

ADM 11 Video Display Terminal



USERS REFERENCE MANUAL

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PREFACE

The ADM 11 Video Display Terminal is a highly featured general purpose ergonomic, conversational terminal, ideally suited for a wide range of requirements.

This User's Reference Manual explains how to use the ADM 11, and provides information on its installation and care. To help you effectively use the great variety of ADM 11 operating features, this manual emphasizes the various features and control codes.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for Class A computing devices 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. Only shielded cables with the shield terminated to the metal hood of the connector can be used.

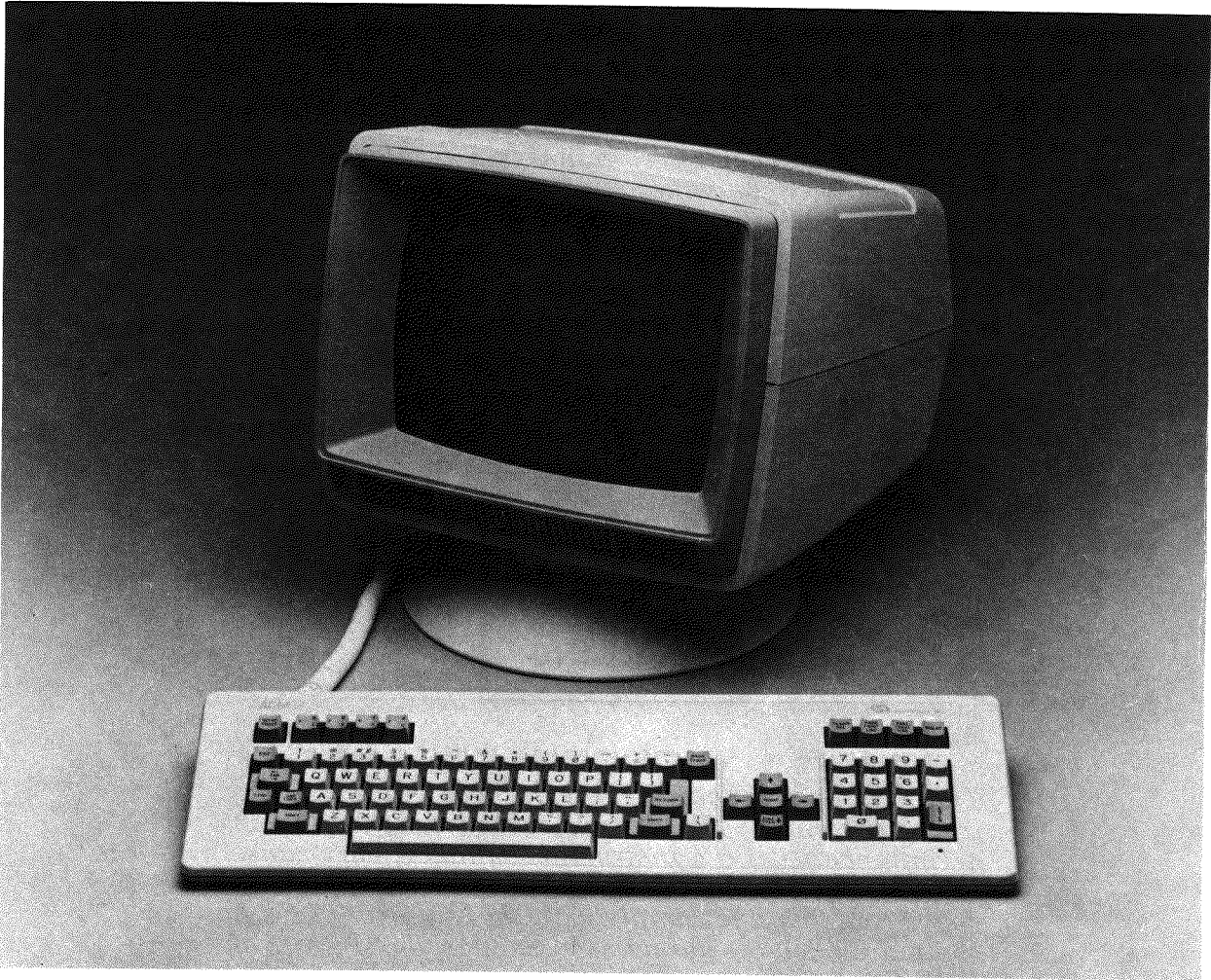


Figure 1-1. ADM 11 Video Display Terminal

SECTION I GENERAL DESCRIPTION

1.1 INTRODUCTION

The Lear Siegler ADM 11 Video Display Terminal, shown in figure 1-1, is a high-speed conversational terminal with a large number of popular features. Its stylized design offers the terminal operator full ergonomic conveniences, such as a tilt and swivel monitor, a low-profile, lightweight keyboard, and long coiled cord for maximum operator comfort. The considerate design of the ADM 11 allows configuration flexibility to meet your specific application needs.

1.2 OPERATION DESCRIPTION

The ADM 11 is used to enter, display, and send asynchronous data, and to receive and display data. In some applications, data transfer may be exclusively unidirectional; e.g., either from the ADM 11 to a host computer, or from the computer to the ADM 11. However, a more frequent application is one in which an operator communicates with the computer, and the computer reacts in accordance with its stored program.

The ADM 11 video display terminal provides:

- Full 128 ASCII character set with 80 x 25 character non-glare display (25th line is a status line and message line).
- A DIN-standard keyboard, with:
 - Numeric keypad with 14 keys
 - Five separate cursor control keys
 - Four programmable function keys, (shiftable to eight)
 - CAP LOCK key and Edit keys
 - 3-Key rollover and 256 keystroke buffer
 - Tilt mechanism

- 7 communication rates in full-duplex and half-duplex send/receive modes.
- Scrolling
- Absolute cursor positioning
- Variable 9 or 10-bit word structures
- Lower case standard with full two-dot descenders
- Four visual attributes - blink, blank, reverse, and non-embedded reduced intensity
- Program mode
- Standard RS-232C or optional 20mA current-loop interface, with RS-232C auxiliary interface port. (Selectable keyboard lock or gated AUXILIARY port.)
- Four Print Modes: Page Print; Line Print; Display and Print; and Transparent Print
- Special control character sequences
- Selectable refresh rate
- Non-volatile set-up mode for terminal configuration

1.2.1 Control Logic

The Control Logic contains the microcomputer and various integrated circuits which control all operations of the ADM 11.

Data entering the unit is received by the Control Logic section. The Control Logic decodes the input data and reformats it into data and control instructions for the Video Logic and Drive section.

1.2.2 Video Logic and Drive

The Video Logic and Drive section contains the display logic needed to drive the monitor, 2K bytes of random access memory (RAM), and character generation circuits, as well as the video logic and monitor.

1.2.3 Keyboard

The keyboard, which meets DIN standards for operator comfort, is attached to the rear of the monitor with a 6-foot coiled cord to provide complete keyboard mobility.

With each keystroke, an ASCII character is immediately transmitted to the host computer. The character is also routed back to the CRT display directly via the I/O interface in half-duplex operation.

1.2.4 Primary (Modem) and Auxiliary Ports

The ADM 11 comes standard with two ports: the RS-232C Modem Port and Auxiliary Port which are located at the back of the terminal. The *Modem (I/O) Port* is the link, or interface, that handles the flow of data in both directions between the ADM 11 and the host computer. The Modem Port may be configured for either RS-232C or the optional 20mA Current Loop operation or RS-422 interface.

The *Auxiliary Port* permits the use of an RO (Receive Only) printer, such as Lear Siegler's VersaPrint 500, when hard copy of data is needed.

With the Modem DTR/X-ON/X-OFF Handshake feature, all data transmitted from the host, even at speeds up to 19,200 baud, will be received by the ADM 11 without any data loss.

1.2.5 Set-Up Logic

The ADM 11 features a non-volatile Set-Up Mode which allows the terminal parameters to be selected through commands from the keyboard or host. These parameters, including baud rates, word structure, cursor type, communications control, and operating modes, can then be "saved" in memory, even when the power is shut-off.

1.2.6 Regulated Power Supply

The ADM 11 Power Supply can accept line voltage inputs of 115 VAC or 230 VAC +/- 10%, 50 or 60 Hz. The voltage is factory set, and must be specified at the time of order. It provides four regulated DC voltages; +5 volts, + and - 12 volts, and +15 volts.

1.3 SPECIFICATIONS

The ADM 11 specifications are listed in Table 1-1, page 1-4.

1.4 ADM 11 WORD STRUCTURE

The ADM 11 transmits serial asynchronous data in a 9 or 10 bit format in the sequence: one start bit, seven or eight data bits, one or no parity bit, and one stop bit. Parity selection (odd, even, or no parity) is permitted only with a seven bit data word. If an eight bit data word is selected, then bit eight can be designated to be either 1 or 0. Parity selection and the value of bit eight are defined via Set-Up Mode.

The received data shall be formatted the same as the transmit data. The word structure, baud rates, and other communications characteristics are established via Set-Up Mode selections. Refer to Section III, paragraph 3.1, page 3-1.

1.5 OPTIONS

The standard ADM 11 can be further equipped with several options.

1.5.1 20mA Current Loop

The ADM 11, with the optional 20mA current loop interface, can operate at a maximum baud rate of 9600 from the Modem Port. This option is plug mounted to permit field installation.

1.5.2 RS-422

The logic board design permits RS-422 to be added as a field or factory installed option. This option is pin compatible with the RS-422 installed in the IBM 3101 and as defined in E.I.A. Specifications RS-422.

1.5.3 International Keycap/ Character Generator Sets

Several character sets are optionally available with the ADM 11, as well as the associated keycap sets. These include UKASCII, French, German, Swedish, Finnish, Danish, Norwegian and Spanish.

1.5.4 Non-Volatile Function Key Memory

The terminal has, as a field installable option, the ability to save user-programmed function key characters in non-volatile memory. The user can access the programmed characters via the four programmable function keys (F1-F4) located at the upper left portion of the keyboard. Refer to **paragraph 3.3.8, page 3-7** for details.

1.5.5 Amber Phosphor Display

While the standard ADM 11 is equipped with a P31 green phosphor display, an amber display is optionally available in place of the green CRT at no additional cost.

1.5.6 Answerback Memory

The ADM 11 circuit board incorporates the facilities to add answerback memory as an option. This provides the capability to transmit a pre-programmed 32-character message. It may be ordered with the unit or as an add-on, plug in component.

Table 1-1. ADM 11 Specifications

SPECIFICATION	DESCRIPTION
DISPLAY	
CRT Screen	12-inch (30.5cm) diagonal; green phosphor with non-glare surface. (Amber optional)
Display Area	8.25" W (21cm) x 5.75" H (14.6cm)
CRT Console	Tilt and Swivel mechanism - 360° swivel capability; tilt 5° forward to 15° back of vertical. Removable base.
Horizontal Refresh Rate	19.5 kHz
Vertical Refresh Rate	50 Hz or 60 Hz, selectable, depending on line frequency.
Display Format	80 characters per line x 24 lines, plus a 25th line for Terminal Status, Host Messages, Set-Up Mode, or Function Key legends.
Display Page	1920 characters (2,000 with status line)
Character Font:	
Character Field	8 x 11 dot matrix.
Character Matrix	7 x 10 dot matrix with descenders.
Cursor	8 x 11 steady or blinking block; can be turned off or on.
Character Sets	128 displayable characters including control codes. Optional international character sets available.
Business Graphics	Block Graphics, Wide Point Graphics, and Line Drawing characters.
Visual Attributes	Four attributes; non-embedded reduced intensity plus blink, blank, reverse video. Can be used individually or in combinations.
Formatting Aids:	
Program Mode	For displaying received control characters.
Conversation Mode	Interactive (character-by-character transmission, Full or Half Duplex operation).
Cursor Movement	Relative and absolute addressing, and read cursor capabilities.

Table 1-1. ADM 11 Specifications (continued)

SPECIFICATION	DESCRIPTION
<p>KEYBOARD FUNCTIONS</p> <p>Keyboard</p> <p>Keyboard Layout</p> <p>Numeric Keypad</p> <p>Cursor Control</p> <p>Function Keys</p> <p>Edit Keys</p> <p>Function Command Keys</p> <p>Non-Volatile Set-Up Mode</p> <p>Operator Convenience</p>	<p>Detached, low-profile, DIN standard with six-foot coiled cord. Sculptured keys, selectric-type layout. Calculator format numeric keypad. Two tone keycaps, by function; rib dividers to separate three keypads. 11° keyboard tilt mechanism. Keys are auto-repeating (15 chars. per second). 256 character keystroke buffer.</p> <p>QWERTY -- Typewriter Pairing.</p> <p>14 keys, 0 through 9, Enter, comma, period, and minus. 0 and Enter keys are double-size.</p> <p>Up, down, left, right, home arranged in a "cross" pattern. Return, Line Feed, New Line, Backspace, Tab and Back Tab.</p> <p>Four programmable function keys, shiftable to eight functions each transmitting up to an 8-character sequence.</p> <p>Erase line or page.</p> <p>Escape, Setup/Status, Delete, Break, Cap Lock, Shift, Control and Clear.</p> <p>No dip switches - Terminal functions are selectable from the keyboard, or remotely from the host. Features selectable in Set-Up Mode include: Key-Click, Communications Characteristics, Replacement Characters, and more.</p> <p>Selectable key-click for audible feedback and 3-key roll-over to reduce "missed" characters.</p>
<p>EDITING</p> <p>Edit Operations</p>	<p>Clear screen, erase to end of line/page. Editing can be from the keyboard or host.</p>
<p>COMMUNICATIONS</p> <p>Interfaces:</p> <p> Primary Port</p> <p> Data Rates</p>	<p>RS-232C, serial asynchronous ASCII communications. Serial auxiliary port (RS-232C) with page print and transparent print.</p> <p>300, 600, 1200, 2400, 4800, 7200, 9600 and 19,200 baud. (9600 max. for 20mA current loop)</p>

Table 1-1. ADM 11 Specifications (continued)

SPECIFICATION	DESCRIPTION
Word Structure	1 start bit, 7 data bits, 1 parity bit (odd, even, mark, space or none - selectable), and 2 stop bits.
Parity	Even, odd, or no parity
Stop Bits	1 stop bit
Format	ASCII serial asynchronous communications.
Busy Indication	<p>Primary (Modem) Port: Sends X-OFF (DC3), X-ON (DC1) or DTR to host on busy/ready condition of main port or auxiliary port.</p> <p>Auxiliary Port: Senses busy level on Pin 20 (DTR) of the Auxiliary interface.</p>
Transmission Format	Character-by-character (Conversation Mode).
Input Buffer	1536 bytes
Data Flow Control	X-On/X-Off (user-selectable characters) or, DTR (Pin 20) may be used to indicate the terminals Busy/Ready status or no control.
GENERAL	
Operating Environment:	
Temperature	5° C to 40° C (41° F to 104° F)
Humidity	10% to 85% without condensation.

