



RelComm, Inc.

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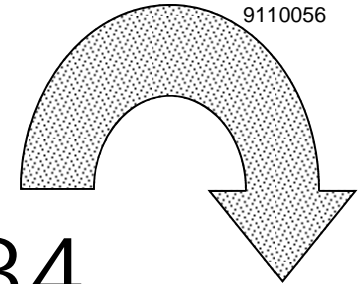
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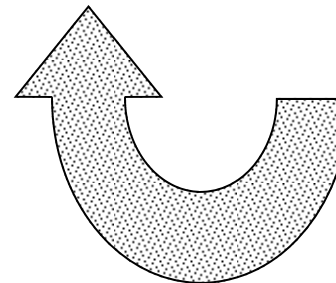
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RCL684

**RS-232 CURRENT LOOP
INTERFACE CONVERTER**



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Limited Warranty service may be obtained by delivering the Product during the warranty period to RCI and providing proof of purchase date. If this Product is delivered by mail, you agree to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. For further information, contact Service, P.O. Box 640, Angels Camp, California 95222, (209) 736-0421, www.relcomm.com.

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IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER AS WARRANTED ABOVE, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. IN NO EVENT WILL RCI BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOST SAVINGS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE SUCH PRODUCT, EVEN IF RCI OR AN AUTHORIZED DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR ANY CLAIM BY ANY OTHER PARTY.

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THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

6.2 Self Test

Follow these instructions to test the internal circuitry of the RCL684:

- (1) Unplug the RCL684 from AC outlet.
- (2) Set switch SWA to full-duplex, transmit active, receive passive.
- (3) Set switch SWC to DCE configuration.
- (4) Attach a DTE device using a straight-pinned cable from the DTE to the RCL684
- (5) On the RCL684 connect a wire from T- to R-.
- (6) On the RCL684 connect a wire from T+ to R+.
- (7) Plug the RCL684 into an AC outlet.
- (8) Set the DTE device to full-duplex.
- (9) Enter data.
- (10) The TX and RX LEDs should flash and the data should display on the DTE's monitor. If this occurs, all internal circuitry is operational.

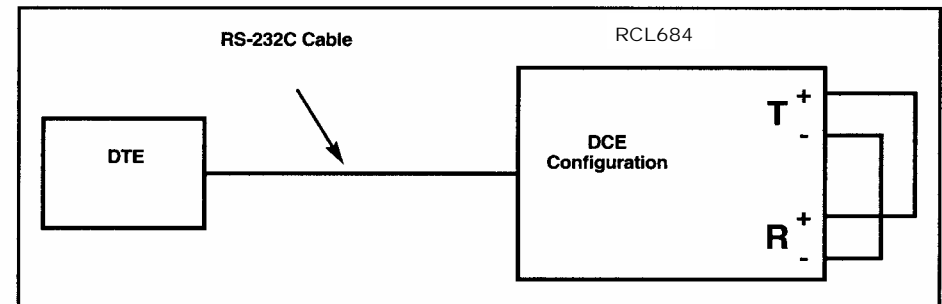


Figure 6-1. Wiring for the Internal Circuitry Test.

6. Operations and Troubleshooting

6.1 Indicators

TX LED

On Continuously: Indicates

(1) receive current loop not attached; (2) no current flowing; or (3) you have an open loop. Check the polarity of the receive loop and/or the active/passive options.

Off: The RCL684 is not connected to an AC outlet or loop current is flowing continuously (which is normal in an idle state).

Flashing: Data is being transmitted from the RS-232 port to the RS-232C interface.

RX LED

On Continuously: Error. Call Technical Support.

Off: No data being received by the RS-232 port.

Flashing: Data is being received by the RS-232 port from the RS-232C interface.

