EK-CPL12-RM-001

DECwriter Correspondent

Programmer Reference Manual

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Programmer Reference Manual

Prepared by Educational Services
of
Digital Equipment Corporation

1st Edition, February 1982

Printed in U.S.A.

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CHAPTER 3 GRAPHIC MODE CHARACTER PROCESSING

Product Introduction

The DECwriter Correspondent is a portable, impact dot matrix, printer terminal. There are four models of the terminal designed to fill the requirements of a wide variety of customers.

Model A — Keyboard Send Receive (KSR) terminal with 300/1200 baud direct connect integral modem, 300 baud integral acoustic coupler, and a 50 to 9600 baud EIA port.

Model B — KSR terminal with a 300/1200 baud direct connect integral modem and a 50 to 9600 baud EIA port.

Model C — KSR terminal with 300 baud acoustic coupler and a 50 to 9600 baud EIA port.

Model D — KSR terminal with a 50 to 9600 baud EIA port.

Book Introduction

The DECwriter Correspondent User Documentation Package covers all models of terminals and is written for three general audiences:

- The hardware installer requiring specific installation and checkout information
- The operator requiring general operating information
- The applications programmer requiring interface and control function descriptions.

The documentation for the DECwriter Correspondent is divided into five books:

- Installation Guide
- Operator Guide
- Programmer's Reference Manual
- Pocket Service Guide
- Technical Manual

The Programmer's Reference Manual includes information on the functions of the terminal which can be controlled by the host and the procedures the programmer can use to implement control of these functions. Programming can be performed locally by using the terminal keyboard if desired.

The host can be programmed to set or select all of the printing features of the terminal by using escape sequences and control sequences. Control sequences are generally considered to be within the "escape sequence" category. The host can not be programmed to control any of the keyboard features or communication features of the terminal. All sequences used by the host to set or select printing features are compatible with ANSI escape sequence standards or with private sequences required to implement new or unique printing features.

CHAPTER 1
TRANSMITTED CHARACTERS

GENERAL

This chapter describes the character codes generated by individual keys or by combinations of keys on the the terminal keyboard. The keys are listed in the following groups:

Standard Keys
Function Keys

STANDARD KEYS

Figure 1-1 illustrates the terminal keyboard and the ASCII character codes generated by the standard keys. The lowercase ASCII code and the uppercase ASCII code generated by each key are presented in tabular form.

> NOTE
> The character codes generated by the embedded keypad are also illustrated and listed. When this feature is selected, the codes generated by keys other than LINE FEED, TAB, RETURN and LOC FF/LOC LF keys are disabled and are not transmitted.

> NOTE
> The character codes generated by the keyboard change when a foreign language is selected. Refer to Appendix A for detailed presentations of transmitted character code sets for all available languages.

The terminal generates the lowercase ASCII code for each of the standard keys when the key is pressed while neither SHIFT key is pressed and the CAPS LOCK key is not down. The terminal generates the uppercase ASCII character code when either or both of the SHIFT keys are pressed while the key is pressed. The SHIFT keys do not affect the embedded keypad keys.

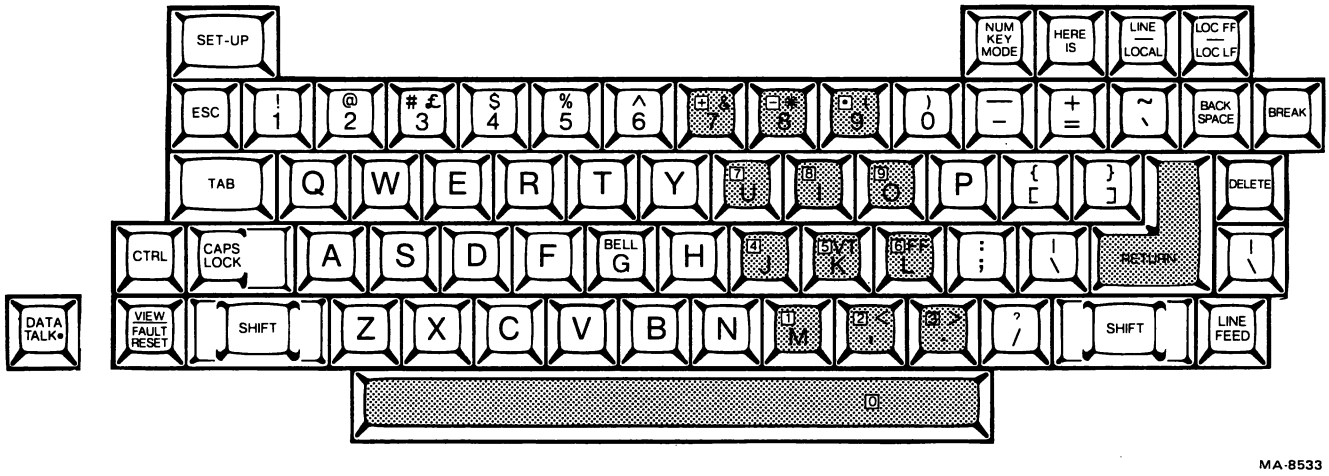

Figure 1-1 Standard Keys

When the CAPS LOCK key is pressed, the 26 alphabetic keys generate uppercase ASCII character codes. The CAPS LOCK key does not affect the nonalphabetic character keys or the imbedded keypad keys.

The keys that are used for the embedded keypad feature of the terminal are shaded in Figure 1-1. The embedded character for each key is shown in the upper left corner of the key. The RETURN key performs the same function as an ENTER key when the embedded keypad feature is used. The embedded character codes are identical to the codes for the corresponding standard keys.

Standard Key Character Codes

Key	Lowercase Code (Octal)	Key	Uppercase Code (Octal)
A	101	a	141
B	102	b	142
C	103	c	143
D	104	d	144
E	105	e	145
F	106	f	146
G	107	g	147
H	110	h	150
I	111	i	151
J	112	j	152
K	113	k	153
L	114	l	154
M	115	m	155
N	116	n	156
O	117	o	157
P	120	p	160
Q	121	q	161
R	122	r	162
S	123	s	163
T	124	t	164
U	125	u	165
V	126	v	166
W	127	w	167
X	130	x	170
Y	131	y	171
Z	132	z	172
1	061	!	041
2	062	@	100
3	063	# or L(pound sign)	043
4	064	$	044
5	065	%	045
6	066	^ (circumflex)	136
7	067	&	046
8	070	*	052
9	071	(	050
0	060	)	051
-(minus)	055	-	137
=	075	+	053
`(grave accent)	140	~(tilde)	176
[	133	{	173
]	135	}	175
;	073	:	072
'(apostrophe)	047	"	042
\	134	|	174
,(comma)	054	<	074
.period	056	>	076
/	057	?	077

FUNCTION KEYS
The function keys of the terminal generate character codes whose function is defined by the computer. The SHIFT keys and CAPS LOCK key do not affect these keys. The function keys are described in the following paragraphs and are illustrated in Figure 1-2.

BREAK KEY
When pressed alone, this key (if enabled) causes the terminal to transmit a break signal. When pressed while holding down the SHIFT key, the BREAK key causes a long break disconnect. Refer to the Communication Chapter of the Operators Guide for detailed information on the two available break signals.

HERE IS KEY
When pressed, this key causes the terminal to transmit the answerback message when the terminal is on line and is capable of transmitting.

Control Character Keys
Figure 1-2 shows the keys used to generate control characters and the two keys described above. Control characters are generated in two ways. When pressed while pressing the CTRL key, each of the unshaded keys in Figure 1-2 transmits its associated control character. The shaded keys in Figure 1-2 are dedicated control character keys and do not require the use of the CTRL key.

The illustration includes a list of all of the control character codes generated by the terminal. No details are provided about the control character code function because each computer may use control characters differently.

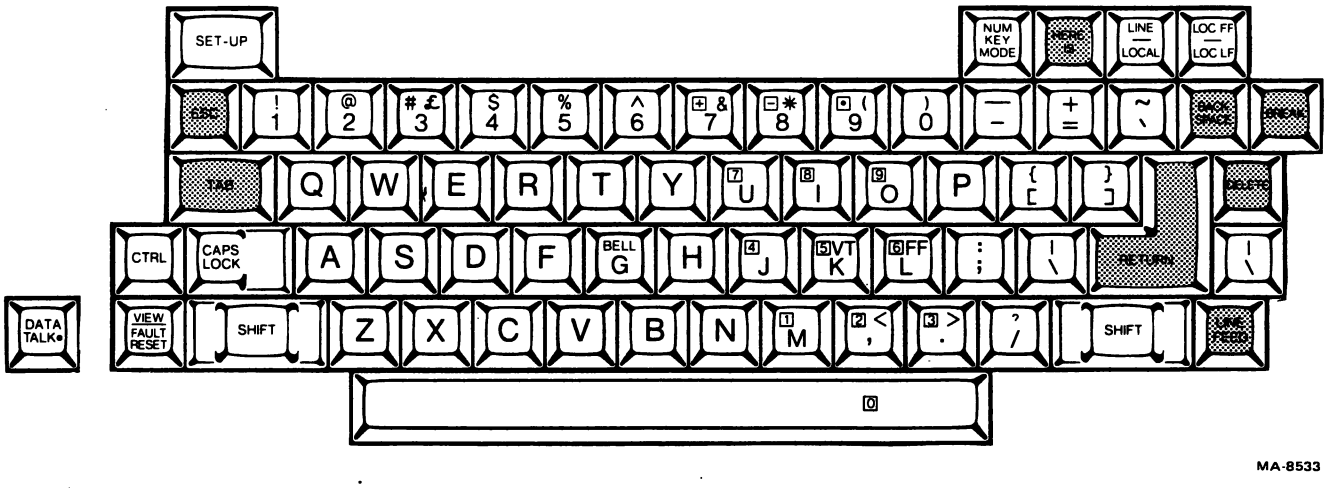

Figure 1-2 Control Character Codes

Control Character Codes

Control Character Mnemonic	Octal Code Transmitted	Key Pressed with CTRL Key Down	Dedicated Key
NUL	ØØØ	Space Bar	
SOH	ØØ1	A	
STX	ØØ2	B	
ETX	ØØ3	C	
EOT	ØØ4	D	
ENQ	ØØ5	E	
ACK	ØØ6	F	
BEL	ØØ7	G	
BS	Ø1Ø	H	BACK SPACE
HT	Ø11	I	TAB
LF	Ø12	J	LINE FEED
VT	Ø13	K	
FF	Ø14	L	
CR	Ø15	M	RETURN*
CR LF	Ø15 Ø12		RETURN*
SO	Ø16	N	
SI	Ø17	O	
DLE	Ø2Ø	P	
DC1 (XON)	Ø21	Q	
DC2	Ø22	R	
DC3 (XOFF)	Ø23	S	
DC4	Ø24	T	
NAK	Ø25	U	
SYN	Ø26	V	
ETB	Ø27	W	
CAN	Ø3Ø	X	
EM	Ø31	Y	
SUB	Ø32	Z	
ESC	Ø33	[	
FS	Ø34	\	
GS	Ø35	]	
RS	Ø36	~	
US	Ø37	?	
DEL	177		DELETE

* The character(s) generated by the RETURN key can be changed by the Auto Line Feed feature. With this feature selected, the RETURN key generates the carriage return and line feed control characters (CR, LF).

