

GDC 048R208-800
Issue 7, February 1997

Installation and Operation

DataComm 500G/UXR

Data Service Unit

Warning

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to CISPR-22 of FCC and international rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. The user is cautioned that any changes or modifications not expressly approved by General DataComm void the user's authority to operate the equipment.

This digital apparatus does not exceed Class A limits for radio noise emissions from digital apparatus described in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Publication Update Bulletin for DataComm 500G/UXR DSU

This publication identifies a change to Issue 6 of the *Operation and Installation Instructions for DataComm 500G/UXR DSU* manual. The change results from upgraded firmware now installed in the DSU. Units with the upgraded firmware are identified as containing C- firmware version (checksum 2DAC).

Telco Latching Loopback

Please refer to Chapter 2, Installation - Figure 2-1, Option Location, on pages 2-2 and 2-3; and Table 2-1, Option Application Notes, on page 2-10.

When the DSU is operating at 64 kbps it can perform a Latching Loopback in response to a command from a Telco Serving Test Center (STC). The new firmware permits you to configure the DSU to ignore the Latching Loopback command.

Switch S11-1, labeled RINH, controls this functionality as follows-

| | | |
|------------|-------|---|
| S11-1 RINH | ON = | DSU does not accept Remote Loopback command from remote DSU or Latching Loopback command from STC |
| | OFF = | DSU accepts both Remote Loopback and Latching Loopback commands |

The DSU continues to support the STC CSU Loopback, which is unaffected by the setting of switch S11-5.

The change in the functionality of Switch S11-5 necessitates changes in the functionality of Switches S11-2 and S11-3, labeled V.54 and PN 127. The new settings for those switches are-

| S11-2 V.54 | <u>RL Method</u> | <u>S11-2</u> | <u>S11-3</u> |
|--------------|---------------------------|--------------|--------------|
| | Remote Loops Inhibited | OFF | OFF |
| S11-3 PN 127 | PN127 Remote Loop Enabled | OFF | ON |
| | V.54 Remote Loop Enabled | ON | OFF |
| | GDC Remote Loop Enabled | ON | ON |

SECTION 1

INTRODUCTION

FEATURES

- CSU/DSUs for direct connection to DATAPHONE* Digital Service with Secondary Channel.
- Provides extended range performance at all rates.
- Automatically detects both line type and line rate.
- Operates at 64 Kbps for "Clear Channel" service.
- Supports both standard DDS and DDS with secondary channel.
- Operates in both point-to-point and multipoint configurations.
- Provides powerful Remote Digital Loopback (RDL) option for enhanced diagnostic capabilities. In addition to the standard General DataComm RDL, V.54 and PN 127 type RDL's are available.

DESCRIPTION

The DataComm 500G/UXR is a multirate Data Service Unit (DSU) that provides direct connection capabilities for DATAPHONE Digital Service (DDS) or DDS with Secondary Channel (DDS/SC). The unit provides for synchronous and asynchronous transmission and reception of serial binary data over 4-wire, metallic circuits used in the DATAPHONE Digital Service. The DataComm 500G/UXR has an on-board Channel Service Unit (CSU) that provides for direct connection to the DDS access line.

The unit is capable of operating in Standard DDS and DDS/SC modes. In Standard DDS mode it can operate at synchronous rates of 2.4, 4.8, 9.6, 19.2, and 56 Kbps. In DDS/SC mode, it can operate at rates of 2.4, 4.8, 9.6, 19.2, 56, and 64 Kbps. The asynchronous data rates of 1.2, 1.8, 2.4, 4.8, 9.6 and 19.2 Kbps are supported in both modes. A secondary channel is also available. The secondary channel baud rate is dependent on the primary channel baud rate. The following asynchronous rates are available on the secondary channel: 75, 110, 150, 300, 600, 1200 and 2400 bps. These rates are a function of the primary channel rate.

Timing is normally derived from the DDS System Network clocking system (network or slave mode) or may be optioned for internal or external clocking provided by the business equipment. The business equipment interface conforms to EIA-232-D, CCITT V.35, and optionally to EIA-530.

* Service Mark of AT&T

INTRODUCTION

The DSU is available in standalone or rackmount versions. The rackmount units feature GDC's unique DataComm or Universal System Shelf packaging concept that allows a variety of data communications products, including up to 16 DSUs, to be mounted in the same high density shelf.

Part numbers of the standard and optional equipment available for the DataComm 500G/UXR are listed in Table 1-1. Technical characteristics are given in Appendix A.

DIAGNOSTICS

The DataComm 500G/UXR DSU incorporates built-in diagnostic circuits to allow quick and thorough performance tests in both the primary and secondary channels whenever DSU operation must be checked. Line Loopback (LL), Remote Terminal Loopback (RT) and Remote Digital Loopback (RDL) tests can be performed individually or in conjunction with the DSU's Self-Test (ST) feature. The Self-Test feature contains a 511 or 2047-bit pattern generator/receiver on the primary channel and a 511-bit pattern generator/receiver on the secondary channel. The Primary/Secondary (P/S) switch provides the option of display and diagnostics between the primary and secondary channels. All diagnostics may also be initiated via the DTE interface. The RATE switch temporarily displays the current primary channel data rate while depressed.

The DataComm 500G/UXR DSU includes a Circuit Assurance Option (CAO) that turns off the primary channel Clear-To-Send (CTS) signal during the reception of an Out-Of-Service (OOS) code from the DDS, or during the idle state. The DSU also provides a System Status Option (SSO) that turns off the primary channel Data-Set-Ready (DSR) signal during reception of the OOS code or during no signal reception.

The DataComm 500G/UXR DSU also supports Serving Test Center (STC) diagnostics. CSU loopback (current reversal), DSU loopback (alternating pattern) and DSU latching loopback tests.

TABLE 1-1. EQUIPMENT LIST

| Description | GDC Part No. |
|---|---------------------|
| DataComm 500G/UXR DSU, Standalone, 117 V ac | 048A049-001 |
| DataComm 500G/UXR/530 DSU, Standalone, 117 V ac | 048A049-011 |
| DataComm 500G/UXR/DRA DSU, Standalone, 117 V ac | 048A049-021 |
| DataComm 500G/UXR, Rackmount | 048P049-001 |
| DataComm 500G/UXR/530, Rackmount | 048M049-001 |
| DataComm 500G/UXR/DRA, Rackmount | 048M049-002 |
| DataComm Enclosures | |
| DataComm Enclosure DE-17A, 117 V ac | 010B070-011 |
| Cover | 010D500-003 |
| DataComm Shelf, DS-1, 117 V ac | 010B015-001 |
| DataComm Shelf, DS-5, -48 V dc | 010B039-001 |
| DataComm Shelf, DS-6, -48 V dc | 010B047-001 |
| Universal System Shelf USS-1D, 117 V, Domestic | 010B080-001 |
| Universal System Shelf USS-1-DC, -48 V dc | 010B044-001 |
| Optional Equipment | |

INTRODUCTION

| | |
|--|--------------|
| EIA-530 Interface Plug-In Card | 048P042-001 |
| Data Rate Adapter Card | 058P128-001 |
| LPDA-2 (Link Problem Determination Aid) Module | 048P065-001 |
| Crossover Adapter for DDS/Private Line Use | 209-038-001 |
| VF Cable Assembly, 4-wire, 20 Feet | 023H101-020 |
| Cable Assembly, 8 x 28, Plug-To-Plug | 830-028-807 |
| Converter Cable Assembly, EIA RS-530/422 (25-Pin) to EIA RS-422/449 (37-Pin) | 027H501-001 |
| V.35 Male -to-Male, Straight Thru Cable | 027H516-XXX* |
| DB-25M/V.35F Adapter Cable | 027H560-001 |
| Straight Thru EIA Cable | 028H502-XXX* |
| RS232 Male-to-Female, Straight Thru Cable (Shielded) | 028H506-XXX* |
| Applicable Publication | |
| Installation of DataComm/NMS DSU Data Rate Adapter Card (GDC Part No. 058P128-001) | 048R161-A1 |
| * XXX= Cable length in feet | |

APPLICATIONS

Digital Data Service has proven to be a highly reliable means of transmitting data. Both the local and interexchange carriers are offering an enhanced version of the service, DDS with Secondary Channel. The DataComm 500G/UXR DSU is designed to support the "inband" secondary channel standard, as outlined in AT&T Technical Reference 62310. This secondary channel provides a communication path for asynchronous data.

SERVICE AND TRAINING

See Section 4 for information on service and training available from GDC.

SECTION 2

INSTALLATION

UNPACKING AND HANDLING

Inspect the DataComm 500G/UXR DSU for damage; if any is observed, notify the shipper immediately. Do not discard the box and packing material; their use will facilitate reshipping the unit, if necessary.

PREOPERATIONAL CHECK

The DSU should be given a preoperational check by performing a Line Loopback Self-Test (see Section 4, Tests) to verify normal operation before it is connected to the communications line or DTE. Verify that option strapping is the same as illustrated in Figure 2-1 [all piano type option switches on the base card (S9 through S13, S16 and S17) should be in the UP (off) positions; S14 and S15 should be in the LEFT (off) positions]. Prior to performing the preoperational check, select a primary channel data rate by depressing any one switch, S16-1 through -6, -8, or S17-1 (see Figure 2-1, Sheet 2 of 3). Perform the test on a standalone DSU before it is connected to anything except power, and on DataComm Shelf plug-in DSUs as they are individually installed.

If the DSU passes the test, but subsequently fails to perform data communications, the DSU is probably not at fault. Either an error has been made in the installation or option selection, or there is a faulty communications line or remote installation. Recheck the cable and line connections and, if necessary, perform the tests in Section 4 to isolate the problem. Verify that the remote DSU is a compatible type (e.g., a DSU operating at the same data rate). Also verify that the DDS is actually operating at the correct data rate. In the event that the DSU does not check out properly, replace it with a spare DSU, if available, and repeat the test. Do not attempt to repair the DSU. For assistance, contact DataComm Service Corporation (see Section 4).

INSTALLATION PROCEDURES

The DSU pc card may be installed in a standalone DataComm Enclosure or rackmounted in a DataComm or Universal System Shelf (USS). Either installation should be located 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).

INSTALLATION

SuperPaint!500G ART:500PCB!Draw(71,141:504,650)

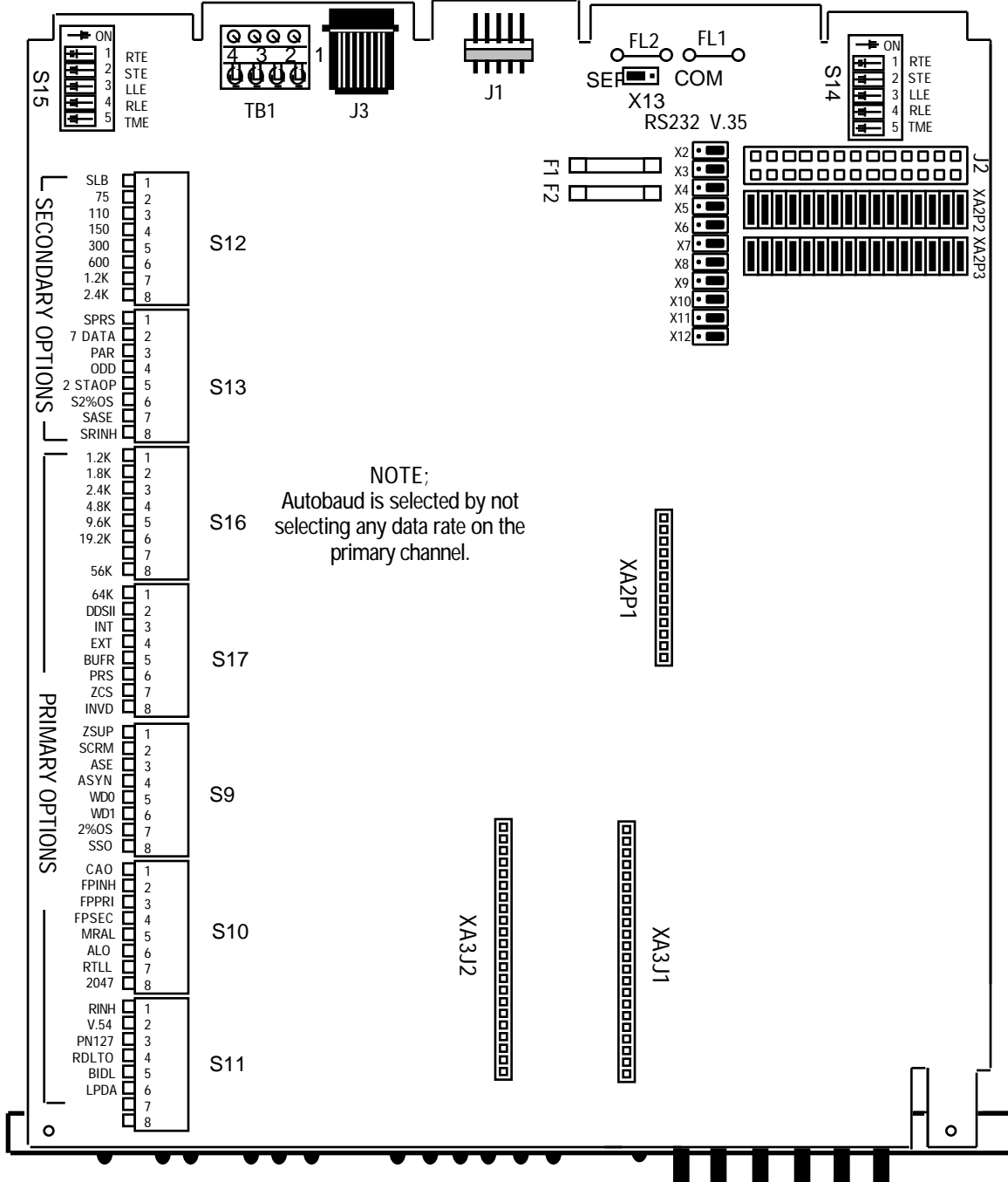
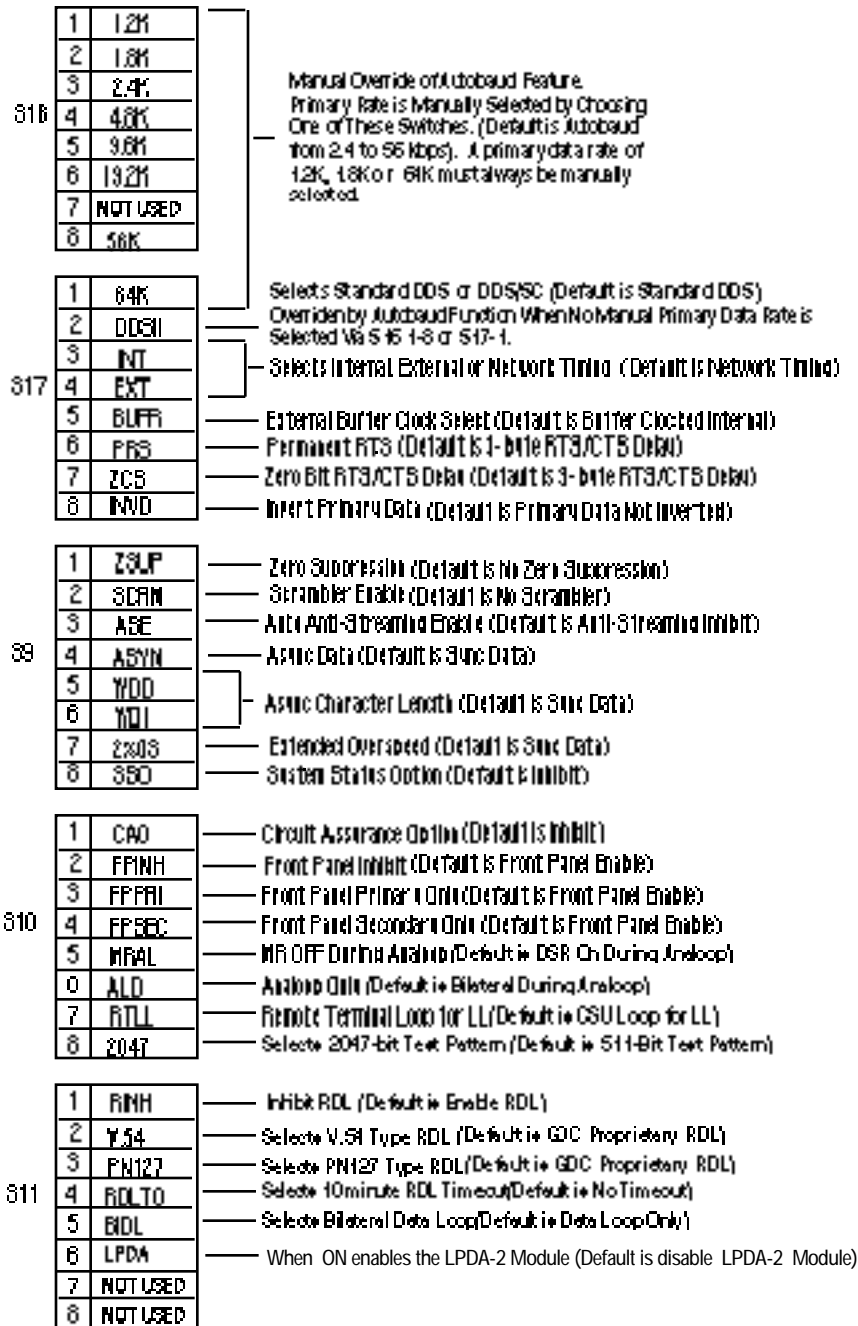


FIGURE 2-1. OPTION LOCATION (Sheet 1 of 3)

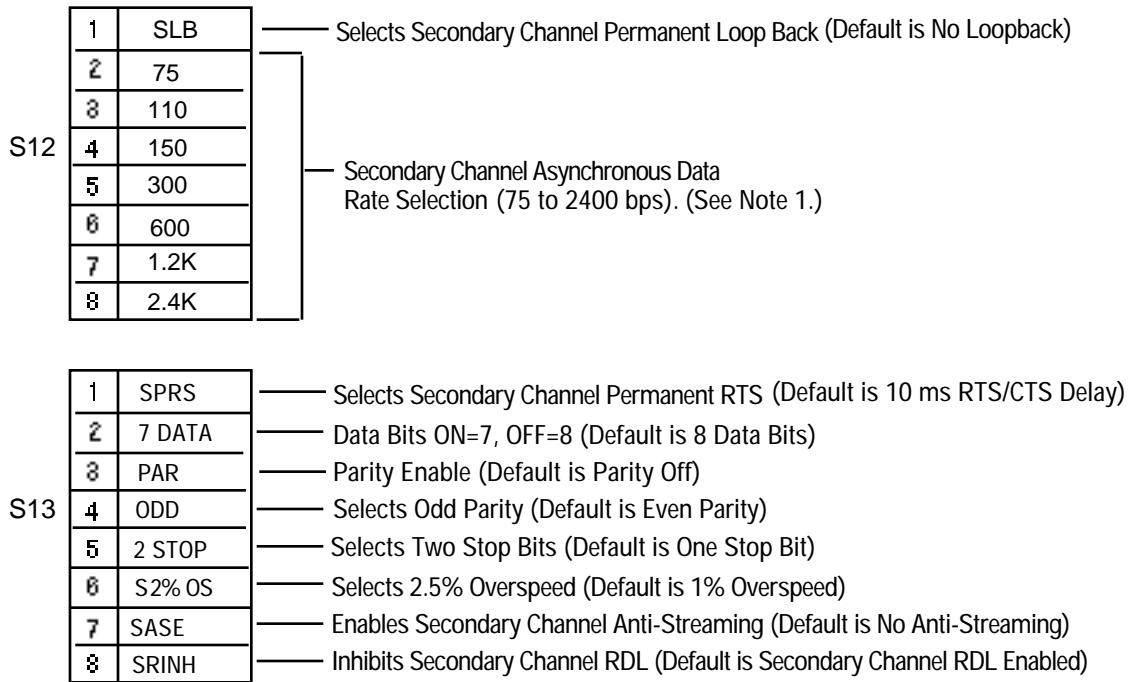
SuperPaint!500G ART:500G-PRI CHAN OPT!Draw(76,31:413,588)
 SuperPaint!500G ART:500G-PRI CHAN OPT!Draw(76,31:416,588)



- NOTES:** 1. Switches are piano-type switches. Down position (ON) selects the option. Unit shipped with switches in the factory default positions (OFF).
 2. Unit will reset when any option is changed.

