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DECEMBER 1999
IC235A
IC235AE
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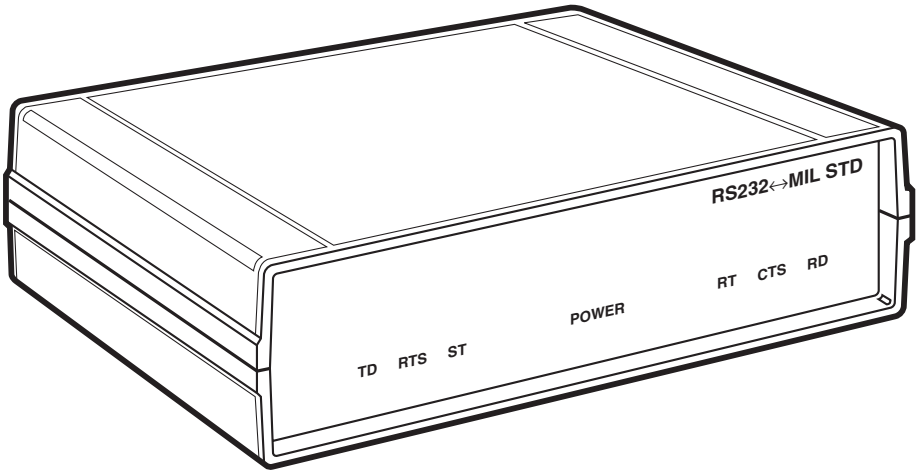
RS-232↔MIL Std. Interface Converter



CUSTOMER SUPPORT INFORMATION

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TRADEMARKS USED IN THIS MANUAL

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Contents

1. Specifications

Connectors —	RS-232 Interface: DB25 female; MIL Std. Interface: DB25 female (pinned in accordance with EIA standard RS-530, which specifies a high-speed interface)
Data Rates—	Speed transparent to a maximum of 64 Kbps
Interface —	EIA Interface: RS-232C/V.24; used for async or sync, depending on the model. Cannot be configured by the user. MIL Std. Interface: RS-530; the same for both models. Cannot be configured by the user. Electrical Settings: MIL 188/114 or MIL 188C. Configured by the user. Either sync or async, depending on the model.
Operation —	IC235A: Async; IC236A: Sync
Leads Supported —	MIL 188C: *Async:* 1, 2, 3, 4, 5, 6, 7, 8, 20, 24; *Sync:* 1, 2, 3, 4, 5, 6, 7, 8, 15, 17, 20, 24; MIL 188/114: *Async:* 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 16, 19, 20, 22, 23, 24; *Sync:* 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 22, 23, 24
Operating Temperature —	32 to 104°F (0 to 40°C)
Storage Temperature —	32 to 158°F (0 to 70°C)
Max. Altitude Tolerance —	15,000 feet (4572 m)

Humidity Tolerance —	Up to 90%, noncondensing
Power Supply —	Regulated wall-mount transformer, UL® and CSA approved, +5 VDC, 12 VDC; PS055: *Primary:* 104 to 125 VAC, 60 Hz, 10%; *Secondary:* +5 VDC @ 860 mA, 22 watts, ±12 VDC @ 300 mA; PS055E: *Primary:* 230 VAC, 50 Hz; *Secondary:* +5 VDC, 5 amps
Size —	2.5"H x 8"W x 6.25"D (6.4 x 20.3 x 16 cm)
Weight —	With power supply, 3 lb. (1.4 kg)

A DB37 female connector may be specified as an option for the MIL 188 interface. Contact Black Box in order to request this option.

2. Introduction

2.1 Description

The RS-232↔MIL Standard Interface Converter is a bi-directional converter enabling you to connect RS-232 equipment to MIL 188/114 or 188C equipment. The Converter is available in synchronous and asynchronous models. The MIL Standard interface is pinned to the RS-530 mechanical specs. The user is given the choice of configuring for balanced or unbalanced operation. The converter is powered by a 115-VAC wall-mounted power supply included with the unit. (A 230-VAC version is available upon request.)

2.2 Applications

Figures 2-1 through 2-4 are included as examples of typical applications for this interface converter. Use them to help you decide how to best use this product.

