DISPLAY TERMINAL GUIDE

11/79

This is a preliminary version of the Display Terminal Guide, covering the use of the Regent® 20, 40 and 60 display terminals.

11/79

The current printing has added a section on the Regent® 25 as well as corrections on other sections.

The material contained in this document is furnished for customer
reference only, and is subject to change. The techniques de-
scribed are proprietary and should be treated accordingly.

A display terminal is an input/output device capable of trans-
mitting data to and receiving data from a system to which it is
connected. It provides a visible representation of data on a
screen, which may be characters, symbols or drawings, in which
images appear as a series of dots in a desired pattern. This
principle of the dot matrix is used by many display terminals.
However, the area covered by a character may vary.

A built-in cursor (location marker) indicates the place where the
next character will be entered on the screen. This may be an
underline or a block (blinking or steady). As the operator en-
ters data, the cursor moves to the right automatically. When an
entire line has been entered, the cursor may move to the left-
most position of the same or the next line.

Some terminals also provide cursor control keys to allow the op-
erator to move the cursor up, down, left, right and home.

Transmission to a host computer may be a character at a time, a
line at a time or a full screen at a time, depending on the type
of terminal, its mode, and the application.

The capabilities of the terminal can be used in the solution of
problems relating to commercial, scientific and education appli-
cations, which require efficient data collection and retrieval.

Information entered at the keyboard may be displayed simultan-
eously on the screen. After the transmission of the displayed
data to a host computer, the computer may send a response which
is displayed on the screen. The screen may be re-used simply by
depressing a key which causes the display to be cleared (erased).

A terminal operator can inquire on an account record and receive
a response from the host computer. A record may be corrected di-
rectly on the display and it can be transmitted to update a mas-
ter file.

The application program controlling the terminal can also present
the operator with partial results or other computational output.

All the Regent® terminals are in attractive desk-top packages and
combine operating simplicity with the latest in technological so-
phistication and microprocessor capability. The Regent® 20, 25,
40 and 60 are low-cost teletypewriter-compatible terminals which
display a total of 1920 legible characters arranged on a display
of 24 lines by 80 characters per line. Dark characters are pre-
sented on a light background (with the reverse selected by a
switch).

The main section of the keyboard on all Regent® terminals is in a
standard typewriter-like layout. The separate sections in this
handbook give more detailed information on keyboards for specific
terminals as well as switches and coding. The side-by-side photo-
graphs and specifications for all four terminals shown below and
in Table 1.1 give an overview of one of the broadest lines of
asynchronous terminals available.

Regent® 60

Regent® 40
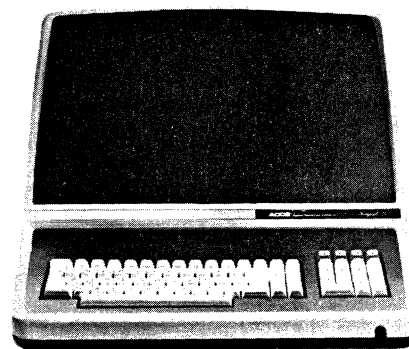
Regent® 25

Regent® 20

The Regent® 20 is used in applications which demand a conversational type terminal with an EIA RS232C interface, upper and lower case (128) character set, unidirectional auxiliary port, a 24 line by 80 character screen and cursor addressing. A current loop interface is optional.

The Regent® 25 combines all the features of the Regent® 20 with the convenience of separate numeric-entry keys. The Regent® 25's separate 18-key cluster greatly speeds numeric data entry and cursor movement. The 10-key numeric section can be altered by switch selection to become a function pad that transmits discrete code sequences.

The Regent® 40, has the capability of extensive visual effects, a 25th Status Line, function keys and a bidirectional auxiliary port. The typical user of a Regent® 40 has need for more extensive visual highlighting in screen formats such as reverse video, blinking, underline, and half and zero intensity. A line drawing set is standard on this conversational display terminal.

At the top of the Regent® series is the Regent® 60. This product has extensive visual highlighting ability, a 25th Status Line, function keys and a bidirectionsl auxiliary port with the additional features of buffered transmission, insert/delete character, print local, must tab and modified data transmission.

All four terminals feature a MONITOR Mode in which all characters received by the terminal, including control codes, can be displayed without being acted upon. This mode is extremely useful as an aid in application program development and communication debugging. By converting the terminal to a line monitor device, it allows full viewing of received data and non-buffered transmitted data. This increases accuracy in the analysis of problems, reduces programming time, and shortens diagnostic time by eliminating assumptions regarding transmission events.

Table 1.1. Comparative Specifications for Regent® Series

Feature	20	25	40	60
Display				
Non-Glare Screen	x	x	x	x
1920 Display Positions	x	x	x	x
12" Display Area	x	x	x	x
128 Displayable Characters	x	x	x	x
Reversible Video Display	x	x	x	x
Block or Underline Cursor	x	x	x	x
Blinking or Steady Cursor	x	x	x	x
Scroll/Non-Scroll	x	x	x	x
International Character Sets	x	x	opt	opt
Character Formation	5x8	5x8	7x8	7x8
Status Line			x	x
Visual Effects				
Half-Intensity			x	x
Reverse Video			x	x
Blinking			x	x
Zero Intensity			x	x
Underline			x	x
Line Drawing			x	x
Disable Status Line			x	x
Disable Screen			x	x
Protect Data from Keyboard Entry				x
Keyboard				
Number of Keys	59	77	91	104
Character Code Set	128	128	128	128
Character Repeat	x	x	x	x
Backspace Key	x	x	x	x
Alpha Lock Key	x	x	x	x
Break Key	x	x	x	x
Escape Key	x	x	x	x
Upper Case SHIFT Lower, Lower Case SHIFT Upper	x	x	x	x
Erase All Key	x	x	x	x
International Character Set Layouts	x	x	opt	opt
Cursor Control Keys U,D,L,R,H,LF	LF only	x	x	x
Numeric Pad		x	x	x
Print On/Off Key			x	x
Local Key			x	x
Tab Key				x
Print Local Key				x
Transmit Key				x
Insert/Delete Line Key				x
Reset Key				x
Erase to End of Line Key	x	x	x	x
Erase to End of Page Key			x	x
Erase Variable Key				x
Form-Page-Message-Conversational Mode Keys				x

Table 1.1.   Comparative Specifications for
            Regent® Series (continued)

Feature	20	25	40	60
Functions				
Cursor Address (Row or Column)	x	x	x	x
Cursor Address (ESC,Y,row,column)	x	x	x	x
Erase Screen	x	x	x	x
Auto Line Feed	x	x	x	x
Audible Alarm	x	x	x	x
Monitor Mode	x	x	x	x
Keyboard Lock/Unlock	x	x	x	x
Print Transparent	x	x	x	x
Printer Busy Code			x	x
Programmable Function Keys		x	x	x
Read Terminal Status			x	x
Self-Test			x	x
Insert/Delete Character in Line				x
Insert/Delete Character in Page				x
Auto Tab/Must Tab				x
Transmission				
9600 Baud Transmission	x	x	x	x
8 Switch-Selectable Speeds	x	x	x	x
EIA RS232C Interface	x	x	x	x
Current Loop Interface	opt	opt	x	x
Parity Selection	x	x	x	x
Parity Check	x	x	x	x
Conversational	x	x	x	x
Unidirectional AUX Port	x	x		
Bidirectional AUX Port			x	x
End of Line Character Selection			x	x
Reverse Channel			x	x
Page, Message, Form, Partial Page				x
Modified Data Transmit				x
Separate Speed for Aux Port				x
Power Ratings				
120 Volt: 60 Watts .50 amps	x	x		
240 Volt: 60 Watts .25 amps	x	x		
120 Volt: 85 Watts .70 amps			x	x
240 Volt: 85 Watts .35 amps			x	x

Physical

Dimensions	15" (38cm) H x 18.5" (47cm) W x 23.25" (59cm) D
Weight	approx. 38 lbs. (17 kg)
Temperature	
Operating	10-40° C
Storage	0-85° C
Humidity	10 to 95% RH non-condensing
Power	120V/60 Hz, 120V/50 Hz, 240V/50Hz
Warranty	90 days, optional 2-year

The Regent® 25 combines all the advanced features of the Regent®
20 with the convenience of a separate 18-key numeric pad.

