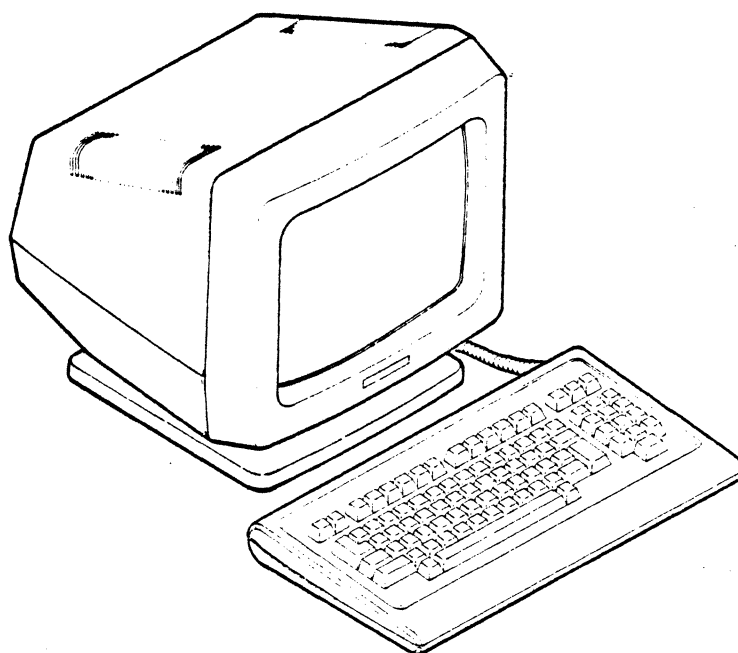




CDC® 722-30 DISPLAY TERMINAL
PART NO. 51942413, 51942414



HARDWARE REFERENCE MANUAL

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PREFACE

This manual contains reference information on the CDC® 722-30 Display Terminal, part number 51942413 or 51942414. This information is for the personnel who operate and program the computer system in which the display terminal is installed. This manual is divided into the following major sections:

- Section 1, General Description - Gives an overview of the terminal and describes its standard and optional features and its specifications.
- Section 2, Basic Operating Features - Describes the basic features of the terminal. This includes its manual controls, keyboard, diagnostic self tests, display features, online/local operations, and print operations.
- Section 3, Parameter Selections - Discusses the parameters that determine how the terminal operates.
- Section 4, ADV Emulation - Describes the terminal operating mode which emulates the advanced mode of a CDC 722-10/20 (CC628-A/B) Display Terminal.
- Section 5, ADDS Emulation - Describes the terminal operating mode which emulates an ADDS* Viewpoint Terminal.
- Section 6, ANSI Emulation - Describes the terminal operating mode that is ANSI X3.64** compatible.
- Section 7, Interface Information - Describes the main and auxiliary interfaces of the terminal.

The 722-30 Display Terminal Owner's Manual, publication number 62950139, is an associated manual that provides information on installing and operating the terminal. Copies of that manual or additional copies of this manual may be ordered from:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

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**ANSI X3.64 is a standard that establishes multi-code commands using ASCII codes. ANSI is an acronym for American National Standards Institute. ASCII is an acronym for American Standard Code for Information Interchange.



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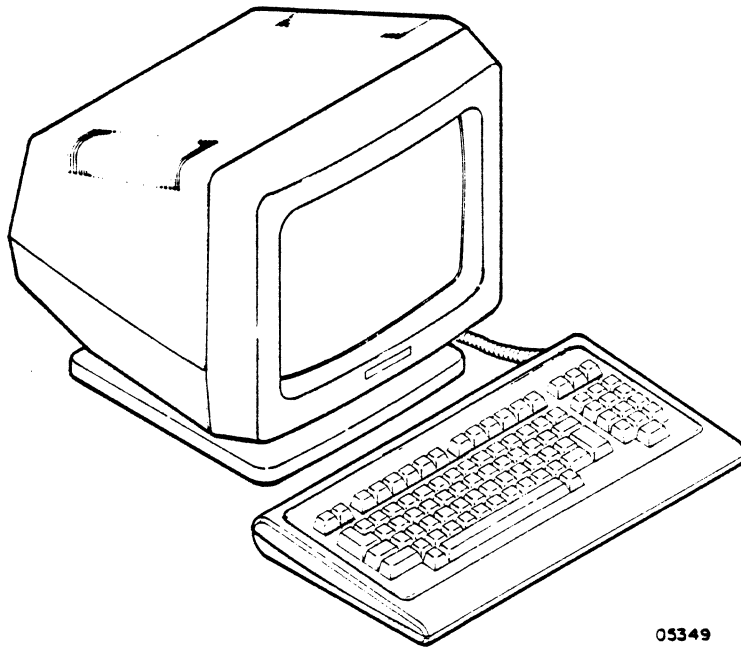
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This section gives an overview of the display terminal and describes its standard and optional features and its specifications.

OVERVIEW

The display terminal (figure 1-1) is an interactive input/output device for a remote or local host computer. The terminal transmits keyboard-entered data to the host computer character by character in a manner like a teletypewriter. In addition, in ANSI emulation, the terminal can also transmit blocks of data, allowing editing to be done before transmission. A serial-interface printer may be connected to the terminal to copy input/output or to make screen copies.

As mentioned in the preface, the terminal has three emulations or personalities: an ADV (advanced) emulator that emulates the advanced mode of a CDC 722-10/20 (CC628-A/B) Display Terminal; an ADDS emulation that emulates an ADDS Viewpoint Terminal; and an ANSI emulation that complies with ANSI standard X3.64. The emulation to be used may be selected by the terminal operator via the keyboard or be selected by the host computer.



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Figure 1-1. Display Terminal

STANDARD FEATURES

The standard features of the terminal include:

- Parameters governing operating characteristics are entered by the terminal operator via the keyboard and are stored in nonvolatile memory.
- Display format of 24 lines by 80 characters per line. In addition, terminal status information appears on a 25th line if enabled in the parameters.
- Display character set includes 95 ASCII alphanumeric characters and two groups of special symbols. The special symbols include line-drawing symbols and graphic/mathematical symbols. In addition, the terminal has a monitor mode where characters for 33 ASCII control codes are displayable without the control functions being performed.
- Characters may be displayed at half (low) intensity, blinking, underlined, in inverse video (dark characters on light background), or in any combination.
- Display cursor may be an underline or a block and may blink, be steadily-lit, or be blanked (not displayed).
- Self tests that check the terminal hardware.
- Host and printer interfaces that are asynchronous, RS-232-C/CCITT-V.24* compatible, and have selectable word formats and selectable speeds from 110 to 19 200 bps. In addition, the host interface can be set up for current-loop communications.
- Receive buffer with 512-character capacity for storing received data that has not yet been processed or displayed.
- Detached keyboard with ASCII character set.
- Tilt and swivel display unit.

*RS-232-C is the Electronic Industries Association standard for signal interchange between data terminal equipment and data communication equipment. CCITT V.24 is a comparable European standard.

OPTIONAL FEATURES

Optional character sets are available that allow the terminal to operate in the languages listed below.

- English (United Kingdom)
- German
- French
- Spanish
- Swedish/Finnish
- Danish/Norwegian

SPECIFICATIONS

The following paragraphs describe the electrical, environmental, and physical specifications for the terminal.

ELECTRICAL SPECIFICATIONS

The electrical specifications for the terminal are:

- Units with part number 51942413 require: 110 (+11) V ac, 60 Hz, single phase input
- Units with part number 51942414 require: 220/240 (+22/24) V ac, 50 Hz, single phase input

ENVIRONMENTAL SPECIFICATIONS

The environmental requirements of the terminal are:

Operating Temperature: 10 C to 40 C (50 F to 104 F)

Nonoperating Temperature: -20 C to 65 C (-40 F to 149 F)

Relative Humidity: 0 to 90%, no condensation

PHYSICAL SPECIFICATIONS

The overall dimensions of the terminal and keyboard are shown in figure 1-2. The terminal weighs 7.0 kg (15.4 lb) and the keyboard weighs 1.5 kb (3.3 lb).

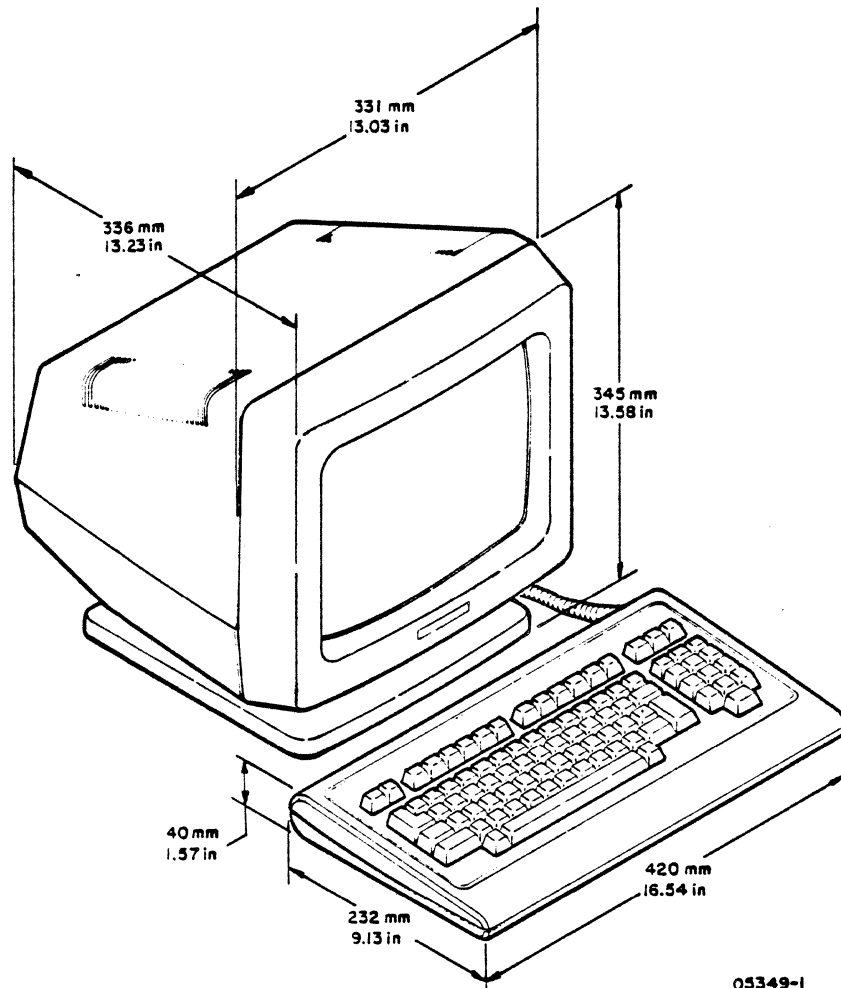


Figure 1-2. Terminal Dimensions

This section describes the basic operating features of the terminal. Unless indicated otherwise, these features are common to ADV, ADDS, and ANSI emulations. The features described are the:

- Manual operator controls
- Keyboard
- Status line
- Diagnostic self tests
- Cursor and scroll/page display
- Display attributes
- Online/local operations
- Transmission of X-off/X-on codes
- Print operations

MANUAL OPERATOR CONTROLS

The terminal has a minimum of manual operator controls. Functions such as adjusting screen contrast, resetting the terminal, and selecting online/local operations are controlled through the parameters described in section 3. The only manual controls (figure 2-1) are the:

- Power switch - Pressing the front end of the switch up turns power on and pressing the back end turns power off.
- AC line fuse - Provides electrical overload protection. This is a 0.3-A (CDC part number 66329971) fuse on 60-Hz units and a 0.15-A (CDC part number 66329972) fuse on 50-Hz units.

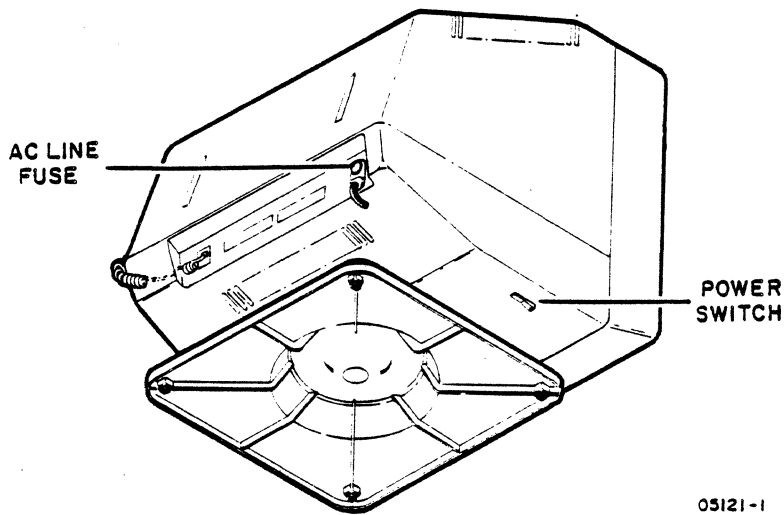


Figure 2-1. Operator Controls

KEYBOARD

The keyboard (figure 2-2) inputs the alphanumeric and control-code entries made by the operator. The keyboard operates in four modes, unshifted, shifted, Control (CTRL) unshifted, and CTRL shifted. Alphanumeric entries generate ASCII codes, while control-code entries generate codes which vary with the emulation. The keycodes generated in each emulation are given in sections 4 (ADV emulation), 5 (ADDS emulation), and 6 (ANSI emulation).

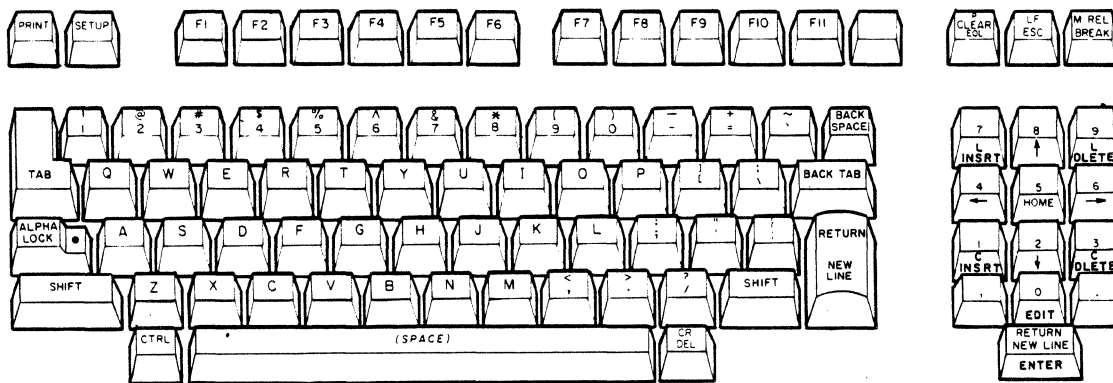


Figure 2-2. Standard Keyboard

If an optional foreign character set is installed, certain keycaps are replaced and the codes for corresponding keys are affected (appendix B contains information on the optional character sets).

Some keys are parameter controlled and can be set up to operate in different ways. For example, the numeric-pad keys on the right side of the keyboard may be set up (via parameter 21) for normal operation in accordance with their lowercase/upercase legends or for opposite operation (unshifted generates upercase functions and shifted generates lowercase functions). The normal operation of the numeric-pad keys facilitates numeric entries, while opposite operation facilitates cursor-control entries.

Note that the upercase functions of the numeric-pad keys are labeled in front, rather than on top of the keycap. The upercase functions of HOME, Cursor-Up (↑), Cursor-Left (←), Cursor Right (→), and Cursor Down (↓) apply to all emulations. The other upercase functions of the numeric-pad keys only apply to ANSI emulation and are described in section 6.

Other general parameter-controlled keyboard features are automatic repeating keys and a keyclick sound. If desired, all alphanumeric keys may be made to repeat at a rate of 15 times per second when held down for one-half second (parameter 2). If the keyclick sound is placed in effect (parameter 17), the keyboard generates a sound (beep) each time a key is pressed.

Under certain conditions, the keyboard locks (becomes unresponsive) to prevent entries from being made. This occurs when the host commands that the keyboard be locked, when the display screen is being copied by a printer, or when a block of data is being sent in ANSI emulation. If the status line is enabled in the parameters, the locking of the keyboard is indicated on the display screen.

STATUS LINE

The terminal displays status information at half intensity on the bottom line of the screen. The status line is controlled by parameter 35 and part of the line may be switched on or off. The information given in the line depends on the emulation being used. As described next, the status line for ADV and ADDS emulations differs slightly from the status line for ANSI emulation.

ADV/ADDS STATUS LINE

The status line for ADV and ADDS emulations is shown in figure 2-3. If the status line is switched off, just the R=XX and C=XX information in figure 2-3 displays.

Online	All Char	DSR-On	ADV	KB-Lock,	Aux-Ready,	R=XX
or	or	or	or	KB Avail,	Aux-Busy, or	
Local	Caps-Only	DSR-Off	ADDS	or KB-Error	Aux-Off	C=XX

Note: Letters XX represent a two-digit number of varying value.

Figure 2-3. ADV/ADDS Status Line

TABLE 2-1. ADV/ADDS STATUS LINE INFORMATION

DISPLAYED INFORMATION	INDICATES
Online or Local	Whether terminal is in online mode for operating with host or in local mode (controlled by parameter 22).
All Char or Caps-Only	Whether ALPHA LOCK key is in use (Caps-Only) or not in use (All Char).
DSR-On or DSR-Off	Whether terminal is receiving a Data Set Ready signal on main (host) interface port (DSR-On) or not (DSR-Off).
ADV or ADDS	The emulation in effect (controlled by parameter 14).
KB-Lock, KB-Avail, or KB-Error	If the keyboard is locked to disable input (KB-Lock), if the keyboard is available for input (KB-Avail), or if the keyboard is not connected to the terminal (KB-Error).
Aux-Ready, Aux-Busy, or Aux-Off	If the auxiliary (printer) interface port is ready to transfer print data (Aux-Ready), if the connected printer has dropped its Data Terminal Ready signal (Aux-Busy), or if the auxiliary port is not enabled (Aux-Off).
R=XX and C=XX	Which row (R) and column (C) the cursor is at. Rows (display lines) are numbered 00 through 23 from top to bottom and columns (character positions) are numbered 00 through 79 from left to right.

ANSI STATUS LINE

The status line for ANSI emulation is shown in figure 2-4. If the status line is switched off, no status displays.

Online or Local	All Char or Caps-Only	DSR-On or DSR-Off	ANSI	KB-Lock, KB Avail, or KB-Error	Aux-Ready, Aux-Busy, or Aux-Off	All or Unprotect
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Figure 2-4. ANSI Status Line

Table 2-2 defines the status line information.

TABLE 2-2. ANSI STATUS LINE INFORMATION

DISPLAYED INFORMATION	INDICATES
Online, Edit, or Local	Whether terminal is in online mode and transmitting data character by character, in edit mode and transmitting data in blocks, or in local mode. (Controlled by parameters 8 and 22.)
All Char or Caps-Only	Same as given in table 2-1.
DSR-On or DSR-Off	Same as given in table 2-1.
ANSI	ANSI emulation is in effect (controlled by parameter 14).
KB-Lock, KB-Avail, or KB-Error	Same as given in table 2-1.
Aux-Ready, Aux-Busy, or Aux-Off	Same as given in table 2-1.
All or Unprotect	Whether all displayed data is enabled for a block transmission in edit mode or just the unprotected data (controlled by parameter 9).

DIAGNOSTIC SELF TESTS

The next paragraphs describe the diagnostic self tests that are included in the terminal firmware. These are the power-on tests and the keyboard-connection test. Following that is a description of monitor mode, which is also in the firmware and is a diagnostic or program-debugging aid.

POWER-ON TESTS

The power-on tests detect basic hardware faults. These tests run automatically when power is turned on or when the terminal is reset via parameter 28. These tests can also be run in a continuous loop when in either ADV or ANSI emulation (sections 4 and 6 describe the keyed-in commands). The sequence of the tests after a power on or reset is as follows:

- All segments of terminal memory are tested.
- The keyboard connection to the terminal is tested.
- If the keyboard connection is good and no fatal error occurs, the terminal sounds a soft beep.
- The screen clears and the cursor goes to the home position.
- The revision level of ADV, ADDS, or ANSI emulation displays. If a memory error was detected, a two-digit error code appears with the revision-level message.
- The status line appears at half intensity at the bottom of screen, or if the status line is not enabled, just the R=XX/C=XX status appears in ADV or ADDS emulation and nothing in ANSI.

This sequence immediately halts if a fatal (terminal cannot continue) error occurs. The screen in such a case will show random (meaningless) data. If the keyboard connection is bad, the sequence is completed but no beep sounds.

KEYBOARD-CONNECTION TEST

The testing of the keyboard connection done in the power-on tests continues throughout all operations. If the connection is found bad after the power-on tests, the words KB-Error are displayed in

the status line at the bottom of the screen. That is if the status line has been switched on through parameter 35. No other error indication is given.

MONITOR MODE

Monitor mode is a diagnostic or program-debugging aid that is placed in effect through parameter 20. It allows control codes to be monitored on the screen instead of the control functions being performed.

CURSOR AND SCROLL/PAGE DISPLAY

The display cursor indicates the location of the next entry position on the screen. Parameter 10 allows the cursor to be a blinking or steadily lit underline, a blinking or steadily lit block, or be blank (not displayed). During consecutive alphanumeric entries, the cursor moves in a right direction through all 80 character positions of a display line. Parameter 19 may be set so a beep sounds to warn the operator when the cursor is eight positions from the end of line.

When an entry fills the last position of a line, parameter 4 controls whether the cursor automatically advances to the beginning of the next line or not. If this automatic advance is not used, the host or operator must move the cursor to avoid overwriting data.

The cursor can be moved up or down, right or left, to the beginning of the present or next line, or to home position without affecting data on the screen. This is done through commands that may be entered from the keyboard or be sent from the host. To facilitate cursor movement to the beginning of the next line, parameter 1 may be set in either ADDS or ANSI emulation for a automatic line feed to occur when one of the RETURN/NEW LINE keys is pressed or when a carriage return code is received from the host.

The location of the home position of the cursor depends on the emulation and whether a scroll or page display is in effect. These display modes are controlled by parameter 3 and are discussed in the following paragraphs.

SCROLL DISPLAY

With a scroll display in ADDS emulation, the home position of the cursor is at the beginning of the 24th line (R=23 and C=00 displayed in ADV/ADDS status line) and data entry is normally limited to the 24th line. When the 24th line fills with data or a line feed is performed with the cursor in the 24th line, the cursor moves to the beginning of the 24th line and all previously entered data on the screen moves up one line. Any data on the top line when the scroll operation occurs moves off the screen and is lost.

The home position of the cursor in a normal scroll display in either ADV or ANSI emulation is at the beginning of the first line (R = 00 and C = 00 displayed in ADV status line). Following a positioning to home, the cursor progresses with data entries in a line-by-line, top-to-bottom manner. When the cursor reaches the 24th line, the display and cursor operate the same as described for ADDS emulation.

The scroll area in either ADV or ANSI emulation can also be reduced in height from the normal full screen area and can be made to scroll up or down. These actions may be directed by the host or by keyboard input (commands are described in sections 4 and 6).

The home position of the cursor in ADV emulation is always at the beginning of the first line. That also is the default home position in ANSI emulation. In addition, the home position in ANSI emulation can be directed to be at the upper-left corner of a reduced scrolling area.

PAGE DISPLAY

With a page display, the home position of the cursor is always at the beginning of the first line. Data entries fill the screen line by line, top to bottom. When the 24th line has filled with data or a line feed is performed with the cursor in the 24th line, the cursor returns to the home position in either ADV or ADDS emulation. In ANSI emulation, the cursor does not return to home until directed.

Continuing data entry causes new data to overwrite data already on the screen.

DISPLAY ATTRIBUTES

Received and transmitted alphanumeric characters may be displayed at normal intensity, half intensity, blinking, underlined, in inverse video (dark characters on light background), or be blanked. These display attributes are controlled through commands from either the host or the keyboard. In ADV or ANSI emulation, any mix of these attributes can be displayed on the screen at the same time and each character may have a variety of attributes in effect. In addition, in ANSI emulation, characters with or without an attribute can be designated as protected data (protected from operator input). The attribute commands for ADV emulation and ANSI emulation are given in sections 4 and 6.

In ADDS emulation, only one type attribute other than normal intensity can be displayed at the same time. ADDS emulation, however, does have additional type attributes available. These additional attributes include blinking at half intensity, inverse video at half intensity, blinking inverse video, blinking inverse video at half intensity, underlining at half intensity, blinking underlining, and blinking underlining at half intensity. The attribute commands for ADDS emulation are given in section 5.

ONLINE/LOCAL OPERATIONS

Parameter 22 controls whether the terminal is set for online operations with the host or for independent local operations. In either case, the emulation in effect determines what commands the terminal recognizes and the operations that are available.

During local operations, the terminal responds to keyboard entries and data displays immediately even though the terminal may be set up for full-duplex (echo) operation when online.

TRANSMISSION OF X-OFF/X-ON CODES

The automatic transmission of X-off/X-on codes by the terminal during online operations is enabled/disabled through parameter 5. If this feature is enabled, the terminal uses the X-off/X-on codes to indicate when it cannot/can receive further data from the host. The terminal sends an X-off (13₁₆) code when one of the following conditions occur:

- The 512-character receive buffer becomes approximately 75 percent full
- The CTRL and S keys are pressed simultaneously (does not apply to edit mode in ANSI emulation)

The terminal sends an X-on (11₁₆) code when:

- The receive buffer has become nearly empty
- The CTRL and Q keys are pressed simultaneously (does not apply to edit mode in ANSI emulation)

PRINT OPERATIONS

Having a serial-interface printer connected to the auxiliary interface port (rear-panel connector labeled AUX EIA) allows a hardcopy of communications to be made. A print operation is done by making the printer ready (printer issuing a Data Terminal Ready to terminal) and giving the terminal the appropriate command for the type print operation to be performed. This enables the transfer of data to the printer.

