

P R E L I M I N A R Y I N F O R M A T I O N

KEYBOARD ASSEMBLY

Supplement to Basic Display Unit User's Guide

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CHAPTER 1

GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual is a supplement to the Basic Display Unit User's Guide and provides general information, installation and operating instructions, and theory of operation for the Keyboard Assembly. Six versions of the keyboard are offered as optional equipment for the Basic Display Unit. These versions are as follows:

- a. M68SVS30100 - Standard TTY keys plus control keys
- b. M68SVS30200 - Same as keyboard a plus 12 function keys
- c. M68SVS30300 - Same as keyboard a plus 16 function keys, editing keys, cursor control keys, and Page mode control keys
- d. M68SVS303A0 - Same as keyboard c plus auxiliary control keys
- e. M68SVS30400 - Same as keyboard c plus numeric keypad
- f. M68SVS304A0 - Same as keyboard e plus auxiliary control keys

Figure 1-1 shows a typical keyboard assembly. A glossary of terms and acronyms used throughout this manual, with their definitions, is provided in Appendix C.

1.2 FEATURES

The features of the Keyboard Assembly include:

- . Teletypewriter compatability
- . Solid state momentary action keys
- . Automatic repeat - When a key is held down, character is repeated until key is released.
- . Rollover - When one key is already depressed, and a second key is depressed, the code for the second key will not be generated until the first key is released.
- . Lock-Out - No codes are generated if two or more keys are depressed simultaneously.

1.3 SPECIFICATIONS

The specifications for the Keyboard Assemblies are identified in Table 1-1.

TABLE 1-1. Keyboard Assembly Specification

CHARACTERISTICS	SPECIFICATION
Power Requirements	+5 Vdc @ 750 mA max.
Logic Requirements	TTL Compatible
Environmental Requirements	
Operating	+15° C to 50° C
Storage	-40° C to 65° C
Dimensions	
Height	3.50 inches
Width	18.54 inches
Length	8.34 inches
Weight	6.5 lbs. max.
Connector Type (20 pin)	AMP 88107-1 or equivalent

1.4 GENERAL DESCRIPTION

The Keyboard Assembly is provided as an option to the Basic Display Unit and is used to generate and control the display of alphanumeric data. The Keyboard's encoded keys generate a seven-bit ASCII code set. The displayable characters in the ASCII set are arranged on the keyboard in a teletypewriter format.

The keyboard can be operated in the On Line or Local modes of operation. In the On Line mode, data exchange between the Basic Display Unit and a host computer is permitted. The Local mode is used only for testing and demonstration purposes.

In addition to the keyboard, other options are available for the Basic Display Unit to enhance its capabilities. For further information regarding the relationship between the keyboard, the Basic Display Unit, and its options, refer to the Basic Display Unit User's Manual.

1.5 EQUIPMENT SUPPLIED

The Keyboard Assembly is shipped with this manual included.

1.6 OPTIONAL EQUIPMENT

Several keyboard interconnecting cable assemblies are available as options. These options provide a ready-made solution to the problem of interconnects. The cable assembly options are as follows:

- . Flat Ribbon Cable with Connector (18 inch), part number M68SVS40200
- . Round Cable with Connector (3 feet), part number M68SVS40300
- . Round Cable with Connector (6 feet), part number M68SVS40400

CHAPTER 2

INSTALLATION INSTRUCTIONS

2.1 INTRODUCTION

This chapter provides instructions for unpacking, inspection, installation, and preparation for use of the Keyboard Assembly.

2.2 UNPACKING INSTRUCTIONS

The user may receive the Keyboard Assembly as part of the Basic Display Unit or as an individual unit. When the Keyboard Assembly is shipped as part of the Basic Display Unit, the unpacking instructions are discussed in the Basic Display Unit User's Guide. When the Keyboard Assembly is shipped as an individual unit, unpack in accordance with the following paragraph.

Unpack the Keyboard Assembly from its shipping carton and, referring to the packing list, verify that all of the items are present. Save the packing material for storing and reshipping of the assembly. If the shipping carton is damaged upon receipt, request that the carrier's agent be present while the assembly is being unpacked and inspected.

2.3 INSPECTION

The Keyboard Assembly should be inspected upon receipt for broken, damaged, or missing parts, and for physical damage to the interconnecting cable.

