

## *Preface*

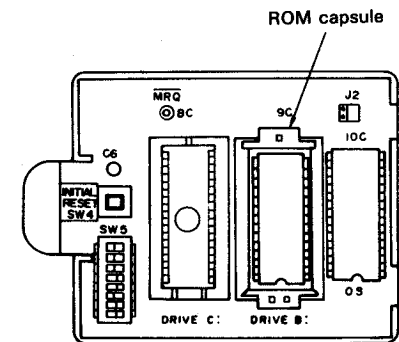
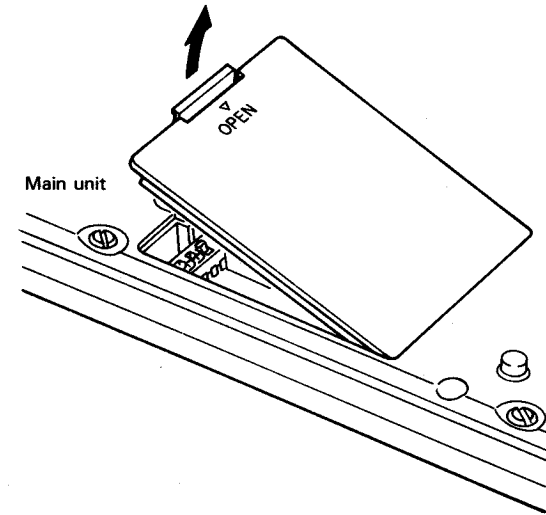
EPSON PX-4 BASIC is a derivative of widely accepted Microsoft BASIC developed by Microsoft, Corp., USA, and runs under the CP/M<sup>®</sup> operating system. Microsoft BASIC is the industry standard BASIC interpreter program for 8-bit microcomputers and enjoys well established reputation.

EPSON PX-4 BASIC is an enhanced version of the Microsoft BASIC interpreter program. It provides extensive graphics and timer facilities as well as powerful supports for peripheral devices unique to the PX-4. Further, inclusion of an item keyboard reinforces the PX-4's power as a dedicated computing machine and extends the range of its applications.

This manual describes all aspects of EPSON BASIC. It is also intended to be a handy guide for your BASIC programming.

## Before using the PX-4 BASIC

The PX-4 BASIC interpreter program is installed in the PX-4 main unit in the form of a ROM capsule, which fits into the ROM capsule box on the back of the main unit. Before using BASIC, make sure that the BASIC ROM capsule has been installed (see figures below).



**NOTE:**

*In the following explanations, it is assumed that the BASIC ROM capsule is installed in the socket marked "DRIVE B:."*

# Chapter 1

## INTRODUCTION TO BASIC

### 1.1 Starting and Terminating BASIC

#### 1.1.1 Starting BASIC

You can start PX-4 BASIC in two ways, with either a cold start or a warm start. Switch on your PX-4.

##### Cold start

Cold start refers to starting up BASIC when the CCP screen (identified by the prompt >) or MENU screen is displayed on the computer display. The program area is initialized whenever a cold start is carried out.

##### (i) Starting BASIC from the CCP screen

```
A> █
```

The above display is called the CCP screen. The CCP screen indicates that CP/M is waiting for a command. Type "B:BASIC" from the keyboard and press **RETURN**.

```
A>B:BASIC █
```

**NOTE:**

If the error message shown in the figure below is displayed on the screen, make sure that the BASIC interpreter ROM is correctly installed in your PX-4.

```
A>B: BASIC
BDOS ERR ON B: SELECT
```

**(ii) Starting BASIC from the MENU screen**

Select BASIC.COM using the cursor movement keys `→`, `←`, `↑`, `↓` (BASIC.COM will be displayed in reverse video) and press `RETURN`.

```
***.k CP/M 07/07 (SAT) 10:13:40 1/1
B: BASIC
#####
```

**NOTE:**

\*\*\*.k denotes the size of your CP/M system.

When BASIC is cold-started, the following initial BASIC screen will appear:

```
BASIC Ver x.x (C) 1983 Microsoft & EPSON
RETURN to run or SPACE to login.
##### Bytes
PF1: 0 Bytes
PF2: 0 Bytes
PF3: 0 Bytes
PF4: 0 Bytes
PF5: 0 Bytes
##### Bytes Free
```

Initial BASIC screen

**NOTE:**

x.x denotes the BASIC version number and ##### the size of the memory that the user can use for programs and data.

