

LA50 Printer

Programmer Reference Manual

Prepared by Educational Services
of
Digital Equipment Corporation

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1

FEATURES

1.1 GENERAL

The LA50 is a compact, dot matrix, serial printer. It was designed for use in personal computer systems, office workstations, and small-sized business computer systems.

The printer is available in four models.

LA50-RA - 120 V
LA50-RB - 220 V
LA50-RC - 240 V
LA50-RD - 100 V

The printer has an input buffer capacity of 2047 characters.

The LA50 receives characters and commands through an asynchronous serial interface. The interface operates at any of several selectable baud rates up to 4800 baud.

The paper feed mechanism is able to move paper both forward and reverse. The printhead is mounted on a carriage that scans horizontally across the paper. The printer is capable of bidirectional printing with automatic print direction determination. The ribbon is in a disposable cartridge.

The printer operates in either of two fundamental modes: text mode or graphic mode. In text mode, characters define the functions and character symbols usually associated with alphanumeric printers. In graphic mode, characters define a single column of 6 dots to be printed, not an entire character image as in text mode.

2 FEATURES

1.1.1 Text Mode

In text mode, the printer uses a 9-element impact dot matrix printhead to print characters in an 8-dot character cell at 100 characters per second. Lines of 80, 96, or 132 characters can be selected to print in the 8-inch wide print region. An enhanced printing mode is available that allows more fully formed characters to be printed in a 16-dot character cell at 50 characters per second.

1.1.2 Graphic Mode

In graphic mode the LA50 allows the programmer to print graphic images by sending data that controls the dot printing elements individually.

1.1.3 LA50 Features

The following are the main features of the LA50.

- Compact size suitable for desk-top location
- ASCII and multinational character set
- VT100 special graphics character set
- Katakana character set for Japan
- Standard escape and control sequences
- Graphic image printing
- Enhanced printing
- High reliability
- Light weight
- Low cost

1.2 SPECIFICATIONS

The following are the specifications for the LA50.

Print method	Incremental with bidirectional lookahead
Print speed	100 characters/second (8 × 9 matrix printing) 44 lines/minute (80 columns printed per line)
Character format (including intercharacter space)	8 × 9 matrix at full speed 18 × 9 matrix at half speed

Horizontal pitch of 10,
12, 5, 6 characters/inch

Bold, underline, or enhanced
density with the following
restrictions:

1. No enhanced printing when using
VT100 or Katakana character sets
2. Bold and enhanced density cannot
be used at the same time

Horizontal pitch of 8.25
characters/inch

Bold, underline (no enhanced
density)

Horizontal pitch of
16.5 characters/inch

Underline (no bold, no enhanced
density)

Graphic mode

144 or 180 dots/inch horizontal
72 dots/inch vertical
2 to 1 or 2-1/2 to 1 aspect ratio

Characters

94 ASCII
81 multinational
63 JIS Katakana
27 VT100 special graphics
1 error indicator

Character pitch

Compressed font - 18.5
characters/inch, 132 characters/line

Double width - 8.25
characters/inch, 66 characters/line

Elite pitch - 12 characters/inch,
96 characters/line

Double width - 6 characters/inch,
48 characters/line

Pica pitch - 10 characters/inch, 80
characters/line

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	Double width – 5 characters/inch, 40 characters/line
Line spacing	12, 8, 6, 4, 3, or 2 lines/inch Partial line up and down, 1/12 inch
Line feed speed	6 lines/inch at 100 ms/line
Form dimensions	Single sheets: 3 to 9 inches wide
Form thickness	Up to 0.011 inches, up to 3-part form
Paper feed method	Friction feed and sprocket/pin feed
Form loading	From rear-top
Ribbon cassette	Operator installable
Power requirements	LA50-RA 120 (104 – 128) Vac LA50-RB 220 (191 – 235) Vac LA50-RC 240 (208 – 256) Vac LA50-RD 100 (90 – 110) Vac 47 to 63 hz
Power consumption	Less than 180 W
Weight	8.5 Kg (18.7 lb)
Dimensions	400 mm (W) x 295 mm (D) x 142 mm (H) (16 in x 11.8 in x 5.6 in)
Data interface	Serial RS232-C and RS423 EIA Standard

COMMUNICATION

2

2.1 DATA INTERFACE

The LA50 data interface is RS-232C and RS-423 compatible. It does not include an interface cable but does include a 25-position plug mounted on the rear of the cabinet. The printer contains the following interface signals listed in Table 2-1 for connection to an interface cable.

2.1.1 Interface Signals

The following paragraphs describe these interface signals.

2.1.1.1 Receive Data – The printer receives serial encoded characters on this line.

Table 2-1 Printer Interface Signals

Function	Direction	Pin	RS-232 Mnemonic
Receive data	To printer	3	BB
Send data	From printer	2	BA
Terminal ready	From printer	20	CD
Request to send	From printer	4	CA
Busy or ready	From printer	11	-
Protective ground	From printer	1	-
Signal ground	Common	7	AB

2.1.1.2 Send Data – The printer sends serial-encoded characters on this line.

Although the bit rate within a character may be up to 4800 bits per second, the character transmission rate from printer to host for any two characters does not exceed 100 characters per second.

The printer, when transmitting to the host, always includes one stop bit with each character.

2.1.1.3 Terminal Ready – The printer sends signals on the Terminal Ready line which indicate the readiness of the printer to send and receive data. When this signal is ON the printer is capable of sending and receiving data. When this signal is OFF the printer is not ready for communication.

The terminal is ready to send and receive data after it completes its power-up initializations, and remains ready to communicate indefinitely.

2.1.1.4 Request to Send – The printer maintains the Request to Send line in the ON condition indefinitely.

2.1.1.5 Ready/Busy – This line carries the Busy/Ready signal, depending on the setting of the Ready/Busy Polarity switch. The printer is unable to receive characters if this signal is in the 'Busy' state and is able to receive characters if this signal is in the 'Ready' state.

2.1.1.6 Protective Ground – This line is connected via removable jumper into the chassis ground of the printer. The chassis is further connected to external grounds through the third wire of the power line cord.

2.1.1.7 Signal Ground – This line establishes the common ground reference potential for all other interface circuits.

2.2 DATA SYNCHRONIZATION

Data synchronization with the printer is attained by an input buffer used in conjunction with either the XON/XOFF protocol or the Ready/Busy protocol, depending on the position of the protocol switch.

2.2.1 Input Buffer

All characters received, except nulls and deletes, are temporarily stored in an input buffer before further processing. Nulls and deletes are ignored and do not occupy space in the input buffer. The input buffer has a 2047 character capacity.

If the printer falls too far behind the incoming data, the input buffer overflows and data is lost. If characters are lost due to input buffer overflow, a single substitute control character (octal 032) is placed in the input buffer at the point of loss. If a character is received with a parity error, the character is replaced in the input buffer by the substitute control character (octal 032) thus causing the error character (reverse question mark) to be printed. The 032 control character, thus indicates loss of characters, or a character received with parity error.

When the printer is capable of printing, characters are fetched from the input buffer and printed or otherwise processed as required. When the printer is incapable of printing, the printer scans the input buffer for printer status request control sequences even if the input buffer is full.

2.2.2 XON/XOFF Protocol

Using the XON/XOFF protocol, the data source becomes synchronized with the printer as described below.

After successfully powering up and becoming enabled to send, the printer sends an XON control character and constantly monitors the number of empty character positions in the input buffer. When the number is less than 128, the printer sends an XOFF control character, signaling the data source to temporarily stop sending data. Meanwhile, the printer continues to take characters from the input buffer and print or otherwise process them. When the number of empty positions in the buffer exceeds 224, the printer sends an XON control character, thus signaling that transmission may resume.

The printer also sends an XOFF control character when it is not ready due to error conditions or operator actions. Running out of paper or detecting a print-head position failure causes an XOFF control character to be sent. The operator actions of opening the cover or placing the printer off-line also cause an XOFF control character to be sent.

B COMMUNICATION

The printer sends an XON control character whenever an XOFF state is present, and all of the following conditions are true.

- The printer is ready.
- All fault conditions are cleared.
- There are more than 224 empty positions for characters in the input buffer.

NOTE: At power up, an XOFF state is assumed.

The printer sends an XOFF control character whenever an XON state is present, and any of the following conditions is true.

- The printer is not ready.
- A fault condition occurs.
- There are less than 128 empty positions for characters in the input buffer.

The printer sends an extra XOFF control character if more than 64 characters have been received since the first XOFF control character has been sent.

2.2.3 Ready/Busy Protocol

The Ready/Busy protocol is functionally the same as the XON/XOFF protocol. However, instead of sending an XOFF control character, the printer places the Ready/Busy signal in the Busy state, and instead of sending an XON control character, the printer places the Ready/Busy signal in the Ready state.

2.3 DATA TRANSMISSION

The LA50 printer communicates using serial characters. The serial character format used must be the same character format used by the computer. Serial characters are transmitted using a start bit, 7 or 8 data bits, an optional parity bit and 1 or more stop bits (Figure 2-1). The number of bits and the polarity of the parity (even or odd) is switch selectable. Parity errors can be detected for either polarity.

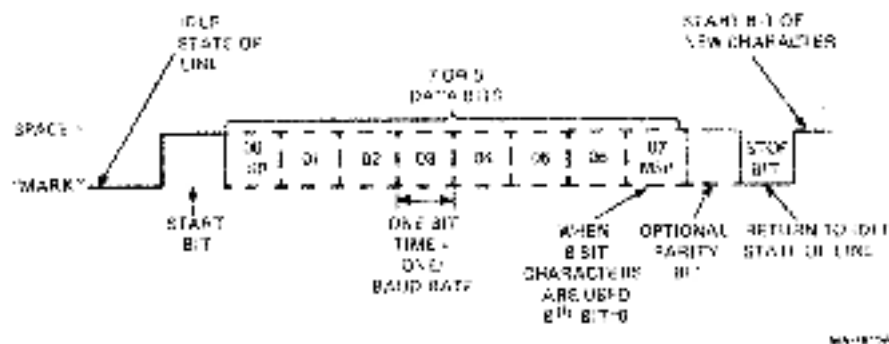
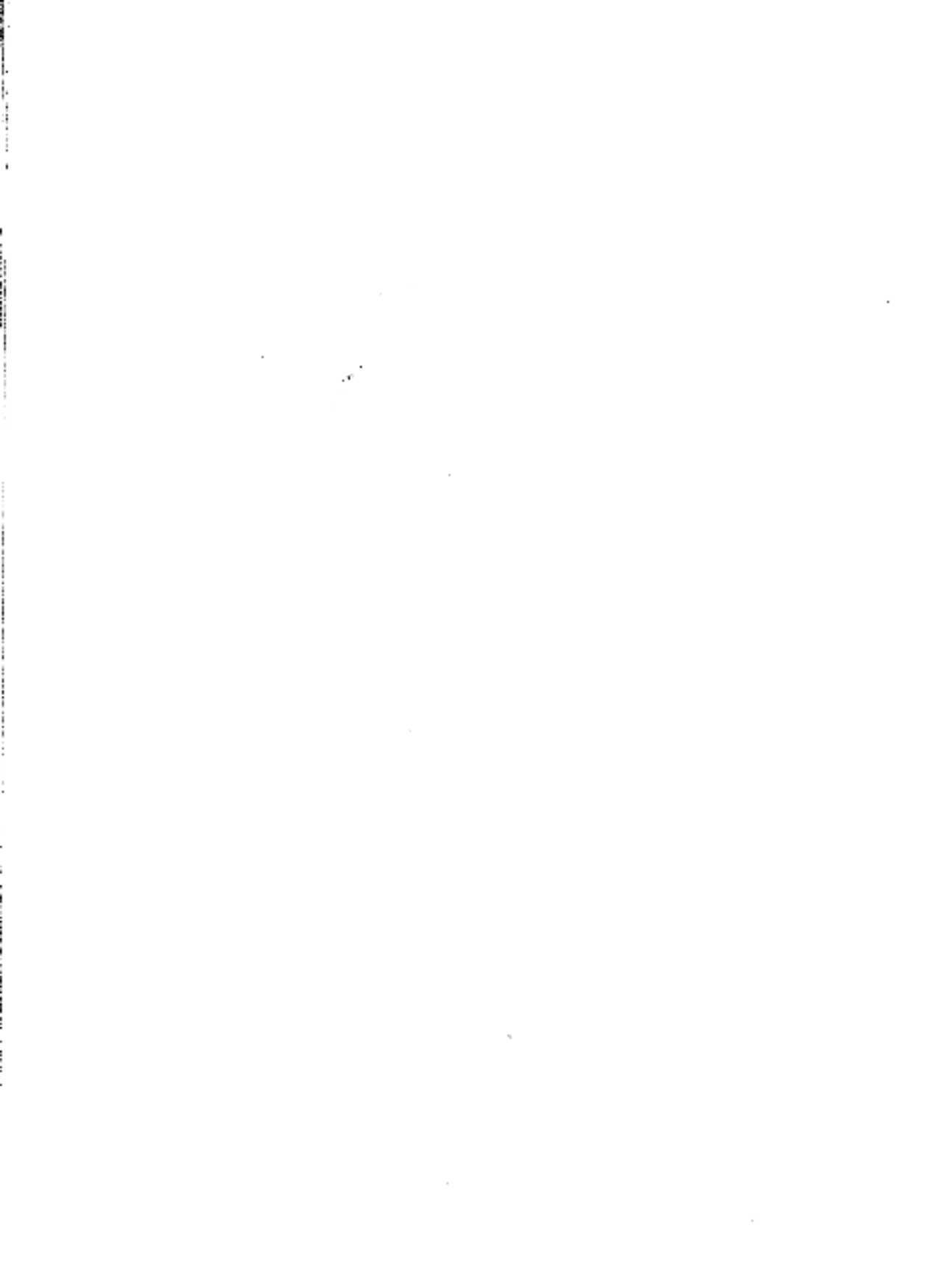


Figure 2-1 Serial Character Format



3

PRINTER CONFIGURATION

3.1 GENERAL

This chapter describes the LA50 configuration switches located in the front of the printer under the access cover. There are two switch packs with eight slide switches in each pack. The switches are used to configure the:

- National character sets
- Graphics aspect ratio
- XON/XOFF and RDY/BUSY protocol
- Right margin
- Baud rate
- Data format.

Additional information regarding these items is included in subsequent chapters.

3.2 FRONT PANEL INDICATORS AND SWITCHES

The following indicators and switches are on the front panel of the LA50 (Figure 3-1).

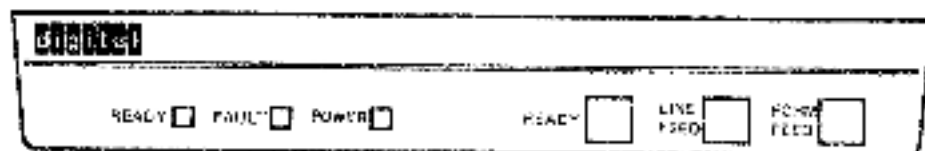


Figure 3-1 Front Panel Controls and Indicators

3.2.1 READY Indicator

The green READY light indicates the operating state of the printer. The light is on when the printer is ready to print or is printing. The light is off when the printer is not ready and will not start.

3.2.2 FAULT Indicator

The red FAULT light blinks when the printer detects an electronic fault. It stays on when the printer is out of paper.

3.2.3 POWER Indicator

The green POWER light is on when power is applied to the printer.

3.2.4 READY Switch

The READY switch controls the operating state of the printer. Pressing the switch alternately puts the printer in the Ready or Not Ready state. Observe the READY light to determine the state of operation.

3.2.5 LINE FEED Switch

Pressing the LINE FEED switch advances the paper one line.

3.2.6 FORM FEED Switch

Pressing the FORM FEED switch advances the paper one full sheet.

3.3 CONFIGURATION SWITCHES

The configuration switches are set for printer use with DIGITAL systems in the United States. They are located under the access cover (Figure 3-2).

The switch positions can be changed by sliding the tab with a ballpoint pen or equivalent (Figure 3-3).

The rest of this chapter describes the switch positions for the system configurations.