The separate key cluster is intended to increase numeric data en-
try and cursor movement. It includes a 10-key numeric pad laid
out to ANSI standards, five cursor control keys to move the curs-
or Up, Down, Left, Right, Home and an ENTER key and COMMA (,)
key. The 10-key numeric section can be altered by an internal
switch selection to become a function pad that transmits discrete
ASCII code sequences.
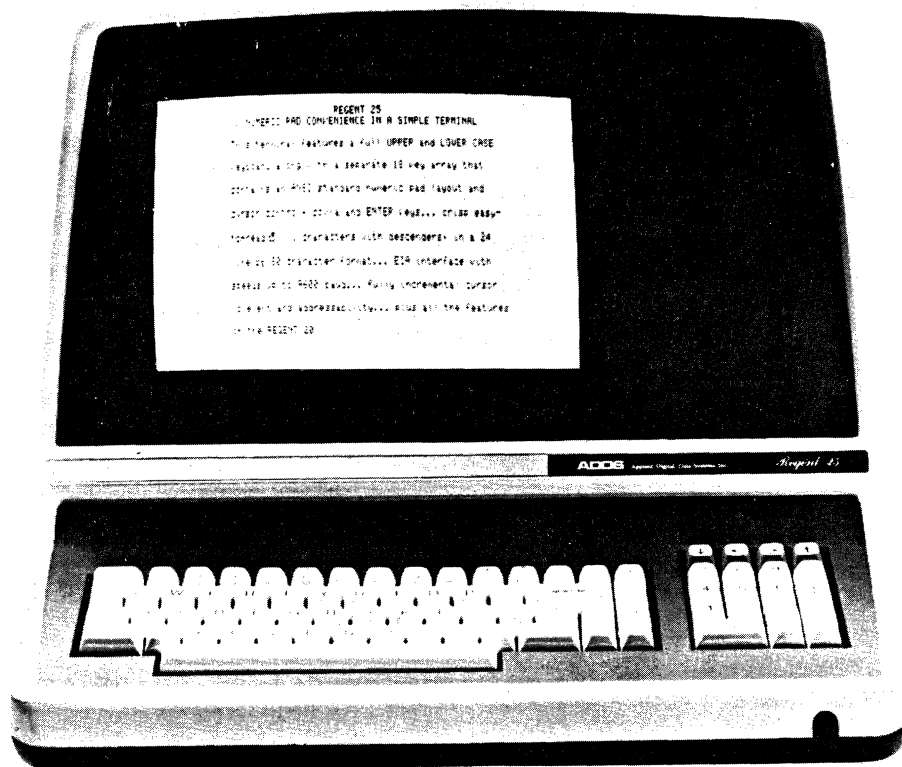
SPECIFICATIONS

Table 3.1. Regent® 25: Specifications

Feature	Description
Screen Format	24 lines by 80 characters per line
Alphanumeric Character Set	96 displayable ASCII codes, and 32 control codes, each formed by a 5 x 8 dot matrix.
Display Presentation	Dark characters on a light background (reversible through switch selection)
Screen Size	12" diagonal, non-glare screen
Refresh Rate	60 frames per second (50 for export model)
Operating Mode	Conversational (character at a time) transmission
Monitor Mode	Allows the terminal to display all received data including control codes. In this mode all encoded sequences are ignored.
Transmission	Half- or Full-Duplex, switch-selectable
Communications Interface	EIA RS232C/CCITT V.24 operates through the range of 110 to 9,600 bps, switch-selectable. (Current loop, optional)
Parity	Choice of even, odd, marking or spacing, switch-selectable.
Keyboard	Standard typewriter-like layout plus numeric pad and cursor control keys. Keyboard lock/unlock under computer control.
Addressable Cursor	Direct positioning by either incremental steps, absolute address or separate line and column address.
Cursor Selection	Allows hardware selection of cursor presentation; blinking or steady, block or underline
Auxiliary Port	Unidirectional, serial output.
Weight	Approximately 38 pounds (17 kg)
Power	120 Volts @ 60 Hz 60 Watts 0.50 Amp 240 Volts @ 50 Hz 60 Watts 0.25 Amp

Table 3.1. Regent® 25 Specifications (continued)

Feature	Description
Physical Dimensions	15" (38cm) H x 18.5" (47cm) W x 23.25" (59cm) D
Temperature	
Operating:	10° to 40° C
Storage:	0° to 85° C
Humidity	10 to 95% RH, non-condensing

MAJOR COMPONENTS

A block diagram of the major components in the Regent® 25 is shown in Figure 3-1 on the following page and described below.

Microprocessor

The heart of the Regent® 25 is an 8085A microprocessor with scratch pad memory (RAM) and program memory (ROM). The program memory of the device is 2K.

CRT Display and Display Buffer

The CRT display presentation is arranged in 24 lines of 80 characters per line (1920 characters total).

Keyboard

The keyboard is arranged in a typewriter-like layout. The keyboard can be locked and unlocked under computer control. A separate 18-key pad contains a numeric section (laid out according to ANSI standards), plus cursor control, ENTER and COMMA (,) keys.

Character Set

Upper/lower case with 96 displayable characters (space is displayed as a blank) is standard, as is display of control characters explicitly inserted into the display. International languages are accommodated by internal switch changes and key-cap changes; no new ROM is needed. Currently supplied character sets are USA, UK, French, German, Spanish, Danish/Norwegian and Swedish/Finnish. The appropriate key caps are optionally available.   •
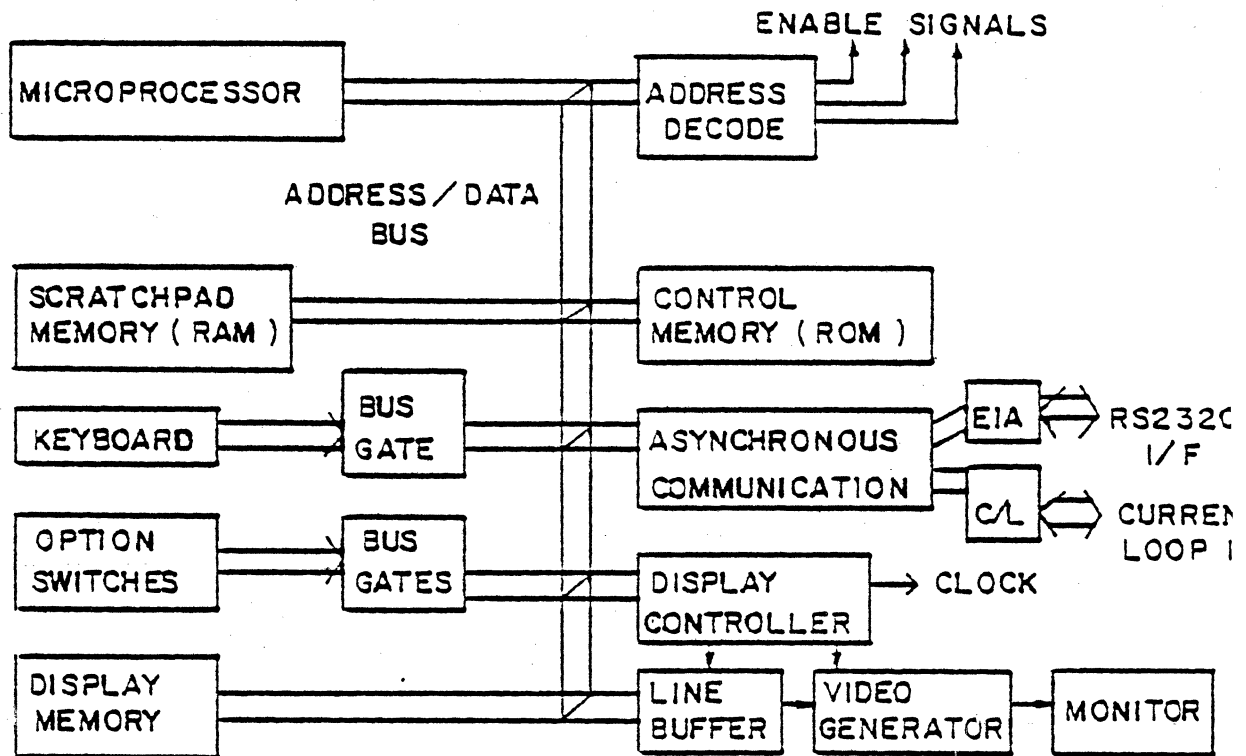
Figure 3-1.   Regent® 25:   Hardware Overview

Monitor Mode

All characters received by the terminal including control codes
are displayed in the screen memory following the keyboard entry
of CONTROL-1.   The terminal will only display the data stream a
will not act upon any of the control commands.   Typing CONTROL-
will terminate this mode.   Figure 3-2 shows the 32 special sym-
bols used for the control codes when displayed.

Communication Interface

The communication interface is EIA RS232C/CCITT V.24.

Transmission rates of 110, 150, 300, 1200, 1800, 2400, 4800 and
9600 baud are switch-selectable on the rear panel of the termin;
(see Switch-Selectable Options, page 3-5).

20 mA Current Loop is available as an option.

.	A	B	C	D	E
NUL	SOH	STX	ETX	EOT	ENQ
F	G	H	I	J	K
ACK	BEL	BS	HT	LF	VT
L	M	N	O	P	Q
FF	CR	SO	SI	DLE	DC1
R	S	T	U	V	W
DC2	DC3	DC4	NAK	SYN	ETB
X	Y	Z	[	\	]
CAN	EM	SUB	ESC	FS	GS
^	_	▨			
RS	US	DEL			

Figure 3-2. Special Symbols for Displayed Control Codes

Auxiliary Port

A serial output port for a peripheral is standard. This port is unidirectional from the Regent® 25 to the peripheral, and consists of only serial output data. Upon command, the display can be made to ignore all data received by the terminal that is intended for the auxiliary port.

SWITCH-SELECTABLE OPTIONS

Operational parameters for the Regent® 25 terminal are conveniently located at the rear of the terminal and can be set by the user before connection to the system.

