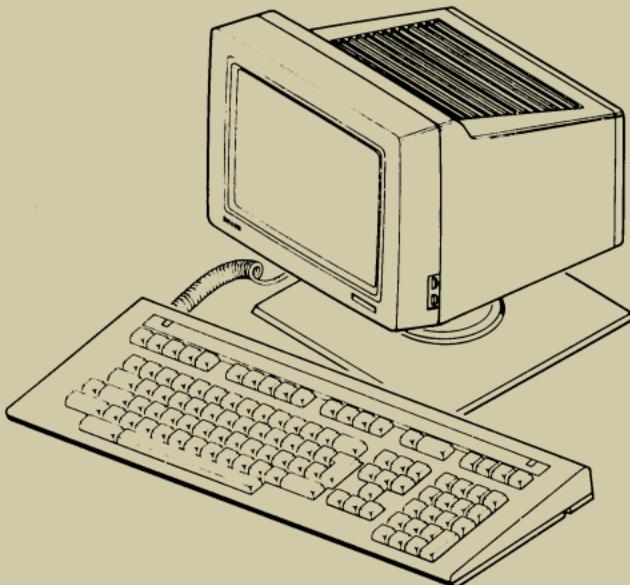


EK-VT3XX-HR-002

# VT330/VT340

## Programmer Pocket Guide



**digital**™



**EK-VT3XX-HR-002**

# **VT330/VT340**

## **Programmer Pocket Guide**

**Prepared by Educational Services  
of  
Digital Equipment Corporation**

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<b>DECtalk</b>	<b>ReGIS</b>	<b>VT330, VT340</b>
<b>DECUS</b>	<b>RSTS</b>	<b>Work Processor</b>
<b>DECwriter</b>	<b>RSX</b>	
<b>DIBOL</b>	<b>SSU</b>	

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## **ABOUT THIS GUIDE**

This pocket guide is a summary of the control functions and commands described in the *VT330/VT340 Programmer Reference Manual*. If you are a programmer, you can use this guide as a quick reference tool to access the VT300 features.

The guide is divided into two parts.

- Part 1 lists the text programming functions from Volume 1 of the programmer reference manual.
- Part 2 lists the graphics programming functions from Volume 2 of the programmer reference manual.

Each section in the guide indicates where that topic is covered in the programmer reference manual. For example, to find out more about

### **1.2 CHARACTER ENCODING**

you would go to Volume 1, Chapter 2 of the programmer reference manual.

There are no entries for Volume 1, Chapter 1 (1.1) or Volume 2, Chapter 12 (2.12).

### **Default Settings**

Default settings for control functions are shown with a (D) next to the setting.



# **PART 1**

## **TEXT PROGRAMMING**

## 1.2 CHARACTER ENCODING

### DEC Multinational Character Set (C0 and GL Codes)

The left half of this set is the 7-bit ASCII set.

ROW	COLUMN	0	1	2	3	4	5	6	7
	BITS	0 0 0 0 0 0 0							
0	0 0 0 0	NUL	0	DLE	20	SP	40	0	@
1	0 0 0 1	SOH	1	DC1	21	!	41	67	100
2	0 0 1 0	STX	2	DC2	22	"	42	68	102
3	0 0 1 1	ETX	3	DC3	23	#	43	69	103
4	0 1 0 0	EOT	4	DC4	24	\$	44	70	104
5	0 1 0 1	ENQ	5	NAK	25	%	45	71	105
6	0 1 1 0	ACK	6	SYN	26	&	46	72	106
7	0 1 1 1	BEL	7	ETB	27	'	47	73	107
8	1 0 0 0	BS	8	CAN	28	(	48	74	108
9	1 0 0 1	HT	9	EM	29	)	49	75	109
10	1 0 1 0	LF	10	SUB	30	*	50	76	110
11	1 0 1 1	VT	11	ESC	31	+	51	77	111
12	1 1 0 0	FF	12	FS	32	,	52	78	112
13	1 1 0 1	CR	13	GS	33	=	53	79	113
14	1 1 1 0	SO	14	RS	34	<	54	80	114
15	1 1 1 1	SI	15	US	35	?	55	81	115

← C0 CODES → GL CODES (ASCII GRAPHIC )

#### KEY

CHARACTER	ESC	33 OCTAL
	27 DECIMAL	
	18 HEX	

MA-0893-83

# DEC Multinational Character Set (C1 and GR Codes)

The right half of this set is the DEC Supplemental Graphic set.

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

← C1 CODES → GR CODES  
(DEC SUPPLEMENTAL GRAPHIC )

MA-0894-83

## National Replacement Character Sets (NRCs)

This table shows the differences between the NRC sets and the 7-bit ASCII set.

### National Replacement Character Sets

Character Set	2/3	4/0	5/11	5/12	5/13	5/14
ASCII	#	@	[	\	]	^
United Kingdom	£	@	[	\	]	^
Dutch	£	%	ÿ	½		~
Finnish	#	@	Ä	Ö	Å	Ü
French	£	à	°	ç	§	^
French Canadian	#	à	â	ç	ê	î
German	#	§	Ä	Ö	Ü	~
Italian	£	§	°	ç	é	^
Norwegian/Danish	#	@	Æ	Ø	Å	~
Portuguese	#	@	Ã	Ç	Õ	~
Spanish	£	§	Í	Ñ	¿	~
Swedish	#	É	Ä	Ö	Å	Ü
Swiss	ù	à	é	ç	ê	î

Character Set	5/15	6/0	7/11	7/12	7/13	7/14
ASCII	-	'	{		}	-
United Kingdom	-	'	{		}	-
Dutch	-	'	..	ƒ	¼	‘
Finnish	-	é	ää	ö	å	ü
French	-	'	é	ù	è	“
French Canadian	-	ô	é	ù	è	û
German	-	'	ä	ö	ü	ß
Italian	-	ù	à	ò	è	ì
Norwegian/Danish	-	'	æ	ø	å	-
Portuguese	-	'	ã	ç	õ	-
Spanish	-	'	'	°	ñ	ç
Swedish	-	é	ää	ö	å	ü
Swiss	è	ô	ä	ö	ü	û

# ISO Latin Alphabet Nr 1 Supplemental Character Set

8	9	10	11	12	13	14	15	COLUMN b6 b7 BITS
								b4 b3 b2 b1 ROW
1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 5 0 0	1 1 0 1	1 1 1 0	1 1 1 1	0 0 0 0 <b>0</b>
200 128 80	220 144 90	NBSP 160 A0	240 161 A1	260 176 B0	300 192 C0	320 208 D0	340 224 E0	360 240 F0
201 129 81	PU1 145 91	i 161 A1	± 177 B1	Á 181 C1	Ñ 193 C1	ñ 209 D1	ó 225 E1	é 241 F1
202 130 82	PU2 146 92	€ 162 A2	2 262 178 B2	À 194 C2	Ò 196 C2	â 210 D2	â 226 E2	ò 242 F2
203 131 83	STS 147 93	£ 163 A3	3 263 179 B3	À 195 C3	Ó 195 C3	ã 227 E3	ô 243 F3	ó 243 F3
204 132 84	CCH 148 94	¤ 164 A4	“ 264 180 B4	À 196 C4	À 196 C4	â 212 D4	â 228 E4	â 244 F4
205 133 85	MW 149 95	¥ 165 A5	μ 181 B5	À 197 C5	Ò 195 C5	â 213 D6	â 229 E5	ô 245 F5
SSA 206 134 86	SPA 150 96	I 166 A6	¶ 182 B6	Æ 198 C6	Ö 198 C6	ö 214 D6	ö 220 E6	ö 246 F6
ESA 207 151 87	EPA 151 97	§ 167 A7	- 183 B7	Ç 199 C7	X 199 C7	ç 215 D7	÷ 221 E7	÷ 247 F7
HTS 210 152 88	II 152 98	II 168 A8	, 184 B8	È 198 C8	Ð 200 C8	ð 216 D8	ø 222 E8	ø 248 F8
HTJ 211 153 89	(C) 153 99	© 169 A9	1 271 185 B9	É 198 B9	Ù 201 C9	ú 217 D9	ú 233 E9	ú 249 F9
VTS 212 154 90	¶ 170 AA	¤ 272 186 BA	À 202 CA	Ú 203 CB	Ü 203 CD	ü 218 DB	ü 224 EA	ü 250 FA
PLD 213 155 91	CSI 155 91	<< 171 AB	>> 187 B6	È 197 B6	Ù 203 CB	Ü 219 DB	ü 225 EB	ü 251 FB
PLU 214 140 8C	ST 156 9C	— 172 AC	¼ 188 BC	Ì 186 CE	Í 196 CC	Í 206 CD	Í 220 DC	Í 226 EC
RI 215 141 8D	OSC 157 9D	— 173 AD	½ 189 BD	Í 195 CE	Ý 205 CF	Í 221 DD	Ý 227 ED	Ý 252 FO
SS2 216 142 8E	PM 158 9E	® 174 AE	% 180 BE	Í 196 CE	Þ 206 CF	Í 222 DE	Þ 238 EE	Þ 254 FE
SS3 217 143 8F	APC 159 9F	— 175 AF	÷ 191 BF	Í 197 CE	Í 207 CF	Í 223 DF	Ý 239 EF	Ý 255 FF

← C1 CODES → GR CODES  
ISO LATIN-1 SUPPLEMENTAL GRAPHIC

MA-0894 E-83

# DEC Special Graphic Character Set

COLUMN	0	1	2	3	4	5	6	7
ROW	BITS B7 B6 B5 B4 B3 B2 B1	0 0 0 0	0 0 1 1	0 1 0 1	1 0 0 1	1 0 1 0	1 1 0 1	1 1 1 1
0	0 0 0 0	NUL 0 0	DLE 20 16 10	SP 40 32 30	0 60 48 36	@ 100 64 40	P 120 80 50	◆ 140 96 60
1	0 0 0 1	SOH 1 1	DC1 21 17 11	! 33 21	1 61 49 31	A 101 65 41	Q 121 81 51	■ 141 97 61
2	0 0 1 0	STX 2 2 2	DC2 22 18 12	“ 34 22	2 62 50 32	B 102 66 42	R 122 82 52	¶ 142 98 62
3	0 0 1 1	ETX 3 3 3	DC3 23 19 13	# 35 23	3 63 51 33	C 103 67 43	S 123 83 53	£ 143 99 63
4	0 1 0 0	EOT 4 4	DC4 24 20 14	\$ 36 24	4 64 52 34	D 104 68 44	T 124 84 54	¤ 144 100 64
5	0 1 0 1	ENQ 5 5 5	NAK 25 21 15	% 37 25	5 65 53 35	E 105 69 45	U 125 85 55	† 145 101 65
6	0 1 1 0	ACK 6 6	SYN 26 22 16	& 38 26	6 66 54 36	F 106 70 46	V 126 86 56	° 146 102 66
7	0 1 1 1	BEL 7 7 7	ETB 27 22 17	' 39 27	7 67 55 37	G 107 71 47	W 127 87 57	‡ 147 103 67
8	1 0 0 0	BS 8 8 8	CAN 28 24 18	( 40 28	8 50 56 48	H 108 72 48	X 128 88 56	ℳ 148 104 68
9	1 0 0 1	HT 9 9 9	EM 31 26 19	) 41 29	9 51 57 39	I 109 73 49	Y 129 89 59	¥ 151 105 89
10	1 0 1 0	LF 10 10 A	SUB 32 26 1A	* 42 26	: 52 42 2A	J 110 74 4A	Z 130 90 5A	≥ 152 106 6A
11	1 0 1 1	VT 11 11 B	ESC 33 27 18	+	53 43 28	K 111 59 48	[ 131 91 58	≤ 153 107 68
12	1 1 0 0	FF 12 12 C	FS 34 28 1C	,	< 54 44 2C	L 112 76 4C	\ 132 92 5C	≠ 154 108 6C
13	1 1 0 1	CR 13 13 D	GS 35 29 1D	- 46 20	= 55 46 30	M 113 77 4D	] 133 93 5D	£ 155 109 6D
14	1 1 1 0	SO 14 14 E	RS 36 30 1E	.	> 56 46 2E	N 114 62 4E	^ 134 78 56	*
15	1 1 1 1	SI 15 15 F	US 37 31 1F	/	?	O 115 63 3F	(BLANK) 135 79 5F	DEL 157 111 6F
								SCAN 1

← C0 CODES → GL CODES  
(DEC SPECIAL GRAPHIC )

## KEY

CHARACTER	ESC	33 OCTAL
	27 DECIMAL	
	1B HEX	

MA-0893C-83

# DEC Technical Character Set

BITS B4 B3 B2 B1		0 1 0 0		0 1 1 0		1 0 0 0		1 0 0 1		1 1 0 0		1 1 1 0	
COLUMN 2 10		GL GR 3 11		GL GR 4 12		GL GR 5 13		GL GR 6 14		GL GR 7 15			
ROW													
0 0 0 0 0	0	41 241	60 260	100 300	120 320	140 340	160 360	180 380	200 400	220 420	240 440	260 460	
0 0 0 0 1	1	33 161	48 176	61 261	64 192	80 206	96 224	112 240	128 256	140 272	152 288	161 304	
0 0 0 1 0	2	42 242	50 184	62 262	66 194	81 209	97 225	113 241	129 257	141 273	153 289	161 305	
0 0 0 1 1	3	36 163	43 243	51 179	67 263	83 211	99 227	115 243	131 259	143 275	155 291	163 307	
0 0 1 0 0	4	44 244	52 184	64 264	68 196	84 212	98 228	116 244	132 260	144 276	156 292	164 308	
0 0 1 0 1	5	45 245	53 185	65 265	69 197	85 213	101 229	117 245	133 261	145 277	157 293	165 309	
0 0 1 1 0	6	46 246	54 186	66 266	70 198	83 214	102 230	118 246	134 262	146 278	158 294	166 310	
0 0 1 1 1	7	47 247	55 187	67 267	71 199	87 215	103 231	119 247	135 263	147 279	159 295	167 311	
0 1 0 0 0	8	48 248	56 188	68 268	72 200	88 216	104 232	120 248	136 264	148 280	160 306	168 322	
0 1 0 0 1	9	49 249	57 189	69 269	73 201	89 217	105 233	121 249	137 265	149 281	161 307	169 323	
0 1 0 1 0	10	50 250	58 190	70 270	74 202	90 218	106 234	122 250	138 266	151 282	163 308	171 324	
0 1 0 1 1	11	51 251	59 191	71 271	75 203	91 219	107 235	123 251	139 267	152 283	164 309	172 325	
0 1 1 0 0	12	52 252	60 192	72 272	76 204	92 220	108 236	124 252	140 274	154 290	166 312	174 326	
0 1 1 0 1	13	53 253	61 193	73 273	77 205	93 221	109 237	125 253	141 275	155 291	167 313	175 327	
0 1 1 1 0	14	54 254	62 194	74 274	78 206	94 222	110 238	126 254	142 276	156 292	168 314	176 328	
0 1 1 1 1	15	55 255	63 195	75 275	79 207	95 223	111 239	127 255	143 277	157 293	169 315	177 329	

**LEGEND**

CHARACTER	OC	4/1	12/1	COLUMN/ROW
		101	301	OCTAL
		65	193	DECIMAL
		41	C1	HEX

\* NOTE:  
WHEN SET IS MAPPED INTO GR,  
BIT B8 IS 1

MA-7602A-83

# Display Controls Font (Left Half)

COLUMN	0	1	2	3	4	5	6	7							
ROW	b8 b7 b6 b5 b4 b3 b2 b1	0 0 0 0 0 0 0 0	0 0 0 0 1 0 0 1	0 0 1 0 0 1 0 1	0 1 0 1 0 0 0 0	0 5 0 1 0 0 1 0	0 1 1 0 1 0 1 1	0 1 1 1 1 0 1 1							
0	0 0 0 0	N U L	0 D L E	20 16 10	SP	40 32 30	O	@	100 64 40	P	120 80 50	'	140 96 50	p	160 117 70
1	0 0 0 1	S O H	1 D C 1	21 18 12	!	41 33 21	1	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
2	0 0 1 0	S T X	2 D C 2	22 18 22	"	42 34 32	2	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
3	0 0 1 1	E T X	3 D C 3	23 19 13	#	43 36 23	3	C	103 63 43	S	123 83 53	c	143 99 63	s	163 115 73
4	0 1 0 0	E O T	4 D C 4	24 20 14	\$	44 36 34	4	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
5	0 1 0 1	E N Q	5 N A K	25 21 15	%	37 53	5	E	105 65 45	U	125 85 55	e	145 101 65	u	165 117 75
6	0 1 1 0	A C K	6 S Y N	26 22 16	&	46 38 36	6	F	106 66 46	V	126 86 56	f	146 102 66	v	166 118 76
7	0 1 1 1	B E L	7 E T B	27 23 17	'	47 39 37	7	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
8	1 0 0 0	B S	10 C A N	30 24 18	(	50 40 28	8	H	110 72 38	X	130 88 48	h	150 104 68	x	170 120 78
9	1 0 0 1	H T	11 E M	31 25 19	)	51 41 29	9	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
10	1 0 1 0	L F	12 10 A	32 26 1A	*	52 42 2A	:	J	112 74 3A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
11	1 0 1 1	V T	13 11 B	33 27 1B	+	53 43 28	;	K	113 59 48	C	133 91 58	k	153 107 68	{	173 123 78
12	1 1 0 0	F C	14 12 C	34 28 1C	<	54 44 2C	L	114 60 3C	\	134 92 5C	l	154 108 6C		174 124 7C	
13	1 1 0 1	C R	15 13 D	35 29 1D	-	55 45 2D	M	115 61 3D	]	135 93 5D	m	155 109 6D	}	175 125 7D	
14	1 1 1 0	S O	16 14 E	36 30 1E	=	56 46 2E	N	116 62 3E	^	136 94 4E	n	156 110 6E	~	176 126 7E	
15	1 1 1 1	S I	17 15 F	37 31 1F	/	57 47 2F	?	O	117 63 3F	-	137 95 4F	o	157 111 6F	Q	177 127 7F

