# Chapter 8

DOWNLOAD CHARACTERS

With this printer you can create new characters and symbols, download their dot data, and have them printed in place of selected characters in the regular character set. Characters that can be generated in this way range from simple but useful symbols like the check mark through to complex Chinese or Japanese characters.

Regular characters are permanently stored in the printer's ROM, but characters you design are downloaded and stored in RAM for use.

DESIGNING YOUR OWN DRAFT CHARACTERS

Designing and printing your own characters has two requirements: first, designing the shape of the character, calculating the data necessary to make the shape, and sending that data to the printer, and secondly, sending the command to print the downloaded characters instead of the regular characters. There are a number of design constraints for download draft quality characters:

- The matrix or grid on which you design the characters is six boxes wide by nine boxes high.
- Horizontally, dots may be centered in a box, or may straddle a line, making the actual character grid 11 dots wide by 9 dots high. Vertically, dots can only be centered in a box. See Figure 8-1.
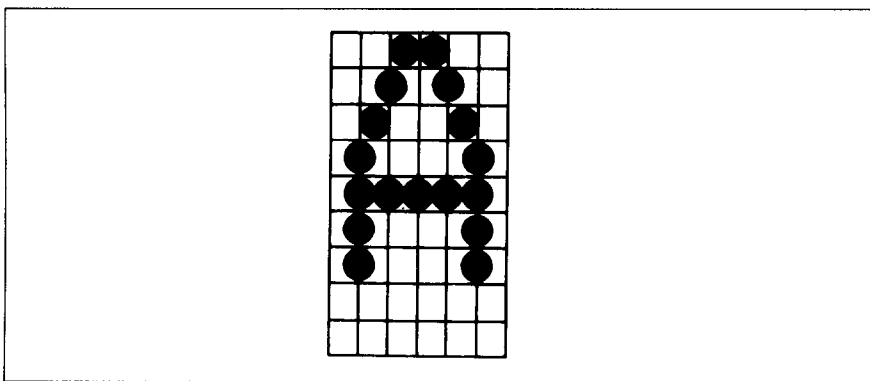
Figure 8-1. Dots can be inside boxes or straddle the vertical lines of the grid.

- The minimum width of a character is five dots.
- The user-defined characters may use eight dots vertically.
- Dots cannot overlap — that is, you may not have a dot inside a box next to one that is on a line.
- You may define any position in the ASCII table.

Photocopy the grid in Figure 8-2 to help design your new characters. We will use a tiny representation of a car-shaped symbol for our example.
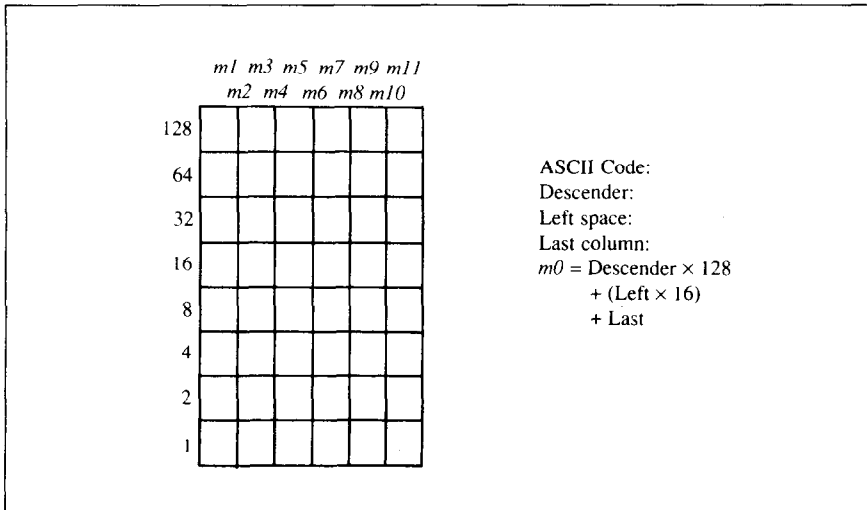

Figure 8-2. Use this grid (or one similar to it) to define your own draft characters.

Defining the attribute data

Before you start the definition, you will need to decide exactly where in the regular ASCII set you want to place your characters. After downloading, you access your new character by sending the code for the character you replaced.

Next you must choose whether to make the car symbol an ascender or a descender. This determines how the character is seated on the line:

Ascender: C⌐R   Descender: C⌐R

We decided that our car symbol will be a "descender", so a figure "1" is written next to Descender on the grid. If your character is not a descender, write a "0" next to Descender.

Next, you must specify the left space and the last print column of the character.

Being able to specify the width of the character allows you to specify the precise area inside the grid that the character will occupy, so that narrow characters will look attractive next to wide ones.

Acceptable values for the left space are 0 to 7, and the last print column are from 4 to 11.

Our character will occupy from column 1 to column 11, so the left space is 0 and the character width data is 11.

Assigning the character data

Now, we calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. For example, looking at Figure 8-3, we see that in the left-most column there are five dots, and they are sitting in the "64" box, "32" box, "16" box, "8" box, and "4" box. Thus its vertical value is 124. In the next column, there is no dot straddling the vertical line; its value is recorded as 0.
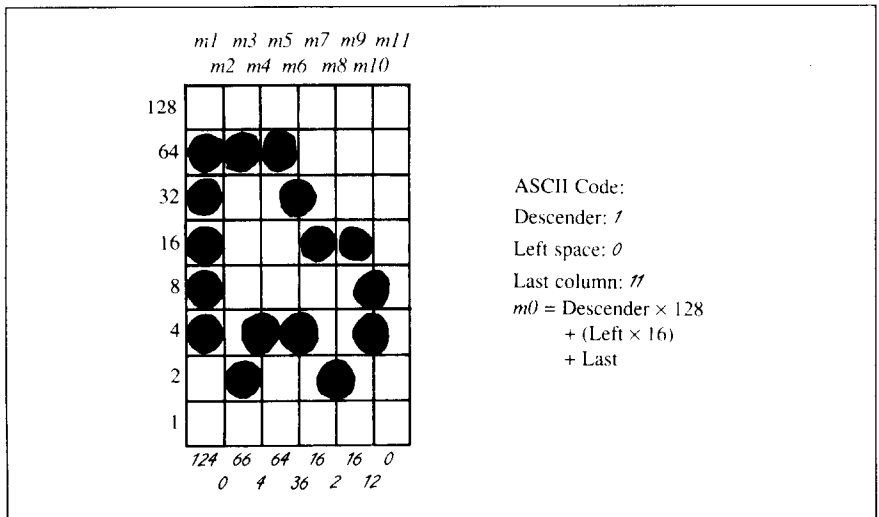
Figure 8-3. Add the values of the dots in each column and write the sum of each column at the bottom.

You will see the letters $m1$, $m2$, $m3$, etc., are above your values. When you define the character, you will substitute your value for each of these letters.

Sample program

To demonstrate how to use the download characters, let's use the "car"
character and some other user-defined characters to print a small graph. This
program will do just that with the Standard mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"xO";
1020 LPRINT CHR$(27);"&";CHR$(O);
1030 LPRINT CHR$(60);CHR$(62);
1040 FOR N=60 TO 62
1050 FOR M=O TO 11
1060 READ MM
1070 LPRINT CHR$(MM);
1080 NEXT M
1090 NEXT N
1100 LPRINT
1110 DATA 139,  2,  5,  8,241,  0
1120 DATA   0,241,  8,  5,  2,  0
1130 DATA 139,124,  0, 66,  4, 64
1140 DATA  36, 16,  2, 16, 12,  0
1150 DATA 139, 46, 16,  2, 60,  0
1160 DATA  48,  0, 48,  0, 48,  0
1170 '
1180 LPRINT CHR$(27);"D";CHR$(11);CHR$(O);
1190 LPRINT CHR$(27);"h";CHR$(1);
1200 LPRINT "   U.S. EXPORTS"
1210 LPRINT CHR$(27);"h";CHR$(O);
1220 LPRINT CHR$(27);"%";CHR$(1);
1230 LPRINT "AUTOS";CHR$(9);
1240 FOR I=.4 TO 9.3 STEP .4
1250 LPRINT CHR$(61);
1260 NEXT I
1270 LPRINT
1280 LPRINT "CHEMICALS";CHR$(9);
1290 FOR I=.4 TO 8.7 STEP .4
1300 LPRINT CHR$(60);
1310 NEXT I
1320 LPRINT
1330 LPRINT "GUNS";CHR$(9);
1340 FOR I=.4 TO 1.4 STEP .4
1350 LPRINT CHR$(62);
```

```
1360 NEXT I
1370 LPRINT
1380 LPRINT CHR$(9);"+--";
1390 SCALE$="--+--"
1400 FOR I=2 TO 8 STEP 2
1410 LPRINT SCALE$;
1420 NEXT I
1430 LPRINT "--+"
1440 LPRINT CHR$(9);"   ";
1450 FOR I=2 TO 8 STEP 2
1460 LPRINT "   ";I;
1470 NEXT I
1480 LPRINT CHR$(27);"%";CHR$(0)
1490 LPRINT CHR$(27);"S";CHR$(0);
1500 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1510 LPRINT CHR$(27);"T"
1520 END
```

U.S. EXPORTS

```
AUTOS       ᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶᎶ
CHEMICALS   ⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄⅄
GUNS        ᚦᚦᚦ
            +-- --- --+-- --- --+-- --- --+-- --- --+-- --- --+
               2      4      6      8
            MILLIONS OF DOLLARS
```
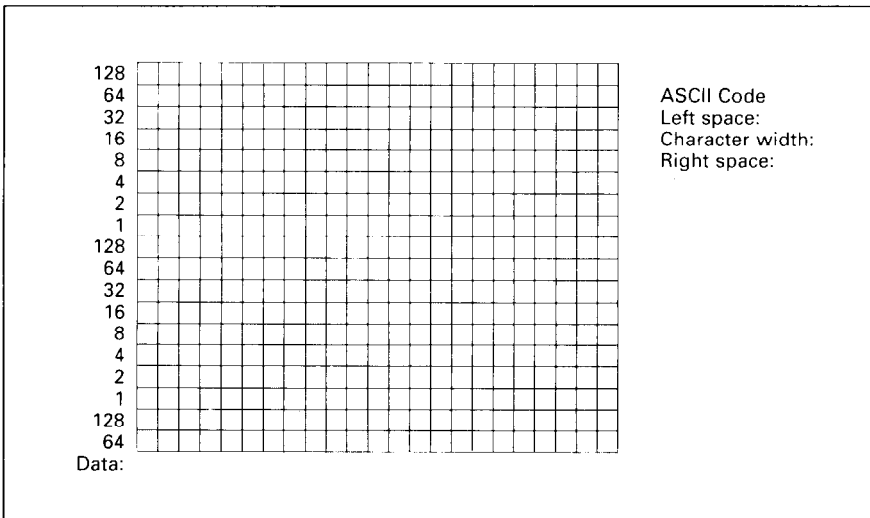
DEFINING YOUR OWN NLQ CHARACTERS

As you probably noticed, NLQ characters are printed by two passes of the print head. Half of the character is printed on the first pass, and the remainder on the second pass. The paper is rolled up half a dot height in between passes to let the print head print dots on the second pass that overlap the previous dots, in order to fill in the spaces and produce denser characters. Additionally, the print head speed is halved, and the dots are printed at double the density of draft characters. For this reason, NLQ characters can contain up to 23 dots in the horizontal direction.

Fundamentally, the process to define and print downloaded NLQ character is the same as for draft characters, except that you must assign the character data according to the emulation mode, you are using.

Assigning the character data with the Standard mode

There are differences in the way the attribute information is processed.

In the draft quality mode the attribute byte carries the descender data, and

