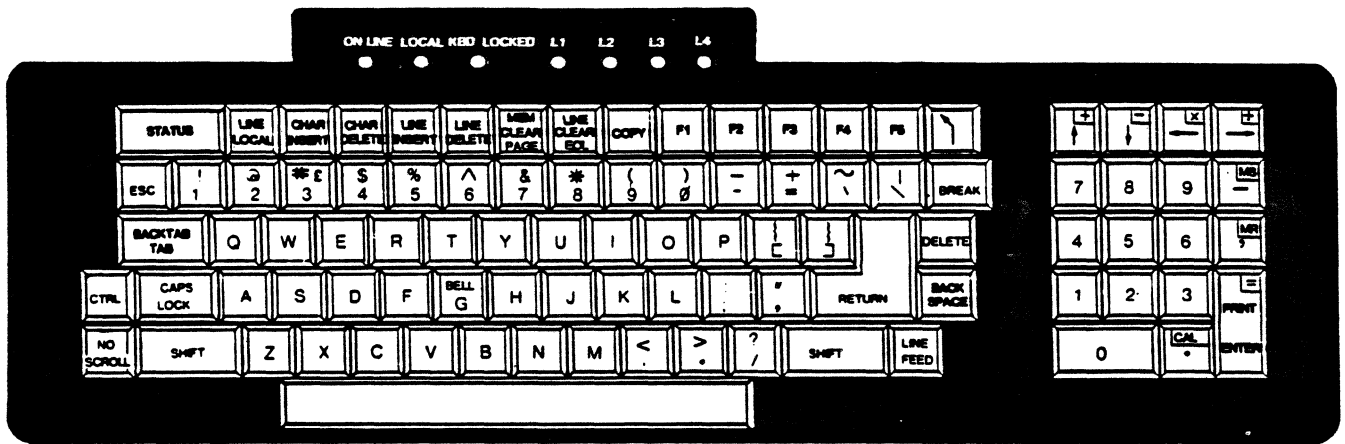


MODEL 7
SECTION 3
KEYBOARD

3-1 General Information

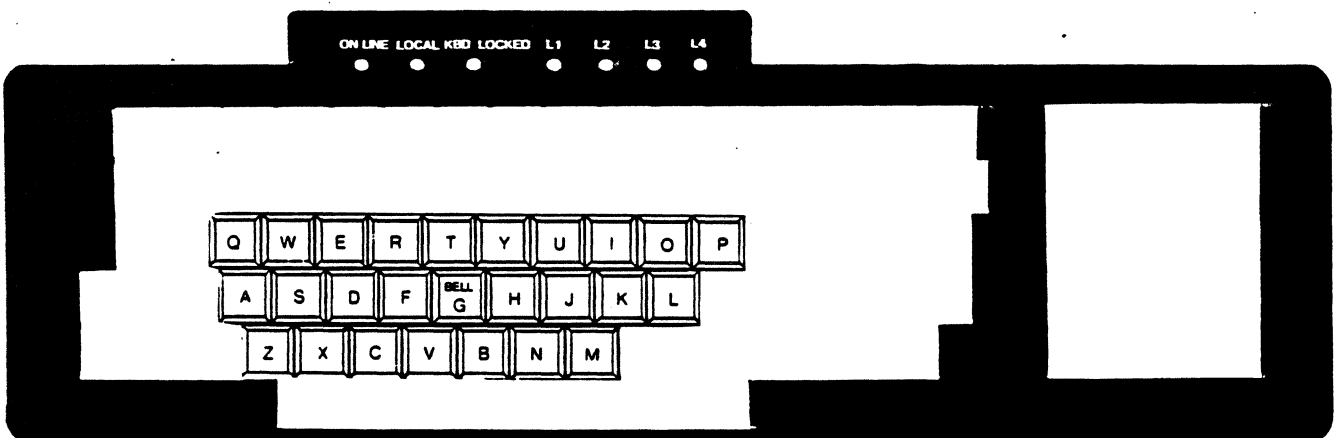
The keyboard is detachable from the terminal for operator comfort and optimal space utilization. The keytops are sculptured with a dimpled 5 in the numeric pad and "deep dishd" F and J keys. The coiled cord leading from the keyboard is terminated in a telephone type 4-pin connector; the cord supplied is compatible with those commonly used on Western Electric type telephones. Do not attempt to plug your keyboard into your telephone. The Teleray 7 keyboard has seven LED indicators: three are used to indicate the (legended) terminal status; the remaining four are used by the host computer to alert the operator of application dependent conditions.

The figure below shows the keyboard.



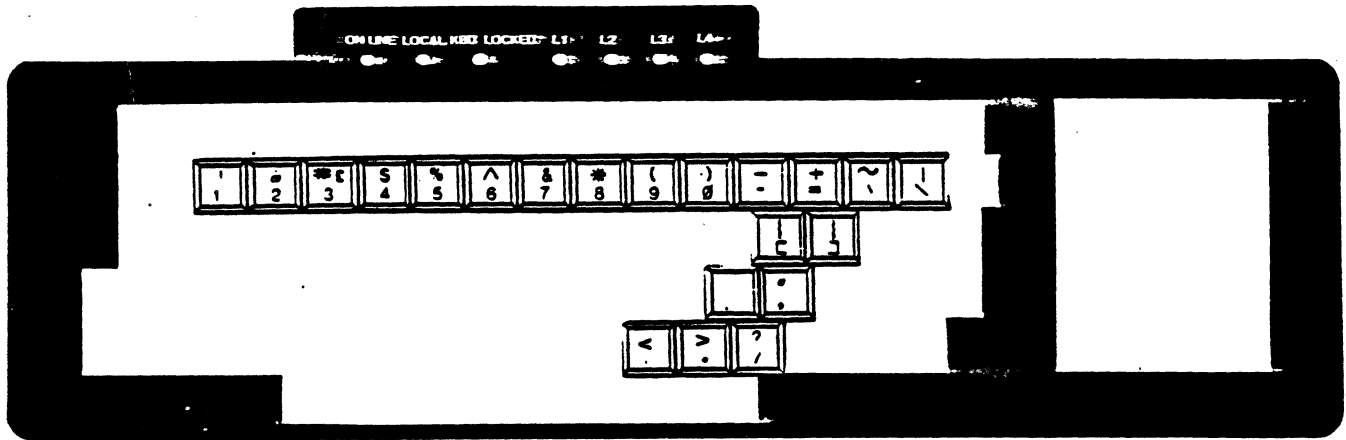
3-2 Alphabetic Keys

The keys shown below generate the appropriate ASCII character. Both upper and lower case can be generated under control of the SHIFT and CAPS LOCK keys.



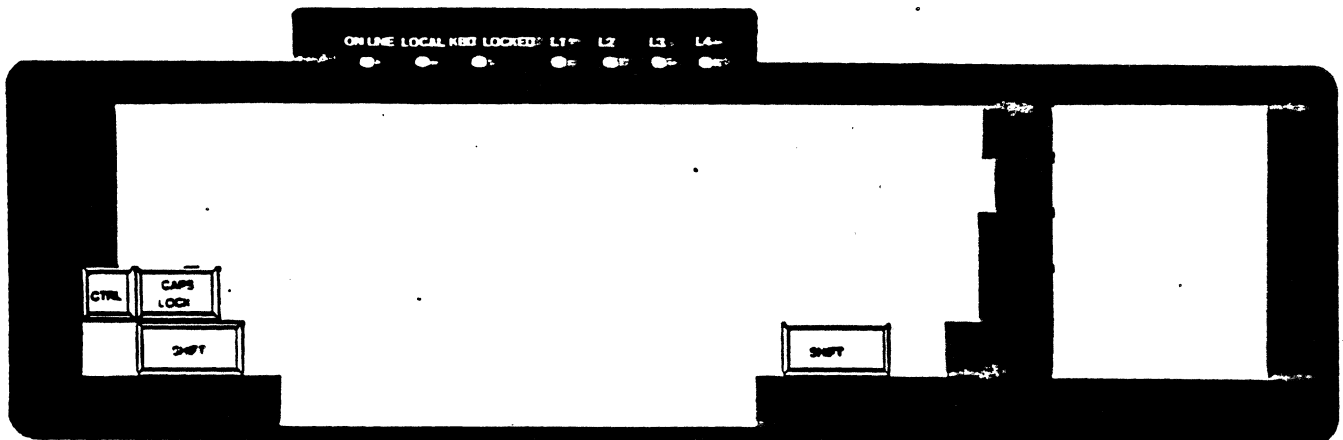
3-3 Numeric and Special Symbols

The keys shown below generate the appropriate ASCII character. In the unshifted position, the character indicated by the lower legend is generated; in the shifted position, the character indicated by the upper legend is generated. The position of CAPS LOCK does not affect the operation of these keys.



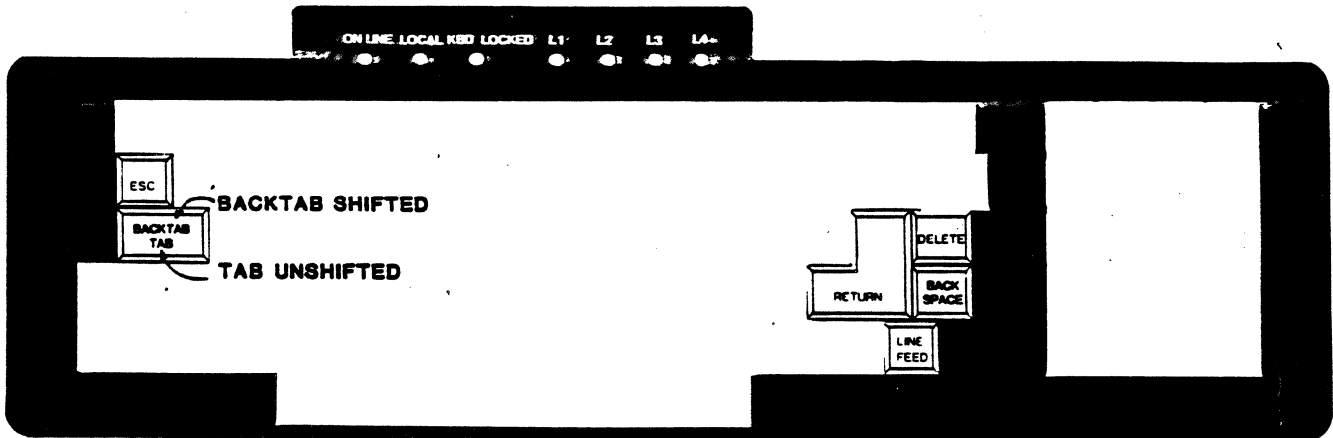
3-4 Keyboard Mode Keys

The keys shown below are used to change the character codes transmitted by the alphabetic, numeric and special symbol keys. All 128 ASCII characters can be generated by the keyboard. Table 3-1 details the keyboard coding.



3-5 Dedicated Keys

The keys shown below generate fixed ASCII control character codes.



3-6 Special Operation Keys

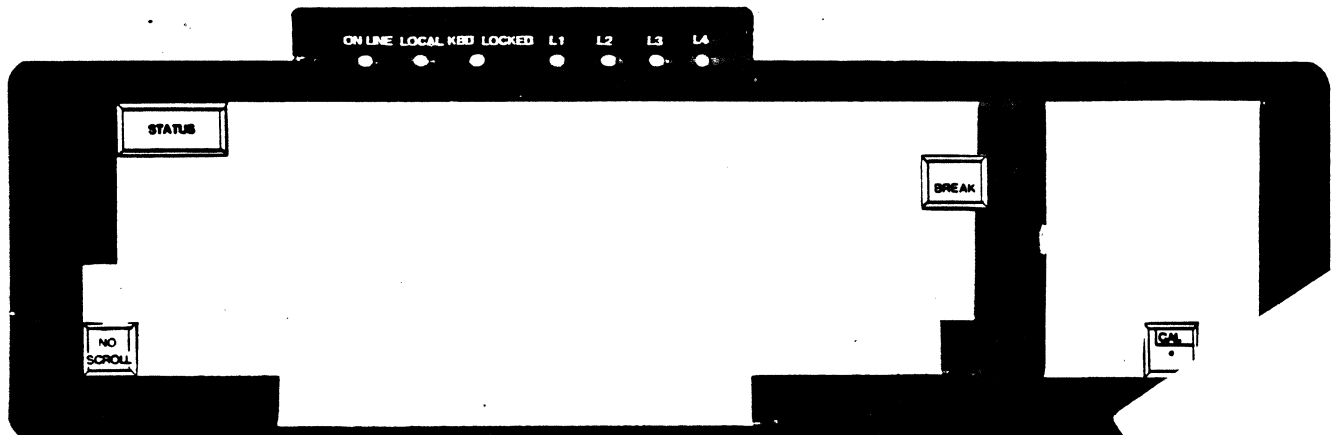
Pressing the BREAK key causes a 250 millisecond spacing condition on the data line. SHIFT and BREAK causes a 3.5 second spacing condition of the data line, and causes the Data Terminal Ready lead to go low for 3.5 seconds. Pressing CTRL and BREAK will initiate transmission of the answerback message if such a message has been previously entered.

