

VT 220

Programmer Pocket Guide

digital

EK-VT220-HR-002

VT 220

Programmer Pocket Guide

Digital Equipment Corporation

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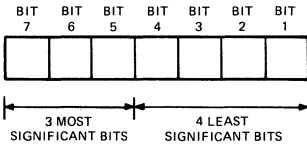
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This pocket guide provides a summary of the information contained in the *VT220 Programmer Reference Manual* (EK-VT220-RM) which you can order from Digital. The guide provides a quick reference tool for people with a knowledge of computer programming to access the VT220 features.

CHARACTER ENCODING

7-Bit Code



(DECIMAL VALUE IS COLUMN IN CODE TABLE)

(DECIMAL VALUE IS ROW IN CODE TABLE)

MA-0890-83

7-Bit ASCII Code Table

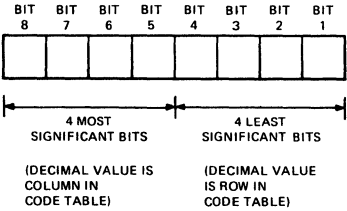
ROW	COLUMN							
	0	1	2	3	4	5	6	7
	BITS							
	b7	b6	b5	b4	b3	b2	b1	
	0 0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0	0 0 0 0	NUL	DLE	SP	0	@	P	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a q
2	0 0 1 0	STX	DC2	"	2	B	R	b r
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	c s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e u
6	0 1 1 0	ACK	SYN	&	6	F	V	f v
7	0 1 1 1	BEL	ETB	'	7	G	W	g w
8	1 0 0 0	BS	CAN	(	8	H	X	h x
9	1 0 0 1	HT	EM	)	9	I	Y	i y
10	1 0 1 0	LF	SUB	*	:	J	Z	j z
11	1 0 1 1	VT	ESC	+	;	K	[	k {
12	1 1 0 0	FF	FS	,	<	L	\	l |
13	1 1 0 1	CR	GS	-	=	M	]	m }
14	1 1 1 0	SO	RS	.	>	N	^	n ~
15	1 1 1 1	SI	US	/	?	O	_	o DEL

KEY

CHARACTER	ESC	OCTAL
	33	DECIMAL
	27	
	1B	HEX

MA-0893A-83

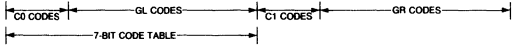
8-Bit Code



MA-0891-83

8-Bit Code Table

COLUMN ROW	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00	NUL	DLE	SP							DCS	///					
01	SOH	DC1								PU1						
02	STX	DC2								PU2						
03	ETX	DC3								STS						
04	EOT	DC4							IND	CCH						
05	ENO	NAK							NEL	MW						
06	ACK	SYN							SSA	SPA						
07	BEL	ETB							ESA	EPA						
08	BS	CAN							HTS							
09	HT	EM							HTJ							
10	LF	SUB							VTS							
11	VT	ESC							PLD	CSI						
12	FF	FS							PLU	ST						
13	CR	GS							RI	OSC						
14	SO	RS							SS2	PM						
15	SI	US						DEL	SS3	APC						///



MA-0892-83

DEC Multinational Character Set (C0 and GL Codes)

ROW	COLUMN								
	0	1	2	3	4	5	6	7	
	BITS b8 b7 b6 b5 0 0 0 0 0 0 0 1 0 0 1 0 0 0 1 1 0 1 0 0 0 1 0 1 0 1 1 0 0 1 1 1								
0	0 0 0 0	NUL	DLE	SP	0	@	P	\	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	,	K	[	k	{
12	1 1 0 0	FF	FS	,	<	L	\	l	|
13	1 1 0 1	CR	GS	-	=	M	]	m	}
14	1 1 1 0	SO	RS	.	>	N	^	n	~
15	1 1 1 1	SI	US	/	?	O	_	o	DEL

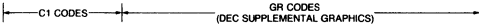


KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

DEC Multinational Character Set (C1 and GR Codes)

8	9	10	11	12	13	14	15	COLUMN	ROW	
1 0 0	1 0 1	1 0 0	1 0 1	1 1 0	1 1 0	1 1 0	1 1 1	b8 b7 b6 b5 b4 b3 b2 b1		
200 128 80	DCS	220 144 90	240 160 A0	260 176 B0	300 192 C0	320 208 D0	340 224 E0	360 240 F0	0 0 0 0	0
201 129 81	PU1	221 145 91	241 161 A1	261 177 B1	301 193 C1	321 209 D1	341 225 E1	361 241 F1	0 0 0 1	1
202 130 82	PU2	222 146 92	242 162 A2	262 178 B2	302 194 C2	322 210 D2	342 226 E2	362 242 F2	0 0 1 0	2
203 131 83	STS	223 147 93	243 163 A3	263 179 B3	303 195 C3	323 211 D3	343 227 E3	363 243 F3	0 0 1 1	3
204 132 84	IND	224 148 94	244 164 A4	264 180 B4	304 196 C4	324 212 D4	344 228 E4	364 244 F4	0 1 0 0	4
205 133 85	NEL	225 149 95	245 165 A5	265 181 B5	305 197 C5	325 213 D5	345 229 E5	365 245 F5	0 1 0 1	5
206 134 86	SSA	226 150 96	246 166 A6	266 182 B6	306 198 C6	326 214 D6	346 230 E6	366 246 F6	0 1 1 0	6
207 135 87	ESA	227 151 97	247 167 A7	267 183 B7	307 199 C7	327 215 D7	347 231 E7	367 247 F7	0 1 1 1	7
210 136 88	HTS	230 152 98	250 168 A8	270 184 B8	310 200 C8	330 216 D8	350 232 E8	370 248 F8	1 0 0 0	8
211 137 89	HTJ	231 153 99	251 169 A9	271 185 B9	311 201 C9	331 217 D9	351 233 E9	371 249 F9	1 0 0 1	9
212 138 90	VTS	232 154 9A	252 170 AA	272 186 BA	312 202 CA	332 218 DA	352 234 EA	372 250 FA	1 0 1 0	10
213 139 91	PLD	233 155 9B	253 171 AB	273 187 BB	313 203 CB	333 219 DB	353 235 EB	373 251 FB	1 0 1 1	11
214 140 92	PLU	234 156 9C	254 172 AC	274 188 BC	314 204 CC	334 220 DC	354 236 EC	374 252 FC	1 1 0 0	12
215 141 93	RI	235 157 9D	255 173 AD	275 189 BD	315 205 CD	335 221 DD	355 237 ED	375 253 FD	1 1 0 1	13
216 142 94	SS2	236 158 9E	256 174 AE	276 190 BE	316 206 CE	336 222 DE	356 238 EE	376 254 FE	1 1 1 0	14
217 143 95	SS3	237 159 9F	257 175 AF	277 191 BF	317 207 CF	337 223 DF	357 239 EF	377 255 FF	1 1 1 1	15



DEC Special Graphics

ROW	COLUMN								
	0	1	2	3	4	5	6	7	
BITS B7 B6 B5 0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0 1 1 1									
0	0 0 0 0	NUL 0 0 0	DLE 20 16 10	SP 40 32 20	0 60 48 37	@ 100 64 40	P 120 80 50	↑ 140 96 60 SCAN 3	160 112 70
1	0 0 0 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	█ 141 97 61 SCAN 5	161 113 71
2	0 0 1 0	STX 2 2 2	DC2 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
3	0 0 1 1	ETX 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
4	0 1 0 0	EOT 4 4 4	DC4 24 20 14	\$ 44 36 24	4 64 52 34	D 104 68 44	T 124 84 54	⏏ 144 100 64	164 116 74
5	0 1 0 1	ENQ 5 5 5	NAK 25 21 15	% 45 37 25	5 65 53 35	E 105 69 45	U 125 85 55	⏏ 145 101 65	165 117 75
6	0 1 1 0	ACK 6 6 6	SYN 26 22 16	& 46 38 26	6 66 54 36	F 106 70 46	V 126 86 56	⏏ 146 102 66	166 118 76
7	0 1 1 1	BEL 7 7 7	ETB 27 23 17	' 47 39 27	7 67 55 37	G 107 71 47	W 127 87 57	⏏ 147 103 67	167 119 77
8	1 0 0 0	BS 8 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
9	1 0 0 1	HT 9 9 9	EM 31 25 19	) 51 41 29	9 71 57 39	I 111 73 49	Y 131 89 59	⏏ 151 105 69	171 121 79
10	1 0 1 0	LF 10 10 10	SUB 32 26 20	* 52 42 2A	: 72 58 3A	J 112 74 4A	Z 132 90 5A	⏏ 152 106 6A	172 122 7A
11	1 0 1 1	VT 11 11 11	ESC 33 27 21	+ 53 43 28	; 73 59 3B	K 113 75 4B	[133 91 5B	⏏ 153 107 6B	173 123 7B
12	1 1 0 0	FF 12 12 12	FS 34 28 22	, 54 44 2C	< 74 60 3C	L 114 76 4C	\ 134 92 5C	⏏ 154 108 6C	174 124 7C
13	1 1 0 1	CR 13 13 13	GS 35 29 23	- 55 45 2D	= 75 61 3D	M 115 77 4D	] 135 93 5D	⏏ 155 109 6D	175 125 7D
14	1 1 1 0	SO 14 14 14	RS 36 30 24	. 56 46 2E	> 76 62 3E	N 116 78 4E	^ 136 94 5E	⏏ 156 110 6E	176 126 7E
15	1 1 1 1	SI 15 15 15	US 37 31 25	/ 57 47 2F	? 77 63 3F	O 117 79 4F	(BLANK) 137 95 5F	⏏ 157 111 6F	177 127 7F



KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

British Character Set

COLUMN		0	1	2	3	4	5	6	7
BITS		0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1	
ROW	b8	0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1	
	b7 b6 b5 b4 b3 b2 b1	0 0 0 0		0 0 0 1		0 0 1 0		0 0 1 1	
0	0 0 0 0	NUL	DLE	SP	0	@	P	`	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	£	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	:	K	[	k	{
12	1 1 0 0	FF	FS	,	<	L	\	l	|
13	1 1 0 1	CR	GS	-	=	M	]	m	}
14	1 1 1 0	SO	RS	.	>	N	^	n	~
15	1 1 1 1	SI	US	/	?	O	_	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Dutch NRC Set (Dutch Keyboard Selection)

ROW	COLUMN				0	1	2	3	4	5	6	7										
	BITS				0 0 0 0	0 0 0 1	0 1 0 0	0 1 0 1	1 0 0 0	1 0 0 1	1 1 0 0	1 1 0 1										
	b7	b6	b5	b4	b3	b2	b1															
0	0	0	0	0	NUL	0	DLE	20	SP	40	0	60	¾	100	P	120	¼	140	p	160		
1	0	0	0	1	SOH	1	DC1 (XON)	21	!	41	1	61	A	Q	81	a	101	á	121	q	141	161
2	0	0	1	0	STX	2	DC2	22	"	42	2	62	B	R	82	b	102	â	122	r	142	162
3	0	0	1	1	ETX	3	DC3 (XOFF)	23	£	43	3	63	C	S	83	c	103	ç	123	s	143	163
4	0	1	0	0	EOT	4	DC4	24	\$	44	4	64	D	T	84	d	104	ð	124	t	144	164
5	0	1	0	1	ENQ	5	NAK	25	%	45	5	65	E	U	85	e	105	é	125	u	145	165
6	0	1	1	0	ACK	6	SYN	26	&	46	6	66	F	V	86	f	106	ê	126	v	146	166
7	0	1	1	1	BEL	7	ETB	27	'	47	7	67	G	W	87	g	107	ë	127	w	147	167
8	1	0	0	0	BS	8	CAN	28	(	48	8	68	H	X	88	h	108	ï	128	x	148	168
9	1	0	0	1	HT	9	EM	29	)	49	9	69	I	Y	89	i	109	ï	129	y	149	169
10	1	0	1	0	LF	10	SUB	30	*	50	:	70	J	Z	90	j	110	ï	130	z	150	170
11	1	0	1	1	VT	11	ESC	31	+	51	:	71	K	ij	91	k	111	ï	131	**	151	171
12	1	1	0	0	FF	12	FS	32	,	52	<	72	L	½	92	l	112	ï	132	f	152	172
13	1	1	0	1	CR	13	GS	33	-	53	=	73	M	|	93	m	113	ï	133	¼	153	173
14	1	1	1	0	SO	14	RS	34	.	54	>	74	N	^	94	n	114	ï	134	,	154	174
15	1	1	1	1	SI	15	US	35	/	55	?	75	O	_	95	o	115	ï	135	DEL	155	175

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Finnish NRC Set (Finnish Keyboard Selection)

COLUMN		0	1	2	3	4	5	6	7
BITS									
	b7	0	0	0	0	1	1	1	1
	b6	0	0	1	1	0	0	1	1
	b5	0	0	0	0	1	1	0	1
	b4	0	0	1	1	0	0	1	1
	b3	0	0	0	0	1	1	0	1
	b2	0	0	0	0	1	1	0	1
	b1	0	0	0	0	1	1	0	1
ROW									
0	0 0 0 0	NUL	DLE	SP	0	@	P	z	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	:	K	Ä	k	ä
12	1 1 0 0	FF	FS	,	<	L	Ö	l	ö
13	1 1 0 1	CR	GS	-	=	M	Ä	m	ä
14	1 1 1 0	SO	RS	.	>	N	Ü	n	ü
15	1 1 1 1	SI	US	/	?	O	-	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

French NRC Set (Flemish and French/Belgian Keyboard Selections)

ROW	COLUMN				0	1	2	3	4	5	6	7			
	BITS														
	b7	b6	b5	b4	b3	b2	b1								
0	0	0	0	0	NUL	0	DLE	20	40	60	80	100	120	140	160
	0	0	0	0		16	10	16	32	48	64	80	96	112	128
	0	0	0	0		17	11	17	33	49	65	81	97	113	129
1	0	0	0	1	SOH	1	DC1 (XON)	21	41	61	81	101	121	141	161
	0	0	0	1		11	5	11	21	31	41	51	61	71	81
	0	0	0	1		12	6	12	22	32	42	52	62	72	82
2	0	0	1	0	STX	2	DC2	22	42	62	82	102	122	142	162
	0	0	1	0		2		18	34	50	66	82	98	114	130
	0	0	1	0		2		19	22	32	42	52	62	72	82
3	0	0	1	1	ETX	3	DC3 (XOFF)	23	43	63	83	103	123	143	163
	0	0	1	1		3		13	23	33	43	53	63	73	83
	0	0	1	1		3		14	24	34	44	54	64	74	84
4	0	1	0	0	EOT	4	DC4	24	44	64	84	104	124	144	164
	0	1	0	0		4		20	36	52	68	84	100	116	132
	0	1	0	0		4		21	24	24	24	24	24	24	24
5	0	1	0	1	ENQ	5	NAK	25	45	65	85	105	125	145	165
	0	1	0	1		5		15	25	35	45	55	65	75	85
	0	1	0	1		5		16	26	36	46	56	66	76	86
6	0	1	1	0	ACK	6	SYN	26	46	66	86	106	126	146	166
	0	1	1	0		6		22	38	54	70	86	102	118	134
	0	1	1	0		6		23	26	26	26	26	26	26	26
7	0	1	1	1	BEL	7	ETB	27	47	67	87	107	127	147	167
	0	1	1	1		7		17	27	37	47	57	67	77	87
	0	1	1	1		7		18	27	37	47	57	67	77	87
8	1	0	0	0	BS	8	CAN	30	50	70	90	110	130	150	170
	1	0	0	0		8		24	40	56	72	88	104	120	136
	1	0	0	0		8		25	28	28	28	28	28	28	28
9	1	0	0	1	HT	9	EM	31	51	71	91	111	131	151	171
	1	0	0	1		9		19	29	39	49	59	69	79	89
	1	0	0	1		9		20	29	39	49	59	69	79	89
10	1	0	1	0	LF	10	SUB	32	52	72	92	112	132	152	172
	1	0	1	0		10		22	42	62	82	102	122	142	162
	1	0	1	0		10		23	2A	2A	2A	2A	2A	2A	2A
11	1	0	1	1	VT	11	ESC	33	53	73	93	113	133	153	173
	1	0	1	1		11		27	43	59	75	91	107	123	139
	1	0	1	1		11		28	28	28	28	28	28	28	28
12	1	1	0	0	FF	12	FS	34	54	74	94	114	134	154	174
	1	1	0	0		12		2C	44	60	76	92	108	124	140
	1	1	0	0		12		2C	2C	2C	2C	2C	2C	2C	2C
13	1	1	0	1	CR	13	GS	35	55	75	95	115	135	155	175
	1	1	0	1		13		29	45	61	77	93	109	125	141
	1	1	0	1		13		30	2D	2D	2D	2D	2D	2D	2D
14	1	1	1	0	SO	14	RS	36	56	76	96	116	136	156	176
	1	1	1	0		14		2E	46	62	78	94	110	126	142
	1	1	1	0		14		2E	2E	2E	2E	2E	2E	2E	2E
15	1	1	1	1	SI	15	US	37	57	77	97	117	137	157	177
	1	1	1	1		15		31	47	63	79	95	111	127	143
	1	1	1	1		15		32	2F	2F	2F	2F	2F	2F	2F