2.4 KEYBOARD ASSEMBLY/BASIC DISPLAY UNIT INTERCONNECTIONS

The Keyboard Assembly is connected to, and is detachable from, the Basic Display Unit by a flexible cable. The cable may be one of two types, flat ribbon or round, and is available in optional lengths.

Removing the bottom panel of the Basic Display Unit permits the keyboard's cable connector to connect to the 20 contact edge connector of the Basic Display Unit's CRT Controller Board (observe orientation). Table 2-1 lists each pin connection, signal mnemonic, and the signal characteristics.

TABLE 2-1. KEYBOARD ASSEMBLY, CABLE PIN CONNECTIONS

PIN NUMBER	SIGNAL MNEMONIC	SIGNAL NAME AND DESCRIPTION
1	KBD0	7-Bit ASCII code (keyboard data bit 0) -- One bit of the 7-bit code that defines each character output by the keyboard.
2	KBD1	KEYBOARD DATA BIT 1 -- Same as KBD0 on pin 1.
3	KBD2	KEYBOARD DATA BIT 2 -- Same as KBD0 on pin 1.
4	KBD3	KEYBOARD DATA BIT 3 -- Same as KBD0 on pin 1.
5	KBD4	KEYBOARD DATA BIT 4 -- Same as KBD0 on pin 1.
6	KBD5	KEYBOARD DATA BIT 5 -- Same as KBD0 on pin 1.
7	KBD6	KEYBOARD DATA BIT 6 -- Same as KBD0 on pin 1.
8	KBD7	KEYBOARD DATA BIT 7 -- The bit defining whether the code is to be interpreted by the Basic Display Unit as an ASCII character or as a control function.
9	<u>KBSTB</u>	KEYBOARD STROBE -- The low-going, negative logic strobe pulse is generated upon depressing an outputted key. Used to initiate an interrupt request.
10	<u>KBATT</u>	KEYBOARD ATTACHED -- Provides a ground to the Basic Display Unit as an indication that the keyboard is attached to the Basic Display Unit.
11	<u>ON LN DR</u>	ON LINE DRIVER -- This signal is used to illuminate the ON LINE key's target light when in the On Line mode.
12	<u>AUT LF DR</u>	AUTO LINE FEED DRIVER -- This signal is used to illuminate the AUTO LF key's target light when in the Auto Line Feed mode.
13	<u>PAG M DR</u>	PAGE MODE DRIVER -- This signal is used to illuminate the PAGE MODE key's target light when in the Page mode.
14	<u>AUX ON DR</u>	AUXILIARY ON DRIVER -- This signal is used to illuminate the AUX ON key's target light when the auxiliary on command is generated.
15	<u>AUX EN DR</u>	AUXILIARY ENABLE DRIVER -- This signal is used to illuminate the AUX EN key's target light when the auxiliary enable command is generated.
16	<u>INS CH DR</u>	INSERT CHARACTER DRIVER -- This signal is used to illuminate the INS CH key's target light when the insert character command is generated.
17	+5V	+5 Vdc -- Used for keyboard's logic circuits.
18	-	Not used.
19,20	GND	GROUND

CHAPTER 3

OPERATION

3.1 INTRODUCTION

Information in this chapter is intended to familiarize the user with the basic functions of the Keyboard Assembly. As previously mentioned, the Keyboard Assembly is provided as an option to the Basic Display Unit and is configured in six versions. Since the M68SVS304A0 version contains the full complement of all keys used on the other five versions, it will be used in the following discussion. Figure 1-4 illustrates all functional keys of the Keyboard Assembly. Appendix A provides the coded ASCII values generated by the keyboard.

3.2 GENERAL OPERATION

The Keyboard Assembly and the Basic Display Unit operate together to effect display changes. The general mode of operation is as follows:

- . Control code outputs from the keyboard are processed as they are received by the Basic Display Unit. In the event the code is invalid or incomplete, the effect on the display area is undefined.
- . All character codes are displayed at the current cursor position, and the cursor is advanced one position to the right.
- . In Scroll mode, the screen display area serves as a scroll area. In this mode, a line feed command causes an upward scroll of all lines if the cursor is in the last line. The top line is scrolled out of the display area and the bottom line is left blank with the cursor in the current column.
- . In Page mode, the screen display area represents a page of information. The cursor moves about within this page and is controlled by commands. It provides a "prompt" position to indicate where the next character will be displayed. (The Page mode option is provided only with the M68SVS30300, M68SVS30400, M68SVS303A0, and M68SVS304A0 versions of the Keyboard Assembly.) The Basic Display Unit's Extended Display Firmware Option provides the necessary control for Page mode operations.

