

**“VUSET\*” ALPHANUMERIC KEYBOARD**  
**(FOR USE WITH “VUSET” DS150C DATA TERMINAL)**  
**DESCRIPTION, INSTALLATION, OPERATION, AND MAINTENANCE**  
**COMMUNICATION DISPLAY TERMINALS**

**1. GENERAL**

**1.01** This section covers the VUSET alphanumeric keyboard manufactured by Plantronics, Inc., of Santa Cruz, California. This keyboard is to be used with the VUSET DS150C data terminal, also manufactured by Plantronics, Inc., either in dial-up or private-line applications. The keyboard consists of 48 buttons and a space bar. It is capable of transmitting 63 alphanumeric characters (uppercase alpha only), 33 control characters, and a space code.

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

**1.03** Descriptive information, installation procedures, operating procedures, and maintenance procedures covering the keyboard are contained in the attached reprint of the practice prepared by Plantronics, Inc.

**1.04** Information covering the alphanumeric application of the VUSET System (alphanumeric keyboard used with the DS150C data terminal) is contained in Section 578-160-101.

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

**2. UNIVERSAL SERVICE ORDER CODED (USOC) OPTIONS**

**2.01** The USOC options for the alphanumeric keyboard are presented in Table A. The description of the options is presented in Part 3 of the attached reprint.

**TABLE A**

**USOC DKK \_\_ (NOTE)**

OPTION	FUNCTION
A1	Even parity
A2	Odd parity

*Note:* Refer to Section 590-000-100 for determination of the USOC suffix.



# VuSet® ALPHANUMERIC KEYBOARD

## (for use with DS150C Data Terminal)

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# VuSet<sup>®</sup> ALPHANUMERIC KEYBOARD

