## OPERATOR ALERTS

| | | |
|---|---|---|
| | Sound Bell | Bel |
| | Keyboard Lock/Unlock | ESC [ 2 h / ESC [ 2 l ¶ |
| * | Illuminate/Extinguish LEDs (1) | ESC [ $P_S$; $P_S$;...$P_S$ q |

(1)

| $P_S$ | LED Indication | $P_S$ | LED Indication |
|---|---|---|---|
| 1 | L1 on | 5 | On Line on |
| 2 | L2 on | 6 | Local on |
| 3 | L3 on | 7 | Keyboard Locked on |
| 4 | L4 on | 0 or none | ¶All off |

## SELF TEST, REPORTS

**Self Test**

| | |
|---|---|
| Reset to Initial State | ESC c |
| Invoke Self Test (1) | ESC [ 16; $P_S$; $P_S$ y |

(1)

| $P_S$ | Meaning | $P_S$ | Meaning |
|---|---|---|---|
| 0 or 1 | All Tests | 5 | SIO Test (turn-around plug needed) |
| 2 | ROM Test | 6 | PIO Test (turn-around plug needed) |
| 3 | DSP Test | 7 | CRT Test (fills screen) |
| 4 | KBD Test | 8 | Repeat previous until error |
| | | 9 | NVM Test |

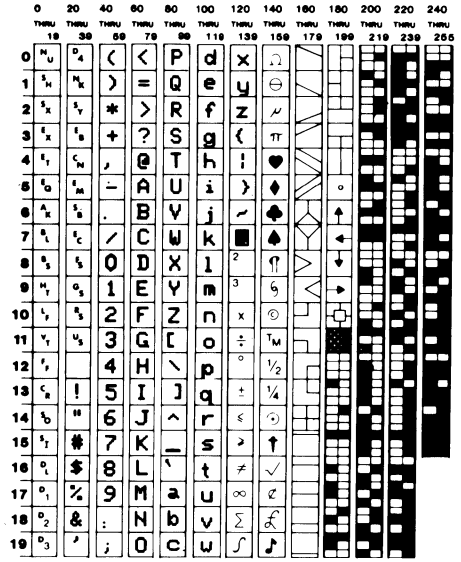
**Reports**

| | |
|---|---|
| S * Program Answerback | ESC P A text ESC \ (¶ = Teleray) |
| S * Program Identity Sequence | ESC P I text ESC \ ¶ = ESC [? 1; 2c) |

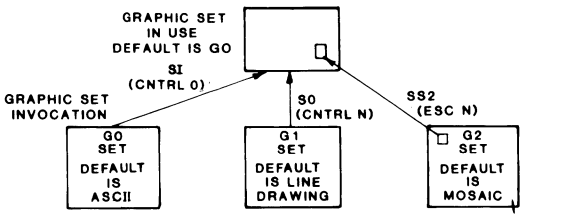
## BOTTOM LINE DISPLAYS

| | |
|---|---|
| Start/End Bottom Line Message | ESC P M text ESC \ |
| Enter/Exit Calculation Mode | ESC [ ? 26 h / ESC [ ? 26 l ¶ |
| Exit Selection Mode (Blank Bottom Line) | ESC [ space w |
| Display Terminal Status On/Off | ESC [ ? 27 h / ESC [ ? 27 l ¶ |
| Lock/Unlock Selection Feature (1st $P_S$ = group; 2nd $P_S$ = item) | ESC [ $P_S$; $P_S$ space v / ESC [ $P_S$; $P_S$ space u |

## DECIMAL CHARACTER TABLE

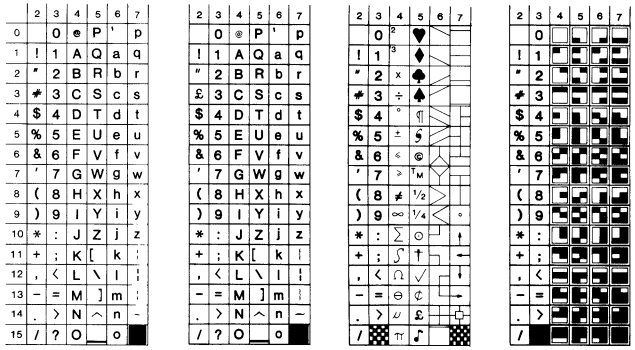



## GRAPHIC CHARACTER SETS




| Set to be Designated | G0 | G1 | G2 |
|---|---|---|---|
| ASCII | ESC ( B | ESC ) B | ESC * B |
| UK | ESC ( A | ESC ) A | ESC * A |
| Line Drawing | ESC ( 0 | ESC ) 0 | ESC * 0 |
| Mosaic | ESC ( 1 | ESC ) 1 | ESC * 1 |

The Shift In and Shift Out control codes invoke a new character set for all data following the control code. The single sequence (ESC N) invokes a new character set for only one character following the sequence.




