

DATAMEDIA CORPORATION
DT80/1
VIDEO TERMINAL
OPERATOR'S HANDBOOK



DATAMEDIA



DT80/1

From the smarter terminal maker.

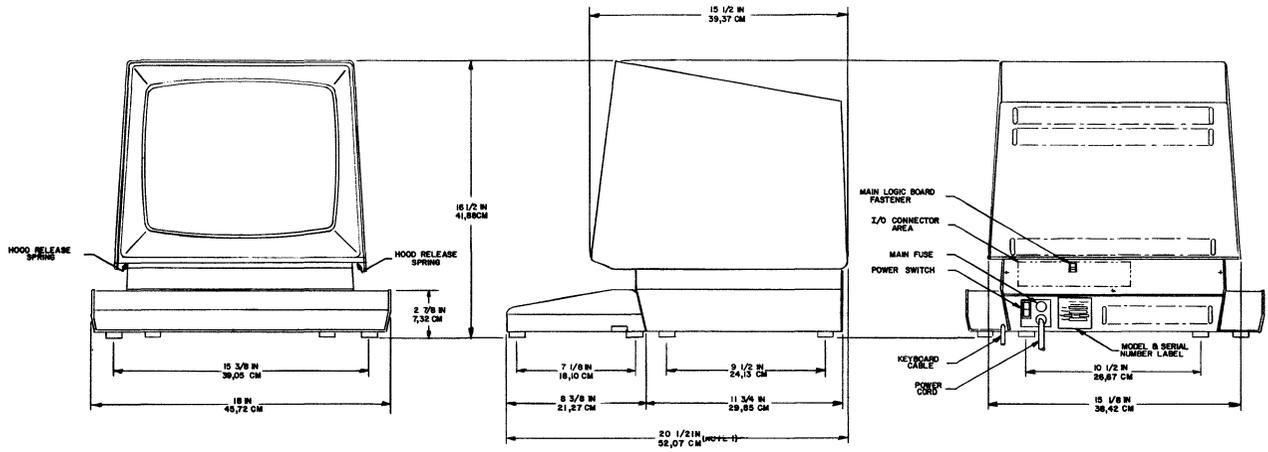
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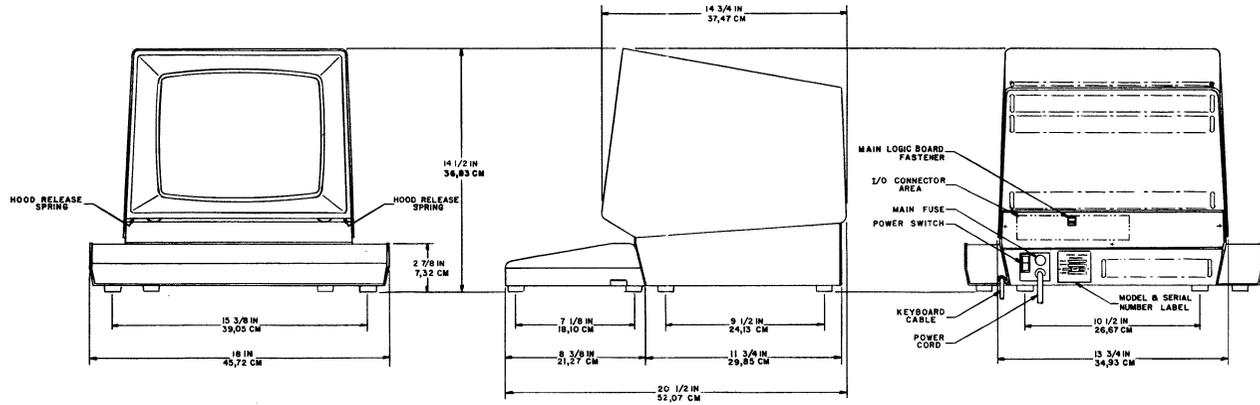
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OUTLINE SPECIFICATIONS

DT 80/1L



OUTLINE SPECIFICATIONS

DT80/1

Figure 1-1

SECTION I

GENERAL DESCRIPTION

A. INTRODUCTION

We are pleased that you have chosen the DT80/1 Video Terminal.

While your new terminal has many advanced features, it is still easy to operate. This handbook will acquaint you with the features of your new terminal and assist you in installing, operating, programming and maintaining it.

The handbook is organized into four separate sections. Section I presents general introductory information, highlights some of the outstanding features of your DT80/1, and provides a comprehensive list of the 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 contains all the information that might be needed by the host computer software programmer to successfully interface with the DT80/1.

B. EQUIPMENT FEATURES

The DT80/1 is an asynchronous CRT terminal with single page video memory. The stand-alone terminal contains an alphanumeric display, control logic, peripheral/communications interfaces, and the keyboard, which is separated from the display unit for increased operator comfort.

DISPLAY

The DT80/1 is capable of displaying either 80 or 132 characters on each of 24 display lines. In the 132 character per line mode, the total display capacity is 3168 characters while in the 80 character mode, the total display capacity is 1920 characters.

In addition, characters may be highlighted by reverse video, increased intensity, underline, and/or blink on a per character selection basis. Other capabilities include split-screen, double wide or double wide and double high characters, bidirectional smooth scrolling, limited graphics, and composite video input/output.

COMMUNICATIONS

The DT80/1 has been designed for interactive applications, data entry, information retrieval or any related data communications requirements, and therefore accommodates either the standard RS232/CCITT-V.24 or, optionally, 20mA current loop interface. Transmit, Receive and Auxiliary speeds may be individually selected.

CURSOR

DT80/1 offers a choice of two non-destructive cursor displays to indicate where the next character entered from the communications link or the keyboard will be placed on the screen. The cursor may be displayed as either a blinking underline (_) or as a blinking block (■). The cursor position is fully addressable and readable on an X-Y coordinate basis.

ANSI/ALTERNATE TERMINAL SUPPORT

The DT80/1 responds to two different programming standards. In ANSI mode, the terminal responds to the coded sequences of ANSI standards X3.41-1974 and X3.64-1977. In Alternate Terminal Support Mode, (ATS Mode), the DT80/1 is compatible with software developed for the VT-52* terminal.

Both modes are discussed in Section 4 of this manual.

CRT SAVER TIME OUT

The communications and keyboard interfaces are constantly monitored for activity. In the event that there is no activity for approximately 35 minutes, by either the operator or the host computer, the terminal will automatically shut off the video display. After shut off, the display will be restored upon receipt of the first character from either the keyboard or the communications interfaces.

*VT-52 is a trademark of Digital Equipment Corporation.

C. TECHNICAL SPECIFICATIONS

Screen Capacity: 1920 or 3168 characters.

Screen Type/Size: P4 white, etched 12-inch diagonal, DT80/1; 15-inch diagonal, DT80/1L.

Characters per Line: 80 or 132

Lines of Display: Up to 24

Character Generation: 7 x 9 dot matrix.

Character Sizes:

12" display (DT80/1)

80 character - .090W x .180H

132 character - .054W x .180H

15" display (DT80/1L)

80 character - .103W x .218H

132 character - .062W x .218H

Active Display Size: 6.09H x 8.91W for 12" Screen. 7.37H x 10.25W for 15" Screen.

Character Set: 128 characters +

Refresh Rate: 50 or 60 Hz

Memory Type: MOS Ram

Keyboard: Electronic, 84 key separable with 6 ft. coiled retractile cord; 66 key layout similar to standard typewriter with 18 key numeric/function cluster.

Indicators: Seven LED's; three dedicated to ON-LINE, LOCAL and KEYBOARD LOCKED plus four are programmable.

Key Click: Sounds each time a key is depressed (selectable).

Audible Alarms: Typewriter Bell (selectable)

- 1) Sounds upon receipt of Bel code
- 2) Sounds eight characters from right margin
- 3) Multiple bell sounds upon detection of error in SET-UP, SAVE, or RECALL.

Line Interface: RS 232/CCITT-V.24 or optional 20mA Current Loop.

Speeds: Baud Rate—15 standard rates from 50 to 9600 selectable via the keyboard with the data rate displayed on the screen. May have different rates for Receive, Transmit, and Auxiliary.

Communications: Asynchronous Serial

Character Size: 7 or 8 bits; Keyboard selectable.

Parity: Even, odd or none.

Communications Protocols: Keyboard selectable via automatic generation of XON and XOFF control codes.

Power: 100-125V, 50/60 ± 3Hz
100 Watts

200-250V, 50/60 ± 3Hz. 100 Watts

Operating Environment: +10°C to +40°C
+50°F to +100°F

Humidity: 10% to 90% R.H. - Non Condensing

Altitude: 3048M (10,000 ft.) operating
12,192M (40,000 ft.) non-operating

Dimensions:

12" Video Display Unit

Depth	37,47 cm.	(14.75 inches)
Height	36,83 cm.	(14.50 inches)
Width	34,93 cm.	(13.75 inches)
Weight	14,08 Kg.	(31.00 lbs.)

15" Video Display Unit

Depth	39,57 cm.	(15.50 inches)
Height	41,88 cm.	(16.50 inches)
Width	38,42 cm.	(15.12 inches)
Weight	21,32 Kg.	(47.00 lbs.)

Keyboard

Depth	21,29 cm.	(8.38 inches)
Height	7,32 cm.	(2.88 inches)
Width	45,72 cm.	(18.00 inches)
Weight	3,39 Kg.	(7.50 lbs.)

Shipping Weights:

12" Display Unit and Keyboard—42.0 lbs.

15" Display Unit and Keyboard—64.0 lbs. (Two packages)

SECTION II

INSTALLATION

A. INTRODUCTION

This section of the handbook begins by offering guidelines to assist you in unpacking, installing and preparing the terminal for operation. This is followed by a preliminary checkout procedure that is designed to give the user confidence that the terminal is operational. After which, the electrical characteristics necessary for interfacing with other devices in your system are given. Finally, in the unlikely event of a malfunction, a section on troubleshooting, which will help the user localize the cause of the malfunction, 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 the terminal and keyboard from its shipping carton.
3. Visually inspect unit for damage. If damage is found notify the carrier and Datamedia Corporation immediately.
4. Complete Warranty Registration card and mail.

Included with your new Datamedia DT80/1 are the following items:

- Video Display Unit (VDU)
- Keyboard with attached cable.
- Operator's Handbook.
- Warranty Registration card.

C. HOOK-UP

1. Insert the keyboard cable plug into the jack marked KEYBOARD (Item 2) in the rear of the VDU. See Fig. 3-1.
2. Connect power cord plug to standard 115 VAC *grounded* wall outlet. (When specified, use 230 VAC).
3. Depress the power switch (Item 5, in Section III, Figure 3-1) to the ON position and allow a one to two minute warm up period. During this period the DT80/1 will automatically perform the power up self test and either the ON LINE or LOCAL LED, located on the keyboard, will be lighted. (See Section 2-F).
4. Set the desired Set-Up features as outlined in the Operating Instruction section of this manual. (See Section III).

D. PRELIMINARY CHECKOUT PROCEDURE

The following procedure utilizes some of the more important features of the DT80/1 and is designed to familiarize an operator with some of its features, and assure that the terminal is operational.

1. After the warm-up period, determine that no error was detected during the Power Up Self Test. If an error has been detected during the self test, a blinking character will be shown at the cursor position (Upper left corner of the screen). See Table 2-3 for a list of Error conditions.

2. Place the terminal in SET-UP mode by depressing the SET-UP key. This display should be similar to that shown in Figure 3-9, SET-UP A Mode presentation.
3. Adjust the brightness of the display by depressing the cursor up (↑) or the cursor down (↓) Key. With each depression of the key, the display should increase or decrease in brightness. Select a comfortable level.
4. Check the condition of the ON LINE/LOCAL LED indicators. If the ON LINE indicator is on, select LOCAL by depressing the **4** key on the main keyboard.
5. Check the number of characters per line by observing the displayed character ruler in the SET-UP A presentation. Assure that both 80 and 132 column mode are operational by depressing the **9** key on the main keyboard.
6. Place and leave the unit in 132 column mode.
7. Exit SET-UP mode by depressing the SET-UP key.
8. Type the following sequence, `[ESC]<[ESC]#8`. The screen should now display 24 lines of 132 columns each of the character E.
9. Return the terminal to SET-UP mode by depressing **SET-UP** and then depress **0** on the main keyboard. This resets the terminal to its original Set-Up conditions, and performs the self test program (See Section 2 F).
10. Return to SET-UP A mode by depressing **SET-UP**, then enter SET-UP B mode, by depressing the **5** key on the main keyboard. (See Figures 3-10 and 3-11).
11. Position the cursor over the third character in the first group of feature switches by repeated depressions of the Cursor Right → key. Change the state of this character (either 0 or 1) to the opposite state by depressing the **6** key on the main keyboard. Exit SET-UP mode by depressing **SET-UP**. Assure that the CRT screen background is in the opposite of its original state. If it was originally white characters on a dark background, it should be dark characters on a white background.
12. Set the **CAPS LOCK** key on the left side of the keyboard to the up (off) position.
13. Type a grouping of shifted and unshifted alphabetic and numeric characters as on a typewriter and observe the display on the CRT.
14. Depress the **CAPS LOCK** key so that it remains in the on (down) position. Type in another group of alphabetic and numeric characters. Assure that the alphabetic characters are all uppercase (Capital letters) and that the numeric characters are unaffected.
15. Return to Setup A mode by depressing the **SET-UP** key. Note the occurrence of the letter "T" above various positions on the character ruler. These indicate the location of a horizontal tab position. Depress the numeral 3 key on the main keyboard. Notice that this operation clears all tab locations. Use the cursor forward → key to position the cursor above the number 8 on the character ruler, then operate the numeral 2 key on the main keyboard to set the individual tab location. (Note that a second operation of the numeral 2 key will clear the individual tab stop.) Repeat for positions 24, 36 and 70. Exit Setup mode (Step 7). Operate the **TAB** key. Note that the cursor advances to the next tab location, with each actuation. Repeat Step 9 to return to the original Set-Up conditions.