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 X3.64-1979, X3.4-1977 and X3.41-1974. The ANSI system of character processing is based on the category of a character in the American National Standard Code for Information Interchange (ASCII) chart (Figure 2-1). The category of a character is determined by the character's position in the ASCII chart.

The characters of the chart can be divided into two general categories, printable characters and control characters. In the eight column ASCII chart, columns Ø and 1 contain the control characters while the rest of the chart contains printable characters (except for SP and DEL). 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.

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 COLUMN 0		0 0 1 1		0 1 0 2		0 1 1 3		1 0 0 4		1 0 1 5		1 1 0 6		1 1 1 7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D	GS	35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER | ESC | 33 OCTAL / 27 DECIMAL / 1B HEX

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Figure 2-1 ASCII Chart

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 depends on the printable character set designated. Refer to the printable character set designation section later in this chapter for more detail.

CONTROL CHARACTERS

A control character is a single character control 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.

Table 2-1 lists 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.

NOTE

When the control representation SET-UP feature is on, control characters are processed as printable characters. Refer to the Operator Guide for detailed information.

Table 2-1 Text Mode ANSI Control Characters

Name	Mnemonic	Octal Code	Function
Null	NUL	ØØØ	No operation (not stored in the input buffer). Used as fill characters
Enquiry	ENQ	ØØ5	Causes the terminal to transmit the answerback message.
Bell	BEL	ØØ7	Sounds audible bell tone.
Backspace	BS	Ø1Ø	Moves the active column left one column unless the active column is at the left margin. This condition causes no action to occur (Active column and active line are described later in this chapter).
Horizontal Tab	HT	Ø11	Advances the active column to the next horizontal tab stop or to the left margin on the next line if there are no more tab stops on the line.
Line Feed	LF	Ø12	Advances the active line by one line or to the top margin of the next page if active line is at the bottom margin. Active column is also set to the left margin if ANSI New Line is on.
Vertical Tab	VT	Ø13	Advances the active line to the next vertical tab stop or the top margin of the next page if there are no more tabs on the page.
Form Feed	FF	Ø14	Advances the active line to the top margin on the next page.
Carriage Return	CR	Ø15	Returns the active column to the left margin.

Shift Out	SO	Ø16	Terminal switches to the G1 printable character set.
Shift In	SI	Ø17	Terminal switches to the GØ printable character set.
Cancel	CAN	Ø3Ø	Immediately ends any control or escape sequence.
Substitute	SUB	Ø32	Immediately ends any control or escape sequence. Any character received with error are replaced by the SUB character. The SUB character is printed as " ▒ ".
Escape	ESC	Ø33	Interpreted as the introducer of an escape sequence.
Delete	DEL	177	No operation (not stored in the input buffer).

ESCAPE AND CONTROL SEQUENCES

Escape and control sequences are used to provide additional controls that are not provided by the control characters in the character set. These sequences are multiple character control functions that are not printed but are used to control the printing and processing of characters. Escape and control sequences are defined in ANSI standards X3.41-1977 and X3.64-1979.

The characters in the escape and control sequences in this chapter are shown (not defined) using the ASCII character set. The case of the characters used in a sequence is significant and must be sent to the printer exactly as shown. These characters are spaced apart for clarity only. The octal equivalent of each sequence is provided as a second reference. The ASCII chart (Figure 2-1) contains the conversion to hexadecimal and decimal for your convenience.

Escape Sequence Format

The format of an escape sequence is:

ESC	I. . .I	F
Ø33	Ø4Ø--Ø57	Ø6Ø--176
Escape Sequence Introducer	Intermediate Characters (Any number of characters -- Ø or more)	Final Character (1 character)

The escape sequence introducer is the ESC control character (octal Ø33). When the ESCape character is received, the next characters received are not printed but stored to be used as part of the sequence.

If the characters received after the ESCape character are in the octal range of Ø4Ø -- Ø57, they are "intermediate characters". The characters are stored as part of the sequence.

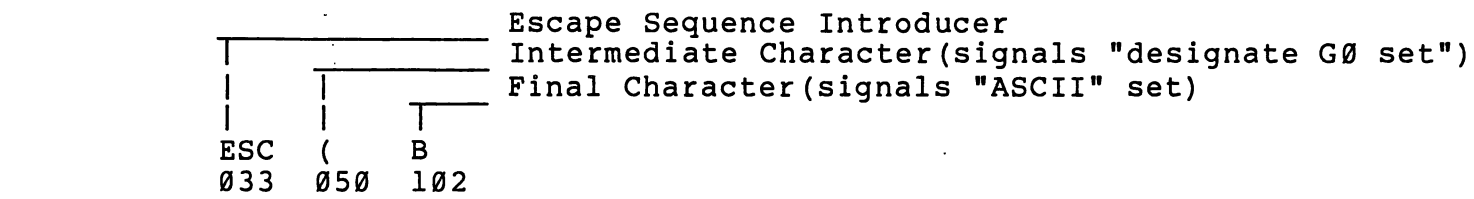
If the character received after the ESCape character is in the octal range of Ø6Ø -- 176, it is a "final character". Final characters in the octal range of 1ØØ -- 176 are reserved for standard ANSI use. Final characters in the octal range of Ø6Ø -- Ø77 are reserved for private use.

The final character indicates the end of the escape sequence. The intermediate and final characters together define the function of the sequence. The terminal performs the action specified by the sequence and then continues to print data.

Example

Action:
Designate ASCII character set as GØ

Sequence



Control Sequence Format
The format of a control sequence is:

CSI	P. . .P	F
Ø33 133	Ø6Ø -- Ø77	1ØØ -- 176
Control Sequence Introducer	Parameter (Ø or more characters)	Final (1 character)

The control sequence introducer (CSI) consists of the ESC (octal Ø33) and [(octal 133) characters. CSI is used to gain the extended functionality of the 8 bit environment while using 7 bit characters. After the CSI characters are received, characters received are not printed but stored to be used as part of the sequence.

If the characters received after the CSI characters are in the octal range of Ø6Ø -- Ø77, the characters are "parameter characters". A parameter character modifies the action or interpretation of the sequence.

Parameters are interpreted as unsigned decimal integers, with the most significant digit transmitted first. Leading zeros are allowed but are not necessary. Each parameter in a group of numeric parameters is separated by the delimiter ";" (octal Ø73). If no decimal value is specified for a parameter character in a sequence sent to the terminal, a value of zero is assumed for the parameter. The limit for a numeric parameter is 254 (decimal). The limit on numeric parameters is 16 per string. More than one string may be issued.

In this manual, parameters are shown using actual values or are designated as Pn, Pn1, Pn2, etc. Within the octal representation of the sequences, parameter characters are shown as ***.

NOTE

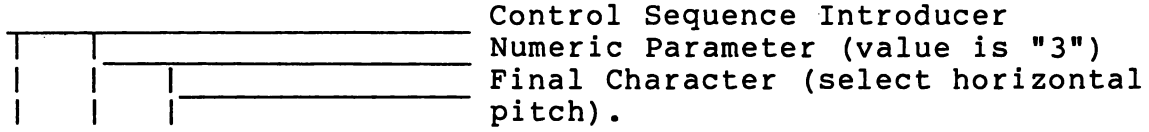
If the ? character (octal Ø77) occurs at the beginning of a string of parameters, the control sequence is processed as a DEC private sequence.

If the character received after the CSI characters is in the octal range of 1ØØ -- 176, it is a final character. Final characters in the octal range of 1ØØ -- 157 are reserved for standard ANSI use. Final characters in the octal range of 16Ø -- 176 octal are reserved for private use. The final character indicates the end of a control sequence. The intermediate and final characters together define the function of the sequence. The terminal performs the action specified by the sequence and then continues to print data.

Example

Action:
Set horizontal pitch to 13.2 characters per inch

Sequence:

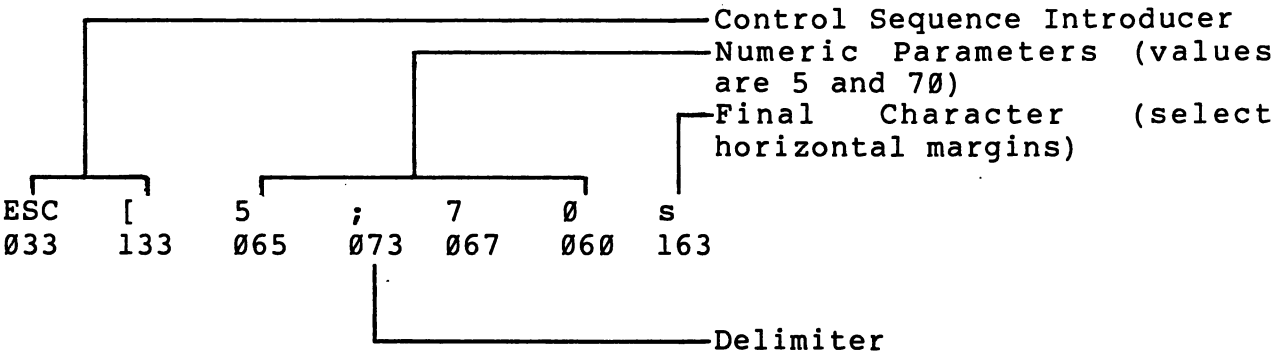


ESC	[	3	w
Ø33	133	Ø63	167

Example

Action:
Set left margin to column 5, set right margin to column 7Ø

Sequence



Error Recovery

The DECwriter terminal usually recovers from control function errors by performing as much of the function as possible. Errors include invalid control functions, control characters embedded in escape or control sequences, and parameters out of range. The following paragraphs describe the specific error recovery techniques used by the terminal.

- A control function not recognized by the terminal is ignored.
- Unsupported control functions (valid control functions not listed in this manual) are ignored.
- If a control character (other than ESC, CAN, or SUB) is sent within an escape or control sequence, the terminal performs the function of the control character as if received before the sequence. The printer then continues to process the sequence.
- If the CANcel character (octal Ø3Ø) or SUBstitute character (octal Ø32) is received during an escape or control sequence, the sequence is immediately ended and the printer returns to text mode character processing.
- If the ESCape character is received during a sequence, the sequence is immediately ended and the terminal begins to process the new sequence.