# *Model 16 Programming Guide*

**March 1984**


TELERAY
DIVISION OF RESEARCH INC
BOX 24064 MINNEAPOLIS, MINN 55424
PHONE (612) 941-3300

## ERGONOMICS

| | | |
|---|---|---|
| S * | Screen Brightness level ($P_n$ = 1 to 64) | ESC [ $P_n$ space s |
| S * | Smooth/Jump Scroll | ESC [ ? 3 h / ESC [ ? 3 ℓ ¶ |
| S * | Smooth Scroll Rate 6/12 lps | ESC [ ? 22 ℓ ¶ / ESC [ ? 22 h |
| S * | Auto Repeat On/Off | ESC [ ? 8 h / ESC [ ? 8 ℓ ¶ |
| S * | Auto Repeat Rate 30/15 cps | ESC [ ? 21 ℓ ¶ / ESC [ ? 21 h |
| S * | Screen Background Dark/Light | ESC [ ? 5 ℓ ¶ / ESC [ ? 5 h |
| S * | Right Margin Bell Column ($P_n$ = columns from end of logical line) | ESC [ $P_n$ space r |
| S * | Cursor Blink/Steady | ESC [ ? 33 h ¶ / ESC [ ? 33 ℓ |
| S * | Cursor Character Select (1) | ESC [ $P_n$ space q |
| S * | Keyclick On/Off | ESC [ ? 28 h / ESC [ ? 28 ℓ ¶ |

(1) For $P_n$ values, see Decimal Character Table, over

## MEMORY STRUCTURE

| | | |
|---|---|---|
| | Set Top, Bottom Margins ($P_n$ = line number) | ESC [ $P_n$; $P_n$ r |
| S * | Set Left, Right Margins ($P_n$ = column number) | ESC [ $P_n$; $P_n$ s |
| S * | Left Margin Wrap On/Off | ESC [ ? 29 h / ESC [ ? 29 ℓ ¶ |
| S * | Right Margin Wrap On/Off | ESC [ ? 7 h / ESC [ ? 7 ℓ ¶ |
| S * | Scrolling Off/On | ESC [ ? 30 ℓ / ESC [ ? 30 h ¶ |
| S * | Page Stop/Auto Advance | ESC [ ? 31 ℓ ¶ / ESC [ ? 31 h |
| S * | Set Logical Line Length to $P_n$ Columns (255 max) | ESC [ $P_n$ ? q |
| S * | Set Logical Page Length to $P_n$ Lines | ESC [ $P_n$ ? p |
| S * | Select Number of Pages | ESC [ $P_n$ space p |

## APPLICATION CONTROLS

| | | |
|---|---|---|
| S * | Monitor Mode/Normal | ESC [ 3 h / ESC [ 3 ℓ ¶ |
| S * | New Line Mode/Line Feed | ESC [ 20 h / ESC [ 20 ℓ ¶ |
| S * | 50/60 Hz Refresh Rate | ESC [ ? 34 h / ESC [ ? 34 ℓ ¶ |
| S * | Selection Menu Line/Page | ESC [ ? 50 ℓ / ESC [ ? 50 h ¶ |
| S * | Screen Saver On/Off | ESC [ ? 32 h / ESC [ ? 32 ℓ ¶ |

## COMMUNICATIONS FORMAT

| | | |
|---|---|---|
| S * | Set Baud Rates (1) | ESC [ $P_s$; $P_s$ ? ) |
| S * | Set Parity (2) | ESC [ $P_s$; $P_s$ ? ~ |
| S * | Serial I/O Parity Check/None | ESC [ ? 37 h / ESC [ ? 37 ℓ ¶ |
| S * | Peripheral I/O Parity Check/None | ESC [ ? 45 h / ESC [ ? 45 ℓ ¶ |
| S * | Serial I/O Full/Half Duplex | ESC [ ? 36 ℓ ¶ / ESC [ ? 36 h |
| S * | Peripheral I/O Full/Half Duplex | ESC [ ? 44 ℓ ¶ / ESC [ ? 44 h |

(1) (2) First $P_s$ selects for Serial port; second $P_s$ for Peripheral port.

