

**DATAMEDIA ELITE 3052
VIDEO TERMINAL
OPERATOR'S HANDBOOK**



**Datamedia
Corporation**

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SECTION I

GENERAL DESCRIPTION

A. INTRODUCTION

We are pleased that you have chosen the Elite 3052 Video Terminal.

Your new terminal has many convenient features, and is surprisingly easy to operate. This handbook will acquaint you with your new terminal's features and assist you in operating, maintaining and programming it.

The handbook is organized into five separate sections. Section I presents general introductory information, highlights some of the many outstanding features of your Elite 3052, and provides a comprehensive list of the terminal's technical specifications. Section II of the handbook provides the information necessary for installing the terminal. This includes: a step-by-step check-out procedure, a description of the electrical interface characteristics, and guidelines to follow in the event of a malfunction. Section III consists of instructions for the terminal operator. Section IV explains the various hardware options that are built into the terminal. Section V contains all the information that might be needed by the software programmer to successfully interface with the Elite 3052.

B. EQUIPMENT FEATURES

The Elite 3052 is a buffered Teletype® compatible CRT terminal with a single-page video memory that displays 1920 alphanumeric characters in a 24 line x 80 character format. The stand-alone terminal contains an alphanumeric display, keyboard (which is separated from the display unit for applications flexibility), storage, control logic and asynchronous communications interface.

Display

The display may be enhanced by reverse video, half-intensity, and/or blink fields in eight levels on a per character selection basis. No memory address space is used to support character attributes.

Editing

Editing features in this Video Display Unit (VDU) include Clear Screen, Erase to End of Page, Erase to End of Line, Cursor Up, Down, Left, Right, Home, Typeover, Absolute Cursor Addressing/Sensing, and Insert/Delete (character and line).

Communications

Designed for interactive applications, data entry, information retrieval or any related data communications requirements; the new VDU accommodates a standard RS232 or optional 20mA current loop interface. Transmit, Receive and Printer speed may be individually selected.

®Teletype is a trademark of Teletype Corporation.

Cursor

The cursor is a non-destructive, blinking or non-blinking underscore and fully addressable on a Y-X coordinate basis. Cursor read and horizontal tabulation (both forward and back) are also provided.

Printer Controller

Printer Controller mode permits the terminal to be used as a baud rate changer between the host computer and a printer.

Auto Copy

When the terminal is in Auto Copy mode the line that the cursor is on will be automatically formatted and output to the printer each time a (LF) is either received from the host or typed at the keyboard.

Hold Screen

Allows the operator to control the rate at which data from the host appears on the screen. Prevents data from being lost before the operator has had time to examine it.

CRT Time-Out

The transmit and receive lines are monitored for the purpose of shutting off the CRT display after 5 minutes of no activity by either the terminal or host. This greatly increases the life of the CRT. The display will return immediately with activity at either the keyboard or receive line. Depress the ALT MODE key and the display will return with no change to the display.

C. TECHNICAL SPECIFICATIONS

Screen Capacity: 1920 characters
Screen Type/Size: P4 white, 12 inch
Screen Filter: Gray or Green
Characters per Line: 80
Lines of Display: Up to 24
Character Generation: 5 x 9 dot matrix
Character Set: Full ASCII, Upper/Lower Case; 128 Codes Stored
Refresh Rates: 50 or 60 Hz
Data Rates: 50 to 9600 bps
Memory Type: MOS
Keyboard: Electronic, typewriter layout with numeric cluster and cursor controls; remote keyboard lock; 10 program function keys
Cursor: Addressable Y-X coordinates; non-destructive, blink/non-blink; up, down, right, left and home; read cursor address.
Key Controls: Xmit Page, Xmit Line, Erase to End of Line, Erase to End of Screen, Master Reset, Print, Roll, Ins/Del, Tab, Back Tab.
Split Screen: Protected Format; Variable Field; Tabbing Horizontal and Vertical; Forward and Back Tab.
Attributes: Eight levels of video enhancement including Reverse Video, Dual Intensity and Blink.
Operating Modes: Local, On Line, On Line with Local Copy, Format, Format (Modified) and Tape (Transparent).
Functional Modes: Insert/Delete, Printer Controller, Hold Screen and Auto Copy.
Push Button Mode Controls: Format, On Line, Local Copy, Tape, EIA/Current Loop and Reset.

Indicators: LED Lamps for Clear to Send, Carrier Detect, Auto Copy, Hold Screen, Printer Controller and Insert/Delete.
Alarm: Audible Alarm ON code or eight characters from end of the line; level adjustable.
Line Interface: RS232, 20mA Current Loop (Optional).
Printer Interface: Independent printer output; speed pre-selectable; local copy capability; printer controlled by host via VDU capability; RS232.
Video Output: Provisions to drive up to 16 external monitors.
Speed: Bits/Second 50 to 9600; 15 standard rates selectable via keyboard; data rate may be displayed on screen.
Power: 100/125V, 50/60Hz, 100 Watt 200/250V, 50/60Hz, 100 Watts
Operating Environment: +10°C to +40°C (+50°F to +100°F); Humidity 10% to 80% (non-condensing).

Dimensions:

Video Display Unit

Depth	14.50 in.	(36.94 cm)
Height	16.00 in.	(40.64 cm)
Width	14.00 in.	(35.56 cm)
Weight	34 lbs.	(15.42 kg)

Keyboard

Depth	8.12 in.	(20.62 cm)
Height	3.75 in.	(9.53 cm)
Width	18.00 in.	(45.72 cm)
Weight	7.16 lbs.	(3.25 kg)

SECTION II

INSTALLATION

A. INTRODUCTION

This section of the handbook begins by offering guidelines to assist you in unpacking and installing the terminal. This is followed by a preliminary check-out procedure that is designed to give the user confidence that the terminal is operational. Next, the electrical characteristics necessary for interfacing with other devices in your system are given. Then an explanation of how to set the transmit, receive and printer baud rates is given. Finally, a section on troubleshooting that will help the user localize the cause of malfunctions is included.

B. UNPACKING

1. Visually inspect the shipping container for signs of damage before opening. If there is any evidence of damage report it to the carrier and notify Datamedia Corporation immediately.
2. Remove terminal from shipping container.
3. Visually inspect unit for damage. If damage is found, file a claim against the carrier and notify Datamedia Corporation immediately.

Included with your new Datamedia Elite 3052 Video Terminal are the following items:

- VDU (Video Display Unit)
- Keyboard with attached cable for mating with the KEYBOARD jack in the rear of VDU
- Operator's Handbook

C. HOOK-UP

1. Connect Keyboard cable plug to KEYBOARD jack in rear of VDU.
2. Connect power cord plug to standard 115 VAC grounded wall outlet. (When specified, use 230 VAC).
3. Operate POWER switch (item 1, in Section III-B, Figure 3-1) to the on position, and allow a two minute warm-up period.
4. Look for the cursor; if not visible, adjust BRIGHTNESS and CONTRAST controls (items 15 and 16 in Figure 3-1) in the following manner:
 - a. Operate BRIGHTNESS control in the clockwise direction to obtain a visible raster.
 - b. Operate the CONTRAST control to find the cursor.
 - c. Reduce brightness and contrast to preferred levels.

D. PRELIMINARY CHECK-OUT PROCEDURE

The following procedure checks the more important features of the Elite 3052 Video Terminal.

1. Secure test configuration by setting the five switches, shown in Figure 3-1 (page 3-1) as Items 8 through 12, to the out position, and Item 13 (EIA) to the in position. Then depress the RESET switch (Item 14)."
2. Set the ALPHA-LOCK key on the left side of the keyboard to the up (off) position.
3. Type a grouping of shifted and unshifted characters and observe display on CRT.
4. Depress ALPHA-LOCK key and it will lock in the on-position. Repeat 3. above and observe that characters are displayed in upper case only (shifting of the number group is still controlled by the SHIFT key).
5. Type MR (Master Reset) key on the keyboard and observe that the CRT is cleared and the cursor is returned to the Home position (upper left).
6. Hold down the CTRL (Control) key on the left side of the keyboard and type the letter "G" key. Nothing will be displayed on the CRT, but the BELL (Audible Alarm) on the right side of the keyboard assembly will sound. If the BELL does not sound, operate the control knob located just forward of the Audible Alarm on the right side of the keyboard assembly in the clockwise direction.
7. Place characters on the first 3 or 4 rows of the display. Characters may be repeatedly entered by simultaneously depressing the REPEAT key and the desired character key.
8. Depress the HOME key and observe that the cursor is positioned to the top left position on the CRT.
9. Depress the INS/DEL key and observe that the INS/DEL lamp on the front of the VDU is lit.
10. Depress the ↓ (Cursor Down) key and observe that each depression moves all characters down the screen one row position.
11. Depress ↑ (Up Cursor) key repeatedly until a row of characters has been returned to the top row.
12. Depress → (Cursor Right) key and observe that characters on the top row move to the right for each depression of this key.
13. Depress ← (Cursor Left) key and observe that characters move to the left for each depression of this key.