The NO SCROLL key alternately transmits the DC3 (Suspend) and DC1 (Resume) control codes if the Suspend/Resume feature has been enabled. These codes are used to stop/start transmissions from the host computer, provided that the host recognizes these codes. If the Suspend/Resume feature is disabled, the NO SCROLL key will transmit no codes. See "Buffering" in Section 5-5, Operations, for further details.

The STATUS key is used to enter and exit the Selection Menu. SHIFT and STATUS will interrupt an undesired long-time function, and will also unlock the keyboard and resume transmission.

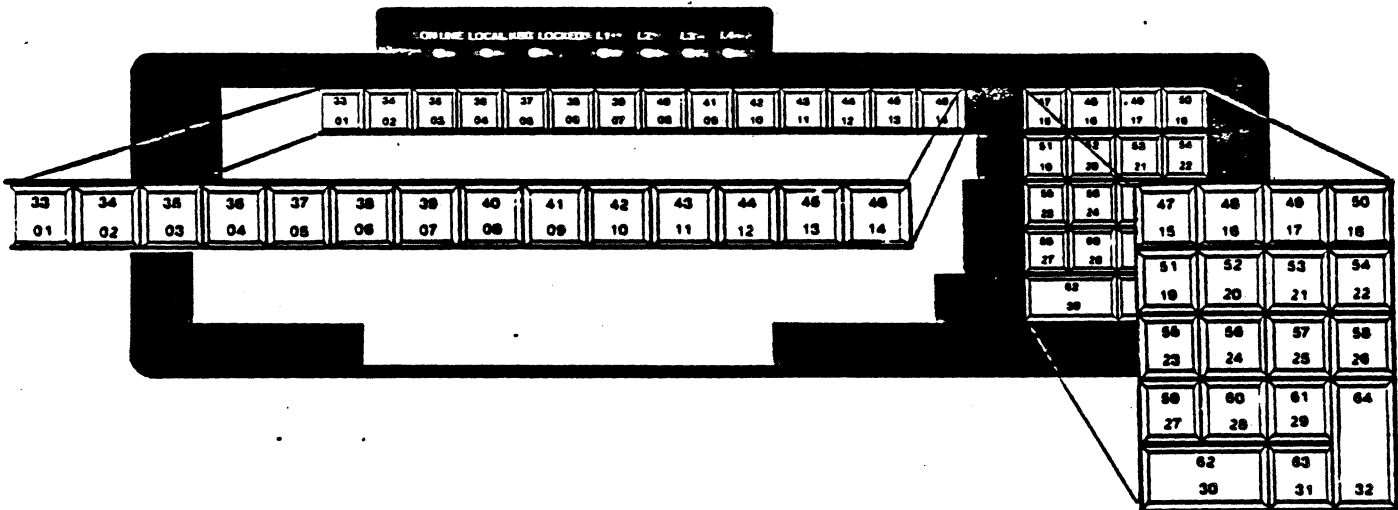
Pressing SHIFT and STATUS will display the Teleray's Selection Menu (see Section 4). Pressing SHIFT and the . in the numeric keypad will invoke Calculator mode. In either Calculator mode or Selection Menu, the numeric keypad is used to perform special functions and is not available for use as a numeric pad.

If the Suspend/Resume feature is enabled, the STATUS key will transmit the Suspend code (DC3) when the full page Selection Menu is displayed and transmit the Resume code (DC1) when the menu is exited. If the Suspend/Resume feature is disabled, the STATUS key will transmit no codes when entering or exiting the Page Selection Menu.



3-7 Macro (Reprogrammable) Keys

The keys shown below can be reprogrammed with any 8-character sequence (a macro). The only ASCII characters that may not be entered are NUL and : (colon). Different macro sequences can be assigned to these keys in both shifted and unshifted positions.



The key numbers shown in the above figure are the macro numbers called by the keytop in that position on the keyboard. Table 3-2 shows the codes programmed in these macros by the Teleray factory; these are called the default values. The Reset to Default State command will reprogram these keys to default values; no other command, including Reset to Initial State, will modify the macro contents except for the Reprogram Macro Key sequences. These sequences are:

| | |
|------------------------------------|---|
| Reprogram Macro Key - Local | ESC P L P ₂ text: P ₂ text... |
| Reprogram Macro Key - Keyboard | ESC P K P ₂ text: P ₂ text... |
| Reprogram Macro Key - Transmitting | ESC P T P ₂ text: P ₂ text... |
| End Macro Key Definition | ESC \ |

where:

text may be any character or sequence except "ESC P L...", "ESC P K...", "ESC P T...", or "ESC \ " or ":". Program function sequences may be included.

P₂ is the 2-digit macro number for the keys as shown in the figure above.

: is used to separate functions; this allows definition of several macros with one escape sequence.

There are three types of macro keys: Local, Transmitting, and Keyboard. Local macros operate locally only; no code is transmitted by them, and the ESCape sequence is executed within the Teleray. Transmitting macros are not interpreted by the Teleray, and the macro contents are transmitted to the host computer. If the host echoes the character sequence, it will be interpreted. Keyboard macros are treated as keyboard input; if the Teleray is in Local mode, they will be acted on locally; in Remote and Character modes, they will be transmitted. If macro keys are to be used to invoke Dynamic Programmable Functions, these macros will normally be Local macros. Figure 3-1 illustrates the operations of these macros.

The programming sequences need only redefine those macro keys you wish to change. Macro keys can be reprogrammed singly or in groups. The macros are stored in non-volatile memory to minimize required reprogramming. If no text (an empty text string) is supplied for a particular P₂, that keyboard macro will not have any effect on the Teleray when that key is pressed. This technique is recommended for those applications requiring certain keys to be disabled.

Keytops for the macro keys are provided to match the default coding. Alternate or special keys can be provided as required for the application. Section 5-7, Figure 5-12a, contains a keyboard diagram with the macro keys shown blank for use in recording your applications.

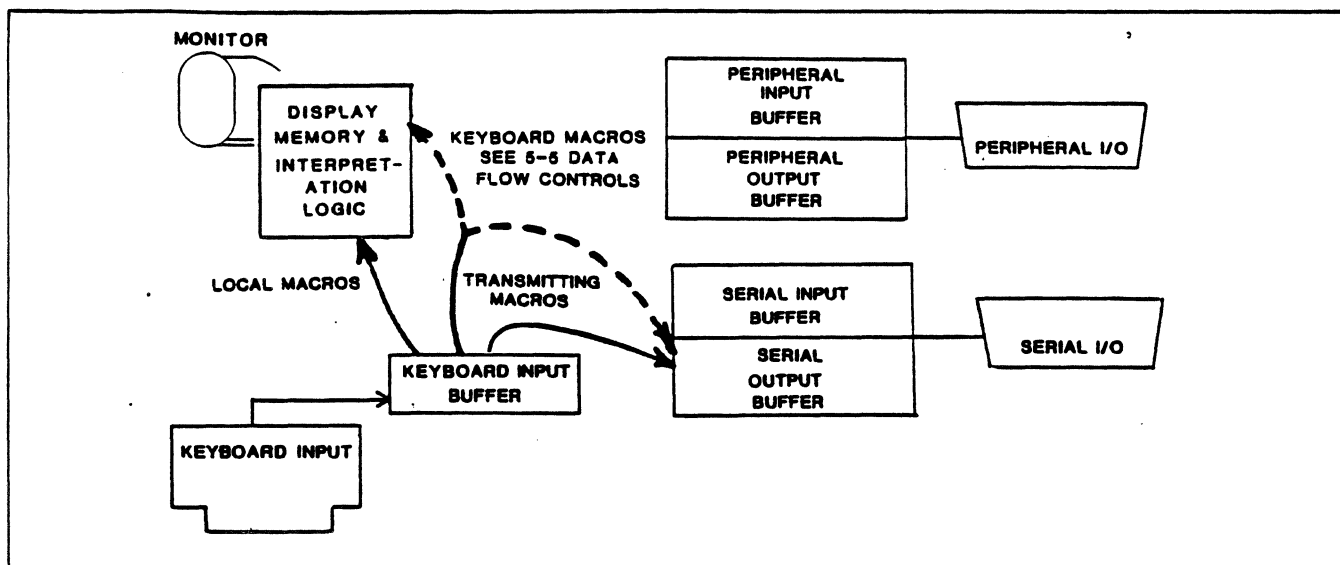


Figure 3-1: Macro Operations

Table 3-1 - Macro Key Default Values

| Macro # | Type | Default Value | Macro # | Type | Default Value |
|---------|------|-----------------------------------|---------|------|-------------------------------|
| 01 | L | ESC [? 12 h Local | 33 | L | ESC [? 12 ℓ Remote (on-line) |
| 02 | L | ESC [@ Insert Char | 34 | L | ESC [~ Insert in Para. |
| 03 | L | ESC [P Delete Char | 35 | L | ESC [p Delete Char in Para. |
| 04 | L | ESC [L Insert Line | 36 | L | ESC [L Insert Line |
| 05 | L | ESC [M Delete Line | 37 | L | ESC [M Delete Line |
| 06 | L | ESC [2 J Erase Page | 38 | L | ESC [? 2 J Erase Memory |
| 07 | L | ESC [0 K Erase to End of Line | 39 | L | ESC [2 K Erase Line |
| 08 | L | ESC [5 i Copy On | 40 | L | ESC [4 i Copy Off |
| 09 | L | ESC [01 u } See | 41 | L | ESC [06 t } See |
| 10 | L | ESC [02 u } Dynamic | 42 | L | ESC [07 t } Dynamic |
| 11 | L | ESC [03 u } Prog. | 43 | L | ESC [08 t } Prog. |
| 12 | L | ESC [04 u } Funct. | 44 | L | ESC [09 t } Funct. |
| 13 | L | ESC [05 u } 5-7 | 45 | L | ESC [10 t } 5-7 |
| 14 | L | ESC [H CR | 46 | K | ESC [H |
| 15 | K | ESC [A One Up | 47 | K | ESC M Reverse Index |
| 16 | K | ESC [B One Down | 48 | K | ESC D Index |
| 17 | K | ESC [D One Left | 49 | K | ESC [D One Left |
| 18 | K | ESC [C One Right | 50 | K | ESC [C One Right |
| 19 | K | 7 | 51 | K | 7 |
| 20 | K | 8 | 52 | K | 8 |
| 21 | K | 9 | 53 | K | 9 |
| 22 | K | - | 54 | K | - |
| 23 | K | 4 | 55 | K | 4 |
| 24 | K | 5 | 56 | K | 5 |
| 25 | K | 6 | 57 | K | 6 |
| 26 | K | , | 58 | K | , |
| 27 | K | 1 | 59 | K | 1 |
| 28 | K | 2 | 60 | K | 2 |
| 29 | K | 3 | 61 | K | 3 |
| 30 | K | 0 | 62 | K | 0 |
| 31 | K | . | 63 | K | ESC [? 26 h Calc mode |
| 32 | K | CR | 64 | L | ESC [i Print |

