

Chapter 2

OPERATION

This chapter provides information which is required in order to actually make effective use of PX-4. It starts with an explanation of procedures for starting and ending operation and goes on to discuss data input, system operation, and the CP/M commands. This is probably the part of the manual which you will refer to most frequently as you become familiar with PX-4.

It is not necessary to try to memorize the commands and operating procedures. If you forget a command, simply open the manual to this chapter and review the section which applies. After doing this several times, you will naturally absorb the information you need to know.

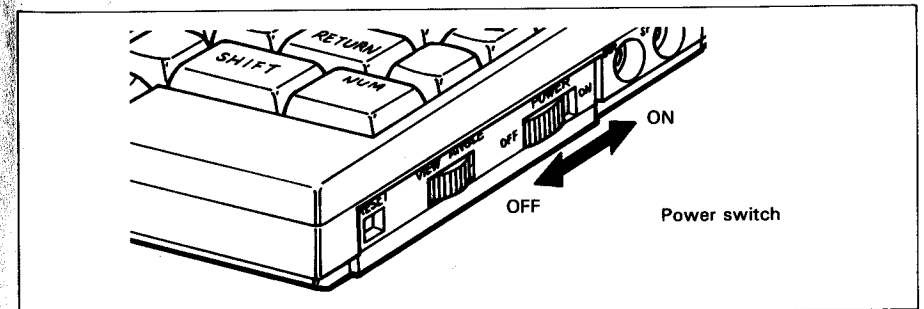
2.1 Introduction to Operation

This section describes procedures for actually starting PX-4 operation after you have removed it from its carton. Follow the procedures carefully and do one step at a time.

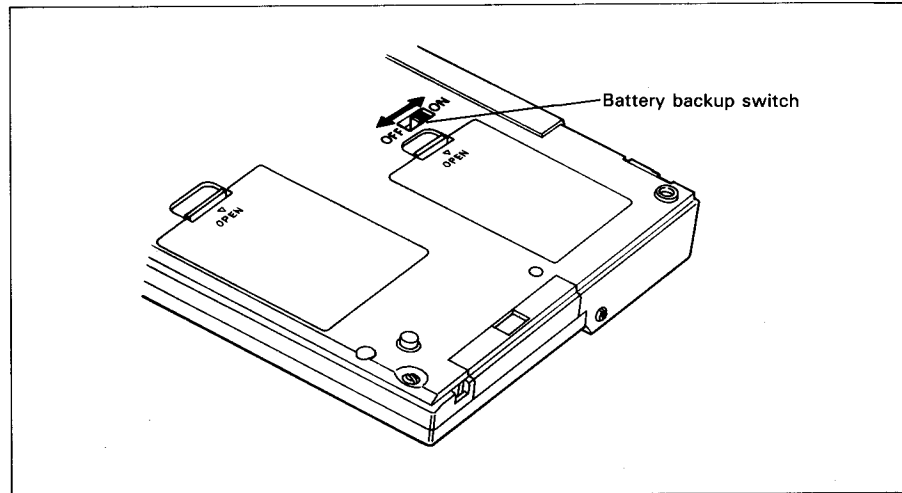
Step 1: Battery installation

PX-4 can be operated using dry cells. If you will be using dry cells, install them as follows.

1. Verify that the power switch is set to OFF.



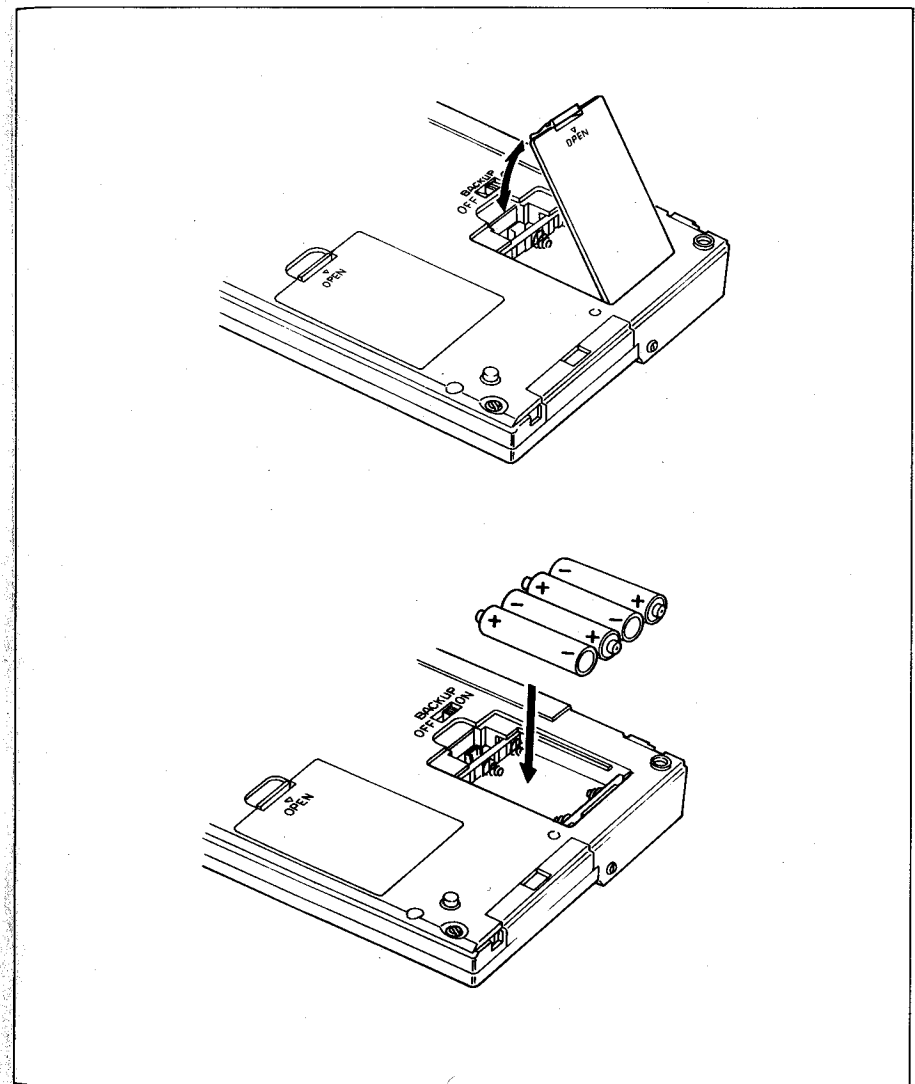
2. Next, set the battery backup switch on the bottom of PX-4 to the ON position.



Here, "battery backup" refers to the supply of power to memory to maintain the contents of memory while the main power is off. Unless you will not be using PX-4 for an extended period of time, leave the battery backup switch set to ON at all times.

NOTE:
See section 2.9 for using NiCd battery pack and AC adapter.

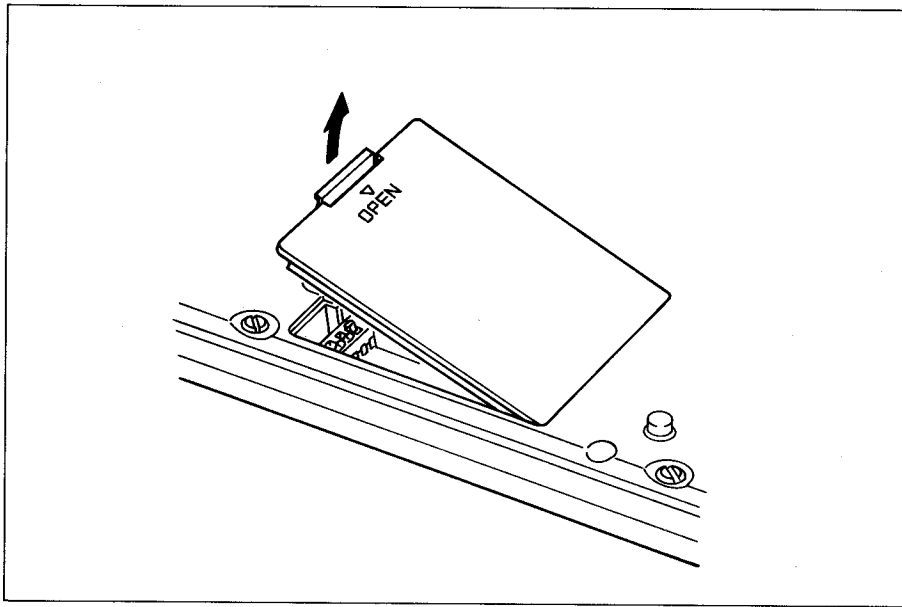
3. Open the battery compartment and insert four dry cells as shown in the figure below. (Be sure to use AA-size cells and make sure that the polarity is correct.)