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

French Canadian NRC Set (French Canadian Keyboard Selection)

ROW	COLUMNS				0	1	2	3	4	5	6	7
	b7	b6	b5	b4	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	à	P	à	p
1	0	0	0	1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0	0	1	0	STX	DC2	"	2	B	R	b	r
3	0	0	1	1	ETX	DC3 (XOFF)	#	3	C	S	c	s
4	0	1	0	0	EOT	DC4	\$	4	D	T	d	t
5	0	1	0	1	ENQ	NAK	%	5	E	U	e	u
6	0	1	1	0	ACK	SYN	&	6	F	V	f	v
7	0	1	1	1	BEL	ETB	'	7	G	W	g	w
8	1	0	0	0	BS	CAN	(	8	H	X	h	x
9	1	0	0	1	HT	EM	)	9	I	Y	i	y
10	1	0	1	0	LF	SUB	*	:	J	Z	j	z
11	1	0	1	1	VT	ESC	+	;	K	à	k	é
12	1	1	0	0	FF	FS	,	<	L	ç	l	ù
13	1	1	0	1	CR	GS	-	=	M	ê	m	è
14	1	1	1	0	SO	RS	.	>	N	î	n	û
15	1	1	1	1	SI	US	/	?	O	—	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

German NRC Set (German Keyboard Selection)

ROW	COLUMNS				COLUMNS				COLUMNS				COLUMNS																			
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7																
	BITS																															
	0 0 0 0				0 0 0 1				0 1 0 0				0 1 0 1				1 0 0 0				1 0 0 1				1 1 0 0				1 1 0 1			
0	0 0 0 0 0	NUL	0 0 0 0	DLE	20 16 32 20	SP	40 32 20	0	60 48 30	§	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70															
1	0 0 0 1	SOH	1 1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 66 41	Q	121 81 51	a	141 97 61	q	161 113 71															
2	0 0 1 0	STX	2 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															
3	0 0 1 1	ETX	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															
4	0 1 0 0	EOT	4 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															
5	0 1 0 1	ENQ	5 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															
6	0 1 1 0	ACK	6 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															
7	0 1 1 1	BEL	7 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															
8	1 0 0 0	BS	8 8 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	170 122 78														
9	1 0 0 1	HT	9 9 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														
10	1 0 1 0	LF	10 10 10 10	SUB	32 26 20	*	52 42 30	:	72 58 40	J	112 74 50	Z	132 90 60	j	152 106 70	z	172 122 7A															
11	1 0 1 1	VT	11 11 11 11	ESC	33 27 21	+	53 43 31	;	73 59 41	K	113 75 51	Ä	133 91 61	k	153 107 71	ä	173 123 7B															
12	1 1 0 0	FF	12 12 12 12	FS	34 28 22	,	54 44 32	<	74 60 42	L	114 76 52	Ö	134 92 62	l	154 108 72	ö	174 124 7C															
13	1 1 0 1	CR	13 13 13 13	GS	35 29 23	-	55 45 33	=	75 61 43	M	115 77 53	Ü	135 93 63	m	155 109 73	ü	175 125 7D															
14	1 1 1 0	SO	14 14 14 14	RS	36 30 24	.	56 46 34	>	76 62 44	N	116 78 54	^	136 94 64	n	156 110 74	ß	176 126 7E															
15	1 1 1 1	SI	15 15 15 15	US	37 31 25	/	57 47 35	?	77 63 45	O	117 79 55	_	137 95 65	o	157 111 75	DEL	177 127 7F															

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Italian NRC Set (Italian Keyboard Selection)

ROW	COLUMN				0	1	2	3	4	5	6	7
	BITS				0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1
	h7	h6	h5	h4	h3	h2	h1	h0				
0	0	0	0	0	NUL	DLE	SP	0	§	P	ù	p
1	0	0	0	1	SOH	DC1 (KDN)	!	1	A	Q	a	q
2	0	0	1	0	STX	DC2	"	2	B	R	b	r
3	0	0	1	1	ETX	DC3 (KDF)	£	3	C	S	c	s
4	0	1	0	0	EOT	DC4	\$	4	D	T	d	t
5	0	1	0	1	ENQ	NAK	%	5	E	U	e	u
6	0	1	1	0	ACK	SYN	&	6	F	V	f	v
7	0	1	1	1	BEL	ETB	'	7	G	W	g	w
8	1	0	0	0	BS	CAN	(	8	H	X	h	x
9	1	0	0	1	HT	EM	)	9	I	Y	i	y
10	1	0	1	0	LF	SUB	*	:	J	Z	j	z
11	1	0	1	1	VT	ESC	+	;	K	°	k	à
12	1	1	0	0	FF	FS	,	<	L	ç	l	ò
13	1	1	0	1	CR	GS	-	=	M	é	m	è
14	1	1	1	0	SO	RS	.	>	N	^	n	ì
15	1	1	1	1	SI	US	/	?	O	—	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Norwegian/Danish NRC Set (Danish and Norwegian Keyboard Selections)

ROW	COLUMN		0	1	2	3	4	5	6	7												
	BITS		0	0	0	0	1	1	1	1												
	b7	b6	0	0	0	0	1	0	1	0												
	b4	b3	b2	b1																		
0	0	0	0	0	NUL	0	DLE	20	16	10	SP	40	0	60	**	100	P	120	**	140	p	160
1	0	0	0	1	SOH	1	DC1 (XON)	21	17	11	!	41	1	61	A	101	Q	121	a	141	q	161
2	0	0	1	0	STX	2	DC2	22	18	12	"	42	2	62	B	102	R	122	b	142	r	162
3	0	0	1	1	ETX	3	DC3 (XOFF)	23	19	13	#	43	3	63	C	103	S	123	c	143	s	163
4	0	1	0	0	EOT	4	DC4	24	20	14	\$	44	4	64	D	104	T	124	d	144	t	164
5	0	1	0	1	ENQ	5	NAK	25	21	15	%	45	5	65	E	105	U	125	e	145	u	165
6	0	1	1	0	ACK	6	SYN	26	22	16	&	46	6	66	F	106	V	126	f	146	v	166
7	0	1	1	1	BEL	7	ETB	27	23	17	'	47	7	67	G	107	W	127	g	147	w	167
8	1	0	0	0	BS	8	CAN	30	24	18	(	50	8	70	H	110	X	130	h	150	x	170
9	1	0	0	1	HT	9	EM	31	25	19	)	51	9	71	I	111	Y	131	i	151	y	171
10	1	0	1	0	LF	10	SUB	32	26	20	*	52	:	72	J	112	Z	132	j	152	z	172
11	1	0	1	1	VT	11	ESC	33	27	21	+	53	;	73	K	113	Æ	133	k	153	æ	173
12	1	1	0	0	FF	12	FS	34	28	22	,	54	<	74	L	114	Ø	134	l	154	ø	174
13	1	1	0	1	CR	13	GS	35	29	23	-	55	=	75	M	115	Å	135	m	155	å	175
14	1	1	1	0	SO	14	RS	36	30	24	.	56	>	76	N	116	Û	136	n	156	ü	176
15	1	1	1	1	SI	15	US	37	31	25	/	57	?	77	O	117	—	137	o	157	ö	177

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Spanish NRC Set (Spanish Keyboard Selection)

