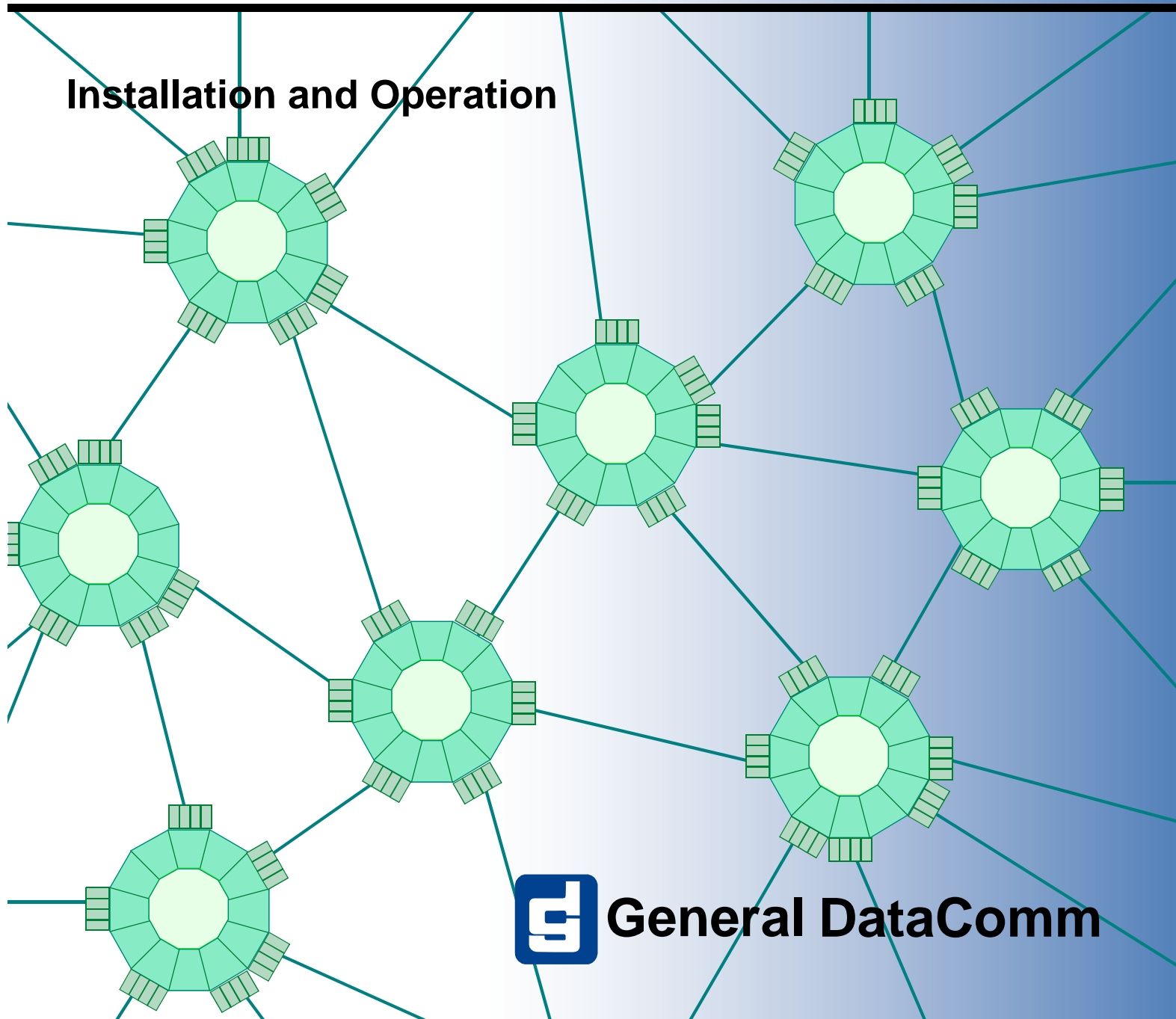


SpectraComm 202 Modem[®]

Installation and Operation



General DataComm

SpectraComm 202 Modem[®]

Installation and Operation

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If you have comments or suggestions concerning this manual, please contact:

Technical Publications Department
General DataComm, Inc.
Park Road Extension
Middlebury, Connecticut USA 06762-1299

Telephone: 1 203 758 1811

Trademarks

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Revision History

Table 0-1 Revision History

Issue Number	Date	Description of Change
01	June 1999	New Issue

Safety Guidelines

Always use the following guidelines when unsafe conditions exist or when potentially hazardous voltages are present:

- Always use caution and common sense.
- To reduce the risk of electrical shock, do not operate equipment with the cover removed.
- Repairs must be performed by qualified service personnel only.
- Never install telephone jacks in a wet location unless the jack is designed for that location.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.

- Use caution when installing telephone lines and never install telephone wiring during an electrical storm.

Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment may contain static-sensitive devices that are easily damaged and proper handling and grounding is essential. Use ESD precautionary measures when installing parts or cards and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floorpads and workbench pads.

When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, like a screwdriver or a paper clip, to set switches.

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Preface

Manual Overview

This preface describes the organization of this manual, typographical conventions used throughout the manual. It is arranged as follows:

- [Organization](#) P-1
- [Related Publications](#) P-1
- [Typographical Conventions](#) P-2
- [Service Support and Training](#) P-3

Organization

The intent of this manual is to describe how to install and operate a General DataComm SpectraComm 202 modem. It is written for operators and installers and assumes a working knowledge of data communications equipment. This manual has four chapters and an index, and is organized as follows:

- *Chapter 1- Product Description* introduces important concepts and features of the SpectraComm 202 modem.
- *Chapter 2- Installation* tells you how to install the SpectraComm 202 modem.
- *Chapter 3 - Operation* describes the front panel of the SpectraComm 202 modem.
- *Chapter 4 - Tests* describes front panel and external tests.
- *Index* contains the SpectraComm 202 modem subjects and page numbers.

Related Publications

A listing of related user manuals is provided below. In addition to the hardware and software manuals, always read the software system release notes supplied with your GDC product.

Applicable Documents	
Publication Name	Publication Number
DeskTop 202 Modem Operation and Installation Instructions	GDC 053R200-000
SpectraComm/UAS Installation and Operation Shelf and Enclosure	GDC 010R302-000
TEAM 202 for Unix	GDC 073R150-V300-01
TEAM 202 Release Notes	GDC 087R914-V300

Typographical Conventions

Head_1st Level

Level 1 Headings introduce major topics and start on a new page. The only exceptions are the Chapter Overview and Manual Overview headings that start immediately after the chapter, preface or appendix title (on the same page as the title).

Head_2nd Level

Level 2 Headings introduce subsections of major topics.

Head_3rd Level

Level 3 Headings introduce subsections of secondary topics.

Font Styles

Courier font is used to show text output that is displayed on the screen.

Times bold font is used when referring to screen names.

Courier bold font is used to show specific input that you type at the keyboard.

Safety Information

The DANGERS, WARNINGS and CAUTIONS that appear throughout this manual are not only preventative measures designed to uphold the safety of both the service engineer and operator, but also enhance equipment reliability.

The definitions and symbols for DANGER, WARNING and CAUTION comply with ANSI Z535.2, American National Standard for Environmental and Facility Safety Signs, and ANSI Z535.4, Product Safety Signs and Labels, issued by the American National Standards Institute.

The following examples show the symbols and definitions of DANGER, WARNING, CAUTION, *Note* and *Important* as they are used in this manual.

Note

Indicates a note. It is something you should be particularly aware of; something not readily apparent. A note is typically used as a suggestion.

Important Indicates an emphasized note. It is something you should be particularly aware of; something not readily apparent. Important is typically used to prevent equipment damage.



CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury. It may also be used to alert against unsafe practices.



WARNING Warning indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.



DANGER Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Service Support and Training

VITAL Network Services, a General DataComm company, is committed to providing the service support and training needed to install, manage, and maintain your GDC equipment.

GDC's VITAL Network Services provides hands-on training courses through **VITAL Network Services Global Technology Training Services**. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems. Training courses are available at our centers in the US, UK, France, Singapore and Mexico, as well as at a customer's site.

For more information regarding GDC's VITAL Network Services' service programs, training courses, or for assistance with your support requirements, contact GDC's VITAL Network Services at the address or phone number listed below, or visit our website at: <http://www.vitalnetsvc.com>

VITAL Network Services World Headquarters

6 Rubber Avenue
Naugatuck, Connecticut 06770 USA

North America: 1 800 243 1030
 1 888 248 4825
 1 203 729 2461
Training Information: 1 203 729 2461
French Speaking Canada: 1 800 361 2552
North America Fax: 1 203 723 5012
 1 203 729 7611

VITAL Network Services Regional Sales and Service Offices:**Europe, Middle East, Africa**

VITAL Network Services
Molly Millars Close
Molly Millars Lane
Wokingham, Berkshire RG41 2QF UK

Telephone: +44 1189 657200
Training: +44 1189 657240
Fax: +44 1189 657279

Central America, Latin America

VITAL Network Services
Periferico Sur 4225, Desp. 306
C.P. 14210, Mexico D.F., Mexico

Telephone: +52 5 645 2238
Training: +52 5 645 2238
Fax: +52 5 645 5976

Asia Pacific

VITAL Network Services
501 Orchard Road 05-05
Wheelock Place, Singapore 238880

Telephone: +65 735 2123
Training: +65 735 2123
Fax: +65 735 6889

International Calling Code (+)

When calling from outside the country of origin, use the appropriate International Calling Code where the + symbol is shown.

Chapter 1: Product Description

Overview

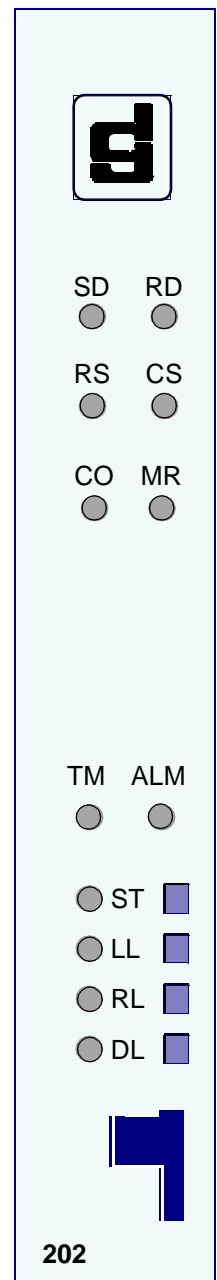
General DataComm's SpectraComm 202 modem is a Bell 202T compatible modem that provides asynchronous communications over two-wire, half-duplex and four-wire, full-duplex private lines, at 0-1400 bps over unconditioned lines (on basic 3002 channel) and 0-1800 bps over lines with C2 conditioning (on basic 3002 channel). The 202 modem is also end-to-end inter-operable with the DeskTop 202 and the DataComm 202T or 202S/T modems, and is also compatible with other 202 modems. This gives you convenient high density packaging at your central site and clear and uncluttered work areas at your remote sites.

Supporting point-to-point and multipoint applications, the SpectraComm 202 modem stores configuration parameters in non-volatile memory. The device can operate in a stand-alone mode controlled by switches and jumpers, or may be network managed via GDC's TEAM 202 SNMP-based application software on a Unix platform.

Note *The SpectraComm 202 modem does not support switched network, reverse channel, or local copy.*

Other features of the modem include:

- A compromise equalizer that guards the modem from problems associated with unconditioned voice grade facilities.
- A soft transmit carrier turnoff which virtually eliminates erroneous data bits affecting polled applications.
- An anti-streaming timer which keeps the modem from being disrupted by faulty streaming terminals in polled applications.
- Simple installation in any SpectraComm shelf.
- The SpectraComm shelf supplies power to the 202 modem from the backplane and supports, rear panel I/O, and optional network management via the SCM (SpectraComm Manager) card.
- Configurable hardware switches and jumpers.
- Options, like Request-to-Send (RS) to Clear-to-Send (CS) delays and carrier mode, can be set from switches located on the modem card. Other parameters have built-in default values which can handle most tasks.
- An array of tests that accurately detects system faults and helps you to quickly restore service.



Included are Self-Test (ST), Local Loopback (LL), Remote Loopback (RL), and Digital Loopback (DL). All of the tests may be controlled by front panel switches and monitored through front panel LED indicators. The local loopback and remote loopback can also be controlled from the terminal. A selectable 10-minute abort timer allows the modem to recover from an inadvertent test.

Applications

[Figure 1-1](#) shows a point-to-point application of the SpectraComm 202 modem.

The modem may also be used in a point-to-multipoint application, for a polling environment.

