

Hazeltine ESPRIT

VIDEO DISPLAY TERMINAL
REFERENCE MANUAL



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HI-1094

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	INSTALLATION	2
2.1	Unpacking Instructions and Inspections	2
2.2	Set-Up and Connections	2
2.3	Turn-On and Warm-Up	2
2.4	User Maintenance	3
2.5	Self Test	3
3.0	TERMINAL DESCRIPTIONS	4
3.1	Display System	4
3.2	Keyboard	4
3.3	Communication Interface	5
3.4	Remote Commands	5
3.5	BLOCK Mode Feature	6
3.6	Emulation Feature	6
3.7	Physical Characteristics	7
4.0	TERMINAL CONTROLS	8
4.1	Keyboard	8
4.2	Panel Controls	11
5.0	Communication Interface	14
5.1	Communication Data	14
5.2	EIA Interface	14
5.3	Current Loop Interface	16
5.4	Communication Mode	16
5.5	Hardwire Interface	17
6.0	TERMINAL PROGRAMMING	18
6.1	Operating Modes	18
6.2	Screen Features	18
6.3	Control Codes of the Esprit	19
6.4	Control Codes of ADM-3A, Regent 25	26
7.0	EMULATION RESTRICTIONS	28
7.1	Emulating Regent	28
7.2	Emulating ADM-3A	28
8.0	SERVICING	29
8.1	Introduction	29
8.2	Preliminary Steps	29
8.3	Warnings	29
8.4	User's Troubleshooting Procedures	29



HI-1094

Appendix A: ASCII Code Character Set

Appendix B: Table of The ESPRIT Remote Commands

Appendix C: Summary of Special Keyboard Commands

Appendix D: Summary of Control Codes

Appendix E: Direct Cursor Address and Send Cursor Address Table

Appendix F: ESPRIT Operation — — — — — Functions

Appendix G: Summary of Numeric Cluster act as Function keys

Note: There are no user serviceable parts in this terminal.

All repairs are to be performed by a Qualified technician.



HI-1094

1.0 INTRODUCTION

The Hazeltine Esprit is a versatile video display terminal which employs microprocessor technology to achieve a new standard of functionality in economic terminals.

The terminal includes a typewriter style keyboard with a numeric pad and special function keys, two industry standard asynchronous serial interfaces, a 12-inch, high-resolution, non-glare display monitor and human-engineered packaging.

The Esprit provides a number of video and formatting features including dual intensity, reverse video, and underline, line editing, and absolute cursor addressing.

Added features such as block mode with protected and unprotected fields greatly enhance the functional capability of the terminal.

The Esprit is also capable of functionally emulating the Regent 25¹ and ADM-3A² terminals.

This manual describes the features and operation of the terminal including the following information:

- Terminal installation, describing the terminal set-up procedure.
- Terminal features, a general description of the terminal's components and functions.
- Operating instructions, describing switch setting requirements, keyboard functions and special keyboard commands.
- Interface details for data set and peripheral communications.
- Terminal programming, describing the operating mode, emulation functions and the usage of remote commands.
- Emulation capabilities, describing the emulation restrictions.
- Terminal troubleshooting.

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2 Trademark of Lear-Siegler



HI-1094

2.0 INSTALLATION

This section describes the installation procedures of the Esprit terminal.

2.1 Unpacking and Inspection

Unpack the terminal and refer to the packing list to verify that all items are present, including any options that have been ordered. If the shipment is damaged upon receipt, request that the carrier's agent be present while the terminal is being unpacked and installed.

The Esprit should be inspected upon receipt for broken, damaged, or missing parts or any other physical or electrical damage.

2.2 Set-Up and Connection

2.2.1 Interface Connection

The Esprit provides two EIA RS-232C or 20mA current loop interfaces to connect to data sets or acoustic couplers. The interface connectors are located on the rear panel as shown in figure 5.1.

2.2.2 Power Connection

The ON/OFF switch plate on the rear panel lists the voltage and power requirements. Those requirements should be checked before turning it on.

2.2.3 Switch Selections

It is suggested that the user set the dip switches (refer to paragraph 4.2) before turning power on.

2.3 Turn-On and Warm-Up

2.3.1 Power Turn-On

When power is turned on a sound alarm should be heard and the cursor should appear on the upper left corner of the display within 3 minutes.

NOTES:

- a. If no sound alarm is heard, check the power source. If the power is correct, refer to Section 8 for troubleshooting.



HI-1094

- b. If random characters appear in the screen and do not clear when the C [CLEAR] key is depressed, or if there is no response to keyboard entries, switch power off, wait 15 seconds and switch power on one more time. If the trouble remains, refer to Section 8 for troubleshooting.
- c. If there is no display after the terminal has warmed up for a reasonable time (no more than 3 minutes), adjust the CONTRAST control located on the rear panel. If there is still no display, refer to Section 8 for troubleshooting.

2.3.2 Warm-UP

If the display unit was brought in from a substantially colder environment it requires at least 1 hour to warm up to reach room temperature prior to power turn on.

After power on, allow 30 seconds for display warm-up. At the end of this period, the terminal is ready to operate.

2.4 User Maintenance

The top cover of the terminal can be cleaned with a soft, damp cloth tissue, but do not use too much water. Keep it dry after cleaning.

There are several openings in the case through which liquids, coins, paper clips, and other objects can fall. Such objects would disturb the electronic operation of the terminal if they come in contact with the circuitry. For this reason, avoid putting drinks and metal objects on the top of the terminal. Rubbing the keys with a dry or barely moist cloth should suffice to clean them.

2.5 Self Test (All repairs to be performed by Qualified Technician)

The Esprit will test itself at power turn on. If any fault is found the message "ERROR" followed by a character will be displayed on the upper-left corner of the screen.

FAULT DETECTED ON	ERROR CHARACTER WILL BE DISPLAYED
	1 2 3 4 5 6 7 8 9 : ; < = > ?
Video Memory	* * * * * * * *
Internal Memory	** * * * * * *
Rom	* * * * * * * *
Keyboard	* * * * * * *

Note: "*" character indicates that the correspondent fault has been found.



3.0 TERMINAL DESCRIPTION

This section describes the basic features of the Esprit terminal.

3.1 Display System

The video display used in the Esprit is a high quality, high resolution, 12 inch display using P31 green-on-black phosphor and a non interlaced raster scanning method which provides crisp and easy-to-read character reproduction on a nonglare screen. Characters are produced using a 7X9 dot matrix for uppercase and a 7X11 dot matrix for lowercase. Two line decoders provide better readability for lowercase characters.

Character patterns are formulated within a 9X12 window. There is 2 dot spacing between character columns and 3 dot spacing between character rows with ample separation between adjacent characters. The character set consists of all 128 ASCII codes. However, the 32 control codes are displayable only in MONITOR mode, which may be set or reset at the keyboard. This mode is extremely useful as an aid in program development and for communication line debugging. The displayed patterns for control codes are brief 2-character forms of their standard abbreviations. See Appendix A for actual font.

The display has a screen capacity of 1920 characters organized as 24 lines of 80 characters each.

The terminal cursor has many representations; blinking or steady, block or underline. It can be selected at the operator's convenience and defaults to a steady block filling the whole character window. When the cursor is superimposed on a non-blank character, the character will show through the cursor in reverse video.

The Esprit provides a programmable character-by-character video attribute which may be high-intensity, reverse video or underline at 11th line. The representations are selected through the control switches located on the rear panel.

3.2 Keyboard

The terminal has a typewriter style keyboard which is permanently attached. The keyboard is decoded and debounced by software scanning which provides high stability and reliability. The keyboard consists of a 59 key main keyboard, a 14 key numeric pad for fast numeric data entry, 4 special function keys for the cursor movement and the auxiliary interface control, 3 special function keys for supporting BLOCK mode operation and 1 "LOCAL" key for LOCAL Mode operation.



HI-1094

The keyboard features typematic (Auto-Repeat) operation at the speed of the interface or 15 characters per second, whichever is slower.

An audible keyclick may be used to enhance the normal typewriter feeling. This is also useful in full duplex operation to make sure if a valid key is depressed. The "keyclick" can be enabled or disabled at the keyboard (refer to Appendix C).

3.3 Communication Interface

The Esprit uses the 7-bit ASCII code for data communication.

It provides a standard EIA RS-232C serial interface to allow a simple connection to a variety of equipments. The terminal also has a standard 20mA passive current loop with current supplied by the host equipment. This interface allows a simple direct connection to most equipments. The two interface options are switch selectable on the rear panel.

The Esprit also allows the terminal user to select one of eight different data rates and four different parity options through switch setting on the rear panel. Possible data rates include: 110, 300, 600, 1200, 2400, 3600, 4800, 9600, bits per second.

In addition to the primary communication interface which is a standard 25-pin EIA connector, the Esprit provides a bidirectional auxiliary interface to allow attachment of a local peripheral, such as hard copy device, paper tape reader, etc. These peripherals may transmit data to the host computer via the terminal.

The auxiliary interface must use the same speed as the primary interface. Several programmable functions are provided to control the output of this auxiliary interface. With the "AUX ENABLE" function, the host computer can talk directly to the peripherals attached to the auxiliary interface.