| (1) $P_s$ | Baud | $P_s$ | Baud |
|---|---|---|---|
| 0 (or none) | 2400 | 8 | 1200 |
| 1 | 50 | 9 | 1800 |
| 2 | 75 | 10 | 2400 |
| 3 | 110 | 11 | 3600 |
| 4 | 134.5 | 12 | 4800 |
| 5 | 150 | 13 | 7200 |
| 6 | 300 | 14 | 9600 |
| 7 | 600 | 15 | 19200 |

| (2) $P_s$ | Parity |
|---|---|
| 0 | None |
| 1 | Odd |
| 2 | Even |
| 3 | Mark |
| 4 | Space |

## DATA FLOW

| | | |
|---|---|---|
| S * | Local/Remote Mode | ESC [ ? 12 h / ESC [ ? 12 ℓ ¶ |
| S * | Character/Block Mode (keyboard entry) | ESC [ ? 25 ℓ ¶ / ESC [ ? 25 h |
| S * | Copy Serial Input to Peripheral - | |
| | Copy Interpreted On/Off | ESC [ ? 7 i / ESC [ ? 6 i ¶ |
| | Copy Transparent On/Off | ESC [ 5 i / ESC [ 4 i ¶ |
| S * | Enable/Disable Suspend-Resume - Serial I/O | ESC [ ? 38 h / ESC [ ? 38 ℓ ¶ |
| * | Enable/Disable Serial Busy-Ready | ESC [ ? 35 h / ESC [ ? 35 ℓ ¶ |
| S * | Local Echo Serial Port Off/On | ESC [ 12 ℓ ¶ / ESC [ 12 h |
| S * | Copy Peripheral Input to Serial - | |
| | Copy Interpreted On/Off | ESC [ ? 9 i / ESC [ ? 8 i ¶ |
| | Copy Transparent On/Off | ESC [ 7 i / ESC [ 6 i ¶ |
| S * | Enable/Disable Suspend-Resume - Peripheral | ESC [ ? 46 h / ESC [ ? 46 ℓ ¶ |
| S * | Enable/Disable Peripheral Busy-Ready Detect | ESC [ ? 41 h / ESC [ ? 41 ℓ ¶ |
| S * | Peripheral Busy-Ready Level High/Low | ESC [ ? 42 h / ESC [ ? 42 ℓ ¶ |
| | Suspend/Resume | DC3 / DC1 |

## BLOCK TRANSMITS

| | | |
|---|---|---|
| | Ready to Transmit | ESC S |
| S * | Select Text for Transmission (1) | ESC [ $P_s$; $P_s$ ? t |
| S * | Transmit Beginning to Cursor/Beginning to End | ESC [ 16 h / ESC [ 16 ℓ ¶ |
| | Transmit Text (Serial I/O Port) (1) | ESC 5 |
| | Transmit Text (Peripheral Port) (1) | ESC [ i or ESC [ o i |
| | Transmit Form and Text | ESC 6 |
| | Start Select Area (SSA)/End Select Area (ESA) | ESC F / ESC G |
| S * | Serial Auto Suspend on End of Line/Normal | ESC [ ? 39 h / ESC [ ? 39 ℓ ¶ |
| * | Select End of Line Resume Character(3) | ESC [ $P_n$ ? y ($P_n$ = CR) |
| S * | Peripheral Auto Suspend on End of Line/Normal | ESC [ ? 40 h / ESC [ ? 40 ℓ ¶ |
| S * | Space Suppression On/Off Serial | ESC [ ? 13 h / ESC [ ? 13 ℓ ¶ |
| S * | Space Suppression On/Off Peripheral | ESC [ ? 15 h / ESC [ ? 15 ℓ ¶ |
| S * | Space Substitution for Fields On/Off Serial | ESC [ ? 40 h / ESC [ ? 40 ℓ ¶ |
| S * | Space Substitution for Fields On/Off Perihperal | ESC [ ? 48 h / ESC [ ? 48 ℓ ¶ |
| S * | Transmit Guarded Fields/Without Guarded Fields | ESC [ 1 ℓ ¶ / ESC [ 1 h |
| S * | Select Start of Transmission Identifier (2) | ESC [ $P_s$; $P_s$ { ($P_n$ = none) |
| S * | Select Guarded Field Replacement Identifier (2) | ESC [ $P_s$; $P_s$ ? z ($P_n$ = HT) |
| S * | Select End of Line Terminator (2) | ESC [ $P_s$; $P_s$ ? } ($P_n$ = LF CR) |
| S * | Select End of Page Terminator (2) | ESC [ $P_s$; $P_s$ ? : ($P_n$ = FF) |
| S * | Select End of Transmission Terminator (2) | ESC [ $P_s$; $P_s$ : |

(1) (2) First $p_s$ selects for Serial port; second $P_s$ for Peripheral port.

