

# VT 240 Series

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Programmer Pocket Guide

**digital**



# VT 240 Series

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## Programmer Pocket Guide

1st Edition, September 1983

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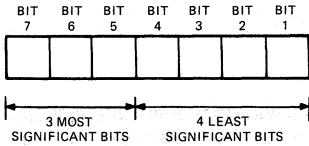
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**This Pocket Guide provides a summary of the information contained in the VT240 Programmer's Reference Manual EK-VT240-RM which can be ordered from DIGITAL. It is provided for use by people with a knowledge of computer programming to access the VT240 features.**

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# CHARACTER ENCODING

## 7-Bit Code



(DECIMAL VALUE IS COLUMN IN CODE TABLE)      (DECIMAL VALUE IS ROW IN CODE TABLE)

MA-0890-83

## 7-Bit ASCII Code Table

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

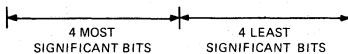
### KEY

| CHARACTER | ESC | 33 | OCTAL   |
|-----------|-----|----|---------|
|           |     | 27 | DECIMAL |
|           |     | 1B | HEX     |

MA-0893A-83

## 8-Bit Code

| BIT<br>8 | BIT<br>7 | BIT<br>6 | BIT<br>5 | BIT<br>4 | BIT<br>3 | BIT<br>2 | BIT<br>1 |
|----------|----------|----------|----------|----------|----------|----------|----------|
|          |          |          |          |          |          |          |          |



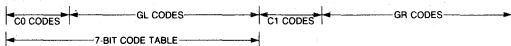
(DECIMAL VALUE IS  
COLUMN IN  
CODE TABLE)

(DECIMAL VALUE  
IS ROW IN  
CODE TABLE)

MA-089 1-83

## 8-Bit Code Table

| COLUMN<br>ROW | 00  | 01  | 02 | 03 | 04 | 05 | 06 | 07  | 08  | 09  | 10  | 11 | 12 | 13 | 14 | 15  |
|---------------|-----|-----|----|----|----|----|----|-----|-----|-----|-----|----|----|----|----|-----|
| 00            | NUL | DLE | SP |    |    |    |    |     |     | DCS | /// |    |    |    |    |     |
| 01            | SOH | DC1 |    |    |    |    |    |     |     | PUI |     |    |    |    |    |     |
| 02            | STX | DC2 |    |    |    |    |    |     |     | PL2 |     |    |    |    |    |     |
| 03            | ETX | DC3 |    |    |    |    |    |     |     | STS |     |    |    |    |    |     |
| 04            | EOT | DC4 |    |    |    |    |    |     | IND | CCH |     |    |    |    |    |     |
| 05            | ENQ | NAK |    |    |    |    |    |     | NEL | MW  |     |    |    |    |    |     |
| 06            | ACK | SYN |    |    |    |    |    |     | SSA | SPA |     |    |    |    |    |     |
| 07            | BEL | ETB |    |    |    |    |    |     | ESA | EPA |     |    |    |    |    |     |
| 08            | BS  | CAN |    |    |    |    |    |     | HTS |     |     |    |    |    |    |     |
| 09            | HT  | EM  |    |    |    |    |    |     | HTJ |     |     |    |    |    |    |     |
| 10            | LF  | SUB |    |    |    |    |    |     | VTS |     |     |    |    |    |    |     |
| 11            | VT  | ESC |    |    |    |    |    |     | PLD | CSI |     |    |    |    |    |     |
| 12            | FF  | FS  |    |    |    |    |    |     | PLU | ST  |     |    |    |    |    |     |
| 13            | CR  | GS  |    |    |    |    |    |     | RI  | OSC |     |    |    |    |    |     |
| 14            | SO  | RS  |    |    |    |    |    |     | SS2 | PM  |     |    |    |    |    |     |
| 15            | SI  | US  |    |    |    |    |    | DEL | SS3 | APC |     |    |    |    |    | /// |



MA-0892-83

# DEC Multinational Character Set (C0 and GL Codes)

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

## KEY

|           |     |    |         |
|-----------|-----|----|---------|
| CHARACTER | ESC | 33 | OCTAL   |
|           |     | 27 | DECIMAL |
|           |     | 1B | HEX     |

# DEC Multinational Character Set (C1 and GR Codes)

| 8                | 9                | 10               | 11               | 12               | 13               | 14               | 15               | COLUMN                                       | ROW              |                  |         |    |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|------------------|------------------|---------|----|
| 1<br>0<br>0      | 1<br>0<br>0<br>1 | 1<br>0<br>1<br>0 | 1<br>0<br>1<br>1 | 1<br>1<br>0<br>0 | 1<br>1<br>0<br>1 | 1<br>1<br>1<br>0 | 1<br>1<br>1<br>1 | b8<br>b7<br>b6<br>b5<br>b4<br>b3<br>b2<br>b1 |                  |                  |         |    |
| 200<br>128<br>80 | DCS              | 220<br>144<br>90 | 240<br>160<br>A0 | •                | 260<br>176<br>80 | À<br>192<br>C0   | 300<br>208<br>D0 | 320<br>224<br>E0                             | 360<br>240<br>F0 | 0 0 0 0          | 0       |    |
| 201<br>129<br>81 | PU1              | 221<br>145<br>91 | 241<br>161<br>A1 | ±                | 261<br>177<br>81 | Á<br>193<br>C1   | Ñ<br>209<br>D1   | ã<br>225<br>E1                               | ñ<br>241<br>F1   | 0 0 0 1          | 1       |    |
| 202<br>130<br>82 | PU2              | 222<br>146<br>92 | 242<br>162<br>A2 | 2                | 262<br>178<br>82 | Â<br>194<br>C2   | Ò<br>210<br>D2   | ä<br>226<br>E2                               | ö<br>242<br>F2   | 0 0 1 0          | 2       |    |
| 203<br>131<br>83 | STS              | 223<br>147<br>93 | 243<br>163<br>A3 | 3                | 263<br>179<br>83 | Ã<br>195<br>C3   | Ó<br>211<br>D3   | å<br>227<br>E3                               | ó<br>243<br>F3   | 0 0 1 1          | 3       |    |
| 204<br>132<br>84 | IND              | 224<br>148<br>94 | 244<br>164<br>A4 | 264<br>180<br>84 | Ä<br>196<br>C4   | Ô<br>212<br>D4   | 324<br>212<br>E4 | ä<br>228<br>F4                               | ô<br>244<br>F4   | 0 1 0 0          | 4       |    |
| 205<br>133<br>85 | NEL              | 225<br>149<br>95 | 245<br>165<br>A5 | μ                | 265<br>181<br>85 | Å<br>197<br>C5   | Õ<br>213<br>D5   | å<br>229<br>E5                               | õ<br>245<br>F5   | 0 1 0 1          | 5       |    |
| 206<br>134<br>86 | SSA              | 226<br>150<br>96 | 246<br>166<br>A6 | ¶                | 266<br>182<br>86 | Æ<br>198<br>C6   | Ö<br>214<br>D6   | æ<br>230<br>E6                               | ö<br>246<br>F6   | 0 1 1 0          | 6       |    |
| 207<br>135<br>87 | ESA              | 227<br>151<br>97 | 247<br>167<br>A7 | •                | 267<br>183<br>87 | Ç<br>199<br>C7   | Œ<br>215<br>D7   | ç<br>231<br>E7                               | œ<br>247<br>F7   | 0 1 1 1          | 7       |    |
| 210<br>136<br>88 | HTS              | 230<br>152<br>98 | 250<br>168<br>A8 | 270<br>184<br>88 | È<br>200<br>C8   | Ø                | 330<br>216<br>D8 | 350<br>232<br>E8                             | 370<br>248<br>F8 | 1 0 0 0          | 8       |    |
| 211<br>137<br>89 | HTJ              | 231<br>153<br>99 | 251<br>169<br>A9 | 1                | 271<br>185<br>89 | É<br>201<br>C9   | Ù                | 331<br>217<br>D9                             | 351<br>233<br>E9 | 371<br>249<br>F9 | 1 0 0 1 | 9  |
| 212<br>138<br>90 | VTS              | 232<br>154<br>9A | 252<br>170<br>AA | 2                | 272<br>186<br>9A | Ê<br>202<br>CA   | Ú                | 332<br>218<br>DA                             | 352<br>234<br>EA | 372<br>250<br>FA | 1 0 1 0 | 10 |
| 213<br>139<br>91 | PLD              | 233<br>155<br>9B | 253<br>171<br>AB | 3                | 273<br>187<br>8B | Ë<br>203<br>CB   | Û                | 333<br>219<br>DB                             | 353<br>235<br>EB | 373<br>251<br>FB | 1 0 1 1 | 11 |
| 214<br>140<br>9C | PLU              | 234<br>156<br>9C | 254<br>172<br>BC | ¼                | 274<br>188<br>9C | Ì<br>204<br>CC   | Ü                | 334<br>220<br>DC                             | 354<br>236<br>EC | 374<br>252<br>FC | 1 1 0 0 | 12 |
| 215<br>141<br>8D | RI               | 235<br>157<br>9D | 255<br>173<br>AD | ½                | 275<br>189<br>8D | Í<br>205<br>CD   | Ý                | 335<br>221<br>DD                             | 355<br>237<br>ED | 375<br>253<br>FD | 1 1 0 1 | 13 |
| 216<br>142<br>8E | SS2              | 236<br>158<br>9E | 256<br>174<br>CE | 276<br>190<br>8E | Î<br>206<br>CE   | 336<br>222<br>DE | 356<br>238<br>FE | 376<br>254<br>FE                             | 376<br>254<br>FE | 1 1 1 0          | 14      |    |
| 217<br>143<br>8F | SS3              | 237<br>159<br>9F | 257<br>175<br>AF | 277<br>191<br>8F | Ï<br>207<br>CF   | 337<br>223<br>DF | 357<br>239<br>EF | 377<br>255<br>FF                             | 377<br>255<br>FF | 1 1 1 1          | 15      |    |