FCC Statement

FEDERAL COMMUNICATIONS COMMISSION AND CANADIAN DEPARTMENT OF COMMUNICATIONS RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

RCL684 Rack
RCL684 Standalone Unit
RCL684 EIA to C/L Interface Card

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5.2 Switch SWC

Switch SWC controls the RS-232 Connector Configuration (DCE/DTE).

Note: “OPEN” indicates Off and “CLOSED” indicates On.

5.2.1 DCE

The RCL684 default configuration is DCE. The 10-position DIP switch is set as follows:

SW1	Not Used	
SW2	OPEN	= SW2 and SW3 are ALWAYS in opposite positions
SW3	CLOSED	= With SW2 OPEN, Data Out is on Pin 3
SW4	OPEN	= SW4 and SW5 are ALWAYS in opposite positions
SW5	CLOSED	= With SW4 OPEN, Data In is on Pin 2
SW6	OPEN	= Pin 4 (RTS) not connected
SW7	CLOSED	= Ties Pin 5 (CTS) to Pin 20 (DTR)
SW8	OPEN	= Removes High on Pin 20 (DTR). If system does not use DTR, raise CTS by CLOSING both SW7 and SW8
SW9	CLOSED	= Place High on Pin 6 (DSR)
SW10	Not Used	

5.2.2 DTE

When configuring the RCL684 as DTE. The 10-position DIP switch is set as follows:

SW1	Not Used	
SW2	CLOSED	= With SW3 OPEN, Data Out is on Pin 2
SW3	OPEN	= SW2 and SW3 are ALWAYS in opposite positions
SW4	CLOSED	= With SW5 OPEN, Data In is on Pin 3
SW5	OPEN	= SW4 and SW5 are ALWAYS in opposite positions
SW6	CLOSED	= Place High on Pin 4 (RTS)
SW7	OPEN	= Pin 5 (CTS) not connected
SW8	CLOSED	= Place High on Pin 20 (DTR)
SW9	OPEN	= Pin 6 (DSR) not connected
SW10	Not Used	

5. The RS-232C Interface

5.1 The RS-232C Interface Pinout

DCE Pin #	DTC Pin #	Circuit	Description	Direction
1	1	AA	Protective Ground	—
3	2	BA	Transmit Data	To DCE
2	3	BB	Receive Data	From DCE
5	4	CA	Request to Send	To DCE
4	5	CB	Clear to Send	From DCE
6	6	CC	Data Set Ready	From DCE
7	7	AB	Signal Ground	—
8	20	CD	Data Terminal Ready	To DCE

RS-232 Interface (Female)

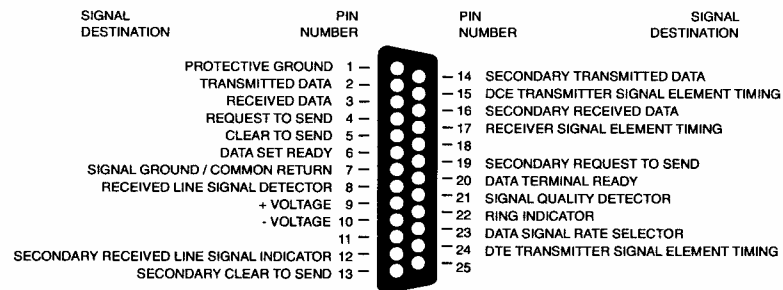


Figure 5-1. The RS-232C Interface.

1. Specifications

Rack Specifications

Power:	115 VAC, 50-60 Hz/220 VAC Switch Selectable
Rack Size:	19" x 10.5" x 5.25"
Weight:	19 lbs. 9.5 oz. (without cards installed)
Capacity:	16 Cards

Standalone Enclosure Specifications

Power:	115 VAC or 220 VAC Wall mount transformer
Size:	1.75" x 5.5" x 8.5" (4.4 x 14 x 21.6 cm)
Weight:	1.5 lbs. (0.7 kg)
Materials:	Plastic enclosure

Card Specifications:

