OPERATING MANUAL model ACT-5A SMOOTH SCROLL

MICRO-TERM, INC.

ST. LOUIS, MISSOURI 63144

OPERATING MANUAL
MODEL: ACT-5A
SMOOTH SCROLL

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ACT-5A SMOOTH SCROLL

ACT-5A COMPUTER TERMINAL BY MICRO-TERM, INC.

TABLE OF CONTENTS

SECTION		PAGE
1	Installation and Introduction to the ACT-5A	7
1.1	Using the ACT-5A Operating Manual	7
2	Operating Modes	8
2.1	Notes On Protected Fields	8
2.2	Transparancy Mode	8
2.3	Local Self Test	8
3	Keyboard	9
3.1	Encoded & Modifier Keys	9
3.2	Function Keys	10
3.2.1	Line/Local Key	10
3.2.2	Cursor Control Keys	10
3.2.3	Break Key	10
3.2.4	Function Keys	11
3.2.5	Toggle Video Attribute Keys - Underline, Reduced Intensity, Blink and Reverse Video	11
3.2.6	Send Key	11
3.2.7	Print Key	12
3.3	Numeric Entry	12
4	Response To Control Codes	13
	Absolute Cursor Postitioning (Direct Cursor Addressing)	13
	Background Follows	13
	Backspace	13
	Bell	13
	Carriage Return	13
	Change Intensity	14
	Clear Unprotected	14
	Cursor Down	14
	Cursor Right	14
	Cursor Off (On)	14
	Cursor Up	14
	Delete Character	14
	Delete Line	15
	Display Control Codes	15
	Enable (Disable) Keyclick	15
	Enable (Disable) Scroll	15
	Enter Graphics Mode	15
	Erase To End Of Frame	15
	Erase To End Of Line	16
	Escape	16
	Exit Graphics Mode	16
	Foreground Follows	17
	Format Mode	17
	Home Up	17
	Home & Clear	17
	Home & Clear To (Un)Protected	17
	Insert Characters	17
	Insert Line	18
	Line Feed	18
	Null	18
	Pass Through Printer On (Off)	18
	Print Line	19
	Print Page	19
	Report Character At Cursor Position	19

(continued)

Report Cursor Position 19
Report Present Video Attributes 19
Reverse Line Feed 19
Reverse Tab 20
Rubout 20
Set End of Block Character 20
Set Send Data Type Unprotected 20
Set Video Attributes 20
Smooth Scroll (Line Feed) 21
Split Screen Mode 21
Start (End) Blinking Field 21
Start (End) Reverse Video Field 21
Start (End) Underlined Field 22
Tab 22
Underline Current Character 22

5 Interface Instructions 23
5.1 EIA Connector Pin Assignments 23
5.2 Current Loop Interface 23
5.3 Full and Half Duplex Operation 23
5.3.1 Full Duplex Operation 24
5.3.2 Half Duplex With Modem Control 24
5.4 Data Rate Selection 24
5.4.1 Selecting the I/0 Data Rate 24
5.4.2 Selecting the Printer Data Rate 24
5.5 UART Options 24
5.6 Printer Port 25
5.6.1 Buffered Printer Mode 25
5.6.2 Pass-Through Printer Operation 25
6 User Selectable Options 26
6.1 Single/Double Underline 26
6.2 Blink Rates For Cursor and Blinking Field 26
6.3 Protected Video Attribute 26
6.4 Keyboard Auto Repeat Rate 27
6.5 Display Null Character On/Off 27
7 Appendix
7.1 Function Summary 28
7.2 Absolute Cursor Addressing Table 29
7.3 Character Sets 30
7.4 ASCII Codes 32
8 Warranty and Service Information 33
9 Custom Modifications 33
10 Suggestion Sheet 34

1.0 INSTALLATION AND INTRODUCTION

The ACT-5A should be positioned on a steady surface and at a comfortable level for the user. A space of at least 3 inches must be provided at the rear of the ACT-5A to provide ease of access to the power switch and brightness control. Care should be taken that magazines or other material do not fall behind the terminal and impede ventilation. The line cord should then be connected to a grounded power source.

The ACT-5A power switch is located on the rear of the unit. After a one minute warm-up period, the monitor should display a blinking block cursor in the upper left corner of the screen. This position will be referred to as the HOME or HOME-UP position throughout this manual. If the cursor does not appear in the home position of an otherwise clear screen, turn the terminal off and back on again. If the cursor still does not appear, refer to Section 8 of this manual.

Depress the 

key on the keyboard. Type on the keyboard. Characters should now appear corresponding to the keys depressed and the cursor will advance. There are 80 character positions per line; after the 80th character is entered on a line a new line is initiated. When the cursor is on the bottom line, the next new line will cause the contents of the screen to scroll upward one line so that the top line disappears.

Adjust the BRIGHTNESS control, on the rear, for comfortable viewing while maintaining a black background. Excessive brightness will cause premature phosphor degradation or burning not covered under warranty.

1.1 USING THE ACT-5A OPERATING MANUAL

All the information necessary to realize the full potential of this powerfully versatile product is contained in this operating manual. We strongly urge you to read the manual thoroughly before you use the unit.

Section 2 describes the various modes of operation including FORMAT, SPLIT SCREEN, GRAPHICS and DISPLAY CONTROL CODES.

Section 3 details the operation of the keyboard and describes the operation of all function keys and numeric key cluster.

Section 4 lists the multitude of ACT-5A features and their definitions alphabetically. Should you encounter problems when attempting to use a particular feature you may refer to its description in Section 4 for clarification.

Section 5 describes the Input/Output (I/O) and Printer interfaces. Information contained in this section is useful to insure compatibility between the ACT-5A and your host computer.

Section 6 explains the user selectable options which include Single/Double Underline, Cursor Blink Rate, Blinking Field Blink Rate, Selection of the Protected Video Attribute, Keyboard Repeat Rate and Keyclick Enable/Disable. Instructions are provided for changing these options to meet your specific tastes or application.

Section 7 is an Appendix which contains the following useful information: A complete list of software controlled features arranged in ascending order by control code or Escape sequence value; a table to aid in using the Cursor Positioning feature; a complete list of the ASCII codes including their Hexadecimal, Octal, Binary and Decimal equivalents; and an enlarged presentation of the 7 x 9 dot matrix for each character in the display set.

2.0 OPERATING MODES

The ACT-5A offers a number of useful operating modes that assist the user in communication with the host computer. Careful study and experimentation with these modes will familiarize the operator with the many powerful communications techniques offered by the ACT-5A.

Specifically designed to help the user understand the computer outputs are the Display the Control Codes, Split Screen, and Graphics modes. By displaying (rather than executing) the control codes the ACT-5A can present every received code to the operator for debugging assistance. The Split Screen mode permits twice as many lines to be displayed on the screen, (provided they are less than 40 characters), greatly relieving the operator's memory. The Graphics mode offers a special set of 32 characters that are useful in presenting fractions and graphic data more clearly.

For efficient communications the Local mode with associated editing features may be utilized to minimize use of costly host CPU time or to minimize the number of packets transmitted in a pay-by-the-packet system. The Local mode can also be used for testing and studying the operation of various terminal features.

To further enhance efficiency the Format mode, with associated protected fields, may be called upon to reduce redundant transmissions of forms from the host in data entry applications. It should be noted that the Format and Split Screen modes are mutually exclusive.

2.1 NOTES ON PROTECTED FIELDS

Unlike most computer terminals that restrict the protected field video attribute to Reduced Intensity, the ACT-5A allows the user to choose this attribute from Reduced Intensity (Standard), Reverse Video, Blink, or Underline.

For explicit instructions on selecting one of the alternate video attributes, please refer to Section 6.3 of this manual. It is important to follow these instructions carefully in order to insure successful use of the protected fields feature.

> **NOTE:** Several of the ESCAPE sequence features discussed in Section 4 refer to protected or unprotected positions. The user should substitute his video attribute selection for the word "protected" when reading about these features.

2.2 TRANSPARENCY MODE

A very useful feature of the ACT-5A is its capability to display a unique symbol for each of the ASCII control codes when in the Display Control Code mode. This mode can be entered and exited only by depressing the CTRL and Q keys simultaneously while in the LOCAL mode. This aids both the receive and transmit operations. On the receive side it permits one to identify every character received by the terminal settling any format problems caused by otherwise unseen control characters. On the transmit side it allows control characters to be imbedded in the displayed data for transmission in block mode to the computer.

2.3 LOCAL SELF TEST

The LOCAL mode also provides a means of testing the terminal manually. If the terminal works in the LOCAL mode any problems are limited to either the ACT-5A interface, the communication link or the remote computer.

2.4 X-ON/X-OFF LINE PROTOCOL

Since this terminal is equiped with the SMOOTH SCROLL feature, it requires the host computer to honor the X-ON/X-OFF protocol to match the input character rate to the scrolling rate. The ACT-5A performs jump scroll operations and refrains from sending any X-OFF or X-ON codes at any time until the smooth scroll feature is selected (see section 4). When SMOOTH SCROLL is selected, the ACT-5A automatically sends an X-OFF code when its input buffer is nearly full or when a PRINT LINE or PRINT PAGE operation is initiated.

3.0 KEYBOARD

The ACT-5A keyboard contains 88 keys which may be classified as either encoded, modifier or function keys (see Figure 3.1).

The keyboard features typamatic (Auto-Repeat) operation at a user selectable rate of either 7.5, 15 or 30 characters per second (CPS). This rate is set to 30 CPS at the factory but may be changed according to the directions given in Section 6.4 of this manual.

An audible tone is emitted each time a key is struck or when the keyboard is auto-repeating. This keyclicking feature may be disabled by following the directions in Section 4 of this manual.

