



# **Dual DSU-DP Option Module & Plug-On Board**

**Option Module PN 1200127L1#HS  
Plug-On Board PN 1200128L1**

**USER MANUAL**



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**FEDERAL COMMUNICATIONS COMMISSION  
RADIO FREQUENCY INTERFERENCE STATEMENT:**

*This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

**WARNING:**

*Change or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*



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# Chapter 1

## Introduction

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### PRODUCT OVERVIEW

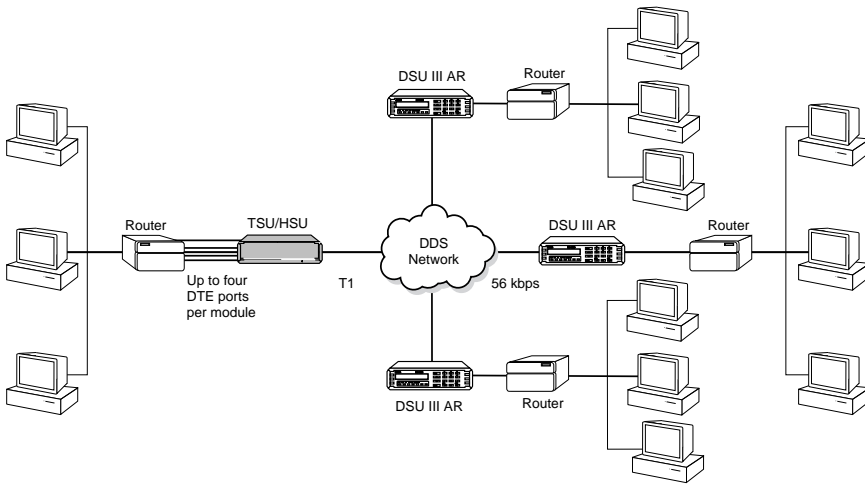
The ADTRAN Dual DSU-DP provides a reliable, high speed data connection for customer data terminal equipment (DTE) through the ADTRAN TSU/HSU DS0 port. It provides compatibility with digital data service (DDS), or Switched 56 network (SW56) services. The Dual DSU-DP supports both synchronous and asynchronous data communication over the DDS or Switched 56 networks.

This unit is an all rate DSU, supporting services from 2.4 to 64 kbps including 19.2 and 38.4 kbps services. The Dual DSU-DP may be used in either point-to-point or multi-point circuits.

The Dual DSU-DP provides both V.35 and EIA-232 electrical and physical DTE interfaces through either an ADTRAN HD-to-RS-232 cable (PN 1200167L2) or ADTRAN HD-to-V.35 cable (PN 1200167L1) to accommodate a variety of applications.

In addition to DDS, the unit also supports Switched 56 (4-wire) service with dialing accomplished from either the front panel or the DTE interface using either the AT command set or the V.25 BIS command set. This model is compatible with AT&T Accunet and U.S. Sprint® SW56 type services.

Figure 1-1 shows a sample point-to-point application for the Dual DSU-DP.



**Figure 1-1**  
*Sample Point-to-Point Application for Dual DSU-DP*

## DDS Overview

Digital Data Service (DDS) is a nationwide service that allows interconnection and transport of data at speeds up to 64 kbps. The local exchange carriers provide the local loop service to DDS customers and may provide data for routing Inter-LATA to an interexchange carrier. In DDS mode, the Dual DSU-DP supports all DDS service rates yielding DTE rates of 2.4, 4.8, 9.6, 19.2, and 38.4 (sync or async); and 56 and 64 kbps (sync only). An additional rate of 57.6 kbps is available in async mode. At the service rates of 56 kbps and 64 kbps, the unit can be configured to run slower DTE rates (async or sync).

## Switched 56 Overview

This switched Digital Data Service allows customers to pay for data connection only for the time the circuit is connected. The regional operating companies or interexchange carriers provide the service to SW56 customers. In SW56 mode the Dual DSU-DP supports DTE rates of 2.4, 4.8, 9.6, 19.2, and 38.4 (asynchronous or synchronous), and 56 kbps (synchronous). An additional DTE rate of 57.6 kbps is available in async



# Chapter 2

## Installation

---

### UNPACK AND INSPECT

Carefully inspect the option module or plug-on board for any shipping damages. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the Dual DSU-DP for repair or for verification of damage during shipment.

### Shipped by ADTRAN

The following items are included in the ADTRAN shipment:

- The Dual DSU-DP Option Module or Dual DSU-DP Plug-On Board
- The user manual (to be inserted into the main TSU/HSU user manual)

### Adapter Cables

Two cables must be purchased separately from ADTRAN:

- PN 1200167L1 HD to V.35 (Winchester)
- PN 1200167L2 HD to RS-232 (DB25)

### Provided by Customer

The customer must provide a cable for connection to the DTE device.

## INSTALLING THE OPTION MODULE

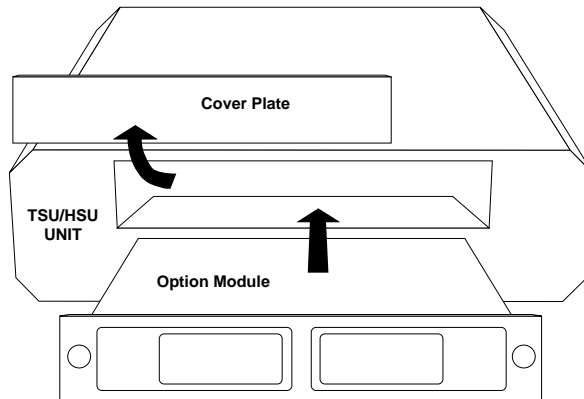


*It is not necessary to turn off the power to the TSU/HSU when installing the option module because it is hot swappable. The plug-on board must be attached to a hot swappable option module if you wish to install it while the TSU/HSU is powered on.*

### Placement of the Option Module

Figure 2-1 is representative of the action required for proper placement of the option module. Perform the following steps to install the option module:

1. Remove the cover plate from the TSU/HSU unit rear panel.
2. Slide the option module into the rear panel of the TSU/HSU unit until it is positioned firmly against the front of the unit.
- 3.. Fasten the thumbscrews at both edges of the option module.



**Figure 2-1**  
*Installing the Option Module*

### Power Connection

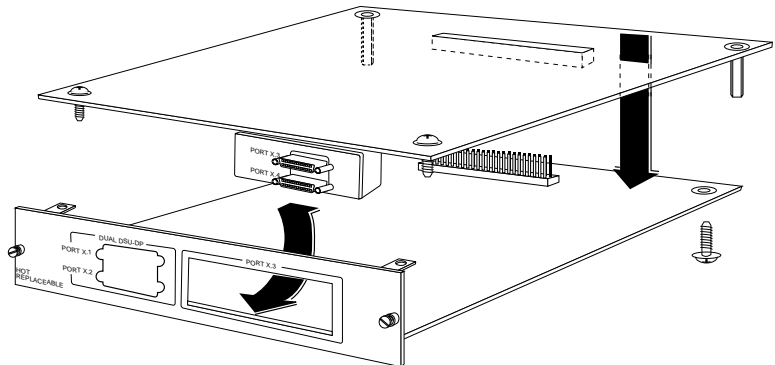
Each option module derives power from the base TSU/HSU unit. Power to the TSU/HSU is supplied by a captive eight-foot power cord.



## Attaching the Plug-On Board

Figure 2-2 is representative of the action required for proper attachment of a plug-on board to the option module. Perform the following steps to install the plug-on board:

1. Hold the plug-on board above the option module.
2. Using a downward and right-to-left motion, slip the plug-on board connector into the opening in the option module back panel.
3. Moving the plug-on board downward, secure the connection of the header pins at the front of the boards.
4. Install two 4-40 screws at both front edges of the option module.
5. Install two 4-40 screws on each of the standoffs on the rear of the plug-on module.



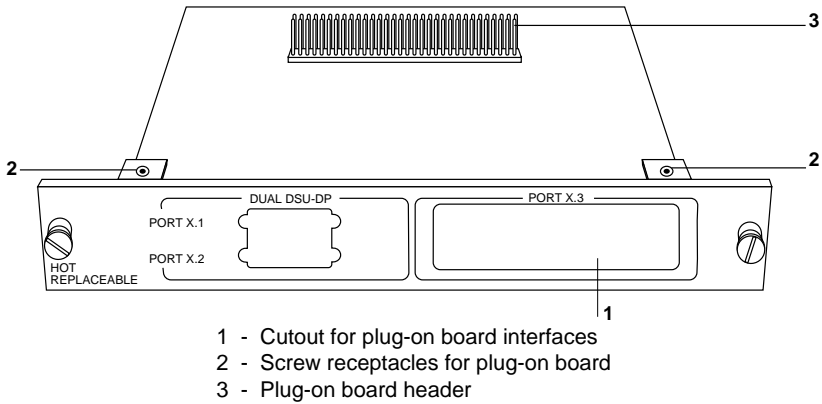
**Figure 2-2**  
*Attaching the Plug-On Board*



*The connection of the header pins between the option module and the plug-on board must be visually verified. Severe damage of the equipment can result from an improper connection.*

## REAR PANEL

The rear panel contains two high-density subminiature DTE connectors which provide V.35 or EIA-232 interfaces via custom cables. Pin assignments for the DTE connections are listed in the section *DTE Data Connection* in this chapter. The DSU-DP rear panel is shown in Figure 2-3.



**Figure 2-3**  
*DSU-DP Option Module Rear View*

## DTE DATA CONNECTION

The DTE should be connected to either the EIA-232 DTE cable or the CCITT V.35 DTE cable. The maximum cable lengths recommended are 50 feet for the EIA-232, and 100 feet for the CCITT V.35 (note: ADTRAN-adapter cables are six feet in length). The pin assignments for the cables are listed in Tables 2-A and 2-B.

The V.35 cable is recommended for use with data rates above 19.2 kbps. The EIA-232 cable works up to 56 kbps with a low capacitance cable or with the external transmit clock option selected. The DTE rate may be configured from the front panel or via the T-Watch<sup>a</sup> Management Program. The DTE can operate in asynchronous or synchronous modes.



**CAUTION**

To prevent possible radio frequency interference emissions, a shielded cable is required.

**Table 2-A**  
Pin Assignments for Primary EIA-232 Cable

HD* Pin #	Pin #	EIA	Description
1	1	AA	Protective Ground (PG)
2	2	BA	Transmit Data (TD)
3	3	BB	Receive Data (RD)
4	4	CA	Request to Send (RS)
5	5	CB	Clear to Send (CS)
6	6	CC	Data Set Ready (SR)
7	7	AB	Signal Ground (SG)
8	8	CF	Received Line Signal Detector (CD)
15	15	DB	Transmit Clock (TC)
16	17	DD	Receive Clock (RC)
18	18	-	Local Loopback (LL)
20	20	CD	Data Terminal Ready (TR)
17	22	CE	Ring Indicator (RI)
14	24	DA	External TX Clock (ETC)
19	25	-	Test Indicator (TI)
* HD = High Density			

**Table 2-B**  
Pin Assignments for Primary V.35 Cable

HD Pin#	Pin	CCITT	Description
1	A	101	Protective Ground (PG)
7	B	102	Signal Ground (SG)
4	C	105	Request to Send (RS)
5	D	106	Clear to Send (CS)
6	E	107	Data Set Ready (SR)
8	F	109	Received Line Signal Detector (CD)
20	H	-	Data Terminal Ready (TR)
17	J	-	Ring Indicator (RI)
18	L	-	Local Loopback (LL)
11	R	104	Received Data (RD-A)
12	T	104	Received Data (RD-B)
24	V	115	Receiver Signal Element Timing (SCRA)
25	X	115	Receiver Signal Element Timing (SCR-B)
9	P	103	Transmitted Data (SD-A)
10	S	103	Transmitted Data (SD-B)
22	Y	114	Transmitter Signal Element Timing (SCT-A)
23	AA	114	Transmitter Signal Element Timing (SCT-B)
13	U	113	External TX Signal Element (SCX-A)
26	W	113	External TX Signal Element (SCX-B)
19	K, NN	-	Test Indicator (TI)

## CONFIGURATION

The Dual DSU-DP option module contains two different user profiles (sets of configuration options) that are stored in read only memory. These profiles are listed in the appendix Default Configuration Profiles. The unit is shipped from the factory with profile 1 (default configuration) loaded into the nonvolatile configuration memory. If profile 1 matches the desired system requirements, no additional configuration is required to put the unit into service. If profile 1 does not match the desired system requirements, modify the default configuration or select another profile more closely matching the desired configuration and modify

When a new profile is loaded or the existing profile is modified, it is stored in the nonvolatile configuration memory. The Dual DSU-DP is then configured with that profile every time power is turned on or reset.

