ALPHA MICRO

AM-60 TERMINAL OWNER'S MANUAL

DSS-10043-00
REV. A01

alpha micro

ALPHA MICROSYSTEMS
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SAFETY WARNING

Dangerous voltages are present when the terminal is on, and may remain after the power is off. Use caution when working on the internal electronics. Do not work alone.

The internal phosphor of the cathode ray tube is toxic. Use caution (safety goggles and gloves) whenever the cathode ray tube is handled. If the tube breaks, exposing skin or eyes to the phosphor, rinse the affected area with cold water and consult a physician.

The terminal power cable is supplied with a safety ground. Do not use the terminal with an ungrounded outlet.

Do not connect or disconnect the keyboard cable when the power is on; doing so may result in damage to the terminal that is not covered under the warranty.

DISCLAIMER

Alpha Microsystems makes no representation or warranties with respect to the contents of this manual and disclaims any implied warranties or fitness for any particular application. Alpha Microsystems reserves the right to revise this manual without obligation of Alpha Microsystems to notify any person or organization of such revision.

COPYRIGHT NOTICE

WARNING:

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this book, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

TERMINAL IDENTIFICATION QUICK REFERENCE

When you unpack your terminal, enter the following information here:

Serial Number _____ (The serial number is on the back of the terminal.)

Date Received: _____

After you set the switches to configure your terminal (as discussed in Section 2.4), record the final switch settings here:

(The three banks of switches are located under the Alpha Micro logo plate on the keyboard. The position of the "OPEN" label on the switch bank indicates whether you push each individual switch up or down to put it in an "open" position.)

	SW1: OPEN/CLOSED	SW2: OPEN/CLOSED	SW3: OPEN/CLOSED
1	N/A	CLOSED	OPEN
2	N/A	OPEN	
3		OPEN	OPEN
4		OPEN	OPEN
5	N/A		
6	N/A		
7	N/A		
8	N/A		

SERVICE AND ASSISTANCE

Alpha Micro provides a comprehensive post sales service and support program for the Alpha Micro product line. Our service organization is structured to provide immediate access to support assistance and information.

Our customer commitment is maintained through the expertise and skills of a competent, professional staff whose dedication assures all Alpha Micro customers the maximum benefits of quality support.

Limited Warranty

Alpha Micro warrants products sold to the dealer against defects in material or workmanship.

To arrange for factory repair, a Return Authorization Number must be obtained from our Customer Service office in advance. The equipment is to be shipped prepaid to:

Alpha Micro
Attn: Returned Goods
17332 Von Karman Avenue
Irvine, CA 92714

In-warranty equipment will be returned freight prepaid by Alpha Micro via UPS surface unless otherwise specified. Freight costs incurred for alternative methods of shipment, or for out-of-warranty equipment, will be the responsibility of the customer.

Technical Assistance

Technical assistance may be obtained through the System Support Group within the International Support/Service Group, which may be contacted between the hours of 3:00 AM through 5:00 PM Pacific Standard Time at (714) 957-8500.

Field Support

In addition to the above referenced services, support is available through the AlphaSERV network. (AlphaSERV is a third party service organization.) Some of the many services available through AlphaSERV are site evaluations, computer installations, systems integration, problem diagnosis, and field repair. The AlphaSERV field engineers are factory trained to ensure continuity of product servicing. For information on AlphaSERV, contact the Customer Service Office at (714) 957-6076.

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CHAPTER 1

INTRODUCTION

The Alpha Micro AM-60 Terminal is a microprocessor-based smart terminal that provides high level performance at a low cost. It has been customized for optimum use with an Alpha Micro computer and is appropriate for use with many different applications. Note that several Alpha Micro software products (e.g., AlphaWRITE) assume the presence and make use of the special features of the AM-60 terminal.

We expect that more and more Alpha Micro software will make use of the special features of the AM-60 terminal and, in the interests of software standardization, we would like to encourage software developers to use the features of the terminal in the manner for which they were designed as discussed in this manual.

This manual is designed to aid you in installing, operating, and programming the terminal. The manual is divided into sections based on these functions. The following paragraphs give a brief description of the scope of the chapters that follow:

CHAPTER 1 SPECIFICATIONS

This chapter contains an introduction to the AM-60 terminal and gives information on terminal features and specifications.

CHAPTER 2 INSTALLATION

This chapter contains detailed information on the receiving, unpacking, site preparation, and installation procedures for the AM-60 terminal.

CHAPTER 3 GENERAL DESCRIPTION

This chapter describes the terminal, its features, and applications.

CHAPTER 4 KEYBOARD

This chapter contains detailed information about the keyboard, its layout and use of the alphanumeric keys, cursor control keys, and function keys.

CHAPTER 5 COMMUNICATIONS CONTROL

This chapter contains specific information on the use of the terminal command sequences.

CHAPTER 6 MAINTENANCE AND TROUBLESHOOTING

This chapter provides information on changing the fuse and cleaning the terminal. We also discuss the use of the AM-60 self test modes, and give procedures for troubleshooting terminal problems.

Additionally, several appendices cover the terminal switch settings and the command sequences recognized by the terminal.

1.1 FEATURES

Some of the major features of the AM-60 terminal are:

* Ergonomic Styling:

  Detachable keyboard with 6-foot, coiled cable
  Green phosphor screen
  Tilting, rotating screen display
  Numeric data entry pad
  Choice of blinking or static cursor
  Selectable keyboard audio feedback

* Eight programmable function keys (shifted and unshifted modes).

* Horizontal and vertical split window display.

* Smooth scrolling

* Graphics character set and line drawing capability

* Protected data fields

* Full set of screen attributes including:

  Reverse display
  Blinking display
  Underscore display
  Half intensity display

* Programmable message fields

* Automatic screen saver-- terminal screen goes blank after approximately ten minutes. (User brings back display by pressing any key that sends data to the computer or the lower CTRL key.)

* Diagnostic self test mode

* Compatibility with Alpha Micro software

Figure 1-1
The Alpha Micro AM-60 Terminal

1.2 SPECIFICATIONS

POWER	
Standard:	120 VAC (+ 20%) 60 Hz, 60 watts (205 BTU/hour) approximately
Optional:	220/240 VAC (+ 20%) 50 Hz, 60 watts (205 BTU/hour) approximately
Dimensions:	Keyboard: 2.6" High by 20.5" Wide by 7.1" Deep (6.604cm by 52.07cm by 18.034cm) Display Cabinet: 12.5" High by 15" Wide by 12.5" Deep (31.75cm by 38.1cm by 31.75cm)
Shipping Weight:	38 Lbs. (17.24Kg) approximately
Finish:	Beige and black

Keyboard:	Detachable with 6' (1.8288cm) coiled cable, 105 keys, cursor control pad, numeric pad, and function keys.
CRT:	12" (30.48cm) diagonal with non-glare display
Display attributes:	Dim, reverse, underscore, blink, blank, and combinations.
Display format:	24 rows by 80 characters per row plus two rows for message and function key identification.
Character matrix:	8 by 10 matrix in a 10 by 11 cell.
Character set:	128 characters with graphics (96 displayable ASCII and 32 control codes).
Memory capacity:	1 page (supports 1920 characters) plus 155 characters on the two status lines.
COMMUNICATIONS	
Type:	EIA RS-232
Baud rates:	50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200
Data Size:	7 or 8 bits.
Stop bits:	1 or 2 stop bits
Parity:	Odd, even, mark or space
Operating temperature:	32 degrees to 122 degrees F (0 degrees to 50 degrees C)
Storage temperature:	-40 degrees to 140 degrees F (-40 degrees to 60 degrees C)
Humidity:	10% to 90% without condensation
Altitude:	Sea level to 15,000 feet (4.572m)
Regulatory Compliance:	Meets Class A subpart J, Part 15 of FCC rules or better. U.L. listed under UL 478 standard, Data Processing Equipment Electronics (EMRT2).

CHAPTER 2

INSTALLATION

WARNING:

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this book, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his or her own expense will be required to take whatever measures may be required to correct the interference.

2.1 UNPACKING AND RECEIVING INSPECTION

Each terminal is shipped in one container which encloses the display unit, keyboard, pedestal base, power cable, and this terminal reference manual. The terminal is enclosed with preformed styrofoam inserts designed to provide maximum protection during shipping.

After receiving the terminal, inspect the shipping containers carefully for damage. Note all external damage on the waybill and make sure it is acknowledged by the delivery agent. Give a written report to the transfer company or carrier. If there is no external damage to the container, unpack the terminal and inspect for internal damage.

Do NOT use sharp instruments to open the container. Remove the terminal carefully and inspect it thoroughly for damage such as loose modules or components. IMPORTANT NOTE: If any damage exists, notify the transfer company immediately. Alpha Microsystems is not responsible for shipping damage. Any repairs made for damages which occurred during shipping are billable to the customer. Save all packaging materials for possible future use in reshipping the terminal.

For information on warranty and service support, see page iv.

2.2 SITE PREPARATION

The terminal has been specially designed to conform to most office environments. A table or desk with a nearby three-pronged electrical outlet to supply the required power (96-144 VAC 60 Hz or 176-264 VAC 50 Hz) and a communication interface located in the vicinity are sufficient to set up the terminal.

2.3 VERIFYING THE AC CONFIGURATION

The AM-60 terminal comes shipped from the factory configured either for 120 (96-144) Volt, 60 Hz operation or 220 (176-264) Volt, 50 Hz operation.

!! STOP !!

Before turning on power to the terminal, you must make sure that the terminal is configured properly for the electrical requirements of your geographical area. Turning on power to an improperly configured terminal will damage the terminal. Look at the back of the terminal. The label that contains the AM-60 part number also tells you what input voltage the terminal has been configured for.

The AM-60 terminal can easily be reconfigured at the installation site to change the input voltage with which the terminal will work. However, because this procedure requires partially disassembling the terminal, we recommend that the procedure be done by your dealer or an AlphaSERV third party service organization member. If you do reconfigure the power supply to accept a different input voltage, make a note of that fact on the part number label on the back of the terminal to ensure that the terminal is always used with the correct input voltage.

2.4 CONFIGURING THE TERMINAL OPTIONS

Before attaching the terminal cables to the terminal or turning on power, you must select the options with which you want to configure your terminal. Some of the things you will want to choose are:

1. What baud rate will the terminal operate at?

2. Do you want the terminal screen to be black with green letters, or green with black letters?

3. Do you want the cursor (the rectangle that marks your current typing position) to blink?

Also, there are several configuration options that should always be set the same way if you are going to be using the AM-60 terminal with an Alpha Micro computer (e.g., you will always select an eight-bit data word length).

The three banks of switches (labeled DS1-DS3) are located beneath the Alpha Micro logo plate on the upper right hand corner of the keyboard. To configure the switches, press up or down on each switch. The position of the "OPEN" label on the switch banks indicates whether pushing up or down on the individual switches places them in the "Open" position.

Figures 2-1a, 2-1b, and 2-1c show switch settings for a typical configuration of the AM-60 terminal for use with an Alpha Micro computer. See Appendix A for a complete discussion of all switch settings.

SW1 (DS1)

1	2	3	4	5	6	7	8
N/A	N/A	open	closed	N/A	N/A	N/A	N/A

POSITION 3/OPEN: Auto-new-line feature enabled. POSITION 4/CLOSED: ENTER key configured to act like RETURN key.

Figure 2-1a
Typical Settings: Switch SW1 (DS1)

SW2 (DS2)

1	2	3	4	5	6	7	8
closed	open	open	open	open	open	open	closed

POSITION 1/CLOSED: 8 bits data; POSITION 2/OPEN: Space parity; POSITION 3/OPEN: 1 stop bit; POSITION 4/OPEN: Parity disabled; POSITIONS 5-8: 9600 baud rate.

Figure 2-1b
Typical Settings: Switch SW2 (DS2)

SW3 (DS3)

1	2	3	4	5	6	7	8
open	open	open	open	open	open	open	open

POSITION 1/OPEN: Must be OPEN; POSITION 2/OPEN: 60 Hz; POSITIONS 3-4/OPEN: Must be OPEN; POSITION 5/OPEN: Start with black screen background; POSITION 6/OPEN: Blinking cursor; POSITION 7/OPEN: Full duplex; POSITION 8/OPEN: Conversation mode.

Figure 2-1c
Typical Settings: Switch SW3 (DS3)

In addition to setting the three external banks of switches, one internal modification can be made. The terminal as received from the factory is configured with the half intensity (dim) character display feature enabled. If you wish to disable the half intensity display, this internal modification needs to be made. However, because making this modification requires partially disassembling the terminal, we recommend that the procedure be done by your dealer or an AlphaSERV third party service organization member.

2.5 CONNECTING THE TERMINAL CABLES

NOTE: Refer to the warning concerning electromagnetic interference at the front of this chapter. The terminal cables you use must be shielded to minimize such interference.

As you face the back of the terminal, you see two connectors. (See Figure 2-2.) If terminal cables have been supplied to you with the terminal, press the terminal connectors into the Primary Communications Port, labeled "MODEM" and the interface connector on your computer. The terminal cables should be labeled, telling you which connector goes to the terminal and which goes to the computer.

