

concept

**REFERENCE
MANUAL**

INFOCON

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CONCEPT -100

Reference Manual

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WARRANTY

Human Designed Systems (HDS) warrants that each terminal will be free from defective materials and workmanship for ninety (90) days from date of shipment to the original customer.

HDS agrees to correct any of the above defects (parts and labor only) when the terminal is returned to the factory freight prepaid by customer. Return authorization must be obtained from HDS before returning the terminal to the factory. The repaired terminal will be returned to the customer freight collect.

Under this warranty HDS may at its option repair or replace the defective terminal or terminal components. Normally, HDS will not ship replacement equipment until the defective terminal or terminal component is received (freight prepaid by the customer) at the HDS factory or service depot — HDS at its option may ship replacement equipment prior to receipt of the defective equipment. In this case the customer will receive an invoice (for the full price of the equipment) upon shipment of the replacement and a cancellation of that invoice upon receipt of the defective terminal or terminal component at HDS' factory or service depot. The model number and serial number must be furnished by the customer at the time of request for warranty service.

This warranty shall be invalid if, in HDS' sole judgment, the terminal or component has been subjected to misuse, abuse, neglect, accident, improper installation or application, alteration or neglect in use, storage, transportation or handling, or if the serial number has been removed, defaced or altered.

EFFECTIVE JANUARY 1, 1979

TABLE OF CONTENTS

Section I Overview and Features	
I.1 Display.....	I-2
I.1.1 General.....	I-2
I.1.2 APL/ASCII.....	I-2
I.1.3 Optional Character Sets.....	I-3
I.1.4 Cursor.....	I-3
I.1.5 Windows.....	I-3
I.1.6 Data Highlighting.....	I-3
I.2 Keyboard.....	I-4
I.2.1 General.....	I-4
I.2.2 Main Pad.....	I-4
I.2.3 Numeric Pad.....	I-6
I.2.4 Function Pad.....	I-6
I.2.5 Programmable Function Keys.....	I-7
I.2.6 Editing and Transmission Keys.....	I-8
I.3 Communication Line(s).....	I-9
I.4 Modes of Operation.....	I-9
I.5 Terminal Functions.....	I-12
I.6 Status Line.....	I-13
Section II Installation and Operation.....	
II.1 Installation.....	II-2
II.1.1 Unpacking.....	II-2
II.1.2 Connectors.....	II-2
II.1.3 Power.....	II-2
II.1.4 Communication Settings.....	II-4
II.2 Operation.....	II-4
Section III Programmer's Reference.....	
III.1 System Overview.....	III-2
III.2 Data Flow.....	III-2
III.3 Windows, Screen, Cursors.....	III-2
III.4 Character Attributes.....	III-3
III.5 Device Independence.....	III-5
III.6 Functions and Function Routing.....	III-5
III.7 Programmable Function Keys.....	III-6
III.8 Programmable Message Characters.....	III-8
III.9 Editing Functions.....	III-9
III.10 Terminal Functions.....	III-9
Appendix A: ASCII Character Set.....	
Appendix B: APL Character Set.....	A-1
Appendix C: Graphics Character Set.....	B-1
Appendix D: Terminal Default Conditions.....	C-1
Appendix E: RS232 Pin Assignment.....	D-1
Appendix F: Summary of Control Codes and Escape Sequences.....	E-1
Appendix G: Timing Considerations.....	F-1
Appendix H: Reference Manual Addendum.....	G-1
Set Insert Type.....	H-1
Define Clear Characteristics.....	H-2
Suspend Transmission.....	H-3
Resume Transmission.....	H-5
Appendix I: Getting Started With the Concept Terminal.....	H-5
Appendix J: 20MA Current Loop Interface Option.....	H-6
Appendix K: Split Speed Option.....	I-1
Appendix L: 20MA Current Loop Interface Option.....	J-1
Appendix M: Split Speed Option.....	K-1

LIST OF TABLES

Table I	Control Keys.....	I-5
Table II	Function Pad Keys.....	I-6
Table III	Editing and Transmission Keys.....	I-8
Table IV	Modes of Operation.....	I-10
Table V	Communication Switch Settings.....	II-3
Table VI	Character Attributes.....	III-4
Table VII	Programmable Function Key Defaults.....	III-7
Table VIII	Function Key Pad - Transmission Defaults.....	III-8
Table IX	Programmable Message Characters.....	III-9
Table X	Terminal Function Summary.....	III-11
	General.....	III-11
	APL/ASCII.....	III-13
	Mode Settings.....	III-14
	Cursor Controls.....	III-18
	Editing.....	III-21
	Display.....	III-24
	Transmission.....	III-28
	Multiple Devices.....	III-32
	Screen Control.....	III-36
	Function Keys.....	III-38

Section I
Overview and Features



CONCEPT

The CONCEPT display system is composed of a CRT display, a detached keyboard, up to four communication lines, and a microprocessor controller. All terminal electronics, except the keyboard, are contained on a single circuit board, which, with the power supply module and monitor, is housed in the display case. All connectors and switches are located on the back panel of the display case.

I.1 DISPLAY

I.1.1 General

A high resolution 20.5 cm (8") x 26.7 cm (10.5) CRT screen provides display of 1920 characters in a 24 line by 80 column format (one display page). Up to 8 display pages of data (optional) may be stored, with 24 lines viewable. A nonglare screen and use of a 7x9 dot matrix in a 10x12 dot array create sharp easy to read characters. Data may be displayed as white characters in a black background (normal video) or as black characters in a white background (reverse video). Pedestal mounting of the display places the screen at an optimal viewing height. Tilt adjustment within a 20 degree range provides additional flexibility and viewing comfort. The display may be used without the pedestal where the application requires wall or shelf mounting. A brightness control on the underside front left of the display case allows convenient adjustment to individual preference.

I.1.2 APL/ASCII

ASCII and APL character sets are selectable from the keyboard or communication line(s). Characters from both character sets may be intermixed on the same screen. APL legends appear on the top of the keys and ASCII legends, where they differ, appear on the front of the keys.

The ASCII character set, shown in Appendix A, includes the 96 upper-lower case characters with lower case descenders and nondestructive underlining. The 32 control codes, displayed in transparent mode (see below), provide line drawing, continuous curve approximation, and special symbols.

The APL character set includes the 96 APL characters shown in Appendix B in a typewriter paired coding structure with full overstrike capability. The 32 control codes have display representation in transparent mode as the subscripted and superscripted digits "0" to "9", "i", "j", "k", "n", "=", and "," - also with full overstrike capacity

for technical text creation.

I.1.3 Optional Character Sets

Up to a total of four character sets may be provided on the concept terminal for extended graphics, foreign language, technical, or other requirements. A number of standard character sets are available as well as facilities for creation of special user defined character sets. Characters from different sets may be intermixed on the display and appear in adjacent locations.

I.1.4 Cursor

The "Cursor" points to the location for the next character. It appears on the screen as a blinking underline or a blinking block, selectable by the operator or program. Both incremental cursor movement and absolute cursor addressing are provided as well as reading of the cursor address. While one cursor is normally used to point to the next location for keyboard or program data, the program can select to use an invisible cursor to position its data without affecting the location of keyboard data.

I.1.5 Windows

A window is a rectangular area of display memory which is treated as the user's logical display. Any number of windows of arbitrary size and location can be used, limited only by the 80 columns and 24 lines (or more if multiple pages are installed) of physical display memory.

Use of windows allow multiple independent operations simultaneously in different areas of the screen. For example, a user might list his program in one window while he tests it in another. A data entry/retrieval application might keep header information and field headings displayed at the top of the screen (one window) and scroll through individual data records in the bottom of the display (a second window). Windows allow fuller use of the screen in display terminal applications. As with the cursor, the keyboard and communication line(s) can maintain and operate in separate independent windows. Default operation, however, uses one window consisting of all display memory for compatibility with CRT terminals without windowing capability.

I.1.6 Data Highlighting

Each character position may be assigned attributes to highlight the data or protect it from being overwritten. Attributes include underlining, reverse video, half intensity, blinking, secure (nondisplay), and protection. Any combination of attributes may be selected for a

character position. Such highlighting features combined with line drawing can be used to significantly enhance display applications. In APL, overstruck operators can only select the reverse video attribute.

I.2 KEYBOARD

I.2.1 General

The keyboard is composed of a main pad, a numeric pad, a terminal function pad, and up to 19 programmable function keys, with distinct shifted and unshifted codes. The keyboard is designed with positive touch, matte finished keys in a layout for efficient and comfortable operator use.

I.2.2 Main_Pad

The main pad has the familiar typewriter layout. In addition to the character keys there are several control keys which are generally familiar to terminal users. These include the following:

Table I
Control Keys

RETURN	Returns the cursor to the left margin of the current line.
LINE FEED	Positions the cursor in the same column of the next line.
BACK SPACE	Positions the cursor one space to the left, with wrap around to the end of the previous line.
TAB/BTAB	Positions the cursor at the next (unshifted)/previous (shifted) tab stop on the line. See Forms Mode for use in forms applications.
ESC	Generates the ESCAPE character (decimal 27)
RUBOUT	Generates the RUBOUT character (decimal 127)
CTRL	Pressed in conjunction with any character key produces the corresponding control code
BREAK	Causes a "Break" or high level on the communication line for approximately 300 milliseconds.
REPT	Pressed in conjunction with any other key repeats that key at a rate of 15 times per second.

1.2.3 Numeric_Pad

The numeric pad includes the decimal digits, minus sign, and decimal point in a calculator layout for fast and convenient numeric data entry. Five keys with yellow silkscreened front legends used in conjunction with the Mult-Code key on the function pad (legend also in yellow) provide easy recognition of normally variable mode settings (see Tables IV and VII for details).

1.2.4 Function_Pad

The function pad provides one key execution of frequently used terminal functions. This pad may also be set to transmit function sequences instead of executing the functions. See Table VIII for details.

Table II
Function Pad Keys

↑	Moves the cursor up one line with wrap around to the last line.
↓	Moves the cursor down one line with wrap around to the first line.
→	Moves the cursor right one position with wrap around to the next line.
←	Moves the cursor left one position with wrap around to the previous line.
HOME	Moves the cursor to the HOME position (upper left corner).
TAB SET/CLR	Sets (unshifted)/clears (shifted) a tab stop at the current column.
SCROL	Moves the display area down (unshifted)/up (shifted) one line (for terminals with multiple pages of memory).
PAGE	Moves the display area to the next (unshifted)/previous (shifted) 24 lines (for terminals with multiple pages of memory).

PRINT	Unshifted: Prints all data from the "home position" up to (but not including) the cursor position. If the cursor is at the home position the entire window is printed. Shifted: Prints all data from the beginning of line up to (but not including) the cursor position. If the cursor is at the beginning of line, the entire line is printed. Control Unshifted: Attaches the printer for terminal output so that any character displayed on the screen is also printed. Control Shifted: Detaches the printer.
TAPE	Sends the message starting from the beginning of line (unshifted)/start of print/transmit(shifted) to the end of line (unshifted)/end of window (shifted) to line 3.
MULT CODE	Used in "MULT-CODE"/"ESCAPE" sequences to invoke terminal functions. See Terminal Functions below.
STAT/RESET	Unshifted, displays a status line on the 24th line of the screen. See Status below. Shifted, resets the terminal to its initial condition.

I.2.5 Programmable Function Keys

Eight (19 optional) programmable function keys with distinct shifted and unshifted versions provide one key stroke execution or transmission of a sequence of character codes. Programmable function keys in a transmit mode can be used to alert the application program of a particular operator request or for transmission of frequently used statements. In execute mode, these function keys can be used to perform a series of terminal functions with one key.