This completes the preliminary check-out of the terminal.

E. INSTALLATION

Whenever either the terminals power is turned on or the RESET switch on the front of the VDU is pushed, the data rates for the receiver, transmitter and printer interfaces are automatically set to a value that is predetermined by the state of bit switches on the logic P.C. Board inside the VDU. Section IV-B gives the switch settings for the various baud rates available.

Below is a procedure that may be followed when it is desired to check the terminals baud rates. How they can be temporarily altered is also explained.

1. To check the baud rates (Transmit Baud Rate, Receive Baud Rate and Printer Baud Rate), hold down the SHIFT key while depressing the ALT MODE key. The following display will appear in the next to last row of the CRT display:

R=XXXX T=XXXX P=XXXX

(Where R=Receive, T=Transmit, P=Printer and XXXX equals a two, three or four digit word which indicates the particular baud rates to which the terminal is presently set.)

TO CHANGE RECEIVE BAUD RATE	It is possible for the operator to change the baud rate for the Receive line by typing "R" followed by "=" (equals) then the numerical value of the desired baud rate. To be valid, the baud rate selected must be one of those listed in Table 4-1. Then depress the RETURN key and the display described above will change to indicate the new value.
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CHANGE TRANSMIT BAUD RATE	The Transmit baud rate may be changed in exactly the same manner as described above for the Receiver baud rate by simply replacing the "R" with "T".
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TO CHANGE BOTH BAUD RATES	The Receiver and Transmit baud rates may be changed simultaneously by typing an "L" in place of the "R" and "T" and proceeding as described above.
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TO CHANGE PRINTER BAUD RATE	The baud rate of the terminals output to the Printer may be changed by typing "P" in place of the "R", "T" and "L" and proceeding as described above.
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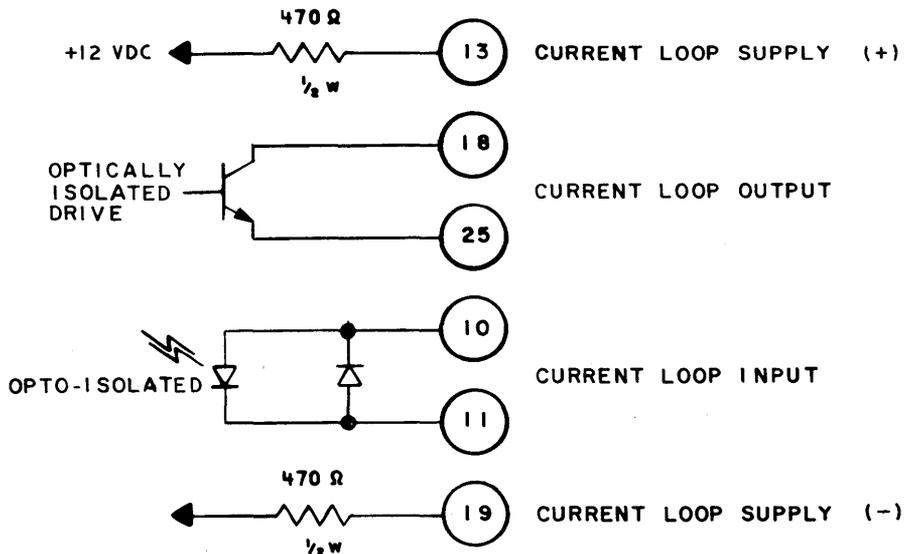
Once it has been determined that the baud rates are correct, the terminal may be connected to the other devices in your system and placed on-line.

2. Connect the EIA, RS232 cable from the host computer or modem to the LINE interface connector at the rear of the VDU. The following table (Table 2-1) lists the pin assignments for the LINE connector.

Pin No.	Signal Name	Bell System Code
1	Frame Ground	AA
2	Transmit Data	BA
3	Receive Data	BB
4	Request to Send	CA
5	Clear To Send	CB
6	Data Set Ready	CC
7	Signal Ground	AB
8	Carrier On	CF
10	Current Loop Input +	
11	Current Loop Input - RX	
13	Current Loop Supply +	
15	Transmission Signal Element Timing (DCE Source)	DB
17	Receiver Signal Element Timing (DCE Source)	DD
18	Current Loop Output +	
19	Current Loop Supply -	
20	Data Terminal Ready	CD
25	Current Loop Output - TX	

**Table 2-1
LINE JACK PIN ASSIGNMENTS**

Figure 2-1 is a schematic diagram of the Current Loop Interface available at the LINE connector. There are several ways in which the circuits shown in Figure 2-1 may be used. Figure 2-2 is an example of just one of these ways. The actual wiring used will depend on the specific application.



**Figure 2-1
SCHEMATIC OF LINE JACK PIN ASSIGNMENTS**

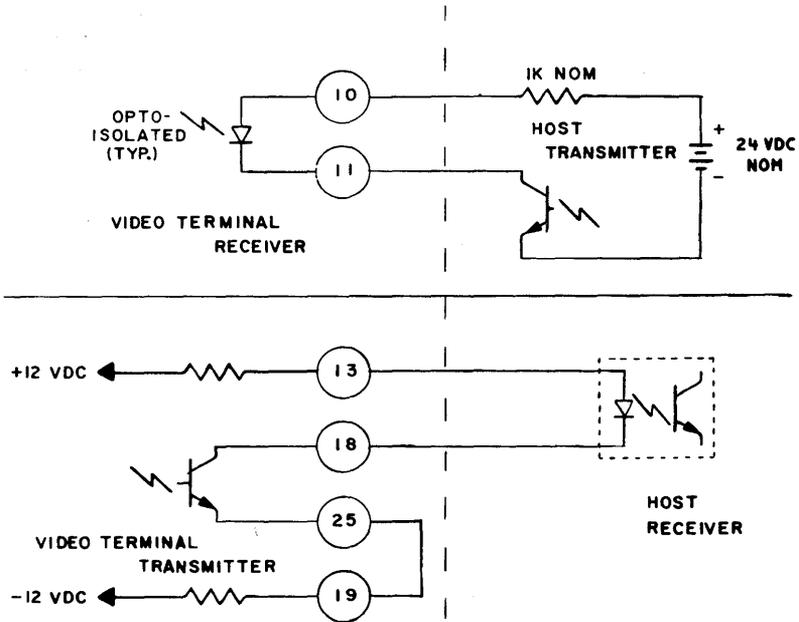


Figure 2-2
EXAMPLE OF LINE CONNECTOR USAGE

If your application requires that the Elite 3052 be interfaced with a printer, connect the EIA cable from the device to the jack marked PRINTER at the rear of the VDU. The signal-pin assignments for the PRINTER jack are specified in Table 2-2.

Pin No.	Signal Name
1	Frame Ground
3	Data Output
6	Data Set Ready (1K to +12 VDC)
7	Signal Ground
8	Carrier Detect (1K to +12 VDC)
18	(+)
&	20mA Active Current Loop
25	(-)

Table 2-2
PRINTER JACK PIN ASSIGNMENTS

The schematic diagram shown in Figure 2-3 below is an example of how the Printer Output Current Loop may be used. A strap change is required to use this circuit. (See Section IV, "Hardware Programming").

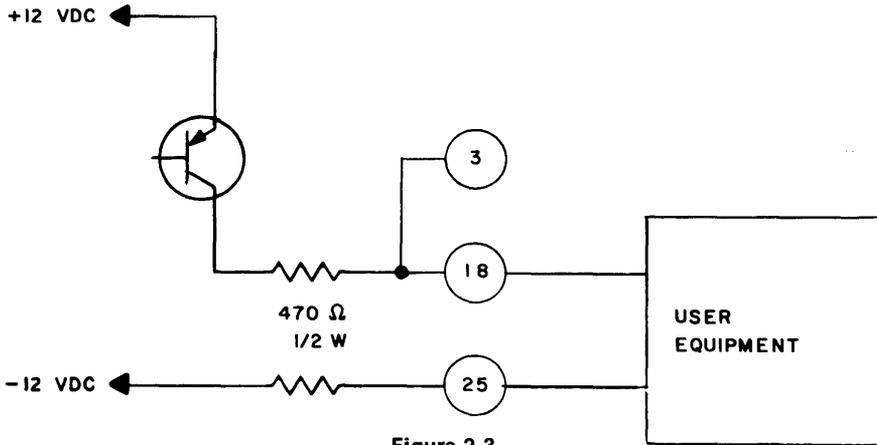


Figure 2-3
PRINTER OUTPUT CURRENT LOOP

F. TROUBLESHOOTING

The Elite 3052 is a highly reliable device. Improper terminal operation can usually be rectified by going over the following checklist:

1. Inspect AC input: Insure that the AC plug is firmly seated in the AC receptacle and that the POWER SWITCH (item 1 in Figure 3-1) is in the on-position.
2. Check CRT control settings: Rotate the BRIGHTNESS control to obtain a visible raster, then rotate the CONTRAST control to obtain a visible cursor.
3. Inspect the keyboard connection: Insure that the connector is firmly seated in the KEYBOARD jack.
4. Inspect line connection: Insure that the connector is firmly seated in the LINE jack.
5. Repeat the Preliminary Check-Out Procedure.
6. If you are unable to obtain proper terminal operation, contact Datamedia Corporation or your local Sales/Service representative, whichever is most convenient.

