TECHNICAL
USER MANUAL

MICRO B
SERIES

MCB, MCB1A, DM10, DM1A

BEEHIVE INTERNATIONAL

TECHNICAL USER MANUAL

MICRO B

VIDEO DISPLAY TERMINALS

MICRO BEE, MICRO BEE 1A, DM10, & DM1A

NOVEMBER 1979

ALL SPECIFICATIONS CONTAINED
IN THIS MANUAL ARE SUBJECT TO
CHANGE AT ANY TIME WITHOUT
NOTICE.

BEEHIVE INTERNATIONAL

Manufacturer of Quality Computer Systems

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b. Failure or malfunctions which occur as a result of improper maintenance, operation (including hostile operating environment) or lack of care.

c. Components (if any) which are specified in the Reference or Operating Manual as being excluded from warranty.

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LIMITATIONS OF WARRANTY

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In some cases Beehive's direct customer has, by written contract, waived all warranties, express and implied, in exchange for an additional discount.

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SECTION I
INTRODUCTION

This manual provides a comprehensive description and operating instructions for the following video display terminals:

- Micro Bee
- Micro Bee 1A
- Micro Bee/Model DM10
- Micro Bee/Model DM1A

These four terminals have very similar operating characteristics and differ mostly in physical appearance and features offered.

The Micro Bee and Model DM10 are identical except for external packaging—the DM10 has a detachable keyboard and the Micro Bee does not. The detachable keyboard also distinguishes the DM1A from the Micro Bee 1A.

The Micro Bee 1A and DM1A both offer a bi-directional buffered auxiliary port and an array of 20 function keys which control the auxiliary port, move the cursor, activate memory locking, set visual attributes or initiate up to twelve user-assigned CPU functions.

Section I provides a brief description of the Micro Bee terminal and a specifications listing in Table 1-1.

Section II describes the installation and initial checkout of the terminal.

Section III describes the operational characteristics and functions of the terminal. Basic operator information is included in this section.

The Micro Bee (see Figure 1-1) is an 8085A microprocessor-controlled, conversational video display terminal which offers the latest advances in technology and human engineering. The predominant user-oriented feature is the status line which provides the operator with updated information on operating modes, error messages, communications protocol, the current operating configuration, and even the time of day. The terminal also initiates a self-test upon reset or power-up, the results of which appear on the status line.

Among the Micro Bee features is the ability to invoke a memory lock condition that allows the operator or host computer to protect a portion of the display from operator access while retaining the capability to enter or receive data in the unlocked portion of the display memory. Other visual features include normal, reverse, blink, underline, and half intensity video levels.

The display format is organized with 24 lines of 80 characters each. Field attributes do not occupy a display cell, even though they occur interspersed in the data stream. Up to 16 attributes per line may be entered.

Expanded line graphics capability gives the operator choice of eleven characters--not just vertical and horizontal lines--in making CRT drawings. Each character can be selectively displayed at one of four video levels, allowing the creation of high-quality charts, graphs, and tables. This can all be accomplished directly from the keyboard.

The Micro Bee keyboard includes the best features of both TTY and typewriter. The shape and positioning of the RETURN key and the additional field termination control keys associated with the numeric pad enhance the user-oriented design. Other keyboard features include autorepeat, two-key rollover, and highly reliable reed switch keying.

Some other significant features of the Micro Bee include X-Y addressing, read cursor address, invisible memory address pointer, 128 ASCII character set with descenders, and read terminal status.

SOLID STYLE CASE   DETACHABLE KEYBOARD TYPE

Figure 1-1   Micro Bee Video Display Terminals

Table 1-1 Specifications

DISPLAY FORMAT
24 lines x 80 characters
STATUS LINE
25th line of display
CRT SIZE
12" measured diagonally
CHARACTER SIZE
Approximately 0.2" high x 0.1" wide
CHARACTER TYPE (Alphanumeric)
128 displayable characters, each formed within an 8 x 8 dot matrix. Descenders on lower case characters.
CHARACTER TYPE (Line Drawing)
Eleven graphic symbols for drawing forms and contiguous lines.
CHARACTER GENERATION
MOS ROM
REFRESH RATE
60 Hz. Switch selection of 50 or 60 Hz
REFRESH MEMORY
MOS RAM
CHARACTER DISPLAY
Light characters on a dark background or dark characters on a light background (switch selectable).
VISUAL ATTRIBUTES
Normal, reverse, blink, underline, half intensity, and security fields.
TABULATION
Fixed tab stops occur each eight character positions.
CURSOR
Non-destructive blinking block.
MEMORY LOCK
Causes display area above the cursor-occupied line to be locked from operator access.
LINE LOCK
The host CPU may selectively designate reserved display lines.
MEMORY ADDRESS POINTER
An invisible cursor that is used to read and write to and from the display memory independent of visible screen functions.
CURSOR CONTROL
Up, down, left, right, home, carriage return, line feed.
CURSOR SENSE
Cursor position is transmitted to the host upon request.

CURSOR ADDRESSING
Direct X-Y cursor positioning by line and column.
MEMORY POINTER DATA SENSE
ASCII value of the character located at the memory address pointer
READ TERMINAL STATUS
A 27-byte status message reflecting switch setting, diagnostic results, communication protocol, etc.
SCROLL
When display memory is filled, the bottom line data will scroll upward. Top down overwrite (roll) is switch selectable.
ERASE FUNCTIONS
Erase to end of screen
Erase to end of line
Clear all data
COMMUNICATION INTERFACE
Serial RS232C or 20 ma CLA (switch selectable)
TRANSMISSION RATE
Switch selectable 110 to 19200 baud (EIA)
Switch selectable 110 to 9600 baud (CL)
PARITY
Switch selectable, odd, even, mark or space
COMMUNICATION MODE
Full duplex
Half Duplex
Echoplex
Asynchronous only
OPERATIONAL MODES
Conversational: Character by character transmission.
Local: Off line display data entry
Line Monitor: Displays all ESC codes and control code sequences.
OPTIONS
Switch selectable 50/60 Hz operation. (The 50 Hz option must be installed to enable switch selection of 50 or 60 Hz. Without the option installed the terminal operates at 60 Hz only.)
TERMINATION CHARACTER
Switch selectable CR, EOT, CR-LF, and ETX
TIME-OF-DAY CLOCK
A digital, CRT-displayed clock that may be set by the host CPU or operator
CPU MESSAGE DEPOSIT
A message buffer holds host CPU data and prints "MSG WAIT" on status line for operator recovery.

READ CURSOR CHARACTER
Character at cursor position is transmitted to host upon request.
ERROR INDICATORS
Status line message reflects self-test results.
BELL
Audible alarm upon receipt of control G or as the cursor passes through the 72n character location when data is being entered from keyboard. The continuou alarm on/off feature is included.
KEYBOARD
A 61-key ANSI compatible TTY/Typewriter compatible layout featuring auto-repeat, two key rollover, alpha lock and lower case inhibit. Also includes a 14-key numeric pad with associated field termination control keys. See below for Additional MCB 1A keyboard information.
SELF TEST
Initiated either through host CPU control, by the operator or upon power-up.
INPUT VOLTAGE AND FREQUENCY
115 Vac+ 10% 60 Hz. 50 Hz optional.
230 Vac+ 10% 60 Hz. 50 Hz optional.
ENVIRONMENTAL SPECIFICATIONS
Altitude: Sea level to 10,000 feet
Temperature: 0 C to 40 C
Humidity: 0 to 80% (noncondensing)
TERMINAL SIZE
DM Series - 24" (61cm) deep x 18.2" (46.2cm) wide x 13.1" (33.3 cm) high
Solid case - 22.5" (57.1cm) deep x 19" (48.3 cm) wide x 13" (33 cm) high

MCB 1A/DM1A FEATURES

AUXILIARY PORT
A serial bidirectional interface that has a character buffer on both the send and receive lines. Transparent printing, communications control, as well as independent baud rates are standard.
FUNCTION KEY ARRAY
Includes 12 user-assigned function keys, 5 cursor movement keys, an auxiliary control key, an attribute set key, and a memory lock key.

SECTION II

INSTALLATION

2.1 INTRODUCTION

This section contains information on unpacking, receiving inspection, connection of the communications interface, physical placement of the terminal and preliminary functional control settings for specific user requirements.

2.2 UNPACKING

The following items are furnished with each Micro Bee terminal:

a. The display terminal with keyboard

b. Technical User Manual

There are no tie-downs or packing materials inside the unit that need to be removed.

2.3 INSPECTION FOR IN-SHIPMENT DAMAGE

Upon receipt, carefully check components for any signs of shipping damage. All shipping containers have been specially designed to protect their contents and special care has been taken to prevent damage under normal shipping conditions. Mishandling should be evident upon inspection of the shipping container. If damage is found after visual inspection, take care not to destroy the evidence. If necessary, document the damage with photographs and contact the transport carrier as soon as possible.

2.4 IDENTIFICATION

An identification plate located on the rear of the terminal provides the model number, part number, serial number, weight, voltage and current requirements, and frequency/power classifications.

2.5 INSTALLATION

2.5.1 Placement for Operation

The terminal is fully self-contained except for the power and I/O cables, making it very easy to install or move. Select a convenient, level surface where the cables are not in the way of the operator and are not inadvertently pulled or disturbed by minor changes in the terminal's position. The keyboard should be placed so that operator use is as comfortable as possible.

> **CAUTION:** Do not place the terminal on any surface that blocks cooling air from the back of the cabinet. The terminal is provided with an internal fan for cooling which circulates air through a grille in the back and through spacing at the bottom sides between the cover and terminal frame. To maintain efficient air circulation, keep at least three-and-one-half (3½) inches of clearance at the rear and on the sides of the terminal (see Figure 2-1).

2.5.2 Power Connection

The terminal is shipped with a three-conductor power cord which grounds the instrument through the offset pin. The safety feature of this ground should always be preserved by grounding the terminal to the outlet box or other earth ground. If it is necessary to use an adapter, ground the pigtail.

2-1

Note: The DM series Micro Bee with
detachable keyboard styling is shown.
The standard Micro Bee does not have
a detachable keyboard and its dimen-
sions differ slightly. (See Table 1-1.)

13.1"
(33.3cm)

24"
(61cm)

Allow at least 3.5 inches clearance
on sides and back of terminal to
permit adequate air circulation.

18.2"
(46.2cm)
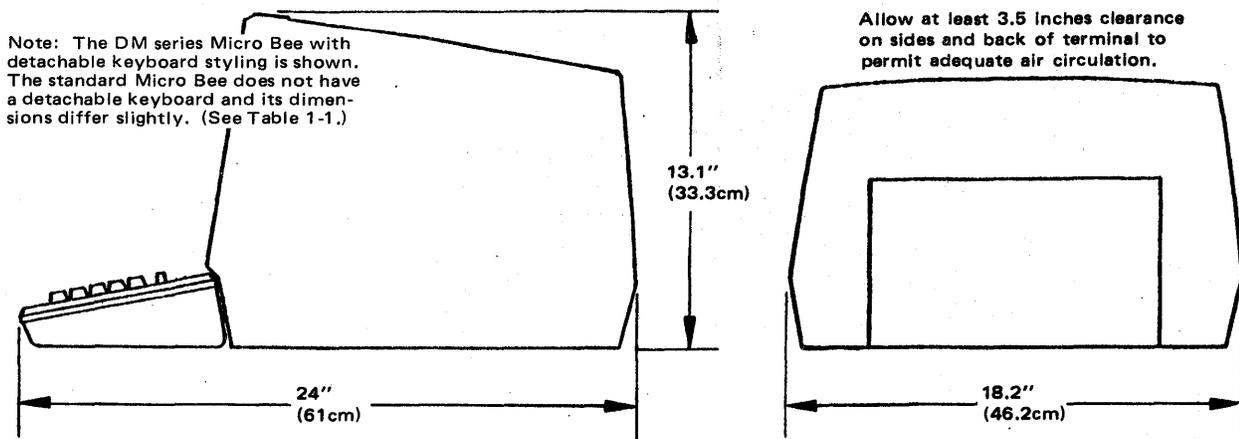
Figure 2-1 Mounting Requirements

2.5.3 Current Loop Interface

The current loop interface is a 20 mA constant
current device which allows the terminal to be
used up to 2000 feet (608m) from the computer.
If shielded, twisted pairs are used, the terminal
may be located up to 6000 feet (1.8km) away if
utilized at slower baud rates. 9600 baud is the
maximum transmission rate possible using the
current loop.