16. Firmly attach the Loopback connectors to the Line and Aux Jacks. (Loopback connectors: Datamedia part number 6GAAA02001). Execute the following sequence, **ESC|2|6y**. (See PCTST Sect. IV, Par. 2.39) This invokes the Data/EIA Loopback tests. Error numbers are 8,16,32, and 64 (See Table 2-3).

If the terminal passes all the above tests, return the terminal to on-line mode. The terminal is now ready for operation. If any problems exist or the terminal fails any of the above tests contact the supplier of your DT80/1.

E. INSTALLATION AND INTERFACE INFORMATION

Whenever the terminal power is turned on, the terminal is Reset or a Recall operation is performed, the DT80/1 data rates are set to those rates which have been selected and saved on a "fixed" basis. (See Set-Up Mode Section III). Once it has been determined that the Baud Rates, Bits per Character, Proper Interface (EIA or Current Loop), Parity, Parity Sense and any other setup feature that effects the host computer communications compatability are correct, the terminal may be connected to the other devices in the system and placed ON—Line.

1. Line and Aux Interface Connectors

Connect the EIA RS232 cable from the host computer or modem to the LINE or Aux interface connector, as required, at the rear of the VDU. The following table (Table 2-1) lists the pin assignments for the LINE connector and Table 2-2 lists the pin assignments for the AUX connector. (See 4-E for further discussion of the Aux Interface.)

Pin No.	Signal Name
1	Frame Ground
2	Transmit Data (TX data)
3	Receive Data (RX data)
4	Request to Send (RTS)
5	Clear to Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground
8	Carrier On (DCD)
9	Current Loop Input +
10	Current Loop RX Data -
11	Secondary Request to Send
12	Speed Indicator (Secondary Carrier Detect)
13	Current Loop Supply +
14	Current Loop Supply -
15	Transmit Clock
17	Receive Clock
18	Current Loop Output +
19	Secondary Request to Send
20	Data Terminal Ready (DTR)
22	Ring Indicator
23	Secondary Request to Send
25	Current Loop Output - Tx Data

Table 2-1
LINE JACK PIN ASSIGNMENTS

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

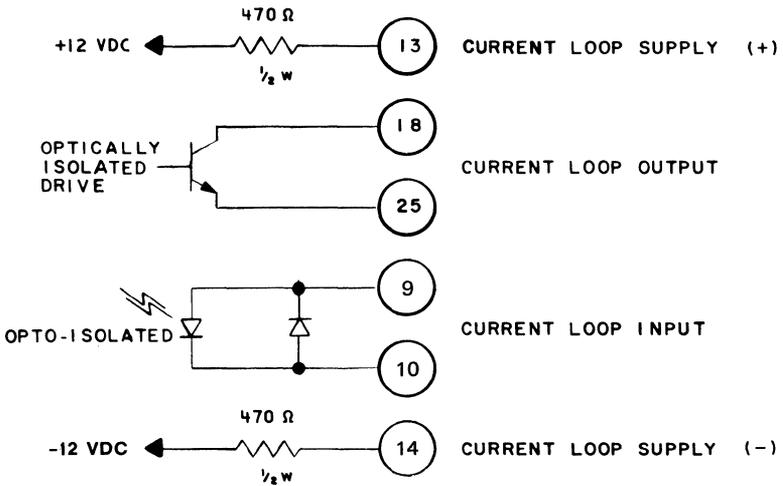


Figure 2-1
SCHEMATIC OF LINE/AUX CURRENT LOOP

Pin No.	Signal Name
1	Frame Ground
2	Receive Data (RX Data)
3	Transmit Data (TX Data)
4	Request to Send (RTS)
5	Clear to Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground
8	Carrier Detect (DCD)
9	Current Loop Input +
10	Current Loop-Rx Data
11	Secondary Request to Send
13	Current Loop Supply +
14	Current Loop Supply -
18	Current Loop Output +
20	Data Terminal Ready (DTR)
22	Ring Indicator
25	Current Loop Output - Tx Data

Table 2-2
AUX JACK PIN ASSIGNMENTS

2. External Video Connections

In addition to the interfaces discussed in paragraph 1 of this section, the DT80/1 may also be interfaced to external video devices. Such devices may be “slaved” to the DT80/1 thru the composite video output jack or remote devices may provide the synchronized video to be displayed on the DT80/1 screen thru the video input jack. The video jacks are located on the back of the terminal. (See Figure 3-1, Items 1 and 3)

a) Video Output

The composite video output provides an EIA RS 170 type output signal generated by combining the internal video signal with a composite synchronization signal. The signal contains all the information internally generated by the DT80/1 for display but excludes any information provided thru the video input jack.

b) Video Input

When an external video signal is supplied to the video input of the DT80/1, this signal is combined with the internal video signal so that the brighter of the two signals corresponds to the screen brightness at that location on the screen. Note that the external video source must be synchronized to the DT80/1, also a video signal applied to this input affects only the internal screen and does not appear on the composite video output.

F. SELF TEST MODE

A Self Test Mode is integral to the DT80/1. Self Test is automatically performed whenever the terminal is powered up with the power ON/OFF switch or the terminal is Reset by a Reset operation from the host or the keyboard. (See Section 3E para. 7.) This self test program checks the following items:

- Internal Program ROM Check Sum
- Nonvolatile RAM Check Sum (NVR)
- Read/Write Memory (RAM)
- Video Memory Attributes
- Keyboard

This test may also be initiated and expanded by the control sequence PCTST as described in Section 4-H, 2.39. Please note the caution included as part of 2.39 concerning the limited number of erase/write cycles available from the Non Volatile Ram.

1. Error Codes

Two types of errors may be detected by the terminal during Self Test, Fatal and Nonfatal. If a fatal error is detected during Self Test Mode, no intelligible information may be displayed on the screen. Some random pattern of characters and possibly an error code may be displayed on the screen and the programmable LED's. **TERMINAL FUNCTIONS MAY OR MAY NOT OPERATE PROPERLY IF A FATAL ERROR IS FOUND.**

Nonfatal errors do not halt the internal processor, instead an error code number between 1 and 128 is displayed at the home position (upper left corner) of the screen. (See Table 2-3)

Depending upon the communication link connections and the Set-Up status, up to eight functional areas are verified during the Self Test Mode execution. They are:

1. Video Memory Attributes
2. Non Volatile RAM
3. Keyboard
4. Line, Data Loop Back **
5. Line, EIA Loop Back *
6. Aux, Data Loop Back **
7. Aux, EIA Loop Back *
8. Program ROM or RAM

*A "Loop Back" connector must be attached to the "Line" and/or "Aux" jacks on the rear of the terminal to accomplish these tests.

**To test Current Loop, Select Current Loop in Set-Up B.

Table 2-3 shows the possible errors, and error codes that may be detected and indicated on the display screen and the failure or failures which correspond to the numbers. Multiple errors are indicated by displaying the arithmetic sum of the individual error numbers. For example, if the keyboard and the Non-volatile RAM are found to malfunction, the error number displayed would be 4 (keyboard) + 2 (NVR), or 6.

**Table 2-3
NON-FATAL ERROR NUMBER**

FAULT								
Error Number Displayed	Fatal Error	Aux EIA*	Aux Data*	Line EIA*	Line Data*	Key-board	NVR	Video Attributes
1								X
2							X	
4						X		
8					X			
16			X					
32		X						
64		X						
128	X							

2. Fatal Errors

If a fatal error occurs, an error code will be displayed, provided the failure does not prevent such a display, on the programmable Keyboard LED's. If the fatal error is a read/write (RAM) error all the LED's are lit. If the error is a ROM checksum error, the number of the ROM is indicated by which LED's are lit.

(A checksum is an internal verification of the contents of the Memory.)

ROM #1	LED's Lighted
1	L4
2	L3
3	L3 and L4
4	L2
5	L2 and L4
6	L2 and L3
7	L2, L3 and L4
8	L1

G. TROUBLE SHOOTING

The DT80/1 is designed and built to be an extremely reliable terminal. Regardless of such efforts, malfunctions may occur. Before following local maintenance procedures the following preliminary maintenance procedures will help to assure that a malfunction actually exists. In many instances, proper terminal operation may be restored without maintenance assistance and unnecessary time delay.

1. Inspect AC input: Insure that the AC plug is firmly seated in the AC receptacle and that the power switch (Item 5 in Figure 3-1) is in the ON position.
2. Inspect the keyboard connection: Insure that the connector is firmly seated in the keyboard jack.
3. Inspect the Line Connection: Insure that the connector is firmly seated in the proper jack labeled "Line."
4. Inspect the Set-Up features for compability to the host computer. (See Figure 3-9, 10, 11) Suggested features to be checked:

ANSI/ATS Mode	Parity
Auto XON/XOFF	Parity Sense
EIA/Current Loop	Receive Speed
Bits per Character	Transmit Speed

The following are some conditions associated with Set-Up Features which may occur:

- a. Terminal will not transmit or receive data, check Auto Xon/Xoff Feature, if not disabled, Type **CTRL Q** to see if the **No Scroll** key has been inadvertently operated. Also check Line/Local condition.
- b. Keyboard Locked LED is on: operate **SET-UP** key twice to enter and exit **SET-UP** mode which will clear the locked keyboard.
- c. Double characters when typing on keyboard: check status of Local Copy feature, if on, turn it off.
- d. Blank screen: enter **SET-UP** and check CRT Time Out feature. If you wish to leave feature on, entering and exiting Set-Up will restore the screen unchanged.

5. Perform the Preliminary Checkout Procedure and pay particular attention to steps 9 and 16.
6. If proper terminal operation cannot be restored, follow locally prescribed procedures for obtaining maintenance.
7. If it becomes necessary to remove the terminal hood or front panel to inspect the monitor, logic board, or power supply board, this operation can be simply accomplished without the need for any tools. To remove the front panel, feel along the bottom edge of the front panel for the finger tip depressions in the terminal base. Pull forward gently, and the bottom of the front panel will disengage from the spring clips holding it to the base.

If the logic board must be removed, first make sure the terminal is disconnected from the AC power source. Locate the Printed Circuit board lock on the rear of the terminal just above the LINE connector and release the board by rotating the lock 90 degrees in either direction, then remove the hex head screw located next to the Printed Circuit board lock. (NOTE: The screw is required to provide an electrical ground path for the discharge of static electricity.) Slide the Printed Circuit board forward 1 or 2 inches and remove the cable from the connector on the front of the board by holding the board on either side of the connector base and gently but firmly pulling upward on the connector. Slide the board forward until it is free of the lateral card guides.

To remove the hood from the DT80 case, push up on the spring catches located directly behind the bottom of the front bezel along the sides of the hood. (See Figure 1-1). With the spring catches disengaged, pull the hood gently forward till the stop is felt, then lift up. The hood should lift off easily. To replace the hood, place the hood on the base so that the hood latches enter the proper slots, and gently push back until the metallic click of the spring catches latching is heard. Gently try to move the hood to be sure it is properly latched.

SECTION III

OPERATOR 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 indicators, switches and jacks on the DT80/1. Sub-section C gives a brief description of the various groups of keys and indicators on the keyboard. Wherever it is appropriate a reference is given to indicate where (in Section IV, Software Programming) more detailed information may be found. Subsection D explains the SET-UP feature for selecting the various operating features that allow the DT80/1 to be tailored to its operating environment.

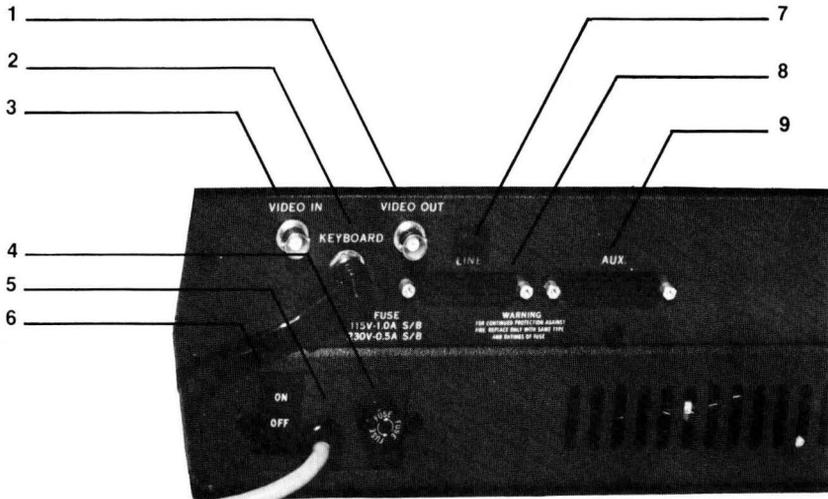


Figure 3—1
VDU CONTROLS AND CONNECTORS

B. VDU CONTROLS AND CONNECTORS

There are eight VDU mounted controls and connectors, all located on the rear surface. Figure 3-1 shows the locations of the various items and the following sub-section gives a brief description of their functions.

