

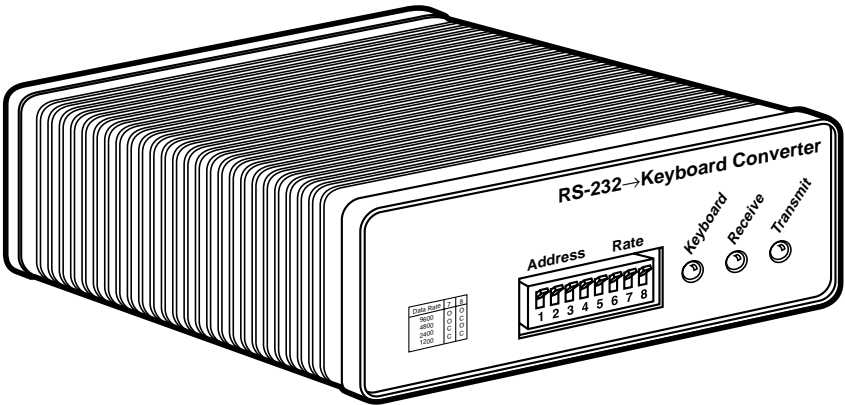


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RS-232→Keyboard Converter



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ELECTRICAL SAFETY STATEMENT****INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
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11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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CE Notice

The CE symbol on your RS-232→Keyboard Converter indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU).

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1. Specifications

Transmission Format:	Asynchronous, half-duplex
Data Rates:	1200, 2400, 4800, and 9600 bps
Serial Interface:	RS-232 or RS-485 2-wire (jumper-selectable)
Connectors:	(1) DB25F for RS-232 and RS-485 device connection; (2) 6-pin mini-DIN connectors
LEDs:	Keyboard, Receive, Transmit
Codes Accepted:	Character, HEX ASCII, Scan Code, Key Code
Multiple Drops:	Supports 58 addressable units in an RS-485 multipoint environment
Data Turnaround Modes:	Line-Oriented or Immediate
Temperature Range:	32 to 122°F (0 to 50°C)
Power Supply:	Interface-powered, obtains operating power from data and control signals
Size:	1.6"H x 4.2"W x 3.8"D (4.1 x 10.7 x 9.7 cm)

2. Introduction

2.1 Description

The RS-232→Keyboard Converter lets you tap into a PC keyboard port with an RS-232 or RS-485 serial interface, while retaining use of the keyboard. Supporting data rates up to 9600 bps, the Converter has a myriad of applications: Simulate keystrokes for software testing, use one RS-485 host to simultaneously control the testing of up to 54 (RS-485) target systems, monitor keyboard activity (Monitor Mode), “add” an RS-232 or RS-485 port to a PC, or connect a keyboard to an RS-232 or RS-485 port.

The RS-232→Keyboard Converter is equipped with one DB25 (female) port for RS-232 or RS-485 device connection, plus two 6-pin mini-DIN ports for input/output connection of an AT® keyboard. No AC power or batteries are required for operation.

2.2 Features

- Tap into a PC keyboard port—with RS-232 or RS-485—while retaining use of the existing keyboard.
- Both RS-232 and RS-485 interfaces included in the same unit.
- Multidrop up to 54 addressable RS-232→Keyboard Converters in RS-485 environments.
- Supports data rates of 1200, 2400, 4800 and 9600 bps.
- Monitor Mode facilitates keyboard activity monitoring.
- Translates ASCII, Hex, Binary, Key Scan Codes, and DOS Scan Codes.
- No AC power required—draws all necessary operating power from interfaces.

2.3 Applications

The RS-232→Keyboard Converter allows you to connect an RS-232 or RS-485 computer port to another computer's keyboard port while still using the keyboard. Typical applications are for:

- **Software Testing.** With the help of a RS-232→Keyboard Converter, you can develop a sequence of keystrokes and send them to the keyboard port of a computer running the software that you want to test. You can do this without having to add any software or ports to the computer system you are testing.
- **Multi-System Testing.** Using the multi-drop capability of the RS-232→Keyboard Converter keyboard port adapter allows centrally controlled testing of up to 58 systems simultaneously. Only the RS-232→Keyboard Converter port adapter allows such flexibility.
- **Remote Access.** The RS-232→Keyboard Converter keyboard port adapter allows remote access to a system where the software does not provide any other method.
- **Monitoring Keyboard Sessions.** The RS-232→Keyboard Converter can be used to monitor keyboard sessions. This can be helpful to develop regression test data or to detect keystrokes that are causing problems with target software.
- **Attach a Keyboard to Your Computer's RS-232 Port.** You can use the RS-232→Keyboard Converter to send and receive from a keyboard attached to an RS-232 port.

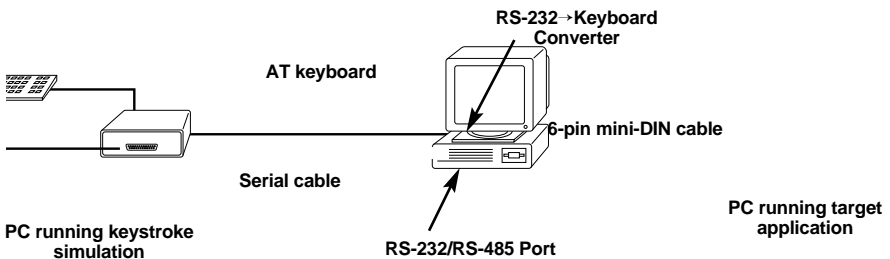


Figure 2-1. Software testing using a PC program to simulate keystrokes.