## (for use with DS150C Data Terminal)

### 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 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.

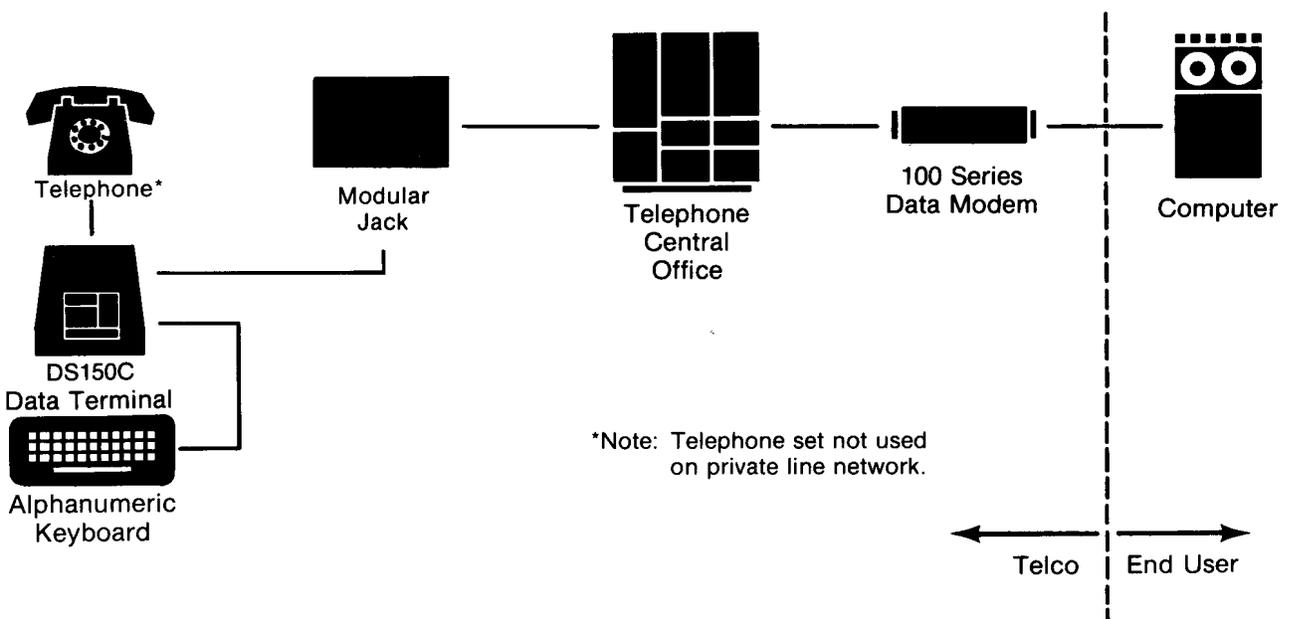


Figure 1, Simplified VuSet Keyboard System

**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" (LF) 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	63 alphanumeric characters
33 control characters	33 control characters
SPACE	SPACE
FSK-ASCII (f <sub>1</sub> )	
COMPUTER TO TERMINAL	
TERMINAL	COMPUTER
63 alphanumeric characters	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
FSK-ASCII (f <sub>2</sub> )	



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 echoed 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.

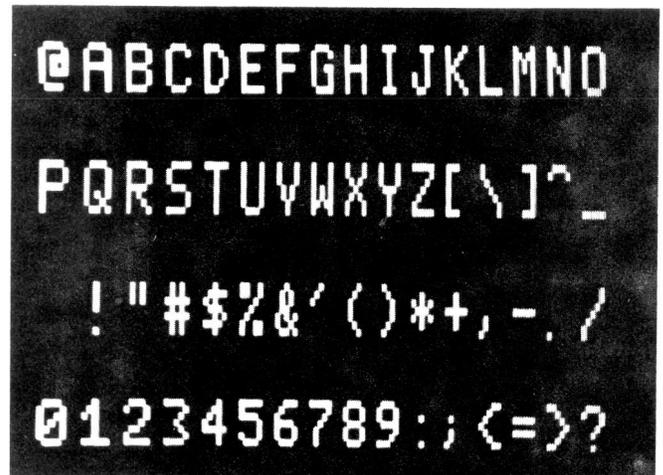


Figure 3, Terminal Display Repertoire

**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 echoed 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.

# VuSet SYSTEM

## 2. ALPHANUMERIC KEYBOARD DESCRIPTION

### 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 8-1/4 inches wide by 2-1/2 inches high by 4-1/2 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 and 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

#### 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)

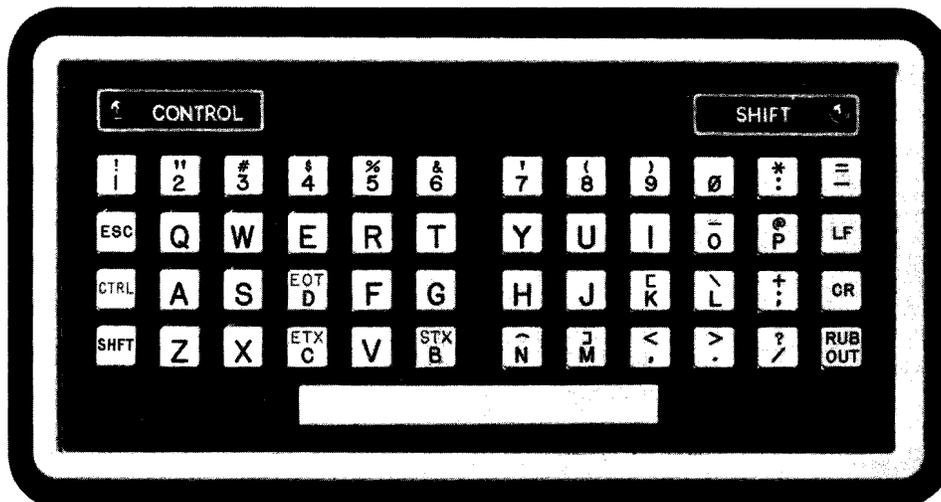


Figure 4, Alphanumeric Keyboard Front Panel



**▲ UNSHIFTED**

BITS				b7	0	0	0	0	1	1	1
				b6	0	0	1	1	0	0	1
b4	b3	b2	b1	b5	0	1	0	1	0	1	1
0	0	0	0				SP*	0		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				b7	0	0	0	0	1	1	1
				b6	0	0	1	1	0	0	1
b4	b3	b2	b1	b5	0	1	0	1	0	1	1
0	0	0	0				SP*		@		
0	0	0	1				i				
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				<			[ \	
1	1	0	1		CR*		=				
1	1	1	0				>			~	
1	1	1	1				?			-	RUB* OUT