(1)

| $P_s$ | Area Transmitted | $P_s$ | Area Transmitted |
|---|---|---|---|
| 0 | Page | 3 | Memory |
| 1 | Line | 4 | Selected Area |
| 2 | Window | | (SSA to ESA) |

(2) $P_s$ Identifiers :

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | Default | 10 | LF | 19 | DC3 | 28 | FS |
| 1 | SOH | 11 | VT | 20 | DC4 | 29 | GS |
| 2 | STX | 12 | FF | 21 | NAK | 30 | RS |
| 3 | ETX | 13 | CR | 22 | SYN | 31 | US |
| 4 | EOT | 14 | SO | 23 | ETB | 32 | NUL |
| 5 | ENQ | 15 | SI | 24 | CAN | 33 | None |
| 6 | ACK | 16 | DLE | 25 | EN | 34 | DEL |
| 7 | BEL | 17 | DC1 | 26 | SUB | 35 | LF CR |
| 8 | BS | 18 | DC2 | 27 | ESC | 36 | CR LF |
| 9 | HT | | | | | | |

(3) First $P_n$ selects for serial port; second $P_n$ for peripheral port
For $P_n$ values, see Decimal Character Table, over.

## TEXT PRESENTATION FORMAT

| | |
|---|---|
| Start/End Protected Area | ESC V / ESC W |
| Duplicate Rendition | ESC [ space z |
| Protect Mode On/Off | ESC [ ? 24 h / ESC [ ? 24 ℓ ¶ |
| Select Qualified Areas (1) | ESC [ $P_s$; $P_s$;...$P_s$ o |
| Select Visual Attributes (2) | ESC [ $P_s$; $P_s$;...$P_s$ m |

| (1) $P_s$ | Area Qualification |
|---|---|
| 0 or none | Normal; cancel previous |
| 3 | Numeric only |
| 4 | Alphabetic only |
| 5 | Right justify |
| 6 | Zero fill (else will be space filled) |
| 8 | Protected, transmitting |
| ? 1 | Entry required |
| ? 2 | Must fill |

| (2) $P_s$ | Attribute |
|---|---|
| 0 or none | Normal; all off |
| 2 | Dim on |
| 4 | Underscore on |
| 5 | Blink on |
| 7 | Inverse on |
| 8 | Blank |

## CURSOR POSITIONING, TABS, TEXT MOVEMENT

**Cursor Manipulation**

| | | |
|---|---|---|
| | One Up or $P_n$ Up | ESC [ $P_n$ A |
| | One Down or $P_n$ Down | ESC [ $P_n$ B |
| | One Right or $P_n$ Right | ESC [ $P_n$ C |
| | One Left or $P_n$ Left | ESC [$P_n$ D or BS |
| | Full Left (Cursor Return) | CR |
| | Home | ESC [ H or ESC [ f |
| | Line Feed | LF |
| | New Line | LF or ESC E |
| | Index | ESC D |
| | Reverse Index | ESC M |
| | Address Origin Window/Absolute | ESC [ ? 6 h / ESC [ ? 6 ℓ ¶ |
| | Direct Address (1st $P_n$ = line number; 2nd $P_n$ = column number) | ESC [ $P_n$; $P_n$ H or ESC [ $P_n$; $P_n$ f |
| * | Save Cursor, Attributes and Character Set (in NVM) | ESC 7 |
| | Restore Cursor, Attribute Tag and Character Set | ESC 8 |

**Tab Operations (Default = every eighth column)**

| | | |
|---|---|---|
| | Cursor to Next Tab Stop | HT |
| S * | Set Tab Stop in Current Column | ESC H |
| S * | Clear Tab Stop in Current Column | ESC [ g |
| | Clear All Tab Stops | ESC [ 3 g |
| | Back $P_n$ Tab Stops | ESC [ $P_n$ Z |

**Test Movement**

| | |
|---|---|
| Scroll Display Window Up $P_n$ Lines | ESC [ $P_n$ S |
| Scroll Display Window Down $P_n$ Lines | ESC [ $P_n$ T |
| Scroll Display Right $P_n$ Columns | ESC [ $P_n$ space A |
| Scroll Display Left $P_n$ Columns | ESC [ $P_n$ space @ |
| Forward/Back $P_n$ Pages | ESC [ $P_n$ U / ESC [ $P_n$ V |

## CLOCK

| | |
|---|---|
| Set Clock Time (1st $P_n$ = hours, 0-23; 2nd $P_n$ = minutes, 0-59; 3rd $P_n$ = seconds, 0-59) | ESC [ $P_n$; $P_n$; $P_n$ ? s |
| Delay Next Operation (1st $P_n$ = seconds, 0-59; 2nd $P_n$ = tenths of seconds) | ESC [ $P_n$; $P_n$ space t |

S indicates modifiable in selection menu
* indicates state saved in non-volatile memory
¶ indicates default condition