Throughout each print transfer, the terminal monitors the Data Terminal Ready signal from the printer. If the signal drops, the terminal displays the words Aux-Busy in the status line (if the status line is turned on) and stops transferring data to the printer. Data received from the host is then held in the receive buffer. When the buffer becomes approximately 75 percent full, the terminal sends an X-off code to the host if automatic transmission of X-on/X-off codes is enabled via parameter 5. Once the printer raises the Data Terminal Ready signal, the transfer continues and the words Aux-Ready appear in the status line (if the status line is turned on). When the receive buffer becomes nearly empty, the terminal sends an X-on code to the host (if automatic transmission of X-on/X-off codes is enabled).

Table 2-3 lists the print operations that are available. The commands for these operations are given in section 4 (ADV emulation), section 5 (ADDS emulation), and section 6 (ANSI emulation).

TABLE 2-3. AVAILABLE PRINT OPERATIONS

EMULATION	NAME OF OPERATION	TYPE OF PRINTING DONE
ADV	Page print (see notes 1 and 2)	<p>Prints the data from the current line (line with cursor) to the last line of the display screen. During the transfer:</p> <ul style="list-style-type: none"> • Terminal uses space suppression. If only spaces (20_{16}) are stored from the cursor position to the end of a line, terminal transfers a carriage return/line feed ($0D/0A_{16}$) to printer and proceeds to next line. • Terminal inserts a 250-millisecond delay after transferring a carriage return, line feed, or form feed ($0C_{16}$). • Keyboard locks (except for the keys mentioned in note 1) and received data is ignored but not lost.
ADV	Form print (see notes 1 and 2)	Same as a page print operation except any data displayed at half intensity between the current line and last line is transferred to the printer as spaces.
ADV	Print I/O (see note 2)	Prints all communications from the host to the terminal.
ADDS	Enable auxiliary port	Allows communications from the host to the terminal to be printed.

TABLE 2-3. AVAILABLE PRINT OPERATIONS (CONTD)

EMULATION	NAME OF OPERATION	TYPE OF PRINTING DONE
ADDS	Transparent print	Prints all data received from the host without it being displayed by the terminal. The keyboard is locked throughout the operation.
ANSI	Enable printer port with display (see notes 3, 4, and 5)	Prints all data received from the host.
ANSI	Enable printer port without display (see notes 4 and 5)	Same as a transparent print operation in ADDS emulation except that the keyboard does not automatically lock. That is done by a separate command.
ANSI	Hard copy (see notes 3, 4, and 5)	Same as a page print operation in ADV emulation except all lines of display are transferred.

Notes:

1. A page or form print can be aborted by pressing the SHIFT and M REL keys.
2. Line-drawing symbols, which can be displayed in ADV emulation, are transferred to the printer as spaces.
3. Special graphic/mathematical symbols, which can be displayed in ANSI emulation, are transferred to the printer as spaces.
4. Parameter 26 controls whether all characters on screen are enabled to be transferred to the printer or just the characters in a programmed scroll region.
5. Parameter 27 may be set so a form feed is inserted at the end of each print operation in ANSI emulation.

This section contains information on the selectable parameters of the terminal. These parameters determine how the terminal operates. The topics discussed include:

- Categories of parameters
- Storage of parameters in memory
- Display of parameters on screen
- Parameter selections available
- Changing parameter settings
- Default parameter settings and settings host can change

CATEGORIES OF PARAMETERS

The various selectable parameters include ones that:

- Are set to make the terminal compatible with the site and its host
- Are set for operator comfort
- Control functions commonly controlled on other type terminals by manual controls. These functions include:
 - Screen contrast adjustment
 - Terminal reset
 - Online/local (offline) mode selection

STORAGE OF PARAMETERS IN MEMORY

The storage of parameter settings involves nonvolatile memory (NVM) that is electrically erasable (contents can be electrically erased and changed via the keyboard), volatile memory, and a set of default parameter settings that is part of the terminal firmware. The default parameter settings become effective when the terminal is initially powered on following installation. The

person installing the terminal then changes the undesired default settings and stores the default and changed settings into NVM.

The NVM stores the parameter settings that the user desires to use on a permanent basis. These settings are permanent in that, unless changed, they automatically become effective each time the terminal is powered on or reset.

If a temporary parameter change is desired, the changed setting should be stored in volatile memory. Such a change will override the permanent setting until cleared by a power off or reset.

In addition to the initial power on, the default settings become effective if instructed via the keyboard or if the terminal cannot detect any stored settings in NVM when a power on or reset occurs.

DISPLAY OF PARAMETERS ON SCREEN

The terminal has 41 numbered parameters and an unnumbered set tabs parameter (figure 3-1). These parameters can be displayed by pressing the SET UP key.

Pressing the SETUP key enters the terminal into setup mode where parameter information is displayed at the bottom of the screen. The first information displayed is the message:

PRESS UP-DOWN ARROWS TO SEE MORE, AND LEFT-RIGHT ARROWS TO
CHANGE VALUES

Pressing the shifted Cursor Up (↑) key or the shifted Cursor Down (↓) key then clears the message and displays the terminal parameters one at a time. The first parameter displayed is the set tabs parameter. The display of the set tabs parameter includes a line of digits 0 through 9 repeated 8 times (for the 80 columns across the screen) with letter Ts above the digits where tabs have been set when in ANSI emulation.

After the set tabs parameter is a series of 41 numbered parameters. The shifted Cursor Up key steps the display to the next higher-numbered parameter (to parameter 1 from set tabs parameter), while the shifted Cursor Down key steps the display to the next lower-numbered parameter (wrapped around to parameter 41 from set tabs parameter).

The following is an example parameter.

1 Auto LF/CR On

The 1 identifies the example parameter as being parameter 1 and the word On indicates the Auto LF/CR (automatic line feed/carriage return) is in effect. The alternate setting for this particular parameter is Off. Using the keyboard, the setting of On can be toggled to Off. However, for the change to become effective, it must be saved in either NVM or volatile memory using the keyboard entries described later in this section under Changing Parameter Settings.

T T T T T T T T T
 0123456789012345678901234567890123456789012345678901234567890123456789

Figure 3-1. Display of Default Set Tabs Parameter

PARAMETER SELECTIONS AVAILABLE

The parameter selections available are defined in table 3-1. Unless indicated otherwise, the definitions given apply to all three emulations.

TABLE 3-1. DEFINITION OF PARAMETERS

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
-	Set tabs display (figure 3-1)	-	Applies only to ANSI emulation. Allows tab stops to be set. The eight series of digits 0 through 9 in the set tabs display mark the 80 columns across the screen and the letter Ts indicate where tabs have been set. Tabs may be added or deleted by moving the cursor to the desired column and pressing the CTRL and M keys. Repeated use of these keys alternately sets and clears a T (tab) at the current column.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
1	Auto LF/CR	On, Off	Applies only to ADDS and ANSI emulations. With the On setting, cursor does an automatic line feed with each CR (0D ₁₆) code received from the host or generated by the RETURN/NEW LINE keys. With the Off setting, cursor does not do an automatic line feed.
2	Auto Repeat	On, Off	Determines whether keys automatically repeat 15 times per second when held down for one-half second. This automatic repeat affects all alphanumeric keys.
3	Auto Scroll	On, Off	Determines whether the display scrolls or the display acts in a page manner (scroll and page displays are described in section 2).
4	Auto Wrap	On, Off	Determines whether cursor automatically advances to the beginning of the next line when the previous line becomes filled (On) or does not automatically advance (Off).
5	Auto Xon-Xoff	On, Off	Determines whether terminal automatically transmits X-off/X-on codes to host when it cannot/can receive further data.
6	Backspace Key	Normal, DEL	Applies only to ADV emulation. Affects the operation of the BACKSPACE key and the CR/DEL key. With the Normal setting, the BACKSPACE and CR/DEL keys operate normally. With the DEL setting, the BACKSPACE key performs the delete function of the CR/DEL key and the CR/DEL key performs only the carriage return function.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
7	Baud Rate	110,150,300, 600,1200, 1800,2400, 4800,9600, 19 200	Sets receive/transmit rate for the main (host) interface port and the auxiliary (printer) interface port.
8	Block Mode	ON, Off	Applies only to ANSI emulation. Determines the type of transmission mode the terminal assumes after a power on or reset. With the On setting, the terminal assumes the edit mode where keyboard entered data is sent to the host in blocks. With the Off setting, the terminal sends keyboard entered data character by character (unless the type-ahead-buffer feature governed by parameter 41 is in effect).
9	Character Sent	All, Unprotected	Applies only to edit mode in ANSI emulation. With the All setting, all data on the screen is enabled to be sent to host. With the Unprotected setting, only the unprotected data on the screen is enabled to be sent.
10	Cursor	BNK-LIN, LIN-CUR, BNK-BLK, BLK-CUR, Blank	Determines which of the following type cursors display: <ul style="list-style-type: none"> ● Blinking underline (BNK-LIN) ● Steadily lit underline (LIN-CUR) ● Blinking block (BNK-BLK) ● Steadily lit block (BLK-CUR) ● Blank

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
11	Data Bits	7,8	Determines whether received/transmitted characters on main and auxiliary interface ports contain 7 or 8 data bits (not including parity). If 8 data bits are selected, terminal sets the 8th data bit to a space in every character transmitted. The 8th data bit in received characters is ignored.
12	DTR On/Off	On,Off	Determines whether terminal issues a constant Data Terminal Ready signal on main interface port (On) or drops Data Terminal Ready when in local (offline) mode (Off). If main port is to use current-loop signals, this parameter is ignored.
13	Duplex Mode	HDX,FDX	Affects the internal routing of keyboard-entered data when on-line and transmitting character by character. With the HDX (half-duplex) setting, entered characters display simultaneously as they are transmitted. With the FDX (full-duplex) setting, entered characters do not display until echoed back by host.
14	Emulation	ADV,ADDS,ANSI	Determines whether ADV, ADDS, or ANSI emulation is in effect.
15	Erasur Mode	All, Unprotected	Applies only to ANSI emulation. With the All setting, all data on the screen can be erased by host. With the Unprotected setting, only the unprotected data on the screen can be erased by host.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
16	Interface	EIA,C.L.	Determines whether main interface port uses EIA RS-232-C/CCITT-V.24 compatible signals (EIA) or current-loop signals (C.L.). For information on interface signals, refer to section 7.
17	Keyclick	On,Off	Determines whether a beep sounds each time a key is pressed.
18	LF Bias	Bias,Normal	Applies only to ADV emulation. With the Bias setting, terminal automatically adds 20 ₁₆ to the cursor address when receiving/transmitting X/Y positioning data. With the Normal setting, nothing is added to the cursor address.
19	Margin Bell	On,Off	Determines whether terminal sounds a beep when cursor is eight character positions from the end of a line.
20	Monitor Mode	On,Off	Controls a feature that may be used for program debugging or for troubleshooting. With the On setting, terminal displays special symbols for control codes instead of executing them. The special symbols displayed are shown in appendix A. With the Off setting, control codes are executed as normal.
21	Numeric Keypad	Unshifted, Shifted	Affects the operation of the twelve numeric pad keys on the lower-right side of keyboard. With the Unshifted setting, the numeric-pad keys operate in accordance with their lowercase/upercase legends. With the Shifted setting, the numeric-pad keys operate the opposite of their lowercase/upercase legends.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
22	Operation Mode	Local,Online	The Online setting conditions terminal for online operations with host. The Local setting conditions terminal for offline, local operations (such as printing from the screen in ADV emulation).
23	Page Key	IMMED,DEF	Applies only to ANSI emulation. Affects the shifted operation of the numeric-pad EDIT key (EDIT is on front of keycap). With the IMMED (immediate) setting, successive use of the shifted EDIT key immediately switches terminal back and forth between character-by-character transmission and edit mode. With the DEF (deferred) setting, pressing the shifted EDIT key sends a code sequence (described in section 6) that requests the host to switch the terminal from its current transmission mode (character-by-character or edit mode). Host must then echo the code sequence back to the terminal before the switch occurs.
24	Parity	Odd,Even,Spc, Mark,No	Determines whether terminal uses odd, even, space (Spc), mark, or no parity on the main and auxiliary interface ports. The type parity selected affects the parity bit generated in transmitted characters and the parity checking done on received characters. If terminal receives a character that does not have the selected parity, it displays a parity error symbol (■) in place of the character.
25	Power (Refresh)	60 Hz,50 Hz	Determines the display refresh rate. This rate is to be the same frequency as the electrical voltage that is powering the terminal.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
26	Print Extent	Full,Scroll	Applies only to ANSI emulation. With the Full setting, all characters on the screen are enabled to be transferred to a connected printer. With the Scroll setting, only characters in the programmable scroll region (two lines to whole screen) are enabled for printing.
27	Print EOM	FF,No	Applies only to ANSI emulation. With the FF (form feed) setting, terminal inserts a FF(0C ₁₆) code at the end of print transfers, while with the No setting, it does not.
28*	Reset Terminal		When this parameter is being displayed, a carriage return (CR) from the keyboard resets the terminal to a power-on state.
29	Response Suppress	On,Off	Applies only to ADV emulation. With the Off setting, the terminal transmits a completion message in response to various commands (ADV commands are described in section 4). With the On setting, no completion message is transmitted.
30	RTS On/Off	On,Off	Determines whether terminal issues a Request to Send signal on main port whenever Data Set Ready is received and Data Terminal Ready is issued (On) or when only a transmission is to occur (Off). If main port is to use current-loop signals, this parameter is ignored.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
31*	Screen Contrast	1 through 15	Controls the contrast of the display screen. A default value of 9 keeps the contrast at medium range if not changed. Contrast may be progressively increased by entering a number from 10 through 15 and progressively decreased by entering a number from 8 through 1
32	Screen Saver	On,Off	Determines whether the display screen goes blank after 15 to 20 minutes of no activity from keyboard or host (On) or does not go blank (Off). A blanked screen returns to normal upon either keyboard or host activity.
33	Set Protection	Off, HF, RV, RV/HF, UL, UL/HF, UL/RV, UL/RV/HF, BI, BI/HF, BI/RV, BI/RV/HF, BI/UL, RV, BI/UL/RV/HF, Normal High	Applies only to ANSI emulation. The setting of this parameter determines the type of displayed characters that can be assigned as protected data (protected from operator entries). The abbreviations used are: HF = half intensity, RV = inverse video, BI = blinking, and UL = underlined. With the Normal High setting, normal displayed characters can be assigned as protected data. With the Off setting, no characters can be assigned as protected data.
34	Spc Compression	On,Off	Applies only to edit mode in ANSI emulation. With the On setting, terminal sends an RS control code (1E ₁₆) in place of consecutive spaces when transmitting to host. With the Off setting, spaces (20 ₁₆) are transmitted as encountered on the screen.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
35	Status Line	On,Off	Determines whether a complete status line is displayed at bottom of screen (On) or just the R/C (row/column status in ADV or ADDS emulation (Off).
36	Stop bits	1,2	Determines whether received/transmitted characters on main and auxiliary ports contain one or two stop bits.
37	Tx. CR	On,Off	<p>Applies only to ANSI emulation.</p> <p>When set to On:</p> <ul style="list-style-type: none"> ● In character-by-character transmissions, terminal adds a CR (0D₁₆) code following the code sequence transmitted for a special function key (keys F1 through F11 or the blank key). ● In edit mode, pressing any special function key or the numeric-pad ENTER starts a block transmission. A CR code is added after the code sequence for the special function key or to the end of a block transmission initiated by the ENTER key. <p>When set to Off:</p> <ul style="list-style-type: none"> ● In character-by-character transmission, no CR code is added to the code sequence for special function keys. ● In edit mode, special function keys cannot start a block transmission and no CR code is added to code sequences or block transmissions.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
38	Tx. Execution	IMMED,DEF	<p>Applies only to edit mode in ANSI emulation. With the IMMED setting, pressing the ENTER key starts a block transmission. With the DEF setting, pressing the ENTER key transmits an ESC S (1B,53₁₆) sequence that notifies host that terminal has a block of data to transmit. No block transmission occurs until host sends a remote transmit command of ESC 5 (1B,35₁₆).</p>
39	Tx. Extent	Page, Part, Line	<p>Applies only to edit mode in ANSI emulation. Determines the size of block transmissions. The selections are:</p> <ul style="list-style-type: none"> ● Page - Selects the data within the scroll region (scroll region is programmable and may include the whole screen or be as small as two lines high). ● Part - Selects the data from either of two starting points. The first starting point is the beginning of the scroll region. The block then includes the data up to the current cursor position. The second starting point is the character position immediately following the last character of the previous partial-page block transmission. The block for this starting point also includes the data up to the current cursor position. ● Line - Selects the data in the current line.

TABLE 3-1. DEFINITION OF PARAMETERS (CONTD)

DISPLAYED INFORMATION			DEFINITION
NO.	PARAMETER	SELECTION	
40	Tx. EOM	FF,No	Applies only to edit mode in ANSI emulation. Determines whether terminal adds an FF code at end of block transmissions (FF) or not (No).
41	Type Ahead Buffer	On,Off	<p>Applies only to character-by-character transmission in ANSI emulation. With the On setting, the following occurs:</p> <ul style="list-style-type: none"> • Keyboard data is entered as usual until a CR (0D₁₆) is sent to the host. • Further data is then stored in the keyboard buffer (up to 64 key presses). Continued attempts to store data after 64 key presses result in the bell sounding but the buffer contents remain unchanged. • One of two responses must be received from the host to continue. One response allows the data in the buffer to be displayed and transmitted to the terminal. (Note: if there is a CR in this data, the buffer will be reactivated.) The other response empties the buffer. (These commands are described in section 6). <p>With the Off setting, keyboard entries are displayed and transmitted in the normal manner.</p>

*Parameters 28 and 31 are not stored in NVM like the other parameters. Following a power on or reset, parameter 31 (Screen Contrast) reverts to its default setting of 9 if a value of 1 through 6 was in effect. Values 7 through 15 can be stored in NVM. Parameter 28 (Reset Terminal) is unique and does not have a default setting.

CHANGING PARAMETER SETTINGS

The parameter settings in effect may be displayed and changed while in online, edit, or local mode. The last selection made automatically goes into volatile memory when either the Cursor Up or Cursor Down key is pressed to step the display to another parameter or when the SETUP key is pressed a second time to leave the setup display.

A parameter change stored in volatile memory automatically clears after a power off or reset. If a change is to be permanent (such as a correction), store the change in nonvolatile memory. The keyboard entries for doing this (plus other operations) are given in table 3-2.

TABLE 3-2. KEYBOARD ENTRIES FOR DISPLAYING/CHANGING/STORING PARAMETERS

OPERATION	KEYBOARD ENTRY
Display parameter information at bottom of screen.	SETUP key
Exit from parameter display.	SETUP key
Step parameter display to next higher-numbered parameter.	Shifted Cursor Up (↑)
Step parameter display to next lower-numbered parameter.	Shifted Cursor Down (↓)
Display alternate setting of parameter on screen. If parameter has more than two possible settings, shifted Cursor Left key steps display to next lower setting and shifted Cursor Right key steps display to next higher setting.	Shifted Cursor Left (←) or Shifted Cursor Right (→)
Store parameter setting currently on screen into volatile memory (temporary change).	Shifted CR/DEL key
Display default setting for parameter currently on screen and store default settings for all parameters into volatile memory.	CTRL and D keys simultaneously
Display setting stored in NVM for current parameter and store all NVM settings into volatile memory.	CTRL and R keys simultaneously
Store all volatile memory settings into NVM (permanent change).	CTRL and S keys simultaneously

DEFAULT PARAMETER SETTINGS AND SETTINGS HOST CAN CHANGE

Table 3-3 lists the default parameter settings that were discussed earlier in this section under Storage of Parameters in Memory. The table also denotes the parameter settings that can be temporarily changed by the host. The host commands that do this are described in section 4 (ADV Emulation), in section 5 (ADDS Emulation), and in section 6 (ANSI Emulation). With ADV and ANSI emulations, the host can also read the parameter settings that affect communications (sections 4 and 6 have details).

TABLE 3-3. DEFAULT PARAMETER SETTINGS

PARAMETER NUMBER	PARAMETER NAME	DEFAULT SETTING
--	Set tabs*	Tab every 8th column
01	Auto LF/CR	Off
02	Auto Repeat	On
03	Auto Scroll	On
04	Auto Wrap	On
05	Auto X-on/X-off	On
06	Backspace Key	Normal
07	Baud Rate	9600
08*	Block Mode	Off
09*	Character Sent	All
10	Cursor	BNK-LIN
11	Data Bits	7
12	DTR On/Off	Off
13	Duplex Mode	FDX
14*	Emulation	ADV
15*	Erasure Mode	All

TABLE 3-3. DEFAULT PARAMETER SETTINGS (CONTD)

PARAMETER NUMBER	PARAMETER NAME	DEFAULT SETTING
16	Interface	EIA
17	Keyclick	Off
18	LF Bias	Bias
19	Margin Bell	Off
20	Monitor Mode	Off
21*	Numeric Keypad	Unshifted
22	Operation Mode	Online
23*	Page Key	IMMED
24	Parity	No
25	Power (Refresh)	60 Hz
26	Print Extent	Full
27	Print EOM	FF
28**	Reset Terminal	
29	Response Suppress	Off
30	RTS On/Off	Off
31**	Screen Contrast	9
32	Screen Saver	On
33*	Set Protection	Off
34*	Spc Compression	Off
35	Status Line	Off
36	Stop Bits	1
37*	Tx. CR	On

TABLE 3-3. DEFAULT PARAMETER SETTINGS (CONTD)

PARAMETER NUMBER	PARAMETER NAME	DEFAULT SETTING
38*	Tx. Execution	IMMED
39*	Tx. Extent	Page
40*	Transmit EOM	FF
41*	Type Ahead Buffer	Off

*The settings for parameters 14 and 21 can be temporarily changed by the host in ADV, ADDS, or ANSI emulation. The settings for set tabs parameter and parameters 08, 09, 15, 23, 33, 34, and 37 through 41 apply only to ANSI emulation and can also be changed by the host.

**The settings for parameters 28 and 31 are not stored in NVM like the other parameters. Following a power on or reset, parameter 31 reverts to its default setting of 9 if a value of 1 through 6 was stored. Values 7 through 15 can be stored in NVM. Parameter 28 is unique and does have a default setting.



This section describes the operation of the terminal under ADV emulation. The topics covered include:

- ADV commands
- ADV parameter words
- ADV keycodes
- ADV line-drawing symbols
- ADV print features

ADV COMMANDS

In ADV emulation, the terminal is controlled by special control code commands. Many of these commands are multiple code sequences. Table 4-1 lists the commands by function in alphabetical order. Following that is table 4-2, which lists the commands in hexadecimal (hex) order and describes the terminal response.

TABLE 4-1. LIST OF ADV COMMANDS BY FUNCTION

FUNCTION (IN ALPHABETICAL ORDER)	HEX CODE	KEY SEQUENCE (SEE NOTES)
Alarm (beep) Sound	07	CTRL-G or SHIFT-CTRL-G
Attributes		
Attribute		
Read attribute	1E,0E	Not applicable
Blank		
Start	1E,12,5B	CTRL-=,CTRL-R,[
End	1E,12,5C	CTRL-=,CTRL-R,\
Blink		
Disable	04	CTRL-D or SHIFT-CTRL-D
Enable	03	CTRL-C or SHIFT-CTRL-C
Start	0E	CTRL-N or SHIFT-CTRL-N
Stop	0F	CTRL-O or SHIFT-CTRL-O
Dim (half intensity)		
End	1D	CTRL-[or SHIFT-CTRL-]
Start	1C	CTRL-\ or SHIFT-CTRL-;
Inverse		
End	1E,45	CTRL-=,SHIFT-E
Start	1E,44	CTRL-=,SHIFT-D

TABLE 4-1. LIST OF ADV COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	HEX CODE	KEY SEQUENCE (SEE NOTES)
Attributes (contd)		
Underscore		
End	15	CTRL-U
Start	14	CTRL-T
Communications control		
Carriage return (CR) delimiter		
Enable sending CR delimiter	1E,05	CTRL-==,CTRL-E
Cursor control		
Backspace		
Backspace	19	CTRL-Y or BACKSPACE* or SHIFT-←
Carriage return (CR)		
Carriage return	0D	CTRL-M or SHIFT-CR or SHIFT-CTRL-CR
Cursor address		
Read cursor address	05	Not applicable
Write cursor address	10	Not applicable
Down		
Cursor down	1A	CTRL-Z or SHIFT-↓ or CTRL-↓
Home		
Cursor home	08	CTRL-H or SHIFT-HOME or SHIFT-CTRL-HOME
New line		
New line	0A	CTRL-J or RETURN/NEWLINE or CTRL-RETURN/NEWLINE
Tab		
Back tab	1E,03	CTRL-==,CTRL-C
Tab ahead	1E,04	CTRL-==,CTRL-D
Skip		
Cursor skip	18	CTRL-X or SHIFT-→ or SHIFT-CTRL-→
Up		
Cursor up	17	CTRL-W or SHIFT-↑ or SHIFT-CTRL-↑
Data		
Read data	1E,10	Not applicable
Display characters		
Basic characters	1E,1D	CTRL-==,CTRL-[or SHIFT-CTRL-]
Line-drawing symbols	1E,1C	CTRL-==,CTRL-\ or SHIFT-CTRL-|
Display control		
Clear		
Clear all data	1E,50	CTRL-==,SHIFT-P
Clear all data except dim (half intensity) data	1E,40	CTRL-==,SHIFT-@
Clear all data with dim bit set	1E,3F	CTRL-==,SHIFT-?
Clear line	0B	CTRL-K

TABLE 4-1. LIST OF ADV COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	HEX CODE	KEY SEQUENCE (SEE NOTES)
Display control (contd)		
Delete		
Delete line	1E,51	CTRL-==,SHIFT-Q
Erase		
Erase page	0C	CTRL-L
Insert		
Insert line	1E,52	CTRL-==,SHIFT-R
Scroll		
Automatic scroll disable	13	CTRL-S
Automatic scroll enable	12	CTRL-R
Field scroll down	1E,56	CTRL-==,SHIFT-V
Field scroll up	1E,55	CTRL-==,SHIFT-U
Set scroll field	1E,57,(U), (L)	CTRL-==,SHIFT-W
Keyboard control		
Normal numeric pad	1E,12,6C	CTRL-==,CTRL-R,1
Shift numeric pad	1E,12,6B	CTRL-==,CTRL-R,k
Mode changing		
Select ADDS emulation mode	1E,12,53,31	CTRL-==,CTRL-R,SHIFT-S,1
Select ANSI emulation mode	1E,12,53,32	CTRL-==,CTRL-R,SHIFT-S,2
Parameters		
Read parameters	1E,13	Not applicable
Printing		
Blind printer	1E,7F	CTRL-==,DEL
Form print	01	CTRL-A
Page print	11	CTRL-Q
Print I/O	1E,46	CTRL-==,SHIFT-F
Status		
Read status	1E,14	Not applicable
Test		
Initiate self tests	1E,16	CTRL-==,CTRL-V

NOTES: ● Key captions separated by hyphens indicate keys pressed at the same time. For example, SHIFT-CTRL-A means press and hold the SHIFT and CTRL keys down and then press the A key. Key captions separated by commas indicate keys pressed one after another in sequence. Neither hyphens nor commas are entered as part of the keyed-in control commands.