Data transmission without the current loop in-
terface is normally limited to 50 feet. The current
loop converts the TTL logic signals into current
signals at one end of the loop, transmits the pat-
tern, reconverts the pattern to TTL logic signals
at the other end, and delivers it to the computer
or terminal. The current loop connections are
contained within the RS232C I/0 connector and
do not interfere with normal RS232C signals re-
quired for asynchronous operation. Figure 2-2
illustrates four common interfacing schemes for
simplex and full duplex operation using current
loop.

2.5.4 Data Interface Connection

Signals used in communicating with the Micro
Bee conform to the requirements of EIA speci-
fication RS232C. In particular, output voltage
swings from − 10 V to + 10 V, while the receivers
present a minimum of 3K ohms impedance to
the line. The input resistance is ap-
proximately 4K ohms. The driver circuits cur-
rent limit at 10 mA on both source and sink.
All data source interconnections are made via the
rear panel input/output connector (refer to
Figure 2-3). A 25-pin miniature D-type ITT Can-

non connector (DM-25S or equivalent) is used
for connecting to the computer. Pin assignments
are defined in Table 2-1.

When using a minimum AUX port interface configu-
ration (Send, Receive, and Ground), it is necessary
to externally jumper together pins 6 and 20 of the
connector to ensure correct terminal operation.

2.5.5 PC Board-Mounted Control Switches

Three switch blocks are mounted on the printed
circuit board. Two are located at the rear of the
board and are accessible through an external
opening for repositioning. The other switch block
is located near the left rear corner of the board
and can be reached by removing the cover. These
switches are illustrated in Figure 2-4 (External
Switch Block) and Figure 2-5 (Internal Switch
Block).

2.6 INITIAL TURN-ON PROCEDURE

The proper turn-on procedure for the terminal
is described in 3.2.2.

2.7 REAR PANEL SWITCH USE

The operating configuration of the Micro Bee is
defined by rear panel and internal switch posi-
tions as described below. Whenever any of these
switches is changed, it is necessary to reset the
terminal to ensure that all new switch positions
are scanned by software. ESC V, or cycling the
power may be used to accomplish a reset.
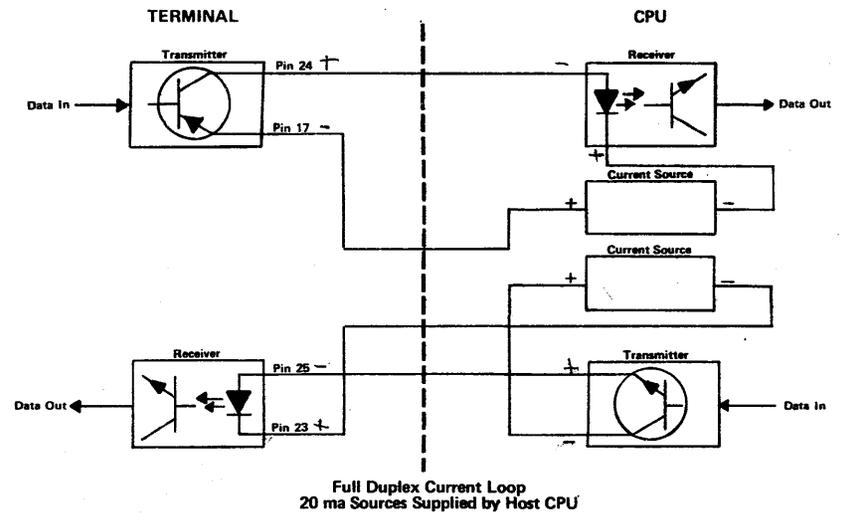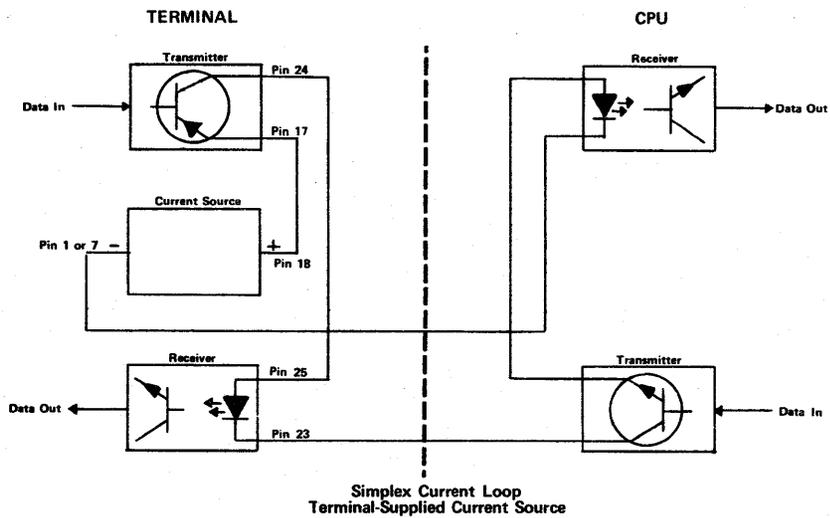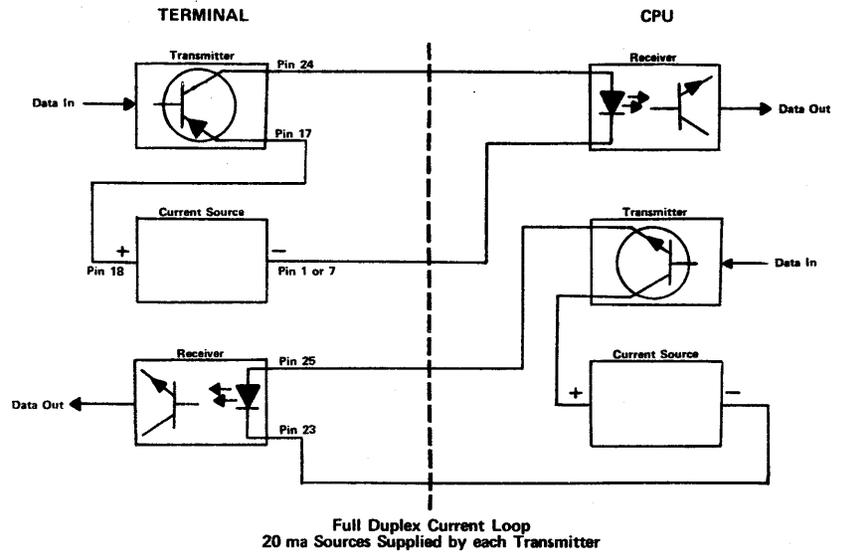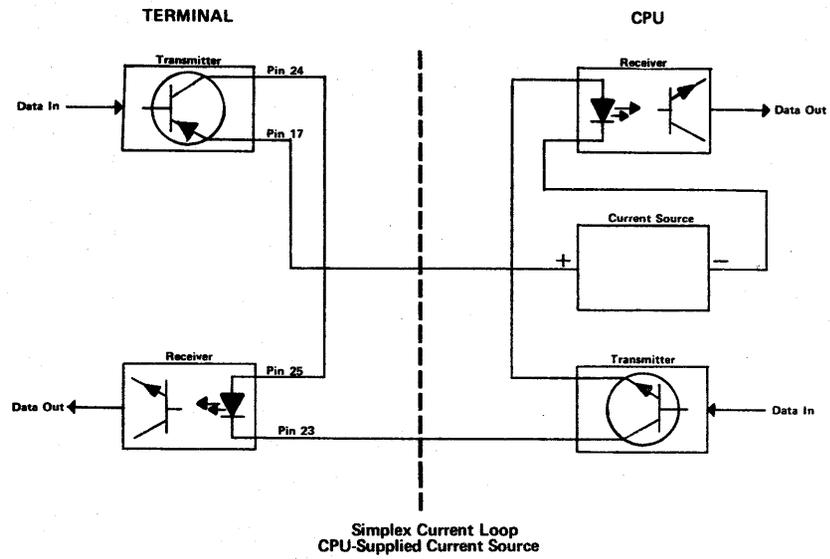
Figure 2-2   Current Loop Cabling

Table 2-1   I/O and Auxiliary Port Pin Assignments

MAIN PORT				
PIN NO.	RS232-C	DESCRIPTION	SIGNAL DIRECTION	ASSIGNMENTS
1	AA	Frame Ground	—	Chassis ground; electrically bonded to frame.
2	BA	Transmitted Data	MCB → Data Set	Transmitted data; Pin 2 will be in the mark condition with no output signal.
3	BB	Received Data	MCB ← Data Set	Received data or terminal input.
4	CA	Request to Send	MCB → Data Set	When off line, RTS is held low; when on line in full duplex, it is kept high. In half duplex on line, it remains low until data transmission. It goes high during transmission and drops low upon completion.
5	CB	Clear to Send	MCB ← Data Set	When Clear to Send is high, the transmission is enabled. When CTS is held low, the transmitter is disabled.
6*	CC	Data Set Ready	MCB ← Data Set	Indicates the host data set is ready.
7	AB	Signal Ground	—	Same potential as chassis ground (pin 1).
16		X8 XMIT Clock	MCB → Data Set	Provides TTL level clock to Data Set.
20	CD	Data Terminal Ready	MCB → Data Set	This pin is high when terminal is On.
AUXILIARY PORT (MICRO BEE 1A AND DM1A ONLY)				
1	AA	Frame Ground	—	Chassis ground; electrically bonded to frame.
2	BA	Transmitted Data	MCB ← Auxiliary device	Data input to terminal.
3	BB	Received Data	MCB → Auxiliary device	Data output to auxiliary device.
4	CA	Request to Send	MCB ← Auxiliary device	Ignored by MCB — does not evoke terminal response.
5	CB	Clear to Send	MCB → Auxiliary device	When high, indicates Auxiliary port enabled and ready to receive data.
6	CC	Data Set Ready	MCB → Data Set	Remains on at all times.
7	AB	Signal Ground	—	Same potential as pin 1.
8	CF	Carrier Detect	MCB → Auxiliary device	Same as CC (pin 6). High at all times.
11		Auxiliary Device Ready	MCB ← Auxiliary device	When High, transmission to Auxiliary is enabled. When Low, transmission to Auxiliary is disabled.
19		Auxiliary Device Ready	MCB ← Auxiliary device	When High, transmission to Auxiliary is enabled. When Low, transmission to Auxiliary is disabled.
20†	CD	Data Terminal Ready	MCB ← Auxiliary device	High indicates Auxiliary device ready to receive data. Low indicates Auxiliary device busy and unable to receive data.

* Note: When connected to DCE equipment not providing these signals, external jumpering must be provided on the terminal interface connector between 6, 8 and 20.
Only applies to Micro Bee & Micro Bee 1A

† Note: When the auxiliary equipment being used does not provide this signal, external jumpering must be provided on the Auxiliary port between pins 6 and 20.

FAN

POWER CORD

SWITCH S1	SWITCH S2
1 RECV ERROR CHECK = UP 2 ROLL MODE = UP 3 AUTO LINE FEED = UP 4 LOWER CASE INHIBIT = UP	BAUD RATE SELECT
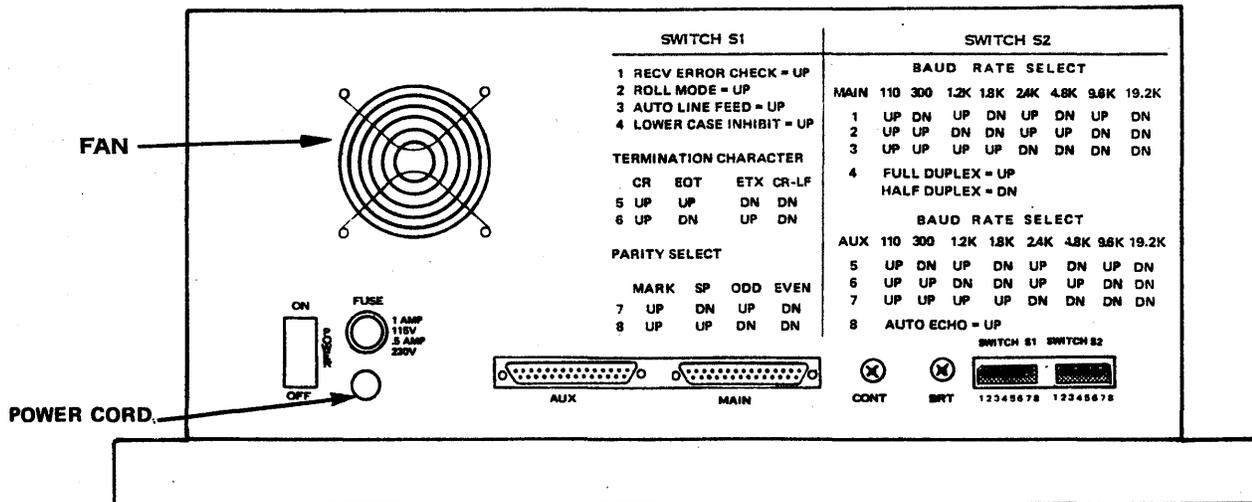
FUSE
Prevents damage to circuitry during voltage/current overload

AUXILIARY PORT
This connector provides an interface for peripheral device, such as disks, printers, tape drives, etc.