Item 1

Video Output Provides a composite RS170 type signal with a composite sync signal. This output contains all video data appearing on the DT80/1 screen except that which is being received on the video input jack.

Item 2

Keyboard Connector Provides power and bidirectional communications with the separable keyboard.

Item 3

Video Input Accepts an external video source that is synchronized to the DT80/1. This analog signal is combined with the internal video signal in such a way that the intensity at any point on the screen will correspond to the larger of the two signals. A video signal on this input affects only the internal display and does not appear on the composite video output.

Item 4

Main Fuse 1 Amp (1.6A for DT80/1L) Slo-Blow Fuse (For continued protection against fire replace only with the same type and rating of fuse).

Item 5

Line Cord UL-SVT three conductor 18 AWG, 7 ft.

Item 6

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

Item 7

P.C. Bd. Lock Main Logic Bd. Lock. See Section II-G.

Item 8

EIA Line Jack EIA Communications Connector. See Section II-E.

Item 9

Aux Jack Auxiliary Communications Connector. See Section II-E.

C. KEYBOARD INDICATORS

1. Audible Alarms

As detailed below, the DT80/1 has three different audible tones. The audio output level of these tones is preset and no adjustment capability is provided.

- a) *Long Tone or Bell*—Operates similar to the margin bell on a typewriter in that it sounds when the active key entry position is eight characters from the right hand margin. This tone also sounds when a "BEL" (07 Hex) code is received at the communications link. (See 3-E)
- b) *Series of Long Tones*—This alarm only occurs when the terminal is turned on, Reset, or Set-Up features are recalled or saved. It indicates that the Non Volatile Ram (NVR) had difficulty in writing or reading the Set-Up features. Should this situation persist refer to 2-F (Self Test Mode).
- c) *Key-Click*—This tone is associated with typing the keyswitches and gives audible actuation feed back to the operator. The tone is sounded for all keyswitch actuations except the following:
 - Shift or CTRL Keys (Do not transmit codes)
 - If the Kybd. Locked indicator is on. (See below and 4-F)
 - If the Key Click feature is deselected (See 3-E)

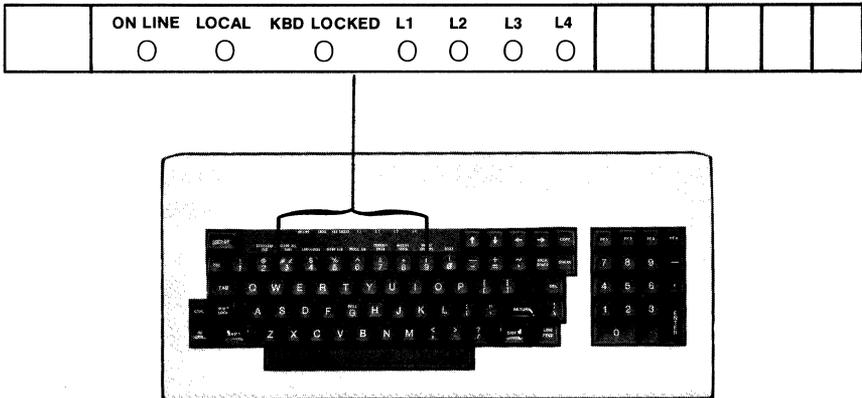


Figure 3-2
KEYBOARD LED INDICATORS

2. LED Indicators (See Figure 3-2)

There are seven LED indicators provided in the DT80/1 Keyboard to provide status information for the operator. If the keyboard is connected and the power is turned on, either the On-Line or the Local LED Indicator will light providing an effective "Power ON" indication.

- a) *On Line*—Indicates the terminal is connected to the line connector and is ready to communicate with the host computer via the communications link.

- b) *Local*—Indicates the terminal is disconnected from the host computer, data can neither be transmitted to nor received from the host. Characters typed on the keyboard will be displayed on the screen only.
- c) *Keyboard Locked*—Indicates that the keyboard buffer is full and the keyboard is turned off. See Section 4-F, paragraph 4.
- d) *L1-L4*—These indicators are actuated by received or locally generated control sequences and their meanings may be defined by the user's application. (See Section 2F and 4H)

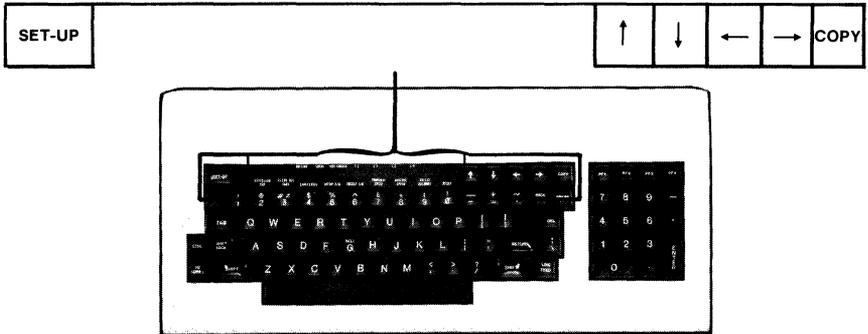


Figure 3-3
KEYBOARD KEYS—GROUP I

D. KEYBOARD DESCRIPTION

Group I (See Figure 3-3)

- Set-Up** The first depression of this key places the terminal in Set-Up Mode, the second depression causes the terminal to exit Set-Up Mode and return to the normal operating mode. (See Section 3-E)
- (Cursor Up) ↑** Each time this key is depressed the cursor is moved up one row position. (See Section 4-G and 4-H). In Set-Up mode, this key progressively increases the brightness of the display.
- (Cursor Down) ↓** Each time this key is depressed the cursor moves down one row. (See Section 4-G and 4-H). In Set-Up mode, this key progressively decreases the brightness of the display.
- (Cursor Left) ←** Each time this key is depressed the cursor moves left one position. (See Section 4-G and 4-H).
- (Cursor Right) →** Each time this key is depressed, the cursor moves right one position. (See Section 4G and 4H).

COPY

Depressing this key causes the contents of the display screen to be transferred to a locally attached peripheral via the Auxiliary Port. Depressing this key in conjunction with the shift key, causes the line upon which the cursor is displayed to be transferred to a locally attached peripheral via the Auxiliary Port. (See Section 4G and 4H).

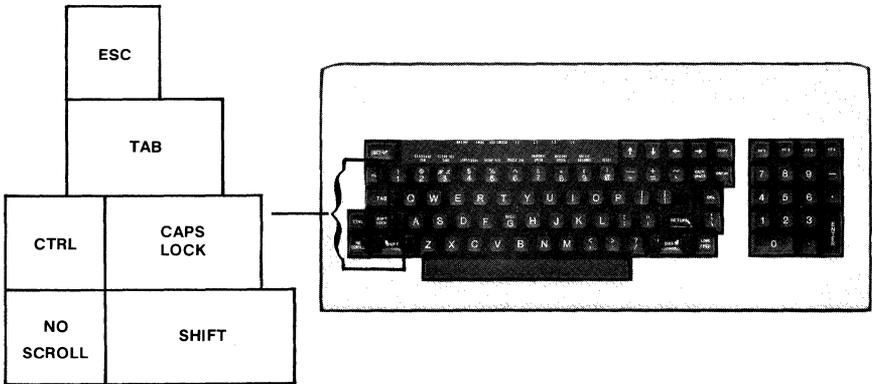


Figure 3-4
KEYBOARD KEYS—GROUP II

Group II (See Figure 3-3)

- ESC (Escape) Used in conjunction with alphabetic and symbol keys to develop escape sequences. The ESC key is operated first, then the alphabetic key. (See Section 4G and 4H).

- TAB Used to advance the cursor to appropriate tab stops on the display screen. (See Section 4G and 4H)

- CTRL (Control) Used in combination with alphabetic and symbol keys to generate control characters. The Control key does not generate an intrinsic code and must be used in conjunction with another key. (See Section 4G and 4H)

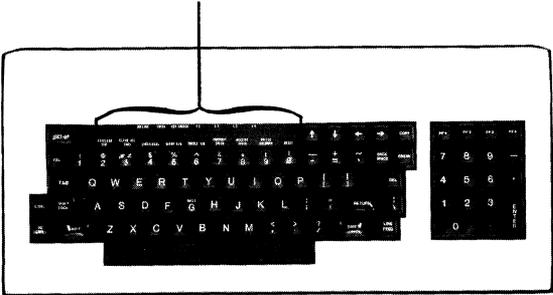
- CAPS.LOCK This is an alternate action keyswitch, which in the down (Actuated) position, causes alphabetic keys to produce capital (uppercase) letters. All numeric and special symbol keys are unaffected by the position of the Caps Lock Key.

- NO SCROLL The first depression of this key causes the DT80/1 to transmit an XOFF code for the purpose of suspending the transmission of data by the host computer. The second depression of this key causes the terminal to transmit an XON code for the purpose of resuming transmission of data from the host computer.

SHIFT

When pressed, this key enables the upper case function of all keys. If a key does not have an upper case function, the status of the shift key will have no affect on the character generated.

SET/CLEAR TAB	CLEAR ALL TABS	LINE/LOCAL	SETUP A/B	TOGGLE 1/0	TRANSMIT SPEED	RECEIVE SPEED	80/132 COLUMNS	RESET
@ 2	#£ 3	\$ 4	% 5	^ 6	& 7	* 8	(9	) 0



**Figure 3-5
KEYBOARD KEYS—GROUP III**

Group III (Figure 3-5) In addition to their use to generate numeric and special characters, Group III keys perform additional functions when the terminal is in Set-Up Mode. The additional function is indicated above each key.

- @
2 In Set-Up A, sets or clears individual horizontal tabs at the current cursor position.
- #£
3 In Set-Up A, clears all horizontal tabs.
- \$
4 Alternately switches the terminal on line or in Local Mode.
- %
5 Alternately switches the terminal between Set-Up A and Set-Up B.
- ^
6 In Set-Up B, turns the feature on at the current cursor location if it is off or off if it is on.
- &
7 In Set-Up B, each depression steps the terminal through the possible transmit baud rate settings in ascending order. When the shift key is held depressed, in conjunction with this key, each depression steps the terminal through the possible Aux. (Peripheral Port) baud rate settings in ascending order.

- *
8 In Set-Up B, each depression steps the terminal through the possible receive baud rate settings, in ascending order.
- (
9 In Set-Up A, each depression will change the terminal display line width from 80 to 132 characters or from 132 to 80 characters.
-)
0 Starts the Reset sequence.

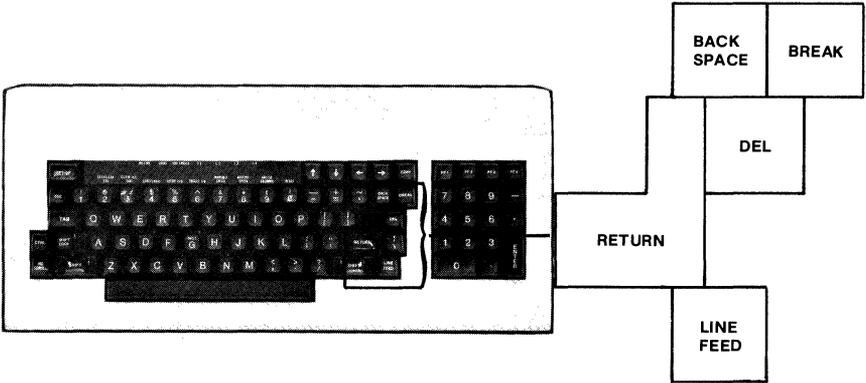


Figure 3-6
KEYBOARD KEYS—GROUP IV

Group IV (See Figure 3-6)

- BACK SPACE** Used to send a Back Space (08 Hex) code to the host computer.
- BREAK** Causes the transmission line to be forced to its zero (inactive) state for specified time period. (See Section 4-C)
- RETURN** Function Key which transmits a Carriage Return Control Code (CR) (0D Hex) or Carriage Return Control Code followed by a Line Feed Control Code (0A Hex) depending on the state of the selectable New Line feature. (See 3-E)
- DEL (Delete)** Function key which transmits a Delete (7F Hex) Control Code. (See Table 4-2)
- LINE FEED** Function key which transmits an LF (0A Hex) Control Code. (See Table 4-2)

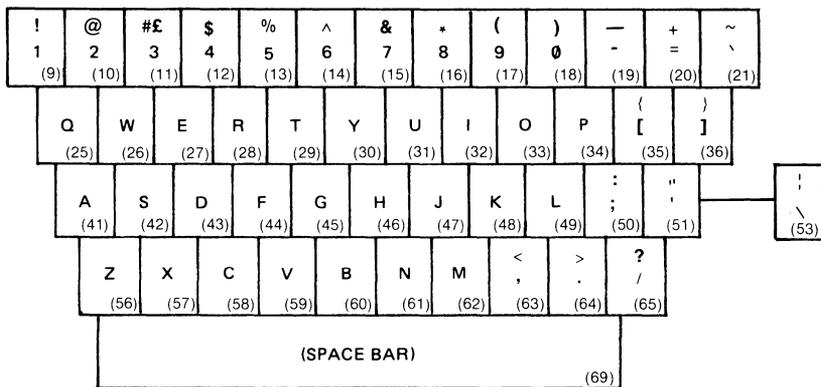


Figure 3-7
KEYBOARD KEYS—GROUP V

Group V (See Figure 3-7)

The keys displayed in Figure 3-7 are used to produce the character shown on the individual keycaps. They function the same as the keys on an ordinary typewriter. They may also be affected by the SHIFT and CTRL (CONTROL) as described for those keys.

