Installation and Operation

DeskTop 56/64 D

General DataComm

Table of Contents

Preface

Scope

This manual describes how to install and operate a General DataComm DeskTop 56/64 DSU. It is written for operators and installers and assumes a working knowledge of data communications.

Organization

This manual has four chapters and one appendix:

- *Chapter 1 - System Description* gives a general description of the DeskTop 56/64 unit.

- *Chapter 2 - Installation* shows you how to set up the unit.

- *Chapter 3 - Operation* contain illustrations that describe controls and indicators for easy operation.

- *Chapter 4 - Tests* contain pre-operational and performance checks on the equipment.

- *Appendix A - Technical Characteristics* list the unit specifications.

Document Conventions

Level 1 paragraph headers introduce major topics.

Level 2 paragraph headers introduce subchapters of major topics.

Level 3 paragraph headers introduce subchapters of secondary topics.

NOTE

Notes present special instructions, helpful hints or general rules.

Related Publications

The following documents have additional information that may be helpful when using this product:

- Operating and Installation Instructions for DeskTop 500
  GDC 048R209-000

- Operating and Installation Instructions for DeskTop 5OOA
  GDC 048R210-000

GDC publication numbers (e.g., GDC 048R218-000) are used to track and order technical manuals. Publication numbers use the following format:

GDC NNNRnnn-000 or GDC NNNRnnn-Vnnn

NNN   identifies the product family (e.g. DSU)

R   denotes a technical publication

nnn   a number assigned by Technical Publications

000   identifies a hardware product and does not change

Vnnn   the software version associated with a product may be
             updated periodically

The Issue Number on the title page only changes when a hardware manual is revised or when a manual is reprinted for some other reason.

Service and Support

General DataComm is committed to providing the service and support needed to install, manage, and maintain your equipment. For information about service programs or for assistance with your support requirements, contact your local Sales Representative or call General DataComm Service Corporation at the 24-hour toll free number listed below:

- in the U.S. dial 1-800-243-1030
- outside the U.S. dial 1-203-598-7526

Be ready with the site name and phone number and a description of the problem and the next available support representative will promptly return your call.

Hands-on training courses are provided by General DataComm Educational Services. Courses range from basic data communications, modems and multiplexers, to complex network and ATM systems and are taught in Connecticut or at a customer location. Call 1-800-242-1030 and follow the menu instructions to discuss educational services or to receive a course schedule.

Safety Instructions

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, such as a screwdriver or a paper clip, to set switches.

Safety Guidelines

The following symbols are used when unsafe conditions exist or when potentially hazardous voltages are present:

Caution statements identify conditions or practices that can result in damage to the equipment or in loss of data.

Warning statements identify conditions or practices that can result in personal injury or loss of life.

Always use caution and common sense. To reduce the risk of electrical shock, do not operate any 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.

Regulatory Notices

FCC Part 68 Compliance

Connection of data communications equipment to the public telephone network is regulated by FCC Rules and Regulations. This equipment complies with Part 68 of these regulations which require all of the following:

All connections to the telephone network must be made using standard plugs and telephone company provided jacks or equivalent. Connection of this equipment to party lines and coin telephones is prohibited. A label on the back of the front panel of data communications equipment and on the underside or rear panel of other equipment provides the FCC Registration number and the Ringer Equivalence Number (REN) for the unit. If requested, give this information to the telephone company.

If the unit causes harm to the telephone network, the telephone company may discontinue your service temporarily and if possible, you will be notified in advance. If advance notice is not practical, you will be notified as soon as possible and will be advised of your right to file a complaint with the FCC. The telephone company may change its communication facilities, equipment, operations and procedures where reasonably required for operation. If so, the telephone company will notify you in writing. You must notify the telephone company before disconnecting equipment from 1.544 Mbps digital service. All repairs or modifications to the equipment must be performed by General DataComm. Any other repair or modification by a user voids the FCC registration and the warranty.

Canada DOC Notification

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.*

Deutschland

Installations Anweisungen: Installieren Sie die Telefonleitungen nicht während eines Gewitters. Installieren Sie die Telefonleitungen nicht in einem feuchten Raum, auβer die Dose entspricht den Vorschriften für Feuchträume. Berühren Sie unisolierte Telefonleitungen oder Einrichtungen nicht, auβer diese sind vom Telefonnetz getrennt. Vorsicht bei der Installierung oder Änderung von Telefonleitungen. *Achtung:* Es gibt keine durch den Benutzer zu wartende Teile im Gerät. Wartung darf nur durch qualifiziertes Personal erfolgen.

Glossary of Terms

Bit
A binary digit, the representation of a signal, wave or state, as either a binary zero or a one.

Bps
Bits per second; basic unit of measure for serial data transmission capacity; also Kbps (kilobits), for thousands of bits per second; Mbps (megabits), for millions of bits per second; Gbps (gigabits), for billions of bits per second; Tbps (terabits), for trillions of bits per second.

ITU-T
International Telecommunications Union - Telecommunications Standardization Sector. A committee that sets international communications standards.

Channel
Part of a circuit path through several entities in a communication system. A channel runs between two nodes.

Data
Digitally represented information, which includes voice, text, facsimile and video.

Dataphone
A service and trademark of AT&T; generically refers to the transmission of data over the phone network (Dataphone Digital Service, or DDS) or to equipment furnished by the telephone company for data transmission.

Data Service Unit
Component of customer premises equipment (CPE) used to interface to a digital circuit, such as DDS and T1; now generally combined with a CSU; performs conversion of customer's data stream to bipolar format for transmission.

