

SR 4 Frame Relay

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Data Comm for Business, Inc.
PO Box 6329
Champaign, IL 61826-6329
(217) 897-6600
www.dcbnet.com

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1. DESCRIPTION

The DCB SR series frame relay multiplexers are used in pairs to allow asynchronous RS-232 devices to communicate through a single composite (network) data link. The network must be synchronous using digital data service or fractional T1 DSU/CSUs. Asynchronous terminal devices may be terminals, printers, plotters, computer ports, etc.

Each data port is configured individually at speeds up to 57,600 bps.

Network speeds may be as high as 128 Kbps synchronous.

The SR multiplexers also control the data flow to and from each RS-232 device. These individually configured flow control parameters may either be software controlled (Xon/Xoff) or hardware controlled through the RS-232D interface.

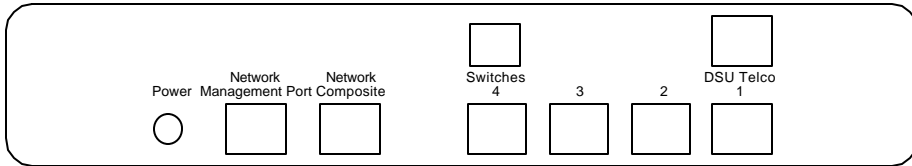
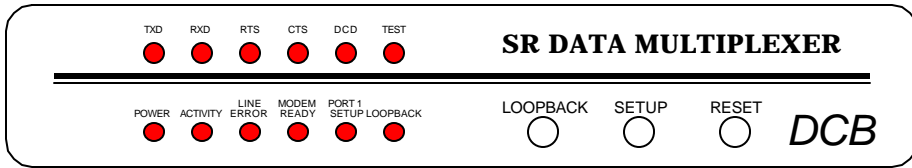
The multiplexer is configured using a network management port or port one of any unit using an asynchronous terminal or PC with terminal emulation software. Multiplexer configurations are kept in non-volatile memory.

Some features of the SR 4 include:

- Test message generation to any local or remote port.
- "Copy" commands to allow host site trainer to assist remote trainee.
- Monitor functions allow network management port user to monitor transmit or receive of any data port.
- Capture command to allow network management port user to control a remote data port.
- Many test features allow diagnostics of the system and communications link.
- Error correction on all network data.
- Power supplies available for 120 or 240VAC and for 12, 24, 48, or 125VDC.

Options:

- Built-in 56 or 64Kbps DSU/CSU.
- Rack mount options available.

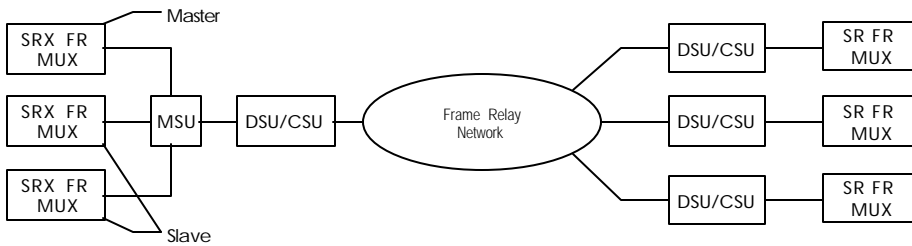


SR 4 Multiplexer shown with optional built-in DSU/CSU

APPLICATION



Point-to-Point Configuration



Point-to-Multipoint Configuration

2. SPECIFICATIONS

2.1 Product

2.1.1 Data Ports

Port Speeds

Asynchronous only

300, 1200, 2400, 4800, 9600, 19,200, 38.4 or 57.6 Kbps

Port Rate Selection

Selected per port through network management port control with an asynchronous terminal.

Data Format

10 bits/character, 1 start, 1 stop, 8 data (including parity)

Interface

CCITT V.24, RS-232D, implemented in RJ-45, 8 position connectors. (RS-561 standard physical pin-out used on RJ-45 connectors)

Port Flow Control

Input (SR control of data input to each port)

Software: Xon/Xoff

Hardware: Clear to Send

Output (Attached device control of output from each SR port)

Software: Xon/Xoff

Hardware: Busy High or Busy Low

Port Flow Control Selection

Selected per port through the network management port with an asynchronous terminal.

Buffering

32K dynamically allocated

2.1.2 Composite Port

Full Duplex

Speed

Synchronous up to 128 Kbps

Interface

RS-232D, implemented in RJ-45, 8 position connector

2.1.3 Network Management Port Commands

- Show Port Configuration
- Show Network Status
- Show Frame Relay Status
- Change Port Configuration
- Change Mux Parameters
- Change Frame Relay Configuration
- Show / Change ID
- Show Activity Counters
- Zero Activity Counters
- Flow Control
- Test Tools
 - Capture Port
 - Copy Command
 - Show RS232
 - Test Message
 - Remote Test Loop
 - Remote Port Ping
 - Monitor Port Tx
 - Monitor Port Rx
 - NMP Parity
 - Port Reset
 - Reset Mux
- Type
- Repeat Last Command
- Disconnect NMP

2.2 Environmental

Operation: -40 to +70° C, 10 to 95% relative humidity
Storage: -40 to +85° C, 10 to 95% relative humidity

2.3 Physical / Electrical

10¼" W x 9¾" D x 2½" H
120 VAC external power supply
Optional 240VAC power supply available
30 watts, .25 amps

2.4 Other Specifications

Operating Modes

- Multiplexing
- Network Loopback
- Port Loopbacks

Front Panel Indicators

- Power
- Activity
- Line Error
- Modem Ready
- Port 1 Setup
- Loopback

Front Panel Switches

- Loopback
- Setup
- Reset

2.5 Optional Built-In DSU/CSU Specifications

- Compatible with Common Carrier digital signalling
- 56 or 64 Kbps
- 4 wire digital line
- Can be used as high speed 4 wire line driver in 56K mode

3. INSTALLATION

3.1 Unpacking

Remove the SR multiplexer from the shipping container and examine it carefully for external damage. If shipping damage is apparent, notify the shipper immediately.