SECTION II INSTALLATION

2.1 INITIAL PREPARATION

The space-saving design of the ADM 11 has proven to be beneficial for almost every terminal site. Its small size is ideally suited to those work environments where physical space is limited.

The physical dimensions of the ADM 11 are shown in **figure 2-1, page 2-2**. The basic requirements for installation are as follows:

- Table or desk mounting
- Standard three-pronged 115-volt (230-volt) A.C. power outlet.
- Cable connection to the computer, data set or modem; serial printer, or other auxiliary device. If connection to a remote computer is desired, a modem or data set is usually required.

CAUTION

Allow the ADM 11 to adjust to severe changes in the environment before applying power. This will reduce the possibility of internal condensation, which could impair its operation.

2.1.1 Line Voltage Selection

The ADM 11 is shipped ready to operate at either 115-volt or 230-volt AC as specified on the purchase order. Lear Siegler authorized maintenance personnel can quickly modify the ADM 11 to operate at any other specified line voltage.

2.1.2 Set-Up Mode Preparation

The operating configurations of the ADM 11 have been pre-set at the factory as indicated by "#" in **Table 2-1, page 2-6**.

These operating functions of the ADM 11, controlled by firmware "switches" are displayed on the status line when the Set-Up mode is entered.

There are two levels of Set-Up Mode: *operator accessible* and *programmer accessible*.

Operator accessible set-up functions are characteristics that relate to operator comfort or preference. The *programmer accessible* set-up functions include all of the feature selections available to the operator, as well as those functions useful to the person programming the system.

Normally, the *programmer accessible* set-up functions are selected when the terminal is installed, or a new peripheral device is attached. **Table 2-1, page 2-6** describes the Set-Up functions which can be selected for both modes.

Parameters of the host computer must be determined before the terminal can be used. If changes need to be made to the Set-Up mode functions, refer to **Section 3.1, page 3-1**.

2.1.3 Keyboard Plug-In

Before applying power to the terminal, plug the keyboard coiled cord into the connector on the back of the monitor. Refer to **figure 2-2, page 2-4** for connector location.

2.1.4 Monitor Keyboard Adjustment

The ADM 11 monitor can be tilted and swiveled to position it in the optimum viewing angle for the operator. "Clicks" heard, as the monitor is adjusted are from the positive detent mechanism, which holds the monitor securely in the desired position.

The keyboard may be tilted for maximum operator comfort. Simply turn down the two feet located under the rear of the keyboard housing, if desired.

2.2 INTERFACE INFORMATION

The ADM 11 may be cabled directly to a local computer, serial printer (or other auxiliary device), or it may be connected via telephone data lines to a remotely located computer. Remote computer connections require the use of a modem or data set. **Figure 2-3 on page 2-5** shows a typical ADM 11 application. **Figure 2-2** shows the rear panel locations of the interface connectors. **Figure 2-4/5** shows the logic associated with these interfaces.

2.2.1 RS-232C Interface

The Primary (Modem) Port RS-232C Interface provides the signals and levels associated with RS-232C, allowing direct connection to a computer or modem. The maximum permissible cable length is 50 feet for RS-232C applications.

2.2.2 20mA Current Loop Interface

The ADM 11 can be configured for 20mA Current Loop operation using the Primary (Modem) Port. The current loop interface

signal levels allow cable lengths of up to 1000 feet. The maximum baud rate for current loop operation is 9600.

2.2.3 Auxiliary Port Interface

The Auxiliary Port is used for connecting an RO (receive only) serial printer or other RO device to the terminal using RS-232C signal levels. The gated Auxiliary Port mode, when selected in Set-Up Mode, allows selective transmission of data from the keyboard, in Half-Duplex mode, or the communication line through the Auxiliary Port.

Note

The peripheral device that is attached to the Auxiliary port must operate at the same baud rate as the communication line.

2.3 INSTALLING THE ADM 11

1. Check the ON/OFF switch on front of unit. Refer to **figure 2-2** to ensure that it is set to OFF.

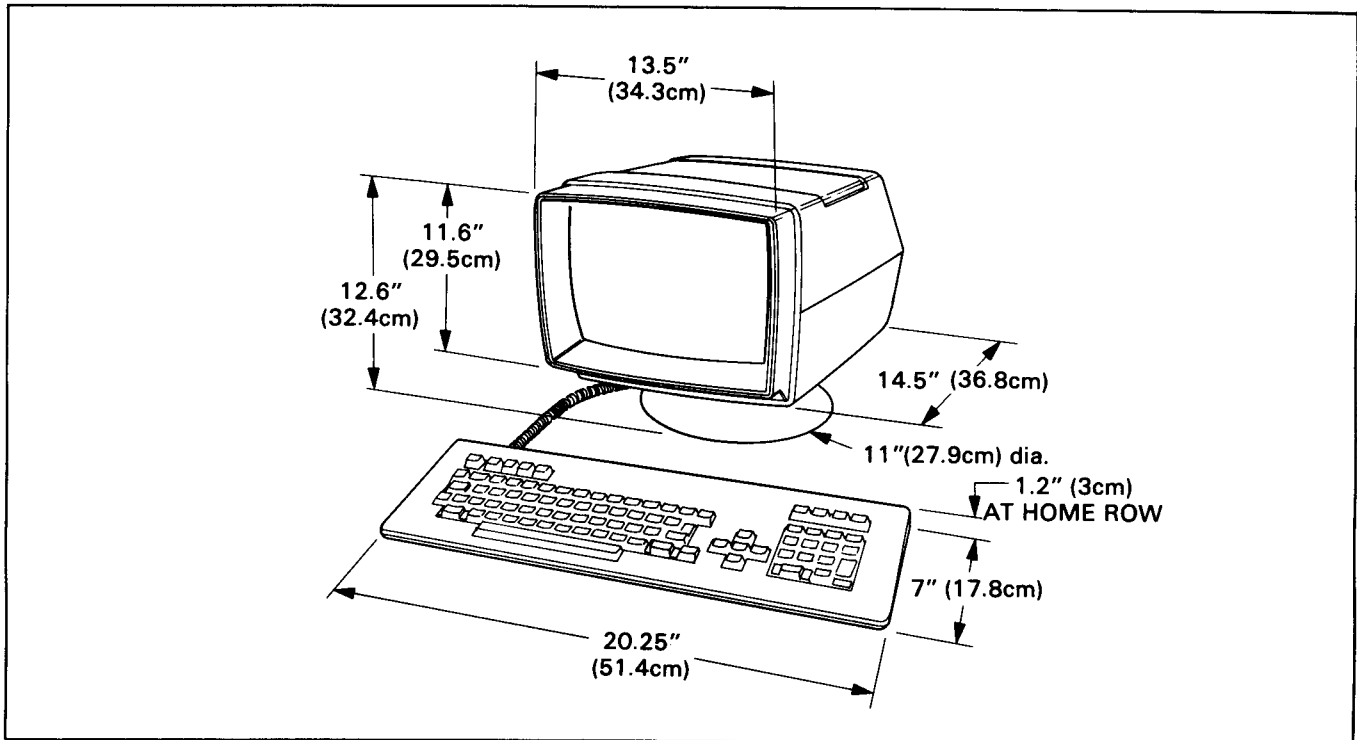


Figure 2-1. ADM 11 Dimensions

2. Connect the data interface cable(s) to the terminal using the appropriate interface information (paragraph 2.2).
3. Plug the power cord into a grounded AC outlet of the proper voltage.
4. Turn on the terminal.
5. Select the desired baud rate via Set-Up Mode (refer to Table 2-1).
6. Select the Set-Up Mode functions as desired to establish the operating parameters of the ADM 11 (refer to Table 2-1). If the terminal is to power-up with the selected functions, save the characteristics by executing a **CTRL | S** operation in Set-Up Mode (refer to paragraph 3.1.2).

2.4 POWER TURN-ON

1. Set the ON/OFF switch on the front of the unit to ON (refer to figure 2-2).
2. Wait approximately 20 seconds for the unit to warm up. The cursor should appear in the HOME position.
3. The Self-Test message "PASS" should appear in the upper left corner and the terminal will sound the audible alarm.
4. If the Self-Test message and the cursor do not appear, turn off the ADM 11, wait 15 seconds and apply power again. If the message and cursor still do not appear, check the CONTRAST control, then contact your authorized Lear Siegler service representative.

CAUTION

To avoid damage to the CRT screen when the terminal is to remain ON but unchanged for extended periods of time, reduce the screen brightness using the CONTRAST control on front of unit.

5. Adjust CONTRAST control (figure 2-2) for desired display brightness.

2.5 POWER TURN-OFF

If the unit is displaying information which must be retained, be sure to transmit this information to the host immediately. This is necessary, as the display is cleared when power is removed from the unit. An alternative is to send the information to a printer prior to turning the unit OFF.

2.6 CARE OF THE ADM 11

2.6.1 Cleaning

At periodic intervals, clean the exterior housing and lightly dust the unit using a soft brush or damp lint-free cloth or paper towels. Do not use petroleum base cleaners, such as lighter fluid, as this could be harmful to the housing. Remove smudges from the CRT exterior screen and housing with conventional spray cleaners or alcohol.

2.6.2 Inspection

The characters on the CRT screen should remain sharp, clear, and intense for the life of the terminal. If this should vary, your authorized Lear Siegler service representative can quickly make any required mechanical and electrical adjustments.

