"VUSET*" DS150C DATA TERMINAL AND ALPHANUMERIC KEYBOARD DESCRIPTION AND OPERATION COMMUNICATION DISPLAY TERMINALS

1. GENERAL

1.01 This section covers the alphanumeric application of the VUSET System—alphanumeric keyboard used with the DS150C data terminal. Both the alphanumeric keyboard and the data terminal are manufactured by Plantronics, Inc., of Santa Cruz, California.

1.02 Whenever this section is reissued, the reason(s) for reissue will appear in this paragraph.

*Registered trademark of Plantronics, Inc.

1.03 Descriptive information and operating procedures covering the application of the VUSET System are contained in the attached reprint of the practice prepared by Plantronics, Inc.

1.04 Information covering the alphanumeric keyboard is contained in Section 578-160-103.

1.05 Detailed information covering the DS150C data terminal, including the numeric application of the VUSET System, is contained in Section 578-160-102.

PLANTRONICS
Santa Cruz

System Description
and Operation Practice
10674-00 March, 1979

VuSet® Terminal and Alphanumeric Keyboard

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System Description
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VuSet® Terminal and Alphanumeric Keyboard

1. SYSTEM DESCRIPTION AND OPERATION

VuSet General System Description

1.01 The VuSet system is an on-line, data entry or inquiry response system which uses voice grade dial-up or private line circuits. Private line use of the alphanumeric keyboard and data terminal is discussed fully in paragraphs 1.24 through 1.27.

1.02 As shown in Figure 1, the system includes the Plantronics Alphanumeric Keyboard and DS150C Data Terminal. These units are designed to interface with a telephone set via a modular connecting block.

1.03 Communication from the keyboard and terminal is over the telephone lines to a 100 Series Data Set. Signalling is by Frequency Shift Keying (FSK) in ASCII format. Keyboard output is serial, asynchronous, at 300 baud.

1.04 The data terminal accepts FSK signalling in ASCII format over the telephone lines from the data set. The system can operate in either half duplex or full duplex modes. System data flow is shown in Table A.

1.05 Call origination occurs at the data terminal and keyboard end. The data terminal is not capable of automatically answering an incoming call.

1.06 When the standard full duplex option is selected, character return (Echoplex) of data transmitted from the keyboard to the VuSet terminal may be either computer or front-end controlled, such as is common in most time share protocols.

1.07 When half duplex mode is selected, characters entered from the keyboard are displayed simultaneously with transmission to the computer. (See Table D)

Alphanumeric Keyboard

1.08 The keyboard is installed with a VuSet Data Terminal Model DS150C to a modular jack in series with a telephone set (Figure 2). The telephone is used to make the initial connection. The DATA/TALK switch on the VuSet is placed in the DATA position to substitute the VuSet equipment for the phone, and data is entered at the keyboard.

1.09 The keyboard contains 48 buttons and a space bar. It is capable of transmitting 63 alphanumeric characters (upper case alpha only), 33 control characters and a space code. The control characters are entered by sequentially depressing the control and/or shift buttons and a designated alphanumeric button. CONTROL and SHIFT lamps on the keyboard light when those buttons are activated and extinguish when the next alphanumeric button is depressed. Control character button combinations are described in Section 2.