MAIN PORT
This port provides data source interface for the terminal, RS232C or current loop interface.

Figure 2-3   Micro Bee Rear Panel

SWITCH S1				SWITCH S2							
1 RECV ERROR CHECK = UP 2 ROLL MODE = UP 3 AUTO LINE FEED = UP 4 LOWER CASE INHIBIT = UP				**BAUD RATE SELECT**							
				MAIN	110	300	1.2K	1.8K	2.4K	4.8K	9.6K	19.2K
				1	UP	DN	UP	DN	UP	DN	UP	DN
				2	UP	UP	DN	DN	UP	UP	DN	DN
TERMINATION CHARACTER				3	UP	UP	UP	UP	DN	DN	DN	DN
	CR	EOT	ETX CR-LF	4	FULL DUPLEX = UP						
5	UP	UP	DN DN		HALF DUPLEX = DN						
6	UP	DN	UP DN		**BAUD RATE SELECT**						
				AUX	110	300	1.2K	1.8K	2.4K	4.8K	9.6K	19.2K
PARITY SELECT				5	UP	DN	UP	DN	UP	DN	UP	DN
	MARK	SP	ODD EVEN	6	UP	UP	DN	DN	UP	UP	DN	DN
7	UP	DN	UP DN	7	UP	UP	UP	UP	DN	DN	DN	DN
8	UP	UP	DN DN	8	AUTO ECHO = UP						

Figure 2-4   External Switches

ON	SWITCH	OFF
Not used	1	Not used
All single key ESC sequences are performed locally only.	2	All single key ESC sequences are transmitted
Display programmed for 50 Hz	3	Display programmed for 60 Hz
NOT USED	4	NOT USED
NOT USED	5	NOT USED
Visual attribute is half intensity	6	Visual attribute is normal
White character on black field	7	Black character on white field
Enables Current Loop	8	Disables current loop

Figure 2-5   Internal Switches

2.7.1 Receiver Error Check (S1-1)

When receiver error check is selected (S1-1 up), an ASCII substitute (S_B) is displayed and the bell will sound if a receiver frame, overrun, or parity error is detected. Even or odd parity is checked depending on the setting of S1-7 and S1-8. With S1-1 down, data are written to the display as received and all errors are ignored.

2.7.2 Roll Mode (S1-2)

When roll mode is enabled (S1-2 up), data scrolls upward if the cursor is in the bottom line and a line feed code is received. As a result of the upward scroll, all data on the page move up by one line, with data previously on the top line being lost and a new blank line appearing at the bottom of the page. This simulates the line feed action of a teletypewriter.

If the roll mode is disabled, the display page does not scroll. A command which attempts to move the cursor down from the bottom line (a line feed) causes the cursor to appear in the top line rather than causing the data to scroll. Thus, the non-roll mode of operation corresponds to a "wrap-around" action of the cursor in the vertical direction. Depression of the RETURN key causes the data to be erased from the cursor position to the end of the present line and the return (or return, line feed) is executed according to the setting of S1-3.

2.7.3 Auto Line Feed Mode (S1-3)

In auto line feed mode (S1-3 up), the RETURN key transmits carriage return-line feed codes and performs a return and line feed locally. With auto line feed mode off, the key transmits and performs only a carriage return.

2.7.4 Inhibit Lower Case (S1-4)

With the switch in the up position, all alpha characters a-z are forced to the upper case regardless of the condition of SHIFT or LOCK. No other codes are affected. With the switch down, all keys are fully shiftable. Received data remain unaffected by this switch setting.

2.7.5 Termination Character (S1-5, S1-6)

The user may select the termination character which is transmitted by the ENTER key in an on-line mode and is the last character sent after a block/line transmit, or a function key sequence. The choices are ET EOT, CR or CR-LF.

2.7.6 Parity (S1-7, S1-8)

The parity selection allows for an odd or even parity bit, or a mark or space parity bit to be generated following the data in the serial data word. Mark or space parity is generated by transmitting an 8-bit data word and forcing the eighth bit low or high. If odd or even parity is selected and S1-1 is up (receiver error check) received data are also examined for proper parity.

2.7.7 Main Baud Rate (S2-1, S2-2, S2-3)

The main baud rate change is accomplished through switch selection on the back panel of the terminal. The user may select the following rates: 110, 300, 1200, 1800, 2400, 4800, 9600 or 19,200 baud. The switch settings are defined in Figures 2-3 and 2-4. For host CPU selection of both main and aux baud rates, a three-code escape sequence is used (see Table 2-2). (Only the Micro Bee 1A and DM1A have an auxiliary port).

Table 2-2   Remote Baud Rate Selection

	110	300	1200	1800	2400	4800	9600	19200
MAIN BAUD RATE ESC, 7,	0	1	2	3	4	5	6	7
AUX BAUD RATE ESC, 5	0	1	2	3	4	5	6	7

2.7.8 Full/Half Duplex (S2-4)

The full/half duplex (FDX/HDX) switch setting (Figure 2-3) determines how data originating from the keyboard are routed within the terminal when operating on-line and in conversational mode. In half duplex mode, data entered via the terminal keyboard are sent to the I/O port and the display memory simultaneously. In full duplex mode, data entered via the terminal keyboard are sent to the I/O port only. Data must be received to be displayed except in the auto echo mode. In full duplex mode, RTS (Request to Send) is raised any time the terminal is on line. In half duplex, RTS is raised only when transmission occurs.

This interfacing conforms to the Electronic Industries Association standard RS232C for full and half duplex operation.

2.7.9 Auxiliary Baud Rate (S2-5, S2-6, S2-7 on Micro Bee 1A only)

The auxiliary baud rate change is accomplished through switch selection on the back panel of the terminal. The user may select the following rates: 110, 300, 1200, 1800, 2400, 4800, 9600, or 19,200 baud.

2.7.10 Auto Echo (S2-8)

With the auto echo switch on, the terminal displays and operates on all data transmitted over the main EIA serial port in conversational mode. With the switch set off, no automatic echo occurs. This switch is only effective in full duplex and allows full duplex communications without need for echo from the host CPU.

2.8 INTERNAL SWITCH USE

2.8.1 Unused Switches (S3-1, S3-4)

Internal switches 1, 4, and 5 are not used in the Micro Bee system.

2.8.2 Inhibit Escape Codes (S3-2)

With the switch on, all single key escape code sequences are performed locally without transmission, regardless of half or full duplex modes.

The ESC key remains unaffected and operable.

With the switch off, single key escape code sequences obey the normal rules of HDX and FDX.

2.8.3 50/60 Hz (S3-3) (Optional)

This switch is used to program the display to 50 or 60 Hz. To avoid beat interference, the display rate should match the power line frequency.

> **Note: Monitor alignment may be necessary if this switch is changed.**

2.8.5 Normal/Half Intensity (S3-6)

This switch reverses the meaning of normal and half intensity visual attributes. With switch on, normal data becomes half intensity and half intensity data becomes highlighted.

2.8.6 Normal/Reverse (S3-7)

This switch reverses the meaning of normal and reversed video attributes. With the switch off, characters are black on white and reversed video attributes cause data to be displayed white on black. Brightness and contrast must be adjusted for proper screen display.

2.8.7 Current Loop (S3-8)

This switch must be on if the current loop circuitry is selected for use. (See section 2.5.3.)

SECTION III

OPERATION

3.1   INTRODUCTION

This section provides both basic and detailed operating instructions for the Micro Bee video display terminal. Section 3.2 is a simplified operating guide which explains in nontechnical language how to turn on the terminal and use the keyboard for most data communication tasks. In Section 3.3 operating modes and other terminal features are explained more fully and examples are given where necessary. This information should be of help to the programmer or technician who must install and interface the terminal with other data communications equipment.

3.2   BASIC OPERATION DESCRIPTION

3.2.1   General

Micro Bee operation is simple and straightforward. Any typist can master the keyboard, which bears close resemblance to the standard typewriter. The few additional keys function as operator-oriented convenience features and selector switches for the terminal's operating modes. They also help the operator communicate with a host computer or other external device.

3.2.2   Turn-On Procedure

Before the Micro Bee is used, it must be properly installed and set up in accordance with Section II of this manual. This should be attempted only by qualified personnel.

An identification plate located on the rear cover of the terminal specifies its electrical power requirements. When moving the terminal to an alternate operating position, make sure that the selected power outlet is properly grounded and supplies the correct operating voltage/frequency. Get technical assistance, if necessary, in making this determination.

The proper turn-on procedure for the terminal is as follows:

a.   Set the rear panel POWER ON/OFF switch to ON (see Figure 2-3); allow a warm-up period of about a minute and ensure that the cursor and status line have appeared on the screen. If both the cursor and status line do not appear, check the brightness and contrast adjustments, as explained in b.

b.   Turn the Brightness control (located on the rear panel; see Figure 2-3) until a raster is faintly visible on the screen.

Write several characters on the screen with the terminal off line using both high and low intensity. Use the half intensity visual attribute as described under ASET in Table 3-2 for an accurate half-intensity level. Reduce the brightness until the background raster is extinguished. Adjust the contrast control (another rear panel component) until the difference between full and half intensity characters is easily distinguished.

c.   Any time power is initially applied to the Micro Bee, it performs a display memory test and a terminal operation test. Because of the CRT warmup time, there is no visible effect on the screen. If the unit is turned off and back on, a slight display flicker occurs while the test is run. When the self test is successfully completed, "SYSTEM RDY" appears on the status line. In the event of a test failure, "ERRCHECK" appears. Self test may also be initiated by the host computer or at will by the operator using the sequence ESC f.

3.2.3   Rear Panel Switches

Switch blocks 1 and 2 (S1 and S2) on the rear panel enable/disable certain operating features of the Micro Bee. There are a total of 16 miniature switches, eight on each switch block. Most rear panel switches

require no operator attention because they must be properly set when the terminal is installed. Section 2.7 describes how to change a switch and the reset procedure which must be used following each switch change.

3.2.4 Keyboard Controls

The Micro Bee keyboard is shown in Figure 3-1. The keyboard's function is to generate codes which the terminal uses to display information and communicate with other equipment. The keyboard produces three main types of codes:

a. Character codes - For example, striking the "A" key causes the displayable character code for the letter "a" to be produced. Depending on the mode of operation selected, the "a" is transmitted, displayed on the screen, or both.

b. Control Character codes - These are not displayed, (except in line monitor mode) but cause specific functions to occur. To generate a control character code, depress **and hold down** the CONTROL key while simultaneously typing the required alphanumeric key. Example: CONTROL G rings the bell.

c. Escape sequence codes - These are also non-displayed (except in line monitor mode) and cause specific functions to occur. To perform an escape operation, depress and release the ESC key and then the designated alphanumeric key. Example: ESC E clears the screen. If the CONTROL key is held down with the ESC

key, the Escape sequence takes place within the terminal only and is not transmitted even if the terminal is on line.

Table 3-1 is an ASCII (abbreviation for American Standard Code for Information Interchange) code chart which the operator may use in determining what keyboard sequence to employ in a given control or escape function. Note that the chart has three columns: Control Characters, Displayable Characters, and Escape Sequences. Using the chart is best explained by giving examples: If the operator wants a line feed (LF) to occur, the sequence CONTROL J (or the LF key) may be used; to initiate the self test, the sequence ESC f is used.

