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Elektronik

MIKRODATORTEKNIK

Häfte 16: Manual för Heathkit terminal (H-19A)

INNEHÅLL

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MIRRODATOTEKNIK

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16. MANUAL FOR HEATHKIT TERMINAL (H-19A)

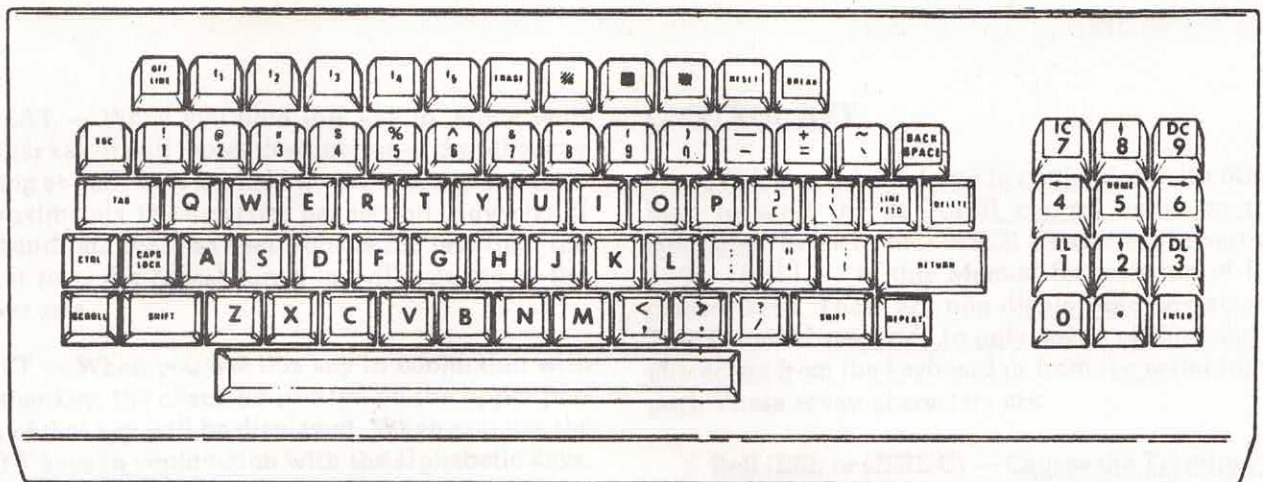
16.1 SPECIFICATIONS

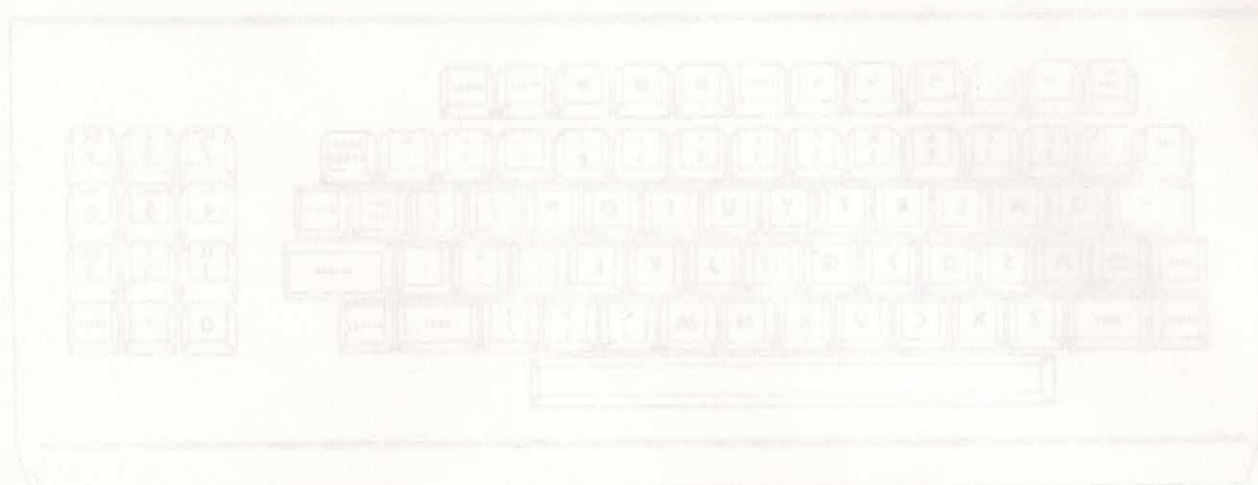
CRT	12" diagonal.
Display Format	25 lines of 80 characters.
Display Size	6.5" high $\times$ 8.5" wide.
Character Size	0.2" high $\times$ 0.1" wide (approximate).
Character Set	128 characters (95 ASCII and 33 graphic).
Character Type	5 $\times$ 7 dot matrix (upper case), 5 $\times$ 9 dot matrix (lower case with decenders).
Keyboard	84 keys (60 alphanumeric, 12 function/control) plus a 12-key numeric pad.
Cursor	Blinking, nondestructive, underline, block, or disabled (DIP switch selectable).
Cursor Controls	Up, down, left, right, home, CR, LF, back space, and tab.
Cursor Addressing	Relative and direct.
Tab	Standard 8-column tab.
Refresh Rate	60 Hz at 60 Hz line frequency. 50 Hz at 50 Hz line frequency.
Edit Functions	Insert and delete character or line.
Erase Functions	Erase page, erase to end of line, erase to end of page, erase to beginning of line, erase to beginning of page, and erase line.
Scroll	Auto or line/page freeze.
Bell	Audible alarm on receipt of ASCII BEL.
Video	Normal and reverse, by character.
Interface	EIA RS-232C at 110 to 9600 baud.
Communications Mode	Full or half duplex.
Parity	Even, odd, stick, or none.
Operating Temperature	0-40° C ambient.
Power Requirements	115 VAC (110-130 VAC), 50/60 Hz, 45 watts. 230 VAC (220-260 VAC), 50/60 Hz, 45 watts.
Dimensions	13" high $\times$ 17" wide $\times$ 20" deep. (33 $\times$ 43.2 $\times$ 50.8 cm.)
Weight	35.2 lbs. (15.8 kg).

SPECIFICATIONS

Weight	8.5 lbs. (3.8 kg.)
Dimensions	17" high x 17" wide x 30" deep (43 x 43 x 76 cm.)
Power Requirements	230 VAC (230-250 VAC), 6000 Hz, 45 watts 115 VAC (110-120 VAC), 6000 Hz, 45 watts
Operating Temperature	0-40° C ambient
Parity	Even, odd, stick, or none
Communications Mode	Full or half duplex
Interface	EIA RS-232C at 110 to 9600 baud
Video	Normal and reverse, by character
Bell	Available alarm on receipt of ASCII BEL
Scroll	Auto or line/page freeze
Enter Functions	Insert and delete character or line Erase page, erase to end of line, erase to end of page Erase to beginning of line, erase to beginning of page and erase line
Exit Functions	
Cursor Addressing	Relative and direct
Cursor Controls	Up, down, left, right, home, CR, LF, back space and tab.
Cursor	Flashing, nondestructive, underlines block or dis- abled (UP switch selectable)
Keyboard	17-key numeric pad 64 keys (60 alphanumeric, 17 function/numeric) plus a case with thumbwheel
Character Type	3 x 7 dot matrix (upper case), 3 x 9 dot matrix (lower case with thumbwheel)
Character Set	128 characters (96 ASCII and 32 graphic)
Character Size	0.7" high x 0.7" wide (approximately)
Display Size	8.5" high x 8.5" wide
Display Format	26 lines of 80 characters 17" diagonal

16.2 NORMAL MODES AND KEYS





SPACE BAR — Causes the cursor to move one character position to the right. A space is a nondisplayable character. If you type the space bar when the cursor is positioned below a displayed character, the character is replaced by a space and the cursor moves one character position to the right. If you type the space bar when the cursor is at the right end of a line, the cursor will remain there since neither a carriage return nor a line feed is generated.

BACK SPACE — Moves the cursor one space to the left. If the cursor is at the left end of a line, it will not move when you type a BACK SPACE. If the software uses this key to delete last input character.

DELETE — Transmits the ASCII code 127 (0x7F). It is a nondisplayable character.

TAB — Software-controlled to move the cursor to the next tabstop (eight character spaces) to the right. The tab stops are fixed at 8, 16, 24, 32, 40, 48, 56, and 64. If the cursor is at character position 73 through 79, it will only move one character position to the right each time you type the TAB key. If the cursor is at character position 80, it will move when you type the TAB key (unless the wrap-around feature has been selected).

ESC (Escape) — A nondisplayable character that transmits the ASCII code 027 (0x1B). This key is used in combination with other keys to enter and exit special modes. See "Special Keys and Modes" on page 10-4.

ALPHABETIC KEYS

The Terminal has the standard 26 letters of the alphabet. These keys can transmit either lower-case or upper-case codes as well as display them on the screen. You can hold either SHIFT key down or you can press the CAPS LOCK key to obtain upper-case letters.

NONALPHABETIC KEYS

The nonalphabetic keys are those with double marks. These include the numbers through 9, punctuation marks, and special characters. The lower marking is generated when both of the SHIFT keys are released, while the upper marking is generated when either or both SHIFT keys are held down. The CAPS LOCK key will not shift these keys.

MISCELLANEOUS

The character codes in the following description apply only to the Terminal's internal handling of the listed codes, which can be overridden by software.

RETURN — Moves the cursor to the first character position of the line that it is currently in. If the cursor is already at the first character position, it remains there. RETURN is a nondisplayable character.

