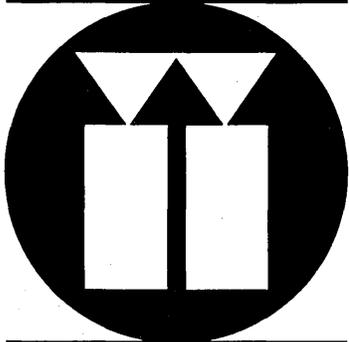


AUG 23 1973

**TECHNICAL USER'S MANUAL**

**VISTA BASIC  
and  
VISTA STANDARD**



**Infoton**

# VISTA BASIC

CONDENSED SPECIFICATION SHEET

INFOTON INCORPORATED • SECOND AVENUE, BURLINGTON, MASSACHUSETTS 01803 • AREA CODE (617) 272-6660

SEP 27 1973

# Infoton



**INFOTON, INC.**

**C. KENT RIPLEY**  
P. O. Box 6611  
San Jose, CA. 95150  
(408) 377-6480



## GENERAL DESCRIPTION

The INFOTON VISTA BASIC CRT Display Terminals are high speed, silent interactive terminals designed for use with an on-line computer. A VISTA BASIC terminal may be used as a substitute for a teletypewriter in a time-sharing application, or as an input/output device in a specialized computer system. The VISTA BASIC is a self-contained desk-top unit which includes keyboard, video display, control and refresh electronics, power supply, and either an EIA or current loop data interface.

## DISPLAY CHARACTERISTICS

### SCREEN SIZES

Characters/Line	32	32	64	64
Lines/Display	10	20	10	20
Character Set	64 character ASCII (Upper Case)			
Character Format	5 x 7 dot matrix			
Character Size	0.10" x 0.15" nominal			
Cursor	Non-destructive blinking underscore			
Refresh Rate	50 or 60 Hz			
Viewing Area	9" x 7"			
Color	White — P4 phosphor			
Readability	Screen easily read without disruptive reflections in 100 foot candle illumination			

## MODES OF OPERATION

### Full/Half Duplex

#### Full Duplex

Keyboard output to outgoing data line. Display input from incoming data line.

#### Half Duplex

Keyboard output to display and to data line. Display input from keyboard and data line.

## Local/On Line

### Local

Data line disconnected. Operation as in Half Duplex.

### On-Line

Data line connected.

## Roll/Page

### Roll

When the format rolls up one line, the former top line of the display is lost; the new bottom line is blank.

### Page

When the cursor is in the last line, any action that would normally move the cursor down one line instead moves the cursor to the corresponding column in the top line.

## COMMAND FUNCTIONS

Erase Screen  
Line Feed, Carriage Return  
Blink Start, Blink End  
Cursor Right, Left, Up, Down, and Home

## INTERFACE

### Data Rates

Maximum data rates are as follows:

#### Asynchronous to Internal Timing

820 characters/second (When in ROLL mode, input during the rolling action should be limited to 220 characters/second)

#### Demand-Response

1500 characters/second average

### Data Interface Modules

Each VISTA BASIC terminal is supplied with either of the following customer-selected interfaces as standard equipment.

#### Asynchronous Communication Interface, Single Speed (I-101)

Provides EIA standard RS-232C connection to modems, couplers, or other equipment. Signals in interface are shown on the reverse side of this sheet.

## SIGNALS IN INTERFACE

Description	Pin Number	RS-232C Designation
Transmitted Data	2	BA
Received Data	3	BB
Request to Send	4	CA
Clear to Send	5	CB
Signal Ground	7	AB
Carrier Detect	8	CF
Data Terminal Ready	20	CD

The interface transmits 11 bits at 110 baud, 10 bits at higher speeds. Receives 10 or 11 bits. Parity bit is always a logical "1" (mark). Standard speeds are 110, 150, 300, 600, 1200, 1800, 2400 or 4800 baud. Speeds up to 8200 baud available on request.

### Asynchronous Current Loop (Teletype) Interface, Single Speed (I-102)

For interface to equipment designed for teletypewriter style 20 or 60 milliamper current loop operation. Transmits 11 bits at 110 baud, 10 bits at higher speeds. Receives 10 or 11 bits. Parity bit is always logical "1" (mark). Standard speeds are 110, 150, 300, 600, 1200, 1800, 2400, or 4800 baud. Speeds up to 8200 baud available on request.

### Parallel Interface Capability

All VISTA BASIC units have a backplane slot that is wired to accept a printed circuit board with a user-designed custom parallel interface. Signals at T<sup>2</sup>L levels are provided for data into memory, data out of memory, keyboard data output, and the necessary control lines for data transfer. Pin allocations and a timing diagram are available upon request.

## KEYBOARD

### Layout

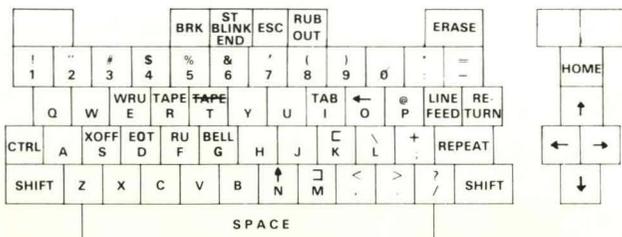
The alphanumeric section is compatible with the Model 33 Teletype. In the unshifted mode, the upper case code is generated for alphabetic characters.

### Rollover

When one key is already depressed and a second key is then depressed, the code for the second key will not be generated until the first key is released.

### Repeat

When a code or function-generating key is depressed along with the Repeat Key, the code or function will be repeated at a rate of 10 per second.



## CONTROLS, SWITCHES, INDICATORS (F, - Front, R - Rear of Unit)

### Controls

Intensity (F)  
Horizontal (F)  
Vertical (F)

### Switches

OFF-ON (F)  
LOCAL-LINE (F)  
ROLL-PAGE (F)  
Full/Half Duplex Selector (R)

### Indicator

Power On (F)

### Mechanical

Size 15" High, 17" Wide, 27" Long  
Weight - 65 pounds

### Environment

Temperature  
Operating: 0° to 40°C  
Storage: -30° to 70°C  
Humidity: 0 to 95% non-condensing

### Power

125 watts  
105 - 125 volts, 60 Hz  
105 - 125 volts or 205 - 230 volts, 50 Hz (Export model)

## OPTIONS

### Integral Modems

One of the following four modems may be supplied with the VISTA BASIC:

INFOTON Product Designation	Equivalent Western Elec. Modem
P-401	103A
P-402	103F
P-403	202C
P-404	202D

Output from the integral modem attaches to a Data Access Arrangement or to a private communications line.

### Numeric Pad

The A-201 Numeric Key Pad contains 10 numeric keys, plus the decimal point for convenient entry of numeric data.



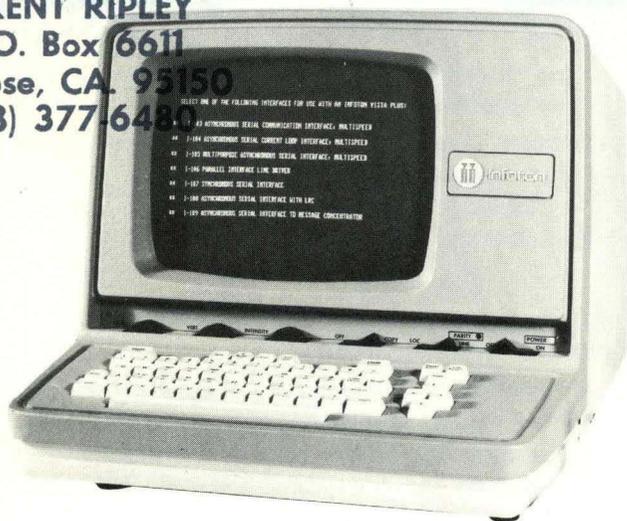
**INFOTON, INC.**

**C. KENT RIPLEY**

**P. O. Box 6611**

**San Jose, CA. 95150**

**(408) 377-6480**



## GENERAL DESCRIPTION

The INFOTON VISTA STANDARD CRT display terminals are designed for use with an on-line computer as high speed, silent interactive terminal devices. They can be utilized as a substitute for a teletype in a time-sharing environment or, more appropriately, as a means to bring the power of a computer into locations which previously could not afford terminal equipment. Incorporated into each unit is a keyboard, video presentation, control and refresh electronics, a power supply and an EIA or current loop interface required for on-line use with a dataphone, computer or teletype.

## DISPLAY CHARACTERISTICS

	SCREEN SIZES			
Characters/Line	40	40	80	80
Lines/Display	10	20	10	20
Character Set	64 character ASCII (upper case)			
Character Format	5 x 7 dot matrix (upper case)			
Character size	0.08" x .19" nominal			
Cursor	Non-destructive blinking underscore			
Refresh Rate	50 or 60 Hz			
Viewing Area	9" x 7"			
Color	White - P4 phosphor			
Readability	Screen easily read without disruptive reflections in 100 foot candle illumination			
Size	15" high, 17" wide, 27" long			
Weight	65 pounds			
Power	125 watts			
	105-125 volts, 60 Hz			
	105-125 volts or 205-250 volts, 50 Hz (Export Model)			
Temperature	0° to 40° C (operating) -30° to 70° C (storage)			
Humidity	0 to 95% non-condensing			

## MODES OF OPERATION

### Full/Half Duplex

#### Full Duplex

Keyboard output to outgoing data line. Display input from incoming data line.

#### Half Duplex

Keyboard output to display and to data line. Display input from keyboard and data line.

### Local/On-line

#### Local

Data line disconnected. Operation as in Half Duplex.

#### On-Line

Data line connected.

### Page/Roll

#### Roll

In normal operation, the unit is in roll mode. When the format rolls up one line, the former top line of display is lost; the bottom line is blank.

#### Page

The page mode is entered whenever the Page command (Control "X") is received from data line or keyboard. Whenever the cursor is in the last line, any action that would normally move the cursor down one line moves the cursor to the corresponding column in the top line.

## COMMAND FUNCTIONS

Erase Screen, Erase to End of Line.

Line Feed, Carriage Return

Blink Start, Blink End

Cursor Right, Left, Up, Down, and Home

Page Mode.

## INTERFACE

### Data Rates

Maximum data rates are as follows:

#### Asynchronous to Internal Timing

820 characters/second (When in ROLL mode, input during rolling action should be limited to 500 char/sec unless two NULL characters are added after the character which causes the rolling action.)

#### Demand-Response

1500 characters/second average

### Data Interface Modules

Each VISTA terminal is supplied with one of the following customer selected data interface modules as standard equipment.