SECTION III

OPERATING INSTRUCTIONS

A. INTRODUCTION

This section is intended for use by the terminal operator, as a quick reference. Sub-section B gives a brief description of the switches and indicators (light emitting diodes, LED), that are located on the VDU. Sub-section C gives a brief description of the various groups of keys on the keyboard. Wherever it is appropriate a reference is given to indicate where (in Section V, "Programming Reference") more detailed information may be found.

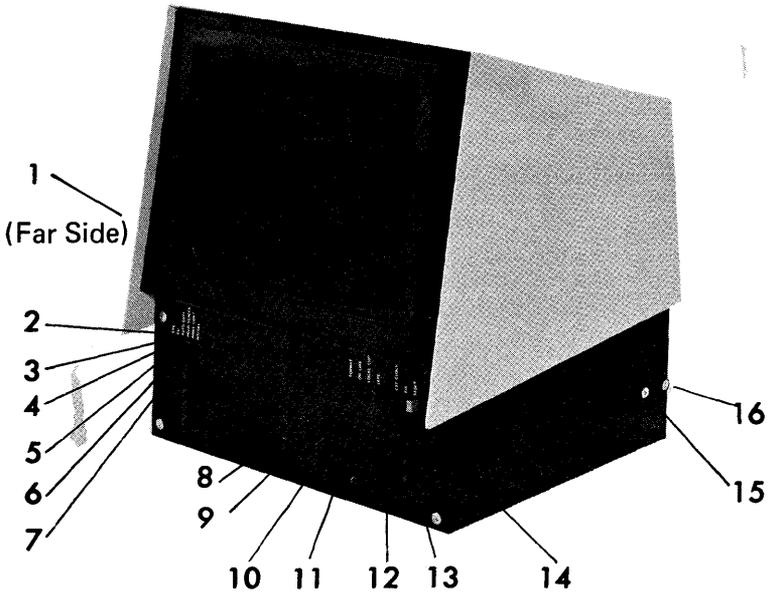


Figure 3-1
VDU SWITCHES AND INDICATORS

B. VDU SWITCHES AND INDICATORS

There are eight single action type switches and four LED's (Light Emitting Diodes) on the front of the VDU (Video Display Unit). In addition to these there are two control knobs on the right side of the VDU and a power switch on the left side. The items described in this sub-section are arranged according to numerical sequence as they appear in Figure 3-1:

Item 1

ON/OFF

Pushing the top of this switch applies AC source voltage to the terminals power supply. Pushing the bottom removes the AC source.

Item 2

CTS

Goes on whenever the host raises the clear to send signal, permitting the terminal to transmit data to the host.

Item 3

CD

This LED goes on to indicate that carrier detect control signal is present at the EIA interface.

Item 4

AUTO COPY

Goes on to indicate that the terminal is in Auto Copy mode. (See Section V-B, AUTO COPY ON).

Item 5

HOLD SCREEN

Goes on to indicate that the terminal is in the Hold Screen mode. (See Section V-B, HOLD SCREEN ON).

Item 6

PRINT CONT

Goes on to indicate that the terminal is in the Printer controller mode. (See Section V-B, PRINT CONT ON).

Item 7

INS/DEL

Goes on to indicate that the terminal is in the Insert/Delete mode. (See Section V-B, INSERT/DELETE ON).

Item 8

FORMAT

Is used to put the terminal in Format Mode. To use this switch, push to set (in-position) then push the RESET switch (item 14). (See Section V-E, Format Mode).

Item 9

ON LINE

This switch is used when putting the terminal in three of the five Operating Modes:

1. **ON-LINE:** To put the terminal in On-Line Mode, set Item 9 to the in-position. (See Section V-D, Operating Modes.)

2. ON-LINE WITH LOCAL COPY: To put the terminal in this mode, set Items 9 and 10 to the in-position. (See Section V-D, Operating Modes).
3. FORMAT MODE (MODIFIED): To put the terminal in this mode, set Item 9 and the Format switch (Item 8) to the in-position and depress RESET (Item 14). (See Section V-E, Format Mode).

Item 10
LOCAL COPY

This switch is used in combination with the On Line switch (Item 9) to put the terminal in the On Line With Local Copy Mode. (See Item 9 above and Section V-D, On Line Mode With Local Copy).

Item 11
TAPE

Enables the operator to put the VDU in Tape Mode, (Transparent). To use, push to set. (See Section V-D, TAPE MODE).

Item 12
EXT CLOCK

Not used. Must be set to out-position.

Item 13
EIA

Push to set when operating through the EIA interface, and push to release when operating via the current loop.

Item 14
RESET

This switch is used to: (1) reset the baud rates to those specified by bit switches inside the VDU, (See Section IV-B); (2) clear the CRT screen; (3) put the terminal into or out of the Format operating mode as defined by the FORMAT and ON-LINE switches (Items 8 and 9); and (4) place the cursor in the Home position (upper left).

Item 15
BRIGHTNESS

Turn clockwise to increase the brightness of the CRT display and counter-clockwise to decrease.

Item 16
CONTRAST

Use to vary the relative brightness of the normal brightness characters and any that may be displayed in DIM brightness.

C. KEYBOARD DESCRIPTION

Group I

PF1 thru PF10
(Program Function)

These keys generate unique commands to the host computer. They are assigned functions by the systems programmer and shall be used as indicated by supervisory personnel. (See Section V-B, PROGRAM FUNCTION KEYS).

ALT MODE

Used in combination with the SHIFT key to facilitate checking the terminal baud rates and for altering them. (See Section II-E, INSTALLATION).

XMIT
(Transmit Page)

This key is depressed when it is desired to transmit the text that is displayed on the VDU screen. (See Section V-B, XMIT PAGE, and Section V-C, COMMUNICATIONS).

PF1	PF2	PF3	PF4	PF5	PF6	PF7	PF8	PF9	PF10	ALT MODE	XMIT	XMIT LINE	ERAS EOL	ERAS EOS	MR
-----	-----	-----	-----	-----	-----	-----	-----	-----	------	----------	------	-----------	----------	----------	----

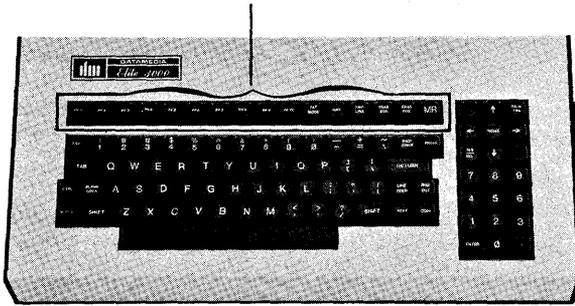


Figure 3-2
KEYBOARD KEYS — GROUP I

XMIT LINE
(Transmit Line)

This key functions the same as XMIT except that only the line that the cursor is on will be transmitted rather than the entire page. (See Section V-B, XMIT LINE and Section V-C, COMMUNICATIONS).

ERASE EOL
(Erase to End of Line)

Depressing this key will clear the current line from the cursor through the end of the line (See Section V-B, ERASE EOL).

ERASE EOS
(Erase to End of Screen)

Depressing this key will clear the screen from the current cursor location through the end of the screen, (See Section V-B, ERASE EOS).

MR (Master Reset)

Depressing this key will clear the entire screen, and return the cursor to the Home position. (See Section V-B, MASTER RESET).