Card Size:	7.5" x 3.625"
Weight:	4.5 oz. (.15 kg)
Interface:	RS-232; 2ØmA Current Loop (6ØmA Option)
Connector:	1, DB25S female—RS-232 Port 1, 4 position terminal block—C/L Port
Switches:	10 position DIP switch for C/L transmission mode 10 position DIP switch for DTE or DCE port configuration 4 position DIP switch for electrical current in the C/L
Indicators:	2 LEDs indicate RS232 activity RX for receive data from external RS232 device TX for transmit data to external RS232 device



CAUTION

Make sure you have the right power supply for your local power. If not, call Technical Support to get a replacement power supply

General Specifications:

The RCL684 is available as a rack mountable card and as a self-contained unit. It is designed to interface an EIA/CCITT port with a current loop circuit. The Unit has switch selectable HALF/FULL DUPLEX modes, and operates in either ACTIVE or PASSIVE current loop configurations.

Features:

- ➔ HDX or FDX operation, switch-selectable
- ➔ Operates in active or passive current loop
- ➔ Data rates to 9600 Baud
- ➔ 2ØmA (6ØmA option) low level

Advantages:

- ➔ Each C/L port can be selected as active and/or passive
- ➔ Adds system flexibility — Same card used in rack and in standalone unit
- ➔ Up to sixteen channels per rack or a single channel in the standalone unit
- ➔ Many applications

1. Specifications

RS232/EIA Specifications

DCE/DTE Selectable
 Pullup resistors sourced to 9VDC for handshaking
 Conforms to EIA-CCITT V.24

Environmental Specifications

Temperature: -40 degrees C to 75 Degrees C
 Altitude: Sea level to 40,000 feet
 Humidity: 0-100% non-condensing

Current Loop Specifications

20 or 60 milliamps (selectable)
 (Selectable)
 Active Xmit/Passive RX
 Passive Xmit/Active RX
 Passive Xmit/Passive RX
 Active Xmit/Active RX

Open Loop Voltage
 ACT/PAS
 5VDC MIN—24/40 VDC MAX
 Mark = 20-80MA
 Space = 0.4-2.0MA
Voltage Drop Marking

	Min.	Max.
Transmitter (Passive)		
Open circuit voltage (of circuit being driven)	5.0 V	40V
Voltage drop, Marking	0.5V	2.0V
Spacing current	0.4mA	2.0mA
Marking current	20mA	80mA
Receiver (Passive)		
Voltage drop, Marking	1.2V	2.7V
Spacing current	0.0mA	3.0mA
Marking current	15mA	80mA
Receiver/Transmitter (active, half-duplex)		
Voltage drop, Marking	1.7V	4.7V
Spacing current	0.0mA	3.0mA
Marking current	15mA	80mA

EIA/CCITT Interface

Conforms to EIA RS232-C and CCITT recommendation V-24

4.3 Switch SWA

Switch SWA controls the Current Loop Configuration. The RCL684 is shipped with the SWA in a “Full-Duplex, Passive” configuration.

Note: 0 indicates “OPEN” and 1 indicates “CLOSED.”

SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	Loop Configuration
0	1	0	1	0	0	1	0	1	0	Full-Duplex, Passive
1	0	1	0	1	1	0	1	0	1	Full-Duplex, Active
0	1	0	1	0	1	0	1	0	1	Full-Duplex, Passive Receive/Active Transmit
1	0	1	0	1	0	1	0	1	0	Full-Duplex, Active Receive/Passive Transmit
0	1	0	1	0	0	1	0	1	0	Half-Duplex, Passive (2-wire operation)
0	1	0	0	1	1	1	0	1	0	Half-Duplex, Active (2-wire operation)

4.4 Switch SWB

Switch SWB controls loop current (20/30/60 mA). The RCL684 is shipped with the SWB in a “20mA receive; 20mA transmit” configuration.

Note: 0 indicates “OPEN” and 1 indicates “CLOSED.”