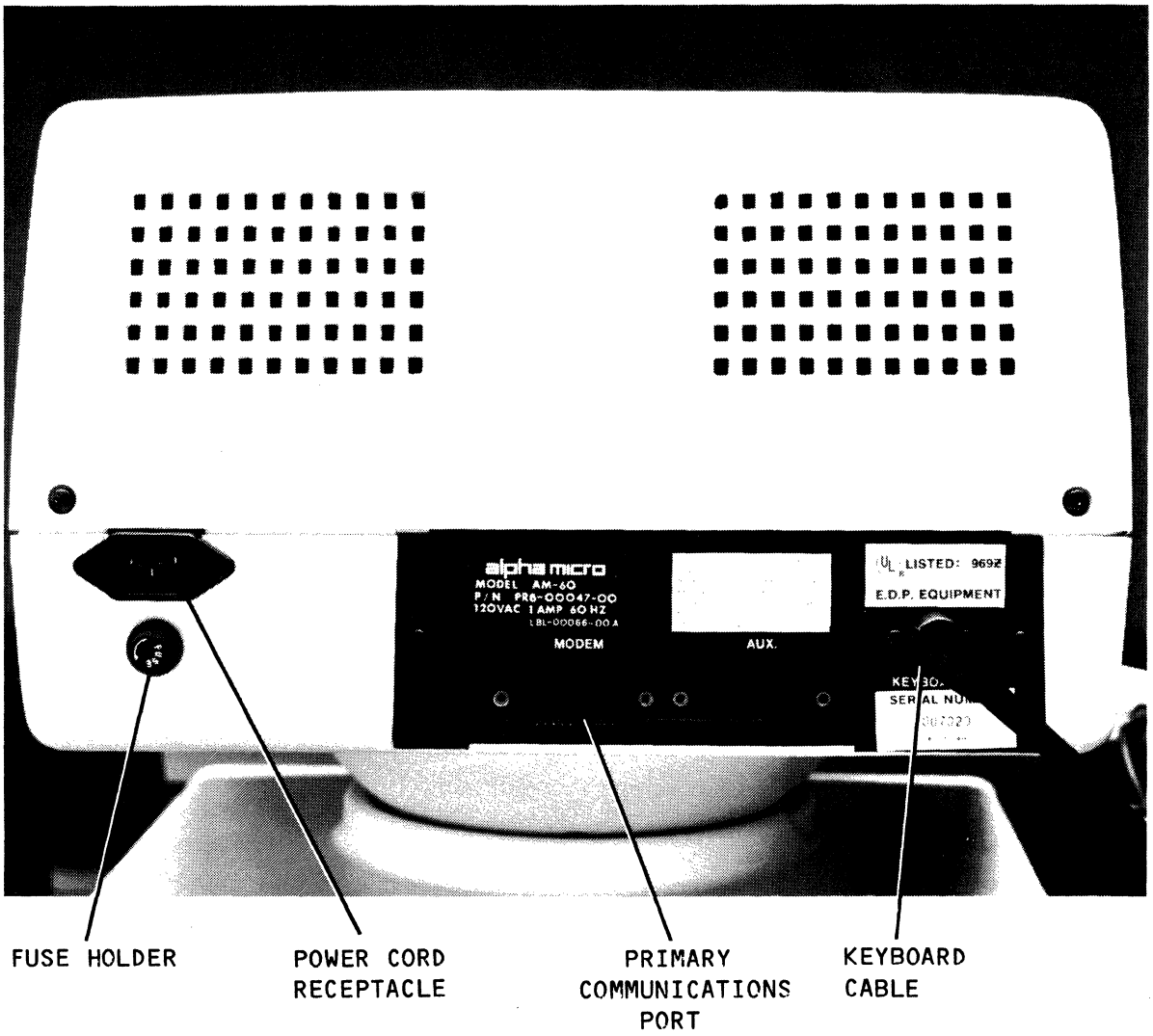


Figure 2-2
Terminal Back Panel: Connectors

Note that pre-made, shielded terminal cables are available from Alpha Micro suitable for connecting the AM-60 terminal to an RS-232C serial I/O interface in an Alpha Micro computer. These terminal cables are available in different lengths, and in two forms:

1. RS-232C 25-pin connectors at both ends;

2. RS-232C 25-pin connector at one end and an RS-232C 9-pin connector at the other end.

For information on ordering these cables, please refer to your dealer or to the Alpha Micro Sales Department.

If you wish to construct your own terminal cables, perform the procedures in Appendix C before continuing on with your terminal installation.

IMPORTANT NOTE: If you are going to be connecting the AM-60 terminal to an Alpha Micro AM-300 Six-port RS-232 Serial I/O Interface, the small cables that go from the AM-300 board to the inside of the computer back panel may need to be modified. See Section C.1 in Appendix C for details.

2.6 TURNING ON THE TERMINAL FOR THE FIRST TIME

Note the rotary on/off switch on the front of the terminal (see Figure 2-3). Make sure the switch is in the fully counter clock-wise or off position before the terminal is plugged into the outlet.

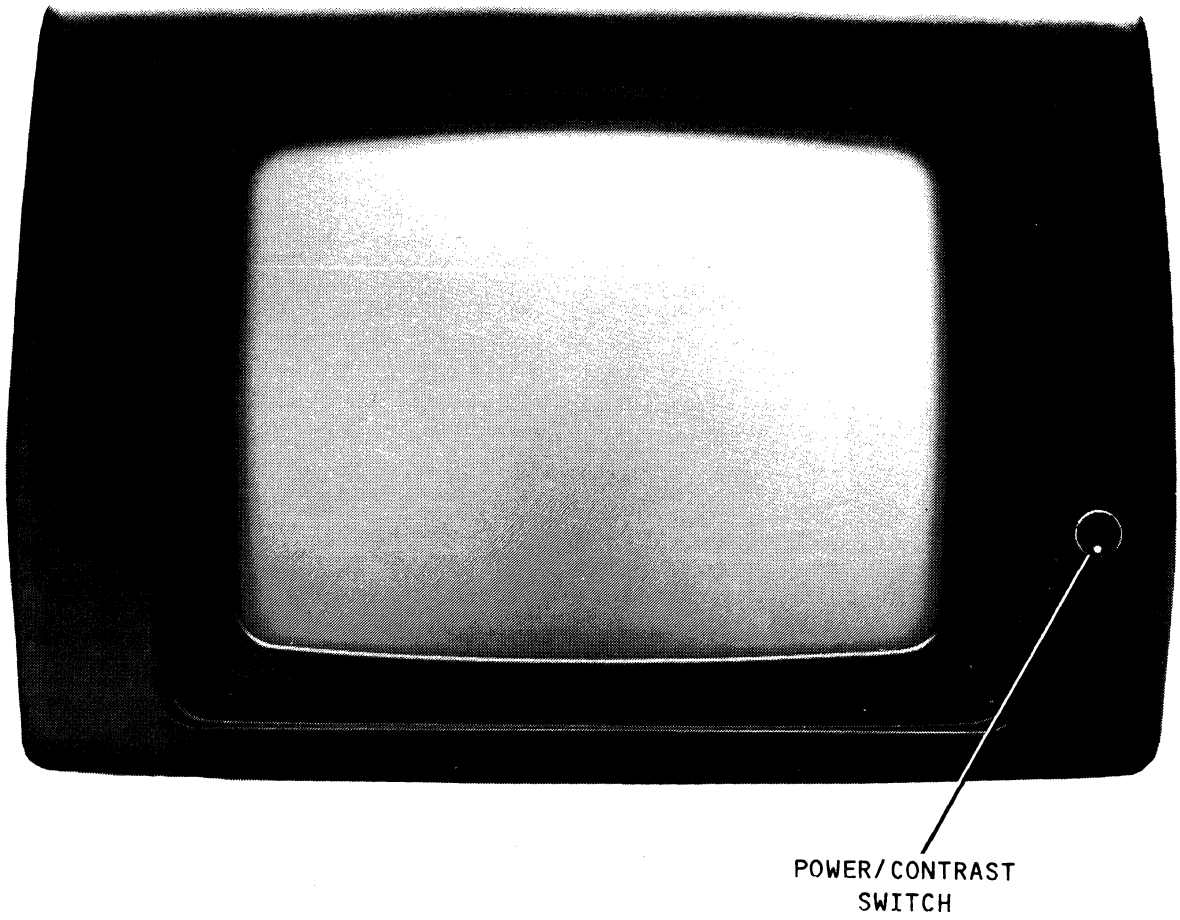


Figure 2-3
Power/Contrast Switch

Now:

1. Is the communications cable installed properly? (See Appendix C for information on constructing your own terminal cable.)

2. Is the power cord firmly connected to the electrical outlet and the terminal power cord receptacle?

   (Check the part number label on the back panel to see if the terminal is set up for 120 (96-144) VAC or 220 (176-264) VAC operation.)

3. Is the keyboard cable secured? (NOTE: Never remove or insert the keyboard cable into the terminal while power is on; doing so may cause damage to the terminal.)

4. Are the switch settings all correct? Baud rate? Parity? Stop bits? 50/60 Hz? Communications mode? Blink cursor? (See Figures 2-1a, 2-1b, 2-1c, and Appendix A for information on switch settings.)

   NOTE: SW1 switch settings cannot all be OPEN unless you are using the diagnostic self test. (See Chapter 6 for information on the self test modes.)

5. Turn the rotary switch to the right until the terminal power comes on. Every time you turn on power to the computer, it performs a diagnostic self test to make sure that all of its modules are working correctly. If the terminal screen remains blank except for a number 0-9 or the letter "Z" in the lower right hand corner of the screen, a problem may have been detected. See Chapter 6, "Maintenance and Troubleshooting," for details.

   Turning the rotary switch further to the right brightens the contrast; turning it back to the left dims the contrast; turning it all the way to the left turns off power to the terminal.

6. Do you want the keyboard audio feedback (key-click) feature disabled? If so, hold down the SHIFT key while you press the ENTER key (located on the numeric data entry pad). To turn the key-click back on, hold down the SHIFT key again while you press the ENTER key. (Every time you turn power on to the terminal, it initially comes up with key-click turned on.)

2.7 SOFTWARE INSTALLATION INSTRUCTIONS

Now that the terminal is ready to be connected to your Alpha Micro computer system, there are several steps left to define the terminal to the Alpha Micro operating system:

1. Install the terminal driver program.

2. Modify the system initialization command file to add the terminal to the system.

3. Reboot the system.

First, you must make sure that an appropriate terminal driver program exists in disk account DSK0:[1,6]. The terminal driver is the program that defines (to the operating system) the particular characteristics of your terminal. Current Alpha Micro software releases contain the

files ALPHA.TDV and AM60.TDV in account DSK0:[1,6]. These files are copies of the terminal driver for the AM-60 terminal. If this driver does not appear on device DSK0: (your System Disk), you will need to contact your dealer or AlphaSERV member for a copy of the driver.

In addition, you must tell the computer operating system that the terminal has been added to the computer. The Alpha Micro computer system interfaces devices to the operating system by consulting a disk file called the "system initialization command file" every time the system is powered up or reset. To add a new device to the system, besides physically connecting it to the system, you need to inform the operating system that the device exists by modifying the system initialization command file (called AMOSL.INI on AMOS/L systems and SYSTEM.INI on AMOS systems). If you do not feel comfortable modifying the system initialization command file, ask your dealer or AlphaSERV member for help.

For full information on modifying the system initialization command file to add your new terminal, see the documentation discussed below. In particular, read the section on the TRMDEF (Terminal Definition) command. (The TRMDEF command defines the terminal's: communications interface port, baud rate, terminal driver program, and input and output buffers.) Please be careful to observe the warnings in these documents concerning modifying the system initialization command file. Most importantly, never modify this file directly-- make a copy of it, change the copy, test the copy, and then rename the copy to the name of your system initialization command file. The reason for this is that making a serious mistake when modifying your system initialization command file directly could leave your system unable to boot from yur system disk.

After you have modified the system initialization command file and rebooted the system (so that it can read your new version of the system initialization command file), your terminal is defined to the Alpha Micro computer system.

2.7.1 Documentation References

For information on using the TRMDEF command, modifying the system initialization command file, and testing a modified system initialization command file, see the document "The System Initialization Command File," in: (for AMOS systems) the AMOS System Operator's Guide, DSS-10001-00, or (for AMOS/L systems) the AMOS/L System Operator's Guide, DSS-10002-00.

Those books also contain information on terminal driver programs and booting the system.

For general information on using the system, refer to the AMOS User's Guide, DWM-00100-35.

CHAPTER 3

GENERAL DESCRIPTION

The Alpha Micro AM-60 terminal consists of a detached keyboard, a CRT display, internal microprocessor controlled video and logic, and a communication interface. It gives you full control in entering data/text onto the display and in communicating with a computer.

3.1 KEYBOARD

The keyboard resembles a conventional typewriter with additional keys for editing and communicating with a computer. When used in combination with other keys, many of these keys can control several operations. The 105-key detachable keyboard is organized into four sections (see Figure 4-1):

* The alphanumeric section
* The cursor control section
* The numeric data entry section
* The function section

3.2 DISPLAY FORMAT

The terminal screen is organized into 24 rows of 80 characters each plus two rows for message and function key identification (see Figure 3-1).

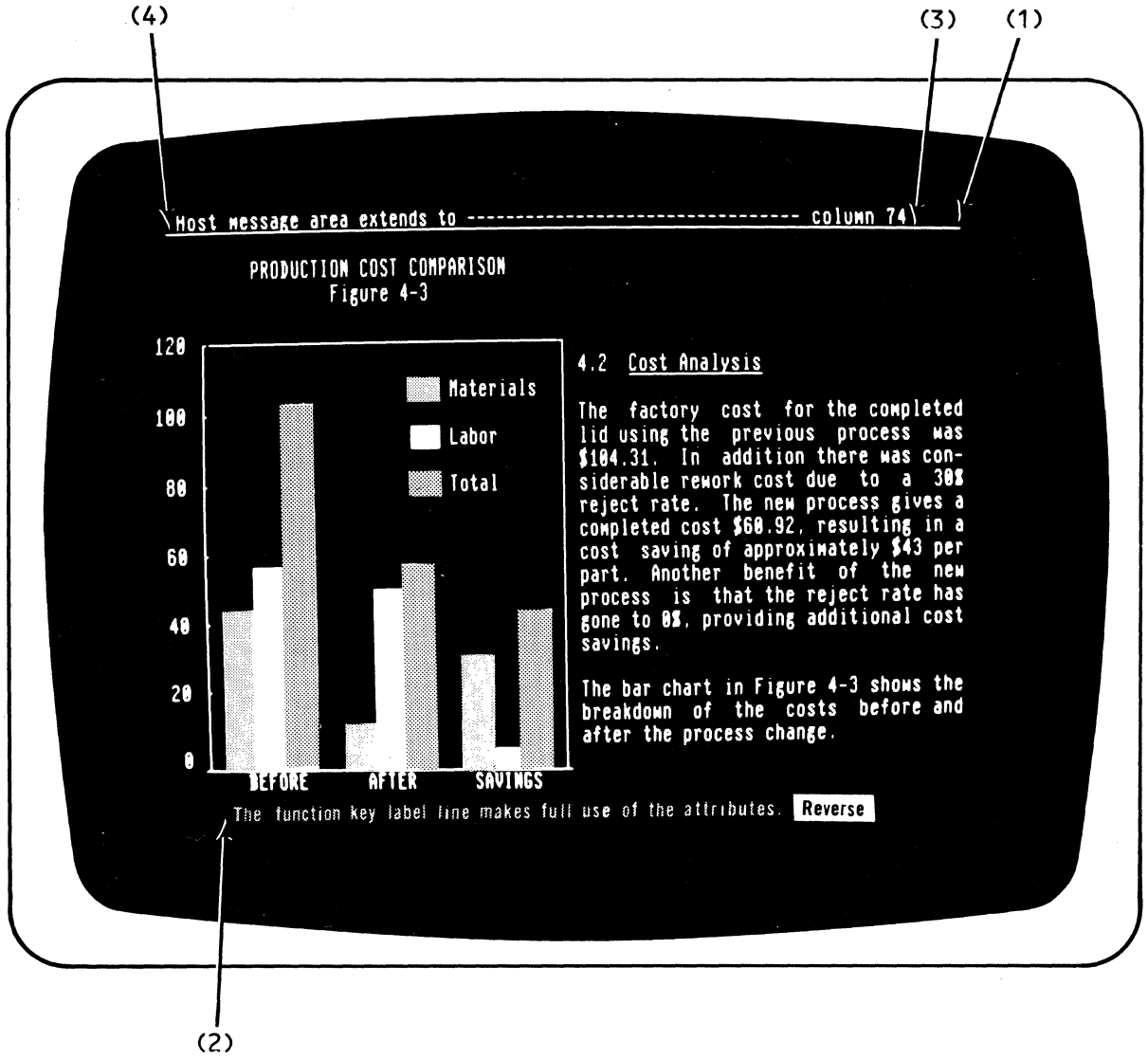


Figure 3-1
Terminal Display Arrangement

This display contains four special display attributes which can be set in any combination (see Section 5.2, "Escape Sequences"). Their relative positions on the screen are highlighted by (1), (2), (3), and (4) in the figure above. These special attribute are as follows:

(1) Data/Text Entry Area start attribute
(2) Function Key Labeling Line attribute
(3) Terminal Message Field start attribute
(4) Program Message Field start attribute

The bottom row consists of a labeling line which can be used to display function key descriptions or any other status message. This row is the Function Key Labeling Line. (See Section 5.2.12 for information on programming the Function Key Labeling Line.)