● If no SHIFT is indicated, letter may be used in either upper or lowercase. SHIFT indicates only uppercase works and lowercase letters indicate only lowercase works.

● Key captions listed are for the standard keyboard.

* With parameter 6 (Backspace Key) set to Normal.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
01	SOH	Form Print	Transfers data displayed at normal intensity to printer from beginning of current line to end of page. Data displayed at half intensity is transferred as space codes (20_{16}). During the transfer, the keyboard locks and received data is ignored but not lost. The operation may be aborted by a SHIFT-M REL key input. Print completion is signaled by the terminal transmitting an 06_{16} (ACK). If the operation is aborted, the terminal transmits an $1E_{16}$ (RS,NAK) sequence.
03	ETX	Enable Blink	Blinks characters whose blink bit is set to 1 (refer to Start Blink command, hex code $0E$). Following a power up or page erase, blink is automatically enabled.
04	EOT	Disable Blink	Disables character blinking.
05	ENQ	Read Cursor Address	Causes terminal to send a cursor-address header code ($1F_{16}$) followed by two codes containing the column and row addresses of the cursor. The column address is transferred first and is numbered from left to right (00 through $4F_{16}$). The second code is the row (line) address and is numbered from top to bottom (00 through 17_{16}). Row/column addresses may be biased to avoid codes 00 through $1F$ by enabling the LF Bias parameter. (LF Bias is otherwise disabled in ADV mode.) When LF Bias is Enabled, cursor position 00 equals 20_{16} . Addressing continues in normal binary progression through $6F_{16}$

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
			for the 80th column position and 37_{16} for the 24th line position.
07	BEL	Alarm	Produces an audible alarm (beep) for approximately one-half second.
08	BS	Home	Moves cursor to first position of the top line.
0A	LF	New Line	Moves cursor to first character position in next line.
0B	VT	Line Clear	Erases characters from, and including, current cursor position to end of that line. Replaces erased characters with spaces (20_{16}).
0C	FF	Page Erase	Erases all characters on screen, fills all positions with spaces (20_{16}), resets cursor to home position, and clears a line-drawing symbol command ($1E, 1C_{16}$) if one is in effect. Also clears attribute bits for all positions and enables blink if previously disabled.
0D	CR	Carriage Return	Moves cursor to first character position of current line.
0E	SO	Start Blink	Sets the blink bit to 1 for the succeeding characters received. If blink is enabled (refer to Enable Blink command, hex code 03), these characters are displayed blinking.
0F	SI	Stop Blink	Sets blink bit to 0 for the succeeding characters received. Those characters are then steadily illuminated.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
10	DLE	Write Cursor Address	Interprets the next two codes as cursor column and row addresses. Cursor moves to the position defined by the addresses. Column address is numbered from left to right (00 through $4F_{16}$). Row (line) address is numbered from top to bottom (00 through 17_{16}). If the column address is greater than $4F_{16}$, the cursor wraps around (that is, 50_{16} equals 01_{16}). Line address operates in a similar manner (that is, $1E_{16}$ equals 06_{16}). Row and column addresses may be biased in the same manner described for the Read Cursor Address command (hex code 05).
11	DC1	Page Print	Transfers all displayed data to printer from beginning of current line to end of page. During the transfer, the keyboard locks and received data is ignored but not lost. The operation may be aborted by a SHIFT-M REL key input. Print completion is signaled by the terminal transmitting an 06_{16} (ACK). If the operation is aborted, the terminal transmits an $1E, 15_{16}$ (RS, NAK) sequence.
12	DC2	Auto Scroll Enable	Enables a scroll display. Screen scrolls up one line each time cursor overflows from bottom line or if a new line command (hex code 0A) is received when cursor is on bottom line. When screen scrolls, cursor moves to first character position in bottom line, the bottom line clears, and the top line is lost.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
13	DC3	Auto Scroll Disable	Disables a scroll display and enables a page display.
14	DC4	Start Underscore	Sets the underscore bit to 1 for each succeeding character received. Those characters are then underlined on the screen.
15	NAK	End Underscore	Sets underscore bit to 0. Each succeeding character received is not underlined on the screen.
17	ETB	Cursor Up	Moves cursor up one line while remaining in same column (character) position. Displayed data is not affected.
18	CAN	Skip	Moves cursor right one character position. Displayed data is not affected.
19	EM	Backspace	Moves cursor left one character position. Displayed data is not affected.
1A	SUB	Cursor Down	Moves cursor down one line while remaining in same column (character) position. Displayed data is not affected. Cursor down does not cause a scroll if a scroll display is in effect. Instead, the cursor moves from the bottom line to the top line.
1C	FS	Start Dim (Half Intensity)	Sets dim bit to 1. Each succeeding character received is displayed at half intensity.
1D	GS	End Dim (Half Intensity)	Sets dim bit to 0. Each succeeding character received is displayed at normal intensity.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,03	RS,ETX	Backtab	Moves cursor backward to one character position to the right of the first half-intensity character it comes to. If there are no half-intensity fields preceding the cursor, the cursor goes to its home position. At the end of cursor movement, the terminal transmits a completion response of 02, 06, 06 ₁₆ (STX,ACK,ACK) if its self tests completed successfully the last time they ran or 02,06,15 ₁₆ (STX,ACK,NAK) if any self test failed.
1E,04	RS,EOT	Tab	Moves cursor forward to one character position to the right of the first half-intensity field it comes to. If there are no half-intensity fields forward of the cursor, the cursor goes to its home position. At the end of cursor movement, the terminal transmits a response the same as described for the backtab command (hex code 1E, 03).
1E,05	RS,ENQ	Add Delimiter	Causes all multiple code sequences generated at the terminal to be terminated with a CR (0D ₁₆) code.
1E,0E	RS,SO	Read Attribute	Causes terminal to transmit a byte that indicates the attributes of the character at the current cursor position. The cursor is not advanced and displayed data is not affected. Bit significance of the byte is: 20 - internal program use; 21 - underscore; 22 - blink; 23 - reduced intensity; 24 and 25 are set to a 1. If

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,10	RS,DLE	Read Data	<p>bit 26 is a 1, the character at the cursor position is a line-drawing symbol and not an alphanumeric character or control code.</p> <p>Transmits the data word stored in memory for the current cursor position. This does not advance the cursor. Seven data bits are transmitted. Determination of whether the bits represent an alphanumeric character/control code or a line-drawing symbol requires that a read attribute command (hex code 1E,0E) be issued.</p>
1E,13	RS,DC3	Read Parameters	<p>Transmits five words indicating parameter settings (parameter words are defined later in this section). These words are preceded by a 02, 06, 25₁₆ (STX,ACK,%) sequence and followed by a 02, 06, 06₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02, 06, 15₁₆ (STX,ACK,NAK) sequence if any self test failed.</p>
1E,14	RS,DC4	Read Status	<p>Transmits a 02, 06, 06₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15₁₆ (STX,ACK,NAK) sequence if any self test failed.</p>

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,16	RS,SYN	Initiate Self Tests	Executes power-on self tests. At completion of self tests, terminal transmits a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if the self tests completed successfully or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed. If the code for this command is entered through the keyboard in local mode, the power-on self tests loop continuously until an error is detected or power is turned off.
1E,1C	RS,FS	Line-Drawing Symbols	Causes terminal to interpret any following data words received from 20 ₁₆ to 3F ₁₆ as line-drawing symbols.
1E,1D	RS,GS	Basic Characters	Causes terminal to interpret received data as normal characters and not line-drawing symbols.
1E,3F	RS,?	Clear Data with Dim Bit Set	Clears data displayed at half intensity from the current cursor position to end of page. No responses are made to any commands during this clearing. When the operation is completed, the terminal transmits a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.
1E,40	RS,@	Clear All Data Except Dim Data	Similar to that described for command with hex code 1E,3F except all but half-intensity data is cleared.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,44	RS,D	Start Inverse Video	Sets inverse bit to 1. Each succeeding character received is displayed in inverse video (dark characters on light background).
1E,45	RS,E	End Inverse	Clears inverse bit to 0. Each succeeding character received is displayed without inverse video.
1E,46	RS,F	Print I/O	Transfers all communications between terminal and host to printer. No data can follow this command until the terminal transmits a completion response. This response is a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.
1E,50	RS,P	Clear All Data	Similar to that described for command with hex code 1E,3F except all data is cleared.
1E,51	RS,Q	Delete Line	Causes all data and associated attribute fields below cursor to move up one line. The current line (line with cursor) is lost and bottom line is cleared. No responses are made to any commands during this operation. When the operation is completed, the terminal transmits a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,52	RS,R	Insert Line	Causes all data and associated attribute fields on current line to move one line down. The current line is cleared and bottom line is lost. No responses are made to any commands during this operation. When the operation is completed, the terminal transmits a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.
1E,55	RS,U	Field Scroll Up	Display lines move up one position in the established scroll field [refer to set scroll field command, hex code 1E,57,(U),(L)]. Uppermost line in the scroll field is lost and lowest line in field is cleared. No responses are made to any commands during this operation. When the operation is completed, the terminal transmits a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.
1E,56	RS,V	Field Scroll Down	Similar to the field scroll up command (hex code 1E,55) except display lines move down and the uppermost line in the scroll field is cleared and the lowest line in field is lost.

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,57, (U),(L)	RS,W, (U),(L)	Set Scroll Field	Establishes a scroll field on the screen. The word U in the command specifies the upper display line of the field and the word L specifies the lower line of the field. If the LF Bias parameter is Disabled, lines are identified as 00 through 17 ₁₆ from the top to bottom of screen. Line numbers outside of 00 through 17 ₁₆ (display lines 1 through 24) automatically cause 00 and 17 ₁₆ to be selected. If the LF Bias parameter is Enabled, the acceptable line numbers are 20 ₁₆ through 37 ₁₆ (display lines 1 through 24). This command works in conjunction with the field scroll up and down commands, (hex codes 1E,55 and 1E,56).
1E,7F	RS,DEL	Blind Printer	Terminal transfers 1E,7F ₁₆ to printer and then stops transferring received/transmitted data to printer. No further data or commands can be sent to the terminal until it returns a completion response. The completion response is a 02,06,06 ₁₆ (STX,ACK,ACK) sequence if terminal self tests completed successfully the last time they ran or a 02,06,15 ₁₆ (STX,ACK,NAK) sequence if any self test failed.
1E,12, 53,30 or 31 or 32	RS,DC2, S, 0 or 1 or 2	Mode Select (Select)	Terminal enters the emulation specified in last code of sequence. A code of 30 ₁₆ specifies ADV emulation; 31 ₁₆ specifies ADV emulation; and 32 ₁₆ specifies ANSI emulation. If the last code sent in the sequence is not 30, 31, or 32 ₁₆ the

TABLE 4-2. DEFINITION OF ADV COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
			terminal returns a 1E,15 ₁₆ (RS,NAK) sequence. With keyboard operations, the command for switching from ADV to ADDS or ANSI can be generated from the keyboard, but not the command for switching from ADDS or ANSI to ADV. If that switch is to be made, it must be done via parameter 14.
1E,12, 5B	RS,DC2, [	Start Blank	Sets blank bit to 1. Each succeeding character received is blanked (not displayed).
1E,12, 5C	RS,DC2, \	End Blank	Clears blank bit to 0. Each succeeding displayable character received is displayed.
1E,12, 6B	RS,DC2, k	Shift Numeric Pad	Causes numeric-pad keys to operate the opposite of their lowercase/upercase legends (facilitates cursor-control entries).
1E,12, 6C	RS,DC2, l	Normal Numeric Pad	Causes numeric-pad keys to operate in accordance with their lowercase/upercase legends (facilitates numeric entries).

ADV PARAMETER WORDS

The read parameter command (hex code 1E,13) allows the host to read the settings of the terminal parameters that affect communications. This information is presented in five words that are preceded by a 02,06,25₁₆ (STX,ACK,%) sequence. Table 4-3 defines the five parameter words and table 4-4 lists the data rate coding used in word 4.

TABLE 4-3. ADV PARAMETER WORDS

BIT	WORD 1	WORD 2	WORD 3	WORD 4	WORD 5
0	0 = PAGE 1 = SCROLL	0 = EOL BELL 1 = DISABLE BELL	0 = PAR ODD 1 = PAR EVEN	DATA RATE 2^3 (See table 4-4)	1
1	0 = HALF DUP 1 = FULL DUP	0 = AUTO LF 1 = NORMAL	0 = 2 STOP BITS 1 = 1 STOP BIT	DATA RATE 2^2 (See table 4-4)	0 = 50 Hz REFRESH 1 = 60 Hz REFRESH
2	1	1	0 = PARITY DISABLE 1 = PARITY ENABLE	DATA RATE 2^1 (See table 4-4)	0 = DTR SWITCHED 1 = DTR CONSTANT
3	1	1	1	DATA RATE 2^0 (See table 4-4)	0 = RTS SWITCHED 1 = RTS CONSTANT
4	1	1	1	1	1
5	1	1	1	1	1
6	1	1	1	1	1

TABLE 4-4. DATA RATE CODING IN PARAMETER WORD 4

BPS	DATA RATE BITS				BPS	DATA RATE BITS			
	2^3	2^2	2^1	2^0		2^3	2^2	2^1	2^0
110	0	0	0	0	1800	0	1	1	0
150	0	0	0	1	2400	0	1	1	1
300	0	0	1	1	4800	1	0	0	0
600	0	1	0	0	9600	1	0	0	1
1200	0	1	0	1	19 200	1	0	1	0

ADV KEYCODES

Keycodes vary with the emulation in affect. Table 4-5 lists the codes generated on the standard keyboard when in ADV emulation. For codes of optional character set keys, refer to appendix B.

TABLE 4-5. ADV KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	PRINT		1E, 11	1E, 01	1E, 11	1E, 01
	SETUP		-	-	-	-
	F1		1E, 71	1E, 61	1E, 31	1E, 21
	F2		1E, 72	1E, 62	1E, 32	1E, 22
	F3		1E, 73	1E, 63	1E, 33	1E, 23
	F4		1E, 74	1E, 64	1E, 34	1E, 24
	F5		1E, 75	1E, 65	1E, 35	1E, 25
	F6		1E, 76	1E, 66	1E, 36	1E, 26
	F7		1E, 77	1E, 67	1E, 37	1E, 27
	F8		1E, 78	1E, 68	1E, 38	1E, 28
	F9		1E, 79	1E, 69	1E, 39	1E, 29
	F10		1E, 7A	1E, 6A	1E, 3A	1E, 2A
	F11		1E, 7B	1E, 6B	1E, 3B	1E, 2B
	(Blank)		1E, 12	1E, 02	1E, 12	1E, 02
P	CLEAR	EOL	0B	0C	0B	0C
LF		ESC	1B	0A	1B	0A
M REL		BREAK	-	-	-	-
	TAB		09	09	09	09
!		1	31	21	31	21
@		2	32	40	00	00

TABLE 4-5. ADV KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
#		3	33	23	33	23
\$		4	34	24	34	24
%		5	35	25	35	25
^		6	36	5E	36	5E
&		7	37	26	37	26
*		8	38	2A	38	2A
(		9	39	28	39	28
)		0	30	29	30	29
_		-	2D	5F	1F	1F
+		=	3D	2B	1E	1E
~		`	60	7E	60	7E
	BACKSPACE		See Note 1	See Note 1	See Note 1	See Note 1
L INSERT*		7	37	-	37	-
↑ *		8	38	17	38	17
L DELETE*		9	39	-	39	-
	Q		71	51	11	11
	W		77	57	17	17
	E		65	45	05	05
	R		72	52	12	12
	T		74	54	14	14
	Y		79	59	19	19

TABLE 4-5. ADV KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	U		75	55	15	15
	I		69	49	09	09
	O		6F	4F	0F	0F
	P		70	50	10	10
]		[	5B	5D	1D	1D
:		\	5C	7C	1C	1C
	BACK TAB		1E,0B	1E,0B	1E,0B	1E,0B
← *		4	34	19	34	19
HOME*		5	35	08	35	08
→ *		6	36	18	36	18
ALPHA		LOCK	-	-	-	-
	A		61	41	01	01
	S		73	53	13	13
	D		64	44	04	04
	F		66	46	06	06
	G		67	47	07	07
	H		68	48	08	08
	J		6A	4A	0A	0A
	K		6B	4B	0B	0B
	L		6C	4C	0C	0C
:		;	3B	3A	3B	3A
"		'	27	22	27	22
}		{	7B	7D	7B	7D
	RETURN NEW LINE		0A	0A	0A	0A

TABLE 4-5. ADV KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
C INSRT*		1	31	-	31	-
↓ *		2	32	1A	32	1A
C DELETE*		3	33	-	33	-
	SHIFT		-	-	-	-
	Z		7A	5A	1A	1A
	X		78	58	18	18
	C		63	43	03	03
	V		76	56	16	16
	B		62	42	02	02
	N		6E	4E	0E	0E
	M		6D	4D	0D	0D
<		,	2C	3C	2C	3C
>		.	2E	3E	2E	3E
?		/	2F	3F	2F	3F
	SHIFT		-	-	-	-
	,		2C	-	2C	-
EDIT*	0		30	-	30	-
	.		2E	-	2E	-
	CTRL		-	-	-	-
	(Space Bar)		20	20	20	20

TABLE 4-5. ADV KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
CR		DEL	See Note 1	See Note 1	See Note 1	See Note 1
ENTER*	RETURN NEW LINE		0A	0A	0A	0A

Notes:

*Legend on front of keycap.

1. In ADV emulation, the BACKSPACE and CR/DEL keys are affected by parameter 6 (Backspace Key). If parameter 6 is set to Normal, the BACKSPACE key generates 19_{16} in all keyboard modes and the CR/DEL key generates $7F_{16}$ when unshifted or when used with the CTRL key and $0D_{16}$ when shifted with or without the CTRL key. If parameter 6 is set to DEL, the BACKSPACE key generates $7F_{16}$ in all keyboard modes and the CR/DEL key only generates $0D_{16}$ in all keyboard modes.

ADV LINE-DRAWING SYMBOLS

Receipt of the line-drawing symbol command $1E,1C_{16}$ (CTRL=, CTRL-\ or SHIFT-CTRL-|) in ADV emulation enables the display of line-drawing symbols. The symbols available and their actual dot formations on the screen are shown in figure 4-1. These symbols are displayed for codes 20 through $3F_{16}$ respectively (normal codes for punctuation marks and numbers). This correlation is shown in binary form in table 4-6. Receipt of the basic character command $1E,1D_{16}$ (CTRL=, CTRL-[or SHIFT-CTRL-]) returns the terminal to normal operation.

To facilitate keyboard input, table 4-7 lists the keyboard entries that correspond with the line-drawing symbols.

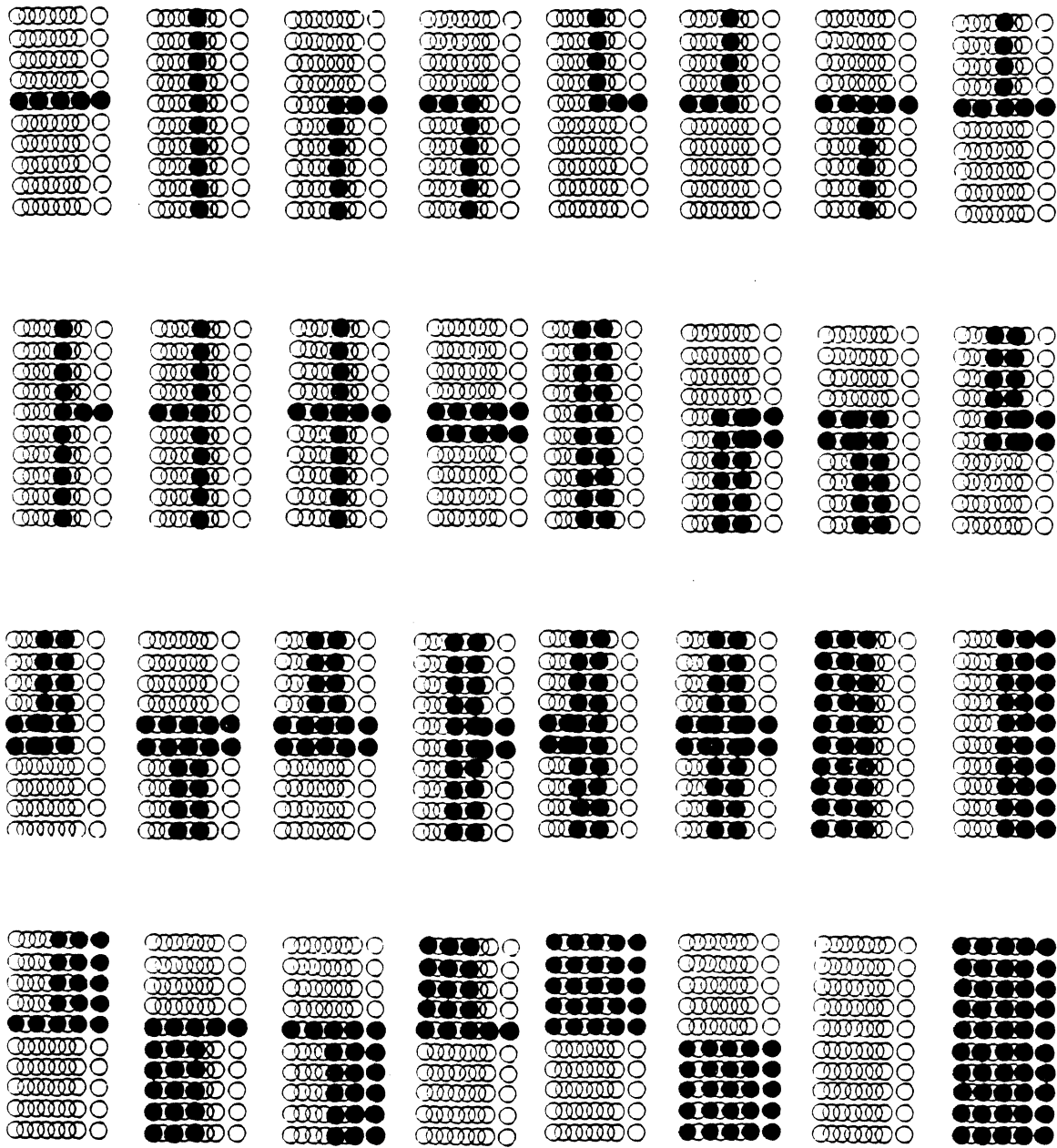


Figure 4-1. Dot Formations of Line-Drawing Symbols

TABLE 4-6. LINE-DRAWING SYMBOL CODES

BITS					0	0
					1	1
					0	1
b4	b3	b2	b1	COLUMN	2	3
↓	↓	↓	↓	↓	ROW	
0	0	0	0	0	—	┆
0	0	0	1	1	|	┆
0	0	1	0	2	┆	┆
0	0	1	1	3	┆	┆
0	1	0	0	4	┆	┆
0	1	0	1	5	┆	┆
0	1	1	0	6	┆	┆
0	1	1	1	7	┆	┆
1	0	0	0	8	┆	┆
1	0	0	1	9	┆	┆
1	0	1	0	10(A)	┆	┆
1	0	1	1	11(B)	┆	┆
1	1	0	0	12(C)	┆	┆
1	1	0	1	13(D)	┆	┆
1	1	1	0	14(E)	┆	┆
1	1	1	1	15(F)	┆	┆

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TABLE 4-7. KEYBOARD ENTRIES FOR LINE-DRAWING SYMBOLS

KEYBOARD ENTRY	SYMBOL PRODUCED	KEYBOARD ENTRY	SYMBOL PRODUCED
(Space Bar)	—	0	⌋
!		1	⌈
"	┌	2	⌋
#	┐	3	┌
\$	└	4	┐
%	┘	5	┌
&	└	6	┐
'	┘	7	┌
(┐	8	┐
)	┌	9	┌
*	┐	:	┐
+	—	;	┐
,	┐	<	┐
-	┐	=	┐
.	┐	>	┐
/	┐	?	┐

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ADV PRINT FEATURES

Print features in ADV emulation include:

- Page print and form print operations (commands 11_{16} and 01_{16}) use space suppression. If only space codes (20_{16}) are stored from the cursor position to the end of a line, the terminal transfers a carriage return/line feed ($0D/0A_{16}$) to the printer and proceeds to the next line.

- Page print and form print operations insert a 250-millisecond delay after transferring a carriage return, line feed, or form feed (OC_{16}) to the printer.
- Line-drawing symbols in all ADV print operations are transferred to the printer as spaces.

This section describes the operation of the terminal in ADDS emulation. The topics covered include:

- ADDS commands
- ADDS cursor addressing
- ADDS video attributes
- ADDS keycodes

ADDS COMMANDS

The commands for ADDS emulation are listed in tables 5-1 and 5-2. Table 5-1 lists the commands in alphabetical order and indicates how they can be generated from the keyboard. Table 5-2 lists the commands in hexadecimal (hex) order and describes the terminal responses.