DDS
Dataphone digital service; private-line digital service offered intra-LATA by BOCs, inter-LATA by AT&T Communications, with data rates typically at 2.4, 4.8,9.6 and 56 K bps; now a part of the services listed by AT&T under the Accunet family of offerings.

Diagnostics

Tests used to detect malfunctions in a system or component.

Digital

Techniques and equipment in which information is encoded as either a binary "1" or "0"; the representation of information in discrete binary form, discontinuous in time, as opposed to the analog representation of information in variable, but continuous waveforms.

DSU

Data Service Unit.

DTE

Data Terminal Equipment.

LED

Light-emitting diode.

Link

The combination of communications devices, media and software intelligence that is required to effect data communications.

Loopback

Diagnostic procedure used for transmission devices; a test message is sent to a device being tested, which is then sent back to the originator and compared with the original transmission; loopback testing may be within a locally attached device or conducted remotely over a communications circuit.

Multipoint Line

A single communications channel (typically a leased telephone circuit) to which more than one station or logical unit are attached, though only one may transmit at a time; such arrangements usually require some kind of polling mechanism, under the control of a master station, to ensure that only one device transmits data at a time; also, a multi-drop line.

Network

An interconnected group of nodes; a series of points, nodes or stations connected by communications channels; the assembly of equipment through which connections are made between data stations.

Point-to-Point

A circuit that connects two points directly with generally no intermediate processing nodes or computers, although there could be switching facilities; a type of connection, such as a phone-line circuit, that links two, and only two, logical entities.

Synchronous Transmission

Data communications in which characters or bits are sent at a fixed rate, with the transmitting and receiving devices synchronized, eliminating the need for start and stop bits necessary in asynchronous transmission and significantly increasing data throughput rates.

Terminal

A point in a network at which data can either enter or leave; a device, usually equipped with a keyboard, often with a display, capable of sending and receiving data over a communications link (IBM); generically the same as data terminal equipment (DTE).

Test Generator

Allows the operator to select a 511-bit test pattern generator.

Transmission

The dispatching of a signal, message or other form of intelligence by wire, radio, telegraphy, telephony, facsimile or other means (ISO); a series of characters, messages or blocks, including control information and user data; the signaling of data over communications channels.

1 System Description

System Description

The DeskTop 56/64 is a Data Service Unit (DSU) that includes an on-board Channel Service Unit (CSU) for direct connection to DATAPHONE Digital Service (DDS).

The DeskTop 56/64 provides transmission and reception of serial binary data over the 4-wire metallic circuits used in the DDS. It operates synchronously at data rates of 56 and 64K bps.

The DeskTop 56/64 normally derives timing from the DDS network clocking system (network or slave mode) or you can option it for internal (DSU) or external (DTE) clocking. The business equipment interface conforms to ITU-T V.35.

Table 1-1 lists the part numbers for the DeskTop 56/64's standard and optional equipment. Appendix A describes the DeskTop 56/64's technical characteristics.

Features

- DSU/CSU for direct connection to the DATAPHONE* Digital Service.

- Operates at 56K bps Standard DDS or at 64K bps for "clear channel" service.

- Provides extended range performance at both rates.

- ITU-T V.35 DTE Interface.

- Operates in both point-to-point and multipoint configurations.

- Provides a powerful Remote Loopback (RL) test for enhanced diagnostic capabilities. Along with this standard General DataComm RL, it also provides V.54 and PN 127 type RLs.

Diagnostics

The DeskTop 56/64 incorporates built-in diagnostic circuits that allow you to perform quick and thorough performance tests for checking DSU operation. You can perform the Line Loopback (LL) and Remote Loopback (RL) tests individually or in conjunction with the DSU Self-Test (ST) feature, using front panel push buttons. The Self-Test feature uses 511- or 2047-bit pattern generator and receiver circuits.

The DeskTop 65/64 also supports Serving Test Center (STC) diagnostics: CSU Loopback (current reversal), DSU Loopback (alternating pattern), and DSU Latching Loopback at 64 Kbps.

Table 1-1   Equipment List

Description	GDC Part No.
DeskTop 56/64 DSU, with ITU-T V.35 Interface, 117 V ac (Domestic)	048A 10 1-001
Optional Equipment	
Wall-mounted AC Transformer, 117 ac	700-053-002
Crossover Adapter for DDS/Private Line Use	208-038-001
Plug-to-Plug Cable Assembly, 7 Feet	830-028-807
V.35 Male-to-Male, Straight Through Cable	027H516-XXX*
*XXX = Cable length in feet	

2 Installation

Overview

This chapter guides you through the process of installing and using the DeskTop 56/64 DSU.

Installation Requirements

Locate the unit in a ventilated area where the ambient temperature does not exceed 122ºF (50ºC).

Unpacking and Handling

Inspect the unit for damage; if any is observed, notify the shipper immediately. Save the box and packing material; you can use it to reship the unit, if necessary. Do not place the unit directly above equipment that generates a large amount of heat (such as power supplies).

Pre-operational Check

Upon power-up, the DSU lights all of its LEDs, and then performs an Analog Loopback Self-Test. The DSU indicates a failure by continuously flashing all its LEDs. If the DSU fails the power-up self-test (refer to *chapter 4*) contact General DataComm Service Corporation .

Before connecting the DSU to the communications line or DTE, you can give it a further pre-operational check by performing a Line Loopback Self-Test (refer to *Chapter 4*) to verify operation.