Press the `SPACE` key.

```
BASIC Ver x.x (C) 1983 Microsoft & EPSON
20313 Bytes Free
PF1: 0 Bytes
Ok
█
```

Now you can create or run your BASIC programs. This method of starting BASIC is referred to as cold start.

When BASIC is cold-started, the virtual screen is set to 40 columns by 50 lines and the programmable function keys are predefined as follows:

PF1	auto
PF2	list
PF3	edit
PF4	stat
PF5	run^M
PF6	load"
PF7	save"
PF8	system
PF9	menu^M
PF10	login

**NOTE:**

^M denotes a carriage return code, which you usually enter into the system by pressing the `RETURN` key. See the descriptions about the `WIDTH` command for the virtual screen size and the `KEY` command for the programmable function keys.

### • Parameters You Can Specify When Starting BASIC

You can specify various parameters when cold-starting BASIC by using the following format:

[<drive name>:]BASIC[<file name>][/F:<number of files>][/M:<max memory address>][/S:<max record length>]  
[/P:<program area number>]

#### <drive name>:

Specifies the name of the drive containing the BASIC.COM file. Since PX-4 BASIC runs on a ROM capsule, you must always specify drive B: or C:. If you omit this parameter, the currently logged-in drive is assumed. This parameter is automatically specified when BASIC is started from the menu screen.

#### NOTE:

Refer to the Operating Manual, Section 2.4.3 "CCP screen" for the logged-in drive.

#### <file name>:

Specifies the name of the program to be loaded and executed immediately after BASIC is started (see Section 2.4 "Files" on how to specify a program name). BASIC will automatically load and execute the specified program after it is started. BASIC assumes a file extension of BAS if the extension is omitted.

#### /F:<number of files>:

Specifies the maximum number of files that can be opened at any one time during the execution of a BASIC program. The maximum value you may enter is 15. This parameter defaults to 3. In following BASIC programs, you cannot specify file numbers higher than that specified here. When you set the number of files to 4 in a program, for example, you cannot use files with file numbers greater than 4 in the program. Specifying too many files will occupy a corresponding amount of memory space for the file I/O buffers, leaving less user area in memory.

#### /M:<max memory address>:

Specifies the maximum memory address of the work space that BASIC can use as the memory area for storing programs and variables. The memory area from this address up to the BDOS start address is reserved as a user area that BASIC will not access. You can load any machine-language programs in this area. The maximum memory address must be the BDOS start address or &H6000, whichever is lower. Notice that the BDOS start address depends on the size of the RAM disk you specify. If this parameter is omitted, BASIC assumes the BDOS start address or &H6000, whichever is lower.

#### NOTE:

See Appendix N "MEMORY MAP" for the BDOS start address. Numbers preceded by &H are in hexadecimal.

#### /S:<max record length>:

Specifies the maximum record length in bytes for use with random files. You cannot specify a record length larger than this value with the BASIC OPEN statement. The default record length is 128 bytes.

#### /P:<program area number>:

Specifies the number of the program area into which BASIC will load the program you specified with its file name. You may specify a number from 1 to 5. BASIC assumes 1 if you omit this parameter. If you do not specify the file name, the program area which will be used is determined immediately when BASIC is started, and BASIC waits for a command in the program area specified by this parameter.

#### NOTE:

See Section 1.2 "Multiple Program Areas" for the program areas.

Example 1:

```
A>B:BASIC /F:1 /M:&H5000 /S:100
```

The above command starts BASIC from the CCP screen. The meanings of the parameters are as follows (assuming that the BASIC interpreter is on drive B:):

- /F:1 ..... Sets the number of files that can be open to 1.
- /M:&H5000 .... Sets the maximum memory address to address &H5000.
- /S:100 ..... Sets the record size for use with random files to 100 bytes.

Each program area is cleared when BASIC is started.

Example 2:

```
**.*/ CP/M 07/07 (SAT) 10:29:07 1/1
B:BASIC A:MKDATE.BAS /P:2
B:BASIC COM
```

The above command starts BASIC from the menu screen (assuming that the BASIC interpreter is on drive B:). The meanings of the parameters are as follows:

A:MKDATE.BAS and "P:2 ..... Specifies that BASIC, after starting execution, must load the program MKDATE.BAS from drive A: into program area 2 for execution.

Each program area is cleared when BASIC is started.

