

SR Data Concentrator Plus Voice

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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 Data Concentrators are used in pairs to allow up to 16 asynchronous RS-232 devices and up to four analog voice channels to communicate through a single composite (network) data link. The network may be synchronous or asynchronous, using leased lines, dial-up modems, ISDN, radio links, or digital data service. Asynchronous terminal devices may be terminals, printers, plotters, computer ports, etc. The voice channels may be connected to standard analog telephone sets, PBXs, fax machines, key systems, radios, etc.

Each data port is configured individually at speeds up to 38,400.

Network speeds may be as high as 115.2 Kbps asynchronous or 128 Kbps synchronous.

The voice channels can be configured for bit rates between 2400 and 16000 bps. Group 3 fax is supported.

The units 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-232-D interface.

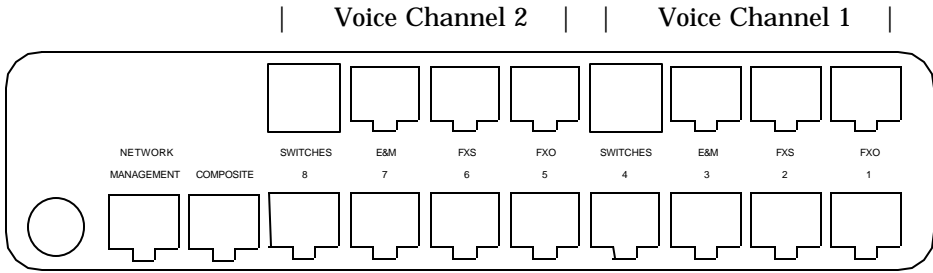
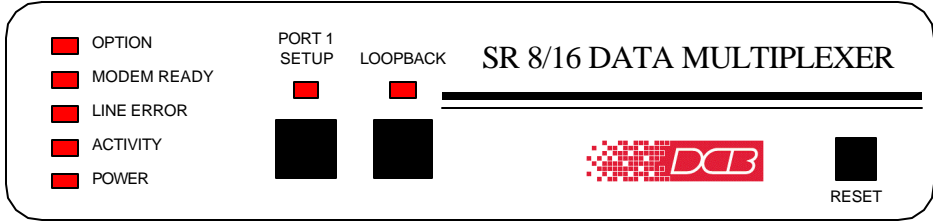
The unit is configured using a network management port and an asynchronous terminal or PC with terminal emulation software. Configurations are kept in non-volatile memory.

Some features of the SRDCVM include:

- Simplex or full duplex links.
- Suitable for satellite links.
- Capable of single-direction broadcast operation with multi-drop links.
- Protocol suitable for single-ended de-multiplexing in a PC.
- Monitor functions allow network management port user to monitor transmit or receive of any data port.
- Capture command allows a network management port user to directly connect to a data port.
- Many test features allow diagnostics of the system and communications link.

Options:

- Power supplies available for 12 VDC, 24 VDC, 48 VDC, 120 VAC, and 240 VAC.
- Internal simplex RS-422 composite adapter.
- Rack mount options available.



SR Data Concentrator, 8 Data / 2 Voice Channel Unit

2. SPECIFICATIONS

2.1 General

2.1.1 Data Ports

Port Speeds

Asynchronous only

300, 600, 1200, 2400, 4800, 9600, 19,200 or 38,400 bps

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

Software: Xon/Xoff

Hardware: Clear to Send

Port Flow Control Selection

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

Buffering

64K dynamically allocated

2.1.2 Composite Port

Simplex or Full Duplex

Speed

Synchronous up to 128 Kbps

Asynchronous from 300 to 115,200 bps

Interface

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

2.1.3 Voice Interface

Type: FXS, FXO or E&M (switch selectable)
Rate: 2400 – 16000 bps, hardware dependent
Rx/Tx Gain: -12 to +12 dBm
Voice ON/OFF level: -127 to -20 dBm
Voice ON holdover: 100 to 1000 ms
Noise insertion: Dynamic, Fixed or OFF
Jitter delay: 20 to 500 ms

