ADM 11 With Emulations
Video Display Terminal
Users Reference Manual

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With Emulations
Video Display Terminal

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USERS REFERENCE MANUAL

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

SECTION PAGE

TABLE OF CONTENTS (cont'd)

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS (cont'd)

APPENDIX

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.

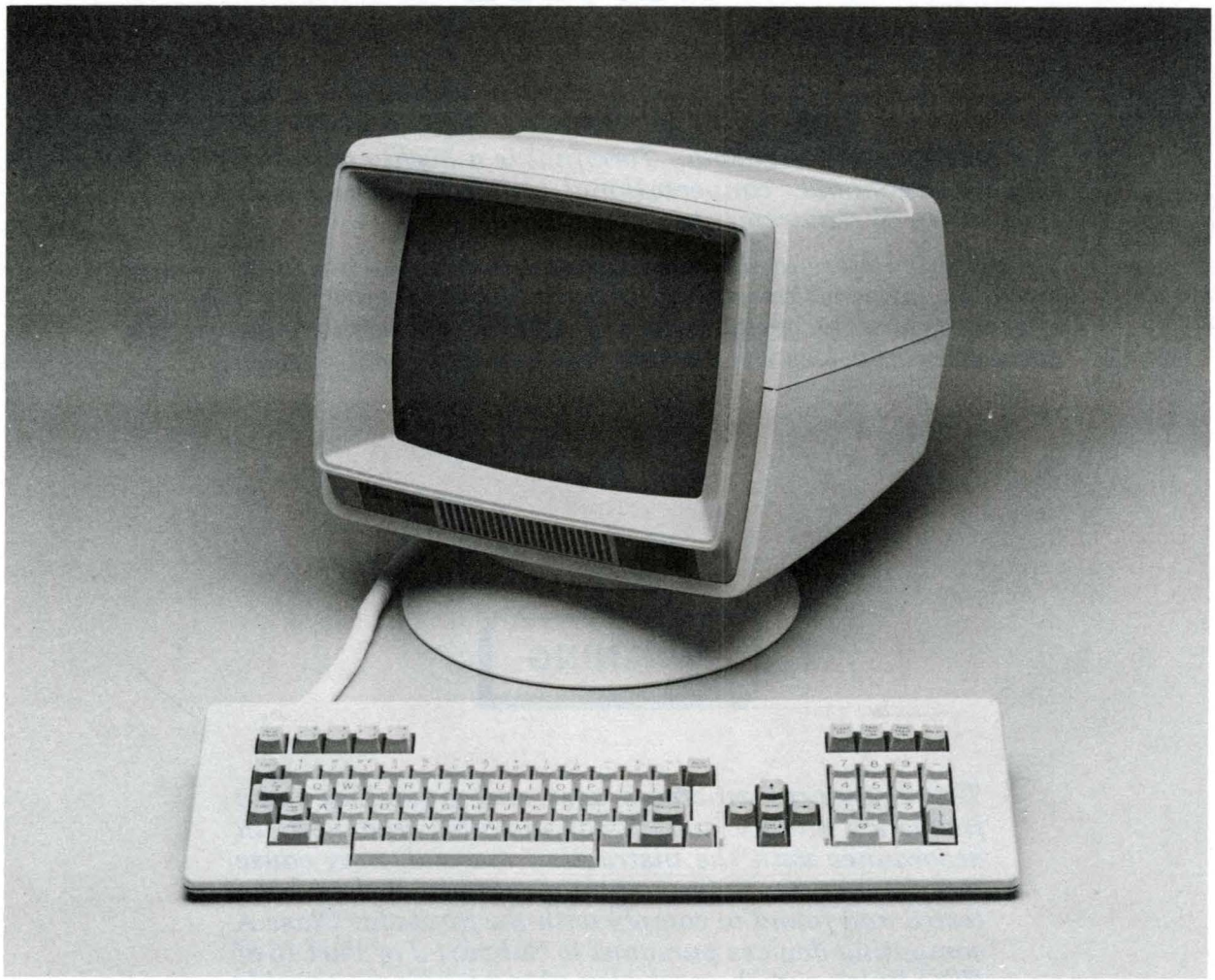


Figure 1-1. ADM 11 Video Display Terminal

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 many popular features. It is keyboard selectable and host computer programmable to perform like any of the following terminals:

- Lear Siegler ADM 11
- ADDS Viewpoint (A2), Regent 25
- Hazeltine 1500, most 1400 and 1420 features
- DEC VT52
- Lear Siegler ADM 3A

The **ADM 11** consists of two major components -- a keyboard and a CRT display. Its exterior design offers the operator full ergonomic conveniences. The monitor tilts and swivels. A low-profile, DIN standard keyboard is easy to handle and may be positioned on a stand, a desk or the lap of the operator. A long coil cord provides maximum operating movement. The unit has configuration flexibility to meet virtually every application need.

1.2 OPERATION DESCRIPTION

The **ADM 11** is an I/O terminal. It is used primarily to send and receive data. In some applications, data transfer may be unidirectional; that is, either from the **ADM 11** to a host computer or from a computer to the **ADM 11**. However, the most frequent application is one in which an operator communicates with a host computer in bi-directional data flow.

The **ADM 11** provides:

- Full 128 ASCII character set, having 80-column x 25-line display format. The twenty-fifth line is a status and message line.
- A DIN-standard keyboard having a 14-key numeric keypad, five separate cursor control keys, four programmable function keys (shiftable to eight), a capital letter lock key, edit keys, a three-key rollover and 256 keystroke buffer. The keyboard is fitted with an adjustable device to control slant (tilt).
- Seven communication rates in full-duplex and half-duplex send/receive modes.
- Scrolling.
- Absolute cursor positioning.
- Variable 9- or 10-bit word structures.
- Upper and lower case characters standard. Lower case letters with full descenders.
- Program mode.
- Standard RS-232C interface or optional 20mA current-loop interface.
- RS-232C auxiliary interface port.
- Optional RS-422 interface.
- Four print modes: Page Print, Line Print, Display and Print, Transparent Print.
- Special control character sequences.
- Selectable refresh rate: 50 Hz or 60 Hz.
- Non-volatile set-up mode for terminal configuration.
- CRT screen saver.

1.2.1 Control Logic

The CRT display unit contains the control logic section. Data entering the terminal is received by the control logic section. 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 Section

The video logic and drive section contains the display logic which drives the monitor. It has 2K bytes of random access memory (RAM) and character generation circuits as well as the video logic and monitor.

1.2.3 Keyboard

The detached keyboard, which meets DIN standards for operator comfort, is connected to the rear of the CRT display monitor with a six-foot coil cord, providing keyboard mobility.

With each keystroke, a location code is transmitted from the keyboard to the CRT display. The CRT display then converts the location code into the appropriate ASCII character for transmission out the modem.

1.2.4 Primary (Modem) and Auxiliary Ports

The **ADM 11** is equipped with two ports located at the back of the terminal. The standard modem (I/O) port is the link, or interface, handling the flow of data in both directions between the **ADM 11** and the host computer. The modem port may be configured for RS-232C or the optional 20mA current loop operation or the optional RS-422 interface.

The auxiliary port permits use of an RO (Receive Only) printer when hard copy of data is needed.

With the modem DTR/XON/XOFF handshake feature, all data transmitted from the host, even at speeds up to 19,200 baud, will be received by the **ADM 11** without 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 from the host. These parameters include baud rates, word structure, cursor type, communications control and operating modes. They may be "saved" in memory when power is shut-off.

1.2.6 Regulated Power Supply

The **ADM 11** power supply accepts line voltage inputs of 115 VAC or 230 VAC ± 10 percent, 50 or 60 Hz. Voltage is factory set and must be specified at time of order. The power supply provides four regulated DC voltages: +5 volts, ± 12 volts and +15 volts.

1.3 SPECIFICATIONS

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

1.4 ADM 11 WORD STRUCTURE

ADM 11 transmits and receives serial asynchronous data in a 9-bit or 10-bit format in the following sequence:

one start bit,
seven or eight data bits,
one or no parity bit,
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 number eight can be designated to be either one or zero. Parity selection and the value of bit number eight are selected in the set-up mode. Refer to **Section III, paragraph 3.1, page 3-1.**

1.5 OPTIONS

The **ADM 11** may be 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

Logic board design permits an RS-422 interface to be added as a field or factory installed option. It 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 available as options for the **ADM 11** as well as their associated keycap sets. These include US/UK, French, German, Swedish/Finnish, Danish, Norwegian and Spanish.

1.5.4 Non-Volatile Function Key Memory

As a field-installable option, the terminal has the ability to save user-programmed function key characteristics in non-volatile memory. The user may access the programmed characters via four programmable function keys (F1-F4) located at the upper left section of the keyboard. Refer to **paragraph 3.3.8, page 3-12.**

1.5.5 Amber Phosphor Display

The standard **ADM 11** is equipped with a P31 green phosphor display. An amber display is available as an option at no additional cost.

1.5.6 Answerback Memory

The **ADM 11** incorporates facilities to add answerback memory as an option. This provides capability to transmit a pre-programmed, 32-character message. Answerback memory may be ordered with the terminal 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	9.5" W (21cm) x 7.25" 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	17.7 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 and 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	Absolute cursor addressing, and read cursor capabilities.

Table 1-1. ADM 11 Specifications (continued)

SPECIFICATION	DESCRIPTION
KEYBOARD FUNCTIONS	
Keyboard	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.
Keyboard Layout	Typewriter pairing, with six selectable international keyboard layouts.
Numeric Keypad	14 keys, 0 through 9, enter, comma, period, and minus. 0 and enter keys are double-size.
Cursor Control	Up, down, left, right, home arranged in a "cross" pattern. Return, line feed, new line, backspace, tab and back tab.
Function Keys	Four programmable function keys, shiftable to eight functions each transmitting up to an 8-character sequence.
Function Command Keys	Escape, set-up/status, delete, break, cap lock, shift, control and clear. Clear/delete and break keys are also programmable.
Non-Volatile Set-Up Mode	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.
Operator Convenience	Selectable key-click for audible feedback and 3-key roll-over to reduce "missed" characters.
EDITING	
Edit Operations	Clear screen, erase to end of line/page. Editing can be from the keyboard or host. These keys are also programmable.
COMMUNICATIONS	
Interfaces:	
Primary Port	RS-232C, serial asynchronous ASCII communications with optional 20mA current loop and optional RS-422.

Table 1-1. ADM 11 Specifications (continued)

SPECIFICATION	DESCRIPTION
Interfaces (cont'd):	
Auxiliary Port	Serial auxiliary port (RS-232C) with page print and transparent print.
Data Rates	300, 600, 1200, 2400, 4800, 9600 and 19,200 baud. (9600 max. for 20mA current loop)
Word Structure	1 start bit, 7 or 8 data bits, 1 or no parity bit (odd, even, mark, space or none - selectable), and 1 stop bit.
Parity	Even, odd, or no parity.
Stop Bits	1 stop bit.
Format	ASCII serial asynchronous communications.
Busy Indication	Primary (modem) port: sends X-OFF (DC3), X-ON (DC1) or DTR to host on busy/ready condition of main port to auxiliary port. Auxiliary port: senses busy level on pin 20 (DTR) of the auxiliary interface.
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 terminal's busy/ready status or no control.
GENERAL	
Operating Environment:	
Temperature	5° C to 40° C (41° F to 104° F)
Humidity	5% to 95% without condensation.

SECTION II
INSTALLATION

2.1 INITIAL PREPARATION

The space-saving design of the **ADM 11** has proven practical in virtually every terminal site. Its small size is particularly suited to work environments having limited physical space.

Dimensions of the **ADM 11** are shown in **Figure 2-1, page 2-1**. Basic requirements for installation are as follows:

- Table or desk mounting.
- Standard, three-prong 115-VAC (230-VAC) power outlet.
- Cable connection to the computer, data set or modem, serial printer or other auxiliary device. If connection to a remote computer is required, a modem or data set is usually needed.

CAUTION

Allow the **ADM 11** *to adjust to severe changes in environment before applying power. This reduces the possibility of internal condensation which could impair operation.*

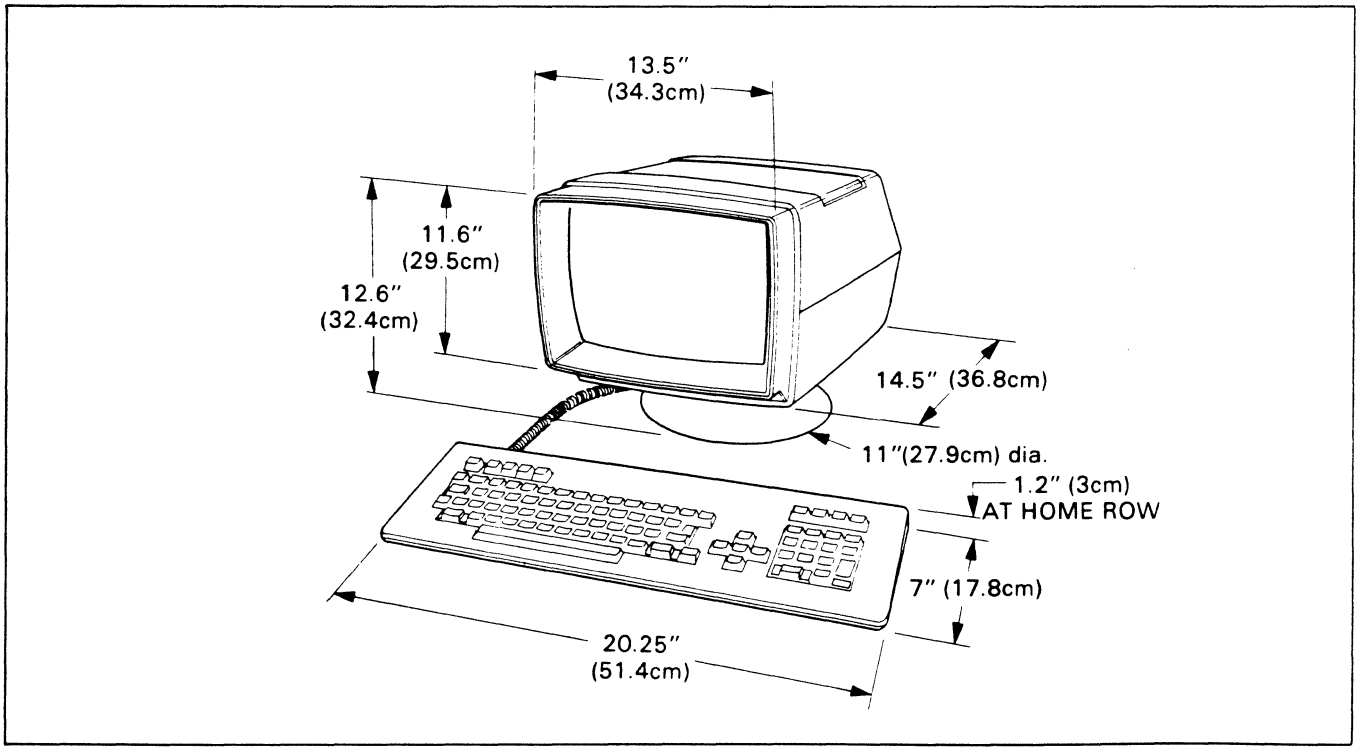


Figure 2-1. ADM 11 Dimensions

2.1.1 Line Voltage Selection

The **ADM 11** is shipped ready to operate at either 115 VAC or 230 VAC as specified by the customer. Lear Siegler authorized maintenance personnel can modify the terminal to operate at any other specified line voltage.

2.1.2 Keyboard Plug-In

Before applying power to the terminal, plug the keyboard coil cord into the connector on the back of the monitor. Refer to **Figure 2-2, page 2-3.**

2.1.3 Monitor/Keyboard Adjustment

The monitor may be tilted and swiveled to position it at the optimum viewing angle suitable for the operator. Clicks are made by the positive detent mechanism which holds the monitor in the position desired. The keyboard may be slanted for maximum operator comfort by turning down the two legs under the rear of the keyboard housing.

2.2 INTERFACE INFORMATION

The **ADM 11** may be connected directly to a local computer, serial printer or other auxiliary device. Or, using telephone lines, it may be connected to a remote computer. Remote computer connection requires use of a modem or data set. **Figure 2-3, on page 2-4**, shows a typical **ADM 11** application. **Figure 2-2, page 2-3**, shows the locations of the rear panel of the interface connections. **Figures 2-4 and 2-5, pages 2-5 and 2-6**, shows the logic of 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. Maximum cable length for RS-232C application is 50 feet.

2.2.2 20mA Current Loop Interface

ADM 11 may be configured for 20mA current loop operation using the primary (modem) port. The current loop interface signal levels allow cable lengths of up to 1,000 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.

Note

The peripheral device 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 the monitor housing to be sure it is off. Refer to **Figure 2-2, page 2-3.**
2. Connect the data interface cable(s) to the terminal. Refer to **paragraph 2.2, page 2-2.**
3. Plug the power cord into a grounded AC outlet of the correct voltage.
4. Turn on the terminal. See below.

2.4 POWER TURN-ON

1. Set the power switch on the front of the monitor housing to the ON position. Refer to **Figure 2-2, page 2-3.**
2. Wait approximately 20 seconds for the unit to warm up. The cursor should appear in the HOME position, row 1 and column 1, in the upper left-hand corner of the screen.
3. Immediately following the warm-up period the cursor and the word "PASS" will appear in the HOME position and the alarm tone will have sounded. This indicates the terminal has self-tested and is ready to function.
4. Adjust CONTRAST control for desired screen brightness. Refer to **Figure 2-2, page 2-3.** Moving the sliding lever toward the center of the monitor brightens the image. Moving it away from center decreases brightness. Begin adjustments with the lever in the middle position and move it either direction to achieve desired level.