ROW	COLUMN				0	1	2	3	4	5	6	7
	BITS				0 0 0 0	0 0 0 1	0 1 0 0	0 1 0 1	1 0 0 0	1 0 0 1	1 1 0 0	1 1 0 1
	b7	b6	b5	b4	b3	b2	b1					
0	0	0	0	0	NUL	DLE	SP	0	§	P	´	p
1	0	0	0	1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0	0	1	0	STX	DC2	"	2	B	R	b	r
3	0	0	1	1	ETX	DC3 (XOFF)	£	3	C	S	c	s
4	0	1	0	0	EOT	DC4	\$	4	D	T	d	t
5	0	1	0	1	ENQ	NAK	%	5	E	U	e	u
6	0	1	1	0	ACK	SYN	&	6	F	V	f	v
7	0	1	1	1	BEL	ETB	'	7	G	W	g	w
8	1	0	0	0	BS	CAN	(	8	H	X	h	x
9	1	0	0	1	HT	EM	)	9	I	Y	i	y
10	1	0	1	0	LF	SUB	*	:	J	Z	j	z
11	1	0	1	1	VT	ESC	+	;	K	i	k	o
12	1	1	0	0	FF	FS	,	<	L	Ñ	l	ñ
13	1	1	0	1	CR	GS	-	=	M	¿	m	¿
14	1	1	1	0	SO	RS	.	>	N	^	n	~
15	1	1	1	1	SI	US	/	?	O	-	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Swedish NRC Set (Swedish Keyboard Selection)

ROW	COLUMN				0	1	2	3	4	5	6	7					
	BITS b7 b6 b5 b4 b3 b2 b1				0 0 0 0	0 0 1 0	0 1 0 1	0 1 1 0	1 0 0 1	1 0 1 0	1 1 0 1	1 1 1 1					
0	0 0 0 0	NUL	0 0 0 0	DLE	20 16 10 10	SP	40 32 20 20	0	60 48 36 30	É	100 84 40 50	P	120 80 50 50	é	140 96 60 60	p	160 112 70 70
1	0 0 0 1	SOH	1 1 1 1	DC1 (XON)	21 17 11 11	!	41 33 21 21	1	61 49 31 31	A	101 85 41 51	Q	121 81 54 52	a	141 97 61 61	q	161 114 71 71
2	0 0 1 0	STX	2 2 2 2	DC2	22 18 12 14	"	42 34 22 22	2	62 50 32 32	B	102 86 42 44	R	122 82 52 54	b	142 98 62 64	r	162 114 72 72
3	0 0 1 1	ETX	3 3 3 3	DC3 (XOFF)	23 19 13 13	#	43 35 23 23	3	63 51 33 33	C	103 87 43 43	S	123 83 53 53	c	143 99 63 63	s	163 115 73 73
4	0 1 0 0	EOT	4 4 4 4	DC4	24 20 14 14	\$	44 36 24 24	4	64 52 34 34	D	104 88 44 44	T	124 84 54 54	d	144 100 64 64	t	164 116 74 74
5	0 1 0 1	ENQ	5 5 5 5	NAK	25 21 15 15	%	45 37 25 25	5	65 53 35 35	E	105 89 45 45	U	125 85 55 55	e	145 101 65 65	u	165 117 75 75
6	0 1 1 0	ACK	6 6 6 6	SYN	26 22 16 16	&	46 38 26 26	6	66 54 36 36	F	106 90 46 46	V	126 86 56 56	f	146 102 66 66	v	166 118 76 76
7	0 1 1 1	BEL	7 7 7 7	ETB	27 23 17 17	'	47 39 27 27	7	67 55 37 37	G	107 91 47 47	W	127 87 57 57	g	147 103 67 67	w	167 119 77 77
8	1 0 0 0	BS	8 8 8 8	CAN	30 24 18 18	(	50 40 28 28	8	70 56 38 38	H	110 94 48 48	X	130 88 58 58	h	150 104 68 68	x	170 120 78 78
9	1 0 0 1	HT	9 9 9 9	EM	31 25 19 19	)	51 41 29 29	9	71 57 39 39	I	111 95 49 49	Y	131 89 59 59	i	151 105 69 69	y	171 121 79 79
10	1 0 1 0	LF	10 10 10 10	SUB	32 26 20 20	*	52 42 30 30	:	72 58 40 40	J	112 96 4A 4A	Z	132 90 5A 5A	j	152 106 6A 6A	z	172 122 7A 7A
11	1 0 1 1	VT	11 11 11 11	ESC	33 27 21 21	+	53 43 31 31	:	73 59 41 41	K	113 97 4B 4B	Ä	133 91 5B 5B	k	153 107 6B 6B	ä	173 123 7B 7B
12	1 1 0 0	FF	12 12 12 12	FS	34 28 22 22	,	54 44 32 32	<	74 60 42 42	L	114 98 4C 4C	Ö	134 92 5C 5C	l	154 108 6C 6C	ö	174 124 7C 7C
13	1 1 0 1	CR	13 13 13 13	GS	35 29 23 23	-	55 45 33 33	=	75 61 43 43	M	115 99 4D 4D	Å	135 93 5D 5D	m	155 109 6D 6D	å	175 125 7D 7D
14	1 1 1 0	SO	14 14 14 14	RS	36 30 24 24	.	56 46 34 34	>	76 62 44 44	N	116 100 4E 4E	Ü	136 94 5E 5E	n	156 110 6E 6E	ü	176 126 7E 7E
15	1 1 1 1	SI	15 15 15 15	US	37 31 25 25	/	57 47 35 35	?	77 63 45 45	O	117 101 4F 4F	—	137 95 5F 5F	o	157 111 6F 6F	DEL	177 127 7F 7F

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Swiss NRC Set (Swiss/French and Swiss/German Keyboard Selections)

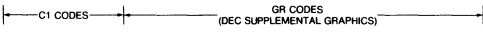
ROW	COLUMN								
	0	1	2	3	4	5	6	7	
	BITS								
	b7 b6 b5		b4 b3 b2 b1		b7 b6 b5		b4 b3 b2 b1		
	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1	
0	0 0 0 0	NUL	DLE	SP	0	à	P	ó	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	û	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(	8	H	X	h	x
9	1 0 0 1	HT	EM	)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	;	K	é	k	ä
12	1 1 0 0	FF	FS	^	<	L	ç	l	ö
13	1 1 0 1	CR	GS	-	=	M	ê	m	ü
14	1 1 1 0	SO	RS	.	>	N	ä	n	û
15	1 1 1 1	SI	US	/	?	O	ö	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

Display Controls Font (Cont)

	8	9	10	11	12	13	14	15	COLUMN	ROW							
	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1	BIT 15 14 13 12 11								
B₀	200 128 80	0	220 144 90	A	240 160 AD	o	260 176 BD	À	300 192 CD	o	320 208 DD	à	340 224 EO	F	360 240 FO	0 0 0 0	0
B₁	201 129 81	1	221 145 91	i	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1	0 0 0 1	1
B₂	202 130 82	2	222 146 92	€	242 162 A2	2	262 178 B2	Ā	302 194 C2	Ō	322 210 D2	ā	342 226 E2	ō	362 242 F2	0 0 1 0	2
B₃	203 131 83	3	223 147 93	£	243 163 A3	3	263 179 B3	Ā	303 195 C3	Ó	323 211 D3	ā	343 227 E3	ó	363 243 F3	0 0 1 1	3
B₄	204 132 84	4	224 148 94	A	244 164 A4	B	264 180 B4	Ä	304 196 C4	Ö	324 212 D4	ä	344 228 E4	ö	364 244 F4	0 1 0 0	4
B₅	205 133 85	5	225 149 95	Y	245 165 A5	μ	265 181 B5	Å	305 197 C5	Ø	325 213 D5	å	345 229 E5	ø	365 245 F5	0 1 0 1	5
B₆	206 134 86	6	226 150 96	ß	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6	0 1 1 0	6
B₇	207 135 87	7	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	œ	327 215 D7	ç	347 231 E7	œ	367 247 F7	0 1 1 1	7
B₈	210 136 88	8	230 152 98	χ	250 168 A8	B	270 184 B8	Ë	310 200 C8	ø	330 216 D8	ë	350 232 E8	ø	370 248 F8	1 0 0 0	8
B₉	211 137 89	9	231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	ù	331 217 D9	é	351 233 E9	ù	371 249 F9	1 0 0 1	9
B_A	212 138 8A	9A	232 154 9A	®	252 170 AA	o	272 186 BA	Ê	312 202 CA	ú	332 218 DA	ê	352 234 EA	ú	372 250 FA	1 0 1 0	10
B_B	213 139 8B	9B	233 155 9B	<<	253 171 AB	>>	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB	1 0 1 1	11
B_C	214 140 8C	9C	234 156 9C	À	254 172 AC	¼	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC	1 1 0 0	12
B_D	215 141 8D	9D	235 157 9D	Å	255 173 AD	½	275 189 BD	Í	315 205 CD	ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD	1 1 0 1	13
B_E	216 142 8E	9E	236 158 9E	Æ	256 174 AE	¾	276 190 BE	Î	316 206 CE	Ǝ	336 222 DE	î	356 238 EE	Ǝ	376 254 FE	1 1 1 0	14
B_F	217 143 8F	9F	237 159 9F	Ɔ	257 175 AF	¿	277 191 BF	Ï	317 207 CF	ß	337 223 DF	ï	357 239 EF	Ɔ	377 255 FF	1 1 1 1	15