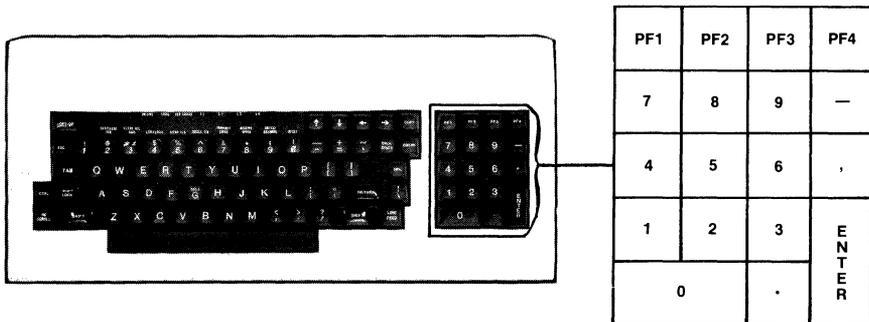


Figure 3-8
KEYBOARD KEYS GROUP VI

Group VI (See Figure 3-8)

PF1-PF4

These keys generate unique commands to the host computer. Their functions are dependent upon host computer programming.

Numeric Keypad

These keys produce the same characters as the numeric keys at the top of alphanumeric section of the keyboard, except they have no upper legends. They produce the same character whether the SHIFT key is

held down or not. They may also be interpreted by the host computer as special function keys if the terminal is in Key Pad Application Mode. (See Section 4C)

E. Set-Up Mode

Set-Up Mode enables the user to set the several operational and communication variables available in the terminal to the configuration required for his application.

1. Entering Set-Up Mode.

Set-Up mode is entered by depressing the Set-Up key. This places the terminal in Set-Up A mode. Set-Up B mode may then be entered by depressing the Set-Up A/Set-Up B selection key (Numeral 5 key on the main keyboard). These two displays, Set-Up A and Set-Up B, show the status of and provide the means for changing the terminal's operational and communications variables. (See Figure 3-9, -10 and -11)

2. Changing a Set-Up Parameter

All Set-Up controls are changed by entering the appropriate Set-Up mode and using the appropriate key to change the control. Display character line length, tab stops, Line/Local mode, and baud rate settings are changed using dedicated keys. The balance of the controls are changed by positioning the cursor over the applicable control bit and using the **6** key to change the state of the bit. Each depression of the **6** key will set the control to the opposite state from that which it was originally (1 to 0 or 0 to 1 where 1 = selected or ON and 0 = deselected or OFF).

3. Set-up Features

The following paragraphs detail each Set-Up feature, listed alphabetically. In addition, the applicable Set-Up mode and the key which should be used to change that feature is indicated. Set-Up features can only be changed in Set-Up mode, however some Set-Up features may be altered by the host computer at any time. (See Section 4-B)

ANSI/ATS Set-Up B



Two programming standards are used by the DT80/1—ANSI, conforming to ANSI stds X3.41-1974 and X3.64-1977 and Alternate Terminal Support Mode (ATS). Both of these standards are discussed in detail in section IV of this manual.

Answer Back Message Set-Up B

When active, this feature provides an identifying message of up to twenty characters in response to an inquiry from the host, (ENQ Control Character) (05 Hex) (See Section 4-G). This inquiry/answer sequence takes place without the knowledge of the operator or modification of displayed data. Typing a CTRL-BREAK will also initiate the answer back message from the terminal.

Auto Repeat Set-Up B

^
6

Any Keyboard or Keypad key which is held closed for more than half a second will automatically begin to repeat at the rate of 30 characters per second until released. All Keyboard keys except the following are affected:

CTRL and any key	NO SCROLL
COPY	RETURN
ESC	SET-UP
	TAB

Auto XON/OFF Set-Up B

^
6

When this feature is selected, the DT80/1 generates the transmission synchronization code XOFF (DC3) to suspend transmission of data from the host computer and XON (DC1) to resume transmission of data from the host computer. An XOFF is generated if the feature is enabled and any of the following occurs:

1. The terminal is placed in Set-Up Mode.
2. The No Scroll key is actuated.
3. CTRL S is actuated.
4. The character count of the internal buffer exceeds 31 characters.

An XON is generated when the terminal exits Set-Up mode, the No scroll key is actuated a second time, a CTRL Q is transmitted, or when the internal buffer character count falls to 16 characters. See section 4-F.

Aux. Interface Set-Up B

^
6

This feature allows the operator to select whether the EIA RS-232C or the 20mA current loop (if installed) interface is active on the auxiliary port.

Bits Per Character/Aux. Set-Up B

^
6

Selects either seven or eight bit data characters for the Auxiliary port. Bit 8 is always ignored on receipt and transmitted as a \emptyset or space.

Bits Per Character/Line Set-Up B

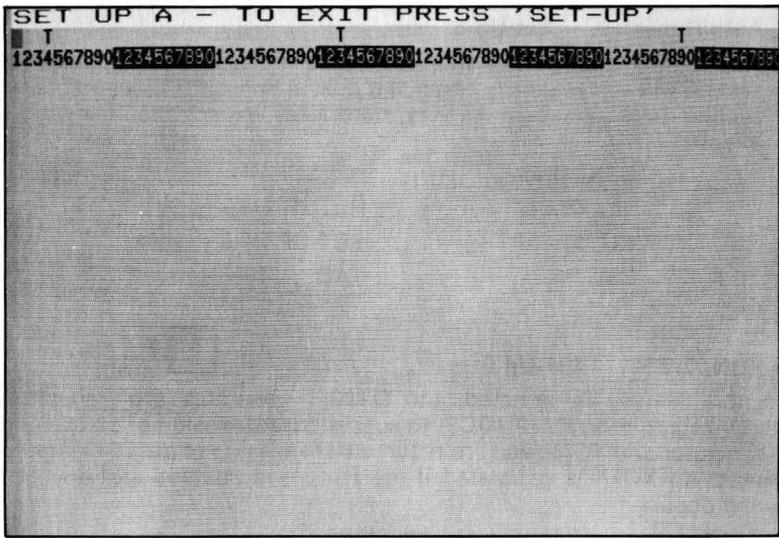
^
6

Same as above except for Line Port.

Characters Per Line Set-Up A

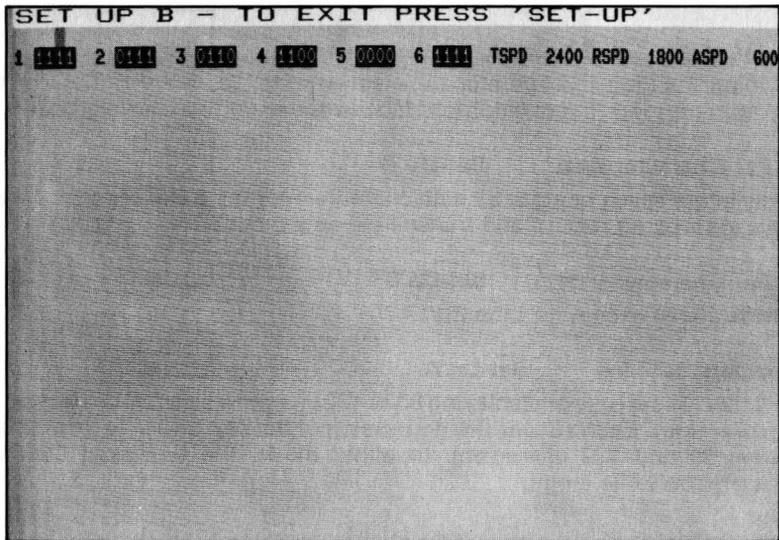
)
9

The DT80/1 is capable of displaying 80 or 132 characters across on each of the 24 display lines. Each successive depression of the key, switches the line size between 80 and 132 characters. In either mode, the displayed lines are physically the same length.



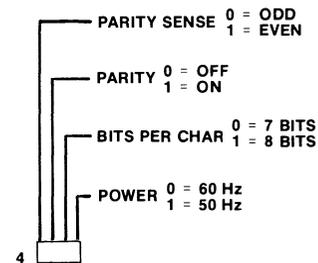
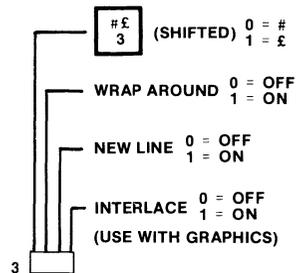
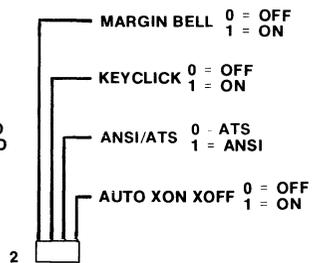
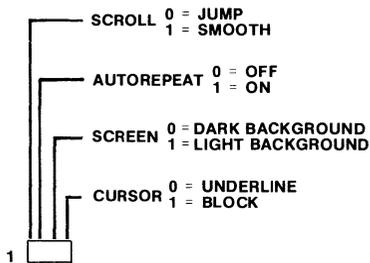
SET UP A MODE PRESENTATION

Fig. 3-9

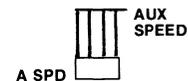
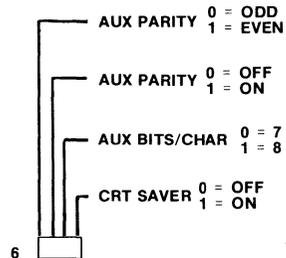
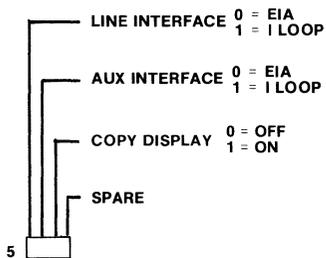


SET UP B MODE PRESENTATION

Fig. 3-10



3-12



SET UP B MODE SUMMARY

Fig. 3-11

CRT Saver Set-Up B



When this feature is selected, the communications link and keyboard interface are monitored for activity. In the event that there is no activity at either interface for approximately 35 minutes, the video display automatically shuts off. The display will be restored upon receipt of the first character from either the keyboard or the line.

Cursor Set-Up B



This feature selects the presentation of the cursor at the active position as either a blinking underscore or inverse video blinking block. In either case the cursor and a character may occupy the same location at the same time.

Data Rate, Aux. Set-Up B



The auxiliary port data transfer rate must be selected to match that of the attached peripheral. The DT80/1 is capable of transmitting at the following speeds: 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 9600, or 19,200* Baud. *Not guaranteed.

Data Rate, Receive Set-Up B



The terminal *receive* data rate must be selected to be the same as the host computer *transmit* data rate. The DT80/1 has 16 internally generated selectable speeds the same as Data Rate, Auxiliary above.

Data Rate, Transmit Set-Up B



The terminal transmit data rate must be selected to be the same as the host computer receive data rate. Please note that the terminal receive and transmit data rates are independent of each other. The same 16 internally generated selectable transmit rates as for Data Rate, Auxiliary above are available.

Interlace Set-Up B



This feature is not used in normal operation and should be deselected. Should this feature be selected erroneously the resulting display could appear shaky or unstable.

Keyclick Tone Set-Up B



If this feature is selected, a keyclick tone is sounded for each depression of a keyboard key except CTRL and the Shift keys (See 3-C).

Line/Local Set-Up A/B



This feature selects between an On-Line or Off-Line condition. In Off-Line (Local) condition, the terminal is inactive at the communications link to the host computer and characters typed on the keyboard are displayed on the screen and not presented to the communications interface. In the On-Line (Line) condition, the terminal transmits all data keyed via the communications links.

Local Copy/Display Set-Up B



The local copy or local display feature modifies the On Line condition of the Line/Local feature. Normally in the On Line feature, all data entered via the keyboard is transmitted via the communications link and not displayed, and data from the communications link is displayed on the screen. With the Local copy feature selected, in addition to being transmitted, data entered via the keyboard is also displayed on the screen.

Margin Bell Set-Up B



When activated an audible tone will be sounded eight characters from the end of the display line when data is being entered from the keyboard. When not active, no tone is sounded.

New Line Set-Up B



If the New Line feature is selected, the keyboard Return key will generate two control codes, a Carriage Return (CR, 0D Hex) Line Feed (LF, 0A Hex), when actuated. In addition, the receipt of a Line Feed (LF) code by the terminal will be interpreted as a Carriage Return and a Line Feed.

Parity, Aux. or Line Set-Up B



This feature turns the parity bit on or off. When the feature is not selected, no parity bit is transmitted or received. Parity on the Auxiliary and the Line Port is independently selected. (See Set-Up B).

Parity Sense, Aux. or Line Set-Up B



The parity sense feature selects whether the data will be checked for odd or even parity. If the Parity feature is selected (See above) this feature must be matched to the host computer's parity sense. If a parity error occurs, the checkerboard () pattern is displayed in place of the character in error.

Power Set-Up B



For proper display, the terminal must be set to the correct power line frequency. If not properly matched to the frequency of the AC power source, the display may appear to be jittery and unstable.

Screen Background Set-Up B



This feature selects between normal screen display, which is light characters on a dark background, or reverse screen display which is dark characters on a light background.

Screen Brightness Set-Up A/B



or



This feature allows the operator to electronically control the brightness level of the CRT for maximum comfort and efficiency.