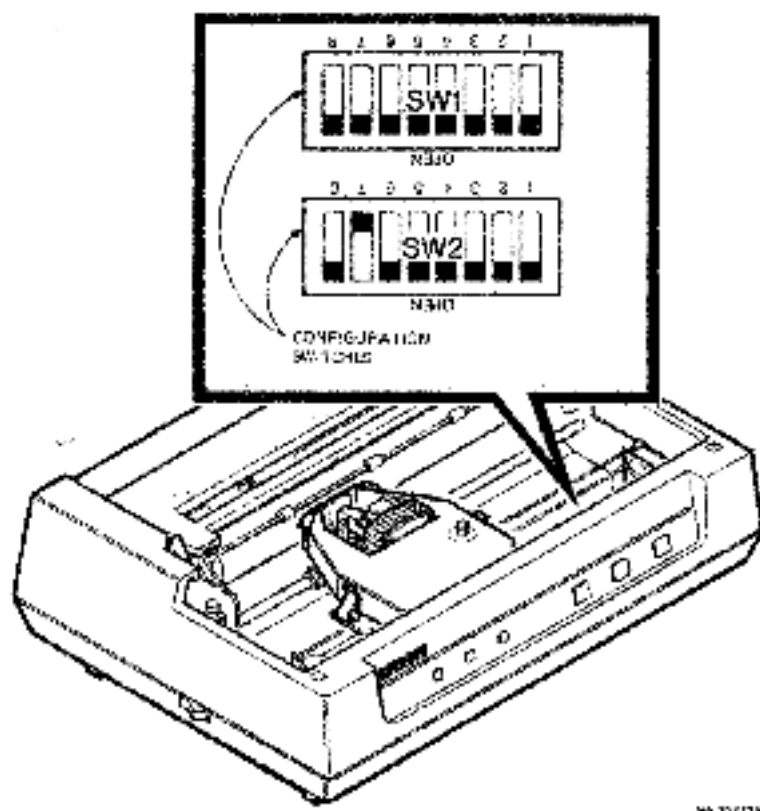


Figure 3-2 LA50 Printer Configuration Switches

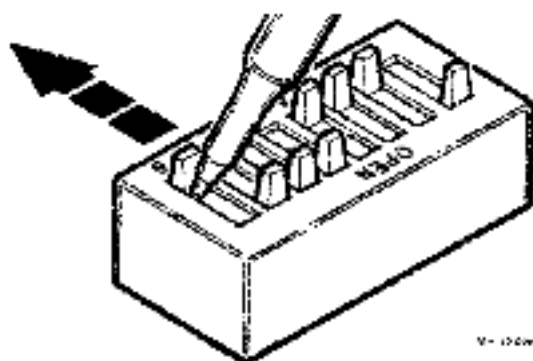


Figure 3-3 Changing Switch Positions

3.3.1 National Character Set Switches

The national character set switches are designated SW1-1 through SW1-4. These switches are initially set to the United States position (all four switches open). The United States position is correct for many DIGITAL systems around the world, since it makes the ASCII, VT100 special graphics, and the multinational character sets available. In an 8-bit environment, no change in switch settings is necessary.

For those systems that do not have multinational capability, the character set switches may be set to match the national character set of the system.

Table 3-1 shows the character sets associated with G0 through G3 for each country. Table 3-2 shows the associated switch positions for that country. For example, if Britain is selected, SW1-1 is closed, and SW1-2, SW1-3, and SW1-4 are open. With this switch selection, G0 is the British character set, G1 is the VT100 character set, G2 is the multinational character set and G3 is the ASCII character set. With four switch settings, there are 16 possible combinations. Only 11 are shown in Tables 3-1 and 3-2. The remaining combinations of switch settings are equivalent to the United States position.

3.3.2 Graphics Aspect Ratio Switch SW1-5

Switch SW1-5 changes the horizontal to vertical dot ratio in graphic mode by changing the number of horizontal dots per inch. The number of vertical dots is kept constant at 72 dots per inch.

Ratio	Horizontal Dots/Inch	SW1-5 Switch Position
2 to 1*	144	Open
2.5 to 1	180	Closed

3.3.3 XON/XOFF and Ready/Busy Protocol Switches SW1-6 and SW1-7

DIGITAL systems use the XON/XOFF protocol. Other systems may require the Ready/Busy protocol. Switch SW1-6 selects the XON/XOFF or Ready/Busy protocol as shown in the SW1-6 chart below. If the Ready/Busy protocol is selected the polarity of the Busy or Ready signal is shown in the SW1-7 chart below.

SW1-6 Position	Protocol
Open*	XON/XOFF
Closed	Ready/Busy

* Initial setting

Table 3-1 Character Set Selection

Nation	G0	G1	G2	G3
United States	ASCII	VT100	Multinational	ASCII
Britain	British	VT100	Multinational	ASCII
Finland	Finnish	VT100	Multinational	ASCII
France	French	VT100	Multinational	ASCII
French Canada	French Canadian	VT100	Multinational	ASCII
Germany	German	VT100	Multinational	ASCII
Italy	Italian	VT100	Multinational	ASCII
Japan	JIS Roman	Katakana	Katakana	ASCII
Norway/Denmark	Norwegian/Danish	VT100	Multinational	ASCII
Spain	Spanish	VT100	Multinational	ASCII
Sweden	Swedish	VT100	Multinational	ASCII

Table 3-2 Character Set Switch Positions

Nation	Switch Positions			
	SW1-1	SW1-2	SW1-3	SW1-4
United States	Open	Open	Open	Open
Britain	Closed	Open	Open	Open
Finland	Open	Closed	Open	Open
France	Closed	Closed	Open	Open
French Canada	Open	Open	Closed	Open
Germany	Closed	Open	Closed	Open
Italy	Open	Closed	Closed	Open
Japan	Closed	Closed	Closed	Open
Norway/Denmark	Open	Open	Open	Closed
Spain	Closed	Open	Open	Closed
Sweden	Open	Closed	Open	Closed

SW1-7 Position	Signal Condition
Open*	Busy – high Ready – low
Closed	Busy – low Ready – high

3.3.4 Right Margin Switch SW1-8

Switch SW1-8 selects the method of controlling a line of characters that exceed the 8-inch line of print. If set to truncate, the printer is limited to printing the first 8 inches of characters. It drops the remaining characters. If set to wrap, the printer prints the remaining characters on the next line.

Selection	Switch Position
Truncate*	Open
Wrap	Closed

3.3.5 Baud Rate Select Switches SW2-1, SW2-2, SW2-3

These switches select the speed (bits per second) at which the printer communicates with the computer.

Baud Rate	Switch Positions		
	SW2-1	SW2-2	SW2-3
4800*	Open	Open	Open
2400	Open	Closed	Open
1200	Open	Closed	Closed
600	Closed	Open	Open
300	Closed	Open	Closed
200	Closed	Closed	Open
110	Closed	Closed	Closed

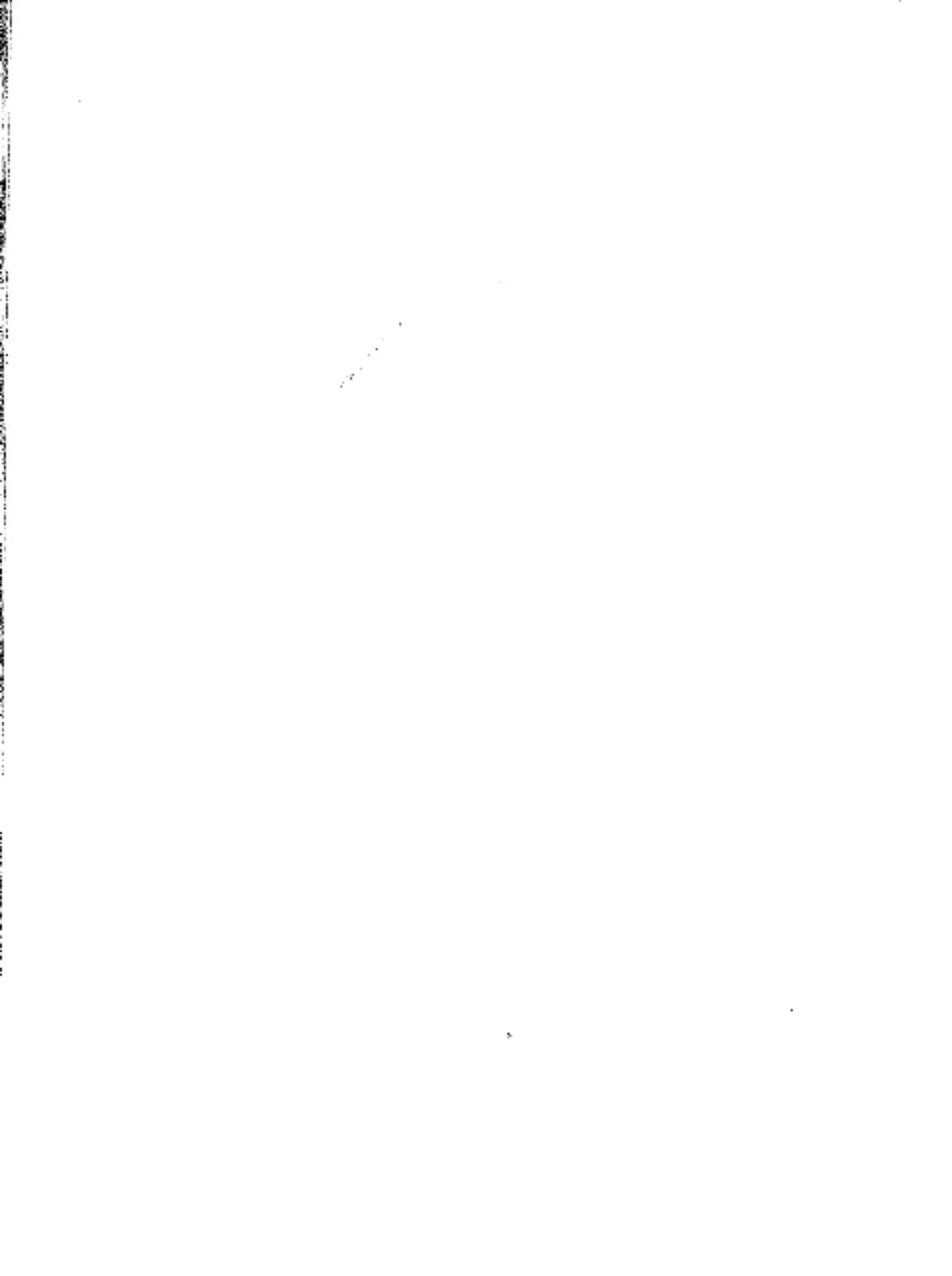
* Initial setting

3.3.6 Data Format Switches SW2-4, SW2-5, SW2-6

These switches select the data format to enable communication with the computer.

Data Format	Switch Position		
	SW2-4	SW2-5	SW2-6
7 bits plus odd parity	Open	Closed	Closed
7 bits plus even parity	Closed	Closed	Closed
7 bits plus 8th bit mark	Open	Open	Closed
7 bits plus 8th bit space	Closed	Open	Closed
8 bits plus odd parity	Open	Closed	Open
8 bits plus even parity	Closed	Closed	Open
8 bits, no parity*	Open	Open	Open

* Initial setting



TEXT MODE CHARACTER PROCESSING

4

4.1 TEXT MODE CHARACTER PROCESSING

This chapter describes the terminal's response to characters received while the printer is operating in text mode.

The terminal processes characters in accordance with the American National Standards Institute (ANSI) standards X3.4-1977. The ANSI system of character processing is based on the category (printable or control) of a character in the American National Standard Code for Information Interchange (ASCII) chart (Figure 4-1). The category of a character is determined by the character's position in the ASCII chart. In the eight column chart, columns 0 and 1 contain the control characters while the rest of the chart contains printable characters (except for SP and DEL). The printer is capable of printing from 14 different character sets which are described in Chapter 5. SP and DEL are always the same control characters regardless of the character set selected.

NOTE: The space character can be considered either an information separator control character or a printable character. It can be considered a printable character because it takes up space in the terminal memory and on the paper when printed.

The following paragraphs describe the terminal response to both printable characters and control characters while operating in text mode.

4.1.1 Active Column and Active Line

Active column is the column where the next character is to be printed. Active line is the line where the next character is to be printed. Column and line numbers begin with one, not zero. Printed characters usually increment the active column. Linefeeds, vertical tabs, and form feeds increment the active line.

20 TEXT MODE CHARACTER PROCESSING

BITS 4 3 2 1 0	OCTAL						
	0	1	2	3	4	5	6
0 0 0 0 0	NUL	DLE	SP	0	@	P	l
0 0 0 0 1	SOH	DC1	!	1	A	Q	a
0 0 0 0 2	STX	DC2	"	2	B	R	b
0 0 0 0 3	ETX	DC3	#	3	C	S	c
0 0 0 0 4	EOT	DC4	\$	4	D	T	d
0 0 0 0 5	ENQ	NAK	%	5	E	U	e
0 0 0 0 6	ACK	SYN	&	6	F	V	f
0 0 0 0 7	BEL	ETB	'	7	G	W	g
0 0 0 0 8	BS	CAN	(	8	H	X	h
0 0 0 0 9	HT	EM	)	9	I	Y	i
0 0 0 1 0	LF	SUB	*	:	J	Z	j
0 0 0 1 1	VT	ESC	+	;	K	[	k
0 0 0 1 2	FF	FS	,	<	L	\	l
0 0 0 1 3	CR	GS	-	=	M	]	m
0 0 0 1 4	SO	RS	.	>	N	^	n
0 0 0 1 5	SI	US	/	?	O	_	o
0 0 0 1 6							DEL

KEY

ASCII CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1A	HEX

Figure 4-1 ASCII Chart

The active column and active line are collectively known as active position. Active position is only loosely linked to the physical position of the printer carriage and paper mechanism. In general, the active column is only recorded when a character is actually printed. Any previous history of active column values is insignificant.

4.1.2 Horizontal Advance Increment

Horizontal advance increment (HAI) is a unit equal to the width of a column. The printer allows HAI values of 1/5 inch, 1/6 inch, 1/8.25 inch, 1/10 inch, 1/12 inch, and 1/16.5 inch. Column numbers begin with one and are measured in units of HAI. Column numbers do not have fractional components.

4.1.3 Vertical Advance Increment

The vertical advance increment (VAI) is the unit of distance between lines. The printer allows VAI values of 1/2 inch, 1/3 inch, 1/4 inch, 1/6 inch, 1/8 inch, and 1/12 inch. Line numbers begin with one and are measured in units of VAI. Line numbers may have fractional components if the vertical pitch changes within a page.

4.2 PRINTABLE CHARACTERS

In text mode, printable ASCII characters are printed as they are received by the terminal. If the active column is not greater than the right margin, each received character is printed and the active column is incremented.

NOTE: The actual characters printed depend on the printable character set designated. Refer to the printable character sets in Chapter 5 and Appendix A for more detail.

Each printable or space character increases the active column by one unit of HAI. Characters in the octal range of 041 - 178 are normally interpreted as printable characters. If the active position is within the printable region, each printable character or space character prints and the active column increases as required. If the previous character was printed at the rightmost position, and a printable or space character is received, one of two actions occurs, depending on the setting of the right margin switch. If the right margin switch is set to truncate, the character is ignored. If the right margin switch is set to wrap, an automatic carriage return and line feed occurs before printing the character.

4.3 CONTROL CHARACTERS

A control character is a single character function whose occurrence in a particular context starts, modifies, or stops a control function. Control functions are characters that provide control of the printing and processing of characters. Control functions are not printed.

Tables 4-1 and 4-2 list the control characters recognized by the terminal and the mnemonic and the function performed by the control character when operating in text mode. All other control characters received by the terminal cause no action.

NOTE: Each control function listed in this chapter is assigned a mnemonic. The mnemonic is an abbreviation of the control function name.

Table 4-1 Text Mode ANSI Control Characters

Printer Control Functions		
Octal Code	Mnemonic	Function
010	BS	Backspace
011	HT	Horizontal tab
012	LF	Line feed
013	VT	Vertical tab
014	FF	Form feed
015	CR	Carriage return
Character Set Control Functions		
Octal Code	Mnemonic	Function
016	SO	Shift out
017	SI	Shift in
Communication Control Functions		
Octal Code	Mnemonic	Function
000	NUL	Null
030	CAN	Cancel
032	SUB	Substitute
033	ESC	Escape
177	DEL	Delete

The printer ignores all other ASCII control characters.