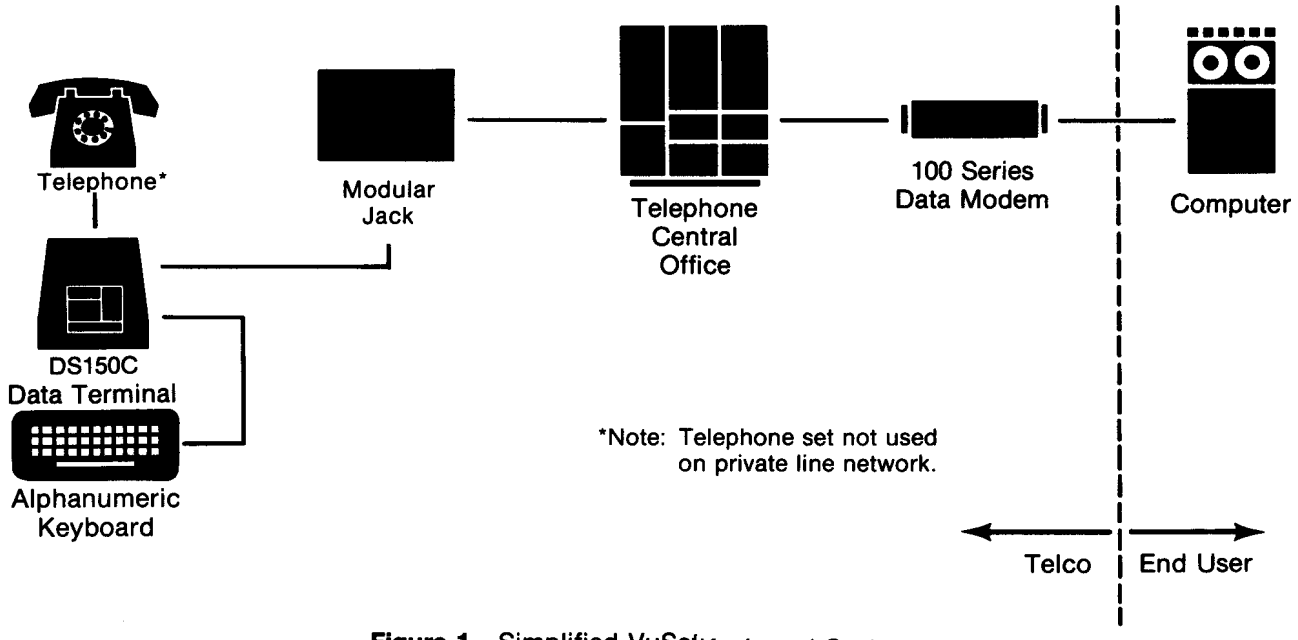


Figure 1, Simplified VuSet Keyboard System

1.10 The keyboard is connected to the data terminal and telephone terminal block via a single three-ended cable. No direct wiring to the telephone set is required.

Data Terminal

1.11 The DS150C Data Terminal operates as a receive-only remote display device and is capable of displaying 64 or 128 characters (option selectable within the terminal) on its CRT.

1.12 When the DATA/TALK switch is in the DATA position, data from the keyboard is routed through the Data Terminal to the telephone line tip and ring connections. When the DATA/TALK switch is in the TALK position, the S/T (switched/tip) and S/R (switched/ring) leads are connected to the respective tip and ring leads toward the central office, and the telephone can now be used for dialing and normal voice communications.

1.13 Computer data from the data modem to the data terminal in bit-serial FSK-ASCII format is demodulated within the terminal and displayed on the CRT in four or eight rows of 16 characters each (64 or 128 characters).

1.14 Receipt of an ASCII "start of text" (STX) code (factory set) erases the display CRT and initializes the system so that the next incoming character will be displayed on the upper left-hand position of the screen. Teletype compatible carriage return and line feed functions are enabled. As an option, an ASCII "carriage return" (CR) code can be used to erase the display and initialize the system. In this mode the STX and line feed codes are ignored.

1.15 Should the terminal receive more than 64 or 128 characters (factory set for 128 characters) before the system is initialized, overflow information will over-write, commencing at character position number one in the upper left-hand position of the screen.

1.16 When the CLEAR switch is activated downward and released, the display screen is erased and initialized to receive subsequent data.

1.17 Figure 3 shows the complete repertoire of ASCII print characters which can be displayed.

1.18 A blinking feature is included to alert the viewer. Receipt of an ASCII DC-1 or DC-2 function character (factory set for DC-2) will cause all information on the CRT to blink approximately once per