Scroll Set-Up B

^
6

This feature selects either smooth scroll or jump scroll. In jump scroll, the terminal displays the lines of data as fast as they are received from the host. As the screen is filled data is shifted upward one full line at a time. This makes the data difficult to read especially at the higher baud rates. Smooth scroll will allow a maximum of 6 lines of data per second to be accepted by the terminal, and when the screen is full, lines are shifted upward one dot row at a time allowing the data to be read comfortably as it appears on the screen. The *Auto XON/XOFF feature must be selected* and supported by the host computer to use Smooth Scroll.

Tabs Set-Up A

Set/Clr.

@
2

Clr. All Tabs

#£
3

The DT80/1 can tab to selected points on a line. Any or all character positions in either the 80 or the 132 character display can be selected as TAB positions. A "T" character displayed above a character position on the character ruler in Set-Up A indicates a Tab Stop location for all rows on the display screen. (See 3-D).

Wraparound Set-Up B

^
6

When this feature is enabled, the next character after the final character (right-most) in a line is automatically placed in the first character position of the next line. If the feature is not enabled, the next and all subsequent characters after the final character in a line overwrite the final character until a cursor positioning (CR, LF, or Cursor Address) command is executed.

£ Set-Up B

^
6

This feature selects either the ASCII character set or the U.K. character set. The only difference between the two character sets is the # (ASCII) or £ (U.K.) display.

4. Saving the Set-Up Features

The temporary storing of any feature or features is easily accomplished by exiting Set-Up mode, after making the desired selections. The features as selected will be active until A.C. power is removed or either a recall or reset operation is performed.

When Set-Up features are stored on a fixed basis, the selections are stored in a Non-volatile Memory (NVR). This is accomplished by making the desired selections and then depressing the **Shift** and the **S** keys simultaneously. The display will go blank momentarily and then return to Set-Up mode. Exit Set-Up mode by depressing Set-Up key. All features which had been selected will now be stored by NVR and will remain until intentionally changed, even when AC power is removed. (See *Caution, Section IV, 2.39 PCTST).

5. Setting the Answer Back Message

Answer back messages may be stored either on a temporary or long term basis, like the Set-Up features. The answer back message does differ from the other features in the manner in which it is entered into the terminal. The procedure is as follows:

After placing the terminal in Set-Up B mode, depress the **Shift** and **A** keys simultaneously. The terminal will respond with A= on the display screen. Start the answer back message with a Message Delimiter Character. (The Message Delimiter Character may be any character not included in the answer back message itself. The MDC will not be transmitted and is only used to denote the start and end of the message). The answer back message may be any length up to 20 characters including space and control characters. Control characters are displayed as a ♦ character to indicate their position. At the end of the message, enter the MDC again. The message will disappear from the screen and be temporarily stored within the terminal memory. If the message is to be stored on a fixed basis, before exiting Set-Up mode depress the shift and "S" key simultaneously as would be done to store a Set-Up feature.

Note: If an error occurs during answer back message entry, the only recovery is typing the MDC and reinitiating this procedure.

6. Recalling Set-Up Features

If, at any time, while operating under temporary feature settings returning to fixed settings is desired, a recall may be accomplished as follows: With the terminal in Set-up mode, simultaneously press the **Shift** and **R** keys. The screen will clear momentarily and return to Set-Up mode. The terminal will now operate in accordance with the settings stored in NVR during the most recent Save operation.

Note: The Recall operation destroys the contents of the page memory.

7. Resetting the Terminal

A reset operation causes the terminal to react as if the power switch had been turned off and back on again. The terminal memory is cleared, the Self Test Mode is invoked and the terminal operation will be in accordance with the fixed Set-Up features stored in NVR. To execute a Reset operation, place the terminal in Set-Up mode by depressing the **Set-Up** key and then depress the **0** key on the main keyboard section.

SECTION IV

PROGRAMMING REFERENCE

A. INTRODUCTION

This section of the manual provides information needed by the host computer programmer to successfully interface with the DT80/1 Video Terminal. The areas covered are:

- Set-Up Features
- Keyboard Functions
- Special Graphics Characters
- Auxiliary I/O Port
- Communications Protocols
- Terminal Control Commands
- Control Sequences

B. SET-UP FEATURES

Features selected in Set-Up mode are stored in the Non-volatile Memory (NVR) so that cycling the primary power does not alter the terminal operating characteristics. Set-Up features which may be modified by the host computer are listed in Table 4-1 and described under DT80/1 Control Sequences. (See Section 4-H).

C. KEYBOARD OPERATION

The keyboard is used to generate and transmit codes per ANSI X3.4-1968 to the host computer via the communications link or directly to the display screen, or both, in Local Copy Mode. The following paragraphs describe the keys which also perform special functions. (Also see Section 2-D).

1. Function Keys

Table 4-2 lists the various function keys found on the DT80/1. These keys transmit control codes which if received by the terminal initiates the indicated functions. (See Section 2-D and 4-G).

2. Break Key

The actuation of the break key causes the transmission line to be forced to its zero (inactive) state for a specific length of time depending upon whether the shift key is also actuated. These time periods are:

Break—233.3 milliseconds \pm 23.33 milliseconds

Shift Break—3.5 seconds \pm .35 seconds

In conjunction with the CTRL key, the Break Key initiates the transmission of answer back message.

3. Cursor Controls

The Cursor Control Keys also transmit control sequences. These control sequences move the cursor one character up, down, right or left. Table 4-3 shows the control sequences generated by each key.

Table 4-1

Set-Up Feature or Terminal State	Changeable from Host Computer	Saved in NVR and changeable in SET-UP
Alternate Keypad Mode	Yes (PCKPAM/PCKPNM)	No
ANSI/VT-52	Yes (PCANM)	Yes
Auto Repeat	Yes (PCARM)	Yes
Auto XON/XOFF	No	Yes
Bits per Char., Aux.	No	Yes
Bits per Char., Line	No	Yes
Characters per Line	Yes (PCCOLM)	Yes
CRT Saver	No	Yes
Cursor	No	Yes
Cursor Key Mode	Yes (PCCKM)	No
Interface, Aux.	No	Yes
Interface, Line	No	Yes
Interlace	Yes (PCINLM)	Yes
Keyclick	No	Yes
Local Copy	No	Yes
Margin Bell	No	Yes
Media Copy	Yes (MC)	No
New Line	Yes (LNM)	Yes
Origin Mode	Yes (PCOM)	No
Parity, Aux.	No	Yes
Parity, Line	No	Yes
Parity Sense, Aux.	No	Yes
Parity Sense, Line	No	Yes
Power	No	Yes
Speed, Aux.	No	Yes
Speed, Receive	No	Yes
Speed, Transmit	No	Yes
Screen	Yes (PCSCNM)	Yes
Scroll	Yes (PCSCLM)	Yes
Tabs	Yes (HTS/TBC)	Yes
Wraparound	Yes (PCAWN)	Yes
# £	Yes (SCS)	Yes

Table 4-2
FUNCTION KEYS

Key	Hex Value of Code	Action
RETURN	0D	Carriage Return (Also see New Line)
LINEFEED	0A	Line Feed
BACKSPACE	08	Backspace
TAB	09	Forward Tab
ESC	1B	Initial delimiter of an ESC sequence
DELETE	7F	Ignored by the DT80/1

**Table 4-3
CURSOR KEY CONTROL SEQUENCES**

Cursor Key	ATS Mode	ANSI Mode with Cursor Key Mode Reset	ANSI Mode with Cursor Key Mode Set
Up ↑	ESC A	ESC [A	ESC O A
Down ↓	ESC B	ESC [B	ESC O B
Right →	ESC C	ESC [C	ESC O A
Left ←	ESC D	ESC [D	ESC O D

4. Auxiliary Keypad

The keys of the auxiliary keypad have four modes of operation, ATS Numeric, ATS Application, ANSI Numeric, and ANSI Application. Table 4-4 show the hex code or ESC sequence transmitted for each key in each mode. None of these keys are effected by the CTRL, Shift or Caps Lock Keys.

**Table 4-4
AUXILIARY KEYPAD CODES**

Key	ATS Numeric Mode	ATS Application Mode	ANSI Numeric Mode	ANSI Application Mode
0	30H	ESC?p	30H	ESCOp
1	31H	ESC?q	31H	ESCOq
2	32H	ESC?r	32H	ESCOr
3	33H	ESC?s	33H	ESCOs
4	34H	ESC?t	34H	ESCot
5	35H	ESC?u	35H	ESCOu
6	36H	ESC?v	36H	ESCOv
7	37H	ESC?w	37H	ESCOW
8	38H	ESC?x	38H	ESCOx
9	39H	ESC?y	39H	ESCOy
.	2CH	ESC?l	2CH	ESCOl
-	2DH	ESC?m	2DH	ESCOm
.	2EH	ESC?n	2EH	ESCOn
ENTER	0DH	ESC?M	0DH	ESCOM
PF1	ESCP	ESCP	ESCOP	ESCOP
PF2	ESCQ	ESCQ	ESCOQ	ESCOQ
PF3	ESCR	ESCR	ESCOR	ESCOR
PF4	ESCS	ESCS	ESCOS	ESCOS

D. SPECIAL GRAPHICS CHARACTERS

If the Special Graphics SET is selected, the graphic representation for ASCII codes 5F Hex thru 7E Hex will be replaced according to the Special Graphics Table, Table #4-5. Also see SCS control sequence.

Graphic with US or UK Set			Graphic with "Special Graphics" Set		
Hex Code	US or UK Set	Graphic	Hex Code	US or UK Set	Graphic with "Special Graphics" Set
5F		Blank	6F	o	— Horizontal line-Scan 1
60	∖	◆ Diamond	70	p	— Horizontal line-Scan 3
61	a	⊞ Checkerboard (error indicator)	71	q	— Horizontal line-Scan 5
62	b	⏎ Horizontal tab	72	r	— Horizontal line-Scan 7
63	c	⏎ Form Feed	73	s	— Horizontal line-Scan 9
64	d	⏎ Carriage return	74	t	⊢ Left "T"
65	e	⏎ Line feed	75	u	⊣ Right "T"
66	f	° Degree symbol	76	v	⊥ Bottom "T"
67	g	± Plus/minus	77	w	⊤ Top "T"
68	h	⏎ New line	78	x	| Vertical Bar
69	i	⏎ Vertical tab	79	y	≤ Less than or equal to
6A	j	⏎ Lower-right corner	7A	z	≥ Greater than or equal to
6B	k	⏎ Upper-right corner	7B	{	π Pi
6C	l	⏎ Upper-left corner	7C	|	≠ Not equal to
6D	m	⏎ Lower-left corner	7D	}	£ UK pound sign
6E	n	+ Crossing lines	7E	~	· Centered dot

NOTE: Codes 6A-6E, 71 and 74-78 are used to draw rectangular grids; each piece of this line drawing set is contiguous with others so that the lines formed are unbroken.

Table 4-5
SPECIAL GRAPHICS CHARACTERS

E. AUXILIARY INPUT/OUTPUT PORT

The DT80/1 terminal includes an independent, bi-directional auxiliary Input/Output (I/O) port. Firmware control of this port supports a locally attached printer or other peripheral device in both the ATS and ANSI operating modes. In order to provide a high degree of flexibility, the control sequences rigorously conform to the ATS and ANSI standard assignments.

In order to optimize the rate of serial data transfer, firmware support includes the processing of XON/XOFF control characters from the peripheral device. Data flow to the peripheral device ceases after receipt of XOFF and will not resume until XON is received.

The basic auxiliary port Set-Up parameters (baud rate, parity and bits/character) are selectable in Set-Up mode from the keyboard and may be saved in Non-Volatile RAM (NVR) with all other terminal Set-Up parameters.

The keyboard **COPY** key enhances the print feature by permitting two locally initiated output functions to occur. No host computer program support for these functions is required. The operations take place locally, independent of the terminal operating mode.

Upon depression of the **COPY** key, the contents of the screen are transferred to the locally attached peripheral device.

Simultaneous depression of the **COPY** key and **SHIFT** key, causes the line containing the active position/cursor to be transferred to the peripheral device. In ATS Mode, the PRINT SCREEN function (**ESC J**), and the PRINT LINE, function (**ESC V**) may be invoked by the host computer via the communications link: Additionally, the terminal may be placed into (**ESC W**), and caused to exit from Printer-Controller Mode, (**ESC X**). (See ATS Mode Control Sequence 4-1).

While in Printer-Controller Mode, the received data stream is routed only to the auxiliary port and not to the display screen. The state of the terminal upon entering Printer-Controller Mode will be retained when Printer-Controller Mode is exited.

In ANSI Mode, the ANSI standard Media Copy function is implemented. Within the bounds of this function it is possible to:

- 1) Print Screen **ESC [[0] i**
- 2) Enter Printer Controller Mode **ESC [[5] i**
- 3) Exit Printer Controller Mode **ESC [[4] i**
(See 4H-2.15 Media Copy)

Note: Print line can only be generated locally, by use of the copy key.

