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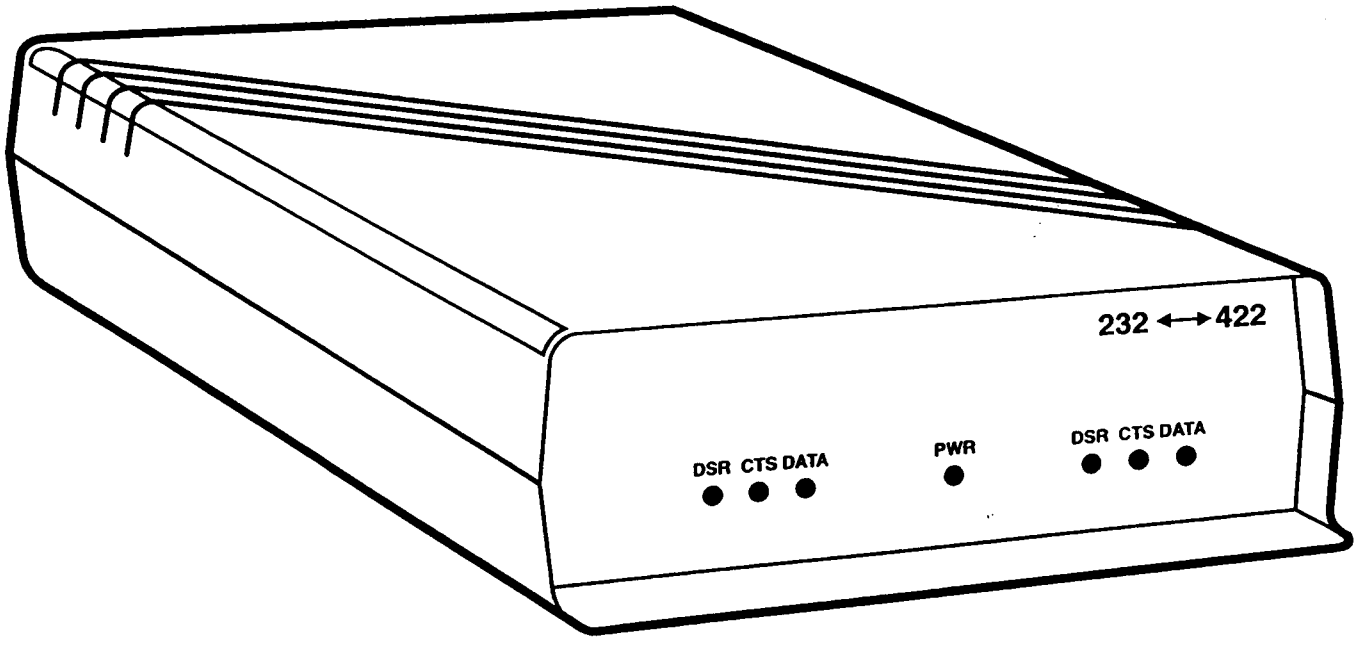
FEBRUARY 1998

IC456A-R3 IC456C-R3
IC456A-R4 IC456C-R4

RS-232↔RS-422 Interface Converter



CUSTOMER SUPPORT INFORMATION

To order or for technical support: Call 724-746-5500 or fax 724-746-0746
Technical support and fax orders 24 hours a day, 7 days a week
Phone orders 24 hours, 7 A.M. Monday to midnight Friday; Saturday 8 to 4 (Eastern)
Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018

Contents

1.0 Specifications

Speed —	64,000 bps, max.
Connectors —	RS-232 port: DB25 female; RS-422.port: DB37 female
Indicators —	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
Controls —	RS-232 port: DTE/DCE DIP shunts RS-422 port: DTE/DCE DIP shunts DIP switch to enable receiver termination
Power —	115 VAC Supply: ±10%, 100 mA 230 VAC Supply: ±10%, 50 mA
Size —	Standalone: 2.3"H x 8"W x 11.9"D Rackmount: 1.2"H x 7.5"W x 11.4"D
Weight —	Standalone: 2 lb. Rackmount: 10 oz.
Environment —	Storage Temperature: -4°F to 158°F (-20°C to 70°C) Operating Temperature: 32°F to 122°F (0°C to 50°C)

2.0 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 port 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.