TABLE 5-1. LISTING OF ADDS COMMANDS

COMMAND	KEY SEQUENCE (SEE NOTES)	HEX CODE
Address, Absolute*	ESC,Y,(row code),(column code)	1B,59,(r),(c)
Address, Horizontal*	CTRL-P,(horizontal address)	10,(h)
Address, Vertical*	CTRL-K,(vertical address)	0B,(v)
Audible Tone	CTRL-G	07
Aux Port Disable	CTRL-T	14
Aux Port Enable	CTRL-R	12
Backspace	BACKSPACE or CTRL-H	08
Backtab	ESC,I	1B,49
Cursor Back	CTRL-U or ←	15
Cursor Disable	CTRL-W	17
Cursor Down	CTRL-J or ↓	0A
Cursor Enable	CTRL-X	18

TABLE 5-1. LISTING OF ADDS COMMANDS (CONTD)

COMMAND	KEY SEQUENCE (SEE NOTES)	HEX CODE
Cursor Forward	CTRL-F or →	06
Cursor Home	CTRL-A or HOME	01
Cursor Up	CTRL-Z or ↑	1A
Erase Screen	CTRL-L or SHIFT-P/CLEAR/EOL	0C
Erase to End of Line	ESC,SHIFT-K	1B,4B
Erase to End of Page	ESC,k	1B,6B
Keyboard Lock	ESC,5 or CTRL-D	1B,35 or 04
Keyboard Unlock	CTRL-BREAK	1B,36 or 02
Mode Change to ADV	CTRL-6, CTRL-R, SHIFT-S,0	1E,12,53,30
Mode Change to ANSI	CTRL-6, CTRL-R, SHIFT-S,2	1E,12,53,32
Monitor Mode Disable**	CTRL-2	None available
Monitor Mode Enable**	CTRL-1	None available
New Line***	CTRL-M or RETURN/NEW LINE	0D
Normal Numeric Pad	CTRL-6, CTRL-R,1	1E,12,6C
Set Attribute	ESC,0,(X) [†]	1B,30,(X) [†]
Shift Numeric Pad	CTRL-6,CTRL-R,k	1E,12,6B
Tab	CTRL-I	09
Tag-Bit Reset	CTRL-O	0F
Tag-Bit Set	CTRL-N	0E
Transparent Print On	ESC,3	1B,33
Transparent Print Off	ESC,4	1B,34

Notes:

- In the table, key captions separated by hyphens indicate keys pressed at the same time. For example, SHIFT-CTRL-A means press and hold the SHIFT and CTRL keys down and then press the A key. Key captions separated by commas indicate keys pressed one after another in sequence. Neither hyphens nor commas are entered as part of the keyed-in control commands.
- If no SHIFT key is indicated in the sequence, either upper or lowercase letter may be used. If SHIFT is indicated or the letter is in lowercase, only one may be used.

TABLE 5-1. LISTING OF ADDS COMMANDS (CONTD)

COMMAND	KEY SEQUENCE (SEE NOTES)	HEX CODE
Notes Contd:		
*See table 5-1 for row and column codes or table 5-2 for horizontal or vertical address.		
**Monitor mode (described in section 2) can only be enabled/disabled locally using the listed key sequences.		
***The key sequences or code listed moves the cursor to the beginning of the next line if terminal parameter 1 (Auto LF/CR) is set to On. If that parameter is set to Off, the cursor moves to the beginning of the current line.		
†The (X) represents an attribute code that is described later in this section under ADDS Video Attributes.		

TABLE 5-2. DEFINITION OF ADDS COMMANDS - IN HEX CODE ORDER

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
01	SOH	Cursor Home	If parameter 3 (Auto Scroll) is set to On, cursor moves the first position of the bottom (24th) line; or if Auto Scroll is set to Off, cursor moves to the first position in the top (1st) line.
06	ACK	Cursor Forward	Advances cursor one space to the right or, if cursor is in the last position of a line, advances cursor to the first position of the next line.
07	BEL	Audible Tone	Sounds an audible alarm (beep) for approximately one-half second.
08	BS	Backspace	Moves cursor one space to the left. If cursor is at the beginning of a line it goes to the end of the previous line. If the cursor is at the top left of the screen, it goes to lower right.

TABLE 5-2. DEFINITION OF ADDS COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
09	HT	Tab	Sends a 1B,49 ₁₆ (ESC, I) to the host. No action is performed at the terminal beyond sending the code. If received from the host, the 1B,49 sequence is ignored. The application must determine the correct action - normally an X,Y cursor movement.
0A	LF	Cursor Down	Moves cursor down one line in the same column position. If this occurs while cursor is on the bottom line, the screen will scroll up one line if parameter 3 (Auto Scroll) is On or will go to the top line if Auto Scroll is Off.
0C	FF	Erase Screen	Clears entire screen and moves cursor to first position in top line. Also clears tag bits for video attributes.
0D	CR	New Line	If parameter 1 (Auto LF/CR) is set to On, moves cursor to the beginning of the next line; or if Auto LF/CR is set to Off, moves cursor to the beginning of the current line.
0E	S0	Tag Bit Set	Sets the tag bit for all succeeding characters until a tag bit reset command (hex code 0F) is received. Characters with the tag bit set will be displayed according to the attribute command [hex code 1B,30,(X)].
0F	SI	Tag Bit Reset	Clears the tag bit for all succeeding characters.
12	DC2	Aux Port Enable	Routes succeeding received/transmitted data to the auxiliary port for printing.

TABLE 5-2. DEFINITION OF ADDS COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
14	DC4	Aux Port Disable	Stops the routing of data to the auxiliary port. The 14_{16} (DC4) code is routed to the printer before the auxiliary port is disabled.
15	NAK	Cursor Back	Moves cursor left one position.
17	ETB	Cursor Disable	Prevents cursor from being displayed.
18	CAN	Cursor Enable	Allows cursor to be displayed.
1A	SUB	Cursor Up	Moves cursor up one line in same column position. If this occurs while cursor is in the top line, the cursor moves to the bottom line.
0B, (v)	VT, (v)	Vertical Address	Moves cursor up/down to the line specified by the vertical address (v) code. Vertical/horizontal cursor addressing is discussed later in this section.
10, (h)	DLE, (h)	Horizontal Address	Moves cursor sideways to the position specified by the horizontal address (h) code. Vertical/horizontal cursor addressing is discussed later in this section.
1B, 30, (x)	ESC, 0, (x)	Set Attribute	Displays the characters with tag bit set in the attribute indicated by the attribute code (x). Video attributes and the attribute codes are discussed later in this section.
1B, 33	ESC, 3	Transparent Print On	Routes all data from host to auxiliary port for printing. No data is displayed on the screen and no keyboard input is recognized.

TABLE 5-2. DEFINITION OF ADDS COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1B,34	ESC,4	Transparent Print Off	Stops the transparent print operation and returns the display and keyboard back to normal operation.
1B,35 or 04	ESC,5 or EOT	Keyboard Lock	Locks all but the unlock keys to prevent operator input.
1B,36 or 02	ESC,6 or STX	Keyboard Unlock	Unlocks the keyboard.
1B,4B	ESC,K	Erase to End of Line	Erases all data displayed from the current cursor position to the end of line. Cursor is not moved and attribute tag bits in erased positions are cleared.
1B,49	ESC,I	Backtab	Same as the tab command (hex code 09).
1B,59, (r),(c)	ESC,Y, (r),(c)	Absolute Address	Moves cursor to the location specified in the row code (r) and column code (c). Absolute cursor addressing is discussed later in this section.
1B,6B	ESC,k	Erase to End of Page	Erases all data displayed from the current cursor position to the end of page. Cursor is not moved and attribute tag bits in erased positions are cleared.
1E,12, 53,30 or 31 or 32	RS,DC2, S,0 or 1 or 2	Mode Change to ADV/ADDS/ANSI	Terminal enters the emulation specified in last code of sequence. A code of 30 ₁₆ specifies ADV emulation; 31 ₁₆ specifies ADDS emulation; and 32 ₁₆ specifies ANSI emulation. If the last code sent in the sequence is not 30, 31, or 32 ₁₆ the terminal returns a 1E,15 ₁₆ (RS,NAK) sequence.
1E,12, 6B	RS,DC2, k	Shift Numeric Pad	Causes numeric-pad keys to operate the opposite of their lowercase/uppercase legends (facilitates cursor-control entries).

TABLE 5-2. DEFINITION OF ADDS COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE	ASCII MNEMONIC	COMMAND NAME	TERMINAL RESPONSE
1E,12,6C	RS,DC2,1	Normal Numeric Pad	Causes numeric-pad keys to operate in accordance with their lowercase/uppercase legends (facilitates numeric entries).

ADDS CURSOR ADDRESSING

Two methods of cursor addressing are available in ADDS emulation, absolute cursor addressing and vertical/horizontal cursor addressing.

ABSOLUTE CURSOR ADDRESSING

Absolute cursor addressing uses a single command to move the cursor to a specific line and column position on the screen. The command first specifies the line (row) and then the column position in that row where the cursor is to move. The format of the command is:

1B,59₁₆, (row code), (column code)...or on the keyboard:
ESC,Y,(row code),(column code)

Figure 5-1 shows the display rows and columns and the characters used to specify them in the absolute address command. The figure also shows several examples of absolute address commands entered through the keyboard. If these example commands were sent to the terminal, their format would be:

ESC,Y,0,P...1B,59,30,50₁₆

ESC,Y,1,a...1B,59,31,61₁₆

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
0	SP	!	"	#	\$	%	&'	(	*)	+ ,	- /	0	1	2	3	4	5
1	!																
2	"																
3	#																
4	\$																
5	%																
6	&																
7	'																
8	(
9)																
10	*																
11	+																
12	,																
13	-																
14	.																
15	/																
16	0																
17	1																
18	2																
19	3																
20	4																
21	5																
22	6																
23	7																

Examples:

ESC, Y, 0, P

ESC, Y, 1, a

The cursor can be moved to any screen position in ADDS emulation by pressing ESC, Y and then the appropriate row and column keys.

Figure 5-1. Absolute Cursor Addressing Chart

VERTICAL/HORIZONTAL CURSOR ADDRESSING

Vertical/horizontal cursor addressing consists of separate commands that move the cursor to a specific row or column. The format of the commands are:

- Vertical (row) address command - $0B_{16}$, (vertical address)...or on the keyboard: CTRL-K, (vertical address)
- Horizontal (column) address command - 10_{16} , (horizontal address)...or on the keyboard: CTRL-P, (horizontal address)

Figure 5-2 shows the display rows and columns and the characters used for their addresses in the vertical/horizontal address commands. These addresses are used in a similar manner as the row and column codes in absolute addressing. However, the vertical and horizontal addresses have different characters assigned to rows and columns.

ADDS VIDEO ATTRIBUTES

The ADDS commands used to display video attributes include the:

- Tag-bit set command - $0E_{16}$...or on the keyboard: CTRL-N
- Tag-bit reset command - $0F_{16}$...or on the keyboard: CTRL-O
- Set Attribute - $1B, 30_{16}$, (attribute code)...or on the keyboard: ESC, 0, (attribute code)

In ADDS emulation, each field of characters to be displayed with a video attribute must be preceded by a tag-bit set command to signify the start of the field and a tag-bit reset command to end the field. When all fields have been established this way, a set attribute command causes the fields to be displayed with the attribute specified in the attribute code at the end of the command. Only one special attribute can be displayed with normal characters at a time. The attribute codes are defined in table 5-3.

SEE NOTE

		1	1	2	2	3	3	4	4	5	5	6	6	7	7	7
0	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	9
		+++++														
0		+@ABCDEFGHIJQRSTUVWXYZP!"#\$%&'()*0123456789@ABCDEFGHIJQRSTUVWXYZ'abcdefghijklmnopqrstu														
1		A														
2		B														
3		C														
4		D														
5		E														
6		F														
7		G														
8		H														
9		I														
10		J														
11		K														
12		L														
13		M														
14		N														
15		O														
16		P														
17		Q														
18		R														
19		S														
20		T														
21		U														
22		V														
23		W														

Vertical Cursor Addressing

In ADDS emulation, use the CTRL-K, (row) command to position the cursor to the desired row.

Examples:

<u>Row</u>	<u>Command</u>
0	CTRL-K, CTRL-@
19	CTRL-K,S

Horizontal Cursor Addressing

Use the CTRL-P, (column) command to position the cursor to the desired column.

Examples:

<u>Column</u>	<u>Command</u>
0	CTRL-P, CTRL-@
79	CTRL-P,y

NOTE: THE SYMBOL + INDICATES THAT THE CTRL KEY MUST BE PRESSED WITH THE INDICATED KEY.

Figure 5-2. Vertical/Horizontal Cursor Addressing Chart

TABLE 5-3. ADDS ATTRIBUTES AND ATTRIBUTE CODES

ATTRIBUTE	KEY ENTRY	HEX CODE
Normal	@	40
Half intensity	A	41
Blinking	B	42
Half-intensity blinking	C	43
Inverse video	P	50
Inverse video, half intensity	Q	51
Inverse video, blinking	R	52
Inverse video, half-intensity blinking	S	53
Underlined	'	60
Underlined, half intensity	a	61
Underlined, blinking	b	62
Underlined, half-intensity blinking	c	63
Blanked (not displayed)	D	44

ADDS KEYCODES

The keycodes generated in ADDS emulation are listed in table 5-4.

TABLE 5-4. ADDS KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	PRINT		-	-	-	-
	SETUP		-	-	-	-
	F1		02, 31, 0D	02, 21, 0D	02, 31, 0D	02, 21, 0D
	F2		02, 32, 0D	02, 22, 0D	02, 32, 0D	02, 22, 0D
	F3		02, 33, 0D	02, 23, 0D	02, 33, 0D	02, 23, 0D
	F4		02, 34, 0D	02, 24, 0D	02, 34, 0D	02, 24, 0D
	F5		02, 35, 0D	02, 25, 0D	02, 35, 0D	02, 25, 0D
	F6		02, 36, 0D	02, 26, 0D	02, 36, 0D	02, 26, 0D
	F7		02, 37, 0D	02, 27, 0D	02, 37, 0D	02, 27, 0D
	F8		02, 38, 0D	02, 28, 0D	02, 38, 0D	02, 28, 0D

TABLE 5-4. ADDS KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	F9		02,39,0D	02,29,0D	02,39,0D	02,29,0D
	F10		02,3A,0D	02,2A,0D	02,3A,0D	02,2A,0D
	F11		02,3B,0D	02,2B,0D	02,3B,0D	02,2B,0D
	(Blank)		02,3C,0D	02,2C,0D	02,3C,0D	02,2C,0D
P	CLEAR	EOL	1B,4B	0C	1B,4B	0C
LF		ESC	1B	0A	1B	0A
M REL		BREAK	Break	-	Break	-
	TAB		09	09	09	09
!		1	31	21	-	-
@		2	32	40	00	00
#		3	33	23	33	23
\$		4	34	24	34	24
%		5	35	25	35	25
^		6	36	5E	1E	1E
&		7	37	26	37	26
*		8	38	2A	38	2A
(		9	39	28	39	28
)		0	30	29	30	29
-		-	2D	5F	1F	1F
+		=	3D	2B	3D	2B
~		`	60	7E	00	1E
	BACKSPACE		08	08	08	08
L INSERT*		7	37	-	37	-

TABLE 5-4. ADDS KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
↑ *		8	38	1A	38	1A
L DELETE*		9	39	-	39	-
	Q		71	51	11	11
	W		77	57	17	17
	E		65	45	05	05
	R		72	52	12	12
	T		74	54	14	14
	Y		79	59	19	19
	U		75	55	15	15
	I		69	49	09	09
	O		6F	4F	0F	0F
	P		70	50	10	10
]		[	5B	5D	1B	1D
|		\	5C	7C	1C	1C
	BACK TAB		1B, 49	1B, 49	1B, 49	1B, 49
← *		4	34	15	34	15
HOME*		5	35	01	35	01
→ *		6	36	06	36	06
ALPHA		LOCK	-	-	-	-
	A		61	41	01	01
	S		73	53	13	13
	D		64	44	04	04
	F		66	46	06	06

TABLE 5-4. ADDS KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	G		67	47	07	07
	H		68	48	08	08
	J		6A	4A	0A	0A
	K		6B	4B	0B	0B
	L		6C	4C	0C	0C
:		;	3B	3A	3B	3A
"		'	27	22	27	22
}		{	7B	7D	1B	1D
	RETURN NEW LINE		See Note 1	See Note 1	See Note 1	See Note 1
C INSRT*		1	31	-	31	-
↓ *		2	32	0A	32	0A
C DLETE*		3	33	-	33	-
	SHIFT		-	-	-	-
	Z		7A	5A	1A	1A
	X		78	58	18	18
	C		63	43	03	03
	V		76	56	16	16
	B		62	42	02	02
	N		6E	4E	0E	0E
	M		6D	4D	0D	0D
<		,	2C	3C	2C	3C

TABLE 5-4. ADDS KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
>		.	2E	3E	2E	3E
?		/	2F	3F	2F	3F
	SHIFT		-	-	-	-
	,		2C	-	2C	-
EDIT*	0		30	-	30	-
	.		2E	-	2E	-
	CTRL		-	-	-	-
	(Space Bar)		20	20	20	20
CR		DEL	7F	0D	7F	0D
ENTER*	RETURN NEW LINE		See Note 1	See Note 1	See Note 1	See Note 1

Notes:

*Legend on front of keycap.

1. If parameter 1 (Auto LF/CR) is set to Off, an 0D₁₆ code is generated. If parameter 1 is set to On, an 0D,0A₁₆ code sequence is generated.



This section describes the operation of the terminal under ANSI emulation. The topics covered include:

- ANSI commands
- ANSI terminal parameter report
- ANSI editing functions
- ANSI character attributes and protect feature
- ANSI keycodes
- ANSI graphic/mathematical symbols

ANSI COMMANDS

The commands in ANSI emulation include single-word control codes and multi-word command sequences. The next paragraph discusses the unique features of the multi-word command sequences. Following that are listings of the commands.

UNIQUE FEATURES OF ANSI COMMANDS

Many of the multi-word ANSI commands have parameters. The default parameter values for these commands are indicated in the listings later in this section. A default parameter value is used during command execution if no other value is given in the code sequence. If a parameter value is given, it must be in the proper location in the code sequence and be within the limits indicated in the listings. If two or more successive parameter values are given in a command, they must be separated by a semicolon (; or 3B₁₆).

The parameters for commands include numeric parameters (abbreviated P_n) and selective parameters (abbreviated P_s). The differences between these two type parameters are:

- Pn represents a single value expressed by one or more decimal digits (0 through 9). For example, keyboard entries of a 1 and a 5 express a parameter value of 15. This same value if sent by the host would be 31_{16} , 35_{16} (ASCII codes for 1 and 5). If a leading zero is included (for example, 015), that zero is ignored.
- Ps represents a value that identifies a selected item. For example, if a command has three different ways of execution, each way may be identified by a 0, 1, or 2. Entering a 1 on the keyboard or the host sending 31_{16} selects the corresponding way of execution.

LISTINGS OF ANSI COMMANDS

The commands for ANSI emulation are listed in tables 6-1 and 6-2. Table 6-1 lists the commands by function in alphabetical order and indicates how they are generated from the keyboard. Table 6-2 lists the commands in hexadecimal (hex) order and describes the terminal responses.

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Alarm (beep) Sound		07	CTRL-G
Attributes Protected field attributes	Terminal parameter 33 enables/disables protected data	1B, 5B, <u>Ps</u> , 7D	ESC, [, <u>Ps</u> , SHIFT-}
Set character attributes		1B, 5B, <u>Ps</u> , 3B, <u>Ps</u> , 3B, ..., 3B, <u>Ps</u> , 6D	ESC, [, <u>Ps</u> , ;, <u>Ps</u> , ;, ..., ;, <u>Ps</u> , m
Transmit device attributes		1B, 5B, 63 or 1B, 5B, 30, 63	ESC, [, C or ESC, [, 0
Communications control Cancel current command		18 or 1A	CTRL-X or SHIFT-Z

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Command sequence delimiter		1B	ESC
Fill character		00 or 7F	DEL or CTRL-DEL
Remote transmit command		1B,35	ESC,5
Space compression/ field delimiting	Private mode 13		
Disable (reset)	Terminal parameter 34 establishes default condition	1B,5B,3F,31,33,6C	ESC,[,SHIFT-?,1,3,1
Enable (set)	Terminal parameter 34 establishes default condition	1B,5B,3F,31,33,68	ESC,[,SHIFT-?,1,3,h
Transmit line rather than whole scrolling region or partial page (line transmit mode)	Private mode 11		
Disable (reset)	Terminal parameter 39 establishes default condition	1B,5B,3F,31,31,6C	ESC,[,SHIFT-?,1,1,1
Enable (set)	Terminal parameter 39 establishes default condition	1B,5B,3F,31,31,68	ESC,[,SHIFT-?,1,1,h
Transmit designated termination character	Terminal parameter 40 establishes default character	1B,5B, <u>Ps</u> ,7C	ESC,[, <u>Ps</u> ,SHIFT-|
Transmit protected data (guarded area transfer mode)	ANSI specified mode 1		
Disable (reset)	Terminal parameter 9 establishes default condition	1B,5B,31,6C	ESC,[,1 or l
Enable (set)	Terminal parameter 9 establishes default condition	1B,5B,31,68	ESC,[,1 or h

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Transmit whole scrolling region rather than partial page (transfer termination mode)	ANSI specified mode 16		
Disable (reset)	Terminal parameter 39 establishes default condition	1B,5B,31,36,6C	ESC,[,1,6,1
Enable (set)		1B,5B,31,36,68	ESC,[,1,6,h
Type ahead buffer			
Disable buffer feature	Terminal parameter 41 establishes default condition	1B,5B,3E,6C	ESC,[,SHIFT->,1
Enable buffer feature		1B,5B,3E,68	ESC,[,SHIFT->,h
Transmit and display buffer contents		1B,5B,30,7E	ESC,[,0,SHIFT-~
Transmit but do not display buffer contents		1B,5B,31,7E	ESC,[,1,SHIFT-~
X-off (Stop data transmission)		13	CTRL-S
X-on (resume data transmission)		11	CTRL-Q
Cursor control			
Automatic wrap around of cursor at end of line (auto wrap mode)	Private mode 7		
Disable (reset)	Terminal parameter 4 establishes default condition	1B,5B,3F,37,6C	ESC,[,SHIFT-? or SHIFT-CTRL-?,7 or CTRL-7,1
Enable (set)		1B,5B,3F,37,68	ESC,[,SHIFT-? or SHIFT-CTRL-?,7 or CTRL-7,h
Backspace		08	BACKSPACE (all keyboard modes)

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Carriage return		0D	RETURN/NEW LINE (all keyboard modes) or CTRL-M or SHIFT-CR
Carriage return and automatic line feed	See Automatic Line Feed later in this table	0D	RETURN/NEW LINE (all keyboard modes)
Cursor addressing			
Direct addressing		1B,5B, <u>Pn</u> ,3B, <u>Pn</u> ,48	ESC,[, <u>Pn</u> ; <u>Pn</u> , SHIFT-H
Horizontal/vertical addressing		1B,5B, <u>Pn</u> ,3B, <u>Pn</u> ,66	ESC,[, <u>Pn</u> ; <u>Pn</u> ,f
Transmit cursor address		1B,5B,36,6E	ESC,[,6 or CTRL-6,n
Cursor down		1B,5B, <u>Pn</u> ,42	ESC,[, <u>Pn</u> ,SHIFT-B or ↓
Cursor down and scroll display up if at bottom margin		1B,44	ESC,SHIFT-D
Cursor home position (origin mode)	Private mode 6		
Cursor home (default home position)		1B,5B,48	SHIFT-HOME
Have home position at upper-left corner of screen (reset)	Default condition	1B,5B,3F,36,6C	ESC,[,SHIFT-?,6,1
Have home position at upper-left position within designated margin (set)		1B,5B,3F,36,68	ESC,[,SHIFT-?,6,h
Cursor left		1B,5B, <u>Pn</u> ,44	ESC,[, <u>Pn</u> , SHIFT-D or ←
Cursor right		1B,5B, <u>Pn</u> ,43	ESC,[, <u>Pn</u> , SHIFT-C or →
Cursor up		1B,5B, <u>Pn</u> ,41	ESC,[, <u>Pn</u> , SHIFT-A or ↑
Cursor up and scroll display down if at top margin		1B,4D	ESC,SHIFT-M

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Line feed			
Automatic line feed with each received carriage return or each RETURN/NEW LINE keyboard entry (line-feed/new-line mode)	ANSI specified mode 20		
Disable (reset)	Terminal parameter 1 establishes default condition	1B,5B,32,30,6C	ESC,[,2,0,1
Enable (set)		1B,5B,32,30,68	ESC,[,2,0,h
Line feed		0A or 0B or 0C	SHIFT-LF or CTRL-J or CTRL-K or CTRL-L
New line		1B,45	ESC, SHIFT-E
Tab			
Back tab	Terminal set tabs parameter	1B,4F,6C	ESC,SHIFT-O,1
Clear tab(s)	establishes default tabs	1B,5B, <u>Ps</u> ,67	ESC,[, <u>Ps</u> ,G
Tab ahead		09	TAB (all keyboard modes)
Set tab in current column		1B,48	ESC,SHIFT-H
Display characters			
Display the designated G0 character set		0F	CTRL-O
Display the designated G1 character set		0E	CTRL-N

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Set special graphic/mathematical symbols as the G0 character set		1B,28,30	ESC, SHIFT-(, 0
Set special graphic/mathematical symbols as the G1 character set		1B,29,30	ESC, SHIFT-), 0
Set standard ASCII character set as the G0 character set		1B,28,42	ESC, SHIFT-(, SHIFT-B
Set standard ASCII character set as the G1 character set		1B,29,42	ESC, SHIFT-), SHIFT-B
Display control			
Alignment pattern			
Display alignment pattern		1B,23,38	ESC, SHIFT-#, 8
Delete character(s)		1B,5B, <u>Pn</u> ,50	ESC,[, <u>Pn</u> , SHIFT-P
Delete line(s)		1B,5B, <u>Pn</u> ,4D	ESC,[, <u>Pn</u> , SHIFT-M
Display features			
Restore previously saved cursor position, character attributes, and character set		1B,38	ESC,8 or CTRL-8
Save current cursor position, character attributes, and character set		1B,37	ESC,7 or CTRL-7
Erase			
Allow all displayed data (including protected) to be erased (erasure mode)	ANSI specified mode 6		
Disable (reset)	Terminal parameter	1B,5B,36,6C	ESC,[,6 or CTRL-6,1
Enable (set)	15 establishes default condition	1B,5B,36,68	ESC,[,6 or CTRL-6,h