The following accessories are included with all SR multiplexers:

- external power supply
- manual
- warranty, maintenance contract and repair information
- Modem to Composite cable (black) for connecting the SR to an external DSU/CSU
- Network Management Port cable (green) for connecting the SR network management port to an asynchronous terminal or PC for configuration
- If your unit has the optional built-in DSU/CSU, a cable is also included for connection to the phone line.

3.2 Setup

The frame relay firmware for the SR series multiplexer can be configured using the Frame Relay (FR) command from the network management port. The configurable parameters are:

Line (Type) - Single Mux or Multiple Mux
Management (Type) - Auto, LMI, Annex D or None
DLCI - Data Link Connection Identifier (Default and Alternate)
Poll Interval - (5-30 sec)
Full Status Interval - (1-255 polls)

3.2.1 Line Type

A normal point-to-point circuit will have a single SR frame relay multiplexer at each end. However, at the host end of point-to-multipoint applications, multiple SRX frame relay multiplexers can be connected to a single frame relay access line using modem sharing units. In this configuration, one multiplexer at the host is configured as the Master and all the others are Slave.

3.2.2 Management Type

When set to AUTO, the multiplexer will automatically determine the correct management type for your network. If you are connecting multiple multiplexers at the host, the Master must be set for LMI or Annex D (the AUTO setting will determine this automatically). The Slaves will default to NONE.

3.2.3 DLCI

In a point-to-point configuration, the DLCI will be automatically loaded when the unit is put on line. In a point-to-multipoint environment, the SRX host multiplexer(s) must be mapped using the DLCIs that correspond to each remote location. Your service provider should supply you a list of DLCIs for your network. These should match the DLCIs listed on the last line of the Show Status (SS) command screen of the Master SRX multiplexer.

Beginning with firmware version 3.3 / 5.3 the SR/FRAD multiplexer has the ability to automatically switch the network connection between two different DLCIs when set for Multi-Mux operation. When set for Multi-Mux Master or Slave, the FR command will ask for a Default DLCI first and then an Alternate DLCI. If zero (0) is entered for the alternate DLCI, only the default DLCI will be used. If a valid DLCI is entered for the alternate, then the SR/FRAD automatically switches to the alternate DLCI approximately two (2) minutes after it stops communicating with the remote SR/FRAD using the default DLCI channel. Note that it switches to the alternate DLCI only if that alternate DLCI appears in the active DLCI list returned in the last full status response from the local frame relay switch. The SR/FRAD remains connected to the alternate DLCI until that channel stops working. At power on or hard reset, the SR/FRAD always starts with the default DLCI.

3.2.4 Poll Interval

The poll interval determines how often a "keep alive" frame is sent to the network. The default is 10 seconds. This is adequate for most installations.

3.2.5 Full Status Interval

The full status interval determines how often a full status request is sent to the network. The default is 6 polls. So every sixth poll will be a full status request.

The multiplexer must be configured properly to connect to the local frame relay network. In most cases, the default settings will work. In addition, each data port must have the proper speed, parity and flow control settings to match the attached device. If changes are required, use the network management port FR and CP commands (see Section 5).

3.3 Connecting the DSU/CSU

Connect the DSU/CSU to the phone line and power ON the DSU/CSU. Confirm the presence of carrier at each DSU/CSU. If carrier is not detected at both ends, recheck the option settings. If carrier is still not present, check the cable from the telephone line to the DSU/CSU. If everything is correct and still no carrier call the manufacturer of the DSU/CSU or contact the telephone company for assistance.

Connect the SR composite port to the DSU/CSU using the Modem to Composite cable supplied.

Connect the multiplexer to power. The Power, Activity and Modem Ready indicators on the front panel of the SR must be ON indicating the on-line condition. (See Section 4). This may take up to one minute. If Line Error and Activity continue to flash, the multiplexer was unable to connect to the local frame relay network. Use the SS command to see if the network is responding to Full Status and Keep Alive messages. If not, contact the telephone company for assistance.

3.4 Optional Built-In 56 or 64 Kbps DSU/CSU

The optional DSU/CSU is configured using DIP switches accessible from the rear of the unit. See Section 4 for a description and location of these switches. The default settings should be correct for most applications.

For line driver applications over customer owned wire (56K only), set one unit for Master Clock and the other unit to Slave Clock.

3.5 Cabling

Cabling between the multiplexer and the computer ports or terminal devices is a common source of installation problems. The SR must have data from attached terminal devices or computer ports, as an input on Position 6 of the RJ45 connector. Data from the SR to any attached equipment will be transmitted on position 5 of the RJ45 connector. See paragraph 6.1 for position location on the RJ45 connector.