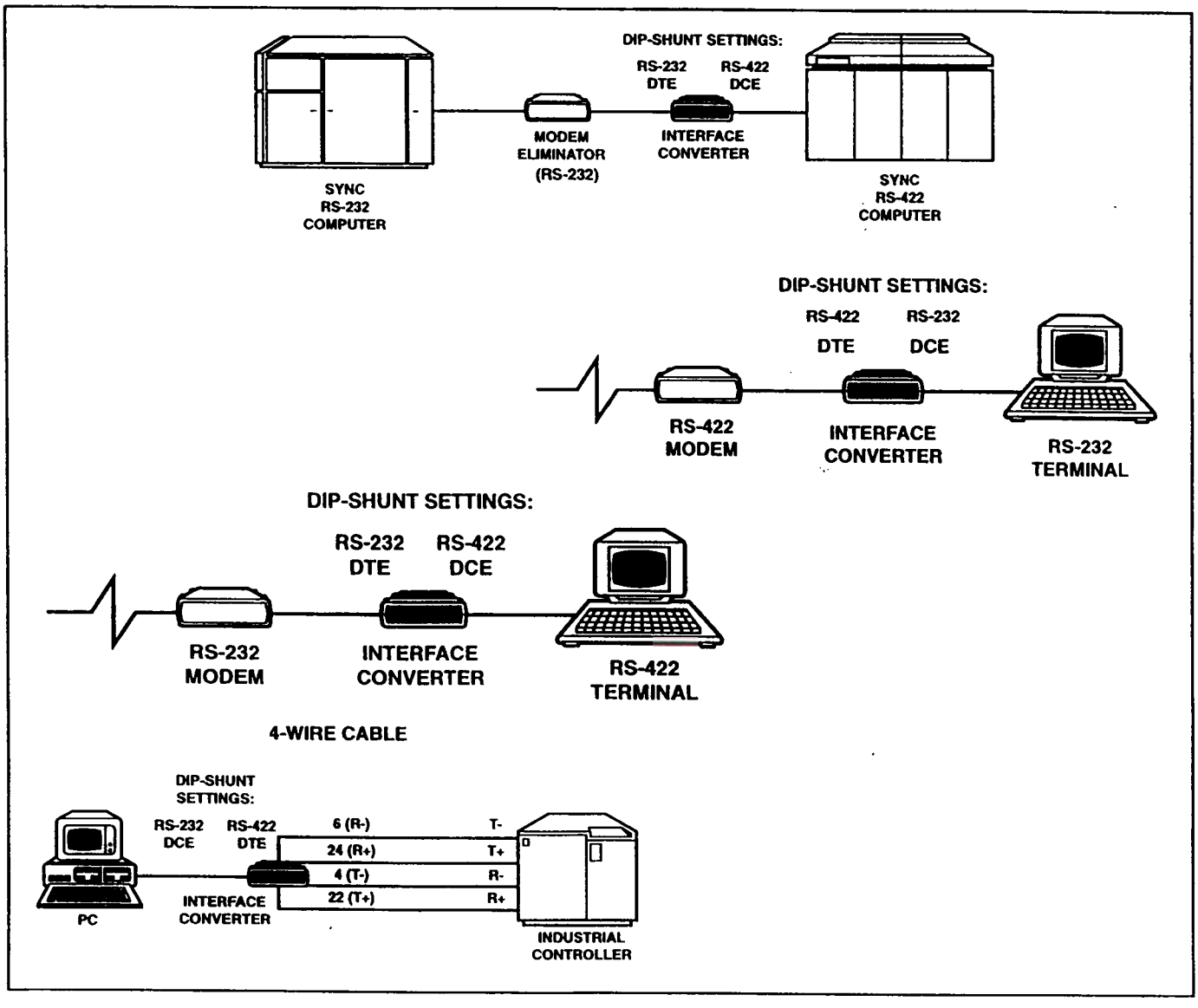


Figure 2-1. Various Applications Showing DCE/DTE Settings.

Things to consider when operating the converter:

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 is 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+, 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; this 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.