3.3 OPERATING CONTROLS

Operating controls of the Keyboard Assembly are grouped into four categories:

1. General Controls - These controls select the mode of operation and transmission.
2. Keyboard Controls - These are the keys that generate the ASCII characters on the display, plus providing control and editing functions.

3. Function Controls - These keys allow commonly used commands to be sent to the Basic Display Unit by depressing a single key.
4. Auxiliary Controls - These keys (AUX SEND, AUX LINE, and AUX ENBL) are used in conjunction with the optional Extended Communications Firmware. Refer to the Extended Communications Firmware Supplement for definition.

3.3.1 General Controls

The Keyboard's general controls are as follows:

ON LINE The ON LINE key selects either the On Line or Local mode of operation. When illuminated (On Line mode), data flow to and from the Basic Display Unit's interface is permitted. In Local mode, data and control are provided by the keyboard. The Basic Display Unit is automatically configured in the half duplex mode, and no data is transmitted to the interface.

PAGE MODE In Page mode (key illuminated), the cursor's position changes according to mode settings and its relative position in the screen display area.

ALL CAPS Depressing the ALL CAPS key (key illuminated) will cause the keyboard to enter the All Capital Letters mode. Resetting the keyboard to the normal mode is accomplished by depressing the ALL CAPS key again. The only keys affected are those generated by the alphabetic keys which will then output their shifted value. All other keys and functions are unaffected, including shift and control functions.

AUTO LF In the Automatic Line Feed mode, a line feed command is automatically inserted when a carriage return is output. The cursor moves to the beginning of the next line.

3.3.2 Keyboard Controls

This section defines the format and effect of each keyboard key that provides a control function.

SHIFT Depressing the SHIFT key in conjunction with another key causes upper case characters to be output. Also, the SHIFT key is used in conjunction with the F1 through F16 function control keys to output function codes. The codes are defined by the Basic Display Unit's firmware or software program.

CTRL Depressing the CTRL (control) key with another key outputs a control code to the Basic Display Unit. Refer to Appendix A for the control codes that are used.

LF The LF (Line Feed) command moves the cursor below its present position. If the cursor is in the bottom line and the display is in the Scroll mode, the top line of the display will be erased, lines 2 through 24 will be moved up one position, and the bottom line will be blank. If the cursor is in the last line and the display is in Page mode, the cursor will be moved to the top line.

ESC

The ESC (Escape) key is used to perform escape functions. Refer to Appendix B for the escape codes and their effect on the display.

BREAK

Depressing the BREAK key forces a "space" condition on the data line as long as the key is depressed.

RETURN

The Carriage RETURN key places the cursor at the beginning of its present line (left margin).

DEL

Deletes character selected by cursor.

CLEAR HOME

The CLEAR HOME key moves the cursor to the home position, which is the first character position of the first line. Thus, home is the upper left-hand corner of the screen. When used in conjunction with the SHIFT key, CLEAR HOME causes the screen to be cleared. The cursor is returned to the home position.

LINE SEND PAGE

When in Page mode, the SEND key causes all data from the home position through the cursor position to be transmitted as a block. When depressed in conjunction with the SHIFT key, the SEND key causes all data from the beginning of the line in which the cursor rests through the end of the line to be transmitted as a block.

↑

In Page mode, the CURSOR UP command moves the cursor one line above its present position. If the cursor is in the first line, this command will move the cursor to the corresponding position in the bottom line.

↓

The CURSOR DOWN command moves the cursor one line below its present position. If the cursor is in the bottom line, this command will move the cursor to the corresponding position in the top line.

→

The CURSOR RIGHT command moves the cursor one character position to the right. If the cursor is at the last position of a line, this command will move the cursor to the first character of the line below. If the cursor is at the last position of the last line, then it will move to the home position.

←

The CURSOR LEFT command moves the cursor one character position to the left. If the cursor is at the first position of a line, this command will move the cursor to the last character of the line above. If the cursor is at the home position, it will move to the lower right corner of the screen.

⇐

In Scroll mode, the tab backward key causes the cursor to move left to previous tab position without line rollover. In Page mode, the tab backward key causes the cursor to move left to the previous tab positions with line and page rollover.

⇒

In Scroll mode, the tab forward key causes the cursor to move right to next tab position without line rollover. In Page mode, the tab forward key causes the cursor to move right to the next tab position with line and page rollover (as defined by the SET TABS command).