#### Asynchronous Serial Communication Interface, Multi-Speed (I-103)

Nine switchable baud rates (110, 150, 300, 600, 1200, 1800, 2400, 3600, 4800 bps.) EIA RS-232C interface to standard modems. Switch selectable, even or odd character parity or fixed parity bit at logical "1". Transmits or receives 10 or 11 bit code.

## Asynchronous Serial Current Loop (TTY) Interface, Multi-Speed (I-104)

Nine switchable baud rates (110, 150, 300, 600, 1200, 1800, 2400, 3600, 4800 bps.) 20 or 60 ma current loop interface to a computer or teletype. Switch selectable, even or odd character parity or fixed parity bit at logical "1". Transmits or receives 10 or 11 bit code.

## Parallel Interface Line Driver (I-106)

Connects interface Port to parallel lines up to 1000 feet or more in length.

## ACCESSORY PORTS

All units have three Accessory Ports for interface to I/O options, peripheral equipment, or special devices. Each of these ports consists of a printed circuit card socket to accept a printed circuit card as part of the VISTA electronics package.

## KEYBOARD

### Layout

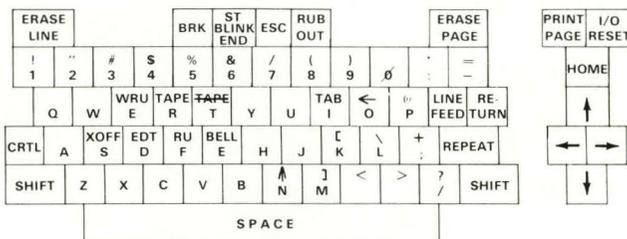
The alphanumeric section is compatible with the Model 33 teletypewriter. In the unshifted mode, the upper case code is generated for alphabetic characters.

### Rollover

When one key is already depressed and a second key is then depressed, the code for the second key will not be generated until the first key is released.

### Repeat

When a code or function-generating key is depressed along with Repeat key, the code or function will be repeated at a rate of 10 per second.



## SWITCHES, CONTROLS, INDICATORS (F - Front, R - Rear of Unit)

### Controls

Intensity (F) Horizontal (F) Vertical (F)

### Switches

- OFF-ON (F)
- LOCAL-LINE (F)
- Data Rate Selector (R)
- Odd-Even-Mark Parity Selector (R)
- Full/Half Duplex Selector (R)
- 20/60 ma. Selector (with current loop interface only) (R)

## Indicators

- Power On (F) Carrier On (F) (with integral modem)
- Parity Error (F)

## OPTIONS

### Interface

## Multipurpose Asynchronous Serial Interface Multi-Speed (I-105)

Contains capabilities of both Asynchronous Serial Communication Interface Multi-Speed (I-103); and Asynchronous Serial Current Loop (TTY) Interface, Multi-Speed (I-104).

## Peripherals:

### Printer Interface (P-101)

An interface circuit providing a serial output to a printer, "on command." Several terminals can share one printer. Appropriate switches and indicators are mounted on the front panel and keyboard of the VISTA.

### Integral Modem (P-401 - P-404)

A modem built into the VISTA. A choice of 103 A, F or 202 C, D modems is available. Output connects to Bell System Data Access Arrangement or private lines. Indicators are mounted on the front panel of the VISTA.

### Answerback (P-303)

Standard teletypewriter answerback function - generates a sequence of up to 39 hardware programmed characters upon receipt of WRU code from data line or use of the "HERE IS" key.

## Accessories

### Numeric Key Pad (A-201)

An additional eleven-key, keyboard mounted matrix for more rapid entry of numeric data.

### Lower Case Character Group (A-202)

96 character ASCII. Including displayable lower case character set. Lower case characters are presented in a 5 x 9 dot matrix. Keyboard has ANSI layout.

### Infotone (Bell) (A-203)

A bell rings when the cursor reaches the tenth position from the end of line or when the BELL code is received from the computer.

### Light Pen - (A-204)

Includes photo-detecting light pen, associated circuitry and interface electronics. The light pen will cause the transmission of a message containing the row and column position of the character at which the pen is pointed.

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INFOTON

TECHNICAL USER'S MANUAL

VISTA BASIC

and

VISTA STANDARD

#00744-Rev. B  
18 February 1972



P R E F A C E

This manual presents basic information necessary for the user of the INFOTON VISTA BASIC and VISTA STANDARD display terminals.

The symbol ++ is used in the margin throughout this manual to indicate extended features that are not available in the VISTA BASIC terminal but are available in the VISTA STANDARD



INFOTON  
 TECHNICAL USER'S MANUAL  
 VISTA BASIC and STANDARD

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## 1. INTRODUCTION



Figure 1.1 VISTA Display Terminal

The INFOTON VISTA Display Terminal (Figure 1.1) is an alphanumeric display that can be used in a wide range of applications requiring man/computer interaction.

The VISTA is designed to communicate with any computer, connected either directly or over standard telephone lines. The unit is completely compatible with systems and software designed for Model KSR 33 or 35 teletypewriters. To the computer the VISTA looks like a teletypewriter except that it can communicate with the computer at much higher speeds.

The VISTA is extremely flexible in its basic form and can be used without modification in most system applications. A variety of options are available to satisfy those applications which require special hardware features.

## 2. SUMMARY OF CHARACTERISTICS

### INTERCHANGEABLE WITH TELETYPE

The VISTA can be substituted for a Model 33 or 35 teletype with no hardware or software modifications. The VISTA can serve as an upgraded high speed terminal to all time-sharing services using ASCII\* Code regardless of the computer system used by the service.

### SILENT OPERATION

The VISTA is completely silent in operation.

### EASY-TO-READ CHARACTERS

High resolution, non-reflecting screen, and contrast-enhancing filter permit easy viewing at distances up to 10 feet under direct glare and 100 foot candle illumination.

### HIGH-SPEED TRANSMISSION RATES

Speeds up to 4800 bps serial or 1500 char/sec parallel are available.

++ Nine switch-selectable transmission rates from 110 up to 4800 bps are available in the standard unit.

### CHOICE OF COMPUTER INTERFACE

The unit is supplied with choice of interface modules; serial asynchronous interface, either EIA RS-232C standard or 20/60 ma TTY style current loop. Parallel data interface is available on the VISTA STANDARD.

### ROLL OR PAGE MODE

The VISTA is normally in Roll Mode. The unit may be switched to Page Mode from the keyboard or the data line. Erase Screen command returns the unit to Roll Mode.

---

\* American Standard Code for Information Interchange.

### CURSOR CONTROL

The unit has a non-destructive position marker or cursor. The cursor displays as a blinking underscore. The cursor position can be tracked and manipulated by the computer or the operator.

### ERASE PAGE AND ERASE TO END OF LINE

The full screen may be erased with one command.

++ With another command, the unit will erase all characters from the cursor position to the end of the line in which the cursor resides.

### BLINK MODE

The VISTA can blink selected words or groups of words in order to attract attention to all or specific parts of the screen.

### VARIETY OF OPTIONS

In addition to the basic VISTA, a variety of options is available, including printer, automatic answerback, lower case characters, and light pen.

### 3. FUNCTIONAL DESCRIPTION

The VISTA terminal is a completely self-contained desk top unit operating independently of any other VISTA terminal in a system. The unit consists of a keyboard, video monitor, refresh memory, control logic, and a computer or modem interface. The modes of operation, communication and interface are illustrated in Figure 3.1 and are described below.

#### ON-LINE/LOCAL

The VISTA has two modes of operation: ON-LINE, with the terminal connected to the data line, and LOCAL, with the terminal disconnected from the data line. LOCAL/ON-LINE selection is made using a switch located on the front panel of the terminal.

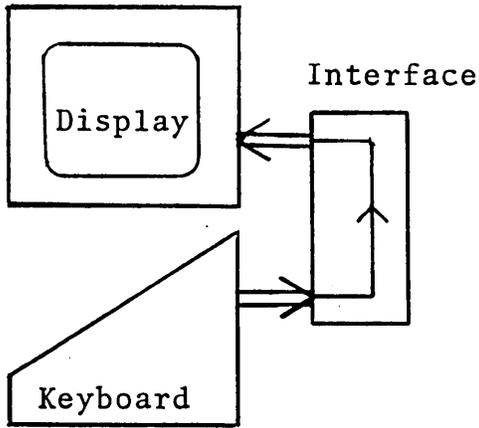
#### FULL-DUPLEX/HALF-DUPLEX

There are two modes of communication to the data line as shown in Figure 3.1 - Full Duplex (FDX) or Half Duplex (HDX). FDX/HDX mode is selected by a switch on the rear of the unit. In Full Duplex mode, information will be displayed only if the computer at the end of the data line echoes back the information transmitted from the keyboard. All computers to which the VISTA may be connected do not necessarily have this Full Duplex or "echo back" capability. In the Half-Duplex mode, data entered on the keyboard is routed to the display - the computer does not echo data back.

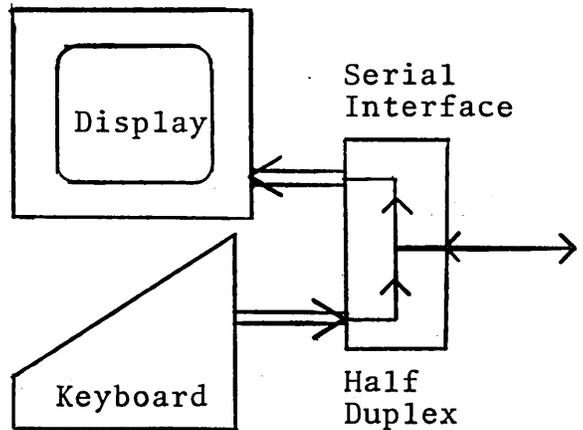
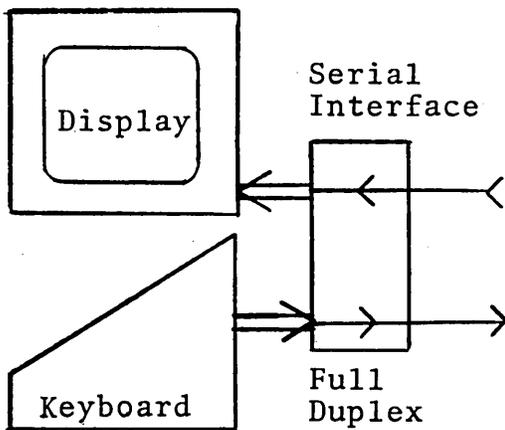
#### INTERFACE

Two general types of interfaces are available, serial and parallel as illustrated in Figure 3.1. The various modes in which the unit may be used are also shown in Figure 3.1.