```
128
64        ASCII Code
32        Left space:
16        Character width:
8         Right space:
4
2
1
128
64
32
16
8
4
2
1
128
64
Data:
```

Figure 8-4. Use this grid (or one similar to it) to define your own NLQ characters with the Standard mode.

specifies the left space and the character width. In the NLQ mode, there are three attribute bytes, the first byte describes the character's left space, the second byte describes the character width. And the third byte describes the right space. Appropriate allocation of data in these three bytes lets you place the character where you like within the grid.

Use the grid in Figure 8-4 to help plot the data. The vertical definition of the character is 18 dots. Each byte therefore represents a third of the vertical definition. That's where the numbers down the left side of the grid come in. Notice that there is a number for each row of dots and that each number is twice the number below it. By making these numbers of two we can take any combination of dots in a vertical column and assign them a unique value.

If we plot our car-shaped symbol for NLQ, the grid data will look like Figure 8-5.

The defining process is the same as for draft characters, except that you must select NLQ mode, and you must define 69 data. If you wish to print your NLQ characters with the regular character set, the remarks regarding the simultaneous use of regular and download characters in the draft character section apply equally to NLQ characters.
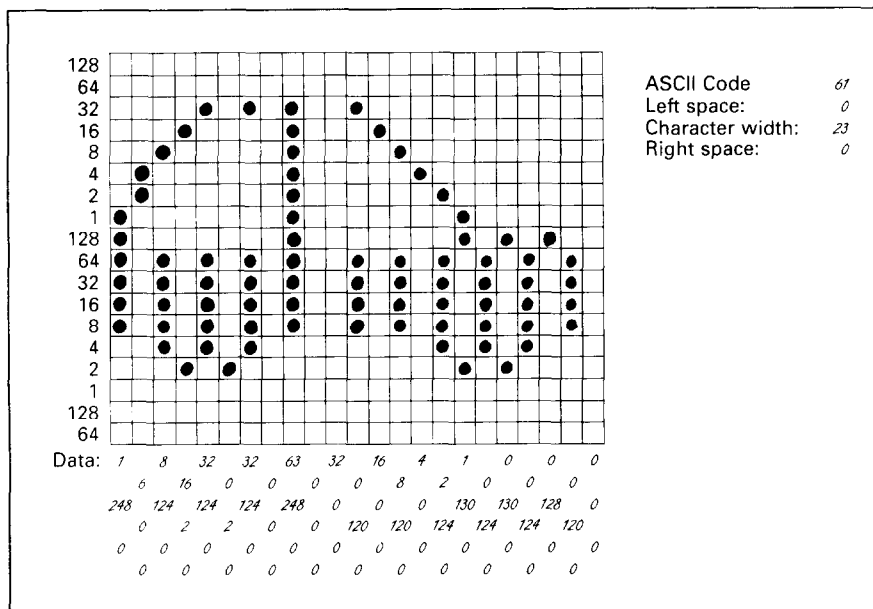

ASCII Code   *61*
Left space: *0*
Character width: *23*
Right space: *0*

Figure 8-5. Add the values of the dots into three bytes.

The following program demonstrates how to use the NLQ download char-
acters with the Standard mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"x1"
1020 LPRINT CHR$(27);"&";CHR$(0);
1030 LPRINT CHR$(60);CHR$(62);
1040 FOR N=60 TO 62
1050 LPRINT CHR$(0);CHR$(23);CHR$(0);
1060 FOR M=1 TO 69
1070 READ MM
1080 LPRINT CHR$(MM);
1090 NEXT M
1100 NEXT N
1110 LPRINT
1120 '
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0);
1140 LPRINT CHR$(27);"h";CHR$(1);
1150 LPRINT "   U.S. EXPORTS"
1160 LPRINT CHR$(27);"h";CHR$(0);
1170 LPRINT CHR$(27);"%";CHR$(1);
1180 LPRINT "AUTOS";CHR$(9);
1190 FOR I=.4 TO 9.3 STEP .4
1200 LPRINT CHR$(61);
1210 NEXT I
1220 LPRINT
1230 LPRINT "CHEMICALS";CHR$(9);
1240 FOR I=.4 TO 8.7 STEP .4
1250 LPRINT CHR$(60);
1260 NEXT I
1270 LPRINT
1280 LPRINT "GUNS";CHR$(9);
1290 FOR I=.4 TO 1.4 STEP .4
1300 LPRINT CHR$(62);
1310 NEXT I
1320 LPRINT
1330 LPRINT CHR$(9);"+--";
1340 SCALE$="--+--"
1350 FOR I=2 TO 8 STEP 2
1360 LPRINT SCALE$;
1370 NEXT I
1380 LPRINT "--+"
1390 LPRINT CHR$(9);"  ";
1400 FOR I=2 TO 8 STEP 2
1410 LPRINT "   ";I;
1420 NEXT I
1430 LPRINT CHR$(27);"%";CHR$(0)
```

```
1440 LPRINT CHR$(27);"S";CHR$(O);
1450 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1460 LPRINT CHR$(27);"T"
1470 END
1480 '
1490 DATA   0,   0,   0,    0,   0,   0,   0,   6,   0
1500 DATA   0,   9,   0,    0,  16, 128,   0,  32,   0
1510 DATA   0,  64, 128,  63, 128,   0,   0,   0, 128
1520 DATA   0,   0,   0,    0,   0, 128,   0,   0,   0
1530 DATA   0,   0, 128,    0,   0,   0,   0,   0, 128
1540 DATA  63, 128,   0,    0,  64, 128,   0,  32,   0
1550 DATA   0,  16, 128,    0,   9,   0,   0,   6,   0
1560 DATA   0,   0,   0,    0,   0,   0
1570 '
1580 DATA   1, 248,   0,    6,   0,   0,   8, 124,   0
1590 DATA  16,   2,   0,   32, 124,   0,   0,   2,   0
1600 DATA  32, 124,   0,    0,   0,   0,  63, 248,   0
1610 DATA   0,   0,   0,   32,   0,   0,   0, 120,   0
1620 DATA  16,   0,   0,    8, 120,   0,   4,   0,   0
1630 DATA   2, 124,   0,    1, 130,   0,   0, 124,   0
1640 DATA   0, 130,   0,    0, 124,   0,   0, 128,   0
1650 DATA   0, 120,   0,    0,   0,   0
1660 '
1670 DATA   0,   0,   0,    2, 208,   0,   5,  40,   0
1680 DATA  10, 215, 128,   5,  40,   0,  10, 215, 128
1690 DATA   5,  40,   0,    0,  87, 128,   4, 128,   0
1700 DATA   0,   4,   0,    4, 144,   0,   0, 100,   0
1710 DATA   4, 128,   0,    0,   8,   0,   4, 144,   0
1720 DATA   0,  96,   0,    4, 128,   0,   0,   0,   0
1730 DATA   4, 128,   0,    8,   0,   0,   4, 128,   0
1740 DATA   0,   0,   0,    7, 128,   0
```
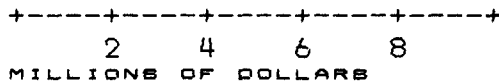
U.S. EXPORTS

```
AUTOS      ᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧᴧ
CHEMICALS  ᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜᴜ
GUNS       ▼▼▼
           +----+----+----+----+----+
                2    4    6    8
           MILLIONS OF DOLLARS
```
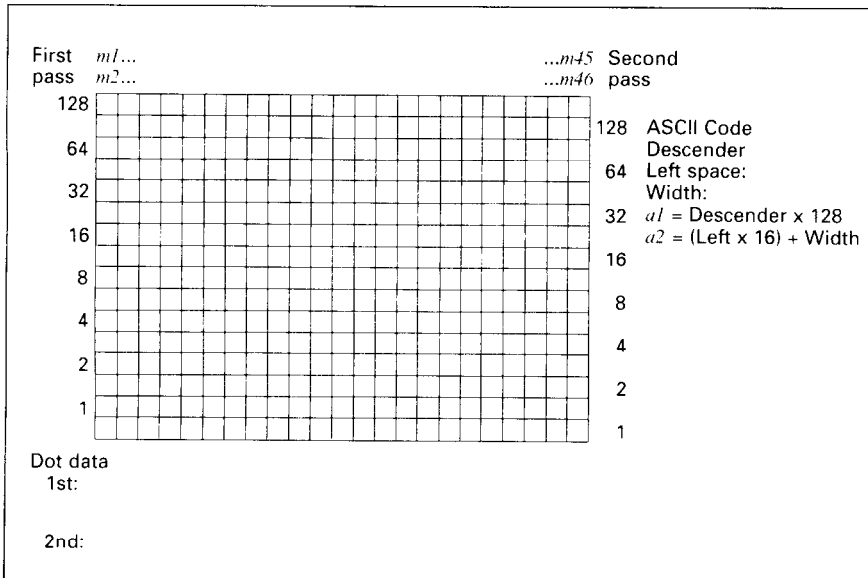
Assigning the character data with the IBM mode

Fundamentally, the process to define and print downloaded NLQ character with the IBM mode is the same as for draft characters, except that you must supply about four times as much character data, and you must design the character with the two passes of the print head in mind.

Use the grid in Figure 8-6 to help plot the data with the IBM mode. Due to the two-pass process, NLQ characters can contain up to 16 dots vertically.

Figure 8-6. Use this grid (or one similar to it) to define your own NLQ characters with the IBM mode.

To make the character data easier to calculate, put the first pass dots with black circle on the grid when you are designing your characters, and the second pass dots with white circle. Remember that adjacent dots may not overlap on the same pass; in other words, if one dot is in a box, its adjacent dot on the same pass may not be on next box. Therefore, to make smooth characters, put the dots needed to overlap any spaces in a character in the appropriate places in the second pass grid.