SET TABS The block of data following the command defines the tab positions. The tab positions are indicated by an ASCII HT to set a tab, or by an ASCII CAN (cancel) to clear a tab, and are separated by space characters to indicate tab spacing (setting). The block is terminated by a line feed character. The SET TABS command, followed by LF with no spaces, an ASCII CAN or ASCII HT, will cause all tabs to be reset.

DEL CHAR In Page mode, this key deletes the character selected by the cursor and moves all characters to the right of the cursor one position to the left. The right-most column is filled with a space character. The cursor does not change position.

INS CHAR In Page mode, all columns in line, starting with cursor column, are moved right one column. The character in the right-most column is discarded. A character is placed in the cursor column and the cursor advances one column to the right with line rollover.

DEL LINE In Page mode, the DEL LINE (Delete Line) key deletes the line selected by the cursor. All lines below the cursor selected line are moved up one position, and the last line is blanked. Cursor moves to first character position of the deleted line.

INS LINE When this key (Insert Line) is depressed in the Page mode, all lines, starting with the one where the cursor is located, are moved down one line. The last line is discarded and the line where the cursor was located is blanked. The cursor moves to the first position of the blanked line.

Numeric Key Pad The Numeric Key Pad duplicates keys located elsewhere on the keyboard. The numerals are arranged in an adding machine format.

3.3.3 Function Controls

The function control keys, F1 through F16, are used to select operations at a specific command level. The key functions are defined by the terminal's firmware or software program.

CHAPTER 4

THEORY OF OPERATION

4.1 INTRODUCTION

This chapter provides the theory of operation for the Keyboard Assembly. A block diagram of the keyboard and its associated circuitry is presented in Figure 4-1.

4.2 BLOCK DIAGRAM DESCRIPTION

The Keyboard Assembly supplied as an option to the Basic Display Unit is electronic. The keys are solid state monetary action modules which are connected to an encoder within the assembly. The encoder generates an 8-bit code (KBD0-KBD7) which totally and uniquely defines each character (upper or lower case, or a control function). The code generated contains seven bits, equivalent to the ASCII code of the character, and an eighth bit (KBD7) defining whether the code is to be interpreted by the Microprocessor Unit (MPU) as a control function or ASCII character.

A strobe signal ($\overline{\text{KBSTB}}$) is generated whenever a character key is depressed. The strobe signal causes the input from the keyboard to be stored in a temporary buffer in the Peripheral Interface Adapter (PIA). The strobe signal also causes an interrupt request to be sent to the MPU. Upon receiving the interrupt, the MPU is required (having completed its current instruction) to read the data stored in the PIA's buffer, recode it, and then store it in the next vacant location in system memory. Whenever there are no interrupts awaiting service, the MPU reads the contents stored in memory and clears it. The MPU then executes internally stored firmware programs to interpret or perform keyboard input commands. These programs control all display and standard communication functions.

In response to codes generated by an illuminating key, the MPU executes an instruction which will be used to drive the key's LED indicator via the PIA. For a detailed description of the circuitry and firmware associated with the keyboard option, refer to the Basic Display Unit User's Manual.