The remote modem cannot be managed by the master SCM.

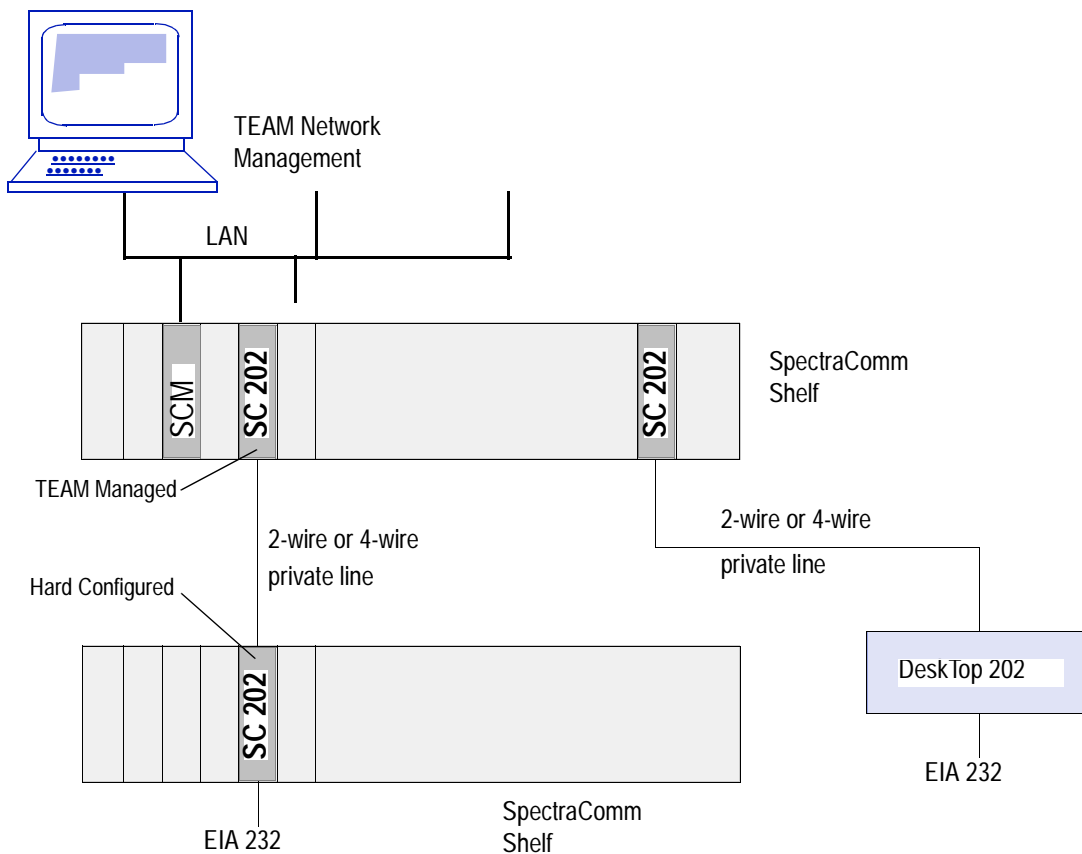


Figure 1-1 Point-to-Point Application for SpectraComm 202 Modem

Technical Characteristics

[Table 1-1](#) lists the SpectraComm 202 modem technical characteristics.

Table 1-1 Technical Characteristics

Item	Specifications
Data rate	0-1400 bps (unconditioned line) 0-1800 bps (C2 conditioning recommended for optimum performance)
Line requirements (compatible with all SpectraComm and UAS shelf configurations)	
Type	4- or 2-wire private line
Impedance	600 ohms (private line only)
Connector	8-pin JM8 jack or 50-pin Telco or wire-wrap (depends on shelf)
Operating mode	
4-wire	Full-duplex, point-to-point or multipoint
2-wire	Half-duplex, point-to-point
Operating format	Asynchronous, serial, binary
Transmitter Characteristics	
Modulation	Frequency shift keying (FSK)
Carrier frequency	
Mark	1200 Hz +/- 1%
Space	2200 Hz +/- 1%
Soft carrier turnoff	
Timing	0, 8, or 30 ms
Frequency	900 Hz +/- 1%
Output level	Adjustable (0 dBm to -15 dBm in 1 dB steps +/- 0.5 dB)
Receive characteristics	
Demodulation	FSK tone demodulation
Carrier detect	
Acquisition	At or before (ON) -26 dBm
Release	At or before (OFF) -31 dBm
Hysteresis	2 dB minimum
Timing	Within 8 ms
Soft carrier detect	Within 8 ms
Equalization	Compromise amplitude and delay
Operating range	0 to -26 dBm
Request-to-Send to Clear-to-Send delay	0, 8, 30, or 180 ms
Modem compatibility	Bell 202T
Terminal interface	Compatible with EIA-232-D
Power requirements	
Dissipation	2.0W maximum

Table 1-1 (Sheet 1 of 2)

Table 1-1 Technical Characteristics (Continued)

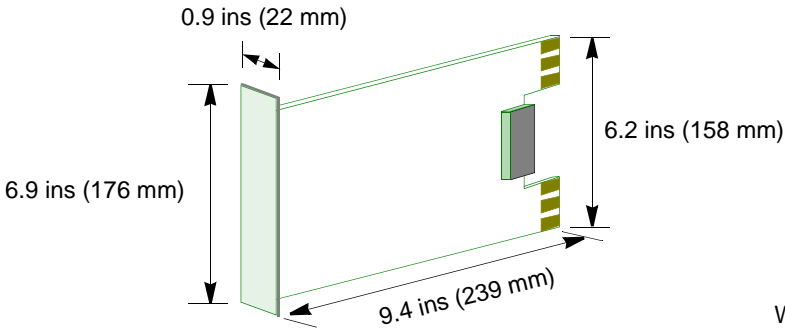
Item	Specifications
Dimensions and weight	
 <p>Weights less than 1.0 lb (less than 0.35 kg)</p>	
Environmental	
Operating temperature	0° to 50°C* (32° to 122°F)
Humidity	Up to 95% without condensation
Interference protection	Complies with FCC Part 15, Class A requirements
Safety protection	UL 1950 listed and CSA approved, TUV EN 60950
* Derate operating temperature by 1°C/1000 ft. above sea level.	
System approvals (pending)	NEBS GR-G3, GR-1089

Table 1-1 (Sheet 2 of 2)

Equipment List

[Table 1-2](#) lists the SpectraComm 202 standard equipment.

Table 1-2 Equipment List

Item Description	GDC Part Number
SpectraComm 202 Modem	053P006-001
SpectraComm Sheves	For shelf and part number information, refer to Table 2-1 in Chapter 2.
Cables GDC cables can be ordered in a variety of lengths:	
Private line cable (7 foot)	830-028-807
Private line cable (14 foot)	830-028-814
Private line cable (25 foot)	830-028-825
Eight-pin modular to #6 spade lug cable (Pins 1, 2, 7, and 8)	024H122-007, 024H122-014, 024H122-025, 024H122-050
DTE cable - DB25 male-to-DB25 male, straight-through	028H502-002, -003, -005, -010, -015, -025, -050, and -100

Chapter 2: Installation

Overview

This chapter tells you how to set up the SC 202 modem and install it in a SpectraComm shelf.

Unpacking and Handling

Inspect the SpectraComm 202 modem for damage; if you see any, notify the shipper immediately. Save the box and packing material, since you can then return the unit, if necessary.

Installing the 202 Modem

Part of the installation steps is choosing a shelf convenient for your work station and making sure that all input/output connections, made through the backplane interface, are correct. Check that the unit is placed in a ventilated area where the ambient temperature does not exceed 122°F (50°C). Do not install the unit directly above equipment that generates a large amount of heat (such as power supplies).

Installing the SpectraComm Shelf

The SpectraComm 202 modem, a single-width SpectraComm card, operates in the SpectraComm shelves, listed in [Table 2-1](#).

Note For installing the 16-slot shelves, refer to *SpectraComm / UAS Shelf and Enclosure, Installation and Operation*, manual P/N GDC 010R302-000.

For installing the SpectraComm 2000 shelf, refer to *SpectraComm 2000 Shelf, Installation and Operation*, manual P/N GDC 010R358-000 (The SC2000 doesn't support TEAM or Craft port management).

Important Be sure to install shelves and power supplies as described in the *SpectraComm/UAS Shelf and Enclosure manual*. If you don't, there may be overheating and power supply shutdown.

Table 2-1 SpectraComm Shelves

Shelf Description	Part Number
SpectraComm Shelf MS-2 Mod. 1, Dual Modular 100/120 VAC	010M054-001
SpectraComm Shelf MS-2 Mod. 2, Dual Modular -48, 60 VDC	010M055-001
SpectraComm Shelf MS-2 Mod. 3, Dual Modular 220/240 VAC	010M056-001
SpectraComm Shelf MS-2 Mod. 4, (Mass Termination) 100/120 VAC	010M057-001

Table 2-1 (Sheet 1 of 2)

Table 2-1 SpectraComm Shelves (Continued)

Shelf Description	Part Number
SpectraComm Shelf MS-2 Mod. 5, (Mass Termination) -48, 60 VDC	010M058-001
SpectraComm Shelf MS-2 Mod. 6, (Mass Termination) 220/240 VAC	010M059-001
SpectraComm/UAS Shelf MS-2 Mod. 7, (Mass Termination) 100/120 VAC*	010M073-001
SpectraComm/UAS Shelf MS-2 Mod.8, (Mass Termination) 220/240 VAC*	010M074-001
SpectraComm/UAS Shelf MS-2 Mod. 9, (Mass Termination) -48, -60 VDC*	010M075-001
SpectraComm Shelf MS-2 Mod. 10, Dual Modular -48, 60 VDC (redundant P.S.)	010M070-001
SpectraComm Shelf MS-2 Mod. 11, (Mass Termination) -48, -60 VDC (redundant P.S.)	010M071-001
SpectraComm/UAS Shelf MS-2 Mod. 12, (Mass Termination) -48, -60 VDC (redundant P.S.)*	010M076-001
+SpectraComm 2000 Shelf (non-redundant)	010B226-001
+SpectraComm 2000 Shelf (redundant)	010B226-002
*Universal Zone 1 Backplane (VF Line) + the SC2000 doesn't support TEAM or Craft port management	

Table 2-1 (Sheet 2 of 2)

Cabling

You need to connect the SC 202 modem to the DTE and to the VF line.

DTE Port

The DTE port is located on the Zone 3 P2 connector and follows the TIA/EIA-232-F standard. Refer to [Table 2-2](#).

Table 2-2 DTE Port Interfacing and Signaling

Pin No.*	EIA Designation	ITU-T Designation	Signal Name	Description
1	AA	101	Frame Ground or Protective Chassis Ground GND	Not applicable--no connection on this card.
2	BA	103	Transmitted Data TXD	This circuit transfers data from the terminal for transmission by the modem over the communication line.
3	BB	104	Received Data RXD	This circuit transfers data to the terminal that was received over the communication line.
4	CA	105	Request-to-Send RTS	When the terminal has data for transmission by the modem, it transfers a signal to the modem via this circuit to prepare it for transmitting.

Table 2-2 (Sheet 1 of 2)

Table 2-2 DTE Port Interfacing and Signaling (Continued)

Pin No.*	EIA Designation	ITU-T Designation	Signal Name	Description
5	CB	106	Clear-to-Send CTS	In response to Request-to-Send signal of the terminal, the modem transfers a signal to the terminal via this circuit when it is able to transmit data. The modem may be optioned to delay response of the Clear-to-Send for 0, 8, 30, or 180 ms. The modem also may be optioned to synthesize Clear-to-Send continuously.
6	CC	107	DCE Ready DSR	The modem transfers a signal to the terminal via this circuit whenever it is powered.
7	AB	102	Signal Ground or Common Return SG	This circuit provides a common ground reference for all of the other terminal interface circuits. Since Pin 7 is the common reference for all signals, including data, timing, and control signals, it must be connected at both ends so that the DTE and DCE work properly across the serial interface.
8	CF	109	Received Line Signal Detector or Data Carrier Detect DCD	The modem transfers a signal to the terminal via this circuit when it is receiving a signal over the communication line that is greater than the threshold of the carrier detection circuit of the modem.
18	LL	141	Local Loopback LL	This circuit transfers a signal from the terminal that causes the modem to enter the Local Loopback test mode (if the terminal control of Local Loopback option is enabled).
21	RL/CG	140/110	Remote Loopback RL	This circuit transfers signal from the terminal that causes the modem to initiate the Remote Loopback test mode (if the terminal control of Remote Loopback option is enabled).
25	CFRES		CF Reset or CFRES	This circuit transfers a signal from the terminal to turn off signal Received Line Signal Detector (CF) regardless of the state of the received carrier (if the CF reset option is enabled). Note that this function is not part of TIA/EIA-232-F.

