UNISYS

Model 115 Printer

Operations Reference Manual

June 1988

Printed in U S America
UP-11358

Priced Item

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Preface

Organization of this Book

Before you begin, look briefly through this book. You will notice that chapters are divided and that each divider page has a table of contents. These divider pages were added to make the book easier to use.

You can search through a chapter to find a main section (printed at the top of every left-hand page.) For quick searches through the book, each chapter's main topic is printed on a blue tab along the edge of each page.

Changes or additions can be easily inserted to this loose-leaf book. Changes to the Model 115 printer will be printed in the document with each new addition.

NOTE:

Add this book to your system documentation library.

Contents

Appendixes

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Chapter 1. Installation

Chapter 1. Installation

The Model 115 Package

The following items should be included in the Model 115 package:

- Model 115 printer (Feed knob is shipped unmounted)
- Separator
- Power cord
- Printer cover
- Printer lid (for sheet feeding)
- Printer lid (for tractor feeding)
- Ribbon cartridge

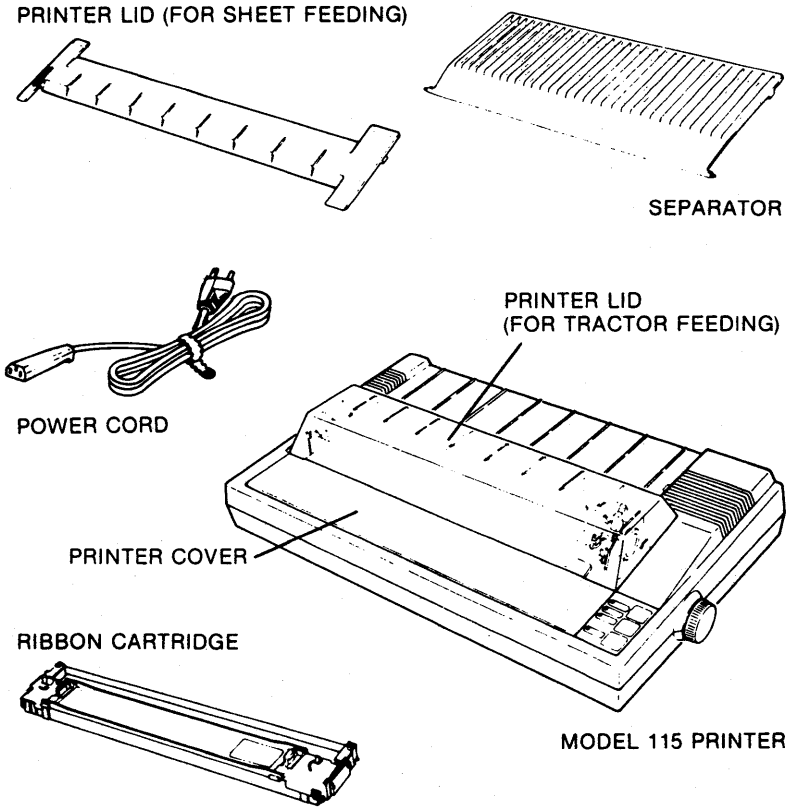
If anything is missing or damaged, contact your Sperry representative.

NOTE:

It is important to save all original packing materials in case you ever need to reship the printer.

Model 115 Package

The following illustration shows the components of the Model 115 printer package.



The paper feed knob is shipped unmounted. Mount it by sliding it into the receptical on the right side of the printer.

Installation

This section includes the steps to get your printer ready for operation.

Printer Site Selection

When selecting a location to operate your printer, follow these guidelines:

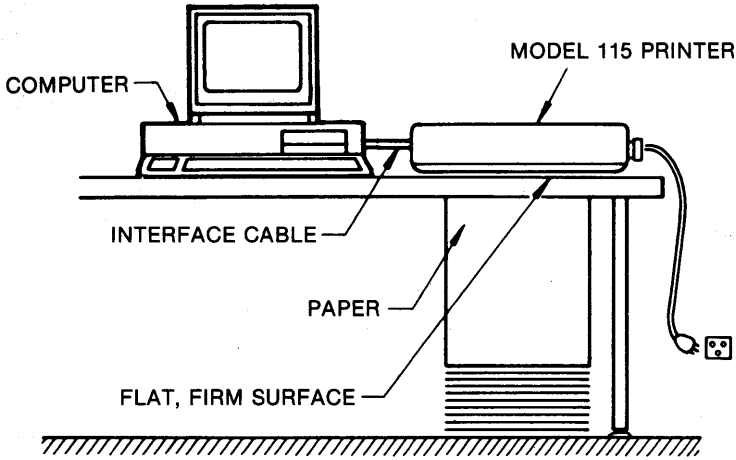
1. Install the printer on a flat, firm surface with ample space for operation.

2. Do not expose the printer to direct sunlight or an atmosphere that contains grease or dust.

3. Do not locate the printer near equipment that generates heat or noise.

Printer Site Selection

4. Do not subject the printer to temperatures below 5° C (41° F) or above 35° C (95° F) during operation. Avoid any sudden changes in temperature or extreme shock.



Installation Steps

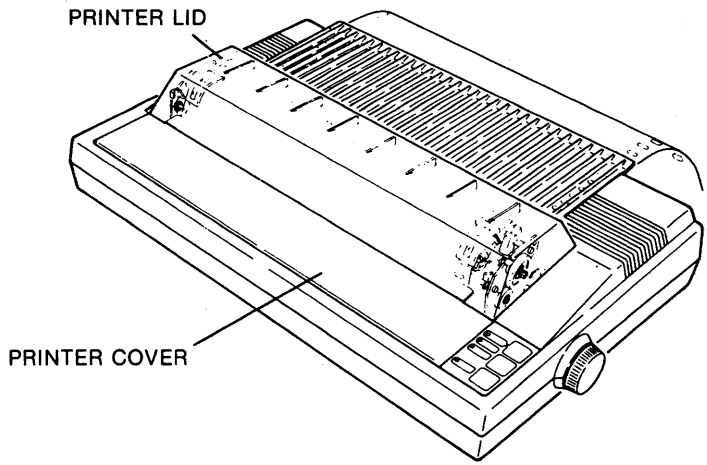
1. **Remove protective paper.**

   The printer is shipped with a sheet of protective paper. This paper is inserted behind the platen to prevent damage from shocks or vibrations.

   Before using the printer, remove this protective paper. If you reship the printer, reinsert this paper.

2. **Remove the printer lid and the printer cover.**

   Grasp the lid from the rear and lift it off the printer. Stand the cover upright and lift it upward and off the printer.

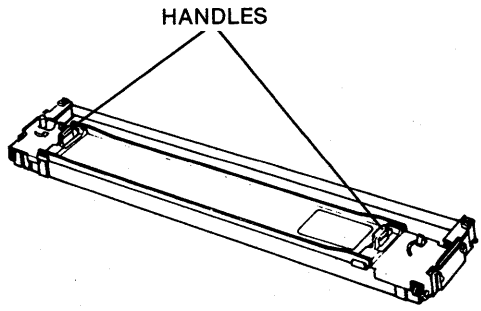


CAUTION:

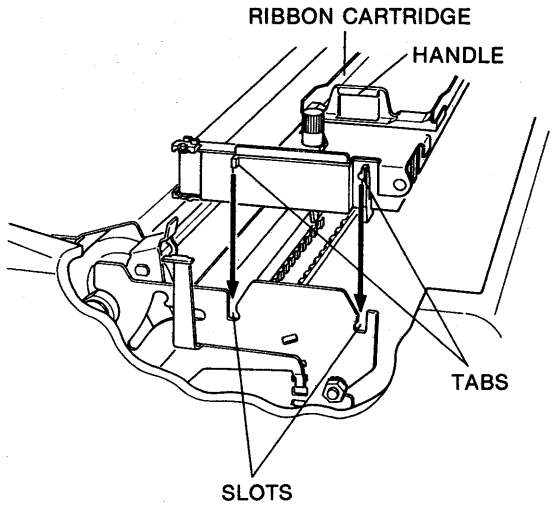
Do not plug the printer into an outlet until you have checked the power supply compatibility as described on page 2-1.

3. Install the ribbon.

Take the ribbon cartridge out of the shipping box.

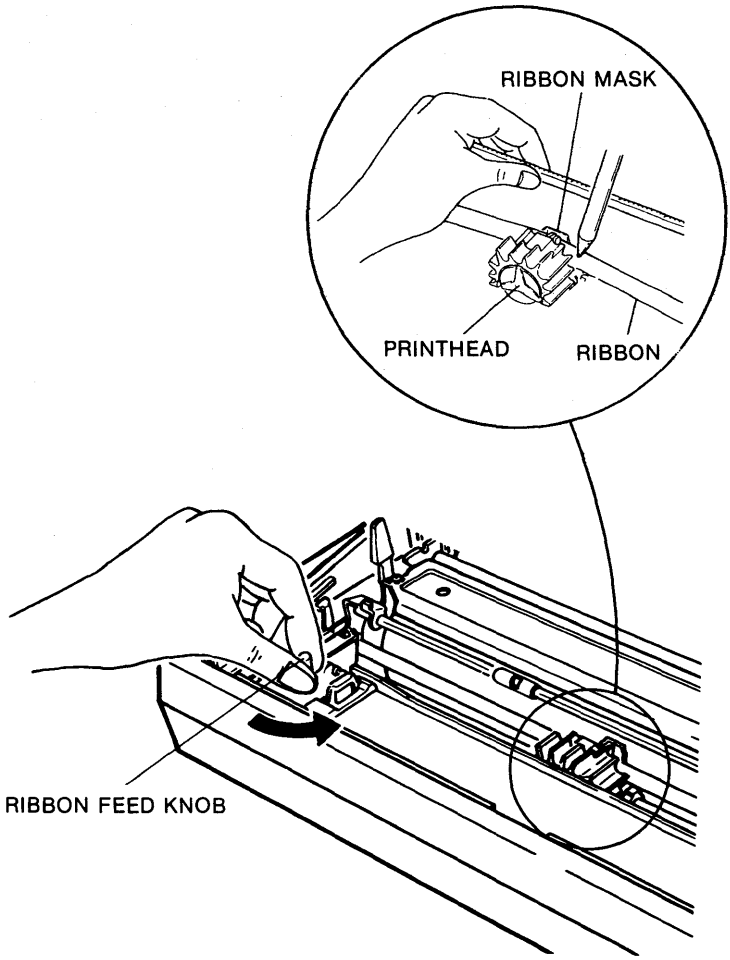


Hold the ribbon cartridge by the handles on each end. Fit the tabs on each end of the cartridge into the slots on either side of the printer. Push the cartridge down into place.



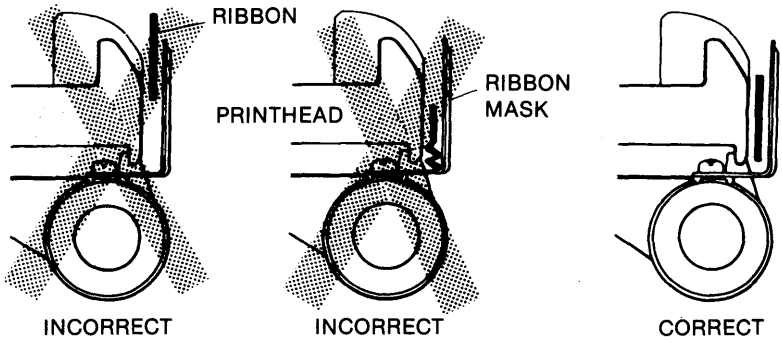
4. Position the ribbon.

Position the ribbon between the printhead and the ribbon mask. Turn the ribbon feed knob on the cartridge counter-clockwise, pressing the ribbon with a ball point pen.



Installation Steps

Make sure the ribbon is not twisted or creased and the cartridge is secured.



5. Adjust ribbon tension.

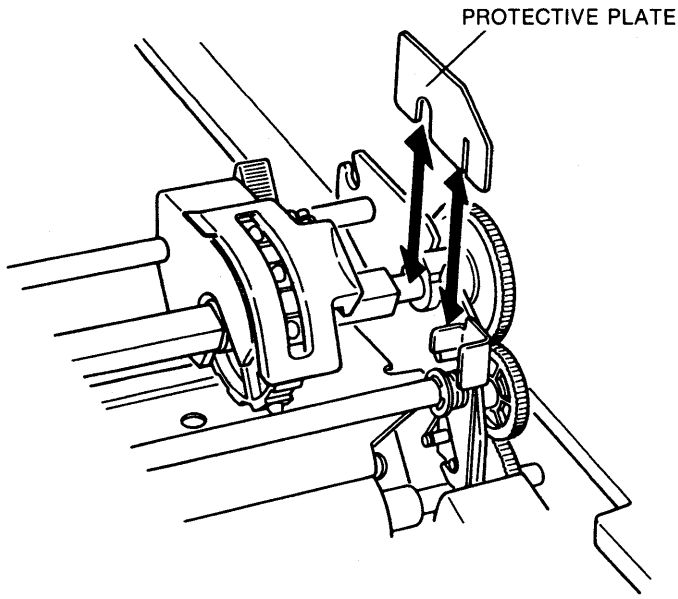
Turn the ribbon feed knob counterclockwise to adjust ribbon tension.

Removing and Installing the Tractor Unit

The tractor on the Model 115 printer is removable. The following procedure shows you how to remove it.

Two protective shipping plates are attached to each end of the tractor unit. These plates must be taken off before you can remove the tractor unit.

To remove the plates, lift them up and off as shown.



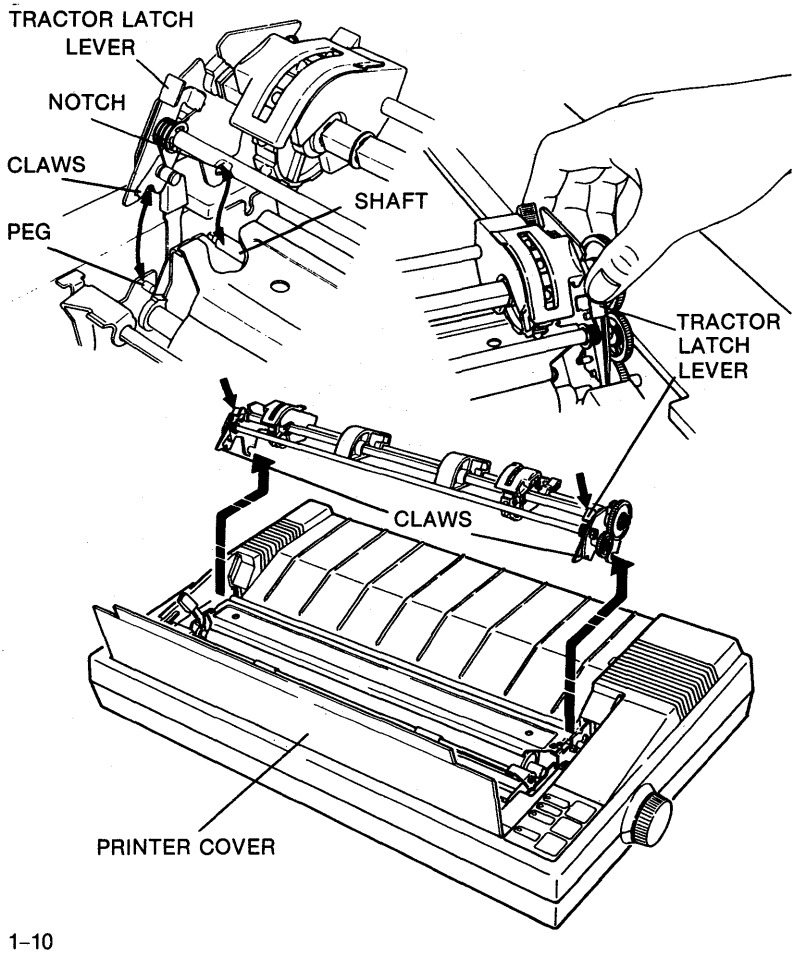
Removing and Installing the Tractor Unit

To remove the tractor unit:

1. Lift the printer cover.

2. Push both tractor latch levers backward to open the claws and then tilt the tractor unit away from you to remove it.

To replace the tractor unit, push the tractor latch levers backward to open the claws. Place the notches of the tractor onto the carriage shaft and clasp the claws around the pegs.



Paper Loading

The Model 115 printer uses either pin-feed paper or cut sheet paper. Follow the loading instructions for the type of paper you will be using.

Loading Cut Sheet Paper (With Friction Feed)

The Model 115 Printer accommodates cut sheets measuring 7.25 to 14.4 inches by 12 inches maximum.

NOTE:

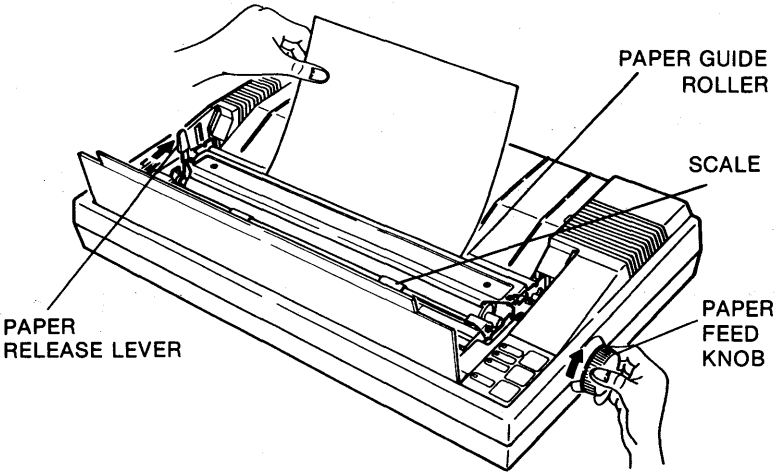
Before using cut sheets, be sure to remove the tractor unit.

Load cut sheet paper as follows:

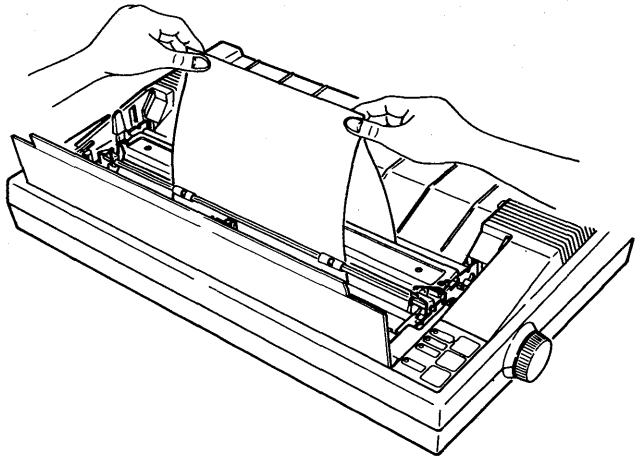
1. Remove or raise the printer cover.
2. Remove the separator.
3. Pull the scale forward, away from the platen.
4. Unlock the paper release lever.
5. Insert the paper between the paper guides at the rear of the printer.
6. Lock the paper release lever.

Paper Loading

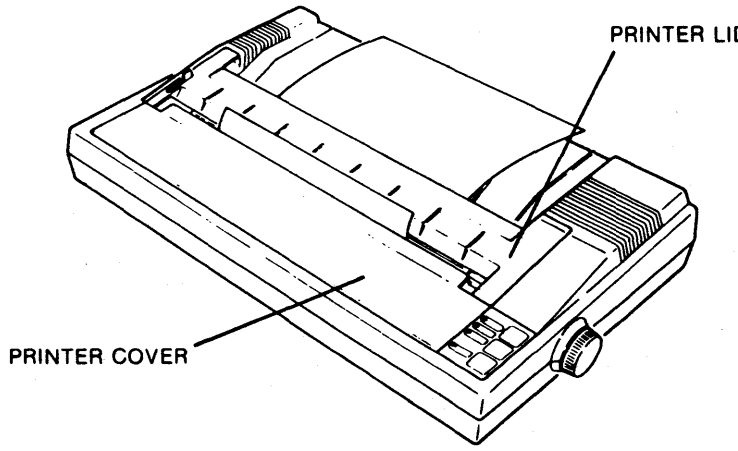
7. Turn the paper feed knob clockwise to advance the paper.



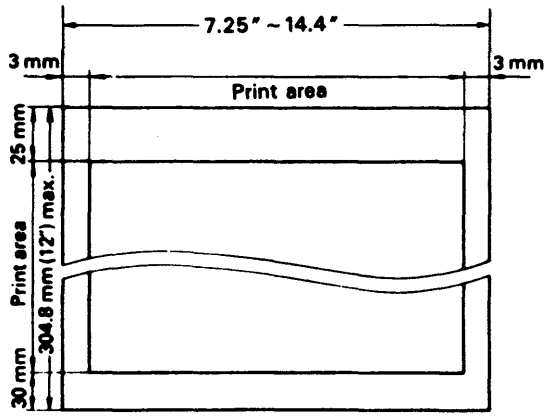
If the paper is not straight, release the paper release lever and align the edges as shown.



8. Push the scale back into position and replace the printer cover and the printer lid.



The print area for cut sheet printing must be within the range indicated by the following illustration.



Loading Fanfold Paper (With Tractor Feed)

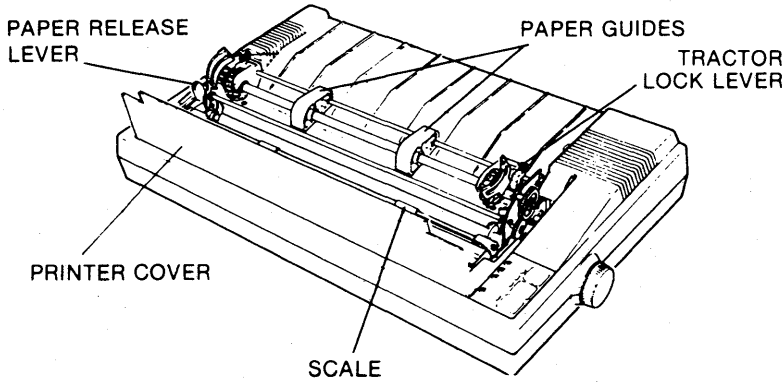
1. Lift the printer cover.

2. Release the tractors by pushing each gray tractor lock lever forward. The tractors will slide freely from right to left. Slide them into position for the size of paper you will be using.

3. Pull the scale forward away from the platen.

4. Unlock the paper release lever.

5. Separate the gray paper guides and position them in between the two tractors.

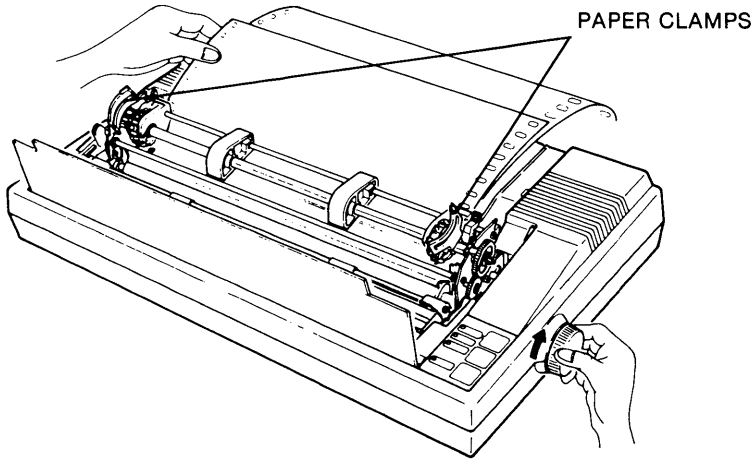


6. Insert the fanfold paper into the back of the printer behind the platen. Folding the paper in half makes it easier for you to push it under the platen and through to the front.

7. Lock the paper release lever and turn the paper feed knob to advance the paper. Then, unlock the paper release lever again.

8. Open the paper clamps on the tractors. Slide the tractors so that the feeding pins align with the pin feed holes on the paper.

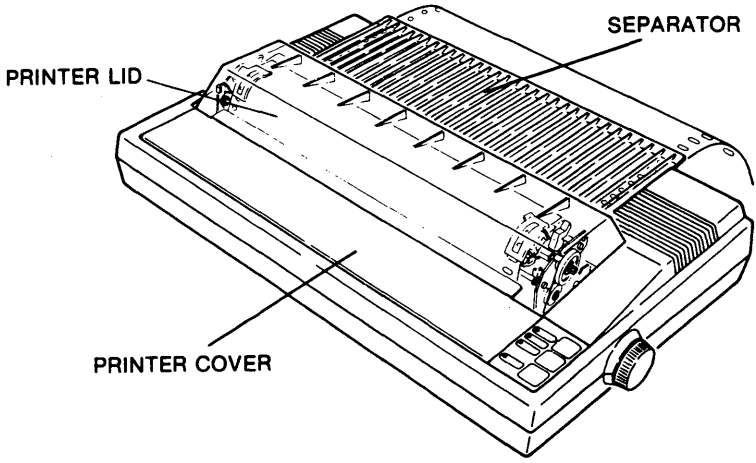
9. Lock the tractors into place by pushing the gray tractor lock levers backward. Close the paper clamps to secure the paper. Push the scale back into position next to the platen.



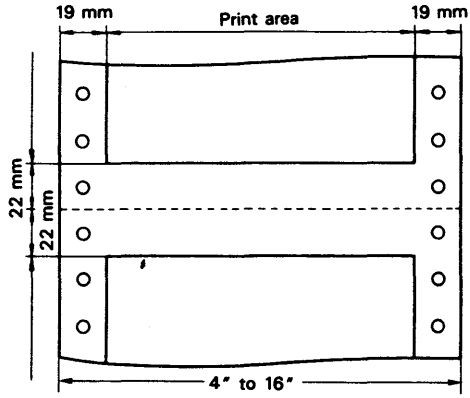
Paper Loading

10. Put the separator in place by fitting the pegs on either side of it into the holes behind the platen area of the printer. The separator should be situated over the incoming paper and under the outgoing paper to aid smooth paper feeding.

    Return the printer cover to its operating position and set the printer lid on the printer.

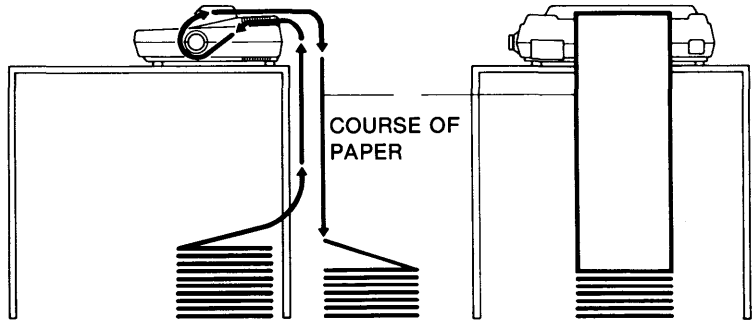


The print area for pin feed printing must be within the range indicated by the following illustration.



Arranging the Paper

By arranging the pin-feed paper as shown, the paper stacks accordion-style.



Removing the Paper

To remove pin-feed paper, tear the last sheet of paper off from the back of the printer and use one of these methods:

1. Open the paper clamps and pull the paper forward and out of the printer.

2. Feed the paper out of the printer by pressing the LF (line feed) or FF (form feed) button repeatedly.(Be sure theprinter power is on, and the printer is offline.)