3.4 Remote Commands

The Esprit responds to an extensive set of remote commands for user application as follows.

- four function key codes
- horizontal tab
- clear screen
- direct cursor address
- insert line
- delete line



HI-1094

- clear from current cursor position to end of line
- clear from current cursor position to end of display (foreground or background spaces)
- clear foreground fields
- clear current foreground field
- display data in normal intensity or high intensity (if this representation is selected)
- cursor home
- cursor up
- cursor down
- cursor right
- cursor left/backspace
- remote page or field transmit
- set or reset BLOCK mode
- field tab and reverse field tab
- sound alarm
- absolute cursor address
- read cursor address
- read character at cursor position
- keyboard lock & unlock
- display ASCII pattern
- enable auxiliary output with display (AUX ON)
- enable auxiliary output without display
- disable auxiliary output (AUX OFF)
- enter or exit function keypad mode
- enter line mode

3.5 BLOCK Mode

The Esprit has a BLOCK mode feature which allows the use of protected and unprotected fields and block transmission of unprotected data. This feature also includes the insert and delete line capabilities (in Line Mode only).

3.6 Emulation

The Esprit is functionally compatible with the Hazeltine 1500 family. In-addition, it can be set to emulate the Regent 25 or ADM-3A terminal. For emulation selection, function summary, and restrictions, please refer to Figure 4.2 Paragraph 6.4 and Section 7.

3.7 Physical Characteristics

a. Mechanical

Size: 13.4 in (340 mm) H X 17.5 in (445 mm) W X 21.7 in (550 mm) D

Weight: 13.5kg (30 lbs)



HI-1094

b. Electrical

power: 115V AC/60 Hz or 230V AC/50Hz

power consumption: 40 watts nominal

c. Environmental

Operating temperature: 10°C to 40°C (50°F to 104°F), ambient

Storage temperature: -20°C to 65°C (4°F to 150°F)

Humidity: 95% non-condensing.



HI-1094

4.0 TERMINAL CONTROLS

4.1 Keyboard

The keyboard contains a typewriter-style alphanumeric cluster and a 14-key numeric pad, plus 8 special function keys as shown in Figure 4-1. All 128 ASCII codes can be generated through the alphanumeric cluster, and many remote commands can be entered from the keyboard.

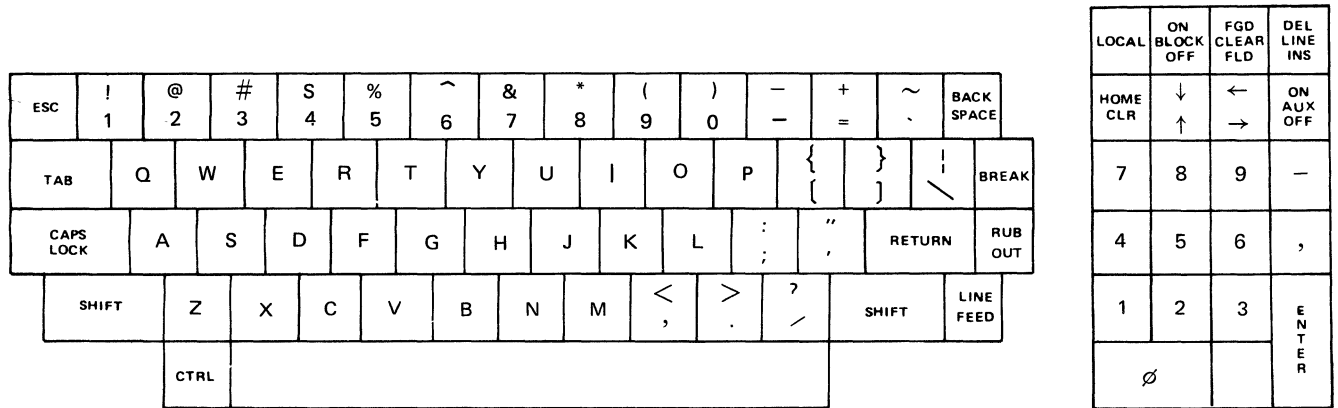


FIGURE 4-1 ESPRIT KEYBOARD LAYOUT

4.1.1 Alphanumeric Cluster

The alphanumeric keys operate in the same manner as a typewriter. The lowercase letter or lower symbol of the key is transmitted whenever it is struck.

There are eight keys on the keyboard that may either transmit control codes or modify any other key depressed simultaneously. If the [SHIFT] key is held down while an alphanumeric key is struck, the uppercase letter or the upper symbol of the key is transmitted.

The [CTRL] key operates like the [SHIFT] key in that it must be held down while another key is depressed to accomplish its function. The [CTRL] and [SHIFT] keys, used in conjunction with the alphanumeric keys, permit transmission of any one of the 128 ASCII codes (Appendix A). If the ASCII code does not correspond to a displayable character, nothing will be displayed on the screen unless the terminal is in MONITOR mode.



HI-1094

The [CAPS LOCK] key is the only alternate action key on the keyboard unit. It does the same function as SHIFT except that it is valid only for the 26 alphabetic letters.

Depressing the [TAB] key will generate a TAB code (09 HEX). Depressing the [TAB] with [SHIFT] will generate LEAD-IN CODE, and then BACK TAB code (14 HEX).

The [LINE FEED] key will generate the Line Feed code (0A HEX).

The [CARRIAGE RETURN] key will generate the Carriage Return code (0D HEX).

The [BREAK] key depressed with [SHIFT] will generate a break signal which lasts for 200 to 250 milliseconds.

The [RUB OUT] key will generate a DEL code (7F HEX).

The [ESC] key will generate the Escape code (1B HEX).

NOTE: In BLOCK Mode, entering the lead-in code ([ESC] or [~], switch selected) will condition the Esprit for a four character transmission which will have no effect on the display. Entering of lead-in code followed by an ASCII entry causes a four character sequence (lead-in code, ASCII code, EOM, NUL) to be transmitted. In the event the lead-in code is erroneously depressed, a second depression will terminate this feature.

4.1.2 Numeric Cluster

The numeric cluster contains keys for the numerals [0] through [0] [-] [,] and [.] . The [ENTER] key duplicates the function of the [RETURN] key. In addition, in BLOCK mode, depressing [ENTER] will cause the terminal to transmit the contents of all foreground fields (page transmission), and depressing [SHIFT] and [ENTER] will cause the contents of the foreground field the cursor is in to be transmitted.

4.1.3 Special Function Keys

The [↑/↓] and [←/→] keys control cursor movement.

When depressed with the [SHIFT] key the [HOME/CLEAR] key will move the cursor to the home position without altering the displayed data. When depressed with the [CTRL] key the [HOME/CLEAR] key will clear the entire display to foreground spaces (background spaces for ADM-3A or Regent 25 modes) with the cursor moved to the home position. In block mode clear screen will only be executed if the cursor is in the home position.

The [AUX ON/OFF] key will alternately disable and enable the auxiliary port output.



HI-1094

Depressing the [LOCAL] key with [SHIFT] will cause the Esprit to enter the LOCAL mode, a second depression will bring it back to the NORMAL mode. The "BLOCK MODE" LED will be blinking while the terminal is in the LOCAL mode.

The [BLOCK ON/OFF] key will alternately enable or disable the BLOCK mode. The "BLOCK MODE" LED will be lit while the terminal is in the BLOCK mode.

The [CLEAR FGD/FLD] key will cause all foreground field data (with [SHIFT] key) or the foreground field data in which the cursor is currently positioned to be cleared to foreground spaces.

The [LINE DEL/INS] key will insert one foreground line or (with [SHIFT] key) delete one character line. This key is inoperative in the BLOCK mode.

NOTE: Refer to Appendix F for those keys used in HALF or FULL duplex mode.

4.1.4 Keyboard Commands

In addition to the special function keys that control the screen directly, most remote commands can be generated from the keyboard. Appendix B lists all commands that can be entered from the keyboard or from the host computer. These commands are described in Section 6.

4.1.5 Special Keyboard Commands

The Esprit also provides ten special keyboard commands concerning MONITOR mode, cursor representation, keyclick and RAM test for user's convenience. The user can select any one of these commands by depressing a numeric key along with the CTRL key. See Appendix C.

4.2 Panel Controls

The terminal is provided with 18 miniature switches at the rear panel, 6 for communication, 3 for video attribute selection, 3 for miscellaneous screen controls, 2 for EIA/Current Loop selection, 2 for End of Message character selection and 2 for emulation selection. The switch locations are shown in Figure 4-2.



HI-1094

4.2.1 Auto Line Feed/Carriage Return

When this switch is in the "ON" position all received carriage returns cause the cursor to move to the first character position of the same line and then move the cursor one line down. Received line feed characters are ignored. When this switch is in the "OFF" position, a carriage return causes the cursor to move to the first column on the same line, and a line feed causes the cursor to move to the next line in the same column.

4.2.2 Half Duplex/Full Duplex

The "OFF" position of this switch selects the full duplex mode of communication that is typically used when the communication system is capable of simultaneous two-way transmission. In this mode, data entered from the keyboard is sent directly to the computer system. Upon reaching the computer, the data is "echoed" back to the terminal at the discretion of the program (i.e. it may not be desirable to echo special codes, passwords, etc.). If modems are used, they must be set for full duplex operation. Only received or "echoed" data is displayed or processed by the terminal.