See the section Manual Command in the Configuration chapter for information on loading default configuration profiles.

## Configuration Methods

The Dual DSU-DP provides methods for both local and remote configuration. These methods are shown in Table 2-C and are discussed in the following sections.

**Table 2-C**  
Configuration Methods

METHOD	STAND ALONE	
	Local	Remote
AT Commands	Yes	Yes
V.25 Commands	Yes	Yes
Front Panel	Yes	Yes
DATAMATE	No	Yes
VT 100	No	Yes

## AT Commands

The Dual DSU-DP can be configured and controlled with in-band AT commands from an asynchronous DTE port just as modems are.

To exit the data mode and enter the command mode, the asynchronous DTE device must transmit a proper escape sequence or three pluses (+++) to the Dual DSU-DP. A specified time delay must occur between the last data character and the first escape sequence character. This is the guard time delay, and it can be changed by writing a value to the S12 register. The default value for the guard time is one second. For a valid escape sequence to occur, the DTE must transmit the escape code character three times in succession with delay between each character being less than the guard time.

Once the command mode is entered, AT commands can be transmitted to the Dual DSU-DP to configure most of the options or initiate tests to check both the Dual DSU-DP and the network connections. All command lines must begin with the AT character set in either capital or lower case letters.

The command line may contain a single command or a series of commands after the AT attention code. When a series of commands is used, the individual commands may be separated with spaces for readability. The maximum length for a command line is 40 characters. Each command line is executed by the Dual DSU-DP upon receipt of a terminating character. The default terminating character is a carriage return (ASCII 013), but it can be changed by writing a different value to register S3.

Before the terminating character is transmitted, the command line can be edited by using the backspace character (ASCII 008) to erase errors so the proper commands can be entered. Valid AT commands for the Dual DSU-DP are listed in the appendix AT Commands.

## V.25 bis Commands

When configured for the V.25 bis option, the Dual DSU-DP accepts in-band dialing and configuration commands from both synchronous and asynchronous DTE ports.

The V.25 bis option supports the following protocols:

- ¥ SDLC (Synchronous Data Link Control)
- ¥ BI-SYNC
- ¥ ASYNCHRONOUS

### SDLC Option

#### Character Format

- ¥ Data bits - 8
- ¥ Parity bit - Ignored

#### Command Structure

[F] [A] [C] [V.25 bis COMMAND] [FCS] [F]

The address field [A] is FFH. The control field [C] is set to 13H except for cases of multi-frame responses. For this case, the control field is set to 03H in all but the last frame. The 03H in the control field indicates that other frames are to follow while the 13H in the control field indicates the final frame.

## Bi-Sync Option

### Character Format

- ¥ Data bits - 7
- ¥ Parity bit - Odd

### Command Structure

[SYN] [SYN] [STX] [V.25 bis COMMAND] [ETX]

## Asynchronous Option

### Character Format

- ¥ Start bit - 1
- ¥ Data bits - 7
- ¥ Parity bit - Even
- ¥ Stop bit - 1

### Command Structure

[V.25 bis COMMAND] [CR] [LF]

## Command Descriptions

The ADTRAN V.25 bis command set is a subset of the CCITT V.25 bis command set. In addition to the CCITT commands supported, ADTRAN has added configuration commands for both local and remote DSUs. The



ADTRAN V.25 bis command set follows:

CIC	Connect incoming call
CNL	Configuration local
CNR	Configuration remote
CRN	Call request with number
CRS	Call request using stored number
DIC	Disregard incoming call
PRN	Program number
RLN	Request list of numbers

The following list contains possible responses to V.25 bis commands:

VAL	Valid V.25 command processed
CFIET	Call failed on switched network - busy detected
CFIDE	Call failed on switched network - no wink detected
CFINS	Call failed - no dial string in specified register
INVCU	Unknown command detected
INVPS	Invalid parameter syntax
INVPV	Invalid parameter value
INVBL	Invalid local password
INVBM	Invalid remote password
INC	Incoming call
CNX	Call connected

If verbose (wordy) responses are disabled (ATV0), the following list of three-character responses are the only ones returned:

VAL	Valid V.25 command processed
INV	Invalid command received
CFI	Call failed
INC	Incoming call
CNX	Call connected

## Syntax and Possible Responses

### **CIC (Connect Incoming Call)**

This command causes the DSU to go on-line. For dial backup units, this command hangs up the dial backup line and initiates an attempt to reestablish the main (DDS) line. There are no parameters associated with this command. Possible indications include VAL, CNX, and CF1xx

### **CNL (Configuration Local)**

This command is used to pass AT commands to the local modem via the V.25 bis command processor. This allows the Dual DSU-DP to be configured with AT commands via a synchronous interface. The command has the following format:

```
CNL [LOCAL PASSWORD;] AT [ONE OR MORE AT  
COMMANDS]
```

A local password may not be required depending on the present configuration of the unit. Responses to CNL commands are returned in the data format currently configured. Possible responses include VAL and INVn.

### **CNR (Configuration Remote)**

This command is used to pass AT commands over the network to the remote DSU via the V.25 bis command processor. This allows a remote Dual DSU-DP to be configured from a synchronous interface. The command's format is as follows:

```
CNR [REMOTE PASSWORD;] AT [ONE OR MORE AT  
COMMANDS]
```

The remote password may or may not be required depending on the present configuration of the remote unit. Responses to the CNR commands are returned in the data format currently configured. Possible responses include VAL and INVn.

## Switched 56 Operation

### CRN (Call Request with Number)

When the Dual DSU-DP is configured for SW56 operation, the CRN command causes the DSU to dial the supplied number. The command format follows:

```
CRN [NUMBER TO BE DIALED]
```

If no number is included in the command, the number stored in dial register number 1 is dialed. If no number is provided and no number is stored in dial register number 1, the Dual DSU-DP responds with the call failure indication CFINS (Call Failure Indication Not Stored).

For a DBU unit, this command initiates dialing on the backup circuit. If the number supplied contains non-dialable digits, they are ignored and only the dialable digits are dialed. Possible responses include VAL, CNX, and CF1xx.

### CRS (Call Request Using Stored Number)

The CRS command causes the Dual DSU-DP to dial the number stored in the specified register. The format of this command is as follows:

```
CRS [OPTIONAL SPACE] [REGISTER NUMBER 1-10]
```

If this command is issued without the register number parameter, the INVPS (Invalid Parameter Syntax) response is issued. If this command is issued and the register parameter is not in the valid range for dialing registers, the INVPV (Invalid Parameter Value) response is returned. Other responses include VAL, CNX, and CF1xx.

### **DIC (Disregard Incoming Call)**

This command causes the V.25 bis processor to return to command mode even if there is an incoming call pending. This allows local commands to be issued and incoming calls to be ignored. There are no parameters associated with this command. The DSU responds with VAL.

### **PRN (Program Number)**

This command stores the supplied number into the specified register. The command has the following format:

```
PRN REGISTER NUMBER; [NUMBER TO BE STORED]
```

If this command is entered with no parameters, the INVPS response is returned. If no register number is included in the command or if it is invalid, the INVPS response is returned. This response is also returned if the number to be stored contains invalid characters. The characters 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, P, T, and & are valid dial characters. If no digits are issued with this command, the specified register is cleared. The DSU responds with VAL.

### **RLN (Request List of Numbers)**

This command causes the Dual DSU-DP to return the number stored in the specified register. The format of this command follows:

```
RLN [REGISTER NUMBER]
```

If the register number is invalid, the INVPS response is returned. When a correct register number is entered, the following response is returned:

```
LSN [REGISTER NUMBER]; [NUMBER STORED] VAL
```

If no register number is present in the command, the Dual DSU-DP responds with a list of all the registers and the stored numbers. This list is followed by the VAL response.

# Chapter 3

## Operation

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### OVERVIEW

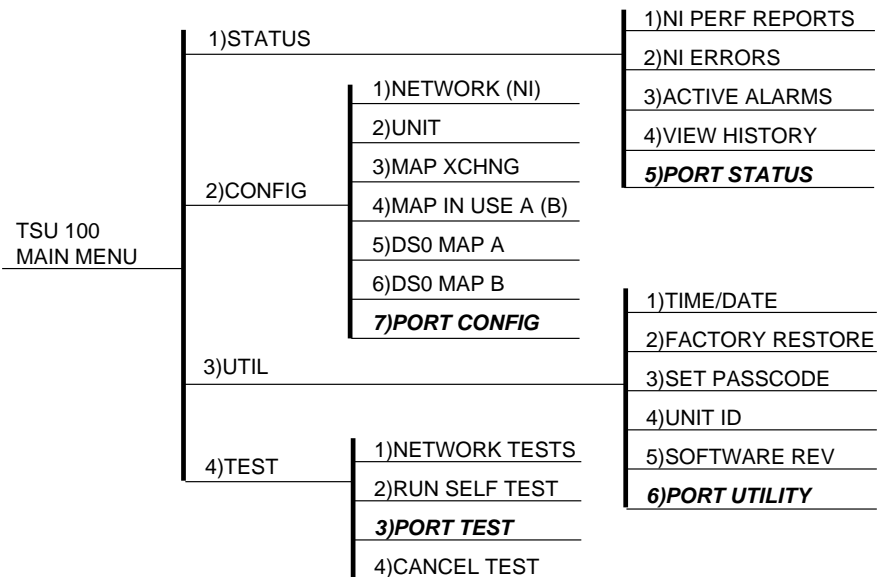
The Dual DSU-DP Option Module and Plug-On Board are both controlled as part of the TSU/HSU using the methods described in their respective manuals.

Refer to the appropriate TSU/HSU User Manual for descriptions of front panel indicators and buttons.

### Menu Structure

The TSU 100 menu tree is used for illustrative purposes.

When an option module or plug-on board is installed in the TSU/HSU, the unit adds it to the list of available options under the various Port menu items. These menu items are printed in *bold italic* letters in the limited overview of the TSU 100 menu shown in Figure 3-1 (complete menu diagram is found in each TSU/HSU User Manual). The TSU 100 is used as an example of the TSU/HSU units.



**Figure 3-1**  
TSU 100 Main Menu

The Dual DSU-DP menus are all submenus found under TSU/HSU menu items:

- 1)STATUS -> 5)PORT STATUS
- 2)CONFIG -> 7)PORT CONFIG
- 3)UTIL -> 6)PORT UTIL
- 4)TEST -> 3)PORT TEST



*When accessing PORT, CONFIG, or TEST submenus, the DSU-DP port must be selected, then remote or local must be selected.*

## Menu Operation

The Dual DSU-DP menus are accessed from and operate the same as menus for the TSU 100. Each of the Dual DSU-DP submenu items are discussed in this manual.

### Operation

With the cursor on one of the four Main menu choices:

- |          |                                                                          |
|----------|--------------------------------------------------------------------------|
| Press:   | <b>ENTER</b> or the <b>number</b> key                                    |
| Results: | Display of the first two submenu items with the cursor on the first item |
| Use:     | The <b>down scroll</b> key to place the cursor on the desired item       |
| Press:   | <b>ENTER</b>                                                             |
| Results: | Display of the first two submenu choices                                 |





# Chapter 4

## Configuration

---

### CONFIGURATION OVERVIEW

#### Local and Remote Configuration

The DSU-DP option module and/or plug-on board (DSU-DP) can be configured *locally* using the front panel or *remotely* by establishing communications with another ADTRAN DSU product. The front panel of the local TSU/HSU can also be used to configure the remote DSU. During remote configuration, the DSU-DP prompts for the remote address before continuing to the Configuration (CONFIG) menus.