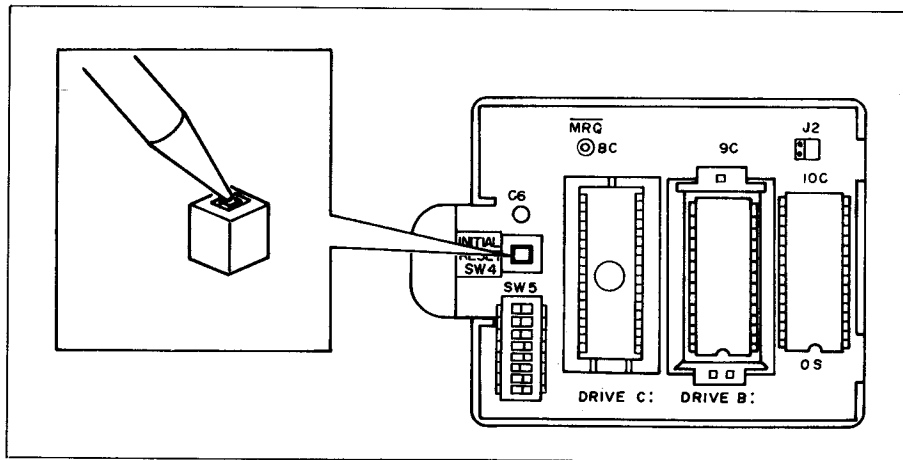
4. Close the battery compartment.

Step 2: System initialization

1. Open the ROM capsule compartment on the bottom of PX-4.



2. Press the 7508 slave CPU reset switch which is located inside the ROM capsule compartment.



3. Close the ROM capsule compartment.
4. Turn on the power switch.
5. Verify that the SYSTEM INITIALIZE screen is displayed. This screen appears as shown below.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 000000000000
```

If the characters which appear on the screen at this time are not easy to read, raise the LCD screen and adjust contrast by turning the VIEW ANGLE control knob.

6. Input the current date and time. When doing this, enter the hour as a number from 1 to 24 (PX-4's clock function uses the 24-hour system). If you accidentally enter an incorrect number, you can correct the entry by moving the cursor with the and keys. After typing in the date and time, press the **RETURN** key; this sets the date and time to PX-4's calendar/clock. For example, if the date is May 30, 1984 and the time is 15:37:40, enter as follows.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 053084153740
```

7. After the date and time have been input, the screen changes as shown below.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 053084153740
WEEK (0 to 6) 0
```

Now enter the day of the week as a number from 0 to 6.
Correspondence between numbers and days of the week is as follows.

0	1	2	3	4	5	6
SUN	MON	TUE	WED	THU	FRI	SAT

Since we are assuming that the date is May 30, 1984, type in 3 for Wednesday and press the **RETURN** key.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 053084153740
WEEK (0 to 6) 3
```

8. After the day of the week has been entered, the screen changes as shown below.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 053084153740
WEEK (0 to 6) 3
RAM DISK SIZE (x1 kB) 26
```

At this point you can specify the RAM disk size (the amount of memory which is used as RAM disk) as a 1- or 2-digit number from 02 to 35K bytes (01 cannot be specified). If 00 is specified, the RAM disk size is set to 0 and the RAM disk cannot be used. The number "26" which is displayed on the screen indicates the default RAM size (the size which is used if no other number is specified). This value is set automatically if the **RETURN** key is pressed without entering any number. The message "RAM DISK SIZE (1 kB) 26" is not displayed when the external RAM disk unit is installed. (RAM disk capacity is fixed to 128K bytes.)

9. For the time being, leave the RAM disk size unchanged; just press the **RETURN** key. After doing so, the screen changes again as shown below.

```
SYSTEM INITIALIZE
DATE/TIME (MMDDYYhhmmss) 053084153740
WEEK (0 to 6) 3
RAM DISK SIZE (x1 kB) 26
USERBIOS SIZE (x256 B) 000
```

The size of the user BIOS area can be specified as a 1, 2, or 3 digit number (indicating a multiple of 256 bytes). The sum of the RAM disk size and the user BIOS area size must not be greater than 35.5K bytes. The "000" displayed on the screen is the system default value (the setting which is used if no other size is specified). For the present, do not specify a user BIOS area size. Just press the **RETURN** key; this ends system initialization and starts CP/M.

NOTES:

1. The system may not operate properly if invalid data is entered during system initialization (for example, if 7 is specified for the day of the week). If you press the return key after accidentally entering an incorrect number, do system initialization over again from the beginning.
2. See Appendix C "BIOS Subroutines" for information pertaining to user BIOS.

Step 3: Running application programs (e.g., BASIC)

1. The following menu screen is displayed after **Step 1** and **Step 2** above have been completed.

```
##.#k CP/M 05/30 (SUN) 15:45:59 1/1
B: BASIC
B: BASIC
```

(Numbers displayed at #.# indicate the memory size of CP/M.)

This screen can be thought of as a list which indicates what application programs are included on the currently selected disk. (See 2.4.2 "MENU screen" for details on the functions of this menu and procedures for using it.)

When several file names are displayed in the menu, the file desired can be selected using the cursor control keys. The name of the selected program (file) is shown in reverse display and displayed on the command line. Now, select BASIC and press the **RETURN** key.

2. When the **RETURN** key is pressed, characters on the command line are passed to the console command processor and the appearance of the screen momentarily changes as shown below.

```
A>B:BASIC
```

This shows that CP/M is starting BASIC from drive B:.

3. After BASIC has been started, the BASIC start-up menu is displayed as shown below.

```
BASIC Ver #.# (C) 1983 Microsoft & EPSON
RETURN to run or SPACE to login.
P0: ***** Bytes Free
P1:
P2:
P3:
P4:
P5:
```

(The numbers indicated for #.# in this screen indicate the version number of BASIC, and those displayed for ***** indicate the amount of memory which is available for use by BASIC.)

Select one of BASIC's five program areas by using the **↑** and **↓** keys to move the cursor up or down. If the space key is pressed, the selected program area is logged in and BASIC stands by for input of commands; if the **RETURN** key is pressed, the selected program area is logged in and any program in that area is executed automatically.

See the BASIC Reference Manual for an explanation of the program areas and procedures for using BASIC.

2.2 Start-Up and Shut-Down

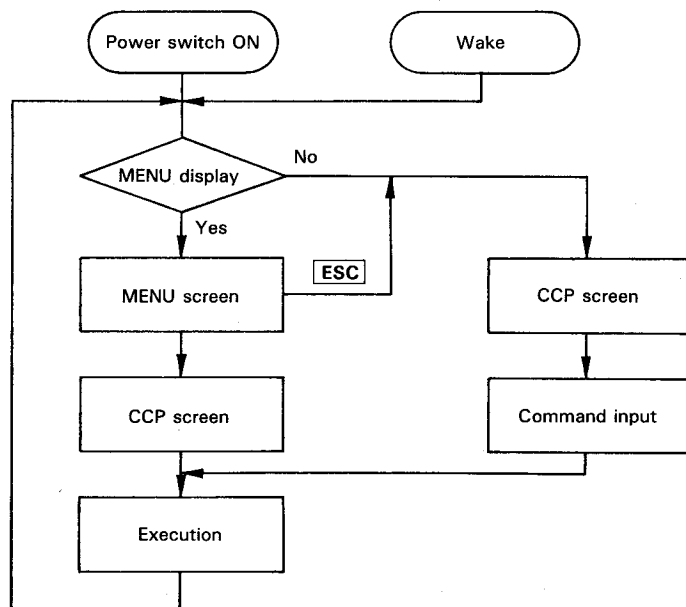
This section describes PX-4's start-up and shut-down sequences. Here, the meanings of "start-up" and "shut-down" are as follows.

Start-up: Refers to start-up of the CP/M operating system when PX-4's power is turned on. One of PX-4's various start-up screens is displayed when CP/M operation is started.

Shut-down: Refers to shut-down of PX-4's power and termination of operation. After shut-down, nothing is displayed on the LCD screen.

Usually, PX-4 is started simply by turning on the power switch. However, it is also possible to set PX-4 to start itself automatically at a preset time. (This is referred to as the wake function. See 2.5.2 "Wake" for an explanation of this function.)

When PX-4 is started, a MENU screen is displayed. Programs are executed by moving the menu cursor to the name of the program which is to be executed, then pressing the **RETURN** key. If you want to go from the MENU screen to the CCP screen, press the **ESC** key.



Whether or not the MENU screen is displayed is specified from the System Display as described in 2.4.4 "System Display."

PX-4 operation is shut down when the power switch is set to OFF or when a specific amount of time has passed since the last key entry was made. In the latter case, the power is turned off automatically by PX-4's power-off function. (See 2.5.4 "Automatic power-off for details on this function.)

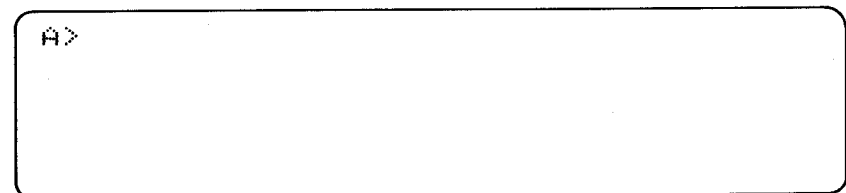
<Power off states The restart mode and the continue mode>

PX-4 enters one of two states when the power is turned off. These states are referred to as the restart mode and the continue mode.

The restart mode is the mode in which the CCP screen is displayed when the power switch is turned on. (If the MENU screen display function is turned on, the MENU screen is displayed instead of the CCP screen; if BASIC is active, the BASIC initial screen is displayed.) When the power is turned off in the restart mode, display information and information concerning input in progress is lost and the start-up screen is displayed the next time the power is turned on.

The continue mode is the mode in which display and input information, etc., is preserved and operation resumes at the point at which it was interrupted when the power switch was turned off. This is shown by example below. Do this examples as described and note the difference which occurs when the power is turned on from the continue mode.

1. Turn on the power switch and display the CCP screen (if the MENU screen is displayed, go to the CCP screen by pressing the **ESC** key). The screen should appear as shown below.



- When the CCP screen is displayed as shown above, type in some letters from the keyboard (any letters will do), but do not press the **RETURN** key.