NOTE:

Do not pull the paper out from the back of the printer as it may damage the paper-end detector.

Form Adjustments

You can adjust the column layout, top-of-form position setting, and print pressure.

Adjusting Column Layout

When you are using paper 4 to 16 inches wide, you can use graduations on the scale to index print column positions (1 to 136).

Setting Top of Form

Top of form refers to the first print line on a form. To set top of form:

1. Using the manual paper feed knob, adjust the paper position so that the line position (where you want the first line to be printed) is at the printhead position.

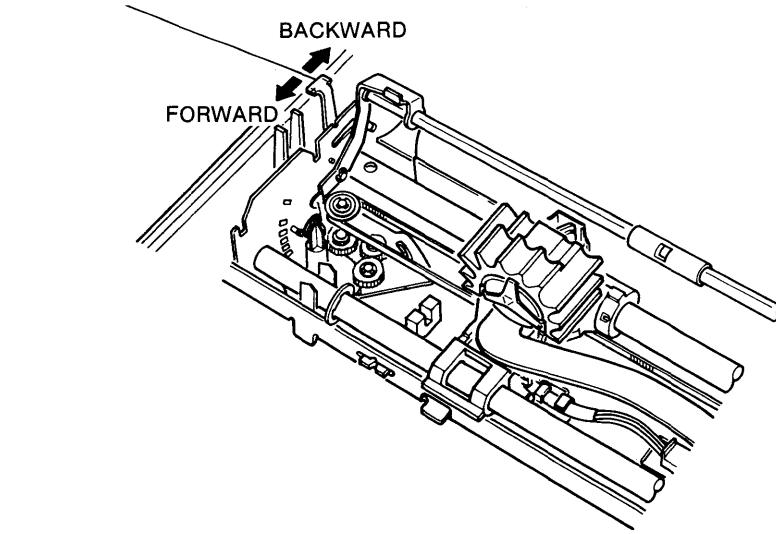
2. This line position automatically becomes top of form when you turn the printer on.

Adjusting Print Pressure

To accommodate paper of different thicknesses, adjust the space between the printhead and the paper.

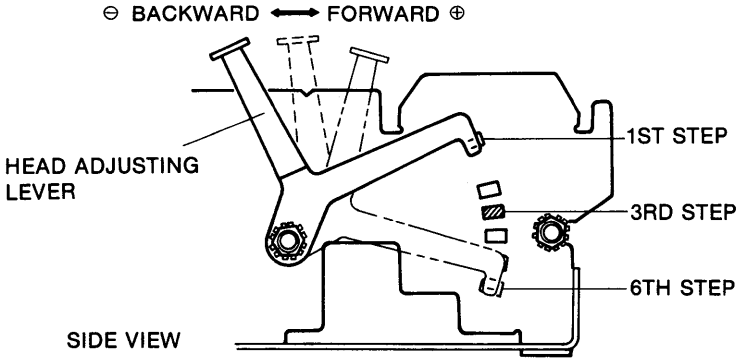
1. Move the head adjusting lever on the left side of the printer either forward or backward:

   - Forward to widen the space for carbon paper sheets.
   - Backward to narrow the space for single-leaf paper.



2. Set the head adjusting lever according to the type of paper you are using.

Paper	Position of adjusting lever
Single-leaf paper	Set the lever to the 3rd step
Carbon paper sheets	Set the lever to the 6th step



NOTE:

If you are using carbon paper, don't print two lines above and below the paper perforations.

If printed characters become faint when you have used the printer for an extended period of time, set the head adjusting lever back one step.

Chapter 2. Operation

Chapter 2. Operation

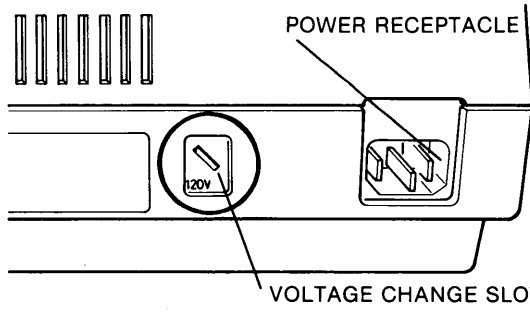
Cable Connections

Power Connection

Your SPERRY Model 115 printer operates on one of the following power sources:

AC 100V, 50/60Hz
AC 120V, 50/60Hz
AC 220V, 50/60Hz
AC 240V, 50/60Hz

Check the back of your printer as shown to make sure it is compatible with the power source in your area. If the voltage displayed is not compatible, turn the voltage change slot with a screwdriver until the proper voltage is displayed.



To connect the power cable to the printer, make sure the printer power is turned off. Take the end of the cable that has no prongs and plug it into the power receptacle at the rear of the printer.

Take the other end of the cable and plug it into your AC power outlet.

Cable Connections

Printer Cable Connection

1. Be sure both the computer and the printer are turned off and unplugged.

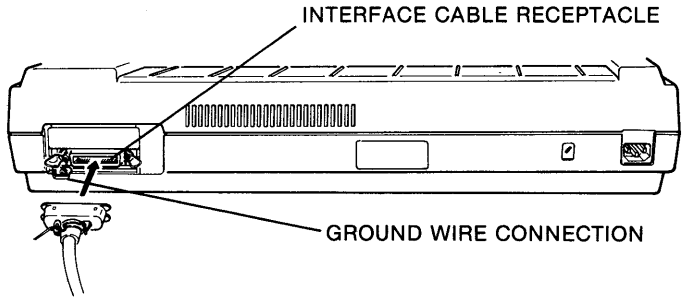
2. **Take the end of the cable with the D-shaped shield and plug it into the matching interface receptacle in the back of the printer.**

3. Make sure it is snapped securely between the two metal clamps.

4. If there is a ground wire on the cable, attach it to the screw below the cable receptacle.

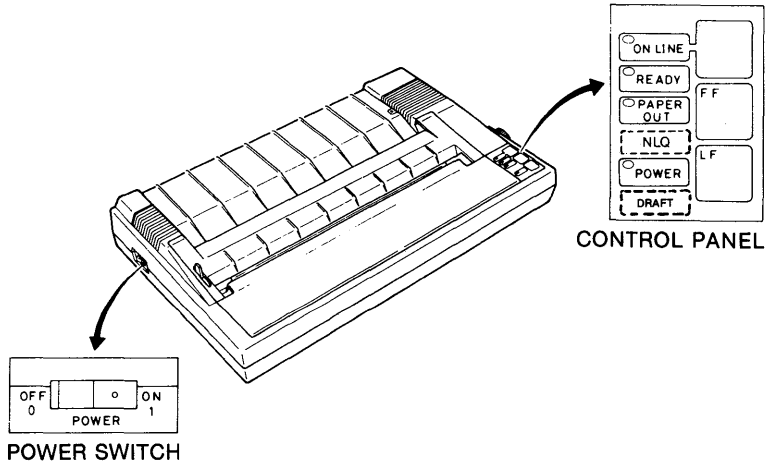
5. Plug the other end of the cable — the end with the two screws into the printer interface receptacle of your host computer.

6. Tighten the small screws on either side of the cable connector.



Controls and Indicators

This section describes the printer control panel and indicators.



CONTROL PANEL

POWER SWITCH

Controls

There are three touch controls on the control panel and a power switch on the right side of the printer case.

> **NOTE:**
>
> Always load the paper before you turn the printer on.

POWER Switch — This switch turns printer power on and off.

ON LINE Control — When you turn the printer on, it is automatically online and ready to be used. If you press the ON LINE button, the printer goes offline. (Press it again to get back online).

The printer automatically goes offline when it is out of paper or if a mechanical problem occurs.

FF (Form Feed) Control — Press this button once to advance the paper to the next top-of-form position. The printer must be offline when you use the FF button.

LF (Line Feed) Control — Press this button once to advance the paper one line. The printer must be offline when you use the **LF** button.

Indicators

There are four indicators on the control panel:

POWER Lights when power is on.

READY Lights when printer is ready to operate.

PAPER OUT Lights when paper supply is near its end.

ON LINE Lights when the printer is online.

Alarm

The printer alarm sounds whenever a mechanical error occurs or the printer is out of paper.

Using Panel Buttons to Set Print Modes

Some printer operating modes such as the emphasized mode and underline mode can be set by using the buttons on the touch control panel. To set the mode (or combinations of modes) of your choice, follow these procedures:

1. Press the ON LINE and FF buttons simultaneously.

   The alarm sounds once and the ON LINE indicator blinks to show you that the printer is ready to accept the mode selection code.

2. Press the ON LINE button the number of times required to set the print mode you want. The alarm sounds each time you press the button.

   Refer to the following table to determine the number of times to press it.

Press ON LINE button:	Function	Reference
0 times	Resets all modes	–
1 time	Condensed mode	SI, DC2
2 times	Enlarged mode	SO, DC4
3 times	Elite mode	ESC M, ESC P
4 times	Emphasized mode	ESC E, ESC F
5 times	Italic mode	ESC 4, ESC 5
6 times	Double-strike mode	ESC G, ESC H
7 times	Underline mode	ESC –
8 times	Superscript mode	ESC S0, ESC T
9 times	Subscript mode	ESC S1, ESC T
10 times	1-inch skip-over perforation	ESC N, ESC O
11 times	Zero font select (Slashed or not slashed)	ESC z
12 times	RAM protect mode	page 2–11
13 times	Prints status of print mode and page length settings	–

3. Press the FF button once to set the code.

   The alarm sounds twice.

4. Press the LF button to terminate mode selection.

   The ON LINE indicator stops blinking and the printer enters off-line mode. Press the ON LINE button to return ON LINE.

Status Print-out

The last function listed in the table is a status report. When performed, this function prints out the current settings for the modes set by the control panel. The following example shows elite, double-strike and underlined modes set.

```
PRINT MODES :
  Condensed       =0
  Enlarged        =0
  Elite           =1
  Emphasized      =0
  Italic          =0
  Double striked=1
  Underlined      =1
  Superscript     =0
  Subscript       =0

PAGE LENGTH : 11"

SKIP LINE LENGTH :  0"
```


Setting Combinations of Print Modes

Combinations of print modes such as enlarged mode plus emphasized mode can be set by combining the selection codes.

Follow the same procedures as for single mode selection with the following exception: the ON LINE button should be pressed the number of times required for the highest numbered mode you want. However, do not press it repeatedly. Instead, stop and press the FF button each time you reach the number required by one of the lower numbered modes you want to set. See the following example.

Example

To combine enlarged, emphasized, and italic modes:

PRESS:	
FF + ON LINE	Initiates mode selection
ON LINE ON LINE (2 times) FF	Sets enlarged mode
ON LINE ON LINE (2 more times. 4 total) FF	Sets emphasized mode
ON LINE (1 more time. 5 total) FF	Sets italic mode
LF	Terminates mode selection

Press the ON LINE button to return ON LINE.

Setting NLQ (Near Letter Quality) Mode

NLQ mode and draft mode can be set from the touch control panel when the printer is ON LINE.

To set NLQ mode, make sure the printer is ON LINE and press the FF button. The alarm sounds twice to confirm NLQ mode.

To set draft mode, make sure the printer is ON LINE and press the LF button. The alarm sounds once to confirm draft mode.

Paper-End Detector

When the paper-end detector (a switch on the paper guide) detects the end of the paper supply, the paper out lamp flashes and the printer stops printing and goes offline. You can advance the last sheet of paper by pressing the LF or FF button.

After you load more paper in the printer, press the ON LINE button to continue your print operation.

The printer can also be restarted by loading more paper and pressing the power switch off and on again. However, this cancels all previously set parameters such as tabs and line spacing.

If you want to print up to the last line of the paper, disable the paper-end detector by:

1. Setting switch pin SW1-3 to the ON position. (See "Setting the Parameter Switches" discussed later in this chapter.)

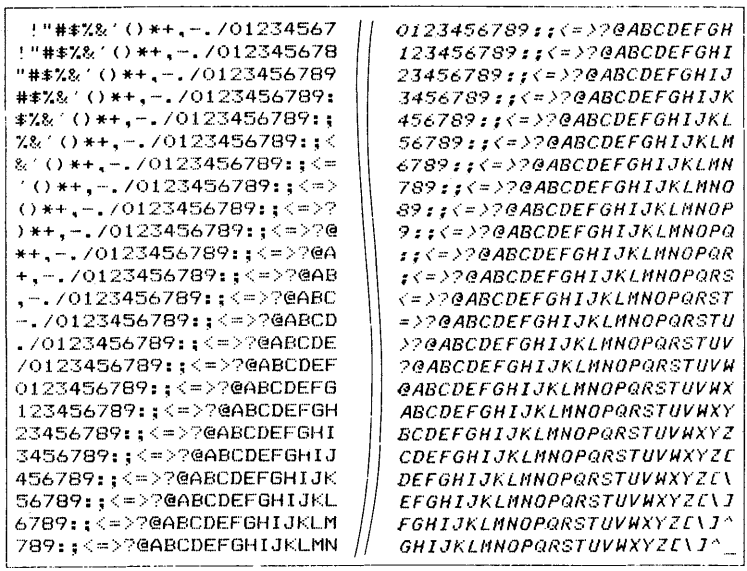
2. Entering control code ESC 8. (See Chapter 4.)

Self-Test

The Model 115 self-test checks printer operation and printing quality. To perform the self test, turn the power switch on while holding down the LF button until the test begins. All characters provided by the internal software are printed. The Near Letter Quality (NLQ) self-test is activated by turning on the power switch while pressing the FF switch.

The self-test prints continuously until you turn the printer off.

An example of a self-test printout is shown here.



NOTE:

The printer prints the self-test across the entire width of the platen. Be sure there is paper in the printer, and be sure the paper is wide enough for the test before you run it.

Printer Startup

To turn on the printer, press the power switch to ON. Turning on the power initializes the printer.

You can also initialize the printer by remotely activating the $\overline{\text{INIT}}$ signal to the parallel interface connector or by using the ESC @ control code. (See Chapter 4).

The ESC @ control code does not reset any print modes or change NLQ back to draft mode if the modes have been set using panel buttons. Also, ESC @ does not check the switch settings. When the RAM protect mode is set to ON, the ESC @ control code does not clear the download characters which are stored in the RAM. When the power is turned on, the RAM protect mode is automatically ON. You can turn this mode OFF by using the buttons on the touch control panel. (See "Using Panel Buttons to Set Print Modes" discussed earlier in this chapter.)

When the printer is initialized:

1. The printhead returns to home position (far left).
2. The printer is automatically online (unless it is out of paper).
3. The print buffer is cleared.
4. The line spacing is set to 1/6 inches.
5. The printer is set according to the parameter switch settings (described later in this chapter).
6. Vertical tabs are cleared and horizontal tabs are set to the default positions.

Parameter Switches

You can select certain printer characteristics by setting the two built-in parameter switches inside the printer.

Accessing the Parameter Switches

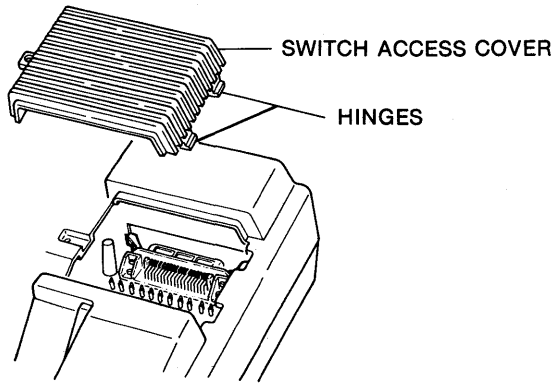
CAUTION:

Static electric discharges can damage electronic components in the printer. To avoid damage, eliminate any static electricity from your hands by touching something metal. Avoid touching any components on the circuit boards other than the switches.

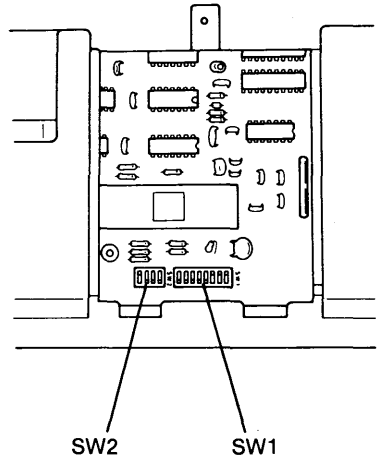
To access the parameter switches, follow these steps:

1. Unplug the power cord from the outlet.

2. Remove the switch access cover that is located on the right side of the printer. Remove the screw that holds it in place and tilt the cover to the right to unlatch the hinges.



Inside the printer, you will see two switch blocks (SW1 and SW2).

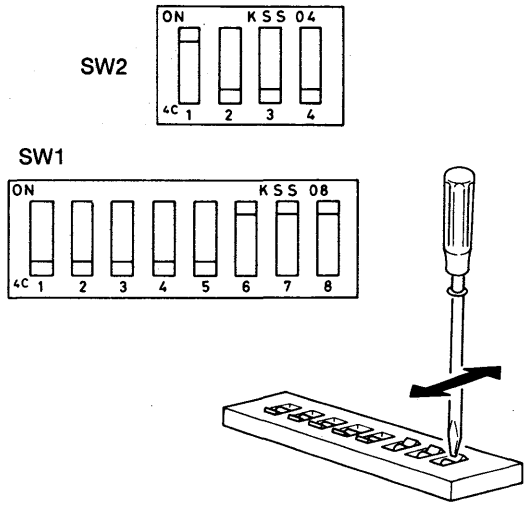


NOTE:

Make sure the power cord is unplugged before you set the switches.

Setting the Parameter Switches

There are eight switch pins on SW1 and four switch pins on SW2. These pins are set to ON or OFF. The ON position is indicated on each switch block.



Switch 1

Parameter switch 1 (SW1) has eight pins. The function of each pin and its factory preset condition is shown in the following table and described on the next page.

SW Pin	Function	ON	OFF	Factory Preset
SW1-1	Select Pica mode or Condensed mode	Condensed	Pica	OFF
SW1-2	Zero font select (slashed or not slashed)	Slashed	Not slashed	OFF
SW1-3	Paper end detector	Invalid	Valid	OFF
SW1-4	Printer mode	FX mode	IBM mode	OFF
SW1-5	Character mode	Emphasized	Normal	OFF
SW1-6	International character set	(See Tables 2-1 and 2-2)		
SW1-7	International character set	(See Tables 2-1 and 2-2)		
SW1-8	International character set	(See Tables 2-1 and 2-2)		

NOTE:

Switch pins SW1-6, SW1-7 and SW1-8 (International character set) are valid only when used in the FX mode.

Parameter Switches

Summary of switch 1 pin settings:

SW1-1 When this pin is set to the ON position, the line length is set at 233 characters per line for condensed mode. In the OFF position, line length is 136 characters per line for pica mode. Pica mode should be selected when NLQ is used.

SW1-2 When this pin is ON, the page length will be 12 inches. When it is OFF, page length will be 11 inches.

SW1-3 This pin enables or disables the paper-end detector; if it is in the ON position, the detector will not function; in the OFF position, the detector functions.

SW1-4 This pin selects the printer mode – either FX or IBM. When it is in the ON position, the FX mode is selected. In the OFF position, the IBM mode is selected.

SW1-5 This pin selects the character mode. In the OFF position, normal characters are printed. In the ON position, emphasized characters are printed.

SW1-6
SW1-7
SW1-8 In the FX mode, these pins are used to select the international character sets. See Tables 2-1 and 2-2.
In the IBM mode, if all three pins are ON, the standard character set is selected when the printer is initialized, otherwise the world trade character set is selected.

Table 2-1 International Character Set Selection

Country	SW1-6	SW1-7	SW1-8
U.S.A.	ON	ON	ON
France	ON	ON	OFF
Germany	ON	OFF	ON
England	ON	OFF	OFF
Denmark	OFF	ON	ON
Sweden	OFF	ON	OFF
Italy	OFF	OFF	ON
Spain	OFF	OFF	OFF

Table 2-2 International Character Set Deviations

Country Dec.code	U.S.A.	France	Germany	England	Denmark	Sweden	Italy	Spain
35(23)	#	#	#	£	#	#	#	Pt
36(24)	$	$	$	$	$	¤	$	$
64(40)	@	à	§	@	@	É	@	@
91(5B)	[	°	Ä	[	Æ	Ä	°	¡
92(5C)	\	ç	Ö	\	ø	Ö	\	Ñ
93(5D)	]	§	Ü	]			é	¿
94(5E)	^	^	^	^	^	Ü	^	^
96(60)						é	ù	
123(7B)	{	é	ä	{	æ	ä	à	¨
124(7C)	|	ù	ö	|	ø	ö	ò	ñ
125(7D)	}	è	ü	}	å	å	è	}
126(7E)	~	¨	ß	~	~	ü	ì	~

Numbers in parentheses are hexadecimal codes.

Switch 2

Parameter switch 2 (SW2) has four pins. The function of each pin and its factory preset condition is shown in the following table and described on the next page.

SW Pin	Function	ON	OFF	Factory Preset
SW2-1	$\overline{\text{SLCT IN}}$ signal fixed or not fixed	Fixed	Not Fixed	ON
SW2-2	Cut Sheet Feeder	Select	De-select	OFF
SW2-3	1 inch skip-over perforation	Valid	Invalid	OFF
SW2-4	Auto line feed	Auto LF with CR	LF from host	OFF

Summary of switch 2 pin settings:

SW2-1 When this pin is set to the OFF position, the $\overline{\text{SLCT IN}}$ signal is not fixed internally, allowing the computer to control the printer.

SW2-2 This pin should be set to ON when the optional cut sheet feeder is installed. Otherwise, it should be set to OFF.

SW2-3 When in the ON position, this pin sets the automatic skip-over perforation function (paper automatically advances to the first line of the next page when the remaining page length is 1 inch.)

SW2-4 Setting this pin to the ON position provides automatic line feed with each carriage return. When set to the OFF position, line feeds must be provided through the software.

After setting the switches, replace the switch access cover and fasten it with the retaining screw.

Chapter 3. Maintenance

Chapter 3. Maintenance

Cleaning

Clean the printer every three months with a soft brush to remove paper dust and particles that may accumulate below the printer cover. The exterior of the printer can be cleaned with a mild detergent and water solution.

The platen should be cleaned every few months with platen cleaner. Platen cleaner is available from your Sperry representative.

NOTE:

To avoid damaging the printhead, do not use a rough cloth or harsh solvents (such as thinner or alcohol).

Printhead Replacement

Because the printer is a sophisticated mechanism, operator troubleshooting of mechanical problems is limited. If a printer malfunctions and the problem is not related to the printhead, contact your Sperry representative.

If your printhead malfunctions or a print dot wire is worn, replace the printhead unit as follows:

1. Disconnect the printer power cord from the outlet.

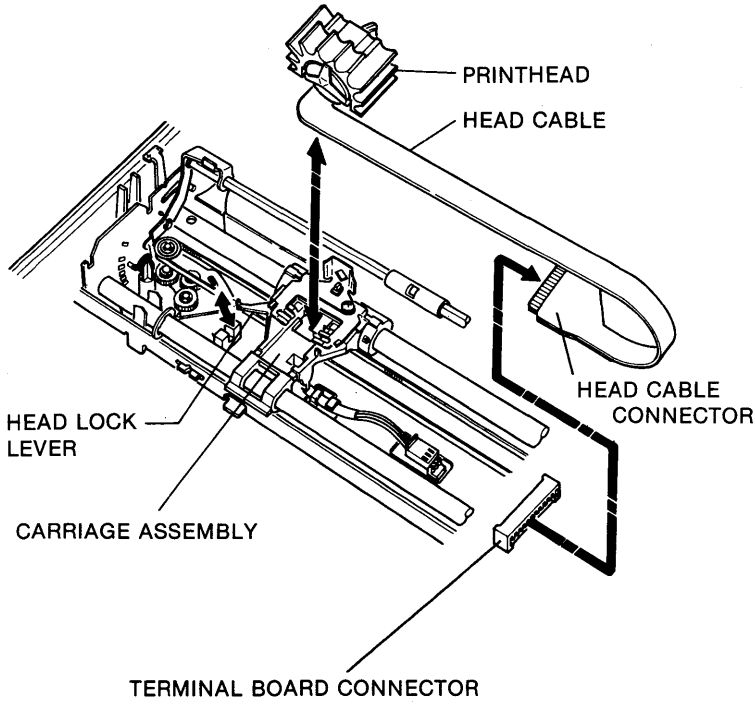
2. Remove the printer lid and ribbon cartridge.

NOTE:

Be sure the printhead has cooled before you remove it.

3. Turn the head lock lever clockwise and remove the printhead.

4. Pull the head cable connector straight out while firmly holding the connector on the terminal board to steady it.



5. Put a new printhead on the carriage assembly and lock it in place using the head lock lever.

NOTE:

Do not move the carriage assembly without a printhead mounted on the carriage.

6. Carefully insert the head cable connector into the mating connector on the terminal board.

Chapter 4. Control Codes

Chapter 4. Control Codes

Software control codes program certain printer functions, such as form feed or the selection of a different print mode. When control codes are sent from the computer to the printer, their functions are executed immediately.

If you are writing your own program, you will need to learn the control codes in order to command the printer to do what you want it to do. However, if you are using a pre-written software program such as WordStar® , these codes are probably already programmed into the software. In that case, all you will need to do is to install the specific characteristics of the Model 115 printer into the software you are using to make sure the printer and the software can communicate with each other. Refer to the installation guide of the software program.

NOTE:

Some software installation instructions have pre-formatted menus in which you can choose the printer by make and model number. If this is the case with your software, you may eliminate the necessity of programming all of the characteristics individually by choosing the menu option as follows:

If switch SW1-4 is set to OFF, choose the IBM Graphics Printer.

If switch SW1-4 is set to ON, choose the Epson® FX Printer. (See Chapter 2 for details on switch settings.)

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IBM® is a registered trademark of the International Business Machines Corporation

Epson® is a registered trademark of the Epson Corporation.

Control Codes

The Model 115 printer has two standard operating modes: text mode and bit-image mode. Text mode prints characters (standard ASCII coded inputs). Bit-image mode prints pictures and images in dot configuration.

Two types of text modes are supported by the Model 115 printer. They are the FX text mode and the IBM text mode. You can select the text mode of your choice by setting switch pin SW1-4. (See Chapter 2.)

Most of the control codes described in this chapter operate identically in either FX or IBM text mode. However, some codes are unique to one mode or the other, while other codes work differently in each mode. These distinctions are noted in the description of the codes they affect.

In this chapter, the control codes are divided into these two groups: text mode control codes (including FX and IBM) and bit-image control codes. (Software control codes, set in the text mode, are also effective in the bit-image mode.) The codes are presented alphabetically (within each group) and each code is described in the following format:

Expression Shows the correct format for using the code.

Function States the purpose of the code.

Remarks Describes the use of the code in more detail.

Reference Lists related control codes.

Example Demonstrates the use of the code.

Definition of Terms

Terms essential to programming control codes are discussed in this section.

Binary, Decimal and Hexadecimal

$(\ )_2$, $(\ )_D$, and $<>_H$ represent binary, decimal, and hexadecimal numbers respectively.