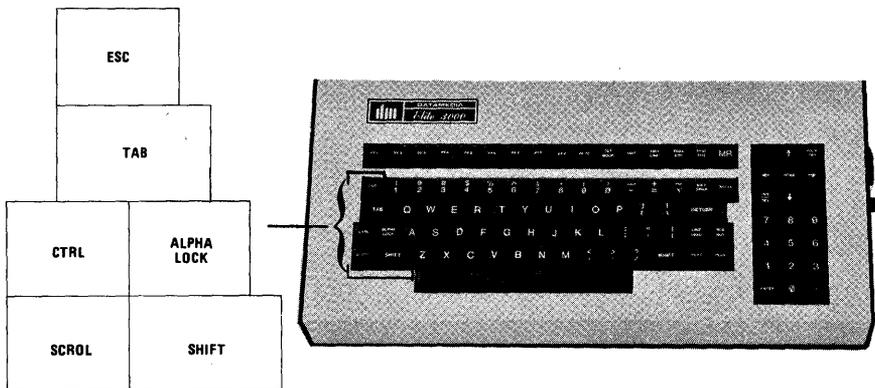


Figure 3-3
KEYBOARD KEYS — GROUP II

Group II

- ESC (Escape)** Used in combination with alphanumeric keys to develop escape sequences. The ESC key is depressed first, then the alphanumeric key. (See Section V-B, (2.), and the chart on back cover).
- TAB** Used to advance the cursor to appropriate tab stops on the CRT display. (See Section V-B, FORWARD TAB).
- CTRL (Control)** Used in combination with alphanumeric keys to generate control characters. (See Section V-B, (1.), and chart on back cover).
- ALPHA LOCK** This is a single action type keyswitch. When in the down (locked) position all alphabetic keys produce capital letters.
- SCROL** This key is used when the terminal is in the Hold Screen mode. Depressing SCROL will cause a new line of data to appear and depressing SCROL while SHIFT is held down will cause the appearance of a new page (24 lines) of data. (See Section V-B, HOLD SCREEN ON).
- SHIFT** There are two SHIFT keys on the keyboard. They are used simultaneously with alphabetic keys to produce capital letters and with double legend keys to produce the upper character.

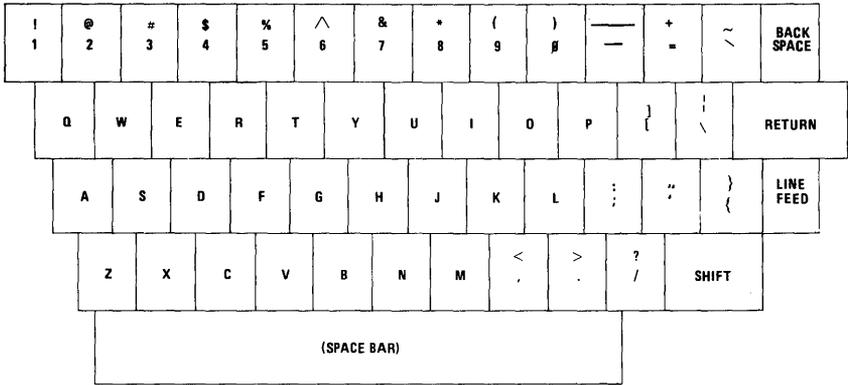


Figure 3-4
KEYBOARD KEYS — GROUP III

Group III

The keys displayed in Figure 3-4 are used to produce the character shown on the individual keycaps. They function the same as the keys on an ordinary typewriter.

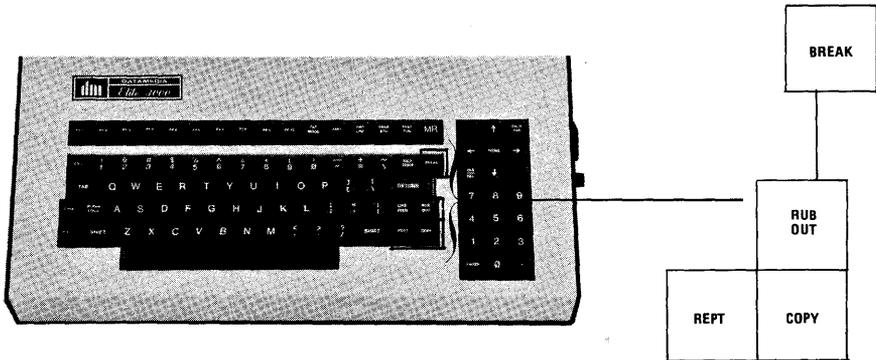


Figure 3-5
KEYBOARD KEYS — GROUP IV

Group IV

BREAK

Depressing this key while the SHIFT key is held down, sets the transmit line to space polarity, (only in On Line Mode or On Line with Local Copy).

RUB OUT

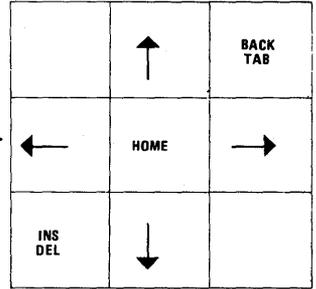
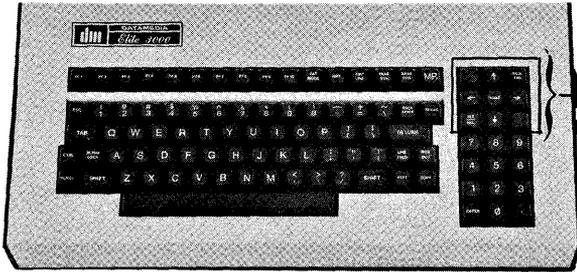
Used to send a rub-out character to the host computer.

REPT (Repeat)

Used in combination with any alphanumeric key to cause it to be continuously repeated.

COPY

Depressing this key causes the contents of the page buffer to be formatted and output to the serial printer interface. (See Section V-B, PRINT SCREEN, and chart on back cover).



**Figure 3-6
KEYBOARD KEYS — GROUP V**

Group V

BLANK KEYS

There are two blank keys on the keyboard. They have no function.

↑
(Cursor Up)

Each time this key is depressed the cursor is moved up one row position. (See Section V-B, CUR ↑, and the chart on back cover).

BACK TAB

Whenever this key is depressed the cursor is moved to the next tab stop to the left. (See Section V-B, BACK TAB, and chart on back cover.)

←
(Cursor Left)

Each time this key is depressed the cursor moves left one column. This key functions the same as the BACK SPACE. (See Section V-B, CUR ←, and chart on back cover.)

HOME

Depressing this key causes the cursor to go to the Home position, (upper left). (See Section V-B, HOME, and chart on back cover.)

→
(Cursor Right)

Each time this key is depressed the cursor moves one column to the right. (See Section V-B, CUR →, and chart on back cover.)

INS/DEL
(Insert/Delete)

Depressing this key puts the terminal in the Insert/Delete mode. To remove the terminal from this mode hold down SHIFT key and depress INS/DEL key again. (See Section V-B, INSERT/DELETE ON, and chart on back cover.)

↓
(Cursor Down)

Each time this key is depressed the cursor moves down one row. (See Section V-B, Cur ↓, and chart on back cover.)



7	8	9
4	5	6
1	2	3
ENTER	␣	.

Figure 3-7
KEYBOARD KEYS — GROUP VI

Group VI

**AUXILIARY
NUMERIC KEY
PAD**

These keys produce the same characters as the numeric keys in the alphanumeric section of the keyboard, (Group III) except they have no upper legends. They produce the same character whether the SHIFT key is held down or not.

ENTER

This key produces the same function as the RETURN key.

SECTION IV

HARDWARE PROGRAMMING

A. INTRODUCTION

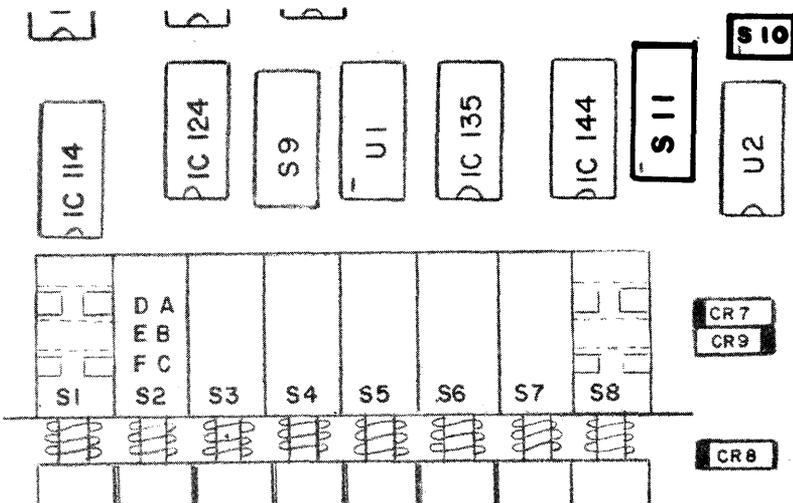
There are five areas of operation in the Elite 3052 that can be altered by hardware programming. Two of these are alterable by bit switches on the Logic P.C. Board inside the VDU and are described in Sub-section B. The remaining three are altered by solder strap options on the same P.C. Board and are described in Sub-section C.