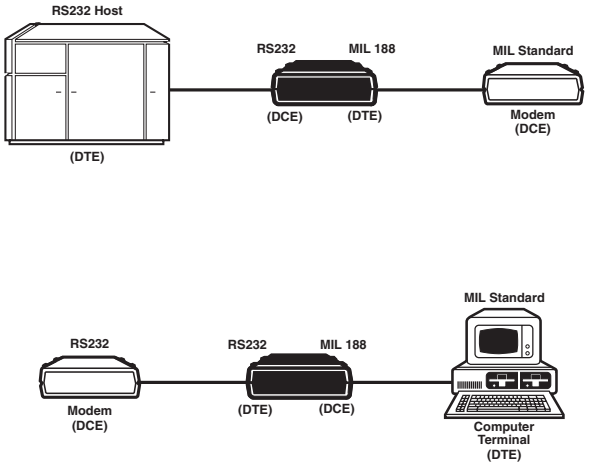
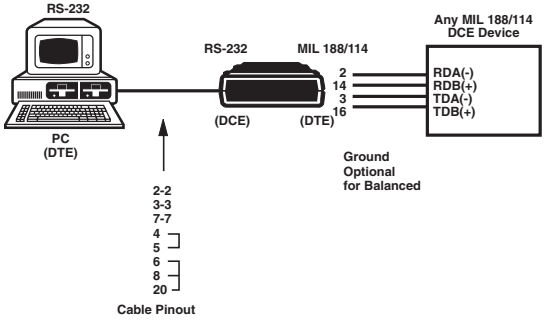


Figure 2-1. Standard Applications.



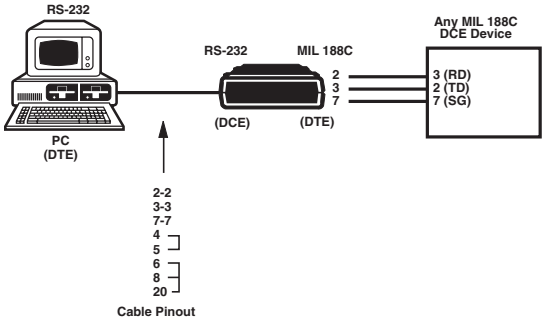


Figure 2-2. MIL 188 Async Applications Showing Pinning.
Note: Grounding is optional for the MIL 188/114 interface.

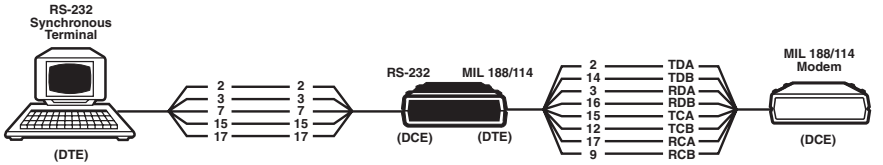


Figure 2-3. MIL 188/114 (Balanced)
Sync Application Showing Pinning.

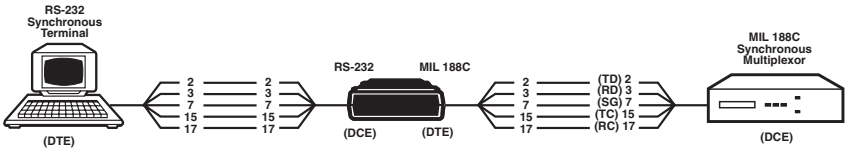


Figure 2-4. MIL 188C (Unbalanced) Sync Application Showing Pinning.

3. Installation

Figure 3-1 shows the location of components on the interface converter's circuit board. These components are described later in this chapter.

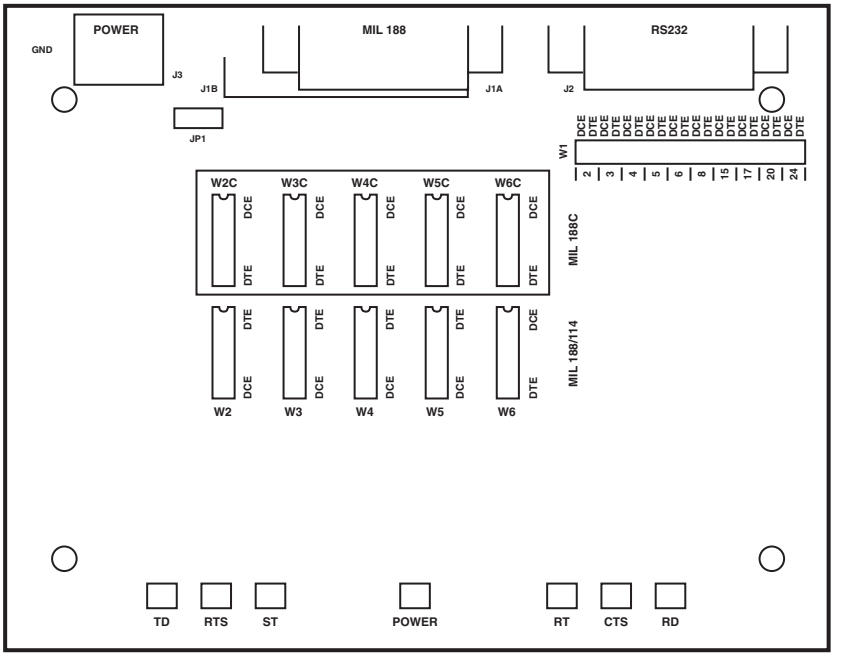


Figure 3-1. The Circuit Board.

