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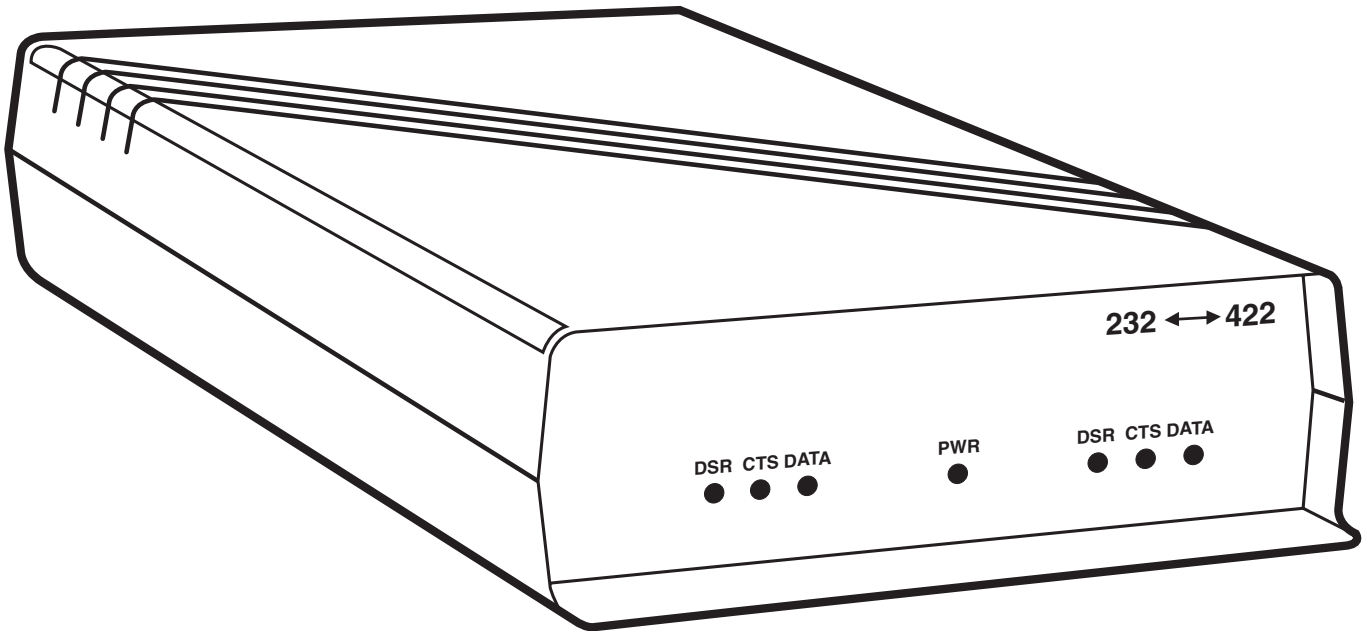
IC456A-R3

IC456C-R3

IC456A-R4

IC456C-R4

# RS-232 ↔ RS-422 Interface Converter



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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 B 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 Industry Canada.*

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

**INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)**

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.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
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.

**TRADEMARKS USED IN THIS MANUAL**

*Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.*

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# 1. Specifications

<b>Speed</b> —	64,000 bps, max.
<b>Connectors</b> —	RS-232 port: DB25 female; RS-422 port: DB37 female
<b>Indicators</b> —	7 LEDs show status of RS-232 and RS-422 signals and indicate power ON. RS-232 Port: DSR, CTS, DATA; RS-422 Port: DSR, CTS, DATA
<b>Controls</b> —	RS-232 port: DTE/DCE DIP shunts; RS-422 port: DTE/DCE DIP shunts; DIP switch to enable receiver termination
<b>Environment</b> —	Storage Temperature: -4 to +158°F (-20 to +70°C); Operating Temperature: 32 to 122°F (0 to 50°C)
<b>Power</b> —	115 VAC Supply: ±10%, 100 mA 230 VAC Supply: ±10%, 50 mA
<b>Size</b> —	Standalone: 2.3"H x 8"W x 11.9"D (5.8 x 20.3 x 30.2 cm); Rackmount: 1.2"H x 7.5"W x 11.4"D (3.1 x 19.1 x 29 cm)
<b>Weight</b> —	Standalone: 2 lb. (1 kg); Rackmount: 10 oz. (283.5 g)

# 2. Introduction

The RS-232↔RS-422 Interface Converter provides bi-directional synchronous or asynchronous conversion of all commonly used RS-232 and RS-422 signals. The unit is designed to operate with one port configured as Data Terminal Equipment (DTE) and the other port as Data Communications Equipment (DCE). Operation is not recommended with both ports configured either DCE or both DTE, when operating in synchronous mode.