The top row consists of two message fields and is called the Message Field Line. The two message fields are the Terminal Message Field and the Program Message Field (see Section 5.2.12 for programming information). The Terminal Message Field contains text automatically generated by the terminal (either "CAPS," indicating that the CAPS LOCK key has been pressed or "LOCK," indicating that the keyboard is locked). This text is displayed in columns 74-80. The Program Message Field contains text generated and sent by a computer program (e.g., a status message telling the user what program he or she is using), and extends from column 2 to 73.

The middle 24 rows of the display compose the data/text entry area, which is the normal work space for the terminal operator. This area is used to display data entered by the operator or data received from the computer.

The terminal is capable of storing up to 24 rows of 80 characters each, a total of 1920 characters. The data/text entry area can be programmed in normal, horizontal, or vertical split screen display format for displaying the internal text storage (see Section 3.5).

Special display attributes can be used to enhance the Terminal Message Field, the Program Message Field, the Function Key Labeling Line, and the data/text entry areas. These enhancement attributes can be used to set up special effects on the screen (such as a reverse and underscored data/text entry area), or they can be used to hide a certain portion of the screen (such as the Terminal Message Field) from the terminal operator (see Section 3.7).

Finally, a protected field mode can be invoked which protects data on the screen from being erased by a specific set of erase commands. (See Section 3.8 for details on protect mode.)

3.3 COMMUNICATIONS MODES

The terminal can operate in one of three different communications modes: local, half duplex, and full duplex (or TTY) modes. (NOTE: The local mode disables communication with the Alpha Micro computer, and so is not normally used.)

Under half duplex conversation mode, the terminal sends to the computer and displays each character you enter. The terminal acts immediately upon Control keys and simultaneously sends them to the computer. (See Table B-1 in Appendix B for information on control codes.)

Under full duplex conversation mode, the terminal sends to the computer each character or control character you enter but does not act upon

them locally. Only when the computer sends the characters back to the terminal are they displayed.

A special character submode is available for the display and transmission of line graphics and special characters to and from the computer. (See Section 5.2.4.)

3.4 DATA TEXT ENTRY FACILITIES

For data entry applications, the terminal can be programmed so that fields of data can either be in half intensity or full intensity. Special commands and line graphics capability are also provided to establish data entry "forms" on the screen.

3.5 SPLIT-SCREEN MODES

The terminal supports various display modes. The following sections describe their formats and memory organization.

3.5.1 Display Windows

The terminal can be programmed by the user or computer to operate in one of four different display formats (Figures 3-2, 3-3, 3-4, and 3-5).

The four display formats are:

1. Normal display window of 24 rows of 80 characters each.

2. Horizontal split screen format with upper and lower display windows organized into:

   Upper Window: M rows X 80 characters
   Lower Window: N rows X 80 characters

   where M can be programmed to be any number from 1 to 24, N can be programmed to be any number from 0 to 23, and M + N = 24. (See Table B-8.)

3. Vertical split screen format with left and right display windows organized into:

   Left window: 24 rows X 39 characters
   Right window: 24 rows X 39 characters

4. Vertical split screen format with left and right display windows organized into:

   Left window: 24 rows X 40 characters
   Right window: 24 rows X 40 characters

Special command sequences from the computer select these display formats (see Section 5.2). The "normal" display format is similar to most conventional terminals supporting only one internal text segment in the terminal.

The split display formats support two text segments simultaneously in the terminal. However, the computer selects only one display window to be active at one time by sending special Escape sequences.

The current screen cursor position identifies the active display window. The computer performs all data/text editing and communication operations on the active display window only; such operations do not affect the inactive window.

Under the vertical split screen format with text segments organized into 39 columns, there is a separation column at columns 40 and 80 of the screen which can be used to separate the two split windows. In addition to the default vertical separation line, you can also use screen effect attributes to highlight the two split windows. (See Sections 3.7.1 and 5.2.15 for information on setting the vertical split column.)

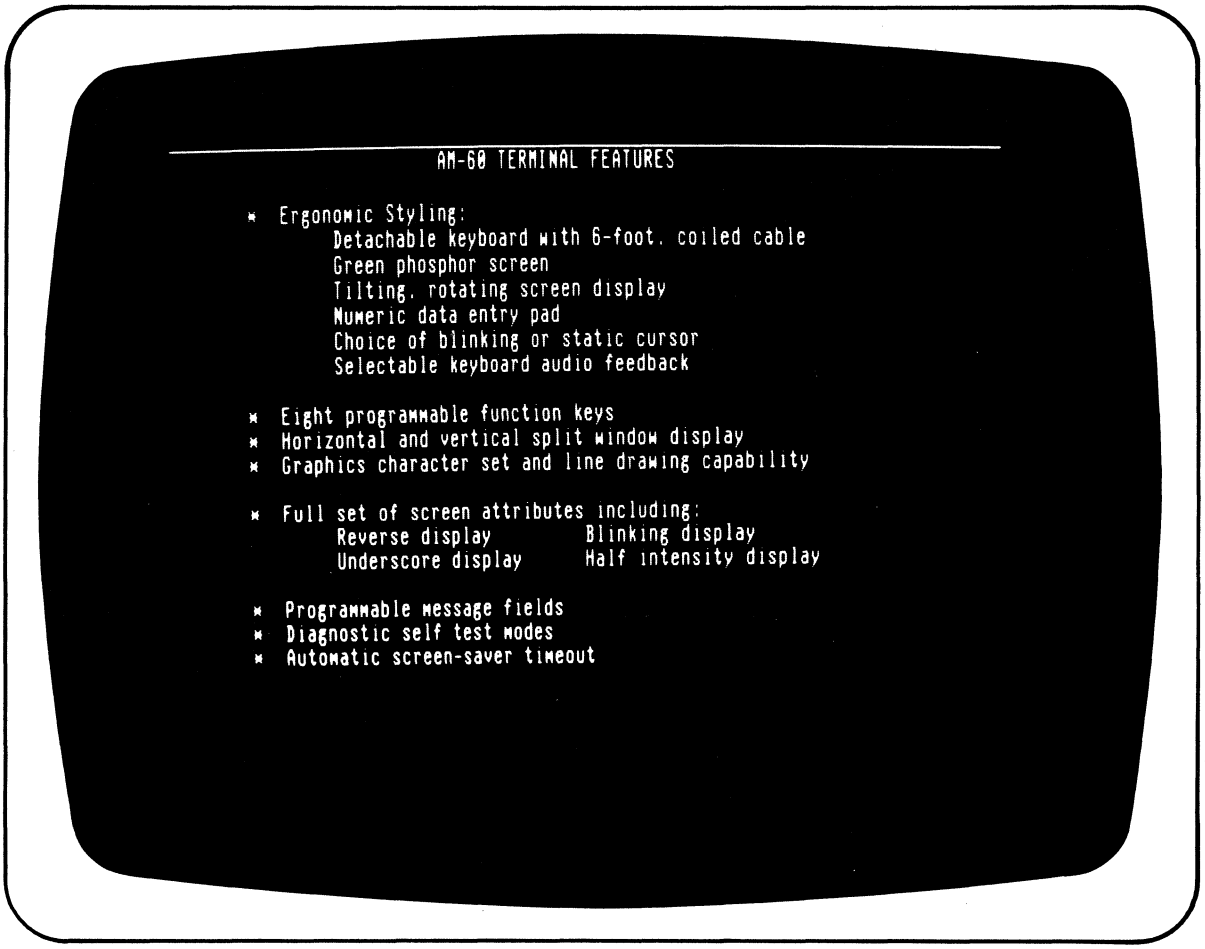


Figure 3-2
Normal Display

Figure 3-3
Horizontal Split

Top + Lower Windows = 24 Rows, selectable

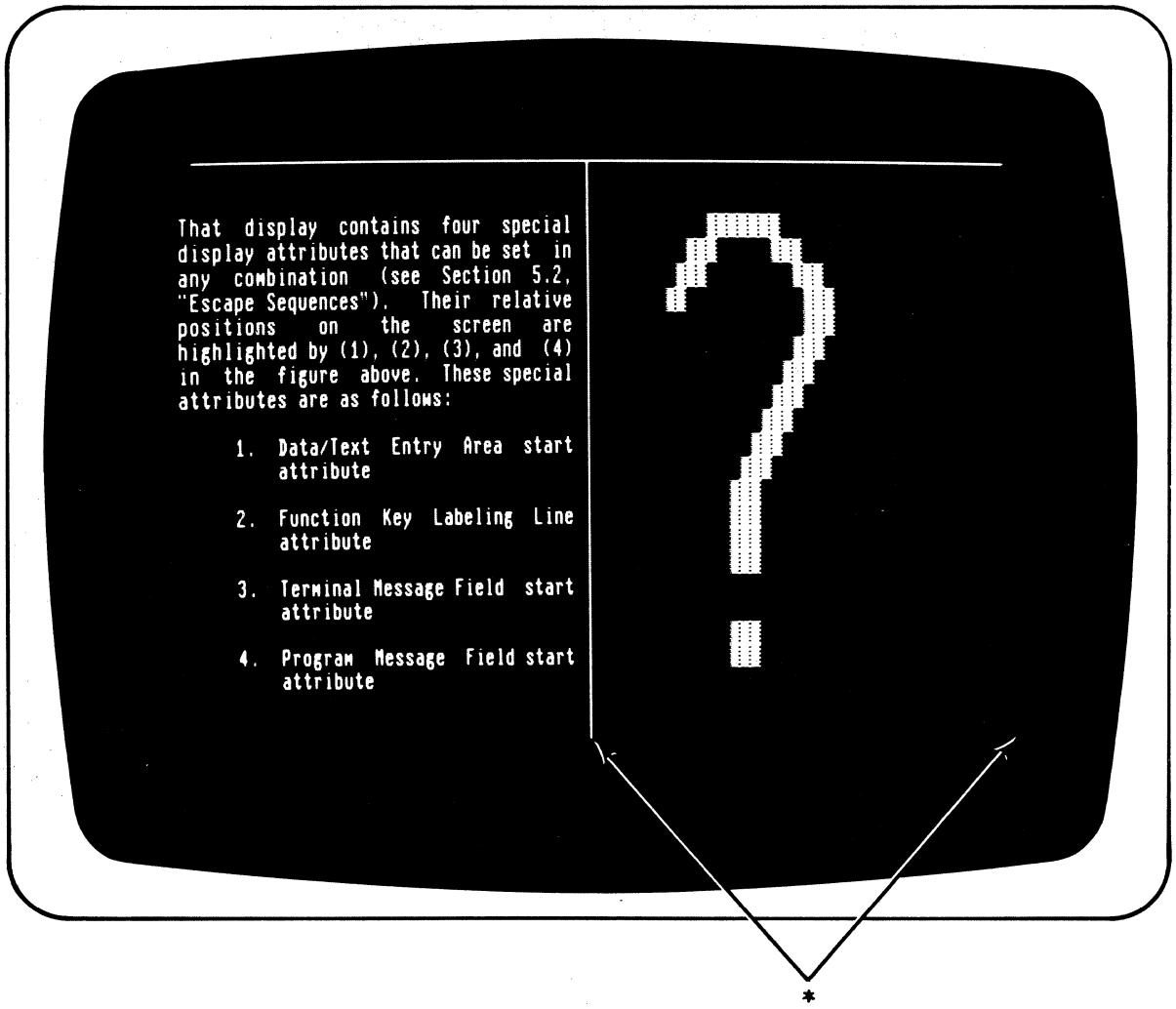


Figure 3-4
Vertical Split (39)

*Vertical split column for separation and special screen effect enhancement. See also special attribute enhancement in Figure 3-1.

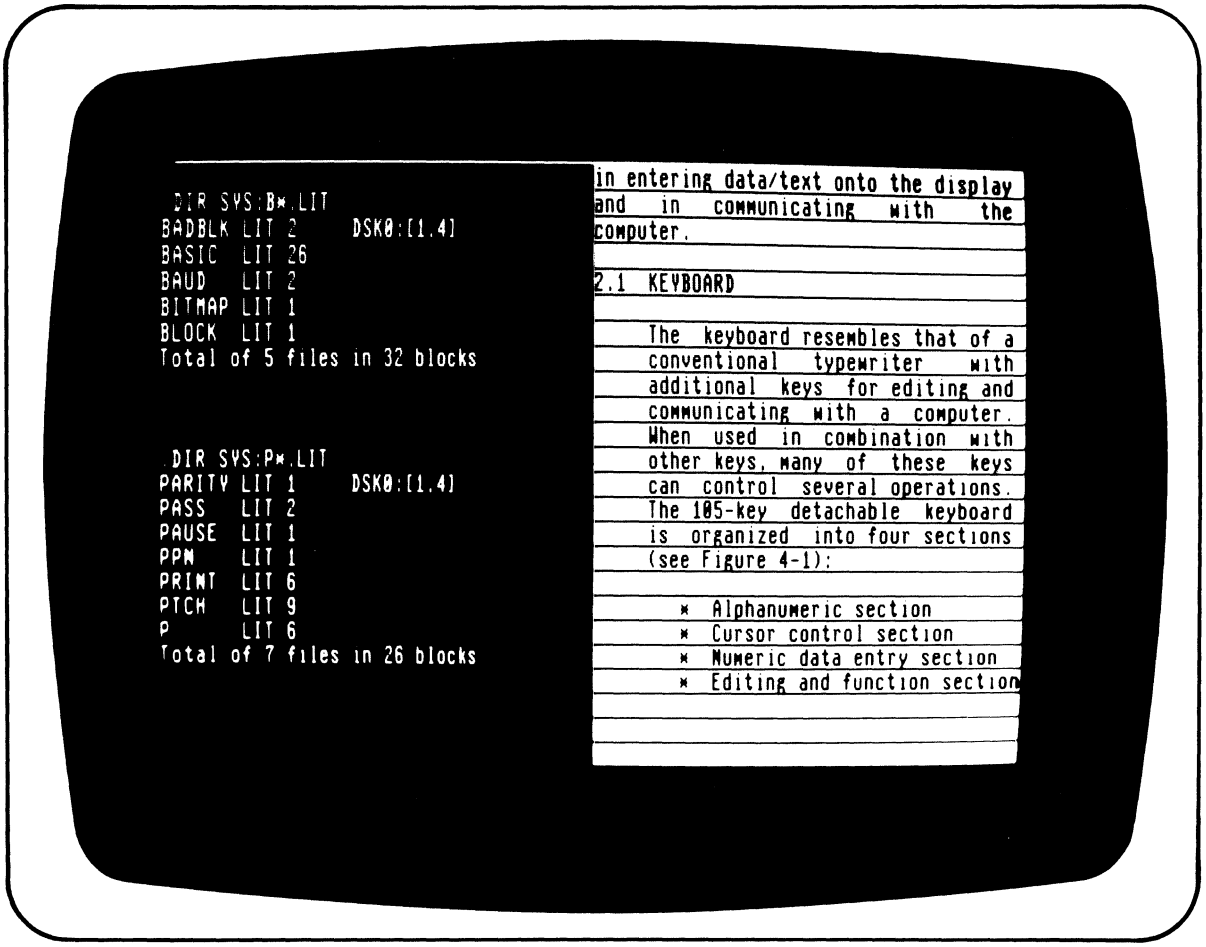


Figure 3-5
Vertical Split (40)

3.5.2 Memory Organization

The terminal supports an internal display memory of 1920 characters. Together with the four display window formats described above, you can program the terminal display memory into four different storage formats (see Section 5.2.13 and Table B-8).