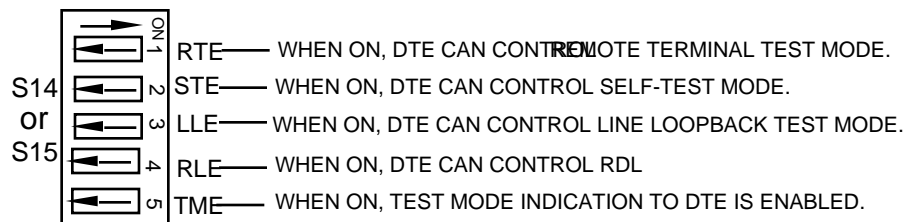
INSTALLATION

PRIMARY OPTION SELECTIONS



- NOTES:**
1. If no rate is selected, then the unit will default to the highest possible rate based on the primary rate.
 2. Switches are piano-type switches. Down position (ON) selects the option. Units are shipped with switches in the factory default position (OFF).
 3. Unit will reset when any option is changed.

SECONDARY OPTION SELECTIONS



SWITCH S14 (PRIMARY) OR S15 (SECONDARY) OPTION SELEC'

FIGURE 2-1. OPTION LOCATION (Sheet 3 of 3)

INSTALLATION

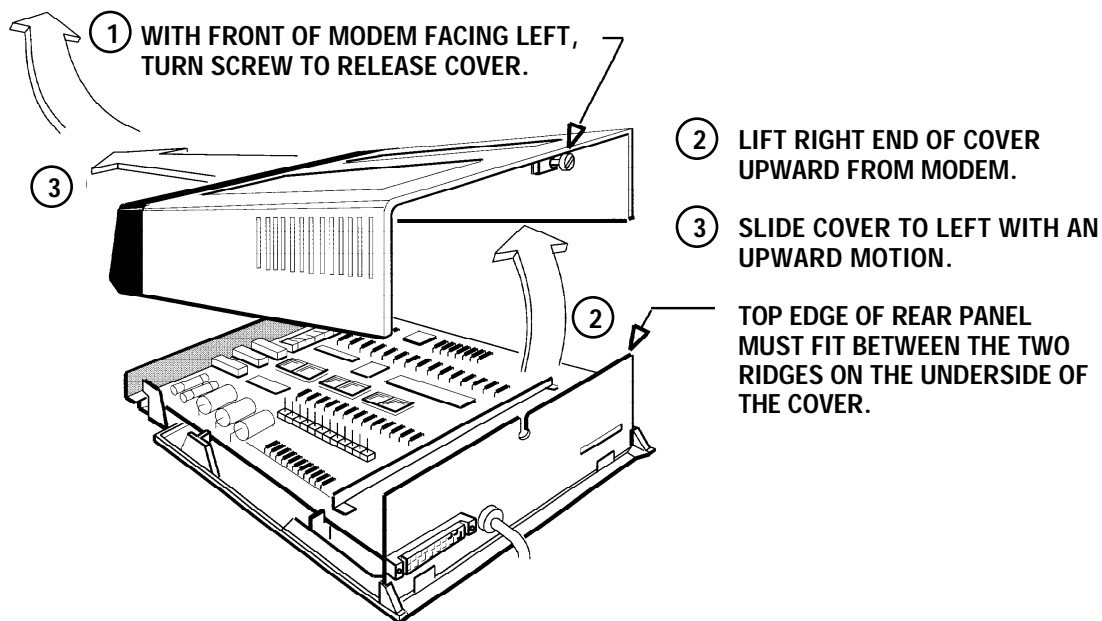
Standalone Installation

If it is necessary to remove the component cards from the standalone base, disconnect the power supply connector from J1, which is mounted at the rear center of the base card. When reinstalling the component cards to the base, reinstall the connector at J1. Refer to Figures 2-1 and 2-2.

Rackmount Installation

The DataComm 500G/UXR DSU may be mounted in a DataComm Shelf (DS-1, DS-5 or DS-6) which may support as many as 16 DSUs. The DSU may be installed in any unused slot in the shelf. To install the modem in the shelf, proceed as follows:

1. Position the card in the top and bottom slot guides with the GDC logo on top, and carefully slide the assembly into the slot until it stops at the rear connectors.
2. Push the front panel with both hands until the assembly mates with the rear connectors.



CAUTION:
DISCONNECT POWER CABLE AND PHONE CONNECTIONS PRIOR TO REMOVAL OF THE COVER.

FIGURE 2-2. STANDALONE COVER REMOVAL PROCEDURE

The Universal System Shelf (USS-1) may also be used and accommodates 16 DSUs. The USS-1 uses harness cards and backplanes configured to occupy one card slot in the shelf for each DSU.

Each backplane assembly is keyed by a tab located at the bottom of the harness card. This tab mates with a slot that is part of the shelf and prevents the backplanes from being inserted incorrectly in the shelf.

To install the DSU into the USS-1 shelf, proceed as follows:

1. **Loosen the backplane screws** and install the plug in card from the front of the shelf by sliding it into the card guides. Seat firmly into the mating connectors on the backplane using both hands.
2. **Tighten the backplane screws.** This assures perfect alignment of the cards in the card guides and the mating connectors on the backplane and allows for easy removal of the cards. Plug in the four-pin cable harness on the backplane adapter to the shelf power connector located directly above the backplane adapter.

OPTION SELECTION

The field-selectable options adapt the DataComm 500G/UXR DSU to a variety of configurations. These options are selected by positioning dip switches and jumper straps on the DSU base card (*note those that remain in the **OFF** position*).

Figure 2-1 (Sheets 1 thru 3) illustrates the location of each option and indicates the manner of selecting each option. Table 2-1 lists the function and application of each option for both the primary and secondary channels.

NOTE

When the unit auto baud feature is enabled and no energy is present, the unit will continuously attempt to auto baud (search for the line rate and type), until a valid signal is presented to the unit. Only front panel LL is available during the autobaud function.

**TABLE 2-1. OPTION APPLICATION NOTES
(PRIMARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Primary Channel Description |
|---|--------------------------|---|
| Grounds | X13 (COM/SEP) | This option provides separation or connection of protective and signal grounds. Separation of grounds (by 100 ohms) is selected with consideration given to power line noise, differences in ground potential, DTE manufacturer's recommendations, and safety requirements. Direct connection reduces the effects of longitudinal power line noise. |
| EIA-232-D or V.35 Interface | X2 — X12 | Jumper positions select EIA-232-D or V.35 interface. Factory set to V.35 position. |
| DTE Control of Primary Channel Remote Terminal Test | S14-1 (RTE) | The DSU may be optioned to permit the DTE to control the Remote Terminal (RT) test mode via pin 12 of the EIA-232-D interface or pin EE of the V.35 interface. |
| DTE Control of Primary Channel Self Test | S14-2 (STE) | The DSU may be optioned to permit the DTE to control the Self-Test (ST) mode via pin 16 of the EIA-232-D interface or pin L of the V.35 interface. |
| DTE Control of Primary Channel Line Loopback Test | S14-3 (LLE) | The DSU may be optioned to permit the DTE to control the Line Loopback (LL) test mode via pin-18 of the EIA-232-D interface or pin J of the V.35 interface. |
| DTE Control of Primary Channel Remote Digital Loopback Test | S14-4 (RLE) | The DSU may be optioned to permit the DTE to control the Remote Digital Loopback (RDL) test mode via pin 21 of the EIA-232-D interface or pin BB of the V.35 interface. |
| DSU Control of Primary Channel Test Mode Indicator | S14-5 (TME) | The DSU may be optioned to permit the DSU to control the Test Mode (TM) indicator via pin 25 of the EIA-232-D interface or pin K of the V.35 interface. |
| Primary Channel Data Rate Select Switches Auto Baud | S16-1 thru S17-1 | Set one switch only to the desired primary channel rate. The DSU has the ability to configure itself to operate with the installed service (DDS or DDS/SC) and at the proper data rate, automatically. This will occur when there is no switch, or more than one switch is selected on S16-1 thru S17-1. S16-8 is reserved for future use . The unit will not automatically configure itself to 64K; this rate must be selected via S17-1. |

**TABLE 2-1. OPTION APPLICATION NOTES (Cont.)
(PRIMARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Primary Channel Description |
|---|--------------------------|---|
| Standard DDS or DDS/SC | S17-2 (DDSII) | The DSU must be optioned for Standard DDS or DDS with Secondary Channel (DDS/SC) when manual primary channel has been selected via S16 1-8 or S17-1. Chooses proper mode automatically when in autobaud (e.g no manual rate override selected). |
| Internal Timing (LDM Applications) | S17-3 (INT) | This is one of three timing modes for the DSU. With internal timing, the transmit timing is derived internal to the DSU. If neither external or internal timing is selected, the DSU defaults to network (Slave) timing, and the transmit timing is derived from the network. |
| External Timing (LDM Applications) | S17-4 (EXT) | With external timing, the transmit timing is provided by the DTE. If neither external or internal timing are selected, the DSU defaults to network (Slave) timing. The transmit timing is derived from the network's signal. |
| External Buffer Clock Select | S17-5 (BUFR) | When ON, the input clock to the FIFO buffer is the DTE clock. (External) When OFF, the input clock to the FIFO Buffer is DSU send timing. (Internal) |
| Permanent RTS | S17-6 (PRS) | Both RTS and CTS remain ON regardless of the state of the attached business equipment (the transmitter is ON regardless of the status of the RTS interface lead) When OFF, the RTS to CTS delay is determined by S17-7 (ZCS). |
| Primary Channel Zero Bit RTS/CTS Delay | S17-7 (ZCS) | When enabled, the primary channel provides zero bits of delay between active RTS and CTS being set to active (the defaults are 18 or 21 bits delay). |
| Invert Primary Data (FOR HDLC USERS ONLY) | S17-8 (INVD) | When running 56 Kbps with HDLC (SDLC or X.25) in the Primary Channel data path, and the equipment can be optioned to SEND FLAGS WHEN IDLE , then the INVD (invert primary data) option can be enabled and the Secondary Channel data rate can be 2.4 Kbps. For all other 56 Kbps applications, where the network does not support 64k Clear Channel, zero suppression must be used and the Secondary Channel data rate cannot be higher than 1.2 Kbps. |
| Zero Suppression | S9-1 (ZSUP) | At 56 Kbps primary rate in certain applications, (where the network does not support 64k Clear Channel), the primary and secondary channels are not permitted to transmit all spaces (zeros) at the same time. This option permits this "ALL ZEROS TRANSMIT " at the ex-pense of reduced secondary channel bandwidth. |

**TABLE 2-1. OPTION APPLICATION NOTES (Cont.)
(PRIMARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Primary Channel Description | | | | | | | | | | | | | | | |
|---|------------------------------------|--|-------------------|------------|------------|----|-----|-----|----|-----|----|----|----|-----|----|----|----|
| Scrambler (Available when operating at 64Kbps only)) | S9-2 (SCRM) | When enabled, the primary channel scrambler and de-scrambler are inserted into the primary channel data path, otherwise they are bypassed. | | | | | | | | | | | | | | | |
| Anti-Streaming Enable | S9-3 (ASE) | When enabled, the primary channel DSU transmitter is forced OFF (idle) if the business equipment RTS lead remains ON for more than 20 seconds. Anti-Streaming releases when the RTS interface lead turns OFF and remains OFF for 100 ms. When a streaming condition is detected, the TM LED will blink and the DTE TM pin will toggle. | | | | | | | | | | | | | | | |
| Primary Channel Async | S9-4 (ASYN) | This option forces the DSU to perform an asynchronous to synchronous conversion, allowing customer equipment to asynchronously transmit on the primary data path. | | | | | | | | | | | | | | | |
| Word Size Selection | S9-5 (WD0) S9-6 (WD1) | <p>These two switches select the ASYNC word size. The option is ignored in SYNC or 56 and 64 Kbps operation.</p> <table border="1" data-bbox="743 993 1125 1150"> <thead> <tr> <th><u>ASYNC WORD</u></th> <th><u>WD1</u></th> <th><u>WD0</u></th> </tr> </thead> <tbody> <tr> <td>11</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>10</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>09</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>08</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table> | <u>ASYNC WORD</u> | <u>WD1</u> | <u>WD0</u> | 11 | OFF | OFF | 10 | OFF | ON | 09 | ON | OFF | 08 | ON | ON |
| <u>ASYNC WORD</u> | <u>WD1</u> | <u>WD0</u> | | | | | | | | | | | | | | | |
| 11 | OFF | OFF | | | | | | | | | | | | | | | |
| 10 | OFF | ON | | | | | | | | | | | | | | | |
| 09 | ON | OFF | | | | | | | | | | | | | | | |
| 08 | ON | ON | | | | | | | | | | | | | | | |
| Extended Overspeed | S9-7 (2%OS) | When enabled and in asynchronous operation, up to 2.3% data rate overspeed can be accommodated. When disabled, a default of 1% overspeed is selected (Primary Only) | | | | | | | | | | | | | | | |
| System Status Option | S9-8 (SSO) | During the reception of the out-of-service code or during periods of no signal reception, the DSU may be optioned to force OFF Data Set Ready (DSR). Otherwise DSR operates normally. | | | | | | | | | | | | | | | |
| Circuit Assurance Option | S10-1 (CAO) | When the DSU receives Idle or Out Of Service codes, it may be optioned to force OFF Clear-To-Send (CTS). Otherwise, CTS operates normally. | | | | | | | | | | | | | | | |
| Front Panel Inhibit | S10-2 (FPINH) | When enabled, inhibits front panel control of all diagnostics (LL, ST, RDL, and RT). The P/S and RATE switch will be unaffected. | | | | | | | | | | | | | | | |
| Front Panel Primary Only | S10-3 (FPPRI) | When enabled, the front panel multi-purpose LED indicators and front panel test switches will function with the primary channel only. The Rate Switch is unaffected and the P/S switch is no longer functional. | | | | | | | | | | | | | | | |

**TABLE 2-1. OPTION APPLICATION NOTES (Cont.)
(PRIMARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Primary Channel Description | | | | | | | | | | | | |
|--|--|--|-------------------|-------------|--------------|----------|-----|-----|------------|-----|----|----------|----|-----|
| Front Panel Secondary Only | S10-4 (FPSEC) | When enabled, the front panel multi-purpose LED indicators and front panel test switches will function with the secondary channel only. The RATE switch is unaffected and the P/S switch is no longer functional. | | | | | | | | | | | | |
| MR OFF During Analog Loopback | S10-5 (MRAL) | During the Line Loopback test mode, the DSU may be optioned to force DSR OFF. Otherwise, DSR is on during line loopback. | | | | | | | | | | | | |
| Analog Loopback Only | S10-6 (ALO) | The DSU may be optioned to only perform an Analog Loopback test when the Line Loopback test mode is selected via front panel switch or via the primary channel DTE interface. Normally bilateral loopback is performed. | | | | | | | | | | | | |
| Remote Terminal Loop for Line Loopback | S10-7 (RTLL) | The DSU may be optioned to perform a Remote Terminal Loopback instead of a Line Loopback as a response to a sealing current reversal. A bilateral Line Loopback is established when this option is disabled. | | | | | | | | | | | | |
| 2047 Test Pattern | S10-8 (2047) | When this option is enabled, a 2047 bit test pattern is used during Self-Test. Otherwise, a 511 bit test pattern is used. | | | | | | | | | | | | |
| Remote Digital Loopback Inhibit | S11-1 (RINH) | When ON, the DSU will not respond to, or generate RDL signals. When OFF, RDL signaling will operate normally. | | | | | | | | | | | | |
| Remote Digital Loopback Methods | S11-2 (V.54) S11-3 (PN 127) | <p>These two switches allow selection of GDC, CCITT V.54 or PN127 Remote Digital Loopback methods. The local and remote DSUs must have the same RDL method selected for proper operation.</p> <table border="1" data-bbox="820 1281 1323 1417"> <thead> <tr> <th><u>RDL Method</u></th> <th><u>V.54</u></th> <th><u>PN127</u></th> </tr> </thead> <tbody> <tr> <td>GDC RDL*</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>PN 127 RDL</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>V.54 RDL</td> <td>ON</td> <td>OFF</td> </tr> </tbody> </table> | <u>RDL Method</u> | <u>V.54</u> | <u>PN127</u> | GDC RDL* | OFF | OFF | PN 127 RDL | OFF | ON | V.54 RDL | ON | OFF |
| <u>RDL Method</u> | <u>V.54</u> | <u>PN127</u> | | | | | | | | | | | | |
| GDC RDL* | OFF | OFF | | | | | | | | | | | | |
| PN 127 RDL | OFF | ON | | | | | | | | | | | | |
| V.54 RDL | ON | OFF | | | | | | | | | | | | |
| Remote Digital Loopback Timeout | S11-4 (RDL TO) | When ON, selects 10-minute RDL timeout. When OFF no timeout . | | | | | | | | | | | | |
| Bilateral Remote Terminal Loop | S11-5 (BIDL) | When ON, selects Bilateral Remote Terminal Loop When OFF data loop only is selected. | | | | | | | | | | | | |
| * Not available at 64 Kbps. | | | | | | | | | | | | | | |

**TABLE 2-1. OPTION APPLICATION NOTES (Cont.)
(SECONDARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Secondary Channel Description | | | | | | | | | | | | | | |
|---|-----------------------------------|--|-----------------|-------------------------|------|-----------|------|-----------------|------|----------------------|-------|---------------------------|-------|----------------------------------|-------|-----------------------------|
| DTE Control of Secondary Channel Remote Terminal Test | S15-1 (RTE) | The DSU may be optioned to permit the DTE to Control the Remote Terminal (RT) test mode via pin-12 of the EIA-232-D interface. | | | | | | | | | | | | | | |
| DTE Control of Secondary Channel Self Test | S15-2 (STE) | The DSU may be optioned to permit the DTE to control the Self-Test (ST) mode via pin-16 of the EIA-232-D interface. | | | | | | | | | | | | | | |
| DTE Control of Secondary Channel Line Loopback Test | (LLE) | The DSU may be optioned to permit the DTE to control the Line Loopback (LL) test via pin-18 of the EIA-232-D interface. | | | | | | | | | | | | | | |
| DTE Control of Secondary Channel Remote Digital Loopback Test | S15-4 (RLE) | The DSU may be optioned to permit the DTE to control the Remote Digital Loopback (RDL) test mode via pin-21 of the EIA-232-D interface. | | | | | | | | | | | | | | |
| DTE Control of Secondary Channel Test Mode Indicator | S15-5 (TME) | The DSU may be optioned to permit the DSU to control the Test Mode (TM) indicator via pin-25 of the EIA-232-D interface. | | | | | | | | | | | | | | |
| Secondary Channel Data Rate Select (Asynchronous Only) | S12-2 thru S12-8 (75 to 2400 bps) | <p>Set "one" switch only to the desired secondary data rate.</p> <table border="0"> <tr> <td>PRI RATE</td> <td>SEC RATE ALLOWED</td> </tr> <tr> <td>2400</td> <td>75 or 110</td> </tr> <tr> <td>4800</td> <td>75, 110, or 150</td> </tr> <tr> <td>9600</td> <td>75, 110, 150, or 300</td> </tr> <tr> <td>19200</td> <td>75, 110, 150, 300, or 600</td> </tr> <tr> <td>56000</td> <td>All selectable rates up to 2400*</td> </tr> <tr> <td>64000</td> <td>No secondary channel</td> </tr> </table> <p>If no switch, or more than one switch is selected, the secondary channel data rate will default to the highest possible rate available based on the primary rate.</p> <p>* 2400 only if network supports 64K clear channel or equivalent. Maximum secondary channel rate is 1200 bps (see Table 2-1, INVD and SUP options)</p> | PRI RATE | SEC RATE ALLOWED | 2400 | 75 or 110 | 4800 | 75, 110, or 150 | 9600 | 75, 110, 150, or 300 | 19200 | 75, 110, 150, 300, or 600 | 56000 | All selectable rates up to 2400* | 64000 | No secondary channel |
| PRI RATE | SEC RATE ALLOWED | | | | | | | | | | | | | | | |
| 2400 | 75 or 110 | | | | | | | | | | | | | | | |
| 4800 | 75, 110, or 150 | | | | | | | | | | | | | | | |
| 9600 | 75, 110, 150, or 300 | | | | | | | | | | | | | | | |
| 19200 | 75, 110, 150, 300, or 600 | | | | | | | | | | | | | | | |
| 56000 | All selectable rates up to 2400* | | | | | | | | | | | | | | | |
| 64000 | No secondary channel | | | | | | | | | | | | | | | |
| Secondary Permanent Request-To-Send | S13-1 (SPRS) | Both RTS and CTS remain ON regardless of the state of the attached business equipment (the transmitter is on regardless of the status of the RTS interface lead). Normal is 10 ms RTS/CTS delay. | | | | | | | | | | | | | | |
| 7 Data Bits | S13-2 (7DATA) | When enabled, the secondary channel ASYNC data format will have a 7-bit data field. | | | | | | | | | | | | | | |

**TABLE 2-1. OPTION APPLICATION NOTES (Cont.)
(SECONDARY CHANNEL)**

| Option | Switch (S) or Jumper (X) | Secondary Channel Description |
|--------------------------------------|--------------------------|--|
| Parity Enable | S13-3 (PAR) | When enabled, the parity switch "ODD" becomes active in determining the parity protocol of the secondary channel data. The default condition is Inhibit Parity (no parity is used in the protocol). |
| Odd Parity | S13-4 (ODD) | When enabled, selects odd parity. The default parity is even. |
| Two Secondary Channel Stop Bits | S13-5 (2STOP) | This option determines the number of stop bits associated with the secondary channel Asynchronous protocol. The default for the number of stop bits is 1. This option selects 2 stop bits. |
| 2.3% Overspeed on Secondary Channel | S13-6 (S2%OS)) | In normal operation, the secondary channel operates at 1% overspeed. When this option is enabled, the secondary channel operates at 2.3% overspeed. |
| Secondary Channel Anti-Streaming | S13-7 (SASE) | When enabled, the secondary channel turns OFF after RTS has been on for 20 seconds. It will automatically re-enable after RTS has been OFF for 100 ms. When a streaming condition is detected, the TM LED will blink and the DTE TM pin will toggle. |
| Inhibit Secondary Channel RDL | S13-8 (SRINH) | When ON, the DSU will not respond to, or generate RDL signals. When OFF, RDL signaling will operate normally. |
| Secondary Channel Permanent Loopback | S12-1 (SLB) | When enabled, the secondary channel data is continuously looped back to the network. This can be used for long-term performance monitoring. (When this option is selected, GDC mode Primary channel RDL cannot be selected.) The secondary channel becomes unavailable to the user and the P/S switch is no longer functional. |

INSTALLATION

PRIMARY CHANNEL OPTION SELECTIONS

Tables 2-2 through 2-5 provide option selection data for primary channel timing, word size selection, RDL selection and data rate.