LINE FEED — Moves the cursor down one line. LINE FEED is a nondisplayable character. If the cursor is at the bottom line, a LINE FEED causes it to remain there. But all of the data on the screen moves up one line. Data on the top line is lost as it is shifted up out of the screen.

SPECIAL MODES AND KEYS

871204

REPEAT — When you hold this key in, along with another key, it will repeat the function of the other key as long as both keys are held down. The repeat rate is approximately 15-characters per second. However, if the baud rate that has been selected is less than the repeat rate, the repeat function will operate at the slower rate.

SHIFT — When you use this key in conjunction with another key, the character printed on the upper portion of that key will be displayed. When you use the SHIFT keys in conjunction with the alphabetic keys, the upper-case character is displayed.

CAPS LOCK — When this latching key is down, the Terminal will transmit the ASCII code for, and display, upper-case (capital) alphabetic letters. It does not shift the keys with the double markings.

OFF LINE — When this latching key is down, the Terminal is inhibited from transmitting or receiving data. However, any displayable characters that you type on the keyboard will appear on the screen and any control codes that the Terminal can process will be processed.

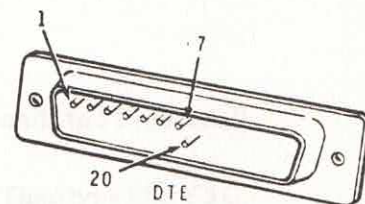
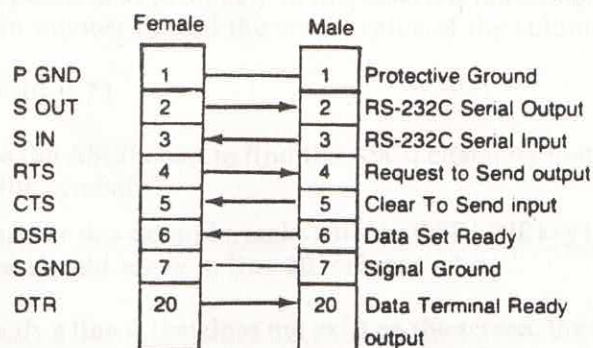
BREAK — When you press this key, it generates a continuous "space level" at the serial RS-232 output of the Terminal. It is generally used to tell the computer that you wish to interrupt execution.

SCROLL — When this is used with Heath software, in the Hold Screen Mode, you can type the SCROLL key to instruct the Terminal to display another line of information onto the screen. You can type SHIFT SCROLL to display another 24 lines of information onto the screen.

CONTROL KEY

The CTRL key is held down in conjunction with other keys to send the 32 ASCII control codes to the computer. Refer to the "ASCII Characters" chart on page 16-11 of this Manual for a listing of the control keys. These are non-displayable characters. The Terminal responds to only seven of the control characters from the keyboard or from the serial input port. These seven characters are:

1. **Bell (BEL or CTRL G)** — Causes the Terminal to sound an audible tone through an internal speaker.
2. **Back Space (BS or CTRL H)** — Duplicates the BACK SPACE key.
3. **Horizontal Tab (HT or CTRL I)** — Duplicates the TAB key.
4. **Line Feed (LF or CTRL J)** — Duplicates the LINE FEED key.
5. **Carriage Return (CR or CTRL M)** — Duplicates the RETURN key.
6. **Escape (ESC or CTRL [)** — Duplicates the ESC key.
7. **(CTRL X)** — Cancels the current escape sequence.



DB-25P kontakt

Terminal H-19A Dator

REPEAT — When you hold this key in along with another key, it will repeat the function of the other key as long as both keys are held down. The repeat rate is approximately 15 characters per second. However, if the baud rate that has been selected is less than the repeat rate, the repeat function will operate at the slower rate.

SHIFT — When you use this key in conjunction with another key, the character printed on the upper portion of that key will be displayed. When you use the SHIFT keys in conjunction with the alphabetic keys, the upper-case character is displayed.

CAPS LOCK — When this latching key is down, the Terminal will transmit the ASCII code for, and display upper case (capital) alphabetic letters. It does not shift the keys with the double meanings.

OFF LINE — When this latching key is down, the Terminal is inhibited from transmitting or receiving data. However, any displayable characters that you type on the keyboard will appear on the screen and any control codes that the Terminal can process will be processed.

PAUSE — When you press this key, it generates a continuous "space level" in the serial RS-232 output of the Terminal. It is generally used to tell the computer that you wish to interrupt execution.

SCROLL — When this is used with the software in the Hold Screen Mode, you can type the SCROLL key to refresh the Terminal to display another line of information onto the screen. You can type SHIFT SCROLL to display another 32 lines of information onto the screen.

CONTROL KEY

The CTRL key is held down in conjunction with other keys to send the 32 ASCII control codes to the computer. Refer to the ASCII Character Chart on page 10-11 of this Manual for a listing of the control keys. Those are non-displayable characters. The Terminal responds to only seven of the control characters from the keyboard as from the serial input port. These seven characters are:

Shift (Left or Right) — Causes the Terminal to sound an audible tone through an internal speaker.

Back Space (Left or Right) — Emulates the BACK SPACE key.

Horizontal Tab (Left or Right) — Emulates the TAB key.

Enter Feed (Left or Right) — Emulates the ENTER key.

Carriage Return (Left or Right) — Emulates the RETURN key.

Escape (Left or Right) — Emulates the ESC key.

(Left or Right) — Cancels the current escape sequence.



DB-25 Connector

Terminal	Host
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25

Terminal H-13A

16.3 SPECIAL MODES AND KEYS

CURSOR FUNCTIONS

Cursor Home — ESC H — [Shift 5 (HOME) of keypad]

Moves the cursor to the first character position on the first line (home).

Cursor Forward — ESC C — [Shift 6 (→) of keypad]

Moves the cursor one character position to the right. If the cursor is at the end of the line, it will remain there.

Cursor Backward — ESC D — [Shift 4 (←) of keypad]

Moves the cursor one character position to the left (backspaces). If the cursor is at the start (left end) of a line, it will remain there.

Cursor Down — ESC B — [Shift 2 (↓) of keypad]

Moves the cursor down one line. If the cursor is at the bottom line, it will remain there; however, a scroll will not occur.

Cursor Up — ESC A — [Shift 8 (↑) of keypad]

Moves the cursor up one line. If the cursor is at the top line, it will remain there; however, a scroll will not occur. *of ESC I = 16-5*

Direct Cursor Addressing — ESC Y — Allows the computer to control the position of the cursor on the screen by entering the escape code, the ASCII character which represents the line number, and the ASCII character which represents the column number.

The first line and the left column are both 32 (decimal) and increase from there. The number 32 (decimal) is used because it is the smallest value of the printing characters. All values less than 32 (decimal) are control codes, which can interfere with operating sequences of some computers.

Since the lines are numbered from 1 to 24 (from top to bottom) and the columns from 1 to 80 (from left to right), you must ⁽¹⁾add the proper line and column numbers to 31 (decimal). Then ⁽²⁾convert these decimal numbers to their equivalent ASCII characters and ⁽³⁾enter them in the following order:

ESC Y	line # (ASCII character)	column # (ASCII character)
	<i>Y - coord.</i>	<i>X - coord.</i>

For example, to place the cursor at line 20, column 40, you will first have to add 31 (decimal) to the line number to find the value of the line #.

$$31 + 20 = 51$$

Then use the "ASCII Characters" chart (on page 16-11) to find the ASCII character that corresponds to 51 (decimal). In this case, it is the number 3. Next, add 31 (decimal) to the column number to find the actual value of the column #.

$$31 + 40 = 71$$

Again, use the ASCII chart to find the ASCII character that corresponds to 71 (decimal) which is the symbol G.

To demonstrate this example, make sure the OFF LINE key is down. Then type ESC Y 3 G. The cursor should move to line 20, column 40.

If you specify a line # that does not exist on the screen, the cursor will remain in the line it is presently in. If you specify a column # that does not exist on the screen, the cursor will move to the right-most column.

CARET FUNCTIONS

Caret Home — (Shift + HOME) or (paged) — Moves the cursor to the first character position on the first line (home).

Caret Forward — (Shift + F) or (paged) — Moves the cursor one character position to the right. If the cursor is at the end of the line, it will remain there.

Caret Backward — (Shift + B) or (paged) — Moves the cursor one character position to the left (backspace). If the cursor is at the start (left end) of a line, it will remain there.

Caret Down — (Shift + D) or (paged) — Moves the cursor down one line. If the cursor is at the bottom line, it will remain there; however, a scroll will not occur.

Caret Up — (Shift + U) or (paged) — Moves the cursor up one line. If the cursor is at the top line, it will remain there; however, a scroll will not occur.

Direct Cursor Addressing — (Shift + F7) — Allows the computer to control the position of the cursor on the screen by entering the message code, the ASCII character which represents the line number, and the ASCII character which represents the column number.

The first line and the left column are both 33 (decimal) and indicate from there. The number 33 (decimal) is used because it is the smallest value of the printing characters. All values less than 33 (decimal) are control codes, which can interfere with operating equipment of some computers.

Since the lines are numbered from 1 to 24 (from top to bottom) and the columns from 1 to 30 (from left to right), you must add the proper line and column numbers to 33 (decimal). That means these decimal numbers to their equivalent ASCII characters are: line 1 is 66 and column 1 is 67 in the following order:

Line 1 ASCII character 66 Column 1 ASCII character 67

To **position** to place the cursor at line 20, column 40, you will first have to add 33 (decimal) to the line number to find the value of the line %

$$33 + 20 = 53$$

Then use the ASCII Character table (00-255) to find the ASCII character that corresponds to 53 (decimal). In this case it is the number 7, next add 67 (decimal) to the column number to find the actual value of the column %

$$33 + 40 = 73$$

Again, use the ASCII chart to find the ASCII character that corresponds to 73 (decimal) which is the symbol E.