In the "normal" display format, the internal display memory is organized as one contiguous text segment. In any of the split screen formats, the display memory is organized as two text segments, namely segment 0 and segment 1:

DISPLAY MODE SELECTION	MEMORY STORAGE SEGMENT	DISPLAY WINDOW
Horizontal Split:	Split Segment 0	Upper display window
	Split Segment 1	Lower display window
Vertical Split:	Split Segment 0	Left display window
	Split Segment 1	Right display window

Each text segment is equal in size to its corresponding display window. Internal scrolling and paging capabilities are provided to position the desired portion of the text segment within the display window.

Only one text segment is active at a time. The cursor location identifies the active text segment. The following notations will be used frequently in the following discussions about cursor movement:

Start-of-text:	The first character in the text.
Start-of-text row:	The first row of characters in the text.
End-of-text:	The last character in the text.
End-of-text row:	The last row of characters in the text.
Start-of-row or Start-of-line:	The first character of a row, usually the row where the cursor is.
End-of-row or End-of-line:	The last character of a row, usually the row where the cursor is.

3.5.3 External and Internal Scrolling

The terminal supports two types of scrolling operations:

1. When the data entered passes the bottom or last row of the display window (i.e., the 24th row of the "normal" display window or the "Mth" row of the upper display window under the horizontal split format), the display window scrolls up.

   If the bottom row of the display window corresponds to the end-of-text row, the scrolling operation causes the loss of the start-of-text row. This kind of scrolling action is defined as "external scrolling" because it is usually activated during communication with the computer.

   The external scrolling feature may be turned off and on with the following escape codes.

ESC N Turns external scrolling off

ESC O Turns external scrolling on

2. If the bottom row of the display window does not correspond to the end-of-text row, the display window scrolls up one row to review the immediately following data line. There is no data lost under this kind of scrolling operation and hence is defined as "internal" scrolling.

   Internal scrolling applies only if the size of the display window is smaller than the size of its corresponding text segment and is normally used for text viewing.

3.5.4 Internal Paging

The terminal provides you with an internal paging mechanism which forces the display window to scroll up or down the text segment a number of rows equal to that of the display window. For example, if the display window supports twelve rows of text, the display window scrolls through twelve rows of text with one internal paging operation.

3.6 SPECIAL FORM CONTROL

The AM-60 terminal supports a command sequence which allows all positions to be written with a specified code:

ESC . Code

For example, if Code = A, then all the positions are written with As.

This command sequence is very useful in data entry applications. One example is an application that requires all positions to be written with underline symbols so that the terminal operater can visualize the exact size of a data field. Upon completion of sending all the entered data to the computer, the computer can send an "ESC . _" sequence to reset all positions with underline symbols. This enhances the speed of transaction oriented systems.

Another command sequence allows all positions to be written with a specified attribute code:

ESC ! ATTR

where ATTR is any attribute code which is specified for the ESC G attribute generation sequence (see Table B-6a). This command sequence is especially useful when generating forms that require attribute

enhancements. The following are two examples where this sequence applies:

1. The entire screen can be written with "normal" attribute codes before a form is generated. By doing this, it eliminates the "flashing" effect which occurs in most terminals when a form is being generated.

2. If a form is composed of primarily one kind of attribute for its fields, this sequence can reduce the time and code required by presetting the screen with the required attribute.

3.7 SCREEN ENHANCEMENT

The terminal provides five screen enhancement attributes: dim (or half intensity), reverse, underscore, blink, and blank (no show). These attributes can be used selectively in any combination to highlight data fields and text blocks. The code that generates these screen enhancement attributes occupies one screen position and is displayed as a "blank." It enhances the displaying of all character positions to the right and subsequent rows until the next screen attribute is encountered (see Section 5.2.11).

The terminal also supports a "dim" or half intensity enhancement attribute which does not occupy any screen position. Characters generated under this mode are displayed in half intensity and the enhancement affects the display on a character by character basis. This dim attribute can be turned off if desired (see Section 2.4).

3.7.1 Special Screen Display Enhancement

In addition to enhancing data or text with screen enhancement attributes, the terminal provides special screen enhancement attributes for different screen appearances (see Section 3.2 and Figure 3-1). These three special screen attributes can be set up by the ESC A command sequence and they are listed below (see Section 5.2.11 for more details):

1. The data/text entry area attribute which is at the last character position of the top message field line.

   Example:

   ESC A 0 | Creates a "green" and underscore screen. (Looks like a sheet of ruled paper.)

2. The Terminal Message Field attribute which starts at column 74 in the message field line.

   Example:

ESC A 1 2 Creates blinking, no underline CAPS field.

3. The Program Message Field attribute which is at the start of the message field line.

   Example:

   ESC A 2 1 Blanks the program message field

Upon powerup, these attributes are set up as follows:

1. The data/text entry attribute is set to normal or reverse, depending on the green/black screen switch setting selection (see Appendix A).

2. The Function Key Labeling Line attribute is set to dim (half intensity).

3. The Terminal Message Field attribute is set to underscore.

4. The Program Message Field attribute is set to an underscore character.

A column of attribute codes can be written into column 40 of the active display window. This screen enhancement feature allows the two split windows of the vertical split screen display mode (39) to be highlighted. The following shows how it can be implemented:

1. The split left window can be highlighted with the attribute ATTR by the following procedure:

   a. ESC]

      To activate the left split window.

   b. ESC n 0

      To enter at column 40 of the screen with a column of "normal" display attributes.

   c. ESC }

      To activate the right split window.

   d. ESC n ATTR

      To set column 80 of the screen (column 40 of the active split window) with a column of attribute codes designated by ATTR (see Table B-6a).

   e. ESC A 0 ATTR

to set the top row of the left split window with attribute enhancement ATTR.

2. The right split window can be highlighted with attribute ATTR by the following procedure:

   a. ESC }

      To activate the right split window.

   b. ESC n 0

      To enter at column 80 of the screen with a column of "normal" display attributes.

   c. ESC]

      To activate the left split window.

   d. ESC n ATTR

      To enter at column 40 of the screen a column of attribute codes designated by ATTR (see Table 7).

For more information on programming the terminal display, see Chapter 5.

3.8 DATA PROTECT MODE

This feature allows you to specify data which can be protected from three, program invoked, erase modes. These three erase modes are:

1. ESC T or ESC t — Erase to end of line
2. ESC Y or ESC y — Erase to end of text
3. ESC : or ESC ; — Erase to end of screen (clear screen)

Data which has been protected will appear in half intensity (dim). It should be noted that data which has been protected is only protected from the three, program invoked, erase modes which are described above. This data is not protected from other modes, control sequences or keyboard input.

The Data Protect Mode is controlled by the following sequence:

1. ESC & Turn on protect mode
2. ESC (Turn on write protect
3. Write data which is to be protected (appears in half intensity)
4. ESC) Turn off write protect
5. Continue normal program. The three erase commands will not erase data written in the write protect mode.
6. ESC ' Turn off protect mode, at the end of the program

NOTE: In protect mode, "ESC (" and "ESC)" function as on and off switches for both Write Protect and Half Intensity. If the protect mode has not been invoked, "ESC (" and "ESC)" function as on and off switches only for half intensity (dim).

In some instances, you may wish to prevent protected data from being scrolled off of the display (see Section 3.5.3). In order to retain the protected data on the screen, it is suggested that the external scrolling function be disabled. The external scrolling feature can be controlled in conjunction with the data protect control sequence with the addition of two additional escape codes.

ESC N Turns off external scrolling

This escape code should be performed immediately after invoking the data protect mode (refer to the Data Protect sequence above).

To turn the external scrolling feature back on, perform the following sequence after the data protect mode has been turned off (refer to the Data Protect sequence above).

ESC O Turns external scrolling on

CHAPTER 4

KEYBOARD

The keyboard is styled after that of a conventional typewriter. Most of the key functions are self explanatory. The 105-key detachable keyboard is organized into four sections (see Figure 4-1):

* The alphanumeric section
* The cursor control section
* The numeric data entry section
* The function section

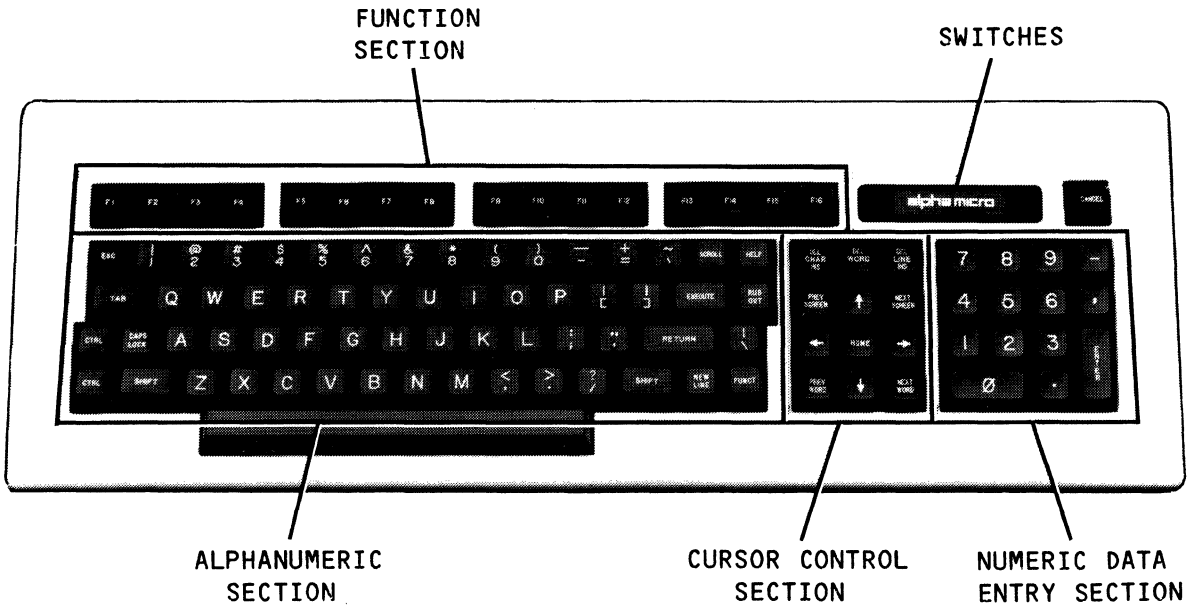


Figure 4-1
Keyboard Organization

You can tailor the programmable function keys for specific applications and can use them in conjunction with the Function Key Labeling Line.

Alphanumeric keys, control keys, and cursor keys are repeatable if you press the key for more than half a second. The terminal keyboard layout is in Figures 4-1 and 4-2. NOTE: The actual ASCII codes sent by the special (i.e., non-alphanumeric) terminal keys are listed in Table B-10 in Appendix B. The following sections discuss the intended functions of the terminal keys rather than the codes generated by them. Note that the functions discussed below are the standard interpretation of the keys used by many Alpha Micro software products. For complete information on how an Alpha Micro software product interprets the use of the terminal keys, refer to the documentation for that product.

In the interests of software standardization, we would like to encourage software developers to design their software to make use of the terminal keys to perform their intended operations (discussed below). For example, the unshifted HELP key sends the code Escape 9-- if your application program has a user help capability, your program should check for the use of this key; if the key is pressed by the user, your program will branch to the routine that displays help information.

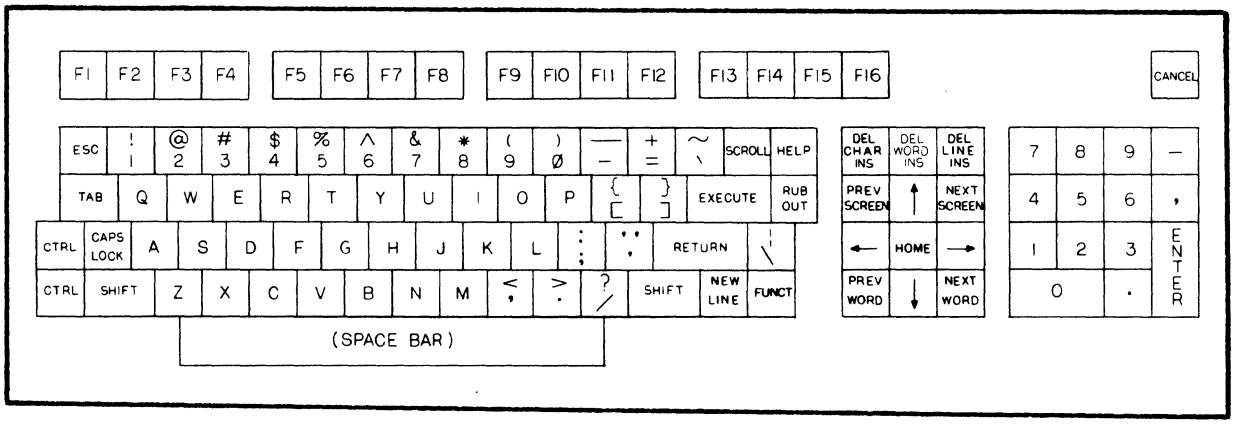


Figure 4-2
Keyboard Layout

4.1 SHIFT, CAPS LOCK, AND CTRL KEYS

The SHIFT key is identical to that of a conventional typewriter shift key except that the shift action also applies to other editing and function keys. The SHIFT key is always used in conjunction with other keys; pressing the SHIFT key alone will not cause anything to happen.

The CAPS LOCK key only controls the alphabetic character keys. Pressing the CAPS LOCK key turns the CAPS mode on and off in a toggling action. When the CAPS mode is on, "CAPS" is displayed in the Terminal Message Field and all alphabetic characters you enter are entered to the computer as upper case.

The CTRL key is used in conjunction with certain other keys to generate ASCII control characters (see Table B-1).