3.1 Installing the Converter

Before attempting to install the interface, read these steps.

1. Make sure the package came with everything that should be included. You should have received the RS-232↔MIL Standard Interface Converter, this manual, and the wall-mounted power supply (either 115 or 230 VAC).

2. Open the interface converter case by removing the two screws on the bottom of the unit with a Phillips-head screwdriver.

3. Set the jumpers and DIP shunts for your application according to the directions found in **Sections 3.2** through **3.5**. See Figure 3-1 for the location of these components.

4. Replace the top of the interface converter and secure it in place with the two screws.

5. Attach the cable from the MIL Standard device to the MIL 188 connector on the rear of the unit.

6. Attach the cable from the RS-232 device to the RS-232 connector on the rear of the unit.

7. Plug the 5-pin adapter of the wall-mounted power supply into the power connector on the rear of the unit. Then plug the three-prong connector into a wall outlet. The unit is now ready for use.

Jumpers W6 and W6C need to be set only for synchronous operation of the converter. They play no part in asynchronous communications.

Positions for jumpers and shunts are labeled “DCE” and “DTE” on the PC board.

For proper operation of the interface converter, the status of the RS-232 and MIL 188 sides of the converter must be opposite each other. For example, if the RS-232 side is set to DCE, the MIL 188 side *must* be set to DTE.

3.2 Setting the RS-232 Interface

In order for the interface converter to operate properly, the RS-232 interface must be set for either DCE or DTE operation. This can be done by setting the push-on jumpers located on W1 (see Figure 3-2). Each pin of the RS-232 interface on the unit must be set either DCE or DTE, opposite to the DCE/DTE status of the equipment you intend to connect to the RS-232 side of the converter. Simply insert the push-on jumper (strap) for each pin onto the header pins for either the DCE or DTE option. The factory-default configuration of the RS-232 interface is set DCE.

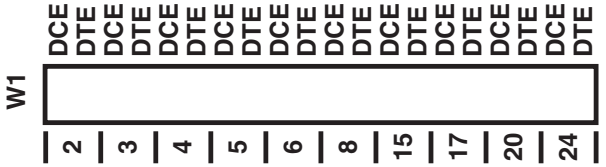


Figure 3-2. Jumper W1.

3.3 Setting the Interface Converter for MIL 188/114 Mode

Jumpers W2 through W6 are used to configure the MIL 188 connector on the interface converter for MIL 188/114 operation. Figure 3-3 shows an isolated graphic of jumpers W2 through W6 set for DCE operation. Each jumper must be configured for either DCE or DTE operation. This setting should be opposite of the DCE/DTE status of the equipment you will attach to the 188 side of the converter. Simply insert the jumper's DIP shunts into the proper positions. The factory-default configuration of the MIL 188C interface is MIL 188C set to DTE.

NOTE

The DTE and DCE settings on jumper W6 are reversed from the rest of the MIL 188/114 mode jumpers. Check closely that you have set this jumper correctly.

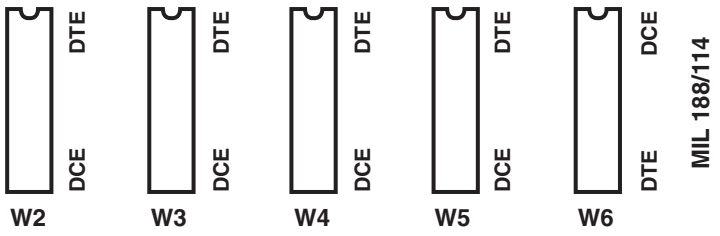


Figure 3-3. Jumpers W2 Through W6.

3.4 Setting the Interface Converter for MIL 188C Mode

Jumpers W2C through W6C are reserved for MIL 188-C mode. Refer to Figure 3-4 for an illustration of these jumpers and to Figure 3-1 for their position on the interface converter's circuit board. In order for the interface converter to operate properly with your MIL 188-C device, you must set these jumpers for either DCE or DTE operation, depending on the DTE/DCE status of your MIL 188-C device. To configure these jumpers simply move the DIP shunt for each to the correct position, as marked on the circuit board. Factory default for the MIL 188 side of the interface converter is to MIL 188-C operation set for DTE.