BASIC DISPLAY UNIT'S CRT CONTROLLER BOARD

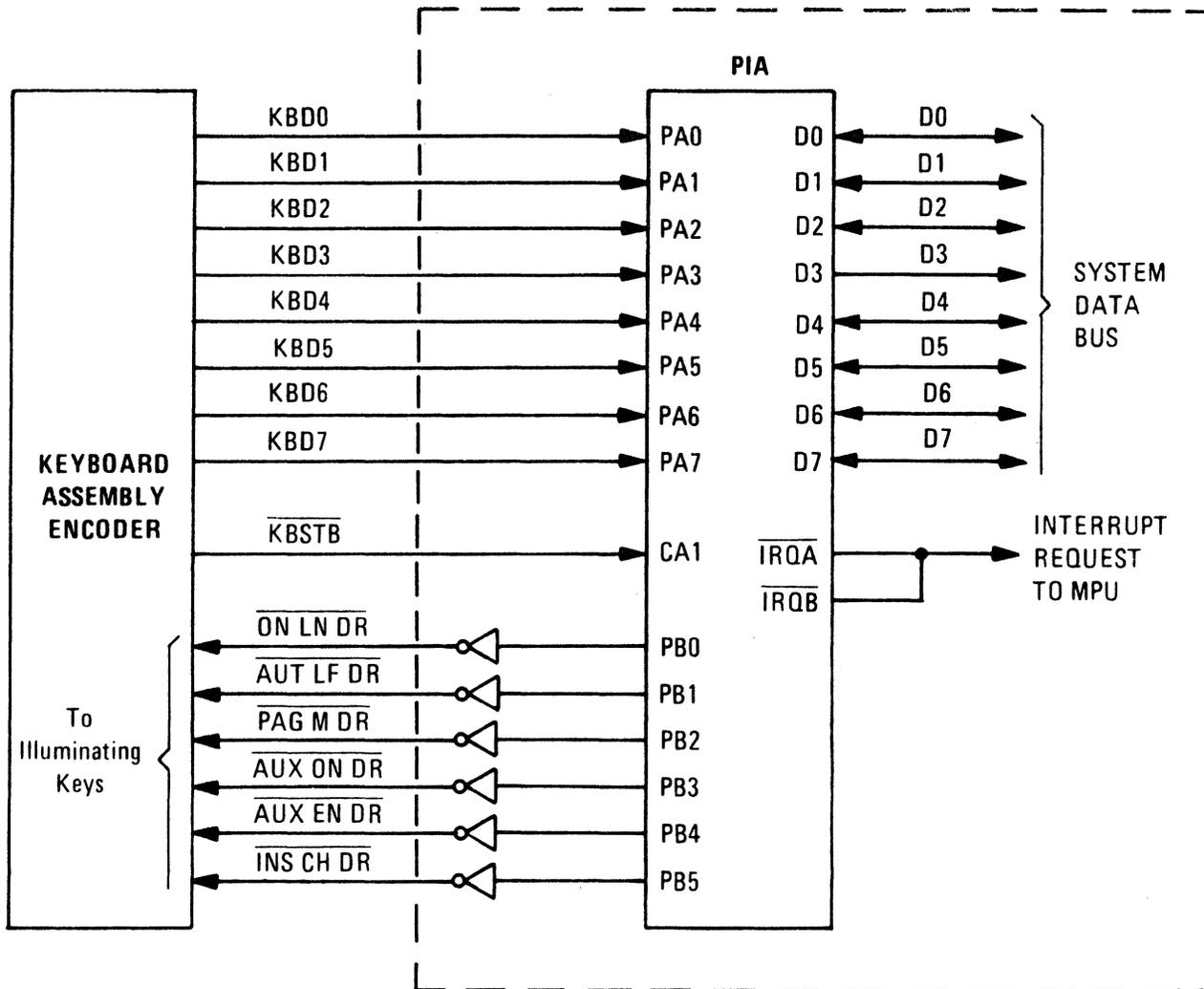


FIGURE 4-1. Keyboard Assembly Block Diagram

APPENDIX A

KEYBOARD ENCODED VALUES

OUTPUT CODE (HEX)

<u>KEY</u>	<u>KEY FUNCTION</u>	<u>KEY ONLY</u>	<u>KEY+SHIFT</u>	<u>KEY+CTRL</u>
F1	As Defined*	A0	B0	FF (Not used)
F2	As Defined*	A1	B1	FF (Not used)
F3	As Defined*	A2	B2	FF (Not used)
F4	As Defined*	A3	B3	FF (Not used)
F5	As Defined*	A4	B4	FF (Not used)
F6	As Defined*	A5	B5	FF (Not used)
F7	As Defined*	A6	B6	FF (Not used)
F8	As Defined*	A7	B7	FF (Not used)
F9	As Defined*	A8	B8	FF (Not used)
F10	As Defined*	A9	B9	FF (Not used)
F11	As Defined*	AA	BA	FF (Not used)
F12	As Defined*	AB	BB	FF (Not used)
F13	As Defined*	AC	BC	FF (Not used)
F14	As Defined*	AD	BD	FF (Not used)
F15	As Defined*	AE	BE	FF (Not used)
F16	As Defined*	AF	BF	FF (Not used)
AUTO LF	Auto. Line Feed (Selected when lit)	F7	F7	FF (Not used)
ON LINE	Terminal on line when lit	F8	F8	FF (Not used)
PAGE MODE	Page Mode function selected when lit	C7	C7	FF (Not used)
AUX SEND	Undefined	F4	F4	FF
AUX LINE	Undefined (Illuminated)	F5	F5	FF
AUX ENBL	Undefined (Illuminated)	F6	F6	FF
1 and !	Print 1 Print ! Not used	31 -- --	-- 21 --	-- -- FF
2 and "	Print 2 Print " Not used	32 -- --	-- 22 --	-- -- FF
3 and #	Print 3 Print # Not used	33 -- --	-- 23 --	-- -- FF
4 and \$	Print 4 Print \$ Not used	34 -- --	-- 24 --	-- -- FF