Figure 3-3 shows the location of the switch block on the rear panel through which the parameters are selected. The switches are clearly labeled 1 through 8. Each is a miniature rocker switch which is pushed down for the "1" state or pushed up for the "0" state. In addition, PC card switches control other parameters. All of these parameters are listed in alphabetical order in Table 3.2. The effects of the individual settings are described in the following pages.
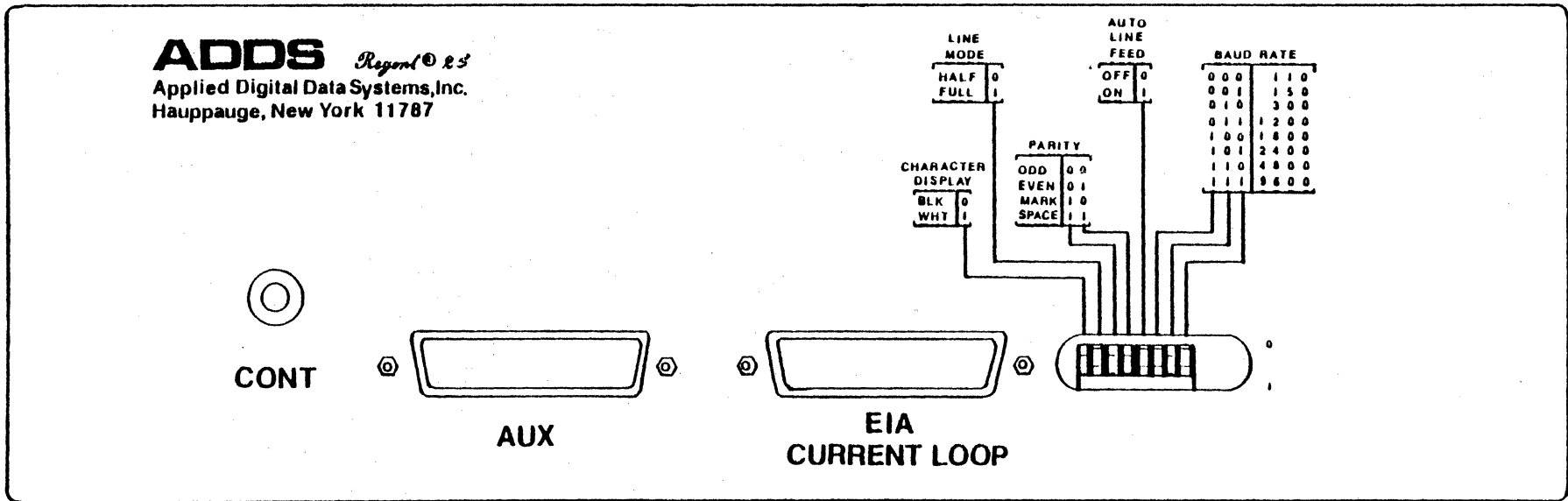
ADDS *Regent® 25*
Applied Digital Data Systems, Inc.
Hauppauge, New York 11787

CONT

AUX

EIA
CURRENT LOOP

LINE MODE		
HALF	0	
FULL	1	

CHARACTER DISPLAY		
BLK	0	
WHT	1	

PARITY		
ODD	0 0	
EVEN	0 1	
MARK	1 0	
SPACE	1 1	

AUTO LINE FEED		
OFF	0	
ON	1	

BAUD RATE	
0 0 0	1 1 0
0 0 1	1 5 0
0 1 0	3 0 0
0 1 1	1 2 0 0
1 0 0	1 8 0 0
1 0 1	2 4 0 0
1 1 0	4 8 0 0
1 1 1	9 6 0 0

Figure 3-3.   Regent® 25: Rear Panel

Table 3.2.   Regent® 25: Alphabetic List of Parameter Settings/Locations

Parameter	Location/Switch	Setting	See Page
Audible Key Feedback	PC Card Switch A5/3	OFF=no click ON =click	3-14
Auto Line Feed	Rear Panel Switch 5	0=disabled 1=enabled	3-9
Auto Scroll	PC Card Switch A5/1	OFF=disabled ON =enabled	3-12
Baud Rate	Rear Panel Switches 6,7,8	6 7 8 110 0 0 0 150 0 0 1 300 0 1 0 1200 0 1 1 1800 1 0 0 2400 1 0 1 4800 1 1 0 9600 1 1 1	3-9
Character Display	Rear Panel Switch 1	0=dark on light background 1=light on dark background	3-8
Cursor Display	PC Card Switches A3/3, A5/4	A3/3 A5/4 Steady block OFF OFF Steady Underl. OFF ON Blinking block ON OFF Blinking Underl. ON ON	3-11
International Character Set	PC Card Switches A3/5,6,7	5 6 7 Dom(U.S.) OFF OFF OFF Bel/Fr/AZERTY OFF OFF ON UK/Netherlands OFF ON OFF Ger/Switzer. OFF ON ON Swed/Finland ON OFF OFF Den/Norway ON OFF ON Spain ON ON OFF (Reserved) ON ON ON	3-12
Full/Half-Duplex	Rear Panel Switch 2	0=Half 1=Full	3-8
Keyboard Lock/ Unlock	PC Card Switch A3/4	OFF=Normal Mode ON =ADDS Consul 580 Compatability	3-11
Numeric Pad as Function Keys	PC Card Switches A3/1,4	Emitted Codes 1 4 STX, Key Code, CR ON OFF ESC, Key Code ON ON Key Codes OFF	3-10
Parity	Rear Panel Switches 3,4	3 4 Odd 0 0 Even 0 1 Marking 1 0 Spacing 1 1	3-8
Parity Check	PC Card Switch A3/2	OFF=disable ON =enable	3-11
Refresh Rate	PC Card Switch A5/2	OFF=60 Hz ON =50 Hz	3-14
Upper/Lower Case	PC Card Switch A3/8	OFF=Upper,Shift lower ON =Lower,Shift Upper	3-12

Character Display - Switch 1

Position of Switch	Description
0	Dark characters, light background
1	Light character, dark background

The standard video presentation of the terminal is dark charac-
ters on a light background (switch 1 = 0). This presentation can
be reversed by setting this switch to 1.

Full or Half-Duplex - Switch 2

Position of Switch	Description
0	Half-Duplex
1	Full-Duplex

In the Full-Duplex Mode (switch 2 = 1), the keyboard acts simply
as a code generator which sends data to the communication line.
There is no direct connection from the keyboard to the display
electronics. Incoming data from the communication line goes
directly to the display electronics. Note that in Full-Duplex
operating mode, the communication line must echo each character
if the operator is to see the data entered from the keyboard.

In Half Duplex Mode (switch 2 = 0), keyed data is simultaneous-
ly displayed on the screen and transmitted to the communication
line.

Parity - Switches 3 and 4

Position of Switch		Description
3	4	
0	0	Odd
0	1	Even
1	0	Marking
1	1	Spacing

If either Even or Odd parity is selected, the terminal appends
the proper parity bit (bit 8, in addition to the 7 ASCII bits) to
outgoing data, and checks parity on all incoming data. Any error
on incoming data (parity, framing, overrun, open line) causes an
asterisk (*) to be displayed on the screen in place of the defec-
tive character if the parity check feature is enabled.

NOTE

A Break in Half-Duplex Mode or disconnecting the
data lines may also cause the asterisk to be dis-
played, since such conditions cause a framing
error or open-line error.

If the parity selected is Marking or Spacing, the parity bit on
outgoing data is always 1 or always 0, respectively. Enabling
parity check (see below) in these modes will display an asterisk
in place of any character with the parity bit in the wrong state.

Auto Line Feed - Switch 5

Position of Switch	Description
0	Auto Line Feed Disabled
1	Auto Line Feed Enabled

In Auto Line Feed Mode (switch 5 = 1), an internal line feed is
generated within the terminal logic whenever a Carriage Return
code (CR) is received or the NEW LINE key is depressed. Since
the effect of a CR code is to place the cursor to the beginning
of the current line, the net effect of a CR when Auto Line Feed
is enabled is to position the cursor to the beginning of the next
line. Note also that a CR code will cause the display to scroll
if the cursor is at the bottom line and both Auto Line Feed and
Auto Scroll are enabled. An internal line feed is always per-
formed when the cursor advances past the end of a line.

Baud Rate - Switches 6, 7, 8

The user may select from the following baud rates: 110, 150, 300,
1200, 1800, 2400, 4800, or 9600, as shown in Table 3.3 below.

Table 3.3.   Regent® 25: Baud Rate Settings

Baud Rate	SWITCHES 6	7	8
110	0	0	0
150	0	0	1
300	0	1	0
1200	0	1	1
1800	1	0	0
2400	1	0	1
4800	1	1	0
9600	1	1	1

PC Card Switches

The following additional user-selectable parameters can be set
using switches on the PC card, as shown in Figure 3-4.