## DATA FLOW

| | | |
|---|---|---|
| S * | Local/Remote Mode | ESC [ ? 12 h / ESC [ ? 12 ℓ ¶ |
| S * | Character/Block Mode (keyboard entry) | ESC [ ? 25 ℓ ¶ / ESC [ ? 25 h |
| S * | Copy Serial Input to Peripheral - | |
| | Copy Interpreted On/Off | ESC [ ? 7 i / ESC [ ? 6 i ¶ |
| | Copy Transparent On/Off | ESC [ 5 i / ESC [ 4 i ¶ |
| S * | Enable/Disable Suspend-Resume - Serial I/O | ESC [ ? 38 h / ESC [ ? 38 ℓ ¶ |
| * | Enable/Disable Serial Busy-Ready | ESC [ ? 35 h / ESC [ ? 35 ℓ ¶ |
| S * | Local Echo Serial Port Off/On | ESC [ 12 ℓ ¶ / ESC [ 12 h |
| S * | Copy Peripheral Input to Serial - | |
| | Copy Interpreted On/Off | ESC [ ? 9 i / ESC [ ? 8 i ¶ |
| | Copy Transparent On/Off | ESC [ 7 i / ESC [ 6 i ¶ |
| S * | Enable/Disable Suspend-Resume - Peripheral | ESC [ ? 46 h / ESC [ ? 46 ℓ ¶ |
| S * | Enable/Disable Peripheral Busy-Ready Detect | ESC [ ? 41 h / ESC [ ? 41 ℓ ¶ |
| S * | Peripheral Busy-Ready Level High/Low | ESC [ ? 42 h / ESC [ ? 42 ℓ ¶ |
| | Suspend/Resume | DC3 / DC1 |

## BLOCK TRANSMITS

| | | |
|---|---|---|
| | Ready to Transmit | ESC S |
| S * | Select Text for Transmission (1) | ESC [ $P_S$; $P_S$ ? t |
| S * | Transmit Beginning to Cursor/Beginning to End | ESC [ 16 h / ESC [ 16 ℓ ¶ |
| | Transmit Text (Serial I/O Port) (1) | ESC 5 |
| | Transmit Text (Peripheral Port) (1) | ESC [ i or ESC [ o i |
| | Transmit Form and Text | ESC 6 |
| | Start Select Area (SSA)/End Select Area (ESA) | ESC F / ESC G |
| S * | Serial Auto Suspend on End of Line/Normal | ESC [ ? 39 h / ESC [ ? 39 ℓ ¶ |
| * | Select End of Line Resume Character(3) | ESC [ $P_n$ ? y (¶ = CR) |
| S * | Peripheral Auto Suspend on End of Line/Normal | ESC [ ? 40 h / ESC [ ? 40 ℓ ¶ |
| S * | Space Suppression On/Off Serial | ESC [ ? 13 h / ESC [ ? 13 ℓ ¶ |
| S * | Space Suppression On/Off Peripheral | ESC [ ? 15 h / ESC [ ? 15 ℓ ¶ |
| S * | Space Substitution for Fields On/Off Serial | ESC [ ? 40 h / ESC [ ? 40 ℓ ¶ |
| S * | Space Substitution for Fields On/Off Perihperal | ESC [ ? 48 h / ESC [ ? 48 ℓ ¶ |
| S * | Transmit Guarded Fields/Without Guarded Fields | ESC [ 1 ℓ ¶ / ESC [ 1 h |
| S * | Select Start of Transmission Identifier (2) | ESC [ $P_S$; $P_S$ [ (¶ = none) |
| S * | Select Guarded Field Replacement Identifier (2) | ESC [ $P_S$; $P_S$ ? z (¶ = HT) |
| S * | Select End of Line Terminator (2) | ESC [ $P_S$; $P_S$ ? } (¶ = LF CR) |
| S * | Select End of Page Terminator (2) | ESC [ $P_S$; $P_S$ ? : (¶ = FF) |
| S * | Select End of Transmission Terminator (2) | ESC [ $P_S$; $P_S$ : |

(1) (2) First $p_S$ selects for Serial port; second $P_S$ for Peripheral port.