C1 CODES GR CODES  
(DEC SUPPLEMENTAL GRAPHICS)

## UK National Character Set

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

## KEY

| CHARACTER | ESC | 33 | OCTAL   |
|-----------|-----|----|---------|
|           |     | 27 | DECIMAL |
|           |     | 1B | HEX     |

## DEC Special Graphics

| COLUMN |             | 0   | 1          | 2   | 3   | 4   | 5       | 6   | 7   |
|--------|-------------|-----|------------|-----|-----|-----|---------|-----|-----|
| BITS   |             | 0 0 |            | 0 1 | 0 1 | 1 0 | 1 0     | 1 1 | 1 1 |
| ROW    | B4 B3 B2 B1 |     |            |     |     |     |         |     |     |
| 0      | 0 0 0 0     | NUL | DLE        | SP  | 0   | @   | P       | ↓   | —   |
| 1      | 0 0 0 1     | SOH | DC1 (XON)  | !   | 1   | A   | Q       | ↑   | —   |
| 2      | 0 0 1 0     | STX | DC2        | "   | 2   | B   | R       | ↖   | —   |
| 3      | 0 0 1 1     | ETX | DC3 (XOFF) | #   | 3   | C   | S       | ↗   | —   |
| 4      | 0 1 0 0     | EOT | DC4        | \$  | 4   | D   | T       | ↘   | —   |
| 5      | 0 1 0 1     | ENQ | NAK        | %   | 5   | E   | U       | ↙   | —   |
| 6      | 0 1 1 0     | ACK | SYN        | &   | 6   | F   | V       | ↕   | —   |
| 7      | 0 1 1 1     | BEL | ETB        | '   | 7   | G   | W       | ↔   | —   |
| 8      | 1 0 0 0     | BS  | CAN        | (   | 8   | H   | X       | ↔   | —   |
| 9      | 1 0 0 1     | HT  | EM         | )   | 9   | I   | Y       | ↔   | —   |
| 10     | 1 0 1 0     | LF  | SUB        | *   | :   | J   | Z       | ↔   | —   |
| 11     | 1 0 1 1     | VT  | ESC        | +   | .   | K   | [       | ↔   | —   |
| 12     | 1 1 0 0     | FF  | FS         | ,   | <   | L   | \       | ↔   | —   |
| 13     | 1 1 0 1     | CR  | GS         | -   | =   | M   | ]       | ↔   | —   |
| 14     | 1 1 1 0     | SO  | RS         | .   | >   | N   | ^       | ↔   | —   |
| 15     | 1 1 1 1     | SI  | US         | /   | ?   | O   | (BLANK) | —   | DEL |

C0 CODES

GL CODES  
(DEC SPECIAL GRAPHICS)

## KEY

CHARACTER

ESC

OCTAL  
DECIMAL  
HEX

Display Controls Font

| COLUMN               |         | 0       | 1 | 2       | 3  | 4       | 5  | 6       | 7  |
|----------------------|---------|---------|---|---------|----|---------|----|---------|----|
| b8 BITS              |         | 0 0 0 0 |   | 0 0 0 1 |    | 0 0 1 0 |    | 0 0 1 1 |    |
| b7 b6 b5 b4 b3 b2 b1 |         | 0 0 0 0 |   | 0 0 0 1 |    | 0 0 1 0 |    | 0 0 1 1 |    |
| ROW                  |         | 0 0 0 0 |   | 0 0 0 1 |    | 0 0 1 0 |    | 0 0 1 1 |    |
| 0                    | 0 0 0 0 | N       | U | 0       | 0  | 0       | 0  | 0       | 0  |
| 1                    | 0 0 0 1 | S       | H | 1       | 1  | 1       | 1  | 1       | 1  |
| 2                    | 0 0 1 0 | S       | X | 2       | 2  | 2       | 2  | 2       | 2  |
| 3                    | 0 0 1 1 | E       | X | 3       | 3  | 3       | 3  | 3       | 3  |
| 4                    | 0 1 0 0 | E       | T | 4       | 4  | 4       | 4  | 4       | 4  |
| 5                    | 0 1 0 1 | E       | D | 5       | 5  | 5       | 5  | 5       | 5  |
| 6                    | 0 1 1 0 | A       | K | 6       | 6  | 6       | 6  | 6       | 6  |
| 7                    | 0 1 1 1 | B       | L | 7       | 7  | 7       | 7  | 7       | 7  |
| 8                    | 1 0 0 0 | B       | S | 8       | 8  | 8       | 8  | 8       | 8  |
| 9                    | 1 0 0 1 | H       | T | 9       | 9  | 9       | 9  | 9       | 9  |
| 10                   | 1 0 1 0 | L       | F | 10      | 10 | 10      | 10 | 10      | 10 |
| 11                   | 1 0 1 1 | V       | T | 11      | 11 | 11      | 11 | 11      | 11 |
| 12                   | 1 1 0 0 | F       | F | 12      | 12 | 12      | 12 | 12      | 12 |
| 13                   | 1 1 0 1 | C       | R | 13      | 13 | 13      | 13 | 13      | 13 |
| 14                   | 1 1 1 0 | S       | O | 14      | 14 | 14      | 14 | 14      | 14 |
| 15                   | 1 1 1 1 | S       | I | 15      | 15 | 15      | 15 | 15      | 15 |

CO CODES GL CODES (ASCII GRAPHICS)

KEY

|           |     |    |         |
|-----------|-----|----|---------|
| CHARACTER | ESC | 33 | OCTAL   |
|           |     | 27 | DECIMAL |
|           |     | 1B | HEX     |