*Pins 1, 9-17, 19, 20, and 22-24 are not used.

Table 2-2 (Sheet 2 of 2)**VF Line**

The SpectraComm shelves listed in [Table 2-1](#) use either modular jacks or 50-pin Telco (mass termination) connector to Zone 1. Shelves with modular jacks use the top modular jack with USOC JM8 pinouts as shown in [Table 2-3](#).

Table 2-3 VF Line Connector Pinouts

Modular Jack Pin	Signal	Description
1	R	Ring. 4-wire transmit to line or 2-wire transmit/receive.
2	T	Tip. 4-wire transmit to line or 2-wire transmit/receive.
3		Not used.
4		Not used.
5		Not used.
6		Not used.
7	T1	Tip 1. 4-wire receive from line
8	R1	Ring 1. 4-wire receive from line

Table 2-3

Shelves with 50-pin connectors or wire-wrap pins are connected as shown in [Table 2-4](#).

The Universal backplane is used on SpectraComm shelves that have model numbers 7, 8, 9, and 12. The Standard backplane is used on models 4, 5, 6, and 11.

Table 2-4 VF Pinout for Universal Standard 50-Pin Backplanes

Slot	Universal Zone 1 Backplane (010C377-001)					Standard 50-Pin Backplane (010P145-001)								
	Conn	T	R	T1	R1	50-Pin Connectors					Wire-Wrap Pins			
						Conn	T	R	T1	R1	T	R	T1	R1
1	J17	26	1	4	29	J18	26	1	27	2	X3	X1	X4	X2
2	J17	30	5	8	33	J18	29	4	30	5	X9	X7	X10	X8
3	J17	34	9	12	37	J18	32	7	33	8	X15	X13	X16	X14
4	J17	38	13	16	41	J18	35	10	36	11	X21	X19	X22	X20
5	J17	42	17	20	45	J18	38	13	39	14	X27	X25	X28	X26
6	J18	46	21	24	49	J18	41	16	42	17	X33	X31	X34	X32
7	J18	26	1	4	29	J18	44	19	45	20	X39	X37	X40	X38
8	J18	30	5	8	33	J18	47	22	48	23	X45	X43	X46	X44
9	J18	34	9	12	37	J20	26	1	27	2	X51	X49	X52	X50
10	J18	38	13	16	41	J20	29	4	30	5	X57	X55	X58	X56
11	J18	42	17	20	45	J20	32	7	33	8	X63	X61	X64	X62
12	J18	46	21	24	49	J20	35	10	36	11	X69	X67	X70	X68
13	J19	26	1	4	29	J20	38	13	39	14	X75	X73	X76	X74
14	J19	30	5	8	33	J20	41	16	42	17	X81	X79	X82	X80
15	J19	34	9	12	37	J20	44	19	45	20	X87	X85	X88	X86
16	J19	38	13	16	41	J20	47	22	48	23	X93	X91	X94	X92

Table 2-4

Backplane Connector

The backplane connector, the standard SpectraComm Zone 2 connector, supplies connections for +5V, +12V, -12V power, Power Good, and the SCM management bus. The SC 202 modem does not generate any major or minor alarms for the SpectraComm Alarm Card, *GDC P/N 048P067-001*.

Configuration

Setting up your SC 202 modem includes configuring the unit. It may be hard configured or soft configured. [Figure 2-1](#) shows you the 202 card with switches and jumpers used for hard or soft configuring. Two user-selectable option jumpers and two user-selectable option switches are located on the SpectraComm 202 modem card.

Configurable options or items are found in [Table 2-5](#) and explained in [Configurable Options on Page 2-6](#). For 202 modem applications, refer to [Recommended Selections on Page 2-9](#).

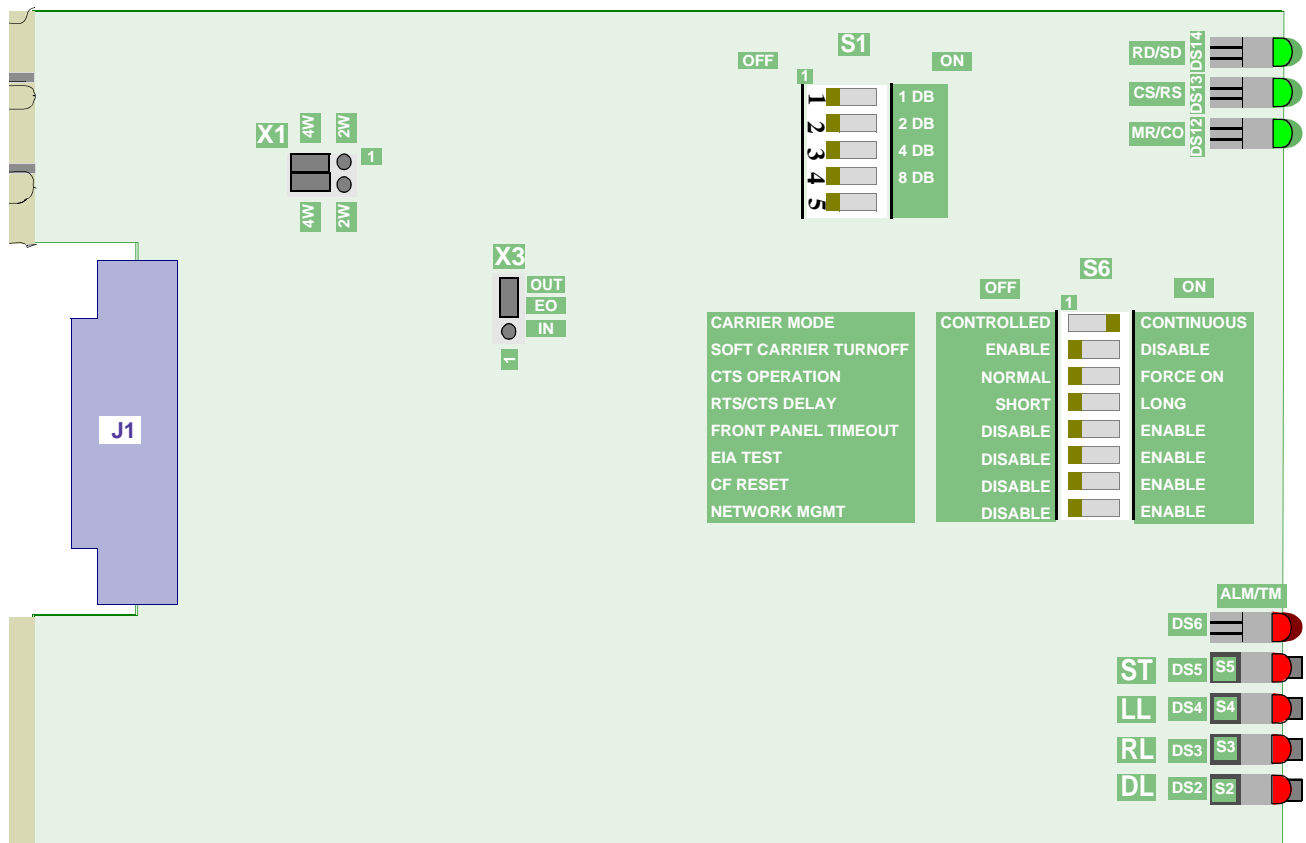


Figure 2-1 Switch Options

Hard Configuration

You configure the unit by simply setting switches and jumpers on the card. You do not need an SCM card or a network manager. Select hard mode by setting S6-8 (NETWORK MGMT) to DISABLE.

Soft Configuration

You configure the unit from the TEAM 202 network manager application software. You must have an SCM (SpectraComm Manager) card in the shelf. The SCM acts as an SNMP proxy agent for the 202 modem.

1. Use jumper X1 to set 2-wire or 4-wire operation, X3 to set equalizer (IN or OUT), and S1 to set the transmit level (1 to 15 DB)
2. Set Switch S6-8 (NETWORK MGMT) to ENABLE and configure all other parameters from the network manager.

The configuration is stored in the unit in non-volatile memory and is automatically restored on power-up or when the card is reset.

Table 2-5 Configurable Options

Item	Selection (defaults in bold)	Hardware	Network Manager
Carrier Mode	Controlled , Continuous	Yes	Yes
Soft Carrier Turnoff	Enable , Disable	Yes	Yes
CTS Operation	Normal , Forced On	Yes	Yes
RTS/CTS Delay	Short , Long	Yes	Yes
Front Panel Timeout	Disable , Enable	Yes	Yes
EIA Test	Disable , Enable	Yes	Yes
CF RESET	Disable , Enable	Yes	Yes
2W/4W Operation	4W , 2W	Yes	No
Equalizer	Out , In	Yes	No
Transmit Output Level	0 to -15 dBm in -1dBm steps	Yes	No
Network Mgmt.	Disable , Enable	Yes	No

Table 2-5

Configurable Options

Carrier Mode

The Carrier Mode determines whether the transmit carrier is controlled by RTS or not.

Controlled Carrier Mode

In controlled carrier mode, the transmitter sends a carrier signal only when RTS is on. This is required for controlling the direction of transmission in half-duplex operation over two-wire facilities or for controlling slave transmission in four-wire multipoint operations. The carrier signal is either 1200 Hz to send a mark, or 2200 Hz to send a space. Turning RTS on turns the transmitter on, and after the set RTS/CTS delay, CTS turns on. Turning RTS off turns off the transmitter within 1 ms. If the soft carrier turnoff option is enabled, 900 Hz is transmitted for a fixed period before the transmitter is turned off.

In four-wire operation, the anti-streaming timer is automatically put into action. Such a device is designed to impede a faulty terminal from: (1) inadvertently keeping the carrier on a multidrop line and (2) hindering other terminals from transmitting. If RTS is turned on for more than 30 ± 1 seconds at a time, the modem turns off the transmitter and turns off the CTS to the terminal, averting any transmission, until RTS turns off and on again.

Continuous Carrier Mode

In continuous carrier (or constant carrier) mode, the transmitter always sends a carrier signal. This is used for full-duplex operation over four-wire facilities.

Soft Carrier Turnoff

The soft carrier turnoff generates a 900-Hz tone after RTS is turned off. This lets the receive data lead, at the remote modem, to remain at a mark when the local RTS is turned off. The soft carrier time is 8 or 30 ms, depending on the setting of the RTS/CTS time.

Enable Soft Carrier Turnoff

Enabling or activating the soft carrier turnoff forces RXD to a mark state on the remote modem before DCD turns off.

Disable Soft Carrier Turnoff

Disabling or de-activating the soft carrier turnoff means that no 900-Hz tone is sent.

CTS Operation

The CTS operation determines whether CTS follows RTS or is always on.

Normal CTS Operation

Normal mode turns on CTS a fixed delay after RTS turns on, also called dummy controlled carrier operation, since the RTS/CTS delay is set to correspond to the carrier detection time of the remote modem. In two-wire mode, **NORMAL** is always selected considering that transmission is half-duplex.

Force On CTS Operation

For the forced-on situation, the transmitter and CTS are always on, whether RTS is on or off.

RTS/CTS Delay

The RTS/CTS delay takes place between RTS turning on and CTS being turned on (that is, during the turning-on process) when CTS operation is set to **NORMAL**. Set the delay to be compatible: (1) with the squelch of the remote modem, (2) with the carrier detect acquisition timing, (3) and for the soft carrier turnoff options in two-wire applications.

Short and Long RTS/CTS Delay

Either short or long delay times can be set to 0, 8, 30, or 180 ms according to [Table 2-6](#).

Table 2-6 RTS/CTS Delay Times

Application	Short Delay	Long Delay
2-wire controlled carrier	30 ms	180 ms
4-wire controlled carrier	8 ms	30 ms
4-wire continuous carrier	0 ms	8 ms

FP Test Timeout

FP (Front Panel) test timeout controls the automatic timeout for FP tests.

Disable FP Test Timeout

Disabling FP test timeout is to have no timeout; however, the front panel RL always ends after 10 minutes, regardless of this option.

Enable FP Test Timeout

Tests terminate after 10 minutes. Note that this feature is called Enable Test Timeout from the Network Manager.

EIA Test

The EIA test option decides whether the EIA 232 control lead LL (Pin 18) directs the LL loopback and the RL (Pin 21) directs the RL loopback.

Disable EIA Test

The data terminal equipment (DTE) can not activate the LL and RL loopbacks.