**● CONTROL**

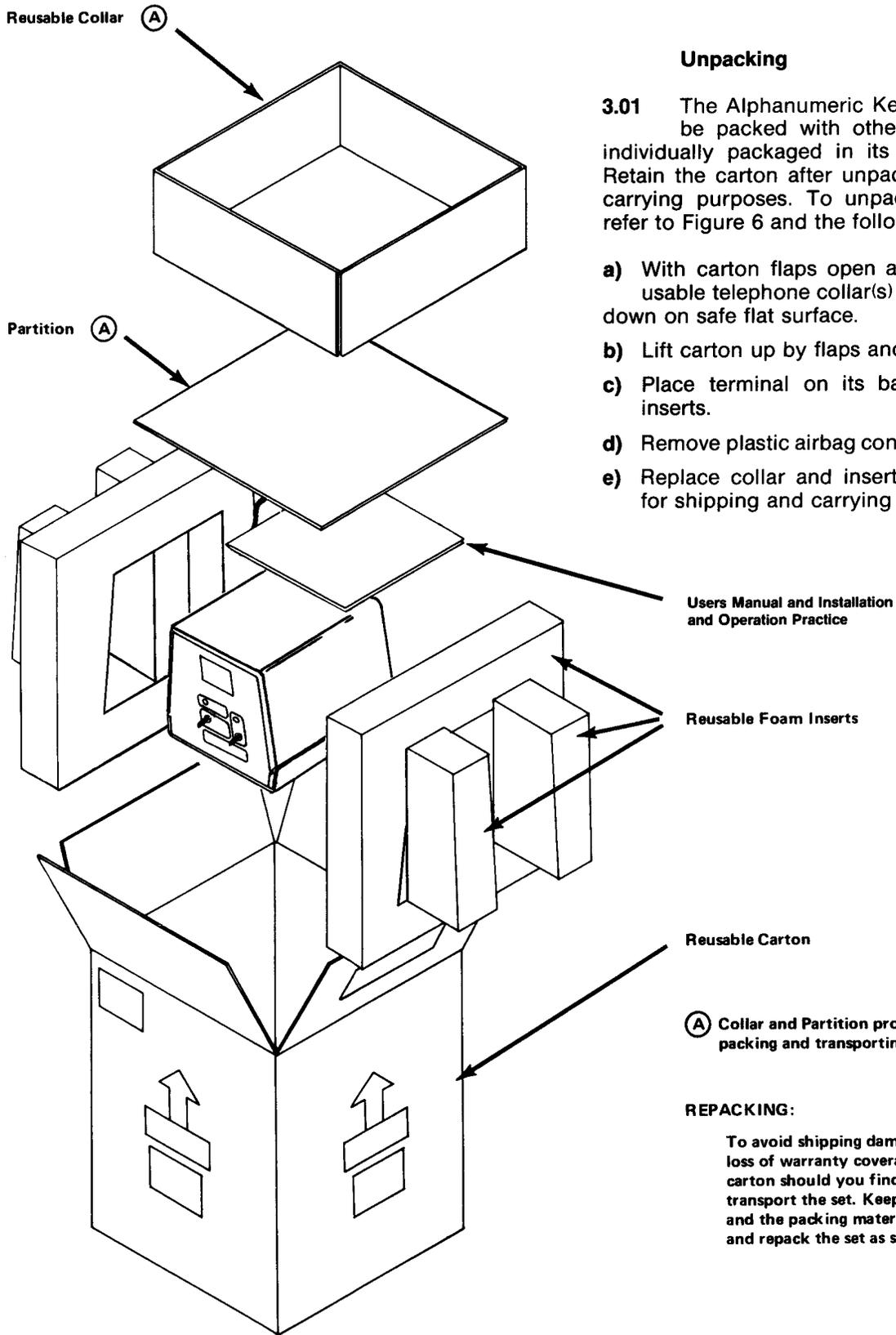
BITS				b7	0	0	0	0	1	1	1
				b6	0	0	1	1	0	0	1
b4	b3	b2	b1	b5	0	1	0	1	0	1	1
0	0	0	0				DLE	SP*			
0	0	0	1			SOH	DC1				
0	0	1	0			STX	DC2				
0	0	1	1			ETX	DC3				
0	1	0	0			EOT	DC4				
0	1	0	1			ENQ	NAK				
0	1	1	0			ACK	SYN				
0	1	1	1			BEL	ETB				
1	0	0	0			BS	CAN				
1	0	0	1			HT	EM				
1	0	1	0			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				b7	0	0	0	0	1	1	1
				b6	0	0	1	1	0	0	1
b4	b3	b2	b1	b5	0	1	0	1	0	1	1
0	0	0	0			NUL		SP*			
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