# Display Controls Font (Cont)

| 8                      | 9                      | 10                    | 11                    | 12                    | 13                    | 14                    | 15                    | COLUMN                              |      |
|------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|------|
| 1<br>0<br>0            | 1<br>0<br>1            | 1<br>0<br>0           | 1<br>0<br>1           | 1<br>1<br>0           | 1<br>1<br>0           | 1<br>1<br>1           | 1<br>1<br>1           | b8<br>b7<br>b6<br>b5<br>b4 b3 b2 b1 | ROWS |
| 0<br>200<br>128<br>80  | 0<br>220<br>144<br>90  | A<br>240<br>160<br>A0 | 0<br>260<br>176<br>80 | À<br>300<br>192<br>C0 | Ð<br>320<br>208<br>D0 | à<br>340<br>224<br>E0 | Ò<br>360<br>240<br>F0 | 0 0 0 0                             | 0    |
| 1<br>201<br>129<br>81  | 1<br>221<br>145<br>91  | ì<br>241<br>161<br>A1 | ±<br>261<br>177<br>81 | Á<br>301<br>193<br>C1 | Ñ<br>321<br>209<br>D1 | á<br>341<br>225<br>E1 | ó<br>361<br>241<br>F1 | 0 0 0 1                             | 1    |
| 2<br>202<br>130<br>82  | 2<br>222<br>146<br>92  | ¢<br>242<br>162<br>A2 | 2<br>262<br>178<br>82 | Â<br>302<br>194<br>C2 | Ò<br>322<br>210<br>D2 | â<br>342<br>226<br>E2 | ô<br>362<br>242<br>F2 | 0 0 1 0                             | 2    |
| 3<br>203<br>131<br>83  | 3<br>223<br>147<br>93  | £<br>243<br>163<br>A3 | 3<br>263<br>179<br>83 | Ã<br>303<br>195<br>C3 | Ó<br>323<br>211<br>D3 | ã<br>343<br>227<br>E3 | ó<br>363<br>243<br>F3 | 0 0 1 1                             | 3    |
| 4<br>204<br>132<br>84  | 4<br>224<br>148<br>94  | Ä<br>244<br>164<br>A4 | Ä<br>264<br>180<br>84 | Ä<br>304<br>196<br>C4 | Ô<br>324<br>212<br>D4 | ä<br>344<br>228<br>E4 | ö<br>364<br>244<br>F4 | 0 1 0 0                             | 4    |
| 5<br>205<br>133<br>85  | 5<br>225<br>149<br>95  | ¥<br>245<br>165<br>A5 | µ<br>265<br>181<br>85 | Å<br>305<br>197<br>C5 | Õ<br>325<br>213<br>D5 | å<br>345<br>229<br>E5 | õ<br>365<br>245<br>F5 | 0 1 0 1                             | 5    |
| 6<br>206<br>134<br>86  | 6<br>226<br>150<br>96  | Å<br>246<br>166<br>A6 | ¶<br>266<br>182<br>86 | Æ<br>306<br>198<br>C6 | Ö<br>326<br>214<br>D6 | æ<br>346<br>230<br>E6 | ö<br>366<br>246<br>F6 | 0 1 1 0                             | 6    |
| 7<br>207<br>135<br>87  | 7<br>227<br>151<br>97  | §<br>247<br>167<br>A7 | ·<br>267<br>183<br>87 | Ç<br>307<br>199<br>C7 | Œ<br>327<br>215<br>D7 | ç<br>347<br>231<br>E7 | œ<br>367<br>247<br>F7 | 0 1 1 1                             | 7    |
| 8<br>210<br>136<br>88  | 8<br>230<br>152<br>98  | ×<br>250<br>168<br>A8 | 8<br>270<br>184<br>88 | È<br>310<br>200<br>C8 | Ø<br>330<br>216<br>D8 | è<br>350<br>232<br>E8 | ø<br>370<br>248<br>F8 | 1 0 0 0                             | 8    |
| 9<br>211<br>137<br>89  | 9<br>231<br>153<br>99  | ©<br>251<br>169<br>A9 | 1<br>271<br>185<br>89 | É<br>311<br>201<br>C9 | Ù<br>331<br>217<br>D9 | é<br>351<br>233<br>E9 | ù<br>371<br>249<br>F9 | 1 0 0 1                             | 9    |
| 10<br>212<br>138<br>90 | 10<br>232<br>154<br>9A | ª<br>252<br>170<br>AA | º<br>272<br>186<br>9A | Ê<br>312<br>202<br>CA | Ú<br>332<br>218<br>DA | ê<br>352<br>234<br>EA | ú<br>372<br>250<br>FA | 1 0 1 0                             | 10   |
| 11<br>213<br>139<br>91 | 11<br>233<br>155<br>9B | «<br>253<br>171<br>AB | »<br>273<br>187<br>9B | Ë<br>313<br>203<br>CB | Û<br>333<br>219<br>DB | ë<br>353<br>235<br>EB | û<br>373<br>251<br>FB | 1 0 1 1                             | 11   |
| 12<br>214<br>140<br>9C | 12<br>234<br>156<br>9C | Ā<br>254<br>172<br>AC | ¼<br>274<br>188<br>9C | Ì<br>314<br>204<br>CC | Ü<br>334<br>220<br>DC | ì<br>354<br>236<br>EC | ü<br>374<br>252<br>FC | 1 1 0 0                             | 12   |
| 13<br>215<br>141<br>9D | 13<br>235<br>157<br>9D | Ĭ<br>255<br>173<br>AD | ½<br>275<br>189<br>9D | Í<br>315<br>205<br>CD | Ý<br>335<br>221<br>DD | í<br>355<br>237<br>ED | ý<br>375<br>253<br>FD | 1 1 0 1                             | 13   |
| 14<br>216<br>142<br>9E | 14<br>236<br>158<br>9E | Ē<br>256<br>174<br>AE | ¾<br>276<br>190<br>9E | Î<br>316<br>206<br>CE | Þ<br>336<br>222<br>DE | î<br>356<br>238<br>EE | þ<br>376<br>254<br>FE | 1 1 1 0                             | 14   |
| 15<br>217<br>143<br>9F | 15<br>237<br>159<br>9F | Ĥ<br>257<br>175<br>AF | ¿<br>277<br>191<br>9F | Ï<br>317<br>207<br>CF | ß<br>337<br>223<br>DF | ï<br>357<br>239<br>EF | ÿ<br>377<br>255<br>FF | 1 1 1 1                             | 15   |

C1 CODES GR CODES  
(DEC SUPPLEMENTAL GRAPHICS)

### Escape Sequences

An escape sequence is a sequence of one or more ASCII graphic characters preceded by the C0 character ESC. For example,

ESC # 6

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

### Control Sequences

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

CSI ? 3 h

ESC [ ? 3 h

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

### Device Control Strings


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

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

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

## TRANSMITTED CODES

### Main Keypad Function Keys

| Key  | Code Transmitted   |
|--|--|
|  | DEL character.   |
| TAB  | HT character   |
| RETURN   | CR character only or a CR character and an LF character, depending on the set/reset state of Linefeed/New Line mode (LNM). |

---

## Main Keypad Function Keys (Cont)

| Key                  | Code Transmitted          |
|----------------------|---------------------------|
| CTRL                 | Does not transmit a code. |
| LOCK                 | Does not transmit a code. |
| SHIFT<br>(2 keys)    | Does not transmit a code. |
| SPACE BAR            | SP character.             |
| COMPOSE<br>CHARACTER | Does not transmit a code. |

## Editing Keys

| Key          | Code Generated<br>VT200 Mode | VT100, VT52,<br>4010/4014 Modes |
|--------------|------------------------------|---------------------------------|
| FIND         | CSI 1 ~                      | None                            |
| INSERT HERE  | CSI 2 ~                      | None                            |
| REMOVE       | CSI 3 ~                      | None                            |
| SELECT       | CSI 4 ~                      | None                            |
| PREV SCREEN  | CSI 5 ~                      | None                            |
| NEXT SCREEN* | CSI 6 ~                      | None                            |

\* In 4010/4014 mode, NEXT SCREEN is used as a "CLEAR SCREEN" key.

## Cursor Control Keys

| Key | ANSI Mode*      |                    | VT52 Mode* |             |
|-----|-----------------|--------------------|------------|-------------|
|     | Reset<br>Normal | Set<br>Application | Normal     | Application |
| ↑   | CSI A           | SS3 A              | ESC A      | ESC A       |
| ↓   | CSI B           | SS3 B              | ESC B      | ESC B       |
| →   | CSI C           | SS3 C              | ESC C      | ESC C       |
| ←   | CSI D           | SS3 D              | ESC D      | ESC D       |

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

## Auxiliary Keypad Keys

| VT100/VT200<br>ANSI Mode* |                           |                               | VT52 Mode*                |                               |
|---------------------------|---------------------------|-------------------------------|---------------------------|-------------------------------|
| Key                       | Keypad<br>Numeric<br>Mode | Keypad<br>Application<br>Mode | Keypad<br>Numeric<br>Mode | Keypad<br>Application<br>Mode |
| 0                         | 0                         | SS3 p                         | 0                         | ESC ? p                       |
| 1                         | 1                         | SS3 q                         | 1                         | ESC ? q                       |
| 2                         | 2                         | SS3 r                         | 2                         | ESC ? r                       |
| 3                         | 3                         | SS3 s                         | 3                         | ESC ? s                       |
| 4                         | 4                         | SS3 t                         | 4                         | ESC ? t                       |
| 5                         | 5                         | SS3 u                         | 5                         | ESC ? u                       |
| 6                         | 6                         | SS3 v                         | 6                         | ESC ? v                       |
| 7                         | 7                         | SS3 w                         | 7                         | ESC ? w                       |
| 8                         | 8                         | SS3 x                         | 8                         | ESC ? x                       |
| 9                         | 9                         | SS3 y                         | 9                         | ESC ? y                       |
| —                         | —(minus)                  | SS3 m                         | —                         | ESC ? m                       |
| ,                         | ,(comma)                  | SS3 l                         | ,                         | ESC ? l†                      |
| .                         | .(period)                 | SS3 n                         | .                         | ESC ? n                       |
| Enter                     | CR<br>or<br>CR LF         | SS3 M                         | CR<br>or<br>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†                        |

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

† You cannot generate these sequences on a VT52 terminal.

‡ Keypad Numeric Mode. ENTER generates the same codes as RETURN. You can change the code generated by RETURN with the Linefeed/New Line Mode. When reset, the Linefeed/New Line Mode causes RETURN to generate a single control character (CR). When set, the mode causes RETURN to generate two control characters (CR, LF).