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE NOTES)
Erase in display		1B,5B, <u>Ps</u> ,4A	ESC,[, <u>Ps</u> , SHIFT-J
Erase in line		1B,5B, <u>Ps</u> ,4B	ESC,[, <u>Ps</u> , SHIFT-K
Insert			
Insert incoming characters to right of cursor (insert/replacement mode)	ANSI specified mode 4		
Disable (reset)	Default condition	1B,5B,34,6C	ESC,[,4,1
Enable (set)		1B,5B,34,68	ESC,[,4,h
Insert line(s)		1B,5B, <u>Pn</u> ,4C	ESC,[, <u>Pn</u> , SHIFT-L
Margins			
Set top and bottom display margins		1B,5B, <u>Pn</u> , <u>3B</u> , <u>Pn</u> ,72	ESC,[, <u>Pn</u> , <u>i</u> , <u>Pn</u> ,r
Keyboard control			
Automatic line feed for RETURN/NEW LINE keyboard entries (line-feed/new-line mode)	ANSI specified mode 20		
Disable (reset)	Terminal parameter 1 establishes default condition	1B,5B,32,30,6C	ESC,[,2,0,1
Enable (set)		1B,5B,32,30,68	ESC,[,2,0,h
Automatic repeat of alphanumeric keys (auto repeat mode)	Private mode 8		
Disable (reset)	Terminal parameter 2 establishes default condition	1B,5B,3F,38,6C	ESC,[,SHIFT-?,8,1
Enable (set)		1B,5B,3F,38,68	ESC,[,SHIFT-?,8,h

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
EDIT key			
Condition shifted EDIT key for switching between character-by-character transmission and edit mode without host intervention (Edit-key execution mode)	Private mode 16		
Disable (reset)	Terminal parameter 23 establishes default condition	1B,5B,3F,31,36,6C	ESC,[,SHIFT-?,1,6,1
Enable (set)		1B,5B,3F,31,36,68	ESC,[,SHIFT-?,1,6,h
ENTER key			
Condition shifted ENTER key to start a block transmission in edit mode without host intervention (transmit-execution mode)	Private mode 14		
Disable (reset)	Terminal parameter 38 establishes default condition	1B,5B,3F,31,34,6C	ESC,[,SHIFT-?,1,4,1
Enable (set)		1B,5B,3F,31,34,68	ESC,[,SHIFT-?,1,4,h
ENTER key and function keys F1 through F11 and key with no legend			
Condition the function keys to start a block transmission in edit mode and for the ENTER and function keys to generate a carriage return termination code (transmit carriage return)			
Disable (reset)	Terminal parameter 37 establishes default condition	1B,5B,3C,6C	ESC,[,SHIFT-<,1
Enable (set)		1B,5B,3C,68	ESC,[,SHIFT-<,h

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
Mode changing			
Change emulation to ADDS		1B,5B,3D,31,68	ESC,[,=,1,h
Change emulation to ADV		1B,5B,3D,30,68	ESC,[,=,0,h
Edit mode rather than character-by-character mode (edit mode)	Private mode 10		
Disable	Terminal parameter 8 establishes default power-on condition	1B,5B,3F,31,30,6C	ESC,[,SHIFT-?,1,0,1
Enable	Terminal parameter 8 establishes default power-on condition	1B,5B,3F,31,30,68	ESC,[,SHIFT-?,1,0,h
Reset ANSI specified modes 1(Ps=31 ₁₆), 4(Ps=34 ₁₆), 6(Ps=36 ₁₆), 16(Ps=31,36 ₁₆) and/or 20(Ps=32,30 ₁₆)	ANSI specified modes are noted throughout this listing	1B,5B, <u>Ps,3B</u> ,... <u>,3B,Ps,6C</u>	ESC,[, <u>Ps,;,...;,Ps,1</u>
Reset private modes 1(Ps=31 ₁₆), 6(Ps=36 ₁₆), 7(Ps=37 ₁₆), 8(Ps=38 ₁₆), 10(Ps=31,30 ₁₆), 11(Ps=31,31 ₁₆), 13(Ps=31,33 ₁₆), 14(Ps=31,34 ₁₆) and/or 16(Ps=31,36 ₁₆)	Private modes are noted throughout this listing	1B,5B,3F, <u>Ps</u> , <u>3B,...,3B,Ps</u> ,6C	ESC,[,SHIFT-?, <u>Ps,;,...;,Ps,1</u>
Set ANSI specified modes 1(Ps=31 ₁₆), 4(Ps=34 ₁₆), 6(Ps=36 ₁₆), 16(Ps=31,36 ₁₆) and/or 20(Ps=32,30 ₁₆)	ANSI specified modes are noted throughout this listing	1B,5B, <u>Ps,3B</u> ,... <u>,3B,Ps,68</u>	ESC,[, <u>Ps,;,...;,Ps,h</u>
Set private modes 1(Ps=31 ₁₆), 6(Ps=36 ₁₆), 7(Ps=37 ₁₆), 8(Ps=38 ₁₆),	Private modes are noted	1B,5B,3F, <u>Ps</u> , <u>3B,...,3B,Ps</u> ,68	ESC,[,SHIFT-?, <u>Ps,;,...;,Ps,h</u>

TABLE 6-1. LIST OF ANSI COMMANDS BY FUNCTION (CONTD)

FUNCTION (IN ALPHABETICAL ORDER)	SPECIAL NOTES	HEX CODE (SEE GENERAL NOTES)	KEY SEQUENCE (SEE GENERAL NOTES)
10(Ps=31,30 ₁₆), 11(Ps=31,31 ₁₆), 13(Ps=31,33 ₁₆), 14(Ps=31,34 ₁₆) and/or 16(Ps=31,36 ₁₆)	through-out this listing		
Parameters			
Report terminal parameters		1B, 5B, <u>so</u> 1, 78	ESC, [, <u>so</u> 1, x
Printing			
Disable printer port		1B, 3F	ESC, SHIFT-?
Enable printer port with display		1B, 2F	ESC, /
Enable printer port without display		1B, 2A	ESC, SHIFT-*
Hard copy		1B, 23, 37	ESC, SHIFT-#
Reset terminal		1B, 63	ESC, c
Status			
Report device status		1B, 5B, 35, 6E	ESC, [, 5, n
Test			
Invoke confidence test (initiate self tests)		1B, 5B, 32, 3B, <u>Ps</u> , 79	ESC, [, 2, ; , <u>Ps</u> , y

GENERAL NOTES:

- The positions for Pn, Ps, and other parameters in code and key sequences are underlined to highlight them. The underlined semicolons (3B₁₆ codes) are needed if consecutive parameter entries are made. Parameter values (including default) are given in table 6-2.
- If SHIFT is not indicated either upper or lowercase letters may be used.
- Key captions separated by hyphens indicate keys pressed at the same time. For example, SHIFT-CTRL-A means press and hold the SHIFT and CTRL keys down and then press the A key. Key captions separated by commas indicate keys pressed one after another in sequence. Neither hyphens nor commas are entered as part of the keyed-in control commands.
- Key captions listed in table are for the standard keyboard.

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
00	NUL	-	Ignored on input (not stored in receive buffer; may be used as a fill character).
07	BEL	-	Produces an audible alarm (beep) for approximately one-half second.
08	BS	Backspace	Moves cursor left one character position, unless it is at the left margin, in which case no action occurs.
09	HT	Tab	Moves cursor to the next tab stop, to the next field, or to the last right tab stop.
0A	LF	Line Feed	Moves cursor to the same column in the same column in the next line.
0B	VT	-	Same as for hex code 0A.
0C	FF	-	Same as for hex code 0A.
0D	CR	Carriage Return	Moves cursor to the beginning of the current line, or if terminal parameter 1 is set to On, moves cursor to the beginning of the next line.
0E	SO	-	Displays the G1 character set designated by either hex code command 1B, 29, 30 or 1B, 29, 42.
0F	SI	-	Displays the G0 character set designated by either hex code command 1B, 28, 30 or 1B, 28, 42.
11	DC1	X-On	Terminal resumes data transmission.
13	DC3	X-Off	Terminal stops transmitting all codes except X-on (11 ₁₆) and X-off (13 ₁₆). That is if X-on/X-off code use is enabled in terminal parameter 5.

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
18	CAN	-	Terminal terminates the command sequence being received and displays the parity error symbol (■).
1A	SUB	-	Same as for hex code 18.
1B	ESC	-	Interprets the following characters in the string as a command, rather than displaying it.
20	SP	-	Deposits a space on the display screen and erases what was there before.
7F	DEL	-	Ignored on input (not stored in receive buffer; may be used as a fill character).
1B,2A	ESC,*	Enable Printer Port Without Display	All data received via the main port is output to the auxiliary port without being processed or displayed. The keyboard should be locked before sending this command and then enabled after exiting this state by sending a enable-printer-port-with-display command (hex code 1B,2F) or a disable-printer-port command (hex code 1B,3F). During this mode, the terminal monitors the Data Terminal Ready signal from the printer and uses the X-on/X-off protocol to control the data flow from the main port to the auxiliary port.
1B,2F	ESC,/	Enable Printer Port with Display	All data received via the main port is displayed, processed and output to the auxiliary port.
1B,35	ESC,5	Remote Transmit	Terminal transmits the block of data it had requested to send to the host via hex code command 1B,53.
1B,37	ESC,7	Save Cursor and Attributes	Causes the current cursor position, character attribute, and character set to be saved.

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE				
1B,38	ESC,8	Restore Cursor and Attributes	Causes the previously saved cursor position, character attribute, and character set to be restored.				
1B,3F	ESC,?	Disable Printer Port	Disables data transfer to the auxiliary port of the terminal.				
1B,44	ESC,D	Index	Cursor moves down one line in same column, and if the bottom margin is encountered, the display scrolls up.				
1B,45	ESC,E	Next Line	Cursor moves to the beginning of the next line, and if the bottom margin is encountered, the display scrolls up.				
1B,48	ESC,H	Set Tab at Current Column	Sets a tab stop at the current cursor position.				
1B,4D	ESC,M	Reverse Index	Cursor moves up one line in same column, and if the top margin is encountered, the display scrolls down.				
1B,63	ESC,c	Reset	Resets terminal to the power-on state.				
1B,23,37	ESC,#,7	Hard Copy	Transfers all data on display screen to the auxiliary port.				
1B,23,38	ESC,#,8	Screen Alignment Display	Displays an alignment pattern.				
1B,28,30 or 1B,28,42 or 1B,29,30 or 1B,29,42	ESC,(,0 ESC,(,B ESC,),0 ESC,),B	Select Character Sets (G0 and G1 designators)	Assigns the G0/G1 character sets. These designated character sets are selectively placed in effect through hex codes 0E(SO) and 0F(SI). The command assignments for the G0/G1 character sets are: <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>Command</u></th> <th style="text-align: left;"><u>Assigns</u></th> </tr> </thead> <tbody> <tr> <td>1B,28,30₁₆</td> <td>Special graphics/ mathematical symbols as G0</td> </tr> </tbody> </table>	<u>Command</u>	<u>Assigns</u>	1B,28,30 ₁₆	Special graphics/ mathematical symbols as G0
<u>Command</u>	<u>Assigns</u>						
1B,28,30 ₁₆	Special graphics/ mathematical symbols as G0						

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
			<p>1B,29,30₁₆ Special graphics/ mathematical symbols as G1</p> <p>1B,28,42₁₆ Standard ASCII char- acters as G0</p> <p>1B,29,42₁₆ Standard ASCII char- acters as G1</p>
1B,4F,6C	ESC,O,1	Back Tab	Cursor moves back to the start of the current unprotected field, the previous unprotected field, the last tab position, or the first unprotected field, whichever is encountered first.
1B,5B,63	ESC,[,c	Device Attributes	Terminal transmits a fixed response of 1B,5B,3F,34,3B,32,63 ₁₆ (ESC,[,?,4,;,2,c).
1B,5B, <u>Pn</u> , 41	ESC,[, <u>Pn</u> ,A	Cursor Up Default Pn is 1	Cursor moves straight up the number of lines specified by Pn. If the top margin is encountered, the cursor stops. If Pn is 0, the cursor moves up one line.
1B,5B, <u>Pn</u> , 42	ESC,[, <u>Pn</u> ,B	Cursor Down Default Pn is 1	Cursor moves straight down the number of lines specified by Pn. If the bottom margin is encountered, the cursor stops. If Pn is 0, the cursor moves down one line.
1B,5B, <u>Pn</u> , 43	ESC,[, <u>Pn</u> ,C	Cursor Forward (Right) Default Pn is 1	Cursor moves right the number of positions specified by Pn. If the end of line is encountered, the cursor stops.
1B,5B, <u>Pn</u> , 44	ESC,[, <u>Pn</u> ,D	Cursor Backward (Left) Default Pn is 1	Cursor moves left the number of positions specified by Pn. If the beginning of the line is encountered, the cursor stops.

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE								
1B,5B, <u>Ps</u> , 4A	ESC,[, <u>Ps</u> ,J	Erase in Display Default Ps is 0	<p>Erases the area on the screen specified by Ps. Whether all or just unprotected data is erased depends on the erasure mode in effect (see hex code 1B,5B,36,68 or 6C and terminal parameter 15). The Ps selection is:</p> <table border="0"> <thead> <tr> <th data-bbox="906 604 938 632"><u>Ps</u></th> <th data-bbox="1138 604 1312 632"><u>Area Erased</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="906 667 922 695">0</td> <td data-bbox="997 667 1437 726">From current cursor position to end of screen</td> </tr> <tr> <td data-bbox="906 762 922 789">1</td> <td data-bbox="997 762 1422 821">From start of screen to the current cursor position</td> </tr> <tr> <td data-bbox="906 856 922 884">2</td> <td data-bbox="997 856 1450 915">All of screen and cursor does not move</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Area Erased</u>	0	From current cursor position to end of screen	1	From start of screen to the current cursor position	2	All of screen and cursor does not move
<u>Ps</u>	<u>Area Erased</u>										
0	From current cursor position to end of screen										
1	From start of screen to the current cursor position										
2	All of screen and cursor does not move										
1B,5B, <u>Ps</u> , 4B	ESC,[, <u>Ps</u> ,K	Erase in Line Default Ps is 0	<p>Erases the part of the current line specified by Ps. Whether all or just unprotected data is erased depends on the erasure mode in effect (see hex code 1B,5B,36,68 or 6C and terminal parameter 15). The Ps selection is:</p> <table border="0"> <thead> <tr> <th data-bbox="906 1192 938 1220"><u>Ps</u></th> <th data-bbox="1013 1192 1437 1220"><u>Part of Current Line Erased</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="906 1255 922 1283">0</td> <td data-bbox="997 1255 1422 1314">From cursor position to end of line</td> </tr> <tr> <td data-bbox="906 1350 922 1377">1</td> <td data-bbox="997 1350 1437 1409">From start of line to cursor position</td> </tr> <tr> <td data-bbox="906 1444 922 1472">2</td> <td data-bbox="997 1444 1422 1503">All of line and cursor does not move</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Part of Current Line Erased</u>	0	From cursor position to end of line	1	From start of line to cursor position	2	All of line and cursor does not move
<u>Ps</u>	<u>Part of Current Line Erased</u>										
0	From cursor position to end of line										
1	From start of line to cursor position										
2	All of line and cursor does not move										
1B,5B, <u>Pn</u> , 4C	ESC,[, <u>Pn</u> ,L	Insert Line(s) Default Pn is 1	<p>Inserts the Pn number of new lines above where the current line is without regard to any protected fields. The line having the cursor and the lines underneath move down. The lines moving past the lower margin are lost. The new inserted lines are filled with spaces whose character attributes are those currently set. No action occurs if</p>								

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE						
1B, 5B, <u>Pn</u> , 4D	ESC, [, <u>Pn</u> , M	Delete Line(s) Default Pn is 1	<p>the cursor is out of the scrolling region when the command is received.</p> <p>Deletes the Pn number of lines starting with the current line and down without regard to any protected fields. Lines underneath move up. New lines are inserted above the bottom margin. The new lines are filled with spaces whose character attributes match those of the last line moved up. No action occurs if the cursor is out of the scrolling region when the command is received.</p>						
1B, 5B, <u>Pn</u> , 50	ESC, [, <u>Pn</u> , P	Delete Character(s) Default Pn is 1	<p>Deletes the Pn number of characters from an unprotected field starting at the current cursor position and to the right. Characters forward in the affected field or line move left the number of characters deleted. If the cursor is in a protected field when the command is received, the cursor advances to the next unprotected position without any deletion.</p>						
1B, 5B, <u>Ps</u> , 67	ESC, [, <u>Ps</u> , g	Tabulation Clear Default Ps is 0	<p>Clears the tab stops specified by Ps. The Ps selection is:</p> <table border="0" data-bbox="980 1402 1547 1614"> <thead> <tr> <th data-bbox="980 1402 1024 1430"><u>Ps</u></th> <th data-bbox="1175 1402 1446 1430"><u>Tab Stops Cleared</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="980 1465 1003 1493">0</td> <td data-bbox="1084 1465 1547 1524">The one at the current cursor position</td> </tr> <tr> <td data-bbox="980 1556 1003 1583">3</td> <td data-bbox="1084 1556 1133 1583">All</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Tab Stops Cleared</u>	0	The one at the current cursor position	3	All
<u>Ps</u>	<u>Tab Stops Cleared</u>								
0	The one at the current cursor position								
3	All								

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE						
1B, 5B, <u>so1</u> , 78	ESC, [, <u>so1</u> , x	Report Terminal Parameters	<p>This command requests a terminal parameter report and enables/disables future unsolicited terminal parameter reports. This enabling/disabling is indicated through the <u>so1</u> parameter in the command. The parameter selection is:</p> <table border="0"> <thead> <tr> <th data-bbox="909 630 974 661"><u>so1</u></th> <th data-bbox="1169 630 1291 661"><u>Meaning</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="909 693 974 745">0 or none</td> <td data-bbox="1015 693 1461 934">This message is a request and the terminal is allowed to send unsolicited terminal parameter reports. An unsolicited report is sent after the SETUP key has been pressed to exit from the parameter display.</td> </tr> <tr> <td data-bbox="909 976 925 997">1</td> <td data-bbox="1015 976 1461 1123">This message is a request and from now on the terminal may only send a terminal parameter report in response to a request.</td> </tr> </tbody> </table> <p>The information given in the terminal parameter report is described later in this section.</p>	<u>so1</u>	<u>Meaning</u>	0 or none	This message is a request and the terminal is allowed to send unsolicited terminal parameter reports. An unsolicited report is sent after the SETUP key has been pressed to exit from the parameter display.	1	This message is a request and from now on the terminal may only send a terminal parameter report in response to a request.
<u>so1</u>	<u>Meaning</u>								
0 or none	This message is a request and the terminal is allowed to send unsolicited terminal parameter reports. An unsolicited report is sent after the SETUP key has been pressed to exit from the parameter display.								
1	This message is a request and from now on the terminal may only send a terminal parameter report in response to a request.								
1B, 5B, <u>P_s</u> , 7C	ESC, [, <u>P_s</u> ,	Transmit Termination Character Default P _s is 0	<p>P_s establishes the transmit termination character that the terminal uses in block transmissions. The P_s selection is:</p> <table border="0"> <thead> <tr> <th data-bbox="909 1438 950 1470"><u>P_s</u></th> <th data-bbox="1015 1438 1356 1470"><u>Termination Character</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="909 1501 925 1522">0</td> <td data-bbox="1047 1501 1112 1522">None</td> </tr> <tr> <td data-bbox="909 1564 925 1585">1</td> <td data-bbox="1047 1564 1299 1596">Form Feed (0C₁₆)</td> </tr> </tbody> </table>	<u>P_s</u>	<u>Termination Character</u>	0	None	1	Form Feed (0C ₁₆)
<u>P_s</u>	<u>Termination Character</u>								
0	None								
1	Form Feed (0C ₁₆)								
1B, 5B, <u>P_s</u> , 7D	ESC, [, <u>P_s</u> , }	Protected Field Attributes Default P _s is 0	<p>P_s establishes which type(s) of displayed character attributes are designated as protected data (terminal parameter 33 enables/disables use of protected data). Multiple attributes may be specified in the sequence by inserting</p>						

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE														
			<p>semicolons (; or 3B₁₆) between the Ps selections. The Ps selection is:</p> <table border="0"> <thead> <tr> <th data-bbox="980 499 1019 527"><u>Ps</u></th> <th data-bbox="1154 499 1455 527"><u>Protected Attribute</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="980 562 997 590">0</td> <td data-bbox="1078 562 1138 590">None</td> </tr> <tr> <td data-bbox="980 625 997 653">1</td> <td data-bbox="1078 625 1292 653">Half intensity</td> </tr> <tr> <td data-bbox="980 688 997 716">4</td> <td data-bbox="1078 688 1230 716">Underlined</td> </tr> <tr> <td data-bbox="980 751 997 779">5</td> <td data-bbox="1078 751 1198 779">Blinking</td> </tr> <tr> <td data-bbox="980 814 997 842">7</td> <td data-bbox="1078 814 1279 842">Inverse video</td> </tr> <tr> <td data-bbox="980 877 1029 905">254</td> <td data-bbox="1078 877 1520 926">All attributes off specifies protection</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Protected Attribute</u>	0	None	1	Half intensity	4	Underlined	5	Blinking	7	Inverse video	254	All attributes off specifies protection
<u>Ps</u>	<u>Protected Attribute</u>																
0	None																
1	Half intensity																
4	Underlined																
5	Blinking																
7	Inverse video																
254	All attributes off specifies protection																
1B,5B,30,63	ESC,[,0,c	Device Attributes	Terminal transmits a fixed response of 1B,5B,3F,34,3B,32,63 ₁₆ (ESC,[,?,4,;,2,c). If parameter 37 (TX CR) is enabled, the termination character of the response is CR (0D ₁₆).														
1B,5B,30,7E	ESC,[,0,	Release Type Ahead Buffer	Applies only if terminal parameter 41 or command 1B,5B,3E,68 ₁₆ is set to enable the type ahead buffer. Causes the data stored in the type ahead buffer to be displayed and transmitted to the host.														
1B,5B,31,68 to set or 1B,5B,31,6C to reset	ESC,[,1,h ESC,[,1,l	Guarded Area Transfer Mode (ANSI specified mode 1)	When reset, all data may be transmitted regardless of protection. When set, only unprotected data may be transmitted, and when a protected field is encountered during a block transmission, a record separator (RS or 1E ₁₆) is sent in place of the field.														
1B,5B,31,7E	ESC,[,1,~	Clear Type Ahead Buffer	Applies only if terminal parameter 41 or command 1B,5B,3E,68 ₁₆ is set to enable the type ahead buffer. Causes the data stored in the type ahead buffer to be transmitted to the host but not displayed.														