2.1 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.

3.0 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

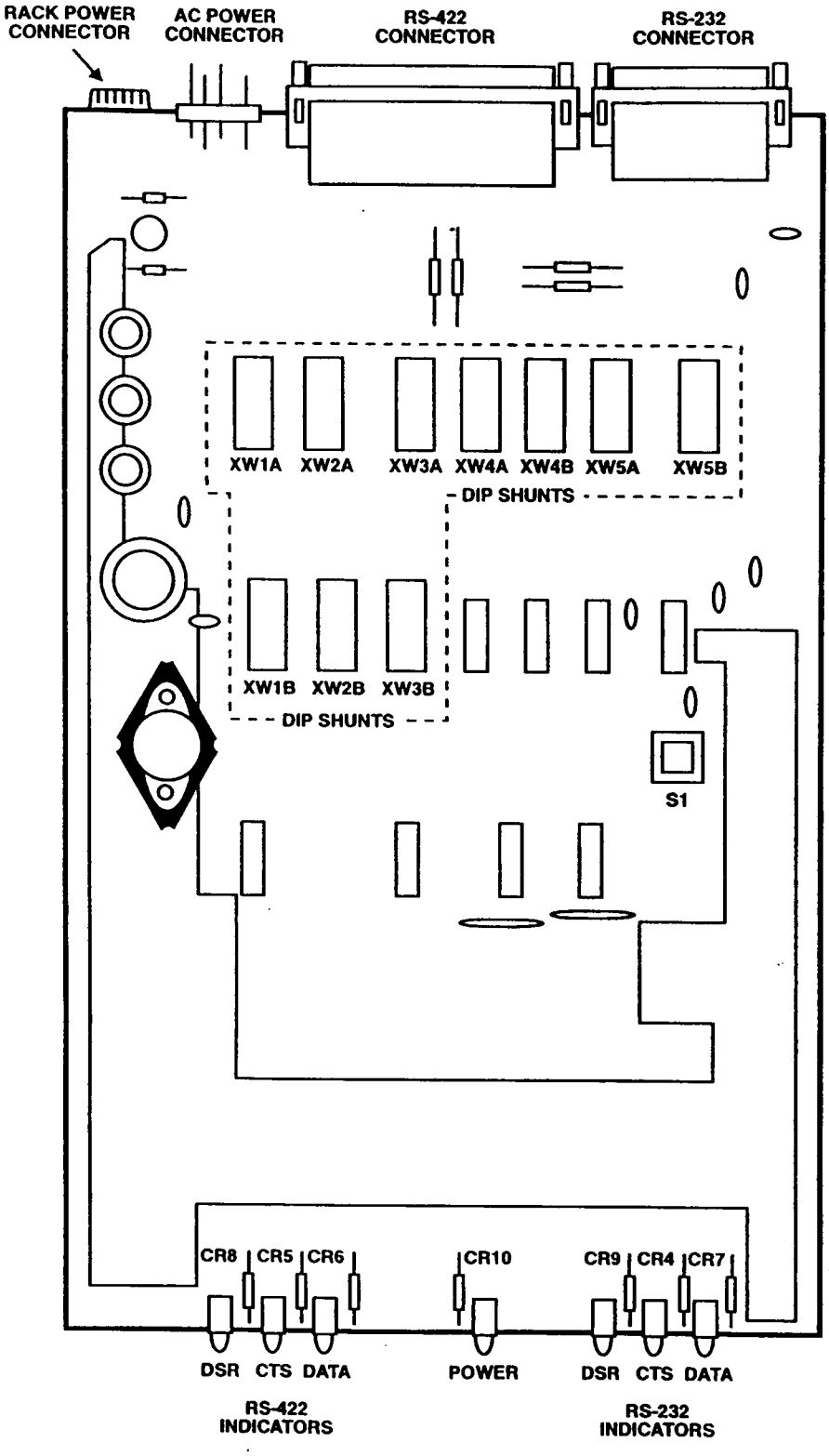


Figure 3-1. Board Layout Showing Component Locations (Dashed Lines show DTE/DCE DIP Shunt Locations)