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## Top Row Function Keys

| Name on<br>Legend Strip | Generic<br>Name | Code Generated |                         |
|-------------------------|-----------------|----------------|-------------------------|
|                         |                 | VT200<br>Mode  | VT100,<br>VT52<br>Modes |
| HOLD SCREEN             | (F1)*           | -              | -                       |
| PRINT SCREEN            | (F2)*           | -              | -                       |
| SET-UP                  | (F3)*           | -              | -                       |
| DATA/TALK               | (F4)*           | -              | -                       |
| BREAK                   | (F5)*           | -              | -                       |
| F6                      | F6              | CSI 1 7 ~      | -                       |
| F7                      | F7              | CSI 1 8 ~      | -                       |
| F8                      | F8              | CSI 1 9 ~      | -                       |
| F9                      | F9              | CSI 2 0 ~      | -                       |
| F10                     | F10             | CSI 2 1 ~      | -                       |
| F11 (ESC)               | F11             | CSI 2 3 ~      | ESC                     |
| F12 (BS)                | F12             | CSI 2 4 ~      | BS                      |
| F13 (LF)                | F13             | CSI 2 5 ~      | LF                      |
| F14                     | F14             | CSI 2 6 ~      | -                       |
| HELP                    | (F15)           | CSI 2 8 ~      | -                       |
| DO                      | (F16)           | CSI 2 9 ~      | -                       |
| F17                     | F17             | CSI 3 1 ~      | -                       |
| F18                     | F18             | CSI 3 2 ~      | -                       |
| F19                     | F19             | CSI 3 3 ~      | -                       |
| F20                     | F20             | CSI 3 4 ~      | -                       |

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

**Keys Used to Generate 7-Bit Control Characters**

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

\* Keys F11, F12, and F13 generate these 7-bit control characters only when the terminal is operated in VT100 mode, VT52 mode or 4010/4014 mode.

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

---

## RECEIVED CODES

### Compatibility Level (DECSCSCL)

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

### C0 (ASCII) Control Characters Recognized

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

**CO (ASCII) Control Characters Recognized (Cont)**

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

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**C1 Control Characters Recognized**

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

## C1 Control Characters Recognized (Cont)

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

## CHARACTER SET SELECTION (SCS)

### Designating "Hard" Character Sets

| Character Set                         | Escape Sequence | Designate as:           |
|---------------------------------------|-----------------|-------------------------|
| ASCII                                 | ESC ( B         | G0<br>(default)         |
|                                       | ESC ) B         | G1                      |
|                                       | ESC * B         | G2<br>(VT200 mode only) |
|                                       | ESC + B         | G3<br>(VT200 mode only) |
| DEC Supplemental<br>(VT200 mode only) | ESC ( <         | G0                      |
|                                       | ESC ) <         | G1                      |
|                                       | ESC * <         | G2                      |
|                                       | ESC + <         | G3                      |
| UK National<br>(VT100 mode only)      | ESC ( A         | G0                      |
|                                       | ESC ) A         | G1                      |
| DEC Special<br>Graphics               | ESC ( 0         | G0                      |
|                                       | ESC ) 0         | G1                      |
|                                       | ESC * 0         | G2<br>(VT200 mode only) |
|                                       | ESC + 0         | G3<br>(VT200 mode only) |

## Designating "Soft" (Down-Line Loadable) Character Sets

### Escape Sequence      Designate As:

|            |    |
|------------|----|
| ESC ( Dscs | G0 |
| ESC ) Dscs | G1 |
| ESC * Dscs | G2 |
| ESC + Dscs | G3 |

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

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

### Invoking Character Sets Using Lock Shifts

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

**Invoking Character Sets Using Single Shifts**

| Control Name          | Coding       | Function  |
|-----------------------|--------------|---|
| SS2 – single shift G2 | SS2<br>ESC N | Invokes G2 into GL for the next graphic character |
| SS3 – single shift G3 | SS3<br>ESC O | Invokes G3 into GL for the next graphic character |

**Select C1 Control Transmission**

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

**NOTE**

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

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

---

\* sp is a space character

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## Terminal Modes

| Name                  | Mnemonic           | Set Mode                  | Reset Mode*                    |
|-----------------------|--------------------|---------------------------|--------------------------------|
| Keyboard Action†      | KAM                | Locked<br>CSI 2 h         | Unlocked<br>CSI 2 l            |
| Insertion-replacement | IRM                | Insert<br>CSI 4 h         | Replace<br>CSI 4 l             |
| Send-receive          | SRM                | Off<br>CSI 12 h           | On<br>CSI 12 l                 |
| Line feed-new line    | LMN                | New line<br>CSI 20 h      | Line feed<br>CSI 20 l          |
| Cursor key            | DECCKM             | Application<br>CSI ? 1 h  | Cursor<br>CSI ? 1 l            |
| ANSI/VT52             | DECANM             | N/A<br>CSI ? 2 l          | VT52                           |
| Column                | DECCOLM            | 132 column<br>CSI ? 3 h   | 80 column<br>CSI ? 3 l         |
| Scrolling†            | DECSCLM            | Smooth<br>CSI ? 4 h       | Jump<br>CSI ? 4 l              |
| Screen†               | DECSCHM            | Reverse<br>CSI ? 5 h      | Normal<br>CSI ? 5 l            |
| Origin                | DECOM              | Origin<br>CSI ? 6 h       | Absolute<br>CSI ? 6 l          |
| Auto wrap             | DECAWM             | On<br>CSI ? 7 h           | Off<br>CSI ? 7 l               |
| Auto repeat†          | DECARM             | On<br>CSI ? 8 h           | Off<br>CSI ? 8 l               |
| Print form feed       | DECPFF             | On<br>CSI ? 18 h          | Off<br>CSI ? 18 l              |
| Print extent          | DECPEX             | Full screen<br>CSI ? 19 h | Scrolling region<br>CSI ? 19 l |
| Text cursor enable    | DECTCEM            | On<br>CSI ? 25 h          | Off<br>CSI ? 25 l              |
| Keypad                | DECKPAM<br>DECKPNM | Application<br>ESC =      | Numeric<br>ESC >               |
| Tektronix 4010/4014   | DECTEK             | On<br>CSI ? 38 h          | Off<br>CSI ? 38 l              |

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

† User Preference feature

**Cursor Positioning**

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

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**Cursor Positioning (Cont)**

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

---

## Tab Stops

**NOTE:**

These sequences are affected by the User Preference Lock in Set-up.

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

## Select Graphic Rendition (SGR)

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

CSI Ps ; ... Ps m

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

CSI 0 ; 4 ; 5 m

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

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

---

### Select Character Attributes (DECSCA)

You can select all subsequent characters to be “selective erasable” or “not selective erasable” (see section on ERASING) using the following format:

**NOTE:**

**This sequence is supported only in VT200 mode.**

CSI Ps " q

where:

| <b>Ps</b> | <b>Action</b>  |
|-----------|--|
| 0         | All attributes off (does not apply to SGR)                             |
| 1         | Designate character as “non-erasable” by DECSEL/DECSED (attribute on). |
| 2         | Designate character as “erasable” by DECSEL/DECSED (attribute off).    |

### Line Attributes

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

**Editing**

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

**Erasing**

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

---

## Erasing (Cont)

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

## Set Top and Bottom Margins (DECSTBM)

CSI Pt ; Pb r

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

## Printing

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

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

---

## Printing (Cont)

| Name                       | Sequence  | Action  |
|----------------------------|-----------|---|
| Print screen               | CSI i     | Prints the screen display (full screen or scrolling region, depending on the Print Extent DECEXT selection). Printer form feed mode (DECPFF) selects either a form feed (FF) or nothing as the print terminator. The print screen sequence is completed when the screen prints. |
|                            | CSI 0 i   | Same as above.  |
| Select graphics to printer | CXI ? i   | Causes subsequent ReGIS Hardcopy commands to direct the graphics display to the printer port. Text that is part of the graphics screen prints with the graphics.  |
|                            | CSI ? 0 i | Same as above.  |
| Select graphics to host    | CSI ? 2 i | Causes subsequent ReGIS Hardcopy commands to direct the graphics display to the host port.  |

## User Defined Keys (DECUDK)

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

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

where:

### Pc      Meaning

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

### PI      Meaning

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

**Key (kyn)      Value (stn)**

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

**Down-Line Loading Characters (DRCS)**

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

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

Parameter descriptions are as follows:

**DECDLD Parameter Characters**

| Parameter | Name                      | Description   |
|-----------|---------------------------|---|
| Pfn       | Font number               | 0 and 1.  |
| Pcn       | Starting character number | Selects starting character in DRCS font buffer to be loaded.  |
| Pe        | Erase control             | 0 = erase all characters in this DRCS set<br>1 = erase only the characters that are being reloaded<br>2 = erase all characters in all DRCS sets (this font buffer number and other font buffer numbers) |
|           | Character Matrix size     | 0 = Device default (7 × 10)<br>1 = (not used)<br>2 = 5 × 10<br>3 = 6 × 10<br>4 = 7 × 10   |