TABLE 2-2. PRIMARY CHANNEL TIMING SELECTION

| INT (SW 17-3) | EXT (SW 17-4) | TIMING SOURCE |
|---------------|---------------|-----------------|
| OFF | OFF | NETWORK (SLAVE) |
| OFF | ON | EXTERNAL |
| ON | OFF | INTERNAL |

TABLE 2-3. PRIMARY CHANNEL WORD SIZE SELECTION

| WD1 (SW 9-6) | WD0 (SW 9-5) | NO. BITS/CHAR |
|--------------|--------------|---------------|
| OFF | OFF | 11 |
| OFF | ON | 10 |
| ON | OFF | 9 |
| ON | ON | 8 |

TABLE 2-4. PRIMARY CHANNEL RDL SELECTION

| V.54 (SW 11-2) | PN127 (SW11-3) | RDL MODE |
|----------------|----------------|-----------|
| OFF | OFF | GDC RDL |
| OFF | ON | PN127 RDL |
| ON | OFF | V.54 RDL |

TABLE 2-5. PRIMARY CHANNEL DATA RATE

| SWITCH SETTING | PRIMARY CHANNEL RATE | SYNC | ASYNC |
|----------------|----------------------|------|-------|
| SW16-1 | 1.2K | | X |
| SW16-2 | 1.8K | | X |
| SW16-3 | 2.4K | X | X |
| SW16-4 | 4.8K | X | X |
| SW16-5 | 9.6K | X | X |
| SW16-6 | 19.2K | X | X |
| SW16-8 | 56K | X | |
| SW17-1 | 64K | X | |

SECONDARY CHANNEL DATA

Tables 2-6 and 2-7 provide data for the allowed secondary channel data rate, and secondary channel asynchronous data format.

TABLE 2-6. ALLOWED SECONDARY CHANNEL DATA RATES

| PRIMARY CHANNEL RATE (bps) | SECONDARY CHANNEL RATES ALLOWED (bps) |
|-----------------------------------|--|
| 1200 | 75 110 |
| 1800 | 75 110 |
| 2400 | 75 110 |
| 4800 | 75 110 150 |
| 9600 | 75 110 150 300 |
| 19200 | 75 110 150 300 600 |
| 56000 | 75 110 150 300 600 1200 2400 |
| 64000 | No Secondary Channel |

TABLE 2-7. SECONDARY CHANNEL ASYNC DATA FORMAT

| 7 DATA | 2 STOP | PARITY | ODD | ASYNC WORD |
|---------------|---------------|---------------|------------|-----------------------------|
| OFF | OFF | OFF | X | 8 DATA, 1 STOP, NO PARITY |
| OFF | OFF | ON | OFF | 8 DATA, 1 STOP, EVEN PARITY |
| OFF | OFF | ON | ON | 8 DATA, 1 STOP, ODD PARITY |
| OFF | ON | OFF | X | 8 DATA, 2 STOP, NO PARITY |
| OFF | ON | ON | OFF | 8 DATA, 2 STOP, EVEN PARITY |
| OFF | ON | ON | ON | 8 DATA, 2 STOP, ODD PARITY |
| ON | OFF | OFF | X | 7 DATA, 1 STOP, NO PARITY |
| ON | OFF | ON | OFF | 7 DATA, 1 STOP, EVEN PARITY |
| ON | OFF | ON | ON | 7 DATA, 1 STOP, ODD PARITY |
| ON | ON | OFF | X | 7 DATA, 2 STOP, NO PARITY |
| ON | ON | ON | OFF | 7 DATA, 2 STOP, EVEN PARITY |
| ON | ON | ON | ON | 7 DATA, 2 STOP, ODD PARITY |

ELECTRICAL CONNECTIONS

Standalone Enclosure

The following paragraphs describe the power line, business equipment, and private line connections to the DataComm 500G/UXR DSU.

The unit is equipped with a captive ac power cord terminated in a molded three-prong plug. Connect the cord to a polarized outlet providing the required ac power. The outlet should not be under switch control. The unit should be powered by the same ac source as the equipment interfaced with the unit, to prevent large circulating currents caused by differences in

INSTALLATION

ground potential. If it is not possible to determine whether the equipment is powered by the same ac source, it should be verified that a potential difference of less than 0.25 V rms exists between the grounding circuits of the respective power outlets.

NOTE

This unit incorporates fusible links, FL1 and FL2 (shown in Figure 2-1, sheet 1), which may be opened if the ground potential exceeds 0.25 V rms between the unit and peripheral equipment. Do not apply power to the unit until all connections to peripheral equipment have been made. If a fusible link is opened in a unit, return it to the factory for repair.

Rackmount Shelf

The DSU obtains power directly from the shelf when properly installed as instructed under Rackmount Installation.

Business Equipment Connections (Data Terminal)

The DataComm 500G/UXR supports three business equipment interfaces: EIA-232-D, CCITT V.35, and optionally EIA-530. The EIA-232-D and V.35 interface hardware resides on the baseboard. An optional plug-in card is required for the EIA-530 interface. The EIA-530 card mates with the base card via connector XA2P1 and may be oriented in two positions when plugged into the basecard (see Figure 2-3). In one position, the 530 card connects to P1 and the DSU and provides an EIA-530 interface, regardless of the EIA-232-D/V.35 basecard strapping. In the other position, the 530 card acts as an XA2P1 jumper so the EIA-232D or V.35 interfaces may be used with the plug-in card mounted. Finally, the plug-in card may be removed entirely and jumpers placed across XA2P1 so that non-EIA-530 units may operate without the card.

Business Equipment connections to the DSU are made via the 25-pin EIA-232-D/EIA-530 connector or the V.35 connector located on the left-hand side of the rear panel (see Figure 2-4).

Appendixes B through E describe the signals exchanged through each of the business equipment interfaces.

NOTE

When the optional EIA-530 Interface is installed, DTE control of Remote Terminal Test and DTE control of Self-Test are not supported.

**Optional EIA-530
Plug-In Card
Installation**

The optional EIA-530 Plug-In Card is installed on the 500G/UXR Basecard as follows.

1. Turn the unit OFF.
2. Remove the cover from the DataComm 500G/UXR standalone unit to gain access to the basecard, or remove the rackmounted basecard from the shelf.
3. Remove the individual jumpers installed on connectors XA2P2/P3.
4. Mate the EIA-530 Plug-In Card (GDC Part Number 048P042-001) to the basecard (GDC Part Number 048P049-001) in one of two orientations as shown in Figure 2-3.
5. Reinstall the cover on the standalone unit or insert the basecard into the shelf.

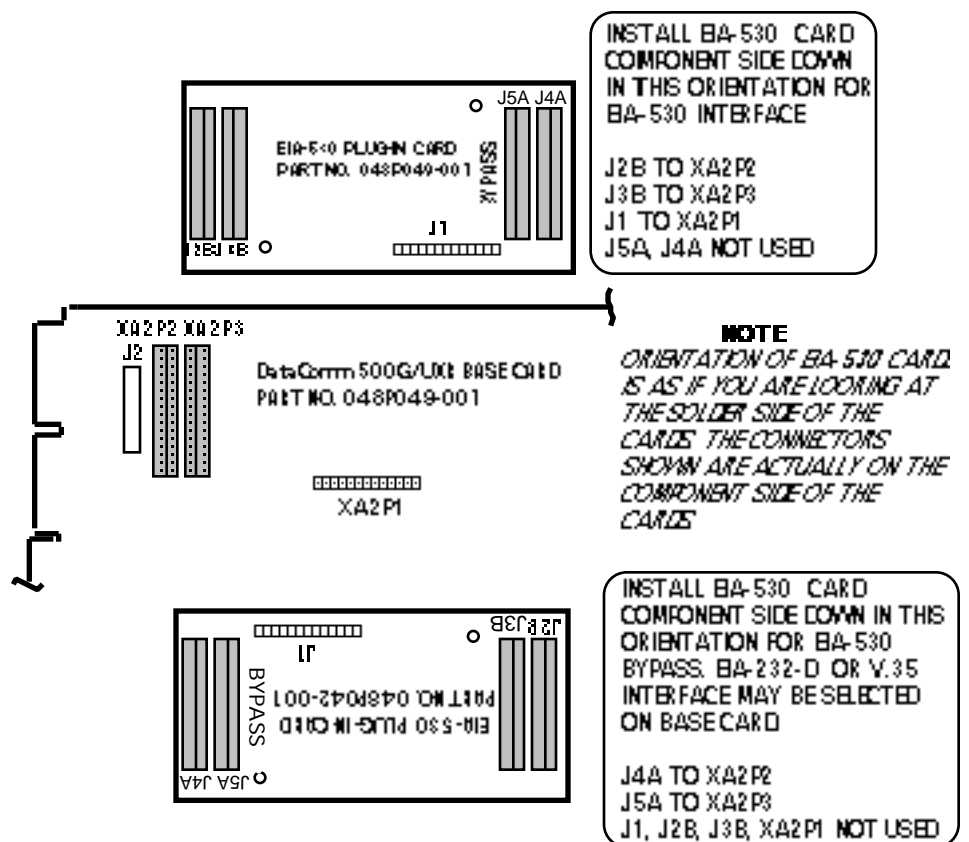


FIGURE 2-3. EIA-530 PLUG-IN CARD INSTALLATION

INSTALLATION

Data Rate Adapter

An optional Data Rate Adapter Card is available as a factory installed option, or as a field upgrade kit. The Data Rate Adapter Card (GDC Part No. 058P128-001) plugs into the DataComm 500G/UXR Base Card in place of the EIA-530 Card.

The Data Rate Adapter is capable of adapting synchronous and asynchronous DTE data transmission speeds of 19.2 Kbps and slower to an aggregate line speed of 56 or 64 Kbps. Rate adaptation is provided for point-to-point and multipoint applications.

For complete operating and installation instructions applicable to the Data Rate Adapter Card, refer to Publication No. 048R161-A1.

DDS/VF Line Connectors

When the DSU is installed in the standalone enclosure, the DSU may be connected to the communications line using either the screw terminals or modular jack at the rear panel. When using the screw terminal, the four-wire private line is brought through the access hole, **LINE**, on the enclosure's rear panel and connected to the four terminal screws mounted on the base card, as illustrated in Figure 2-4.

NOTE

If using the modular jack J3, Tx lines are on pins 1 and 2, Rx lines are on pins 7 and 8. Pin 1 is on the left and pin 8 is on the right when facing the rear panel.

If the DSU is rackmounted in the DataComm Shelf DS-I, the four wire private line is connected to the top four screws of the terminal block mounted on the shelf's rear panel. If the modem is mounted in the Universal System Shelf, the plastic cover attached at the rear of the backplane must first be removed to expose the VF terminal blocks. These blocks accommodate wires that do not have terminal lugs. Remove the lugs and a portion of the insulation on the existing cable and insert the wires into the block by first unscrewing the captive screw for that portion of the terminal. Replace the plastic cover.

In either case, before making the connection, verify that the terminal block corresponds to the shelf receptacle in which the DSU card is installed. Refer to Figure 2-5.

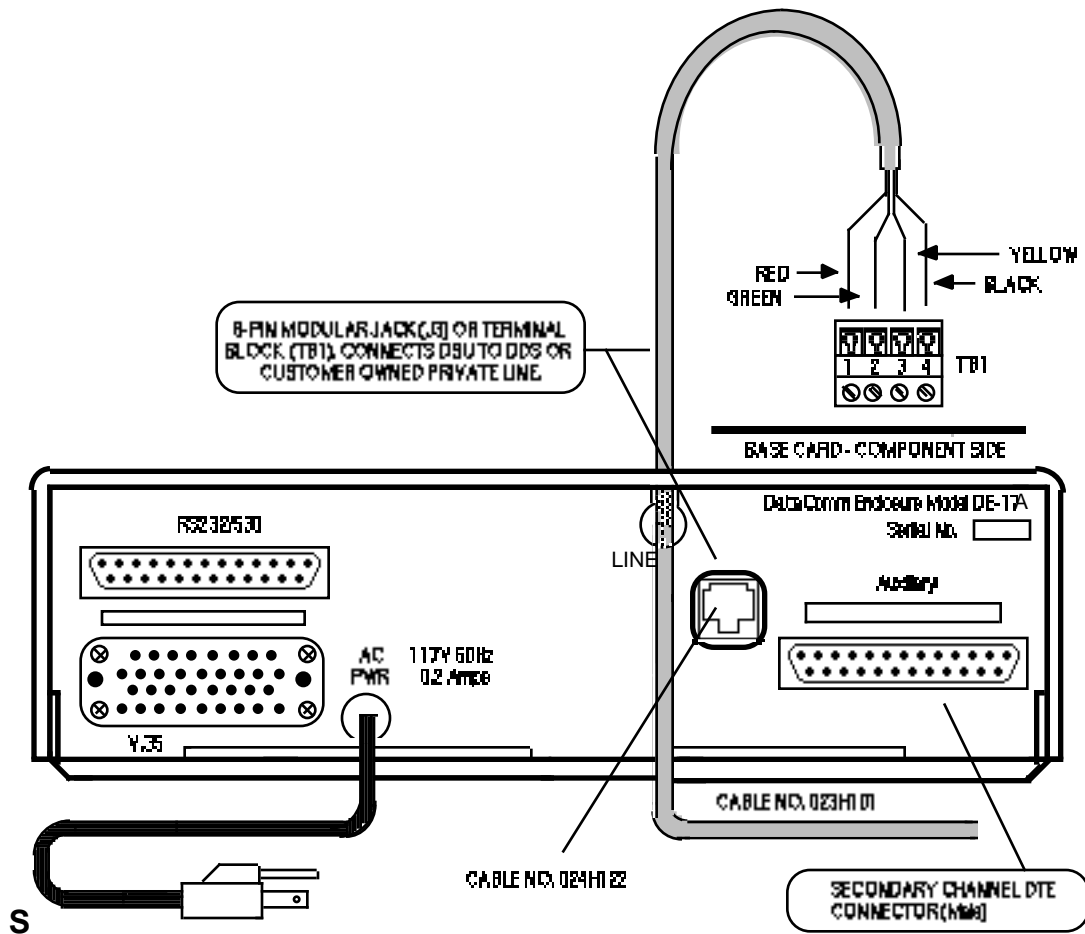


FIGURE 2-4. STANDALONE ENCLOSURE REAR PANEL AND PC BOARD CONNECTIONS

INSTALLATION

SuperPaint!500G FP & TSTS:500G FP & TSTS:500G/RACK!Draw(69,47:459,665)

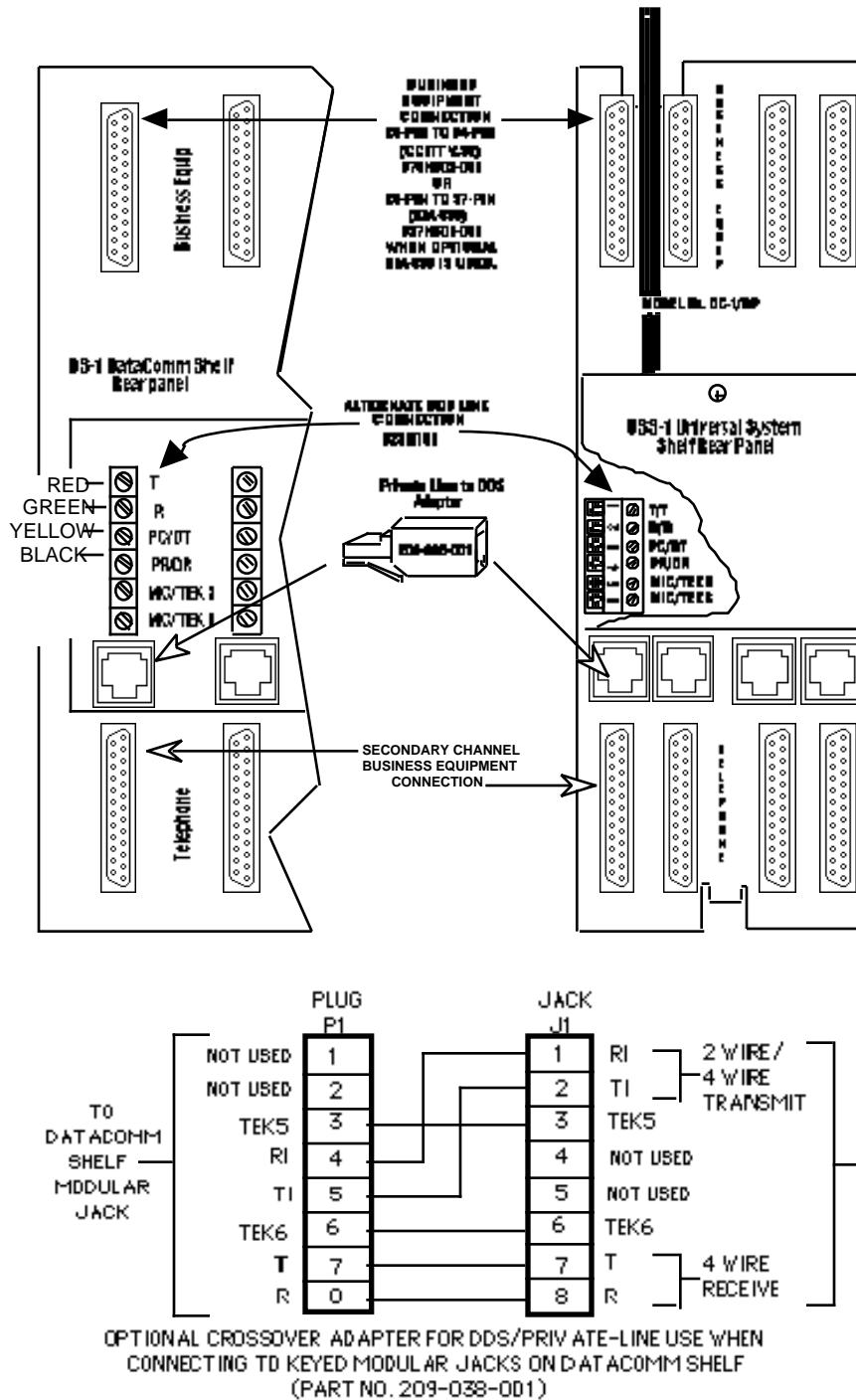


FIGURE 2-5. DataComm/UNIVERSAL SYSTEM SHELF REAR PANEL CONNECTIONS

SECTION 3

OPERATION

OVERVIEW

All operations of the DataComm 500G/UXR DSU are controlled automatically after it is properly installed. It has no operating instructions (except for test procedures given in Section 4, Tests). This section describes the controls, indicators, and connectors of the modem that the operator may use to check the operation of the DSU.