The unit has two user-selectable configurations: one for connecting RS-422 modem equipment to RS-232 terminal equipment (DCE to DTE) and one for connecting RS-232 modem equipment to RS-422 terminal equipment (DCE to DTE). Both configurations allow bi-directional data transfer. Typical applications are shown in Figure 2-1.

Things to consider when operating the converter:

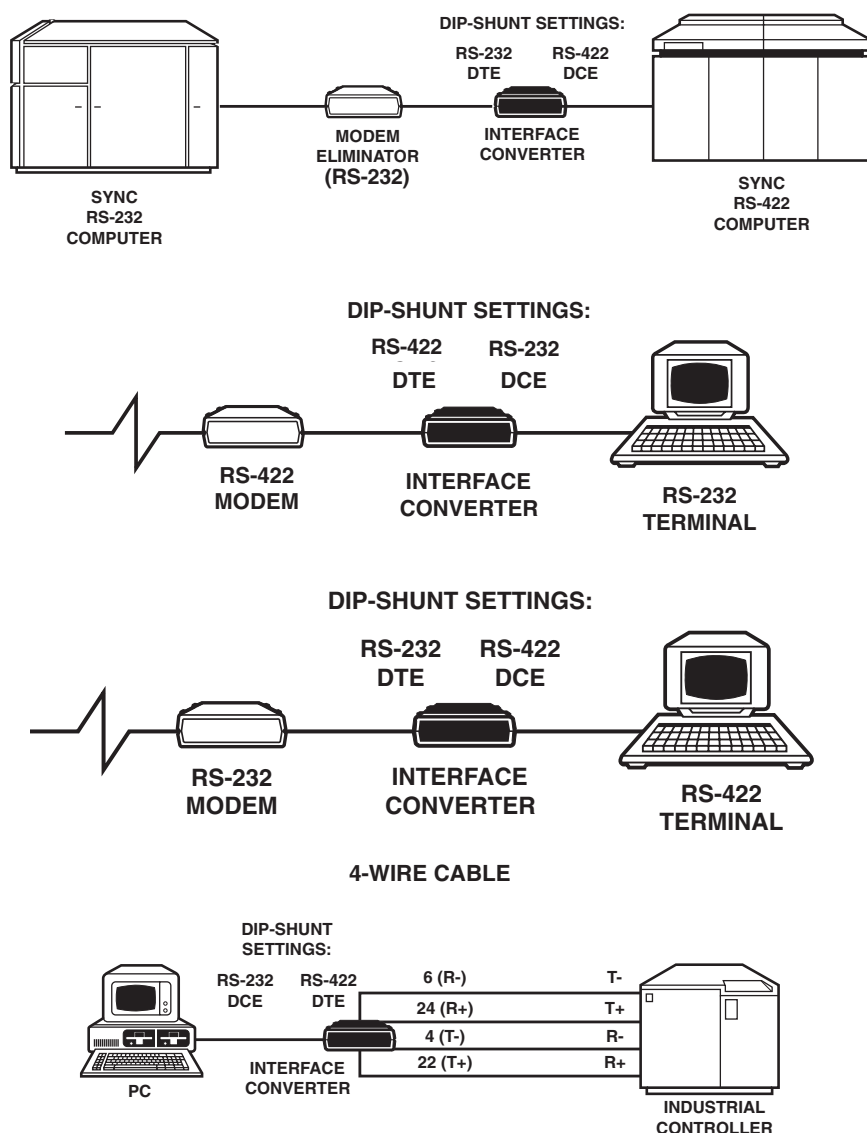


Figure 2-1. Various Applications Showing DCE/DTE Settings.

1. The Converter does not require special handshaking signals in order to operate.
2. The Converter should always be configured the opposite of the equipment it's connected to if straight-through cabling is used. For example, if you are connecting a modem (a DCE device) to the Converter, configure the Converter's port connected to the modem as DTE.
3. Some industrial controllers include RTS+, RTS-, CTS+, and CTS-. If necessary, in most cases, these can be jumpered together.
4. According to EIA specifications, RS-422 signals are A and B, where mark = B>A in voltage and space + A>B in voltage. Many manufacturers label their leads as + and -. In most cases, +=B and -=A is the scheme the Converter uses. However, some manufacturers have reversed this scheme. Consult the manufacturer of your RS-422 equipment if you have problems.