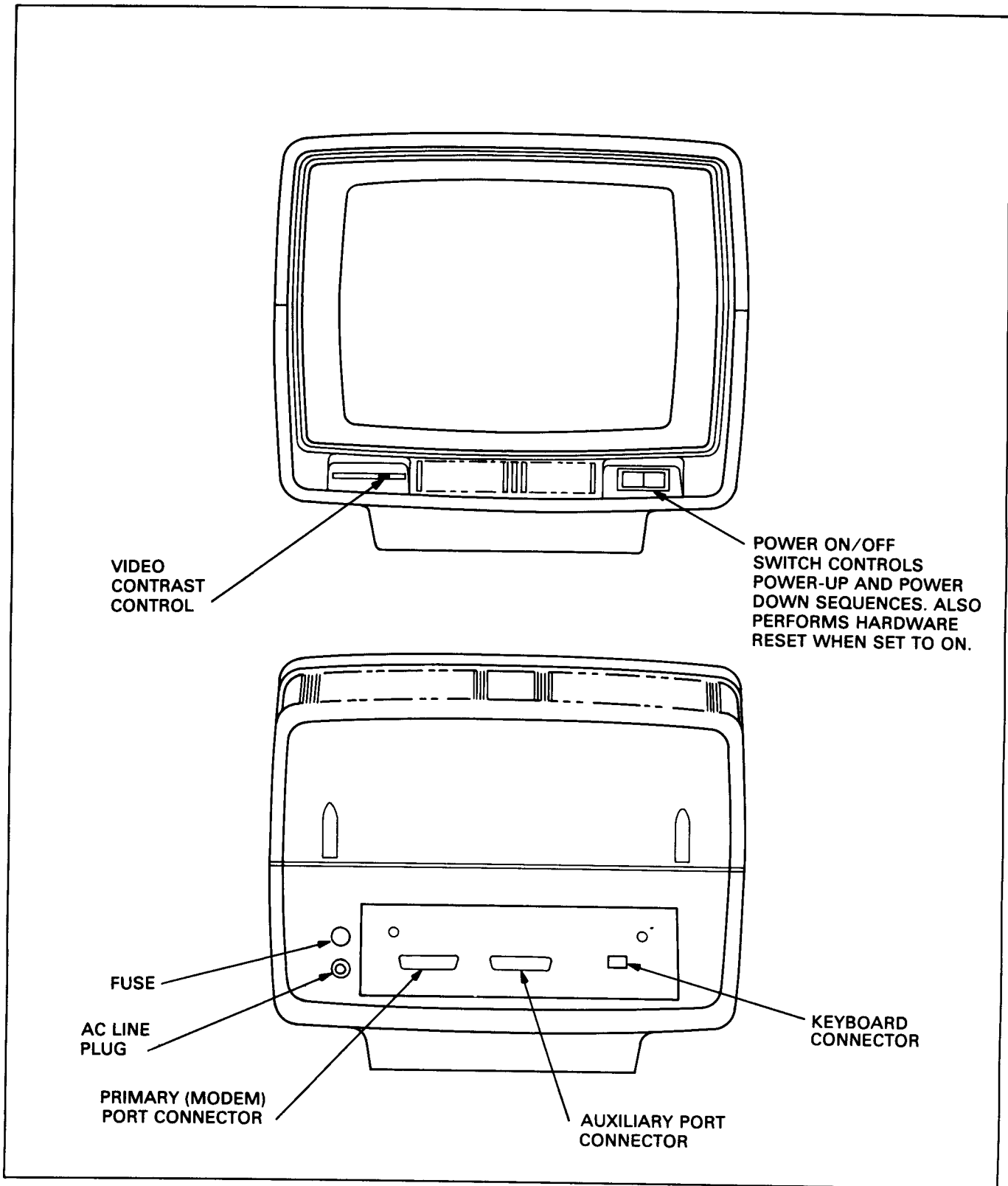


Figure 2-2. ADM 11 Controls and Connectors

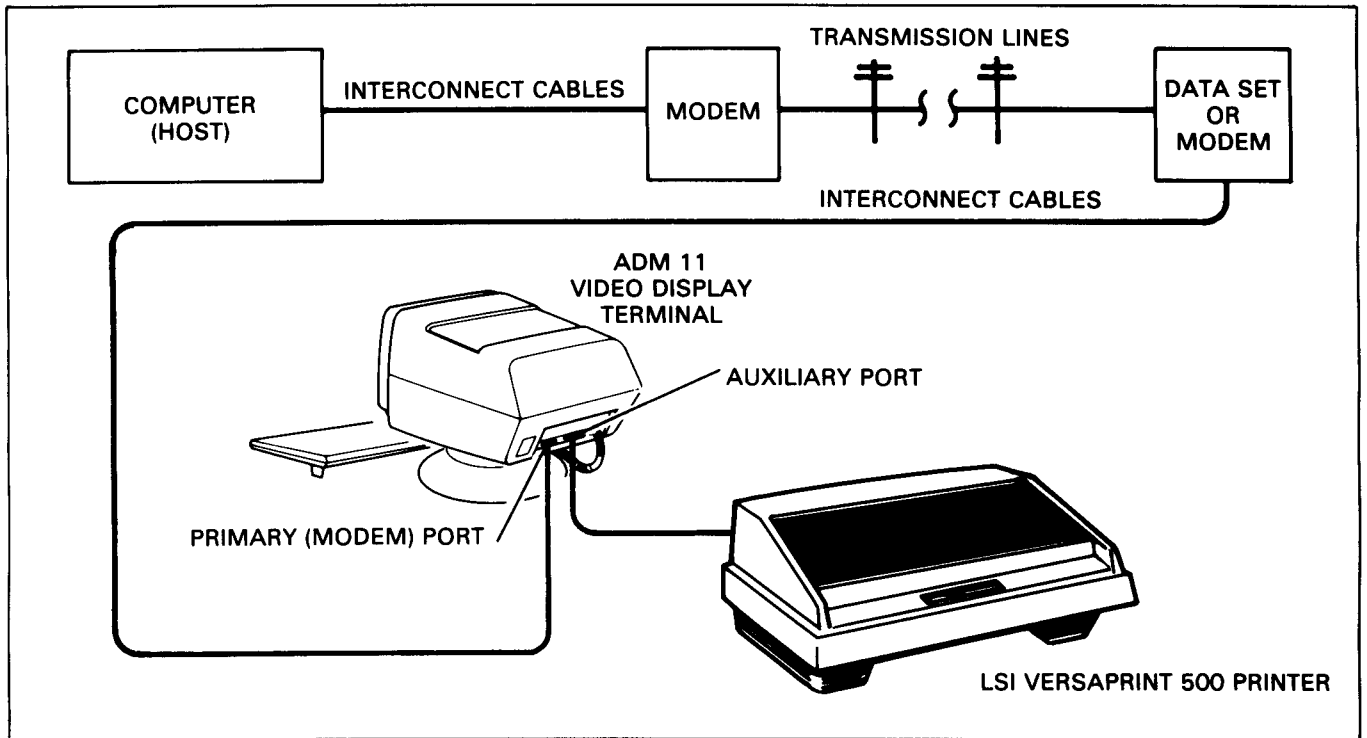


Figure 2-3. Typical ADM 11 Applications

Table 2-1. Set-Up Mode Functions

("#" indicates factory pre-set configurations; * indicates operator accessible functions)

FUNCTION	SETTING	DESCRIPTION
CLICK*	N	No key-click sounds when a key is depressed.
	Y #	Key-click sounds when a key is depressed.
ONLINE*	N	Terminal operation is off-line (local) mode.
	Y #	Terminal operation is on-line to the host computer.
CURSOR BLINK*	N #	Cursor is a non-blinking reverse video block.
	Y	Cursor is a blinking reverse video block
STATUS*	NORM	Status Line is in normal video.
	REV #	Status Line is in reverse video.
	BLANK	Status Line is blank.
	BLINK	Status Line is blinking.
WRAP	N	Cursor remains at rightmost column of screen when a line has been filled with characters.
	Y #	Cursor moves to the first column of the next line when a line has been filled with characters.
NEWLINE	N	Auto line feed is disabled. <input type="checkbox"/> RETURN and <input type="checkbox"/> ENTER perform a carriage return only; the cursor moves to the leftmost column of the current line.
	Y #	Auto line feed is enabled. <input type="checkbox"/> RETURN and <input type="checkbox"/> ENTER perform a line feed and carriage return, the cursor moves to the leftmost column of the next line.
BPS	300 600 1200 2400 4800 9600 # 19200	Sets the baud rate to be used in communications with the host computer and the auxiliary device. Note: current loop to 9600 Baud only

Table 2-1. Set-Up Mode Functions (continued)

("#" indicates factory pre-set configurations; * indicates operator accessible functions)

FUNCTION	SETTING	DESCRIPTION
BITS	7	Selects the data bit length to be seven bits.
	8 #	Selects the data bit length to be eight bits.
BIT 8	0	Sets the eighth data bit to zero.
	1 #	Sets the eighth data bit to one. NOTE: These settings are valid only if an 8 data word bit is selected.
PTY ENABLE	N #	Parity bit is disabled.
	Y	Parity bit is enabled. This setting is valid only if a 7 bit data word is selected.
PTY	EVEN #	Even parity is enabled.
	ODD	Odd parity is enabled. NOTE: These settings are valid only if a 7 bit data word is selected.
SET DUPLEX MODE	HDX	Half Duplex mode is enabled. Typed characters are transmitted to the host computer and displayed on the screen.
	FDX #	Full Duplex mode is enabled. Typed Characters are transmitted to the host computer. Characters must be echoed from the host computer to be displayed.
CHRS/FNC	4	Function keys will store up to four character codes per key. This allows eight functign keys to programmed.
	8 #	Function keys will store up to eight character codes per key. This allows four function keys to be programmed.
FNC KEYS	N #	The non-volatile memory option for the function keys is not present. (Disabled)
	Y	The non-volatile memory option for the function keys is present. (Enabled)

Table 2-1. Set-Up Mode Functions (continued)

("#" indicates factory pre-set configurations; * indicates operator accessible functions)

FUNCTION	SETTING	DESCRIPTION
SO/SI	LK KBD #	Unlocks and Locks the keyboard using CTRL-N/CTRL-O codes respectively .
	GATE AUX	Enables and Disables GATED Auxiliary mode using using CTRL-N/CTRL-O codes respectively.
FREQ	60 #	Sets vertical refresh rate to 60 Hz.
	50	Sets vertical refresh rate to 50 Hz.
HANDSHAKE	NO	Handshaking busy/ready protocol between the terminal and host computer is disabled.
	DTR	Handshaking protocol is enabled using the DTR signal on pin 20.
	XON #	Handshaking protocol is enabled using X-ON/OFF codes on pin 20.
XON/XOFF	DC1 / DC3 #	The X-ON/X-OFF characters that are transmitted are set to DC1/DC3.
	ACK/NAK	The X-ON/X-OFF characters that are transmitted are set to ACK/NAK.
	STX/ETX	The X-ON/X-OFF characters that are transmitted are set to STX/ETX. NOTE: These settings are valid only if the XON handshake mode is selected.
BUSY	HI	The active busy DTR signal for the Auxiliary Port is set to high.
	LO #	The active busy DTR signal for the Auxiliary Port is set to low.
ANSBK	N #	Disables the terminal's answerback message upon receipt of an ENQ code.
	Y	Enables the terminal's answerback message upon receipt of an ENQ code. NOTE: These settings are valid only if the terminal has the answerback option installed.

Table 2-2. Down-Line Load Set-Up Features

The Set-Up features can be down-line loaded by the host computer using the following command sequences:

ESC k P₀ P₁ P₂ P₃ P₄ P₅ P₆ P₇

Where P₀-P₇ defines eight nibbles of set-up such that each nibble is in the range 30-3F.

NIBBLE	BITS 7 - 4	BITS 3 2 1 0	DESCRIPTION
P ₀	'3'		On-line 1 = Online 0 = Local Cursor 1 = Blink 0 = Steady Not used Not used
		3 2 1 0	
P ₁	'3'		Status line attribute 00 = Normal 01 = Reverse 10 = Blank 11 = Blink Key click 1 = ON 0 = OFF Not used Not used
		3 2 1 0	
P ₂	3		Function keys non-volatile 1 = YES 0 = NO Auxiliary busy level 1 = Low 0 = High Duplex 1 = FDX 0 = HDX SO/SI mode 1 = Gated Auxiliary Mode 0 = Keyboard Lock

Table 2-2. Down-Line Load Set-Up Features (continued)

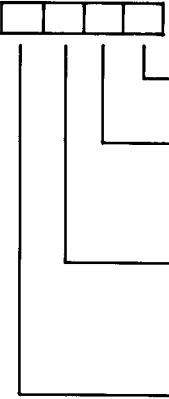
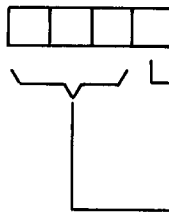
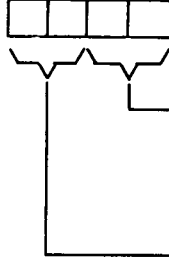
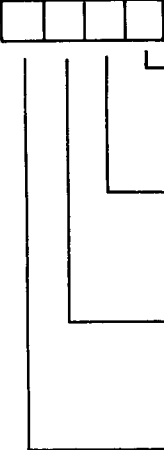
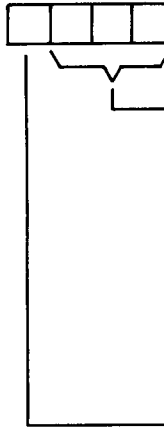
NIBBLE	BITS 7 - 4	BITS 3 2 1 0	DESCRIPTION
P ₃	'3'		<p>Wraparound 1 = ON 0 = OFF</p> <p>Newline with RETURN or ENTER key 1 = ON 0 = OFF</p> <p>Vertical Refresh 1 = 50 Hz 0 = 60 Hz</p> <p>Number of characters per function key 1 = 8 0 = 4</p>
P ₄	'3'		<p>Answerback enabled 1 = YES 0 = NO</p> <p>Not used</p>
P ₅	'3'		<p>X-ON/X-OFF Selection 00 = DC1/DC3 01 = ACK/NAK 10 = STX/ETX 11 = Unallowed</p> <p>Handshake Mode 00 = None 01 = DTR 10 = X-ON/X-OFF 11 = Unallowed</p>

Table 2-2. Down-Line Load Set-Up Features (continued)

NIBBLE	BITS 7 - 4	BITS 3 2 1 0	DESCRIPTION
P ₆	'3'		<p>Number of data bits per word 1 = 8 bits 0 = 7 bits</p> <p>Parity enabled 1 = YES 0 = NO</p> <p>Parity sense 1 = ODD 0 = EVEN</p> <p>Bit 8 level 1 = High 0 = Low</p>
P ₇	'3'		<p>Baud Rate 000 = 300 baud 001 = 600 baud 010 = 1200 baud 011 = 2400 baud 100 = 4800 baud 101 = 9600 baud 110 = 19200 baud 111 = Unallowed</p> <p>Not used</p>