If the DSU passes the test, but subsequently fails to perform data communications, it is probably not at fault. There is either an error in option selection or installation, or a faulty communications line or remote installation.

Checking Option Selection

All option selections are made using external switches S510 and S511. Verify that option selection is the same as illustrated in *Figure 2-1*. All option switches are left in the OFF (default) position.
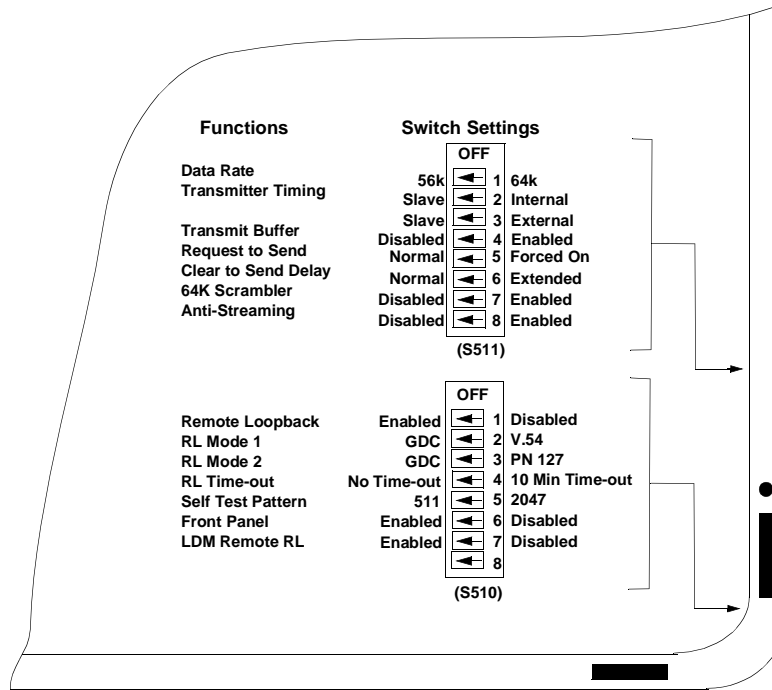
Functions	Switch Settings	
	OFF	
Data Rate	56k ◄ 1	64k
Transmitter Timing	Slave ◄ 2	Internal
	Slave ◄ 3	External
Transmit Buffer	Disabled ◄ 4	Enabled
Request to Send	Normal ◄ 5	Forced On
Clear to Send Delay	Normal ◄ 6	Extended
64K Scrambler	Disabled ◄ 7	Enabled
Anti-Streaming	Disabled ◄ 8	Enabled
	(S511)	

Functions	Switch Settings	
	OFF	
Remote Loopback	Enabled ◄ 1	Disabled
RL Mode 1	GDC ◄ 2	V.54
RL Mode 2	GDC ◄ 3	PN 127
RL Time-out	No Time-out ◄ 4	10 Min Time-out
Self Test Pattern	511 ◄ 5	2047
Front Panel	Enabled ◄ 6	Disabled
LDM Remote RL	Enabled ◄ 7	Disabled
	◄ 8	
	(S510)	

Figure 2-1   Option Location and Selection

Checking the Installation and Line

Recheck the cable and line connections and, if necessary, perform the tests in *Chapter 4* to isolate the problem.

Verify that the remote DSU is a compatible type (e.g., a DSU operating at the same data rate).

Verify that the DDS network is operating at the correct rate. If the DSU does not check out properly, replace it with a spare and repeat the test. Do not attempt to repair the DSU.

For assistance, you may contact General DataComm Services at the number listed in the *Preface* of this manual.

Option Selection

The field-selectable options adapt the DeskTop 56/64 to a variety of configurations. You select these options by positioning DIP switches on the bottom of the DSU. The DSU resets following any option change.

Figure 2-1 shows the location of each option switch, and describes the function and application of each option.

Electrical Connections

The following paragraphs describe the power line, business equipment and private line connections to the DeskTop 56/64.

AC Power

The wall-mounted transformer is equipped with a cord terminated in a 5-pin DIN plug. Connect this plug to the DIN receptacle labeled POWER, located on the rear of the unit (see *Figure 2-3*). Connect the wall-mounted transformer to an outlet providing the required ac power. The outlet should not be under switch control.

Business Equipment Connections (Data Terminal)

The DTE interface supports business equipment device type, ITU-T V.35. Connect V.35 compatible equipment to the connector labeled Business Equipment. This connector is located on the rear panel (see *Figure 2-2*).

Appendix A describes the signals exchanged through the business equipment interface.

DDS/VF Line Connectors

The DSU is connected to the communications line using the RJ48 modular jack on the rear panel (see *Figure 2-2*).
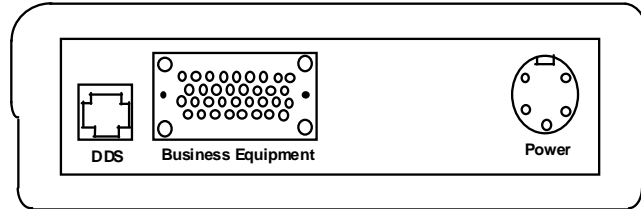
Figure 2-2   Rear Panel Connectors

> *The TX lines on the modular jack are on pins 1 and 2, and the*
> *RX lines are on pins 7 and 8. Pin 1 is on the left and pin 8 is*
> **NOTE** *on the right, when viewed from the rear panel.*