← COCODES →

GL CODES

(ASCII GRAPHIC )

## KEY

CHARACTER	ESC	33 27 1B	OCTAL DECIMAL HEX

MA-0893-83W

# Display Controls Font (Right Half)

8		9		10		11		12		13		14		15		COLUMN		
																b8 b7 b6 b5 b4 t3 t2 t1	BITS	
																	ROW	
1	0	0	0	0	0	1	0	1	0	1	0	1	1	1	1	00000	0	
8	0	D <sub>0</sub> 128 80	C <sub>0</sub> 144 90	S <sub>0</sub> N <sub>0</sub> P <sub>0</sub>	220 240 160 AD	240 176 180	0	260 177 B1	300 192 C0	320 208 D0	340 224 E0	360 240 F0	343 227 E3	363 243 F3	344 228 E4	364 244 F4	00001	1
8	1	P <sub>1</sub> 201 129 81	U <sub>1</sub> 221 141 91	i <sub>1</sub> A1	241 161 A1	±	261 177 B1	301 193 C1	321 209 D1	341 225 E1	361 241 F1	342 226 E2	362 242 F2	343 227 E3	363 243 F3	00010	2	
8	2	P <sub>2</sub> 202 130 82	U <sub>2</sub> 222 146 92	c <sub>2</sub> A2	242 162 A2	2	262 178 B2	302 194 C2	322 210 D2	342 226 E2	362 242 F2	343 227 E3	363 243 F3	344 228 E4	364 244 F4	00101	3	
8	3	S <sub>3</sub> 203 131 83	T <sub>3</sub> 223 147 93	s <sub>3</sub> A3	243 163 A3	3	263 179 B3	303 195 C3	323 211 D3	343 227 E3	363 243 F3	344 228 E4	364 244 F4	345 229 E5	365 245 F5	00111	4	
I	N	D <sub>4</sub> 204 132 84	R <sub>4</sub> 224 148 94	H <sub>4</sub> R <sub>4</sub>	x <sub>4</sub> A4	*	264 180 B4	304 196 C4	324 212 D4	344 228 E4	364 244 F4	345 229 E5	365 245 F5	346 228 E6	366 246 F6	01000	5	
N	E	L <sub>5</sub> 205 133 85	M <sub>5</sub> 225 149 95	w <sub>5</sub> A5	245 165 A5	μ	265 181 B5	305 197 C5	325 213 D5	345 229 E5	365 245 F5	346 228 E6	366 246 F6	347 229 E7	367 247 F7	01010	6	
S	S	A <sub>6</sub> 206 134 86	S <sub>6</sub> 226 150 96	i <sub>6</sub> A6	246 166 A6	¶	266 182 B6	306 198 C6	326 214 D6	346 230 E6	366 246 F6	347 229 E7	367 247 F7	348 229 E8	368 248 F8	01110	7	
E	S	A <sub>7</sub> 207 135 87	E <sub>7</sub> 227 151 97	p <sub>7</sub> A7	247 167 A7	*	267 183 B7	307 199 C7	327 215 D7	347 231 E7	367 247 F7	348 229 E8	368 248 F8	349 229 E9	369 249 F9	10001	8	
H	T	S <sub>8</sub> 210 136 88	g <sub>8</sub> 98	II <sub>8</sub> AB	250 168 AB	/	270 184 B8	310 200 CB	330 216 D8	350 232 E8	370 248 F8	351 233 E9	371 249 F9	352 234 EA	372 250 FA	10010	9	
H	T	J <sub>9</sub> 211 137 89	g <sub>9</sub> 99	(C <sub>9</sub> A9	251 169 A9	1	271 185 B9	311 201 CB	331 217 D9	351 233 E9	371 249 F9	352 234 EA	372 250 FA	353 234 EB	373 251 FB	10101	10	
V	T	S <sub>10</sub> 212 138 90	g <sub>10</sub> 9A	aa <sub>10</sub> AA	252 170 AA	Ω	272 186 B4	312 202 CA	332 218 DA	352 234 EA	372 250 FA	353 234 EB	372 250 FA	354 234 EB	374 251 FB	10110	11	
P	L	D <sub>11</sub> 213 139 91	C <sub>11</sub> 233 155 98	ss <sub>11</sub> AB	253 171 AB	⟨⟨	273 187 B8	313 203 CB	333 219 DB	353 235 EB	373 251 FB	353 235 EB	373 251 FB	354 235 EB	374 251 FB	10111	12	
P	L	U <sub>12</sub> 214 140 92	S <sub>12</sub> 234 156 9C	— <sub>12</sub> AC	254 172 AC	¼	274 188 BC	314 204 CC	334 220 DC	354 236 EC	374 252 FC	355 236 ED	375 252 FD	356 236 EE	376 252 FD	11000	13	
R	I	C <sub>13</sub> 215 141 93	Q <sub>13</sub> 235 157 9D	— <sub>13</sub> AD	255 173 AD	½	275 189 BD	315 205 CD	335 221 DD	355 237 ED	375 253 FD	356 237 ED	375 253 FD	357 237 ED	376 254 FE	11011	14	
S	S	Z <sub>14</sub> 216 142 9E	P <sub>14</sub> 236 158 9E	(R <sub>14</sub> AE	256 174 AE	%	276 190 BE	316 206 CE	336 222 DE	356 238 EE	376 254 FE	357 238 EE	377 255 FF	357 238 EE	377 255 FF	11100	15	
S	S	Z <sub>15</sub> 217 143 9F	A <sub>15</sub> 237 159 9F	— <sub>15</sub> AF	257 175 AF	€	277 191 BF	317 207 CF	337 223 DF	357 239 EF	377 255 FF	357 239 EF	377 255 FF	358 239 EF	378 256 FF	11111	16	

← C1 CODES → GR CODES ISO LATIN-1 SUPPLEMENTAL GRAPHIC

MA-0401-86

## C0 (7-Bit) Control Characters Recognized

Name	Mnemonic	Function
Null	NUL	Ignored.
Enquiry	ENQ	Sends answerback message.
Bell	BEL	Sounds the bell tone if the bell is enabled.
Backspace	BS	Moves the cursor one character position to the left. If the cursor is at the left margin, no action occurs.
Horizontal tab	HT	<p><i>Interactive mode</i> Moves the cursor to the next tab stop. If there are no more tab stops, the cursor moves to the right margin. HT does not cause text to auto wrap.</p> <p><i>Local editing mode</i> Depends on the setting of erasure mode (ERM).</p>
		<p>ERM set: Moves the cursor to the next tab stop or field boundary.</p> <p>ERM reset: Moves the cursor to the next unprotected field boundary.</p>
		If there are no tab stops or character fields in the scrolling region, the page scrolls to the next tab stop or field.
Line feed	LF	Causes a line feed or a new line operation, depending on the setting of line feed/new line mode.
Vertical tab	VT	Treated as LF.
Form feed	FF	Treated as LF.
Carriage return	CR	Moves the cursor to the left margin on the current line.
Shift out (Locking shift 1)	SO (LS1)	Maps the G1 character set into GL. You designate G1 by using a select character set (SCS) sequence (Vol. 1, Chapter 5).

## C0 (7-Bit) Control Characters Recognized (Cont)

Name	Mnemonic	Function
Shift in (Locking shift 0)	SI	Maps the G0 character set into GL. You designate G0 by using a select character set (SCS) sequence (Vol. 1, Chapter 5).
Device control 1 (XON)	DC1	Also known as XON. If XON/XOFF flow control is enabled, DC1 clears DC3 (XOFF). This action causes the VT300 to continue sending characters.
Device control 3 (XOFF)	DC3	Also known as XOFF. If XON/XOFF flow control is enabled, DC3 causes the VT300 to stop sending characters. The terminal cannot resume sending characters until it receives a DC1 control character.
Device control 4	DC4	Introduces an SSU session manage- ment command. The VT300 and host use this control to separate SSU commands from ANSI text and control functions. See Vol. 1, Chapter 14.
Cancel	CAN	Immediately cancels an escape sequence, control sequence, or device control string in progress. The VT300 does not display any error characters.
Substitute	SUB	Immediately cancels an escape sequence, control sequence, or device control string in progress. The VT300 displays a reverse question mark ? for an error character.
Escape	ESC	Introduces an escape sequence. ESC also cancels any escape sequence, control sequence, or device control string in progress.
Delete	DEL	Usually ignored when received. DEL is not used as a fill character. Digital does not recommend using DEL as a fill character. Use NUL instead.

## C1 (8-Bit) Control Characters Recognized

Name	Mnemonic	Function
Index	IND	Moves the cursor down one line in the same column. If the cursor is at the bottom margin, the page scrolls up.
Next line	NEL	Moves the cursor to the first position on the next line. If the cursor is at the bottom margin, the page scrolls up.
Start selected area	SSA	Defines the cursor position as the start of a block of data eligible to be sent to the host (Vol. 1, Chap. 9).
End selected area	ESA	Defines the cursor position as the end of a block of data eligible to be sent to the host (Vol. 1, Chap. 9).
Horizontal tab set	HTS	Sets a horizontal tab stop at the column where the cursor is.
Reverse index	RI	Moves the cursor up one line in the same column. If the cursor is at the top margin, the page scrolls down.
Single shift 2	SS2	Temporarily maps the G2 character set into GL, for the next graphic character. You designate the G2 set by using a select character set (SCS) sequence (Vol. 1, Chap. 5).
Single shift 3	SS3	Temporarily maps the G3 character set into GL, for the next graphic character. You designate the G3 set by using a select character set (SCS) sequence (Vol. 1, Chap. 5).

## C1 (8-Bit) Control Characters Recognized (Cont)

Name	Mnemonic	Function
Device control string	DCS	Introduces a device control string.
Set transmit state	STS	The VT300 sends STS to the host to request a block transmission (Vol. 1, Chap. 9).
Start protected area	SPA	Defines the cursor position as the start of a character string that you cannot edit from the keyboard.
End protected area	EPA	Defines the cursor position as the end of a character string that you cannot edit from the keyboard.
Control sequence introducer	CSI	Introduces a control sequence.
String terminator	ST	Ends a device control string. You use ST in combination with DCS.
Operating system command	OSC	Introduces an operating system command.*
Privacy message	PM	Introduces a privacy message string.*
Application program command	APC	Introduces an application program command.*

\* The VT300 ignores all following characters, until it receives a SUB, ST, or any other C1 control character.

## 8-Bit Control Characters and 7-Bit Equivalents

Name	8-Bit Character	7-Bit Sequence
Index	IND	ESC D
Next line	NEL	ESC E
Start selected area	SSA	ESC F
End selected area	ESA	ESC G
Horizontal tab set	HTS	ESC H
Reverse index	RI	ESC M
Single shift 2	SS2	ESC N
Single shift 3	SS3	ESC O
Device control string	DCS	ESC P
Set transmit state	STS	ESC S
Start protected area	SPA	ESC V
End protected area	EPA	ESC W
Control sequence introducer	CSI	ESC [
String terminator	ST	ESC \
Operating system command	OSC	ESC ]
Privacy message	PM	ESC ^
Application program	APC	ESC _

## 1.3 KEYBOARD CODES

### Main Keypad Function Keys

Key	Code Sent
<x>	Delete (DEL, 7/15) or backspace (BS, 0/8), depending on the <X> key mode selected. You can select the mode by using set-up or a control function.
Tab	Horizontal tab (HT, 0/9).
Return	Carriage return (CR, 0/13), or carriage return (CR, 0/13) and line feed (LF, 0/10). Depends on the state of line feed/new line mode (LNM). See Vol. 1, Chap. 11.
Ctrl	Does not send a code. You use Ctrl with another key to send a control code.

## Main Keypad Function Keys (Cont)

Key	Code Sent
Lock	Does not send a code. You use Lock to set or clear the "caps lock" or "shift lock" state. You select "caps lock" or "shift lock" in the Keyboard Set-Up screen.
Shift (2 keys)	Does not send a code. You use Shift with another standard key, to send the top character shown on the key.
Space bar	Sends a space (SP, 2/0).
Compose Character	Does not send a code. Pressing Compose Character starts a compose sequence. You can disable the Compose Character key in the Keyboard Set-Up screen.

## Editing Keys

### Code Sent

Key	VT300 Mode	VT100, VT52 Modes
Find	CSI 1 ~	The editing keys do not send codes in these two modes.
Insert Here	CSI 2 ~	
Remove	CSI 3 ~	
Select	CSI 4 ~	
Prev Screen	CSI 5 ~	
Next Screen	CSI 6 ~	

### Arrow Keys

Key	ANSI Mode*		VT52 Mode*	
	Cursor Normal	Key Mode Application	Cursor Normal	Key Mode 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 VT300 and VT100 modes.  
VT52 mode is not compatible with ANSI mode.

## Numeric Keypad Keys

	ANSI Mode*		VT52 Mode*	
	Keypad Mode		Keypad Mode	
Key	Numeric	Application	Numeric	Application
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 VT300 and VT100 modes.

VT52 mode is not compatible with ANSI standards.

† The last character in the sequence is a lowercase L.

‡ You cannot use these sequences on a VT52 terminal.

\$ Keypad numeric mode. Enter sends the same codes as Return. You can use line feed/new line mode (LNM) to change the code sent by Return. When LNM is reset, pressing Return sends one control character (CR). When LNM is set, pressing Return sends two control characters (CR, LF).

## Top-Row Function Keys

Name on Legend Strip	Generic Name	Code Sent	VT300 Mode	VT100, VT52 Modes
Hold Session	(F1)*	—	—	—
Local Print	(F2)*	—	—	—
Set-Up	(F3)*	—	—	—
Switch Session	(F4)*	—	—	—
Break	(F5)*	—	—	—
F6	F6	CSI 17 ~	—	—
F7	F7	CSI 18 ~	—	—
F8	F8	CSI 19 ~	—	—
F9	F9	CSI 20 ~	—	—
F10	F10	CSI 21 ~	—	—
F11 (ESC)	F11	CSI 23 ~	ESC	—
F12 (BS)	F12	CSI 24 ~	BS	—
F13 (LF)	F13	CSI 25 ~	LF	—
F14	F14	CSI 26 ~	—	—
Help	F15	CSI 28 ~	—	—
Do	F16	CSI 29 ~	—	—
F17	F17	CSI 31 ~	—	—
F18	F18	CSI 32 ~	—	—
F19	F19	CSI 33 ~	—	—
F20	F20	CSI 34 ~	—	—

\* F1 through F5 are local function keys that do not send codes.

## Keys Used to Send 7-Bit Controls

Control Character Mnemonic	Key Pressed with Ctrl (All Modes)	Dedicated Function Key
NUL	2 or space bar	—
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 or [	F11 (ESC)*
FS	4 or /	—
GS	5 or ]	—
RS	6 or ~	—
US	7 or ?	—
DEL	8	Delete

\* Keys F11, F12, and F13 send these 7-bit control characters only in VT100 and VT52 modes.

† These keystrokes send control characters only if XOFF support is disabled.

## Local Editing Keys

Interactive Mode	Local Editing Mode	
Name on Top of Key	Name on Front of Key	Local Editing Function
Return	—	If DECLNM is set, sends a block of text to the host.
Find	Home Cursor	Moves the cursor to the top left corner of the scrolling region.
Insert Here	Insert /Overstrike	Switches between insert mode or overstrike mode.
Remove	CLR PAGE* Clear Field	When shifted, erases the characters on the current page. Otherwise erases the characters in a field.
Select	EDIT*	Switches the terminal between interactive mode and local editing mode.
Prev Screen	Prev Page	Displays the previous page in page memory on the screen.
Next Screen	Next Page	Displays the next page in page memory on the screen.
PF1	Tab   <— * —>	Tabs to the next unprotected field or tab stop.  Shift-Tab tabs to the previous unprotected field or tab stop.
PF2	Insert Line	Inserts a line of character positions on the current page.

\* To select this function, you press the Shift key and this key.