Detailed Sequence Definitions

The following paragraphs describe in detail the escape and control sequences to which the terminal responds. These sequences are arranged as follows:

Active Column and Active Line
Horizontal Pitch
Horizontal Margins
Horizontal Tabs
Vertical Pitch
Form Length
Vertical Margins
Vertical Tabs
Printable Character Set Selection
Printer Mode Selection
External Keypad Mode
Product Identification

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. Linefeed vertical tabs and form feeds increment the active line.

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.

The printer carriage moves Ø.6 inches to the right whenever printing stops for more than one second and automatic last character view (LCV) has been selected. This action allows the last character printed to be viewed. However, active column is not affected by this feature. Bell characters have only an active line attribute. They are not guaranteed to be sounded at any particular column within a line.

In addition to the control characters (backspace, horizontal tab, carriage return, line feed, vertical tab, and form feed) the following escape sequences are used to modify active column and active line.

Name	Mnemonic	Sequence	Function
Index	IND	ESC D Ø33 1Ø4	Increment active line and advance paper one line in current pitch. Line Feed New Line mode has no effect on this feature.
		NOTE The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.	
Vertical Position Absolute	VPA	ESC [Pn d Ø33 133 *** 144	Set active line to Pn. If Pn is less than or equal to the active line, or if Pn is greater than bottom margin, paper is advanced and active line is set to top margin on next page.

Next Line	NL	ESC E Ø33 1Ø5		Set active column to left margin and increment active line by one in current pitch.
Horizontal Position Absolute	HPA	ESC [Pn Ø33 133 *** 14Ø		Set the active column to column Pn. If Pn is greater than the right margin, then the active column is set to the left margin on the next line. If Pn is less than or equal to the left margin then the active column is set to the left margin.
Horizontal Position Relative	HPR	ESC [Pn a Ø33 133 *** 141		Advance the current active column by Pn column If the active column excee right margin, then the active column is set to th left margin on the line regardless of actual value of Pn. Pn = Ø, then no motion occurs.
Cursor Up	CUP	ESC [Pn A Ø33 133 *** 1Ø1		Decrement current active line by Pn lines without going past the top margin. If Pn is greater than or equal to the current active line, the sequence is ignored.
Vertical Position Relative Down	VPR	ESC [Pn e Ø33 133 *** 145		Advance active line Pn lines. If Pn = (Ø) 256 lines is assumed If the parameter exceeds the bottom margin, then the active line is set to the t margin on the next P regardless of the actual value of Pn.

NOTE

The PLD sequence does not modify active line. To avoid losing the top of form reference send an equal number of PLU sequences to the printer.

Partial Line Down	PLD	ESC Ø33	K 113	Index paper down 1/12 inch. Line Feed New Line mode has no effect on this sequence.

NOTE

The PLU sequence does not modify active line. To avoid losing the top of form reference send an equal number of PLD sequences to the printer.

Partial Line Up	PLU	ESC Ø33	L 114	Index paper up 1/12 inch. Line Feed New Line mode has no effect on this sequence.
Reverse Index	RI	ESC Ø33	M 115	Decrement active line and moves the paper up one line unless it is at the top margin. Line Feed New Line mode has no effect on this sequence.

Horizontal Pitch (Characters Per Inch)

Horizontal pitch determines the width of printed characters as well as their spacing. The terminal has eight horizontal pitch selections. (Refer to Figure 2-2 for examples.) Any combinations of pitch may be used on a single print line.

Changing the horizontal pitch changes the active column. The resulting new active column is that of the first column boundary at or to the right of the physical position of the previous active column in the old pitch. New active column is calculated as follows:

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

where
- Newcol = the new active column
- Newpitch = the new pitch in char/inch
- Oldcol = the old active column
- Oldpitch = the old pitch in char/inch

The division performed above is an integer division. Any remainder or fractional part of the quotient is discarded.

Changing horizontal pitch also resets the horizontal margins. The left margin is set to column 1 and the right margin is set to the maximum column for the selected pitch (Refer to Table 2-2).

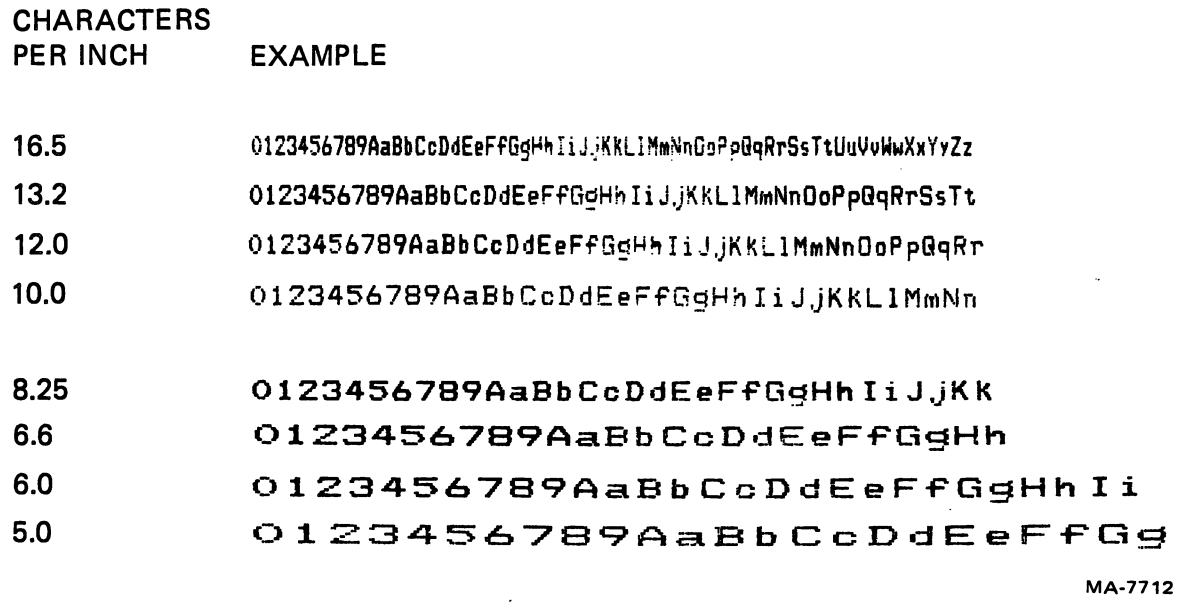


Figure 2-2 Horizontal Pitch Example

Table 2-2 Maximum Right Margins

Horizontal Pitch	Maximum Column
10	80
12	96
13.2	105
16.5	132
5	40
6	48
6.6	52
8.25	66

The horizontal pitch default selection is 10 characters per inch. The following sequences are used to set horizontal pitch:

Name	Mnemonic	Sequence					Function
Set Horizontal Pitch	DECSHORP	ESC 033	[133	0 060	w 167		Set horizontal pitch to 10 char/inch
		ESC 033	[133	1 061	w 167		Set horizontal pitch to 10 char/inch
		ESC 033	[133	2 062	w 167		Set horizontal pitch to 12 char/inch
		ESC 033	[133	3 063	w 167		Set horizontal pitch to 13.2 char/inch
		ESC 033	[133	4 064	w 167		Set horizontal pitch 16.5 char/inch
		ESC 033	[133	5 065	w 167		Set horizontal pitch 5 char/inch
		ESC 033	[133	6 066	w 167		Set horizontal pitch 6 char/inch
		ESC 033	[133	7 067	w 167		Set horizontal pitch 6.6 char/inch
		ESC 033	[133	8 070	w 167		Set horizontal pitch 8.25 char/inch

Horizontal Margins

The left horizontal margin specifies the first printable column on a line; the right horizontal margin specifies the last printable column on a line. Printing is permitted only within the inclusive left and right margins.

The set horizontal margins sequence (when accompanied by two parameters) sets the left and right margins. If both parameters are not 0, and the first parameter is smaller than the second parameter, the left margin is set to the first parameter specified and the right margin is set to the second parameter. The carriage is then repositioned to the new left margin, when the next printing character is received.

NOTE

Changing the horizontal pitch modifies the horizontal margins. The left margin is set to column 1 and the right margin is set to the maximum right margin in the selected horizontal pitch.

The sequence is ignored if the first parameter is greater than or equal to the second parameter. The sequence is also ignored if one of the parameters specified would set the right margin further right than the column which is equivalent to 8 inches (maximum printing width).

If the first parameter in the sequence is omitted, the remaining parameter sets the right margin to the specified value. If an attempt is made to set the right margin to the left of the left margin, the sequence is ignored.

If the second parameter in the sequence is omitted, the first parameter sets the left margin to the specified value. If an attempt is made to set the left margin to the right of the right margin, the sequence is ignored. If the active colum is less than the new left margin, then the active column is set to the new left margin and the print head is repositioned. If the active column is greater than the right margin, then the print head is advanced to the next line.

If both parameters are zero or omitted the margins are unchanged. The default setting (at 1Ø cpi) for the left margin is column 1. The default setting for the right margin is column 8Ø (Refer to Table 2-2).

The following sequence is used to set the left and right margins:

Name	Mnemonic	Sequence						Function
Set Left and Right Margins	DECSLRM	ESC Ø33	[133	P1 ***	; Ø73	P2 ***	s 163	Set left and right margins to the values given.

NOTE
The * character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.**

Horizontal Tabs

A horizontal tab is a preselected point on a line to which the print head advances when a horizontal tab control character is received. The printer has 132 possible horizontal tab stops, one for each column. Tab stops are associated with column numbers, not physical positions on the paper. Thus, changing horizontal pitch will also change the physical position of tab stops.

Each stop may be set or cleared independently. Setting a stop already set has no effect; the same is true for clearing a stop already cleared. Tab stops may be set or cleared without regard to margins or horizontal pitch. The default settings for horizontal tabs are 1 tab every eight columns, beginning with column one.

The following sequences are used to set or clear horizontal tab stops:

Name	Mnemonic	Sequence							Function
Horizontal Tabulation Set	HTS	ESC 033	H 110						Set horizontal tab stop at active column.
Horizontal Tabulation Set	DECHTS	ESC 033	1 061						Set horizontal tab stop at active column.
Tabulation Clear	TBC	ESC 033	[133	Ø 060	g 147				Clear horizontal tab at active column.
Tabulation Clear	TBC	ESC 033	[133	2 062	g 147				Clear all horizontal tab stops.
Tabulation Clear	TBC	ESC 033	[133	3 063	g 147				Clear all horizontal tab stops.
Clear All Horizontal Tabs	DECCAHT	ESC 033	2 062						Clear all horizontal tab stops.
	NOTE The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.								
Set Horizontal Tabs	DECSHTS	ESC 033	[133	Pn ***	; 073	...	Pn ***	u 165	Set horizontal stops at the values given.