B. BIT SWITCHES

The two areas of operation that can be altered by the bit switches are:

- Baud Rates at Power On or Reset
- Parity-Even or Mark

Figure 4-1 below shows the location of the Bit Switches on the P.C. Board.



**Figure 4-1
P.C. BOARD BIT SWITCHES**

1. Baud Rates — Whenever the terminal power is turned on or the RESET switch on the front of the VDU is depressed, the terminals transmit, receive and printer baud rates are automatically set to a predetermined value. This value is determined by the eight positions of switch S11 on the Logic P.C. Board inside the VDU. The different switch settings and the baud rates they produce are listed in Table 4-1 below. The individual baud rates (Receive, Transmit or Printer), may be temporarily altered by input from the keyboard. The method is described in detail in Section II-E.

	S11 Position				BAUD RATE
Line Interface	4	3	2	1	
Printer Interface	8	7	6	5	
	ON	ON	ON	ON	50
	ON	ON	ON	OFF	75
	ON	ON	OFF	ON	110
	ON	ON	OFF	OFF	*134.5
	ON	OFF	ON	ON	150
	ON	OFF	ON	OFF	300
	ON	OFF	OFF	ON	600
	ON	OFF	OFF	OFF	1200
	OFF	ON	ON	ON	1800
	OFF	ON	ON	OFF	2000
	OFF	ON	OFF	ON	2400
	OFF	ON	OFF	OFF	3600
	OFF	OFF	ON	ON	4800
	OFF	OFF	ON	OFF	7200
	OFF	OFF	OFF	ON	9600
	OFF	OFF	OFF	OFF	9600

*Input as 134 (not 134.5) to select this rate.

**Table 4-1
BAUD RATE SWITCH SETTINGS**

2. Parity — May be either: Even if position 1 of switch S10 is off; or Mark if position 1 of switch S10 is on.

C. SOLDER STRAP OPTIONS

The three areas of operation that can be altered by solder straps are 50/60 Hertz, blinking/non-blinking cursor, and printer interface.

1. 50/60 Hertz

50Hz	60Hz
H to F	H to J
L to K	L to M
M1 to N1	N1 to P1

2. Cursor Blink

BLINK	NON-BLINK
J1 to H1	REMOVE STRAP

3. Printer Interface

20mA	EIA
E2 to F2	E2 to D2

SECTION V

PROGRAMMING REFERENCE

A. INTRODUCTION

This section offers all the information the programmer should have to successfully interface with the Elite 3052 Video Terminal. The areas given attention are:

- Terminal Functions:
 1. Single character control functions
 2. Multiple character escape sequences
- Communications
- Operating Modes
- Format Mode
- Execution Times

B. TERMINAL FUNCTIONS

1. Single character control functions:

The ASCII codes used in Elite 3052 Video Terminal communications are shown in the code chart on the back cover of this handbook. The 32 characters shown in the two leftmost columns are designated as "control" characters. Only 5 of these control characters are used to perform actual functions in the Elite 3052, and are described below.

The remainder of the control codes are ignored by the terminal. If, however, the terminal is in Tape Mode, any control characters received from the host will be displayed with special display characters as illustrated in the chart, (See Section V-D, TAPE MODE).

Any of the 32 control codes may be generated by the keyboard. This is accomplished by holding down the CTRL key and depressing one of the 32 alphanumeric keys that correspond to the desired control code. The alphanumeric keys just mentioned are (@) through (_). These keys represent (NUL) through (US) respectively.

BELL (BEL)

Each time this character is received by the terminal the audible alarm on the right side of the keyboard assembly will sound for ¼ second. The alarm can be sounded from the keyboard by holding down the control key then depressing the upper case "G".

The Bell will also sound on the 72nd character on any given line if the keyboard is active.

← CURSOR LEFT (BS)

Each time this is received the cursor moves one column position to the left. If the cursor is in the leftmost position, no further cursor movement will occur.

**FORWARD TAB
(HT)**

The cursor will move right to the next tab stop. The new cursor location is dependent upon the terminal operating mode and whether the function is input from the host computer or from the keyboard (TAB key):

- **Host Entered Tab** — The program (host) entered tab stops are located at the fixed column addresses of 0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 73, 74, 75, 76, 77, 78 and 79 and are independent of the operating mode. The tab function will not cause the cursor to move off the current line.
- **Keyboard Entered Tab** — The keyboard entered tab is identical to the program entered tab function except when operating in Format Mode or Format Mode (Modified). (See Section V-E, FORMAT MODE). If in one of the Format modes, the cursor will advance to the first character position of the next unprotected field. If the cursor is positioned in the last unprotected field on the screen, the cursor will advance to the first unprotected location after the Home position.

LINE FEED (LF)

The Line Feed moves the cursor down one row. If the cursor is on the last row and a Line Feed is received the display will be scrolled up. This will leave the last line clear and the top line will be lost.

**CARRIAGE
RETURN (CR)**

When this character is entered the cursor will return to the first column position of the current line. When the terminal is in Format Mode the Carriage Return functions differently depending on whether it is entered from the keyboard or from the host:

- **Keyboard Entered in Format Mode:** The cursor will move to the first column position in the first unprotected field of the current line.
- **Host Entered in Format Mode with Dim Attribute On:** The cursor will write protected spaces in all unprotected locations from the cursor position to the end of the line. The cursor will then be positioned to the 1st column of the line.

2. Multiple character escape sequences:

**KYBD OFF
(ESC) (@)**

Disables the keyboard input. The operator can re-enable the keyboard by holding down the SHIFT key and typing the BREAK key.

**CUR ↑ (ESC) (A)
(Cursor Up)**

Moves the cursor up one row. If the cursor is on the top row it will not move. (This functions differently when in Insert/Delete). (See INSERT/DELETE ON, this section).

CUR ↓ (ESC) (B)
(Cursor Down)

Moves the cursor down one row. If the cursor is on the bottom line Cursor Down does nothing. (This functions differently when in Insert/Delete). (See INSERT/DELETE ON, this section.)

CUR → (ESC) (C)
(Cursor Right)

Moves the cursor one column position to the right. If the cursor is already at the last position to the right it will not move. (This functions differently when in Insert/Delete). (See INSERT/DELETE ON, this section). If the terminal is in Format Mode or Format Mode (Modified), Cursor Right will function differently depending on whether it is entered from the keyboard or the host: (See Section V-E, FORMAT MODE).

- Keyboard Entered: If in Format Mode or Format Mode (Modified) and the cursor is in the last position before a protected field, it will not go into the protected field but will jump to the first position of the next unprotected field.
- Host Entered: The movement of the cursor is not restricted by Format Mode or Format Mode (Modified).

CUR ← (ESC) (D)
(Cursor Left)

Moves the cursor one position to the left. If the cursor is already at the first position to the left it will not move. (This functions differently when in Insert/Delete). (See INSERT/DELETE ON this section). If the terminal is in Format Mode or Format Mode (Modified), its' movement is restricted from entering protected fields when entered from the keyboard as described above for the Cursor Right.

BACK TAB (ESC) (E)

The cursor will move left to the next tab stop. The new cursor location is dependent upon the terminal operating mode and whether the function is input from the host computer or from the keyboard:

- Host Entered Back Tab: Tab stops for a program entered back tab are located at the fixed column addresses of 0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 73, 74, 75, 76, 77, 78 and 79 and are independent of operating mode. The Back Tab function will not cause cursor movement off of the current line. If the host sends a Back Tab when the cursor is in column zero, the cursor will not move.
- Keyboard Entered Back Tab: The keyboard entered Back Tab is identical to the program entered Back Tab function except when operating in Format Mode or Format Mode (Modified). (See SECTION V-E, FORMAT MODE). If in one of the Format Modes the cursor will move left to the first position of the current unprotected field. If the cursor is already at the first

character position in the unprotected field, the cursor will move left to the first position of the preceding unprotected field. If the cursor is in the first character position of the first unprotected field on the screen, the Keyboard Entered Back Tab will not move the cursor.

**MODE CHANGE
(ESC) (F) VALUE**

Where VALUE defines the desired operating mode according to the following list:

MODE	VALUE
Local	0 (30 Hex)
Format	1 (31 Hex)
On Line	2 (32 Hex)
Format (Modified)	3 (33 Hex)
On Line With Local	6 (36 Hex)
Copy	

(See Section V-D for details on each of these modes).
NOTE: Tape Mode is controlled by a switch on the front of the VDU and cannot be set (on or off) by the host. (See Section V-D, TAPE MODE).

**READ CURSOR
(ESC) (G)**

The terminal will send the four character sequence (ESC) (Y) (row address plus 20 hex) (column address plus 20 hex).

- (Row Position plus 20 hex) ranges from 20 hex to 37 hex corresponding to row positions 0 through 23.
- (Column position plus 20 hex) ranges from 20 hex to 6F hex corresponding to column positions 0 through 79. (See Table 5-1.)