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
1B,5B,34, 68 to set or 1B,5B,34, 6C to reset	ESC, [,4,h ESC, [,4,1	Insert/Replacement Mode (ANSI specified mode 4)	When set, incoming characters are inserted to the right of the cursor position, causing the characters that follow in the unprotected field to shift right (protected characters are unaffected). Characters shifted off the line or to a protected field are lost. When reset, incoming characters overlay the character at the current cursor position.
1B,5B,35, 6E	ESC, [,5,n	Device Status Report	Terminal transmits 1B,5B,30,6E ₁₆ (ESC, [,0,n) if terminal self tests completed successfully the last time they ran or 1B,5B,33,6E ₁₆ (ESC, [,3,n) if any self test failed.
1B,5B,36, 68 to set or 1B,5B,36, 6C to reset	ESC, [,6,h ESC, [,6,1	Erasure Mode (ANSI specified mode 6)	When set, the erase-in-line and erase-in-display commands (hex codes 1B,5B,Ps,4B and 1B,5B,Ps,4A respectively) can erase protected data. When reset, those commands cannot erase protected data. Terminal parameter 15 establishes the default erasure mode.
1B,5B,36, 6E	ESC, [,6,n	Cursor Position Report	Terminal transmits 1B,5B,P1,3B,Pc,52 ₁₆ (ESC, [,P1,;,Pc,R). P1 and Pc are parameters. P1 represents the line number of the current cursor position and Pc represents the column number of that position. Lines are numbered 00 through 23(17 ₁₆) from top to bottom, and columns are numbered 00 through 79(4F ₁₆) from left to right.
1B,5B,3C, 68 to set or 1B,5B,3C, 6C to reset	ESC, [,<,h ESC, [,<,1	Transmit Carriage Return (CR)	When set, the following occurs as applicable: ● In character-by-character transmissions, terminal adds a CR (0D ₁₆) following the code sequence transmitted for a special function key (a F1

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
			<p>through F12 key or the key with no legend).</p> <ul style="list-style-type: none"> In edit mode, pressing a special function key starts a block transmission and a CR is added after the code sequence for the special function key. In addition, a CR is sent to end each block transmission started by the ENTER key. <p>When reset, no CR is added for special function keys in either character-by-character transmission or block transmissions. In addition, no CR is added to block transmissions started by the ENTER key.</p> <p>The default condition for the transmit-carriage-return function is determined by terminal parameter 37.</p>
<p>1B,5B,3E,68 to set or 1B,5B,3E,6C to reset</p>	<p>ESC,[,>,h ESC,[,>,l</p>	<p>Type Ahead Buffer</p>	<p>When set, the following occurs:</p> <ul style="list-style-type: none"> Keyboard entries are stored but not transmitted, displayed, nor acted upon until directed by a 1B,5B,30,7E₁₆ command or a 1B,5B,31,7E₁₆ command. The only keyboard entry immediately transmitted is a CR(0D₁₆). <p>When reset, the transmission and display of keyboard entries occurs normally.</p>
<p>1B,5B,31,36,68 to set or 1B,5B,31,36,6C to reset</p>	<p>ESC,[,1,6,h ESC,[,1,6,l</p>	<p>Transfer Termination Mode (ANSI specified mode 16)</p>	<p>This command interacts with the line-transmit mode command (hex code 1B,5B,3F,31,31,68 or 6C) to provide the means for changing the size of block transmissions during operations (default selection is determined by the</p>

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
			<p>setting of terminal parameter 39). These interactions are:</p> <ul style="list-style-type: none"> • With line transmit mode reset, setting this command selects the full scrolling region for a block transmission. • With line transmit mode reset, resetting this command selects a partial page for a block transmission. • Resetting this command and setting line transmit mode selects a line as the size of a block transmission.
<p>1B,5B,32,30,68 to set or 1B,5B,32,30,6C to reset</p>	<p>ESC,[,2,0,h ESC,[,2,0,l</p>	<p>Line-Feed/New-Line Mode (ANSI specified mode 20)</p>	<p>When set, a RETURN/NEW LINE keyboard entry generates CR(0D₁₆) and line feed (LF or 0A₁₆) codes. When reset, a RETURN/NEW LINE entry only generates a CR code.</p>
<p>1B,5B,3D,30, or 31,68</p>	<p>ESC,[,=,0, or 1,h</p>	<p>Mode Select (ADV/ADDS Select)</p>	<p>Terminal enters the emulation specified in the fourth code of the command sequence. A fourth code of 30₁₆ specifies ADV emulation, while a fourth code of 31₁₆ specifies ADDS emulation.</p>
<p>1B,5B,3F,36,68 to set or 1B,5B,3F,36,6C to reset</p>	<p>ESC,[,?,6,h ESC,[,?,6,l</p>	<p>Origin Mode (private mode 6)</p>	<p>When set, cursor home position is at the upper-left character position within the top margin. (Note that the cursor can be positioned outside margins with either hex code command 1B,5B,Pn,3B,Pn,48 or 1B,5B,Pn,Pn,66.) When reset, the cursor home position is at the upper-left corner of the screen.</p>
<p>1B,5B,3F,37,68 to set or</p>	<p>ESC,[,?,7,h</p>	<p>Auto Wrap Mode (private mode 7)</p>	<p>When set, cursor automatically advances to the beginning of the next line when the last position of the previous line is filled (if at</p>

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
1B,5B,3F, 37,6C to reset	ESC,[?,7,1		bottom line of margin, display scrolls up one line). When reset, the cursor does not automatically advance under these conditions. default state of this feature is determined by terminal parameter 4.
1B,5B,3F, 38,68 to set or 1B,5B,3F, 38,6C to reset	ESC,[?,8,h ESC,[?,8,1	Auto Repeat Mode (private mode 8)	When set, the alphanumeric keys repeat 15 times per second when held down for one-half second. When reset, no keys repeat. The default state of this feature is determined by terminal parameter 2.
1B,5B, <u>Pn</u> , 3B, <u>Pn</u> ,48	ESC,[<u>Pn</u> ,; <u>Pn</u> ,H	Direct Cursor Addressing Default Pn is 0	Moves the cursor to the position specified by "Pn; Pn", which may be anywhere on the screen regardless of margins. The first Pn in this command specifies the line position (00 through 17 ₁₆ from top to bottom of screen). The second Pn specifies the character position or column (00 through 4F ₁₆). If no Pn values are given the cursor is positioned at the upper-left corner of screen.
1B,5B, <u>Pn</u> , 3B, <u>Pn</u> ,66	ESC,[<u>Pn</u> ,; <u>Pn</u> ,f	Horizontal/Vertical Cursor Addressing Default Pn is 0	Same as direct cursor addressing (hex code command 1B,5B,Pn,3B,Pn,48).
1B,5B, <u>Pn</u> , 3B, <u>Pn</u> ,72	ESC,[<u>Pn</u> ,; <u>Pn</u> ,r	Set Top and Bottom Margins Default Pn is no margins (whole screen is scrolling region)	Sets the top and bottom margins to define the scrolling region. The first Pn of the command specifies the line number of the first (top) line in the scrolling region. The second Pn specifies the line number of the last (bottom) line of the scrolling region. (Lines are numbered 00 to 17 ₁₆ from top to bottom of screen.) The minimum size of the scrolling region allowed is two lines. After receiving this command, the cursor is placed in the home position designated by the origin mode (hex code command 1B,5B,3F,36,68 or 6C).

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE								
1B,5B,32, 3B, <u>Ps</u> ,79	ESC,[,2,;; <u>Ps</u> ,y	Invoke Confidence Test (initiate self tests)	<p>Enters the terminal into its power-on self tests. The number of times the tests are run depends on the Ps. The Ps selection is:</p> <table border="1" data-bbox="899 493 1453 840"> <thead> <tr> <th><u>Ps</u></th> <th><u>Times Tests Are Run</u></th> </tr> </thead> <tbody> <tr> <td>0 (00₁₆)</td> <td>None, but terminal is reset</td> </tr> <tr> <td>1 (01₁₆)</td> <td>Once</td> </tr> <tr> <td>8 (08₁₆)</td> <td>Tests repeat indefinitely until an error occurs or power is turned off</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Times Tests Are Run</u>	0 (00 ₁₆)	None, but terminal is reset	1 (01 ₁₆)	Once	8 (08 ₁₆)	Tests repeat indefinitely until an error occurs or power is turned off
<u>Ps</u>	<u>Times Tests Are Run</u>										
0 (00 ₁₆)	None, but terminal is reset										
1 (01 ₁₆)	Once										
8 (08 ₁₆)	Tests repeat indefinitely until an error occurs or power is turned off										
1B,5B,3F, 31,30,68 to set or 1B,5B,3F, 31,30,6C to reset	ESC,[,?,1, 0,h ESC,[,?,1, 0,1	Edit Mode (private mode 10)	<p>When set, terminal enters edit mode. When reset, terminal transmits keyboard-entered data character by character. The transmission mode initially in effect when the terminal is powered-on is determined by terminal parameter 8. After that, the transmission mode may be changed by the operator (through the EDIT key) or by the host.</p>								
1B,5B,3F, 31,31,68 to set or 1B,5B,3F, 31,31,6C to reset	ESC,[,?,1, 1,h ESC,[,?,1, 1,1	Line Transmit Mode (private mode 11)	<p>This command interacts with the transfer-termination-mode command (hex code 1B,5B,31,36,68 or 6C) to provide the means for changing the size of block transmissions during operations (default selection is determined by the setting of terminal parameter 39). These interactions are:</p> <ul style="list-style-type: none"> • Setting this command selects a line as the size of a block transmission • Resetting this command and setting transfer termination mode selects the full scrolling region for a block transmission 								

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE
<p>1B,5B,3F, 31,33,68 to set or 1B,5B,3F, 31,33,6C to reset</p>	<p>ESC,[?,1, 3,h ESC,[?,1, 3,l</p>	<p>Space Compression/Field Delimiting Mode (pri- vate mode 13)</p>	<p>● Resetting this command and transfer termination mode selects a partial page for a block transmission.</p> <p>When set, trailing spaces in a field are suppressed and each field sent is terminated with a 1E₁₆ (RS) code except the last field, which is terminated by a CR code or CR/LF if line-feed/new-line mode (hex code 1B,5B,32,30,68) is in effect. When reset, all spaces are transmitted as they are encountered.</p>
<p>1B,5B,3F, 31,34,68 to set or 1B,5B,3F, 31,34,6C to reset</p>	<p>ESC,[?,1, 4,h ESC,[?,1, 4,l</p>	<p>Transmit Execution Mode (private mode 14)</p>	<p>When set, pressing the ENTER key in edit mode immediately starts a block transmission. When reset, pressing the ENTER in edit mode transmits a 1B,53₁₆ (ESC,S) sequence to the host as a transmit request. Terminal then does not start the block transmission until the host sends a remote transmit command (hex code 1B,35). The default mode of the ENTER key is determined by terminal parameter 38.</p>
<p>1B,5B,3F, 31,36,68 to set or 1B,5B,3F, 31,36,6C to reset</p>	<p>ESC,[?,1, 6,h ESC,[?,1, 6,l</p>	<p>Edit Key Execution Mode (private mode 16)</p>	<p>When set, successive pressing of the shifted EDIT key switches the terminal between character-by-character transmission mode and edit mode. When reset, pressing the shifted EDIT key transmits one of the EDIT mode sequences (set if in character-by-character transmission mode or reset if in edit) to the host to request a transmission mode change. The host must then respond with the opposite code to change the transmission mode. The default mode of the EDIT key is determined by terminal parameter 23.</p>

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE												
<u>1B,5B,Ps,</u> <u>3B,...,</u> <u>3B,Ps,68</u>	<u>ESC,[,Ps,;,</u> <u>...,;,Ps,h</u>	Set ANSI Specified Modes	<p>This command may be used to set the the commands listed as ANSI specified modes. The ANSI modes desired to be set are specified in the Ps chain of this command. The Ps selection is:</p> <table border="0"> <thead> <tr> <th style="text-align: center;"><u>Ps</u></th> <th style="text-align: center;"><u>ANSI Mode Set</u></th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">1 (01₁₆)</td> <td>Guarded area transfer mode (hex code 1B,5B, 31,68)</td> </tr> <tr> <td style="vertical-align: top;">4 (04₁₆)</td> <td>Insert/replacement mode (hex code 1B,5B, 34,68)</td> </tr> <tr> <td style="vertical-align: top;">6 (06₁₆)</td> <td>Erasure mode (hex code 1B,5B,36,68)</td> </tr> <tr> <td style="vertical-align: top;">16 (31,36₁₆)</td> <td>Transfer termination mode (hex code 1B,5B, 31,36,68)</td> </tr> <tr> <td style="vertical-align: top;">20 (32,30₁₆)</td> <td>Line-feed/new-line mode (hex code 1B,5B, 32,30,68)</td> </tr> </tbody> </table>	<u>Ps</u>	<u>ANSI Mode Set</u>	1 (01 ₁₆)	Guarded area transfer mode (hex code 1B,5B, 31,68)	4 (04 ₁₆)	Insert/replacement mode (hex code 1B,5B, 34,68)	6 (06 ₁₆)	Erasure mode (hex code 1B,5B,36,68)	16 (31,36 ₁₆)	Transfer termination mode (hex code 1B,5B, 31,36,68)	20 (32,30 ₁₆)	Line-feed/new-line mode (hex code 1B,5B, 32,30,68)
<u>Ps</u>	<u>ANSI Mode Set</u>														
1 (01 ₁₆)	Guarded area transfer mode (hex code 1B,5B, 31,68)														
4 (04 ₁₆)	Insert/replacement mode (hex code 1B,5B, 34,68)														
6 (06 ₁₆)	Erasure mode (hex code 1B,5B,36,68)														
16 (31,36 ₁₆)	Transfer termination mode (hex code 1B,5B, 31,36,68)														
20 (32,30 ₁₆)	Line-feed/new-line mode (hex code 1B,5B, 32,30,68)														
<u>1B,5B,Ps,</u> <u>3B,...,</u> <u>3B,Ps,6C</u>	<u>ESC,[,Ps,;,</u> <u>...,;,Ps,l</u>	Reset ANSI Specified Modes	<p>This command may be used to reset the commands listed as ANSI specified modes. The ANSI modes desired to be reset are specified in the Ps chain of this command. The Ps selection is:</p> <table border="0"> <thead> <tr> <th style="text-align: center;"><u>Ps</u></th> <th style="text-align: center;"><u>ANSI Mode Reset</u></th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">1 (01₁₆)</td> <td>Guarded area transfer mode (hex code 1B,5B, 31,6C)</td> </tr> <tr> <td style="vertical-align: top;">4 (04₁₆)</td> <td>Insert/replacement mode (hex code 1B,5B, 34,6C)</td> </tr> <tr> <td style="vertical-align: top;">6 (06₁₆)</td> <td>Erasure mode (hex code 1B,5B,36,6C)</td> </tr> </tbody> </table>	<u>Ps</u>	<u>ANSI Mode Reset</u>	1 (01 ₁₆)	Guarded area transfer mode (hex code 1B,5B, 31,6C)	4 (04 ₁₆)	Insert/replacement mode (hex code 1B,5B, 34,6C)	6 (06 ₁₆)	Erasure mode (hex code 1B,5B,36,6C)				
<u>Ps</u>	<u>ANSI Mode Reset</u>														
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4 (04 ₁₆)	Insert/replacement mode (hex code 1B,5B, 34,6C)														
6 (06 ₁₆)	Erasure mode (hex code 1B,5B,36,6C)														

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE																		
<p>1B,5B,3F, <u>Ps,3B,</u> <u>...3B,</u> <u>Ps,68</u></p>	<p>ESC,[,?, <u>Ps,i,...,i,</u> <u>Ps,h</u></p>	<p>Set Private Modes</p>	<p>16 (31,36₁₆) Transfer termination mode (hex code 1B,5B,31,36,6C)</p> <p>20 (32,30₁₆) Line-feed/new-line mode (hex code 1B,5B,32,30,6C)</p> <p>This command may be used to set the commands listed as private modes. The private modes desired to be set are specified in the Ps chain of this command. The Ps selection is:</p> <table border="1" data-bbox="974 798 1526 1743"> <thead> <tr> <th><u>Ps</u></th> <th><u>Private Mode Set</u></th> </tr> </thead> <tbody> <tr> <td>6(06₁₆)</td> <td>Origin mode (hex code 1B,5B,3F,36,68)</td> </tr> <tr> <td>7(07₁₆)</td> <td>Auto wrap mode (hex code 1B,5B,3F,37,68)</td> </tr> <tr> <td>8(08₁₆)</td> <td>Auto repeat mode (hex code 1B,5B,3F,38,68)</td> </tr> <tr> <td>10(31,30₁₆)</td> <td>Edit mode (hex code 1B,5B,3F,31,30,68)</td> </tr> <tr> <td>11(31,31₁₆)</td> <td>Line transmit mode (hex code 1B,5B,3F,31,31,68)</td> </tr> <tr> <td>13(31,33₁₆)</td> <td>Space compression/field delimiting mode (hex code 1B,5B,3F,31,33,68)</td> </tr> <tr> <td>14(31,34₁₆)</td> <td>Transmit execution mode (hex code 1B,5B,3F,31,34,68)</td> </tr> <tr> <td>16(31,36₁₆)</td> <td>Edit key execution mode (hex code 1B,5B,3F,31,36,68)</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Private Mode Set</u>	6(06 ₁₆)	Origin mode (hex code 1B,5B,3F,36,68)	7(07 ₁₆)	Auto wrap mode (hex code 1B,5B,3F,37,68)	8(08 ₁₆)	Auto repeat mode (hex code 1B,5B,3F,38,68)	10(31,30 ₁₆)	Edit mode (hex code 1B,5B,3F,31,30,68)	11(31,31 ₁₆)	Line transmit mode (hex code 1B,5B,3F,31,31,68)	13(31,33 ₁₆)	Space compression/field delimiting mode (hex code 1B,5B,3F,31,33,68)	14(31,34 ₁₆)	Transmit execution mode (hex code 1B,5B,3F,31,34,68)	16(31,36 ₁₆)	Edit key execution mode (hex code 1B,5B,3F,31,36,68)
			<u>Ps</u>	<u>Private Mode Set</u>																	
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			7(07 ₁₆)	Auto wrap mode (hex code 1B,5B,3F,37,68)																	
			8(08 ₁₆)	Auto repeat mode (hex code 1B,5B,3F,38,68)																	
			10(31,30 ₁₆)	Edit mode (hex code 1B,5B,3F,31,30,68)																	
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HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE																		
<p>1B,5B,3F, <u>Ps,3B,</u> <u>...,3B,</u> <u>Ps,6C</u></p>	<p>ESC,[,?, <u>Ps,i,....,i,</u> <u>Ps,l</u></p>	<p>Reset Private Modes</p>	<p>This command may be used to reset the commands listed as private modes. The private modes desired to be reset are specified in the Ps chain of this command. The Ps selection is:</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: center;"><u>Ps</u></th> <th style="text-align: center;"><u>Private Mode Reset</u></th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">6(06₁₆)</td> <td>Origin mode (hex code 1B,5B,3F,36,6C)</td> </tr> <tr> <td style="vertical-align: top;">7(07₁₆)</td> <td>Auto wrap mode (hex code 1B,5B,3F,37,6C)</td> </tr> <tr> <td style="vertical-align: top;">8(08₁₆)</td> <td>Auto repeat mode (hex code 1B,5B,3F,38,6C)</td> </tr> <tr> <td style="vertical-align: top;">10(31,30₁₆)</td> <td>Edit mode (hex code 1B,5B,3F,31,30,6C)</td> </tr> <tr> <td style="vertical-align: top;">11(31,31₁₆)</td> <td>Line transmit mode (hex code 1B,5B,3F,31,31,6C)</td> </tr> <tr> <td style="vertical-align: top;">13(31,33₁₆)</td> <td>Space compression/field delimiting mode (hex code 1B,5B,3F,31,33,6C)</td> </tr> <tr> <td style="vertical-align: top;">14(31,34₁₆)</td> <td>Transmit execution mode (hex code 1B,5B,3F,31,34,6C)</td> </tr> <tr> <td style="vertical-align: top;">16(31,36₁₆)</td> <td>Edit key execution mode (hex code 1B,5B,3F,31,36,6C)</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Private Mode Reset</u>	6(06 ₁₆)	Origin mode (hex code 1B,5B,3F,36,6C)	7(07 ₁₆)	Auto wrap mode (hex code 1B,5B,3F,37,6C)	8(08 ₁₆)	Auto repeat mode (hex code 1B,5B,3F,38,6C)	10(31,30 ₁₆)	Edit mode (hex code 1B,5B,3F,31,30,6C)	11(31,31 ₁₆)	Line transmit mode (hex code 1B,5B,3F,31,31,6C)	13(31,33 ₁₆)	Space compression/field delimiting mode (hex code 1B,5B,3F,31,33,6C)	14(31,34 ₁₆)	Transmit execution mode (hex code 1B,5B,3F,31,34,6C)	16(31,36 ₁₆)	Edit key execution mode (hex code 1B,5B,3F,31,36,6C)
<u>Ps</u>	<u>Private Mode Reset</u>																				
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11(31,31 ₁₆)	Line transmit mode (hex code 1B,5B,3F,31,31,6C)																				
13(31,33 ₁₆)	Space compression/field delimiting mode (hex code 1B,5B,3F,31,33,6C)																				
14(31,34 ₁₆)	Transmit execution mode (hex code 1B,5B,3F,31,34,6C)																				
16(31,36 ₁₆)	Edit key execution mode (hex code 1B,5B,3F,31,36,6C)																				

TABLE 6-2. DEFINITION OF ANSI COMMANDS - IN HEX CODE ORDER (CONTD)

HEX CODE (SEE NOTES)	ASCII MNEMONIC (SEE NOTES)	COMMAND NAME AND DEFAULT PARAMETER	TERMINAL RESPONSE														
<u>1B,5B,Ps,</u> <u>3B,Ps,3B,</u> <u>...,3B,</u> <u>Ps,6D</u>	ESC,[, <u>Ps,;</u> <u>Ps,;,...,;</u> <u>Ps,n</u>	Set Character Attributes	Sets the character attributes per the Ps chain of this command. The Ps selection is: <table style="margin-left: 40px;"> <thead> <tr> <th><u>Ps</u></th> <th><u>Attributes Set</u></th> </tr> </thead> <tbody> <tr> <td>0 or none</td> <td>All attributes off (reset all tags)</td> </tr> <tr> <td>1</td> <td>Half intensity</td> </tr> <tr> <td>4</td> <td>Underline</td> </tr> <tr> <td>5</td> <td>Blinking</td> </tr> <tr> <td>6</td> <td>Blank</td> </tr> <tr> <td>7</td> <td>Inverse video</td> </tr> </tbody> </table>	<u>Ps</u>	<u>Attributes Set</u>	0 or none	All attributes off (reset all tags)	1	Half intensity	4	Underline	5	Blinking	6	Blank	7	Inverse video
<u>Ps</u>	<u>Attributes Set</u>																
0 or none	All attributes off (reset all tags)																
1	Half intensity																
4	Underline																
5	Blinking																
6	Blank																
7	Inverse video																

NOTES:

The positions for Pn, Ps, and other parameters in code sequences are underlined to highlight them. The underlined semicolons and 3B₁₆ codes are needed if consecutive parameter entries are made.

ANSI TERMINAL PARAMETER REPORT

The terminal parameter report available in ANSI emulation allows the host to monitor the terminal parameters that affect communications. Using the report terminal parameters command (hex code 1B,5B,sol,78), the terminal may be programmed to transmit unsolicited parameter reports or to transmit parameter reports only when requested. If unsolicited parameter reports are enabled, a parameter report is sent after the SETUP key has been pressed to exit from the parameter display.

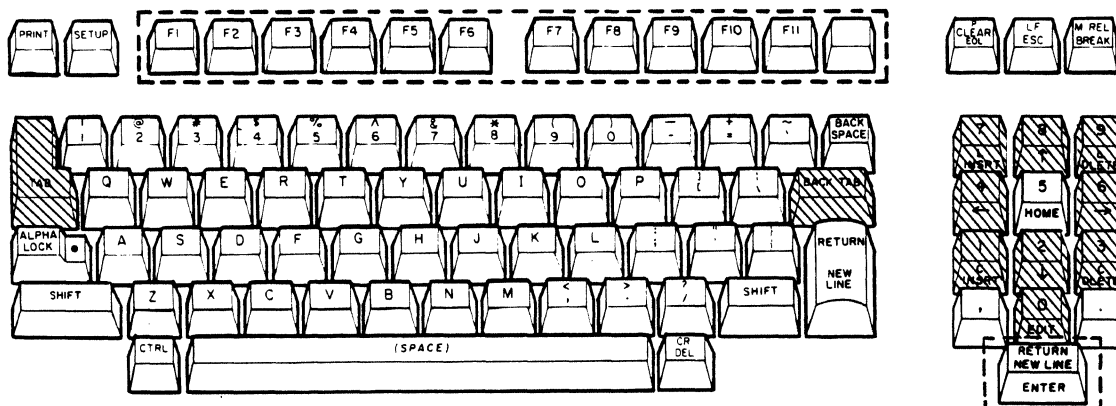
The hex code sequence of the parameter report is 1B,5B,sol,3B,par,3B,nbits,3B,xspeed,3B,rspeed,3B,clkmul,3B,flag,78 (ESC,[,sol,;,par,;,nbits,;,xspeed,;,rspeed,;,clkmul,;,flag,x). The meaning of the codes in the report represented by abbreviations is given in table 6-3.



TABLE 6-3. CODING OF TERMINAL PARAMETER REPORT

CODE REPRESENTED BY	VALUE	MEANING
sol	2	This message is a report.
	3	This message is a report and the terminal is only reporting on request.
par	1	No parity set
	2	Space parity set
	3	Mark parity set
	4	Odd parity set
	5	Even parity set
nbits	1	8 bits per character set
	2	7 bits per character set
xspeed/ rspeed	16(10 ₁₆)	110 bps data rate set
	32(20 ₁₆)	150 bps data rate set
	48(30 ₁₆)	300 bps data rate set
	56(38 ₁₆)	600 bps data rate set
	64(40 ₁₆)	1200 bps data rate set
	72(48 ₁₆)	1800 bps data rate set
	88(58 ₁₆)	2400 bps data rate set
	104(68 ₁₆)	4800 bps data rate set
	112(70 ₁₆)	9600 bps data rate set
	120(78 ₁₆)	19 200 bps data rate set
clkmul	Always 1	The bit rate multiplier is 16
flag	Always 0	None

ANSI EDITING FUNCTIONS

The keyboard keys that control ANSI editing functions are identified in figure 6-1. These keys are used to place the terminal in edit mode, position the cursor, delete characters, delete lines, insert characters, insert lines, and start a block transmission.



LEGEND:  IDENTIFIES EDIT CONTROL KEYS
 IDENTIFIES POSSIBLE START TRANSMISSION KEYS

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Figure 6-1. ANSI Editing Function Keys

PLACING TERMINAL IN EDIT MODE

Terminal parameter 8 gives the option of having the terminal enter either edit mode or character-by-character mode after each power on or reset. Switching the terminal from the automatically entered mode may then be done by either:

- Simultaneously pressing the SHIFT and EDIT keys. If the EDIT key is set for immediate operation, successive use of the shifted EDIT key switches the terminal back and forth between edit and character-by-character mode without any transmission to the host. If the EDIT key is set for deferred operation, use of the shifted EDIT key causes a transmission of a code sequence that must be echoed back by the host before the mode change occurs. If the terminal is leaving character-by-character mode, the hex code sequence sent is 1B,5B,3F,31,30,68 (ESC,[,?,1,0,h); or if leaving edit mode, the hex code sequence sent is 1B,5B,3F,31,30,6C (ESC,[,?,1,0,l).

- Sending the terminal a command to set edit mode (ANSI specified mode 10) or to reset edit mode (enter character-by-character mode). This may be done through individual set/reset hex commands of 1B,5B,3F,31,30,68 to set or 1B,5B,3F,31,30,6C to reset or be done through multiple set/reset commands of 1B,5B,Ps,3B,...,3B,Ps,68 to set or 1B,5B,Ps,3B,...,3B,Ps,6C to reset.

When placing the terminal in edit mode, the desired size of block transmissions, the enabling/disabling of transmitting protected data, and the erasure mode in effect may be different than the set default conditions. The default conditions for these items are determined by terminal parameters 39, 9, and 15 respectively. These parameter settings may be overridden by sending the appropriate commands.

POSITIONING CURSOR IN EDIT MODE

In edit mode, pressing the SHIFT key together with the Cursor Up (↑), Cursor Down (↓), Cursor Left (←), or Cursor Right (→) key causes the corresponding cursor movement without any transmission to the host. Using these keys, the cursor may be positioned anywhere within the set scrolling region (whole screen is the default scrolling region).

Using any other cursor positioning keys in edit mode causes the corresponding keycodes to be transmitted. If full-duplex routing is in effect, the functions for the transmitted codes do not occur until the host echoes them back. This applies to the:

- | | |
|--|----------------------|
| ● TAB key | ● Shifted LF/ESC key |
| ● BACKTAB key | ● Shifted CR/DEL key |
| ● RETURN/NEW LINE key
in main key cluster | ● Shifted HOME key |

NOTE

The RETURN/NEW LINE function of the ENTER key does not apply to edit mode, only the ENTER (initiate block transmission) function.

DELETING CHARACTERS IN EDIT MODE

An unprotected character is deleted in edit mode by:

1. Positioning the cursor on the character to be deleted.
2. Simultaneously pressing the SHIFT and C DELETE keys. This deletes the character at the cursor position. Characters beyond the cursor in the same unprotected field (to end of line) move left to fill in the space left by the deleted character.

If an attempt is made to delete a protected character, the terminal sounds a beep and moves the cursor to the first position of the next unprotected field.