TABLE A
VuSet Data Flow

KEYBOARD TO COMPUTER		
KEYBOARD		COMPUTER
63 alphanumeric characters	→ FSK-ASCII (f_1) →	63 alphanumeric characters
33 control characters SPACE		33 control characters SPACE
COMPUTER TO TERMINAL		
TERMINAL		COMPUTER
63 alphanumeric characters	← FSK-ASCII (f_2) ←	63 alphanumeric characters
SPACE		SPACE
NON-PRINT, ERASES SCREEN AND INITIALIZES DISPLAY (Switch selectable in data terminal)		CR or STX
NON-PRINT, RETURNS DISPLAY TO START OF PRESENT LINE (Switch selectable in data terminal)		CR
NON-PRINT, INDEXES DISPLAY TO SAME CHARACTER POSITION ON NEXT LINE (Switch selectable in data terminal)		LF
NON-PRINT, CAUSES SCREEN TO BLINK (Switch selectable in data terminal)		DC-1 or DC-2

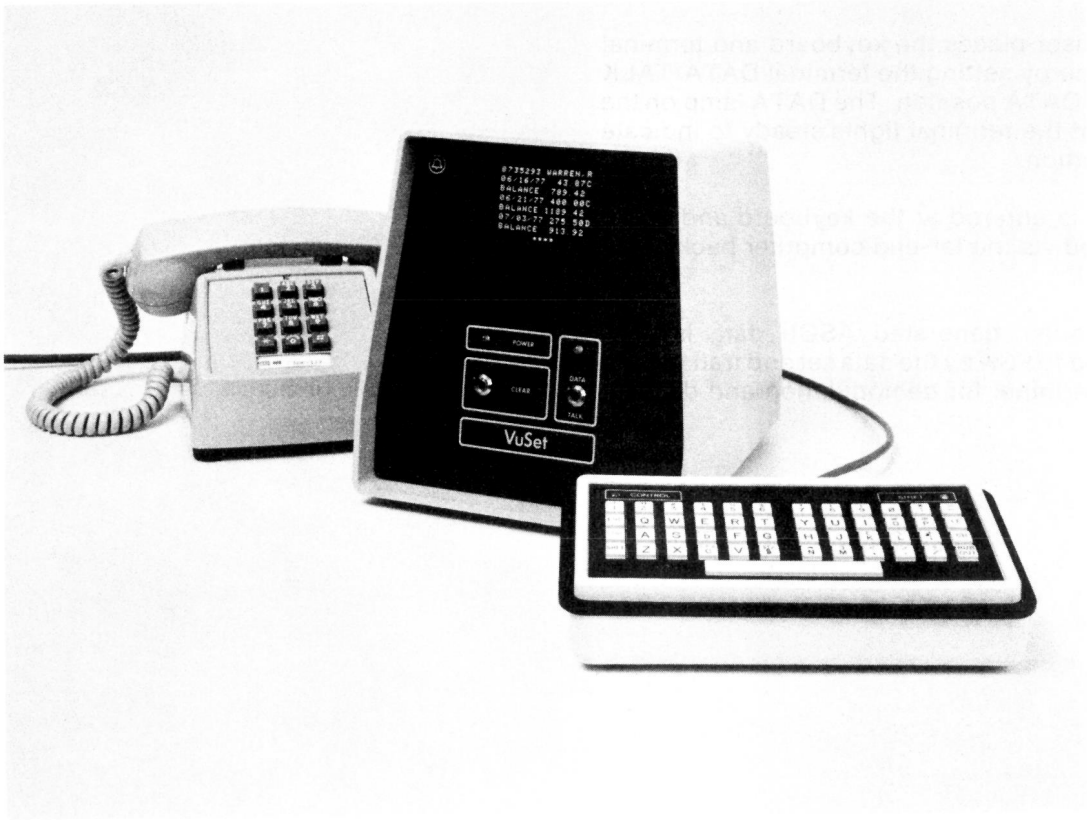


Figure 2, VuSet Keyboard/Terminal Installation

second. The blink operation will be terminated upon receipt of a clear and home command (switch selectable CR or STX function character) or actuation of the CLEAR switch on the VuSet front panel.

System Operation (Dial-up Network)

1.19 The user originates a call to the computer in the normal manner with the terminal DATA/TALK switch in the TALK position. Calls are automatically answered by the data set which returns a 2225 Hz answerback tone to indicate the completion of handshaking with the computer.