CAUTION

To avoid damage to the CRT screen when the terminal is to remain ON but unchanged for extended time

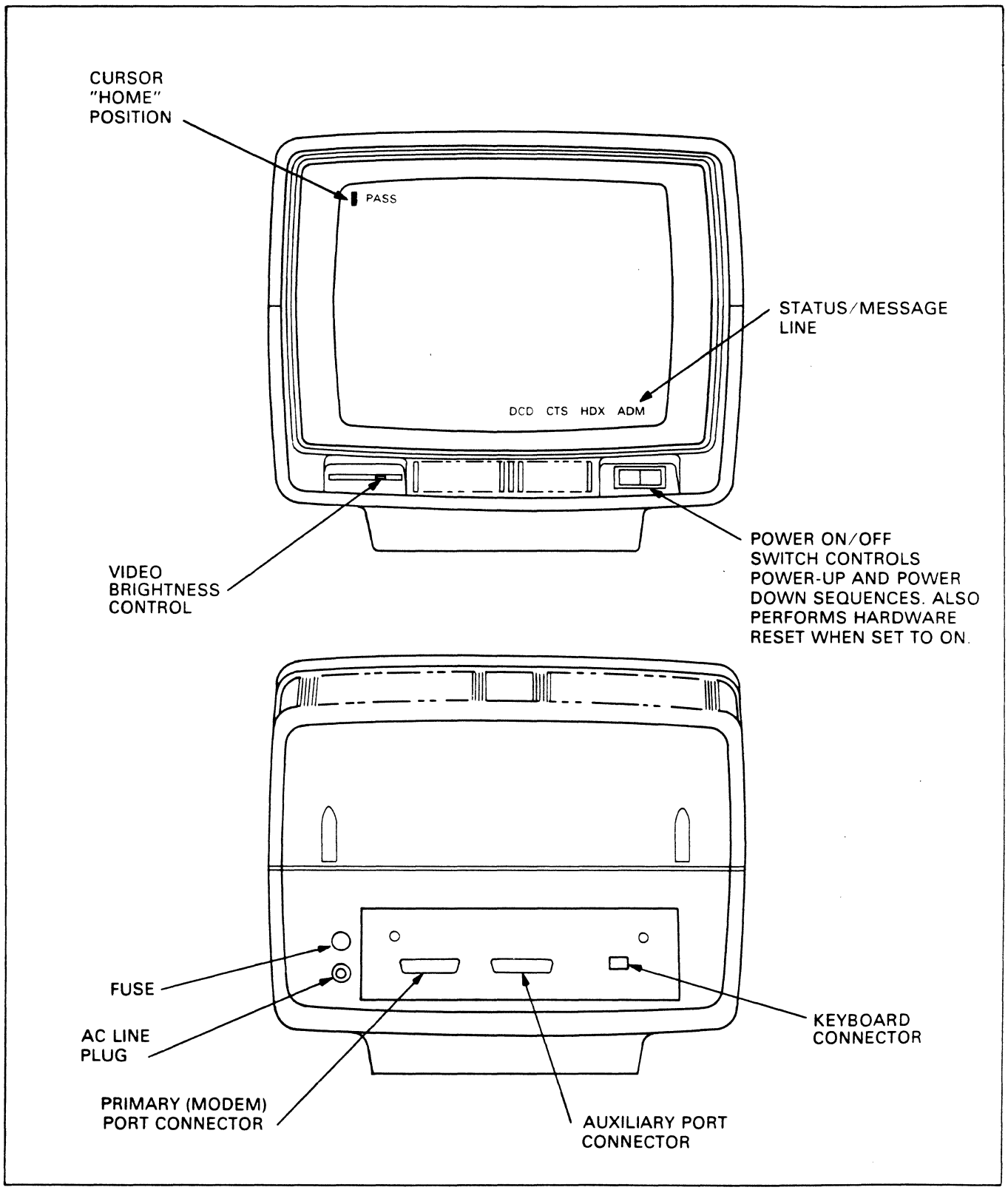


Figure 2-2. ADM 11 Controls and Connectors

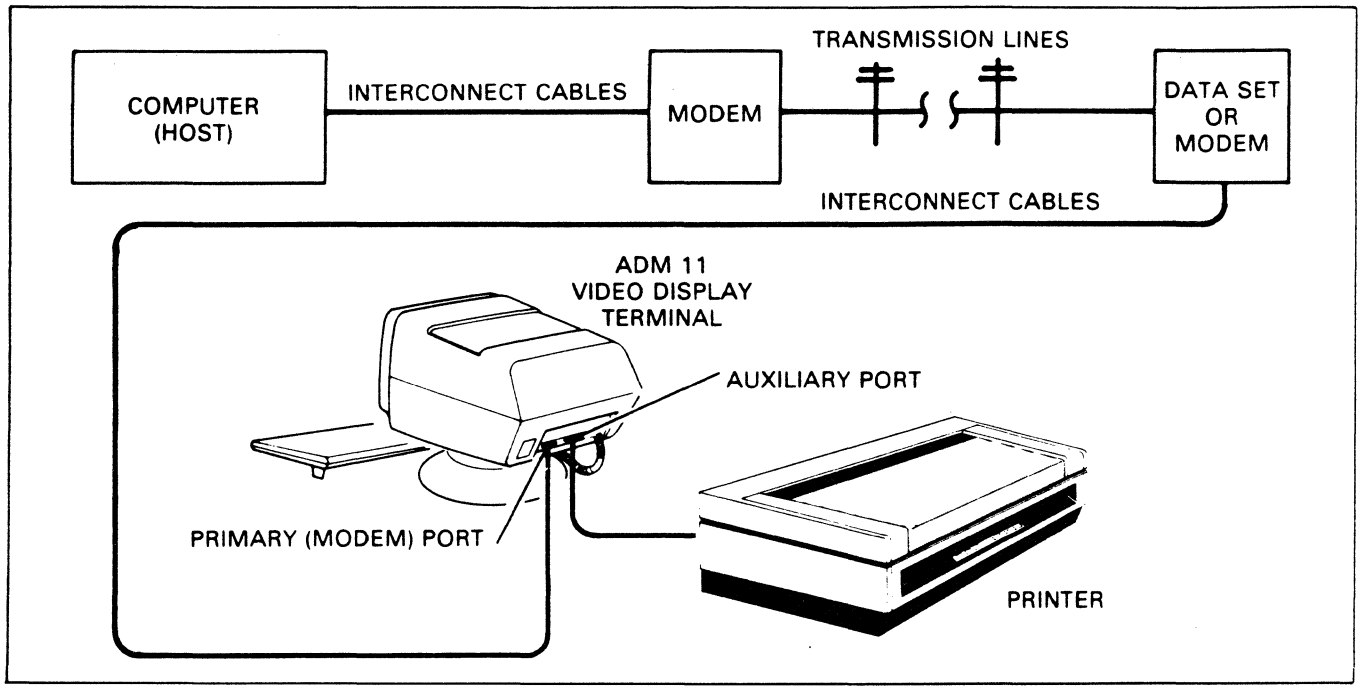


Figure 2-3. Typical ADM 11 Applications

periods, reduce the screen brightness using the CONTRAST control on the front of the unit or select the SCREEN SAVER feature in set-up mode.

5. The status/message line (25th line at the bottom of the screen) displays the terminal status. Following are the messages that may appear when the power is turned on:

DESCRIPTION	COLUMN LOCATION	SYMBOL
Data Carrier Detect	42-44	DCD
Clear To Send	46-48	CTS
Parity Error	51-52	PE
Program Mode	53-56	PROG
Keyboard Lock	58-62	KBDLOK
Conversation Mode	70-72	FDX or HDX
Terminal Mode	76-79	ADM ADDS HAZ VT52

6. If the test message and cursor do not appear on the screen, turn power off and wait 15 seconds. Turn power on again. Check the contrast control to be certain it has not been moved to the far left hand position, thereby reducing screen brightness. If the test message and cursor do not appear, turn off power and contact your Lear Siegler service representative.

2.5 POWER TURN-OFF

If the terminal is displaying information which must be retained, transmit this information to the host computer immediately. This is necessary because the display is cleared and the information lost when power is turned off. As an alternative, send the information to a printer prior to turning power off.

2.6 CARE OF THE ADM 11

2.6.1 Cleaning

Periodically clean the exterior housing and dust the unit using a soft brush or a 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 screen and housing with conventional spray cleaners or alcohol.

2.6.2 Inspection

Characters which appear on the screen should remain sharp, clear and intense for the life of the terminal. If there is deterioration of character quality your Lear Siegler service representative can make the needed mechanical and electrical adjustments to correct the condition.

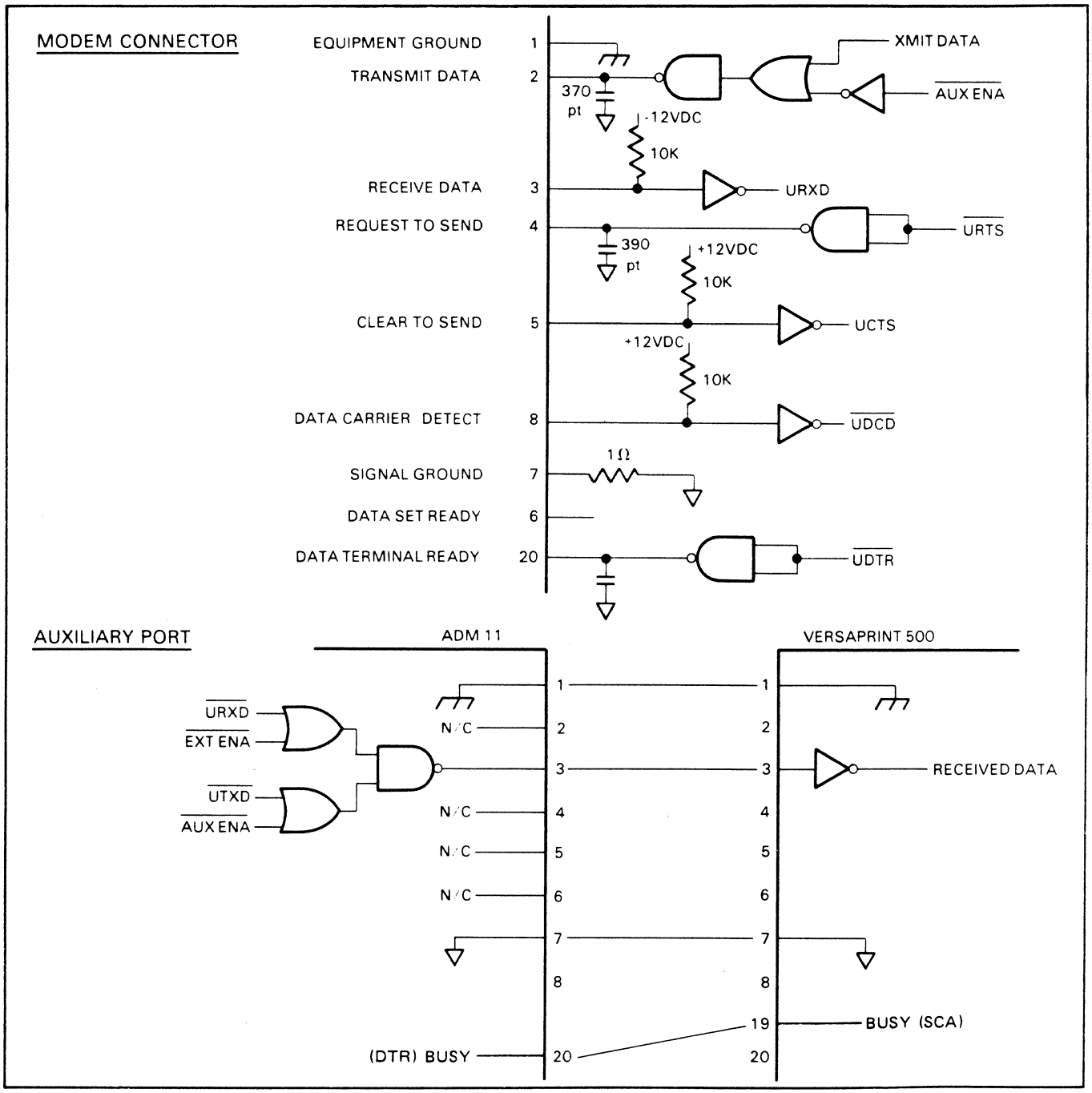


Figure 2-4. Modem Connector and Auxiliary Port

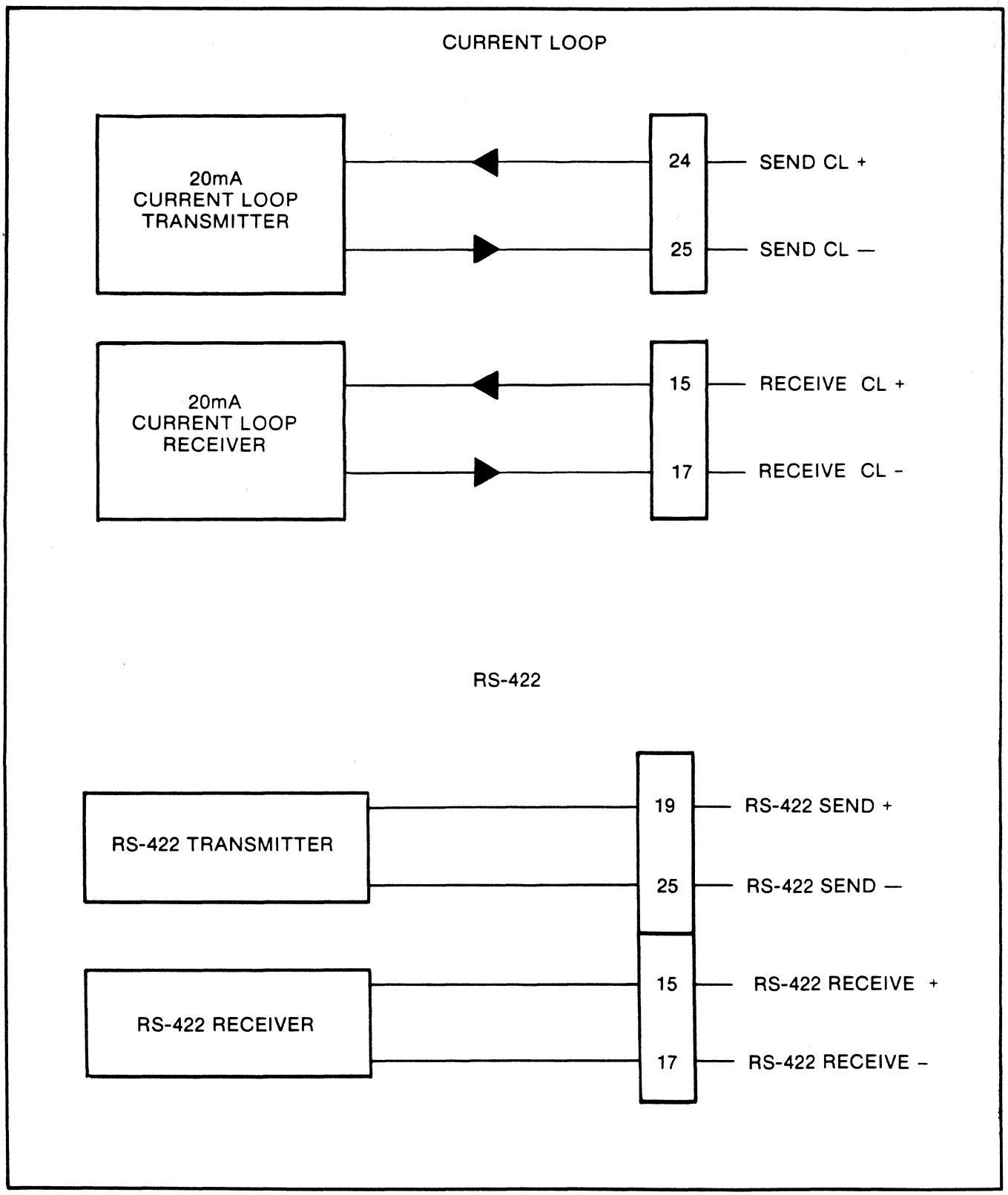


Figure 2-5. Optional Current Loop and RS-422 Interface Logic

Table 2-1. 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 P_0 P_1 P_2 P_3 P_4 P_5 P_6 P_7 P_8 P_9 (P must be in the range Hex 30 - Hex 3F)

Where P_0 - P_9 defines ten bytes of set-up commands. Within each byte, bits 7-4 are fixed and not selectable. Bits 3-0 constitute a nibble having selectable bits. See Table 2-2 for down-line loadable characters.

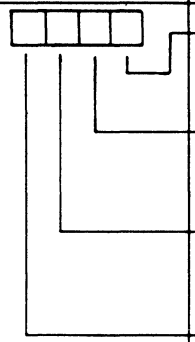
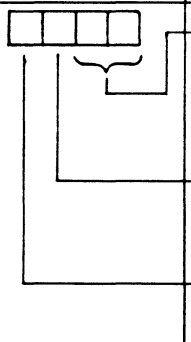
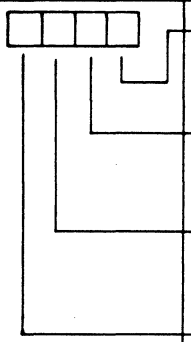
BYTE	NIBBLES: DEFAULT CHARACTER	NIBBLES: SELECTABLE BITS 3 2 1 0	DESCRIPTION
P_0	=		On-line 1 = Online 0 = Local Cursor 1 = Blink 0 = Steady Screen Saver 1 = Yes 0 = No Scroll Mode 1 = Yes 0 = No
		3 2 1 0	
P_1	'4'		Status line attribute 00 = Normal 01 = Reverse 10 = Blank 11 = Blink Key click 1 = ON 0 = OFF 580 Comp (ADDS only) 1 = Yes 0 = No
		3 2 1 0	
P_2	'4'		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 2-1. Down-Line Load Set-Up Features (continued)

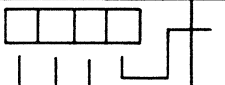
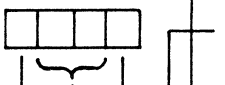
BYTE	NIBBLES: DEFAULT CHARACTER	NIBBLES: SELECTABLE BITS 3 2 1 0	DESCRIPTION
P_3	'0'		Wraparound 1 = ON 0 = OFF Newline with RETURN or ENTER key 1 = ON 0 = OFF Vertical Refresh 1 = 50 Hz 0 = 60 Hz Number of characters per function key 1 = 8 0 = 4
		3 2 1 0	
P_4	'0'		Answerback enabled 1 = Yes 0 = No Terminal Mode 00 = ADM 11 01 = ADDS 10 = HAZ 11 = VT52 Lead In (HAZ only) 1 = ~ (Tilde) 0 = ESC
		3 2 1 0	
P_5	'0'		X-ON/X-OFF selection 00 = DC1/DC3 01 = ACK/NAK 10 = STX/ETX 11 = Unallowed Handshake Mode 00 = None 01 = DTR 10 = X-ON/X-OFF 11 = Unallowed

Table 2-1. Down-Line Load Set-Up Features (continued)

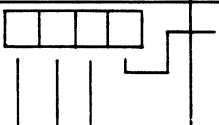
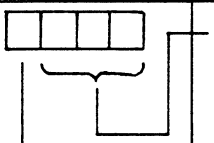
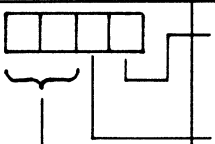
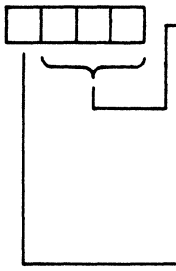
BYTE	NIBBLES: DEFAULT CHARACTER	NIBBLES: SELECTABLE BITS 3 2 1 0	DESCRIPTION
P_6	'2'		Number of data bits per word 1 = 8 bits 0 = 7 bits Parity enabled 1 = Yes 0 = No Parity sense 1 = Odd 0 = Even Bit 8 level 1 = High 0 = Low
		3 2 1 0	
P_7	'5'		Baud Rate 000 = 300 baud 001 = 600 baud 010 = 1200 baud 011 = 2400 baud 100 = 4800 baud 101 = 9600 baud 110 = 19200 baud 111 = Unallowed Not used
		3 2 1 0	
P_8	'0'		ADM 3A mode 1 = Enable 0 = Disable Cursor position after clear (ADDS only) 1 = Bottom 0 = Top Not used

Table 2-1. Down-Line Load Set-Up Features (continued)

BYTE	NIBBLES		DESCRIPTION
	DEFAULT CHARACTER	SELECTABLE BITS 3 2 1 0	
P_9	'0'		Keyboard tables 000 = US/UK 001 = German 010 = French 011 = Spanish 100 = Swedish/Finnish 101 = Norwegian 110 = Danish Reverse X-ON/X-OFF select 1 = Enable 0 = Disable

SECTION III
OPERATION

3.0 PRELIMINARY NOTE

Refer to **Table 3-1, below** for an explanation of the keystroke execution for CONTROL and ESCAPE functions used throughout this manual.