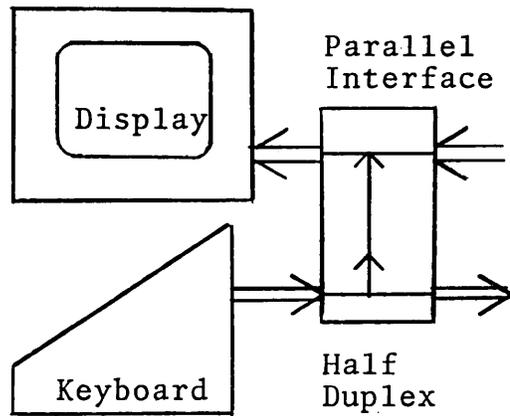
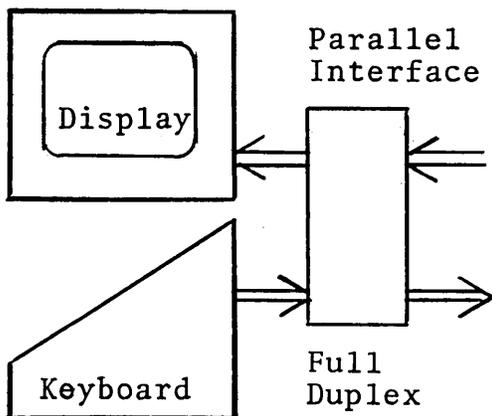
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18 February 1972



LOCAL - With Serial or Parallel Interface



ON LINE - With Serial Interface



ONE LINE - With Parallel Interface

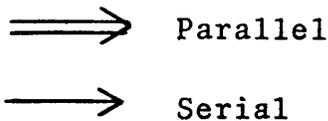


Figure 3.1

MODES OF OPERATION AND COMMUNICATION

## 4. OPERATIONAL FEATURES

### TELETYPEWRITER COMPATIBILITY

The VISTA reacts to the full ASCII character set, (Appendix A) receiving and storing both upper and lower case codes. For this reason, the VISTA can be used without software modification in applications which are now using a teletypewriter Model 33 or 35. The effect of each ASCII code on the VISTA is shown in Appendix B. All characters are displayed as upper case characters, unless the unit is equipped with the lower case character option. Although the terminal may be programmed as a teletypewriter, the full advantages of the VISTA as an interactive terminal are realized when the software makes full use of the unit's features described in the following sections:

### CURSOR

The cursor is a unique character appearing on the display at all times. The cursor indicates the position at which the next data character will be displayed. It also indicates the end position of data transmission to the computer. The "Home" position for the cursor is the first position on the first line of the display, i.e., the upper left-hand corner of the display.

The cursor appears on the display screen as a blinking underscore. It blinks approximately five times a second. The blinking prevents the operator from losing track of the cursor. The cursor will advance one step for each character that is typed. The cursor can be positioned by the cursor control keys or from the data line. There are five cursor movement commands and corresponding keys: Home, Cursor Down, Cursor Up, Cursor Left, Cursor Right which the VISTA recognizes as cursor movement commands. The "Carriage Return" and "Line Feed" codes also generate cursor movements. All these commands allow

the operator or the computer to manipulate the cursor to any position on the screen.

The cursor is "non-destructive". In response to one of the cursor movement commands, the cursor moves but does not alter any data appearing on the screen.

The actual position of the cursor cannot be directly read by the computer. However, since all cursor movements entered by the operator on the keyboard are transmitted to the computer, the computer can at all times follow the position of the cursor. This feature allows software editing of a page of textual data on the screen.

The computer can move the cursor to any X-Y coordinate by embedding the appropriate sequence of cursor movement characters in a message being sent to the VISTA. An efficient cursor moving algorithm can be constructed by using the "wrap-around" feature of the cursor movement at the edges of the screen. For example, the computer program or operator can move the cursor from the Home position to the lower right-hand corner with a single Cursor-left command.

#### ROLL MODE

The VISTA STANDARD is normally in Roll Mode. The VISTA BASIC is put in Roll Mode by appropriately setting the manual switch on the front panel. In this mode, when the screen fills, the data on the screen rolls up one line; the former top line is lost and the bottom line is blank. The data appears to roll up. As line after line of text is written on the screen, the visual effect is that of a continuous scroll of text moving past a window.

Rolling is caused when the cursor is anywhere on the bottom line and a LINE FEED character is received by the terminal. Rolling is also caused when the cursor is in the bottom right-hand corner of the screen and any displaying code is received.

Cursor movement from one of the five basic cursor commands (Home, Cursor Right, Cursor Left, Cursor Up, and Cursor Down)

will not move the screen at all. When the cursor is in the bottom line, Cursor-Down moves the cursor to the top line without rolling. From the bottom right position Cursor-Right moves the cursor to the top left position without rolling. This prevents inadvertent rolling during cursor manipulation by the operator.

In Roll Mode, characters can be transferred at a maximum fixed rate of 500 characters/second (220 characters/second, on VISTA BASIC). Higher rates can be attained in parallel demand-response mode which will be discussed in Section 6, INTERFACES.

#### PAGE MODE

In Page Mode, whenever the cursor is in the last line, any action that would normally cause the data to roll does not roll the data; instead, the new data is written on the top line of the screen, writing over the old data on the top line.

In Page Mode, characters can be transferred at a maximum fixed rate of 820 characters per second, in serial mode. Higher rates can be attained in parallel demand-response mode which will be discussed in Section 6, INTERFACES. On the VISTA STANDARD, the Page Mode is entered whenever the Page Command is received from the data line or keyboard.

++ The unit is switched from Page Mode to Roll Mode whenever the ERASE command is received from the data line or keyboard. On the VISTA BASIC, the Page Mode is entered by setting a manual switch on the front panel of the unit.

#### BLINK

Any set of characters in any portion of the screen may be blinked. Blinking begins at the cursor position at which the Blink Start character is received; it stops at the cursor position at which the Blink Stop character is received. Any number of groups of characters may be blinked. The Blink Start and Blink Stop characters display as blank spaces on the screen.

RESPONSE TO COMMANDS

The VISTA terminal is controlled and manipulated from its data stream. The data stream control logic is defined as follows:

1. Certain characters are designated as command characters (Appendix B).
2. The computer inserts these characters within the text transmitted to the VISTA.
3. When accepting the data, the VISTA continually monitors the input data stream for these command characters, performing a designated action upon reception of a command character.

For example, when a Blink Start command character is received by the VISTA, the unit turns on the Blink feature and all characters from that position to the end of the screen will be displayed as blinking characters by the VISTA until a Blink Stop character is received.

The commands which are used to control the display are described below:

++ PAGE MODE - Puts the unit in Page Mode. Roll Mode is restored when the screen is erased.

ERASE SCREEN - All data on the screen is erased. Cursor moves to Home position.

++ ERASE TO END OF LINE - Erases all data from, and including, the cursor position to the end of line.

When the ERASE TO END OF LINE command is used, characters can be transferred at a maximum fixed rate of 500 characters/second, either in parallel or serial mode. However, if one NULL character is inserted after each ERASE TO END OF LINE command sent to the unit, then a message may be transmitted

at a maximum rate of 760 characters/second. If two NULLS are inserted, then an 820 character/second rate may be attained.

CARRIAGE RETURN - Places cursor at left most position of the line in which the cursor resides.

LINE FEED - Places cursor on the next line at the same position in which the cursor previously resided.

NULL - (Not generated from the keyboard) No action is taken when this code appears on the line.

RUB-OUT - When received, no action is taken.

BREAK - (Keyboard Only) Places "space" (logical "0") condition on the data line as long as key is depressed.

++ PRINT PAGE - If the unit is equipped with the Printer Interface Option, this code causes the page of data on the screen to be transmitted to the printer. The data on the screen is not erased.

HOME - Positions the cursor to the top left position.

CURSOR RIGHT - Places cursor one position to the right of present position. If cursor is in last character of line, the next position is first position in the line below or in the home position if the cursor is in the last line.

CURSOR LEFT - Places cursor one position to left of present position. If cursor is in first character of line, the next position is last position of the line above.

CURSOR UP - Places cursor one position above the present position. If cursor is in the first line, the next position is in the bottom line.

CURSOR DOWN - Places cursor one line below present position. If cursor is in the last line, the next position is in the top line.

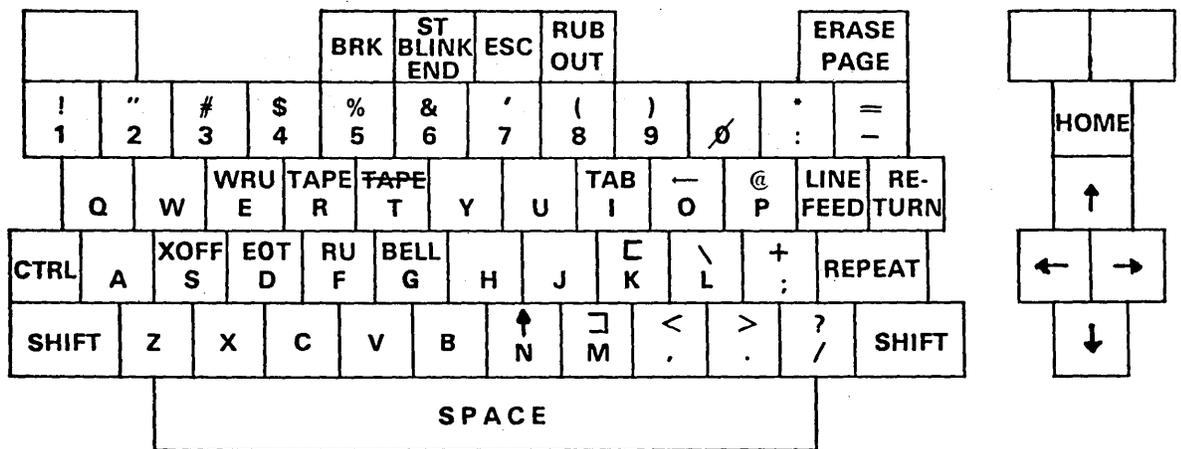
BLINK START, STOP - All characters between cursor positions at which Blink Start and Blink Stop are commanded will blink. Blink Start and Blink Stop each are non-displayed characters. The positions at which they occur on the screen are blank. Blinking may be stopped by writing any character or Space in the Blink Start positions.