If we plot our car-shaped symbol for NLQ, the grid data will look like Figure 8-7.

The defining process is the same as for draft characters, except that you must select NLQ mode, and you must define 46 data. If you wish to print your NLQ
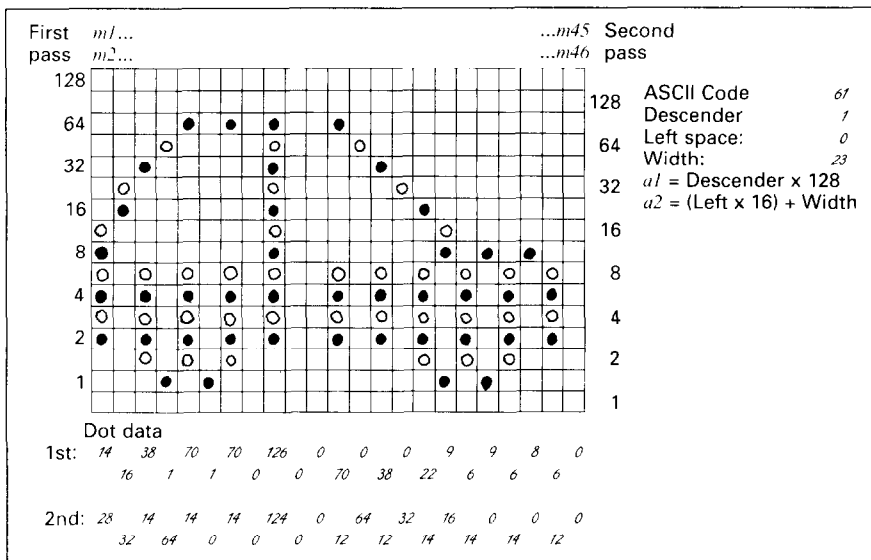
First *m1*...   ...*m45* Second
pass *m2*...   ...*m46* pass

128		128
64		64
32		32
16		16
8		8
4		4
2		2
1		1

ASCII Code   *61*
Descender   *1*
Left space: *0*
Width: *23*
a1 = Descender x 128
a2 = (Left x 16) + Width

Dot data

1st:	14	38	70	70	126	0	0	0	9	9	8	0
	16	1	1	0	0	70	38	22	6	6	6	

2nd:	28	14	14	14	124	0	64	32	16	0	0	0
	32	64	0	0	0	12	12	14	14	14	12	

Figure 8-7. Add the values of the dots for each pass.

characters with the regular character set, the remarks regarding the simultaneous use of regular and download characters in the draft character section apply equally to NLQ characters.

The following program demonstrates how to use the NLQ download characters with the IBM mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"I";CHR$(7);
1020 LPRINT CHR$(27);"=";CHR$(146);CHR$(0);CHR$(21);
1030 LPRINT CHR$(60);
1040 FOR N=60 TO 62
1050 LPRINT CHR$(128);CHR$(23);
1060 FOR M=1 TO 46
1070 READ MM
1080 LPRINT CHR$(MM);
1090 NEXT M
1100 NEXT N
1110 LPRINT
1120 '
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0);
1140 LPRINT CHR$(27);"[@";CHR$(4);CHR$(0);
1150 LPRINT CHR$(0);CHR$(0);CHR$(34);CHR$(2);
1160 LPRINT "   U.S. EXPORTS"
1170 LPRINT CHR$(27);"[@";CHR$(4);CHR$(0);
1180 LPRINT CHR$(0);CHR$(0);CHR$(17);CHR$(1);
1190 LPRINT CHR$(27);"I";CHR$(7);
```
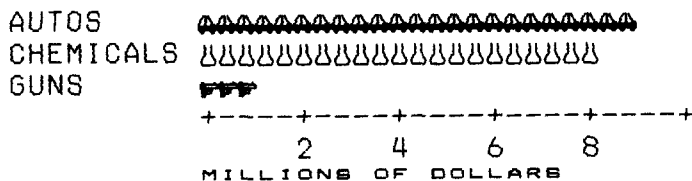
```
1200 LPRINT "AUTOS";CHR$(9);
1210 FOR I=.4 TO 9.3 STEP .4
1220 LPRINT CHR$(61);
1230 NEXT I
1240 LPRINT
1250 LPRINT "CHEMICALS";CHR$(9);
1260 FOR I=.4 TO 8.7 STEP .4
1270 LPRINT CHR$(60);
1280 NEXT I
1290 LPRINT
1300 LPRINT "GUNS";CHR$(9);
1310 FOR I=.4 TO 1.4 STEP .4
1320 LPRINT CHR$(62);
1330 NEXT I
1340 LPRINT
1350 LPRINT CHR$(9);"+--";
1360 SCALE$="--+--"
1370 FOR I=2 TO 8 STEP 2
1380 LPRINT SCALE$;
1390 NEXT I
1400 LPRINT "--+"
1410 LPRINT CHR$(9);"   ";
1420 FOR I=2 TO 8 STEP 2
1430 LPRINT "   ";I;
1440 NEXT I
1450 LPRINT CHR$(27);"I";CHR$(2)
1460 LPRINT CHR$(27);"S";CHR$(0);
1470 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1480 LPRINT CHR$(27);"T"
1490 END
1500 '
1510 DATA    0,   0,   0,   0,   2,   4,   4,   2,   1,   8
1520 DATA    8,   0,   1,  16,240,224,   1,   0,   0,   0
1530 DATA    1,   0,   0,   0,   1,   0,   0,   0,   1,   0
1540 DATA  240,224,   1,  16,   8,   0,   1,   8,   4,   2
1550 DATA    2,   4,   0,   0,   0,   0
1560 '
1570 DATA   14,  28,  16,  32,  38,  14,   1,  64,  70,  14
1580 DATA    1,   0,  70,  14,   0,   0,126,124,   0,   0
1590 DATA    0,   0,  70,  12,   0,  64,  38,  12,   0,  32
1600 DATA   22,  14,   9,  16,   6,  14,   9,   0,   6,  14
1610 DATA    8,   0,   6,  12,   0,   0
1620 '
1630 DATA    0,   0,  24,  32,   7,  16,  56,  14,   1,  48
1640 DATA   56,  14,   7,  48,   8,  14,   2,  32,   8,   0
1650 DATA    6,  32,   8,   0,   2,  40,   8,   0,   4,  36
1660 DATA    8,   0,   0,  40,   8,   0,   0,  32,  32,   0
1670 DATA    8,  32,   0,   0,  24,  48
```

U.S. EXPORTS

```
AUTOS      ΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔ
CHEMICALS  ΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩ
GUNS       ▛▛▛
           +----+----+----+----+----+
              2    4    6    8
           MILLIONS OF DOLLARS
```

MEMO

chapter 9

MS-DOS AND YOUR PRINTER

When using your printer with an IBM PS/2, PC-AT or compatible, you will probably be using PC-DOS or MS-DOS as an operating system. A number of software tricks may be useful here. This chapter is not, however, a substitute for the operating system manuals supplied with your computer.

To learn how to print files, etc. it is best to read the relevant parts of these manuals.

INSTALLING APPLICATION SOFTWARE WITH YOUR PRINTER

When installing application software, you may find that your printer is not specifically mentioned in the lists of printers given for installation. However, this should pose no problem. Read this section, and guidelines provided with your software on printer installation.

Choose one of the following (in order of preference) according to your selected Emulation mode.

#	Standard mode	IBM mode
1	Star XR-1020/1520	* Proprinter III
2	Star XR-1000/1500	* Proprinter II
3	Star NX-1020 Color	* Proprinter
4	Epson EX-800/1000	
5	* Epson FX-850/1050	
6	Star NX-1000 Color	

NOTE: * does not support color printing.

If your software package does not mention printers by name, but asks instead what features your printer is capable of, the most common questions are: "Can your printer perform a backspace?" and "Can it do a hardware form feed?". You should answer "Yes" to both these questions.

Other software packages may allow you to install specific features. Spreadsheet programs will often ask for the maximum number of columns to be printed. This is given below.

	CPI	Number of columns	
		Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	

Sometimes the software installation will ask you for an initialization sequence to return to the default settings. The command for your printer is <ESC> @.

Make sure that the Memory Switches are set for the correct printer emulation, and that you have selected the appropriate character set using the Memory Switch settings.

If you are in doubt about the configuration of your application software, seek expert advice. Your software supplier will probably be your most qualified reference.

EMBEDDING PRINTER COMMANDS

Many word-processors and other software lack commands for changing font, printing double-size characters, or printing in color. Your printer therefore has commands that can be embedded in documents to control these functions without software help. The commands consist of a capital letter enclosed in double parentheses, followed by a digit:

Font:	((F))0	Tms Romn
	((F))1	Sanserif
	((F))2	Courier
	((F))3	Prestige
	((F))4	Script
	((F))7	Orator
	((F))9	Draft
Size:	((S))0	Standard size
	((S))1	Double width
	((S))2	Double height
	((S))3	Double width and height

Color:	((C))0	Black
	((C))1	Red
	((C))2	Blue
	((C))3	Violet
	((C))4	Yellow
	((C))5	Orange
	((C))6	Green

If you want to print a title in double-size Script, then change to regular-size fonts for other text, you can use these commands as follows:

File as seen on computer screen:

```
((F))4 ((S))3
Printer commands
((F))0 ((S))0
Font commands ((F))1can be ((F))2embedded
((F))3anywhere ((F))9in a document.
```

Printout:

Printer commands

```
Font commands can be embedded
anywhere in a document.
```

When you use these commands there are several points to note:

- The font ((F)) command is ignored if the FONT LOCK mode was selected when power was switched on.

- The color ((C)) command is valid only when the color ribbon is installed.

- A line consisting of commands alone prints as a blank line.

- The software will not know that these are commands, so you cannot trust your software to give you the correct line width. The printed line may be considerably shorter than the line on the screen; the extra space being the space that was occupied by the commands.

One way to handle the last problem is to prepare your document without the commands, then insert them as a final step, with the margins released. The find, replace, and copy functions of word-processing software can be helpful here.

If you do not use these commands or the panel controls, the printer will print standard-size, draft characters.

The printer supports various commands in addition to the above, such as quadruple-size printing.
Most of these other commands consist of the escape code followed by one or more letters or numbers.

If your software enables you to place the escape code in your files, or if you are able to define this as a user option during installation, you can also embed these escape sequences.

PROGRAMMING THE PRINTER WITH DOS COMMANDS

If your system includes the file PRINT.COM you can use the main DOS printing command. Simply type the word PRINT followed by the name of the file you want to print. To print a file named README.DOC, for example, type:

```
A>PRINT README.DOC
```

The computer may respond with the following message, asking which printer to use:

```
Name of list device [PRN]:
```

If your computer is connected to only one printer, press RETURN to select the default choice (PRN).
Printing will begin and the A> prompt will reappear. You can execute other commands or programs while the file is being printed.

A single PRINT command can print two or more files. List the file names consecutively on the same line, or use wild-card characters (* and ?). Each file will be printed starting on a new page. The PRINT command also has control options. For example, you can terminate a printing job in progress with the /T option. (The printer may not stop printing immediately as there may be considerable data stored ahead in its buffer.) For the /T option, type:

```
A>PRINT/T
```

See your DOS manual for further information about the PRINT command. If your system does not include PRINT.COM, you can print files by using the PRN device name in COPY or TYPE commands such as the following:

```
A>COPY README.DOC PRN
A>TYPE README.DOC >PRN
```

COPY and TYPE do not permit you to execute other commands while the file
is printing.

If you want a particular font, or print pitch, you can make these settings from
the control panel before you start printing. See Chapter 5.

If you print from the DOS command level very often, it will be advantageous
to create a printer setup file. Then instead of setting font etc. manually each
time, you can complete the setup with a single command from your
computer. For example, you can create a file containing printer command to
select near letter quality, and select elite pitch with the Standard mode. You
can find the commands in Chapter 7. We suggest the following:

- Near letter quality   <ESC>   "x"   "1"
- Elite pitch   <ESC>   "!"   <1>

<ESC> "!" <1> is a powerful command that, in addition to selecting elite
pitch, cancels unwanted features such as underlining which might be left
from previous commands. The angle brackets around the <1> indicate
character code 1, which is a control code, not the printable digit "1".

You may want to place additional commands in this file, such as left and right
margins, line spacing and bottom margin commands. Or you may want to
create a variety of setup files with a different set of commands in each.

To avoid excess line feeds, you should place the commands on one line in the
setup file. You may or may not be able to generate a setup file with word-
processing software; it depends on whether your software lets you enter
control codes. If your system includes the file EDLIN.COM, however, you
can easily create a setup file with the DOS line editor.

An appropriate name for this setup file would be NLQELITE.DAT. To use
the DOS line editor, type the command EDLIN NLQEJ.ITE.DAT, then type
the underlined parts of the following display. Press RETURN at the end of
each line. Do not type the symbol "^". This symbol means to hold the CTRL
key down while pressing the next key: for example, ^V means to type CTRL-
V. ^C means to type CTRL-C, which indicates the end of the input.

```
A>EDLIN NLQELITE.DAT
New file
*1
        1:*^V[X1^V[!^VA
        2:*^C
*E
```

^V indicates that the following character is a control code. ^V[enters the
<ESC> code. <ESC> has character code 27, and "[" is the 27th character
from A in the ASCII sequence. Similarly, ^VA enters the control code <1>.
See your DOS manual if you need further information about EDLIN.

You can now set up the printer by sending it the file NLQELITE.DAT. To
avoid unnecessary logging of commands, switch hard-copy output off (by
pressing CTRL-PRTSC if hard copy is on). To print the file README.DOC
in NLQ elite type, give the following two commands:

```
A>COPY NLQELITE.DAT PRN
A>PRINT README.DOC
```

For greater convenience you can make a batch file that will set up the printer
and print any specified file with a single command. To create such a batch
file with the name NLQPRINT.BAT, type in the first four lines shown next.
^Z means to press the CTRL and Z keys simultaneously. To use this file to
print README.DOC, type the fifth line.

```
A>COPY CON NLQPRINT.BAT
COPY NLQELITE.DAT PRN
PRINT %1
^Z
A>NLQPRINT README.DOC
```

The first line above is a copy command from the CONsole screen to a file
named NLQPRINT.BAT. The next two lines are the contents of this file. The
%1 is a dummy parameter: whatever file name you type after NLQPRINT
will be substituted for %1 and printed.

PROGRAMMING WITH BASIC

As an example of programming the printer on Microsoft BASIC, we have listed the program for the IBM-PC. This program runs in the printer's Standard mode, and the downloadable condition.

```
1000 ' Set control codes
1010 E$=CHR$(27)                                'Escape code
1020 D$=E$+"x0"                                 'Draft quality
1030 N$=E$+"x1"                                 'Near letter quality
1040 F$=E$+"k"                                  'Select font
1050 C$=F$+CHR$(2)+N$                           'Select Courier
1060 H$=CHR$(9)                                 'Horizontal tab
1070 P$=E$+"P"                                  'Pica pitch
1080 ' Start printing
1090 WIDTH "LPT1:",255
1100 LPRINT E$;"D";CHR$(3);CHR$(27);CHR$(0)         'Set HT
1110 LPRINT C$;"Resident fonts are:"
1120 LPRINT H$;D$;"Draft characters,";N$;
1130 LPRINT H$;F$;CHR$(0);"Tms Romn characters,"
1140 LPRINT H$;F$;CHR$(1);"Sanserif characters,";
1150 LPRINT H$;F$;CHR$(2);"Courier characters,"
1160 LPRINT H$;F$;CHR$(3);"Prestige characters,";
1170 LPRINT H$;F$;CHR$(4);"Script characters,"
1180 LPRINT H$;F$;CHR$(7);"Orator characters,";
1190 LPRINT H$;F$;CHR$(12);"Helvet characters,"
1200 LPRINT
1210 LPRINT C$;"Print pitches are:"
1220 LPRINT H$;P$;"Pica pitch (10 CPI),";
1230 LPRINT H$;E$;"M";"Elite pitch (12 CPI),"
1240 LPRINT H$;P$;
1250 LPRINT CHR$(15);                           'Select condensed print
1260 LPRINT "Condensed pica pitch (17 CPI),";
1270 LPRINT H$;E$;"M";"Condensed elite pitch (20 CPI),";
1280 LPRINT CHR$(18)                            'Cancel condensed print
1290 LPRINT H$;E$;"p1";                         'Select proportional spacing
1300 LPRINT P$;"Proportional spacing,";
1310 LPRINT E$;"p0"                             'Cancel proportional spacing
1320 LPRINT
1330 LPRINT H$;E$;"w1";"Double-height,";E$;"w0"
1340 LPRINT H$;E$;"W1";"Double width, ";E$;"W0"
1350 LPRINT H$;E$;"h";CHR$(1);"Double-sized,"
1360 LPRINT H$;E$;"h";CHR$(2);"Quad-sized.";
1370 LPRINT E$;"h";CHR$(0)
1380 LPRINT :LPRINT
1390 LPRINT E$;"Q";CHR$(47)                     'Set right margin
1400 LPRINT C$;"Various line and character spacings:"
1410 LPRINT E$;"a1"                             'Center text
1420 FOR I=1 TO 7
1430 LPRINT E$;"A";CHR$(I);                     'Line spacing set
1440 LPRINT E$;" ";CHR$(I);                     'Increase character space
1450 LPRINT "THE SPACINGS ARE CHANGED"
1460 NEXT I
1470 FOR I=7 TO 1 STEP -1
1480 LPRINT E$;"A";CHR$(I);                     'Line spacing set
1490 LPRINT E$;" ";CHR$(I);                     'Increase character space
1500 LPRINT "THE SPACINGS ARE CHANGED"
1510 NEXT I
1520 LPRINT E$;"a0"                             'Left justify
1530 LPRINT E$;"3";CHR$(36);                    'Set 1/6" line spacing
1540 LPRINT E$;" ";CHR$(0);                     'Normal character space
1550 LPRINT CHR$(27);"Q";CHR$(80)
1560 LPRINT
1570 LPRINT C$;"Other features:"
1580 LPRINT H$;E$;"E";"Emphasized";E$;"F";", ";
1590 LPRINT E$;"G";"Double-strike";E$;"H";", ";
```

```
1600 LPRINT E$;"4";"Italics";E$;"5";", "
1610 LPRINT H$;E$;"-1";"Underlining";E$;"-0";", ";
1620 LPRINT E$;"S0";"SUPERSCRIPT";E$;"T";" and ";
1630 LPRINT E$;"S1";"SUBSCRIPT";E$;"T";", "
1640 LPRINT H$;TM$;"Download characters: ";
1650 GOSUB 2110
1660 LPRINT D$;E$;"%1";                    'Select draft download character
1670 FOR I=1 TO 5
1680 LPRINT CHR$(60);                       'Print download character
1690 NEXT I
1700 LPRINT E$;"%0";                        'Select normal character
1710 GOSUB 2200
1720 LPRINT C$;E$;"%1";                     'Select NLQ download character
1730 FOR I=1 TO 5
1740 LPRINT CHR$(60);                       'Print download character
1750 NEXT I
1760 LPRINT E$;"%0"                         'Select normal character
1770 LPRINT
1780 LPRINT H$;C$;"Various dot graphics densities:"
1790 DIM LOGO$(4)
1800 RESTORE 2420
1810 FOR ROW=1 TO 4
1820 FOR COL=1 TO 65
1830 READ DG
1840 LOGO$(ROW)=LOGO$(ROW)+CHR$(DG)
1850 NEXT COL
1860 NEXT ROW
1870 LPRINT E$;"A";CHR$(8);                 'Set 8/72" line spacing
1880 FOR ROW=1 TO 4
1890 LPRINT "     ";
1900 FOR B=0 TO 3
1910 LPRINT E$;"*";CHR$(B);
1920 LPRINT CHR$(65);CHR$(0);LOGO$(ROW);
1930 LPRINT "   ";
1940 NEXT B
1950 LPRINT
1960 NEXT ROW
1970 LPRINT :LPRINT
1980 FOR ROW=1 TO 4
1990 LPRINT "     ";
2000 FOR B=4 TO 7
2010 LPRINT E$;"*";CHR$(B);
2020 LPRINT CHR$(65);CHR$(0);LOGO$(ROW);
2030 LPRINT "   ";
2040 NEXT B
2050 LPRINT
2060 NEXT ROW
2070 LPRINT E$;"@"
2080 END
2090 '
2100 ' SUBROUTINES
2110 ' Define draft download character
2120 LPRINT D$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2130 RESTORE 2300
2140 FOR M=0 TO 11
2150 READ MM
2160 LPRINT CHR$(MM);
2170 NEXT M
2180 RETURN
2190 '
2200 ' Define NLQ download character
2210 LPRINT C$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2220 LPRINT CHR$(0);CHR$(23);CHR$(0);
2230 RESTORE 2330
2240 FOR M=1 TO 69
2250 READ MM
2260 LPRINT CHR$(MM);
2270 NEXT M
2280 RETURN
```

124