#### Configuration Menu

The Configuration menu consists of five sub-menus relating to a specific interface or function of the DSU-DP that requires setup. These functions and their corresponding functions are:

- 1) **Network Options:** Network Interface Parameters
- 2) **DTE Options:** DTE Interface Parameters
- 3) **Test Options:** Test Parameters
- 4) **Dial Options:** Dialing Parameters
- 5) **Manual Commands:** Specialty commands reserved for experienced DSU operators

The DSU-DP contains two different user profiles (sets of configurations options) that are stored in read only memory (see the appendix, *Default Configuration Profiles*). The unit is shipped from the factory with profile number 1 (default configuration) loaded into the current (nonvolatile configuration) memory. If profile 1 matches requirements for the system, no additional configuration is required to put the unit into service. If profile 1 does not match system requirements, it can be modified, or the other profile that more closely matches the system requirements can be loaded into current memory. When a different profile is loaded, or the existing profile is modified, it is stored in the current (nonvolatile configuration) memory. The DSU-DP is then configured with that profile every time power is turned on or until the unit is reset.

A complete Dual DSU-DP Configuration menu tree is found in the appendix *Dual DSU-DP Configuration Menu Tree*.

## CONFIGURING NETWORK OPTIONS

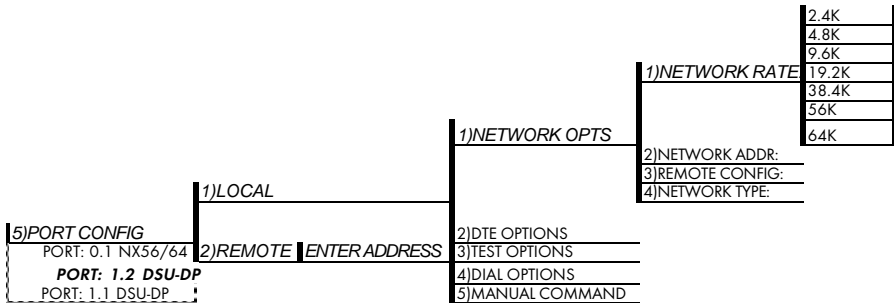
### Network Options

The NETWORK OPTIONS configuration parameters control the network operation of the DSU-DP.

### Network Rate

The Network Rate option sets the network operating speed. The unit should be set to the rate required by the DDS Service. The DSU DP also supports subrate DTE data over a 56 kbps or 64 kbps loop. The network rate must be set independently of the DTE rate.

Seven network rate selections are available (see Figure 4-1).



**Figure 4-1**  
Setting Network Rate Options

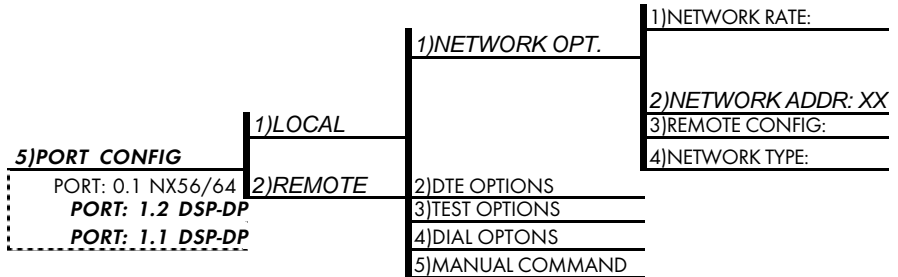
Network commands are provided in Table 4-A.

**Table 4-A**  
*Loop Rate Commands*

Front Panel	AT Command
2.4K	% B 1
4.8K	% B 2
9.6K	% B 3
19.2K	% B 4
38.4K	% B 5
56K	% B 6
64K clear channel	% B 7

## Network Address

A two-digit decimal address can be assigned to each DSU-DP. This addressing capability makes it possible to perform remote configuration and testing in point-to-point and multi-drop networks. Figure 4-2 shows the menu path used to change the network address. The factory default setting is 0.



**Figure 4-2**  
Setting the Network Address

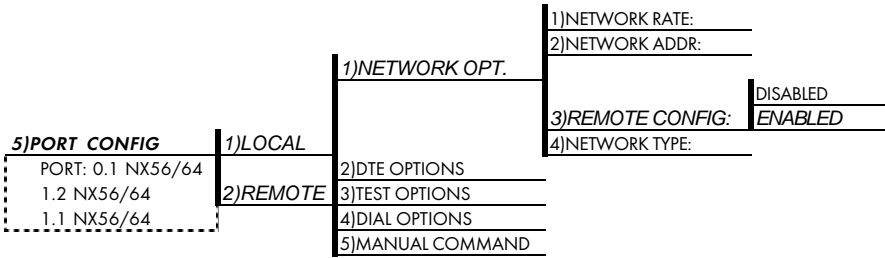
Table 4-B shows the AT command used to set the network address Table 4-B

**Table 4-B**  
Network Address Command

Front Panel	AT Command	Description
XX (Decimal)	_N=xx	Assigns a 2 digit Network Address

## Remote Configuration Option

This option sets up the DSU-DP to accept or reject remote configuration commands. Figure 4-3 shows the menu path for enabling/disabling remote configuration. The factory default setting is ENABLED.



**Figure 4-3**  
*Enabling/Disabling Remote Configuration*

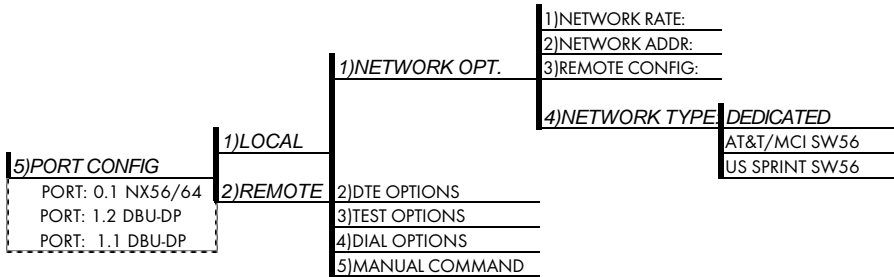
Table 4-C shows the equivalent AT commands used to enable or disable remote configuration.

**Table 4-C**  
*Remote Configuration Commands*

Front Panel	AT Command	Description
DISABLE	&P4	Disable Remote Configuration
ENABLE	&P5	Enable Remote Configuration

## Network Type

This option configures the DSU-DP for the specific type of network being used. The factory default setting is DEDICATED (see Figure 4-4).



**Figure 4-4**  
Setting Network Type Options

Table 4-D shows the equivalent AT commands that perform the same configuration functions.

**Table 4-D**  
Network Type Commands

Front Panel	AT Command	Description
DEDICATED	&L0	Any 4-wire DDS Network
AT&T/MCI SW 56	&L1	AT&T/MCI Switched 56 Service
US SPRINT SW 56	&L2	US SPRINT Switched 56 Service

## CONFIGURING DTE OPTIONS

The DTE OPTIONS menu is used to select the configuration parameters that control the operation of the DSU-DP DTE Interface such as the DTE rate, data format, DTE command options, transmit clock, CS options, anti-stream, and CD options.

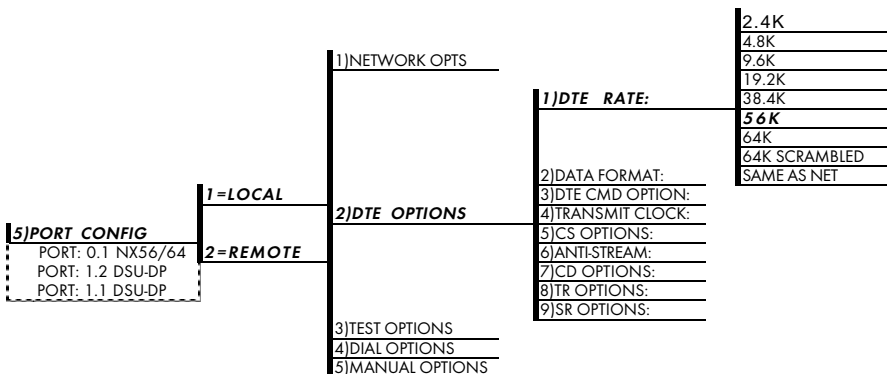
### DTE Rate

The selectable DTE rates over a 56 or 64 kbps network are shown in Figure 4-5. If a slower network rate is selected, the DTE rate automatically matches the network rate. If an attempt is made to set the DTE rate for network rates slower than 56 kbps, the DSU-DP will automatically change the option setting to SAME AS NET. The factory default setting is 56K.



**NOTE**

*If asynchronous mode is set, the 56K option is actually 57.6 kbps.*



**Figure 4-5**

*DTE Rates for 56 or 64 kbps Network Rate*

The equivalent AT commands for setting the DTE rate for a 56 kbps or 64 kbps are shown in Table 4-E.



**Table 4-E**  
DTE Rate AT Commands

Front Panel	AT Command	Description
DTE 2.4K	%K3	DTE rate 2.4K sync and async
DTE 4.8K	%K4	DTE rate 4.8K sync and async
DTE 9.6K	%K5	DTE rate 9.6K sync and async
DTE 19.2K	%K6	DTE rate 19.2K sync and async
DTE 38.4K	%K7	DTE rate 38.4K sync and async
DTE 56K	%K8	DTE rate 56K sync or 57.6K async
64K	%K9 - F0	DTE rate 64K
64K SCRAMBLER	%K9 - F1	DTE rate 64K with data scrambler enabled

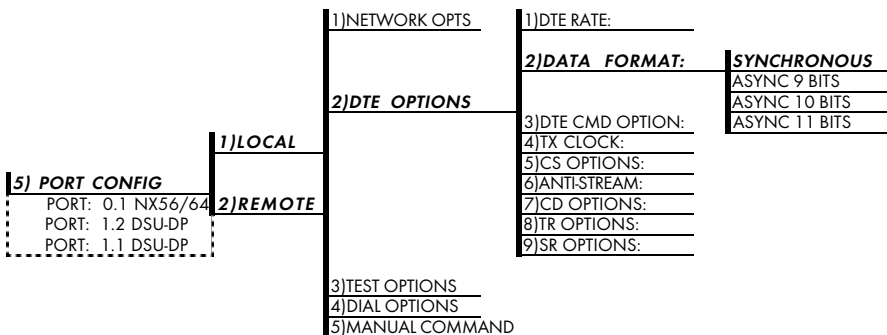


**CAUTION**

*For 64 kbps clear channel operation, there is a possibility that the DTE data sequences might mimic network loop maintenance functions and erroneously cause other network elements to activate loopbacks. To prevent this, the 64K SCRAMBLER option should be selected for both the local and remote DSU.*

## Data Format

The DATA FORMAT option is used to select either the synchronous or asynchronous mode of operation for the DTE interface. The factory default setting is SYNCHRONOUS (see Figure 4-6). If asynchronous is chosen, the length of the data bytes must be selected.



**Figure 4-6**  
Selecting Asynchronous or Synchronous Data Format

Table 4-F shows the AT commands that can be used to set the DATA FORMAT.

**Table 4-F**  
Data Format Commands

Front Panel	AT Command	Description
For asynchronous options, select the length of the data bytes.		
SYNCHRONOUS	&Q2	Always synchronous
ASYNCH 9 BITS	&Q0	ASYNCH with 9 bits including start, stop, parity
ASYNCH 10 BITS	&Q0	ASYNCH with 10 bits including start, stop, parity
ASYNCH 11 BITS	&Q0	ASYNCH with 11 bits including start, stop, parity

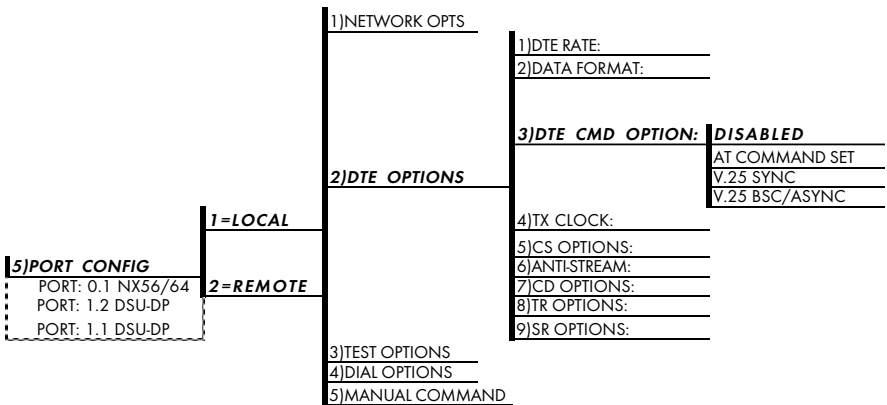


**NOTE**

*For AT command set, the async word length must be set via the front panel.*

## DTE Command Option

The DTE COMMAND option is used to enable AT commands from the DTE, enable V.25 bis SDLC (synchronous data link control) commands, enable V.25 (bisync and async), or disable all DTE command modes (see Figure 4-7).