Table 4-2 Text Mode ANSI Control Characters

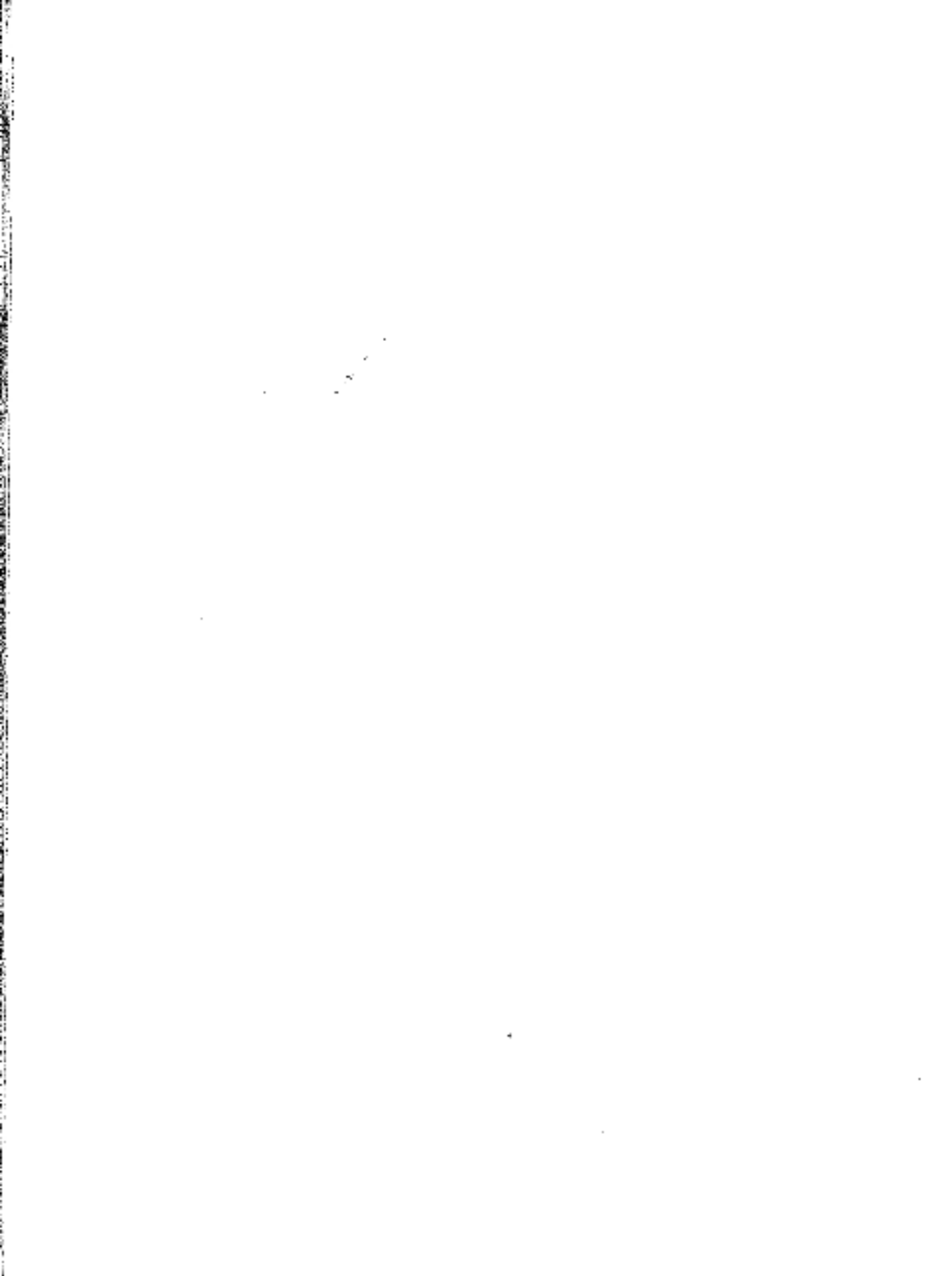
Name	Mnemonic	Octal Code	Function
Backspace	BS	010	Backspace decreases active column by one unit of HAI. If the active column is at the leftmost position, the backspace character is ignored.
Horizontal tabs.	HT	011	A horizontal tab is a preselected point on a line to which the printhead advances when a horizontal tab (HT) control character is received. The printer has fixed horizontal tab stops every eight units of HAI. Tab stops are associated with column numbers, not physical positions on the paper. Thus, changing horizontal pitch also changes the physical position of tab stops. When no tab exists to the right of the active column, the right margin switch setting takes precedence. If this switch is set to wrap, the printer executes an automatic carriage return and a line feed. If the switch is set to truncate, the active column is set to beyond the rightmost print column. This causes the printer to ignore characters until the active column returns to within the printable region.

Table 4-2 Text Mode ANSI Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Line feed	LF	012	Line feed advances active line by one unit of VAI. If less than one unit of VAI remains unprinted on the page before execution of the Line Feed, then the line feed character sets the active line to the uppermost position on the next page.
Vertical tab	VT	013	Vertical tab functions the same as line feed.
Form feed	FF	014	Form feed advances the active line to the uppermost position on the next page.
Carriage return	CR	015	Carriage return returns the active column to the leftmost position.
Shift out	SO	016	Shift out selects the G1 character set as the active character set. For additional information, refer to Chapter 5.
Shift in	SI	017	Shift in selects the G0 character set as the active character set. For additional information, refer to Chapter 5.

Table 4-2 Text Mode ANSI Control Characters (Cont)

Name	Mnemonic	Octal Code	Function
Null Delete	NUL DEL	000 177	The null and delete characters may be used for timing. They cause no operation in the printer, and are different from ignored characters in that they are stripped from the data stream upon reception without occupying space in the input buffer.
Cancel	CAN	030	Cancel immediately ends any escape or control sequence.
Substitute	SUB	032	Substitute immediately ends any escape or control sequence. The character is interpreted as being in place of a character or characters received in error. In text mode, the substitute character is printed as the error character (reverse question mark).
Escape	ESC	033	Escape introduces an escape sequence. Refer to Chapter 5.



ESCAPE AND CONTROL SEQUENCES

5

5.1 GENERAL

The LA50 uses escape sequences standardized by the American National Standards Institute (ANSI) to control many of its features. For the LA50 features that lack an ANSI standard escape sequence, additional escape sequences have been defined and are within the extensions permitted by the ANSI system.

ANSI has established a flexible and comprehensive system for transmitting format and editing information. The system can be used with printing terminals like the LA50 as well as with video terminals and printers. The system has the following important advantages.

1. It is well defined and well documented. This greatly decreases the chances of incompatible implementations and aids in achieving device independence in output.
2. It has ample provisions for future extensions without sacrificing compatibility with older programs. The syntax used in ANSI controls allows a large number of new controls to be added with little difficulty.
3. It is compatible with all the frequently used communication protocols. In contrast, many other systems use control codes that are reserved for communication functions. In these other systems, codes used for line turnaround, disconnect and synchronization get confused with those used to send parameter values.

4. It has a flexible parameter passing convention that allows single parameters, multiple parameters, and default parameters. For example, in the graphic rendition escape sequence, the single parameter ESC [0 m causes bold and underline to be disabled; the multiple parameter ESC [1 ; 4 m causes bold and underline to be enabled; and ESC [n (no parameter included) uses the default parameter of 0 which is understood.

5.2 ESCAPE AND CONTROL SEQUENCES

Using the escape sequences described in this chapter, the programmer can control the following LA50 features.

- Partial line paper motion
- Horizontal pitch selection
- Vertical pitch selection
- Page length selection
- Character set selection
- Printing density selection
- Bold and underline selection
- Product Identification
- Printer status request
- Printer status report
- Graphic mode

The escape sequences allow expansion of the control functions beyond the current limit of the 32 control characters. For compatibility, certain control character positions are left blank where the LA50 does not perform the function associated with that control character.

Control functions that require parameters are always invoked by control sequences. For example, setting horizontal pitch is invoked by a control sequence since the pitch can be set to 5, 6, 8.25, 10, 12, or 15.5, characters per inch.

The escape and control sequences are described in the following paragraphs. A summary of these sequences is provided in Appendix B.

Examples of the escape sequences use the ASCII character and the octal equivalent. For example, in the partial line down escape sequence ESC K (033 113), the K is the ASCII character and the 033 113 is the octal code for the ESC and K, respectively.

5.2.1 Partial Line Paper Motion

The following sequences cause partial line paper motion.

Partial Line Down (PLD)

```
ESC  K
033 113
```

The above sequence moves paper forward (upward) 1/12 inch.

Partial Line Up (PLU)

```
ESC  L
033 114
```

The above sequence moves paper reverse (downward) 1/12 inch.

The PLD and PLU sequences do not modify active line. Unless an equal number of PLU and PLD sequences are sent to the printer, the page boundary reference will have changed. Thus, PLD and PLU sequences may be used for remote adjustment of the form position, such as for modifying the top-of-form position.

5.2.2 Horizontal Pitch Selection

When the horizontal pitch changes, the printer converts the active column to the new horizontal pitch. The computation may yield a fractional component that is rounded up to the next integer so that all printing is on the column grid for the selected pitch. A variable amount of white space is included in the line at the point of horizontal pitch change.

As an example, consider a horizontal pitch of 10 characters per inch in a line that is to be converted to a horizontal pitch of 12 characters per inch. The pitch is to be changed after the third character is printed (Figure 5-1).

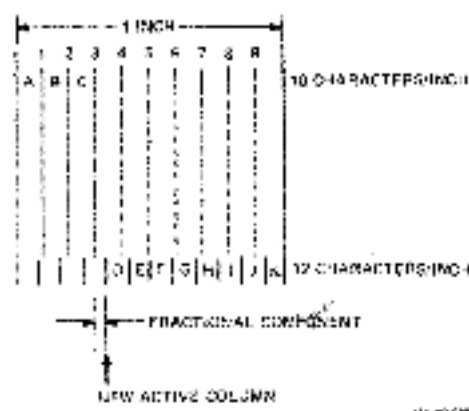


Figure 5-1 Changing Horizontal Pitch

The following formula determines the precise location of active column when the horizontal pitch is changed.

$$\text{Newcol} = 1 + \frac{(\text{Newpitch} \times (\text{Oldcol} - 1))}{\text{Oldpitch}}$$

where

Newcol	= the new active column
Newpitch	= the new pitch in characters/inch
Oldcol	= the old active column
Oldpitch	= the old pitch in characters/inch

The division performed above is integer division wherein any non-zero remainder rounds the quotient up to the next higher integer.

Changing horizontal pitch sets the *rightmost* position for printing to the specified maximum column and sets the single- or double- width attribute of characters as follows.

Horizontal Pitch	Maximum Column	Width
10	80	Single
12	96	Single
16.5	132	Single
5	40	Double
6	48	Double
8.25	66	Double

Double-width characters are considered to be one column wide, not two columns wide. Therefore, tab stops are every eight double-width columns in double-width pitches, and double-width characters are printed on a double-width grid.

The following sequences select single-width printing and set the horizontal pitch.

Set Horizontal Pitch (DECSHORP)

```
ESC [ 0 w      or      ESC [ 1 w
033 133 060 167      033 133 061 167
```

Either of the above sequences sets horizontal pitch to 10 characters/inch (HAI = 1/10 inch).

```
ESC [ 2 w
033 133 062 167
```

This sequence sets horizontal pitch to 12 characters/inch (HAI = 1/12 inch).

```
ESC [ 4 w
033 133 064 167
```

This sequence sets horizontal pitch to 16.5 characters/inch (HAI = 1/16.5 inch).

The following sequences select double-width printing and set the horizontal pitch.

Set Horizontal Pitch (DECSHORP)

```
ESC [ 5 w
033 133 065 167
```

The above sequence sets horizontal pitch to 5 characters/inch ($HAI = 1/5$ inch).

```
ESC [ 6 w
033 133 066 167
```

The above sequence sets horizontal pitch to 6 characters/inch ($HAI = 1/6$ inch).

```
ESC [ 8 w
033 133 070 167
```

The above sequence sets horizontal pitch to 8.25 characters/inch ($HAI = 1/8.25$ inch).

5.2.3 Vertical Pitch Selection

When the vertical pitch changes, no paper motion occurs, and the printer converts the active line to the new vertical pitch. The computation may yield a fractional component which is retained.

For example, assume a vertical pitch of 5 lines per inch is to be changed to a vertical pitch of 6 lines per inch as shown in Figure 5-2.

Note that the fractional component of vertical pitch occurs at the end of the page because there is no paper motion during change of vertical pitch. This is unlike the change of horizontal pitch where the fractional component occurs at the point where the pitch is changed.

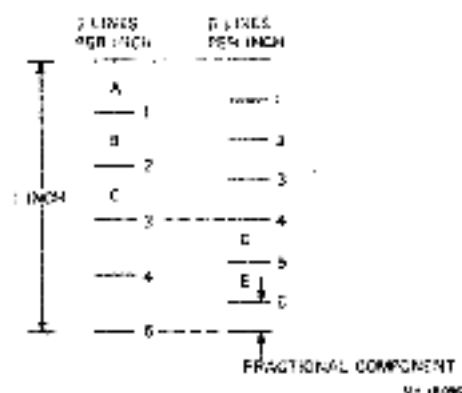


Figure 5-2 Changing Vertical Pitch

The following sequences set the vertical pitch.

Set Vertical Pitch (DECVERP)

ESC [0 z or ESC] 1 z
033 133 061 172 033 133 061 172

Either of the above sequences sets vertical pitch to 6 lines/inch ($VAI = 1/6$ inch).

ESC [2 z
033 133 062 172

The above sequence sets vertical pitch to 8 lines/inch ($VAI = 1/8$ inch).

ESC [3 z
033 133 063 172

The above sequence sets vertical pitch to 12 lines/inch ($VAI = 1/12$ inch).

```
ESC [ 4 z
033 133 064 172
```

The above sequence sets vertical pitch to 2 lines/inch ($VAI = 1/2$ inch).

```
ESC [ 5 z
033 133 065 172
```

The above sequence sets vertical pitch to 3 lines/inch ($VAI = 1/3$ inch).

```
ESC [ 6 z
033 133 066 172
```

The above sequence sets vertical pitch to 4 lines/inch ($VAI = 1/4$ inch).

5.2.4 Page Length Selection

At power-up time, the page length is set to 11 inches, corresponding to 66 lines with the default vertical spacing.

The page length command sets the page length in inches. This is accomplished by providing a parameter representing the number of lines per page from 0 to 252. To calculate the desired parameter, (Pn) use the following equation.

$$\text{Parameter (lines/page)} = \text{desired page length (inch/page)} \\ \times \text{current vertical pitch (lines/inch)}$$

The following chart gives the required parameter values for a small selection of page lengths as a function of vertical pitch.

Length in Inches	Vertical Pitch Selected					
	2	3	4	6	8	12
11	22	33	44	66	88	132
14	28	42	56	84	112	168

The page length can be set to any length from 1/12 inch per page to 21 inches per page in VAI units at the current vertical pitch. Or, if the page length is set to zero, the printer has no paging – all form feed characters are equivalent to line feed characters.

If the desired page length exceeds 21 inches then the printer sets the page length to 21 inches.

The following sequence sets the page length.

Set Page Length (DECSLPP)

```
ESC [ Pn t
033 133 ... 164
```

The above sequence sets active line to top-of-form position and sets page length to Pn units of current VAI.

5.2.5 Character Set Selection

The normal mode of the printer is text mode. In text mode, the printer is capable of printing the 94 printable characters of the ASCII character set, the 81 additional characters of the multinational character set, the 63 additional characters of the JIS Katakana character set, the 27 additional characters of the VT100 special graphic character set, and the error character, which is a reverse question mark.

The 266 different characters are grouped into the 14 character sets in Appendix A. Each character set contains 94 characters. Many of the 266 characters appear in several character sets.

The printer is considered to be in 7-bit mode if the number of data bits has been set to 7 (refer to Chapter 3). In 7-bit mode, all characters are printed from the GL character set.

The printer is considered to be in 8-bit mode if the number of data bits has been set to 8 (refer to Chapter 3). In 8-bit mode all characters are printed from the GL character set if the eighth bit is 0 or from the GR set if the eighth bit is 1. The advantage of 8-bit mode is that two character sets (one in GL and one in GR) can be resident simultaneously.

