RS-232↔485/422 Converter Plus
RS-232↔485/422 Opto-Isolator/Converter
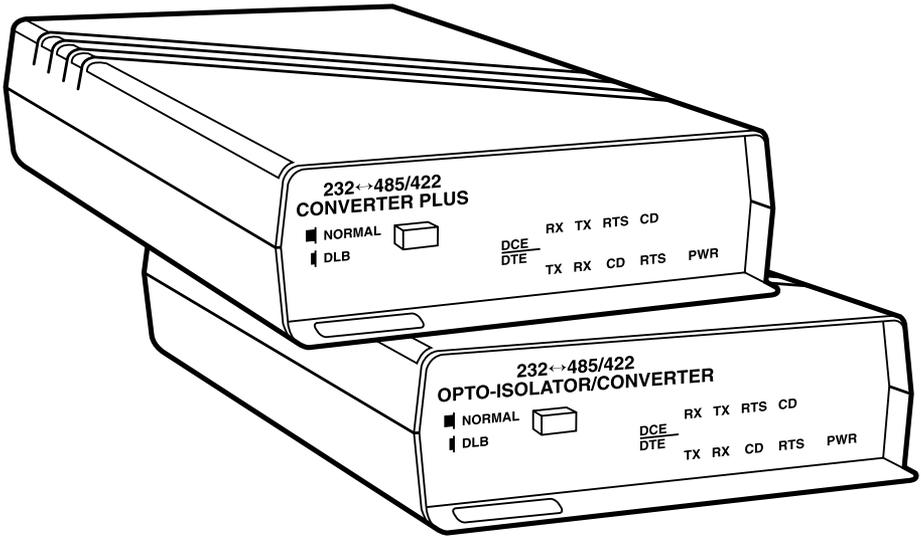
FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

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.

NORMAS OFICIALES MEXICANAS (NOM)
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.

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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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

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Contents

1. Specifications

Optical Isolation: IC109A-R3, IC109AE, IC109C only

Pins Supported: RS-232 port: TD, RD, RTS, CTS, CD, DTR, DSR, SG, and FG; RS-485 port: TXA, TXB, RXA, RXB

Data Rate: Up to 115 kbps, transparent to data

Operation: Point-to-point or multipoint; Full or half-duplex; Transparent to data; Selectable RTS-to-CTS delay with option to inhibit CTS if CD is present (DCE); DTE or DCE configurable RS-232 port; Normal or loopback operation

Timeout Delay: 0.15, 0.7, 2, 7, or 70 msec (for the RS-485 driver enabled by data feature)

MTBF: Approximately 180,000 hours (ground benign environment)

Interface: (1) asynchronous RS-232 port (DTE/DCE selectable); (1) asynchronous RS-485 port with improved surge protection and switch-selectable line termination or line bias

Connectors: (1) DB25 female RS-232 port; (1) four-wire terminal block (TB1) RS-485 port

Indicators: (5) LEDs: TX, RX, RTS, CD, and PWR

Temperature Tolerance: *Operating:* 32 to 122°F (0 to 50°C); *Storage:* -4 to +158°F (-20 to +70°C)

Humidity: Up to 95% relative humidity, noncondensing

Power: PS154 (for use with IC108A, IC109A-R3): *Input:* 120 V, 60 Hz, 20 W; *Output:* AC 17 VCT, 0.7 A; PS154E (for use with IC108AE, IC109AE): *Input:* 230 V, 50 Hz, 20 W; *Output:* AC 17 VCT, 750 mA

Size: IC108A, IC108AE, IC109A-R3, IC109AE: 1.8"H x 5.5"W x 8.4"D (4.6 x 14 x 21.3 cm); IC108C, IC109C: 4.7"H x 0.6"W x 7.4"D (11.9 x 1.5 x 18.8 cm)

Weight: IC108A, IC108AE, IC109A-R3, IC109AE: 1 lb. (0.5 kg); Power supply only: *PS154:* 0.4 lb. (0.2 kg), *PS154E:* 1.1 lb. (0.5 kg)

2. Introduction

The RS-232↔485/422 Converter Plus and the RS-232↔485/422 Opto-Isolator/ Converter are interface converters that change the electrical characteristics from a non-balanced data standard (RS-232) to a balanced data standard (RS-422 or RS-485). The units do not change/manipulate the actual data that passes through the unit. For example, use the converters in an industrial application where RS-485 or RS-422 devices need to connect to an RS-232 device.

All models are RS-232-to-RS-485 interface converters that can be used in pairs to operate in the same manner as a line driver. Each allows an RS-232 device to transmit data over much longer distances than is normally possible. Depending on the operating environment, as many as 64 devices can be linked together using twisted-pair cable.