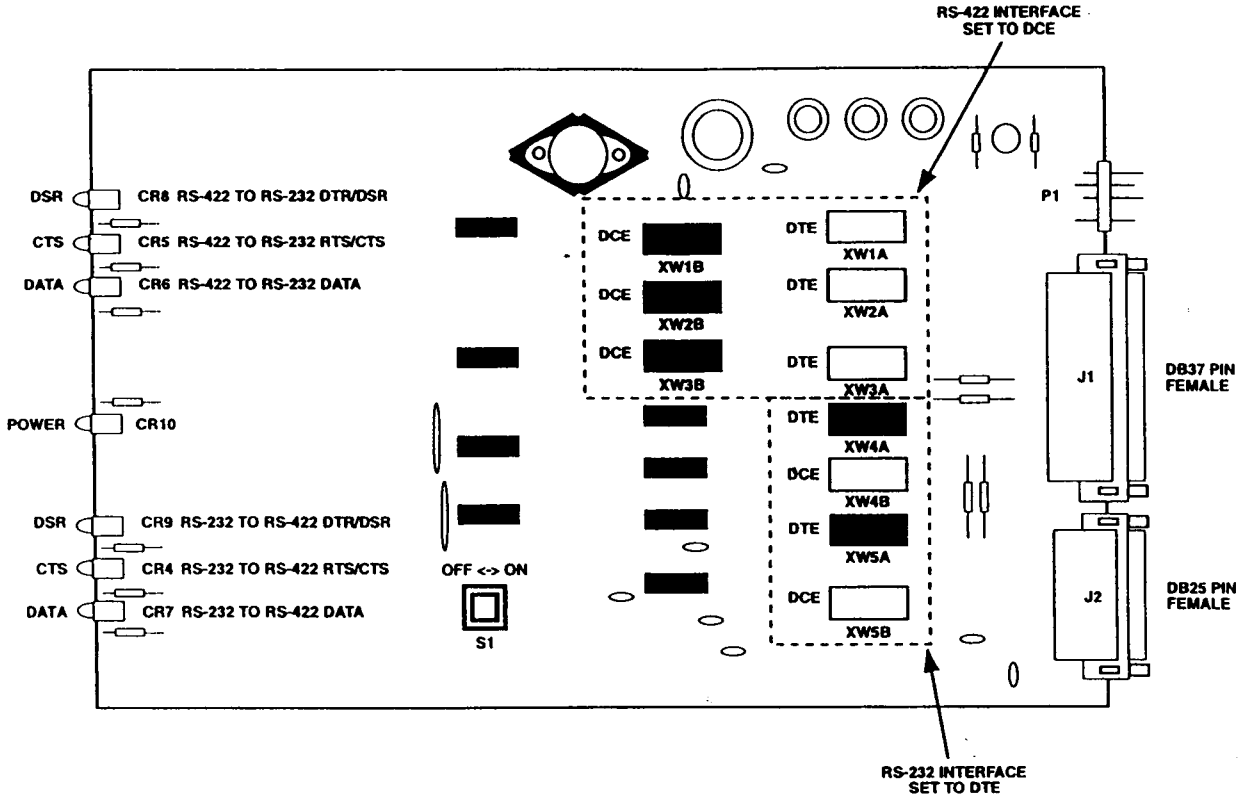


Figure 3-2. Sample DIP-Shunt Setting.

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 4-2 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.