Escape Sequences

An escape sequence begins with the C0 character ESC, followed by one or more ASCII graphic characters. For example,

```
ESC # 6
```

is an escape sequence that changes the current line of text to double-width characters. Escape sequences use only 7-bit characters, and can be used in 7-bit or 8-bit environments.

Control Sequences

A control sequence begins with CSI (9/11), followed by one or more ASCII graphic characters. CSI can also be expressed as the 7-bit code extension ESC [. So you can express all control sequences as escape sequences whose second character code is [. For example, the following two sequences are equivalent sequences that perform the same function (they cause the display to use 132 columns per line rather than 80).

```
CSI ? 3 h
```

```
ESC [ ? 3 h
```

Whenever possible, use CSI instead of ESC [to introduce a control sequence. CSI can only be used in an 8-bit environment.

Device Control Strings


A device control string is a delimited string of characters used in a data stream as a logical entity for control purposes. It consists of an opening delimiter DCS, a command string (data), and a closing delimiter ST.

DCS is an 8-bit control character that can also be expressed as ESC P when coding for a 7-bit environment.

ST is an 8-bit control character that can also be expressed as ESC / when coding for a 7-bit environment.

TRANSMITTED CODES

Main Keypad Function Keys

Key	Code Transmitted
	DEL character
Tab	HT character
Return	CR character only or a CR character and an LF character, depending on the set/reset state of line feed/new line mode (LNM).
Ctrl	Does not send a code.
Lock	Does not send a code.
Shift (2 keys)	Does not send a code.
Space bar	SP character
Compose Character	Does not send a code.

Editing Keys

Key	Code Generated VT200 Mode	VT100, VT52 Modes
Find	CSI 1 ~	None
Insert Here	CSI 2 ~	None
Remove	CSI 3 ~	None
Select	CSI 4 ~	None
Prev Screen	CSI 5 ~	None
Next Screen	CSI 6 ~	None

Cursor Control Keys

Key	ANSI Mode*		VT52 Mode*	
	Normal	Application	Normal	Application
↑	CSI A	SS3 A	ESC A	ESC A
↓	CSI B	SS3 B	ESC B	ESC B
→	CSI C	SS3 C	ESC C	ESC C
←	CSI D	SS3 D	ESC D	ESC D

* ANSI mode applies to VT200 and VT100 modes. VT52 mode is an ANSI-incompatible mode.

Auxiliary Keypad Keys

Key	VT100/VT200 ANSI Mode*		VT52 Mode*	
	Keypad Numeric Mode	Keypad Application Mode	Keypad Numeric Mode	Keypad Application Mode
0	0	SS3 p	0	ESC ? p
1	1	SS3 q	1	ESC ? q
2	2	SS3 r	2	ESC ? r
3	3	SS3 s	3	ESC ? s
4	4	SS3 t	4	ESC ? t
5	5	SS3 u	5	ESC ? u
6	6	SS3 v	6	ESC ? v
7	7	SS3 w	7	ESC ? w
8	8	SS3 x	8	ESC ? x
9	9	SS3 y	9	ESC ? y
-	-(minus)	SS3 m	-	ESC ? m
,	,(comma)	SS3 l	,	ESC ? l†
.	.(period)	SS3 n	.	ESC ? n
Enter	CR or CR LF	SS3 M	CR or CR LF	ESC ? M‡
PF1	SS3 P	SS3 P	ESC P	ESC P
PF2	SS3 Q	SS3 Q	ESC Q	ESC Q
PF3	SS3 R	SS3 R	ESC R	ESC R
PF4	SS3 S	SS3 S	ESC S	ESC S†

* ANSI mode applies to VT200 and VT100 modes. VT52 mode is an ANSI-incompatible mode.

† You cannot generate these sequences on a VT52 terminal.

‡ Keypad numeric mode. **Enter** generates the same codes as **Return**. You can change the code generated by **Return** with the line feed/new line mode. When reset, line feed/new line mode causes **Return** to generate a single control character (CR). When set, the mode causes **Return** to generate two control characters (CR, LF).

Top Row Function Keys

Name on Legend Strip	Generic Name	Code Generated	
		VT200 Mode	VT100, VT52 Modes
Hold Screen	(F1)*	-	-
Print Screen	(F2)*	-	-
Set-Up	(F3)*	-	-
Data/Talk	(F4)*	-	-
Break	(F5)*	-	-
F6	F6	CSI 1 7 ~	-
F7	F7	CSI 1 8 ~	-
F8	F8	CSI 1 9 ~	-
F9	F9	CSI 2 0 ~	-
F10	F10	CSI 2 1 ~	-
F11 (ESC)	F11	CSI 2 3 ~	ESC
F12 (BS)	F12	CSI 2 4 ~	BS
F13 (LF)	F13	CSI 2 5 ~	LF
F14	F14	CSI 2 6 ~	-
Help	(F15)	CSI 2 8 ~	-
Do	(F16)	CSI 2 9 ~	-
F17	F17	CSI 3 1 ~	-
F18	F18	CSI 3 2 ~	-
F19	F19	CSI 3 3 ~	-
F20	F20	CSI 3 4 ~	-

* F1 through F5 are local function keys and do not generate codes.

Keys Used to Generate 7-Bit Control Characters

Control Character Mnemonic	Key Pressed With Ctrl (All Modes)	Dedicated Function Key
NUL	2, space	
SOH	A	
STX	B	
ETX	C	
EOT	D	
ENQ	E	
ACK	F	
BEL	G	
BS	H	F12 (BS)*
HT	I	Tab
LF	J	F13 (LF)*
VT	K	
FF	L	
CR	M	Return
SO	N	
SI	O	
DLE	P	
DC1	Q†	
DC2	R	
DC3	S†	
DC4	T	
NAK	U	
SYN	V	
ETB	W	
CAN	X	
EM	Y	
SUB	Z	
ESC	3, [	F11 (ESC)*
FS	4, /	
GS	5,]	
RS	6, ~	
US	7, ?	
DEL	8	Delete

* Keys F11, F12, and F13 generate these 7-bit control characters only when the terminal is in VT100 mode or VT52 mode.

† These keystrokes are enabled only if XOFF support is disabled. If XOFF support is enabled, then **CTRL-S** is a "hold screen" local function and **CTRL-Q** is a "release screen" local function.

RECEIVED CODES
Compatibility Level (DECSCSCL)

Sequence	Action
CSI 6 1 " p	Set terminal for level 1 (VT100 mode).
CSI 6 2 " p	Set terminal for level 2 (VT200 mode, 8-bit controls).
CSI 6 2 ; 0 " p	Set terminal for level 2 (VT200 mode, 8-bit controls).
CSI 6 2 ; 1 " p	Set terminal for level 2 (VT200 mode, 7-bit controls).
CSI 6 2 ; 2 " p	Set terminal for level 2 (VT200 mode, 8-bit controls).

CO (ASCII) Control Characters Recognized

Mnemonic	Name	Action
NUL	Null	Ignored when received.
ENQ	Enquiry	Generates answerback message.
BEL	Bell	Generates bell tone if bell is enabled.
BS	Backspace	Moves cursor to the left one character position: if cursor is at left margin, no action occurs.
HT	Horizontal tabulation	Moves cursor to next tab stop, or to right margin if there are no more tab stops. Does not cause auto wrap.
LF	Linefeed	Causes a line feed or a new line operation, depending on the setting of new line mode.
VT	Vertical tabulation	Processed as LF.
FF	Form feed	Processed as LF.
CR	Carriage return	Moves cursor to left margin on current line.
SO (LS1)	Shift out (lock shift G1)	Invokes G1 character set into GL. G1 is designated by a select-character-set (SCS) sequence.