## Models

There are three models of the RS-232↔RS-422 Interface Converter.

- **IC456A-R3** — a standalone unit for 115-VAC operation.
- **IC456AE-R3** — a standalone unit for 230-VAC operation.
- **IC456C-R3** — a printed circuit card for rack-mounted units.

The same RS-232↔RS-422 printed circuit card is used for both 115- and 230-VAC applications. An Interface Converter Rack (RM060) is available through your sales representative. This is a 19-inch rack capable of holding up to eight printed-circuit cards. The rack has its own power supply which is switch selectable between 115- and 230-VAC operation.

If you ordered the IC456A-R4 or IC456C-R4, you should have received cables with your RS-232↔RS-422 Interface Converter.



## 3. Installation

To connect the Converter to your devices, follow these steps:

1. Attach the cable from the RS-422 device to the 37-pin female receptacle on the rear panel of the Converter.
2. Attach the cable from the RS-232 device to the 25-pin female receptacle on the rear panel of the Converter.
3. Plug the 4-pin power cord into the receptacle on the rear panel of the case. However, don't plug the power module into an AC outlet at this time. You can power up only after you have configured the Converter's DTE/DCE DIP shunts (**Section 3.1**).

### 3.1 Configuration

The Converter's RS-232 and RS-422 ports must each be set for DCE or DTE operation. Configuration is accomplished through DIP shunts located inside the unit on the printed circuit board (see Figures 3-1 and 3-2). One configuration is for connecting RS-422 DCE to RS-232 DTE. The second configuration is for connecting RS-232 DCE to RS-422 DTE. Refer to Table 3-1 for the DTE/DCE settings appropriate to your application.

**Table 3-1. DTE/DCE DIP Shunt Settings.**

RS-422 Port		RS-232 Port	
to appear as	put a DIP shunt in	to appear as	put a DIP shunt in
DTE	XW1A XW2A XW3A	DTE	XW4A XW5A
DCE	XW1B XW2B XW3B	DCE	XW4B XW5B