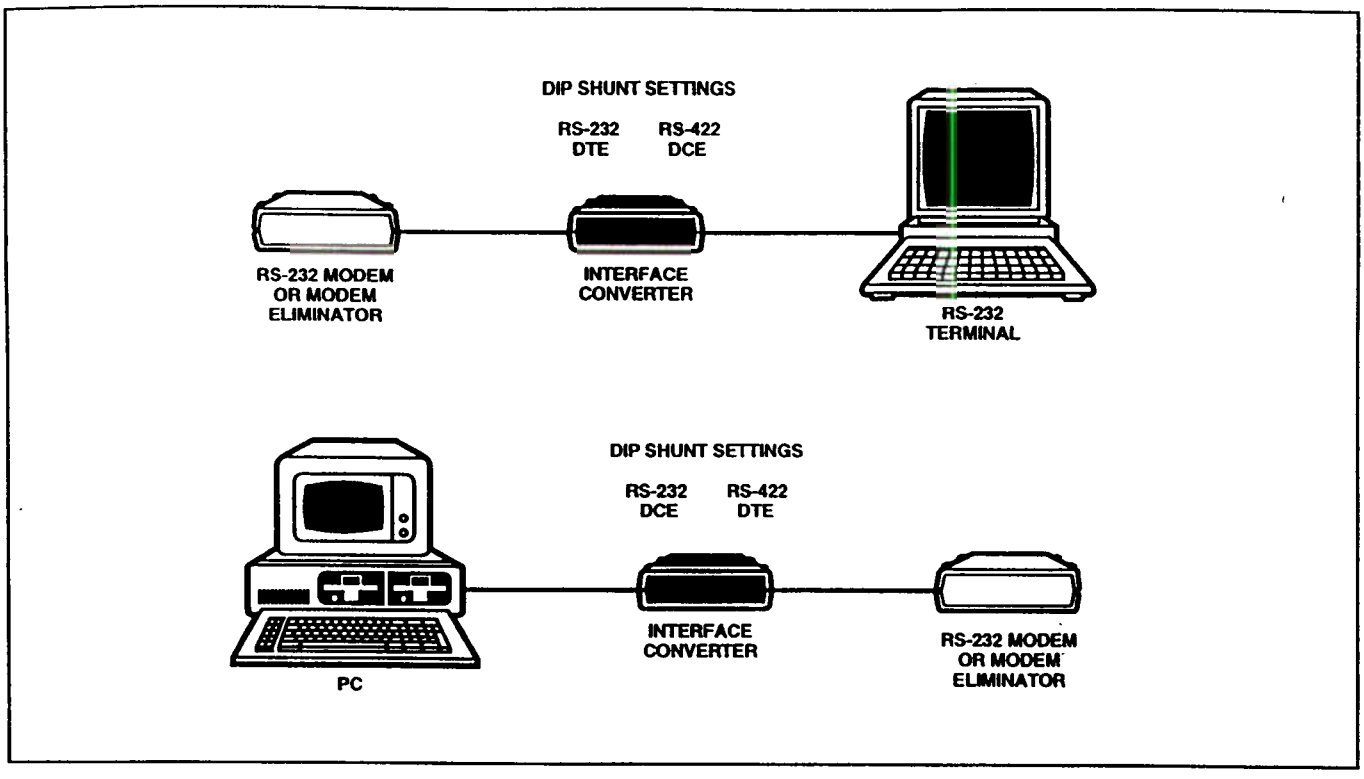


Figure 3-3. Synchronous Applications.

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

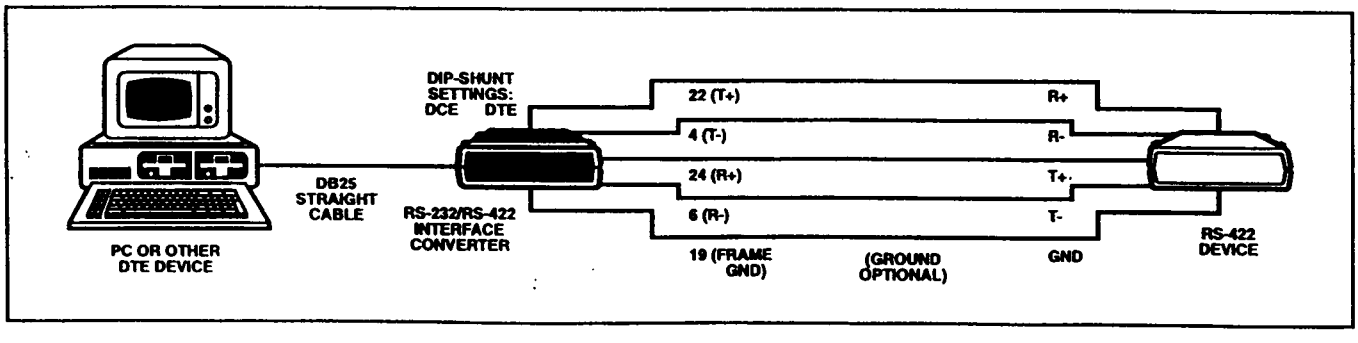


Figure 3-4. RS-422 Asynchronous Application.