Table 3-2 - Keyboard Coding

| | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | | 54 | |
| 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | |
| 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | | |
| 95 | | | | | | | | | | | | | | | |

| | | | |
|----|----|----|----|
| 16 | 17 | 18 | 19 |
| 36 | 37 | 38 | 39 |
| 55 | 56 | 57 | 58 |
| 74 | 75 | 76 | 77 |
| 92 | 93 | | |

| Key No. | Unshifted | Shifted | Control | Key No. | Unshifted | Shifted | Control |
|-----------|--------------------------------------|----------------------|------------|---------|----------------------|---------|---------|
| 1 | Unencoded | | | 54 | Delete | Delete | Delete |
| 2 thru 15 | Macro (Programmable) Keys | | | 59 | Unencoded | | |
| 20 | ESC | ESC | ESC | 60 | Unencoded | | |
| 21 | 1 | ! | 1 | 61 | a | A | SOH |
| 22 | 2 | | NUL | 62 | s | S | DC3 |
| 23 | 3 | # | ESC | 63 | d | D | EOT |
| 24 | 4 | \$ | FS | 64 | f | F | ACK |
| 25 | 5 | % | GS | 65 | g | G | BEL |
| 26 | 6 | | RS | 66 | h | H | BS |
| 27 | 7 | & | US | 67 | j | J | LF |
| 28 | 8 | * | DEL | 68 | k | K | VT |
| 29 | 9 | (| 9 | 69 | l | L | FF |
| 30 | 0 |) | 0 | 70 | ; | : | ; |
| 31 | - | _ | - | 71 | ' | " | ' |
| 32 | = | + ~ | = | 72 | CR | CR | CR |
| 33 | / | { } | RS | 73 | BS | BS | BS |
| 34 | | ~ | FS | 78 | Unencoded | | |
| 35 | BREAK | BREAK- DISCONNECT | ANSWERBACK | 79 | Unencoded | | |
| 40 | HT | ESC [Z | HT | 80 | z | Z | SUB |
| 41 | q | Q | DC1 | 81 | x | X | CAN |
| 42 | w | W | ETB | 82 | e | C | ETX |
| 43 | e | E | ENQ | 83 | v | V | SYN |
| 44 | r | R | DC2 | 84 | b | B | STX |
| 45 | t | T | DC4 | 85 | n | N | SO |
| 46 | y | Y | EM | 86 | m | M | CR |
| 47 | u | U | NAK | 87 | , | < | , |
| 48 | i | I | HT | 88 | . | > | . |
| 49 | o | O | SI | 89 | / | ? | US |
| 50 | p | P | DLE | 90 | Unencoded | | |
| 51 | [| [| ESC | 91 | LF | LF | LF |
| 52 |] |] | GS | 95 | SP | SP | NUL |

The macro keys are described in Section 3-7.

SECTION 4

SELECTION MENUS

The Teleray Model 7 contains many user-selectable features and modes of operation. The host computer can select features and change modes with ESCape sequences. The operator can change them with the same ESCape sequences or, more simply, with a special display form called a Selection Menu.

This Selection Menu form can be used in one of two ways: as a full-page (66 lines) menu, or sequentially as a single selection line on the terminal's bottom (25th) line. The choice of page selection or line selection menus can be made either by ESCape sequence or within each menu. These choices are described in Section 5-3, Application Controls. The selection page menu format allows the operator to see all of the choices that are available on a single display page. When this page is accessed, the terminal's internal display memory is used to store the menu messages; consequently, the display memory contents are erased. The selection line menu accesses all of the same parameters as the full-page menu, but accesses them sequentially. The selection line menu does not erase the display memory.

Figure 4-1 represents the Selection Menu. Each individual block in the leftmost group represents a category of selections; each block in the rightmost group represents a feature selection. The current category and feature being selected within these blocks is indicated with a diamond instead of a square block. The prompt associated with the category and feature appears on the screen so that you do not have to memorize the meaning of each block. The blocks and diamonds serve to indicate your current position in the menu. The Teleray will remember the most recent access to the Selection Menu and will automatically return to that position whenever the Selection Menu is accessed.

In Selection mode, the keyboard's numeric keypad block is specially interpreted. The remainder of the Teleray remains active, and the display memory will not be disturbed. The CURSOR RIGHT and CURSOR LEFT keys are used to select features within the category. When shifted, the CURSOR RIGHT and CURSOR LEFT keys are used to select categories. CURSOR RIGHT moves forward in the selection sequence; CURSOR LEFT moves backward.

There are three types of selections: On/off selections; parametric selections; and numeric selections. The CURSOR UP and CURSOR DOWN keys are used to make on/off selections, respectively. The current state of each selection is shown on the display immediately following the feature prompt. These messages are designed to be self-explanatory. The CURSOR UP and CURSOR DOWN keys are used to course through the parameter list for parametric selections. The current state of each selection is displayed. Numeric selections are entered using the numeric keypad (only). Again, the current state of each selection will be displayed. Whenever selection choices are changes, they will be automatically saved in non-volatile memory.

Lock/Unlock Selection ESC [P_s; P_s space v / ESC [P_s; P_s space u

Each selection feature can be locked via an ESCape sequence so that this feature can no longer be changed from the keyboard. Features that have been locked will appear as dim blocks. If an entire category of features has been locked, the category indicator will appear dim.

These ESCape sequences can be entered from either the computer or from the I/O ports. The second P_s selection parameter is the number of the selection feature within the category; the first P_s is the number of the category. The categories and features are numbered in the order they appear on the Teleray screen (and the order they appear on the following page top to bottom). Example: ESC [3; 7 space v locks the Screen Saver feature (in the Application Controls category). ESC [1; 6 space u unlocks the inverse video features (in the Ergonomic Controls category). If a parameter of 0 (zero) or if no parameter is given, the entire category will be locked or unlocked.

The selections available in each category are described in the appropriate operations section. The figure on the following page will assist in identifying the categories and locating these sections, and contains blanks for recording your settings.

| | | | | |
|-------|-------------------------|--|---|---|
| ◆◆◆◆◆ | 1 ERGONOMETRIC CONTROLS | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 10 11 | Brightness _____ Scroll Type _____ Scroll Rate _____ Keyboard Auto Repeat _____ Auto Repeat Rate _____ Inverse Video _____ Margin Bell Column _____ Cursor Blink _____ Cursor Character _____ Keyclick _____ Wide Screen _____ |
| ◆◆◆◆◆ | 2 MEMORY STRUCTURE | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 10 11 | Tab Column _____ Left Margin Column _____ Right Margin Column _____ Left Margin Wrap _____ Right Margin Wrap _____ Scrolling _____ Horizontal Hold _____ Page Advance _____ Characters Per Line _____ Lines Per Page _____ Number of Pages _____ |
| ◆◆◆◆◆ | 3 APPLICATION CONTROLS | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 10 11 | Monitor Mode _____ Set Hours _____ Set Minutes _____ New Line _____ Function Loading _____ Screen Refresh Rate _____ Screen Saver _____ Answerback _____ Terminal Identity _____ User Defined Control _____ Selection Menu _____ |
| ◆◆◆◆◆ | 4 COMMUNICATIONS FORMAT | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 | Serial Baud Rate _____ Serial Parity Type _____ Serial Parity Check _____ Serial Duplex _____ Prphl Baud Rate _____ Prphl Parity Type _____ Prphl Parity Check _____ Prphl Duplex _____ |
| ◆◆◆◆◆ | 5 DATA FLOW CONTROLS | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 | Local/Remote _____ Block/Character _____ Serial Copy _____ Serial Suspend-Resume _____ Serial Local Echo _____ Prphl Copy _____ Prphl Suspend-Resume _____ Prphl Busy-Ready _____ Prphl Busy-Ready Level _____ |
| ◆◆◆◆◆ | 6 BLOCK TRANSMIT FORMAT | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 | Transmit _____ Transmit to Cursor _____ Transmit Guarded _____ End of Line Suspend _____ Serial Space Suppression _____ Serial Space Substitution _____ Prphl EOL Suspend _____ Prphl Space Suppression _____ Prphl Space Substitution _____ |
| ◆◆◆◆◆ | 7 TRANSMIT TERMINATORS | ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆ | 1 2 3 4 5 6 7 8 9 10 | Serial Start of Transmit Code _____ Serial Guarded Field Code _____ Serial End of Line Code _____ Serial End of Page Code _____ Serial End of Transmit Code _____ Prphl Start of Transmit Code _____ Prphl Guarded Field Code _____ Prphl End of Line Code _____ Prphl End of Page Code _____ Prphl End of Transmit Code _____ |

Figure 4-1: Selection Menu

5-12 Graphic Sets and Control Characters

A. Standards

The control character set employed by Teleray is described in ANSI X3.4 ASCII. Extensions to the ASCII code space are defined by ANSI X3.64, "Additional Controls For Use With American National Standard Code For Information Interchange." The corresponding international standard is ISO DP 6429. These standards define a set of encoded control functions to facilitate data interchange with 2-dimensional imaging devices, such as CRT and printer terminals. Additional controls and features in the Teleray which are not included in this standard were coded as "private use" parameters as described in X3.64.

The control sequences shown in this manual are described in terms of the ASCII character equivalent. Designating or invoking alternate graphic sets does not affect the relationship.

B. Graphic Character Sets

The Teleray has four resident graphic sets: an ASCII set, a UK set, a Line Drawing set, and a Mosaic set. The Teleray can have only one graphic set in use at one time. These graphic character sets are invoked (placed in "use") with either of two complementary locking shifts or by a non-locking single shift. The locking shift Shift In (SI) invokes the G0 graphic set; Shift Out (SO) the G1 graphic set. The G0 or G1 set remains in use until the next occurrence of SO or SI. A single character from the G2 set can be displayed using the single shift (ESC N). The single shift selects the single next character from the G2 set; the set in use automatically reverts to the G0 or G1 set as invoked by the most recent occurrence of SO or SI.

Designation of the contents of G0, G1, or G2 is selected from the four resident graphic sets using the ESCape sequences shown in Figure 5-17. The designation or invocation of G0, G1, or G2 does not change text already in the Teleray display memory. Designation of G0, G1, or G2 does not change the graphic set in use unless the designation of the G set currently in use is changed.

The graphic set designations and invocation are stored in non-volatile memory. The mosaic set is designed so that the cells in the character block have a direct relationship to the six low order ASCII bit values. See Figure 5-14. The UK set is identical to ASCII except that the pound sterling symbol (£) is substituted for the # symbol. The line drawing and mosaic sets are illustrated in Figure 5-16.