2.2 Network Management Port Commands

Show Network Status
Show Port Configuration
Show Voice Configuration
Change Port Configuration
Change Mux Parameters
Change Voice Configuration
Configure Network
Show / Change ID
Activity Counters
Zero Activity Counters
Flow Control
Test Tools
 Capture Port
 Network Loop
 Monitor Port Tx
 Monitor Port Rx
 NMP Parity
 Reset Mux
Type
Repeat Last Command
Disconnect NMP

2.3 Environmental

Operation: 0 to 65° C, 10 to 85% relative humidity
Storage: -40 to 85° C, 10 to 85% relative humidity

2.4 Physical / Electrical

10¼" W x 9¾" D x 2½" H – 8 channel unit
10¼" W x 9¾" D x 4¼" H – 16 and 24 channel units
120 VAC external power supply
30 watts, .25 amps
Optional 12 VDC, 24VDC, 48VDC, or 240VAC power supply
available

2.5 Other Specifications

Operating Modes

- Multiplexing
- Transmit/Receive or Receive-Only mode
- Network Loopback
- Port Loopbacks

Front Panel Indicators

- Power
- Activity
- Line Error
- Modem Ready
- Option
- Loopback

Front Panel Switches

- Loopback
- Reset

3. INSTALLATION

3.1 Unpacking

Remove the unit 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:

- external power supply
- manual
- warranty, maintenance contract and repair information
- Modem to Composite cable (black) for connecting the unit to an external modem or DSU/CSU
- Network Management Port cable (green) for connecting the network management port to an asynchronous terminal or PC for configuration

3.2 Setup

The composite port must be configured properly for the type of link used (Sync or Async). In addition, each data port must have the proper speed, parity and flow control settings. This is done using the network management port CN and CP commands (see Section 5).

3.3 Using Leased Line Modems

In this section, a reference to modem includes modems, digital radios or DSU/CSUs for leased line installations.

Connect the modems to the phone line and power ON the modems. Confirm the presence of carrier at each modem. 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 modem. If everything is correct and still no carrier call the manufacturer of the modem or contact the telephone company for assistance.

Connect the composite port to the modem. A two foot RJ45 to DB-25 male cable connects the composite port of the unit (the RJ45 connector second from the left when viewed from the rear) to the data port of the modem (usually a DB-25 female connector). See Section 6 for cabling information.

Connect the units to power.

Power, Activity and Modem Ready indicators on the front panel of the unit must be ON indicating the on-line condition. (See Section 4).

3.4 Cabling

Cabling between the unit and the computer ports or terminal devices is a common source of installation problems. The unit must have data from attached terminal devices or computer ports, as an input on Position 6 of the RJ45 connector. Data from the unit 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.

3.5 Parity Considerations

SR data concentrators transfer all character bits whether it is 7 data bits plus parity or 8 data bits. The SRDC does not verify parity for each character transferred. Consequently, the parity setting of the devices at either end of an SRDC channel must match. Because of this ability to transfer 8 bits transparently, the SRDC 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 SRDC 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.

The SRDC does not recognize XON/XOFF characters received from the attached device and will pass them to the other end without taking flow control action.

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

3.6 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 unit and attached devices. If your system uses 8 bits, no parity (8,N,1), set the host 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 unit) Clear To Send, position 7 of the RJ45 connector, is used. For output flow control (data output from the unit 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.

3.7 Voice Settings

Select the proper voice channel settings for your application based on the following chart. The voice interface is selected by DIP switches (see Section 4).

Equipment		Voice Interface	
Local	Remote	Local	Remote
Analog Phone*	Analog Phone*	FXS	FXS
Analog PBX Ext.	Analog Phone*	FXO	FXS
Analog PBX Ext.	Key System	FXO	FXS
Key System	Analog Phone*	FXS	FXS
Key System	Key System	FXS	FXS
Analog Phone Line	Analog Phone*	FXO	FXS
PBX 4-wire tie line	PBX 4-wire tie line	E&M	E&M

* Digital or "feature" phones of the type used by some PBX systems are not supported.