SW1	SW2	SW3	SW4	Loop Current
0	0	0	0	20mA receive; 20mA transmit loops
1	1	1	1	60mA receive; 60mA transmit loops
1	1	0	0	60mA receive; 20mA transmit loops
0	0	1	1	20mA receive; 60mA transmit loops
1	0	1	0	30mA receive; 30mA transmit loops

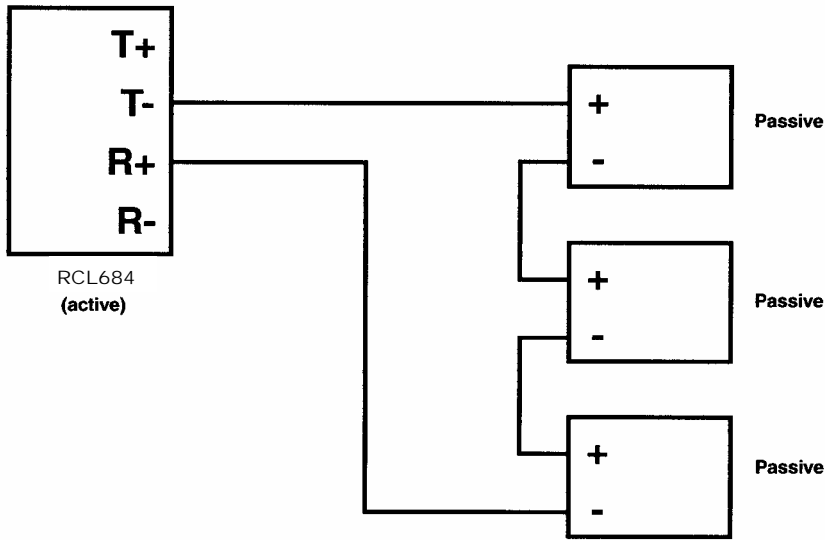


Figure 4-7. 2-Wire Half-Duplex Multipoint (RCL684 active).

2. Introduction

The RS-232 ↔ Current Loop Interface Converter (RCL684) is a bidirectional self-contained unit that enables the interconnection of a digital 20/30/60mA unipolar current-loop interface with an RS-232 interface. The RCL684 cannot be used with an analog current loop (4 to 20 mA) or bipolar current loop.

the RCL684 will not supply loop current, but it will operate with 20, 30, or 60 ma unipolar current at up to 30 VDC.

WARNING!

Only one device on the current loop may be active. If more than one device is active, each of the devices will be permanently damaged.

Current loop was designed to transfer data in a noisy environment with as much integrity as possible. The maximum distance that the RCL684 can be placed from other devices on the current loop (see Section 1) is based on using 24 AWG under ideal conditions, with the RCL684 designated as the active device in a point-to-point configuration.

Refer to Sections 4.1 and 4.2 for instructions on testing the current loop and connecting it to the RCL684

Switch selections allow for half-duplex or full-duplex operation; 20, 30, or 60 mA loop current; and configuring the RCL684 as either DTE or DCE.

Two LEDs monitor data flow.

The RCL684 can act as either an active or passive device on the current loop. As an active device, the RCL684 supplies 20, 30, or 60 ma loop current at 18 VDC for operation. As a passive device,

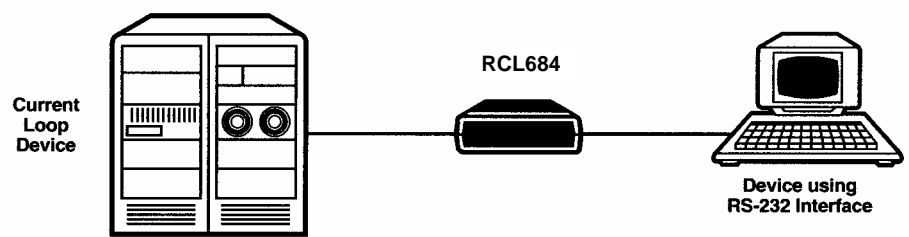


Figure 2-1. With the RCL684, you can interconnect a Current loop and an RS-232 interface.