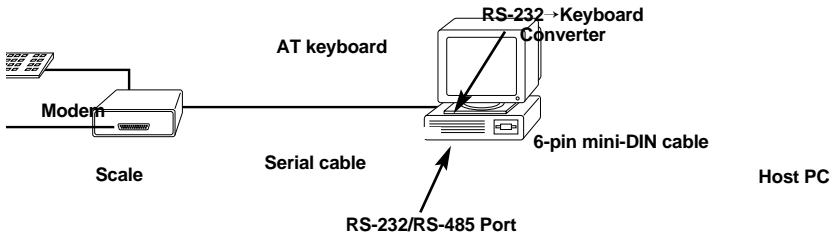


Figure 2-2. Creating an “extra” RS-232 or RS-485 port for a remote input device.

3. Configuration

The instructions in this chapter will help you properly configure the RS-232→Keyboard Converter.

3.1 Configuration Switches

The RS-232→Keyboard Converter has eight DIP switches that you can use to set the port address and the bit rate. These externally accessible switches are located on the front of the RS-232→Keyboard Converter, as shown in Figure 3-1.

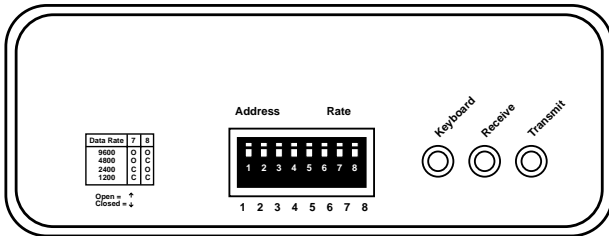


Figure 3-1. Front-panel switches.

Figure 3-2 shows the open and closed positions of the DIP switches.

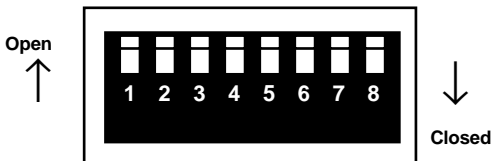


Figure 3-2. Close-up of DIP switches showing open and closed positions.

3.1.1 ADDRESS CONFIGURATION (SWITCHES S1 THROUGH S6)

Switches S1 through S6 allow you to set an address for the Converter. You must set an address for each RS-232→Keyboard Converter configured in a multidrop topology. (You don't need to set an address when you're using only one Converter.) To set a Converter address, choose an address from the left-most column of Table 3-1. Then configure Switches S1 through S6 according to the the Open or Closed settings in the same row.

Table 3-1. RS-232→Keyboard Converter Address Settings

Address	Switch Settings					
	1	2	3	4	5	6
None	Open	Open	Open	Open	Open	Open
1	Closed	Open	Open	Open	Open	Open
2	Open	Closed	Open	Open	Open	Open
3	Closed	Closed	Open	Open	Open	Open
4	Open	Open	Closed	Open	Open	Open
5	Closed	Open	Closed	Open	Open	Open
6	Open	Closed	Closed	Open	Open	Open
7	Closed	Closed	Closed	Open	Open	Open
8	Open	Open	Open	Closed	Open	Open
9	Closed	Open	Open	Closed	Open	Open
10	Open	Closed	Open	Closed	Open	Open
11	Closed	Closed	Open	Closed	Open	Open
12	Open	Open	Closed	Closed	Open	Open
13	Closed	Open	Closed	Closed	Open	Open
14	Open	Closed	Closed	Closed	Open	Open
15	Closed	Closed	Closed	Closed	Open	Open
16	Open	Open	Open	Open	Closed	Open
17	Closed	Open	Open	Open	Closed	Open
18	Open	Closed	Open	Open	Closed	Open
19	Closed	Closed	Open	Open	Closed	Open
20	Open	Open	Closed	Open	Closed	Open
21	Closed	Open	Closed	Open	Closed	Open
22	Open	Closed	Closed	Open	Closed	Open
23	Closed	Closed	Closed	Open	Closed	Open
24	Open	Open	Open	Closed	Closed	Open
25	Closed	Open	Open	Closed	Closed	Open
26	Open	Closed	Open	Closed	Closed	Open
27	Closed	Closed	Open	Closed	Closed	Open