```
A>ABCDEFGG
```

- Turn off the power switch while pressing the **CTRL** key (this turns off the power in the continue mode), then turn the power switch back on again. When the power switch is turned on, the speaker beeps and data displayed on the screen when the power was turned off is displayed again. If any further keys are pressed at this point, they will appear following the characters which were input before the power was turned off.

Conditions under which the power goes off in the continue mode (under which previous conditions are maintained the next time the power switch is turned on) are as follows.

- When the power switch is turned off while pressing the **CTRL** key
- When the power is turned off by the auto power-off function
- When the power switch is turned off during execution of a BASIC program
- When a power failure occurs
- When the power switch is turned off while the item keyboard is installed

2.3 Inputting Data from the Keyboard

Either of two types of keyboards can be used with PX-4: the standard keyboard or the item keyboard. This keyboards are described below.

Standard keyboard

The standard keyboard has 72 keys. These keys are divided into four groups by function as follows.

Alphanumeric keys (50 keys)

The alphanumeric keys are used to input letters, numbers, and graphic characters.

Function keys (9 keys)

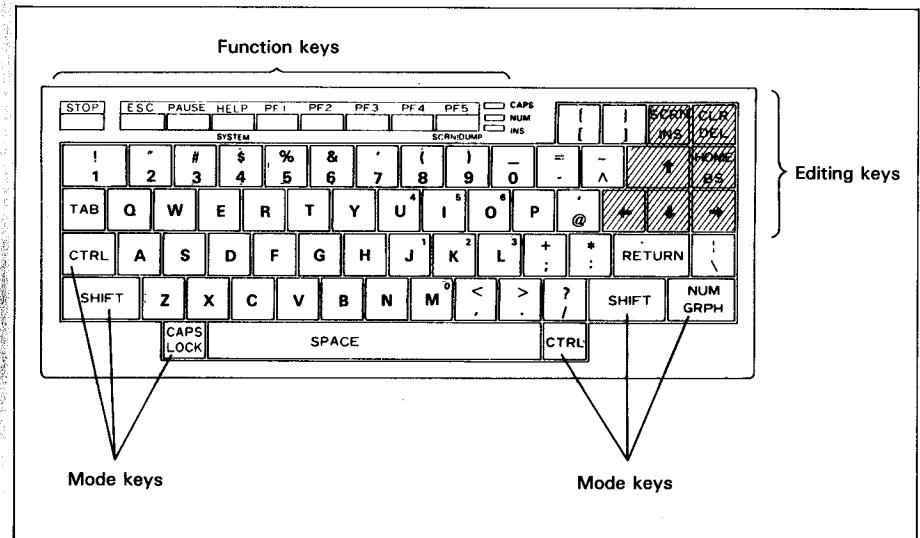
The function keys are definable; that is, commands and functions can be assigned to them by the user.

Editing keys (7 keys)

These keys are used for screen editing and control.

Mode keys (6 keys)

These keys are used to switch input between the alphanumeric and graphic input modes.



Item keyboard

The keys on the item keyboard are divided into four groups by function as follows.

Item keys (32 keys) and **SHIFT** key (1 key)

Except for the **SHIFT** key, all of these keys are redefinable. The initial key definitions (those set when the system is initialized) are as shown in the figure below.

Numeric keys (19 keys)

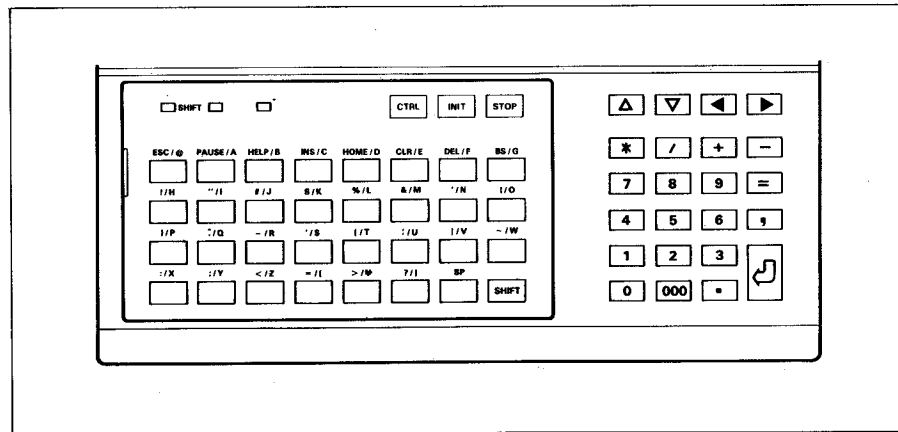
Included among the numeric keys are keys used for inputting numbers and arithmetic operators, and the **RETURN** key.

Cursor control keys

These keys are used to move the cursor.

System keys (3 keys)

These keys are used to reset the system and for input/output control.



There are three LED indicators on the item keyboard. One of these indicates the current **SHIFT** state, and the other two are provided for use by the user. Procedures for lighting and turning out the LEDs are described in Appendix E "Programmable Function Keys and Item Keys" in the BASIC Reference Manual.

2.3.1 Input procedures when using the standard keyboard

This section describes procedures for inputting data (letters, numbers, and graphic characters) and for using the function keys.

Before trying to input any data, prepare for input as follows.

1. Display the CCP screen. At this point, PX-4 is in the data input mode (the mode in which PX-4 accepts character input when keys are pressed.)
2. Verify that the three LEDs located next to **PF5** are not lit.

If any of the LEDs are lit, turn them out as follows.

If the CAPS LED is lit, press the **CAPS LOCK** key.

If the NUM LED is lit, press and hold the **SHIFT** key, then press the **NUM** key.

If the INS LED is lit, press the **INS** key.

When the standard keyboard is installed, the following three modes can be selected by pressing the mode selection keys. Characters input when keys are pressed correspond to the input mode being used at the time.

- (1) Alphanumeric modes
 - Normal mode
 - CAPS LOCK mode
 - Numeric mode
- (2) Graphic mode

(1) Inputting alphanumeric characters and symbols (alphanumeric modes)

Basic procedures for switching the keyboard input mode are as follows.

Normal mode

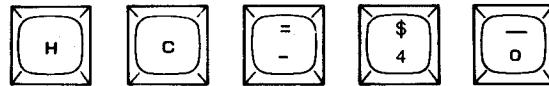
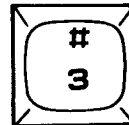
None of the keyboard LEDs are lit while the keyboard is in the normal mode. Characters which can be input in this mode are as follows.

Lowercase letters (a to z) and spaces

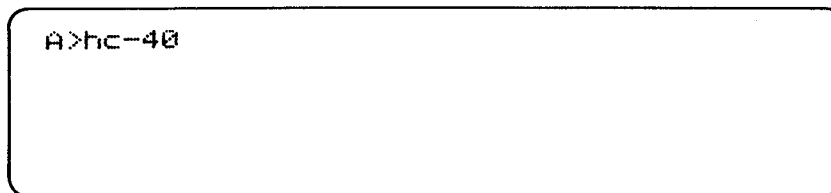
Numerals (0 to 9)

Alphanumeric symbols ([] - @; : , . / \)