**Table B, Keyboard ASCII Codes**

### 3. ALPHANUMERIC KEYBOARD AND TERMINAL INSTALLATION AND INTERFACE



#### Unpacking

3.01 The Alphanumeric Keyboard, though it may be packed with other VuSet equipment, is individually packaged in its own shipping carton. Retain the carton after unpacking for reshipping or carrying purposes. To unpack the VuSet terminal refer to Figure 6 and the following procedure:

- a) With carton flaps open all the way, remove reusable telephone collar(s) and turn carton upside down on safe flat surface.
- b) Lift carton up by flaps and let terminal slide out.
- c) Place terminal on its base and remove foam inserts.
- d) Remove plastic airbag containing the power cord.
- e) Replace collar and inserts in carton and retain for shipping and carrying purposes.

(A) Collar and Partition provide space for packing and transporting telephone set.

#### REPACKING:

To avoid shipping damage and possible loss of warranty coverage, use this carton should you find it necessary to transport the set. Keep this carton and the packing material it contains, and repack the set as shown.

Figure 6, Data Terminal Packing

**Options**

**3.02** Switch selectable data terminal options are selected at the factory. If switch selectable options are to be changed, proceed as follows:

- a) Remove display unit from housing by removing the three #6-32 screws from the bottom.
- b) Slide the terminal forward out of its housing.
- c) Visually inspect all subassemblies for damage and ensure solid connections.
- d) Locate option select switches on data terminal Data Converter and Demodulator Boards (see Figure 7). For Data Converter and Demodulator Board switch settings, go to paragraph 3.03 and 3.04, respectively.

**Terminal Data Converter Board Setting**

**3.03** The seven segments of switch S1 (1-7) on the Data Converter Board (see Figure 7) should be set for required options as listed in Table C.

**CAUTION:** Data rates must be the same for terminal and data set.

**Terminal Demodulator Board Setting**

**3.04** The seven segments of switch S1 (1-7) on the Demodulator Board (see Figure 7) should be set for required options as listed in Table D.

**Keyboard Parity Setting**

**3.05** The factory preset parity setting is EVEN. Should the parity desired be ODD, remove the two screws on the bottom of the keyboard and

**Table C**  
**Data Converter Board Option Select**

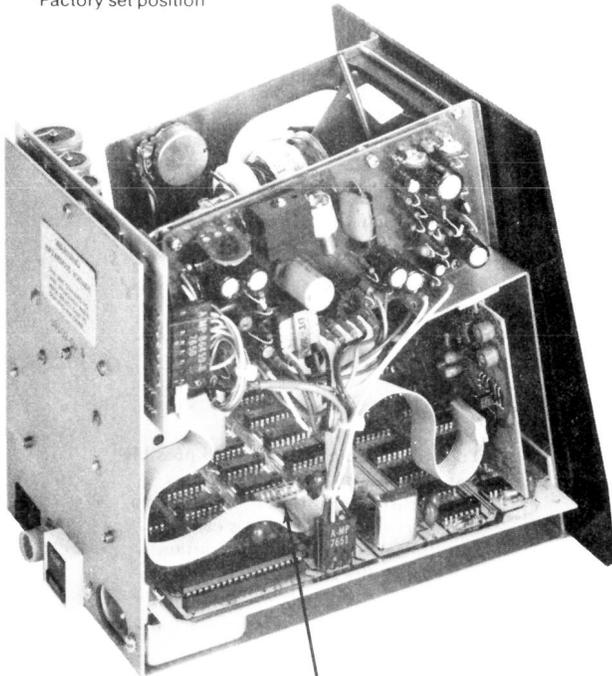
S1 on Data Converter Board							Option Selected
1	2	3	4	5	6	7	
OFF	OFF	ON	OFF	—	—	—	110 Baud Rate
OFF	OFF	ON	ON	—	—	—	150 Baud Rate
OFF	ON	OFF	ON	—	—	—	300 Baud Rate*
—	—	—	—	ON	—	—	64 Character Display
—	—	—	—	OFF	—	—	128 Character Display*
—	—	—	—	—	ON	—	CR Decode Enable
—	—	—	—	—	OFF	—	STX, CR, LF Decode Enable*
—	—	—	—	—	—	ON	DC-1 Blink Enable
—	—	—	—	—	—	OFF	DC-2 Blink Enable*