CO (ASCII) Control Characters Recognized (Cont)

Mnemonic	Name	Action
SI (LS0)	Shift in (lock shift G0)	Invokes G0 character set into GL. G0 is designated by a select-character-set (SCS) sequence.
DC1	Device control 1	Also referred to as XON. If XOFF support is enabled, DC1 clears DC3 (XOFF), causing the terminal to continue send- ing characters (keyboard send- ing unlocks) unless KAM mode is currently set.
DC3	Device control 3	Also referred to as XOFF. If XOFF support is enabled, DC3 causes the terminal to stop sending characters until a DC1 control character is received.
CAN	Cancel	If received during an escape or control sequence, terminates and cancels the sequence. No error character is displayed. If received during a device control string, the DCS is ter- minated and no error character is displayed.
SUB	Substitute	If received during escape or control sequence, terminates and cancels the sequence. Causes a reverse question mark to be displayed. If re- ceived during a device control sequence, the DSC is termi- nated and reverse question mark is displayed.
ESC	Escape	Processed as escape sequence introducer. Terminates any escape, control or device control sequence which is in progress.
DEL	Delete	Ignored when received. Note: May not be used as a time fill character.

C1 Control Characters Recognized

Mnemonic	Equivalent 7-Bit Code Extension	Name	Action
IND	ESC D	Index	Moves cursor down one line in same column. If cursor is at bottom margin, screen performs a scroll up.
NEL	ESC E	Next line	Moves cursor to first position on next line. If cursor is at bottom margin, screen performs a scroll up.
HTS	ESC H	Horizontal tab set	Sets one horizontal tab stop at the column where the cursor is.
RI	ESC M	Reverse index	Moves cursor up one line in same column. If cursor is at top margin, screen performs a scroll down.
SS2	ESC N	Single shift G2	Temporarily invokes G2 character set into GL for the next graphic character. G2 is designated by a select-character-set(SCS) sequence.
SS3	ESC O	Single shift G3	Temporarily invokes G3 character set into GL for the next graphic character. G3 is designated by a select-character-set(SCS) sequence.
DCS	ESC P	Device control string	Processed as opening delimiter of a device control string for device control use.

C1 Control Characters Recognized (Cont)

Mnemonic	Equivalent 7-Bit Code Extension	Name	Action
CSI	ESC [	Control sequence introducer	Processed as control sequence introducer.
ST	ESC /	String terminator	Processed as closing delimiter of a string opened by DCS.

CHARACTER SET SELECTION (SCS)

Designating Hard Character Sets

Use the following list of escape sequence formats to designate hard character sets as G0 through G3.

Escape Sequence	Designate As:
ESC ({final}	G0
ESC) {final}	G1
ESC * {final}	G2
ESC + {final}	G3

The following is a list of available character sets and their associated final character.

Character Sets	Final Character
ASCII	B
DEC supplemental (VT200 mode only)	<
DEC special graphics	0
National replacement character sets	NOTE Only one national character set is available for use at any one time (national mode).
British	A
Dutch	4
Finnish	C or 5
French	R
French Canadian	Q
German	K
Italian	Y

Character Sets	Final Character
Norwegian/Danish	E or 6
Spanish	Z
Swedish	H or 7
Swiss	=

Examples

ASCII as G0	ESC (B
British as G3	ESC * A

Designating Soft (Down-Line-Loadable) Character Sets

Escape Sequence	Designate As:
ESC (Dscs	G0
ESC) Dscs	G1
ESC * Dscs	G2
ESC + Dscs	G3

Dscs can consist of zero, one, or two intermediate characters and a final character.

Intermediate characters are in the range of 2/0 to 2/15; final characters are in the range of 3/0 to 7/14. (See ASCII Code Table for column/row notation.)

Invoking Character Sets Using Lock Shifts

Control Name	Coding	Function
LS0 – lock shift G0	SI	Invoke G0 into GL (default).
LS1 – lock shift G1	SO	Invoke G1 into GL.
LS1R – lock shift G1, right	ESC ~	Invoke G1 into GR (VT200 mode only).
LS2 – lock shift G2	ESC n	Invoke G2 into GL (VT200 mode only).
LS2R – lock shift G2, right	ESC }	Invoke G2 into GR (default, VT200 mode only).
LS3 – lock shift G3	ESC o	Invoke G3 into GL (VT200 mode only).
LS3R – lock shift G3, right	ESC |	Invoke G3 into GR (VT200 mode only).

Invoking Character Sets Using Single Shifts

Control Name	Coding	Function
SS2 – single shift G2	SS2 ESC N	Invokes G2 into GL for the next graphic character.
SS3 – single shift G3	SS3 ESC O	Invokes G3 into GL for the next graphic character.

Select C1 Control Transmission

Control Name	Sequence*	Action
7-bit C1 control transmission (S7C1T)	ESC sp F	Converts all C1 codes returned to the application to their equivalent 7-bit code extensions.

NOTE

The S7C1T sequence is ignored when the terminal is in VT100 or VT52 mode.

8-bit C1 control transmission (S8C1T)	ESC sp G	Returns C1 codes to the application without converting them to their equivalent 7-bit code extensions.
---------------------------------------	----------	--

* sp is a space character

Terminal Modes

Name	Mnemonic	Set Mode	Reset Mode*
Keyboard action†	KAM	Locked CSI 2 h	Unlocked CSI 2 l
Insertion-replacement	IRM	Insert CSI 4 h	Replace CSI 4 l
Send-receive	SRM	Off CSI 12 h	On CSI 12 l
Line feed-new line	LNM	New line CSI 20 h	Line feed CSI 20 l
Cursor key	DECCKM	Application CSI ? 1 h	Cursor CSI ? 1 l
ANSI/VT52	DECANM	N/A CSI ? 2 l	VT52
Column	DECCOLM	132 column CSI ? 3 h	80 column CSI ? 3 l
Scrolling†	DECSCLM	Smooth CSI ? 4 h	Jump CSI ? 4 l
Screen†	DECSCNM	Reverse CSI ? 5 h	Normal CSI ? 5 l
Auto wrap	DECAWM	On CSI ? 7 h	Off CSI ? 7 l
Auto repeat†	DECARM	On CSI ? 8 h	Off CSI ? 8 l
Print form feed	DECPFF	On CSI ? 18 h	Off CSI ? 18 l
Print extent	DECPEX	Full screen CSI ? 19 h	Scrolling region CSI ? 19 l
Text cursor enable	DECTCEM	On CSI ? 25 h	Off CSI ? 25 l
Keypad	DECKPAM DECKPNM	Application ESC =	Numeric ESC >
Character set	DECNRCM	National CSI ? 42 h	Multinational CSI ? 42 l

* The last character of each sequence is lowercase L (6/12).

† User preference feature

Cursor Positioning

Name	Control Character	Sequence	Action
Cursor up (CUU)	-	CSI Pn A	Moves cursor up Pn lines in the same column.
Cursor down (CUD)	-	CSI Pn B	Moves cursor down Pn lines in the same column.
Cursor forward (CUF)	-	CSI Pn C	Moves cursor right Pn columns.
Cursor backward (CUB)	-	CSI Pn D	Moves cursor left Pn columns.
Cursor position (CUP)	-	CSI PI ; Pc H	Moves cursor to line PI, column Pc. The numbering of the lines and columns depends on the state (set/reset) of origin mode (DECOM).
Horizontal and vertical position (HVP)	-	CSI PI ; Pc f	Moves cursor to line PI, column Pc. The numbering of the lines and columns depends on the state (set/reset) of origin mode (DECOM). Digital recommends using CUP instead of HVP.
Index (IND)	IND	ESC D	Moves cursor down one line in the same column. If the cursor is at the bottom margin the screen performs a scroll-up.
Reverse index (RI)	RI	ESC M	Moves cursor up one line in the same column. If the cursor is at the top margin the screen performs a scroll-down.