Table 2-1   Option Location and Selection

S511		
1	Data Rate	DSU operating rate 56 Kbps = OFF 64 Kbps = ON
2 3	Transmitter Timing	Transmitter timing source. Slave timing (derived from the network) = both OFF. Internal timing (generated by the DSU) = only S511-2ON. External timing (provided by the DTE) = only S511-3ON.
4	Transmit Buffer	Transmit buffer clock source. Internal timing (uses Internal Timing source) = Disabled. External (provided by the DTE) timing = Enabled.
5	Request to Send	Request to Send operation. Normal = OFF. Select RTS-to-CTS delay with S511-6. Force ON RTS and CTS = Forced ON.
6	Clear to Send Delay	RTS-to-CTS delay. S511-5 must be OFF. Normal (3-byte delay) = OFF. Extended (45 ms delay) = ON
7	64K Scrambler	Data scrambler/descrambler. Applicable only at 64 Kbps. Disabled = OFF. Enabled = ON.
8	Anti-Streaming	Auto Anti-Streaming (if RTS remains ON for more than 20 seconds, the DSU forces OFF its primary channel transmitter; after RTS ids OFF for 100 ms, the DSU releases Anti-Streaming). Disabled=OFF. Enabled = ON.

Table 2-1   Option Location and Selection (Cont.)

S510	
1 Remote Loopback	Remote Loopback test. Enabled = OFF. Disabled = ON.
2 RL Mode 1 RL Mode 2 3	Remote Loopback type. Configure both DSUs for the same type. <u>RL type</u> <u>S510-2</u> <u>S510-3</u> GDC (n/a at 64k) Disabled (OFF) Disabled (OFF) PN 127 Disabled (OFF) Enabled (ON) V.54 Enabled (ON) Disabled (OFF)
4 RL Time-out	Remote Loopback time-out. No time-out = OFF. 10-minute time-out = ON.
5 Self Test Pattern	Self-Test pattern. 511-bit pattern = OFF. 2047-bit pattern = ON.
6 Front Panel	Front Panel Test Switches Enabled = OFF Disabled = ON
7 LDM Remote RL	Enabled = Allows RDL to be initiated from the slave-timed unit while in LDM mode.

3 Operation

Overview

This chapter describes the DSU controls and indicators. You may use these to check for operation of the unit.

Controls and Indicators

Figures 3-1 and 3-2 illustrate the DSU front panel and explain the function of each control and indicator.

Pressing this push button places the remote DSU in Remote Terminal Loopback.

Pressing this push button places the local DSU in Line Loopback.

ON HS RS CS CO   SD RD   ST LL RL

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DeskTop
56/64

ST LL RL

Pressing this push button causes the local DSU's test pattern generator to generate and check a selectable test pattern.
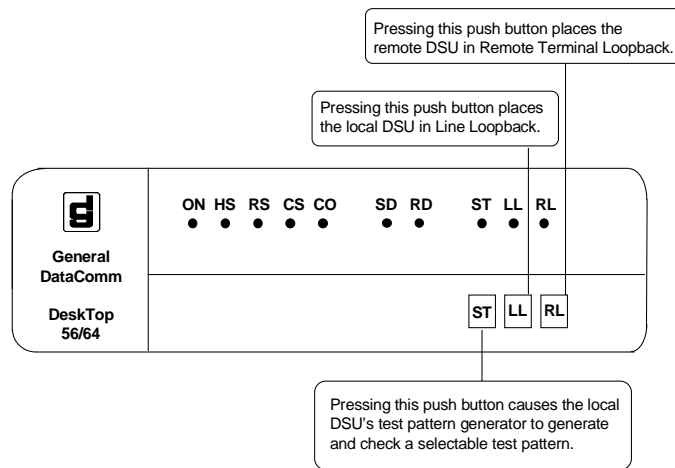
Figure 3-1   Front Panel Push Buttons

ON when DSU is ready to send data. OFF during self-test modes.

ON when DSU is receiving data. OFF during self-test modes.

ON when DTE is ready to send data. Also ON during self-test modes or when RTS Forced On option is enabled.

ON when send data is a space.

ON when received data is a space.

ON when DSU has ac voltage and DSU power supply is 5 V dc.

ON during a line Loopback test.

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DeskTop 56/64

ON HS RS CS CO   SD RD   ST LL RL

ST   LL   RL

ON when DSU is optioned for 64K bps. OFF when optioned for 56K bps.

ON during self-test. Flashes if errors are detected during test.

ON during remote Loopback test. Flashes during an RT Loopback condition.

LL flashes during a STC CSU loopback test. LL and RL flash during a STC DSU loopback.