Models without opto-isolation include IC108A, IC108AE, and IC108C. Models with opto-isolation (IC109A-R3, IC109AE, and IC109C) protect equipment from differences in ground potentials on one side of the unit to the other side of the unit. Inside the RS-232↔485/422 Opto-Isolator/Converter, optical isolation circuitry converts electrical signals to light and back again, to keep signal noise and ground loops from crossing between your RS-485 installation's segments. That means the electrical noise from your factory floor won't affect your office communications, and the difference in ground potential between buildings won't damage your sensitive equipment.

The converters are available in standalone (IC108A, IC108AE, IC109A-R3, IC109AE) and rackmount (IC108C and IC109C) versions. The rackmount cards fit in the multi-function rack (part number RM005).

If you ordered the IC109A-R3, you should have received a cable and an adapter with your RS-232↔485/422 Opto-Isolator/Converter. The cable plugs into an IBM® PC AT® (or clone) DB9 COM port. The adapter is used with the supplied cable to connect to an IBM PC computer's DB25 COM port.

A manual loopback test checks the system wiring for both the RS-232 and RS-485 interfaces.

3. Installation

This section describes the jumper and switch functions for configuring the converter. See Figure 1 on the next page for the component locations.

To install your RS-232↔485/422 Converter Plus or RS-232↔422/485 Opto-Isolator/Converter:

1. Set each of the ten jumpers/switches for your application.

2. Connect the converters together as shown in Figures 5 through 8 (pages 22–24).

3. Apply power. (Use power supply PS154 or PS154E, depending on which RS-232↔485/422 converter you have. See **Chapter 1** for more information.)

3.1 Jumper and Switch Configuration

NOTE

As you read this section, refer to Tables 1 and 2. Table 1 (pages 14–16) lists DCE jumper settings, and Table 2 (pages 19–21) lists DTE jumper settings.

3.1.1 DTE/DCE CONFIGURATION

A DIP shunt is used to select DTE or DCE configuration. For the RS-232↔485/422 converter to appear as a DTE device, put the DIP shunt jumper in socket XW1B. (See Figure 1.) For the RS-232↔485/422 converter to appear as a DCE device, put the DIP shunt jumper in socket XW1A.

3.1.2 FRAME GROUND/SIGNAL GROUND

Jumper W7 ties signal ground to frame ground. The position is left open at the factory. To connect signal ground to frame ground, solder a 100-ohm, ½-watt resistor in location W7. Or, use a wire jumper. Make sure that ground circulating currents are limited to acceptable levels.

3.1.3 FULL/HALF-DUPLEX OPERATION

Jumper W8 selects full or half-duplex operation. Set W8 to the HALF position (B-C position) for half-duplex operation. Set W8 to the FULL position (A-B position) for full duplex operation.

NOTE

When the jumper W9 (CTS) is in the ON position and jumper W15 is in the A-B position, the RS-485 driver is always turned on to enable data transmission. Therefore, half-duplex transmission is not possible. See Section 3.1.5 for the RS-485 driver's explanation.
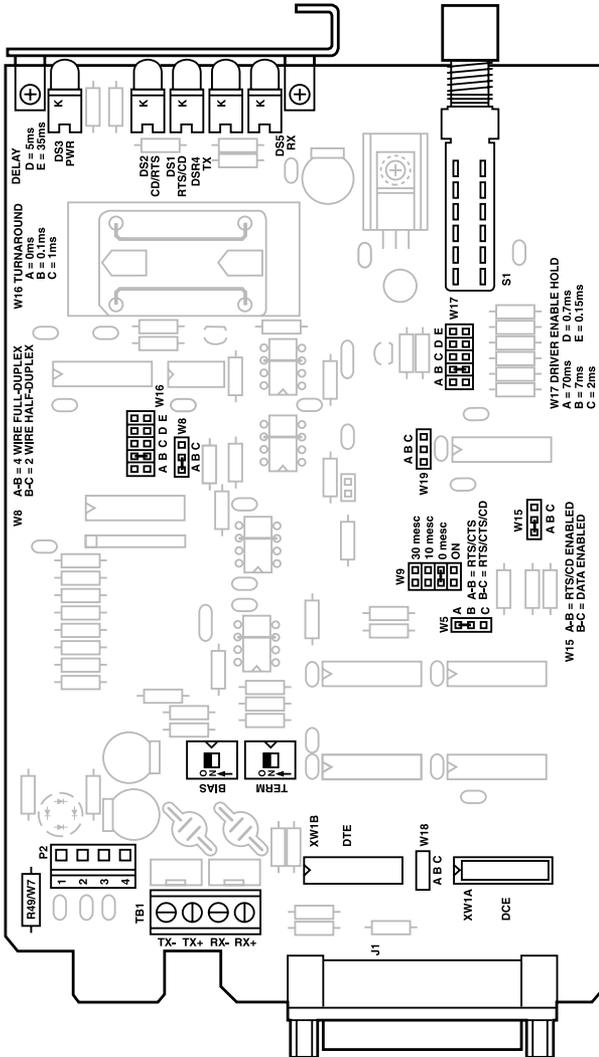
Figure 1. The printed circuit board's layout.