Defaults for function keys "INSRT" to "SEND" provide local editing and message transmission. The default settings for F1 to F3 (F14, if optional function keys installed) provide transmission of an alert character, a key ID, and a message terminating character. See Table VII for these default sequences.

1.2.6 Editing and Transmission Keys

The editing and transmission keys allow the user to create and edit text easily, verify it, and then transmit it to the computer or peripheral device.

TABLE III
Editing and Transmission Keys

INSRT	Unshifted, places the keyboard in insert mode and lights the insert mode indicator. Shifted, returns the keyboard to normal entry mode and resets the insert mode light. In insert mode data is right shifted as necessary to accomodate newly entered data. Insert mode can be used to insert characters, words, sentences, paragraphs, or text of arbitrary size. Data is right shifted only to the first available space. Right shifting will overlap lines if necessary, and if no available space is encountered, the last character of the window is lost. In User mode (see below) right shifting terminates on encountering a protected field. Spaces actually entered by the user are treated as characters, so that special spacing can be maintained.
DEL CHAR	Deletes the character at the current cursor position, left shifting all subsequent data on the line (unshifted)/window (shifted) with line wraparound. A blank is placed in the last position vacated by the left shift. In User Mode (see below) left shifting terminates on encountering a protected field.
LINE INS/DEL	Unshifted, inserts a line of blanks on the current cursor line, moving the current and all subsequent lines of data down one line. The last Line of data is lost. Shifted, deletes the current line of data, moving all subsequent lines of data up a line and creating a blank last line. In page mode, this function has no effect.
CLEAR EOL/EOP	Clears all unprotected data from the current cursor position to the end of line (unshifted) or end of window (shifted). A separate function is provided which clears both protected and unprotected data (see below).

SEND	Transmits all unprotected data from the start of the line or field to the cursor position (unshifted) or from the home position to the cursor position (shifted). A separate function allows the transmission of all data including protected fields (see below).
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I.3 COMMUNICATION LINE(S)

The CONCEPT terminal provides one communication line as standard (line 1) and up to three optional communication lines (lines 2-4). All lines are EIA RS232C compatible. 2UmA interfaces are available as an option. Pin assignments and use are described in Appendix E. The standard communication line has a four foot cable from the back panel terminating with a 25 pin male connector for connection to communication or peripheral equipment via a user supplied cable with matching female connector.

Default baud rate, parity, stop bits, and full/half duplex settings are selected for each line independently on the dip switches on the back panels. See Table V below for settings. These settings can be overridden after initialization by functions from the keyboard or communication line.

In addition to normal use of the primary line (line 1) for computer communication, arbitrary networking among the communication lines, the keyboard, and display may be selected from the keyboard or under program control for more complex communication requirements or control of local peripherals, such as tape cassettes, printers, and floppy disks.

I.4 MODES OF OPERATION

Several modes of operation are provided to meet various application needs. Table IV below shows the various modes and default selections (in capital letters).

Table IV

Modes of Operation

Local/REMOTE	In local mode, data entered at the keyboard is displayed or executed. No data is received or transmitted on the primary communication line. This setting does not affect data transfers on the optional auxiliary lines. In remote mode, data from the keyboard is transmitted to the primary communication line, and display or execution of keyboard data is determined by the duplex selection. Data from the primary line is displayed or executed.
Half/Full Duplex	(Default selection is determined by dip switch settings on the back panel.) In full duplex, keyboard data is only transmitted. In half duplex, keyboard data is both transmitted and displayed or executed.
Block/CHARACTER	In Character mode, keyboard data is transmitted a character at a time as typed. Block mode allows the operator to type in data and edit it on the screen without transmission. The data may then be transmitted by using the send key or under program control.
UPPER-LOWER/Caps Lock	To provide compatibility with certain earlier terminal types, Caps Lock mode converts all lower case characters to their upper case equivalents. Upper-Lower case mode provides the full character set. When selected by the keyboard or main communication line applies to both devices.
Device DEPENDENT/Independent	For dependent devices, control codes or escape/mult-code sequences marked below with a (D) received from that device apply to all other dependent devices. For independent devices, these escape/mult-code sequences apply only to that device.

USER/ Programmer (D)	Programmer mode allows use of all terminal capabilities and overwriting of protected data. User mode allows execution of only a subset of the terminal functions for the user who does not need or want to be concerned with the special display or communication features of the terminal. Mode selections restricted to programmer mode are indicated by a (P).
TEXT/Form (D)	Text mode (P), which automatically selects scroll mode, is designed for normal interactive terminal use and text editing applications. Data scrolls up on bottom line overflow and Tab/Back Tab execute typewriter tabs to the next/previous tab stop. Editing and send functions apply to lines and windows. Form mode (P), which automatically selects page mode, is designed for field oriented data entry/retrieval applications through formatted screens. Scrolling of data is inhibited to prevent loss of the screen form and Tab/Back Tab execute form tabs to the next/previous unprotected field. Edit and send functions apply to fields and the window.

| SCROLL/Page | (D)	| In Scroll mode (P), overflow on the bottom | line causes all data to be scrolled up one | line and the bottom line to be cleared for | new data. The top line of data is lost. In | Page mode (P), overflow on the bottom line | merely overwrites data on that line.
| Transparent | On/OFF (D)	| Normally (transparent mode off) control | codes are executed. With transparent mode | on (P) control codes are treated as | characters and displayed on the screen in | their display representation shown in | Appendices A and B. The only exception to | this treatment of control characters in | transparent mode is the control sequence to | turn transparent mode off, which is | executed.
| Auto Line | Feed On/OFF | (D)	| When auto line feed is selected (P), a | carriage return will automatically cause a | line feed to be executed following the | carriage return.
| Auto Tab | On/OFF (D)	| Auto tab selection (P) causes an automatic | tab to the next unprotected field when the | cursor is moved into a protected location | while entering data.

I.5 TERMINAL FUNCTIONS

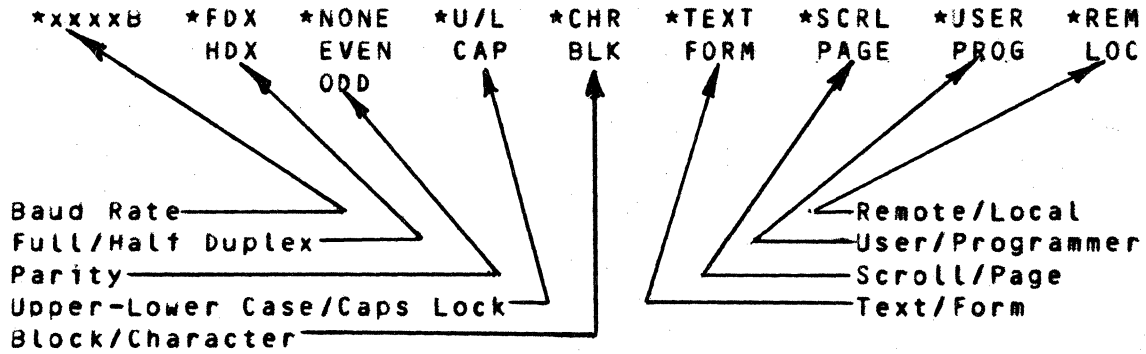
All terminal functions, such as cursor controls, carriage return, mode selections, and character attribute setting, are invoked by control codes or MULT-CODE/ESCAPE sequences and may be executed from the keyboard or under program control from the communication line. A MULT-CODE/ESCAPE sequence is invoked by typing MULT-CODE key on the keyboard or transmitting the ESCAPE character from the communication line followed by a function ID and parameters as necessary. The "ESCAPE" character indicating a function from the communication line is by default the ESC control code (27), but may be reset by the user if necessary for equipment compatibility.

As shown in Tables I, II, and III, certain commonly used terminal functions (both control code and MULT-CODE/ESCAPE sequences) have individual keys for one key execution. These keys have the same effect as typing the corresponding function sequence. For example, pressing the "HOME" key has the same effect as typing MULT-CODE, "?" and pressing "RETURN" has the same effect as depressing the "CTRL" key in conjunction with the "M".

Table X in Section III lists all terminal functions and their invoking sequence as well as providing a detailed description of their operation.

I.6 STATUS LINE

A status line, showing current mode and communication line settings, may be displayed on the 24th line of the screen. The status line has the following format:



SECTION II

Installation and Operation

II.1 INSTALLATION

II.1.1 Unpacking

After removing the terminal from the carton and removing the protective packing material, the terminal should be inspected for any physical signs of damage during shipping. If there are any signs of damage, the user should report them immediately to HDS, and not attempt to operate the terminal. The tilt of the display can be adjusted to individual preference by the knob on the front of the pedestal. Sliding the knob to the left (right) lowers (raises) the screen. The knob should be released prior to use and retightened when the CRT is in the desired viewing position.

II.1.2 Connectors

After unpacking the terminal, the keyboard cable connector should be connected to the matching female connector on the back panel and the screws tightened to insure proper fit. If the terminal is to communicate with a computer and/or local peripherals, the communication lines should be connected to the appropriate devices, and the connector screws tightened. For details on pin assignments and usage see Appendix E.

II.1.3 Power

The CONCEPT terminal requires only a normal 110 volt - 60 cycle grounded outlet. For best operation the terminal should be on its own or lightly loaded power line. When turned on the display should show a blinking underline cursor in the home position on the screen. Brightness can be adjusted by use of the knob under the front left side of the terminal.

A European version of the terminal is available running on 240 volt - 50 cycle power.

II.1.4 Communication Settings

The default baud rate, parity, stop bits, and duplex settings should be set on the dip switches on the back panel as required by the equipment with which the terminal will be communicating. A dip switch package is provided for each communication line on the system. The switch package for the main communication line is located above the keyboard cable connector and all other switches are located above their respective connectors. Table V below presents the switch settings. One setting from each category should be selected. Stop bits are normally set to one for baud rates of 300 and above and set to two for slower speeds.

Table V

Dip Switch
Settings 1-8 (X=On, 0=Off, Blank=Unused)

	1	2	3	4	5	6	7	8
50 Baud					X	X	X	X
75 Baud					0	X	X	X
110 Baud					X	0	X	X
135 Baud					0	0	X	X
150 Baud					X	X	0	X
300 Baud					0	X	0	X
600 Baud					X	0	0	X
1200 Baud					0	0	0	X
1800 Baud					X	X	X	0
2000 Baud					0	X	X	0
2400 Baud					X	0	X	0
3600 Baud					0	0	X	0
4800 Baud					X	X	0	0
7200 Baud					0	X	0	0
9600 Baud					X	0	0	0
Even Parity					0			
Odd Parity					X			
Half Duplex				0				
Full Duplex				X				
Two Stop Bits			0					
One Stop Bit			X					
No Parity	0							
Parity	X							

II.2 OPERATION

When the terminal is turned on (power switch located in the middle of the rear back plate) or the reset function executed, the terminal is initialized by setting the communication lines to their default selections, setting the default modes of operation shown in Table IV, clearing the screen, and homing the cursor. To test the keyboard and display locally, the operator can place the terminal in local mode by typing the MULT-CODE key followed by a "(" (shift 9). Text is displayed on the screen as it is typed on the keyboard. Characters appear with the current keyboard attribute settings. Control codes, function keys, and MULT-CODE/ESCAPE sequences cause the appropriate action. If text is typed beyond the right margin, it wraps around to the left margin of the following line. The terminal recognizes when data has just overflowed to prevent an immediately following carriage return-line feed from causing an extra line in the text. Overflowing the bottom line with data or a line feed causes all data to scroll up one line and the bottom line is cleared and the first line of data is lost. Page and Form mode, as described above, may be used to prevent scrolling of data.

The underline character is treated differently than other characters to provide compatibility with hard copy underlining of text. An underline character will underline the character at the cursor position rather than replacing it. Typing a blank over an underlined character in ASCII mode will remove the underline.