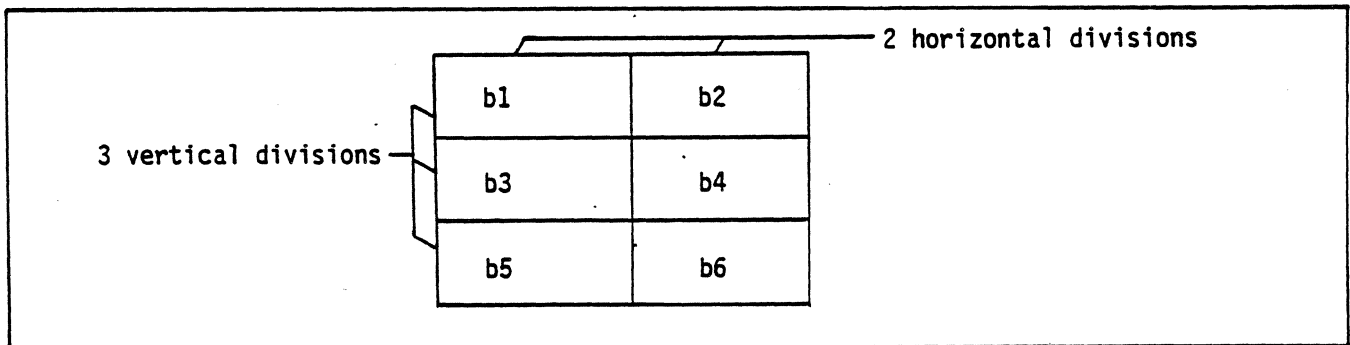


Figure 5-14: Mosaic Character Cell Composition

USA STANDARD CODE FOR INFORMATION INTERCHANGE

| <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">Bits</div> <div style="display: flex; flex-direction: column; gap: 2px;"> <div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="border-bottom: 1px solid black; width: 100%;"></div> </div> </div> | | | | | 0 0 | 0 0 | 0 1 | 0 1 | 1 0 | 1 0 | 1 1 | 1 1 |
|---|----------------|----------------|----------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|
| b ₄ | b ₃ | b ₂ | b ₁ | COLUMN ROW | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 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

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

Figure 5-15 ASCII Character Set

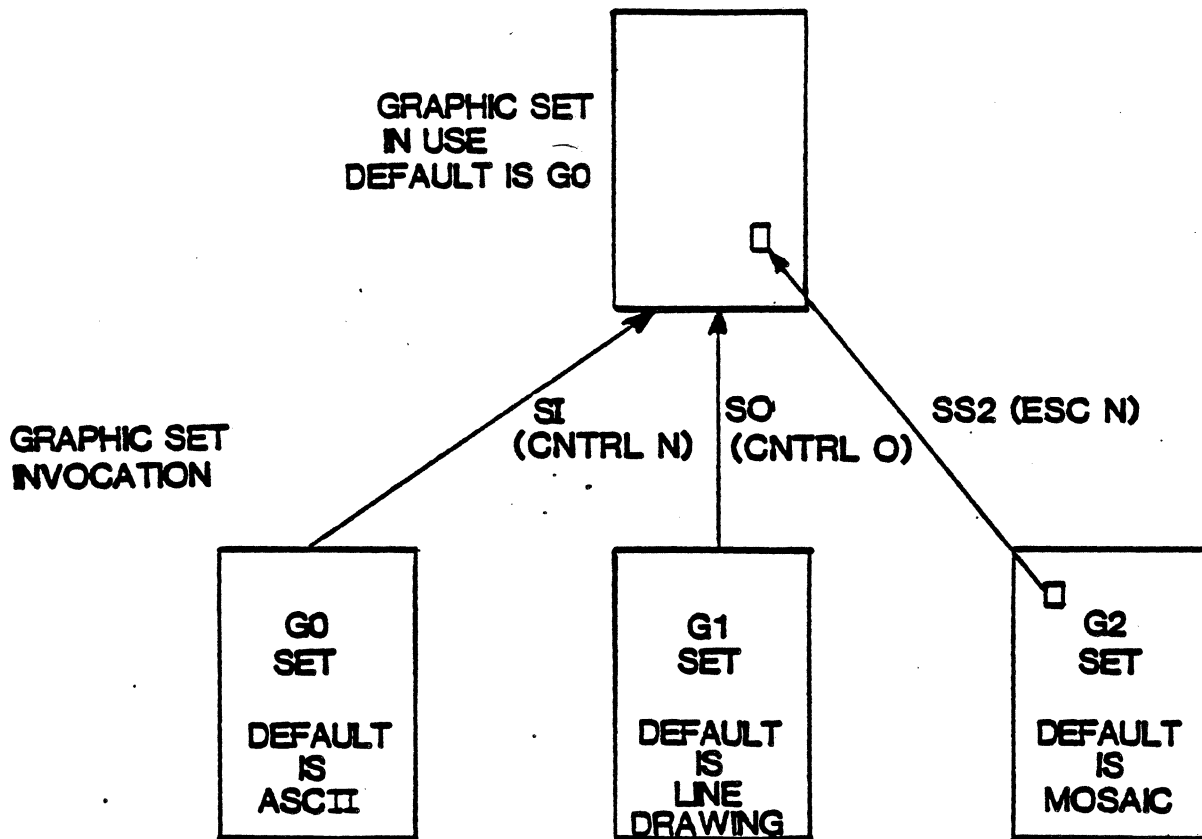
LINE DRAWING

| COLUMN ROW | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------|----|---|---|-----|---|---|
| 0 | | 0 | 2 | ♥ | | |
| 1 | ! | 1 | 3 | ♦ | | |
| 2 | " | 2 | x | ♣ | | |
| 3 | # | 3 | ÷ | ♠ | | |
| 4 | \$ | 4 | ° | ♣ | | |
| 5 | % | 5 | ± | 9 | | |
| 6 | & | 6 | ≤ | © | | |
| 7 | ' | 7 | ≥ | ™ | | |
| 8 | < | 8 | ≠ | 1/2 | | |
| 9 |) | 9 | ∞ | 1/4 | ◁ | ○ |
| 10 | * | : | ∑ | ⊙ | ⌊ | ↑ |
| 11 | + | ; | ∫ | † | ⌋ | ← |
| 12 | , | < | Ω | ✓ | ⌋ | ↓ |
| 13 | - | = | ⊖ | ∅ | ⌋ | → |
| 14 | . | > | μ | £ | ⌋ | ⊞ |
| 15 | / | ? | π | ♪ | ⌋ | ⊞ |

MOSIAC SETS

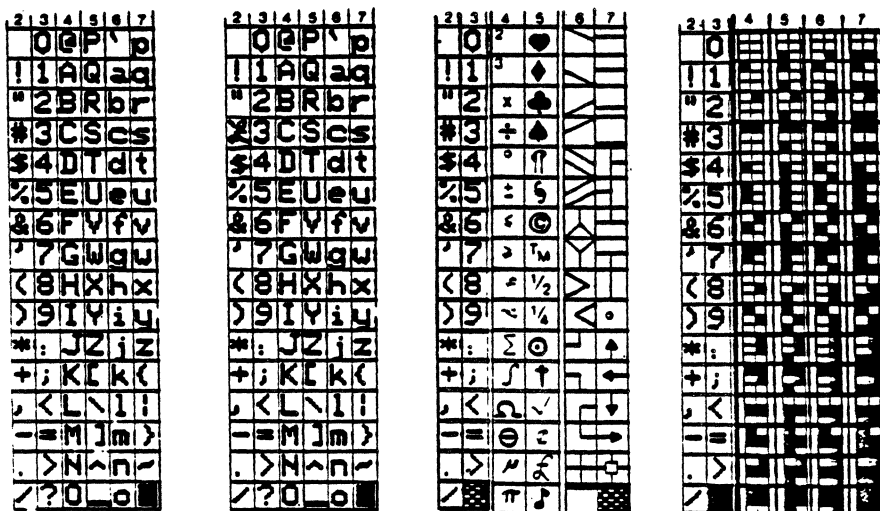
| COLUMN ROW | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------|----|---|---|---|---|---|
| 0 | | 0 | □ | ▣ | ▤ | ▥ |
| 1 | ! | 1 | ▣ | ▤ | ▥ | ▦ |
| 2 | " | 2 | ▣ | ▤ | ▥ | ▦ |
| 3 | # | 3 | ▣ | ▤ | ▥ | ▦ |
| 4 | \$ | 4 | ▣ | ▤ | ▥ | ▦ |
| 5 | % | 5 | ▣ | ▤ | ▥ | ▦ |
| 6 | & | 6 | ▣ | ▤ | ▥ | ▦ |
| 7 | ' | 7 | ▣ | ▤ | ▥ | ▦ |
| 8 | < | 8 | ▣ | ▤ | ▥ | ▦ |
| 9 |) | 9 | ▣ | ▤ | ▥ | ▦ |
| 10 | * | : | ▣ | ▤ | ▥ | ▦ |
| 11 | + | ; | ▣ | ▤ | ▥ | ▦ |
| 12 | , | < | ▣ | ▤ | ▥ | ▦ |
| 13 | - | = | ▣ | ▤ | ▥ | ▦ |
| 14 | . | > | ▣ | ▤ | ▥ | ▦ |
| 15 | / | ? | ▣ | ▤ | ▥ | ▦ |

Figure 5-16 Line Drawing and Mosaic Sets



| | SI | SO | SS1 |
|--------------|---------|---------|---------|
| 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 designate a new character set for all data following the control code. The single shift sequence (ESC N) designates a new character set for only one character following the sequence.



**GRAPHIC SET
REPertoire**

ASCII

UK

**LINE
DRAWING**

MOSAIC

Figure 5-17: Graphic Sets

5-13 User Defined Control Sequences

| | | |
|-----|---|--|
| S * | User Defined Controls/ ANSI Controls | ESC [? 51 h / ESC [? 51 ℓ |
| S * | Define Control Sequences (1) | ESC P C intro space P _S ; P _S ;...P _S : intro space P _S ; P _S ...P _S :...ESC \ |
| | Examine Memory | ESC P E hexadecimal address space hexadecimal address:...ESC \ |
| | Write Memory | ESC P W hexadecimal address space hexadecimal byte:...ESC \ |
| | Clear User Defined Controls | ESC [space |

The Model 7 can be programmed by the user to have a user selected operation invoked by a user selected control sequence. The following table is a list of operations that the user can select for Define Control Sequences.

| (1) P _S Value | Subroutine |
|--------------------------|---------------------------------------|
| 0 | No Operation |
| 1 | *Screen Brightness Level |
| 2 | *Right Margin Bell |
| 3 | *Cursor Character Select |
| 4 | For future use |
| 5 | *Set Top and Bottom Margins |
| 6 | *Set Left and Right Margins |
| 7 | *Set Line Length |
| 8 | *Set Page Length |
| 9 | *Set Number of Pages |
| 10 | For future use |
| 11 | Exit User Defined Controls |
| 12 | For future use |
| 13 | Sound Bell |
| 14 | *Program Bell |
| 15 | *Program LEDs |
| 16 | For future use |
| 17 | Start Message Line Loading |
| 18 | *Lock Selection Feature |
| 19 | *Unlock Selection Feature |
| 20 | For future use |
| 21 | *Set Time |
| 22 | Report Time |
| 23 | *Delay Next Operation |
| 24 | For future use |
| 25 | *Set Serial Baud Rate |
| 26 | *Set Peripheral Baud Rate |
| 27 | *Set Parity |
| 28 | No Scroll |
| 29 | Media Copy |
| 30 | For future use |
| 31 | Transmit Text (Serial I/O Port) |
| 32 | Transmit Text (Peripheral I/O Port) |
| 33 | Transmit Form Serial |
| 34 | Start Selected Area |
| 35 | End Selected Area |
| 36 | *Select Text for Transmission |
| 37 | For future use |
| 38 | *Define Dynamic Function |
| 39 | *End Dynamic Function Definition |
| 40 | *Locally Perform Dynamic Function |
| 41 | *Transmit Dynamic Function Contents |
| 42 | *Enable Transmits to Dynamic Function |
| 43 | *Clear All Dynamic Function Memory |
| 44 | For future use |
| 45 | Start Protected Area |
| 46 | End Protected Area |
| 47 | Duplicate Rendition |

| P _s Value | Subroutine |
|----------------------|-----------------------------------|
| 48 | *Select Qualified Areas |
| 49 | *Select Graphic Rendition |
| 50 | *Select Line Attribute |
| 51 | For future use |
| 52 | *Cursor Up |
| 53 | *Cursor Down |
| 54 | *Cursor Right |
| 55 | *Cursor Left |
| 56 | Carriage Return |
| 57 | Cursor Home |
| 58 | Index |
| 59 | Cursor New Line |
| 60 | Reverse Index |
| 61 | *Cursor Position |
| 62 | Send Cursor Position |
| 63 | Save Cursor |
| 64 | Restore Cursor |
| 65 | Cursor to Next Tab Stop |
| 66 | Set Tab Stop |
| 67 | *Clear Tab Stop(s) |
| 68 | *Tab Backwards |
| 69 | *Scroll Text Up |
| 70 | *Scroll Text Down |
| 71 | *Scroll Text Right |
| 72 | *Scroll Text Left |
| 73 | *Page Forward |
| 74 | *Page Backward |
| 75 | For future use |
| 76 | Erase to Right Margin |
| 77 | Erase from Left Margin |
| 78 | Erase Entire Line to Both Margins |
| 79 | Erase to End of Window |
| 80 | Erase from Start of Window |
| 81 | Erase Entire Window |
| 82 | Erase to End of Pages |
| 83 | Erase All Pages |
| 84 | Erase to End of Field |
| 85 | Erase from Start of Field |
| 86 | Erase Entire Field |
| 87 | For future use |
| 88 | Reset to Initial State |
| 89 | For future use |
| 90 | *Insert Character |
| 91 | *Delete Character |
| 92 | *Select Editing Extent |
| 93 | *Insert Character in Text Block |
| 94 | *Delete Character in Text Block |
| 95 | *Delete Word |
| 96 | *Undelete Word |
| 97 | *Insert Line |
| 98 | *Delete Line |
| 99 | *Undelete Line |
| 100 | For future use |
| 101 | Program Answerback |
| 102 | Send Answerback |
| 103 | Program Identity |
| 104 | Send Identity |
| 105 | Send Device Status Report |
| 106 | Send Status Line Report |
| 107 | Send Peripheral Port Status |
| 108 | For future use |

| P_s Value | Subroutine |
|-------------|--|
| 109 | Shift In |
| 110 | Shift Out |
| 111 | Single Shift |
| 112 | Reset Mode |
| 113 | Set Mode |
| 114 | For future use |
| 115 | Convert Character to Cursor Column |
| 116 | Convert Character to Cursor Line |
| 117 | Convert Character to Cursor Page |
| 118 | Convert Parameter(s) from Character(s) |
| 119 | Convert Parameter(s) from Program |
| 120 | Convert Parameter(s) from Digits |
| 121 | Store Field Modifier to End of Line |
| 122 | Store Field Modifier to End of Page |
| 123 | Search and Clear Field Delimiter |
| 124 | Send Character at Cursor |
| 125 | *Send Cursor Column |
| 126 | *Send Cursor Line |
| 127 | *Send Cursor Page |