Table 3-1 (continued). RS-232→Keyboard Converter Address Settings

Address	Switch Settings					
	1	2	3	4	5	6
28	Open	Open	Closed	Closed	Closed	Open
29	Closed	Open	Closed	Closed	Closed	Open
30	Open	Closed	Closed	Closed	Closed	Open
31	Closed	Closed	Closed	Closed	Closed	Open
32	Open	Open	Open	Open	Open	Closed
33	Closed	Open	Open	Open	Open	Closed
34	Open	Closed	Open	Open	Open	Closed
35	Closed	Closed	Open	Open	Open	Closed
36	Open	Open	Closed	Open	Open	Closed
37	Closed	Open	Closed	Open	Open	Closed
38	Open	Closed	Closed	Open	Open	Closed
39	Closed	Closed	Closed	Open	Open	Closed
40	Open	Open	Open	Closed	Open	Closed
41	Closed	Open	Open	Closed	Open	Closed
42	Open	Closed	Open	Closed	Open	Closed
43	Closed	Closed	Open	Closed	Open	Closed
44	Open	Open	Closed	Closed	Open	Closed
45	Closed	Open	Closed	Closed	Open	Closed
46	Open	Closed	Closed	Closed	Open	Closed
47	Closed	Closed	Closed	Closed	Open	Closed
48	Open	Open	Open	Open	Closed	Closed
49	Closed	Open	Open	Open	Closed	Closed
50	Open	Closed	Open	Open	Closed	Closed
51	Closed	Closed	Open	Open	Closed	Closed
52	Open	Open	Closed	Open	Closed	Closed
53	Closed	Open	Closed	Open	Closed	Closed
54	Open	Closed	Closed	Open	Closed	Closed
55	Closed	Closed	Closed	Open	Closed	Closed
56	Open	Open	Open	Closed	Closed	Closed
57	Closed	Open	Open	Closed	Closed	Closed
58	Open	Closed	Open	Closed	Closed	Closed
*59	Closed	Closed	Open	Closed	Closed	Closed

*Special Setting 59: Puts Converter in immediate mode with address of zero (no address).

3.1.2 BIT-RATE SWITCHES (S7 AND S8)

Set Switches S7 and S8 together to determine the RS-232→Keyboard Converter's bit rate (in bits per second).

<u>S7</u>	<u>S8</u>	<u>Bit Rate</u>
Open	Open	9600 bps
Closed	Open	4800 bps
Open	Closed	2400 bps
Closed	Closed	1200 bps

3.2 Configuration Straps

In addition to the configuration switches described in **Section 3.1**, the RS-232→Keyboard Converter also has two internal straps: one that sets the RS-232 or RS-485 operation, and one that determines whether the keyboard connection passes through the RS-232→Keyboard Converter or connects between devices in parallel. In order to configure these straps, you must open the RS-232→Keyboard Converter's case.

NOTE

Before opening the case, determine whether the default settings are correct for your application (see Section 3.2.2).

3.2.1 OPENING THE CASE

To open the RS-232→Keyboard Converter, insert a large flat-head screwdriver into an open slot on either side of the case (see Figure 3-3).

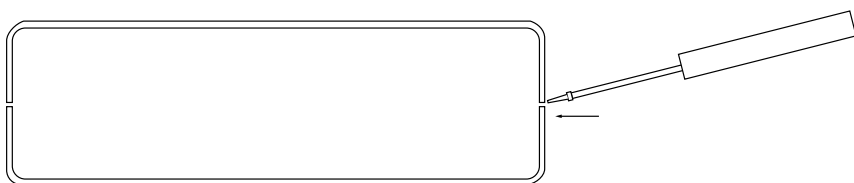


Figure 3-3. Using a large flat-blade screwdriver, open the plastic case.

Twist the screwdriver head slightly and the top half of the case will separate from the lower half (see Figure 3-4).

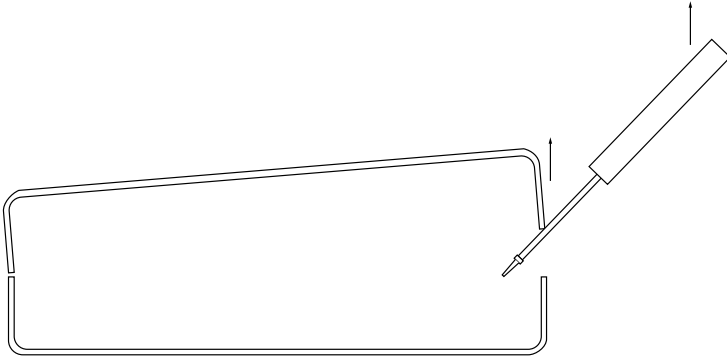


Figure 3-4. Twisting the screwdriver.

To close the case, fit the two halves together snugly and snap them back in place.

3.2.2 JUMPERS K1 AND K2

The internal jumpers mounted on the RS-232→Keyboard Converter's PC board (labeled K1 and K2) are used to configure the RS-232/RS-485 operation and keyboard operation. Figure 3-5 shows the location of the RS-232→Keyboard Converter's jumpers on the internal PC board.

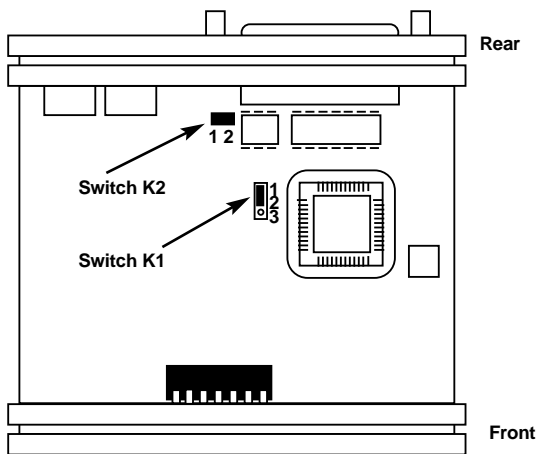


Figure 3-5. Jumpers K1 and K2 on the top of the PC board.