Table 3-2 is a listing of all keyboard keys on the Micro Bee. Each is described in sufficient detail to enable the operator to use it effectively. A more detailed approach to this information is included in Section 3.3.

3.2.5 Communication Modes

The Micro Bee terminal is capable of operating off line (local) or on line. "LOCAL" or "ONLINE" is displayed in field A of the status line, depending on the mode selected. Two operational modes of communication are provided when the unit is on line: full duplex (FDX) and half duplex (HDX).

Local - Data communication takes place between the keyboard and display memory only. No data transmission occurs.
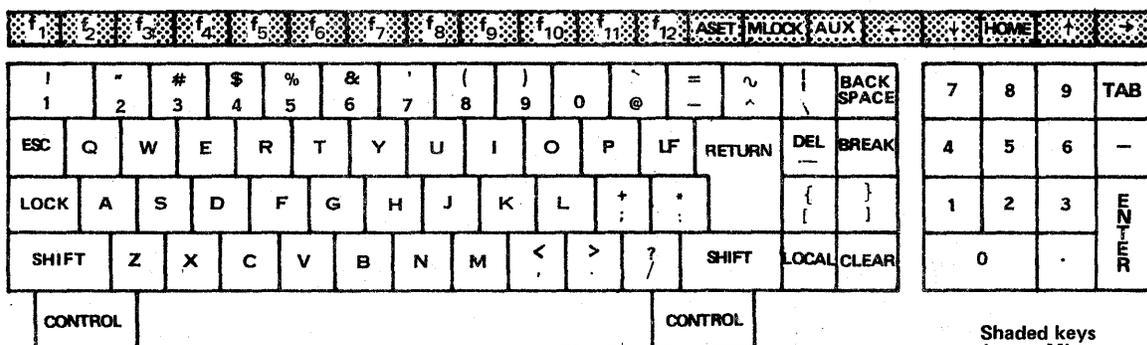
Figure 3-1 Micro Bee Keyboard

Table 3-1 Part A   Micro Bee ASCII Code Chart

	CONTROL CHARACTERS		DISPLAYABLE CHARACTER						ESCAPE SEQUENCE					
BIT 7 6 5 / 4 3 2 1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0000	NUL (@)	DLE (P)	SP	∅	@	P	`	p	SET CLOCK (SP)	(∅)	(@)	(P)	(\)	F1 (p)
0001	SOH (A)	DC1 X-ON (Q)	!	1	A	Q	a	q	(!)	DISPLAY CPU MESSAGE ON (1)	↑ (A)	(Q)	(a)	F2 (q)
0010	STX (B)	DC2 (R)	"	2	B	R	b	r	BOOT LD RUN (")	DISPLAY CPU MESSAGE OFF (2)	↓ (B)	GRAPHIC MODE ON (R)	KEYBOARD ENABLE (b)	F3 (r)
0011	ETX (C)	DC-3 X-OFF (S)	#	3	C	S	c	s	(#)	(3)	→ (C)	GRAPHIC MODE OFF (S)	KEYBOARD DISABLE (c)	F4 (s)
0100	EOT (D)	DC-4 (T)	$	4	D	T	d	t	($)	(4)	← (D)	(T)	ATTRIBUTE SET (d)	F5 (t)
0101	ENQ (E)	NAK (U)	%	5	E	U	e	u	(%)	AUX BAUD RATE SET (5)	CLEAR (E)	(U)	(e)	F6 (u)
0110	ACK (F)	SYN (V)	&	6	F	V	f	v	(&)	WRITE CONTROL MODE (6)	CURSOR ADDRESS (F)	RESET (V)	SELF TEST (f)	F7 (v)
0111	BEL (G)	ETB XMIT (W)	/	7	G	W	g	w	(')	MAIN BAUD RATE SET (7)	READ CURSOR CHARACTER (G)	(W)	MEMORY LOCK ON (g)	F8 (w)
1000	BS (H)	CAN (X)	(	8	H	X	h	x	AUX ON (()	CONTINOUS ALARM ON (8)	HOME (H)	(X)	MEMORY LOCK OFF (h)	F9 (x)
1001	HT (I)	EM (Y)	)	9	I	Y	i	y	AUX OFF ())	CONTINOUS ALARM OFF (9)	(I)	CURSOR ADDRESS (Y)	(i)	F10 (y)
1010	LF (J)	SUB (Z)	*	:	J	Z	j	z	LINE MONITOR OFF (*)	LINE MONITOR ON (:)	CLEAR EOS (J)	(Z)	ENABLE AUX PORT (j)	F11 (z)
1011	VT (K)	ESC ([)	+	;	K	[	k	{	(+)	CPU MESSAGE DEPOSIT (;)	CLEAR EOL (K)	([)	DISABLE AUX PORT (k)	F12 ({)
1100	FF (L)	FS (•)	,	<	L	\					(,)	LINE LOCK (<)	(L)	CURSOR SENSE (\)	START BLINK (l)	(|)
1101	CR (M)	GS (])	-	=	M	]	m	}	(-)	LINE UNLOCK (=)	(M)	(])	NORMAL VIDEO (m)	(})
1110	SO (N)	RS (∧)	.	>	N	∧	n	~	(.)	(>)	OFF LINE (LOCAL) (N)	SET MEM POINTER (∧)	ON LINE (n)	(~)
1111	SI (O)	US (_)	/	?	O	_	o	DEL	UNLOCK ALL LINES (/)	READ TERMINAL STATUS (?)	READ TERMINAL STATUS (O)	READ DATA AT MEMORY POINTER (_)	(o)	DEL

3-3

Table 3-1 Part B Escape Sequence Reference Chart

Attribute Set	ESC d
Aux Baud Rate Set	ESC 5
Aux Off	ESC)
Aux On	ESC (
Aux Port Disable	ESC k
Aux Port Enable	ESC j
Boot Load Run	ESC "
Clear to End of Line	ESC K
Clear to End of Page	ESC J
Clear Screen	ESC E
Continuous Alarm Off	ESC 9
Continuous Alarm On	ESC 8
CPU Message Deposit	ESC ;
Cursor Address	ESC Y
Cursor Address	ESC F
Cursor Down	ESC B
Cursor Left	ESC D
Cursor Right	ESC C
Cursor Sense	ESC \
Cursor Up	ESC A
Display Message Off	ESC 2
Display Message On	ESC 1

F1	ESC p	F9	ESC x
F2	ESC q	F10	ESC y
F3	ESC r	F11	ESC z
F4	ESC s	F12	ESC {
F5	ESC t		
F6	ESC u		
F7	ESC v		
F8	ESC w		

Graphic Mode Off	ESC S
Graphic Mode On	ESC R
Home	ESC H
Keyboard Disable	ESC c
Keyboard Enable	ESC b
Line Lock	ESC <
Line Unlock	ESC=
Main Baud Rate Set	ESC 7
Memory Lock Off	ESC h
Memory Lock On	ESC g
Monitor Mode Off	ESC *
Monitor Mode On	ESC :
Normal Video	ESC m
Off Line	ESC N
On Line	ESC n
Read Cursor Character	ESC G
Read Data at Memory Pointer	ESC __
Read Terminal Status	ESC O
Reset	ESC V
Self Test	ESC f
Set Clock	ESC SP
Set Memory Pointer	ESC ^

Table 3-2 Keyboard Functions

KEY	FUNCTION
0-9 keys (Numeric pad)	These are separate numeric data entry keys. Numeric pad keys are not affected by the SHIFT, LOCK, or CONTROL keys.
(.) (Decimal Point)	The decimal point key generates the same code and character as the period on the typewriter array. This key is included on the numeric pad as a convenience feature.
ENTER	The ENTER key generates the termination character selected by the rear panel switches. If CR (Carriage Return) or CR LF (carriage return-line feed) are selected, the terminal performs these functions when the ENTER key is depressed. If EOT (end of transmission) or ETX (end of text) are selected, the terminal transmits these codes but no visible display functions occur. (See section 3.3.2)
(−) (Minus)	The minus key generates the same code and character as in the typewriter array.
TAB	The TAB key moves the cursor to the next tabulation position. Fixed tab locations occur each eight character positions, e.g., position 0, 8, 16, etc. Tabs cannot be set by the operator.
	Selection of roll or non-roll mode also affects TAB key operation. In non-roll, TAB key actuation advances the cursor to the next available tabulation stop. When the cursor is at the last tab stop of line 24, the next TAB key actuation returns the cursor to HOME. In roll mode, the cursor is also positioned from tab stop to tab stop when the TAB key is pressed. However, when the cursor is in the last position of line 24, TAB key actuation causes rolling of the display.
CONTROL	Depression of either CONTROL key followed by an alphanumeric or symbol key causes the terminal to perform a control function as described in part b of 3.2.4 and as listed on the ASCII Code chart, Table 3-1.
ESC	Depression of ESC followed by an alphanumeric or symbol key causes the terminal to perform an escape function as described in part c of 3.2.4 and as listed on the ASCII Code chart, Table 3-1.
BREAK	The CONTROL BREAK sequence may be used to interrupt transmission from the host CPU. Actuation of the BREAK key alone causes no operation.
LOCAL	Depression of the LOCAL key alternately toggles the terminal from local to on line modes. The host computer (CPU) can place the terminal on line with an ESC N sequence and in local mode with an ESC n. "LOCAL" or "ON LINE" appears in field A of the status line, depending on the mode selected.
CLEAR	This key erases the screen and positions the cursor at the home location. CLEAR is interlocked with the CONTROL key to prevent accidental clearing of screen.
	Other clear functions require an escape code operation: EOS (erase to end of screen) erases from cursor position to end of screen upon depression or receipt of ESC, J; EOL (erase to end of line) erases from cursor position to end of the line upon depression or receipt of ESC, K.
RETURN (Carriage Return)	This key causes the cursor to move to first position of the current line while not in auto line feed mode (switch S1-3 down). If auto line feed is on, the cursor advances to the beginning of the following line.
	The RETURN key behaves differently when the terminal is in roll mode than it does with roll disabled. The carriage return is considered destructive in the non-roll mode. For example, if the RETURN key is struck with the cursor in position 40 of a displayed line and the terminal is in non-roll, all data in positions 40 through 80 of the line are erased; however, display positions 0 through 39 are undisturbed. If the auto line feed is enabled, a line feed occurs and the cursor appears in the first position of the next line. If auto line feed is disabled, the cursor simply moves left on the same line to position 0. The carriage return is considered nondestructive in the ROLL mode because operating the RETURN key has no effect on any displayed data (unless auto line feed is enabled) and serves only to reposition the cursor.
BACK SPACE	This key is equivalent to the ← key, except that the ASCII back space code is transmitted when on line. CONTROL H is the ASCII back space (BS) code.
SHIFT	Nonalpha displayable keys such as !/1 are manipulated with the SHIFT keys. When entering an alpha character with the LOCK on and a SHIFT depressed, a double shift occurs which results in a lower case character being displayed.
LOCK	The LOCK key is more accurately described as a "caps lock" because it affects the alpha characters (A-Z) only. It is a toggle key also. This means striking the key once causes it to assume a detent position (the key remains depressed) and upper case characters only may be produced. Striking the key again releases it from the detent position, enabling lower case characters to be produced.
LF	Depression of this key causes the cursor to move down one line while occupying the same character position.
Space Bar	The space bar moves the cursor to the right one character position. When the cursor reaches the last position on the last line, it returns to the first position on the last line. If the space bar moves the cursor over displayed data, the data are deleted from memory and from the screen.
DEL/ (Delete/ Underline)	Depression of this key causes an underline to be displayed (if struck over existing data, it replaces the data with an underline). With the SHIFT key depressed, it causes a delete code to be transmitted but not displayed.
Alphanumeric Keys (A-Z, punctuation, and shiftable numeric keys	The remaining keys, which are arranged and like the familiar standard typewriter keyboard, function as such. When used in conjunction with SHIFT/LOCK keys, the associated letter, number, symbol or punctuation mark is displayed and/or transmitted. When used in conjunction with the ESC/CONTROL keys, they produce numerous special function code sequences.