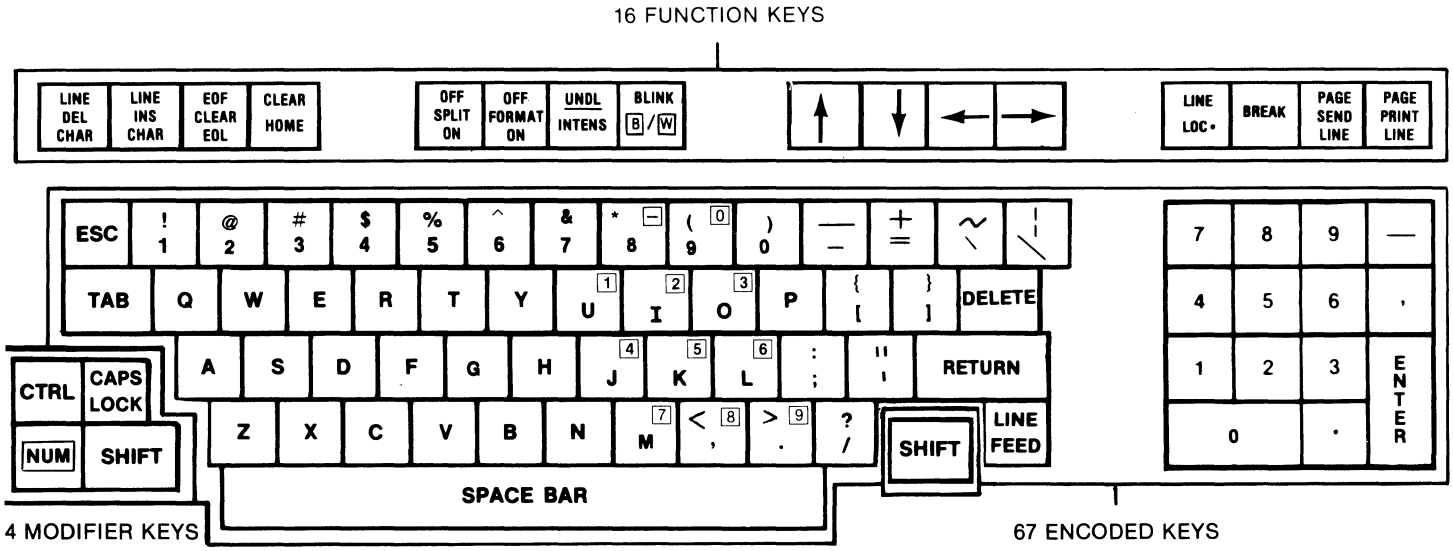


Figure 3.1 Keyboard Layout

3.1 ENCODED AND MODIFIER KEYS

The majority of keys on the keyboard generate an output code when struck. The assignment of output codes to keys is illustrated in Figures 3.1 and 3.2. Note that the output codes generated by the encoded keys depend on the state of the four modifier keys - CAPS LOCK, CTRL, NUM and SHIFT. The modifier keys do not generate output codes nor do they cause a keyclick to sound when they are depressed.

NOTE: The encoded key ESC and the modifier key CTRL have special significance to the ACT-5A and appear frequently in this manual in conjunction with another key eg. ESC H , CTRL G The ESC key should be depressed and released before striking the H key in the above example but the CTRL key (because it is a modifier key) must be depressed and held down while simultaneously striking the G key and released after the G key is released.

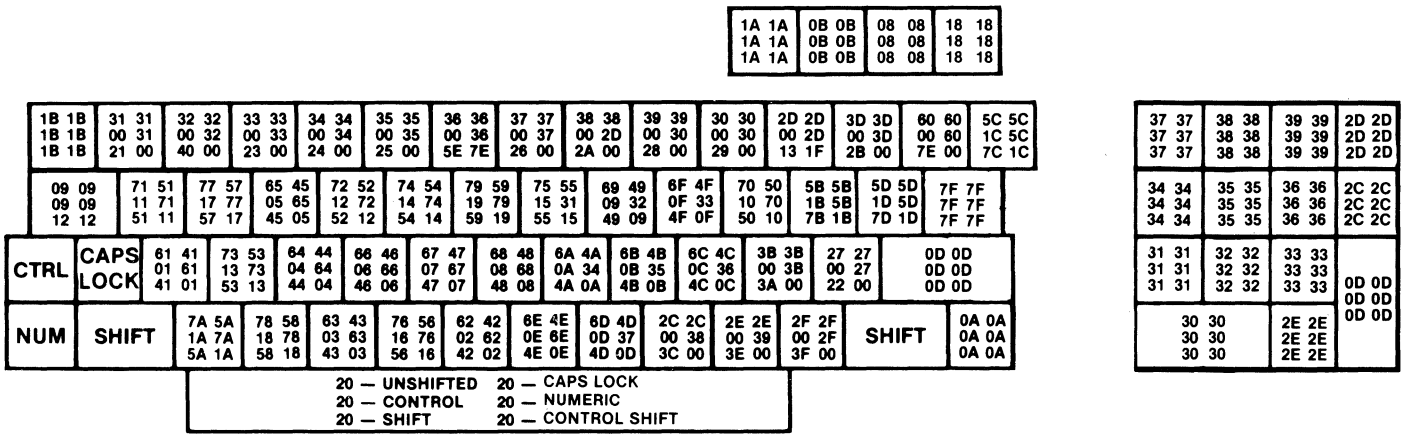


Figure 3.2 Keyboard Output Codes

3.2 FUNCTION KEYS

Twelve of the sixteen keys in the top row of keys on the ACT-5A keyboard do not generate output codes but control various functions. These functions are described below.

3.2.1 [LINE LOC•] KEY

This key controls whether the ACT-5A is in the ON-LINE or LOCAL mode. When ON-LINE (key up) all codes generated by the encoded key are transmitted out the I/O and AUX ports and all data received at either the I/O or AUX ports is accepted and displayed. When in the LOCAL mode (key down) all codes generated by the encoded keys are "echoed" to the screen and are not transmitted out either the I/O or AUX ports. Data may be sent out these ports when in the LOCAL mode by invoking a SEND command as described in Section 3.2.6 below.

> **NOTE:** Due to the dramatic effect that some of the ACT-5A features have on the operation of the terminal (Enter Split Screen Mode, Display Control Characters etc.) those features may be invoked only by an operator typing the appropriate key(s) at the keyboard while in the LOCAL mode. These features may not be accessed by the host computer by sending codes to the terminal i.e. the same codes that may be typed at the keyboard in the LOCAL mode to execute the restricted features are ignored when received from the host computer regardless of the state of the [LINE LOC•] switch.

In the LOCAL mode data sent from the host computer is accepted and displayed so that the operator does not miss any messages or data that may be generated by the host while in the LOCAL mode.

3.2.2 CURSOR CONTROL KEYS [↑] [↓] [←] [→]

In the LOCAL mode these keys do not send codes to the host, but move the cursor in the indicated direction. The cursor temporarily suspends blinking when these keys (or any encoded keys) are depressed. This greatly facilitates positioning the cursor quickly and accurately. When ON-LINE, these keys transmit the following codes:

Key	Code
Cursor Up	CTRL Z
Cursor Down	CTRL K
Cursor Left	CTRL H
Cursor Right	CTRL X

3.2.3 [BREAK] KEY

This key forces the serial output to assume the space (logical 0) state for the duration it is depressed.

3.2.4 [LINE DEL CHAR] [DEL INS CHAR] [EOF CLEAR EOL] [CLEAR HOME] [OFF SPLIT ON] [OFF FORMAT ON]

These function keys execute the operations inscribed on them. Refer to Section 4 for a detailed description of the various functions.

3.2.5 TOGGLE VIDEO ATTRIBUTE KEYS [UNDL INTENS] and [BLINK B/W]

These keys may be used to change the present video attribute setting causing subsequently typed or received characters to be displayed with the new video attribute type. These keys act as toggle switches i.e. each time they are struck the indicated attribute will change. To change back to its original value the key should be struck again.

KEY(S) TO CHANGE VIDEO ATTRIBUTES

[UNDL INTENS]	Intensity
[SHIFT] [UNDL INTENS]	Underline
[BLINK B/W]	Reverse Video
[SHIFT] [BLINK B/W]	Blink

3.2.6 SEND KEY [PAGE SEND LINE]

This key in conjunction with the [SHIFT] and [CTRL] keys commands the ACT-5A to transmit all or part of the contents of its screen out pin 2 of its I/O and AUX communication ports. There are three types of SEND operations described below. Each of these operations will send either both unprotected and protected characters or unprotected characters only. This selection is determined by the Send Unprotected Only, Send Unprotected and Protected functions described in Section 4 of this manual.

KEY(S)	SEND OPERATIONS
[PAGE SEND LINE]	SEND LINE sends data from left margin to cursor position followed by a carriage return code.
[SHIFT] [PAGE SEND LINE]	SEND PAGE sends all data from home to cursor position. At the end of each line a carriage return code is sent.
[CTRL] [PAGE SEND LINE]	SEND BLOCK stores an end of block marker ■ at the present cursor position then searches backwards for a previous ■ marker. If one is found, all data from the character immediately following the ■ marker to the newly displayed ■ marker is transmitted. Carriage return codes are sent at the end of each line and an end of block (EOB) code is sent at the completion of the send operation. If no previous ■ marker is found the send operation commences at the home-up position.

When sending, all data received from the host is ignored.

PROGRAMMING HINT

In order to avoid transmitting trailing spaces (those between the last displayable unprotected character and the end of the line) the screen should be CLEARED TO PROTECTED SPACES before entering data that is to be sent in block mode to the computer. This will minimize the time spent transmitting the line or lines.

When in the LOCAL mode if no data is being sent to the computer by the ACT-5A it will accept data from the computer and display it. This allows the user to edit the data on the screen, send it and receive a response from the main processor without changing the [LINE LOC•] switch. It also insures that any messages from the computer system are not ignored when in the LOCAL mode.