### Warm Start

Execute a cold start and the following message is displayed on the screen:

```
BASIC Verx.x (C) 1983 Microsoft & EPSON
##### Bytes Free
P1: 0 Bytes
OK
```

Now switch the computer off and on again. The display will show the initial BASIC screen instead of the CCP or MENU screen.

```
BASIC Verx.x (C) 1983 Microsoft & EPSON
RETURN to run or SPACE to login.
##### Bytes Free
P2: 0 Bytes
P3: 0 Bytes
P4: 0 Bytes
P5: 0 Bytes
##### Bytes Free
```

This means that once the computer enters the BASIC mode, it cannot exit the BASIC mode unless you execute the SYSTEM command. This method of starting up BASIC is called a "warm start."

Using this method, you can start BASIC immediately after switching on your PX-4 and make it a dedicated BASIC machine.

When BASIC is started by a warm start, the program areas retain whatever data they contained before the power was turned off. The programmable function keys also retain their assigned values.

## Initial BASIC Screen

The initial BASIC screen appears on the display when BASIC is cold-started without a <file name> or /P parameter, or when it is warm-started. P1 through P5 identify program areas 1 through 5 and the numbers to their right indicate their memory size.

The initial BASIC screen also indicates any program area names defined by the TITLE command. Note that all program areas are cleared when BASIC is activated by cold start.

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

"Initial BASIC Screen"

Select the program you want to run using the following keys:

- ↑ Moves the cursor upward.
- ↓ Moves the cursor downward.

Using these keys, position the cursor on the number of the program area to be selected. To run the program in the selected program area, press the **RETURN** key.

If you press the **SPACE** key, BASIC will wait for a command in the selected program area.

## 1.1.2 Terminating BASIC

To terminate BASIC, use the SYSTEM command. Since the SYSTEM command clears the contents of the whole program area, you must save any wanted programs on an auxiliary storage device. After BASIC is terminated, the menu screen appears if display of the menu screen is enabled and the CCP screen appears if it is not.

## 1.1.3 Turning the power off

The PX-4 starts up BASIC immediately if you power it on again after having temporarily switched it off (warm start). BASIC, however, behaves in different ways depending on how you switch the power off.

### (1) When you turned the POWER switch off while holding the **CTRL** key down (continuity mode)

When you turn the POWER switch off while holding the **CTRL** key down then turn the POWER switch on again, BASIC will return to the same operating state as before the switch was turned off. In this case, the programs are preserved in memory and the screen remains unchanged (i.e., the initial BASIC screen is not displayed).

This holds in the following cases:

- When you turn the POWER switch off during the execution of a program
- When the battery has run out and the power is automatically turned off (auto power-off)
- When the battery level falls below the lower limit and the power is automatically turned off
- When a POWER OFF command with the RESUME parameter is executed
- When the item keyboard is installed

### (2) When you simply turn the POWER switch off (restart mode)

When you simply turn the POWER switch off, the initial BASIC screen appears on the display once you turn the switch on again. The programs are held in memory. The same is also true when you execute a POWER OFF command without the RESUME parameter.

### 1.1.4 Starting BASIC in other ways

You can also get BASIC to start automatically. Starting BASIC automatically when the PX-4 POWER switched is turned on is called an "auto start", and starting BASIC and running a given program automatically at a specified time is called "wake".

To use auto start and wake, see the descriptions about the AUTOST and WAKE commands in the Operating Manual, Subsections 2.5.2 "Wake" and 2.5.3 "Auto start".

## 1.2 Multiple Program Areas

PX-4 BASIC divides the program memory into five areas to allow up to five programs to be stored at a time. Each program area is assigned a number called a program area number. You must use this number to specify the area the program is to be run with the /P: parameter when starting BASIC with the BASIC command, or when starting the program from the initial BASIC screen. After BASIC is started, you can log in the specified program area by entering the LOGIN n (n denotes the program area number) command from the keyboard. You need not specify the maximum size of each program area; the BASIC interpreter manages the program areas within the limit of the program memory available for programs.

The memory areas reserved for simple, array, and string variables are used commonly by the program areas. The memory areas for these variables are cleared by executing the LOGIN command.

The program in the currently logged in program area can be moved to another program area by using the PCOPY command. It is advised that you should name frequently used program areas with the TITLE command. To display the initial BASIC screen after having executed a program, execute the MENU command.