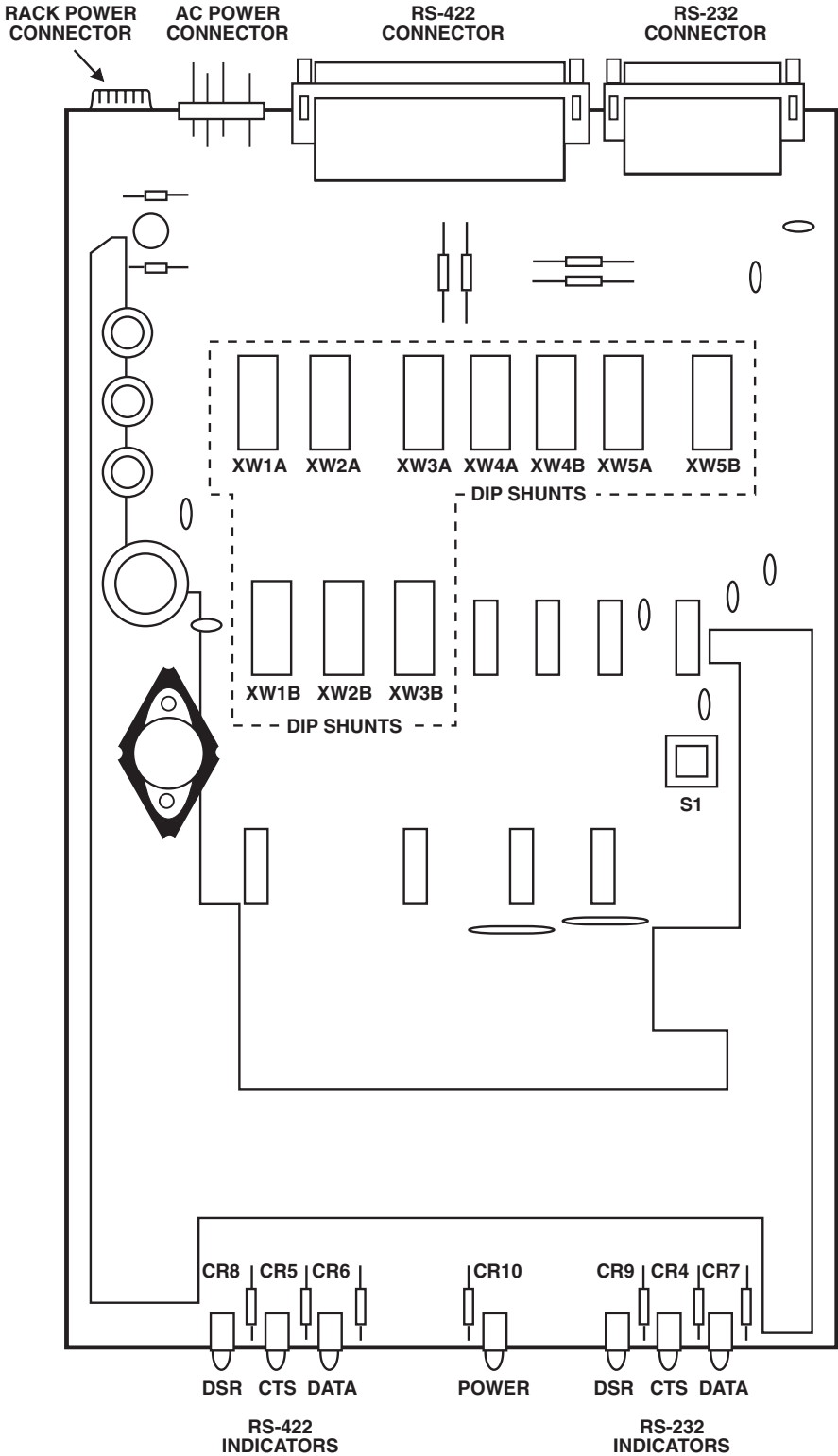


Figure 3-1. Board Layout Showing Component Locations.  
(Dashed Lines show DTE/DCE DIP Shunt Locations.)

# RS-232 ↔ RS-422 INTERFACE CONVERTER

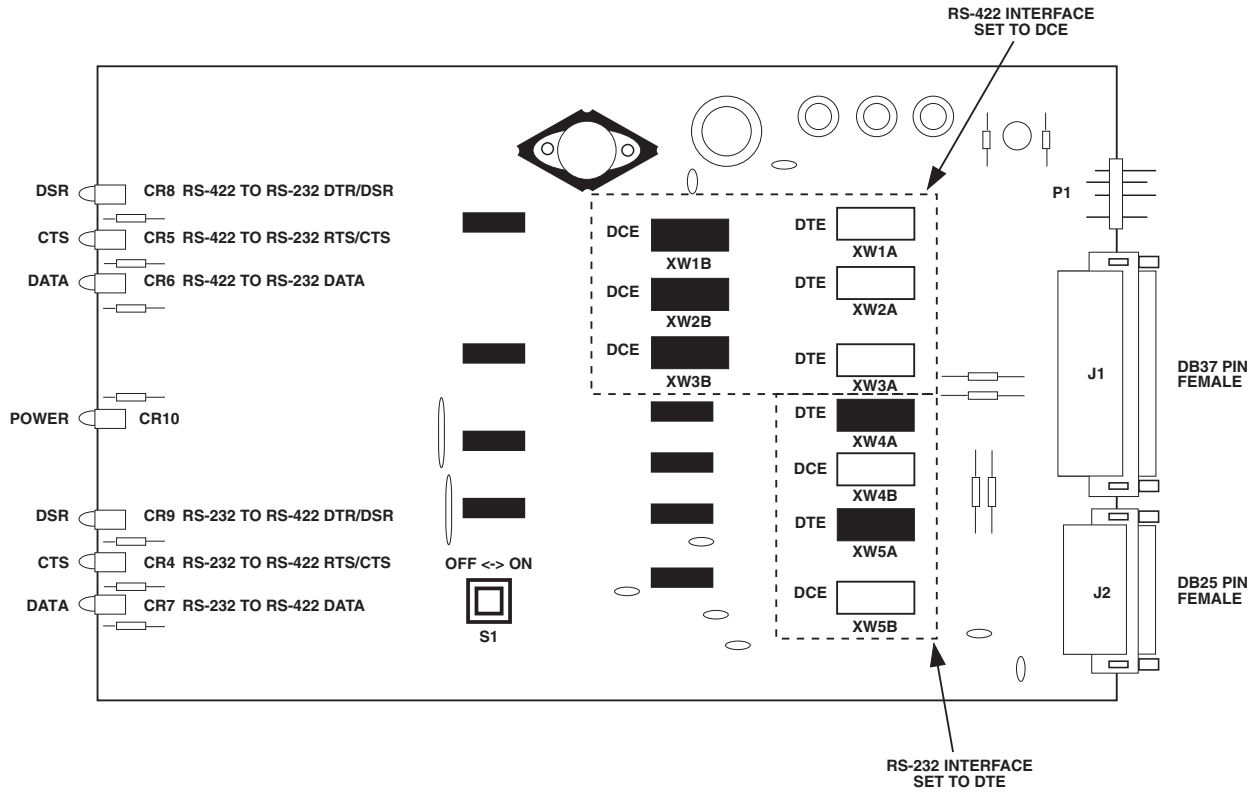


Figure 3-2. Sample DIP-Shunt Setting.