Control codes are described in decimal notation, but you must be familiar with binary and hexadecimal notation to use the bit-image mode.

ASCII Code

Computers use "bits" (binary digits) grouped together as codes to represent characters and numbers.

ASCII (American Standard Code for Information Interchange) is a standardized code used to transmit data. For example, the bit group $(01000001)_2 = (65)_D = <41>_H$ represents the ASCII character "A."

Escape Codes

Escape sequence (ESC) control codes expand the processing capabilities of the Model 115 printer. ESC code $(27)_D$, followed by any alphanumeric symbolic character, provides special functions such as setting column length or entering bit-image mode.

Generally, printer control codes (such as ESC) are not standardized. Each manufacturer has its own meaning for these codes. Don't confuse escape codes with the escape key on your keyboard.

Buffer-Full Print

The print buffer temporarily stores data for input to the printer. It stores only print data, not commands. When a full line of print data (including spaces) has been stored in the print buffer and the next data you enter is printable, the data in the print buffer is automatically printed, followed by a line feed. This is called a "buffer-full print." At this time, the enlarged mode set by the SO code is cancelled.

Input Buffer

The printer is capable of storing up to 8K bytes of data in its input buffer for quick data processing.

Two kinds of data are stored in the input buffer: print data and control codes. Print data is then sent to the print buffer. This data is printed when a print execution control code such as CR is input or when the print buffer becomes full.

Since the input buffer holds 8K bytes of data in RAM area, the host computer begins its next job as soon as all the data has been output to the printer and functions whether or not the printer is printing.

FX and IBM Print Modes

This printer has two modes of operation, selected by switch pin SW1-4. When this switch is set to ON, the printer follows the FX standard in its control commands. This is the normal mode of operations. However, if the printer is used in FX mode with IBM personal computers and other compatible systems, the special graphics characters and international characters which are standard on the screen will not be printed correctly. To overcome this problem the printer can be placed in a special IBM mode by turning it off and setting switch pin SW1-4 to OFF. This is the factory set mode of your printer.

Fewer commands are available in IBM mode than in FX mode. The commands which remain cover most of the basic printer functions, but there are fewer commands for controlling the page format, print style and bit image graphics functions, and user-defined characters cannot be printed.

Definition of Terms

Column Width

When you turn on the printer power, the column width is either 136 columns (for pica-sized print) or 233 columns (for condensed print) depending on the setting of switch pin SW1-1. (The default setting is pica.) You can change the column width by using the ESC Q code (right-margin setting). The right margin can be set at a maximum of 136 columns in pica-sized print, or a maximum of 233 columns in condensed print. If you change the left margin by using the ESC 1 code, the print buffer becomes full at the right-margin setting that is in effect.

Hex Dump

If you execute or list programs in hex dump mode, all data sent from the computer is printed in hexadecimal notation. For example, when you send the following statement to the printer:

```
LPRINT CHR$[0];CHR$[27];"A";CHR$[24];
```

the data is printed in the following hexadecimal notation:

```
00 1B 41 18
```

In some programming languages (such as BASIC), a few codes cannot be sent to the printer. You can perform a hex dump to find out which codes are being sent to the printer.

To perform a hex dump, turn the power on while pressing both the LF and FF buttons. The hex dump is printed only when the printer buffer is full. The data remaining in the buffer can be printed when the printer is switched to offline. A hex dump cannot be cancelled while it is printing.

How to Send Control Codes

The SPERRY Model 115 Printer receives two types of control codes: one-byte control codes and expanded control codes called ESCAPE (ESC) codes.

All codes are sent to the printer using certain formats. The format you use will depend on the language or program you have.

The illustrations and examples throughout this book have been written using the format of SPERRY BASIC. For more information about BASIC, refer to the BASIC User's Guide for DOS 1.25 or Programming in BASIC for DOS 2.11.

In BASIC, the codes are written in decimal numbers and sent as follows:

One-byte codes follow this format:

```
LPRINT CHR$[8]
```

LPRINT	indicates that the next data will be sent to the printer.
CHR$	tells the printer that the next data it receives will be a code denoting a printer function.
(8)	is the decimal notation of the control code for backspace.

How to Send Control Codes

ESCAPE codes follow this format:

```
LPRINT CHR$[27];"x";
```

LPRINT & CHR$	operate the same way as one-byte codes.
(27)	is the code that tells the printer that the next data it receives will be an escape code.
x	is the notation for the escape code.

Control Codes in Text Mode

BEL

Expression

CHR$[7];

Function

Sounds the printer alarm.

Remarks

The BEL code causes the printer alarm to sound for approximately 0.1 second.

Example

10 LPRINT CHR$[7];

<beep>

BS [Backspace] [FX Mode Only]

Expression

CHR$[8];

Function

Moves the print position back one character.

Remarks

This code prints the data in the print buffer, then moves the printhead one character position to the left.

When this code is input following bit image data, the printhead is returned to the position where the bit image printing started.

This code is ignored immediately after execution of a horizontal tab or when in the proportional print mode. In the enlarged print mode, the print position is backspaced by two pica-sized characters.

Reference

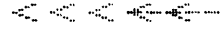
DEL

Example 1

```
10 'Backspace
20 LPRINT "YYYYY";
30 LPRINT CHR$[8];CHR$[8];
40 LPRINT "= = = = ="
```


Example 2

```
10 'Backspace in Enlarged Print Mode
20 LPRINT CHR$[27];"W";CHR$[1];
30 LPRINT "<<<<<";
40 LPRINT CHR$[8];CHR$[8];
50 LPRINT CHR$[27];"W";CHR$[0];
60 LPRINT "-----"
```



CAN [Cancel]

Expression

CHR$[24];

Function

Clears all data in the printer buffer for the current line.

Remarks

All control codes, except SO, remain in effect.

Reference

DEL and BS

Example

(The "xxxxx" entered in line 30 disappears.)

```
10 'Cancel
20 LPRINT "Gone!"
30 LPRINT "xxxxx";CHR$[24];
40 LPRINT "     with";
50 LPRINT " the wind."
```

```
Gone!
     with the wind.
```

CR [Carriage Return]

Expression

CHR$[13];

Function

Starts printing at the left margin of the current line.

Remarks

All the data stored in the printer buffer is printed at the first column of the current line.

Then, if AUTO FEED XT (pin no. 14 of the interface connector) is at LOW level or if switch pin SW2-4 is set to ON, the paper automatically advances one line.

If there is no data preceding the CR code (or if the data is spaces only), the printhead will not move, but the paper will advance one line if switch pin SW2-4 is set to ON.

This code cancels the enlarged print mode set by the SO code.

Reference

LF

Example

```
10 'Carriage return
20 LPRINT "Underscore by CR";CHR$[13];
30 LPRINT "_ _ _ _ _ _ _ _ _ _"
```

```
Underscore by CR
```

DC1 [FX Mode Only]

Expression

CHR$[17];

Function

The DC1 code places the printer in the selected state and makes it ready to receive data.

Remarks

The DC1 code is effective only when switch pin SW2-1 is in the OFF position. (See Chapter 2.) It is ignored if it is received while the printer is already in the selected state.

Reference

DC3

Example 1

```
10 'Device Control 1
20 LPRINT CHR$[17];"AAAAA";CHR$[19];
30 LPRINT "BBBBB";CHR$[17];"CCCCC"
```

```
AAAAACCCCC
```

Example 2

```
10 'Device Control 1
20 LPRINT "AAAAA";CHR$[17];
30 LPRINT "BBBBB";CHR$[19];"CCCCC";CHR$[17];
```

```
BBBBB
```

DC2

Expression

CHR$[18];

Function

Cancels condensed print mode.

Remarks

If pica-sized characters are selected, the DC2 code cancels the condensed print mode set by the SI code.

If elite-sized characters are selected, the DC2 code affects only the internal flag of the printer. The print mode does not change unless you cancel the elite-sized character mode by using the ESC P code.

Reference

SI, ESC M, ESC P

Example

```
10 'Condensed Mode Cancel
20 LPRINT CHR$[15];"Condensed Mode"
30 LPRINT CHR$[18];"= = = =>> Now in Pica-sized Mode"
```

```
Condensed Mode
=====>>Now in Pica-sized Mode
```

DC3 [FX Mode Only]

Expression

CHR$[19];

Function

Places the printer in the deselected state in which it is not ready to receive data.

Remarks

Any data sent to the printer while it is in the deselected state is discarded.

The DC3 code is effective only when switch pin SW2-1 is in the OFF position.

Reference

DC1

DC4

Expression

CHR$[20];

Function

Cancels enlarged print mode.

Remarks

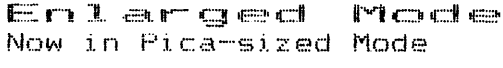
The DC4 code cancels the enlarged print mode set by the SO code. It does not cancel the enlarged print mode set by the ESC W code.

Reference

SO, ESC W

Example

```
10 'Enlarged Mode Cancel
20 LPRINT CHR$[14];"Enlarged Mode"
30 LPRINT CHR$[20];"Now in Pica-sized Mode"
```



DEL [FX Mode Only]

Expression

CHR$[127];

Function

Cancels last printable data.

Remarks

The DEL code deletes the printable data previously stored in the printer buffer.

This code is ignored in the proportional print mode.

Reference

BS

Example

(The last "e" in the word delete disappears.)

```
10 'Delete last character
20 LPRINT "Delete";
30 LPRINT CHR$[127];"ing";
```

```
Deleting
```

ESC > [FX Mode Only]

Expression

CHR$[27];">";

Function

Set MSB

Remarks

This code causes the most significant bit (MSB) of all subsequent 8-bit data received to be set to 1.

It does not affect bit 7 of bit image data.

MSB control does not work for bit image data.

Reference

ESC =, ESC #

Example

```
10 'Sets MSB to 1
20 LPRINT CHR$[27];">";
30 GOSUB 90
40 'Sets MSB to 0
50 LPRINT CHR$[27];"=";
60 GOSUB 90
70 END
80 '
90 'Subroutine
100 LPRINT
110 LPRINT "Oh! Excellent."
120 LPRINT
130 RETURN
```

```
Oh/ Excellent.

Oh! Excellent.
```

ESC = [FX Mode Only]

Expression

CHR$[27];'' = '';

Function

Reset MSB

Remarks

This code causes the most significant bit (MSB) of all subsequent 8-bit data received to be set to 0.

It does not affect bit 7 of bit image data.

MSB control does not work for bit image data.

Reference

ESC >, ESC #

ESC # [FX Mode Only]

Expression

CHR$[27];"#";

Function

Cancel MSB

Remarks

This code cancels the MSB control setting set by ESC = or ESC >.

It does not affect bit 7 of bit image data.

MSB control does not work for bit image data.

Reference

ESC =, ESC #

Example

```
10 'Sets MSB to 1
20 LPRINT CHR$[27];">";
30 GOSUB 90
40 'Cancels MSB control set by ESC >
50 LPRINT CHR$[27];"#";
60 GOSUB 90
70 END
80 'Subroutine
90 LPRINT
100 LPRINT "Take a chance!"
110 LPRINT
120 RETURN
```

```
Take a chance!

Take a chance!
```

ESC - [minus]

Expression

CHR$[27];"-";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Sets/cancels underline print mode.

Remarks

If n = 1 or 49, all following printed data is underlined.
If n = 0 or 48, the underline print mode is cancelled.

The underline is printed beneath each character as a continuous line in all print modes.

The underline mode is ignored in the bit-image mode.

Example

```
10 'Underline Mode
20 LPRINT CHR$[27];"-";CHR$[1];
30 LPRINT "This is underlined."
40 LPRINT CHR$[27];"-";CHR$[0];
50 LPRINT "    This is not underlined."
```

```
This is underlined.
    This is not underlined.
```

ESC $ [FX Mode Only]

Expression

CHR$[27];"$";CHR$[n1];CHR$[n2];

$0 \leqslant n1 \leqslant 255, 0 \leqslant n2 \leqslant 3$

Function

Sets absolute dot position.

Remarks

This code specifies the position from which subsequent characters are printed. The dot position is defined with n1 and n2, with n1 being the lower byte of the dot position and n2 being the upper byte.

If you specify the dot position as 0 (with 0 for both n1 and n2), printing begins at the left margin. If the position specified is beyond the right margin, the code is ignored and the previous setting remains in effect.

The resolution of a dot is 1/60 inch.

This code is effective only when the printer is in NLQ mode.

Reference

ESC x

ESC \ [FX Mode Only]

Expression

CHR$[27];"\";CHR$[n1];CHR$[n2];
-4894 ≤ (256 * n2 + n1) ≤ 4895

Function

Sets relative dot position.

Remarks

The print head is moved to a dot postion specified relative to its current position. Unlike the absolute movement made by the <ESC> $ command, the size of the relative movement is dependent on the current character size and whether Draft mode or NLQ mode is selected. The number of dots is given in twos complement form by using the formula ((n1) + 256 * (n2)). The table below shows how (n1) and (n2) control movement to the left and to the right relative to the current dot position. All entries in the table for (n1) and (n2) are given in hexadecimal.

No. of dots	4895	...	2	1	−1	−2	−3	...	−4894
(n1)	13	...	0	0	FF	FF	FF	...	EC
(n2)	1F	...	2	1	FF	FE	FD	...	E2

To reverse the process and find (n1) and (n2) first calculate the displacement required (n dots) and then, if it is to the left, subtract it from 65536. The values of (n1) and (n2) can then be calculated from the formula:

(n1) = n MOD 256
(n2) = INT (n/256)

If the command would cause the print position to move outside the current margins it will be ignored.

This code is effective only when the printer is in the NLQ mode.

Reference

ESC x, ESC $

ESC (Space) [FX Mode Only]

Expression

CHR$[27];" ";CHR$[n];

$0 \leqslant n \leqslant 127$

Function

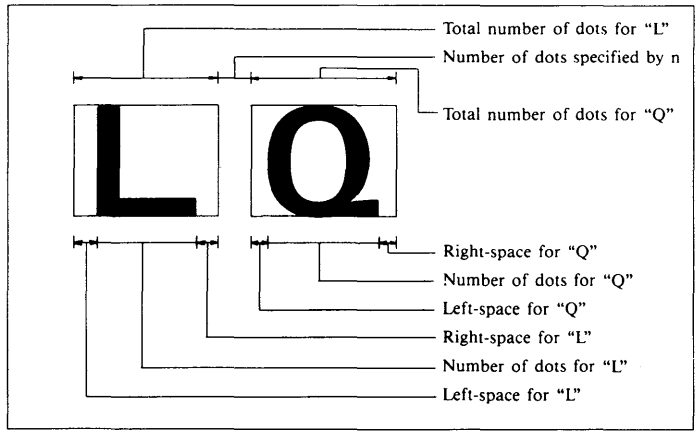
Sets additional character space for NLQ mode.

Remarks

This code specifies the amount of extra space added to the right of each character. The space is represented in dots, and "n" specifies the number of dots which can range from 0-127. This space is in addition to the spaces already included in the definition of the character.

ESC (space) is effective only when the printer is in NLQ mode.

The following diagram illustrates the value of n.



ESC <

Expression

CHR$(27);"<";

Function

Prints the current line from left to right.

Remarks

This code returns the printhead to its leftmost position (regardless of the left margin set by ESC 1), then prints one line from left to right.

Reference

ESC U

Example

With the printhead in the leftmost position:

```
10 'ESC <
20 LPRINT CHR$(27);"<";
30 LPRINT "These two lines are"
40 LPRINT CHR$(27);"<";
50 LPRINT "printed unidirectionally."
60 LPRINT
70 LPRINT "These two are"
80 LPRINT "printed bidirectionally."
```

```
These two lines are
printed unidirectionally.

These two are
printed bidirectionally.
```

NOTE:

ESC < causes the printhead to return to its leftmost position once and prints unidirectionally for one line only, while ESC U 1 causes all subsequent print data to be printed unidirectionally. Use these two commands for greater print precision.

ESC @ [FX Mode Only]

Expression

CHR$[27];"@";

Function

Initializes the printer.

Remarks

The printer is initialized and all data in the print buffer is cleared.

ESC / [FX Mode Only]

Expression

CHR$[27];"/";CHR$[n];

(0 ≤ n ≤ 7)

Function

Selects VFU channel.

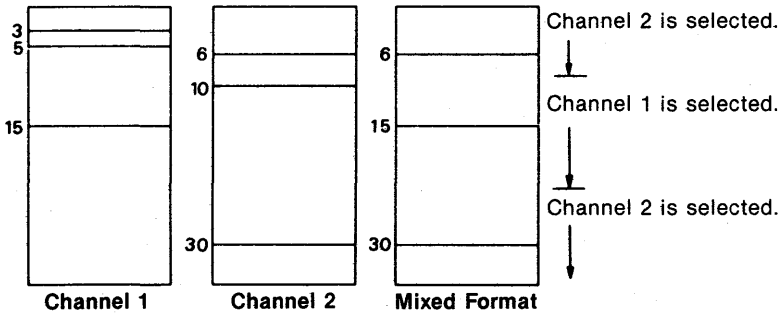
Remarks

This code specifies the VFU (Vertical Format Unit) channel on which subsequent vertical tabulation will be performed.

A page can be divided into channels within which vertical tabs can be independently set and stored.

For example, vertical tabs can be set at lines 3, 5 and 15 for channel 1 while they are set at lines 6, 10 and 30 for channel 2. (See the following illustration.) Up to seven VFU channels may be set.

Channel 0 is selected when the power is turned on.

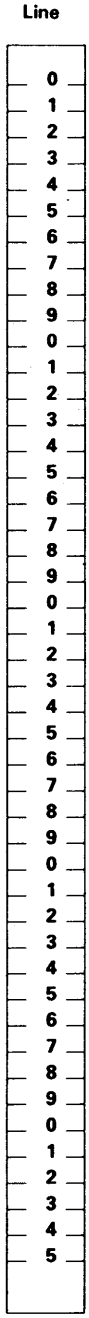


Reference

VT, ESC b, ESC B

Example

```
10 'Vertical format unit
20 LPRINT CHR$[27];"C";CHR$[16];
30 LPRINT "*--- The first top of form ---*"
40 '
50 'VFU channel 1
60 LPRINT CHR$[27];"b";CHR$[1];
70 LPRINT CHR$[2];CHR$[5];CHR$[9];CHR$[0];
80 '
90 'VFU channel 2
100 LPRINT CHR$[27];"b";CHR$[2];
110 LPRINT CHR$[3];CHR$[7];CHR$[10];CHR$[0];
120 '
130 'Selects VFU channel
140 LPRINT CHR$[27];"/";CHR$[1];
150 GOSUB 1000
160 '
170 'Selects VFU channel 2
180 LPRINT CHR$[27];"/";CHR$[2];
190 GOSUB 1000
200 END
210 '
1000 'Sub routine
1010 LPRINT CHR$[12];
1020 LPRINT "* ---- The next top of form --- *";
1030 FOR I=1 TO 3
1040 LPRINT CHR$[11];"This is TAB        ";I
1050 NEXT
1060 RETURN
```




```
*---- The first top of form ----*

* ------ The next top of form ----*
This is TAB     1

This is TAB     2

This is TAB     3

* ------ The next top of form ----*
This is TAB     1

This is TAB     2

This is TAB     3
```

ESC ! [FX Mode Only]

Expression

CHR$[27];"!";CHR$[n];

(0 ⩽ n ⩽ 255)

Function

Selects print mode.

Remarks

This code sets one print mode (or a combination of print modes) as defined by the value of n. The chart on the following page shows the values for n and the corresponding print modes.

When this code is input, all print modes controlled by it are cancelled and the new print mode or modes specified become effective.

The print modes contolled by this code are:

Underline	Emphasized
Italic	Condensed
Enlarged	Proportional
Double Strike	Pica
Elite	

If the double-strike mode is specified with this command when the superscript/subscript mode is already set, the double-strike mode is not set.

NOTE:

In the proportional mode, characters are always emphasized.

The emphasized mode will be ignored if it is specified together with the elite mode.

Reference

SI, SO, DC2, DC4, ESC E, ESC F, ESC G, ESC H, ESC M, ESC P, and ESC W, ESC-, ESC 4, ESC 5.

The definition of each bit, is shown below:

Bit	7	6	5	4	3	2	1	0
"1"	Under-line	Italic	Enlarged	Double-strike	Empha-sized	Con-densed	Propor-tional	Elite
"0"	-	-	-	-	-	-	-	Pica

The following table shows the decimal values of n when used with ESC ! to set combinations of print modes.

n	Un	It	En	D	Em	C	P	EL
1								o
2							o	
3								o
4						o		
5						o		o
6							o	
7						o		o
8					o			
9								o
10							o	
11								o
12					o			
13	INVALID MODE							
14							o	
15						o		o
16				o				
17				o				o
18				o			o	

n	Un	It	En	D	Em	C	P	EL
19				o				o
20				o		o		
21				o		o		o
22				o			o	
23				o		o		o
24				o	o			
25				o				o
26				o			o	
27				o				o
28				o	o			
29				o		o		o
30				o			o	
31				o		o		o
32			o					
33			o					o
34			o				o	
35			o					o
36			o			o		

n	Un	It	En	D	Em	C	P	EL
37			o			o		o
38			o				o	
39			o			o		o
40			o		o			
41			o					o
42			o				o	
43			o					o
44			o		o			
45			o			o		o
46			o				o	
47			o			o		o
48			o	o				
49			o	o				o
50			o	o			o	
51			o	o				o
52			o	o		o		
53			o	o		o		o
54			o	o			o	
55			o	o		o		o
56			o	o	o			
57			o	o				o
58			o	o			o	
59			o	o				o
60			o	o	o			
61			o	o		o		o
62			o	o			o	
63			o	o		o		o
64		o						
65		o						o
66		o					o	
67		o						o
68		o				o		
69		o				o		o
70		o					o	
71		o				o		o
72		o			o			
73		o						o

n	Un	It	En	D	Em	Ç	P	EL
74		o					o	
75		o						o
76		o			o			
77		o				o		o
78		o					o	
79		o				o		o
80		o		o				
81		o		o				o
82		o		o			o	
83		o		o				o
84		o		o		o		
85		o		o		o		o
86		o		o			o	
87		o		o		o		o
88		o		o	o			
89		o		o				o
90		o		o			o	
91		o		o				o
92		o		o	o			
93		o		o		o		o
94		o		o			o	
95		o		o		o		o
96		o	o					
97		o	o					o
98		o	o				o	
99		o	o					o
100		o	o			o		
101		o	o			o		o
102		o	o				o	
103		o	o			o		o
104		o	o		o			
105		o	o					o
106		o	o				o	
107		o	o					o
108		o	o		o			
109		o	o			o		o
110		o	o				o	

Control Codes in Text Mode

n	Un	It	En	D	Em	C	P	EL
111		o	o			o		o
112		o	o	o				
113		o	o	o				o
114		o	o	o			o	
115		o	o	o				o
116		o	o	o		o		
117		o	o	o		o		o
118		o	o	o			o	
119		o	o	o		o		o
120		o	o	o	o			
121		o	o	o				o
122		o	o	o			o	
123		o	o	o				o
124		o	o	o	o			
125		o	o	o		o		o
126		o	o	o			o	
127		o	o	o		o		o
128	o							
129	o							o
130	o						o	
131	o							o
132	o					o		
133	o					o		o
134	o						o	
135	o					o		o
136	o				o			
137	o							o
138	o						o	
139	o							o
140	o				o			
141	o					o		o
142	o						o	
143	o					o		o
144	o			o				
145	o			o				o
146	o			o			o	

n	Un	It	En	D	Em	C	P	EL
147	o			o				o
148	o			o		o		
149	o			o		o		o
150	o			o			o	
151	o			o		o		o
152	o			o	o			
153	o			o				o
154	o			o			o	
155	o			o				o
156	o			o	o			
157	o			o		o		o
158	o			o			o	
159	o			o		o		o
160	o		o					
161	o		o					o
162	o		o				o	
163	o		o					o
164	o		o			o		
165	o		o			o		o
166	o		o				o	
167	o		o			o		o
168	o		o		o			
169	o		o					o
170	o		o				o	
171	o		o					o
172	o		o		o			
173	o		o			o		o
174	o		o				o	
175	o		o			o		o
176	o		o	o				
177	o		o	o				o
178	o		o	o			o	
179	o		o	o				o
180	o		o	o		o		
181	o		o	o		o		o
182	o		o	o			o	

n	Un	It	En	D	Em	C	P	EL
183	o		o	o		o		o
184	o		o	o	o			
185	o		o	o				o
186	o		o	o			o	
187	o		o	o				o
188	o		o	o	o			
189	o		o	o		o		o
190	o		o	o			o	
191	o		o	o		o		o
192	o	o						
193	o	o						o
194	o	o					o	
195	o	o						o
196	o	o				o		
197	o	o				o		o
198	o	o					o	
199	o	o				o		o
200	o	o			o			
201	o	o						o
202	o	o					o	
203	o	o						o
204	o	o			o			
205	o	o				o		o
206	o	o					o	
207	o	o				o		o
208	o	o		o				
209	o	o		o				o
210	o	o		o			o	
211	o	o		o				o
212	o	o		o		o		
213	o	o		o		o		o
214	o	o		o			o	
215	o	o		o		o		o
216	o	o		o	o			
217	o	o		o				o
218	o	o		o			o	
219	o	o		o				o

n	Un	It	En	D	Em	C	P	EL
220	o	o		o	o			
221	o	o		o		o		o
222	o	o		o			o	
223	o	o		o		o	o	o
224	o	o	o					
225	o	o	o					o
226	o	o	o				o	
227	o	o	o					o
228	o	o	o			o		
229	o	o	o			o		o
230	o	o	o				o	
231	o	o	o			o		o
232	o	o	o		o			
233	o	o	o					o
234	o	o	o				o	
235	o	o	o					o
236	o	o	o		o			
237	o	o	o			o		o
238	o	o	o				o	
239	o	o	o			o		o
240	o	o	o	o				
241	o	o	o	o				o
242	o	o	o	o			o	
243	o	o	o	o				o
244	o	o	o	o		o		
245	o	o	o	o		o		o
246	o	o	o	o			o	
247	o	o	o	o		o		o
248	o	o	o	o	o			
249	o	o	o	o				o
250	o	o	o	o			o	
251	o	o	o	o				o
252	o	o	o	o	o			
253	o	o	o	o		o		o
254	o	o	o	o			o	
255	o	o	o	o		o		o

Un: Underline Mode
It: Italic Mode
D: Double-strike mode
En: Enlarged mode

Em: Emphasized mode
P: Proportional Mode
C: Condensed mode
El: Elite-sized mode

ESC & [FX Mode Only]

Expression

CHR$[27];"&";CHR$[0];CHR$[n];CHR$[m];	Initiates character definition for character codes n to m.
CHR$[a];CHR$[pl-1];CHR$[pl-2];CHR$[pl-3]; . . .CHR$[pl-11];	Attribute and definition data for character code n.
CHR$[pk-1];CHR$[pk-2];CHR$[pk-3]; . . .CHR$(pk-11)	Attribute and defini-tion data for character code m. (0 ≤ n, m ≤ 255)

Function

Defines download characters.