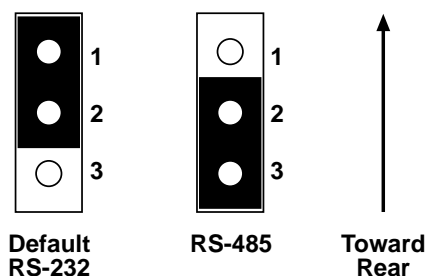


Figure 3-6. Possible strap positions for Jumper K1.

Jumper K1: RS-232 or RS-485 Interface

This setting determines whether the DB25 operates according to the RS-232 standard or the RS-485 standard.

<u>K1</u>	<u>Setting</u>
1 & 2	RS-232 Operation (default position)
2 & 3	RS-485 Operation

Jumper K2: Power via DB25 Pin 9

Normally, the RS-232 Keyboard Converter operates on +5V supplied by the computer's 6-pin mini-DIN keyboard interface. You may also supply operating voltage to pin 9 on the DB25 connector if you don't connect the computer's mini-DIN keyboard interface. However, most computers already supply voltage on pin 9. Connect this jumper *only* if:

- You aren't connecting the Converter to the computer keyboard port, and
- The computer does *not* supply power on pin 9 of its RS-232 port.

<u>K2</u>	<u>Setting</u>
Strap On	Connects +5V from the RS-232 device to pin 9 of the DB25 connector.
Strap Off	Disconnects pin 9 on the DB25 connector (default position).

WARNING

+5V is normally provided by the PC. DO NOT connect to another +5V source if the PC provides power. This can damage the RS-232 device and the connected equipment.

4. Installation

The RS-232→Keyboard Converter is typically installed by connecting the RS-232/RS-485 port to a computer or terminal, the Keyboard port to a keyboard, and the Computer port to a computer's keyboard port. This section describes connection procedures.

There are three data ports on the rear panel of the RS-232→Keyboard Converter—an RS-232/RS-485 female DB25 port, a Keyboard port, and a Computer port (see Figure 4-1).

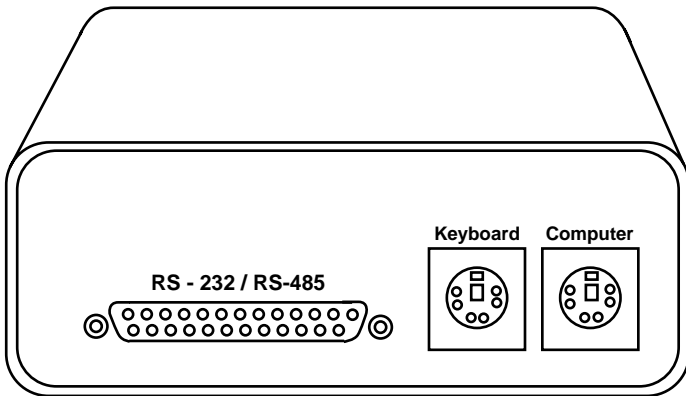


Figure 4-1. Connection ports on the rear panel.

4.1 Connecting RS-232/RS-485 Devices

When the Converter’s DB25 port is configured as an RS-232 port, it looks like DCE (Data Circuit-Terminating Equipment). Therefore, the RS-232→Keyboard Converter serial port will connect directly to a DTE (Data Terminal Equipment). The following pinout diagram shows the signal directions of the pins on the interface.

Pin#	Description	Direction
1	Protective Ground	N/A
2	Transmit Data	RS-232 Input to Converter
3	Receive Data	RS-232 Output from Converter
4	Request to Send	RS-232 Input to Converter
5	Clear to Send	RS-232 Output to Converter
6	Data Set Ready	RS-232 Output to Converter
7	Signal Ground (common return)	
8	Carrier Detect	RS-232 Output from Converter
9	+5VDC	RS-232 Input
14	Transmit Data/Receive Data	RS-485 Input+/Output+
16	Transmit Data/Receive Data	RS-485 Input-/Output-
20	Data Terminal Ready	RS-232 Input to Converter

4.1.1 CONNECTING RS-232 TERMINAL EQUIPMENT

The diagrams in this section show pin connections between the RS-232→Keyboard Converter’s serial port and standard RS-232 serial interfaces. You can use these diagrams to construct your own cables, or you can purchase pre-made cables.

PC/XT to RS-232→Keyboard Converter Pin-Outs

Serial DB25 (DTE) Pin No.	RS-232→Keyboard Converter DB25 (DCE) Pin No.
1 (FG) -----	1
2 (TD)-----	2
3 (RD) -----	3
4 (RTS) -----	4
5(CTS)-----	5
6 (DSR) -----	6
7 (SG) -----	7
8 (CD) -----	8
20 (DTR) -----	20

PC/AT to RS-232→Keyboard Converter Pin-Outs

Serial DB9 (DTE) Pin No.		RS-232→Keyboard Converter DB25 (DCE) Pin No.
1 (CD)	←	8 (CD)
2 (RD)	←	3 (RD)
3 (TD)	→	2 (TD)
4 (DTR)	→	20 (DTR)
5 (SG)	→	7 (SG)
6 (DSR)	←	6 (DSR)
7 (RTS)	→	4 (RTS)
8 (CTS)	←	5 (CTS)
9 (n/c)		