The "ON" position of this switch selects the half duplex mode of communication. In this mode data entered from the keyboard is sent directly to the computer system and is displayed as received data. Echoing, as in the full duplex mode, is not required; if used, it may cause each transmitted character to be displayed twice.

4.2.3 Auto New Line/Truncate

When this switch is in "ON" position the cursor will automatically advance to the first column of the next line where a character is entered in the 80th column of the present line. In the "OFF" position, the cursor will remain in the 80th column and any successive characters entered will overwrite the last character on the line until a cursor movement code is received by the terminal.



HI-1094

4.2.4 Parity

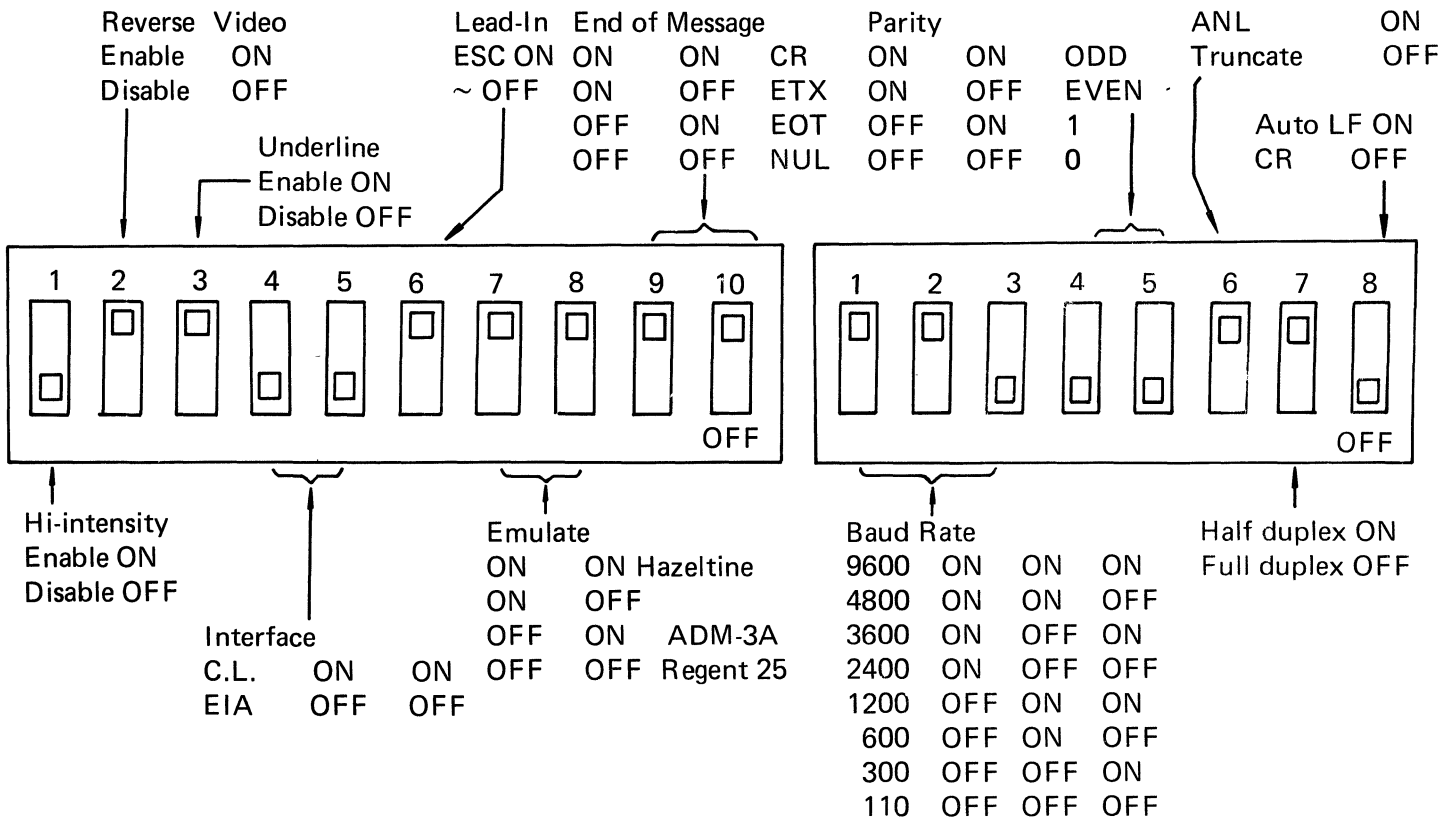
The parity switches are used to select the parity compatible with the system. The switch setting for each parity condition is shown figure 4-2.

The four possibilities are:

<u>Parity</u>	<u>Operation</u>
<u>EVEN</u>	Checks for even parity on received data and generates even parity on outgoing data.
ODD	Checks for odd parity on received data and generates odd parity on outgoing data.
1	The parity bit of each character transmitted is set to a one. No parity check is done on received data.
0	The parity bit of each character transmitted is set to a zero. No parity check is done on received data.

4.2.5 Baud Rate

The three baud rate switches are used to select one of eight communication speeds from 110 to 9600 baud. The switch settings for each available speed are shown in figure 4-2.





HI-1094

4.2.6 EOM (End of Message)

The two EOM (End of Message) switches select the character which will be inserted at the end of direct cursor address, send character and page transmission to signal the end of message. They are designated as shown in figure 4–2.

4.2.7 Emulation

The two emulation switches select the terminal which will be emulated.

4.2.8 Lead-in Code ~/ESC

This switch must be set to select the lead-in code as [ESC] or [~] for remote commands. If [ESC] is selected as the lead-in code, [~] will be displayed when received.

4.2.9 EIA RS-232C/20mA Current Loop

The two switches select the communication interface and must be positioned in the same direction.

4.2.10 Underline Enable/Disable

When this switch is in the "ON" position, all foreground data will have one dot line override on the 11th line of the dot matrix.

4.2.11 High Intensity Enable/Disable

When this switch is in the "ON" position, all foreground data will be displayed in high intensity.

4.2.12 Reverse Video Enable/Disable

When this switch is in the "ON" position, all foreground data will be displayed in reverse video.

NOTES:

1. Baud rate, parity, emulation and lead-in code are determined by the switch settings at the time the terminal is turned on. To make a change after the terminal is turned on, reselect the switches for the desired parity, baud rate, emulation and lead-in code, then press the SHIFT and BREAK keys (figure 4–1) to initiate the change.
2. If a character is received with a parity error when EVEN or ODD parity is selected, a "?" symbol will be displayed.



HI-1094

5.0 COMMUNICATION INTERFACE

The Esprit terminal provides EIA RS-232C and 20mA current loop interfaces. The terminal may be configured to run in full duplex or half duplex mode for asynchronous ASCII data communication.

5.1 Communication Data

The Esprit terminal communicates via the 7-bit ASCII shown in Appendix A. A parity bit, as selected, is added to make an eight bit code.

The format for received and transmitted data is asynchronous serial ASCII. Each transmitted character is preceded by a start bit and followed by one parity bit and one stop bit (2 stop bits for 110 baud). Received characters may have any number of stop bits except zero. The parity bit can be selected (see Section 4) to be even, odd, mark (always one) or space (always zero). Switches are provided (see section 4) to select one of eight transmission speeds from 110 to 9600 baud.

5.2 EIA Interface

5.2.1 EIA Input/Output Connector

The standard EIA input/output connector located at rear of the terminal (figure 5-1) provides the connection to the appropriate data set or acoustic coupler. The signals conform to EIA standard RS-232C; these are listed below.

Pin	Direction	Designation	Function
1	-----	AA	Protective Ground (Chassis)
2	From Terminal	BA	Transmitted Data
3	To Terminal	BB	Received Data
4	From Terminal	CA	Request To Send
5	To Terminal	CB	Clear To Send
6	To Terminal	CC	Data Set Ready
7	-----	AB	Signal Ground
8	To Terminal	CF	Data Carrier Detect (See Note)
13	From Terminal	--	16X Clock Output (TTL Level)
18	-----	--	+ Current Loop Input
19	-----	--	- Current Loop Input
20	From Terminal	CD	Data Terminal Ready
21	-----	--	+ Current Loop Output
25	-----	--	- Current Loop Output

NOTES: 1. CD is true (high) whenever the terminal is turn-on.
2. CF is directly passed to AUX CF.



HI-1094

5.2.2 Auxiliary Input/Output Connector

The auxiliary port permits serial output of received and transmitted data, at the data I/O baud rate, to an RS-232C compatible auxiliary device. Output and display may be controlled by remote commands described in paragraph 6.3. Additional information is furnished with the modification instructions.

The auxiliary input/output connector provides the EIA RS-232C voltage level signals listed below:

<u>Pin</u>	<u>Direction</u>	<u>Designation</u>	<u>Function</u>
1	-----	Aux AA	Protective Ground (Chassis)
2	To Terminal	Aux BB	Auxiliary Data In
3	From Terminal	Aux BA	Auxiliary Data Out
4	To Terminal	Aux CA	Auxiliary Request To Send
5	From Terminal	Aux CB	Auxiliary Clear To Send (See Note)
6	From Terminal	Aux CC	Auxiliary Data Set Ready
7	-----	Aux AB	Signal Ground
8	From Terminal	Aux CF	Data Carrier Detect

NOTE: Aux CC is true (high) whenever the terminal is power-on.