Enable EIA Test

The data terminal equipment (DTE) can turn on LL or RL loopbacks by turning on the LL and RL leads.

CF Reset

Determines whether the DTE can force a reset on the carrier detector output, CF (RLSD or DCD).

Disable CF Reset

When the CFRES is disabled, DTE can not reset CF. Select **DISABLE** if the DTE does not support CFRES on Pin 25.

Enable CF Reset

This is used at the master end of a four-wire polling application. For faster polling, when the DTE detects the end of the response to the poll, it can turn on Pin 25 (CFRES) of the DTE interface. This causes the interface lead CF to turn off immediately, without waiting for the normal carrier-detect release time. CF stays off until a new carrier signal is acquired.

2W/4W Operation

You can configure the modem to operate as either a two-wire or a four-wire system.

4W

A four-wire setup can be full-duplex, transmitting and receiving at the same time.

2W

A two-wire setup is half-duplex, that is, communications can go in both directions, but in only one direction at a time. Note that RL (remote loopbacks) can not be performed in a two-wire mode.

Equalizer

The compromise delay equalizer has to handle errors in the received signal. By adjusting specific circuit parameters, such as the receiver clock frequency, the equalizer for the SC 202 measures and corrects these errors.

Equalizer Out

The equalizer is not used.

Equalizer In

When you insert the equalizer in the receive signal path, the equalizer helps compensate for the amplitude and phase distortion of long lines.

Transmit Output Level

The transmit output level controls the level of the transmitted signal. DBm designates the power level relative to one milliwatt. Zero dBm is one milliwatt.

0 to -15 dBm

You can set the signal level, in -1 dBm increments, from 0 to -15 dBm.

Recommended Selections

Two-wire point-to-point applications are found in [Table 2-7](#); four-wire point-to-point applications in [Table 2-8](#); and for four-wire multipoint applications in [Table 2-9](#).

Table 2-7 Selections Recommended for 2-Wire Point-to-Point Applications

Item	Local/Remote Modem
Carrier Mode	Controlled
Soft Carrier Turnoff	Enable (8 ms) or Disable (0 ms)
CTS Operation	Normal
RTS/CTS Delay	Short (30 ms) or Long (180 ms)
Transmitter Output Level	0 to -15 dBm in 1 dBm steps
Line Operation	2-wire
Equalizer	In or Out
Front Panel Time-Out	Enable or Disable
Terminal Test Control	Enable or Disable

Table 2-7 (Sheet 1 of 2)

Table 2-7 Selections Recommended for 2-Wire Point-to-Point Applications (Continued)

CF Reset	Enable or Disable
Notes:	
<ul style="list-style-type: none"> Receiver squelch is equal to 9 ms, if RTS/CTS delay is equal to 30 ms. Receiver squelch is equal to 156 ms, if RTS/CTS delay is equal 180 ms. Anti-streaming timer is disabled. Dummy carrier is disabled. 	

Table 2-7 (Sheet 2 of 2)**Table 2-8** Selections Recommended for 4-Wire Point-to-Point Applications

Item	Local/Remote Modem
Carrier Mode	Continuous
Soft Carrier Turnoff	Disable
CTS Operation	Normal or Force On
RTS/CTS Delay	Short (0 ms) or Long (8 ms)
Transmitter Output Level	0 to -15 dBm in 1 dBm steps
Line Operation	4-wire
Equalizer	In or Out
Front Panel Time-Out	Enable or Disable
Terminal Test Control	Enable or Disable
CF Reset	Enable or Disable
Notes:	
<ul style="list-style-type: none"> Receiver squelch is disabled. Anti-streaming timer is disabled. Dummy carrier is automatic and is always on; however, if RTS is real, CTS follows in 0 or 8 ms. If RTS is not provided, CTS should be forced on. 	

Table 2-8**Table 2-9** Selections Recommended for 4-Wire Multipoint Applications

Item	Master Modem	Slave Modem
Carrier Mode	Continuous	Controlled
Soft Carrier Turnoff	Disable	Enable or Disable
CTS Operation	Normal or Force On	Normal
RTS/CTS Delay	Short (0 ms) or Long (8 ms)	Short (8 ms) or Long (30 ms)
Transmitter Output Level	0 to -15 dBm in 1 dBm steps	0 to -15 dBm in 1 dBm steps
Line Operation	4-wire	4-wire
Equalizer	In or Out	In or Out

Table 2-9 (Sheet 1 of 2)

Table 2-9 Selections Recommended for 4-Wire Multipoint Applications (Continued)

Front Panel Time-Out	Enable or Disable	Enable or Disable
Terminal Test Control	Enable or Disable	Enable or Disable
CF Reset	Enable or Disable	Enable or Disable
Notes:		
<ul style="list-style-type: none">• Soft Carrier Turnoff is equal to 0 ms, if disabled.• Soft Carrier Turnoff is equal to 8 ms, if enabled and RTS/CTS delay is equal to 8 ms.• Soft Carrier Turnoff is equal to 30 ms, if enabled and RTS/CTS delay is equal to 30 ms.• Receiver Squelch is disabled.• Anti-streaming timer is disabled on master modem and enabled on slave modem.• Dummy carrier is automatic on master modem and disabled on slave modem.		

Table 2-9 (Sheet 2 of 2)

Installing and Removing the 202 Modem

You can install the 202 modem card in any unused slot in the shelf having proper connectors needed for the network. To install the 202 card in the shelf:

1. Observe the card slot number on the shelf's lower guide bar. This slot number corresponds to the rear panel DTE and line connections. This number is not visible once the card is inserted in the shelf.
2. With the GDC logo on top, insert the module into its slot, then slide it in until it makes contact.
3. Pull down the ejector tab and firmly push the module in until it seats in the rear connectors.

To remove the modem from the shelf for accessing the internal option switches and jumpers, reverse the installation steps above.

TIA/EIA-232-F Cable

Description of the signals transferred by means of the TIA/EIA-232-F cable assembly are found in [Table 2-2](#). [Figure 2-2](#) shows you the DTE port cable and displays the GDC part numbers for its varying cable lengths.

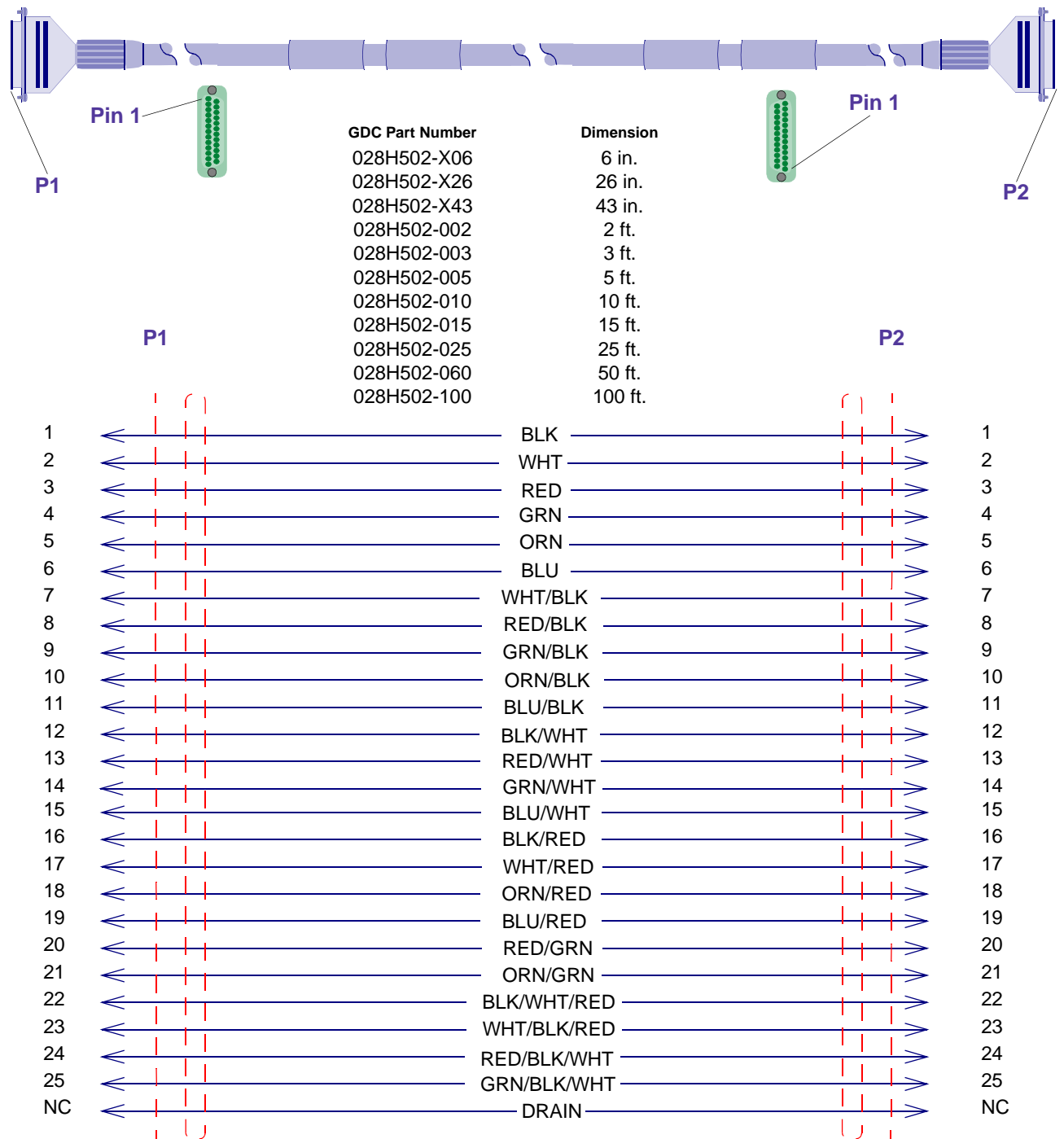


Figure 2-2 DTE Port Cable

Chapter 3: Operation

Overview

Using the SpectraComm 202 modem for your applications is described in this chapter.

After you select the card options, the modem operates unattended. You can visually verify the operation of the modem by monitoring the front panel indicators.

Pre-Operational Check

Once you insert a card into a powered system (or when you first power the system up), the card automatically performs a simple power-on self-test (POST). This test allows you to check the front panel LEDs by turning them on and off; and it checks that the firmware checksum of the card is correct. If the self-test fails, the ALM LED stays lit.

Status Reported by LEDs

Front Panel Indicators and Switches

Twelve front panel indicators monitor the operation of the SpectraComm 202 modem and gives you up-to-date status of your modem. See [Figure 3-1](#). The SD, RD, RS, CS, CO, and MR front panel LEDs are green and the TM, ALM, ST, LL, RL, and DL LEDs are red. Each LED is identified in [Figure 3-1](#). Four front panel switches control the diagnostics of the SpectraComm 202 modem. The push-button switches are pressed momentarily and red LEDs show you only the active switches. Loopback tests or self-tests are activated by pressing and releasing the push-buttons once, causing the corresponding LEDs to light. A test is de-activated by pressing and releasing the push-button a second time.

