digital

VT102 PROGRAMMING REFERENCE CARD

CONTROL CHARACTERS RECEIVED

Name	Character Mnemonic	Octal Code	Function
Null	NUL	000	This character is ignored when received (not stored in input buffer) and used as a fill character.
End Of Text	ETX	003	This character can be selected as a half-duplex turnaround character.
End Of Transmission	EOT	004	This character can be selected as a disconnect character or as a half-duplex turnaround character. When used as a turnaround character, the disconnect character is DLE-EOT.
Enquire	ENQ	005	This character transmits the answerback message.
Bell	BEL	007	This character generates a bell tone.
Backspace	BS	010	This character moves the cursor to the left one character position, unless it is at the left margin, in which case no action occurs.
Horizontal Tab	HT	011	This character moves the cursor to the next tab stop, or to the right margin if there are no more tab stops.

Name	Character Mnemonic	Octal Code	Function
Line Feed	LF	012	This character causes a line feed or a new line operation. (refer to Linefeed/New Line mode.)
Vertical Tab	VT	013	This character is processed as LF.
Form Feed	FF	014	This character is processed as LF. It can also be selected as a half-duplex turnaround character.
Carriage Return	CR	015	This character moves the cursor to left margin on the current line. It can also be selected as a half-duplex turnaround character.
Shift Out	SO	016	This character selects the G1 character set, as designated by a Select Character Set sequence.
Shift In	SI	017	This character selects the G0 character set, as designated by a Select Character Set sequence.
Device Control 1	DC1	021	This character is processed as XON. It causes the terminal to continue transmitting characters.
Device Control 3	DC3	023	This character is processed as XOFF. It causes terminal to stop transmitting all characters except XOFF and XON. It can also be selected as a half-duplex turnaround character.

Name	Character Mnemonic	Octal Code	Function
Cancel	CAN	030	If received during an escape or control sequence, the sequence is cancelled and substitution character (▧) is displayed.
Substitute	SUB	032	This character is processed as CAN.
Escape	ESC	033	This character is processed as a sequence introducer.
Delete	DEL	177	This character is ignored when received (not stored in input buffer).

ANSI COMPATIBLE SEQUENCES

Set Mode

Name	Mnemonic	Mode	Sequence
Keyboard action	KAM	Locked	ESC [2 h
Insertion-replacement	IRM	Insert	ESC [4 h
Send-receive	SRM	Off	ESC [1 2 h
Line feed/new line	LMN	New line	ESC [2 0 h
Cursor key	DECCKM	Application	ESC [? 1 h
ANSI/VT52	DECANM	ANSI	N/A
Column	DECCOLM	132 column	ESC [? 3 h
Scrolling	DECSCLM	Smooth	ESC [? 4 h
Screen	DECSCNM	Reverse	ESC [? 5 h
Origin	DECOM	Relative	ESC [? 6 h
Auto wrap	DECAWM	On	ESC [? 7 h
Auto repeat	DECARM	On	ESC [? 8 h
Print form feed	DECPFF	On	ESC [? 1 8 h
Print extent	DECPEX	Full Screen	ESC [? 1 9 h

Reset Mode

Name	Mnemonic	Mode	Sequence
Keyboard action	KAM	Unlocked	ESC [2 l*
Insertion-replacement	IRM	Replace	ESC [4 l*
Send-receive	SRM	On	ESC [1 2 l*
Line feed/new line	LMN	Line feed	ESC [2 0 l*
Cursor key	DECCKM	Cursor	ESC [? 1 l*
ANSI/VT52	DECANM	VT52	ESC [? 2 l*
Column	DECCOLM	80 column	ESC [? 3 l*
Scrolling	DECSCLM	Jump	ESC [? 4 l*
Screen	DECSCNM	Normal	ESC [? 5 l*
Origin	DECOM	Absolute	ESC [? 6 l*
Auto wrap	DECAWM	Off	ESC [? 7 l*
Auto repeat	DECARM	Off	ESC [? 8 l*
Print form feed	DECPFF	Off	ESC [? 1 8 l*
Print extent	DECPEX	Scrolling Region	ESC [? 1 9 l*