1.20 The user places the keyboard and terminal on-line by placing the DATA/TALK switch in the DATA position. The DATA lamp on the front panel of the terminal lights when the connection is established with the computer.

1.21 Data is entered at the keyboard and echoplexed via the far-end computer back to the data terminal.

1.22 Computer generated ASCII data is converted to FSK by the data set and transmitted to the data terminal for demodulation and display.

1.23 Disconnection is initiated by placing the DATA/TALK switch in the TALK position and hanging up.

System Operation (Private Line Network)

1.24 In a private line application, the keyboard and terminal are permanently connected to the computer via a dedicated private telephone line. This application eliminates the use of a telephone set and the need of handshaking with the computer.

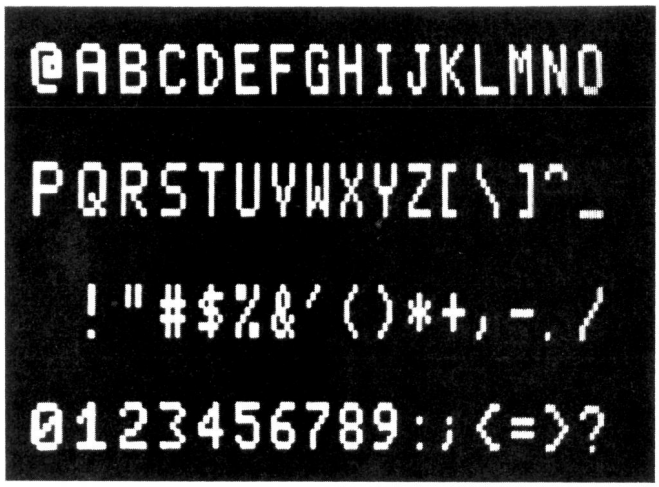


Figure 3, Terminal Display Repertoire

1.25 The user places the keyboard and terminal on-line by setting the terminal DATA/TALK switch in the DATA position. The DATA lamp on the front panel of the terminal lights steady to indicate on-line operation.

1.26 Data is entered at the keyboard and echoplexed via the far-end computer back to the data terminal.

1.27 Computer generated ASCII data is converted to FSK by the data set and transmitted to the data terminal for demodulation and display.

2. ALPHANUMERIC KEYBOARD DESCRIPTION AND OPERATION

Keyboard Description

2.01 The keyboard (shown in Figure 4) consists of a 49-button pad, four rows of twelve buttons plus a space bar, with two indicator lights and internal modulation electronics. Its components are packaged in a molded beige-colored case with beige buttons set in a black front panel.

2.02 The keyboard weighs approximately two pounds and measures 8-¼ inches wide by 2-½ inches high by 4½ inches deep.

2.03 Keystrokes, either single or in sequence with the control and shift buttons, are converted by the internal electronics to FSK-ASCII format and clocked out asynchronously at 300 baud at a -9 dBm maximum output level. Keyboard power is ±12 Vdc from the data terminal via the interconnecting cable.

2.04 The unshifted and shifted modes of the keyboard permit transmission of the capital alpha, numeric and special characters shown on the buttons. Four single key commands are also provided; LF (line feed), CR (carriage return), RUB OUT and ESC (escape).RUB OUT is only available by single key command.

2.05 The remaining control commands are shown and defined in Figure 5. The CTRL button, in combination with each of the 26 alpha character buttons, provides 26 control commands. Six additional control commands can be transmitted by sequentially depressing the CTRL, SHFT and one of the alpha character buttons K through P. Table B shows the 7-bit ASCII code transmitted for each character and command.

2.06 Undefined keying combinations at any level revert to the next lower level defined code. For example, CTRL-SHFT-A reverts to CTRL-A and causes the SOH command to be transmitted, CTRL-SHFT-5 reverts to %, etc.

2.07 Parity (ODD or EVEN) is selectable by an option switch within the keyboard. The factory pre-set position is for EVEN parity.