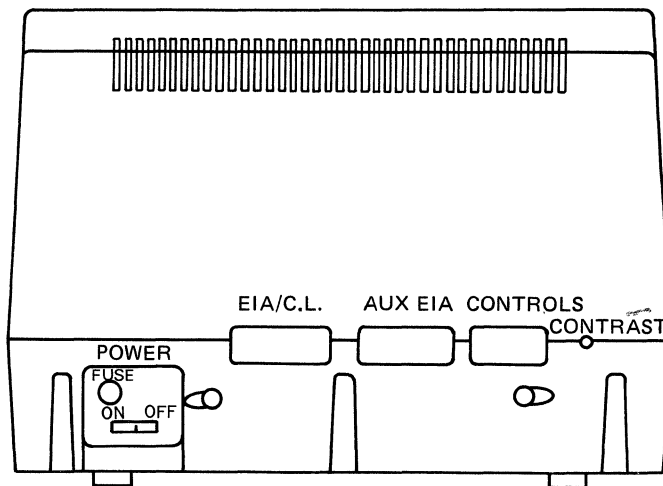


Figure 5-1 rear panel



5.3 Current Loop Interface

The current loop interface converts the standard EIA RS-232C voltage level interface to a 20 mA current loop interface. The current loop interface switching states are "mark" (current flow) or "space" (no current flow). The output data controls a circuit closure. In the "mark" condition, the circuit is closed while in the "space" condition, the circuit is open.

The 20mA current loop interface should be installed as below:

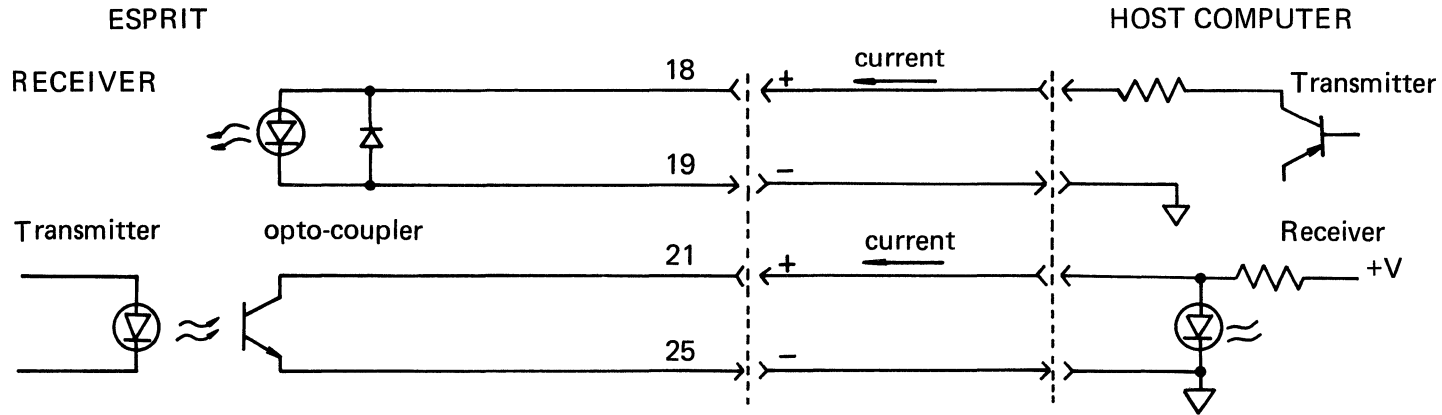


FIGURE 5-2 20mA CURRENT LOOP CONNECTION

5.4 Communication Mode

5.4.1 Full Duplex

The full duplex mode of communication is used with systems capable of simultaneous two-way transmission, and permits more computer control of the display. Data and commands entered at the keyboard are transmitted directly to the computer without display, then "echoed" back to the terminal. Those commands are performed only when they are echoed back to the terminal.

In the full duplex mode, the terminal's "Request to Send" output is high (true) when the first character is entered and remains high until power is shut off.

5.4.2 Half Duplex

The half duplex mode of communication is used when the system is not capable of simultaneous two-way transmission, or "echoed" back operation is undesirable. Data keyed from the keyboard is transmitted and displayed simultaneously.



HI-1094

Half duplex transmission via a modem is accomplished by the following modem control sequence:

1. When a character is entered at the keyboard, the terminal outputs a "Request to Send" signal to the modem.
2. The terminal checks for a "Data Set Ready" signal from the modem.
3. Upon sensing the "Data set Ready" signal, the terminal waits, if necessary, for a "Clear to Send" signal from the modem.
4. Upon sensing the "Clear to Send" signal, the terminal transmits the character via the modem. The terminal's "Request to Send" signal remains present, and entered characters are transmitted, until one of the following four "turn around" characters are entered: Carriage Return, End of Text (ASCII ETX, keystroke CTRL C) End of Transmission (ASCII EOT, keystroke CTRL D), or Null Code.
5. After transmission of the "turn around" character, the terminal sends out a "NULL" code, and delays 1.5ms then resets its "Request to Send" signal and the modem switches to the receive mode. The sequence begins again when the next character is typed.

Note that if the terminal does not sense a "Data Set Ready" signal in step 2 above, it transmits the character regardless of the state of "clear to send." This permits hard-wired connection to a computer or other device without simulation of modem controls.

5.5 Hardwire Interface

The terminal can be connected directly to a computer by connecting pins 2, 3, and 7 from the EIA connector on the rear panel. Note that pins 2 and 3 may have to be crossed with the corresponding pins on the computer. No wiring changes are required at the terminal to simulate the presence of a modem. Refer to your computer supplier for any special wiring at the computer interface.



HI-1094

6.0 TERMINAL PROGRAMMING

The Esprit terminal can be operated in many modes to assist the user in communicating with a computer. Careful study and experimentation with those modes will familiarize the operator with the many powerful communication techniques offered by the terminal.

6.1 Operating Modes

6.1.1 NORMAL Mode

When set to the NORMAL mode, the Esprit may be used as an interactive terminal to interact with the computer in either FULL or HALF duplex communication mode.

6.1.2 MONITOR Mode

When the Esprit is set to the MONITOR mode, all ASCII codes, including control codes, received by the terminal will be displayed rather than being acted upon. Only the CR code (OD HEX) will perform the Carriage Return function in addition to being displayed as a control code.

6.1.3 BLOCK Mode

When the Esprit is set to the BLOCK mode data will not be transmitted until the operator depresses the "ENTER" key with or without [SHIFT]. This function provides the operator with the ability to edit data before it is transmitted. When the terminal is in this mode, it can exit to NORMAL mode only. This mode is not available when either the Regent 25 or ADM-3A is being emulated.

6.1.4 LOCAL Mode

When the Esprit is set to the LOCAL mode, data entered at the keyboard is displayed but not transmitted. Data received at the communication interface is ignored. Utilizing this operation mode the operator can become familiar with the response to remote commands offered by the terminal. LOCAL mode also allows the operator to prepare and edit a full screen display with the assurance that the host computer will be unable to destroy the prepared text. When the terminal is in this mode, it can exit to NORMAL mode only.

6.2 Screen Features

6.2.1 Cursor

The cursor represents the position on which the next character



HI-1094

will be displayed. If the cursor moves to the position that already has a character displayed, the cursor overlays it and the character video is reversed in the cursor block.

6.2.2 Scrolling

If a displayable ASCII code is received at the last character position of the bottom row and the Auto-New-Line switch is in the "ON" position, the screen moves up one row, the top row data is removed, and the cursor moves to the first character position (left margin) of the new bottom row. This operation is on the bottom row and a Line Feed is executed. Scrolling is inoperative in the Block mode.

6.2.3 Foreground/Background

For form fill applications in enhanced BLOCK mode operation, all data on the screen may be displayed as either foreground background field depending on the most recent command (as described in the next paragraph). The foreground characters may be displayed in high intensity, underline and/or reverse video which are selected and enabled through rear panel control switches. Background characters are always low intensity. The terminal defaults to the background state at turn-on and will change to foreground state after the Set Foreground command is received.

6.3 Control Codes

The remote command feature of the terminal provides the user with the capability of controlling the terminal via the CPU software. For the terminal to execute a remote command, the command code must be preceded by a lead-in code (except as noted).

The lead-in code may be either a tilde (ASCII ~, 7E HEX) or an escape (ASCII ESC, 1B HEX). The / ESC switch (paragraph 4.2.8) must be set to agree with the lead-in code selected. Unless in MONITOR mode, the lead-in code is not displayed when received and does not advance the cursor. The command code must follow the lead-in code without intervening characters (including DEL or NUL characters). If the code following the lead-in code is not one of the valid command codes requiring a lead-in (a second lead-in is invalid), both the lead-in character and the following character will be ignored.

The remote commands are divided into four categories or sets: cursor controls, editing controls, format controls, and control of special functions. The remote commands are listed and described below in detail.