* The last character of the sequence is lowercase L (154$_8$)

Cursor Key Codes Generated

Cursor Key (Arrow)	ANSI Characters Generated	
	Reset (Cursor)	Set (Application)
Up	ESC [A	ESC O A
Down	ESC [B	ESC O B
Right	ESC [C	ESC O C
Left	ESC [D	ESC O D

Keypad Character Selection

Name	Mnemonic	Sequence
Alternate	DECKPAM	ESC =
Numeric	DECKPNM	ESC >

Keypad Codes Generated

Key	VT52 Numeric Keypad Mode	VT52 Alternate Keypad Mode	ANSI Numeric Keypad Mode	ANSI Alternate Keypad Mode
0	0	ESC ? p	0	ESC O p
1	1	ESC ? q	1	ESC O q
2	2	ESC ? r	2	ESC O r
3	3	ESC ? s	3	ESC O s
4	4	ESC ? t	4	ESC O t
5	5	ESC ? u	5	ESC O u
6	6	ESC ? v	6	ESC O v
7	7	ESC ? w	7	ESC O w
8	8	ESC ? x	8	ESC O x
9	9	ESC ? y	9	ESC O y
— (minus)	— (minus)	ESC ? m	— (minus)	ESC O m
, (comma)	, (comma)	ESC ? l*	, (comma)	ESC O l*
. (period)	. (period)	ESC ? n	. (period)	ESC O n
ENTER	Same as RETURN	ESC ? M	Same as RETURN	ESC O M
PF1	ESC P	ESC P	ESC O P	ESC O P
PF2	ESC Q	ESC Q	ESC O Q	ESC O Q
PF3	ESC R	ESC R	ESC O R	ESC O R
PF4	ESC S	ESC S	ESC O S	ESC O S

* The last character of the sequence is lowercase L (154$_8$)

Select Character Sets SCS

Character Set	G0 Designator	G1 Designator
United Kingdom (UK)	ESC (A	ESC) A
United States (USASCII)	ESC (B	ESC) B
Special characters and line drawing set	ESC (0	ESC) 0
Alternate character ROM	ESC (1	ESC) 1
Alternate character ROM — Special characters	ESC (2	ESC) 2

Name	Mnemonic	Sequence
Single Shift 2	SS2	ESC N
Single Shift 3	SS3	ESC O

US/UK Character Set

BITS b7 b6 b5 / b4 b3 b2 b1 ROW	COLUMN 0 0 0 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		SP	0	@	P	`	p
0 0 0 1 1		DC1 (XON)	!	1	A	Q	a	q
0 0 1 0 2			"	2	B	R	b	r
0 0 1 1 3		DC3 (XOFF)	# £	3	C	S	c	s
0 1 0 0 4	ENQ		$	4	D	T	d	t
0 1 0 1 5	ENQ		%	5	E	U	e	u
0 1 1 0 6			&	6	F	V	f	v
0 1 1 1 7	BEL		'	7	G	W	g	w
1 0 0 0 8	BS	CAN	(	8	H	X	h	x
1 0 0 1 9	HT		)	9	I	Y	i	y
1 0 1 0 10	LF	SUB	*	:	J	Z	j	z
1 0 1 1 11	VT	ESC	+	;	K	[	k	{
1 1 0 0 12	FF		,	<	L	\	l	|
1 1 0 1 13	CR		-	=	M	]	m	}
1 1 1 0 14	SO		.	>	N	^	n	~
1 1 1 1 15	SI		/	?	O	_	o	DEL