3. Installation

1. Remove the screw located at the center of the bottom cover.
2. Remove the top cover.
3. Lift the back panel from its guide.
4. Insert the power supply receptacle into the 4-prong plug (See Figure 7-1 on page 16. The 4-prong plug is near W1). The receptacle should be aligned so that the lip is on the upward side. **DO NOT PLUG THE POWER SUPPLY INTO AN AC OUTLET!**
5. Test your current loop for active devices. See Section 4.1 on page 9.
6. Connect your current loop to the RCL684. See Section 4.2 on page 10.
7. Insert the back panel into its guide, making sure the power-supply cable and current-loop cable exit through the holes provided for them.
8. Set switches SWA, SWB and SWC to the desired positions. The RCL684 is shipped with SWA set to Full-Duplex, Passive; SWB set to 20mA receive; 20mA transmit; and SWC set to DTE. See Sections 4.3, 4.4, and 5.2, respectively, on pages 15 and 17 for more information on these switches.
9. Replace the top cover.
10. Replace the screw.
11. Attach your RS-232C cable.
12. Plug the power supply into an AC outlet. The RCL684 is now ready for operation.

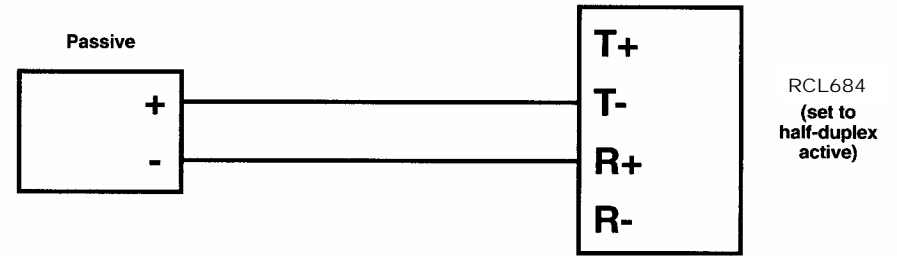
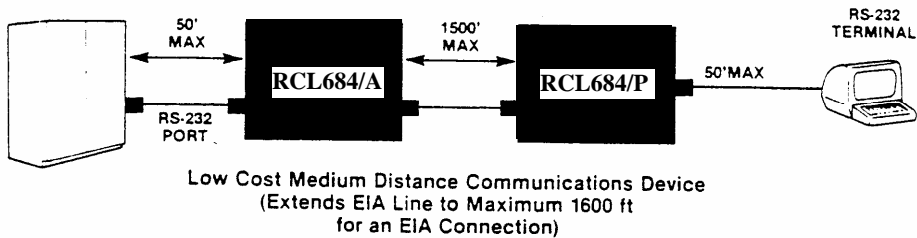


Figure 4-5. 2-Wire Point-to-Point (half-duplex).

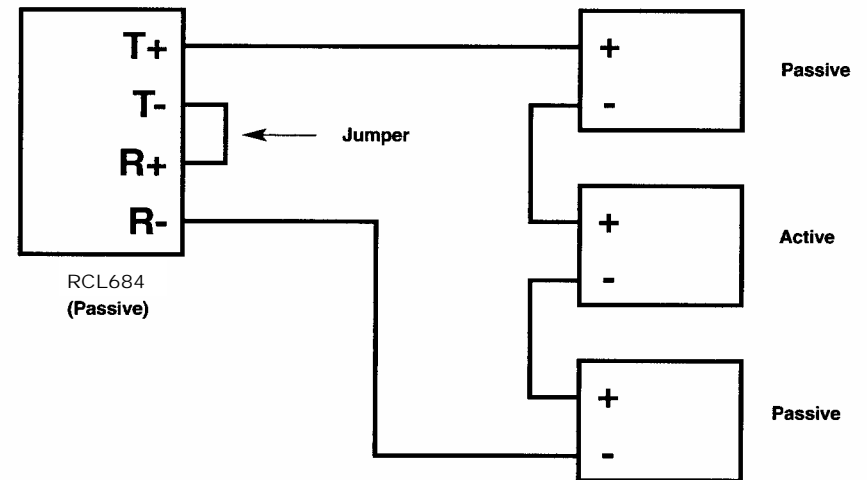


Figure 4-6. 2-Wire Half-Duplex Multipoint (RCL684 passive).

