
MORROW 50

USER'S GUIDE

PRELIMINARY VERSION

Please excuse the absence of illustrations.
The information contained herein is accurate
as of the time of printing, but is subject to
change without notice.

TABLE OF CONTENTS
The Product User's Manual

<u>Section</u>	<u>Page Number</u>
I. INTRODUCTION	
A. Scope of this Manual	
B. General Information	
1. Safety Precautions	
2. FCC Required Warning	
C. Product Description	
D. Warranty	
E. Repair Services	
II. GETTING STARTED	
A. Receiving Inspection	
B. Unpacking	
C. In Case of Damage	
D. Mechanical Check-out	
E. Power Cords	
F. Cables and Connections	
G. 20 ma Current Loop	
H. Voltage Selection	
I. Power On/Off	
III. SETTING TERMINAL PARAMETERS	
A. Contrast	
B. Setting Default Parameters	
C. Monitor Tilt	

IV. THE KEYBOARD

- A. Alphanumeric Keys
- B. Numeric Keypad
- C. Cursor Control Keys
- D. Editing Keys
- E. Function Keys
- F. Functional Command Keys

V. THE SCREEN

- A. Text Lines 1-24
- B. Line 25 -- Status or User Display
 - 1. Row & Column
 - 2. Editing Mode
 - 3. Keyboard Lock
 - 4. Write Protect Mode
 - 5. Graphics Mode
 - 6. Communications & Operational Modes
- C. Character Sets
 - 1. Normal Alphanumeric
 - 2. Graphics
- D. Video Attributes
- E. Screen Clearing Functions
 - 1. The Insert Character
 - 2. Other Clearing Functions

VI. TRANSMISSION & OPERATING MODES

- A. Transmission Modes
 - 1. Full Duplex Mode
 - 2. Half Duplex Mode

B. Operating Modes

1. Local Mode

C. Write Protect Mode

D. Monitor Mode

E. Printing Modes

1. Simultaneous Print Mode

2. Buffer Print Mode

VII. TERMINAL PROGRAMMING COMMANDS

A. Overview

B. General Terminal Commands

C. Cursor Control Commands

D. Display Control Commands

E. Editing Commands

F. Communication Control Commands

VIII. APPENDICES

A. List of Control Codes -- Alphabetical by Function

B. List of Control Codes -- Alphabetical by CTRL/ESC Sequence

C. Terminal Emulation Codes

D. ASCII Code Table

I. INTRODUCTION

A. Scope of this Manual

This Manual is a reference guide for users of the The Product CRT Terminal. It has been written to give you enough information to set up and use the terminal with a minimum of effort. The manual does NOT include technical details about the electronics or the internal workings of the terminal, but does include enough detail to allow you to program and operate it easily and efficiently.

B. General Information

1. Safety Precautions

WARNING

Do not open the The Product's case, except under the supervision of a qualified repair person -- there are dangerously high voltages inside the case.

Since there are no controls or adjustments inside the case which a user would need to change, always leave this to qualified service and repair people.

3. FCC Required Warning

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

C. Product Description

The The Product is a full-function, intelligent Video Display Terminal which has the following standard features:

- * A 12" (30.5 cm) diagonal video monitor
- * 5 screen tilt positions -- 5, 7.5, 10, 12.5, and 15 degrees
- * An Etched green phosphor screen
- * 50/60 Hz operation
- * A 24 row by 80 character display area

- * A 25th row, for displaying status or user information
- * 7 by 9 character display within a 9 by 12 matrix
- * 96 ASCII alphanumeric and punctuation symbols
- * 32 control character symbols
- * 7 other optional character sets: British/Dutch, Japanese, Danish/Norwegian, Swedish/Finnish, Spanish, French, and German/Swiss
- * A lightweight detachable keyboard
- * 93 attractively styled keys
- * 9 dedicated cursor control keys -- left, right, up, down, home, tab, back tab, carriage return, and line feed
- * 7 editing functions -- Clear, Clear to End Of Line, Clear to End Of Page, Line Insert, Line Delete, Character Insert, Character Delete
- * 5 Function Keys -- F1 through F5, which can be used alone or with Shift to generate 10 individual function codes
- * 4 Functional Command Keys -- Break, ESC, Control, and Print
- * 4 styles of cursor display -- reverse block, blinking reverse block, blinking underline, and invisible
- * Programmable screen attributes, including Normal Intensity, Half Intensity, Reverse Video, Underline, Blinking, Blanked, and combinations of these modes
- * Attributes displayed by character (hidden attributes) -- The terminal does not use display memory to store information about attributes -- leaving you with a full 1920 characters of displayed data
- * Programmable protection of characters and fields within the display
- * Programmable transmission of data only from unprotected fields of the display.
- * Local Mode -- for operation on a stand-alone basis
- * Monitor Mode, displaying control characters on the screen instead of executing them
- * Keyboard Lock/Unlock under program control
- * Optional display wraparound
- * Full or half duplex communications
- * Switch-selectable default baud rates from 110 - 19,200 baud; also programmable remotely, either from the Host computer or from the keyboard, for both Host and Printer interfaces

- * Default Switch, Host computer, or Keyboard selectable parity options:
Even/Odd/No Parity, Mark or Space default
- * Selectable word length: 7 or 8 data bits, with either 1 or 2 stop bits
- * An RS-232C/20 mA. current loop interface for communication with a host computer
- * An RS-232C bidirectional Auxiliary Port which allows the use of a Printer, Modem, or other peripheral with the terminal
- * Both XON/XOFF and DTR communications protocols
- * Emulation of 5 popular CRT Terminals: ADM-3A, ADM-5, TeleVideo 910, Hazeltine 1420, ADDS Regent 25 -- set at power-up by DIP switch
- * 115 V AC (+/- 10%) at 60 Hz (+/- 2%), 230 V AC (+/- 10%) at 50 Hz (+/- 2%), 100 W primary power
- * Monitor dimensions: H 13.3" x W 14.7" x D 14.4"
(33.55 x 36.8 x 36.0 cm)
- * Monitor weight: 24 lbs. (10.9 kg)
- * Keyboard dimensions: H 3.0" x W 17.6" x D 8.0" (7.5 x 44.0 x 20.0 cm)
- * Keyboard weight: 4 lbs. (1.8 kg)
- * Operating temperature: 0 to 50 degrees C (32 to 122 F.)
- * Storage temperature: -20 to 65 degrees C (-4 to 149 F.)
- * Humidity: 10-95% in the absence of condensation

C. Warranty

LIMITED WARRANTY

The Company warrants that The Product will be free from defects in material and workmanship for a period of 90 days (three months) from the date of shipment from the factory. The Company will repair (or, at its option, replace) any The Product CRT terminal which proves to be defective during this warranty period, provided that the terminal is returned to The Company as hereinafter specified.

No defective terminal may be returned to The Company without a Return Material Authorization (RMA) Number from The Company. This number must be included on the shipping container and the packing list when the terminal is returned. To obtain an RMA number, contact The Company or our Authorized

Distributor or Dealer, at the address on the back of this manual.

Shipment to The Company's Authorized Repair Facility shall be at the expense of the Owner of the shipped terminal, and in no case shall The Company be liable for costs of shipping or for damages sustained during shipment. The Company will pay return shipping costs for terminals which are under warranty.

Note: The The Product Warranties do NOT cover:

- a. Routine maintenance and adjustment required to maintain the The Product for operations specified in the Operator's or Service Manuals.
- b. Failure or malfunction which may result from improper maintenance, operation (including hostile environments), or lack of proper care.
- c. Damage during shipment.
- d. Failure of any component specifically described as being excluded from Warranty in either the Operator's or Maintenance Manuals.
- e. Malfunctions arising from connection or interfacing to any other equipment whatever.

LIMITATIONS OF WARRANTY

The foregoing warranties are in lieu of all other warranties, express or implied, including (but not limited to) the implied warranties of merchantability and fitness for a particular purpose. In no event will The Company be liable for consequential damages.

NOTE

Outside of the USA, the above warranty may not apply. Check with the Authorized Distributor or Dealer from whom you bought the The Product.

D. Repair Services

You can get repairs for your The Product from:

- * Authorized Distributors and Dealers
- * The Company's Factory Repair Facility
- * Independent Service Organizations
- * Your own repair people, with replacement boards from The Company

If you have any hardware problem with the The Product, first contact the Authorized Distributor or Dealer from whom you bought the terminal.

If you cannot contact your dealer, contact our Independent Service Organization or The Company directly. You will have to pay the costs of shipping the The Product from your place of business to the Service Center,

and also return shipping costs. You will also have to pay standard hourly rates for out-of-warranty repairs. The current rates and charges will be explained when you contact us.

Note: When sending us a terminal for repair, you must have a Return Material Authorization Number, as described in the Warranty included with this manual. Also, please include a detailed written description of what's wrong with the terminal, and the name and telephone number of a responsible technical person whom we can contact, in case of questions.

II. GETTING STARTED

A. Receiving Inspection

Before you accept the The Product from the carrier, first check the carton to make sure that it has not been opened; next, check the carton for damage (holes, dents, scrapes, etc.) which might show that the package had been mishandled, dropped or damaged in transit. If you find that it has been opened, or that there is visible damage, DO NOT OPEN THE CARTON. Note the damage on the waybill, and insist that the delivery agent sign the waybill. Notify the carrier, your Distributor or Dealer, and The Company immediately.

B. Unpacking

The The Product is shipped in a sturdy cardboard box, with styrofoam packing and plastic sheeting, to protect it from damage during shipment.

To unpack the The Product, carefully slit the sealing tape that secures the the top flaps to the box -- do not cut the box itself, since you may need it and the styrofoam packing to re-ship the terminal.

Carefully lift out the keyboard and monitor assemblies, and the styrofoam packing piece by piece. If there is any evidence of broken glass in the package as you open it, be extremely careful -- the inside coating of all cathode ray tubes (TV tubes) is poisonous. If there is any doubt, use heavy gloves when taking the Monitor Assembly out of the package.

C. In case of Damage

If you do find hidden damage when you unpack the The Product, immediately notify the carrier and your Distributor or Dealer. Pictures of the damaged carton or terminal will help when it comes time to file a claim for damages.

To recover for shipping damage, you must file a claim with the carrier who transported the terminal. The Company will arrange to repair damage incurred during shipment, but will bill you for the cost of the repairs. You must then recover these costs from the carrier, or their insurance company.

D. Mechanical Check-out

Check the Monitor Assembly and the power cord carefully for damage. Make sure that the power switch on the back of the Monitor Assembly moves freely, and clean the face of the CRT tube with a soft cloth, if necessary.

Next, take the coiled cord which comes out of the Keyboard, make sure that there are no kinks or knots in it, and plug the modular jack at its end into the socket on the right side of the Monitor Assembly.

Figure 1.
Picture of Modular Jack & Socket

E. Power Cords

The The Product is shipped from the factory with a U.S. NEMA Standard 3-pronged plug. If you need a different type of plug, first, make sure that the power cord is NOT plugged into the wall socket (mains), then cut off the plug that is on the cord, and connect whatever plug you need for your local power system.

The wires in the The Product's power cord are color-coded as follows:

Green = Earth ground
 Black = Primary power (hot)
 White = Primary power return (neutral).

F. Cables and Connections

The Host and Printer Interface connectors on the back of the monitor assembly are Female DB-25S (25-pin RS-232) connectors. Set up the male connectors of the RS-232 cables to the host computer and the printer according to Tables 1 and 2.