3.1.4 CTS DELAY (W9 JUMPER)

When the converter's transmitter is first turned on, an unstable carrier signal is transmitted for several milliseconds. If data was sent during this period, it's received as distorted information. Setting a CTS delay on the RS-232↔485/422 converter allows the communications link to settle down before data can be sent.

RS-232↔485/422 Converter as DCE (XW1A 8-Position Shunt)

When the RS-232↔485/422 converter is configured as a DCE device (DIP shunt in position XW1A), jumper W9 controls the amount of delay from the time RTS (jumper W5 in the A-B position) is received true until CTS is asserted true. If W5 is in the B-C position, CTS will be inhibited if an RS-485 carrier is present when RTS is raised. To select a CTS delay period, set jumper W9 to the 0-, 10-, or 30-msec position. Regardless of the delay setting selected, when RTS goes false, CTS will immediately go false. If jumper W9 is in the "ON" position, CTS is held at +5 VDC.

RS-232↔485/422 Converter as DTE (XW1B 8-Position Shunt)

When the RS-232↔485/422 converter is configured as a DTE device (DIP shunt in position XW1B), CTS is not supported.

3.1.5 RS-485 DRIVER ENABLE (W15)

The RS-232↔485/422 converter's RS-485 driver can be set to be enabled in one of three ways: 1) by RS-232 control signals, 2) by data, or 3) constantly on via setting W9 in the ON position.

Driver Enabled by RS-232 Control Leads

If your equipment raises CD or RTS when it is ready to send data, you can set the RS-485 driver to be enabled by one of these leads. If your equipment does not have the capability to raise CD or RTS, you will need to set the RS-485 driver to be enabled by data or constantly enabled.

In order for an RS-232 control lead to enable the RS-485 driver, W15 must be in position A-B and W9 must be set for 0, 10, or 30 ms.

- When the RS-232 port is selected as DTE (DIP shunt in the XW1B position), the RS-485 driver will be enabled when CD (pin 8 of the RS-232 connector) goes true.

- When the RS-232 port is selected as DCE (DIP shunt in the XW1A position), RTS enables the driver.

Driver Enabled by Data

The RS-485 driver can also be enabled without asserting an RS-232 control lead. When jumper W15 is placed in the B-C position, the driver is enabled when data is received on the RS-232 port of the RS-232↔485/422 converter. As soon as the first bit of the first character is received at the RS-232 port, the RS-485 driver is enabled and an internal timer is started. The timer begins its "time out" on a low (0) to high (1) transition of data. When the timer times out, the RS-485 driver is disabled. Jumper W17 allows this timeout delay to be set for 0.15, 0.7, 2, 7, or 70 msec.

NOTE

There's a limitation to using this "DATA ENABLES DRIVER" feature. At data rates above 64 kbps, the first character in the data stream will be garbled by the converter. If higher data rates are required, transmit a <break> if possible, or a <nul> character before each message. This will enable the RS-485 driver, activate the timer, and allow the message to be transmitted without errors. The receiving device will need to ignore the first character received.

Driver Constantly Enabled (4 Wire Only)

The RS-485 driver can be constantly enabled by setting jumper W9 to the ON position.

3.1.6 HALF-DUPLEX TURNAROUND DELAY

When operating in half-duplex mode (jumper W8 in the HALF position [B-C position]), the RS-232↔485/422 converter adds a small delay each time it stops transmitting data and prepares to receive data. This delay allows the RS-485 interface and transmission line time to stabilize, reducing the possibility of garbled data being received at the end of a message.

The turnaround delays are 0 (W16 in position A), 0.1 msec (W16 in position B), 1 msec (W16 in position C), 5 msec (W16 in position D), and 35 msec (W16 in position E).

3.1.7 RS-485 INTERFACE TERMINATED OR UNTERMINATED

Some distortion on the twisted-pair line may be caused by impedance mismatch from the different devices connected to the line. To help eliminate this type of distortion, terminate the RS-485 interface with a resistor network at the receiver input pins (RXA and RXB) via switch S2. When S2 is placed in the "TERM" position, the resistor network is connected across the line. When S2 is placed in the "UNTERM" position, no connection to the resistor network is made and the line is not terminated.