Function Pad Enable - Switch Block A3, Switches 1,4

A3/1 Position	A3/4 Position	Description
ON	OFF	STX, key code, CR
ON	ON	ESC, key code
OFF	OFF	key code

The numeric pad can be changed into one of the two function pad
arrays by setting two switches in Switch Block A3. When A3/1 is
ON and A3/4 is OFF, the keys 0 through 9 plus the COMMA (,) and
PERIOD (.) will transmit the three byte sequence:

             STX   code of the depressed key   CR

When A3/1 and A3/4 are both set ON, the keys 0 through 9 plus the
COMMA (,) and PERIOD (.) will transmit the two-byte sequence:

             ESC code of the depressed key

The twelve numeric pad keys emit codes as shown in Table 3.4
below:

Table 3.4   Numeric Pad Key Codes

Key	A3/1 OFF	A3/1 ON, A3/4 OFF	A3/1 ON, A3/4 ON
0	0	STX 0 CR	ESC 0
1	1	STX 1 CR	ESC 1
2	2	STX 2 CR	ESC 2
3	3	STX 3 CR	ESC 3
4	4	STX 4 CR	ESC 4
5	5	STX 5 CR	ESC 5
6	6	STX 6 CR	ESC 6
7	7	STX 7 CR	ESC 7
8	8	STX 8 CR	ESC 8
9	9	STX 9 CR	ESC 9
.	.	STX . CR	ESC .
,	,	STX , CR	ESC ,

When A3/1 is ON, the function sequences sent;

   1)   are not displayed in Half-Duplex;

   2)   in Half-Duplex Mode, set RTS at start and drop RTS at
        end of sequence;

   3)   transmit regardless of keyboard lock status.

Parity Check - Switch Block A3, Switch 2

Position of A3/2	Description
OFF	Parity Check Disabled
ON	Parity Check Enabled

The parity check feature may be enabled or disabled using an
internal switch. When switch 2 of Switch Block A3 is ON, the ter-
minal displays detected parity errors as an asterisk (*) on the
CRT. If OFF, parity errors are ignored, and data is displayed as
received by the terminal without checking for parity.

Cursor Display - Switch Block A3, Switch 3
                 Switch Block A5, Switch 4

A3/3 Position	Description	A5/4 Position	Description
OFF	Steady Cursor	OFF	Rectangular Block
ON	Blinking Cursor	ON	Underline

The standard display uses a steady block cursor. Blinking cursor
(at 2 Hz rate) is set through switch 3 on Switch Block A3;
underline cursor is set through switch 4 of Switch Block A5. For
example, both of these switches would be set ON for a blinking
underline cursor.

Keyboard Lock - Switch Block A3, Switch 4

Position of A3/4	Description
OFF	Normal Mode
ON	ADDS Consul 580 Compatibility

Keyboard Lock (Normal Mode)

When switch A3/4 is OFF and the control code ESC,5 is received or
generated at the keyboard, the keyboard locks and remains locked
until an unlock command ESC,6 is received or generated at the
keyboard. The unlock command is not transmitted to the CPU when
generated from the locked keyboard and is strictly a local
function that operates in either Half or Full-Duplex Mode. BREAK
is the only key enabled to transmit during keyboard lock; it will
not unlock the keyboard.

<u>Note</u>

If switch A3/1 is ON, the function pad sequences are
also enabled to transmit.

Keyboard Lock (ADDS Consul 580 Compatability)

When switch A3/4 is ON, the keyboard will lock upon receipt of an
EOT code, and unlock on receipt of an STX code or the depression
of the BREAK key on the keyboard.

International Character Sets - Switch Block A3, Switches 5, 6, 7

The user may change the character set by setting switches 5, 6
and 7 on Switch Block A3 as shown in Table 3.5 below.

Table 3.5.   International Character Set Switch Settings

	A3/5	A3/6	A3/7
Domestic (U.S.)	OFF	OFF	OFF
Belgium/France/			
AZERTY	OFF	OFF	ON
U.K./Netherlands	OFF	ON	OFF
Germany/			
Switzerland	OFF	ON	ON
Sweden/Finland	ON	OFF	OFF
Denmark/Norway	ON	OFF	ON
Spain	ON	ON	OFF
(Reserved)	ON	ON	ON

Upper/Lower Case - Switch Block A3, Switch 8

Position of Switch	Description
OFF	Upper case, shift-lower
ON	Lower case, shift-upper

The terminal normally powers up in upper case-shift to lower
mode. Setting switch 8 on Switch Block A3 ON will change this
initial condition to lower-shift to upper.

Auto Scroll Mode - Switch Block A5, Switch 1

Position of Switch	Description
OFF	Auto Scroll Mode Disabled
ON	Auto Scroll Mode Enabled

When the Auto Scroll Mode is enabled, data scrolls upward if the
cursor is in the bottom line (line 24) and a Line Feed
(CONTROL-J) code is received by the display electronics or gene-
rated from the keyboard. Data will also scroll if the cursor is
in the bottom line and a CR is received, or the NEW LINE key is
depressed and Auto Line Feed is enabled. As a result of the up-
ward scroll, all data on the screen moves up by one line, with
data previously on the top line being lost from memory and a new
blank line appearing at the bottom of the screen. This simulates
the line feed action of a teletypewriter.

If the Auto Scroll option is disabled, the display does not
scroll. A command which attempts to move the cursor down from
the bottom line (Cursor Down or Line Feed) causes the cursor to
appear in the top line, rather than causing the data to scroll.
Thus, the non-Auto Scroll mode of operation corresponds to a
"wraparound" action of the cursor in the vertical direction.

Switch Block A3

```
 _____
| 1  2  3  4  5  6  7  8 |
|_____|
```
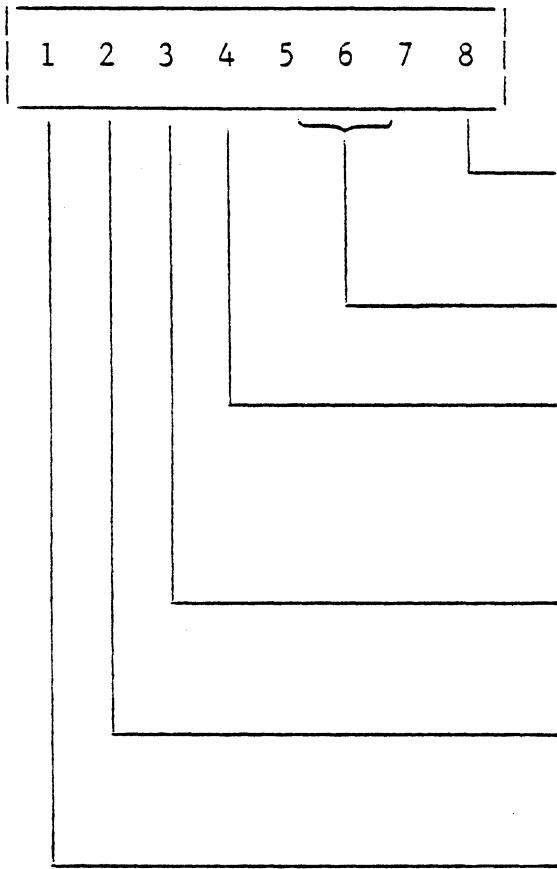
Upper-Lower case
  ON = lower, shift-upper
  OFF= upper, shift-lower

International character sets
  (see Table 3.5)

Keyboard Lock
  OFF   ESC,5 locks
           ESC,6 unlocks
  ON   EOT locks
           STX unlocks

Cursor Blink (also see A5/4)
  ON = blink
  OFF= steady

Parity Check
  ON = enable
  OFF= disable

Numeric pad as function keys
(see Table 3.4)

Switch Block A5

```
 _____
| 1  2  3  4  5  6  7  8 |
|_____|
```
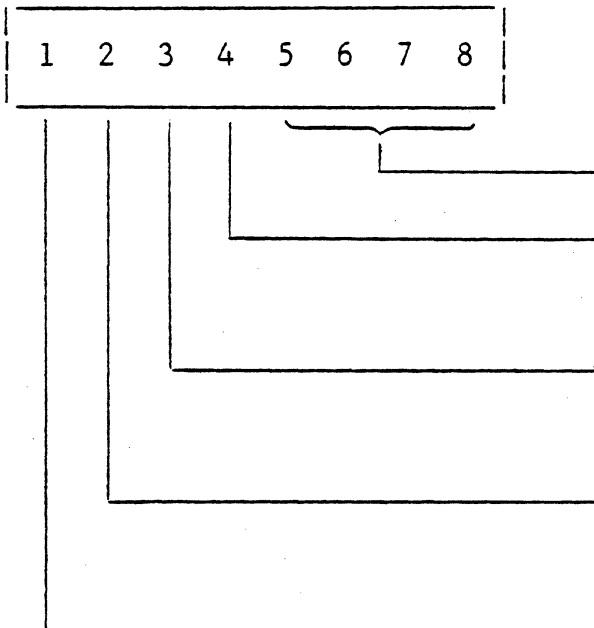
Reserved

Cursor Display (also see A3/3)
  ON = underline
  OFF= block

Audible Key Feedback
  ON = feedback
  OFF= no feedback

Screen Refresh Rate
  ON = 50 Hz
  OFF= 60 Hz

Auto Scroll Mode
  ON = enable
  OFF= disable

Figure 3-4. Regent® 25: PC Card Switch Settings

Screen Refresh Rate - Switch Block A5, Switch 2

Position of A5/2	Description
OFF	60 Hz
ON	50 Hz

An internal switch controls the screen refresh rate. The screen is refreshed at 60 frames/second with switch 2 of Switch Block A5 OFF; to refresh at 50 frames/second, this switch should be set ON.

<u>NOTE</u>

Power wiring changes will be necessary to change between 120 VAC and 240 VAC operation.

Audible Key Feedback - Switch Block A5, Switch 3

Position of A5/3	Description
ON	Key Click
OFF	No Click

A short tone burst ("click") is heard each time a key emits a code when this switch is set ON.