The mode in which these characters can be input is referred to as the alphanumeric normal mode. In other words, the character which is input when a key such as that shown in the figure at right is pressed is that which appears at the bottom of the key face (3). If the key pressed is an alphabetic key, a lowercase letter is input. To see this, try pressing the following keys in sequence.



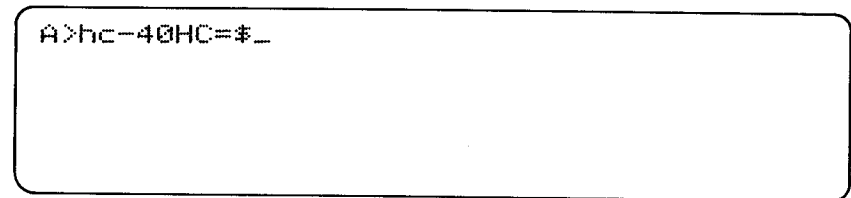
After pressing these keys, the screen appears as shown below.



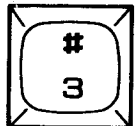
NOTE:

If you accidentally press an incorrect key, press the **HOME BS** key. This moves the cursor one space to the left and deletes the last character entered. Carefully press the keys one at a time.

Next, press the same keys again while holding the **SHIFT** key. After doing this, the screen should appear as shown below.

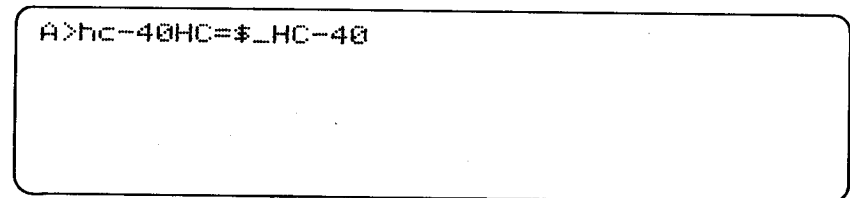


As you can see, pressing alphabetic keys together with the **SHIFT** key causes uppercase letters to be input; pressing keys such as that shown at right causes the character printed at the top of the key (#) to be input.



CAPS LOCK mode

Now press the **CAPS LOCK** key (the key to the right of the space bar); this causes the CAPS LED to light and switches the keyboard to the alphanumeric CAPS LOCK mode. After switching to this mode, press the above keys in sequence again. The screen should now appear as follows.



This mode is almost the same as the alphanumeric normal mode, but uppercase letters are input when alphabetic keys are pressed by themselves, and lowercase letters are input when they are pressed together with the **SHIFT** key. To switch back to the alphanumeric normal mode, press the **CAPS LOCK** key again.

The table below summarizes procedures for inputting data in the alphanumeric modes.

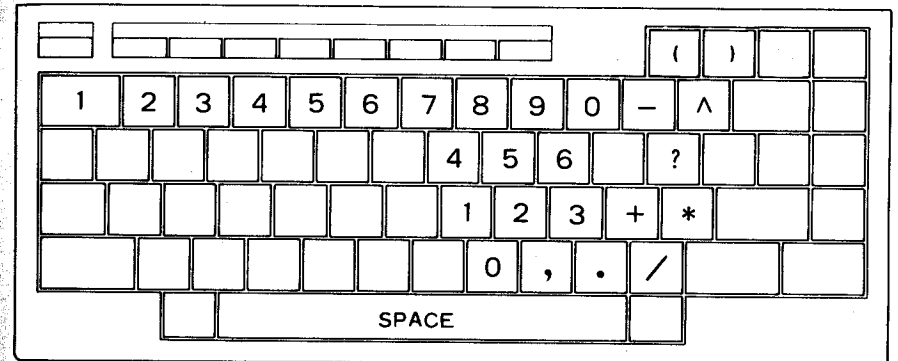
Table of keyboard modes

LED	Key input		Input data
<div style="display: flex; flex-direction: column; gap: 5px;"> <div><input type="checkbox"/> CAPS</div> <div><input type="checkbox"/> NUM</div> <div><input type="checkbox"/> INS</div> </div>			a
		+	A
			1
		+	!
<div style="display: flex; flex-direction: column; gap: 5px;"> <div><input checked="" type="checkbox"/> CAPS</div> <div><input type="checkbox"/> NUM</div> <div><input type="checkbox"/> INS</div> </div>			A
		+	a
			1
		+	!

Numeric mode

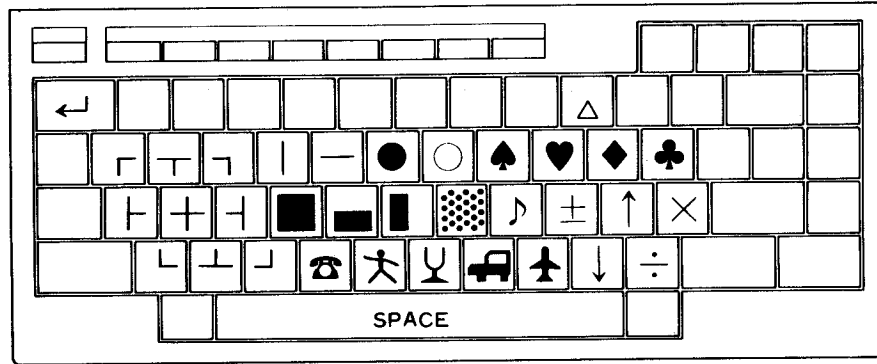
Certain keys on the keyboard have a special function when they are pressed while the keyboard is in the numeric mode. If you work with numbers frequently, you will find it convenient to learn to use these special keys.

To enter the numeric mode, press the **SHIFT** key together with the **NUM** key. In this mode, the NUM LED lights. Characters which can be input and the keys used to input them are as shown in the figure below.



(2) Graphic character input (graphic mode)

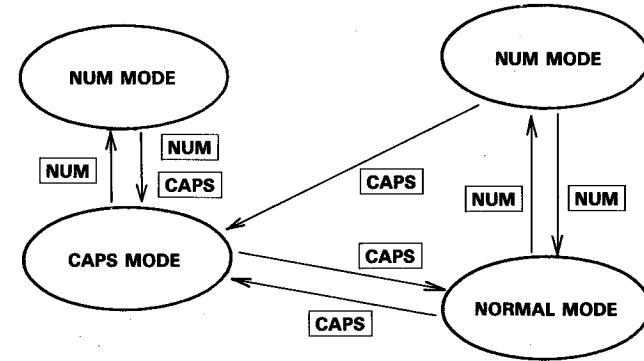
Although the key faces are not marked with graphic characters, such characters can be input using the keys shown in the figure below.



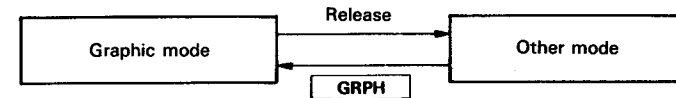
To input a graphic character, press the key to which that character is assigned together with the **GRPH** key. For example, if the **▽** key is pressed together with the **GRPH** key, the character “☎” is input.

Unlike other modes, the keyboard cannot be locked in the graphic mode. (Graphic characters can only be input while the **GRPH** key is being pressed.)

Although basic procedures for switching the keyboard mode are as described above, it is also possible to switch modes in a variety of other ways which are dependent on the mode being used at the time. These procedures are illustrated in the figure below.

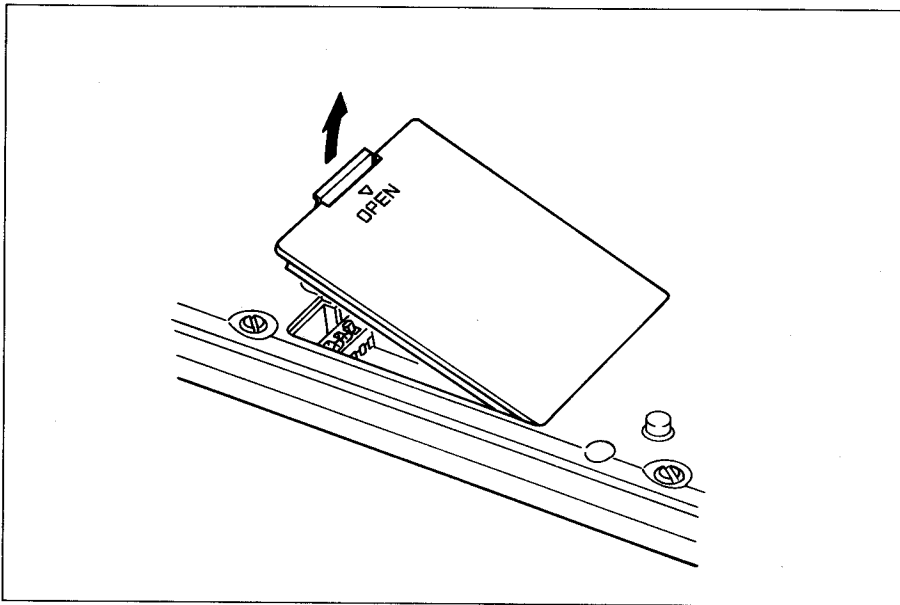


In this figure, **NUM** indicates that the **NUM** key is to be pressed while holding the **SHIFT** key. The graphic input mode can be entered from any other mode simply by pressing the **GRPH** key.

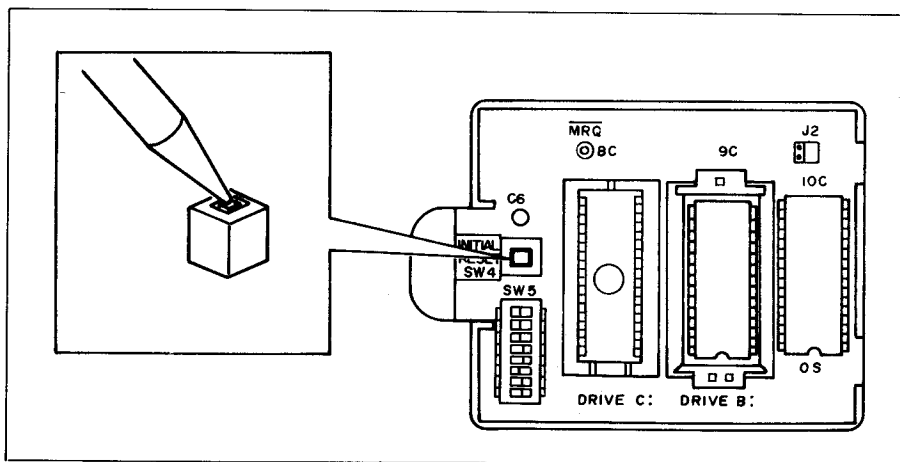


Step 2: System initialization

1. Open the ROM capsule compartment on the bottom of PX-4.



2. Press the 7508 slave CPU reset switch which is located inside the ROM capsule compartment.



3. Close the ROM capsule compartment.
4. Turn on the power switch.
5. Verify that the SYSTEM INITIALIZE screen is displayed. This screen appears as shown below.