3.1 SET-UP MODE

There are two set-up modes which may be used on the **ADM 11**: the OPERATOR ACCESSIBLE MODE and the SUPERVISOR FUNCTIONS MODE. The OPERATOR ACCESSIBLE MODE is accessed by holding down the SHIFT key and pressing the SET-UP/STATUS key: [SHIFT] [SETUP]. The SUPERVISOR FUNCTIONS MODE is accessed by simultaneously holding down the three keys: SHIFT, CTRL and SETUP/STATUS: [SHIFT] [CTRL] [SETUP].

3.1.1 Operator Accessible Set-Up Mode

Operator accessible mode of the set-up mode permits turning the audible key click on and off, selecting a blinking or steady cursor, selecting a reverse-image message/status line and turning the message/status line off. These functions relate to the comfort and the individual preferences of the operator. The operator also may place the terminal on-line or off-line in this mode. The following function messages appear, one by one, in the lower left-hand corner (25th line) of the screen.

CLICK	N Y (N = NO Y = YES)
ON LINE	N Y
CURSR BLINK	N Y
STATUS	NORM REV BLANK

These selections are for the convenience of the operator and do not effect system operational values which are set by the supervisor.

3.1.2 Supervisor Functions Set-Up Mode

The 29 functions which are displayed, one by one, in the SUPERVISOR FUNCTIONS MODE of the set-up mode, are listed below:

CLICK	N Y
ON LINE	N Y
CURSR BLINK	N Y
STATUS	NORM REV BLANK
WRAP	N Y
NEWLN	N Y
BPS	300 600 1200 2400 4800 9600 19200

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.

BITS	7 8
BIT8	0 1 (0 = Space 1 = Mark)
PTY	N Y
PTY	EVN ODD
DUPLEX *	HDX FDX
CHR/FNC	4 8
FNC NVM **	N Y
SO/SI	LK KB GT EX
HZ	60 50
HNDSHK	NO DTR XON
REV XON/XOFF	ENA DIS
XON/XOFF	DC1/DC3 AK/NK STX/ETX
BUSY	HI LO
ANSBK	N Y
SCRN SAVE	N Y
KEYBD	US/UK GER FREN SPAN SWE/FIN NOR DAN
ADM3A	N Y
MODE	ADM ADDS HAZ VT52
LEADIN	ESC ~
SCROLL	N Y
580 COMP	N Y
CURSR HOME	TOP BOTTOM

*Terminal ignores half duplex instruction in VT52 mode. VT52 always operates in FDX.

**Do not enable if option is not installed.

These set-up functions include all the feature selections available to the operator, as well as those needed by the person responsible for programming the system.

OPERATOR ACCESSIBLE and SUPERVISOR ACCESSIBLE functions are also listed in **Table 3-2, page 3-3**. The table includes detailed descriptions of all functions and lists them in the same sequence as above and as they appear on the screen while the terminal is in the SUPERVISOR ACCESSIBLE FUNCTION MODE.

3.1.3 Selection of Set-Up Functions

When either of the two set-up modes is entered, the message/status line at the bottom of the screen (25th line) will disappear. The set-up functions will be displayed on this line at the lower lefthand corner of the screen.

As each function is called up, the cursor is positioned over one of the available selections. For example, the N or the Y when a NO or YES response is needed. Anytime power is first turned on, the cursor is positioned over the individual configurations which were set the last time the set-up mode was saved. (See **paragraph 3.1.6, page 3-7.**) To change the value for any function, press [←] or [→] until the cursor is positioned over the desired value.

To display the next function on the list of set-up mode functions, press [↓]. For example, if the terminal is in the OPERATOR ACCESSIBLE SET-UP MODE, the first function displayed is CLICK. Pressing [↓] will remove CLICK from the screen and display the next function, ONLINE.

To back up and display the previous function, press [↑]. To return to the beginning of the list and display the first function on the list, press [HOME].

The set-up functions may be changed in any sequence; they do not need to be selected in order of display. All the selected functions will remain in affect until the terminal is turned off, reset or reprogrammed by instructions received from a host computer.

3.1.4 Exiting Set-Up Mode

To exit either of the two set-up modes, press the SETUP/STATUS key: [STATUS]. The terminal will display its status on the message/status line.

3.1.5 Communications Buffering During Set-Up

The terminal continues to receive, but does not display or process, data which is received via the primary (modem) connector while the terminal is in set-up mode. When HANDSHAKING is enabled, the terminal will XOFF if the host computer sends data which overruns the input buffer within the terminal.

Table 3-2. Set-Up Mode Functions

*(# indicates default configurations; * indicates operator accessible functions)*

FUNCTION	SETTING	DESCRIPTION
CLICK*	N	No key-click sound when a key is depressed.
	Y#	Key-click sound when a key is depressed.
ONLINE*	N	Terminal operation is off-line (local) mode.
	Y#	Terminal operation is on-line to host.
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.
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 next line down when a line has been filled with characters.
NEWLINE	N	Auto line feed is disabled. RETURN and ENTER perform a carriage return only; the cursor moves to the leftmost column of the current line.
	Y#	Auto line feed is enabled. RETURN and ENTER perform a line feed and carriage return; the cursor moves to the leftmost column of the next line down.
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.
BITS	7	Sets the data bit length to seven bits.
	8#	Sets the data bit length to 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-bit data word is selected.

Table 3-2. Set-Up Mode Functions (continued)

*(# indicates default configurations; * indicates operator accessible functions)*

FUNCTION	SETTING	DESCRIPTION
PTY ENABLE	N#	Parity bit is disabled.
	Y	Parity bit is enabled. This setting is valid only if a 7-bit data work 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. Allows eight function keys to be programmed.
	8#	Function keys will store up to eight character codes per key. Allows four function keys to be programmed.
FNC KEYS	N#	Non-volatile memory option for the function keys is not present. (Disabled)
	Y	Non-volatile memory option for the function keys is present. (Enabled) Note: Must not be enabled if option is not installed.
SO/SI	LK KBD#	Unlocks and locks the keyboard using CTRL-N/CTRL-O codes respectively.
	GATE AUX	Enables and disables auxiliary port using CTRL-N/CTRL-O codes respectively.
FREQ (Hz)	60#	Sets vertical refresh rate to 60 Hz.
	50	Sets vertical refresh rate to 50 Hz.
HANDSHAKE	NO	Handshaking busy/ready protocol between terminal and host computer is disabled.
	DTR	Handshaking protocol is enabled using the DTR signal on pin 20.
	XON#	Handshaking protocol is enabled, using XON/XOFF codes on pin 2.

Table 3-2. Set-Up Mode Functions (contined)

*(# indicates default configurations; * indicates operator accessible functions)*

FUNCTION	SETTING	DESCRIPTION
REV XON/XOFF	ENA#	Enables the receipt of XON/XOFF codes from the host.
	DIS	Disables the receipt of XON/XOFF codes from the host.
XON/XOFF	DC1/DC3#	The XON/XOFF characters that are transmitted are set to DC1/DC3.
	ACK/NAK	The XON/XOFF characters that are transmitted are set to ACK/NAK.
	STX/ETX	The XON/XOFF characters that are transmitted are set to STX/ETX.
		NOTE: These settings are valid only if the X-ON handshake mode is selected.
BUSY	HI	Active busy DTR signal for the auxiliary port is set to high.
	LO#	Active busy DTR signal for the auxiliary port is set to low.
ANSBK	N#	Disables terminal's answerback message.
	Y	Enables terminal's answerback message.
		NOTE: These settings are valid only if the terminal has the answerback option installed.
SCREEN SAVE	N#	Disables CRT screen saver feature.
	Y	Enables CRT screen saver feature, automatically disables video after about 15 minutes of non-use.
KEYBOARD	US/UK#	Sets USA/United Kingdom keyboard.
	GER	Sets German keyboard.
	FREN	Sets French keyboard.
	SPAN	Sets Spanish keyboard.
	SWE/FIN	Sets Swedish/Finnish keyboard.
	NOR	Sets Norwegian keyboard.
	DAN	Sets Danish keyboard.
ADM3A MODE	N#	When enabled, the terminal recognizes only an " ESC = " sequence plus other functions. (See page 3-18.)
	Y	

Table 3-2. Set-Up Mode Functions (continued)

*(# indicates default configurations; * indicates operator accessible functions)*

FUNCTION	SETTING	DESCRIPTION
MODE	ADM#	Sets terminal to operate as an ADM 11.
	ADDS	Sets terminal to operate as an ADDS terminal.
	HAZ	Sets terminal to operate as an Hazeltine terminal.
	VT52	Sets terminal to operate as a DEC VT52.
LEAD IN	ESC#	Selects ESCAPE as the lead-in character.
	~	Selects the tilde as the lead-in character in HAZ mode only.
SCROLL	N	Disables automatic scrolling.
	Y#	Enables automatic scrolling when 24th line is filled.
580 COMP.	N#	Disables Model 580 compatibility.
	Y	Enables ADDS Model 580 compatibility. Functional only when ADDS mode is selected.
CURSOR HOME	TOP#	ADDS mode only. Determines position of cursor after a clear screen operation.
	BOTTOM	

Note

Changing communications characteristics when in set-up mode may affect or prevent further data transfer with the host computer or auxiliary device.

3.1.6 Saving Set-Up Functions

The power on mode conditions are established by the last-saved functions selected in either of the two set-up mode features. When 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 save the set-up in non-volatile memory, enter [CTRL][S]. (Press [CTRL] and [S] simultaneously when in set-up mode.)

There are two other commands that also may 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. [CTRL][R] causes the terminal to restore the function values currently in non-volatile memory. 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 the set-up mode. The **ADM 11** will always power up to the last saved set-up conditions. Refer to **Figure 3-1, page 3-8**, for an illustration and description of set-up mode display and associated keys.

3.1.7 Down-Line Load Set-Up

The set-up mode features may be selected by the host computer using a command sequence. Refer to **Table 2-1 on page 2-7** for details.

3.2 OPERATIONAL MODES

The **ADM 11** provides several different modes of operation which are selectable by the host computer or from the keyboard. The various control codes and escape sequences used to change the operating characteristics of the terminal are described in detail in **paragraph 3.5, page 3-14.**

3.2.1 On-Line And/Or Local Mode

On-Line Mode -- When the terminal is placed on-line (ONLINE Y), data that is received via the primary (modem) port will be displayed and/or acted upon and keyboard entries will be transmitted and/or displayed, depending on the communications mode selected.

Local Mode -- In local mode (ONLINE N), 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 using the keyboard is immediately transmitted to the host computer, character by character. The display action on the terminal screen 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 also are routed to the CRT to be displayed locally. RTS goes low when RETURN or ENTER is depressed.

3.2.3 Program Mode

Setting the terminal to program mode via the [SHIFT][HOME] key sequence allows the terminal to display all 128 ASCII characters. Normally, the 32 control codes (Hex 00-1F) cause a particular action to be performed. This allows embedding of particularly useful information in print output. The information also is useful as a diagnostic aid. However, in program mode, the control codes are displayed instead of being acted upon. Control codes can never be displayed in reduced intensity. To enter program mode press [SHIFT][HOME]. To exit program mode press [SHIFT][HOME] again.

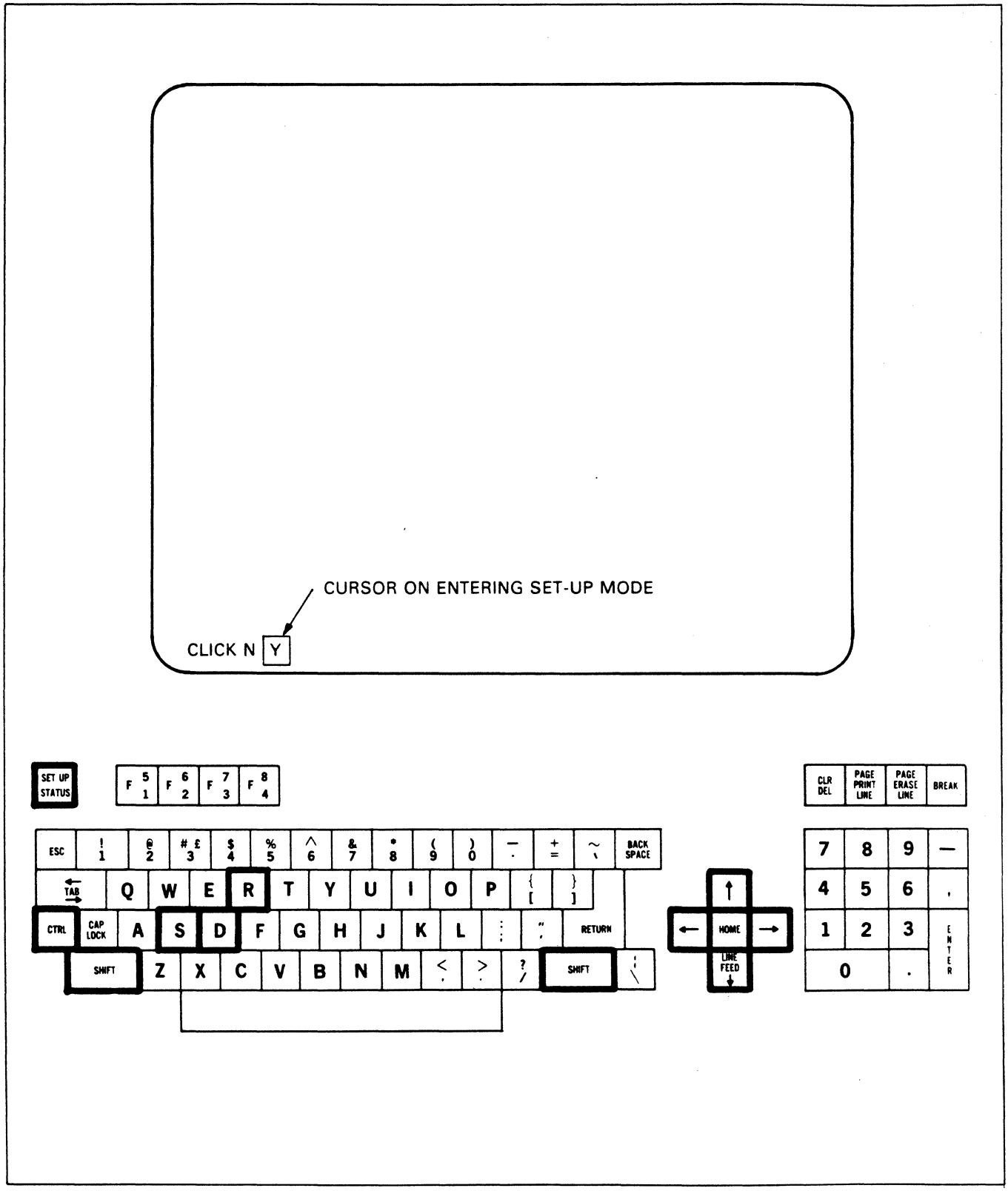


Figure 3-1. ADM 11 Set-Up Mode Display and Associated Keys

3.3 KEYBOARD OPERATION

The operator uses a keyboard to enter data and perform control operations. The keyboard contains 96 ASCII character-set keys and various control and/or modifier keys. All keys are auto-repeating at the rate of approximately 15 characters per second except the SETUP/STATUS, PAGE/LINE ERASE, BREAK, PAGE/LINE PRINT, CLR/DEL and FUNCTION keys. Auto-repeating begins after a key has been pressed for a minimum of one second. **Figure 3-2, page 3-10**, illustrates and describes the functions of the **ADM 11** keyboard. **Paragraphs 3.3.2** thru **3.3.9** provide details about the various types of keyboard operation as follows:

- 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 by the operator is independent of the one preceding or following it. However, the keyboard is scanned so even a very fast typist will not be able to overrun the keyboard. There is a three-key rollover, data entry protection, plus a 256 keystroke buffer, on the **ADM 11**. The keyboard may also provide audible feedback through a user-selectable "click" feature that indicates a valid key closure.

[SHIFT] and [CTRL] are used in conjunction with various keys to modify the operation of those keys.