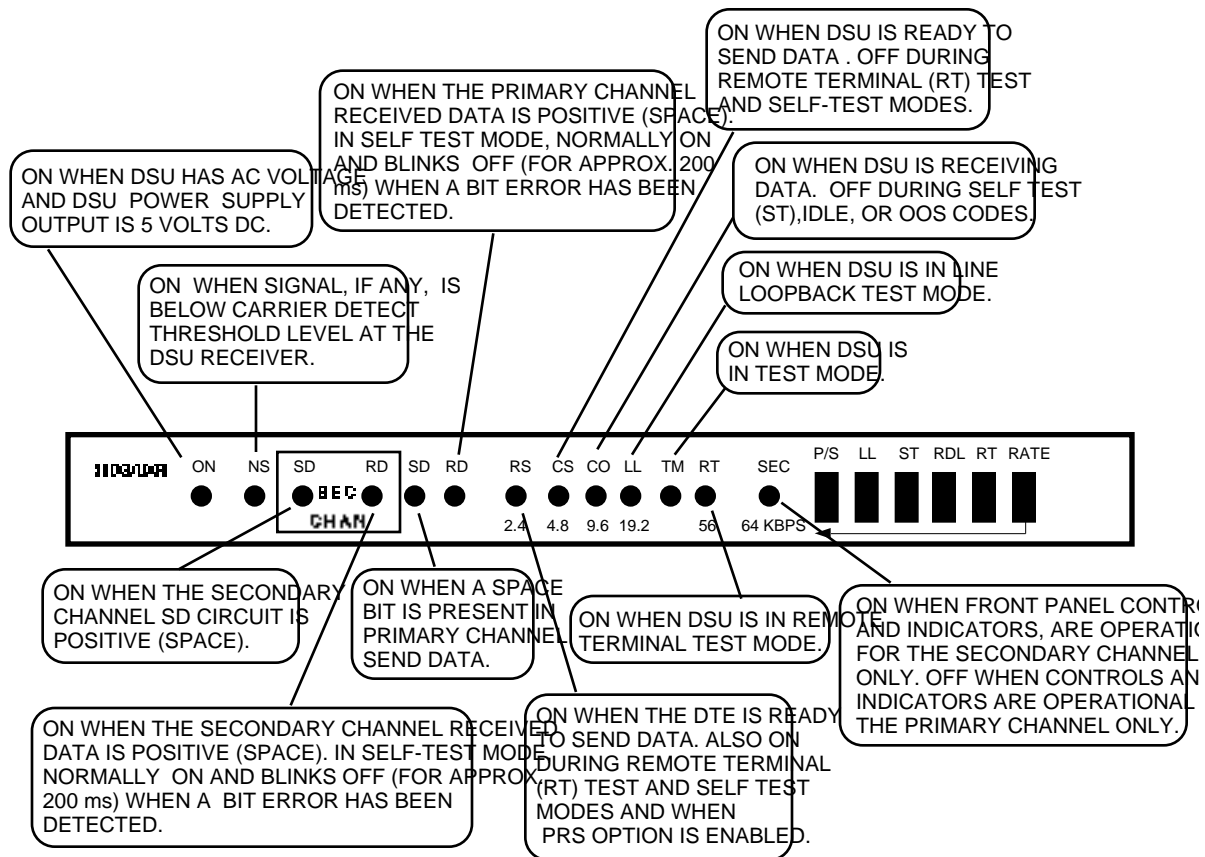
CONTROLS, INDICATORS, AND CONNECTORS

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

RACKMOUNT SHELF

Rackmount shelf front panel controls, indicators, and fuses are described in the manual supplied with the shelf. Refer to it if you have a rackmount shelf. The shelf's rear panel and connectors are illustrated in Section 2.

OPERATION



NOTE: MULTI-PURPOSE LED INDICATORS INCLUDE DESIGNATIONS: 2.4, 4.8, 9.6, 19.2, 56 AND 64KBPS, AS SHOWN. RATE PUSHBUTTON SWITCH IS PRESSED, ALL RATE LEDs WILL BE OFF, EXCEPT FOR THE LED THAT INDICATES CURRENT PRIMARY CHANNEL RATE.

FIGURE 3-1. FRONT PANEL INDICATORS

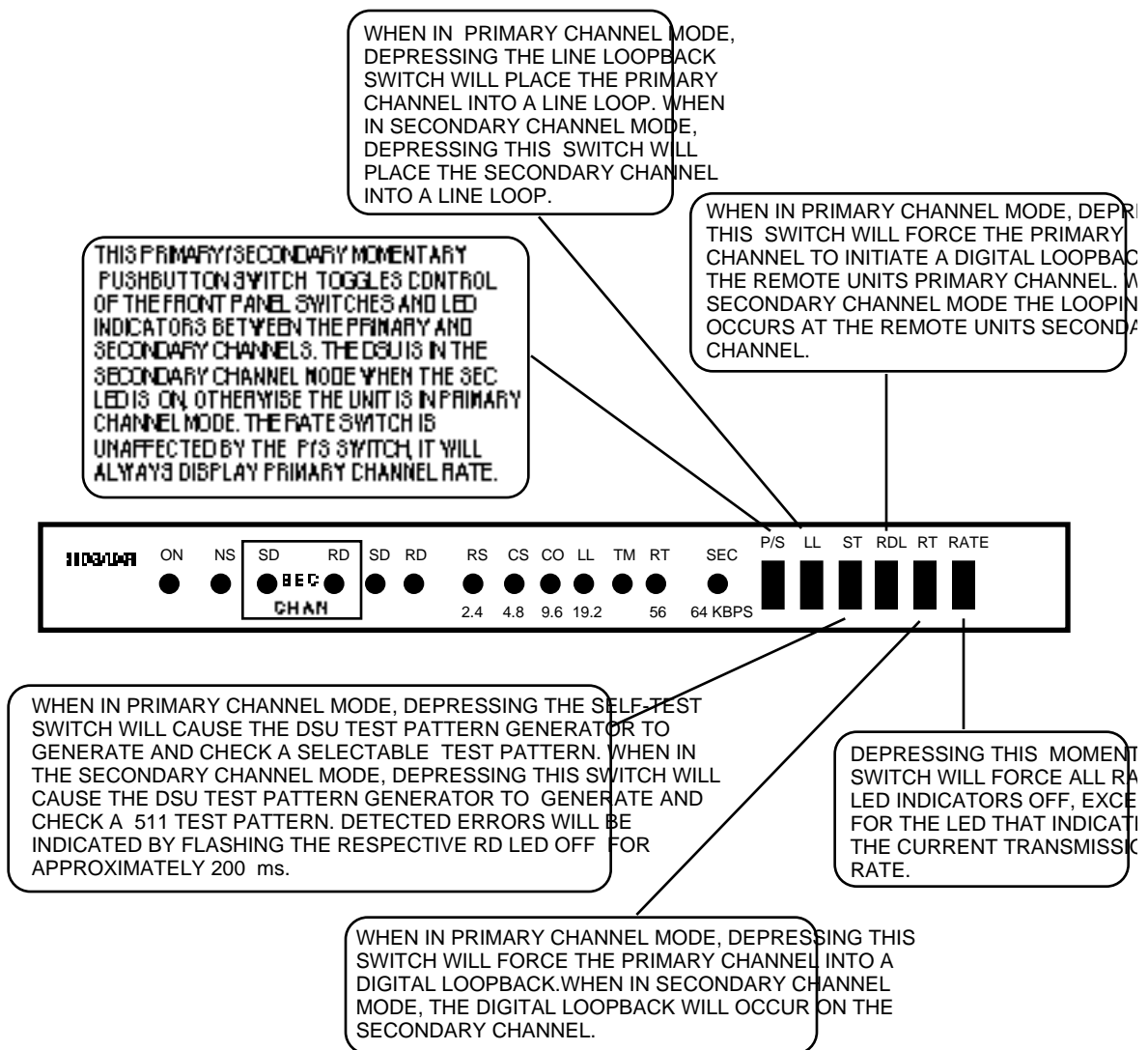


FIGURE 3-2. FRONT PANEL CONTROLS

SECTION 4

TESTS

OVERVIEW

This section describes tests that may be performed from the front panel after installing the DSU or whenever the operation of the DSU must be checked.

The SD and RD test indicators referred to in the tests described in this section, may flicker or appear to be solidly ON depending upon the data rate at which the unit is being tested. When the data set is operated at the higher rates (above 9600 bps), the indicators appear to be ON constantly; below that they appear to flicker. The test descriptions and front panel indicators shown in the illustrations assume that the data set has established its test and is operating at 9600 bps or below; for units set to operate above 9600 bps, indicators SD and RD will appear to be solidly ON, though they may not appear as bright as other LED indicators.

NOTE

Diagnostics may be performed on either the primary or secondary channel.

Diagnostics may be initiated from the front panel switches, the DTE interfaces or from the STC network.

For DTE initiated diagnostics, see Figure 2-1 for optioning and control.

All network initiated loops are done on both the Primary and Secondary data channels.

The pushbutton switch P/S (Primary/Secondary) on the front panel determines whether front panel switches perform Primary or Secondary diagnostics. The P/S switch is disabled while any front panel test is active.

When performing Primary Channel tests the SEC LED must be OFF. When performing Secondary Channel tests the SEC LED must be ON. The state of the SEC LED can be changed by depressing the P/S switch on the front panel.

Table 4-1 describes the diagnostic test priorities.

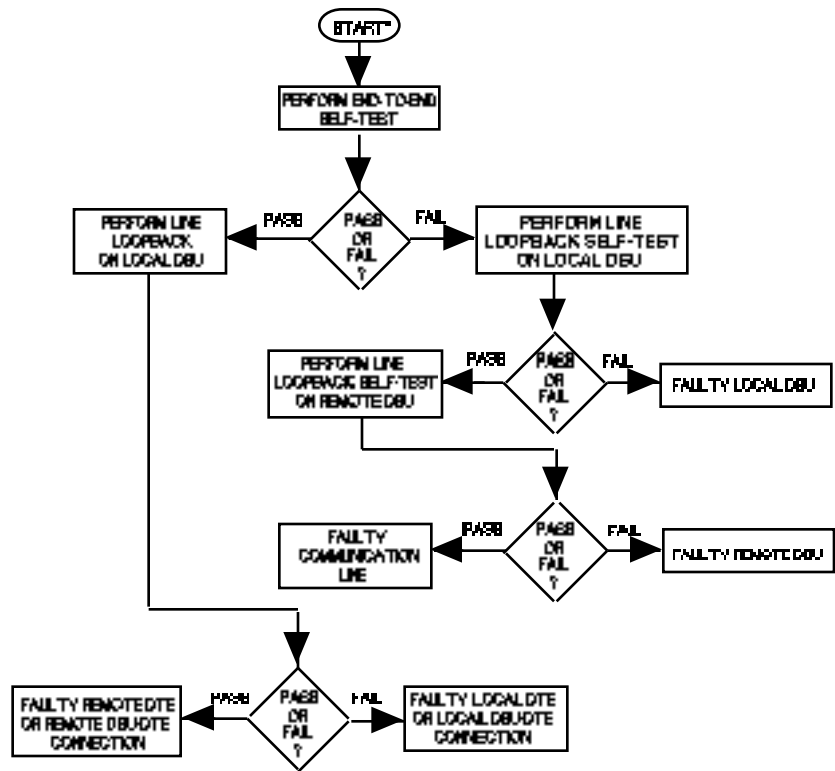
TABLE 4-1. DIAGNOSTIC TEST PRIORITIES

| PRIMARY CHANNEL | | |
|--------------------------|-------------|----------------------------|
| Priority | Test | Means of Activation |
| 1 | LL | STC (current reversal) |
| 2 | LL | Front Panel |
| 3 | RT | STC |
| 4 | RT | Front Panel |
| 5 | RDL | Front Panel |
| 6 | LL | DTE |
| 7 | RT | DTE |
| 8 | RDL | DTE |
| 9 | ST | Front Panel |
| 10 | ST | DTE |
| 11 | RT (Remote) | (from remote RDL) |
| SECONDARY CHANNEL | | |
| 1 | LL | STC (current reversal) |
| 2 | RT | STC |
| 3 | LL | Front Panel |
| 4 | RT | Front Panel |
| 5 | RDL | Front Panel |
| 6 | LL | DTE |
| 7 | RT | DTE |
| 8 | RDL | DTE |
| 9 | ST | Front Panel |
| 10 | ST | DTE |
| 11 | RT (Remote) | (from remote RDL) |

The tests described in this section can also be used to isolate problems in the data communications system (refer to the fault-isolation sequence in Figure 4-1).

POINT-TO-POINT TESTING

The following paragraphs present test information for point-to-point installations. The MRAL (S10-5) option, *Modem Ready OFF During Line Loopback* must be selected for compatibility with your DTE. If desired, the DSU may be optioned to permit the DTE to control Line Loopback, Remote Terminal Test, Self Test and Remote Digital Loopback (Refer to Section 2, Installation) on both the primary and secondary channels.



*ASSUMING A PROBLEM EXISTS

FIGURE 4-1. FAULT-ISOLATION SEQUENCE

TESTS

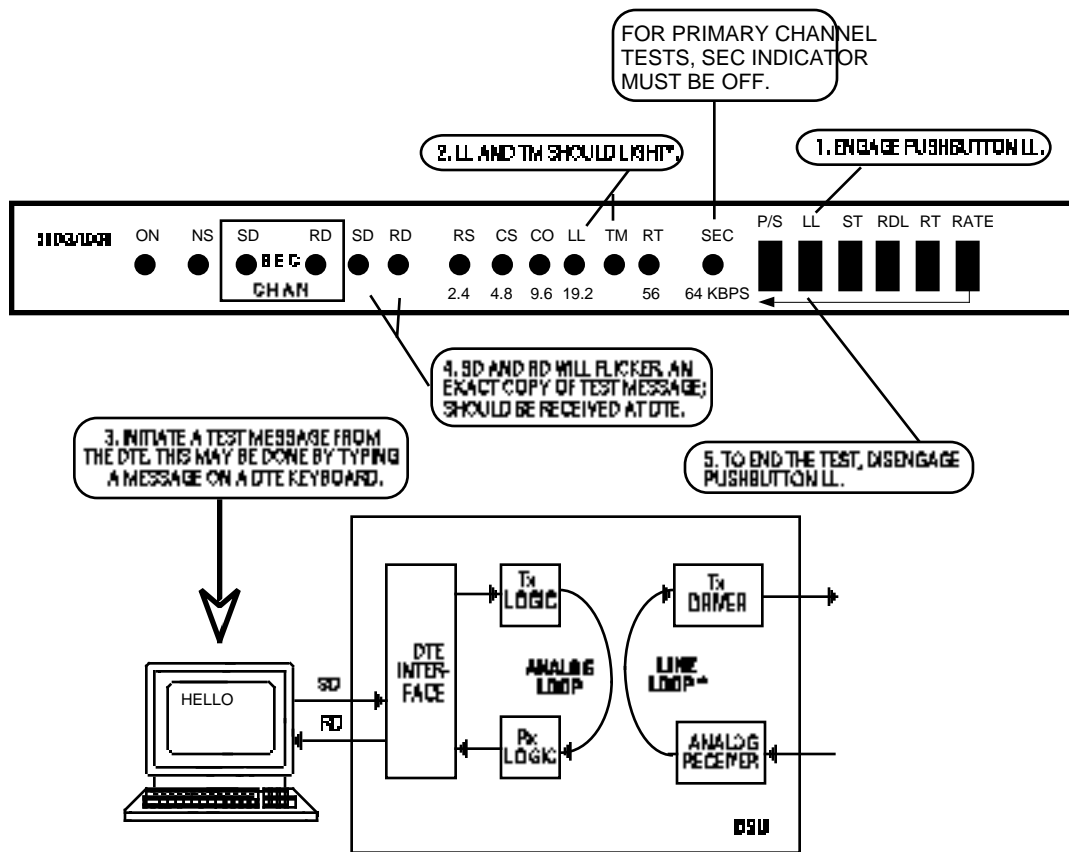
PRIMARY LINE LOOPBACK TEST

Line Loopback (LL) checks the performance of the DataComm 500G/UXR DSU and its associated DTE. When the test is initiated, the DSU transmitter output and receiver input are disconnected from the communications line and connected together, creating a circuit similar to an analog loopback circuit that loops signals from the transmitter through the receiver. Also, the disconnected transmitter and receiver communications lines are connected together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the originating station (Figure 4-2 illustrates LL).

While Line Loopback is being performed locally, a Self-Test pattern may also be sent from the remote site to the local DSU, which will loop the test pattern back to the remote site for verification. This test will check the performance of the remote site's DSU and the communications line. To perform this test, make arrangements with the remote site personnel before initiating Line Loopback Self-Test locally.

NOTE

When in the primary channel, a composite Analog Loopback is performed for both secondary and primary data.



* WHEN ALO IS ENABLED (S10-6 ON), LINE LOOP IS NOT ACTIVATED AND THE LL LED WILL NOT BE LIT.

FIGURE 4-2. PRIMARY LINE LOOPBACK TEST, LOCALLY CONTROLLED

TESTS

PRIMARY REMOTE TERMINAL TEST

Remote Terminal (RT) test checks performance of local and remote DSUs, the remote DTE, and the communications line. When the test is initiated, the local looping DSU transmitter input and receiver output are disconnected from the DTE interface and connected together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-3 illustrates RT.

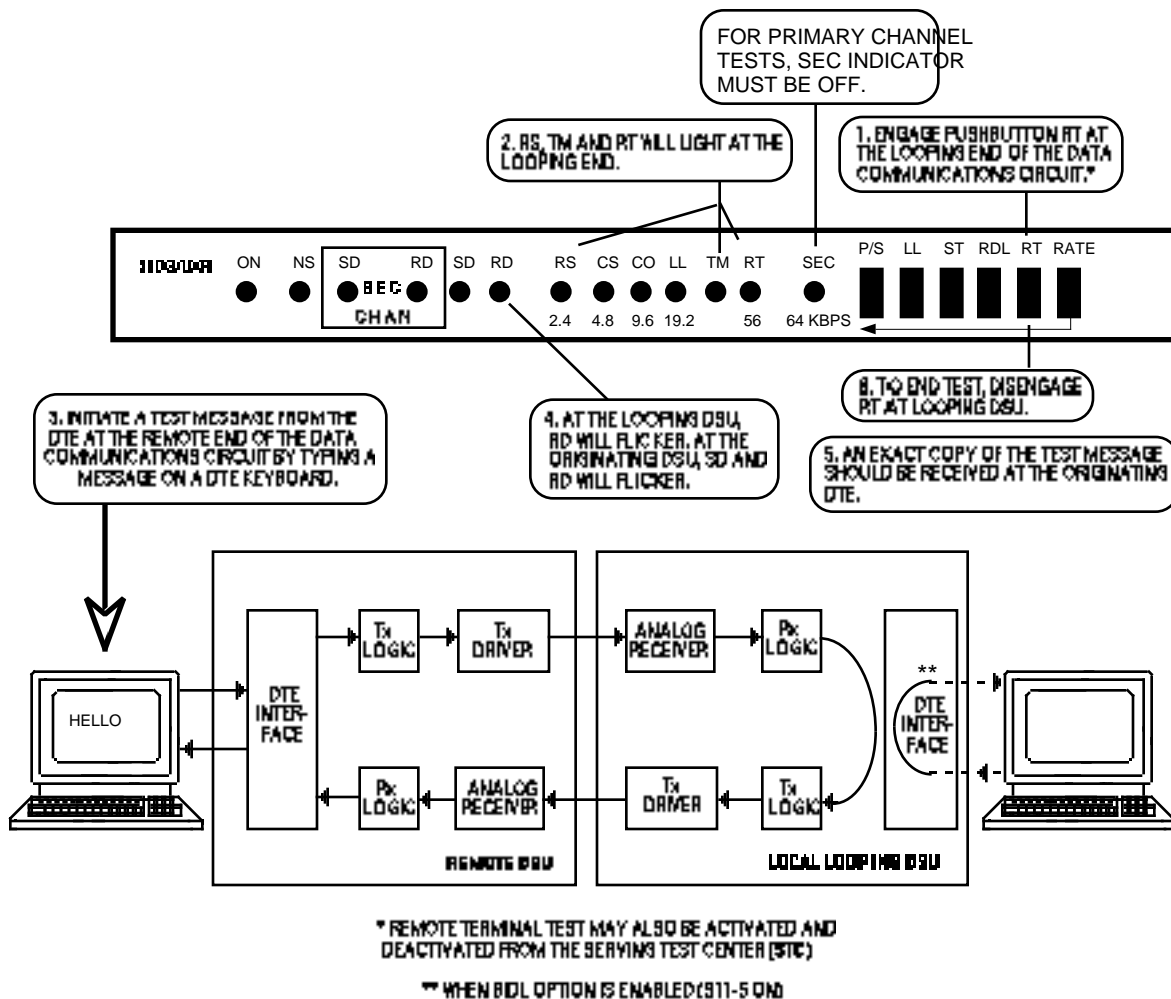


FIGURE 4-3. PRIMARY REMOTE TERMINAL TEST, LOCALLY CONTROLLED

PRIMARY REMOTE DIGITAL LOOPBACK

Remote Digital Loopback checks the performance of the local and remote DSUs, the local DTE, and the communications line. When this test is initiated, the remote DSU goes into an RT Loopback condition (see RT loopback test). The remote DSU transmitter and receiver are disconnected from the DTE interface and connected together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-4 illustrates RDL.