A set of commands cause the GL and GR sets to select one of four intermediate pointers, G0 through G3. These pointers can be set to provide access to any of the 14 available character sets. Table 5-1 lists the commands and designate how the pointers select the GL or GR set. For example, the LS2 command causes the GL set to select the character set assigned to G2 and the LSR1 command causes the GR set to select the character set assigned to G1.

The character set escape sequences assign the character sets to the pointers as shown in Table 5-2.

5.2.6 Printing Density Selection

The following sequences select the printing density.

Select Density (DECDEN)

```
ESC [ 0 " z   or   ESC [ 1 " z
033 133 060 042 172   033 133 061 042 172
```

Either of the above sequences selects normal density printing.

```
ESC [ 2 " z
033 133 062 042 172
```

The above sequence selects enhanced density printing.

Enhanced density and bold printing cannot be performed at the same time. If both are specified, enhanced density takes precedence. Exceptions to this are as follows.

1. 16.5 characters/inch - Neither enhanced density nor bold can be printed.
2. 8.25 characters/inch - Bold printing prints and enhanced density does not.
3. VT100 - Bold printing prints and enhanced density does not.
4. Katakana - Bold printing prints and enhanced density does not.
5. Graphics - Neither enhanced density nor bold printing print.

Table 5-1 Active Character Set Selection

Command	Mnemonic	Escape Sequence	GL Set	GR Set
Shift in	SI	CTRL/O (017 octal)	G0	-
Shift out	SO	CTRL/N (016 octal)	G1	-
Single shift 2	SS2	ESC N 033 116	G2*	-
Single shift 3	SS3	ESC O 033 117	G3*	-
Locking shift 2	LS2	ESC n 033 156	G2	-
Locking shift 3	LS3	ESC o 033 157	G3	-
Locking shift 1 right	LS1R	ESC ~ 033 176	-	G1
Locking shift 2 right	LS2R	ESC 033 175	-	G2
Locking shift 3 right	LS3R	ESC 033 174	-	G3

- * A special case is the SS2 (single shift 2) and SS3 (single shift 3) commands. When these commands are given, the next character printed is selected from the G2 or G3 set respectively, regardless of the setting of the eighth bit. After this single character, printing continues from the GL or GR set. The locking shift commands (LS2, LS3, LS1R, LS2R, or LS3R) remain in effect until another locking shift is received.

Table 5-2 Character Set Selection

G0	G1	G2	G3	Character Set
ESC(B	ESC)B	ESC*B	ESC+B	ASCII
ESC(A	ESC)A	ESC*A	ESC+A	Britain
ESC(5	ESC)5	ESC*5	ESC+5	Finland
ESC(C	ESC)C	ESC*C	ESC+C	Finland
ESC(R	ESC)R	ESC*R	ESC+R	France
ESC(9	ESC)9	ESC*9	ESC+9	French Canada
ESC(Q	ESC)Q	ESC*Q	ESC+Q	French Canada
ESC(K	ESC)K	ESC*K	ESC+K	Germany
ESC(Y	ESC)Y	ESC*Y	ESC+Y	Italy
ESC(J	ESC)J	ESC*J	ESC+J	JIS Roman
ESC(I	ESC)I	ESC*I	ESC+I	JIS Katakana
ESC(6	ESC)6	ESC*6	ESC+6	Norway/Denmark
ESC(E	ESC)E	ESC*E	ESC+E	Norway/Denmark
ESC(Z	ESC)Z	ESC*Z	ESC+Z	Spain
ESC(7	ESC)7	ESC*7	ESC+7	Sweden
ESC(H	ESC)H	ESC*H	ESC+H	Sweden
ESC(<	ESC)<	ESC*<	ESC+<	Multinational
ESC(0	ESC)0	ESC*0	ESC+0	VT100 Special Graphics

If enhanced density is in effect or is selected while one of the above modes is in effect, the printer retains the enhanced density attribute in memory, but ignores it and prints in normal density. Subsequent selection of a mode that supports enhanced density printing causes the retained attribute to become active.

5.2.7 Selection of Bold and Underlined Printing

The following sequences select bold or underline as specified by the parameters (Pn). All following printable characters are rendered according to these parameters until the next selection. Parameters are evaluated from left to right.

Select Graphic Rendition (SGR)

```
ESC [ Pn ; ... Pn m
033 133 *** 073 ... *** 155
```

```
Pn = 0
060
```

When Pn equals 0, the above sequence turns off bold printing and turns off underline printing.

```
Pn = 1
061
```

When Pn equals 1, the above sequence turns on bold printing.

```
Pn = 4
064
```

When Pn equals 4, the above sequence turns on underlined printing.

```
Pn = 2 2
062 062
```

When Pn equals 22, the above sequence turns off bold printing.

```
Pn = 2 4
062 064
```

When Pn equals 24, the above sequence turns off underlined printing.

NOTE: Any other parameter values received in the sequence are ignored, but do not invalidate the sequence. That is, the parameter values of 0, 1, 4, 22, and 24 may be specified along with other values not applicable to the printer.

Enhanced density and bold printing cannot be performed at the same time. If both are specified, enhanced density takes precedence. Exceptions to this are as follows.

1. 16.5 characters/inch - Neither enhanced density or bold can be printed.
2. 8.25 characters/inch - Bold printing prints and enhanced density does not.
3. VT100 - Bold printing prints and enhanced density does not.
4. Katakana - Bold printing prints and enhanced density does not.
5. Graphics - Neither enhanced density nor bold printing prints.

If the bold attribute is in effect or is selected while the printer is in one of the above modes, the printer retains the bold density attribute in memory, but ignores it and prints with bold printing off. Subsequent selection of a mode that supports the bold printing causes the retained attribute to become active.

5.2.8 Product Identification

The printer automatically sends an answer to a request for device attributes sequence. The following sequences cause the printer to send its product identification sequence.

Device Attribute (DA)

ESC [c	or	ESC 0 c
033 133 143		033 133 060 143

The printer sends

```
ESC [ ? 1 ? c
033 133 077 081 067 143
```

which forms the product identification of the printer.

5.2.9 Printer Status Request

The printer automatically sends an answer to a device status request sequence. The answer sent is in the form of a Device Status Report (see Paragraph 5.2.10). The following sequences control printer status reports and enable or disable unsolicited reports.

Device Status Request (DSR)

ESC	[	n	or	ESC	{	0	n
033	133	156		033	133	060	156

Upon receiving either of the above sequences, the printer sends an extended status report.

ESC	[	?	1	n
033	133	077	061	156

Receipt of the above sequence disables all unsolicited status reports.

ESC	[	?	2	n
033	133	077	062	156

Receipt of the above sequence enables unsolicited brief status reports and the printer sends an extended status report.

ESC	[	?	3	n
033	133	077	063	156

Receipt of the above sequence enables unsolicited extended status reports and the printer sends an extended status report.

5.2.10 Printer Status Report

The printer is capable of sending brief and extended status reports. The reports may be solicited or unsolicited. Unsolicited reports, if enabled, are sent when any reportable status condition changes state. Unsolicited status reports are initially disabled. The following illustrates the specific formats and contents of the brief and extended printer status reports.

Device Status Report (Brief Report) (DSR)

```
ESC [ 0 n
033 133 060 156
```

The above sequence indicates that no malfunction was detected.

```
ESC [ 3 n
033 133 063 156
```

The above sequence indicates that a malfunction was detected.

Device Status Report (Extended Report) (DSR)

```
ESC [ 0 n
033 133 060 156
```

followed by

```
ESC [ ? 2 0 n
033 133 077 062 060 156
```

The above sequence indicates that no malfunction was detected.

```
ESC | 3 n
033 133 063 156
```

followed by

```
ESC | ? Pn ; ... Pn n
033 133 077 *** 073 ... *** 156
```

The above sequence indicates that a malfunction was detected. Pn may be any valid combination of the following values.

Pn	Failure
2 1 062 061	Hardware failure
2 2 062 062	Communication failure (event)
2 3 062 063	Input buffer overflow (event)
2 4 062 064	Printer deselected
2 6 062 066	Cover open
2 7 062 067	Paper empty

The only reportable hardware failure is printhead position failure. Communication failure may be parity or framing error or receipt of an erroneous character. Failures designated as events are reset upon sending an extended report, and are reportable only when they occur - not when they are reset.

5.2.11 Escape Sequences with 8-bit Equivalents

In 7-bit mode, there are 34 possible control characters as shown in columns 0 and 1, the SP in column 2 and the DEL in column 7 (refer to Figure 4-1).

Not all of these control characters are used by the LA50. The control characters used are shown in Appendix A.

Two character escape sequences from ESC @ (033 100) to ESC ____ (033 137) can be replaced by an equivalent control character from 200g to 237g in 8-bit mode. These 8-bit control characters are mapped on a 1-to-1 basis with the two-character escape sequences.

For example, the ESC K (033 113g) sequence for partial line down can be invoked in 8-bit mode by a control character of 213g. The control character causes the data to be compressed, since only one character, rather than two, is required. Another example is the ESC L (033 114) sequence for partial line up which can be replaced by a control character of 214g in 8-bit mode.

5.2.12 Entering and Exiting Graphic and Text Mode

Graphic mode provides a means for selectively printing individual dot patterns, rather than predefined characters from the character set table.

The ESC P q (033 120 161) escape sequence is used for entering graphic mode. If an ESC P is sent, the LA50 looks for a lowercase q. If it receives a digit (60 to 71g) it ignores the digit and looks for the lowercase q. When it receives the lowercase q, it enters graphic mode.

The following escape sequences cause the printer to enter a null state.

ESC ____
033 137

ESC |
033 135

ESC ^
033 136

5.3.1 Graphic Control Characters

Graphic control characters are characters in the octal range of 040 - 076. Characters not assigned are ignored. The others are processed as follows.

Octal Code	ASCII Symbol	Action Performed
041	!	Repeat introducer
044	\$	Graphic carriage return
055	-	Graphic new line

5.3.2 Graphic Carriage Return

The graphic carriage return character "\$" (octal 044) causes the carriage to move back to the position where the first graphic character was printed after entering graphic mode. This feature allows you to overprint lines of graphic data starting at the same horizontal position.

5.3.3 Graphic New Line

The graphic new line character "-" (octal 055) causes the carriage to move back as with graphic carriage return, and moves the paper forward (upward) 1/12 inch. This feature allows printing consecutive lines of graphic data starting at the same horizontal position.

5.3.4 Repeat Sequence

The following is a repeat sequence.

<repeat introducer> <numeric parameter> <printable character>

The repeat introducer is the graphic control character "!" (octal 041).

The numeric parameter specifies the number of times to print the character that follows. The numeric parameter is a string of characters in the octal range of 060 - 071 which is evaluated as a decimal number. If a numeric parameter is not received, or a parameter evaluates as 0, a value of one is assumed. If the parameter evaluates to a value larger than 65535, a value of 65535 is assumed. All decimal digits shall be processed as part of the count.

The printable character (a character in the octal range of 077 to 176) is printed as many times as specified by the numeric parameter-count. A repeat sequence has the same effect as receiving the printable character that number of times. All printable characters end the repeat sequence processing and start the printing.

All other characters received during a repeat sequence are processed as usual except for the substitute control character, which is treated the same as a graphic space character.

The following examples illustrate the repeat sequence.

Repeat Sequence	Function
1 1 0 ? 041 061 060 077	Repeat ten graphic spaces.
1 6 @ 041 066 100	Repeat six patterns of top dot only.

5.3.5 Graphic Substitute

The substitute character is interpreted as being in place of a character or characters received in error. In graphic mode, it is considered to be a graphic space. If a repeat sequence is being processed, the processing is cancelled and the number of graphic spaces required by the repeat count is printed. The printer remains in graphic mode.

5.3.6 State After Exiting Graphic Mode

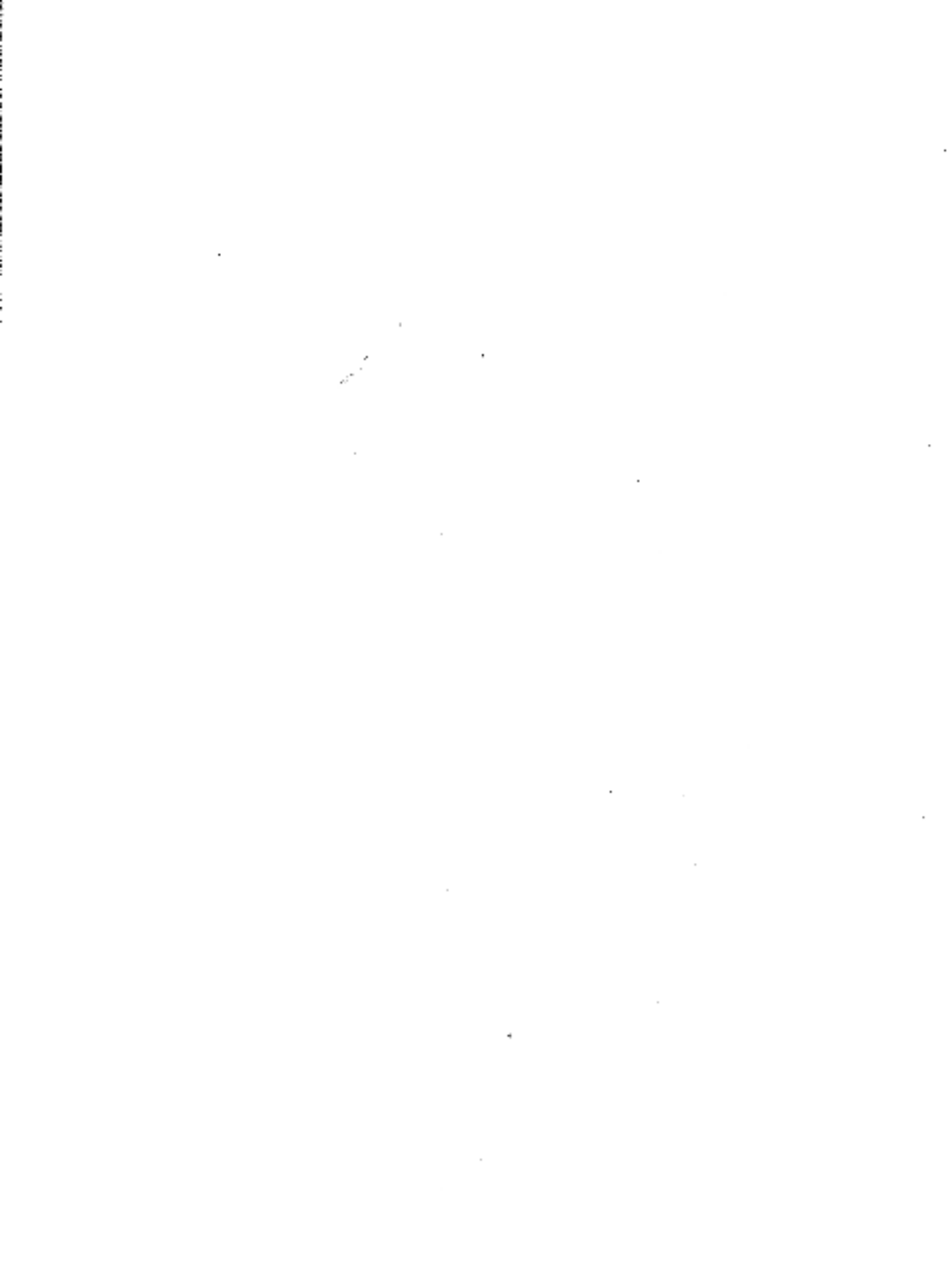
After an exit condition is met, the printer has the following state.

Horizontal position is the same as just before entering graphic mode.

Horizontal pitch is the same as just before entering graphic mode.

Vertical position is modified according to the control characters received while in graphic mode.

Vertical pitch is the same as just before entering graphic mode.