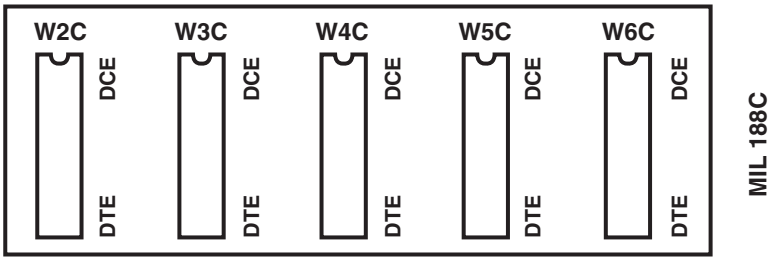


Figure 3-4. Jumpers W2C Through W6C.

3.5 Tying Together Frame and Signal Ground

Jumper JP1 is included on the circuit board in order to enable Frame and Signal Ground to be tied together. Enabling JP1 connects 100 ohms resistance between signal ground and frame ground. This is required in certain special applications. In order to enable this option, simply place the jumper's strap onto the two header pins.

4. Status Indicators

Both synchronous and asynchronous models are equipped with the LED status indicators listed below. The tables on the next pages explain the definition and function of each LED for the two possible connector configurations.

Configuration:	RS-232 (DCE)	MIL 188 (DTE)
LED Indicator	**Definition**	**Function**
TD	Transmit Data	Indicates that data is flowing from RS-232 to MIL 188C.
RD	Receive Data	Indicates that data is flowing from MIL 188C to RS-232.
RTS	Request to Send	Indicates RTS is being received from RS-232.
CTS	Clear to Send	Indicates that CTS is being received from MIL 188C.
*ST	Send Timing	Indicates that Transmit Clock is being outputted to the RS-232 device.
*RT	Receive Timing	Indicates that Receive Clock is being outputted to the RS-232 device.

*Applies to the synchronous model of the interface converter only.

Configuration: RS-232 (DTE) MIL 188 (DCE)		
LED Indicator	**Definition**	**Function**
TD	Transmit Data	Indicates that data is flowing from MIL 188 to RS-232.
RD	Receive Data	Indicates that data is flowing from RS-232 to MIL 188C.
RTS	Request to Send	Indicates that CTS is being received from the RS-232 device.
CTS	Clear to Send	Indicates that RTS is being received from the MIL 188C device.
*ST	Send Timing	Indicates that Transmit Clock is being received from the RS-232 device.
*RT	Receive Timing	Indicates that Receive Clock is being received from the RS-232 device.

*Applies to the synchronous model of the interface converter only.

5. Troubleshooting

If you experience any difficulty with your RS-232/MIL 188 setup, follow these steps to find a solution:

1. Make sure that all the devices in the setup are configured properly. Check DIP switches and jumpers in each device to ensure they are set correctly.

2. Test your RS-232 and MIL 188 equipment to discern if they are the source of the trouble.

3. After checking that both the RS-232 and MIL 188 devices are operating correctly, check the connections between all your devices, and check that the power supplies on all three are functioning properly.

4. Next, if you are using an asynchronous RS-232↔MIL Standard Interface Converter, you can perform a data loopback test. (If you are operating a synchronous RS-232↔MIL Standard Interface Converter, call Technical Support for more troubleshooting help.)

There are several versions of the loopback test, depending on which mode (MIL 188C or MIL 188/114) you have the Converter set up for.

THE LOOPBACK TEST WITH THE CONVERTER IN MIL 188-C MODE.

If the Converter is in 188-C mode, the loopback test will help you check the data and handshaking between the RS-232 device to the MIL 188C device. Perform this test before calling Technical Support. The information from this test will help them to aid you in troubleshooting the interface converter.

The loopback-test procedure:

Connect a PC or dumb terminal to the RS-232 side of the interface converter via a cable with a DB25 male connector. (This cable *must* have straight-through pinning; *none* of its leads can be shorted together. Plus, the RS-232 side of the converter must be set to DCE.) Then, on the MIL 188C interface, short Pin 20 to pins 6 and 8 together, pins 4 and 5 together, and pins 2 and 3 together. The MIL 188C side of the interface converter must be set to DTE.

Next, type a few characters on the PC or terminal keyboard. If the same characters you've typed appear on the screen, the converter's data transmitting/receiving capabilities and handshaking functions are performing properly. Check the RS-232 and MIL 188C equipment you are connecting to the interface converter again.

If no data appears on your screen, then either the converter's data transmitting/receiving capabilities or handshaking components are malfunctioning. Call Technical Support for assistance.

THE LOOPBACK TEST WITH THE CONVERTER IN MIL 188/114 MODE.

If the converter is in MIL 188/114 mode, the loopback test will help you check the data and handshaking between the RS-232 device to the MIL 188/114 device. Perform this test before calling Technical Support. The information from this test will help them to aid you in troubleshooting the interface converter.