3.2.7 PRINT KEY [PAGE PRINT LINE]

This key in conjunction with the [SHIFT] and [CTRL] keys commands the ACT-5A to send all or part of the contents of the screen out pin 3 of the PRINTER port. There are three types of PRINT operation invoked by the [PAGE PRINT LINE] key and described below. When sending data out the PRINTER port all data received from the host computer is ignored. Unlike the SEND function, the PRINT function does not discriminate between protected and unprotected characters. All characters are sent out the PRINTER port. No attribute information is transmitted to the printer, only the ASCII code for each displayed character is sent.

KEY(S)	PRINT OPERATIONS
[PAGE PRINT LINE]	Prints data from left margin to cursor position followed by a carriage return and line feed code.
[SHIFT] [PAGE PRINT LINE]	Prints all data from home to cursor position. At the end of each line a carriage return and line feed code is sent.
[CTRL] [PAGE PRINT LINE]	PRINT BLOCK stores end of text marker ■ at the present cursor position then searches backwards for a previous ■ marker. If one is found all data from the character immediately following the ■ marker to the newly displayed ■ marker is transmitted out the printer port. Carriage return and line feed codes are sent at the end of each line. If no previous ■marker is found the print operation commences at the home-up position.

At the commencement of the Print Operation, an X-OFF* code is sent to the host. No characters are removed from the 40 character input buffer during this operation, but they are inserted into the buffer. If the terminal receives more than 24 characters from the host at this time, errors may be introduced into the data stream, and data may be lost. Once the selected print operation has completed execution, the characters in the buffer are removed and acted upon. When the buffer is completely emptied, an X-ON code is sent to allow the host computer to resume transmission.

NOTE: If the host computer does not honor the X-ON/X-OFF protocol, and characters are sent to the ACT-5A immediately following a print line or print page command, there is a strong possibility that the input buffer will overflow. In order to avoid this situation, the program in the host computer must delay sending characters after a print command until the print operation has time to finish.

NOTE: The data rate to the printer is independent of the data rate between the terminal and the host computer (when using one of the above PRINT functions) and is switch selectable as described in Section 5.4.2.

*See Section 2.4

3.3 NUMERIC DATA ENTRY

There are three methods provided by the ACT-5A keyboard for facililating the entry of numeric data. These are 1) Typewriter style - the numbers 1 through 9 and 0 appear in the top row of the main keyboard just as on a modern typewriter 2) Calculator style - a 14 key, calculator format numeric pad is provided for accounting type data entry and 3) Keypunch style - when the [NUM] key is depressed a numeric key cluster identical to the IBM Model 29 keypunch format is available inlaid in the main keypad. This feature is especially attractive to keypunch operators since they needn't sacrifice their speed learning the calculator format. To disable the [NUM] key it should be pressed again and will disengage.

4.0 RESPONSES TO CONTROL CODES

Numbers shown in braces (eg *[07]*) represent the Hexadecimal equivalent of the associated ASCII code.

ABSOLUTE CURSOR POSITIONING (DIRECT CURSOR ADDRESSING)

ABSOLUTE CURSOR POSITIONING allows the user to position the cursor anywhere within the 24 x 80 display matrix. The general format is a lead-in code, followed by two address coordinates. These coordinates must be transmitted to the terminal in ASCII. The cursor assumes the new position after the coordinates have been given. No other coding may be imbedded within this string of characters. Please refer to Appendix 7.2 for the ABSOLUTE CURSOR ADDRESSING TABLE and Appendix 7.3 for a complete list of decimal/hex/ASCII conversions. If the cursor is positioned in a protected field in the FORMAT mode, it will be moved to the first unprotected position.

CTRL T *[14]* [(LINE NUMBER)] [(COLUMN NUMBER)]

To position the cursor the ASCII code *[14]* must be received followed by the appropriate line number (0-23) and the column number (0-79). If an invalid line is received, it is reduced modulo 24 until a valid line 0-23 is produced. Similiarly an invalid column is reduced modulo 80. The top line of the display is line 0; the leftmost column is column 0.

EXAMPLE: To position the cursor on the tenth line down and in the fifth column from the left, the following codes must be received by the terminal.

[14] [09] [04] — CTRL T CTRL 2 I CTRL D

When in split screen mode, the Row Number's range from 0-47 and the Column Number's range from 0-38.

BACKGROUND FOLLOWS

All subsequent data received by the terminal after receipt of this function code is displayed in low (half) intensity. The terminal is restored to full intensity by giving a FOREGROUND FOLLOWS command.

[1B] [43] — ESC SHIFT C

BACKSPACE

This will cause the cursor to move to the nearest character position to the left without erasing data on the screen. When the cursor reaches the leftmost column it will stop. If the cursor is in the HOME UP position it will not move.An attempt to backspace into a protected field in the FORMAT mode will result in the cursor staying in the first unprotected position.

[08] — CTRL H

BELL

When the BELL code is received an audible tone of 1760 hertz is generated for one half second. The cursor position is not affected.

[07] — CTRL G

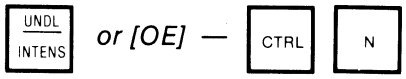
CARRIAGE RETURN

LOCAL: The cursor is moved to the leftmost unprotected position of the next line. If it is on the bottom line the screen will scroll.
LINE: The cursor is moved to the leftmost unprotected position on the present line.

[OD] — RETURN

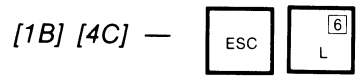
CHANGE INTENSITY

All subsequent data received by the terminal after receipt of this function code is displayed in low (half) intensity. Full intensity is restored when the terminal receives a second code of the same type. Therefore the change intensity code acts as a toggle switch.



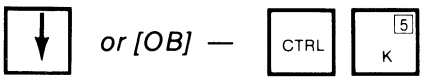
CLEAR UNPROTECTED

Receipt of this command will replace all unprotected characters with unprotected spaces and the cursor will move to the HOME UP position.



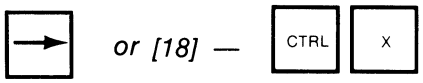
CURSOR DOWN

On receipt of the CURSOR DOWN command the cursor is moved down one line in the same column. If the cursor is on the bottom line of the screen, the position of the cursor will not change nor will the display scroll. If the cursor attempts to enter a protected field in FORMAT mode, it will move to the first unprotected position after the protected field.

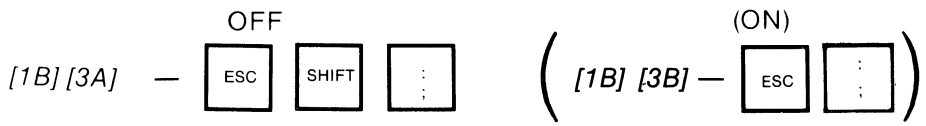


CURSOR RIGHT

The cursor advances one column to the right. The display is not altered. If in the last column it will not move. If the next position is protected and the FORMAT mode is set the cursor will move to the first unprotected position it encounters.

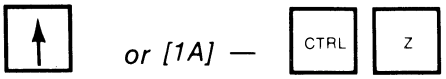


CURSOR OFF (ON)



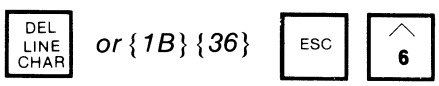
CURSOR UP

On receipt of the CURSOR UP command the cursor is moved up one line in the same column. If the cursor is on the top line of the screen, the position of the cursor will not change. If the position above is protected and the FORMAT mode is set the cursor will move to the first unprotected position following the protected field it attempted to enter.



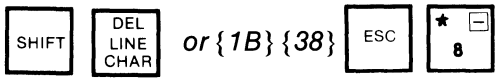
DELETE CHARACTER

Delete the character denoted by the cursor. All characters to the right of the cursor row are moved left by one column. The rightmost position is cleared to the video attribute of the last character on the line.

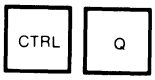


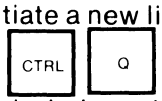
DELETE LINE

All data on the line denoted by the cursor is eliminated. Pre-existing data below the cursor is moved up one line and the bottom line is cleared to the present attribute type.



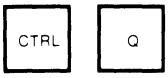
DISPLAY CONTROL CODES

Typing a 

in LOCAL mode conditions the terminal to display all future control characters rather than act upon them. The control characters thus become functionally transparent. This transparency mode is particularly useful for verifying the control characters sent from the main processor. While control characters are being displayed, the terminal will continue to automatically scroll and initiate a new line after filling a line with 80 characters. The only control code that will be acted upon is another 

, from the keyboard in LOCAL, which will restore the terminal to its normal execution of control character commands. Appendix 7.4 lists the 32 ASCII control characters in hexadecimal, their keyboard representation and their display counterparts.

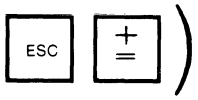
NOTE: This can be initiated in LOCAL mode ONLY.

[11] — 

ENABLE (DISABLE) KEYCLICK

These functions control the generation of the audible clicks when encoded keys are struck at the keyboard.

[1B] [3C] — 

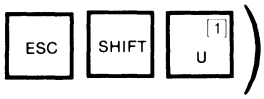
(*[1B] [3D]* — 

)

ENABLE (DISABLE) SCROLL

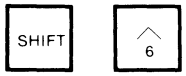
After this code is received LINE FEED's in the bottom row and REVERSE LINE FEED's in the top row perform a scroll up or down operation respectively.

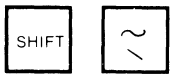
[1B] [54]— 

(*[1B] [55]* 

)

ENTER GRAPHICS MODE

This function invokes an alternate character set for ASCII codes *[5D] [5E]*— 

thru *[7E]* — 

Appendix 7.4 lists the ASCII code, its keyboard representation, and its displayed counterpart. This is particularly useful for generating graphs and displaying fractions or subscripts.