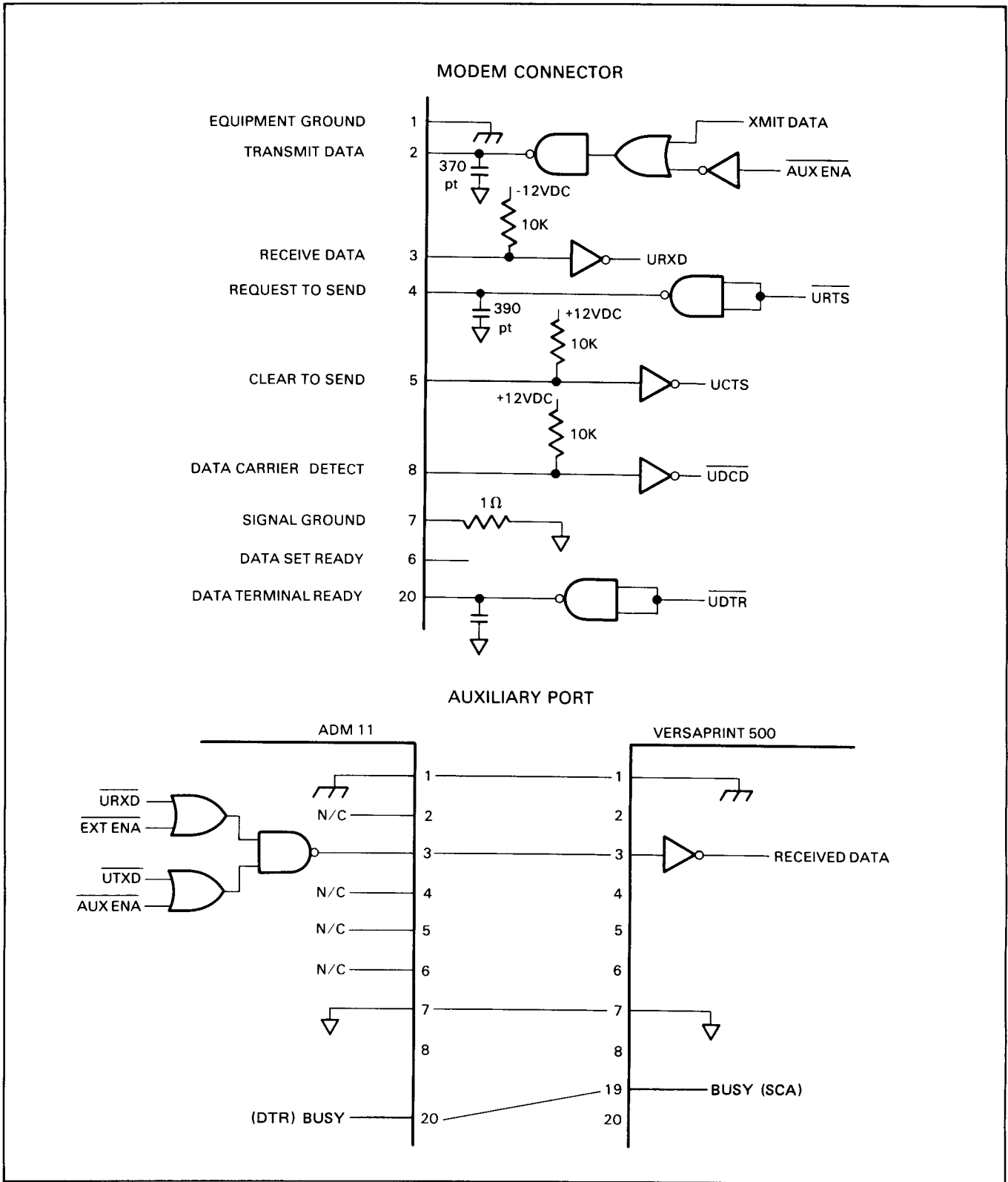


Figure 2-4. Modem Connector and Auxiliary Port

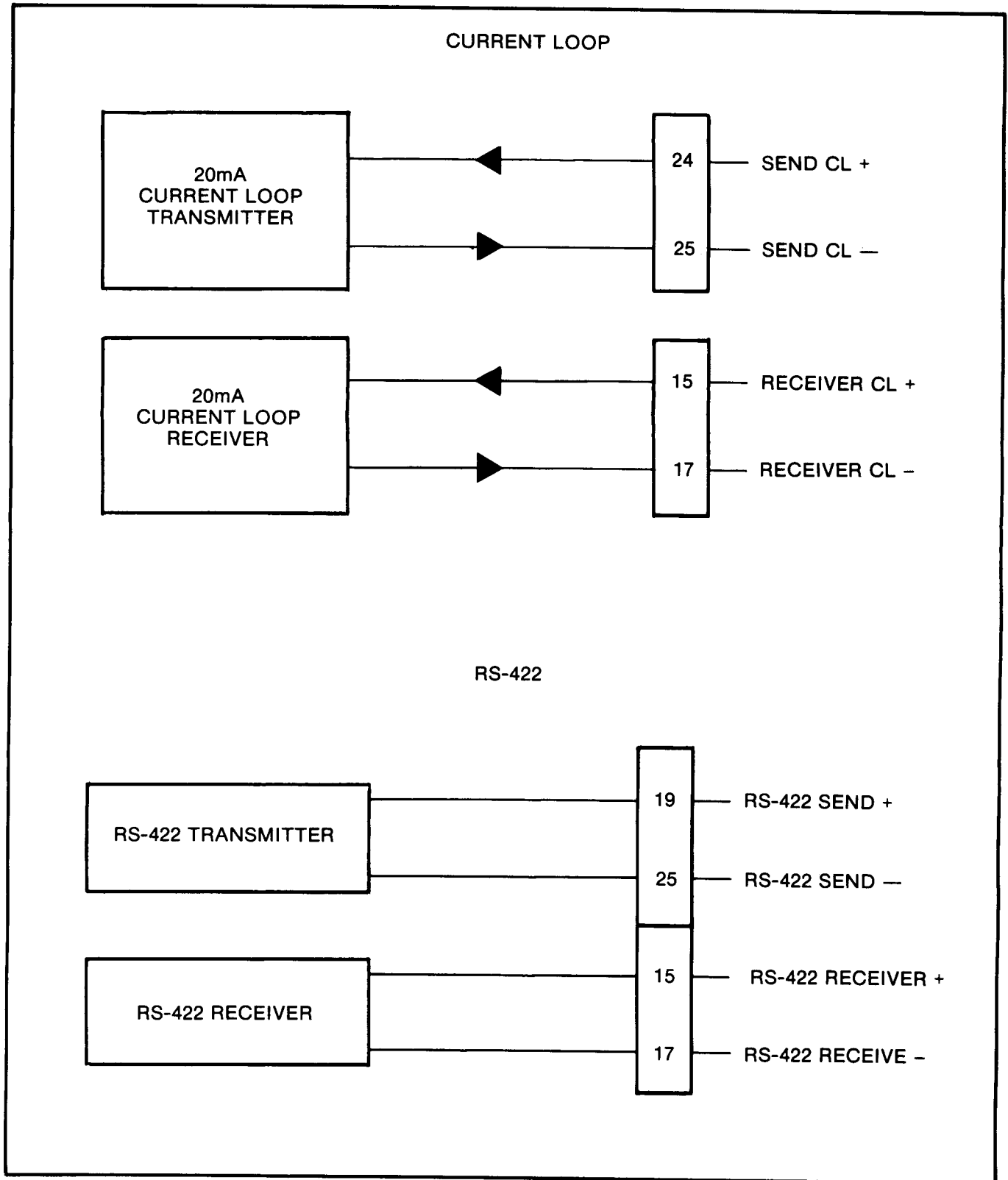


Figure 2-5. Optional Current Loop and RS-422 Interface Logic

SECTION III OPERATION

3.1 SET-UP MODE

The OPERATOR ACCESSIBLE set-up functions are accessed by entering **[SHIFT][SETUP]**; the supervisor functions are accessed by entering **[SHIFT][CTRL][SETUP]** from the keyboard.

3.1.1 Selecting Functions

When Set-Up Mode is entered, the status line (line 25) will disappear, and the first set-up mode function will be displayed, (see figure 3-1). The cursor will be positioned over one of the available selections (N or Y); this is the current value associated with the function. To change the value associated with a particular function, press **[→]** or **[←]** until the cursor is positioned over the desired value. Press **[↓]** to display the next available function. For example, pressing **[↓]** when CLICK is displayed will cause the STATUS function to be displayed if in the operator accessible mode. Pressing **[↑]** will cause the previous function to be displayed. Pressing the **[HOME]** key causes the first function (CLICK) to be displayed.

Pressing the **[STATUS]** key will cause the terminal to exit Set-Up and return to the previously established mode. The status line will appear at the bottom of the display screen. The operator can go from operator to supervisor accessible functions while in Set-

up mode via the **[SHIFT][CTRL][SETUP]** command mentioned above.

Pressing the **[STATUS]** key exits Set-Up mode and causes any changes that were made to take effect and the status line will be displayed. The ADM 11 receives but does not process all received data while in Set-Up mode. When handshaking is enabled the ADM 11 will X-OFF on drop if the host overruns the input buffer.

Note

Changing communications characteristics when in Set-Up Mode may affect or prevent further data transfer with the host computer or auxiliary device.

3.1.2 Saving Set-Up Functions

When the various functions are selected, they take effect upon exiting Set-Up Mode. The set-up is stored in temporary "working" memory and will be lost if the terminal is powered-down. To cause the set-up functions to be saved in non-volatile memory, enter the **[CTRL][S]** (press **[CTRL]** and **[S]** simultaneously) command when in Set-Up Mode.

There are two other commands that can also be performed in Set-Up Mode: **[CTRL][D]** and **[CTRL][R]**. **[CTRL][D]** causes the ADM 11 to be set to the default function values.

Table 3-1. Keystroke Explanations

This chart describes the keystroke execution used in this manual.

Keystrokes	Descriptions
[ESC] [A] [2]	Independent keystrokes, typed one after the other.
[CTRL] [Z]	Simultaneous keystrokes. In this example, the CTRL key is held down while the "Z" key is typed.

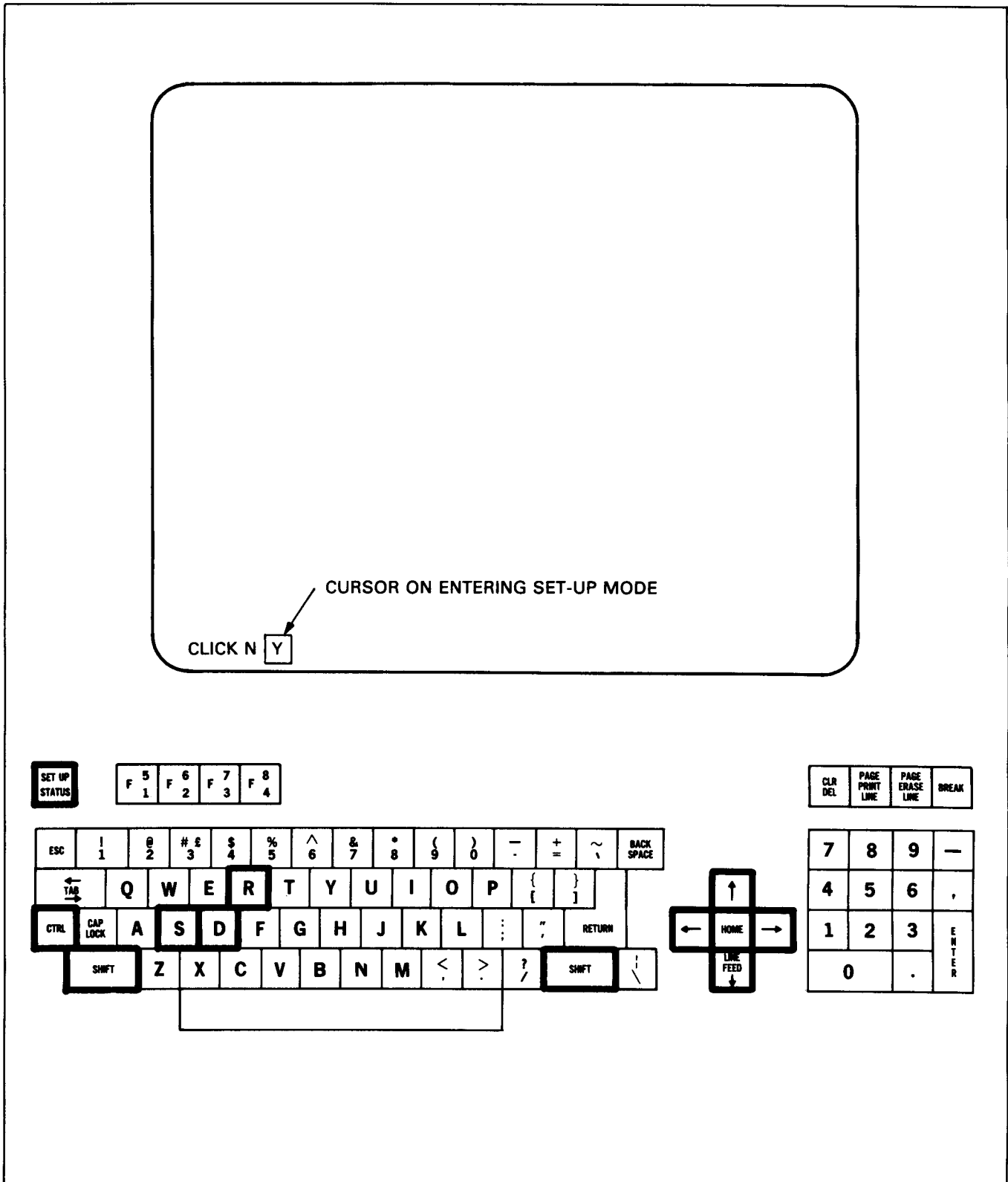


Figure 3-1. ADM 11 Set-Up Mode Display and Associated Keys

CTRL R causes the terminal to restore the function values that are currently in non-volatile memory (the current function values might not have been saved). A **CTRL S** must follow a **CTRL D** or **CTRL R** if the desired settings are to be saved in non-volatile memory. A save, default, or restore operation will not be performed if the corresponding key sequence (**CTRL S**, **CTRL D**, or **CTRL R**) is entered while the terminal is in any mode other than Set-Up. The ADM 11 will always power-up to the last saved set-up conditions.

3.1.3 Down-Line Load Set-Up

The Set-Up mode features can be selected by the host computer by a command sequence. Refer to Table 2-2 on page 2-8 for details.

3.2 OPERATIONAL MODES

The ADM 11 provides several different modes of operation which are selectable by the host or from the keyboard. The power-on mode conditions are established by the last saved functions selected in the associated Set-Up features. The various command sequences used to change the operating characteristics of the ADM 11 are detailed in paragraph 3.5.

3.2.1 On-Line Or Local Mode

On-Line Mode -- When the terminal is placed On-Line, data that is received will be displayed or acted upon, and keyboard entries will be transmitted and/or displayed, depending on the communications mode selected.

Local Mode -- In Local Mode, the terminal ignores the communications interface. Keyboard entries are displayed or acted upon locally. No data transmission takes place between the terminal and the host computer. The RTS (Request To Send) and DTR (Data Terminal Ready) signals are held low (busy).

3.2.2 Conversation Mode

The ADM 11 operates exclusively in Conversation Mode. Data that is entered on the keyboard is immediately transmitted to the host computer, character-by-character.

The display action is determined by the setting of Full or Half Duplex Mode as follows:

Full Duplex -- Characters that are entered from the keyboard are transmitted to the host computer, but are not directly displayed on the CRT. In order for data to be displayed, it must be echoed from the host computer. RTS is always high.

Half Duplex -- Characters that are entered from the keyboard are transmitted to the host computer and are also routed to the CRT to be displayed locally. RTS goes low when RETURN or ENTER is depressed.

3.2.3 Program Mode

Setting Program Mode via the **ESC U** key sequence causes the terminal to display all 128 ASCII characters. Normally, the 32 control codes (00-1F) cause a particular action to be performed. However, in Program Mode, the control codes are displayed instead of being acted upon. This allows the embedding of formatting information that is particularly useful in print output and as a diagnostic aid. The control codes can never be displayed in reduced intensity. The **ESC X** key sequence causes the terminal to exit Program Mode.

3.3 KEYBOARD OPERATION

The operator uses a keyboard very similar to that of a standard office typewriter to enter data and perform control operations. Functionally, the keyboard consists of the displayable 96 ASCII character set keys and various control or modifier keys. All keys are auto-repeating, except the SETUP, PAGE/LINE ERASE, BREAK, ENTER, RETURN, and Function Keys, at the rate of approximately 15 characters per second. Auto repeat starts after a key has been depressed for a minimum of one second. Figure 3-2 describes the functions of the ADM 11 keyboard. Paragraphs 3.3.2 thru 3.3.9 detail the keyboard by the following types of operation, page 3-6.