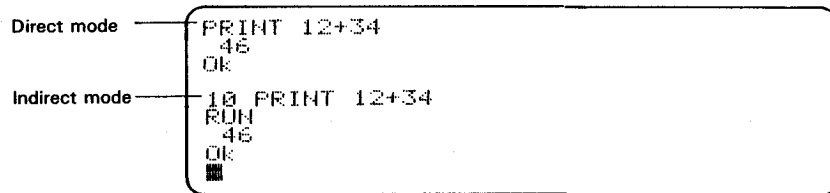
The programs in all the program areas are erased when BASIC is terminated by the SYSTEM command or a cold start is performed. For further information, see the command descriptions for the LOGIN, MENU, PCOPY, SYSTEM, and TITLE commands in Chapter 3 "COMMANDS AND STATEMENTS."



### 1.3 Direct and Indirect Modes

When creating a program, you normally enter program lines by keying in BASIC statements preceded by a line number from the keyboard. Each statement is accepted by BASIC when you press the **RETURN** key at the end of the program line. At this point, the BASIC interpreter only stores the program statement in the current program area and will not execute them. To execute these statements, you have to enter a RUN command after making sure that the cursor is at the extreme left of the screen. BASIC will then execute the statements starting at the program line with the lowest line number. This execution mode is called the indirect mode.

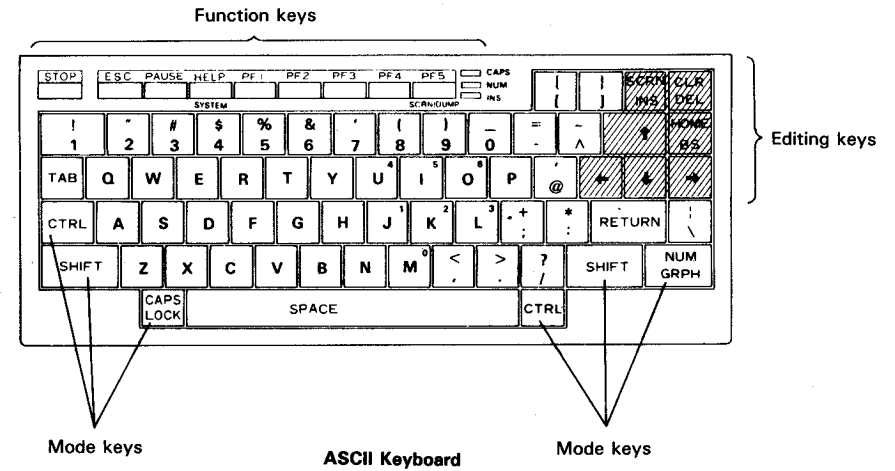
If you enter a command without specifying a line number and press the **RETURN** key, BASIC will execute the command immediately. This execution mode in which commands are executed without the use of the RUN command, one line at a time, is called the direct mode. BASIC statements DEFFN, DEFUSR, GOSUB-RETURN, GOTO, ON ERROR GOTO, ON GOSUB, READ, and WHILE-WEND can not be executed in the direct mode.



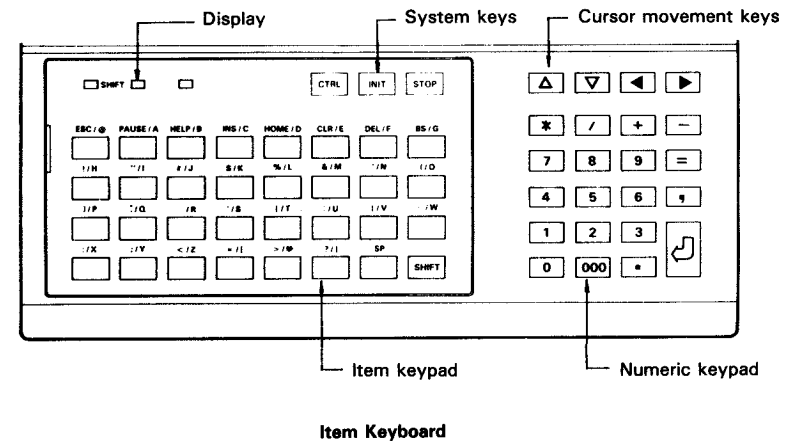
**NOTE:**  
 In this manual, BASIC statements are referred to as commands when they are executed in the direct mode.

### 1.4 Keyboards

#### 1.4.1 ASCII and item keyboards



The figure above shows the ASCII keyboard.