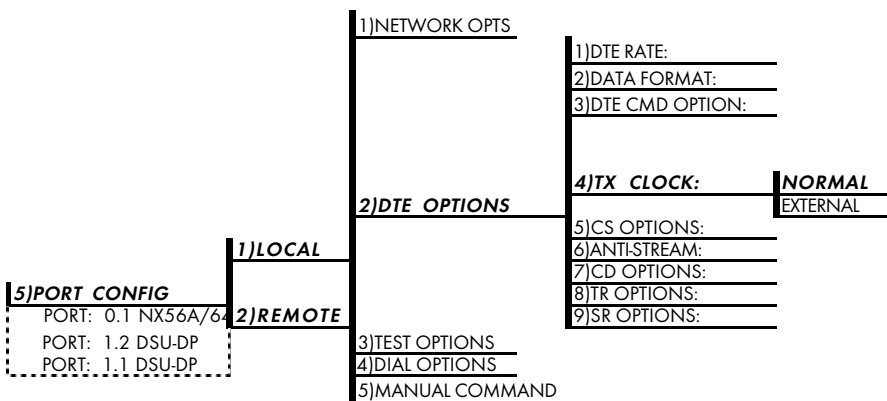
**Figure 4-7**  
Selecting the DTE Command Option



*When the unit is in DTE CMD OPTION mode (idle in SW56 mode, forced with TR option, or from escape sequence in AT mode) with AT COMMAND SET or V.25 SYNC selected, the DTE format is independent of the DATA FORMAT option. However, if V.25 BSC/ASYNC is selected, the unit will use V.25 BISYNC (BSC) commands for synchronous data format or V.25 ASYNC commands for asynchronous data format.*

## Transmit Clock

The TRANSMIT CLOCK option is used to select the source of the clock used to transfer data from the DTE into the DSU-DP. Figure 4-8 shows the menu path used to set the TRANSMIT CLOCK option.



**Figure 4-8**  
Transmit Clock Options

Table 4-G shows the AT commands used to set the Transmit Clock option.

**Table 4-G**  
Transmit Clock AT Commands

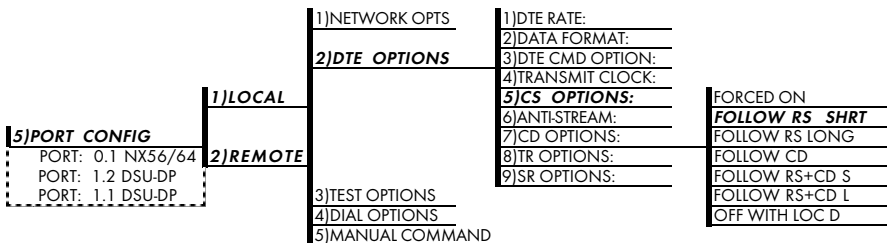
Front Panel	AT Command	Description
NORMAL	&X0	TX clock from DSU selected
EXTERNAL	&X1	ETC clock from DTE selected

The EXTERNAL clock option is normally used in modem tail circuit applications. A DSU-to-modem interconnect diagram for this application is shown in the appendix, *DSU-to-Modem Interconnect*.

The EXTERNAL clock option is also recommended when the EIA-232 connector is used for 56 kbps and 64 kbps applications. A special DSU cable diagram for this application is shown in the appendix, *EIA-232 Connector*. Using this option and a special cable eliminates data errors caused by excessive delays in the DTE transmit clock receiver and transmit data driver.

## CS Options

The CS (clear to send) OPTIONS menu is used to select one of seven different control modes for the CS lead. Figure 4-9 shows the menu path used to access the CS OPTIONS menu. The default factory setting is FOLLOWS RS with CS DELAY SHORT.



**Figure 4-9**  
Selecting CS Options

If one of the options chosen involves request to send (RS), then the delay from RS to CS must be selected. Table 4-H shows the AT Commands used to set the CS OPTIONS.

**Table 4-H**  
*CS Options AT Commands*

Front Panel	AT Command	Description
FORCED ON	&R0	CS always on.
FOLLOWS RS SHRT	&R1/_D0	CS on with RS after delay; off when RS or if DSU cannot pass data.
FOLLOW RS LONG	&R1/_D1	Same as FOLLOW RS SHRT
FOLLOW CD	&R2	CS off when CD goes off or if DSU cannot pass data.
FOLLOWS RS+CD S	&R3/_D0	CS follows RS after delay and also off if CD off. If CD goes off after RS is on, DSU _DP will turn off CS but continue to pass data until RS goes off. CS also off if DSU cannot pass data.
FOLLOW RS+CD L	&R4/_D1	Same as FOLLOW RS+CD S
OFF WITH LOCD	&R4	Off 5 sec after LOCD (loss of carrier detect). Valid only in SW56 mode. CS is forced on but will turn off for 5 seconds after a call is disconnected.

Specified times for the short and long delays at the different operating speeds are shown in Table 4-1.

**Table 4-1**  
*Short and Long Delays  
at Different Operating Speeds*

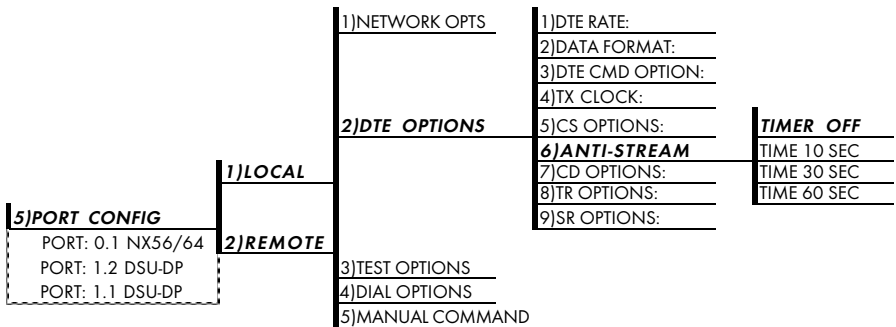
Rate	Short Option	Long Option	Tolerance
64K	1.1ms	16.1ms	±.4ms
56K	1.1ms	16.1ms	±.4ms
38.4K	1.5ms	16.5ms	±.4ms
19.2K	1.5ms	16.5ms	±.4ms
9.6K	1.5ms	16.5ms	±.4ms
4.8K	1.9ms	16.9ms	±.7ms
2.4K	3.8ms	18.8ms	±1.3ms



## Anti-Stream

The ANTI-STREAM option is used to select the anti-stream timeout. Figure 4-10 shows the menu path used to access the ANTI-STREAM options menu. The anti-stream timeout is the maximum time the DSU-DP transmits data into the network from the DTE. This feature prevents one DTE device on a multi-drop network from continuously tying up the transmit circuit back to the master DSU.

The anti-stream timer is reset to zero when RS changes to the active state and is updated every second while RS is active. When the anti-stream timeout expires, the DSU-DP stops transmitting DTE data into the network but continues to accept data from it. This condition exists until the DTE deactivates the RS input.



**Figure 4-10**  
Anti-Stream Options

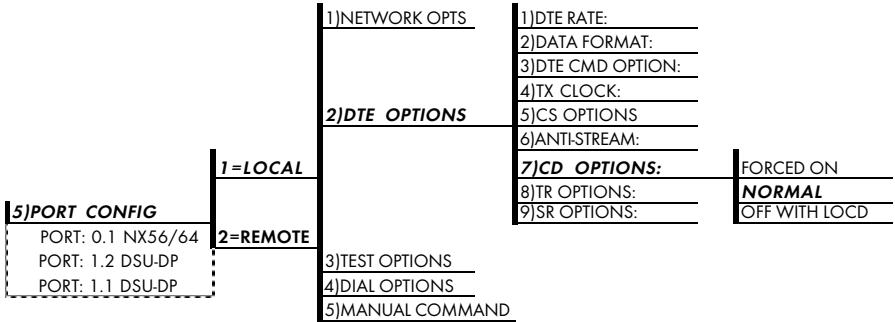
The factory default setting is TIMER OFF. Table 4-J shows the available options and their AT commands.

**Table 4-J**  
*Anti-Stream AT Commands*

Front Panel	AT Command	Description
TIMER OFF	%T0	Anti-stream timer disabled
TIME 10 SEC.	%T1	Timeout equal 10 seconds
TIME 30 SEC.	%T2	Timeout equal 30 seconds
TIME 60 SEC.	%T3	Timeout equal 60 seconds

## CD Options

The CD OPTIONS menu is used to select one of three different control modes for the receive line signal detector (CD) lead. The default factory setting is NORMAL (see Figure 4-11).



**Figure 4-11**  
*Selecting CD Options*

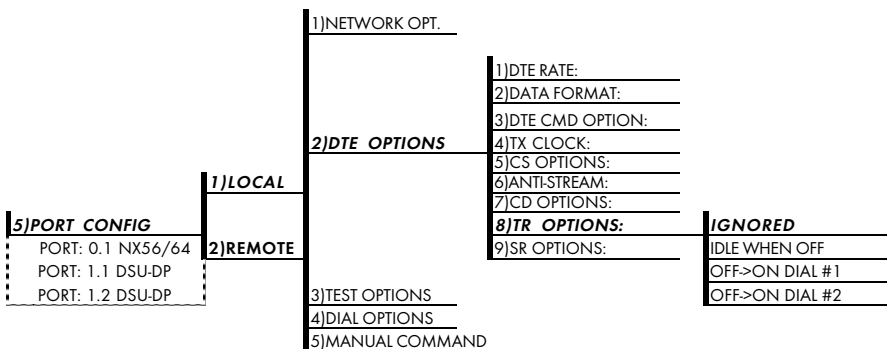
Table 4-K shows the equivalent AT commands for setting CD options.

**Table 4-K**  
*CD Options AT Commands*

Front Panel	AT Command	Description
FORCED ON	&C0	On all the time.
NORMAL	&C1	On only when data present on network.
OFF WITH LOCD	&C2	On except after disconnect in Switched 56 application.

## TR Options

The TR OPTIONS menu is used to select the DSU-DP response to the data terminal ready (TR) lead. The factory default setting is IGNORED (see Figure 4-12).



**Figure 4-12**  
Selecting TR Options

Table 4-L shows the equivalent AT commands for setting TR OPTIONS.

**Table 4-L**  
TR Options AT Commands

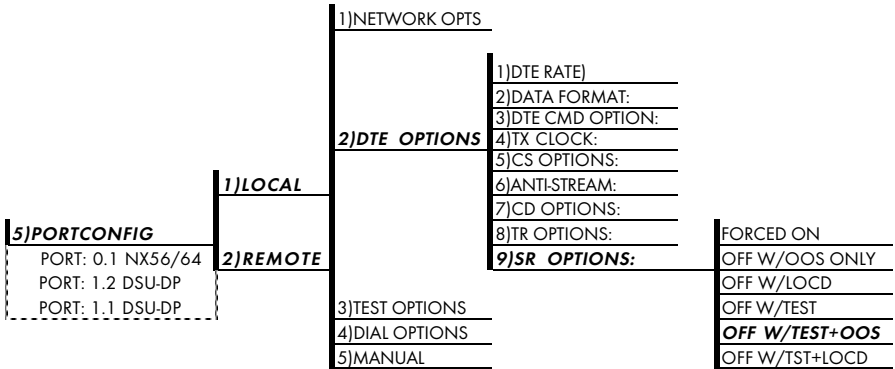
Front Panel	AT Command	Description
IGNORE	&D0	Ignore the TR input.
IDLE WHEN OFF	&D2	See the following Note.
OFF->ON DIAL #1	&D3	Dial Stored #1: TR goes off to on (SW56 only).
OFF->ON DIAL #2	&D4	Dial Stored #2: TR goes off to on (SW56 only).



*For IDLE WHEN OFF option: In SW56 mode, TR Off causes the DSU to go On Hook (Idle). The unit also will not dial out if TR is off. In dedicated mode, the DSU goes into DTE command mode when TR goes off. When TR goes on, if the DSU does not receive a command in the number of seconds set in S40, the DSU goes into data mode.*

## SR Options

The SR OPTIONS menu is used to select the operating mode for the data set ready (SR) lead. The factory default setting is OFF W/TEST + OOS (shown in Figure 4-13).