## Local Editing Keys (Cont)

Interactive Mode	Local Editing Mode	
Name on Top of Key	Name on Front of Key	Local Editing Function
PF3	Delete Line	Deletes a line of character positions from the current page.
PF4	Delete Char	Deletes a character from the current page.
,	(Space)	Inserts a comma or a space character, depending on the setting of the Keypad Comma feature in the Keyboard Set-Up.
Enter	Transmit	Sends a block of characters to the host.

## 1.4 EMULATING VT SERIES TERMINALS

### Selecting an Operating Level

Sequence	Level Selected
	<i>Level 1</i>
CSI 61 " p	VT100 mode
	<i>Level 3</i>
CSI 62 " p	VT300 mode, 8-bit controls
CSI 62 ; 0 " p	VT300 mode, 8-bit controls
CSI 62 ; 2 " p	VT300 mode, 8-bit controls
CSI 63 " p	VT300 mode, 8-bit controls
CSI 63 ; 0 " p	VT300 mode, 8-bit controls
CSI 63 ; 2 " p	VT300 mode, 8-bit controls
CSI 62 ; 1 " p	VT300 mode, 7-bit controls
CSI 63 ; 1 " p	VT300 mode, 7-bit controls (default)

*NOTE: In VT100 mode, the terminal ignores some control functions. See Table 4-1 in Volume 1.*

*VT300 mode is compatible with all VT200 applications.*

## Sending C1 Controls to the Host

Sequence	Mode Before	Mode After
<i>7-Bit Controls (S7C1T)</i>		
ESC sp F	VT300 mode, 8-bit controls	VT300 mode, 7-bit controls
	VT300 mode, 7-bit controls	Same.
	VT100 mode or VT52 mode	Same.
<i>8-Bit Controls (S8C1T)</i>		
ESC sp G	VT300 mode, 8-bit controls	Same.
	VT300 mode, 7-bit controls	VT300 mode, 8-bit controls
	VT100 mode or VT52 mode	Same.

## National Replacement Character Set Mode (DECNRCM)

Default: Multinational

Mode	Sequence	Function
Set (national)	CSI ? 42 h	The terminal uses 7-bit characters from an NRC set.
Reset (multi- national)	CSI ? 42 l*	The terminal uses 7-bit and 8-bit characters from the DEC Multinational or ISO Latin-1 character set.

\* The last character in the sequence is a lowercase L.

## 1.5 USING CHARACTER SETS

### Character Sets Available

	Level 1 (VT100)	Level 3 (VT300)	
ASCII	Yes	All character sets	
DEC Supplemental Graphic	No	are available.	
ISO Latin-1 supplemental	No		
User-preferred supplemental	No		
National replacement (NRCs)	Yes		
DEC Special Graphic	Yes		
DEC Technical	No		
Soft character sets (DRCS)	No		

### Selecting a Character Set

1. Designate the character set as G0, G1, G2, or G3.
2. Map the character set into GL or GR.

### Designating Character Sets

Use the following sequence format.

#### ESC Intermediate Final

where

Intermediate designates the set as G0, G1, G2, or G3.  
Final selects the character set.

#### Intermediate

#### Final

To Select	Use	To Select	Use
<i>94-Character Sets</i>		ASCII	B
G0	(	DEC Supplemental Graphic	% 5
G1	)	ISO Latin-1 supplemental	A
G2	*	(96 characters)	
G3	+	User-preferred supplemental (VT300 mode only)	<
		DEC Special Graphic	0

Intermediate		Final	
To Select	Use	To Select	Use
<i>For 96-Character Sets</i>			
G1	-	DEC Technical	>
G2	.	<i>National Replacement Character Sets*</i>	
G3	/	British	A
		Dutch	4
		Finnish†	5 or C
		French	R
		French Canadian†	9 or Q
		German	K
		Italian	Y
		Norwegian/Danish†	' or E or 6
		Portuguese	% 6
		Spanish	Z
		Swedish†	7 or H
		Swiss	=

\* Only one national character set is available at a time. You must select national mode to use national character sets.

† Digital recommends using the first code shown.

## Mapping Character Sets

### With Locking Shifts

Locking Shift	Code	Function
LS0 (lock shift G0)	SI	Map G0 into GL. (D)
LS1 (lock shift G1)	SO	Map G1 into GL.

### VT300 Mode Only

LS1R (lock shift G1, right)	ESC ~	Map G1 into GR.
LS2 (lock shift G2)	ESC n	Map G2 into GL.
LS2R (lock shift G2, right)	ESC }	Map G2 into GR.
LS3 (lock shift G3)	ESC o	Map G3 into GL.
LS3R (lock shift G3, right)	ESC	Map G3 into GR.

(D) = default.

### *With Single Shifts*

Single-Shift Control	8-Bit Character	7-Bit Sequence	Function
Single shift G2	SS2	ESC N	Maps G2 into GL for the next character.
Single shift G3	SS3	ESC O	Maps G3 into GL for the next character.

(D) = default.

## **Assign User-Preferred Supplemental Set (DECAUPSS)**

Default: DEC Supplemental Graphic

Sequence	Supplemental Set Assigned
DCS 0 ! u % 5 ST	DEC Supplemental Graphic
DCS 1 ! u A ST	ISO Latin-1 supplemental

## **Announcing ANSI Conformance Levels**

Use the following sequence format.

**ESC sp final**

where

<b>Final</b>	Selects ANSI Conformance Level
<b>L</b>	<b>ANSI Level 1</b> ASCII set designated as G0. ISO Latin-1 supplemental set designated as G1. G0 mapped into GL. G1 mapped into GR.
<b>M</b>	<b>ANSI Level 2</b> ASCII set designated as G0. ISO Latin-1 supplemental designated as G1. G0 mapped into GL. G1 mapped into GR.
<b>N</b>	<b>ANSI Level 3</b> ASCII designated as G0. GO mapped into GL.

## **Soft Character Sets**

You can only load soft character sets in VT300 mode.

## Guidelines for Designing Soft Characters

Character Dimension	80-Column Font	132-Column Font
Cell width	10 pixels	6 pixels
Cell height	20	20
Body width	9	5
Body height	12	12
Ascender height	4	4
Descender height	4	4
Spacing before character	0	0
Spacing after character	1	1

## Converting Binary Code to an ASCII Character

Binary Value	Hex Value	Hex Value + 3F Offset	Character Equivalent
000000	00	3F	?
000001	01	40	@
000010	02	41	A
000011	03	42	B
000100	04	43	C
000101	05	44	D
000110	06	45	E
000111	07	46	F
001000	08	47	G
001001	09	48	H
001010	A	49	I
001011	B	4A	J
001100	C	4B	K
001101	D	4C	L
001110	E	4D	M
001111	F	4E	N
010000	10	4F	O
010001	11	50	P
010010	12	51	Q
010011	13	52	R
010100	14	53	S
010101	15	54	T
010110	16	55	U
010111	17	56	V
011000	18	57	W

## Converting Binary Code to an ASCII Character (Cont)

Binary Value	Hex Value	Hex Value + 3F Offset	Character Equivalent
011001	19	58	X
011010	1A	59	Y
011011	1B	5A	Z
011100	1C	5B	[
011101	1D	5C	\
011110	1E	5D	]
011111	1F	5E	^
100000	20	5F	-
100001	21	60	'
100010	22	61	a
100011	23	62	b
100100	24	63	c
100101	25	64	d
100110	26	65	e
100111	27	66	f
101000	28	67	g
101001	29	68	h
101010	2A	69	i
101011	2B	6A	j
101100	2C	6B	k
101101	2D	6C	l
101110	2E	6D	m
101111	2F	6E	n
110000	30	6F	o
110001	31	70	p
110010	32	71	q
110011	33	72	r
100100	34	73	s
110101	35	74	t
110110	36	75	u
110111	37	76	v
111000	38	77	w
111001	39	78	x
111010	3A	79	y
111011	3B	7A	z
111100	3C	7B	{
111101	3D	7C	
111110	3E	7D	}
111111	3F	7E	~

## Down-Line-Loading a Soft Character Set

Use the following sequence format.

DCS Pfn; Pen; Pe; Pcmw; Psw; Pt; Pcmh; Pcss { Dscs  
Sxbp1; Sxbp2; ...; Sxbpn ST

Parameter Name	Description
Pfn	Font number Selects the DRCS font buffer to load. Pfn = 0 or 1. Both values refer to DRCS buffer 1 for each session.
Pcn	Starting character Selects where to load the first character in the DRCS font buffer. The location corresponds to a location in the ASCII code table.  Example: Pcn = 0 means that the first soft character is loaded into position 2/0 of the character table.  Pcn is affected by the character set size. See Pcss below.
Pe	Erase Selects which characters to erase from control the DRCS buffer before loading the new font.  0 = erase all characters in the DRCS buffer with this number, width and rendition. 1 = erase only characters in locations being reloaded. 2 = erase all renditions of the soft character set (80-column, 132-column).
Pcmw	Character matrix width Selects the maximum character cell width.  <i>VT300 mode</i>  0 = 10 pixels wide for 80 columns, 6 pixels wide for 132 columns. (D) 1 = illegal. 2 = 5 × 10 pixel cell.   VT200 3 = 6 × 10 pixel cell.   compatible 4 = 7 × 10 pixel cell.   5 = 5 pixels wide. 6 = 6 pixels wide.  • • 10 = 10 pixels wide.

(D) = default.

## Down-Line-Loading a Soft Character Set (Cont)

Parameter Name	Description
Pcmw (cont)	If you omit a Pcmw value, the terminal uses the default character width. Any Pcmw value over 10 is illegal.
	Use Pcmw values 2 through 4 with VT200 compatible software. Fonts designed specifically for a VT300 terminal should use values 5 through 10.
Pw	Font Width
	Selects the width of the font.
	0 = 80 columns. (D) 1 = 80 columns. 2 = 132 columns.
Pt	Text or full-cell
	Defines the font as a text font or <i>full-cell font</i> .
	0 = text. (D) 1 = text. 2 = full cell.
Pcmh	Character matrix height
	Selects the maximum character cell height.
	0 or omitted = 20 pixels high. (D) 1 = 1 pixel high. 2 = 2 pixels high. 3 = 3 pixels high.
	20 = 20 pixels high.
	Pcmh values over 20 are illegal. If the value of Pcmw is 2, 3, or 4, Pcmh is ignored.
Pcss	Character set size
	Defines the character set as a 94- or 96-character graphic set.
	0 = 94-character set. (D) 1 = 96-character set.
	The value of Pcss changes the meaning of the Pcn (character number) parameter above.

---

(D) = default.

## Down-Line-Loading a Soft Character Set (Cont)

Parameter Name	Description
<i>Examples</i>	
• If Pcss = 0 (94-character set)	
The terminal ignores any attempt to load characters into the 2/0 or 7/15 table positions if Pcss is 0.	
 <b>Pcn Specifies</b>	
1	column 2/row 1
 <b>94 Specifies</b>	
94	column 7/row 14
• If Pcss = 1 (96-character set)	
 <b>Pcn Specifies</b>	
1	column 2/row 0
 <b>96 Specifies</b>	
96	column 7/row 15

Dscs defines the character set name. You use this name in the select character set (SCS) escape sequence. You use the following format for the Dscs name.

**I I F**

where

I I are zero to two intermediate characters, from the range 2/0 to 2/15 in the ASCII character set.

F is a final character in the range 3/0 to 7/14.

Sxbp1 ; Sxbp2 ;...; Sxbpn are the sixel bit patterns for individual characters, separated by semicolons (3/11). Your character set can have 1 to 94 patterns or 1 to 96 patterns, depending on the setting of the character set size parameter (Pcss). Each sixel bit pattern is in the following format.

**S...S/S...S**

where

the first S...S represents the upper columns of sixels of the soft character.

/ (2/5) advances the sixel pattern to the lower columns of the soft character.

the second S....S represents the lower columns of the soft character.

## **Valid DECDLD Parameter Combinations**

Pcmw	Pt	Pcmh	Pw
------	----	------	----

### *80-Column Fonts*

2 to 9	0, 1	1 to 20	0, 1
2 to 10	2	1 to 20	0, 1

### *132-Column Fonts*

2 to 5	0, 1	1 to 20	2
2 to 6	2	1 to 20	2

## **Clearing a Soft Character Set**

You can clear a soft character set that you loaded into the terminal by using the following DECDLD control string.

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

Any of the following actions also clear the soft character set.

- Performing the power-up self-test.
- Selecting Recall Saved Settings or Recall Factory Default Settings in the Set-Up Directory.
- Using a reset to initial state (RIS) or ESC c sequence.

## **1.6 PAGE MEMORY**

### **Setting the Page Format**

Name	Mnemonic	Sequence
Set columns per page	DECSCPP	CSI Pn \$   Pn columns (80 or 132).
Column mode	DECCOLM	Set: CSI ? 3 h 132 columns.  Reset: CSI ? 3 1* 80 columns. (D)
Set lines per page	DECSLPP	CSI Pn t Pn lines per page. The number of pages depends on how many sessions you use.

Pn	Dual Sessions	Single Session
24	3 pages	6 pages
36	2 pages	4 pages
72	1 page	2 pages
144	—	1 page

---

\* The last character in the sequence is a lowercase L.  
(D) = default.

## Setting the Page Format (Cont)

Name	Mnemonic	Sequence
Origin mode	DECOM	Set: CSI ? 6 h Move within margins.
		Reset: CSI ? 6 l* Move outside margins. (D)
Set top and bottom margins	DECSTBM	CSI Pt ; Pb r Pt = top line. Pb = bottom line.

\* The last character in the sequence is a lowercase L.

(D) = default.

## Moving Through Page Memory

Name	Mnemonic	Sequence*
Next page	NP	CSI Pn U Move Pn pages forward. C = Home.
Preceding page	PP	CSI Pn V Move Pn pages backward. C = Home.
Page position absolute	PPA	CSI Pn sp P Move to page Pn. C = Same as old page.
Page position backward	PPB	CSI Pn sp R Move Pn pages backward. C = Same as old page.
Page position relative	PPR	CSI Pn sp Q Move Pn pages forward. C = Same as old page.

\* The last character in the sequence is a lowercase L.

C = new cursor position.

## 1.7 VISUAL CHARACTER AND LINE ATTRIBUTES

You use the following visual character attribute values with the control functions in this section.

### Visual Character Attribute Values

Ps	Attribute	Mode (VT100, VT300)
0	All attributes off	All
1	Bold	All
4	Underline	All
5	Blinking	All
7	Negative image	All
8	Invisible	VT300 only
22	Bold off	VT300 only
24	Underline off	VT300 only
25	Blinking off	VT300 only
27	Negative image off	VT300 only
28	Invisible off	VT300 only

### Setting Visual Character Attributes

Name	Mnemonic	Sequence
Select graphic rendition	SGR	CSI Ps...Ps m Ps = character attribute value(s)

### Setting Line Attributes

Name	Mnemonic	Sequence	
Single-width, single-height line	DECSWL	ESC # 5	
Double-width, single-height line	DECDSL	ESC # 6	
Double-width, double height line	DECDSHL	ESC # 3 ESC # 4	Top half Bottom half

## 1.8 EDITING

### Editing Sequences

Name	Mnemonic	Sequence
Erasure mode	ERM	<b>Set: CSI 6 h</b> You can edit all characters. (D)  <b>Reset: CSI 6 l*</b> You can only edit unprotected characters.
Insert/ replace mode	IRM	<b>Set: CSI 4 h</b> Insert characters.  <b>Reset: CSI 4 l*</b> Replace characters.
Delete line	DL	<b>CSI Pn M</b> Pn lines.
Insert line	IL	<b>CSI Pn L</b> Pn lines.
Delete character	DCH	<b>CSI Pn P</b> Pn characters.
Insert character†	ICH	<b>CSI Pn @</b> Pn characters.
Erase in display	ED	<b>CSI Ps J</b> Ps = 0, cursor to end. (D) Ps = 1, beginning to cursor. Ps = 2, complete display.
Erase in line	EL	<b>CSI Ps K</b> Ps = 0, cursor to end. (D) Ps = 1, beginning to cursor. Ps = 2, complete line.
Erase character†	ECH	<b>CSI Pn X</b> Pn characters.
Selective erase in display†	DECSED	<b>CSI ? Ps J</b> Ps = 0, cursor to end. (D) Ps = 1, beginning to cursor. Ps = 2, complete display.
Selective erase in line†	DECSEL	<b>CSI ? Ps K</b> Ps = 0, cursor to end. (D) Ps = 1, beginning to cursor. Ps = 2, complete line.

\* The last character in the sequence is a lowercase L.

† Available in VT300 mode only.

(D) = default.

## Character Protection

Name	Mnemonic	Sequence
<b>Independent Protection</b>		
Select character attribute*	DECSCA	CSI Ps " q Ps = 0 or 2, unprotected. (D) Ps = 1, protected.
Start protected area	SPA	8-bit: SPA 7-bit: ESC V
End protected area	EPA	8-bit: EPA 7-bit: ESC W

### Visual Attribute Protection (For Local Editing Only)

Protected fields attribute	DECPRO	CSI Ps } Ps = character attribute value. See "Setting Visual Character Attributes."
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\* Available in VT300 mode only.  
(D) = default.