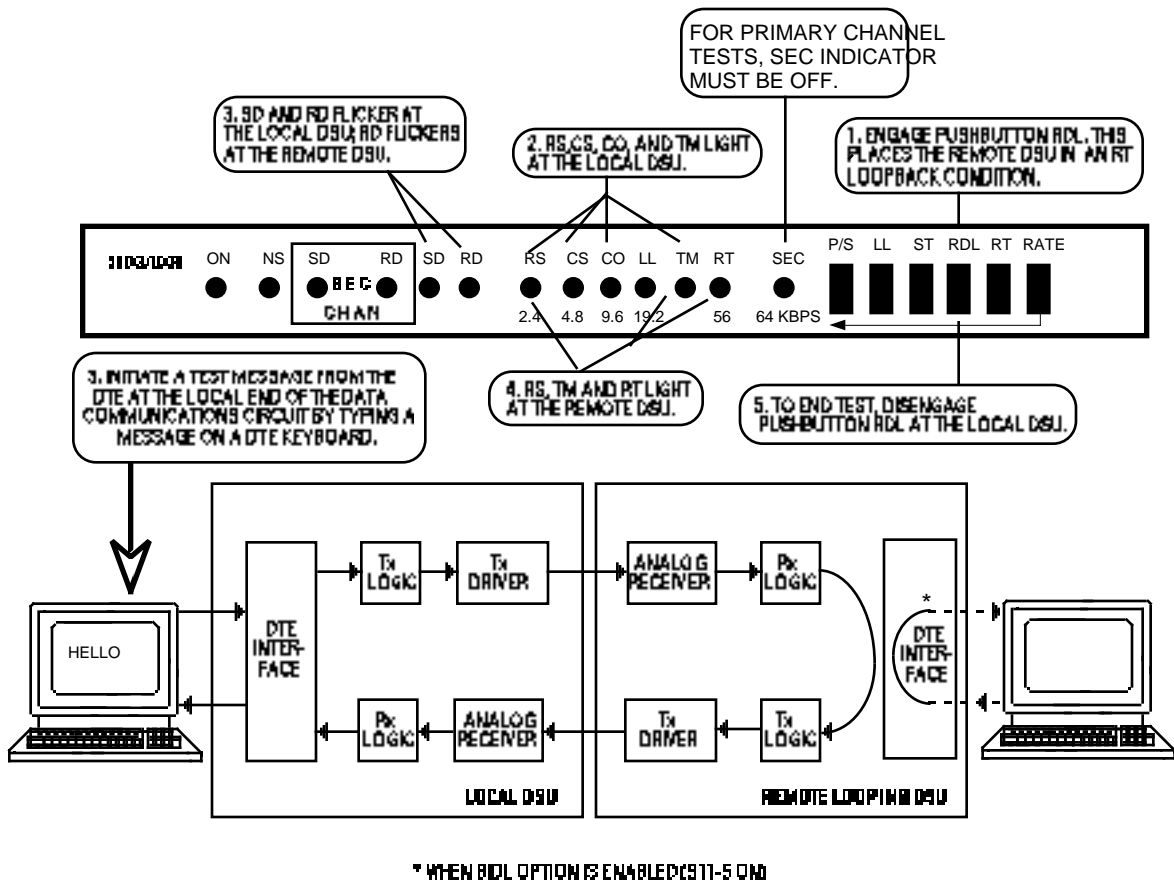
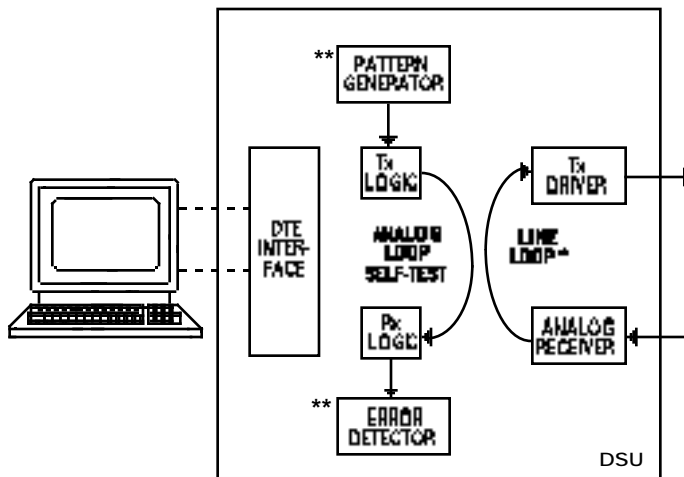
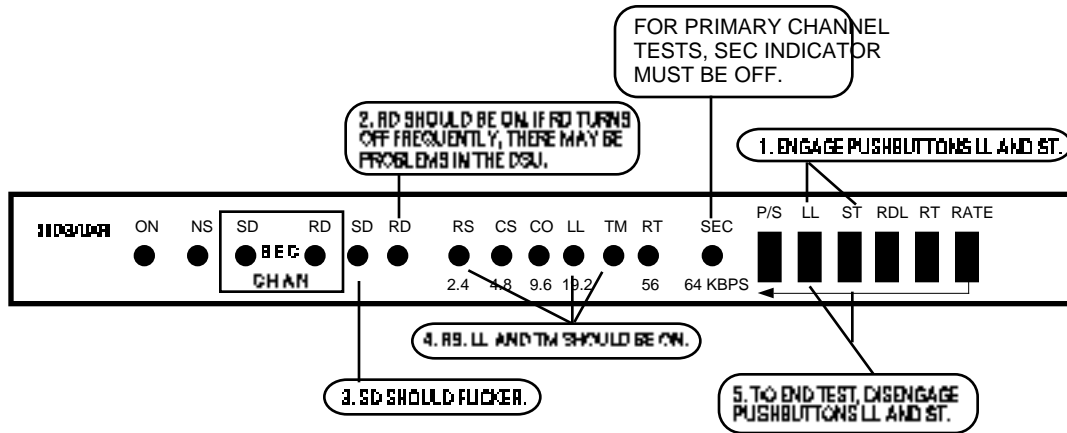


FIGURE 4-4. PRIMARY REMOTE DIGITAL LOOPBACK TEST, LOCALLY CONTROLLED

TESTS

PRIMARY SELF-TESTS

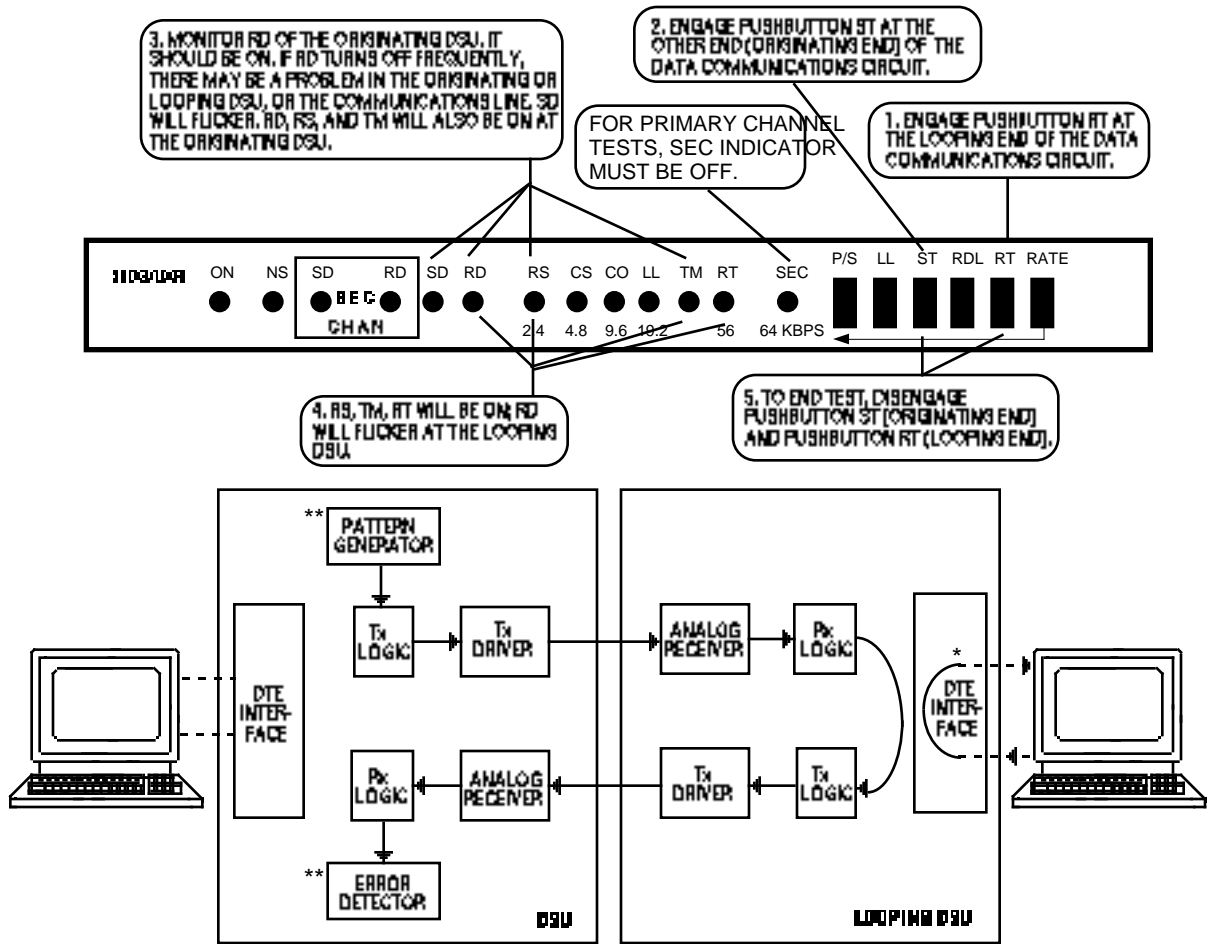
The Self-Test function conditions the DataComm 500G/UXR DSU transmitter to generate a test pattern, while the DSU receiver monitors the received signal for errors in the received test pattern (see Figures 4-5 thru 4-7). If any errors are detected, front panel indicator RD is turned off for approximately 200 ms. This function may be used in place of the DTE-generated test messages in the Line Loopback and Remote Terminal tests.



* WHEN ALO IS ENABLED (S10-6 ON), LINE LOOPBACK IS NOT ACTIVATED.
 ** OPTION SWITCH S10-8 SELECTS EITHER A 2047 OR 511 TEST FOR THE PATTERN GENERATOR AND ERROR DETECTOR.

FIGURE 4-5. PRIMARY LINE LOOPBACK SELF-TEST

**PRIMARY REMOTE
TERMINAL SELF-TEST**



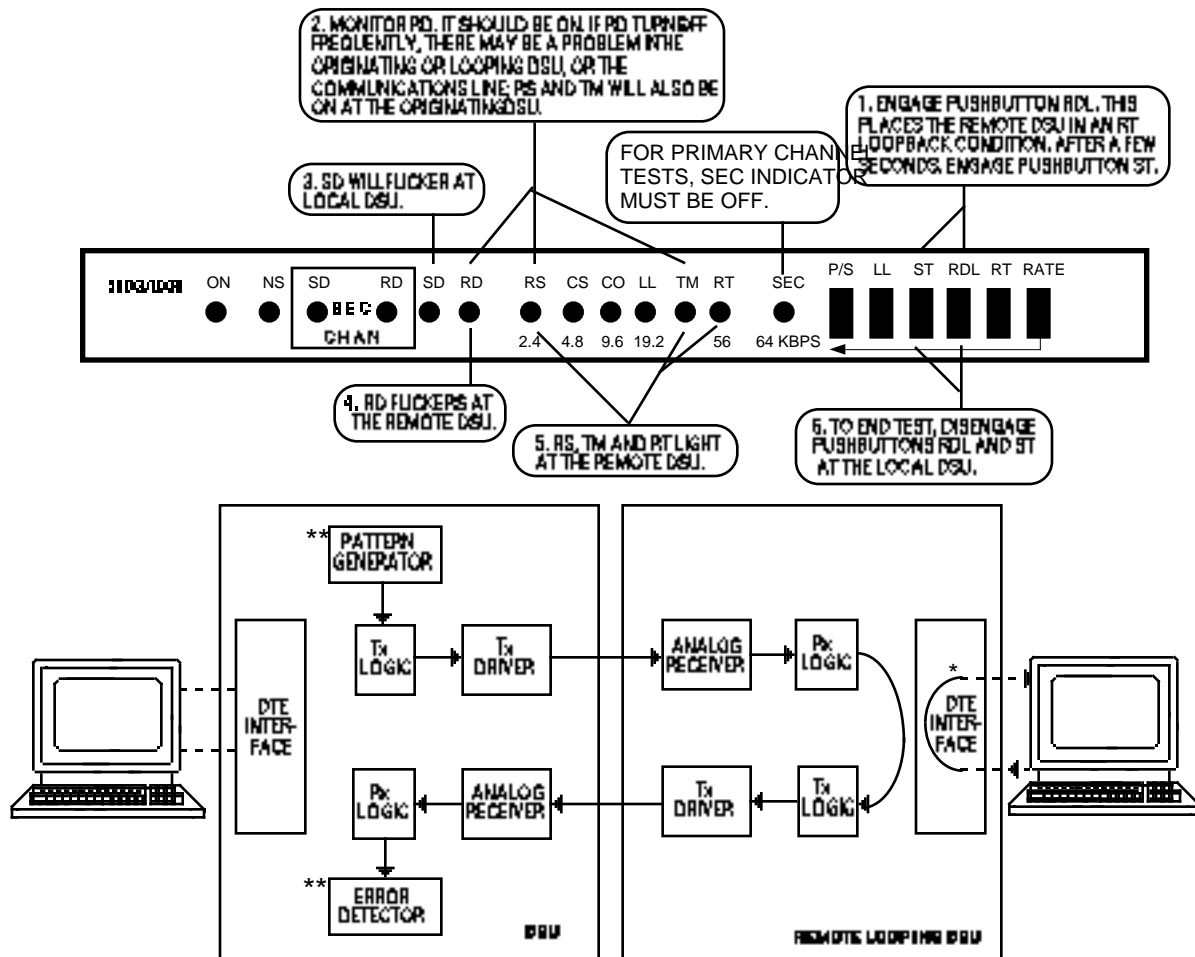
* WHEN BDL OPTION IS ENABLED (§ 11-5 DN)

** OPTION SWITCH S10-8 SELECTS EITHER A 2047 OR 511 TEST FOR THE PATTERN GENERATOR AND ERROR DETECTOR.

FIGURE 4-6. PRIMARY REMOTE TERMINAL SELF-TEST

TESTS

PRIMARY REMOTE DIGITAL LOOPBACK SELF-TEST

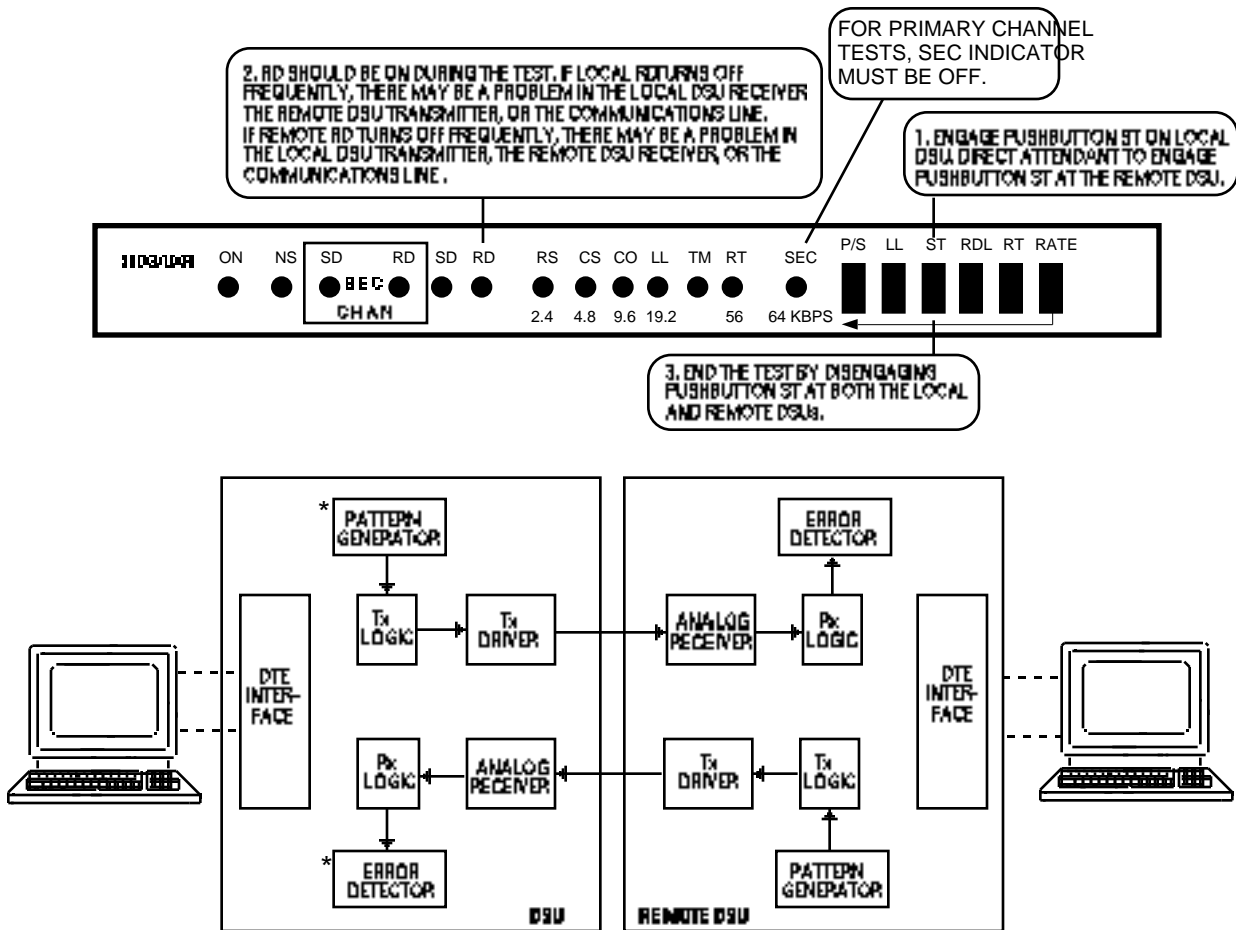


*WHEN BIDL OPTION IS ENABLED (S11-6 DN)
 **OPTION SWITCH S10-8 SELECTS EITHER A 2047 OR 511 TEST FOR THE PATTERN GENERATOR AND ERROR DETECTOR.