3.3.2 Alphanumeric and Punctuation Keys

Upper case and lower case, numerics and punctuation characters from the 96 ASCII character set (Hex 21-7E) plus space (Hex 20) and DEL (Hex 7F) are sent to the display and/or transmitted to the host computer when a key is pressed. Keys having a double legend produce the lower case or lower legend when unshifted and the upper case or upper legend when pressed using the [SHIFT] key. The [CAP LOCK] key shifts only the alphabet keys to capital letters. The [SPACE] key generates an ASCII (Hex 20) code for transmission. It occupies one space on the display screen. The [DEL] key produces an ASCII Hex 7F code for transmission but does 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 through 9 and minus, comma and period are sent 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.

3.3.4 Modifier Keys

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

[SHIFT] causes the upper legend characters of a double-legend key to be produced when pressed in conjunction with either [SHIFT] key.

[CAP LOCK] causes the 26 alphabet characters to stay in shift (uppercase) when it is depressed. The [CAP LOCK] key must be pressed again to release. Numeric, punctuation and various control keys are not affected.

[CTRL] causes one of the 32 ASCII control codes to be generated when pressed in conjunction with an otherwise displayable character key. The character generated is not displayed unless program mode is set. Refer to **Table 3-3a, page 3-19** for details.

3.3.5 Cursor Control Keys

The cursor is used to indicate the next character position to be entered on the display. It 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

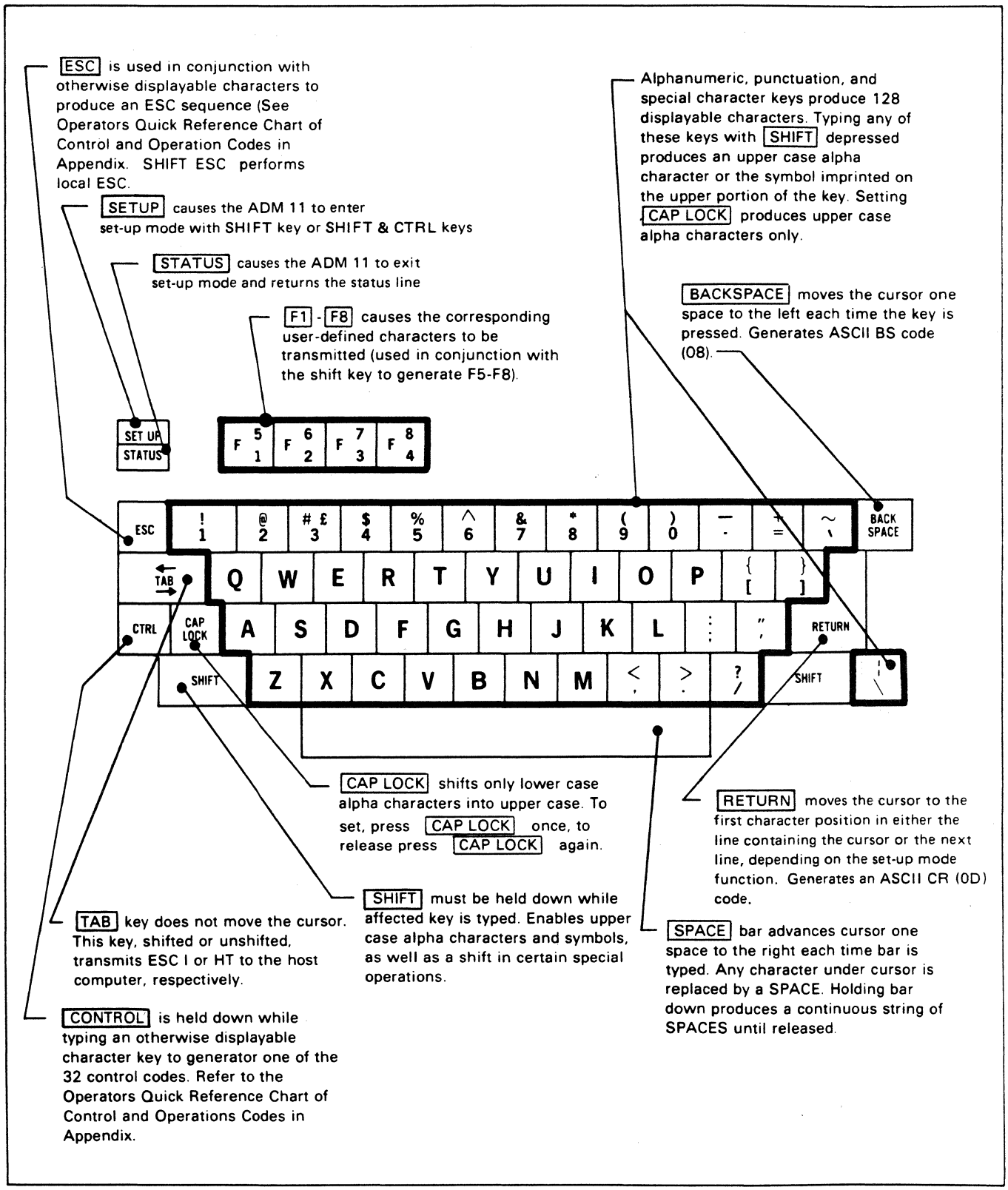


Figure 3-2. ADM 11 Standard Keyboard Operation Characteristics

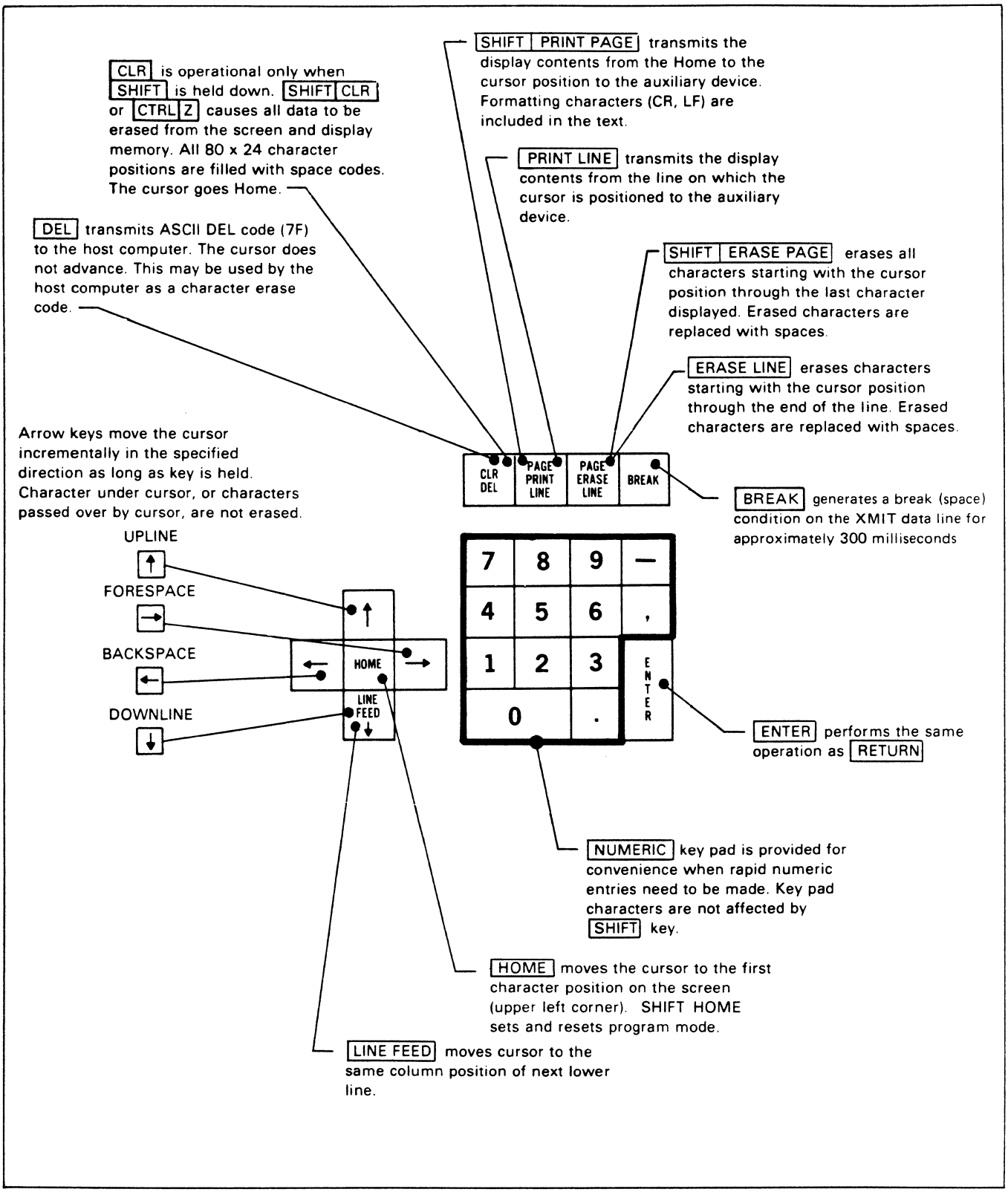


Figure 3-2. ADM 11 Standard Keyboard Operation Characteristics (continued)

[HOME] move the cursor as indicated and transmit the ASCII control codes listed in **Table 3-3a, page 3-19.**

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 backspace code (hex 08) is generated.

[RETURN] moves the cursor to the beginning of the line it occupies. A carriage return code (hex 0D) is generated. A line feed code is generated prior to the carriage return when new line mode is switched ON in set-up mode.

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 causes a scroll operation to occur if the cursor is on the bottom line of the display. A line feed code (hex 0A) is generated.

3.3.6 Edit Keys

There are two edit keys on the **ADM 11** keyboard: [ERASE] and [CLEAR]. These keys are local functions and no codes are transmitted. However, use of these keys provides three operations:

[ERASE] removes (erases) all characters from the cursor position to the end of the line. Erased characters are replaced with spaces. Cursor position does not change.

[SHIFT][ERASE] removes (erases) all characters from the cursor position through the last character displayed on the CRT. Erased characters are replaced with spaces. Cursor position does not change.

[SHIFT][CLR] removes (clears) all characters on the screen and moves the cursor to the HOME position (first row, first column). Cleared characters are replaced with spaces.

3.3.7 Print Keys

[PRINT] causes the data on the line on which the cursor is positioned to be sent to the auxiliary port device. This device is usually a printer. The operation is referred to as a print line operation. The entire line, starting at the left margin, is transmitted but trailing blanks and/or NULLS are omitted. The line is terminated by the automatic insertion of CR (hex 0D), NULL (hex 00), LF (hex 0A), NULL (hex 00) in the output data.

[SHIFT][PRINT] causes the data from the HOME position to the end of the screen to be sent to the auxiliary port device. This is known as a print page operation. At the end of each transmitted line, **ADM 11** automatically inserts a CR (hex 0D), NULL (hex 00), LF (hex 0A), NULL (hex 00) code in the output data.

3.3.8 Function Keys

The **ADM 11** keyboard has four function keys, giving the user four or eight programmable function sequences using [SHIFT]. Function sequences 1 through 4 are accessed by pressing [F1], [F2], [F3], [F4] keys. Function sequences 5 through 8 are accessed by pressing [F1], [F2], [F3], [F4] in conjunction with [SHIFT].

The number of characters programmable into each function key sequence is controlled by the set-up feature: CHR/FNC. If CHR/FNC = 4, the user may program all eight function key sequences with four characters each. If CHR/FNC = 8, the user may still program eight function keys. If the non-volatile function option is installed, the user may save the functions into non-volatile memory. In this case, when CHR/FNC = 8, function key sequences F5 through F8 will default to the non-programmed state. Function keys are programmed via the escape sequence ESC ! X STRING where X is a character @-G (hex 40-46) corresponding to function key 1 thorugh 8 and string is the actual code to be programmed into the function sequence.

Function sequences may be programmed from the host using four or eight ASCII characters or from the keyboard locally using four or eight keystrokes. Keystrokes may be ASCII characters (hex 00-7F) or local action keys, such as [PAGE ERASE]. It is possible to link function sequences into longer sequences using the actual

function key to which you wish to link. This also creates looping when a function is linked to itself. A looping function will repeat until the terminal operator presses [SHIFT BREAK].

Function keys are programmed via an ESCAPE sequence. See **Table 3-4a, page 3-23**. If CHR/FNC = 8, then eight characters must be entered for each function. NULLS (CTRL-@) programmed into a function sequence are not transmitted. A function may 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 option is not present, the functions will default as follows:

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

Note

The default values for the keys are shown in the charts below. The NULLS are for explanatory purposes. They are never transmitted.

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

F1 = SOH @ CR NULL NULL NULL NULL NULL
F2 = SOH A CR NULL NULL NULL NULL NULL
F3 = SOH B CR NULL NULL NULL NULL NULL
F4 = SOH C CR NULL NULL NULL NULL NULL

3.3.9 Special Function Keys

The DEL/CLEAR, LINE/PAGE PRINT, LINE/PAGE ERASE and BREAK keys are programmable. Seven functions, using these four keys (unshifted and shifted) may be programmed with up to three bytes each in a fashion similar to keys F1 through F8. They may also be linked to each other or to keys F1 through F8. These keys, however, do not require the NVM option in order to be saved. They default to their standard functions as imprinted on the keycaps. Special function keys are programmed via the escape sequence [ESC] [!] [X] [STRING] where X is a character P-V (hex 50-56) corresponding to special function keys:

DEL = P
PRINT LINE = Q
ERASE LINE = R
BREAK = S
SHIFT/CLEAR = T
SHIFT/PRINT LINE = U
SHIFT/ERASE PAGE = V
SHIFT/BREAK = ABORT FUNCTION (Not programmable)

3.3.10 Special Operation Keys

Keys listed below perform special operations or have a "unique" effect on the **ADM 11**:

Press [SET-UP] to cause the **ADM 11** to enter set-up mode when pressed in conjunction with [SHIFT][CTRL], as described in **paragraph 3.1, page 3-1**.

Press [STATUS] to cause the terminal to exit set-up mode when pressed as described in **paragraph 3.1, page 3-1**. Also, [STATUS] causes the **ADM 11** to display the terminal status on the 25th line.

Press [BREAK] to cause 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. It usually is used for control signaling to the host computer.

Press [ESC] to generate a special control code (hex 1B) which is used for command operations, and which usually precedes one or more characters. Thus, [ESC] usually is a Lead-In character for terminal control operations.

Pressing [SHIFT][ESC] 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 whole character set may be displayed on the CRT by setting program mode into the terminal. Control codes may not be

displayed in reduced intensity. Wrap mode is enabled automatically when program mode is selected. The key sequence [SHIFT][HOME] selects program mode. [SHIFT][HOME] keyed again exits the program mode. The displayable USASCII character set and control codes are shown in the **Appendix**.

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

3.5 COMMAND CODE SET

3.5.1 Control Codes

The operational characteristics of the **ADM 11** are partly controlled by a group of control codes which may originate from the host computer or the keyboard. In program mode the **ADM 11** will display, but not act upon, the recognized Control codes. [SHIFT][HOME] sets program mode and repeating [SHIFT][HOME] exits program mode. Of the 32 ASCII standard control codes available, the **ADM 11** utilizes the control codes listed in **Tables 3-3a, 3-3b, 3-3c, and 3-3d, pages 3-19 thru 3-22**.

3.5.2 Escape Sequences

An escape sequence is transmitted by the host computer or formed by pressing [ESC] followed by one or more additional characters. Each escape sequence controls a specific terminal operation. Some are one-time only. Others remain operative for as long as power to the terminal is not interrupted, or until terminated by another escape sequence or control code.

Tables 3-4a, 3-4b, 3-4c and 3-4d, pages 3-23 thru 3-32 show the escape sequences used by the **ADM 11** initiated by the host computer or the keyboard.

3.6 DATA TRANSMISSION

ADM 11 always operates in the conversation mode (character by character). Data is transmitted when a key is pressed. Communications are serial asynchronous, using an ASCII character format of one (1) start bit, seven (7) or eight (8) data bits, an odd/even/no parity bit and one (1) stop bit. Word structure and baud rate used for transmission are selectable in set-up mode. Primary (modem) port communications are via a bidirectional RS-232C or optional 20mA current loop. Interfaces are detailed in **Section II**. Auxiliary port communications are unidirectional via RS-232C interfacing. These are also detailed in **Section II**. Data communications take place whenever the **ADM 11** is placed in on-line mode via set-up mode. When receiving data, the terminal has an XON/XOFF or DTR busy indication feature. It is selectable in set-up mode and is used to command the host to suspend transmission in order to prevent data loss.

3.6.1 Conversation Mode Characteristics

Characters entered from the keyboard are immediately transmitted to the host computer. Control codes and escape sequences are transmitted but normally are not displayed. For any characters generated by the keyboard to be displayed or commands directly acted upon by the terminal, the unit must be set to half duplex mode. In full duplex mode, only those characters which are echoed by the host will be displayed and only those commands echoed by the host will cause any action.

3.6.2 Busy/Ready Status

ADM 11 signals the host about the potential for data loss because the input buffer (1,536 characters) is nearly full or the terminal is otherwise unable to accept data. The signal sent depends upon the handshake mode setting. Handshake mode may be set to DTR, XON/XOFF or NONE via set-up mode. Refer to **Table 3-2, page 3-3**. If NONE is selected, no busy signal is sent to the host computer when the input buffer is full.

If DTR or XON/XOFF are selected, a busy signal is sent to the host computer when the input buffer has been sent 1,280 characters. In other words, the operator is within 256 characters of filling the buffer.

A ready signal (DTR high or XON) is sent as buffer content is reduced to 256 characters. Data flow to the host is not halted. The terminal indicates it is ready to receive additional data. XON and XOFF normally transmit DC1 and DC3 signals to the host respectively, but they may be

changed via set-up mode. If the terminal receives XON/XOFF when DTR mode is set, XON and XOFF are ignored by the terminal.

Executing the transparent print function, or using display and print with low speed printers, causes the XON/XOFF commands to be issued when appropriate. Busy/ready condition of the printer is sensed on the auxiliary port via the DTR signal on pin 20.

3.6.3 Reverse XON/XOFF ENABLE/ DISABLE

If the terminal is set to the XON/XOFF mode, XON/XOFF characters sent by the host may be ignored. For example, in the display and print mode, an XOFF character destined for the printer would shut down the terminal. This problem can be overcome by setting the REV XON/XOFF set-up feature to DISABLE.