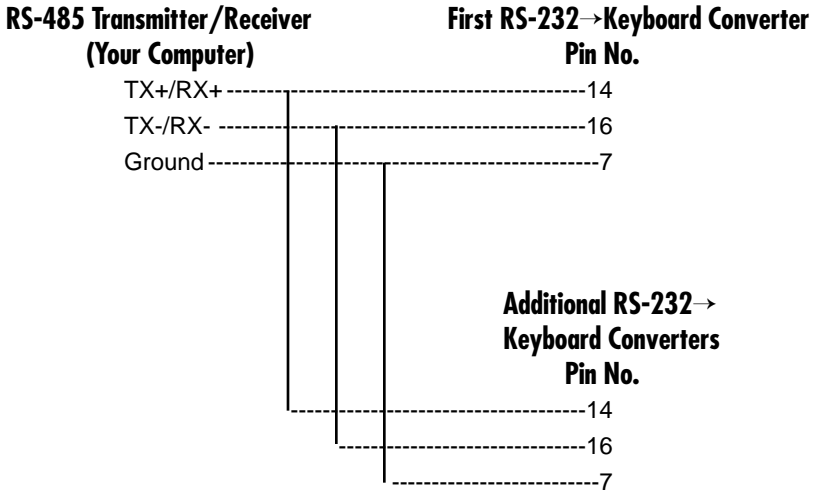
4.1.2 CONNECTING RS-485 TERMINAL EQUIPMENT

The diagrams below show pin connections between the RS-232→Keyboard Converter's RS-485 half-duplex serial interface and typical RS-485 serial interfaces. You can use these diagrams to construct your own cables, or you can custom-order pre-made cables.

Point-To-Point Connection

RS-485 Transmitter/Receiver (Your Computer)	RS-232→Keyboard Converter Pin No.
TX+/RX+	-----14
TX-/RX-	-----16
Ground	-----7

Multi-Point Connection



4.2 Connecting the Computer and Keyboard Ports

To connect the Computer and Keyboard ports:

1. Connect the keyboard's 6-pin mini-DIN connector to the keyboard port on the RS-232 to Keyboard Converter.
2. Connect the enclosed 6-pin mini-DIN cable between the port labeled "Computer" on the RS-232 to Keyboard Converter to the target PC's Keyboard DIN port.

5. Operation

5.1 Command/Data Entry

The RS-232→Keyboard Converter's main job is to accept data from the RS-232 or RS-485 port and send it through to another computer's keyboard port. However, you may also enter configuration commands to the RS-232→Keyboard Converter. You may send data or commands in the following forms:

- ASCII
- ASCII control codes
- DOS scan codes
- Keyboard scan codes
- ASCII Hexadecimal

Commands are instructions to the RS-232→Keyboard Converter to do something other than just pass data through to the computer. All commands begin with a ~ (tilde, hex 7E) character followed by a command character and, in some cases, some data.

~C<ENTER> {Sets RS-232→Keyboard Converter to Character Mode}
 DIR^M<ENTER> {Sends DOS a directory command}

COMMAND ENTRY RULES

Commands have some restrictions based upon the RS-232→Keyboard Converter operating model. (See **Section 5.2** for operating modes.) These rules are listed below:

- Rule #1 You may string commands together in one command line. Separate commands with spaces. This will occur before you press <ENTER/CR>.
- Rule #2 Each command line must end with an <ENTER/CR>. The RS-232→Keyboard Converter will not begin command execution until it receives a carriage-return character.
- Rule #3 If you turn on line turnaround (~L Command) or set an address on the RS-232→Keyboard Converter if the RS-232→Keyboard Converter is addressed, a line can have a maximum length of 46 characters and should end with an <ENTER> (CR, hex 0D).

- Rule #4 When immediate turnaround is set, data and commands are interpreted as received and are buffered up to 30 characters.
- Rule #5 If you get more than 30 characters ahead of the computer, the additional characters will be ignored.
- Rule #6 Characters are not echoed when the RS-232→Keyboard Converter is addressed.
- Rule #7 If line turnaround is set or if the RS-232→Keyboard Converter is addressed, a colon is sent back acknowledging the data sent.
- Rule #8 After receiving an addressed message, a colon is sent back immediately.
- Rule #9 If the Converter is not addressed but line turnaround is set, a colon is sent back after the data has been processed, signaling that another command can be sent.

5.2 Operating Modes

Four operating-mode commands set the way RS-232→Keyboard Converter interprets incoming data. Once set, the RS-232→Keyboard Converter operating mode stays the same until you change it or until a power failure occurs.

~C Character Mode—The default mode of operation. When this mode is set, any ASCII character except ~ (tilde, hex 7E), ^ (caret, hex 5E), and CR (return, hex 0D) is converted to the scan codes for that character. Each ASCII character will be sent to the keyboard with the corresponding make and release codes. Allow enough time for the codes to be sent through to the computer, as an ASCII code can require up to 10 keyboard codes to execute. (*This is the default operating mode.*)

Control codes may be sent by a combination of a ^ (caret, hex 5E) and the corresponding letter. For example, a control C (hex 03) is ^C.