**Figure 4-13**  
Setting SR Options

Table 4-M shows the AT commands for setting SR OPTIONS.

**Table 4-M**  
SR Options AT Commands

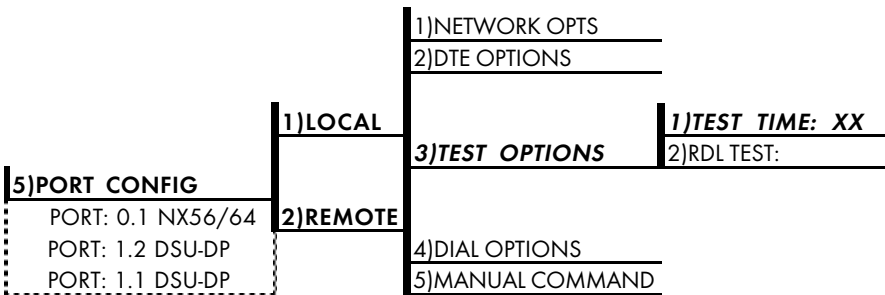
Front Panel	AT Command	Description
FORCED ON	&S0	Always on.
OFF W/OOS ONLY	&S1	Off when network Out Of Service (OOS).
OFF W/LOCD	&S3	Off 5 seconds after disconnect (SW56 only).
OFF W/TEST	&S0_C0	Off when unit is in test.
OFF W/TEST +OOS	&S1_C0	Off in test or OOS.
OFF W/TST +LOCD	&S5	Off 5 seconds after disconnect or test.

## TEST OPTIONS

The TEST OPTIONS menu enables or disables different test modes and specifies the maximum test time allowed.

### Test Timeout

The TEST TIMEOUT option sets the length of time a DSU-DP remains in a test mode before automatically returning to the data mode. Enter the timeout from 0 to 255 seconds. The factory default setting is off (0). Figure 4-14 shows the menu path used to access TEST TIMEOUT.



**Figure 4-14**  
*Setting Test Timeout Option*

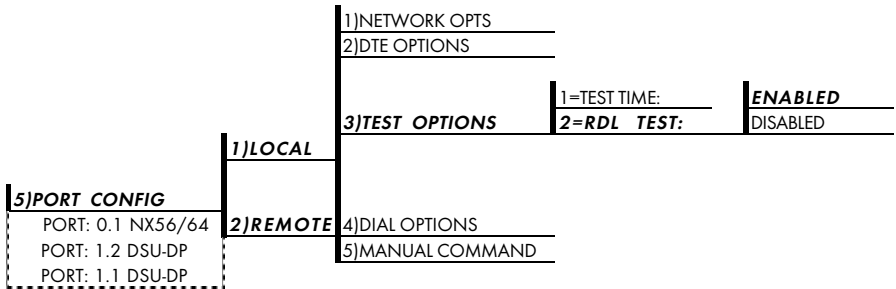
Table 4-N shows the equivalent AT command for setting the TEST TIMEOUT.

**Table 4-N**  
*Test Timeout AT Command*

Front Panel	AT Command	Description
ENTER TIMEOUT	S18=x	Specify 0 - 255 seconds test timeout

## Remote Digital Loopback

The RDL (Remote Digital Loopback) option specifies whether or not the DSU-DP responds to an RDL request from the far end of the circuit. The factory default setting is RDL ENABLED. Figure 4-15 shows the menu path used to access this option.



**Figure 4-15**  
*Remote Digital Loopback*

Table 4-O shows the equivalent AT commands for setting the RDL option.

**Table 4-O**  
*Remote Digital Loopback AT Commands*

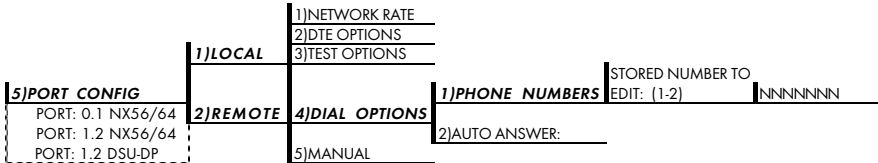
Front Panel	AT Command	Description
RDL DISABLED	&T5	RDL request from remote DSU ignored
RDL ENABLED	&T4	RDL request accepted

## CONFIGURING DIAL OPTIONS

The DIAL OPTIONS menu stores up to two phone numbers and defines the AUTO ANSWER operation of the DSU-DP when it is configured for Switched 56 operation.

### Phone Number

The DSU-DP stores up to two numbers of 36 digits each. Edit a phone number by reentering the entire number. This process overwrites the previously stored number. Figure 4-16 shows the menu path used to access the PHONE NUMBERS option.



**Figure 4-16**  
*Editing Stored Phone Numbers*

Table 4-P shows the AT Command for storing phone numbers.

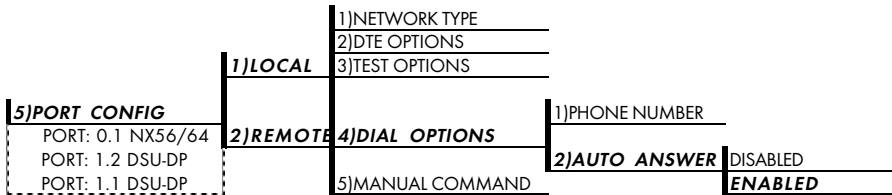
**Table 4-P**  
*AT Command for Storing Phone Numbers*

AT Command	Description
&Zn=	Store Phone Number



## Auto Answer

The AUTO ANSWER option is used to specify how incoming calls are to be answered. If ENABLED, incoming calls are automatically answered by the DSU-DP. If DISABLED, an incoming call can be answered manually by an AT or V.25 command from the DTE, or by raising TR from the DTE. Figure 4-17 shows the menu path used to enable or disable this option. The default setting is AUTO ANSWER ENABLED.



**Figure 4-17**  
*Enabling/Disabling the Auto Answer Function*

Table 4-Q show the AT Commands available for the AUTO ANSWER option.

**Table 4-Q**  
*AT Commands for Auto Answer*

Front Panel	AT Command	Description
DISABLED	_J0	Auto Answer disabled
ENABLED	_J1	Auto Answer enabled

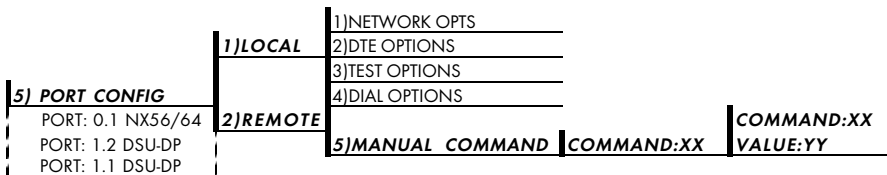
## MANUAL COMMAND

The MANUAL COMMAND option is a shortcut method for entering configuration and control commands for the DSU-DP.

The first display prompts the user to enter the command number.

### COMMAND:00

Figure 4-18 shows the menu path for MANUAL COMMAND. The available manual commands are listed in Table 4-R.



**Figure 4-18**  
*Manual Command*

Use the number keys to enter the hexadecimal command number. Press **Enter** to complete. Once the command number is entered, the display shows both the command number and the present value or setting for the command. The command value can be edited or reissued with the existing value.

### COMMAND: XX VALUE: YY

Use the number keys to enter the hexadecimal value. Press **Enter** to complete. The system briefly displays **COMMAND ACCEPTED** and returns to the active menu.

**Table 4-R**  
Manual Commands

Command Description	Command	Value
AT Command Echo		
Disable	82	00
Enable	82	01
AT Result code		
Enable	85	00
Disable	85	01
AT Long or Short code		
Short form	86	00 to FF
Long form	86	00 to FF
AT Escape Character	2	00 to FF
AT CR Character	3	00 to FF
AT LF Character	4	00 to FF
AT BS Character	5	00 to FF
AT Escape Char. Timer	0C	00 to FF
Abort Call Timer	7	00 to FF
DTR Recognize Delay (x 2.5ms)	19	00 to FF
DTR Initiated Command Timeout (seconds)	28	00 to FF
Load Factory Opt.		
Option Set #1	8A	00
Option Set #2	8A	01
Store User Profile		
Save to Profile 0	91	00
Save to Profile 1	91	01
Select User Profile		
Power Up Profile 0	93	00
Power Up Profile 1	93	01
Network Address Lock		
Network Addr. Unlock	C3	00
Network Addr. Lock	C3	01
EIA LLB SIGNAL		
Disable	9C	00
Enable	9C	01



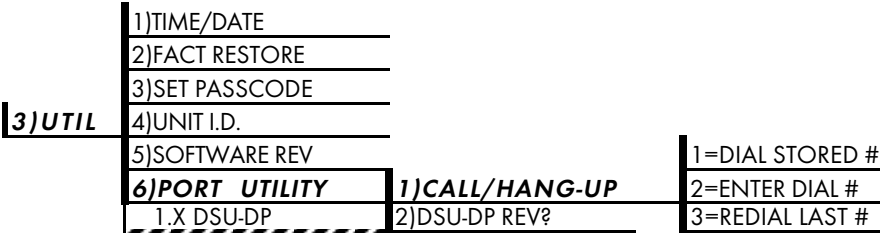
# Chapter 5

## Dialing

### DIALING OVERVIEW

In Switched 56 mode (SW56) the DSU-DP operates as a 4-wire Switched 56 DSU. Call initiation and termination can be accomplished through either the TSU/HSU front panel or the DTE interface via the AT command set or V.25 bis. The AT command set and V.25 bis are covered in other chapters. This chapter covers dialing via the front panel.

Figure 5.1 describes the menu path used to initiate a call.



**Figure 5-1**  
Menu Path to Initiate a Call



**NOTE**

*If the DSU-DP is not configured for either AT&T/MCI SW56 or Sprint SW56, the unit displays:*

NOT IN SW56 MODE PRESS <CANCEL>

Once you enter the CALL/HANG-UP menu, one of three menus appears based on the status of the SW56 network. These three menus are discussed in this chapter.

### **1. No Call Active**

If no call is active the DSU-DP is idle and the screen displays the menu shown in Figure 5.1.

- To dial a stored telephone number, press **1** (for DIAL STORED #) followed by **Enter**. The unit displays the two stored telephone numbers. Enter **1** or **2** for the desired stored number and press **Enter** to initiate dialing.
- To dial a telephone number not already stored, press **2** (for ENTER DIAL #) followed by **Enter**. The screen goes blank and the cursor is flashing in the upper left hand corner. Begin entering your telephone number and press **Enter** to initiate dialing.
- To dial the previous number that was called, press **3** (for REDIAL LAST #) followed by **Enter**. The DSU initiates dialing the last telephone number dialed.

Once dialing has been initiated, the DSU-DP turns on the status messages. The first status message is DIALING followed by each digit of the telephone number to dial as it is being dialed out. If the network fails to send a wink (SW56 equivalent of a dial tone), the status message displayed is NO WINK FROM CO for approximately five (5) seconds followed by IDLE.

If the SW56 network is working properly, the DIALING message persists until the distant DSU answers the call, upon which the status message changes to DATA MODE. Press the CANCEL button to exit from the status messages at any time.

## 2. Call Is Active

If a call is active (DSU-DP status = DATA MODE) upon entering the CALL/HANG-UP menu, the following is displayed:

- 1 = HANG UP (Flashing)
- 2 = STAY ON LINE

Press **1** (for HANG-UP) followed by **Enter** to disconnect the call. The display backs out to PORT UTILITY. To see status messages, press **2** (for STAY ON-LINE) and the status messages are displayed. Press **Cancel** to stop viewing status messages.

## 3. Receiving an Incoming Call with Auto Answer Disabled

If the DSU is receiving an incoming call and Auto Answer is disabled, upon entering the CALL/HANG-UP menu the following is displayed:

- 1 = ANSWER CALL (Flashing)
- 2 = STAY IDLE

Press **Enter** to answer the call, otherwise press **Cancel**. If answering is selected, the DSU momentarily displays **COMMAND ACCEPTED** and then returns the display to **PORT UTILITY**.