FIGURE 4-7. PRIMARY REMOTE DIGITAL LOOPBACK SELF-TEST, LOCALLY CONTROLLED

**PRIMARY
END-TO-END
SELF-TEST**

In addition to using the Self-Test function in conjunction with other test features, Self-Test may be used independently. In this test, the local and remote DSUs exchange Self-Test patterns between their respective test circuits to check the performance of the communications line and the local and remote DSUs (not including the DSUs' DTE interfaces). To perform End-to-End Self-Test, proceed as shown in Figure 4-8.



*OPTION SWITCH S10-8 SELECTS EITHER A 2047 OR 511 TEST FOR THE PATTERN GENERATOR AND ERROR DETECTOR.

FIGURE 4-8. PRIMARY END-TO-END SELF-TEST

TESTS

SECONDARY LINE LOOPBACK TEST

Line Loopback (LL) checks the performance of the DataComm 500G/UXR DSU secondary channel and its associated DTE. When the test is initiated, the DSU transmitter output and receiver input are disconnected from the communications line and connected together, creating a circuit similar to an analog loopback circuit that loops signals from the transmitter through the receiver. Also, the disconnected transmitter and receiver communications lines are connected together, creating a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the originating station (Figure 4-9 illustrates LL). This test does affect the primary channel.

While Line Loopback is being performed locally, a Self-Test pattern may also be sent from the remote site to the local DSU, which will loop the test pattern back to the remote site for verification. This test will check the performance of the remote site's DSU and the communications line. To perform this test, make arrangements with the remote site personnel before initiating Line Loopback Self-Test locally.

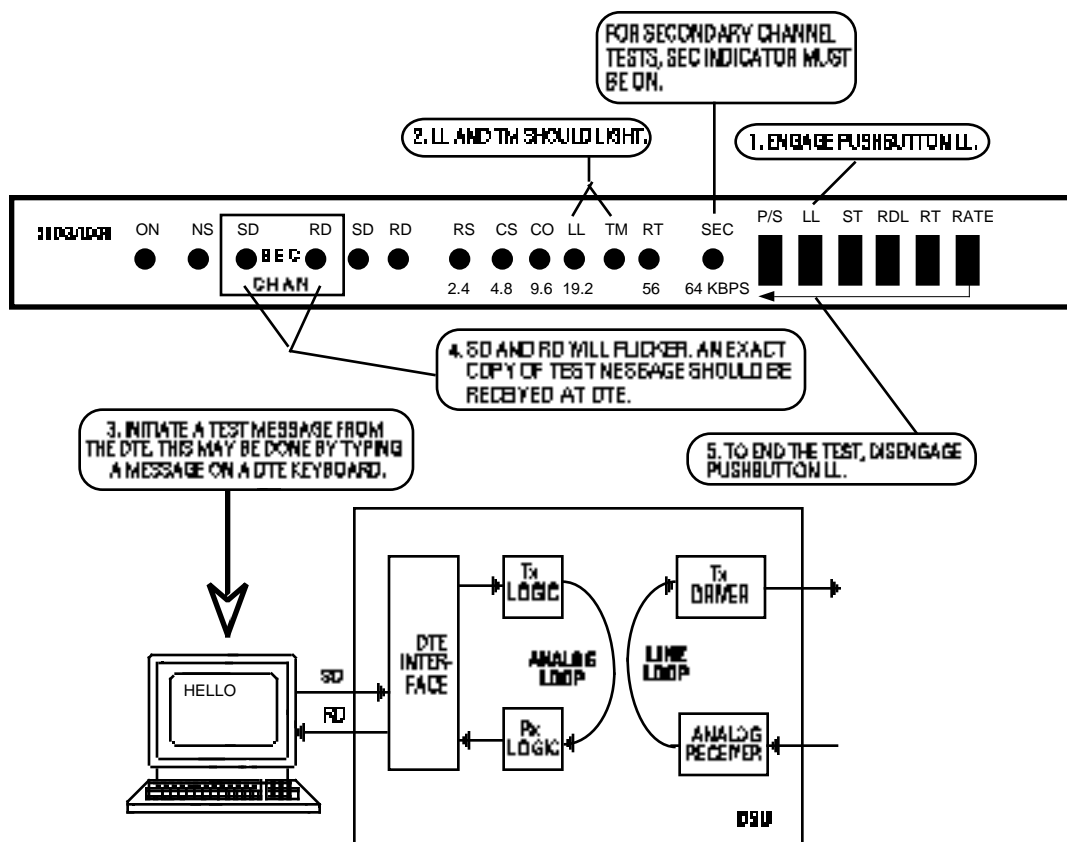


FIGURE 4-9. SECONDARY LINE LOOPBACK TEST, LOCALLY CONTROLLED

SECONDARY REMOTE TERMINAL TEST

Remote Terminal (RT) test checks performance of local and remote DSUs, the remote DTE, and the communications line. When the test is initiated, the local looping DSU transmitter input and receiver output are disconnected from the DTE interface and connected together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-10 illustrates RT.

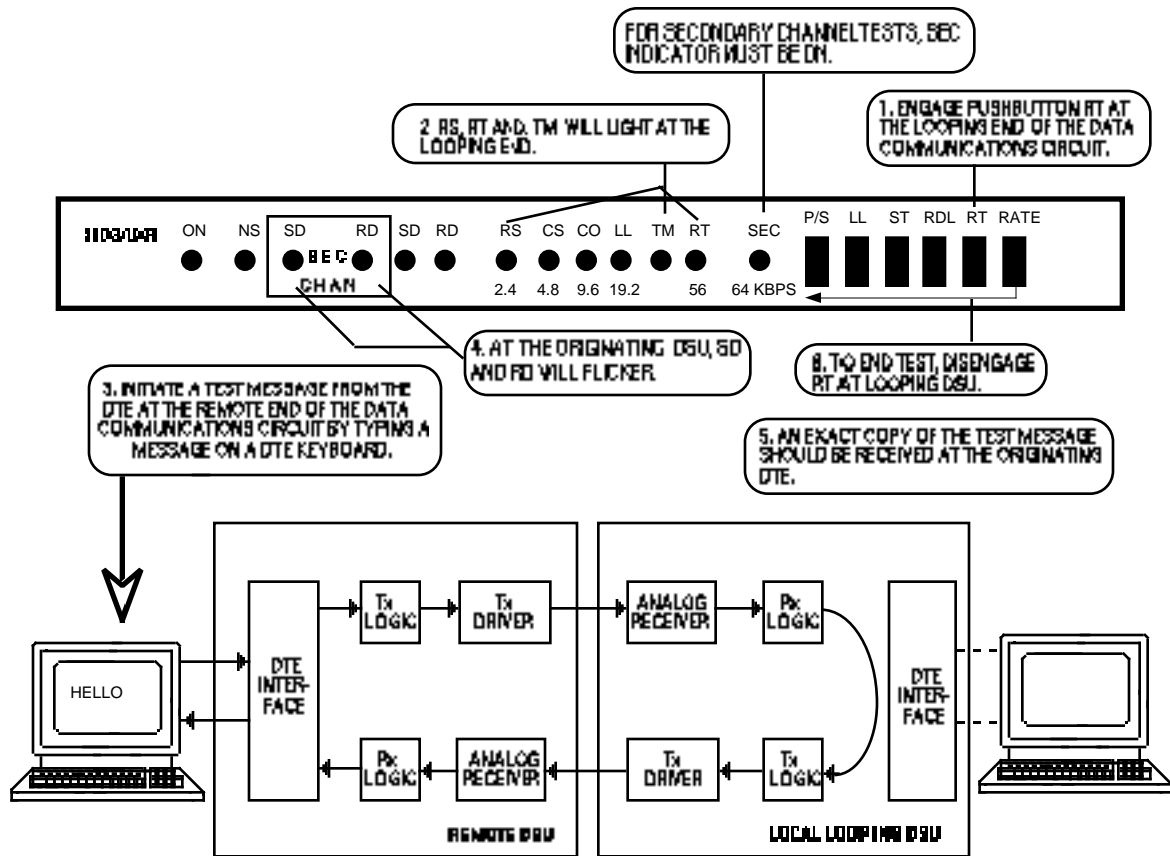


FIGURE 4-10. SECONDARY REMOTE TERMINAL TEST, LOCALLY CONTROLLED

TESTS

SECONDARY REMOTE DIGITAL LOOPBACK

Remote Digital Loopback checks the performance of the local and remote DSUs, the local DTE, and the communications line. When this test is initiated, the remote DSU goes into an RT Loopback condition (see RT loopback test). The remote DSU transmitter and receiver are disconnected from the DTE interface and connected together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-11 illustrates RDL.

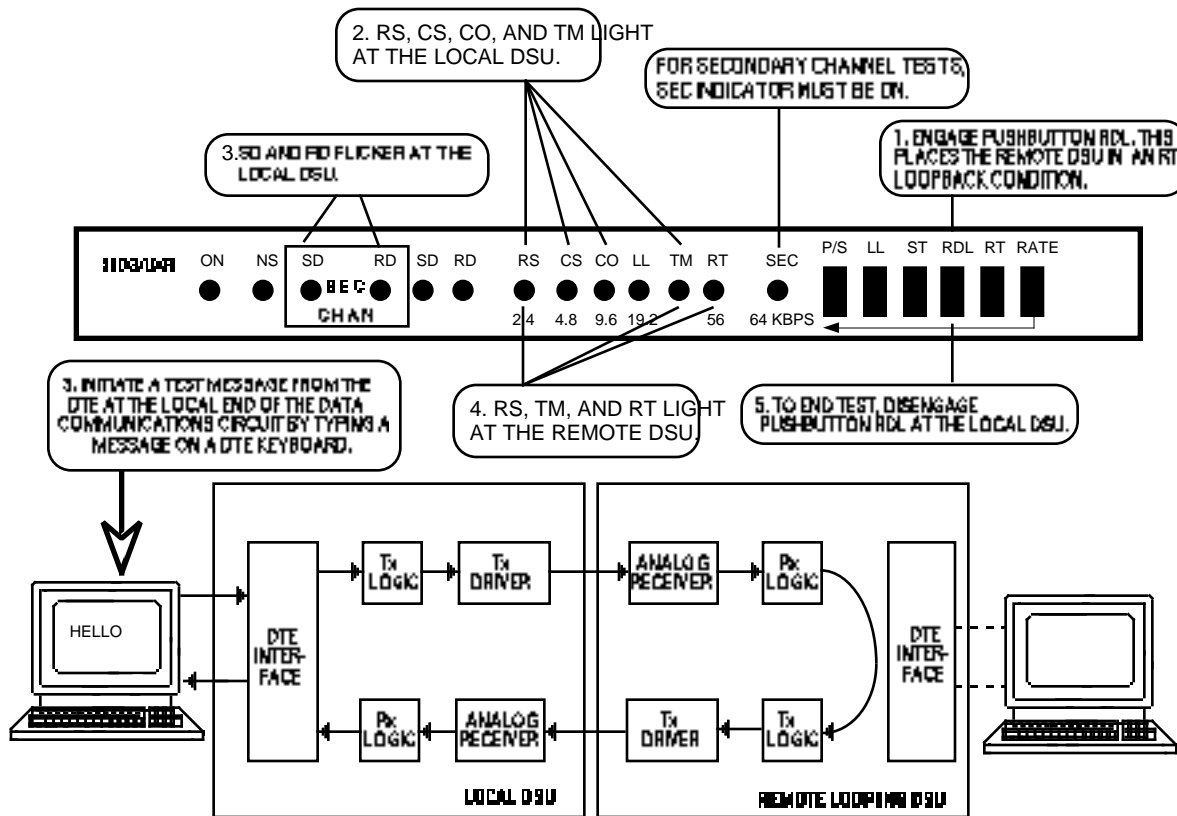


FIGURE 4-11. SECONDARY REMOTE DIGITAL LOOPBACK TEST, LOCALLY CONTROLLED

SECONDARY SELF-TESTS

The Self-Test function conditions the DataComm 500G/UXR DSU transmitter to generate a test pattern, while the DSU receiver monitors the received signal for errors in the received test pattern (see Figure 4-12). If any errors are detected, front panel indicator RD is turned off for approximately 200 ms. This function may be used in place of the DTE-generated test messages in the Line Loopback and Remote Terminal tests.

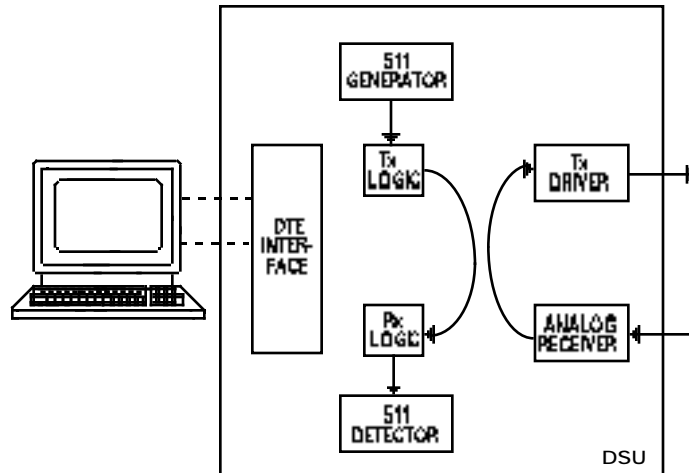
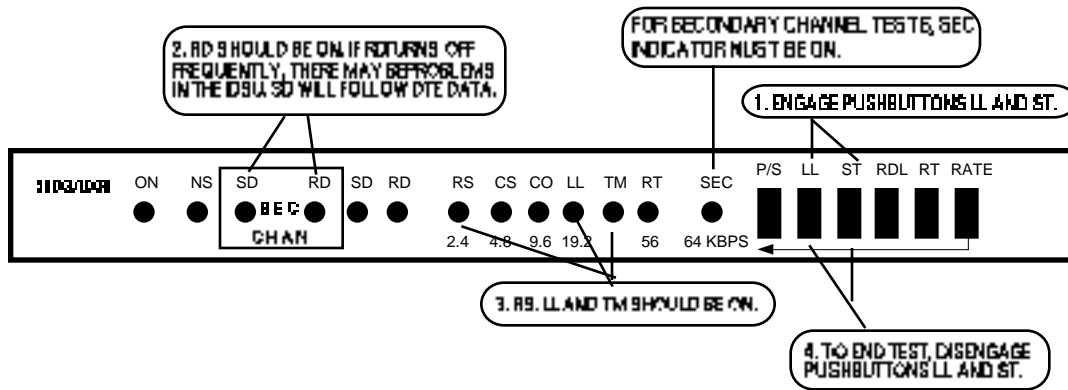


FIGURE 4-12. SECONDARY LINE LOOPBACK SELF-TEST

TESTS

**SECONDARY REMOTE
TERMINAL SELF-TEST**

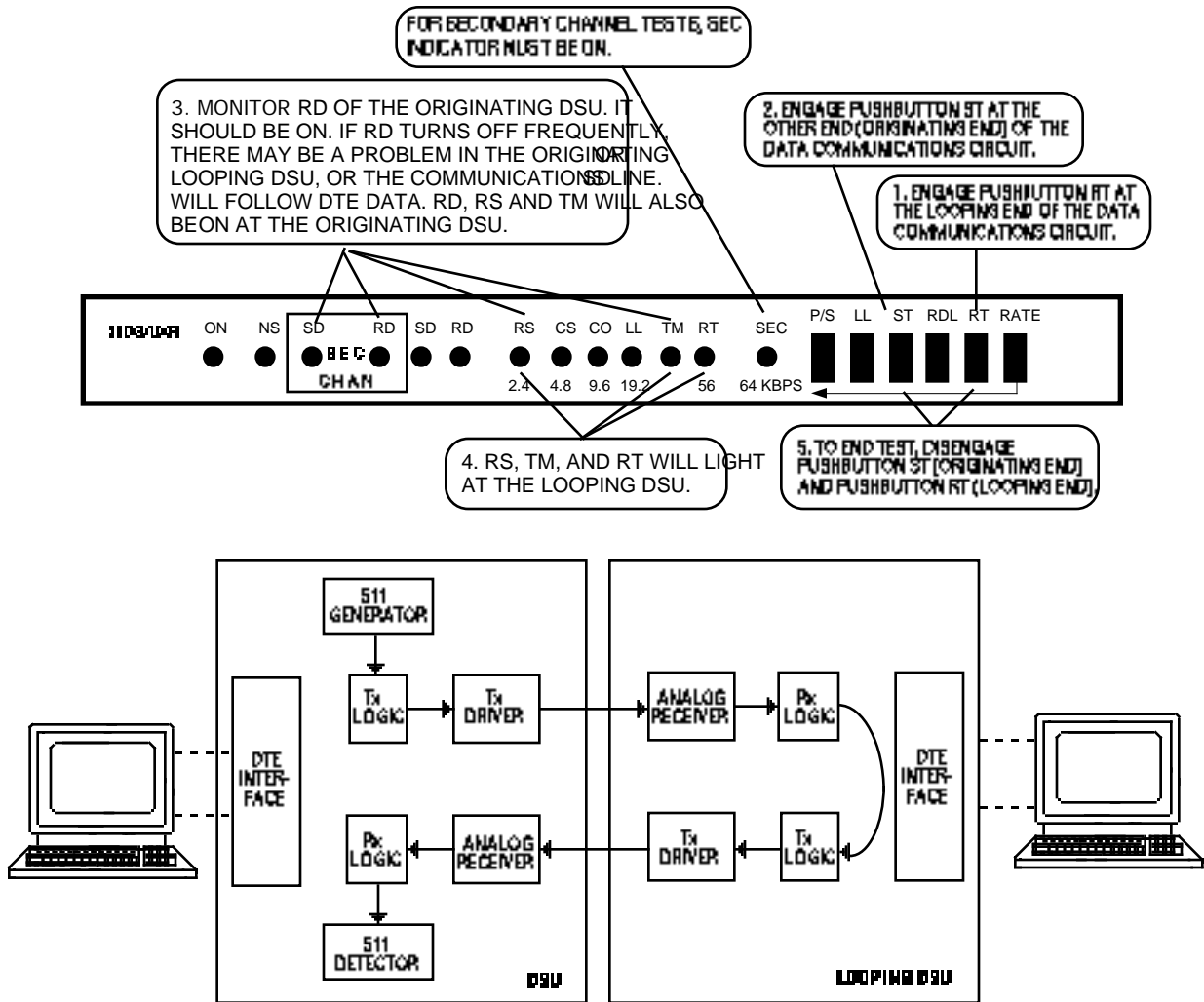
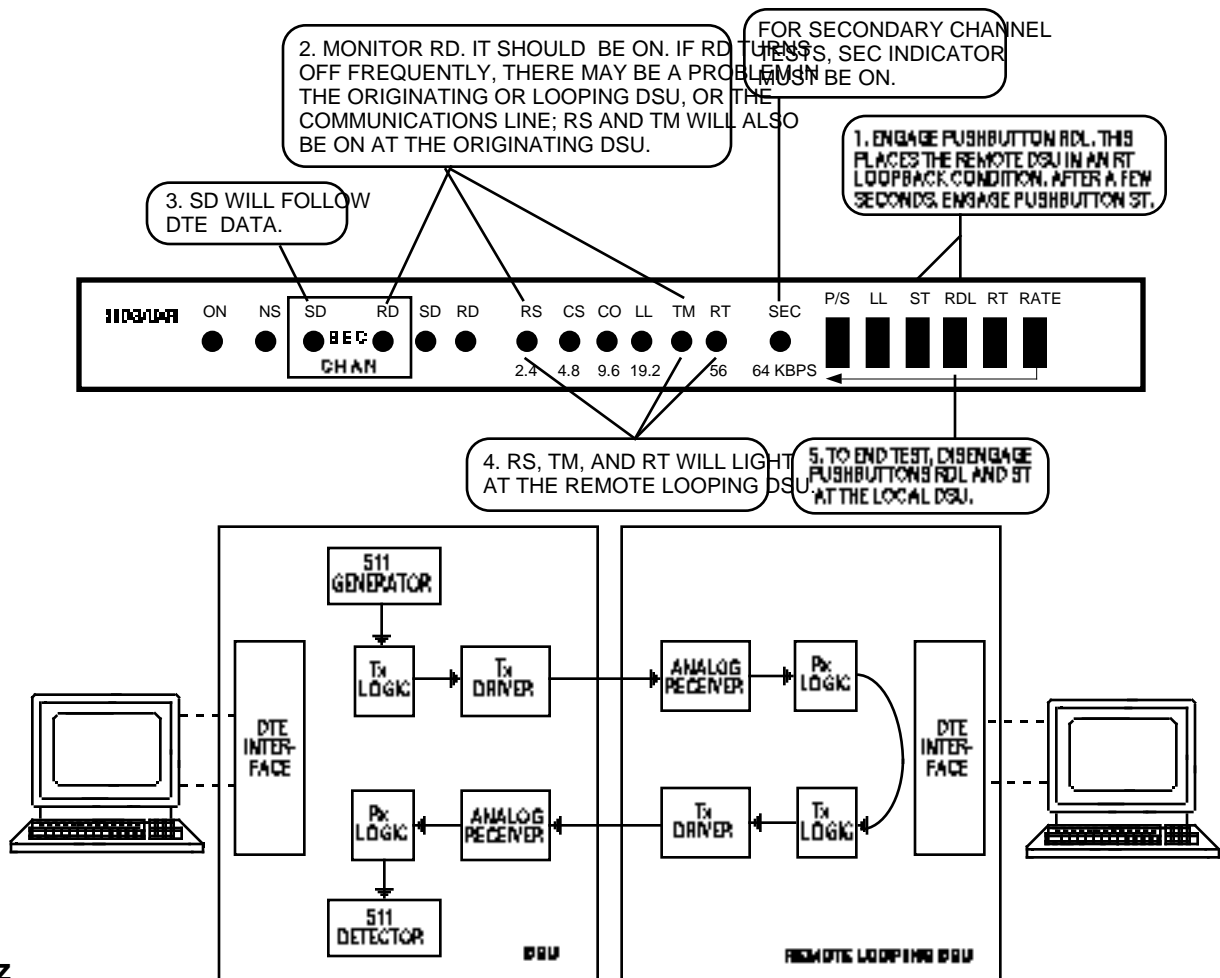


FIGURE 4-13. SECONDARY REMOTE TERMINAL SELF-TEST

**SECONDARY
REMOTE DIGITAL
LOOPBACK SELF-TEST**



Z

FIGURE 4-14. SECONDARY REMOTE DIGITAL LOOPBACK SELF-TEST, LOCALLY CONTROLLED

TESTS

**SECONDARY
END-TO-END
SELF-TEST**

In addition to using the Self-Test function in conjunction with other test features, Self-Test may be used independently. In this test, the local and remote DSUs exchange Self-Test patterns between their respective test circuits to check the performance of the communications line and the local and remote DSUs (not including the DSUs' DTE interfaces). To perform End-to-End Self-Test, proceed as shown in Figure 4-15.