Pin #	Signal Name
1	Frame (Protective) Ground (Earth)
2	TxD (Data Output from Terminal)
3	RxD (Data Input to Terminal)
4	RTS (Request To Send -- Output)
5	CTS (Clear To Send -- Input)
6	DSR (Data Set Ready -- optional Input)
7	Signal Ground
8	DCD (Carrier Detect) -- Input
20	DTR (Data Terminal Ready -- Output)
9	20 mA source (+12V, no load)
14	20 mA source (+12V, no load)
10	Detected Current Loop Data
25	+ Transmit Loop Current
13	- Transmit Loop Current
12	+ Receive Loop Current
24	- Receive Loop Current

Table 1. -- Host Interface Connector

Pin	Signal Name
1	Frame (Protective) Ground
2	RxD (Received Data -- from Aux. Device)
3	TxD (Transmitted Data -- to Aux. Device)
4	RTS (Request to Send -- from Aux. Device)
5	CTS (Clear to Send -- to Aux. Device)
6	DSR (Data Set Ready -- to Aux. Device)
7	Signal Ground
8	DCD (Data Carrier Detect -- to Aux. Device)
19	Aux. Device Busy line
20	DTR (Data Terminal Ready -- from Aux. Device)

Table 2. -- Auxiliary Port Interface Connector

G. 20 mA Current Loop

If you will be using 20 mA current loop to communicate with your terminal, set up the connectors as shown in Figure 2:

Figure 2. -- Current Loop configuration

H. Voltage Selection

On the back of the monitor assembly, there is a switch for selecting either 115 V AC or 230 V AC. (See Figure 3) Set this switch to whatever voltage your local power lines (mains) carry.

Figure 3. -- Photo of back of Monitor Assembly, showing Power Switch, etc.

H. Power On/Off

After you have chosen the right voltage, plug in the The Product and turn on the power by pressing on the end of the power switch with the white dot (see Figure 3.).

You should hear a "beep" from the keyboard, and the CRT screen should light up slowly, with the cursor at the top left corner.

If the The Product does not start up, turn off the power by pressing on the unmarked end of the power switch, unplug the power cord, and check the fuse on the back of the Monitor Assembly. If it is blown, replace it with a 115V, 1A/230V, 0.5A fuse, plug the The Product back in, and try again.

If the fuse is OK, check to see if there really is power at the outlet (mains) -- get an electric lamp or some simple electric appliance, plug it in, and try it.

III. SETTING TERMINAL PARAMETERS

A. Contrast

At the front of the The Product's monitor assembly, at the bottom right hand corner, there is a wheel for adjusting the contrast (brightness or dimness) of the screen. To set the contrast, move the wheel back and forth until the screen looks good to you. We suggest that you do this while a display is on the screen, so that you get a good balance between normal and half-intensity displays.

B. Setting Default Parameters

There are a number of DIP switches on the back of the The Product's monitor assembly (see Figure 5.) which control the DEFAULT settings of various operating parameters for the terminal. When you turn the The Product ON, or press the SHIFT and BREAK keys simultaneously, it checks these DIP switches, and sets the parameters accordingly.

After the power has been turned ON, the DIP switches have no effect, so to change the default parameters, you must set them with <ESC> sequences.

You can change some of these parameters, either from the keyboard or by remote programming from the Host computer, but setting the DEFAULTS saves operator and programming time.

Figure 5.
Back of monitor assembly -- showing all DIP switches

As you can see from Figure 5, and by looking at the back of the Monitor Assembly, we have included a chart of the settings for the DIP switches on the case of the The Product. Any time you need to change the setting, simply turn the Monitor Assembly around, check the chart for the settings you need, and set the DIP switches accordingly.

Using the chart, you can quickly set the:

PRINT PORT BAUD RATE -- Switches 1 - 3 on the Left DIP Switch let you specify any baud rate from 110 to 19,200 baud.

END OF MESSAGE -- Switches 4 & 5 let you specify which character will be sent as the End of Message delimiter when the The Product is operating in Block Mode.

INTERNATIONAL CHARACTER SET -- Switches 6 - 8 let you specify which of the 8 character sets you want to display on the screen. Appropriate keycaps may be purchased separately. (Optional)

SCREEN FREQ -- Switch 9 lets you specify the refresh rate for the display screen.

BUSY LABEL -- Switch 10 on the Left DIP Switch lets you specify whether a High or Low logic signal on Line 19 of the Printer Port will be recognized as a printer Busy signal.

EMULATION -- Switches 1 - 3 on the Center DIP Switch let you specify which terminal you want the terminal to emulate.

AUTO LF -- Switch 4 lets you specify whether the terminal will emit a Line Feed character after every Carriage Return, or not.

CURSOR -- Switches 5 & 6 let you specify what the Cursor will look like when it is displayed on the screen.

LINE TRUNCATE -- Switch 7 lets you specify whether the terminal will move characters in Column 80 to the next Row down, or discard them, when you insert characters in the middle of a line in Insert Mode.

HD/FD -- Switch 8 lets you specify whether the terminal will communicate with the Host Computer in Full or Half Duplex Mode.

MAIN PORT BAUD RATE -- Switches 1 - 3 on the Right DIP Switch lets you specify any baud rate from 110 to 19,200.

STOP BIT -- Switch 4 lets you specify how many stop bits the terminal will send with every character it transmits to the Host computer.

DATA LENGTH -- Switch 5 lets you specify how many bits of data a character will include.

PARITY MODE -- Switches 6 - 8 on the Right DIP Switch let you specify what kind of parity the terminal will use and expect when communicating with the Host computer.

C. Monitor Tilt

The The Product's Monitor Assembly can be adjusted so that the screen is at a comfortable viewing angle. There are 5 possible positions, from 5 to 15 degrees, which you can select by lifting up on the front edge of the Monitor Assembly and moving the Monitor Support, as shown in Figure 5:

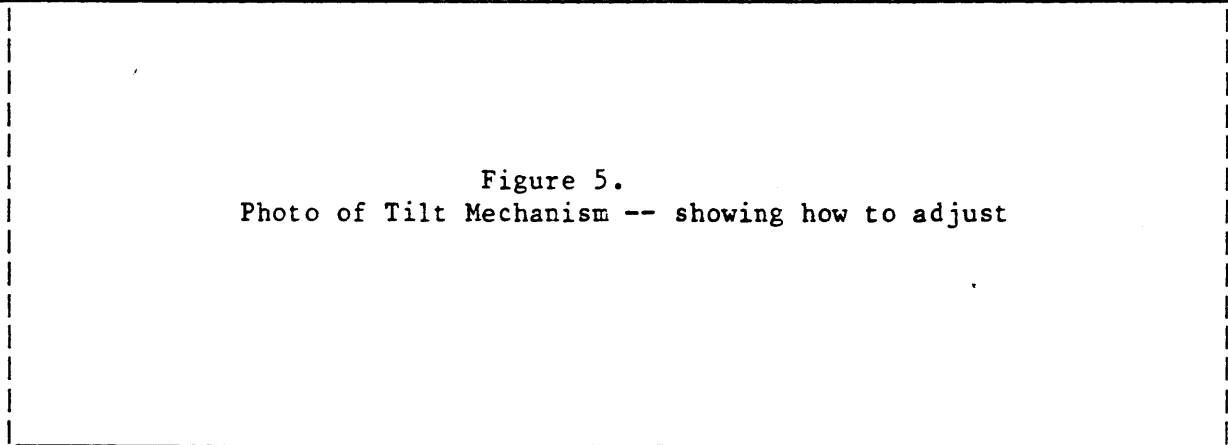


Figure 5.
Photo of Tilt Mechanism -- showing how to adjust

IV. THE KEYBOARD

The The Product's keyboard has 93 keys, which can be divided into 5 groups:

A. Alphanumeric Keys

The letter and number keys are arranged like a normal typewriter keyboard, so that typists will be familiar with it.

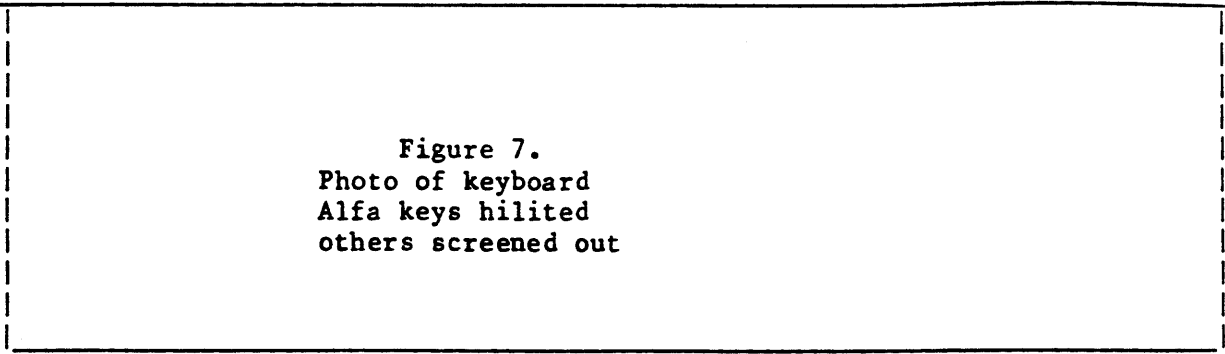


Figure 7.
Photo of keyboard
Alfa keys hilited
others screened out

B. Numeric Keypad

Just to the right of the typewriter style keyboard, there is a numeric keypad, with the keys arranged like a normal 10-key calculator. This keypad allows you to enter numeric data quickly and accurately.

The <ENTER> key operates like the <RETURN> key, except in Block Mode, where it is used to send a whole screen of information to the host computer. (See the discussion of Operating Modes on Page XX, for a detailed explanation of Block Mode.)

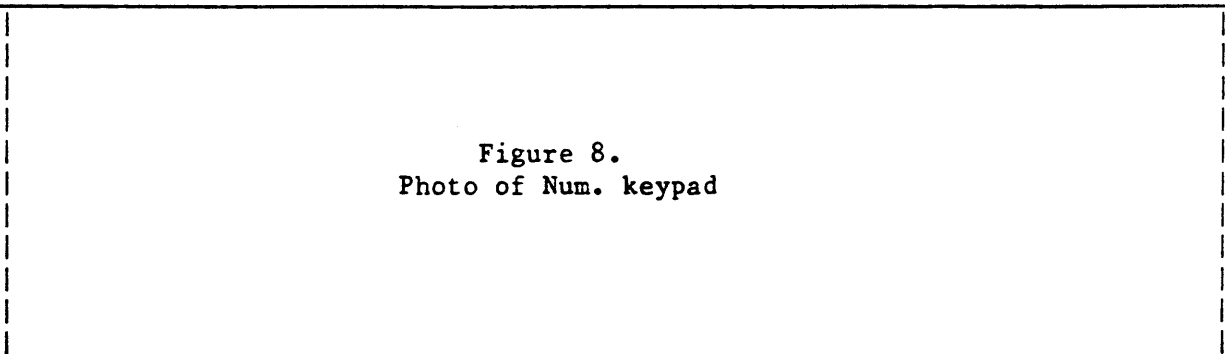


Figure 8.
Photo of Num. keypad

C. Screen Control Keys

The terminal has two groups of keys for controlling what is displayed on the CRT Screen:

1. Cursor Control Keys

The Product has a group of keys which control the movement of the cursor on the screen:

The <Arrow> keys (Up, Down, Right, and Left) move the cursor in the directions that they point.

The <RETURN> key moves the cursor back to the left side of the screen, and the Line Feed key moves it down one line.

The <HOME> key moves the cursor to the top left corner of the screen.

The <TAB> key causes the cursor to move right several spaces, depending on the tab setting in your program. Pressing the Shift and Tab keys at the same time causes the cursor to Back Tab -- move to the left, depending on your program.