3.7 CURSOR CONTROL

3.7.1 Relative Cursor Positioning

Cursor position indicates the next character position in the display. The cursor may be moved to any position on the screen using the separate cursor control keys. 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 entered on the keyboard. The operation codes, and the local operations required to control the cursor position, are presented in **Tables 3-4a, 3-4b, 3-4c, and 3-4d, pages 3-23 thru 3-31.**

3.7.2 Absolute Cursor Positioning/Reading

Absolute cursor addressing commands the cursor to move directly to a specific display location. Commanding the cursor to a specific location is also known as loading the cursor. Reading the cursor position and loading the cursor are normally executed by the host computer. The load/read commands are executed by means of control codes and escape sequences in which the row and column location of the cursor is expressed, using a pair of ASCII characters. See **Appendix** for the ASCII characters assigned to each row and column for each terminal mode.

Load Cursor Operation -- When load cursor is initiated the cursor moves to the commanded position. As an example, load cursor operation codes required are as follows for the **ADM 11** mode:

ESC = ROW COL

ASCII ASCII

- ASCII character associated with cursor column (1-80) position. (Character = ASCII space through o. See **page A-9.**)
- ASCII character associated with row (1-24) position. (Character = ASCII space through 7. See **page A-9.**)

Example: [ESC] [=] [,] [K] commands the cursor to move directly to row 13, column 44.

Read Cursor Operation -- 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 ASCII character for row and column, followed by a CR.

3.7.3 Tab Control

ADM 11 has no local tab operation. [TAB] transmits an HT code (hex 09) and [SHIFT] [TAB] transmits an escape I code (hex 1B 49) to the host computer.

3.7.4 Scrolling

ADM 11 data is entered into display memory starting at the HOME position and continues through position 80 of line 24, the last data position. When position 80 is filled, or when new line or line feed occurs in line 24, the display is shifted upward one line and data entry continues in position 1 of the new line 24. The original top line of the display is lost. Scrolling continues indefinitely. When scrolling occurs, the 25th line is cleared, but will be restored after one second in which scrolling does not occur.

The 25th line (status line) may be disabled by selecting blank attribute for the status line in the set-up mode.

3.8 EDITING OPERATIONS

ADM 11 is equipped with data editing capabilities which may be executed from the host and from the keyboard. **Table 3-4a, page 3-23** describes the commands and keyboard entries used to perform editing functions.

3.8.1 Erase And Clear Operations

All or certain selected areas of the display may be cleared of data by appropriate commands. The erase may be from the cursor to the end of the line by pressing [ERASE], or from the cursor to the end of the 24th line by pressing [SHIFT][ERASE]. The character used to replace the cleared data may be either a space (hex 20) or a NULL (hex 00). Refer to the [ESC][t], [ESC][*] and [ESC][y] commands in **Table 3-4a, page 3-23 and 3-24** for replacing erased data with NULL. In addition to these commands, the whole screen may be erased (to spaces) by depressing [SHIFT][CLEAR] on the keyboard at any time.

3.9 DISPLAY HIGHLIGHTING OPERATIONS

ADM 11 may have various attributes used to highlight data on the display. Visual and graphic attributes used for display formatting are covered below:

3.9.1 Visual Attributes

There are four visual attributes which may be assigned to any character on display. These include blink, blank, reverse, underline and reduced intensity. Reduced intensity is non-embedded. The others are embedded attributes. Selection of an escape 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 the control characters, to have reduced intensity. The list of attribute combinations and their escape sequences for the **ADM 11** and ADDS terminal modes are shown below:

ADM

[ESC][G][0]	Normal Video
[ESC][G][1]	Blank
[ESC][G][2]	Blink
[ESC][G][3]	Blank
[ESC][G][4]	Reverse
[ESC][G][5]	Reverse and Blank
[ESC][G][6]	Reverse and Blink
[ESC][G][7]	Blank and Reverse
[ESC][G][G]	Underline
[ESC][G][H]	Underline, Blink
[ESC][)]	Set Reduced Intensity (non-embedded)
[ESC][(]	Set Normal Intensity (non-embedded)

ADDS *

[ESC][0][@]	Normal Video
[ESC][0][A]	Reduced
[ESC][0][B]	Blink
[ESC][0][C]	Blink, Reduced
[ESC][0][D]	Blank
[ESC][0][P]	Reverse
[ESC][0][Q]	Reverse
[ESC][0][R]	Blink, Reverse
[ESC][0][S]	Blink, Reverse
[ESC][0][']'	Underline
[ESC][0][q]	Underline
[ESC][0][b]	Blink, Underline
[ESC][0][c]	Blink, Underline

*** Note**

CTRL N (SO) code needs to be sent first to set tag bit before attribute command.

HAZ and VT52 terminal modes provide relatively few visual attribute choices. These may be found in their escape sequence lists in **Tables 3-4c and 3-4d, pages 3-28 through 3-32.**

3.9.2 Graphics

The graphics mode (a visual attribute of the unit) capability of the **ADM 11** terminal allows the user to draw business forms or simple graphs to enhance the information presentation. ADDS, HAZ and VT52 do not offer graphics. Graphic symbols available, as well as the associated ASCII codes, are illustrated in the **Appendix.** Pressing [ESC] [G] [8] sets graphics mode for the line or the remainder of the line on which cursor is located. Terminal reverts to regular (non-graphics) mode at the beginning of next line. [ESC] [G] [8] must be entered for each individual line on which graphics are to be employed. The appropriate commands are shown below:

[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
[ESC] [G] [D]	Business Graphics, Reverse and Blank
[ESC] [G] [E]	Business Graphics, Reverse and Blink
[ESC] [G] [F]	Business Graphics, Reverse, Blank, and Blink

3.10 SET-UP MODE OPERATIONS

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 (25th line) when set-up mode is entered. Set-up mode is fully described in **paragraph 3.1, page 3-1.**

3.11 PRINT OPERATIONS

The auxiliary port of the **ADM 11** typically is connected to a serial RO (Receive Only) printer. Communication of data to the auxiliary device is unidirectional via an RS-232C interface. A busy/ready signal level is monitored for status during print operations. There are four types of print output: Page Print, Print Line, Display and Print, and Transparent Print.

3.11.1 Page Print

When **ADM 11** receives a formatted print page command, data will be transmitted from the whole screen (HOME to lower right-hand margin) to an auxiliary device. Trailing blanks and/or NULLS are omitted on each line. This is useful when using a formatted screen being sent to a pre-printed form. The print page commands may be generated from the host or the keyboard. Each print line sent is followed by a CR (hex 0D), NULL (hex 00), LF (hex 0A), NULL (hex 00) in the data stream. When an unformatted page print command is given, trailing blanks and/or NULLS are printed on each line. Each print line is not followed by a CR, NULL, LF, NULL in the data stream.

3.11.2 Line Print

Upon receiving a print line escape sequence, the **ADM 11** transmits data from the line on which the cursor is positioned to the printer.

3.11.3 Display and Print (Copyprint Mode)

Display and print mode is enabled or disabled by entering a command from the keyboard or by receiving the correct escape sequence from the host. When using this method of transmission, the terminal will display and act upon all received data. It will also transmit the data to the printer via the auxiliary port to the printer. When operating in conversation mode/half duplex, keyboard entries are transmitted to the host and displayed 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 them from the host. When operating in this mode the terminal will not display received data. However, the terminal will transmit the received data through the auxiliary port to the printer. No commands except the reset display and print/transparent print modes are acted upon.

3.12 RESET OPERATIONS

ADM 11 may be reset in either of two ways: a power-on reset, or a reset terminal command.

3.12.1 Power-On Reset

A power-on reset consists of a complete recycling of the **ADM 11** functions. It is performed by setting the power switch to OFF; waiting at least 10 seconds; then turning the switch to ON. All

display and other volatile memory is erased when powering down. Upon powering up the unit is subject to the complete power-on procedure described in **Section II.**

3.12.2 Reset Terminal Command

ADM 11 is reset when the ESC o ! command is received from either the keyboard or the host computer. 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 terminal is reset by either of the above methods the self-test will be carried out. The test will verify the integrity of display memory, program memory, non-volatile memory and the associated internal control logic. On completion of self-test the terminal will sound a tone.

3.13 ADM 3A MODE

The ADM 3A mode is a subset of the **ADM 11** mode. The ADM 3A mode may be entered using the set-up mode, setting the ADM 3A N Y feature to Y. In the ADM 3A mode the terminal assumes the following characteristics:

1. The only escape sequence recognized is ESC = (r) (c) (load cursor).
2. When not in local mode, the auxiliary port is always enabled.
3. When in half duplex mode, keyboard input will be transmitted both to the host and the auxiliary port.
4. The auxiliary port may be controlled by the SO/SI set-up feature.
5. Scroll mode is always enabled.

Table 3-3a. Control Codes Utilized by ADM 11 (LSI)

OPERATION	FROM HOST (ASCII Code)	FROM KEYBOARD	HEX CODE	DESCRIPTION
Answerback	ENQ	CTRL E	05	Transmits answerback message if option is present. Otherwise, no operation.
Bell	BEL	CTRL G	07	Sounds audible tone.
Backspace	BS	← or BACKSPACE	08	Moves cursor left one character position.
Linefeed	LF	↓	0A	Moves cursor to next line down, same column. If cursor is on last line, scroll takes place.
Up Cursor	VT	↑	0B	Moves cursor up one line, same column. If cursor is on first line there is no operation.
Right Cursor	FF	→	0C	Moves cursor one space right.
Return	CR	RETURN	0D	Moves cursor to first column, same line. (Note: If NEWLINE Y is selected in set-up mode, RETURN key also sends a newline (US) command to host and moves cursor down one line.
Unlock Keyboard	SO		0E	In the SO/SI LK KB set-up mode, this unlocks the keyboard.
Lock Keyboard	SI	CTRL O	0F	In the SO/SI LK KB set-up mode, this locks the keyboard.
Auxiliary Port ON	SO	CTRL N	0E	In the SO/SI GT EX set-up mode, this switches the auxiliary (printer) port ON.
Auxiliary Port OFF	SI	CTRL O	0F	In the SO/SI GT EX set-up mode, this switches the auxiliary (printer) port OFF.
XON Character	DC1	CTRL Q	11	Signal to host to resume data transmission. Disabled when reverse X-ON/ X-OFF is disabled in the set-up mode.
XOFF Character	DC3	CTRL S	13	Signal to host to indicate buffer - full condition. Also, if received from host terminal will stop transmission of data.
Auxiliary Port OFF	DC4	CTRL T	14	Switches auxiliary port OFF.
Clear Screen	SUB	CTRL Z	1A	Clears screen to spaces; moves cursor HOME.
Escape	ESC	ESC	1B	Lead in command.
Home Cursor	RS	CTRL	1E	Moves cursor to first column, first row (HOME).
New Line	US	CTRL _	1F	Moves cursor to first character position of next line. If cursor is on bottom line, a scroll occurs.

Table 3-3b. Control Codes - ADDS Terminal Version

OPERATION	FROM HOST (ASCII Code)	CONTROL CODE FROM KEYBOARD	HEX CODE	DESCRIPTION
Cursor Home	SOH	CTRL A	01	Moves cursor to HOME position.
Unlock Keyboard *	STX (580 only)	CTRL B	02	Enables keyboard.
Lock Keyboard *	EOT (580 only)	CTRL D	04	Disables keyboard.
Cursor Right	ACK	CTRL F	06	Moves cursor right one column.
Bell Tone	BEL	CTRL G	07	Sounds BEEP tone.
BackSpace	BS	CTRL H	08	Moves cursor left one column.
Field Tab	HT	CTRL I	09	Moves cursor directly to beginning of next foreground field.
Cursor Down	LF	CTRL J	0A	Moves cursor down one line.
Vertical Cursor ** Positioning	VT (r)	CTRL K (r)	0B (r)	Moves cursor directly to row defined by value r.
Clear Screen	FF	CTRL L	0C	Clears display screen to spaces.
Cursor Return	CR	CTRL M	0D	Moves cursor to left-hand side of display screen (column 1).
Set Atrributes	SO	CTRL N	0E	Sets tag bits for defining attributes.
Reset Attributes	SI	CTRL O	0F	Resets tag bit.
Horizontal Cursor ** Positioning	DLE (x)	CTRL P (x)	10 (x)	Moves cursor directly to column position defined by x.
Auxiliary Port ON	DC2	CTRL R	12	Switches auxiliary (printer) port on. (copyprint mode)
Auxiliary Port OFF	DC4	CTRL T	14	Switches auxiliary (printer) port off.
Backspace *	NAK	CTRL U	15	Moves cursor left one space.
Cursor OFF	ETB	CTRL W	17	Blanks cursor to invisible.
Cursor ON	CAN	CTRL X	18	Restores cursor to normal, visible operation.
Cursor UP	SUB	CTRL Z	1A	Moves cursor up one line.
Escape	ESC	ESC	1B	Command lead-in.

NOTE:

* Will be effected by "REV X-ON/X-OFF", if ACK/NAK or STX/ETX is selected by set-up. ACK/NAK is disable in "580" mode.

** If REV X-ON/X-OFF is selected, cursor address to Col 13 or Row 13 (DC3) will turn transmitter off.

Table 3-3c. Control Codes - Hazeltine Terminal Version

OPERATION	FROM HOST (ASCII Code)	CONTROL CODE FROM KEYBOARD	HEX CODE	DESCRIPTION
Bell Tone	BEL	CTRL G	07	Sounds BEEP tone.
BackSpace	BS	CTRL H	08	Moves cursor left one column.
Field Tab	HT	CTRL I	09	Moves cursor directly to beginning of next foreground field.
Line Feed	LF	CTRL J	0A	Moves cursor down one line.
Cursor Return	CR	CTRL M	0D	Moves cursor to left-hand side of screen (column 1).
Modulo 8 Tab	SO	CTRL N	0E	Moves cursor right directly to beginning of next Modulo 8 tab position.
Cursor Right	DLE	CTRL P	10	Moves cursor right one column.

Table 3-3d. Control Codes - VT52 Terminal Version

OPERATION	FROM HOST (ASCII Code)	CONTROL CODE FROM KEYBOARD	HEX CODE	DESCRIPTION
Bell Tone	BEL	CTRL G	07	Sounds BEEP tone.
BackSpace	BS	CTRL H	08	Moves cursor left one column.
Modulo 8 Tab	HT	CTRL I	09	Moves cursor to beginning of next Modulo 8 tab position.
Line Feed	LF	CTRL J	0A	Moves cursor down one line.
Line Feed	VT	CTRL K	0B	Same as LF.
Line Feed	FF	CTRL L	0C	Same as LF.
Cursor Return	CR	CTRL M	0D	Moves cursor to left side of screen (column 1).
ESCAPE	ESC	ESC	1B	Lead-in character for command sequence.

Table 3-4a. Escape Sequences ADM 11 (LSI)

OPERATION	SEQUENCE	HEX CODE	DESCRIPTION
Program Function Keys	ESC ! (x)	1B 21 (x)	x = @-G (F1-F8) 4/8 byte NVM. x = P-W (DEL' PRINT' ERASE' BREAD) 3 byte NVM. See Table 3-4a-1.
Keyboard Unlock	ESC "	1B 22	Allows data to be entered on keyboard (same as SO), unless transmit buffer is full.
Keyboard Lock	ESC #	1B 23	Prevents data from being entered on keyboard (same as SI).
Write Normal Intensity	ESC (	1B 28	Clears reduced intensity mode.
Write Reduced Intensity	ESC)	1B 29	Sets reduced intensity for all screen data except control codes.
Clear to NULLS	ESC *	1B 2A	Clears all display data. Cursor moves HOME.
Clear to NULLS	ESC :	1B 3A	Clears all display data. Cursor moves HOME.
Clear to Spaces	ESC +	1B 2B	Causes all display data to be cleared to spaces. Cursor moves home. All attributes revert to normal display. Message and/or status line not affected.
Clear Screen to Spaces	ESC ;	1B 3B	Same as ESC +.
Load Cursor	ESC = (r) (c)	1B 3D (r) (c)	Positions cursor on specific row (r) and column (c).
Read Cursor	ESC ?	1B 3F	Transmits cursor position by row and column followed by carriage return.
Auxiliary Pass Thru Modes	ESC A (x)	1B 41 30 1B 41 31 1B 41 32	x = 0 aux. OFF x = 1 aux. ON, display OFF X= 2 aux. ON, display ON
Select Full Duplex	ESC D F	1B 44 46	Sets full duplex mode. Keyboard entries transmitted only.
Select Half Duplex	ESC D H	1B 44 48	Sets half duplex mode. Keyboard entries transmitted and routed to display.
Write Message (Host (Host Only)	ESC F	1B 46	Message line write mode. Until mode terminated, all characters and/or control codes from host computer effect only message line. Mode is terminated by CR or when 79 columns have been filled on the 25th line.
Write Embedded Attribute	ESC G (x)	1B 47 (x)	Writes the embedded attribute at cursor.
Write Alignment Pattern	ESC H	1B 48	Writes an alignment pattern of H's to screen.
Print Screen Formatted	ESC P	1B 50	Transmits to auxiliary port device, all data from HOME to end of display.
Erase Line	ESC T	1B 54	Erases line from cursor to end of line.