\*Factory set position

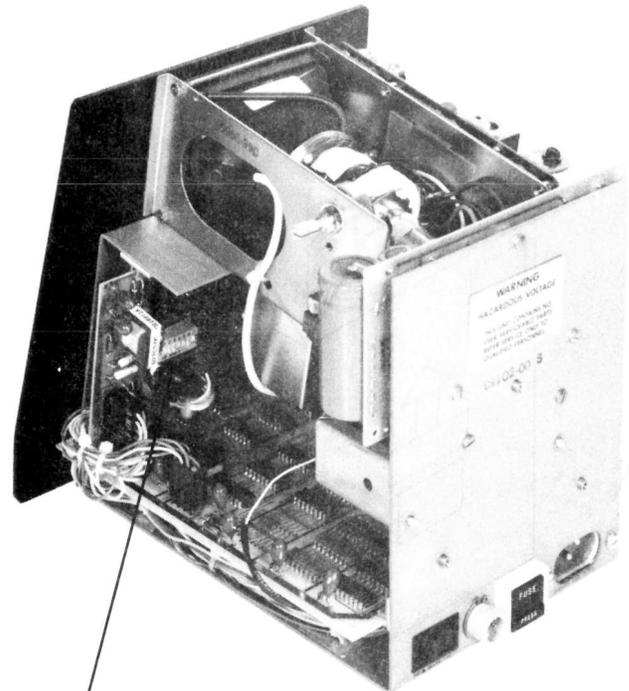
**Table D**  
**Demodulator Board Option Select**

S1 on Demodulator Board							Option Selected
1	2	3	4	5	6	7	
ON	OFF	—	ON	OFF	OFF	—	Alphanumeric *
OFF	ON	—	OFF	OFF	ON	—	Numeric
—	—	—	—	—	—	ON	Local Copy
—	—	—	—	—	—	OFF	Echoplex*

\*Factory set position



S1 on Data Converter Board



S1 on Demodulator Board

**Figure 7, Data Terminal Switch Locations**

## VuSet SYSTEM

open the case. The parity switch (shown in Figure 8) is located on the lower right hand corner of the keyboard P.C. board and the positions are clearly marked.

### Interface Cable Connection

**CAUTION:** *Do not apply power to terminal before making connections per this section.*

**3.06** Connect the keyboard and data terminal as follows (see Figure 9):

- a) If telephone set is used, connect modular cord between telephone set and PHONE connector of interface box at rear of data terminal.
- b) Connect modular cord between telephone line modular jack and LINE connector of interface box at rear of data terminal.
- c) Connect interface cable between keyboard and connector at rear of data terminal.
- d) Connect interface cable between data terminal and VUSET connector of interface box at rear of data terminal.
- e) Connect power supply cord to receptacle at rear of data terminal and A.C. power source.

### Installation Information

#### DS150C with Alphanumeric Keyboard

**3.07 OFF-Line Test Procedure.** Set switch S1-5 and S1-7 on the demodulator board to "ON". This will allow the keyboard to send directly to the DS150C and will simulate a local mode.