[1B] [4D] — 

ERASE TO END OF FRAME (EEOF) PRESENT VIDEO ATTRIBUTES

All characters from the cursor position to the end of the screen are erased to present video attribute spaces. The cursor position is not affected.



— *[1F]*

EEOF PROTECTED

Same as EEOF except the Protected Field attribute bit is set on all characters to the right and below the cursor.



— *[1B] [4A]*

EEOF UNPROTECTED

Same as EEOF except the Protected Field attribute bit is reset on all characters to the right and below the cursor.



— *[1B] [4B]*

ERASE TO END OF LINE: EEOL

All positions from the cursor to the right margin are replaced by present video attribute spaces.



— *[1E]*

ERASE TO END OF LINE PROTECTED

This code causes the same action as the ERASE TO END OF LINE code except that all positions to the right of the cursor are cleared to protected spaces.



— *[1B] [40]*

ERASE TO END OF LINE UNPROTECTED

Same as EEOL except the Protected Field attribute bit is reset on all characters in the same row and to the right of the cursor.



— *[1B] [49]*

ESCAPE

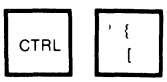
This code conditions the terminal to treat the following code(s) in a special manner. If the code immediately following the ESCAPE code is a valid ESCAPE sequence code the appropriate ESCAPE sequence feature will be executed. If not, the illegal code and the Escape code are ignored. For a list of these features see Table 1 in Appendix 7.1.

Note that to invoke an ESCAPE sequence feature - ESC A - Underline Current Character for example, the 

key must be depressed and released before striking the 

key.

[1B] — 

or 

EXIT GRAPHICS MODE

This will EXIT the GRAPHICS MODE and restore the standard character set. See ENTER GRAPHICS MODE.

[1B] [4E] — 

FOREGROUND FOLLOWS

All characters received after this command will appear in full intensity. Only these characters, including spaces, will be transmitted during a SEND LINE or SEND SCREEN.

[1B] [42] — ESC SHIFT B

FORMAT MODE

Enter: Prevents the cursor from entering the protected fields. Not permissible when in the split-screen mode. A bell is sounded if an attempt to enter this mode is made when in the split-screen mode. Exit: Allows unrestricted movement of the cursor.

ENTER

[1B] [44] — ESC SHIFT D

EXIT

[1B] [45] — ESC SHIFT E

HOME UP

This function moves the cursor to the upper left corner of the screen unless it is protected and the FORMAT mode is set, in which case it moves to the first unprotected position.

[1D] — CTRL }

HOME AND CLEAR

This function moves the cursor to the upper left corner of the screen. The screen is then cleared to present video attribute type.

[0C] — SHIFT CLEAR HOME *or* CTRL L

HOME AND CLEAR TO (UN)PROTECTED

These codes cause the cursor to move to the upper left corner of the screen and write (un) protected spaces in all screen positions.

[1B] [60] — ESC ~ (*[1B] [61]* — ESC a)

INSERT CHARACTERS

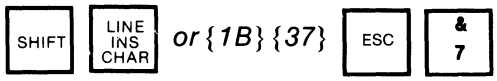
Insert subsequent characters into the cursor row at the cursor position. After this command, all characters at the cursor position and to its right are moved one position to the right each time a displayable character is typed at the keyboard. To exit from this mode, any control character may be typed. The ACT-5A will act upon the control character and sound the BELL to indicate an exit from the insertion mode.

Key Stroke	Screen Contents
	The quick brown_jumps . . .
ESC G	The quick brown_jumps . . . (insertion mode entered)
Space	The quick brown _jumps . . .
f	The quick brown f_jumps . . .
o	The quick brown fo_jumps . . .
x	The quick brown fox_jumps . . .
RETURN	The quick brown fox jumps . . . (Bell sounds and RETURN Function Performed)

LINE INS CHAR *or {1B} {47}* ESC SHIFT G

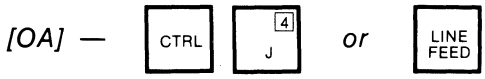
INSERT LINE

This will allow a new line of text to be added between any two pre-existing lines on the screen. A blank line will be inserted on the row denoted by the cursor. All pre-existing text on the cursor row and below is moved down by one line and the last line scrolls downward off the screen. The blank line will be cleared to spaces with the present video attributes.



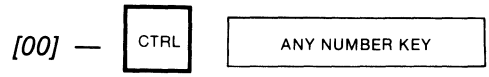
LINE FEED

This will cause the cursor to move down one line in the same column. If the cursor is on the bottom line, the screen will scroll. The new bottom line will be filled with spaces of the present video attribute type.



NULL

Sending the ASCII NULL is accomplished by holding the CTRL key down and then striking any number key.



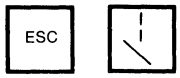
PASS THROUGH PRINTER PORT ON (OFF)

There are two modes of Pass Through Printer Port Operation: Monitor Mode and Non-Monitor Mode. When Pass Through Printer operation is enabled in either of these modes, all data received from the host computer is sent directly to the printer port at the same data rate as it was received at the I/O port, and printer output is routed to the host computer. When Pass Through Printer operation is disabled, received data is not routed to the printer port nor is the printer output sent to the host computer.

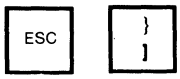
When the ACT-5A is operating in the Monitor Mode, the terminal displays all data received from the host computer in addition to passing it through to the printer. All keyboard functions are enabled, and the ACT-5A operates normally. Note that both the output of the printer and of the ACT-5A are tied to the Serial Out Line and that errors can occur as a result of this if the printer produces output codes (this includes X-ON and X-OFF codes).

In Non-Monitor Mode, however, the terminal passes the data through to the printer but does not disturb the contents of the screen. All keyboard functions are disabled, the keyboard is locked and will remain in this state until the Pass Through Printer Port Off code is received by the terminal from the host computer.

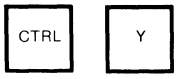
The Pass Through Printer Port Off code disables both Monitor and Non-Monitor Pass Through Printer operation.

MONITOR PASS THROUGH PRINTER ON: 

— {1B} {5C}

NON-MONITOR PASS THROUGH PRINTER ON: 

— {1B} {5D}

PASS THROUGH PRINTER OFF: 

— {19}

PRINT LINE

This will cause all characters from the beginning of the line denoted by the cursor to the cursor position (inclusive) to be sent out the printer port. At the end of the line a CARRIAGE RETURN and LINE FEED will be sent. The transmission can only be interrupted by the appropriate signal on the printer busy line. While the line is being transmitted to the printer, no data will be accepted into the terminal. The BELL will sound after the line has been sent. SEE NOTE SECTION 3.2.7.

[1B] [46] — ESC SHIFT F

PRINT PAGE

All text from the home position to the Cursor position inclusive will be sent to the printer port. At the end of each line a CR and LF will be sent. The transmission can only be interrupted by the appropriate signal on the printer I/O ready line. While the line is being transmitted to the printer, no data will be accepted into the terminal. The BELL will sound after all data has been sent. (SEE NOTE SECTION 3.2.7)

[10] — CTRL P

REPORT CHARACTER AT CURSOR POSITION

The ASCII code for the character at the cursor position is transmitted to the computer followed by the EOB Character.

[1B] [4F] — ESC SHIFT O

REPORT CURSOR POSITION

After receiving the ASCII control code ENQ *[05]*, the terminal will respond by reporting the cursor's current address coordinates. These coordinates are coded in binary and transmitted in ASCII followed by the EOB Character. Please refer to Appendix 7.2 for the ABSOLUTE CURSOR ADDRESSING TABLES and Appendix 7.3 for a complete list of decimal/hex/ASCII conversions.

The range of Row Number's is 0-23 in full screen mode and 0-47 in split screen mode. The range of Column Number's is 0-79 in full screen mode and 0-38 in split screen mode

[05] — CTRL E

The terminal will respond with (LINE NUMBER) (COLUMN NUMBER) (EOB CHARACTER)

REPORT PRESENT VIDEO ATTRIBUTES

Upon receipt of this command the present state of the video attributes is transmitted to the host computer followed by the EOB Character.See the SET ATTRIBUTES command description for a list of output code to attribute state assignments.

[1B] [52] — ESC SHIFT R

REVERSE LINE FEED

This function will cause the cursor to move up one line in the same column. If the cursor is on the top line, the cursor will remain there, but the screen will scroll downwards; the screen will appear to move down one line, losing the bottom line of the screen, and forming a blank line at the top of the screen. The blanks in the top line will be set to the present video attribute type.

[1B] [48] — ESC SHIFT H

REVERSE TAB

This code causes the cursor to move to the leftmost position of a preceeding unprotected field regardless of whether the FORMAT mode is set. If the home-up position is encountered the cursor will not move.

SHIFT TAB or CTRL R - *[12]*

RUBOUT

On LINE, depression of this key transmits the ASCII code [7F] to the computer. In LOCAL, depression of this key causes the execution of a Backspace - space - Backspace sequence unless the cursor is in the leftmost column of the line (Column 0 and Column 41 in Split Screen Mode) or unless the character to the left of the cursor is protected and the terminal is in Format mode. In these cases no action is taken. This code may also be used as a timing code (filler code).

[7F] — DELETE

SEND LINE SEE SECTION 3.2.6
SEND SCREEN SEE SECTION 3.2.6

SET END OF BLOCK CHARACTER

This function specifies which code will be sent to terminate the following sequences. Report Attributes at Cursor, Report Cursor Position, Report Character at Cursor and Block Send. When in Half Duplex the RTS line is dropped only after the EOB character is sent. The default value is Carriage Return.

[1B] (39) [New EOB Character] — ESC (9 EOB Character

SET SEND DATA TYPE UNPROTECTED (BOTH UNPROTECTED & PROTECTED)

These codes control the type of characters that will be sent when the PAGE SEND LINE key is struck. On power-up the SEND DATA TYPE is set to unprotected only.