Alphanumeric Keyboard Specifications

2.08 Data Specifications

Output/Signal/Format:	FSK-ASCII Format Space = 1070 Hz Mark = 1270 Hz 63 alphanumeric characters and space (upper case alpha only) 33 control commands
Output Data Rate:	300 baud asynchronous
Output Level:	—9 dBm (maximum), fixed

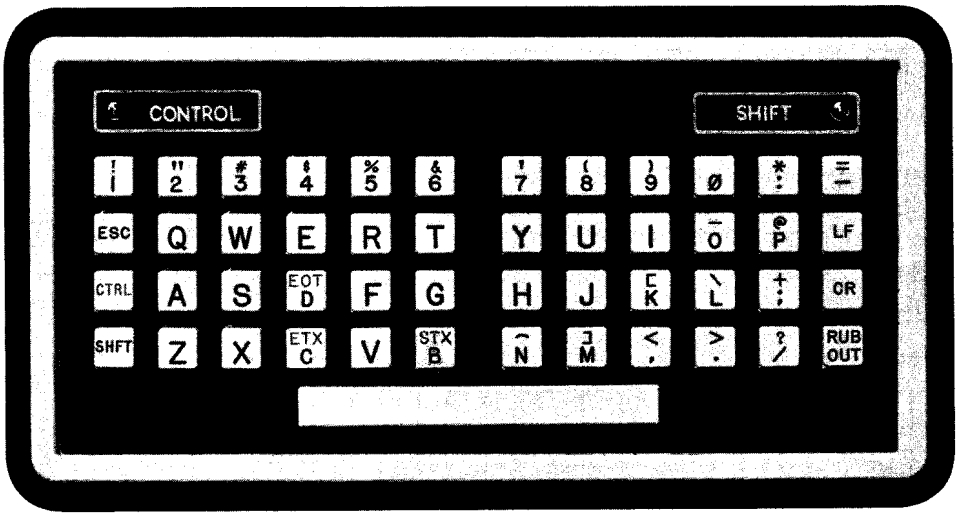


Figure 4, Alphanumeric Keyboard Front Panel

2.09 Power Requirements

Operating Voltage: ± 12 Vdc obtained from the VuSet Data Terminal

2.10 Physical Characteristics

Weight: Less than 2 pounds (1.8 kg)