Table 5-4: Define Control Sequence Operations

A. A user defined control is programmed, only in ANSI mode, as follows:

1. Select the desired control sequence character string.
2. Select the Model 7 operation(s) to be executed upon receipt of the control sequence.
3. Formulate the desired control sequence to program the new control sequence.

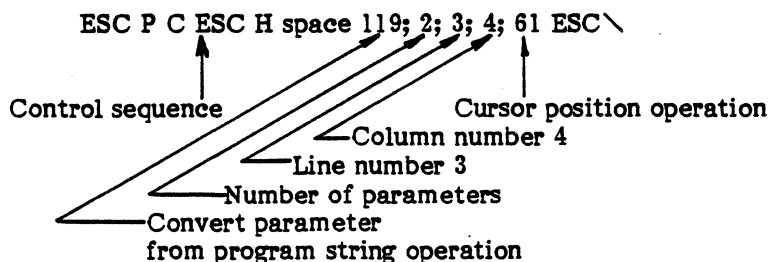
Here is a simple example of defining a user control sequence.

1. Control sequence is ESC H.
2. Operations are Clear Page, Cursor Home (Clear Page $P_s = 81$, Cursor Home $P_s = 57$).
3. Type ESC P C ESC H space 81; 57 ESC \.

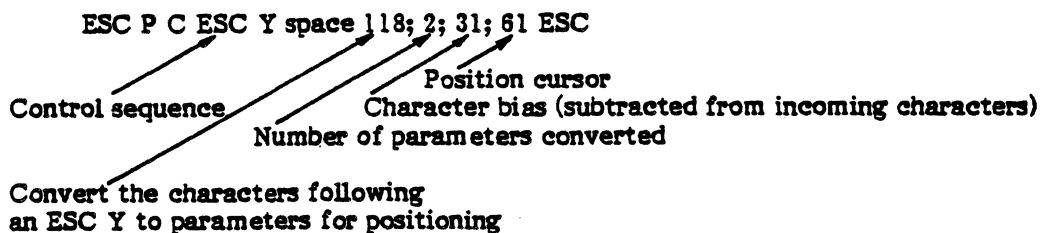
After completing Steps 1, 2, and 3, the User Defined Controls mode should be selected and the ESC H operation tested to check whether it performs the operations in Step 2 above.

Many of the Model 7 operations require parameters to select a type or quantity for the operation. In the user defined control mode, the parameter values can either be converted from characters following a control character string, from numbers programmed within the control sequence definition, or by a 1- to 3-digit number following the control sequence. The value zero is used when no parameter(s) is specified and each parameter specified will cause the same action defined for the ANSI control sequence. Here are two more examples.

1. This sequence defines the sequence ESC H to move the cursor to Line 3, Column 4.



2. This sequence defines the sequence ESC Y to position the cursor using the characters following ESC Y.



More than one control sequence can be defined in a definition string. The ESC P C is used to start a string, the ESC \ is the string terminator, and colons (:) are used to separate control sequence definitions within a string. Here is an example:

Combining 1 and 2 above ESC P C ESC H space 119; 2; 3; 4; 61: ESC Y space 76; 2; 1F; 61 ESC \

B. Subroutines Which Require Explanation

- 29 Media copy corresponds to ANSI sequences of the form ESC [P_s i where P_s designates the action taken to affect data flow to or from the peripheral port.
- 112 Reset mode corresponds to ANSI sequences of the form ESC [P_s l where the parameters select the Model 7 features to be reset.
- 113 Set mode corresponds to ANSI sequences of the form ESC [P_s h where the parameters select the Model 7 features to be set.
- 115 Convert character to cursor column causes the character following this subroutine to be converted to a cursor column position. One definition parameter is required following the subroutine number. This value will be subtracted from the incoming ASCII character to produce the new column number.

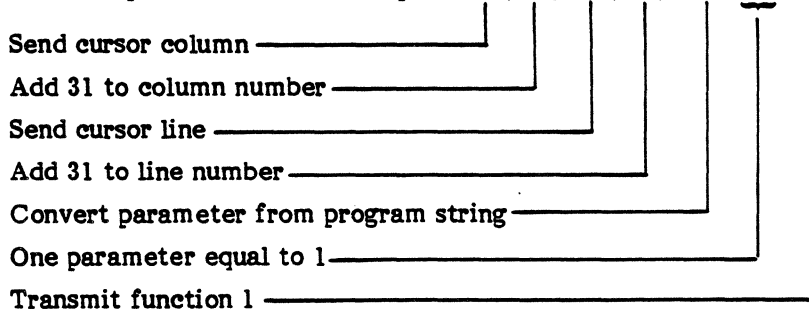
Example: 115; 31; Sn

Subroutine designer Subtracted value next subroutine designer

- 116 Convert character to line operates the same way as convert character to column except the cursor will move to a new line number.
- 117 Convert character to page operates the same as convert character to column except position will be a new page.
- 118 Convert parameter(s) from character(s) causes incoming character(s) following execution of this subroutine to be converted to parameter(s). Two definition parameters are required for this subroutine number. The first value designates the number of incoming characters to be converted and the second value the amount to be subtracted from each incoming ASCII character to produce a parameter value. For example, if the control sequence ESC Y is programmed with parameters 118; 2; 31; 61, then the string ESC Y 7 H would cause the cursor to move to Line 24, Column 41. The 2 after the 118 designates two incoming characters, and the 31 is subtracted from both the 7 and the H. After the 7 and the H are converted, they are stored in a parameter table so that when the cursor position routine (61) is executed, the action taken is the same as it would be with the ANSI sequence ESC [24; 71 H.
- 119 Convert parameter(s) from program string is similar to convert parameter(s) from character(s) except that there is no subtracted value and the parameter quantity value is followed by the actual parameter list. For example, if ESC Y was programmed with 119; 2; 24; 41; 61, then the string ESC Y would cause the cursor to move to Line 24, Column 41. In this case, the cursor position parameters were predefined compared to the previous example where the characters following the ESC Y determined the cursor position.

- 120 Convert parameters from digits causes the digits following the control sequence to be converted to a single parameter. One definition parameter is required to specify the number of digits. For example, if ESC Y is programmed with 120; 2; 61, then the string ESC Y 04 will cause the cursor to move to Line 4, Column 1. The column number is one because only the first or line parameter was specified, so the column parameter is defaulted.
- 121 Store field modifier to the end of line will cause the current graphic rendition to be displayed from the cursor position to the end of the line. This modifier is stored at the cursor position as a blank character, and the cursor is moved one position to the right. If another modifier is present before the end of the line, the operation will terminate at this modifier. (1)
- 122 Store modifier to the end of the page operates similar to store modifier to end of line, except that the modifier does not occupy a space in the display and the current rendition is stored to the next modifier or to the end of the line. (1)
- 123 Search and clear field modifier will search out and clear the field modifier and the associated field for whichever type of field modifier is being used (i.e., end of line or end of page). (1)
- (1) Field modifiers should not be used simultaneously with qualified areas.
- 124 Send character at cursor causes the character beneath the cursor symbol to transmit.
- 125 Send cursor column causes a cursor column position character to transmit. One definition parameter is required to specify the amount to be added to the cursor column number to produce the desired ASCII character to be sent. For example, if ESC a is programmed with 125; 31 and the cursor is in Column 23, then a 6 character will transmit when the Telaray receives an ESC a. (2)
- 126 Send cursor line causes the same action as send cursor column except the cursor line is used. (2)
- (2) Send cursor line and column can be combined to form a cursor position report, and if a terminator is required, a function transmit should also be added where the function is programmed with the needed terminator. The following example will program the sequence ESC a as a cursor position report.

For example: ESC P C ESC a space 125; 31; 126; 31; 119; 1; 1; 41 ESC



Function number 1 has to be preprogrammed with the desired cursor position report terminator(s).

- 127 Send cursor page causes the same action as send cursor column except the cursor page is used.

C. The Model 7 Teleray supports two separate control modes, the ANSI 3.64 controls and the user defined controls. The default controls for the user defined controls are compatible with the Teleray Model 10 control sequences detailed below.

Operating Modes

| | |
|------------------------|---------------|
| Wide/Normal Characters | ESC m / ESC l |
| Enter/Leave Protect | ESC W / ESC X |
| Keyboard Lock/Unlock | ESC b / ESC c |
| Disable/Enable Display | ESC e / ESC f |
| Reset to Initial State | ESC g |

Operator Communications

| | |
|--------------------------|----------------------------------|
| Fields | (see FIELD MODIFIERS) |
| Search & Clear Delimiter | ESC S |
| Change I/O Baud | (See PROGRAMMABLE DATA RATES) |
| Bell | BEL (CTRL G) |
| Parity Error | Automatic S _B Display |

Programmable Functions

| | |
|-------------------------|--------------------------------------|
| Define Function | ESC U then 2-digit number (01 to 32) |
| End Function Definition | ESC V |
| Transmit to Function | ESC N then 2-digit number (01 to 32) |
| Execute Function | ESC T then 2-digit number (01 to 32) |

Peripheral Interface

| | |
|------------------------|-------------------------------|
| Print All | ESC O (oh) |
| Peripheral On | DC2 (CTRL R) |
| Peripheral Off | DC4 (CTRL T) |
| Change Peripheral Baud | (see PROGRAMMABLE DATA RATES) |

Transmits

| | |
|---------|-------|
| Line | ESC i |
| Message | ESC I |
| Page | ESC Z |

Buffer

| | |
|-------------------------|---------------------------|
| Buffer Control Enable | ESC h |
| Busy/Ready | Automatic DC3 / DC1 codes |
| Buffer Protocol Disable | ESC g |

Cursor Manipulation

| | |
|-------------------|------------------------------------|
| One Up | ESC A |
| One Down | LF (ESC B or CTRL J) |
| One Right | ESC C or Space |
| One Left | BS (ESC D or CTRL H) |
| Home | ESC H |
| Absolute Position | (See CURSOR COORDINATE POSITONING) |
| Position Read | ESC a |
| Tab Set | ESC F |
| Clear All Tabs | ESC G |
| Tab | HT (CTRL I) |
| Back Tab | ESC d |

Clears and Edits

| | |
|------------------|----------------------|
| Clear EOL | ESC K |
| Clear EOP | ESC J |
| Clear Page | FF (ESC j or CTRL L) |
| Insert Character | ESC P |
| Delete Character | ESC Q |
| Insert Line | ESC L |
| Delete Line | ESC M |

*Except dedicated keys or switches

PROGRAMMABLE DATA RATES

| Serial I/O: ESC [...Then Character Peripheral: ESC \ ...Then Character | | | | | |
|--|-------|-------------|-------|-------------|-------|
| Rate (Baud) | Char. | Rate (Baud) | Char. | Rate (Baud) | Char. |
| 50 | 0 | 300 | 5 | 2400 | : |
| 75 | 1 | 600 | 6 | 3600 | ; |
| 110 | 2 | 1200 | 7 | 4800 | < |
| 135.5 | 3 | 1800 | 8 | 7200 | = |
| 150 | 4 | 2000 | 9 | 9600 | > |
| | | | | Reserved | ? |

FIELD MODIFIERS

| Unprotected: ESC R...then: | Field Characteristics | Protected: ESC R...then: |
|-------------------------------|--------------------------------|-----------------------------|
| @ | Normal (ends all others) | G |
| A | Blink | *R |
| B | Dim | S |
| C | Dim, Blink | T |
| D | Inverse | U |
| E | Inverse, Blink | V |
| F | Inverse, Dim | W |
| G | Inverse, Dim, Blink | X |
| H | Underline | Y |
| I | Underline, Blink | Z |
| J | Underline, Dim | [|
| K | Underline, Dim, Blink | \ |
| L | Underline, Inverse |] |
| M | Underline, Inverse, Blink | ^ |
| N | Underline, Inverse, Dim | _ |
| O | Underline, Inverse, Dim, Blink | P |
| | Protect Only | |

NOTE: Refer to Instruction Manual regarding use of blank field modifier in place of blink, for secure fields.