Remarks

This code assigns the character pattern defined by p1, p2, p3,. . .p11 as a download character to ASCII codes n to m. The variable "a" determines the descender and proportional print attributes. How to obtain attribute "a" is explained later in this chapter.

If the download character is only being assigned to one character code, specify m = n.

That is:

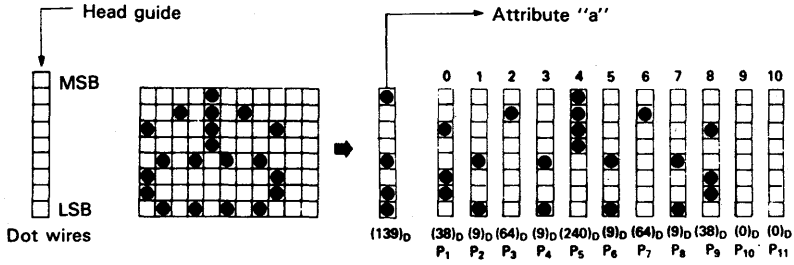
CHR$[27];"&";CHR$[0];CHR$[n];
CHR$[n];CHR$[a];CHR$[p1];CHR$[p2];. . .CHR$[p11]

Reference

ESC :, ESC %

Example 1

This example illustrates redefinition of ASCII code 65 as download character "A" instead of character "A."

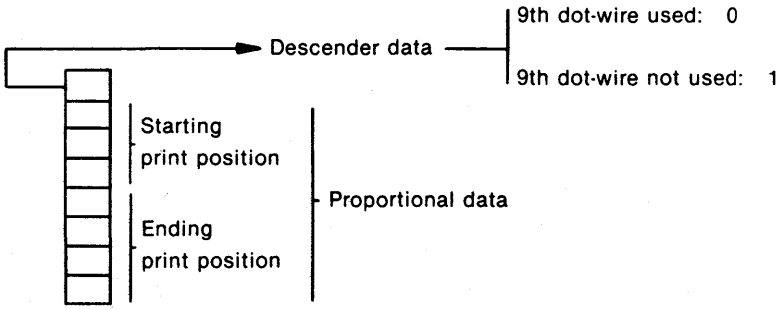



```
10 'Download Character Definition
20 LPRINT CHR$[27];"&";CHR$[0];"AA";
30 LPRINT CHR$[139];
40 LPRINT CHR$[38];CHR$[11];CHR$[64];CHR$[73];
50 LPRINT CHR$[240];CHR$[137];CHR$[64];CHR$[73];
60 LPRINT CHR$[38];CHR$[0];CHR$[0];CHR$[0];
70 LPRINT CHR$[27];"%";CHR$[1];CHR$[0]
80 LPRINT "AAAAA"
```

AAAAA

Obtaining Attribute "a"

Attribute "a" consists of descender data and proportional data as shown in the figure below. The descender data determines whether or not the ninth dot-wire will be used, and the proportional data determines the starting and ending positions of the character in the print area.



As the figure shows, the three high-order bits of the seven bits of proportional data represent the starting position of the character in the print area and the remaining four bits indicate the ending position. In this example, attribute "a" is:

$$(100010011)_2 = <8B>_H = (139)_D$$

NOTE:

The maximum print area width of a download character is twelve dots. However, dots in the twelfth column are automatically set to 0. The minimum width of a download character is five dots.

Definition of Download Characters for Proportional Printing

All data is automatically printed as emphasized characters during printing in the proportional mode. In this mode, the entire character will not be printed if its width is greater than the specified width of the print area.

For example, dots in position 11 cannot be printed if the print area specified for proportional data is in position 0 to 11. Therefore, when defining a download character for printing in the proportional mode, be sure to set an ending print position which is 1 or more dots greater than the actual width of the character.

Print positions

Normal mode

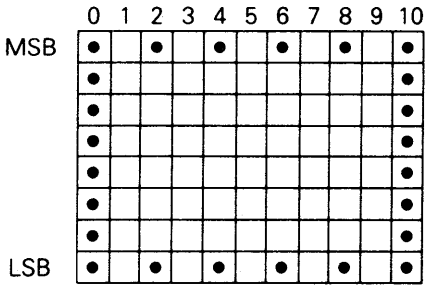
```
0 1 2 3 4 5 6 7 8 9 10 11
● o o o o o o o o o ●  o
```

Enlarged or Emphasized mode

```
0 1 2 3 4 5 6 7 8 9 10 11
● ● o o o o o o o o ●  ●
```

Example 2

The following example illustrates definition of a box pattern in place of the character "@."



Line Number

60-80	Copies the standard character patterns from ROM and RAM.
90-100	Selects character patterns in RAM for printing
120-130	Initiates character definition.
150	Specifies definition of the code for the character "@."
170	Specifies (139)D as the "attribute" of the character code for the character "@."
180-210	Specifies the new definition of the code for the character "@."

```
10 'Download Character
20 '
30 'Defines a box
40 '
50 'Copy the original character patterns
60 'into download character set
70 LPRINT CHR$[27];":";CHR$[0];CHR$[0];CHR$[0];
80 'Selects download character set
90 LPRINT CHR$[27];"%";CHR$[1];CHR$[0];
100 '
110 'Defines a box pattern
120 LPRINT CHR$[27];"&";CHR$[0];
130 'Defines a box into a @ code
140 LPRINT "@@";
150 '139 is the Attribute a
160 LPRINT CHR$[139];
170 'Sends a box pattern
180 LPRINT CHR$[255];CHR$[0];CHR$[129];CHR$[0];
190 LPRINT CHR$[129];CHR$[0];CHR$[129];CHR$[0];
200 LPRINT CHR$[129];CHR$[0];CHR$[255];
210 'Ok. Let's use the box.
220 LPRINT "This is a box. OOOOO> @"
230 LPRINT "These are boxes. OOO> @@@@@"
240 END
```

```
This is a box.------> □
These are boxes. ---> □□□□□
```

NOTE:

Do not define horizontally adjacent dots.

ESC % [FX Mode Only]

Expression

CHR$[27];"%";CHR$[m];CHR$[0];

(m = 0 or 1)

Function

Selects/deselects download character set

Remarks

When m = 0, this code selects the character generator in the internal ROM.

When m = 1, this code selects the download character set which has been defined by ESC &.

Reference

ESC &

Example

```
10 'Selects Character Set [France]
20 LPRINT CHR$[27];"R";CHR$[1];
30 '
40 'Defines CG pattern
50 LPRINT CHR$[27];"&";CHR$[0];CHR$[64];CHR$[64];
60 LPRINT CHR$[139];
70 LPRINT CHR$[38];CHR$[9];CHR$[64];CHR$[9];
80 LPRINT CHR$[240];CHR$[9];CHR$[64];CHR$[9];
90 LPRINT CHR$[38];CHR$[0];CHR$[0];
100 '
110 LPRINT "@@@@@"
120 LPRINT CHR$[27];"%";CHR$[1];CHR$[0];
130 LPRINT "@@@@@"
140 LPRINT CHR$[27];"%";CHR$[0];CHR$[0];
150 LPRINT "@@@@@"
160 END
```

NOTE:

In the above example, the download character "ぁ" is defined differently than it was on page 4-39. This is to illustrate that horizontally adjacent dots are not printed even if defined.

ESC : 0 [FX Mode Only]

Expression

CHR$[27];":";CHR$[0];CHR$[0];CHR$[0];

Function

Copies ROM character set.

Remarks

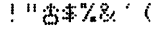
This code copies the ROM CG character set into the download character set.

Reference

ESC &, ESC %

Example

```
10 'Copy from ROM CG to Download CG
20 LPRINT CHR$[27];":";CHR$[0];CHR$[0];CHR$[0];
30 '
40 'CG pattern definition
50 LPRINT CHR$[27];"&";CHR$[0];"##";
60 LPRINT CHR$[139];
70 LPRINT CHR$[38];CHR$[9];CHR$[64];CHR$[9];
80 LPRINT CHR$[240];CHR$[9];CHR$[64];CHR$[9];
90 LPRINT CHR$[38];CHR$[0];CHR$[0];
100 '
110 LPRINT CHR$[27];"%";CHR$[1];CHR$[0];
120 FOR I=33 TO 47
130 LPRINT CHR$[I];
140 NEXT
150 LPRINT CHR$[27];"%";CHR$[0];CHR$[0];
160 END
```



ESC 0 [zero]

Expression

CHR$[27];"0"

Function

Sets 1/8-inch line spacing.

Remarks

The ESC 0 code sets subsequent line spacing to 1/8-inch.

Reference

ESC 1, ESC 2, ESC 3, ESC A

Example

```
10 '1/8-inch Line Spacing
20 LPRINT CHR$[27];"0"
30 FOR I = 1 TO 4
40 LPRINT "1/8-inch Line Spacing"
50 NEXT
```

```
1/8-inch Line Spacing
1/8-inch Line Spacing
1/8-inch Line Spacing
1/8-inch Line Spacing
```

ESC 1

Expression

CHR$[27];"1";

Function

Sets 7/72-inch line spacing.

Remarks

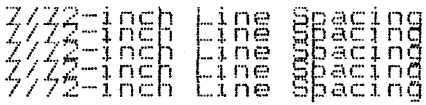
The ESC 1 code sets subsequent line spacing to 7/72-inch.

Reference

ESC 0, ESC 2, ESC 3, ESC A

Example

```
10 '7/72 inch Line Spacing
20 LPRINT CHR$[27];"1";
30 FOR I = 1 TO 5
40 LPRINT "7/72 inch Line Spacing"
50 NEXT
```



ESC 2 [IBM Mode]

Expression

CHR$[27];"2";

Function

Executes line spacing set by ESC A.

Remarks

The ESC 2 code initiates the line feed spacing set by ESC A. If no ESC A command has been given, ESC 2 sets subsequent line spacing to 1/6-inch.

Reference

ESC 0, ESC 1, ESC 3, ESC A

ESC 2 [FX Mode]

Expression

CHR$[27];"2";

Function

Sets 1/6-inch line spacing.

Remarks

ESC 2 sets the line spacing to the default setting of 1/6-inches.

Reference

ESC 0, ESC 1, ESC 3, ESC A

ESC 3

Expression

CHR$[27];"3";CHR$[n];

(0 ⩽ n ⩽ 255)

Function

Sets n/216-inch line spacing.

Remarks

The ESC 3 code sets subsequent line spacing to n/216-inch.

The amount of line spacing is set in units 1/3 the size of the space-adjacent dots.

Reference

ESC 0, ESC 1, ESC 2, ESC A, ESC J

Example

To set 20/216-inch (5/54-inch) line spacing:

```
10 'n/216-inch Line Spacing
20 LPRINT CHR$[27];"3";CHR$[20];
30 FOR I = 1 TO 4
40 LPRINT "20/216-inch LINE SPACING"
50 NEXT
```

```
20/216-inch LINE SPACING
20/216-inch LINE SPACING
20/216-inch LINE SPACING
20/216-inch LINE SPACING
```

NOTE:

When n = 1 or n = 2, spacing may not be accurate.
To set 20/216-inch line spacing for one line, see ESC J.

ESC 4 [FX Version]

Expression

CHR$[27];"4";

Function

Sets italic mode.

Reference

ESC 5

Example

```
10 'Selects italic mode
20 LPRINT "Standard"
30 LPRINT CHR$[27];"4";
40 LPRINT "Alternate"
50 LPRINT CHR$[27];"5";
60 LPRINT "Standard"
```

```
Standard
Alternate
Standard
```

ESC 4 [IBM Version]

Expression

CHR$[27];"4";

Function

Selects world trade character set. 2. (See Appendix E.) Same as ESC 6.

Reference

ESC 5, ESC 6, ESC 7

ESC 5 [FX Version]

Expression

CHR$(27);"5";

Function

Cancels the italic mode set by ESC 4.

Reference

ESC 4

ESC 5 [IBM Version]

Expression

CHR$[27];"5"; CHR$[n];

(n = 0, 1, 48 or 49)

Function

Selects/cancels automatic line feed.

Reference

LF, ESC O, ESC 1, ESC 2, ESC 3, ESC A

Remarks

If N = 1 or 49 the automatic line feed function is activated and the printer will automatically add a line to each carriage return.

If N = 0 or 48, automatic line feed is cancelled.

ESC 6 [FX Version]

Expression

CHR$[27];"6";

Function

Sets print code area expansion.

Remarks

This code makes it possible to print character definitions of ASCII codes $(128)_D$ to $(159)_D$ and $(255)_D$. This code sequence is also used when defining these codes.

When in the FX mode, characters used in the international character sets are assigned to these codes, which normally are not printable. These characters become printable after ESC 6 has been input.

The following table shows the decimal codes and the characters they represent. The characters shown will be printed in italics except when printed in the elite mode.

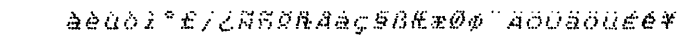
Dec. code	Char.	Dec. code	Char	Dec. code	Char.	Dec. code	Char.
128	*à*	*137*	*Ñ*	*145*	*β*	*153*	*Ü*
129	*è*	*138*	*ñ*	*146*	*Æ*	*154*	*ä*
130	*ù*	*139*	*¤*	*147*	*æ*	*155*	*ö*
131	*ò*	*140*	*Pt*	*148*	*Φ*	*156*	*ü*
132	*ì*	*141*	*Å*	*149*	*ϕ*	*157*	*È*
133	*°*	*142*	*å*	*150*	*¨*	*158*	*è*
134	*£*	*143*	*ç*	*151*	*Ä*	*159*	*¥*
135	*í*	*144*	*§*	*152*	*ö*	*255*	*ø*
136	*¿*						

Reference

ESC 7

Example

```
10 'Sets print code expansion
20  LPRINT CHR$(27);"6";
30 FOR I = 128 TO 159
40 LPRINT CHR$(I);
50 NEXT
60 LPRINT
70 LPRINT CHR$(27);"7";
80 END
```



NOTE:

Once ESC 6 has been received, inputting any character whose most significant bit is set will make it impossible to print data until the print buffer becomes full. Cancel this condition by turning off the printer.

ESC 6 [IBM Version]

Expression

CHR$[27];"6";

Function

Selects world trade character set. (See Appendix E.) Same as ESC 4 (IBM version).

Reference

ESC 4, ESC 5, ESC 7

ESC 7 [FX Version]

Expression

CHR$[27];"7";

Function

Cancels print code area expansion.

Remarks

This code cancels the ESC 6 setting and causes the printer to ignore all codes from $(128)_D$ to $(159)_D$ and $(255)_D$ (except control codes). This is the state the printer is in when it is turned on.

Reference

ESC 6

ESC 7 [IBM Version]

Expression

CHR$[27];"7";

Function

Selects normal character set. (See Appendix E.)

Reference

ESC 4, ESC 5, ESC 6

ESC 8

Expression

CHR$(27);"8";

Function

Causes the printer to ignore the paper-end detector.

Remarks

This code enables the printer to print data to the last line of the last sheet of paper.

If switch pin SW1-3 is set to the ON position when you turn the power on, the printer is automatically in the ESC 8 condition.

Reference

ESC 9

NOTE:

The ESC 8 code is ignored if it is entered after the printer is already out of paper.

ESC 9

Expression

CHR$[27];"9";

Function

Enables the paper-end detector.

Remarks

This code cancels the ESC 8 condition. When the printer detects the end of paper, it goes offline.

If switch pin SW1-3 is set to the OFF position, the paper-end detector is automatically enabled when you turn on the printer.

Reference

ESC 8

ESC A

Expression

CHR$[27];"A";CHR$[n];

(0 ⩽ n ⩽ 85)

Function

Sets programmable line spacing.

Remarks

This code sets line spacing to n/72-inch. In IBM mode, the line spacing set by this code does not go into effect until it is executed by the ESC 2 code.

If n = 1 (1/72-inch), the amount of space between each line equals the space between two adjacent dot wires in the printhead.

Reference

ESC 0, ESC 1, ESC 2, ESC 3

Example

```
10 'n/72-inch Line Spacing
20 FOR I = 1 TO 8
30 LPRINT CHR$[27];"A";CHR$[I];
40 LPRINT CHR$[27];"2";
50 LPRINT "LINE SPACING ----- "
60 NEXT
```

ESC B

Expression

CHR$[27];"B";CHR$[n_1];CHR$[$n_2$];. . .;CHR$[n_k];CHR$[0];

Function

Sets vertical tab stop positions.

Remarks

You can set up to 16 vertical tab stop positions per page. If you want to change form length using the ESC C code, do so before you set tabs and make sure your tab settings fit within the current form length.

Each n in the expression indicates a tab stop position. Tab stop numbers must be in numerical order. They are followed by the NUL code, (CHR$(0)). Use the VT code to perform a vertical tab operation.

Once vertical tab stops are set, they are in effect until new stops are specified. (If the printer is reset or turned off, tab stops set using this code are cleared.) ESC B followed only by the NUL code cancels tab stops.

Reference

VT

Example

The following example sets vertical tab stop positions at 10, 20, and 40.

```
10 LPRINT CHR$[27];"B";CHR$[10];CHR$[20];CHR$[40];
CHR$[0];
```

ESC C

Expression

CHR$[27];"C";CHR$[n];

(1 ⩽ n ⩽ 127)

Function

Sets form length.

Remarks

The ESC C code sets form length to the number of lines specified.

Example

To set the form length to 50 lines:

```
10 LPRINT CHR$[27];"C";CHR$[50];
```

NOTE:

The position on the page where you enter the ESC C code becomes the new top-of-form position.

Form feed, skip-over perforation, etc. are carried out according to the form length you set using this code.

The form length is stored as an absolute length. It will not change after it has been set, even if you change the line spacing.

ESC C 0

Expression

CHR$[27];"C";CHR$[0];CHR$[n];

(1 ⩽ n ⩽ 22)

Function

Sets form length in inches.

Remarks

The ESC C 0 code sets the form length in inches and sets the current paper position as the top of form.

The default page length is 11 inches or 12 inches, depending on the setting of switch pin SW1-2.

Form feed, skip over perforation and other codes dependent on form length are performed according to the form length set by this code.

Reference

ESC C

Example

To set the form length to 8 inches:

```
10 LPRINT CHR$[27];"C";CHR$[0];CHR$[8];
```

ESC D

Expression

CHR$[27];"D";CHR$[n_1];CHR$[$n_2$]. . .;CHR$[n_k];CHR$[0];

Function

Sets horizontal tab stop positions.

Remarks

You can set up to 136 horizontal tab stop positions at printer column positions between 1 and 136. (When the printer is in condensed print mode, up to 233 tab stops can be set.)

The n's in the format above indicate the column numbers for tab stop positions. Tab stop numbers must be in numerical order. They must be followed by the NUL code, (CHR$(0)) as a terminator. Use the HT code to perform a horizontal tab operation.

Once horizontal tab stops are set, they are in effect until new stops are specified. If the printer is reset or turned off, tab stops set using this code are cleared and the printer automatically sets tabs at eight character intervals.

ESC D followed only by the NUL code cancels tab stops.

NOTE:

In FX mode, tab positions are stored in memory as absolute positions and are not affected by change in character width.

In IBM mode, however, tab positions are stored as relative positions and change when character width is changed.

Reference

HT

Example

The following example shows horizontal tab stop positions set at printer column positions of 6, 13 and 20.

```
10 'Horizontal TAB
20 LPRINT"01234567890123456789012345678 90"
30 LPRINT CHR$[27];"D";CHR$[6];CHR$[13];CHR$[20];
   CHR$[0];
40 FOR I=1 TO 3
50 LPRINT CHR$[9];"STOP!";
60 NEXT
```

```
01234567890123456789012345678 90
      STOP!  STOP!     STOP!
```

ESC E

Expression

CHR$[27];"E";

Function

Sets emphasized print mode.

Remarks

Emphasized printing provides a darker, higher-quality print.

If pica-sized characters are selected, ESC E causes all the following data to be printed in emphasized characters.

If elite-sized characters are selected, ESC E affects only the internal flag of the printer. The print mode does not change unless the elite-sized character mode is cancelled by the ESC P code.

Reference

ESC F, ESC M

Example

```
10 'Emphasized Mode
20 LPRINT "One of these words is ";
30 LPRINT CHR$[27];"E";
40 LPRINT "emphasized."
50 LPRINT CHR$[27];"F";
```

```
One of these words is emphasized.
```

ESC EM [FX Mode Only]

Expression

CHR$[27];CHR$[25];"n";

(n = 0 or 4)

Function

Selects sheet feeder mode.

Remarks

When n = 4, the sheet feeder mode is selected.

When n = 0, the sheet feeder mode is not selected.

The sheet feeder mode must be selected when the optional cut sheet feeder is used.

When the sheet feeder mode is selected, the printer accepts data from the host computer when the ON LINE button is pressed even if the printer runs out of paper.

When the print operation for one sheet has been completed, the next sheet is loaded automatically. This makes it possible for the host computer to send data continuously, just as when fanfold paper is used.

The sheet feeder mode can also be selected by setting switch pin SW2-2 to the ON position.

ESC F

Expression

CHR$[27];"F";

Function

Cancels the emphasized print mode.

Remarks

If pica-sized characters are selected, the ESC F code cancels the emphasized print mode set by the ESC E code.

If elite-sized characters are selected, ESC F affects only the internal flag of the printer. It does not affect the print mode unless you cancel the elite-sized mode by using ESC P.

Reference

ESC E, ESC M

Example

```
10 'Emphasized Mode Cancel
20 LPRINT CHR$[27];"E";
30 LPRINT "Emphasized";
40 LPRINT CHR$[27];"F";
50 LPRINT "          Pica-sized"
```

```
Emphasized          Pica-sized
```

ESC G

Expression

CHR$[27];"G";

Function

Sets double-strike print mode.

Remarks

The data following this code is printed in double-strike print mode. The printer completes one line of printing by two passes of the printhead while advancing the paper by about 1/216-inch between the first pass and the second pass.

The printer adjusts paper feeding to maintain the absolute length and number of lines per page. This eliminates the vertical gap between dots, enabling high-quality printing.

Reference

ESC H

Example

```
10 'Double-strike mode
20 LPRINT "Normal Print";
30 LPRINT CHR$[27];"G";
40 LPRINT "Double Print"
```

```
Normal Print
Double Print
```

ESC H

Expression

CHR$[27];"H";

Function

Cancels double-strike print mode.

Remarks

The ESC H code cancels the double-strike print mode set by the ESC G code.

Reference

ESC G

Example

```
10 'Double-strike cancel
20 LPRINT CHR$[27];"G";
30 LPRINT "Double Print"
40 LPRINT CHR$[27];"H";
50 LPRINT "Normal Print"
```

```
Double Print
Normal Print
```

ESC I [FX Mode Only]

Expression

CHR$[27];"I";CHR$[n];

(n = 0, 1, 48, or 49)

Function

Selects or deselects the international character code table.

Remarks

The ESC I code acts as a character code function switch. When the international character code table is selected, printable characters are assigned to control codes which are normally unused, such as codes $(0)_D$ to $(31)_D$ and codes $(128)_D$ to $(159)_D$.

When n = 1 or 49, the international character code table is selected.

When n = 0 or 48, the international character code table is not selected.

NOTE:

This code does not affect control codes such as CR, LF, and FF.

Control Codes in Text Mode

The following table shows the international character codes set by ESC I.

Dec code		Dec code		Dec code		Dec code		Dec code		Dec code	
0	á	13	CR	26	ä	128	à	141	CR	154	ä
1	è	14	SO	27	ESC	129	è	142	SO	155	ESC
2	ù	15	SI	28	ù	130	ü	143	SI	156	ü
3	ò	16	§	29	É	131	Ó	144	§	157	É
4	í	17	β	30	é	132	í	145	β	158	é
5	°	18	DC2	31	¥	133	°	146	DC2	159	¥
6	£	19	DC3			134	£	147	DC3		
7	BEL	20	DC4			135	BEL	148	DC4		
8	BS	21	ϕ			136	BS	149	ϕ		
9	HT	22	¨			137	HT	150	¨		
10	LF	23	Ä			138	LF	151	Ä		
11	VT	24	CAN			139	VT	152	CAN		
12	FF	25	EM			140	FF	153	EM		

Example 1

```
10 'Selects Control code
20 LPRINT CHR$(7): 'BEL code
30 LPRINT CHR$(0): 'NUL code
40 LPRINT CHR$(27);"I";CHR$(1);
50 LPRINT CHR$(7); 'Printable code
60 LPRINT CHR$(0); 'Printable code
70 LPRINT CHR$(27);"I";CHR$(0);
80 END
```

<beep>
<beep>

à

Example 2

```
10 'International Characters
20 ' in codes 1 to 6
30 LPRINT CHR$(27);"I";CHR$(1);
40 FOR I = 1 TO 6
50 LPRINT CHR$(I);
60 NEXT
70 END
```

èùòì °£

ESC J

Expression

CHR$[27];"J";CHR$[n];

(0 ⩽ n ⩽ 255)

Function

Sets n/216-inch line feed for one line.

Remarks

In FX mode, the printer prints the data in the print buffer and executes n/216-inch line feed. No carriage return is perfromed

In IBM mode, the printer feeds the paper forward by n/216 of an inch and then performs a carriage return. ESC 5(0) causes a carriage return alone

Reference

ESC 3

Example

To execute 113/216-inch line feed in FX mode (no carriage return):

```
10 'n/216-inch Line Feed
20 LPRINT "This shows"
30 LPRINT CHR$[27];"J";CHR$[113]
40 LPRINT "113/216-inch line spacing"
50 LPRINT "for one line only."
```

```
This shows


113/216-inch line spacing
for one line only.
```

NOTE:

If n = 1 or 2, paper feeding may not be accurate. If n = 0, a paper feed is not performed.

For continuous n/216-inch line spacing, use ESC 3.

ESC M [FX Mode Only]

Expression

CHR$[27];"M";

Function

Sets elite-sized printing.

Remarks

The data following this code is printed in elite-sized characters (12 characters per inch). In this mode, use of the emphasized or proportional print code affects only the internal flag of the printer. The print mode does not change. This code can be cancelled by using the ESC P code.

Reference

ESC P, SI, DC2, ESC E, ESC F

Example

```
10 'Elite-sized Printing
20 LPRINT "Pica-sized"
30 LPRINT CHR$[27];"M";
40 LPRINT "    Elite-sized"
```

```
Pica-sized    Elite-sized
```

ESC N

Expression

CHR$[27];"N";CHR$[n];

(1 ⩽ n ⩽ 127)

Function

Sets skip-over perforation.

Remarks

The skip-over perforation function specifies the number of lines (n) to be skipped at the bottom of a page.

For example, if you are using 11-inch paper and you set a skip-over perforation of six lines, the printer prints 60 lines from the top-of-form position, feeds six lines, and continues printing the 61st line of data at the top-of-form position of the next page. A skip-over perforation setting with a value that exceeds the length of the form is ignored.

When you change the form length by using the ESC C code, any skip-over perforation previously specified is cancelled. ESC N must be entered again to set the amount of skip-over perforation.

When switch pin SW2-3 is ON, one-inch skip-over perforation is automatically set.