FXS - In this mode, the unit provides DC voltage and current (talk battery) for a local telephone instrument. By monitoring the presence or absence of current to the telephone instrument, the unit detects whether the phone, or telephone equivalent, is idle (on hook) or busy (off hook). This information is then transmitted to the far end. The on-hook or off-hook information is then relayed to the telephone switching equipment by the far end FXO unit.

CAUTION

Excessive ringing loads on the voice circuits can cause damage to the units! Old style telephones with "bell" ringers will damage the equipment. Use newer phones with electronic ringers having a ringer equivalence of 1.0B or less.

FXO - The FXO mode is the inverse of the FXS mode. The FXO interface appears as a telephone instrument to the attached equipment. When in FXO mode, the unit's signaling circuits are conditioned to detect an incoming ring signal, representing an incoming call, and to provide a DC path (loop closure) to the PBX or central office switch to indicate on-hook/off-hook status. When ringing is detected, the FXO end will send a busy indication to the FXS unit at the far end, thus instructing it to ring its phone. When the far end FXS unit detects an off-hook condition, it sends a busy to the near end FXO which then provides an off-hook (loop closure) state to the telephone switching system. In this manner, the FXS/FXO pair together make the two units appear "transparent" to the operation of a normal telephone line. Thus the user may establish the same type of telephone services over the circuit derived through the use of the SRDCVMs that he or she could by direct connection over a normal telephone pair. In other words, the SRDCVM will not interfere, and will pass essentially unchanged, the signaling normally present in a standard telephone line connection.

E&M - In this mode, the unit interfaces to the tie trunk port of a PBX, and provides a Type I E&M signaling interface. This is a logic level type interface, where typically the PBX places battery voltage on the M-lead to indicate an off-hook condition to the unit, and the unit in return, places a ground on the E-lead to indicate a busy condition to the PBX. The E&M interface of the unit is available on the eight wire modular jack marked "E&M", and provides for four-wire voice operation.

3.8 Resetting Factory Defaults

The factory default settings for the data and voice ports are as follows:

Data Ports:

Loop	OFF
Flow Control	CNB (CTS No Busy)
Rate	9600

Composite Port:

Modem type	ASYNCR, 57.6 Kbps
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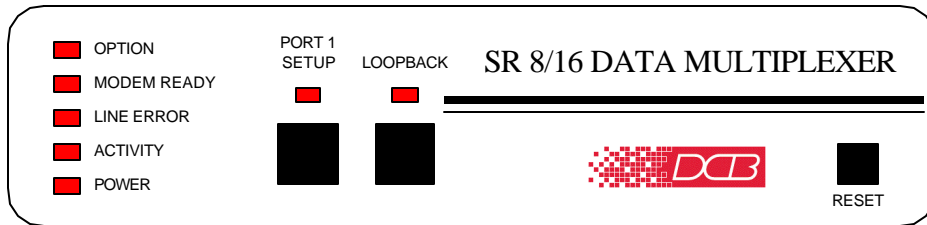
Voice Ports:

Voice jitter delay	150 ms
Rx gain (out)	+9 dBm
Tx gain (in)	-9 dBm
Voice rate	6400 or 7200 bps, hardware dependent
Voice ON level	-40 dBm
Voice OFF level	-43 dBm
Voice ON holdover	200 ms
Noise insert	Dynamic
Echo canceller gain	0 dBm

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 PORT 1 SETUP switch while depressing the RESET switch.
2. Be sure to continue to hold the Port 1 Setup switch until its LED has flashed once and returned to OFF.
3. Release and depress the Port 1 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 and SV commands to check the settings.

4. SWITCHES AND INDICATORS



4.1 Switches

4.1.1 Front Panel Switches

Port 1 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 – Initiates a composite port loopback toward the data ports. The loopback is active when the indicator is on.

Reset – Performs a hardware reset of the unit.