OUTPUT CODE (HEX)

<u>KEY</u>	<u>KEY FUNCTION</u>	<u>KEY ONLY</u>	<u>KEY+SHIFT</u>	<u>KEY+CTRL</u>
5 and %	Print 5	35	--	--
	Print %	--	25	--
	Not used	--	--	FF
6 and &	Print 6	36	--	--
	Print &	--	26	--
	Not used	--	--	FF
7 and ^	Print 7	37	--	--
	Print ^	--	27	--
	Not used	--	--	FF
8 and (Print 8	38	--	--
	Print (--	28	--
	Not used	--	--	FF
9 and)	Print 9	39	--	--
	Print)	--	29	--
	Not used	--	--	FF
Ø	Print Ø	3Ø	FØ	--
	Not used	--	--	FF
- and =	Print -	2D	--	--
	Print =	--	3D	--
	Not used	--	--	FF
^ and ~	Print ^	5E	--	--
	Print ~	--	7E	--
	ASCII RS	--	--	1E
\ and :	Print \	5C	--	--
	Print :	--	7C	--
	ASC FS	--	--	1C
BREAK	Execute break	8C	8C	--
	Not used	--	--	FF
INS CHAR	Insert Character mode selected when lit	DØ	DØ	FF (Not used)
DEL CHAR	Deletes Character selected by cursor	D1	D1	FF (Not used)
SET TABS	Initializes Set Tabs function	DC	DC	FF (Not used)
ESC	Escape function	1B	1B	FF (Not used)
Q	Print q	71	--	--
	Print Q	--	51	--
	ASCII DC1	--	--	11
W	Print w	77	--	--
	Print W	--	57	--
	ASCII ETB	--	--	17
E	Print e	65	--	--
	Print E	--	45	--
	ASCII ENQ	--	--	Ø5

OUTPUT CODE (HEX)

<u>KEY</u>	<u>KEY FUNCTION</u>	<u>KEY ONLY</u>	<u>KEY+SHIFT</u>	<u>KEY+CTRL</u>
R	Print r	72	--	--
	Print R	--	52	--
	ASCII DC2	--	--	12
T	Print t	74	--	--
	Print T	--	54	--
	ASCII DC4	--	--	14
Y	Print y	79	--	--
	Print Y	--	59	--
	ASCII EM	--	--	19
U	Print u	75	--	--
	Print U	--	55	--
	ASCII NAK	--	--	15
I	Print i	69	--	--
	Print I	--	49	--
	ASCII HT	--	--	09
O	Print o	6F	--	--
	Print O	--	4F	--
	ASCII SI	--	--	0F
P	Print p	70	--	--
	Print P	--	50	--
	ASCII DLE	--	--	10
@ and ^	Print @	40	--	--
	Print ^	--	60	--
	ASCII NUL	--	--	00
LF	Generate line feed	0A	0A	FF (Not used)
RETURN	Generate carriage return	0D	0D	FF (Not used)
←	Tab backward	DB	DB	FF (Not used)
→	Tab forward	DA	DA	FF (Not used)
DEL LINE	Delete line indicated by cursor and move text up	D7	D7	FF (Not used)
A	Print a	61	--	--
	Print A	--	41	--
	ASCII SOH	--	--	01
S	Print s	73	--	--
	Print S	--	53	--
	ASCII DC3	--	--	13
D	Print d	64	--	--
	Print D	--	44	--
	ASCII EOT	--	--	04
F	Print f	66	--	--
	Print F	--	46	--
	ASCII ACK	--	--	06

OUTPUT CODE (HEX)