Figure 3-2 shows the DIP-shunt settings used for an application like the one illustrated in Figure 3-3a.

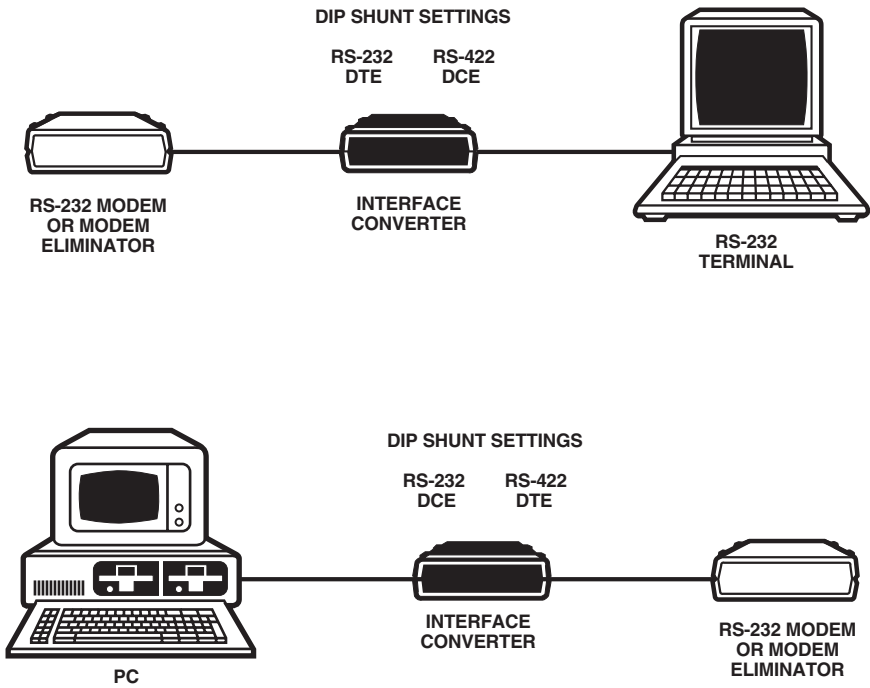
## NOTE

The filled-in rectangles in Figure 3-2 indicate the jumpers that contain a DIP-shunt.

## CAUTION

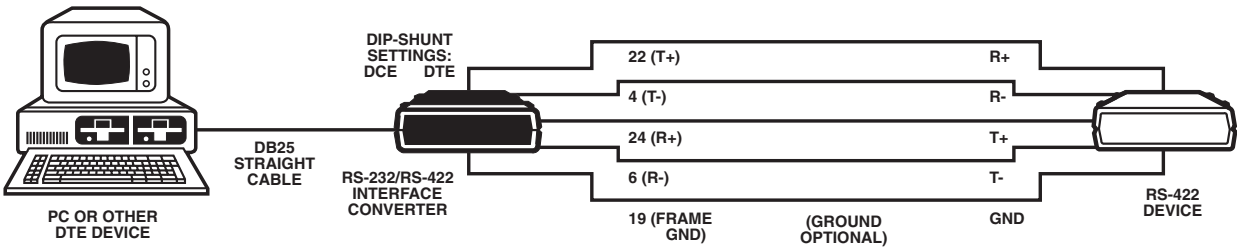
Never set both ports the same: the clocks will not operate correctly. If two DTEs are connected through the Converter, a modem eliminator is required in order to avoid setting both ports the same. If two DCEs are connected together, a cross-over cable is required.

Figures 3-3a and 3-3b show some typical synchronous applications.



**Figure 3-3. Synchronous Applications.**

Applications involving asynchronous devices are also possible. Figure 3-4 illustrates a popular asynchronous setup, while Figure 3-5 shows the cabling involved.



**Figure 3-4. RS-422 Asynchronous Application.**

### THE RECEIVER TERMINATION SWITCH

This switch is marked S1 on the printed circuit-board diagram in Figures 3-1 and 3-2. This switch serves to terminate the receiver with pull-up and pull-down resistors in order to designate the receiver state and enable the Converter's anti-streaming function. Setting the switch to the ON position closes the switch, setting the switch to OFF opens the switch.