F. COMMUNICATIONS PROTOCOLS:

The incoming data stream to a DT80/1 is processed on a first in/first out basis thru a 64 character communications line buffer. Since the processor time required to perform certain functions may exceed the single character time period, particularly at the higher baud rates, the 64 character buffer may overflow. Therefore, when the contents of the buffer exceeds 31 characters, and the Auto XON/XOFF feature is selected, the DT80/1 will transmit an XOFF (DC3; 13 Hex) to the host computer. Upon recognition of this code, the host computer should cease transmitting data. If the host computer fails to respond to the XOFF command, the buffer may continue to fill until its capacity is exceeded and data is lost. Should this occur, the terminal will discard incoming characters and display the error (checkerboard) pattern. If the host recognizes the XOFF character and stops transmission of data, the terminal processor will remove characters from the buffer until 16 remain, at which time the terminal will transmit an XON code (11 Hex) to the host computer. Upon recognition of this code, the host should resume transmission of data. The use of the XOFF/XON synchronization ensures that each character and/or command sent to the terminal will be correctly processed and none are lost or misinterpreted.

The terminal provides two alternate methods of transmitting the XOFF and XON synchronization; the **No Scroll** key and Control S/Control Q. If the Auto XOFF/ON feature is selected, the terminal coordinates the use of these three different sources of XOFF/XON so that the desired effect results. For example, if the communications buffer status has caused an XOFF to be sent to the host computer and then the operator types the **No Scroll** key, a second XOFF is not sent, but the manual operation of the **No Scroll** key now takes precedence for signalling the resumption of the data transmission from the host computer. The initial operation of the **No Scroll** key also inhibits scrolling and freezes the screen until a second operation occurs. NOTE: The **No Scroll** Key is inoperative if Auto XON/XOFF is disabled.

If the Auto XOFF/XON feature is not selected, XOFF/XON can only be transmitted from the terminal by use of Control S and Control Q. Simultaneous depression of the **CTRL** and **S** keys causes an XOFF character to be transmitted to the host computer. Simultaneous depression of the **CTRL** and **Q** Keys will cause an XON to be transmitted to the host computer.

The DT80/1 also recognizes XOFF and XON when they are transmitted to it via the communications links. Receipt of an XOFF will inhibit the terminal from transmitting any codes except XOFF or XON. The keyboard will store up to seven keystrokes in a keyboard buffer. If the keyboard buffer overflows, the keyclick (if selected) will stop and the Keyboard Locked LED will light. Transmission will resume upon receipt of XON and the Keyboard Locked condition can be cleared by entering, then exiting, SET-UP MODE.

The following are some special considerations for the use of XOFF/XON sequences:

1. Entering Set-Up mode will cause the terminal to stop taking characters from the communications buffer. If the Auto XOFF is selected, an XOFF will be sent to the host computer if the buffer reaches its fill level.
2. Two terminal functions cause the input buffer to be erased. If the host continues to send data after it initiates either a Reset or Self-Test function, any data (in the communications buffer) will be lost. However, if the host computer suspends data transmission as if it had received an XOFF from the terminal and the Auto XOFF/XON feature is selected, when the terminal completes the specified operation it will send an XON to the host computer. If the host computer cannot be programmed as above, a delay in data transmission of no less than 10 seconds may be used to allow the terminal time to complete the function. If an error is detected by the function, data may still be lost.
3. A host computer with Software that does not support the receipt and processing of XOFF/XON may still use the DT80/1 provided ESC sequences are never sent to the terminal, the baud rate is limited to 4800 Baud or less, and the Software does not employ smooth scrolling or split screen. Fill characters may also have to be used subsequent to the CR, LF sequence to allow time for function execution at the terminal.

G. TERMINAL CONTROL COMMANDS

The DT80/1 has a number of single character control sequences which cause it to perform specific functions. The control characters have values between "00" and "1F" Hex, and are generated by holding the CTRL key depressed while depressing the appropriate key (See Table 4-7). The following list describes the control codes recognized by the DT80/1, all others are ignored.

NUL (00 Hex)	Ignored upon receipt.
ENQ (05 Hex)	Causes the terminal to transmit the answerback message to host.
BEL (07 Hex)	Causes the bell tone to be sounded.
BS (08 Hex)	Causes the cursor to move left one character position, unless it is at the left margin, in which case no action occurs.
HT (09 Hex)	Causes the cursor to move to the next tab stop, or to the right margin if no further tab stops are present on current line.
LF (0A Hex)	Causes a Line Feed or New Line operation depending upon Set-Up mode parameters.
VT (0B Hex)	Interpreted as LF.
FF (0C Hex)	Interpreted as LF.
CR (0D Hex)	Causes the cursor to move to the left margin on the current line.
SO (0E Hex)	Selects the G1 characters set, as designated by the SCS control sequence. See Section 4H -2.43.
SI (0F Hex)	Selects the GO character set, as designated by ESC(sequence. See Section 4H-2.43.
DC1 (XON) (11 Hex)	Causes the terminal to resume transmission. (See Para. 4F).
DC3 (XOFF) (13 Hex)	Causes the terminal to stop transmitting all codes except XOFF and XON. (See Para. 4F)
CAN (18 Hex)	If sent during a control sequence, the sequence is immediately terminated and not executed. It also causes the error character to be displayed on the screen.
SUB (1A Hex)	Interpreted as CAN.
ESC (1B Hex)	Initiates a control sequence.
DEL (7F Hex)	Ignored when received.

When control codes are embedded within a control sequence, they are executed immediately and the processing of the control sequence will continue with the next character received unless:

- 1) if the control character is an ESC, the current control sequence is abandoned and a new one started.
- 2) if the control character is either a CAN or a SUB, the current control sequence is abandoned.

The following is an example using the control sequence, EL para. 4H-2.10. (ESC [2 K). If this sequence were sent as `ESC[[2LF]LF]K`, where LF is the Line Feed Control Code, the Line Feed control codes would be operated on as soon as they were received and the cursor would be moved down two lines, after which, when the final character, K, of the control sequence were received, the line containing the cursor would be erased.

**Table 4-6
CONTROL CODES GENERATED**

Key Pressed with CTRL key down (shifted or unshifted)	Hex Code Transmitted	Function Mnemonic	Key Pressed with CTRL key down (shifted or unshifted)	Hex Code Transmitted	Function Mnemonic
Space Bar	00	NUL	P	10	DLE
A	01	SOH	Q	11	DC1 or XON
B	02	STX	R	12	DC2
C	03	ETX	S	13	DC3 or XOFF
D	04	EOT	T	14	DC4
E	05	ENQ	U	15	NAK
F	06	ACK	V	16	SYN
G	07	BELL	W	17	ETB
H	08	BS	X	18	CAN
I	09	HT	Y	19	EM
J	0A	LF	Z	1A	SUB
K	0B	VT	[	1B	ESC
L	0C	FF	\	1C	FS
M	0D	CR	]	1D	GS
N	0E	SO	~	1E	RS
O	0F	SI	?	1F	US

H. CONTROL SEQUENCES

All the control sequences, in this section, are a subset of those specified in ANSI X-3.64-1977 and ANSI X-3.41-1974.

1.0 Definitions and Notations

- 1.1 Please note that when the DT80/1 is in the ANSI mode, *none* of the ATS control sequences will be properly executed. When the terminal is in ATS mode, it will not properly execute the ANSI control sequences. Many of the two character escape sequences command different functions in ANSI and ATS mode.
- 1.2 The following paragraphs define the terminology and give some examples of the characteristics of the ANSI control sequences used in this manual.

1.2.1 Escape Sequences

An escape sequence consists of two or more seven (7) bit character combinations in succession, of which the first is always ESC (1B Hex), used to accomplish additional functions and employ features available in the DT80/1.

- a) In a two character escape sequence, the first is always ESC and the last character is always one of the final characters which are defined by X3.41 for two character escape sequences as any character in the ASCII character set from numeric zero (30 Hex) to (7E Hex). Note that the characters from 30 Hex to 3F Hex do not have an ANSI standardized definition and are reserved for private use as designated by the device manufacturer.
- b) In a three character escape sequence, an intermediate character is placed between the ESC character and the final character. The intermediate character is defined in X3.41 as being a bit combination from "space" (20 Hex) to / (2F Hex) in the ASCII set.
Note: Three character ESC sequences using the character numeric zero (30 Hex) to ? (3F Hex) as the final character are reserved for private use as designated by the device manufacturer. An example of a three character escape sequence is ESC # 4 .

The third type of escape sequence employed is defined as a Control Sequence Function by ANSI X3.64-1977 and has the general format of:

CSI P . . PI . . IF where:

1. CSI is defined as the Control Sequence Introducer character consisting of the character ESC [.
2. P . . P, the parameter string, which can be from zero characters to a maximum number of characters as defined by the implementation. Parameter string characters are defined as characters from numeric zero (30 Hex) to "?" (3F Hex) inclusive, but " " (3C Hex) to "?" (3F Hex) are currently undefined.

There can be two types of parameters in a parameter string:

- a) Pn, Numeric Parameter, which is used to designate a decimal value, such as 3, 32, or 120. As an example, multiple numeric parameters would be used to define cursor position and would be separated by a ";" (3B Hex). For example, the character string `ESC[[18;124R` from the terminal would report to the host computer, the current cursor position to be line 18, column 124. (See paragraph 2.01 this section, Cursor Position Report).
- b) Ps, Selective Parameter, which is used to select a specific sub function from a list of available sub functions. A variable number of Selective Parameters may be required in a control sequence, each parameter selects a particular entry in the list specified for that control sequence. Multiple selective parameters within the same control sequence are separated by the semicolon character (;) (3B Hex).
- c) The default value of Ps or Pn is the value assumed when no explicit value or the value of 0 is provided in the control sequence character string. For example, any of the three following character strings:

ESC	[	B
ESC	[	0B
ESC	[	1B

Will move the cursor one row down from its present row location since 1 is the default value. (See CUD 2.02)

An example of a multiple "Ps" string is `ESC[[0;1;2q` (See PCLL para. 2.29) this character string affects the status of the keyboard LED indicators and would accomplish the following:

- Ps 0 - Extinguish all LED's, then
- 1 - Light L1, then
- 2 - Light L2

3. "F" is the function defining final character. F characters are ASCII characters from @ (40 Hex) to (7E Hex) inclusive.

2.0 DT80/1 CONTROL SEQUENCES

All of the following escape and control sequences are transmitted via the communications link from the host computer to the DT80/1 unless otherwise indicated. All of the control sequences are a subset of those specified in ANSI X-3.64 1977 and ANSI X-3.41 1974.

2.01 CPR **Cursor Position Report** `ESC[[Pn;PnR` (Default value of Pn = 1)

Reports the current cursor position by means of the parameters from the terminal to the host computer. This sequence has two parameter values, the first specifies the vertical position as a decimal row number from 1 through 24 inclusive and the second specifies the horizontal position as a decimal column number from 1 through 132 inclusive. A

response with no values for Pn present is a report of the cursor at Home Position (upper left corner of the display).

Note: The numeric parameters reported depend upon the state of the Origin Mode as described by 2.30 PCOM. The Cursor Position Report is initiated by the host computer by sending a Device Status Report sequence to the DT80/1 (2.08 DSR).

2.02 CUB

Cursor Backward `ESC[[PnD]` (Default value of Pn = 1)
Moves the cursor in the backward (left) direction. The distance moved is defined by the value of the parameter. If the parameter value is zero or one, the cursor is moved one character position backward. If the parameter value is any number greater than 1, the cursor is moved that many character positions backward. Regardless of the values of the parameter, the cursor movement will stop at the left margin of the line upon which the cursor resides.

2.03 CUD

Cursor Down `ESC[[PnB]` (Default value of Pn = 1)
Moves the cursor position downward without altering the horizontal position. The number of lines is indicated by the value of the parameter. If the parameter value is zero or one, the cursor is moved one line downward. If the parameter value is any number greater than 1 the cursor is moved that many lines downward. Regardless of the value of the parameter, cursor movement ceases at the bottom margin or the bottom of the display. (See 2.37 PCSTBM)

2.04 CUF

Cursor Forward `ESC[[PnC]` (Default value of Pn = 1)
Moves the cursor position in the forward (right) direction the number of character positions indicated by the parameter. A parameter value of zero or 1 moves the active position one character position forward. If the parameter value is any number greater than 1 the cursor is moved that number of character positions forward. Regardless of the value of the parameter, cursor movement stops at the right margin.

2.05 CUP

Cursor Position `ESC[[Pn;PnH]` (Default value of Pn = 1)
Moves the cursor to the line and column position specified by the parameters. This sequence has two parameter values, the first is a decimal value from 1 through 24 specifying the row numbers and the second is a decimal value from 1 through 132 specifying the horizontal character position. A parameter value of zero or one for either the first or second parameter moves the cursor to the first (top) row or left most column position of the display respectively. The default condition with no parameters present is equivalent to a cursor to home (upper left most position) command. As in CPR; the interpretation of the line numbers depend on the state of the Origin Mode (2.30 PCOM).

2.06 CUU

Cursor Up `ESC[[PnA` (Default value of Pn = 1)
Moves the cursor upward the number of rows specified by the value of the parameter without altering the horizontal position. A parameter value of zero or one moves the cursor one line upward. If the parameter value is any number greater than 1, the cursor is moved upward that number of rows. Regardless of the value of the parameter, cursor movement stops at the top margin or top display line. (See 2.37 PCST BM)

2.07 DA

Device Attributes `ESC[[PnC` (Default value of Pn = 0)
Requests the terminal to send a device attributes (DA) control sequence to identify itself. The form is derived by the DA control sequence with either no parameter or a parameter of 0. The terminal response to the request is in the form of the DA control sequence containing a numeric parameter with a value greater than zero. The parameter value will indicate a unique device identification code according to a register which is established independently of but in accordance with ANSI X3.64-76.