```
SYSTEM INITIALIZE  
DATE/TIME (MMDDYYhhmmss) 000000000000
```

If the characters which appear on the screen at this time are not easy to read, raise the LCD screen and adjust contrast by turning the VIEW ANGLE control knob.

6. Input the current date and time. When doing this, enter the hour as a number from 1 to 24 (PX-4's clock function uses the 24-hour system). If you accidentally enter an incorrect number, you can correct the entry by moving the cursor with the \leftarrow and \rightarrow keys. After typing in the date and time, press the **RETURN** key; this sets the date and time to PX-4's calendar/clock. For example, if the date is May 30, 1984 and the time is 15:37:40, enter as follows.

```
SYSTEM INITIALIZE  
DATE/TIME (MMDDYYhhmmss) 053084153740
```

7. After the date and time have been input, the screen changes as shown below.

```
SYSTEM INITIALIZE  
DATE/TIME (MMDDYYhhmmss) 053084153740  
WEEK (0 to 6) 0
```

2.3.2 Input procedures when the item keyboard is installed

This section explains procedures for keying in data when the item keyboard is installed on PX-4. Types of keys on the item keyboard are as follows.

Item keys

The keyboard includes 31 item keys which can be defined by the user and a shift key which is used to shift the functions of the item keys. Any string of characters can be assigned to the item keys, making it possible to design easy-to-use systems for special-purpose applications.

However, initial values are assigned to the item keys during system initialization to make it easy to prepare and run application programs. The initial values assigned include alphanumeric characters and control codes, and are set whenever the system is initialized, the reset switch is pressed, or BASIC operation is terminated by execution of the SYSTEM command.

Numeric keys

There are 19 keys in the numeric key pad, including numeric keys, special symbol keys, and a **RETURN** key.

Cursor control keys

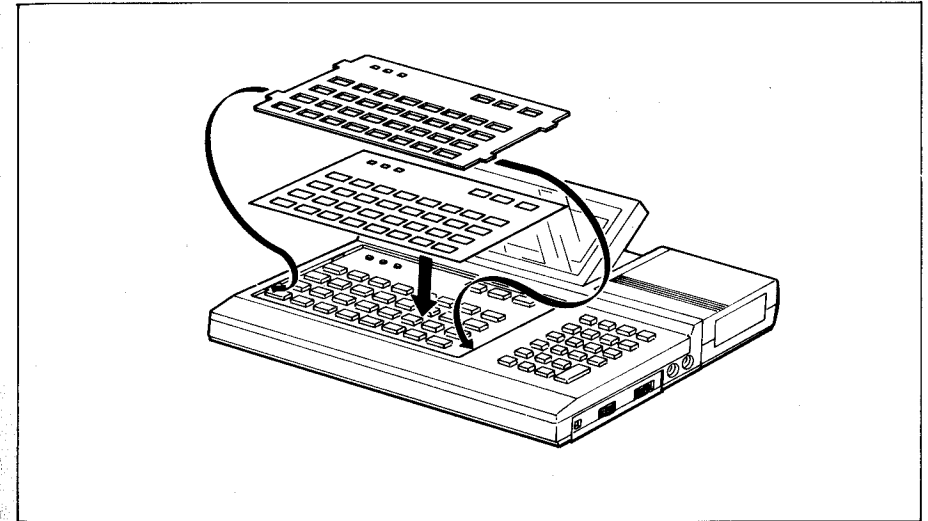
The cursor control key group consists of four keys for moving the cursor.

System keys

The system control key group consists of three system keys.

(1) Input using the item keys

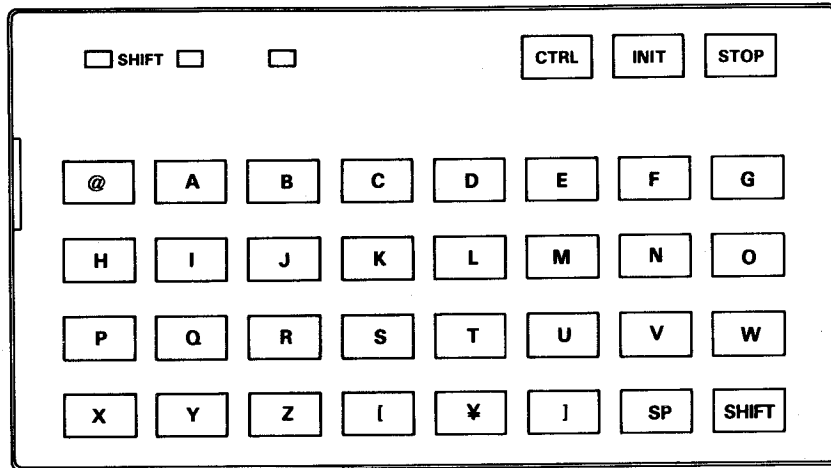
Since the functions of item keys are defined by the user, the faces of the keys are not marked. Instead, overlay sheets are provided to allow the user to mark the keys as appropriate. Of the two overlay sheets provided, one is preprinted with the key definitions which are effective following system initialization. This sheet is placed over the top of the item keyboard. The user can write his own definitions on the other overlay sheet.



The item key group alternates between the normal mode and the shift mode when the **SHIFT** key is pressed. When the item keys are in the shift mode, the LED at the upper left corner of the keyboard lights.

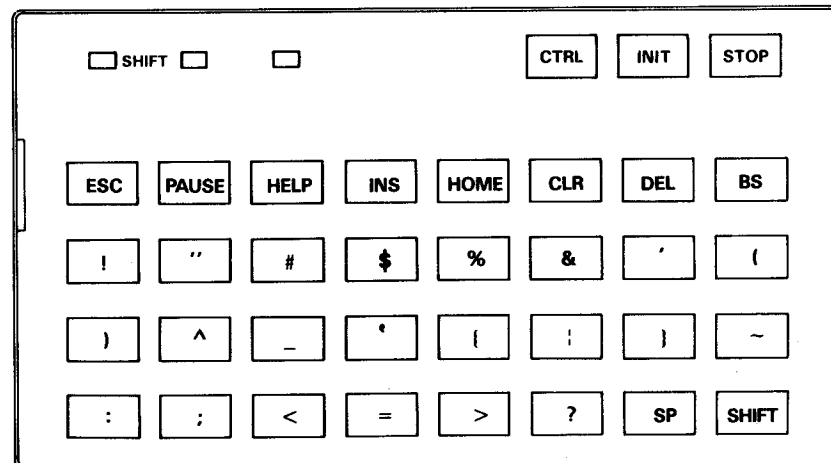
Normal mode

Keys which are effective in the normal mode (the mode in which the SHIFT LED is not lit) are as shown below.



Shift mode

Keys which are effective in the shift mode (the mode in which the SHIFT LED is lit) are as shown below.

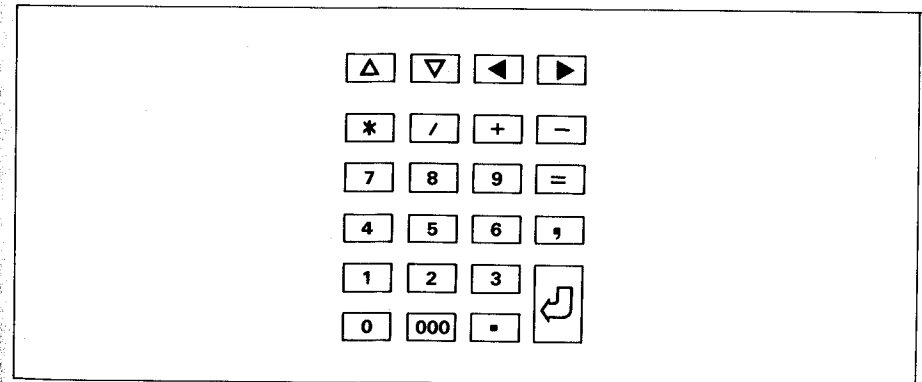


Use of the special keys is as shown below.

- ESC** Switches from the menu screen to the CCP screen.
- PAUSE** Momentarily stops execution of CP/M commands or BASIC programs. Execution resumes when any key other than the **SHIFT**, **INIT**, or **STOP** keys is pressed.
- HELP** Does nothing. Can be used for special purposes in user-written programs.
- INS** See the explanation of the **SCRN INS** key in 2.3.3, "Using the editing keys."
- HOME** See the explanation of the **SHIFT** + **HOME BS** keys in 2.3.3, "Using the editing keys."
- CLR** See the explanation of the **SHIFT** + **CLR DEL** keys in 2.3.3, "Using the editing keys."
- DEL** See the explanation of the **CLR DEL** key in 2.3.3, "Using the editing keys."
- BS** See the explanation of the **HOME BS** key in 2.3.3, "Using the editing keys."

(2) Input using the numeric keys

The numeric keys are those whose markings are as shown below.



Characters and symbols which can be input using these keys are as follows.

- Numerals (0 to 9 and 000)**
- Alphanumeric symbols (* /+ - = , .)**
- RETURN code**

Cursor control keys

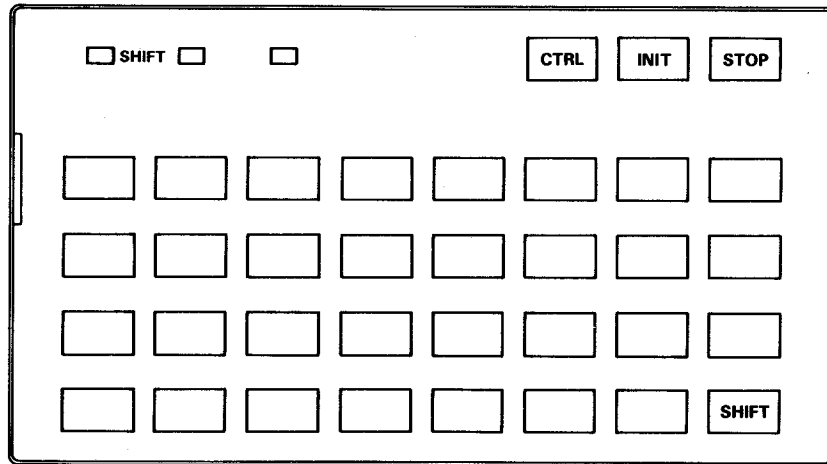
The cursor control keys are those keys which are marked as shown below.



See 2.3.3, "Using the editing keys" for procedures for using the cursor control keys.

(4) Input using the system keys

The system keys are the three keys in the figure below which are marked **CTRL**, **INIT**, and **STOP**.



The system keys have special functions, and can only be used as described below.

1. System initialization

System initialization is performed when the reset switch is pressed while holding the **INIT** and **STOP** keys.

2. **STOP**

Pressing the **STOP** key ends execution of CP/M commands or BASIC programs and returns the system to the command input mode.

3. **CTRL** + **STOP**

Pressing the **STOP** key together with the **CTRL** key forcibly terminates program execution and any input/output operation which is currently in progress and returns the system to the command input mode.

NOTE:

*The system **CTRL** key is not the same as the **CTRL** on the standard keyboard, and cannot be used in combination with other keys.*

Notes concerning item keyboard installation

The item key parameters are as follows following system initialization.

- *The key repeat function is turned off.*
- *The power goes off in the continue mode when the power switch is turned off.*
- *The System Display cannot be displayed.*
- *The screen contents cannot be dumped to the printer by pressing **CTRL** + **PF5**.*

2.3.3 Using the editing keys

The cursor control keys and the **INS**, **DEL**, and **BS** keys are used for editing commands and messages which have been input from the keyboard and for controlling the screen.