DISPLAY PRESENTATION

<u>Size</u>

The non-glare screen is 12" diagonal. Standard presentation of the 24 x 80 data entry area is dark characters on a light background. A rear panel switch can reverse th is presentation (see page 3-8).

80 CHARACTERS

24 LINES

SCREEN DISPLAY
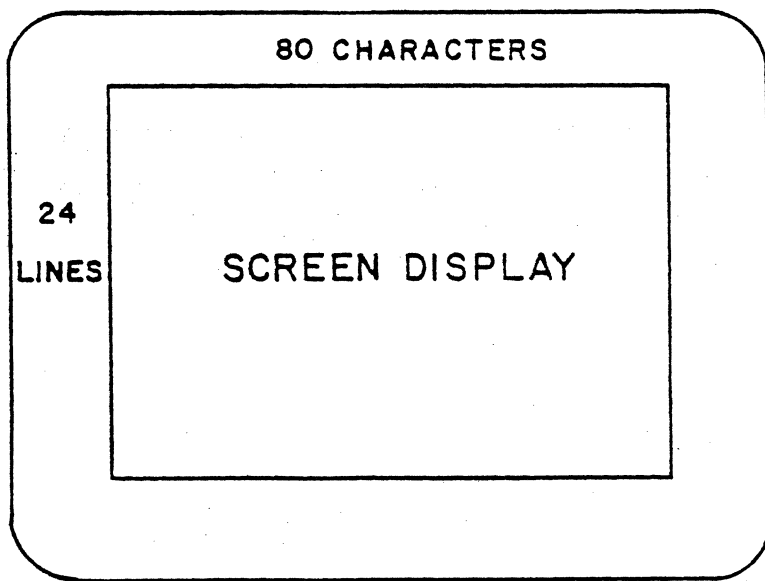
Figure 3-5. Regent® 25: CRT Screen

Matrix

Characters are formed as a 5 x 8 pattern within a 7 x 10 dot matrix.

KEYBOARD

The keyboard is designed for ease of operation and to minimize required training time for operators familiar with typewriters.

Typing Array

A group of 59 keys is arranged in the standard offset used for typewriters. All keys in this array generate ASCII codes, except for four unencoded keys:

BREAK   - Generates a 500 millisecond break ("spacing" condition) on the Transmitted Data output line (interlocked with CONTROL key).

CONTROL - Used in conjunction with alphanumeric keys to effect the desired code. For example, the key labeled "J" generates different codes depending on whether or not the CONTROL key is held down when the J-key is depressed.

SHIFT   - Used in conjunction with alphanumeric keys to effect the desired code. For example, the non-shifted P-key generates the code for "P" but the shifted P-key generates the code for "p".

NOTE

The SHIFT and CONTROL Keys are independent; either key alone or both together may be used in conjunction with an alphanumeric key.

CASE   - Toggles the alphabetic portion of the keyboard through an "alpha lock" state. The keyboard will normally generate upper case and SHIFT will generate the lower case. Operation of the "CASE" key will cause the alphabetic portion of the keyboard to generate lower case and SHIFT will generate upper case.

For the domestic keyboard, "alphabetic" is A through Z. For international layouts, such special characters as Ñ, Å, Ø, Ü, Ä, Ö are also affected.

The keyboard's power-up state is upper case-shift lower. This is alterable to lower case-shift upper through the use of an internal switch (see page 3-12).

<u>Separate Key Pad</u>

In addition, there is a separate key pad which contains the ten
numerics (0-9) plus the PERIOD (.), COMMA (,), ENTER, and control
keys for cursor movement; i.e., up, down, left, right and home.
Through the setting of internal switches, the 0 through 9 plus
PERIOD and COMMA keys will transmit either a three-byte sequence
comprised of STX, the depressed keys code and CR or a two-byte
sequence of ESCape plus the depressed key's code.
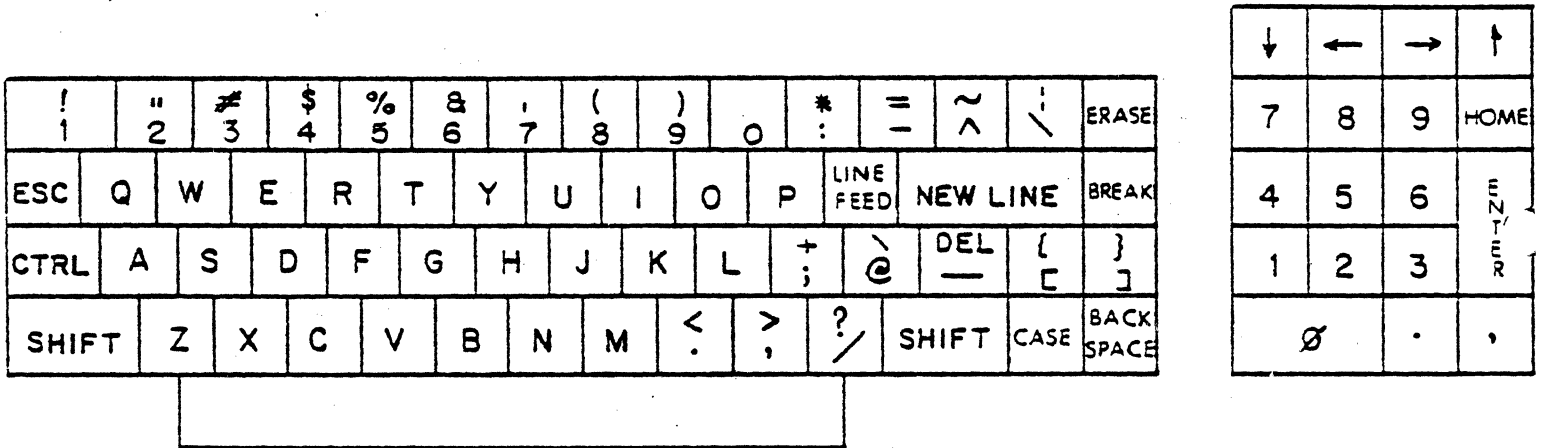
Figure 3-6.   Regent® 25: Keyboard

All keys on the keyboard are typamatic except ERASE, NEW LINE,
ENTER, HOME, ESCAPE, BREAK, SHIFT, CONTROL and CASE. Key func-
tions automatically repeat at the rate of 15 per second if the
key is held down for more than a full second.

TERMINAL COMMANDS

Commands which generate ASCII codes to affect the state of the terminal can be entered using ASCII Code Sequences. However, some commands can be obtained by using one of the display terminal's special function keys. For example, the Cursor Home Command may be generated by depressing the HOME key or the ASCII Code Sequence CTRL-A.

The Terminal Commands are described below and listed alphabetically in Table 3.6.

Cursor Control Codes

The cursor is shown in the inverse presentation of the display. It indicates where the next entered character will appear and can be moved to any position in the display without changing any of the displayed data. The following codes are used for moving the cursor.

Home

The SOH (CONTROL-A or HOME) code places the cursor in the Home position, that is, in the lower left in Auto Scroll Mode, and the upper left in non-Auto Scroll Mode.

Forward

The ACK (CONTROL-F or ->) code moves the cursor one position forward. If the cursor is at the end of a line, it advances to the beginning of the next line when ACK is received.

Back

The BS (CONTROL-H or BACKSPACE) or the NAK (CONTROL-U or <-) code moves the cursor back one position. If the cursor is at the beginning of a line, it goes to the end of the preceding line in response to BS or NAK. Note that BS or NAK causes a cursor wraparound from the beginning of the top line to the end of the last line on the display.

Up

The SUB (CONTROL-Z or |) code moves the cursor up to the same relative position in the line above the current line. The upward cursor movement is wraparound from the top line to the bottom line in the display.

Down

The LF (CONTROL-J, ↓ or LINE FEED) code causes the cursor to move
down one line from its current position. Cursor downward move-
ment is wraparound from the bottom line to the top line if Auto
Scroll Mode is disabled. If Auto Scroll is enabled, LF causes
the display to scroll.

Carriage Return

The CR (CONTROL-M or NEW LINE) code places the cursor at the be-
ginning of the same line in non-Auto Line Feed Mode, or at the
beginning of the next line if Auto Line Feed is enabled.

Line Feed

The LF (CONTROL-J, ↑ or LINE FEED) code causes the cursor to move
down one line from its current position. Cursor downward move-
ment is wraparound from the bottom line to the top line if Auto
Scroll is disabled; if Auto Scroll is enabled, LF causes the
display to scroll.

Erase Codes

Erase All

When the FF (CONTROL-L or CONTROL-ERASE) code is received, the
screen is erased (filled with "spaces") and the cursor is posi-
tioned at the upper left corner.

Erase to End of Line

The code sequence ESC, K or ERASE causes the data to be erased to
the end of the line, with the cursor remaining in the current
position.

Erase to End of Page

The code sequence ESC,k erases the data from the present cursor
position to the end of the screen. The cursor remains in its
present position.

Cursor Addressing Codes

Two forms of cursor addressing are available on the terminal.
The first scheme allows for separate commands to either the
vertical or horizontal address; both commands are absolute. The
second address scheme allows a four-byte command to position the
cursor both vertically and horizontally to the desired cursor
position.

Vertical Cursor Addressing

The Vertical Address Command code is VT (CONTROL-K). The five least significant bits of the character following receipt of a VT code positions the cursor to the desired line by defining, in binary, one of the 24 lines (0-23).