~H Hex ASCII Mode—Data is interpreted as hexadecimal-encoded ASCII. For example, to send the computer the character “A,” you would need to send its hexadecimal ASCII value (hex 41) as two ASCII digits, 4 and 1.

~S Scan Code Mode—In this mode, data is translated to the corresponding keyboard scan codes. For an ASCII transfer, each pair of ASCII-encoded characters is interpreted as a DOS scan code. For a binary transfer, each 8-bit character is interpreted as a DOS scan code. DOS assigns each key a

DOS scan code. Note that all DOS scan codes are sent complete with make and break sequences.

~K Key Code Mode—In this mode, codes are sent directly to the computer without interpretation. For an ASCII transfer, each pair of ASCII-encoded characters is interpreted as a keyboard code. For a binary transfer, each 8-bit character is interpreted as a keyboard code. Care should be taken in using keyboard scan codes, as the computer can be left in a very confused state if the scan-code sequence is not properly completed.

5.3 Data Transfer Commands

~A ASCII Transfer—Default setting. If ASCII transfer is set, all data is interpreted as ASCII.

~B Binary Transfer—In scan code (~S) or key code (~K) modes. Data is sent as 8-bit binary.

5.4 Keyboard Commands

~Dmn Set/Clear Keyboard LEDs—Use this command to turn on or off local keyboard LED indicators. The *mn* field is an ASCII hex-encoded binary field, where:

b0 = Scroll Lock

b1 = Num Lock

b2 = Caps Lock

Examples: ~D01 Scroll Lock on, Caps & Num Lock off
 ~D04 Caps Lock on, Scroll & Num Lock off
 ~D00 Turns off all LEDs

~Xmn Send Data to Keyboard—Use this command to send the ASCII hex-encoded byte *mn* to the keyboard. This command requires technical knowledge of the keyboard.

5.5 Turnaround Commands

- ~I **Immediate Turnaround**—Data is interpreted “on-the-fly.” The special address-switch setting of 59 (see **Section 3.1**) makes this the default for non-addressed mode. Note that in this mode <ENTER/CR> (hex 0D) is not a special character and is passed on to the computer.
- ~L **Line Turnaround**—Set the RS-232→Keyboard Converter to a line-oriented basis, with each line ending with an <ENTER/CR> (hex 0D).
- ~P*m* **Set Turnaround Delay (*m* milliseconds)**—This sets the delay that the RS-232→Keyboard Converter waits before sending data in response to a command. The default setting in non-addressed mode is 0, and in addressed mode the default setting is 3 milliseconds.

NOTE

You must send two digits. For example, for 7 milliseconds, send ~P07).

5.6 Keyboard Monitor Commands

- ~M **Monitor ON**—Turns keyboard monitor on.
- ~N **Monitor OFF**—Turns keyboard monitor off.

5.7 Other Commands

- ~T **Test RS-232→Keyboard Converter**—This command to the RS-232→Keyboard Converter causes it to undergo tests to validate the keyboard and computer interface. You will see the keyboard LED’s cycle, testing the keyboard interface. You should see on the PC screen:

TEST:7 (with the number cycling from 0–7)

The serial port displays:

Test: <ENTER> to stop

The test runs until <ENTER> is received.

~? **Request Status**—The format of the response is:

AA-EEDDMBTV where

AA is the address setting

- is a dash character, Hex 2D

EE is an error status:

00 = No Errors 01 = Parity Error

02 = Framing Error 03 = Parity and Framing

DD LED status (bit field 0=OFF, 1=ON

b0=Scroll lock b1=Num Lock b2=Caps Lock

M Mode setting (~C, ~H, ~K, or ~S)

B Binary or ASCII Transfer Setting (~A or ~B)

T Turnaround Setting (~I or ~L)

V Monitor Setting (~M or ~N)

5.8 Multidrop Operation

If the DIP-switch address setting is not zero, RS-232→Keyboard Converter looks for an address select prefix to any buffer received. The address must be the first byte of the transmission and the high bit set. Address 1 is hex 81, Address 2 is hex 82, etc. If you send a command to address 80, all RS-232→Keyboard Converters will read the command.

When sending data to the RS-232→Keyboard Converter in multidrop mode, the RS-232→Keyboard Converter will return a single-byte colon character when it receives the message. This does not mean that you can send another buffer, but rather that the RS-232→Keyboard Converter received the message and the host can go on to talk to other devices. If a proper delay cannot be assured, you should poll the device until it responds before sending another buffer.

5.9 LED Indicators

The RS-232→Keyboard Converter features three front-panel LEDs that monitor data activity on the keyboard and RS-232/RS-485 ports. These LEDs are:

Keyboard Turns solid yellow when the keyboard is sending to the computer. Blinks whenever the RS-232→Keyboard Converter is processing a command from the RS-232/485 port. If RS-232→Keyboard Converter is set with an address, the LED blinks yellow when it receives its address.

Receive Blinks red when RS-232→Keyboard Converter receives data or commands on the RS-232/RS-485 port.

Transmit Blinks green when RS-232→Keyboard Converter transmits data through the RS-232/RS-485 port.