CHARACTER SET CHARTS

A

Table A-1 ASCII Character Set

PC BIT5 24 23 22 21 20 19	PC BIT 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	C O L U M N		C O L U M N		C O L U M N		C O L U M N		C O L U M N		C O L U M N		C O L U M N		C O L U M N		C O L U M N	
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1
0 0 0 0 0 0	0	NUL		SP	0	@	P	Y	P										
0 0 0 0 0 1	1		DC1	!	1	A	Q	a	q										
0 0 0 0 0 2	2				2	B	R	b	r										
0 0 0 0 0 3	3				3	C	S	c	s										
0 0 0 0 0 4	4				4	D	T	d	t										
0 0 0 0 0 5	5				5	E	U	e	u										
0 0 0 0 0 6	6				6	F	V	f	v										
0 0 0 0 0 7	7				7	G	W	g	w										
0 0 0 0 1 0	8	BS	CAN	(	8	H	X	h	x										
0 0 0 0 1 1	9	HT		)	9	I	Y	i	y										
0 0 0 1 0 0	10	LF	SUB	*	:	J	Z	j	z										
0 0 0 1 0 1	11	VT	ESC	+	;	K	[	k	{										
0 0 0 1 0 2	12	FF		,	<	L	\	l											
0 0 0 1 0 3	13	CR		-	=	M	]	m	}										
0 0 0 1 0 4	14	SO		.	>	N	^	n	~										
0 0 0 1 0 5	15	SI		/	?	O	_	o	DEL										

KEY

ASCII CHARACTER

ESC

22

13

16

01101011

10110110

10110110

A-100

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO GR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-2 VT100 Special Graphic Character Set

BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	BIT 7 BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0
0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0
NUL	SP	0	@	P	↑	↓	←	→
DC1 (SOH)	!	1	A	Q	↑	↓	←	→
DC2 (STX)	2	2	B	R	↑	↓	←	→
DC3 (ETX)	#	3	C	S	↑	↓	←	→
DC4 (EOT)	\$	4	D	T	↑	↓	←	→
DC5 (ENQ)	%	5	E	U	↑	↓	←	→
DC6 (ACK)	&	6	F	V	↑	↓	←	→
DC7 (BEL)	7	7	G	W	↑	↓	←	→
BS	CAN	8	H	X	↑	↓	←	→
HT	)	9	I	Y	↑	↓	←	→
LF	SUB	10	J	Z	↑	↓	←	→
VT	ESC	11	K	[	↑	↓	←	→
FF	12	12	L	\	↑	↓	←	→
CR	13	13	M	]	↑	↓	←	→
SO	14	14	N	^	↑	↓	←	→
SI	15	15	O	_	↑	↓	←	→

KEY

0 = 0, 1 = 1, 2 = 2, 3 = 3, 4 = 4, 5 = 5, 6 = 6, 7 = 7, 8 = 8, 9 = 9, A = 10, B = 11, C = 12, D = 13, E = 14, F = 15, G = 16, H = 17, I = 18, J = 19, K = 20, L = 21, M = 22, N = 23, O = 24, P = 25, Q = 26, R = 27, S = 28, T = 29, U = 30, V = 31, W = 32, X = 33, Y = 34, Z = 35, [= 36, \ = 37,] = 38, ^ = 39, _ = 40, ` = 41, a = 42, b = 43, c = 44, d = 45, e = 46, f = 47, g = 48, h = 49, i = 50, j = 51, k = 52, l = 53, m = 54, n = 55, o = 56, p = 57, q = 58, r = 59, s = 60, t = 61, u = 62, v = 63, w = 64, x = 65, y = 66, z = 67, { = 68, | = 69, } = 70, ~ = 71, = 72, > = 73, ? = 74, / = 75, \ = 76, ^ = 77, _ = 78, ` = 79, a = 80, b = 81, c = 82, d = 83, e = 84, f = 85, g = 86, h = 87, i = 88, j = 89, k = 90, l = 91, m = 92, n = 93, o = 94, p = 95, q = 96, r = 97, s = 98, t = 99, u = 100, v = 101, w = 102, x = 103, y = 104, z = 105, { = 106, | = 107, } = 108, ~ = 109, = 110, > = 111, ? = 112, / = 113, \ = 114, ^ = 115, _ = 116, ` = 117, a = 118, b = 119, c = 120, d = 121, e = 122, f = 123, g = 124, h = 125, i = 126, j = 127, k = 128, l = 129, m = 130, n = 131, o = 132, p = 133, q = 134, r = 135, s = 136, t = 137, u = 138, v = 139, w = 140, x = 141, y = 142, z = 143, { = 144, | = 145, } = 146, ~ = 147, = 148, > = 149, ? = 150, / = 151, \ = 152, ^ = 153, _ = 154, ` = 155, a = 156, b = 157, c = 158, d = 159, e = 160, f = 161, g = 162, h = 163, i = 164, j = 165, k = 166, l = 167, m = 168, n = 169, o = 170, p = 171, q = 172, r = 173, s = 174, t = 175, u = 176, v = 177, w = 178, x = 179, y = 180, z = 181, { = 182, | = 183, } = 184, ~ = 185, = 186, > = 187, ? = 188, / = 189, \ = 190, ^ = 191, _ = 192, ` = 193, a = 194, b = 195, c = 196, d = 197, e = 198, f = 199, g = 200, h = 201, i = 202, j = 203, k = 204, l = 205, m = 206, n = 207, o = 208, p = 209, q = 210, r = 211, s = 212, t = 213, u = 214, v = 215, w = 216, x = 217, y = 218, z = 219, { = 220, | = 221, } = 222, ~ = 223, = 224, > = 225, ? = 226, / = 227, \ = 228, ^ = 229, _ = 230, ` = 231, a = 232, b = 233, c = 234, d = 235, e = 236, f = 237, g = 238, h = 239, i = 240, j = 241, k = 242, l = 243, m = 244, n = 245, o = 246, p = 247, q = 248, r = 249, s = 250, t = 251, u = 252, v = 253, w = 254, x = 255, y = 256, z = 257, { = 258, | = 259, } = 260, ~ = 261, = 262, > = 263, ? = 264, / = 265, \ = 266, ^ = 267, _ = 268, ` = 269, a = 270, b = 271, c = 272, d = 273, e = 274, f = 275, g = 276, h = 277, i = 278, j = 279, k = 280, l = 281, m = 282, n = 283, o = 284, p = 285, q = 286, r = 287, s = 288, t = 289, u = 290, v = 291, w = 292, x = 293, y = 294, z = 295, { = 296, | = 297, } = 298, ~ = 299, = 300, > = 301, ? = 302, / = 303, \ = 304, ^ = 305, _ = 306, ` = 307, a = 308, b = 309, c = 310, d = 311, e = 312, f = 313, g = 314, h = 315, i = 316, j = 317, k = 318, l = 319, m = 320, n = 321, o = 322, p = 323, q = 324, r = 325, s = 326, t = 327, u = 328, v = 329, w = 330, x = 331, y = 332, z = 333, { = 334, | = 335, } = 336, ~ = 337, = 338, > = 339, ? = 340, / = 341, \ = 342, ^ = 343, _ = 344, ` = 345, a = 346, b = 347, c = 348, d = 349, e = 350, f = 351, g = 352, h = 353, i = 354, j = 355, k = 356, l = 357, m = 358, n = 359, o = 360, p = 361, q = 362, r = 363, s = 364, t = 365, u = 366, v = 367, w = 368, x = 369, y = 370, z = 371, { = 372, | = 373, } = 374, ~ = 375, = 376, > = 377, ? = 378, / = 379, \ = 380, ^ = 381, _ = 382, ` = 383, a = 384, b = 385, c = 386, d = 387, e = 388, f = 389, g = 390, h = 391, i = 392, j = 393, k = 394, l = 395, m = 396, n = 397, o = 398, p = 399, q = 400, r = 401, s = 402, t = 403, u = 404, v = 405, w = 406, x = 407, y = 408, z = 409, { = 410, | = 411, } = 412, ~ = 413, = 414, > = 415, ? = 416, / = 417, \ = 418, ^ = 419, _ = 420, ` = 421, a = 422, b = 423, c = 424, d = 425, e = 426, f = 427, g = 428, h = 429, i = 430, j = 431, k = 432, l = 433, m = 434, n = 435, o = 436, p = 437, q = 438, r = 439, s = 440, t = 441, u = 442, v = 443, w = 444, x = 445, y = 446, z = 447, { = 448, | = 449, } = 450, ~ = 451, = 452, > = 453, ? = 454, / = 455, \ = 456, ^ = 457, _ = 458, ` = 459, a = 460, b = 461, c = 462, d = 463, e = 464, f = 465, g = 466, h = 467, i = 468, j = 469, k = 470, l = 471, m = 472, n = 473, o = 474, p = 475, q = 476, r = 477, s = 478, t = 479, u = 480, v = 481, w = 482, x = 483, y = 484, z = 485, { = 486, | = 487, } = 488, ~ = 489, = 490, > = 491, ? = 492, / = 493, \ = 494, ^ = 495, _ = 496, ` = 497, a = 498, b = 499, c = 500, d = 501, e = 502, f = 503, g = 504, h = 505, i = 506, j = 507, k = 508, l = 509, m = 510, n = 511, o = 512, p = 513, q = 514, r = 515, s = 516, t = 517, u = 518, v = 519, w = 520, x = 521, y = 522, z = 523, { = 524, | = 525, } = 526, ~ = 527, = 528, > = 529, ? = 530, / = 531, \ = 532, ^ = 533, _ = 534, ` = 535, a = 536, b = 537, c = 538, d = 539, e = 540, f = 541, g = 542, h = 543, i = 544, j = 545, k = 546, l = 547, m = 548, n = 549, o = 550, p = 551, q = 552, r = 553, s = 554, t = 555, u = 556, v = 557, w = 558, x = 559, y = 560, z = 561, { = 562, | = 563, } = 564, ~ = 565, = 566, > = 567, ? = 568, / = 569, \ = 570, ^ = 571, _ = 572, ` = 573, a = 574, b = 575, c = 576, d = 577, e = 578, f = 579, g = 580, h = 581, i = 582, j = 583, k = 584, l = 585, m = 586, n = 587, o = 588, p = 589, q = 590, r = 591, s = 592, t = 593, u = 594, v = 595, w = 596, x = 597, y = 598, z = 599, { = 600, | = 601, } = 602, ~ = 603, = 604, > = 605, ? = 606, / = 607, \ = 608, ^ = 609, _ = 610, ` = 611, a = 612, b = 613, c = 614, d = 615, e = 616, f = 617, g = 618, h = 619, i = 620, j = 621, k = 622, l = 623, m = 624, n = 625, o = 626, p = 627, q = 628, r = 629, s = 630, t = 631, u = 632, v = 633, w = 634, x = 635, y = 636, z = 637, { = 638, | = 639, } = 640, ~ = 641, = 642, > = 643, ? = 644, / = 645, \ = 646, ^ = 647, _ = 648, ` = 649, a = 650, b = 651, c = 652, d = 653, e = 654, f = 655, g = 656, h = 657, i = 658, j = 659, k = 660, l = 661, m = 662, n = 663, o = 664, p = 665, q = 666, r = 667, s = 668, t = 669, u = 670, v = 671, w = 672, x = 673, y = 674, z = 675, { = 676, | = 677, } = 678, ~ = 679, = 680, > = 681, ? = 682, / = 683, \ = 684, ^ = 685, _ = 686, ` = 687, a = 688, b = 689, c = 690, d = 691, e = 692, f = 693, g = 694, h = 695, i = 696, j = 697, k = 698, l = 699, m = 700, n = 701, o = 702, p = 703, q = 704, r = 705, s = 706, t = 707, u = 708, v = 709, w = 710, x = 711, y = 712, z = 713, { = 714, | = 715, } = 716, ~ = 717, = 718, > = 719, ? = 720, / = 721, \ = 722, ^ = 723, _ = 724, ` = 725, a = 726, b = 727, c = 728, d = 729, e = 730, f = 731, g = 732, h = 733, i = 734, j = 735, k = 736, l = 737, m = 738, n = 739, o = 740, p = 741, q = 742, r = 743, s = 744, t = 745, u = 746, v = 747, w = 748, x = 749, y = 750, z = 751, { = 752, | = 753, } = 754, ~ = 755, = 756, > = 757, ? = 758, / = 759, \ = 760, ^ = 761, _ = 762, ` = 763, a = 764, b = 765, c = 766, d = 767, e = 768, f = 769, g = 770, h = 771, i = 772, j = 773, k = 774, l = 775, m = 776, n = 777, o = 778, p = 779, q = 780, r = 781, s = 782, t = 783, u = 784, v = 785, w = 786, x = 787, y = 788, z = 789, { = 790, | = 791, } = 792, ~ = 793, = 794, > = 795, ? = 796, / = 797, \ = 798, ^ = 799, _ = 800, ` = 801, a = 802, b = 803, c = 804, d = 805, e = 806, f = 807, g = 808, h = 809, i = 810, j = 811, k = 812, l = 813, m = 814, n = 815, o = 816, p = 817, q = 818, r = 819, s = 820, t = 821, u = 822, v = 823, w = 824, x = 825, y = 826, z = 827, { = 828, | = 829, } = 830, ~ = 831, = 832, > = 833, ? = 834, / = 835, \ = 836, ^ = 837, _ = 838, ` = 839, a = 840, b = 841, c = 842, d = 843, e = 844, f = 845, g = 846, h = 847, i = 848, j = 849, k = 850, l = 851, m = 852, n = 853, o = 854, p = 855, q = 856, r = 857, s = 858, t = 859, u = 860, v = 861, w = 862, x = 863, y = 864, z = 865, { = 866, | = 867, } = 868, ~ = 869, = 870, > = 871, ? = 872, / = 873, \ = 874, ^ = 875, _ = 876, ` = 877, a = 878, b = 879, c = 880, d = 881, e = 882, f = 883, g = 884, h = 885, i = 886, j = 887, k = 888, l = 889, m = 890, n = 891, o = 892, p = 893, q = 894, r = 895, s = 896, t = 897, u = 898, v = 899, w = 900, x = 901, y = 902, z = 903, { = 904, | = 905, } = 906, ~ = 907, = 908, > = 909, ? = 910, / = 911, \ = 912, ^ = 913, _ = 914, ` = 915, a = 916, b = 917, c = 918, d = 919, e = 920, f = 921, g = 922, h = 923, i = 924, j = 925, k = 926, l = 927, m = 928, n = 929, o = 930, p = 931, q = 932, r = 933, s = 934, t = 935, u = 936, v = 937, w = 938, x = 939, y = 940, z = 941, { = 942, | = 943, } = 944, ~ = 945, = 946, > = 947, ? = 948, / = 949, \ = 950, ^ = 951, _ = 952, ` = 953, a = 954, b = 955, c = 956, d = 957, e = 958, f = 959, g = 960, h = 961, i = 962, j = 963, k = 964, l = 965, m = 966, n = 967, o = 968, p = 969, q = 970, r = 971, s = 972, t = 973, u = 974, v = 975, w = 976, x = 977, y = 978, z = 979, { = 980, | = 981, } = 982, ~ = 983, = 984, > = 985, ? = 986, / = 987, \ = 988, ^ = 989, _ = 990, ` = 991, a = 992, b = 993, c = 994, d = 995, e = 996, f = 997, g = 998, h = 999, i = 1000, j = 1001, k = 1002, l = 1003, m = 1004, n = 1005, o = 1006, p = 1007, q = 1008, r = 1009, s = 1010, t = 1011, u = 1012, v = 1013, w = 1014, x = 1015, y = 1016, z = 1017, { = 1018, | = 1019, } = 1020, ~ = 1021, = 1022, > = 1023, ? = 1024, / = 1025, \ = 1026, ^ = 1027, _ = 1028, ` = 1029, a = 1030, b = 1031, c = 1032, d = 1033, e = 1034, f = 1035, g = 1036, h = 1037, i = 1038, j = 1039, k = 1040, l = 1041, m = 1042, n = 1043, o = 1044, p = 1045, q = 1046, r = 1047, s = 1048, t = 1049, u = 1050, v = 1051, w = 1052, x = 1053, y = 1054, z = 1055, { = 1056, | = 1057, } = 1058, ~ = 1059, = 1060, > = 1061, ? = 1062, / = 1063, \ = 1064, ^ = 1065, _ = 1066, ` = 1067, a = 1068, b = 1069, c = 1070, d = 1071, e = 1072, f = 1073, g = 1074, h = 1075, i = 1076, j = 1077, k = 1078, l = 1079, m = 1080, n = 1081, o = 1082, p = 1083, q = 1084, r = 1085, s = 1086, t = 1087, u = 1088, v = 1089, w = 1090, x = 1091, y = 1092, z = 1093, { = 1094, | = 1095, } = 1096, ~ = 1097, = 1098, > = 1099, ? = 1100, / = 1101, \ = 1102, ^ = 1103, _ = 1104, ` = 1105, a = 1106, b = 1107, c = 1108, d = 1109, e = 1110, f = 1111, g = 1112, h = 1113, i = 1114, j = 1115, k = 1116, l = 1117, m = 1118, n = 1119, o = 1120, p = 1121, q = 1122, r = 1123, s = 1124, t = 1125, u = 1126, v = 1127, w = 1128, x = 1129, y = 1130, z = 1131, { = 1132, | = 1133, } = 1134, ~ = 1135, = 1136, > = 1137, ? = 1138, / = 1139, \ = 1140, ^ = 1141, _ = 1142, ` = 1143, a = 1144, b = 1145, c = 1146, d = 1147, e = 1148, f = 1149, g = 1150, h = 1151, i = 1152, j = 1153, k = 1154, l = 1155, m = 1156, n = 1157, o = 1158, p = 1159, q = 1160, r = 1161, s = 1162, t = 1163, u = 1164, v = 1165, w = 1166, x = 1167, y = 1168, z = 1169, { = 1170, | = 1171, } = 1172, ~ = 1173, = 1174, > = 1175, ? = 1176, / = 1177, \ = 1178, ^ = 1179, _ = 1180, ` = 1181, a = 1182, b = 1183, c = 1184, d = 1185, e = 1186, f = 1187, g = 1188, h = 1189, i = 1190, j = 1191, k = 1192, l = 1193, m = 1194, n = 1195, o = 1196, p = 1197, q = 1198, r = 1199, s = 1200, t = 1201, u = 1202, v = 1203, w = 1204, x = 1205, y = 1206, z = 1207, { = 1208, | = 1209, } = 1210, ~ = 1211, = 1212, > = 1213, ? = 1214, / = 1215, \ = 1216, ^ = 1217, _ = 1218, ` = 1219, a = 1220, b = 1221, c = 1222, d = 1223, e = 1224, f = 1225, g = 1226, h = 1227, i = 1228, j = 1229, k = 1230, l = 1231, m = 1232, n = 1233, o = 1234, p = 1235, q = 1236, r = 1237, s = 1238, t = 1239, u = 1240, v = 1241, w = 1242, x = 1243, y = 1244, z = 1245, { = 1246, | = 1247, } = 1248, ~ = 1249, = 1250, > = 1251, ? = 1252, / = 1253, \ = 1254, ^ = 1255, _ = 1256, ` = 1257, a = 1258, b = 1259, c = 1260, d = 1261, e = 1262, f = 1263, g = 1264, h = 1265, i = 1266, j = 1267, k = 1268, l = 1269, m = 1270, n = 1271, o = 1272, p = 1273, q = 1274, r = 1275, s = 1276, t = 1277, u = 1278, v = 1279, w = 1280, x = 1281, y = 1282, z = 1283, { = 1284, | = 1285, } = 1286, ~ = 1287, = 1288, > = 1289, ? = 1290, / = 1291, \ = 1292, ^ = 1293, _ = 1294, ` = 1295, a = 1296, b = 1297, c = 1298, d = 1299, e = 1300, f = 1301, g = 1302, h = 1303, i = 1304, j = 1305, k = 1306, l = 1307, m = 1308, n = 1309, o = 1310, p = 1311, q = 1312, r = 1313, s = 1314, t = 1315, u = 1316, v = 1317, w = 1318, x = 1319, y = 1320, z = 1321, { = 1322, | = 1323, } = 1324, ~ = 1325, = 1326, > = 1327, ? = 1328, / = 1329, \ = 1330, ^ = 1331, _ = 1332, ` = 1333, a = 1334, b = 1335, c = 1336, d = 1337, e = 1338, f = 1339, g = 1340, h = 1341, i = 1342, j = 1343, k = 1344, l = 1345, m = 1346, n = 1347, o = 1348, p = 1349, q = 1350, r = 1351, s = 1352, t = 1353, u = 1354, v = 1355, w = 1356, x = 1357, y = 1358, z = 1359, { = 1360, | = 1361, } = 1362, ~ = 1363, = 1364, > = 1365, ? = 1366, / = 1367, \ = 1368, ^ = 1369, _ = 1370, ` = 1371, a = 1372, b = 1373, c = 1374, d = 1375, e = 1376, f = 1377, g = 1378, h = 1379, i = 1380, j = 1381, k = 1382, l = 1383, m = 1384, n = 1385, o = 1386, p = 1387, q = 1388, r = 1389, s = 1390, t = 1391, u = 1392, v = 1393, w = 1394, x = 1395, y = 1396, z = 1397, { = 1398, | = 1399, } = 1400, ~ = 1401, = 1402, > = 1403, ? = 1404, / = 1405, \ = 1406, ^ = 1407, _ = 1408, ` = 1409, a = 1410, b = 1411, c = 1412, d = 1413, e = 1414, f = 1415, g = 1416, h = 1417, i = 1418, j = 1419, k = 1420, l = 1421, m = 1422, n = 1423, o = 1424, p = 1425, q = 1426, r = 1427, s = 1428, t = 1429, u = 1430, v = 1431, w = 1432, x = 1433, y = 1434, z = 1435, { = 1436, | = 1437, } = 1438, ~ = 1439, = 1440, > = 1441, ? = 1442, / = 1443, \ = 1444, ^ = 1445, _ = 1446, ` = 1447, a = 1448, b = 1449, c = 1450, d = 1451, e = 1452, f = 1453, g = 1454, h = 1455, i = 1456, j = 1457, k = 1458, l = 1459, m = 1460, n = 1461, o = 1462, p = 1463, q = 1464, r = 1465, s = 1466, t = 1467, u = 1468, v = 1469, w = 1470, x = 1471,