Point-to-Point

When only two devices are connected to the line in a point-to-point application, each device should have the termination network connected to the line. Set switch S2 to the "TERM" position (see Figures 5 and 6).

Multipoint

For multipoint applications, switch S2 should be in the "UNTERM" position on all the RS-232↔485/422 converter devices in the network except for the two units at the extreme opposite locations on the line. The extreme opposite devices are the two devices that have the greatest cable length between them, which may not necessarily be the devices that are physically located the farthest apart. These two units should be set in the "TERM" position (see Figure 7). If any of the other RS-232↔485/422 converters were configured as "terminated," the amount of distortion could increase—possibly causing errors in the data being transmitted.

3.1.8 NORMAL/LOOPBACK OPERATION

The Normal/Loopback switch (S1) is a two-position pushbutton switch extending through the front panel. The Normal position permits the RS-232↔485/422 converter to operate normally. The Loopback position allows data coming into the RS-232↔485/422 converter to be sent back out the same port. This is for testing the connection between the RS-232↔485/422 converter and the device attached to each port.

Normal

When this switch is in the normal mode, data is passed through the converter from the RS-232 port to the RS-485 port and vice versa.

Loopback

When set to the loopback mode, any data received at the RS-485 port will be transmitted back out the RS-485 port and any data received at the RS-232 port will be transmitted back out the RS-232 port.

3.1.9 RS-485 INTERFACE LINE BIASED (FAIL-SAFE)

If S3 is in the Off position, there is no line bias. If S3 is in the On position, there is line bias. Setting to the on position will help stabilize the RS-422/RS-485 data lines. This is useful if there's noise on the data lines.

3.2 DCE/DTE Configuration

This section contains block diagrams (Figures 2 and 4) and jumper and switch settings (Tables 1 and 2) for DCE/DTE operation. For a detailed description of the jumpers and switches, see **Section 3.1**.
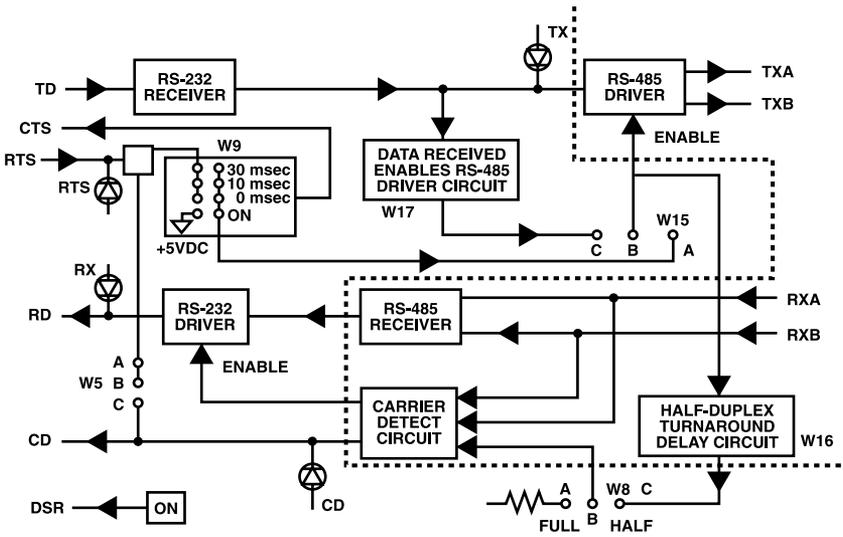
Figure 2. Simplified functional block diagram (DCE operation).

Table 1. DCE jumper settings.

NOTE
For additional information on the jumper requirements, see Section 3.1.

| Function	Jumper Requirements
1. Configure the RS-232 port as DCE	XW1 in A position
2. Signal ground connected to frame ground • Connected	W7 is IN (solder your own 100-ohm, $\frac{1}{2}$-watt resistor in place)
• Not connected	W7 is OUT
3. Full or half-duplex operation • Full duplex	W8 in FULL position (4 wire, A-B)
• Half-duplex	W8 in HALF position (2 wire, B-C)
4. CTS delay • Yes	W9 in 0-ms position W9 in 10-ms position W9 in 30-ms position
• No	W9 in ON position (no delay, CTS held to +5 VDC)

Table 1 (continued). DCE jumper settings.