CURSOR COORDINATE POSITIONING

| ESC Y ... then <u>Line Code</u> ... then <u>Column Code</u> | | | | | |
|---|-------|--------------|-------|----------|-------|
| LINE CODES | | COLUMN CODES | | | |
| Line No. | Char. | Col. No. | Char. | Col. No. | Char. |
| 1 | Space | 1 | Space | 28 | : |
| 2 | ! | 2 | ! | 29 | < |
| 3 | " | 3 | " | 30 | * |
| 4 | # | 4 | # | 31 | > |
| 5 | \$ | 5 | \$ | 32 | ? |
| 6 | % | 6 | % | 33 | @ |
| 7 | & | 7 | & | 34 | A |
| 8 | ' | 8 | ' | 35 | B |
| 9 | (| 9 | (| 36 | C |
| 10 |) | 10 |) | 37 | D |
| 11 | * | 11 | * | 38 | E |
| 12 | + | 12 | + | 39 | F |
| 13 | , | 13 | , | 40 | G |
| 14 | - | 14 | - | 41 | H |
| 15 | . | 15 | . | 42 | I |
| 16 | / | 16 | / | 43 | J |
| 17 | 0 | 17 | 0 | 44 | K |
| 18 | 1 | 18 | 1 | 45 | L |
| 19 | 2 | 19 | 2 | 46 | M |
| 20 | 3 | 20 | 3 | 47 | N |
| 21 | 4 | 21 | 4 | 48 | O |
| 22 | 5 | 22 | 5 | 49 | P |
| 23 | 6 | 23 | 6 | 50 | Q |
| 24 | 7 | 24 | 7 | 51 | R |
| | | 25 | 8 | 52 | S |
| | | 26 | 9 | 53 | T |
| | | 27 | : | 54 | U |
| | | | | 55 | V |
| | | | | 56 | W |
| | | | | 57 | X |
| | | | | 58 | Y |
| | | | | 59 | Z |
| | | | | 60 | [|
| | | | | 61 | \ |
| | | | | 62 |] |
| | | | | 63 | ^ |
| | | | | 64 | _ |
| | | | | 65 | ` |
| | | | | 66 | a |
| | | | | 67 | b |
| | | | | 68 | c |
| | | | | 69 | d |
| | | | | 70 | e |
| | | | | 71 | f |
| | | | | 72 | g |
| | | | | 73 | h |
| | | | | 74 | i |
| | | | | 75 | j |
| | | | | 76 | k |
| | | | | 77 | l |
| | | | | 78 | m |
| | | | | 79 | n |
| | | | | 80 | o |

Notes: Any undefined coordinate character will be ignored.

D. The user may also define his own Model 7 operations. Here is an example of how examine and write control strings may be used to examine and write user defined assembly language programs.

1. ESC P R 0FE0 0FE0: ESC \

Following this control string, the Teleray will output the hexadecimal equivalents of the memory contents from hexadecimal address 0FE0 to 0FE0 (separated by spaces).

2. ESC P W 0FE1 FF: 0C: 10: AC: ESC \

This control string will cause FF to be written at address 0FE1, 0C to be written at 0FE2, and so forth.

More information is needed to define user operations other than the ones supplied in Table 5-4. This information can be obtained through Teleray Field Service Sales by asking for Special Feature 874.

The user definable program space starts at 0FDF and ends at 0FFF. The first memory cell of this space designates the number of user defined subroutines (up to 16). The succeeding memory cells taken in pairs designate the subroutine addresses with the high order address byte being stored in the high order address of a pair (see Figure 5-18).

Leftover display memory provides a place to program the user defined subroutines. This area of memory is usually designated for functions 17-32 on a 4-page non-volatile memory option. Installing this option is highly advisable to ensure integrity of any user defined subroutines.

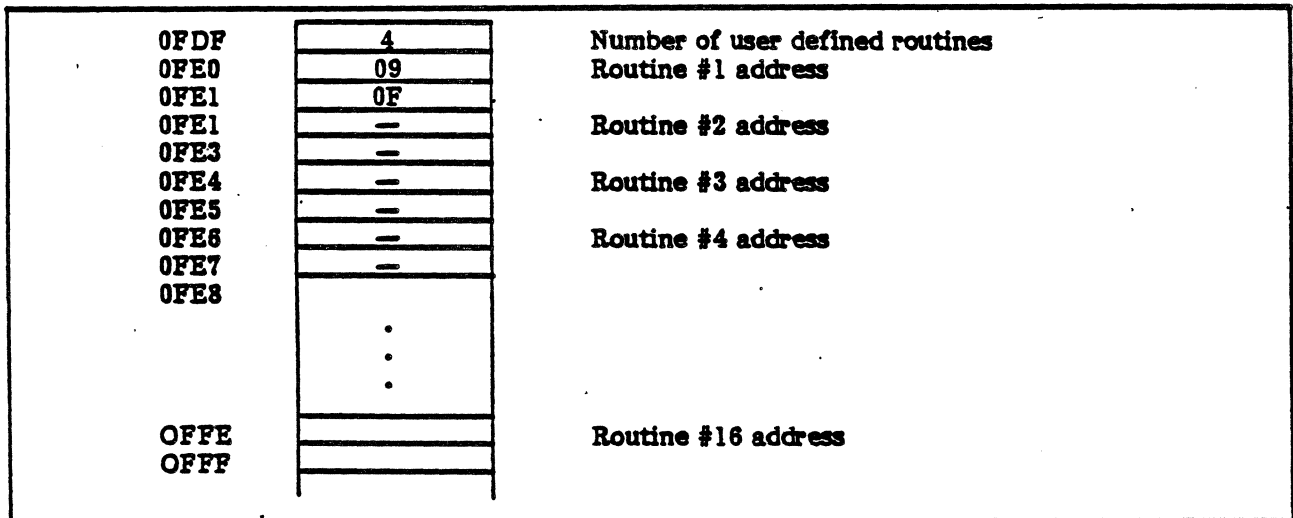


Figure 5-18 - User Definable Subroutine Memory

SECTION 7

CODING SUMMARY ARRANGED BY FUNCTION

S indicates modifiable in Selection Menu
* indicates state saved in non-volatile memory
¶ indicates default condition
ℓ indicates lower case L

- 7-1 Ergonomic Controls
- 7-2 Memory Structure Controls
- 7-3 Application Controls, Operator Alerts, and Bottom Line Displays
- 7-4 Communications Format
- 7-5 Data Flow Controls
- 7-6 Block Transmits
- 7-7 Programmable Functions
- 7-8 Text Presentation Format
- 7-9 Cursor Positioning
- 7-10 Erases, Resets, and Edits
- 7-11 Test Reports and Messages
- 7-12 Character Sets
- 7-13 User Defined Control Sequences

7-1 Ergonomic Controls

| | |
|---------------------------------------|--|
| S * Screen Brightness Level | ESC [P _n space s |
| S * Smooth Scroll/Jump Scroll (1) | ESC [? 3 h / ESC [? 3 l [¶] |
| S * Smooth Scroll Rate 6/12 lps | ESC [? 22 l [¶] / ESC [? 22 h |
| S * Auto Key-Repeat On/Off | ESC [? 8 h / ESC [? 8 l [¶] |
| S * Auto Key-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 (2) | ESC [P _n space r |
| S * Cursor Character Blink/Steady (3) | ESC [? 33 h [¶] / ESC [? 33 l |
| S * Cursor Character Select | ESC [P _n space q |
| S * Keyclick On/Off | ESC [? 28 h / ESC [? 28 l [¶] |

- (1) Smooth scroll temporarily revoked automatically if input buffer attempts to overflow.
- (2) Set P_n to zero to disable Bell; Bell rings P_n columns from end of logical line. Default = 8.
- (3) If steady, cursor blinks only if placed on a non-space character.

7-2 Memory Structure Controls

| | |
|--|--|
| Set Top, Bottom Margins (1) | ESC [P _n ; P _n r |
| S * Set Left, Right Margins (1) | 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 (2) | ESC [? 30 l [¶] / ESC [? 30 h |
| S * Page Stop/Page Auto Advance | ESC [? 31 l [¶] / ESC [? 31 h |
| S * Set Logical Line Length to P _n Characters (3) | ESC [P _n ? q |
| S * Set Logical Page Length to P _n Lines | ESC [P _n ? p |
| S * Select Number of Pages (4) | ESC [P _n space p |

- (1) Margins must be smaller than logical page size. Defaults are Line 1; last line of page.

| (2) <u>Scrolling</u> | <u>Page</u> | <u>Action on Reaching Page Boundary</u> |
|----------------------|-------------|---|
| On | Stop | Scroll within page |
| On | Advance | Scroll into next page |
| Off | Stop | Overwrite in current page |
| Off | Advance | Auto "flip" into next page |

Cursor will not move backward or scroll beyond first page or forward beyond last page.

- (3) 255 characters per line maximum.
- (4) Remainder used as dynamic programmable function if non-volatile memory option installed (255 lines per page maximum).