## 1.9 LOCAL EDITING

### Local Editing Sequences

Name	Mnemonic	Sequence
Edit mode	DECEDM	Set: CSI ? 10 h Edit mode.  Reset: CSI ? 10 l* Interactive mode.
Edit key execution mode	DECEKEM	Set: CSI ? 16 h Immediate. (D)  Reset: CSI ? 16 l* Deferred.
Line transmit mode	DECLTM	Set: CSI ? 11 h Line.  Reset: CSI ? 11 l* Page. (D)
Transmit termination mode	TTM	Set: CSI 16 h Scrolling region. (D)  Reset: CSI 16 l* Partial page.

\* The last character in the sequence is a lowercase L.  
(D) = default.

## Local Editing Sequences Summary (Cont)

Name	Mnemonic	Sequence
VT131 transmit mode	DEC131TM	Set: CSI ? 53 h VT131.  Reset: CSI ? 53 l* ANSI. (D)
Guarded area transfer mode	GATM	Set: CSI 1 h All characters. (D)  Reset: CSI 1 l* Unprotected characters.
Selected area transfer mode	SATM	Set: CSI 17 h All characters. (D)  Reset: CSI 17 l* Selected characters.
Multiple area transfer mode	MATM	Set: CSI 15 h All characters. (D)  Reset: CSI 15 l* Area with cursor.
Start selected area	SSA	8-bit: SSA 7-bit: ESC F
End selected area	ESA	8-bit: ESA 7-bit: ESC G
Set transmit termination character	DECTTC	<i>Normal</i> CSI Ps   Ps = end-of-block character. Omitted by default. 0 = no character. 1 = FF (form feed). 2 = ETX (end of text). 3 = EOT (end of transmission). 4 = CR (carriage return). 5 = DC3 (XOFF).
		<i>Extended</i> CSI ? Pn1;...; Pn6   Pn1;...;Pn6 = decimal code of end-of-block character(s).
Transmit line termination characters	DECTLTC	CSI ? Pn1;...;Pn6 's Pn1;...;Pn6 = decimal code of end-of-line character(s). Default is CR.

\* The last character in a sequence is lowercase L.

(D) = default.

### Local Editing Sequences Summary (Cont)

Name	Mnemonic	Sequence
Space compression mode	DECSCFDM	Set: CSI ? 13 h No spaces.
		Reset: CSI ? 13 l* Spaces. (D)
Transmit execution mode	DECTEM	Set: CSI ? 14 h Immediate. (D)
		Reset: CSI ? 14 l* Deferred.
Set transmit state	STS	ESC S From VT300 when DECTEM reset.
Transmit	DECXMIT	ESC 5 From host.

\* The last character in the sequence is a lowercase L.

(D) = default.

### Defining the Character Block Size for Transmission

Block Size	Line Transmit Mode (LTM)	Transmit Termination Mode (TTM)	VT131 Transmit Mode (DEC131TM)
Line	Set	—	—
VT131 partial page	Reset	Reset	Set
ANSI partial page	Reset	Reset	Reset
Scrolling region	Reset	Set	—

### Selecting Character Fields for Transmission

Fields Selected	Guarded Area Transfer Mode (GATM)	Selected Area Transfer Mode (SATM)	Multiple Area Transfer Mode (MATM)
All fields	Set	Set	Not available
Unprotected fields only	Reset	Set	Not available
Selected fields only	Set	Reset	Set
Selected field with cursor only	Set	Reset	Reset
Unprotected and selected fields	Reset	Reset	Set
Unprotected fields and selected field with cursor	Reset	Reset	Reset

## 1.10 CURSOR MOVEMENT AND PANNING

### Cursor Sequences

Name	Mnemonic	Sequence
<b>Enabling the Cursor</b>		
Text cursor enable mode	DECTCEM	Set: CSI ? 25 h Visible cursor (D)
		Reset: CSI ? 25 l* Invisible cursor

In the following sequences, the default value for Pn, Pl, and Pc is 1.

### Moving the Cursor

Cursor position	CUP	CSI Pl ; Pe H Line Pl, column Pc.
Horizontal and vertical position	HVP	CSI Pl ; Pe f Line Pl, column Pc. (Digital recommends CUP instead.)
Cursor forward	CUF	CSI Pn C Pn columns right.
Cursor backward	CUB	CSI Pn D Pn columns left.
Cursor up	CUU	CSI Pn A Pn lines up.
Cursor down	CUD	CSI Pn B Pn lines down.

---

\* The last character in the sequence is a lowercase L.  
(D) = default.

### Panning

Name	Mnemonic	Sequence
Pan down	SU	CSI Pn S Pn lines down.
Pan up	SD	CSI Pn T Pn lines up.
Pan right	SL	CSI Pn sp @ Pn columns right.
Pan left	SR	CSI Pn sp A Pn columns left.

## Panning (Cont)

Name	Mnemonic	Sequence
Horizontal cursor coupling mode	DECHCCM	Set: CSI ? 60 h Coupled  Reset: CSI ? 60 l* Uncoupled (D)
Vertical cursor coupling mode	DECVCCM	Set: CSI ? 61 h Coupled (D)  Reset: CSI ? 61 l* Uncoupled
Page cursor coupling mode	DECPCCM	Set: CSI ? 64 h Coupled (D)  Reset: CSI ? 64 l* Uncoupled

\* The last character in the sequence is a lowercase L.

(D) = default.

## 1.11 KEYBOARD, PRINTING, AND DISPLAY SEQUENCES

### Keyboard Control Sequences

Mode	Mnemonic	Sequence	
		Set	Reset
Keyboard action	KAM	CSI 2 h Locked.	CSI 2 l* Unlocked. (D)
Backarrow key	DECBKM	CSI ? 67 h Backspace.	CSI ? 67 l* Delete. (D)
Line feed/ new line	LNM	CSI 20 h New line.	CSI 20 l* Line feed. (D)
Autorepeat	DECARM	CSI ? 8 h Repeat. (D)	CSI ? 8 l* No repeat.
Autowrap	DECAWM	CSI ? 7 h Autowrap.	CSI ? 7 l* No autowrap.(D)
Cursor keys	DECCKM	CSI ? 1 h Application.	CSI ? 1 l* Cursor. (D)
Keypad application/ numeric	DECKPAM DECKPNM	ESC = Application.	ESC > Numeric. (D)

\* The last character in the sequence is a lowercase L.

(D) = default.

#### **Keyboard Control Sequences (Cont)**

Mode	Mnemonic	Sequence	
		Set	Reset
Numeric keypad	DECNKM	CSI ? 66 h Application.	CSI ? 66 l* Numeric. (D)
Keyboard usage	DECKBUM	CSI ? 68 h Data processing.	CSI ? 68 l* Typewriter. (D)

\* The last character in the sequence is a lowercase L.

(D) = default.

Programming UDKs

## Definable Keys

**F6 through F14**      **Help (F15)**  
**Do (F16)**      **F17 through F20**

## **DECUDK Device Control String Format**

DCS Pc ; Pl | Ky1/St1;...Kyn/Stn ST

where

**Pc** is the *clear parameter*

**0 or none** = Clear all keys before loading new values.  
(default)

1 = Clear one key at a time, before loading a new value.

**P1** is the *lock parameter*

**0 or none** = Lock the keys.

**1** = Do not lock the keys. (default)

Ky1/St1;...Kyn/Stn are the *key definition strings*.

The key selector number (Kyn) indicates which key you are defining.

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

The string parameters (Stn) are the key definitions, encoded as pairs of hex codes.

3/0 through 3/9 (0 through 9)  
4/1 through 4/6 (A through F)  
6/1 through 6/6 (a through f)

## Printing Control Sequences

Name	Mnemonic	Sequence
Printer extent mode	DECPEX	Set: CSI ? 19 h Page. (D)  Reset: CSI ? 19 l* Scrolling region.
Print form feed mode	DECPFF	Set: CSI ? 18 h Form feed.  Reset: CSI ? 18 l* No form feed. (D)
Auto print mode	MC	On: CSI ? 5 i Off: CSI ? 4 i
Printer controller mode	MC	On: CSI 5 i Off: CSI 4 i
Print page	MC	CSI i or CSI 0 i
Print composed main display	MC	CSI ? 10 i
Print all pages	MC	CSI ? 11 i
Print cursor line	MC	CSI ? 1 i
Start printer-to-host session	MC	CSI ? 9 i
Stop printer-to-host session	MC	CSI ? 8 i
Assign printer to active session	MC	CSI ? 18 i
Release printer	MC	CSI ? 19 i

\* The last character in the sequence is a lowercase L.  
(D) = default.

## Screen Display Control Sequences

Name	Mnemonic	Sequence
Send/receive mode	SRM	Set: CSI 12 h Local echo off. (D)
		Reset: CSI 12 I* Local echo on.
Screen mode	DECSCNM	Set: CSI ? 5 h Light background.
		Reset: CSI ? 5 I* Dark background. (D)
Select text/ graphics look-up table	DECSTGLT	CSI Ps ) }
		Ps = 0, monochrome color map look-up table.
		Ps = 1, color-1 color map look-up table.
		Ps = 2, color-2 color map look-up table.
Scrolling mode	DECSCLM	Set: CSI ? 4 h Smooth scroll. (D)
		Reset: CSI ? 4 I* Jump scroll.
Select active status display†	DECSASD	CSI Ps \$ } Ps = 0, main display. Ps = 1, status line.
Select status line type†	DECSSDT	CSI Ps \$ ~ Ps = 0, none. Ps = 1, indicator. Ps = 2, host-writable.

\* The last character in the sequence is a lowercase L.

† Available in VT300 mode only.

(D) = default.

## 1.12 VT300 REPORTS

### Primary Device Attributes

Name	Mnemonic Sequence
Primary DA request (Host to VT300)	DA CSI c or CSI 0 c
Primary DA response (VT300 to host)	CSI ? Psc; Ps1; ... Psn c
	Psc = operating level. 61 = level 1 (VT100 family). 62,63 = level 3 (VT300 family).*
	Ps1...Psn = extensions. 1 = 132 columns. 2 = printer port. 3 = ReGIS graphics. 4 = pixel graphics. 6 = selective erase. 7 = soft character set. 8 = user-defined keys. 9 = NRC sets. 13 = local editing mode. 15 = DEC technical set. 16 = locator device port. 18 = user windows. 19 = dual sessions.

\* The VT300 send all the Ps extensions listed.

### Alias Primary DA Responses From the VT300\*

Terminal	Identification Sequence	Meaning
VT100 DA	ESC [ ? 1; 2 c	VT100 terminal
VT101 DA	ESC [ ? 1; 0 c	VT101 terminal
VT102 DA	ESC [ ? 6 c	VT102 terminal
VT125 DA	ESC [ ? 12; 7; 1; 10; 102 c	VT125 terminal
VT131 DA	ESC [ ? 7 c	VT131 terminal
VT220 DA	CSI ? 62; 1; 2; 6; 7; 8; 9 c	VT220 terminal
VT240 DA	CSI ? 62; 1; 2; 3; 4; 6; 7; 8; 9 c	VT240 terminal

\* To change these alias responses, you must use the General Set-Up screen. See Chapter 5 of *Installing and Using the VT330/VT340 Video Terminal*.

## **Secondary Device Attributes**

Name	Mnemonic	Sequence
Secondary DA request (Host to VT300)	DA	CSI > c or CSI > 0 c
Secondary DA response (VT300 to host)	DA	CSI > Pp; Pv; Pc c Pp = identification code. 18 = VT330 terminal. 19 = VT340 terminal.  Pv = firmware version.  Pc = ROM cartridge registration.

## **Device Status Reports**

Name	Mnemonic	Sequence
------	----------	----------

### **VT300 Operating Status**

Request (Host to VT300)	DSR	CSI 5 n
Report (VT300 to host)	DSR	CSI 0 n No malfunction.  CSI 3 n Malfunction.

### **Cursor Position Report**

Request (Host to VT300)	DSR	CSI 6 n
Report (VT300 to host)	CPR	CSI Pl; Pc R Pl = line number. Pc = column number.

### **Extended Cursor Position Report**

Request (Host to VT300)	DSR	CSI ? 6 n
Report (VT300 to host)	DECXCPR	CSI Pl; Pc; Pp R Pl = line number. Pc = column number. Pp = page number.

## Device Status Reports (Cont)

Name	Mnemonic	Sequence
<b>Printer Port</b>		
Request (Host to VT300)	DSR	CSI ? 15 n
Report (VT300 to host)	DSR	CSI ? 13 n No printer.  CSI ? 10 n Printer ready.
		CSI ? 11 n Printer not ready.
		CSI ? 18 n Printer busy.
		CSI ? 19 n Printer assigned to other session.
<b>UDK Status (VT300 Mode Only)</b>		
Request (Host to VT300)	DSR	CSI ? 25 n
Report (VT300 to host)	DSR	CSI ? 20 n UDKs unlocked.  CSI ? 21 n UDKs locked.
<b>Keyboard Dialect</b>		
Request (Host to VT300)	DSR	CSI ? 26 n
Report (VT300 to host)	DSR	CSI ? 27; Pla; Pst n Pla = keyboard dialect. 1 = North American. 2 = British. 3 = Flemish. 4 = French Canadian. 5 = Danish. 6 = Finnish. 7 = German.

## Device Status Reports (Cont)

Name	Mnemonic	Sequence
	Pla	= keyboard dialect. (cont)
8		= Dutch.
9		= Italian.
10		= Swiss French.
11		= Swiss German.
12		= Swedish.
13		= Norwegian.
14		= French/Belgian.
15		= Spanish.
16		= Portuguese.
	Pst	= Keyboard status.
0		= Keyboard ready.
3		= No keyboard.
8		= Keyboard busy.

## Locator Device Status (VT300 Mode Only)

Request (Host to VT300)	DSR	CSI ? 55 n
Report (VT300 to host)	DSR	CSI ? 53 n No locator device.  CSI ? 50 n Locator device ready.  CSI ? 51 n Locator device not ready.  CSI ? 58 n Locator device busy.

## Locator Device ID (VT300 Mode Only)

Request (Host to VT300)	DSR	CSI ? 56 n
Report (VT300 to host)	DSR	CSI ? 57; 0 n Unknown device.  CSI ? 57; 1 n Digital's mouse.  CSI ? 57; 2 n Digital's tablet.

## Terminal State Reports (VT300 Mode Only)

Name	Mnemonic	Sequence
Request (Host to VT300)	DECRQTSR	CSI Ps \$ u Ps = report requested. 0 = ignored. 1 = terminal state report. 2 = color table report.
Terminal state report (VT300 to host)	DECTSR	DCS 1 \$ s D..D ST D...D = report data.
Color table report (VT300 to host)	DECCTR	DCS 2 \$ s D...D ST D...D = color data in groups of five (Pc, Pu, Px, Py, Pz).
		Pc = color number (0 to 255). Pu = color coordinate system. 1 = HLS (hue, lightness, saturation). 2 = RGB (red, green, blue).  HLS Values      RGB Values
	Px = 0 to 360	0 to 100 (hue              (red angle)            intensity))
	Py = 0 to 100	0 to 100 (lightness)      (green intensity))
	Pz = 0 to 100	0 to 100 (saturation)      (blue intensity))
Restore	DECRSTS	DCS Ps \$ p D...D ST Ps = data string format. 0 = error. 1 = terminal state report. 2 = color table report. D...D = restored data.

## Presentation State Reports (VT300 Mode Only)

Name	Mnemonic	Sequence
Request (Host to VT300)	DECRQPSR	CSI Ps \$ w Ps = report requested. 0 = error. 1 = cursor information report. 2 = tab stop report.
Cursor information report (VT300 to host)	DECCIR	DCS 1 \$ u D...D ST D..D = data string below.
		Pr; Pc; Pp; Srend; Satt; Sflag; Pgl; Pgr; Scss; Sdesig Pr = cursor's line number. Pc = cursor's column number. Pp = current page number. Srend = visual attributes. (Table 1) Satt = character protection attributes. (Table 2) Sflag = flags and modes the terminal must save. (Table 3)
		Pgl = logical character set (G0 through G3) mapped into GL. 0 = G0. 1 = G1. 2 = G2. 3 = G3.
		Pgr = logical character set (G0 through G3) mapped into GR. 0 = G0. 1 = G1. 2 = G2. 3 = G3.
		Scss = size of character sets in G0 through G3. (Table 4)
		Sdesig = string of intermediate and final characters indicating the character sets designated as G0 through G3.
Tab stop report (VT300 to host)	DECTABSR	DCS 2 \$ u D...D ST D...D = tab stops.
Restore	DECRSPS	DCS Ps \$ t D...D ST Ps = data string format. 0 = error. 1 = cursor information report. 2 = tab stop report. D...D = data string.

**Table 1 Srend Values**

Bit	Attribute	Bit Value
8	—	Always 0 (off).
7	—	Always 1 (on).
6	Extension indicator	1 = another character (byte) of visual attribute data follows this one. 0 = no more attribute data.
5	Invisible	0 = off. 1 = on.
4	Negative image	0 = off. 1 = on.
3	Blinking	0 = off. 1 = on.
2	Underline	0 = off. 1 = on.
1	Bold	0 = off. 1 = on.