DEC	B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	ASCII
ROW/COLUMN ADDRESS								
1.	0	1	0	0	0	0	0	SPACE
2.	0	1	0	0	0	0	1	!
3.	0	1	0	0	0	0	1	"
4.	0	1	0	0	0	1	1	#
5.	0	1	0	0	0	1	0	\$
6.	0	1	0	0	1	0	0	%
7.	0	1	0	0	1	1	0	&
8.	0	1	0	0	1	1	1	'
9.	0	1	0	1	0	0	0	(
10.	0	1	0	1	0	0	1)
11.	0	1	0	1	0	1	0	.
12.	0	1	0	1	0	1	1	+
13.	0	1	0	1	1	0	0	,
14.	0	1	0	1	1	0	1	-
15.	0	1	0	1	1	1	0	:
16.	0	1	0	1	1	1	1	/
17.	0	1	1	0	0	0	0	0
18.	0	1	1	0	0	0	1	1
19.	0	1	1	0	0	1	0	2
20.	0	1	1	0	0	1	1	3
21.	0	1	1	0	1	0	0	4
22.	0	1	1	0	1	0	1	5
23.	0	1	1	0	1	1	0	6
24.	0	1	1	0	1	1	1	7
COLUMN ADDRESS (END OF ROW ADDRESSING)								
25.	0	1	1	1	0	0	0	8
26.	0	1	1	1	0	0	1	9
27.	0	1	1	1	0	1	0	:
28.	0	1	1	1	0	1	1	:
29.	0	1	1	1	1	0	0	<
30.	0	1	1	1	1	0	1	=
31.	0	1	1	1	1	1	0	>
32.	0	1	1	1	1	1	1	?
33.	1	0	0	0	0	0	0	@
34.	1	0	0	0	0	0	1	A
35.	1	0	0	0	0	1	0	B
36.	1	0	0	0	0	1	1	C
37.	1	0	0	0	1	0	0	D
38.	1	0	0	0	1	0	1	E
39.	1	0	0	0	1	1	0	F
40.	1	0	0	0	1	1	1	G
41.	1	0	0	1	0	0	0	H
42.	1	0	0	1	0	0	1	I
43.	1	0	0	1	0	1	0	J
44.	1	0	0	1	0	1	1	K
45.	1	0	0	1	1	0	0	L
46.	1	0	0	1	1	0	1	M
47.	1	0	0	1	1	1	0	N
48.	1	0	0	1	1	1	1	O
49.	1	0	1	0	0	0	0	P
50.	1	0	1	0	0	0	1	Q
51.	1	0	1	0	0	1	0	R
52.	1	0	1	0	0	1	1	S
53.	1	0	1	0	1	0	0	T

Table 5-1
CURSOR ADDRESS TABLE

DEC	B ₇	B ₆	B ₅	B ₄	B ₃	B ₂	B ₁	ASCII
COLUMN ADDRESS								
54.	1	0	1	0	1	0	1	U
55.	1	0	1	0	1	1	0	V
56.	1	0	1	0	1	1	1	W
57.	1	0	1	1	0	0	0	X
58.	1	0	1	1	0	0	1	Y
59.	1	0	1	1	0	1	0	Z
60.	1	0	1	1	0	1	1	[
61.	1	0	1	1	1	0	0	\
62.	1	0	1	1	1	0	1]
63.	1	0	1	1	1	1	0	^
64.	1	0	1	1	1	1	1	_
65.	1	1	0	0	0	0	0	\
66.	1	1	0	0	0	0	1	a
67.	1	1	0	0	0	1	0	b
68.	1	1	0	0	0	1	1	c
69.	1	1	0	0	1	0	0	d
70.	1	1	0	0	1	0	1	e
71.	1	1	0	0	1	1	0	f
72.	1	1	0	0	1	1	1	g
73.	1	1	0	1	0	0	0	h
74.	1	1	0	1	0	0	1	i
75.	1	1	0	1	0	1	0	j
76.	1	1	0	1	0	1	1	k
77.	1	1	0	1	1	0	0	l
78.	1	1	0	1	1	0	1	m
79.	1	1	0	1	1	1	0	n
80.	1	1	0	1	1	1	1	o

**Table 5-1 (Cont'd.)
CURSOR ADDRESS TABLE**

- HOME (ESC) (H)** The cursor will move to the first column and the first row (top left).
- REV LF (ESC) (I)** (Reverse Line Feed) Moves the cursor up one line. If the cursor is on the top line it will not move but the display will be shifted down one line unless the terminal is in Format Mode. In Format Mode and the cursor is on the top line a REV LF will have no effect.
- ERASE EOS (ESC) (J)** All unprotected characters from the current cursor position through the end of the screen are set to unprotected spaces with attribute tags set to \emptyset . Any characters input subsequent to this function will be displayed with whatever attributes were set prior to the erase.
- ERASE EOL (ESC) (K)** All unprotected characters from the cursor to the end of the current line are set to unprotected spaces with the attribute tags set to \emptyset . Any characters input subsequent to this function will be displayed with whatever attributes were set prior to the erase.
- XMIT PAGE (ESC) (L)** The contents of the display buffer are formatted and output to the communications interface. The data format is described in Section V-C, Communications.

**MASTER RESET
(ESC) (M)**

The terminal state following a Master Reset (MR) command is as follows:

- Cursor at Home position (upper left)
- Screen cleared to spaces,
- Keyboard on,
- Insert/Delete off,
- Attributes set to \emptyset unless the terminal is in Format Mode and the DIM attribute is on and the host entered data is displayed on the screen in half-intensity,
- Hold Screen mode off,
- Auto copy mode off

**ATTRIBUTE
CHANGE (ESC) (O)
(VALUE)**

Where VALUE defines the attributes according to Table 5-2.

Attributes			Value (Hex)
Blink	Dim	Reverse Video	
			30
		*	31
	*		32
	*	*	33
*			34
*		*	35
*	*		36
*	*	*	37

**Table 5-2
ATTRIBUTE CHANGE VALUES**

**INSERT/DELETE
ON (ESC) (P)**

Places the terminal in the Insert/Delete mode. This mode permits the operator to:

- (1) Insert characters.
- (2) Delete characters.
- (3) Insert lines.
- (4) Delete lines.

Any of these operations can be performed by first positioning the cursor at the location in the text where the operation is desired then putting the terminal in the Insert/Delete mode by either depressing the INS/DEL key or sending the escape sequence (ESC) (P) from the host to the terminal. Each of the four operations can then be performed as described below.

- **Insert Characters:** Characters, or spaces, are inserted at the cursor location by simply typing the desired character, or space, or by transmitting it from the host. Each time a character, or space, is inserted the cursor and all text to the right, moves right one column position. Whatever attributes the terminal is set for will be appended to the inserted character or space.

- **Delete Character:** The character at the cursor location will be deleted and all characters to the right of the cursor will be shifted left one position. The operation terminates at a protected character or at the end of the line. The right most character on the line (field) is set to a space with the current state of the attributes appended to it.

To use this feature, place the cursor under the character to be deleted, then set Insert/Delete on. Each execution of the Cursor Left command will delete a character as described above.

- **Insert Line:** A blank line with attributes set to \emptyset will be inserted on the line containing the cursor. The text on the line containing the cursor and all lines below it will be shifted down the screen by one line. The last line on the screen will be deleted.

To use this function, place the cursor on the line where the insertion is desired. Then set Insert/Delete on. Each execution of the Down Cursor (or Line Feed) command will insert a line as described above. NOTE: Insert Line will not function if the terminal is in Format Mode.

- **Delete Line:** The text at the line containing the cursor will be deleted. The text on all lines below this line will be shifted up one line. The last line of the display will be set to spaces with attributes set to \emptyset .

To use this function, place the cursor on the line to be deleted. Then set Insert/Delete on. Each execution of the Up Cursor command will delete a line as described above.

NOTE: Delete line will not function if the terminal is in Format Mode.

**INSERT/DELETE
OFF (ESC) (Q)**

Cancels Insert/Delete mode.

**SEND FUNCTION
KEY (ESC) (S)**

If the operating mode of the terminal is Format Mode Modified), the ten Program Function keys will not produce the codes specified by the Code Chart on the back cover. Instead, an (ENQ) character will be output. The host should respond with the SEND FUNCTION KEY sequence (ESC S). The terminal will then output the appropriate code according to which one of the ten Program Function keys was depressed. (See PROGRAM FUNCTION KEYS, this section.)

**XMIT LINE
(ESC) (T)**

The line at the cursor "Y" location is formatted and output. The format is identical to XMIT PAGE except that only one line is output. The line is output beginning at column \emptyset , regardless of where on the line the cursor is. The end of the transmission is

indicated by a (CR) character. The cursor is returned to its original position before the transmission was initiated. (See Section V-C Communications, for data format.)