Function	Jumper Requirements

5. Enable the RS-485 driver
    a. RS-485 driver is enabled by
      RS-232 control leads
    • by RTS
    See **Section 3.1.5** for more
    information.
	W15 in A-B position and
	W9 in 0-ms position
	W9 in 10-ms position
	W9 in 30-ms position

b. RS-485 driver is enabled by data
    How long the TX stays active after
    data is received on the RS-232 port
    (see **Section 3.1.5**).
	W15 in B-C position and
	W17 msec
	A 70-ms position
	B 7-ms position
	C 2-ms position
	D 0.7-ms position
	E 0.15-ms position

c. RS-485 driver constantly enabled (see **Section 3.1.5**).	W9 in ON position
6. Half-duplex turnaround delay • 0-msec turnaround delay	W8 in HALF (B-C) position and W16 in position A
• 0.1-msec turnaround delay	W16 in position B
• 1-msec turnaround delay	W16 in position C
• 5-msec turnaround delay	W16 in position D
• 35-msec turnaround delay (see **Section 3.1.6**).	W16 in position E

Table 1 (continued). DCE jumper settings.

Function	Jumper Requirements

7. RS-485 interface is terminated
    or unterminated
        • Terminated
	S2 in TERM position (ON)

• Unterminated See **Section 3.1.7** for more information.	S2 in UNTERM position (OFF)
8. Normal or loopback operation • Normal mode	S1 in Normal position (released)
• Loopback mode See **Section 3.1.8** for more information.	S1 in Loopback position (pressed in)
9. RS-485 Interface Line Biased (Fail- Safe), Receive See **Section 3.1.9** for more information.	S3 Off No line bias S3 On Line biased

NOTE
If line bias is on, the RS-485 CD will ALWAYS be on. See Figure 3.
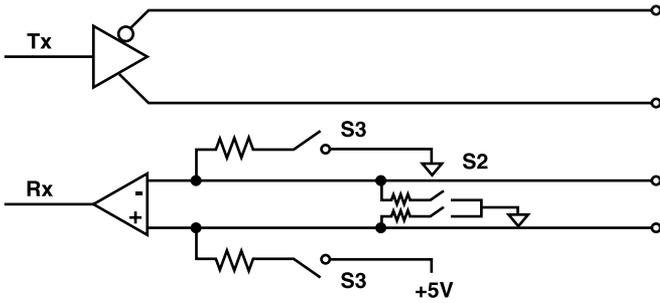
Figure 3. Line bias. S2 shows the line termination when "Term" is selected. S3 shows line bias when "Bias" is selected.
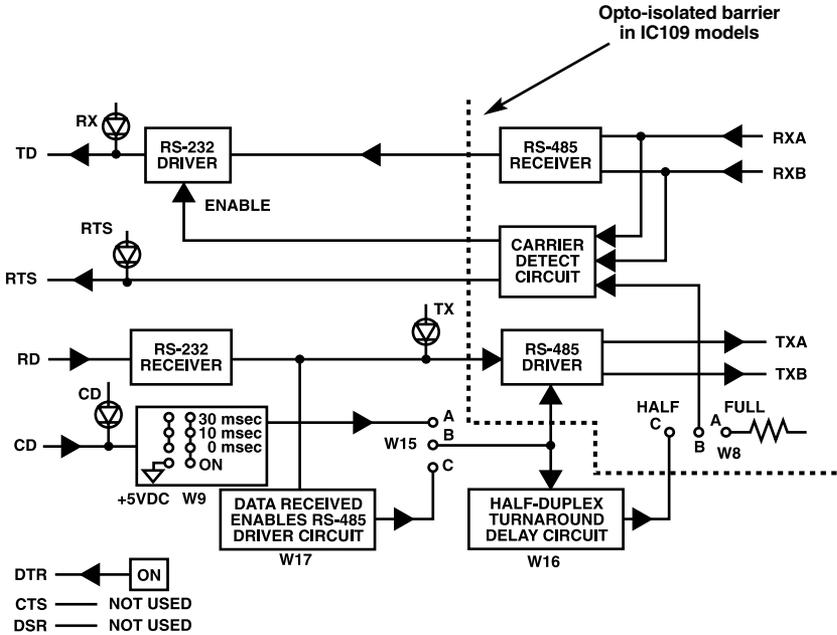
Figure 4. Simplified functional block diagram (DTE operation).

NOTE

The delay settings for W9 apply only to the RS-232↔485/422 converter's CTS output. Since CTS is not used when the RS-232↔485/422 converter is configured as a DTE device, placing jumper W9 in either the 0-, 10-, or 30-msec position will allow the CD input to enable the RS-485 driver. When jumper W9 is in the ON position, the CD input has no affect on the RS-485 driver.

Table 2. DTE jumper settings.

NOTE
For additional information on the jumper requirements, see Section 3.1.