To demonstrate this example, make sure the OFF LINE key is down. Then type EDCY 53. The cursor should move to line 20, column 40.

If you specify a line % that does not exist on the screen, the cursor will remain in the line it is presently in. If you specify a column % that does not exist on the screen, the cursor will move to the rightmost column.

Cursor Position Report — ESC n — Reports the position of the cursor in the form of ESC Y line# column#.

Save Cursor Position — ESC j — The present cursor position is saved so the cursor can be returned there later on the "Set to previously saved position" command.

Set to Previously Saved Position — ESC k — Returns the cursor to the position where it was when it received the "Save cursor position" command.

Reverse Index — ESC I — This is a reverse line feed. It causes the cursor to move upward one line. If the cursor is at the top line it will remain there. However, any text on the screen will be scrolled downward one line. cf s 16-4

ERASING AND EDITING

Clear Display (SHIFT ERASE) — ESC E — Erases all the information on the screen. The screen is filled with spaces and the cursor is placed in the home position.

Erase Beginning of Display — ESC b — Erases the display from the start of the screen to the cursor position, and includes the cursor position.

Erase to End of Page (ERASE Key) — ESC J — Erases all the information from the cursor (including the cursor position) to the end of the page.

Erase Entire Line — ESC l — Erases the entire line, including the cursor position.

Erase Beginning of Line — ESC o — Erases from the beginning of the line to the cursor position, and includes the cursor position.

Erase to End of Line — ESC K — Erases from the cursor (including the cursor position) to the end of the line.

Insert Line — ESC L — [Shift 1 (IL) of keypad]
Inserts a new blank line by moving the line that the cursor is on, and all following lines, down one line. Then the cursor is moved to the beginning of the blank line.

Delete Line — ESC M — [Shift 3 (DL) of keypad]
Deletes the contents of the line that the cursor is on, places the cursor at the beginning of the line, moves all the following lines up one line, and adds a blank line at line 24.

Delete Character — ESC N — [Shift 9 (DC) of keypad]
Deletes the character at the cursor position and shifts any existing text that is to the right of the cursor, and on the same line, one character position to the left.

Enter Insert Character Mode — ESC @ — [shift 7 (IC) of keypad]
Lets you insert characters or words into text already displayed on the screen. The first time you type IC, the Terminal enters the Insert Character Mode. You can then use the cursor controls to place the cursor at the point where you want to insert characters. As you type in the desired characters, any existing text directly above and to the right of the cursor is shifted to the right. This feature lets you add letters or words to existing text without having to re-type the whole text. When you finish inserting characters, type IC again to exit the Insert Character Mode. The Terminal transmits an ESC @ to enter, and an ESC O to exit the Insert Character Mode.

Exit Insert Character Mode — ESC O — Exits the Insert Character Mode. See "Enter Insert Character Mode" above.

Insert Character Mode - **INS** - Inserts the character at the cursor position.

Insert Line Mode - **IL** - Inserts a new line at the cursor position. The cursor is moved to the beginning of the new line.

Insert Block Mode - **IB** - Inserts a block of text at the cursor position. The cursor is moved to the beginning of the block.

Insert Text Mode - **IT** - Inserts text at the cursor position. The cursor is moved to the beginning of the text.

ERASING AND EDITING

Clear Display (Ctrl Y) - **Ctrl Y** - Erases all the information on the screen. The screen is filled with spaces and the cursor is placed in the home position.

Erase Rest of Line - **Ctrl E** - Erases the display from the start of the screen to the cursor position, and includes the cursor position.

Erase to End of Page (Ctrl K) - **Ctrl K** - Erases all the information from the cursor position to the end of the page, including the cursor position.

Erase Entire Line - **Ctrl D** - Erases the entire line including the cursor position.

Erase Beginning of Line - **Ctrl B** - Erases from the beginning of the line to the cursor position, and includes the cursor position.

Erase to First of Line - **Ctrl F** - Erases from the cursor to the first of the line, including the cursor position.

Insert Line - **IL** - Inserts a new line at the cursor position. The cursor is moved to the beginning of the new line.

Delete Line - **Ctrl U** - Deletes the contents of the line that the cursor is on, places the cursor at the beginning of the line, and adds a blank line at the end.

Delete Character - **Ctrl D** - Deletes the character at the cursor position and shifts any existing text that is to the right of the cursor one space to the right.

Insert Insert Character Mode - **INS** - Inserts the character at the cursor position. The cursor is moved to the beginning of the character.

Insert Insert Character Mode - **INS** - Inserts the character at the cursor position. The cursor is moved to the beginning of the character.

CONFIGURATION

Reset to Power-Up Configuration — ESC z — Nullifies all previously set escape modes and returns to the power-up configuration. *skillin for ESC y 16-6b*

NOTE: If characters are sent to the Terminal during this "reset" time, several characters may be lost while the Terminal is resetting. If a basic program, for example, calls for an ESC z to be printed, be sure the computer delays and does not immediately send other characters to the Terminals. *how many ~ ?*

Set Mode — ESC x — Certain operating modes can be enabled and disabled from the keyboard. To enable the functions, type ESC x followed by the appropriate number given below:

- 1 = Enable 25th line. The 25th line is available as a line that is totally separate from the normally-used 24 lines. You might use this line, for example, to identify the user functions keys with labels which correspond to the function that your computer provides when it receives these function key escape codes. Or you might use it to display information concerning the status of your computer while a program is running.

The only way to place the cursor on the 25th line is to enable the 25th line and then use "Cursor Addressing." Once on the 25th line, the terminal acts like a 1-line terminal ("erase in display" commands only operate on the 25th line) until you use cursor addressing to place the cursor on one of the other 24 lines of the Terminal. This is a good place to use the "Save Cursor Position" and the "Set Cursor To Previously Saved Position" routines. With these routines, the current cursor position can be saved, your routine can address the 25th line, write information on the 25th line, and return to the "remembered" cursor location without your program having to remember that location. "Demon-

- 2 = No key click. This function turns off the key click.
- 3 = Hold screen mode. See "Enter Hold Screen Mode" for a description of this function. *s 16-7 CD!*
- 4 = Block cursor. Produces a cursor that fills the entire character position.
- 5 = Cursor off. Turns off the cursor so there is no cursor at all.
- 6 = Keypad shifted. See "Enter Keypad Shifted Mode" for a description of this function. *s 16-8 BC!*
- 7 = Alternate keypad mode. See "Enter Alternate Keypad Mode" for a description of this function. *s 16-8 CD!*
- 8 = Auto line feed on receipt of CR. A line feed is automatically performed (in addition to a CARRIAGE RETURN) when a CARRIAGE RETURN is received.
- 9 = Auto CR on receipt of line feed. A CARRIAGE RETURN is automatically performed (in addition to a line feed) when a line feed is received.

Example: If you want to turn off the cursor, press OFF LINE and type ESC x 5.

These functions default back to their initial states (as set by switches S401 and S402 on the terminal logic circuit board) when the Terminal is reset (RESET and right-hand SHIFT keys) or when you turn the Terminal off and then back on again. You can also reset these functions using the Reset Mode escape codes (ESC y). See below. *ESC z scan d?* *s 16-7*

Reset Mode — ESC y — Resets the "Set Mode" functions to their initial states. To reset a function, type ESC y followed by the appropriate number given below.

- 1 = Disable 25th line
- 2 = Enable key click
- 3 = Exit hold screen mode
- 4 = Underscore cursor
- 5 = Cursor on
- 6 = Keypad unshifted
- 7 = Exit alternate keypad mode
- 8 = No auto line feed
- 9 = No auto CR

See "Set Modes" above.

Modify The Baud Rate — ESC r — Initially, the baud rate is set by the switches on the terminal logic circuit board. However, you can change the baud rate from the keyboard. To do this, type ESC r followed by the appropriate letter given below:

A=110
B=150
C=300
D=600
E=1200
F=1800

G=2000
H=2400
I=3600
J=4800
K=7200
L=9600

M=19200* *Not presently supported (may drop characters).

Example: If the baud rate switches on the terminal logic circuit board are set to 4800 baud and you want to communicate with the computer at 9600 baud, just type ESC r L.

The baud rate reverts back to the baud rate set by the switches on the circuit board when you RESET the Terminal (RESET and right-hand SHIFT keys) or when you turn the Terminal off and then back on.

MODES OF OPERATION

Enter Hold Screen Mode — ESC [— The Hold Screen Mode allows you to control when new information is printed on the screen. This is especially useful when you are reading lists or looking for a particular part of a program. Push the OFF LINE key to its down position and then type ESC [to enter the Hold Screen Mode. Then, after you release the OFF LINE key, each time you type the SCROLL key a new line of text will appear on the bottom line and the top line of text will scroll up and off the screen. If you type SHIFT SCROLL, a whole new page (24 lines) of text will be scrolled onto the screen. Press the OFF LINE key to its down position and type ESC \ to exit the Hold Screen Mode. Remember: in this mode, when the cursor is at the start of a line of text, the Terminal is probably waiting for a scroll command.

This mode requires that the host computer respond to XON and XOFF.