*Example*

If the bold and underline attributes are the current writing renditions, Srend is the ASCII uppercase C character (binary 01000011).

**Table 2 Satt Values**

Bit	Attribute	Bit Value
8	—	Always 0 (off).
7	—	Always 1 (on).
6	Extension	1 = another character (byte) of selective erase attribute data follows this one. 0 = no more selective erase data.
5	—	0 = Reserved for future use.
4	—	0 = Reserved for future use.
3	—	0 = Reserved for future use.
2	—	0 = Reserved for future use.
1	Selective erase (DECSCA)	0 = off. 1 = on.

*Example*

If the selective erase attribute is on for writing, then Satt is the ASCII uppercase A character (binary 01000001).

**Table 3 Sflag Values**

Bit	Attribute	Bit Value
8	—	Always 0 (off).
7	—	Always 1 (on).
6	Extension	1 = another character (byte) of indicator flag data follows this one. 0 = no more flag data.
5	—	Reserved for future use.
4	Autowrap	1 = autowrap pending. 0 = autowrap not pending.
3	Single shift 3 (SS3)	1 = G3 is mapped into GL for the next typed character setting only. 0 = single shift 3 is off.
2	Single shift 2 (SS2)	1 = G2 is mapped into GL for the next typed character setting only. 0 = single shift 2 is off.
1	Origin mode	1 = origin mode set. 0 = origin mode reset.

*Example*

If origin mode is set, auto wrap is pending, and a single shift 3 has been received, then Sflag is the ASCII upper case M character (binary 01001101).

**Table 4 Scss values**

Bit	Indicates	Bit Value
8	—	Always 0 (off)
7	—	Always 1 (on)
6	Extension	1 = another character (byte) of character size data follows this one. 0 = no more size data.
5	—	0 = reserved for future use.
4	G3 set size	0 = 94 characters. 1 = 96 characters.
3	G2 set size	0 = 94 characters. 1 = 96 characters.
2	G1 set size	0 = 94 characters. 1 = 96 characters.
1	G0 set size	0 = 94 characters. 1 = 96 characters.

**Example**

Suppose the following conditions exist.

- ISO Latin-1 supplemental is designated as G2 and G3.
- ASCII is designated as G0 and G1.

Then Scss is the backslash ASCII \ character (binary 01001100).

**Mode Settings (VT300 Mode Only)**

Name	Mnemonic	Sequence
Request mode (Host to VT300)	DECRQM	CSI Pa \$ p Pa = ANSI mode. (Table 5)
		CSI ? Pd \$ p Pd = DEC private mode. (Table 6)
Report mode (VT300 to host)	DECRPM	CSI Pa; Ps \$ y Pa = ANSI mode. (Table 5)  Ps = mode state. 0 = unknown mode. 1 = set. 2 = reset. 3 = permanently set. 4 = permanently reset.

## Mode Settings (VT300 Mode Only) (Cont)

Name	Mnemonic Sequence
Set mode	SM      CSI Pa; ... Pa h Pa = ANSI mode(s). (Table 5)
	CSI ? Pd; ... Pd h Pd = DEC private mode(s). (Table 6)
Reset mode	RM      CSI Pa; ... Pa l Pa = ANSI mode(s). (Table 5)
	CSI ? Pd; ... Pd l Pd = DEC private mode(s). (Table 6)

**Table 5 ANSI Modes for DECRQM, DECRPM, SM, and RM**

*NOTE: This table shows only the modes that can change.*

Mode	Mnemonic	Pa
Guarded area transfer	GATM	1
Keyboard action	KAM	2
Control representation	CRM*	3
Insert/replace	IRM	4
Erasure	ERM	6
Horizontal editing	HEM†	10
Send/receive	SRM	12
Multiple area transfer	MATM	15
Transmit termination	TTM	16
Selected area transfer	SATM	17
Line feed/new line	LNM	20

\* The host cannot change the setting of CRM. You can only change CRM from set-up. If CRM is set, the terminal ignores DECRQM and most other control functions.

† This mode is permanently reset.

**Table 6 DEC Private Modes for DECRQM, DECRPM,  
SM and RM**

Mode	Mnemonic	Pd
Cursor keys	DECCKM	1
ANSI	DECANM	2
Column	DECCOLM	3
Scrolling	DECSCLM	4
Screen	DECSCNM	5
Origin	DECOM	6
Autowrap	DECAWM	7
Autorepeat	DECARM	8
Edit	DECEDM	10
Line transmit	DECLTM	11
Space compression	DECSCFDM	
		13
field delimiter		
Transmit execution	DECTEM	14
Edit key execution	DECEKEM	16
Print form feed	DECPFF	18
Printer extent	DECPEX	19
Text cursor enable	DECTCEM	25
4010/4014 emulation	DECTEK	38
National replacement character set	DECNRCM	42
Graphics expanded print	DECGEPM	43
Graphics print color	DECGPCM	44
Graphics print color syntax	DECGPCS	45
Graphics print background	DECGPBM	46
Graphics rotated print	DECGRPM	47
VT131 transmit	DEC131TM	53
Horizontal cursor coupling	DECHCCM	60
Vertical cursor coupling	DECVCCM	61
Page cursor coupling	DECPCCM	64
Numeric keypad	DECNKM	66
Backarrow key	DECBKM	67
Keyboard usage	DECKBUM	68
Transmit rate limiting	DECXRLM	73
Sixel display mode	DECSDM	80

## Other Control Function Settings (VT300 Mode Only)

Name	Mnemonic	Sequence
Request (Host to VT300)	DECRQSS	DCS \$ q D...D ST D...D = intermediate and/or final characters of function. (Table 7)
Report (VT300 to host)	DECRPSS	DCS Ps \$ r D...D ST Ps = 0, valid request. Ps = 1, invalid request.  D...D = intermediate and/or final characters of function. (Table 7)

Table 7 Control Functions for DECRQSS Requests

Control Function	Mnemonic	Intermediate and Final Character(s)
Protected fields attributes	DEC PRO	}
Select active status display	DECS ASD	\$ }
Set character attribute	DEC SCA	" q
Set conformance level	DEC SCL	" p
Set columns per page	DEC SCPP	\$
Set lines per page	DEC SLPP	t
Set status line type	DEC SSDT	\$ ~
Set top and bottom margins	DEC STBM	r
Set transmit termination character(s)	DEC TTC	
Transmit line termination character(s)	DEC TLTC	' s
Select graphic rendition	SGR	m

## Saving and Restoring the Cursor State

Name	Mnemonic	Sequence
Save cursor state	DECSC	<b>ESC 7</b> Saves: <ul style="list-style-type: none"><li>• Cursor position</li><li>• Visual attributes</li><li>• Characters sets in GL and GR</li><li>• Autowrap setting</li><li>• Origin mode (DECOM) setting</li><li>• Selective erase attribute</li><li>• Any single shift 2 or 3 (SS2 or SS3) sent.</li></ul>
Restore cursor state	DECRC	<b>ESC 8</b> Restores DECSC settings. If nothing was saved: <ul style="list-style-type: none"><li>• Moves cursor to home position.</li><li>• Turns visual attributes off (normal attribute).</li><li>• Resets origin mode (DECOM).</li><li>• Turns selective erase attribute off.</li><li>• Maps ASCII set into GL, and DEC Supplemental Graphic into GR.</li></ul>

## Window Reports (VT300 Mode Only)

Name	Mnemonic	Sequence
Request (Host to VT300)	DECRQDE	<b>CSI " v</b>
Report (VT300 to host)	DECRPDE	<b>CSI Ph; Pw; Pml; Pmt; Pmp " w</b> Ph = number of lines. Pw = number of columns. Pml = leftmost column. Pmt = top line. Pmp = page number.

## User-Preferred Supplemental Set (VT300 Mode)

Request (Host to VT300)	DECRQUPSS	<b>CSI &amp; u</b>
Report (VT300 to host)	DECAUPSS	<b>DCS 0 ! u % 5 ST</b> DEC Supplemental Graphic <b>DCS 1 ! u A ST</b> ISO Latin-1 supplemental

## 1.13 RESETTING SEQUENCES

Name	Mnemonic	Sequence
<b>Resetting the Terminal</b>		
Soft terminal reset*	DECSTR	CSI ! p Affects functions in Table 8.
Hard terminal reset	RIS	ESC c Not recommended.
Tabulation clear	TBC	CSI 0 g Clear tab at cursor position.
		CSI 3 g Clear all tabs.

\* VT300 mode only

**Table 8 Soft Terminal Reset (DECSTR) States**

Mode	Mnemonic	State After DECSTR
Text cursor enable	DECTCEM	Cursor enabled.
Insert/replace	IRM	Replace.
Origin	DECOM	Absolute (cursor origin at upper-left of screen).
Autowrap	DECAWM	No autowrap.
National replacement character set	DECNRCM	Multinational set.
Keyboard action	KAM	Unlocked.
Numeric keypad	DECNKM	Numeric characters.
Cursor keys	DECCKM	Normal (arrow keys).
Edit	DECEDM	Interactive. (No change if set to "unavailable" in Local Editing Set-Up.)

**Table 8 Soft Terminal Reset (DECSTR) States (Cont)**

Mode	Mnemonic	State After DECSTR
Edit key execution	DECEKEM	Immediate.
Transmit execution	DECTEM	Immediate.
Erasure	ERM	All characters.
Guarded area transfer	GATM	All characters.
Multiple area transfer	MATM	All selected areas.
Selected area transfer	SATM	All areas.
VT131 transmit	DEC131TM	On (VT131).
Line transmit	DECLTM	Off (page or partial page).
Transmit termination	TTM	Scrolling region.
<b>Other Control Functions</b>		
Set top and bottom margins	DECSTBM	Top margin = 1. Bottom margin = page length.
All character sets	G0, G1, G2, G3, GL, GR	VT300 default settings. (DECSTR works only in VT300 mode.)
Select graphic rendition	SGR	Normal rendition.
Select character attribute	DECSCA	Normal (erasable by DECSEL and DECSAD).
Start selected area	SSA	Cleared.
End selected area	ESA	Cleared.
Start protected area	SPA	Cleared.
End protected area	EPA	Cleared.
Save cursor state	DECSC	Home position with VT300 defaults.
Assign user-preferred supplemental set	DECAUPSS	Set selected in set-up.
Select active display	DECSASD	Main display (first 24 lines).

## 1.14 SESSION MANAGEMENT

You can use the following control function to switch sessions.

Enable session: CSI & x

### 1.A VT52 MODE

Sequence	Action
CSI ? 2 l*	Enter VT52 mode.
ESC <	Exit VT52 mode. (Enter VT100 mode.)
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 position.
ESC I	Reverse line feed.
ESC J	Erase from cursor to end of screen.
ESC K	Erase from cursor to end of line.
ESC Y Pn	Move cursor to column Pn.
ESC Z	Identify. (host to terminal)
ESC / Z	Report. (terminal to host)
ESC =	Enter alternate keypad mode.
ESC >	Exit alternate keypad mode.
ESC ^	Enter autoprint mode.
ESC _	Exit autoprint mode.
ESC \ W	Enter printer controller mode.
ESC X	Exit printer controller mode.
ESC ]	Print screen.
ESC V	Print the line with the cursor.

\* The last character in the sequence is a lowercase L.

### 1.B COMMUNICATION

Name	Mnemonic	Sequence
Transmit rate limiting mode	DECXRLM	CSI ? 7 3 h Limited to 180 characters per second.
		CSI ? 7 3 l* Unlimited speed.

\* The last character in the sequence is a lowercase L.



## **PART 2**

# **GRAPHICS PROGRAMMING**

## 2.1 INTRODUCTION TO REGIS

### ReGIS Command Summary

#### Command ReGIS

Letter	Command	Description
S	Screen	Provides screen controls, such as erasing the screen.
W	Write	Provides writing controls, such as writing shades.
P	Position	Moves the graphics cursor without performing any writing.
V	Vector	Draws vectors (straight lines) between the screen locations you specify in the command.
C	Curve	Draws circles and arcs, using the screen locations you specify in the command.
T	Text	Controls the display of text strings in graphics, and lets you specify characters to display.
L	Load	Defines and loads alternate characters you can display with the text command.
@	Macrograph	Defines a command string as a macrograph. You use macrographs to store and recall other ReGIS command strings.
R	Report	Reports information such as the active position and error codes.
F	Polygon Fill	Fills in a single closed figure, such as a circle or square.
:	Resynchronization	Resynchronizes the flow of ReGIS command strings to the beginning of a new command.

## Entering and Exiting ReGIS

You use device control strings to enter and exit ReGIS.

*NOTE: You can enter ReGIS from VT100 or VT300 mode.*

8-Bit DCS String	7-Bit Equivalent Escape Sequence	Meaning
DCS p or DCS 0p	ESC Pp or ESC P0p	Enters ReGIS at the point where ReGIS was last exited. Does not display commands.
DCS 1p	ESC P1p	Enters ReGIS at the command level. ReGIS begins at a new command. Does not display commands.
DCS 2p	ESC P2p	Enters ReGIS at the point where ReGIS was last exited. Displays commands on the screen's bottom line (command display mode).
DCS 3p	ESC P3p	Enters ReGIS at the command level. ReGIS begins at a new command. Displays commands on the screen's bottom line (command display mode).
ST	ESC \	Exits ReGIS mode.

## ReGIS Power-Up/Reset Default Values Summary

Type	Default Command	Default Setting
<b>Screen Controls</b>		
Screen coordinates	S(A[0,0][799,479])	Upper-left corner is [0,0]. Lower-right corner is [799,479].
Scrolling	S[0,0]	No scrolling.
Printing offset	S(H(P[50,0]))	Any printing from the screen is offset 50 coordinates at the printer, to approximate centering on 8-1/2 inch wide paper.

## ReGIS Power-Up/Reset Default Values (Cont)

Type	Default Command	Default Setting	
Mono-chrome output mapping	S(M0(L0)1(L33) 2(L67)3(L100))	VT330 output map values	
		M0 black	M2 light gray
		M1 dim gray	M3 white
	S(M0(L0)1(L4) 2(L10)3(L17) 4(L24)5(30) 6(L37)7(44) 8(L50)9(L57) 10(L64)11(L70) 12(L77)13(L84) 14(L90)15(97))	VT340 output map values	
		M0 black	M8 black
		M1 gray-2	M9 gray-2
		M2 gray-4	M10 gray-4
		M3 gray-6	M11 gray-6
		M4 gray-1	M12 gray-1
		M5 gray-3	M13 gray-3
		M6 gray-5	M14 gray-5
		M7 white	M15 white
Color output mapping	S(M0(AD)1(AB) 2(AR)3(AG) 4(AM)5(AC) 6(AY)7(AW) 8(AD)9(AB) 10(AR)11(AG) 12(AM)13(AC) 14(AY)15(AW))	VT340 output map values	
		M0 black	M8 gray 25%
		M1 blue	M9 blue
		M2 red	M10 red
		M3 green	M11 green
		M4 magenta	M12 magenta
		M5 cyan	M13 cyan
		M6 yellow	M14 yellow
		M7 gray 50%	M15 gray 75%
Background S(I0) intensity		Output map location M0 is used for background. The default value for M0 is black for color and monochrome.	
Display graphics page	S(P0)	Displays the first graphics page.	
<b>Write Controls</b>			
Pixel vector multiplier	W(M1)	PV multiplication factor is 1.	
Writing pattern	W(P1)	Solid line.	
Pattern multiplier	W(P(M2))	Pattern multiplication factor is 2.	
Negative pattern	W(N0)	Disabled.	

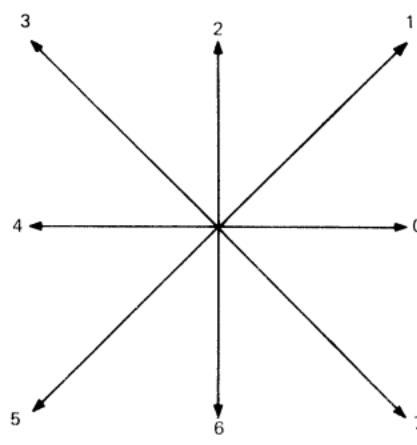
## ReGIS Power-Up/Reset Default Values (Cont)

Type	Default Command	Default Setting
Bitmap planes	VT330: W(F3) VT340: W(F15)	Writing enabled to all bitmap planes.
Foreground intensity	VT330: W(I3) VT340: W(I7)	The VT330 uses output map location M3. The VT340 uses output map location M7.
Overlay writing	W(V)	On.
Shading	W(S0)	Off.
<b>Text</b>		
Character set	T(A0)	ISO Latin Alphabet Nr 1 character set.
Character cell	T(S1)	Standard character cell size 1.
Display cell	T(S[9,20])	Display cell size associated with standard character cell size 1.
Unit cell	T(U[8,20])	Unit cell size associated with standard character cell size 1.
Character positioning	T[+9,+0]	Character positioning associated with standard character cell size 1.
Height multiplier	T(H2)	Multiplication factor of 2.
Tilt	T(D0 S1 D0)	String and character tilt off.
Italics	T(I0)	Off.
Size multiplier	T(M[1,2])	Multiplication factor of 1 for width and 2 for height.
<b>Load</b>		
Character set	L(A1)	Character set 1 selected for loading.