Function	Jumper Requirements
1. Configure the RS-232 port as DTE	XW1 in B position
2. Signal ground connected to frame ground • Connected	W7 is IN (100-ohm, ½-watt resistor soldered in place)
• Not connected	W7 is OUT
3. Full or half-duplex operation • Full duplex	W8 in FULL position (4 wire, A-B)
• Half-duplex	W8 in HALF position (2 wire, B-C)
4. CTS delay	CTS not supported

5. Enable the RS-485 driver
  a. RS-485 driver enabled by
    RS-232 lead CD
	W15 in A-B position and
	W9 in 0-ms position
	W9 in 10-ms position
	W9 in 30-ms position

Table 2 (continued). DTE jumper settings.

Function	Jumper Requirements
b. RS-485 driver is enabled by data • Disable timeout delay	W15 in B-C position and W17 msec A 70 B 7 C 2 D 0.7 E 0.15
c. RS-485 driver is constantly enabled	W9 in ON position
6. Half-duplex turnaround delay • 0-msec turnaround delay • 0.1-msec turnaround delay • 1-msec turnaround delay • 5-msec turnaround delay • 35-msec turnaround delay	W8 in HALF position and W16 in position A W16 in position B W16 in position C W16 in position D W16 in position E
7. RS-485 interface is terminated or unterminated	
• Terminated	S2 in TERM position (ON)
• Unterminated	S2 in UNTERM position (OFF)
8. Normal or loopback operation	
a. Normal mode	S1 in Normal position (Released)
b. Loopback mode	S2 in Loopback position (Pressed in)

Table 2 (continued). DTE jumper settings.

Function	Jumper Requirements	
9. RS-485 Interface Line Biased (Fail-Safe), Receive	S3 Off	No line bias
	S3 On	Line biased

NOTE
**If line bias is on, the RS-485 CD will ALWAYS be on.**

3.3 Typical Applications

This section describes some typical applications where the RS-232↔485/422 converter might be used. The connections shown in the figures are for the RS-485 port.
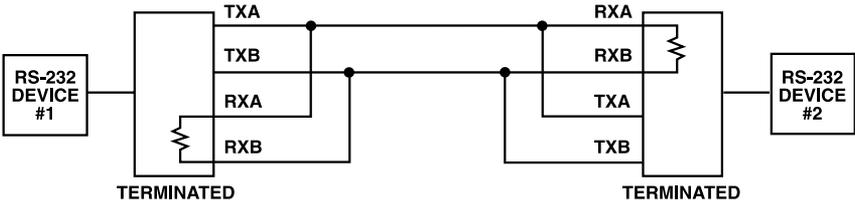
Figure 5 shows a typical point-to-point, 4-wire, full or half-duplex connection with both RS-232↔485/422 converters terminated by setting switch S2 to the TERM position. Figure 6 shows a typical point-to-point, 2-wire, half-duplex connection with both RS-232↔485/422 converters terminated by setting switch S2 to the TERM position.

In a 4-wire, full-duplex, point-to-point application, each of the drivers on the two RS-232↔485/422 converters may always be enabled without any adverse effects. See Figure 5.

In a 2-wire, point-to-point or multipoint application, only one driver may be enabled at any one time. See Figure 6. If more than one driver is turned ON, a situation known as contention occurs and the data from one driver interferes with the data from the other driver. This results in both sets of data being unintelligible or inhibits data flow altogether.
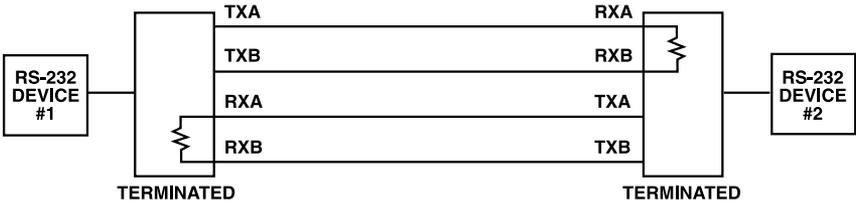
**Figure 5. Point-to-point, 4-wire (full or half-duplex).**

Figure 6. Point-to-point, 2-wire (half-duplex).

Figure 7 shows a typical multipoint, 4-wire, half-duplex connection. Figure 8 shows a typical multipoint, 2-wire, half-duplex connection. In the multipoint applications depicted in Figures 7 and 8, the devices at the extreme opposite ends of the installation are terminated by setting switch S2 to the TERM position. These devices are the two devices that have the greatest cable length between them, not necessarily the devices that are physically located the farthest apart. (See Figures 7 and 8.) A resistor shown in the circuit indicates that the termination resistor has been selected via switch S2.