Table 3-2 Keyboard Functions (concluded)

KEY	FUNCTION
	The following key descriptions apply to Micro Bee 1A only
AUX	This toggle key alternately enables/disables the Auxiliary port. On terminals with no AUX key, ESC j enables and ESC k disables the AUX port.
MLOCK	This toggle key alternately enables/disables the memory lock function. When enabled (on depression of key or receipt of ESC, g) the display area above the cursor-occupied line is "frozen" and protected from keyboard access. The area below this line continues to function normally. Any depression again of the MLOCK key or receipt of ESC h disables the memory lock function and the entire display screen is returned to normal operation. "MEM LOCK" on the status line indicates this mode is being used.
ASET	Depression of this key or ESC d allows the operator to enter specific codes which determine the visual characteristics of any succeeding characters, e.g., half intensity, reverse video, blink, etc. Data are displayed in that attribute until the occurrence of a succeeding attribute or the end of memory. The field attribute ASCII codes and additional information are contained in 3.3.2.
◄— (Cursor Left)	Depression of this key or ESC D moves the cursor to the left. If the cursor is at the first character position on a line, the cursor moves to the last character on the line above and upon reaching Home, moves to the last position on the last line.
▼ (Cursor Down)	Depression of this key or ESC B moves the cursor to the same character position on the next line down. If on the last line, the cursor moves to the same character position on the first line.
HOME	Depression of this key or ESC H moves the cursor to the first character position on the first available line.
▲ (Cursor Up)	Depression of this key or ESC A moves the cursor to the same character position in the next line above. Upon reaching the top line, the cursor moves to the same character location in the bottom line.
—► (Cursor Right)	Depression of this key or ESC C moves the cursor to the next character position. When the cursor reaches the last character position on the line, it moves to the first position on the next line down. When the cursor reaches the last position on the last line, it moves to the home position.
F1-F12 (Special Function keys)	The operation of the special function keys is determined by the user. Depression of any of these keys causes transmission of the codes indicated on Table 3-1. The CPU responds to these codes as determined by local programming. Seek local technical advice when necessary in determining what functions (if any) have been assigned to these keys.

On Line — Data are entered into memory, displayed according to duplex setting, and transmitted to the CPU. Transmission of the data to the CPU takes place in either full duplex or half duplex.

a. **Full duplex** - Data sent from the keyboard through the I/O port go to the CPU only and are not displayed. Only data received from the CPU are displayed by the terminal.

b. **Half duplex** - Keyboard entered data are displayed and transmitted to the CPU simultaneously.

3.2.6   Transmission Mode

When the Micro Bee is On Line, transmission occurs in a character-by-character fashion as the keys are depressed. This is called a "conversational" mode and is used by the terminal to communicate with both the CPU and in the case of Micro Bee 1A/DM1A, with auxiliary devices.

3.2.7   Additional Operating Features

Many of the following Micro Bee capabilities are not readily apparent from the keyboard. Some are implemented using control and escape functions and others occur as an end result of the terminal operating program.

Subcharacter Display — When using the Micro Bee in communication with a CPU and a receiver error occurs on a received character, the S_B character is displayed and a simultaneous audible alarm occurs.

Audible Alarm-The CON G sequence (BELL char.) causes momentary action of the audible alarm. This is usually a result of a keyboard entry causing the cursor to pass the 72nd character position with the alarm sounding to warn the operator of the approaching line end. The momentary alarm also occurs when an

illegal keyboard entry is attempted or a receiver error is detected. The CPU may gain the attention of the operator using the **continuous** alarm feature (ESC 8). The operator can end a continuous alarm by striking any keyboard key. ESC 9 received over the I/O also ends the continuous alarm.

Clock — A 24-hour clock which can be used to indicate elapsed time or time of day can be made to appear in the status line by using the procedure outlined in Section 3.3.3.

Graphics — The construction of line drawings and forms may be accomplished using the terminal's graphics mode. Eleven characters are available to make graphs, charts, etc., which can be transmitted to the CPU for storage and recall at a later date. See Section 3.3.3.

Read Terminal Status — The ESC O sequence may be used by the operator to display a 27-character status line message which summarizes the current terminal operating configuration (baud rates, duplex setting, rear panel switch positions, etc.). The message appears in the status line and is interpreted using Section 3.3.7.

Line Lock — The CPU may designate display lines as reserved for its exclusive use. The operator has no control over this, but "LINE LOCK" appears on the status line when such has occurred. The operator may enter data in any unprotected area of display that remains. See Section 3.3.3.

3.3   DETAILED OPERATION DESCRIPTION

3.3.1   General

This section provides detailed functional information on the Micro Bee. It is assumed that the reader has some background in digital communications and is familiar with some of the terminology involved. To understand all terminal capabilities thoroughly, the user must read this section because it covers terminal functions which are interrelated and mode dependent. While none of the following material is difficult, the user must be acquainted with it to realize maximum efficiency from the Micro Bee.

3.3.2   Keyboard Operation

Control Functions (CONTROL)

Associated Key: | CONTROL |

To perform a control operation, depress the CONTROL key and **hold this key down** while simultaneously typing the alphanumeric key. The CONTROL key is used to modify the meaning (and code) of certain other keys. When held down during action of any displayable character key (columns 2-7 of ASCII code chart), bits 6 and 7 of the code are forced to zero so that the codes from rows O and 1 of the chart can be produced from the keyboard. It is also used as a safeguard for functions like clear, break, reset and others so that the accidental striking of these keys does not destroy screen contents or disrupt communications.

Escape Functions (ESC)

Associated Key: | ESC |

To perform an escape operation, depress and release the ESC key, followed by the designated alphanumeric key. Be careful that any commas or dashes appearing in the explanation of an escape or control operation are actually part of the intended sequence before entering them as part of the sequence. Often the punctuation is included in the text only to help clarify the explanation of a multiple entry keyboard operation. The ASCII code chart is the best place to verify control or escape sequences.

The escape key is used as the first code in a multiple code sequence. It must be pressed and released before the second key is struck.

On Line: ASCII ESC is transmitted.

The CONTROL ESC sequence allows local action of escape code sequences. The codes are not transmitted even if the terminal is on line. This sequence overrides full duplex and all other switch settings. For example, preceeding the clock-setting sequence with a CONTROL key entry results in a clock being displayed on the terminal screen with no clock information being transmitted out the I/O.

On Line: Nothing is sent for the entire sequence.

SHIFT and LOCK

Associated Keys: | SHIFT | | LOCK |

The SHIFT and LOCK keys are used to generate
upper case codes and are operated the same as the
equivalent typewriter keys, except as follows:
The LOCK key (also called the alpha lock key) af-
fects alpha characters (A—Z, upper and lower case)
only, so the SHIFT key must be used to manipulate
the other displayable keys such as !/1. Do not enter
an alpha character with the LOCK on and the
SHIFT depressed because a double shift occurs which
results in lower case characters being displayed. The
SHIFT keys do not affect special function keys or
numeric pad keys.

Keyboard Lock

The ESC b sequence causes the keyboard to be
enabled (data can be entered from the keyboard).

The ESC c sequence causes the keyboard to be
disabled (data cannot be entered from keyboard).

**WARNING- Only CPU intervention of a Hard
Reset can remove the disabled state after the
keyboard is locked.**

Numeric Pad Functions

The numeric pad keys shown below, when de-
pressed, cause the associated character to be
displayed and/or trans-
mitted. The numeric pad

7	8	9	TAB
4	5	6	—
1	2	3	E N T E R
0		.	

also includes TAB, Minus (—)
and ENTER keys. This
group is a separate
numeric data entry key
pad, not affected by the
SHIFT, LOCK, or
CONTROL keys.
The ENTER key generates the termination char-
acter designated by the rear panel switches (see
Section 2.7.5). If a CR or CR-LF is the selected
termination character and the ENTER key is
struck while in Local or half duplex, the ter-
minal activates the code locally and transmits
it if in On Line. There is no visible screen re-
sponse to EOT or ETX, but these codes are trans-
mitted. The minus key in the numeric pad gene-
rates the same code as the typewriter array minus
key.

Action of the TAB key causes the cursor to advance
to the right and halt at the next tab stop location.
Tab stops are fixed at location 0, 8, 16, 24, 32, 48,
56, 64, and 72 of each line. The TAB key automat-
ically wraps at the end of each line.

Roll Mode: In Roll mode, action of the TAB key
advances the cursor sequentially until
it reaches the end of the display. Tab-
bing beyond line 24 causes rolling to
occur.

Non-Roll Mode: In Non-Roll mode, the cursor
wraps to Home when it is tab-
bed from line 24, column 80.

Keyboard Operation: TAB or CONTROL I (HT)

I/O Operation: Receipt of CONTROL I (HT)

Transmitted Code: CONTROL I (HT)

Break (CONTROL BREAK)

Associated Key: | BREAK |

The CONTROL BREAK sequence generates a 250
(+10%) millisecond break ("spacing" condition)
on the transmitted data output line. Depressing
the BREAK key automatically removes the termi-
nal from the graphics mode. This action is nec-
essary to condition the terminal for reception of
ASCII codes from the displayable character columns
of the code chart (see Table 3-1). This key is inop-
erative in the local mode. Actuating BREAK by
itself causes no operation.

Keyboard Operation: CONTROL BREAK

I/O Operation: None

Local (LOCAL)

Associated Key: | LOCAL |

The LOCAL key is a toggle function; it alternately
switches the terminal from on line to local and

vice versa. In the on line mode, all alphanumeric characters are transmitted through the main I/O port when keys are struck. All control keys (such as RETURN) send their associated control code. All function keys send their associated two-code sequence if enabled by the appropriate internal switch. (See Section II.) If the switch is disabled, the code is performed locally only.

In the local mode keyboard data are routed directly to the display and any key activated only affects the display; no transmission occurs. The receiver is only partially disabled while in local mode. It continues to monitor for the receipt of certain code sequences that be performed while the terminal is in a local mode. These sequences are:

> AUX-ON or AUX-OFF
> GO ON LINE

Keyboard Operation: LOCAL or ESC n for On Line
LOCAL or ESC N for Local

I/O Operation: Receipt of ESC n for On Line
Receipt of ESC N for Local

Transmitted Code: ESC n for On Line
ESC N for Local

NOTE: The LOCAL/ON LINE terminal condition is reflected in the status line.

Clear Screen (CONTROL CLEAR)

Associated Key: CLEAR

The CONTROL CLEAR sequence erases the screen and positions the cursor to home. The EOS function (ESC,J) causes data to be cleared from the cursor position to the end of the screen. The EOL function (ESC, K) causes the data to be cleared from the cursor position to the end of the line.

Keyboard Operation: CONTROL CLEAR or ESC E causes erasure of all screen data.
ESC J for EOS
ESC K for EOL

I/O Operation: ESC E clears screen entirely.
ESC J for EOS
ESC K for EOL

Transmitted Code: as above

Carriage Return (RETURN)

Associated Key: RETURN

The RETURN key behaves differently when the terminal is in roll mode than it does with roll disabled. (A description of roll and non-roll modes is contained in 2.7.2.) The carriage return is considered destructive in the non-roll mode. For example, if the RETURN key is struck with the cursor in position 40 of a displayed line and the terminal is in non-roll, all data in positions 40 through 80 of the line are erased. However, display positions 0 through 39 are undisturbed. If the auto line feed is enabled, a line feed occurs and the cursor appears in the first position of the next line. If auto line feed is disabled, the cursor simply moves left on the same line to position O. The carriage return is considered nondestructive in the ROLL mode because operating the RETURN key has no effect on any displayed data (unless auto line feed is enabled) and serves only to reposition the cursor.

Keyboard Operation: RETURN or CONTROL M

I/O Operation: CONTROL M

Transmitted Code: as above

Line Feed (LF)

Associated Key: LF

Action of the line feed key causes the cursor to advance to the next line. On reaching line 24, if the terminal is in the roll mode (switch S1-2 up), action of the line feed key causes scrolling to occur. Line 1 is lost and the data moves to create a new line 24. If the terminal is in the non-roll mode (switch S1-2 down), the cursor wraps to line 1 of the display.

Memory Lock/Line Lock: In non-roll mode, en-
countering a locked area advances
the cursor to the first unlocked line
available, wrapping, if necessary.
In roll mode, memory-locked areas
are not encountered because of
scrolling. However, on reaching a
locked line, the cursor skips that
line, forcing a scroll of all un-
locked lines, if necessary.