7-3 Application Controls, Operator Alerts, and Bottom Line Displays

A. 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 ¶ |

B. Operator Alerts

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

(1) First P_s selects one of 15 tones or off; second P_s selects duration.

| P _s Value | Note | Duration (Seconds) |
|----------------------|---------|--------------------|
| 0 | none | .1 |
| 1 | C | .1 |
| 2 | Db | .2 |
| 3 | D | .3 |
| 4 | Eb | .4 |
| 5 | E | .5 |
| 6 | F | .6 |
| 7 | Gb | .7 |
| 8 | G | .8 |
| 9 | G# | .9 |
| 10 | A | 1.0 |
| 11 | A# | 1.1 |
| 12 | B | 1.2 |
| 13 | C | 1.3 |
| 14 | E | 1.4 |
| 15 | G | 1.5 |
| 16 | Ignored | 1.6 |

(2)

| P _s | Action |
|----------------|--|
| 0 or none | ¶All off |
| 1 | L1 on |
| 2 | L2 on |
| 3 | L3 on |
| 4 | L4 on |
| 5 | On Line on (Automatically reset) |
| 6 | Local on (Automatically reset) |
| 7 | Keyboard Locked on (Automatically reset) |

C. Bottom Line Displays

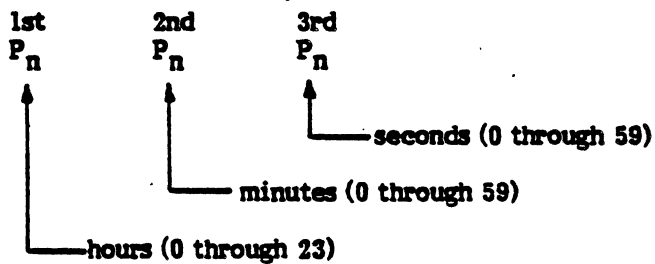
| | |
|---|---|
| Start/End Message Line Message (1) | ESC P M text ESC \ |
| Enter/Exit Calculation Mode | ESC [? 26 h / ESC [? 26 l ¶ |
| Exit Selection Mode (Blank Bottom Line) | ESC [space w |
| Display Terminal Status On/Off (2) | ESC [? 27 h / ESC [? 27 l ¶ |
| Display Self Test Result (3) | Automatic on self test completion |
| Lock Selection Feature (4) | ESC [P _s ; P _s space v |
| Unlock Selection Feature (4) | ESC [P _s ; P _s space u |

- (1) Message to be placed on the bottom line is bracketed between the ESC sequences shown. No text will erase the bottom line. MSG indicator will indicate to the operator that a message is waiting if the bottom line is being used to display terminal status, Selection Menu, or self test result.
- (2) Terminal status displays current condition of: clock, cursor column number, line number, page number, entry error, function memory.
- (3) Includes program revision level and self test results.
- (4) Each selection feature can be separately locked. First P_s selects group; second P_s selects item. (See Page 4-1.)

D. Clock

| | |
|--------------------------|--|
| Set Clock Time (1) | ESC [P _n ; P _n ; P _n ? s |
| Request Time | ESC [? 7 n |
| Report Clock Time (1)(2) | ESC [P _n ; P _n ; P _n ? r |
| Delay Next Operation (3) | ESC [P _n ; P _n space t |

(1) Format



- (2) Status display is a 12-hour clock (no AM, PM)
Computer clock is a 24-hour clock, military time format (e.g., 14 = 2 PM, 2 = 2 AM, etc.)
- (3) First P_n in seconds 0 through 59; second P_n in tenths of seconds. Data accepted into buffers but not processed; keyboard is locked during delay interval.

7-4 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 Duplex/Half | ESC [? 36 ℓ ¶ / ESC [? 36 h |
| S * Peripheral I/O Full Duplex/Half | ESC [? 44 ℓ ¶ / ESC [? 44 h |

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

| P _S | Baud Rate | P _S | Baud Rate |
|----------------|-----------|----------------|-----------|
| 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) First P_S selects for Serial port; second P_S selects for Peripheral port.

| P _S | Parity Setting |
|----------------|-------------------------|
| 0 | None (8 bits no parity) |
| 1 | Odd |
| 2 | Even |
| 3 | Mark |
| 4 | Space |

7-5 Data Flow Controls

| | |
|--|-------------------------------|
| S * Local/Remote Mode (1) | ESC [? 12 h / ESC [? 12 ℓ ¶ |
| S * Character/Block Mode (2) | 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 (3) | 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 Low/High (4) | ESC [? 42 h / ESC [? 42 ℓ ¶ |
| Suspend | DC3 |
| Resume | DC1 |
| Bell Queue 8 Characters | |
| Serial Input Buffer 256 Characters | |
| Serial Output Buffer 16 Characters | |
| Peripheral Input Buffer 256 Characters | |
| Peripheral Output Buffer 16 Characters | |

- (1) Operates on Serial I/O port.
- (2) Operates on keyboard data; transmitting functions will continue to transmit.
- (3) Operates on keyboard data and transmitting functions.
- (4) Always active; jumper in plug to disable.

7-6 Block Transmits

| | |
|---|--|
| Ready to Transmit | ESC S |
| Transmit Text (1) (Serial I/O Port) | ESC 5 |
| Transmit Text (1) (Peripheral I/O Port) | ESC [i |
| Transmit Form and Text | ESC 6 |
| Start Select Area (SSA) | ESC F |
| End Select Area (ESA) | ESC G |
| S * Select Text for Transmission (2) | ESC [P _s ; P _s ? t |
| S * Transmit from Beginning to Cursor/to End | ESC [16 h / ESC [16 l ¶ |
| S * Serial Auto Suspend on End of Line/Normal | ESC [? 39 h / ESC [? 39 l ¶ |
| S * Peripheral Auto Suspend on End of Line/Normal | ESC [? 47 h / ESC [? 47 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 Peripheral | ESC [? 48 h / ESC [? 48 l ¶ |
| S * Transmit Guarded Fields/Transmit without Guarded Fields | ESC [1 l ¶ / ESC [1 h |
| S * Select Start of Transmission Identifier (3) | ESC [P _s ; P _s { Default is none |
| S * Select Guarded Field Replacement Identifier (3) | ESC [P _s ; P _s ? z Default is HT |
| S * Select End of Line Terminator (3) | ESC [P _s ; P _s ? { Default is LF CR |
| S * Select End of Page Terminator (3) | ESC [P _s ; P _s ? Default is FF |
| S * Select End of Transmission Terminator (3) | ESC [P _s ; P _s |

(1) Text is selected by settings of "Select Text" and "Transmit from Beginning to Cursor/to End".

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

| P _s Value | Area Transmitted |
|----------------------|----------------------------|
| 0 | Page |
| 1 | Line |
| 2 | Window |
| 3 | Memory |
| 4 | Selected Area (SSA to ESA) |

(3) First P_s selects for Serial port; second P_s selects for Peripheral port.

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

7-7 Programmable Functions

A. Macro Keys

- * Reprogram Macro Key (Local) (1)(2) ESC P L P_s text: P_s text...
- * Reprogram Macro Key (Transmitting) (1)(2) ESC P T P_s text: P_s text...
- * Reprogram Macro Key (Keyboard) (1)(2) 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; only include P_s text for those functions to be reprogrammed.

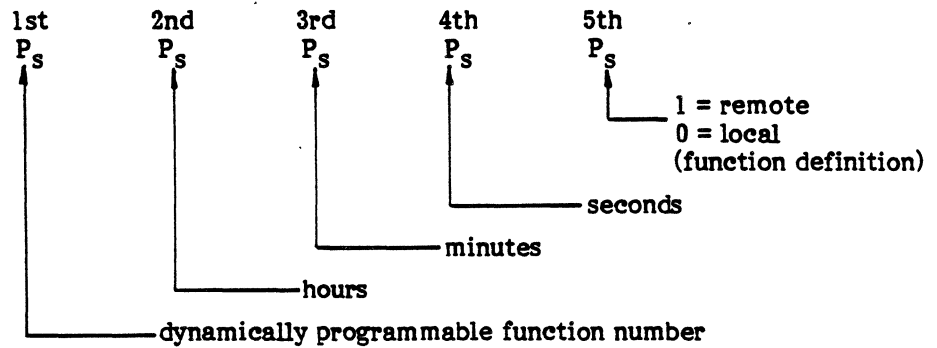
- (2) Local macros always operate locally; no code is transmitted. Transmitted macro keys always transmit; there is no local effect unless the host computer echoes the macro character string. Keyboard macro keys are treated as keyboard input (e.g., local in Local mode, transmitting in Remote and Character modes, etc.).

B. Dynamic Programmable Functions

- * Define Dynamic Function P_s (1) ESC P P_s text
- End Dynamic Function Definition ESC \
- Locally Perform Dynamic Function P_s ESC [P_s u
- Transmit Dynamic Function P_s Contents ESC [P_s t
- Enable Transmits to Dynamic Function P_s ESC [P_s z
- S * Load Functions With Interpretation/Transparent ESC [? 23 h / ESC [? 23 ℓ ¶
- Clear all Dynamic Function Memory ESC [2 space x
- Programmable Function Alarm (2) ESC [P_s; P_s; P_s; P_s; P_s ? x

(1) P_s is 2-digit dynamic programmable function number 01 through 32.

(2) Alarm Format:



7-8 Text Presentation Format

Start Protected Area

ESC V

End Protected Area

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

Select Line Attributes (3)

ESC # P_s

S * Wide Screen On/Off

ESC [? 20 h / ESC [? 20 l

| (1) P _s Value | 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 Value | Attribute |
|--------------------------|----------------------------|
| 0 or none | Normal; all attributes off |
| 2 | Dim on |
| 4 | Underscore on |
| 5 | Blink on |
| 7 | Inverse on |
| 8 | Blank |

| (3) P _s Value | Attribute |
|--------------------------|-----------------------------------|
| 3 | Double Width-Double Height Top |
| 4 | Double Width-Double Height Bottom |
| 5 | Normal Width-Normal Height |
| 6 | Double Width-Normal Height |
| 7 | Quad Width-Double Height Top |
| 8 | Quad Width-Double Height Bottom |

7-9 Cursor Positioning

A. 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 (1) | LF |
| New Line (1) | LF or ESC E |
| Index | ESC D |
| Reverse Index | ESC M |
| Address Origin Window/Absolute | ESC [? 6 h / ESC [? 6 l ¶ |
| Direct Address (2) | ESC [P _n ; P _n H or ESC [P _n ; P _n f |
| Request Position Report | ESC [6 n |
| Cursor Position Response (2) | ESC [P _n ; P _n R |
| * Save Cursor, Attributes and Character Set (in NVM) | ESC 7 |
| Restore Cursor, Attribute Tag and Character Set | ESC 8 |
| (1) ESC [20 h sets LF to New Line function ESC [20 l sets LF to Index function | } Also select what CR and LF keys transmit |
| (2) First P _n is decimal line number Second P _n is decimal column number | |

B. Tab Operations (Default stops 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 |

C. Text Movement

| | |
|--|------------------------------|
| Scroll Display Text Up P _n Lines (1) | ESC [P _n S |
| Scroll Display Text Down P _n Lines (1) | ESC [P _n T |
| Scroll Display Text Right P _n Columns (2) | ESC [P _n space A |
| Scroll Display Text Left P _n Columns (2) | ESC [P _n space @ |
| Forward P _n Pages | ESC [P _n U |
| Reverse P _n Pages | ESC [P _n V |

- (1) All 24 lines if window not specified or if set to 24. Scrolls also automatically initiated by moving cursor past page or window boundaries.
- (2) Scrolls may also be initiated by moving cursor past page boundaries.

7-10 Erases, Resets, and Edits

A. Erases

| | |
|--|----------------------------|
| Erase from Cursor to Right Margin (1) | 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 (2) | 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 | ESC [P _s N (3) |

- (1) To end of logical line if no margin.
- (2) To end of page if no bottom margin.
- (3) P_s

