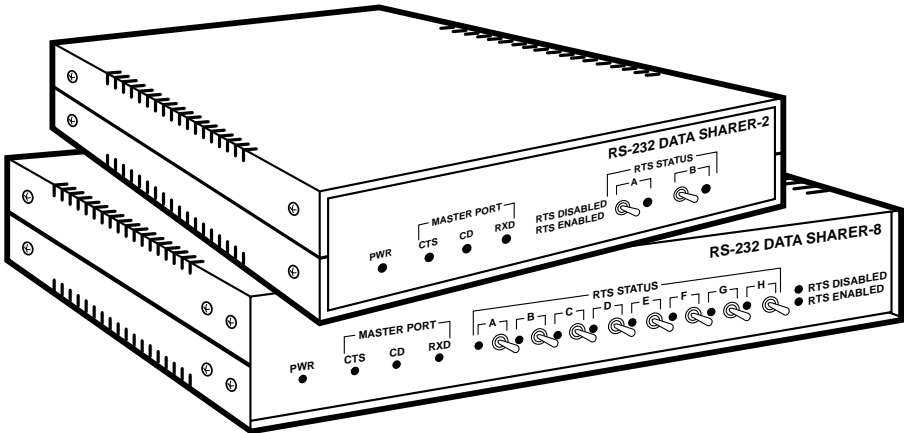




JULY 2000
TL553A-R3
TL553AE-R3
TL554A-R3
TL554AE-R3
TL601A-R2
TL601AE-R2

RS-232 Data Sharers



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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 Industry Canada.

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 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 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.

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1. Specifications

Interface	Serial EIA RS-232C/CCITT V.24; Master Port: DTE; Slave Ports: DCE
Protocol	Asynchronous or synchronous
Operation	Full- or half-duplex
Contention Type	RTS/CTS
Clock Source	External (provided by DCE)
Data Rates	Transparent to all data rates up to 115.2 Kbps
User Controls	Front-panel switches: RTS enabled/disabled; Jumpers: RTS Delay (0 or 25 ms); RXD Broadcast or Gated Mode; RTS Timeout Period (10 or 30 seconds or none); RTS Timeout Signal (RXD only or RXD and TXD)
Indicators	RS-232 Data Sharer-2: (6) LEDs (Power, RTS A, RTS B, Master Port CD, CTS, and RXD) RS-232 Data Sharer-4: (8) LEDs (Power, RTS A through RTS D, Master Port CD, CTS, and RXD) RS-232 Data Sharer-8: (12) LEDs (Power, RTS A through RTS H, Master Port CD, CTS, and RXD)
Connectors	RS-232 Data Sharer-2: (3) DB25 female data ports; RS-232 Data Sharer-4: (5) DB25 female data ports; RS-232 Data Sharer-8: (9) DB25 female data ports
Pins Supported	DB25 pins 1 through 10, 15, 17, 20, 22
Power	Data Sharers TL553A-R3, TL554A-R3, and TL601A-R2: From wallmount power supply PS154: Input: 115 VAC, 60 Hz at 100 mA; Output: 17 VAC CT at 700 mA; Data Sharers TL553AE-R3, TL554AE-R3, and TL601AE-R2: From in-line power supply PS154E: Input: 230 VAC, 50 Hz at 50 mA; Output: 17 VAC CT at 750 mA
Operating Temperature	32 to 140° F (0 to 60° C)
Storage Temperature	-4 to 158° F (-20 to 70° C)
Humidity	0 to 95% relative humidity, noncondensing

Mean Time Between Failures (ground-benign environment)	..RS-232 Data Sharer-2:	180,000 hours;
	RS-232 Data Sharer-4:	95,000 hours;
	RS-232 Data Sharer-8:	65,000 hours
Enclosure	Steel	
Size	RS-232 Data Sharer-2:	2.5"H x 8.1"W x 11.3"D (6.4 x 20.6 x 28.7 cm);
	RS-232 Data Sharer-4,	
	RS-232 Data Sharer-8:	2.9"H x 12.5"W x 11.1"D (7.4 x 31.8 x 28.2 cm)
Weight	RS-232 Data Sharer-2:	2.4 lb. (1.1 kg);
	RS-232 Data Sharer-4:	5.0 lb. (2.3 kg);
	RS-232 Data Sharer-8:	5.5 lb. (2.5 kg)

2. Introduction

The RS-232 Data Sharer allows multiple devices, such as mainframe controllers, terminals, etc., to share a single RS-232 line. You can use this device to let multiple terminals or controllers share a single modem or multiplexor port—so you spend less money on telephone-line lease charges and modem costs.