(1)

| $P_S$ | Area Transmitted | $P_S$ | Area Transmitted |
|---|---|---|---|
| 0 | Page | 3 | Memory |
| 1 | Line | 4 | Selected Area |
| 2 | Window | | (SSA to ESA) |

(2) $P_S$ **Identifiers:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | Default | 10 | LF | 19 | DC3 | 28 | FS |
| 1 | SOH | 11 | VT | 20 | DC4 | 29 | GS |
| 2 | STX | 12 | FF | 21 | NAK | 30 | RS |
| 3 | ETX | 13 | CR | 22 | SYN | 31 | US |
| 4 | EOT | 14 | SO | 23 | ETB | 32 | NUL |
| 5 | ENQ | 15 | SI | 24 | CAN | 33 | None |
| 6 | ACK | 16 | DLE | 25 | EN | 34 | DEL |
| 7 | BEL | 17 | DC1 | 26 | SUB | 35 | LF CR |
| 8 | BS | 18 | DC2 | 27 | ESC | 36 | CR LF |
| 9 | HT | | | | | | |

(3) First $P_n$ selects for serial port; second $P_n$ for peripheral port
For $P_n$ values, see Decimal Character Table, over.

## TEXT PRESENTATION FORMAT

| | |
|---|---|
| Start/End Protected Area | ESC V / ESC W |
| Duplicate Rendition | ESC [ space z |
| Protect Mode On/Off | ESC [ ? 24 h / ESC [ ? 24 ℓ ¶ |
| Select Qualified Areas (1) | ESC [ $P_S$; $P_S$;...$P_S$ o |
| Select Visual Attributes (2) | ESC [ $P_S$; $P_S$;...$P_S$ m |

| (1) $P_S$ | Area Qualification |
|---|---|
| 0 or none | Normal; cancel previous |
| 3 | Numeric only |
| 4 | Alphabetic only |
| 5 | Right justify |
| 6 | Zero fill (else will be space filled) |
| 8 | Protected, transmitting |
| ? 1 | Entry required |
| ? 2 | Must fill |

| (2) $P_S$ | Attribute |
|---|---|
| 0 or none | Normal; all off |
| 2 | Dim on |
| 4 | Underscore on |
| 5 | Blink on |
| 7 | Inverse on |
| 8 | Blank |

## CURSOR POSITIONING, TABS, TEXT MOVEMENT

**Cursor Manipulation**

| | | |
|---|---|---|
| | One Up or $P_n$ Up | ESC [ $P_n$ A |
| | One Down or $P_n$ Down | ESC [ $P_n$ B |
| | One Right or $P_n$ Right | ESC [ $P_n$ C |
| | One Left or $P_n$ Left | ESC [$P_n$ D or BS |
| | Full Left (Cursor Return) | CR |
| | Home | ESC [ H or ESC [ f |
| | Line Feed | LF |
| | New Line | LF or ESC E |
| | Index | ESC D |
| | Reverse Index | ESC M |
| | Address Origin Window/Absolute | ESC [ ? 6 h / ESC [ ? 6 ℓ ¶ |
| | Direct Address (1st $P_n$ = line number; 2nd $P_n$ = column number) | ESC [ $P_n$; $P_n$ H or ESC [ $P_n$; $P_n$ f |
| * | Save Cursor, Attributes and Character Set (in NVM) | ESC 7 |
| | Restore Cursor, Attribute Tag and Character Set | ESC 8 |

**Tab Operations (Default = every eighth column)**

| | | |
|---|---|---|
| | Cursor to Next Tab Stop | HT |
| S * | Set Tab Stop in Current Column | ESC H |
| S * | Clear Tab Stop in Current Column | ESC [ g |
| | Clear All Tab Stops | ESC [ 3 g |
| | Back $P_n$ Tab Stops | ESC [ $P_n$ Z |

**Test Movement**

| | |
|---|---|
| Scroll Display Window Up $P_n$ Lines | ESC [ $P_n$ S |
| Scroll Display Window Down $P_n$ Lines | ESC [ $P_n$ T |
| Scroll Display Right $P_n$ Columns | ESC [ $P_n$ space A |
| Scroll Display Left $P_n$ Columns | ESC [ $P_n$ space @ |
| Forward/Back $P_n$ Pages | ESC [ $P_n$ U / ESC [ $P_n$ V |

## CLOCK

| | |
|---|---|
| Set Clock Time (1st $P_n$ = hours, 0-23; 2nd $P_n$ = minutes, 0-59; 3rd $P_n$ = seconds, 0-59) | ESC [ $P_n$; $P_n$; $P_n$ ? s |
| Delay Next Operation (1st $P_n$ = seconds, 0-59; 2nd $P_n$ = tenths of seconds) | ESC [ $P_n$; $P_n$ space t |

## MACRO KEYS

| | | |
|---|---|---|
| * | Reprogram Macro Key (Local) (1) | ESC P L $P_S$ text; $P_S$ text... |
| * | Reprogram Macro Key (Transmitting) (1) | ESC P T $P_S$ text; $P_S$ text... |
| * | Reprogram Macro Key (Keyboard) (1) | ESC P K $P_S$ text; $P_S$ text... |
| | End Macro Key Sequence Definition | ESC \ |

(1) Typical Sequence

ESC P □ $P_S$ text; $P_S$ text; $P_S$ text; $P_S$ text...ESC \

□ L for local; T for transmitting, K for keyboard; text limited to eight characters maximum.
$P_S$ = 2-digit key number for key to be reprogrammed.