Vertical Pitch

Vertical pitch determines the spacing between lines, not the height of printed characters. Refer to Figure 2-3 for examples. The terminal has six vertical pitch selections. Changing vertical pitch:

- alters form length
- resets the top margin and active line to line one
- resets the bottom margin to the line equal to the new length of the form.

The vertical pitch default selection is 6 lines per inch.

The following sequences are used to set vertical pitch:

Name	Mnemonic	Sequence				Function
Set Vertical Pitch	DECVERP	ESC 033	[133	Ø 060	z 172	Set vertical pitch 6 lines/inch
		ESC 033	[133	1 061	z 172	Set vertical pitch 6 lines/inch
		ESC 033	[133	2 062	z 172	Set vertical pitch 8 lines/inch
		ESC 033	[133	3 063	z 172	Set vertical pitch 12 lines/inch
		ESC 033	[133	4 064	z 172	Set vertical pitch 3 lines/inch
		ESC 033	[133	5 065	z 172	Set vertical pitch 4 lines/inch
		ESC 033	[133	6 066	z 172	Set vertical pitch 4 lines/inch

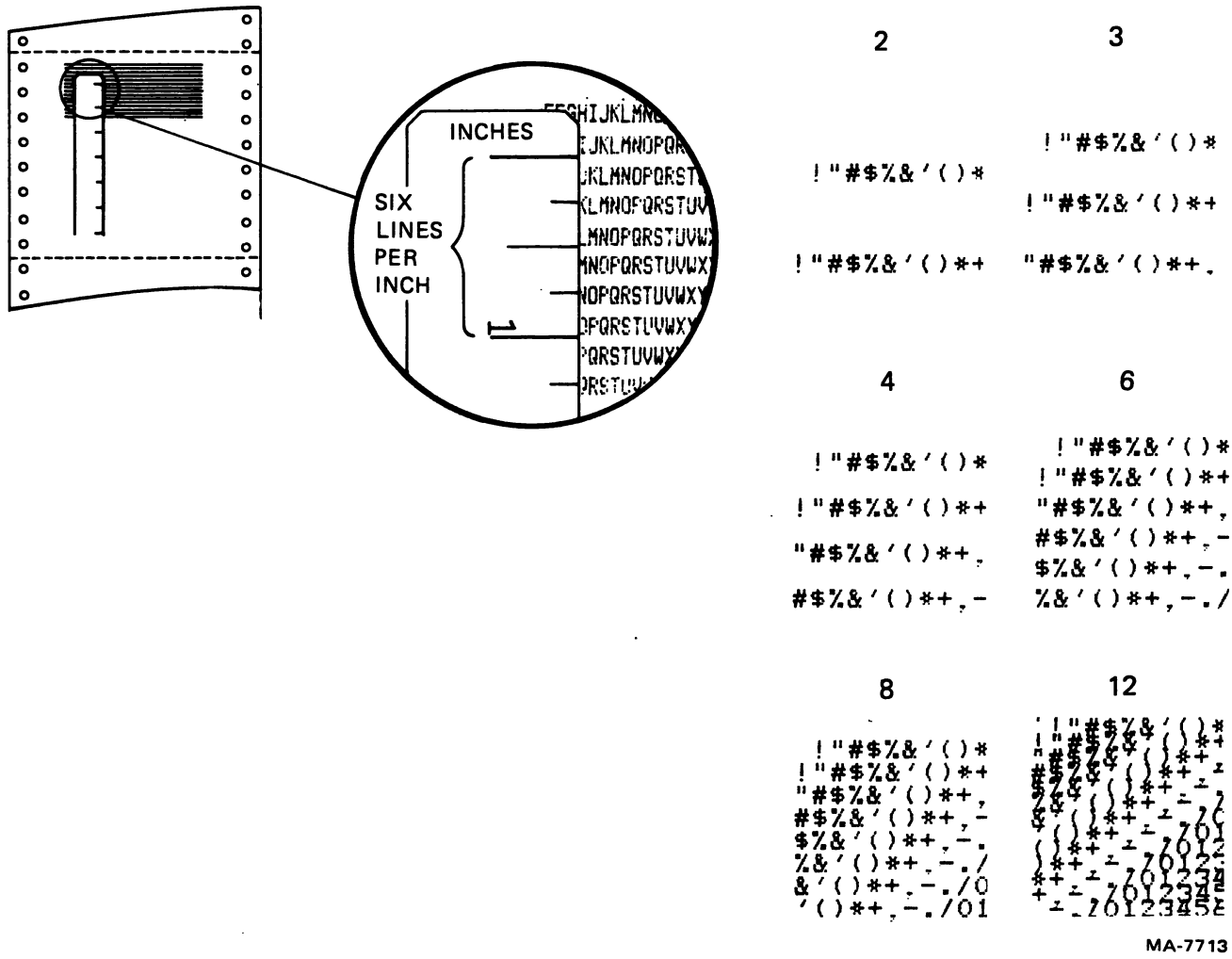


Figure 2-3 Vertical Pitch Example

Form Length (Lines per page)
The vertical form length can be set to any length from one line per page to 252 lines per page, or if the form length is set to zero, the terminal will have no paging.

NOTE
This is not to be confused with the operator-settable form length command which uses multiples of 1/24".

The following table shows some of the more likely settings:

Form Length in Inches	Vertical Pitch Selected 2	3	4	6	8	12
3	6	9	12	18	24	36
3.5	7	10 or 11	14	21	28	42
4	8	12	16	24	32	48
5.5	11	16 or 17	22	33	44	66
6	12	18	24	36	48	72
7	14	21	28	42	56	84
8	16	24	32	48	64	96
8.5	17	25 or 26	34	51	68	102
11	22	33	44	66*	88	132
12	24	36	48	72	96	144
14	28	42	56	84	112	168
21	42	63	84	126	168	252

* 11 inch form at 6 lines per inch = 66 line form length.

The power up default form length selection is 66 lines. The following sequence sets form length.

Name	Mnemonic	Sequence				Function
Set Page Length	DECSLPP	ESC 033	[133	Pn ***	t 164	Set top of form to active line and set form length to Pn lines in selected pitch.

NOTE
The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.

Vertical Margins

The top vertical margin specifies the first printable line; the bottom vertical margin specifies the last printable line. Printing is allowed only on the lines between the inclusive top and bottom margins.

When vertical pitch and form length are changed, vertical margins are reset; the top margin is set to line 1 and the bottom margin is set to the form length. The following conditions must be true to set new vertical margins:

- Top margin must be greater than or equal to 1.
- Bottom margin must be greater than or equal to the top margin.
- Form length must be greater than or equal to the bottom margin.

Attempting to print above the top margin or below the bottom margin automatically advances the active line to the top margin of the next page. For example; a line feed (LF) received at the bottom margin causes the terminal to perform a form feed.

The set vertical margins sequence accompanied by two parameters set the top and bottom margins. If both parameters are not Ø and the first parameter is smaller than or equal to the second parameter, the top margin is set to the first parameter and the bottom margin is set to the second parameter. Then the carriage may be repositioned to the new top margin if the print head is not between the new margins on a page and there is no printer activity.

The sequence is ignored if the first parameter is greater than the second parameter. The sequence is also ignored if one of the parameters specified would set the bottom margin past the assigned form length.

If the first parameter in the sequence is omitted, the remaining parameter sets the bottom margin to the specified line. If attempt is made to set the bottom margin above the current top margin, the sequence is ignored.

If the second parameter in the sequence is omitted, the first parameter sets the top margin to the specified line. If an attempt is made to set the top margin below the current bottom margin, the sequence is ignored. If the active line is less than the new top margin, then the active line is set to the new top margin and the print head is repositioned. If it is greater than the bottom margin, then a form feed is executed.

If both parameters are set to zero or omitted the margins are unchanged. The default top margin selection is line 1; the bottom margin selection is line 66.

The following sequences set the top and bottom margins.

Name	Mnemonic	Sequence							Function
Set Top, Bottom Margins	DECSTBM	ESC Ø33	[133	Pl ***	; Ø73	P2 ***	r 162		Set top margin to line Pl and se bottom margin to

NOTE

The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.

Vertical Tabs

A vertical tab is a preselected line to which the print head advances when a vertical tab control character is received. The printer has 168 vertical tab positions. Vertical tabs may be set and cleared like horizontal tabs. Vertical tab stops are associated with specific line numbers, not physical positions on the paper. Thus, changing vertical pitch changes the printing position of the vertical tabs on the paper. The default settings for vertical tabs are one every line.

The following sequences set or clear vertical tab stops.

Name	Mnemonic	Sequence							Function
Vertical Tab Set	VTS	ESC Ø33	J 112						Set vertical stop at active li
Vertical Tab Set	DECVTS	ESC Ø33	3 Ø63						Same

NOTE

The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.

Set Vertical Tab Stops	DECSVTS	ESC Ø33	[133	PN ***	; Ø73	...	Pn ***	v 166	Set vertical tab stops at lines given.
Tabulation Clear	TBC	ESC Ø33	[133	1 Ø61	g 147				Clear vertical ta stop at active line.
Tabulation Clear	TBC	ESC Ø33	[133	4 Ø64	g 147				Clear all vertica tab stops.
Clear All Vertical Tabs	DECCAVT	ESC Ø33	4 Ø64						Same

Host Reset Command

When the reset command (ESC c) is received from the host, the terminal resets all the host-settable parameters to their default values. These parameters are:

Horizontal Pitch = 10 characters/inch
Left Margin = column 1
Right Margin = column 80
Horizontal Tabs = column 1, and every 8 spaces thereafter
Vertical Pitch = 6 lines/inch
Top Margin = line 1
Bottom Margin = line 66
Vertical Tabs = none
Page Size = 11 inches
G0 Character Set = USASCII
G1 Character Set = USASCII
G2 Character Set = USASCII
G3 Character Set = USASCII
New-Line Character = none
End-of-Line Control = wrap mode

ANSI STRINGS

When the terminal receives any of the escape sequences listed below, the terminal responds as usual to control characters received (octal 000 -- 037 and 177) and discards any print characters received (octal 040 -- 176). The printer reverts to text processing mode when the sequence ESC \ (octal 033 134 received or an error occurs.

Name	Mnemonic	Sequence
Application Program Command	APC	ESC _ (033 137)
Operating System Command	OSC	ESC] (033 135)
Privacy Message	PM	ESC ^ (033 136)
Device Control	DCS	ESC P (033 120)

NOTE

DCS is not graphics mode. The terminal remains in DCS mode until it recognizes a valid protocol selector or the printer receives the terminator sequence ESC \.