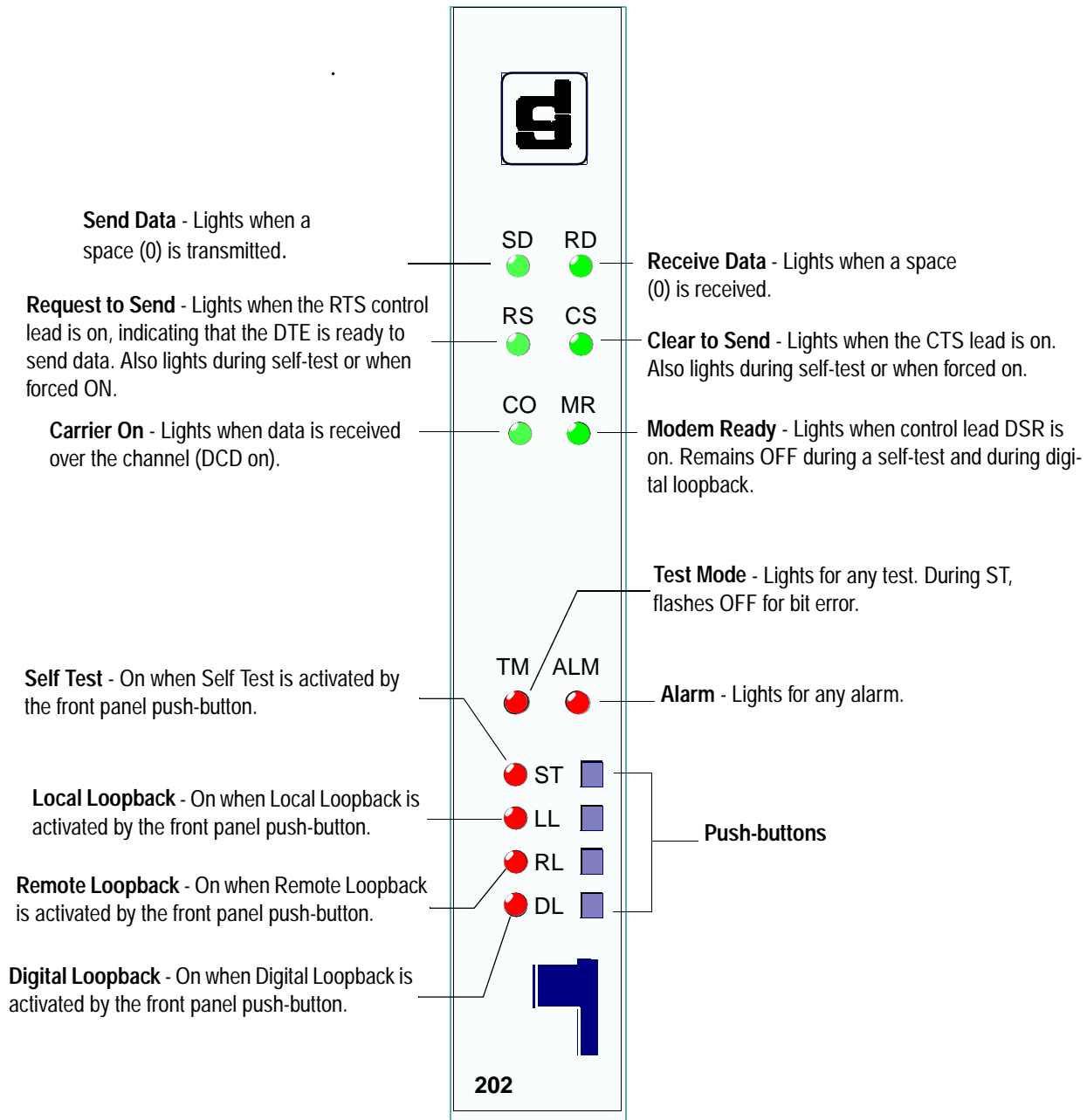


Figure 3-1 Front Panel Indicators and Switches

Status Reported to the Network Manager

Table 3-1 displays the modem items reported to the network manager.

Table 3-1 Status of Items Reported to Network Manager

Item Reported to Network Manager	State or Mode
Serial number of card	Presents the serial number of the card.
Firmware revision of card	Displays latest firmware revision of the card.
Carrier operation	Controlled, Continuous
Soft carrier turnoff	Enable, Disable
CTS operation	Normal, Forced On
RTS/CTS delay	Short, Long
Test time-out	Disable, Enable
EIA test	Disable, Enable
CF reset	Disable, Enable
2W/4W operation	2W, 4W
Control leads	RS, CS, MR, CO
Test status	Idle, local loopback, LL with self-test, digital loopback, remote digital loopback, RDL with self-test
ALM LED	On if Power-Up Self-Test fails
TM LED	On for any Channel Diagnostic Test
Receive data	RD
Send data	SD
Unit Failure	Unit has failed its power on self-test. Major Alarm: on=orange, off=dark green.
Checksum Corrupt	Indicates that the non-volatile memory, which stores the configuration of the unit, has become corrupted. Major Alarm: on=orange, off=dark green.
Test results	Bit errors for self-test, OK for LB
Time remaining	Displays time left to test in a bar chart form.
Diagnostic status	ST, LL, RL, DL

Important The following status items are not reported to the network manager:

- Equalizer - In or Out
- Transmit output level

Alarms

A power-up alarm is reported to the network manager every time the unit is powered up or reset. This alarm is cleared automatically by the SCM.

If a POST failure occurs, it is reported as status to the network manager (checksum failure, non-volatile RAM failure, and so forth) and is displayed on the front panel ALM LED.

Overview

The SpectraComm 202 modem features three types of test functions that let you isolate problems in the data communication line: power-on self test, loopback tests (local, digital, remote, and DTE-initiated), and self-test.

Diagnostics

Power-On Self-Test

- The SpectraComm 202 does a Power-On Self Test (POST) to check memory, microprocessor, LEDs, and so forth, at power-up or when commanded to do a soft reset.
- The POST flashes the LEDs once as an LED test and indicates that POST is executing. Any POST failure lights the ALM LED, and is reported as an alarm detail to the network manager. Whether POST passes or fails, the unit tries to continue with normal operation.

Loopback Tests

The SpectraComm 202 supports LL (Local Loopback), DL (Digital Loopback), and RL (Remote Loopback) tests.

Local Test

Local Loopback (LL) checks out the modem, terminal, and terminal-to-modem connection. During this test, the transmitter and receiver of the modem are disconnected from the line and connected together. This builds a circuit that loops terminal-generated data through the modem and back to the terminal for error-checking. See [Figure 4-1](#).

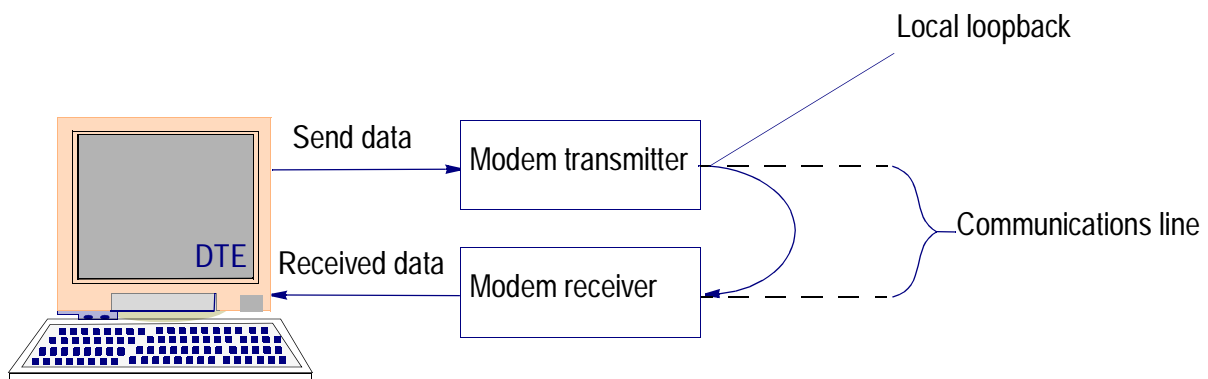


Figure 4-1 Error-Checking System for Local Loopback

All transmitted data gets looped back to your terminal (DTE). You can start the local loopback from the front panel LL push-button, the DTE LL control lead (if enabled), or from the network manager. If enabled, the testing automatically ends after a time-out, if you had initiated it from the front panel or network manager.

To do the local loopback test, see [Figure 4-2](#) and follow the steps below.

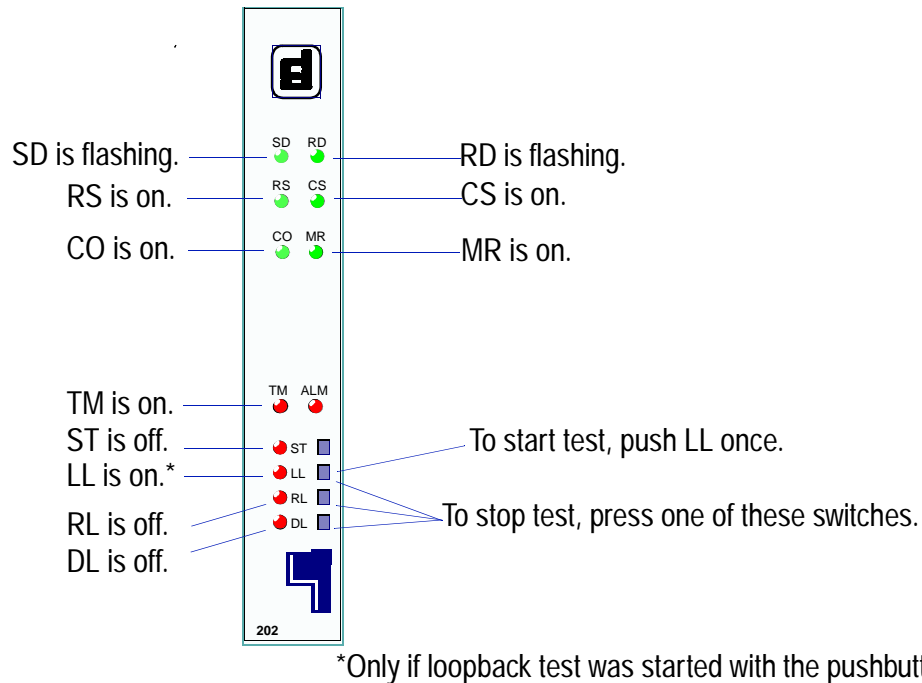


Figure 4-2 Front Panel Local Loopback

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. Check that the front panel indicator MR is ON.
3. Press front panel switch LL once.

If terminal control of the local loopback option is on, that is, EIA TST, S6-6, is enabled (ENABLE), you can initiate the test from the terminal by turning on Control Lead LL (Pin 18) of the terminal-to-modem interface. [Figure 4-2](#) shows you what is displayed on the modem during this diagnostic test.

4. Enter the test data at the terminal.
5. Compare the data that you just entered at the terminal with the data that is looped back and displayed by the terminal.

Important *If errors occur frequently, a problem may exist in the modem, terminal, or terminal-to-modem connection.*

- To stop the test:

If you started the local loopback by pressing front panel switch LL, the test ends automatically after ten minutes if the option EIA TST (S6-6), is enabled (ENABLE).

Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-2](#).

Test initiated by terminal. If you started the local loopback from the terminal, you can stop the test from the terminal by turning off Control Lead LL (Pin 18) of the terminal-to-modem interface.

Local Loopback with Self-Test

Local self-test checks out just the modem itself. During this test, the transmitter and receiver of the modem are disconnected from the line and connected together. This creates a circuit that loops a terminal-generated test pattern through the modem and back again for error-checking. See [Figure 4-3](#).

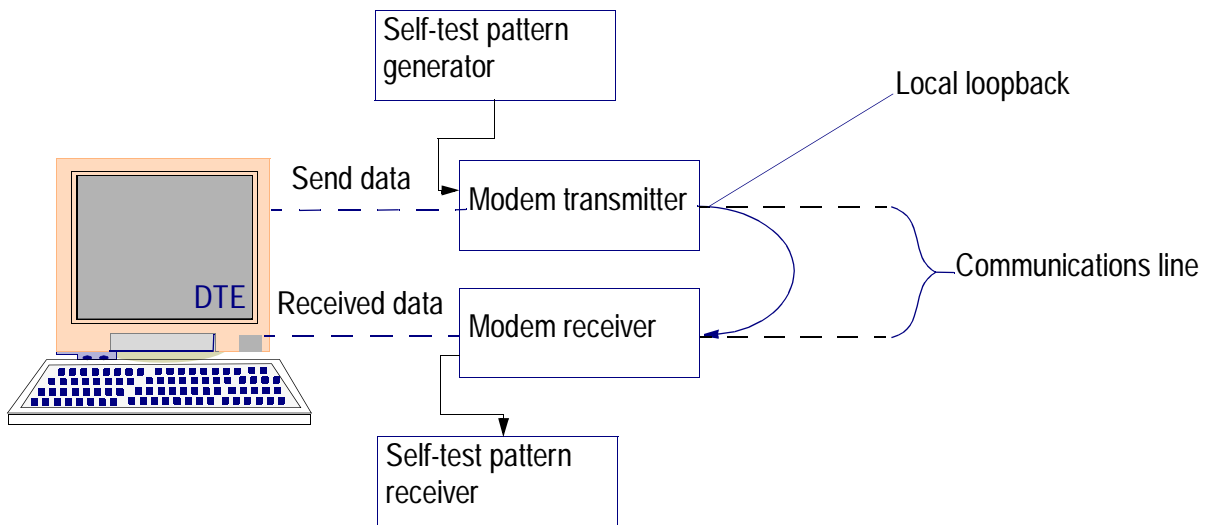


Figure 4-3 Error-Checking System for Loopback with Self-Test

To perform local loopback with self-test, see [Figure 4-4](#) and follow the steps below.