In addition, the terminal lets you set Tab Stops at any Column position on the screen by placing the cursor in the column where you want a Tab Stop, and pressing <ESC> and then <1>. Thereafter, when you press <TAB> or <BACKTAB>, the cursor will move left or right to the nearest Tab Stop. To delete a particular Tab Stop, send an <ESC><2>, and to delete ALL Tab Stops, send an <ESC><3>.

If Write Protect Mode is ON, pressing <TAB> or <BACKTAB> will move the cursor right or left to the next Unprotected field on the screen -- regular Tab Stops, however, will be inoperative.

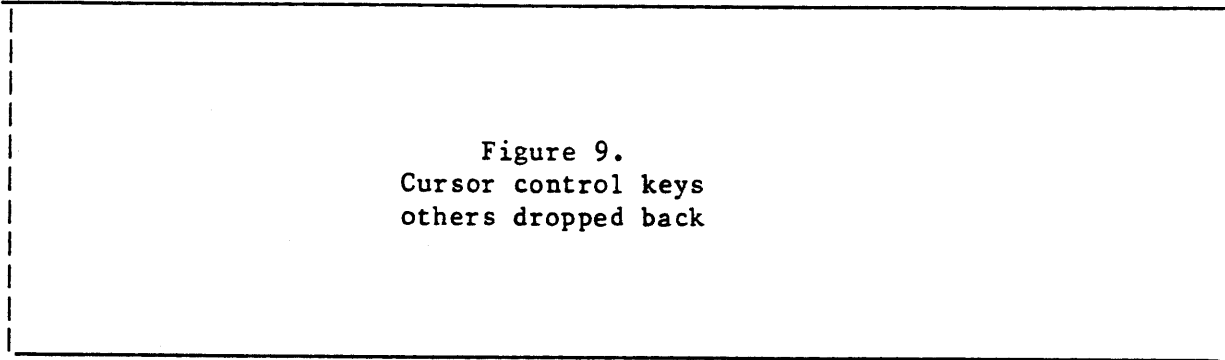


Figure 9.
Cursor control keys
others dropped back

2. Editing Keys

Note: The abbreviations "EOL" and "EOP" stand for End Of Line and End Of Page.

There are 8 keys for quick editing:

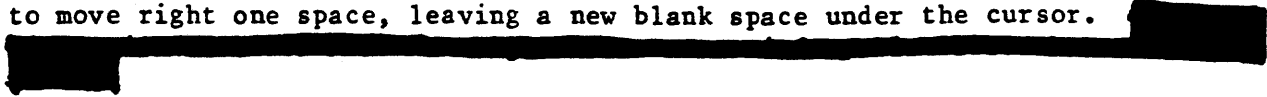
Pressing Shift and the Clear/Home key will clear all unprotected characters from the screen, and put the cursor at the first unprotected character position, ready for new data.

The EOP/CLEAR/EOL key clears unprotected characters which are to the right of and below the cursor. Pressing this key alone will clear characters from wherever the cursor is, to the end of the line that it is on. Pressing the SHIFT key at the same time will clear all characters from the cursor position to the bottom of the screen.

The INS/LINE/DEL key inserts and deletes entire lines. Pressing this key alone will delete an entire line, and cause all of the lines below it to move up. Pressing the SHIFT key at the same time will cause the line on which the cursor is sitting to move down one row, leaving the cursor on a blank line. (See the discussion of Block Mode on Page XX for more information about how this key works.)

The INS/CHAR/DEL key inserts and deletes single characters. Pressing

this key alone will delete the character at the cursor position, causing all the other characters on the line to move left one space. Pressing the SHIFT key at the same time will cause all the characters to the right of the cursor to move right one space, leaving a new blank space under the cursor.



The RUB OUT key (sometimes called DEL or Delete) sends a character to the computer which tells it to delete the last character sent. Depending on the program you are working with, this may cause the character to disappear, or it may print a block of dots on the screen.

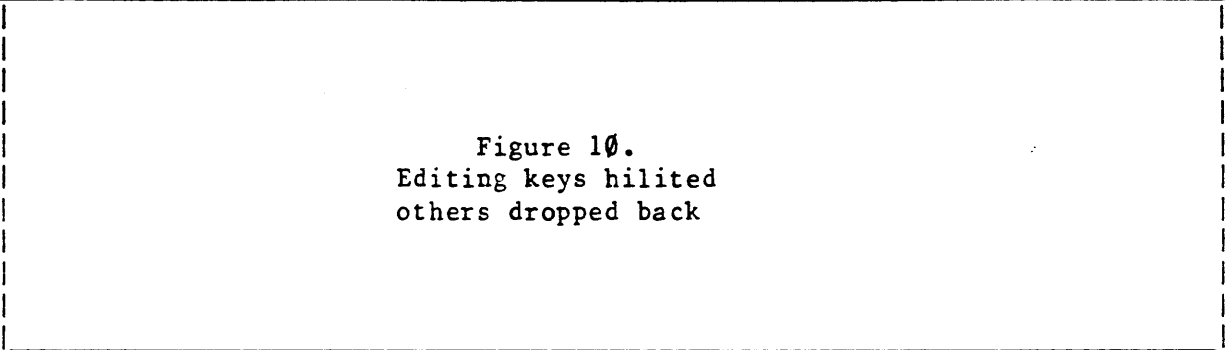


Figure 10.
Editing keys hilited
others dropped back

D. Function Keys

There are 5 Function keys on the top row of the The Product's keyboard, marked F1 - F5:

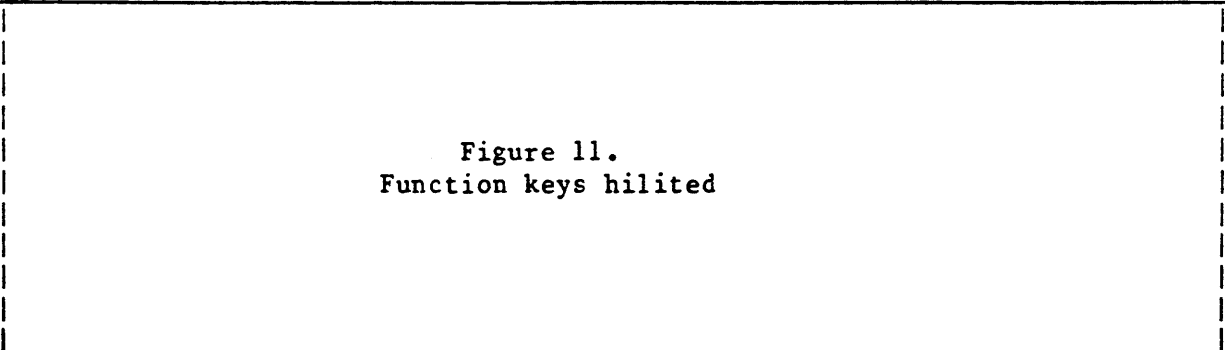


Figure 11.
Function keys hilited

These keys produce the following codes when pressed:

Key	Unshifted		Shifted	
	Hex	Characters	Hex	Characters
F1	01 40 0D	CTL-A @ CR	01 60 0D	CTL-A ` CR
F2	01 41 0D	" A "	01 61 0D	" a "
F3	01 42 0D	" B "	01 62 0D	" b "
F4	01 43 0D	" C "	01 63 0D	" c "
F5	01 44 0D	" D "	01 64 0D	" d "

Table 3 -- Function Key Codes

Your application program must recognize these keys, and decide what action to perform when it sees them.

E. Functional Command Keys

The CTRL key works with the "@", "A"..."Z", and "[", "\", "]", "^", "_" keys to generate the ASCII Control characters from 00 to 1F (hexadecimal -- 0 to 31 decimal) which are used by some computer systems for passing control information.

The ESC key generates the ASCII Escape character, which indicates that the next character or characters has some special meaning to the computer system.

Holding down the SHIFT key while pressing the ESC key generates a Local Escape -- the The Product will prepare to execute an ESC function, but will not send an ESC character to the host computer.

The PRINT key causes the The Product to send all of the characters on the screen to the printer via the Printer Interface connector on the back of the Monitor Assembly.

The BREAK key sends a special signal to the Host computer via the RS-232 interface, indicating that something unusual is happening -- some Host computer systems need to see the BREAK signal to recognize that a terminal is now active, and needs attention, others use BREAK as a signal to quit whatever they are doing, and get new instructions from the terminal.

Holding down the SHIFT key while pressing the BREAK key causes the The Product to reset itself. It clears any error condition, reads the DIP switches on the back of the monitor assembly, and sets up all parameters as if you had just turned on the power.

Figure 12.
Funct. Command Keys
highlighted

V. THE SCREEN

The The Product can display a total of 25 lines on its CRT screen:

Figure 13.
Photo of CRT Screen
Text pattern on lines
1 - 24, + status line

A. Text Lines 1-24

The top 24 lines of the The Product's screen are for entering text and data. Data typed in at the keyboard, or data from the host computer normally appears here.

B. Line 25 -- Status or User Display

The 25th line of the screen is usually a status line, telling you where the cursor is on the screen, and what operating parameters have been selected:

Figure 13.
Illustration of the Status Line
(Line drawing, maybe)

1. Row & Column

The first field of the Status line (at the left end), contains the characters `<*RC=>` and four digits. This field tells you which Row and Column

the cursor is in.

The first two digits show what row (line) the Cursor is on. These digits will vary from <01> to <24>.

The next pair of digits show what column (character position on the line) the Cursor is on. These digits will vary from <01> to <80>.

2. Emulation Mode

The second field of the Status Line tells you which terminal the product is emulating. The codes that appear here are:

ADM3A	for the	Lear-Siegler ADM3A or ADM5
ADS25	for the	ADDS 25
TE910	for the	TeleVideo 910/925
H1420	for the	Hazeltine 1420
FR50	for the	Terminal's native mode.

3. Character Set

The third field tells you which character set the terminal is using to display text on the screen. These character sets are optional, please contact _____ for more information. The possible codes are:

DENMK	for	Danish or Norwegian
FRAN	for	French
GERM	for	German or Swiss
JAPAN	for	Japanese
SPAIN	for	Spanish
SWEDN	for	Swedish or Finnish
U.K.	for	British or Dutch
U.S.	for	ASCII standard characters.

4. Auxiliary Port Mode

The fourth field shows the status of the terminal's Auxiliary Port. The codes displayed are:

BDIR	for	Bidirectional Mode
PRT0	for	Print Mode 0
PRT1	for	Print Mode 1
PRT2	for	Print Mode 2
PRT3	for	Print Mode 3

These modes are explained in detail on Pages XX to XXX.

5. Editing Mode

The sixth field of the Status Line shows what Editing Mode the terminal is in. These Editing Mode codes are:

EDTL	for	EDiT a Line at a time
EDTP	for	EDiT a Page at a time

INSL for INSert a Line at a time

INSP for INSert a Page at a time

Edit Mode (either Line or Page at a time) is the mode which you will use most often. This mode replaces characters on the screen with whatever you type in, or with whatever characters the Host computer sends to the terminal.

Insert Mode lets you add data on the screen without erasing any of the characters which are already there. The The Product will move any text or data on the screen to the right or down a line, to make room for whatever you type in.

Page Editing Mode enables the wraparound feature for Insert Mode, and when using the Character Insert and Character Delete keys. When a Character is inserted on a line all of the characters move right one column, and the character in Column 80 moves to Column 1 of the next line.

The character in Column 80 of Row 24 (bottom right corner of the screen) is forced off and lost. Similarly, when deleting a character, all characters move left 1 column, and characters in Column 1 move to Column 80 of the line above.

Line Editing Mode disables the wraparound feature, and inserting or deleting affects only the line where the cursor is -- characters in Column 80 are lost when inserting new characters, and the The Product inserts blanks (or other Insert Character) in Column 80 when deleting.