Printable Character Set Selection

The printer has the capability of printing 12 character sets. Any 4 of these character sets can be selected as the GØ, Gl, G2 or G3 printing character sets. The computer uses valid three-character ANSI Escape Sequences to select these character sets. The character sets available are:

United States
United Kingdom
Finland
Norway/Denmark
Sweden
Germany
France
French-Canada
Italy
Spain
VTlØØ Compatible
APL

The designated character sets are used until another Select Character Set (SCS) sequence is received. The character sets can be changed by the computer using the Select Character Set (SCS) sequence as often as required.

The USASCII character set is the power up default selection for all printing character sets. The following sequences designate the various character sets.

GØ	Gl	G2	G3	
ESC (A	ESC) A	ESC * A	ESC + A	Select Great Brita
ESC (B	ESC) B	ESC * B	ESC + B	Select United Stat
ESC (C	ESC) C	ESC * C	ESC + C	Select Finland *
ESC (E	ESC) E	ESC * E	ESC + E	Select Norway and Denmark*
ESC (H	ESC) H	ESC * H	ESC + H	Select Sweden*
ESC (K	ESC) K	ESC * K	ESC + K	Select Germany
ESC (R	ESC) R	ESC * R	ESC + R	Select France
ESC (Q	ESC) Q	ESC * Q	ESC + Q	Select French Cana
ESC (Y	ESC) Y	ESC * Y	ESC + Y	Select Italy
ESC (Z	ESC) Z	ESC * Z	ESC + Z	Select Spain
ESC (Ø	ESC) Ø	ESC * Ø	ESC + Ø	Select VTlØØ line drawing set
ESC (5	ESC) 5	ESC * 5	ESC + 5	Select Finland
ESC (6	ESC) 6	ESC * 6	ESC + 6	Select Norway and Denmark
ESC (7	ESC) 7	ESC * 7	ESC + 7	Select Sweden
ESC (8	ESC) 8	ESC * 8	ESC + 8	Select APL
ESC (9	ESC) 9	ESC * 9	ESC + 9	Select French Cana

* These sequences technically constitute sequences received in error However, the character sets will be selected as the error action.

Printer Mode Selection
The following are ANSI and Private Escape Sequences which select the other variable printer features of the terminal.

Sequence	Function
ESC [2Ø h	Enable line feed new line mode. This causes line feed to slew to the left margin, as well as index down one line.
ESC [2Ø l	Disable line feed new line mode.
ESC [? Pn ; ... Pn h Pn = Ø -- Pn = 7 --	Set Privacy Mode: Change nothing Set autowrap mode for lines which are too long
ESC [? Pn ; ... Pn l Pn = Ø -- Pn = 7 --	Reset Privacy Mode: Change nothing Clear autowrap mode

External Keypad Mode
The external keypad mode feature is used to define the function of the external keypad. When the numeric mode is on, thekeypad is used for rapid numeric entries. The keys generate individual characters. When the alternate function mode is on, the keypad is used to transmit control sequences. Refer to Table 2-3 for more detail. The following sequences control the external keypad mode.

Name	Mnemonic	Sequence	Function
Alternate Keypad	DECKPAM	ESC = Ø33 Ø75	Selects alternate function mode
Numeric Keypad	DECKPNM	ESC >* Ø33 Ø76	Select numeric mode

Product Identification

The terminal automatically transmits an answer to the ANSI standard request for device attributes. The following sequences cause the terminal to transmit its product identification sequence:

Name	Mnemonic	Sequence	Function
Identify Terminal	DECID	ESC Z Ø33 132	The terminal transmits ESC [? 15 c which forms the product identification of the basic terminal.
Device Attributes	DA	ESC [Ø c Ø33 133 Ø6Ø 143	Same
Device Attributes	DA	ESC [c Ø33 133 143	Same

Table 2-3 External Keypad Characters and Escape Sequences

Key	Character Transmitted with Numeric Mode On	Character Transmitted with Alternate Mode On
Enter	CR or CR LF Ø15 or Ø15 Ø12	ESC O M Ø33 117 115
'	' Ø54	ESC O l Ø33 117 154
-	- Ø55	ESC O m Ø33 117 155
.	. Ø56	ESC O n Ø33 117 156
Ø	Ø Ø6Ø	ESC O p Ø33 117 16Ø
]	] Ø61	ESC O q Ø33 117 161
2	2 Ø62	ESC O r Ø33 117 162
3	3 Ø63	ESC O s Ø33 117 163
4	4 Ø64	ESC O t Ø33 117 164

5	5 Ø65	ESC O u Ø33 117 165
6	6 Ø66	ESC O v Ø33 117 166
7	7 Ø67	ESC O w Ø33 117 167
8	8 Ø7Ø	ESC O w Ø33 117 17Ø
9	9 Ø71	ESC O y Ø33 117 171
PF1	ESC O P Ø33 117 12Ø	ESC O P Ø33 117 12Ø
PF2	ESC O Q Ø33 117 121	ESC O Q Ø33 117 121
PF3	ESC O R Ø33 117 122	ESC O R Ø33 117 122
PF4	ESC O S Ø33 117 123	ESC O S Ø33 117 123

CHAPTER 3
GRAPHIC MODE CHARACTER PROCESSING

GENERAL

This chapter describes the responses of the terminal to characters received while the terminal is operating in graphic mode.

GRAPHIC MODE

In graphic mode, characters received define specific columns of dots to be printed. Graphic mode allows the user to print dot combinations anywhere on a page. Graphic mode can be used to draw pictures and plot graphs (Figures 3-1 and 3-2). The use of single-sheet or tractor-feed paper is not recommended when operating in graphic mode.

After entering graphic mode, the horizontal and vertical pitch change. The right, left, and bottom margins also change. The graphic mode pitch and margins section describes these changes.

The terminal has a horizontal resolution of 132 columns per inch with a 5Ø percent overlap and a vertical resolution of 72 dots per inch with no overlap between dots. There is a 44 percent dot overlap between lines. The aspect ratio (ratio of horizontal to vertical resolution) is 1:83.

GRAPHIC STRING FORMAT

The following is the format for a string of graphic data.

DCS Introducer	ESC P
Protocol Selector	Pn q
Data	Control characters or column definitions
DCS Terminator	ESC \

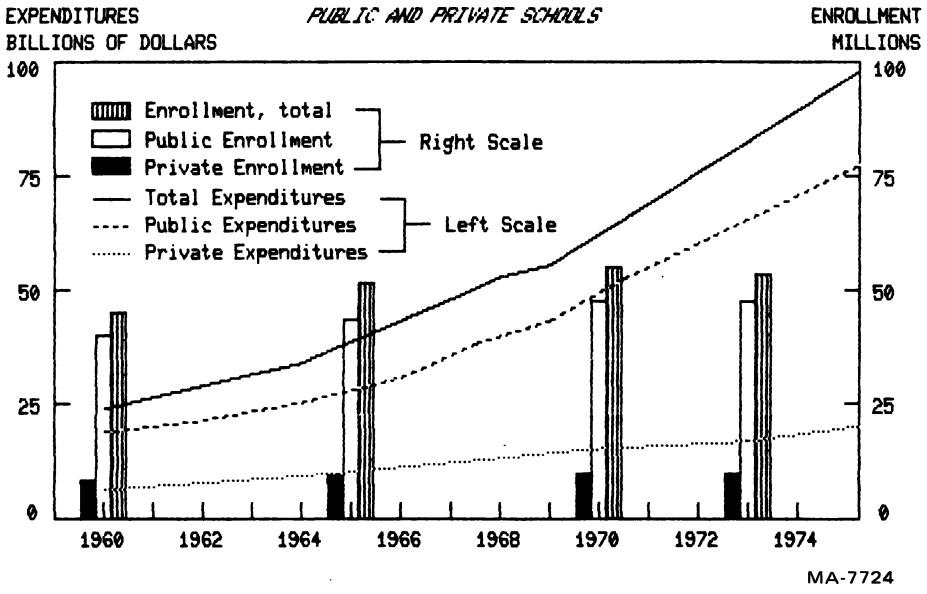


Figure 3-1 Graph Example

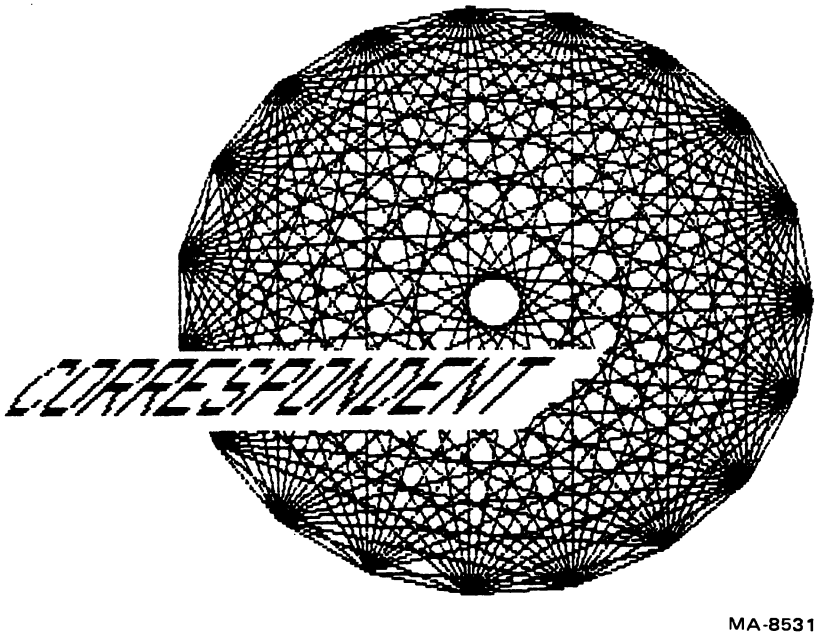


Figure 3-2 Picture Example

DCS INTRODUCER
When the terminal receives the DCS introducer, it enters DCS mode and waits for the correct protocol selector. The DCS introducer is the ANSI DCS introducer sequence ESC P (octal Ø33 12Ø).

When the protocol selector is received, the terminal begins to process data as described in the data section.

The terminal remains in DCS mode if the proper protocol selector is not received, or if it receives a character that is out of range before the correct protocol selector is recognized.

NOTE
In DCS mode, all printable characters in the octal range of Ø4Ø -- 176 (except for protocol selectors) are discarded. All control characters received (octal ØØØ -- Ø37) (except CANcel, SUBstitute, and ESCape) are processed as described in the text mode character processing chapter.

PROTOCOL SELECTOR
After receiving the DCS introducer, the protocol selector causes the terminal to enter graphic mode. The protocol selector consists of a numeric parameter and a final character. The correct protocol for the terminal is numeric parameter "Ø" (octal Ø6Ø) or "1" (octal Ø61) and final character "q" (octal 161).