### 5. EQUIPMENT DESCRIPTION

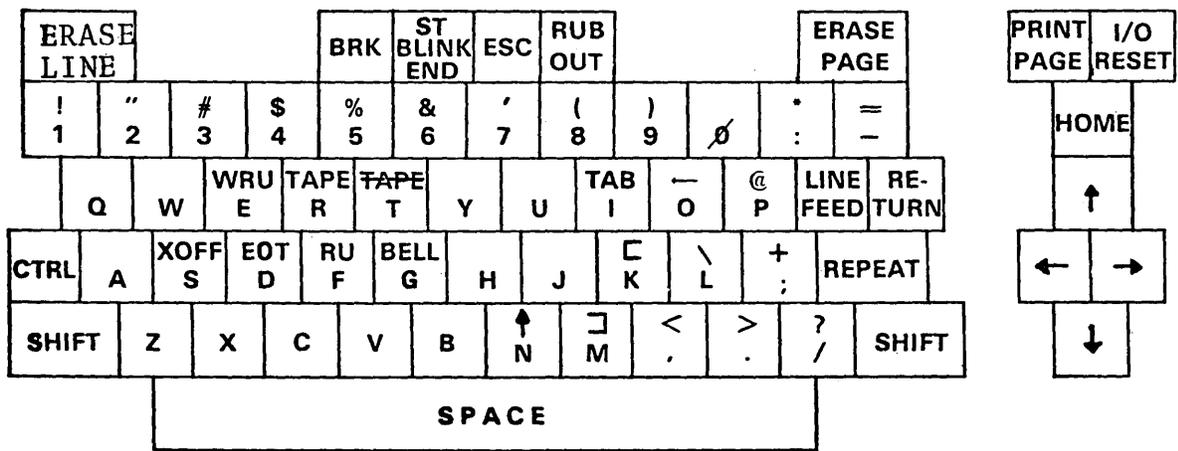
The basic VISTA unit logically and physically consists of three parts, keyboard, display, and control. These components and the controls and indicators on the unit are described in this section.

#### KEYBOARD

The operator interacts with the VISTA and with the computer via the keyboard. (Figure 5.1)



VISTA BASIC KEYBOARD



VISTA STANDARD KEYBOARD

Figure 5.1

Keyboard (ie., upper case only)

The VISTA BASIC and STANDARD are character oriented (conversational) terminals, not buffered terminals\*; as soon as a key is depressed, the associated code for the key is instantly transmitted to the computer.

Most keys on the keyboard are the normal printing characters and standard carriage controls found on teletypewriter or electric typewriter keyboards. The arrangement, key shape, and touch pressure are similar to an electric typewriter.

The keyboard consists of coded keys (eg. A, B), function keys (eg. REPEAT, BRK), and mode keys (SHIFT, CTRL).

The basic VISTA can generate 96 ASCII codes; all 128 ASCII codes can be generated if the unit is equipped with the lower case option.

Appendix B illustrates the full code set, how to generate the codes from the keyboard, and the effect of the codes on the display.

Both the SHIFT key and the CTRL key establish a mode for the keyboard; i.e., data is not actually generated until a coded key is depressed. Depressing the SHIFT key in conjunction with another key causes upper case characters to be transmitted. The keyboard on the VISTA, without the lower case option generates upper case codes for the alphabetic characters whether or not the SHIFT key is depressed. For the sake of operator convenience, two SHIFT keys are on the keyboard. Each of these keys has the same effect on the data.

Control codes do not display, but in most applications are used as function codes. Some of the Control codes have been used as functions on the VISTA. For example, Control L erases the screen on the VISTA. Some of the function codes are generated by depressing SHIFT and CTRL in conjunction with a coded key. An example of this is the Control Shift M code

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\*The VISTA PLUS is a buffered display terminal.

which is a cursor-down command. To simplify the entry of commands from the keyboard, function keys are provided for all commands. When depressed, the key labeled ↓ generates the cursor-down command (Control Shift M).

The REPEAT key when depressed in conjunction with a coded key or function key generates repeated transmission of the code or function at a rate of 10 characters per second.

The BREAK key places "space", i.e., a logical "0" condition, on the data line for as long as the key is depressed. The BREAK key operates with any of the Serial Asynchronous Interfaces discussed in Section 6.

- ++      Depressing the I/O RESET key,
- .    resets the state of all peripheral options which are attached to the unit.
  - .    resets the parity indicator.
  - .    homes the cursor.

This key does not transmit any data to the data line and does not alter any data on the screen.

The keyboard has an interlock feature and a roll-over feature which govern operation when two coded keys are simultaneously depressed.

When one key is already depressed and a second key is then depressed, the code for the second key will not be generated until the first key is released ("interlock"). Upon release of either key, the code for the other key is generated ("roll-over") provided that this key remains depressed.

## DISPLAY

The display screen is a cathode-ray tube (CRT) with P4 phosphor. The viewing area of the display is 9" wide and 7" high. A variety of display formats is available in the VISTA series. The VISTA is available in a 10 or 20 line format. The VISTA BASIC is available with 32 characters per line or 64 character per line, and the STANDARD is available with 40 characters per line or 80 characters per line.

The displayed characters are white on a charcoal background. The characters are reprinted on the display surface 60 times/second to provide flicker-free viewing. Characters are displayed on the screen in a rectangular array (i.e., horizontal lines and vertical columns). Each of the possible character positions on the display consists of a 7 x 10 matrix of dots. Each displayed character is uniquely formed by increasing the intensity of a set of points within the 7 x 10 matrix. The upper case characters are displayed in a 5 x 7 dot matrix format as illustrated in Figure 5.2 for the letters J and K. The dot matrix forming the character is always in the upper left hand portion of the 7 x 10 dot matrix.

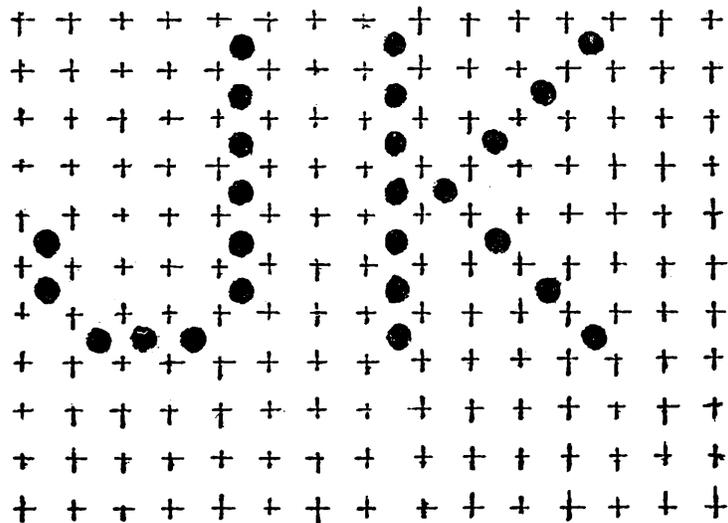


Figure 5.2. Dot Matrix Character Format

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The position of the cursor within the 7 x 10 matrix is illustrated in Figure 5.3.

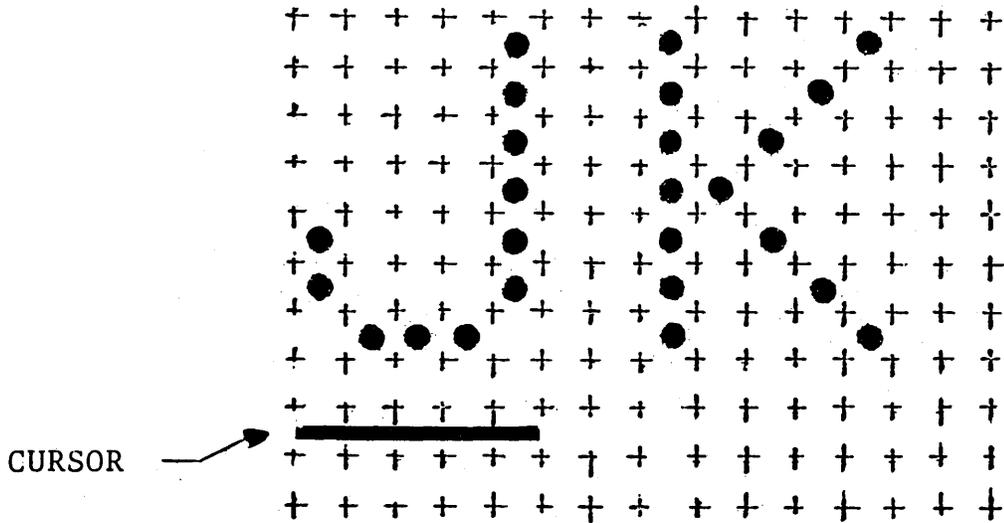


Figure 5.3. Dot Matrix with Cursor

++ If the unit is equipped with the Lower Case Option, lower case characters appear in a 5 x 10 dot matrix format, as illustrated in Figure 5.4.

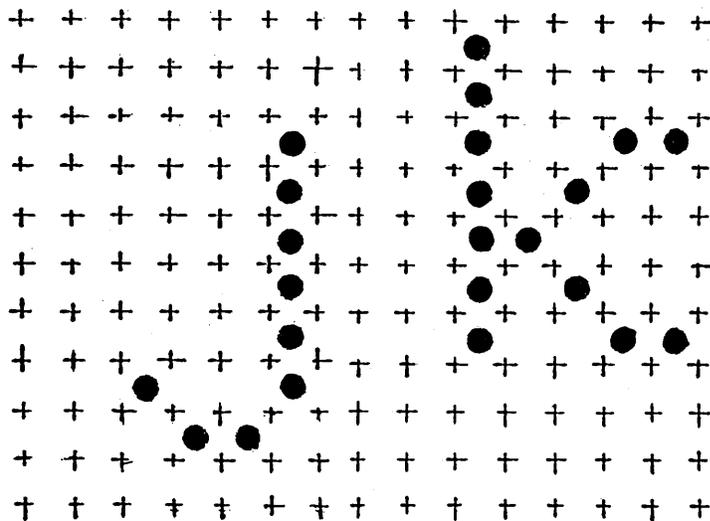


Figure 5.4  
Lower Case Dot Matrix

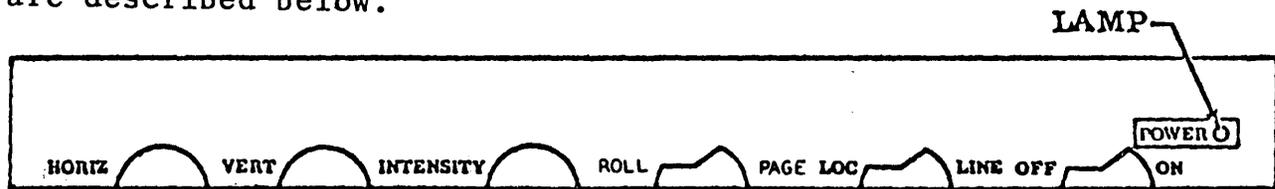
## CONTROL LOGIC

The Control Logic contains the logic, power supply, central timing and control, refresh memory, character generator and Communications Interface. The most important functions of the Control Logic are:

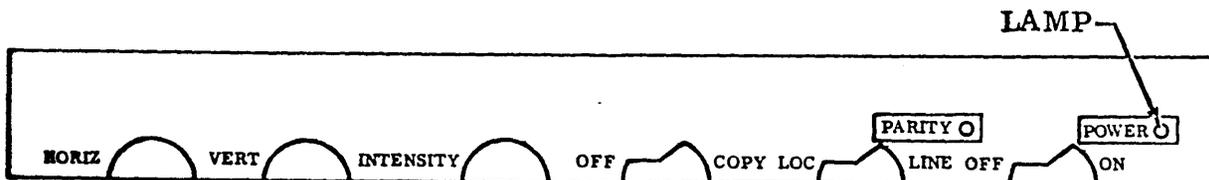
- Stores in a refresh memory, all data entered via the keyboard, or received over the communication line.
- Converts the ASCII characters into dot matrix form and presents them on the CRT.
- Maintains the display by refreshing the image 60 times/second.
- Provides the electrical interface between the electrical operating levels of the VISTA and the equipment with which the terminal is operating. The standard interfaces are described in detail in Section 6.
- Decodes command codes received on the data line and performs the appropriate function.