To put the terminal in communication (remote) mode, the user types MULT-CODE, "9". Data from the keyboard (depending on the duplex setting) and the communication line(s) is displayed and executed as above. While the keyboard and communication line(s) normally use the same cursor, the keyboard and each communication line can establish an independent cursor in its own window. The keyboard cursor is the only visible cursor. Independent communication line cursors serve as pointers and can be controlled as the keyboard cursor but have no visible representation.

If terminal power is turned off or disconnected, the operator should wait 15 seconds before restoring power. This time is required to provide adequate time for the CPU and terminal memory to reset.

SECTION III

Programmer's Reference



only by the display memory width of 80 columns and length which depends on the number of optional pages installed (24 lines are standard with additional 24 lines per optional page). The device's cursor address and cursor movement are relative to the window, allowing applications to run in different windows invisible to the program as long as the window size is sufficient for the application. Cursor movement and consequently data display for the device is restricted to the current window. Cursor right/left movement beyond the boundaries of the window wraps around to the next/previous line. Scrolling up or down is restricted to the window. All other data is unaffected.

While a window is logically defined, the display screen is a physical entity, always displaying 24 lines of 80 characters. In the standard unit with, one page of memory, all 24 lines of display memory, possibly including several windows, are displayed on the screen by necessity. When multiple pages of memory are available, portions of or entire windows may not be visible.

The keyboard's visible cursor is the link between display memory and the screen. The keyboard cursor always remains visible on the screen. Thus, as the cursor moves above (below) the display screen, the display screen moves up (down) one line of display memory to keep the keyboard cursor visible.

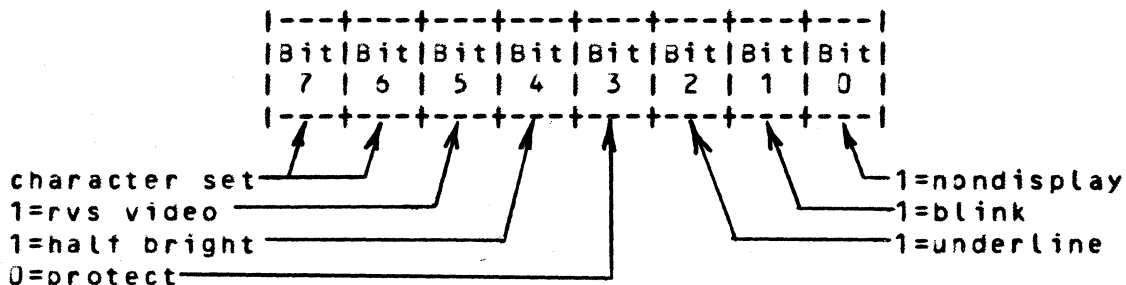
III.4 Character_Attributes

Associated with each character in display memory is a word defining the attributes for that character. These attributes are described below in Table VI.

Table VI
Character Attributes

Video Reversal	If on, the character is displayed in the reverse video combination (black on white - white on black) of the display.
Blinking	If on, the character appears blinking at the rate of twice per second.
Underline	If on, the character appears with an underline.
Half Bright	If on, the character appears with half the normal video intensity.
Secure (nondisplay)	If on, the character will not be displayed on the screen, but is stored in display memory.
Character Set	This field indicates from which character set the character is to be displayed. Up to four character sets may be used.
Protection	If on, the character may not be overwritten by data from a device in user mode. Such an attempt to overwrite the character will cause the bell to sound.

The attribute word has the following format:



Each device has a current attribute word. Functions allow setting and resetting of individual bits and setting and reading of the entire word. The device's current attribute word is put into the display memory for each character received and displayed by the device. Selected attributes can also be set or reset for a block of display memory

without effecting the data. See function descriptions below.

III.5 Device Independence

Each I/O device, keyboard-display and communication line(s), may have its own window, cursor, mode settings, attribute settings, and character set selection. Thus the keyboard operator can be entering data in block and form mode while the program is scrolling reverse video messages in another area of the screen. On power up or after a reset all devices are set "dependent" causing mode changes originating from one device to affect all other dependent devices (default-all devices). Any device may be set "independent" so that mode changes originating from that device affect only that device. Similarly, on power up or after a reset all devices share a common window and are tied to the keyboard window. Thus, changing one window will affect all device windows. Device windows can be "untied" allowing separate windows.

The current settings of half/full duplex, local/remote, and block/character modes determine the capability of creating separate windows and/or devices for the keyboard and primary communication line. In full duplex/remote/character mode of operation characters typed on the keyboard are transmitted down the primary communication line and not echoed to the display. The host computer subsequently retransmits these characters down the primary communication line. Thus, an independent keyboard window and/or device definition will not have the desired effect. In half duplex, block or local mode of operation keyboard characters are transmitted to the display allowing an independent keyboard window or device.

III.6 Functions and Function Routing

All terminal functions are executed by a control code or a MULT-CODE (from the keyboard)/ESCAPE (from a communication line) sequence. The function normally affects all devices. For example, if a computer program sends out an escape sequence to select programmer mode, the selection affects the communication line and the keyboard. In this case all devices are dependent. However, there is often a need for devices to have different mode settings. To fill this requirement, individual devices can be set independent. When independent, terminal functions from a requesting device affect only that device. For, example, in a half duplex or block mode application, putting the communication line in programmer mode allows that device to create and overwrite protected data, but the keyboard user, if previously in user mode, is still in user mode and unable to type in protected fields.

Frequently, when devices are independent, one device needs

the ability to execute a function on another device. For example, a data entry retrieval program may want to put the keyboard in block, user, and form mode. This can be done by Function Routing. A device executes a function routing command followed by the message length, the device number to be affected, and the message. The message is then treated as if it had come from the specified device.

A few functions by their nature or for user convenience, are exceptions to the dependent/independent device relationship. These include duplex, Local/Remote, Block/Character, and Reset Functions.

III.7 Programmable_Function_Keys

The eight (optionally 19) function keys can be programmed to transmit or execute a separate user defined sequence of codes for the shifted and unshifted version of the keys. In transmit mode the sequence will be transmitted even if the user is in block mode, allowing function key program alerting even in block mode applications. In execute mode, depressing the function key is equivalent to typing the code sequence on the keyboard.

The default sequences for the program function keys are show below in Table VII. The default execute sequences operate as if preceded by a MULT-CODE causing the corresponding function. The default transmit sequences precede the message with the programmable function key identifier (FS, decimal 28, by default) and terminate it with a programmable EOM (CR, decimal 13, by default).

Table VII
Programmable Function Key Defaults

KEY	E=Xec T=Xmt	Unshifted	Shifted
INSRT	E	^P (Insert mode on)	NUL (Insert mode off)
DEL CHAR	E	^Q (Delete Char in Line)	^A (Delete Char in Window)
LINE INS/DEL	E	^R (Insert line)	^B (Delete line)
CLEAR EOL/EOP	E	^S (Clear to end of Line/Field)	^C (Clear to end of Window)
SEND	E	^T (Transmit Line/Field)	^D (Transmit Window)
F1	T	5	%
F2	T	6	&
F3	T	7	'
F4	T	8	(
F5	T	9)
F6	T	:	*
F7	T	;	+
F8	T	<	,
F9	T	=	-
F10	T	>	.
F11	T	?	/
F12	T	@	C
F13	T	A	D
F14	T	B	E

The sequences associated with an unshifted or shifted function key can be set with a terminal function described below. The character sequence length is limited to a total length of 34 character codes assignable to all function keys

(unless additional memory is purchased with the terminal). Default settings do not use any of these positions.

The 12 keys in the function key pad (cursor control pad) normally execute immediately. While these key sequences are not modifiable, the entire pad may be set to transmit instead of execute where the application requires the program to control all terminal operations. The code sequence transmitted in this mode is the keyboard's programmable escape character and a one character key ID. The key IDs are shown in Table VIII below.

Table VIII
Function Key Pad - Transmission Mode Defaults

KEY	Unshifted	Shifted	Control	Control & Shifted
MULT-CODE	:	:	:	:
STAT/RESET	+	,	+	,
PRINT	{	|	}	~
PAGE	-	.	-	.
↑	;	;	;	;
TAPE	\	\	@	^
←	>	>	>	>
HOME	?	?	?	?
→	=	=	=	=
SCROLL	[\	[\
↓	<	<	<	<
TABSET/CLR]	-]	-

III.8 Programmable Message Characters

To provide the greatest flexibility and ease of use with a variety of computer and communication systems, the CONCEPT terminals allow user selection of terminal message and alert codes through the "Message Character" function described in Table X. The modifiable codes and their defaults are shown in Table IX below. When changing message characters, a null value (decimal 0) entered for any character indicates that code is not to be used.

Table IX
Message Characters

CODE	DEFAULT
ESCAPE Code for terminal escape sequence functions	ESC (decimal 27)
Acknowledgement of satisfactory completion of terminal request	ACK (decimal 6)
Negative Acknowledgement to terminal request	NAK (decimal 21)
Start of message prior to message transmission (SOM)	Not Used
End of field on transmission (EOF)	^W (decimal 23)
End of line on transmission (EOL)	CR (decimal 13)
End of message on transmission (EOM)	CR (decimal 13)
Function key transmission leadin	FS (decimal 28)

III.9 Editing Functions

The concept terminal system provides several functional capabilities allowing local or block mode editing and manipulation of screen data. These capabilities include insert mode, delete character in line/window, insert/delete line and clear to end of line/window. The functions are the default programming on the first four programmable function keys and are, also, available under program control. The terminal can determine character positions where data has not been typed. These characters, referred to below as "blanks", are stored in display memory as spaces (decimal 32) with the nondisplay bit in the attribute word set. Functions such as insert mode and delete character terminate with "blanks". The distinction between typed and untyped areas of the screen can be eliminated through use of the block attribute setting function (set nondisplay bit to display). These functions are discussed in detail below.

III.10 Terminal Functions

All terminal functions are executable from the keyboard and communication line(s) by control codes (^) or Escape/Mult-Code (MC) sequences. The following table describes all terminal functions, in topic order. A list in code order is contained in Appendix E. Shown below is the

function, followed by a (P) if executable only in programmer mode and a (D) if it is device dependent/independent type function. Column 2 indicates whether a special key exists (k), shifted (K), control (^k), or control shifted (^K). Column 3 presents the multicode sequence if typed from the keyboard including the Mult-Code (MC), command identifier, character, and required parameters. Column 4 presents the decimal equivalent of the command identifier character (CI). Column 5 describes the command in detail.

Table X
Terminal Functions

Function	Key	Sequence	CI	Description
General				
Reset - Initialize	K	MC ,	(44)	Sets the communication lines to the default profile settings on the back panel (baud rate, parity, duplex, and stop bits); sets all devices dependent and to remote, text, and user mode; ties all device windows and cursors to the keyboard window and cursor of all display memory and the home position; and clears the display memory to blanks (untyped spaces). Resets the terminal to ASCII, upper/lower case, character mode, default message characters, transparent mode off, auto line feed off, auto tab off, default tab settings, blinking underline cursor, insert mode off, blink off, reverse video off, underline off, half bright off, protection off, security off, normal screen video, normal intensity protected fields, default output network, form feed prior to print on, default function keys and function pad in execute mode.
Status	k	MC +	(43)	Displays the terminal's current status as shown on page . If the status line is already displayed, this function turns the display off.