Keyboard Operation: LF or CONTROL J

I/O Operation: Receipt of CONTROL J (LF)

Transmitted Code: CONTROL J (LF)

Back Space (BACK SPACE)

Associated Key: | BACK SPACE |

This key is equivalent to the ← key except that the
ASCII back space code is transmitted when on line.
Local effects are identical to ←.

Keyboard Operation: BACK SPACE or
CONTROL H

I/O Operation: CONTROL H (BS)

Transmitted Code: CONTROL H (BS)

Delete (DEL/—)

Associated Key: | DEL —|

This key normally produces the underscore
character (_). When shifted, this key transmits
the delete (rub out) code (·), but does not
display it.

Transmitted Codes: Underscore is sent when un-
shifted; delete (rub out) is
sent when shifted.

Home (HOME)

Associated Key: | HOME |
(Micro Bee 1A/DM1A only)

Action of the HOME key moves the cursor direct-
ly to the home position, line 1 column 1. Using

the HOME key does not alter the data on the
screen.

Memory Lock/Line Lock: When portions of the
memory are locked, the cursor
moves to the first unlocked location
available (moving from the top of
the screen down).

Keyboard Operation: HOME or ESC H.

I/O Operation: Receipt of ESC H.

Transmitted Code: ESC H.

Cursor Left (←)

Associated Key: | ← |
(Micro Bee 1A/DM1A only)

Action of this key advances the cursor one posi-
tion to the left. On reaching column 1 of a line, it
wraps to column 80 of the previous line. On
reaching home, it wraps to column 80 of line 24.

Memory Lock/Line Lock: On reaching an area of
"memory lock", the cursor wraps
to column 80 of line 24. On reach-
ing a locked line, the cursor wraps
from column 1 to column 80 of
the first unlocked line above. If no
further unlocked lines remain be-
fore reaching home, the cursor
wraps to column 80 of line 24.

Keyboard Operation: or ESC D.

I/O Operation: Receipt of ESC D.

Transmitted Code: ESC D.

Cursor Right (→)

Associated Key: | → |
(Micro Bee 1A/DM1A only)

Action of this key advances the cursor one posi-
tion right. On reaching line end, it wraps to col-
umn 1 of the next line below. On reaching column
80 of line 24, it wraps to home.

Memory Lock/Line Lock: On reaching an area of
"memory lock" while wrapping
from column 80 line 24, the cur-
sor advances to the first available
unlocked location of the screen. On
reaching a locked line, the cursor
advances to column 1 of the first
unlocked line available, wrapping
through home, if required.

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Keyboard Operation: → or ESC C.

I/O Operation: Receipt of ESC C.

Transmitted Code: ESC C.

Cursor Up (↑)

Associated Key: ⬚↑⬚
(Micro Bee 1A/DM1A only)

Action of this key advances the cursor up one
line; on reaching the home line, it wraps through
to line 24.

Memory Lock/Line Lock: On reaching an area
of "memory lock", the cursor ad-
vances and wraps to line 24. On
reaching a locked line, it advances
to the first free unlocked line,
wrapping through line 1, if necessary.

Keyboard Operation: ↑ or ESC A.

I/O Operation: Receipt of ESC A.

Transmitted Code: ESC A.

Cursor Down (↓)

Associated Key: ⬚↓⬚
(Micro Bee 1A/DM1A only)

Action of this key advances the cursor down
one line. On reaching line 24, it wraps back to
line O.

Memory Lock/Line Lock: On reaching a "mem-
ory locked" area, the cursor ad-
vances to the first unlocked line.
On reaching a locked line, the cur-
sor advances to the next unlocked
line, wrapping through line 1, if
necessary.

Keyboard Operation: ↓ or ESC B.

I/O Operation: ESC B.

Transmitted Code: ESC B.

Special Function Keys (F1-F12)

Associated Keys:
(Micro Bee 1A/DM1A ⬚F1⬚ through ⬚F12⬚
only)
These keys or the escape sequences specified in
the rightmost column of Table 3-1 transmit a
4- or 5-code sequence according to Table 3-3.
Example: F1 when depressed transmits

STX ESC p TERM

(where TERM = the termination character se-
lected by the rear panel switches. [See 2.75] The
choices are CR, EOT, ETX, or CR-LF). Under
no conditions are the function key codes sent via
the auxiliary port.

Local: Associated codes are transmitted.

Line Monitor Mode: Code sequence is displayed.
Example: S_X E_C $_q$ ^C_R
No data is written to display
by the function keys except
in line monitor mode.

On Line: Code sequence is transmitted.

Table 3-3 Function Key Codes

FUNCTION KEY	CODE TRANSMITTED
F1	STX, ESC, p, TERM
F2	STX, ESC, q, TERM
F3	STX, ESC, r, TERM
F4	STX, ESC, s, TERM
F5	STX, ESC, t, TERM
F6	STX, ESC, u, TERM
F7	STX, ESC, v, TERM
F8	STX, ESC, w, TERM
F9	STX, ESC, x, TERM
F10	STX, ESC, y, TERM
F11	STX, ESC, z, TERM
F12	STX, ESC, {, TERM

Auxiliary Port On/Off (AUX)

Associated Key: ⬚AUX⬚
(Micro Bee 1A/DM1A only)

Depression of this key or the sequence ESC j
enables the bidirectional serial auxiliary port
which is available only on the type 1A.
Another depression of the AUX key or ESC k
disables this auxiliary port.

Keyboard Operation: AUX or ESC j
for aux on; AUX
or ESC k for aux off

I/O Operation: Receipt of ESC j
for aux on; receipt
of ESC k for aux off.

Transmitted Codes: ESC j or ESC k

Memory Lock (M-LOCK)

Associated Key: ⬚M-LOCK⬚
(Micro Bee 1A/DM1A only)

The M-LOCK key causes the display memory above the cursor line to be locked from operator access or scrolling. The display area below the locked portion of the screen functions normally. The cursor position is not affected by memory lock. Data in the locked portion of the screen cannot be altered by the operator but remain available for CPU control and data entry using the memory address pointer. Memory lock is not operable beyond line 23. A status message of "MEM LOCK" appears in this mode.

Keyboard Operation: M-LOCK or ESC g activates Memory Lock.
M-LOCK or ESC h deactivates memory lock.
M-LOCK toggles the Micro Bee in and out of Memory Lock.

I/O Operation: ESC g for Memory Lock On;
ESC h for Memory Lock Off.

Transmitted Codes: ESC g and ESC h.

Attribute Set (ASET)

Associated Key: | A-SET |
(Micro Bee 1A/DM1A only)

The ASET key sets up the terminal so that the next key is interpreted as a visual attribute according to Table 3-4. Other keys are ignored. Example: ASET Q causes the screen to become half intensity reversed video from the cursor position to the end of the screen (or until another visual attribute code is found). There is a limit of 16 visual attributes allowed per line. An attribute may not be set in the 80th column of the screen. However, to stop a video field at the end of a line, another attribute may be set at column 1 of the next line. In non-roll mode, a video attribute in column 0 cannot be followed immediately by a CR; a code such as a space code must be entered before the CR. Attributes may not be followed immediately by graphics characters. An attribute may be overwritten with another attribute. The security field attributes allow characters from the I/O or keyboard which are normally displayed to be blanked. The cursor moves as usual but leaves blanks in the display positions where secured characters are written.

The reverse, half reverse, blinking reverse, and half blinking reverse security fields allow the operator to see exactly where the security fields have been placed.

Keyboard Operation: Enter mode with ASET or ESC d followed by desired attribute ASCII Code from Table 3-4.
Exit mode by setting a normal attribute (@.

I/O Operation: ESC d followed by the appropriate ASCII Code from Table 3-4 sets an attribute.

Table 3-4 Visual Attributes

Key (ASCII Code)	Visual Attributes
@	Normal (Stop Visual Attribute)
A	Half Intensity
B	Blinking
C	Half-Blink
P	Reverse-Video
Q	Reverse-Half
R	Reverse-Blink
S	Reverse-Half-Blink
`	Underline-Normal
a	Underline-Half
b	Underline-Blink
c	Underline-Half-Blink
p	Underline-Reverse
q	Underline-Reverse-Half
r	Underline-Reverse-Blink
s	Underline-Reverse-Half-Blink
$	Security (Invisible)
4	Reverse-Security
5	Half-Reverse-Security
6	Blinking-Reverse-Security
7	Blinking-Half-Reverse-Security

3.3.3 Operational Characteristics

Receiver Control Code Handling

When in normal operating mode (i.e., not in line monitor or write control mode), the ASCII control codes, NUL and delete codes and ESC code sequences that are valid terminal remote commands as listed in Table 3-1 are not written in display memory. Received control codes and ESC code sequences that are not listed in Table 3-1 are ignored. Control code display symbols are listed in Table 3-5. Line monitor mode allows display of all received codes.

Receipt of the write control code sequence (ESC 6) from the receiver or the keyboard causes the next received control or escape sequence to be written into memory without execution. The terminal then reverts to the previous operating condition prior to the receipt of the sequence.

Table 3-5 Control Code Symbols

A — S_H	I — H_T	Q — D_1	Y — E_M
B — S_X	J — L_F	R — D_2	Z — S_B
C — E_X	K — V_T	S — D_3	[— E_C
D — E_T	L — F_F	T — D_4	\ — F_S
E — E_Q	M — C_R	U — N_K	] — G_S
F — P_K	N — S_O	V — S_Y	∧ — R_S
G — Δ	O — S_I	W — E_B	— — U_S
H — B_S	P — D_L	X — C_N	@ — ▪

Sub—Character Display

When using the Micro Bee to communicate with a CPU in full duplex and a receiver error occurs on either a transmitted or received message, the S_B character is displayed and a simultaneous ring of the bell occurs. This subcharacter is a normally nondisplayed control code (see Table 3-5). The bell rings once for each displayed subcharacter, indicating that the CPU has detected a receiver error on a transmitted message and has echoed back a subcharacter in place of the error. The bell ring also indicates that the terminal itself has detected an error on a received message.

Display Locking

Portions of the display memory may be selectively locked from operator access under control of the memory lock and line lock functions. Memory lock is described in Section 3.3.2. The line lock feature is explained next.

Line Lock

By way of the remote command ESC < followed by a cursor address row coordinate, the host CPU may selectively designate lines as reserved for exclusive CPU use. For example, to lock line 3, the CPU enters ESC < " (See Table 3-6). When lines are so locked, keyboard and received data and terminal functions have no effect on those lines. In addition, only the CPU may unlock locked display lines. The terminal does not allow cursor positioning in locked lines; the cursor moves down to the next available unlocked line. Clear screen and roll functions operate normally except that locked lines are left unaffected and fixed in display position. A status message of "LINE LOCK" appears in Field E while in this mode. A maximum of 23 lines may be locked at any single time. The I/O may write in a locked line using the memory address pointer described later in this section.

Keyboard Operation: None.

I/O Operation: ESC < locks, ESC = unlocks
These escape sequences must be followed by a third code which specifies which line is to be locked or unlocked. These codes are specified in Table 3-6.

Example: ESC < + locks line 12. ESC ? is a CPU-entered code which unlocks all lines.

Transmitted Code: None. All codes are entered by the CPU.

Table 3-6 Cursor Address Codes

X or Y	ASCII CODE	X or Y	ASCII CODE	X or Y	ASCII CODE
1	SPACE	28	;	55	V
2	!	29	<	56	W
3	"	30	=	57	X
4	#	31	>	58	Y
5	$	32	?	59	Z
6	%	33	@	60	[
7	& .	34	A	61	\
8	'	35	B	62	]
9	(	36	C	63	^
10	)	37	D	64	—
11	*	38	E	65	`
12	+	39	F	66	a
13	,	40	G	67	b
14	-	41	H	68	c
15	.	42	I	69	d
16	/	43	J	70	e
17	0	44	K	71	f
18	1	45	L	72	g
19	2	46	M	73	h
20	3	47	N	74	i
21	4	48	O	75	j
22	5	49	P	76	k
23	6	50	Q	77	l
24	7	51	R	78	m
25	8	52	S	79	n
26	9	53	T	80	o
27	:	54	U		

Audible Alarm

An audible tone is sounded in the terminal if the bell character (CONTROL G) is received. This is consistent with the bell control of teletypewriters. When data entry from the keyboard causes the cursor to pass through the 72nd position of a line, an audible alarm also sounds.