As is indicated in the table below, certain editing keys are used in combination with the **SHIFT** and **CTRL** keys. Further, the functions of the editing keys vary according to the mode of system operation.

Editing key	↑	↓	←	→	SHIFT + ↑	SHIFT + ↓	SHIFT + ←	SHIFT + →
Screen								
Menu	See 2.4.2.							
CCP					Moves the window up one line.	Moves the window down one line.	When the virtual screen is 80 characters wide, moves the window 20 characters to the left.	When the virtual screen is 80 characters wide, moves the window 20 characters to the right.
BASIC	Moves the cursor up one line.	Moves the cursor down one line.	Moves the cursor one character to the left.	Moves the cursor one character to the right.	Same as above.	Same as above.	Same as above.	Same as above.
System Display			Same as above.	Same as above.				

NOTE:

When the item keyboard is installed, the cursor control keys cannot be used with the **SHIFT** key except when the menu screen is displayed.

Editing key	SCRN INS	CLR DEL	HOME BS	SHIFT + SCRN INS	SHIFT + CLR DEL	SHIFT + HOME BS	CTRL + ↑	CTRL + ↓
Screen								
Menu			Deletes the character to the left of the cursor.				See 2.4.2.	
CCP	Redisplays the contents of the command buffer.	Deletes one character from the command buffer.	Same as above.	Switches scrolling between the tracking mode and the non-tracking mode.			Moves the window up 8 lines in the virtual screen.	Moves the window down 8 lines in the virtual screen.
BASIC	Switches key input to the insert mode.	Deletes the character at the cursor position.	Same as above.	Same as above.	Clears the screen.	Moves the cursor to the beginning of the virtual screen.	Same as above.	Same as above.
System Display		Inputs a delete character Δ.	Same as above.					

Editing key	CTRL + →	CTRL + ←	CTRL + SCRN INS
Screen			
Menu			
CCP	When the virtual screen is 80 characters wide, moves the window to its right side.	When the virtual screen is 80 characters wide, moves the window to its left side.	Moves the window screen to the position of the cursor.
BASIC	Same as above.	Same as above.	Same as above.
System Display			

NOTES:

1. See 2.6, "Virtual Screen and Window" concerning the CCP screen; for the BASIC screen, see 1.6, "Screen Editor" in the BASIC Reference Manual.
2. The **CTRL** key cannot be used when the item keyboard is installed.

2.4 Screens

After reading the preceding sections, you have probably noticed that PX-4's operation varies according to what type of screen is being displayed at a given time. For example, a command which is executed properly when input from the keyboard while one screen is displayed may result in an error if input in another screen. Further, the assignments of the function keys may change.

The system states in which operation differs are referred to as the system's operating modes. Different screens are displayed for each operating mode.

PX-4 has three main screens as follows.

MENU screen
CCP screen
System Display

The functions of the various screens are briefly explained below.

MENU screen

The MENU screen displays a list of CP/M application programs which are currently recorded on disks. When a program is selected from the menu list, operation is automatically switched to the CP/M mode, and the program is loaded and executed. You can select whether the menu is displayed or not displayed.

CCP screen

This screen is displayed when the system is operating in the CP/M mode (the mode in which CP/M commands and application programs are executed). In the CP/M mode, either the CCP screen (the screen used to input CP/M commands) or an application program screen is displayed.

System Display (not displayed when the item keyboard is installed)

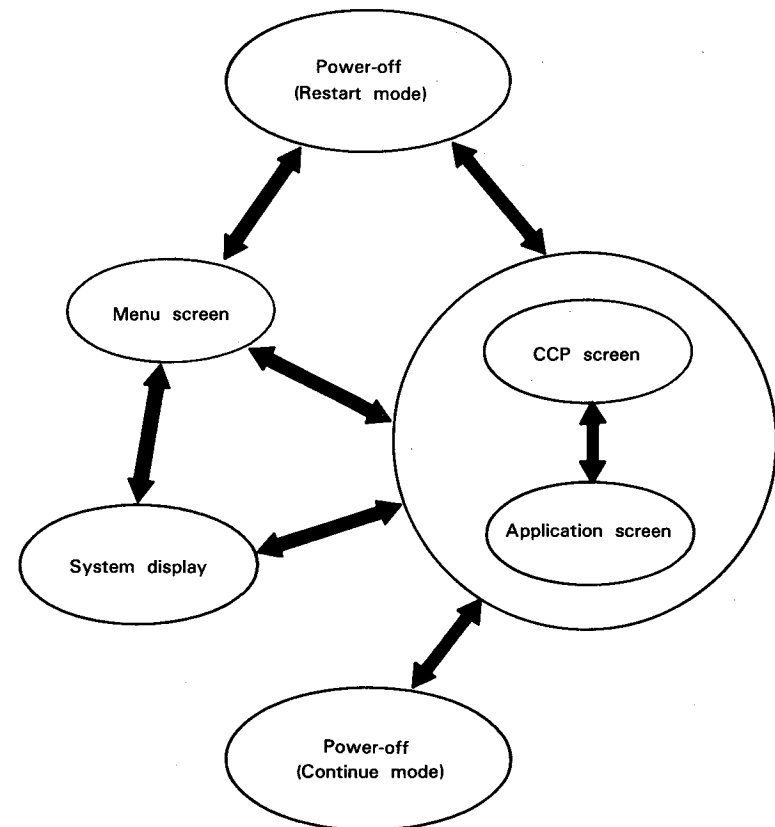
The System Display is used to turn the MENU screen display function on or off, and to set a variety of other system parameters (such as the wake or alarm settings and the auto start/auto power-off functions).

The System Display can be displayed by pressing **CTRL** + **HELP** in any operating mode. When the System Display is displayed, operation is returned to the previous mode by pressing the **ESC** key.

Try turning on the power switch and pressing the **HELP** key together with the **CTRL** key; a screen with the title "*** SYSTEM DISPLAY ***" appears. Next, press the **ESC** key and notice the previous screen is displayed again.

2.4.1 Switching screens

The three screens described above are related to each other; that is, display can be switched from one screen to another as shown in the figure below.



Principal operations for each of the display screens is described below.

MENU screen

Power switch..... When set to OFF, the power is unconditionally turned off in the restart mode.

ESC key Switches display to the CCP screen.

Program selection..... When a program is selected, the system switches momentarily to the CCP screen for program loading, then the application program is executed.

CCP screen

Power switch..... When set to OFF, the power is turned off in the restart mode; if set to OFF while pressing the **CTRL** key, the power is turned off in the continue mode.

NOTE:

See the explanation of the CP/M operation and the CCP screen in 1.3.1, "Operating system."

System Display

Power switch..... When set to OFF, turns off the power in the restart mode.

ESC key Returns display to the screen shown before appearance of the System Display.

NOTE:

The System Display cannot be displayed when the item keyboard is installed.

When the item keyboard is installed, the power always goes off in the continue mode when the power switch is set to OFF, regardless of whether the **CTRL** key is pressed.

2.4.2 MENU screen

The MENU screen displays a list of specified program files (CP/M commands and application programs). Program files can be selected from the list with the cursor control keys, then loaded and executed by pressing the **RETURN** key.