```
2290 ' DATA
2300 ' Draft download character data
2310 DATA 139,124,  0, 66,  4, 64, 36, 16,  2, 16, 12,  0
2320 '
2330 ' NLQ download character data
2340 DATA  1,248,  0,  6,  0,  0,  8,124,  0, 16,  2,  0
2350 DATA 32,124,  0,  0,  2,  0, 32,124,  0,  0,  0,  0
2360 DATA 63,248,  0,  0,  0,  0, 32,  0,  0,  0,120,  0
2370 DATA 16,  0,  0,  8,120,  0,  4,  0,  0,  2,124,  0
2380 DATA  1,130,  0,  0,124,  0,  0,130,  0,  0,124,  0
2390 DATA  0,128,  0,  0,120,  0,  0,  0,  0
2400 '
2410 ' Dot graphics data
2420 ' 1ST LINE
2430 DATA  0,  0,  0,  0,  1,  3,  7,  7,  7, 15, 14, 14
2440 DATA 14, 14, 14,  7,  7,  3,  3, 15, 15, 15,  0,  0
2450 DATA  0,  0,  6,  7,  7,  7,  7,  7,  7,  7,  7,  6
2460 DATA  6,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7,  7
2470 DATA  7,  7,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7
2480 DATA  7,  7,  0,  0,  0
2490 ' 2ND LINE
2500 DATA  0,  0, 60,255,255,255,255,255,143, 15,  7,  7
2510 DATA  7,  7,  3,  3,  3,131,193,241,240,240,  0,  0
2520 DATA  0,  0,  0,  0,224,255,255,255,255,255, 31,  0
2530 DATA  0,  0,  1,  3, 31,255,255,255,255,255,255,  1
2540 DATA  0,  0,  0,  1,  7, 31,255,252,240,192,128,  0
2550 DATA  0,  0,  0,  0,  0
2560 ' 3RD LINE
2570 DATA  0, 31, 31,  3,129,128,192,192,192,192,192,224
2580 DATA 224,224,224,240,255,255,255,255,255,127,  0,  0
2590 DATA  0,  0,  0,  0,  0,192,255,255,255,255,255, 15
2600 DATA 15, 63,252,240,192,  0,240,255,255,255,255,255
2610 DATA  7, 15,127,252,240,192,  0,  0,  0,  0,  0,  0
2620 DATA  0,  0,  0,  0,  0
2630 ' 4TH LINE
2640 DATA  0,248,248,240,224,224,112,112, 56, 56, 56, 56
2650 DATA 56,120,120,240,240,224,224,192,128,  0,  0,  0
2660 DATA  0,  0,  0,  0,  0,  0,128,248,248,248,248,240
2670 DATA 192,  0,  0,  0,  0,  0,240,248,248,248,248,240
2680 DATA 192,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
2690 DATA  0,  0,  0,  0,  0
```

How the program works

This program begins by assigning a number of printer commands to BASIC string variables (lines 1000 to 1070). You can find most of these commands near the beginning of chapter 7.

The WIDTH "LPT1:" 255 statement in line 1090 means infinite line width. It prevents the IBM-PC from inserting unwanted carriage returns and line feeds in graphics data.

Actual printing begins in line 1100. Using the preassigned commands, the program prints samples of its different fonts, followed by samples of the print pitches, then some double and quadruple-sized printing.

Next comes the central attraction of the program: a line of text printed fourteen times in expanding and contracting loops to give a barrel effect. The work is done by four printer commands: a command setting the right margin (line 1390); a centering command (line 1410); a command to vary the line spacing (lines 1430 and 1480); and a command to micro-adjust the space between characters (lines 1440 and 1490).

Next the program returns to normal spacing and gives a demonstration of the printer's word-processing abilities: italic printing, bold printing, underlining, subscripts, etc.

The row of car symbols in the next printed line is created by downloading two new character patterns, which are printed in place of the character "<" (character 60). Details can be found in Chapter 8.

The final part of the program uses dot graphics to print some "SW" logos with various densities.

The dot pattern of the logo was originally laid out on graph paper, then converted to the data in lines 2420 to 2690 with the help of a calculator. Each number represents eight vertical dots. (See "Graphics commands" in Chapter 7 for details.)

The pattern is printed in four rows, each eight dots high and 65 dots wide. Lines 1790 to 1860 read the dot data into a string array variable named LOGO$. Line 1870 sets the line spacing to 8/72 inch so that the rows will connect vertically. The loop in lines 1880 to 1960 and lines 1980 to 2060 do the printing in four passes of the print head.

Resident fonts are:
Draft characters,   **Tms Romn characters,**
Sanserif characters,   Courier characters,
Prestige characters,   *Script characters,*
ORATOR CHARACTERS,   Helvet characters,

Print pitches are:
Pica pitch (10 CPI),   Elite pitch (12 CPI),
Condensed pica pitch (17 CPI),   Condensed elite pitch (20 CPI),
Proportional spacing,

Double-height,
Double width,
Double-sized,

Quad-sized.

Various line and character spacings:
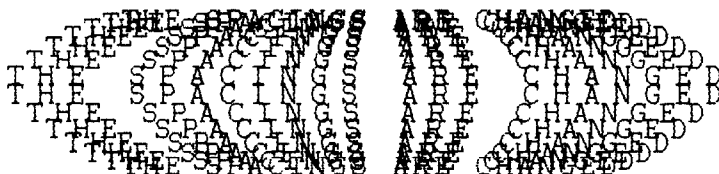
Other features:
Emphasized, Double-strike, *Italics,*
Underlining, SUPERSCRIPT and SUBSCRIPT,
Download characters: 🔲🔲🔲🔲♠♠♠♠

Various dot graphics densities:

MEMO

Chapter 10   TROUBLESHOOTING AND MAINTENANCE

The following section on troubleshooting and maintenance is intended only as a brief guide.

Remember that your printer is a highly sophisticated electronic device, which also contains high voltage inside. For that reason, only carry out those operations described in this chapter.

CAUTION: Any attempt to carry out operations other than those described here may result in electric shock and/or damage to the printer. When carrying out any repairs or maintenance, always follow the instructions carefully.

TROUBLESHOOTING

Your printer is a reliable piece of precision machinery, which should not cause you any trouble, provided it is used and treated sensibly. However, if you do experience a minor problem, the few tips below help you avoid having to make an unnecessary service call. The following table gives you ideas on where to look in this section if you experience faults:

Region of fault	Description
Power supply	Power is not being supplied to the printer
Printing	The printer does not print, or stops printing
	The print is faint or uneven
	Dots are missing in characters or graphics
	While using application software, fonts or characters cannot be printed
	The printout is not what is expected when running a program
Paper feeding	Single sheets do not feed properly (without ASF)
	Continuous paper does not feed properly with the tractor feed
	The ASF is not operating or is not feeding paper properly
	Paper park (switching between continuous paper and cut sheets) is not working properly
	Text is being printed all on one line, or with extra blank lines
	Page length and margin settings are not what is expected

Remember — it is better not to attempt operations or repairs above your level of competence.

Otherwise, you run the risk of damaging the printer.

Power supply

If the POWER indicator does not illuminate, check the following:

Check	Possible remedy
Is the power cable properly plugged into the electrical outlet?	Turn off the printer, ensure the power cable is securely connected, and then turn the printer back on.
Is power being supplied to the outlet?	Turn off the printer, unplug it. Try the outlet with another appliance to determine if electricity is being supplied from that outlet.
Is the printer voltage correct?	Check the bottom panel of your printer to ensure that the outlet voltage corresponds to the voltage required by the printer. If they do not match, DO NOT try to operate the printer. Contact your supplier.

Printing

If your printer does not print, or suddenly stops printing, check the following:

Check	Possible remedy
Is the interface cable connected securely?	Check both ends of the cable - printer and computer to make sure that the connector is firmly in position.
Is the ON LINE indicator illuminated?	If it is not, press the [ON LINE] button to set the printer on-line.
Is the PAPER indicator illuminating?	If it is, the paper has run out. Load more paper.
Is the printer beeping intermittently?	The release lever is moved while the paper is in printing position. Move the release lever to the original position.
Is the paper caught up internally?	Turn off the power, remove the jammed paper, replace, turn on the printer, and continue printing. Make sure that the loading edge of the paper is smooth and uncreased.
Is the ribbon caught up around the print head?	Turn off the power, remove the ribbon, retension it, and replace it. This problem occurs most frequently with a worn ribbon, so you may need to replace the ribbon.
Is the software you are using properly installed for your printer?	Check the installation settings in your software, and reinstall if necessary.
Can the printer perform self-test operations?	Turn the printer off, and turn it on again, holding down one of the buttons to perform a self-test. If these do not work, contact your dealer.

If the print is faint, or uneven, check the following:

Check	Possible remedy
Is the ribbon properly installed?	Check and reinstall if necessary.
Is the ribbon worn out?	The ribbon has a long life, but will eventually need replacing. Fit a new ribbon cartridge if necessary.

If dots are missing in the printing, check the following:

Check	Possible remedy
Are dots missing at random in the printing?	The ribbon has become slack, causing it to get caught up. Stop printing, remove the ribbon cartridge, retension and replace it.
Is a line of dots missing consistently throughout the printing?	The print head may be damaged. Stop printing, and contact your supplier.

If your application software cannot print the fonts or characters selected, check the following:

Check	Possible remedy
Is your application software properly installed?	Check the software installation, and re-install the software if necessary.
Are fonts not being selected properly?	Check the software installation, and insert the commands necessary for font changes into the software.