### 3.2 LEDs

The RS-232↔RS-422 Interface Converter is equipped with seven LEDs located on the front panel that indicate the status of INPUT signals.

The three LEDs on the right side of the front panel show conditions on the RS-232 interface: DSR (Data Set Ready), CTS (Clear To Send), and Data.

The three LEDs on the left side of the panel show the same conditions on the RS-422 interface: DSR (Data Set Ready), CTS (Clear To Send), and Data.

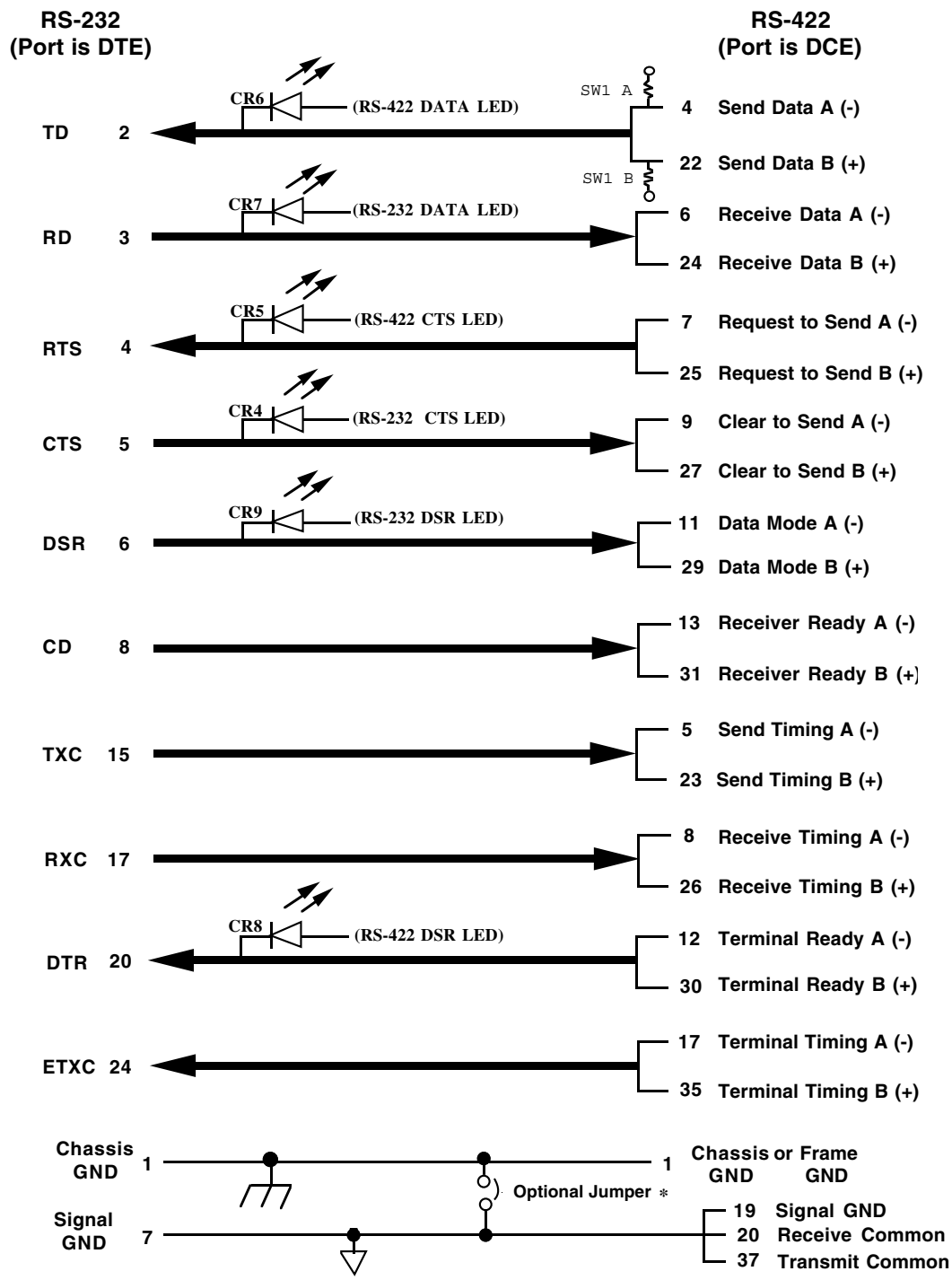
The LED labeled PWR, located in the center of the front panel, indicates when power is applied to the unit.