3.1.1 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 (Figures 3-6 and 3-7) , 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.

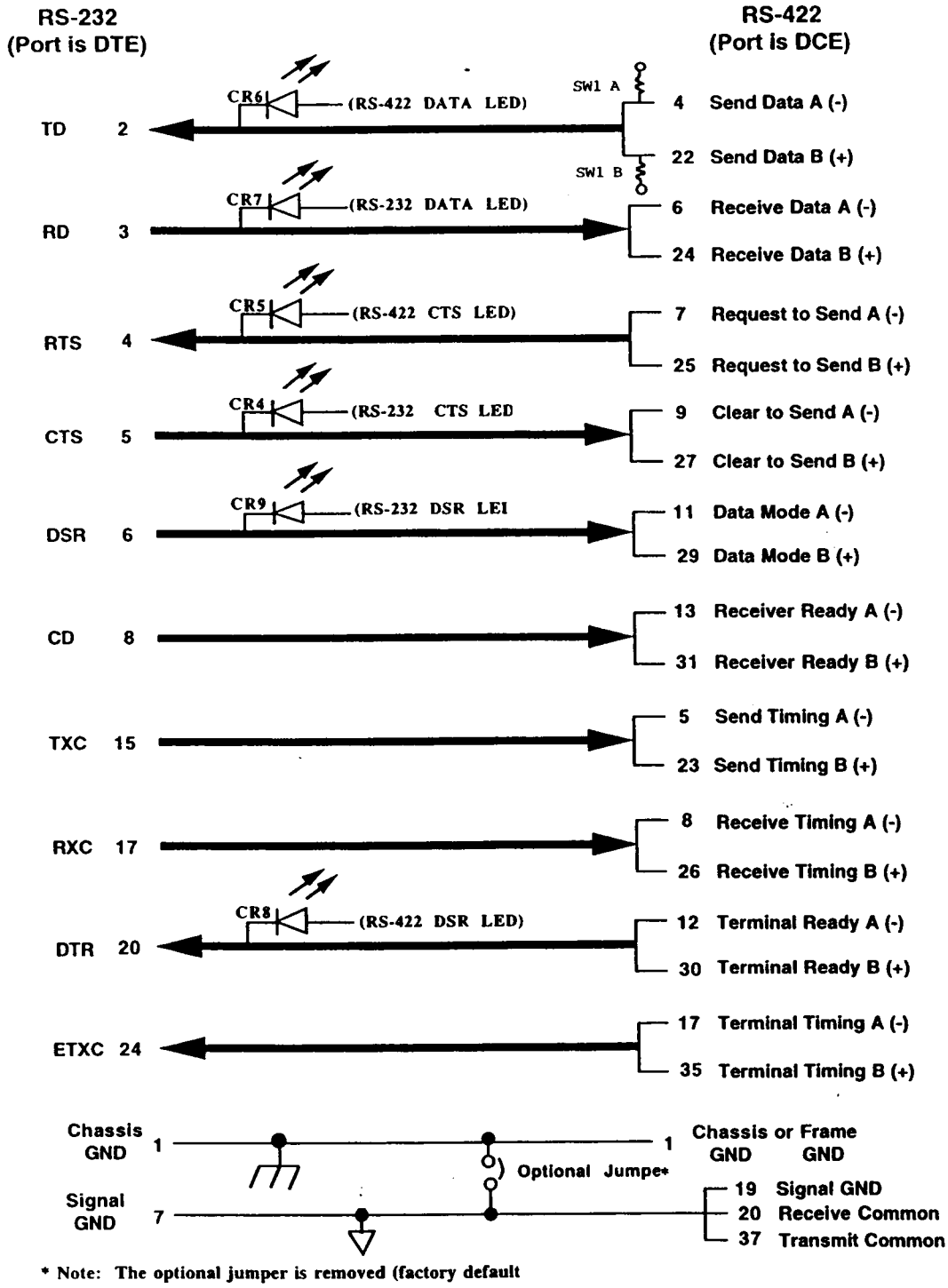
Figures 3-6 and 3-7 illustrate signal flow in both the DTE and DCE configurations.