The RS-232 Data Sharer is available in three models:

- TL601A-R2 and TL601AE-R2 (RS-232 Data Sharer 2-Port)
- TL553A-R3 and TL553AE-R3 (RS-232 Data Sharer 4-Port)
- TL554A-R3 and TL554AE-R3 (RS-232 Data Sharer 8-Port)

Each of the RS-232 Data Sharers supports the following features:

- Transparency to data.
- Transparency to data rates up to 115.2 Kbps.
- Synchronous and asynchronous data transmission.
- Either hardware priority or round-robin priority for selection of terminal ports. In hardware priority, requests for access to the shared line are prioritized according to ports' letter designations: The port represented by the letter closest to the start of the alphabet is given access. In round-robin priority, access to the shared line is strictly sequential: Ports receive access in alphabetical order.
- Front-panel switches for enabling and disabling the RTS (Request to Send) signal on each input port. With this feature, you can isolate faulty units or perform process-of-elimination diagnostics. This is because when the RTS signal is disabled on a port, that port can't contend for access.
- Jumper-selectable options: RTS delay (0 or 25 ms), RXD operation (gated or broadcast mode), hardware-prioritized vs. round-robin port selection, RTS-timeout period (32 seconds, 10 seconds, or disabled), and RTS-timeout signal (RXD and TXD or TXD only)

In all applications, the Sharer shares a single RS-232 line among multiple devices. Beyond that, applications will vary depending on the function of the device connected to the Sharer's master port. Typical synchronous and asynchronous applications are described on the following pages.

2.1 Typical Synchronous Application

In this kind of application, the devices sharing the line (the “slave devices”) are usually controllers at a remote site. The shared line runs from the RS-232 Data Sharer to a modem (the “master device”) that is ultimately linked to a host computer. The controllers must be configured for multipoint modems, with the Request to Send (RTS) signal switched. RTS has to be switched because if a controller keeps RTS high, the Sharer will think the controller is streaming and deny it access to the line (see **Section 4.5**).

Suggested jumper settings for a Sharer in this type of application:

- √ Jumper W2 in A–B position (0 ms RTS delay)
- √ Jumper W3 in A–B position (RXD Broadcast Mode)
- √ Jumper W4 (4- and 8-Port Sharers only) in A–B position (sequential polling)
- √ Timeout-period jumpers in C position (timeout disabled); settings of timeout-signal jumpers irrelevant.

The RS-232 Data Sharer is transparent to communications protocol (SDLC, BSC, etc.), data-encoding technique (NRZ, NRZI, etc.), and addressing.

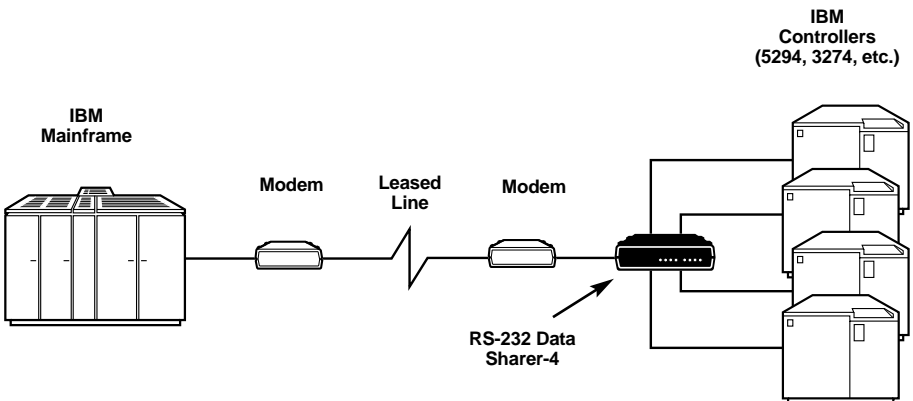


Figure 2-1. Synchronous application—an RS-232 Data Sharer in an IBM® multipoint environment.