### Operation and Test Procedure (Dial-up Network)

**3.08** This procedure verifies operation of the keyboard and data terminal in a dial-up network.

- a) Set POWER switch at rear of terminal 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 test 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.

k) Upon completion of test, set terminal DATA/TALK switch to TALK position and replace the handset onto the switchhook.

### Operation and Test Procedure (Private Line Network)

**3.09** This procedure verifies operation of the keyboard and data terminal in a private line network.

- 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) The loop-back associated with the 108E data set at distant location should be enabled (not the loop-back device inserted on the line side of the 108E, if so equipped). Typing on the keyboard will now send a signal from the keyboard through the data set and back to the DS150C. If the screen displays the same characters as typed, service is considered operational.

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

### Transportation to User Site

**3.10** Repack keyboard in shipping carton. Use the following procedure:

- a) Set POWER switch at rear of data terminal in OFF position.
- b) Disconnect power supply cord from main supply.
- c) Disconnect power supply cord from rear of data terminal.
- d) Disconnect interface cable from interface box on rear of data terminal and rear of keyboard.
- e) Place keyboard in its shipping carton, close the flaps, slide the sleeve over the carton and tape in place across open ends.

### Site Requirements, Customer Responsibilities

**3.11** The following facilities are required at the user site:

- a) A telephone connected to a telephone line via a modular jack (telephone not used in private line application).
- b) Three-wire, single phase, grounded 117V, 60 Hz power receptacle within reach of 8-foot power cord on data terminal unit.

- c) Desk, table or platform capable of supporting Vu-Set data terminal, keyboard and telephone set.

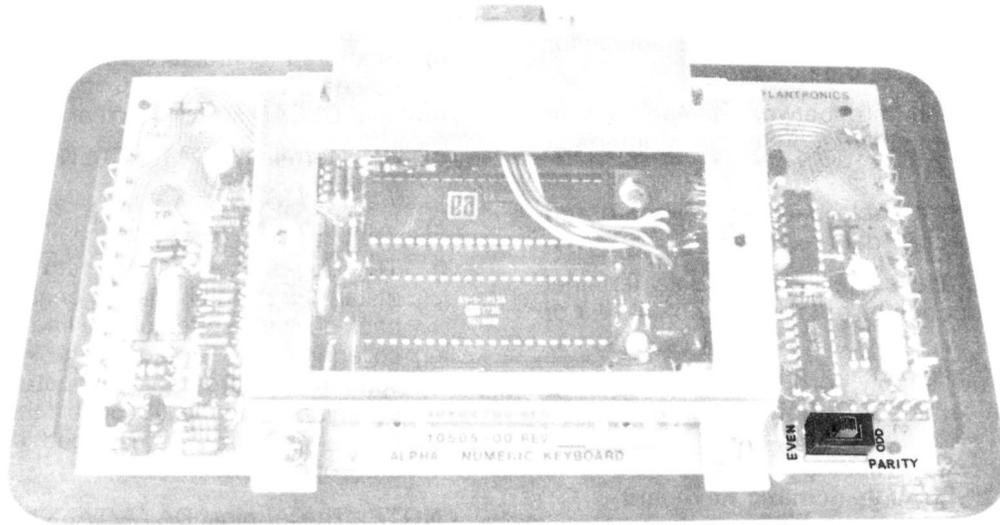
**Site Requirements, TELCO Responsibilities**

**3.12** The keyboard and terminal are designed to operate on telecommunication lines that meet normal talking and ringing requirements.