KEYBOARD ON
(ESC) (U)

Enables keyboard input.

PRINT LINE
(ESC) (V)

The line that the cursor is on will be formatted and output to the printer. (See Section V-C Communications, for data format.)

PRINT CONT ON
(ESC) (W)

This sequence puts the terminal in the Printer Controller mode. In this mode the terminal functions as a baud rate changer between the host and the printer. For example, if the host is operating at 9600 baud and the printer is running at 50 baud the host can communicate directly to the printer, via the terminal, simply by placing the terminal in Printer Controller mode. The terminals' three baud rates must be set to appropriate values. In this case the terminals' baud rates would be:

Printer Baud Rate — 50 bps

Receiver Baud Rate — 9600 bps

The Transmit Baud Rate of the terminal will, in most cases, be set at the same rate as the receiver, but must be adjusted to accommodate the host. The host must be programmed to respond to XMIT OFF (DC3) and XMIT ON (DC1) codes to prevent data from being lost.

PRINT CONT OFF
(ESC) (X)

Takes the terminal out of the Printer Controller mode.

CUR Y-X
(ESC) (Y)

The (ESC) (Y) is followed by two more characters that are capable of placing the cursor anywhere on the screen. The format is the same as for the Read Cursor (ESC G) sequence, in that the third character represents the Y (row) position and the fourth character represents the X (column) position. The Y and X position characters must both be offset by 20 hex to place them above the Control Code characters.

- The (Y position plus 20 hex) character ranges from 20 hex to 37 hex corresponding to row positions 0 through 23 respectively.
- The (X position plus 20 hex) character ranges from 20 hex to 6F hex, corresponding to column positions 0 through 79 respectively. (See Table 5-1.)
- If the value that is given for the row address is out of range (greater than 37 hex) the cursor will remain on the same line. This can be useful when only column (Y) addressing is desired. (This may help to simplify Host Software.)

- If the value that is given for the column (X) address is out of range (greater than 6F hex) the cursor will return to column 0 (left most column).

IDENT (ESC) (Z)

When the terminal receives this ESC sequence, it will respond with the sequence (ESC) (/) (L).

HOLD SCREEN ON (ESC) ([)

This puts the terminal in the Hold Screen mode which is intended for the user who wishes to scan through data that exceeds the page size of the VDU screen, (24 lines). Data input to the screen is disabled and the terminal sends XMIT OFF (DC3) to the host when either: (1) a Line Feed (LF) is received with the cursor on the bottom line; or (2) a Reverse Line Feed (ESC I) is received with the cursor on the top line. A new line of data can be input by depressing the SCROL key. This will cause the terminal to send XMIT ON (DC1) to the host and enable input to the screen. The next (LF) or (ESC I), depending on whether the cursor is on the bottom line or the top line, will once again disable input to the screen and cause XMIT OFF (DC3) to be sent to the host. Holding down the SHIFT key while depressing the SCROL key will permit an entire new page of up to 24 lines to be input before XMIT OFF is sent again. Any characters received after XMIT OFF is sent will be placed in the terminals receive FIFO, up to a maximum of 128 characters. None of the characters stored in the FIFO will be displayed or executed until they are removed from the FIFO by the operator depressing the SCROL key or SHIFT and SCROL key as described above.

- Hold Screen mode will not function properly if the terminal is in Format Mode or Format Mode (Modified).

HOLD SCREEN OFF (ESC) (\)

Tells the terminal to exit Hold Screen mode.

PRINT SCREEN (ESC) (])

Causes the terminal to send the contents of the page buffer to the printer. The Data Format is described in Section V-C, Communications.

AUTO COPY ON (ESC) (^)

With the terminal in Auto Copy mode the contents of the line the cursor is on is sent to the printer each time a Line Feed is either received from the host or typed at the keyboard.

- If, while in this mode, the host sends a CUR Y-X (ESC) (Y) (VALUE) (VALUE) command sequence the terminal will send the line the cursor was on through the line just above the new cursor position. If the cursor Y (VALUE) is out of range, no print will occur.
- The terminal will send X OFF to the host at the beginning of the print operation and X ON at the end. The host must support these so that no data is lost.

- The terminal will alternately enter and exit Auto Copy mode each time the COPY key is depressed while the SHIFT key is held down.
- Section V-C Communications gives a description of the Data Format to the printer.

AUTO COPY
OFF (ESC) (—)

Takes the terminal out of Auto Copy mode.

PROGRAM
FUNCTION
KEYS (PF1-PF10)

The escape sequences of (ESC) (?) then (p), (q), (r), (s), (t), (u), (v), (w), (x), and (y), are generated by the PF1 through PF10 keys respectively. Program Function Keys are usually used for requesting special data or programs. Their particular meaning is specified by the software.

- When the terminal is in Format Mode (Modified) the Program Function Keys will output (ENQ) only, rather than an escape sequence. (See Section V-E.)

C. COMMUNICATIONS

General

The Elite 3052 Data Terminal is designed to communicate with both a host computer and a hard copy device (printer).

Communications between the terminal and the host computer is accomplished via a Full Duplex, RS232 compatible interface. The terminal supports:

- a) conversational mode (character-by-character) communications in On Line Mode and On Line Mode With Local copy, and
- b) batch mode communications in Format Mode and Format Mode (Modified).

Terminal communications to the printer is via an RS232 compatible interface.

The data rate at each of these interfaces is independently selectable. In all, there are fifteen different data rates available, ranging from 50 bps to 9600 bps. (Sections 2-E and 4-B give further details.)

Data Format

Whenever the terminal is transmitting, (either a full page or just a line), each line of data is treated as an individual logical unit. This permits certain control characters to be introduced into the data stream at appropriate points. The data format is as follows:

Host Interface:

1. A (GS) character is introduced to indicate the end of each line.
2. A (CR) character is used to mark the end of the last line of transmission.
3. The data that is in protected fields is not transmitted. Instead, an (FS) character is introduced to indicate its' location. Protected fields are created

by host entered data when the terminal is in Format Mode or Format Mode (Modified), and the DIM attribute is on.

4. The last line to be transmitted will be the last line that contains unprotected data.

Printer Interface:

1. All displayed data is transmitted; this includes the contents of protected fields.
2. (CR) (LF) and ten (Rubouts) is placed at the end of each line of data. The (Rubouts) are used as pads to allow for the slower speed of a mechanical printer.
3. The last line sent to the printer will be the last line containing data.

Both of the data transmission formats just described incorporate "Redundant Space Suppression". This means that anytime trailing spaces are encountered, either at the end of a line or at the end of a field, only the first space is transmitted and the rest are suppressed.

Line Signals

The terminal will initiate transmission to the host only when the CTS (Clear to Send) signal is high. If the host does not provide the CTS signal, it may be obtained by strapping it to RTS (Request to Send) at the terminals interface connector. In the Elite 3052 the RTS signal is always on.

The CD (Carrier Detect) signal is used as an indicator to show the presence of a carrier detect control signal at the EIA interface.

Dynamic Buffer Allocation

The Elite 3052 Video Terminal is able to operate in a software environment using either dedicated buffers or dynamically allocated buffers. Dynamic buffer allocation is supported in Format Mode (Modified) only. In this mode the three transmit functions (XMIT, XMIT LINE, and PF1-PF10) generate the codes shown in the following table, rather than their normal operation.

Keyswitch	Transmitted Character	Expected Response
XMIT	DC2	ESC L
XMIT LINE	DC4	ESC T
PF1-PF10	ENQ	ESC S

Anytime one of the transmit function keys is depressed, and the terminal is in Format Mode (Modified), the keyboard is automatically locked-out until one of the transmit operations has been completed. Although the table above indicates that there is a particular response expected, in fact, the actual response may vary as follows:

- (ESC L) will initiate a transmit page operation in response to either of the transmit keys.
- (ESC T) will initiate a transmit line operation in response to either of the transmit keys.
- (ESC S) is an appropriate response to PF1-PF10 keys only.

If either the XMIT key or the XMIT LINE key is depressed and the host responds with (ESC S) the terminal will ignore it, and the keyboard will remain locked-out. If necessary, the operator may unlock the keyboard by depressing the (BREAK) key while holding down the (SHIFT) key.

Format Mode, On Line Mode and On Line Mode With Local Copy must be supported by dedicated buffers.

D. OPERATING MODES

The Elite 3052 has (5) Operating Modes in addition to Tape (Transparent) Mode. The terminal can be put in any of these (5) Modes by the operator or the host. Tape Mode however, is available only by setting the TAPE switch on the front of the VDU to the in-position.