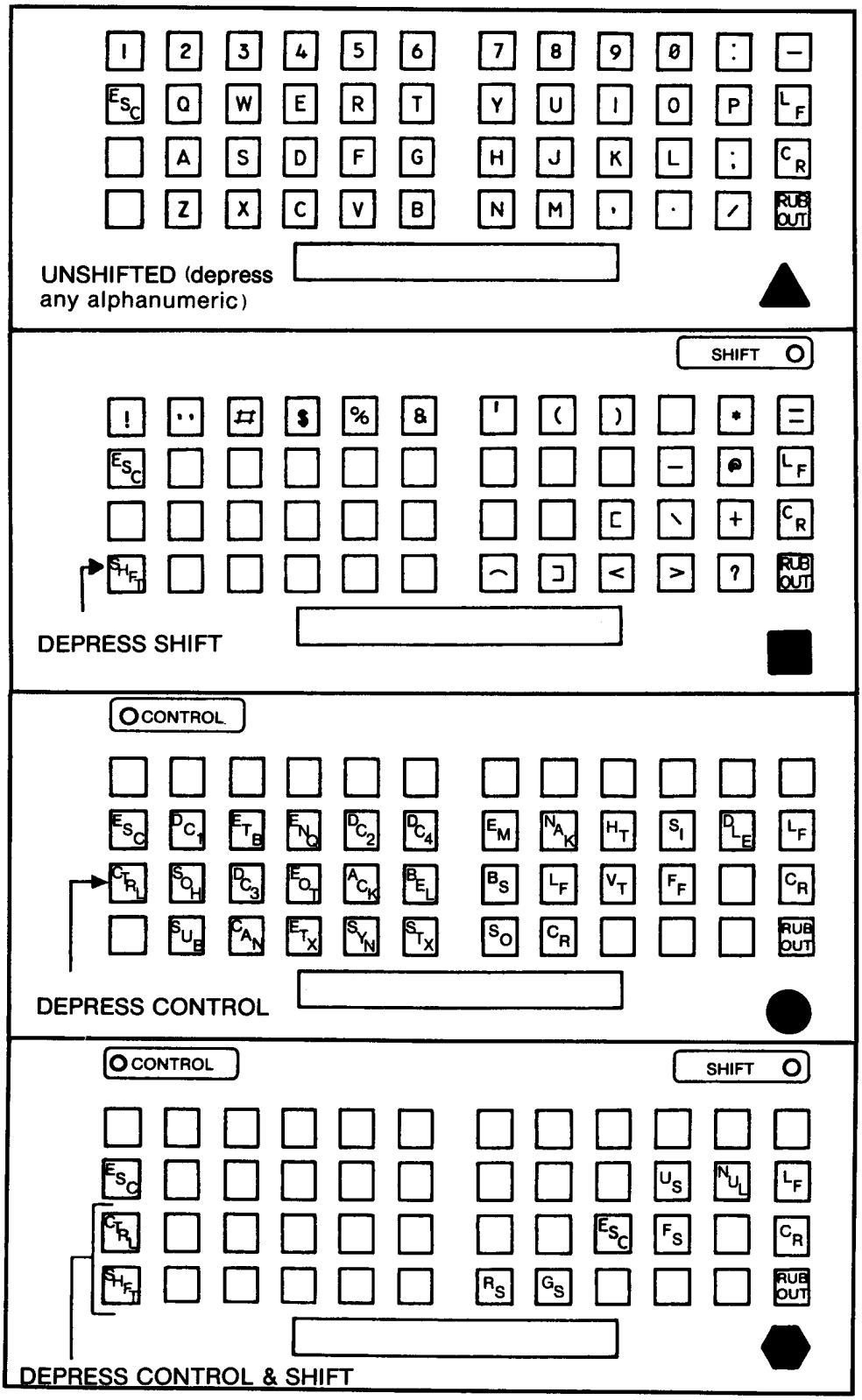
Dimensions: 4-1/2" deep (11.43 cm)
8-1/4" wide (20.95 cm)
2-1/2" high (6.34 cm)

2.11 Operating Environment

Temperature: 0° to 50° C (operating)
—10° to 65° (non-operating)

Moisture: 0 to 90% relative humidity (no condensation)

Altitude: 10,000 feet (3048m) maximum (operating)



ACK —Acknowledge
BEL —Bell
BS —Back space
CAN —Cancel
CR —Carriage return
DC1 —Device control 1
DC2 —Device control 2
DC3 —Device control 3
DC4 —Device control 4
RUB OUT —Rub out
DLE —Data link escape
EM —End of media
ENQ —Enquiry
EOT —End of transmission
ESC —Escape
ETB —End of transmission block
ETX —End of text
FF —Form feed
FS —File separator
GS —Group separator
HT —Horizontal tab
LF —Line feed
NAK —Negative acknowledge
NUL —Null
RS —Record separator
SI —Shift in
SO —Shift out
SOH —Start of heading
STX —Start of text
SUB —Substitute
SYN —Synchronize
US —Unit separator
VT —Vertical tab

Figure 5, Keyboard Entry

UNSHIFTED

BITS				b_7	0	0	0	0	1	1	1
				b_6	0	0	1	1	0	0	1
b_4	b_3	b_2	b_1	b_5	0	1	0	1	0	1	1
0	0	0	0						Ø		P
0	0	0	1						1	A	Q
0	0	1	0						2	B	R
0	0	1	1						3	C	S
0	1	0	0						4	D	T
0	1	0	1						5	E	U
0	1	1	0						6	F	V
0	1	1	1						7	G	W
1	0	0	0						8	H	X
1	0	0	1						9	I	Y
1	0	1	0		LF*				:	J	Z
1	0	1	1			ESC*			;	K	
1	1	0	0				,			L	/
1	1	0	1		CR*		-			M	
1	1	1	0				.			N	
1	1	1	1				/			O	— RUB* OUT