4.1.2 Voice Port Switches

Two DIP switches accessible from the rear of the unit are used to select the active voice interface (FXO, FXS or E&M) as follows:

<u>SW 1</u>	<u>SW 2</u>	<u>TYPE</u>
UP	–	FXS
DN	UP	FXO
DN	DN	E&M

4.2 Indicators

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

ACTIVITY – Flashes off briefly for every 16 blocks of data.

LINE ERROR – Not used.

MODEM READY – three states:

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

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.

OPTION – indicates the composite port is configured ASYNC

PORT 1 SETUP – 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 – ON when the composite loopback has been activated by depressing the front panel switch. To return to normal operation, depress the front panel switch again.

5. NETWORK MANAGEMENT PORT

5.1 Introduction

The Network Management port (NMP) is used to configure the unit for proper operation. This connection must be used to configure the composite and data ports.

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 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>PARAGRAPH</u>
Show: Network	SN	5.4.2
Config	SC	5.4.3
Voice	SV	5.4.4
Change: Port Config	CP	5.4.5
MUX Param	CO	5.4.6
Voice	CV	5.4.7
Config Network	CN	5.4.8
Set ID	ID	5.4.9
Activity Counters/Zero	AC/Z	5.4.10
Flow Control	FC	5.4.11
Test Tools	TT	5.4.15
Type	TY	5.4.12
Repeat Last Command	*	5.4.13
Disconnect NMP	BYE	5.4.14

This Help screen shows the choice of commands available. The commands allow you to display the selected options (Show network and configuration), configure the unit (Configure ports and Set ID), and perform many different diagnostic functions such as monitor data, perform loopbacks, show flow control state, show activity and other useful tests. Some commands are not available on units without data ports.

5.4.2 Show Network (Configuration)

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

5.4.3 Show (Port) Configuration

The Show Config (SC) command shows the current port configuration settings for local 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. Also displayed is the current Block Transmit Mode setting. Use this command to verify proper port configuration. To change these settings, use the CP and CO commands.

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

5.4.4 Show Voice (Configuration)

The Show Voice (SV) command displays the current voice channel settings for Tx/Rx gain, voice rate, and jitter delay. The active voice interface for each channel is also displayed. To see all voice settings, use the SVA command..

5.4.5 Change Port Configuration

The Change Port Config (CP) 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 CTS No Busy, 9600 bps.

5.4.6 Change Multiplexer Parameters

The CO command allows configuration of three options. These options are as follows:

- Idle Timeout: 2-15 character times or disabled
- Block Termination Character: 00 to FF hex or disabled
- Mux Mode: Normal or Receive Only

5.4.7 Change Voice (Configuration)

The Change Voice (CV) command is used to change certain global parameters on the voice channel(s). Configurable parameters include:

- Tx and Rx gain
- Voice Rate
- Voice jitter delay

To change all voice parameters, use the CVA command.

5.4.8 Configure Network

The Configure Network command (CN) allows configuration of the SRDC composite port for synchronous or asynchronous operation.

5.4.9 Set ID

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

5.4.10 Activity Counts / Zero

The Activity Counts (AC) command shows transmit and receive statistics for all data and voice ports. The data are presented in terms of blocks of information sent and received by the voice channel(s), network and each data port. Error counts are also shown. In addition, the total number of voice port off-hook minutes is displayed along with the number of errored minutes. 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.

5.4.11 Flow Control

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

5.4.12 Type

The Type (TY) command displays information about the local unit including firmware version, number of ports and unit ID.

5.4.13 Repeat Last Command

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

5.4.14 Disconnect NMP

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

5.4.15 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>PARAGRAPH</u>
Capture Port	CA#	5.4.16
Network Loop/Quit	NL/QNL	5.4.17
Monitor Port Tx	MT#	5.4.18
Monitor Port Rx	MR#	5.4.18
NMP Parity	P	5.4.19
Reset MUX	RESET	5.4.20

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

5.4.17 Network Loopback

The Network Loopback (NL) command enables a loopback of the composite port. Use the QNL command to disable the loopback.