2.2 Typical Asynchronous Application

In this kind of application, the devices sharing the line (the “slave devices”) are usually local intelligent terminals or PCs. The shared line runs from the RS-232 Data Sharer directly to a controller, processor, or host (the “master” device). The slave devices must be able to switch the Request to Send (RTS) signal and wait for the Clear to Send (CTS) signal before sending data. This is because if a slave keeps RTS high, the Sharer will think the slave is streaming and deny it access to the line. If you want any PCs or terminals that can’t toggle RTS to share an RS-232 line, call your supplier. See **Section 4.5** and step 3 in **Chapter 6**.

Suggested jumper settings for a Sharer in this type of application:

- ✓ Jumper W2 in B–C position (25 ms RTS delay)
- ✓ Jumper W3 in B–C position (RXD Gated Mode)
- ✓ Jumper W4 (4- and 8-Port Sharers only) in B–C position (hardware prioritization)
- ✓ Timeout-period jumpers in B position (10 seconds)
- ✓ Timeout-signal jumpers in A-B position (TXD only)

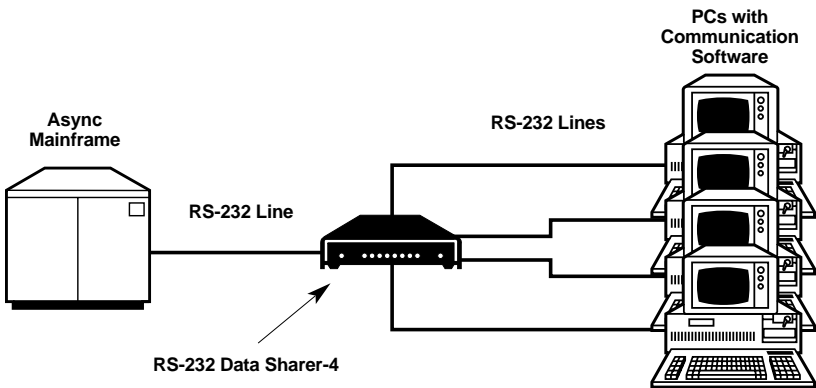


Figure 2-2. Asynchronous application—an RS-232 Data Sharer providing four PCs with access to an async host.

3. The Front Panel

All models of the RS-232 Data Sharer have similar front panels. The only difference is the number of RTS LEDs and toggle switches (depending on the model, there are two, four, or eight RTS indicators and a matching number of switches). This chapter describes each of the front-panel indicators and switches.

3.1 The LEDs

PWR

If this LED is lit, the Sharer is ON. If not, either the Sharer is OFF or it's not getting any power.

RTS

These LEDs indicate the status of the RTS signal for each port. There is one RTS LED for each terminal ("slave") port. When the Request to Send signal is raised on any of the terminal ports, the corresponding LED will light up.

Master Port CD, CTS, and RXD

These LEDs indicate when a device attached to the Master Port has asserted CD (Carrier Detect), CTS (Clear to Send), or RXD (Received Data) signals.

3.2 The RTS Toggle Switches

You can use these switches to enable or disable the Sharer's detecting an RTS signal on any of the slave ports. Disabling a port's RTS detection will prevent that port's device from accessing the modem or CPU. This feature is useful if you want to isolate a slave device, especially if the device is malfunctioning.

- **RTS Enabled** — A slave port's RTS detection is enabled when the port's switch is in the *down* position (the factory-default setting). The port's RTS LED will light when the port's device raises RTS.
- **RTS Disabled** — A slave port's RTS detection is disabled when the port's switch is in the *up* position. The port's RTS LED will always be off whether the port's device raises RTS or not.

4. Jumper-Selectable Options

Refer to Figure 4-1, below, for an overhead view of the internal circuit board of the RS-232 Data Sharer-2 model. Refer to Figure 4-2 on the next page if you have a RS-232 Data Sharer-4 or RS-232 Data Sharer-8.