NOTE

Although Figures 7 and 8 show only four RS-232↔485/ 422 converter devices networked together, up to 64 units can be connected in the manner shown in Figure 7, and up to 32 units as shown in Figure 8.
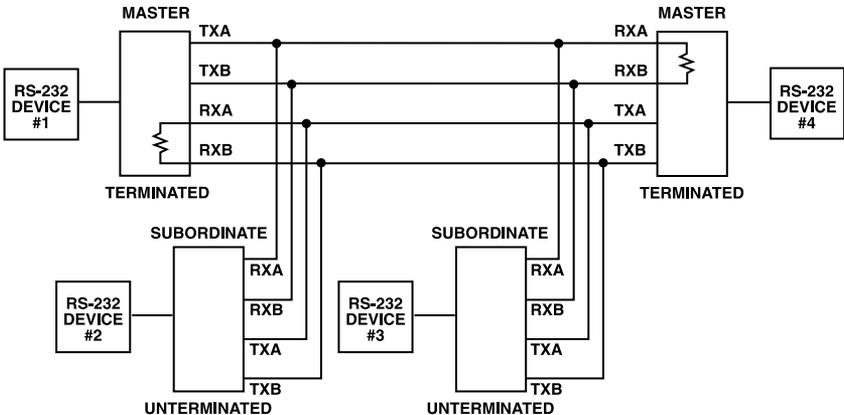
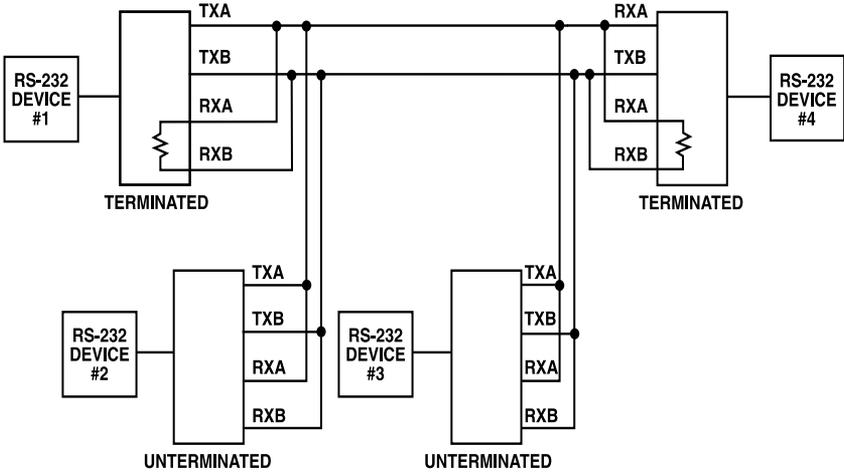
Figure 7. Multipoint, 4-wire (half-duplex).

Figure 8. Multipoint, 2-wire (half-duplex).

Example: 2-Wire Multipoint Configuration Using RTS Enable

In the following application, an industrial controller is used to gather information from several remote programmable logic controller (PLC) stations (see Figure 9). A system protocol has been defined such that all the programmable logic controllers receive the information sent by the industrial controller, but only the remote station specifically addressed will respond. In this system, the industrial controller and all the remote stations are DTE devices. The step-by-step installation procedure follows Figure 9.
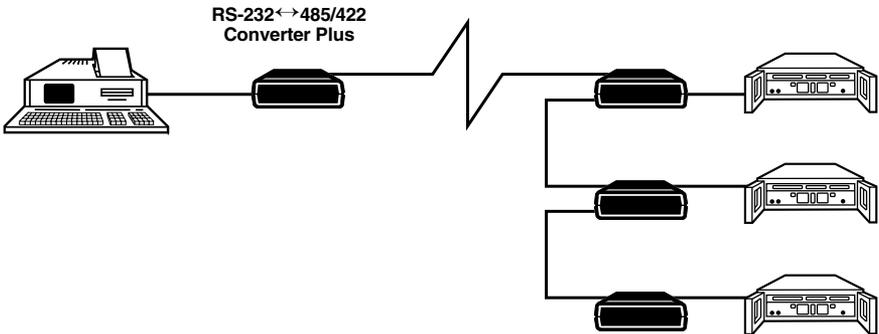
Figure 9. Sample multipoint operation.

Installation Procedure for the Multipoint Application in Figure 9

1. Set all the RS-232↔485/422 converters for DCE operation (jumper XW1 in position A).

2. Connect a straight-through cable from the RS-232 port on each RS-232↔485/422 converter to the RS-232 port on each of the PLCs.

3. Set all the RS-232↔485/422 converters for normal operation (switch S1 [the loopback switch] in the "Normal" position).

4. After a remote station has been addressed, data transmission can occur between that station and the industrial controller until the industrial controller sends a "CLEAR" command. This command causes the remote PLC to resume data logging while waiting to be addressed again. In this application, set each RS-232↔485/422 converter for half-duplex operation (jumper W8 in the "HALF" [B-C] position).