See Section 6 to determine the correct cables for your computer and terminal devices.

3.6 Parity Considerations

SR multiplexers transfer all character bits whether it is 7 data bits plus parity or 8 data bits. The SR does not verify parity for each character transferred. Consequently, the parity setting of the devices at either end of an SR channel must match. Because of this ability to transfer 8 bits transparently, the SR can transfer graphic characters, binary files and support "PC terminals."

Why XON/XOFF parity settings?

Parity only becomes an issue if you are using XON/XOFF flow control. The SR must know what to send for the parity bit of the XON and XOFF characters. The attached devices will not recognize the flow control characters if the parity is not correct. Also, the SR must know which character to interpret as an XON or XOFF when received from the attached device.

Remote site XON/XOFF parity settings.

When setting XON/XOFF flow control at a remote site, set the parity of the SR port to match the attached device. If the device is set for EVEN parity, set the SR port for XE (XON/XOFF Even). If the attached device is set for ODD parity, set the SR port for XO (XON/XOFF Odd). If you are using 8 data bits and no parity, set the SR port for XS (XON/XOFF Space). For the XON/ XOFF characters, the SPACE parity setting is the same as 8 data bits no parity.

Host site XON/XOFF parity settings.

Since the host computer can process data faster than we can type, it will never issue flow control to stop the inflow of data. If an XON or XOFF character is issued by the CPU, it is for a status or initialization function and not flow control. Because of this activity, the host SR must pass the XON/XOFF character to the remote end and not act upon it. To accomplish this task, the SR has an XON/XOFF Transparent setting. When set for Transparent, the SR will pass the XON/XOFF characters to the other end without taking flow control action. When using XON/XOFF flow control, set the host computer side SR ports to XT (XON/XOFF Transparent).

Host site parity determination.

When the host site SR port is set for XT (XON/XOFF Transparent), parity is not specified for the XON or XOFF characters to be issued. The SR will determine the parity for the XON/XOFF characters as follows:

1. If the flow control setting is for XT (XON/XOFF Transparent), the SR will interrogate the other SR multiplexer for the parity setting of the corresponding port.
2. If the corresponding port is set for XE(Even), XO(Odd), XM(Mark) or XS(Space) flow control, the SR will use the matching parity.
3. If the corresponding port is set for XT(Transparent) or any of the CTS flow control options, the SR will default to Space parity (same as 8 data bits-no parity).

3.7 Flow Control and Rate Tips

Individual port options are set through the network management port or through port 1 setup. (See Section 5).

Flow control options are the most critical and the most common source of installation problems. If the flow control is improperly implemented data loss may occur.

If you are using software flow control (Xon/Xoff) double check the parity settings. Make sure that the Parity is set the same at the CPU, remote SR and attached devices. If your system uses 8 bits, no parity (8,N,1), set the host multiplexer ports for Xon/Xoff Transparent (XT) and set the remote ports for Xon/Xoff Space (XS).

If half of your characters are good and half are bad, there is a parity setting mismatch between the CPU and terminal device.

When using hardware flow control, double check the cabling (see Section 6). For input flow control (data flow into the SR) Clear To Send, position 7 of the RJ45 connector, is used. For output flow control (data output from the SR to a terminal or printer) Busy high or low, position 3 is used.

Using the network management port, issue the “AC” command (Activity) to see information about port errors and retransmissions. Port errors indicate either speed, parity or both are incorrectly set. The “SC” command (Show Configuration) can be used to confirm each port is set correctly.

3.8 Resetting Factory Defaults

The factory default settings for the SR multiplexer ports are as follows:

Data Ports:

| | |
|--------------|---------------------|
| Loop | OFF |
| Flow Control | XS (XON/XOFF Space) |
| Rate | 9600 |

Composite Port:

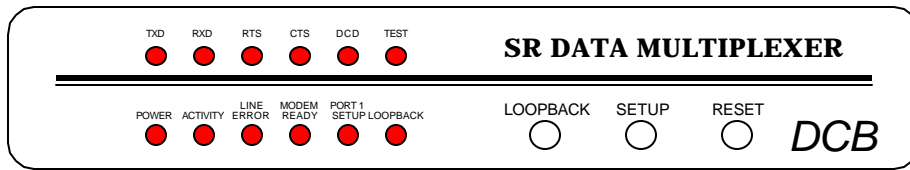
| | |
|------------------|-------------|
| Modem type | SYNC |
| Line type | Leased Line |
| Error Correction | ON |

To reset the unit to factory defaults use the !R command from the network management port or perform the following steps using the front panel switches:

1. Depress and hold the SETUP switch while depressing the RESET switch.
2. Be sure to continue to hold the SETUP switch until its LED has gone OFF and returned ON.
3. Release and depress the SETUP switch again to return management control to the network management port.
4. All port settings should be at the factory defaults. Use the SC (Show Configuration) command to check the port settings.

4. CONTROLS AND INDICATORS

4.1 Switches



4.1.1 Front Panel Switches (shown with built-in DSU)

Setup – Maps the network management port commands to the terminal attached to data port 1. When Port 1 Setup is active, the indicator is on.

Loopback – The loopback function is disabled in this product.