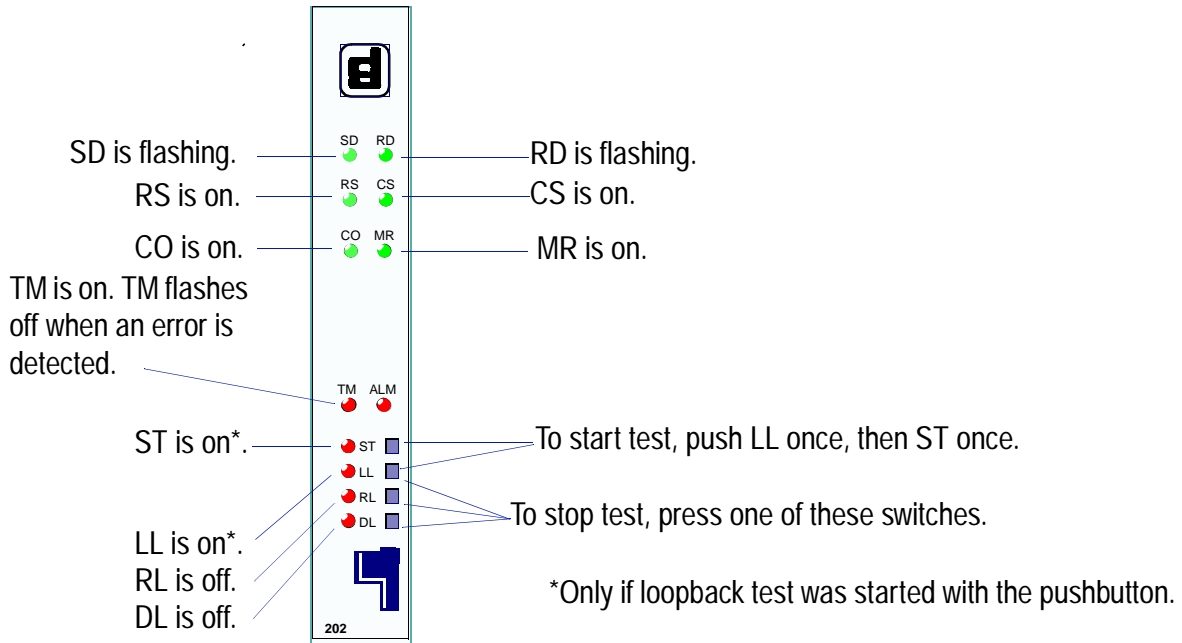


Figure 4-4 Front Panel Local Loopback Self-Test

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. Check that the front panel indicator MR is ON.
3. Press front panel switch LL once, then press ST once.
4. Monitor front panel Indicator TM.
If TM flashes off, the modem has detected an error.

Important *If errors occur, a problem exists in the modem.*

- To stop the test:
If option switch FRONT PANEL TIMEOUT, S6-5, is on, or enabled (ENABLE), the test ends automatically after ten minutes.
Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-4](#).

Digital Loopback

Digital Loopback checks the local and remote modems, the remote terminal, and the communications line. During this test, the transmitter and receiver of the modem are disconnected from the terminal interface and connected together. This test loops remote-generated data through the modem and back to the originating DTE for error-checking. See [Figure 4-5](#).

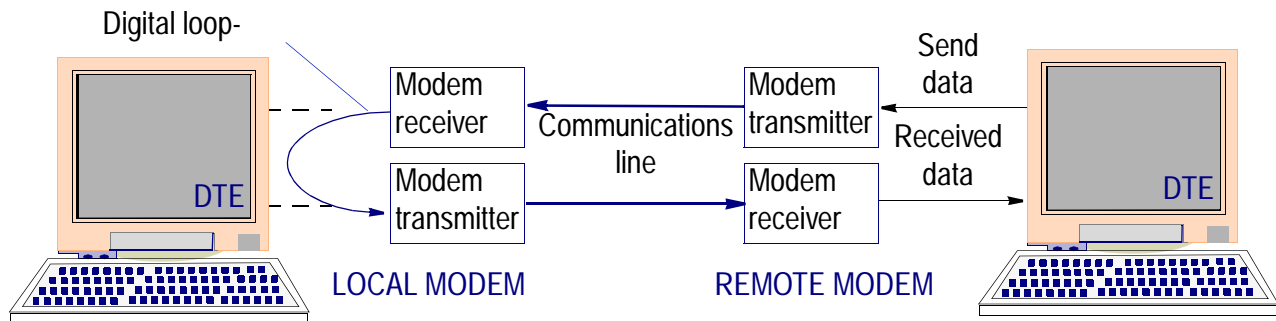


Figure 4-5 Error-Checking System for Digital Loopback

Thus, any received data from the remote modem is looped back and re-transmitted to the remote modem. Digital loopback can be initiated from the front panel DL push-button, or from the network manager. If enabled, the test automatically ends after a time-out.

Note *Digital Loopback may only be done when the modem is configured for four-wire operation.*

To perform the digital loopback test, see [Figure 4-6](#) and follow the steps below.

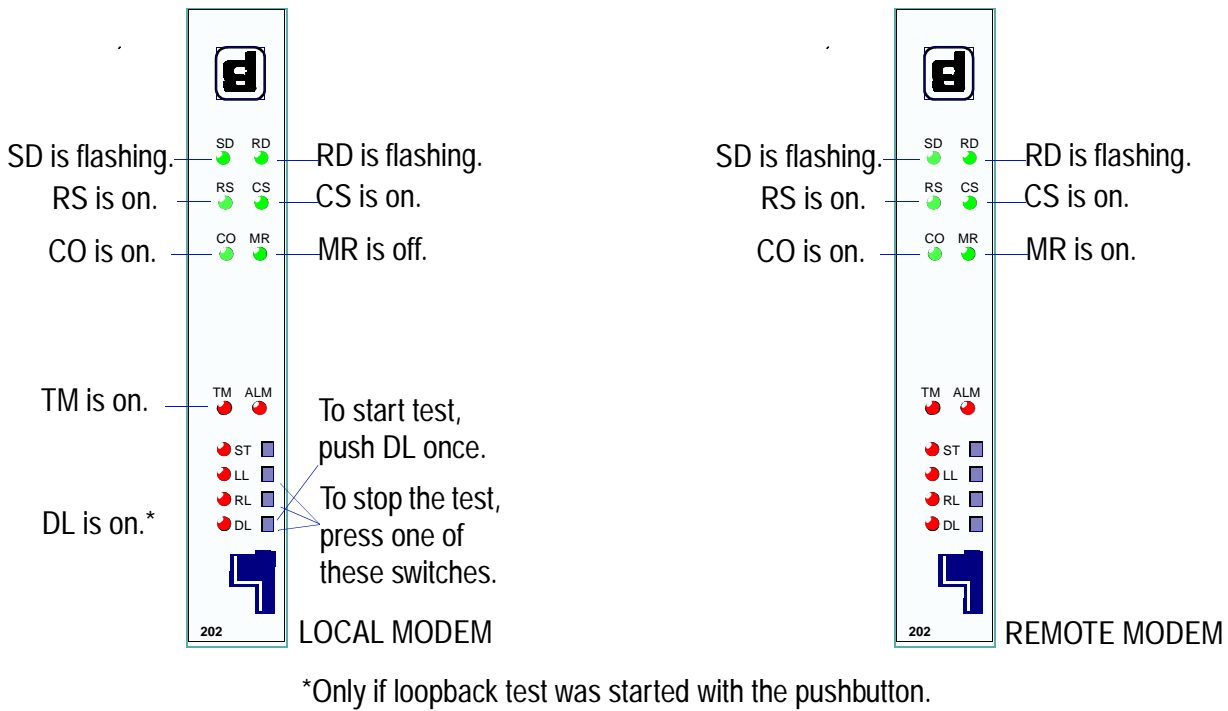


Figure 4-6 Front Panel Digital Loopback Test

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. First, on the local modem, press front panel switch DL once.
Observe that the RS, CS, and CO LEDs are on.
3. Ask the remote attendant to enter data at the remote DTE terminal.
4. Ask the remote attendant to compare the data that was entered at the remote terminal with the data that is looped back and displayed by the terminal.

Important If errors occur frequently, a problem may exist in the local or remote modems - **Check the equalizer and transmit level selections** - the remote terminal, the remote terminal-to-modem connection, or the communications line.

- To stop the test:
If FRONT PANEL TIMEOUT, S6-5, is enabled (ENABLE), the test ends automatically after ten minutes.
Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-6](#).

Digital Loopback with Self-Test

The digital loopback with self-test is the same as the digital loopback, except that for the self-test, the remote DTE is disconnected from the modem, and the self-test pattern generator is applied to the remote modem transmitter and modem receiver only. See [Figure 4-7](#) and proceed with the digital loopback steps.

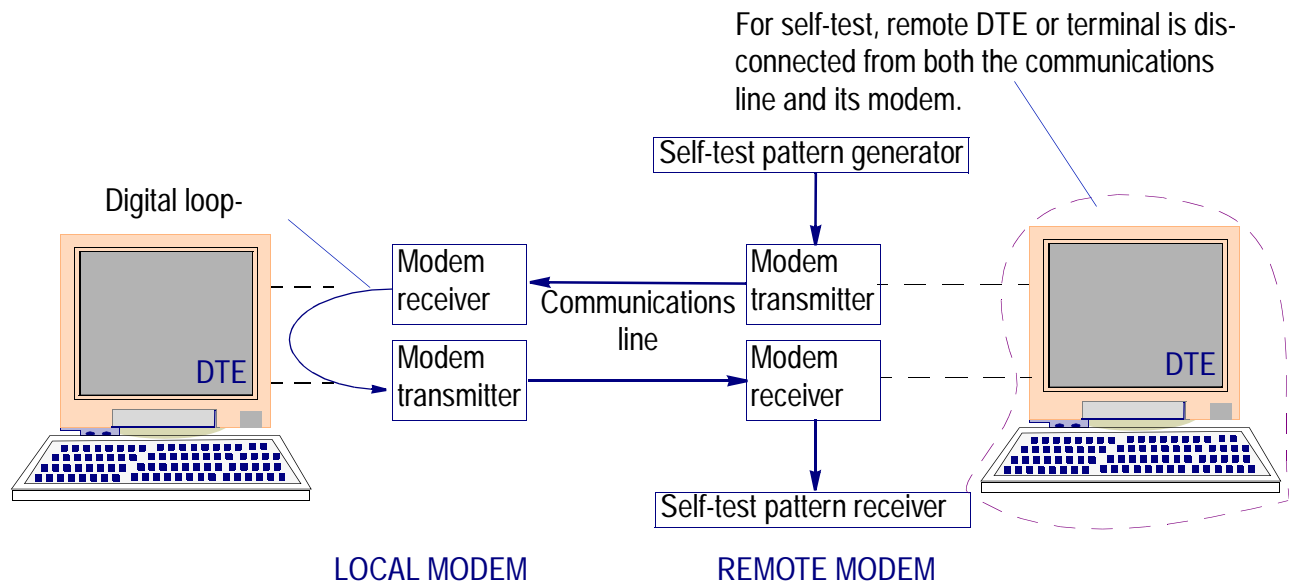


Figure 4-7 Error-Checking System for Digital Loopback with Self-Test

Note *Digital Loopback may be done only when the modem is configured for four-wire operation.*

To perform digital loopback with self-test, see [Figure 4-8](#) and follow the steps below.