Reference

ESC O, ESC C

Example

```
10 'Skip-over Perforation
20 LPRINT CHR$[27];"C";CHR$[5];
30 LPRINT CHR$[27];"N";CHR$[2];
40 FOR I = 1 TO 9
50 LPRINT "Let's count ";I
60 NEXT
```

```
Let's count    1
Let's count    2
Let's count    3


Let's count    4
Let's count    5
Let's count    6


Let's count    7
Let's count    8
Let's count    9
```

ESC O

Expression

CHR$[27];"O";

Function

Cancels skip-over perforation.

Remarks

This code cancels the skip-over perforation set by the ESC N code.

Reference

ESC N

Example

```
10 'Skip-over Perforation Cancel
20 LPRINT CHR$[27];"C";CHR$[4];
30 LPRINT CHR$[27];"N";CHR$[2];
40 LPRINT "Twinkle, twinkle little star"
50 LPRINT "      *! *! *! *! *! *! "
60 LPRINT CHR$[27];"O";
70 FOR I = 1 TO 2
80 LPRINT "Twinkle, twinkle little star"
90 LPRINT "      *! *! *! *! *! *! "
100 NEXT
```

```
Twinkle, twinkle little star
     *! *! *! *! *! *!

Twinkle, twinkle little star
     *! *! *! *! *! *!
Twinkle, twinkle little star
     *! *! *! *! *! *!
```

ESC P [FX Mode Only]

Expression

CHR$[27];"P";

Function

Cancels elite-sized printing.

Remarks

The elite-sized print mode set by the ESC M code is cancelled and the printer returns to pica-sized print.

Reference

ESC M

Example

```
10 'Pica-sized Printing
20 LPRINT CHR$[27];"P";
30 LPRINT "Pica-sized character"
40 LPRINT
50 LPRINT CHR$[27];"M";
60 LPRINT "Elite-sized character"
70 LPRINT
80 LPRINT CHR$[27];"P";
90 LPRINT "Pica-sized character again"
```

```
Pica-sized character

Elite-sized character

Pica-sized character again
```

ESC Q [FX Mode Only]

Expression

CHR$[27];"Q";CHR$[n];

n = the column number where the margin is to be set.

Function

Sets the right margin.

Remarks

This code must be specified at the beginning of a line. If not, the print data preceding the code may be lost.

The range of n is determined by the current character size. The minimum and maximum values for n in each print size are listed below. If their range is exceeded, n is ignored and the previous setting remains in effect.

Left margin + 2 ⩽ n ⩽ 136 for pica-sized mode.
Left margin + 3 ⩽ n ⩽ 163 for elite-sized mode.
Left margin + 4 ⩽ n ⩽ 233 for condensed mode.

If the enlarged print mode is set, n for each mode is half of each value listed above.

When data input goes beyond the right margin set by this sequence, a carriage return and a line feed are automatically performed, and the remaining data is printed on the next line.

Reference

ESC X

Example

```
10 'Right margin set
20 LPRINT CHR$[27];"Q";CHR$[15];
30 LPRINT "12345678901234567890123456789O"
```

```
1234567890123456789012345
67890123456789O
```

ESC R [FX Version]

Expression

CHR$[27];"R";CHR$[n];

(0 ⩽ n ⩽ 10)

Function

Selects international character set.

Remarks

When this code is input (in the FX mode), all subsequent data is printed using the character set of the country specified by n.

The variable n represents one of the following country character sets:

n	Country
0	U.S.A.
1	France
2	Germany
3	England
4	Denmark

n	Country
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

Code table and character fonts are shown in Appendix F.

Example

```
10 'International Character Sets
20 LPRINT CHR$(15);
30 FOR I = 0 TO 8
40 LPRINT CHR$(27);"R";CHR$(I):
50 FOR J = 33 TO 126
60 LPRINT CHR$(J);
70 NEXT
80 LPRINT
90 NEXT
100 END
```

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
qrstuvwxyz{|}~

!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJKLMNOPQRSTUVWXYZ°çß^_`abcdefghijklmnop
qrstuvwxyzéùè¨

!"#$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_`abcdefghijklmnop
qrstuvwxyzäöüß

!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
qrstuvwxyz{|}~

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZÆØÅ^_`abcdefghijklmnop
qrstuvwxyzæøå~

!"¤%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnop
qrstuvwxyzäöåü

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ°\é^_ùabcdefghijklmnop
qrstuvwxyzàòèì

!"₧$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ¡Ñ¿^_`abcdefghijklmnop
qrstuvwxyz¨ñ}~

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[¥]^_`abcdefghijklmnop
qrstuvwxyz{|}~
```

HEX DEC	23H 35	24H 36	40H 64	5BH 91	5CH 92	5DH 93	5EH 94	60H 96	7BH 123	7CH 124	7DH 125	7EH 126
U.S.A	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	£	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	$_t$	$	@	|	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	#	¥	@	[	¥	]	^	`	{	|	}	~
NORWAY	#	¤	É	Æ	ø	Å	Ü	é	æ	ø	å	ü
DENMARK2	#	£	É	Æ	ø	Å	Ü	é	æ	ø	å	ü

The special character patterns shown above are stored at the addresses in the character generator shown below.

HEX DEC	23H 35	24H 36	40H 64	5BH 91	5CH 92	5DH 93	5EH 94	60H 96	7BH 123	7CH 124	7DH 125	7EH 126
U.S.A												
FRANCE			0	5	15	16			30	2	1	22
GERMANY			16	23	24	25			26	27	28	17
U.K.	6											
DENMARK1				18	20	13			19	21	14	
SWEDEN		11	29	23	24	13	25	30	26	27	14	28
ITALY				5		30		2	0	3	1	4
SPAIN	12			7	9	8			22	10		
JAPAN					31							
NORWAY		11	29	18	20	13	25	30	19	21	14	28
DENMARK2			29	18	20	13	25	30	19	21	14	28

ESC R [IBM Version]

Expression

CHR$[27];"R";

Function

Cancels horizontal and vertical tab settings.

Remarks

All horizontal and vertical tab settings are cancelled and replaced with the default settings.

Reference

HT, ESC D, VT, ESC B

ESC S

Expression

CHR$[27];"S";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Sets superscript/subscript print mode.

Remarks

If n=0 or 48, data is printed in superscript mode (characters measuring 1.6mm high are printed on the upper half of a line).

If n=1 or 49, data is printed in subscript mode (characters measuring 1.6mm high are printed on the lower half of a line).

The ESC T code cancels this code.

Reference

ESC T

Example 1

```
10 'Superscript Mode
20 LPRINT CHR$(27);"E";
30 LPRINT "Y = aX";CHR$(27);"F";
40 LPRINT CHR$(27);"S";CHR$(0);CHR$(15);
50 LPRINT "3";
60 LPRINT CHR$(27);"T";CHR$(18);
70 LPRINT CHR$(27);"E";
80 LPRINT " + bX";CHR$(27);"F";
90 LPRINT CHR$(27);"S";CHR$(0);CHR$(15);
100 LPRINT "2";
110 LPRINT CHR$(27);"T";CHR$(18);
120 LPRINT CHR$(27);"E";
130 LPRINT " + cX + d"
```

$Y=aX^3+bX^2+cX+d$

Example 2

```
10 'Subscript Mode
20 LPRINT CHR$(27);"E";
30 LPRINT "H";CHR$(27);"F";
40 LPRINT CHR$(27);"S";CHR$(1);CHR$(15);
50 LPRINT "2";
60 LPRINT CHR$(27);"T";CHR$(18);
70 LPRINT CHR$(27);"E";
80 LPRINT "O";CHR$(27);"F";
90 LPRINT CHR$(27);"T";CHR$(18);
100 END
```

H_2O

ESC T

Expression

CHR$[27];"T";

Function

Cancels the superscript/subscript print mode.

Remarks

The ESC T code cancels the superscript or subscript print mode set by the ESC S code.

Reference

ESC S

ESC U

Expression

CHR$[27];"U";CHR$[n]

(n = 0, 1, 48 or 49)

Function

Sets/cancels unidirectional printing.

Remarks

If n = 1 or 49, data is printed in one direction from left to right. If n = 0 or 48, unidirectional printing is cancelled.

Unidirectional printing (all lines are printed from left to right) improves the precision of vertical character alignment.

Reference

ESC <

Example

```
10 'Set print direction
20 LPRINT CHR$[27];"U";CHR$[1];
30 LPRINT "These two lines"
40 LPRINT "are printed unidirectionally."
50 LPRINT CHR$[27];"U";CHR$[0];
60 LPRINT "But these two"
70 LPRINT "are printed bidirectionally."
```

```
These two lines
are printed unidirectionally.
But these two
are printed bidirectionally.
```

ESC W

Expression

CHR$[27];"W";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Sets/cancels enlarged print mode.

Remarks

If n=1 or 49, all following data is printed in enlarged characters.

If n=0 or 48, enlarged print mode is cancelled. This code is not cancelled by a line feed.

ESC W 0 also cancels enlarged print set by the SO code.

Reference

SO, DC4

Example

```
10 'Enlarged Mode by ESC W
20 LPRINT "Enlarged mode"
30 LPRINT CHR$[27];"W";CHR$[1];
40 LPRINT "Enlarged mode"
50 LPRINT CHR$[27];"W";CHR$[0];
60 LPRINT "Enlarged mode"
```

```
Enlarged mode
Enlarged mode
Enlarged mode
```

ESC X [IBM Mode Only]

Expression

CHR$[27];"X";CHR$[n1];CHR$[n2];

(0≤n1, n2≤255)

Function

Sets left and right margins.

Remarks

The left margin is set to n1 columns and the right margin is set to n2 columns, both in the current character width. The values of n1 and n2 should be in the range of 0 to 255.

The absolute positions of the margins will depend on whether enlarged, condensed or normal pica mode is selected.

The minimum width of the print area which can be set is one-half inch.

Reference

ESC Q, ESC l

ESC a (n) [FX Mode Only]

Expression

CHR$(27);"a";CHR$(n);

(n = 0, 1, 2 or 3)

Function

Sets/cancels text justification and alignment.

Remarks

If n = 0, text is aligned flush left.

If n = 1, text is centered.

If n = 2, text is aligned flush right.

If n = 3, text is justified at both the left and right margins.

This code is effective only when the printer is in the NLQ mode.

Reference

ESC x

ESC b [FX Mode Only]

Expression

CHR$[27];"b";CHR$[n];CHR$[m1];...;CHR$[mk];CHR$[0];

(0 ⩽ n ⩽ 7) (1 ⩽ k ⩽ 16)

Function

Sets VFU (Vertical Format Unit) positions.

Remarks

This code sets vertical tabs for VFU channel n. CHR$(0) must always be placed at the end of this sequence as a terminator.

Example

This example shows how to set vertical tabs at the 5th, 10th and 13th lines in channel 2.

NOTE:

Tabs on channel 0 can also be set by ESC B.

```
10 'Set Vertical Tabs
20 LPRINT CHR$[27];"b";
30 LPRINT CHR$[2];CHR$[5];CHR$[10];CHR$[13];
40 LPRINT CHR$[0];
50 '
60 'Selects channel 2
70 LPRINT CHR$[27];"/";CHR$[2];
80 LPRINT "Start!";CHR$[11];"BB";CHR$[11];
90 LPRINT "CC";CHR$[11];"DD"
100 END
```

```
Start!
```

0 line

```
BB
```

5th line

```
CC
```

10th line

```
DD
```

13th line

ESC l [lowercase L]

Expression

CHR$[27];"l";CHR$[n];

Function

Sets the left margin.

Remarks

This code sets the left margin at the column specified by n.

The range of n is determined by the current character size. If n exceeds the maximum values shown below, this code is ignored and the previous margin remains effective.

0 ⩽ n ⩽ Right margin - 2 Pica mode and proportional mode
0 ⩽ n ⩽ Right margin - 3 Elite mode
0 ⩽ n ⩽ Right margin - 4 Condensed mode

Reference

ESC Q

Example 1

To set the left margin to the 8th column:

```
10 'Left Margin
20 LPRINT "01234567890123456789O"
30 LPRINT CHR$[27];"l";CHR$[8];
40 LPRINT
50 LPRINT "A new left margin"
```

```
01234567890123456789O

        A new left margin
```

Example 2

To change the left margin to the 15th column:

```
10 'Horizontal Tab & Left Margin
20 LPRINT "012345678901234567890"
30 LPRINT CHR$(27);"D";CHR$(2);CHR$(8);CHR$(15);
40 LPRINT CHR$(0);
50 LPRINT "A";CHR$(9);"B";CHR$(9);"C";CHR$(9);"D"
60 LPRINT CHR$(27);"I";CHR$(15);
70 LPRINT "012345678901234567890"
80 LPRINT CHR$(27);"D";CHR$(3);CHR$(9);CHR$(14);
90 LPRINT CHR$(0);
100 LPRINT "E";CHR$(9);"F";CHR$(9);"G";CHR$(9);"H"
110 END
```

```
012345678901234567890
A B       C       D
                  012345678901234567890
                  E  F       G     H
```

NOTE:

ESC I clears any horizontal tab positions previously set. New tab positions must be set.

ESC p [FX Mode Only]

Expression

CHR$[27];"p";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Sets/cancels proportional mode.

Remarks

When n = 1 or n = 49, the proportional spacing mode is set.

When n = 0 or n = 48, the normal spacing mode is set.

In the proportional mode, narrow characters such as "l" and "i" occupy less space than wider ones. This makes printed material neater and easier to read.

In this mode, the codes BS and DEL are not accepted and printing is always performed in the emphasized mode.

The ESC p command is not valid when the printer is in NLQ mode.

Example

```
10 'Proportional spacing mode
20 LPRINT "        <Normal Print Mode>"
30 GOSUB 1000
40 LPRINT
50 LPRINT "        <Proportional Spacing Mode>"
60 LPRINT CHR$(27);"p";CHR$(1);
70 GOSUB 1000
80 LPRINT CHR$(27);"p";CHR$(0);
90 END
1000 'Subroutine
1010 LPRINT "The Earth, our planet, is located at"
1020 LPRINT "an average distance of 93 million miles"
1030 LPRINT "from the Sun."
1040 RETURN
```

```
     <Normal Print Mode>
The Earth, our planet, is located at
an average distance of 93 million miles
from the Sun.
```

```
     <Proportional Spacing Mode>
The Earth, our planet, is located at
an average distance of 93 million miles
from the Sun.
```

The following table shows the widths of all the characters (including international characters) used in the FX mode.

ASCII code	Char.	Width (unit: 1/2 dot)
0	à	12
1	è	12
2	ù	11
3	ò	10
4	ì	6
5	°	8
6	£	12
7	¡	5
8	¿	12
9	Ñ	12
10	ñ	11
11	¤	12
12	Pt	12
13	Å	12
14	å	12
15	ç	11
16	ş	10
17	ß	11
18	Æ	12
19	æ	12
20	Ø	12
21	ø	12
22	¨	8
23	Ä	12
24	Ö	12
25	Ü	12
26	ä	12
27	ö	10
28	ü	11
29	É	12
30	é	12
31	¥	12
32	SPACE	12
33	!	5
34	"	8
35	#	12
36	$	12
37	%	12
38	&	12
39	'	5
40	(	6
41	)	6
42	*	12
43	+	12
44	,	7
45	–	12
46	.	6
47	/	10
48	0	12
49	1	8
50	2	12
51	3	12
52	4	12

ASCII code	Char.	Width (unit: 1/2 dot)
53	5	12
54	6	12
55	7	12
56	8	12
57	9	12
58	:	6
59	;	6
60	<	10
61	=	12
62	>	10
63	?	12
64	@	12
65	A	12
66	B	12
67	C	12
68	D	12
69	E	12
70	F	12
71	G	12
72	H	12
73	I	8
74	J	11
75	K	12
76	L	12
77	M	12
78	N	12
79	O	12
80	P	12
81	Q	12
82	R	12
83	S	12
84	T	12
85	U	12
86	V	12
87	W	12
88	X	10
89	Y	12
90	Z	10
91	[	8
92	\	10
93	]	8
94	^	12
95	_	12
96	`	5
97	a	12
98	b	11
99	c	11
100	d	11
101	e	12
102	f	10
103	g	11
104	h	11
105	i	8

ASCII code	Char.	Width (unit: 1/2 dot)
106	j	9
107	k	10
108	l	8
109	m	12
110	n	11
111	o	12
112	p	11
113	q	11
114	r	11
115	s	12
116	t	11
117	u	12
118	v	12
119	w	12
120	x	10
121	y	12
122	z	10
123	{	9
124	|	5
125	}	9
126	~	12
127	Ø	12
128	à	11
129	è	11
130	ù	11
131	ò	11
132	ì	8
133	°	8
134	£	12
135	¡	10
136	¿	11
137	Ñ	12
138	ñ	12
139	¤	12
140	Pt	12
141	Å	12
142	å	11
143	ç	11
144	ş	12
145	ß	11
146	Æ	12
147	æ	12
148	Ø	12
149	ø	11
150	¨	9
151	Ä	12
152	Ö	12
153	Ü	12
154	ä	11
155	ö	11
156	ü	12
157	É	12
158	é	11

Control Codes in Text Mode

ASCII code	Char.	Width (unit: 1/2 dot)
159	¥	12
160	SPACE	12
161	!	10
162	"	10
163	#	12
164	$	11
165	%	12
166	&	12
167	'	5
168	(	8
169	)	8
170	*	12
171	+	12
172	,	8
173	-	12
174	.	7
175	/	10
176	0	12
177	1	9
178	2	12
179	3	12
180	4	12
181	5	12
182	6	11
183	7	12
184	8	12
185	9	11
186	:	8
187	;	9
188	<	10
189	=	11
190	>	9
191	?	11
192	@	12
193	A	12
194	B	12
195	C	12
196	D	12
197	E	12
198	F	12
199	G	12
200	H	12
201	I	10
202	J	12
203	K	12
204	L	10
205	M	12
206	N	12
207	O	12
208	P	12
209	Q	12
210	R	12

ASCII code	Char.	Width (unit: 1/2 dot)
211	S	12
212	T	12
213	U	12
214	V	11
215	W	12
216	X	12
217	Y	12
218	Z	12
219	[	11
220	\	7
221	]	11
222	^	10
223	_	12
224	`	5
225	a	11
226	b	11
227	c	11
228	d	12
229	e	11
230	f	12
231	g	11
232	h	11
233	i	9
234	j	10
235	k	11
236	l	9
237	m	11
238	n	10
239	o	11
240	p	11
241	q	11
242	r	10
243	s	11
244	t	10
245	u	11
246	v	10
247	w	12
248	x	12
249	y	11
250	z	12
251	{	10
252	¦	9
253	}	10
254	~	12
255	Ø	12

ESC s [FX Mode Only]

Expression

CHR$[27];"s";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Sets/cancels half-speed printing.

Remarks

If n = 1 or 49, print speed decreases from the normal 160 cps (characters per second) to 80 cps.

If n = 0 or 48, half-speed printing is cancelled and the printer returns to the normal print speed of 160 cps.

Half-speed printing reduces print noise.

Example

```
10 'Half-speed printing
20 LPRINT "This line is printed at 160 cps."
30 LPRINT CHR$[27];"s";CHR$[1];
40 LPRINT "This line is printed at 80 cps."
50 LPRINT CHR$[27];"s";CHR$[0];
60 LPRINT "Printing again at 160 cps."
```

```
This line is printed at 160 cps.
This line is printed at 80 cps.
Printing again at 160 cps.
```

ESC x [FX Mode Only]

Expression

CHR$[27];"x";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Selects either the draft mode or NLQ (Near Letter Quality) mode.

Remarks

If n = 1 or 49, NLQ mode is selected.

If n = 0 or 48, the draft mode is selected.

NLQ and draft modes can also be selected from the printer control panel. See Chapter 2.

The following print modes can be used with the NLQ mode:

Normal	Underline
Enlarged	Superscript
Emphasized	Subscript

The following commands are effective only when the printer is in the NLQ mode:

ESC a	ESC \
ESC (space)	ESC $

Example

```
10 'Print quality select
20 LPRINT "       <Draft Mode>"
30 GOSUB 1000
40 LPRINT
50 LPRINT "       <Near Letter Quality (NLQ) Mode>"
60 LPRINT CHR$(27);"p";CHR$(0);
70 GOSUB 1000
80 LPRINT CHR$(27);"p";CHR$(1);
90 END
1000 'Subroutine
1010 LPRINT "Who has seen the wind?"
1020 LPRINT "Neither I nor you."
1030 LPRINT "But when the leaves hang trembling,"
1040 LPRINT "The wind is passing through."
1050 RETURN
```

```
     <Draft Mode>
Who has seen the wind?
Neither I nor you.
But when the leaves hang trembling,
The wind is passing through.
```

```
     <Near Letter Quality (NLQ) Mode>
Who has seen the wind?
Neither I nor you.
But when the leaves hang trembling,
The wind is passing through.
```

ESC z [FX Mode Only]

Expression

CHR$[27];"z";CHR$[n]:

n = 0, 1,

Function

Zero font selection.

Remarks

This code selects either a standard zero or a slashed zero. The standard zero is selected when n = 0; the slashed zero is selected when n = 1.

This code is effective only in the FX mode.

Example

```
10 'Zero Font Selection
20 LPRINT "Zeros in normal mode 0 0 0 0 0"
30 LPRINT CHR$[27];"z";CHR$[1];
40 LPRINT "Zeros in slashed mode 0 0 0 0 0"
50 LPRINT CHR$[27];"z";CHR$[0];
60 LPRINT "Back to normal mode 0 0 0 0 0"
```

```
Zeros in normal mode 0 0 0 0 0
Zeros in slashed mode Ø Ø Ø Ø Ø
Back to normal mode 0 0 0 0 0
```

FF [Form Feed]

Expression

CHR$[12];

Function

Advances paper to the next top of form.

Remarks

All the data stored in the print buffer is printed; then, the paper advances to next top of form.

This codes cancels the enlarged print mode set by the SO code.

Reference

ESC C

ESC z

Expression

CHR$[27];"z";CHR$[n];

(n = 0, 1, 48 or 49)

Function

Selects zero font.

Remarks

If n = 1 or 49, the following zeros are printed with slashes.

If n = 0 or 48, the following zeros are printed without slashes.

With zeros with slashes, it is easy to distinguish from capital letter "O".

Example

```
10 'Selects Zero font'.
20 LPRINT CHR$[27];"z";CHR$[1];
30 LPRINT "ZERO with slash ----- OOOO"
40 LPRINT CHR$[27];"z";CHR$[0];
50 LPRINT "ZERO without slash -- OOOO"
60 END
```

```
ZERO with slash ------ Ø0Ø0Ø
ZERO without slash -- OOOOO
```

ADDENDUM

In line with the modification of this printer, command on the back page is newly added.
Insert this sheet between 4-106 and 4-107 of the Manual.
In addition, correct the table on 2-6 as follows.

Controls and Indicators

Press ON LINE button:	Function	Reference
0 times	Resets all modes	-
1 time	Condensed mode	SI, DC2
2 times	Enlarged mode	SO, DC4
3 times	Elite mode	ESC M, ESC P
4 times	Emphasized mode	ESC E, ESC F
5 times	Italic mode	ESC 4, ESC 5
6 times	Double-strike mode	ESC G, ESC H
7 times	Underline mode	ESC -
8 times	Superscript mode	ESC S0, ESC T
9 times	Subscript mode	ESC S1, ESC T
10 times	1-inch skip-over perforation	ESC N, ESC O
11 times	Zero font select (slashed or not slashed)	ESC z
12 times	RAM protect mode	-
13 times	Prints status of print mode and page length settings	-

3. Press the FF button once to set the code.

   The alarm sounds twice.

4. Press the LF button to terminate mode selection.

   The ON LINE indicator stops blinking and the printer enters off-line mode. Press the ON LINE button to return ON LINE.

2-6

2. OPERATION

4. CONTROL CODES

HT [Horizontal Tab]

Expression

CHR$[9];

Function

Performs horizontal tabulation.

Remarks

Use the HT code to perform horizontal tab operations. The printer tabs to the predetermined horizontal tab unit set by the ESC D code.

When the printer power is turned on, a tab is automatically set every eight characters. If the ESC D code is not used to set new tab units, the HT code refers to the automatic tab settings.

Entering multiple HT codes causes the printer to tab to the tab unit multiplied by the number of HT codes.

Reference

ESC D

Example

```
10 'Horizontal Tab
20 LPRINT "01234567890123456789012345678 9"
30 FOR I = 1 TO 3
40 LPRINT CHR$[9];"TAB";
50 NEXT
```

```
01234567890123456789012345678 9
        TAB      TAB      TAB
```

NOTE:

If the print position set by this code exceeds the column end, the data is printed at the beginning of the next line.

LF [Line Feed]

Expression

CHR$[10];

Function

Advances the paper one line.

Remarks

All the data stored in the print buffer is printed; then, a line feed is performed. (If no data precedes the LF code or if the data is only spaces, only the line feed is performed.)

The amount of line spacing is determined by ESC O, ESC 1, ESC 2, ESC 3 or ESC A.

If the paper has reached the position where the skip-over perforation function has been set, the paper is fed to the top-of-form position of the next sheet.

This code cancels the enlarged print mode set by the SO code but not the mode set by ESC W 1.

Reference

SO, ESC 0, ESC 1, ESC 2, ESC 3, ESC A, ESC W

NUL

Expression

CHR$[0];

Function

Use this code with ESC B and ESC D as a list terminator. You can also use NUL with other printer control codes to select options (ESC S, for example).

Reference

ESC B, ESC D

Example

The following example shows the use of the NUL code with ESC B to cancel vertical tab stops.