Vertically positioning the cursor using the Vertical Address Command does not affect its horizontal position. For example, the sequence VT,K positions the cursor to line number 11 (the 12th line from the top) without affecting horizontal positioning of the cursor.

Horizontal Cursor Addressing

The Horizontal Address Command code is DLE (CONTROL-P). All seven bits of the character following receipt of a DLE define the desired horizontal position of the cursor. The most significant three bits are used to determine which group of ten positions is to be addressed (0-9, 10-19, ..., 70-79). The least significant four bits make up a BCD number (0-9) which selects which of the ten positions within any one group is to be selected.

For example, the ASCII Code for "8" is 38 (hexadecimal).

$$38 = \underbrace{011}_{\text{group}} \mid \underbrace{1000}_{\text{position in group}}$$

The cursor position can be determined from the tables below.

Group	Most Significant Three Bits
0-9	000
10-19	001
20-29	010
30-39	011
40-49	100
50-59	101
60-69	110
70-79	111

Position in Group	Least Significant Four Bits
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

The code sequence DLE (CONTROL-P), 8 positions the cursor to column 38, the 39th column on the screen counting from zero, without affecting the vertical positioning of the cursor.

Refer to Appendix A, Figure A-2, the Vertical and Horizontal Cursor Addressing Chart, for the recommended ASCII characters for horizontal positioning.

Absolute Cursor Addressing

The address scheme ESC,Y,r,c (where ESC is CONTROL-[) can position the cursor to any position on the screen, where r,c is the address of a position within the 1920-character data entry field. In this command, r represents the row and c represents the column. A chart of absolute screen addresses used with this command sequence is given on pages A-6 and A-7.

Print Transparent Mode

The Print Transparent Enable code sequence ESC,3 is a remote command from the computer which tells the CRT to ignore the entire data stream including all command codes which are directed to the peripheral (printer or other device). Likewise, the peripheral device may communicate directly with the CPU while in Transparent Mode. Generation of the code sequence ESC,4 disables this mode.

Audible Tone

An audible tone is sounded in the Regent® if the BEL (CONTROL-G) character is received. This is consistent with the bell control of teletypewriters.

Auxiliary Port

All incoming serial data following the code DC2 (CONTROL-R) is directly routed to the auxiliary port. Upon receipt of a DC4 (CONTROL-T, which is also sent to the AUX port), the port is disabled (held marking).

Receipt of the ESC,3 command will enable the AUX port and cause the display to ignore the entire data stream which is directed to the peripheral. Receipt of the sequence ESC,4 will reenable the display of the data stream. The AUX port will be returned to the state it was in before receipt of the ESC,3 and the ESC,4 ending Transparent Print Mode will have gone to the AUX port.

Table 3.6. Regent® 25: Alphabetical List of Terminal Commands

Command	ASCII Code	Generation from Keyboard
Address, Absolute	ESC,Y,r,c	ESC,Y,r,c
Address, Horizontal	DLE,x	CONTROL-P,x
Address, Vertical	VT,x	CONTROL-K,x
Audible Tone	BEL	CONTROL-G
AUX port OFF	DC4	CONTROL-T
AUX port ON	DC2	CONTROL-R
Backspace	BS	BACKSPACE or CONTROL-H
Cursor Back	NAK	CONTROL-U or ←-
Cursor Down	LF	LINE FEED or CONTROL-J or ↓
Cursor Forward	ACK	CONTROL-F or -→
Cursor Home	SOH	CONTROL-A or HOME
Cursor Up	SUB	CONTROL-Z or ↑
Erase All	FF	CONTROL-ERASE
Erase to End of Line	ESC,K	ERASE
Erase to End of Page	ESC,k	ESC,k
Keyboard Lock	ESC,5	ESC,5†
	EOT	CONTROL-D*
Keyboard Unlock	ESC,6	ESC,6†
	STX	CONTROL-B*
Line Feed	LF	LINE FEED or CONTROL-J
Monitor Mode Disable	--	CONTROL-2
Monitor Mode Enable	--	CONTROL-1
New Line	CR	NEW LINE or CONTROL-M
Store Control Character	ESC,Z	ESC,Z
Transparent Print OFF	ESC,4	ESC,4
Transparent Print ON	ESC,3	ESC,3

*-only when the keyboard lock option is enabled.
†-only when the keyboard lock option is disabled.

NOTE

Commas are shown between characters in a code sequence for
readability in this text, but are not entered as part of
the code sequence.

DATA ENTRY

In Half-Duplex Mode (or with echoed data in Full-Duplex Mode),
when a displayable code is entered from the keyboard it causes
the corresponding character to be entered at the current cursor
location, and the cursor automatically advances one position.
New data overwrites old data showing on the screen. When a
character is entered at the end of a line, the cursor goes to the
beginning of the next line. If the character was entered in the
last position on the last line, the screen will scroll if Auto
Scroll is enabled; otherwise, the cursor will be positioned to
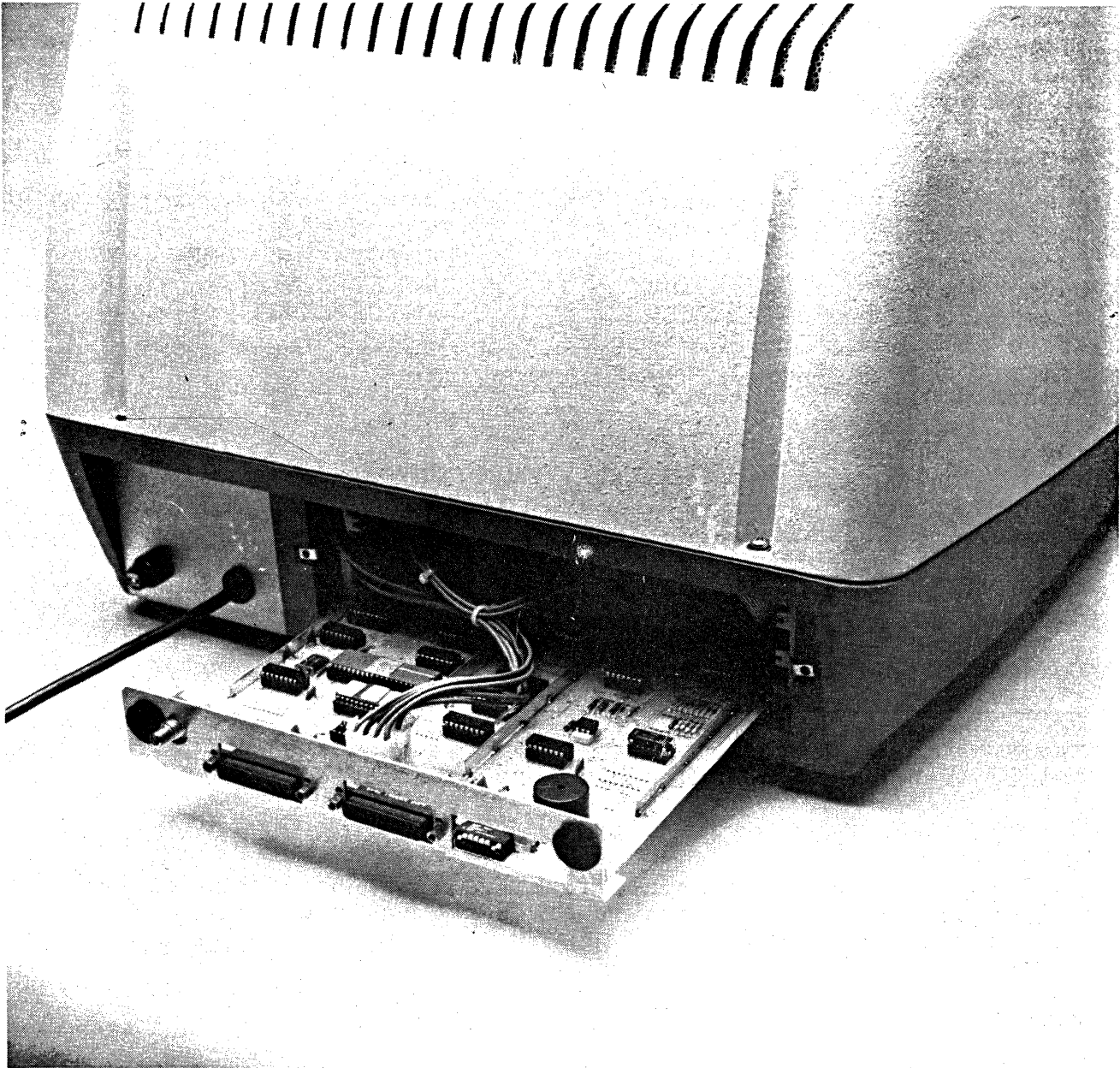the first position on the first line.

Figure 3-7 Location of PC Board in Regent® 25

DATA INTERFACE DESCRIPTION
AND CABLING

Interfaces available with the Regent® terminals are de-
scribed in this section. Connector pin assignments, inter-
face signal descriptions and recommended cable practice are
presented in sufficient detail to enable the systems engi-
neer to construct appropriate cables and to design inter-
faces to special equipment, if required.

CONNECTOR COMPLEMENT

Two connectors are located on the rear panel of the Regent®,
a Data connector and an Auxiliary Connector.