HI-1094

6.3.1 Cursor Controls

Command	Lead-in	ASCII	DESCRIPTION
Cursor Home	Yes	DC2	On receipt of the Cursor Home command the cursor moves to the upper left character (HOME) position. The display is unchanged.
Cursor Up	Yes	FF	On receipt of the Cursor Up command the cursor moves up one row in the same column without altering the display. If the cursor is on the top row, it does not move.
Cursor Down	Yes	VT	On receipt of the Cursor Down command the cursor moves down one row in the same column without altering the display. If the cursor is on the bottom row, it does not move.
Cursor Left Backspace	No	BS	On receipt of the Cursor Left (or Backspace) command the cursor moves left one column in the same row without altering the display. If the cursor is in the leftmost column, it moves to the rightmost column and up one row unless it is on the HOME position.
Cursor Right	No	DLE	On receipt of the Cursor Right command the cursor moves right one column in the same row without altering the display. If the cursor is in the rightmost column, it moves to the leftmost column of the next row unless it is on the rightmost column of the bottom row.
Line Feed	No	LF	On receipt of the Line Feed command the cursor moves down one row in the same column; if it is in the bottom row, the display scrolls up. If the Auto LF/CR on the rear panel is set to Auto Line Feed (Paragraph 4.2.2), Line Feed command is ignored.



HI-1094

Carriage Return	No	CR	On receipt of the Carriage Return command the cursor moves to the leftmost column of the present row. If the Auto LF/CR is set to Auto LF (Paragraph 4.2.1), the cursor also moves down one row; if it is on the bottom row, the display scrolls up.
Direct Cursor Address	Yes	DC1, X, Y	The Direct Cursor Address command is a four characters sequence: Lead-in, DC1, X-coordinate, Y-coordinate. The 80 character columns are designated X and range from 0 to 79. The rows are designated Y and range from 0 to 23. The four characters in the sequence must be received without intervening characters, such as NUL and DEL. Appendix E lists all possible addresses and the key strokes for generating them.
Send Cursor Address	Yes	ENQ	On receipt of the Send Cursor Address command the terminal responds with the sequence X-Coordinate, Y-Coordinate, EOM code. The coordinate system is the same as described for Direct Cursor Address above. The coordinates transmitted are listed in appendix E.
Send character at Cursor Address	Yes	!	On receipt of this command the terminal transmits the character at the present cursor position followed by an selected EOM code. The cursor is not advanced. When used in conjunction with the cursor up, down, right, left and direct cursor address commands, this permits reading any character perviously entered on the display.

6.3.2 Editing Controls

<u>Command</u>	<u>Lead-in</u>	<u>ASCII</u>	<u>Description</u>
Clear Screen	Yes	FS	On receipt of this command the entire screen is cleaned to foreground spaces and the cursor moves to the HOME position.



HI-1094

Clear to End of Screen (Foreground)	Yes	CAN	On receipt of this command all characters from and including the present cursor position to the end of the screen are cleared to foreground spaces.
Clear to End of Screen (Background)	Yes	ETB	On receipt of this command all characters from and including the present cursor position to the end of the screen are cleared to background spaces.
Clear to End of Line	Yes	SI	On receipt of this command all characters from and including the present cursor position to the end of the cursor row are cleared to foreground spaces.
Clear Field	Yes	SYN	On receipt of this command the terminal will cause the contents of the foreground field in which the cursor is currently positioned to be cleared. The cursor will be repositioned to the beginning of the field. Nothing will be cleared if the cursor is positioned within a background field, and the cursor will be repositioned to the first position of the next foreground field unless there is no new foreground field down screen.
Clear Foreground Field	Yes	GS	On receipt of this command all foreground characters on the display are replaced with foreground spaces and the cursor moves to the first character position of the first foreground field.
Insert Line	Yes	SUB	On receipt of this command a new row of all foreground spaces is inserted at the present cursor position with the cursor in the first column. The row the cursor was on and all rows below it scroll down one row. Insert line is in-operative in the Block mode.



HI-1094

Delete Line	Yes	DC3	On receipt of this command the row the cursor is on is deleted from the display and all rows below it scroll up one row. The cursor moves to the leftmost column of the present row. Delete line is inoperative in the Block mode.
-------------	-----	-----	--

6.3.3 Format Controls

<u>Command</u>	<u>Lead-in</u>	<u>ASCII</u>	<u>Description</u>
Set Background	Yes	EM	On receipt of this command all subsequent data is entered as a background field until canceled by the following Set Foreground command. Data entered as background is displayed at low intensity, not cleared by a Clear Foreground Field command, and tabbed over by a Field Tab command. The terminal defaults to this state at turn-on.

Set Foreground	Yes	US	On receipt of this command all subsequent data is entered as a foreground field until cancelled by the Set Background command; all foreground data is displayed at high intensity, underline, or reverse video as selected through the rear panel switches.
----------------	-----	----	---

Field Tab	No	HT	On receipt of this command the Cursor tabs to the first character position in the next foreground field. If there is no new foreground down screen from the present cursor position the cursor remains in the original location. A warning alarm is heard in this condition.
-----------	----	----	--

Horizontal Tab	Yes		On receipt of this command, the cursor tabs to the next tab stop on the present row. Tab stops are located in columns 0, 8, 16, 24, . . . (steps of 8) . . . , 72 (numbering columns from 0 to 79). If there are no more tab stops in the present row the cursor moves to the leftmost column of the next row or to the home position if it was on the bottom row.
----------------	-----	--	--



HI-1094

Reverse Field Tab	YES	DC4	On receipt of this command the cursor is repositioned to the first foreground position in the field in which it is located. In the event that the cursor is located in the first position of a foreground field or within a background field, the cursor will move back to the first position of the previous foreground field. This command will be ignored if the cursor is in the first position of the first foreground field on the display. A warning alarm is heard in this condition.
-------------------	-----	-----	---

6.3.4 Special Function controls

<u>Command</u>	<u>Lead-in</u>	<u>ASCII</u>	<u>Description</u>
Sound Alarm	No	BEL	On receipt of this command the terminal sounds an audible alarm for approximately 0.3 seconds.
Keyboard Unlock	Yes	ACK	On receipt of this command the keyboard is unlocked. The terminal defaults to this condition at power-on.
Keyboard Lock	Yes	NAK	On receipt of this command the keyboard is locked out and no operator entries may be made. This command may be cancelled by the Keyboard Unlock command.
Display Test Pattern "H"	Yes	"	On receipt of this command a test pattern of all background "H" characters is displayed with the cursor in the HOME position.
Display ASCII Pattern	Yes	8	On receipt of this command a pattern of all ASCII characters is displayed with the cursor in the HOME position.
Set BLOCK Mode	Yes	#	On receipt of this command the terminal enters the BLOCK mode.



HI-1094

Reset BLOCK Mode	Yes	\$	On receipt of this command the terminal enters the NORMAL mode.
Enable Auxiliary Port With Display	Yes	/	On receipt of this command all data received via the primary port is displayed, processed and output at the auxiliary port. In half duplex operation, keyboard entries are transmitted via the primary port. The terminal defaults to this condition at turn-on.
Enable Auxiliary Port Without Display	Yes	*	This command permits transmission to an auxiliary device without affecting the screen. On receipt of this command, data (except the AUX commands) received via the primary port is output to the auxiliary port without processing or displaying by the terminal.
Disable Auxiliary Output	Yes	?	On receipt of this command the auxiliary output is disabled and no data is output at the auxiliary port. Input remains enabled.
Remote Page Transmit	Yes	SO	On receipt of this command all foreground data on the screen will be transmitted. The end of transmission is indicated by a selected End of Message character. After transmission is completed, the cursor is repositioned to the first character of the first foreground field on the display.
Remote Field Transmit	Yes	)	On receipt of this command the data in the foreground field in which the cursor is currently positioned

NOTE: Remote AUX commands should be followed by a "NUL" code for one character synchronization.



Set Line Mode Yes

will be transmitted and the end of transmission is indicated by a selected End of Message character. The cursor will be repositioned to the beginning of the field. Nothing will be transmitted if the cursor is within a background field, and the cursor will be repositioned to the first position of the next foreground field, unless there is no new foreground field down screen. This command is valid in the BLOCK mode only. After receipt of this command the terminal is capable of doing line transmit. Line transmit is defined as transmission of all foreground characters on the line on which the cursor is located. Transmission will be invoked by depressing the [CR] or [ENTER] key and terminated by insertion of the selected End of Message Character. The cursor will be relocated to the first position of the next line. If the cursor is located on the bottom line, line transmit shall cause the screen to roll up.

6.4 ADM-3A And Regent 25 Control Codes

The Esprit can emulate the control codes of ADM-3A, and Regent 25 terminals. However, the emulation is restricted to those commands which concern software only. Some emulated control codes act differently from the specifications of the original manufacture.