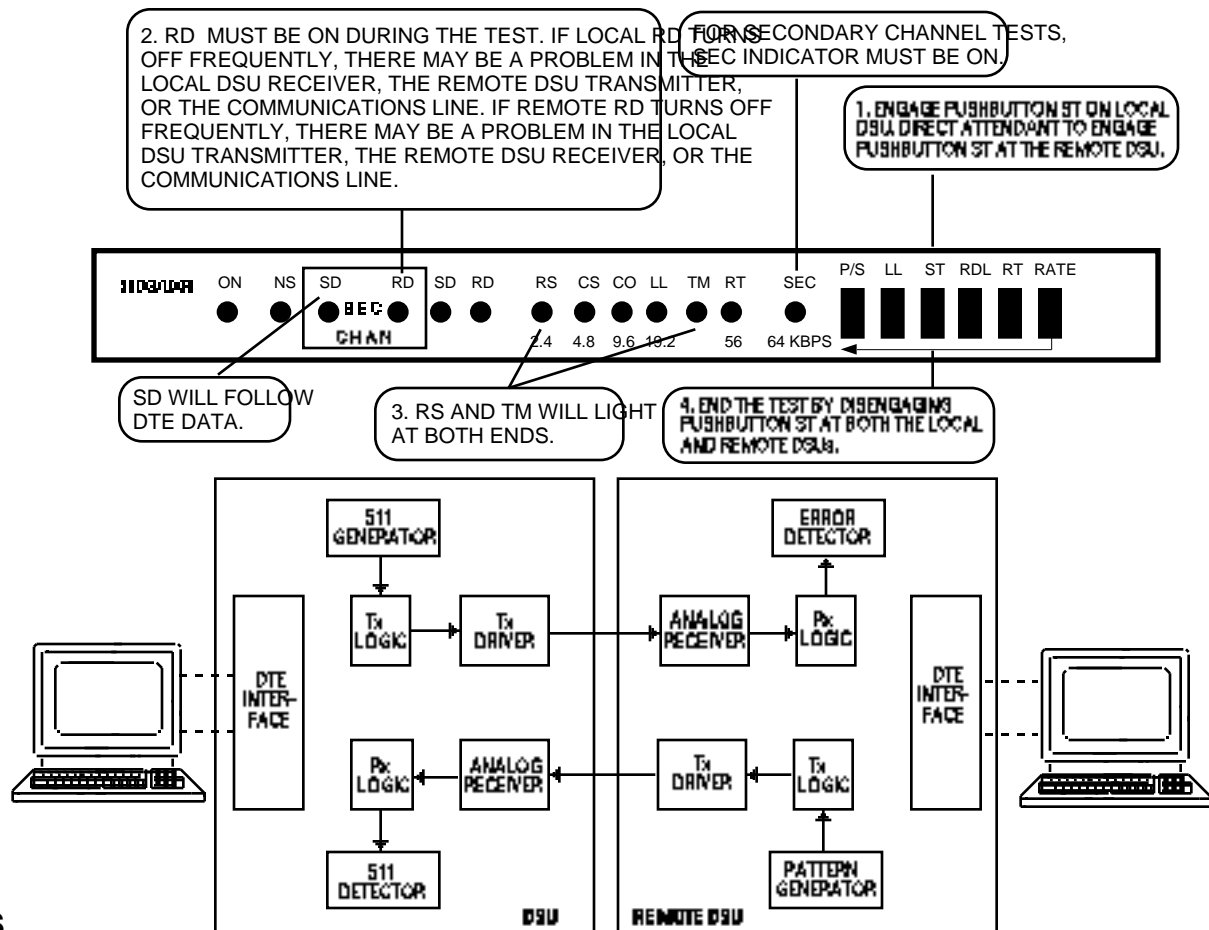


FIGURE 4-15. SECONDARY END-TO-END SELF-TEST

**LINE LOOPBACK TEST
(STC CONTROLLED)**

The Line Loopback (LL) test is a remotely controlled diagnostic, initiated by a serving test center (STC), that reverses the polarity of the sealing current. When the DataComm 500G/UXR DSU detects the reversed current, the DSU transmitter output and receiver input are disconnected from the communications line and connected together (similar to analog loopback); and the disconnected transmitter and receiver communications lines are connected together to create a circuit (the Line Loopback circuit) that loops received signals back over the communications line to the originating station. (Figure 4-16 illustrates LL.)

When it is necessary to isolate a problem, contact the STC and ask them to initiate the Line Loopback test. The test results should be used in conjunction with the fault-isolation sequence (Figure 4-1) to pinpoint a problem, if any.

While LL is being performed by the STC, or if the DTE signals the DSU to initiate the line loopback (LL) test mode, a test message may be sent from the local DTE through the local DSU, which will loop the message back to the DTE for verification. This test will check the performance of the local DSU, DTE, and DSU-DTE interconnections.

NOTE

All STC controlled tests loop both the primary and secondary channels.

When option switch S10-7 (RTLL) is enabled, the DSU will respond to a current reversal with an RT test instead of an LL test.

TESTS

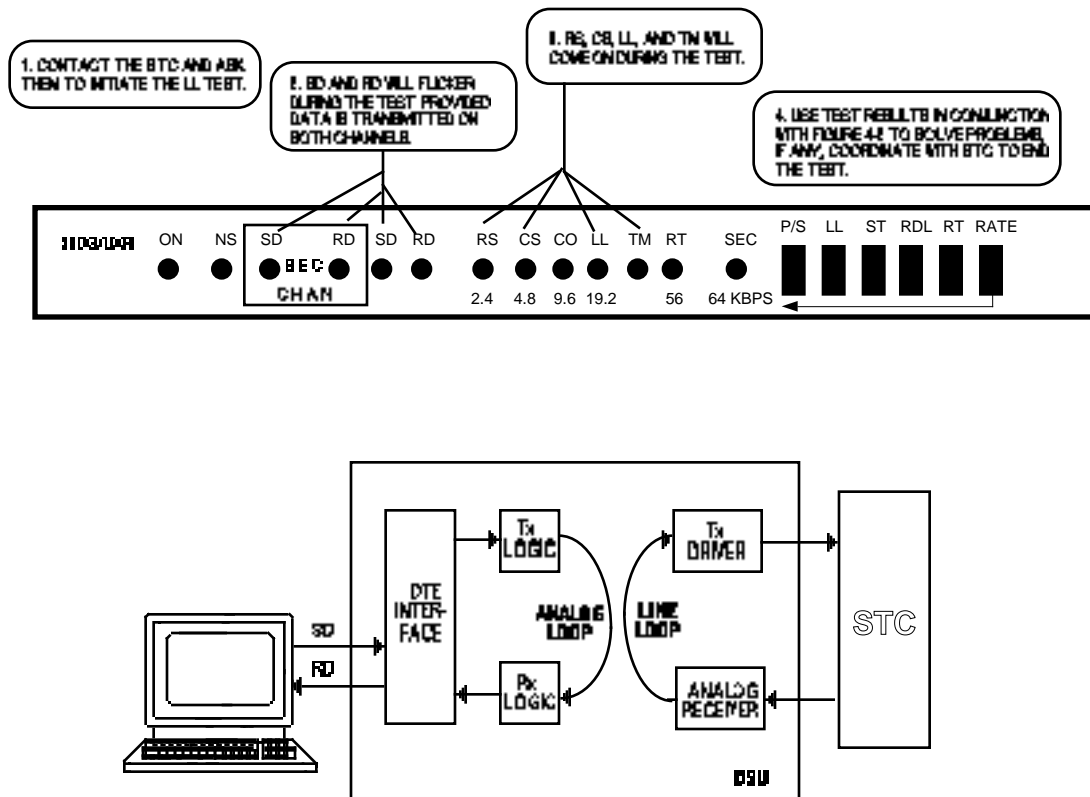


FIGURE 4-16. LINE LOOPBACK TEST, STC CONTROLLED

REMOTE TERMINAL TEST (STC CONTROLLED)

The Remote Terminal (RT) test is a remotely controlled diagnostic that is initiated by network codes from the STC. When the test is initiated, the DSU transmitter input and receiver output are disconnected from the DTE interface and connected together, creating a circuit that loops the receiver's digital output signals to the transmitter's input. Figure 4-17 illustrates RT.

When it is necessary to isolate a problem, contact the STC and ask them to initiate the DSU loopback test. The test results should be used in conjunction with the fault-isolation sequence (Figure 4-1) to pinpoint a problem.

NOTE

The primary and secondary channels are looped back when a latching loopback is initiated.

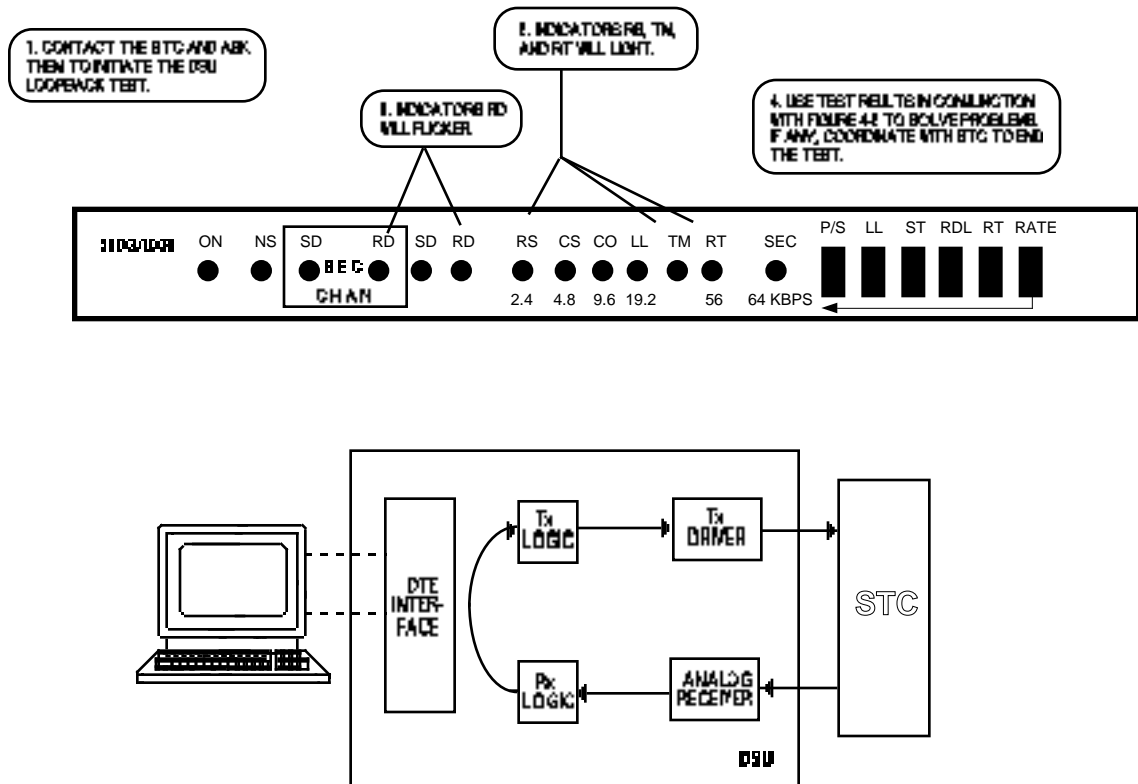


FIGURE 4-17. REMOTE TERMINAL TEST, STC CONTROLLED

TESTS

TECHNICAL ASSISTANCE PROCEDURE

For technical assistance, customers should call DataComm Service Corporation at 203-598-7526.

In Canada:

General DataComm (Canada) Ltd.
Service and Repair Facility
1790 Beaulac Street
St. Laurent, Montreal, Quebec H4R 1W8
Telephone: 1-514-336-5454
TWX: 610-421-3221
Telex: 05824085

In the United Kingdom, contact the GDC area manager at:

General DataComm (U.K.) Ltd.
Molly Millars Close
Molly Millars Lane
Wokingham, Berkshire
England RG11 2QF
Telephone: 011-44-734-774-868
Telex: 851 847298
Fax: 011-44-734-774-871

In Europe/Africa/Middle East:

General DataComm
3 Batiment Saturne
Parc Club Ariane
Rue Helene Boucher
78284 Guyancourt Cedex, France
Tel: 011-33-1-30570200
Fax: 011-33-1-30443794

In the Pacific:

General DataComm Pty.
Suite 404
275 Alfred Street North
North Sydney, NSW 2060, Australia
Tel: 011-61-2-956-5099
Fax: 011-61-2-956-5083

In Asia:

General DataComm
401 Centry Square
1-13 D'Aguilar Street
Central, Hong Kong
Tel: 011-852-5265511
Telex: 780-80579
Fax: 011-852-5259944

In Latin America:

General DataComm, International
1579 Straits Turnpike
P.O. Box 1299
Middlebury, Connecticut 06762-1299
Telephone: 203-574-1118
Telex: 7400905
Fax: 203-758-9518

To return a unit for repair, *if so authorized by GDC*, use the return tag and address the package:

Product Repair Department
General DataComm, Inc.
1579 Straits Turnpike
P.O. Box 1299
Middlebury, Connecticut 06762-1299

Lease and Maintenance contract customers may call DataComm Service Corporation toll-free at 1-800-243-1030, 24 hours a day, 7 days a week for trouble reporting or installation scheduling. (Installations are normally scheduled between 8 a.m. and 5 p.m.)

TRAINING

Hands-on training courses are available from DataComm Service Corporation's Educational Services in the USA and in the UK. Courses offered range from basic data communications, modems and multi-plexers, to complex network systems, and are given at GDC's Connecticut facility or at a customer's location.

For information call:

USA (203) 574-1118, Ext. 6190.
UK 011-44-734-774-868

APPENDIX A

TECHNICAL CHARACTERISTICS

| Item | Specifications |
|--------------------------|--|
| Physical | |
| PC card | |
| Height | 0.87 in. (22 mm) |
| Width | 10.5 in. (267 mm) |
| Depth | 10.75 in. (273 mm) |
| Weight | 1 lb 3 oz (0.54 kg) |
| Shipping weight | 2 lb 3 oz (1.0 kg) |
| Standalone installation | |
| Height | 3.9 in. (99 mm) |
| Width | 10.9 in. (277 mm) |
| Depth | 12.5 in. (318 mm) |
| Weight | 6 lb 5 oz (2.8 kg) |
| Shipping weight | 7 lb 5 oz (3.3 kg) |
| Environmental | |
| Temperature, (rackmount) | |
| Operating | 32° to 122°F (0° to 50°C) |
| Nonoperating | -40° to 185°F (-40° to 85°C) |
| Temperature, standalone | |
| Operating | 32° to 122°F (0° to 50°C) |
| Nonoperating | -40° to 158°F (-40° to 70°C) |
| Humidity, operating | 5% to 95% without condensation |
| Altitude | |
| Operating | 0 ft to 10,000 ft (0 m to 3,047 m). Derate by 1°C/1000 ft above sea level. |
| Non-operating | 0 ft to 40,000 ft (0 m to 12,191 m) |
| Electrical | |
| Power requirements | |
| Voltage | 117 V ac (+10%, -15%) |
| Frequency | 60 Hz |
| Power dissipation | |
| Standalone | 15 W maximum |
| Rackmount | 10 W maximum |
| Fusing | |
| PC card | Two 1.5 A, 250 V, 3AG (GDC Part No. 215-150) |
| Enclosures | See respective enclosures for fusing requirements |

TECHNICAL CHARACTERISTICS

TECHNICAL CHARACTERISTICS (Cont.)

| Item | Specifications |
|------------------------------------|--|
| Electrical (Cont.) | |
| Operation | |
| DDS | Full- or half-duplex point-to-point, or half-duplex multipoint |
| Customer-owned | Full- or half-duplex, point-to-point |
| Signal Format | Serial, synchronous, or asynchronous, binary |
| Character format (Primary) | 8-11 bits/character |
| Character format (Secondary) | 9-11 bits/character |
| Overspeed (Primary or Secondary) | 1 or 2.3% |
| Signal encoding | Bipolar, return-to-zero |
| Data rate (Primary) | 2400,4800, 9600,19200, 56000, 64000 bps (synchronous) |
| Data Rate (Secondary) | 1200,1800, 2400, 4800, 9600 or 19,200 bps (asynchronous) Async only — 75, 110, 150, 300, 600, 1200, or 2400 bps |
| Communications line | DDS or 4-wire, non-loaded metallic lines (19-26 ga) |
| Terminating impedance | 135 ohms +20% |
| DTE interface (Primary) | EIA-232-D, CCITT V.35, optional EIA-530 |
| DTE Interface (Secondary) | EIA-232-D |
| Transmit Power | |
| 2400, 4800,19200, 56000, 64000 bps | 6.0 dBm, maximum (50% duty cycle, random bipolar sequence, 135-ohm impedance) |
| 9600 bps | 0 dBm maximum (50% duty cycle, random bipolar sequence, 135-ohm impedance) |
| Primary | |
| RTS-CTS delay (synchronous) | |
| 2400 bps | 8 ms nominal |
| 4800 bps | 4 ms nominal |
| 9600 bps | 2 ms nominal |
| 19200 bps | 1.0 ms nominal |
| 56000 bps | 0.35 ms nominal |
| 64000 bps | Constant Carrier |
| Secondary | |
| RTS-CTS delay | 10 ±2 ms for all rates |
| Timing | Receiver (slave network), internal (DSU) +0.01%, or external (DTE) (will accept external clock up to +0.02%) |
| Receiver | |
| Dynamic range | 48 dB extended range at 56 kbps |
| Acquisition time | 200 ms |
| Release time | 1 sec |