Mating connectors (Cinch or Canon type DB-25P, or equiva-
lent) are shipped with each terminal.

A 25-pin female connector (Cinch or Canon type DB-25S, or
equivalent) is the data connector for both EIA signals and
Current Loop signals. The same type of connector is used
for the Auxiliary interface.

PIN ASSIGNMENTS

Those EIA signals which apply to this class of terminal
(asynchronous data communication) are assigned to pins in
accordance with EIA Specification RS232C for interfacing
data communication equipment, with one exception as noted in
Table 7.1. Both the standard EIA circuit name and the cir-
cuit name used in Europe (CCITT Specification V24) are shown
in Table 7.1. Pins which are unassigned by RS232C for asyn-
chronous data communication are used by the Regent® termi-
nals for the Current Loop interface.

THE EIA DATA INTERFACE

Signal Definition and Description

All signals at this interface are not required for most ap-
plications. Signal descriptions are grouped from most com-
monly used to least frequently used.

1. Protective Ground and Signal Ground (AA and AB)

    Pins 1 and 7 should be carried in a cable to a device
    such as a modem which is wired in accordance with
    RS232C. Internally in the Regent®, these signals are
    tied together at one point.

Table 7.1. Regent® Data Connector Pin Assignments

Pin No.	EIA RS232 Circuit	CCITT V24 Circuit	Signal	Description
1	AA	101	GND	Protective Ground
2	BA	103	EIAOUT	Transmitted Data
3	BB	104	EIAIN	Received Data
4	CA	105	RQSND	Request to Send
5	CB	106	CLSND	Clear to Send
6	CC		DSR	Data Set Ready
7	AB	102	GND	Signal Ground
8	CF	109	CARDET	Received Line Signal
11	*SCA/SA	120	SCA	Secondary Request to Send
12	*SCF/SB	122	SCR	Secondary Received Line Signal Detector Detector
15	–	–	LBIAS2	Current Loop Bias (+)
17	–	–	LIN+	Current Loop Input (+)
18	–	–	LIN-	Current Loop Input (-)
20	CD	108.2	DATTRY	Data Terminal Ready
22	–	–	LBIAS1	Current Loop Bias (+)
23	–	–	CLEIAOUT	Current Loop Receiver's EIA Output (Regent® 20/25)
24	–	–	LOUT+	Current Loop Output (+)
25	–	–	LOUT-	Current Loop Output (-)

*For Regent® 40 and 60 only. There is a discrepancy between RS232C and standard assignments on a Bell System 202 modem, as shown below:

202 Name	Pin #	RS232C Name	Pin #
SA	11	SCA	19
SB	12	SCF	12

These terminals use RS232 signal names and a pin assignment for SCA/SA in accordance with Bell 202 modems.

2. Transmitted Data and Received Data (BA and BB)

    The "primary channel" data lines (Pins 2 and 3) are the
    lines on which data goes to and from the terminal.

    Data can be output on BA when Clear to Send (CB) is in
    the ON state. The 200-300 millisecond "long space" is
    forced on this line when the operator's CTRL-BREAK keys
    are depressed. (For the Regent® 20/25 the "long space"
    is 500 milliseconds.)

    Data received on BB goes to the display electronics.

3. Request to Send and Clear to Send (CA and CB)

    These control lines (Pins 4 and 5) are normally used in
    either of two situations:

    a) when operating on a half-duplex channel such as a
       two-wire 202 modem, or

    b) when hardwired to a computer which senses CA to de-
       termine when the terminal wants to transmit and con-
       trols CB to permit the terminal to transmit only at
       the CPU's discretion.

    Signal CA is turned ON when the Regent® has data to
    transmit. In CONVERSATIONAL mode CA goes ON when the
    first character is typed and goes OFF when a NEW LINE
    function occurs in the Regent® 20, 40 and 60. In the
    Regent® 20 and 25, CA also goes OFF after a control
    character is sent.

    CA goes ON when a Function key is depressed and goes OFF
    automatically about two bit times after the last bit of
    the line termination character sequence is transmitted.

    CA goes ON when the XMIT key is activated and goes OFF
    when the line terminator is output at the end of a
    transmission in PAGE, MESSAGE, or FORMS mode (in the Re-
    gent® 60 only).

    Data will not be transmitted until CB is ON. If CB is
    OFF the first character from the keyboard is buffered
    and then permitted to go out when CB goes to the ON
    state again.

    CB is assumed ON if left open (disconnected) at the
    interface.

4. Data Set Ready (CC)

    This signal from the MODEM is ON when the Data Set is
    conditioned to operate.

5. Received Line Signal Detector (CF)

If this signal on Pin 8 goes to the ON state, the CAR-
RIER message appears in the Status Line (Regent® 40 and
60 only). If CF is left open (disconnected) the CARRIER
message does not appear.

6. Secondary Request to Send and
Secondary Received Line Signal Detector (SCA and SCF)

These signals are normally of interest only to the users
of a two-wire 202 modem equipped with the "Supervisory
Channel" option. Pin assignments are 11 (SCA) and 12
(SCF).

SCA and SCF are used for circuit assurance and interrupt
capability between the CPU and the terminal.

SCA is controlled by the terminal to inform the CPU of
circuit assurance. It may also be used to interrupt the
CPU. SCA is held ON when the Regent® is receiving data
(is in Half-Duplex Mode and Request to Send is OFF),
except that if the operator depresses the BREAK key, a
250-millisecond OFF condition occurs on the SCA.

SCF to the Regent® can force the terminal from a
transmit state to a receive state and keep the Regent®
in a receive state. If SCF is ON, the Regent® can
transmit, but if SCF goes to the OFF state, the Regent®
is forced to a receive state and cannot send data until
SCF goes ON again.

NOTE

If SCF is open (not connected), it is assumed by the
interface to be ON.

Refer to Section 6 for a detailed description of the
various options available for reverse channel operation.

Voltage Conventions

Signal CD on Pin 20 (DATTRY) is held ON whenever power is
on. The following signal levels apply:

For CA, CB, CF, and CD: ON = +3V to +15V
                          OFF = -3V to -15V

For BA and BB: MARK = -3V to -15V = Logical 1
                SPACE = +3V to +15V = Logical 0

Circuit CB is assumed to be true if no signal is applied,
e.g., open input.

Recommended EIA Cabling

The recommended method of constructing cables varies, depending on the baud rate and distances involved. The limitation on cable length is set by the capacitance of the cable. When a pulse which represents a bit is transmitted down a line, the edges of the pulse become less sharp (rise and fall time get longer) as the capacitance of the line increases.

Since line capacitance is a linear function of length, it follows that the probability of correctly detecting a bit will eventually deteriorate to an unacceptable value as the line length is increased. Table 7.2 below lists cable lengths which can be safely assumed.

Table 7.2.   Recommended EIA Cabling Lengths

Baud Rate	Maximum Cable Length (feet)
300	4000 feet
1200	1000 feet
1800	650 feet
2400	500 feet
4800	250 feet
9600	125 feet

These figures are conservative in the sense that they might be exceeded by a factor of two and still provide an acceptable error rate. However, ADDS does not recommend going beyond those figures. The table is based on several assumptions. Readily available wire is used; that is, special low-capacitance cable was not utilized in deriving these numbers. In addition, no special line drive or receiver circuits were assumed and the terminal was not operating over telephone facilities.

Table 7.3 gives recommended cable construction for two cases: distances of less than 50 feet and transmission speed of 2400 baud or less, and distances of more than 50 feet and transmission speeds up to 9600 baud.

For the shorter distance and lower speed, only signals BA and BB (Transmitted Data and Received Data) need be carried as two twisted pairs, with a ground return in each pair. For the longer distance and higher speed, signals CA and CB (Request to Send and Clear to Send) should also be carried as twisted pairs with a ground return in each pair.

If one purchases off-the-shelf cable containing twisted pair, the cable usually consists of all twisted pairs with no other single conductors in the cable. The tables on the following page show the signals which must be carried as twisted pair and those which are carried in pairs as a matter of convenience is using readily available cable.

Table 7.3   EIA Cable Lengths

I. Distances less than 50 feet, speeds up to 2400 baud

PIN	SIGNAL	PAIR
2	BA-EIAOUT	Pair
1	AA-GND	
3	BB-EIAIN	Pair
7	GND	
4	CA-RQSND	Pair or
8	CF-CARDET	single
5	CB-CLSND*	Pair or
20	CD-DATTRY	single
6	DSR	Single

II. Distances greater than 50 feet, speeds more than 2400
    baud

PIN	SIGNAL	PAIR
2	BA-EIAOUT	Pair
1	AA-GND	
3	BB-EIAIN	Pair
1	GND	
4	CA-RQSND	Pair
7	GND	
5	CB-CLSND*	Pair
7	GND	
8	CF-CARDET	Single
20	CD-DATTRY	Single
6	DSR	Single

*CLSND is true if the line is left open.

THE CURRENT LOOP INTERFACE

The Regent® Current Loop Interface is implemented by means of opto-isolators which can operate at any speed up to 9600 baud.