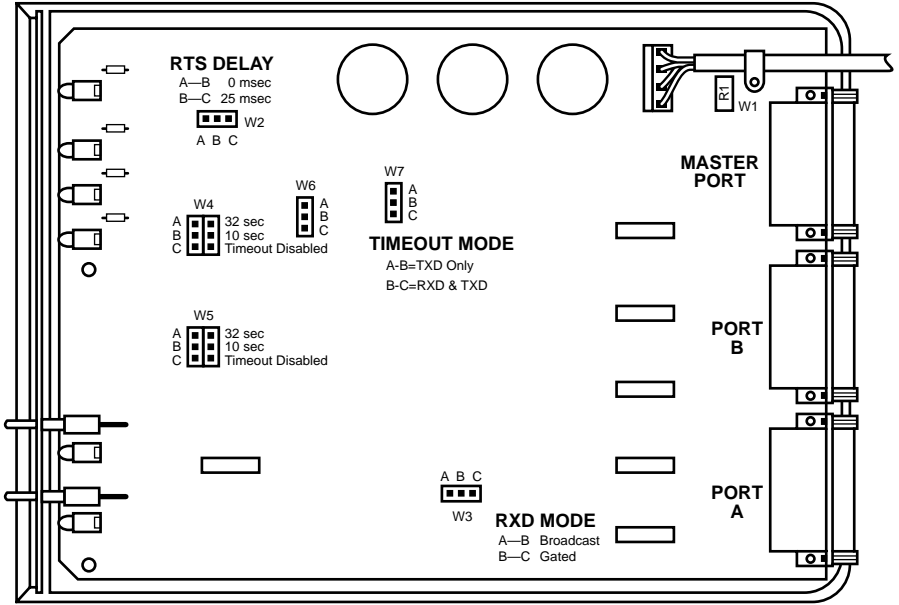


Figure 4-1. Jumper locations on the PC board of the RS-232 Data Sharer-2.

4.1 Jumper W1—Tying Signal Ground to Frame Ground

Using jumper W1, you can tie signal ground to frame ground. The position is left open at the factory. If signal ground is to be connected to frame ground, we recommend that you solder a 100-ohm, 0.5-watt resistor in location W1. You can use a wire jumper instead of a resistor, but make sure that ground-circulating currents are limited to acceptable levels.