6.4.1 Cursor Controls

<u>Comand</u>	<u>ADM-3A</u>	<u>Regent 25</u>
Cursor Home	RS	SOH
Cursor Down	LF	LF
Cursor Up	VT	SUB
Cursor Left (Back Space)	BS	NAK or BS
Cursor Right	FF	ACK
Line Feed	LF	LF
Carrige Return	CR	CR
Direct Cursor Address	ESC, =, r, C	ESC, Y, r, C
Address Horizontal		DLE
Address Vertical		VT



HI-1094

6.4.2 Editing Controls

<u>Command</u>	<u>ADM-3A</u>	<u>Regent-25</u>
Clear Screen	SUB	FF
Clear to End of Screen		ESC, K
Clear to End of Line		ESC, K

6.4.3 Special Function Controls

<u>Command</u>	<u>ADM-3A</u>	<u>ADDS</u>
Sound Alarm	BEL	BEL
Keyboard Unlock	SO	ESC, 6
Keyboard Lock	SI	ESC, 5
Enable Auxiliary Port with Display		DC2
Enable Auxiliary Port without Display		ESC, 3
Disable Auxiliary Port		DC4
Transparent Print Off		ESC, 4
Enter Function Keypad Mode 1	ESC, ;	ESC, ;
Enter Function Keypad Mode 2	ESC, <	ESC, <
Enter Function Keypad Mode 3		ESC, =
Exit Function Keypad Mode	ESC, >	ESC, >

Refer to Appendix G for function keypad Mode description



HI-1094

7.0 EMULATION LIMITATIONS

This paragraph lists restrictions when the Esprit is used to emulate Regent 25 or ADM-3A terminals.

7.1 Regent 25 Emulation

The Esprit terminal does not emulate the following functions:

- ESC Z command (store control character)
- "Consul 580 compatible keyboard lock and unlock control codes"
- Numeric pad acts as function keys by remote command only; not by hardware dip switch setting.
- When keyboard is locked out no keyboard entries are processed.
- There is no "CASE" key.
- When a "break" is transmitted no * will be displayed to show the interface is disconnected.

7.2 ADM-3A Emulation

- The Esprit terminal neither generates nor responds to secondary channel signals.
- There is no automatic answer back feature.

7.3 Hazeltine 1500 Family Emulation

- All received NUL and DEL codes are ignored by the Esprit terminal; these codes cannot be used for direct cursor addressing.
- Clear screen from keyboard requires use of the CONTROL and CLEAR key.
- A NULL is transmitted after the selected EOM character.



HI-1094

8.0 SERVICING

8.1 Preliminary Steps

Before deciding that the terminal is malfunctioning, check the following:

1. If the unit powers up (alarm sounds and POWER ON LED lit), proceed to step2; otherwise, check the following:
 - Power cord plugged into working outlet and power switch on
 - Fuse not blown
2. If the unit powers up and no error message is displayed but it does not operate properly, check that:
 - Connectors at rear of terminal are tight
 - DIP switches at rear of terminal are set properly for the system
 - Contrast control at rear of terminal is set properly
 - If possible, substitute another terminal to insure that the problem is not in the interface

8.2 Fuse Replacement

Use only a 1A, 250V, 3AG fuse. Use of a higher rated fuse may cause damage to the terminal.

WARNING

Repair or adjustment of internal components should be performed only by a qualified technician.

Dangerous voltages are present in the terminal (13,500 VDC, 600 VDC and 100 to 240 VAC). Some voltage may remain present after power is disconnected. DO NOT TOUCH AREAS WITH WARNING LABELS.

The internal phosphor coating on the CRT is toxic; if skin or eyes are exposed to phosphor due to a broken tube, rinse with water immediately and consult a physician.

Double check that power cord is disconnected before working on internal components.



HI-1094

8.3 Monitor Adjustments (to be performed by Qualified Technician only)

If the display exhibits one or more of the faults listed below, remove the top cover and adjust the control listed. Use only a plastic alignment tool to make monitor adjustments.

Problem	Adjust
Raster shows behind characters or display too dim and cannot be corrected with CONTRAST control	BRIGHTNESS
Display rolls or part of the top or bottom character row missing	V. HOLD
Some character rows larger or smaller than others	V. LINEAR
Display too wide or too narrow	WIDTH
Display too high or not high enough	V. HEIGHT
Display out of focus	FOCUS

8.4 Self Test

The Esprit terminal will perform a self test each time it is turned on and will display an error message if a fault is detected. Refer to paragraph 2.5 for the meaning of the error messages.



HI-1094

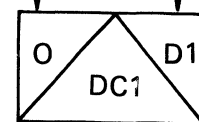
Appendix A
ASCII CODED CHARACTER SET

		CONTROL CHARACTERS			DISPLAYABLE CHARACTERS					
B17		7	6	5	010	011	100	101	110	111
BIT	4 3 2 1	@	NUL	P	SP	0	@	P	'	P
	0000	A	SOH	0	!	1	A	O	a	q
	0001	B	STX	R	"	2	B	R	b	r
	0010	C	ETX	S	#	3	C	S	c	s
	0011	D	EOT	T	\$	4	D	T	d	t
	0100	E	ENO	U	%	5	E	U	e	u
	0101	F	ACK	V	&	6	F	V	f	v
	0110	G	BEL	W	,	7	G	W	g	w
	0111	H	BS	X	(	8	H	X	h	x
	1000	I	HT	Y	)	9	I	Y	i	y
	1001	J	LF	Z	*	:	J	Z	j	z
	1010	K	VT	[	+	;	K	[	k	{
	1011	L	FF	\	,	<	L	\	l	;
	1100	M	CR	]	-	=	M	]	m	}
	1101	N	SO	^	.	>	N	^	n	~
	1110	O	SI	_	/	?	O	_	o	DEL
1111										

- Ak -ACKNOWLEDGE
- Bl -BELL
- Bs -BACKSPACE
- Cn -CANCEL LINE
- Cr -CARRIAGE RETURN
- Dl -DATA LINK ESCAPE
- D1 -DEVICE CONTROL 1
- D2 -DEVICE CONTROL 2
- D3 -DEVICE CONTROL 3
- D4 -DEVICE CONTROL 4
- Em -END OF MEDIUM
- Eq -ENQUIRY
- Ex -END OF TRANSMISSION
- Es -ESCAPE
- Eb -END OF BLOCK
- Et -END OF TEXT
- Ff -FORM FEED
- Fs -FILE SEPARATOR
- Gs -GROUP SEPARATOR
- Ht -HORIZONTAL TAB
- Lf -LINE FEED
- Nk -NEGATIVE ACKNOWLEDGE
- Rs -RECORD SEPARATOR
- S1 -SHIFT IN
- So -SHIFT OUT
- Sp -SPACE
- Sh -START OF HEADING
- St -START OF TEXT
- Sb -SUBSTITUTE
- Sy -SYNCHRONOUS IDLE
- Us -UNIT SEPARATOR
- Vt -VERTICAL TAB

Key pressed when "CTRL" is held down

displayed character



standard abbreviation

CONTROL CHARACTER LEGEND



HI-1094

Appendix B Summary of Remote Commands

ASCII	HEX	Keystroke	Lead-in	Function
ENQ	05	CE	*	Send Cursor Address
ACK	06	CF	*	Keyboard Unlock
BEL	07	CG		Sound Alarm
BS	08	CH		Back Space/Cursor Left
HT	09	CI		Field Tab
LF	0A	CJ		Line Feed
VT	0B	CK	*	Cursor Down
FF	0C	CL	*	Cursor Up
CR	0D	CM		Carriage Return
SO	0E	CN	*	Remote Page Transmit
SI	0F	CO	*	Clear To End of Line
DLE	10	CP		Cursor Right
DC1	11	CQ	*	Direct Cursor Address
DC2	12	CR	*	Home Cursor
DC3	13	CS	*	Delete Line
DC4	14	CT	*	Reverse Field Tab
NAK	15	CU	*	Keyboard Lock
SYN	16	CV	*	Clear Field
ETB	17	CW	*	Clear To End of Screen (Background)
CAN	18	CX	*	Clear To End of Screen (Foreground)
EM	19	CY	*	Set Background
SUB	1A	CZ	*	Insert Line
FS	1C	C \	*	Clear Screen
GS	1D	C]	*	Clear Foreground Field
US	1F	C _	*	Set Foreground
!	21	!	*	Send Character at Cursor Address
"	22	"	*	Display Test Pattern "H"
#	23	#	*	Set BLOCK Mode
\$	24	\$	*	Reset BLOCK Mode
)	29	)	*	Remote Field Transmit
*	2A	*	*	Enable Auxiliary Port (No Display)
.	2E	.	*	Set Line Mode
/	2F	/	*	Enable Auxiliary Port (With Display)
8	38	8	*	Display ASCII Pattern
:	3A	:	*	Horizontal Tab
;	3B	;	*	Enter Function Keypad Mode 1
<	3C	<	*	Enter Function Keypad Mode 2
=	3D	=	*	Enter Function Keypad Mode 3
>	3E	>	*	Exit Function Keypad Mode
?	3F	?	*	Disable Auxiliary Port



HI-1094

Appendix C Summary of Special Keyboard Commands

Keystroke	Function
(CTRL) with (1)	MONITOR Mode Enable
(CTRL) with (2)	MONITOR Mode Disable
(CTRL) with (3)	Line Mode Enable or Disable (toggle) (See Note E)
(CTRL) with (4)	Key-Click Enable or Disable (toggle)
(CTRL) with (5)	Select Static Cursor
(CTRL) with (6)	Select Slow Blinking Cursor
(CTRL) with (7)	Select Fast Blinking Cursor
(CTRL) with (8)	Select Block Cursor
(CTRL) with (9)	Select Underline Cursor
(CTRL) with (0)	Refresh RAM Test (toggle) (see Note C)

NOTES:

- a: These commands are legal not only when using Hazeltine 1500 Family control codes but also in emulating Regent 25, or ADM-3A. They can be selected through the keyboard only.
- b: Key-Click defaults to disable state at power on.
- c: The first depression after power-on will cause every byte of refresh RAM to be filled with 55 HEX. A pattern of all background "U" characters is displayed with the cursor in the HOME position. A second depression will fill refresh RAM with AA HEX. Another pattern of all foreground "*" characters is displayed. These characters are complements and result in storing both a 1 and a 0 in every bit location. This feature is not available in BLOCK mode.
- d: Use only the numeric keys on main keypad, not the numeric pad.
- e: Line mode can be set by remote command "Set Line Mode" and will be reset to the NORMAL mode by "Reset Block Mode" command.