5. Connect the RS-232↔485/422 converters together via a 2-wire twisted-pair cable (see Figure 7).

6. Terminate (switch S2 in the TERM position) the two RS-232↔485/422 converters that have the greatest cable run between them and leave the others unterminated (switch S2 in the UNTERM position).

7. Since all remote PLC stations must be inactive until addressed, each remote RS-232↔485/422 converter's RS-485 driver must not be constantly enabled (each remote RS-232↔485/422 converter's W9 jumper must be set to a position other than ON—30-, 10-, or 0-msec delay). The remote PLCs are fairly far from the industrial controller in our example, so it would be wise to set the CTS Delay (jumper W9) for 10 msec. This allows the line to stabilize after a remote PLC becomes active but before it starts to transmit.

8. Set jumper W9 on the RS-232↔485/422 converter connected to the industrial controller to a delay of 30, 10, or 0 msec.

9. Set each remote RS-232↔485/422 converter's W15 jumper and the master RS-232↔485/422 converter to the A-B position. This allows the RS-485 driver to be enabled via the RS-232 control lead (in our example, RTS).

10. Jumper W16 is only used in 2-wire mode. W17 is only used in data enable mode. See Table 1. Typically, the default settings are fine.

11. This completes the configuration procedure. The system can now be activated.

Appendix. Pinning

Tables 3 and 4 show the RS-232 and RS-485 interface pinnings.

Table 3. RS-232 interface.

NOTE

Pins 9 through 25 are not used.

Pin	Circuit	Description	Signal Type	Direction when configured as	
				DCE	DTE
1	AA	Protective Ground	Ground	—	—
2	BA	Transmitted Data	Data	Input	Output
3	BB	Receive Data	Data	Output	Input
4	CA	Request to Send	Control	Input	Output
5	CB	Clear to Send	Control	Output	Not connected
6	CC	Data Set Ready	Control	Output (held high)	Not connected
7	AB	Signal Ground	Ground	—	—
8	CF	Data Carrier Detect	Control	Output	Input

Table 4. RS-485 pinning chart.

Pin Name	Description
TXA and TXB TXA=TX- TXB=TX+	Data received by the RS-232↔485/422 converter at the RS-232 port is transmitted out of the unit over twisted-pair wires via these two outputs. The TX LED indicates the state of these two leads. When the TXA lead is positive with respect to the TXB lead (a "zero" being transmitted), the TX LED is lit.
RXA and RXB RXA=RX- RXB=RX+	These are the received data inputs for the RS-485 port. The status of these leads is monitored by the RX LED. When the RXA lead is positive with respect to the RXB lead (a "zero" is being received), the RX LED is lit.

Quick Reference:
User-Selectable Options

Use this list as a quick-reference guide when you need to change the jumper settings.

An asterisk (*) designates the factory-preset jumper settings.

XW1A	DCE*	
XW1B	DTE	

W8	A-B*	4-wire
	B-C	2-wire

W15	A-B*	RTS/CD enabled
	B-C	Data enabled (Maximum speed is 64K.)

W5	A-B*	RTS/CTS delay (normal)
	B-C	RTS/CTS/CD delay (CTS inhibited if CD is present when RTS is raised.)

W9   RTS/CTS delay (The time before the RS-485 driver is enabled and CTS is asserted after RTS is asserted. The RS-485 driver is always enabled.)

A	30 msec
B	10 msec
C*	0 msec
D	ON

W17   When W15 is in the B-C (data enabled) position, this is the time the RS-485 driver remains enabled after a low-to-high transition on the DATA line to prevent disabling the driver in the middle of a character.

A	70 msec
B*	7 msec
C	2 msec
D	0.7 msec
E	0.15 msec

NOTE
This only pertains to the unit when it is in data enable mode.

°

W16 Turnaround delay (When W8 is in the B-C [2 wire] position, this
is the time after the driver is disabled and before the receiver is
enabled.)

A	0 msec
B*	0.1 msec
C	1 msec
D	5 msec
E	35 msec

NOTES

1. **W16's delay setting (0, 0.1, 1, 5, or 35 msec) only pertains to the unit in 2-wire mode (W8 set to B-C position).**

2. **If the converter is configured data enabled (W15, position B-C) and 2-wire (W8 position B-C), then delays from W17 and W16 are cumulative.**

S1 OUT* Normal
IN Loopback

S2 OFF* RS-485 Receiver Unterminated
ON RS-485 Receiver Terminated

S3 OFF* Line Bias Off
ON Line Bias On (The Carrier Detect light will come on.
Default is +5 volts.)

TB1 4-wire terminal block on unit
1 - - - - - - Rx - - - - - B+
2 - - - - - - Rx - - - - - A-
3 - - - - - - Tx - - - - - B+
4 - - - - - - Tx - - - - - A-

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