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

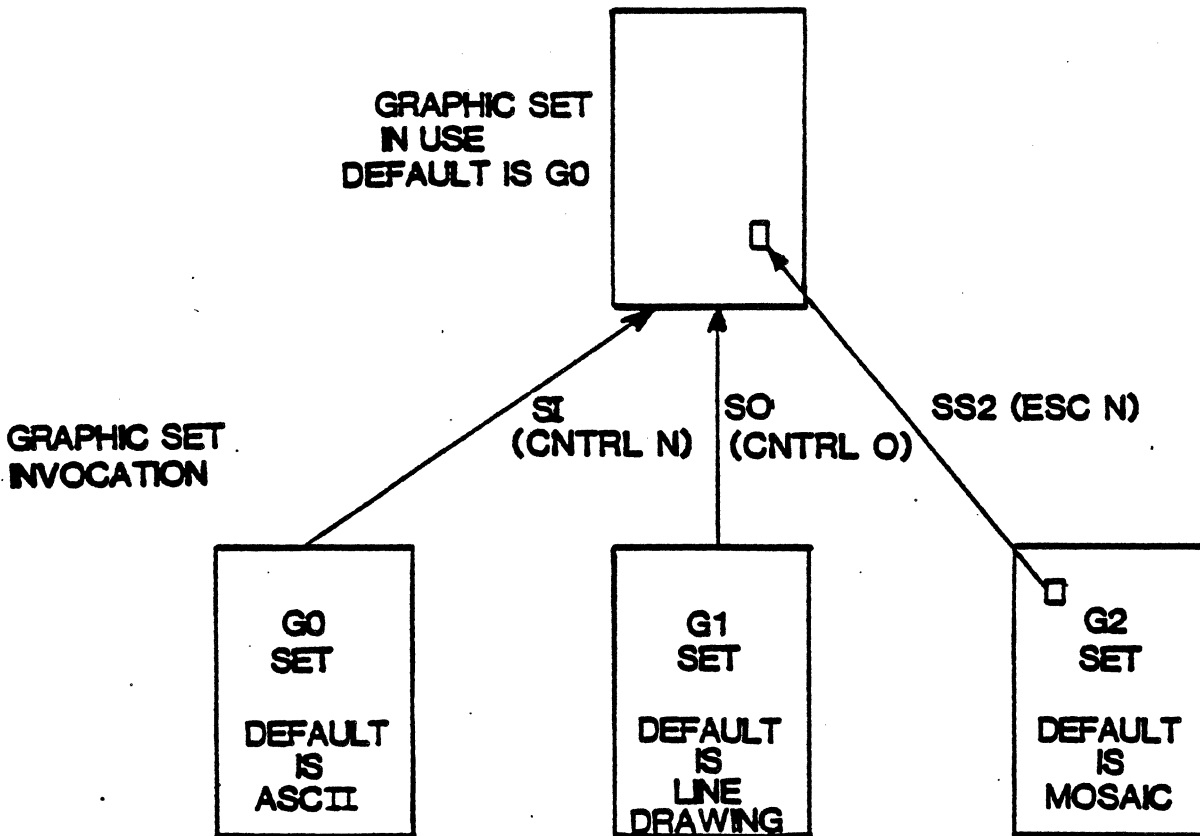
B. Resets

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

C. Edit Functions

| | |
|--|--------------------------|
| Repeat Previous P _n Times | ESC [P _n b |
| Insert P _n Characters (1) | ESC [P _n @ |
| Delete P _n Characters (1) | ESC [P _n P |
| Select Editing Extent (2) | ESC [P _s Q |
| Insert P _n Characters in Text Block | ESC [P _n ~ |
| Delete P _n Characters in Text Block | ESC [P _n p |
| Delete P _n Words | ESC [? w |
| Reinstate Last Deleted Word P _n Times | ESC [P _n ? v |
| Insert P _n Lines | ESC [P _n L |
| Delete P _n Lines | 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) Operation extent selected by editing extent mode.
- (2) Edit within the window for P_s = 0 or nothing
Edit within the line for P_s = 1
Edit within the field for P_s = 2



| | SI | SO | SS1 |
|--------------|---------|---------|---------|
| 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 designate a new character set for all data following the control code. The single shift sequence (ESC N) designates a new character set for only one character following the sequence.

| | | | |
|--------------|--------------|-------------------------|---------------------|
| 2 3 4 6 7 | 2 3 4 5 6 7 | 2 3 4 5 6 7 | 2 3 4 5 6 7 |
| 0 @ P ' p | 0 @ P ' p | 0 2 3 4 5 6 7 | 0 1 2 3 4 5 6 7 |
| ! 1 A Q a q | ! 1 A Q a q | ! 1 2 3 4 5 6 7 | ! 1 2 3 4 5 6 7 |
| " 2 B R b r | " 2 B R b r | " 2 x 3 4 5 6 7 | " 2 3 4 5 6 7 |
| # 3 C S c s | # 3 C S c s | # 3 + 4 5 6 7 | # 3 4 5 6 7 |
| \$ 4 D T d t | \$ 4 D T d t | \$ 4 5 6 7 | \$ 4 5 6 7 |
| % 5 E U e u | % 5 E U e u | % 5 6 7 | % 5 6 7 |
| & 6 F V f v | & 6 F V f v | & 6 7 | & 6 7 |
| ' 7 G W g w | ' 7 G W g w | ' 7 8 9 | ' 7 8 9 |
| < 8 H X h x | < 8 H X h x | < 8 9 | < 8 9 |
| > 9 I Y i y | > 9 I Y i y | > 9 | > 9 |
| * : J Z j z | * : J Z j z | * : 0 1 2 3 4 5 6 7 | * : 0 1 2 3 4 5 6 7 |
| + ; K L k l | + ; K L k l | + ; J T 0 1 2 3 4 5 6 7 | + ; 0 1 2 3 4 5 6 7 |
| , < L \ ! | , < L \ ! | , < 2 3 4 5 6 7 | , < 0 1 2 3 4 5 6 7 |
| - = M J m j | - = M J m j | - = 3 4 5 6 7 | - = 0 1 2 3 4 5 6 7 |
| . > N ^ n ^ | . > N ^ n ^ | . > 4 5 6 7 | . > 0 1 2 3 4 5 6 7 |
| ? 0 _ o _ | ? 0 _ o _ | ? 5 6 7 | ? 0 1 2 3 4 5 6 7 |

**GRAPHIC SET
REPertoire**

ASCII

UK

LINE
DRAWING

MOSAIC

Control Character Display and Generation

| Monitor Mode Display | Control Character | Keyboard Generation Press (1) Control & |
|----------------------|-------------------|---|
| AK | ACK | F |
| BL | BEL | G |
| BS | BS | H |
| CN | CAN | X |
| CR | CR | M |
| D ₁ | DC1 | Q |
| D ₂ | DC2 | R |
| D ₃ | DC3 | S |
| D ₄ | DC4 | T |
| D _L | DLE | P |
| EM | EM | Y |
| EQ | ENQ | E |
| ET | EOT | D |
| EC | ESC | 3 |
| EB | ETB | W |
| EX | ETX | C |
| FF | FF | L |
| FS | FS | 4 |
| GS | GS | 5 |
| HT | HT | I |
| LF | LF | J |
| NK | NAK | U |
| N _L | NUL | 2 or space bar |
| RS | RS | 6 |
| S _I | SI | O |
| S _O | SO | N |
| S _H | SOH | A |
| S _X | STX | B |
| S _B | SUB | Z |
| S _Y | SYN | V |
| U _S | US | 7 |
| V _T | VT | K |
| | DEL | 8 |

USA STANDARD CODE FOR INFORMATION INTERCHANGE

| Bits | | | | | 0 0 | 0 0 1 | 0 1 0 | 0 1 1 | 1 0 0 | 1 0 1 | 1 1 0 | 1 1 1 |
|----------------|----------------|----------------|----------------|--------|-----|-------|-------|-------|-------|-------|-------|-------|
| b ₄ | b ₃ | b ₂ | b ₁ | COLUMN | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| ROW | | | | | | | | | | | | |
| 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 |

(1) Dedicated keys on keyboard for several of these codes.

7-13 User Defined Control Sequences

| | | |
|-----|---|---|
| S * | User Defined Controls/ ANSI Controls | ESC [? 51 h / ESC [? 51 Z |
| S * | Define Control Sequences (1) Examine Memory Write Memory Clear User Defined Controls | ESC P C intro space P ₃ ; P ₃ ;...P ₃ : intro space P ₃ ; P ₃ ...P ₃ :...ESC ESC P R hexadecimal address space hexadecimal address ESC ESC P W hexadecimal address space hexadecimal byte;...ESC ESC [space |

P₃ Value

Subroutine

| | |
|----|---------------------------------------|
| 0 | No Operation |
| 1 | *Screen Brightness Level |
| 2 | *Right Margin Bell |
| 3 | *Cursor Character Select |
| 4 | For future use |
| 5 | *Set Top and Bottom Margins |
| 6 | *Set Left and Right Margins |
| 7 | *Set Line Length |
| 8 | *Set Page Length |
| 9 | *Set Number of Pages |
| 10 | For future use |
| 11 | Exit User Defined Controls |
| 12 | For future use |
| 13 | Sound Bell |
| 14 | *Program Bell |
| 15 | *Program LEDs |
| 16 | For future use |
| 17 | Start Message Line Loading |
| 18 | *Lock Selection Feature |
| 19 | *Unlock Selection Feature |
| 20 | For future use |
| 21 | *Set Time |
| 22 | Report Time |
| 23 | *Delay Next Operation |
| 24 | For future use |
| 25 | *Set Serial Baud Rate |
| 26 | *Set Peripheral Baud Rate |
| 27 | *Set Parity |
| 28 | No Scroll |
| 29 | Media Copy |
| 30 | For future use |
| 31 | Transmit Text (Serial I/O Port) |
| 32 | Transmit Text (Peripheral I/O Port) |
| 33 | Transmit Form Serial |
| 34 | Start Selected Area |
| 35 | End Selected Area |
| 36 | *Select Text for Transmission |
| 37 | For future use |
| 38 | *Define Dynamic Function |
| 39 | *End Dynamic Function Definition |
| 40 | *Locally Perform Dynamic Function |
| 41 | *Transmit Dynamic Function Contents |
| 42 | *Enable Transmits to Dynamic Function |
| 43 | *Clear All Dynamic Function Memory |
| 44 | For future use |
| 45 | Start Protected Area |
| 46 | End Protected Area |
| 47 | Duplicate Rendition |

| P_s Value | Subroutine |
|----------------------------|-----------------------------------|
| 48 | *Select Qualified Areas |
| 49 | *Select Graphic Rendition |
| 50 | *Select Line Attribute |
| 51 | For future use |
| 52 | *Cursor Up |
| 53 | *Cursor Down |
| 54 | *Cursor Right |
| 55 | *Cursor Left |
| 56 | Carriage Return |
| 57 | Cursor Home |
| 58 | Index |
| 59 | Cursor New Line |
| 60 | Reverse Index |
| 61 | *Cursor Position |
| 62 | Send Cursor Position |
| 63 | Save Cursor |
| 64 | Restore Cursor |
| 65 | Cursor to Next Tab Stop |
| 66 | Set Tab Stop |
| 67 | *Clear Tab Stop(s) |
| 68 | *Tab Backwards |
| 69 | *Scroll Text Up |
| 70 | *Scroll Text Down |
| 71 | *Scroll Text Right |
| 72 | *Scroll Text Left |
| 73 | *Page Forward |
| 74 | *Page Backward |
| 75 | For future use |
| 76 | Erase to Right Margin |
| 77 | Erase from Left Margin |
| 78 | Erase Entire Line to Both Margins |
| 79 | Erase to End of Window |
| 80 | Erase from Start of Window |
| 81 | Erase Entire Window |
| 82 | Erase to End of Pages |
| 83 | Erase All Pages |
| 84 | Erase to End of Field |
| 85 | Erase from Start of Field |
| 86 | Erase Entire Field |
| 87 | For future use |
| 88 | Reset to Initial State |
| 89 | For future use |
| 90 | *Insert Character |
| 91 | *Delete Character |
| 92 | *Select Editing Extent |
| 93 | *Insert Character in Text Block |
| 94 | *Delete Character in Text Block |
| 95 | *Delete Word |
| 96 | *Undelete Word |
| 97 | *Insert Line |
| 98 | *Delete Line |
| 99 | *Undelete Line |
| 100 | For future use |
| 101 | Program Answerback |
| 102 | Send Answerback |
| 103 | Program Identity |
| 104 | Send Identity |
| 105 | Send Device Status Report |
| 106 | Send Status Line Report |
| 107 | Send Peripheral Port Status |
| 108 | For future use |

P_s Value**Subroutine**

| | |
|-----|--|
| 109 | Shift In |
| 110 | Shift Out |
| 111 | Single Shift |
| 112 | Reset Mode |
| 113 | Set Mode |
| 114 | For future use |
| 115 | Convert Character to Cursor Column |
| 116 | Convert Character to Cursor Line |
| 117 | Convert Character to Cursor Page |
| 118 | Convert Parameter(s) from Character(s) |
| 119 | Convert Parameter(s) from Program |
| 120 | Convert Parameter(s) from Digits |
| 121 | Store Field Modifier to End of Line |
| 122 | Store Field Modifier to End of Page |
| 123 | Search and Clear Field Delimiter |
| 124 | Send Character at Cursor |
| 125 | *Send Cursor Column |
| 126 | *Send Cursor Line |
| 127 | *Send Cursor Page |