Local Edit Mode means that character sequences sent by the CHARACTER INSert or LINE DElete keys, as well as the other keys described on Pages 19 & 20 affect the screen, but are not sent to the Host computer.

In Conversational Edit Mode, the sequences sent by the editing keys are sent to the Host computer.

You can change the Edit Mode from the keyboard, or by sending character sequences from the Host computer.

Pressing the <SHIFT> and <ESC> keys simultaneously (Local Escape, not sent to the Host computer) signals the The Product that you want to change modes. The next key you press will tell it which mode to go to:

<k> puts it in Local Edit Mode
<l> puts it in Conversational Edit Mode
<q> puts it in Insert Mode
<r> puts it in Edit Mode (clears Insert Mode)
<N> puts it in Page Mode
<O> puts it in Line Mode

You can also have the Host computer send <ESC><k>, <ESC><l>, etc., to change from one editing mode to another, under program control.

7. Keyboard Lock

The The Product lets you lock the keyboard, so that no data or text can be typed in, until it is unlocked again. This feature is very handy for applications where data integrity and security are important.

The seventh field of the Status Line shows whether the Keyboard Lock is on or off. Normally, it will appear as 4 reversed blanks (light green background). When the Keyboard is locked, the letters <KLOK> will appear in dark letters in this field.

Pressing the <ESC> key in Local Mode, or <SHIFT><ESC> (Local Escape) in Conversational Mode, then pressing <#> will lock the keyboard, while <SHIFT><ESC><"> will unlock it. You can also lock and unlock the keyboard remotely by sending the <ESC><#> and <ESC><"> sequences to the The Product from the Host computer.

8. Protect Mode

The eighth field on the Status Line shows whether there are any Protected fields or characters on the screen. This block is normally 4 reverse blanks, but if Protect Mode is ON, the dark letters <PROT> will appear in the block.

9. Write Protect Mode

The ninth field on the Status Line will display the letters "W.P." when the The Product (tm) is in Write Protect Mode.

10. Communications & Operational Modes

The tenth field in the Status Line shows which Transmission Mode the The Product is using. This field is 4 characters wide, and the first character is always blank, while the last 3 characters show the Mode.

If the The Product is in Local Mode, the Status Line block just to the right of the Graphics Mode Block will display <LOC>. Otherwise, it will show the Transmission Mode -- <FDX> or <HDX>.

Local Mode is set by the sequence <ESC><D><L>, and Block Mode is set by <ESC>, and ended by <ESC><C>.

Full Duplex is set by the sequence <ESC><D><F>, Half Duplex by <ESC><D><H>.

For more information on these modes, see <Transmission & Operating Modes>, on Page XX.

11. Main Port Baud Rate

The eleventh field shows the current Baud Rate for the Main Port. This field is 5 characters wide, and will have the numbers < 110>, < 300>, < 600>, < 1200>, < 2400>, < 4800>, < 9600>, or <19200> in it.

12. Main Port Stop Bits, Data Bits, & Parity

The twelfth field in the Status line is 4 characters wide, and shows how many stop bits and data bits the The Product's Main Port circuit is using to transmit data to the Host computer, and what kind of parity it is using.

The first character of the field is always a blank.

The second character can contain a <1> or a <2>, for either 1 or 2 Stop Bits.

The third character shows how many data bits are being used, and can contain either a <7> or an <8>.

The fourth character shows which kind of Parity the The Product is using, and can contain:

Ø	for	Parity bit set to <Ø>
1	for	Parity bit set to <1>
E	for	Even Parity
O	for	Odd Parity
N	for	No Parity bit

In Even and Odd Parity, the circuitry checks the number of bits in the ASCII character to be transmitted, and puts a <1> in the parity bit to make the total number of <1>s in the character even or odd, respectively.

13. Auxiliary Port Baud Rate

The thirteenth field shows the Baud Rate that the The Product is using to transmit to the device connected to the Auxiliary Port. The format of this field is identical to that of the Main Port Baud Rate field.

14. Auxiliary Port Stop Bits, Data Bits, & Parity

This field is shows the number of Stop Bits and Data Bits, as well as the type of Parity which the The Product is using to transmit data to the device connected to the Auxiliary Port. This field's format is identical to that of the Main Port Stop Bits, Data Bits, and Parity field.

~~The fifteenth (rightmost) field on the Status Line has the letters <SEND> on it whenever the The Product is sending a successful block of data to the Host computer in Block Mode.~~

~~Whenever the Product is in Block Mode, it will accept data from the Host computer and display it on the GPF screen only if the Host computer sends data to the Host until the <SEND> key is pressed.~~

~~Whenever the Product is in Block Mode, it will accept data from the Host computer and display it on the GPF screen only if the Host computer sends data to the Host until the <SEND> key is pressed.~~

C. Character Sets

1. Normal Alphanumeric

The The Product can display the entire ASCII character set:

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz
 0123456789
 !"#\$%&'()*+,-./:;<=>@[\\]^_`{|}~

as well as <SPACE> (< >) and (which appears as an irregular block of dots).

D. Video Attributes

The The Product lets you display characters on the screen with any of several attributes:

Normal
 Blink
 Blank
 Reverse
 Underline
 Half Intensity

or any combination of these. The The Product does not use display memory to store the attribute code -- you get a full 1920 characters displayed on the screen.

You can set the display attributes by sending the sequence <ESC><G>, followed by a one-character code.

For more information on the Display Attributes, and how to set them, see the discussion of <ESC><G>, on Page XX.

E. Screen Clearing Functions

1. The Insert Character

The normal character used to clear the CRT screen is the ASCII Space character (32 Decimal, 20 Hex, 040 Octal). Some programs, however, require an ASCII Null character (00 in Decimal, Hex and Octal) as a "placeholder" in any position on the screen which does not have valid data in it. Other programs, which lay out the screen as a form to be filled in, require different characters to indicate areas where data can be entered (Zeros on an all-numeric "pre-printed form", for instance).

The The Product normally uses the ASCII Space character to clear the screen, but allows you to specify whatever ASCII character you need as the Insert Character which clears text from the screen.

By sending the sequence:

<ESC><e>{Insert Character}

either from the keyboard or from the host computer, you can specify which character the The Product will use to clear the screen. The Line and Character Insert keys will use this Insert Character to fill in spaces when you press them.

Thereafter, you can use <ESC><;>, <ESC><+> or <Ctrl Z> (the code put out by the Clear key on the The Product keyboard) to clear all the unprotected areas on the screen to the character you specified.

2. Other Clearing Functions

If you send the character sequence <ESC><, > to the Terminal, the terminal will clear the screen to blanks which will also have the Write Protect Attribute. (See the explanation of <ESC><p>{code} on Page XX.)

If you send the sequence <ESC><: > it will clear all unprotected fields to ASCII Nulls.

If you send the sequence <ESC><* > it will clear the entire screen to ASCII Nulls, turn OFF Write Protect mode, and reset the Display Attribute. (See the explanation of <ESC><G>{code}, on Page XX.) The The Product will then operate as a normal CRT terminal: Data can be entered anywhere on the screen, and will appear as bright letters on a dark background (if you are using Reverse Video, of course, they will appear as dark letters on a light background).

VI. TRANSMISSION AND OPERATING MODES

A. Transmission Modes

The The Product has two Transmission Modes:

1. Full Duplex Mode

In this Mode, the The Product transmits every character typed in at the keyboard to the Host computer via the Main RS-232C Port on the back of the Monitor Assembly. The Host must then decide what to do in response to the character it has received. In the majority of cases, it will simply echo the character back to the terminal, and the The Product will display it on the screen (or take some action, if it is a Control Character such as <CR>). The Host program may send a different character or characters, however, such as instructions for random Cursor positioning.

In essence, the The Product sends character strings to the Host, and then displays or executes whatever the Host sends back.

2. Half Duplex Mode

In this Mode, the The Product sends character strings to the Host computer, and displays or executes them without waiting for the Host to echo them back. It will also respond to strings of characters sent from the Host, displaying or executing them, as appropriate.

In both Half and Full Duplex Modes, the The Product depends on the Host computer for all editing and most screen control functions. It acts as a "dumb" terminal.

B. Operating Modes

1. Local Mode

In Local Mode, the The Product does not communicate with the Host Computer -- it neither sends characters over the Main RS-232 Port, nor receives signals from it. It does, however, send and receive signals via the Printer Port, so that you can compose text on the screen, and then send it to the Printer by pressing the <PRINT> key.

2. Local Edit Mode

In Local Edit Mode, the The Product's edit keys make changes to the text on the screen, but do not send any characters to the Host computer.

C. Write Protect Mode

The The Product lets you protect any character or group of characters on the screen so that they cannot be overwritten. When it receives the sequence <ESC><>>, the terminal will Set the Protect Attribute for all of the following characters it receives until it gets an <ESC><(>.

It will also Set the Display Attribute for all of these characters to the current Write Protect attribute, which is set by the sequence <ESC><p>{code}.

When Write Protect Mode is turned ON by the sequence <ESC><&>, these characters will be protected from overwriting until you send the sequence <ESC><'> to turn Write Protect Mode OFF.

See the discussions of <ESC><>>, etc., below.

Write Protect Mode lets you create "preprinted forms" on the screen, so that you can enter and send to the Host computer only the information which can change, without the "line numbers" and other formatting information that the operator may need to understand the "form". This cuts down the Host's workload, since the fewer characters it has to deal with, the more time it has to do the actual data processing.

To set up a "form", the first thing you need to do is to define how the Write Protected areas will look, by setting the W.P. attribute with <ESC><p>{code} (The codes are listed on Page XX, in the discussion of <ESC><G>). If you don't explicitly load a different attribute, the terminal will display Write Protected characters in Half Intensity Normal format.

If you wanted to display W.P. fields as Half Intensity Reverse, you would send the terminal <ESC><p><D>, for instance.

Next, clear the screen to ASCII blanks with the W.P. attribute Set by sending: <ESC><, >.

Next, write the "form" on the screen by sending the text that you want to appear on the "form". Begin each Protected field with an <ESC><>>, write the descriptive text or graphics on the screen, then end it with an <ESC><(>.

Next, set the Display Attribute for the unprotected field, if you want to make it different from the normal default attribute, and write as many spaces as the input data will require.

Begin Protection again with an <ESC><>>, and so on, until you have written the whole screen.

So far, all you have done is to specify which fields on the screen are to be protected or unprotected, but have NOT actually turned the Write Protection Mode ON -- you can still write over any character on the screen.

To turn ON Write Protection, send the terminal an <ESC><&>.

Data can now be entered only in unprotected fields, and the <TAB> and <BACKTAB> will move the cursor from one unprotected field to the other.

After you have finished entering data using the "form", and want to go back to the terminal's normal unprotected editing mode, send it an <ESC><`> (1B 27 Hex) to turn OFF Write Protection.

D. Monitor Mode

The The Product has a special Monitor Mode, which lets you see which ASCII codes have been sent by the terminal or the Host computer. Instead of performing the action (like a Line Feed) specified by the character, a small two-letter abbreviation is printed on the screen. This can be very helpful in finding software problems, such as extra characters inserted in strings, and in showing where the various delimiters are when operating in Block Mode.