Figures 3-5 and 3-6 illustrate signal flow in both the DTE and DCE configurations.

### NOTE

**Some LEDs may be lit when no input signal is present. This is not a malfunction, but a floating state condition at the input that causes the output of that driver to indicate a positive voltage condition.**

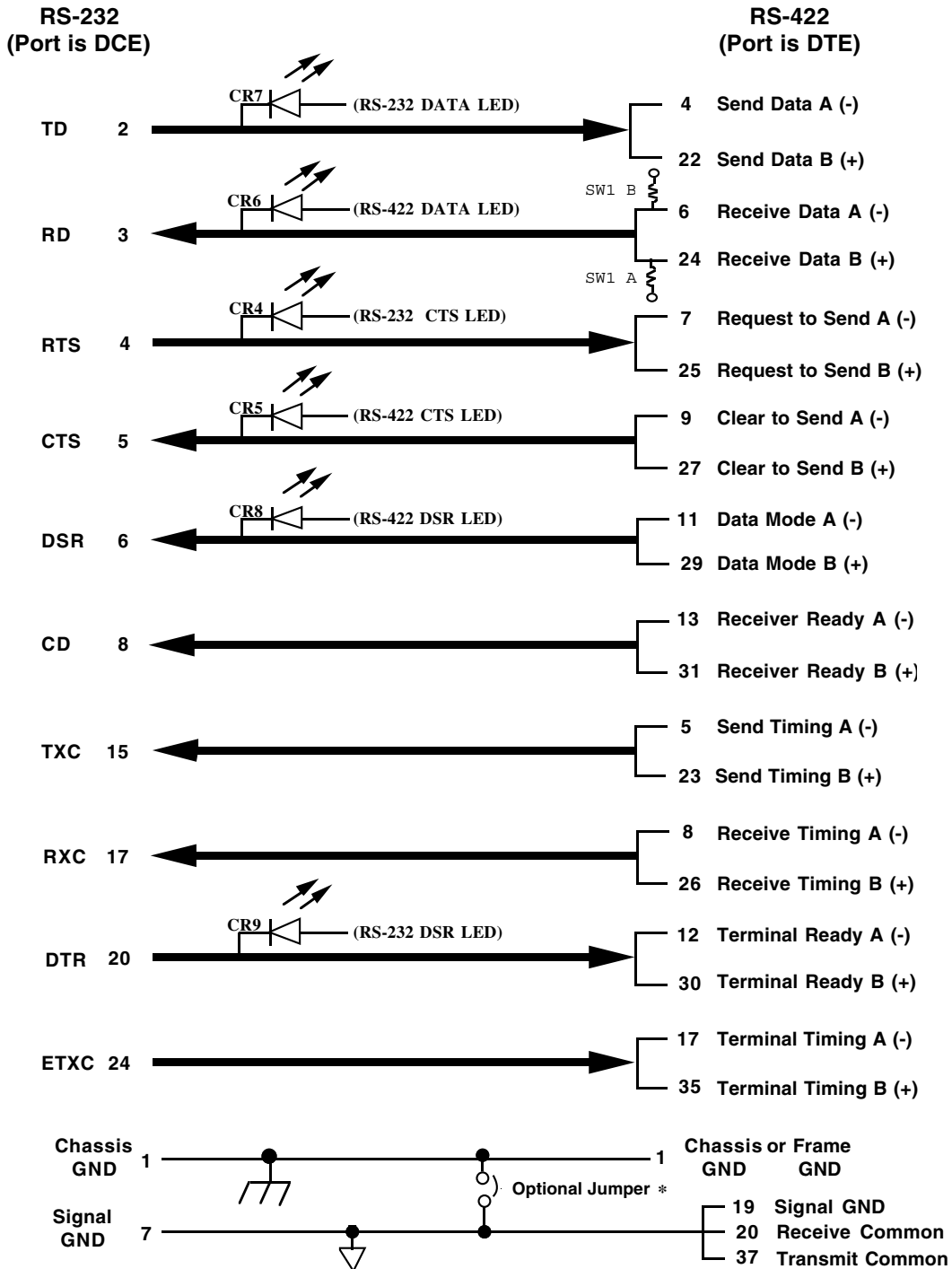
**RS-232 ↔ RS-422 Signal Flow Diagram**  
 (Arrows indicate the direction of signal flow.)



\* Note: The optional jumper is removed (factory default)

Figure 3-5. Signal Flow Diagram A.