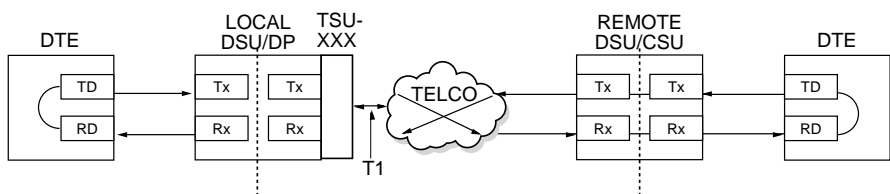
# Chapter 6

## Testing & Troubleshooting

### TEST OVERVIEW

The DSU-DP performs a variety of diagnostic functions that isolate portions of the circuit to identify the problem source. Tests may be initiated and terminated from the front panel or the DTE interface. In asynchronous mode, AT commands can control the testing from the DTE interface. For synchronous operation, V.25 bis commands can provide test control (see Figure 6-1).

The unit also responds to standard DDS network tests initiated from telco test centers. In addition, it can run several tests such as local and remote loopbacks to aid in problem isolation.



**Figure 6-1**  
*Normal Operation Before Initiating Loopback Test*



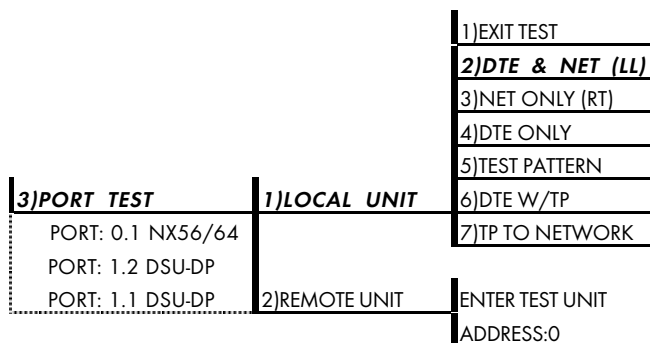
*All diagnostic tests disrupt data flow.*

## Initiating a Test

Initiate tests using the following procedure:

1. Select Test from the Main menu by pressing 4, then press **Enter**.
2. Select **PORT TEST** and then select the desired DSU-DP port.
- 3.. Specify local or remote by selecting the corresponding number, followed by **Enter**.
4. Use the **Up** and **Down** Arrows to view test options.
5. Select a test from the available options by pressing the corresponding number twice or select the test option and press **Enter**.

The example in Figure 6-2 shows the menu path for initiating a local DTE and Network test.



**Figure 6-2**  
*Initiating a Test*

Once the test is initiated the screen displays

- A. DTE & NETWORK  
<ENTER > TO EXIT

and the TEST LED for the specified module will turn On.

## DSU-DP Test Operation

Pressing **Enter** will exit the tests and the unit will momentarily display:

- B. EXITING TEST  
PLEASE WAIT

followed by:

- C. <ENTER> TO START  
DTE & NET TEST

Pressing **Enter** causes the test to restart and screen A. is again displayed. Another test may be chosen by pressing **Cancel** to return to the previous menu.



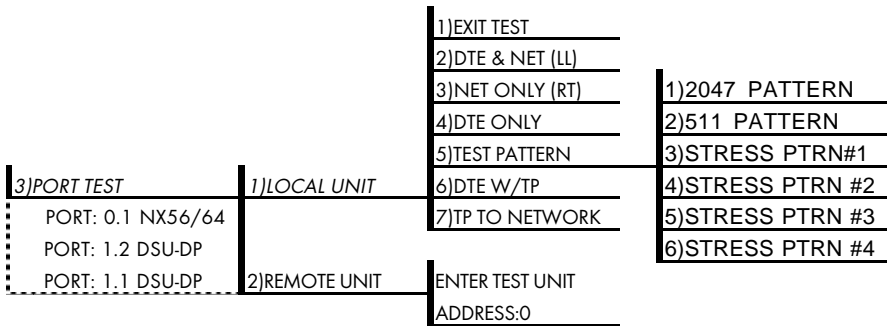
### NOTE

*If you have initiated a test and wish to back out of the test screen without exiting the test, press **Cancel** and the unit will return to the previous menu.*

Both NET ONLY (RT) and DTE ONLY operate in the same manner:

### Tests Using the TEST Pattern Generator

If you wish to run tests utilizing the test pattern generator, i.e., DTE with TP or TP to Network (see Figure 6-2), first select the desired test pattern to run under 5)TEST PATTERN (see Figure 6-3). The default is 2047 PATTERN.



**Figure 6-3**  
Complete Test Menu

Once the desired test pattern has been selected, choose either DTE with TP or TP TO NETWORK (Figure 6-2) and press ENTER and the unit will display:

DTE WITH TP (or *TEST PATTERN*)  
TST ERR = XXXX

To *inject an error* into the test pattern generator, press 2; to *clear the error count*, press 1.

Table 6-A describes the different values for TST ERR=XXXX.

**Table 6-A**  
Values for TST ERR=XXXX

XXXX	Meaning
0000-9999	Displays the number of bit errors
NO SYNC	TP receiver unable to sync-up on test pattern
OVERFLOW	The number of bit errors has exceeded

To exit the test, press **Enter** and the bottom line will briefly display <ENTER> TO EXIT. Press **Enter** again and the unit will briefly display:

EXITING TEST  
PLEASE WAIT

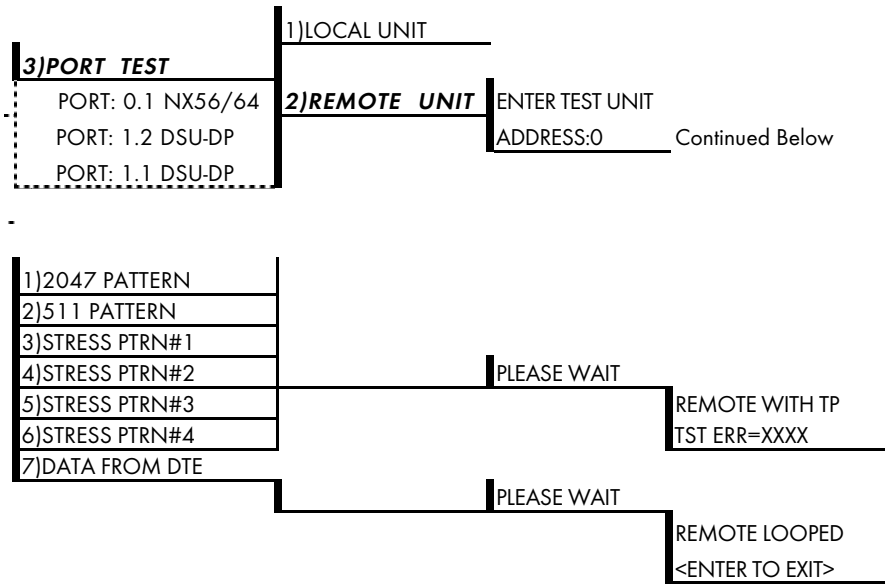
followed by:

<ENTER> TO START  
DTE W/TP TEST (or *TP TO NET TEST*)

Press **Enter** to restart the test or press **Cancel** to back up to the previous menu.

### Remote Test

To place the far-end DSU into a loopback, choose the 2) *REMOTE UNIT* option and follow the diagram in Figure 6-4. The test unit address is the network address of the far-end DSU. When selecting the test pattern, if 7) *DATA FROM DTE* is chosen some BERT-type device should be connected to the DTE interface.



**Figure 6-4**  
*Remote Test Example*

The test pattern mode works the same as the other test pattern modes:

- 2 to inject error
- 1 to clear error count
- <ENTER> twice to exit test (see test pattern generator)

## TROUBLESHOOTING

This section is intended to provide a quick and easy means of diagnosing suspected problems associated with local or remotely attached ADTRAN DSU/CSUs. Two separate troubleshooting sections are provided; one focuses on new installs, the other on existing circuits.

See Troubleshooting Supplement appendix for information on the TSU Alarm and History Buffer. Two errors are discussed there: EPROM errors and DTE streaming.

### Messages from the DSU/CSU

The DSU-DP displays messages on the LCD display and LEDs concerning the status of the unit and the local loop. If the Alarm LED is On, one or more of the messages shown in Table 6-B is displayed on the LCD.



**NOTE**

The Status menu must be selected in order for the unit to display status messages. Return to the Main menu where STATUS can be selected. Then select PORT STATUS and the needed DSU-DP.

**Table 6-B**

Messages from the DSU-CSU

Message	Meaning	Probable Cause	Action
NET IS NORMAL	Good signal being received from the telco.	Indicates good connection through telco network. Alarm LED is off.	No action required; unit properly connected to telco circuit.
OOS/OOF FROM NET	Unit detects an Out of Service or Out of Frame condition from the telco.	Telco is having problems with DDS circuit or remote unit is turned off or disconnected	Check remote unit. Contact telco service provider. If a problem persists, contact telco provider.
TEST FROM TELCO	Telco activated a loopback to test the DDS circuit.	Telco network	Wait until test is complete or contact telco service provider.
DSU-DP INACTIVE	TSU/HSU controller has DSU-DP in standby mode.	<ul style="list-style-type: none"> <li>• DSU-DP out of DS0 map</li> <li>• TSU/HSU in Test or alarm</li> </ul>	<ul style="list-style-type: none"> <li>• Map DSU-DP into DS0 map</li> <li>• Check TSU/HSU operation</li> </ul>

## Troubleshooting New Installs

Before initiating diagnostics on a newly installed unit and/or DDS circuit and before contacting ADTRAN Technical Support, please check the items in Table 6-C to ensure the unit is configured properly.

After verifying the items listed in Table 6-C the unit should operate properly and display the following:

**DATA MODE  
NET IS NORMAL**

If a status message other than **DATA MODE NET IS NORMAL** is shown, begin performing diagnostics described in the section *Test Sequence for Troubleshooting New Installs or Existing Circuits*.

**Table 6-C**  
*Troubleshooting New Installs*

Configuration Item to Check	Option Selection	Action
Network Rate	2.4 to 64 kbps	Select the network rate of the DDS service from the configuration menu.
Data Format	Async or Sync	Select the type of data to be used from the Configuration menu.
DTE Cable	N/A	Verify DTE cable connection to the proper DTE port on the DSU-DP.
Run selftest	N/A	Verify the unit passes self test.



## Test Sequence for Troubleshooting New Installs or Existing Circuits

If your DSU ....	Do this...
Is suspected of having problems	Perform a <b>Self Test</b> to determine if the unit is in good health.
Is receiving excessive errors requiring retransmission of data	Perform a <b>DTE with Test Pattern</b> to determine if the unit's internal transmitter and receiver is operating error free.
Is receiving excessive errors requiring retransmission of data	Perform a <b>Remote Test</b> to verify the connection between the local and remote unit is error free. Run the test using all available test patterns.



### NOTE

*If an external BERT tester is available these additional tests may be performed:*

- *DTE & Loop Test*
- *DTE Only Test*
- *Loop Only Test*

If the unit fails any of these tests or the problem has not been determined, contact ADTRAN Technical Support; see inside back cover.

## LOCAL UNIT DIAGNOSTICS

The local DSU-DP can perform six different tests; see Table 6-D.

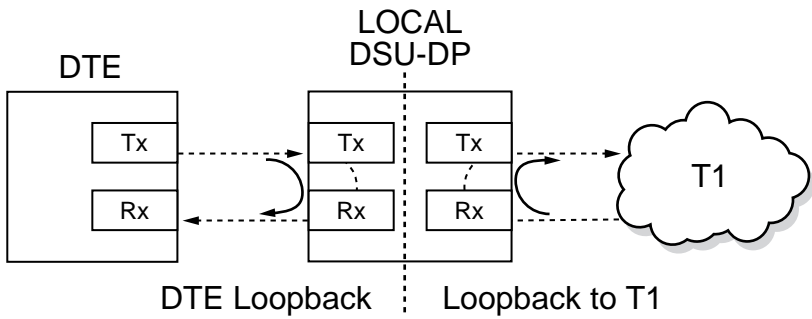
**Table 6-D**  
*Test AT Commands*

Front Panel Display	AT Command	Description
DTE & Net (LL)	&T10	TD/RD and RX/TX Loopbacks
Net Only (RT)	&T11	RX/TX Loopback at Network Interface
DTE Only	&T1	TX/RX Loopback at DTE Interface
DTE with TP	&T8	TX/RX Loopback with Test Pattern
TP to Network	&T9	Transmit/Receive Test Pattern
Self Test	Z	Check Internal Components (Resets Unit)
Exit Test	&T0	Stops test, returns to data mode
TD = Customer Transmit Data RD = Customer Receive Data TX = Network Transmit Data RX = Network Receive Data		

## DTE & NET

### Test Description

The DTE & Net test splits the DSU-DP into two separate DTE and network interface sections and then loops the receive data of each interface back to its respective transmit data. The DTE & NET test provides a bidirectional loopback at the DSU-DP. Figure 6-5 illustrates the loopback points and the signal paths for this test.