## CONTROLS

There are several operator controls and indicators in addition to the keyboard. These are shown in Figure 5.5 and are described below.



VISTA BASIC



VISTA STANDARD

POWER - In the ON position the terminal is in the operating state. In the OFF position, power is removed from the terminal. After the switch is turned to ON, a 30 second warm-up period is required before operating the terminal. The POWER light glows when power is applied to the unit.

The power requirements for the unit are:

125 watts; 105-125 volts; 60 Hz or 105-125,  
205-250 volts; 50 Hz (Export model)

INTENSITY - This knob allows the screen brightness to be adjusted for the operator's viewing comfort.

HORIZONTAL/VERTICAL - The HORIZONTAL and VERTICAL controls allow adjustment for a stable picture. They correspond to the controls normally found on a commercial television set. Once these controls are set, they require no further adjustment during the operating period.

++ CONTINUOUS PRINT - This switch effects operation only when the unit is equipped with the Printer Interface Option. When in the COPY position, incoming data to the VISTA is also routed to the printer. This option is further explained in Section 7, OPTIONAL FEATURES.

++ PARITY LIGHT - Glows when a parity error occurs. Depressing I/O RESET on the keyboard turns the PARITY light off.

MECHANICAL SPECIFICATIONS - The unit's size is 15" high, 17" wide, 27" long; Weight 65 pounds.

ENVIRONMENT SPECIFICATION - The temperature requirements are:

Operating 0° to 40°C  
Storage -30° to 70°C

Humidity must be 0 to 95% noncondensing.

## 6. INTERFACES

### INTRODUCTION

The VISTA operates with a computer either over telephone lines via a modem, or locally connected by direct cable. The standard interfaces accommodate a wide range of computer systems and a wide range of data rates. This has been accomplished by adhering to commonly accepted standards for data transmission mode, transmission method (asynchronous), and transmission rate.

The Interface Module chosen depends upon the communications environment in which the terminal will be used. The Interface Module makes the necessary conversion between the electrical operating levels of the VISTA and those of the particular external circuit or computer with which the Interface Module is designed to operate. Also, the interface arranges data in the format required by the circuit or computer.

### ASYNCHRONOUS SERIAL INTERFACE

Using this interface, the VISTA communicates in bit-serial, character asynchronous mode. Asynchronous is the transmission method in which the timing information is derived from each character transmitted. The term asynchronous is synonymous with START-STOP and implies that the receiver comes to rest between characters. The START bit allows the receiving VISTA to initiate its timing in proper synchronism with the incoming data. The STOP bit(s) ensure that the communication line is returned to the marketing condition ready for a new START.

Input and output data characters contain 11 bits compatible with the KSR 33/35 teletype. However, the unit in receiving, will operate with 10 or 11 bit formats. The VISTA transmits in 11 bit format to be compatible with TTY devices at 110 baud. At higher speeds than 110 baud, the unit transmits 10 bits. (NOTE: On a special order, 11 bits can be transmitted at all speeds.)

The following bit configuration and character structure is used by the Asynchronous Interface:

- Bit: 1. START - "space" polarity - first bit transmitted
2. b 1 - at least significant data bit
3. b 2 - data bit
4. b 3 - data bit
5. b 4 - data bit
6. b 5 - data bit
7. b 6 - data bit
8. b 7 - most significant data bit
9. Parity bit (this bit is always set to 1, i.e., mark polarity, on the VISTA BASIC)
10. STOP - "mark" polarity
11. STOP - "mark" polarity (Note comments above on 11th bit).

When the interface is transmitting, it adds the start bit, computes and adds the parity bit, and adds the stop bit to every seven-bit code being sent. When it is receiving, it removes the start and stop bits, and transfers only the seven information bits to the appropriate logic.

++ When receiving, parity is checked.

Transmission is always initiated with the start bit. Bits b 1 through b 7, shown above, bear a one-to-one correspondence with the bits b 1 through b 7 of the ASCII code. (Ref. Appendix B) The "Space" and the "Mark" polarities are as defined by the EIA Standard RS-232C.\* Even parity implies that the total number of ones in every character should be an even number; odd implies that it should be odd.

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\* This is the accepted interface standard for serial data transmission which is adhered to by the communication carriers. It was formed by the Electronic Industries Association and issued as specification, RS-232. Version C is the current version of the specification.

VISTA STANDARD INTERFACES

The VISTA STANDARD contains the customer's choice of one of the following interfaces;

- Asynchronous Serial Communications Interface (I-103)
- Asynchronous Serial Current Loop (TTY) Interface (I-104)
- Parallel Interface (I-106)

As an option, the VISTA can be equipped with the Multipurpose Asynchronous Serial Interface (I-105) which incorporates the capabilities of both the I-103 and I-104 interfaces. The Multipurpose Asynchronous Serial Interface (MASI) and the Parallel Interface are described in this section.

## MULTIPURPOSE ASYNCHRONOUS SERIAL INTERFACE

The MASI is multipurpose in the sense that it fully provides many interfaces in one printed circuit card. MASI provides an exposed panel in the rear of the unit (see Figure 6.1) by which the customer can select any one of a number of computer interfaces using any one of a number of data rates. Also, the connection is available to locally drive a teletype or other teletype-like hard copy device. (NOTE: This capability is available in the standard unit - it is not the Printer Interface Option which is discussed in the OPTIONAL FEATURES Section.) Additionally, a 20 ma d.c. current source is available for use to self-power the terminal or where an outside source is not readily available.

The MASI panel shown in Figure 6.1 contains:

- (a) Rotary switch to select the baud rate.
- (b) Slide switch to select full or half duplex operation.
- (c) Slide switch to select 20 ma or 60 ma current loop operation.
- (d) Slide switch to select parity - odd, even, or mark.
- (e) Terminal strip used for current loop interface.
- (f) Terminal strip for providing data output in the form of 20 ma current loop.
- (g) Plug receptacle used for the RS-232C standard communications interface.

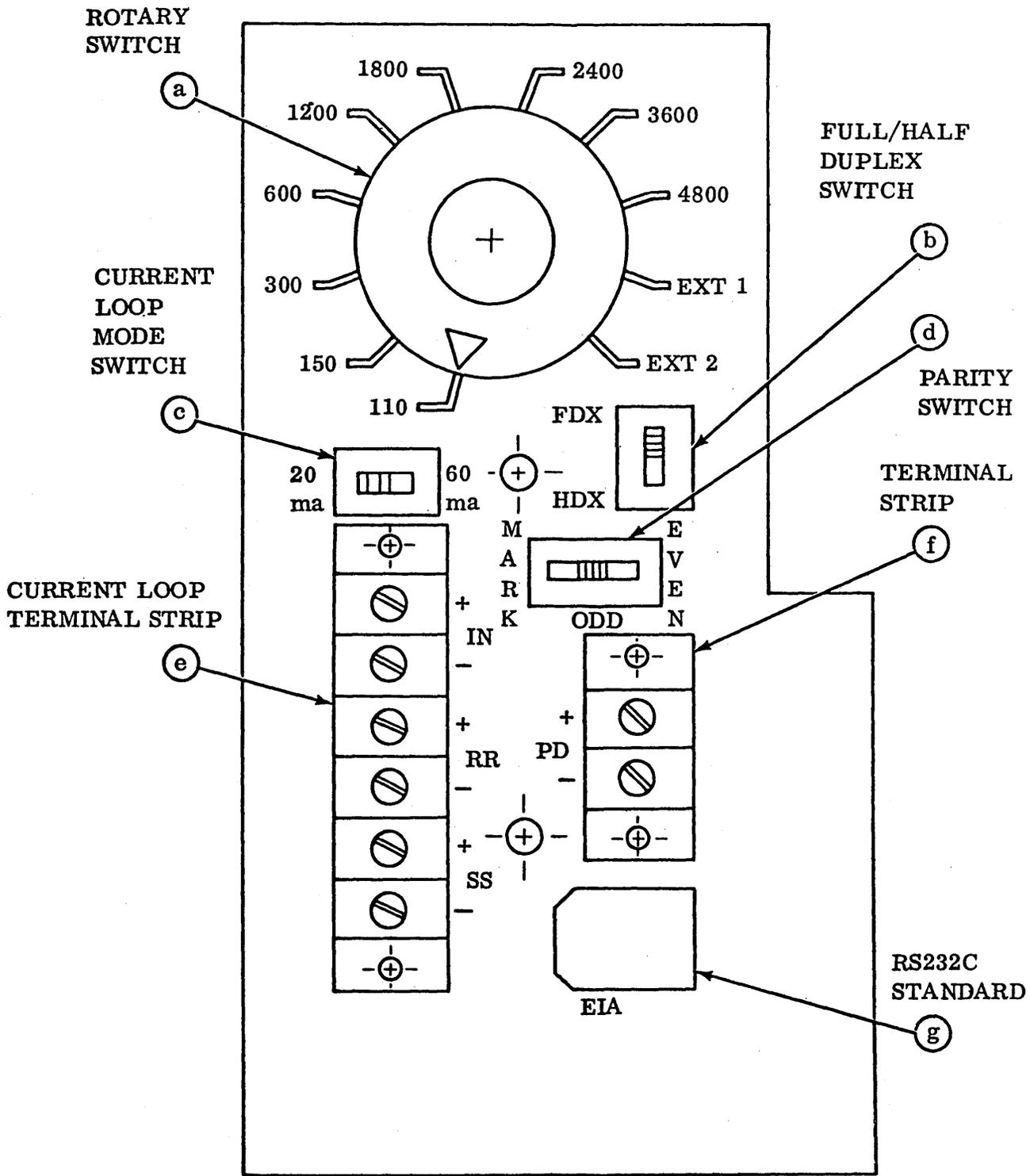


FIGURE 6.1

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MASI INTERFACES PANEL

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Using the MASI panel, a customer can easily configure his VISTA for either the EIA RS-232C communication interface, or the teletype style current loop interface.