Set Device Dependent	MC 3	(51)	Sets that device dependent. Commands listed below received by that device apply to all dependent devices: APL/ASCII, user/programmer mode, text/form mode, scroll/page mode, transparent mode, auto linefeed, auto tab, blink, reverse video, half bright, underline, nondisplay, protection, select character set, set attribute of block. These commands are marked below with a (D).
Set Device Independent	MC #	(35)	Sets device independent. All commands (mult-code/escape sequences) received from that device apply only to that device.
Change Message Character (P)	MC 0 chr,w	(111)	chr specifies the message character to be changed: 32="ESC"(Sp)36="EOF"(\$) 33="ACK" (!)37="EOL"(%) 34="NAK" (")38="EOM"(&) 35="SOM" (#)39=function key leadin (^) w specifies the new character. A separate escape character (ESC) applies to each device in the system (keyboard, communication lines 1-4). All other message characters apply to all devices in the system. The negative acknowledgement (NAK) for requests from the keyboard is the bell code. (^G)

Table X (continued)

APL/ASCII				
APL Mode (D)		MC 0	(48)	Selects APL mode, APL character set, and overstrike mode for that device if independent, all dependent devices if dependent.
APL Mode - Alternate		^N	(14)	Selects APL mode, APL character set, and overstrike mode for that device if independent, all dependent devices if dependent.
ASCII Mode (D)		MC)	(41)	Selects ASCII mode, ASCII character set, and nonoverstrike mode for that device if independent, all dependent devices if dependent.
ASCII Mode - Alternate		^0	(15)	Selects ASCII mode, ASCII character set, and nonoverstrike mode for that device if independent, all dependent devices if dependent.

Table X (continued)

Mode Settings				
User (D)		MC u	(117)	Selects user mode, preventing execution of certain terminal functions. These functions are marked below with a (P).
Programmer (D)		MC U	(85)	Selects programmer mode, allowing execution of all terminal functions.
Text (P) (D)		MC f	(102)	Selects text mode, and automatically selects scroll mode. Tab (back tab) executes a typewriter tab to the next (previous) tab stop. Also affects block transmission, see below.
Form (P) (D)		MC F	(70)	Selects form mode and automatically selects page mode. Tab (back tab) executes a form tab to the next (previous) unprotected field. Also affects block transmission, see below.
Scroll (P) (D)		MC s	(115)	Selects scroll mode. On bottom line overflow, all data in the window is "scrolled" up one line (the top line is lost) and the bottom line is cleared to blanks (untyped spaces).
Page (P) (D)		MC S	(83)	Selects page mode. On bottom line overflow, display-memory and cursor remain in place and bottom line data is overwritten.

Character	MC 7	(55)	Selects character mode. If in Remote mode, characters are transmitted as they are typed on the keyboard to the primary communication line (line 1). If in local mode, this mode has no effect.
Block	MC &	(38)	Selects block mode. Characters typed on the keyboard are displayed but not transmitted. Placing the terminal in block mode automatically selects protection for the main communications line (line 1). See transmit functions below.
Upper/Lower Case	MC 5	(53)	Selects upper-lower case mode, displaying the full upper-lower case character set. When selected by the keyboard or main communication line applies to both devices regardless of dependent / independent status.
Caps Lock	MC %	(37)	Selects caps lock mode, displaying and transmitting lower case characters in their upper case form. Characters 97 through 122 (a-z) are displayed as characters 65 through 90 (A-Z). Applies to all devices regardless of dependent status.

Full Duplex	MC 8	(56)	Selects full duplex mode. If in Remote mode, data typed on the keyboard is transmitted on the primary communication line but not displayed. An independent keyboard window definition will not apply in full duplex unless the terminal is in block mode.
Half Duplex	MC *	(42)	Selects half duplex mode. If in Remote mode, data typed on the keyboard is transmitted on the primary line and "echoed" to the display. An independent keyboard window definition does apply in half duplex mode.
Remote	MC 9	(57)	Selects Remote mode. Data typed on the keyboard is transmitted on the primary communication line and if in half duplex "echoed" to the display. Data from the primary communication line is sent to the display.
Local	MC (	(40)	Selects local mode. Data typed on the keyboard is sent to the display. Data is neither sent or received on the primary communication line.

Transparent Mode Off (D)	MC t	(116)	Selects normal handling of control codes.
Transparent Mode On (P) (D)	MC T	(84)	Selects transparent mode. Control codes are treated as normal characters appearing in their display representation shown in Appendices A & B. The only exception is the ESC t sequence which will reset transparent mode. Escape characters are not displayed until the following character is received. Control code display representations can also be generated through use of the repeat character generation function.
Auto Linefeed Off (P) (D)	MC l	(108)	Selects normal handling of carriage return.
Auto Linefeed On (P) (D)	MC L	(76)	Selects auto linefeed causing an automatic linefeed to be performed (but not transmitted) after receipt of a carriage return.
Auto Tab Off (P) (D)	MC b	(98)	Eliminates automatic tabbing
Auto Tab On (P) (D)	MC B	(66)	Selects auto tab mode. When the cursor moves into a protected location, a form tab (form mode) or text tab (text mode) is automatically executed.

Table X (continued)

Cursor Controls				
Carriage Return	k	^M	(13)	Returns the cursor to the left margin of the current line. If auto line feed is set, a line feed will also automatically occur.
Line Feed	k	^J	(10)	Moves the cursor down one line in the same column position. If the cursor is presently on the bottom line of the window, action is determined by the page/scroll mode selection described above.
Backspace	k	^H	(8)	Moves the cursor back one space. If at the left most position of the line, the cursor wraps around to the last column of the previous line. The backspace is inoperable when the cursor is in the home position.
Tab	k	^I	(9)	<u>Text_Mode</u> - moves the cursor to the next tab stop. If none is encountered, the cursor is positioned at the right margin. <u>Form_Mode</u> - moves the cursor to the next unprotected field. If none is encountered, the cursor is positioned at the end of the window.

Back Tab	K	MC ^	(39)	Text_Mode - moves the cursor to the previous tab stop. If none is encountered, the cursor is positioned at the left margin. Form_Mode - moves the cursor to the previous unprotected field. If none is encountered, the cursor is positioned in the Home position.
Tab Set	k	MC J	(93)	Sets a tab stop at the current cursor column.
Tab Clear	K	MC _	(95)	Clears the tab stop at the current cursor column.
Cursor Up	k	MC ;	(59)	Moves the cursor up one line with wraparound to the bottom line.
Cursor Down	k	MC <	(60)	Moves the cursor down one line with wraparound to the top line.
Cursor Right	k	MC =	(61)	Moves the cursor right one column with wraparound to the next line or first line if presently on the last line.
Cursor Left	k	MC >	(62)	Moves the cursor left one column with wraparound to the previous line or last line if presently on the first line.
HOME	k	MC ?	(63)	Moves the cursor to the home position - upper left corner of the window.

Write Address (P)	MC a ln1, Col	(97)	Positions the cursor at line (ln1-32), column (Col-32). Line and column numbering starts at 0. To address lines beyond 0-95 a two parameter line number - ln1, ln2 - must be used. The effective line number is: (ln1x96)+(ln2-32). ln1 must be 0-3.
Read Address (P)	MC A	(65)	Transmits the cursor address as in "Write Address" above preceded by the programmable SOM character and followed by the programmable EOM character to the primary communication line if requested by the keyboard or to the requesting communication line. A code of 1 to 3 for ln indicates a two parameter line number is being sent.
End of Text	MC p	(112)	Moves the cursor to the last nonblank character position in the window.
Set Cursor to Blink Underline	MC w	(119)	Sets the cursor to a blinking underline.
Set Cursor to Blink Block	MC W	(87)	Sets the cursor to a blinking reverse video block.

Table X (continued)

Editing				
Form Feed		^L	(12)	Clears the window to blanks (untyped spaces) and homes the cursor.
Insert Mode On	k	MC ^P	(16)	Sets insert mode. As data is entered, data starting at the current cursor position is right shifted up to the first blank (untyped space) with line wraparound if necessary. The entered data and the current attribute word are placed in the vacated position and the cursor incremented. In User mode right shifting terminates on encountering a protected field. If no blank is found before the end of window or a protected location (User mode) is encountered, the last character is lost.
Insert Mode Off	K	MC ^Q	(0)	Resets the device to normal data entry with entered data replacing or overstriking existing data.
Delete Character in Line/Field	k	MC ^Q	(17)	Deletes the character at the current cursor position, left shifting all data on the current line until a blank (untyped space) or the right margin is encountered, at which point a blank is placed in the last position. In User mode, left shifting terminates on encountering a protected field.

Delete Character in Window	k	MC ^A	(01)	Same as delete character in line, except left shifting will continue across lines if necessary until the right margin of the last line is encountered.
Insert Line	k	MC ^R	(18)	In text mode, the data on the current line and above is scrolled up one line and the current line is cleared to blanks (untyped spaces). Data in the top line is lost. In form mode this function has no effect.
Delete Line	K	MC ^B	(02)	In text mode, the data on subsequent lines is scrolled up one line replacing the current line. The bottom line is cleared to blanks. In form mode this function has no effect.
Clear Unprotected to End of Line/field	k	MC ^S	(19)	In form mode, unprotected data from the current cursor position to the first protected field is cleared to blanks. In text mode, unprotected data from the cursor position to the right margin is cleared to blanks.
Clear Unprotected to End of Window	K	MC ^C	(03)	Unprotected data from the cursor position to the end of the window is cleared to blanks.

Clear All to End of Line/Field (P)	MC ^U	(21)	In text mode, clears to blanks all data (protected and unprotected) from the cursor position to the end of line. In form mode, clears to blanks unprotected data from the current cursor position to the first protected field.
Clear All to End of window (P)	MC ^E	(05)	Clears to blanks all data (protected and unprotected) from the cursor position to the end of the window.

Table X (continued)

Display				
Blink On (P) (D)		MC C	(67)	Sets the blink indicator in the device's attribute word.
Blink Off (P) (D)		MC c	(99)	Clears the blink indicator in the device's attribute word.
Reverse Video On (P) (D)		MC D	(68)	Sets the reverse video indicator in the device's attribute word.
Reverse Video Off (P) (D)		MC d	(100)	Clears the reverse video indicator in the device's attribute word.
Half Bright On (P) (D)		MC E	(69)	Sets the half bright indicator in the device's attribute word.
Half Bright Off (P) (D)		MC e	(101)	Clears the half bright indicator in the device's attribute word.
Underline On (P) (D)		MC G	(71)	Sets the underline indicator in the device's attribute word.
Underline Off (P) (D)		MC g	(103)	Clears the underline indicator in the device's attribute word.
Nondisplay On (P) (D)		MC H	(72)	Sets the nondisplay (secure) indicator in the device's attribute word.
Nondisplay Off (P) (D)		MC h	(104)	Clears the nondisplay (secure) indicator in the device's attribute word.
Protection On (P) (D)		MC I	(73)	Sets the protection indicator in the device's attribute word.

Protection Off (D)	MC i	(105)	Clears the protection indicator in the device's attribute word.
Select Character Set (P) (D)	MC j n	(106)	Selects character set (n-32) =0,1,2,3. If optional character sets are not present, all characters from that set selection will appear as blanks. Normally, character set 0 is ASCII, character set 1 is Graphics (optional), and character set 3 is APL. If APL is selected in this manner, overstrike mode will not be in effect.
Reverse Screen Video	MC k	(107)	Sets the display screen to black characters on a white background. Does not apply to an individual window.
Normal Screen Video	MC K	(75)	Sets the display screen to white characters on a black background. Does not apply to an individual window.
Half Bright Protected Fields	MC M	(77)	Displays all protected character positions at half intensity.
Normal Intensity Protected Fields	MC m	(109)	Displays all protected character positions at normal intensity.
Set Attribute Word (P) (D)	MC N w	(78)	Sets the attribute word to w as described in Section III.4.