**Figure 6-5**  
*DTE & Net Test*

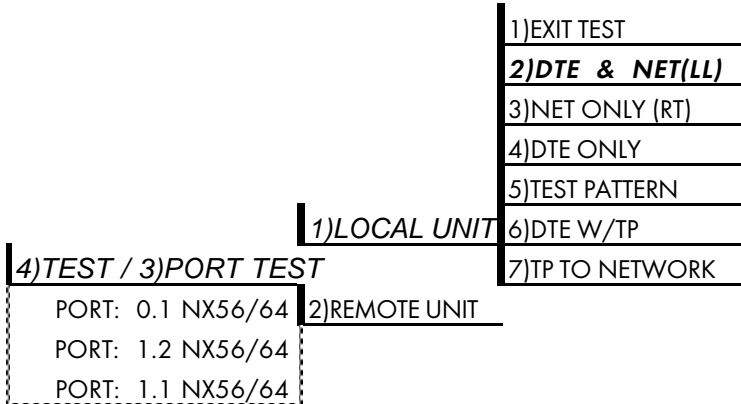
### Test Purpose

The DTE & Net test is used for the following purposes:

- Verify integrity of the DTE interface and cable.
- Provide a loopback for network tests.

## Initiating

Follow the menu path outlined in Figure 6-6 to initiate a DTE & Loop Test.



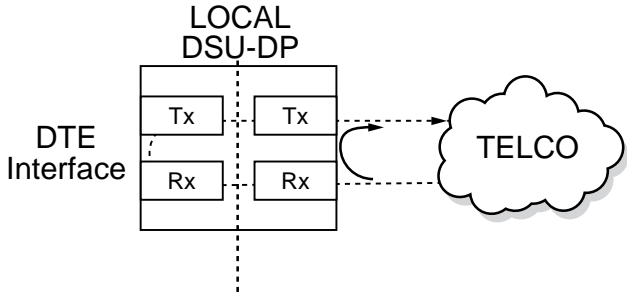
**Figure 6-6**  
*Initiating a DTE & Net Test*

## Interpreting Test Results

A BERT tester must be used to interpret the test results of a DTE & Net test.

## NET Only (RT)

The Net Only (RT) test allows the T1 interface and a major portion of the DTE interface for the local DSU-DP to be tested from the remote site over the actual communication circuit. Figure 6-7 illustrates the loopback point and the signal paths for this test.



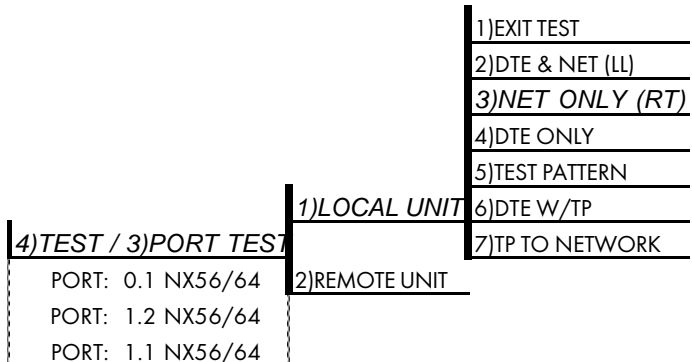
**Figure 6-7**  
Loop Only Test

### Test Purpose

The Net Only test is used to provide a loopback for network tests.

### Initiating

Follow the menu path outlined in Figure 5-8 to initiate a Net Only test.



**Figure 6-8**  
Initiating a Net Only Test

## **Interpreting Test Results**

The Net Only test is used for the purpose of looping the DDS service back to the telco. No test results are available from the local DSU-DP.

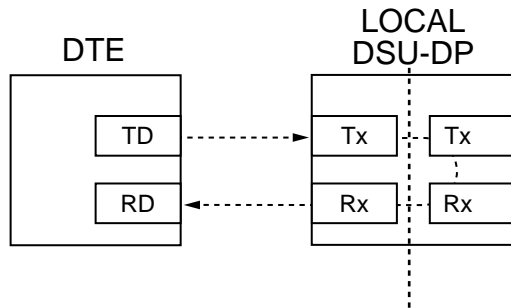
## DTE Only

The DTE Only test provides a method for testing both the DTE interface drivers and receivers of the local DSU-DP (see Figure 6-9). This test can be used to verify proper operation between the local DTE and the local DSU-DP .



**NOTE**

*When this test is implemented, the far unit receives an OOS/OOF message from the network and enters an alarm state.*



**Figure 6-9**  
*DTE Only Test Diagram*

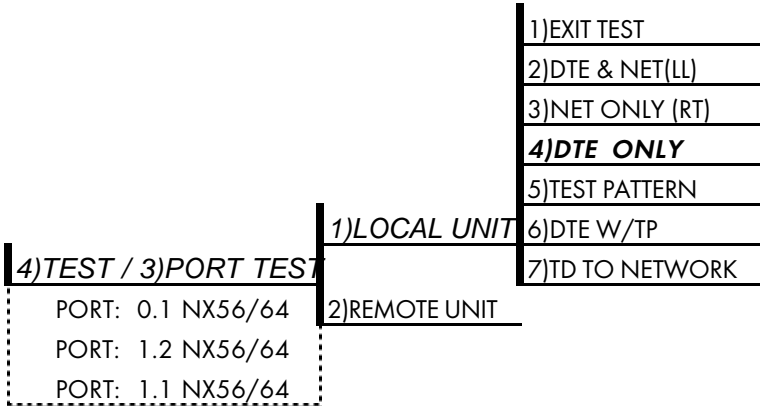
### Test Purpose

The DTE Only test is used for the following purposes:

- Verify integrity of the DTE interface
- Verify integrity of connection between DTE and DSU-DP

## Initiating

Follow the menu path outlined in Figure 6-10 to initiate a DTE Only test.



**Figure 6-10**  
*Initiating a DTE Only Test*

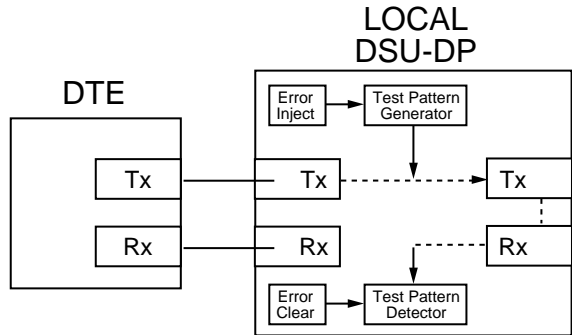
## Interpreting Test Results

A BERT tester must be used to interpret the test results of a DTE Only test.



## DTE with Test Pattern

The DTE with TP (test pattern) test is similar to the DTE Only test described previously except the test pattern is generated using the DSU-DP internal test pattern generator. This test can be used to detect deficiencies within the internal drivers and receivers of the DSU-DP. Figure 6-11 illustrates the loopback point and the data paths for this test.



**Figure 6-11**  
*DTE with Test Pattern*

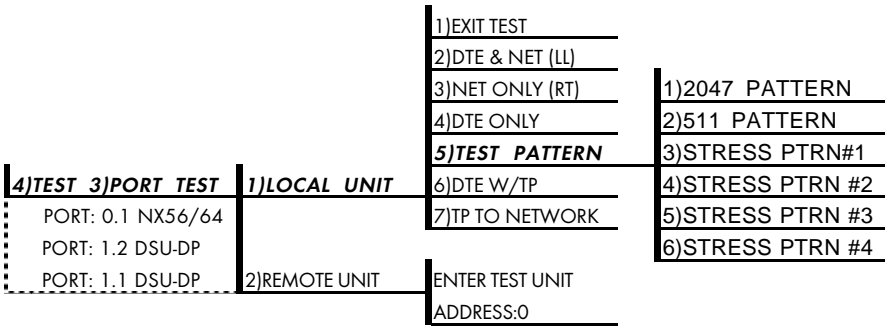
### Test Purpose

A DTE test using a test pattern is used for the following purposes:

- Verify integrity of the DTE interface.
- Verify integrity of connection between DTE and DSU-DP.

### Initiating

Follow the menu path outlined in Figure 6-12 to initiate a DTE Test using a Test Pattern. First select the desired test pattern to be generated, then choose the test.



**Figure 6-12**  
*Initiating a DTE Test with Test Pattern*

### Interpreting Test Results

If the unit is functioning properly, the DSU-DP displays:

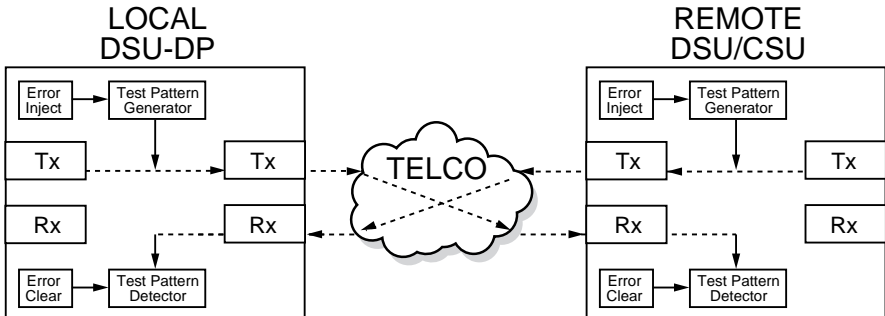
**DTE WITH TP  
TST ERR=XX**

The first line of the display indicates the type of test being performed while the second line of the display indicates the number of errors accumulated by the test pattern detector.

If errors occur during this test, the test error count can be reset to zero by pressing 1. To verify proper operation of this test, single bit errors can be injected into the transmitted test pattern by pressing 2. These errors appear on the TEST ERR display.

## TP to Network

The TP TO NETWORK option converts the local DSU-DP into a BERT tester for the purpose of testing the DDS circuit. When this test is used, the remote DSU/CSU must be in loopback or transmitting a test pattern. Figure 6-13 illustrates the data paths for this mode.



**Figure 6-13**  
*Test Pattern Only*

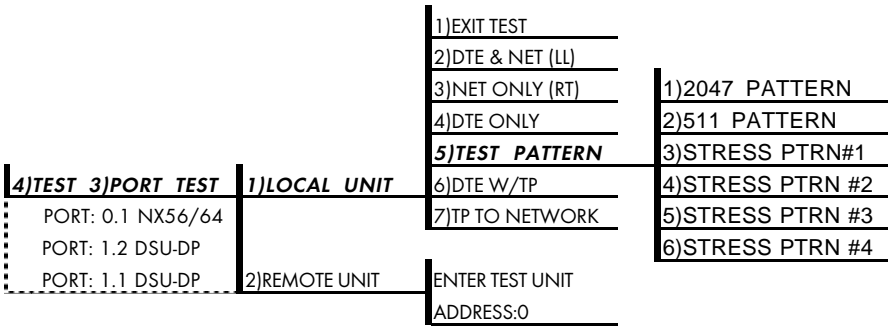
### Test Purpose

Testing using a test pattern is used for the following purposes:

- Transmits user selected test pattern using an internal test pattern generator, and compares the received data using an internal test pattern detector to detect if there are any errors on the DDS circuit.
- Injects errors and verifies the unit transmits data across the communication circuit to the remote unit.
- Helps determine from which direction the circuit is receiving errors.

### Initiating

Follow the menu path outlined in Figure 6-14 to initiate a test using a test pattern.



**Figure 6-14**  
*Initiating a Test Using a Test Pattern*

### Interpreting Test Results

If the unit is functioning properly, the display should show the following:

**TST ERR = 00**

### Exit Test

If you leave the Test Options menu for any reason, you can exit any test by selecting the TESTS OPTIONS menu and selecting EXIT TEST.