4.2 ESC KEY AND ESCAPE SEQUENCES

The ESC key is used to generate the ASCII ESC (Escape) code that is normally used in conjunction with one or more other ASCII key codes to formulate special Escape sequences that control certain terminal functions.

The terminal locally executes Escape sequences generated from the keyboard if the terminal is operating under local or half duplex conversation mode. We discuss these functions in detail in the communication control section of Chapter 5.

4.3 ALPHANUMERIC KEYS

The ALPHANUMERIC keys are used to enter any of the standard ASCII characters into the terminal. All alphanumeric keys can operate in conjunction with the SHIFT key. However, only the alphabetic character keys are affected by the CAPS LOCK key. Certain alphanumeric keys generate ASCII control codes when the CTRL key is pressed at the same time. (See Table B-1.)

4.3.1 RUB OUT

The RUB OUT key generates a rub out (DEL or 7F hex) and acts to delete the character to the left of the cursor. The rub out code is not normally displayed except under the special character mode.

4.3.2 Numeric Key Pad and ENTER Key

The numeric key pad is used mainly for convenience in data entry. The "-", ".", and "," keys generate ASCII equivalent codes. The ENTER key is switch selectable to generate the same code as the RETURN key or TAB key. With the SHIFT key pressed down, the ENTER key turns the key-click on or off.

4.4 HELP KEY

The HELP key causes a help menu, command summary, text file, or other user aid to be displayed on the terminal screen.

4.5 CANCEL KEY

The CANCEL key causes the current function to be interrupted.

4.6 CURSOR CONTROL KEYS

The cursor indicates the next position available on the screen for data entry. It is switch selectable to be either a blinking or non-blinking rectangular block. (See Appendix A for information on configuring the cursor.) As characters are entered, the cursor moves from left to right across the display. The cursor automatically moves to the beginning of the row immediately below when it reaches the end of a row. Scrolling may occur when the cursor reaches the bottom row of the display window. Cursor movement can be controlled either by the terminal operator or the computer.

Command code sequences generated by cursor control keys are outlined in Table B-1.

4.6.1 HOME

This key moves the cursor to the first character position at the upper left hand corner of the display window.

4.6.2 Cursor Right (→)

This key moves the cursor one character position to the right.

4.6.3 Cursor Left (←)

This key moves the cursor one position to the left.

4.6.4 Cursor Up (↑)

This key moves the cursor to the screen position immediately above the present cursor location. When the cursor reaches the top of the display window, scrolling may occur.

4.6.5 Cursor Down (↓)

This key moves the cursor to the screen position immediately below the current cursor location. If the cursor passes the bottom of the display window, scrolling may occur.

4.6.6 SCROLL

The operation of this key causes the terminal to alternately send a Control-S and Control-Q (XON and XOFF). Pressing the SCROLL key toggles the output between Control-S and Control-Q, with Control-S being the first code sent. (Under the Alpha Micro operating system, a Control-S suspends terminal output; a Control-Q revives it.)

4.6.7 RETURN

This key performs the carriage return (CR) operation which moves the cursor to the first position on the same row.

This key is switch selectable to perform the combination of carriage return (CR) and the Cursor Down keys. (See Appendix A for information on configuring the RETURN key.)

4.6.8 EXECUTE

The operation of this key is similar to that of the RETURN key. The manner in which your application interprets the EXECUTE key depends on the requirement of your application. For those applications in which the user expects an "L" shaped RETURN key, the EXECUTE key can be interpreted as performing the same function as a RETURN key (allowing the user to press either the EXECUTE or RETURN key to perform the same function). For other applications, the RETURN key might be interpreted as selecting a menu option and the EXECUTE key might be interpreted as a "do this function" key.

4.6.9 NEW LINE

This key moves the cursor to the first character position of the row immediately below. This operation is a combination of that of the Cursor Down and RETURN keys.

4.6.10 TAB (Unshifted)

This key moves the cursor right to the next column position where the tab has been set. If no column tab position can be found, the cursor stops at the first position of the row immediately below. If the cursor passes the last character of the display window, scrolling may occur. This tab operation is disabled if the column-tab mode is off. (See Section 5.2.7.)

4.7 TEXT/DATA EDITING KEYS

The AM-60 terminal provides a comprehensive set of editing keys for form/data entry and text editing for the terminal user in conjunction with the computer. The keys are totally controlled by the computer, as the terminal does not support local editing.

The keys' associated command sequences are sent to the computer when the terminal operates under conversation mode. Command code sequences generated by these editing keys are outlined in Table B-10.

4.7.1 DEL/INS CHAR (Unshifted) [INSERT CHARACTER]

This key moves all the characters right one position starting from the cursor position to the end of the row. A space character is placed at the cursor position. The last character on the row is lost.

4.7.2 DEL/INS CHAR (Shifted) [DELETE CHARACTER]

This key deletes the character at the cursor position. All characters, starting from the cursor location to the end of the row are moved one character position to the left. A space is placed at the last character position of the row.

4.7.3 DEL/INS WORD (Unshifted) [INSERT WORD]

This key causes all characters entered after pressing this key to be inserted at the current cursor position, shifting to the right all characters at the right of the cursor location each time you enter a new character until you enter a word delimiter. (A word delimiter is a space, punctuation mark, carriage return, or tab.)

4.7.4 DEL/INS WORD (Shifted) [DELETE WORD]

This key deletes all characters from the right of the current cursor position to a word delimiter, inclusive. (A word delimiter is a space, punctuation mark, carriage return, or tab.)

4.7.5 DEL/INS LINE (Unshifted) [INSERT LINE]

This key causes all rows, starting from the cursor row to the end-of-text row of the text segment to be moved down one row.

4.7.6 DEL/INS LINE (Shifted) [DELETE LINE]

This key causes the cursor row to be deleted. All rows, starting from the row immediately below the cursor row to the end-of-text row of the text segment are moved up one row.

4.7.7 PREV SCREEN

This key causes the text in the currently defined active text segment to be replaced by as much text from the program text buffer as will fit in the text segment ending with the line immediately preceding the current start-of-text.

4.7.8 NEXT SCREEN

This key causes the text in the currently defined active text segment to be replaced by as much text from the program text buffer as will fit in the text segment beginning with the line immediately following the current end-of-text.

4.7.9 PREV WORD

This key causes the cursor to move to the beginning of the word immediately preceding the current cursor location. (A word is delimited by a space, tab, punctuation mark, or carriage return.)

4.7.10 NEXT WORD

This key causes the cursor to move to the beginning of the word immediately following the word on which the cursor is currently positioned. (A word is delimited by a space, tab, punctuation mark, or carriage return.)

4.8 PROGRAMMABLE FUNCTION KEYS

There are a total of eight programmable function keys on the terminal (labeled F5 through F12) which can be operated in shifted or unshifted mode, resulting in up to sixteen function key sequences. These sixteen function key sequences are programmable up to eight characters/codes each (See Section 5.2.16). (The remaining eight function keys (labeled F1-F4 and F12-F16) are not programmable and send only a specific sequence of codes (see Table B-3).)

Upon powerup, a default function key sequence is assigned with each of the sixteen function key positions (see Table B-3). The computer can independently and selectively program the eight function keys with different sequences. Once programmed, pressing the appropriate function key causes the associated function key sequence to be sent to the computer. The function key positions that are not programmed send out the default function key sequence.

A programmed function key can be "deprogrammed" by using the function key programming sequence with a "null" sequence. Once deprogrammed, the default function key sequence applies again. For reasons of software compatibility, all programs should always use the default sequence or remember to de-program the keys on exit.

Terminal operators should also be cautious about programming the function keys, since most software will expect the function keys to send the default code sequences.

4.8.1 FUNCT

This key can be used in conjunction with any other alphanumeric key to generate additional function code sequences. Pressing the FUNCT key followed by any alphanumeric key x generates a function key sequence of SOH x to the computer. The FUNCT key itself does not send anything to the computer; rather, it indicates that the next key pressed will send a code sequence.

4.9 KEY-CLICK CONTROL

The terminal keyboard audio feedback or key-click is controlled by the shifted ENTER key. Pressing the shifted ENTER key enables or disables the key-click in a toggling action. Enabling or disabling the key-click is only a local operation and will not affect communication with the computer. The keyboard key-click is turned on upon powerup of the terminal.

CHAPTER 5

COMMUNICATION CONTROL

The computer can control the terminal operation via a series of command sequences. These command sequences fall into two categories: 1) Commands using single byte ASCII control characters; and, 2) Commands using Escape sequences.

Many of these command sequences correspond to keys on the keyboard. (The keys and their corresponding command sequences are listed in Table B-10 in Appendix B.) Their effects on communication are governed by the following rules:

1. If the terminal is operating under local mode, all command sequences generated from the keyboard are only executed locally.

2. If the terminal is operating under half-duplex conversation mode, all command sequences generated from the keyboard are locally executed and subsequently sent to the computer.

3. If the terminal is operating under full-duplex conversation mode, all command sequences are sent to the computer only. (Full duplex conversation mode is the mode typically used with the Alpha Micro computer.)

5.1 ASCII CONTROL CHARACTERS

The control character commands are listed in Table B-1. Control characters can be generated from the keyboard by using the CTRL key in conjunction with certain alphanumeric keys. They can also be generated by some special keys on the keyboard such as the HOME key (see Appendix B).

Control characters generated from the keyboard are executed if the terminal is under local or half duplex conversation mode. If the terminal is under full duplex conversation mode, they are only sent to the computer and are not acted upon locally.

5.2 ESCAPE SEQUENCES

Escape sequences are command sequences to instruct the terminal to perform certain operations. They are all preceded by an ESC code.

Escape sequences can be generated from the keyboard by the following two means:

1. By sending to the terminal an ESC code followed by one or more other ASCII characters to generate the required sequence (see Table B-9).

2. By using certain editing keys such as DEL CHAR to generate the specific Escape sequence associated with each of these keys (see Table B-10).

Escape sequences generated from the keyboard are executed locally and/or transmitted to the computer, depending on the current operating mode of the terminal. Escape sequences received from the computer are always executed.

The following sections list all the terminal Escape sequences according to their usages. Spaces between codes within each sequence are used for clarity only. (These spaces are not part of the Escape sequence.)

5.2.1 Cursor Set/Read

The computer can control the terminal cursor by the following sequences:

ESC = Sets cursor in the active window. This is a multiple code sequence:

ESC = r c where r = cursor row (see Table B-5)
c = cursor column (see Table B-5)

ESC ? Reads cursor of the active window. The terminal returns to the computer with:

r c CR where r = cursor row (see Table B-5)
c = cursor column (see Table B-5)
CR = 0D (hex)

ESC - Sets cursor to the specific split window. This is a multiple code sequence:

ESC - n r c where n = 0 or 1 (Split Segment number)
r = cursor row (see Table B-5)
c = cursor column (see Table B-5)

ESC / Read the active split segment number and the cursor position. The terminal replies with:

n r c CR where n = 0 or 1 (Split Segment number)
r = cursor row (see Table B-5)
c = cursor column (see Table B-5)

In addition, the cursor can be moved from the active display window to the other split display window by using the split segment selection Escape sequence (see Section 5.2.14).

5.2.2 Read Cursor Byte

The computer can read the character/byte where the cursor is located:

ESC M — Causes the terminal to send to the computer the character at the current cursor position.

This is a very useful command sequence for word processing and data entry when selective data is desired to be sent to the computer. This sequence, in conjunction with the function key, can create new functions such as "send a sentence," "send a field," or "send a word" to the computer.

5.2.3 Keyboard Lock/Unlock

The terminal keyboard can be locked and unlocked by the following sequences:

ESC " — Unlock (enable) keyboard.

ESC # — Lock (disable) keyboard. All key entries are ignored.

5.2.4 Communication Modes Controls

ESC B — Places the terminal into local mode (not generally used with the Alpha Micro computer).

ESC C — Places the terminal into conversation mode.

ESC D — Sets the terminal into either half or full duplex communication. This is a multiple code sequence:

ESC D x where x = H for half duplex
x = F for full duplex

ESC U — "On special character mode." All entries to the terminal are displayed, but none are interpreted or executed except for the "off special character mode" sequence.

ESC u — "Off special character mode."

ESC X "Off special character mode."

5.2.5 Text Editing Modes Controls

ESC q "On" insert mode. This command places the terminal into the insert mode under which any character entered is inserted at the cursor position. All characters on the same row, starting from the cursor to the end of the row, are moved to the right by one position. The last character on the row is lost.

ESC r "Off" insert mode. This command places the terminal into the replace mode under which any character entered replaces the character at the current cursor position.

5.2.6 Half Intensity Display Control

ESC ("On" half intensity. All characters will be displayed in half intensity. (Turns on write protect if protect mode has been turned on.)

ESC) "Off" half intensity. (Turns off write protect if protect mode has been turned on.)

ESC . CODE All positions are written with the specified code, CODE (see Section 3.6).

ESC ! ATTR All positions are written with the specified attribute code, ATTR (see Section 3.6 and Table B-6a).

5.2.7 Special Cursor Controls

ESC i Performs the TAB operation. (See Section 4.6.10 for an explanation of the TAB operation.)

ESC I Performs the BACK TAB operation. The cursor moves left to the first column tab position it finds on the current row. If there is no column tab position to the left, the cursor stops at the first position of the current row. If the cursor passes the last character of the display window, scrolling may occur.

The two command sequences above require that column-tab mode be set on. See the explanation of ESC 1, below.

ESC { Moves the cursor to the start of the active text segment.

5.2.8 Column Tabulation Controls

There are two kinds of column tabulation control: 1) the "typewriter styled" column-tab setting, 2) the half-intensity-space column setting which facilitates the generation of data entry "forms" with column fields.

ESC 0 — Turns "Off" the column-tab mode and clears all column tab settings.

ESC 1 — Turns "On" the column-tab mode and stores the current cursor column position as a tab position.

ESC 2 — Clears the column-tab position at the current cursor position.

ESC V — Sets a column of half intensity spaces at the cursor column, starting from the row where the cursor is down to the end-of-text row.

5.2.9 Data/Text Editing Controls

ESC * — Clears all text with nulls (00 hex). The active text segment is cleared to nulls (00 hex), half intensity is turned off and the cursor is placed at the HOME position.

ESC + — Clears all text with spaces. The active segment is cleared to spaces (20 hex), half intensity is turned off and the cursor is placed at the HOME position.

ESC , — Clears all text with half intensity spaces. The active text segment is cleared with half intensity spaces (A0 hex), the half intensity mode is turned off and the cursor is placed at the HOME position.

ESC : — Clears all full intensity text with nulls (00 hex).

ESC ; — Clears all full intensity text with spaces (20 hex).

ESC E — Inserts a line, see Section 4.7.5.

ESC R — Deletes a line. See Section 4.7.6.

ESC Q — Inserts a character. See Section 4.7.1.

ESC W — Deletes a character. See Section 4.7.2.

ESC T — Causes all characters starting at the cursor to the end of the row to be replaced with spaces (20 hex).