LOCAL MODE

In this mode the terminals receiver is inactive. The terminals transmitter is also inactive until the operator depresses:

1. The XMIT key,
2. The XMIT LINE key.

- The front panel switch settings for Local Mode are:
FORMAT — OUT
ON LINE — OUT
LOCAL COPY — OUT
- The escape sequence to put the terminal in this mode is: (ESC) (F) (30 hex)

ON LINE

In this mode the keyboard is used to transmit to the host as typing occurs, character-by-character. Local copy must be provided by the host. The XMIT and XMIT LINE keys generate their identifying codes but do not initiate transmission unless echoed by the Host.

- The front panel switch settings for this mode are:
FORMAT — OUT
ON LINE — IN
LOCAL COPY — OUT
- The escape sequence to put the terminal in this mode is: (ESC) (F) (32 hex)

ON LINE WITH LOCAL COPY

Intended for applications where the user wishes to operate in On Line Mode but the host does not echo back the data transmitted by the terminal. In all other respects this mode is identical to On Line.

- The front panel switch settings for this mode are:
FORMAT — OUT
ON LINE — IN
LOCAL COPY — IN
- The escape sequence to put the terminal in this mode is: (ESC) (F) (36 hex)

FORMAT MODE

This is a batch operating mode in which protected fields and operator entry fields may be created by the host for formatted data entry applications. Transmission of either operator entered data only, or all data is permitted by line or page. (Protected data is never transmitted.) (For further details on this mode see Section V-E, Format Mode.)

- The front panel switch settings are:
FORMAT — IN
ON LINE — OUT
LOCAL COPY — OUT

NOTE: When manually putting the terminal into or out of Format Mode, the RESET switch on the front of the VDU must be depressed after setting the switches as specified above.

- The escape sequence is: (ESC) (F) (31 hex)

FORMAT MODE (MODIFIED)

This is identical to Format Mode except that the batch transmission is not directly initiated by the operator. Instead whenever the XMIT, XMIT LINE, or one of the Program Function keys is depressed the terminal will output a special character. (See Section V-C, Dynamic Buffer Allocation.)

- The front panel switch settings for format Mode (Modified) are:

FORMAT — IN
ON LINE — IN
LOCAL COPY — OUT

NOTE: Unless the terminal was already in Format Mode, the RESET switch on the front of the VDU must be depressed when manually putting the terminal in Format Mode (Modified).

- The escape sequence is: (ESC) (F) (33 hex)

TAPE MODE (TRANSPARENT)

Whenever the terminal is in this mode all characters received from the host that are ordinarily non-printable are converted to special displayable characters and are displayed on the VDU screen. These characters ordinarily represent executable codes such as Line Feed (LF) or Carriage Return (CR). The characters are illustrated in the chart on the back cover. The operator can put the terminal in Tape Mode by setting the TAPE switch on the front of the VDU to the inposition. The host is unable to put the terminal in or out of this mode.

E. FORMAT MODE

General

Format Mode can provide considerable time and effort saving advantages with regard to data input. Pre-designed data formats can be stored at the host and

transferred to the Elite 3052 VDU screen upon request by the operator. The Program Function keys (PF1-PF10) may be used as the medium of request. Each of the PF1-PF10 keys will generate a unique escape sequence that can be used to either designate a specific display format, or to request a menu of display formats. The operator can then choose the desired format from the menu.

Form Generation

Once the appropriate format has been designated the host should execute the following steps:

1. Send the sequence (ESC) (F) (31 hex). This will put the terminal in Format Mode and set the DIM attribute on.
2. Send Master Reset (ESC) (M) to clear the page buffer, set attribute tag bits, set screen to unprotected spaces, set Insert/Delete mode off, and Home the cursor.
3. Send (ESC) (@) sequence to turn off the keyboard and prevent operator interference while the form is being generated.
4. Place form on the screen.

There are two types of data fields that the host can place on the screen while the terminal is in Format Mode:

1. Protected Fields: Data from the host with the DIM attribute on will create protected fields. This data is displayed in low brightness and cannot be altered by the operator.
2. Operator Changeable Fields: The host can place operator changeable data on the screen by preceding it with any of the change attribute codes that does not include DIM. (See ATTRIBUTE CHANGE in Section V-B.)

Since memory address space is not used for attributes, there is no limitation or restriction on their use.

It is important to note that there are only two ways to create protected fields:

1. Host entered data while in Format Mode and the DIM attribute is on.
2. A host entered (CR) while in Format Mode and the DIM attribute is on will set the remainder of the current line from the cursor to the end of the line to protected spaces.

Data Preparation

After the form has been entered on the display the cursor can be moved to the appropriate location for operator input to begin and the keyboard can be turned on. The escape sequence to turn the keyboard on is (ESC) (U).

The operator can now begin entering data at the keyboard. If the cursor reaches the end of an unprotected field as a result of the operator typing, it will automatically move to the first position of the next unprotected field if the operator continues typing. Data from the keyboard will not enter protected fields.

The operator can quickly position the cursor to desired locations in unprotected fields by using the following cursor positioning functions:

1. Tab and Back Tab.
2. Cursor Up, Down, Left, Right.
3. Carriage Return and Line Feed.

The operation of each of these functions is fully described in Section V-B.

Typing errors can be quickly corrected by positioning the cursor to the locations where the correction is required then either overtyping the old data with new data, or by using Insert/Delete mode. Insert/Delete mode is described in Section V-B.

Transmission Format

When the operator is finished entering data, transmission to the host can be initiated by depressing the XMIT key. The transmission data format is:

1. The end of each line of data is indicated by a (GS) character.
2. The last character transmitted is a (CR), which indicates the end of transmission.
3. Only unprotected data is transmitted. All data input to the terminal from the keyboard will be unprotected. Data input to the terminal from the host however, will normally be with the DIM attribute on which means it will be protected. The host may enter unprotected data by preceding it with an attribute change sequence that will set the DIM attribute off. (See Section V-B, ATTRIBUTE CHANGE.)
4. Trailing spaces are replaced with a single space. (Redundant Space Suppression.)

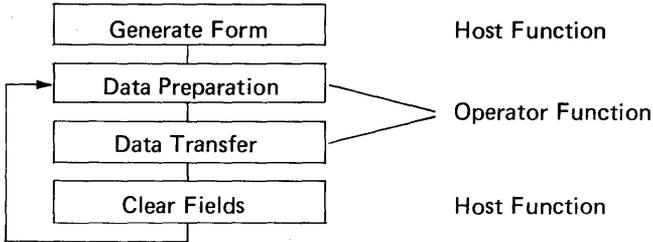
The display data can also be sent to a hard-copy device via the PRINTER jack. The data format for this is:

1. All data, protected and unprotected is transmitted.
2. Each line of data is terminated with (CR), (LF) and ten (Rubouts).
3. Redundant trailing spaces are replaced with one space. (Redundant Space Suppression).

Transmission to the printer is initiated by the operator depressing the COPY key, or by the host sending (ESC) (), Print Screen.

Data Transfer operations are more thoroughly described in Section V-C Communications.

The following diagram shows a procedure that may be used to support interactive data entry in Format Mode:



When the transfer of data to the host has been completed the host can send the Home Cursor (ESC) (H) and Erase to end of Screen (ESC) (J) functions to prepare for further operator input. If the form is no longer needed a Master Reset can be used to clear the VDU screen.

Format Mode (Modified)

This is the same as Format Mode except for the method of data transfer to the host. Transmission is not directly initiated by the operator. The XMIT, XMIT LINE and PF1-PF10 keys produce special characters rather than their normal functions. This mode can be used to support Dynamic Buffer Allocation and is thoroughly described in Section V-C Communications, under Dynamic Buffer Allocation.

F. EXECUTION TIMES

The terminals hardware complements the firmware so that execution time of nearly all functions is minimal. Additionally, a 128-character communication line buffer stacks the input characters so that the execution time is essentially transparent to the program. The program overhead associated with the input buffer gives the capability of removing 3+ characters from the buffer and placing them in the display memory for each character received at 9600 baud.

With the above information and a table of execution times for all functions, the user can determine the state of the input buffer at any point in the character string being output to the terminal. (See Table 5-3.)

Function	Exec. Time
1. Master Reset	
1.1 Format Mode	6ms
1.2 Other Modes	2ms
2. Erase (EOS)	2ms
3. Insert Character	6ms
4. Delete Character	6ms
5. Insert Line	130ms
6. Delete Line	130ms

**Table 5-3
COMMAND SEQUENCE EXECUTION TIMES**

An additional feature of the Elite 3052 Video Terminal that may be of great help to the user, is the fact that, unless the terminal is in Tape Mode (Section V-D), the input buffer ignores (Rubout) characters. Therefore, (Rubout) characters may be used as pads.



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