```
##.#k CP/M 05/05 (SAT) 12:08:07 1/6*
B: BASIC
D: ED COM D: SUBMIT COM
D: ASM COM D: STAT COM
D: DDT COM D: LOAD COM
D: XSUB COM D: DUMP COM
D: M COM D: Z COM
D: L COM
```

The MENU screen consists of three parts as follows.

1. Header

```
##.#k CP/M 05/05 (SAT) 12:08:19 1/6*
```

The MENU screen header consists of the date and time, the CP/M comment (CP/M size, #.#.#), and the current/maximum number of menu pages (1/6 in the example above). An asterisk is displayed to the right of the menu page numbers if there are more than 73 files.

2. Command line

```
B: BASIC
```

When the program file which is currently selected is executable by itself, its drive name and file name are displayed on the command line (for example, B: BASIC); directly executable files are referred to as COM files because they are identified with the file name extension COM.

If the program file selected is not executable by itself (for example, if it is a BASIC program file), the drive name and file name of the required COM file (e.g., B: BASIC) are displayed on the command line, followed by the drive name, file name, and file name extension of the selected program file. An example of this is shown below, when program file "E: KEY.BAS" is selected. Since this is a BASIC program file, it is displayed on the command line after "B: BASIC".

When the file selected is a COM file, its file name extension is not displayed on the command line.

```

##.#k CP/M 05/05 (SAT) 12:38:31 5/6*
B: BASIC E: KEY.BAS
E: Z COM E: COMP1 COM
E: KEY BAS E: COMP2 COM
E: FCB COM E: DISKCOPY COM
E: DDT COM E: W COM
E: ASM COM E: LOAD COM
E: SS COM E: C2 BAS
  
```

When a COM file is selected, a cursor () is displayed 12 character positions from the left side of the screen; if parameters are to specified when the program file is executed, they can be typed in from the keyboard starting at this position. When typing characters into the command line, mistakes can be corrected by pressing the [BS] key to move the cursor back, then retyping. The command line will hold a maximum of 40 characters.

After command line input has been completed, press the [RETURN] key. This passes the contents of the command line to the CCP, which executes the command.

If the command line will not hold all necessary parameters, press the [ESC] key and type in the command from the CCP screen.

3. Program file list

The program file list is the part of the screen which is shown below.

```

B: BASIC COM D: SUBMIT COM
D: ED COM D: STAT COM
D: ASM COM D: LOAD COM
D: DDT COM D: DUMP COM
D: XSUB COM D: Z COM
D: M COM D: L COM
  
```







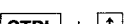
Files satisfying the following conditions are displayed in the program file list.

- Files are in a drive which has been specified in the System Display.
- File name extensions are those which have been specified in the System Display. (Up to four file name extensions can be specified in the System Display.)

The program file list may consist of up to six pages, each of which displays the names of up to 12 files. Therefore, a maximum 72 file names can be displayed in the file list. If the number of files whose names should be displayed in the list is greater than 72, an asterisk is displayed at the right side of the header.




Files are selected from the list by using the cursor control keys to move the block cursor (the part of the display in which black and white are reversed) to the desired file name.

Keys which are used for screen control during MENU display are as follows.

Key	Function
	Moves the block cursor to the program file name above its current position. The block cursor does not move if it is already at the bottom line of the list.
	Moves the block cursor to the program file name below its current position. The block cursor does not move if it is already at the bottom line of the list.
	Moves the block cursor to the file name to the right of its current position. If the block cursor is already at the right side of the screen, it moves to the first file name on the next line. If it is at the right side of the bottom line, it moves to the first file name on the first line of the list.
	Moves the block cursor to the file name to the left of its current position. If the block cursor is already at the left side of the screen, it moves to the first file name on the previous line. If it is at the left side of the top line in the list, it moves to the file name on the right side of the bottom line.
	Switches display to the preceding MENU page and positions the block cursor to the first file name in that page. Does nothing if the first page is already being displayed.
	Advances display to the next MENU page and positions the block cursor to the first file name in that page. Does nothing if the last page is already being displayed.
	Switches display to the first MENU page and positions the block cursor to the first file name in that page. Does nothing if the first page is already being displayed.

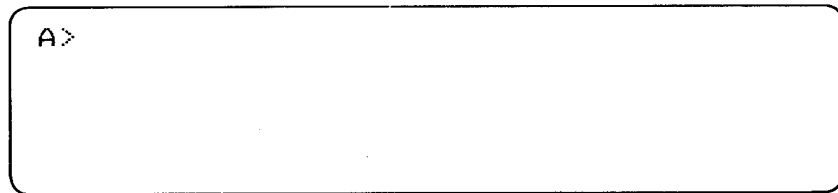
Any parameters on the command line are cleared when any of the above keys are pressed.


NOTE:

 +  cannot be used when the item keyboard is installed. To use the cursor control keys with the  key, verify that the SHIFT LED is lit, then press the appropriate cursor control key.

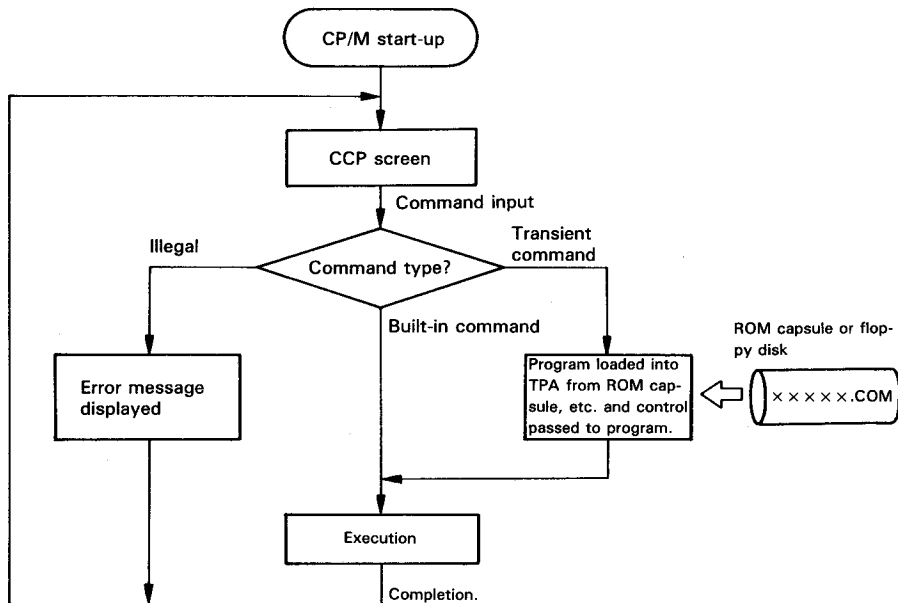
2.4.3 CCP screen

The CCP screen is the first screen which appears in the CP/M mode. This screen is the actual point of origin for all PX-4 operation. All file maintenance and program development is done from this screen, and it is used for execution of all application programs (such as BASIC, CP/M commands, and user programs). This screen always appears immediately after CP/M operation is started, and programs can be executed by inputting commands from this screen. (Although the MENU screen is displayed upon start-up if the MENU display function is on, the system returns to the CCP screen momentarily after program selection in order to execute the program.)



There are two types of CP/M commands. One of these consists of routines which are built into the CCP (the control key commands and built-in commands). The other (transient commands) consists of program files which are stored in ROM capsules or on floppy disks, and which are executed by typing the drive name and file name from the keyboard and pressing the  key. The file name extension “.COM” is used with all transient commands. Therefore, you can prepare your own transient CP/M commands by writing machine language programs and storing them in the RAM disk under a file name whose extension is .COM.

The flow of program execution under CP/M is shown below.



In the CCP screen shown below, the letter "A" indicates a drive name. The drive whose name is displayed on the CCP screen is referred to as the logged-in drive. When the logged-in drive is drive A, the CCP will attempt to load transient program files from drive A when commands are input unless another drive name is specifically specified.

By way of example, try entering the transient command shown below from the CCP screen (the command can be entered in either uppercase or lowercase letters).

```
A>BASIC
```

Since the logged-in drive is drive A, CCP looks for program file BASIC.COM in that drive. However, the file is not in drive A, so an error message is displayed as follows.

```
A>BASIC
BASIC?
A>
```

File BASIC.COM is located in drive B. When the logged-in drive is drive A, the command must be input as follows.

```
A>B: BASIC
```

It is also possible to change the logged-in drive from A to B before inputting the BASIC command. This is done as follows.