Appendix A. Scan Codes

AT Scan Code	Converter SC Code	Key	Keyboard Scan Codes
01	01	ESC	76 F0 76
02	02	1/!	16 F0 1E
03	03	2/@	1E F0 1E
04	04	3/#	26 F0 26
05	05	4/\$	25 F0 25
06	06	5/%	2E F0 2E
07	07	6/^	36 F0 36
08	08	7/&	3D F0 3D
09	09	8/*	3E F0 3E
10	10	9/(46 F0 46
11	11	0/)	45 F0 45
12	12	-/_	4E F0 4E
13	13	=/+	55 F0 55
14	14	Backspace	66 F0 66
15	15	Tab	0D F0 0D
16	16	Q	15 F0 15
17	17	W	1D F0 1D
18	18	E	24 F0 24
19	19	R	2D F0 2D
20	20	T	2C F0 2C
21	21	Y	35 F0 35
22	22	U	3C F0 3C
23	23	I	43 F0 43
24	24	O	44 F0 44
25	25	P	4D F0 4D
26	26	[{/	54 F0 54
27	27]}	5B F0 5B
28	28	Enter	5A F0 5A
28	A0	Keypad Enter	E0 5A E0 F0 5A
29	29	LeftCtrl	14 F0 14
29	A1	RightCtrl	E0 14 E0 F0 14
29+69	A2	PAUSE	E1 14 77 E1 F0 14 F0 77
30	30	A	1C F0 1C
31	31	S	1B F0 1B
32	32	D	23 F0 23
33	33	F	2B F0 2B

AT Scan Code	Converter SC Code	Key	Keyboard Scan Codes
33	33	F	2B F0 2B
34	34	G	34 F0 34
35	35	H	33 F0 33
36	36	J	3B F0 3B
37	37	K	42 F0 42
38	38	L	4B F0 4B
39	39	;/:	4C F0 4C
40	40	'"	52 F0 52
41	41	~/~	0E F0 0E
42	42	LeftShift	12 F0 12
43	43	\	5D 50 5D
44	44	Z	1A F0 1A
45	45	Z	22 F0 22
46	46	C	21 F0 21
47	47	V	2A F0 2A
48	48	B	32 F0 32
49	49	N	31 F0 31
50	50	M	3A F0 3A
51	51	./,<	41 F0 41
52	52	./>	49 F0 49
53	53	///?	4A F0 4A
53	93	/	E0 4A E0 F0 4A
54	54	RightShift	59 F0 59
55	55	*	7C F0 7C
55	A4	PRT SCRN	E0 12 E0 7C E0 F0 7C E0 F0 12
56	A5	RightAlt	11 F0 11
57	57	Space	E0 11 E0 F0 11
58	58	Caps Lock	29 F0 29
59	59	F1	58 F0 58
60	60	F2	05 F0 05
61	61	F3	06 F0 06
62	62	F4	0C F0 0C
63	63	F5	03 F0 03
64	64	F6	0B F0 0B
65	65	F7	83 F0 83
66	66	F8	0A F0 0A

RS-232 → KEYBOARD CONVERTER

AT Scan Code	Converter SC Code	Key	Keyboard Scan Codes
67	67	F9	01 F0 01
68	68	F10	09 F0 09
69	69	NUM LOCK	77 F0 77
70	70	SCROLL LOCK	7E F0 7E
71	71	HOME	E0 6C E0 F0 6C
71	A6	Keypad Home/7	C6 F0 6C
72	72	Up Arrow	E0 12 E0 75 E0 F0 75 E0 F0 12
72	A7	Keypad Up Arrow/8	75 F0 75
73	73	Page Up	E0 7D E0 F0 7D
73	A8	Keypad PageUp/9	7D F0 7D
74	74	-	7B F0 7B
75	75	Left Arrow	E0 12 E0 6B E0 F0 6B E0 F0 12
75	A9	Keypad Left Arrow/4	6B F0 6B
76	76	05	73 F0 73
77	77	Right Arrow	E0 12 E0 74 E0 F0 74 E0 F0 12
77	B0	Keypad Rt. Arrow/6	74 F0 74
78	78	+	79 F0 79
79	79	End	E0 12 E0 69 E0 F0 69 E0 F0 12
79	B1	End/1	69 F0 69
80	80	Down Arrow	E0 12 E0 72 E0 F0 72 E0 F0 12
80	B2	Keypad Dn Arrow/2	72 F0 72
81	81	Page Down	E0 12 E0 7A E0 F0 7A E0 F0 12
81	B3	Keypad PageDown/3	7A F0 7A
82	82	Insert	E0 70 E0 F0 70
82	B4	Ins/0	70 F0 70
83	83	Delete	E0 12 E0 71 E0 F0 72 E0 F0 12
83	B5	Keypad Del/.	71 F0 71
84		Undefined	
85		Undefined	
86		Undefined	
87	87	F11	78 F0 78
88	88	F12	07 F0 07
89		Undefined	
90	90	Left Window	E0 5B E0 F0 5B
91	91	Right Window	E0 5C E0 F0 5C
92	92	Menu	E0 5D E0 F0 5D