RS-232 ↔ Current Loop Interface Converter

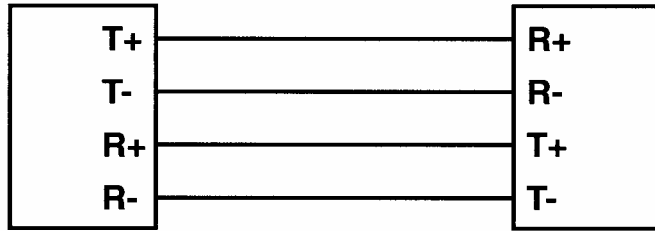


Figure 4-3. 4-Wire Point-to-Point. (full duplex)

RS-232 ↔ Current Loop Interface Converter

4. The Current-Loop Interface

4.1 Testing for Other Active Devices on the Current Loop

You must test for an active device on the current loop if you plan to have the RCL684 supply loop current.

WARNING!

Only one device on the current loop may be active. If more than one device is active at the same time, each device will be permanently damaged.

There are two tests that you can run. Either is sufficient.

4.1.1 LED TEST

(1) Unplug the RCL684 from the AC outlet.

(2) Set the SWA switch to full duplex, passive.

(3) Attach the T- of the 4-wire current loop device (or “-” in a 2-wire current loop) to R- of the RCL684

(4) Attach the T+ of the 4-wire current loop device (or “+” in a 2-wire current loop) to R+ of the RCL684. See Figure 4-1 (4-wire current loop) or Figure 4-2 (2-wire current loop).

(5) Plug the RCL684 into the AC outlet.