**RS-232 ↔ RS-422 Signal Flow Diagram**  
 (Arrows indicate the direction of signal flow.)



\* Note: The optional jumper is removed (factory default)

Figure 3-6. Signal Flow Diagram B.

## 4. Ground Strap and Interface Pinouts

Signal grounds (Pins 19, 20, and 37 on the RS-422 interface and Pin 7 on the RS-232 interface) are connected together, but not connected to chassis ground (Pin 1). However, for applications requiring all grounds to be at a common reference point, these pins can be connected to chassis ground by installing a jumper strap across W6 located at the rear of the printed-circuit board between J1 and P1 (refer to Figures 4-1 and 4-2).

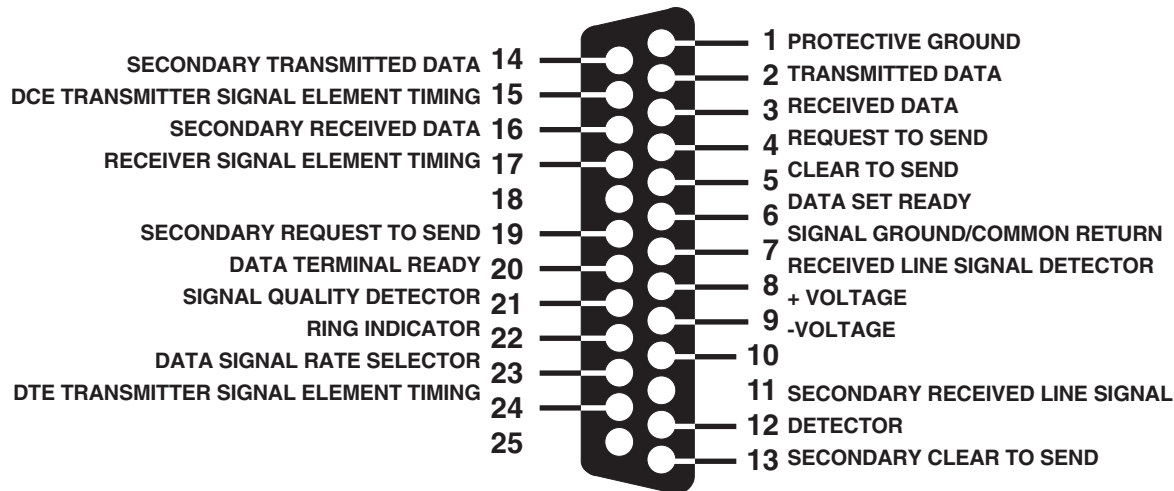


Figure 4-1. The RS-232 Interface.

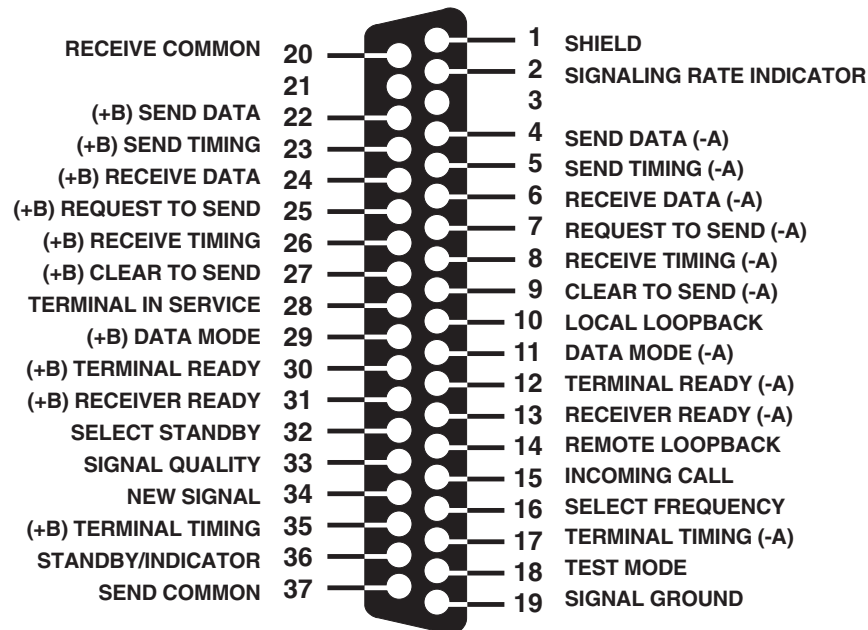


Figure 4-2. The RS-422 Interface.





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