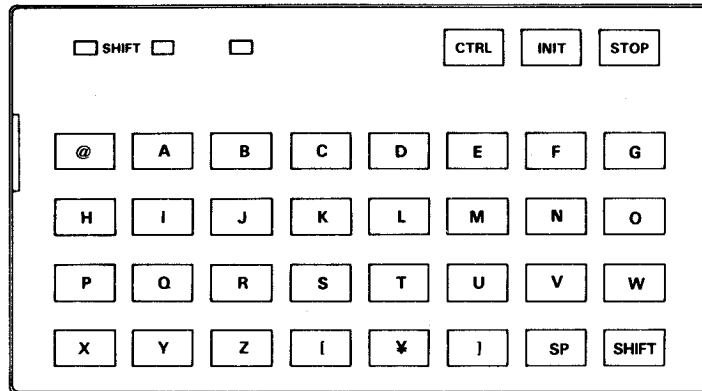


The keyboard illustrated above is called an item keyboard.

The item keyboard is designed for dedicated use on special-purpose machines. It is not suited for building BASIC programs. At power-on time, the item keyboard is initialized as follows (this facilitates minor program modification):

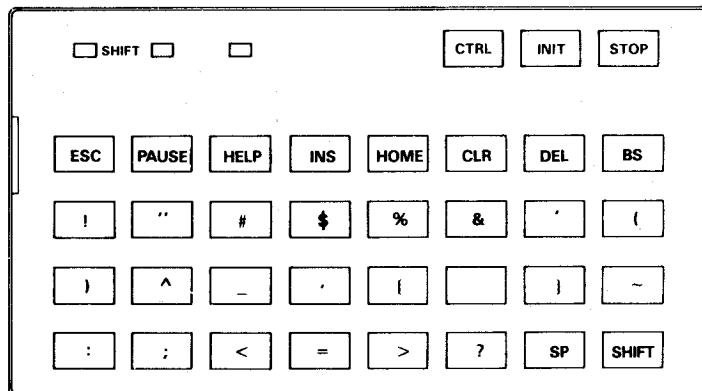
## Normal mode

In the normal mode, you can use the following keys in the normal keyboard mode (SHIFT LED is off):



## Shift mode

The following keys are available in the shift keyboard mode (SHIFT LED is on):



These key arrangements can be redefined from BASIC (see the KEY command description).

When the item keyboard is installed, the system display function using the **CTRL** + **HELP** keys and the screen dump function using the **CTRL** + **PF5** are not available (you can obtain a hardcopy of the screen image by using the BASIC COPY command, however).

For details of programming item keys, see Appendix E and Operating Manual.

## 1.4.2 Special keys

PX-4 BASIC supports several special keys. The item keyboard however, does not have a key which corresponds to the ASCII keyboard **CTRL** key, therefore it can not provide the same special functions as those available to the ASCII keyboard.

The special keys are described below.

(1) **PF1** - **PF5**, **SHIFT** + **PF1** - **PF5** (not available on the item keyboard)  
These keys are called programmable function keys. You can assign a character string of up to 15 characters to each programmable function key. You can save many keystrokes by assigning often-used character strings (including BASIC commands and statements) to these keys (see the KEY, KEY LIST, and KEY LLIST commands). See also Subsection 1.1.1 "Starting BASIC" for the procedure to set up the function keys when BASIC is cold-started.

(2) **STOP** or **CTRL** + **C**  
Pressing the **STOP** key or **CTRL** + **C** keys interrupts the execution of the current program and places BASIC in the wait state. To resume execution, enter the CONT command from the keyboard. The program cannot be resumed with the CONT command if it has been modified after being interrupted or if the keys were pressed while the program was doing a file I/O. These keys should be used to return BASIC into the wait state from the AUTO command entry mode. You can enable or disable these functions by using the STOP KEY command (see the STOP KEY command).

(3) **PAUSE** or **CTRL** + **S**  
These keys temporarily stop the execution of a program or printing of a program listing. To resume execution or printing, press a key other than the **STOP** or **CTRL** + **C** keys.

(4) **CTRL** + **PF5** (not available on the item keyboard)  
Pressing these keys simultaneously transfers the contents of the screen to the printer in a bit image format. These keys serve the same function as the COPY command (see the COPY command).

(5) **CTRL** + **HELP** (not available on the item keyboard)

These keys call up the System Display, which shows you how to operate the microcassette recorder manually or how to set the alarm or wake time. Pressing the **ESC** key will return you to the screen displayed before the System Display appeared.

(6) **CTRL** + **STOP**

Pressing these keys simultaneously while the PX-4 is performing an I/O operation to or from the microcassette drive or RAM disk stops the I/O operation.

### 1.4.3 Entering characters from the keyboard

Refer to the Operating Manual, Section 2.3 "Inputing Data from the Keyboard" on how to enter characters from the keyboard.