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 Diagrai

(Arrows indicate the direction of signal flow.)



* Note: The optional jumper is removed (factory default

Figure 3-5. Signal Flow Diagram A.

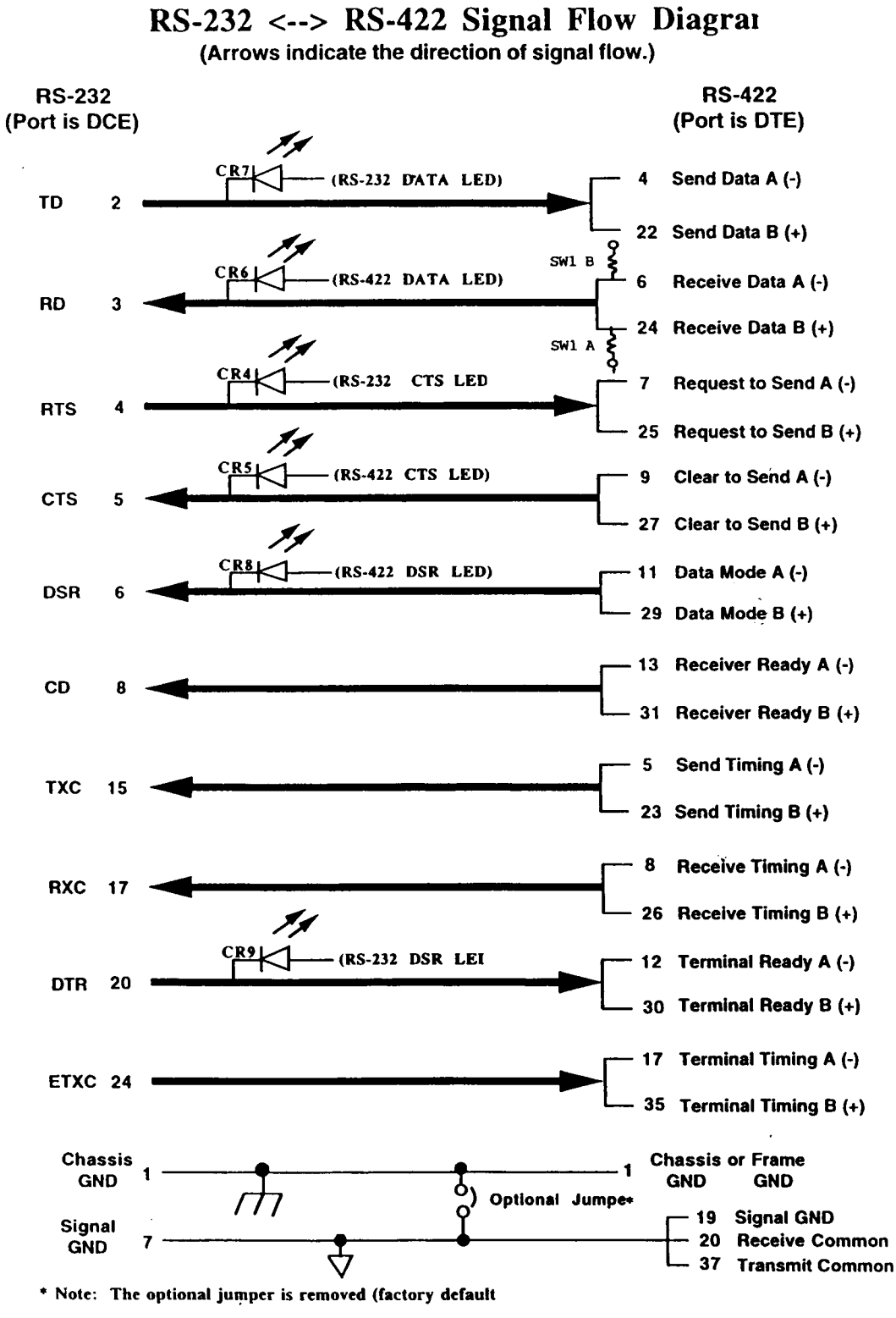


Figure 3-6. Signal Flow Diagram B.