Reset – Performs a hardware reset of the multiplexer.

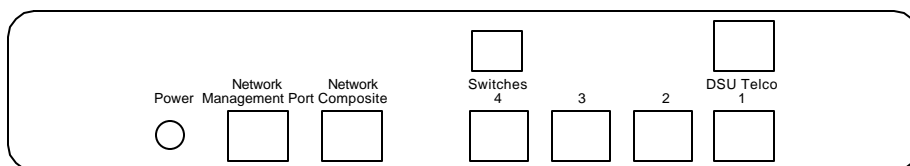
4.1.2 Optional Built-In DSU Switches

The DSU switches are located at the rear of the unit. Switch functions are shown in the following table:

| Switch | Down | Up |
|--------|--------------|----------------|
| 1 | 56K | 64K (optional) |
| 2 | Slave Clock | Master Clock |
| 3 | Must Be Down | |
| 4 | RTS Normal | RTS Forced ON |
| 5 | Normal | Local Loop ON |
| 6 | Not Used | |

NOTE

RTS mode (sw 4) is active in 56Kbps mode only. In 64Kbps mode, RTS is forced on.



For normal operation with a telephone company line, set the DSU for SLAVE clock timing (switch position 2 DOWN). For in-house line driver applications (56K only), set the host DSU for MASTER timing (switch position 2 UP). The remote unit should remain set for Slave clock.

4.2 Multiplexer Indicators

POWER – is ON when the SR is connected to power.

ACTIVITY – three states:

ON – multiplexing mode with no data activity.

FLICKERING – multiplexing mode with data activity (the ACTIVITY indicator flickers off for every 16 blocks of data).

FLASHING SLOWLY – the multiplexer has lost communication with the local frame relay network. If LINE ERROR is also flashing, Data Carrier Detect has been lost indicating a major composite link problem.

LINE ERROR – flashes when an error is detected in received data.

MODEM READY – four states:

ON – Data Carrier Detect and Clear to Send are present from the composite link device indicating an active composite link.

FAST FLASHING – composite link is active but there are 10 blocks of data outstanding without a response from the remote multiplexer.

SLOW FLASHING – composite link modem is retraining and flashing Data Carrier Detect or Clear to Send upon each retrain indicating a problem with the composite link.

OFF – Data Carrier Detect or Clear to Send is not present from the composite modem or DSU/CSU indicating a problem with the composite link.

PORT 1 SETUP – is ON when the network management port functions have been mapped to data port 1 by depressing the front panel switch. To return these functions to the network management port, depress the front panel switch again.

LOOPBACK – The loopback function is disabled in this product.

The following table shows the relationship between composite DCD and CTS and the front panel MODEM READY and ACTIVITY indicators.

| DCD | CTS | MODEM READY | ACTIVITY |
|-----|-----|-------------|----------|
| HI | HI | ON | ON |
| LO | LO | OFF | Flash |
| LO | HI | OFF | Flash |
| HI | LO | OFF | ON |

4.3 Optional DSU/CSU Indicators

| | | |
|------|-------------|--|
| TxD | Flashing | Data is being sent over the link. |
| RxD | Flashing | Data is being received from the link. |
| RTS | ON | Forced on or high from the multiplexer. |
| | OFF | No RTS from the multiplexer. |
| CTS | Follows RTS | CTS signal to the multiplexer. |
| DCD | ON | Normal condition. |
| | OFF | No carrier signal received from the far end. |
| TEST | ON | Unit is in loopback (DIP switch 5 UP) |
| | Flashing | Telephone line in loopback. |

5. NETWORK MANAGEMENT PORT

5.1 Introduction

The Network Management port (NMP) is used to configure the SR multiplexer for proper operation. This connection must be used to configure the SR composite and data ports. The NMP can also be used to configure remote SR ports after a link is established between the host and remote sites.

5.2 Connections and Setup

Connection to the NMP is made either through a port on the rear of the multiplexer or by using Port 1 Setup.

5.2.1 Port 1 Setup

The easiest way to access the NMP functions is by using a terminal connected to port 1 of the multiplexer. A switch located on the front panel performs this function. See paragraph 4.1.1 for information. This option cannot be used if a printer is connected to port 1.

5.2.2 Dedicated Terminal or PC

The NMP functions are also available through a port on the rear of the unit labeled Network Management Port. To connect a dedicated terminal to this port, use the green cable provided and the appropriate adapter for either a terminal or PC. Set the terminal device for 9600 bps, 8 data bits, no parity, one stop bit and no flow control.

5.2.3 Dedicated Modem

For remote access to NMP functions, a dial-up modem may be connected to the Network Management Port. You must fix the DTE interface speed of the modem at 9600 bps, 8 data bits, no parity and one stop bit. Refer to your modem manual for appropriate setup procedures. Use the appropriate cable from paragraph 6.3.3 for connection.

5.3 Using the Network Management port

To activate the NMP, press the ENTER key. When you see **AT YOUR COMMAND >>**, the NMP is active and ready for your commands. Type H <Enter> to display the command set.