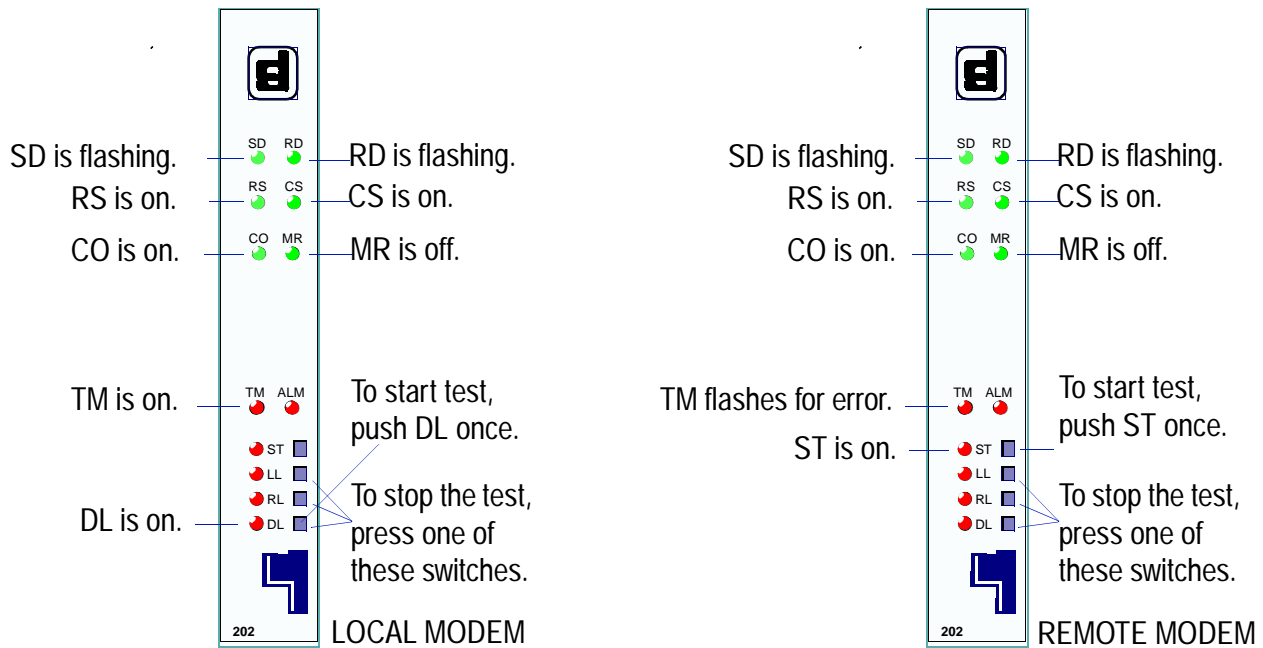


Figure 4-8 Front Panel Digital Loopback Self-Test

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. For both local and remote front panels, check that the MR is on.
3. On the local modem, press front panel switch DL once.
Observe that the RS, CS, and CO LEDs are on.
4. Ask the remote attendant to press the front panel push-button ST on the remote modem.
5. Ask the remote attendant to monitor the front panel indicator TM.
If TM flashes off on the remote modem, the modem has detected an error.

Important *If errors occur frequently, a problem may exist in the local or remote modems - **Check the equalizer and transmit level selections** - the remote terminal, the remote terminal-to-modem connection, or the communications line.*

- To stop the test:

If FRONT PANEL TIMEOUT, S6-5, is enabled (ENABLE) for both local and remote devices, the test ends automatically after ten minutes.

Manually. You can stop the test manually by pressing any loopback test switch on both front panels as shown in [Figure 4-8](#).

Remote Loopback Test

Corresponding to the RDL (Remote Digital Loopback) on the DeskTop 202 modem, the remote loopback test for the SC 202 is a proprietary loopback (not compatible with the V.54 loop-up/loop-down code). The remote loopback test works only in four-wire, continuous carrier mode, and is compatible only with the DeskTop 202 and SpectraComm 202 modems. Basically, the remote loopback checks the operation of the local and remote modems, the local terminal, and the communications line.

During the test, the transmitter and receiver of the remote modem are disconnected from their terminal interface and are connected together to make a circuit that loops locally generated data through the remote modem and back to the local terminal for error-checking, as illustrated in [Figure 4-9](#).

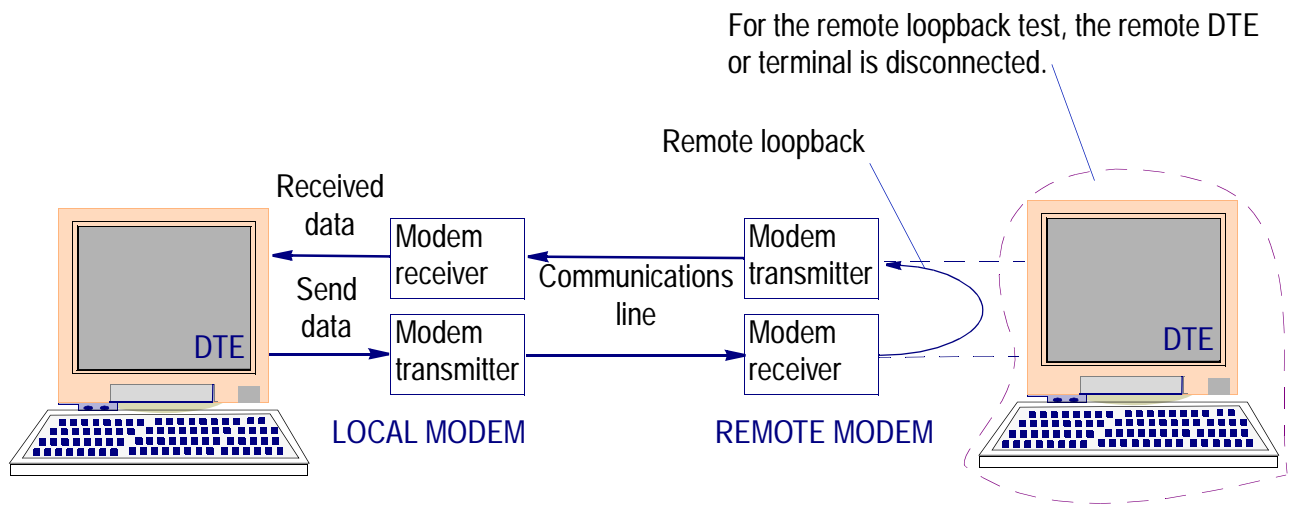


Figure 4-9 Error-Checking System for Remote Loopback Test

[Figure 4-10](#) shows the front panel remote loopback test.

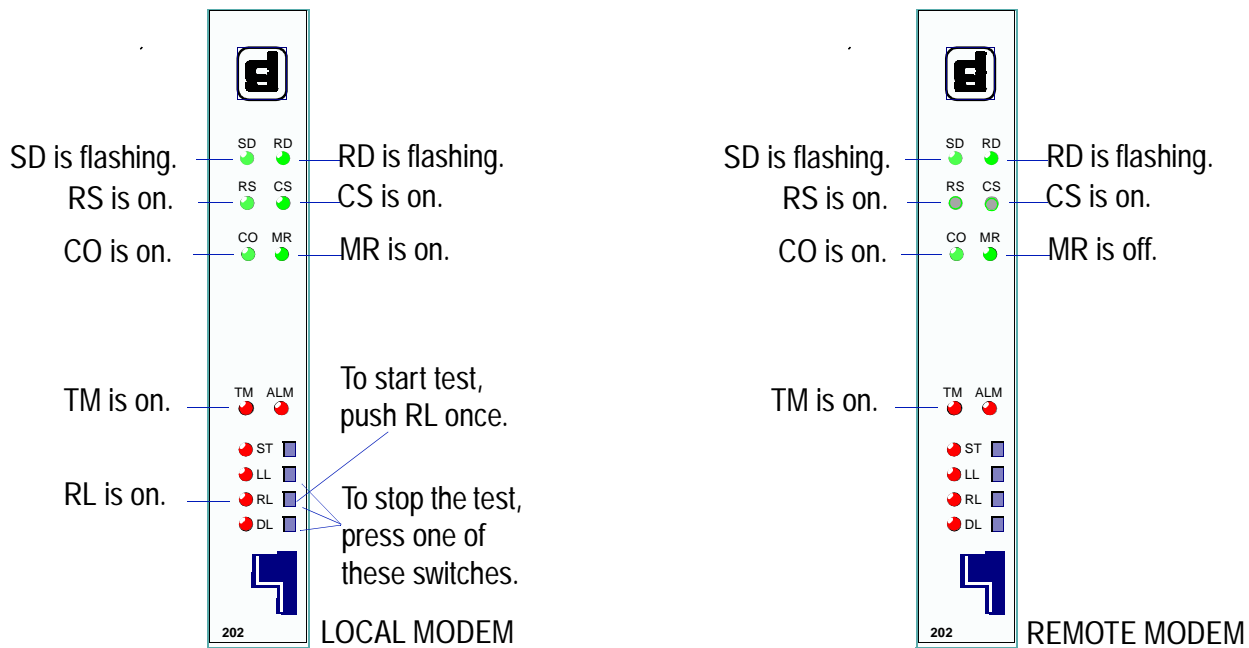


Figure 4-10 Front Panel Remote Loopback Test

Note Remote Loopback may be done only when the modem is configured for four-wire, continuous carrier operation.

To do the remote loopback test (See [Figure 4-10](#)), do the following:

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. Press front panel switch RL on the local modem.

Note If the terminal control of remote loopback is on, that is, if Switch EIA TEST, S6-6, is enabled (ENABLE), you can initiate the test from the terminal by turning on Control Lead RL (Pin 21) of the terminal-to-modem interface.

3. After front panel indicator TM turns on, enter data at the local terminal.
4. Compare the data that was entered at the terminal with the data that is looped back and displayed by the terminal.

Important If errors occur frequently, a problem may exist in the local or remote modems - **Check the equalizer and transmit level selections** - the remote terminal, the remote terminal-to-modem connection, or the communications line.

- To stop the test:

Automatically. The test ends automatically after ten minutes.

Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-10](#).

Note

If Remote loopback was initiated from the terminal, you may end the test from the terminal by turning off RL on (Pin 21) of the terminal-to-modem interface.

Remote Loopback with Self-Test

The remote loopback with **self-test** is the same as the remote loopback test, except that for the self-test. The local DTE or local terminal is disconnected from the modem, and the self-test pattern generator is applied to the local modem transmitter and modem receiver only. This test can be done if the modem is configured for a four-wire, continuous carrier operation. See [Figure 4-11](#) and [Figure 4-12](#) proceed with the steps below.

For remote loopback, the local DTE or terminal is disconnected from its modem.

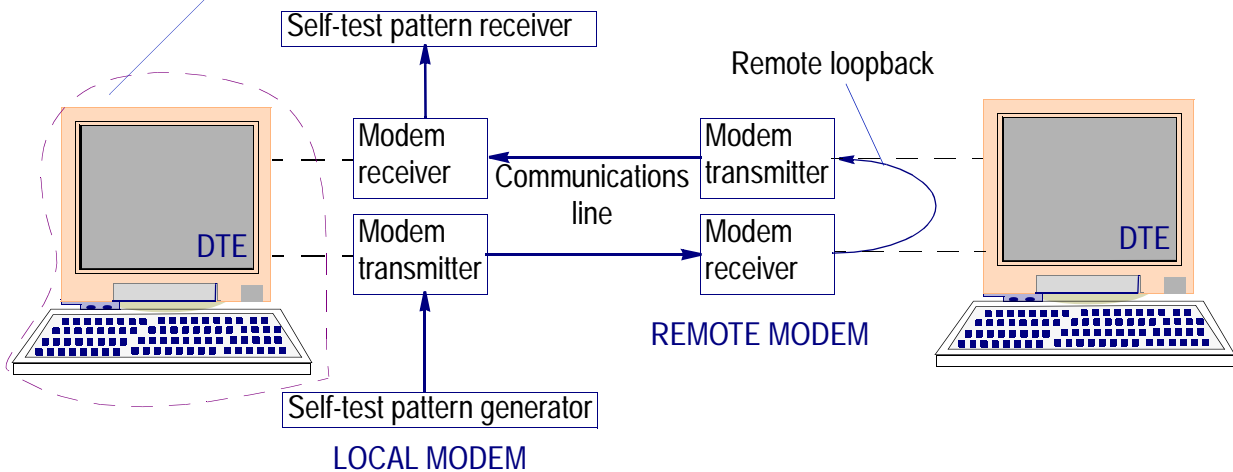


Figure 4-11 Error-Checking System for Remote Loopback with Self-Test

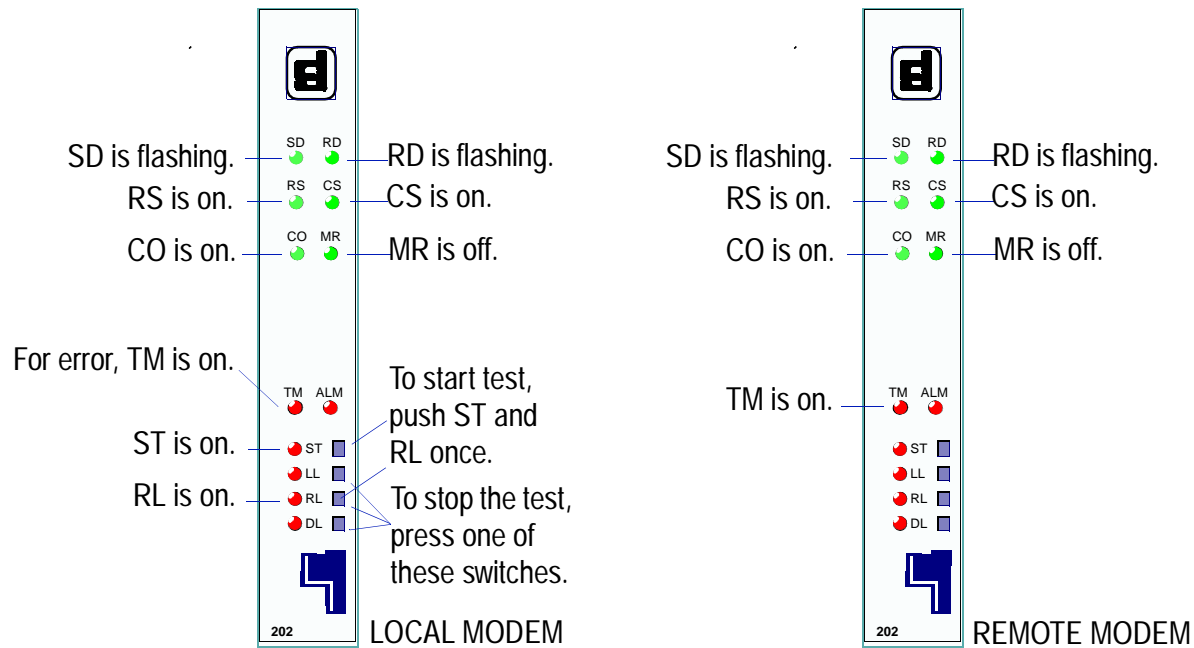


Figure 4-12 Front Panel Remote Loopback Self-Test

1. Make sure that the 202 is properly installed in the shelf and powered up.
2. Press front panel switch RL on the local modem. After front panel indicator TM turns on, press front panel switch ST on the local modem.
3. Monitor front panel indicator TM. If TM flashes off, the modem has detected an error.