## PROGRAMMABLE FUNCTIONS

| | | |
|---|---|---|
| * | Define Dynamic Function ($P_S$ = 01 to 32) | ESC P $P_S$ text |
| | End Dynamic Function Definition | ESC \ |
| | Locally Perform Dyn. Func. ($P_S$ = 01 to 32) | ESC [$P_S$ u |
| | Transmit Dyn. Func. Contents ($P_S$ = 01 to 32) | ESC [ $P_S$ t |
| | Enable Transmits to Dyn. Func. ($P_S$ = 01 to 32) | ESC [ $P_S$ z |
| S * | Load Functions Transparent/Interpreted | ESC [ ? 23 h / ESC [ ? 23 ℓ ¶ |
| | Clear Dynamic Function Memory | ESC [ 2 space x |

## ERASES, EDITS, RESETS

**Erases**

| | | |
|---|---|---|
| | Erase from Cursor to Right Margin | ESC [ 0 K |
| | Erase from Cursor to Left Margin | ESC [ 1 K |
| | Erase Entire Line to Both Margins | ESC [ 2 K |
| | Erase from Cursor to Bottom Margin | ESC [ 0 J |
| | Erase from Cursor to Top Margin | ESC [ 1 J |
| | Erase Entire Page Within Margins | ESC [ 2 J |
| | Erase from Cursor to End of Pages | ESC [ ? 1 J |
| | Erase All Pages | ESC [ ? 2 J |
| | Erase Field (1) | ESC [ $P_S$ N |
| * | Erase to Protected/Nonprotected Spaces | ESC [ ? 49 h / ESC [ ? 49 ℓ ¶ |

(1) $P_S$ **Field Definition**

| | |
|---|---|
| 0 or none | From cursor to end of field |
| 1 | From cursor to beginning of field |
| 2 | Entire field |

**Edits**

| | | |
|---|---|---|
| | Repeat Previous $P_n$ Times | ESC [ $P_n$ b |
| | Insert/Delete $P_n$ Characters (see Select Editing Extent) | ESC [ $P_n$ @ / ESC [ $P_n$ P |
| | Select Editing Extent (1) | ESC [ $P_S$ Q |
| | Insert/Delete $P_n$ Characters in Text Block | ESC [ $P_n$ ~ / ESC [ $P_n$ p |
| | Delete $P_n$ Words | ESC [ ? w |
| | Reinstate Last Deleted Word $P_n$ Times | ESC [ $P_n$ ? v |
| | Insert/Delete $P_n$ Lines | ESC [ $P_n$ L / ESC [ $P_n$ M |
| | Reinstate Last Deleted Line $P_n$ Times | ESC [ $P_n$ ? u |
| | Insert/Replacement Mode | ESC [ 4 h / ESC [ 4 ℓ ¶ |

(1) $P_S$ **Editing Extent**

| | |
|---|---|
| 0 or none | Within window |
| 1 | Within line |
| 2 | Within field |

**Resets**

| | |
|---|---|
| Reset to Initial State | ESC c |
| Reset to Default Conditions | ESC [ 255; 255 space y |

# USA STANDARD CODE FOR INFORMATION INTERCHANGE

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

CONTROL FUNCTION DEFINITIONS

| | | | |
|---|---|---|---|
| NUL | Null, or all zeros | DC1 | Device control 1 |
| SOH | Start of heading | DC2 | Device control 2 |
| STX | Start of text | DC3 | Device control 3 |
| ETX | End of text | DC4 | Device control 4 |
| EOT | End of transmission | NAK | Negative acknowledge |
| ENQ | Enquiry | SYN | Synchronous idle |
| ACK | Acknowledge | ETB | End of transmission block |
| BEL | Bell, or alarm | CAN | Cancel |
| BS | Backspace | EM | End of medium |
| HT | Horizontal tabulation | SUB | Substitute |
| LF | Line feed | ESC | Escape |
| VT | Vertical tabulation | FS | File separator |
| FF | Form feed | GS | Group separator |
| CR | Carriage return | RS | Record separator |
| SO | Shift out | US | Unit separator |
| SI | Shift in | SP | Space |
| DLE | Data link escape | DEL | Delete |