---

## DECDLD Parameter Characters (Cont)

| Parameter | Name               | Description  |
|-----------|--------------------|--|
| Pw        | Width attribute    | 0 = Device default (80 columns)<br>1 = 80 column<br>2 = 132 column |
| Pt        | Text/<br>full-cell | 0 = Device default (text)<br>1 = Text<br>2 = Full-cell             |

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

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

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

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

### Clearing a Down-Line Loaded Character Set

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

DCS 1;1;2 { sp @ ST

Down-line loaded character sets are also cleared by:

- performing the power-up self-test
- using the Set-Up Recall or Default functions
- using RIS or ESC c sequences

## Reports

### Device Attributes (DA)

| Communication                               | Sequence                        | Meaning   |
|---|---------------------------------|---|
| Host to VT240<br>(primary DA<br>request)    | CSI c<br>or<br>CSI 0 c          | "What is your<br>service class code<br>and what are your<br>attributes?"  |
| VT240 to host<br>(primary DA<br>response)   | CSI ? 62; 1; 2; 3; 4; 6; 7; 8 c | "I am a service<br>class 2 (VT200<br>family) terminal<br>(62) with 132<br>columns (1),<br>printer port (2),<br>ReGIS display (3),<br>sixel graphics I/O<br>(4), selective<br>erase (6), DRCS<br>(7), and UDK (8). |
| Host to VT240<br>(secondary DA<br>response) | CSI > c<br>or<br>CSI > 0 c      | "What type of ter-<br>minal are you, what<br>is your firmware<br>version, and what<br>hardware options<br>do you have<br>installed?"  |
| VT240 to host<br>(secondary DA<br>response) | CSI > 1; Pv; Po c               | "I am a VT240 (2),<br>my firmware<br>version is (Pv),<br>and I have PO<br>option installed.   |

Where:

Pv = firmware/software version

Po: 0 = no options

1 = Integral modem

EXAMPLE: CSI>2;10;1c = VT240 version 1.0, with integral modem option

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## Device Status Report (DSR)

| Communication                                     | Sequence     | Meaning   |
|---|--------------|---|
| Host to VT240<br>(request for<br>terminal status) | CSI 5 n      | "Please report your<br>operating status using<br>a DSR control se-<br>quence. Are you in<br>good operating con-<br>dition or do you have<br>a malfunction?" |
| VT240 to host<br>(DA response)                    | CSI 0 n      | "I have no<br>malfunction."   |
|   | CSI 3 n      | "I have a<br>malfunction."  |
| Host to VT240<br>(request for<br>cursor position) | CSI 6 n      | "Please report your<br>cursor position using<br>a CPR (not DSR)<br>control sequence."   |
| VT240 to host<br>(CPR response)                   | CSI Pv; Ph R | "My cursor is posi-<br>tioned at (Pv);<br>(Ph)."  |

Where:

Pv = vertical position (row)

Ph = horizontal position (column)

## DSR - Printer Port

| Communication                                    | Sequence   | Meaning   |
|--|------------|---|
| Host to VT240<br>(request for<br>printer status) | CSI ? 15 n | "What is the printer<br>status?"  |
| VT240 to host                                    | CSI ? 13 n | "DTR has not been<br>asserted on the<br>printer port since<br>power up or reset - in<br>essence, I have no<br>printer." |
|  | CSI ? 10 n | "DTR is asserted on<br>the printer port. The<br>printer is ready."  |
|  | CSI ? 11 n | "DTR is not currently<br>asserted on the printer<br>port. The printer is not<br>ready."                                 |

**DSR – User Defined Keys**

|  |            |   |
|--|------------|---|
| Host to VT240<br>(request for<br>UDK status) | CSI ? 25 n | “Are User Defined<br>Keys locked or<br>unlocked?” |
| VT240 to host                                | CSI ? 20 n | “User Defined Keys<br>are unlocked.”              |
|  | CSI ? 21 n | “User Defined Keys<br>are locked.”                |

**Identification (DECID)**

ESC Z

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

**ReGIS Graphics Protocol Controls Mode**

The ReGIS graphics mode is available through the VT200 and VT100 modes only. You enter ReGIS by sending a ReGIS device control string to the terminal.

**Control String  
Parameter**

|                        |   |
|------------------------|---|
| DCS p<br>or<br>DCS 0 p | Causes VT240 to enter ReGIS at previous command level. (ReGIS is at the highest command level if the terminal was powered-up after the last device control string.) |
| DCS 1 p                | Causes VT240 to enter ReGIS at highest command level.   |
| DCS 2 p                | Causes VT240 to enter ReGIS at previous command level with commands displayed on the screen's bottom line (command display mode enabled).                           |
| DCS 3 p                | Causes VT240 to enter ReGIS at highest command level with commands displayed on the screen's bottom line (command mode enabled).                                    |
| ST                     | Exit ReGIS mode and return to text mode.  |

---

## Terminal Reset

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

## Tests (DECTST)

The sequence format for invoking terminal tests is:

CSI 4 ; ..... ; Ps y

Where:

| Ps        | Test                                      |
|-----------|---|
| 0         | Test 1, 2, 3, 4, and 6                    |
| 1         | Power-up self-test                        |
| 2         | EIA port data loopback test               |
| 3         | Printer port loopback test                |
| 4         | Color Bar Test                            |
| 5         | (not used)                                |
| 6         | EIA port modem control line loopback test |
| 7         | 20 mA port loopback test                  |
| 8         | (not used)                                |
| 9         | Repeat other test in parameter string     |
| 10        | Full screen blue                          |
| 11        | Full screen green                         |
| 12        | Full screen red                           |
| 13        | Full screen white                         |
| 14        | Integral modem analog loopback test       |
| 15        | Integral modem external loopback test     |
| 16 and up | (not used)                                |

### NOTE:

**DECTST causes a communications line disconnect.**

## Adjustments (DECALN)

ESC # 8     Displays screen alignment pattern (full screen of "Es").

**VT52 Escape Sequences**

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

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\* Line and column numbers for direct cursor addressing are single character codes whose value is the desired number plus 37 (octal).

† The response to ESC Z in VT52 mode is ESC / Z.

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## ReGIS

### ReGIS Command Summary

| Command Key Letter | ReGIS Command Name | Description  |
|--------------------|--------------------|--|
| P                  | Position           | Positions the graphics cursor without performing any writing.  |
| V                  | Vector             | Draws vectors (straight lines) between screen locations specified within the command.  |
| C                  | Curve              | Draws circles, arcs and/or curves using screen locations specified within the command.   |
| T                  | Text               | Controls display of graphics text strings, and allows specification of characters to be displayed.   |
| W                  | Write              | Specifies writing controls, such as shading  |
| S                  | Screen             | Specifies screen controls, such as erasing the screen.   |
| @                  | Macrograph         | Defines a macrograph. Macrographs are used for storing and recalling ReGIS command strings, allowing a complex figure, which is to be used more than once to be stored as a macrograph, and invoked as a single command. |
| L                  | Load               | Controls definition and loading of alternate characters which can be displayed using the Text command.   |
| R                  | Report             | Reports information (such as active position, and error codes); initiates report position interactive mode.  |
| ;                  | Resynchronization  | Semicolon serves as a resynchronization command.   |

---

**ReGIS Power On/Reset Default Values Summary**

| <b>Command Type</b> | <b>Command</b>              | <b>Default Description</b>   |
|---------------------|-----------------------------|--|
| Screen Control      | S(A[0,0] [799,499])         | Defines the screen as having coordinate values of [0,0] for upper left corner, and [799,479] for lower right.                                    |
| Screen Control      | S[0,0]                      | No scroll is to occur.   |
| Screen Control      | S(H(P[50,0]))               | Any printing from the screen will be offset at the printer 50 coordinates to approximate centering on 8-1/2 inch wide paper.                     |
| Screen Control      | S(M0(L0)1(L25)2(L50)3(L75)) | Output map values for monochrome monitor are dark for M0, dim grey for M1, light grey for M2, and white for M3.                                  |
| Screen Control      | S(M0(AD)1(AB)2(AR)3(AG))    | Output map values for color monitor are dark for M0, blue for M1, red for M2, and green for M3.  |
| Screen Control      | S(I0)                       | Output map location 0 is selected for background intensity value, with dark background for color and monochrome monitors (default value for M0). |
| Screen Control      | S(T0)                       | No time delay.   |
| Write Control       | W(M1)                       | Pixel vector (PV) multiplication of 1.   |
| Write Control       | W(P1)                       | Solid line selected for writing pattern.   |
| Write               | W(P(M2))                    | Pattern multiplication factor of 2.  |
| Write Control       | W(N0)                       | Negative pattern control disabled.   |
| Write Control       | W(F3)                       | Writing enabled to both bit map planes.  |