HI-1094

Appendix D Summary of Control Codes

FUNCTION	ESPRIT ASCII	ADDS ASCII	ADM-3A ASCII
Send Cursor Address	LI, ENQ		
Keyboard Unlock	LI, ACK	ESC, 6	SO
Sound Alarm	BEL	BEL	BEL
Back Space (Left Cursor)	BS	NAK BS	BS
Field Tab	HT		
Back Tab	LI, DC4		
Line Feed	LF	LF	LF
Cursor Down	LI, VT	LF	LF
Cursor UP	LI, FF	SUB	VT
Carriage Return	CR	CR	CR
Page Transmit	LI, SO		
Clear To End of Line	LI, SI	ESC, K	
Cursor Right	DLE	ACK	FF
Direct Cursor Address	LI, DC1	ESC, Y	ESC, =
Home Cursor	LI, DC2	SOH	RS
Delete Line	LI, DC3		
Reverse Field Tab	LI, DC4		
Keyboard Lock	LI, NAK	ESC, 5	SI
Clear Field	LI, SYN		
Clear To End of Screen (Background)	LI, ETB	ESC, K	
Clear To End of Screen (Foreground)	LI, CAN		
Set Background	LI, EM		
Insert Line	LI, SUB		
Clear Screen	LI, FS	FF	SUB
Clear Foreground Field	LI, GS		
Set Foreground	LI, US		
Send Character At Cursor Address	LI, !		
Display Test Pattern "H"	LI, "		
Set Block Mode	LI, #		
Reset Block Mode	LI, \$		
Field Transmit	LI,)		
Enable Auxiliary Port, No Display	LI, *	ESC, 3	
Set Line Mode	LI, .		
Enable Auxiliary Port With Display	LI, /	DC2	
Display ASCII Pattern	LI, 8		
Transparent Print Off		ESC, 4	
Horizontal Tab	LI, :		
Enter Function Keypad Mode 1	LI, ;	ESC, ;	ESC, ;
Enter Function Keypad Mode 2	LI, <	ESC, <	ESC, <
Enter Function Keypad Mode 3	LI, =	ESC, =	
Exit Function Keypad Mode	LI, >	ESC, >	ESC, >
Disable Auxiliary Port	LI, ?	DC4	
Address Horizontal		DLE	
Address Vertical	D-1	VT	



HI-1094
Appendix E
Direct Cursor Address and Send Cursor Address Table

<u>ASCII</u>		<u>CRT POSITION</u>		<u>ASCII</u>		<u>CRT POSITION</u>	
DECIMAL CODE	CHARACTER	ROW #	COLUMN #	DECIMAL CODE	CHARACTER	ROW #	COLUMN #
0	CTRL @			64	@	0	64
1	CTRL A	1	1	65	A	1	65
2	CTRL B	2	2	66	B	2	66
3	CTRL C	3	3	67	C	3	67
4	CTRL D	4	4	68	D	4	68
5	CTRL E	5	5	69	E	5	69
6	CTRL F	6	6	70	F	6	70
7	CTRL G	7	7	71	G	7	71
8	CTRL H	8	8	72	H	8	72
9	CTRL I	9	9	73	I	9	73
10	CTRL J	10	10	74	J	10	74
11	CTRL K	11	11	75	K	11	75
12	CTRL L	12	12	76	L	12	76
13	CTRL M	13	13	77	M	13	77
14	CTRL N	14	14	78	N	14	78
15	CTRL O	15	15	79	O	15	79
16	CTRL P	16	16	80	P	16	
17	CTRL Q	17	17	81	Q	17	
18	CTRL R	18	18	82	R	18	
19	CTRL S	19	19	83	S	19	
20	CTRL T	20	20	84	T	20	
21	CTRL U	21	21	85	U	21	
22	CTRL V	22	22	86	V	22	
23	CTRL W	23	23	87	W	23	
24	CTRL X		24	88	X		
25	CTRL Y		25	89	Y		
26	CTRL Z		26	90	Z		
27	CTRL [		27	91	[
28	CTRL \		28	92	\		
29	CTRL]		29	93]		
30	CTRL ^		30	94	^		
31	CTRL _		31	95	_		
32	SPACE	0	32	96	`	0	0
33	!	1	33	97	a	1	1
34	"	3	34	98	b	2	2
35	#	4	35	99	c	3	3
36	\$	5	36	100	d	4	4
37	%	6	37	101	e	5	5
38	&	7	38	102	f	6	6
39	•	8	39	103	g	7	7
40	(	9	40	104	h	8	8
41	)	10	41	105	i	9	9
42	*	11	42	106	j	10	10
43	+	12	43	107	k	11	11
44	,	13	44	108	l	12	12
45	-	14	45	109	m	13	13
46	.	15	46	110	n	14	14
47	/	16	47	111	o	15	15
48	0	17	48	112	p	16	16
49	1	18	49	113	q	17	17
50	2	19	50	114	r	18	18
51	3	20	51	115	s	19	19
52	4	21	52	116	t	20	20
53	5	22	53	117	u	21	21
54	6	23	54	118	v	22	22
55	7		55	119	w	23	23
56	8		56	120	x		24
57	9		57	121	y		25
58	:		58	122	z		26
59	:		59	123	{		27
60	<		60	124	}		28
61	=		61	125	~		29
62	>		62	126	DEL		30
63	?		63	127			31

NOTE: The coordinates of "Send Cursor Address" command are shown in the outlined areas.



HI-1094

ADM-3A Direct Cursor Address Table

ASCII CRT POSITION				ASCII CRT POSITION			
ASCII DECIMAL CODE	CHARACTER	ROW #	COLUMN #	DECIMAL CODE	CHARACTER	ROW #	COLUMN #
0	CTRL @			64	@	0	32
1	CTRL A	1	33	65	A	1	33
2	CTRL B	2	34	66	B	2	34
3	CTRL C	3	35	67	C	3	35
4	CTRL D	4	36	68	D	4	36
5	CTRL E	5	37	69	E	5	37
6	CTRL F	6	38	70	F	6	38
7	CTRL G	7	39	71	G	7	39
8	CTRL H	8	40	72	H	8	40
9	CTRL I	9	41	73	I	9	41
10	CTRL J	10	42	74	J	10	42
11	CTRL K	11	43	75	K	11	43
12	CTRL L	12	44	76	L	12	44
13	CTRL M	13	45	77	M	13	45
14	CTRL N	14	46	78	N	14	46
15	CTRL O	15	47	79	O	15	47
16	CTRL P	16	48	80	P	16	48
17	CTRL Q	17	49	81	Q	17	49
18	CTRL R	18	50	82	R	18	50
19	CTRL S	19	51	83	S	19	51
20	CTRL T	20	52	84	T	20	52
21	CTRL U	21	53	85	U	21	53
22	CTRL V	22	54	86	V	22	54
23	CTRL W	23	55	87	W	23	55
24	CTRL X		56	88	X		56
25	CTRL Y		57	89	Y		57
26	CTRL Z		58	90	Z		58
27	CTRL [		59	91	[		59
28	CTRL \		60	92	\		60
29	CTRL]		61	93	]		61
30	CTRL ^		62	94	^		62
31	CTRL _		63	95	_		63
32	SPRCE		0	96	·	0	64
33	!	0	1	97	a	1	65
34	∕	1	2	98	b	2	66
35	#	2	3	99	c	3	67
36	\$	3	4	100	d	4	68
37	%	4	5	101	e	5	69
38	&	5	6	102	f	6	70
39	,	6	7	103	g	7	71
40	(	7	8	104	h	8	72
41	)	8	9	105	i	9	73
42	*	9	10	106	j	10	74
43	+	10	11	107	k	11	75
44	,	11	12	108	l	12	76
45	-	12	13	109	m	13	77
46	.	13	14	110	n	14	78
47	/	14	15	111	o	15	79
48	0	15	16	112	p	16	
49	1	16	17	113	q	17	
50	2	17	18	114	r	18	
51	3	18	19	115	s	19	
52	4	19	20	116	t	20	
53	5	20	21	117	u	21	
54	6	21	22	118	v	22	
55	7	22	23	119	w	23	
56	8	23	24	120	x		
57	9		25	121	y		
58	:		26	122	z		
59	∕		27	123	{		
60	<		28	124	:		
61	=		29	125	}		
62	>		30	126	~		
63	?		31	127	DEL		