Read Attribute Word (P)	MC n	(110)	Causes the device's attribute word preceded by a SOM and terminated by an EOM to be transmitted to the requesting device. Initiated by the keyboard, the sequence is transmitted over the primary line. The transmitted attribute word is offset by 64 (bit 6 is set) to guarantee a control code will not be transmitted.
Repeat Character Horizontal (P)	MC r c,n	(114)	Generates the character "c" repeatedly in the horizontal direction (n-32) times, starting at the current cursor position. The cursor is then positioned 1 column after the last repeated character. Display versions of control codes can be generated in this manner.
Repeat Character Vertical (P)	MC R c,n	(82)	Generates the character "c" repeatedly in the vertical direction (n-32) times starting at the current cursor position. The cursor is then positioned in the same position as the last repeated character. Display versions of control codes can be generated in this manner.

Set Attribute of Block (P)	MC J m,w, lns,cls	(74)	Sets selected attributes of a block of display memory. The bits of m specify which attributes are to be affected. A 1 indicates it's to be affected; a 0 indicates the attribute is to remain unchanged. m can be determined by summing the values corresponding to the desired character attributes as follows: 1=display/nondisplay, 2=blink on/off, 4=underlining, 8=protection, 16=brightness control, 32=normal/reverse video. Attributes not specified in m will retain their prior values. Since bits 6-8 are not used the parameter can be offset by 64 to allow input of displayable characters. w is the setting for the selected attributes as shown on page . The block is defined by the cursor in the upper left corner and the number of lines (lns-32) and the number of columns (cls-32). Example: Set the entire screen to reverse video. Home the cursor and put the keyboard in programmer mode (MULT-CODE U). Reverse video of screen by typing MULT-CODE J ' ' 8 p.
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Table X (continued)

Transmission				
Set Baud Rate (P)	MC 0 n	(79)	Sets the baud rate on the requesting line (or primary line if requested by the keyboard) according to (n-32):	0=50 (Sp) 8=1800((1=75 (!) 9=2000() 2=110 (") 10=2400(* 3=134.5(#) 11=3600(+ 4=150 (\$) 12=4800(, 5=300 (%) 13=7200(- 6=600 (&) 14=9600(. 7=1200 (^)
Set Parity (P)	MC P n	(80)	Sets the parity on the requesting line (or primary line if requested by the keyboard) according to (n-32):	0 = none(sp) 1 = even(!) 2 = odd(")
Set Start of Print / Transmit	MC 1	(49)	Sets the start of print/transmit to the current position for all print/transmit window requests.	

Transmit Line/field	k	MC ^T	(20)	<p>Text Mode - Transmits to the requesting line (or primary line if requested from the keyboard) unprotected characters from the beginning of line up to but not including the cursor position. If the cursor is at the beginning of a line, all unprotected data on the line is transmitted. The programmable EOF character is transmitted after each unprotected field except for the last field which is terminated by the programmable EOM character. Trailing spaces in unprotected fields are suppressed. Underlined and unprotected data results in data, backspace, underline. The cursor is returned to its original position.</p> <p>Form Mode - Transmits to the requesting line (or primary line if requested from the keyboard) all unprotected data from the first previous protected character or the start of window (if no protected data) to the first protected character at or after the cursor position. If the unprotected field crosses lines the programmable EOL is transmitted at the end of each line. The sequence is terminated with the programmable EOM character. All else as above.</p>
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Transmit Window	K	MC ^D	(04) Transmits to the requesting line (or primary line if requested from the keyboard) all unprotected data from the "start of print/transmit" (default - home position, see above) up to but not including the cursor position. If the cursor is at or before the "start of print/transmit" all unprotected data in the window is transmitted. The programmable EOL is transmitted for all fields which span lines. An EOL is not transmitted when a field ends at the right margin. The programmable EOF is transmitted after each field except for the last which is terminated by the programmable EOM. Trailing spaces in fields are suppressed. EOM, EOL and EOF characters are handled as above for blank lines and fields. The cursor is returned to its original position.
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Transmit All Line (P)	MC ^V	(22)	Transmits to the requesting line (or primary line if requested from the keyboard) all data from the beginning of line up to but not including the cursor position. If the cursor is positioned at the beginning of the line, the entire line is transmitted. Transmission is terminated with the programmable EOM character. Underlined data results in data, backspace, underline. The cursor is returned to its original position.
Transmit All Window (P)	MC ^F	(06)	Transmits to the requesting line (or primary line if requested from the keyboard) all data from the "start of print/transmit" (default - home position, see above) up to but not including the cursor position. If the cursor is at or before the "start of print/transmit" all data in the window is transmitted. The programmable EOL terminates all lines except for the last which is terminated by the programmable EOM character. Underlined data results in data, backspace, underline. Trailing spaces in lines are suppressed. EOM and EOL characters are treated for blank lines as above. The cursor is returned to its original position.

Table x (continued)

Multiple Devices				
Set Output Network (P)		MC Y n	(89)	Sets the device's output network to n as described in Section III.2 If successful, the programmable ACK character is returned to the requesting device (nothing returned if requested from the keyboard). If unsuccessful the programmable NAK character is returned (bell returned if requested from the keyboard).
Read Output Network (P)		MC y	(121)	Causes transmission of the device's output network word to the requesting line (or the primary line if requested by the keyboard). The data is preceded by an SOM and terminated by an EOM.
Function Route (P)		MC Q dev,msg, EOF	(81)	Routes a message to operate as if it came from another device. (Dev-32) is the device number, and msg is the message. Valid entries for (Dev-32) are: U(sp)=Keyboard/Video 1(!) =Line 1 (primary communication line) 2(") =Line 2 3(#) =Line 3 4(\$) =Line 4 EOF is the end of field character (default ^w). The maximum message length is 7 characters.

Print Window	k	MC ((123)	<p>Performs a printer attach sequence if the printer is not currently attached (will transmit ACK or NAK sequence as above). Transmits to the printer (line 2) all data from the beginning of the line containing the "start of print/transmit" (default - home, see above) up to but not including the cursor position. If the cursor is at or before start of print/transmit all unprotected data in the window is transmitted.</p> <p>If the cursor is positioned after the start of print/transmit but in column one of any line, the entire line is printed. Control characters are replaced with spaces and, if in form mode, protected characters are replaced with spaces. Underlined data to be printed results in data, backspace, underline. The printing sequence is terminated with a carriage return, line feed. If the "Form feed prior to print" indicator is set, a form feed (^L) followed by 15 rubouts is transmitted prior to the data. The cursor is returned to its original position.</p>
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Print Line	K	MC		(124)	Performs a printer attach sequence if the printer is not currently attached (will transmit ACK or NAK sequence as above). Transmits to the printer (line 2) all data from the beginning of line up to but not including the cursor position. If the cursor is positioned at the beginning of line, the entire line is printed. Control characters are replaced with spaces and in form mode, protected characters are replaced with spaces. Underlined data to be printed results in data, backspace, underline. The printing sequence is terminated with a carriage return, line feed. If the "Form feed prior to print" indicator is set, a form feed (^L) followed by 15 rubouts is transmitted prior to the data. The cursor is returned to its original position.
Attach Printer	^k	MC	}	(125)	Attaches the printer (line 2) as an auxiliary device for all I/O from the keyboard and line destined for the display. If line 2 is unavailable the terminal sounds the bell if requested by the keyboard or sends a NAK if requested by a line. If line 2 is available an ACK sequence is sent.
Detach Printer	^K	MC	~	(126)	Detaches the printer (line 2) as an auxiliary device.

FF Prior to Print On		MC Z	(90)	Causes a form feed (^L) and 16 Rub Outs to be, transmitted to the printer (line 2) prior to every Print to EDW/EOL.
FF Prior to Print Off		MC z	(122)	Turns off the form feed prior to print.
Attach Tape	^k	MC @	(64)	Attaches the tape (line 3) as an auxiliary device for I/O from the keyboard and primary line destined for the display.
Detach Tape	^K	MC ^	(94)	Detaches the tape (line 3) as an auxiliary device.
Message to Tape	k	MC ^	(96)	Transmits to the tape (line 3) all data from the "start of print/transmit" up to but not including the cursor position. If the cursor is positioned at or before the start of print/transmit all data from the cursor position to the end of window is transmitted.

Table X (continued)

Screen Control				
Define Window (P)		MC v ln1,cl1, l,c	(118)	Defines the device's window with home position (ln1-32), (cl1-32) and with (l-32) lines and (c-32) columns. The cursor is homed. Note: Line and column numbering starts at 0.
Tie Window (P)		MC q n	(113)	Ties the requesting device's window to another device's window. (n-32) specifies the window to tie to as follows: 0 = keyboard, else equals requesting device's window. A device which ties to its own window creates an independent window for that device.
Page ↑	K	MC .	(46)	Moves the display up 24 lines. The display, however, will not move above the first line of the keyboard window. Multiple pages of memory only.
Page ↓	k	MC -	(45)	Moves the display down 24 lines. The display, however, will not move beyond the last line of the keyboard window. Multiple pages of memory only.

Scroll ↑	K	MC \	(92)	Moves the display up one line. The display, however, will not move above the first line of the keyboard window. Multiple pages of memory only.
Scroll ↓	k	MC [	(91)	Moves the display down one line. The display, however will not move beyond the last line of the keyboard window. Multiple pages of memory only.
Start of Screen		MC V ln	(86)	Sets the first line of the display to line (ln-32) subject to 24 lines being available for display and at least one line of the keyboard window being displayed. Multiple pages of memory only.

Table X (continued)

Function Keys			
Program (P)	MC 4 L, K, t, msg	(52)	<p>Defines a character sequence to be associated with a programmable function key. (L-32) is the length of the sequence. (K-32) is the key to be programmed as follows:</p> <p>32-47 shifted keys 1-16 48-63 unshift keys 1-16 64-66 unshift keys 17-19 67-69 shifted keys 17-19</p> <p>Note: "Insert Mode" corresponds to key 1, F1 corresponds to key 6.</p> <p>t=32 implies default transmit(Sp) t=33 implies default execute(!) t=34 implies transmit("") t=35 implies execute immediate(#)</p> <p>msg is the actual character message to be programmed on the function key. A total of 34 characters (unless additional memory is purchased with the terminal) can be programmed on the function keys. Setting t equal to 32 or 33 with a message length of 0 will return a key to its default sequence (which does not use any of the 34 programmable characters).</p>
Reset All (P)	MC \$	(36)	Resets all programmable function keys to their default sequences.

Set Function Pad to XMT (P)	MC X	(88)	Sets the function pad to transmit mode.
Set Function Pad to XEC (P)	MC x	(120)	Sets the function pad to execute mode.

ASCII CHARACTER SET*

D000 0000	D001 0001	D002 0002	D003 0003	D004 0004	D005 0005	D006 0006	D007 0007	D008 0010	D009 0011	D010 0012	D011 0013	D012 0014	D013 0015	D014 0016	D015 0017
D016 0020	D017 0021	D018 0022	D019 0023	D020 0024	D021 0025	D022 0026	D023 0027	D024 0030	D025 0031	D026 0032	D027 0033	D028 0034	D029 0035	D030 0036	D031 0037
D032 0040	D033 0041	D034 0042	D035 0043	D036 0044	D037 0045	D038 0046	D039 0047	D040 0050	D041 0051	D042 0052	D043 0053	D044 0054	D045 0055	D046 0056	D047 0057
D048 0060	D049 0061	D050 0062	D051 0063	D052 0064	D053 0065	D054 0066	D055 0067	D056 0070	D057 0071	D058 0072	D059 0073	D060 0074	D061 0075	D062 0076	D063 0077
D064 0100	D065 0101	D066 0102	D067 0103	D068 0104	D069 0105	D070 0106	D071 0107	D072 0110	D073 0111	D074 0112	D075 0113	D076 0114	D077 0115	D078 0116	D079 0117
D080 0120	D081 0121	D082 0122	D083 0123	D084 0124	D085 0125	D086 0126	D087 0127	D088 0130	D089 0131	D090 0132	D091 0133	D092 0134	D093 0135	D094 0136	D095 0137
D096 0140	D097 0141	D098 0142	D099 0143	D100 0144	D101 0145	D102 0146	D103 0147	D104 0150	D105 0151	D106 0152	D107 0153	D108 0154	D109 0155	D110 0156	D111 0157
D112 0160	D113 0161	D114 0162	D115 0163	D116 0164	D117 0165	D118 0166	D119 0167	D120 0170	D121 0171	D122 0172	D123 0173	D124 0174	D125 0175	D126 0176	D127 0177

*Standard character set. Control codes (characters 0–31) are displayable in transparent mode. Decimal and octal character values are shown and preceded by a "D" and an "O" respectively.