5.4 Commands

5.4.1 Help (H or ?)

| <u>COMMAND</u> | <u>LOCAL</u> | <u>REMOTE</u> | <u>PARAGRAPH</u> |
|------------------------|--------------|---------------|------------------|
| Show: Config | SC | RSC | 5.4.2 |
| Network | SN | | 5.4.3 |
| FR Status | SS | RSS | 5.4.4 |
| Change: Port Config | CP | RCP | 5.4.5 |
| MUX Param | CO | RCO | 5.4.6 |
| FR Config | FR | | 5.4.7 |
| Set ID | ID | RID | 5.4.8 |
| Activity Counters/Zero | AC/Z | RAC | 5.4.9 |
| Flow Control | FC | | 5.4.10 |
| Test Tools | TT | | 5.4.14 |
| Type | TY | RTY | 5.4.11 |
| Repeat Last Command | * | | 5.4.12 |
| Disconnect NMP | BYE | | 5.4.13 |

This Help screen shows the choice of commands available. The commands allow you to display the selected options (Show network and configuration), configure the SR (Configure ports and Set ID), and perform many different diagnostic functions such as send a test message, monitor data, perform loopbacks, show flow control state, show activity and other useful tests.

5.4.2 Show (Port) Configuration

The Show Config (SC) command shows the current port configuration settings for either the local or the remote (RSC) ports. Port numbers may be included with this command to limit the display range. If no port numbers are included, settings for all ports are shown. Use this command to verify proper port configuration.

NOTE

Several commands allow port numbers or port number ranges to be included on the command line. When port numbers are included, the syntax is as follows:

| | |
|----------------|----------------------|
| (Command)1 | Port 1 |
| (Command)1,2,6 | Ports 1, 2 & 6 |
| (Command)1 2 6 | Ports 1, 2 & 6 |
| (Command)2-6 | Ports 2 thru 6 |
| (Command)1,5-8 | Ports 1 and 5 thru 8 |

5.4.3 Show Network (Configuration)

The Show Network (SN) command displays the current network (composite port) configuration and multiplexer mode of operation.

Configuration parameters include SYNC or ASYNC, LEASED LINE or DIAL-UP and ERROR CORRECTION ON or OFF.

Operating modes are OFF LINE, ON-LINE MUXING, and LOOPBACK MUXING.

5.4.4 Show Frame Relay Status

The Show Status (SS) command displays a report of frame relay statistics including error status.

5.4.5 Change Port Configuration

The Change Port Config (CP / RCP) command sets the data port loopback, flow control and rate configuration for each data port. Follow the prompts and examples on the screen to select the port(s) and parameter(s) you wish to change. One or more ports may be set with a single command by selecting a range of port numbers. The factory default setting is Xon/Xoff Space, 9600 bps.

5.4.6 Change Multiplexer Parameters

The CO / RCO command allows configuration of global data port parameters. These include RTS Data Gate and Data Carrier Detect. For most systems, these settings will never have to be changed.

The RTS Data Gate is used to insure that no data is transmitted from a data port unless RTS is high from the attached device. This will sometimes stop "streaming" ports.

The state of Data Carrier Detect is critical to proper operation of some host computers. Many computers depend on DCD to issue login prompts. If your host does not issue logins properly, you may need to change this setting.

5.4.7 Change Frame Relay Configuration

The Frame Relay (FR) command is used to set the frame relay parameters. A list of current settings is displayed followed by prompts for new settings. To change a setting, follow the prompts. If the current setting is correct, press <Enter> to leave the setting unchanged.

5.4.8 Set ID

The Set ID (ID / RID) command allows you to set or change either the local or remote multiplexer identifier. IDs can be a maximum of 15 characters in length. Pressing <Enter> with no entry will leave the ID unchanged.

5.4.9 Activity Counts / Zero

The Activity Counts (AC / RAC) command shows transmit and receive data statistics for all ports. The data are presented in terms of blocks of information sent and received by the network and each data port. Error counts are also shown. A range of ports may be included with this command to reduce the number of ports shown.

The Z command is used to zero the counters so that current activity can be monitored.

5.4.10 Flow Control

The Flow Control (FC) command displays the current port flow control status for both local and remote ports. A port range may be included with this command.

5.4.11 Type

The Type (TY) command displays information about the local multiplexer including firmware version, number of ports and multiplexer ID. The Remote Type (RTY) command is used to display similar information about the remote multiplexer.

5.4.12 Repeat Last Command

To repeat the last command, simply press the * key. This is handy for repeating screens of constantly changing data.

5.4.13 Disconnect NMP

The BYE command toggles the CTS output from the Network Management port. This is used to disconnect equipment such as dial-up modems or the DCB Access Switch.

5.4.14 Test Tools

The Test Tools (TT) menu summarizes the test and troubleshooting commands. These commands are listed separately to reduce the clutter in the main help list, but are always available from the command prompt.

| <u>COMMAND</u> | <u>LOCAL</u> | <u>REMOTE</u> | <u>PARAGRAPH</u> |
|------------------|--------------|---------------|------------------|
| Capture Port | CA# | RCA# | 5.4.15 |
| Copy Command | CC# | RCC# | 5.4.16 |
| Show RS232 | SR | RSR | 5.4.17 |
| Test Message | TM# | RTM# | 5.4.18 |
| Remote Test Loop | | RTL# | 5.4.19 |
| Remote Port Ping | | RPP# | 5.4.20 |
| Monitor Port Tx | MT# | | 5.4.21 |
| Monitor Port Rx | MR# | | 5.4.21 |
| NMP Parity | P | | 5.4.22 |
| Port Reset | PR | | 5.4.23 |
| Reset MUX | RESET | RRESET | 5.4.24 |

5.4.15 Capture Port

The Capture Port command (CA#) permits the network management port to capture any of the local ports. While this command is active, the normal data path is interrupted and a two-way communication link is established between the network management port and the captured port. A port number must be included on the command line.