ESC t — Causes all characters starting at the cursor to the end of the row to be replaced with nulls (00 hex).

ESC Y — Erases to the end of the text segment with spaces (20 hex)

ESC y — Erases to the end of the text segment with nulls (00 hex).

ESC N — Turns external scrolling off

ESC O — Turns external scrolling on

5.2.10 Paging and Screen Controls

ESC h — Performs internal paging of the active text segment. This command causes the display window to roll up by one display window, putting the cursor at the top of the screen.

For example, if the display window displays 12 rows of text, it scrolls 12 rows of text in one operation. The operation stops at the end-of-text, and if the end-of-text is already displayed, this command forces the display window to display the start-of-text.

ESC a — Turns terminal screen display on.

ESC b — Turns terminal screen display off.

5.2.11 Screen Attributes and Graphics

ESC G — Enters the attribute code at the cursor position. This is a multiple code sequence (see Section 3.7):

ESC G ATTR

where ATTR = attribute code (see Table B-6a)

ESC A — Sets special screen attribute. This is a multiple code sequence used to set the four special attributes on the screen (Figure 3-1 and Section 3.7.1):

ESC A n ATTR

where n = 0 for the data/text entry area
= 1 for the Terminal Message Field
= 2 for the Program Message Field
ATTR = attribute code (see Table B-6a)

(To set the attribute for the Function Key Labeling Line, position the cursor to the first position of the Function Key Labeling Line, and embed the appropriate

control characters in the text you want to display to achieve the desired result. See Table B-6a.)

ESC H Enters the graphic code at the cursor position. This is a multiple code sequence:

ESC H GRAPH where GRAPH = graphic code (see Table B-4)

5.2.12 Message Fields and Labeling Fields

ESC F Enters message to the Program Message Field. This is a multiple code sequence:

ESC F n aaaa RUB

where n = column number of position of text (see Table B-5)
aaaa = character string of up to 73 characters
RUB = ASCII RUBOUT or DEL code (7F hex)

ESC z Enters message to the unshifted Function Key Labeling Line. This is a multiple code sequence:

ESC z n aaaa RUB

where n = column number of position of text (see Table B-5)
aaaa = character string of up to (78 - starting-column#) characters
RUB = ASCII RUBOUT or DEL code (7F hex)

ESC Z Enters message to the shifted Function Key Labeling Line. This is a multiple code sequence:

ESC Z n aaaa RUB

where n = column number of position of text (see Table B-5)
aaaa = character string of up to (78 - starting-column#) characters
RUB = ASCII RUBOUT or DEL code (7F hex)

An example of using this message field is a ruler line that displays the margin settings and tab positions for word processing applications.

Under the ESC F, ESC z, or ESC Z sequence, embedded control characters in the message are displayed so that graphic characters can be used to enhance the message.

5.2.13 Display Mode Selection

ESC x — Changes display mode. This is a multiple code sequence:

ESC x mode

where mode = display mode (see Table B-8)

If the mode selected is the horizontal split mode, the sequence is:

ESC x mode HSR

where HSR = the horizontal split row number (see Table B-8)

While changing the display mode, the following things will happen:

1. All the text segments are cleared except for the top Message Field Line, the Function Key Labeling Line, and the tab settings.

2. The communication electronics are reset, but the local/conversation mode and the HDX/FDX submodes are maintained.

3. The operating switches (SW1 - 1,2,3,4) are read.

4. The half intensity, insert, and special character modes are all turned off.

5. The new display mode is set up with the text segment 0 activated.

6. An ACK is sent upon completion to the computer if the change display mode command orginates from the computer.

5.2.13.1 ACK After Display Mode Initialization

While changing display modes using the "ESC x MODE" command, the terminal has to perform several time consuming operations (such as clearing the entire data storage). But, instead of requiring the computer to send an ENQ, the terminal transmits an ACK to the computer upon completion of the display mode initialization.

It is very important that your applications program wait for this ACK before sending information to the terminal.

5.2.14 Split Segment Selection

ESC J Activates the alternate split window or text segment.

ESC K Activates the alternate split window or text segment.

ESC] Activates split segment 0.

ESC } Activates split segment 1.

5.2.15 Vertical Split Column

ESC n Sets a column of characters as specified at column 40 of the active display window. This sequence is used to set the separation column for the vertical split mode of 39 characters with a character other than the default vertical line (see Sections 3.5.1 and 3.7.1). This is a multiple code sequence:

ESC n COLCODE

where COLCODE is the column code (see Table B-7)

5.2.16 Programming the Function Keys

ESC f The eight function keys can be programmed independently and selectively with a total of sixteen function key sequences for their shifted and unshifted positions with the following command sequence (see Section 4.8):

ESC f KCODE sequence DEL (or RUBOUT code)

where KCODE = key code of the key position to be programmed as follows:

UNSHIFTED	KCODE	SHIFTED	KCODE
F5	@	F5	H
F6	A	F6	I
F7	B	F7	J
F8	C	F8	K
F9	D	F9	L
F10	E	F10	M
F11	F	F11	N
F12	G	F12	O

"Sequence" = function key sequences up to eight bytes. If "sequence" is a null sequence, the default function key code is used (see Table B-3).

The following Escape sequences affect the timing of the function key sequence:

ESC $ No delay between characters sent in function key sequence. (Default mode.)

ESC % A delay of approximately 30 ms between each character sent in the function key sequence.

5.2.17 Data Protect Mode

ESC & Turns on protect mode (refer to section 3.8).

ESC (Turns on write protect (if protect has been invoked). Data written in this mode will appear in half intensity and is protected from the three following program invoked erase modes: erase to end of line, erase to end of text, and erase to end of screen (clear screen).

ESC) Turns off write protect (if protect has been invoked).

ESC ' Turns off protect mode.

CHAPTER 6

MAINTENANCE AND TROUBLESHOOTING

6.1 MAINTENANCE

The AM-60 terminal requires very little maintenance. When cleaning the terminal cabinet, keyboard, or screen, do not use solvent-based or abrasive cleaners-- a light dusting with a soft cloth is usually all that will be required.

6.1.1 Changing the Fuse

Before checking the fuse, turn off power to the terminal and remove the power cord from the outlet on the back of the terminal.

The AM-60 fuse holder is directly beneath the power cord outlet on the back of the terminal cabinet. If you suspect that the fuse has "blown," remove the existing fuse by screwing the fuse holder counter clockwise until it comes out. Gently remove the fuse from the fuse holder and inspect it for damage. If you need to replace the fuse, remember that it is very important to use the correct fuse value for the type of input voltage for which your terminal has been configured:

Use a 250 Volt, 1 amp fuse for 120 Volt AC operation; use a 250 Volt, .5 amp fuse for 220 Volt AC operation.

6.2 SELF TEST FEATURES

The terminal has two internal self test features and display/verification capability to ensure proper terminal operation.

6.2.1 Powerup Self Test

Upon powerup of the terminal, an internal self test sequence is automatically initiated. If the terminal is not operating correctly, the following occurs:

1. The terminal bell sounds.

2. The screen remains blank except for an error message which appears near the lower right hand corner of the screen as follows:

Z - faulty microprocessor	9 - faulty memory chip A9
4 - faulty memory chip A4	0 - faulty memory chip A10
5 - faulty memory chip A5	1 - faulty memory chip A11
6 - faulty memory chip A6	2 - faulty memory chip A12
7 - faulty memory chip A7	3 - faulty memory chip A13
8 - faulty memory chip A8	

3. Operation halts.

6.2.2 Diagnostic Self Test

The diagnostic self test is a repetitive self test sequence provided to assist the field engineer in isolating a faulty module in the terminal. In addition to performing all the test sequences in the powerup self test, the diagnostic self test also verifies the proper operation of the communication port electronics. It requires two communication "loop-back" connectors for the Primary Communication Port (labeled "MODEM" on the back of the terminal) and the Auxiliary Communication Port (labeled "AUX").

Primary Communication Port Loop back pins connection:

RS-232C: 2 to 3, 4 to 5, 8 to 20

Current Loop: 7 to 13, 9 to 10, 11 to 12, 4 to 5, 8 to 20

Auxiliary Communication Port Loop back pins connection:

RS-232C: 3 to 20

Current Loop: 3 to 20

To initiate the self test:

1. Set all the switches in SW1 to OPEN prior to the powerup of the terminal.

2. Connect the loop back connectors to the two ports on the back of the terminal.

3. Turn the terminal on.

The first thing that happens is that a screenfull of 1s is displayed.

If no error is detected, the terminal will repeat the self test. If a fault is detected, the terminal sounds the terminal bell, terminates the diagnostic test, and displays a message near the lower right hand corner of the screen:

X - Faulty Primary Communication Port
Y - Faulty Auxiliary Communication Port

6.2.3 Display/Keyboard Verification

The terminal provides the field engineer with the capability to verify proper keyboard connection and display adjustment. When the SPACE BAR of the keyboard is pressed during the diagnostic self test, the self test is terminated and a pattern of all displayable characters and the screen attribute settings required for proper display adjustments appear on the screen.

Pressing any key at this point displays the associated key symbol at the 10th and 11th column position of the bottom row. An ! symbol is displayed at column 9 if the pressed key is a function or editing key. The following describes these key symbols:

1. All alphanumeric keys including special symbol keys such as *, -, and keys on the numeric key pad are displayed with their associated symbols at columns 10 and 11 (see Table B-2).

2. Keys generating ASCII control codes are displayed with their associated ASCII symbol (see Table B-1). An exception to this is the RETURN key which is displayed with the ! and the double vertical line graphic symbols at columns 9 and 10.

3. Keys generating Escape sequences are displayed with an ! at column 9 and their associated Escape sequence code at columns 10 and 11. For example, the PREV WORD key is displayed with !QQ at columns 9, 10, and 11.

4. The SHIFT and CTRL keys are not displayed. They can be verified in conjunction with another alphanumeric key. For example, pressing the CTRL and A keys simultaneously generates the SOH ( ) symbols at columns 10 and 11.

5. The CAPS LOCK key is not displayed. You can verify it by noting the "CAPS LOCK" label in the Terminal Message Field at the top of the screen display when CAPS LOCK is enabled.

6. The function keys are displayed with the following symbols at columns 9 and 10:

KEY	UNSHIFTED	SHIFTED
F5	! (blank)	! §
F6	! ↑	! ¢
F7	! ↓	! ¼
F8	! .	! ½
F9	! ←	! °
F10	! →	! ™
F11	! ¶	! ©
F12	! †	! ®

7. The FUNCT key generates the ! and the control symbols (see Appendix B).

6.2.3.1 Verifying User Programmable Switch Settings

User programmable switch settings are displayed on the bottom row at columns 2 and 3 for SW1, 4 and 5 for SW2, and 6 and 7 for SW3. (NOTE: The switches are located beneath the Alpha Micro logo plate at the upper right corner of the keyboard.) The following patterns can be used to verify the switch settings:

O = Open C = Closed

PATTERN I:	SWITCH POSITION 1	2	3	4	5	6	7	8	DISPLAY POSITION ON BOTTOM ROW 2nd	3rd	4th	5th	6th	7th
SW1	C	O	C	O	C	O	C	O	#	:				
SW2	C	O	C	O	C	O	C	O			#	:		
SW3	C	O	C	O	C	O	C	O					%	Z

PATTERN II:	1	2	3	4	5	6	7	8	2nd	3rd	4th	5th	6th	7th
SW1	O	C	O	C	O	C	O	C	\	E				
SW2	O	C	O	C	O	C	O	C			\	E		
SW3	O	C	O	C	O	C	O	C					Z	%

PATTERN III:	1	2	3	4	5	6	7	8
SW1	C	C	C	C	C	C	C	C
SW2	C	C	C	C	C	C	C	C
SW3	C	C	C	C	C	C	C	C

2nd 3rd 4th 5th 6th 7th

Locations 2, 3, 4, 5, 6 7 are displayed with solid "blocks" (RUB OUT symbols)

PATTERN IV:	1	2	3	4	5	6	7	8
SW1	0	0	0	0	0	0	0	0
SW2	0	0	0	0	0	0	0	0
SW3	0	0	0	0	0	0	0	0

2nd 3rd 4th 5th 6th 7th

Locations 2, 3, 4, 5, 6 7 are all blanks.

6.3 TROUBLESHOOTING HINTS

If you have problems with your terminal, refer to the list below of symptoms, possible causes and solutions. If you are unable to correct the problem yourself, contact your dealer or AlphaSERV member for technical assistance.

SYMPTOM: Terminal is "dead."

POSSIBLE CAUSE: No AC power.

SOLUTION: Check power cord. Is it plugged firmly into the terminal and into the electrical outlet? Is power switch on the front of the display cabinet turned clockwise? Check the label on the back of the terminal to see if the terminal is configured properly for the electrical requirements of your geographical area. Check the fuse to see if it has "blown."

POSSIBLE CAUSE: Power/Contrast rotary switch is not turned clockwise far enough.

SOLUTION: Adjust contrast.

SYMPTOM: Alpha Micro Operating System Prompt does not appear.

POSSIBLE CAUSE: The computer system is not up and running.

SOLUTION: Check the computer system. If another terminal is attached to the system, use the SYSTAT command to check on the status of the system.

POSSIBLE CAUSE: Incorrect switch settings-- word length, parity, stop bits, etc.

SOLUTION: Check the switch settings. (See Appendix A.) Remember to turn power off to the terminal and then back on again after changing the switch settings.

POSSIBLE CAUSE: Terminal cables damaged or incorrectly configured.

SOLUTION: Check the cables for obvious breakages. Refer to your dealer for help in getting correctly configured cables, or refer to Appendix C for information on building your own cables.

SYMPTOM: Terminal display is garbled.

POSSIBLE CAUSE: Incorrect baud rate switch settings.

SOLUTION: Check the switch settings. (See Appendix A.) Remember to turn power off to the terminal and then back on again after changing the switch settings.

SYMPTOM: Every character you type is displayed twice.

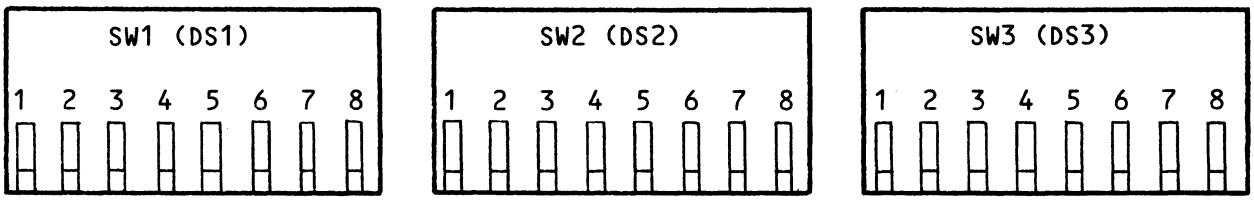
POSSIBLE CAUSE: Your terminal is set for half duplex operation, but should be set for full duplex operation.

SOLUTION: Check the switch settings. (See Appendix A.) Remember to turn power off to the terminal and then back on again after changing the switch settings.