Cabling

As shown in Figure 7-1, two cases are possible, one where ADDS supplies the 20 Ma. current or the customer supplies it. Frequently one has to employ a hybrid of the two parts, e.g., the customer provides 20 Ma. to ADDS but expects a "contact closure" output from ADDS. (Most TTYs are strapped to accept a loop current and provide contact closure outputs.) IMPORTANT: The polarities shown in Figure 7-1 must be followed.
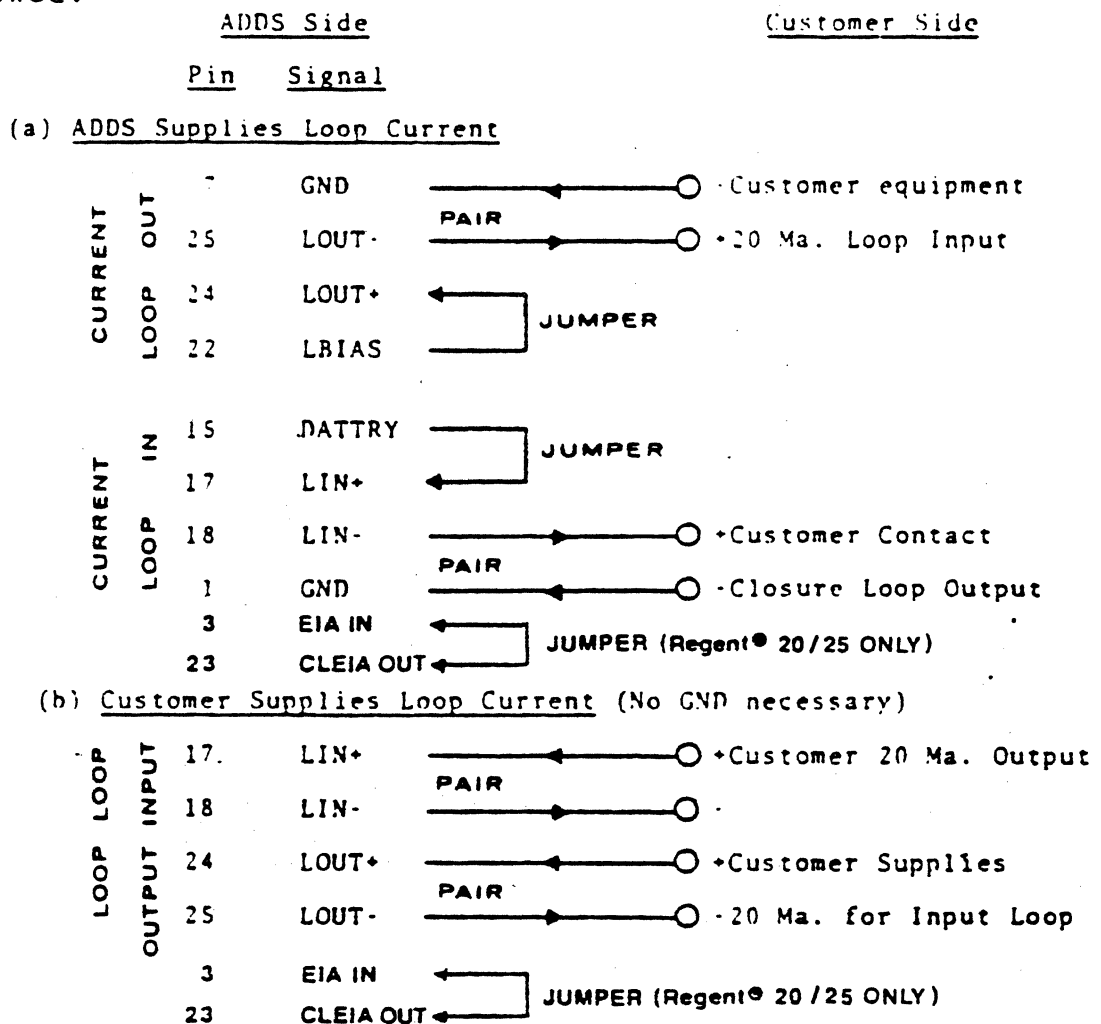
ADDS Side   Customer Side

Pin   Signal

(a) ADDS Supplies Loop Current

```
CURRENT LOOP OUT
         -    GND    ────────◄──────O ·Customer equipment
                            PAIR
         25   LOUT·  ────────►──────O ·20 Ma. Loop Input
         24   LOUT+  ◄──────┐
                            │ JUMPER
         22   LBIAS  ───────┘

CURRENT LOOP IN
         15   DATTRY ──────┐
                           │ JUMPER
         17   LIN+   ◄──────┘
         18   LIN-   ────────►──────O ·Customer Contact
                            PAIR
         1    GND    ────────◄──────O ·Closure Loop Output
         3    EIA IN ◄──────┐
                           │ JUMPER (Regent® 20/25 ONLY)
         23   CLEIA OUT ◄───┘
```

(b) Customer Supplies Loop Current (No GND necessary)

```
LOOP LOOP OUTPUT INPUT
         17.  LIN+   ────────◄──────O ·Customer 20 Ma. Output
                            PAIR
         18   LIN-   ────────►──────O ·
         24   LOUT+  ────────◄──────O ·Customer Supplies
                            PAIR
         25   LOUT-  ────────►──────O ·20 Ma. for Input Loop
         3    EIA IN ◄──────┐
                           │ JUMPER (Regent® 20/25 ONLY)
         23   CLEIA OUT ◄───┘
```

Figure 7-1.   Current Loop Cabling

High Noise Environments

Since the current loop interface provides a true floating
pair of input wires and a floating pair of output wires, the
system designer may utilize this interface to achieve very
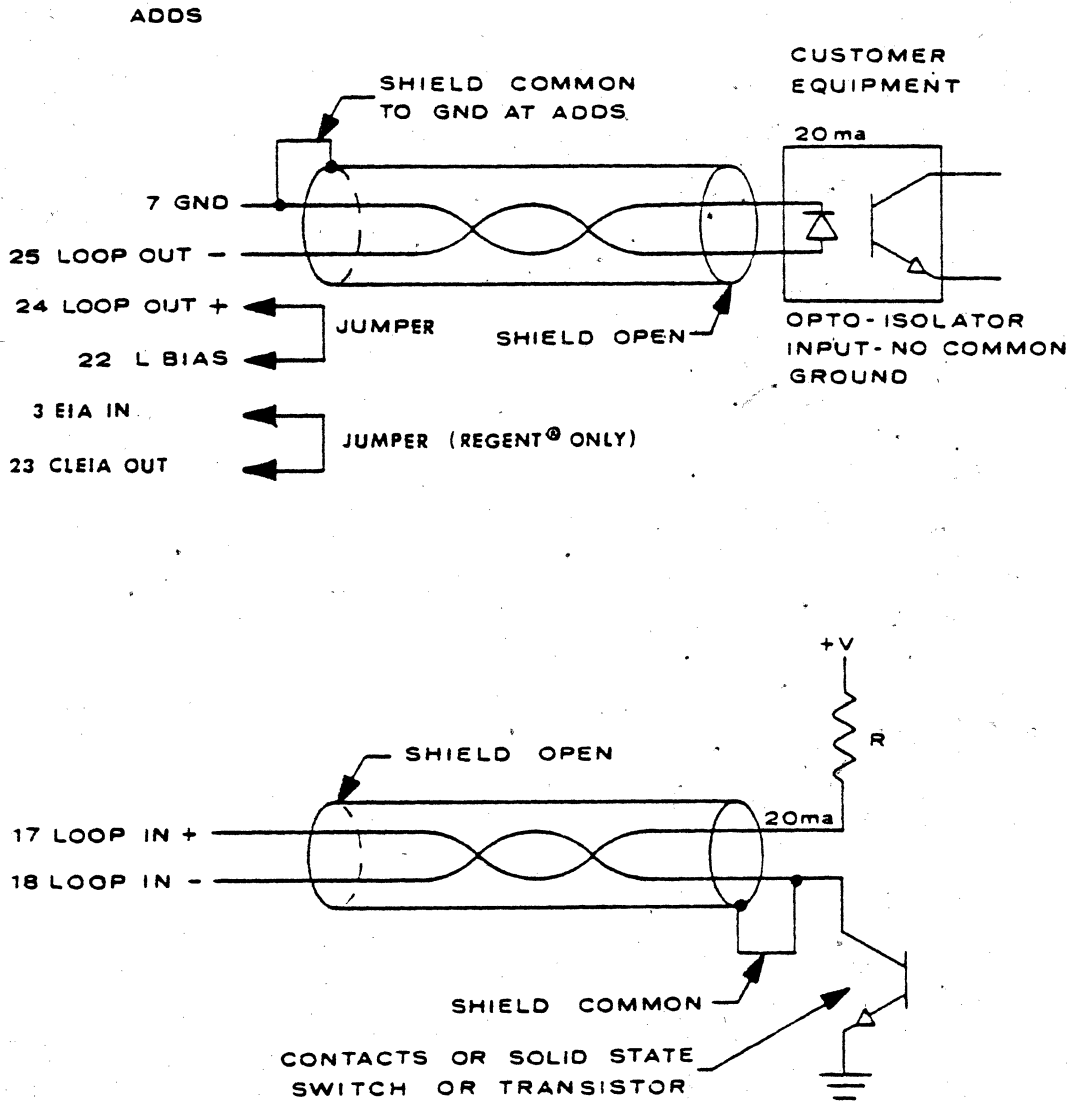high common mode noise rejection. A suggested technique is
depicted in Figure 7-2.

Figure 7-2.   Current Loop in High Noise Environment