DELETING LINES IN EDIT MODE

In edit mode, any line in the scrolling region may be deleted regardless of protected fields. To delete a line:

1. Position the cursor in the line to be deleted.
2. Simultaneously press the SHIFT and L DELETE keys. This deletes the line at the cursor position. Lines underneath move up and the cursor goes to the beginning of the first line moved up. In addition, a new line is inserted above the bottom margin. This new line is filled with spaces whose attributes match those of the last line moved up.

INSERTING CHARACTERS IN EDIT MODE

A character may be inserted in any unprotected field in edit mode. To insert a character:

1. Position the cursor where the character is to be inserted.
2. Simultaneously press the SHIFT and C INSRT keys.

3. Enter the character(s) to be inserted. The entered characters are inserted to the right of the cursor. All characters that follow in the same unprotected field shift right to make room for the inserted characters. Characters shifted off the line or to a protected field are lost.
4. Simultaneously press the SHIFT and C INSRT keys again.

If an attempt is made to insert a character in a protected field, the terminal sounds a beep and moves the cursor to the first position of the next unprotected field. At that position, the inserted character is placed.

INSERTING LINES IN EDIT MODE

A line of data may be added in the scrolling region in edit mode. To insert a blank line:

1. Position the cursor in the line under where the new line is to be inserted.
2. Simultaneously press the SHIFT and L INSRT keys. This inserts a new line above where the cursor had been, moves the lines underneath down and moves the cursor to the beginning of the new line. The line movement down goes to either the bottom margin or the first line encountered having a protected field. A line moving past the bottom margin is lost. The new line is filled with spaces whose character attributes match those of the preceding line.

STARTING A BLOCK TRANSMISSION IN EDIT MODE

A block transmission in edit mode may be started several different ways. The way used depends on the host system. The ways include:

- Pressing the ENTER key. In cases where lines are being sent in blocks, this must be done after each line. If the ENTER key is set for immediate operation, this starts the block transmission. If the ENTER key is set for deferred operation, its use causes the transmission of a hex code $1B,53_{16}$ (ESC,S) sequence. The terminal then waits for the host to return a remote transmit command (hex code $1B,35$) before transmitting the block of data.

- If terminal parameter 37 is set to On or a transmit carriage-return command (hex code 1B,5B,3C,68) is in effect, pressing anyone of the special function keys (a F1 through F12 key or the key with no legend) also starts a block transmission.

During a block transmission, the keyboard is locked. The data portion of the block transmission is sent first. If terminal parameter 37 is set to On or a transmit carriage-return command has been received, the data portion is followed by:

- A CR (0D₁₆) code if the ENTER key was used to start the transmission
- A function key code sequence and a CR code if one of the special function keys was used to start the transmission

If no transmit carriage-return command is in effect and terminal parameter 37 is set to Off, the data portion is followed by:

- Nothing if a termination character has not been specified
- A FF(0C₁₆) code if terminal parameter 40 is set to FF or a transmit termination character command (hex code 1B,5B,Ps) has been received.

The FF termination character may also be specified to end a transmission when transmit carriage return is in effect.

ANSI CHARACTER ATTRIBUTES AND PROTECT FEATURE

In ANSI emulation, characters displayed with an attribute may be designated as protected data. The attribute and protect features are controlled by the set character attributes command (hex code 1B,5B,Ps,3B,Ps,3B,...,3B,Ps,6D) and the protected field attributes command (hex code 1B,5B,Ps,7D).

A field of characters to be displayed with an attribute must be preceded by a set character attributes command that specifies the attribute(s) to be used. Another set character attributes command must then be sent following the field that turns the attribute(s) off.

When the desired attribute fields are set up, they may be protected by sending a protected field attributes command that specifies the attribute(s) to be protected. Any data sent later having the same attributes will also be protected. If the protected fields are to be switched to unprotected, another protected field attributes command is sent to clear the protection.

ANSI KEYCODES

Table 6-4 lists the codes generated on the standard keyboard when in ANSI emulation. For codes of optional character set keys, refer to appendix B.

TABLE 6-4. ANSI KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	PRINT		-	-	-	-
	SETUP		-	-	-	-
	F1		1B, 4F, 50+	1B, 4F, 70+	1B, 4F, 50+	1B, 4F, 70+
	F2		1B, 4F, 51+	1B, 4F, 71+	1B, 4F, 51+	1B, 4F, 71+
	F3		1B, 4F, 52+	1B, 4F, 72+	1B, 4F, 52+	1B, 4F, 72+
	F4		1B, 4F, 53+	1B, 4F, 73+	1B, 4F, 53+	1B, 4F, 73+
	F5		1B, 4F, 41+	1B, 4F, 74+	1B, 4F, 41+	1B, 4F, 74+
	F6		1B, 4F, 42+	1B, 4F, 75+	1B, 4F, 42+	1B, 4F, 75+
	F7		1B, 4F, 43+	1B, 4F, 76+	1B, 4F, 43+	1B, 4F, 76+
	F8		1B, 4F, 44+	1B, 4F, 77+	1B, 4F, 44+	1B, 4F, 77+
	F9		1B, 4F, 4D+	1B, 4F, 78+	1B, 4F, 4D+	1B, 4F, 78+
	F10		1B, 4F, 6C+	1B, 4F, 79+	1B, 4F, 6C+	1B, 4F, 79+
	F11		1B, 4F, 6D+	1B, 4F, 7A+	1B, 4F, 6D+	1B, 4F, 7A+
	(Blank)		1B, 4F, 6E+	1B, 4F, 7B+	1B, 4F, 6E+	1B, 4F, 7B+
P	CLEAR	EOL	1B, 5B, 4B	1B, 5B, 32, 4A	1B, 5B, 4B	1B, 5B, 32, 4A
LF		ESC	1B	0A	1B	0A

TABLE 6-4. ANSI KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
M REL		BREAK	Break	Reset	Break	Reset
	TAB		09	09	09	09
!		1	31	21	31	21
@		2	32	40	32	40
#		3	33	23	33	23
\$		4	34	24	34	24
%		5	35	25	35	25
^		6	36	5E	36	5E
&		7	37	26	37	26
*		8	38	2A	38	2A
(		9	39	28	39	28
)		0	30	29	30	29
-		-	2D	5F	2D	5F
+		=	3D	2B	3D	2B
~		`	60	7E	60	7E
	BACKSPACE		08	08	08	08
L INSERT*		7	37	1B, 5B, 4C++	37	1B, 5B, 4C++
↑ *		8	38	1B, 5B, 41++	38	1B, 5B, 41++
L DELETE*		9	39	1B, 5B, 4D++	39	1B, 5B, 4D++
	Q		71	51	11	11
	W		77	57	17	17
	E		65	45	05	05
	R		72	52	12	12
	T		74	54	14	14

TABLE 6-4. ANSI KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	Y		79	59	19	19
	U		75	55	15	15
	I		69	49	09	09
	O		6F	4F	0F	0F
	P		70	50	10	10
]		[	5B	5D	1B	1B
:		\	5C	7C	1C	1C
	BACK TAB		1B, 4F, 6C	1B, 4F, 6C	1B, 4F, 6C	1B, 4F, 6C
← *		4	34	1B, 5B, 44++	34	1B, 5B, 44++
HOME*		5	35	1B, 5B, 48	35	1B, 5B, 48
→ *		6	36	1B, 5B, 43++	36	1B, 5B, 43++
ALPHA		LOCK	-	-	-	-
	A		61	41	01	01
	S		73	53	13	13
	D		64	44	04	04
	F		66	46	06	06
	G		67	47	07	07
	H		68	48	08	08
	J		6A	4A	0A	0A
	K		6B	4B	0B	0B
	L		6C	4C	0C	0C
:		;	3B	3A	3B	3A
"		'	27	22	27	22
}		{	7B	7D	7B	7D

TABLE 6-4. ANSI KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
	RETURN NEW LINE		See Note 1	See Note 1	See Note 1	See Note 1
C INSRT*		1	31	See Note 2	31	See Note 2
↓ *		2	32	1B, 5B, 42++	32	1B, 5B, 42++
C DELETE*		3	33	1B, 5B, 50++	33	1B, 5B, 50++
	SHIFT		-	-	-	-
	Z		7A	5A	1A	1A
	X		78	58	18	18
	C		63	43	03	03
	V		76	56	16	16
	B		62	42	02	02
	N		6E	4E	0E	0E
	M		6D	4D	See Note 1	See Note 1
<	,		2C	3C	2C	3C
>	.		2E	3E	2E	3E
?	/		2F	3F	2F	3F
	SHIFT		-	-	-	-
	,		2C	2C	2C	2C
EDIT*	0		30	See Note 3	30	See Note 3
	.		2E	2E	2E	2E
	CTRL		-	-	-	-
	(Space Bar)		20	20	20	20

TABLE 6-4. ANSI KEYCODES (CONTD)

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
CR		DEL	7F	See Note 1	7F	See Note 1
ENTER*	RETURN NEW LINE		See Note 4	See Note 4	See Note 4	See Note 4

Notes:

*Legend on front of keycap.

†If terminal parameter 37 is set to On or a transmit carriage-return command is in effect, an $0D_{16}$ code is added at the end of the code sequence.

††These codes are sent in character-by-character mode only. In edit mode, the corresponding function is performed and no code is sent.

1. If terminal parameter 1 is set to On or a line-feed/new-line mode command is in effect, a $0D,0A_{16}$ sequence is generated; otherwise, just $0D_{16}$.
2. In edit mode, the first pressing sets the display for the character-insert function and the next pressing releases the display from the character-insert function. In character-by-character mode, the first pressing sends a $1B,5B,34,68_{16}$ sequence and the next pressing sends a $1B,5B,34,6C_{16}$ sequence.
3. Refer to definition of ANSI command $1B,5B,3F,31,36,68$ or $6C$ earlier in this section for information on the operation of the shifted EDIT key.
4. In character-by-character mode, either $0D_{16}$ or $0D,0A_{16}$ is sent. This depends on the conditions described in note 1. In edit mode, either $1B,53_{16}$ is sent or a block transmission starts. For further details, refer to Starting a Block Transmission in Edit Mode earlier in section.

ANSI GRAPHIC/MATHEMATICAL SYMBOLS

Table 6-5 shows the special graphic/mathematical symbols that can be displayed in ANSI emulation. When these symbols are in effect, they are displayed in place of the standard ASCII characters having codes 5F through 7E₁₆ (lowercase alphabetical characters and some lesser used punctuation marks). To facilitate keyboard input, table 6-5 also lists the keyboard entries that correspond with the symbols.

To use these symbols, they must first be assigned to either the G0 or G1 character set. For example, the command 1B,29,30₁₆ (ESC,),(0) assigns the symbols to G1 (a complete list of designations is given in table 6-2). After the character set has been designated, the symbols are placed in effect via a 0E₁₆ (SO) command. Switching back to the standard character set is done with a 0F₁₆ (SI) command.

TABLE 6-5. ANSI GRAPHIC/MATHEMATICAL SYMBOLS

HEX CODE	KEYBOARD ENTRY	SYMBOL PRODUCED
5F	-	Blank
60	\	◆ Diamond
61	a	■ Checkboard (parity error indicator)
62	b	H _T Horizontal tab
63	c	F _F Form feed
64	d	C _R Carriage return
65	e	L _F Line feed
66	f	° Degree
67	g	+ Plus/minus
68	h	N _L New line
69	i	V _T Vertical tab
6A	j	] Lower-right corner (see note 1)
6B	k	] Upper-right corner (see note 1)
6C	l	[Upper-left corner (see note 1)
6D	m	[Lower-left corner (see note 1)
6E	n	+ Crossing lines (see note 1)
6F	o	- Horizontal line-scan 1 (see note 2)
70	p	- Horizontal line-scan 3 (see note 2)
71	q	- Horizontal line-scan 6 (see note 2)
72	r	- Horizontal line-scan 9 (see note 2)
73	s	- Horizontal line-scan 12 (see note 2)

TABLE 6-5. ANSI GRAPHIC/MATHEMATICAL SYMBOLS (CONTD)

HEX CODE	KEYBOARD ENTRY	SYMBOL PRODUCED
74	t	⊢ Left T (see note 1)
75	u	⊣ Right T (see note 1)
76	v	⊥ Bottom T (see note 1)
77	w	⊤ Top T (see note 1)
78	x	| Vertical bar (see note 1)
79	y	≤ Less than or equal to
7A	z	≥ Greater than or equal to
7B	{	π Pi
7C	---	≠ Not equal to
7D	}	£ Pound
7E	~	• Centered dot

- NOTES: 1. These symbols are used to draw rectangular grids; each piece of this line-drawing set is contiguous with others so that the lines formed are unbroken.
2. These symbols give better resolution than dashes or underlines when drawing graphs.

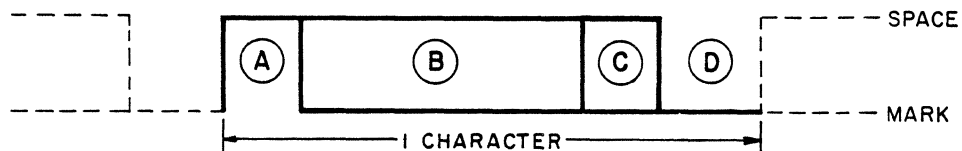
This section describes the main and auxiliary interfaces of the terminal. The connectors for these interfaces are on the rear panel. The connector for the main interface is labeled EIA/CL and the connector for the auxiliary interface is labeled AUX EIA.

MAIN INTERFACE

The main interface carries the communications with the host. The terminal automatically uses pacing in multiple word transmissions to the host. This pacing allows no more than one word to be transmitted every 8 milliseconds regardless of the baud rate selected in the parameters. This is done to avoid host overrun.

The format of the words received/transmitted over the interface is shown in figure 7-1. The number of data bits, the parity, and the stop bits are parameter selectable. If parity is selected, the terminal checks all received words for correct parity and inserts parity in words transmitted. If a received word contains a parity error, the terminal displays a parity error symbol (■) in its place and stores a 7F₁₆ code in memory. The same actions occur for a received word that does not have the correct format.

The pin assignments of the main interface (EIA/CL) connector are listed in table 7-1. The table also indicates the signals that are available on the interface. A parameter allows either the RS-232-C/CCITT-V.24 signals or the current-loop signals to be used.



- (A) 1 START BIT (SPACE OR HIGH)
- (B) 7 OR 8 DATA BITS (1=MARK OR LOW, 0=SPACE OR HIGH)
- (C) 1 OR NO PARITY BIT (EVEN, ODD, SPACE, OR MARK)
- (D) 1 OR 2 STOP BITS (MARK OR LOW)

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Figure 7-1. Word Format

TABLE 7-1. EIA/CL CONNECTOR PIN ASSIGNMENTS

PIN NO.	RS-232	CCITT	SIGNAL NAME	ORIGIN*
1	AA	101	Protective Ground	Modem/Terminal
2	BA	103	Transmitted Data	Terminal
3	BB	104	Received Data	Modem
4	CA	105	Request to Send (RTS)	Terminal
5	CB	106	Clear to Send (CTS)	Modem
6	CC	107	Data Set Ready (DSR)	Modem
7	AB	102	Signal Ground	Modem/Terminal
8	CF	109	Carrier On	Modem
9				Not Used
10				Not Used
11				Not Used
12				Not Used
13				Not Used
14				Not Used
15				Not Used
16				Not Used
17			Current-Loop Transmitted Data (Source)	Terminal
18				Not Used
19				Not Used
20	CD	108.2	Data Terminal Ready (DTR)	Terminal
21				Not Used
22				Not Used
23			Current-Loop Received Data (Return)	Host
24			Current-Loop Transmitted Data (Return)	Terminal
25			Current-Loop Received Data (Source)	Host

*An origin listed as a modem is the host in local, direct-cable connections.

RS-232-C/CCITT-V.24 SIGNALS

The RS-232-C/CCITT-V.24 signals are for interfacing with a modem or directly to a local host that has a RS-232-C/CCITT-V.24 asynchronous interface. Table 7-2 defines the RS-232-C/CCITT-V.24 signals used by the terminal.

TABLE 7-2. DEFINITION OF RS-232-C/CCITT-V.24 SIGNALS

SIGNAL NAME	DEFINITION
Protective Ground	Grounded to the terminal chassis.
Transmitted Data	Carries the words and break signals transmitted by the terminal. Is held in a marking state when no transmission is occurring.
Received Data	Carries the words from the host. Reception by the terminal starts when a start bit (space) is detected.
Request to Send	This signal from the terminal is controlled by a parameter. This signal may be set to be on whenever Data Set Ready and Data Terminal Ready signals are on or only be on when the terminal is to transmit.
Clear to Send	When on, indicates the terminal may transmit.
Data Set Ready	Must be on for the terminal to receive and transmit data.
Signal Ground	Provides the common ground reference for all RS-232-C/CCITT-V.24 signals.
Carrier On	When on, indicates the modem is receiving a carrier signal over the telephone line.
Data Terminal Ready	This signal from the terminal may be set up in the parameters to be on constantly or to go off when the terminal is placed in local mode.

For the Data Set Ready, Clear to Send, and Carrier Detect signals, the terminal interprets a voltage more negative than -3 V or an open circuit as an off condition and a voltage more positive than +3 V as an on condition. For the Received Data signal, the terminal interprets a voltage more negative than -3 V as a mark (logical 1) and a voltage more positive than +3 V as a space (logical 0).

The length of cable used in the interface connection cannot exceed 15.24 m (50 ft).

CURRENT-LOOP SIGNALS

The current-loop signals include a pair of Received Data lines and a pair of Transmitted Data lines. Each pair of lines form a separate circuit when connected to a host that has a current loop interface. The power for the signals is provided by an external system battery.

The current in the circuits must be less than or equal to 20 mA. The minimum current acceptable is 14 mA. The open-circuit voltage of the battery cannot be greater than 24 V and cannot be less than 10 V. With an open-circuit voltage of 10 V or greater, a loss of power at terminal does not result in an open-circuit condition in the loop.

The maximum voltage drop across the transmitter or receiver circuits of the terminal is 2 V.

AUXILIARY INTERFACE

The auxiliary interface of the terminal is for connecting a printer having a RS-232-C/CCITT-V.24 serial interface. The pin assignments of the auxiliary interface (AUX EIA) connector are listed in table 7-3. The meaning of the listed signals are similar to those of the RS-232-C/CCITT-V.24 signals for the main interface. However, the signals of the auxiliary interface are of reverse origin (the printer is the terminal device and the terminal is the modem device).

The baud rate, formatting, and parity of the data transferred to the printer are the same as used on the main interface. The length of the cable to the printer is not to exceed 15.24 m (50 ft).

TABLE 7-3. AUX EIA CONNECTOR PIN ASSIGNMENTS

PIN NO.	RS-232	CCITT	SIGNAL NAME	ORIGIN
1	AA	101	Protective Ground	Printer/Terminal
2				Not Used
3	BB	104	Received Data	Terminal
4				Not Used
5				Not Used
6	CC	107	Data Set Ready (DSR)	Terminal
7	AB	102	Signal Ground	Printer/Terminal
8	CF	109	Received Line Signal Detector (CO)	Terminal
9				Not Used
10				Not Used
11				Not Used
12				Not Used
13				Not Used
14				Not Used
15				Not Used
16				Not Used
17				Not Used
18				Not Used
19				Not Used
20	CD	108.2	Data Terminal Ready (DTR)	Printer
21				Not Used
22				Not Used
23				Not Used
24				Not Used
25				Not Used



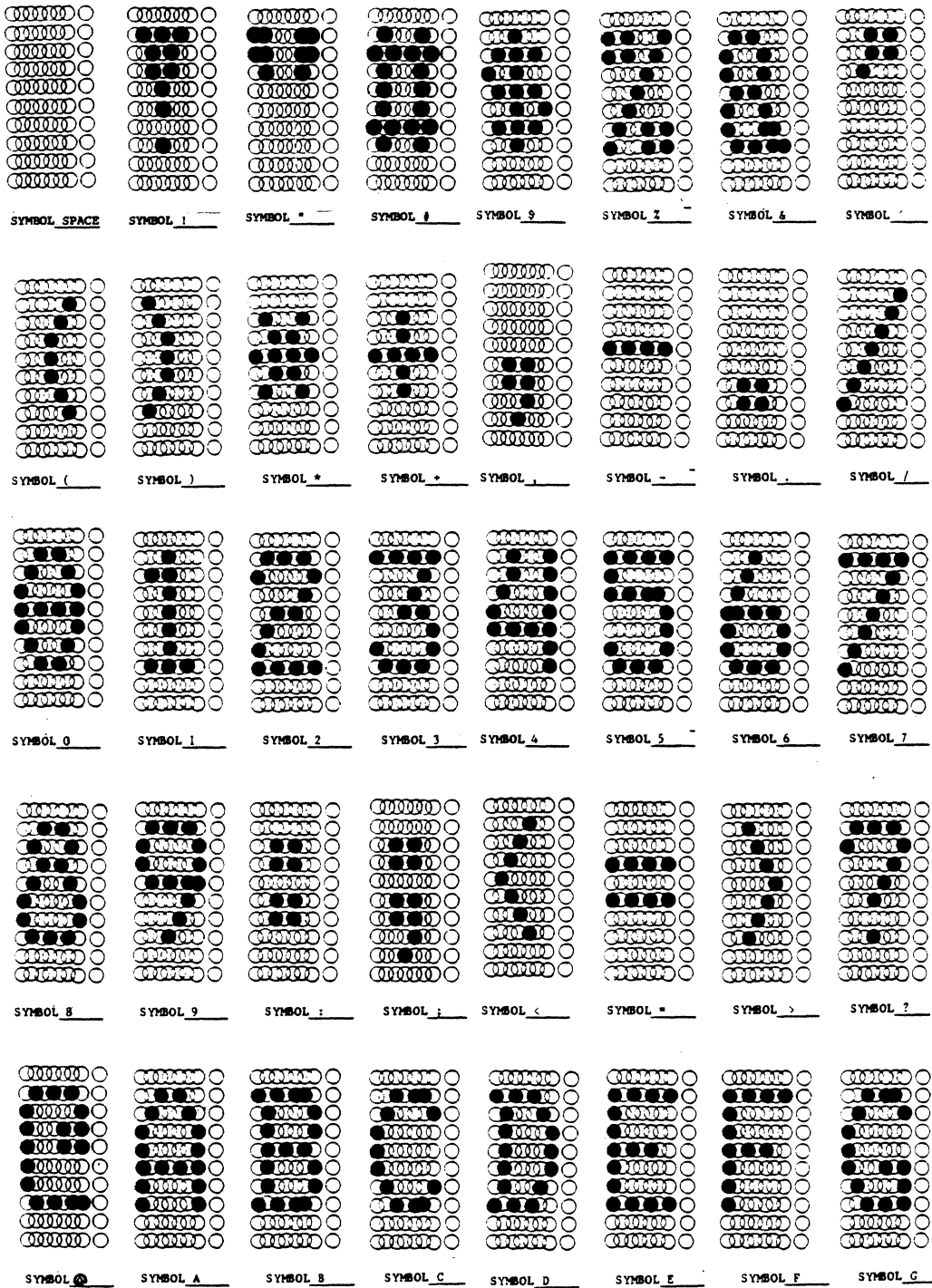
This appendix contains the following:

- A table of the ASCII alphanumeric character codes (table A-1)
- Illustrations of the dot-matrix formations of the standard alphanumeric characters (figure A-1)
- A table of the ASCII control codes (table A-2)
- Illustrations of the dot-matrix formations of the control code symbols displayed in monitor mode (figure A-2)

TABLE A-1. ALPHANUMERIC CHARACTER CODES

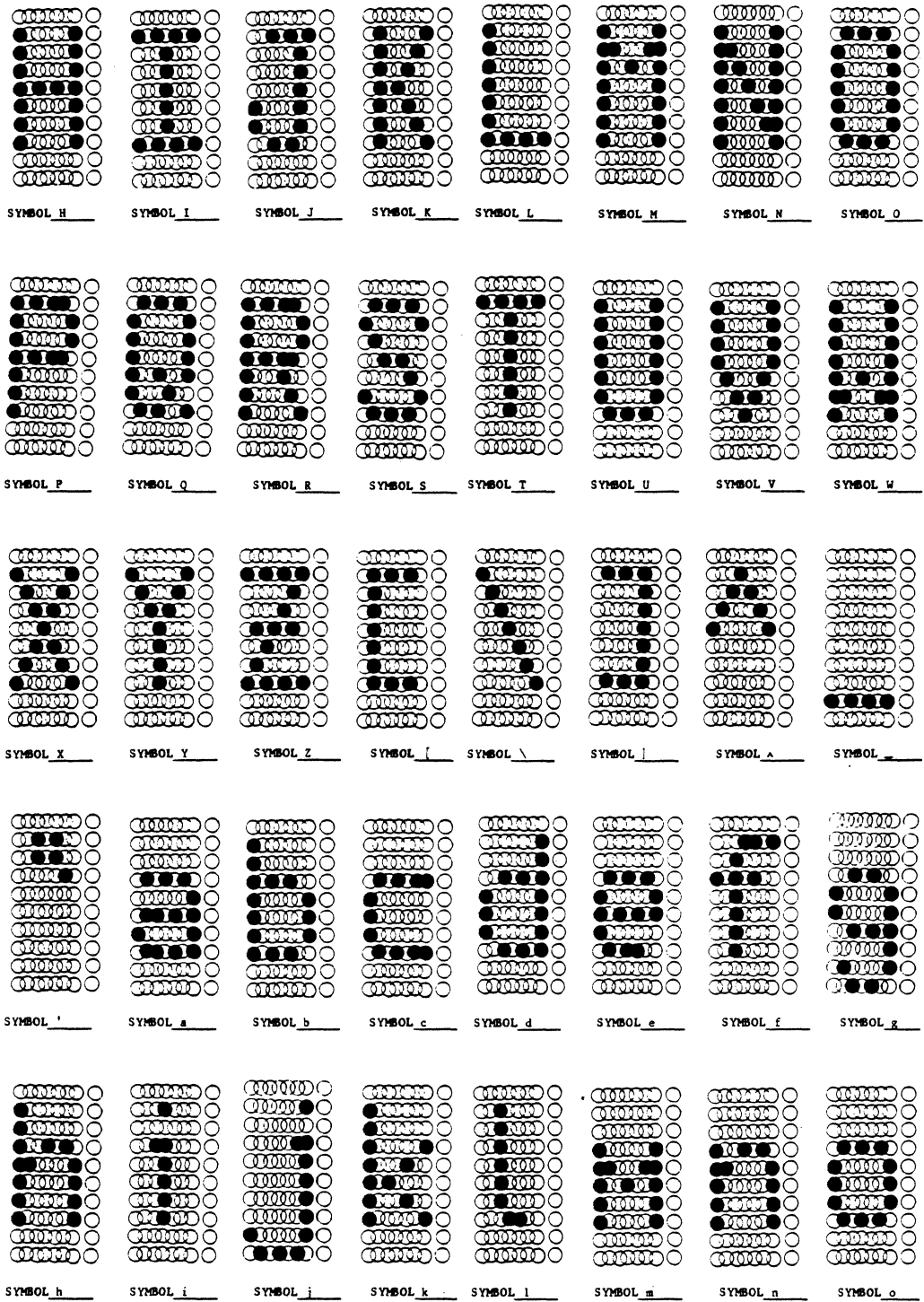
BITS					0	0	1	1	1	1	
					0	1	0	0	1	1	
					0	1	0	1	0	1	
b7	b6	b5			COLUMN						
BITS					ROW	2	3	4	5	6	7
b4	b3	b2	b1								
0	0	0	0	0	0	SP	0	@	P	'	p
0	0	0	1	1	1	!	1	A	Q	a	q
0	0	1	0	2	2	"	2	B	R	b	r
0	0	1	1	3	3	#	3	C	S	c	s
0	1	0	0	4	4	\$	4	D	T	d	t
0	1	0	1	5	5	%	5	E	U	e	u
0	1	1	0	6	6	&	6	F	V	f	v
0	1	1	1	7	7	'	7	G	W	g	w
1	0	0	0	8	8	(	8	H	X	h	x
1	0	0	1	9	9	)	9	I	Y	i	y
1	0	1	0	10(A)	10	*	:	J	Z	j	z
1	0	1	1	11(B)	11	+	;	K	[k	{
1	1	0	0	12(C)	12	,	<	L	\	l	
1	1	0	1	13(D)	13	-	=	M]	m	}
1	1	1	0	14(E)	14	.	>	N	^	n	~
1	1	1	1	15(F)	15	/	?	O	_	o	