NOTE: DEPENDS ON THE CHARACTER SET SELECTED. U.S. - U.K. -£

KEY

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

Special Characters and Line Drawing Set

BITS b7 b6 b5 / b4 b3 b2 b1 ROW	COLUMN 0 0 0 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		SP	0	@	P		SCAN 3
0 0 0 1 1		DC1 (XON)	!	1	A	Q		SCAN 5
0 0 1 0 2			"	2	B	R		SCAN 7
0 0 1 1 3		DC3 (XOFF)	#	3	C	S		SCAN 9
0 1 0 0 4	ENQ		$	4	D	T		
0 1 0 1 5	ENQ		%	5	E	U		
0 1 1 0 6			&	6	F	V		
0 1 1 1 7	BEL		'	7	G	W		
1 0 0 0 8	BS	CAN	(	8	H	X		
1 0 0 1 9	HT		)	9	I	Y		
1 0 1 0 10	LF	SUB	*	:	J	Z		
1 0 1 1 11	VT	ESC	+	;	K	[		
1 1 0 0 12	FF		,	<	L	\		
1 1 0 1 13	CR		-	=	M	]		
1 1 1 0 14	SO		.	>	N	^		
1 1 1 1 15	SI		/	?	O	BLANK	SCAN 1	DEL

KEY

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

Character Attributes

Name	Mnemonic	Sequence
Select Graphic Rendition (no attributes)	SGR	ESC [m
Select Graphic Rendition (no attributes)	SGR	ESC [0 m
Select Graphic Rendition (select attribute bold)	SGR	ESC [1 m
Select Graphic Rendition (select attribute underline)	SGR	ESC { 4 m
Select Graphic Rendition (select attribute blink)	SCR	ESC [5 m
Select Graphic Rendition (select attribute, reverse video)	SGR	ESC [7 m

Scrolling Region

Name	Mnemonic	Sequence
Set top and bottom margins	DECSTBM	ESC [Pt; Pb r

Cursor Movement Commands

Name	Mnemonic	Sequence
Cursor up	CUU	ESC [Pn A
Cursor down	CUD	ESC [Pn B
Cursor forward (right)	CUF	ESC [Pn C
Cursor backward (left)	CUB	ESC [Pn D
Cursor position	CUP	ESC [Pl; Pc H
Cursor position (home)	CUP	ESC [H
Horizontal and vertical position	HVP	ESC [Pl; Pc f
Horizontal and vertical position (home)	HVP	ESC [f
Index	IND	ESC D
Reverse index	RI	ESC M
Next line	NEL	ESC E
Save cursor (and attributes)	DECSC	ESC 7
Restore cursor (and attributes)	DECRC	ESC 8

Tab Stops

Name	Mnemonic	Sequence
Horizontal tab set (at current column)	HTS	ESC H
Tabulation clear (at current column)	TBC	ESC [g
Tabulation clear (at current column)	TBC	ESC [0 g
Tabulation clear (all tabs)	TBC	ESC [3 g

Line Attributes

Name	Mnemonic	Sequence
Double-height top half	DECDHL	ESC # 3
Double-height bottom half	DECDHL	ESC # 4
Single-width single-height	DECSWL	ESC # 5
Double-width single-height	DECDWL	ESC # 6

Erasing

Name	Mnemonic	Sequence
Erase in line (cursor to end of line)	EL	ESC [K
Erase in line (cursor to end of line)	EL	ESC [0 K
Erase in line (beginning of line to cursor)	EL	ESC [1 K
Erase in line (entire line containing cursor)	EL	ESC [2 K
Erase in display (cursor to end of screen)	ED	ESC [J
Erase in display (cursor to end of screen)	ED	ESC [0 J
Erase in display (beginning of screen to cursor)	ED	ESC [1 J
Erase in display (entire screen)	ED	ESC [2 J

Editing Functions

Name	Mnemonic	Sequence
Delete character	DCH	ESC [Pn P
Insert line	IL	ESC [Pn L
Delete line	DL	ESC [Pn M

Print Commands

Name	Mnemonic	Sequence
Media copy (enter auto print)	MC	ESC [? 5 i
Media copy (exit auto print)	MC	ESC [? 4 i
Media copy (enter printer controller)	MC	ESC [5 i
Media copy (exit printer controller)	MC	ESC [4 i
Media copy (print screen)	MC	ESC [i
Media copy (print screen)	MC	ESC [0 i
Media copy (print cursor line)	MC	ESC [? 1 i