ST, LL, and RL will flash if a NO-signal or streaming condition is detected.
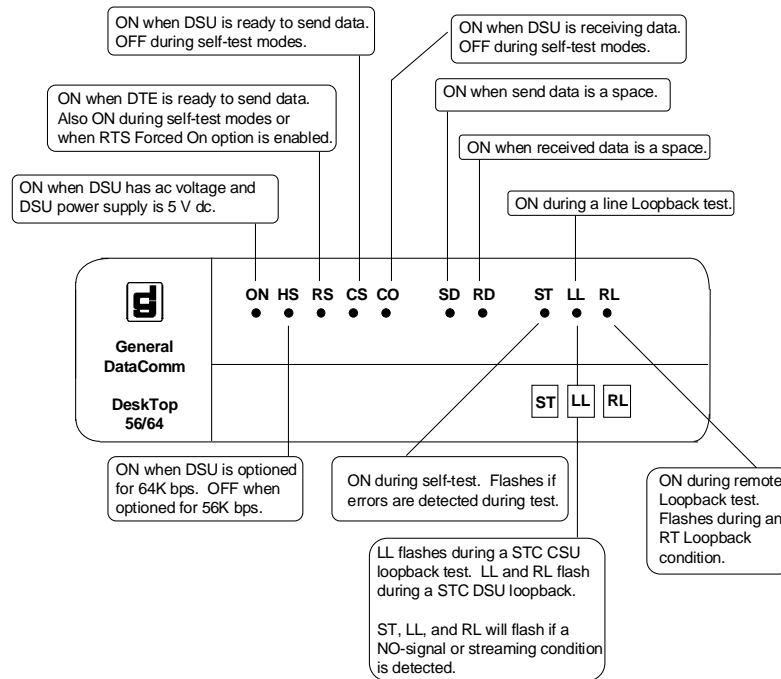
Figure 3-2   Front Panel indicators and Display

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4 Tests

Overview

This chapter describes tests that you can perform as a pre-operational check on installation of the DeskTop 56/64 or whenever you must check its operation.

The SD and RD LEDs may appear to be ON or to flicker, depending on the data rate at which you are testing the unit. When the DSU is operating, the indicators may appear to be solidly ON.

NOTE

Diagnostics may be controlled from the front panel push buttons or from the Serving Test Center (STC) NOTE depending on the specific test.

You can also use the tests described in this chapter to isolate problems in the data communications system (refer to the fault-isolation sequence in *Figure 4-1*).

Table 4-1 describes the diagnostic test priorities.

Table 4-1 Diagnostic Test Priorities

Priority	Test	Means of Activation
1	CSU Loopback	STC (current reversal)
2	LL/LL-ST	Front Panel
3	DSU Loopback	STC (Codes) (if activated first, has priority over LL/LL- ST)
4	RL/RL-ST	Front Panel
5	ST	Front Panel
6	RT (Remote)	(from remote RL)

Point-to-Point Testing

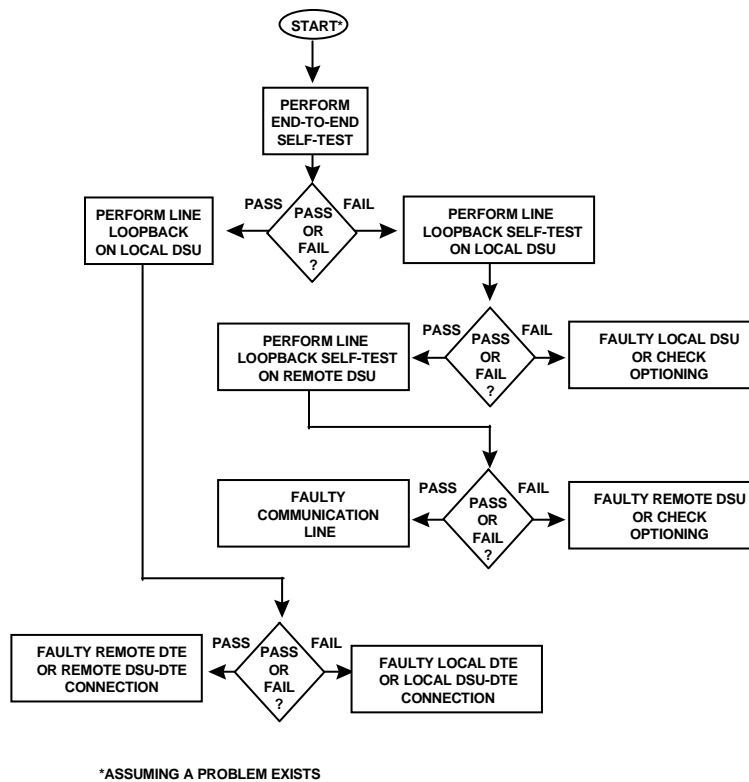The following diagrams present test information for point-to-point installations.

Figure 4-1   Fault-Isolation Sequence

Line Loopback Test

Line Loopback (LL) checks the performance of the DSU and its associated DTE. The DSU disconnects its line transmitter and receiver from the communications line, then connects them together, creating a circuit similar to an Analog Loopback circuit that loops signals from the transmitter through the receiver. It also connects the transmit and receive communications lines together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the remote DSU. *Figure 4-2* illustrates LL.

While the local DSU is performing Line Loopback, the remote DSU can send a Self-Test pattern to the local DSU, which loops the test pattern back to the remote DSU for verification. This test checks the performance of the remote DSU and the communications line. To perform this test, make arrangements with the remote site personnel before initiating Line Loopback locally.
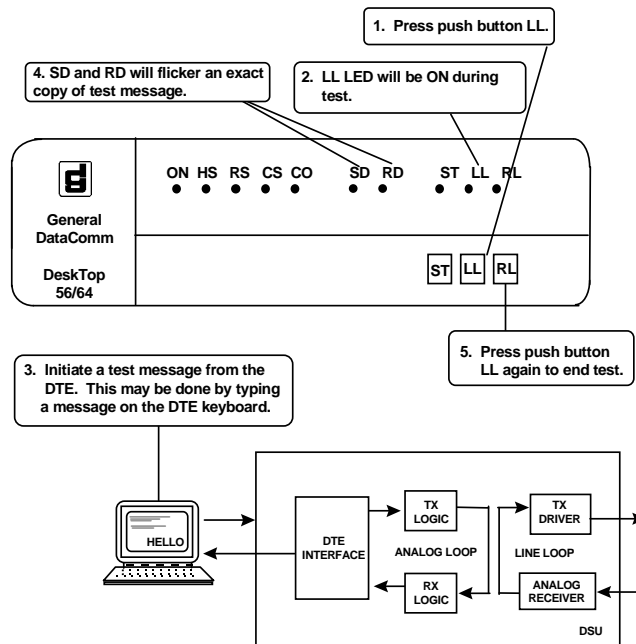