<i>Option Present</i>	<i>Response</i>
DT80/1 - No Options	<code>ESC[[?1;2C</code>

2.08 DSR

Device Status Report `ESC[[Ps]` (Default value of Ps = 0)
Reports the general status of the device sending the control sequence and/or requests a status report from the receiving device.

<i>Ps Value</i>	<i>Meaning</i>
0	Ready: No Malfunctions Detected (default)
3	Malfunction, retry
5	Status Report Request (use a DSR control sequence)
6	Cursor Position Report Request (use a CPR control sequence (2.01 CPR)

A Device Status Report with a Ps of 0 or 3 is a response to a requesting DSR with a Ps value of 5.

2.09 ED

Erase in Display `ESC[[PsJ` (Default value of Ps = 0)
Erases some or all of the characters in the display according to the value of the parameter (Ps).

<i>Parameter</i>	<i>Parameter Meaning</i>
0	Erase from cursor position to end of display inclusive.
1	Erase from start of display to cursor position inclusive.
2	Erase entire display.

Complete lines, erased by this sequence will return to single width mode.

2.10 EL **Erase in Line** `ESC` `[` `P` `s` `K` (Default value of Ps = 0)
Erases some or all of the characters in the line upon which the cursor resides according to the value of parameter.

Parameter Parameter Meaning

0	Erase from cursor position to end of line (right margin) inclusive.
1	Erase from start of line (left margin) to active position inclusive.
2	Erase entire line.

2.11 HTS **Horizontal Tabulation Set** `ESC` `H`
Sets one horizontal tabulation stop at the current cursor position.

2.12 HVP **Horizontal and Vertical Position**

`ESC` `[` `P` `n` `;` `P` `n` `f` (Default value of Pn = 1)

Moves the cursor to the position specified by the parameters. The first parameter is a decimal value between 1 and 24 specifying the row number and the second is a decimal value between 1 and 132 specifying the horizontal character position. A parameter value of zero or one for either parameter moves the cursor to the first line (top most) or left most column of the display. The default condition with no parameters present moves the active position to the home (upperleft most) position. The line and column numbers depend on the state of the Origin Mode (2.30 PCOM).

2.13 IND **Index** `ESC` `D`
Causes the active position to move downward one display line without affecting the horizontal position. If the cursor is at the bottom margin, upward scrolling of displayed data occurs.

2.14 LNM **Line Feed/New Line Mode**

Set Mode: `ESC` `[` `2` `0` `h`

Reset Mode: `ESC` `[` `2` `0` `l` (Lower case L)

The Line Feed/New Line mode is a dual state condition which controls the terminal reaction to the Line Feed (LF, 0C Hex) control character. The "reset" state reaction to the Line Feed control code (LF, 0C Hex) as defined in X 3.4-1977 causes only vertical movement of the cursor to the next display line and causes the Return Key on the keyboard to send only a Carriage Return Control Code, (CR, 0D Hex).

In the "set" state, the Line Feed control character (LF, 0C Hex) causes the cursor to move to the first position of the next lower display line and is implemented by the Return Key on the keyboard, which in this state sends both a Carriage Return and a Line Feed control code when depressed by the

operator. This is also called the New Line Option. This mode does not effect the Format Effectors, Index (IND) or Next Line (NEL).

2.15 MC

Media Copy `ESC [[Ps] i` (Default value of Ps = 0)

Controls the transfer of data between the terminal and the auxiliary output device in accordance to the value of the Ps supplied.

Parameter Parameter Meaning

0	Copy entire contents of display to auxiliary output device (Default). For the purpose of controlling transfer, XON and XOFF are accepted and acted upon by the terminal from the auxiliary output device to prevent data overrun of the auxiliary device.
1	No effect.
2	No effect.
3	No effect.
4	Turn off copying the received data stream to the auxiliary output device. The termination sequence is NOT transferred to the output device.
5	Turn on copying the received data stream to the auxiliary output device. The received data stream will NOT be copied to the display of the DT80/1, nor will any command or control sequence be executed by the DT80/1. XON and XOFF, if received from the auxiliary output device, will be passed on to the host computer.
6	No effect.
7	No effect.

2.16 NEL

Next Line `ESC [[E`

Causes the cursor to move to the first position on the next line downward. If the cursor is at the bottom margin, a scroll up is performed.

2.17 PCALN

Screen Alignment Display (Private Code) `ESC # 8`

Upon receipt of this command, all character positions are filled with alphabetic uppercase E. This format is used by manufacturing and service personnel for alignment and focus adjustments and for preliminary check out of the DT80/1.

2.18 PCANM

ANSI/ATS (Private Code)

Set Mode: None

Reset Mode: `ESC [[? 2 1` (Lower case L)

Selects which set of control and escape sequences will be interpreted and executed by the terminal. While in ANSI mode, (Normal), the terminal may be switched to Alternate Terminal Support (ATS) mode with this sequence and the

ATS control sequences in Section 4-I are active. Return to ANSI (Normal) mode can only be accomplished from ATS mode by use of the appropriate ATS Space. Control sequence. The control sequence character strings of ANSI and ATS mode are mutually exclusive. The sequences in this section (4-H) can not be executed in ATS mode.

2.19 PCARM **Auto Repeat Mode** (Private Code)

Set Mode: ESC [[?] 8 h

Reset Mode: ESC [[?] 8 l (Lower case L)

Turns the Auto Repeat feature of the terminal's keyboard on or off. The reset mode turns off the Auto Repeat mode and all of the keys on the keyboard will not repeat automatically when held depressed. The Set mode turns on the Auto Repeat feature allowing most keyboard keys to automatically repeat when held depressed for more than one half second.

2.20 PCAWN **Auto Wrap Mode**(Private Code)

Set Mode: ESC [[?] 7 h

Reset Mode: ESC [[?] 7 l (Lower case L)

Allows the host computer to enable or disable the Auto Wrap feature. (See Wraparound, Section 3-E) In Reset mode, any displayable character received when the cursor is at the right margin will overwrite the previously displayed character. In "set" mode, a character received when the cursor is positioned at the right margin of the display will automatically be placed on the first (left most) character position of the next display line.

2.21 PCCKM **Cursor Keys Mode**(Private Code)

Set Mode: ESC [[?] 1 h

Reset Mode: ESC [[?] 1 l (Lower case L)

In the reset mode, the four cursor function keys will send ANSI cursor control commands. In the Set mode, the four cursor function keys will send application functions. (See Table 4-3 on page 4-3).

2.22 PCCOLM **Column Mode**(Private Code)

Set Mode: ESC [[?] 3 h

Reset Mode: ESC [[?] 3 l (Lower case L)

This sequence allows the host to select between 80 and 132 characters per line on the display. The "Set" mode sequence selects the 132 character per line display and the "Reset" mode sequence selects the 80 character per line display.

2.23 PCDHL

Double Height-Double Width Display Presentation

(Private Code)

Upper Portion: **ESC#3**

Lower Portion: **ESC#4**

When double-high double-wide video presentation is selected, each character occupies an area equivalent to two character spaces wide and two character rows high. In 80 column mode, 40 such characters may be displayed on two adjacent display lines. In 132 column mode, 66 such characters may be displayed on two adjacent display lines. To achieve correct results, the exact same character strings must be displayed on two consecutive display lines. With the cursor residing in any location on the first line of the pair, the **ESC#3** sequence will set the upper half of the double wide double high presentation. With cursor residing in any location on the second line of the pair the **ESC#4** sequence will set the lower half of the enlarged presentation. For either command, any characters which were displayed beyond the 40th or 66th positions dependent upon line width are blanked and lost. If the cursor resided beyond the 40th or 66th position when the control sequences are executed, it will be left in the right most display position on the line otherwise its relative column location will remain unchanged. Further, only column positions through 40 or 66, dependent upon active line width, may be accessed on lines displaying either half of a double high double wide presentation.

2.24 PCDWL

Double Wide Line (Private Code) **ESC#6**

Causes the line upon which the cursor currently resides to become double width-single height presentation. If the line containing the cursor was single width and the cursor location was beyond column 40 in 80 column mode (66 if 132 column mode) the cursor is left in the last column on the line. Data located in column positions beyond 40 in 80 column mode or 66 if 132 column mode is blanked and lost.

2.25 PCID

Identify Terminal (Private Code) **ESCZ**

Terminal responds as if it had received an ANSI device attributes sequence as discussed in 2.07 DA.

2.26 PCLNLM

Interlace Mode(Private Code)

Set Mode: **ESC[?9h**

Reset Mode: **ESC[?9l** (Lower case L)

The set mode causes the monitor to display 480 lines per frame. (Interlace) Used for high resolution graphic displays, when the option is installed.

The reset mode causes the monitor to display 240 lines per frame. (Non-Interlace) Used for normal data display.

2.27 PCKPAM **Key Pad Application Mode** (Private Code)

ESC **E**

Alters the interpretation of the keys included in the keypad cluster so that they will transmit control sequences to the host computer in accordance with Table 4-4 on page 4-3.

2.28 PCKPNM **Keypad Numeric Mode** (Private Code) **ESC** **>**

Causes the keypad keys to send the ASCII codes and control sequences corresponding to the characters inscribed on the key tops and Table 4-4, page 4-3.

2.29 PCLL **Load LEDS** (Private Code)

ESC **[** **[Ps** **;** **[. . .** **;** **[Ps** **q**

Lights or extinguishes the four programmable LED's on the keyboard according to the selective parameters.

Parameter Parameter Meaning

0	Extinguish LED's 1 thru 4.
1	Light L1
2	Light L2
3	Light L3
4	Light L4

2.30 PCOM **Origin Mode** (Private Code)

Set Mode: **ESC** **[** **[?** **6** **h**

Reset Mode: **ESC** **[** **[?** **6** **l** (Lower case L)

The state of Origin Mode determines whether the cursor position numbers are relative to the top line of the screen or to the top margin as set with a Set Margin sequence (See 2.37 PCSTBM). The cursor is left at the applicable home position after execution of this command.

If Origin Mode is "Set" the cursor line numbers are relative to the top margin as set with a Set Margin control sequence (i.e. line 1 refers to the top margin, line 2 refers to the top margin +1 line etc.) Cursor position commands and reports are affected accordingly. The cursor cannot be positioned outside the margin limits if Origin Mode is "Set".

2.31 PCRC **Restore Cursor** (Private Code) **ESC** **8**

Restores the active cursor position (vertical and horizontal) video attributes and character set to those which had been previously saved by use of the Save Cursor Control Sequence (PCSC 2.34).

2.32 PCREPTPARM (Private Code) **Report Terminal Parameters**

ESC **[** **[<sol>** **;** **[<par>** **;** **[<nbits>** **;** **[<xspeed>** **;** **[<clkmul>** **;** **[<flags>** **x**

(See PCREQTPARM below)

2.33 PCREQTPARM (Private Code) **Request Terminal Parameters**

ESC||sol|x

Sent by the host computer to the terminal to request the status of selected terminal parameters. The terminal replies with the sequence shown under PCREPTPARM. (2.32 above) Status sequences may be sent at the request of the host or at the discretion of the terminal. The DT80/1 is inhibited from sending unsolicited reports at power up or reset. The meanings of the sequence parameters are:

<i>Parameter</i>	<i>Value</i>	<i>Meaning</i>
<sol>	0 or none	This message is a request for a status report (PCREQRPARM). The terminal may send unsolicited reports.
	1	This message is a request for a Status report. Any subsequent reports will only be in response to a request by the host computer.
	2	This message is a report (PCREPTPARM).
	3	This message is a report and the terminal is only reporting in response to a request.
<par>	1	No parity set.
	4	Parity is set and odd.
	5	Parity is set and even.
<nbits>	1	8 bits per character
	2	7 bits per character
<xspeed>	0	50
	8	75
	16	110
	24	134.5
	32	150
	40	200
	48	300
	56	600
	64	1200
	72	1800
	80	2000
	88	2400
	96	3600
	104	4800
	112	9600
	120	19200
<clkmul>	1	Bit Rate Multiplier is 16.
<flags>		Not Applicable

2.34 PCSC **Save Cursor** (Private Code) **ESC|7**

Causes the terminal to save the cursor position, (vertical and horizontal), video attributes, and character set in local memory for recall at a later time upon command of the host computer. (See 2.31 PCRC; 2.43 SCS; 2.44 SGR).

2.35 PCSCLM **Scrolling Mode**(Private Code)

Set Mode: `ESC[[?4h`

Reset Mode: `ESC[[?4l` (Lower case L)

Allows the host computer to select either jump scroll or smooth scroll for data received from the communication link. The "Set" state causes smooth scroll to be operative at a maximum rate of six lines per second. The "Reset" state causes the scroll to occur one line at a time at line speed (See Section 3E-Scroll page 3—15).

2.36 PCSCNM **Screen Mode**(Private Code)

Set Mode: `ESC[[?5h`

Reset Mode: `ESC[[?5l` (Lower case L)

The "Set" state produces a display which consists of dark characters on a light background, while the "Reset" state produces a display which is light characters on a dark background.

2.37 PCSTBM **Set Top and Bottom Margins** (Private Code)

`ESC[[Pn;Pnr`

Defines the scrolling region by setting the top and bottom line limit within which scrolling may occur. The first parameter is the top limit and the second parameter is the bottom limit. Both are numeric values between 1 and 24. The default scrolling region is the entire screen or normal operating mode. The bottom line limit must be at least one greater than the top line limit making the minimum scrolling region two lines. After executing this control sequence, the cursor is left in the home position, as defined by the Origin Mode State. (See 2.30 Origin Mode PCOM)

2.38 PCSWL **Single Width Line** (Private Code) `ESC#5`

Resets the line upon which the cursor resides to single width display from double width or either half of double width double height display. If the line is already single width this command has no effect. The cursor position is unchanged.