HI-1094

REGENT 25 Direct Cursor Address Table

<u>ASCII</u>		<u>CRT POSITION</u>		<u>ASCII</u>		<u>CRT POSITION</u>	
DECIMAL CODE	CHARACTER	ROW #	COLUMN #	DECIMAL CODE	CHARACTER	ROW #	COLUMN #
0	CTRL @			64	@		32
1	CTRL A			65	A		33
2	CTRL B			66	B		34
3	CTRL C			67	C		35
4	CTRL D			68	D		36
5	CTRL E			69	E		37
6	CTRL F			70	F		38
7	CTRL G			71	G		39
8	CTRL H			72	H		40
9	CTRL I			73	I		41
10	CTRL J			74	J		42
11	CTRL K			75	K		43
12	CTRL L			76	L		44
13	CTRL M			77	M		45
14	CTRL N			78	N		46
15	CTRL O			79	O		47
16	CTRL P			80	P		48
17	CTRL Q			81	Q		49
18	CTRL R			82	R		50
19	CTRL S			83	S		51
20	CTRL T			84	T		52
21	CTRL U			85	U		53
22	CTRL V			86	V		54
23	CTRL W			87	W		55
24	CTRL X			88	X		56
25	CTRL Y			89	Y		57
26	CTRL Z			90	Z		58
27	CTRL [			91	[		59
28	CTRL \			92	\		60
29	CTRL]			93	]		61
30	CTRL ^			94	^		62
31	CTRL _			95	_		63
32	SPACE	0	0	96	‘		64
33	!	1	1	97	a		65
34	"	2	2	98	b		66
35	#	3	3	99	c		67
36	\$	4	4	100	d		68
37	%	5	5	101	e		69
38	&	6	6	102	f		70
39	.	7	7	103	g		71
40	(	8	8	104	h		72
41	)	9	9	105	i		73
42	*	10	10	106	j		74
43	+	11	11	107	k		75
44	-	12	12	108	l		76
45	.	13	13	109	m		77
46	/	14	14	110	n		78
47	0	15	15	111	o		79
48	1	16	16	112	p		
49	2	17	17	113	q		
50	3	18	18	114	r		
51	4	19	19	115	s		
52	5	20	20	116	t		
53	6	21	21	117	u		
54	7	22	22	118	v		
55	8	23	23	119	w		
56	9		24	120	x		
57	:		25	121	y		
58	;		26	122	z		
59	<		27	123	{		
60	=		28	124	}		
61	>		29	125	~		
62	?		30	126			
63			31	127	DEL		



HI-1094

Regent 25 Cursor Address Horizontal and Address Vertical Table

ASCII		CRT POSITION		ASCII		CRT POSITION	
DECIMAL CODE	CHARACTER	ROW #	COLUMN #	DECIMAL CODE	CHARACTER	ROW #	COLUMN #
0	CTRL @	0	0	64	@	0	40
1	CTRL A	1	1	65	A	1	41
2	CTRL B	2	2	66	B	2	42
3	CTRL C	3	3	67	C	3	43
4	CTRL D	4	4	68	D	4	44
5	CTRL E	5	5	69	E	5	45
6	CTRL F	6	6	70	F	6	46
7	CTRL G	7	7	71	G	7	47
8	CTRL H	8	8	72	H	8	48
9	CTRL I	9	9	73	I	9	49
10	CTRL J	10		74	J	10	
11	CTRL K	11		75	K	11	
12	CTRL L	12		76	L	12	
13	CTRL M	13		77	M	13	
14	CTRL N	14		78	N	14	
15	CTRL O	15		79	O	15	
16	CTRL P	16	10	80	P	16	50
17	CTRL Q	17	11	81	Q	17	51
18	CTRL R	18	12	82	R	18	52
19	CTRL S	19	13	83	S	19	53
20	CTRL T	20	14	84	T	20	54
21	CTRL U	21	15	85	U	21	55
22	CTRL V	22	16	86	V	22	56
23	CTRL W	23	17	87	W	23	57
24	CTRL X		18	88	X		58
25	CTRL Y		19	89	Y		59
26	CTRL Z			90	Z		
27	CTRL [			91	[
28	CTRL \			92	\		
29	CTRL]			93]		
30	CTRL ^			94	^		
31	CTRL _			95	_		
32	SPACE	0	20	96	/	0	60
33	!	1	21	97	a	1	61
34	"	2	22	98	b	2	62
35	#	3	23	99	c	3	63
36	\$	4	24	100	d	4	64
37	%	5	25	101	e	5	65
38	&	6	26	102	f	6	66
39	'	7	27	103	g	7	67
40	(	8	28	104	h	8	68
41	)	9	29	105	i	9	69
42	*	10		106	j	10	
43	+	11		107	k	11	
44	,	12		108	l	12	
45	-	13		109	m	13	
46	.	14		110	n	14	
47	/	15		111	o	15	
48	0	16	30	112	p	16	70
49	1	17	31	113	q	17	71
50	2	18	32	114	r	18	72
51	3	19	33	115	s	19	73
52	4	20	34	116	t	20	74
53	5	21	35	117	u	21	75
54	6	22	36	118	v	22	76
55	7	23	37	119	w	23	77
56	8		38	120	x		78
57	9		39	121	y		79
58	:			122	z		
59	;			123	{		
60	<			124	}		
61	=			125	~		
62	>			126	DEL		
63	?			127			



HI-1094

Appendix F

sprint Operation - - - - - Functions

FUNCTION	KEY STROKE (S)	HALF DUPLEX			FULL DUPLEX	
		CHAR (S) SENT	DO FUNCTION WHEN KEYED	DO FUNCTION WHEN RECEIVED	CHAR (S) SENT	DO FUNCTION WHEN RECEIVED
Direct Cursor Address	~ ^c Q	~ DC1	Yes	Yes	~ DC1	Yes
Read Cursor Address	~ ^c E	~ ENQ	No	Yes ²	~ ENQ	Yes ²
Home Cursor	^s HOME	No	Yes	If preceded by ~	~ DC2	Yes
Up Cursor	^s LINE FEED or ↑	No	Yes	If preceded by ~	~ FF	Yes
Down Cursor	~ ^c K	~ VT NO	Yes Yes	Yes if preceded by ~	~ VT ~ VT	Yes Yes
Left Cursor a) b)	← BACK SPACE	No BS	Yes Yes	Yes Yes	BS BS	Yes Yes
Right Cursor a) b)	→ ^s BACK SPACE	No DLE	Yes Yes	Yes Yes	DLE DLE	Yes Yes
Foreground Tab	TAB	HT	Yes	Yes	HT	Yes
Clear Screen	^c [CLEAR]	No	Yes	If preceded by ~	~ FS	Yes
Set Background	~ ^c Y	~ EM	Yes	Yes	~ EM	Yes
Set Foreground	~ ^c -	~ US	Yes	Yes	~ US	Yes
Audible Alarm	^c G	BEL	Yes	Yes	BEL	Yes
Keyboard Lock	~ ^c U	~ NAK	Yes	Yes	~ NAK	Yes
Keyboard Unlock	~ ^c F	~ ACK		Yes	~ ACK	Yes
Delete Line	^s DEL LINE INS	No	Yes	Yes	~ DC3	Yes
Insert Line	DEL LINE INS	No	Yes	Yes	~ SUB	Yes
Clear to end-of-line	^c FGD CLEAR FLD	No	Yes	If preceded by ~	~ SI	Yes
Clear to end-of-screen	^{cs} FGD CLEAR FLD	No	Yes	If preceded by ~	~ CA	Yes
Clear Foreground	^s FGD CLEAR FLD	No	Yes	If preceded by ~	~ GS	Yes
Clear to end-of screen (back-ground)	~ ^c W	~ ETB	Yes	If preceded by ~	~ ETB	Yes
Clear Field	FGD CLEAR FLD	No	Yes	If preceded by ~	~ SYN	Yes



HI-1094

Appendix G

Summary of Numeric Cluster Function Key Modes The numeric cluster Keys can be commanded to act as function key and will transmit a sequence of codes according to the following table:

KEYSTROKE	MODE 1 (LI, ;)	MODE 2 (LI, <)	MODE 3 (LI, =)
0	LI 0	STX 0 CR	LI ? p
1	LI 1	STX 1 CR	LI ? q
2	LI 2	STX 2 CR	LI ? r
3	LI 3	STX 3 CR	LI ? s
4	LI 4	STX 4 CR	LI ? t
5	LI 5	STX 5 CR	LI ? u
6	LI 6	STX 6 CR	LI ? v
7	LI 7	STX 7 CR	LI ? w
8	LI 8	STX 8 CR	LI ? x
9	LI 9	STX 9 CR	LI ? y
.	LI .	STX . CR	LI ? n
,	LI ,	STX, CR	LI ? l
-			LI ? m
ENTER			LI ? M

NOTE: a. Lead-in (LI) code can be either ESC or ~ in Hazeltine mode. When Regent 25 or ADM-3A is emulated, Lead-in (LI) code can be ESC only.

b. Mode 3 in not available in ADM-3A emulation.

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