EIA RS-232C Communication Interface - This interface provides the EIA RS-232C standard interface capability. The VISTA STANDARD is delivered with a 10 foot detachable cable which is used to connect the VISTA to the appropriate modem. The cable on one end has a Molex plug and on the other end a standard EIA connector. The Molex plug is plugged into the rear of the unit (ref. point g of Figure 6.1) and the EIA connector to the customer's equipment (e.g., modem, computer). In Appendix C, the pin connections for both of these connectors are specified. The baud rate is then selected using the rotary switch (ref. point a of Figure 6.1). Available baud rates are 110, 150, 300, 600, 1200, 1800, 2400, 3600 or 4800. Any modem compatible with the Bell 103 and 202 series modems may be used. (NOTE: The 103 type modem at up to 300 baud; the 202 type at up to 1800 baud.)

The setting EXT 1 on the Rotary Switch provides the capability for handling data rates other than those listed above. External clock frequencies must be 8 times the data rate. The data rate and the clock rate must be proportional to within +1%.

For example, to run at 8000 baud, connect an external 64 KHZ TTL compatible, external, pulse source to proper Molex pin, pin #6, (ref. Appendix C) and rotate the rotary switch to EXT 1. The result will be compatible with a 64 KHZ clock pulse generator. (NOTE: The clock level must also be TTL compatible.)

The setting EXT 2 on the rotary switch is not used.

The Terminal Strip connector screws (ref. point f, Figure 6.1) are used when it is desired to drive a local teletype-like hard copy device. Terminal #7 (+) of the teletype is connected to the (+) terminal on the rear of the VISTA 1 and terminal #6 (-) is connected to the (-) terminal on the VISTA.

#### CURRENT LOOP INTERFACE

The MASI provides the current loop interface which is compatible with the current/no current data output of teletype equipment. The interface can be set to be either 20 ma or 60 ma, half or full-duplex. A terminal strip (screw connectors) is located on the MASI panel on the rear of the VISTA (ref. point e in Figure 6.1). Two wire twisted pair or four wire twisted pair is recommended for half or full duplex, respectively.

Over limited distances (less than 250 feet) it is preferable to use a true current source on input to the interface, so that voltage drops in the circuit and line do not affect the signal current.

For driving long lines (greater than 250 feet), a simple voltage-resistor driving source may be used. Figure 6.2 shows the maximum data rates as a function of cable length for two voltages and two currents.

When operating in the current loop mode, the FDX/HDX (ref. point b, Figure 6.1) switch on the panel should be in the FDX position. (Half-Duplex/Full-Duplex operation will really be determined by the wiring to the terminal strip.)

Full and Half-Duplex operation is determined by the method of interconnection, Figure 6.2. When using the VISTA in the RS-232C mode (discussed above), the current loop output is also available for transmitting data to other VISTA's or other teletype-like devices. The specifications for the current loop are given below.

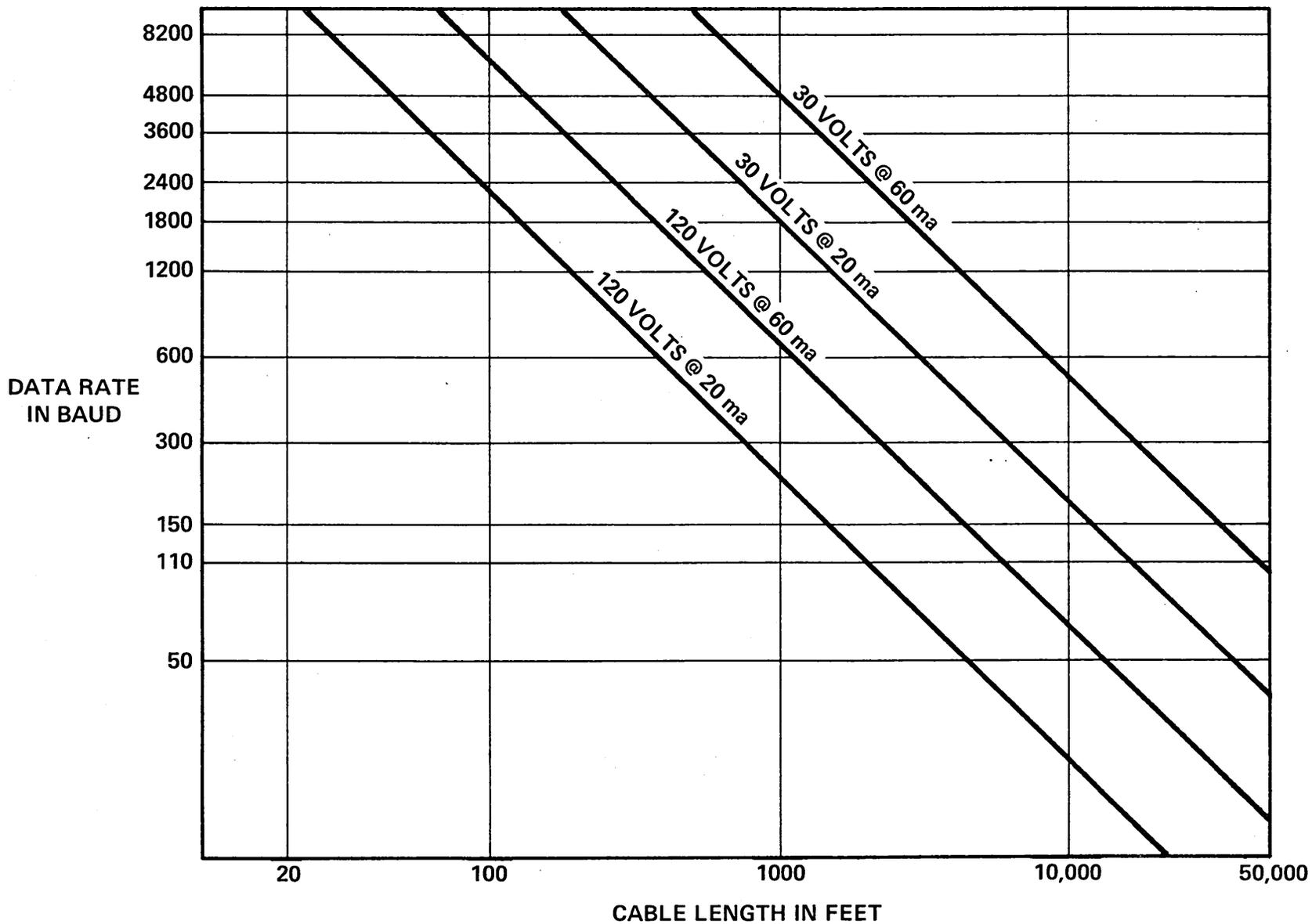


Figure 6.2

Data Rate versus Cable Length as a Function of Signal Level for INFOTON Current Loop Interfaces.

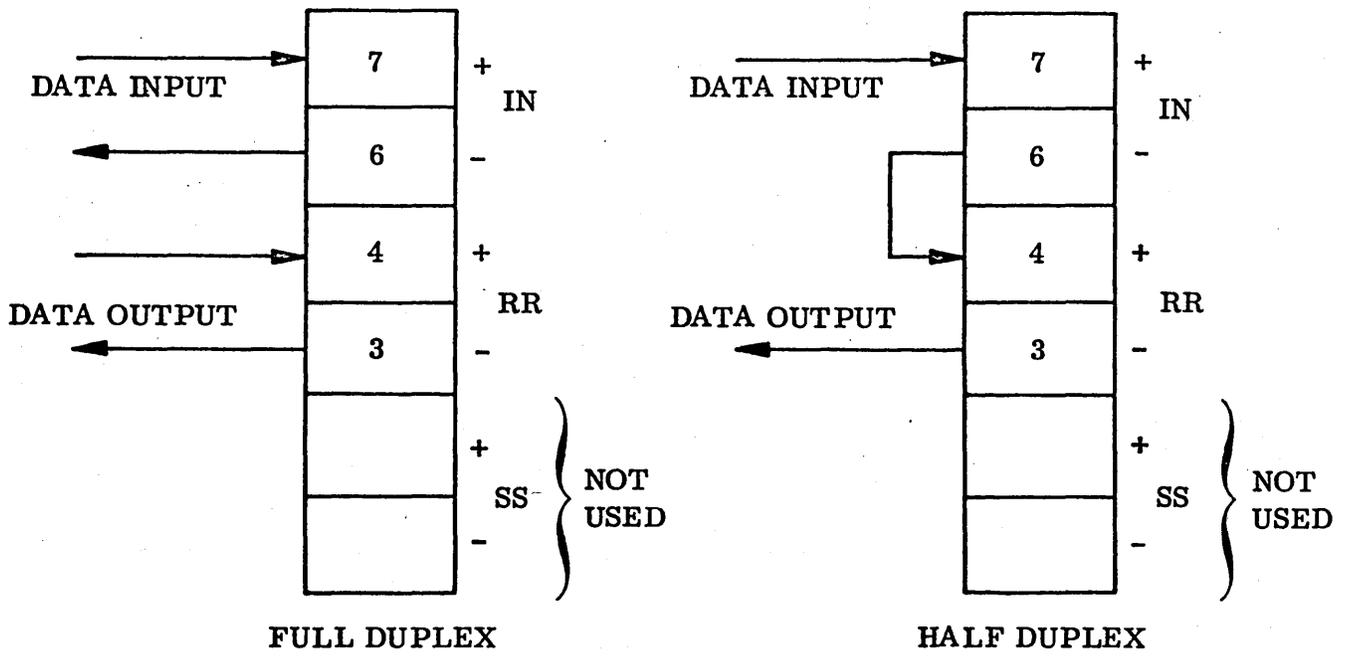


FIGURE 6.3  
VISTA STANDARD CURRENT LOOP CONNECTIONS

### Input Specifications

- 1) 20 ma  $\pm$  20%
- 2) 60 ma  $\pm$  10% - 20%

### Output Specifications

- 1) Maximum Ratings
  - a) 500 ma resistive or capacitive
  - b) 120 VDC
- 2) 'On' Voltage  
2 Volts @ 60 ma

### Operating Speeds

0 to 6400 bps

### Maximum Noise Environment

- 1) 20 ma Loop - 5 ma noise max.
- 2) 60 ma Loop - 10 ma noise max.