Appendix B. ASCII Scan Codes

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
NUL ^@	00	14 1E F0 1E F0 14
SOH ^A	01	14 1C F0 1C F0 14
STX ^B	02	14 32 F0 32 F0 14
ETX ^C	03	14 21 F0 21 F0 14
EOT ^D	04	14 23 F0 23 F0 14
ENQ ^E	05	14 24 F0 24 F0 14
ACK ^F	06	14 2B F0 2B F0 14
BEL ^G	07	14 34 F0 34 F0 14
BS ^H	08	66 F0 66
TAB ^I	09	0D F0 0D
LF ^J	0A	14 3B F0 3B F0 14
VT ^K	0B	14 42 F0 42 F0 14
FF ^L	0C	14 4B F0 4B F0 14
CR ^M	0D	3A F0 3A
SO ^N	0E	14 31 F0 31 F0 14
SI ^O	0F	14 44 F0 44 F0 14
DLE ^P	10	14 4D F0 4D F0 14
DC1 ^Q	11	14 15 F0 15 F0 14
DC2 ^R	12	14 2D F0 2D F0 14
DCE ^S	13	14 1B F0 1B F0 14
DC4 ^T	14	14 2C F0 2C F0 14
NAK ^U	15	14 3C F0 3C F0 14
SYN ^V	16	14 2A F0 2A F0 14
ETB ^W	17	14 1D F0 1D F0 14
EM ^X	18	14 22 F0 22 F0 14
SUB ^Y	19	14 35 F0 35 F0 14
SUB ^Z	1A	14 1A F0 1A F0 14
ESC ^[1B	76 F0 76
FS ^\	1C	14 5D F0 5D F0 14
GS ^]	1D	14 5B F0 5B F0 14
RS ^^	1E	14 12 36 F0 36 F0 12 F0 14
US ^_	1F	14 12 4E F0 4E F0 12 F0 14
Space	20	29 F0 29
!	21	12 16 F0 16 F0 12
"	22	12 52 F0 52 F0 12
#	23	12 26 F0 26 F0 12
\$	24	12 25 F0 25 F0 12

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
%	25	12 2E F0 2E F0 12
&	26	12 3D F0 3D F0 12
	27	52 F0 52
(28	12 46 F0 46 F0 12
)	29	12 45 F0 45 F0 12
*	2A	7C F0 7C
+	2B	79 F0 79
,	2C	41 F0 41
-	2D	7B F0 7B
.	2E	49 F0 49
/	2F	4A F0 4A
0	30	45 F0 45
1	31	16 F0 16
2	32	1E F0 1E
3	33	26 F0 26
4	34	25 F0 25
5	35	2E F0 2E
6	36	36 F0 36
7	37	3D F0 3D
8	38	3E F0 3E
9	39	46 F0 46
:	3A	12 4C F0 4C F0 12
;	3B	4C F0 4C
<	3C	12 41 F0 41 F0 12
=	3D	12 55 F0 55 F0 12
>	3E	12 49 F0 49 F0 12
?	3F	12 4A F0 4A F0 12
@	40	12 1E F0 1E F0 12
A	41	12 1C F0 1C F0 12
B	42	12 32 F0 32 F0 12
C	43	12 21 F0 21 F0 12
D	44	12 23 F0 23 F0 12
E	45	12 24 F0 24 F0 12
F	46	12 2B F0 2B F0 12
G	47	12 34 F0 34 F0 12
H	48	12 33 F0 33 F0 12
I	49	12 43 F0 43 F0 12

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
J	4A	12 3B F0 3B F0 12
K	4B	12 42 F0 42 F0 12
L	4C	12 4B F0 4B F0 12
M	4D	12 3A F0 3A F0 12
N	4E	12 31 F0 31 F0 12
O	4F	12 44 F0 44 F0 12
P	50	12 4D F0 4D F0 12
Q	51	12 15 F0 15 F0 12
R	52	12 2D F0 2D F0 12
S	53	12 1B F0 1B F0 12
T	54	12 2C F0 2C F0 12
U	55	12 3C F0 3C F0 12
V	56	12 2A F0 2A F0 12
W	57	12 1D F0 1D F0 12
X	58	12 22 F0 22 F0 12
Y	59	12 35 F0 35 F0 12
Z	5A	12 1A F0 1A 0 12
[5B	54 F0 54
\	5C	5D F0 5D
]	5D	5B F0 5B
^	5E	12 36 F0 36 F0 12
_	5F	12 4E F0 4E F0 12
`	60	0E F0 0E
a	61	1C F0 1C
b	62	32 F0 32
c	63	21 F0 21
d	64	23 F0 23
e	65	24 F0 24
f	66	2B F0 2B
g	67	34 F0 34
h	68	33 F0 33
i	69	43 F0 43
j	6A	3B F0 3B
k	6B	42 F0 42
l	6C	4B F0 4B
m	6D	3A F0 3A
n	6E	31 F0 31

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
o	6F	44 F0 44
p	70	4D F0 4D
q	71	15 F0 15
r	72	2D F0 2D
s	73	1B F0 1B
t	74	2C F0 2C
u	75	3C F0 3C
v	76	2A F0 2A
w	77	1D F0 1D
x	78	22 F0 22
y	79	35 F0 35
z	7A	1A F0 1A
{	7B	12 54 F0 54 F0 12
	7C	12 5D F0 5D F0 12
}	7D	12 5B F0 5B F0 12
~	7E	12 0E F0 0E F0 12
Del	7F	71 F0 71