---

## ReGIS Power On/Reset Default Values Summary (Cont)

| Command Type  | Command     | Default Description  |
|---------------|-------------|--|
| Write Control | W(I3)       | Output map location 3 selected for write tasks, resulting in white for monochrome, green for color, since these are the default values for M3. |
| Write Control | W(V)        | Overlay writing in effect.   |
| Write Control | W(S0)       | Shading disabled.  |
| Text          | T(A0)       | Character set containing standard ASCII characters is selected for text processing.  |
| Text          | T(S1)       | Standard character cell size 1 is selected for text processing.  |
| Text          | T(S[9,20])  | Display cell size associated with standard character cell size 1.  |
| Text          | T(U[8,20])  | Unit cell size associated with standard character cell size 1.   |
| Text          | T[+9,+0]    | Character positioning associated with standard character cell size 1.  |
| Text          | T(H2)       | Height multiplication factor of 2.   |
| Text          | T(D0 S1 D0) | String and character tilt disabled.  |
| Text          | T(I0)       | Italics disabled.  |
| Text          | T(M[1,2])   | Size multiplication factor of 1 for width, and 2 for height.   |
| Load          | L(A1)       | Select set 1 for loading.  |

**Screen Control Command Summary**

| <b>Command</b>     | <b>Description</b>  |
|--------------------|---|
| S (A[X,Y] [X,Y])   | Display addressing; allows defining addressing of screen at different size or orientation than actually true for VT240.   |
| S [X,Y]            | Scroll; uses relative X and Y values to define scrolling of screen data within the bit map while leaving coordinate system unchanged.   |
| S <PV number>      | Scroll; uses PV offset values to define scrolling of screen data within the bit map while leaving coordinate system unchanged.  |
| S (H)              | Hard copy control defining whole screen area is printed.  |
| S (H[X,Y] [X,Y])   | Hard copy control defining amount of screen to be printed; bracketed values are actual screen coordinates identify opposing positions to be used to define portion of screen to be printed.   |
| S (H[X,Y])         | Hard copy control defining amount of screen to be printed; bracketed values are actual screen coordinates used with current cursor location to identify opposing positions defining portion of screen to be printed.                          |
| S (H(P[X,Y]))      | Print offset; defines relative offset value from current printhead location to where upper left corner of image is to be printed; [50,0] is default at power on, until new value is defined; any new value remains in effect until redefined. |
| S (M<n>(<Lvalue>)) | Output mapping for changing mono shade values; Any or all values can be changed in a given command; defines the shade to be stored in selected (<n>) output map location.   |
| S (M<n>(<RGB>))    | Output mapping for changing color values using RGB specifier; any or all values can be changed in a given command; defines the color to be stored in selected (<n>) output map location.  |

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**Screen Control Command Summary (Cont)**

| <b>Command</b> | <b>Description</b>   |
|----------------|--|
| S (M<n>(HLS))  | Output mapping for changing color values using HLS specifier; any or all values can be changed in a given command; defines the color to be stored in selected (<n>) output map location; default values are HLS values for default RGB values. |
| S (I<n>)       | Background intensity select; selects output map location (<n>) to be used for background.  |
| S (I(RGB))     | Background intensity select; selects output ap location containing closest color to RGB value specified.   |
| S (I(HLS))     | Background intensity select; selects output map location containing closest color to HLS value specified.  |
| S (T<0-255>)   | Time delay; defines number of ticks f real time clock to be counted for a delay.   |
| S (E)          | Screen erase; causes all graphic images on screen to be rewritten at current background intensity.   |
| S (I<value>,E) | Screen erase to defined background intensity; defines a background intensity, and erases screen to that value.   |
| S (W(M<n>))    | Temporary write defining multiplication factor for PV values; defines number of coordinates to be affected by each PV value specified for a scroll.  |
| S (C<0 or 1>)  | Graphic Cursor Control; disables (C0) or enables (C1) display of diamond cursor.   |

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## Position Command Summary

| Command     | Description  |
|-------------|--|
| P [X,Y]     | Positioning using [X,Y] values to define a new active position; the [X,Y] values can be absolute, relative, or absolute/relative.  |
| P <PV>      | Positioning using PV values to define a relative repositioning of the active position.   |
| P (W(M<n>)) | Temporary write control defining multiplication factor for PV values; defines number of coordinates to be affected by PV values.   |
| P (B)       | Begin a bounded sequence; causes current active position to be stored for reference at the end of the sequence.  |
| P (S)       | Start an unbounded sequence; causes a dummy position to be stored for reference at the end of the sequence.  |
| P (E)       | End of sequence; causes last stored (B) or (S) value to be referenced; if value referenced was stored by a (B), active position will be defined by the stored value; If value referenced was stored by (S), active position will remain at its current location. |
| P [ ]       | Null position; used in conjunction with write tasks to force write tasks to begin with first location of pattern memory.   |

## Write Control Command Summary

| Command       | Description   |
|---------------|---|
| W (M<n>)      | PV multiplication; defines multiplication factor(<n>) for PV values can be used as temporary write control for other types of commands.       |
| W (P<0-9>)    | Select standard pattern; selects one of ten stored write patterns for write tasks.  |
| W (P<binary>) | Specify binary pattern; allows specification of unique writing patterns for write tasks. The specified pattern can be up to 8 bits in length. |

---

## Write Control Command Summary (Cont)

| Command         | Description  |
|-----------------|--|
| W P(M<1-16>))   | Pattern multiplication; used to define the number of times each bit of the pattern memory will be processed. Pattern multiplication can be combined with either select standard pattern or the specify binary pattern, or by itself, to define a multiplication factor for the last specified pattern. |
| W (N<0-1>)      | Negative pattern control; when on (N1), allows reversing effect of currently selected write pattern.   |
| W (F<0-3>)      | Foreground plane control; provides a mask which determines which planes of the bit map can be written to during write tasks.   |
| W (I<0-3>)      | Foreground intensity select; defines an output map address (<0-3>) to be used for write tasks; writing puts address of that location into bit map.   |
| W (I (<RGB>)    | Foreground intensity select; defines writing tasks to occur using the output map address containing the color closest to the RGB value specified.  |
| W (I (<HLS>)    | Foreground intensity; defines writing to occur using output map address containing the color closest to the HLS value specified.   |
| W (V,E,C, or R) | Four option letters available to define type of writing to occur: (C) for complement writing; (E) for erase writing; (R) for replace writing; (V) for overlay writing.   |
| W (S<0-1>)      | Shading on/off control; when on (S1), enables shading at currently selected pattern, with the shading reference line defined by the Y axis value of the active position when (S1) is invoked.  |
| W (S [,Y])      | Shading reference line select; selects a horizontal shading reference line defined by [,Y], which can be either an absolute or relative value.   |
| W (S (x) [X])   | Shading reference line select; selects a vertical shading reference line defined by [X], which can be either an absolute or relative value.  |

**Write Control Command Summary (Cont)**

| <b>Command</b>      | <b>Description</b>   |
|---------------------|--|
| W (S '<character>') | Shading character select; allows graphic objects to be filled using the character specified. |

**Vector Commands Summary**

| <b>Command</b>       | <b>Description</b>   |
|----------------------|--|
| V [ ]                | Draw dot; used to write to a single pixel defined by current active position; No cursor movement occurs.   |
| V [X,Y]              | Draw line using [X,Y] value to define a position to which a line is to be drawn from the current active position; the [X,Y] value can be an absolute, relative, or absolute/relative positioning value.  |
| V <PV>               | Draw line using PV values to define a position to which a line is to be drawn, relative to the current active position, in the direction defined by the PV value.  |
| V (B)                | Begin a bounded sequence; causes current active position to be stored for reference at the end of the sequence.  |
| V (S)                | Start an unbounded sequence; causes a dummy position to be stored for reference at the end of the sequence.  |
| V (E)                | End of sequence; causes last stored (B) or (S) value to be referenced; If value referenced was stored by a (B), a line is drawn from the active position where (E) is sensed, to the location stored by (B); If value referenced was stored by (S), no line is drawn, and active position remains at current position. |
| V (W (<suboptions>)) | Temporary write control; used to invoke write control values different from those currently in effect, without altering those write control values; temporary write control values remain in effect only for the duration of write tasks they are invoked for.   |