### PARALLEL INTERFACE

The Parallel (I-106) Interface provides maximum flexibility for control of the I/O processes of the VISTA. The I/O signals generated and received by this interface are compatible with the majority of computer system interfaces. The Parallel Interface is available as an option at no extra cost and occupies the position normally occupied by the MASI card in the VISTA STANDARD. The Parallel Interface is basically an extension of the VISTA's I/O structure allowing the VISTA back-wiring to extend beyond the standard 10 foot maximum structurally allowed for the I/O bus. This is accomplished by extending the effective aperture time for data in and out and by using complementary drivers and receivers.

The Parallel Line Drivers amplify the output bus to a differential signal capable of driving long twisted pair lines.

During output, data from the VISTA keyboard is stored in bi-stable latch circuits and applied to the cable lines via

the line drivers; parity is computed and applied to the parity output. The keyboard strobe is delayed to allow the data to settle on the data lines and is then produced in a stretched version such that transmission degradation will not result in loss of signal.

The Differential Receivers reliably receive and amplify to bus levels, any differential signal as low as + .5 volts. The signals are shown in Appendix D.

During input, the received data (in either complementary form, or TTL/DTL levels referenced to a provided bias level) is detected and gated into the unit data bus by a delayed and shaped input strobe line. Parity is computed and checked, and if found to be in error, the parity flag is set.

NOTE: In order to reverse the sense of parity (odd to even, or even to odd), it is necessary only to reverse the pair of complementary drive lines and complementary input lines.

The drivers and receivers have the following characteristics:

Thousand (1000) foot twisted wire-pair drive capability and reception.

High common mode noise rejection.

Response to greatly attenuated differential signals.

Convertability to DTL/TTL drive and reception for less demanding uses.

Response to signals with voltage far in excess of DTL/TTL levels.

The standard rates discussed in the MASI section apply to the Parallel Interface. However, with the Parallel Interface and operating in the demand-response mode, a data rate as high as 1500 characters per second average rate may be attained.

Individual characters will require more or less than 1/1500 sec., but the average transfer rate is 1500 char/sec. This is the highest I/O speed available with the VISTA.

To achieve this rate, it is necessary for the computer controlling the transfer to test (i.e., demand response) the status of the VISTA after each transfer to determine whether the VISTA is ready to transfer the next character. In Page Mode, characters may be transferred at the 820 char/sec. rate without the need for testing status after each transfer.

An initial reset signal is provided to be used for power-on initialization of the external electronics. This signal is maintained at ground during power turn-on and until system conditions have stabilized. It is suggested that this signal be utilized to prevent spurious operation of the external electronics.

A VISTA with Parallel Interface contains a panel (instead of the MASI panel) on the rear of the unit with:

1. a Half/Full duplex switch; and
2. a MOLEX connector(s).

#### VISTA BASIC INTERFACES

Although comparable interfaces to those described in the VISTA STANDARD are available on the VISTA BASIC, the interfaces on the BASIC are not as flexible as those on the STANDARD.

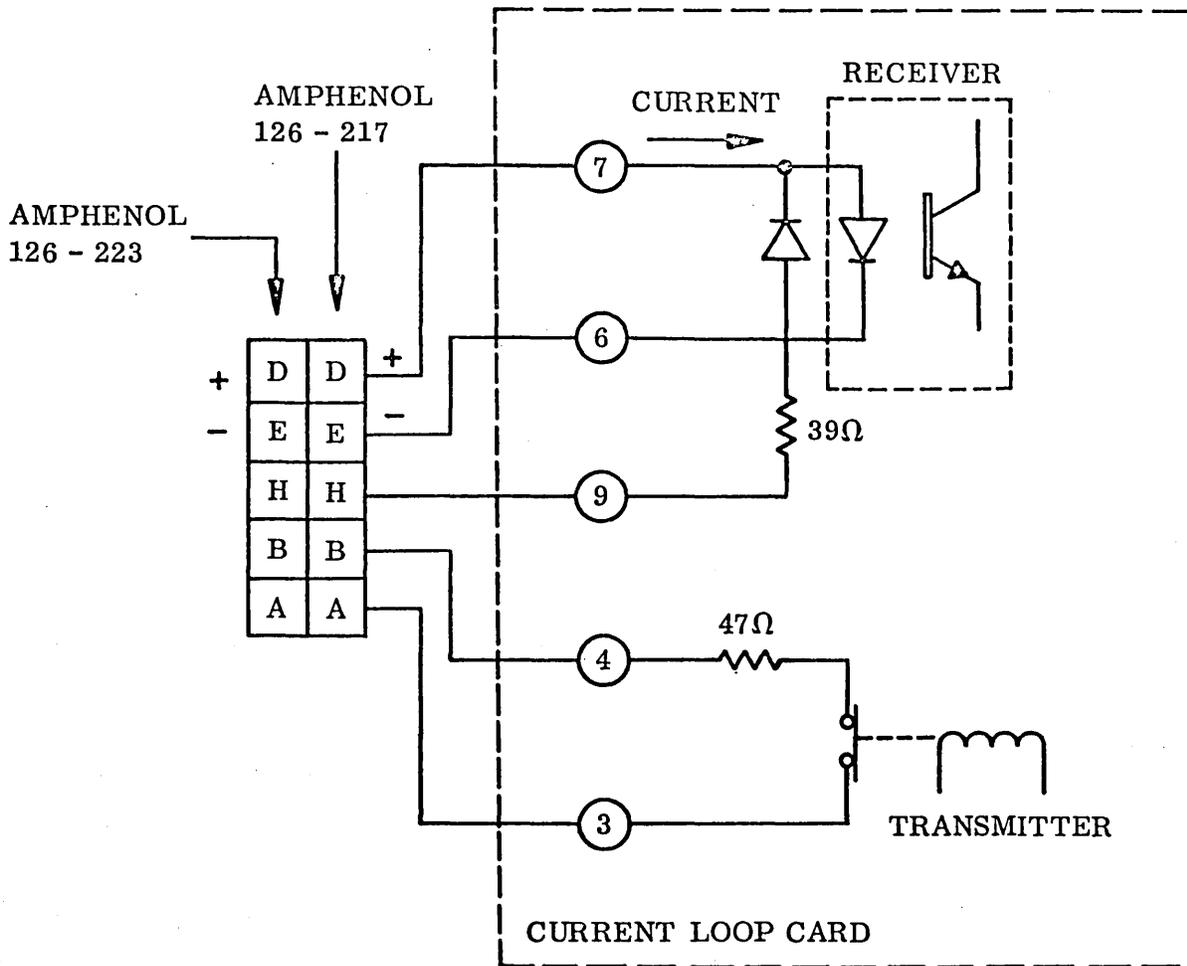
The Asynchronous Serial Interface, RS-232C standard, is available on the BASIC unit. With the VISTA BASIC, however, baud rate is fixed and must be specified at time of purchase. The MASI panel shown in Figure 6.1 is not supplied with the VISTA BASIC. Changing the baud rate on the VISTA BASIC is a change which may be made in the field by a qualified service man.

A switch does exist on the rear of the VISTA BASIC providing Full or Half-Duplex operation (up position designates Full duplex).

As previously noted, there is no parity selection on the VISTA BASIC. Parity is always set to mark on the BASIC.

A Current Loop data interface may be ordered with the VISTA BASIC. An AMPHENOL matrix connector is provided with the unit. The connections for this interface are shown in Figure 6.3.

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Operating Mode	Jumper *	Input	Output
20 MA HALF DUPLEX	E to B	D → A	D → A
20 MA FULL DUPLEX	-	D → E	B → A
60 MA HALF DUPLEX	E to B & D to H	D → A	D → A
60 MA FULL DUPLEX	D to H	D → E	B → A

NOTE: Current must flow into positive terminal.

\* Jumper on mating connector  
Amphenol 126-223

FIGURE 6.3  
VISTA BASIC CURRENT LOOP CONNECTION

## 7. OPTIONAL FEATURES

One of the characteristics of the VISTA is the ease with which options can be attached to the unit. These options greatly expand the range of applications in which the terminal can be used.

### ++ ANSWERBACK OPTION (P-303)

In environments where many terminals dial into a single computer, it is sometimes desirable to know which specific terminal is calling. The Answerback option provides the VISTA with a sequence of 21 hardware programmed characters upon receipt of WRU code from the data line or upon depression of HERE IS key. The code for this message is specified by the customer and is programmed at the factory or upon installation.

### NUMERIC PAD (A-201)

This option provides ten additional numeric keys, plus "decimal point" on the keyboard. These keys are laid out in a block form and provide a convenient entry of numeric data.

### ++ LOWER CASE OPTION (A-202)

The lower case option on the VISTA STANDARD is handled by a second character generator, which has only the lower case characters within it. These are displayed on a 5 x 10 dot matrix.

### ++ PRINTER INTERFACE (P-101)

Provides the interface to drive (a) Model 33 or 35 Teletypewriter, (b) REPCO Model 120, or (c) Centronics Model 101 printer. Provides continuous copy of incoming data or page print of contents of display memory. Up to ten terminals (with printer interface) can share one terminal.

++ INFOTONE (A-203)

The Infotone generates a short, audible signal whenever the cursor moves to the tenth character position from the end of a line or when the "Bell" code is received by the terminal.

POWER LOCK (A-205)

A key-operated lock is provided on the front panel of the display in series with the main power supply to prevent unauthorized operation.

TEKTRONIX 4501 SCAN CONVERTER INTERFACE (A-301)

Allows the simultaneous display of alphanumeric characters generated by VISTA electronics and the output of the Tektronix Model 4501 Scan Converter. Graphics presented on the Scan Converter are displayed on the same raster scan used for alphanumeric characters.

++ LIGHT PEN (A-204)

Includes photo-detecting light pen, associated power supply and interface electronics. The light pen will cause the transmission of a message containing the row and column position of the character at which the pen is pointed.

## 8. OPERATING INSTRUCTIONS

### INITIAL SETUP

At the start of any operating period, we recommend that you follow these procedures before transmitting data to the data line.

1. Set the LOCAL/ON-LINE switch to LOCAL
2. Switch to ON position. Watch for the indicator light to come on. Allow 30 seconds for warm-up.
3. Adjust the INTENSITY control for your viewing comfort.
4. Adjust the VERTICAL and HORIZONTAL controls for a stable image.
5. Type a message and see that it is correctly written on the screen. When completing the message on a given line, press the CARRIAGE RETURN and LINE FEED KEY buttons. This action places the cursor in the first character position of the next line.