**Exit Hold Screen Mode — ESC ** — Exits the Hold Screen Mode. See "Enter Hold Screen Mode" above.

Basic Mode - **ESC** - The hold screen mode allows you to control when new information is printed on the screen. This is especially useful when you are reading lists or looking for a particular part of a program. Press the **ESC** key to its home position and then type **ESC** to enter the Hold Screen Mode. Then when you release the **ESC** key, each time you press the **ESC** key a new screen will appear on the bottom line and the top line will scroll up and off the screen. If you type **ESC** a whole new page (41 lines) of text will be scrolled onto the screen. Press the **ESC** key to its home position and type **ESC** to exit the Hold Screen Mode. Paragraphs in this mode, when the cursor is at the start of a line of text, the Terminal is probably waiting for a scroll command.

This mode requires that the host computer respond to **XON** and **XOFF**.

Exit Hold Screen Mode - **ESC** - Exits the Hold Screen Mode. See Basic Mode above.

MODES OF OPERATION

The baud rate reverts back to the baud rate set by the switch on the speed board when you press the **RIGHT**, **Terminal**, **MARKET** and **right-hand SHIFT** keys or when you turn the Terminal off and then back on.

Example: If the baud rate switch on the terminal logic circuit board is set to 19200 and you want to communicate with the computer at 9600 baud, just type **ESC** 1.

To do this type **ESC** followed by the appropriate figure given below:

110	19200
120	18000
130	17000
140	16000
150	15000
160	14000
170	13000
180	12000
190	11000
200	10000
210	9000
220	8000
230	7000
240	6000
250	5000
260	4000
270	3000
280	2000
290	1000
300	500

Initially, the baud rate is set by the switch on the terminal logic circuit board. However, you can change the baud rate from the keyboard. To do this type **ESC** followed by the appropriate figure given below:

See Basic Mode above.

- No auto CR
- No auto line feed
- Exit alternate keypad mode
- 4-way scroll
- Forward scrolling
- Cursor on
- Lock on the cursor
- Exit hold screen mode
- Enable key lock
- Disable scrolling

Enter Reverse Video Mode — ESC p — The characters displayed on the screen can also be displayed in reverse video, a black character on a white background. Type ESC p to enter the Reverse Video Mode, and ESC q to exit the Reverse Video Mode.

Exit Reverse Video Mode — ESC q — Exits the Reverse Video Mode. See "Enter Reverse Video Mode" above.

Enter Graphics Mode — ESC F — The graphics mode lets you display 33 special symbols. Refer to the "Graphic Mode Symbols" in the "Appendix" of this Manual. Type ESC F to enter the Graphics Mode. Then type any of the 26 lower-case keys or the seven other symbol keys that correspond to the graphic symbols. Type ESC G to exit the Graphics Mode. You can place the Terminal in the Reverse Video Mode while it is in the Graphics Mode to increase the number of graphic symbols.

s16-13..16-15

Exit Graphics Mode — ESC G — Exits the Graphics Mode. See "Enter Graphics Mode" above.

Enter Keypad Shifted Mode — ESC t — The shifted functions that the keypad transmits normally require you to press and hold the SHIFT key when you type one of the keys. You can type ESC t to enter the Shift Keypad Mode so that you do not need to hold the SHIFT key to obtain the shifted functions. However, if you place the Terminal in the Shifted Keypad Mode and you need to use the unshifted functions (numbers), you will have to press and hold the SHIFT key to obtain them. Type ESC u to exit the Shifted Keypad Mode.

Exit Keypad Shifted Mode — ESC u — Exits the Keypad Shifted Mode. See "Enter Keypad Shifted Mode" above.

Enter Alternate Keypad Mode — ESC = — The codes sent to the computer from the Terminal Keypad normally include the numbers, period, ENTER, and (when shifted) some special cursor movement and editing functions. You can change these keypad codes using the Alternate Keypad Mode to transmit specific escape codes that your computer may respond to.

see s 16-10 !

Type ESC = to enter and ESC > to exit the Alternate Keypad Mode.

The following chart lists the escape codes sent by the Terminal in the Alternate Keypad Mode.

KEY	HEATH ESCAPE CODE	ANSI ESCAPE CODE
0	ESC ? p	ESC O p
1	ESC ? q	ESC O q
2	ESC ? r	ESC O r
3	ESC ? s	ESC O s
4	ESC ? t	ESC O t
5	ESC ? u	ESC O u
6	ESC ? v	ESC O v
7	ESC ? w	ESC O w
8	ESC ? x	ESC O x
9	ESC ? y	ESC O y
.	ESC ? n	ESC O n
ENTER	ESC ? M	ESC O M

Exit Alternate Keypad Mode — ESC > — Exits the Alternate Keypad Mode. See "Enter Alternate Keypad Mode" above.

Enter Keypad Video Mode — ~~XXXXXX~~ — The characters displayed on the screen can also be displayed in reverse video. A blank character on a white background. Type ESC p to enter the Reverse Video Mode, and ESC q to exit the Reverse Video Mode.

Exit Reverse Video Mode — ~~XXXXXX~~ — Exits the Reverse Video Mode. See "Enter Reverse Video Mode" above.

Enter Graphics Mode — ~~XXXXXX~~ — The graphics mode lets you display 32 special symbols. Refer to the "Graphic Mode Symbols" in the "Appendix" of this manual. Type ESC P to enter the Graphics Mode. When you type any of the 32 lower-case keys or the seven other special keys that correspond to the graphic symbols, Type ESC C to exit the Graphics Mode. You can also exit the Terminal in the Reverse Video Mode while in the Graphics Mode by pressing the number of graphic symbols.

Exit Graphics Mode — ~~XXXXXX~~ — Exits the Graphics Mode. See "Enter Graphics Mode" above.

Enter Keypad Shifted Mode — ~~XXXXXX~~ — The shifted function keys that the keypad normally assume you to use and hold the SHIFT key when you type one of the keys. You can type ESC t to enter the Shift Keypad Mode so that you do not need to hold the SHIFT key to obtain the shifted function. However, if you give the Terminal in the Shifted Keypad Mode and you need to use the unshifted function (instead, you will have to press and hold the SHIFT key to obtain them). Type ESC o to exit the Shifted Keypad Mode.

Exit Keypad Shifted Mode — ~~XXXXXX~~ — Exits the Keypad Shifted Mode. See "Enter Keypad Shifted Mode" above.

Enter Alternate Keypad Mode — ~~XXXXXX~~ — The codes sent to the computer from the Terminal keypad normally include the numeric prefix, ENTER, and (-) for shifted. Some special control characters and naming functions. You can change these sent codes using the Alternate Keypad Mode to transmit specific escape codes that your computer can respond to.

Type ESC = to enter and ESC > to exit the Alternate Keypad Mode.

The following chart lists the escape codes sent by the Terminal in the Alternate Keypad Mode.

KEY	HEATH ESCAPE CODE	ANSI ESCAPE CODE
0	ESC p	ESC O p
1	ESC q	ESC O q
2	ESC r	ESC O r
3	ESC s	ESC O s
4	ESC t	ESC O t
5	ESC u	ESC O u
6	ESC v	ESC O v
7	ESC w	ESC O w
8	ESC x	ESC O x
9	ESC y	ESC O y
-	ESC z	ESC O z
ENTER	ESC M	ESC O M

Exit Alternate Keypad Mode — ~~XXXXXX~~ — Exits the Alternate Keypad Mode. See "Enter Alternate Keypad Mode" above.

ADDITIONAL FUNCTIONS

Keyboard Disabled — ESC } — Inhibits the output of the keyboard.

Keyboard Enabled — ESC { — A computer-sent code that enables the keyboard after it was inhibited by a "Keyboard Disabled" command.

Wrap Around at End of Line — ESC v — 81st character on a line is automatically placed in the first character position on the next line. The page scrolls up if necessary

Discard at End of Line — ESC w — After the 80th character in a line, the characters overprint. Therefore, only the last character received will be displayed in position 80.

Identify as VT52® (ESC / K) — ESC Z — The Terminal responds to interrogation with ESC / K to indicate that it can perform as a VT52.

Transmit 25th Line — ESC]

Transmit Page — ESC #

The transmit functions (Transmit 25th Line and Transmit Page) are the same except for the source of the data transmitted. Your computer may have a special routine (which is required for this function to work) so it can accept the transmitted codes.

Basically (assuming that the mode has not changed), the data is transmitted the same as it appears on the CRT. This includes all 1920 characters (24 lines of 80 characters), or the 80 characters of the 25th line. However, it is possible that the actual number of characters transmitted will be more than 1920. If graphic characters, reverse video characters, or both are encountered, the proper escape sequence for entering the respective modes will be transmitted. When one or both of these parameters no longer apply, the appropriate escape sequence will then be sent to exit the mode.

The escape sequence which is sent is determined by whether the Terminal is in the Heath mode or the ANSI mode. The sequence will be the same as that which was sent to the Terminal (or entered from the keyboard) to cause the Terminal to enter and/or exit the reverse video and graphic character modes.

Following the transmission of the last character, a CARRIAGE RETURN is sent and the bell will sound.

If a transmit page is executed (ESC #), only lines 1 through 24 are transmitted. If you want to transmit the 25th line, you must ask for that specifically (ESC]). This operates the same as the transmit page except that only the 80 characters of the 25th line (and any necessary escape sequences) are transmitted and followed by a CARRIAGE RETURN. In the event that the 25th line is not enabled, only a CARRIAGE RETURN will be transmitted.