Figure 4-2   Line Loopback Test

Remote Loopback Test

Remote Loopback (RL) checks the performance of the local and remote DSUs, the local DTE, and the communications line. When you initiate this test, the remote DSU enters the RT Loopback condition. The remote DSU disconnects its DTE transmitter and receiver from the DTE interface, then connects them together, creating a circuit that loops the receiver digital output signals to the transmitter input. *Figure 4-3* illustrates RL.
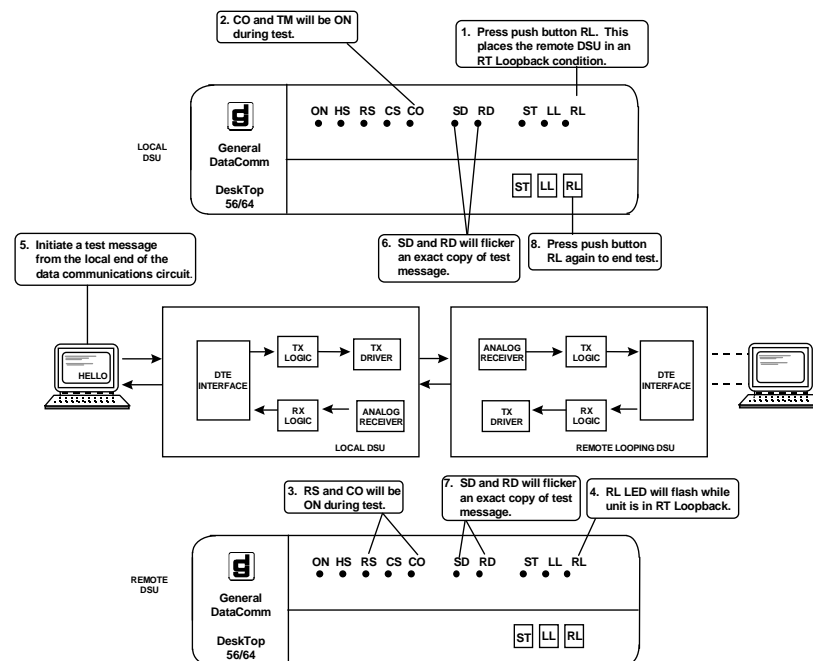

Figure 4-3   Remote Loopback Test

Self-Test

Self-Test allows the DSU to generate a test pattern and monitor the received signal for errors in the received test pattern.

If the DSU detects any errors, the ST LED flashes. You can use Self-Test in place of DTE-generated test messages for the Line Loopback or Remote Loopback tests. *Figures 4-4* through *4-6* illustrate Self-Test.
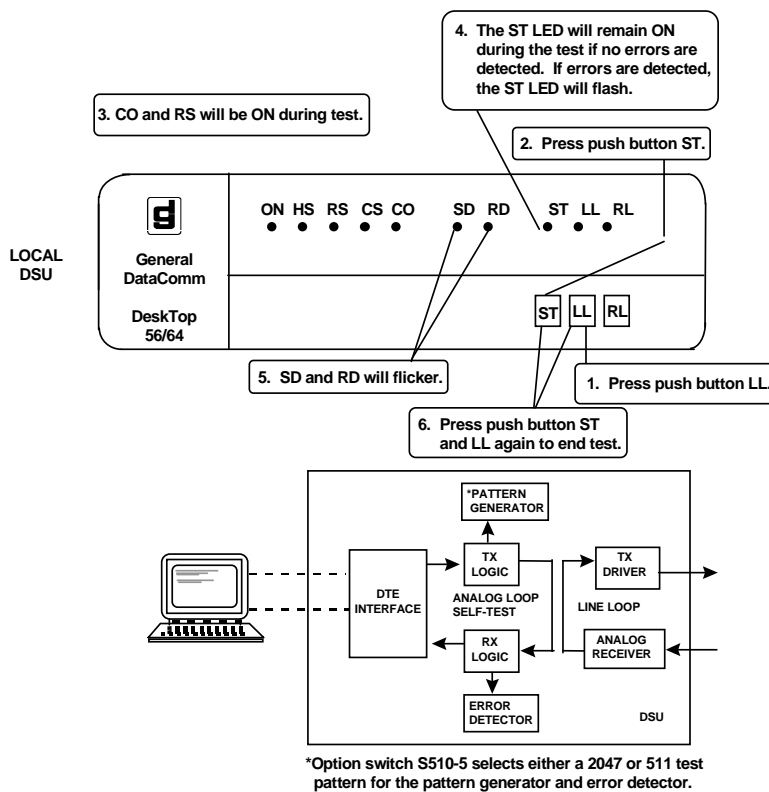
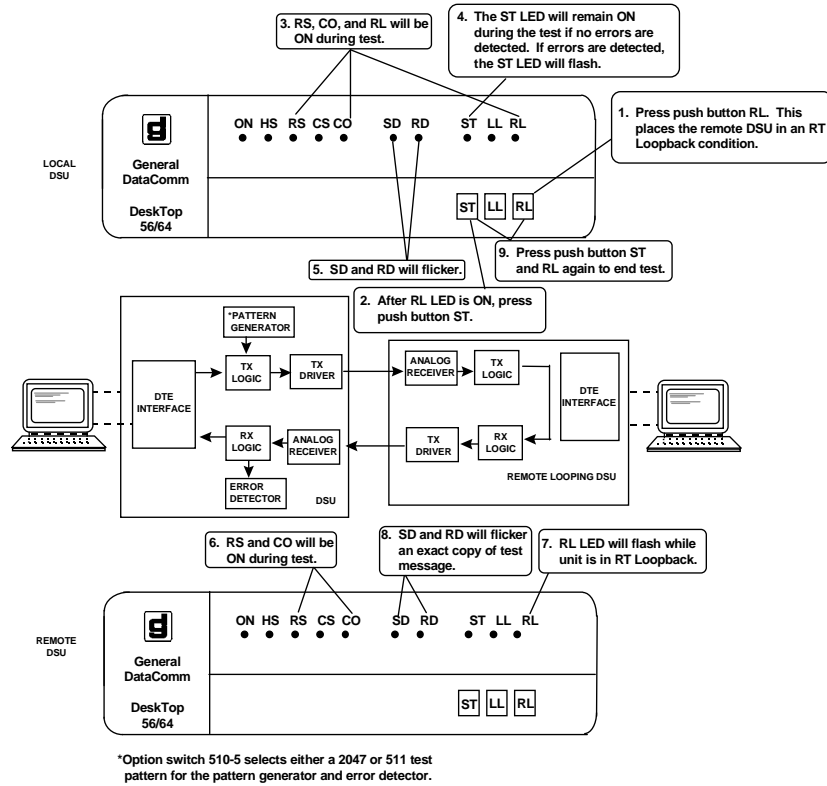