The loopback-test procedure:

Connect a PC or dumb terminal to the RS-232 side of the interface converter via a cable with a DB25 male connector. (This cable *must* have straight-through pinning; *none* of its leads can be shorted together. Plus, the RS-232 side of the converter must be set to DCE.) Then, on the MIL 188/114 interface, short pins 19 and 13 together, pins 4 and 5 together, pins 20, 6, and 8 together, pins 23, 22, and 10 together, pins 2 and 3 together, and pins 14 and 16 together.

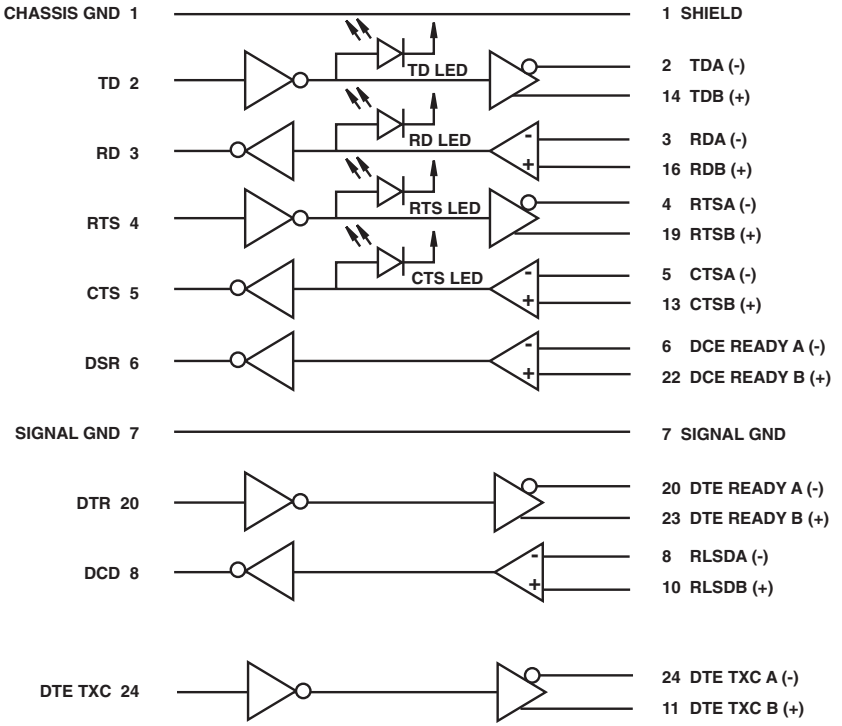
Next, type a few characters on the PC or terminal keyboard. If the same characters you've typed appear on the screen, nothing is wrong with either the interface converter's data transmitting/receiving capabilities nor the handshaking. Check the RS-232 and MIL 188/114 equipment you are connecting to the interface converter again.

If no characters appear on your screen, either the converter's data transmitting/receiving capabilities or its handshaking components are malfunctioning. Contact Technical Support for further assistance.

Appendix A: Signal Flow Diagrams

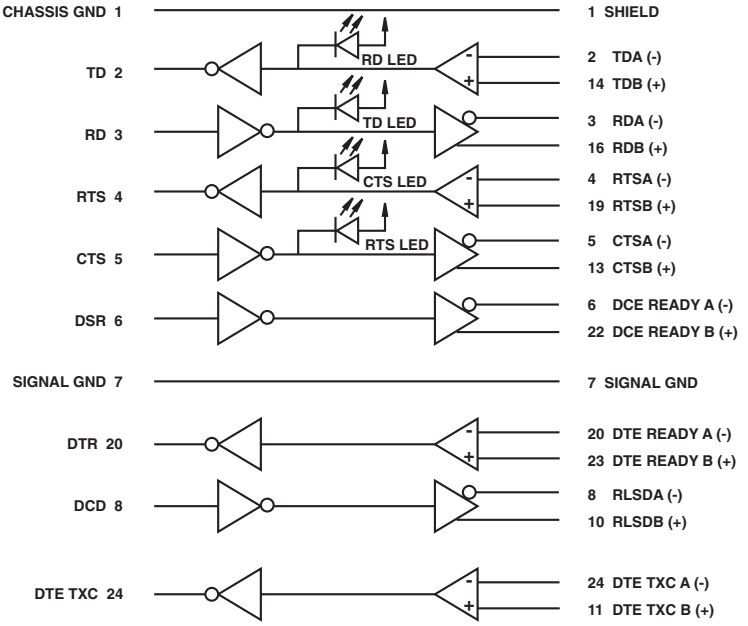
This appendix is devoted to signal-flow diagrams that show the functions of various pins on the RS-232 and MIL 188 interfaces under different configurations.