APL CHARACTER SET*

D000 0000	D001 0001	D002 0002	D003 0003	D004 0004	D005 0005	D006 0006	D007 0007	D008 0010	D009 0011	D010 0012	D011 0013	D012 0014	D013 0015	D014 0016	D015 0017
0	1	2	3	4	5	6	7	8	9	:	:	⋈	⋈	⋈	⋈
D016 0020	D017 0021	D018 0022	D019 0023	D020 0024	D021 0025	D022 0026	D023 0027	D024 0030	D025 0031	D026 0032	D027 0033	D028 0034	D029 0035	D030 0016	D031 0037
0	1	2	3	4	5	6	7	8	9	:	:	⋈	⋈	⋈	⋈
D032 0040	D033 0041	D034 0042	D035 0043	D036 0044	D037 0045	D038 0046	D039 0047	D040 0050	D041 0051	D042 0052	D043 0053	D044 0054	D045 0055	D046 0056	D047 0057
⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
D048 0060	D049 0061	D050 0062	D051 0063	D052 0064	D053 0065	D054 0066	D055 0067	D056 0070	D057 0071	D058 0072	D059 0073	D060 0074	D061 0075	D062 0076	D063 0077
0	1	2	3	4	5	6	7	8	9	()	:	⋈	⋈	⋈
D064 0100	D065 0101	D066 0102	D067 0103	D068 0104	D069 0105	D070 0106	D071 0107	D072 0110	D073 0111	D074 0112	D075 0113	D076 0114	D077 0115	D078 0116	D079 0117
⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
D080 0120	D081 0121	D082 0122	D083 0123	D084 0124	D085 0125	D086 0126	D087 0127	D088 0130	D089 0131	D090 0132	D091 0133	D092 0134	D093 0135	D094 0136	D095 0137
⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
D096 0140	D097 0141	D098 0142	D099 0143	D100 0144	D101 0145	D102 0146	D103 0147	D104 0150	D105 0151	D106 0152	D107 0153	D108 0154	D109 0155	D110 0156	D111 0157
⋈	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
D112 0160	D113 0161	D114 0162	D115 0163	D116 0164	D117 0165	D118 0166	D119 0167	D120 0170	D121 0171	D122 0172	D123 0173	D124 0174	D125 0175	D126 0176	D127 0177
⋈	P	Q	R	S	T	U	V	W	X	Y	Z	[]	\$	⋈

B-1

*Standard character set. Control codes (characters 0–31) are displayable in transparent mode. Decimal and octal character values are shown and preceded by a “D” and an “O” respectively.



CONCEPT GRAPHICS CHARACTER SET*

D000	D000	D001	D001	D002	D002	D003	D003	D004	D004	D005	D005	D006	D006	D007	D007	D008	D010	D009	D011	D010	D012	D011	D013	D012	D014	D013	D015	D014	D016	D015	D017
D016	D020	D017	D021	D018	D022	D019	D023	D020	D024	D021	D025	D022	D026	D023	D027	D024	D030	D025	D031	D026	D032	D027	D033	D028	D034	D029	D035	D030	D036	D031	D037
D032	D040	D033	D041	D034	D042	D035	D043	D036	D044	D037	D045	D038	D046	D039	D047	D040	D050	D041	D051	D042	D052	D043	D053	D044	D054	D045	D055	D046	D056	D047	D057
D048	D060	D049	D061	D050	D062	D051	D063	D052	D064	D053	D065	D054	D066	D055	D067	D056	D070	D057	D071	D058	D072	D059	D073	D060	D074	D061	D075	D062	D076	D063	D077
D064	D100	D065	D101	D066	D102	D067	D103	D068	D104	D069	D105	D070	D106	D071	D107	D072	D110	D073	D111	D074	D112	D075	D113	D076	D114	D077	D115	D078	D116	D079	D117
D080	D120	D081	D121	D082	D122	D083	D123	D084	D124	D085	D125	D086	D126	D087	D127	D088	D130	D089	D131	D090	D132	D091	D133	D092	D134	D093	D135	D094	D136	D095	D137
D096	D140	D097	D141	D098	D142	D099	D143	D100	D144	D101	D145	D102	D146	D103	D147	D104	D150	D105	D151	D106	D152	D107	D153	D108	D154	D109	D155	D110	D156	D111	D157
D112	D160	D113	D161	D114	D162	D115	D163	D116	D164	D117	D165	D118	D166	D119	D167	D120	D170	D121	D171	D122	D172	D123	D173	D124	D174	D125	D175	D126	D176	D127	D177

*Decimal and octal character values are shown and preceded by a "D" and an "O" respectively.

Appendix D

Terminal Default Conditions

The following default conditions are applicable upon power up or after a terminal reset.

	<u>Function</u>	<u>Default Condition</u>
General:	Baud Rate	Back panel dip switch
	Parity	Back panel dip switch
	Duplex	Back panel dip switch
	Stop Bits	Back panel dip switch
	Dependent Indicator	Dependent
	Message Characters	Default, See page III-9
APL/ASCII:	Character Set	ASCII
	Mode	Non-overstrike
Mode Setting:	User/Programmer	User
	Text/Form	Text
	Scroll/Page	Scroll
	Character/Block	Character
	Upper-Lower Case/Caps Lock	Upper-Lower Case
	Remote/Local	Remote
	Transparent Mode	Off
	Auto Linefeed	Off
Auto Tab	Off	
Editing:	Insert Mode	Off
Cursor Controls:	Cursor Address	Home (0,0)
	Cursor Type	Blinking, Underline
	Tab Settings	8, 16, 24 ... 80
Display:	Blink	Off
	Reverse Video	Off
	Half Bright	Off
	Underline	Off
	Nondisplay	Off
	Protection	Off
	Screen Video	White characters on black background
	Protected Fields	Normal brightness
Memory	Nondisplayed spaces	
Transmission:	Start of Print Transmit	Home (0,0)
Multiple Devices:	Output Network	Half Duplex: video, line 1 on; lines 2-4 off
		Full Duplex: line 1 on; video, lines 2-4 off
	FF Prior to Print	On

Appendix D

Terminal Default Conditions (continued)

	<u>Function</u>	<u>Default Condition</u>
Screen Control:	Window	Entire display memory All windows and cursors tied to the keyboard window
	Start of Screen	Line 0
Function Keys:	Programming Cursor Control Pad	Default, See page III-8 Execute Mode

Network Defaults

Local/Remote Mode	Half/Full Duplex	Block/Character Mode	Network	
			Video	Line 1
Local	Half	Block	On	Off
Local	Half	Char	On	Off
Local	Full	Block	On	Off
Local	Full	Char	On	Off
Remote	Half	Block	On	Off
Remote	Half	Char	On	On
Remote	Full	Block	On	Off
Remote	Full	Char	Off	On

Appendix E
 Communications Interfaces

The terminal transmits ASCII coded data in asynchronous format. Each character is transmitted serially and is preceded by a start bit and followed by one or two stop bits. A four foot cable fitted with a male 25 pin RS-232-C type connector is provided for connection. Signals are provided which conform to EIA standards for interfacing to data communications equipment. The table below lists the pin configuration, EIA circuit name, CCITT V.24 circuit name and signal description.

Primary Communications Interface
 Pin Assignments

Pin Number	EIA Circuit	CCITT V.24	Description
1	AA	101	Protective Ground
2	BA	103	Transmitted Data
3	BB	104	Received Data
4	CA	105	Request to Send
5	CB	106	Clear to Send
7	AB	102	Signal Ground
20	CD	108	Data Terminal Ready

Circuit Description

Protective Ground (AA,101) This conductor is electrically bonded to the machine frame.

Transmitted Data (BA,103) This conductor transmits data from the terminal to a modem or computer interface. The circuit is held in a marking condition during intervals between characters, and at all times when no data is being transmitted. The terminal will not transmit data unless an ON condition is present on the following three circuits where implemented.

1. Circuit CA (Request to Send)
2. Circuit CB (Clear to Send)
3. Circuit CD (Data Terminal Ready)

Received Data (BB,104) Signals on this circuit are received input from the modem or computer.

Request to Send (CA,105) This signal, generated by the terminal, when ON indicates the terminal is prepared to transmit data. The Request to Send line is maintained in an ON condition at all times when the terminal is powered up.

Clear to Send (CB,106) This signal generated by the data communications equipment, when ON indicates the data set is ready to transmit data. This circuit by default is jumpered internally to CA (request to send). If the data communications equipment can control CB, the internal jumpering can be modified to disconnect the constant clear to send.

Signal Ground (AB,102) This conductor establishes the common ground reference potential for all interchange circuits. This conductor is internally connected to protective ground (CA).

Data Terminal Ready (CD,108) This signal provided by the terminal is used to control switching of the data communication equipment to the communications channel. The Data Terminal Ready line is held in the on condition at all times when the terminal is powered up.

Auxilliary Communications Interface

The second communications interface (assumed to be a printer port) reverses the pin configuration of the transmit/receive lines (BA,BB) and the request to send/clear to send lines (CA,CB). This interface is fitted with a female 25 pin RS-232-C type connector. The table below lists the pin configuration, EIA circuit name, CCITT V.24 circuit name and signal description.

Auxilliary Communications Interface (Printer Port)
Pin Assignments

Pin Number	EIA Circuit	CCITT V.24	Description
1	AA	101	Protective Ground
2	BB	104	Received Data
3	BA	103	Transmitted Data
4	CB	106	Clear to Send
5	CA	105	Request to Send
6	CC	107	Data Set Ready
7	AB	102	Signal Ground
8	CD	108	Carrier Detect

The signal descriptions are as above except for the following. Clear to Send (CB) and Request to Send (CA) are NOT internally jumpered and, thus, must be provided or jumpered in the peripheral equipment. Data Set Ready (CC) and Carrier Detect (CD) are jumpered together and held in an ON condition at all times when the terminal is powered up.

Appendix F
 Summary of Control Codes and Escape Sequences

The tables below summarize in numerical order the control code and escape sequence functions. Also presented is a short description and the Section III, Table X category and page.