Continuous Alarm

The continuous alarm feature allows the host processor to gain the attention of the terminal operator. It is turned on with an ESC 8 sequence from the keyboard or over the main I/O port. The alarm can be turned off by either striking any key or by receiving an ESC 9 sequence on the main I/O port or aux port. When keyboard alarm turnoff is used, the key struck is not displayed.

Cursor Addressing

Cursor addressing allows the cursor to be positioned with a four code sequence sent from either the keyboard or from the I/O port. Cursor addressing is direct (not relative) and is not affected by the current cursor location. The cursor is addressed by receiving the following four-character sequence:

ESC, F or Y, line address, and character address

For example, to position the cursor to line 15 and character position 41, send the following sequence: ESC F Period (.) H.

If an invalid row or column address is sent, the cursor will not move from its current position.

Table 3-6 gives the character and line location ASCII characters required to address any position on the display.

Read Cursor Character

The read cursor character feature provides for the transmission of the character at the current cursor location to the host processor. An ESC G command causes the character to be transmitted to the host CPU. The ASCII equivalent codes are sent in place of graphic characters.

Cursor Sense

The cursor sense feature provides for the transmission of the current cursor location to the host processor. An ESC \ command causes the cursor position to be transmitted by line and column as shown in the cursor addressing scheme in Table 3-6.

Cursor sense is an on-line function only and is not operable from the keyboard. When the terminal receives this command, it replies with an ESC F followed by the X-Y coordinates of the current cursor position. This allows the CPU or other I/O to store away the cursor address and later reposition the cursor to its original location.

Memory Address Pointer

The memory address pointer is an I/O-controlled, invisible cursor that is used to read and write to and from the display memory, independent of visible screen functions. The memory address pointer is positioned just like the cursor but only by the I/O. The sequence is: ESC ∧,Line Address, Character Address. If an invalid row or column address is sent, the pointer does not move.

After the memory address pointer is set, the data to be written in display are entered. Attempts to write characters beyond column 80 of the current line cause overwrite on character position 80, i.e., automatic wraparound on line end does not occur. The memory address pointer must be repositioned on a line basis. Any control or attribute characters it contains (with the exception of GS) cannot be acted upon and are only displayed. The GS (CTRL]) terminator must be used when the data to be entered at the pointer is complete. To reposition the memory address pointer without sending data, the sequence ESC ∧ x-y GS is used.

Locked lines may be entered and written in using the memory address pointer.

Data Read at Memory Pointer

Using the sequence ESC_ (underscore), data located at the memory pointer is transmitted out of the I/O port. If, for example, the memory address pointer is at position 10 of a given line, the character there is transmitted.

Read Terminal Status

The terminal status is generated in response to the code ESC O. When this code is entered from the keyboard, no communication occurs to the I/O, but the terminal status message appears in line 25. When ESC O is received from the I/O the terminal status is transmitted back to the line in response to the code, but the status message is not displayed.

Clock

A 24-hour clock which provides time of day or indicates elapsed time can also be made to appear on the status line using the keyboard sequence ESC, space bar, hours, minutes. For example, to set the time at 06:45, the keys ESC, space bar, 0, 6, 4 and 5 are struck. The colons are inserted automatically and the seconds begin counting when the last minute digit is entered. Erasing the clock from the status line can be accomplished with the RESET sequence, ESC V. If a clock-setting mistake is made, the operator must complete the erroneous entry until all clock digits are filled, then key ESC, space bar again and reenter the correct time. A correct clock setting sequence must contain any initial or trailing zeros and consist of four digits.

Self-Test

A self-testing firmware routine is invoked at power up. This may also be initiated by the operator or through CPU intervention with the sequence ESC f. This performs a memory test throughout the terminal's RAM and an LRC check of the ROM. Successful completion of the test and correct terminal operation is verified by the appearance of SYS READY on the status line. Failure to perform the test correctly causes ERR CHECK to be displayed in the status line. The error may be fournd by entering ESC O which displays the 27-byte status message. The fifth digit of the status message (character position 43) indicates the reason for failure:

0 - Normal
1 - ROM fault
2 - RAM fault

CPU Message Deposit

The procedure for the host CPU to deposit data into the message waiting buffer is the code sequence ESC ; message GS.

The operator is notified of the message deposit by "MSG WAIT" which appears on the status line in reversed blinking video. When the operator simultaneously depresses and holds down either the right of left pair of SHIFT and CONTROL keys, the message on deposit is displayed on line 25 in half-

intensity reversed video, replacing the original status message. This new message remains as long as the selected SHIFT/CONTROL key pair is held down. On releasing the keys, the original status reappears. The CONTROL ESC 1 keyboard sequence also places the CPU message in line 25. It remains there until removed by the CPU or the keyboard sequence CONTROL ESC 2. If for some reason no message is present, the status line appears blank and nonreversed.

The function of displaying the deposited message may be controlled via the I/O by the use of the ESC 1 sequence. This causes the message to remain displayed until the normal status line is displayed on receipt of an ESC 2 sequence.

The customer, therefore, has the ability to force an alternate status line and gain additional system information.

The following constraints apply to data which is to held as a waiting message:

a. A maximum of 80 characters can be stored. Overflow overwrites in character position 80.
b. Attribute codes and control codes are not recognized. For example, sending CR-LF to the Message Waiting buffer results in "CR-LF" being displayed in the data stream as control code symbols.
c. The GS terminator (CTRL]) must be used at all times. For example, if a 10-character message is sent to the MESSAGE WAITING buffer and it is followed by a GS, any data past that point reverts to normal display memory.

Line Monitor

The line monitor mode (initiated with the sequence ESC :) allows the entry of received control code and ESC sequences into display memory. Remote command execution is inhibited and all codes are displayed. Control codes and escape codes are generated on the keyboard and written to display memory without command execution. To exit the line monitor mode, the sequence ESC * is used.

Reset

Execution of the reset sequence (ESC, V) causes the terminal to be set to its initial state without altering the display memory. Reset functions the same as power-on, except the display memory is not altered and the power-on diagnostic is not invoked. A reset cannot be executed from the keyboard if the keyboard is in lock mode.

Hard Reset

Simultaneous depression of the right hand shift and control keys along with the V key will cause the terminal to reset the same as power on including the self test. The screen will be cleared. This will function in all modes, including the keyboard lock mode.

Boot Load

The Boot Load sequence ESC " allows loading of programs directly into the RAM memory area. A program can be entered either from the keyboard or over the I/O port. The load address and program data are loaded using ASCII characters of 0 through 9 and A through F representing their hex value. Every character is assumed to be a hex character or control character and two sequential characters are used to form an 8-bit byte. The program load operation is terminated by any character other than 0—9 or A through F. An @ character causes the programs just loaded to be executed, starting at the defined load address. A # character saves the program, allowing its later execution, and returns the terminal to normal operation.

If a run address other than what was initially loaded is desired, it is possible to load only the address by entering ESCAPE, " four-digit hexadecimal address, and @ (program run terminator). If a later run is desired at the same address, an ESCAPE, " @ will do this. The address, however, is cleared out at reset time to prevent accidental running of nonexistent programs.

A program is loaded and executed in the following manner:

a. ESC " initiates the boot load.

b. The first four characters are used as the high-low load address.

c. Subsequent bytes are stored sequentially, starting at the load address.

d. An @ character terminates the load sequence and starts execution of the loaded program at the load address.

e. A # character terminates the load sequence and returns the terminal to normal operation, allowing for later execution of the program.

3.3.4 Modes of Communication

The Micro Bee terminal is capable of operating off-line (Local) or on-line. Two operational modes of communication are provided when the unit is on-line: full duplex and half duplex. See section 3.2.5 for an explanation of these modes.

3.3.5 Modes of Transmission

Character (conversational) Transmission

During character transmission, the terminal must be on line. Received alphanumerics are stored in memory and displayed. Received control codes or escape codes cause the unit to perform the appropriate function and are not stored in memory or displayed. In

full duplex operation, keyboard entered control codes and escape sequence codes are transmitted but are not acted upon unless echoed back to the terminal.

In half duplex mode, control codes and escape sequence codes are transmitted and acted upon locally.

Auxiliary Character Transmission (Micro Bee 1A/DM1A)

The Micro Bee 1A/DM1A bidirectional serial auxiliary port is provided with buffering on both transmit and receive lines. The terminal recognizes the command to turn on the auxiliary interace even when in a local mode. This provides the ability for the CPU to transfer data into the auxiliary port buffer, thence to the auxiliary device. The buffer size compensates for dissimilar functional speed between mechanical and electronic devices.

I/O Data Flow

Table 3-7 summarizes the possible data flow paths within the Micro Bee and between the Micro Bee and external equipment. It is important to realize that a number of different communications modes are possible and that these modes are sometimes determined by the operator and sometimes by the CPU. For example, the CPU can turn on the auxiliary port and communicate with it without any operator intervention or control. The key to ascertaining the current operational mode is the status line. It indicates "LOCAL," "ON LINE," etc., depending on the selected mode. (A complete explanation of the status line indicators is contained in Section 3.3.7.)

Table 3-7 I/O Data Flow

MODES ENABLED	MAIN PORT		AUX PORT		KEYBOARD	CRT
	Transmitter	Receiver	Transmitter	Receiver		
LOCAL		**				
ON—LINE						
ENABLE—AUX		**				
AUX—ON		**				
ON—LINE ENABLE AUX						
ON—LINE, AUX—ON						
AUX—ON, ENABLE AUX		**				
ON—LINE, AUX—ON, ENABLE AUX						

**Monitored for special I/O functions such as Aux On
*Only HDX or FDX auto echo

Table 3-7 can be used to determine the data flow path(s) which are possible in each of the major modes and in most common mode combinations.

Examples:

In local mode, data can only be routed from the keyboard to the CRT. The dual asterisks indicate that the main port receiver monitors the CPU for special commands such as go on line or aux on.

In the on line/enable aux mode combination, keyboard entered data are transmitted from the main port and displayed on the CRT if the terminal is in half duplex or in full duplex auto echo. Keyboard entered data are also transmitted from the aux port. Incoming data from both the main and aux port receivers are displayed on the CRT.

3.3.6 Memory and Display Organization

Character Set

The terminal is capable of transmitting and displaying the entire 128 ASCII code set. All 32 control codes are displayed as special symbols. These symbols are exhibited in the control code symbols Table 3.5.

Field Attributes

The display format is organized with 24 lines of 80 characters each. Field attributes do not occupy display memory even though they occur interspersed in the data stream. Up to 16 attributes per line may be entered.

Field attributes control visual characteristics of data following the attribute until the occurrence of either a succeeding field attribute or the end of display. A detailed explanation of the use of visual attributes is contained in Section 3.3.2.

Graphic Mode

Eleven graphic characters are available and may be displayed in normal video, half intensity, blinking or blinking half intensity. The graphic mode is turned on by entering an ESC R sequence and turned off with an ESC S sequence. To use the graphic mode, the following procedure is followed.

a. Turn on graphic mode with an ESC R.

b. Move the cursor to where the graphic character is to start. At least one character must separate a graphics character and any preceeding video attribute.

c. Then key the ASCII character required for the desired graphic symbol as shown in Table 3-8.

d. Repeat steps b and c as needed.

e. Exit the graphic mode with ESC S.

Table 3-8 Graphic Characters

SYMBOL	NORMAL	ASCII EQUIVALENT HALF	ASCII EQUIVALENT BLINK	HALF BLINK
▢	@	A	B	C
▢	D	E	F	G
▢	H	I	J	K
▢	L	M	N	O
▢	P	Q	R	S
▢	T	U	V	W
▢	X	Y	Z	[
▢	\	]	↑	←
▢	●	a	b	c
▢	d	e	f	g
▢	h	i	j	k

3.3.7 Status Line

Status Line Field Definition

The status line occupies the 25th display line of the CRT and is displayed in half intensity reverse video. The breakdown of the status line display fields is outlined in Tables 3-9 and 3-10.