Table A-3 Finnish Character Set

32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0 BITS		0 1 2 3 4 5 6 7		0 1 2 3 4 5 6 7		0 1 2 3 4 5 6 7		0 1 2 3 4 5 6 7		0 1 2 3 4 5 6 7		0 1 2 3 4 5 6 7	
00000000		00000001		00000010		00000011		00000100		00000101		00000110	
00000111		00001000		00001001		00001010		00001011		00001100		00001101	
00001110		00001111		00010000		00010001		00010010		00010011		00010100	
00010101		00010110		00010111		00011000		00011001		00011010		00011011	
00011100		00011101		00011110		00011111		00100000		00100001		00100010	
00100011		00100100		00100101		00100110		00100111		00101000		00101001	
00101010		00101011		00101100		00101101		00101110		00101111		00110000	
00110001		00110010		00110011		00110100		00110101		00110110		00110111	
00111000		00111001		00111010		00111011		00111100		00111101		00111110	
00111111		01000000		01000001		01000010		01000011		01000100		01000101	
01000110		01000111		01001000		01001001		01001010		01001011		01001100	
01001101		01001110		01001111		01010000		01010001		01010010		01010011	
01010100		01010101		01010110		01010111		01011000		01011001		01011010	
01011011		01011100		01011101		01011110		01011111		01100000		01100001	
01100010		01100011		01100100		01100101		01100110		01100111		01101000	
01101001		01101010		01101011		01101100		01101101		01101110		01101111	
01110000		01110001		01110010		01110011		01110100		01110101		01110110	
01110111		01111000		01111001		01111010		01111011		01111100		01111101	
01111110		10000000		10000001		10000010		10000011		10000100		10000101	
10000110		10000111		10001000		10001001		10001010		10001011		10001100	
10001101		10001110		10001111		10010000		10010001		10010010		10010011	
10010100		10010101		10010110		10010111		10011000		10011001		10011010	
10011011		10011100		10011101		10011110		10011111		10100000		10100001	
10100010		10100011		10100100		10100101		10100110		10100111		10101000	
10101001		10101010		10101011		10101100		10101101		10101110		10101111	
10110000		10110001		10110010		10110011		10110100		10110101		10110110	
10110111		10111000		10111001		10111010		10111011		10111100		10111101	
10111110		11000000		11000001		11000010		11000011		11000100		11000101	
11000110		11000111		11001000		11001001		11001010		11001011		11001100	
11001101		11001110		11001111		11010000		11010001		11010010		11010011	
11010100		11010101		11010110		11010111		11011000		11011001		11011010	
11011011		11011100		11011101		11011110		11011111		11100000		11100001	
11100010		11100011		11100100		11100101		11100110		11100111		11101000	
11101001		11101010		11101011		11101100		11101101		11101110		11101111	
11110000		11110001		11110010		11110011		11110100		11110101		11110110	
11110111		11111000		11111001		11111010		11111011		11111100		11111101	
11111110													

KEY

ASCII CHARACTER

ESC	25
	27
	28

 25
ASCII
27
ASCII
28
ASCII

 3x3
CHARACTER
SET
FROM
ASCII

A-3-1000

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO OL. IF CHARACTER SET IS LOADED INTO 3R (8 BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-4 French Character Set

0 1 2 3 4 5 6 7 BITS 00 01 10 11 00 01 10 11	0 0 0 0 0 1 1 1 0 1 2 3 4 5 6 7 COLUMNS							
	0	1	2	3	4	5	6	7
	NUL		3P	0		P		
0 0 0 0 0 0 0 0								
0 0 0 0 0 0 0 1		DC1 (XOFF)		1	A	Q	a	q
0 0 0 0 0 0 1 0				2	B	R	b	r
0 0 0 0 0 0 1 1		DC3 (XOFF)		3	C	S	c	s
0 0 0 0 0 1 0 0			\$	4	D	T	d	t
0 0 0 0 0 1 0 1			%	5	E	U	e	u
0 0 0 0 0 1 1 0			&	6	F	V	f	v
0 0 0 0 0 1 1 1			'	7	G	W	g	w
0 0 0 0 1 0 0 0	BS	CAN	(	8	H	X	h	x
0 0 0 0 1 0 0 1	HT		)	9	I	Y	i	y
0 0 0 0 1 0 1 0	LF	SUB	*		J	Z	j	z
0 0 0 0 1 0 1 1	VT	ESC	+	:	K		k	
0 0 0 0 1 1 0 0	FF		,	<	L		l	
0 0 0 0 1 1 0 1	CR		=	=	M		m	
0 0 0 0 1 1 1 0	SD		-	>	N	A	n	
0 0 0 0 1 1 1 1	SI		/	?	O		o	DEL

KEY

ASCII CHARACTER

ESC

255

DECIMAL

10

OCTAL

16

HEX

HIGHLIGHTED DIFFERENCES
FROM ASCII

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO OR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-5 French Canadian Character Set

32 00 BITS	0	1	2	3	4	5	6	7
0000 0000 0000 0000	0	1	2	3	4	5	6	7
0 0 0 0 0	NUL		SP	0	1	P	2	p
0 0 0 0 1		DC1	3	1	A	Q	a	q
0 0 0 1 0			4	2	B	R	b	r
0 0 0 1 1		DC3	#	3	C	S	c	s
0 0 1 0 0			5	4	D	T	d	t
0 0 1 0 1			%	5	E	U	e	u
0 0 1 1 0			&	6	F	V	f	v
0 0 1 1 1			7	7	G	W	g	w
0 1 0 0 0	BS	CAN	[	8	H	X	h	x
0 1 0 0 1			]	9	I	Y	i	y
0 1 0 1 0	LF	SUB	*	:	J	Z	j	z
0 1 0 1 1	VT	ESC	+	;	K	[	k	4
0 1 1 0 0	FF		<	<	L	\	l	5
0 1 1 0 1	CR		=	=	M	]	m	6
0 1 1 1 0	SD		>	>	N	^	n	7
0 1 1 1 1	SI		/	?	O	_	o	DEL

KEY

ASCII CHARACTER

ESC

00

HEX

UNUSUAL

IF

HEX

HIGH-BIT DIFFERENCES
FROM ASCII

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO OR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-6 German Character Set

BIT 3				C		1		2		3		4		5		6		7	
BITS				0		1		2		3		4		5		6		7	
0	1	2	3	0		1		2		3		4		5		6		7	
0	0	0	0	NUL	0	0	0	SP	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	1	0		DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1	DC1
0	0	1	1																
0	1	0	0																
0	1	0	1		DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3	DC3
0	1	1	0																
0	1	1	1																
1	0	0	0																
1	0	0	1																
1	0	1	0																
1	0	1	1																
1	1	0	0	BS	CAN														
1	1	0	1	HT															
1	1	1	0	LF	SUB														
1	1	1	1	VT	ESC														
1	1	1	0	FF															
1	1	1	1	CR															
1	1	1	0	SO															
1	1	1	1	SI															

KEY

ASC CHARACTER

ESC

0

TOTAL

1

DECIMAL

16

HEX



DIFFERENCE IN CHARACTER SETS

PRINTING

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO GR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-7 Italian Character Set

BITS		OCCURS		0		1		2		3		4		5		6		7	
45 44 43 42 41 40 39 38		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
0 0 0 0 0 0 0 0	2	NUL			SP	0													
0 0 0 0 1 0 0 0	1		DC1			1		A		Q									
0 0 0 0 1 0 0 1	1																		
0 0 0 0 1 0 0 1	2					2		B		R									
0 0 0 0 1 0 0 1	3																		
0 0 0 0 1 0 0 1	4		DC3			3		C		S									
0 0 0 0 1 0 0 1	5																		
0 0 0 0 1 0 0 1	6					4		D		T									
0 0 0 0 1 0 0 1	7																		
0 0 0 0 1 0 0 1	8					5		E		U									
0 0 0 0 1 0 0 1	9																		
0 0 0 0 1 0 0 1	10					6		F		V									
0 0 0 0 1 0 0 1	11																		
0 0 0 0 1 0 0 1	12					7		G		W									
0 0 0 0 1 0 0 1	13																		
0 0 0 0 1 0 0 1	14	B5	CAN			8		H		X									
0 0 0 0 1 0 0 1	15																		
0 0 0 0 1 0 0 1	16	HT				9		I		Y									
0 0 0 0 1 0 0 1	17																		
0 0 0 0 1 0 0 1	18	LF	SUB			10		J		Z									
0 0 0 0 1 0 0 1	19																		
0 0 0 0 1 0 0 1	20	VT	ESC			11		K											
0 0 0 0 1 0 0 1	21																		
0 0 0 0 1 0 0 1	22	PF				12		L											
0 0 0 0 1 0 0 1	23																		
0 0 0 0 1 0 0 1	24	CR				13		M											
0 0 0 0 1 0 0 1	25																		
0 0 0 0 1 0 0 1	26	SO				14		N		A									
0 0 0 0 1 0 0 1	27																		
0 0 0 0 1 0 0 1	28	SI				15													

KEY

ACKNOWLEDGMENTS

ESC	20	ctrl,
	21	ctrl C
	9	tab

5.2.2. REGULATORY DIFFERENCES



22-22-2

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO OR (8-BIT MODE ONLY), ADD 700 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-9 Katakana Character Set