DATA
The data contained within a graphic string can be either control characters or printable data. The following paragraphs describe the control characters to which the terminal responds in graphic mode and the format of the printable received characters.

Control Characters
In graphic mode, terminal responds to a subset of the following control characters.

ANSI Control Characters -- Table 3-1 lists and describes the ANSI control characters (octal ØØØ -- Ø37) that are processed in graphic mode.

Private Control Characters -- Table 3-2 lists and describes the private control characters in the octal range of Ø4Ø -- Ø76 that are processed in graphic mode.

Printable Data
After the proper protocol selector is received, any character received in the octal range of Ø77 to 176 is considered printable data. These characters define a column of six dots to be printed. This allows selective firing of the top six printhead wires (Figure 3-3). The bottom three printhead wires are not used.

Table 3-1 Graphic Mode ANSI Control Characters

Name	Mnemonic	Octal Code	Function
Null	NUL	ØØØ	No operation (not stored in input buffer). Used as fill characters.
Bell	BEL	ØØ7	Sounds audible bell tone.
Cancel	CAN	Ø3Ø	Immediately causes an exit graphic mode.
Substitute	SUB	Ø32	Replaces any character received with errors. When received in graphic mode, SUB is processed as a one column space.
Escape	ESC	Ø33	Causes the terminal to exit graphic mode and process the sequence.

Table 3-2 Graphic Mode Private Control Characters

Name	Mnemonic	Octal Code	ASCII Character	Function
Graphic Repeat Introducer	DECGRI	Ø41	!	Begin processing a repeat sequence.
Graphic Carriage Return	DECGCR	Ø44	$	The collected column definitions are print then the carriage mov back to the position where the first character was printed after entering graphi mode. This allows lines to be overprinted.
Graphic New Line	DECGNL	Ø55	-	The collected column definitions are printed and the carriage moves back to the first characte printed after enterir graphic mode. Then the paper is advanced 1/12 inch. This allov printing of two consecutive lines of graphic data at the same horizontal position.

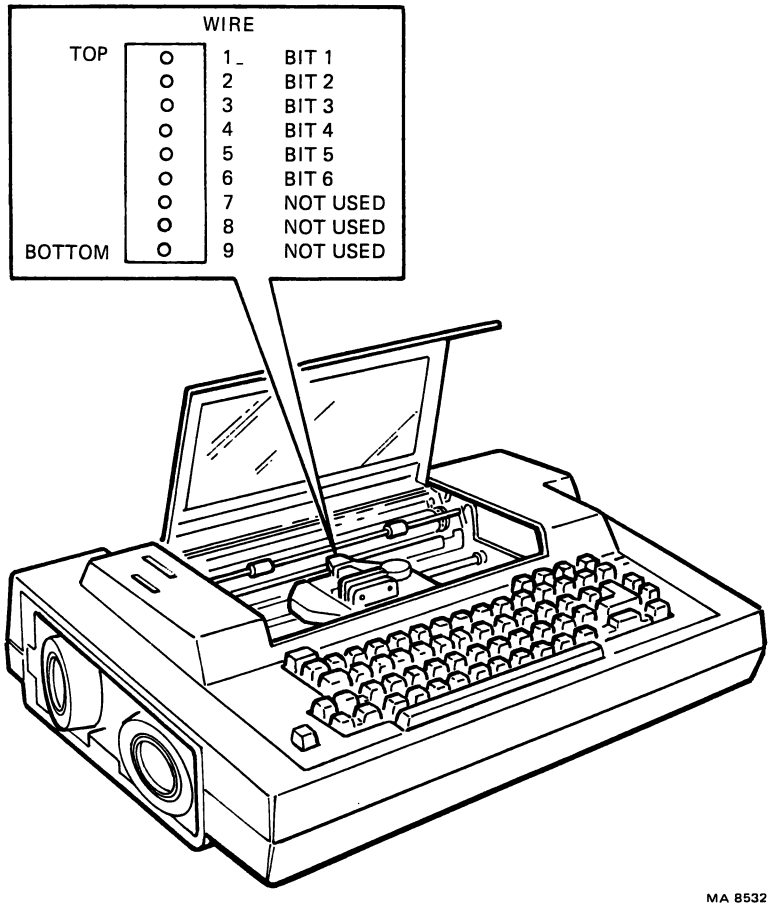


Figure 3-3 Graphic Mode Print Head Firing

Printable characters are processed as follows.

The offset (octal Ø77) is subtracted from the binary value of the character received. The result is a six bit column definition. A print head wire is fired, and a dot printed if the corresponding bit is set to 1.

The least significant bit (bit Ø) is associated with the top print head wire (wire 1). The fifth bit is associated with the fourth print head wire from the bottom (wire 6) and is the last wire that can be fired in graphic mode.

	Wire	
Top	1	bit Ø
	2	bit 1
	3	bit 2
	4	bit 3
	5	bit 4
	6	bit 5
	7	Not used
	8	Not used
Bottom	9	Not used

Refer to Table 3-3 for several printable character examples. Appendix C contains a complete list of the printable characters and the corresponding dot columns. There is no printing action when each dot column is received. The dot columns are printed when:

- All dot buffers are full
- The image buffer is full
- A graphic mode carriage motion command is received
- An exit graphic mode sequence is received by the terminal.

Table 3-3 Printable Character Examples

Character	Octal Value	Binary Value (minus Offset)	Wires Fired
?	077	00000000	o o o o o o
@	100	00000001	* o o o o o
-	176	00111111	* * * * * *
_	137	00100000	o o o o o *
M	115	00001110	o * * * o o

Repeat Sequence

A repeat sequence allows the terminal to continually print a dot column for a specified number of times. It has the same effect as receiving the dot column that many times. A repeat sequence is defined as:

Repeat introducer	! (octal Ø41)
Numeric parameter	Number of times to print the dot column
Dot column	Character in the octal range of Ø77 -- 176

The repeat sequence introducer is the private control character ! (octal Ø41).

The numeric parameter specifies the number of times to print the column definition that follows. The numeric parameter is a string of characters in the octal range of Ø6Ø -- Ø71. If a numeric parameter is not specified, a value of "1" is assumed for that parameter. If the value specified is larger than the limit of the terminal for numeric parameters 64K (65,535), the terminal limit is assumed. All decimal digits are processed as part of the count.

The dot column (a character in the octal range of Ø77 to 176) is printed as many times as specified by the numeric parameter count.

All control characters received during a repeat sequence are processed as usual. For example the control character "!" resets the repeat sequence count.

All unspecified characters (octal Ø72 to Ø76) are ignored.

If a repeat sequence with 14 or more blank column definitions is received, the terminal performs a graphic mode slew. During this condition, the carriage assembly moves over the white space at the rate of 45 inches per second. The slew stops for the last 14 columns.

DCS Terminator

The DCS terminator ESC \ (octal Ø33 134) causes the terminal to exit graphic mode and revert to text mode character processing. The CANcel or ESCape control characters also cause the terminal to exit graphic mode. If the ESCape control character is received, the terminal exits graphic mode and processes the escape sequence.

After an exit condition, the following conditions are set:

- Text mode features (i.e., margins, pitch) are restored.
- Vertical position is modified according to the control characters received while in graphic mode.
- Horizontal position is the same as just before entering graphic mode.
- The first text mode vertical motion command causes the printhead carriage to advance to the next text mode line before executing the command (refer to Vertical Resynchronization).

GRAPHIC MODE PITCH

In graphic mode, the horizontal pitch is set to 70 columns per inch (5 characters per inch). The vertical pitch is set to 12 lines per inch.

GRAPHIC MODE MARGINS

Upon entering graphic mode, the left margin is repositioned to the right (a maximum of 0.11 inches) of the last printed column in text mode. Graphic mode left margin is calculated as follows.

$$\text{Left Margin} = 1 + \frac{(\text{Current Active Column} - 1) \times \text{Old pitch}}{70}$$

Any remainder is rounded up to the next whole number.

Upon entering graphic mode, the right margin is repositioned to the left (a maximum of 0.11 inches) of the text mode right margin. The graphic mode right margin is calculated as follows.

$$\text{Right Margin} = \frac{\text{Old Right Margin} \times \text{Old Pitch}}{70}$$

Discard any remainder.

The top margin remains the same as in text mode. Bottom margin is calculated as follows.

$$\text{Bottom Margin} = \frac{\text{Old Bottom Margin} \times \text{Old Pitch}}{12}$$

If an attempt is made to print past the right margin set in text mode, the printer automatically generates a graphic new line (refer to Private Control Character section in this chapter).

Graphic mode maximum line length depends on the horizontal pitch and right margin that was selected in text mode. In graphic mode, the maximum line length is 13.1 inches (or 1,736 dots). To use the maximum line length the following conditions must be met before entering graphic mode.

- Horizontal pitch feature must be set to 10 characters per inch.
- Text mode left margin must be set to column 1.
- Text mode right margin must be set to column 132.
- Active column must be column 1.

Perforation Skip

When using perforated paper during graphic mode it may not be desirable to print on the perforations between sheets of paper. If you are using friction feed roll paper, continuous printing is allowed.

The terminal distinguishes between a perforated form and a continuous form as follows.

- If the top margin equals one and the bottom margin equals the form length, the printer ignores the bottom margin and continues to print data.
- If the top margin does not equal one or the bottom margin does not equal the form length, the printer does not print below the bottom margin and skips to the next top margin.

Vertical Resynchronization

In text mode, the spacing between lines is set according to the selected vertical pitch. (Refer to text mode character processing.) In graphic mode, lines are spaced 1/12 inch apart.

Because of the difference in vertical pitch, the printhead may not be on a text mode line when the printer exits graphic mode. The printer must resynchronize the print head to the next text mode line. This resynchronization occurs when:

- There is a perforation skip
- After exiting graphic mode and just before the first vertical motion command, such as a form feed or line feed command (except superscript and subscript).

Superscript or subscript can be used to label graphic data with text mode comments. Reverse line feed is not recommended because the vertical registration of graphic data may not be satisfactory.

APPENDIX A
TEXT MODE PRINTABLE CHARACTER SETS

GENERAL

This appendix includes a summary of all printable character sets which the terminal is capable of processing in text mode.