To display an alternate status line or no status line at all, use the CPU message deposit function. In order to inhibit display of the status line, the sequence ESC ; GS ESC 1 is employed. This causes no message to be deposited and forces the status line to be displayed in normal video with no data present. The 25th line remains inaccessible to the operator. In order to display an alternate status line, the complete CPU message deposit sequence is followed.

An additional status line for host CPU system information can be implemented through the use of the CPU line lock feature.

The following is an explanation of the messages which may appear on the status line:

Field A - Main Port Status

ON LINE - indicates that the terminal is on line to the CPU.

LOCAL - displayed when the terminal has been taken off line by placing it in the local mode.

Field B - Line Monitor Mode

MONITOR - indicates line monitor mode has been entered. Control/Escape codes are displayed but not acted upon.

Field C - Main Port Control Field

This field indicates the status of EIA circuit Data Set Ready (CC).

DSR - displayed when CC is on, indicating that the data set is connected and ready to send or receive data. This field is blank when circuit CC is off, indicating that data set is disconnected and unable to send or receive data.

Field D - Auxiliary Port

AUX RDY - appears when the auxiliary device is properly connected and ready to receive or remit data.

AUX ON - appears when the aux on mode is entered with ESC (. This mode enables the aux device to exchange data directly with the CPU.

AUX BSY - appears when an auxiliary device is not properly connected or ready to receive data.

Field E - Message Field

This field is used variously, as described in the following list. Only one message at a time can appear.

SYSTEM RDY - displayed if the terminal self test is completed with no errors.

LINE LOCK - displayed when the host CPU has initiated the line lock feature on one or more data lines.

MEM LOCK - displayed when the host CPU or operator has initiated the memory lock feature.

ERR CHECK - displayed when the self test fails.

MSG WAIT - displayed in half intensity reverse blinking video when the host processor has completed a message sequence to the terminal message buffer.

KEYBD LOCK - displayed when the keyboard has been disabled by the CPU

Fields F and G - Status Message

These fields are used jointly to display the 27-byte status message when it is evoked. See Table 3-10 for a complete explanation of the status message.

Table 3-9   Status Line Display Fields

A	B	C	D	E	F	G	H
ONLINE LOCAL	MONITOR	DSR	AUXRDY AUX ON AUX BSY	*ERR CHECK *MSG WAIT *KEYBD LOCK MEM LOCK LINE LOCK SYSTEM RDY		GRAPHIC	HH:MM:SS
(1-7)	(9-15)	(17-19)	(21-26)	(28-38)	(40-53)	(55-65)	(67-80)

————————STATUS MESSAGE————————
(39-65)
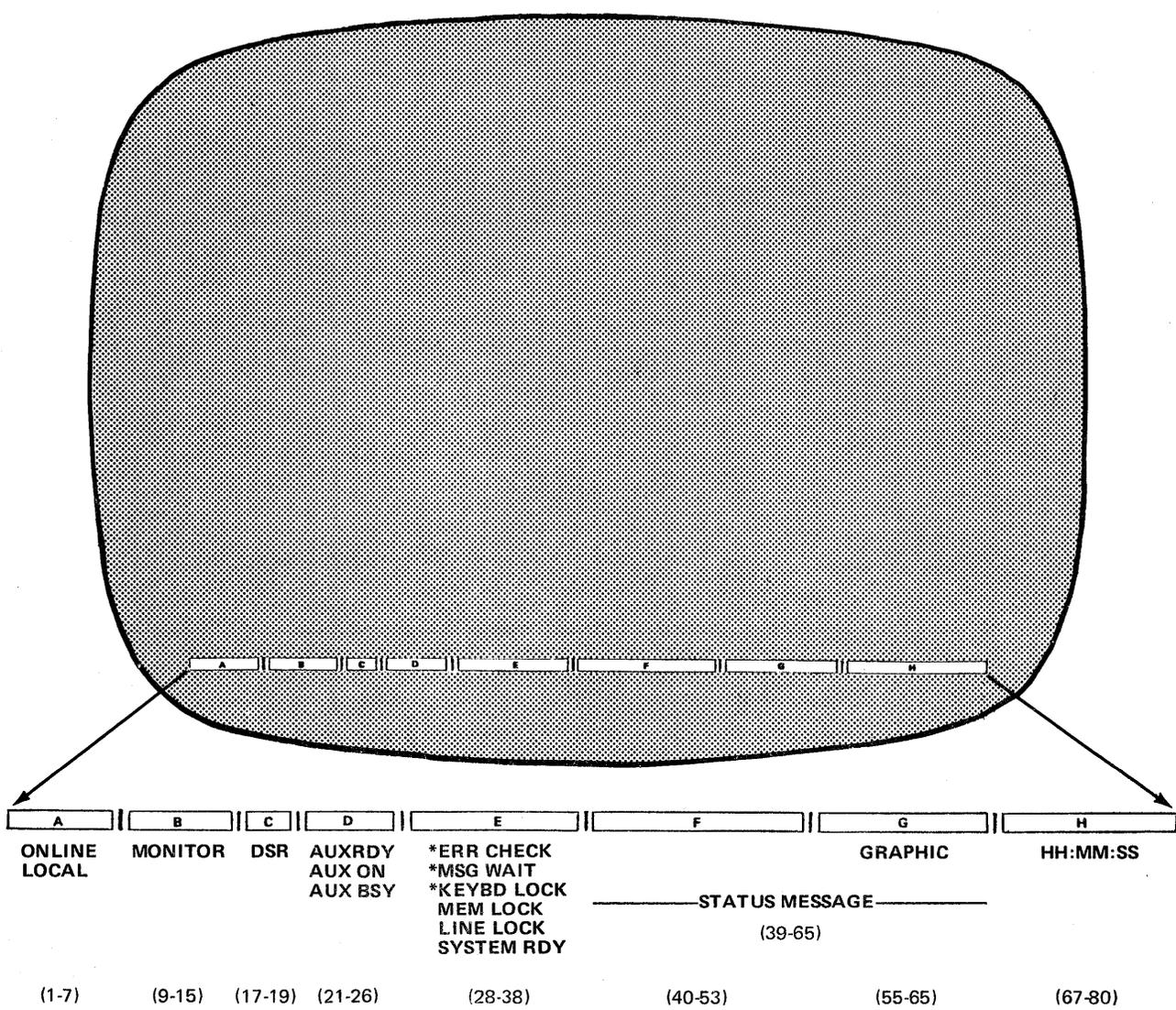
The numbers in parentheses indicate the character positions occupied by each field in the 80-character status line.

*Status line indicators which appear in full intensity reversed blinking video. All others appear in half-intensity reversed video.

The status line is an invaluable ready-reference tool which enables the operator to tell at a glance which operating modes/features are currently in use on the Micro Bee, and whether the terminal is operating correctly.

It is normally continuously visi ble unless superseded by a CPU message or other I/O function. The status line occupies a complete 80-character display line on the bottom (25th) row of the screen and consists of 8 fields displayed in full intensity reversed blinking or half-intensity reversed video.

The possible messages for each field are explained in Section 3.3.7 of this manual and are shown graphically here. Please note only one message at a time can be displayed in each field.

The all-numeric status message, when displayed, occupies fields F and G. It may be requested by the operator or the CPU using the sequence ESC O. It is broken down character by character in Table 3-10 which follows on the next page.

Table 3-10 Field F&G Status Line Indicators

CHARACTER POSITION	CHARACTER DISPLAYED	FEATURE CONVEYED	MESSAGE CONVEYED
39	1 - 7	Main Baud Rate	0 = 110 2 = 1200 4 = 2400 6 = 9600 1 = 300 3 = 1800 5 = 4800 7 = 19200
40	1 - 7	Auxiliary Baud Rate	Same as above
41	0 - 3	Termination Character	0 = CRLF 1 = ETX 2 = EOT 3 = CR
42	0 - 3	Parity Select	0 = Even 1 = Space 2 = Odd 3 = Mark
43	0 - 3	Self-diagnostics	0 = No fault 1 = ROM fault 2 = RAM fault
44	0 - 1	Receiver Error Check	0 = Off 1 = On
45	0 - 1	Roll Mode	0 = Off 1 = On
46	0 - 1	Auto Line Feed	0 = Off 1 = On
47	0 - 1	Lower Case Inhibit	0 = Off 1 = On
48	0 - 1	Duplex Mode	0 = Half Duplex 1 = Full Duplex
49	0 - 1	Auto Echo	0 = Off 1 = On
50	0 - 1	Screen Display	0 = Off 1 = On
51	0 - 1	Main Port	0 = On Line 1 = Local
52	0 - 1	Aux Enable	0 = Off 1 = On
53	0 - 1	Graphics Mode	0 = Off 1 = On
54	0 - 1	Line Lock	0 = Off 1 = On
55	0 - 1	Memory Lock	0 = Off 1 = On
56	0 - 1	Keyboard Lock	0 = Off 1 = On
57	0 - 1	Error Check	0 = No error 1 = Diagnostic error detected
58	0 - 1	CPU Message Wait	0 = No message waiting 1 = Message waiting
59	0 - 1	ESC Code Suppression	0 = Off 1 = On
60	0 - 1	Main Baud Reset	0 = Under rear panel switch command 1 = Under software command
61	0 - 1	Aux Baud Reset	0 = Under rear panel switch command 1 = Under software command
62	Various	Software version	Reflects ROM revision level
63	Various	Software version	Reflects ROM revision level
64	Various	Software version	Reflects ROM revision level
65	Blank	Reserved	

TYPICAL TRANSMITTED MESSAGE: 27-character string, clock. The clock digits appear only when it has been properly set.

Field G - Graphic

GRAPHIC - appears in Field G of the status line when this mode has been entered.

Field H - Clock

Normally blank, clock clear. When the clock is set, the time is displayed in the format HH:MM:SS. This is a 24-hour clock.

3.4 OPERATOR TROUBLESHOOTING

Most terminal functional problems which occur soon after initial installation result from operator unfamiliarity with the machine. Some problems appear to be a terminal malfunction when, in fact, an improper mode or function has been selected by the operator. These mistakes can usually be rectified with a simple keyboard sequence or by changing a switch setting. Table 3-11 describes the corrective action required in several common situations.

If you are unable to diagnose a hardware malfunction through the use of the self-test, or if you have problems interfacing the terminal to your system, call the Beehive International home office or the Field Engineering Depot at (801) 355-6000 for assistance.

Table 3-11   Operating Error Indicators

SYMPTOM	PROBABLE CAUSE	SOLUTION
Screen is blank	a. Terminal unplugged b. Power not on c. Maladjusted brightness pot	a. Plug in terminal b. Turn power on c. Adjust brightness control
Cursor is present; No data can be entered from the keyboard; Cursor does not move	a. Keyboard is locked b. The terminal is in full duplex and the CPU is not echoing characters	a. Cycle main power b. Set terminal to half duplex Set auto echo to on
Cursor is present; No data entered on screen; Cursor moves	Security field attribute enabled	Delete security field attribute
All data are displayed as graphic symbols	Graphics mode on	Depress BREAK key or ESC V or ESC S
Control characters or Escape sequences are being displayed instead of being acted upon	Line monitor mode enabled	Depress ESC *
Characters enlarged hori- zontally--Characters in reverse fields obliterated	Maladjusted contrast pot	Adjust contrast control on rear panel
Random or SB characters displayed on screen	a. Incorrect baud rate b. Incorrect parity setting	a. Set baud rate on rear panel b. Set parity selection on rear panel
Continuous alarm bell	a. Alarm has been set by code	a. Depress any key on keyboard
Clock displays invalid data	Incorrect entry	Depress ESC space bar and set hours and minutes
Two characters displayed when one key is struck	a. Half duplex switch selected on full duplex system	a. Enable full duplex switch on rear panel
No response from host CPU	a. Terminal in Local mode b. Incorrect parity c. Incorrect baud rate d. I/O cable faulty or disconnected	a - d. Verify correct switch settings and connections
Double line feed	Incorrect auto line feed switch setting	Set auto LF switch on rear panel to OFF
Upper case characters only	a. Shift lock depressed b. Lower case inhibit switch on	a. Release shift lock b. Reset rear panel switch
Computer fails to recognize end of terminal message	Incorrect termination character selected	Select correct termination character
Partial screen inaccessible to operator	a. Memory lock asserted b. Line lock asserted	a. Depress MLOCK key or ESC g or ESC h b. Depress ESC V or cycle the power