APPENDIX A

SETTINGS OF USER PROGRAMMABLE SWITCHES

There are three banks of switches located beneath the Alpha Micro logo plate at the upper right corner of the keyboard. Facing the front of the keyboard, the following diagram corresponds to the exact arrangement of the switches. Each bank contains eight switches.



A.1 OPERATING SWITCH SETTINGS (SW1)

Switches 3 and 4 of SW1 are the switches that select the auto-new-line and ENTER key configuration options.

SWITCH SW1 - POSITIONS 1-2: NOT USED

SWITCH SW1 - POSITION 3:

OPEN Enables the auto-new-line (NL) operation. When data is entered at the last position of the row, the cursor is moved to the beginning of the next row automatically. (The normal setting when using the AM-60 with an Alpha Micro computer.)

CLOSED Disables the auto-new-line (NL) operation. The cursor does not advance to the next row if data is entered at the last position of the row.

This switch does not affect any other cursor movement which is activated by a cursor movement command such as cursor right or cursor left.

SWITCH SW1 - POSITION 4:

OPEN Selects the ENTER key to operate as the tab (TAB or HT) function and the RETURN key to operate as the combination of the carriage return (CR) and line feed (LF) functions.

CLOSED Selects the ENTER key to operate as the carriage return (CR) function and the RETURN key to operate as the carriage return (CR) function only. (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)

SWITCH SW1 - POSITIONS 5-8: NOT USED

A.2 COMMUNICATION SWITCHES (SW2)

SWITCH SW2 - POSITION 1:

OPEN 7 bits data.
CLOSED 8 bits data. (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)

SWITCH SW2 - POSITION 2:

If parity is enabled (SW2 POSITION 4/CLOSED):

OPEN Odd parity.
CLOSED Even parity.

If parity is disabled (SW2 POSITION 4/OPEN):

OPEN Space parity (most significant bit = 0). (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)
CLOSED Mark parity (most significant bit = 1). Requires 8-bit data setting.

SWITCH SW2 - POSITION 3:

OPEN 1 stop bit. (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)
CLOSED 2 stop bits.

SWITCH SW2 - POSITION 4:

OPEN Parity disabled. (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)
CLOSED Parity enabled.

SWITCH SW2 - POSITIONS 5-8:

RS-232C communication port baud rate setting:

5	6	7	8	BAUD RATE
open	open	open	open	19200
open	open	open	closed	9600
open	open	closed	open	7200
open	open	closed	closed	4800
open	closed	open	open	3600
open	closed	open	closed	2400
open	closed	closed	open	2000
open	closed	closed	closed	1800
closed	open	open	open	1200
closed	open	open	closed	600
closed	open	closed	open	300
closed	open	closed	closed	150
closed	closed	open	open	134.5
closed	closed	open	closed	110
closed	closed	closed	open	75
closed	closed	closed	closed	50

A.3 CONFIGURATION SWITCHES (SW3)

SWITCH SW3 - POSITION 1: MUST BE SET "OPEN"

*SWITCH SW3 - POSITION 2:

OPEN 60 Hz screen refresh rate.
CLOSED 50 Hz screen refresh rate.

SWITCH SW3 - POSITIONS 3 AND 4: RESERVED. MUST BE SET "OPEN"

*SWITCH SW3 - POSITION 5:

OPEN Starts with black screen background.
CLOSED Starts with green screen background.

SWITCH SW3 - POSITION 6:

OPEN Blinking cursor.
CLOSED Non-blinking cursor.

SWITCH SW3 - POSITION 7:

OPEN Starts with full duplex conversation mode. (The normal setting when using the AM-60 terminal directly connected to an Alpha Micro computer; i.e., when not using a modem.)
CLOSED Starts with half duplex conversation mode.

SWITCH SW3 - POSITION 8:

OPEN Starts with conversation mode. (The normal setting when using the AM-60 terminal with an Alpha Micro computer.)
CLOSED Starts with local mode.

*These switches are also read when the display mode is being changed (see Section 5.2.13).

A.4 EXAMPLES

The following are switch settings for a typical configuration of the AM-60 terminal for use with an Alpha Micro computer:

SW1 (DS1)

1	2	3	4	5	6	7	8
N/A	N/A	open	closed	N/A	N/A	N/A	N/A

POSITION 3/OPEN: Auto-new-line feature enabled. POSITION 4/CLOSED: ENTER key configured to act like RETURN key.

SW2 (DS2)

1	2	3	4	5	6	7	8
closed	open	open	open	open	open	open	closed

POSITION 1/CLOSED: 8 bits data; POSITION 2/OPEN: Space parity; POSITION 3/OPEN: 1 stop bit; POSITION 4/OPEN: Parity disabled; POSITIONS 5-8: 9600 baud rate.

SW3 (DS3)

1	2	3	4	5	6	7	8
open	open	open	open	open	open	open	open

POSITION 1/OPEN: Must be OPEN; POSITION 2/OPEN: 60 Hz; POSITIONS 3-4/OPEN: Reserved-- Must be OPEN; POSITION 5/OPEN: Start with black screen background; POSITION 6/OPEN: Blinking cursor; POSITION 7/OPEN: Full duplex; POSITION 8/OPEN: Conversation mode.

APPENDIX B

CODE SUMMARIES

B.1 TERMINAL CONTROL CODES

Table B-1
Terminal Control Codes

ASCII Code (in hex)	Display Symbol	Control Key	Function/ Operation
00	(blank)	@,/	NULL
01	↑	A,a	SOH
02	↓	B,b	STX
03	.	C,c	ETX - Cursor Up
04	←	D,d	EOT
05	→	E,e	ENQ - Computer checks busy, Terminal returns ACK if not busy.
06	¶	F,f	ACK - Terminal sends ACK to Computer if it is not busy.
07	†	G,g	Sound Beeper
08	§	H,h	Back Space
09	¢	I,i	Tab Cursor
0A	¼	J,j	Line Feed (cursor down)
0B	½	K,k	Cursor Up
0C	°	L,l	Cursor Right
0D	TM	M,m	Carriage Return
0E	©	N,n	Unlock Keyboard
0F	®	O,o	Lock Keyboard
10	T	P,p	DLE
11	L	Q,q	DC1 - XON

Table B-1 (Continued)
Terminal Control Codes

ASCII Code (in hex)	Display Symbol	Control Key	Function/ Operation
12	⌐	R,r	DC2
13	¬	S,s	DC3 - XOFF
14	├	T,t	DC4
15	┘	U,u	NAK
16	|	V,v	SYN
17	▮	W,w	ETB
18	┼	X,x	CAN
19	┤	Y,y	EM
1A	-	Z,z	SUB - Clears all with spaces, see ESC +
1B	▒	[,{	Escape sequence start
1C	=	\,|	FS
1D	┴	],}	GS
1E	‖	^,~	Cursor Home
1F	▒	_, RUBOUT	New Line

B.2 ASCII CODES (7 BITS)

Table B-2
ASCII Codes (7 Bits)

Control Codes

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

B.3 DEFAULT FUNCTION KEY CODES

Table B-3
Default Function Key Code

FUNCTION KEY	UNSHIFTED CODE	SHIFTED CODE
F1	ESC 5	ESC 7
F2	ESC 4	ESC 6
F3	ESC S	ESC s
F4	ESC @	ESC P
F5	SOH @	SOH H
F6	SOH A	SOH I
F7	SOH B	SOH J
F8	SOH C	SOH K
F9	SOH D	SOH L
F10	SOH E	SOH M
F11	SOH F	SOH N
F12	SOH G	SOH O
F13	ESC E	ESC |
F14	ESC R	ESC ~
F15	ESC T	ESC t
F16	ESC Y	ESC y

B.4 GRAPHIC CODES

Table B-4
Graphic Codes

Sequence to enter Graphic code = ESC H Graphic-Code

Graphic Code	Display Symbol	Display Symbol (in ASCII hex)
0	┬	10
1	└	11
2	┌	12
3	┐	13
4	├	14
5	┘	15
6	│	16
7	▒	17
8	┼	18
9	┤	19
:	─	1A
;	▒	1B
<	═	1C
=	┴	1D
>	╫	1E
?	▒	1F

B.5 CURSOR ROW OR COLUMN CODES

Table B-5
Cursor Row or Column Code

r = Row number c = Column number

r or c	ASCII Character	r or c	ASCII Character	r or c	ASCII Character
1	(space)	28	;	55	V
2	!	29	<	56	W
3	"	30	=	57	X
4	#	31	>	58	Y
5	$	32	?	59	Z
6	%	33	@	60	[
7	&	34	A	61	/
8	'	35	B	62	]
9	(	36	C	63	^
10	)	37	D	64	_
11	*	38	E	65	`
12	+	39	F	66	a
13	,	40	G	67	b
14	-	41	H	68	c
15	.	42	I	69	d
16	/	43	J	70	e
17	0	44	K	71	f
18	1	45	L	72	g

Table B-5 (Continued)
Cursor Row or Column Code

r = Row number c = Column number

r or c	ASCII Character	r or c	ASCII Character	r or c	ASCII Character
19	2	46	M	73	h
20	3	47	N	74	i
21	4	48	O	75	j
22	5	49	P	76	k
23	6	50	Q	77	l
24	7	51	R	78	m
25	8	52	S	79	n
26	9	53	T	80	o
27	:	54	U		

B.6 SCREEN ATTRIBUTE CODES

Table B-6a
Screen Attribute Codes: Data/Text Entry Area

The sequence to enter screen attributes is: ESC G Attribute-code

Attribute Code	Screen Attribute Effect
(space)	Enter space code (20 hex)
0	Normal (green characters on black screen)
1	Blank (no show)
2	Blink
3	Blank
4	Reverse
5	Reverse and blank
6	Reverse and blink
7	Reverse and blank
8	Underscore
9	Underscore and blank
:	Underscore and blink
;	Underscore and blank
<	Underscore and reverse
=	Underscore, reverse, and blank
>	Underscore, reverse and blink
?	Underscore, reverse, blink and blank
p	Dim
q	Blank
r	Dim and blank
s	Blank
t	Dim and reverse
u	Reverse and blank
v	Dim, reverse and blink
w	Reverse and blank
x	Dim and underscore
y	Underscore and blank
z	Dim, underscore and blink
{	Dim, underscore, blink and blank
|	Dim, underscore and reverse
}	Underscore, reverse and blank
~	Dim, underscore, reverse and blink

Table B-6b
Screen Attributes Codes:
Program Message Area and Function Key Labeling Line

The codes below are embedded in the display text to achieve the indicated results.

NOTE: 1E (hex) turns off dim mode (clear bit 7)
1F (hex) turns on dim mode (set bit 7)

Attribute Code	Screen Attribute Effect
(space)	Enter space code (20 hex)
Control-a	Normal (green characters on black screen)
Control-b	Blank (no show)
Control-c	Blink
Control-d	Blank
Control-e	Reverse
Control-f	Reverse and blank
Control-g	Reverse and blink
Control-h	Reverse and blank
Control-i	Underscore
Control-j	Underscore and blank
Control-k	Underscore and blink
Control-l	Underscore and blank
Control-m	Underscore and reverse
Control-n	Underscore, reverse, and blank
Control-o	Underscore, reverse and blink
Control-p	Underscore, reverse, blink and blank

B.7 VERTICAL SPLIT COLUMN 40 SEPARATION CODES

Table B-7
Vertical Split Column 40 Separation Code

Sequence = ESC n Column-Code

NOTE: This sequence is provided to set at column 40 the separation column for the vertical split (with 39-column text segments) display window. However, the sequence is recognized at all times and can be executed under other display modes.

Column Code	Display Symbol	Column Code	Display Symbol	Column Code	Display Symbol
(space)	(space)	@	(blank)		
!	‖	A	↑	a	‖
"	⊥	B	↓	b	⊥
#	=	C	.	c	=
$	▒	D	←	d	▒
%	-	E	→	e	-
&	┤	F	¶	f	┤
'	†	G	†	g	†
(	■	H	§	h	■
)	|	I	¢	i	|
*	┘	J	¼	j	┘
+	├	K	½	k	├
,	┐	L	°	l	┐
-	┌	M	™	m	┌
.	└	N	©	n	└
/	┬	O	®	o	┬

Table B-7 (Continued)
Vertical Split Column 40 Separation Code

Sequence = ESC n Column-Code

Column Code	Display Symbol	Column Code	Display Symbol	Column Code	Display Symbol
0		P	⊤	p	
1		Q	└	q	
2		R	┌	r	
3		S	┐	s	
4		T	├	t	
5		U	┘	u	
6		V	│	v	
7		W	▉	w	
8	Enter Attribute Code (See Table B-6a)	X	┼	x	Enter Attribute Code (See Table B-6a)
9		Y	┤	y	
:		Z	-	z	
;		[	▒	{	
<		\	=	|	
=		]	⊥	}	
>		^	‖	~	
?		_	▒	RUBOUT	

B.8 DISPLAY MODE SELECTION

Table B-8
Display Mode Selection

Sequence = ESC x Display-Mode-Code Horizontal-split-row (optional)*

Display Mode Code	Display Window
0	Normal Display: 24 rows by 80 characters
1	Horizontal Split: M rows by 80 characters and N rows by 80 characters
2	Vertical Split: 24 rows by 39 characters and 24 rows by 39 characters
3	Vertical Split: 24 rows by 40 characters and 24 rows by 40 characters

*Horizontal split row number defines the physical row number on the data/text area of the screen where the lower window starts. For example, a 12 means that the lower split starts at row 12. The limit of the horizontal split number is from 2 to 24. The Horizontal split row number follows the rule outlined on Table 5.

B.9 TERMINAL ESCAPE SEQUENCES

Table B-9
Terminal Escape Sequences

* = Multiple character sequence, requiring additional characters or codes.

HEX	2	3	4
0		0 Clear all tab	@
1	! Write undimmed with attribute*	1 Turn on column tab mode	A Set special attribute*
2	" Enable keyboard	2 Clear tab at cursor	B Set local mode
3	# Disable keyboard	3	C Set conversation (TTY) mode
4	$ No delay between Function Key sequence codes	4	D Set HDX/FDX*
5	% 3 ms delay in Function Key sequence codes	5	E Insert line
6	& On protect mode	6	F Message to Program Message Field
7	' Off protect mode	7	G Enter attribute*
8	(On dim mode	8	H Enter graphic*
9	) Off dim mode	9	I Back tab cursor
A	* Clear all to null	: Clear undimmed to null	J Activate alternate split
B	+ Clear all to spaces	; Clear undimmed to spaces	K Activate alternate split
C	, Clear all to dimmed spaces	<	L
D	- Set cursor to selected window*	= Set cursor to active window	M Read cursor byte
E	. Write undimmed area with code*	>	N Turn external scrolling off
F	/ Read cursor and active segment*	? Read cursor from active window	O Turn external scrolling on

Table B-9 (Continued)
Terminal Escape Sequences

* = Multiple character sequence, requiring additional characters or codes.