4.0 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).

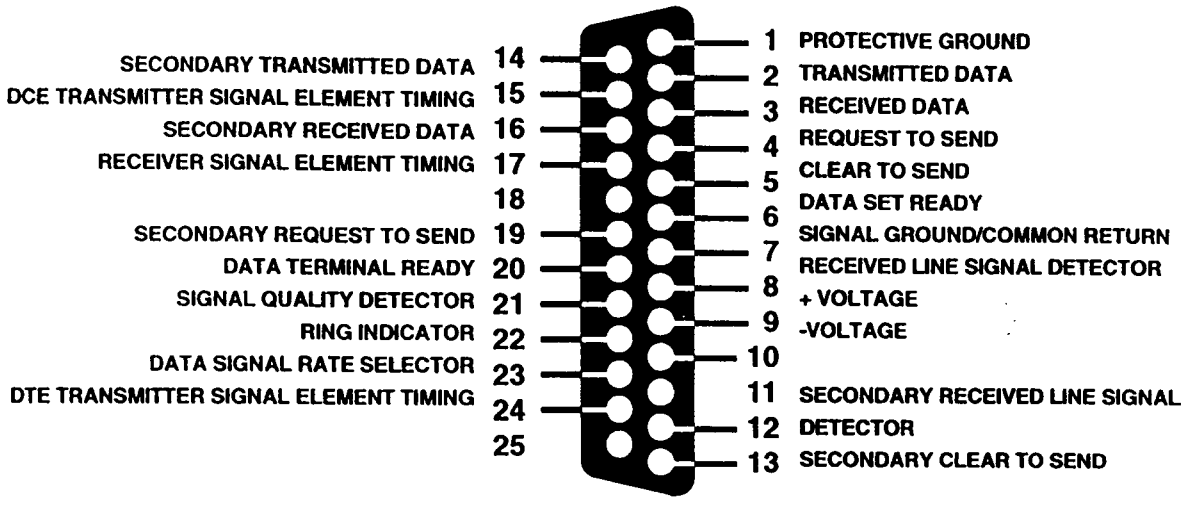


Figure 4-1. The RS-232 Interface.

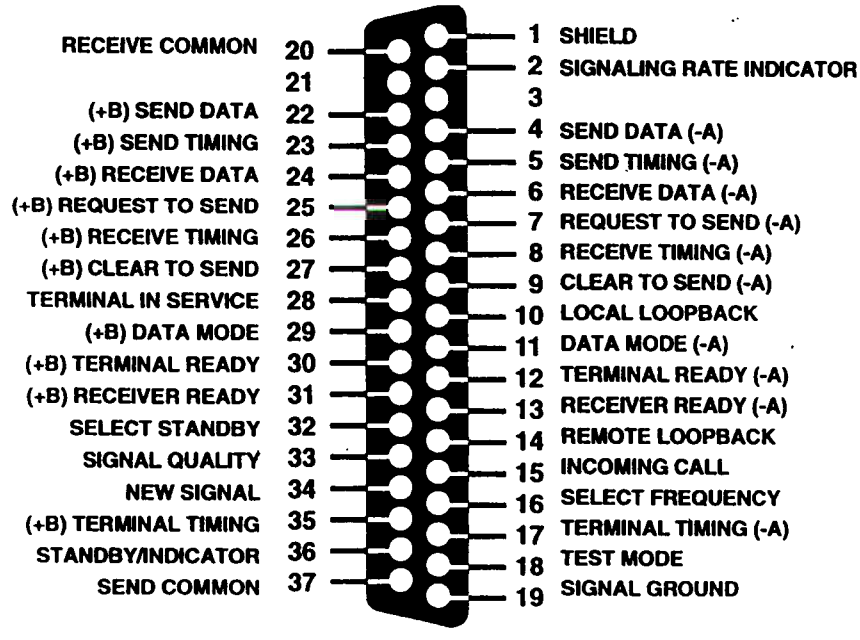


Figure 4-2. The RS-422 Interface.