<u>KEY</u>	<u>KEY FUNCTION</u>	<u>KEY ONLY</u>	<u>KEY+SHIFT</u>	<u>KEY+CTRL</u>
G	Print g	67	--	--
	Print G	--	47	--
	ASCII BEL	--	--	07
H	Print h	68	--	--
	Print H	--	48	--
	ASCII BS	--	--	08
J	Print j	6A	--	--
	Print J	--	4A	--
	ASCII LF	--	--	0A
K	Print k	6B	--	--
	Print K	--	4B	--
	ASCII VT	--	--	0B
L	Print l	6C	--	--
	Print L	--	4C	--
	ASCII FF	--	--	0C
; and +	Print ;	3B	--	--
	Print +	--	2B	--
	Not used	--	--	FF
: and *	Print :	3A	--	--
	Print *	--	2A	--
	Not used	--	--	FF
[and {	Print [5B	--	--
	Print {	--	7B	--
	ASCII ESC	--	--	1B
] and }	Print]	5D	--	--
	Print }	--	7D	--
	ASCII GS	--	--	1D
↑	Move cursor up one line	C1	C1	FF (Not used)
↓	Move cursor down one line	C2	C2	FF (Not used)
INS LINE	Insert line at point indicated by cursor	D6	D6	FF (Not used)
Z	Print z	7A	--	--
	Print Z	--	5A	--
	ASCII SUB	--	--	1A
X	Print x	78	--	--
	Print X	--	58	--
	ASCII CAN	--	--	18
C	Print c	63	--	--
	Print C	--	43	--
	ASCII ETX	--	--	03

OUTPUT CODE (HEX)

KEY	KEY FUNCTION	KEY ONLY	KEY+SHIFT	KEY+CTRL
V	Print v	76	--	--
	Print V	--	56	--
	ASCII SYN	--	--	16
B	Print b	62	--	--
	Print B	--	42	--
	ASCII STX	--	--	02
N	Print n	6E	--	--
	Print N	--	4E	--
	ASCII SO	--	--	0E
M	Print m	6D	--	--
	Print M	--	4D	--
	ASCII CR	--	--	0D
, and <	Print ,	2C	--	--
	Print <	--	3C	--
	Not used	--	--	FF
. and >	Print .	2E	--	--
	Print >	--	3E	--
	Not used	--	--	FF
/ and ?	Print /	2F	--	--
	Print ?	--	3F	--
	Not used	--	--	FF
DEL	Delete	5F	7F	--
	ASCII VS	--	--	1F
←	Move cursor left one character	C3	C3	FF (Not used)
→	Move cursor right one character	C4	C4	FF (Not used)
LINE ERASE	Delete line indicated by cursor. Following lines are <u>NOT</u> moved up.	D4	D5	FF (Not used)
CLEAR HOME	Home-position cursor to upper left-hand corner of CRT screen.	C0	--	--
	Erase screen	--	D8	--
	Not used	--	--	FF
Space Bar	Print space	20	20	FF (Not used)
SEND	Send all data	D9	--	--
	Send 1 line	--	DF	--
	Not used	--	--	FF
7	Print 7	37	--	--
	Print ^	--	27	--
	Not used	--	--	FF

OUTPUT CODE (HEX)

<u>KEY</u>	<u>KEY FUNCTION</u>	<u>KEY ONLY</u>	<u>KEY+SHIFT</u>	<u>KEY+CTRL</u>
8	Print 8	38	--	--
	Print (--	28	--
	Not used	--	--	FF
9	Print 9	39	--	--
	Print)	--	29	--
	Not used	--	--	FF
4	Print 4	34	--	--
	Print \$	--	24	--
	Not used	--	--	FF
5	Print 5	35	--	--
	Print %	--	25	--
	Not used	--	--	FF
6	Print 6	36	--	--
	Print &	--	26	--
	Not used	--	--	FF
1	Print 1	31	--	--
	Print !	--	21	--
	Not used	--	--	FF
2	Print 2	32	--	--
	Print "	--	22	--
	Not used	--	--	FF
3	Print 3	33	--	--
	Print #	--	23	--
	Not used	--	--	FF
∅	Print ∅	3∅	f∅	FF (Not used)
.	Print .	2E	--	--
	Print >	--	3E	--
	Not used	--	--	FF
ALL CAPS	Limits ASCII output from keyboard to all characters using SHIFT.			
CTRL	Control key			
SHIFT	Shift key			

NOTES:

1. Some keys are not defined but are encoded. This permits the user to specifically identify operations not currently accommodated.
2. Some keys are not encoded. These keys are identified by the output code of FF and are shown as not used.
3. * indicates that these key functions are defined by the terminal's firmware or software program.