```
10 LPRINT CHR$[27];"B";CHR[0];
```

SI [Shift In]

Expression

CHR$[15];

Function

Sets condensed print mode.

Remarks

If pica-sized characters are selected, all following data is printed as condensed characters (17 characters per inch). Use the DC2 code to cancel the SI code.

When the emphasized print mode is selected using the ESC E code, the SI code affects only the internal flag of the printer. The print mode does not change unless the emphasized print mode is cancelled using the ESC F code.

If you enter the SO code while the printer is in condensed print mode, condensed, enlarged characters are printed.

Reference

DC2, ESC M

Example 1

```
10 'Condensed Mode
20 LPRINT CHR$(15);"Condensed Mode"
30 LPRINT "Still in Condensed Mode"
```

```
Condensed Mode
Still in Condensed Mode
```

Example 2

```
10 'Condensed & Enlarged mode
20 LPRINT CHR$(15);"Condensed mode"
30 LPRINT CHR$(14);"Now in Condensed Enlarged mode"
40 LPRINT "Condensed mode"
```

```
Condensed mode
Now in Condensed enlarged mode
Condensed mode
```

NOTE:

A line feed does not cancel condensed print mode set by the SI code.

SO [Shift Out]

Expression

CHR$[14];

Function

Sets enlarged print mode.

Remarks

All data that follows this code on the same line is printed in enlarged characters. This code is cancelled by a line feed, DC4, or ESC W 0.

Reference

DC4, ESC W

Example

```
10 'Enlarged mode with auto-reset
20 LPRINT CHR$[14];"Enlarged print mode"
30 LPRINT "Pica-sized print mode"
```

```
Enlarged print mode
Pica-sized print mode
```

NOTE:

The only difference between the SO code and the ESC W code is that a line feed cancels the SO code.

VT [Vertical Tab]

Expression

CHR$[11];

Function

Performs vertical tabulation.

Remarks

Use the VT code to perform vertical tab operations. The printer executes line feeds until reaching the predetermined vertical tab unit set by the ESC B code.

If vertical tab units have not been set, the VT code acts as a line feed command.

Entering multiple VT codes causes the printer to tab to the tab unit multiplied by the number of VT codes.

If no vertical tab is encountered until the paper is advanced to the next top of form, the paper stops at the top-of-form position.

This code cancels the enlarged print mode set by the SO code.

Reference

ESC B

Example

```
10 'Vertical Tab
20 LPRINT CHR$(27);"B";
30 LPRINT CHR$(1);CHR$(3);CHR$(6);CHR$(10);CHR$(0);
40 FOR I = 1 TO 4
50 LPRINT CHR$(11);"TAB";
60 NEXT I
```

```
TAB          1st line
TAB          3rd line
TAB          6th line
TAB          10th line
```

Control Codes in Bit-Image Mode

Data is printed in dot units when the printer is in a bit image mode. The Model 115 printer is provided with eight 8-pin bit image modes and two 9-pin bit image modes.

The bit-image mode is set by any of the following control codes:

ESC *
ESC ^
ESC K
ESC L
ESC Y
ESC Z

These codes select either the 8-pin or 9-pin bit image mode and vary the bit-image density and print speed.

The expression used to set bit-image mode is:

<control code> CHR$(n1);CHR$(n2)

where: <control code> sets the desired bit image mode, density and speed.

n1 and n2 indicate the number of bit-image data bytes.

Once the bit-image mode is specified, all data is recognized as bit-image data until the specified number of data bytes is received (n1 and n2). The printer then automatically returns to text mode.

How to Obtain n1 and n2

The number of bit-image data bytes is sent in hexadecimal or decimal numbers n1 and n2. (The least significant bit is n1 and the most significant bit is n2.) N1 is the remainder of the number of data bytes divided by 256. N2 is the quotient of the number of data bytes divided by 256.

In normal-density bit-image mode, the maximum number of printable dot positions per line is 816. If the values of n1 and n2 are greater than 816 dot positions, they are ignored.

In the following examples, the number of data bytes is 300.

To obtain n2:

n2 = number of data bytes/256
n2 = 300/256
= (1)D
= <01>H

To obtain n1:

n1 = Remainder of n2
= (44)D
= <2C>H

(n1 is the remainder of 300 divided by 256 and n2 is the quotient of 300 divided by 256).

Combining Text Data and Bit-Image Data

You can combine text data and bit-image data on the same line. However, the amount of printable bit-image data decreases if you combine it with text data.

For each text character, decrease the number of bit-image data bytes according to the following chart.

If the enlarged print mode is set, the number of bit-image data bytes is decreased by twice the amount listed in the chart. For example, 799 bit-image data bytes are printable on a line if you use the ESC K code after 3 condensed and 1 pica-sized characters are printed (816-(3.5x3) + 6x1). (Fractions are rounded.)

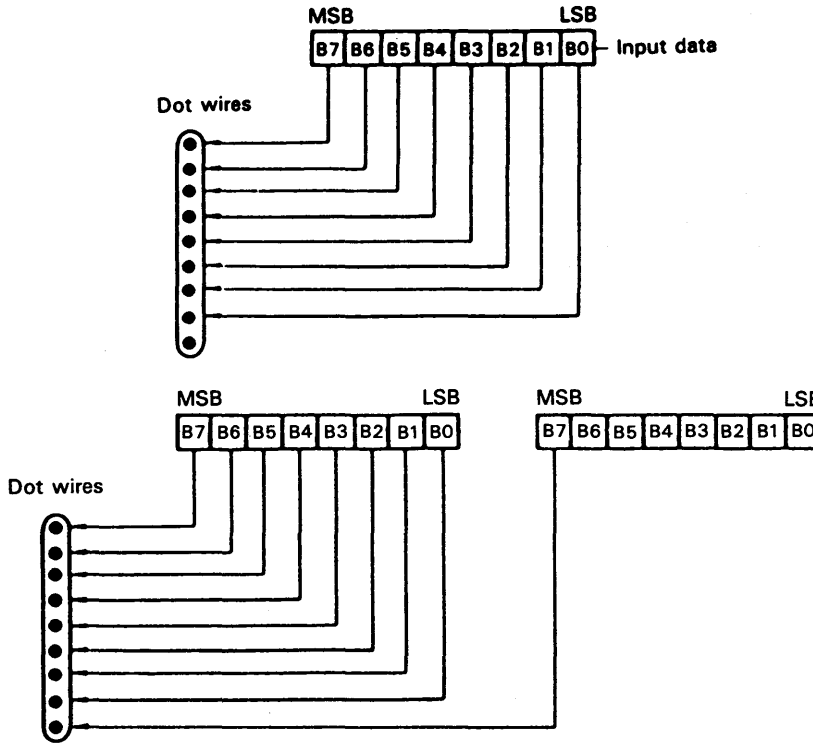
3 condensed characters	1 pica-sized character	ESC	K	Bit-image data
3.5 × 3	6 × 1			799 max.

NOTE:

If the amount of data sent for bit image printing exceeds the maximum dots per line shown above, excess data will be discarded.

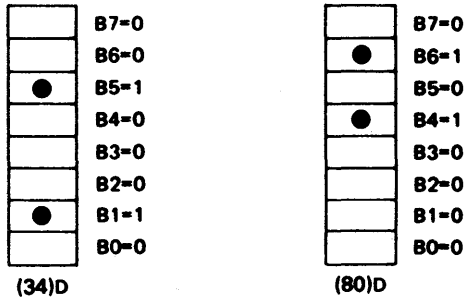
Relationship Between Bit-Image Data and Dot Wires

The following figures show the relationship between the bit-image data and the dot wires in the printhead. You can arbitrarily control the eight dot wires in the printhead. In the 8-pin bit-image mode, the 9th dot wire is not used.



MSB = Most significant bit LSB = Least significant bit

If a bit is 1, the printhead fires. If a bit is 0, the printhead does not fire. Here are two examples of bit-image data:



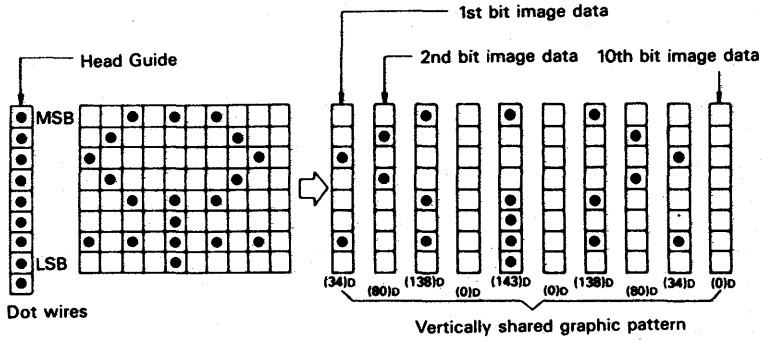
A box with ● denotes bit 1; a blank box denotes bit 0.

You can determine the decimal values of the binary bits by referring to Appendix E. For example, the first bit $(00100010)_2$ is defined as $(34)_D$ and the second bit $(01010000)_2$ is defined as $(80)_D$.

The following two program examples print graphic data.

Example 1

Graphic Pattern Formation



Program

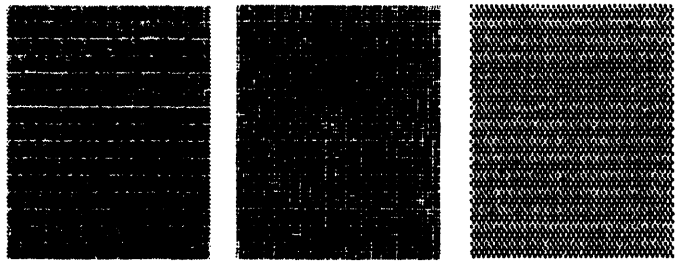
```
10 'Bit-Image Printing [Normal density]
20 LPRINT CHR$[27];"K";CHR$[10];CHR$[0];
30 FOR I=1 TO 10
40 READ R
50 LPRINT CHR$[R];
60 NEXT
70 LPRINT
80 DATA 34,80,138,0,143,0,138,80,34,0
90 END
```

Example 2

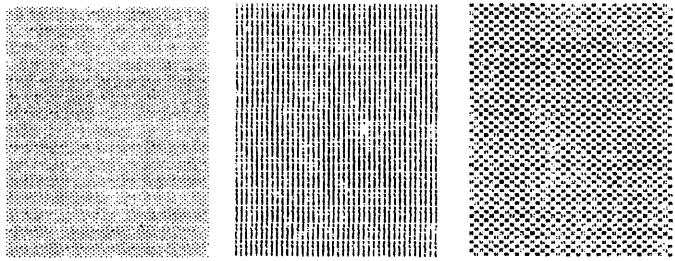
```
10 'Bit-Image Printing (Normal density)
20 LPRINT CHR$(27);"K";CHR$(12);CHR$(0);
30 FOR J = 1 TO 12
40 READ R
50 LPRINT CHR$(R);
60 NEXT J
70 LPRINT
80 DATA 4,10,26,58,103,231
90 DATA 231,103,58,26,10,4
100 END
```

The following examples of brightness and dot density show the differences between various dot patterns in bit-image mode.

Brightness

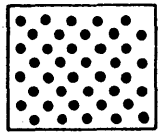


1 2 3

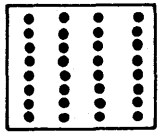


4 5 6

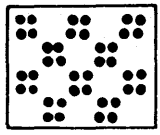
Dot Density

A: 

Data will be transmitted in order of $(170)_D$ and then $(85)_D$.
(8-dot line spacing)

B: 

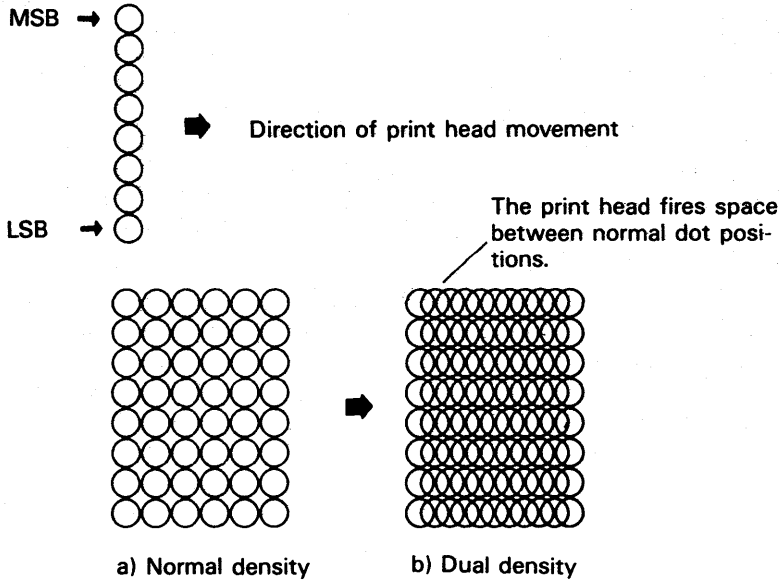
Data will be transmitted in order of $(255)_D$ and then $(0)_D$.
(8-dot line spacing)

C: 

Data will be transmitted in order of two $(204)_D$ and then $(51)_D$.
(8-dot line spacing)

Difference Between Normal-Density and Dual-Density

The normal-density, bit-image mode is accessed by using ESC K. The dual-density, bit-image mode is accessed by using ESC L.



ESC *

Expression

CHR$[27];"*";CHR$[m];CHR$[n1];CHR$[n2];

Function

This code selects the 8-pin bit-image mode.

The following chart describes the values for "m."

m	Mode	Dot density (dots/inch)	Maximum Position/ 8 in.	Head Speed (In./sec.)	Code With Same Function
0	Normal density	60	816	16	ESC K
1	Dual-density	120	1632	8	ESC L
2	Double-speed, dual-density	120	1632	16	ESC Y
3	Quadruple-density	240	3264	8	ESC Z
4	Screen graphics	80	1088	8	-
5	Plotter graphics	72	979	12	-
6	Screen graphics II	90	1224	8	-
7	Plotter graphics, dual-density	144	1958	6	-

Remarks

n1 and n2 — represent the number of bit-image data bytes. (Refer to "How to Obtain n1 and n2.")

Data following ESC * is printed in the bit-image mode selected by m. If the value specified for m is not in the range 0 to 7, the number of data specified is ignored.

If m is 2 or 3, horizontally adjacent dots are not printed. To print screen data, m = 4 is optimal.

The following example,

```
10 LPRINT CHR$[27];"*";CHR$[0];CHR$[0];CHR$[1];
20 FOR I = 1 TO 256: LPRINT "x";: NEXT
30 LPRINT "END"
```

is the same as:

```
10 LPRINT CHR$[27];"K";CHR$[0];CHR$[1];
20 FOR I = 1 TO 256: LPRINT "x";: NEXT
30 LPRINT "END"
```

Reference

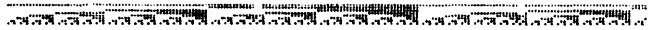
ESC K, ESC L, ESC Y, ESC Z

Example 1

```
10 'Bit-Image Mode Selection
20 FOR I = 0 TO 6
30 IF I = 5 GOTO 110
40 LPRINT CHR$(27);"*";CHR$(1);CHR$(12);CHR$(0);
50 FOR J = 1 TO 12
60 READ R
70 LPRINT CHR$(R);
80 NEXT J
90 DATA 1,3,7,15,31,63,63,31,15,7,3,1
100 RESTORE
110 NEXT I
120 END
```

Example 2

```
10 'Bit-Image print
20 '480 dots/8" (Normal Density)
30 D = 200
40 LPRINT CHR$(27);"*";CHR$(0);
50 LPRINT CHR$(D MOD 256);CHR$(INT (D/256));
60 FOR I = 1 TO D
70 LPRINT CHR$(I MOD 128 + 128);
80 NEXT
90 END
```



ESC ? [FX Mode Only]

Expression

CHR$[27];"?";"n";CHR$[m];

(n = K, L, Y or Z)

(0 ⩽ m ⩽ 7)

Function

This code changes the functions of the bit-image mode setting sequences (ESC K, ESC L, ESC Y and ESC Z).

Remarks

The printer has 8 different 8-pin bit-image modes as indicated in the description of ESC *. The function of each bit-image mode setting sequence is set when the power is turned on. However, the user can change the function of each sequence with ESC ?.

The value of m represents the mode to be set by the sequence corresponding to the value of n. (See ESC *).

For example, ESC ? K 5 changes the function of ESC K so that it sets the 8-pin plotter graphics mode even though the default function of ESC K is to set the 8-pin normal density bit-image mode.

Reference

ESC *, ESC K, ESC L, ESC Y, ESC Z

ESC ^ [FX Mode Only]

Expression

CHR$[27];"^";CHR$[a];CHR$[n1];CHR$[n2];

(a = 0 or 1)

Function

Selects 9-pin bit-image mode.

Remarks

This sequence selects one of the 9-pin bit image modes. The specified number of bytes following this sequence is printed in the selected bit-image mode.

"a" specifies the mode as follows:

a	Mode
0	Normal density
1	Dual density

n1 and n2 specify the number of bytes following this sequence which are to be printed in the bit-image mode.

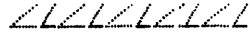
The format of data following this sequence should be as follows:

CHR$[m11];CHR$[m12];CHR$[m21];CHR$[m22];. . .;CHR$[mk1];
CHR$[mk2]

Here mk1 is used to fire the upper 8 wires of the printhead and mk2 is used to fire the lowest wire of the printhead (only the most significant bit is valid).

Example

```
10 '9-pin Bit Image print
20 FOR A=1 TO 5
30 FOR M=0 TO 1
40 LPRINT CHR$[27];"^";CHR$[M];CHR$[10];CHR$[0];
50 LPRINT CHR$[0];CHR$[128];CHR$[1];CHR$[128];
60 LPRINT CHR$[2];CHR$[128];CHR$[4];CHR$[128];
70 LPRINT CHR$[8];CHR$[128];CHR$[16];CHR$[128];
80 LPRINT CHR$[32];CHR$[128];CHR$[64];CHR$[128];
   CHR$[128];
90 LPRINT CHR$[128];CHR$[0];CHR$[0];
100 NEXT M
110 NEXT A
```



ESC K

Expression

CHR$[27];"K";CHR$[n1];CHR$[n2];

Function

Sets 8-pin normal-density bit-image mode. (The maximum number of bit-image data bytes per line is 480.)

Remarks

n1 and n2	represent the number of bit-image data bytes. (Refer to "How to Obtain n1 and n2.")

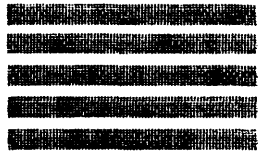
Data following the ESC K code is printed as normal- density, bit-image data.

Reference

ESC L, ESC Y, ESC Z, ESC *

Example

```
10 'Normal-Density Bit-Image Mode
20 FOR I = 1 TO 5
30 LPRINT CHR$(27);"K";CHR$(80);CHR$(0);
40 FOR N = 1 TO 80
50 LPRINT CHR$(255);
60 NEXT N
70 LPRINT
80 NEXT I
90 END
```



ESC L

Expression

CHR$[27];"L";CHR$[n1];CHR$[n2];

Function

Sets 8-pin dual-density bit-image mode. (The maximum number of bit-image data bytes per line is 1632.)

Remarks

n1 and n2	represent the number of bit-image data bytes. (Refer to "How to Obtain n1 and n2.")

Data following ESC L is printed as dual-density bit-image data.

The transfer sequence of bit-image data is the same as with ESC K (normal-density, bit-image printing), but the bit- image data is printed in 1632 dot positions per line, producing denser graphic data.

The print speed decreases from the normal 16 inches per second (ips) to 8 ips.

You can combine normal-density, bit-image data with dual-density, bit-image data on a line with characters in text mode. If characters in text mode and dual-density bit-image mode are mixed, the amount of printable bit-image data decreases twice the amount of normal-density bit-image data. (Refer to "Combining Text Data and Bit-Image Data.")

Reference

ESC K, ESC Y, ESC Z, ESC *

Example 1

```
10 'Dual-Density Bit-Image Mode
20 FOR I=1 TO 5
30 LPRINT CHR$(27);"L";CHR$(80);CHR$(0);
40 FOR N=1 TO 80
50 LPRINT CHR$(255);
60 NEXT N
70 LPRINT
80 NEXT I
90 END
```

Example 2

```
10 'Dual-Density Bit-Image Mode
20 LPRINT CHR$(27);"L";CHR$(10);CHR$(0);
30 FOR J=1 TO 10
40 READ R
50 LPRINT CHR$(R);
60 NEXT J
70 DATA 34,80,138,0,143,0,138,80,34,0
80 END
```

ESC Y

Expression

CHR$[27];"Y";CHR$[n1];CHR$[n2];

Function

Sets 8-pin double-speed, dual-density, bit-image mode. (The maximum number of bit-image data bytes per line is 1632.)

Remarks

n1 and n2	represent the number of bit-image data bytes. (Refer to "How to Obtain n1 and n2.")

Data following ESC Y is printed as dual-density, bit-image data at 16 inches per second (ips).

If ESC L is used, the print speed decreases from the normal 16 ips to 8 ips. However, if ESC Y is used, print speed remains normal. Horizontally adjacent dots cannot be printed.

Reference

ESC K, ESC L, ESC Z, ESC *

ESC Z

Expression

CHR$[27];"Z";CHR$[n1];CHR$[n2];

Function

Sets 8-pin quadruple-density, bit-image mode. (The number of bit-image data bytes per line is 3264.)

Remarks

n1 and n2 represent the number of bit-image data bytes. (Refer to "How to Obtain n1 and n2.")

Data following ESC Z is printed as quadruple-density bit-image data.

The print speed is 8 inches per second (ips), the same as that for dual-density, bit-image mode (ESC L). Horizontally adjacent dots cannot be printed.

Reference

ESC K, ESC L, ESC Y, ESC *

Example