Are characters other than those expected being printed?	Either you are using the wrong International Character Set (reset with Memory Switch or software commands), or you have the wrong character set selected (for example if characters other than IBM block graphic characters are being printed). Correct this with Memory Switch or the appropriate software sequences.

If the printout is not what is expected:

Check	Possible remedy
Is the printer installed correctly?	Your software may think that it is driving a different emulation to the one actually set. Check the Memory Switch settings to make sure you have the right emulation.
Is the printer not printing anything that you are expecting?	Use the Hex Dump mode to analyze the output from the computer to the printer. This will enable you determine that the right escape sequence, etc are being transmitted.

Paper feeding

If cut sheet paper (without ASF) is not feeding smoothly, check the following:

Check	Possible remedy
Is the paper release lever pushed front (to the ▮ position)?	Set the release lever to the ▮ position.
Is the paper guide in place and vertical?	The paper guide should be in place and vertically for cut sheets to feed smoothly.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper feed freely.
Is the ASF selected with the Memory Switch setting?	If it is, then deselect it.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.
Are froms jamming between printing surface and the platen?	Clean the surface of the platen roller with a cloth barely dampended with a little alcohol.

If fanfold (continuous) paper is not being fed correctly using the tractor feed, check the following:

Check	Possible remedy
Is the paper release lever pushed to the ▮ position?	Make sure the release lever is pushed to the ▮ position.
Is the paper guide in the vertical position?	When using the tractor feed, the paper guide should be horizontal.
Are the holes on each side of the paper aligned with regard to each other in the tractor units?	If the two sides of the paper are out of alignment, realign them so that the tractor holes match up.
Are the tractor units too close or too far apart?	Misalignment of the tractor units, making the paper too close or too tight, will prevent a smooth paper feed.
Are the tractor units locked in position and the covers closed?	Correct this if necessary.

Check	Possible remedy
Is the paper feeding freely into the printer?	The paper should not be too far from the printer (less than 1 meter/3 feet), and there should be no cables or other obstacles obstructing its path. The paper should also be feeding straight into the printer, and an angled feed may cause jams and blockages.
Is the paper caught up around the perforation?	It is recommended to skip around the perforation. If you cannot, set on the CR-CENTERING with Memory switch.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.

If the ASF is not operating or is not feeding paper correctly, check the following:

Check	Possible remedy
Has the correct ASF option been selected with the Memory Switch?	Select correct option.
Is the release lever set to the ▶ position?	The release lever should be set to the single-sheet position.
Is the ASF correctly mounted?	Make sure that the ASF is properly seated on the printer.
Is paper caught up near the print head?	Stop printing, remove the jammed sheet (you may have to remove the ASF for this), and continue.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper to feed freely.
Is there too much paper in the paper feed hopper or stacker?	The ASF's paper feed hopper and stacker can hold between 100 to 150 sheets each. Make sure that there is no more paper than this in either the hopper or stacker.
Was the paper fanned before being fed into the ASF?	If this is not done, paper jams may occur. Remove the stack of paper from the ASF and fan it before reinserting.
Has the paper been used already or is it creased?	Only new, uncreased paper should be used with the ASF.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick or too thin?	There are limits to the thickness of paper that can be fed in this way. Try with different paper.

If the paper park facility does not appear to be working correctly, check the following:

Check	Possible remedy
Is the paper release lever in the ▶ position?	The paper release lever must be set to the ▶ position after the fanfold paper has been parked.
Has the fanfold paper been properly parked?	Make sure that the PAPER indicator comes on after the fanfold paper has been parked.

If text is being printed all on one line, or with extra blank lines, check the following:

Check	Possible remedy
Is the text all on the same line?	Carriage returns are not being expanded to <CR> + <LF> pairs. Check the Memory Switch setting and correct.
Is text being printed with extra blank lines?	Two line feeds are being printed. Either make sure your software print just a carriage return or (if this is not possible), set the AUTO LF to OFF with the Memory Switch setting.

If the page length and margins are not what is expected, check the following:

Check	Possible remedy
Is the printing starting too high or too low on the page?	Use the Micro Feed facility to adjust the print position relative to the page.
Does the printer's page length not match the physical page length?	Use the Memory Switches to set up the correct page length, or use software commands to do it.

MAINTENANCE

Essentially, your printer is a robust piece of equipment, but should be treated with a modicum of care in order to avoid malfunctions. For example:

• Keep your printer in a "comfortable" environment. Roughly speaking, if you are comfortable, then the environment is suitable for your printer (see Chapter 2).

• Do not subject the printer to physical shocks or excessive vibration.

• Avoid over-dusty environments. Dust is the enemy of all precision mechanical devices.

• To clean the exterior of the printer, use a cloth barely dampened with either water with a little detergent or a little alcohol, but do not allow any liquid to fall inside the printer.

• The interior of the printer may be cleaned with a small vacuum cleaner or a compressed-air aerosol (sold for this purpose). When performing this operation, be sure not to bend or damage any cable connections or electronic components.
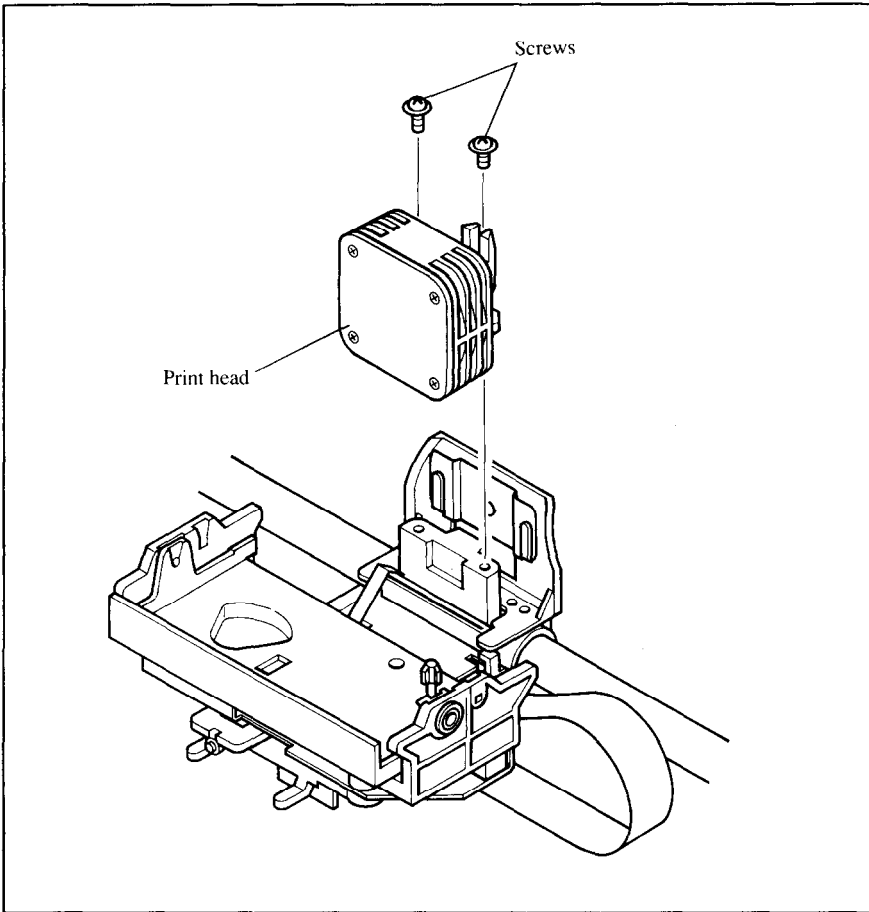
REPLACING THE PRINT HEAD

This is not a job which you will need to do very often. The print head has been designed to last for about 100 million draft characters. In normal everyday use, this will translate to years of life. However, if the print quality is faint, even after you have changed the ribbon or you have adjusted the gap between the print head and the platen (see Chapter 4), the print head may need replacement.

Only use a replacement print head as recommended by your supplier.

1. Turn OFF the printer, and unplug the power cord.
2. Open the front cover, and remove the ribbon cartridge.
3. If the printer has been in operation immediately before this operation, the print head will be hot. Allow time for the print head to cool before attempting to work on it.
4. Unscrew the two screws that hold the print head in place and set them aside.
5. Disengage the connector, then remove the print head.
6. Place the new print head on its support, seating it on the two pins.

7. Fasten the print head down with the two screws.
8. Replace the ribbon cartridge and close the front cover, then plug the power cord back in.

Screws

Print head

Figure 10-1. Replacing the print head.

chapter 11

SPECIFICATIONS

Printing system ....Serial Impact Dot-matrix

Printing speed ....Pica   Elite

	Pica	Elite
High-Speed Draft	372 cps	420 cps
Draft	280 cps	336 cps
Near Letter Quality	70 cps	84 cps

Print direction ....Bi-directional, logic-seeking
Uni-directional, logic-seeking
(selectable)

Print head ....9 pins
Life: 100 million draft characters

Line spacing ....1/6, 1/8, $n/72$, $n/216$ inches

Font styles ....Draft, High-Speed Draft, Tms Romn,
Sanserif, Courier, Prestige, Script,
Orator, Helvet

Characters ....ASCII   96

International	16 sets (*)
IBM special	111
IBM block graphic	50
IBM code page	6 sets (**)
Download	255

  * USA, France, Germany, England, Denmark I, Sweden, Italy, Spain I, Japan, Norway, Denmark II, Spain II, Latin America, Korea, Irish, Legal

 ** #437 (U.S.A.), #850 (Multi-Lingual), #860 (Portuguese), #861 (Icelandic), #863 (Canadian French), #865 (Nordic)

Number of columns ....CPI	Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	Variable

Character matrix ....Draft	NLQ
Pica	9×11	18×23
Elite	9×8	18×19

Bit image dot-matrix .... DPI	Normal type	Wide type
Normal	60	$(8 \text{ or } 9) \times 480$	$(8 \text{ or } 9) \times 816$
Double	120	$(8 \text{ or } 9) \times 960$	$(8 \text{ or } 9) \times 1632$
High-speed double*	120	$(8 \text{ or } 9) \times 960$	$(8 \text{ or } 9) \times 1632$
Quadruple*	240	$(8 \text{ or } 9) \times 1920$	$(8 \text{ or } 9) \times 3264$
CRT graphics type 1	80	$(8 \text{ or } 9) \times 640$	$(8 \text{ or } 9) \times 1088$
Plotter graphics	72	$(8 \text{ or } 9) \times 576$	$(8 \text{ or } 9) \times 979$
CRT graphics type 2	90	$(8 \text{ or } 9) \times 720$	$(8 \text{ or } 9) \times 1224$
Double-density plotter graphics	144	$(8 \text{ or } 9) \times 1152$	$(8 \text{ or } 9) \times 1958$

* It is impossible to print adjacent dots in the mode marked with an asterisk (*).