APPENDIX B
ESCAPE SEQUENCES

<u>ESCAPE SEQUENCE</u>	<u>FUNCTION</u>	<u>ESCAPE SEQUENCE</u>	<u>FUNCTION</u>
ESC, @	CURSOR TO HOME POSITION	ESC, ~	SET BLINK
ESC, A	CURSOR UP ONE LINE	ESC, a	RESET BLINK
ESC, B	CURSOR DOWN ONE LINE	ESC, b	SET (FIELD) VIDEO INVERT
ESC, C	CURSOR LEFT ONE COLUMN	ESC, c	RESET (FIELD) VIDEO INVERT
ESC, D	CURSOR RIGHT ONE COLUMN	ESC, d	SET HALF BRIGHT
ESC, E	LOAD CURSOR POSITION	ESC, e	RESET HALF BRIGHT
ESC, F	READ CURSOR POSITION	ESC, f	SET UNDERLINE
ESC, G	SET PAGE MODE	ESC, g	RESET UNDERLINE
ESC, H	SET SCROLL MODE	ESC, h	SET NON-DISPLAY
ESC, I	SET TOP DISPLAY LINE	ESC, i	RESET NON-DISPLAY
ESC, J	SET LAST DISPLAY LINE	ESC, j	SET FIELD PROTECT
ESC, K	SET LEFT DISPLAY COLUMN	ESC, k	RESET FIELD PROTECT
ESC, L	SET RIGHT DISPLAY COLUMN	ESC, l	SET TRANSPARENT MODE
ESC, M	SET PROTECT MODE	ESC, m	RESET TRANSPARENT MODE
ESC, N	WRITE ABSOLUTE	ESC, n	SET VIDEO INVERT-FULL SCREEN
ESC, O	READ ABSOLUTE	ESC, o	RESET VIDEO INVERT-FULL SCREEN
ESC, P	CHARACTER INSERT	ESC, q	TERMINAL RESET
ESC, Q	CHARACTER DELETE	ESC, r	ALLOW STATUS INDICATORS
ESC, R	ENABLE KEYBOARD	ESC, s	DISALLOW STATUS INDICATORS
ESC, S	DISABLE KEYBOARD	ESC, z	ENABLE LOAD FUNCTION
ESC, T	PAGE ERASE	ESC, {	DISABLE LOAD FUNCTION
ESC, U	LINE ERASE	ESC, :	SET DISPLAY SPECIAL CHARACTERS
ESC, V	LINE INSERT	ESC, }	RESET DISPLAY SPECIAL CHARACTERS
ESC, W	LINE DELETE		
ESC, X	CLEAR/HOME		
ESC, Y	SEND PAGE		
ESC, Z	TAB		
ESC, [BACK TAB		
ESC, \	SET TABS		
ESC,]	START DATA		
ESC, ^	END DATA		
ESC, _	SEND LINE		

APPENDIX C

GLOSSARY OF TERMS

ASCII CODE: A seven bit code universally accepted as the data unit for representing character codes. Known as the American Standard Code for Information Interchange (ASCII).

BUFFER: An electronic circuit which forms a temporary store for data or information signals.

FIRMWARE: Programs or control instructions which are not changeable (by the user) and are held in read only memory or other permanent memory devices.

HOME: The home position is the first character position of the first line. Thus, home is the upper left-hand corner of the display screen.

INTERRUPT: The hardware system which enables a program being executed by a processor to be temporarily suspended, an alternative program executed, and the original program execution resumed where it was suspended.

LINE ROLLOVER: Cursor moving to the left on a display screen - proceeds from left-most column of current line to right-most column of previous line, proceeds from left-most column of top line to right-most column of last line.
Cursor movement to the right - proceeds from right-most column of current line to left-most column of next line, proceeds from right-most column of last line to left-most column of top line.

MEMORY: The general term for the internal store where data, programs, or other information needed by the processor system is held. Often used to refer to the individual store locations where particular data can be immediately accessed.

MICROPROCESSOR UNIT (MPU): The integrated circuits containing the control or arithmetic logic of the microprocessor, or the actual microprocessor, including its inherent memory.

PAGE ROLLOVER: Cursor movement upward on a display screen - proceeds from top line to last line in same column.
Cursor movement downward - proceeds from last line to top line in same column.

PERIPHERAL INTERFACE ADAPTER (PIA): An integrated circuit that provides a flexible method of connecting byte-oriented peripherals to an MPU. The PIA features built in registers which not only make it programmable but also provide temporary data storage to simplify data transfer.