### ESTABLISH COMMUNICATION

The next step depends upon the communication link used to the computer. If this is a direct connection or a private wire phone-line connection, the VISTA is ready to operate. Make the appropriate settings (rear of the unit) for FDX/HDX, Baud rate, and parity. Assuming power is provided to the communications link, switching the unit from LOCAL to LINE will place the VISTA on line with the computer and any depression of the keys will be transmitted to the computer.

If the VISTA is connected via switched phone lines, the computer must be called to establish the line. Before placing the call, however, switch the unit from LOCAL to LINE. Make the appropriate settings (rear of unit) for FDX/HDX, Baud rate and parity.

Operation at this point depends upon the particular computer

system used.

++ If your VISTA is equipped with a Data Rate Switch, set the Data Rate switch to the speed at which the computer will transmit and receive data from the VISTA terminal. Incorrect setting of this switch will result in inability to communicate with the computer.

In Full Duplex information will be displayed only if the computer at the end of the data line echoes back the information transmitted from the keyboard. This allows you to verify that the message you transmitted on the data line was in fact received by the computer. All computers to which the VISTA may be connected do not necessarily have this "echo back" capability.

In Half Duplex, data is routed from the keyboard to the display so you see what is actually being transmitted to the data line. In this mode, the computer does not echo data back. If, by mistake, you should select Half Duplex when the computer is operating in Full Duplex, double characters will appear on the screen. The switch should then be turned to the Full Duplex position.

++ In the Local mode, you can switch to the Page format by holding down the Control key and depressing the "X" key. When On-Line in Half-Duplex mode this same procedure applies. When On-Line in Duplex mode, the computer must be set up to "echo back" the keyboard data in order to change to Page format from the keyboard.

++ The VISTA is normally in the Roll format. On computer command the terminal can switch automatically to the Page format.

++ The terminal automatically returns to the Roll format whenever the screen is erased, either from the keyboard or on computer command.

++ The parity light comes on whenever a character is received with improper parity. This serves as an indicator that incorrect data has been received. This light is the response the VISTA makes to incorrect parity.

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You may extinguish the parity light by pushing the I/O Reset button. If repeated parity errors are occurring, check that the parity switch (on the rear of the unit) is set to the position required by the computer system to which the terminal is connected. If the computer system is designed to operate with "Even" or "Odd" parity, set the Parity switch to the corresponding position. Otherwise, set the Parity switch to the Mark position. Failure to set this switch to the correct position will cause incorrect data to be transmitted to the computer or inability to communicate with the computer.

++ The I/O Reset key is used to extinguish the Parity Indicator Light, or to stop the operation of peripheral equipment such as a printing device which may be attached to the VISTA terminal.

The Break button is described in the Keyboard Section. It is provided for systems that respond to the Break interrupt. Break is especially useful in a half-duplex operation.

++ For units equipped with a printer option, depressing the Print Page key will cause the printer to print all data on the screen, from the cursor position to the end of the screen. You can stop this printing operation at any time by depressing the I/O Reset key.

++ The Continuous Copy switch operates on those units equipped with the printer option. Setting this switch to the Copy position causes all data being received from the data line to be duplicated on the printer as it is being received. If the VISTA is in the Half-Duplex mode or Duplex mode with "echo back", the printer will also copy all information transmitted from the keyboard.

Warning: Printer speed, terminal data rate switch setting, and computer data rate must all be the same for the COPY function to operate properly.

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Appendix A  
VISTA CODE SET

Bits 4, 3, 2, 1	Bits 7, 6, 5							
	000	001	010	011	100	101	110	111
0000	NULL		SPACE	0	@	P	@	P
0001			!	1	A	Q	A	Q
0010			"	2	B	R	B	R
0011		PRINT PAGE	#	3	C	S	C	S
0100			\$	4	D	T	D	T
0101			%	5	E	U	E	U
0110			&	6	F	V	F	V
0111	BELL		'	7	G	W	G	W
1000	HOME	PAGE	(	8	H	X	H	X
1001		CURSOR RIGHT	)	9	I	Y	I	Y
1010	LF	CURSOR LEFT	*	:	J	Z	J	Z
1011	ERASE EOL	ESC	+	;	K	[	K	[
1100	ERASE	CURSOR UP	,	<	L	\	L	\
1101	CR	CURSOR DOWN	-	=	M	]	M	]
1110			.	>	N	↑	N	↑
1111	BLINK STOP	BLINK START	/	?	O	←	O	RUB OUT

The area enclosed by dashed lines is reserved for lower case.

## Appendix B

## VISTA INPUT-OUTPUT CODES

<u>7 Bit Octal Code</u>	<u>Remarks</u>
000	Null, Control shift P
001	Control A
002	Control B
003	Control C
004	Control D
005	Control E
006	Control F
007	Control G. Rings bell on TTY. Works with VISTA STANDARD equipped with A-203 INFOTONE.
010	*Control H. Backspaces some TTYs. Sends cursor Home on VISTA
011	Control I. Horizontal tab on some TTYs.
012	*Control J. Line feed; advances display to next line - rolls screen when VISTA is in Roll Mode and cursor was at bottom of page.
++ 013	*Control K. Erase to end of Line
014	*Control L, Erases screen. Cursor is then sent Home,
015	*Control M. Carriage Return to beginning of line.
016	Control N
017	*Control O. Blink Stop command
020	Control P
021	Control Q
022	Control R. Tape on.

\*Appears next to the codes which are commands.

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<u>7 Bit Octal Code</u>	<u>Remarks</u>
++ 023	*Control S. Print Page if unit is equipped with Print Adapter. (Cursor remains wherever it was.)
024	Control T. Tape off.
025	Control U
026	Control V
027	Control W
++ 030	*Control X. Switches unit to Page Mode.
031	*Control Y. Cursor Right.
032	*Control Z. Cursor Left.
033	Escape. This code is generated by control shift K.
034	*Control Shift L. Cursor Up
035	*Control Shift M. Cursor Down
036	Control Shift N
037	Control Shift O. Blink Start.
040	Space
041	!
042	"
043	#
044	\$
045	%
046	&
047	' Apostrophe.
050	(
051	)
052	*
053	+
054	,
055	-
056	.

\*Appears next to the codes which are commands.

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<u>7 Bit Octal Code</u>	<u>Remarks</u>
057	/
060	Ø
061	1
062	2
063	3
064	4
065	5
066	6
067	7
070	8
701	9
072	:
073	;
074	<
075	=
076	>
077	?
100	@
101	A
102	B
103	C
104	D
105	E
106	F
107	G
110	H
111	I
112	J
113	K
114	L
115	M
116	N
117	O

<u>7 Bit Octal Code</u>		<u>Remarks</u>
120	P	
121	Q	
122	R	
123	S	
124	T	
125	U	
126	V	
127	W	
130	X	
131	Y	
132	Z	
133	[	Shift K.
134	\	Shift L.
135	]	Shift M.
136	↑	
137	←	
140	@	
141	A	
142	B	
143	C	
144	SEE	D
145		E
146	NOTE	F
147		G
150		H
151		I
152		J
153		K
154		L
155		M
156		N
157		O

<u>7 Bit Octal Code</u>		<u>Remarks</u>
160	P	
161	Q	
162	R	
163	S	
164	T	
165	U	
166	SEE	V
167		W
170	NOTE	X
171		Y
172		Z
173		[
174		\
175		]
176		↑
177		Delete, rub out. Non-printing.

NOTE: When received on the data line, these codes are stored in memory and can therefore be re-transmitted (e.g., to printer). However, they are displayed as upper case characters in the standard models and cannot be transmitted from the keyboard. In those models equipped for the lower case option, the codes are both transmitted and displayed as lower case.

EIA RS-232C Name	Description	EIA Pin No.	MOLEX Pin No.	Comments
BA	Data Transmitted from Terminal	2	1	Logical "1" = OFF = -6V Logical "0" = ON = +6V 3000 ohm minimum load impedance
CA	Request to Send Signal from Terminal	4	2	Goes high (+6V) when the terminal is ready to transmit
CB	Clear to Send Signal to Terminal	5	3	Must be high to allow terminal to send; is supplied by a modem
BB	Data Transmitted to Terminal	3	4	Logical "1" = OFF = -5V to -25V Logical "0" = ON = +5V to +25V 3000 ohm minimum load impedance
CF	Carrier Present Signal to Terminal	8	5	Must be high to allow terminal to receive; is supplied by a modem
CD	Data Terminal Ready Signal from Terminal	20	8	+12 Volt power supply
	External Clock Input at TTL Logic Levels	No Connec- tion to EIA Inter- face	10	For use with Selector Switch in EXT 1 position
AB	Signal Ground	7	12	

APPENDIX C

MULTIPURPOSE ASYNCHRONOUS SERIAL INTERFACE

EIA SIGNALS AND PIN CONNECTORS

<u>IN/OUT</u>	<u>DESIGNATION</u>	<u>FUNCTION</u>
In	ID0	Data in (LSB)
In	ID1	Data in
In	ID2	Data in
In	ID3	Data in
In	ID4	Data in
In	ID5	Data in
In	ID6	Data in (MSB)
In	ID7	Parity in
In	IOR	Input strobe
	BUSY	Internal busy signal
Out	BST	Indicated DATA OUT is valid (strobe signal)
Out	BD0	Data Out (LSB)
Out	BD1	Data Out
Out	BD2	Data Out
Out	BD3	Data Out
Out	BD4	Data Out
Out	BD5	Data Out
Out	BD6	Data Out (MSB)
Out	PAR	Parity Out
Out	INITIAL RESET	Ext. System on "pwr ON"
Out	GND	
Out	DTL/TTL Ref.	Reference for T <sup>2</sup> L or DTL Inputs
Out	BRK	Ground going signal when break key is depressed
In	Parity INH	Inhibits Parity Check On Input Data

Signal Levels

Voltage: One: 3.3v typical; zero: .2v typical

Current Drive: 100 ma drive max. (short circuit current)

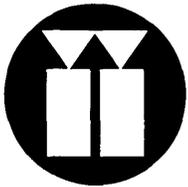
Impedance Range: 50-500 ohms

Rise Time: Function of cable length and in the range of 40 to 1000 nanoseconds

Appendix D

Parallel Interface Signals





Infoton

INFOTON INCORPORATED SECOND AVENUE, BURLINGTON, MASSACHUSETTS 01803  
SUBSIDIARY OF OPTICAL SCANNING CORPORATION  
AREA CODE 617 272-6660

00744-Rev. B  
CF 18844  
300 - 5/73

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