Figure 4-4   Line Loopback Self-Test

3. RS, CO, and RL will be ON during test.

4. The ST LED will remain ON during the test if no errors are detected. If errors are detected, the ST LED will flash.

1. Press push button RL. This places the remote DSU in an RT Loopback condition.

LOCAL
DSU

ON HS RS CS CO   SD RD   ST LL RL

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56/64

ST LL RL

5. SD and RD will flicker.

9. Press push button ST and RL again to end test.

2. After RL LED is ON, press push button ST.

*PATTERN
GENERATOR

TX
LOGIC

TX
DRIVER

ANALOG
RECEIVER

TX
LOGIC

DTE
INTERFACE

DTE
INTERFACE

RX
LOGIC

ANALOG
RECEIVER

TX
DRIVER

RX
LOGIC

ERROR
DETECTOR   DSU

REMOTE LOOPING DSU

6. RS and CO will be ON during test.

8. SD and RD will flicker an exact copy of test message.

7. RL LED will flash while unit is in RT Loopback.

REMOTE
DSU

ON HS RS CS CO   SD RD   ST LL RL

General
DataComm

DeskTop
56/64

ST LL RL

*Option switch 510-5 selects either a 2047 or 511 test
pattern for the pattern generator and error detector.

Figure 4-5   Remote Loopback Self-Test

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End-to-End Self-Test

You can use the Self-Test with other test features, or independently. In End-to- End Self-Test, the local and remote DSUs exchange Self-Test patterns to check the performance of the communications line and the local and remote DSUs (not including the DSU DTE interfaces). *Figure 4-6* illustrates End-to- End Self-Test.
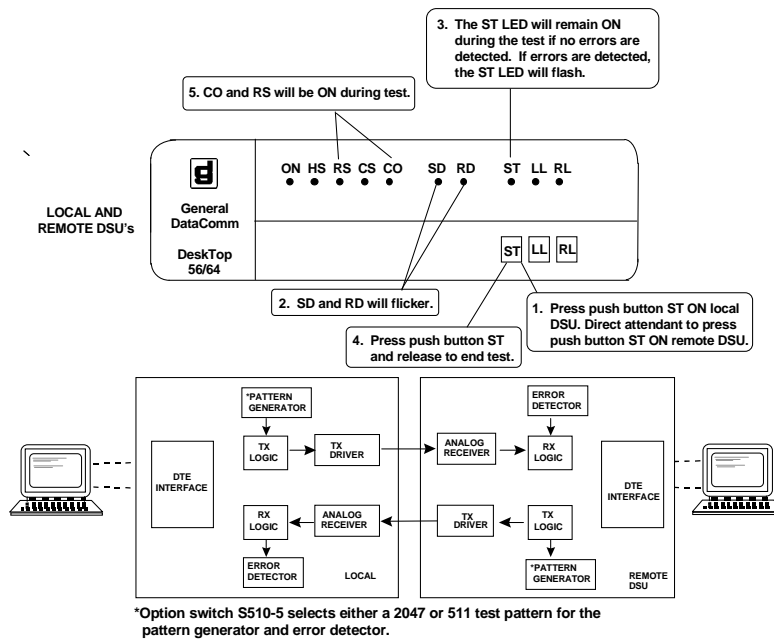

Figure 4-6   End-to-End Self-Test

CSU Loopback Test

The CSU Loopback test is controlled by the Serving Test Center (STC), which reverses the polarity of the sealing current. When the DSU detects the reversed current, it disconnects its line transmitter and receiver from the communications line, then connects them together. It also connects the transmit and receive communications lines together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the STC. *Figure 4-7* illustrates CSU Loopback.