The following table lists the two-letter abbreviations for the ASCII control codes:

```
*****
*      Note to typesetter -- do not set this -- for each of the *
* 2-letter codes in the left column, set the first UP (superscript) *
* and the second DOWN (subscript), as per example in pencil in the *
* margin *
*****
```

Screen Code	Hex Code	Key Sequence	Description
	00	CTRL @	NUL -- NUL1
SH	01	CTRL A	SOH -- Start Of Heading
SX	02	CTRL B	STX -- Start of TeXt
EX	03	CTRL C	ETX -- End of TeXt
ET	04	CTRL D	EOT -- End Of Transmission
EQ	05	CTRL E	ENQ -- ENQuiry
AK	06	CTRL F	ACK -- ACKnowledge
BL	07	CTRL G	BEL -- BEL1
BS	08	CTRL H	BS -- Back Space
HT	09	CTRL I	HT -- Horizontal Tabulation
LF	0A	CTRL J	LF -- Line Feed
VT	0B	CTRL K	VT -- Vertical Tabulation
FF	0C	CTRL L	FF -- Form Feed
CR	0D	CTRL M	CR -- Carriage Return
SO	0E	CTRL N	SO -- Shift Out
SI	0F	CTRL O	SI -- Shift In
DL	10	CTRL P	DLE -- Data Link Escape
D1	11	CTRL Q	DC1 -- Device Control 1
D2	12	CTRL R	DC2 -- Device Control 2
D3	13	CTRL S	DC3 -- Device Control 3
D4	14	CTRL T	DC4 -- Device Control 4
NK	15	CTRL U	NAK -- Negative AcKnowledge
SY	16	CTRL V	SYN -- SYNchronize Idle
EB	17	CTRL W	ETB -- End of Transmission Block
CN	18	CTRL X	CAN -- CANCEL
EM	19	CTRL Y	EM -- End of Medium
SB	1A	CTRL Z	SUB -- SUBstitute
EC	1B	CTRL]	ESC -- ESCape (ESC key)
FS	1C	CTRL \	FS -- File Separator
GS	1D	CTRL]	GS -- Group Separator
RS	1E	CTRL ^	RS -- Record Separator
US	1F	CTRL _	US -- Unit Separator
Block	7F	DEL	RUBOUT/DEL key

E. Printing Modes

The The Product has 2 Printing Modes, for use when a printer is connected to the Auxiliary (Printer) Interface Port on the back of the Monitor Assembly:

1. Simultaneous Print Mode

This mode lets you send information from the Host computer both to the The Product's screen and to a printer connected to the Printer Port on the back of the Monitor Assembly.

To turn ON Simultaneous printing, send the terminal an <ESC><@>. To turn it OFF, send an <ESC><A>.

2. Buffer Print Mode

When Buffer Print Mode is ON, characters from the Host computer are stored in a buffer in the terminal, and NOT displayed on the screen. The terminal will send the characters to the printer at whatever baud rate the Printer Port has been set to.

To turn Buffer Print ON, send the terminal an <ESC><`>, and to turn it OFF, send an <ESC><a>.

VII. TERMINAL PROGRAMMING COMMANDS

A. Overview

The The Product provides great flexibility in setting its operating parameters -- they can be set as power-up defaults by the DIP switches on the rear of the Monitor Assembly, changed interactively from the keyboard, or controlled from the Host computer. The following sections describe the Control and Escape sequences which set and alter the operating parameters.

The notation " (Default = ON)" means that the command is in force when the The Product is turned ON, and remains in force until you change it.

B. General Terminal Commands

1. CTRL-G -- Bell

<CTRL-G> causes the small loudspeaker in the Keyboard Assembly to emit a tone for 300 ms. to get the operator's attention.

2. ESC # -- Lock Keyboard

<ESC><#> will lock the keyboard, so that nothing entered by the operator will be sent, or have any effect on the screen display.

3. ESC " -- Unlock Keyboard

<ESC><"> will unlock the keyboard, so that normal keyboard entry can continue. (Default)

4. ESC > -- Keyclick ON

<ESC> ">" will turn the keyclick function ON -- whenever any key on the keyboard is pressed, the loudspeaker in the Keyboard Assembly will emit a 100 ms. tone to verify that a key entry has been made.

5. ESC < -- Keyclick OFF

<ESC> "<" will turn the keyclick function OFF -- experienced operators often find the keyclick unnecessary and irritating. (Default)

6. ESC @ -- Simultaneous Print ON

<ESC><@> will send all characters received from the Host computer to both the CRT screen and the Auxiliary Port on the rear of the Monitor Assembly. In effect, it will print on both the screen and the printer.

7. ESC A -- Simultaneous Print OFF

<ESC><A> will quit sending received characters to the Auxiliary Port, and only print to the CRT screen. (Default)

8. ESC C -- (Conversation Mode ON)

<ESC><C> will send data input on the keyboard to the Host computer character-by-character, as it is entered. (Default = ON)

9. ESC ` -- Buffer Print ON

<ESC><`> will send all characters received from the Host computer directly to the printer connected to the Auxiliary Port, without displaying them on the CRT screen.

10. ESC a -- Buffer Print OFF

<ESC><a> will quit sending received characters to the Auxiliary Port, and will send them to the CRT screen. (Default)

11. ESC ^ -- Bell ON

<ESC><^> will turn the Bell ON, so that whenever it receives the hexadecimal value "07", it will make the small loudspeaker in the Keyboard Assembly emit a bell tone. (Default)

12. ESC _ -- Bell OFF

<ESC><_> will turn OFF the Bell function, and not emit any tones when it receives a hexadecimal "07".

13. ESC e {Char} -- Load Insert Character

<ESC><e>{any character} will cause the The Product to use the character as the default character for clearing the screen. The terminal normally uses <Space> (Hexadecimal 20) as the Insert Character for clearing the screen, and provides commands for setting unused character positions to <NUL> (Hexadecimal 00), as well as other characters.

14. ESC F {code} -- Display Control Code

<ESC><F>{Control Character (ASCII 0 - 1F Hex)} will cause that Control Character to be displayed on the screen and not executed. The list of 2-letter Control Code abbreviations is in Section VI., Page XX.

15. ESC f {Text} -- Load User Line

The The Product normally displays the status of its operating parameters on the 25th line of the CRT screen. It is possible, however, to display up to 80 characters of User information on this line.

<ESC><f>{up to 80 characters of text} will store the text in the terminal's User Line memory, ready for display. If less than 80 characters are entered, terminate the entry with a <CR>.

16. ESC g -- Display User Line

<ESC><g> will display the text stored in the User Line memory on the 25th line of the CRT screen.

17. ESC h -- Display Status Line

<ESC><h> will display the Status Line (operating parameters) on the 25th line of the CRT screen.

18. ESC Ctrl-O -- Enable Display of 25th line

<ESC><Ctrl-F> will cause the The Product to display the Status or User line on the 25th line of the screen. Displaying the 25th line on the screen slows down scrolling slightly, so that for applications in which the The Product is operating at 4800 baud or above, you may want to disable the 25th line with an <ESC><Ctrl-U>. when the The Product is emulating other terminals, <ESC><o> will do the same thing.

19. ESC Ctrl-N -- Disable Display of 25th line

<ESC><Ctrl-U> will disable the display of the 25th line on the screen. When the The Product is emulating other terminals, <ESC><n> will do the same thing. (Default)

20. ESC L -- Unformatted Print (also <SHIFT><PRINT>)

<ESC><L> will send all of the characters on the screen, from Row 1, Column 1 (top left) to the Cursor position, to the Printer via the Auxiliary Port on the back of the Monitor Assembly. It does not add a <CR><LF> at the end of a line, or at the end of the transmission. The terminal will send an <ACK> to the Host computer when it finishes transmitting the data.

Pressing the <SHIFT> and <PRINT> keys simultaneously will cause the The Product to issue an <ESC><L>.

21. ESC P -- Print (also the <PRINT> key)

<ESC><P> will send to the Printer port all characters between Row 1, Column 1 (the top left corner of the screen) and the cursor. Characters to the Right and Below the Cursor are not sent. It will send a <CR><LF> at the end of every line, and at the end of the transmitted data, as well as an <ACK>

to the Host computer when it finishes.

22. ESC U -- Monitor Mode ON

<ESC><U> will turn on the Monitor Mode -- control characters (Hexadecimal 00 to 1F, and 7F) will be printed on the screen as 2-letter abbreviation, instead of being executed. (00 Hex prints as a blank, and 7F as a dotted block -- see the discussion of Monitor Mode on Page XX, for a list of the abbreviations).

Pressing the <CTRL> and <1> keys will turn the Monitor Mode ON, but will not cause the The Product to emit any characters.

23. ESC u or ESC X -- Monitor Mode OFF

<ESC><u> or <ESC><X> will turn off the Monitor Mode -- after the sequence of characters is entered and written to the CRT screen, all control characters (Hexadecimal 00 to 1F) will be interpreted as commands, and not printed as 2-letter abbreviations. (Default)

Pressing the <CTRL> and <2> keys simultaneously will turn the Monitor Mode OFF, but will not cause the The Product to emit any characters.

C. Cursor Control Commands

1. CTRL H -- Backspace

<CTRL-H> (Hexadecimal 08) will move the cursor left 1 column on the screen, without altering any of the characters on the screen.

If the cursor was on Column 1 of any Row and Wraparound is ON, it will move to Column 80 of the Row above. If Wraparound is OFF, the cursor will not move. (Both the <BACK SPACE> and <Left Arrow> keys cause the The Product to issue a <CTRL-H>.)

If the cursor is at the HOME position (Row 1, Column 1), it will not move when the <BACK SPACE> or <Left Arrow> keys are pressed.

2. CTRL I -- Tab

<CTRL-I> (Hexadecimal 09) will print several <Space> characters (Hexadecimal 20) on the screen until the cursor reaches the next defined Tab Stop. (See <ESC l>, below, for how to set Tab Stops) (The <TAB> key causes the The Product to issue a <CTRL-I>.)

See the discussion on Page XX, for the effect of the <TAB> key when Protect Mode is ON.

3. CTRL J -- Line Feed

<CTRL-J> (Hexadecimal 0A) will move the cursor down 1 row on the screen, leaving it on the same column, without altering any of the characters on the screen.

If Scrolling is ON, a <LF> will cause the screen to scroll if the Cursor is on the 24th (bottom) Row. (The <LINE FEED> and <SHIFTed DOWN-ARROW> keys issue a <CTRL-J>). If Scrolling is OFF, the cursor will move from Row 24 (bottom of the screen) to Row 1 (top of the screen) when the The Product

receives a <CTRL-J>.

4. CTRL K -- Cursor Up (Up Arrow)

<CTRL-K> (Hexadecimal 0B) will move the cursor up 1 row on the screen, leaving it on the same column, without altering any of the characters on the screen. If the cursor is on Row 1 (the top line), it will not move upwards, nor will it cause the screen to scroll down. (The <UP-ARROW> key issues a <CTRL-K>.)

5. CTRL L -- Cursor Right (Right Arrow)

<CTRL-L> (Hexadecimal 0C) will move the cursor right 1 column, leaving it on the same row, without altering any of the characters on the screen.

If wraparound is ON and the cursor is in Column 80, the cursor will move to Column 1 of the next Row (if it is in Row 24, it will go to Row 1, Column 1).

If Wraparound is OFF, and the cursor is in Column 80, it will not move.

(The <RIGHT-ARROW> key issues a <CTRL-L>.)

6. CTRL M -- Carriage Return (Return)

<CTRL-M> (Hexadecimal 0D) will move the cursor to Column 1 (the left end) of the Row that it is on. (The <RETURN> key issues a <CTRL-M>.) If AUTO LF is ON, the terminal will also issue a <LF> (<CTRL-J>, 0A Hex).

7. CTRL V -- Cursor Down (Down Arrow)

<CTRL-V> (Hexadecimal 16) will move the cursor down 1 row on the screen, leaving it in the same column. If the cursor was on the 24th line, it will not move below the 24th line. (The <Down Arrow> key issues a <CTRL-V>.)