2.39 PCTST **Invoke Confidence Test** (Private Code) `ESC[[2;Psv`

Allows the host computer to cause a self test process to occur at the terminal. Ps is the selective decimal value parameter indicating the test or tests to be performed. Its value is arrived at by summing the weight assigned to each test and sending that sum for the decimal value of Ps. If Ps is 0, no tests are performed but the EXCEL 12 & 14 is reset. Data Loop Back and EIA Modem Control tests cannot be conducted on line, but are locally generated to aid in trouble-shooting.

<i>Test</i>	<i>Weight</i>
Power Up Self Test (ROM, RAM, NVR and Keyboard)	1
Data Loop Back	2 (Loop Back Connector required)
EIA Modem Control Test	4 (Loop Back Connector required)
Repeat Selected Tests indefinitely (until failure or power off)	8 *

*Caution:

Due to the limited number of Erase/Write cycles (10^5 cycles) available from the NVR (Non Volatile Ram) because of the nature of the part, do not include the Power up Self Test in any Repeat Selected Tests procedure.

2.40 RI

Reverse Index `ESC M`

Reverse Index will move the cursor from its location to the same horizontal position on the display line immediately above. If the cursor location is at the top margin, a scroll down action is performed.

2.41 RIS

Reset to Initial State `ESC c`

This control sequence will Reset the DT80/1 to the initial state existing when power was supplied. The Power-Up Self Test function is also initiated and performed.

2.42 RM

Reset Mode `ESC [Ps;. . .;Ps l` (Lower case L)

Resets one or more modes of the terminal as specified by each Selective Parameter in the parameter string. Each mode to be reset is specified by a separate parameter. See "Modes" under Control Sequence Summary. Note: ANSI Modes and private modes cannot be mixed in the same control sequence string. Private modes are identified by the "?" in the sequence string.

2.43 SCS

Select Character Set

The DT80/1 can select any one of five possible character sets for display. (Note: The two alternate character sets are optional.) Any two of the five sets can be selected to be enabled by the Control Codes SO and SI by using the Escape sequences listed below. Once the two different character sets have been selected, the operator can switch between them by using the control codes SI and SO. The control code SI (0F Hex) enables the GO set and the control code SO (0E Hex) enables the GI set. See ANSI std X3.74-1974.

<i>GO Sets</i>	<i>GI Sets</i>	<i>Name</i>
ESC (A	ESC)A	U.K. Set
ESC (B	ESC)B	ASCII Set
ESC (Ø	ESC)Ø	Special Graphics (See Section 4D)
ESC (1	ESC)1	Alternate Character ROM Std. Character Set
ESC (2	ESC)2	Alternate Character ROM Special Graphics

2.44 SGR

Select Graphic Rendition

ESC ([[Ps;...];Ps]m) Default value = 0

The host computer may invoke the graphic rendition specified by the numeric value of the parameter of parameters in the control sequence. The selected renditions will remain the same for all subsequent characters transmitted to the display until the next occurrence of the SGR control sequence in the receive data stream.

Parameter Parameter Meaning

Ø	Primary Rendition (Normal presentation)
1	Bold or increased intensity
4	Underscore
5	Blink
7	Negative (Reverse) Image

All other parameter values are ignored.

2.45 SM

Set Mode ESC ([[Ps;...];Ps]h)

Causes one or more features to be temporarily set within the DT80/1 as specified by each selective parameter value in the parameter string. Each mode to be set is specified by a separate parameter value. The mode will remain set until reset by a Reset Mode (RM) control sequence. (Ref. RM 2.42)
NOTE: ANSI Modes and private codes cannot be mixed in the same control sequence string. Private modes are identified by the "?" in the sequence string.

2.46 TBC

Tabulation Clear

ESC ([[Ps]g) Default value of Ps = Ø

Horizontal tabulation stops are cleared according to the parameters. If no tab stop locations exist the command will have no effect.

Parameter Parameter Meaning

0	Clear the horizontal tabulation stop at the current cursor location.
3	Clear all horizontal tabulation stops.

I. Valid Alternate Terminal Support Mode (ATS) Control Sequences. In using the sequences listed below, observe the indicated status of the shift key.

Cursor Up ESC A	Moves the cursor up one position without altering the horizontal position. Cursor movement stops at the top margin. Identical to the default condition of CUU (See 2.06).
Cursor Down ESC B	Moves the cursor down one position without altering the horizontal position. Cursor movement stops at the bottom margin. Identical to the default condition of CUD. (See 2.03)
Cursor Right ESC C	Moves the cursor right one character position. Cursor movement stops at the right margin. Identical to the default condition of CUF. (See 2.04)
Cursor Left ESC D	Moves the cursor left one position. Cursor movement stops at the left margin. Identical to the default condition of CUB. (See 2.02)
Enter Graphics Mode ESC F	Enables the special graphics set. (See Table 4-5 page 4-4)
Exit Graphics Mode ESC G	Enables the standard ASCII character set per ANSI X3.4-1968.
Cursor to Home ESC H	Moves the cursor to the home position (upper left corner) of the display area. Equivalent to the default condition CUP. (See 2.05)
Reverse Line Feed ESC I	Moves the cursor up one position without altering the horizontal position. If the cursor is at the top margin, a scroll down action is performed. Identical to the default condition of RI. (See 2.40)
Erase to End of Screen ESC J	Erase from the current cursor location to the end of the display screen.
Erase to End of Line ESC K	Erase from the current cursor location to the end of the line upon which the cursor resides.
Print Line ESC V	Transfer data on the line containing the cursor to the auxiliary output device. XON and XOFF commands from the auxiliary output device may be used to accomplish the data transfer.

Enter Printer
Controller Mode

ESCW

Puts the terminal in the Printer Controller Mode, the terminal functions as a baud rate changer between the host and the printer. Data received via the communications link is routed to the auxiliary output port, but not displayed, XON and XOFF, if recognized by the host computer, may be used to support the data transfer.

Exit Printer
Controller Mode

ESCX

Takes the terminal out of Printer Controller Mode and returns the terminal to normal ATS mode.

Direct Cursor
Address

ESCYLC

Moves the cursor to the specified line and column. Line (L) and column (C) numbers are in accordance with Table 4-7 page 4-24.

Identify

ESCZ

Initiates the identifier ESC sequence. This sequence is ESC/Z. Similar to DA sequence 2.07, except response is different.

Print Screen

ESCJ

Transfer the contents of the display to the auxiliary output device. XON and XOFF from the auxiliary output device may be used to accomplish the data transfer.

Enter Alternate
Keypad Mode

ESCE

The auxiliary keypad keys send escape sequences in accordance with Table 4-4, Application Mode instead of normal ASCII values.

Exit Alternate
Keypad Mode

ESC>

The auxiliary keypad sends ASCII codes in accordance with Table 4-4, Numeric Mode.

Enter ANSI Mode

ESC<

All subsequent escape sequences will be interpreted according to ANSI standards X3.64-1977 and X3-41-1974 as explained in Section 4H. The ATS sequences will not be recognized or executed.

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

Table 4-7
ATS X-Y ADDRESSING

J. Control Sequence Summary

The following is a summary of the ANSI compatible control sequences for the DT80/1. They are listed alphabetically by function and if further information is required the paragraph number explaining that sequence is referenced.

1. Escape Sequences

Name	Control Sequence	Reference
------	------------------	-----------

Character Video Attributes	ESC [[Ps ; . . . ; Ps m	2.44
	0	Primary (Normal)
	1	Bold
	4	Underscore
	5	Blink
	7	Reverse

Character Sets	G0 Set	G1 Set	Reference
----------------	--------	--------	-----------

UK	ESC (A	ESC) A	2.43
ASCII	ESC (B	ESC) B	
Special Graphics	ESC (0	ESC) 0	
Alt. ROM	ESC (1	ESC) 1	
Alt. ROM Special Graphics	ESC (2	ESC) 2	

Character Size

Double High Top Half	ESC # 3	2.23
Double High Bottom Half	ESC # 4	2.23
Single Width Single Height	ESC # 5	2.38
Double Width Single Height	ESC # 6	2.24

Cursor Movements

Cursor Up	ESC [Pn A	2.06
Cursor Down	ESC [Pn B	2.03
Cursor Right	ESC [Pn C	2.04
Cursor Left	ESC [Pn D	2.02
Cursor Addressing	ESC [P1 ; Pc H	2.05
	or ESC [P1 ; Pc f	2.12
Index	ESC D	2.13
New Line	ESC E	2.16
Reverse Index	ESC M	2.40
Save Cursor & Attributes	ESC 7	2.34
Restore Cursor & Attributes	ESC 8	2.31

PI - line #; Pc - column #

Erase

Cursor to end of line	ESC [K	2.10
Beginning of line to cursor	ESC [1 K	2.10
Entire Line	ESC [2 K	2.10
Cursor to end of screen	ESC [J	2.09
Beginning of screen to cursor	ESC [1 J	2.09
Entire Screen	ESC [2 J	2.09

LED's

ESC [[Ps ; . . . ; Ps q	2.29
Ps - 0 Extinguish All	
1 L1 on	
2 L2 on	
3 L3 on	
4 L4 on	

Media Copy

Copy contents of display to aux. output device	ESC [0 i	2.15
Start copying data stream to aux. output device	ESC [5 i	
Stop copying data stream to aux. output device	ESC [4 i	

Modes

Auto Repeat - ON	ESC [? 8 h	2.19
- OFF	ESC [? 8 l *	2.19
Column - 132	ESC [? 3 h	2.22
- 80	ESC [? 3 l *	2.22
Cursor Application	ESC [? 1 h	2.21
- Key	ESC [? 1 l *	2.21
Interlace - ON	ESC [? 9 h	2.26
- OFF	ESC [? 9 l *	2.26
Key Pad-Application	ESC =	2.27
-Numeric	ESC >	2.28
Line Feed	ESC [2 0 h	2.14
New Line	ESC [2 0 l *	2.14
Origin - Relative	ESC [? 6 h	2.30
- Absolute	ESC [? 6 l *	2.30
Screen - Reverse	ESC [? 5 h	2.36
- Normal	ESC [? 5 l *	2.36
Scrolling - Smooth	ESC [? 4 h	2.35
Scrolling - Jump	ESC [? 4 l *	2.35
ATS (Alt. Terminal)	ESC [? 2 l *	2.18
Wraparound - ON	ESC [? 7 h	2.20
- OFF	ESC [? 7 l *	2.20

*Lower case L

Reports

Cursor Position

- Invoked By	ESC [[6 n	2.08
- Response	ESC [[P]; Pc R	2.01

Status

- Invoked By	ESC [[5 n	2.08
- Response: Ready	ESC [[0 n	
- Response: Malf. Retry	ESC [[3 n	

Terminal Parameters

- Invoked by	ESC [[0 x	2.33
- Response	See para 2.32 & 2.33	

What are you

- Invoked by	ESC [[c	2.07
- Response DT80/1	ESC [[? 1; 2 c	

Reset to Initial State

ESC [c	2.41
---------	------

Scrolling Region

ESC [[Pt; Pb r	2.37
-----------------	------

Pt - Top line scrolling region

Pb - Bottom line scrolling region

Tabs

Set Tab	ESC [H	2.11
Clear Tab	ESC [[g	2.46
Clear All Tabs	ESC [[3 g	2.46

Tests

Fill screen with "E"	ESC # 8	2.17
Power up self test	ESC [[2; Ps y	2.39

Ps = Power up self test -1

Ps = Data Loop back -2

Ps = EIA modem control -4

Ps = Repeat selected tests -8

2. SUMMARY OF CONTROL CODES RECOGNIZED BY THE DT80/1 (Ref. Section 4-G)

NUL (CTRL Space Bar)	Transmitted to host, but ignored on input.
ENQ (CTRL E)	Initiates the Answerback Message. (Ref. 3E-5)
BEL (CTRL G)	Sounds the Bell (Ref. 3C-1).
BS (CTRL H or Back Space Key)	Moves the cursor left one character position. (Ref. 4H-2.02)
HT (CTRL I or Tab Key)	Moves the cursor to next Tab Stop. (Ref. 4H-2.11 and 2.46)
LF (CTRL J or Line Feed Key)	Causes a Line Feed or New Line Operation. Ref. 4H-2.14)
VT (CTRL K)	Interpreted as LF.
FF (CTRL L)	Interpreted as LF.
CR (CTRL M or Return Key)	Returns the cursor to left margin of the current line. NOTE: When New Line is enabled, the Return Key generates both a CR and an LF.
SO (CTRL N)	Selects the GI character set. (Ref. 4H-2.43)
SI (CTRL O)	Selects the G0 character set. (Ref. 4H-2.43)
DC1 (CTRL Q)	Causes the terminal to resume transmission. (Ref. 4-F)
DC3 (CTRL S)	Causes the terminal to stop transmitting all codes except DC1 or DC3. (Ref. 4-F)
CAN (CTRL X)	Terminates a control sequence without executing it. (Ref. 4-G)
SUB (CTRL Z)	Interpreted as CAN.
ESC (CTRL [or ESC Key)	Introduces a control sequence. (Ref. 4H-1).



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