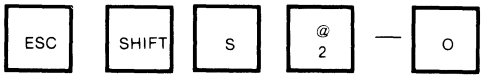
[1B] [5E] — ESC SHIFT 6 (*[1B] [5F]* — ESC SHIFT —)

SET VIDEO ATTRIBUTES

The code immediately following this command sequence indicates the new state of the video attributes. All subsequent received (typed) displayable characters are to be displayed with these attributes. The assignment of video attribute states to set characters is as follows:

SET (REPORT) CHARACTER	(4 ASCII LSB's)	NEW ATTRIBUTE SETTING			
		INTENSITY	BLINK	REVERSE	UNDERLINE
@	0000	FULL	NO	NO	NO
A	0001	FULL	NO	NO	YES
B	0010	FULL	NO	YES	NO
C	0011	FULL	NO	YES	YES
D	0100	FULL	YES	NO	NO
E	0101	FULL	YES	NO	YES
F	0110	FULL	YES	YES	NO
G	0111	FULL	YES	YES	YES
H	1000	LOW	NO	NO	NO
I	1001	LOW	NO	NO	YES
J	1010	LOW	NO	YES	NO
K	1011	LOW	NO	YES	YES
L	1100	LOW	YES	NO	NO
M	1101	LOW	YES	NO	YES
N	1110	LOW	YES	YES	NO
O	1111	LOW	YES	YES	YES

Upon power-up the video attributes are set to full intensity no blink, no reverse and no underline.



[1B] [53] [XF] sets all attribute bits.

SMOOTH SCROLL (LINE FEED)

The upward scrolling of the ACT-5A caused by line feeds may be performed in one of two ways (provided the serial number is greater than 80xx1999): jump scroll or smooth scroll. When in jump scroll mode, new lines of data appear on the screen as fast as the computer sends them to the terminal. In smooth scroll mode, new lines of data appear on the screen at the maximum rate of five per second. The upward movement of lines proceeds smoothly allowing the data to be read as it appears on the screen.

NOTE: In order to use the smooth scroll feature the host computer must support the XON-XOFF protocol. If output from the host cannot be controlled by XON (Control Q) and XOFF (Control S) codes the terminal will smooth scroll only if data is received at a rate of less than five lines per second. If data appears at a faster rate the terminal will automatically perform jump scrolls. Reverse line feeds do not smooth scroll. See Section 2.4

Select Smooth Scroll *[1B] [3E] —*



Select Jump Scroll *[1B] [3F] —*



When the terminal is initially turned on the jump scroll mode is selected.

SPLIT SCREEN MODE

Enter: The screen format is 48 lines of 39 characters rather than the usual 24 by 80. Exit: Returns the screen format to 24 lines by 80 characters. Note this affects the following functions: Absolute Cursor Positioning, Request Cursor Positioning, Line Feed, Cursor Right - Left - Up - Down, Insert Line and Character, Delete Line and Character, Back Space, Print, Send, Carriage Return, Erase to End of Line and Erase to End of Frame. The bell is sounded if an attempt to enter this mode is made while in the Format mode. **(LOCAL ONLY).**

ENTER

[1B] [50] —



EXIT

[1B] [51] —



START (END) BLINKING FIELD

Displayable characters received after these codes will blink (not blink). The other three video attributes are not affected.

[1B] [56] —



(*[1B] [57] —*

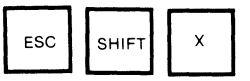


)

START (END) REVERSE VIDEO FIELD

Displayable characters received after these codes will be displayed as reverse — black dots on a white background (standard — white dots on a black background). The other three video attributes are undisturbed.

[1B] [58] —



(*[1B] [59] —*



)

START (END) UNDERLINED FIELD

Displayable characters received after these codes will be underlined (not underlined). The other three video attributes are unchanged.

[1B] [5A] — ESC SHIFT Z (*[1B] [5B]* — ESC { [ )

TAB

The execution of this command depends upon whether the FORMAT mode is set.

If the FORMAT mode is not set the cursor will advance to the next fixed TAB stop on the present line. The fixed TAB stops are in columns 8, 16, 24, 32, 41, 49, 57, 65, and 73. If the cursor is in columns 73 through 79 it will not move.

If the FORMAT mode is set the cursor will advance to the first (leftmost) position of the next unprotected field. If there are no more Unprotected fields from the cursor position to the end of the screen the cursor will not move.

[09] — CTRL I 2 *or* TAB

UNDERLINE CURRENT CHARACTER

The character at the cursor position is underlined regardless of the state of the other video attributes. The cursor moves right after underlining.

[1B] [41] — ESC A

5.0 INTERFACE INSTRUCTIONS:

5.1 EIA CONNECTOR PIN ASSIGNMENTS:

The pin assignments for the 25 pin EIA connectors on the rear of the ACT-5A are as follows:

I/O Connector:

PIN NUMBER	SIGNAL
1	Ground (Chassis)
2	Serial RS232c data out of ACT-5A
3	Serial RS232c data into ACT-5A
4	Request To Send (To Modem)
5	Clear To Send (From Modem)
7	Ground (Signal)
20	Data Terminal (ACT-5A) Ready (High whenever ACT-5A is on)

Printer Connector:

PIN NUMBER	SIGNAL
1	Ground
2	Printer Serial RS232c data into Act-5A from Printer
3	Printer Serial RS232c data out of ACT-5A
7	Ground
20	Printer Ready (High = Ready)

5.2 CURRENT LOOP INTERFACE

An optically isolated, polarized, passive, 20mA current loop interface is available as a standard feature of the ACT-5A. In order to enable it pins 10, (22), 11(23), 12(24) and 13(25) on the I/0 conector must be connected to the computer as follows:

ACT-5A I/0 Connector Pins	Signal
12 (or 24)	Receiver Current input (+)
13 (or 25)	Receiver Current return (-)
10 (or 22)	Transmitter current sink (+)
11 (or 23)	Transmitter Current source (-)

Since the interface is passive a typical installation would appear like:

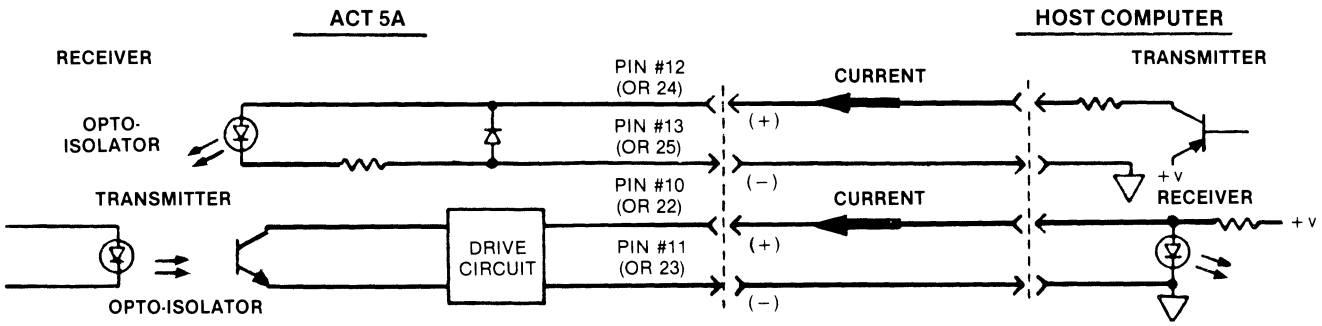


Figure 5.1 TYPICAL CURRENT LOOP CONNECTION

5.3 FULL AND HALF DUPLEX OPERATION

The ACT-5A may operate in either full or half duplex modes. In full duplex all characters typed at the keyboard and sent to the host computer are echoed by the host and appear on the screen, In the half duplex mode the host does not echo the characters sent to it so the ACT-5A provides a local echo of each transmitted character. Some modems require the half duplex mode—otherwise full duplex is usually the prefered mode of operation. In both full and half duplex, CTS must be high to allow commencement of PRINT and SEND operations. The full/half duplex switch is read only upon power up. If this switch is toggled during terminal operation, the terminal must be recycled to insure proper operation.

5.3.1 Full Duplex Operation

In the full duplex mode (selected by the slide at the rear of the cabinet) the ACT-5A's transmitter and receiver circuits operate independently and data may flow both into and out of the serial interface concurrently. Only pins 2 (RS232c Serial Data Out), 3 (RS232c Serial Data In) and 7 (Signal Ground) must be connected to establish full duplex communication.

5.3.2 Half Duplex With Modem Control

In the half duplex mode of operation (selected by the switch at the rear of the cabinet) all characters typed at the keyboard are echoed internally and also transmitted to the host computer through the I/O port. The Request To Send (RTS), Clear To Send (CTS) protocol is employed to enable use with Bell 103 and 202 type modems. In half duplex operation on line, RTS is raised when a character is struck at the keyboard for transmission to the host computer and dropped after the transmission of the EOB character. RTS is raised at the commencement of a SEND operation, and dropped at the completion.

5.4 DATA RATE SELECTION

The ACT-5A features data transmission/reception rates of 110, 300, 600, 1200, 2400, 4800, 9600 and 19,200 baud (bits/second) for both the I/0 and PRINTER communication ports.

5.4.1 Selecting the I/0 Data Rate

The photo below indicates the location of the 8 switches that select the I/0 data rate. No two switches shoud be turned on at the same time.