## 1.5 Screen Configuration

The LCD (Liquid Crystal Display) can display dot image graphics such as dots and lines as well as alphanumeric characters.

### 1.5.1 Virtual Screen

The LCD can display alphanumeric characters on the 40-column by 8-line screen. The PX-4 has an internal screen, called the virtual screen, which is larger than the physical screen. The contents of the virtual screen are viewed through a window. You can move the window vertically and horizontally to view the contents of the whole virtual screen. The LCD corresponds to a window, and movement of the window over the virtual screen is called scrolling. The virtual screen allows you to edit a wider area of a BASIC program than can be physically viewed with one window.

You can set the numbers of columns and lines of the virtual screen using the **WIDTH** command. The **WIDTH** command can set the number of columns to either 40 or 80 and the number of lines to any number between 8 and 50. The product of the number of columns and lines must not exceed 2000.

```
500 SP=0:AG=3.2:CNT=0:AGL=2.2
510 ?
520 ?
530 FOR I=0 TO 32*5-1
540 READ FONT:POKE &H5000+I, FONT
550 NEXT
560 POKE &H110, BIRD MOD 256
570 POKE &H111, INT (RD/256)
580 POKE &H112, 0
590 POKE &H113, &H50
400 ?
410 ?
420 BUN=TRUE
430 CLS
440 VB=RND(1)*51+5 : HB=240:KANJI(0,48):PSET, BIRD+X : GOSUB 640
450 ?
460 LINE(30,63)-(90,15):LINE(90,15)-(145,63):LINE(117,40)-(140,25):LINE(140,25)-
(239,63):KANJI (HB,VB),PSET, BIRD+4
470 VB=VB+RND(1)*8-4:IF VB>56 THEN VB=56 ELSE IF VB<5 THEN VB=5
480 HB=HB-8:IF HB<0 THEN 440
490 ?
500 SP=(SP+1) MOD 255:KANJI (HB,VB),PSET, BIRD+SP:LOCATE 29,1:PRINT"COUNT :":CNT
510 KY#=INKEY$:IF KY#="" THEN 570
520 ?
530 IF ASC(KY#)=29 THEN GOSUB 630:AGL=AGL+.1:GOSUB 640
```

Virtual screen

Window

#### NOTE:









Virtual screen size is set to 80 columns by 25 lines.

## Scrolling

The screen has three scrolling modes: tracking, nontracking, and horizontally nontracking modes. In the tracking mode, the window scrolls following the cursor as you move the cursor. In the nontracking mode, the window maintains its position in relation to the cursor when it is moved over the virtual screen. When the width of the virtual screen is set to 80 columns, horizontal scrolling occurs at every 20 columns. The window may also be disabled for scrolling horizontally (horizontally nontracking mode).

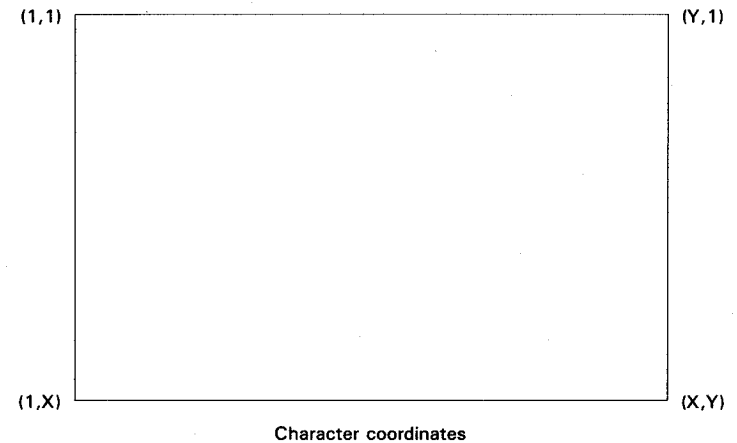
The scrolling mode can be changed by pressing the **SHIFT** + **SCRN** keys simultaneously. If the scrolling mode is switched from nontracking to tracking when the cursor is outside the screen window, the window immediately moves to the position of the cursor in the virtual screen. BASIC is placed in the tracking mode when it is started.