The Remote Capture port command (RCA#) connects the network management port to a remote multiplexer port. During this time, normal data communications are suspended and the NMP terminal can talk directly to captured port.

The Capture commands are active until two consecutive ESC characters are issued.

5.4.16 Copy Command

The Copy Command (CC#) is used for training. This command is used when the instructor is at the host site and the trainee is at the remote. The command is followed by the port number to which the trainee's terminal is attached.

After the command is entered, all data from the local port will be displayed on both terminals. Keyboard inputs from either terminal will be sent to the host port.

The Remote Copy Command (RCC#) performs the same function when the instructor is located at the remote site. This command is used only at the remote site.

The Copy commands are active until two consecutive ESC characters are issued by the instructor.

5.4.17 Show RS-232

The Show RS-232 (SR) command shows the current state of RS-232 control signals on the local ports. A range of port numbers may be included to limit the display.

The Remote Show RS-232 (RSR) command shows the status of RS-232 control signals at the remote ports. As with the SR command, a range of port numbers may be included on the command line.

5.4.18 Test Message

The Test Message (TM#) command sends a Quick Brown Fox... message to a local port. The QBF message continues until any key is pressed on the network management port terminal. A local port number must be included on the command line.

The Remote Test Message (RTM#) command sends a QBF test message to a remote port. The message continues until any key is pressed on the network management port terminal. The number of the remote port must be included on the command line.

5.4.19 Remote Test Loop

The Remote Test Loop (RTL#) command is used to test a data path from end to end. This command enables port loopback in the remote multiplexer, then sends a test message to that port. If everything is working correctly, the test message is displayed on the network management port terminal. A remote port number must be included on the command line.

5.4.20 Remote Port Ping

The Remote Port Ping (RPP#) command measures the echo time of a single character, on the selected port, and displays the result in milliseconds. This information is useful when troubleshooting the frame relay network. Excessive delay may indicate problems with the network configuration. To stop pinging, press any key.

5.4.21 Monitor Port TX or RX

The Monitor Port TX (MT#) command monitors data transmitted from the selected port to the corresponding port of the remote multiplexer. The Monitor Port RX (MR#) command monitors data received by the selected port from the corresponding port of the remote multiplexer. A local port number must be included on the command line.

When port monitor is active, two ESC characters are needed to end the test.

5.4.22 NMP Parity

The NMP Parity command (P) sets the parity for the network management port. The factory default is SPACE (8,N,1).

5.4.23 Port Reset

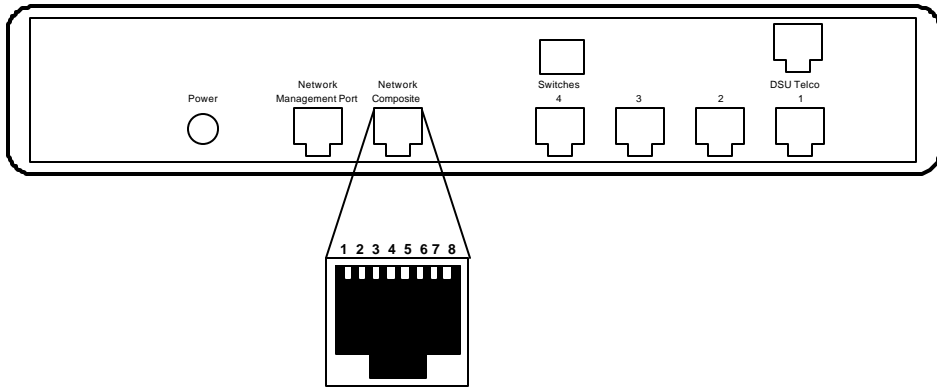
The Port Reset (PR) command is used to reset flow control to hung ports. A range of local port numbers or ALL may be included with this command. Flow control leads at both the local and remote ports are reset.

5.4.24 Reset Mux

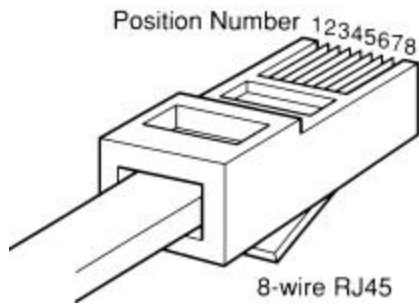
The Reset Mux (RESET) command performs a local multiplexer reset. To reset the remote multiplexer use RRESET.