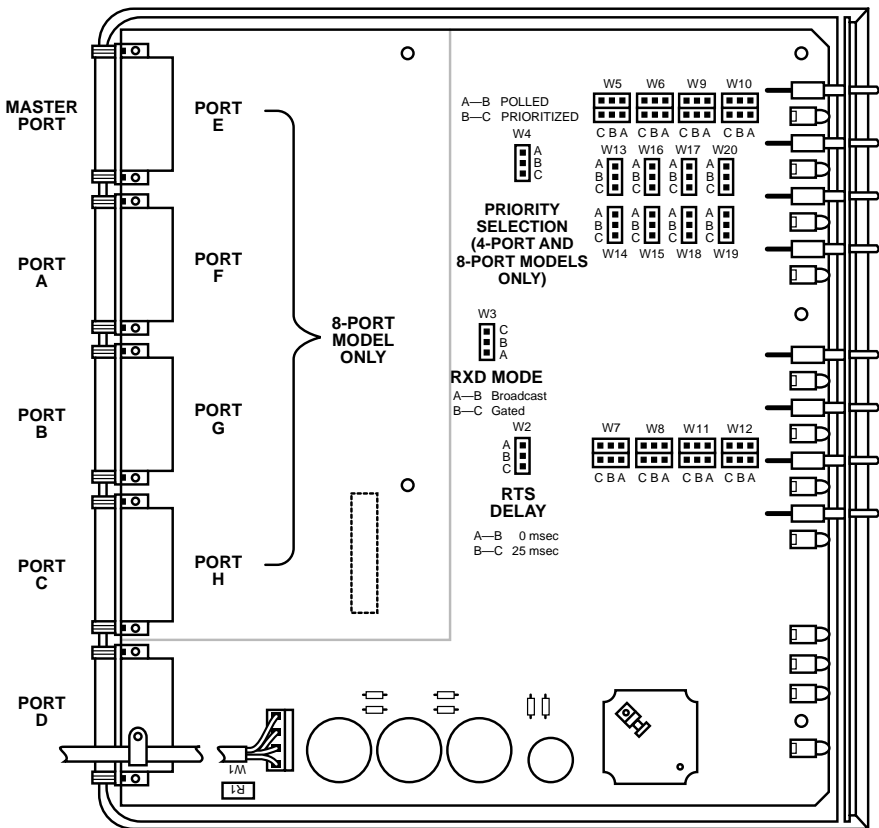


Figure 4-2. Jumper locations on the PC board of the RS-232 Data Sharer-4 and -8 models (8-port unit shown).

4.2 Jumper W2—RTS Delay

You can set jumper W2 for the amount of time you want the RTS signal to delay as it passes through the RS-232 Data Sharer from a slave port to the master port.

Settings

W2 in A–B position = 0-ms delay (no delay, factory-default setting).

W2 in B–C position = 25-ms delay as RTS goes from OFF to ON, and no delay as RTS goes from ON to OFF.

4.3 Jumper W3—RXD Broadcast or Gated Mode

Depending on which way jumper W3 is set, the Sharer will broadcast data out of all slave ports or out of only the active port.

Settings

W3 in A–B position = RXD Broadcast Mode (factory-default setting). Any data received on the RXD pin of the master port is broadcast out of the RXD pin of each slave port.

W3 in B–C position = RXD Gated Mode. Only the slave port that is currently enabled (the port that has RTS asserted) will output data on its RXD pin. All other slave ports will be forced to a marking state.

NOTE

You must be operating in full duplex to use Gated Mode. In half-duplex operation, a slave must drop its RTS signal before the master device can respond. In Gated Mode, a slave must have RTS asserted or data from the master port won't be gated through to the slave port. Since a slave port can't assert RTS and simultaneously receive data in half-duplex operation, Gated Mode is possible only in full-duplex applications.

4.4 Jumper W4—Priority Selection (4- and 8-Port Models Only)

Jumper W4 determines whether the slave ports will (a) be polled for RTS sequentially or (b) prioritized with Port A given the highest priority and Port D or H given the lowest priority.

Settings

W4 in A–B position = Sequential (round-robin) polling (factory-default setting). When the currently gated slave port drops RTS, the Sharer will begin polling each port for RTS *starting with the next port in sequence (if C drops, polling begins with D; if F drops, polling begins at G; etc.)*. The Sharer will gate through to the master port the first slave port that it detects having RTS asserted “true.”

W4 in B–C position = Hardware priority. When the currently gated slave port drops RTS, the Sharer will begin looking for RTS *starting with the highest-priority port (Port A) and continuing sequentially from there (Ports B, C, etc.) down to the lowest-priority port (Port D on 4-port models or Port H on 8-port models)*. The Sharer will gate through to the master port the highest-priority slave port that it detects having RTS asserted “true.”

4.5 Timeout Jumpers

Sometimes an RS-232 device or component malfunctions and begins to continuously assert the RTS (Request to Send) signal. This condition, called “streaming,” can cause problems in a shared-line system, because a streaming slave can monopolize the shared line and prevent the slave(s) that are still working from accessing the master.

The RS-232 Data Sharer has a mechanism to prevent this: You can set two groups of jumpers to define conditions under which the Sharer will cut off the active slave if it asserts RTS for too long in the absence of data activity. One group of jumpers are the “timeout-period jumpers,” and can be set independently for each port:

- 2-port units: W4 (Port A) and W5 (Port B)
- 4-port units: W5 (Port A), W6 (Port B), W7 (Port C), and W8 (Port D)
- 8-port units: W5 (Port A), W6 (Port B), etc., through W12 (Port H)

RS-232 DATA SHARERS

Each of these jumpers determines how long the RS-232 Data Sharer will wait before cutting off access to the slave on the corresponding port if that slave keeps asserting RTS after data activity stops:

Settings

Timeout-period jumper in A position = 32 seconds.