Paper feed......................................Friction or push tractor feed (standard)
Bottom feed or Push/Pull feed (option)

Paper feed speed ....3.4 inches/second max (Normal type)
3.7 inches/second max (Wide type)

Paper specifications ....Normal Type	Wide type
Cut sheet		
Width	4" - 11.7"	4" - 16.5"
	(101 - 297 mm)	(101 - 419 mm)
Length	7.17" - 14.3"	7.17" - 14.3"
	(182 - 364 mm)	(182 - 364 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
Weight	52 - 90 g/m²	52 - 90 g/m²
	45 - 77 kg	45 - 77 kg
	14 - 24 lb	14 - 24 lb

Fanfold (continuous)

Width	4" - 10"	4" - 16"
	(101 - 254 mm)	(101 - 406 mm)
Length	5.5" (Minimum)	5.5" (Minimum)
	(140 mm)	(140 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
	0.35 mm (Total for multi-part forms)	
Weight	52 - 82 g/m²	52 - 82 g/m²
	45 - 70 kg	45 - 70 kg
	14 - 22 lb	14 - 22 lb

Copies .... Original + 2 copies (Multi-part mode off)
Original + 4 copies (Multi-part mode on)

Maximum buffer size .... Without Download   32 kB
With Download   14 kB

Emulations .... Standard mode: Epson EX-800/1000
IBM mode: IBM Proprinter III

Interface .... Centronics parallel (standard)
RS-232C/422 serial (option)

Ribbon type .... On-carriage, dedicated
Monochrome (Black only)
Color (Black, red, blue, violet, yellow, orange, green)

Ribbon life

Monochrome (LZ9) .... 4 million characters (draft pica)
Color (X9CL) .... 1 million characters (draft pica)

Dimensions and Weight	Normal type	Wide type
Width	466 mm (18.3")	608 mm (23.9")
Depth	400 mm (15.7")	400 mm (15.7")
Height	157 mm (6.2")	157 mm (6.2")
Weight	9.7 kg (21.4 lb)	11.9 kg (26.2 lb)

Power supply .... 120VAC, 220VAC, 240VAC, 50/60 Hz
(varies according to the country of pur-
chase)

Options .... Color Ribbon Cartridge (X9CL)
Single-bin Automatic Sheet Feeder
(SF-10DMII/15DMII)
Dual-bin Automatic Sheet Feeder
(SF-10RMII/15RMII)
Pull Tractor Unit (PT-10XM/15XM)
Serial Interface Cartridge (IS-8XL)
Buffered Parallel Interface cartridge
(IP-128XL)

PINOUT OF INTERFACE CONNECTOR

The following describes the pinout of the interface connector (signals which are low when active are overlined).

Parallel interface

Pin	Name	Function
1	$\overline{\text{STROBE}}$	Goes from high to low (for ≥ 0.5 μs) when active
2	DATA0	High when active
3	DATA1	High when active
4	DATA2	High when active
5	DATA3	High when active
6	DATA4	High when active
7	DATA5	High when active
8	DATA6	High when active
9	DATA7	High when active
10	$\overline{\text{ACK}}$	5μs low pulse acknowledges receipt of data
11	BUSY	Low when printer ready to receive data
12	PAPER	High when paper out. Can be disabled with Memory Switch setting
13	SELECT	High when printer is on-line
14, 15	N/C	
16	SIGNAL GND	Signal ground
17	CHASSIS	Chassis ground (isolated from signal ground)
18	+5V	+5V DC output from printer
19 ~ 30	GND	Twisted pair ground return
31	$\overline{\text{RESET}}$	When this input signal is low, printer is reset
32	$\overline{\text{ERROR}}$	Outputs low when printer cannot continue, due to an error
33	EXT GND	External ground
34, 35	N/C	
36	$\overline{\text{SELECT IN}}$	Always high

Serial Interface

Pin	Name	Function
1	GND	Printer's chassis ground.
2	TXD	This pin carries data from the printer.
3	RXD	This pin carries data to the printer.
4	RTS	This pin is always set space.
5	CTS	This pin is Space when the computer is ready to send data. This printer does not check this pin.
6	N/C	
7	GND	Signal ground.
8 ~ 10	N/C	
11	RCH	This printer turn this pin Space when it is ready to receive data. This line carries the same signal as pin 20.
12	N/C	
13	GND	Signal ground.
14 ~ 19	N/C	
20	DTR	This printer turns this pin Sapce when it is ready to receive data.
21 ~ 25	N/C	

CHARACTER SETS

The following tables show the standard and IBM character sets.

The decimal character code of each character is shown in an inset to the lower right of the character.

The hexadecimal code can be found by reading the entires at the top and left edges of the table. For example, the character "A" is in column 4 and row 1, so its hexadecimal character code is 41. This is equivalent $(4 \times 16 + 1 = 65)$ to decimal 65, the number in the inset.

Control codes recognized by this printer are indicated by abbreviations inside pointed brackets < >.

	0	1	2	3	4	5	6	7
0	<NUL> | 0	| 16	| 32	0 | 48	@ | 64	P | 80	` | 96	p | 112
1	<DC1> | 1	! | 17	! | 33	1 | 49	A | 65	Q | 81	a | 97	q | 113
2	<DC2> | 2	| 18	'' | 34	2 | 50	B | 66	R | 82	b | 98	r | 114
3	<DC3> | 3	| 19	# | 35	3 | 51	C |	S | 83	c | 99	s | 115
		<DC4>	$				`	t

Character

Hexadecimal value (high order)

Control code

Decimal value

Hexadecimal value (low order)

Standard character set #2

	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	⟨DC1⟩ 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	⟨DC2⟩ 18	'' 34	2 50	B 66	R 82	b 98	r 114
3	3	⟨DC3⟩ 19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	⟨DC4⟩ 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	⟨NAK⟩ 21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	⟨BEL⟩ 7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	⟨BS⟩ 8	⟨CAN⟩ 24	(40	8 56	H 72	X 88	h 104	x 120
9	⟨HT⟩ 9	⟨EM⟩ 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	⟨LF⟩ 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	⟨VT⟩ 11	⟨ESC⟩ 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	⟨FF⟩ 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124
D	⟨CR⟩ 13	29	— 45	= 61	M 77	] 93	m 109	} 125
E	⟨SO⟩ 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	⟨SI⟩ 15	31	/ 47	? 63	O 79	_ 95	o 111	⟨DEL⟩ 127

	8	9	A	B	C	D	E	F
0	à 128	§ 144	160	0 176	@ 192	P 208	` 224	p 240
1	è 129	ß 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	ù 130	Æ 146	'' 162	2 178	B 194	R 210	b 226	r 242
3	ò 131	æ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	ì 132	Ø 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	° 133	ø 149	% 165	5 181	E 197	U 213	e 229	u 245
6	£ 134	.. 150	& 166	6 182	F 198	V 214	f 230	v 246
7	¡ 135	Ä 151	' 167	7 183	G 199	W 215	g 231	w 247
8	¿ 136	Ö 152	(168	8 184	H 200	X 216	h 232	x 248
9	Ñ 137	Ü 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	ñ 138	ä 154	* 170	: 186	J 202	Z 218	j 234	z 250
B	¤ 139	ö 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	R 140	ü 156	, 172	< 188	L 204	\ 220	l 236	¦ 252
D	Á 141	É 157	- 173	= 189	M 205	] 221	m 237	} 253
E	å 142	é 158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	Ç 143	¥ 159	/ 175	? 191	O 207	— 223	o 239	Ø 255

International character sets

When an international character set is selected by a command from software, the following changes are made in the Standard Italic character set:

Country	35	36	64	88	90	91	92	93	94	96	123	124	125	126
U.S.A.	#	$	@	X	Z	[	\	]	^	`	{	¦	}	~
FRANCE	#	$	à	X	Z	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	X	Z	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	$	@	X	Z	[	\	]	^	`	{	¦	}	~
DENMARK 1	#	$	@	X	Z	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	X	Z	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	X	Z	°	\	é	^	ù	à	ò	è	ì
SPAIN 1	₧	$	@	X	Z	¡	Ñ	¿	^	´	¨	ñ	}	~
JAPAN	#	$	@	X	Z	[	¥	]	^	`	{	¦	}	~
NORWAY	#	¤	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK 2	#	$	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN 2	#	$	á	X	Z	¡	Ñ	¿	é	´	í	ñ	ó	ú
LATIN AMERICA	#	$	á	X	Z	¡	Ñ	¿	é	ü	í	ñ	ó	ú
KOREA	#	$	@	X	Z	[	₩	]	^	`	{	¦	}	~
IRISH	#	$	@	Ú	´	[	\	]	^	`	Á	É	Ó	~
LEGAL	#	$	§	X	Z	°	'	"	¶	`	©	®	†	™

The command for selecting the international character set is:

<ESC> "R" *n*

Where *n* means character code *n*, i.e. CHR$ (*n*) in BASIC. The values of *n* are:

0	U.S.A.	6	Italy	12	Latin America
1	France	7	Spain I	13	Korea
2	Germany	8	Japan	14	Irish
3	England	9	Norway	64	Legal
4	Denmark I	10	Denmark II		
5	Sweden	11	Spain II		

IBM character set #2

Code Page #437 (U.S.A.)

	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	⟨DC1⟩ 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	⟨DC2⟩ 18	'' 34	2 50	B 66	R 82	b 98	r 114
3	♥ 3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	♦ 4	⟨DC4⟩ 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117
6	♠ 6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	⟨BEL⟩ 7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	⟨BS⟩ 8	⟨CAN⟩ 24	(40	8 56	H 72	X 88	h 104	x 120
9	⟨HT⟩ 9	⟨EM⟩ 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	⟨LF⟩ 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	⟨VT⟩ 11	⟨ESC⟩ 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	⟨FF⟩ 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124
D	⟨CR⟩ 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	⟨SO⟩ 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	⟨SI⟩ 15	31	/ 47	? 63	O 79	_ 95	o 111	127

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #850 (Multi-lingual)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	β 225	± 241
2	é 130	Æ 146	ó 162	▒ 178	┬ 194	Ê 210	Ô 226	= 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	- 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	= 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	- 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	255