6. INTERFACE SIGNALS AND CABLING

6.1 Connector Location and Pin Reference



SR 4 Rear Panel and RJ-45 Jacks



RJ-45 Plug Positions

6.2 Port Interface

6.2.1 Composite Port (RJ-45)

| <u>Pin</u> | <u>Signal</u> | <u>In/Out</u> |
|------------|---------------------|---------------|
| 1 | Receive Clock | IN |
| 2 | Transmit Clock | IN |
| 3 | Data Carrier Detect | IN |
| 4 | Signal Ground | |
| 5 | Transmit Data | OUT |
| 6 | Receive Data | IN |
| 7 | Request to Send | OUT |
| 8 | Clear to Send | IN |

6.2.2 Data Ports (RJ-45)

| <u>Pin</u> | <u>Signal</u> | <u>In/Out</u> |
|------------|---------------------|---------------|
| 1 | Data Set Ready | OUT |
| 2 | Data Carrier Detect | OUT |
| 3 | Busy | IN |
| 4 | Signal Ground | |
| 5 | Receive Data | OUT |
| 6 | Transmit Data | IN |
| 7 | Clear to Send | OUT |
| 8 | Request to Send | IN |

6.2.3 Network Management Port (RJ-45)

| <u>Pin</u> | <u>Signal</u> | <u>In/Out</u> |
|------------|---------------------|---------------|
| 1 | Not Used | |
| 2 | Not Used | |
| 3 | Data Carrier Detect | IN |
| 4 | Signal Ground | |
| 5 | Transmit Data | OUT |
| 6 | Receive Data | IN |
| 7 | Request to Send | OUT |
| 8 | Clear to Send | IN |

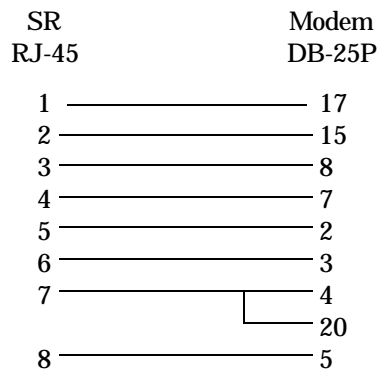
6.2.4 Optional Built-In DSU Interface (RJ-48S)

| <u>Pin</u> | <u>Signal</u> | <u>In/Out</u> |
|------------|---------------|---------------|
| 1 | Transmit Data | OUT |
| 2 | Transmit Data | OUT |
| 7 | Receive Data | IN |
| 8 | Receive Data | IN |

6.3 Cables

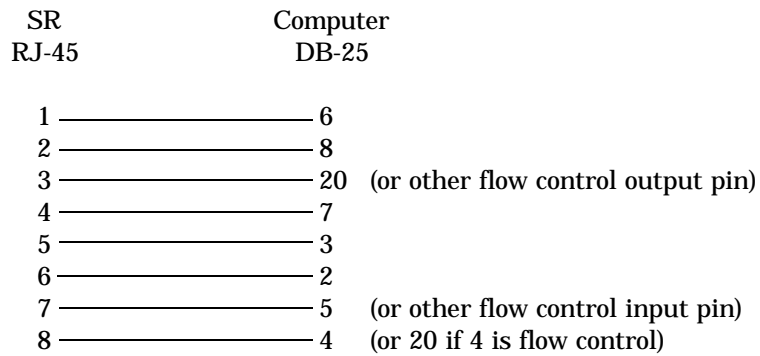
6.3.1 Composite Port to Modem

A two foot composite to modem cable is included with each SR multiplexer. The configuration is as follows:



6.3.2 Data Ports to Host Computer

Configured as DTE



6.3.2 Data Ports to Host Computer, continued

Configured as DCE

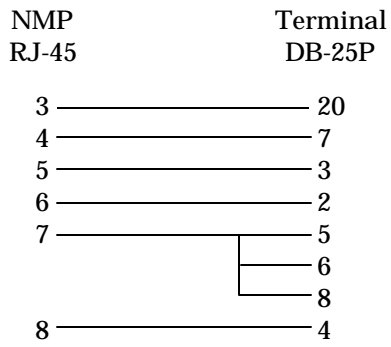
| SR RJ-45 | Computer DB-25 |
|-------------|--------------------------------------|
| 1 | |
| 2 | 20 (or 4 if 20 is flow control) |
| 3 | 5 (or other flow control output pin) |
| 4 | 7 |
| 5 | 2 |
| 6 | 3 |
| 7 | 4 (or other flow control input pin) |
| 8 | 8 |

To a PC Com Port

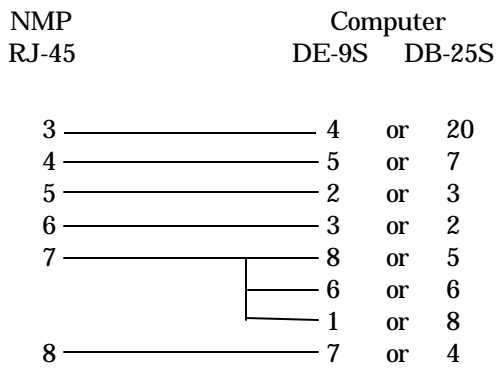
| SR RJ-45 | Computer DB-25S | DE-9S |
|-------------|--------------------|-------|
| 1 | 6 | or 6 |
| 2 | 8 | or 1 |
| 3 | 4 | or 7 |
| 4 | 7 | or 5 |
| 5 | 3 | or 2 |
| 6 | 2 | or 3 |
| 7 | 5 | or 8 |
| 8 | 20 | or 4 |