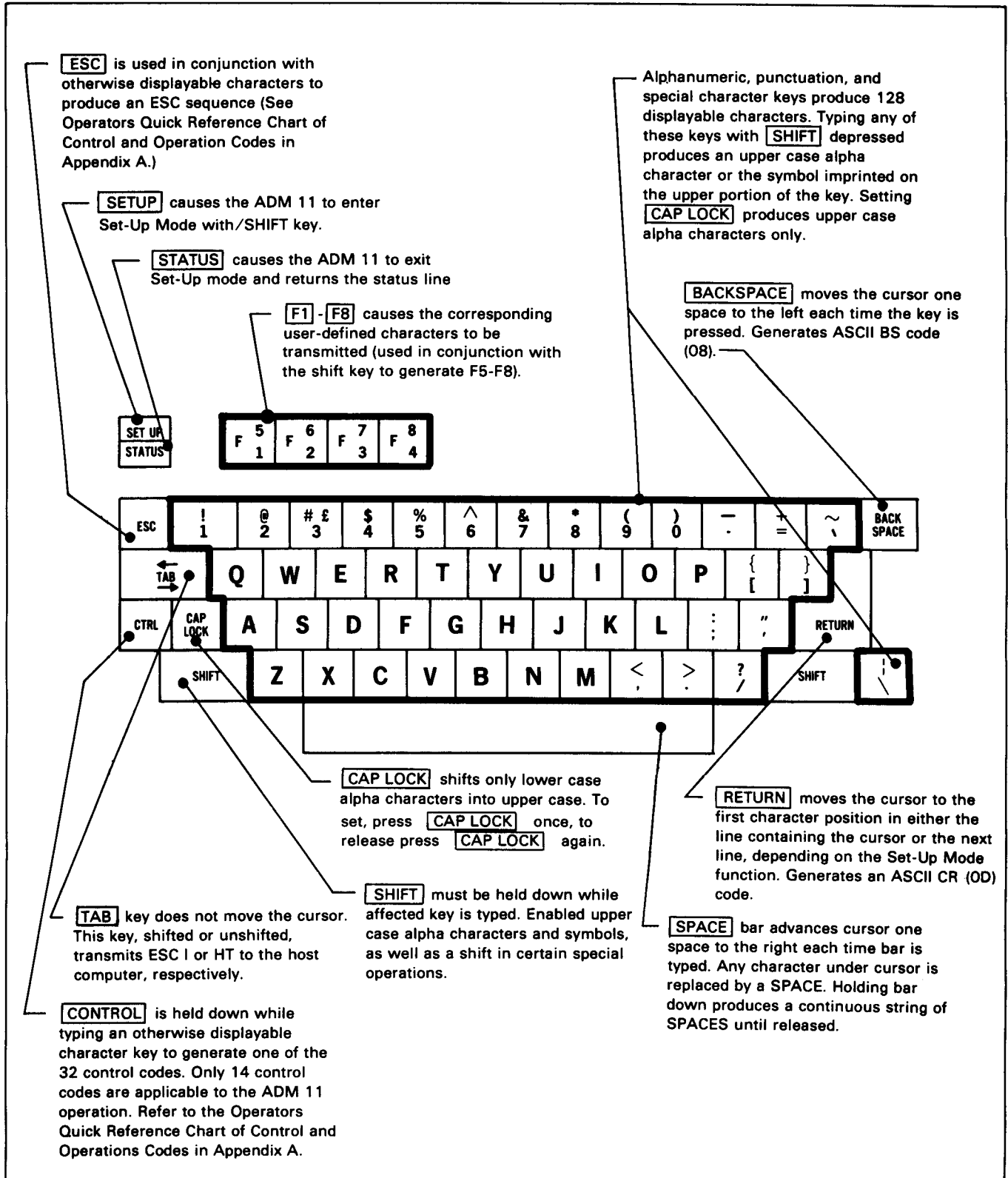


Figure 3-2. ADM 11 Standard Keyboard Operation Characteristics

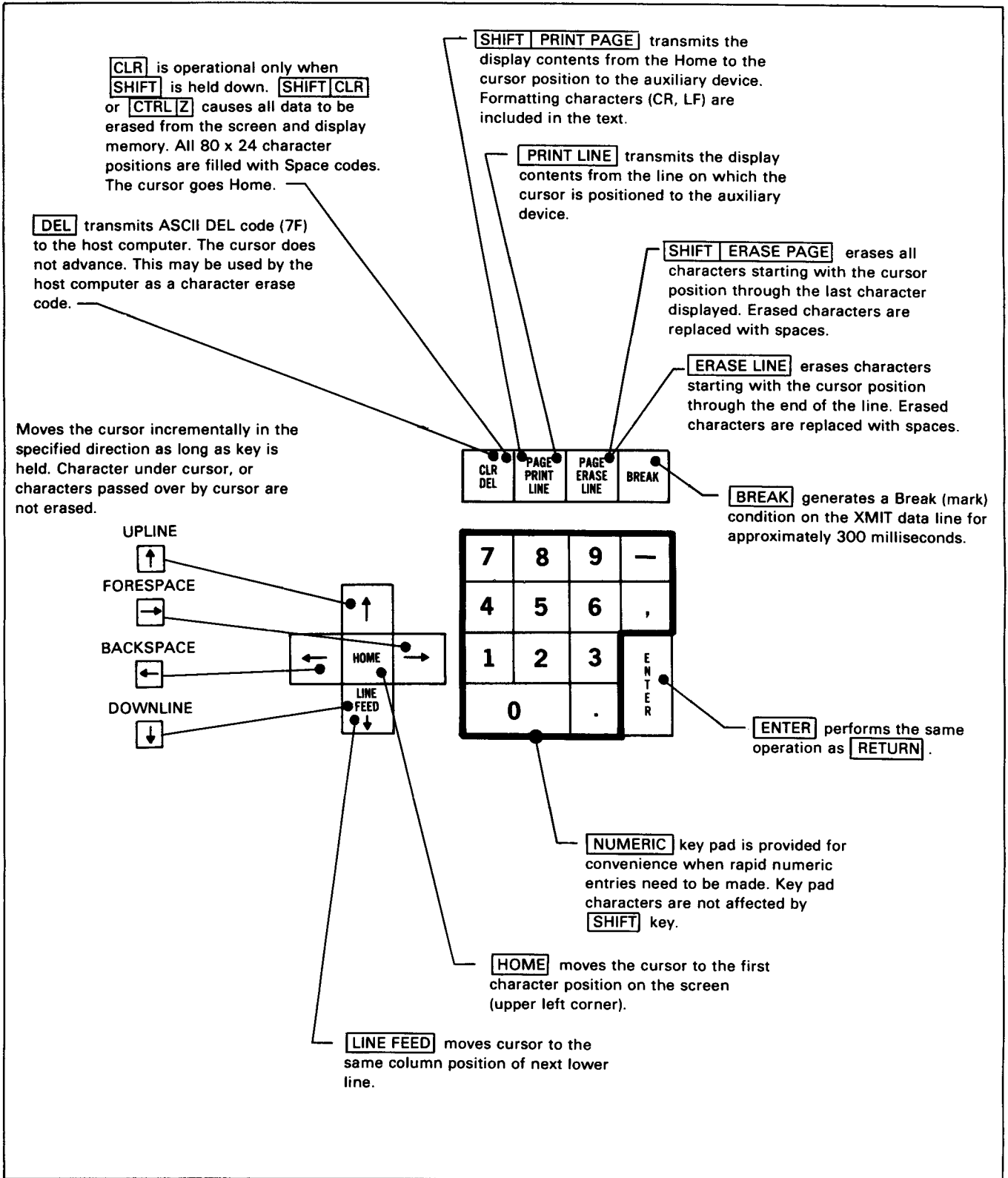


Figure 3-2. ADM 11 Standard Keyboard Operation Characteristics (continued)

- Alphanumeric and Punctuation Keys
- Numeric Keypad
- Modifier Keys
- Cursor Control Keys
- Edit Keys
- Transmission Keys
- Function Keys
- Special Operation Keys

3.3.1 Keystroke Conventions

Ordinarily, each keystroke that is typed by the operator is independent of the one preceding or following it. However, the keyboard is scanned in such a manner that even a very fast typist will not be able to overrun the keyboard. This is accomplished by the 3-key rollover data entry protection, plus a 256 keystroke buffer, provided by the ADM 11. The keyboard also provides audible feedback by a user-selectable key-click feature that indicates a valid key closure.

Keys such as **SHIFT** and **CTRL** are used in conjunction with other keys to modify their operation.

3.3.2 Alphanumeric and Punctuation Keys

The upper/lower case, numerics, and punctuation characters from the 96-displayable ASCII character set, (Hex 21-7E), plus space (Hex 20) and DEL (Hex 7F), are output to the display and/or transmitted when a key is pressed. Keys that have a double legend produce the lower-case or lower legend when unshifted, and the upper-case or upper legend when pressed with the **SHIFT** key. The **SPACE** key generates an ASCII 20 Hex code for transmission and occupies one space on the display screen. The **DEL** key produces an ASCII 7F Hex code for transmission, but will not occupy a space on the display screen unless Program Mode is set. **DEL** may be used by the host computer as a character erase code.

3.3.3 Numeric Keypad

The ASCII numerals 0 thru 9 and minus, comma, and period are output to the display

and/or transmitted (depending upon the communications mode selected) when a key is pressed. The ASCII hex codes generated are identical to the lower legend numerals and punctuation on the main keyboard area.

3.3.4 Modifier Keys

The following keys do not generate any output by themselves, but modify the code generated by the alphanumeric keys on the keyboard.

SHIFT causes the upper legend character of a double legend key to be produced when pressed in conjunction with either **SHIFT** key. The 26-alpha characters are shifted for upper-case, and unshifted for lower case.

CAPLOCK this alternate action key causes the 26-alpha characters to stay shifted (upper-case) when on. The numeric and punctuation keys, as well as the various control keys, are not affected.

CTRL the control key causes one of the 32-ASCII control codes to be generated when pressed in conjunction with an otherwise displayable character key. The character generated will not display a character on the display unless Program Mode is set. Some control codes are utilized by the ADM 11, refer to **Table 3-2, page 3-9** for details.

3.3.5 Cursor Control Keys

The Cursor is used to indicate the next character position to be entered on the display. The cursor may be positioned by remote commands from the host computer or by cursor control keys on the keyboard. The following keys are used to position the cursor on the display:

↑ **↓** **←** **→** and **HOME** move the cursor as indicated and transmit the ASCII control codes listed in **Table 3-2, page 3-9**.

The **TAB** key does not move the cursor. **TAB** transmits an HT code (Hex 09) to the host computer. **SHIFT TAB**, ie. **BACK TAB** transmits an ESC I code (Hex 1B 49) to the host computer.

BACKSPACE causes the cursor to move one character position to the left. A BS code (Hex 08) is generated.

RETURN moves the cursor to the beginning of the line it was in, or the beginning of the next line (a line feed code is generated prior to the carriage return when new line mode is "ON") depending upon the New Line with CR selection made in Set-Up Mode. A CR code (Hex 0D) is generated.

The **ENTER** key, which is part of the numeric keypad, performs the same function as the **RETURN** key.

LINE FEED moves the cursor to same column position on the next line down. This will cause a scroll operation to occur if the cursor was on the bottom line of the display. An LF code (Hex 0A) is generated.

3.3.6 Edit Keys

There are two edit keys on the ADM 11 keyboard; the **ERASE** and **CLEAR** keys. These keys are local functions and no code(s) are transmitted. However, these keys provide for three operations as shown below:

ERASE erases all characters from the cursor position through the end of the line. The erased characters are replaced with spaces. The cursor position does not change.

SHIFT ERASE erases all characters from the cursor position through the last character that is displayed on the CRT. The erased characters are replaced with spaces. The cursor position does not change.

SHIFT CLR erases all characters on the screen and moves the cursor to the HOME position (first row, first column). The erased characters are replaced with spaces.

3.3.7 Print Keys

PRINT causes the data on the line that the cursor is positioned to be output to the Auxiliary Port device, usually a printer. This is known as a Print Line operation. The entire line starting from the left margin is transmitted but trailing blanks and/or nulls are omitted. The line is terminated by CR NULL LF NULL.

SHIFT PRINT causes the data from the HOME position to the end of the screen to be output to the Auxiliary Port device. This is

known as a Print Page operation. At the end of each line that is transmitted, the ADM 11 automatically inserts a CR (Hex 0D) NULL (Hex 00), and LF (Hex 0A) NULL (Hex 00) code in the output data.

3.3.8 Function Keys

The ADM 11 keyboard has 4 function keys giving the user 8 programmable function sequences with **SHIFT**. Function sequences 1 through 4 are accessed by pressing keys **F1** - **F4** and function sequences 5 through 8 are accessed by pressing keys **F1** - **F4** in conjunction with the **SHIFT** keys.

The number of characters programmable into each function key sequence is controlled by the SET UP feature CHRS/FNC. If CHRS/FNC = 4 then the user can program all eight function key sequences with 4 characters each. If the Non Volatile Functions option is installed, the user can save functions F1-F8 into NVM (Non-Volatile Memory). If CHRS/FNC = 8 the user can still program eight function keys, but now each function key sequence is programmed with 8 characters. However, only F1-F4 can be saved in NVM. In this case, function key sequences F5-F8 will default to the non-programmed state.

The function sequences may be programmed from the host with 4 or 8 ASCII characters or from the keyboard locally with 4 or 8 "keystrokes". Keystrokes may be ASCII characters 00-7F hex or local action keys like **PAGE ERASE**. It's even possible to link function sequences into longer sequences by programming the 4th or 8th keystroke with the actual function key you wish to link to. This also enables looping if you link a function on itself. A looping function will repeat until the operator presses **SHIFT** and **BREAK** keys simultaneously.

Function keys are programmed via the escape sequence **ESC [X STRING** where X is a character @-G (40-46 hex) corresponding to function key 1 through 8 and "string" is the actual codes to be programmed into the function sequence. If CHRS/FNC = 8 then characters must be entered. NULLS (CTRL-@) programmed into a function sequence are not transmitted. A function can be filled

partially with data then padded with NULLS or totally disabled by completely filling it with NULLS. On power up, if the Non Volatile Function key option is not present, the functions will default as follows:

If CHRS/FNC = 8 five NULLS are padded in.
If CHRS/FNC = 4 only one NULL is padded in.

F1 = SOH @ CR NUL NUL NUL NUL NUL
F2 = SOH A CR NUL NUL NUL NUL NUL
F3 = SOH B CR NUL NUL NUL NUL NUL
F4 = SOH C CR NUL NUL NUL NUL NUL
F5 = SOH D CR NUL NUL NUL NUL NUL
F6 = SOH E CR NUL NUL NUL NUL NUL
F7 = SOH F CR NUL NUL NUL NUL NUL
F8 = SOH G CR NUL NUL NUL NUL NUL

NOTE: The above nulls are for explanatory purposes only and are never transmitted.