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## Curve Commands Summary

| Command               | Description  |
|-----------------------|--|
| C [X,Y]               | Circle with center at current position; [X,Y] defines a point on the circumference of the circle; the specified [X,Y] value can be absolute, relative, or absolute/relative position.  |
| C (C) [X,Y]           | Circle with center at specified position; [X,Y] defines a point to serve as the circle center, while current active position defines a point on the circumference; the [X,Y] value can be absolute, relative, or absolute/relative position.   |
| C (A<degrees>) [X,Y]  | Arc with center at current position; [X,Y] defines the starting point for drawing the arc, while the signed value of the <degrees> (+ or -) determines which direction the arc will be drawn from that point: + for counterclockwise, and - for clockwise; the [X,Y] value can be absolute, relative, or absolute/relative position.                         |
| C (A<degrees>C) [X,Y] | Arc with center at specified position; [X,Y] defines the center, while the current active position is the point from which the arc is drawn; The signed value of <degrees> (+ or -) determines which direction the arc will be drawn: + for counterclockwise, and - for clockwise; The [X,Y] value can be absolute, relative, or absolute/relative position. |
| C (B)<positions> (E)  | Closed curve sequence; used to define a closed curve graphic image built from interpolation of [X,Y] positions specified within the option; the [X,Y] values specified can be absolute, relative, or absolute/relative.  |
| C (S)<positions> (E)  | Open curve sequence; used to define an open curve graphic image built from interpolation of [X,Y] positions specified within the option; the [X,Y] values specified can be absolute, relative, or absolute/relative.   |

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## Curve Commands Summary (Cont)

| Command              | Description   |
|----------------------|---|
| C [ ]                | Null position; used with either open or closed sequence to affect interpolation; [] will cause a position equal to the last specified active position to be stored as part of the positions to be interpolated; when used at the beginning of a sequence, the value stored will be the current active position. |
| C (W (<suboptions>)) | Temporary write control; used to invoke write control different from those currently in effect, without altering the overall write control values; temporary write control values remain in effect only for the duration of write tasks they are invoked for.   |

## Text Command Summary

| Command                 | Description   |
|-------------------------|---|
| T 'text'                | Text string; provides identification of text to be displayed; Text string characters must be delimited by either single quotes ('text'), or double quotes("text").  |
| T (A<0-3>)              | Character set; defines which of four possible character sets (<0-3>) is to be used for processing text string characters.   |
| T (S<0-16>)             | Standard character cell size; defines a set of display cell, unit cell, and character positioning, values to be used in processing text string characters; any one of 17 different sets (<0-16>) can be invoked.                            |
| T (S [ <width,height>]) | Display cell size; allows varying size of cell used for text string characters; default value comes from screen coordinate value associated with the standard character cell size default of(S1); if specified in pixels, [9,20] is [9,10]. |

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**Text Command Summary (Cont)**

| <b>Command</b>         | <b>Description</b>  |
|------------------------|---|
| T [X,Y]                | Character positioning; allows varying of positioning between text string characters; default value comes from position value associated with the standard character cell size default of (S1); [X,Y] values are relative.   |
| T (U [<width,height>]) | Unit cell size; allows varying size of unit used for text string characters; default value comes from screen coordinate value associated with the standard character cell size default of (S1). In pixels, [8,20] is [8,10].  |
| T (H<1-25>)            | Height multiplier; when invoked, the height multiplier will change the display cell and unit cell size height values to a value equal to 10 times the specified multiplier ([1-25]), without affecting width values, or positioning.  |
| T (D<a> S<0-16>)       | String tilt; used to define a tilt of text string characters, as a whole, relative to the normal horizontal baseline; <a> defines the degrees of the tilt; <0-16> provides a standard set value from which positioning during the tilt can be computed.   |
| T (D<a> S<0-16> D a )  | String/character tilt; used to define separate tilt values for the string, and the characters in the text string; the first <a> defines the degrees of tilt for the string; the second <a> defines the degrees of tilt for the characters in the string; <0-16> provides a standard set value from which positioning during the tilt can be computed. |
| T (I<a>)               | Italics; defines a degree of tilt (<a>) for characters without changing their orientation to the current baseline.  |

---

**Text Command Summary (Cont)**

| <b>Command</b>       | <b>Description</b>  |
|----------------------|---|
| T (B)<options>(E)    | Temporary text control; allows selecting text values which differ from those currently defined, without affecting the current values; the temporary values remain in effect until (E) is invoked.   |
| T <PV>               | PV spacing; Uses PV values to enable superscript, subscript, and overstrike functions.  |
| T (W (<options>)     | Temporary write control; used to invoke write control values different from those currently in effect, without altering the overall write control values; temporary write control values are only in effect for the text command they are invoked for.                |
| T (M [width,height]) | Size multiplication; provides multiplication factors for the height and width values of the unit cell size associated with standard cell size 1; the minimum multiplication for height and width is 1; the maximum multiplication is 16 for width and 127 for height. |

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## Load Command Summary

| Command                 | Description   |
|-------------------------|---|
| L (A<1-3>)              | Select set; defines which of the three loadable character sets is to be selected for any subsequent load cell activity.   |
| L (A"<name>")           | Specify name; provides a name ("<name>") of up to ten characters in length to be applied to the currently selected set; specify name can be combined with the select set: (A<1-3> "<name>").  |
| L "<ASCII>" <hex pairs> | Load cell; used to generate characters to be stored in the selected set; "<ASCII>" is a single ASCII character which provides an identity for the character cell; <hex pairs> are used to define the bit pattern of the character to be stored on line-by-line basis. |

## Macrograph Summary

| Syntax                    | Description   |
|---------------------------|---|
| @<letter>                 | Invoke macrograph; causes content of the selected macrograph (<letter>), a single case insensitive letter, to be invoked on the screen starting at the current cursor location. |
| @:<letter> <definition>@; | Define macrograph; defines the single, case insensitive letter the macrograph is to be stored under, and the definition to be stored.   |
| @.                        | Clear all macrographs; when invoked, deletes stored macrograph descriptions from all 26 macrograph storage locations.   |
| @:<letter>@;              | Clear defined macrograph; used to clear the contents of a single macrograph storage location; this option is actually a define macrograph option invoked with no definition.    |

**Report Command Summary**

| <b>Command</b>   | <b>Description</b>   |
|------------------|--|
| R (P)            | Cursor position; causes reporting of the current active position.  |
| R (M (<letter>)) | Macrograph contents; causes reporting of the contents of the specified macrograph storage location.  |
| R (M (=) )       | Macrograph storage status; causes reporting of how much space has been assigned to macrograph storage, and how much of that space is currently free. |
| R (L)            | Character set; cause reporting of set currently selected for loading.  |
| R (E)            | Error; causes reporting of the last error encountered by the parser.   |
| R (P (I))        | Report position interactive; places VT240 in a mode where cursor can be repositioned from the keyboard.  |

**Report Command Error Condition Option Responses**

| <b>Code</b> | <b>Condition</b>          | <b>Description</b>   |
|-------------|---------------------------|--|
| 0           | No Error                  | No error has been detected since the last resynchronization character(;); a 0 will be reported as the error character (<M>).                                 |
| 1           | Ignore Character          | An unexpected character was encountered, and ignored; the error character (<M>) will represent the character ignored.  |
| 2           | Extra Option Coordinates  | The syntax S(H[X,Y][X,Y]) contained more than two coordinate pairs; the extra coordinate pairs were ignored; always returns 0 for the error character (<M>). |
| 3           | Extra Coordinate Elements | The syntax [X,Y] contained more than two coordinate elements all but the first two elements were ignored; always returns 0 as the error character (<M>).     |
| 4           | Alphabet Out Of Range     | The syntax L(A<0-3>) contained a number less than 0 or greater than 3; always returns 0 for the error character (<M>).                                       |
| 5           | Reserved                  |  |

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## Report Command Error Condition Option Responses (Cont)

| Code | Condition                | Description  |
|------|--------------------------|--|
| 6    | Reserved                 |  |
| 7    | Begin/Start Overflow     | The stacking limit of 16 (B) and (S) position and/or vector commands was exceeded; Subsequent (B) or (S) commands were ignored; the error character(<M>) represents either a B or an S.      |
| 8    | Begin/Start Underflow    | A position or vector command (E) was encountered with no corresponding (B) or (S) option preceeding it; the (E) option is ignored; the error character (<M>) represents the E option letter. |
| 9    | Text Standard Size Error | A standard set number of less than 0 or greater than 16 was attempted by a text command standard set select; always returns 0 as the error character (<m>).                                  |

### 4010/4014

#### Entering/Exiting 4010/4014 Mode

There are two ways to enter and exit 4010/4014 mode: using set-up or escape sequences.

| Sequence    | Function               |
|-------------|------------------------|
| CSI ? 3 8 h | Enters 4010/4014 mode. |
| CSI ? 3 8 l | Exits 4010/4014 mode.  |

#### NOTE

The VT240 enters 4010/4014 in alpha mode, and exits 4010/4014 to the VT200, 7-bit control mode.