There are several keys which are used to control scrolling. These keys allow you to efficiently position the window in the virtual screen. Since the item keyboard does not have a key which corresponds to the **CTRL** key on the ASCII keyboard, you cannot use the scroll control functions. The scroll control keys are:

- SHIFT** +  Scrolls the screen window upward.
- SHIFT** +  Scrolls the screen window downward.
- SHIFT** +  Scrolls the screen window to the left 20 columns at a time when the virtual screen width is set to 80 columns.
- SHIFT** +  Scrolls the screen window to the right 20 columns at a time when the virtual screen width is set to 80 columns.
- CTRL** +  Scrolls the screen window to the top of the virtual screen.
- CTRL** +  Scrolls the screen window downward one screen at a time.
- CTRL** +  Scrolls the screen window to the extreme left of the virtual screen when the virtual screen width is set to 80 columns.
- CTRL** +  Scrolls the screen window to the extreme right of the virtual screen when the virtual screen width is set to 80 columns.
- CTRL** + **SCRN** Pressing these keys simultaneously when the cursor is outside the window scrolls the screen window so that the cursor is at the center of the window. The cursor will not be centered in the window however, if it has been positioned at the top or bottom of the virtual screen.

## 1.5.2 Character coordinates

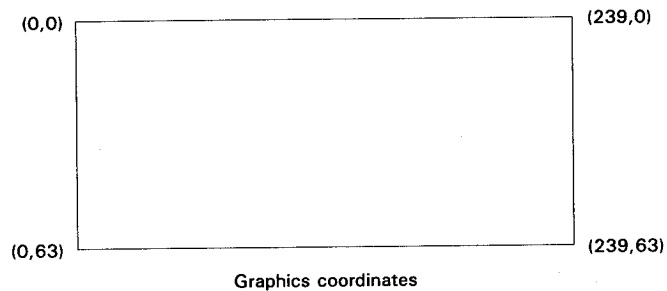
You must specify the position of the characters to be displayed on the screen by using the positions in the virtual screen (character coordinates). With character coordinates, the upper left corner of the virtual screen is taken as (1, 1) and the value of the x coordinate increases from left to right up to 40 or 80 columns, while the value of the Y coordinate increases from top to bottom, up to either 8 to 50 or 8 to 25 lines.



X and Y can be specified with the WIDTH command.

### 1.5.3 Graphics coordinates

The graphics coordinates are used to draw bit image graphics using the PSET and LINE statements. In graphics coordinates, the upper left of the LCD screen is taken as the origin (0, 0) irrespective of the size of the virtual screen. You can specify x coordinate values from 0 to 239 and the y coordinate values from 0 to 63. Since the concept of a virtual screen does not apply to the graphics coordinates, once the graphics displayed on the LCD screen are scrolled out of the screen, they will not return to the original position when the screen is scrolled back.



Dot positions can be specified using either absolute coordinates in which the coordinates of the dot positions are directly specified or relative coordinates which have their coordinates specified relative to the position of the previously specified dot.





You can specify the use of the relative coordinates by specifying the keyword STEP before the coordinate specification. For example, assuming that the LRP (Last Referenced Point or position whose coordinates are updated every time a command relating to graphics coordinates is executed) is at  $(x_0, y_0)$ , the absolute coordinates of STEP  $(x, y)$  are  $(x_0 + x, y_0 + y)$ .

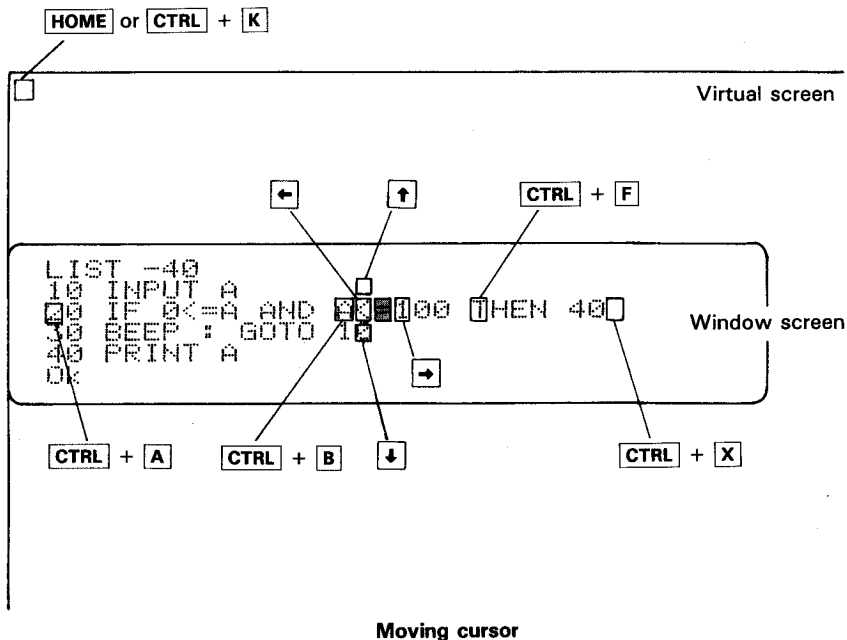
### 1.6 Screen Editor

The screen editor provides the user with facilities to carry out editing functions on the display screen, such as text addition and deletion, which allow you to modify your programs efficiently. With the screen editor, you can modify the character string being input through the execution of the LINE INPUT statement.