8. CTRL ^ -- Home

<CTRL ^> (Hexadecimal 1E) will move the cursor to Row 1, Column 1 (the top left-hand corner of the CRT screen, without altering any of the characters on the screen. (The <HOME> key issues a <CTRL ^>.)

9. CTRL _ -- Newline (<CR> & <LF>)

<CTRL _> (Hexadecimal 1F) will move the cursor to Column 1 of the row below, effectively issuing a Carriage Return and a Line Feed, without altering any of the characters on the screen. (No single key on the keyboard will duplicate this command -- it is provided as a convenience to the programmer.)

10. ESC [{code} -- Set Cursor Row Position

<ESC><[><{code}> will move the Cursor to the position in the current row specified by the code. The codes are the same as those which are used to do random X-Y cursor positioning -- add the desired cursor position to 20 hex, and use the ASCII character specified by that hex value. (See Table 5, on Page XX, below)

11. ESC] {code} -- Set Cursor Column Position

<ESC><[>{code} will move the Cursor up or down in the same Column, to the position specified by the code. The codes are the same as the ones used for random X-Y cursor addressing. (See Table 5, on Page XX, below)

12. ESC 1 -- Set Tab

<ESC><1> will set a Tab Stop at the Column position where the cursor is located. The The Product will remember the Tab Stop, and you may use the <TAB> key to go to this column position at any time.

See the discussion on Page XX for an explanation of the effect of <TAB> in Protect Mode.

13. ESC 2 -- Clear Tab

<ESC><2> will clear any Tab Stop which may exist at the cursor position.

14. ESC 3 -- Clear All Tabs

<ESC><3> will clear ALL Tab Stops which have been set.

15. ESC = {Row}{Column} -- Random Cursor Addressing

<ESC><=>{Row Character}{Column Character} will move the cursor to the position specified by the Row and Column characters.

The Row and Column characters are generated by adding the Row or Column number desired to the value of the ASCII <Space> character (32 Decimal, 20 Hex), as illustrated in the following table:

Row / Col	ASCII Char	Hex Code	Decimal	Oct	Row / Col	ASCII Char	Hex Code	Decimal	Oct
1	<SP>	20	32	40	41	H	48	72	110
2	!	21	33	41	42	I	49	73	111
3	"	22	34	42	43	J	4A	74	112
4	#	23	35	43	44	K	4B	75	113
5	\$	24	36	44	45	L	4C	76	114
6	%	25	37	45	46	M	4D	77	115
7	&	26	38	46	47	N	4E	78	116
8	'	27	39	47	48	O	4F	79	117
9	(	28	40	50	49	P	50	80	120
10	)	29	41	51	50	Q	51	81	121
11	*	2A	42	52	51	R	52	82	122
12	+	2B	43	53	52	S	53	83	123
13	,	2C	44	54	53	T	54	84	124
14	-	2D	45	55	54	U	55	85	125
15	.	2E	46	56	55	V	56	86	126
16	/	2F	47	57	56	W	57	87	127
17	0	30	48	60	57	X	58	88	130
18	1	31	49	61	58	Y	59	89	131
19	2	32	50	62	59	Z	5A	90	132
20	3	33	51	63	60	[	5B	91	133

21	4	34	52	64	61	\	5C	92	134
22	5	35	53	65	62	]	5D	93	135
23	6	36	54	66	63	^	5E	94	136
24	7	37	55	67	64	_	5F	95	137
25	8	38	56	70	65	~	60	96	140
26	9	39	57	71	66	a	61	97	141
27	:	3A	58	72	67	b	62	98	142
28	;	3B	59	73	68	c	63	99	143
29	<	3C	60	74	69	d	64	100	144
30	=	3D	61	75	70	e	65	101	145
31	>	3E	62	76	71	f	66	102	146
32	?	3F	63	77	72	g	67	103	147
33	@	40	64	100	73	h	68	104	150
34	A	41	65	101	74	i	69	105	151
35	B	42	66	102	75	j	6A	106	152
36	C	43	67	103	76	k	6B	107	153
37	D	44	68	104	77	l	6C	108	154
38	E	45	69	105	78	m	6D	109	155
39	F	46	70	106	79	n	6E	110	156
40	G	47	71	107	80	o	6F	111	157

Table 5. -- Cursor Addressing

16. ESC ? -- Read Cursor Row/Column position

<ESC><?> will send the Row and Column position of the cursor to the Host computer as the character string "{Row}{Column}", where the {Row} and {Column} are the Row or Column number added to the ASCII value of the SPACE character.

If the cursor were at Row 2, Column 13, <ESC><?> would return: <"><->.

17. ESC Ctrl-C -- Fetch character at Cursor Position

<ESC><Ctrl-C> will cause the The Product to send the character which is under the cursor and a carriage return to the host computer. In Hazeltine emulation mode, an <ESC><!> will do the same thing.

18. ESC I -- Back Tab

<ESC><I> will move the cursor left to the previous Tab Stop or unprotected field, if Write Protect Mode is ON. (<SHIFT><TAB> [Back Tab] issues the sequence <ESC><I>)

19. ESC i -- Field Tab

<ESC><i> will move the cursor to the beginning of the next unprotected field on the screen.

The The Product lets you set protected fields (which can not be written into from the keyboard) as well as unprotected fields. This is especially useful in setting up screen "forms" for data entry. <ESC><i> lets you move to the next unprotected field, without having to calculate its screen location.

20. ESC j -- Reverse Line Feed

<ESC><j> will move the cursor up one row, without changing columns, or altering any character on the screen. If Scrolling is ON, <ESC><j> will cause the screen to scroll down 1 Row, if the Cursor is in Row 1 (top). (<SHIFT><UpArrow> issues the sequence <ESC><j>)

D. Display Control Commands

1. CTRL Z -- Clear Unprotected to Insert Character

<CTRL Z> will clear all unprotected screen locations to the current Insert Character -- this is an ASCII <Space> by default, but can be set to anything you like by using <ESC><e>{Insert Character}.

2. ESC & -- Write Protect Mode ON

<ESC><&> will turn the Write Protect Mode ON. When Protect Mode is on, characters with the Write Protect Attribute set can not be written over. When Write Protect Mode is ON, all screen attributes are fixed to particular locations on the screen (See the discussion of <ESC><c>, below, and also the discussion of Write Protect Mode on Page XX.)

3. ESC ' -- Write Protect Mode OFF

<ESC><'> will turn the Write Protect Mode OFF, and normal data or text entry can continue. (Default)

4. ESC . {code} -- Load Cursor Attribute

<ESC><.>{code} will set the Cursor Attribute, so that the cursor will be displayed in various ways. The codes are:

<0> = Cursor is a Steady Block
 <1> = Cursor is Not Displayed
 <2> = Cursor is a Blinking Block
 <3> = Cursor is a Blinking Underline

5. ESC) -- Begin Write Protection

<ESC><)> will Begin Write Protect Mode; thereafter, any character displayed on the screen up to the next <ESC><(> will be Write Protected, if Write Protect Mode has been turned ON by an <ESC><&>.

6. ESC (-- End Write Protection

<ESC><(> will End Write Protect Mode, and characters on the screen up to the next <ESC><)> will be unprotected, and can be written over. (Default)

7. ESC * -- Clear All to NULLs

<ESC><*> will clear all character positions on the screen to the ASCII <NULL> character (&00). This is used in some programs instead of the <Space> character to fill unused screen positions.

8. ESC + -- Clear All Unprotected to the Insert Character

<ESC><+> will clear all unprotected character positions to the current Insert Character, which is an ASCII <Space> (20 Hex) by default, unless set to another character with an <ESC><e>{char}.

9. ESC ; -- Clear All Unprotected to the Insert Character

(This command is the same as <ESC><+>.)

10. ESC , -- Clear All to Write Protected Insert Character

<ESC><, > will clear all character positions to the Insert Character, with the Write Protect Attribute set. (See Page XX)

11. ESC : -- Clear All Unprotected to <NULL>

<ESC><: > will clear all unprotected character positions to the ASCII <NULL> character (00).

12. ESC b -- Set Reverse Field

<ESC> will change the screen display to dark characters on a light background.

13. ESC d -- Set Normal Field

<ESC><d > will set the screen display to the normal dark background with bright characters.

14. ESC c -- Set Fixed Attribute

<ESC><c > causes the terminal to set fixed attributes -- the particular attribute (blinking, underline, reverse, etc.) is attached to a particular location on the CRT screen. Any character in that location will be displayed with the attribute. When Write Protect mode is ON, all attributes are fixed.

This feature allows you to set up "forms" on the CRT screen. If Row 2, Columns 3 through 10 have the reverse attribute set, any data entered there will be displayed in reverse video. This feature is most useful in Block Mode, and in applications where the text does not scroll on the screen.

15. ESC w -- Set Attribute by Character

<ESC><w > will cause the terminal to allow you to set the attribute of each character separately by using <ESC><G>{code}. The attribute will "follow" the character around on the screen when it is moved, or the screen scrolls. (Default)

This feature is useful for highlighting specific sections of text, and is useful in Conversational Mode, and when text scrolls up the screen.

16. ESC G {code} -- Set Display Attribute

<ESC><G > prepares the The Product to set the Screen Display Attribute for the part of the screen which is to the Right and Below the cursor. The next character is the code which tells it which attribute to set.

The codes are listed in Table 6, below.

Table 6. -- Attribute Codes

Intensity
Half Full

<@>	<0>	= Normal (Bright characters on dark background) (DEFAULT)
<A>	<1>	= Blank (Characters not displayed)
	<2>	= Blink (Characters blink)
<C>	<3>	= Blink Blank (Characters not displayed)
<D>	<4>	= Reverse (Dark characters on light background)
<E>	<5>	= Reverse Blank (Not displayed)
<F>	<6>	= Reverse Blink (Dark characters blink)
<G>	<7>	= Reverse Blink Blank (Not displayed)
<H>	<8>	= Underline (Bright characters, bright underline)
<I>	<9>	= Underline Blank (Not displayed)
<J>	<:>	= Underline Blink (Characters blink, underline steady)
<K>	<:>	= Underline Blink Blank (Not displayed)
<L>	"<"	= Underline Reverse (Dark characters, dark underline)
<M>	<=>	= Underline Reverse Blank (Not displayed)
<N>	">"	= Underline Reverse Blink (Characters blink, underline steady)
<O>	<?>	= Underline Reverse Blink Blank (Not displayed)

17. ESC H -- Toggle Auto-Scroll

<ESC><H> will turn ON auto-scrolling, if it is off, or turns it OFF if it is on. (Default = ON)

18. ESC p {code} -- Set Write Protection Attribute

<ESC><p>{code} specifies the Display Attribute for all subsequent Write Protected characters. The default value is <@>, Half Intensity. The codes used to change from the default are the same as the ones used to set Display Attributes. (See <ESC><G>, above)

19. ESC T -- Erase to EOL with Insert Character

<ESC><T> will replace all the characters from the cursor to the end of the current line with the Insert Character. The Insert Character is normally an ASCII <Space>, but can be set to any character with <ESC><e>{any single character}.

20. ESC t -- Erase to EOL with Nulls

<ESC><t> will replace all the characters from the cursor to the end of the current line with the ASCII NULL character (00).

21. ESC Y -- Erase to EOP with Insert Character

<ESC><Y> will replace all the characters from the cursor to the bottom of the screen with the Insert Character. The Insert Character is normally an ASCII <Space>, but can be set to any character with <ESC><e>{any single character}.

22. ESC y -- Erase to EOP with Nulls

<ESC><y> will replace all the characters from the cursor to the bottom of the screen with the ASCII NULL character (00).