## Resynchronization Command (;)

ReGIS recognizes a semicolon (;) as a command to resynchronize. If you think errors are occurring in your program, you can use the semicolon between command strings to return to the command level.

## **Pixel Vector (PV) Directions**



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## **2.2 SCREEN CONTROL COMMAND**

### **VT330 Default Monochrome Map**

Map Location	Default Shade	HLS Values			RGB Values		
		H	L	S	R	G	B
0	Black	0	0	0	0	0	0
1	Dark gray	0	50	100	0	0	100
2	Light gray	120	50	100	100	0	0
3	White	240	50	100	0	100	0

### **VT340 Default Monochrome Map**

Map Location	Default Shade	HLS Values			RGB Values		
		H	L	S	R	G	B
0	Black	0	0	0	0	0	0
1	Gray-2	0	13	0	13	13	13
2	Gray-4	0	26	0	26	26	26
3	Gray-6	0	40	0	40	40	40
4	Gray-1	0	6	0	6	6	6
5	Gray-3	0	20	0	20	20	20
6	Gray-5	0	33	0	33	33	33
7	White 7	0	46	0	46	46	46
8	Black 0	0	0	0	0	0	0
9	Gray-2	0	13	0	13	13	13
10	Gray-4	0	26	0	26	26	26
11	Gray-6	0	40	0	40	40	40
12	Gray-1	0	6	0	6	6	6
13	Gray-3	0	20	0	20	20	20
14	Gray-5	0	33	0	33	33	33
15	White 7	0	46	0	0	46	0

## VT340 Default Color Map

Map Location	Default Color	HLS Values			RGB Values		
		H	L	S	R	G	B
0	Black	0	0	0	0	0	0
1	Blue	0	50	60	20	20	80
2	Red	120	46	72	80	13	13
3	Green	240	50	60	20	80	20
4	Magenta	60	50	60	80	20	80
5	Cyan	300	50	60	20	80	80
6	Yellow	180	50	60	80	80	20
7	Gray 50%	0	53	0	53	53	53
8	Gray 25%	0	26	0	26	26	26
9	Blue*	0	46	29	33	33	60
10	Red*	120	43	39	60	26	26
11	Green*	240	46	29	33	60	33
12	Magenta*	60	46	29	60	33	60
13	Cyan*	300	46	29	33	60	60
14	Yellow*	180	46	29	60	60	33
15	Gray 75%	0	80	0	80	80	80

\* These colors are less saturated than colors 1 through 6.

## Screen Control Command Summary — S

Option	Default	Description
(A[X1,Y1] [X2,Y2])	[0,0][799,479]	Display addressing Lets you define screen addressing that uses a different size or orientation than the default VT300 screen.
[X,Y]	[0,0]	Scrolling with relative X and Y values Uses an [X,Y] value to scroll screen data in the bitmap. Does not change the coordinate system.
<PV number>	None	Scrolling with PV offset Uses a <PV number> to scroll screen data in the bitmap. Does not change the coordinate system.
(H)	None	Print complete screen

## Screen Control Command Summary — S (Cont)

Option	Default	Description
(H[X,Y][X,Y])	None	Print defined area (two positions) Uses two [X,Y] screen coordinates to define opposite corners of the area to print.
(H[X,Y])	None	Print defined area (one position) Uses an [X,Y] screen coordinate and the current cursor position to define opposite corners of the area to print.
(H(P[X,Y]))	[50,0]	Print offset suboption Defines where the upper-left corner of an image will print, using a relative offset from the current printhead location.
		The default at power-up is [50,0], until you define a new value. Any new value remains in effect until redefined.
(M<n> <Lvalue>))	VT330 0(L0) 1(L25) 2(L50) 3(L75)	Output mapping values (monochrome) Defines the monochrome intensity value to store in the selected <n>
	VT340 0(L0) 1(L4) 2(L10) 3(L17) 4(L24) 5(L30) 6(L37) 7(L44) 8(L50) 9(L57) 10(L64) 11(L70) 12(L77) 13(L84) 14(L90) 15(L97)	output map location. You can change the value of one or more locations with a single command.
(M<n> <RGB>))	0(AD) 1(AB) 2(AR) 3(AG) 4(AM) 5(AC) 6(AY) 7(AD) 8(AW) 9(AB) 10(AR) 11(AG) 12(AM) 13(AC) 14(AY) 15(AD)	Output mapping values (RGB color) Defines the RGB color to store in the selected <n> output map. You can change the value of one or more locations with a single command.

## Screen Control Command Summary — S (Cont)

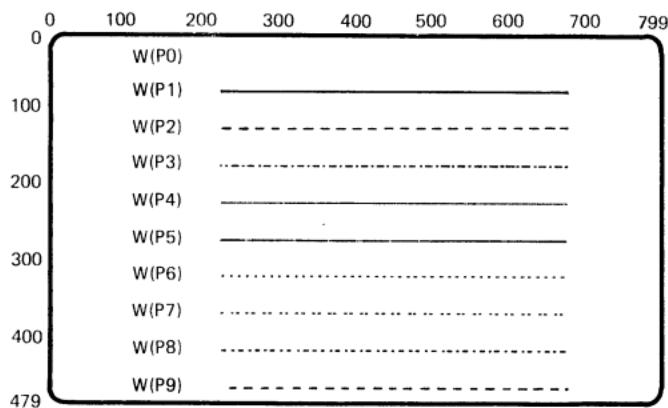
Option	Default	Description
(M<n> (HLS))	0(AL0) 1(AH0L50S60) 2(AH120L46S72) 3(AH240L50S60) 4(AH60L50S60) 5(AH300L50S60) 6(AH180L50S60) 7(AH0L53S0) 8(AH0L26S0) 9(AH0L46S29) 10(AH120L43S29) 11(AH240L46S29) 12(AH60L46S29) 13(AH300L46S29) 14(AH180L46S29) 15(AH0L80S0)	Output mapping values (HLS color) Defines the HLS color to store in the selected <n> output map location. You can change the value of one or more locations with a single command. Default values are HLS values for default RGB values.
(I<n>)	0	Background intensity (monochrome) Selects output map location <n> for the background.
(I(RGB))	D	Background intensity (RGB color) Selects the output map location containing the closest color to the RGB value you specified.
(I(HLS))	L0	Background intensity (HLS color) Selects the output map location containing the closest color to the HLS value you specified.
(T<0 to 32767>)	None	Time delay Selects the number of ticks of the real time clock to count for a delay.
(P<0 or 1>)	0	Display graphics page Selects which graphics page is displayed when running a single session.
(E)	None	Screen erase (current background) Erases the screen and sets the screen to the current background intensity.

## Screen Control Command Summary — S (Cont)

Option	Default	Description
(I<value>,E) None		Screen erase (selected background) Erases the screen and sets the screen to a selected background <value>.
(W(M<n>))	Current value set in write command	Pixel vector multiplier Selects a multiplication factor of <n> for each PV value in a scroll command. <n> defines the number of coordinates affected by each PV value. This is a temporary write command, in effect until the next command key letter.
(C<0 or 1>)	1	Graphics cursor on/off Turns the graphics output cursor off (C0) or on (C1).
(C1(H<n>))	0 (diamond)	Graphics output cursor The H selects the output cursor style.
(C1(I<n>))	0 (crosshair)	Graphics input cursor The I selects the input cursor style.

## 2.3 WRITE CONTROL COMMAND

### Standard Patterns



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## **Standard Patterns**

<b>Pattern Number</b>	<b>Binary Pattern</b>	<b>Description</b>
0	00000000	All-off write pattern
1	11111111	All-on write pattern
2	11110000	Dash pattern
3	11100100	Dash-dot pattern
4	10101010	Dot pattern
5	11101010	Dash-dot-dot pattern
6	10001000	Sparse dot pattern
7	10000100	Asymmetrical sparse dot pattern
8	11001000	Sparse dash-dot pattern
9	10000110	Sparse dot-dash pattern

## **Selecting VT330 Planes for Writing**

<b>Command Code</b>	<b>Planes You Can Write To</b>	
W(F0)	00	None
W(F1)	01	Plane 0
W(F2)	10	Plane 1
W(F3)	11	All planes

*NOTE: Remember to restore writing to both planes after using 1-plane or no-plane writing.*

## **Selecting VT340 Planes for Writing**

<b>Command Code</b>	<b>Planes You Can Write To</b>	
W(F0)	0000	None
W(F1)	0001	Plane 0
W(F2)	0010	Plane 1
W(F3)	0011	Planes 0 and 1
W(F4)	0100	Plane 2
W(F5)	0101	Planes 0 and 2
W(F6)	0110	Planes 1 and 2
W(F7)	0111	Planes 0, 1, and 2
W(F8)	1000	Plane 3
W(F9)	1001	Planes 0 and 3
W(F10)	1010	Planes 1 and 3
W(F11)	1011	Planes 0, 1, and 3
W(F12)	1100	Planes 2 and 3
W(F13)	1101	Planes 0, 2, and 3
W(F14)	1110	Planes 1, 2, and 3
W(F15)	1111	All planes

*NOTE: Remember to restore writing to all planes after using 1-plane or no-plane writing.*

## Write Control Command Summary — W

Option	Default	Description
(M<n>)	1	PV multiplication Defines a multiplication factor of <n> for all pixel vector (PV) values used in later commands. Can serve as a temporary write control for other types of commands.
(P<0 to 9>)	1	Select standard pattern Selects 1 of 10 stored writing patterns.
(P<binary>)	1	Specify binary pattern Lets you create your own writing pattern, up to 8 bits in length.
(P(M<1 to 16>))2		Pattern multiplication Selects how many consecutive pixels <1 to 16> to write each bit of pattern in memory to. You can use this option: <ul style="list-style-type: none"><li>• with the select standard pattern option,</li><li>• with the specify binary pattern option, or</li><li>• by itself, to define a multiplication factor for the last specified pattern.</li></ul>
(I<0 to 3>) (I<0 to 15>)	3 (VT330) 7 (VT340)	Select foreground intensity (monochrome) Selects the output map address (<0 to 3>) to use for writing.
(I(<RGB>))	Current color map	Select foreground intensity (RGB color) Selects the output map address to use for color writing with RGB values. Selects the color closest to the RGB value specified.

## Write Control Command Summary — W (Cont)

Option	Default	Description
(I(<HLS>))	None	Select foreground intensity (HLS color) Selects the output map address to use for color writing with HLS values. Selects the color closest to the HLS value specified.
(F<0 to 3>)	3 (VT330)	Plane select
(F<0 to 15>)	15 (VT340)	Selects which of the terminal's bitmap planes ReGIS can write to.
(V,R,C,or E)	(V)	Writing style Default style is (V) for overlay writing. (R) for replace writing (C) for complement writing (E) for erase writing
(N<0 or 1>)	0	Negative pattern control When set to (N1), reverses the effect of currently selected write pattern.
(S<0 or 1>)	0	Shading on/off control When set to (S1), turns on shading with currently selected pattern. The shading reference line is defined by the Y-coordinate of the active position when (S1) is selected.
(S[,Y])	Current Y position	Select horizontal shading reference line Selects a line defined by [,Y], which can be either an absolute or relative value.
(S(suboption) [X])	Current X position	Select vertical shading reference line Selects a line defined by [X], which can be either an absolute or relative value.
(S' <character>')	None	Select shading character Selects a character to use for shading, instead of writing pattern.

## 2.4 POSITION COMMAND

### Position Command Summary — P

Argument	Default	Description
[X,Y]	None	<b>Cursor positioning with [X,Y] values</b> The [X,Y] values can be absolute, relative, or absolute/relative screen coordinates.
<PV>	None	<b>Cursor positioning with PV values</b> The pixel vector values select a direction and distance to move, relative to the current cursor position.
(W(M<n>))		<b>PV multiplier</b> This temporary write control option selects a multiplication factor for PV values. This factor defines the number of coordinates to move for each PV value.
(B)	None	<b>Begin a bounded position stack</b> Pushes the current active position onto the stack. This position becomes the active position again after a corresponding (E) option in the stack.
(S)	None	<b>Start an unbounded position stack</b> Pushes a dummy position onto the stack. When ReGIS reaches an (E) option in the stack, the active position stays at its current location.
(E)	None	<b>End of bounded or unbounded position stack</b> Selects the active position at the end of a position stack. The active position is based on the corresponding (B) option in a bounded stack or (S) option in an unbounded stack.
(P<pn>)	None	<b>Select graphics page option</b> Moves the cursor from one page to another in graphics page memory.

## 2.5 VECTOR COMMAND

### Vector Command Summary — V

There are no default values for these options.

Option	Description
[]	<b>Draw dot</b> Draws one dot (a single pixel) at the current active position. Does not move the cursor.
[X,Y]	<b>Draw line (with coordinate)</b> Draws a line from the current active position to the [X,Y] position. You can use absolute, relative, or absolute/relative values for [X,Y].
<PV>	<b>Draw line (with PV value)</b> Draws a line from the current active position to a relative position defined by <PV>. The PV value defines a direction.
(B)	<b>Begin a bounded position stack</b> Saves the current active position by pushing it on the stack. This is the starting point for a line.
(S)	<b>Start an unbounded position stack</b> Saves a dummy position, by pushing it onto the stack.
(E)	<b>End of bounded position stack</b> Draws a line to the position saved by the previous (B) option from the position specified before the (E) option. Then pops the saved position off the stack.  <b>End of unbounded position stack</b> Ends a position stack started by an (S) option. No line is drawn, and the active position does not move.
(W(<suboptions>))	<b>Temporary write control</b> Lets you use temporary write control values with one vector command. Temporary values only remain in effect for the selected command.

## 2.6 CURVE COMMAND

### Curve Command Summary — C

Option*	Default	Description
[X,Y]	None	Circle with center at current position [X,Y] defines a point on the circumference of the circle.
(C)[X,Y]	None	Circle with center at specified position [X,Y] defines the center of the circle. The current active position defines a point on the circumference.
(A<degrees>)[X,Y] 360		Arc with center at current position [X,Y] defines the starting point for an arc. <degrees> is a signed value that determines the size and direction of arc. + = counterclockwise — = clockwise
(A<degrees>C)[X,Y] None		Arc with center at specified position [X,Y] defines the arc's center. The starting point for the arc is the current active position. <degrees> is a signed value that determines the size and direction of arc. + = counterclockwise — = clockwise

\* All [X,Y] coordinates can be absolute, relative, or absolute/relative values.

## Curve Command Summary — C (Cont)

Option*	Default	Description
(B)<positions>(E)	None	Closed curve sequence Defines a closed curve based on [X,Y] positions specified in the sequence.
(S)<positions>(E)	None	Open curve sequence Defines an open curve based on [X,Y] positions specified in the sequence.
(W(<suboptions>))	None	Temporary write control Lets you use temporary write control values with one curve command. Temporary values only remain in effect for the selected command, but that command can include several curves.

- 
- \* All [X,Y] coordinates can be absolute, relative, or absolute/relative values.

## 2.7 TEXT COMMAND

You can use characters from the terminal's built-in character sets, or you can design and load a set (2.8). All the built-in sets have 94 characters, except the ISO set. The ISO set has 96 characters.

### Built-in character sets

#### ASCII

ISO Latin Nr 1 supplemental graphic

DEC Supplemental Graphic

DEC Special Graphic

DEC Technical

National replacement character (NRC) sets (14 sets)

### Control Characters in Text Strings

Carriage return	CR	Returns the cursor to the horizontal position where the current text writing command started.
Line feed	LF	Moves the cursor down one line in the same column.
Backspace	BS	Moves the cursor back one character position. You can use BS to overstrike a character.
Horizontal tab	HT	Moves the cursor forward one character position, using the current text spacing value.

## Selecting a 7-Bit Character Set With the L or R Suboption

To Select This Set	Use This Designator
ASCII	(B
DEC Special Graphic	(0
DEC Technical	(>

### National Replacement Character Sets

British	(A
Dutch	(4
Finnish	(5
French	(R
French Canadian	(9
German	(K
Italian	(Y
Norwegian/Danish	('
Portuguese	(%6
Spanish	(Z
Swedish	(7
Swiss	(=

### Example

- The following command selects the DEC Technical set for use with ReGIS.

T(A0(L"(>"))

## Selecting an 8-Bit Set with the R Suboption

To Select This Set	Use This Designator
DEC Supplemental Graphic	)%5
ISO Latin-1 supplemental	-A

### Example

- The following command selects the DEC Supplemental Graphic set for use with ReGIS.