RS-232 (configured DCE) **MIL 188/114 (configured DTE)**



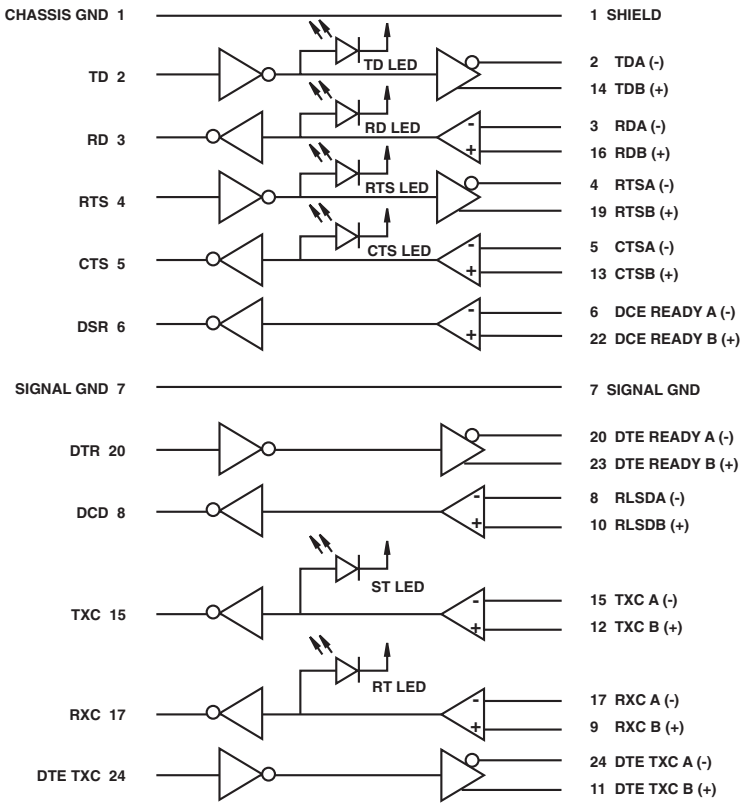
RS-232 (configured DTE)

MIL 188/114 (configured DCE)



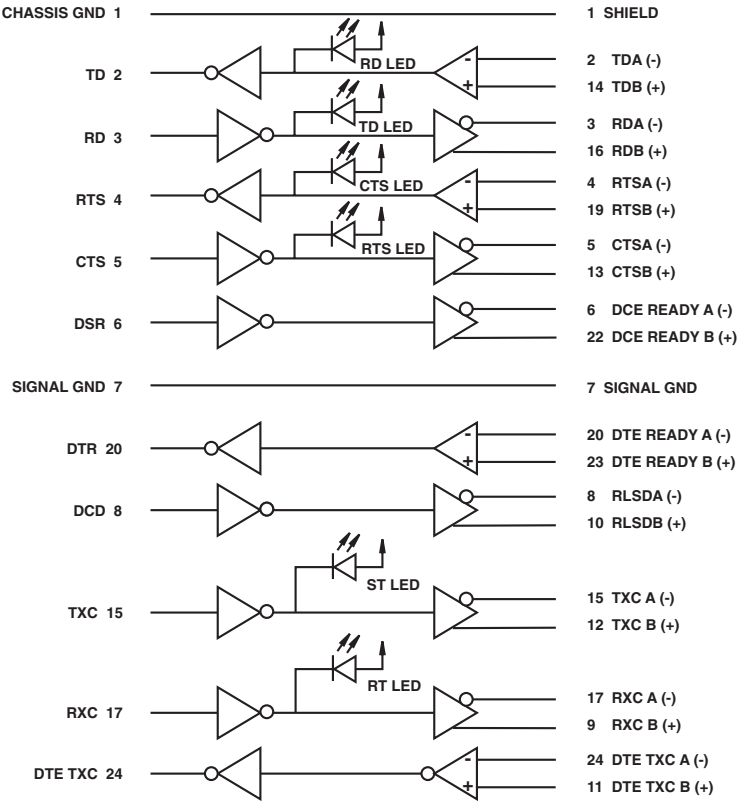
RS-232 (configured DCE)

MIL 188/114 (configured DTE)