5.4.18 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 unit. The Monitor Port RX (MR#) command monitors data received by the selected port from the corresponding port of the remote unit. 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.

5.4.19 NMP Parity

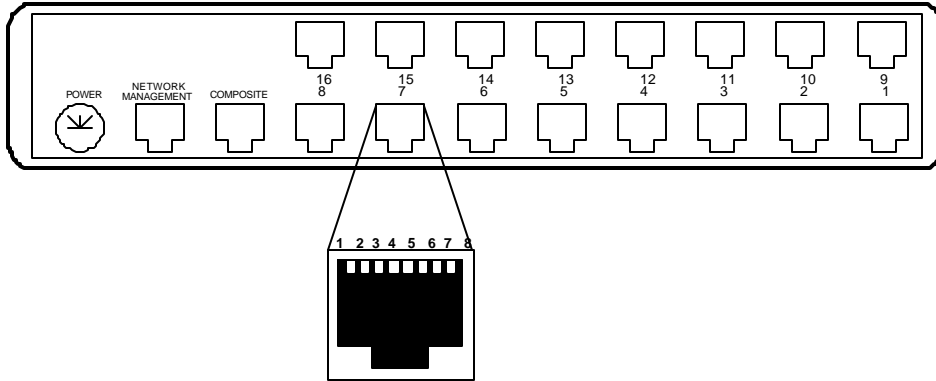
The NMP Parity command (P) sets the parity for the network management port. The factory default is SPACE (8,N,1).

5.4.20 Reset Mux

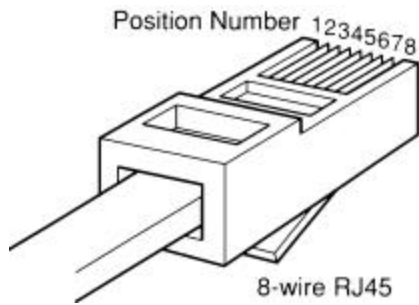
The Reset Mux (RESET) command performs a reset of the unit.

6. INTERFACE SIGNALS AND CABLING

6.1 Connector Location and Pin Reference



SR-16 Rear Panel and RJ-45 Jack



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 Voice Port Interface

FXO Interface

<u>Pin</u>	<u>Signal</u>
4	Ring
5	Tip

FXS Interface

<u>Pin</u>	<u>Signal</u>
4	Tip
5	Ring

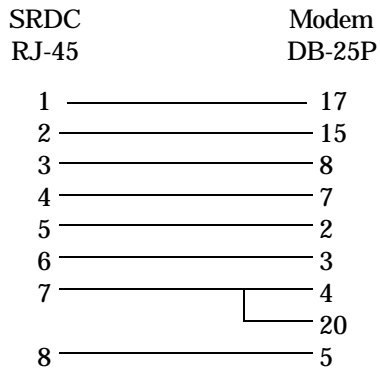
E&M Interface (Type I)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Not Used	
2	E lead	OUT
3	Audio	IN
4	Audio	OUT
5	Audio	OUT
6	Audio	IN
7	M lead	IN
8	Ground	