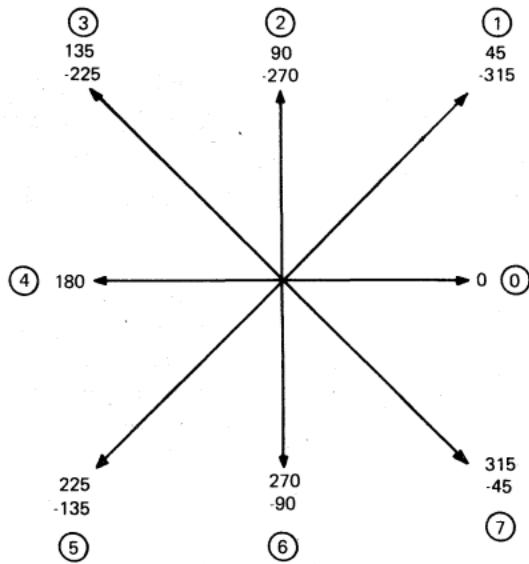
T(A0(R")%5"))

## Standard Character Cell Sizes

Set Number	Display Cell Size	Unit Cell Size	Character Positioning
S0	[9,10]	[8,10]	[9, ]
S1	[9,20]	[8,20]	[9, ]
S2	[18,30]	[16,30]	[18, ]
S3	[27,45]	[24,45]	[27, ]
S4	[36,60]	[32,60]	[36, ]
S5	[45,75]	[40,75]	[45, ]
S6	[54,90]	[48,90]	[54, ]
S7	[63,105]	[56,105]	[63, ]
S8	[72,120]	[64,120]	[72, ]
S9	[81,135]	[72,135]	[81, ]
S10	[90,150]	[80,150]	[90, ]
S11	[99,165]	[88,165]	[99, ]
S12	[108,180]	[96,180]	[108, ]
S13	[117,195]	[104,195]	[117, ]
S14	[126,210]	[112,210]	[126, ]
S15	[135,225]	[120,225]	[135, ]
S16	[144,240]	[128,240]	[144, ]

*NOTE: The sizes in this table are expressed in screen coordinate values. These values are based on the default screen addressing for the VT300. See Volume 2, Chapter 2.*

## Tilt Compass



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## Text Command Summary — T

Option	Default	Description
(A<0 to 3>)	0	Select character set Selects one of four possible character sets (<0 to 3>) to use for text string characters.  (A0) built-in set (A1to 3) one of three loadable sets
(A0(L"<designator>")) "(B"		Select character set (left) Used with the (A0) option to select a built-in 7-bit set for the left side (GL) of the code table. Default: ASCII set.
(A0(R"<designator>")) "-A"		Select character set (right) Used with the (A0) option to select a built-in 7-bit or 8-bit set for the right side (GR) of the code table. Default: ISO Latin-1 supplemental graphic set.
(S<0 to 16>)	1	Standard character cell size Selects 1 of 17 standard sets. The set defines the display cell, unit cell, and character positioning values for text characters.
(S[<width,height>]) [9,20]*		Display cell size Lets you change the size of the screen area used for each character.

\* Default value is based on standard S1 character cell.

## Text Command Summary — T (Cont)

Option	Default	Description
[X,Y]	[9,0]*	Character positioning Lets you vary spacing between text characters. [X,Y] values are relative.
(U[<width,height>])	[8,20]*	Unit cell size Lets you change scale of characters.
(H<height>)	2	Height multiplier Changes the height of the display cell and unit cell, without affecting the width or positioning values. New height is equal to 10 times the specified multiplier (<1-25>).
(D<a> S<0 to 16>)	(D0 S1)	String tilt Selects a tilt angle for text strings, relative to the current baseline.
	<a>	Selects the degrees of the tilt. (45 degree increments)
	<0 to 16>	Selects a standard size to use for positioning tilted characters.
(I<a>)	0	Italics Selects a tilt angle <a> for italic characters without changing their orientation to the current baseline. Angle is $\pm$ 22 or 45 degrees.

\* Default value is based on standard S1 character cell.

## Text Command Summary — T (Cont)

Option	Default	Description
(B)<options>(E)	Current text controls in effect	<b>Temporary text control</b> Selects temporary option values for one text command.  Temporary values remain in effect until you use (E).
<PV>	None	<b>PV spacing</b> Selects PV value to use for superscripts, subscripts, and overstriking.
(W(<options>))	Current write controls in effect	<b>Temporary write control</b> Selects temporary write control values for one text command.
(M[width,height])	[1,2]	<b>Size multiplication</b> Selects a new unit cell size. Multiplies the height and width of the standard S1 unit cell by the factors you select. The maximum width factor is 16.

## 2.8 LOAD COMMAND

### Load Command Summary — L

Option	Default	Description
(A<1 to 3>)	1	Select character set Selects one of three loadable character sets to use for any load commands that follow.
(A" <name> ")	" "	Specify name Selects a name of up to 10 characters for the currently selected loadable character set. You can use this option with the select character set option: (A<1 to 3>"<name>").

## Load Command Summary — L (Cont)

Option	Default	Description
"<ASCII>" <hex pairs>	None	Load character cell Loads a character into the currently selected loadable set.
		<ASCII> is an ASCII character you use to select the loadable character in other commands.
		<hex pairs> define the bit pattern for each line of the character.

## 2.9 MACROGRAPHS

### Macrograph Summary — @

Option	Default	Description
@<call letter>	None	Invoke macrograph Inserts the contents of the macrograph specified by <call letter> into the ReGIS command string. The <call letter> is not case sensitive.
@:<call letter> <definition>@:	None	Define macrograph Defines a macrograph and selects <call letter> to identify the macrograph. The <call letter> is not case sensitive.
@.	None	Clear all macrographs Deletes all macrograph definitions.
@:<call letter>@;	None	Clear defined macrograph Deletes the macrograph identified by <call letter>.

## 2.10 REPORT COMMAND

You can use report commands to perform two basic functions.

- Request the current status of ReGIS operations.
- Enter graphics input mode (to use a mouse or graphics tablet).

### Report Command Error Codes (Error Condition Option)

*NOTE: Use the resynchronization character (:) to clear the error status.*

		< M > Error	
Code	Condition	Character	Meaning
0	No error	Always 0	No error detected since the last resynchronization character (:).
1	Ignore character	The ignored character	An unexpected character was found and ignored.
2	Extra option	Always 0	The syntax S(H[X,Y]  X,Y)) coordinates contained more than two coordinate pairs. The extra pairs were ignored.
3	Extra coordinate values	Always 0	The syntax [X,Y] contained more than two coordinate values. The extra values were ignored.
4	Alphabet out of range	Always 0	The syntax L(A<0 to 3>) contained a number less than 0 or greater than 3.
5	Reserved	—	—
6	Reserved	—	—
7	Begin/start overflow	(B) or (S)	The stacking limit of 16 (B) and (S) options for position and vector commands was exceeded. Extra (B) or (S) options were ignored.

## Report Command Error Codes (Cont)

		<M> Error	
Code	Condition	Character	Meaning
8	Begin/start underflow	(E)	A position or vector command contained an (E) option without a corresponding (B) option. The (E) option was ignored.
9	Text standard size error	Always 0	A text command selected a standard character size number of less than 0 or greater than 16.

## Report Command Summary — R

Option	Default	Description
(P)	None	<b>Cursor position</b> Reports the current active output position.
(M(<call letter>))	None	<b>Macrograph contents</b> Reports the contents of the macrograph identified by <call letter>.
(M(=))	None	<b>Macrograph storage status</b> Reports how much space the terminal has assigned to macrograph storage, and how much of that space is currently free.
(L)	None	<b>Character set</b> Reports which character set (1 to 3) is selected for loading.
(E)	None	<b>Error</b> Reports the last error found by the parser since resynchronization.
(In)	0	<b>Graphics input modes</b> Selects one-shot mode (0) or multiple mode (1).
(P(I))	None	<b>Report position interactive</b> Requests an input cursor position report.

## 2.11 POLYGON FILL COMMAND

### Polygon Fill Command Summary — F

Option	Default	Description
F(V<positions>)	None	Vector option <positions> are the positions of the polygon's vertices.
F(C<positions>)	None	Curve option <positions> are coordinate values for a curve or circle.
F(C(A + <degrees>))	None	Position option (with curve option) C identifies a curve option. A identifies an arc suboption. <degrees> are the number of degrees and the direction to draw the arc in.
	<position1>	<position1> is the arc's starting point.
	P<position2>...)	P identifies a position option. <position2> is the new active position.
F(W(<suboptions>))	None	Temporary Write Control as an Option of the F Command <suboptions> are the temporary write control values to use.
	<options>)	<options> are polygon fill command options that will use the temporary write control values.

## Polygon Fill Command Summary — F (Cont)

Option	Default	Description
F(C(W (<sub-suboptions>) <suboptions>)<options>)	None	<p>Temporary Write Control as a Suboption of the C or V Options</p> <p>C identifies a curve option. You could also use a vector (V) option.</p> <p>W identifies a temporary write control suboption.</p> <p>&lt;sub-suboptions&gt; are the temporary write control values to use.</p> <p>&lt;suboptions&gt; are the curve options and values that will use the temporary write control values.</p> <p>&lt;options&gt; are any other polygon fill command options.</p>

## 2.13 4010/4014 MODE

In 4010/4014 mode, the terminal uses 7-bit character codes to communicate with the host.

### Screen Addressing

#### 4010/4014 series terminals

GIN mode            1024 × 768 Tekpoints (default)  
Other modes        4096 × 3072 Tekpoints (12-bit addressing)

#### VT300 terminal

4010/4014 mode    623 × 480 pixel array, centered on the screen  
                      614 × 460 pixel array (for vector drawing)

## Valid ASCII Control Characters in 4010/4014 Mode

Mnemonic	Row	Column/ Name	Action
BEL	0/7	Bell	Rings the bell tone (if the bell is enabled). clears the bypass condition, and clears the condition that prevents the terminal from responding to carriage returns.
BS	0/8	Backspace	Moves the cursor left one position. If the current position is at the left margin, no action occurs.

## Valid ASCII Controls in 4010/4014 Mode (Cont)

Column/ Mnemonic			
Mnemonic	Row	Name	Action
HT	0/9	Horizontal tab	Moves the cursor one tab space to the right. If the current position is already at the end of the line, HT causes an automatic line feed and carriage return.
LF	0/10	Line feed	Moves the cursor down line down. If the cursor is already on the bottom row of the screen, LF moves the cursor to the top of the screen and switches margins. Clears the bypass condition.
VT	0/11	Vertical tab	Moves the cursor up one line. The cursor stops at the top line.
CR	0/13	Carriage return	Moves the cursor to the current left margin. Resets the terminal from graph mode to alpha mode. Cancels the crosshair cursor when setting alpha mode, but leaves the terminal with an undefined margin and page full status. Clears the bypass condition.
ESC	1/11	Escape	Escape sequence introducer.
FS	1/12	File separator	Selects point plot mode.
GS	1/13	Group separator	Selects graph mode.
RS	1/14	Record separator	Selects incremental plot mode.
US	1/15	Unit separator	Resets terminal from graph mode to alpha mode. Clears the bypass condition.

## **Keys Used to Send ASCII Control Characters**

To send the control character codes from the keyboard, hold down the Ctrl key and press another key.

Mnemonic	Column/ Row	Key Pressed with Ctrl
ENQ	0/5	E
BEL	0/7	G
BS	0/8	H
HT	0/9	I
LF	0/10	J
VT	0/11	K
FF	0/12	L
CR	0/13	M
ETB	1/7	W
CAN	1/8	X
SUB	1/10	Z
ESC	1/11	3
FS	1/12	4
GS	1/13	5
RS	1/14	6
US	1/15	7

## **Escape Sequences**

Request terminal status	<b>ESC ENQ</b>	The terminal sends status information and (1) the address of the lower-left corner of the alpha cursor (alpha mode) or (2) the address of the current cursor position (graph mode).
Print hard copy of the bitmap	<b>ESC ETB</b>	Prints a hard copy of the terminal's bitmap by using the sixel protocol. Also clears the bypass condition. Only works when a printer is connected to the terminal's printer port.
Set bypass condition	<b>ESC CAN</b>	Selects the bypass condition. The VT300 ignores any data received from the host.

## Escape Sequences (Cont)

Set alpha mode	<b>ESC FF</b>	Selects alpha mode. The terminal erases the screen, moves the current position to the upper-left corner, activates margin 1, and clears the bypass condition.
Set GIN mode	<b>ESC SUB</b>	Selects graphics input mode.
Set point plot mode	<b>ESC FS</b>	Selects point plot mode.

### Select Raster Writing Mode Features

*NOTE: These sequences are not part of the 4010/4014 protocol.*

Overlay mode	<b>ESC / 0 d</b>	Set dots on.
Erase mode	<b>ESC / 1 d</b>	Sets dots off.
Complement mode	<b>ESC / 2 d</b>	Complements dots.

### Select Character Size

Aligned mode	<b>ESC 8</b>	Selects 35 lines of 74 characters each (default).
	<b>ESC 9</b>	38 lines of 81 characters
	<b>ESC :</b>	58 lines of 121 characters
	<b>ESC ;</b>	64 lines of 133 characters
	<b>ESC 0</b>	64 lines of 133 characters*
	<b>ESC 1</b>	35 lines of 74 characters*
	<b>ESC 2</b>	35 lines of 74 characters*
	<b>ESC 3</b>	35 lines of 74 characters*
Enlarged mode	<b>ESC 8</b>	Selects 24 lines of 69 characters each (default).
	<b>ESC 9</b>	24 lines of 69 characters
	<b>ESC :</b>	47 lines of 125 characters
	<b>ESC ;</b>	47 lines of 125 characters
	<b>ESC 0</b>	47 lines of 125 characters*
	<b>ESC 1</b>	24 lines of 69 characters*
	<b>ESC 2</b>	24 lines of 69 characters*
	<b>ESC 3</b>	24 lines of 69 characters*

\* Not recommended.

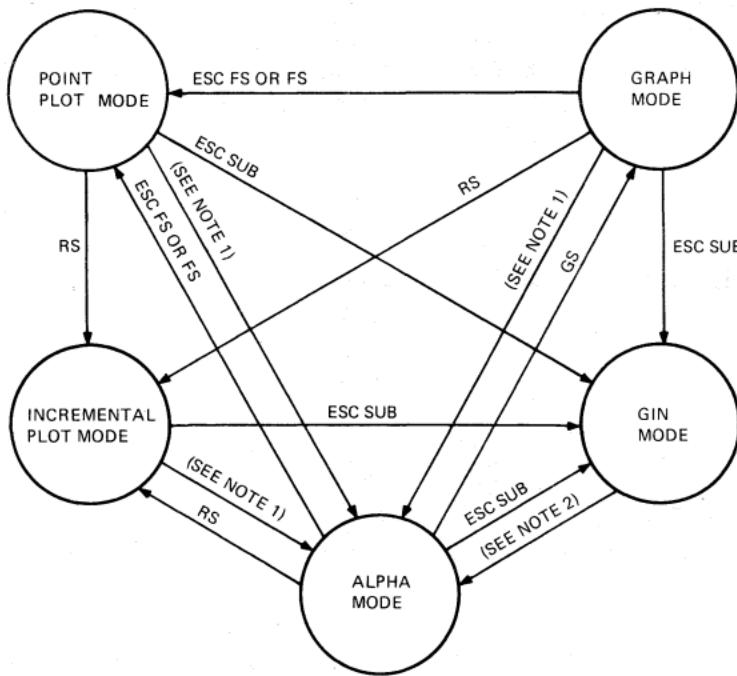
## Escape Sequences (Cont)

### Select Vector Patterns

Normal intensity	<b>ESC '</b>	Solid
	<b>ESC a</b>	Dotted
	<b>ESC b</b>	Dot-dash
	<b>ESC c</b>	Short dash
	<b>ESC d</b>	Long dash
	<b>ESC e</b>	Solid
	<b>ESC f</b>	Solid
	<b>ESC g</b>	Solid
Bold intensity	<b>ESC h</b>	Solid
	<b>ESC i</b>	Dotted
	<b>ESC j</b>	Dot-dash
	<b>ESC k</b>	Short dash
	<b>ESC l</b>	Long dash
	<b>ESC m</b>	Solid
	<b>ESC n</b>	Solid
	<b>ESC o</b>	Solid
Prevent response to CRs or LFs	<b>ESC CR</b>	Prevents the terminal from responding to carriage returns.
	<b>ESC LF</b>	Prevents the terminal from responding to line feeds.
Set LCE flag	<b>ESC DEL</b>	Sets the LCE flag.
	<b>ESC NUL</b>	Sets the LCE flag.
	<b>ESC ESC</b>	Sets the LCE flag.
	<b>ESC CR</b>	Sets the LCE flag and prevents the terminal from responding to CRs.
	<b>ESC LF</b>	Sets the LCE flag and prevents the terminal from responding to LFs.
Delete character	<b>ESC ?</b>	Use as a substitute for the low Y coordinate value of DEL if your operating system uses DEL for synchronization.

## Changing Operating Modes

You can only leave GIN mode from the keyboard.