Code Page #860 (Portuguese)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▓ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	À 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	È 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	Ê 137	Õ 153	Ò 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Í 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Â 143	ó 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #861 (Icelandic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	Á 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	þ 149	Í 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	Ó 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	Ý 151	Ú 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ý 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Ð 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	ð 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	Þ 141	Ø 157	¡ 173	╜ 189	= 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #863 (Canadian French)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	í 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Ê 146	ó 162	▓ 178	┬ 194	π 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	¶ 134	û 150	³ 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	─ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	= 141	Ù 157	¾ 173	╜ 189	= 205	▌ 221	φ 237	² 253
E	À 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #865 (Nordic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	ì 141	Ø 157	¡ 173	╜ 189	= 205	▌ 221	φ 237	2 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Character set #1

Other characters are identical to character set #2.

The duplication of control codes enables systems with a 7-bit interface to obtain control functions when the most significant bit is set to 1 by the <ESC> ">" command in the standard mode.

	O	1
O	<NUL> 0	16
1	1	<DC1> 17
2	2	<DC2> 18
3	3	<DC3> 19
4	4	<DC4> 20
5	5	<NAK> 21
6	6	22
7	<BEL> 7	23
8	<BS> 8	<CAN> 24
9	<HT> 9	<EM> 25
A	<LF> 10	26
B	<VT> 11	<ESC> 27
C	<FF> 12	28
D	<CR> 13	29
E	<SO> 14	30
F	<SI> 15	31

	8	9
O	<NUL> 128	144
1	129	<DC1> 145
2	130	<DC2> 146
3	131	<DC3> 147
4	132	<DC4> 148
5	133	<NAK> 149
6	134	150
7	<BEL> 135	151
8	<BS> 136	<CAN> 152
9	<HT> 137	<EM> 153
A	<LF> 138	154
B	<VT> .139	<ESC> 155
C	<FF> 140	156
D	<CR> 141	157
E	<SO> 142	158
F	<SI> 143	159

IBM special character set

Additional characters can be printed by special commands.

	0	1
0	∅ 0	► 16
1	☺ 1	◄ 17
2	☻ 2	↕ 18
3	♥ 3	‼ 19
4	♦ 4	¶ 20
5	♣ 5	§ 21
6	♠ 6	▬ 22
7	• 7	↨ 23
8	◘ 8	↑ 24
9	○ 9	↓ 25
A	◙ 10	→ 26
B	♂ 11	← 27
C	♀ 12	∟ 28
D	♪ 13	↔ 29
E	♫ 14	▲ 30
F	☼ 15	▼ 31

MEMO

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COMMAND SUMMARY

Standard Mode

The following commands take effect with the Standard mode.

CONTROL CODE	FUNCTION	PAGE
\<BEL\>	Bell	100
\<BS\>	Backspace	86
\<HT\>	Horizontal tab	88
\<VT\>	Vertical tab	84
\<CR\>	Carriage return	86
\<LF\>	Line feed	80
\<FF\>	Form feed	82
\<SO\>	Expanded printing for one line	75
\<SI\>	Condensed printing	74
\<DC1\>	Set printer on-line	100
\<DC2\>	Cancel condensed printing	74
\<DC3\>	Set printer off-line	100
\<DC4\>	Cancel one-line expanded printing	75
\<CAN\>	Cancel last line	99
\<ESC\> \<LF\>	Reverse line feed	80
\<ESC\> \<FF\>	Return to top of current page	83
\<ESC\> \<SO\>	Expanded printing for one line	75
\<ESC\> \<SI\>	Condensed printing	74
\<ESC\> \<EM\> \<0\>	Manual feed	101
\<ESC\> \<EM\> \<1\>	Select ASF bin #1	102
\<ESC\> \<EM\> \<2\>	Select ASF bin #2	102
\<ESC\> \<EM\> \<4\>	Auto feed	101
\<ESC\> \<EM\> "R"	Eject paper from ASF	102
\<ESC\> \<EM\> "T" n	Set print start position on ASF	102
\<ESC\> \<SP\> n	Increase character spacing	76
\<ESC\> "!" n	Select master print mode	76
\<ESC\> "#"	Accept MSB as is	99
\<ESC\> "$" $n1$ $n2$	Absolute horizontal tab in inches	89
\<ESC\> "%" 0	Select ROM character set	97
\<ESC\> "%" 1	Select download character set	96
\<ESC\> "&" \<0\> $n1$ $n2$ $m0$ $m1$ $m2$ $m3$ ... mll	Define draft download characters	93
\<ESC\> "&" \<0\> $n1$ $n2$ $m0$ $m1$ $m2$ dl $d2$ ... dx	Define NLQ download characters	94
\<ESC\> "*" $n0$ $n1$ $n2$ $m1$ $m2$ ...	Select graphics mode	91
\<ESC\> "-" 0	Stop underlining	69
\<ESC\> "-" 1	Start underlining	69
\<ESC\> "/" $n0$	Select vertical tab channel	84
\<ESC\> "0"	Set line spacing to 1/8 inch	79
\<ESC\> "1"	Set line spacing to 7/72 inch	79
\<ESC\> "2"	Set line spacing to 1/6 inch	79
\<ESC\> "3" n	Set line spacing to n/216 inch	79
\<ESC\> "4"	Select italic characters	67
\<ESC\> "5"	Select upright characters	68
\<ESC\> "6"	Select character set #2	71
\<ESC\> "7"	Select character set #1	71
\<ESC\> "8"	Disable paper-out detector	83
\<ESC\> "9"	Enable paper-out detector	83

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CONTROL CODE	FUNCTION	PAGE
`<ESC> ":" <0> n <0>`	Copy character set from ROM into RAM	95
`<ESC> "<"`	One-line uni-directional printing	101
`<ESC> "="`	Set MSB to 0	99
`<ESC> ">"`	Set MSB to 1	99
`<ESC> "?" n m`	Convert graphics density	91
`<ESC> "@"`	Reset printer	102
`<ESC> "A" n`	Set line spacing to n/72 inch	80
`<ESC> "B" n1 n2 .... <0>`	Set vertical tab stops	83
`<ESC> "C" <0> n`	Set page length to n inches	82
`<ESC> "C" n`	Set page length to n lines	82
`<ESC> "D" n1 n2 .... <0>`	Set horizontal tab stops	88
`<ESC> "E"`	Emphasized printing	68
`<ESC> "F"`	Cancel emphasized printing	68
`<ESC> "G"`	Double-strike printing	68
`<ESC> "H"`	Cancel double-strike printing	69
`<ESC> "J" n`	Perform one n/216-inch line feed	81
`<ESC> "K" n1 n2 m1 m2 ...`	Print normal-density graphics	90
`<ESC> "L" n1 n2 m1 m2 ...`	Print double-density graphics	90
`<ESC> "M"`	Elite pitch	74
`<ESC> "N" n`	Set bottom margin	82
`<ESC> "O"`	Cancel bottom margin	82
`<ESC> "P"`	Pica pitch	74
`<ESC> "Q" n`	Set right margin	85
`<ESC> "R" n`	Select international character set	72
`<ESC> "S" 0`	Superscript	70
`<ESC> "S" 1`	Subscript	70
`<ESC> "T"`	Cancel superscript or subscript	70
`<ESC> "U" 0`	Bi-directional printing	100
`<ESC> "U" 1`	Uni-directional printing	101
`<ESC> "W" 0`	Cancel expanded printing	75
`<ESC> "W" 1`	Expanded printing	75
`<ESC> "Y" n1 n2 m1 m2 ...`	Print double-density, double-speed graphics	90
`<ESC> "Z" n1 n2 m1 m2 ...`	Print quadruple-density graphics	91
`<ESC> "[" "T" <4> <0> <0> <0> n1 n2`		
	Select IBM code page	72
`<ESC> "\" n1 n2`	Relative horizontal tab	89
`<ESC> "^" n0 n1 n2 m1 m2 ...`	Select 9-pin graphics mode	92
`<ESC> "a" 0`	Left justify	87
`<ESC> "a" 1`	Center text	87
`<ESC> "a" 2`	Right justify	87
`<ESC> "a" 3`	Full justify	87
`<ESC> "b" n0 n1 n2 .... <0>`	Set vertical tab stops in channel	84
`<ESC> "e" 0 n`	Set horizontal tab stop every n columns	88
`<ESC> "e" 1 n`	Set vertical tab stops every n lines	84
`<ESC> "f" 0 n`	Absolute horizontal tab in columns	89
`<ESC> "f" 1 n`	Feed paper n lines	81
`<ESC> "h" n`	Select double or quadruple size	77
`<ESC> "j" n`	Perform one n/216-inch reverse line feed	81
`<ESC> "k" n`	Select NLQ font	67
`<ESC> "l" n`	Set left margin	85
`<ESC> "p" 0`	Select fixed spacing	76
`<ESC> "p" 1`	Select proportional spacing	75
`<ESC> "r" n`	Select print color	98
`<ESC> "t" 0`	Select standard character set	71
`<ESC> "t" 1`	Select IBM character set	71
`<ESC> "t" 2`	Shift download character area	96
`<ESC> "w" 0`	Return to normal height	78
`<ESC> "w" 1`	Print double-height characters	77
`<ESC> "x" 0`	Select draft quality characters	66
`<ESC> "x" 1`	Select NLQ characters	66
`<ESC> "~" 1`	Select slash zero	73
`<ESC> "~" 0`	Select normal zero	73

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CONTROL CODE	FUNCTION	PAGE
"(" "(" "0" ")" ")"	Manual feed	101
"(" "(" "1" ")" ")"	Select ASF bin #1	102
"(" "(" "2" ")" ")"	Select ASF bin #2	102
"(" "(" "4" ")" ")"	Auto feed	101
"(" "(" "C" ")" ")" *d*	Select print color	98
"(" "(" "F" ")" ")" *d*	Select font	67
"(" "(" "R" ")" ")"	Eject paper from ASF	102
"(" "(" "S" ")" ")" *d*	Select character size	77
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	102
\<DEL\>	Delete last character sent	99

IBM Mode

The following commands take effect with the IBM mode.

CONTROL CODE	FUNCTION	PAGE
\<ESC> "I" \<VT>	Select NLQ italic characters	68
\<ESC> "I" \<SI>	Select NLQ download characters with italic	97
\<ESC> "J" *n*	Perform one *n*/216-inch line feed	81
\<ESC> "K" *n1 n2 m1 m2* ...	Print normal-density graphics	90
\<ESC> "L" *n1 n2 m1 m2* ...	Print double-density graphics	90
\<ESC> "N" *n*	Set bottom margin	82
\<ESC> "O"	Cancel bottom margin	82
\<ESC> "P" \<0>	Select fixed spacing	76
\<ESC> "P" \<1>	Select proportional spacing	75
\<ESC> "Q" *n*	Set printer off-line	100
\<ESC> "R"	Reset all tab stops	88
\<ESC> "S" 0	Superscript	70
\<ESC> "S" 1	Subscript	70
\<ESC> "T"	Cancel superscript or subscript	70
\<ESC> "U" 0	Bi-directional printing	100
\<ESC> "U" 1	Uni-directional printing	101
\<ESC> "W" 0	Cancel expanded printing	75
\<ESC> "W" 1	Expanded printing	75
\<ESC> "X" *n1 n2*	Set left and right margins	86
\<ESC> "Y" *n1 n2 m1 m2* ...	Print double-density, double-speed graphics	90
\<ESC> "Z" *n1 n2 m1 m2* ...	Print quadruple-density graphics	91
\<ESC> "[" "@" \<4> \<0> \<0> \<0> *n m*	Select character height, width, and line spacing	78
\<ESC> "[" "T" \<4> \<0> \<0> \<0> *n1 n2*	Select IBM code page	72
\<ESC> "\" *n1 n2*	Enable printing of all character codes	73
\<ESC> "]"	Reverse line feed	80
\<ESC> "^" *n*	Enable printing of all character codes on next character	73
\<ESC> "_" 0	Stop overlining	69
\<ESC> "_" 1	Start overlining	69
\<ESC> "k" *n*	Select NLQ font	67
\<ESC> "r" *n*	Select print color	98
\<ESC> "t" 0	Select standard character set	71
\<ESC> "t" 1	Select IBM character set	71
"(" "(" "0" ")" ")"	Manual feed	101
"(" "(" "1" ")" ")"	Select ASF bin #1	102
"(" "(" "2" ")" ")"	Select ASF bin #2	102
"(" "(" "4" ")" ")"	Auto feed	101
"(" "(" "C" ")" ")" *d*	Select print color	98
"(" "(" "F" ")" ")" *d*	Select font	67
"(" "(" "R" ")" ")"	Eject paper from ASF	102
"(" "(" "S" ")" ")" *d*	Select character size	77
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	102