There are several function keys which are used by the screen editor. The item keyboard does not have a key which corresponds to the **CTRL** key of the ASCII keyboard, so you cannot use the screen editor functions. The editor function keys are:

- HOME** or **CTRL** + **K** : Position the cursor at the top of the virtual screen.
- CLS** or **CTRL** + **L** : Erase all text data on the virtual screen and position the cursor at the top of the virtual screen.
- INS** or **CTRL** + **R** : Place the keyboard into the insert mode. When this mode is entered, an underline character (“\_”) appear on the screen as the cursor. Move the cursor to the character location you want to insert characters and enter them. The cursor and the characters to the right of the cursor will shift right. To exit this mode, press either **INS** or **CTRL** + **R** again. You may also exit the insert mode by pressing a cursor movement or **RETURN** key.
- DEL** : Pressing this key after positioning the cursor under the character to be deleted deletes the character and shifts the characters to the right of the cursor one character to the left.

-  : Moves the cursor one line up.
-  : Moves the cursor one line down.
-  : Moves the cursor one character to the left.
-  : Moves the cursor one character to the right.
- STOP** or **CTRL** + **C** : Cancel the editing changes made so far on the current line and position the cursor at the beginning of the following line. Also use these keys to return to the command mode if you entered the automatic line generation mode with the AUTO command. If you press these keys during execution of a program, the program will terminate and BASIC waits for another command.



- BS** or **CTRL** + **H** : Delete the character to the left of the cursor. The characters under and to the right of the cursor shift one character to the left.
- TAB** or **CTRL** + **I** : Move the cursor to the next tab position. The character positions from where the cursor is located to the next tab position are filled with spaces. Tabs are placed at every eighth character position.
- CLR** or **CTRL** + **L** : Clear the entire screen and move the cursor to the home position (the upper left corner of the screen).
- CTRL** + **A** : Move the cursor to the beginning of the current line.
- CTRL** + **B** : Move the cursor to the beginning of the preceding word.
- CTRL** + **E** : Erase the characters from the cursor position to the end of that line.
- CTRL** + **F** : Move the cursor to the beginning of the next word.
- CTRL** + **X** : Move the cursor to the right of the last character on the current line.
- CTRL** + **Z** : Erase the characters from the cursor position to the end of the virtual screen.
- Scroll control keys** : Used to scroll the window over the virtual screen (see 1.5.1 "Virtual screen").

### 1.6.2 Editing a program

You can edit your programs quickly and easily by using the screen editor. To do this, display the program to be edited on the screen, by using the LIST or EDIT command. Then move the cursor to the location you want to edit your program text. You must edit only one program line at a time, and press the **RETURN** key after completing the editing. If you forget to press the **RETURN** key, the line in the program memory will remain unchanged even though the line on the screen appears to be altered.

## Chapter 2

# PROGRAMMING

### 2.1 Program Lines and Line Numbers

BASIC regards a program as comprising a collection of lines. Each line consists of a line number and a statement. For example, when you key in

```
10      A = 10      RETURN
```

Line number      Statement

from the keyboard, BASIC stores the statement "A = 10" in program memory with a line number of 10 as its label. When you execute the RUN command, BASIC interprets and executes the program lines in program memory sequentially in numerical order.

You must specify the destination of the GOTO or GOSUB statement with a line number. You must also specify the line number when modifying, deleting, or printing a portion of a program.

**NOTE:**

*BASIC executes all program lines in numerical order unless the program flow is changed by the GOTO, GOSUB, or IF...THEN...ELSE statement.*

A line can be a maximum of 255 characters long including the line number. Within this limit, a line can contain two or more statements, which must be separated by colons (:). Line numbers must be integers between 0 and 65529.

The use of the AUTO command is convenient when entering two or more program lines. When the AUTO command is executed, BASIC will automatically generate a new line number each time you press the **RETURN** key, saving you from having to enter line numbers. To terminate the AUTO command, press the **CTRL** + **C** or **STOP** (see the description of the AUTO command).