Special Function Keys

The eight special function keys f₁, f₂, f₃, f₄, f₅, Blue, Red, and Gray on the top row of the keyboard transmit two-character escape codes to the computer. You can define the meanings of each of these keys to suit your particular application (your software program must recognize the particular escape codes associated with the keys). See the "Appendix."

ADDITIONAL FUNCTIONS

Keyboard Disabled — **ESC** — Inhibits the output of the keyboard.

Keyboard Enabled — **ESC** — A command and code that enables the keyboard after it was inhibited by a "Keyboard Disabled" command.

Write A Line On and Off — **ESC** — A character on a line is automatically placed in the first character position on the next line. The user needs up it necessary.

Placed at End of Line — **ESC** — After the 80th character in a line the character is placed at the end of the line. The character placed will be displayed in position 80.

Identify as VT52+ (ESC \ A) — **ESC** — The Terminal responds to information with **VT52** to indicate that it can perform as a VT52.

Terminal 25th Line — **ESC**

Terminal Page — **ESC** — The terminal functions (Terminal 25th Line and Terminal Page) are the same except for the source of the data transmitted. Your computer may have a special routine which is required for this function to work so it can accept the transmitted data.

Basically (assuming that the mode has not changed), the data is transmitted the same as it is on the CRT. This includes all 132 characters (124 lines of 80 characters) on the 25th line. However, it is possible that the actual number of characters transmitted will be more than 132. If graphic characters, reverse video characters, or other escape sequences are encountered, the proper escape sequence for changing the respective mode will be transmitted. When one or both of these parameters no longer apply, the appropriate escape sequence will then be sent to exit the mode.

The escape sequence which is sent is determined by whether the Terminal is in the Half or Full mode. The sequence will be the same as that which was sent to the Terminal (or entered from the keyboard) to cause the Terminal to enter and/or exit the reverse video and graphic character modes.

Following the transmission of the last character, a CARRIAGE RETURN is sent and the bell will sound.

If a terminal page is selected (ESC \), only lines 1 through 24 are transmitted. If you want to transmit the 25th line, you must ask for that specifically (ESC \). This operates the same as the terminal page except that only the 80 characters of the 25th line (and any necessary escape sequences) are transmitted and followed by a CARRIAGE RETURN. In the event that the 25th line is not enabled, only a CARRIAGE RETURN will be transmitted.

Special Function Keys

The eight special function keys **ESC**, **ESC**, **ESC**, **ESC**, **ESC**, **ESC**, **ESC**, and **ESC** on the top row of the keyboard transmit two character escape codes to the computer. You can define the meaning of each of these keys in your particular application (your software program must recognize the particular escape codes associated with the keys). See the Appendix.

SUMMARY OF KEYPAD FUNCTIONS

The keypad can operate in any one of four modes: normal unshifted, normal shifted, alternate unshifted, and alternate shifted. Then, within each of these modes, you can use the SHIFT key shifted or unshifted. (See "Enter Keypad Shifted Mode" and "Enter Alternate Keypad Mode.")

Normal Unshifted — This is the normal operating mode.

Example:	TYPE	TERMINAL TRANSMITS
	<u>3</u>	<u>3</u>
	SHIFT 3	DL (Delete Line)

Normal Shifted — ESC t to enter; ESC u to exit — The normal functions are inverted.

Example:	TYPE	TERMINAL TRANSMITS
	<u>3</u>	<u>DL (Delete Line)</u>
	SHIFT 3	<u>3</u>

Alternate Unshifted — ESC = to enter; ESC > to exit — This is the normal alternate mode.

Example:	TYPE	TERMINAL TRANSMITS
	<u>3</u>	<u>ESC ? s (Heath escape code)</u>
	SHIFT 3	DL (Delete Line)

Alternate Shifted — ESC t ESC = to enter; ESC u ESC > to exit — The normal alternate functions are now inverted.

Example:	TYPE	TERMINAL TRANSMITS
	<u>3</u>	<u>DL (Delete Line)</u>
	SHIFT 3	ESC ? s (Heath escape code)

SUMMARY OF KEYBOARD FUNCTIONS

The keypad can operate in any one of four modes: normal unshifted, normal shifted, alternate unshifted, and alternate shifted. When, within each of these modes, you can use the SHIFT key shifted or unshifted (See "Enter Keypad Shifted Mode" and "Enter Alternate Keypad Mode").

Normal Unshifted — This is the normal operating mode.

Example	TYPE	TERMINAL TRANSMITS
	3	3
	SHIFT 3	DL (Delete Line)

Normal Shifted — ESC to enter; ESC > to exit — The normal functions are inverted.

Example	TYPE	TERMINAL TRANSMITS
	3	DL (Delete Line)
	SHIFT 3	3

Alternate Unshifted — ESC = to enter; ESC > to exit — This is the normal alternate mode.

Example	TYPE	TERMINAL TRANSMITS
	3	ESC 3 (Health escape code)
	SHIFT 3	DL (Delete Line)

Alternate Shifted — ESC ESC = to enter; ESC ESC > to exit — The normal alternate functions are now inverted.

Example	TYPE	TERMINAL TRANSMITS
	3	DL (Delete Line)
	SHIFT 3	ESC 3 (Health escape code)

16.4 ASCII CHARACTERS

The characters in the shaded areas are not processed by the Terminal.

DECIMAL CODE	HEX CODE	CHARACTERS	CONTROL KEYS	DESCRIPTION
0	0	NUL	@	Null, tape feed.
1	1	SOH	A	Start of heading.
2	2	STX	B	Start of text.
3	3	ETX	C	End of text.
4	4	EOT	D	End of transmission.
5	5	ENQ	E	Enquiry; also WRU.
6	6	ACK	F	Acknowledge; also RU.
7	7	BEL	G	Rings the bell.
8	8	BS	H	Backspace; also FEB, format effector backspace.
9	9	HT	I	Horizontal tab.
10	A	LF	J	Line feed: advances cursor to next line.
11	B	VT	K	Vertical tab (VTAB).
12	C	FF	L	Form feed to top of next page.
13	D	CR	M	Carriage return to beginning of line.
14	E	SO	N	Shift out.
15	F	SI	O	Shift in.
16	10	DLE	P	Data line escape.
17	11	DC1	Q	Device control 1: turns transmitter on (XON).
18	12	DC2	R	Device control 2.
19	13	DC3	S	Device control 3: turns transmitter off (XOFF).
20	14	DC4	T	Device control 4.
21	15	NAK	U	Negative acknowledge; also ERR (error).
22	16	SYN	V	Synchronous idle (SYNC).
23	17	ETB	W	End of transmission block.
24	18	CAN	X	Cancel (CANCL). Cancels current escape sequence.
25	19	EM	Y	End of medium.
26	1A	SUB	Z	Substitute.
27	1B	ESC	[	Escape.
28	1C	FS	\	File separator.
29	1D	GS	]	Group separator.
30	1E	RS	.	Record separator.
31	1F	US	-	Unit separator.
32	20	SP		Space.
33	21	!		Exclamation point.
34	22	"		Quotation mark.
35	23	#		Number sign.
36	24	\$		Dollar sign.
37	25	%		Percent sign.
38	26	&		Ampersand.
39	27	'		Acute accent or apostrophe.
40	28	(		Open parenthesis.
41	29	)		Close parenthesis.
42	2A	*		Asterisk.
43	2B	+		Plus sign.
44	2C	,		Comma.
45	2D	-		Hyphen or minus sign.
46	2E	.		Period.
47	2F	/		Slash.

ASCII CHARACTERS

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Characters in the shaded areas are not processed by the Terminal.

DECIMAL CODE	HEX CODE	CHARACTERS	CONTROL KEYS	DESCRIPTION
0	0	NUL	␣	Null, zero feed
1	1	SOH	A	Start of heading
2	2	STX	B	Start of text
3	3	ETX	C	End of text
4	4	EOF	D	End of transmission
5	5	ENO	E	Emergency stop, WTRU
6	6	ACK	F	Acknowledged, also RU
7	7	BEL	G	Rings the bell
8	8	BS	H	Backspace, also FEB, format effector backspace
9	9	HT	I	Horizontal tab
10	A	LF	J	Line feed, advances cursor to next line
11	B	VT	K	Vertical tab (VTAB)
12	C	FF	L	Form feed to top of next page
13	D	CR	M	Carriage return to beginning of line
14	E	SO	N	Shift out
15	F	SI	O	Shift in
16	10	LS	P	Left line escape
17	11	DC1	Q	Device control 1: turns transmitter on (XON)
18	12	DC2	R	Device control 2
19	13	DC3	S	Device control 3: turns transmitter off (XOFF)
20	14	DC4	T	Device control 4
21	15	NAX	U	Negative acknowledged, also ERR (error)
22	16	SYN	V	Synchronous idle (SYNC)
23	17	ETB	W	End of transmission block
24	18	CAN	X	Cancel (CANON), Cancels current escape sequence
25	19	EM	Y	End of medium
26	1A	SUB	Z	Substitute
27	1B	ESC	[	Escape
28	1C	FS	/	File separator
29	1D	GS	;	Group separator
30	1E	RS	:	Record separator
31	1F	US	.	Unit separator
32	20	SP		Space
33	21	!		Exclamation point
34	22	"		Quotation mark
35	23	#		Number sign
36	24	\$		Dollar sign
37	25	%		Percent sign
38	26	&		Ampersand
39	27	'		Single accent or apostrophe
40	28	(		Open parenthesis
41	29	)		Close parenthesis
42	2A	*		Asterisk
43	2B	+		Plus sign
44	2C	,		Comma
45	2D	-		Hyphen or minus sign
46	2E	.		Period
47	2F	/		Slash

DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION
48	30	0	Number 0.
49	31	1	Number 1.
50	32	2	Number 2.
51	33	3	Number 3.
52	34	4	Number 4.
53	35	5	Number 5.
54	36	6	Number 6.
55	37	7	Number 7.
56	38	8	Number 8.
57	39	9	Number 9.
58	3A	:	Colon.
59	3B	;	Semicolon.
60	3C	<	Less than.
61	3D	=	Equal sign.
62	3E	>	Greater than.
63	3F	?	Question mark.
64	40	@	At sign.
65	41	A	Letter A.
66	42	B	Letter B.
67	43	C	Letter C.
68	44	D	Letter D.
69	45	E	Letter E.
70	46	F	Letter F.
71	47	G	Letter G.
72	48	H	Letter H.
73	49	I	Letter I.
74	4A	J	Letter J.
75	4B	K	Letter K.
76	4C	L	Letter L.
77	4D	M	Letter M.
78	4E	N	Letter N.
79	4F	O	Letter O.
80	50	P	Letter P.
81	51	Q	Letter Q.
82	52	R	Letter R.
83	53	S	Letter S.
84	54	T	Letter T.
85	55	U	Letter U.
86	56	V	Letter V.
87	57	W	Letter W.
88	58	X	Letter X.
89	59	Y	Letter Y.
90	5A	Z	Letter Z.
91	5B	[	Open brackets.
92	5C	\	Reverse slash.
93	5D	]	Close brackets.

DESCRIPTION	CHARACTER	HEX CODE	DECIMAL CODE
Control 0	0	80	128
Control 1	1	81	129
Control 2	2	82	130
Control 3	3	83	131
Control 4	4	84	132
Control 5	5	85	133
Control 6	6	86	134
Control 7	7	87	135
Control 8	8	88	136
Control 9	9	89	137
Control 10	A	90	144
Control 11	B	91	145
Control 12	C	92	146
Control 13	D	93	147
Control 14	E	94	148
Control 15	F	95	149
Control 16	10	96	150
Control 17	11	97	151
Control 18	12	98	152
Control 19	13	99	153
Control 20	14	100	160
Control 21	15	101	161
Control 22	16	102	162
Control 23	17	103	163
Control 24	18	104	164
Control 25	19	105	165
Control 26	1A	106	166
Control 27	1B	107	167
Control 28	1C	108	168
Control 29	1D	109	169
Control 30	1E	110	170
Control 31	1F	111	171
Control 32	20	112	172
Control 33	21	113	173
Control 34	22	114	174
Control 35	23	115	175
Control 36	24	116	176
Control 37	25	117	177
Control 38	26	118	178
Control 39	27	119	179
Control 40	28	120	180
Control 41	29	121	181
Control 42	2A	122	182
Control 43	2B	123	183
Control 44	2C	124	184
Control 45	2D	125	185

GRAPHIC SYMBOLS

DECIMAL CODE	HEX CODE	CHARACTERS	DESCRIPTION	GRAPHIC SYMBOLS
94	5E	↑	Up arrow/caret.	↑
95	5F	_	Underscore.	_
96	60	`	Grave accent.	`
97	61	a	Letter a.	a
98	62	b	Letter b.	b
99	63	c	Letter c.	c
100	64	d	Letter d.	d
101	65	e	Letter e.	e
102	66	f	Letter f.	f
103	67	g	Letter g.	g
104	68	h	Letter h.	h
105	69	i	Letter i.	i
106	6A	j	Letter j.	j
107	6B	k	Letter k.	k
108	6C	l	Letter l.	l
109	6D	m	Letter m.	m
110	6E	n	Letter n.	n
111	6F	o	Letter o.	o
112	70	p	Letter p.	p
113	71	q	Letter q.	q
114	72	r	Letter r.	r
115	73	s	Letter s.	s
116	74	t	Letter t.	t
117	75	u	Letter u.	u
118	76	v	Letter v.	v
119	77	w	Letter w.	w
120	78	x	Letter x.	x
121	79	y	Letter y.	y
122	7A	z	Letter z.	z
123	7B	{	Left brace.	{
124	7C		Vertical bar (broken).	
125	7D	}	Right brace.	}
126	7E	~	Tilde.	~
127	7F	DEL	Delete (rubout).	DEL

DETAILED MIX CODE	CHARACTERS	DESCRIPTION	GRAPHIC SYMBOLS
94	95	Tip arrowhead	↑
95	96	Underline	—
96	97	Circle around	○
97	98	Letter A	A
98	99	Letter B	B
99	100	Letter C	C
100	101	Letter D	D
101	102	Letter E	E
102	103	Letter F	F
103	104	Letter G	G
104	105	Letter H	H
105	106	Letter I	I
106	107	Letter J	J
107	108	Letter K	K
108	109	Letter L	L
109	110	Letter M	M
110	111	Letter N	N
111	112	Letter O	O
112	113	Letter P	P
113	114	Letter Q	Q
114	115	Letter R	R
115	116	Letter S	S
116	117	Letter T	T
117	118	Letter U	U
118	119	Letter V	V
119	120	Letter W	W
120	121	Letter X	X
121	122	Letter Y	Y
122	123	Letter Z	Z
123	124	Left brace	{
124	125	Vertical bar (broken)	
125	126	Right brace	}
126	127	Tab	—
127	128	Delete (space)	DEL

[illegible]

Graphic Symbols (cont'd)

KEY (SYMBOL)	SYMBOL	KEY (SYMBOL)	SYMBOL	KEY (SYMBOL)	SYMBOL
1 [100] [110]	1 [100] [110]	2 [100] [110]	3 [100] [110]	4 [100] [110]	5 [100] [110]
6 [100] [110]	7 [100] [110]	8 [100] [110]	9 [100] [110]	10 [100] [110]	11 [100] [110]
12 [100] [110]	13 [100] [110]	14 [100] [110]	15 [100] [110]	16 [100] [110]	17 [100] [110]
18 [100] [110]	19 [100] [110]	20 [100] [110]	21 [100] [110]	22 [100] [110]	23 [100] [110]
24 [100] [110]	25 [100] [110]	26 [100] [110]	27 [100] [110]	28 [100] [110]	29 [100] [110]
30 [100] [110]	31 [100] [110]	32 [100] [110]	33 [100] [110]	34 [100] [110]	35 [100] [110]
36 [100] [110]	37 [100] [110]	38 [100] [110]	39 [100] [110]	40 [100] [110]	41 [100] [110]
42 [100] [110]	43 [100] [110]	44 [100] [110]	45 [100] [110]	46 [100] [110]	47 [100] [110]
48 [100] [110]	49 [100] [110]	50 [100] [110]	51 [100] [110]	52 [100] [110]	53 [100] [110]
54 [100] [110]	55 [100] [110]	56 [100] [110]	57 [100] [110]	58 [100] [110]	59 [100] [110]
60 [100] [110]	61 [100] [110]	62 [100] [110]	63 [100] [110]	64 [100] [110]	65 [100] [110]
66 [100] [110]	67 [100] [110]	68 [100] [110]	69 [100] [110]	70 [100] [110]	71 [100] [110]
72 [100] [110]	73 [100] [110]	74 [100] [110]	75 [100] [110]	76 [100] [110]	77 [100] [110]
78 [100] [110]	79 [100] [110]	80 [100] [110]	81 [100] [110]	82 [100] [110]	83 [100] [110]
84 [100] [110]	85 [100] [110]	86 [100] [110]	87 [100] [110]	88 [100] [110]	89 [100] [110]
90 [100] [110]	91 [100] [110]	92 [100] [110]	93 [100] [110]	94 [100] [110]	95 [100] [110]
96 [100] [110]	97 [100] [110]	98 [100] [110]	99 [100] [110]	100 [100] [110]	101 [100] [110]

16.6 Summary of Sequences (Heath/Zenith Mode)

Control Characters

007O	(BEL)	BELL
010O	(BS)	BACKSPACE
011O	(HT)	HORIZONTAL TAB (SAME AS VT52)
012O	(LF)	LINE FEED
015O	(CR)	CARRIAGE RETURN
021O	(XON)	XON
023O	(XOFF)	XOFF
030O	(CAN)	CANCEL CURRENT CONTROL SEQUENCE
033O	(ESC)	ESCAPE

Cursor Functions

ESC A	CURSOR UP
ESC B	CURSOR DOWN
ESC C	CURSOR FORWARD
ESC D	CURSOR BACKWARD
ESC H	CURSOR HOME
ESC I	REVERSE INDEX
ESC Y	DIRECT CURSOR ADDRESSING (SAME AS VT52)
ESC j	SAVE CURSOR POSITION
ESC n	CURSOR POSITION REPORT
ESC k	SET CURSOR TO PREVIOUSLY SAVED POSITION

Configuration

ESC r Bn MODIFY BAUD RATE
Bn VALUES:

A = 110	G = 2000
B = 150	H = 2400
C = 300	I = 3600
D = 600	J = 4800
E = 1200	K = 7200
F = 1800	L = 9600

ESC x Ps SET MODES

Ps =

- | | |
|----------------------------|-------------------------------------|
| 1 = ENABLE 25th LINE | 6 = KEYPAD SHIFTED |
| 2 = NO KEY CLICK | 7 = ENTER ALTERNATE KEYPAD MODE |
| 3 = ENTER HOLD SCREEN MODE | 8 = AUTO LINE FEED ON RECEIPT OF CR |
| 4 = BLOCK CURSOR | 9 = AUTO CR ON RECEIPT OF LINE FEED |
| 5 = CURSOR OFF | |

ESC y Ps RESET MODE

(RM) ESC | Ps |

Ps =

- | | |
|---------------------------|--------------------------------|
| 1 = DISABLE 25th LINE | 6 = KEYPAD UNSHIFTED |
| 2 = ENABLE KEY CLICK | 7 = EXIT ALTERNATE KEYPAD MODE |
| 3 = EXIT HOLD SCREEN MODE | 8 = NO AUTO LINE FEED |
| 4 = UNDERSCORE CURSOR | 9 = NO AUTO CR |
| 5 = CURSOR ON | |

ESC < ENTER ^NSI MODE

N/A

N/A ENTER HEATH/ZENITH MODE

(PEZM)

ESC | ? 2 h

ESC z RESET TO POWER-UP CONFIGURATION

(PRAM)

ESC | z

Additional Functions

ESC Z	IDENTIFY AS VT52 (ESC/K)
ESC #	TRANSMIT PAGE
ESC I	TRANSMIT 25th LINE
ESC {	KEYBOARD ENABLE
ESC }	KEYBOARD DISABLE
ESC v	WRAP-AROUND AT END OF LINE
ESC w	DISCARD AT END OF LINE

Note: The Terminal will transmit the following functions, but will not respond if they are received.