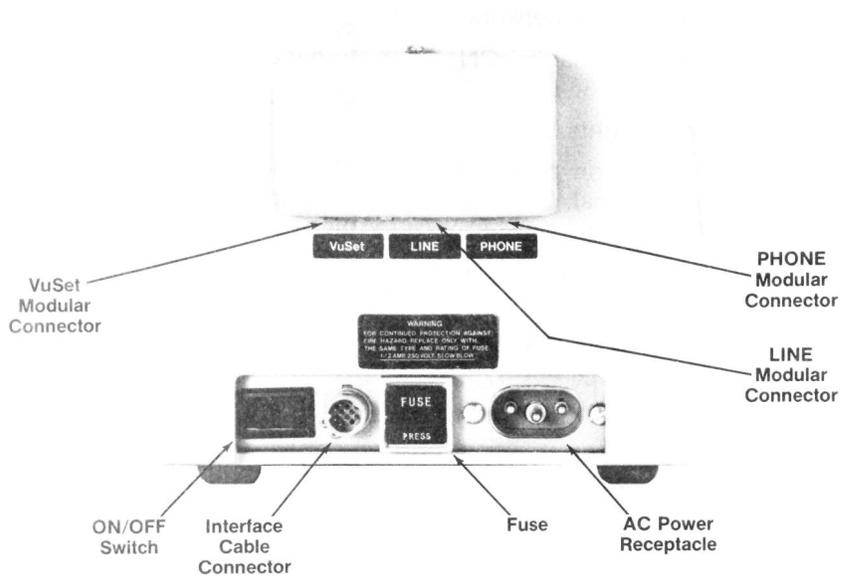
**User Site Installation**

**3.13** Install telephone set (if required) with the Vu-Set equipment according to standard plant practices. Test the completed installation per paragraph 3.07, 3.08, or 3.09.

**3.14** It is suggested that the VuSet keyboard shipping carton, including its outer sleeve, be retained at the user location.



**Figure 8, Keyboard Parity Switch**



**Figure 9, VuSet and Keyboard Modular Interface**

## VuSet SYSTEM

### 4. ON-SITE TROUBLESHOOTING

#### General

**4.01** The VuSet Alphanumeric Keyboard is designed to be replaced rather than be repaired on site. Use the procedures in the following paragraph, as well as 3.06, 3.07, 3.08 and 3.09 to isolate system problems to the keyboard.

#### Fault Isolation (Dial-up Network)

**4.02** With the keyboard connected to the data terminal and telephone modular jack, and power applied through the terminal, depress the keyboard CTRL and SHFT buttons while observing the CONTROL and SHIFT indicators. If either indicator does not light when its corresponding button is depressed, replace the keyboard per procedures in paragraph 4.06.

**4.03** If the keyboard is suspected of causing other system problems, test as follows:

- a) Place a call to the VuSet Alphanumeric Keyboard test number.
- b) On receipt of answerback tone, place DATA/TALK switch into DATA position and leave handset off-hook.
- c) Enter data via keyboard according to prompting messages on terminal CRT.
- d) If display prompts properly but does not acknowledge receipt of keyboard information, terminate call and replace keyboard per procedures in paragraph 4.06.

#### Fault Isolation (Private Line Network)

**4.04** With the keyboard connected to the data terminal and telephone modular jack, and power applied through the terminal, depress the keyboard CTRL and SHFT buttons while observing the CONTROL and SHIFT indicators. If either indicator does not light when its corresponding button is depressed, replace the keyboard per procedures in paragraph 4.06.

**4.05** If the keyboard is suspected of causing other problems, test as follows:

- a) Verify that terminal DATA/TALK switch is in DATA position.
- b) Verify that terminal DATA lamp lights steady.
- c) If display prompts properly but does not acknowledge receipt of keyboard information, replace keyboard per procedures in paragraph 4.06.

#### Removal/Replacement

**4.06** To remove and replace the keyboard, proceed as follows:

- a) If telephone is used, ensure that telephone handset is on switchhook.
- b) Ensure that terminal DATA/TALK switch is in TALK position.
- c) Place POWER switch at rear of data terminal in OFF position.
- d) Disconnect power supply cord from main supply.
- e) Disconnect interface cable at rear of keyboard.
- f) Connect interface cable to receptacle at rear of new keyboard.
- g) Connect power supply cord to main supply.
- h) Place POWER switch at rear of data terminal to ON position.
- j) Test new keyboard per procedures in paragraph 3.07, 3.08, or 3.09.

### 5. MAINTENANCE

#### General

**5.01** The VuSet Alphanumeric Keyboard is not designed to be maintained in the field. Suspected faulty keyboards should be returned to Western Electric Service Center.

#### Cleaning and Touch-up Procedure

**5.02** Soap and warm water applied with a damp towel to all external surfaces will give the best results. For stubborn scuff marks, most commercial cleansers can be used as directed without harm. Care should be taken to avoid scratching the surface.

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