```
A>B:
B>BASIC
```

2.4.4 System display

The System Display displays a variety of system parameters, such as the date, time, and sizes of the RAM disk and user BIOS areas. It is also used to set parameters such as the wake/alarm time, auto-start string or alarm message, and MENU display function (on or off). When the optional microcassette drive is installed, it can be manually operated from the System Display.

The System Display screen can be displayed by pressing the **HELP** key together with the **CTRL** key. However, it cannot be displayed during system initialization or when the item keyboard is installed.

The appearance of the System Display screen is as shown below.

```
* SYSTEM DISPLAY * 05/05 (SAT) 14:42:23
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> ABC <MENU> ON

-Select or ESC to exit. 1=RAM cartridge
2=alarm 3=auto start 4=menu
```

When the optional microcassette drive is installed, the appearance is as follows.

```
* SYSTEM DISPLAY * 05/05 (SAT) 00:06:13
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> ON
<MCT COUNT> 00191
-Select or ESC to exit. 1=RAM cartridge
2=alarm 3=auto start 4=menu 5=MCT
<<-/ <- /mou #/dint ->>/era 000/
```

Items included in the System Display are as follows.

Top line Title, and date and time
 <RAM DISK> Indicates the amount of memory which is currently allocated to the RAM disk.
 <USER BIOS> Indicates the amount of memory which is currently allocated as the user BIOS area.
 <MENU DRIVE> Indicates drives whose files are displayed in the menu screen.
 <ALARM> Indicates whether the alarm function is currently turned on or off. (See 2.5.1, Alarm.)
 <AUTO> Indicates whether the auto-start function is currently turned on or off.
 <MENU> Indicates whether the menu display function is currently turned on or off.
 <MCT COUNT> Displayed only when the optional microcassette drive is installed. Indicated the current value of the tape counter.

1 = RAM cartridge Effective only when an optional RAM cartridge is installed; formats the RAM cartridge.
 2 = alarm Used to set the alarm or wake function.
 3 = auto start Used to set the auto-start function.
 4 = menu Used to turn the menu display function on or off.
 5 = MCT Displayed only when the optional microcassette drive is installed. Used to make a variety of microcassette settings.

The bottom line of the screen is related to manual operation of the microcassette drive. For details, see section 2.8, "Microcassette Handling."

```
<<-/ <- /mou #/dint ->>/era 000/
```

2.4.5 MENU screen display specification

This section describes procedures for turning on or off the MENU display function from the System Display.

- (1) Bring the System Display to the screen by pressing **CTRL** + **HELP**, then press the **4** key. The screen then changes as shown below.

```
* SYSTEM DISPLAY * 05/05 (SAT) 16:32:59
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> ON

-Select or ESC to return.
<MENU> 1=off 2=on 3=drive
4=ext1 5=ext2 6=ext3 7=ext4
```

- (2) To turn off the MENU display function, press the **1** key (1 = off); to turn it on, press the **2** key (2 = on). If you select **1**, the screen changes as shown below; if you select **2**, go on to the next step (the screen does not change).

```
* SYSTEM DISPLAY * 05/05 (SAT) 16:39:51
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> OFF

-Select or ESC to exit. 1=RAM cartridge
2=alarm 3=auto start 4=menu
```

- (3) After the MENU display function has been turned on by specifying **2**, the screen remains as shown in paragraph (1) above. Now, specify what files are to be displayed in the menu screen. Start by pressing the **3** key to select the drives whose files are to be displayed. After pressing the **3** key, the screen appears as shown below.

```
* SYSTEM DISPLAY * 05/05 (SAT) 16:33:16
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> ON

-Input drive names, ESC to cancel
CBA
```

Input the names of up to three drives as letters from A to K (either uppercase or lowercase letters may be used). In the example above, drives C:, B:, and A: are specified. Do not include commas, spaces, or other delimiting punctuation between the drive names. After typing in the drive names, press the **RETURN** key.

- (4) The next step is to specify the file name extensions of files which are to be displayed in the MENU screen. This is done from the screen shown in paragraph (1) above. Up to four extensions can be specified; begin specification of each extension by pressing the indicated key (i.e., 4 = ext1, 5 = ext2, 6 = ext3, or 7 = ext4).

For example, to specify the first extension, press the **4** key (for "4 = ext1"). The screen then changes as shown below.

```
* SYSTEM DISPLAY * 05/05 (SAT) 16:33:32
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> ON

-Input extension name 1, ESC to cancel
COM
```

The extension "COM" shown in the screen above is the extension which is automatically set as extension 1 upon system initialization. Another extension can be entered at this point by typing in the appropriate characters and pressing the **RETURN** key. (Alternatively, display can be returned to the screen shown in paragraph (1) without changing the extension by pressing the **ESC** key.)

Press the **RETURN** key, then check extension 2 by pressing the **5** key. The screen will appear as follows.

```
* SYSTEM DISPLAY * 05/05 (SAT) 16:34:32
<RAM DISK> 026 KB <ALARM> OFF
<USER BIOS> 000x256 B <AUTO> OFF
<MENU DRIVE> CBA <MENU> ON

-Input extension name 2, ESC to cancel
BAS B: BASIC
```

The extension "BAS B:BASIC" is the extension which is automatically set during system initialization. The letters "BAS" indicate that files whose extensions are BAS are to be included in the MENU. "B:BASIC" is not part of the extension, but is included to indicate that the letters "B:BASIC" are to be included on the MENU command line whenever a file whose extension is BAS is selected in the MENU screen. This is illustrated in the figure below.

```

##.#k CP/M 05/05 (SAT) 16:37:40 1/6
B:BASIC A:TEST.BAS
B:BASIC COM
D:SUBMIT COM
D:STAT COM
D:LOAD COM
D:DUMP COM
D:Z COM
D:ED COM
D:ASM COM
D:DDT COM
D:XSUB COM
D:M COM
  
```

The reason for this is that BASIC program files cannot be executed by themselves directly from the MENU, but only while the COM file BASIC is running. When the command line includes both B:BASIC and the name of a BASIC program file, BASIC is automatically started before loading and executing the BASIC program file.

If BAS is specified by itself as a file name extension (if "B:BASIC" is omitted), "B:BASIC" is not included on the command line when a BAS file is selected in the MENU. This is shown in the screens below.

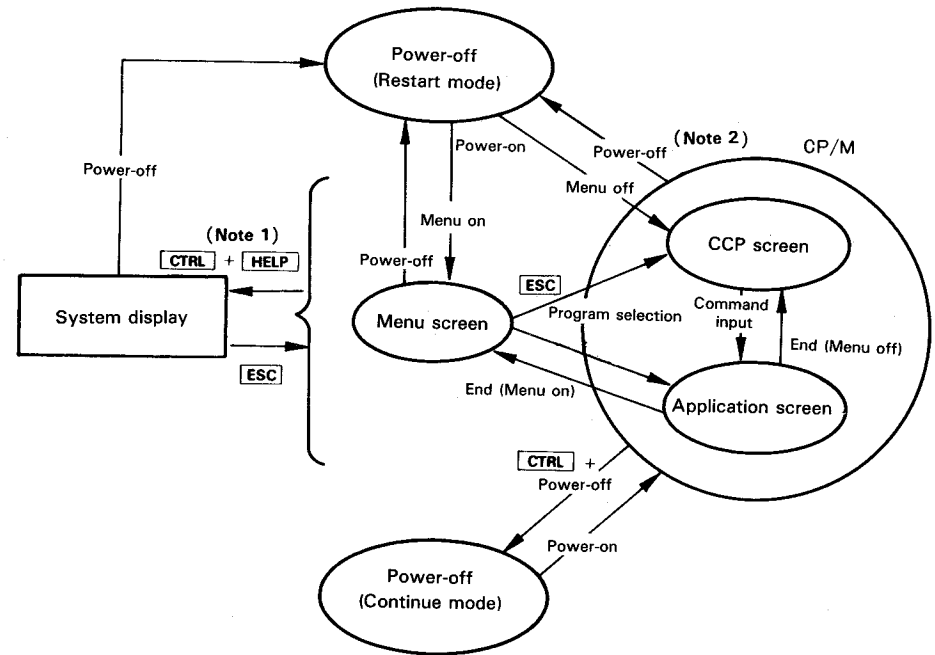
```

##.#k CP/M 05/05 (SAT) 17:54:37 1/6
A:TEST.BAS
B:BASIC COM
D:SUBMIT COM
D:STAT COM
D:LOAD COM
D:DUMP COM
D:Z COM
D:ED COM
D:ASM COM
D:DDT COM
D:XSUB COM
D:M COM
  
```

When BAS is specified by itself as a file name extension, the MENU screen appears as follows when a BAS program file is selected. An error will result if the **RETURN** key is pressed while the screen is as shown above.

Procedures for specifying extensions 3 and 4 are the same as those described above for extensions 1 and 2. After settings have been made in this manner, the MENU screen is displayed when System Display is ended and whenever the power is turned on.

The figure below summarizes the manner in which screens are switched during System Display.



NOTES:

1. When the item keyboard is installed, the power goes off in the continue mode whenever the power switch is turned off.
2. The System Display cannot be displayed while the item keyboard is installed.