Cursor Positioning (Cont)

Name	Control Character	Sequence	Action
Next line (NEL)	NEL	ESC E	Moves the cursor to the first position on the next line. If the cursor is at the bottom margin the screen performs a scroll-up.
Save cursor (DECSC)	-	ESC 7	Saves the following in terminal memory. <ul style="list-style-type: none">• cursor position• graphic rendition• character set shift state• state of wrap flag• state of origin mode• state of selective erase
Restore cursor (DECRC)	-	ESC 8	Restores the states described for (DECSC) above. If none of these characteristics were saved: the cursor moves to home position, origin mode is reset, no character attributes are assigned, and the default character set mapping is established.

Tab Stops**NOTE**

These sequences are affected by the user preference lock in set-up.

Name	Control Character	Sequence	Action
Horizontal tab set (HTS)	HTS	ESC H	Sets a tab stop at the current column.
Tabulation clear (TBC)	-	CSI g	Clears a horizontal tab stop at cursor position.
		CSI 0 g	Clears a horizontal tab stop at cursor position.
		CSI 3 g	Clears all horizontal tab stops.

Select Graphic Rendition (SGR)

You can select one or more character renditions at a time using the following format.

CSI Ps ; ... Ps m

When you use multiple parameters, they are executed in sequence. The effects are cumulative. For example, to change from increased intensity to blinking-underlined, you can use:

CSI 0 ; 4 ; 5 m

When you select a single parameter, no delimiter (3/11) is used.

Ps	Action
0	All attributes off.
1	Display at increased intensity.
4	Display underscored.
5	Display blinking.
7	Display negative (reverse) image.
2 2	Display normal intensity.
2 4	Display not underlined.
2 5	Display not blinking.
2 7	Display positive image.

Select Character Attributes (DECSCA)

You can select all subsequent characters to be erasable or not erasable using the following format. (See "Erasing" section.)

NOTE

This sequence is supported only in VT200 mode.

CSI Ps " q

where:

Ps	Action
0	All attributes off. (Does not apply to SGR.)
1	Designate character as "not erasable" by DECSEL/DECSED (attribute on).
2	Designate character as "erasable" by DECSEL/DECSED (attribute off).

Line Attributes

Name	Sequence	
	Top Half	Bottom Half
Double-height line (DECDHL)	ESC # 3	ESC # 4
	The same character must be used on both lines to form full character. If the line was previously single-width, single-height, all characters to the right of center are lost.	
Single-width line (DECSWL)	ESC # 5	
Double-width line (DECDWL)	ESC # 6	

Editing

Name	Sequence	Action
Insert line (IL)	CSI Pn L	Inserts Pn lines at the cursor.
Delete line (DL)	CSI Pn M	Deletes Pn lines starting at the line with the cursor.
Insert characters (ICH) (VT200 mode only)	CSI Pn @	Insert Pn blank characters at the cursor position, with the character attributes set to normal.
Delete character (DCH)	CSI Pn P	Deletes Pn characters starting with the character at the cursor position.

Erasing

Name	Sequence	Action
Erase character (ECH) (VT200 mode only)	CSI Pn X	Erases characters at the cursor position and the next n-1 character.
Erase in line (EL)	CSI K	Erases from the cursor to the end of the line, including the cursor position.
	CSI 0 K	Same as above.
	CSI 1 K	Erases from the beginning of the line to the cursor, including the cursor position.
	CSI 2 K	Erases the complete line.
Erase in display (ED)	CSI J	Erases from the cursor to the end of the screen, including the cursor position.
	CSI 0 J	Same as above.
	CSI 1 J	Erases from the beginning of the screen to the cursor, including the cursor position.
	CSI 2 J	Erases the complete display.

Erasing (Cont)

Name	Sequence	Action
Selective erase in line (DECSEL) (VT200 mode only)	CSI ? K	Erases all "erasable" characters (DECSCA) from the cursor to the end of the line.
	CSI ? 0 K	Same as above.
	CSI ? 1 K	Erases all "erasable" characters (DECSCA) from the beginning of the line to and including the cursor position.
Selective erase in display (DECSED) (VT200 mode only)	CSI ? 2 K	Erases all "erasable" characters (DECSCA) on the line.
	CSI ? J	Erases all "erasable" characters (DECSCA) from and including the cursor to the end of the screen.
	CSI ? 0 J	Same as above.
	CSI ? 1 J	Erases all "erasable" characters (DECSCA) from the beginning of the screen to and including the cursor.
	CSI ? 2 J	Erases all "erasable" characters (DECSCA) in the entire display.

Set Top and Bottom Margins (DECSTBM)

CSI Pt ; Pb r

Selects top and bottom margins defining the scrolling region. Pt is the line number of the first line in the scrolling region. Pb is the line number of the bottom line. If you do not select either Pt or Pb, they default to top and bottom respectively. Lines are counted from 1.

Printing

Before you select a print operation, check printer status using the print status report (DSR). (See "Reports" section.)

Name	Sequence	Action
Auto print mode	CSI ? 5 i	Turns on auto print mode. All following display lines print when you move the cursor off the line using a line feed, form feed, vertical tab, or auto wrap. The printed line ends with a carriage return and the character (LF, FF, or VT) which moved the cursor off the previous line. Auto wrap lines end with a line feed.
	CSI ? 4 i	Turns off auto print mode.
Printer controller	CSI 5 i	Turns on printer controller mode. The terminal sends received characters to the printer without displaying them on the screen. All characters and character sequences, except NUL, XON, XOFF, CSI 5 i, and CSI 4 i are sent to the printer. The terminal does not insert or delete spaces, or provide line delimiters, or select the correct printer character set. Printer controller mode has a higher priority than auto print mode. It can be selected during auto print mode. When in printer controller mode, keyboard activity continues to be directed to the host.
	CSI 4 i	Turns off printer controller mode.
Print cursor line	CSI ? 1 i	Prints the display line containing the cursor. The cursor position does not change. The print-cursor-line sequence is complete when the line prints.

Printing (Cont)

Name	Sequence	Action
Print screen	CSI i	Prints the screen display (full screen or scrolling region depending on the print extent DECEXT selection). Printer form feed mode (DECPFF) selects either a form feed (FF) or nothing as the print terminator. The print screen sequence is complete when the screen prints.
	CSI 0 i	Same as above.

User Defined Keys (DECUDK)

The device control string format for down-line-loading UDK functions is:

DCS Pc;PI | Ky1/st1;ky2/st2;...kyn/stn ST

where:

Pc Meaning

None	Clear all keys before loading new values.
0	Clear all keys before loading new values.
1	Load new key values, clear old only where defined.

PI Meaning

None	Lock the keys against future redefinition.
0	Lock the keys against future redefinition.
1	Do not lock the keys against future redefinition.

Key	Value (kyn)	Key	Value (kyn)
F6	17	F14	26
F7	18	HELP	28
F8	19	DO	29
F9	20	F17	31
F10	21	F18	32
F11	23	F19	33
F12	24	F20	34
F13	25		

Stn is a string of hex pairs of ASCII characters that define the specified key.

NOTE

To access the programmed values of the keys, you type Shift - (function key).

Down-Line-Loading Characters (DRCS)

You can down-line-load your DRCS character set using the following DECDLD device control string format.

DCS Pfn;Pcn;Pe;Pcms;Pw;Pt { Dscs Sxbp1;Sxbp2;...;Sxbpn ST

Parameter descriptions are as follows.

DECDLD Parameter Characters

Parameter	Name	Description
Pfn	Font number	0 and 1.
Pcn	Starting character number	Selects starting character in DRCS font buffer to be loaded.
Pe	Erase control	0 = erase all characters in this DRCS set
		1 = erase only the characters that are being reloaded
		2 = erase all characters in all DRCS sets (this font buffer number and other font buffer numbers)
	Character Matrix size	0 = device default (7 × 10) 1 = (not used) 2 = 5 × 10 3 = 6 × 10 4 = 7 × 10
Pw	Width attribute	0 = device default (80 columns)
		1 = 80 column 2 = 132 column
Pt	Text/full-cell	0 = device default (text)
		1 = text 2 = full-cell (not used)

Dscs defines the character set name for the soft font, and is used in the SCS (select character set) escape sequence.

Sxbp1;Sxbp2;...;Sxbpn are sixel bit patterns (1 to 94 patterns) for characters separated by semicolons. Each sixel bit pattern has the form:

S...S/...S

where the first S...S represents the upper columns (sixel) of the DRCS character, the slash advances the sixel pattern to the lower columns of the DRCS character, and the second S...S represents the lower columns (sixel) of the DRCS.