47 00 63	46 01 62	45 02 61	44 03 60	43 04 59	42 05 58	41 06 57	40 07 56	39 08 55	38 09 54	37 10 53	36 11 52	35 12 51	34 13 50	33 14 49	32 15 48	31 16 47	30 17 46	29 18 45	28 19 44	27 20 43	26 21 42	25 22 41	24 23 40	23 24 39	22 25 38	21 26 37	20 27 36	19 28 35	18 29 34	17 30 33	16 31 32	15 32 31	14 33 30	13 34 29	12 35 28	11 36 27	10 37 26	9 38 25	8 39 24	7 40 23	6 41 22	5 42 21	4 43 20	3 44 19	2 45 18	1 46 17	0 47 16	48 00 64	49 01 65	50 02 66	51 03 67	52 04 68	53 05 69	54 06 70	55 07 71	56 08 72	57 09 73	58 10 74	59 11 75	60 12 76	61 13 77	62 14 78	63 15 79	64 16 80	65 17 81	66 18 82	67 19 83	68 20 84	69 21 85	70 22 86	71 23 87	72 24 88	73 25 89	74 26 90	75 27 91	76 28 92	77 29 93	78 30 94	79 31 95	80 32 96	81 33 97	82 34 98	83 35 99	84 36 100	85 37 101	86 38 102	87 39 103	88 40 104	89 41 105	90 42 106	91 43 107	92 44 108	93 45 109	94 46 110	95 47 111	96 48 112	97 49 113	98 50 114	99 51 115	100 52 116	101 53 117	102 54 118	103 55 119	104 56 120	105 57 121	106 58 122	107 59 123	108 60 124	109 61 125	110 62 126	111 63 127	112 64 128	113 65 129	114 66 130	115 67 131	116 68 132	117 69 133	118 70 134	119 71 135	120 72 136	121 73 137	122 74 138	123 75 139	124 76 140	125 77 141	126 78 142	127 79 143	128 80 144	129 81 145	130 82 146	131 83 147	132 84 148	133 85 149	134 86 150	135 87 151	136 88 152	137 89 153	138 90 154	139 91 155	140 92 156	141 93 157	142 94 158	143 95 159	144 96 160	145 97 161	146 98 162	147 99 163	148 100 164	149 101 165	150 102 166	151 103 167	152 104 168	153 105 169	154 106 170	155 107 171	156 108 172	157 109 173	158 110 174	159 111 175	160 112 176	161 113 177	162 114 178	163 115 179	164 116 180	165 117 181	166 118 182	167 119 183	168 120 184	169 121 185	170 122 186	171 123 187	172 124 188	173 125 189	174 126 190	175 127 191	176 128 192	177 129 193	178 130 194	179 131 195	180 132 196	181 133 197	182 134 198	183 135 199	184 136 200	185 137 201	186 138 202	187 139 203	188 140 204	189 141 205	190 142 206	191 143 207	192 144 208	193 145 209	194 146 210	195 147 211	196 148 212	197 149 213	198 150 214	199 151 215	200 152 216	201 153 217	202 154 218	203 155 219	204 156 220	205 157 221	206 158 222	207 159 223	208 160 224	209 161 225	210 162 226	211 163 227	212 164 228	213 165 229	214 166 230	215 167 231	216 168 232	217 169 233	218 170 234	219 171 235	220 172 236	221 173 237	222 174 238	223 175 239	224 176 240	225 177 241	226 178 242	227 179 243	228 180 244	229 181 245	230 182 246	231 183 247	232 184 248	233 185 249	234 186 250	235 187 251	236 188 252	237 189 253	238 190 254	239 191 255	240 192 256	241 193 257	242 194 258	243 195 259	244 196 260	245 197 261	246 198 262	247 199 263	248 200 264	249 201 265	250 202 266	251 203 267	252 204 268	253 205 269	254 206 270	255 207 271	256 208 272	257 209 273	258 210 274	259 211 275	260 212 276	261 213 277	262 214 278	263 215 279	264 216 280	265 217 281	266 218 282	267 219 283	268 220 284	269 221 285	270 222 286	271 223 287	272 224 288	273 225 289	274 226 290	275 227 291	276 228 292	277 229 293	278 230 294	279 231 295	280 232 296	281 233 297	282 234 298	283 235 299	284 236 300	285 237 301	286 238 302	287 239 303	288 240 304	289 241 305	290 242 306	291 243 307	292 244 308	293 245 309	294 246 310	295 247 311	296 248 312	297 249 313	298 250 314	299 251 315	300 252 316	301 253 317	302 254 318	303 255 319	304 256 320	305 257 321	306 258 322	307 259 323	308 260 324	309 261 325	310 262 326	311 263 327	312 264 328	313 265 329	314 266 330	315 267 331	316 268 332	317 269 333	318 270 334	319 271 335	320 272 336	321 273 337	322 274 338	323 275 339	324 276 340	325 277 341	326 278 342	327 279 343	328 280 344	329 281 345	330 282 346	331 283 347	332 284 348	333 285 349	334 286 350	335 287 351	336 288 352	337 289 353	338 290 354	339 291 355	340 292 356	341 293 357	342 294 358	343 295 359	344 296 360	345 297 361	346 298 362	347 299 363	348 300 364	349 301 365	350 302 366	351 303 367	352 304 368	353 305 369	354 306 370	355 307 371	356 308 372	357 309 373	358 310 374	359 311 375	360 312 376	361 313 377	362 314 378	363 315 379	364 316 380	365 317 381	366 318 382	367 319 383	368 320 384	369 321 385	370 322 386	371 323 387	372 324 388	373 325 389	374 326 390	375 327 391	376 328 392	377 329 393	378 330 394	379 331 395	380 332 396	381 333 397	382 334 398	383 335 399	384 336 400	385 337 401	386 338 402	387 339 403	388 340 404	389 341 405	390 342 406	391 343 407	392 344 408	393 345 409	394 346 410	395 347 411	396 348 412	397 349 413	398 350 414	399 351 415	400 352 416	401 353 417	402 354 418	403 355 419	404 356 420	405 357 421	406 358 422	407 359 423	408 360 424	409 361 425	410 362 426	411 363 427	412 364 428	413 365 429	414 366 430	415 367 431	416 368 432	417 369 433	418 370 434	419 371 435	420 372 436	421 373 437	422 374 438	423 375 439	424 376 440	425 377 441	426 378 442	427 379 443	428 380 444	429 381 445	430 382 446	431 383 447	432 384 448	433 385 449	434 386 450	435 387 451	436 388 452	437 389 453	438 390 454	439 391 455	440 392 456	441 393 457	442 394 458	443 395 459	444 396 460	445 397 461	446 398 462	447 399 463	448 400 464	449 401 465	450 402 466	451 403 467	452 404 468	453 405 469	454 406 470	455 407 471	456 408 472	457 409 473	458 410 474	459 411 475	460 412 476	461 413 477	462 414 478	463 415 479	464 416 480	465 417 481	466 418 482	467 419 483	468 420 484	469 421 485	470 422 486	471 423 487	472 424 488	473 425 489	474 426 490	475 427 491	476 428 492	477 429 493	478 430 494	479 431 495	480 432 496	481 433 497	482 434 498	483 435 499	484 436 500	485 437 501	486 438 502	487 439 503	488 440 504	489 441 505	490 442 506	491 443 507	492 444 508	493 445 509	494 446 510	495 447 511	496 448 512	497 449 513	498 450 514	499 451 515	500 452 516	501 453 517	502 454 518	503 455 519	504 456 520	505 457 521	506 458 522	507 459 523	508 460 524	509 461 525	510 462 526	511 463 527	512 464 528	513 465 529	514 466 530	515 467 531	516 468 532	517 469 533	518 470 534	519 471 535	520 472 536	521 473 537	522 474 538	523 475 539	524 476 540	525 477 541	526 478 542	527 479 543	528 480 544	529 481 545	530 482 546	531 483 547	532 484 548	533 485 549	534 486 550	535 487 551	536 488 552	537 489 553	538 490 554	539 491 555	540 492 556	541 493 557	542 494 558	543 495 559	544 496 560	545 497 561	546 498 562	547 499 563	548 500 564	549 501 565	550 502 566	551 503 567	552 504 568	553 505 569	554 506 570	555 507 571	556 508 572	557 509 573	558 510 574	559 511 575	560 512 576	561 513 577	562 514 578	563 515 579	564 516 580	565 517 581	566 518 582	567 519 583	568 520 584	569 521 585	570 522 586	571 523 587	572 524 588	573 525 589	574 526 590	575 527 591	576 528 592	577 529 593	578 530 594	579 531 595	580 532 596	581 533 597	582 534 598	583 535 599	584 536 600	585 537 601	586 538 602	587 539 603	588 540 604	589 541 605	590 542 606	591 543 607	592 544 608	593 545 609	594 546 610	595 547 611	596 548 612	597 549 613	598 550 614	599 551 615	600 552 616	601 553 617	602 554 618	603 555 619	604 556 620	605 557 621	606 558 622	607 559 623	608 560 624	609 561 625	610 562 626	611 563 627	612 564 628	613 565 629	614 566 630	615 567 631	616 568 632	617 569 633	618 570 634	619 571 635	620 572 636	621 573 637	622 574 638	623 575 639	624 576 640	625 577 641	626 578 642	627 579 643	628 580 644	629 581 645	630 582 646	631 583 647	632 584 648	633 585 649	634 586 650	635 587 651	636 588 652	637 589 653	638 590 654	639 591 655	640 592 656	641 593 657	642 594 658	643 595 659	644 596 660	645 597 661	646 598 662	647 599 663	648 600 664	649 601 665	650 602 666	651 603 667	652 604 668	653 605 669	654 606 670	655 607 671	656 608 672	657 609 673	658 610 674	659 611 675	660 612 676	661 613 677	662 614 678	663 615 679	664 616 680	665 617 681	666 618 682	667 619 683	668 620 684	669 621 685	670 622 686	671 623 687	672 624 688	673 625 689	674 626 690	675 627 691	676 628 692	677 629 693	678 630 694	679 631 695	680 632 696	681 633 697	682 634 698	683 635 699	684 636 700	685 637 701	686 638 702	687 639 703	688 640 704	689 641 705	690 642 706	691 643 707	692 644 708	693 645 709	694 646 710	695 647 711	696 648 712	697 649 713	698 650 714	699 651 715	700 652 716	70
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Table A-10 Multinational Character Set

BITS				0		1		2		3		4		5		6		7	
31 30 29 28				COLLUM		0		1		2		3		4		5		6	
31 30 29 28				0		1		2		3		4		5		6		7	
0	0	0	0	1	NUL			SP				À		Í		à		í	
0	0	0	1	0		DC1		!		±		Á		Ê		á		ê	
0	0	0	1	1				"		³		Â		Ë		â		ë	
0	0	1	0	0				#		´		Ã		Ì		ã		ì	
0	0	1	0	1				\$		µ		Ä		Ó		ä		ó	
0	0	1	1	0				%		¶		Å		Ô		å		ô	
0	0	1	1	1				&		·		Ä		Õ		ä		õ	
0	1	0	0	0				'		¸		Å		Ö		å		ö	
0	1	0	0	1				(		¹		Æ		Ø		æ		ø	
0	1	0	1	0				)		º		Æ		Ù		æ		ù	
0	1	0	1	1				*		»		Ç		Ú		ç		ú	
0	1	1	0	0				+		¼		È		Û		è		û	
0	1	1	0	1				,		½		É		Ü		é		ü	
0	1	1	1	0				.		¾		Ë		Ý		ë		ý	
0	1	1	1	1				:				Ì		Þ		ì		þ	
1	0	0	0	0				;				Í		à		í			
1	0	0	0	1				<				Î		á		î			
1	0	0	1	0				=				Ï		â		ï			
1	0	0	1	1				>				Ð		ã		ð			
1	0	1	0	0				@				Ñ		ä		ñ			
1	0	1	0	1				A				Ò		å		ò			
1	0	1	1	0				B				Ó		æ		ó			
1	0	1	1	1				C				Ô		å		ô			
1	1	0	0	0				D				Õ		ä		õ			
1	1	0	0	1				E				Ö		å		ö			
1	1	0	1	0				F				×		ä		×			
1	1	0	1	1				G				Y		å		ÿ			
1	1	1	0	0				H				Z		ä		z			
1	1	1	0	1				I				[		ä		[			
1	1	1	1	0				J				]		ä		]			
1	1	1	1	1				K				^		ä		^			
1	1	1	1	1				_				¸		ä		_			
1	1	1	1	1				9				9		ä		9			
1	1	1	1	1				:				:		ä		:			
1	1	1	1	1				<				<		ä		<			
1	1	1	1	1				=				=		ä		=			
1	1	1	1	1				>				>		ä		>			
1	1	1	1	1				@				@		ä		@			
1	1	1	1	1				A				A		ä		A			
1	1	1	1	1				B				B		ä		B			
1	1	1	1	1				C				C		ä		C			
1	1	1	1	1				D				D		ä		D			
1	1	1	1	1				E				E		ä		E			
1	1	1	1	1				F				F		ä		F			
1	1	1	1	1				G				G		ä		G			
1	1	1	1	1				H				H		ä		H			
1	1	1	1	1				I				I		ä		I			
1	1	1	1	1				J				J		ä		J			
1	1	1	1	1				K				K		ä		K			
1	1	1	1	1				L				L		ä		L			
1	1	1	1	1				M				M		ä		M			
1	1	1	1	1				N				N		ä		N			
1	1	1	1	1				O				O		ä		O			
1	1	1	1	1				P				P		ä		P			
1	1	1	1	1				Q				Q		ä		Q			
1	1	1	1	1				R				R		ä		R			
1	1	1	1	1				S				S		ä		S			
1	1	1	1	1				T				T		ä		T			
1	1	1	1	1				U				U		ä		U			
1	1	1	1	1				V				V		ä		V			
1	1	1	1	1				W				W		ä		W			
1	1	1	1	1				X				X		ä		X			
1	1	1	1	1				Y				Y		ä		Y			
1	1	1	1	1				Z				Z		ä		Z			
1	1	1	1	1				[				[		ä		[			
1	1	1	1	1				]				]		ä		]			
1	1	1	1	1				^				^		ä		^			
1	1	1	1	1				_				_		ä		_			
1	1	1	1	1				¸				¸		ä		¸			
1	1	1	1	1				9				9		ä		9			
1	1	1	1	1				:				:		ä		:			
1	1	1	1	1				<				<		ä		<			
1	1	1	1	1				=				=		ä		=			
1	1	1	1	1				>				>		ä		>			
1	1	1	1	1				@				@		ä		@			
1	1	1	1	1				A				A		ä		A			
1	1	1	1	1				B				B		ä		B			
1	1	1	1	1				C				C		ä		C			
1	1	1	1	1				D				D		ä		D			
1	1	1	1	1				E				E		ä		E			
1	1	1	1	1				F				F		ä		F			
1	1	1	1	1				G				G		ä		G			
1	1	1	1	1				H				H		ä		H			
1	1	1	1	1				I				I		ä		I			
1	1	1	1	1				J				J		ä		J			
1	1	1	1	1				K				K		ä		K			
1	1	1	1	1				L				L		ä		L			
1	1	1	1	1				M				M		ä		M			
1	1	1	1	1				N				N		ä		N			
1	1	1	1	1				O				O		ä		O			
1	1	1	1	1				P				P		ä		P			
1	1	1	1	1				Q				Q		ä		Q			
1	1	1	1	1				R				R		ä		R			
1	1	1	1	1				S				S		ä		S			
1	1	1	1	1				T				T		ä		T			
1	1	1	1	1				U				U		ä		U			
1	1	1	1	1				V				V		ä		V			
1	1	1	1	1				W				W		ä		W			
1	1	1	1	1				X				X		ä		X			
1	1	1	1	1				Y				Y		ä		Y			
1	1	1	1	1				Z				Z		ä		Z			
1	1	1	1	1				[				[		ä		[			
1	1	1	1	1				]				]		ä		]			
1	1	1	1	1				^				^		ä		^			
1	1	1	1	1				_				_		ä		_			
1	1	1	1	1				¸				¸		ä		¸			
1	1	1	1	1				9				9		ä		9			
1	1	1	1	1				:				:		ä		:			
1	1	1	1	1				<				<		ä		<			
1	1	1	1	1				=				=		ä		=			
1	1	1	1	1				>				>		ä		>			
1	1	1	1	1				@				@		ä		@			
1	1	1	1	1				A				A		ä		A			
1</																			

Table A-11 Norwegian/Danish Character Set

NT	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0	COL. 0	COL. 1	COL. 2	COL. 3	COL. 4	COL. 5	COL. 6	COL. 7
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
0 0 0 0	0	NUL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 0 0 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
0 0 1 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 0 1 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
0 1 0 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 1 0 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
0 1 1 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 1 1 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 0 0 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 0 0 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 0 1 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 0 1 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1 0 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 1 0 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1 1 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 1 1 1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1

KEY

ASCII CHARACTER

ESC	27	00111001
	28	00111010
	29	00111011

MISSING - IS DIFFERENT
FROM ASCII

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO CL. IF CHARACTER SET IS LOADED INTO GR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-12 Spanish Character Set