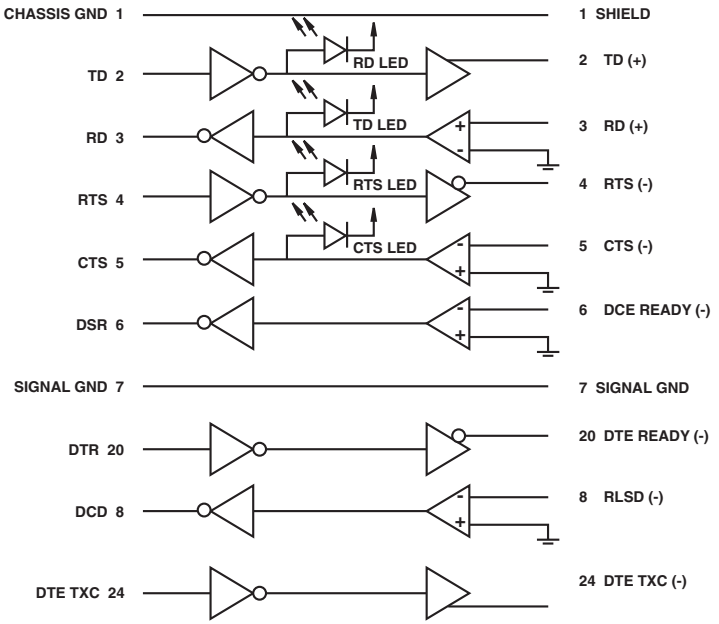
RS-232 (configured DTE)

MIL 188/114 (configured DCE)



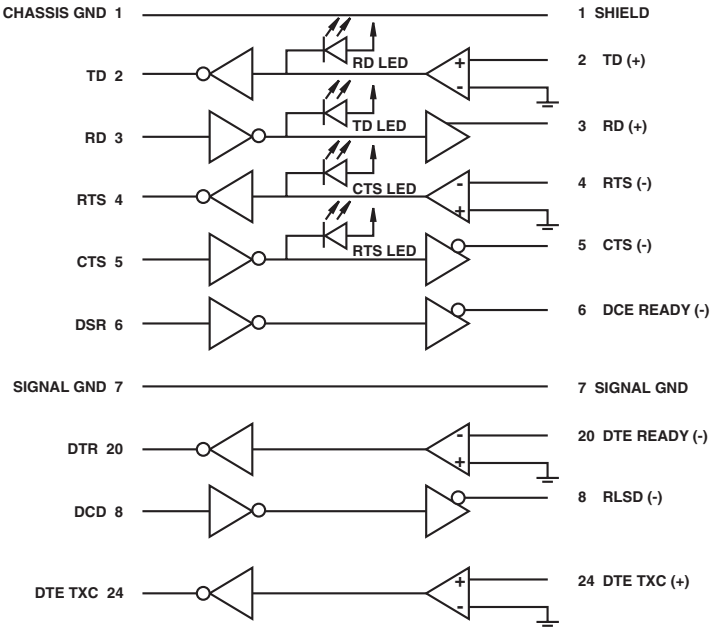
RS-232 (configured DCE)

MIL 188C (configured DTE)



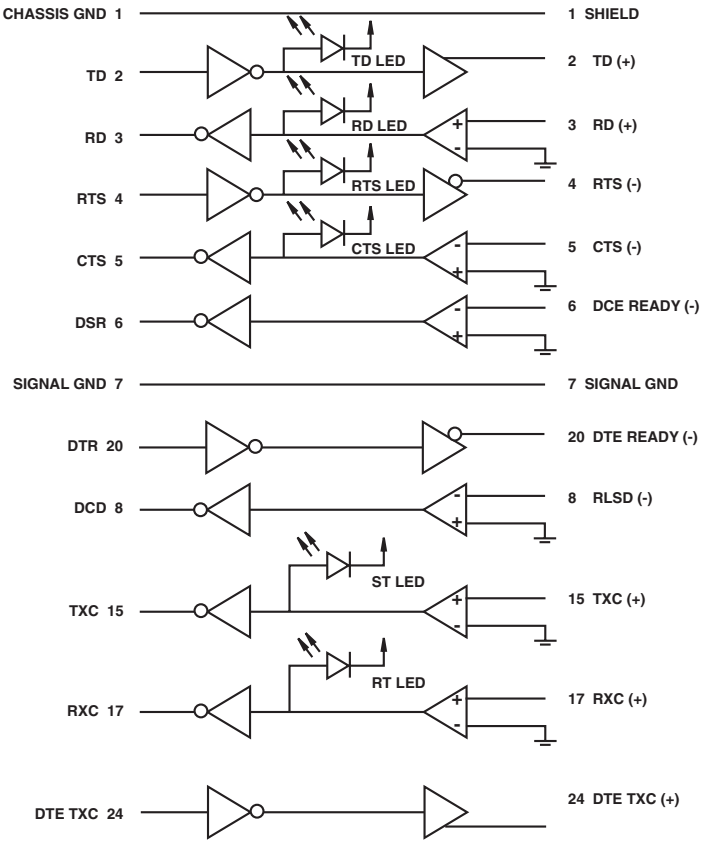
RS-232 (configured DTE)

MIL 188C (configured DCE)