When it is necessary to isolate a problem, contact the STC and ask them to initiate the CSU Loopback test. Use the test results with the fault-isolation sequence (*Figure 4-1*) to pinpoint a problem.

While the unit is in CSU Loopback, you can send a test message from the local DTE through the local DSU, which loops the message back to the DTE for verification. This test checks the performance of the local DSU, DTE, and DSU-DTE interconnections.
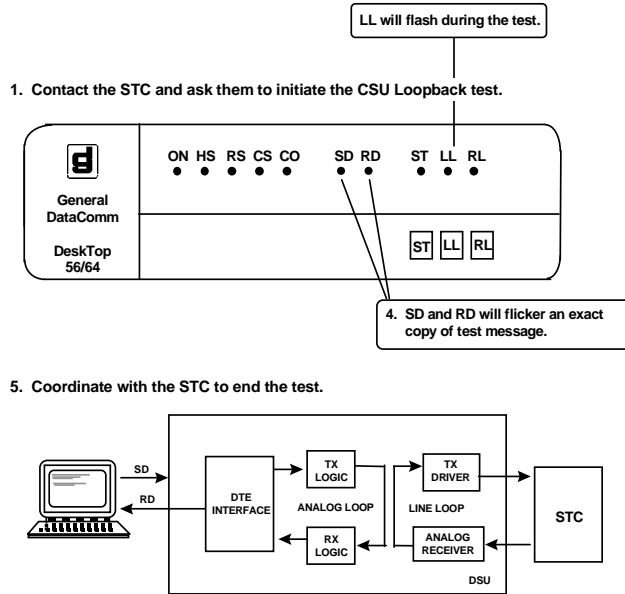
Figure 4-7   CSU Loopback Test

DSU Loopback Test

The DSU Loopback test is controlled by the Serving Test Center (STC), which sends network codes. When the DSU detects the codes, it disconnects its line transmitter and receiver from the communications line, then connects them together, creating a circuit that loops the receiver digital output signals to the transmitter input. *Figure 4-8* illustrates DSU Loopback.

When it is necessary to isolate a problem, contact the STC and ask them to initiate the DSU Loopback test. Use the test results with the fault-isolation sequence (*Figure 4-1*) to pinpoint a problem.
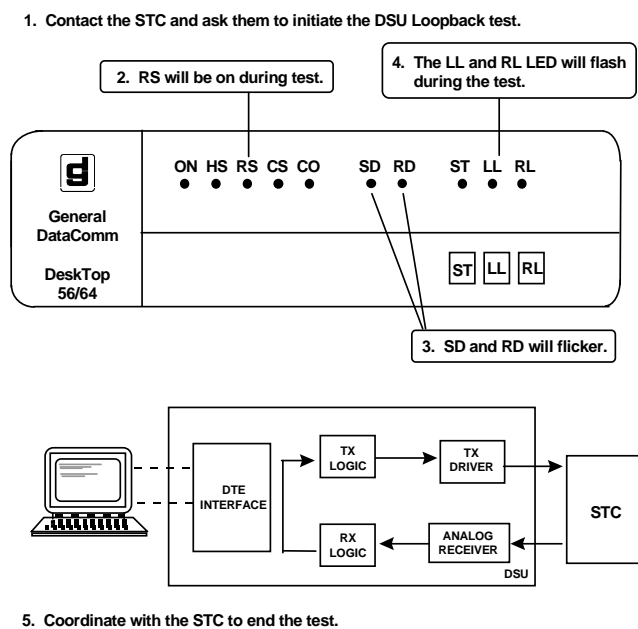
Figure 4-8   DSU Loopback Test

Technical Characteristics

Item	Specifications
Physical	
Height	1.4 in. (3º)
Width	7.4 (188 mm)
Depth	11.0 in. (279 mm)
Weight	1.0 lb. (0.45 kg)
Shipping weight	5.5 lb. (2.5 kg)
Environmental	
Temperature, storage	-40º to 158ºF (-40º to 70ºC)
Temperature, operating	32º to 122ºF (0º to 50ºC) (0º to 45ºC when Data Rate Adapter is installed)
Humidity, operating	5% to 95% without condensation
Altitude, operating	0 ft to 10,000 ft (0 m to 3,047 m). Derate operating temp. by 1ºC/1000 ft above sea level.
Electrical	
Power requirements	
Voltage	117 V ac (+10%, -15%)
Frequency	60 Hz
Power dissipation	5 W nominal
Operation	
DDS	Full- or half-duplex point-to-point, or full duplex multipoint
Customer-owned	Full- or half-duplex, point-to-point
Signal Format	Serial synchronous

Technical Characteristics (Cont.)

Item	Specifications
Electrical Data Rate Communications Line Terminating impedance DTE interface	 56000, 64000 bps (synchronous) DDS or 4-wire, non-loaded metallic lines (19-26 ga) 135 ohms ±20% ITU-T V.35
Transmit Power	6.0 dBm, maximum (50% duty cycle, random bi-polar sequence, 135-ohm impedance)
RTS-CTS delay (synchronous)	
56000 64000	0.35 ms nominal Constant Carrier
Timing	Receiver (slave network), internal (DSU) ±0.01%, or external (DTE) (accepts external clock up to ±0.01%)
Receiver	
Dynamic range	48 dB extended range at 56 K bps
Acquisition time	200 ms
Release time	1 sec nominal
Range	
Line data range	Mileage with 26 ga cable
56 K bps	3.6 mi (5.8 km)
64 K bps	3.2 mi (5.2 km)

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