## OPERATOR ALERTS

| | |
|---|---|
| Sound Bell | Bel |
| Keyboard Lock/Unlock | ESC [ 2 h / ESC [ 2 l ¶ |
| * Illuminate/Extinguish LEDs (1) | ESC [ $P_S$; $P_S$;...$P_S$ q |

(1)

| $P_S$ | LED Indication |
|---|---|
| 1 | L1 on |
| 2 | L2 on |
| 3 | L3 on |
| 4 | L4 on |
| 5 | On Line on |
| 6 | Local on |
| 7 | Keyboard Locked on |
| 0 or none | ¶All off |

## SELF TEST, REPORTS

**Self Test**

| | |
|---|---|
| Reset to Initial State | ESC c |
| Invoke Self Test (1) | ESC [ 16; $P_S$; $P_S$ y |

(1)

| $P_S$ | Meaning |
|---|---|
| 0 or 1 | All Tests |
| 2 | ROM Test |
| 3 | DSP Test |
| 4 | KBD Test |
| 5 | SIO Test (turn-around plug needed) |
| 6 | PIO Test (turn-around plug needed) |
| 7 | CRT Test (fills screen) |
| 8 | Repeat previous until error |
| 9 | NVM Test |

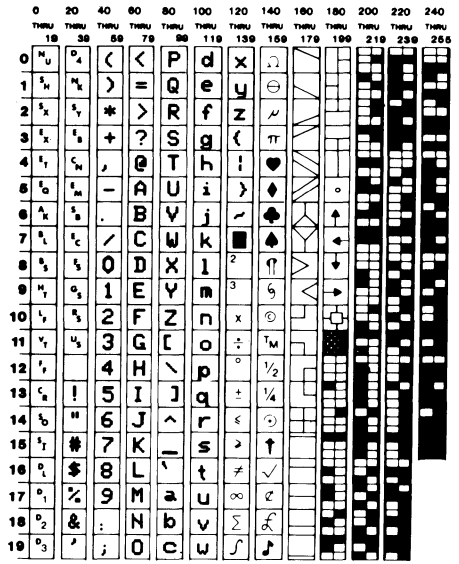
**Reports**

| | |
|---|---|
| S * Program Answerback | ESC P A text ESC \ (¶ = Teleray) |
| S * Program Identity Sequence | ESC P I text ESC \ ¶ = ESC [? 1; 2c) |

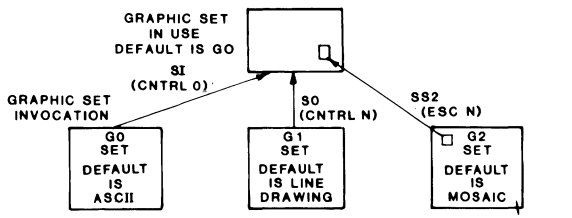
## BOTTOM LINE DISPLAYS

| | |
|---|---|
| Start/End Bottom Line Message | ESC P M text ESC \ |
| Enter/Exit Calculation Mode | ESC [ ? 26 h / ESC [ ? 26 l ¶ |
| Exit Selection Mode (Blank Bottom Line) | ESC [ space w |
| Display Terminal Status On/Off | ESC [ ? 27 h / ESC [ ? 27 l ¶ |
| Lock/Unlock Selection Feature (1st $P_S$ = group; 2nd $P_S$ = item) | ESC [ $P_S$; $P_S$ space v / ESC [ $P_S$; $P_S$ space u |

# DECIMAL CHARACTER TABLE



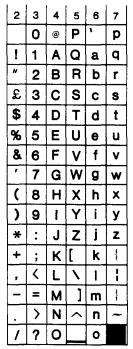
# GRAPHIC CHARACTER SETS

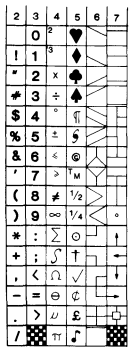


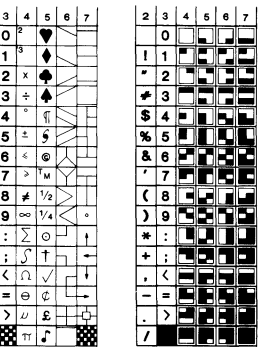

| Set to be Designated | G0 | G1 | G2 |
|---|---|---|---|
| ASCII | ESC ( B | ESC ) B | ESC * B |
| UK | ESC ( A | ESC ) A | ESC * A |
| Line Drawing | ESC ( 0 | ESC ) 0 | ESC * 0 |
| Mosaic | ESC ( 1 | ESC ) 1 | ESC * 1 |

The Shift In and Shift Out control codes invoke a new character set for all data following the control code. The single sequence (ESC N) invokes a new character set for only one character following the sequence.


ASCII


UK


LINE DRAWING


MOSAIC