Table 3-4a. Escape Sequences ADM 11 (LSI) (continued)

OPERATION	SEQUENCE	HEX CODE	DESCRIPTION
Set Program Mode	ESC U	1B 55	When set, control characters are displayed but not acted upon.
Reset Program Mode	ESC X	1B 58	Exits program mode.
Erase to End of Page	ESC Y	1B 59	Erases data from cursor to end of display. Replaces with spaces.
Display Message Line	ESC g	1B 67	Displays message line if status line is enabled.
Display Status Line	ESC h	1B 68	Displays status line if message line is enabled.
Down Load Set-Up	ESC k	1B 6B	Down loads set-up mode features.
Write 25th Line Status (Cols. 1-40)	ESC 1	1B 6C	Enables writing function key legent line. Terminated legend line.
Special Terminal Functions	ESC o (x)	1B 6F (x)	x = 1 Reset x = 9 Display program version x = A Function key default x = S Set-up mode default x = 0 Set ADM mode x = 1 Set ADDS mode x = 2 Set HAZ mode x = 3 Set VT 52 mode
Print Screen Unformatted	ESC p	1B 70	Same as ESC P, except line is not terminated by CR NULL and LF NULL. No characters are omitted.
Erase to End of Line	ESC t	1B 74	Erases from cursor position to end of line.
Erase to End of Page	ESC y	1B 79	Erases from cursor position to end of display.
Print Line	ESC z	1B 7A	Prints entire line at cursor, omitting trailing blanks and/or NULLS.
Select Video Features	ESC ~ (x)	1B 7E 30 1B 7E 31 1B 7E 32	x = 0 video OFF, cursor OFF x = 1 video ON, cursor OFF x = 2 video ON, cursor ON

Table 3-4a(1). Function Keys ADM 11

KEY	CODE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
F1	ESC ! @	1B 21 40	4/8-byte Opt. VM/NVM
F2	ESC ! A	1B 21 41	4/8-byte Opt. VM/NVM
F3	ESC ! B	1B 21 42	4/8-byte Opt. VM/NVM
F4	ESC ! C	1B 21 43	4/8-byte Opt. VM/NVM
Shift F1	ESC ! D	1B 21 44	4-byte Opt. VM/NVM
Shift F2	ESC ! E	1B 21 45	4-byte Opt. VM/NVM
Shift F3	ESC ! F	1B 21 46	4-byte Opt. VM/NVM
Shift F4	ESC ! G	1B 21 47	4-byte Opt. VM/NVM
DELETE	ESC ! P	1B 21 50	3-byte NVM
PRINT	ESC ! Q	1B 21 51	3-byte NVM
ERASE	ESC ! R	1B 21 52	3-byte NVM
BREAK	ESC ! S	1B 21 53	3-byte NVM
Shift DELETE	ESC ! T	1B 21 54	3-byte NVM
Shift PRINT	ESC ! U	1B 21 55	3-byte NVM
Shift ERASE	ESC ! V	1B 21 56	3-byte NVM
Shift BREAK	ABORT FUNCTION (not programmable)		Used for aborting a print function or looping operation.

NOTE: VM is Volatile Memory
NVM is Non-Volatile Memory

Table 3-4b. Escape Sequences ADDS Terminal Version

OPERATION	ASCII CODE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
Set Visual Attributes (Requires CTRL N tag bit)	ESC 0 @ ESC 0 A ESC 0 B ESC 0 C ESC 0 D ESC 0 P ESC 0 Q ESC 0 R ESC 0 S ESC 0 ' ESC 0 a ESC 0 b ESC 0 c	1B 30 03 1B 30 41 1B 30 42 1B 30 43 1B 30 44 1B 30 50 1B 30 51 1B 30 52 1B 30 53 1B 30 60 1B 30 61 1B 30 62 1B 30 63	Normal Screen Intensity Reduced Screen Intensity Blink Blink, Reduced Intensity Blank Reverse Video Reverse Video Blink, Reverse Blink, Reverse Underline Underline Blink, Underline Blink, Underline
Aux Port ON Transparent	ESC 3	1B 33	Switches auxiliary (printer) port to transparent mode
Aux Port OFF	ESC 4	1B 34	Switches off auxiliary port
Lock Keyboard	ESC 5	1B 35	Disables keyboard
Unlock Keyboard	ESC 6	1B 36	Enables keyboard
Video OFF	ESC D	1B 44	Turns off video to make screen blank. Terminal condition to send and receive data.
Character Delete	ESC E	1B 45	Deletes character cursor position.
Character Insert	ESC F	1B 46	Insert a space at cursor position.
Erase	ESC K	1B 4B	Erases line from position of cursor to end of line.
Insert Line	ESC M	1B 40	Moves line which the cursor is on down.
Back Tab	ESC O	1B 4F	Moves cursor to left to beginning of previous tab field.
Print Page Formatted	ESC X	1B 58	Sends data through auxiliary port to printer to print full screen.
Absolute Cursor Positioning	ESC Y (r) (c)	1B 59 (r) (c)	Moves cursor directly to the position defined by row and column coordinates r and c respectively.
Write Control Character	ESC Z (x)	1B 5A (x)	Write control character "x".
Video ON	ESC d	1B 64	Restores screen to normal with video on.
Erase Page	ESC k	1B 6B	Removes all data from cursor to end of screen.
Delete Line	ESC *l*	1B 6C	Removes (erases) line on which cursor is positioned and all other lines below cursor are moved up.

Table 3-4b. Escape Sequences ADDS Terminal Version (continued)

OPERATION	ASCII CODE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
Special Terminal Functions	ESC o (x)	1B 6F (x)	x = ! Reset x = 9 Display program version x = A Function key default x = S Set-up mode default x = 0 Set ADM mode x = 1 Set ADDS mode x = 2 Set HAZ mode x = 3 Set VT52 mode
Print Page Unformatted	ESC x	1B 78	Sends all data on screen in unformatted version in auxiliary port.

Table 3-4c. Escape Sequences - Hazeltine Terminal Version

OPERATION	ASCII CODE ESCAPE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
Read Cursor Position	(LI) ENQ	(1B) 05	Causes terminal to report to host the present cursor position in row, column coordinates.
Unlock Keyboard	(LI) ACK	(1B) 06	Enables keyboard. Allows data to be entered on keyboard.
Move Cursor Down	(LI) VT	(1B) 0B	Moves cursor down one line. Does not cause scroll on Line 24.
Erase Line	(LI) SI	(1B) 0F	Removes all data from cursor position to end of line on which cursor is positioned. Programmable Key ****
Absolute Cursor Positioning	(LI) DC1 (r) (c)	(1B) 11 (r) (c)	Moves cursor directly to position defined by row and column coordinates r and c.
Cursor Home	(LI) DC2	(1B) 12	Moves cursor to HOME position at upper left corner of screen.
Delete Line	(LI) DC3	(1B) 13	Removes (erases) all data from line on which cursor is positioned. All other lines below cursor are moved up.
BackTab	(LI) DC4	(1B) 14	Moves cursor to left to beginning of previous tab field.
Lock Keyboard	(LI) NAK	(1B) 15	Disables keyboard.
Clear Field	(LI) SYN	(1B) 16	Clears foreground field in which cursor resides.
Erase Page to Reduced Intensity	(LI) ETB	(1B) 17	Erases page from cursor to end of screen with reduced intensity spaces.
Erase Page	(LI) CAN	(1B) 18	Erases page to full intensity spaces from cursor to end of screen.
Background Reduced Intensity	(LI) EM	(1B) 19	Following characters are written at reduced intensity.
Insert Line	(LI) SUB	(1B) 1A	Moves line cursor in on down one line.
Clear Screen	(LI) FS	(1B) 1C	Removes all data from display screen and fills screen with spaces.
Clear Foreground	(LI) GS	(1B) 1D	Removes all foreground data and fills the foreground with spaces. Normal intensity.
Print Screen Formatted	(LI) RS	(1B) 1E	Sends formatted data to auxiliary (printer) port.
Foregound Data Follows	(LI) US	(1B) 1F	Following characters are written at normal intensity.
Send Character At Cursor	(LI) !	(1B) 21	Commands terminal to transmit value of of character at cursor position to host.

Table 3-4c. Escape Sequences - Hazeltine Terminal Version (continued)

OPERATION	ASCII CODE ESCAPE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
Display Test Pattern	(LI) "	(1B) 22	Fills screen with test pattern.
Aux Port On Transparent	(LI) *	(1B) 2A	Switches auxiliary (printer) port ON without display of data being printed.
Aux Port On With Display	(LI) /	(1B) 2F	Switches auxiliary (printer) port ON with simultaneous display of data being printed.
Modulo 8 Tab	(LI) :	(1B) 3A	Moves cursor to beginning of next modulo 8 tab field.
Set Keypad Mode	(LI) >	(1B) 3E	Enables keypad mode. Causes ESCAPE sequences to be transmitted from numerical keypad.
Clear Keypad Mode	(LI) <	(1B) 3C	Restores keypad to normal operation.
Special Terminal Functions	(LI) o (x)	(1B) 6F	x = ! Reset x = 9 Display program version x = A Function key default x = S Set-up mode default x = 0 Set ADM mode x = 1 Set ADDS mode x = 2 Set HAZ mode x = 3 Set VT52 mode
Reset Auxiliary Port	(LI) ?	(1B) 3F	Resets auxiliary (printer) port.

NOTE: Lead-In (LI) may be either ESCAPE or TILDE as selected in the set-up mode.

Table 3-4c(1). Escape Sequences Transmitted from Keypad When Terminal Is In Hazeltine Keypad Mode (1420 Compatible)

KEY	ESCAPE SEQUENCE	HEX CODE
0	ESC 0 CR	1B 30 0D
1	ESC 1 CR	1B 31 0D
2	ESC 2 CR	1B 32 0D
3	ESC 3 CR	1B 33 0D
4	ESC 4 CR	1B 34 0D
5	ESC 5 CR	1B 35 0D
6	ESC 6 CR	1B 36 0D
7	ESC 7 CR	1B 37 0D
8	ESC 8 CR	1B 38 0D
9	ESC 9 CR	1B 39 0D
,	ESC , CR	1B 2C 0D
–	ESC – CR	1B 2D 0D
.	ESC . CR	1B 2E 0D

Table 3-4d. Escape Sequences - VT52 Terminal Version

OPERATION	ASCII CODE ESCAPE SEQUENCE FROM HOST	HEX CODE	DESCRIPTION
Reverse Video	ESC 3	1B 33	Causes screen to display data in reverse video.
Clear Reverse Video	ESC 4	1B 34	Restores display screen from reverse video to normal operation.
Set Keypad Mode	ESC =	1B 3D	Enables keypad mode. Causes ESCAPE sequences to be transmitted from numerical keypad.
Clear Keypad Mode	ESC >	1B 3E	Restores keypad to normal operation.
Cursor Up	ESC A	1B 41	Moves cursor up one line.
Cursor Down	ESC B	1B 42	Moves cursor down one line.
Cursor Right	ESC C	1B 43	Moves cursor one space to right.
Cursor Left	ESC D	1B 44	Moves cursor one space backwards to left.
Cursor Home	ESC H	1B 48	Moves cursor to HOME position at upper left corner of screen.
Reverse Line Feed	ESC I	1B 49	Performs a line feed up instead of down. Causes scroll at line 1.
Erase Page	ESC J	1B 4A	Erases page to full intensity spaces from cursor to end of screen.
Erase Line	ESC K	1B 4B	Removes all data from cursor position to end of line on which cursor is positioned.
Print Page Formatted	ESC V	1B 56	Sends formatted data to auxiliary (printer) port.
Aux Port On Transparent	ESC W	1B 57	Switches auxiliary (printer) port ON without display of data being printed.
Aux Port OFF	ESC X	1B 58	Switches auxiliary port OFF.
Absolute Cursor Positioning	ESC Y (r) (c)	1B 59 (r) (c)	Moves cursor directly to position defined by row and column coordinates r and c. See Table in appendix.
Request Terminal ID	ESC Z	1B 5A	This sequence from host commands terminal to transmit its identification code.
Print Line	ESC]	1B 5D	Transmits contents of line on which cursor is positioned to auxiliary (printer) port.

Table 3-4d(1). Escape Sequences Transmitted from Keypad When Terminal Is In VT52 Keypad Mode

KEY	ESCAPE SEQUENCE	HEX CODE
0	ESC ? p	1B 4F 70
1	ESC ? q	1B 4F 71
2	ESC ? r	1B 4F 72
3	ESC ? s	1B 4F 73
4	ESC ? t	1B 4F 74
5	ESC ? u	1B 4F 75
6	ESC ? v	1B 4F 76
7	ESC ? w	1B 4F 77
8	ESC ? x	1B 4F 78
9	ESC ? y	1B 4F 79
,	ESC ? l	1B 4F 6C
–	ESC ? m	1B 4F 6D
.	ESC ? n	1B 4F 6E
ENTER	ESC M	1B 4F 40
DEL	ESC P	1B 4F 50
PRINT	ESC Q	1B 4F 51
ERASE	ESC R	1B 4F 52
BREAK	ESC S	1B 4F 53

APPENDIX
OPERATORS
QUICK REFERENCE
CHARTS

FUNCTION OF KEYS ON KEYBOARD
LEAR SIEGLER ADM 11 MODE

KEY MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
[TAB] HDX FDX	NONE	HT HT	
[BACKTAB] HDX FDX	NONE	ESC I ESC I	
[RETURN] HDX FDX	NEWLINE	CR LF CR LF	NEWLINE MODE
[RETURN] HDX FDX	RETURN	CR CR	NON-NEWLINE MODE
[ENTER] HDX FDX	SAME AS RETURN SAME AS RETURN		BOTH NEWLINE MODE AND NON-NEWLINE
[↑] HDX FDX	CURSOR UP	VT VT	
[↓] HDX FDX	CURSOR DOWN	LF LF	
[→] HDX FDX	CURSOR RIGHT	FF FF	
[←] HDX FDX	CURSOR LEFT	BS BS	
[HOME] HDX FDX	CURSOR HOME	RS RS	
[SHIFT HOME] HDX FDX	SET/CLEAR PROGRAM MODE SET/CLR PROG MODE		EACH KEYSTROKE ALTERNATES BETWEEN SET AND CLEAR
[BACKSPACE] HDX FDX	CURSOR LEFT	BS BS	
[DELETE] HDX FDX		DEL DEL	3-BYTE PROGRAMMABLE***

FUNCTION OF KEYS ON KEYBOARD
LEAR SIEGLER ADM 11 MODE (continued)

KEY MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
[CLEAR] HDX FDX	 CLEAR SCREEN CLEAR SCREEN		 3-BYTE PROGRAMMABLE***
[PRINT LINE] HDX FDX	 PRINT LINE PRINT LINE		 3-BYTE PROGRAMABLE***
[PRINT PAGE] HDX FDX	 PRINT PAGE PRINT PAGE		 3-BYTE PROGRAMMABLE***
[LINE ERASE] HDX FDX	 LINE ERASE LINE ERASE		 3-BYTE PROGRAMMABLE***
[PAGE ERASE] HDX FDX	 PAGE ERASE PAGE ERASE		 3-BYTE PROGRAMMABLE***
[BREAK] HDX FDX	 BREAK BREAK		 3-BYTE PROGRAMMABLE***
[SHIFT][BREAK] HDX FDX	 ABORT ABORT		 NOT PROGRAMMABLE
[F1] THROUGH [F8]			4 OR 8 BYTE PROGRAMMABLE VOLATILE OR NON-VOLATILE MEMORY. #SEE NOTE BELOW FOR DEFAULT VALUES.

NOTES:

*** THESE 3-BYTE PROGRAMMABLE KEYS DO NOT REQUIRE INSTALLATION OF THE OPTIONAL NON-VOLATILE MEMORY (NVM) MODULE.

THE DEFAULT VALUES OF KEYS F1 THROUGH F8 ARE AS FOLOWS:

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

FUNCTION OF KEYS ON KEYBOARD
ADDS MODE

KEY MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
TAB HDX FDX	FIELD TAB	HT HT	
BACKTAB HDX FDX	BACKTAB	ESC O ESC O	
RETURN HDX FDX	NEWLINE	 CR	NEWLINE MODE
RETURN HDX FDX	RETURN	 CR	NON-NEWLINE MODE
ENTER HDX FDX	SAME AS RETURN SAME AS RETURN		BOTH NEWLINE MODE AND NON-NEWLINE
↑ HDX FDX	CURSOR UP	SUB SUB	
SHIFT ↑ HDX FDX	LINE DELETE	ESC *l* ESC *l*	
↓ HDX FDX	CURSOR DOWN	LF LF	
SHIFT ↓ HDX FDX	LINE INSERT	ESC M ESC M	
→ HDX FDX	CURSOR RIGHT	ACK ACK	
SHIFT → HDX FDX	CHARACTER INSERT	ESC F ESC F	
← HDX FDX	CURSOR LEFT	NAK NAK	
SHIFT ← HDX FDX	CHARACTER DELETE	ESC E ESC E	
HOME HDX FDX	CURSOR HOME	SOH SOH	

FUNCTION OF KEYS ON KEYBOARD
ADDS MODE (continued)

KEY MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
[SHIFT] [HOME] HDX FDX	SET/CLR PROG. MODE SET/CLR PROG. MODE		EACH KEYSTROKE ALTERNATES BETWEEN SET AND CLEAR
[BACKSPACE] HDX FDX	CURSOR LEFT	BS BS	
[DELETE] HDX FDX		DEL DEL	3-BYTE PROGRAMMABLE***
[CLEAR] HDX FDX	CLEAR SCREEN	 FF	3-BYTE PROGRAMMABLE***
[PRINT LINE] HDX FDX	NO FUNCTION NO FUNCTION		3-BYTE PROGRAMABLE***
[PRINT PAGE] HDX FDX	PRINT PAGE PRINT PAGE		3-BYTE PROGRAMMABLE***
[LINE ERASE] HDX FDX	LINE ERASE	ESC K ESC K	3-BYTE PROGRAMMABLE***
[PAGE ERASE] HDX FDX	PAGE ERASE	ESC k ESC k	3-BYTE PROGRAMMABLE***
[BREAK] HDX FDX	BREAK BREAK		3-BYTE PROGRAMMABLE***
[SHIFT] [BREAK] HDX FDX	ABORT ABORT		NOT PROGRAMMABLE
[F1] THROUGH [F8]			4 OR 8 BYTE PROGRAMMABLE VOLATILE OR NON-VOLATILE MEMORY. #SEE NOTE BELOW.

NOTES:

*** THESE PROGRAMMABLE KEYS DO NOT REQUIRE INSTALLATION OF THE OPTIONAL NON-VOLATILE MEMORY (NVM) OPTION; HOWEVER, THEY ARE PROGRAMMABLE ONLY IN THE ADM MODE.