Reports

Name	Mnemonic	Sequence
Device status report (request status of VT102)	DSR	ESC [5 n
Response:		
Terminal OK	DSR	ESC [0 n
Terminal not OK	DSR	ESC [3 n
Device status report (request status of printer)	DSR	ESC [? 15 n
Response:		
Printer ready	DSR	ESC [? 10 n
Printer not ready	DSR	ESC [? 11 n
No printer	DSR	ESC [? 13 n
Device status report (report cursor position)	DSR	ESC [6 n
Cursor position report	CPR	ESC [P1; Pc R
Device attributes (what are you)	DA	ESC [c
Device attributes (what are you)	DA	ESC [0 c
Identify Terminal (what are you)	DECID	ESC Z

NOTE: *ESC Z is not recommended.*

Name	Mnemonic	Sequence
Device Attributes Response: VT102	DA	ESC [? 6 c

Reset

Name	Mnemonic	Sequence
Reset to initial state	RIS	ESC c

Tests and Adjustments

Name	Mnemonic	Sequence
Screen alignment display (fill screen with "Es")	DECALN	ESC # 8
Invoke confidence test (power-up test)	DECTST	ESC [2 ; 1 y
Invoke confidence test (data loop back test, requires test connector)	DECTST	ESC [2 ; 2 y
Invoke confidence test (EIA modem control test, requires test connector)	DECTST	ESC [2; 4 y
Invoke confidence test (repeat power-up test continuously until failure or power-off)	DECTST	ESC [2 ; 9 y
Invoke confidence test (repeat data loopback test continuously until failure or power-off, requires test connector)	DECTST	ESC [2 ; 10 y
Invoke confidence test (repeat EIA test continuously until failure or power-off, requires test connector)	DECTST	ESC [2; 12 y
Invoke confidence test printer port data loopback test, requires test connector)	DECTST	ESC [2; 16 y
Invoke confidence test (repeat printer port data loopback test continuously until failure or power-off, requires test connector	DECTST	ESC [2; 24 y

Keyboard LEDs

Name	Mnemonic	Sequence
Load LEDs (L1 off)	DECLL	ESC [q
Load LEDs (L1 off)	DECLL	ESC [0 q
Load LEDs (L1 on)	DECLL	ESC [1 q

VT52 COMPATIBLE MODE

Modes	Sequence
Enter ANSI mode	ESC <

Keypad Character Selection

Name	Sequence
Enter alternate keypad mode	ESC =
Exit alternate keypad mode (Numeric keypad mode)	ESC >

NOTE: VT52 alternate keypad and numeric keypad mode different than ANSI.

Character Sets

Name	Sequence
Special graphics character set	ESC F*
Select US/UK character set (as determined by the US/UK character SET-UP feature)	ESC G

Cursor Position

Name	Sequence
Cursor up†	ESC A
Cursor down†	ESC B
Cursor right†	ESC C
Cursor left†	ESC D
Cursor to home	ESC H
Direct cursor address	ESC Y Pl Pc‡
Reverse line feed	ESC I $\int$

* Same as special character and line drawing set in ANSI mode.
† Same when sent from the terminal.
‡ Line and column numbers for direct cursor address are single character codes whose values are the desired number plus (37_8). Line and column numbers start at one.
$\int$ The last character of the sequence is an uppercase i (111_8).

Erasing

Name	Sequence
Erase to end of line	ESC K
Erase to end of screen	ESC J

Print Commands

Name	Sequence
Enter auto print mode	ESC ^
Exit auto print mode	ESC −
Enter printer controller mode	ESC W
Exit printer controller mode	ESC X
Print screen	ESC]
Print cursor line	ESC V

Reports

Name	Sequence
Identify (what are you)	ESC Z
Response: VT102	ESC / Z

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