3.3.9 Special Operation Keys

The keys listed below perform special operations or have a unique effect on the ADM 11.

SET-UP key causes the ADM 11 to enter Set-Up Mode when pressed in conjunction with **SHIFT** and **CTRL**, as described in paragraph 3.1.1, page 3-1.

STATUS key causes the ADM 11 to exit Set-Up Mode when pressed, as described in paragraph 3.1.1. Also, **STATUS** key causes the ADM 11 to go into status line mode displaying the terminal status on the right half of the 25th line.

BREAK causes a break (mark) condition to be presented on the transmit data line of the Primary (Modem) Port for approximately 300 milliseconds. This operation has no effect on the terminal and is usually used for control signaling to the host device.

ESC generates a special control code (Hex 1B), which is used for command operations and usually followed by one or more characters. Thus, ESCape is usually considered as a "Lead-In" character for terminal control operations. Paragraph 3.4 and Table 3-3 detail the ESCape sequences utilized by the ADM 11. Pressing **SHIFT** with the **ESC** key causes a local Escape function to be processed.

3.4 DISPLAY CHARACTER FORMAT

The standard ADM 11 character set contains 128 ASCII characters, 32 of which are control characters. The entire character set may be displayed on the CRT screen by setting Program mode in the unit or by preceding a control character with an **ESC** code. Control codes can not be displayed in reduced intensity. WRAP MODE is automatically enabled when Program mode is selected. The key sequence **ESC****U** selects Program mode; **ESC****X** exits Program mode. The displayable USASCII character set and control codes are shown in Appendix A.

In addition to the standard ASCII character set, the ADM 11 provides a business graphics capability. The business (limited) graphics character set is illustrated in Appendix A.

3.5 COMMAND CODE SET

3.5.1 Control Codes

The operational characteristics of the ADM 11 are controlled, in part, by a group of control codes which may originate from the host or the keyboard. Control codes can be displayed when Program Mode is set. When Program Mode is set, the ADM 11 will display but not act upon the recognized control code. **ESC****U** sets Program Mode and **ESC****X** exits Program Mode. Of the 32-ASCII standard control codes available for use, the ADM 11 utilizes the control codes listed in Table 3-2.

3.5.2 Escape Sequences

An Escape sequence is formed by executing the **ESC** ASCII control code, followed by one or more otherwise displayable ASCII characters. Each Escape sequence controls a specific terminal operation. Some operations are one-time only, others remain operative for as long as power to the unit is not interrupted or until terminated by a control code or ESCape sequence.

Table 3-3 shows the ESCape sequences used by the ADM 11, whether initiated from the host or the computer or the keyboard. Escape

Table 3-2. Control Codes Utilized by the ADM 11


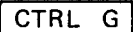








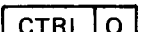

OPERATION	FROM HOST (ASCII Code)	FROM KEYBOARD	HEX CODE	DESCRIPTION
Answerback	ENQ		05	Transmits answerback if the option is present. Otherwise there is no operation.
Bell	BEL		07	Sounds the audible bell tone.
Backspace	BS	 	08	Moves the cursor to the left one character position. If cursor is at left margin no function is performed.
Linefeed	LF	 	0A	Moves the cursor to the next line down in the same column. If the cursor is located on the last line, a scroll operation will be performed.
Upline	VT		0B	Moves the cursor to the previous line up in the same column. If the cursor is located on the first line, no operation takes place.
Forespace	FF		0C	Moves the cursor to the right one character position. The cursor moves to the first position of the next line, when at the last character position of the line if wraparound mode is set.
Carriage Return	CR		0D	Moves the cursor to the first character position of the line containing the cursor.
Keyboard Enable	SO		0E	Allows data to be entered on the keyboard - keyboard unlock (same as ESC") (*from Host only if keyboard is already locked) unless the keyboard is locked by a full transmit buffer. If SO/SI is set for GATED AUX in Set-Up Mode, this enables the GATED Auxiliary mode.
Keyboard Disable	S1		0F	Prevents data from being entered on the keyboard - keyboard lock. (Same as ESC #) If SO/SI is set for LK/KBD in Set-Up Mode Otherwise, if GATE AUX is set, this disables GATE Auxiliary mode.
X-ON Character	DC1		11	Transmits the default X-ON character (DC1) if no other X-ON character is selected in Set-Up Mode. When the input buffer also resumes transmission of data when received after a DC3.

Table 3-2. Control Codes Utilized by the ADM 11 (continued)

OPERATION	FROM HOST (ASCII Code)	FROM KEYBOARD	HEX CODE	DESCRIPTION
X-OFF Character	DC3	CTRL S	13	Transmits the default X-OFF character (DC3) if no other X-OFF character is selected in Set-Up Mode, when the input buffer becomes full. Also when received stop transmission of data.
Clear all to Spaces	SUB	CTRL Z	1A	Erases the display to spaces, and, moves the cursor to the Home position.
Escape	ESC	ESC	1B	Recognized by the terminal as a code extension character which must be followed by otherwise displayable character or characters to invoke a specific terminal operation.
Home Cursor	RS	HOME	1E	Moves the cursor to the first character position of the first line of the display.
New Line	US	RETURN * or CTRL -	1F	Moves the cursor to the first character position of the next line (*when new-line feed is enabled). If the cursor is already on the bottom line, then a scroll operation occurs.

Table 3-3. ADM 11 Escape Sequences
(Operations which have an * beside them are also selectable in Set-Up Mode.)

OPERATION	HOW TO EXECUTE		HEX CODE	DESCRIPTION
	FROM HOST	FROM KEYBOARD		
Keyboard Enable	ESC "		1B 22	Allows data to be entered on the keyboard (same as SO), unless the transmit buffer is full.
Keyboard Disable	ESC #	ESC #	1B 23	Prevents data from being entered on the keyboard (same SI).
Write Normal Intensity	ESC (	ESC (	1B 28	Clears the reduced intensity mode.
Write Reduced Intensity	ESC)	ESC)	1B 29	Sets reduced intensity mode where as all data entered on screen will be reduced except for control codes.
Clear to NULL	ESC*	ESC *	1B 2A	Causes all display data to be cleared to Nulls and the cursor moves home. All attributes revert to normal display. The message and/or status line is unaffected.
Clear to Spaces	ESC +	ESC +	1B 2B	Causes all display data to be cleared to spaces. Cursor moves home. All attributes revert to normal display. The message and/or status line is unaffected.
Address Cursor	ESC=(X ₁ X ₂)	ESC = X ₁ X ₂	1B 3D (20-37) (20-6F)	Used to position the cursor to a specified row and column on the display. The location is expressed as two ASCII characters. The first (X ₁) specifies the row co-ordinate and is between "Space" and "7" (20-37 Hex). The second (X ₂) specifies the column co-ordinate and is between "Space" and "O" (20-6F Hex).
Read Cursor	ESC ?	ESC ?	1B 3F	Causes the terminal to transmit the cursor row and column position in the format as described in Read Cursor operation. Row position is transmitted first, followed by the column position and terminated by a 'CR'.
Auxiliary Control.	ESC A0		1B 41 30	Resets Transparent/Display and Print Modes.
	ESC A1	ESC A 1	1B 41 31	Transparent mode is set display.
	ESC A2	ESC A 2	1B 41 32	No display and print mode is set.
Set Full-Duplex*	ESC D F	ESC D F	1B 44 46	NOTE: When GATED Auxiliary Mode or the above modes are set Page Print operation cancel these modes. Cancels Half-Duplex, and causes keyboard entries to be transmitted only. For characters to be displayed they must be echoed by the host.

Table 3-3. ADM 11 Escape Sequences (continued)
(Operations which have an * beside them are also selectable in Set-Up Mode.)

OPERATION	HOW TO EXECUTE		HEX CODE	DESCRIPTION
	FROM HOST	FROM KEYBOARD		
Set Half-Duplex*	ESC D H	ESC D H	1B 44 48	Cancels Full-Duplex, and causes all keyboard data to be transmitted, and routed to the display.
Write Message (Host Only)	ESC F	ESC F	1B 46	Places ADM 11 into message line write mode. Until the mode is terminated, all applicable characters and/or control sequences from the host computer affect only the message line. This mode is terminated by CR (0D Hex) or when 80 columns have been filled on the 25th line.
Write Embedded Attributes	ESC GAtt	ESC G "X"	1B 47 X	Writes Embedded attribute at the cursor and increments the cursor. X = the specific attribute code. Refer to Table 3-4 for the attribute codes.
Print Page - Formatted	ESC P	SHIFT PRINT	1B 50	Causes all data from home up to the end of the display to be transmitted to the Auxiliary Port device. A CR NUL and LF NUL code (0D, 00, 0A, 00 Hex) are added at the end of each line as it is sent. If the printer goes busy, depressing SHIFT BREAK aborts the print and returns the terminal to normal operation. All trailing blanks or nulls on a line are omitted from the printed page.
Erase Line to Spaces	ESC T	ERASE	1B 54	Erases the data from the cursor position through the end of the line, and replaces it with spaces. The cursor does not move.
Set Program Mode	ESC U	ESC U	1B 55	When set the 32-ASCII control characters are displayed and not acted upon.
Clear Program Mode	ESC X	ESC X	1B 58	Causes Program Mode to be exited, the 32-ASCII control characters will be acted upon, if utilized by the ADM 11.
Erase to End-of-Page	ESC Y	SHIFT ERASE	1B 59	Erases the data from the cursor position up to the end of the display and replaces it with spaces.
Display Message Line	ESC g	ESC g	1B 67	Sets ADM 11 into Message Line display mode. If the terminal has been placed into status line mode, the last message written to the terminal will be redisplayed on the 25th line.

Table 3-3. ADM 11 Escape Sequences (continued)
































OPERATION	HOW TO EXECUTE		HEX CODE	DESCRIPTION
	FROM HOST	FROM KEYBOARD		
Enable Status Line	ESC h	 	1B 68	Set ADM 11 into status display by writing over the message on the 25th line.
Write Function Key Legends (Host Only)	ESC I	 	1B 6C	Place ADM 11 into function key legend write mode. Until the mode is terminated, all applicable characters and/or controls from the host computer will only affect the left 40 characters of the 25th line. The mode is terminated by CR or when 40 characters have been written.
Reset Terminal	ESC o !	  	1B 6F 21	Causes the Master Reset and Self-Test routine to be executed, and the last saved Set-Up functions to be loaded. Clears all display data.
Display Program Version	ESC o 9	  	1B 6F 39	Displays and transmits the firmware version that is stored in EPROM. This is followed by a power-up with diagnostic error results. A single character (20 - 2F Hex) shows the error results in the least significant 4 bits: Bit 0 = System RAM failure 1 = Screen RAM failure 2 = Not used 3 = Not used NOTE: A "Space" after the firmware version indicates no error.
Default Function Keys	ESC o A	  	1B 6F 41	Causes all function keys to default as described in paragraph 3.3.8.
Default Set-Up	ESC o S	  	1B 6F 53	Causes all of the active set-up to be set to factory default settings with the exception of the baud rate and word structure.
Print Page-Unformatted	ESC p	 	1B 70	Same as ESC P except that each line is not terminated by CR NUL and LF NUL. No character are omitted.
Erase To-End-of-Line (Null)	ESC t	 	1B 74	Erases all data from the cursor position up to the end of the line and replaces the data with nulls.
Erase To-End-of-Page (Null)	ESC y	 	1B 7A 79	Erases all data from the cursor position up to the end of the display and replaces the data with nulls.
Print Line	ESC z		1B 7A	Prints entire line at cursor, omitting trailing blanks and/or nulls. Terminated by CR NULL LF NULL.
Program Function keys	ESC ! X	  	1B 21 X	Program function keyX = @-G followed by 4 or 8 characters depending upon set-up mode.

Table 3-3. ADM 11 Escape Sequences (continued)

OPERATION	HOW TO EXECUTE		HEX CODE	DESCRIPTION
	FROM HOST	FROM KEYBOARD		
Alignment Pattern	ESC H	 	1B 48	Fill screen with H's for alignment pattern.
Video Control	ESC ~ X	  	1B 7E 'X'	X = '0' = Video off '1' = Video on, Cursor off '2' = Video on, Cursor on
Downline Load Setup	ESC k P ₀ P ₁ P ₂ P ₃ P ₄ P ₅ P ₆ P ₇		1B 6B 'P0P1P2 P3P4P5 P6P7'	Downline load new set-up as described in Section 3.1.3 on Down-Line Load Set-Up format.

sequences may be initiated from the keyboard using the **ESC** key as follows:

Conversation Mode, Full Duplex --
ESC is transmitted directly to the host computer and is utilized by the ADM 11 only when echoed back by the host computer.

Conversation Mode, Half Duplex --
ESC is transmitted to the host computer and acted upon locally by the ADM 11.

Local Escape

Pressing **SHIFT** in conjunction with the **ESC** key causes the Escape sequence in its entirety to be acted upon locally and not transmitted.

3.6 DATA TRANSMISSION

The ADM 11 always operates in Conversation Mode (character-by-character). Data is transmitted when a key is depressed and if half duplex is selected, the data is also displayed on the screen. Communications are serial asynchronous, with an ASCII character format of 1 start bit, 7 or 8 data bits, odd/even/no parity bit, and 1 stop bit. The word structure and baud rate used for transmission are selectable in Set-Up Mode. Primary (Modem) Port communications are via a bi-directional RS-232C or optional 20mA current loop interfaces detailed in Section II. Auxiliary Port communications is uni-directional via RS-232C interfacing, also detailed in Section II.

Data communications can take place whenever the ADM 11 is placed in On-Line Mode via Set-Up Mode. When receiving data the ADM 11, has an X-ON/X-OFF or DTR busy indication feature (selectable in Set-Up Mode) that is used to command the host to suspend transmission to prevent data loss.

3.6.1 Conversation Mode Characteristics

The ADM 11 always operates in Conversation Mode. In this way, characters that are entered from the keyboard are immediately transmitted to the host computer. This includes any control codes or Escape sequences which are normally not displayed. For characters to be displayed or commands directly acted upon by the

terminal, the unit must be set to Half Duplex Mode. If Full Duplex Mode is set, then only those codes that are echoed by the host will be displayed or cause any action to take place.