THESE KEYE PROVIDE THE FUNCTIONS AS PROGRAMMED IN THE ADM 11 TERMINAL MODE. DEFAULT VALUES ARE ADDS DEFAULT VALUES:

F1	STX 1 CR	F5	STX ! CR
F2	STX 2 CR	F6	STX " CR
F3	STX 3 CR	F7	STX # CR
F4	STX 4 CR	F8	STX $ CR

FUNCTION OF KEYS ON KEYBOARD
HAZELTINE MODE

KEY / MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
NOTE: IN THE HAZELTINE MODE, THE LEAD-IN CHARACTER MAY BE EITHER ESC OR ~ (TILDE) SELECTABLE IN SET-UP MODE			
[TAB] HDX FDX	FIELD TAB	 HT HT	
[BACKTAB] HDX FDX	BACKTAB	 (LCI) DC4	 SEE (L1) NOTE ABOVE
[RETURN] HDX FDX	NEWLINE	 CR	 NEWLINE MODE
[RETURN] HDX FDX	RETURN	 CR	 NON-NEWLINE MODE
[ENTER] HDX FDX	 SAME AS RETURN SAME AS RETURN		 BOTH NEWLINE MODE AND NON-NEWLINE
[↑] HDX FDX	LINE DELETE	 (LI) FF	
[SHIFT][↑] HDX FDX	LINE DELETE	 (L1) DC3	
[↓] HDX FDX	CURSOR DOWN	 (LI) VT	
[SHIFT][↓] HDX FDX	LINE INSERT	 (LI) SUB	
[→] HDX FDX	CURSOR RIGHT	 DLE	
[SHIFT][→] SEE REMARK HDX FDX			PERFORMS CHARACTER INSERT FUNCTION IN LOCAL MODE ONLY
[←] HDX FDX	CURSOR LEFT	 BS	
[SHIFT][←] SEE REMARK HDX FDX			PERFORMS CHARACTER DELETE FUNCTION ON LOCAL MODE ONLY

FUNCTION OF KEYS ON KEYBOARD
HAZELTINE MODE (continued)

KEY MODE	FUNCTION PERFORMED	CONTROLS CODE OR SEQUENCE TRANSMITTED	REMARKS
[HOME] HDX FDX	CURSOR HOME	 (LI) DC2	
[SHIFT HOME] HDX FDX	SET/CLR PROG MODE SET/CLR PROG MODE		EACH KEYSTROKE ALTERNATES BETWEEN SET AND CLEAR
[BACKSPACE] HDX FDX	CURSOR LEFT	 BS BS	
[SHIFT BACKSPACE] HDX FDX	CURSOR RIGHT	 DLE	
[DELETE] HDX FDX		 DEL DEL	 3-BYTE PROGRAMMABLE***
[SHIFT CLEAR] HDX FDX	CLEAR SCREEN	 (LI) FS	 3-BYTE PROGRAMMABLE***
[PRINT LINE] HDX FDX	 NO FUNCTION NO FUNCTION		
[PRINT PAGE] HDX FDX	 PRINT PAGE PRINT PAGE		 3-BYTE PROGRAMMABLE***
[LINE ERASE] HDX FDX	LINE ERASE	 (LI) SI	 3-BYTE PROGRAMMABLE***
[PAGE ERASE] HDX FDX	PAGE ERASE	 (LI) CAN	 3-BYTE PROGRAMMABLE***
[SHIFT] [BREAK] HDX FDX	 ABORT ABORT		 NOT PROGRAMMABLE
[F1] THROUGH [F8]			4 OR 8 BYTE PROGRAMMABLE VOLATILE OR NON- VOLATILE MEMORY. #SEE NOTE BELOW.

NOTES:

*** THESE PROGRAMMABLE KEYS DO NOT REQUIRE INSTALLATION OF THE OPTIONAL NON-VOLATILE MEMORY (NVM) OPTION; HOWEVER, THEY ARE PROGRAMMABLE ONLY IN THE ADM MODE.

THESE KEYE ARE PROGRAMMABLE ONLY IN THE ADM MODE, AND THEY DEFAULT TO ADM 11 VALUES.

FUNCTION OF KEYS ON KEYBOARD
VT52 MODE

KEY (FDX ONLY) #	CONTROL CODE OR ESCAPE SEQUENCE TRANSMITTED	REMARKS
TAB	HT	MODULO 8 TAB
BACKTAB	(NONE)	NO FUNCTION PERFORMED
RETURN	CR LF	NEWLINE MODE
RETURN	CR	NON-NEWLINE MODE
ENTER	SEE REMARK	SAME AS RETURN KEY
↑	ESC A	
SHIFT ↑	SEE REMARK	LINE DELETE. OPERATES IN LOCAL MODE ONLY.
↓	ESC B	
SHIFT ↓	SEE REMARK	LINE INSERT. OPERATES IN LOCAL MODE ONLY.
→	ESC C	
SHIFT →	SEE REMARK	CHARACTER INSERT. OPERATES IN LOCAL MODE ONLY.
←	ESC D	
SHIFT ←	SEE REMARK	CHARACTER DELETE. OPERATES IN LOCAL MODE ONLY.
HOME	ESC H	
SHIFT HOME	SEE REMARK	SETS AND CLEARS PROGRAM MODE. EACH KEYSTROKE ALTERNATES BETWEEN SET AND CLEAR.
BACKSPACE	BS	
SHIFT BACKSPACE	DEL	
DELETE	DEL	3-BYTE PROGRAMMABLE KEY ***
CLEAR	(NONE)	CLEARS SCREEN IN LOCAL MODE ONLY. 3-BYTE PROGRAMMABLE KEY***
PRINT LINE	(NONE)	NO FUNCTION PERFORMED 3-BYTE PROGRAMMABLE KEY***
PRINT PAGE	SEE REMARK	SENDS ALL DATA ON SCREEN TO AUXILIARY PORT FOR PRINTING (DEFAULT SETTING). THIS IS A 3-BYTE PROGRAMMABLE KEY***
LINE ERASE	ESC K	3-BYTE PROGRAMMABLE KEY ***
PAGE ERASE	ESCJ	3-BYTE PROGRAMMABLE KEY ***
BREAK	SEE REMARK	PERFORMS BREAK FUNCTION. 3-BYTE PROGRAMMABLE KEY***

FUNCTION OF KEYS ON KEYBOARD
VT52 MODE (continued)

KEY (FDX ONLY) #	CONTROL CODE OR ESCAPE SEQUENCE TRANSMITTED	REMARKS
[SHIFT] [BREAK]	SEE REMARK	PERFORMS ABORT FUNCTION.
[F1] THROUGH [F8]		4 OR 8-BYTE PROGRAMMABLE KEYS. VOLATILE OR NON-VOLATILE MEMORYL THESE KEYS ARE PROGRAMMABLE ONLY IN ADM 11 MODE, AND THEY DEFAULT TO ADM 11 VALUES.

NOTES:
THE TERMINAL FUNCTIONS IN FULL DUPLEX MODE ONLY WHEN OPERATING IN THE VT-52 MODE. IT IGNORES ANY COMMAND TO OPERATE IN HALF DUPLEX MODE.

*** THESE PROGRAMMABLE KEYS DO NOT REQUIRE INSTALLATION OF THE OPTIONAL NON-VOLATILE MEMORY (NVM) OPTION. THESE KEYS ARE PROGRAMMABLE VIA ADM MODE ONLY.

OPERATORS QUICK REFERENCE CHART OF ABSOLUTE CURSOR POSITIONS

ADDS, VT52 keys Used: ESC Y ROW ASCII COL ASCII

LSI ADM 11 Keys Used: ESC = ROW ASCII COL ASCII

ASCII CODES	POSITION ROW	POSITION COL	ASCII CODES	POSITION ROW	POSITION COL	ASCII CODES	POSITION ROW	POSITION 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	S		52	n		79
9		26	T		53	ESC = o		80
ESC = :		27	ESC = U		54			

HAZELTINE CURSOR ADDRESS CHART

This table provides row (Y) and column (X) coordinate information for direct cursor address and read cursor address. To address the cursor it is necessary to precede the X and Y coordinates by a lead in code followed by a DC1 code. For read cursor address, the terminal will transmit the row and column coordinates indicated by the brackets.

BITS b1...b7	DEC VALUE	ASCII CHAR.	COORDINATES COL. NO. (X)	LINE NO. (Y)
0000000	0	NUL	0	0
0000001	1	SOH	1	1
0000010	2	STX	2	2
0000011	3	ETX	3	3
0000100	4	EOT	4	4
0000101	5	ENQ	5	5
0000110	6	ACK	6	6
0000111	7	BEL	7	7
0001000	8	BS	8	8
0001001	9	HT	9	9
0001010	10	LF	10	10
0001011	11	VT	11	11
0001100	12	FF	12	12
0001101	13	CR	13	13
0001110	14	SO	14	14
0001111	15	SI	15	15
0010000	16	DLE	16	16
0010001	17	DC1	17	17
0010010	18	DC2	18	18
0010011	19	DC3	19	19
0010100	20	DC4	20	20
0010101	21	NAK	21	21
0010110	22	SYN	22	22
0010111	23	ETB	23	23
0011000	24	CAN	24	
0011001	25	EM	25	
0011010	26	SUB	26	
0011011	27	*ESC	27	
0011100	28	FS	28	
0011101	29	GS	29	
0011110	30	RS	30	
0011111	31	US	31	
0100000	32	SP	32	0
0100001	33	!	33	1
0100010	34	"	34	2
0100011	35	#	35	3
0100100	36	$	36	4
0100101	37	%	37	5
0100110	38	&	38	6
0100111	39	'	39	7
0101000	40	(	40	8
0101001	41	)	41	9
0101010	42	*	42	10
0101011	43	+	43	11
0101100	44	,	44	12
0101101	45	-	45	13
0101110	46	.	46	14
0101111	47	/	47	15

OUTPUT READ CURSOR ADDRESS

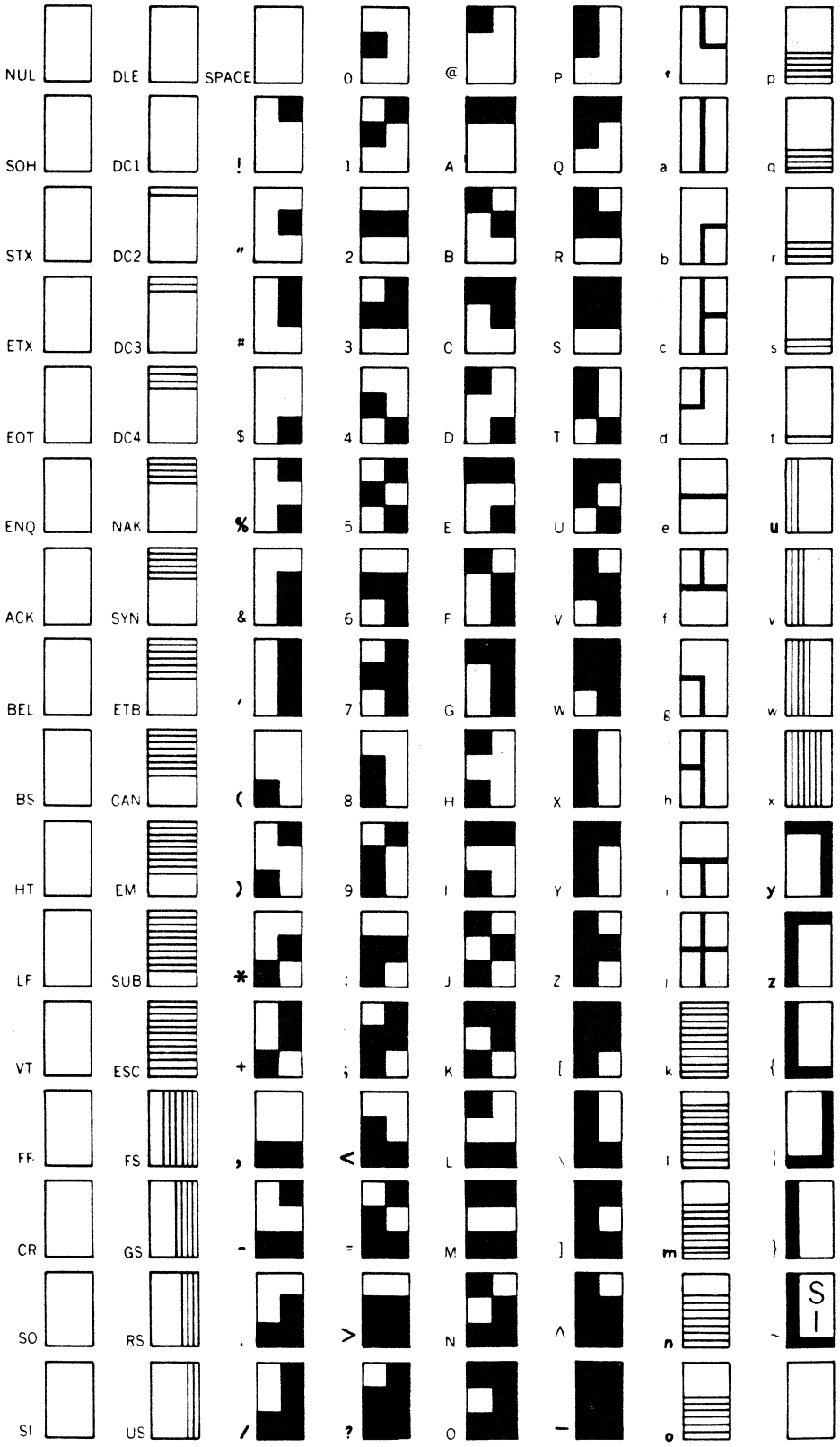
BITS b1...b7	DEC VALUE	ASCII CHAR.	COORDINATES COL. NO. (X)	LINE NO. (Y)
0110000	48	0	48	16
0110001	49	1	49	17
0110010	50	2	50	18
0110011	51	3	51	19
0110100	52	4	52	20
0110101	53	5	53	21
0110110	54	6	54	22
0110111	55	7	55	23
0111000	56	8	56	
0111001	57	9	57	
0111010	58	:	58	
0111011	59	;	59	
0111100	60	<	60	
0111101	61	=	61	
0111110	62	>	62	
0111111	63	?	63	
1000000	64	@	64	0
1000001	65	A	65	1
1000010	66	B	66	2
1000011	67	C	67	3
1000100	68	D	68	4
1000101	69	E	69	5
1000110	70	F	70	6
1000111	71	G	71	7
1001000	72	H	72	8
1001001	73	I	73	9
1001010	74	J	74	10
1001011	75	K	75	11
1001100	76	L	76	12
1001101	77	M	77	13
1001110	78	N	78	14
1001111	79	O	79	15
1010000	80	P		16
1010001	81	Q		17
1010010	82	R		18
1010011	83	S		19
1010100	84	T		20
1010101	85	U		21
1010110	86	V		22
1010111	87	W		23
1011000	88	X		
1011001	89	Y		
1011010	90	Z		
1011011	91	[		
1011100	92	\		
1011101	92	]		
1011110	94	^		
1011111	95	—		

OUTPUT READ CURSOR ADDRESS

HAZELTINE CURSOR ADDRESS CHART (continued)

BITS b1...b7	DEC VALUE	ASCII CHAR.	COORDINATES COL. NO. (X)	LINE NO. (Y)	
1100000	96	`	0	0	
1100001	97	a	1	1	
1100010	98	b	2	2	
1100011	99	c	3	3	
1100100	100	d	4	4	
1100101	101	e	5	5	
1100110	102	f	6	6	
1100111	103	g	7	7	
1101000	104	h	8	8	
1101001	105	i	9	9	
1101010	106	j	10	10	
1101011	107	k	11	11	OUTPUT
1101100	108	l	12	12	READ
1101101	109	m	13	13	CURSOR
1101110	110	n	14	14	ADDRESS
1101111	111	o	15	15	
1110000	112	p	16	16	
1110001	113	q	17	17	
1110010	114	r	18	18	
1110011	115	s	19	19	
1110100	116	t	20	20	
1110101	117	u	21	21	
1110110	118	v	22	22	
1110111	119	w	23	23	
1111000	120	x	24		
1111001	121	y	25		
1111010	122	z	26		
1111011	123	{	27	OUTPUT	
1111100	124	|	28	READ	
1111101	125	}	29	CURSOR	
1111110	126	*	30	ADDRESS	
1111111	127	DEL	31		

LIMITED GRAPHICS CHARACTER SET



DISPLAYABLE USASCII CHARACTER SET AND CONTROL CODES

		CONTROL CHARACTERS		DISPLAYABLE CHARACTERS					
HEX BYTE 1ST		0	1	2	3	4	5	6	7
2ND	BITS $^{4}3_{2}1$ BITS $^{7}6_{5}$	$0_{0}0_{0}$	$0_{0}1_{1}$	$0_{1}0_{0}$	$0_{1}1_{1}$	$1_{0}0_{0}$	$1_{0}1_{1}$	$1_{1}0_{0}$	$i_{1}1_{1}$
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	S	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

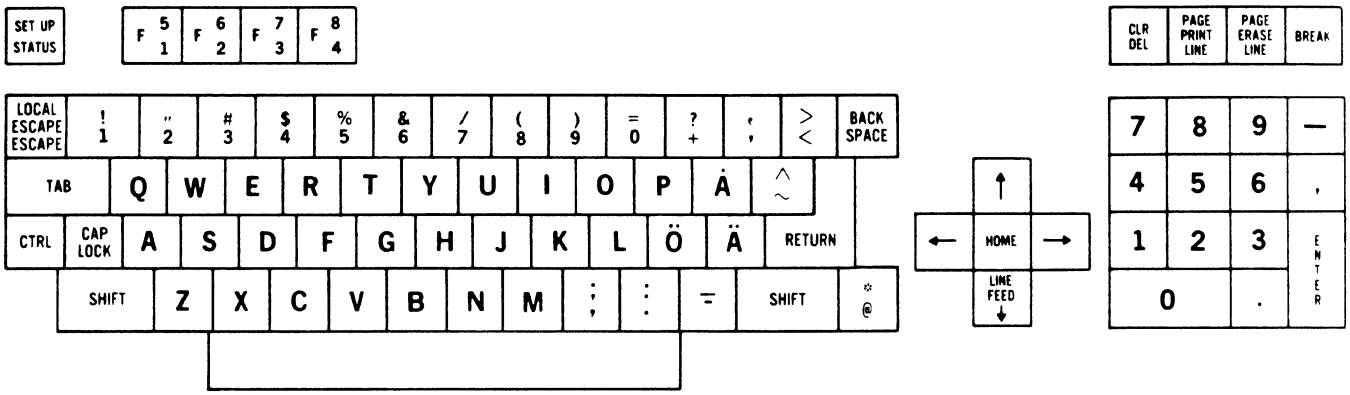
USE CTRL KEY WITH DISPLAYABLE CHARACTER KEYS TO PRODUCE CONTROL CODES

128 CHARACTER ASCII FORMAT, WITH HEX CODES

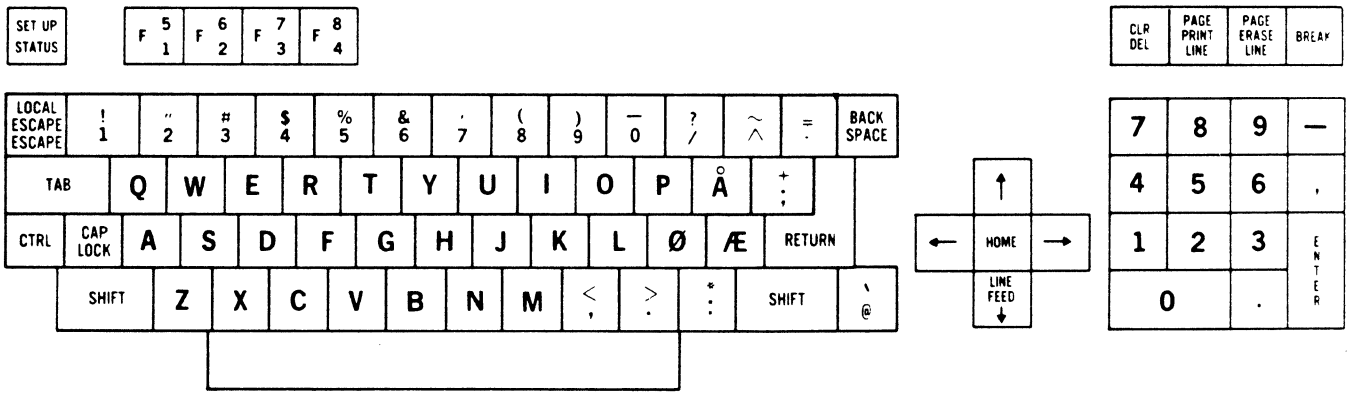
00 NUL	01 SOH	02 STX	03 ETX	04 EOT	05 ENQ	06 ACK	07 BEL	08 BS	09 HT	0A LF	0B VT	0C FF	0D CR	0E SO	0F SI
10 DLE	11 DC1	12 DC2	13 DC3	14 DC4	15 NAK	16 SYN	17 ETB	18 CAN	19 EM	1A SUB	1B ESC	1C FS	1D GS	1E RS	1F US
20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F