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER

ESC	33 OCTAL
	27 DECIMAL
	1B HEX

MA-7247

US (ASCII) Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	£	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER

ESC	33	OCTAL
	27	DECIMAL
	1B	HEX

MA-7248

UK Character Set

BITS B7 B6 B5 / B4 B3 B2 B1 / ROW	COLUMN 0 (0 0 0)		1 (0 0 1)		2 (0 1 0)		3 (0 1 1)		4 (1 0 0)		5 (1 0 1)		6 (1 1 0)		7 (1 1 1)	
0 0 0 0 / 0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	é	140 96 60	p	160 112 70
0 0 0 1 / 1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0 / 2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1 / 3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0 / 4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1 / 5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0 / 6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1 / 7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0 / 8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1 / 9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0 / 10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1 / 11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	Ä	133 91 5B	k	153 107 6B	ä	173 123 7B
1 1 0 0 / 12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	Ö	134 92 5C	l	154 108 6C	ö	174 124 7C
1 1 0 1 / 13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	Å	135 93 5D	m	155 109 6D	å	175 125 7D
1 1 1 0 / 14	SO	16 14		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	Ü	136 94 5E	n	156 110 6E	ü	176 126 7E
1 1 1 1 / 15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER: ESC | 33 OCTAL | 27 DECIMAL | 1B HEX

MA-7420

Finnish Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 COLUMN 0		0 0 1 1		0 1 0 2		0 1 1 3		1 0 0 4		1 0 1 5		1 1 0 6		1 1 1 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	Ä	100 64 40	P	120 80 50	ä	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	Æ	133 91 5B	k	153 107 6B	æ	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	Ø	134 92 5C	l	154 108 6C	ø	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	Å	135 93 5D	m	155 109 6D	å	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	Ü	136 94 5E	n	156 110 6E	ü	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER **ESC** | 33 OCTAL | 27 DECIMAL | 1B HEX

MA-7421

Norwegian/Danish Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 COLUMN 0		0 0 1 1		0 1 0 2		0 1 1 3		1 0 0 4		1 0 1 5		1 1 0 6		1 1 1 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	E	100 64 40	P	120 80 50	é	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	Ä	133 91 5B	k	153 107 6B	ä	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	Ö	134 92 5C	l	154 108 6C	ö	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	Å	135 93 5D	m	155 109 6D	å	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	Ü	136 94 5E	n	156 110 6E	ü	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER | ESC | 33 OCTAL / 27 DECIMAL / 1B HEX

MA-7422

Swedish Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	§	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	Ä	133 91 5B	k	153 107 6B	ä	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	Ö	134 92 5C	l	154 108 6C	ö	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	Ü	135 93 5D	m	155 109 6D	ü	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	ß	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER | ESC | 33 OCTAL / 27 DECIMAL / 1B HEX

MA-7423

German Character Set

B7 B6 B5 / BITS B4 B3 B2 B1 / ROW	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	COLUMN 0	1	2	3	4	5	6	7
0 0 0 0 / 0	NUL 0 0 0	20 16 10	SP 40 32 20	0 60 48 30	à 100 64 40	P 120 80 50	ô 140 96 60	p 160 112 70
0 0 0 1 / 1	1 1 1	DC1 (XON) 21 17 11	! 41 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	a 141 97 61	q 161 113 71
0 0 1 0 / 2	2 2 2	22 18 12	" 42 34 22	2 62 50 32	B 102 66 42	R 122 82 52	b 142 98 62	r 162 114 72
0 0 1 1 / 3	3 3 3	DC3 (XOFF) 23 19 13	# 43 35 23	3 63 51 33	C 103 67 43	S 123 83 53	c 143 99 63	s 163 115 73
0 1 0 0 / 4	4 4 4	24 20 14	$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	d 144 100 64	t 164 116 74
0 1 0 1 / 5	ENQ 5 5 5	25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	e 145 101 65	u 165 117 75
0 1 1 0 / 6	6 6 6	26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	f 146 102 66	v 166 118 76
0 1 1 1 / 7	BEL 7 7 7	27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	g 147 103 67	w 167 119 77
1 0 0 0 / 8	BS 10 8 8	CAN 30 24 18	(50 40 28	8 70 56 38	H 110 72 48	X 130 88 58	h 150 104 68	x 170 120 78
1 0 0 1 / 9	HT 11 9 9	31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	i 151 105 69	y 171 121 79
1 0 1 0 / 10	LF 12 10 A	SUB 32 26 1A	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	j 152 106 6A	z 172 122 7A
1 0 1 1 / 11	VT 13 11 B	ESC 33 27 1B	+ 53 43 2B	; 73 59 3B	K 113 75 4B	â 133 91 5B	k 153 107 6B	é 173 123 7B
1 1 0 0 / 12	FF 14 12 C	34 28 1C	, 54 44 2C	< 74 60 3C	L 114 76 4C	ç 134 92 5C	l 154 108 6C	ù 174 124 7C
1 1 0 1 / 13	CR 15 13 D	35 29 1D	- 55 45 2D	= 75 61 3D	M 115 77 4D	ê 135 93 5D	m 155 109 6D	è 175 125 7D
1 1 1 0 / 14	SO 16 14 E	36 30 1E	. 56 46 2E	> 76 62 3E	N 116 78 4E	î 136 94 5E	n 156 110 6E	û 176 126 7E
1 1 1 1 / 15	SI 17 15 F	37 31 1F	/ 57 47 2F	? 77 63 3F	O 117 79 4F	_ 137 95 5F	o 157 111 6F	DEL 177 127 7F

KEY

ASCII CHARACTER: ESC | 33 OCTAL | 27 DECIMAL | 1B HEX

MA-7424

French Canadian Character Set

BITS B7 B6 B5 / B4 B3 B2 B1	ROW	COLUMN 0		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	à	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	£	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	°	133 91 5B	k	153 107 6B	é	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	ç	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	§	135 93 5D	m	155 109 6D	ù	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	è	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER | ESC | 33 OCTAL / 27 DECIMAL / 1B HEX

MA-7425

French Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0		0 0 1 / 1		0 1 0 / 2		0 1 1 / 3		1 0 0 / 4		1 0 1 / 5		1 1 0 / 6		1 1 1 / 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER

ESC	33	OCTAL
	27	DECIMAL
	1B	HEX

MA-7247

Spanish Character Set

B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0		0 0 1 / 1		0 1 0 / 2		0 1 1 / 3		1 0 0 / 4		1 0 1 / 5		1 1 0 / 6		1 1 1 / 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	§	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	£	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	¡	133 91 5B	k	153 107 6B	o	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	Ñ	134 92 5C	l	154 108 6C	ñ	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	¿	135 93 5D	m	155 109 6D	ç	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER **ESC** 33 OCTAL / 27 DECIMAL / 1B HEX

MA-7247F

Italian Character Set

BITS B4 B3 B2 B1	ROW	COLUMN 0		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	♦	140 96 60	– SCAN 3	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	▒	141 97 61	– SCAN 5	161 113 71
0 0 1 0	2		2 2 2		22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	␤	142 98 62	– SCAN 7	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	␋	143 99 63	– SCAN 9	163 115 73
0 1 0 0	4		4 4 4		24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	␍	144 100 64	├	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	␊	145 101 65	┤	165 117 75
0 1 1 0	6		6 6 6		26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	␀	146 102 66	┴	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	±	147 103 67	┬	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	␤	150 104 68	│	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	␋	151 105 69	≤	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	␍	152 106 6A	≥	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	␊	153 107 6B	π	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	␀	154 108 6C	≠	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	␍	155 109 6D	£	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	┼	156 110 6E	·	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	(BLANK)	137 95 5F	– SCAN 1	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER | ESC | 33 OCTAL / 27 DECIMAL / 1B HEX

MA-7249

VT100 Compatible Character Set

BITS B7 B6 B5 / B4 B3 B2 B1	ROW	COLUMN 0 (0 0 0)		COLUMN 1 (0 0 1)		COLUMN 2 (0 1 0)		COLUMN 3 (0 1 1)		COLUMN 4 (1 0 0)		COLUMN 5 (1 0 1)		COLUMN 6 (1 1 0)		COLUMN 7 (1 1 1)	
0 0 0 0	0	NUL	0 0 0		20 16 10	SP	40 32 20	0	60 48 30	—	100 64 40	*	120 80 50	◇	140 96 60	P	160 112 70
0 0 0 1	1		1 1 1	DC1 (XON)	21 17 11	‥	41 33 21	1	61 49 31	α	101 65 41	?	121 81 51	A	141 97 61	Q	161 113 71
0 0 1 0	2		2 2 2		22 18 12	(	42 34 22	2	62 50 32	⊥	102 66 42	⍴	122 82 52	B	142 98 62	R	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	<	43 35 23	3	63 51 33	∩	103 67 43	⌈	123 83 53	C	143 99 63	S	163 115 73
0 1 0 0	4		4 4 4		24 20 14	≤	44 36 24	4	64 52 34	⌊	104 68 44	~	124 84 54	D	144 100 64	T	164 116 74
0 1 0 1	5	ENQ	5 5 5		25 21 15	=	45 37 25	5	65 53 35	∈	105 69 45	↓	125 85 55	E	145 101 65	U	165 117 75
0 1 1 0	6		6 6 6		26 22 16	>	46 38 26	6	66 54 36	—	106 70 46	∪	126 86 56	F	146 102 66	V	166 118 76
0 1 1 1	7	BEL	7 7 7		27 23 17	]	47 39 27	7	67 55 37	∇	107 71 47	⍵	127 87 57	G	147 103 67	W	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	∨	50 40 28	8	70 56 38	Δ	110 72 48	⊃	130 88 58	H	150 104 68	X	170 120 78
1 0 0 1	9	HT	11 9 9		31 25 19	∧	51 41 29	9	71 57 39	⍳	111 73 49	↑	131 89 59	I	151 105 69	Y	171 121 79
1 0 1 0	10	LF	12 10 A	SUB	32 26 1A	≠	52 42 2A	)	72 58 3A	∘	112 74 4A	⊂	132 90 5A	J	152 106 6A	Z	172 122 7A
1 0 1 1	11	VT	13 11 B	ESC	33 27 1B	÷	53 43 2B	[	73 59 3B	·	113 75 4B	←	133 91 5B	K	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 C		34 28 1C	,	54 44 2C	;	74 60 3C	⍞	114 76 4C	⊢	134 92 5C	L	154 108 6C	⊣	174 124 7C
1 1 0 1	13	CR	15 13 D		35 29 1D	+	55 45 2D	×	75 61 3D	⌶	115 77 4D	→	135 93 5D	M	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 E		36 30 1E	.	56 46 2E	:	76 62 3E	⊤	116 78 4E	≥	136 94 5E	N	156 110 6E	$	176 126 7E
1 1 1 1	15	SI	17 15 F		37 31 1F	/	57 47 2F	\	77 63 3F	⊙	117 79 4F	_	137 95 5F	O	157 111 6F	DEL	177 127 7F

KEY

ASCII CHARACTER **ESC** | 33 OCTAL | 27 DECIMAL | 1B HEX

MA-7714

APL Character Set

APPENDIX B
TEXT MODE CONTROL FUNCTION SUMMARY

GENERAL

This appendix includes summaries of the text mode control characters and the terminal escape and control sequences.