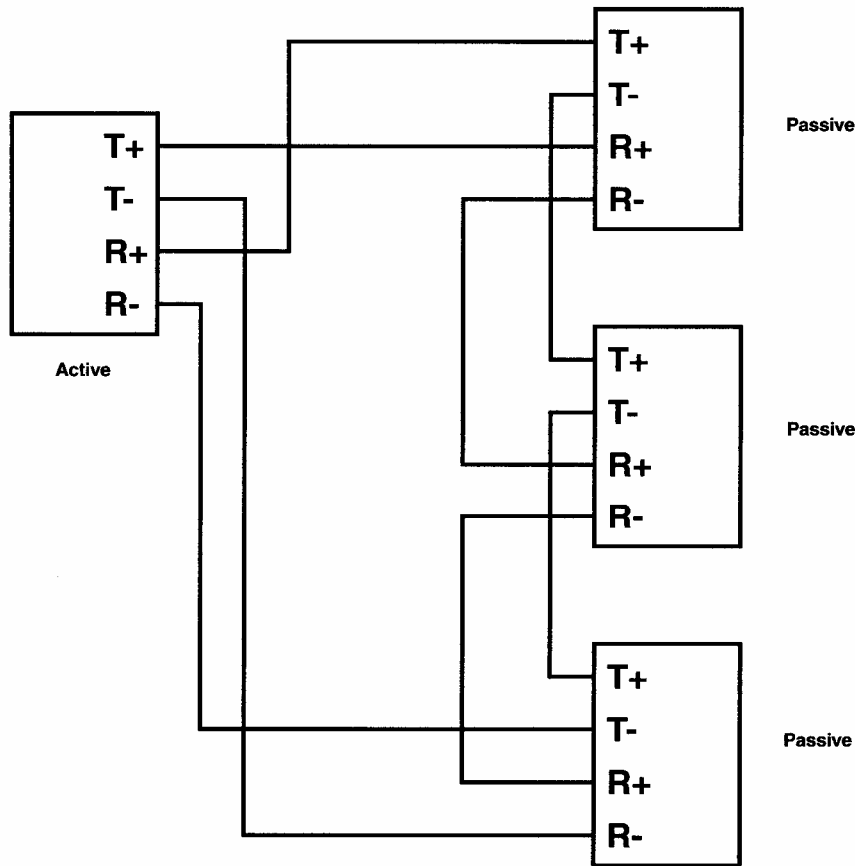


Figure 4-4. 4-Wire Multipoint.

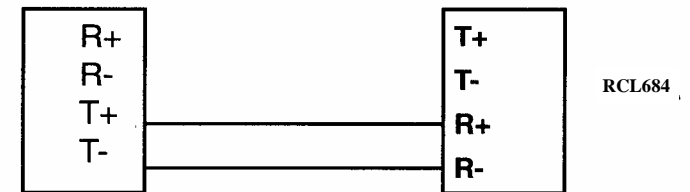


Figure 4-1. Wiring configuration for a 4-wire current loop LED test.

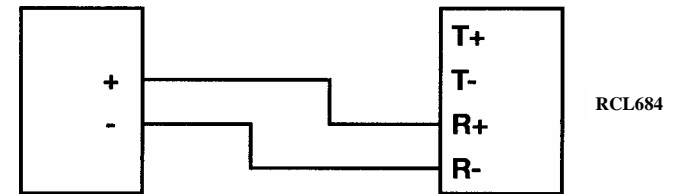


Figure 4-2. Wiring configuration for a 2-wire current loop LED test.

RS-232 ↔ Current Loop Interface Converter

	Terminals			
	1 (T+)	2 (T-)	3 (R+)	4 (R-)
4-Wire Full-Duplex	+ Receive	- Receive	+ Transmit	- Transmit
2-Wire Half-Duplex Passive	+ Loop	Jumper to 3 (R+)	Jumper to 2 (T-)	- Loop
2-Wire Half-Duplex Active	No Connection	+ Loop	- Loop	No Connection

Table 1. Current Loop Cable Connections.

(6) Test results:

(a) If the TX LED on the RCL684 is off, the other device is active.

(b) If the TX LED on the RCL684 lights continuously, there is no current in the loop. Therefore, the other current-loop device is passive.

(c) If the TX LED flashes, the current loop is sending data. This indicates that the other device is active.

(7) Unplug the RCL684 from the AC outlet and remove the R- to R- and R+ to R+ wires.

4.1.2 VOLTMETER TEST

Attach the voltmeter to the two Transmit lines (T+ and T-) of a current loop device (not the RCL684). If the voltmeter reads voltage, the device is active. If no voltage registers, the device is passive.

4.2 Connecting the Current Loop Wires to the RCL684

When you attach current loop wires to the RCL684 the unit should not be connected to an AC outlet. Unless very fine stranded-wire cable is used, wire tinning is not required. Just insert the wire into the receptacle and tighten the screw. The wire will be firmly gripped by the terminal. Table 1 details how the current loop should be connected to the RCL684. Refer also to Figures 4-3 through 4-7

4.2.1 4-WIRE CURRENT LOOP

Regardless of whether the RCL684 is active or passive, attach the current loop wires as indicated in Table 1 and as shown in Figures 4-3 or 4-4.

RS-232 ↔ Current Loop Interface Converter

4.2.2 2-WIRE CURRENT LOOP

Connections to a 2-wire half-duplex multipoint current loop depend on whether the RCL684 is used as an active or passive unit. Note the connections in Table 1. The connections are also shown in Figures 4-5, 4-6, and 4-7.

Note: Not all 2-wire current loops are bidirectional half-duplex. Some current loops are simplex.