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Figure A-1. Alphanumeric Dot-Matrix Formations (Sheet 1 of 3)



03812-1

Figure A-1. Alphanumeric Dot-Matrix Formations (Sheet 2 of 3)

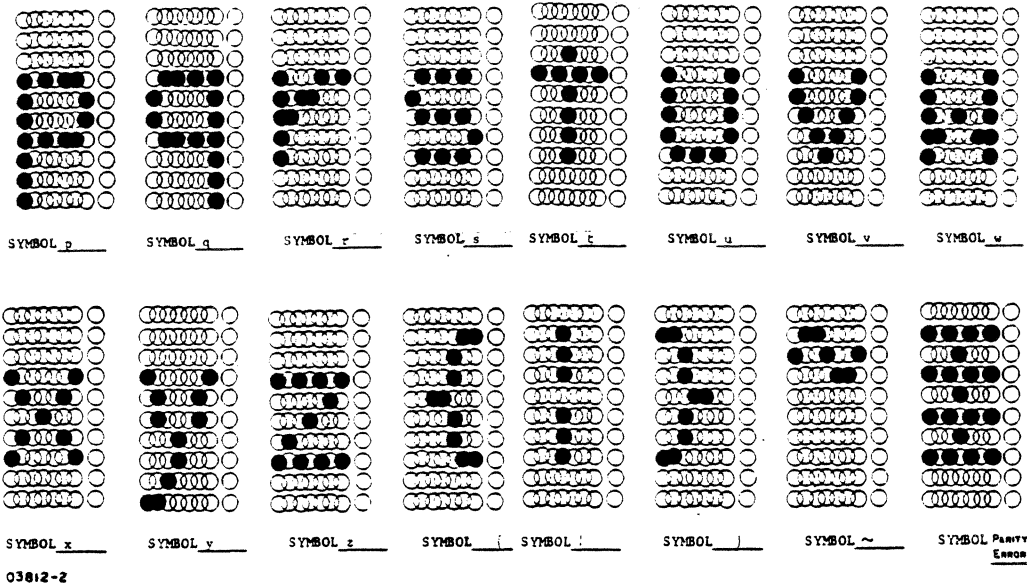
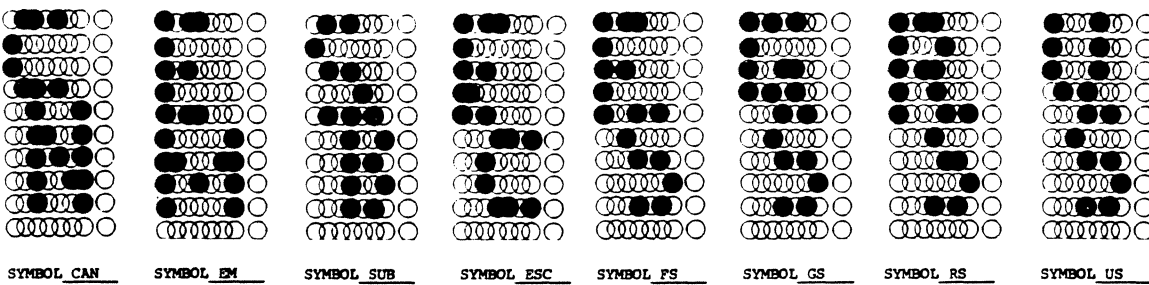
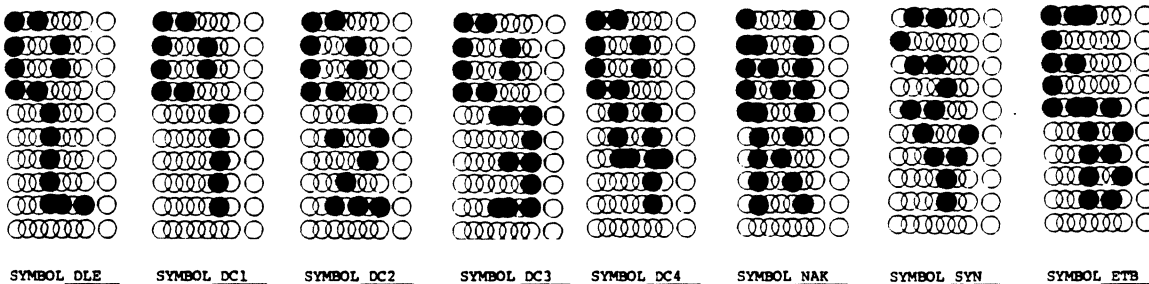
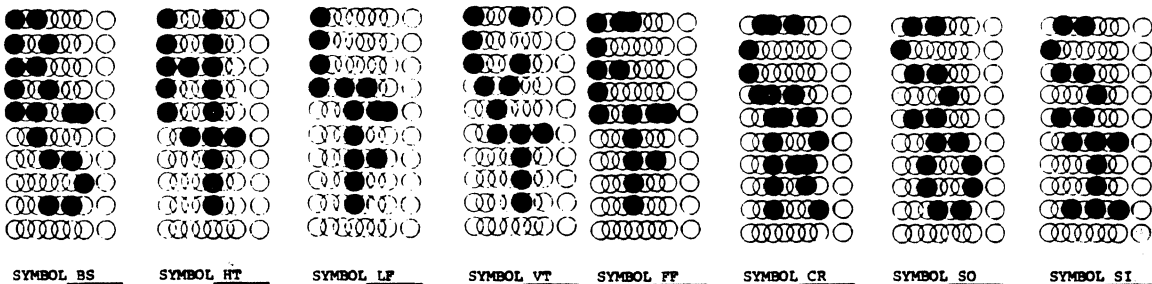
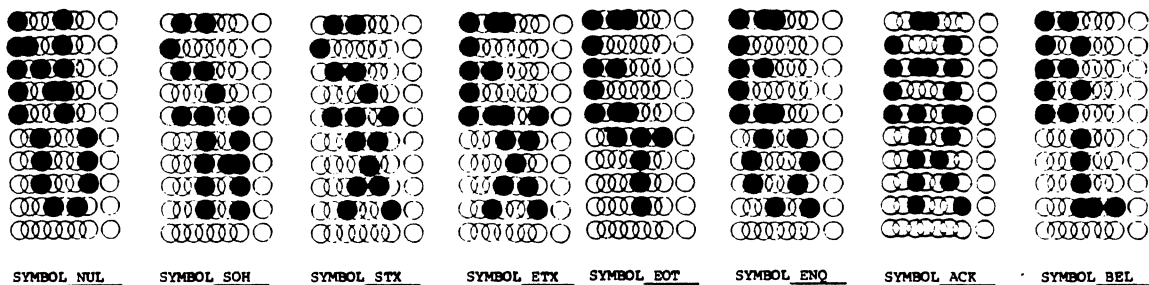


Figure A-1. Alphanumeric Dot-Matrix Formations (Sheet 3 of 3)

TABLE A-2. CONTROL CODES

BITS					COLUMNS		
					0	1	7
b7	b6	b5	b4	b3	b2	b1	ROW
0	0	0	0	0	0	0	NUL DLE
0	0	0	1	1	0	0	SOH DC1
0	0	1	0	2	0	1	STX DC2
0	0	1	1	3	0	1	ETX DC3
0	1	0	0	4	0	1	EOT DC4
0	1	0	1	5	0	1	ENQ NAK
0	1	1	0	6	0	1	ACK SYN
0	1	1	1	7	0	1	BEL ETB
1	0	0	0	8	0	1	BS CAN
1	0	0	1	9	0	1	HT EM
1	0	1	0	10 (A)	0	1	LF SUB
1	0	1	1	11 (B)	0	1	VT ESC
1	1	0	0	12 (C)	0	1	FF FS
1	1	0	1	13 (D)	0	1	CR GS
1	1	1	0	14 (E)	0	1	SO RS
1	1	1	1	15 (F)	0	1	SI US DEL

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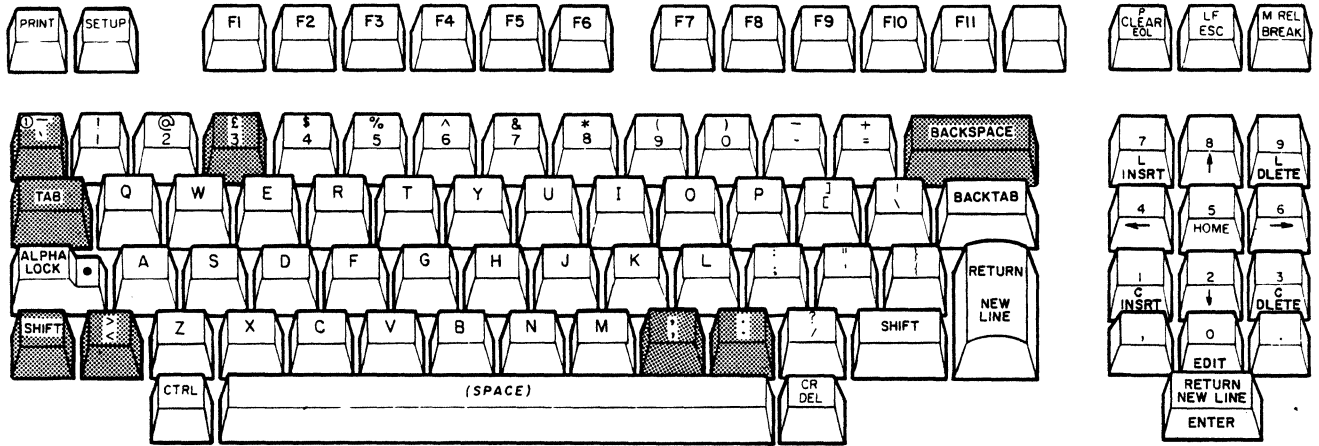
03811-1

Figure A-2. Dot-Matrix Formations of Control Code Symbols



This appendix contains the following:

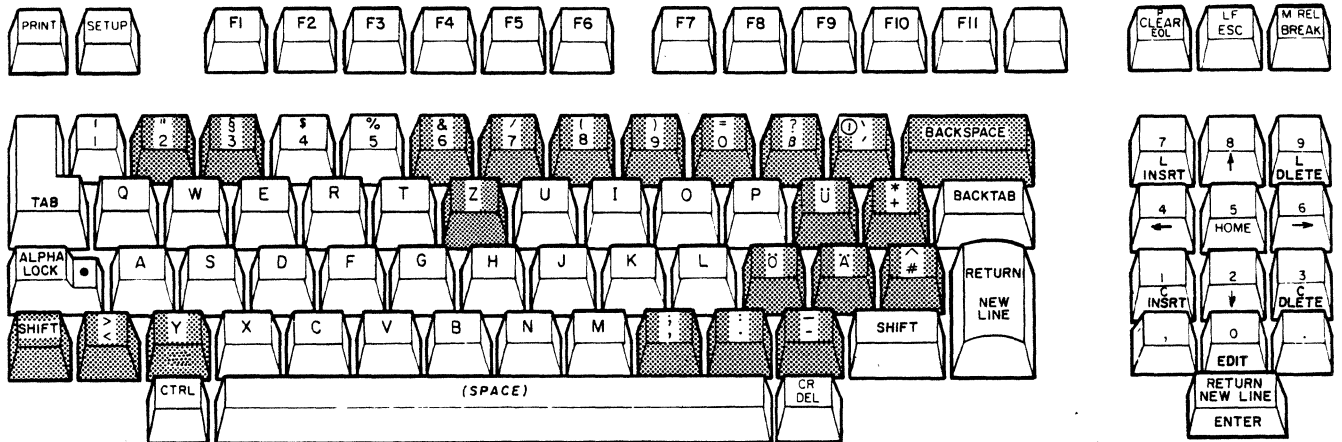
- Illustrations of the keycaps of optional character sets (figures B-1 through B-6)
- Tables listing the keycodes of the optional character sets (tables B-1 through B-6)



① UPPER-OVER BAR
LOWER-GRAVE ACCENT

Figure B-1. United Kingdom Keycaps

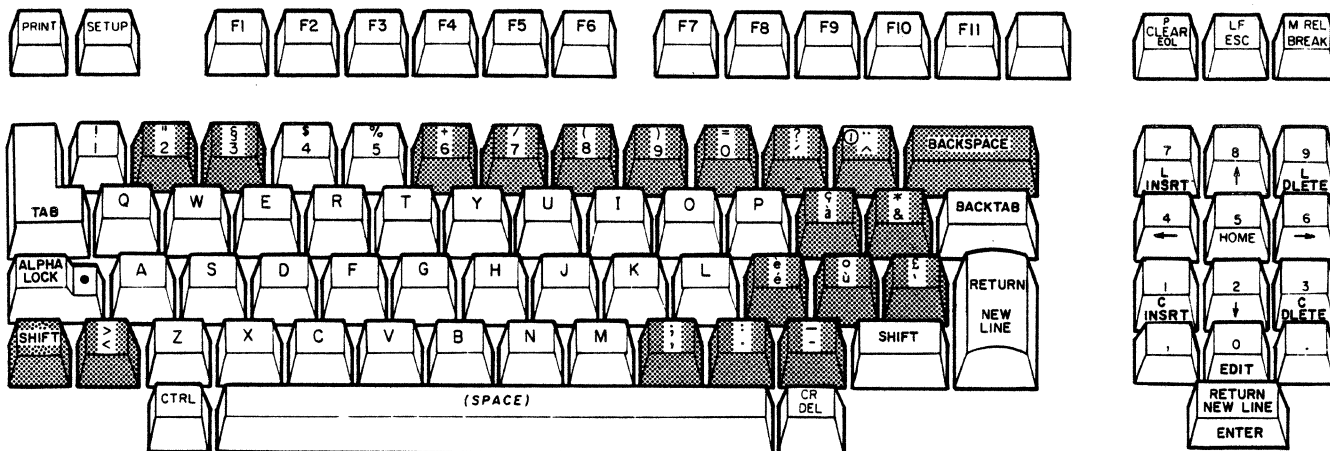
05425



① UPPER-GRAVE ACCENT
LOWER-APOSTROPHE, ACUTE ACCENT

Figure B-2. German Keycaps

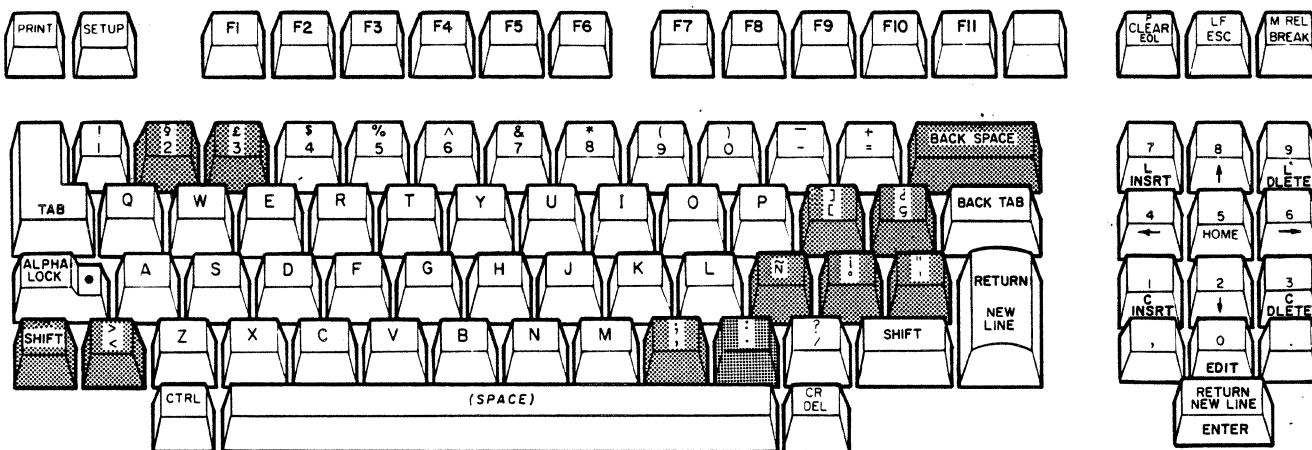
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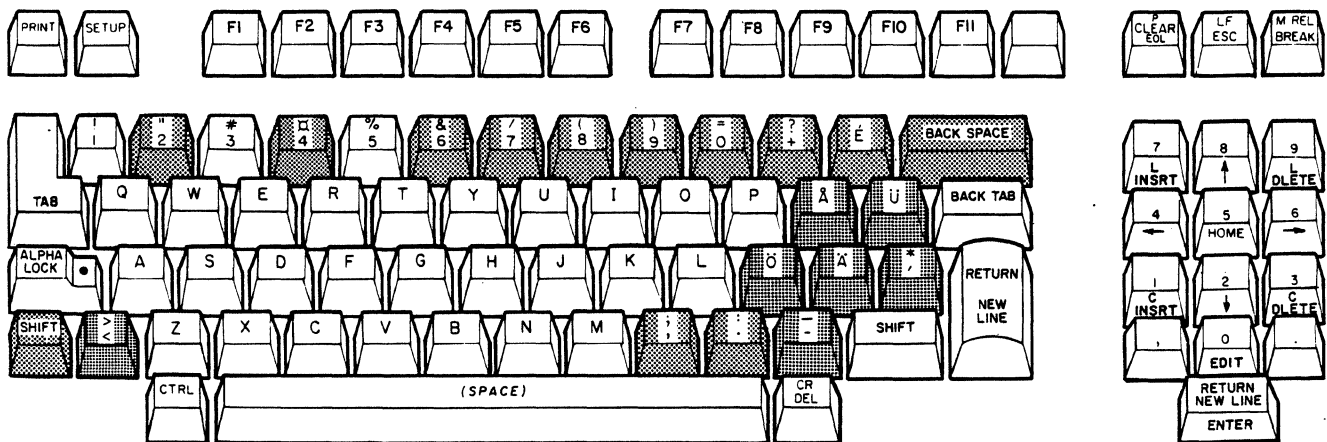
⓪ UPPER-UMLAUT

Figure B-3. French Keycaps



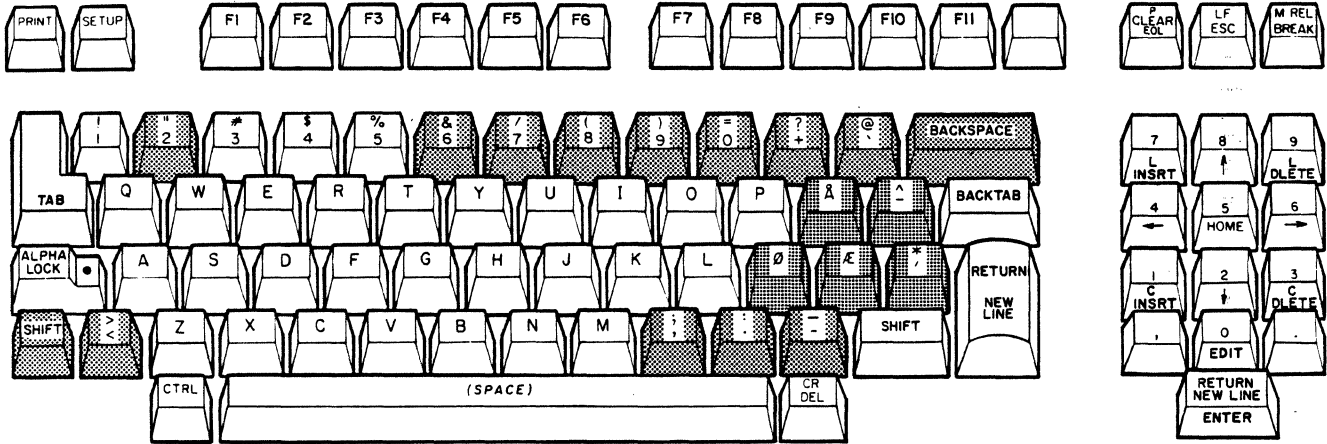
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Figure B-4. Spanish Keycaps



05429

Figure B-5. Swedish/Finnish Keycaps



05430

Figure B-6. Danish/Norwegian Keycaps

TABLE B-1. UNITED KINGDOM KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
£		3	33	23	33	23
			-	-	-	-
,		,	2C	2C	2C	2C
.		.	2E	2E	2E	2E
>		<	60	7E	60	7E
			3C	3E	3C	3E

TABLE B-2. GERMAIN KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
"		2	32	22	00	00
§		3	33	40	33	40
&		6	36	26	36	26
/		7	37	2F	37	2F
(		8	38	28	38	28
)		9	39	29	39	29
=		0	30	3D	30	3D
?		ß	7E	3F	1F	1F
'		'	27	60	1E	1E
			-	-	-	-
	Z		7A	5A	19	19
	Ü		7D	5D	1D	1D
*		+	2B	2A	1C	1C
	Ö		7C	5C	7C	5C
	Ä		7B	5B	7B	5B
^		#	23	5E	23	5E
	Y		79	59	1A	1A
;		,	2C	3B	2C	3B
:		.	2E	3A	2E	3A
		-	2D	5F	2D	5F
>		<	3C	3E	3C	3E

TABLE B-3. FRENCH KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
"		2	32	22	00	00
§		3	33	5D	33	5D
+		6	36	2B	36	2B
/		7	37	2F	37	2F
(		8	38	28	38	28
)		9	39	29	39	29
=		0	30	3D	30	3D
?		'	27	3F	1F	1F
;		^	5E	7E	1E	1E
-		-	-	-	-	-
ç		à	40	5C	1D	1D
*		&	26	2A	1C	1C
e		e'	7B	7D	7B	7D
o		u'	7C	5B	7C	5B
ø		'	60	23	60	23
:		,	2C	3B	2C	3B
:		.	2E	3A	2E	3A
|		-	2D	5F	2D	5F
\		<	3C	3E	3C	3E

TABLE B-4. SPANISH KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
§		2	32	40	00	00
ø		3	33	23	33	23
-		-	-	-	-	-
]		[	1E, 4B	1E, 4D	1D	1D
á	Ñ	á	7D	5D	1C	1C
		ç	7C	5C	7C	5C
í		í	7B	5B	7B	5B
=		'	27	22	27	22
:		,	2C	3B	2C	3B
:		.	2E	3A	2E	3A
~		'	60	7E	60	7E
>		<	3C	3E	3C	3E

TABLE B-4. SWEDISH/FINNISH KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
"		2	32	22	00	00
Å		4	34	24	34	24
&		6	36	26	36	26
/		7	37	2F	37	2F
(		8	38	28	38	28
)		9	39	29	39	29
=		0	30	3D	30	3D
?		+	2B	3F	1F	1F
	•		60	40	1E	1E
	-		-	-	-	-
	Å		7D	5D	1D	1D
	U		7E	5E	1C	1C
	Ö		7C	5C	7C	5C
	Ä		7B	5B	7B	5B
*		'	27	2A	27	2A
;		,	2C	3B	2C	3B
:		.	2E	3A	2E	3A
_		-	2D	5F	2D	5F
>		<	3C	3E	3C	3E

TABLE B-6. DANISH/NORWEGIAN KEYCODES

KEY LEGENDS			HEX CODES GENERATED			
UPPER	CENTER	LOWER	UNSHIFTED	SHIFTED	CTRL	CTRL SHIFTED
"		2	32	22	00	00
&		6	36	26	36	26
/		7	37	2F	37	2F
(		8	38	28	38	28
)		9	39	29	39	29
=		0	30	3D	30	3D
?		+	2B	3F	1F	1F
@		'	60	40	1E	1E
	-		-	-	-	-
^	Å		7D	5D	1D	1D
	-		7E	5E	1C	1C
	Ø		7C	5C	7C	5C
	Æ		7B	5B	7B	5B
*		'	27	2A	27	2A
;		,	2C	3B	2C	3B
:		.	2E	3A	2E	3A
_		-	2D	5F	2D	5F
>		<	3C	3E	3C	3E

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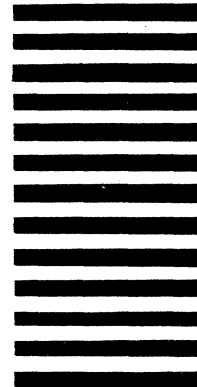
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