3.6.2 Busy/Ready Status

The ADM 11 has the ability to signal the host of a potential data loss due to the input buffer (1,536 characters) being nearly full or the terminal being otherwise unable to accept data. The type of signal that is sent depends upon the Handshake Mode setting. The Handshake Mode can be set to DTR, X-ON/X-OFF, or NONE via Set-Up Mode (refer to Table 2-1). If NONE is selected, then no busy signal is sent to the host computer when the input buffer is full.

If DTR or X-On/X-Off is selected, then the following applies: a busy signal is selected (DTR low or X-OFF). Then whenever the input buffer contains 1,280 characters, the appropriate busy signal is sent to the host computer. A ready signal (DTR high or X-ON) is sent to the host computer when the buffer contents are reduced to 256 characters (12% or less of the input buffer is full), as long as data flow to the host is not halted. This allows the terminal to indicate to the host computer that it is ready to receive more data. X-ON and X-OFF transmit DC1 and DC3 signals to the host computer, respectively, but, they may be changed via Set-Up Mode. If the terminal receives X-ON/X-OFF when DTR mode is set, then X-ON and X-OFF are ignored by the terminal.

Executing the Transparent Print function or using Display and Print with low speed printers will cause the X-ON/X-OFF commands to be issued when appropriate. The Busy/Ready condition of the printer is sensed on the Auxiliary Port via the DTR signal on Pin 20.

3.7 CURSOR CONTROL

3.7.1 Relative Cursor Positioning

The Cursor may be moved to any position on the screen typically using the separate cursor control keys. Its position signifies the next character position in the display. When data is being entered, the cursor moves one

position to the right on the line or to the first position in the next line each time a character is written. The operation codes and local operations required to control the cursor positions are outlined in Table 3-2, pg 3-9.

3.7.2 Absolute Cursor Positioning/Reading

Absolute Cursor Addressing requires commanding the cursor to a specific display location or reading out the exact cursor location. Commanding the cursor to a specific location (loading the cursor), as well as reading the cursor position, are normally executed by the host computer. The Load/Read commands are executed by means of Escape sequences in which the row and column location of the cursor is expressed in a pair of ASCII characters. See Appendix for the ASCII characters assigned to each row and column location.

Load Cursor Operation -- When the Load Cursor operation is initiated the cursor moves to the commanded position. The Load Cursor operation codes required are as follows:

ESC = ROW COL
 ASCII ASCII

└ ASCII Character associated with cursor column (1-80) position.
(Character = ASCII space through o.)

└ ASCII Character associated with row (1-24) position.
(Character = ASCII space through 7.)

EXAMPLE: ESC = , K commands the cursor to Row 13, column 44.

Read Cursor Operation -- The Read Cursor operation consists of the Read command usually from the host, and an immediate response from the terminal which defines the cursor position. The host executes

ESC ?, and the terminal responds with the appropriate Row ASCII and Column ASCII character, followed by a "CR".

3.7.3 Tab Control

The ADM 11 has no local tab operation. **TAB** transmits an HT code (Hex 09) and **SHIFT TAB** transmits an ESC I code (Hex 1B 49) to the host computer.

3.7.4 Scrolling

In the ADM 11, data is entered into display memory starting at the HOME position, and continues through Position 80 of Line 24 (last data position). When Position 80 is filled, or when a New Line or Line Feed occurs in Line 24, the display is shifted upwards one line and data entry continues in Position 1 of the new Line 24. The original topline of the display is lost. Scrolling continues indefinitely. When Scrolling occurs, the 25th line is cleared, but will be restored after 2 seconds of non-scrolling.

The 25th status line can be disabled by selecting "BLANK" attribute for the status line in Set-Up.

3.8 EDITING OPERATIONS

The ADM 11 is equipped with data editing capabilities, which may be executed from the host and from the keyboard. Table 3-3 describes the commands and keyboard entries used to perform display editing.

3.8.1 Erase And Clear Operations

All or selected areas of the display may be cleared of data by appropriate commands. The erase can be from the cursor to the end of the line or page (**ERASE** or **SHIFT ERASE**). The character used to replace the cleared data may be either a space (Hex 20) or a NUL (Hex 00). Refer to the **ESC t**, **ESC ***, and **ESC y** commands in Table 3-3 for replacing erased data with NUL. In addition to these commands, the entire screen can be erased (to spaces) by depressing **SHIFT CLR** on the keyboard at any time.

3.9 DISPLAY HIGHLIGHTING OPERATIONS

The ADM 11 may have various attributes used to highlight data on the display. The visual and graphic attributes used for display formatting are discussed in the paragraphs that follow.

3.9.1 Visual Attributes

There are four Visual Attributes that can be assigned to any character on display. They include: Blink, Blank, Reverse, and Reduced Intensity. Reduced Intensity is non-embedded; the others are embedded attributes. Selection of an ESC G code sequence writes the embedded attribute from the cursor position to the end of the line. The non-embedded attribute (Reduced Intensity) causes each character written on the screen, with the exception of control characters, to have Reduced Intensity. The list of attribute combinations and their ESC G code sequences are shown below.

ESC	G	0	Normal Video
ESC	G	1	Blank
ESC	G	2	Blink
ESC	G	3	Blank and Blink
ESC	G	4	Reverse
ESC	G	5	Reverse and Blank
ESC	G	6	Reverse and Blink
ESC	G	7	Blank, Blink, and Reverse

3.9.2 Graphics

The Graphics capability of the ADM 11, another visual attribute of the unit, allows the user to draw business type forms or simple graphs to enhance the information presentation. The graphics symbols that are available for use and the associated ASCII codes are illustrated in **Appendix A**. Graphics Mode may be set via an ESC G 8 key sequence. The appropriate commands are as follows:

ESC	G	8	Business Graphics
ESC	G	9	Business Graphics and Blank
ESC	G	A	Business Graphics and Blink
ESC	G	B	Business Graphics, Blank and Blink

ESC	G	C	Business Graphics and Reverse Business Graphics, Reverse, and Blank
ESC	G	D	
ESC	G	E	Business Graphics, Reverse, and Blink
ESC	G	F	Business Graphics, Reverse, Blank, and Blink
ESC	G	)	Set Reduced Intensity
ESC	G	(	Reset Reduced Intensity

3.10 SET-UP MODE OPERATIONS

The general operating characteristics of the ADM 11 are controlled by 20 user-selectable features that are displayed, one at a time, on the status line (line 25) when Set-Up Mode is entered. Both the operator and host computer have the ability to change the functions that are selectable in Set-Up Mode. Selections may be saved in non-volatile memory to re-establish the same functions on the next power-on cycle or terminal reset operation. The operation of Set-Up Mode is fully described in **paragraph 3.1**.

3.11 PRINT OPERATIONS

The Auxiliary Port of the ADM 11 is most typically connected to a serial RO (receive-only) printer. The communications of data to the auxiliary device is uni-directional via an RS-232C interface. A Busy/Ready signal level is monitored for status during print operations. The four types of print output are: Page Print, Print Line, Display and Print, and Transparent Print, details as follows:

3.11.1 Page Print

Upon receipt of a Print Page command the ADM 11 will transmit the data from the entire screen (Home to lower right margin) to the auxiliary device. Trailing blanks and/or nulls are omitted on each line. This is useful when using a formatted screen being output to a pre-printed form. The Print Page commands can be generated from the host or keyboard. Each print line output is followed by a CR, NULL, LF, NULL (Hex 0D, 00, 0A, 00) in the data stream.

3.11.2 Line Print

Upon receipt of a Print Line command, the ADM 11 will transmit the data on the line that the cursor is positioned to the auxiliary device.

3.11.3 Display and Print

Display and Print is enabled or disabled by entering a command from the keyboard or by receiving the ESCape sequence from the host. When using this method of transmission the terminal will display and act upon all received data as well as transmitting the data out the Auxiliary Port to the printer. When operating in Conversation Mode/Half-Duplex, keyboard entries are transmitted to the host and display only. There is no output to the printer.

3.11.4 Transparent Print

Transparent Print is enabled or disabled by entering commands from the keyboard or by receiving the command from the host. When operating in this mode the terminal will not display received data, however, the terminal will transmit the received data out the Auxiliary Port to the printer. No commands except the reset Display and Print/Transparent Print Modes are acted upon.

3.12 RESET OPERATIONS

The ADM 11 can be reset in one of two ways: a Power-On Reset, or a Reset Terminal command. Both cause the Self-Test to be executed and are detailed below.

3.12.1 Power-On Reset

A Power-On Reset consists of a complete recycling of the ADM 11 functions, including power. This is accomplished by setting the ON/OFF switch to OFF, waiting at least 10 seconds, then setting the switch to ON. All display and other volatile memory is erased when powering down. Upon power-up, the unit is subject to the complete Power Turn-On procedure specified in Section II.

3.12.2 Reset Terminal Command

The ADM 11 is reset when the ESC o ! command is received from the host computer or input from the keyboard. When executed, the terminal will self-test and load the Set-Up Mode function settings that are saved in non-volatile memory.

3.12.3 Self-Test

When the ADM 11 is reset by either of the methods described, the terminal Self-Test will be executed. The Self-Test will verify the integrity of the display memory, the program memory, non-volatile memory and the associated internal control logic. Upon completion of Self-Test, the terminal will sound the audible alarm and display the a "PASS" message.

3.13 STATUS INFORMATION

The following is a list of status information that appears on the 25th status line, and their locations.

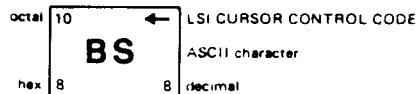
DESCRIPTION	COLUMN LOCATION	DISPLAY
DATA CARRIER DETECT	41-43	DCD
CLEAR TO SEND	46-48	CTS
PARITY ERROR	51-52	PE
PROGRAM MODE	55-58	PROG
KEYBOARD LOCK	61-70	KBD - LOCKED
CONVERSATION MODE	73-75	LOCAL OR FDX OR HDX

APPENDIX A
OPERATORS
QUICK REFERENCE
CHARTS

ASCII CONTROL CODE CHART

B7 B6 BITS B5 B4 B3 B2 B1	0 0 0 0		0 0 0 1		0 1 0 1		1 0 0 1		1 1 0 1	
	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE			
0 0 0 0	0 NUL	20 DLE	40 SP	60 0	100 @	120 P	140 '	160 p		
0 0 0 1	1 SOH	21 DC1	41 !	61 1	101 A	121 Q	141 a	161 q		
0 0 1 0	2 STX	22 DC2	42 "	62 2	102 B	122 R	142 b	162 r		
0 0 1 1	3 ETX	23 DC3	43 #	63 3	103 C	123 S	143 c	163 s		
0 1 0 0	4 EOT	24 DC4	44 \$	64 4	104 D	124 T	144 d	164 t		
0 1 0 1	5 ENQ	25 NAK	45 %	65 5	105 E	125 U	145 e	165 u		
0 1 1 0	6 ACK	26 SYN	46 &	66 6	106 F	126 V	146 f	166 v		
0 1 1 1	7 BEL	27 ETB	47 '	67 7	107 G	127 W	147 g	167 w		
1 0 0 0	8 BS	30 CAN	50 (	70 8	110 H	130 X	150 h	170 x		
1 0 0 1	9 HT	31 EM	51)	71 9	111 I	131 Y	151 i	171 y		
1 0 1 0	10 LF	32 SUB	52 *	72 :	112 J	132 Z	152 j	172 z		
1 0 1 1	11 VT	33 ESC	53 +	73 ;	113 K	133 [	153 k	173 {		
1 1 0 0	12 FF	34 FS	54 ,	74 <	114 L	134 \	154 l	174 ;		
1 1 0 1	13 CR	35 GS	55 -	75 =	115 M	135]	155 m	175 }		
1 1 1 0	14 SO	36 RS	56 .	76 >	116 N	136 ^	156 n	176 ~		
1 1 1 1	15 SI	37 US	57 /	77 ?	117 O	137 _	157 o	177 RUBOUT (DEL)		

LEGEND



ADM 11 ESCAPE SEQUENCES

HEX	2	3	4	5	6	7		
0		0	@	P	PRINT PAGE - FORMATTED	p	PRINT PAGE- UNFORMATTED	
1	!	PROGRAM FUNCTION KEYS *	A	AUXILIARY CONTROL *	Q	a	q	
2	"	KEYBOARD ENABLE	B		R	b	r	
3	#	KEYBOARD DISABLE	C		S	c	s	
4	\$		D	SET FULL / HALF DUPLUX *	T	ERASE LINE TO SPACES	t	ERASE TO END OF LINE NULL
5	%		E		U	SET PROGRAM MODE	e	u
6	&		F	WRITE MESSAGE (HOST ONLY)	V	f	v	
7	'		G	WRITE EMBEDDED ATTRIBUTES *	W	g	DISPLAY MESSAGE LINE	w
8	(	WRITE NORMAL INTENSITY	H	ALIGNMENT PATTERN	X	h	ENABLE STATUS LINE	x
9	)	WRITE REDUCED INTENSITY	I		Y	i	ERASE TO END OF PAGE (NULL)	y
A	*	CLEAR TO NULL	J		Z	j	z	PRINT LINE
B	+	CLEAR TO SPACES	K		[	k	DOWNLOAD SETUP *	{
C	,		<	L	\	l	WRITE FUNC. KEY LEGENDS (HOST ONLY)	|
D	-		=	ADDRESS CURSOR **	M	]	m	}
E	.		>	N	^	n	~	VIDEO CONTROL
F	/		?	READ CURSOR	O	_	o	* DEL

*MULTIPLE CHARACTERS REQUIRED, SEE TABLE 3-3.