Timeout-period jumper in B position = 10 seconds.

Timeout-period jumper in C position = No timeout (timeout disabled) for corresponding port (factory-default setting).

The second group, the “timeout-signal jumpers,” can also be set independently for each port:

- 2-port units: W6 (Port A) and W7 (Port B)
- 4-port units: W13 (Port A), W14 (Port B), W15 (Port C), and W16 (Port D)
- 8-port units: W13 (Port A), W14 (Port B), etc., through W20 (Port H)

These jumpers determine whether the Sharer monitors only the TXD (Transmit Data) signal or both the TXD and RXD (Receive Data) signals to decide when to start or reset the timeout timer:

Settings

Timeout-signal jumper in A-B position = TXD only. The Sharer will *start* the timeout timer when the slave on the corresponding port either a) is granted access and does not transmit anything but continues to assert RTS, or b) keeps asserting RTS after it stops transmitting data. The Sharer will *reset* the timer if the slave drops RTS or resumes transmitting before the timeout expires.

Timeout-signal jumper in B-C position = TXD and RXD (factory-default setting). The Sharer will *start* the timeout timer when the slave on the corresponding port either a) is granted access and does not transmit or receive anything but continues to assert RTS, or b) keeps asserting RTS after it stops transmitting or receiving data. The Sharer will *reset* the timer if the slave drops RTS or resumes transmitting or receiving before the timeout expires.

The setting of a timeout-signal jumper is irrelevant when the corresponding timeout-period jumper is set to position C (no timeout for corresponding port).

5. Installation

I. Set all of the RS-232 Data Sharer's jumpers to suit your application:

Jumper W2 in A-B position = 0 ms RTS delay*

Jumper W2 in B-C position = 25 ms RTS delay

Jumper W3 in A-B position = RXD Broadcast Mode*

Jumper W3 in B-C position = RXD Gated Mode

Timeout-period jumpers:

2-port units: W4 and W5;

4-port units: W5 through W8;

8-port units: W5 through W12.

A position = 32-second timeout period

B position = 10-second timeout period

C position = Timeout disabled*

Timeout-signal jumpers:

2-port units: W6 and W7;

4-port units: W13 through W16;

8-port units: W13 through W20.

A-B position = TXD only

B-C position = RXD and TXD*

4- and 8-port models only:

Jumper W4 in A-B position = sequential polling

Jumper W4 in B-C position = hardware prioritized*

*Factory-default setting.

2. Connect the devices that you want to share the line to the slave ports (“Port A,” “Port B,” etc.) on the rear of the RS-232 Data Sharer. The slave ports are configured as DCE, normally requiring straight-through cabling to your DTE devices.

NOTE

When matching terminals to slave ports, keep the priority of the ports in mind. On the 2-port model, higher priority is given to Port A than Port B. On the 4- and 8-port models, when jumper W4 is set to the B–C position, highest priority is given to Port A, then Port B, then Port C, and so on, in that order.

3. Connect the modem, CPU, or other shared RS-232 device to the Sharer’s “Master Port.” The master port is configured as DTE, normally requiring straight-through cabling to your DCE device.
4. Plug in the Sharer’s power supply.
5. If you need to set the RTS Enabled/Disabled switches on the unit’s front panel differently from the default settings, do so now.

Your RS-232 Data Sharer system is now ready for continuous operation.

6. Operation (Port Selection)

Port selection is initiated by the presence of a Request to Send (RTS) signal on any slave port:

1. Any number of terminals can raise their RTS signals, and the corresponding LEDs on the front panel of the RS-232 Data Sharer will light. The RS-232 Data Sharer will activate only *one* slave port at a time. On the 2-port model, and on the 4- and 8-port models with jumper W4 set to the B-C position, the Sharer selects the active port according to hardware priority—Port A is given the highest priority, Port B has second highest priority, and so on. On the 4- and 8-port models with jumper W4 set to the B-C position, the Sharer selects as the active port the first port in its polling sequence whose attached device has RTS asserted. All other slave ports are locked out until the active port drops its RTS signal.
2. If jumper W2 is set to A-B, the Sharer asserts the RTS signal on its master port immediately; otherwise, it waits for 25 ms, then asserts RTS. The Clear to Send (CTS) and Receive Data (RXD) signals are gated back to the active port, and the Sharer is receptive to the Transmit Data (TXD) signal.