APPENDIX B

PRIMARY BUSINESS EQUIPMENT (DTE) INTERFACE SIGNALS (EIA-232-D)

| Pin No. | EIA | CCITT | DSU | Name | Description |
|---------|-----|-------|------------|----------------------------------|---|
| 1 | AA | 101 | GND | Protective ground | Connected to equipment frame. Optionally, it may be connected to signal ground, pin 7. |
| 2 | BA | 103 | SD | Transmitted data | Transfers data signals from DTE for modulation and transmission over communications line. |
| 3 | BB | 104 | RD | Received data | Transfers data signals to DTE that were received over communications line and demodulated by DSU. |
| 4 | CA | 105 | RS | Request to send | Indicates to DSU that DTE is prepared to transmit. |
| 5 | CB | 106 | CS | Clear to send | Indicates to DTE that DSU is prepared to transmit. |
| 6 | CC | 107 | DSR | Data set ready | Indicates to DTE that DSU is prepared for data communications. |
| 7 | AB | 102 | SIG GND | Signal ground | Establishes common ground reference for all interface circuits except protective ground, pin 1. |
| 8 | CF | 109 | CO | Received line signal detector | Indicates to DTE that DSU is receiving data (not receiving idle or OOS codes). |
| 9 | | | +12 V | +12 volts | +12 V supply |
| 10 | | | -12 V | -12 volts | -12 V supply |
| 12 | CC | | RTE | Remote Terminal enable | Transfers signal from DTE to control Remote Terminal (RT) test mode if option switch S14-1 is on. |

**PRIMARY BUSINESS EQUIPMENT (DTE)
INTERFACE SIGNALS (EIA-232-D)**

**PRIMARY BUSINESS EQUIPMENT (DTE) INTERFACE
SIGNALS (EIA-232-D) (Cont.)**

| Pin No. | EIA | CCITT | DSU | Name | Description |
|--|-----|-------|-----|--|--|
| 15 | DB | 114 | SC | Transmitter signal element timing | Transfers transmitter signal timing information from DSU to DTE. |
| 16 | | 125 | STE | Self-Test enable | Transfers signal from DTE to control Self-Test mode if option switch S14-2 is on. |
| 17 | DD | 115 | RC | Receiver signal element timing | Transfers receiver signal timing information from DSU to DTE. |
| 18 | LL | 141 | LLE | Line Loopback enable | Transfers signal from DTE to control line loopback test if option switch S14-3 is on. |
| 20 | CD | 108/2 | TR | Data terminal ready | Indicates to DSU that DTE is prepared for data communications. |
| 21 | RL | 140 | RLE | Remote Digital Loopback enable | Transfers signal from DTE to control Remote Digital Loopback test mode if option switch S14-4 is on. |
| 24 | DA | 113 | TC | Transmitter signal element timing (External Clock) | Transfers transmitter signal timing information from DTE to DSU. |
| 25 | TM | 142 | TM | Test mode | Indicates to DTE that DSU is in a test mode if option switch S14-5 is on. |
| * Pins 11, 13, 14, 19, 22 and 23 are not used. | | | | | |

APPENDIX C

PRIMARY BUSINESS EQUIPMENT (DTE) INTERFACE SIGNALS (CCITT V.35)

| V.35 Pin | CCITT | EIA | DSU | Signal | Description |
|-----------|------------|----------------|--------------|-------------------------------------|--|
| A | 101 | AA | | Protective ground | This circuit is connected to the equipment frame. Normally, it is separated from signal ground (pin B) by 100 ohms, but it may be connected to signal ground by means of an option strap (X1). |
| B | 102 | AB | | Signal ground | Establishes a common ground reference for all interface circuits except protective ground, pin A. |
| C | 105 | CA | RS | Request-to-send | Indicates to DSU that DTE is prepared to transmit. |
| D | 106 | CB | CS | Clear-to-send | Indicates to DTE that DSU is prepared to transmit. |
| E | 107 | CC | DM | Data-set-ready | Indicates to DTE that DSU is operational. |
| F | 109 | CF | CO | Received line signal detector | Indicates to DTE that DSU is receiving data (not idle or OOS codes). |
| K | 142 | TM | TM | Test mode | Indicates to DTE that DSU in a test mode if option switch S14-5 is ON. |
| L | 141 | LL | LLE | Line loopback enable | Transfers signal from DTE to control Line Loopback test mode if option switch S14-3 is ON. |
| P S | 103 103 | BA(A) BA(B) | SD-A SD-B | Transmitted data | Transfers data signals from DTE for modulation and transmission over communications line. |
| R T | 104 104 | BB(A) BB(B) | RD-A RD-A | Received data | Transfers data signals received over communication line and demodulated by DSU to DTE. |
| U W | 113 113 | DA(A) DA(B) | TT-A TT-B | Transmitter timing (DTE source) | Transfers transmitter signal timing information from DTE to DSU. |
| V X | 115 115 | DD(A) DD(B) | RT-A RT-B | Receiver timing | Transfers receiver signal timing information from DSU to DSU. |
| Y AA/a | 114 114 | DB(A) DB(B) | ST-A ST-B | Transmitter timing | Transfers transmitter signal timing information from DSU to DTE. |
| BB/b | 140 | RL | | Remote Digital Loopback test enable | Transfers signal from DTE to control Remote Digital Loopback test mode if option switch S14-4 is ON and the DSU is an RDL-version. |
| H | 108/2 | CD | TR | Data Terminal Ready | Indicates to DSU that DTE is prepared for data communication. |
| Z | | | | X Out | |
| CC | | | RTE | Remote Terminal Test Enable | Transfers signal from DTE to control Remote Terminal Test Mode if option switch S14-1 is on. |
| J | | | STE | Self-Test Enable | Transfers signal from DTE to control Self-Test Mode if option switch S14-2 is on. |

APPENDIX D

SECONDARY BUSINESS EQUIPMENT (DTE) INTERFACE SIGNALS (EIA-232-D)

| Pin No. | EIA | CCITT | DSU | Name | Description |
|--|-----|-------|---------|-------------------------------|--|
| 1 | AA | 101 | GND | Protective ground | Optionally, it may be connected to signal ground, pin 7. |
| 2 | BA | 103 | SD | Transmitted data | Transfers data signals from DTE for modulation and transmission over communications line. |
| 3 | BB | 104 | RD | Received data | Transfers data signals to DTE that were received over communications line and demodulated by DSU. |
| 4 | CA | 105 | RS | Request to send | Indicates to DSU that DTE is prepared to transmit. |
| 5 | CB | 106 | CS | Clear to send | Indicates to DTE that DSU is prepared to transmit. |
| 6 | CC | 107 | DSR | Data set ready | Indicates to DTE that DSU is prepared for data communications. |
| 7 | AB | 102 | SIG GND | Signal ground | Establishes common ground reference for all interface circuits except protective ground, pin 1. |
| 8 | CF | 109 | CO | Received line signal detector | Indicates to DTE that DSU is receiving data (not receiving idle or OOS codes). |
| 9 | | | +12 V | +12 volts | +12 V supply |
| 10 | | | -12 V | -12 volts | -12 V supply |
| 12 | CC | | RTE | Remote Terminal Enable | Transfers signal from DTE to control Remote Terminal (RT) test mode if option switch S15-1 is on. |
| 16 | | 125 | STE | Self Test Enable | Transfers signal from DTE to control Self-Test mode if option switch S15-2 is on. |
| 18 | LL | 141 | LL | Line Loopback enable | Transfers signal from DTE to control local loopback test in secondary channel if option switch S15-3 is on. |
| 20 | CD | 108/2 | TR | Data terminal ready | Indicates to DSU that DTE is prepared for data communications. |
| 21 | RL | 140 | RL | Remote Digital Loopback | Transfers signal from DTE to control Remote Digital Loopback test mode of secondary data channel if S15-4 is on. |
| 25 | TM | 142 | TM | Test mode | Indicates to DTE that DSU is in a test mode if option switch S15-5 is on. |
| * Pins 11, 13, 14, 15, 17, 19, 22, 23, 24, are not used. | | | | | |

APPENDIX E

BUSINESS EQUIPMENT (DTE) INTERFACE SIGNALS (EIA-530)

| P1 PIN | EIA Circuit Designation | Signal | Description |
|-----------|----------------------------|---------------------------------|--|
| 1 | — | Shield | Allows shield connections via pin number 1. |
| 2 14 | BA(A) BA(B) | Transmitter Data | Transfers data signals from DTE for modulation and transmission over communication line. |
| 3 16 | BB(A) BB(B) | Received Data | Transfers data signals received over communications line and demodulated by DSU to DTE. |
| 4 19 | CA(A) CA(B) | Request-To-Send | Indicates to DSU that DTE is prepared to transmit. |
| 5 13 | CB(A) CB(B) | Clear-To-Send | Indicates to DTE that DSU is prepared to transmit. |
| 6 22 | CC(A) CC(B) | Data-Set-Ready | Indicates to DTE that DSU is operational. |
| 20 23 | CD(A) CD(B) | DTE Ready | Indicates to DSU that DTE is prepared for data communications. |
| 7 | AB | Signal Ground | Establishes common ground reference for all interface circuits except protective ground. |
| 8 10 | CF(A) CF(B) | Received Line Signal Detector | Indicates to DTE that DSU is receiving data (not idle or OOS codes). |
| 15 12 | DB(A) DB(B) | Transmitter Timing | Transfers transmitter signal timing information from DSU to DTE. |
| 17 9 | DD(A) DD(B) | Receiver Timing | Transfers receiver signal timing information from DSU to DTE. |
| 18 | LL | Local Loopback | Controls the line loopback test condition in the local DCE if S14-3 is on. |
| 21 | RL | Remote Loopback | Controls the remote digital loopback test condition in the remote DCE if S14-4 is on. |
| 24 11 | DA(A) DA(B) | Transmitter Timing (DTE Source) | Transfers transmitter signal timing information from DTE to DSU. |
| 25 | TM | Test Mode | Indicates whether the local DCE is in a test condition. |

APPENDIX F

GLOSSARY

| | |
|----------------------------------|---|
| Address | A sequence of bits, a character, or a group of characters that identifies a network station, user, or application; used mainly for routing purposes. |
| AL | Analog Loopback. |
| Analog | Transmission employing variable and continuous waveforms to represent information values. |
| Analog Loopback | Technique for testing transmission equipment and devices that isolates faults to the analog signal receiving or transmitting circuitry; a device, such as a modem, echoes back a received (test) signal that is then compared with the original signal. |
| ANALOOP[®] | General DataComm's version of Analog Loopback Test. |
| Asynchronous | Transmission that is not related to a specific frequency or to the timing of the transmission facility; transmission characterized by individual characters or bytes with start and stop bits from which a receiver derives the necessary timing for sampling bits; start-stop transmission. |
| Asynchronous Transmission | Serial transmission of data in which each character is individually synchronized by the use of start and stop bits. A start bit precedes and one or more stop bits follow continuous information bits. Also called start-stop transmission. There is no definite time relationship between transmission of successive characters. |
| Baud | The maximum number of signaling elements, or symbols, per second that are generated; may be different from bps rate as several bits may be encoded per symbol, or baud, with advanced encoding techniques such as phase-shift keying. |
| BERT | Bit Error Rate Test, or tester. |
| Bipolar | The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities. Zero and one values are represented by the signal amplitude at either polarity, while no-value "spaces" are at zero amplitude; also, polar transmission. |
| Bisynchronous | A Binary Synchronous Communications protocol (BISYNC) that uses special characters to define the various fields of a message and for control functions. Typically used for transmission between a CPU and a CRT or batch-type processor. BISYNC accommodates a variety of transmission codes including ASCII, EBCDIC, and SBT (Six-Bit Transcode). |
| Bit | A binary digit, the representation of a signal, wave, or state, as either a binary zero or a one. |
| Bit Error Rate (BER) | The percentage of received bits that are in error, relative to a specific amount of bits received; usually expressed as a number referenced to a power of 10; e.g., 1 in 10 ⁵ . |
| 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 |

GLOSSARY

bits per second; Gbps (gigabits), for billions of bits per second; Tbps (terabits), for trillions of bits per second.

Buffer A storage device used to compensate for differences in the rate of data flow when transmitting data from one device to another.

Byte Generally an 8-bit quantity of information, used mainly in referring to parallel data transfer, memory capacity, and data storage; also generally referred to in data communications as an octet or character.

Carrier Detect An EIA-232-D Interface modem signal that indicates to the attached terminal that a modem is receiving a signal from the remote modem.

CCITT International Telegraph and Telephone Consultative Committee (from the French, Comité Consultatif International Télégraphique et Téléphonique.)

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

Channel Service Unit (CSU) A component of customer premises equipment (CPE) used to terminate a digital circuit, such as DDS or T1, at the customer site; performs certain line-conditioning features, ensures network compliance per FCC rules, and responds to loopback commands from central office; also, ensures proper ones density in transmitted bit stream and performs bipolar violation correction.

Character Standard bit presentation of a symbol, letter, number, or punctuation mark.

Character Code One of several standard sets of binary representations for the alphabet, numerals, and common symbols, such as ASCII, EBCDIC, BCD.

Character Oriented Describing a communications protocol or transmission procedure that carries control information encoded in fields of one or more bytes.

Clear To Send (CTS) A signal indicating to the terminal that a modem is ready to transmit.

Clear To Send Delay The time required by a modem to inform a terminal device that it is ready to send or reply to information just received.

Clock An oscillator-generated signal that provides a timing reference for a transmission link; used to control the timing of functions as sample interval, signaling rate, and duration of signal elements; an "enclosed" digital network typically has only one "master" clock.

Common Carrier In the United States, any supplier of transmission facilities or services to the general public that is authorized to provide such facilities or services by the appropriate regulatory authority and bound to adhere to the applicable operating rules, such as making services available at a common price and on a nondiscriminatory basis.

Constant Carrier Operation in which the Clear to Send signal from the modem to the terminal is held permanently on and the modem's transmit carrier is always on. Carrier stays on independent of Request to Send from the data terminal; also continuous carrier.

Control Characters Any transmitted characters, not message or user data, used to control or facilitate data transmission between data terminal equipment (DTE); includes extra characters associated with addressing, polling, message delimiting and blocking, framing, synchronization, and error checking.

Controlled Carrier When Controlled Carrier is selected, the modem's transmit carrier is turned on and off by Request To Send (CA) from the terminal. The physical carrier signal is

impressed on the line and the terminal is allowed to pass data after the Clear To Send delay.

Convergence Display

Oscilloscope display pattern from optional Constellation Pattern Generator which indicates the rate at which the adaptive equalizer in the modem's receiver converges on received signals. This indication permits the identification of individual malfunctioning remote stations or associated branch lines in multipoint networks.

CS Clear To Send.

CSU Channel Service Unit.

CTS Clear To Send.

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

Data Carrier Detect (DCD)

A signal sent from a data set which informs the terminal that a carrier waveform is being received; also called Carrier Detected, Carrier Found, Carrier On, etc.

DataCommonality

General DataComm's term to describe a unique packaging technique that provides (1) high density modular packaging, (2) a broad array of versatile data sets and accessories, (3) system flexibility and ease of expansion, (4) low power consumption, (5) heat dissipation, (6) quick and simple installation, (7) at-a-glance monitoring of system operation, (8) convenient, low-cost maintenance, and (9) high reliability.

Data Communications

Transmitting and receiving coded digital signals between computers or other digital devices or systems according to agreed upon specifications or standards.

Data Communications Equipment (DCE)

Equipment that provides the signal conversion, connection control, and coding required for communication between data terminal equipment and data circuits; may be independent (e.g., a modem) or an integral part of a computer.

DATALOOP® General DataComm's version of Digital Loopback test.

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.

Data Set A modem; term infrequently used except within the telephone carrier industry.

Data Terminal Equipment (DTE)

Generally end-user devices, such as terminals and computers that connect to DCE, which either generate or receive the data carried by the network; in EIA-232-D connections, designation as either DTE or DCE determines signaling role in handshaking; in a CCITT X.25 interface, the device or equipment that manages the interface at the user premises.

Data Terminal Ready (DTR)

A signal from the terminal to the modem indicating that the terminal is ready to receive and transmit.

dB Decibel; a unit of measurement used to express the ratio of two values, usually the power of electrical or electromagnetic signals; equal to 10 times the logarithm de-

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rived from a ratio of the two power levels, which are expressed in watts; the relative gain or loss of a signal when the measured signal value is compared in a ratio to another, usually its input, value.

dBm Decibel reference to one milliwatt; relative strength of a signal, calculated in decibels, when the signal is compared in a ratio to a value of one milliwatt; used mainly in telephony to refer to relative strength of a signal (e.g., at 0 dBm, a signal delivers 1 milliwatt to a line load, while at -30 dBm a signal delivers 0.001 milliwatts to a load).

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 kbps; 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.

Digital Loopback (DL) Technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit; device being tested will echo back a received test message, after first decoding and then reencoding it, the results of which are compared with the original message.

DSU Data Service Unit.

DTE Data Terminal Equipment.

Duplex Transmission Simultaneous two-way independent transmission in both directions. Also called full duplex transmission.

EIA Electronic Industries Association.

Equalization The process of reducing the effect(s) of amplitude frequency and/or phase distortion of a circuit by the introduction of networks to compensate for the difference in attenuation and/or time delay at the various frequencies in the transmission bands.

External Modem A standalone modem, as opposed to a modem integrated within a computer or terminal.

Four-Wire Circuit Provision of two-wire pairs (or logical equivalent) for simultaneous two-way transmission.

Ground An electrical connection or common conductor that, at some point, connects to the earth.

Half Duplex (HDX) Operational mode of a communications line where transmission occurs in either direction, but not both directions simultaneously; transmission directions are alternately switched to accommodate two-way data flow.

Interface A shared boundary; a physical point of demarcation between two devices, where the electrical signals, connectors, timing, and handshaking are defined; the procedure, codes, and protocols that enable two entities to interact for the meaningful exchange of information.

LED Light-emitting diode.

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| Link | The combination of communications devices, media and software intelligence that is required to effect data communications. |
| Local Area Network | A type of high-speed data communications arrangement wherein all segments of the transmission medium (typically, coaxial cable, twisted-pair wire, or optical fiber) are under the control of the network operator. |
| 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. |
| Modem | Modulator/demodulator; electronic device that enables digital data to be sent over (typically) analog transmission facilities. |
| MR | Modem Ready. |
| 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. |
| Node | A point where one or more functional units interconnect transmission lines (ISO); a physical device that allows for the transmission of data within a network; an end-point of a link or a junction common to two or more links in a network (IBM SNA); typically includes host processors, communications controllers, cluster controllers, and terminals. |
| Noise | Any extraneous and unwanted signal disturbances in a communications link (e.g., electromagnetic interference; random variations in signal voltage or current or interfering signals). |
| 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. |
| Private Line | A leased line, an unswitched circuit. |
| RD | Receive Data. |
| RDL | Remote Digital Loopback. |
| Remote Digital Loopback (RDL) | Similar to the Digital Loopback diagnostic test, except no modem operator is required at the looping modem. With RDL, a signal is sent down the communications line which instructs the remote modem to place itself in digital loopback mode. |
| Request To Send | A signal to the sending modem that the terminal is ready to transmit; part of modem handshaking. |
| RTS | Request To Send. |
| RTS-CTS Delay | The delay between the time that the data terminal equipment asserts Request to Send (RTS) and the time that the modem asserts Clear to Send (CTS). Sets the time delay or turnaround time from reception to transmission. |

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| SD | Send Data. |
| Self-Test | A diagnostic test mode in which the modem is disconnected from the telephone facility and its transmitter's output is connected to its receiver's input to permit the looping of test messages (originated by the modem test circuitry) through the modem to check its performance. |
| Send Data (SD) | Send data from DTE to DCE. |
| Switched Network | Communications link for which the physical path, established by dialing, may vary with each use (e.g., a dial-up telephone circuit). |
| 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 Transmission | Allows the operator to select a 511 test pattern generator. 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. |
| Transparent Mode | Transmission of binary data with recognition of most control characters suppressed. In binary synchronous communications, entry to and exit from the transparent mode are indicated by a sequence beginning with a special character. |
| Two-Wire Circuit | Usually a telephone circuit consisting of two insulated electrical conductors, typical of most local loops. |

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PATENT NOTICE

ANALOOP[®] is a patented method and apparatus of General DataComm, Inc. (U.S. Patent 3,655,915).

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