CONTROL CODES

VALUE	CODE	DESCRIPTION	CATEGORY	PAGE
0	␣			
1	A			
2	B			
3	C			
4	D			
5	E			
6	F			
7	G	Bell		
8	H	Backspace	Cursor Controls	18
9	I	Tab	Cursor Controls	18
10	J	Line Feed	Cursor Controls	18
11	K			
12	L	Form Feed	Editing	21
13	M	Carriage Return	Cursor Controls	18
14	N	APL Mode	APL/ASCII	13
15	O	ASCII Mode	APL/ASCII	13
16	P			
17	Q			
18	R			
19	S			
20	T			
21	U			
22	V			
23	W			
24	X			
25	Y			
26	Z			
27	[
28	\			
29]			
30	^			
31	_			

Appendix F
 Summary of Escape Sequences and Control Codes

ESCAPE SEQUENCES

VALUE	CODE	DESCRIPTION	CATEGORY	PAGE
0	^@	Insert Mode off	Editing	21
1	^A	Delete Character in window	Editing	22
2	^B	Delete Line	Editing	22
3	^C	Clear Unprotected to EOW	Editing	22
4	^D	Transmit Unprotected window	Transmission	30
5	^E	Clear All to EOW	Editing	23
6	^F	Transmit All window	Transmission	31
7	^G			
8	^H			
9	^I			
10	^J			
11	^K			
12	^L			
13	^M			
14	^N			
15	^O			
16	^P	Insert Mode on	Editing	21
17	^Q	Delete Char in Line/Field	Editing	21
18	^R	Insert Line	Editing	22
19	^S	Clear Unprotected to EOL/EOF	Editing	22
20	^T	Trans Unprotected Line/Field	Transmission	29
21	^U	Clear All to EOL/EOF	Editing	23
22	^V	Transmit All Line/Field	Transmission	31
23	^W			
24	^X			
25	^Y			
26	^Z			
27	^[
28	^\ ^_			
29	^J			
30	^^			
31	^_			

Appendix F
 Summary of Control Codes and Escape Sequences

Escape Sequences (continued)

VALUE	CODE	DESCRIPTION	CATEGORY	PAGE
52	Sp			
53	!			
54	"			
55	#	Set Device Independent	General	12
56	\$	Reset All Function Keys	Function Keys	38
57	%	Caps Lock	Mode Settings	15
58	&	Block Mode	Mode Settings	15
59	^	Back Tab	Cursor Controls	19
40	(	Local	Mode Settings	16
41	)	ASCII Mode	APL/ASCII	13
42	*	Halt Duplex	Mode Settings	16
43	+	Status	General	11
44	,	Reset/Initialization	General	11
45	-	Page Up	Screen Control	36
46	.	Page Down	Screen Control	36
47	/			
48	U	APL Mode	APL/ASCII	13
49	1	Start of Print/Transmit	Transmission	28
50	2			
51	3	Set Device Dependent	General	12
52	4	Program Function Keys	Function Keys	38
53	5	Upper/Lower Case	Mode Settings	15
54	6			
55	7	Character Mode	Mode Settings	15
56	8	Full Duplex	Mode Settings	16
57	9	Remote	Mode Settings	16
58	:			
59	;	Cursor Up	Cursor Controls	19
60	<	Cursor Down	Cursor Controls	19
61	=	Cursor Right	Cursor Controls	19
62	>	Cursor Left	Cursor Controls	19
63	?	Home Cursor	Cursor Controls	19

Appendix F
 Summary of Control Codes and Escape Sequences

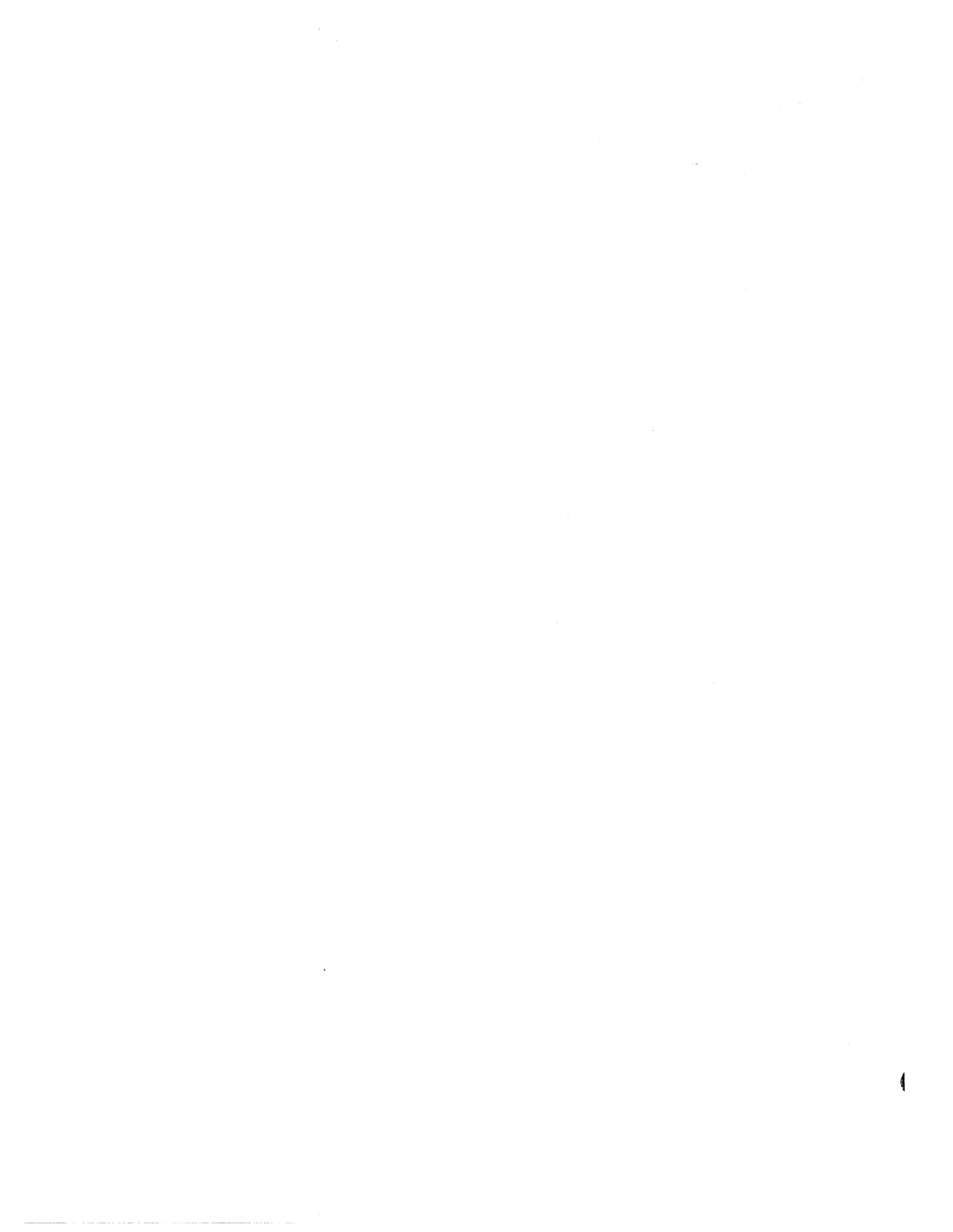
Escape Sequences (continued)

VALUE	CODE	DESCRIPTION	CATEGORY	PAGE
64	@	Attach Tape	Multiple Devices	35
65	A	Read Cursor Address	Cursor Controls	20
66	B	Auto Tab On	Mode Settings	17
67	C	Blink On	Display	24
68	D	Reverse Video On	Display	24
69	E	Half Bright On	Display	24
70	F	Form Mode	Mode Settings	14
71	G	Underline On	Display	24
72	H	Nondisplay On	Display	24
73	I	Protection On	Display	24
74	J	Set Attribute of Block	Display	27
75	K	Normal Screen Video	Display	25
76	L	Auto Linefeed On	Mode Settings	17
77	M	Half Bright Protected Fields	Display	25
78	N	Set Attribute Word	Display	25
79	O	Set Baud Rate	Transmission	28
80	P	Set Parity	Transmission	28
81	Q	Function Route	Multiple Devices	32
82	R	Repeat Character Vertical	Display	26
83	S	Page Mode	Mode Settings	14
84	T	Transparent Mode On	Mode Settings	17
85	U	Programmer Mode	Mode Settings	14
86	V	Start of Screen	Screen Control	37
87	W	Cursor to Blinking Block	Cursor Controls	20
88	X	Function Key Pad to Xmt	Function Keys	39
89	Y	Set Output Network	Multiple Devices	32
90	Z	Form Feed Prior to Prt On	Multiple Devices	35
91	[	Scroll Down	Screen Control	37
92	\	Scroll Up	Screen Control	37
93	]	Tab Set	Cursor Controls	19
94	^	Detach Tape	Multiple Devices	35
95	_	Tab Clear	Cursor Controls	19

Appendix F
 Summary of Control Codes and Escape Sequences

Escape Sequences (continued)

VALUE	CODE	DESCRIPTION	CATEGORY	PAGE
96	v	Message to Tape	Multiple Devices	35
97	a	Write Cursor Address	Cursor Controls	20
98	b	Auto Tab Off	Mode Settings	17
99	c	Blink Off	Display	24
100	d	Reverse Video Off	Display	24
101	e	Half Bright Off	Display	24
102	f	Text Mode	Mode Settings	14
103	g	Underline Off	Display	24
104	h	Nondisplay Off	Display	24
105	i	Protection Off	Display	25
106	j	Select Character Set	Display	25
107	k	Reverse Screen Video	Display	25
108	l	Auto Linefeed Off	Mode Settings	17
109	m	Norm Intensity Protect Flds	Display	25
110	n	Read Attribute Word	Display	26
111	o	Change Message Character	General	12
112	p	End of Text	Cursor Controls	20
113	q	Tie Window	Screen Control	36
114	r	Repeat Character Horizontal	Display	26
115	s	Scroll Mode	Mode Settings	14
116	t	Transparent Mode Off	Mode Settings	17
117	u	User Mode	Mode Settings	14
118	v	Define Window	Screen Control	36
119	w	Cursor to Blinking Underline	Cursor Control	20
120	x	Function Key Pad to Execute	Function Keys	39
121	y	Read Output Network	Multiple Devices	32
122	z	Form Feed Prior to Prt Off	Multiple Devices	35
123	{	Print to End of Window	Multiple Devices	33
124	|	Print to End of Line	Multiple Devices	34
125	}	Attach Printer	Multiple Devices	34
126	~	Detach Printer	Multiple Devices	34
127	Rub			



Appendix G
Timing Considerations

Generally, the concept terminal system can process data at a rate which does not require the insertion of fill characters. However, there are a few operations, which involve moving a significant amount of data on the screen, where timing considerations are important. In the table below, System Overhead (SO) is a factor dependent on baud rate equal to :

$$SO = .45 + (.3 \times \text{Rate}/9600)$$

If a delay is performed rather than transmission of fill characters the Rate above is equal to zero and the overhead reduces to .45. The table below details functions where timing considerations have a significant impact.

Function	Fill Required (milliseconds)	Description
Insert Line	$.75n/(1-S0)$	n is the number of lines to be moved.
Delete Line	$.75n/(1-S0)$	n is the number of lines to be moved.
Insert Character	$4n/(1-S0)$	n is the number of lines to be moved.
Delete Character	$4n/(1-S0)$	n is the number of lines to be moved.
Clear window (^L)	$.5n/(1-S0)$	n is the number of lines in the window.
Clear to EOL	$4/(1-S0)$	
Clear to EOW	$4n/(1-S0)$	n is the number of lines cleared.
Block Attribute Setting	$(.5L+.02C)/(1-S0)$	L is the number of lines in the block. C is the number of characters in the block.
Repeat Character Horizontal	$.024C/(1-S0)$	C is the repeat count.
Repeat Character Vertical	$.25C/(1-S0)$	C is the repeat count.
Text Tab	$2/(1-S0)$	
Form Tab	$2m/(1-S0)$	m is the number of characters tabbed over.

CONCEPT

Reference Manual

- Addendum -

Enclosed are descriptions of additional functions available on multiple-page *concept* terminals. They include:

- . Set Insert Type;
- . Define Clear Characteristics;
- . Suspend Transmission; and
- . Resume Transmission.