SWITCH# I/0	PRINTER	DATA RATE (BAUD)
1	8	19.2K
2	7	9600
3	6	4800
4	5	2400
5	4	1200
6	3	600
7	2	300
8	1	110

NOTE: At 19,200 baud the ACT-5A cannot execute all control codes before another code arrives. When this occurs one or more characters are stored in a forty character First-In-First-Out (FIFO) buffer. When this buffer fills to 24 characters the ACT-5A transmits an X-Off* code to force the host to suspend transmission. When the buffer is emptied an X-On code is transmitted to the host. If the host does not honor the X-Off/X-On protocol, Rubout characters (not nulls) must be sent. As long as this buffer does not overflow (an unlikely event) the user will be unaware of its existence. Control features that take more than one character time at 19,200 baud to complete execution are:

Function	Length In Number of Character Times at 19,200 Baud
Clear Foreground	160
Home & Clear	26
Line Feed (Scrolling)	3
Erase to End of Screen	1-26 (Cursor Position Dependent)
Tab (Format Mode On)	1-32 (Form Dependent)
Reverse Tab	1-450 (Form Dependent)
Pass through Printer (ON and OFF)	40

*See Section 2.4

5.4.2 Selecting the Printer Data Rate

Located immediately above the I/0 data rate select switches on the main logic board are 8 printer rate select switches. Refer to Section 6.0 to gain access to these switches by removing the cabinet top. The printer switches select the same rates as the I/0 switches (listed above) except in the opposite order.

5.5 UART OPTIONS

The ACT-5A is factory set to transmit and receive a data word consisting of 1 start bit, 7 ASCII data bits, an 8th data bit (tied high on transmit, ignored on receive) and two stop bits. The parameters of the data word may be modified by resetting the UART option switches located on the logic board in the rear of the cabinet (see photo below). The UART option switches have the following effects on the data transmission format:

UART SWITCH #	FUNCTION
5	8th bit transmit select: Off (switch down) causes a logical 1 (mark) to be transmitted; On (switch up) chooses a logical 0 (space).
10	Parity select: Off (switch down) selects no parity; On enables the type of parity selected by switch 8
9	Number of stop bits: Off (switch down) selects 2 stop bits; On selects one stop bit.
6,7	Word length: Lengths of 5, 6, 7 or 8 are possible. The parity bit (if selected) is added on to the word length.

Length (Bits)	Switch 6	Switch 7
8	Off	Off
7	Off	On
6	On	Off
5	On	On

8	Odd/Even Parity Select: Off (switch down) selects even parity; On selects odd parity. Switch 10 must be on to enable parity generation.

UART switches five through ten are all factory set to the off position.

5.6 PRINTER PORT

The ACT-5A printer port operates in two modes: buffered and pass-through. Both modes are software controlled by either codes typed at the keyboard or received from the computer.

If the Pass Through Printer is to be operated at speeds greater than 1200 baud, a delay of 20 millisecond should preceed the transmission of the PTP on code sequence to the terminal. This delay ensures that the input buffer will be empty and the PTP ON code will be executed promptly. Another pause in the data transmission to the ACT-5A of 10 milliseconds must immediately follow the PTP on codes to prevent the printer UART from acquiring false start bit synchronization and thus printing erroneous characters.

5.6.1 Buffered Printer Mode

The screen contents may be sent out the PRINTER connector pin 3 (in a serial RS232c format) by depressing the PAGE PRINT LINE key as described in Section 3.2.7 or by sending a PRINT code from the computer (see Section 4) to the ACT-5A. The data rate used to transmit characters to the local printer is independent of the I/0 data rate and may be selected as described in Section 5.4.2 above. When transmitting characters to the printer the ACT-5A senses the printer ready line at pin 20 of the PRINTER connector. If this signal assumes the low (not ready) state the ACT-5A suspends transmission until the printer becomes ready and reasserts this line. If pin 20 is not connected the ACT-5A assumes that the printer is always ready to accept data and transmits continuously until the selected PRINT operation terminates.

NOTE: See Section 3.2.7.

5.6.2 Pass-Through Printer Operation

A software controlled switch is provided by the ACT-5A to connect the serial data input line (from the computer) to the serial data output line to the printer and conversely the serial data input line from the printer to the serial data output line to the host computer. Three codes control this switch - on (monitored/not monitored) and off (see Section 4). This type of printer operation requires that your printer be able to accept data at the same rate as the I/0 rate between the terminal and the host computer.

6.0 USER SELECTABLE OPTIONS

The operation of several ACT-5A features may be altered by changing jumper selections on the logic printed circuit board. These options are described in the following subsections.

In order to gain access to the jumpers on the main logic board the cabinet top must be removed. Before doing so **UNPLUG** the unit from the 110 (220) Volt receptacle. Then remove the four retaining screws located on the sides and at the rear of the cabinet. Carefully lift the cabinet top up and off of the chassis and set it aside while modifying the jumper selections. It is important to **REPLACE** the cover (cabinet top) before reconnecting power to the unit.

6.1 SINGLE/DOUBLE UNDERLINE

FACTORY SETTING: SINGLE

Jumper W1 selects whether underlined fields will have one or two understrokes i.e. A or A. Note that the single underline appears in the same scan line as the bottom row of a descending lower case character (g) while a double underscore over-writes both descending rows (g). It is for this reason that we suggest double underscores be used only in the absence of descending characters.

W1 CONNECTIONS

A to S	for single
B to S	for double

6.2 BLINK RATES FOR CURSOR AND BLINKING FIELDS

FACTORY SETTING: CURSOR 2 HZ; BLINKING FIELDS 1 HZ

Jumpers W2 and W3 select the blinking frequencies of the cursor and of the blinking fields. These two rates are independent and may be selected as follows:

CURSOR RATE:

W2 CONNECTIONS	BLINK RATE (Hz)
S to A	4
S to B	2
S to C	1
S to D	0

BLINKING RATE:

W3 CONNECTIONS	BLINK RATE (Hz)
S to A	4
S to B	2
S to C	1

6.3 PROTECTED VIDEO ATTRIBUTE

FACTORY SETTING: PROTECTED FIELDS = REDUCED INTENSITY

The video attribute associated with protected fields may be any one of: Reduced Intensity, Blinking, Reverse Video or Underlined. In order to change the protected video attribute two operations must be performed.

First W4 should be connected as follows

W4 CONNECTION	PROTECTED VIDEO ATTRIBUTE
S to A	Reduced Intensity
S to B	Blinking
S to C	Reverse Video
S to D	Underline

Second the Protected Field Attribute switches (Refer to Figure 5.2 above) T.O. 2 and T.O. 3 must be set as follows:

PROTECTED VIDEO ATTRIBUTE	T.O. 2	T.O. 3
Reduced Intensity	OFF	OFF
Blinking	OFF	ON
Reverse Video	ON	OFF
Underline	ON	ON

6.4 KEYBOARD AUTO REPEAT RATE

FACTORY SETTING: 30 CPS

After approximately a .5 second delay all keys automatically repeat at either 7.5, 15 or 30 characters per second (CPS) depending upon the W5 jumper selection:

W5 CONNECTION	REPEAT RATE (CPS)
S to A	30
S to B	15
S to C	7.5

6.5 DISPLAY NULL CHARACTER ON/OFF

FACTORY SETTING: ON T.O. 4

This switch (located at the rear of the cabinet) controls the displaying of the null symbol when in either the display, the control characters mode or in graphics mode. Refer to Figure 5.2 for the exact location of this switch.

7.1 Function Summary

HEX	DECIMAL	KEYBOARD	FUNCTION
05	5	[Ctrl E]	Report Cursor Position
07	7	[Ctrl G]	Bell
08	8	[Ctrl H]	Backspace
09	9	[Ctrl I]	Tab
0A	10	[Ctrl J]	Line Feed
0B	11	[Ctrl K]	Cursor Down
0C	12	[Ctrl L]	Home & Clear to Current Attributes
0D	13	[Ctrl M]	Return
0E	14	[Ctrl N]	Change Intensity
10	16	[Ctrl P]	Print Screen
11	17	[Ctrl Q]	Display Control Characters (Local)
12	18	[Ctrl R]	Reverse Tab
14	20	[Ctrl T]	Absolute Cursor Position
18	24	[Ctrl X]	Cursor Right
19	25	[Ctrl Y]	Pass Through Printer (Off)
1A	26	[Ctrl Z]	Cursor Up
1D	29	[Ctrl]]	Home Up
1E	30	[Ctrl ^]	Erase To End Of Line Current Attributes
1F	31	[Ctrl _]	Erase To End of Screen Current Attributes