8 7 6 5 4 3 2 1 0 BITS		0 1 2 3 4 5 6 7 THIS CHAR		0 1 2 3 4 5 6 7 0		0 1 2 3 4 5 6 7 1		0 1 2 3 4 5 6 7 2		0 1 2 3 4 5 6 7 3		0 1 2 3 4 5 6 7 4		0 1 2 3 4 5 6 7 5		0 1 2 3 4 5 6 7 6		0 1 2 3 4 5 6 7 7								
8	7	6	5	4	3	2	1	0	8	7	6	5	4	3	2	1	0	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	NUL	20	SP	40	0	91	8	P	142	p	183							
0	0	0	0	0	0	0	1	1	DC1 SOH	21	!	33	1	92	A	Q	143	q	184							
0	0	0	0	0	0	1	0	0	22	11	42	2	93	B	R	144	r	185								
0	0	0	0	0	1	0	1	1	DC3 SHO	23	8	43	3	94	C	S	145	s	186							
0	0	0	0	1	0	0	0	0	24	13	53	4	95	D	T	146	t	187								
0	0	0	0	1	0	0	1	1	25	14	63	5	96	E	U	147	u	188								
0	0	0	0	1	0	1	0	0	26	15	73	6	97	F	V	148	v	189								
0	0	0	0	1	0	1	1	1	27	16	83	7	98	G	W	149	w	190								
0	0	0	1	0	0	0	0	0	28	17	93	8	99	H	X	150	x	191								
0	0	0	1	0	0	0	1	1	29	18	04	9	100	I	Y	151	y	192								
0	0	0	1	0	0	1	0	0	30	19	14	10	101	J	Z	152	z	193								
0	0	0	1	0	0	1	1	1	31	20	24	11	102	K		153		194								
0	0	1	0	0	0	0	0	0	32	21	34	12	103	L		154		195								
0	0	1	0	0	0	0	1	1	33	22	44	13	104	M		155		196								
0	0	1	0	0	0	1	0	0	34	23	54	14	105	N	A	156	~	197								
0	0	1	0	0	0	1	1	1	35	24	64	15	106	O	—	157	DEL	198								
0	0	1	0	1	0	0	0	0	36	25	74	16	107													
0	0	1	0	1	0	0	1	1	37	26	84	17	108													
0	0	1	0	1	0	1	0	0	38	27	94	18	109													
0	0	1	0	1	0	1	1	1	39	28	05	19	110													
0	0	1	0	1	1	0	0	0	40	29	15	20	111													
0	0	1	0	1	1	0	1	1	41	30	25	21	112													
0	0	1	0	1	1	1	0	0	42	31	35	22	113													
0	0	1	0	1	1	1	1	1	43	32	45	23	114													
0	1	0	0	0	0	0	0	0	44	33	55	24	115													
0	1	0	0	0	0	0	1	1	45	34	65	25	116													
0	1	0	0	0	0	1	0	0	46	35	75	26	117													
0	1	0	0	0	0	1	1	1	47	36	85	27	118													
0	1	0	0	0	1	0	0	0	48	37	95	28	119													
0	1	0	0	0	1	0	1	1	49	38	06	29	120													
0	1	0	0	0	1	1	0	0	50	39	16	30	121													
0	1	0	0	0	1	1	1	1	51	40	26	31	122													
0	1	0	0	1	0	0	0	0	52	41	36	32	123													
0	1	0	0	1	0	0	1	1	53	42	46	33	124													
0	1	0	0	1	0	1	0	0	54	43	56	34	125													
0	1	0	0	1	0	1	1	1	55	44	66	35	126													
0	1	0	0	1	1	0	0	0	56	45	76	36	127													
0	1	0	0	1	1	0	1	1	57	46	86	37	128													
0	1	0	0	1	1	1	0	0	58	47	96	38	129													
0	1	0	0	1	1	1	1	1	59	48	07	39	130													
0	1	0	1	0	0	0	0	0	60	49	17	40	131													
0	1	0	1	0	0	0	1	1	61	50	27	41	132													
0	1	0	1	0	0	0	0	0	62	51	37	42	133													
0	1	0	1	0	0	0	1	1	63	52	47	43	134													
0	1	0	1	0	0	1	0	0	64	53	57	44	135													
0	1	0	1	0	0	1	1	1	65	54	67	45	136													
0	1	0	1	0	1	0	0	0	66	55	77	46	137													
0	1	0	1	0	1	0	1	1	67	56	87	47	138													
0	1	0	1	0	1	1	0	0	68	57	97	48	139													
0	1	0	1	0	1	1	1	1	69	58	08	49	140													
0	1	0	1	1	0	0	0	0	70	59	18	50	141													
0	1	0	1	1	0	0	1	1	71	60	28	51	142													
0	1	0	1	1	0	0	0	0	72	61	38	52	143													
0	1	0	1	1	0	0	1	1	73	62	48	53	144													
0	1	0	1	1	0	1	0	0	74	63	58	54	145													
0	1	0	1	1	0	1	1	1	75	64	68	55	146													
0	1	0	1	1	1	0	0	0	76	65	78	56	147													
0	1	0	1	1	1	0	1	1	77	66	88	57	148													
0	1	0	1	1	1	1	0	0	78	67	98	58	149													
0	1	0	1	1	1	1	1	1	79	68	09	59	150													
0	1	1	0	0	0	0	0	0	80	69	19	60	151													
0	1	1	0	0	0	0	1	1	81	70	29	61	152													
0	1	1	0	0	0	0	0	0	82	71	39	62	153													
0	1	1	0	0	0	0	1	1	83	72	49	63	154													
0	1	1	0	0	0	1	0	0	84	73	59	64	155													
0	1	1	0	0	0	1	1	1	85	74	69	65	156													
0	1	1	0	0	1	0	0	0	86	75	79	66	157													
0	1	1	0	0	1	0	1	1	87	76	89	67	158													
0	1	1	0	0	1	1	0	0	88	77	99	68	159													
0	1	1	0	0	1	1	1	1	89	78	0A	69	160													
0	1	1	0	1	0	0	0	0	90	79	1A	70	161													
0	1	1	0	1	0	0	1	1	91	80	2A	71	162													
0	1	1	0	1	0	0	0	0	92	81	3A	72	163													
0	1	1	0	1	0	0	1	1	93	82	4A	73	164													
0	1	1	0	1	0	1	0	0	94	83	5A	74	165													
0	1	1	0	1	0	1	1	1	95	84	6A	75	166													
0	1	1	0	1	1	0	0	0	96	85	7A	76	167													
0	1	1	0	1	1	0	1	1	97	86	8A	77	168													
0	1	1	0	1	1	1	0	0	98	87	9A	78	169													
0	1	1	0	1	1	1	1	1	99	88	0B	79	170													
0	1	1	0	1	1	1	1	1	100	89	1B	80	171													
0	1	1	1	0	0	0	0	0	101	90	2B	81	172													
0	1	1	1	0	0	0	1	1	102	91	3B	82	173													
0	1	1	1	0	0	0	0	0	103	92	4B	83	174													
0	1	1	1	0	0	0	1	1	104	93	5B	84	175													
0	1	1	1	0	0	1	0	0	105	94	6B	85	176													
0	1	1	1	0	0	1	1	1	106	95	7B	86	177													
0	1	1	1	0	1	0	0	0	107	96	8B	87	178													
0	1	1	1	0	1	0	1	1	108	97	9B	88	179													
0	1	1	1	0	1	1	0	0	109	98	0C	89	180													
0	1	1	1	0	1	1	1	1	110	99	1C	90	181													
0	1	1	1	0	1	1	1	1	111	100	2C	91	182													
0	1	1	1	0	1	1	1	1	112	101	3C	92	183													
0	1	1	1	0	1	1	1	1	113	102	4C	93	184													
0	1	1	1	0	1	1	1	1	114	103	5C	94	185													
0	1	1	1	0	1	1	1	1	115	104	6C	95	186													
0	1	1	1	0	1	1	1	1	116	105	7C	96	187													
0	1	1	1	0	1	1	1	1	117	106	8C	97	188													
0	1	1	1	0	1	1	1	1	118	107	9C	98	189													
0	1	1	1	0	1	1	1	1	119	108	0D	99	190													
0	1	1	1	0	1	1	1	1	120	109	1D	100	191													
0	1	1	1	0	1	1	1	1	121	110	2D	101	192													
0	1	1	1	0	1	1	1	1	122	111	3D	102	193													

KEY

ASCII CHARACTER

ESC

OCTAL

DECIMAL

HEX

DIFFERENCES FROM ASCII

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO OL. IF CHARACTER SET IS LOADED INTO GR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

Table A-14 United Kingdom Character Set

BIT 6 BIT 5 BIT 4 BIT 3 BIT 2 BIT 1 BIT 0	0	1	2	3	4	5	6	7
0 0 0 0 0 0 0	NUL		SP	0	@	P	'	0
0 0 0 0 0 0 1		DC1 (XON)	!	1	A	Q	a	9
0 0 0 0 0 1 0			"	2	B	R	b	f
0 0 0 0 0 1 1		DC3 (XOFF)	#	3	C	S	c	s
0 0 0 0 1 0 0			\$	4	D	T	d	t
0 0 0 0 1 0 1			%	5	E	U	e	u
0 0 0 0 1 1 0			&	6	F	V	f	v
0 0 0 0 1 1 1			'	7	G	W	g	w
0 0 0 1 0 0 0	BS	CAN	(	8	H	X	h	x
0 0 0 1 0 0 1	HY		)	9	I	Y	i	y
0 0 0 1 0 1 0	LF	SUB	*		J	Z	j	z
0 0 0 1 0 1 1	VT	ESC	+		K	[	k	<
0 0 0 1 1 0 0	FF		,	<	L	\	l	
0 0 0 1 1 0 1	CR		-	=	M	]	m	}
0 0 0 1 1 1 0	SO		.	>	N	^	n	~
0 0 0 1 1 1 1	SI		/	?	O	_	o	DEL

KEY

ASCII CHARACTER

ESC

32

10111111

10111111

101

HIGHLIGHTS DIFFERENCES
FROM ASCII

THIS CHART ASSUMES CHARACTER SET IS LOADED INTO GL. IF CHARACTER SET IS LOADED INTO GR (8-BIT MODE ONLY), ADD 200 TO THE OCTAL VALUE, 128 TO THE DECIMAL VALUE AND 80 TO THE HEX VALUE, TO SELECT THE CHARACTER FOR PRINTING.

SUMMARY OF ESCAPE SEQUENCES AND SWITCHES

B

Escape Sequence Summary

Name/Mnemonic	Escape Sequence/Description						
Set horizontal pitch DECSHOP	ESC OSH	[135	Pn ***	w 167			
	Pn =	0 1 2 4 5 6 8					
		10 10 12 16.5 5 6 6.25 CPI					
Set vertical pitch DECVSP	ESC OSI	[133	Pn ***	z 172			
	Pn =	0 1 2 3 4 5 6					
		6 6 6 12 2 3 4 LPI					
Page length selection DECSLPP	ESC OSH	[133	Pn ***	t 164			
Pn = 0 to 252	Pn (lines/page) = Paper length (inches/page) × Vertical pitch (lines/inch)						
Partial line down PLD	ESC OSH	K 133	Move down 1/2 line (paper up 1/12 inch)				
Partial line up PLU	ESC OSH	L 114	Move up 1/2 line (paper down 1/12 inch)				
Select density DECDEN	ESC OSH	[133	Pn ***	" 042 172			
	Pn =	0 1	Select normal density printing				
	Pn =	2	Select enhanced density printing				
Select graphic rendition SGR	ESC OSH	f 133	Pn ***	" 073	Pn ***	m 155	
	Pn =	0 - Reset					
	Pn =	1 - Bold on	Pn = 22 - Bold off				
	Pn =	4 - Underline on	Pn = 24 - Underline off				

Escape Sequence Summary (Cont)

Name/Mnemonic	Escape Sequence/Description										
Device substitute DA	ESC	[	n								
	033	133	143								
	Sends back identification code										
	ESC	[	?	?	?	?	n				
	033	133	077	061	067		143				
Device status report DSR	ESC	[	n				Send extended status report				
	033	133	156				Disable all unsolicited status reports				
	ESC	[	?	1	n		Enable unsolicited status reports				
	033	133	077	061	156		Enable unsolicited brief reports and send extended status report				
	ESC	[	?	2	n		Enable unsolicited brief reports and send extended status report				
	033	133	077	061	156		Enable unsolicited brief reports and send extended status report				
	ESC	[	?	3	n		Enable unsolicited extended report and send extended status report				
	033	133	077	063	156		Enable unsolicited extended report and send extended status report				
Brief status report (sent back by printer) BSR	ESC	[	0	n			No malfunction detected				
	033	133	060	156			Malfunction detected				
	ESC	[	3	n			Malfunction detected				
	033	133	063	156			Malfunction detected				
Extended status reports (sent back by printer) DSR	ESC	[	0	n			No malfunction detected				
	033	133	060	156			Malfunction detected				
	followed by										
	ESC	[	?	2	0	n					
	033	133	077	062	060		156				
	ESC	[	3	n			Malfunction detected				
	033	133	062	156			Malfunction detected				
	followed by										
	ESC	[	?	Pn	...	Pn	n				
	033	133	077	***	075	***	156				
Pn = 21 Hardware failure Pn = 22 Communication failure (event) Pn = 23 Input buffer overflow (event) Pn = 24 Printer disconnected Pn = 26 Cover open Pn = 27 Paper empty											
Enter graphics mode	ESC	P	n	Enter graphics mode							
	033	120	141								
	!	n	Repeat introducer, n = 0 to 65535								
	S	Graphic carriage return									
	-	Graphic new line									
Exit graphics mode	ESC	\									
	033	134									

Character Set Selection

SO	CTRL/N (016)	Select G0 to be GL
SI	CTRL/O (017)	Select G1 to be GL
SR2	ESC N (032 + 16)	Select next character from G2
SR3	ESC O (033 + 17)	Select next character from G3
LS2	ESC n (032 + 56)	Select G2 to be GL
LS3	ESC o (033 + 57)	Select G3 to be GL
LS1R	ESC -- (032 + 176)	Select G1 to be GR
LS2R	ESC (033 + 175)	Select G2 to be GR
LS3R	ESC (033 + 174)	Select G3 to be GR

Assign Character Sets

ESC Gn Gh

Assign set gh to Gh where Gh is

"1" = G0

"2" = G2

"3" = G1

"4" = G3

and gh is from the list below

B - ASCII

J - JIS Roman

A - Britain

I - JIS Katakana

S - Finland*

G - Norway/Denmark*

C - Finland

E - Norway/Denmark

R - France

Z - Spain

9 - French Canada*

7 - Sweden*

O - French Canada

H - Sweden

K - Germany

L - Multinational

Y - Italy

Q - VT100 Special Graphics

* Preferred

O - OPEN; C - CLOSED

Country	Switch Bank 1			
	4	3	2	1
US (ASCII)	0	0	0	0
Britain	0	0	0	0
Finland	0	0	0	0
France	0	0	0	0
French Canada	0	0	0	0
Germany	0	0	0	0
Italy	0	0	0	0
Japan	0	0	0	0
Norway/Denmark	0	0	0	0
Spain	0	0	0	0
Sweden	0	0	0	0

Notes

- For all countries except Japan:
G0 = Selected country, G1 = VT100, G2 = Multinational, and G3 = ASCII.
- For Japan:
G0 = JIS Roman, G1 = Katakana, G2 = Katakana, and G3 = ASCII.

Baud Rate	Switch Bank 2		
	1	2	3
4800	0	0	0
2400	0	0	0
1200	0	0	0
600	0	0	0
300	0	0	0
200	0	0	0
110	0	0	0

Data Format	Switch Bank 2		
	4	5	6
7 Bits + odd parity	0	0	0
7 Bits + even parity	0	0	0
7 Bits + 8th bit mark	0	0	0
7 Bits + 8th bit space	0	0	0
8 Bits + odd parity	0	0	0
8 Bits + even parity	0	0	0
8 Bits + No parity	0	0	0

O = OPEN; C = CLOSED

Switch Bank 1

Aspect Ratio	(Switch 5)	Protocol Switch	(Switch 6)
2:1	O	XON/XOFF	O
2:5:1	C	Ready/Busy	C
Signal Level	(Switch 7)	Right Margin	(Switch 8)
Busy = Hi; Ready = Lo	O	Truncated	O
Busy = Lo; Ready = Hi	C	Wrap	C

Power Up Conditions

Printer selected - on-line

Printer status report - disable unsolicited report

Horizontal pitch - 10 characters/inch

Vertical pitch - 5 lines/inch

Page length - 11 inches

Active position - top leftmost position

Bold, underline, double width - off

Printing density - normal

7-bit mode - GL = 00

8-bit mode - GL = 00, GR = 02

Character set, aspect ratio, protocol, right margin, and data format are selected per switch settings

Attributes	Vertical Pitch (Characters/Inch)					
	16.5	12	10	8.25	6	5
Enhanced		X	X		X	X
Bold		X	X	X	X	X
Underline	X	X	X	X	X	X
Maximum characters/line	132	96	80	66	48	40