ESC P	BLUE FUNCTION KEY
ESC O	RED FUNCTION KEY
ESC R	GREY FUNCTION KEY
ESC S	11 FUNCTION KEY
ESC T	12 FUNCTION KEY
ESC U	13 FUNCTION KEY
ESC V	14 FUNCTION KEY
ESC W	15 FUNCTION KEY

Erasing and Editing

ESC E	CLEAR DISPLAY (SHIFT ERASE)
ESC J	ERASE TO END OF PAGE (ERASE KEY)
ESC K	ERASE TO END OF LINE
ESC L	INSERT LINE
ESC M	DELETE LINE
ESC N	DELETE CHARACTER
ESC O	EXIT INSERT CHARACTER MODE
ESC @	ENTER INSERT CHARACTER MODE
ESC b	ERASE BEGINNING OF DISPLAY
ESC i	ERASE ENTIRE LINE
ESC o	ERASE BEGINNING OF LINE

Modes of Operation

ESC F	ENTER GRAPHICS MODE
ESC G	EXIT GRAPHICS MODE
ESC I	ENTER HOLD SCREEN MODE
ESC =	ENTER ALTERNATE KEYPAD MODE
ESC >	EXIT ALTERNATE KEYPAD MODE
ESC p	ENTER REVERSE VIDEO MODE
ESC q	EXIT REVERSE VIDEO MODE
ESC i	ENTER KEYPAD SHIFTED MODE
ESC u	EXIT KEYPAD SHIFTED MODE

Alternate Keypad Sequence

ESC ? M	ENTER KEY
ESC ? n	PERIOD (.) KEY
ESC ? p	0 KEY
ESC ? q	1 KEY
ESC ? r	2 KEY
ESC ? s	3 KEY
ESC ? t	4 KEY
ESC ? u	5 KEY
ESC ? v	6 KEY
ESC ? w	7 KEY
ESC ? x	8 KEY
ESC ? y	9 KEY

16.7

Decimal to Hex to ASCII Conversion

Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII
0	00	NUL	46	2E	.	92	5C	\
1	01	SOH	47	2F	/	93	5D	] ^
2	02	STX	48	30	0	94	5E	^
3	03	ETX	49	31	1	95	5F	-
4	04	EOT	50	32	2	96	60	·
5	05	ENQ	51	33	3	97	61	a
6	06	ACK	52	34	4	98	62	b
7	07	BEL	53	35	5	99	63	c
8	08	BS	54	36	6	100	64	d
9	09	HT	55	37	7	101	65	e
10	0A	LF	56	38	8	102	66	f
11	0B	VT	57	39	9	103	67	g
12	0C	FF	58	3A	:	104	68	h
13	0D	CR	59	3B	:	105	69	i
14	0E	SO	60	3C	<	106	6A	j
15	0F	SI	61	3D	=	107	6B	k
16	10	DLE	62	3E	>	108	6C	l
17	11	DC1	63	3F	?	109	6D	m
18	12	DC2	64	40	@	110	6E	n
19	13	DC3	65	41	A	111	6F	o
20	14	DC4	66	42	B	112	70	p
21	15	NAK	67	43	C	113	71	q
22	16	SYN	68	44	D	114	72	r
23	17	ETB	69	45	E	115	73	s
24	18	CAN	70	46	F	116	74	t
25	19	EM	71	47	G	117	75	u
26	1A	SUB	72	48	H	118	76	v
27	1B	ESC	73	49	I	119	77	w
28	1C	FS	74	4A	J	120	78	x
29	1D	GS	75	4B	K	121	79	y
30	1E	RS	76	4C	L	122	7A	z
31	1F	US	77	4D	M	123	7B	{
32	20	SP	78	4E	N	124	7C	
33	21	!	79	4F	O	125	7D	}
34	22	"	80	50	P	126	7E	~
35	23	#	81	51	Q	127	7F	DEL
36	24	\$	82	52	R			
37	25	%	83	53	S			
38	26	&	84	54	T			
39	27	'	85	55	U			
40	28	(	86	56	V			
41	29	)	87	57	W			
42	2A	*	88	58	X			
43	2B	+	89	59	Y			
44	2C	,	90	5A	Z			
45	2D	-	91	5B	[			

GRAPHIC SYMBOLS: 

TO ENTER GRAPHICS MODE ESC F
TO EXIT GRAPHICS MODE ESC G

Decimal to Hex to ASCII Conversion

Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII
0	00	NUL	48	30	0	144	90	R	240	F0	À
1	01	SOH	49	31	1	145	91	S	241	F1	Á
2	02	STX	50	32	2	146	92	T	242	F2	Â
3	03	ETX	51	33	3	147	93	U	243	F3	Ã
4	04	END	52	34	4	148	94	V	244	F4	Ä
5	05	ACK	53	35	5	149	95	W	245	F5	Å
6	06	BS	54	36	6	150	96	X	246	F6	Ä
7	07	HT	55	37	7	151	97	Y	247	F7	Ë
8	08	LF	56	38	8	152	98	Z	248	F8	Ì
9	09	VT	57	39	9	153	99	[	249	F9	Í
10	0A	FF	58	3A	A	154	A0	\	250	FA	Î
11	0B	CR	59	3B	B	155	A1	]	251	FB	Ï
12	0C	SO	60	3C	C	156	A2	^	252	FC	Ï
13	0D	SI	61	3D	D	157	A3	_	253	FD	Ï
14	0E	DL	62	3E	E	158	A4	`	254	FE	Ï
15	0F	DC1	63	3F	F	159	A5	!	255	FF	Ï
16	10	DC2	64	40	0	160	A6	"			
17	11	DC3	65	41	1	161	A7	#			
18	12	DC4	66	42	2	162	A8	\$			
19	13	NAK	67	43	3	163	A9	%			
20	14	SYN	68	44	4	164	AA	&			
21	15	ETB	69	45	5	165	AB	'			
22	16	CAN	70	46	6	166	AC	(			
23	17	CM	71	47	7	167	AD	)			
24	18	SUB	72	48	8	168	AE	*			
25	19	ESC	73	49	9	169	AF	+			
26	1A	FS	74	4A	A	170	B0	,			
27	1B	GS	75	4B	B	171	B1	-			
28	1C	RS	76	4C	C	172	B2	.			
29	1D	US	77	4D	D	173	B3	:			
30	1E	SP	78	4E	E	174	B4	;			
31	1F		79	4F	F	175	B5	<			
32	20		80	50	0	176	B6	=			
33	21		81	51	1	177	B7	>			
34	22		82	52	2	178	B8	?			
35	23		83	53	3	179	B9	@			
36	24		84	54	4	180	BA	A			
37	25		85	55	5	181	BB	B			
38	26		86	56	6	182	BC	C			
39	27		87	57	7	183	BD	D			
40	28		88	58	8	184	BE	E			
41	29		89	59	9	185	BF	F			
42	2A		90	5A	A	186	C0	0			
43	2B		91	5B	B	187	C1	1			
44	2C		92	5C	C	188	C2	2			
45	2D		93	5D	D	189	C3	3			
46	2E		94	5E	E	190	C4	4			
47	2F		95	5F	F	191	C5	5			
48	30		96	60	0	192	C6	6			
49	31		97	61	1	193	C7	7			
50	32		98	62	2	194	C8	8			
51	33		99	63	3	195	C9	9			
52	34		100	64	4	196	CA	A			
53	35		101	65	5	197	CB	B			
54	36		102	66	6	198	CC	C			
55	37		103	67	7	199	CD	D			
56	38		104	68	8	200	CE	E			
57	39		105	69	9	201	CF	F			
58	3A		106	6A	A	202	D0	0			
59	3B		107	6B	B	203	D1	1			
60	3C		108	6C	C	204	D2	2			
61	3D		109	6D	D	205	D3	3			
62	3E		110	6E	E	206	D4	4			
63	3F		111	6F	F	207	D5	5			
64	40		112	70	0	208	D6	6			
65	41		113	71	1	209	D7	7			
66	42		114	72	2	210	D8	8			
67	43		115	73	3	211	D9	9			
68	44		116	74	4	212	DA	A			
69	45		117	75	5	213	DB	B			
70	46		118	76	6	214	DC	C			
71	47		119	77	7	215	DD	D			
72	48		120	78	8	216	DE	E			
73	49		121	79	9	217	DF	F			
74	4A		122	7A	A	218	E0	0			
75	4B		123	7B	B	219	E1	1			
76	4C		124	7C	C	220	E2	2			
77	4D		125	7D	D	221	E3	3			
78	4E		126	7E	E	222	E4	4			
79	4F		127	7F	F	223	E5	5			
80	50		128	80	0	224	E6	6			
81	51		129	81	1	225	E7	7			
82	52		130	82	2	226	E8	8			
83	53		131	83	3	227	E9	9			
84	54		132	84	4	228	EA	A			
85	55		133	85	5	229	EB	B			
86	56		134	86	6	230	EC	C			
87	57		135	87	7	231	ED	D			
88	58		136	88	8	232	EE	E			
89	59		137	89	9	233	EF	F			
90	5A		138	8A	A	234	F0	0			
91	5B		139	8B	B	235	F1	1			