NOTE

If Broadcast Mode is enabled (jumper W3 set to the A-B position), the RXD signal will be forwarded to all slave ports.

CTS will remain high until the active slave drops RTS or the master device drops CTS.

3. If at any point the active slave begins streaming (that is, if it continuously asserts RTS without transmitting anything or—if the corresponding timeout-signal jumper is set to the B-C position—receiving anything), and the corresponding timeout-period jumper is not set to the C position (no timeout for that port), the RS-232 Data Sharer will begin a timeout countdown.

If the active slave drops RTS or begins to transmit (or, again depending on the jumper, receive) data, the Sharer resets its timer. If, on the other hand, the active slave keeps asserting RTS for the chosen number of seconds in the absence of the chosen type(s) of data activity,

the Sharer will end that slave's session and select a new active port.

When the Sharer times out a slave, it continues to monitor that slave's RTS signal. It will deny that slave any further line access (that is, it will ignore that slave's port each time it chooses a new active port) until the slave's RTS goes low and then high again (a good sign that the slave device has been reset, fixed, or replaced).

NOTE

Some asynchronous dumb terminals continuously assert RTS from the time they are powered ON until they are powered OFF. This behavior can cause an RS-232 Data Sharer to time out such a terminal and never switch back to it. If you must put such a terminal on your system, call your supplier. They might be able to provide you with equipment better suited to your application.

4. Once the active slave device drops RTS, the RS-232 Data Sharer either (a) locks onto the requesting port with the highest priority (this is the case for 2-port Sharers and for 4- and 8-port Sharers with jumper W4 in the B-C position), or (b) begins polling at the next port in sequence and locks onto the first device it detects with RTS asserted (this is the case for 4- and 8-port Sharers with jumper W4 in the A-B position).

7. Troubleshooting

7.1 Calling BLACK BOX

If you determine that your RS-232 Data Sharer is malfunctioning, *do not attempt to alter or repair the unit*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500. The problem may be solvable over the phone.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- The nature and duration of the problem.
- When the problem occurs.
- The components involved in the problem.
- Any particular application that, when used, appears to create the problem or make it worse.

7.2 Shipping and Packaging

If you need to transport or ship your RS-232 Data Sharer:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Sharer for repair, include its power supply. If you are returning the Sharer, make sure you include everything you received with the unit. Before you ship, contact Black Box to get a Return Materials Authorization (RMA) number.

Appendix: Pin Descriptions

PIN	NAME	DIRECTION		FUNCTION
		MASTER PORT (DTE)	SLAVE PORT (DCE)	
1	Frame Gnd	—	—	Hardwired; connected to all ports.
2	TXD	Output	Input	Only enabled slave device transmits to the master (signal is gated).
3	RXD	Input	Output	Master broadcasts to all slaves unless Gated Mode is selected.
4	RTS	Output	Input	When any slave goes true, master port output goes true.
5	CTS	Input	Output	CTS is gated from master device to enabled slave device. When enabled slave drops RTS, CTS is gated to the slave with the highest priority.
6	DSR	Input	Output	Master broadcasts to all slaves simultaneously.
7	Signal Gnd	—	—	Hardwired; connected to all ports.
8	CD	Input	Output	Master broadcasts to all slaves simultaneously.
9	Positive Signal (passed through from DCE device)	—	—	All Pin 9s internally interconnected (no power is supplied on this pin).
10	Negative Signal (passed through from DCE device)	—	—	All Pin 10s internally interconnected (no power is supplied on this pin).
15	TXC	Input	Output	Master broadcasts to all slaves simultaneously.
17	RXC	Input	Output	Master broadcasts to all slaves simultaneously.
20	DTR	Output	Input	When any slave goes true, master port output goes true.
22	RI	Input	Output	Master broadcasts to all slaves simultaneously.



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