Important If errors occur frequently, a problem may exist in the local or remote modems - **Check the equalizer and transmit level selections** - the remote terminal, the remote terminal-to-modem connection, or the communications line.

- To stop the test:

Automatically. The test ends automatically after ten minutes.

Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-10](#).

DTE-initiated Loopbacks Test

By the control leads on the DTE, you can activate the LL and RL loopbacks specified by ITU-T V.54. Control lead LL (Pin 18), if enabled, controls the LL loopback. It is not subject to a time-out. Control lead RL (Pin 21), if enabled, controls the RL loopback, which is subject to the RL time-out. Either of these control leads causes the front panel TM LED to light, but not the LL or RL LEDs. Note that the V.54 Test Mode (TM) control lead is not supported, since Pin 25 is used to support CFRES.

Self-Test (End-to-End Self-Test)

The self-test, or end-to-end self-test, checks the operation of the local and remote modems and the communications line. During the test, the local and remote modems exchange modem-generated test patterns and check the received test patterns for errors (See [Figure 4-13.](#)) [Figure 4-14](#) shows you identical switch and LED operations for both the local and remote modems.

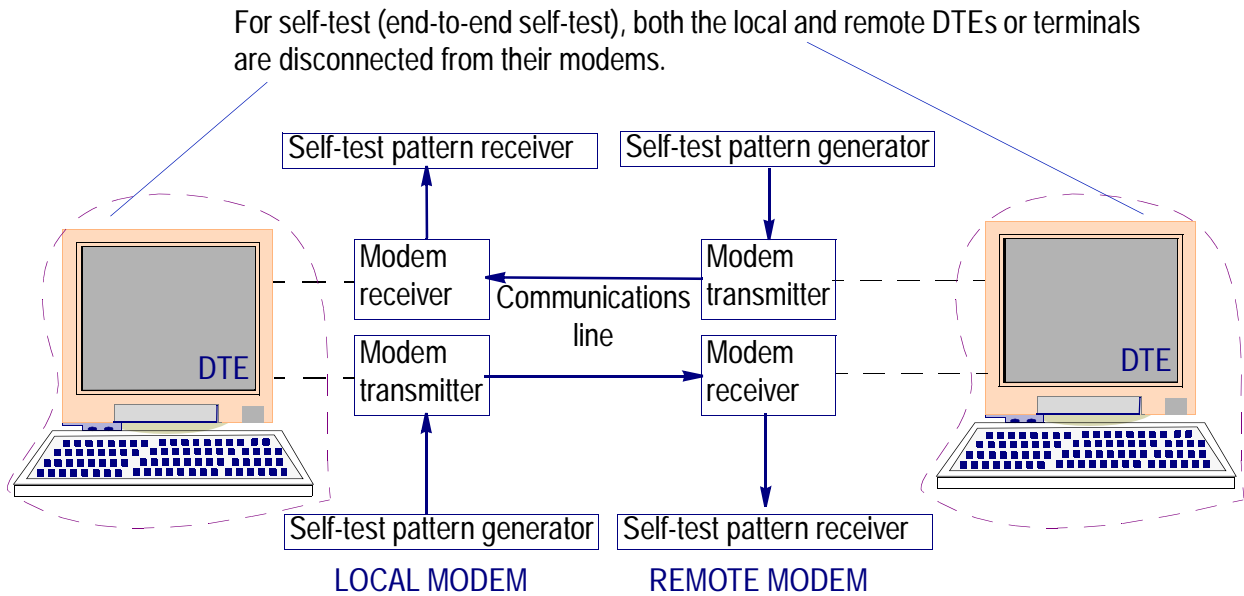


Figure 4-13 Error-Checking System for Self-Test or End-to-End Self-Test

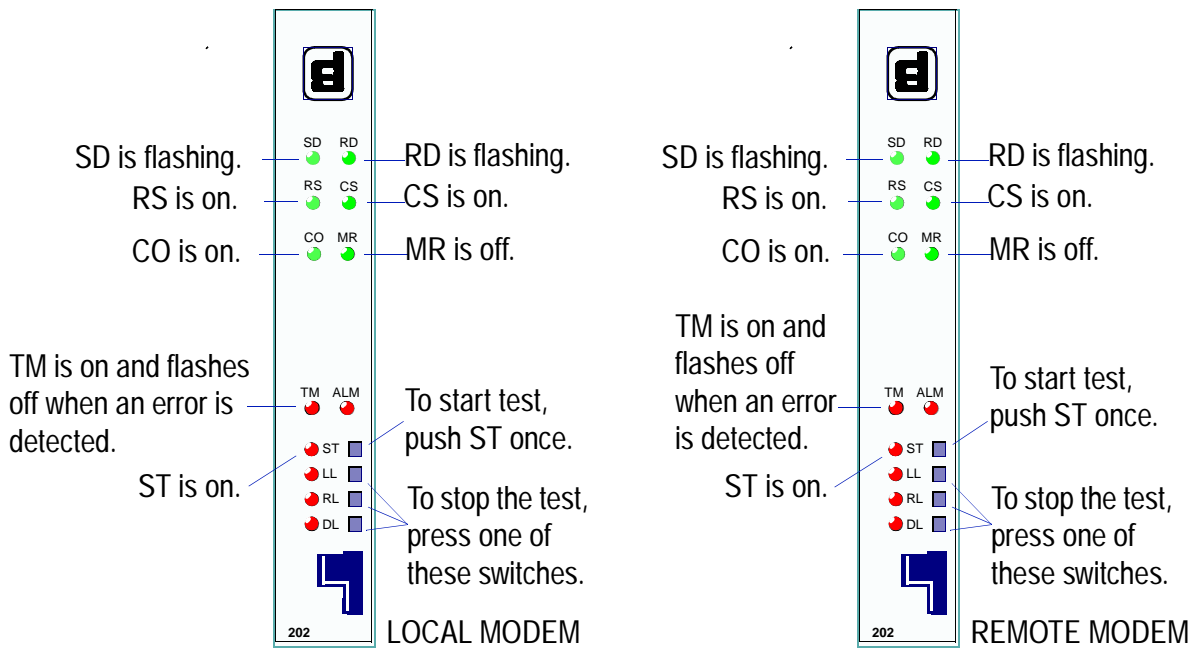


Figure 4-14 Front Panel End-to-End Self-Test

Specifically,

- The SpectraComm 202 is designed to insert a 63-bit test pattern generator into the transmit data path and a test pattern checker into the receive data path.
- The self-test is initiated by pressing the front panel self test push-button, or by the network manager. The self-test may be used end-to-end with another 202 modem that supports self-test, or with LL or RL loopbacks. It may also be used with the DL push-button on the remote modem.
- The ST LED lights when in self-test. Any detected errors in the pattern causes the TM LED to flash off. Errors are also reported to the network manager as an error count. The network manager displays elapsed time of test and total errors, and can reset the error count.

To perform the self-test, do these steps and see [Figure 4-14](#):

1. Press front panel switches ST on the local and remote modem.
2. Monitor front panel indicator TM on each modem. If TM flashes off during the test, the modem has detected an error.

Important *If errors occur frequently, a problem may exist in the local or remote modems - **Check the equalizer and transmit level selections** - the remote terminal, the remote terminal-to-modem connection, or the communications line.*

- To stop the test:
Manually. You can stop the test manually by pressing any loopback test switch on the front panel, as shown in [Figure 4-14](#).

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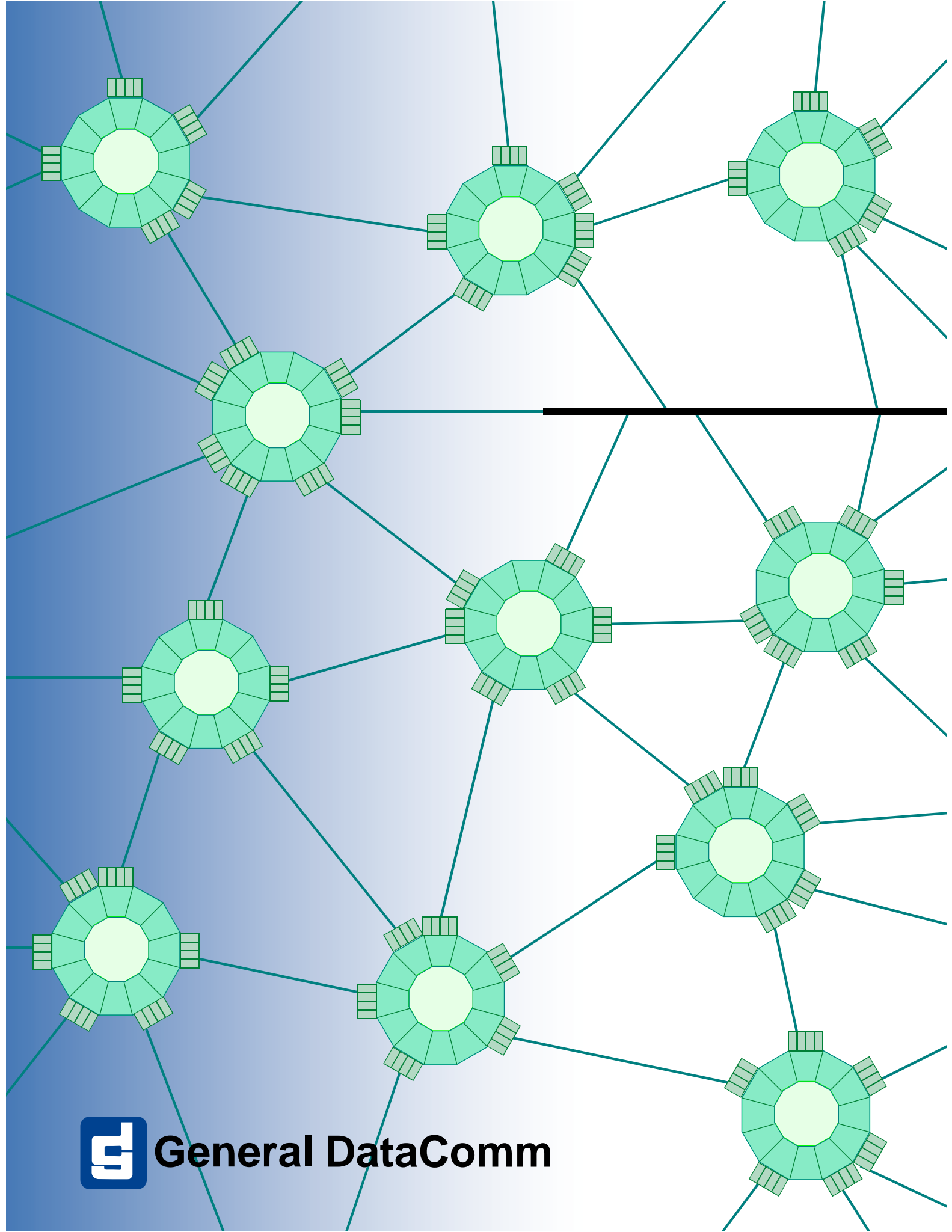
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