E. Editing Commands

1. ESC E -- Line Insert

<ESC><E> will move all of the lines below the cursor down one line, leaving the cursor on a line consisting of Insert Characters. The bottom line of the screen will scroll off and be lost. The <LINE INS> key issues an <ESC><E>.

2. ESC N -- Set Page Edit

<ESC><N> will cause the terminal to Insert and Delete Characters by moving the whole page left or right, and inserting and deleting characters at Row 24, Column 80 (bottom right corner). (See the discussion of Editing Mode on Page XX.)

3. ESC O -- Set Line Edit

<ESC><O> will cause the terminal to insert and delete characters only on the line where the cursor is. (See the discussion on Page XX.) (Default)

4. ESC Q -- Character Insert

<ESC><Q> will move all of the characters to the right of the cursor right one space, leaving the cursor on the Insert Character which fills the inserted space. Any character in Column 80 will be scrolled off the right side of the screen and lost. The <CHAR INS> key issues an <ESC><Q>.

5. ESC R -- Line Delete

<ESC><R> will delete all of the characters on the line where the cursor is, and move all of the lines below the cursor up one line. The bottom line on the screen will consist of Insert Characters. The <LINE DEL> key issues an <ESC><R>.

6. ESC W -- Character Delete

<ESC><W> will delete the character at the cursor position, moving all characters on the line left one column to fill the deleted space. An Insert Character will be entered in Column 80. The <CHAR DEL> key issues an <ESC><W>.

7. ESC k -- Set Local Edit

<ESC><k> will set the terminal to respond to the Editing Keys, but not send their character sequences to the Host computer.

8. ESC l -- Set Conversational Edit

<ESC><l> will set the terminal to send the Edit key character sequences to the Host computer for processing. (Default)

9. ESC q -- Set Insert Mode

<ESC><q> will put the The Product in Insert Mode. All characters typed in at the keyboard will be entered on the screen, and characters already there

will move right and down to make room for them. (See discussion of Insert Mode on Page XX).

10. ESC r -- Clear Insert Mode

<ESC><r> will clear Insert Mode, and return to Edit Mode, where characters sent from the keyboard or the Host computer overwrite characters already on the screen. (See discussion of Insert Mode on Page XX). (Default)

F. Communication Control Commands

1. CTRL N -- End XON/XOFF Software Handshaking

<CTRL N> will quit doing software handshaking with the Host computer by sending XON/XOFF signals. (See <CTRL O>)

2. CTRL O -- Begin XON/XOFF Software Handshaking

<CTRL O> will begin doing software handshaking with the Host computer by sending XON/XOFF signals. (Default)

XON/XOFF software handshaking is done by sending an ASCII <DC3> character (Hex 13) for XOFF to the Host computer when the terminal's internal character storage buffer is almost full. The Host computer must recognize the XOFF, and stop sending characters over the RS-232C line. When the The Product's character buffer is almost empty, it tells the Host to start sending again by sending it an ASCII <DC1> character (Hex 11) for XON.

3. CTRL R -- Enable Bidirectional Auxiliary Port

<CTRL R> will connect the Auxiliary Port in parallel with the Host Port, allowing the Host and any device to communicate directly. Characters sent from the Host or the Auxiliary (which might be a KSR machine, for instance) will be displayed on the The Product's CRT screen. <CTRL R> sets the baud rate of the Auxiliary Port equal to the Main Port's baud rate.

4. CTRL T -- Disable Bidirectional Auxiliary Port

<CTRL T> will disconnect the Auxiliary Port from the Host Port. (Default)

5. ESC Ctrl-F -- Enable Hardware Handshaking

<ESC><CTRL F> will cause the The Product to enable hardware handshaking by means of the DTR line in the main (host) port. When the terminal is busy, and cannot accept a character from the host computer, it will pull the DTR line LOW to signal that it is busy.

6. ESC Ctrl-U -- Disable Hardware Handshaking

<ESC><CTRL U> will cause the The Product to ignore the DTR line, and use either software handshaking or no handshaking. (Default)

7. ESC D {code} -- Set Communication Mode

<ESC><D> {code} will set the Communication Mode. Possible modes are:

Full Duplex, in which the The Product communicates with the Host computer

in Full Duplex mode. The code for Full Duplex is <F>.

Half Duplex, in which the The Product communicates with the Host computer in Half Duplex mode. The code for Half Duplex is <H>.

Local, in which the The Product does not communicate with the Host Computer -- all changes and editing are done on the screen locally. The code for Local is <L>.

When the terminal is turned ON, the Transmission Mode is set according to the default DIP switch on the back of the Monitor Unit. (See the discussion of Transmission and Operating Modes on Page XX)

8. ESC { bspw -- Configure Main Port

<ESC><{><code> will set the baud rate, stop bits, parity and word length for the Main Interface Port on the back of the Monitor Assembly. The parameters are:

b = Baud Rate

<0>	=	110
<1>	=	300
<2>	=	600
<3>	=	1200
<4>	=	2400
<5>	=	4800
<6>	=	9600
<7>	=	19200

s = Stop Bits

<0>	=	1 Stop Bit
<1>	=	2 Stop Bits

p = Parity

<0>	=	No Parity (Parity Ignored)
<1>	=	Odd Parity, both Transmit & Receive
<3>	=	Even Parity, both Transmit & Receive
<5>	=	Mark Parity, Transmit Parity Check Disabled
<7>	=	Space Parity, Transmit Parity Check Disabled

w = Word Length

<0>	=	8 Bits
<1>	=	7 Bits

Default values for the Main Port Baud Rate, Stop Bits, Parity, and Word Length are set from the DIP switches on the back of the Monitor Unit when the power is turned on or when you press the <SHIFT> and <BREAK> keys simultaneously.

If the terminal does not recognize a received character because of bad parity, wrong number of bits, etc., it will print a <?> on the screen for each bad character received.

9. ESC } bspw -- Configure Auxiliary Port

<ESC><><bspw> will set baud rate, stop bits, parity and wordlength for the Auxiliary (Printer) Interface Port on the back of the Monitor Assembly.

The "bspw" codes are the same as those for <ESC><(><bspw>, above.

The two commands above are used to override the default settings which the The Product reads from the DIP switches on the back of the Monitor Unit when the power is turned on, or to reset the values after they have been changed for a particular application.

X. APPENDICES

NOTE: The codes used to indicate command parameters are:

- {*} = in the "Default" column, indicates a default parameter
- {--} = indicates Not Applicable, or not a Default
- {c} = a character
- {n} = one or more decimal numbers
- {t} = a text string, 80 or less characters, ending with a Carriage Return
- bspw = four digits, indicating:
 - Baud Rate
 - Number of Stop Bits
 - Parity
 - Word Length (number of bits/character)
- DIP = a parameter selectable via the DIP switches on the rear of the Monitor Unit
- H.I. = Half Intensity display

See the discussion of the individual commands in the text for detailed explanations of the parameters.

A. List of Control Codes -- Alphabetical by Function

Function	Default	Code	Page No.
Back Tab	--	ESC I	XX
Begin XON/XOFF Handshake	*	CTRL O	XX
Begin Write Protection	--	ESC)	XX
Bell	--	CTRL G	XX
Bell OFF	--	ESC _	XX
Bell ON	*	ESC ^	XX
Buffer Print OFF	*	ESC a	XX
Buffer Print ON	--	ESC `	XX
Carriage Return	--	CTRL M	XX
Character Delete	--	ESC W	XX
Character Insert	--	ESC Q	XX
Clear All TABs	--	ESC 3	XX
Clear All to W.P. Space	--	ESC ,	XX
Clear All to Nulls	--	ESC *	XX
Clear Insert Mode	*	ESC r	XX
Clear Monitor Mode	*	CTRL 2	XX
Clear Monitor Mode	*	ESC X	XX
Clear Monitor Mode	*	ESC u	XX
Clear TAB here	--	ESC 2	XX
Clear Unprot to Ins Char	--	CTRL Z	XX
Clear Unprot to Nulls	--	ESC :	XX
Clear Unprot to Space	--	ESC ;	XX
Clear Unprot to Space	--	ESC +	XX
Configure Main Port	DIP	ESC { bspw	XX
Configure Aux. Port	DIP	ESC } bspw	XX
Conversation Mode ON	*	ESC C	XX
Cursor Down (Down Arrow)	--	CTRL V	XX
Cursor Left (Back Space)	--	CTRL H	XX
Cursor Right (Right Arw)	--	CTRL L	XX
Cursor Up (Up Arrow)	--	CTRL K	XX
Disable BiDir Print Port	*	CTRL T	XX
Disable Hardw Handshake	*	ESC CTL U	XX
Disable 25th Line	*	ESC CTL N	XX
Display Control Code	--	ESC F {c}	XX
Display Status Line	*	ESC h	XX
Display User Line	--	ESC g	XX
Enable BiDir Print Port	--	CTRL R	XX
Enable Hardw Handshake	--	ESC CTL F	XX
Enable 25th Line	--	ESC CTL O	XX
End Write Protection	--	ESC (	XX

End XON/XOFF Handshake	--	CTRL N	XX
Erase EOL with NULs	--	ESC t	XX
Erase EOL with Insert Chr	--	ESC T	XX
Erase EOP with NULs	--	ESC y	XX
Erase EOP Insert Char	--	ESC Y	XX
Field Tab	--	ESC i	XX
Home	--	CTRL ^	XX
Keyclick OFF	*	ESC <	XX
Keyclick ON	--	ESC >	XX
Line Delete	--	ESC R	XX
Line Feed	--	CTRL J	XX
Line Insert	--	ESC E	XX
Load Cursor Attribute	DIP	ESC . {n}	XX
Load Insert Character	Blank	ESC e {c}	XX
Load User Line	--	ESC f {t}	XX
Lock Keyboard	--	ESC #	XX
Monitor Mode OFF	*	CTRL 2	XX
Monitor Mode OFF	*	ESC u	XX
Monitor Mode OFF	--	ESC X	XX
Monitor Mode ON	--	CTRL 1	XX
Monitor Mode ON	--	ESC U	XX
Newline (CR & LF)	--	CTRL _	XX
Print	--	ESC P	XX
Random Cursor Addressing	--	ESC = {n,n}	XX
Read Cursor R/C Position	--	ESC ?	XX
Reverse Line Feed	--	ESC j	XX
Set Attribute by Char	*	ESC m	XX
Set Conversational Edit	*	ESC l	XX
Set Cursor Column Pos	--	ESC] {n}	XX
Set Cursor Row Position	--	ESC [{n}	XX
Set Display Attribute	Ø	ESC G {n}	XX
Set Fixed Attributes	--	ESC c	XX
Set Full Duplex Mode	DIP	ESC D F	XX
Set Half Duplex Mode	DIP	ESC D H	XX
Set Insert Mode	--	ESC q	XX
Set Line Edit Mode	*	ESC O	XX
Set Local Edit	--	ESC k	XX
Set Local Mode	--	ESC D L	XX
Set Normal Video	*	ESC d	XX
Set Page Edit Mode	--	ESC N	XX
Set Reverse Video	--	ESC b	XX
Set TAB here	--	ESC l	XX
Set Write Prot Attrib	H.I.	ESC p {n}	XX
Simultaneous Print OFF	*	ESC A	XX
Simultaneous Print ON	--	ESC @	XX

TAB	—	CTRL I	XX
Toggle Auto-Scroll	*	ESC H	XX
Unformatted Print	--	ESC L	XX
Unlock Keyboard	*	ESC "	XX
Write Protection OFF	*	ESC ^	XX
Write Protection ON	--	ESC &	XX