#### Alpha Mode Summary

|         |                                       |
|---------|---------------------------------------|
| ESC     | Set LCE                               |
| ESC NUL | Set LCE                               |
| ESC ESC | Set LCE                               |
| ESC ENQ | Set bypass and return terminal status |
| BEL     | Ring bell                             |
| ESC BEL | Ring bell                             |
| BS      | Move one space left                   |
| ESC BS  | Move one space left                   |
| HT      | Move one space right                  |
| ESC HT  | Move one space right                  |
| LF      | Move one line down                    |
| ESC LF  | Set LCE. Ignore filler LF and CR      |
| ESC CR  | Set LCE. Ignore filler LF and CR      |

**Alpha Mode Summary (Cont)**

|         |                                |
|---------|--------------------------------|
| VT      | Move one line up               |
| ESC VT  | Move one line up               |
| ESC FF  | Erase and home (page)          |
| CR      | Move to left margin            |
| ESC ETB | Make copy                      |
| ESC CAN | Set bypass condition           |
| ESC SUB | Set GIN and bypass condition   |
| FS      | Set point plot                 |
| ESC FS  | Set point plot                 |
| GS      | Set graph and dark vector      |
| ESC GS  | Set graph and dark vector      |
| RS      | Set incremental plot           |
| ESC RS  | Set incremental plot           |
| SP      | Move one space right           |
| ESC 0   | Select smallest character size |
| ESC :   | Select smallest character size |
| ESC ;   | Select smallest character size |
| ESC 1   | Select small character size    |
| ESC 8   | Select small character size    |
| ESC 9   | Select small character size    |
| ESC 2   | Select large character size    |
| ESC 3   | Select largest character size  |
| ESC DEL | Set LCE.                       |

**NOTE**

1. LCE is a flag indicating an escape sequence introduction condition.
2. All non-control ASCII characters are print characters in Alpha mode.

**Graph and Point Plot Mode Summary**

|         |                                       |
|---------|---------------------------------------|
| ESC NUL | Set LCE                               |
| ESC ENQ | Set bypass and return terminal status |
| BEL     | Ring bell                             |
| ESC LF  | Set LCE and ignore filler LFs and CRs |
| ESC FF  | Erase and home and go to Alpha        |
| CR      | Set Alpha and lift                    |
| ESC ETB | Make copy                             |
| ESC CAN | Set bypass condition                  |
| ESC SUB | Set GIN and bypass condition          |
| FS      | Set point plot                        |
| ESC FS  | Set point plot                        |
| GS      | Set graph and do a dark vector        |
| ESC GS  | Set graph and do a dark vector        |
| RS      | Set incremental plot                  |
| ESC RS  | Set incremental plot                  |
| US      | Set Alpha mode                        |
| ESC US  | Set Alpha mode                        |

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**Graph and Point Plot Mode Summary (Cont)**

|    |                                   |
|----|-----------------------------------|
| SP | High X or high Y coordinate value |
| !  | High X or high Y coordinate value |
| "  | High X or high Y coordinate value |
| #  | High X or high Y coordinate value |
| \$ | High X or high Y coordinate value |
| %  | High X or high Y coordinate value |
| &  | High X or high Y coordinate value |
| '  | High X or high Y coordinate value |
| (  | High X or high Y coordinate value |
| )  | High X or high Y coordinate value |
| *  | High X or high Y coordinate value |
| +  | High X or high Y coordinate value |
| ,  | High X or high Y coordinate value |
| -  | High X or high Y coordinate value |
| .  | High X or high Y coordinate value |
| /  | High X or high Y coordinate value |
| 0  | High X or high Y coordinate value |
| 1  | High X or high Y coordinate value |
| 2  | High X or high Y coordinate value |
| 3  | High X or high Y coordinate value |
| 4  | High X or high Y coordinate value |
| 5  | High X or high Y coordinate value |
| 6  | High X or high Y coordinate value |
| 7  | High X or high Y coordinate value |
| 8  | High X or high Y coordinate value |
| 9  | High X or high Y coordinate value |
| :  | High X or high Y coordinate value |
| ;  | High X or high Y coordinate value |
| <  | High X or high Y coordinate value |
| =  | High X or high Y coordinate value |
| >  | High X or high Y coordinate value |
| ?  | High X or high Y coordinate value |
| @  | High X or high Y coordinate value |
| [  | Low Y coordinate value            |
| \  | Low Y coordinate value            |
| ]  | Low Y coordinate value            |
| ^  | Low Y coordinate value            |
| _  | Low Y coordinate value            |

**Graph and Point Plot Mode Summary (Cont)**

|         |                                 |
|---------|---------------------------------|
|         | Low Y                           |
| ESC     | Set Normal, Solid Vector        |
| ESC a   | Set Normal, Dotted Vector       |
| ESC b   | Set Normal, Dot-Dashed Vector   |
| ESC c   | Set Normal, Short Dashed Vector |
| ESC d   | Set Normal, Long Dashed Vector  |
| ESC e   | Set Normal, Solid Vector        |
| ESC f   | Set Normal, Solid Vector        |
| ESC g   | Set Normal, Solid Vector        |
| ESC h   | Set Bold, Solid Vector          |
| ESC i   | Set Bold, Dotted Vector         |
| ESC j   | Set Bold, Dot-Dashed Vector     |
| ESC k   | Set Bold, Short Dashed Vector   |
| ESC l   | Set Bold, Long Dashed Vector    |
| ESC m   | Set Bold, Solid Vector          |
| ESC n   | Set Bold, Solid Vector          |
| ESC o   | Set Bold, Solid Vector          |
| {       | Low Y                           |
| [       | Low Y                           |
| ]       | Low Y                           |
| -       | Low Y                           |
| DEL     | Low Y or NO-OP (note 2)         |
| ESC ?   | Low Y (note 2)                  |
| ESC DEL | Set LCE                         |

**NOTE**

1. LCE is a flag indicating an escape sequence introduction condition.
  2. The affect of DEL as a Low Y character can be disabled by the DEL implies Low Y option in graphics set-up; if DEL cannot be used, the program can substitute ESC ? which performs the same function as DEL.
  3. All uppercase alphabetical characters can be used for High X or High Y coordinate values.
  4. All lowercase alphabetical characters can be used for Low Y coordinate values.
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## Incremental Plot Mode

|         |   |
|---------|---|
| ESC NUL | Set LCE (note 1)                        |
| ESC ENQ | Set bypass and return terminal status   |
| ESC BEL | Ring bell                               |
| ESC LF  | Set LCE and ignore filler LF's and CR's |
| ESC CR  | Set LCE and ignore filler LF's and CR's |
| ESC FF  | Go Alpha and erase and home             |
| CR      | Set Alpha and left margin               |
| ESC ETB | Make copy                               |
| ESC CAN | Set bypass                              |
| ESC SUB | Set bypass and GIN                      |
| ESC     | Set LCE                                 |
| ESC ESC | Set LCE                                 |
| FS      | Set point plot mode                     |
| ESC FS  | Set point plot mode                     |
| GS      | Set graph mode                          |
| ESC GS  | Set graph mode                          |
| US      | Set Alpha mode                          |
| ESC US  | Set Alpha mode                          |
| Space   | Turn beam off (pen up)                  |
| P       | Turn beam on (pen down)                 |
| D       | Move up (north)                         |
| E       | Move up, right (northeast)              |
| A       | Move right (east)                       |
| I       | Move down, right (southeast)            |
| H       | Move down (south)                       |
| J       | Move down, left (southwest)             |
| B       | Move left (west)                        |
| F       | Move up, left (northwest)               |

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## Gin Mode

Gin mode is exited from keyboard only. While in GIN, only arrow keys are used (either shifted or unshifted) to reposition cross hair cursor. Gin mode is exited by activating any key normally active in VT100 mode. GIN mode exits to Alpha mode.

## Bypass Condition

|         |   |
|---------|---|
| ESC ENQ | Set Bypass and return terminal status                     |
| ESC CAN | Set Bypass with no other action                           |
| ESC SUB | Set Bypass and go to GIN                                  |
| BEL     | Clear bypass and ring bell (if enabled)                   |
| ESC BEL | Clear bypass and ring bell (if enabled)                   |
| LF      | Clear bypass and cause new line                           |
| ESC LF  | Clear bypass, set LCE, and ignore filler LFs and CRs      |
| ESC CR  | Clear bypass, set LCE, and ignore filler LFs and CRs      |
| CR      | Clear bypass, move cursor to left margin, and go to Alpha |
| US      | Clear bypass and go to graph                              |
| ESC US  | Clear bypass and go to graph                              |
| ESC ETB | Clear bypass and make copy                                |
| ESC FF  | Clear bypass, go to Alpha, and clear screen and home      |

### NOTE

1. LCE is flag indicating an escape sequence introduction condition.
2. NEXT SCREEN key performs same function as ESC FF.