```
10 'Quadruple-Density Bit-Image Mode
20 FOR I = 1 TO 5
30 LPRINT CHR$(27);"Z";CHR$(80);CHR$(0);
40 FOR N = 1 TO 80
50 LPRINT CHR$(255);
60 NEXT
70 LPRINT
80 NEXT
90 END
```

Appendixes

Appendix A. Specifications

1. Print Method: Impact dot matrix

2. Print Speed:

	(cps)
Pica	160
Condensed	137
Elite	96
Emphasized	80
NLQ	32

3. Print Direction: Bidirectional in the text mode. Undirectional in the bit image mode or when programmed.

4. Number of Pins in Head: 9

5. Line Spacing: 1/6" or programmable

6. Printing Characteristics
   Matrix: 9x9
   Character set: FX Mode: 96 ASCII characters, 32 international characters (for 11 countries), and 96 italic characters

   IBM Mode: 96 ASCII characters, 32 international characters, 57 graphic characters, 37 symbols, no italic characters.

Specifications

7. Character Size

Character pitch	Width (mm)	Height (mm)	Character space (mm)
Pica	2.1	3.1	2.54
Elite	1.4	3.1	2.11
Condensed	1.05	3.1	1.48
Elite condensed	1.05	3.1	1.27
Superscript/Subscript	Depends on pitch	1.6	Depends on pitch

*The width in the enlarged mode is twice that indicated above.

8. Column Width

Character pitch	Col. width	Col. inch
Pica	136	10
Elite	163	12
Condensed	233	17
Elite condensed	272	20

*The column width in the enlarged mode is half that indicated above.

9. Media Handling

	Paper width
Fanfold Paper:	101.6 mm (4") to 406.4 mm (16") paper can be used with the tractor unit
Cut Sheet:	184.2 mm (7.25") to 365.8 mm (14.4") cut sheet paper can be used with the friction feed mechanism.
Copies:	One original plus two carbon copies. Total thickness not to exceed 0.3 mm (0.012")

10. Interface:	Centronics style (8-bit parallel)
11. Ink Ribbon	
Color:	Black
Type:	Cartridge
Life expectancy:	3 million characters
12. Environmental Conditions	
Operating temperature:	5° to 35° C (41° to 95° F)
Operating humidity:	10% to 80% (No condensation)
13. Power Requirements	
Voltage:	100 VAC ± 10% 120 VAC ± 10% 220 VAC ± 10% 240 VAC ± 10%
Frequency:	49.5 to 60.5 Hz
Power consumption:	70 VA max.

Specifications

14. Physical Characteristics

Height:	123 mm
Width:	602 mm
Depth:	363 mm (with tractor unit)
Weight:	5.1 kg

NOTE:

Specifications are subject to change without notice.

Appendix B. Parallel Interface

The Model 115 includes a parallel interface, which is described below.

Specifications

1. Synchronization:	By externally supplied $\overline{\text{STROBE}}$ pulses.
2. Handshaking:	By $\overline{\text{ACKNLG}}$ or BUSY signals.
3. Logic level:	Input data and all interface control signals are compatible with the TTL level.

Connector

Plug: 57-30360 (AMPHENOL)

Interface cables should be as short as possible.

Connector Pin Numbers and Descriptions of Signals

In the following table, direction refers to the direction of signal flow from the printer. Return means TWISTED PAIR RETURN and is to be connected at signal ground level. To wire the interface, use a twisted-pair cable for each signal and complete connection on the return side. To prevent noise, shield these cables and connect them to the chassis of the host computer and the printer, respectively.

Interface conditions are based on TTL level. The rise and fall times of each signal must be less than 0.2 μ.s.

Transfer data to the printer only after confirming the $\overline{\text{ACKNLG}}$ signal or when the level of the BUSY signal is LOW.

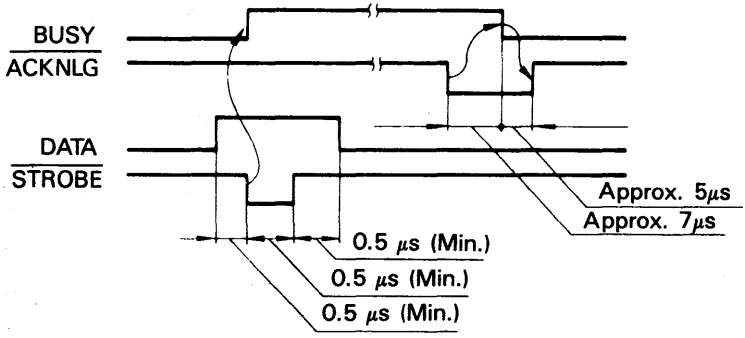
Under normal conditions, printer cable pins 11, 12 and 32 are activated when out-of-paper is detected. ESC 8 code disables pins 11 and 32 from the PE (paper-end) signal, but does not disable pin 12.

Signal Pin No.	Return Pin No.	Signal	Direction	Description
1	19	$\overline{\text{STROBE}}$	In	STROBE pulse to read data in. Pulse width must be more than 0.5 μs at receiving terminal.
2	20	DATA 1	In	These signals represent information of the 1st to 8th bits of parallel data respectively. Each signal is at "HIGH" level when data is logical "1" and "LOW" when logical "0."
3	21	DATA 2	In	
4	22	DATA 3	In	
5	23	DATA 4	In	
6	24	DATA 5	In	
7	25	DATA 6	In	
8	26	DATA 7	In	
9	27	DATA 8	In	
10	28	$\overline{\text{ACKNLG}}$	Out	Approx. 12 μs pulse. "LOW" indicates that data has been received and that the printer is ready to accept other data.
11	29	BUSY	Out	A "HIGH" signal indicates that the printer cannot receive data. The signal becomes "HIGH" in the following cases: 1. During data entry 2. During printing operation 3. In OFF-LINE state 4. During printer error status.
12	30	PE	Out	A "HIGH" signal indicates that the printer is out of paper.
13	-	-	-	Pulled up to + 5V through 3.3 KΩ resistantance.

Signal Pin No.	Return Pin No.	Signal	Direction	Description
14	-	$\overline{\text{AUTO}}$	In	With this signal being at "LOW" level, the paper is automatically fed one line after printing. (The signal level can be fixed to "LOW" with switch pin SW2-4 provided on the control circuit board.)
15	-	NC	-	Not used.
16	-	OV	-	Logic GND level.
17	-	CHASSIS GND	-	Printer chassis GND. In the printer, the chassis GND and the logic GND are isolated from each other.
18	-	NC	-	Not used.
19 to 30	-	GND	-	TWISTED-PAIR RETURN signal GND level.
31	-	$\overline{\text{INIT}}$	In	When the level of this signal becomes "LOW" the printer controller is reset to its initial state and the print buffer is cleared. This signal is normally at "HIGH" level, and its pulse width must be more than 50 μ.s at the receiving terminal.
32	-	$\overline{\text{ERROR}}$	Out	The level of this signal becomes "LOW" when the printer is in: 1. PAPER-END state 2. OFF-LINE state 3. Error state.
33	-	GND	-	Same as with pins 19 to 30.
34	-	NC	-	Not used.
35	-	-	-	Pulled up to +5V through 3.3 KΩ Resistance.
36	-	$\overline{\text{SLCT IN}}$	In	The DC1/DC3 code is only valid when this signal is "HIGH" level. Internal fixing can be carried out with switch pin SW2-1.

Parallel Interface Timing

The following diagram shows the parallel interface timing.



Appendix C. Mixed Use of Printing Modes

In the following table, O indicates that mixed print mode is available. The x indicates that pitch takes priority and mixed print mode is not available.

These conditions apply: emphasized mode takes priority over condensed mode and in superscript/subscript mode, the printer double-strikes characters. Also, in the proportional mode, characters are always emphasized and the proportional mode takes priority over superscript/subscript mode.

Mode	Pica-sized Pitch	Elite-sized Pitch	NLQ Mode
Enlarged	O	O	O
Emphasized	O	X	O
Super/Subscript	O	O	O
Condensed	O	O	X
Double strike	O	O	X
Underline	O	O	O
Italic	O	O	X
Unidirectional	O	O	O
Proportional	O	X	X

Appendix D. Control Codes Summary

Control Codes Summary

Control Codes Summary

Code	Function	Page
Bit-Image (cont.)		
ESC Y	Set 8-pin double-speed, dual-density bit-image mode	4-136
ESC Z	Set 8-pin quadruple-density bit-image mode	4-137
ESC *	Select 8-pin bit-image mode	4-126
ESC ?	Change bit-image mode sequence function	4-129
ESC ^	Select 9-pin bit-image mode	4-130
Input Data Control		
CAN	Cancel	4-12
DEL	Delete	4-18
DC1	Select printer	4-14
DC3	Deselect printer	4-16
ESC >	Set MSB	4-19
ESC =	Reset MSB	4-20
ESC #	Cancel MSB control	4-21
ESC $	Set absolute dot position	4-23
ESC \	Set relative dot position	4-24
Miscellaneous		
BEL	Bell	4-9
BS	Backspace	4-10
ESC @	Initialize printer	4-28
ESC 8	Disable paper-end detection	4-60
ESC 9	Enable paper-end detection	4-61
ESC <	Home printer head	4-26
ESC U	Select print direction	4-91
ESC s	Set/cancel half speed printing	4-103
ESC EM	Select sheet feeder mode	4-69
NUL	List terminator	4-110
ESC z	Set/cancel slashed zero	4-105A

Appendix E. IBM Mode Character Sets

Character Set 1 (Normal)

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	á 160	⁞ 176	└ 192	┴ 208	α 224	≡ 240
1	0001	1	17	! 33	1 49	A 65	Q 81	a 97	q 113	129	145	í 161	▒ 177	┴ 193	┬ 209	ß 225	± 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	ó 162	■ 178	┬ 194	┬ 210	Γ 226	≥ 242
3	0011	3	19	# 35	3 51	C 67	S 83	c 99	s 115	131	147	ú 163	│ 179	├ 195	└ 211	π 227	≤ 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	ñ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	Ñ 165	┤ 181	┼ 197	┌ 213	σ 229	⌡ 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	ª 166	┤ 182	├ 198	┌ 214	μ 230	÷ 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	º 167	┐ 183	├ 199	┼ 215	τ 231	≈ 247
8	1000	8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	136	CAN 152	¿ 168	┐ 184	└ 200	┼ 216	Φ 232	° 248
9	1001	HT 9	25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	153	⌐ 169	┤ 185	┌ 201	┘ 217	Θ 233	• 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	¬ 170	│ 186	┴ 202	┌ 218	Ω 234	· 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	½ 171	┐ 187	┬ 203	▉ 219	δ 235	√ 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124	FF 140	156	¼ 172	┘ 188	├ 204	▬ 220	∞ 236	n 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	157	¡ 173	┘ 189	─ 205	▌ 221	Ø 237	² 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	« 174	┘ 190	┼ 206	▐ 222	∈ 238	■ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	127	SI 143	159	» 175	┐ 191	┴ 207	■ 223	∩ 239	SP 255

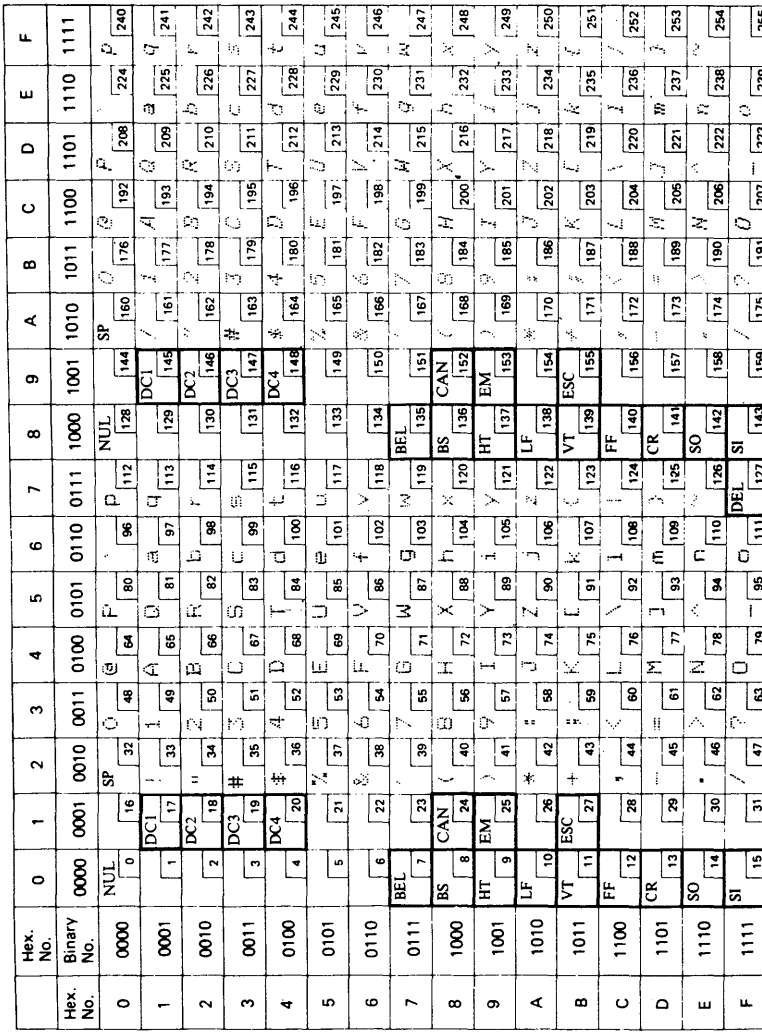
IBM Mode Character Sets

Character Set 2 (World Trade Set)

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	⁞ 176	└ 192	⊥ 208	α 224	≡ 240
1	0001	1	17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▒ 177	⊥ 193	┬ 209	ß 225	± 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▓ 178	┬ 194	┬ 210	Γ 226	≥ 242
3	0011	♥ 3	19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	└ 211	π 227	≤ 243
4	0100	♦ 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	└ 212	Σ 228	⌠ 244
5	0101	♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	┌ 213	σ 229	⌡ 245
6	0110	♠ 6	22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	├ 198	┌ 214	µ 230	÷ 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	├ 199	┼ 215	τ 231	≈ 247
8	1000	8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╖ 184	└ 200	┼ 216	Φ 232	° 248
9	1001	HT 9	25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╡ 185	┌ 201	┘ 217	Θ 233	· 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	│ 186	┴ 202	┌ 218	Ω 234	· 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╖ 187	┬ 203	▉ 219	δ 235	√ 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124	î 140	£ 156	¼ 172	┘ 188	├ 204	■ 220	∞ 236	n 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	┘ 189	─ 205	▌ 221	Ø 237	² 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	┘ 190	┼ 206	▌ 222	€ 238	■ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	127	Å 143	ƒ 159	» 175	╖ 191	┴ 207	■ 223	∩ 239	SP 255

Appendix F. FX Mode Character Sets

1. U.S.A. (Normal Set)



	Hex. No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	SP 160	° 176	À 192	Ð 208	à 224	ð 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	| 124	FF 140	156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	157	173	½ 189	Í 205	Ý 221	í 237	ý 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

2. France