B. List of Control Codes -- Alphabetical by CTRL/ESC sequence

Code	Function	Default Setting	Page No.
CTRL 1	Monitor Mode ON	--	XX
CTRL 2	Monitor Mode OFF (clear)	*	XX
CTRL G	Bell	--	XX
CTRL H	Cursor Left (Back Space)	--	XX
CTRL I	TAB	--	XX
CTRL J	Line Feed	--	XX
CTRL K	Cursor Up (Up Arrow)	--	XX
CTRL L	Cursor Right (Right Arw)	--	XX
CTRL M	Carriage Return	--	XX
CTRL N	End XON/XOFF Handshake	--	XX
CTRL O	Begin XON/XOFF Handshake	*	XX
CTRL R	Enable BiDir Print Port	--	XX
CTRL T	Disable BiDir Print Port	*	XX
CTRL V	Cursor Down (Down Arrow)	--	XX
CTRL Z	Clear Unprot to Ins Char	--	XX
CTRL ^	Home	--	XX
CTRL _	Newline (CR & LF)	--	XX
ESC CTL F	Enable Hardware Handshake	--	XX
ESC CTL N	Disable 25th Line Display	*	XX
ESC CTL O	Enable 25th Line Display	--	XX
ESC CTL U	Disable Hardw Handshake	*	XX
ESC "	Unlock Keyboard	*	XX
ESC #	Lock Keyboard	--	XX
ESC &	Write Protection ON	--	XX
ESC ^	Write Protection OFF	*	XX
ESC (	End Write Protection	--	XX
ESC)	Begin Write Protection	--	XX
ESC *	Clear All to Nulls	--	XX
ESC +	Clear Unprot to Space	--	XX
ESC ,	Clear All to W.P. Space	--	XX
ESC . {n}	Load Cursor Attribute	DIP	XX
ESC 1	Set TAB here	--	XX
ESC 2	Clear TAB here	--	XX
ESC 3	Clear All TABs	--	XX
ESC :	Clear Unprot to Nulls	--	XX
ESC ;	Clear Unprot to Space	--	XX
ESC <	Keyclick OFF	*	XX
ESC = {n,n}	Random Cursor Addressing	--	XX
ESC >	Keyclick ON	--	XX
ESC ?	Read Cursor R/C Position	--	XX

ESC @	Simultaneous Print ON	--	XX
ESC A	Simultaneous Print OFF	*	XX
ESC C	Conversation Mode ON	*	XX
ESC D F	Set Full Duplex Mode	DIP	XX
ESC D H	Set Half Duplex Mode	DIP	XX
ESC D L	Set Local Mode	--	XX
ESC E	Line Insert	--	XX
ESC F {c}	Display Control Code	--	XX
ESC G {n}	Set Display Attribute	0	XX
ESC H	Toggle Auto-Scroll	*	XX
ESC I	Back Tab	--	XX
ESC L	Unformatted Print	--	XX
ESC N	Set Page Edit Mode	--	XX
ESC O	Set Line Edit Mode	*	XX
ESC P	Print	--	XX
ESC Q	Character Insert	--	XX
ESC R	Line Delete	--	XX
ESC T	Erase EOL Insert Char	--	XX
ESC U	Monitor Mode ON	--	XX
ESC W	Character Delete	--	XX
ESC X	Monitor Mode OFF	*	XX
ESC Y	Erase EOP Insert Char	--	XX
ESC [{n}	Set Cursor Row Position	--	XX
ESC] {n}	Set Cursor Column Pos	--	XX
ESC ^	Bell ON	*	XX
ESC _	Bell OFF	--	XX
ESC `	Buffer Print ON	--	XX
ESC a	Buffer Print OFF	*	XX
ESC b	Set Reverse Video	--	XX
ESC c	Set Fixed Attributes	--	XX
ESC d	Set Normal Video	*	XX
ESC e {c}	Load Insert Character	Blank	XX
ESC f {t}	Load User Line	--	XX
ESC g	Display User Line	--	XX
ESC h	Display Status Line	*	XX
ESC i	Field Tab	--	XX
ESC j	Reverse Line Feed	--	XX
ESC k	Set Local Edit	--	XX
ESC l	Set Conversational Edit	*	XX
ESC m	Set Attribute by Char	*	XX
ESC p {n}	Set Write Prot Attrib	H.I.	XX
ESC q	Set Insert Mode	--	XX
ESC r	Clear Insert Mode	*	XX
ESC t	Erase EOL with NULs	--	XX
ESC u	Monitor Mode OFF	*	XX

ESC y	Erase EOP with NULs	--	XX
ESC { bspw	Configure Main Port	DIP	XX
ESC } bspw	Configure Auxiliary Port	DIP	XX

C. Emulated Codes

Function	Freedom 100	TeleVideo 910	Hazeltine 1420	ADDS 25	ADM3/5
Back Tab	ESC I	ESC I	ESC I	ESC I	ESC I
Begin XON/XOFF	CTRL O	CTRL O			
Begin Write Protect	ESC)	ESC)		ESC)	ESC)
Bell	CTRL G	CTRL G	CTRL G	CTRL G	CTRL G
Bell OFF	ESC _	ESC _			ESC _
Bell ON	ESC ^	ESC ^			ESC ^
Buffer Print OFF	ESC a	ESC a	ESC ?	ESC a	ESC a
Buffer Print ON	ESC `	ESC `	ESC *	ESC `	ESC `
Carriage Return	CTRL M	CTRL M	CTRL M	CTRL M	CTRL M
Character Delete	ESC W	ESC W		ESC E	ESC W
Character Insert	ESC Q	ESC Q		ESC F	ESC Q
Clear All TABs	ESC 3	ESC 3			ESC 3
Clear to W.P. I.C.	ESC ,	ESC ,	ESC CTRL \	ESC ,	ESC ,
Clear All to Nulls	ESC *	ESC *		ESC *	ESC *
Clear Insert Mode	ESC r	ESC r			ESC r
Clear Monitor Mode	CTRL 2	CTRL 2	CTRL 2	CTRL 2	CTRL 2
Clear Monitor Mode	ESC u or X	ESC u or X			ESC u or X
Clear TAB at Cursor	ESC 2	ESC 2			ESC 2
Clr Unpr to Ins Chr	CTRL Z	CTRL Z	ESC CTRL]	CTRL Z	CTRL Z
Clr Unpr to Ins Chr	ESC +	ESC +		ESC +	ESC +
Clr Unpr to Ins Chr	ESC ;	ESC ;		ESC ;	ESC ;
Configure Main Port	ESC { bspw	ESC { bspw			
Configure Aux. Port	ESC } bspw	ESC } bspw			
Convers. Mode ON	ESC C	ESC C			ESC C
Cursor Down	CTRL V	CTRL V	ESC CTRL K	CTRL J	CTRL J
Cursor Left	CTRL H	CTRL H	CTRL H	CTRL U	CTRL H
Cursor Right	CTRL L	CTRL L	CTRL P	CTRL F	CTRL L
Cursor Up	CTRL K	CTRL K	ESC CTL L	CTRL Z	CTRL K
Disable BiDir Port	CTRL T	CTRL T	CTRL T		CTRL O
Disable Hardw Handsh	ESC CTL U				
Disable 25th Line	ESC CTL N	ESC n	ESC n	ESC n	ESC n
Display CTRL Code	ESC F {c}	ESC F {c}		ESC Z {c}	ESC f {c}
Display Status Line	ESC h	ESC h	ESC h		
Display User Line	ESC g	ESC g	ESC g		
Enable BiDir Port	CTRL R	CTRL R	CTRL R		CTRL N
Enable Hardw Handsh	ESC CTL F				
Enable 25th Line	ESC CTL O	ESC o	ESC o	ESC o	ESC o
End Write Protect	ESC (	ESC (		ESC (	ESC (
End XON/XOFF	CTRL N	CTRL N			
Erase EOL w/ Null	ESC t	ESC t			ESC t

Erase EOL Ins Chr	ESC T	ESC T	ESC CTL O	ESC K	ESC T
Erase EOP w/ Null	ESC y	ESC y		ESC *	ESC y
Erase EOP Ins Chr	ESC Y	ESC Y	ESC CTL X	ESC k	ESC k
Field Tab	ESC i	ESC i	CTRL I	ESC i	ESC i
Home	CTRL ^	CTRL ^	ESC CTL R	CTRL A	CTRL ^
Keyclick OFF	ESC <	ESC <			
Keyclick ON	ESC >	ESC >			
Line Delete	ESC R	ESC R		ESC l	ESC R
Line Feed	CTRL J	CTRL J	CTRL J	CTRL J	CTRL J
Line Insert	ESC E	ESC E	ESC CTL Z	ESC M	ESC E
Load Cursor Attrib	ESC . {n}	ESC . {n}		ESC . {n}	ESC . {n}
Load Insert Char	ESC e {c}	ESC e {c}			ESC e {c}
Load User Line	ESC f {t}	ESC f {t}			ESC f {t}
Lock Keyboard	ESC #	ESC #	ESC CTL U	ESC 5	ESC #
Monitor Mode OFF	ESC u/X	ESC u/X			ESC u/X
Monitor Mode OFF	CTRL 2	CTRL 2	CTRL 2	CTRL 2	CTRL 2
Monitor Mode ON	ESC U	ESC U			ESC U
Monitor Mode ON	CTRL 1	CTRL 1	CTRL 1	CTRL 1	CTRL 1
Newline (CR & LF)	CTRL _	CTRL _		CTRL _	CTRL _
Formatted Print	ESC P	ESC P			ESC P
Random Cursor Address	ESC = nn	ESC = nn	ESC CTL Q	ESC Y nn	ESC = nn
Read Cursor Position	ESC ?	ESC ?	ESC CTL E		ESC ?
Reverse Line Feed	ESC j	ESC j	ESC j		ESC j
Self Test	ESC V	ESC V		ESC V	ESC V
Set Attrib. by Char	ESC m	ESC m			ESC m
Set Convers. Edit	ESC l	ESC l			ESC l
Set Cursor Col Posn	ESC] {n}	ESC] {n}		CTRL P {n}	ESC] {n}
Set Cursor Row Posn	ESC [{n}	ESC [{n}		CTRL K {n}	ESC [{n}
Set Display Attrib	ESC G {n}	ESC G {n}	ESC CTL Gn	ESC Ø {n}	ESC G {n}
Set Fixed Attribute	ESC c	ESC c			ESC c
Set Full Duplex	ESC D F	ESC D F			ESC D F
Set Half Duplex	ESC D H	ESC D H			ESC D H
Set Insert Mode	ESC q	ESC q			ESC q
Set Line Edit	ESC O	ESC O			
Set Local Edit	ESC k	ESC k			
Set Local Mode	ESC D L				
Set Normal Video	ESC d	ESC d	ESC CTL G0	ESC G0	ESC G
Set Page Edit Mode	ESC N	ESC N			
Set Reverse Video	ESC b	ESC b	ESC CTL G4	ESC b	ESC b
Set TAB at cursor	ESC l	ESC l			ESC l
Set W. P. Attribute	ESC p {n}	ESC p {n}			ESC p {n}
Simul Print OFF	ESC A	ESC A	ESC ?	CTRL T	CTRL O
Simul Print ON	ESC @	ESC @	ESC /	CTRL R	CTRL N
TAB	CTRL I	CTRL I	CTRL N	CTRL I	CTRL I
Toggle Auto-Scroll	ESC H	ESC H		ESC H	ESC H

Unformatted Print	ESC L	ESC L			ESC L
Unlock Keyboard	ESC "	ESC "	ESC CTL F	ESC 6	ESC "
Write Protect OFF	ESC ^	ESC ^	ESC CTL _		ESC ^
Write Protect ON	ESC &	ESC &	ESC CTL Y		ESC &