GRAPHIC SYMBOLS
TO ENTER GRAPHIC MODE
FOR IT GRAPHIC MODE
F8 F9

command	cmd	page
ASN[,W=<drive>I,S=<drive>]	ASN	10-9
CAT[,<drive list>I,<match list>]	CAT	10-11
COPY,<filespec>,<file spec>	COPY	10-13
COPY,<file spec>,<drive>		
COPY,<drive>,<drive>,<match list>]		
DATE[,<mm,dd,yy>]	DATE	10-15
DELETE,<file spec>,<file list>]	DELETE	10-16
GET,<file spec>,<file list>]	GET	10-7
default extension : .BIN		
LIST,<file spec>,<line range>I,N]	LIST	10-17
MON	MON	10-7
O,<file spec>,<command>	O	10-18
default extension : .OUT		
P,<command>	P	10-19
PROT,<file spec>,<options>]	PROT	10-20
RENAME,<file spec 1>,<file spec 2>	RENAME	10-21
default extension : .TXT		
SAVE,<file spec>,<begin adr>,<end adr>,<transfer adr>]	SAVE	10-22
default extension : .BIN		
SAVE.LOW	SAVE.LOW	10-22
STARTUP	STARTUP	10-23
TTYSET,<parameter list>]	TTYSET	10-25
VERSION,<file spec>	VERSION	10-29
default extension : .CMD		
GETCHR Get character	\$AD15	10-33
PUTCHR Put character	\$AD18	10-33
PSTRNG Print string	\$AD1E	10-33
INBUFF Input to line buffer	\$AD1B	10-34
PCRLF Print CR + LF	\$AD24	10-34
OUTADR Output hexadecimal address	\$AD45	10-34
OUTDEC Output decimal number	\$AD39	10-35
OUTHEX Output hexadecimal number	\$AD3C	10-35
GETHEX Get hexadecimal number	\$AD42	10-35
INDEC Input decimal number	\$AD48	10-35
Line buffer	\$A080 - \$A0FF	10-32
System date registers	\$AC0E - \$AC10	10-32
Line buffer pointer	\$AC14 - \$AC15	10-32
Escape return register	\$AC16 - \$AC17	10-32

OmniSoft Screen Editor

POWER EDITOR COMMANDS

Line syntax : " " = current, " " = last, digits = offset or relative line number, + and - allowed.

Buffered Commands ('E' prompt)

Edit <filename> Clear buffer and read file.
 New <filename> Clear buffer and save filename.
 Get <filename> Get file past cursor.
 Save <filename> Save entire file.
 Save Partial <filename> Save part of file.
 Move <lines>,<lines> will move lines to after cursor position.
 Copy <lines>,<lines> will copy lines to after cursor position.
 Delete <lines>,<lines> will delete cursor position.
 Position <lines> Sets tabs at column 0, line.
 Tabs Repetitive <incr> Sets tabs at columns 0, incr, 2 * incr, 3 * incr, etc.
 Tabs Non-repetitive <column> - Sets tab at entered column.
 Tabs Clear all tabs.
 T+ Enable display of tab markers.
 T- Disable display of tab markers.
 T= Display version, filename, and line and memory status. Enter any key to exit.

When loading a new file or exiting the editor you will be prompted to save the current buffer if it has been modified since the last save. Any response other than an 'n' or 'y' will save the old buffer. A response of 'c' or 'e' will allow you to change the file name before saving.

Non-buffered commands (see page 19-9)

Quit Exit editor.
 4 move cursor left one character.
 6 move cursor right one character.
 8 move cursor up one line.
 0 move cursor down one line.
 0 move cursor left and right of line.
 0 move cursor 1/2 screen down.
 0 move cursor to next identifier.
 0 move cursor to next tab.
 0 move cursor backward to previous tab.
 0 single character left and right of carriage return will merge lines, with multiple leading spaces compressed into one space.
 0 delete current line.
 0 overwrite one character.
 0 delete characters until escape.
 0 enter insert mode.

Text search commands

Find will position cursor, response is CR = stop command
 Space = continue
 N = multiple occurrences on line

Replace will position cursor, response is

Space = continue
 R = Replace and continue
 N = multiple occurrences on line
 E = entire buffer

Note : When the 'r' prompt appears enter the find pattern - if you enter just a carriage return then this will terminate the search. If you enter a pattern, the search will continue. A '-' is used as a don't care in the find and replace patterns. The entire buffer option will enable the replacement throughout the rest of the buffer. The multiple occurrences option will allow a match on each occurrence of the find pattern. The search will start on the current line, continue to the end of the buffer, start back at the top, and stop on the current line. The cursor will be positioned at the last match when the command terminates.

Insert or append mode

Character entry until an escape is entered. Insert mode will insert characters before the current cursor position. Append mode will append characters after the current cursor position. The current line with no partial line carried over. In addition the following special characters are recognized :

BS or DEL backspaces over character.
 RT or ctrl Z reverse tab.
 ctrl X copies remainder of last line entered.
 ctrl A removes all characters entered so far.

DIRECTIVES

END	end of source program	12-12
EQU	equate a symbol to operand	12-12
FCB	form constant byte	12-13
FDB	form double constant byte	12-14
FCC	form constant characters	12-13
LIB	process library file	12-14
NAM	specify name or title	12-14
ORG	assign origin of program counter	12-15
PAG	skip to next page	12-16
RMB	reserve memory bytes	12-16
SPC	insert spaces of output listing	12-16
TTL	specify name or title	12-14
OPT	assembler control options	12-15
	PAG enable page formatting	

COMMAND

[P,]ASMB,<filename1>,<filename2>,<optionlist>]

optionlist

B	no binary file
D	no date on list
G	print only one line for FCB, FDB and FCC
L	no list
S	no symbol table
Y	delete binary file

DEBUG COMMAND SUMMARY

General system control

CALC	Calc	13-16
DELAY=<value>	DElay	13-17
DEPTH	DEpTh	13-17
EXIT	Exit	13-17
FLAG[=<address>]	FLag	13-18
IND=ON or OFF	IND	13-18
MACH	MAch	13-18
MODE=1 or 0	MOde	13-18
REG	Reg	13-19
RESET	RESet	13-19
RET	REt	13-19
SET, <register list>	Set	13-20
STACK[,<value>]	STACK	13-20
STATES	STATes	13-20
TRAIL	TRAIL	13-20
X, <FLEX command>	X	13-21

Memory commands

ASM[, <address>]	Asm	13-21
DIS, <start address>, <stop address>	Dis	13-22
DUMP, <address>	DUMp	13-22
FILL, <start address>, <stop address>[, <byte>]	FILL	13-22
FIND, <start address>, <stop address>, <string>	FIND	13-22
MEM, <address>	Mem	13-23

Simulation control

GO	Go	13-24
JUMP, <address>	Jump	13-24
PAST[, <value>]	PAst	13-24
SIM[, <count>]	SIM	13-24
START, <address>	STart	13-25
STEP[<count>]	STEP	13-25
TRACE=<value>	Trace	13-25
TSM[, <count>]	TSM	13-26
'ctrl'C	operator halt	13-26
escape	halt on EOL	13-26
'ctrl'F	faster	13-26
'ctrl'S	slower	13-26

Breakpoints

B, <actions> <address>[, <modifier> <count>], IF <condition>	B	13-27
Ba <address>[, <modifier> <count>], IF <condition>	Ba	13-27
R... Print register contents	R...	
Z... Zero the states counter	Z...	
T... Trace mode on	T...	
U... Trace mode off (untrace)	U...	
H... Histogram counter	H...	
M... Print message	M...	
J... Jump to new address	J...	
S... Stop simulation	S...	
Bp[, <address>[-<address>]]	BP	13-29
CLB[, <address>[-<address>]]	CLB	13-29
CLH[, <address>[-<address>]]	CLH	13-29
CLM	CLM	13-29
HIST[, <address>[-<address>]]	Hist	13-30
RT[, <address>]	RT	13-30

Memory protection

BOUNDS[, <types>]	BOunds	13-31
CLP[, <type>]	CLP	13-31
PROT, <address>[-<address>], <type>	Prot	13-32

Execution traps

INST=<count>	INST	13-32
ITRAP=ON or OFF	ITrap	13-33
NEST=<value>	Nest	13-33
STOP=<address>	STOP	13-33
XFR=ON or OFF	XFR	13-33

Interrupt control

IRQ=<count>	IRQ	13-34
NMI=<count>	NMI	13-34
'Ctrl'I	'Ctrl'I	13-34
'Ctrl'N	'Ctrl'N	13-34