**MULTIPLE CHARACTERS REQUIRED, SEE FIGURE 3-2.

OPERATORS QUICK REFERENCE CHART OF ABSOLUTE CURSOR POSITIONS

Keys Used: ESC = ROW
ASCII COL
ASCII

ASCII CODES	POSITION		ASCII CODES	POSITION		ASCII CODES	POSITION	
	ROW	COL		ROW	COL		ROW	COL
ESC = SPACE	1	1	ESC = ;		28	ESC = V		55
!	2	2	<		29	W		56
"	3	3	=		30	X		57
#	4	4	>		31	Y		58
\$	5	5	?		32	Z		59
%	6	6	@		33	[		60
&	7	7	A		34	\		61
'	8	8	B		35	]		62
(	9	9	C		36	^		63
)	10	10	D		37	_		64
*	11	11	E		38	`		65
+	12	12	F		39	a		66
,	13	13	G		40	b		67
-	14	14	H		41	c		68
.	15	15	I		42	d		69
/	16	16	J		43	e		70
0	17	17	K		44	f		71
1	18	18	L		45	g		72
2	19	19	M		46	h		73
3	20	20	N		47	i		74
4	21	21	O		48	j		75
5	22	22	P		49	k		76
6	23	23	Q		50	l		77
7	24	24	R		51	m		78
8	25	25	S		52	n		79
9	26	26	T		53	o		80
:	27	27	ESC = U		54			

LIMITED GRAPHICS CHARACTER SET

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

DISPLAYABLE USASCII CHARACTER SET AND CONTROL CODES

HEX BYTE		1ST		CONTROL CHARACTERS		DISPLAYABLE CHARACTERS					
		BITS 4321	BITS 765	0	1	2	3	4	5	6	7
2ND				00 ₀	00 ₁	01 ₀	01 ₁	10 ₀	10 ₁	11 ₀	11 ₁
0	0000			NUL	DLE		0	@	P	'	p
1	0001			SOH	DC1	!	1	A	Q	a	q
2	0010			STX	DC2	"	2	B	R	b	r
3	0011			ETX	DC3	#	3	C	S	c	s
4	0100			EOT	DC4	\$	4	D	T	d	t
5	0101			ENQ	NAK	%	5	E	U	e	u
6	0110			ACK	SYN	&	6	F	V	f	v
7	0111			BEEP	ETB	'	7	G	W	g	w
8	1000			BS (←)	CAN	(	8	H	X	h	x
9	1001			(SKIP) HT	EM	)	9	I	Y	i	y
A	1010			LF (↓)	SUB	*	:	J	Z	j	z
B	1011			VT (↑)	ESC	+	;	K	[	k	{
C	1100			FF (→)	FS	,	<	L	\	l	|
D	1101			CR	GS	-	=	M	]	m	}
E	1110			SO	(HOME) RS	.	>	N	^	n	~
F	1111			SI	(NEW LINE) US	/	?	O	--	o	DEL

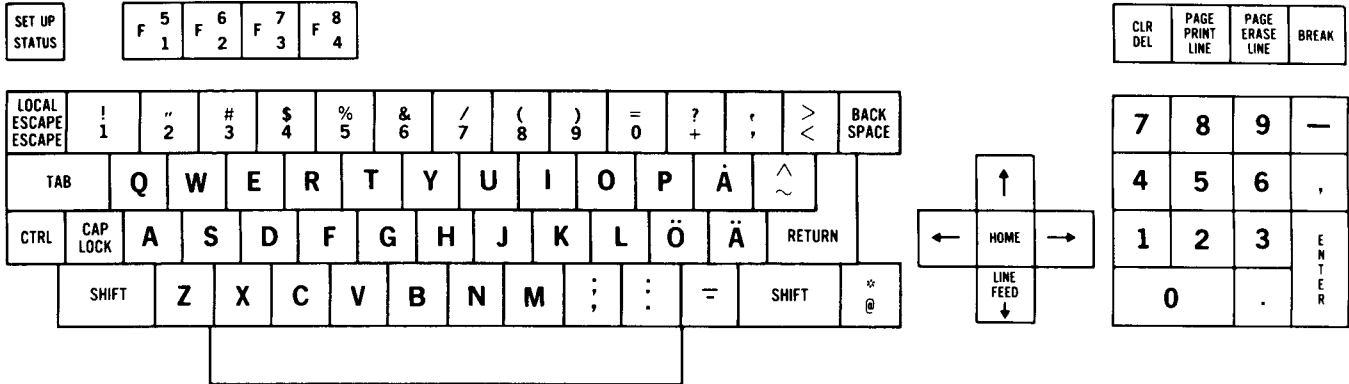
USE CTRL KEY
 WITH DISPLAYABLE
 CHARACTER KEYS
 TO PRODUCE
 CONTROL CODES

128 CHARACTER ASCII FORMAT, WITH HEX CODES

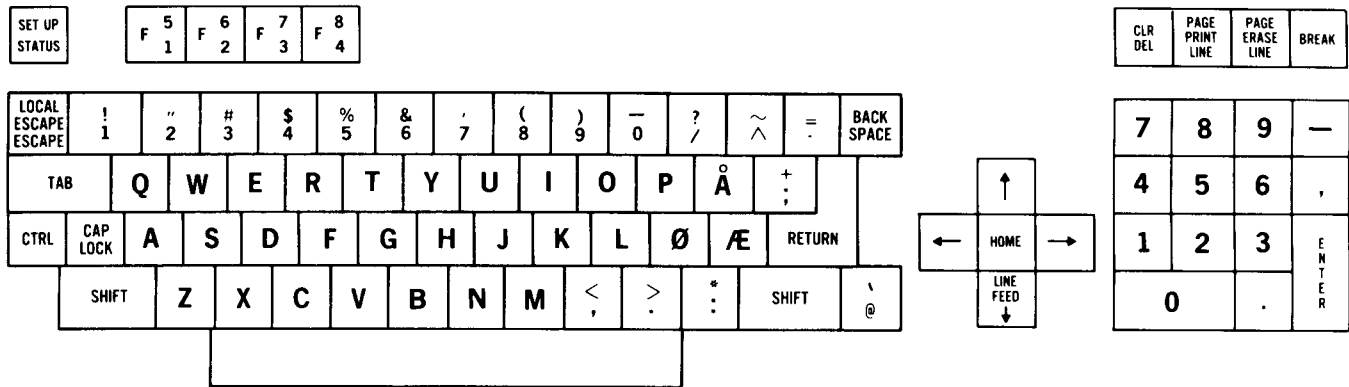
00 NUL	01 SOH	02 STX	03 ETX	04 EOT	05 ENQ	06 ACK	07 BEL	08 BS	09 HT	0A LF	0B VT	0C FF	0D CR	0E SO	0F SI
10 DLE	11 DC1	12 DC2	13 DC3	14 DC4	15 NAK	16 SYN	17 ETB	18 CAN	19 EM	1A SUB	1B ESC	1C FS	1D GS	1E RS	1F US
20	21 !	22 "	23 #	24 \$	25 %	26 &	27 '	28 (	29)	2A *	2B +	2C ,	2D -	2E .	2F /
30	31 0	32 1	33 2	34 3	35 4	36 5	37 6	38 7	39 8	3A 9	3B :	3C ;	3D <	3E =	3F >?
40	41 @	42 A	43 B	44 C	45 D	46 E	47 F	48 G	49 H	4A I	4B J	4C K	4D L	4E M	4F N O
50	51 P	52 Q	53 R	54 S	55 T	56 U	57 V	58 W	59 X	5A Y	5B Z	5C [	5D \]	5E ^	5F _
60	61 '	62 a	63 b	64 c	65 d	66 e	67 f	68 g	69 h	6A i	6B j	6C k	6D l	6E m	6F n o
70	71 p	72 q	73 r	74 s	75 t	76 u	77 v	78 w	79 x	7A y	7B z	7C {	7D |	7E }	7F ~ &

INTERNATIONAL KEYBOARD LAYOUTS

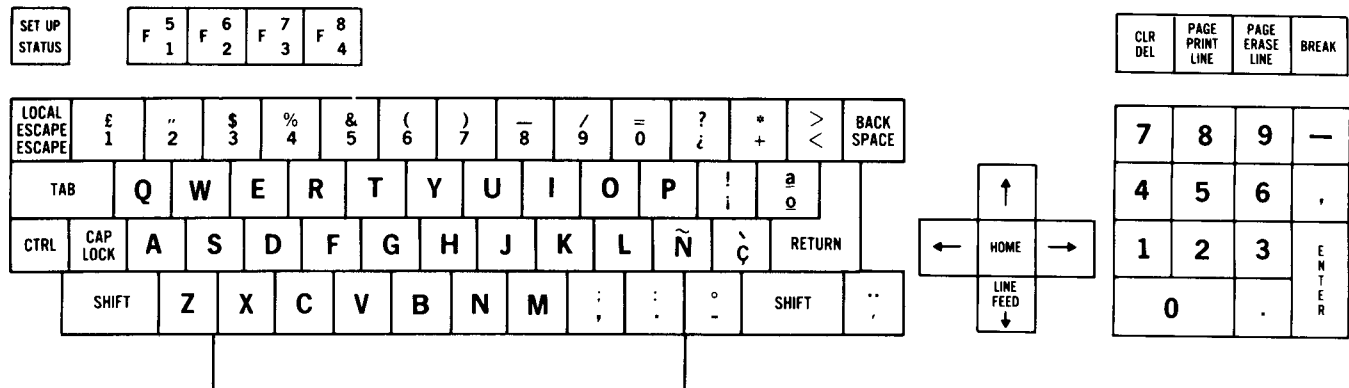
ADM 11 SWEDISH/FINNISH QWERTY KEYBOARD LAYOUT



ADM 11 NORWEGIAN QWERTY KEYBOARD LAYOUT

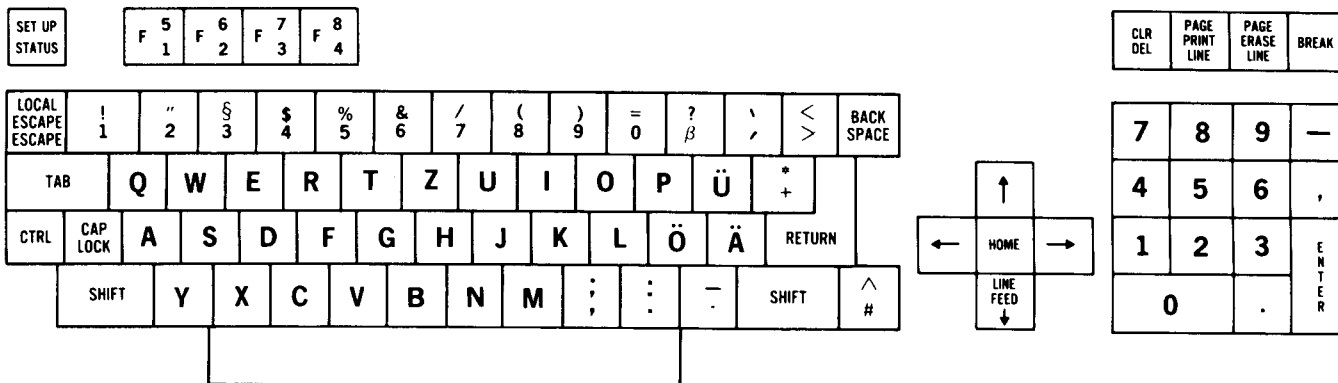


ADM 11 SPANISH QWERTY KEYBOARD LAYOUT

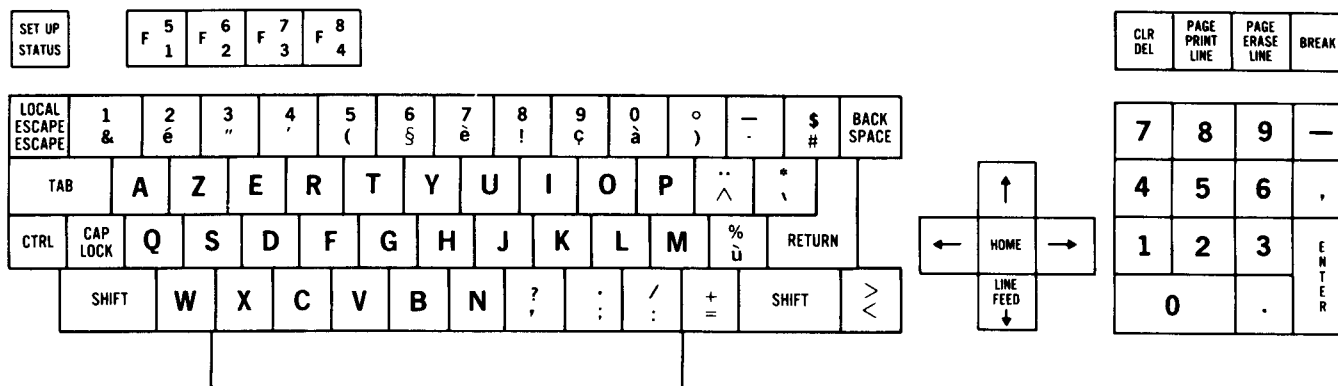


INTERNATIONAL KEYBOARD LAYOUTS

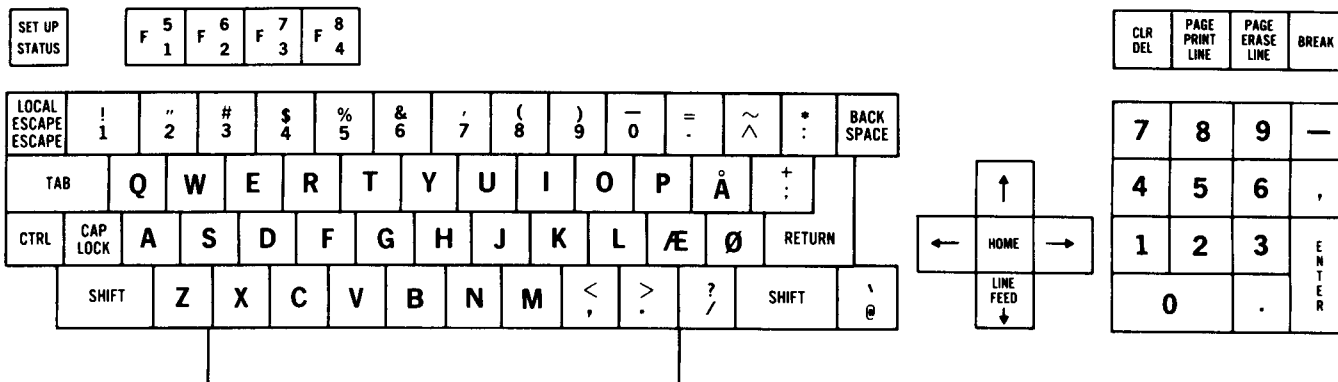
ADM 11 GERMAN QWERTZ KEYBOARD LAYOUT



ADM 11 FRENCH AZERTY KEYBOARD LAYOUT



ADM 11 DANISH QWERTY KEYBOARD LAYOUT



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