	Hex. No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	à 64	P 80	` 96	p 112	NUL 128	144	SP 160	° 176	À 192	Þ 208	` 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	± 177	Á 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	² 178	Â 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	³ 179	Ã 195	S 211	c 227	s 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	¤ 164	´ 180	Ä 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	µ 181	Å 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¦ 166	¶ 182	Æ 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	§ 167	· 183	Ç 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	¨ 168	¸ 184	È 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	¹ 185	É 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	ª 170	º 186	Ê 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	é 123	VT 139	ESC 155	« 171	» 187	Ë 203	[219	k 235	é 251
C	1100	FF 12	28	, 44	< 60	L 76	Ç 92	l 108	ù 124	FF 140	156	¬ 172	¼ 188	Ì 204	Ç 220	l 236	ù 252
D	1101	CR 13	29	- 45	= 61	M 77	§ 93	m 109	è 125	CR 141	157	173	½ 189	Í 205	§ 221	m 237	è 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	¨ 126	SO 142	158	® 174	¾ 190	Î 206	^ 222	n 238	¨ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	¯ 175	¿ 191	Ï 207	_ 223	o 239	255

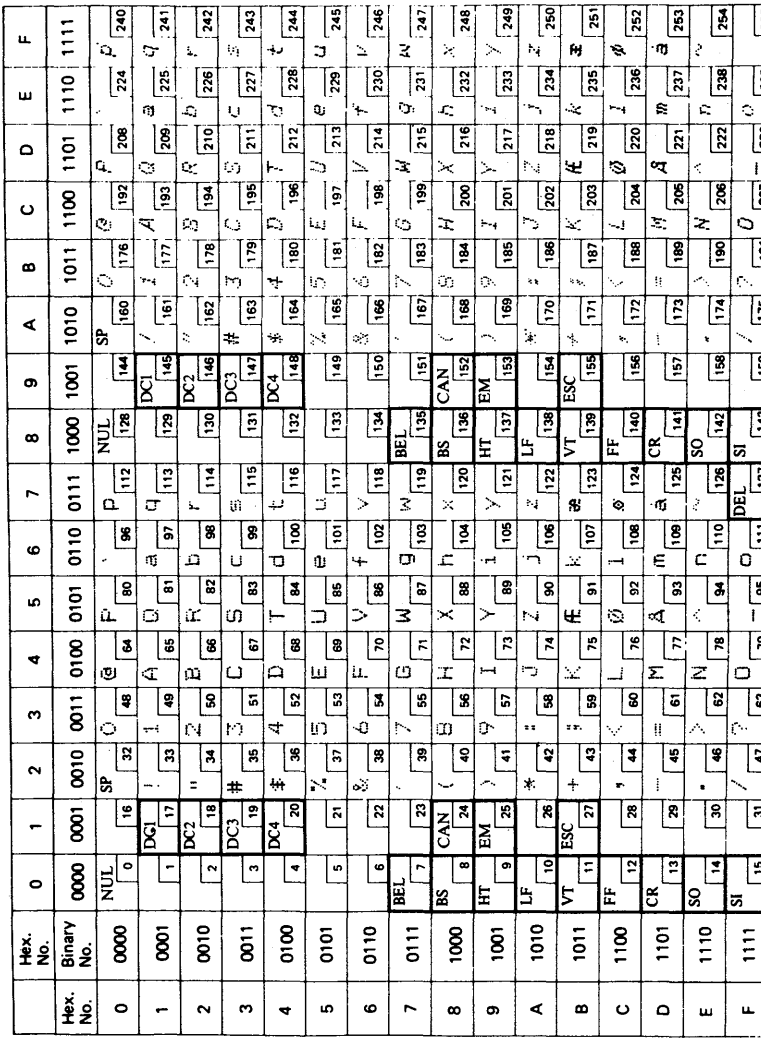
3. Germany

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	§ 64	P 80	` 96	p 112	NUL 128	144	SP 160	0 176	§ 192	P 208	224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	1 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	¤ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¦ 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	§ 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	¨ 168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	ª 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123	VT 139	ESC 155	« 171	; 187	K 203	Ä 219	k 235	ä 251
C	1100	FF 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124	FF 140	156	¬ 172	< 188	L 204	Ö 220	l 236	ö 252
D	1101	CR 13	29	- 45	= 61	M 77	Ü 93	m 109	ü 125	CR 141	157	- 173	= 189	M 205	Ü 221	m 237	ü 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	ß 126	SO 142	158	® 174	> 190	N 206	^ 222	n 238	ß 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	¯ 175	? 191	O 207	_ 223	o 239	255

4. United Kingdom

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	SP 160	0 176	@ 192	P 208	` 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	1 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	" 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	£ 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	% 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	& 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	(168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	| 124	FF 140	156	, 172	< 188	L 204	\ 220	l 236	/ 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	157	- 173	= 189	M 205	] 221	m 237	} 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	/ 175	? 191	O 207	_ 223	o 239	255

5. Denmark



6. Sweden

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	É 64	P 80	é 96	p 112	NUL 128	144	SP 160	176	É 192	P 208	é 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC1 147	£ 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	¤ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	§ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	• 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¶ 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	ß 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	© 168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	™ 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	´ 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123	VT 139	ESC 155	¨ 171	; 187	K 203	Ä 219	k 235	ä 251
C	1100	FF 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124	FF 140	156	≠ 172	< 188	L 204	Ö 220	l 236	ö 252
D	1101	CR 13	29	- 45	= 61	M 77	Å 93	m 109	å 125	CR 141	157	Æ 173	= 189	M 205	Å 221	m 237	å 253
E	1110	SO 14	30	. 46	> 62	N 78	Ü 94	n 110	ü 126	SO 142	158	Ø 174	> 190	N 206	Ü 222	n 238	ü 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	ø 175	? 191	O 207	_ 223	o 239	255

7. Italy

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	· 16	SP 32	0 48	@ 64	P 80	ù 96	p 112	NUL 128	144	SP 160	° 176	À 192	Ð 208	ù 224	ð 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	° 91	k 107	à 123	VT 139	ESC 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	ò 124	FF 140	156	¬ 172	¼ 188	Ì 204	\ 220	ì 236	ü 252
D	1101	CR 13	29	- 45	= 61	M 77	é 93	m 109	è 125	CR 141	157	- 173	½ 189	Í 205	é 221	í 237	è 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	ì 126	SO 142	158	® 174	¾ 190	Î 206	^ 222	î 238	ì 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	¯ 175	¿ 191	Ï 207	_ 223	ï 239	255

8. Spain

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	SP 160	0 176	@ 192	P 208	` 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	1 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	£ 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	§ 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	(168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	¨ 123	VT 139	ESC 155	+ 171	; 187	K 203	[219	k 235	¨ 251
C	1100	FF 12	28	, 44	< 60	L 76	Ñ 92	l 108	ñ 124	FF 140	156	, 172	< 188	L 204	Ñ 220	l 236	ñ 252
D	1101	CR 13	29	- 45	= 61	M 77	¿ 93	m 109	} 125	CR 141	157	- 173	= 189	M 205	¿ 221	m 237	} 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	/ 175	? 191	O 207	_ 223	o 239	255

9. Japan

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	SP 160	0 176	@ 192	P 208	` 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	" 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	# 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	% 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	& 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	(168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	1100	FF 12	28	, 44	< 60	L 76	¥ 92	l 108	| 124	FF 140	156	, 172	< 188	L 204	¥ 220	l 236	/ 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	157	- 173	= 189	M 205	] 221	m 237	} 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	/ 175	? 191	O 207	_ 223	o 239	255

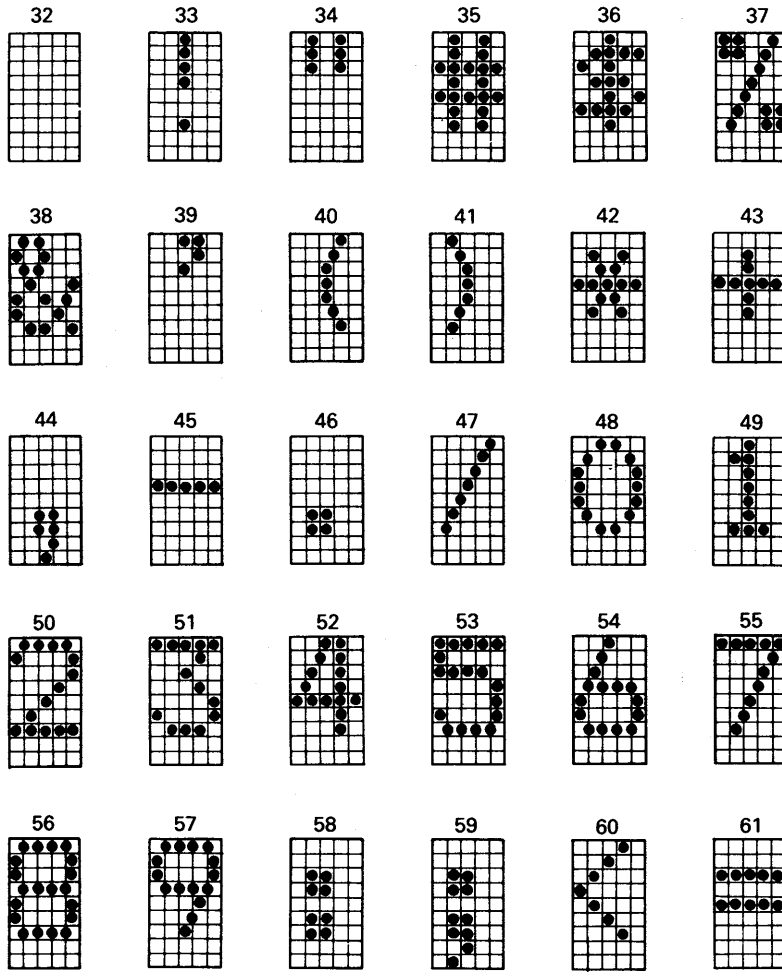
10. Norway

Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	É 64	P 80	é 96	p 112	NUL 128	144	SP 160	0 176	É 192	P 208	é 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	1 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	2 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	3 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	¤ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	§ 164	4 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	• 165	5 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¶ 166	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	ß 167	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	® 168	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	™ 170	: 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	Æ 91	k 107	æ 123	VT 139	ESC 155	´ 171	; 187	K 203	Æ 219	k 235	æ 251
C	1100	FF 12	28	, 44	< 60	L 76	Ø 92	l 108	ø 124	FF 140	156	¨ 172	< 188	L 204	Ø 220	l 236	ø 252
D	1101	CR 13	29	- 45	= 61	M 77	Å 93	m 109	å 125	CR 141	157	≠ 173	= 189	M 205	Å 221	m 237	å 253
E	1110	SO 14	30	. 46	> 62	N 78	Ü 94	n 110	ü 126	SO 142	158	Æ 174	> 190	N 206	Ü 222	n 238	ü 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	Ø 175	? 191	O 207	_ 223	o 239	255

11. Denmark II

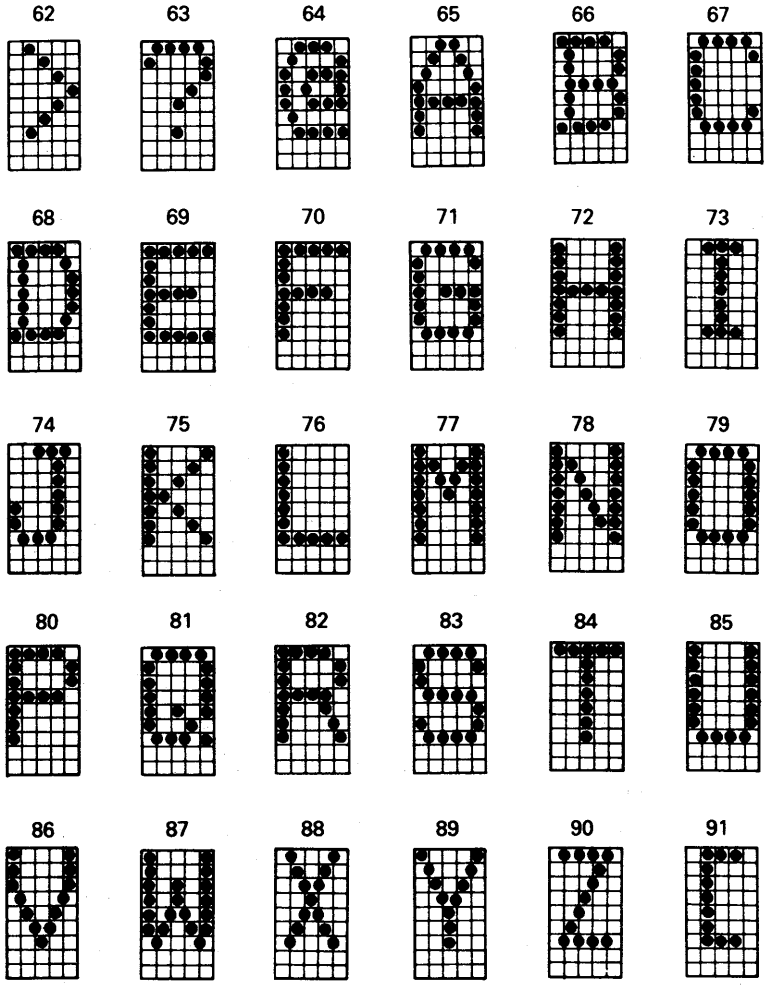
Hex. No.	Binary No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SP 32	0 48	É 64	P 80	é 96	p 112	NUL 128	144	SP 160	176	É 192	P 208	é 224	p 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	± 177	A 193	Q 209	a 225	q 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	² 178	B 194	R 210	b 226	r 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	³ 179	C 195	S 211	c 227	s 243
4	0100	4	DC4 20	¤ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	¤ 164	´ 180	D 196	T 212	d 228	t 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	¥ 165	µ 181	E 197	U 213	e 229	u 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¦ 166	¶ 182	F 198	V 214	f 230	v 246
7	0111	BEL 7	23	' 39	7 55	G 71	W 87	g 103	w 119	BEL 135	151	§ 167	· 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	¨ 168	¸ 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	¹ 185	I 201	Y 217	i 233	y 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	ª 170	º 186	J 202	Z 218	j 234	z 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	Æ 91	k 107	æ 123	VT 139	ESC 155	« 171	» 187	K 203	Æ 219	k 235	æ 251
C	1100	FF 12	28	, 44	< 60	L 76	Ø 92	l 108	ø 124	FF 140	156	¬ 172	¼ 188	L 204	Ø 220	l 236	ø 252
D	1101	CR 13	29	- 45	= 61	M 77	Å 93	m 109	å 125	CR 141	157	173	½ 189	M 205	Å 221	m 237	å 253
E	1110	SO 14	30	. 46	> 62	N 78	Ü 94	n 110	ü 126	SO 142	158	® 174	¾ 190	N 206	Ü 222	n 238	ü 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	¯ 175	¿ 191	O 207	_ 223	o 239	255

Appendix G. IBM Mode Character Fonts

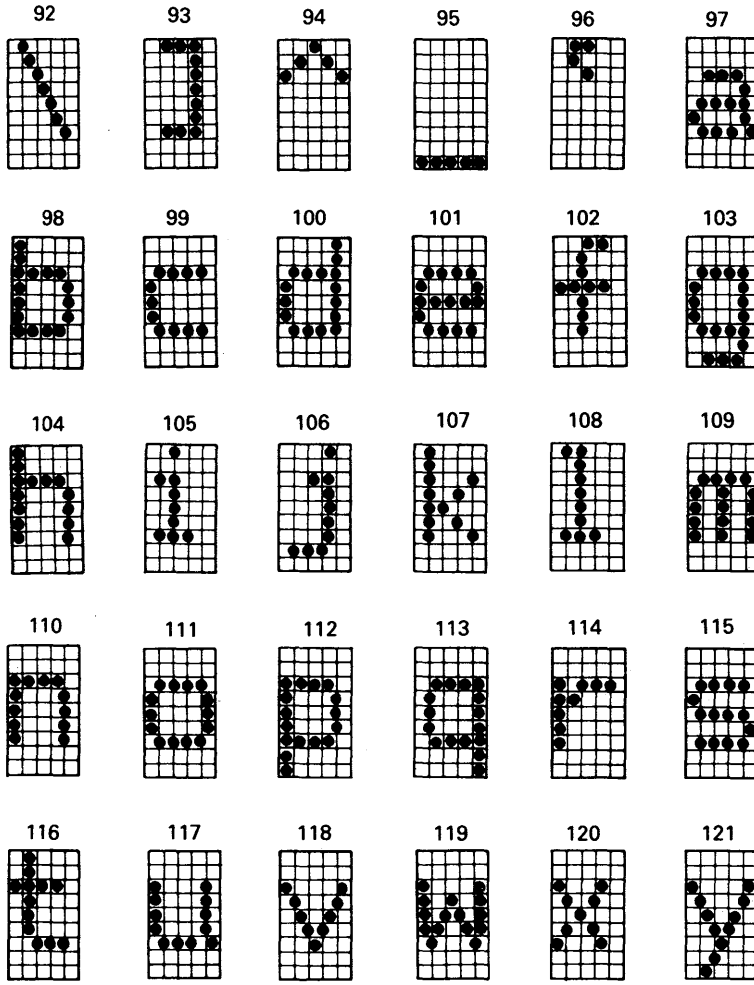


NOTE: Numbers represent Decimal code.

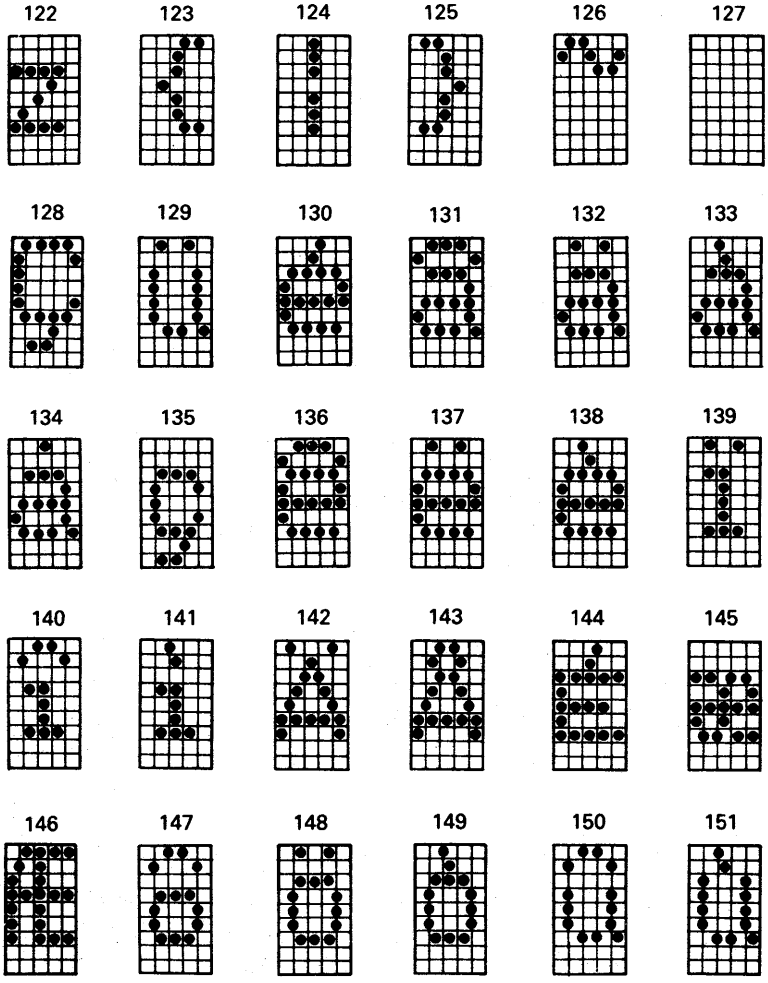
IBM Mode Character Fonts

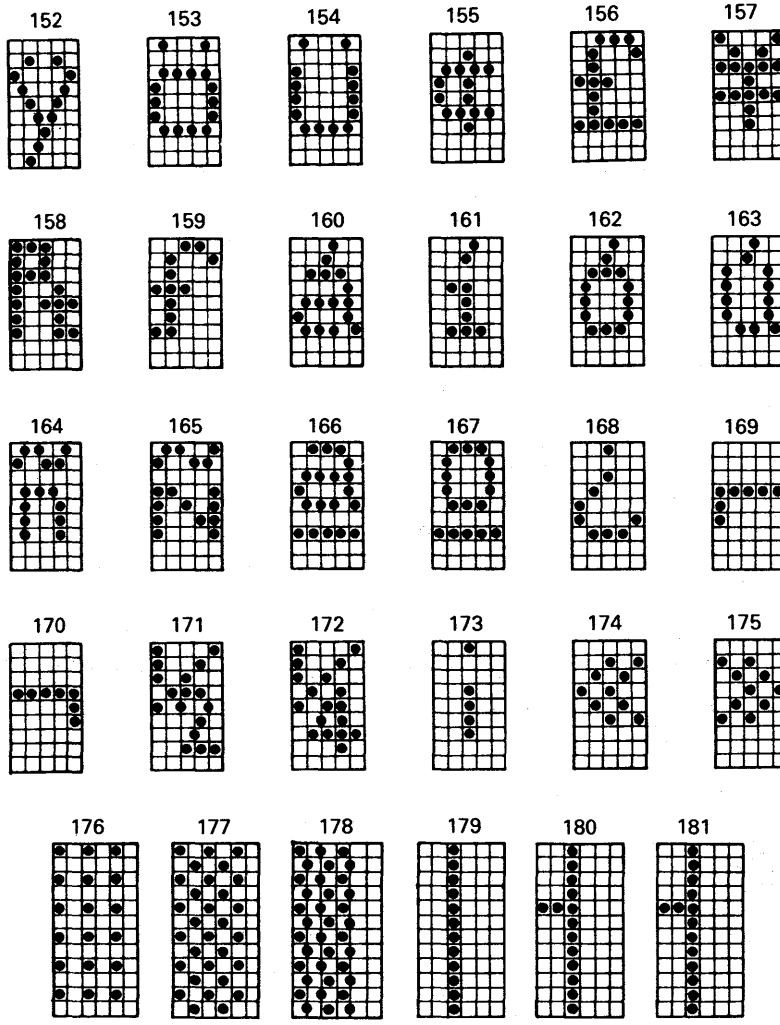


Appendix G. IBM Mode Character Fonts



IBM Mode Character Fonts

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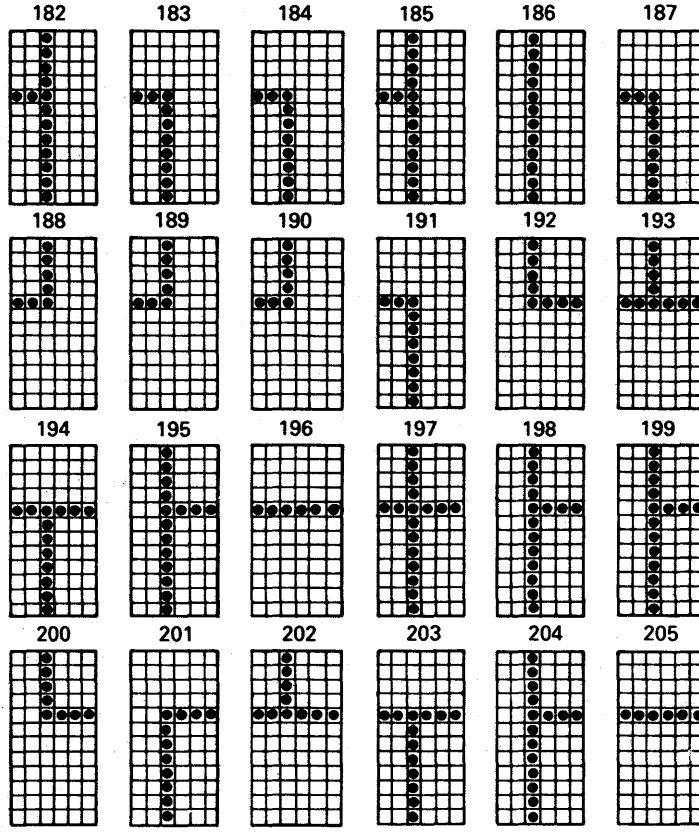
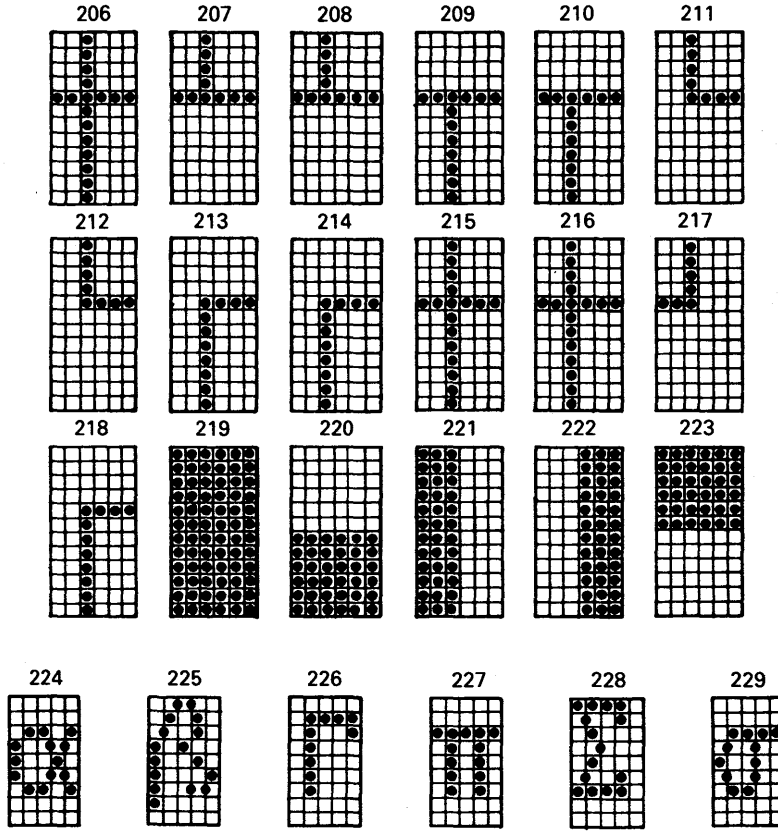
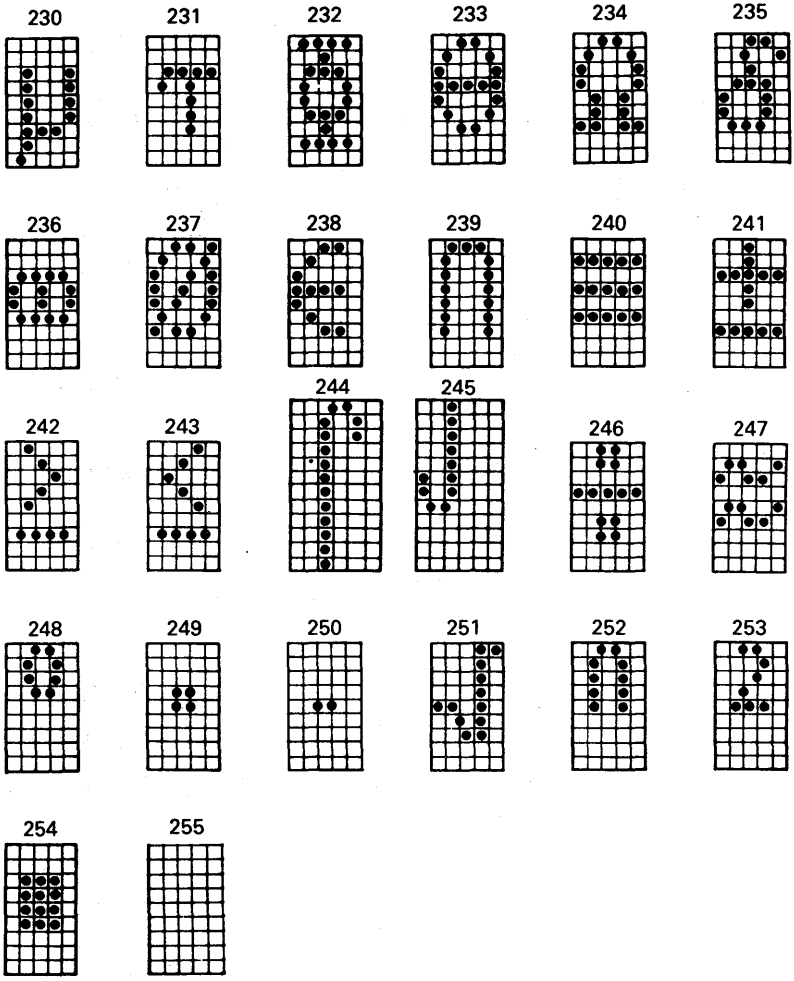
IBM Mode Character Fonts



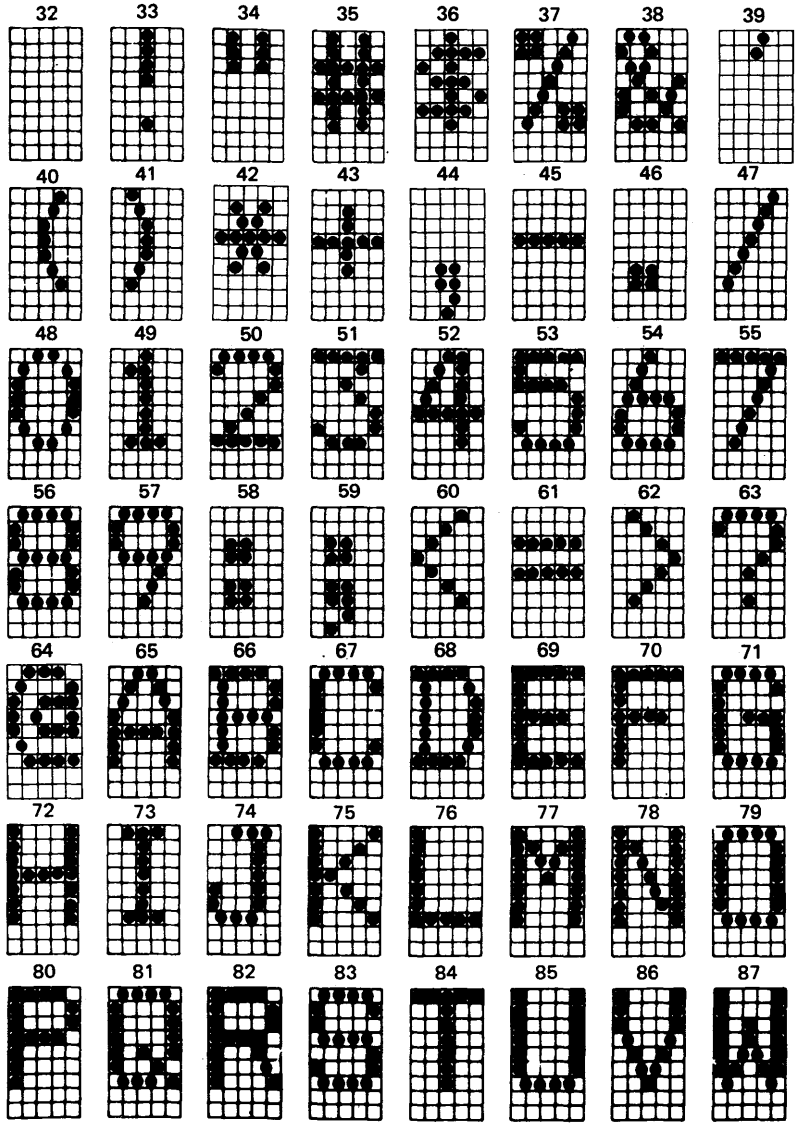
Appendix G. IBM Mode Character Fonts



IBM Mode Character Fonts

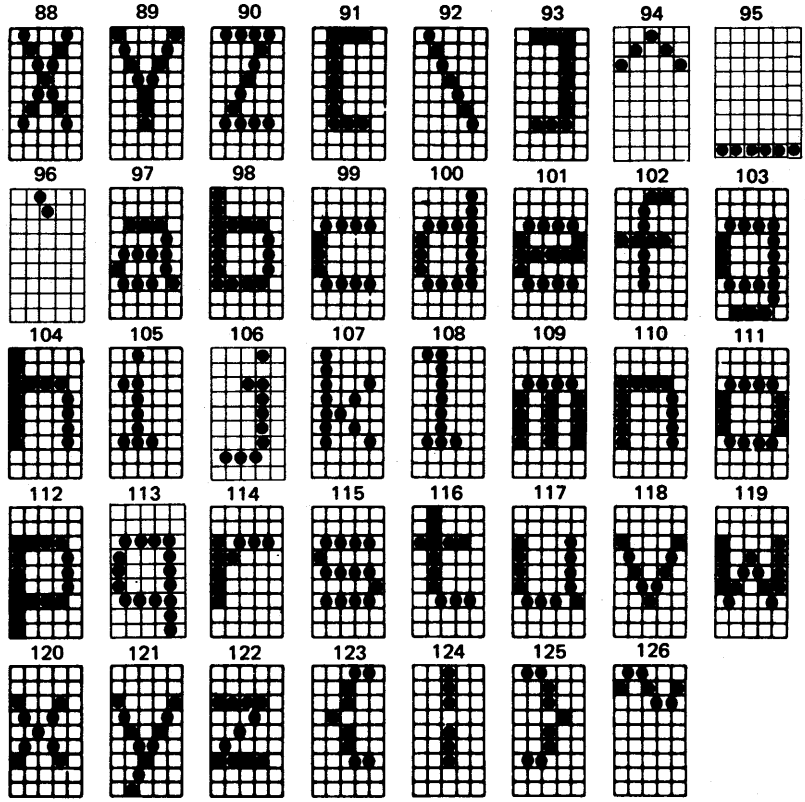


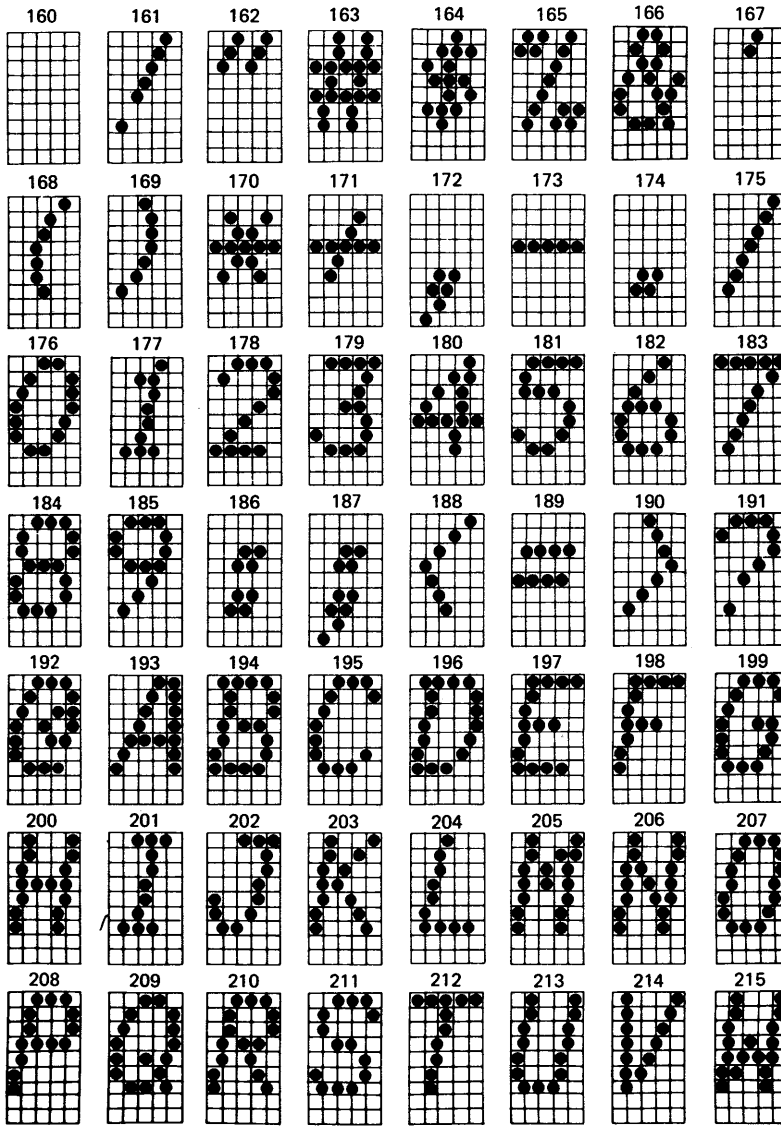
Appendix H. FX Mode Character Fonts



NOTE: Numbers represent Decimal code.

FX Mode Character Fonts

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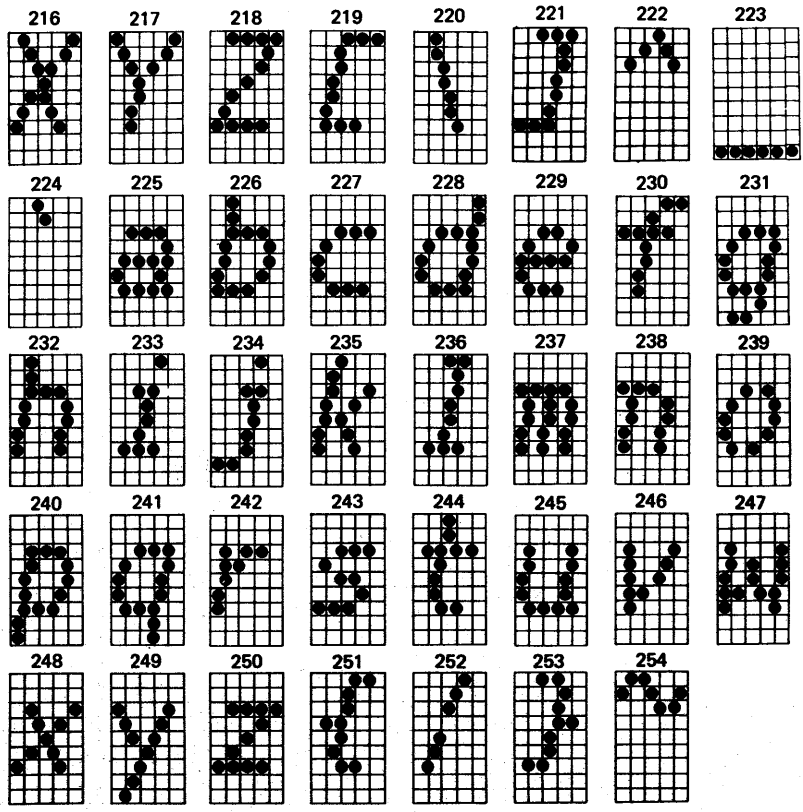
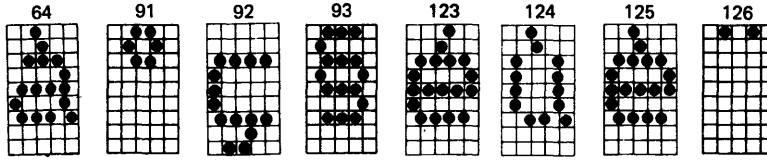
FX Mode Character Fonts

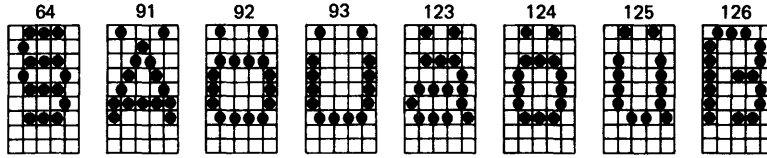


Appendix H. FX Mode Character Fonts

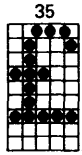
France



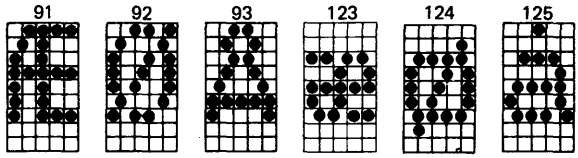
Germany



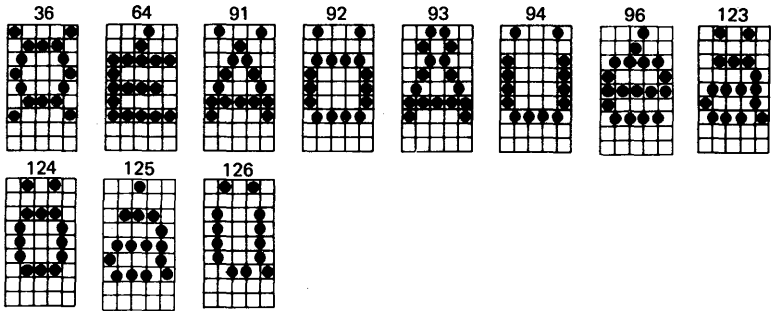
U.K.



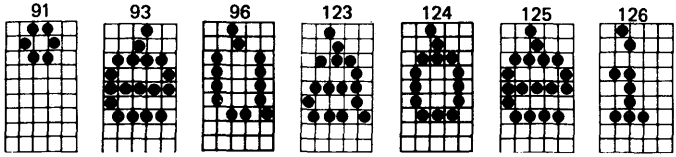
Denmark



Sweden



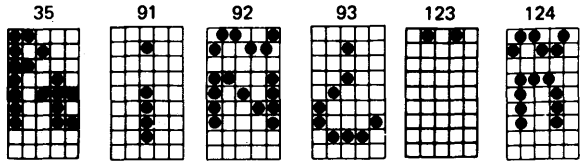
Italy



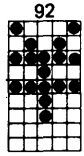
APPENDIX H

FX Mode Character Fonts

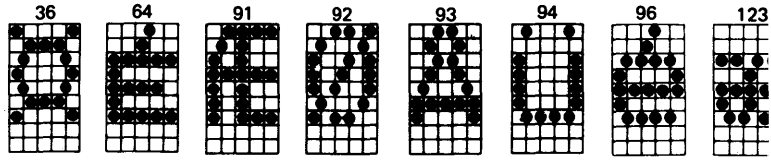
Spain

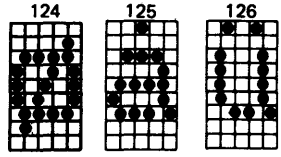


Japan

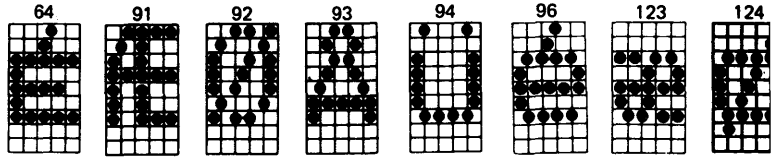


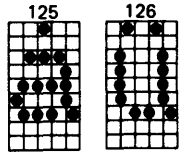
Norway





Denmark II





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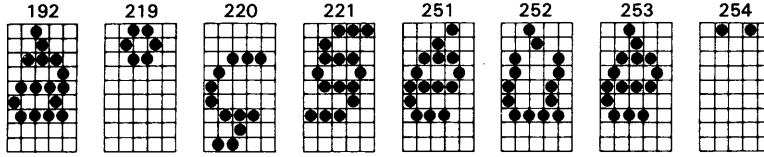
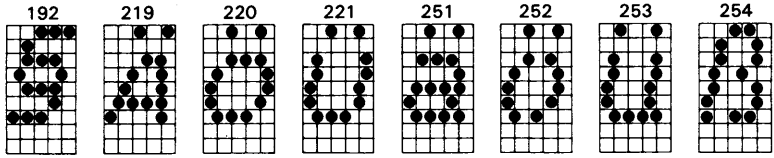
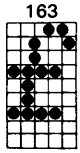
France



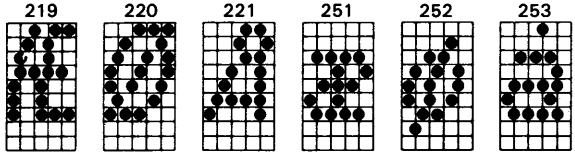
Germany



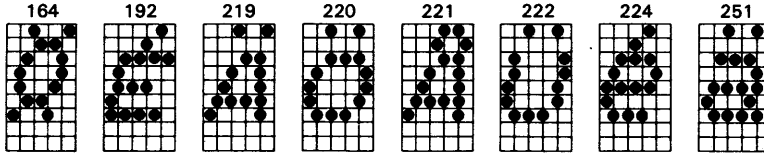
U.K.



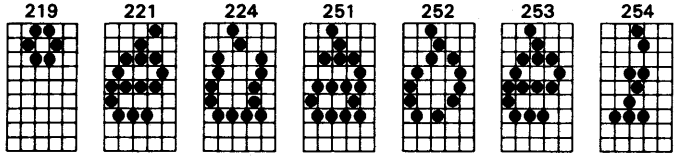
Denmark I



Sweden



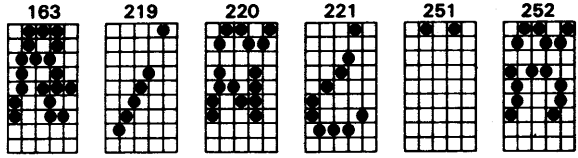
Italy



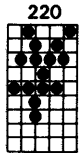
APPENDIX H

FX Mode Character Fonts

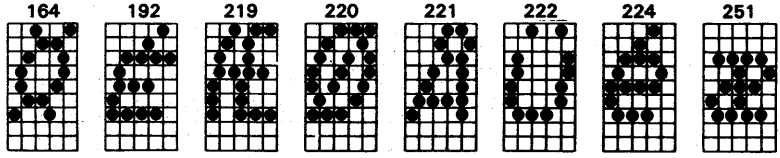
Spain

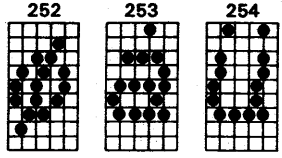


Japan

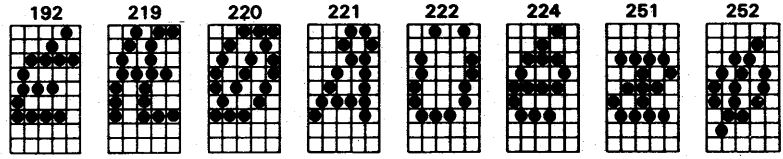


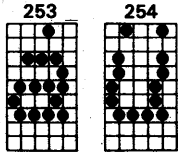
Norway





Denmark II





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