Human Designed Systems, Inc.
3700 Market Street
Philadelphia, PA 19104
(215) 382-5000

DN1300-7904-1
April, 1979

FUNCTION:	Set Insert Type
PROGRAMMER/USER MODE:	Programmer
DEVICE DEPENDENT COMMAND:	No
SEQUENCE:	MC ↑ G, t
DECIMAL EQUIVALENT:	(7)
DESCRIPTION:	Defines the insert type to be used for the requesting device. Valid values for 't' are:
	space (32) = window
	! (33) = line

When the device is in insert mode, the insert type determines whether the character right - shifting will stop at the end of the current line (!) or wraparound all lines to the end of the window (space). The default type is "window".

FUNCTION: Define Clear Characteristics
 PROGRAMMER/USER MODE: Programmer
 DEVICE DEPENDENT COMMAND: No
 SEQUENCE: MC ↑ H,m,w,chr
 DECIMAL EQUIVALENT: (8)
 DESCRIPTION: Defines the clear character and attributes to be used by the following functions which clear/erase a portion of display memory:

- . Form feed (↑ L)
- . Delete character in line/window
- . Insert line
- . Delete line
- . Clear all to end of line/window
- . Clear unprotected to end of line/window

The user may either use all or part of the requesting device's current attribute word as the clear attribute. Specific attributes can be superceded by a user-defined attribute as follows:

- . The bits of 'm' specify which attributes are to be taken from the current attribute word and which are to be supplied by the user. A '1' indicates that the attribute setting will be supplied by the user; a '0' indicates the current attribute setting is to be used. 'm' can be determined by summing the values corresponding to the supplied character attributes as follows:

- 1 = display/nondisplay
- 2 = blink on/off
- 4 = underlining
- 8 = protection
- 16 = brightness control
- 32 = normal/reverse video

Attributes not specified in 'm' will retain their current attribute word values. Since bits 6-8 are not used the parameter can be offset by 64 to allow input of displayable characters.

- . 'w' is the setting of the selected attributes as shown on page III-4 of the Reference Manual.
- . The clear attribute to be used in the above functions is determined by taking the current attribute word and changing those bits specified as 1's in 'm' to their corresponding values in 'w'.
- . 'chr' is the actual character to be placed in the area of display memory being cleared.
- . The default values for these parameters during power up/reset are:
 - . 'm' - change nondisplay bit (65);
 - . 'w' - set to nondisplayable (65); and
 - . 'chr' - space (32).

For example, to clear to displayed spaces, the user would enter:

```
MC ↑H,A,@,␣
```

where:

"A" (65) = change nondisplay bit

"@" (64) = set to displayable

"␣" (32) = space

Or, to clear to reverse-video, half-bright periods, enter:

```
MC ↑H,p,p,.
```

where:

"p" (112) = change brightness control bit and reverse video reverse video bit

"p" (112) = set to half-bright, reverse video

"." (46) = period

The user should be sure to note that only the above named functions use these characteristics; other functions which search for blanks (nondisplayed spaces), such as insert mode, are not affected.

FUNCTION: Suspend Transmission

PROGRAMMER/USER MODE: User

DEVICE DEPENDENT COMMAND: No

SEQUENCE: ↑ S

DECIMAL EQUIVALENT: (19)

DESCRIPTION: When a control-S is received during any of the following "transmission" functions, transmission of data to the line issuing the control-S will be suspended until a control-Q is received. These functions are:

- . Block Transmit;
- . Print;
- . Read Address;
- . Read Attribute Word;
- . Read Output Network; and
- . Transmission of Programmable Function Keys.

A control-S received at a time other than during the execution of these functions will have no effect.

FUNCTION:	Resume Transmission
PROGRAMMER/USER MODE:	User
DEVICE DEPENDENT COMMAND:	No
SEQUENCE:	↑ Q
DECIMAL EQUIVALENT:	(17)
DESCRIPTION:	Resumes transmission of data which has been previously suspended by a control-S (See description). A control-Q received at a time other than during the execution of one of the "transmission" functions will have no effect.

GETTING STARTED WITH THE CONCEPT TERMINAL

As a new Concept terminal owner you're probably wondering how to make use of all of its extensive capabilities. The following pages describe very briefly how to use your new Concept terminal. They do not replace a complete reading of the Reference Manual, but after reading the next few pages, you should be able to interactively communicate with your host computer and enter simple terminal commands from the keyboard. If you have any problems please don't hesitate to call our Customer Service Department at 215-382-5000.

CONNECTING THE TERMINAL

After the Concept terminal is unpacked, follow the connection procedure listed below.

1. Attach the keyboard cable connector to the first connector (smallest - labeled 'KEYBOARD') on the extreme left of the back panel. Tighten the screws to insure contact.
2. If the terminal is to communicate with a computer and/or modem, connect the communication cable (labeled 'LINE 1') to the connector on that device. Tighten the screws.
3. If the terminal is to communicate with a printer, connect the printer's cable to the communications port marked 'LINE 2', and tighten the screws.
4. The terminal may be plugged into a normal 110 volt grounded outlet - preferably its own or a lightly loaded outlet.
5. Turn the terminal on via the back panel on-off switch. After 5-10 seconds, the display should show a blinking underline cursor in the home position (upper left corner of the screen). If the terminal is turned off, wait 15 seconds before turning on again to allow the display memory to reset itself.

DN1300-7907-14

6. Brightness can be adjusted by turning the knob under the front left side of the terminal. The long knob extending from the front of the pedestal adjusts the tilt of the screen. To use, first loosen the knob, grasp the terminal and raise/lower the screen to the desired position; then re-tighten the knob.

SETTING TERMINAL DEFAULTS

Prior to turning on the terminal, the communication dip switches (the small white switches on the back panel) must be set. The setting of these switches will determine the status of the terminal when turned on or reset.

There is a set of dip switches for each communications line, located above their respective connectors on the back panel. On the right side of the back panel is a diagram showing how to set each switch for the desired communications setting. A solid circle means the appropriate switch should be set in the 'ON' position, and the open circle refers to the 'OFF' position.

Using the end of a pen or pencil, flip each switch to the appropriate setting. The uppermost four switches set the correct baud rate (those switches marked 5-8). For each different baud rate, these four switches have been assigned a pattern of 'ONs' and 'OFFs'. (Refer to Page II-3 of the Concept Manual). Also set the parity, duplex and stop bits. Normally, stop bits are set to one for all baud rates other than 110. If you're not sure on any of the above, check with your installation manager.

Once the default configuration has been selected, holding the shift key down and pressing the "Reset Stat" key will reset the terminal. Pressing the "Reset Stat" key (no shift) will display the status of the terminal on the 24th line of the display and will allow you to verify your back panel entries. (See page I-13 in the Reference Manual) To remove the status line, depress the "Reset Stat" key (no shift) once again.

SIMPLE TERMINAL COMMANDS

Any portion of the terminal configuration, including three of the settings (baud rate, duplex, and parity) which you just finished setting on the back panel dip switches, may be changed by executing a command either from the keyboard or from a computer program. Keyboard commands are executed by depressing the key marked "MULT CODE" followed by typing a key indicating which command and potentially several more keys indicating parameters. NOTE: DO NOT ENTER A COMMA OR A SPACE BETWEEN THE TYPING OF EACH PARAMETER.

Begin testing the terminal by trying a few commands.

Programmer Mode: Type "MULT CODE" (abbreviated MC) key and then type a shift u.

Local Mode: Type MC key and then type a shift 9.

If the status line settings now read PROG and LOC, you have successfully executed the commands. All other terminal commands - listed in the yellow Reference Card and also in the Reference Manual - are entered in the same manner:

- always preceded by the typing of MC key,
- never requiring the typing of a comma or a space between the characters in the command sequence.

Many of the terminal command sequences require that you be in Programmer mode in order to successfully execute them. This is indicated on the reference card by a P in the third column of each command description.

Other interesting commands to try include:

APL mode:	MC Ø	(Concept APL only)
ASCII mode:	MC shift Ø	
Transparent mode:	MC shift t	You must be in programmer mode for this command.

When the terminal is in transparent mode, 'control codes' are displayed rather than transmitted. Control codes represent the first 32 characters in each character set (see the back of the yellow Reference card). From the keyboard, control codes are generated by holding the CTRL key down and then pressing the desired key (e.g. to generate a Control A, hold the CTRL key down and press the A). The displayed ASCII control codes generate line drawing, forms, curve approximation and general math symbols. The displayed APL control codes generate subscripts and superscripts. The correct control code to type can be determined from the back of the yellow Reference card. For each character set, the generated character is four rows (64 characters) before the typed keys. Thus, a 'Control - L' corresponds to Σ .

Transparent mode off: MC t

Position Cursor at Line 10, Column 5: MC a * % You must be in programmer mode for this command.

Parameters are entered without additional spaces or commas. In the above sequence, the first parameter indicates the line number while the second indicates the column number (line and column numbering begin at 0). Should you make a mistake during command entry, finish the command and then retype from the beginning. Parameters are entered as single characters and represent the corresponding displayable character on the back of the yellow Reference card (displayable characters start with a space - character number 32). Thus, a one corresponds to a !, a five corresponds to a %, and a ten corresponds to a * (check the card). Try several cursor positions for yourself!

All terminal commands may be generated by the host computer by replacing the MULT CODE key with an 'ESCAPE' character (default is character 27). See your installation manager for details on generating this character.

Commands are summarized on the yellow Reference card and covered in detail in the Reference Manual.

Enjoy! Let us know how you do or if you have any questions.

20 MA CURRENT LOOP INTERFACE OPTION ON CONCEPT TERMINALS

When the *Concept* terminal is ordered with the 20ma current loop option, it can be configured to operate in any of three modes - 20ma active, 20ma passive or RS-232 compatible. The mode selection is accomplished by setting two sets of DIP switches which are mounted on the main circuit board inside the terminal case. The DIP switches are located on the top right hand corner of the circuit board in locations S1 and S2 (S1 is on top). DIP switch S1 controls the "receive" line mode, while S2 controls the "transmit" line. The following tables specify the switch configurations for the three modes of operation.

DIP Switch S1 (Receive)

Switch Settings (1-ON,0-OFF,X-Don't Care)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
RS-232	0	0	0	0	0	0	1	X
20ma Passive	0	1	0	1	0	1	0	X
20ma Active	1	0	1	0	1	1	0	X

DIP Switch S2 (Transmit)

Switch Settings (1-ON,0-OFF, X-Don't Care)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
RS-232	0	0	0	0	0	1	X	X
20ma Passive	0	1	0	1	0	0	X	X
20ma Active	1	0	1	0	1	0	X	X

The communication interface connector on terminals equipped with the 20ma current loop option is the standard 25 pin male connector. The current loop signals are on the following pins:

Terminal Transmit + Pin 18
 Terminal Transmit - Pin 25
 Terminal Receive + Pin 10
 Terminal Receive - Pin 11



SPLIT SPEED OPTION ON CONCEPT TERMINALS

The split speed option on the *CONCEPT* terminal allows for the independent settings of Baud rates on the transmit and receive lines of the primary communication interface. The default values for the Baud rates are read from the DIP switches on the back panel of the *CONCEPT* terminal upon power up or upon execution of the terminal RESET function. DIP switch #1 sets the default Baud rate for the "receive" line; DIP switch #2 sets the default Baud rate for the "transmit" line. The remaining default parameters on the DIP switches - parity, duplex setting and number of stop bits - are controllable only from DIP switch #1.

In order to change the Baud rates following the reading of the DIP switches, a MULT-CODE (MC) sequence from the keyboard or an ESCAPE (ESC) sequence from the communication line must be performed. As an example, the "receive" Baud rate can be changed to 600 Baud by executing the following sequence from the keyboard - MC O &. The FUNCTION ROUTE command must be used to change the Baud rate on the "transmit" line. As an example, the "transmit" Baud rate can be changed to 3600 Baud by executing the following sequence from the keyboard - MC Q " ESC O + ↑w. Note that programmer mode is required for execution of the Baud rate change function.