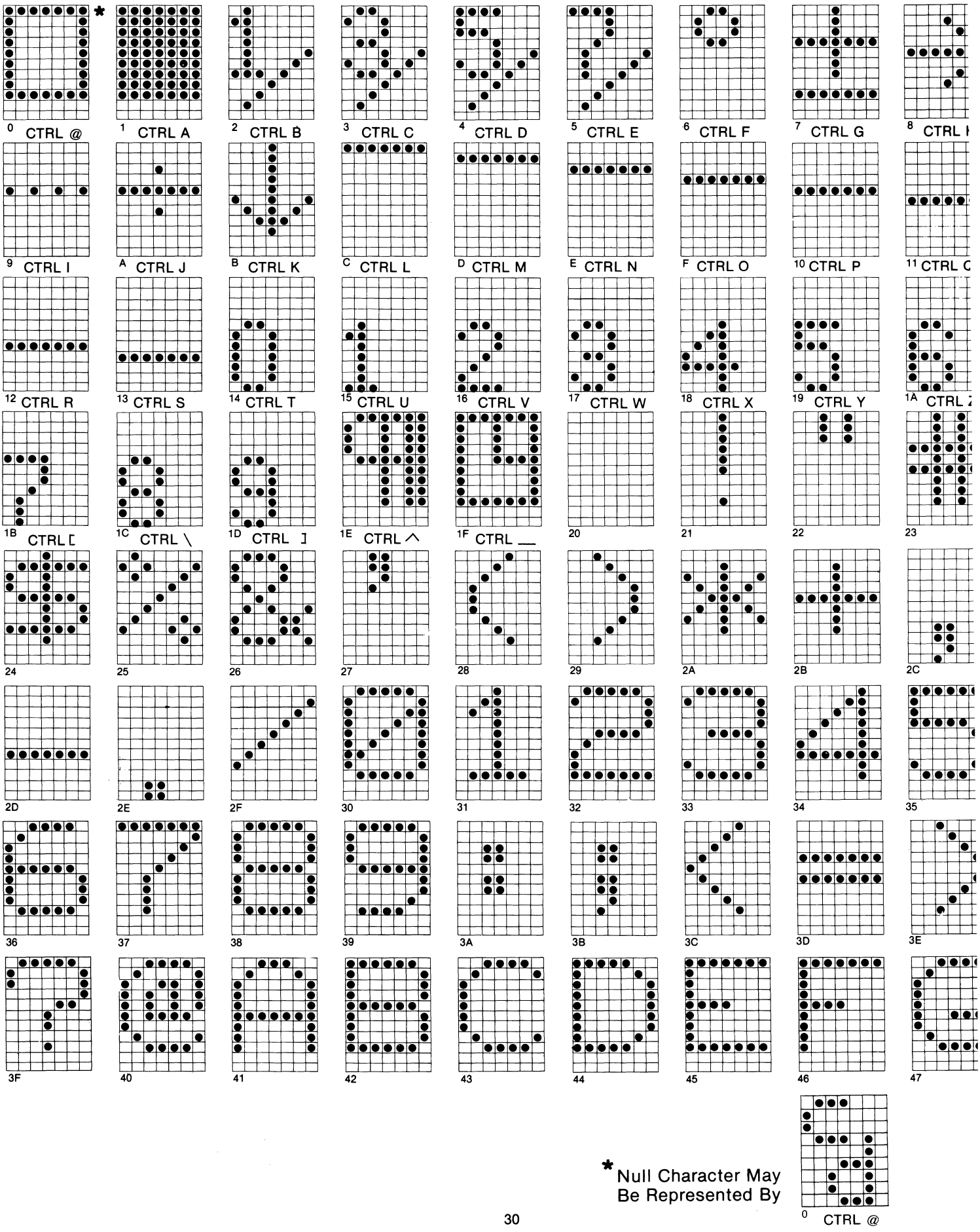
The [Esc] key must be pressed first then released before the next key for these functions. CAPS LOCK or SHIFT key must be depressed.

1B 36	27	54	[Esc] [6]		Delete Character
1B 37	27	55	[Esc] [7]		Insert Line
1B 38	27	56	[Esc] [8]		Delete Line
1B 39	27	57	[Esc] [9]		Set EOB Character
1B 3A	27	58	[Esc] [:]		Cursor Off
1B 3B	27	59	[Esc] [;]		Cursor On
1B 3C	27	60	[Esc] [<]		Enable Keyclick
1B 3D	27	61	[Esc] [=]		Disable Keyclick
1B 3E	27	62	[Esc] [>]		Select Smooth Scroll
1B 3F	27	63	[Esc] [?]		Select Jump Scroll
1B 40	27	64	[Esc] [@]		Erase to End of Line Protected
1B 41	27	65	[Esc] [A]		Underline
1B 42	27	66	[Esc] [B]		Foreground Follows
1B 43	27	67	[Esc] [C]		Background Follows
1B 44	27	68	[Esc] [D]		Format On
1B 45	27	69	[Esc] [E]		Format Off
1B 46	27	70	[Esc] [F]		Print Line
1B 47	27	71	[Esc] [G]		Insert Character
1B 48	27	72	[Esc] [H]		Reverse Line Feed
1B 49	27	73	[Esc] [I]		Erase To End Of Line Unprotected
1B 4A	27	74	[Esc] [J]		Erase To End Of Screen Protected
1B 4B	27	75	[Esc] [K]		Erase To End Of Screen Unprotect
1B 4C	27	76	[Esc] [L]		Clear Foreground
1B 4D	27	77	[Esc] [M]		Enter Graphics
1B 4E	27	78	[Esc] [N]		Exit Graphics
1B 4F	27	79	[Esc] [O]		Report Character At Cursor
1B 50	27	80	[Esc] [P]		Enter Split Screen Mode (Local)
1B 51	27	81	[Esc] [Q]		Exit Split Screen (Local)
1B 52	27	82	[Esc] [R]		Report Video Attributes
1B 53	27	83	[Esc] [S]		Set Video Attributes
1B 54	27	84	[Esc] [T]		Enable Scroll
1B 55	27	85	[Esc] [U]		Disable Scroll
1B 56	27	86	[Esc] [V]		Start Blinking Field
1B 57	27	87	[Esc] [W]		End Blinking Field
1B 58	27	88	[Esc] [X]		Start Reverse Video Field
1B 59	27	89	[Esc] [Y]		End Reverse Video Field
1B 5A	27	90	[Esc] [Z]		Start Underline Field
1B 5B	27	91	[Esc] [[ ]		End Underline Field
1B 5C	27	92	[Esc] [\ ]		Pass Through Printer On (Monitor)
1B 5D	27	93	[Esc] [ ]]		Pass Through Printer On (Non-Monitor)
1B 5E	27	94	[Esc] [^]		Set Send Data Type — Unprotected
1B 5F	27	95	[Esc] [_]		Set Send Data Type — All
1B 60	27	96	[Esc] [`]		Home and Clear to Protected Spaces
1B 61	27	97	[Esc] [a]		Home and Clear to Unprotected Spaces

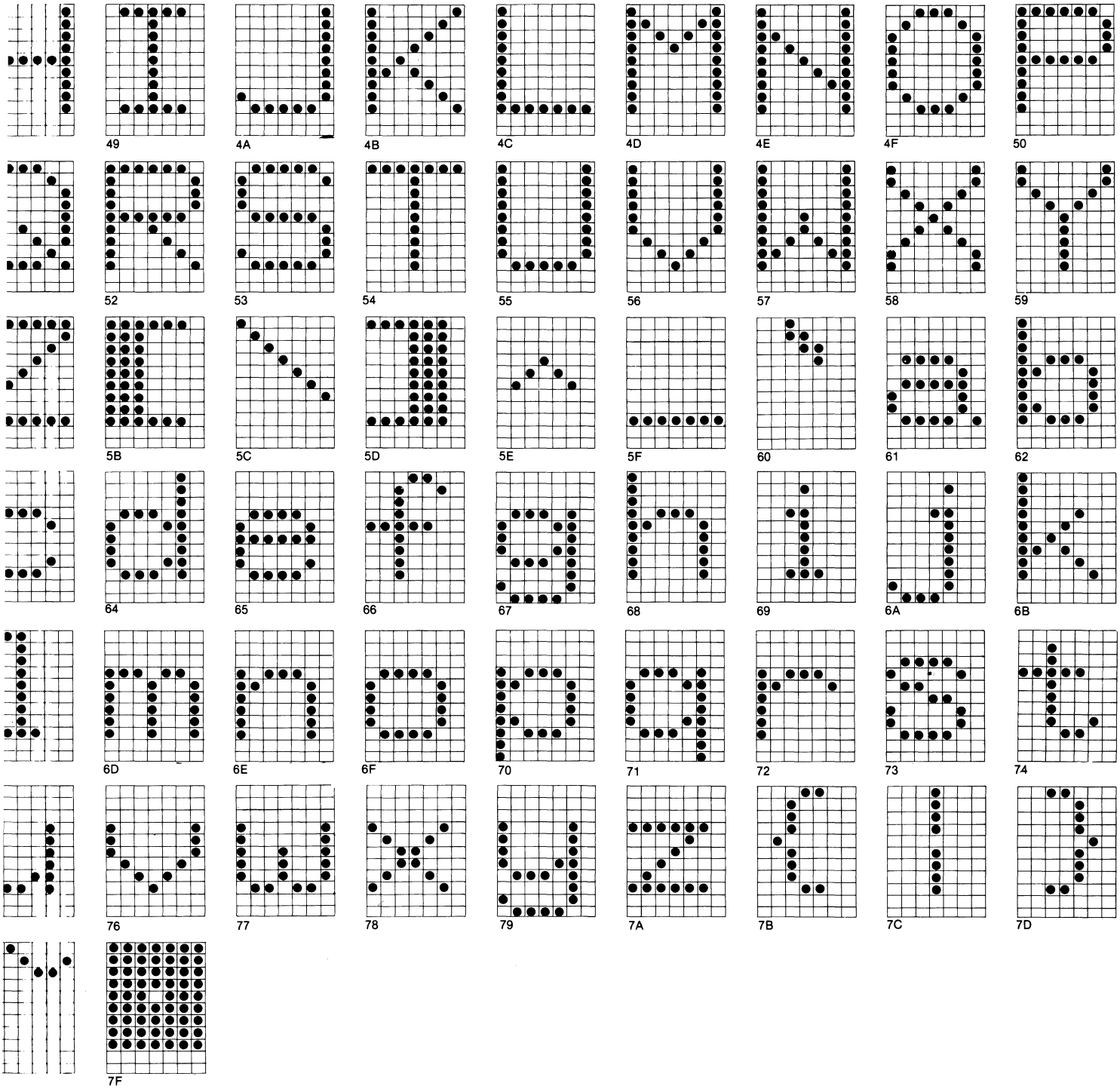
2 ABSOLUTE CURSOR ADDRESSING TABLE - ACT-5A