6.3 Cables

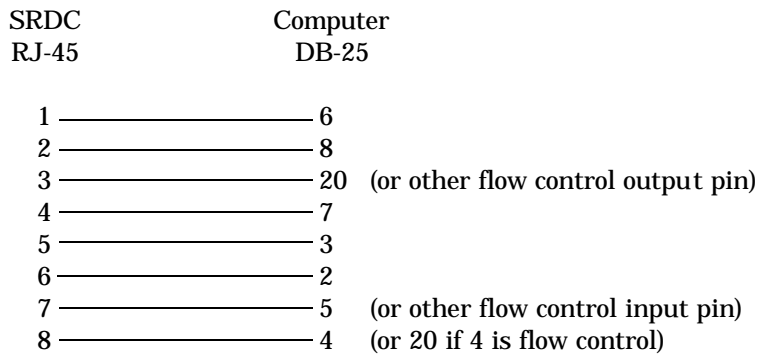
6.3.1 Composite Port to Modem

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



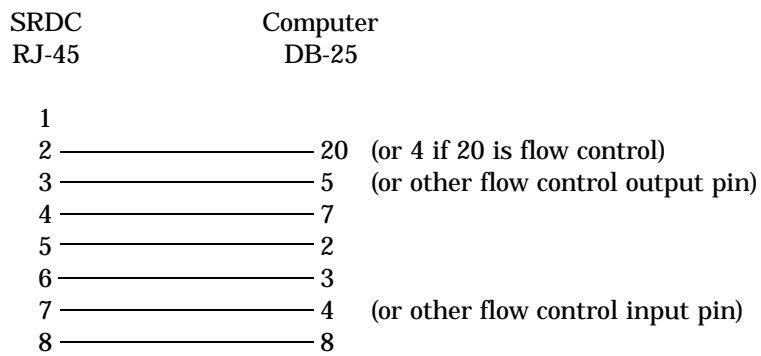
6.3.2 Data Ports to Host Computer

Configured as DTE

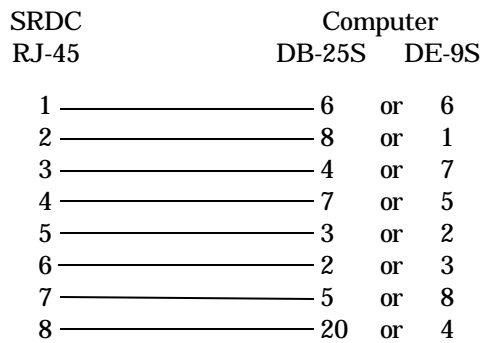


6.3.2 Data Ports to Host Computer, continued

Configured as DCE

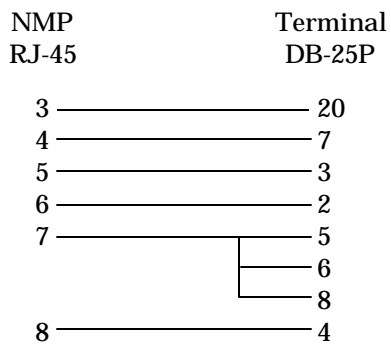


To a PC Com Port

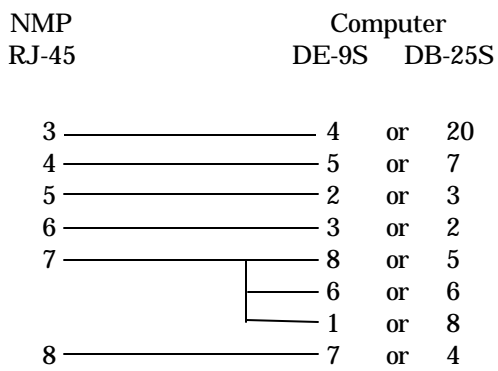


6.3.3 Network Management Port

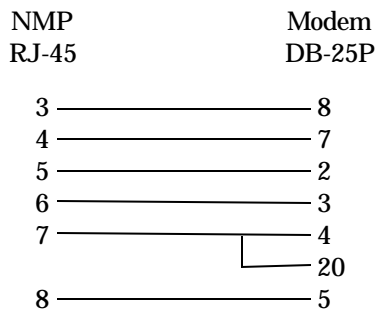
To a TERMINAL



To a PC using terminal emulation



To a dial-up MODEM for remote access



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, especially the loopback tests 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 unit 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 unit. If characters again appear correctly, the communications link and the ports on both units are working correctly. The problem then is with the host computer port or the cable between the host computer and the unit.

Port loopbacks can be turned on and off from the Network Management port.

7.3 Installation Troubleshooting, Modems or DSUs

First, set up the Modems or DSUs without connecting the units. If DSUs are used they 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, 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 units, 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 unit.

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 unit 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.

7.5 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