6.3.3 Network Management Port

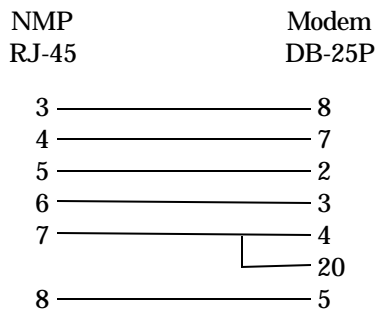
To a TERMINAL



To a PC using terminal emulation

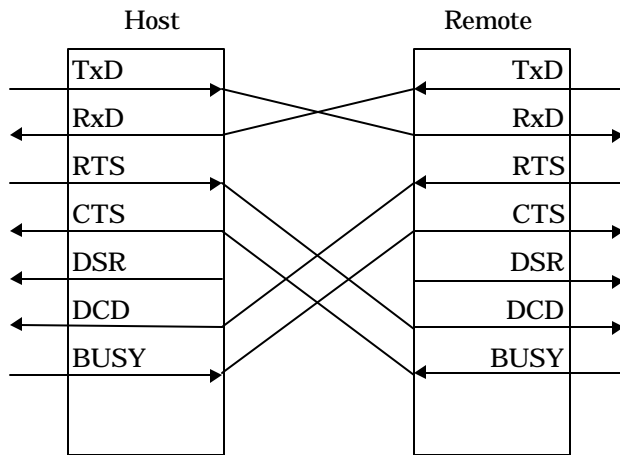


To a dial-up MODEM for remote access



6.4 Signal Paths through Multiplexers

The following diagram shows the signal flow between data ports of two SR multiplexers.



Transmit Data to Receive Data is the normal required path for data flow.

RTS to DCD is a hardware handshake path used to wake up the remote device. Many host computers require DCD to issue a login prompt.

Busy to CTS is the hardware flow control path. For CTS/Busy flow control, the hardware flow control pin of the attached device must be wired to Busy on the multiplexer.

The DSR output of the multiplexer port is always asserted (high).

7. TROUBLESHOOTING

7.1 General Approach

When troubleshooting problems, a rational plan can save you many hours of frustration. The following is a brief outline of standard troubleshooting procedures.

1. Gather the facts to determine the exact nature of the problem.
2. Draw a picture of the system showing the equipment at both the host and remote ends and the phone lines or in-house wiring. Use this as a reference to note your observations, test steps and test results. A picture keeps you focused and often saves duplicate effort.
3. Record the front panel indications before changing anything. This is an important part of fact gathering
4. If you change anything, change only one thing at a time.
5. Use the built-in test functions and record your results.

7.2 Loopback Tests

It is best to begin loopback testing at the remote terminal and work toward the host. If all the loopbacks are successful, the data communications equipment and the terminal are working correctly.

Put the remote multiplexer port in loopback and have someone type alpha characters on the keyboard of the affected terminal. If the characters appear correctly on the screen, the port is working. Next loop the associated port of the host multiplexer. If characters again appear correctly, the communications link and the ports on both multiplexers are working correctly. The problem then is with the host computer port or the cable between the host computer and the multiplexer.

Port loopbacks can be turned on and off from the Network Management port of the multiplexer. If a NMP terminal is not available, port loopback can be enabled using the Port 1 Setup function of the remote multiplexer

7.3 Installation Troubleshooting, DSUs

First, set up the DSUs without connecting the multiplexers. The DSUs should be set to constant carrier, also called forced Request To Send, or constant RTS.

Carrier Detect should be ON at both locations.

7.4 Installation Troubleshooting, Multiplexers

Before trying terminals, make sure the multiplexers are able to “see” each other. Use the RTY command to verify a response from the remote multiplexer. If you get a correct response to RTY, the link is up and the multiplexers are communicating.

7.5 Installation Troubleshooting, Terminals

Terminal problems typically fall into four categories:

1. The terminal or printer gets no data
2. The terminal or printer gets “garbage” data
3. Blocks of data are lost
4. Terminals or printers seem to “hang”.

When a terminal gets no data, check to see the cables are wired correctly and that flow control is set properly.

If the terminal gets “garbage” data, check the speeds of the host and remote multiplexers, the terminal and the computer ports to make sure they match.

Blocks of data are lost most often when data is sent to a printer or a lot of data is being displayed on a terminal. Most of these problems are due to flow control not matching between the printer or terminal and the multiplexer.

If terminals and printers work for a while and then “hang”, check the flow control settings. When Xon/Xoff flow control is set to a different parity on the multiplexer than on the terminal or printer, the result is either a “hung” device that is flow controlled off but never back on, or a device that is never flowed off causing buffer overflow and lost data.

7.6 Assistance

If you need assistance troubleshooting your system, contact DCB customer support at (217) 897-6600 between 8:00 am and 5:00 pm central time Monday through Friday.

8. WARRANTY

DCB multiplexers are warranted to be free of defects in materials and workmanship for two years. Data Comm for Business will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Dewey, IL. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCB liability shall not exceed the original purchase price.

All equipment returned for repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call (217) 897-6600 between the hours of 8 AM and 5 PM central time. Equipment must be shipped prepaid to DCB and will be returned at DCB's expense.

Ship returned items to:

Data Comm for Business
2949 CR 1000E
Dewey, IL 61840

Data Comm for Business, Inc.
PO Box 6329
Champaign, IL 61826-6329

Tel (217) 897-6600
Fax (217) 897-1331
Email support@dcbnet.com