DECIMAL	ASCII	ROW	COLUMN	DECIMAL	ASCII	ROW	COLUMN
0	CTRL 0	0	0	64	@	16	64
1	CTRL A	1	1	65	A	17	65
2	CTRL B	2	2	66	B	18	66
3	CTRL C	3	3	67	C	19	67
4	CTRL D	4	4	68	D	20	68
5	CTRL E	5	5	69	E	21	69
6	CTRL F	6	6	70	F	22	70
7	CTRL G	7	7	71	G	23	71
8	CTRL H	8	8	72	H	0	72
9	CTRL I	9	9	73	I	1	73
10	CTRL J	10	10	74	J	2	74
11	CTRL K	11	11	75	K	3	75
12	CTRL L	12	12	76	L	4	76
13	CTRL M	13	13	77	M	5	77
14	CTRL N	14	14	78	N	6	78
15	CTRL O	15	15	79	O	7	79
16	CTRL P	16	16	80	P	8	0
17	CTRL Q	17	17	81	Q	9	1
18	CTRL R	18	18	82	R	10	2
19	CTRL S	19	19	83	S	11	3
20	CTRL T	20	20	84	T	12	4
21	CTRL U	21	21	85	U	13	5
22	CTRL V	22	22	86	V	14	6
23	CTRL W	23	23	87	W	15	7
24	CTRL X	0	24	88	X	16	8
25	CTRL Y	1	25	89	Y	17	9
26	CTRL Z	2	26	90	Z	18	10
27	CTRL [	3	27	91	[	19	11
18	CTRL \	4	28	92	\	20	12
29	CTRL]	5	29	93	]	21	13
30	CTRL ^	6	30	94	^	22	14
31	CTRL _	7	31	95	_	23	15
32		8	32	96	`	0	16
33	!	9	33	97	a	1	17
34	"	10	34	98	b	2	18
35	#	11	35	99	c	3	19
36	$	12	36	100	d	4	20
37	%	13	37	101	e	5	21
38	&	14	38	102	f	6	22
39	'	15	39	103	g	7	23
40	(	16	40	104	h	8	24
41	)	17	41	105	i	9	26
42	*	18	42	106	j	10	27
43	+	19	43	107	k	11	28
44	,	20	44	108	l	12	28
45	—	21	45	109	m	13	29
46	.	22	46	110	n	14	30
47	/	23	47	111	o	15	31
48	0	0	48	112	p	16	32
49	1	1	49	113	q	17	33
50	2	2	50	114	r	18	34
51	3	3	51	115	s	19	35
52	4	4	52	116	t	20	36
53	5	5	53	117	u	21	37
54	6	6	54	118	v	22	38
55	7	7	55	119	w	23	39
56	8	8	56	120	x	0	40
57	9	9	57	121	y	1	41
58	:	10	58	122	z	2	42
59	;	11	59	123	{	3	43
60	<	12	60	124	|	4	44
61	=	13	61	125	}	5	45
^?	>	14	62	126	~	6	46
¡	?	15	63				

7.3 CHARACTER SETS



* Null Character May Be Represented By


49
4A
4B
4C
4D
4E
4F
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5B
5C
5D
5E
5F
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6A
6B
6D
6E
6F
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76
77
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79
7A
7B
7C
7D
7F

7.4 TABLE OF THE ASCII CODES

CTRL	Character	Binary Bit 7 to Bit 0	Octal	Decimal	Hexadecimal
@	NUL	00000000	000	000	00
A	SOH	00000001	001	001	01
B	STX	00000010	002	002	02
C	ETX	00000011	003	003	03
D	EOT	00000100	004	004	04
E	ENQ	00000101	005	005	05
F	ACK	00000110	006	006	06
G	BEL	00000111	007	007	07
H	BS	00001000	010	008	08
I	HT	00001001	011	009	09
J	LF	00001010	012	010	0A
K	VT	00001011	013	011	0B
L	FF	00001100	014	012	0C
M	CR	00001101	015	013	0D
N	SO	00001110	016	014	0E
O	SI	00001111	017	015	0F
P	DLE	00010000	020	016	10
Q	DC1	00010001	021	017	11
R	DC2	00010010	022	018	12
S	DC3	00010011	023	019	13
T	DC4	00010100	024	020	14
U	NAK	00010101	025	021	15
V	SYN	00010110	026	022	16
W	ETB	00010111	027	023	17
X	CAN	00011000	030	024	18
Y	EM	00011001	031	025	19
Z	SUB	00011010	032	026	1A
[	ESC	00011011	033	027	1B
\	FS	00011100	034	028	1C
]	GS	00011101	035	029	1D
^	RS	00011110	036	030	1E
_	US	00011111	037	031	1F
	SP	00100000	040	032	20
	!	00100001	041	033	21
	"	00100010	042	034	22
	#	00100011	043	035	23
	$	00100100	044	036	24
	%	00100101	045	037	25
	&	00100110	046	038	26
	'	00100111	047	039	27
	(	00101000	050	040	28
	)	00101001	051	041	29
	*	00101010	052	042	2A
	+	00101011	053	043	2B
	,	00101100	054	044	2C
	—	00101101	055	045	2D
	.	00101110	056	046	2E
	/	00101111	057	047	2F
	0	00110000	060	048	30
	1	00110001	061	049	31
	2	00110010	062	050	32
	3	00110011	063	051	33
	4	00110100	064	052	34
	5	00110101	065	053	35
	6	00110110	066	054	36
	7	00110111	067	055	37
	8	00111000	070	056	38
	9	00111001	071	057	39
	:	00111010	072	058	3A
	;	00111011	073	059	3B
	<	00111100	074	060	3C
	=	00111101	075	061	3D
	>	00111110	076	062	3E
	?	00111111	077	063	3F
	@	01000000	100	064	40
	A	01000001	101	065	41
	B	01000010	102	066	42
	C	01000011	103	067	43
	D	01000100	104	068	44
	E	01000101	105	069	45
	F	01000110	106	070	46
	G	01000111	107	071	47
	H	01001000	110	072	48
	I	01001001	111	073	49
	J	01001010	112	074	4A
	K	01001011	113	075	4B
	L	01001100	114	076	4C
	M	01001101	115	077	4D
	N	01001110	116	078	4E
	O	01001111	117	079	4F
	P	01010000	120	080	50
	Q	01010001	121	081	51
	R	01010010	122	082	52
	S	01010011	123	083	53
	T	01010100	124	084	54
	U	01010101	125	085	55
	V	01010110	126	086	56
	W	01010111	127	087	57
	X	01011000	130	088	58
	Y	01011001	131	089	59
	Z	01011010	132	090	5A
	[	01011011	133	091	5B
	\	01011100	134	092	5C
	]	01011101	135	093	5D
	^	01011110	136	094	5E
	_	01011111	137	095	5F
	'	01100000	140	096	60
	a	01100001	141	097	61
	b	01100010	142	098	62
	c	01100011	143	099	63
	d	01100100	144	100	64
	e	01100101	145	101	65
	f	01100110	146	102	66
	g	01100111	147	103	67
	h	01101000	150	104	68
	i	01101001	151	105	69
	j	01101010	152	106	6A
	k	01101011	153	107	6B
	l	01101100	154	108	6C
	m	01101101	155	109	6D
	n	01101110	156	110	6E
	o	01101111	157	111	6F
	p	01110000	160	112	70
	q	01110001	161	113	71
	r	01110010	162	114	72
	s	01110011	163	115	73
	t	01110100	164	116	74
	u	01110101	165	117	75
	v	01110110	166	118	76
	w	01110111	167	119	77
	x	01111000	170	120	78
	y	01111001	171	121	79
	z	01111010	172	122	7A
	{	01111011	173	123	7B
	¦	01111100	174	124	7C
	}	01111101	175	125	7D
	~	01111110	176	126	7E
	DEL	01111111	177	127	7F

CTRL	ABBR.	DESCRIPTION
@	NUL	— null, or all zeros
A	SOH	— start of heading
B	STX	— start of text
C	ETX	— end of text
D	EOT	— end of transmission
E	ENQ	— enquiry
F	ACK	— acknowledge
G	BEL	— bell
H	BS	— backspace
I	HT	— horizontal tabulation
J	LF	— line feed

CTRL	ABBR.	DESCRIPTION
K	VT	— vertical tabulation
L	FF	— form feed
M	CR	— carriage return
N	SO	— shift out
O	SI	— shift in
P	DLE	— data link escape
Q	DC1	— device control 1 (X ON)
R	DC2	— device control 2
S	DC3	— device control 3 (X OFF)
T	DC4	— device control 4
U	NAK	— negative acknowledge

CTRL	ABBR.	DESCRIPTION
V	SYN	— synchronous idle
W	ETB	— end of transmission blc
X	CAN	— cancel
Y	EM	— end of medium
Z	SUB	— substitute
[	ESC	— escape
\	FS	— file separator
]	GS	— group separator
^	RS	— record separator
_	US	— unit separator
	SP	— space
	DEL	— delete

8.0 WARRANTY AND SERVICE INFORMATION

a) The ACT-5A requires no maintenance and should perform faithfully for many years. MICRO-TERM will repair any unit which fails within the original warranty period provided that no modifications have been performed on the circuit, other than the jumper modifications outlined in this manual.

b) The ACT-5A is accompanied by a limited one year warranty. For in-warranty service, the user may elect to return either the defective board or the entire unit to the factory, freight prepaid. MICRO-TERM will return in-warranty repairs freight prepaid for the first ninety days of the warranty period and freight collect thereafter. The video display module is an exception to this one year warranty; it is warranted by its manufacturer for ninety days and likewise by MICRO-TERM, Inc.

c) Beyond the warranty period MICRO-TERM will charge a nominal fee for the repair of any ACT-5A. A complete technical manual including schematic, theory of operation and timing diagrams is available to owners of the ACT-5A. Any further information relating to the operation or interfacing of your ACT-5A can be obtained by writing directly to:

TECHNICAL STAFF
MICRO-TERM,INC.
1314 Hanley Industrial Ct.
St. Louis, Missouri 63144
314-968-8151

9.0 CUSTOM MODIFICATIONS

MICRO-TERM is one of the few computer terminal manufacturers that will modify its standard terminals to exact customer specifications--even for quantity one. Write for information.

NOTES

10.0 SUGGESTION SHEET

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