INTERNATIONAL KEYBOARD LAYOUTS

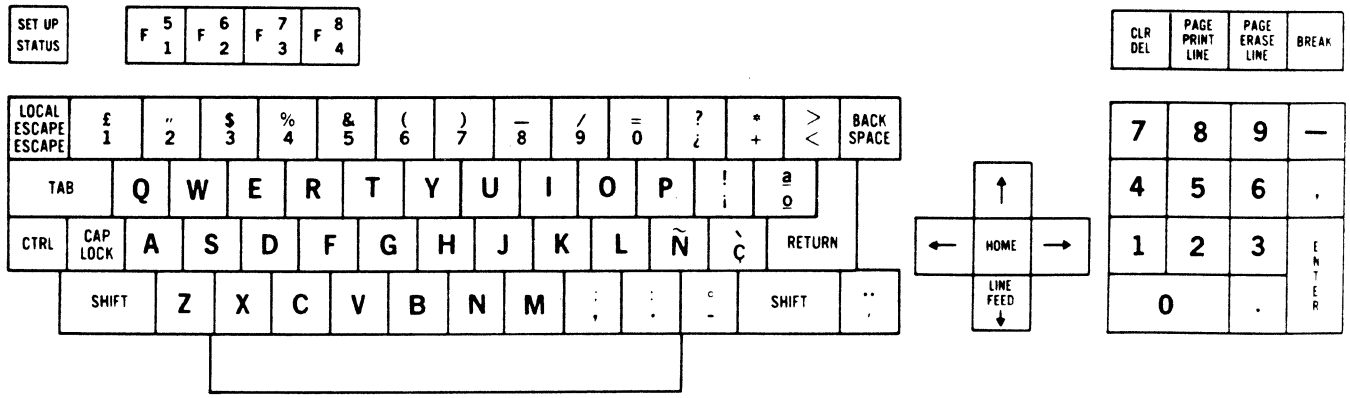
ADM 11 SWEDISH/FINNISH QWERTY KEYBOARD LAYOUT



ADM 11 NORWEGIAN QWERTY KEYBOARD LAYOUT

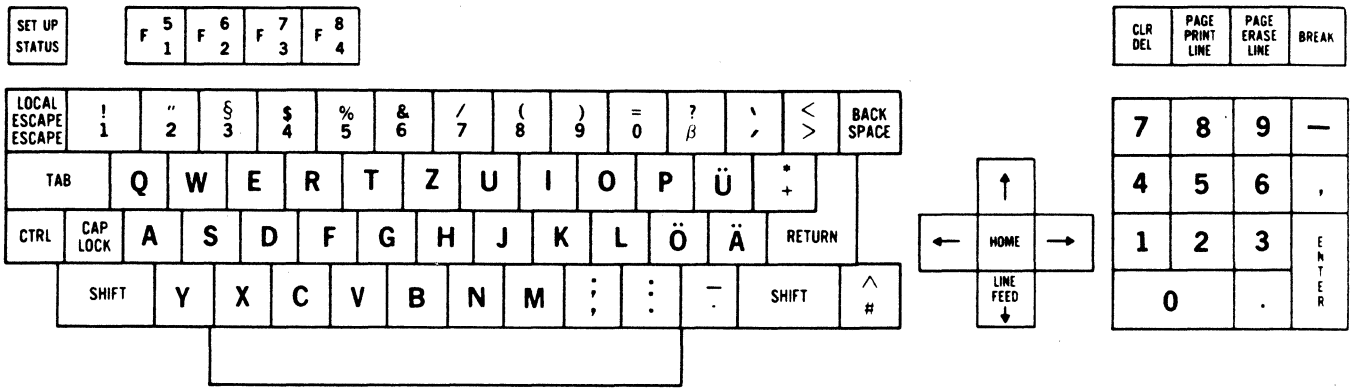


ADM 11 SPANISH QWERTY KEYBOARD LAYOUT

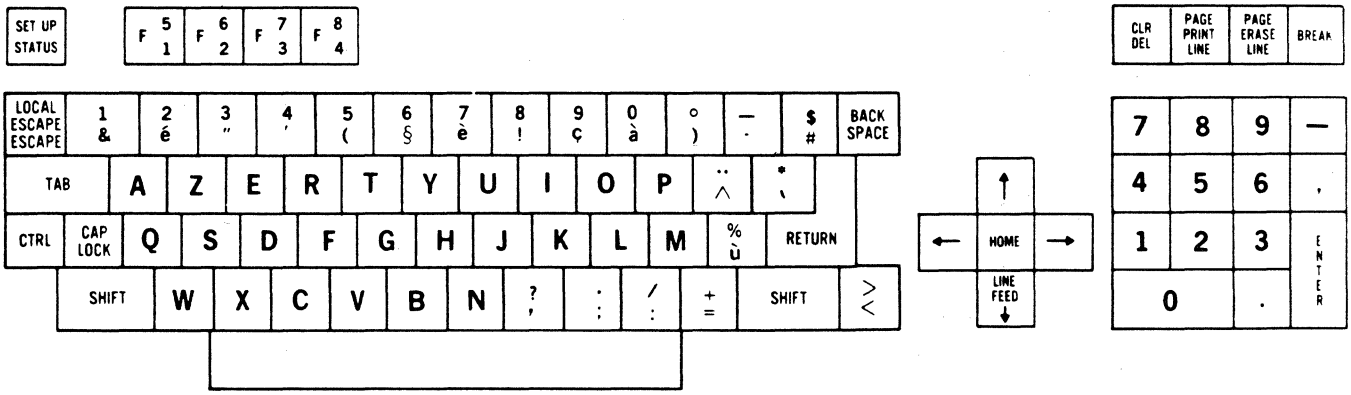


INTERNATIONAL KEYBOARD LAYOUTS

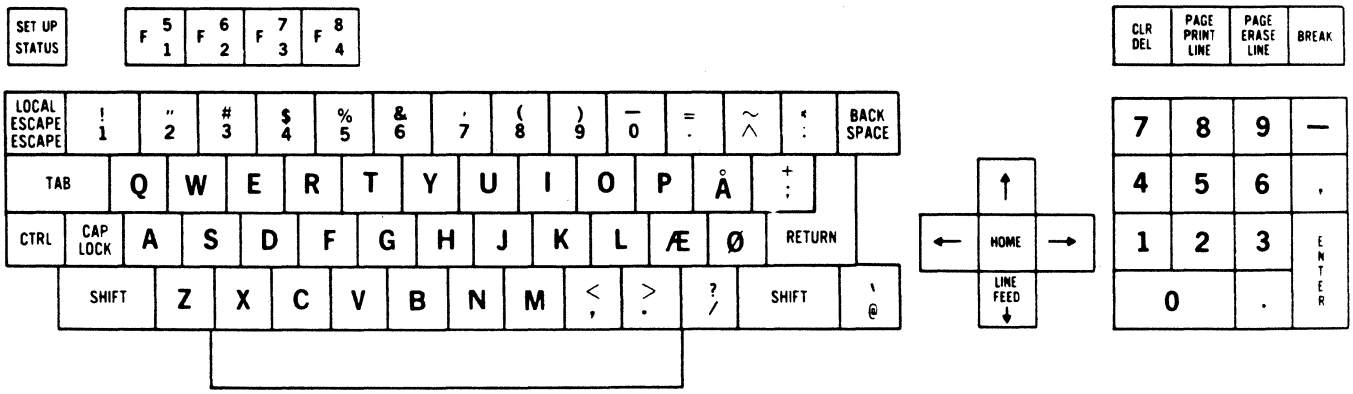
ADM 11 GERMAN QWERTZ KEYBOARD LAYOUT



ADM 11 FRENCH AZERTY KEYBOARD LAYOUT



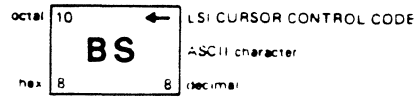
ADM 11 DANISH QWERTY KEYBOARD LAYOUT



ASCII CONTROL CODE CHART

B7 B6 B5 / BITS / B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
0 0 0 0	0 NUL 0 0	20 DLE 10 16	40 SP 20 32	60 0 30 48	100 @ 40 64	120 P 50 80	140 ` 60 96	160 p 70 112
0 0 0 1	1 SOH 1 1	21 DC1 11 17	41 ! 21 33	61 1 31 49	101 A 41 65	121 Q 51 81	141 a 61 97	161 q 71 113
0 0 1 0	2 STX 2 2	22 DC2 12 18	42 " 22 34	62 2 32 50	102 B 42 66	122 R 52 82	142 b 62 98	162 r 72 114
0 0 1 1	3 ETX 3 3	23 DC3 13 19	43 # 23 35	63 3 33 51	103 C 43 67	123 S 53 83	143 c 63 99	163 s 73 115
0 1 0 0	4 EOT 4 4	24 DC4 14 20	44 $ 24 36	64 4 34 52	104 D 44 68	124 T 54 84	144 d 64 100	164 t 74 116
0 1 0 1	5 ENQ 5 5	25 NAK 15 21	45 % 25 37	65 5 35 53	105 E 45 69	125 U 55 85	145 e 65 101	165 u 75 117
0 1 1 0	6 ACK 6 6	26 SYN 16 22	46 & 26 38	66 6 36 54	106 F 46 70	126 V 56 86	146 f 66 102	166 v 76 118
0 1 1 1	7 BEL 7 7	27 ETB 17 23	47 ' 27 39	67 7 37 55	107 G 47 71	127 W 57 87	147 g 67 103	167 w 77 119
1 0 0 0	10 ← BS 8 8	30 CAN 18 24	50 (28 40	70 8 38 56	110 H 48 72	130 X 58 88	150 h 68 104	170 x 78 120
1 0 0 1	11 TAB HT 9 9	31 EM 19 25	51) 29 41	71 9 39 57	111 I 49 73	131 Y 59 89	151 i 69 105	171 y 79 121
1 0 1 0	12 ↓ LF A 10	32 SUB 1A 26	52 * 2A 42	72 : 3A 58	112 J 4A 74	132 Z 5A 90	152 j 6A 106	172 z 7A 122
1 0 1 1	13 ↑ VT B 11	33 ESC 1B 27	53 + 2B 43	73 ; 3B 59	113 K 4B 75	133 [5B 91	153 k 6B 107	173 { 7B 123
1 1 0 0	14 → FF C 12	34 FS 1C 28	54 , 2C 44	74 < 3C 60	114 L 4C 76	134 \ 5C 92	154 l 6C 108	174 ¦ 7C 124
1 1 0 1	15 RTN CR D 13	35 GS 1D 29	55 - 2D 45	75 = 3D 61	115 M 4D 77	135] 5D 93	155 m 6D 109	175 } 7D 125
1 1 1 0	16 SO E 14	36 HOME RS 1E 30	56 . 2E 46	76 > 3E 62	116 N 4E 78	136 ^ 5E 94	156 n 6E 110	176 ~ 7E 126
1 1 1 1	17 SI F 15	37 NEWLINE US 1F 31	57 / 2F 47	77 ? 3F 63	117 O 4F 79	137 _ 5F 95	157 o 6F 111	177 RUBOUT (DEL) 7F 127

LEGEND



ADM 11-E ESCAPE SEQUENCES (LSI)

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

*MULTIPLE CHARACTERS REQUIRED, SEE TABLE 3-4-A.
**MULTIPLE CHARACTERS REQUIRED, SEE TABLE 3-5a.

ADDS MODE ESCAPE SEQUENCES

HEX	2		3		4		5		6		7	
0			0	SET ATTRIBUTES*	@		P		`		p	
1	!		1		A		Q		a		q	
2	"		2		B		R		b		r	
3	#		3	AUXILIARY PORT ON ***	C		S		c		s	
4	$		4	AUXILIARY PORT OFF ***	D	VIDEO OFF	T		d	VIDEO ON	t	
5	%		5	KEYBOARD LOCK	E	CHARACTER DELETE ****	U		e		u	
6	&		6	KEYBOARD UNLOCK	F	CHARACTER INSERT ****	V		f		v	
7	'		7		G		W		g		w	
8	(		8		H		X	PRINT PAGE FORMATTED ****	h		x	PRINT PAGE UNFORMATTED ****
9	)		9		I		Y	LOAD CURSOR*	i		y	
A	*		:		J		Z	WRITE CONTROL CHARACTER	j		z	
B	+		;		K	LINE ERASE	[		k	PAGE ERASE	{	
C	,		<		L		\		l	LINE DELETE **	¦	
D	-		=		M	LINE INSERT **	]		m		}	
E	.		>		N		^		n		~	
F	/		?		O	BACK TAB ***	_		o	SPECIAL TERMINAL FUNCTIONS *	DEL	

*MULTIPLE CHARACTERS REQUIRED, SEE TABLE 3-4-B.
**REGENT 40 & UP
***A2 VERSION ONLY
****REGENT 60 & UP

HAZELTINE MODE ESCAPE SEQUENCES

HEX	2		3		4		5		6		7	
0	NUL		DLE				0		@		P	
1	SOH		DC1	ABSOLUTE CURSOR POSITIONING*	!	SEND CHARACTER AT CURSOR	1		A		Q	
2	STX		DC2	CURSOR HOME	"	DISPLAY TEST PATTERN	2		B		R	
3	ETX		DC3	LINE DELETE	#		3		C		S	
4	EOT		DC4	BACKTAB	$		4		D		T	
5	ENQ	READ CURSOR	NAK	KEYBOARD DISABLE	%		5		E		U	
6	ACK	KEYBOARD ENABLE	SYN	CLEAR FIELD	&		6		F		V	
7	BEL		ETB	PAGE ERASE TO BG SPACES	'		7		G		W	
8	BS		CAN	PAGE ERASE TO FG SPACES	(		8		H		X	
9	HT		EM	BACKGROUND DATA FOLLOWS	)		9		I		Y	
A	LF		SUB	LINE INSERT	*	AUX. PORT ON WITHOUT DISPLAY	:	MODULO 8 TAB	J		Z	
B	VT	CURSOR DOWN	ESC		+		;		K		[	
C	FF		FS	CLEAR FULL SCREEN TO SPACES	,		<	SET KEYPAD MODE**	L		|	
D	CR		GS	CLEAR FG TO SPACES	-		=		M		]	
E	SO		RS	PRINT SCREEN FORMATTED	.		>	CLEAR KEYPAD MODE	N		~	
F	ST	LINE ERASE	US	FOREGROUND DATA FOLLOWS	/	AUX. PORT ON WITH DISPLAY	?	RESET AUX. PORT	O	SPECIAL TERMINAL FUNCTIONS*	—	

*MULTIPLE CHARACTERS REQUIRED. SEE TABLE 3-4-C.
**SEE TABLE 3-4-C(1)

VT52 MODE ESCAPE SEQUENCES

HEX	2		3		4		5		6		7	
0			0		@		P				p	
1	!		1		A	CURSOR UP	Q		a		q	
2	"		2		B	CURSOR DOWN	R		b		r	
3	#		3	SET REVERSE VIDEO	C	CURSOR RIGHT	S		c		s	
4	$		4	CLEAR REVERSE VIDEO	D	CURSOR LEFT	T		d		t	
5	%		5		E		U		e		u	
6	&		6		F		V	PRINT PAGE - FORMATTED	f		v	
7	'		7		G		W	AUX. PORT W/O DISPLAY	g		w	
8	(		8		H	CURSOR HOME	X	AUX. PORT OFF	h		x	
9	)		9		I	REVERSE LINE FEED	Y	ABSOLUTE CURSOR POSITION*	i		y	
A	*		:		J	PAGE ERASE CURSOR TO END SCRN	Z	REQUEST TERMINAL IDENT.*	j		z	
B	+		;		K	LINE ERASE CURSOR TO END LINE	[		k		{	
C	,		<		L		\		l		¦	
D	-		=	ENTER KEYPAD MODE**	M		]	PRINT LINE	m		}	
E	.		>	EXIT KEYPAD MODE	N		^		n		~	
F	/		?		O		_		o	SPECIAL TERMINAL FUNCTIONS*	DEL	

*MULTIPLE CHARACTERS REQUIRED, SEE TABLE 3-4-D.
**SEE TABLE 3-4-D(1).

INDEX

SUBJECT PAGE

A

B

C

D

E

F-G-H

I-J

SUBJECT PAGE

K

L

M

N

O

P-Q

R

S

SUBJECT PAGE

T-U

V

W-X-Y-Z

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