TEXT MODE CONTROL CHARACTERS

The following table lists the text mode control characters to which the terminal responds.

Name	Mnemonic	Octal Code	Function
Null	NUL	ØØØ	No operation (not stored in the input buffer). Used as fill characters (See Communication Chapter.)
Enquiry	ENQ	ØØ5	Causes the terminal to transmit the answerback message.
Bell	BEL	ØØ7	Sounds audible bell tone.
Backspace	BS	Ø1Ø	Moves the active column left one column unless the active column is at the left margin. This condition causes no action to occur (Active column and active line are described later in this chapter).
Horizontal Tab	HT	Ø11	Advances the active column to the next horizontal tab stop or to the left margin on the next line if there are no more tab stops on the line.

Line Feed	LF	Ø12	Advances the active line by one line or to the top margin of the next page if active line is at the bottom margin. Active column is also set to the left margin if ANSI New Line is on.
Vertical Tab	VT	Ø13	Advances the active line to the next vertical tab stop or the top margin of the next page if there are no more tabs on the page.
Form Feed	FF	Ø14	Advances the active line to the top margin on the next page.
Carriage Return	CR	Ø15	Returns the active column to the left margin.
Shift Out	SO	Ø16	Terminal switches to the G1 printable character set.
Shift In	SI	Ø17	Terminal switches to the GØ printable character set.
Cancel	CAN	Ø3Ø	Immediately ends any control or escape sequence.
Substitute	SUB	Ø32	Immediately ends any control or escape sequence. Any character received with errors are replaced by the SUB character. The SUB character is printed as " ".
Escape	ESC	Ø33	Interpreted as the introducer of an escape sequence.
Delete	DEL	177	No operation (not stored in

ESCAPE AND CONTROL SEQUENCE SUMMARY
The following table lists the escape and control sequences to which the terminal responds.

Character Sets

	G0			G1			G2			G3		
Great Britain	ESC	(	A	ESC	)	A	ESC	*	A	ESC	+	
United States	ESC	(	B	ESC	)	B	ESC	*	B	ESC	+	
Finland	ESC	(	C	ESC	)	C	ESC	*	C	ESC	+	
Norway/Denmark	ESC	(	E	ESC	)	E	ESC	*	E	ESC	+	
Sweden	ESC	(	H	ESC	)	H	ESC	*	H	ESC	+	
Germany	ESC	(	K	ESC	)	K	ESC	*	K	ESC	+	
France	ESC	(	R	ESC	)	R	ESC	*	R	ESC	+	
French Canada	ESC	(	Q	ESC	)	Q	ESC	*	Q	ESC	+	
Italy	ESC	(	Y	ESC	)	Y	ESC	*	Y	ESC	+	
Spain	ESC	(	Z	ESC	)	Z	ESC	*	Z	ESC	+	
VT100 compatible	ESC	(	0	ESC	)	0	ESC	*	0	ESC	+	
Finland	ESC	(	5	ESC	)	5	ESC	*	5	ESC	+	
Norway/Denmark	ESC	(	6	ESC	)	6	ESC	*	6	ESC	+	
Sweden	ESC	(	7	ESC	)	7	ESC	*	7	ESC	+	
Select APL	ESC	(	8	ESC	)	8	ESC	*	8	ESC	+	
French Canada	ESC	(	9	ESC	)	9	ESC	*	9	ESC	+	

NOTE
The *** character is used to indicate variable numeric parameters within the octal representation of the control or escape sequence.

Active Column and Active Line

Name	Mnemonic	Sequence
Index	IND	ESC D 033 104
Vertical Position Absolute	VPA	ESC [Pn d 033 133 *** 144
Next Line	NL	ESC E 033 105
Horizontal Position Absolute	HPA	ESC [Pn 033 133 *** 140
Horizontal Position Relative	HPR	ESC [Pn a 033 133 *** 141

Cursor Up	CUP	ESC	[	Pn	A
		Ø33	133	***	1Ø1
Vertical Position Relative Down	VPR	ESC	[	Pn	e
		Ø33	133	***	145
Partial Line Down	PLD	ESC	K		
		Ø33	113		
Partial Line Up	PLU	ESC	L		
		Ø33	114		
Reverse Index	RI	ESC	M		
		Ø33	115		

Horizontal Pitch (Characters Per Inch)

Name	Mnemonic	Sequence			
Set Horizontal Pitch (1Ø cpi)	DECSHORP	ESC	[	Ø	w
		Ø33	133	Ø6Ø	167
(1Ø cpi)		ESC	[	1	w
		Ø33	133	Ø61	167
(12 cpi)		ESC	[	2	w
		Ø33	133	Ø62	167
(13.2 cpi)		ESC	[	3	w
		Ø33	133	Ø63	167
(16.5 cpi)		ESC	[	4	w
		Ø33	133	Ø64	167
(5 cpi)		ESC	[	5	w
		Ø33	133	Ø65	167
(6 cpi)		ESC	[	6	w
		Ø33	133	Ø66	167
(6.6 cpi)		ESC	[	7	w
		Ø33	133	Ø67	167
(8.25 cpi)		ESC	[	8	w
		Ø33	133	Ø7Ø	167

Horizontal Margins

Name	Mnemonic	Sequence
Set Left and Right Margins	DECSLRM	ESC [Pl ; P2 s 033 133 *** 073 *** 163

Horizontal Tabs

Name	Mnemonic	Sequence
Horizontal Tabulation Set	HTS	ESC H 033 110
Horizontal Tabulation Set	DECHTS	ESC 1 033 061
Tabulation Clear	TBC	ESC [0 g 033 133 060 147
Tabulation Clear	TBC	ESC [2 g 033 133 062 147
Tabulation Clear	TBC	ESC [3 g 033 133 063 147
Clear All Horizontal Tabs	DECCAHT	ESC 2 033 062
Set Horizontal Tabs	DECSHTS	ESC [Pl ; ... Pn u 033 133 *** 073 ... *** 165

Vertical Pitch (Lines Per Inch)

Name	Mnemonic	Sequence
Set Vertical Pitch (6 lpi)	DECVERP	ESC [0 z 033 133 060 172
(6 lpi)		ESC [1 z 033 133 061 172
(8 lpi)		ESC [2 z 033 133 062 172

(12 lpi)		ESC [3 z Ø33 133 Ø63 172
(2 lpi)		ESC [4 z Ø33 133 Ø64 172
(3 lpi)		ESC [5 z Ø33 133 Ø65 172
(4 lpi)		ESC [6 z Ø33 133 Ø66 172

Form Length

Name	Mnemonic	Sequence
Set Lines Per Physical Page	DECSLPP	ESC [Pl t Ø33 133 *** 164

Vertical Margins

Name	Mnemonic	Sequence
Set Top, Bottom Margins	DECSTBM	ESC [Pl ; P2 r Ø33 133 *** Ø73 *** 162

Vertical Tabs

Name	Mnemonic	Sequence
Vertical Tab Set	VTS	ESC J Ø33 112
Vertical Tab Set	DECVTS	ESC 3 Ø33 Ø63
Set Vertical Tab Stops	DECSVTS	ESC [Pl ; ... Pn v Ø33 133 *** Ø73 *** 166
Tabulation Clear	TBC	ESC [1 g Ø33 133 Ø61 147
Tabulation Clear	TBC	ESC [4 g Ø33 133 Ø64 147
Clear All Vertical Tabs	DECCAVT	ESC 4 Ø33 Ø64

Product Identification -

Name	Mnemonic	Sequence
Device Attributes	DA	ESC [c Ø33 133 143
Device Attributes	DA	ESC [Ø c Ø33 133 Ø6Ø 143
Identify Terminal	DECID	ESC Z Ø33 132

APPENDIX C
GRAPHIC MODE PRINTABLE CHARACTER SUMMARY

GENERAL

This appendix includes a summary of the graphic mode printable characters and the dot column definition for each character. Bullets represent wires fired. Open circles represent wires not fired.

Printable Character Dot Column Definitions Summary

Character	Octal Value	Wires Fired
?	Ø77	o o o o o o o o
@	1ØØ	• o o o o o
A	1Ø1	o • o o o o
B	1Ø2	• • o o o o

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
C	103	o o ^ o o o
D	104	^ o ^ o o o
E	105	o ^ ^ o o o
F	106	^ ^ ^ o o o
G	107	o o o ^ o o
H	110	^ o o ^ o o
I	111	o ^ o ^ o o

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
J	112	^ ^ o ^ o o
K	113	o o ^ ^ o o
L	114	^ o ^ ^ o o
M	115	o ^ ^ ^ o o
N	116	^ ^ ^ ^ o o
O	117	o o o o ^ o
P	120	^ o o o ^ o

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
Q	121	o ^ o o ^ o
R	122	^ ^ o o ^ o
S	123	o o ^ o ^ o
T	124	^ o ^ o ^ o
U	125	o ^ ^ o ^ o
V	126	^ ^ ^ o ^ o
W	127	o o o ^ ^ o

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
X	130	^ o o ^ ^ o
Y	131	o ^ o ^^ ^ o
Z	132	^ ^ o ^ ^ o
[	133	o o ^ ^ ^ o
\	134	^ o ^ ^ ^ o
]	135	o ^ ^ ^ ^ o
^	136	^ ^ ^ ^ ^ o

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
_	137	o o o o o ^
`	140	^ o o o o ^
a	141	o ^ o o o ^
b	142	^ ^ o o o ^
c	143	o o ^ o o ^
d	144	^ o ^ o o ^
e	145	o ^ ^ o o ^

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
f	146	^ ^ ^ o o ^
g	147	o o o ^ o ^
h	150	^ o o ^ o ^
i	151	o ^ o ^ o ^
j	152	^ ^ o ^ o ^
k	153	o o ^ ^ o ^
l	154	^ o ^ ^ o ^

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
m	155	o ^ ^ ^ o ^
n	156	^ ^ ^ ^ o ^
o	157	o o o o ^ ^
p	160	^ o o o ^ ^
q	161	o ^ o o ^ ^
r	162	^ ^ o o ^ ^
s	163	o o ^ o ^ ^

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
t	164	^ o ^ o ^ ^
u	165	o ^ ^ o ^ ^
v	166	^ ^ ^ o ^ ^
w	167	o o o ^ ^ ^
x	170	^ o o ^ ^ ^
y	171	o ^ o ^ ^ ^
z	172	^ ^ o ^ ^ ^

Printable Character Dot Column Definitions Summary (Cont)

Character	Octal Value	Wires Fired
{	173	o o ^ ^ ^ ^
|	174	^ o ^ ^ ^ ^
}	175	o ^ ^ ^ ^ ^
~	176	^ ^ ^ ^ ^ ^