### NOTES

1. US,CR,ESC US,ESC FF, OR NEXT SCREEN KEY;
2. NEXT SCREEN KEY(OR ANY OTHER ACTIVE NON-ARROW KEY ENTERED FROM THE KEYBOARD).

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## 4010/4014 Mode Transition Diagram

### Clearing the Screen

In 4010/4014 mode, you use the Next Page key. You can also clear the screen with the Clear Display feature in the Set-Up Directory screen.

## **4010/4014 Functions the Terminal Ignores**

### **Sequence Function**

<b>ESC SO</b>	Selects alternate character set.
<b>ESC SI</b>	Selects ASCII character set.
<b>ESC p</b>	Sets solid vector pattern with write-through.
<b>ESC q</b>	Sets dotted vector pattern with write-through.
<b>ESC r</b>	Sets dot-dashed vector pattern with write-through.
<b>ESC s</b>	Sets short dashed vector pattern with write-through.
<b>ESC t</b>	Sets long dashed vector pattern with write-through.
<b>ESC u</b>	Sets solid vector pattern with write-through.
<b>ESC v</b>	Sets solid vector pattern with write-through.
<b>ESC w</b>	Sets solid vector pattern with write-through.

### **Escape Sequences for Control Characters**

#### **Sequence Control Character**

<b>ESC BEL</b>	BEL
<b>ESC BS</b>	BS
<b>ESC HT</b>	HT
<b>ESC VT</b>	VT
<b>ESC GS</b>	GS
<b>ESC RS</b>	RS
<b>ESC US</b>	US

### **Entering and Exiting 4010/4014 Mode**

You can use the Graphics Set-Up screen or the following escape sequences. The VT300 enters 4010/4014 in alpha mode. The terminal exits 4010/4014 mode to VT300 mode with 7-bit controls.

<b>ESC [ ? 3 8 h</b>	Enter 4010/4014 mode.
<b>ESC [ ? 3 8 l*</b>	Exit 4010/4014 mode.

\* The final character in the sequence is a lowercase L.

## **Bypass Condition**

Turn on the bypass condition with an escape sequence.

- ESC CAN** Selects the bypass condition only.
- ESC ENQ** Selects the bypass condition and requests status information.
- ESC SUB** Selects the bypass condition and places the terminal in GIN mode.

Turn off the bypass condition with a control character, escape sequence, or the Next Page key.

## **Control Characters**

- BEL** Rings the bell tone, if the bell is enabled.
- LF** Causes a new line operation.
- CR** Moves the cursor to the left margin and resets the terminal to alpha mode.
- US** Resets the terminal from graph mode to alpha mode.

## **Escape Sequences**

**ESC ETB** Prints a hard copy of the bitmap.

**ESC FF** Selects alpha mode and clears the screen.

### **Key**

**Next Page** Selects alpha mode and clears the screen.

## **Alpha Mode**

Character Size	Sequence
<b>Aligned Mode</b>	
35 lines of 74 characters	<b>ESC 8</b> (default)
	<b>ESC 1, ESC 2, or ESC 3</b>
38 lines of 81 characters	<b>ESC 9</b>
58 lines of 121 characters	<b>ESC :</b>
64 lines of 133 characters	<b>ESC ; or ESC 0</b>
<b>Enlarged Mode</b>	
24 lines of 69 characters	<b>ESC 8</b> (default)
	<b>ESC 9, ESC 1, ESC 2,</b>
	<b>or ESC 3</b>
48 lines of 124 characters	<b>ESC :, ESC ;, or ESC 0</b>

## **Alpha Mode Control Characters**

<b>Character</b>	<b>Function</b>
HT	Moves cursor one space to the right.
VT	Moves cursor up one line.
LF	Causes line feed. When used on the bottom display row, wraps cursor to top row and switches margins.
CR	Moves cursor to the left margin. May also cause a line feed, depending on the new line value selected in Display set-up. When used on the bottom line (with LF selected as part of the CR value), CR causes the same wraparound as LF.
BS	Moves the cursor to the left one position. Nothing happens if the cursor is already at the active margin.

## **Graph Mode**

### **Line Patterns**

<b>Pattern</b>	<b>Sequence</b>
Solid (normal)	ESC ', ESC e, ESC f, or ESC g
Solid (bold)	ESC h, ESC m, ESC n, or ESC o
Dotted (normal)	ESC a
Dotted (bold)	ESC i
Dot-dash (normal)	ESC b
Dot-dash (bold)	ESC j
Short dash (normal)	ESC c
Short dash (bold)	ESC k
Long dash (normal)	ESC d
Long dash (bold)	ESC l*

\* The last character in the sequence is a lowercase L.

### **Drawing Command**

You use the GS control character to enter graph mode from alpha mode. In graph mode, GS defines the start of a vector.

## Encoding Coordinates

In 4010/4014 mode, you can use 10-bit or 12-bit addressing. For 10-bit addressing, coordinates are encoded into 4 bytes. For 12-bit addressing, coordinates are encoded into 5 bytes.

### Byte Values for Encoding Coordinates

Byte Name	<-----7-Bit ASCII Character----->						
	Tag	Bits	<-----Address Bits----->				
	7	6	5	4	3	2	1
High Y	0	1	5 most significant bits of Y address				
Extra	1	1		Y2	Y1	X2	X1
Low Y	1	1	5 intermediate bits of Y address				
High X	0	1	5 most significant bits of X address				
Low X	1	0	5 intermediate bits of X address				

### Rules for Sending Short Address

Bytes Changed	<----- Bytes Sent ----->				
	High Y	Extra	Low Y	High X	Low X
High Y	Yes	No	No	No	Yes
Low Y	No	No	Yes	No	Yes
High X	No	No	Yes	Yes	Yes
Low X	No	No	No	No	Yes
Extra	No	Yes	Yes	No	Yes

### Point Plot Mode

You can enter point plot mode from alpha or graph mode, using the FS control character.

### Incremental Plot Mode

You can enter incremental mode from all modes (except GIN mode) by using the RS control character or ESC RS sequence. When you select RS, the terminal uses the current cursor position for relative movement.

### Changing the Cursor Position

#### Character Function

Space	Turns beam off/pen up.
P	Turns beam on/pen down.
D	Up (north)
E	Up, right (northeast)
A	Right (east)
I	Down, right (southeast)
H	Down (south)
J	Down, left (southwest)
B	Left (west)
F	Up, left (northwest)

## Graphics Input (GIN) Mode

You can select GIN mode by using the ESC SUB sequence.

### Using Arrow Keys to Move the Cursor

Key	Direction
→	1 pixel right
Shift - →	10 pixels right
←	1 pixel left
Shift - ←	10 pixels left
↑	1 pixel up
Shift - ↑	10 pixels up
↓	1 pixel down
Shift - ↓	10 pixels down

## 2.14 SIXEL GRAPHICS

### Sixel Data Format

Use the following device control string to send sixel data.

DCS P1 ; P2; P3; q s...s ST

where

DCS is a C1 control character that introduces the sixel data sequence. You can also express DCS as the 7-bit escape sequence ESC P for a 7-bit environment.

P1 is the macro parameter. This parameter indicates the pixel aspect ratio used by the application or terminal. The pixel aspect ratio defines the shape of the pixel dots the terminal uses to draw images. For example, a pixel that is twice as high as it is wide has an aspect ratio of 2:1.

*NOTE: The macro parameter is provided for compatibility with existing Digital software. New applications should set P1 to 0 and use the set raster attributes control, described later in this chapter.*

P1	Pixel Aspect Ratio (Vertical:Horizontal)
Omitted	2:1 (default)
0 or 1	2:1
2	5:1
3 or 4	3:1
5 or 6	2:1
7, 8, or 9	1:1

You can override the setting of the macro parameter by using the set raster attributes character (".", 2/2) in a sixel data string. See below.

;  
; is a semicolon (3/11). This character separates numeric parameters in a DCS string.

P2 selects how the terminal draws the background color. You can use one of three values.

P2	Meaning
0 or 2 (default)	Pixel positions specified as 0 are set to the current background color.
1	Pixel positions specified as 0 remain at their current color.

P3 is the horizontal grid size parameter. The horizontal grid size is the horizontal distance between two pixel dots. The VT300 ignores this parameter because the horizontal grid size is fixed at 0.0195 cm (0.0075 in).

q indicates that this device control string is a sixel command.

s...s is the sixel encoded data string. The *sixel data characters* are characters in the range of ? (hex 3F) to ~ (hex 7E). Each sixel data character represents six vertical pixels of data. Each sixel data character represents a binary value equal to the character code value minus hex 3F.

#### Examples

- ? (hex 3F) represents the binary value 000000.
- t (hex 74) represents binary value 110101.
- ~ (hex 7E) represents binary value 111111.

The terminal translates the six bits to a *sixel* — six pixels in a vertical column. The least significant bit is at the top.

*NOTE: For information on how to code sixel characters, see Section 1.5 of this manual or "Soft Character Sets" in Volume 1, Chapter 5 of the VT330/VT340 Programmer Reference Manual.*

You can also use sixel control functions in the data string. The next section describes these characters and their functions.

ST is the string terminator. ST is a C1 control character. You can also express ST as the 7-bit escape sequence ESC \ for a 7-bit environment.

## Sixel Control Functions

### Graphics Repeat Introducer (!)

The ! (2/1) character lets you repeat a graphic character.

#### ! Pn character

where

Pn is the repeat count (any decimal value).

character is the character to repeat. You can use any character in the range of ? (hex 3F) to ~ (hex 7E).

### Raster Attributes ("")

This command selects the raster attributes for the following sixel data string. This command must precede any sixel data, and overrides any raster attributes set by the macro parameter described above.

#### " Pan ; Pad; Ph; Pv

where

##### Pan

— = pixel aspect ratio

##### Pad

Pan defines the vertical shape of the pixel.

Pad defines the horizontal shape of the pixel. If you use the set raster attributes command ("") in a sixel data string, you must specify a pixel aspect ratio. You can only use integer values for Pan and Pad. The VT300 rounds the pixel aspect ratio to nearest integer.

Ph and Pv define the horizontal and vertical size of the image (in pixels), respectively.

*NOTE: The VT300 uses Ph and Pv to erase the background when P2 = 0 or 2. See the "Sixel Data Format" section in this chapter.*

Ph and Pv do not limit the size of the image defined by the sixel data. However, Ph and Pv let you omit background sixel data from the image definition and still have a color background. They also provide a concise way for the application or terminal to encode the size of an image.

### Color Introducer (#)

This command lets you select colors in two ways.

Select a color map entry by number.

# **Pc**

where

**Pc** is the color number (Table 9).

Select HLS or RGB colors

# **Pc ; Pu; Px; Py; Pz**

where

**Pc** is the color number.

**Pu** is the color coordinate system (HLS or RGB).

**Px**, **Py**, and **Pz** are the color coordinates in the specified system. Table 9 lists the possible values.

**Table 9 Color Specifier**

Parameter	Possible Values	Definition
Pc	0 to 255	The color number to define.
Pu	1	HLS (hue,lightness, and saturation)
(required)	2	RGB (red, green, and blue)

*NOTE: The values of the following parameters depend on the color coordinate system selected (HLS or RGB).*

#### **HLS Values**

Px	0 to 360 degrees	Hue angle
Py	0 to 100 percent	Lightness
Pz	0 to 100 percent	Saturation

#### **RGB Values**

Px	0 to 100 percent	Red intensity
Py	0 to 100 percent	Green intensity
Pz	0 to 100 percent	Blue intensity

#### **Graphics Carriage Return (\$)**

The \$ (2/4) character indicates the end of the sixel line.

The active position returns to the left margin of the same sixel line. You can use this character to overprint lines.

#### **Graphics New Line (-)**

The - (2/13) character indicates the end of a sixel line. The active position moves to the left margin of the next sixel line.

#### **Parameter Separator (;**

The ; (3/11) character separates numeric parameters in a device control string. If there is no number before the separator, the terminal assumes that parameter is 0. If there is a number after the separator, the terminal assumes that parameter is 0.

## Sixel Display Mode (DECSDM)

Set: CSI ? 8 0 h

Enables the Sixel Scrolling feature on the Graphics Set-up screen. Sixel drawing begins at the text active position and can scroll.

Reset: CSI ? 8 0 1 \*

Disables the Sixel Scrolling feature on the Graphics Set-up screen. Sixel drawing begins at the home position and does not scroll. The text active position is not affected.

## 2.15 USING A MOUSE OR TABLET

### Default Locator Button Codes

Button	Device	Code (Pressed)	Code (Released)
1 (left)	mouse, puck, or stylus barrel	CSI 241 ~	CSI 242 ~
2 (middle)	mouse, puck, or stylus tip	CSI 243 ~	CSI 244 ~
3 (right)	mouse or puck	CSI 245 ~	CSI 246 ~
4 (fourth)	puck	CSI 247 ~	CSI 248 ~

There is also a null button code that the terminal sends in response to a host request when none of the buttons are currently being pressed: CSI 240 ~.

### Locator Command Summary

Name	Command	Function
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#### ReGIS

One-shot graphics input mode	R(I0)	(1) Selects one-shot mode. (2) In multiple mode, exits multiple mode and selects one-shot mode.
Multiple graphics input mode	R(I1)	Selects multiple mode.
Request cursor position report	R(P(I))	In one-shot or multiple mode, requests a cursor position report from the terminal.  In one-shot mode, the terminal sends the report when you press a locator button.

\* The last character in the sequence is a lowercase L.

In multiple mode, the terminal sends the report immediately. The terminal also sends a report when you press a locator button.

#### 4010/4014 Mode

GIN mode      ESC SUB      Selects graphics input mode.

### Programming Locator Device Buttons (DECLBD)

DCS Pc \$ w Ky1/Std1/Stu1 ; ... ; Kyn/Stdn/Stun ST

*NOTE: This command is sent separately, not in a ReGIS device control string.*

where

Pc            = clear parameter.  
0 or none    = clear all button definitions before  
                  loading new values (default).  
1            = clear one button at a time, before  
                  loading a new value.

*NOTE: You can only use 6 characters per button transition (pressed or released).*

Ky1/Std/Stu ; ... are the button definition strings.

Ky1 = number of the button you are defining.

Ky1	Button	Device
1	Right	Mouse, puck, or stylus barrel
2	Middle	Mouse, puck, or stylus tip
3	Left	Mouse or puck
4	Fourth	Puck only

Std = the code the selected locator button sends when pressed. The value is a string of hex pairs, each representing one 8-bit character.

You can use hex values in the following ranges.

3/0 through 3/9 (0 through 9)  
4/1 through 4/6 (A through F)  
6/1 through 6/6 (a through f)

Stu = the code the selected locator button sends when released. You code this value the same as Std above.

## 2.16 PRINTING GRAPHICS

### Graphics Printing Control Sequences

Name	Mnemonic	Sequence
Graphic expanded print mode	DECGEPM	CSI ? 43 h Expanded.
		CSI ? 43 l* Compressed. (D)
Graphic print color mode	DECGPCM	CSI ? 44 h Color.
		CSI ? 44 l* Black and white. (D)
Graphic print color syntax	DECGPCS	CSI ? 45 h RGB system. (D)
		CSI ? 45 l* HLS system.
Graphic print background mode	DECGPBM	CSI ? 46 h Background.
		CSI ? 46 l* No background. (D)
Graphic rotated print mode	DECGRPM	CSI ? 47 h Rotated.
		CSI ? 47 l* Compressed. (D)

### Sending Graphics to the Host or Printer

Graphics to host	MC	CSI ? 2 i
Graphics to printer	MC	CSI ? i or CSI ? 0 i

\* The last character in the sequence is a lowercase L.

(D) = default.

## Sixel Levels for Printers

The VT300 sends the following device control strings to printers, depending on the pixel level selected in Printer Set-Up.

### Level 1

Example: Digital's LA50 printer.

**ESC P 1 q S...S ESC \**

where

**S...S** is the pixel data defining the image.

### Level 2

Examples: Digital's LA75 and LN03 printers.

*NOTE: When printing expanded or rotated images with an LA75, select level 1.*

**ESC P Pn1; Pn2; Pn3; q " Pn4; Pn5; Pn6; Pn7 S...S ESC \**

where

**Pn1** is the macro parameter. Pn1 is always 0 for level 2 print operations.

**Pn2** is the background select parameter.

1 = background printing disabled.

2 = background printing enabled.

**Pn3** is the horizontal grid size. Default is 6 for compressed images, and 9 for expanded or rotated images.

**Pn4** is the pixel aspect ratio numerator. Default = 1.

**Pn5** is the pixel aspect ratio denominator. Default = 1.

**Pn6** is the horizontal extent parameter.

**Pn7** is the vertical extent parameter.

**S...S** is the pixel data defining the image.

### LA210 Printer

*For compressed print operations*

Uses the same pixel device control string format as in level 1.

*For expanded and rotated print operations*

**ESC P 9 q S...S ESC \**

where

**9** is the macro parameter. This parameter specifies a 1 to 1 aspect ratio with a grid size of 338 × 0.025 mm (13.5 × 0.001 in).

**S...S** is the pixel data defining the image.



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