SHIFT

BITS				b_7	0	0	0	0	1	1	1
				b_6	0	0	1	1	0	0	1
b_4	b_3	b_2	b_1	b_5	0	1	0	1	0	1	1
0	0	0	0						@		
0	0	0	1				!				
0	0	1	0				"				
0	0	1	1				#				
0	1	0	0				$				
0	1	0	1				%				
0	1	1	0				&				
0	1	1	1	1			'				
1	0	0	0				(				
1	0	0	1				)				
1	0	1	0		LF*		*				
1	0	1	1			ESC*	+			{	
1	1	0	0					<		\	
1	1	0	1		CR*		-	=		}	
1	1	1	0					>		~	
1	1	1	1					?		—	RUB* OUT

CONTROL

BITS				b_7	0	0	0	0	1	1	1
				b_6	0	0	1	1	0	0	1
b_4	b_3	b_2	b_1	b_5	0	1	0	1	0	1	1
0	0	0	0			DLE					
0	0	0	1		SOH	DC1					
0	0	1	0		STX	DC2					
0	0	1	1		ETX	DC3					
0	1	0	0		EOT	DC4					
0	1	0	1		ENQ	NAK					
0	1	1	0		ACK	SYN					
0	1	1	1		BEL	ETB					
1	0	0	0		BS	CAN					
1	0	0	1		HT	EM					
1	0	1	0		LF*	SUB					
1	0	1	1		VT	ESC*					
1	1	0	0		FF						
1	1	0	1		CR*						
1	1	1	0		SO						
1	1	1	1		SI						RUB* OUT

CONTROL/SHIFT

BITS				b_7	0	0	0	0	1	1	1
				b_6	0	0	1	1	0	0	1
b_4	b_3	b_2	b_1	b_5	0	1	0	1	0	1	1
0	0	0	0		NUL						
0	0	0	1								
0	0	1	0								
0	0	1	1								
0	1	0	0								
0	1	0	1								
0	1	1	0								
0	1	1	1								
1	0	0	0								
1	0	0	1								
1	0	1	0		LF*						
1	0	1	1			ESC*					
1	1	0	0			FS					
1	1	0	1		CR*	GS					
1	1	1	0			RS					
1	1	1	1			US					RUB* OUT

NOTE: *Single Key Function

Table B, Keyboard ASCII Codes

3. VUSET DATA TERMINAL DESCRIPTION

Terminal Description

3.01 The terminal consists of a receive-only data set, display electronics, small CRT screen, a CLEAR switch, a DATA/TALK switch, and two indicator lights.

3.02 The terminal weighs approximately 10 pounds and measures about 8 inches wide by 9 inches deep.

3.03 The terminal accepts bit-serial FSK-ASCII data from the computer which is option switch selectable into 64 character format (four lines of 16 characters) or 128 character format (eight lines of 16 characters) display on the CRT. (Factory set for 128 characters.)

3.04 Receipt for an ASCII "start of text" (STX) code (factory set) erases the display CRT and initializes the system so that the next incoming character will be displayed on the upper left-hand position of the screen. Teletype compatible carriage return and line feed functions are enabled. As an option, an ASCII "carriage return" (CR) code can be used to erase the display and initialize the system. In this mode the STX and line feed *codes* are ignored.

3.05 Should the terminal receive more than 64 or 128 characters (switch selected) before the system is initialized, overflow information will overwrite, commencing at character position number one in the upper left-hand position of the screen.

3.06 A blinking feature is included to alert the viewer. Receipt of an ASCII DC-1 or DC-2 function character (factory set for DC-2) will cause all information on the CRT to blink approximately once per second. The blink operation will be terminated upon receipt of a clear and home command (switch selectable CR or STX function character) or actuation of the CLEAR switch on the VuSet front panel.

Indicators

3.07 Terminal status is shown by two indicator lights (LED's) below the display screen.

3.08 *POWER.* The POWER lamp indicates status of AC power to the terminal and must be illuminated for the terminal to operate.

3.09 *DATA.* The DATA lamp indicates the status of the telephone line connection.