Clearing a Down-Line-Loaded Character Set

You can clear a character set that you have down-line-loaded using the following DECCLD control sequence.

```
DCS 1;1;2 { sp @ ST
```

Down-line-loaded character sets are also cleared by the following actions.

- Performing the power-up self-test.
- Using the set-up “Recall” or “Default” features.
- Using RIS or ESC c sequences.

Reports

Device Attributes (DA)

Communication	Sequence	Meaning
Host to VT220 (primary DA request)	CSI c or CSI 0 c	“What is your service class code and what are your attributes?”
VT220 to host (primary DA response)	CSI ? 62; 1; 2; 6; 7; 8; 9 c	“I am a service class 2 (VT200 family) terminal (62) with 132 columns (1), printer port (2), selective erase (6), DRCS (7), UDK (8). I support 7-bit national replacement character sets (9).”
Host to VT220 (secondary DA request)	CSI > c or CSI > 0 c	“What type of terminal are you, what is your firmware version, and what hardware options do you have installed?”
VT220 to host (secondary DA response)	CSI > 1; Pv; Po c	“I am a VT220 (identification code of 1, my firmware version is _____ (Pv), and I have PO options installed.

EXAMPLE: CSI>1;10;0c = VT220 version 1.0, no options

NOTE

If the terminal is in VT100 mode and an ID other than VT220 ID is selected, then the following primary exchanges apply.

Communication	Sequence	Meaning
VT220 to host (VT100 ID selected in set-up)	ESC [? 1; 2 c	"I am a VT100 terminal with AVO."
VT220 to host (VT101 ID selected in set-up)	ESC [? 1; 0 c	"I am a VT101 terminal."
VT220 to host (VT102 ID selected in set-up)	ESC [? 6 c	"I am a VT102 terminal."

Device Status Report (DSR)

Communication	Sequence	Meaning
Host to VT220 (request for terminal status)	CSI 5 n	"Please report your operating status using a DSR control sequence. Are you in good operating condition or do you have a malfunction?"
VT220 to host (DA response)	CSI 0 n	"I have no malfunction."
	CSI 3 n	"I have a malfunction."
Host to VT220 (request for cursor position)	CSI 6 n	"Please report your cursor position using a CPR (not DSR) control sequence."
VT220 to host (CPR response)	CSI Pv; Ph R	"My cursor is positioned at _____ (Pv); _____ (Ph)." Where: Pv = vertical position (row) Ph = horizontal position (column)

DSR – Printer Port

Communication	Sequence	Meaning
Host to VT220 (request for printer status)	CSI ? 15 n	“What is the printer status?”
VT220 to host	CSI ? 13 n	“DTR has not been asserted on the printer port since power up or reset—in essence, I have no printer.”
	CSI ? 10 n	“DTR is asserted on the printer port. The printer is ready.”
	CSI ? 11 n	“DTR is not currently asserted on the printer port. The printer is not ready.”

DSR – User Defined Keys (VT200 mode only)

Communication	Sequence	Meaning
Host to VT220 (request for UDK status)	CSI ? 25 n	“Are User Defined Keys locked or unlocked?”
VT220 to host	CSI ? 20 n	“User Defined Keys are unlocked.”
	CSI ? 21 n	“User Defined Keys are locked.”

DSR – Keyboard Language

Communication	Sequence	Meaning
Host to VT220 (request for keyboard language)	CSI ? 26 n	“What is the key- board language?”
VT220 to host	CSI ? 27; Pn n	“My keyboard lan- guage is _____ (Pn).”

where:

Pn	Language
0	Unknown*
1	North American
2	British
3	Flemish
4	French Canadian
5	Danish
6	Finnish
7	German
8	Dutch
9	Italian
10	Swiss (French)
11	Swiss (German)
12	Swedish
13	Norwegian
14	French/Belgian
15	Spanish

* Sent by a terminal that for some reason cannot determine its keyboard language. The VT220 will never send this response.

Identification (DECID)

ESC Z

Causes the terminal to send a primary DA response sequence. DECID, however, is not recommended. You should use the primary DA request for this purpose.

Terminal Reset

Name	Sequence	Action
Soft terminal reset (DECSTR)	CSI ! p	Sets terminal to power-up default states
Hard terminal reset (RIS)	ESC c	Replaces all set-up parameters with NVR values or power-up default values if NVR values do not exist.

Tests (DECTST)

The sequence format for invoking terminal tests is as follows.

CSI 4 ; ; Ps y

where:

Ps	Test
0	Test 1, 2, 3, and 6
1	Power-up self-test
2	EIA port data loopback test
3	Printer port loopback test
4	(not used)
5	(not used)
6	EIA port modem control line loopback test
7	20 mA port loopback test
8	(not used)
9	Repeat other test in parameter string
10 and up	(not used)

NOTE

DECTST causes a communications line disconnect.

Adjustments (DECALN)

ESC # 8 Displays screen alignment pattern (full screen of E's).

VT52 Escape Sequences

Escape Sequence	Function
ESC A	Cursor up
ESC B	Cursor down
ESC C	Cursor right
ESC D	Cursor left
ESC F	Enter graphics mode
ESC G	Exit graphics mode
ESC H	Cursor to home
ESC I	Reverse line feed
ESC J	Erase to end of screen
ESC K	Erase to end of line
ESC Y Line Column	Direct cursor address
ESC Z	Identify
ESC =	Enter alternate keypad mode
ESC >	Exit alternate keypad mode
ESC <	Enter ANSI mode
ESC	Enter auto print mode
ESC	Exit auto print mode
ESC W	Enter printer controller mode
ESC X	Exit printer controller mode
ESC |	Print screen
ESC V	Print cursor line

VT 220

Programmer Pocket Guide Addendum for Models D, E, and F

EK-VT220-HR-002

The information in this addendum applies only to models D, E, and F of the VT220 video terminal. You can identify your model by looking at the label on the rear of the terminal (Figure 1).

All other information in the *VT220 Programmer Pocket Guide* applies to VT220 models A, B, C, D, E, and F.

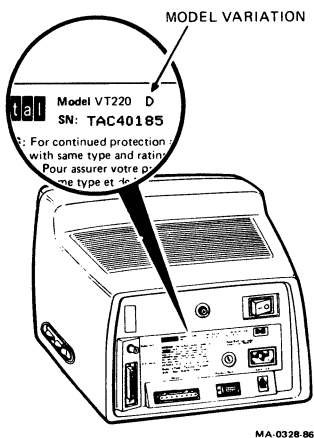


Figure 1 Identifying the VT220 Model

• **Norwegian/Danish NRC Set**
(Danish and Norwegian Keyboard Selections,
Models D, E, and F)

Use the following table for VT220 models D, E, and F.

ROW	COLUMN	0	1	2	3	4	5	6	7
	BITS b7 b6 b5 b4 b3 b2 b1	0 0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0	0 0 0 0	NUL	DLE	SP	0	@	P	\	p
1	0 0 0 1	SOH	DC1 (XON)	!	1	A	Q	a	q
2	0 0 1 0	STX	DC2	"	2	B	R	b	r
3	0 0 1 1	ETX	DC3 (XOFF)	#	3	C	S	c	s
4	0 1 0 0	EOT	DC4	\$	4	D	T	d	t
5	0 1 0 1	ENQ	NAK	%	5	E	U	e	u
6	0 1 1 0	ACK	SYN	&	6	F	V	f	v
7	0 1 1 1	BEL	ETB	'	7	G	W	g	w
8	1 0 0 0	BS	CAN	(8	H	X	h	x
9	1 0 0 1	HT	EM)	9	I	Y	i	y
10	1 0 1 0	LF	SUB	*	:	J	Z	j	z
11	1 0 1 1	VT	ESC	+	;	K	Æ	k	æ
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15	1 1 1 1	SI	US	/	?	O	_	o	DEL

KEY

CHARACTER	ESC	33	OCTAL
		27	DECIMAL
		1B	HEX

MA-0308-86

• **CHARACTER SET SELECTION (SCS)**

Designating Hard Character Sets


Add the following entry.

Character Set

Final Character

Norwegian/Danish
 (models D, E, and F)

E or 6 or \



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