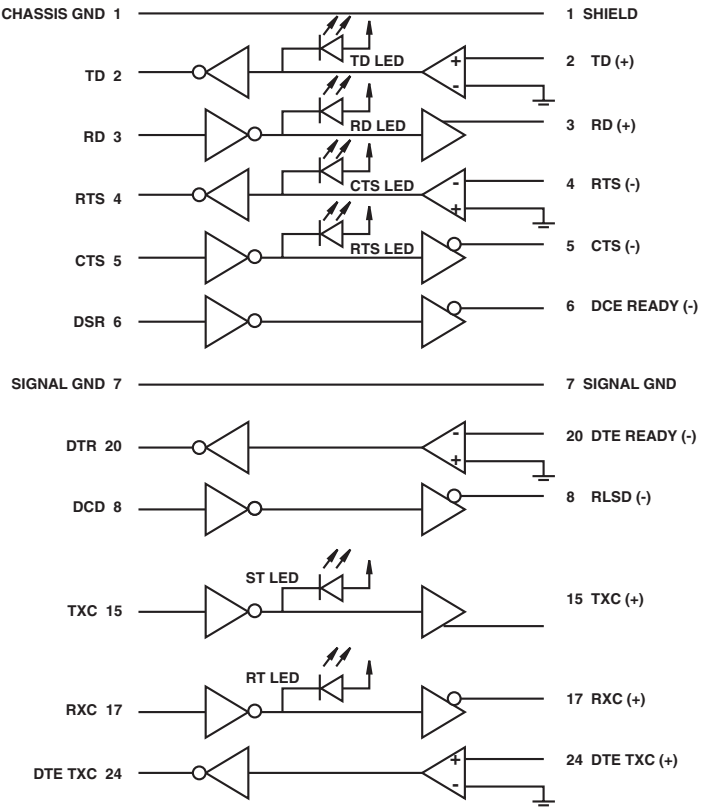
RS-232 (configured DCE)

MIL 188C (configured DTE)



RS-232 (configured DTE)

MIL 188C (configured DCE)



Appendix B: The Interfaces

This appendix is devoted to the RS-232, RS-530, and power interfaces. The MIL 188/114 and MIL 188C interfaces are based on the RS-530 interface standard. Figures B-1 and B-2 illustrate these interfaces and label the pins on each.

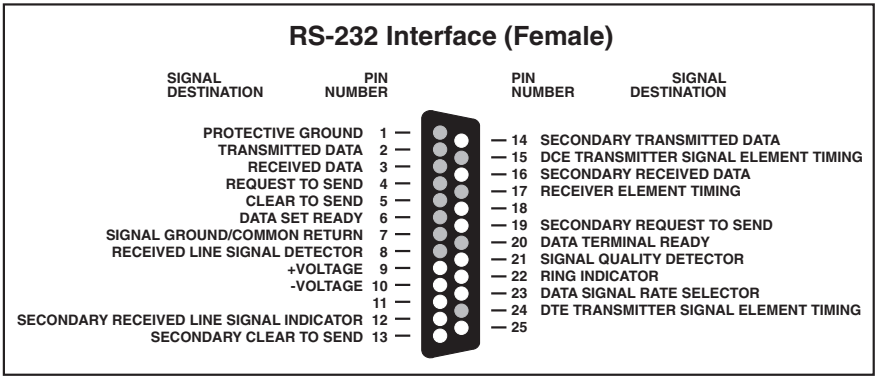


Figure B-1. The RS-232 Interface (Female).

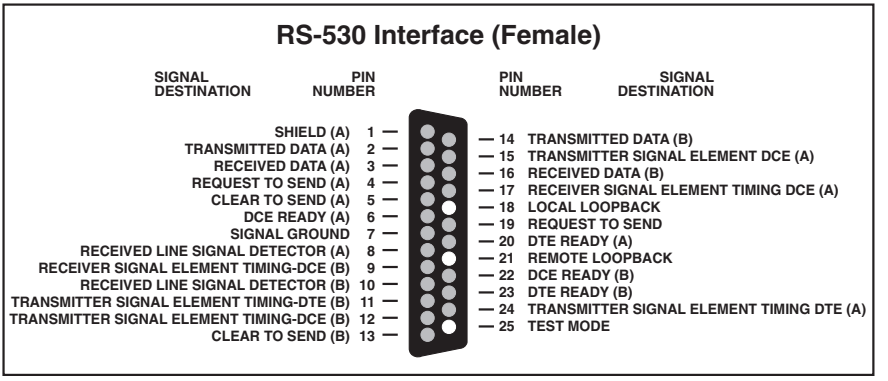


Figure B-2. The RS-530 Interface (Female).

Pin	Function
1	Signal Ground
2	Not Connected
3	+5 Volts
4	-12 Volts
5	+12 Volts

Figure B-3. The Power Interface.

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