- When the DATA indicator is ON steady, it indicates that a connection has been established, the terminal is receiving the 2225 Hz Mark tone from the data set, and the terminal may display received data when sent.
- The DATA lamp flashing at a steady rate indicates an incomplete connection, i.e., ringing, busy signal, disconnected call, etc.
- When the DATA lamp is OFF, the terminal will not receive data.

Controls

3.10 *POWER.* A two-position ON/OFF rocker switch located in the back of the terminal which controls the power supply. Power must be ON to operate the terminal.

3.11 *DATA/TALK.* The DATA/TALK switch is a two-position toggle.

- In DATA (up) position, the terminal is connected to the line.
- The telephone cannot be used for voice communication with the switch in DATA position.
- When the switch is moved to its TALK (down) position, the terminal is disconnected and voice communications via the telephone are possible.
- In a private line application, setting the DATA/TALK switch to the TALK position takes the VuSet off the line.

3.12 *CLEAR.* When the CLEAR switch is activated downward and released, the display screen is erased and initialized to receive subsequent data.

Data Terminal Specifications

3.13 Data Specifications

Display Format:	5X7 character dot matrix 64 characters (four lines of 16 characters) or 128 characters (eight lines of 16 characters)
Input Signal Format:	FSK-ASCII Format Space = 2025 Hz Mark = 2225 Hz
Input Data Rate:	110, 150 or 300 baud (10, 15, 30 characters/second) selectable at installation. Asynchronous operation.
Input Response Time:	2 milliseconds (maximum)
Receive Level Sensitivity:	0 to -40 dBm (referenced to telephone line)

3.14 Control Codes

Teletypewriter Compatible codes CR, STX, LF, DC-1 and DC-2 available

3.15 Controls

Clear, Data/Talk and Power

3.16 Indicators

Data and Power

3.17 Power Requirements

Operating Voltage:	Single phase, grounded, 117 Vac ±10%, 60 Hz (8 foot power cord provided)

3.18 Physical Characteristics

Weight:	approximately 10 pounds (4.54 kg)
Dimensions:	9-¼" deep (23.50cm) 7-⅞" wide (20.00 cm) 8-⅛" high (20.64 cm)

3.19 Operating Environment

Temperature:	0° to 50° (operating) —10° to 65°C (non-operating)
Moisture:	0 to 95% relative humidity (no condensation)
Altitude:	10,000 feet (3048m) maximum (operating)

4. OPERATOR'S INSTRUCTIONS

Operating Procedure (Dial-up Network)

4.01 To connect the system to the computer, proceed as follows:

a) Set terminal POWER switch to ON position.

b) Verify that terminal POWER lamp lights.

c) Scattered characters may appear on terminal screen after 30 seconds; this is normal. Depress terminal CLEAR switch to clear the screen.

d) Set terminal DATA/TALK switch to TALK position.

e) Pick up telephone handset and ensure dial tone is present.

f) Place call to required number.

g) On receipt of answerback tone, set terminal DATA/TALK switch to DATA position and leave handset off hook.

h) Verify that terminal DATA lamp lights steady.

j) Enter data via the keyboard according to prompting messages on terminal screen.

4.02 To disconnect the system from the computer, proceed as follows:

a) Set terminal DATA/TALK switch to TALK position.

b) Place telephone handset on switchhook (hang up).

c) Depress terminal CLEAR switch to clear the display screen if desired.

d) The telephone can now be used for normal voice communications.

Operating Procedure (Private Line Network)

4.03 To operate the system when connected to a private line, proceed as follows:

a) Set terminal POWER switch to ON position.

b) Verify that terminal POWER lamp lights.

c) Scattered characters may appear on terminal screen after 30 seconds; this is normal. Depress terminal CLEAR switch to clear the screen.

d) Set terminal DATA/TALK switch to DATA position.

e) Verify that terminal DATA lamp lights steady.

f) Enter data via the keyboard according to prompting messages on terminal screen.

NOTE: The terminal DATA/TALK switch must remain in the DATA position for proper operation.

Plantronics, Inc. | 345 Encinal Street | Santa Cruz, California 95060 | 408/426-5858

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