HEX	5	6	7
0	P		P
1	Q Insert one character space	a Turn screen off	q On insert mode
2	R Delete line	b Turn screen on	r Off insert mode
3	S	c	s
4	T Erase to end of line with spaces	d	t Erase to end of line with null
5	U On special character mode	e	u Off special character mode
6	V Enter dim space column	f Program function key	v
7	W Delete character	g	w
8	X Off special character mode	h Internal paging	x Select display mode*
9	Y Erase to end of text with spaces	i Tab cursor	y Erase to end of text with nulls
A	Z Message to Function Key Labeling Line (Shifted)	j	z Message to function Key Labeling Line (Unshifted)
B	[	k	{ Cursor to SOTX (True Home)
C	\	l	|
D	] Activate split segment 0	m	} Activate split segment 1
E	^	n Enter column 40 code*	~
F	_	o	(DEL)

B.10 KEYBOARD COMMAND CODE SEQUENCES

Table B-10
Keyboard Command Code Sequences

Key	Sequence (Unshifted)	Sequence (Shifted)	Operation
CANCEL	ESC L	ESC B	Interrupt program
CHAR INS/DEL	ESC N	ESC O	
Cursor Down	0A	ESC _	Move cursor down one row
Cursor Left	08	ESC [	Move cursor left one position
Cursor Right	0C	ESC \	Move cursor right one position
Cursor Up	0B	ESC ^	Move cursor up one row
EXECUTE	ESC <	ESC >	Acts similar to RETURN
HELP	ESC 9	ESC 8	Display help information
HOME	1E	ESC {	Move cursor to home position
LINE INS/DEL	ESC h	ESC K	Insert/delete current row
NEXT SCREEN	ESC v	ESC V	Display next screen
NEXT WORD	ESC w	ESC g	Move cursor to next word
NEW LINE	ESC !	ESC "	
PREV SCREEN	ESC r	ESC q	Display previous screen
PREV WORD	ESC Q	ESC W	Move cursor to previous word
SCROLL	11/13	ESC 3	Suspend/revive terminal output
TAB	09	ESC I	Horizontal Tab
WORD INS/DEL	ESC 1	ESC 2	Insert/delete current word
DATA ENTRY PAD:			
0	30	ESC .	
1	31	ESC +	
2	32	ESC ,	
3	33	ESC -	
4	34	ESC '	
5	35	ESC (	
6	36	ESC)	
7	37	ESC #	
8	38	ESC $	
9	39	ESC %	
-	2D	ESC &	
,	2C	ESC *	
.	2E	ESC /	
ENTER			Local function that turns key-click on and off.

APPENDIX C

BUILDING TERMINAL CABLES

This appendix contains information on building cables for your AM-60 terminal that will connect it to the communications interface of your computer.

There are two communications interface connectors on the terminal. Facing the terminal from the back, the connector on the left (labeled "MODEM") is for communicating with the computer (see Figure 2-2). The other connector is not used at this time. You will use the terminal with an RS-232C interface.

WARNING:

> This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this book, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

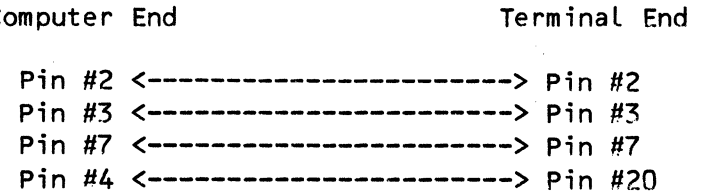
Below is a list of the RS-232C signals recognized by the AM-60 terminal. The minimum cable configuration requires the use of the signals marked with an asterisk.

RS-232 C SIGNALS:

PIN #	SIGNAL	
1	Frame ground	
2	Transmit data (output)	*
3	Receive data (input)	*
4	Request to send (output)	
5	Clear to send (input)	
7	Signal ground	*
8	Data carrier detect (input)	
20	Data terminal ready (output)	*

* = Minimum signals required

To connect an AM-60 terminal to an Alpha Micro computer, this signal list translates into the following minimum pin connection diagram:



C.1 VERIFYING AM-300 SERIAL I/O INTERFACE CABLES

IMPORTANT NOTE: If you are going to be connecting the AM-60 terminal to an Alpha Micro AM-300 Six-port RS-232 Serial I/O Interface, the small cables that go from the AM-300 board to the inside of the computer back panel may need to be modified. These cables (PDB-00301-00) contain two RS-232 connectors that connect to the computer back panel, and one small, plastic connector that connects to the AM-300 board itself. Check the back of the RS-232 connectors--there should be a jumper wire going from Pin #4 to Pin #20 on both connectors. If there is not a jumper wire in this position, you will need to solder one there.

C.2 BEFORE YOU START

When you construct a terminal cable, you enable specific interfacing signals by soldering cable wires to certain connector pins. (See the signals listed in the first paragraph of Section C.1.)

Below are a few things you should keep in mind before beginning.

C.2.1 Cable Length

We recommend that RS-232C cables not be longer than fifty feet. As you increase the cable length beyond the recommended maximum, the reliability of the data signal decreases. There are several things you can do if the cables absolutely must be longer than the recommended maximum:

a. Alternatives to the RS-232 standard (RS-422 and RS-423) do allow communication over cables that are longer than fifty feet. You will need some special equipment to implement these standards however.

b. Signal conditioning equipment (for example, a "short haul modem") can improve signal quality.

C.2.2 Cable Type

We recommend that the cable you use be shielded and jacketed-- using such a cable properly will help to minimize electromagnetic interference. Reducing such interference will not only protect your system from signal noise, but will protect other devices around your terminal (e.g., a TV or radio) from interference radiated by an improperly shielded terminal.

Please see the note at the front of this chapter for information on your responsibilities concerning electromagnetic interference. See the section below for information on shielding terminal cables.

C.2.3 Connectors

Use a good quality RS-232 25-pin on one end of the cable. Use another 25-pin connector or a 9-pin connector on the other end of the cable (depending on the type of connector attached to your Alpha Micro computer interface). The connectors should have a metal hood and cable clamp, both of which should be connected to the cable shield to minimize signal noise.

C.3 BUILDING THE RS-232 CABLE

Now you can begin to make the cable:

1. If you look carefully at the cable connectors, you will see that there are very small numbers printed on the side of the connector to which you will be soldering cable wires-- these are the pin numbers.

2. Notice that the cable itself consists of several (typically, three to six) colored wires. Pick a color. (It doesn't matter which color wire goes to what pin as long as each end of the same colored wire goes to the proper pin on both ends of the cable.)

3. Strip about 1/16" of the insulation off the end of the wire you have chosen, leaving bare wire. Tin the wire with a small amount of solder and trim it back to 1/16" if necessary.

4. Melt a small amount of solder into the solder cup of the connector pins to which you will be soldering wires.

5. Heat the connector pin to which you wish to attach the wire until the solder inside the pin melts, and insert the tinned wire into the pin while removing heat from the pin.

   Remember the color of the wire attached to the pin-- you will solder the same color wire on the other end of the cable to the appropriate pin on the other connector.

6. Now, solder the wires to the other pins per the signal list in Section C.1. Write down what colored wires go to what connector pins.

7. Connect the cable shield to the connector hood as directed in "Shielding the Cable," below. Attach the connector hood. (Always remember to put the connector hood on-- that will protect wires soldered to the connectors from being pulled loose. If there is a strain relief mechanism supplied with the connector hood, put that on as well to further protect the wires from being pulled loose.)

8. Label the connector hood so you remember what end of the cable goes to the computer and what end goes to the terminal.

9. Go to the other end of the cable and solder the cable's wires to the connector on that end, using the corresponding wires on the proper pins.

NOTE: If you are going to be using the AM-60 terminal on an AM-1000 system, please be sure that Pins #11 and #18 are open unless you are using the remote reset feature of the AM-1000 serial port #0. Unless a remote reset switch is installed on the cable, shorting those pins

together on a cable connected to Port #0 can prevent your AM-1000 system from booting.

C.4 SHIELDING THE CABLE

There are different techniques for shielding a terminal cable, but the method we recommend as best satisfying FCC shielding requirements is to use a metal connector hood that connects to the cable shield. Note that Alpha Micro offers pre-made cables that conform to this shielding technique.

The shielded cable consists of several layers. On the inside are the colored wires that carry the data signals. Surrounding these wires is a metal foil covering. On the outside of the foil covering are small, uncoated "drain" wires. Completely surrounding all of the above elements is the plastic coating that forms the outside of the cable.

The technique for making an adequately shielded cable involves connecting the metal cable hood to the cable drain wires to ensure electrical continuity. Refer to Figure C-1, below.

When you strip the end of the shielded cable to allow access to the signal wires, also strip a small amount of the plastic coating back from the interior foil layer of the cable. Trim the drain wires and bend them down over the plastic coating of the cable. Make the signal wire connections by soldering the proper signal wires to the appropriate connector pins as discussed in the sections above.

Then place the metal connector hood in place, enclosing the cable. Bend the drain wires back up over the outside of the connector hood neck, and solder them into place. Crimp the supplied strain relief ring over the connector hood/cable connection as shown in Figure C-1. If a plastic outer shell is provided for the metal connector hood, put it in place now.

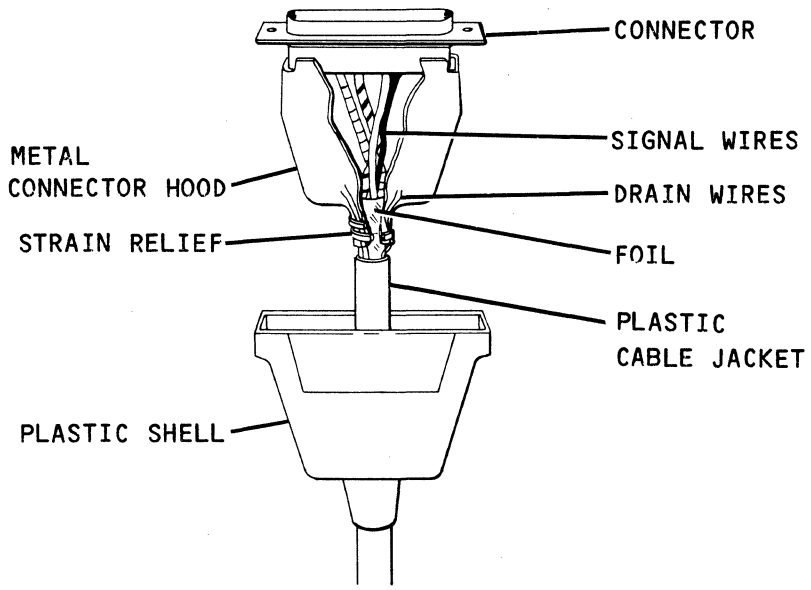


Figure C-1
Shielding a Cable

APPENDIX D

AMOS AND AMOS/L SCREEN HANDLING MONITOR CALLS

Chapter 5 discusses the ESCAPE sequences your programs can use to enable the various features of the Alpha Micro AM-60 terminal.

Alpha Micro computer systems that use the AMOS or AMOS/L operating system (or "monitor") provide another method for your programs to use these terminal features. Your programs can call upon the computer monitor to perform the screen handling functions for you. We suggest that you use the monitor facilities rather than programming the terminal directly yourself. Allowing the monitor to do the work for you will result in a standardized programming interface with a minimum of maintenance headaches. (Even if the exact details of performing a terminal function change in the future, if you use the monitor to communicate with the terminal, your program interface probably won't have to change.)

Your assembly language program will use the TCRT monitor call to use the terminal screen handling features. For information on using TCRT, refer to the AMOS/L Monitor Calls, DSS-10003-00 (for AMOS/L systems), or the AMOS Monitor Calls, DWM-00100-42 (for AMOS systems).

Your AlphaBASIC programs will use the TAB(-1,f) function, where f is the decimal function code of the feature. See the AlphaBASIC User's Manual, DWM-00100-01, for details.

For information on using the monitor facilities from within programs written in other languages (e.g., PASCAL), refer to the user's manual for that language.

Below is a list of the terminal feature function codes (in decimal) established at the time of this printing of the AM-60 Terminal Owner's Manual. For the most up to date list, please refer to latest version of the AMOS/L Monitor Calls or AMOS Monitor Calls manual.

0	Clear Screen and set normal intensity
1	Cursor Home (move to 1,1)
2	Cursor Return (move to column 1 without line-feed)
3	Cursor Up one row
4	Cursor Down one row
5	Cursor Left one column
6	Cursor Right one column
7	Lock Keyboard
8	Unlock Keyboard
9	Erase to End of Line
10	Erase to End of Screen
11	Enter Background Display Mode (reduced intensity)
12	Enter Foreground Display Mode (normal intensity)
13	Enable Protected Fields
14	Disable Protected Fields
15	Delete Line
16	Insert Line
17	Delete Character
18	Insert Character
19	Read Cursor Address
20	Read Character at Current Cursor Address
21	Start Blinking Field
22	End Blinking Field
23	Start Line Drawing Mode (enable alternate character set)
24	End Line Drawing Mode (disable alternate character set)
25	Set Horizontal Position
26	Set Vertical Position
27	Set Terminal Attributes
28	Cursor on
29	Cursor off
30	Start Underscore
31	End Underscore
32	Start Reverse Video
33	End Reverse Video
34	Start Reverse Blink
35	End Reverse Blink
36	Turn Off Screen Display
37	Turn On Screen Display
38	Top Left Corner
39	Top Right Corner
40	Bottom Left Corner
41	Bottom Right Corner
42	Top Intersect
43	Right Intersect
44	Left Intersect
45	Bottom Intersect

46	Horizontal Line
47	Vertical Line
48	Intersection
49	Solid Block
50	Slant Block
51	Cross-Hatch Block
52	Double Line Horizontal
53	Double Line Vertical
54	Send Message to Function Key Line
55	Send Message to Shifted Function Key Line
56	Set Normal Display Format
57	Set Horizontal Split (Follow with Row Code)
58	Set Vertical Split (39 Character Columns)
59	Set Vertical Split (40 Character Columns)
60	Set Vertical Split Column to Next Character
61	Activate Split Segment 0
62	Activate Split Segment 1
63	Send Message to Host Message Field
64	Up-Arrow Symbol
65	Down-Arrow Symblol
66	Raised Dot Symbol
67	End of Line Symbol
68	Horizontal Tab Symbol
69	Paragraph Symbol
70	Dagger Symbol
71	Section Symbol
72	Cent Sign Symbol
73	One-Quarter Symbol
74	One-Half Symbol
75	Degree Symbol
76	Trademark Symbol
77	Copyright Symbbol
78	Registered Symbol

If you want to write your own software support and assign your own function codes, we recommend that you start at function code 255 and work down to code 128 to avoid conflicting with future codes assigned by Alpha Micro.

ALPHA MICRO AM-60 TERMINAL OWNER'S MANUAL

DOCUMENT HISTORY

Revision A00 - (Printed 3/83) - New document.

Revision A01 - (Printed 9/83) - Added information on protected fields

Index

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