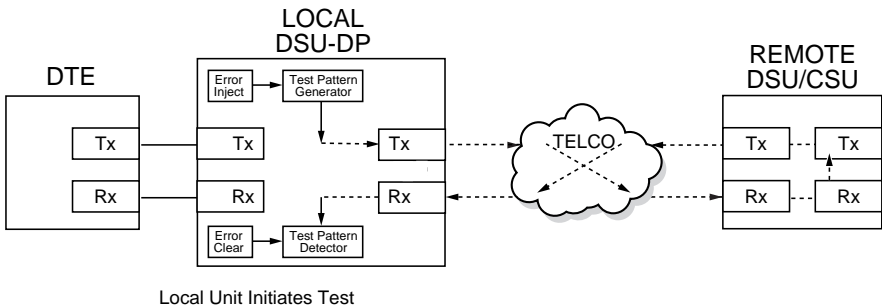
## REMOTE UNIT DIAGNOSTICS

A remote DSU-DP can perform seven different tests; see Table 6-E.

**Table 6-E**  
*Remote Tests and AT Commands*

Front Panel	AT Command	Description
1=2047 PATTERN	_T0&T7	Standard 2047 random data pattern
2=511 PATTERN	_T1&T7	Standard 511 random data pattern
3=STRESS PTRN #1	_T2&T7	DDS Stress Pattern #1
4=STRESS PTRN #2	_T3&T7	DDS Stress Pattern #2
5=STRESS PTRN #3	_T4&T7	DDS Stress Pattern #3
6=STRESS PTRN #4	_T5&T7	DDS Stress Pattern #4
7=DATA FROM DTE	&T6	Data from DTE

The Remote Unit submenu allows a remotely installed DSU to be placed into loopback. There are six test patterns to choose from or Data from the DTE may be selected. See Figure 6-15 for a V.54 RDL test pattern.



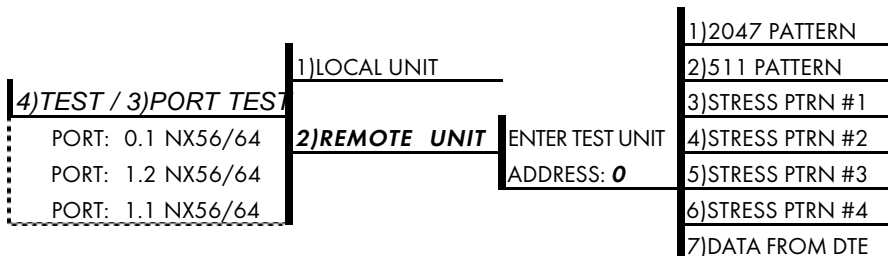
**Figure 6-15**  
*V.54 RDL with Test Pattern*

### Test Purpose

Test the local DSU, the DDS circuit, and remote DSU.

### Initiating

Follow the menu path outlined in Figure 6-16 to place a remote DSU-DP into loopback.



**Figure 6-16**  
*Initiating a Remote Test*

After selecting Remote Unit from the menu, the following prompt is displayed for entering the address for the remote unit:

**ENTER TEST UNIT**  
**ADDRESS:XX**

Use the number keys to type the address of the remote DSU, then press **Enter**. The test pattern selections are displayed. After a test pattern is selected, the system briefly displays **PLEASE WAIT**.

### Test Results

If the test is successful the status menu is displayed. If not, **UNABLE TO EXECUTE TEST** is displayed.

### Interpreting Test Results

If the unit is functioning properly, the display should show:

**TST ERR = 00.**

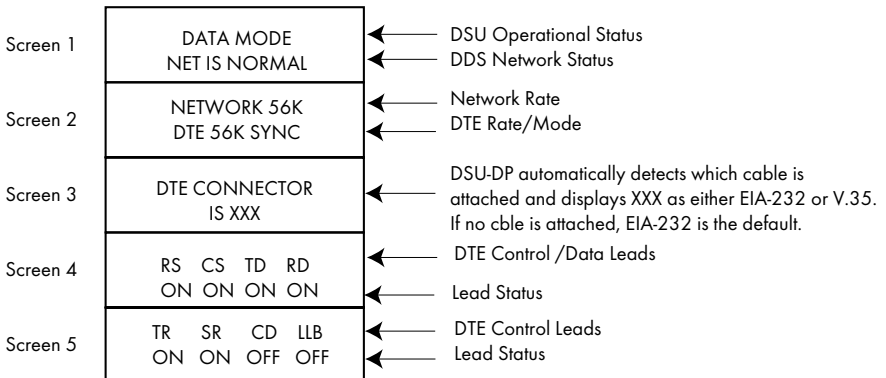
# Chapter 7

## Status Selection

### STATUS DISPLAY

The STATUS selection displays two lines at a time of the current operational status of the network and the DTE interfaces.

Examples of possible status displays are shown in Figure 7-1.



**Figure 7-1**  
*Examples of Status Displays*

## DSU Operational Status

Possible messages include:

### **DATA MODE**

The unit is ready to pass data if network status is normal.

### **UNIT IN TEST**

The unit is in test. Scroll to next status menu for test type.

### **DTE COMMAND MODE**

The unit is in command mode from the DTE (AT or V.25 bis).

In SW56 mode the following messages are possible:

### **IDLE**

The unit is idle, waiting for a call or a dial command.

### **INCOMING CALL**

The unit has detected an incoming call.

### **DIALING**

The unit is dialing a number.

## Network Status

This line of the display shows the current status of the dedicated network interface. Possible messages include:

### **NET IS NORMAL**

The DSU is connected to the T1. No network irregularity detected.

### **DSU-DP INACTIVE**

The DSU-DP has been put into Stand-By mode by the TSU/HSU controller.



**OOS/OOF FROM NET**

The DSU-DP detects an abnormal condition code from the network.

**NO FRAME SYNC**

The DSU-DP cannot sync on the signal from the telco (64k mode only).

**TEST FROM TELCO**

The DSU-DP is in a test initiated from the telco. Scroll to next status menu for test type.

In SW56 mode the following messages are possible:

**ANSWERING CALL**

The DSU-DP is answering an incoming call.

**NO WINK FROM CO**

The DSU-DP did not see a proper signal from the network during dialing.

**CALL DISCONNECT**

The SW56 call was terminated.

**Network Rate**

The message displayed on this line of the Status display screen indicates the rate of the service configured for the network.

**DTE Rate/Mode**

The message displayed on this line of the Status display screen indicates the DTE data rate and format.

## DTE Control Leads and Status

Eight DTE interface leads are displayed with their current status (on or off) displayed below them. The leads are identified as follows:

RS	Request to send
CS	Clear to send
TD	DTE transmit data
RD	DTE receive data
TR	Data terminal ready
SR	Data set ready
CD	Carrier detect
LLB	Local loopback

# Appendix A

## AT Commands

---

Table A-A and A-B shows the AT commands available for the DSU-DP.

**Table A-A**  
*AT Commands*

Command	Title	Default
A/	Re-execute Command	none
ATA	Answer	none
ATDn	Dial Number	none
ATE	Echo Command	1
ATH	Hang Up Call	none
ATO	Go Online	none
ATQn	Result Code Display	0
ATSn?	Read S-Register	none
ATSn=x	Write to S-Register	none
ATVn	Result Code From	1
ATZ	Reset	none
AT&Cn	DCD Option	0
AT&Dn	DTR Option	0
AT&Fn	Restore Factory Options	none
AT&Ln	Network Type	0
AT&Qn	DTE Data Format	0
AT&Rn	CS Options	0
AT&Sn	SR Options	0
AT&Tn	Test Commands	0
AT&V	View Current Configuration	none
AT&Wn	Store User Profile	0

**Table A-A (Cont'd)**

*AT Commands*

Command	Title	Default
AT&Xn	Transmit Clock	0
AT&Yn	Power Up User Profile	0
AT&Zn=x	Store Phone Number	none
AT%Bn	Network Rate Select	0
AT%Kn	DTE Rate Select	
AT%P	Password Control	0
AT%P=x	Password Entry	0
T%P>x	Password Verify	0
AT%R	Initiate Remote Config.	
AT%Tn	Anti-stream Option	0
AT_An	LLB Control	0
AT_Cn	SR Control During Test	0
AT_Dn	RTS-CTS Delay	0
AT_Fn	Scrambler Control	0
AT_Jn	Auto Answer Enable/Disable	0
AT_N=xx	Set Network Address	none
AT_Rn	LB Enable/Disable	0
AT_S=xx	Set Serial Number	none
AT_Tn	Select Test Pattern	0

**Table A-B**

*Test Pattern Commands*

Front Panel	AT Command	Description
2047 PATTERN	_T0&T8	Standard 2047 random data pattern.
511 PATTERN	_T1&T8	Standard 511 random data pattern.
STRESS PTRN #1	_T2&T8	Stress pattern with alternating high and low ones densities. Repeated pattern of 100 octets: 1111 1111; followed by 100 octets: 0000 0000.
STRESS PTRN #2	_T3&T8	Stress pattern with alternating medium and low ones densities. Repeated pattern of 100 octets: 0111 1110; followed by 100 octets: 0000 0000.
STRESS PTRN #3	_T4&T8	Stress pattern with medium ones density. Continuous series of octets: 0011 0010.
STRESS PTRN #4	_T5&T8	Stress pattern with low ones density. Continuous series of octets: 0100 0000.

# Appendix B

## Default Configuration Profiles

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### DEFAULT CONFIGURATION PROFILES

The DSU-DP contains two different user profiles (sets of configurations options) stored in read only memory (see Table B-A). The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See the *Installation* chapter and *Manual Command* section of the *Configuration* chapter for more information.

#### **Profile 1**

Profile 1 is configured for a 56 kbps, synchronous, point-to-point or dial up operation.

#### **Profile 2**

Use profile 3 for a SW56, asynchronous operation with CS and CD forced on.

**Table B-A**  
*Default Configuration Profiles*

Command/Options	Profile Numbers	
	(00) 1	(01) 2
<b>Manual Command</b>		
Escape Character	43=2BH	43=2BH
CR Character	13=0DH	13=0DH
LF Character	10=0AH	10=0AH
BS Character	8	8
SW56 Abort Call Timer	50=32H	50=32H
Escape Guard Timer	50=32H	50=32H
Command Echo	Enable	Enable
Result Code	Enable	Enable
Long or Short Code	Long	Long
Test Pattern Type	2047	2047
CS Delay	Short	Short
DTR Recog. Delay (x2.5ms)	0	0
DTR Command Timeout (x1 sec)	8	8
AT Password Control	Disable	Disable
<b>Network Options</b>		
Network Rate	56K	56k
Network Address	0	0
Remote Conf. En/Dis	Enable	Enable
Network Type	Dedicated	AT&T/MCI SW56
<b>DTE Options</b>		
Remote DSU Address	0	0
DTE Rate (56/64K network )	56K	57.6K
Scrambler Mode	OFF	OFF
DTE Data Format	SYNC	ASYNCR
DTE Command Options	DIS	DIS
Transmit Clock	Normal	Normal
CS Options	Follow RS	Forced On
Anti-stream Timer	Timer Off	Timer Off
CD Options	Normal	Forced On
TR Options	Ignored	Ignored
SR Options	Off Test+OOS	Off Test+OOS
<b>Test Options</b>		
Test Timeout	Off	Off
RDL En/Dis	RDL Accepted	RDL Accepted
EIA Controlled LLB	Disable	Disable
<b>Dial Options</b>		
Auto Answer	Enable	Enable

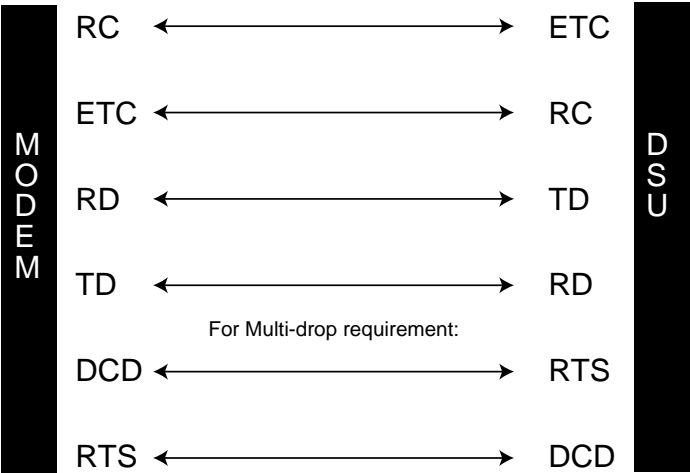
# Appendix C

## DSU to Modem Interconnect

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### MODEM TAIL CIRCUIT APPLICATION

A DSU to modem interconnect diagram for a modem tail circuit application is shown in Figure C-1.



**Figure C-1**  
*DSU to Modem Interconnect*



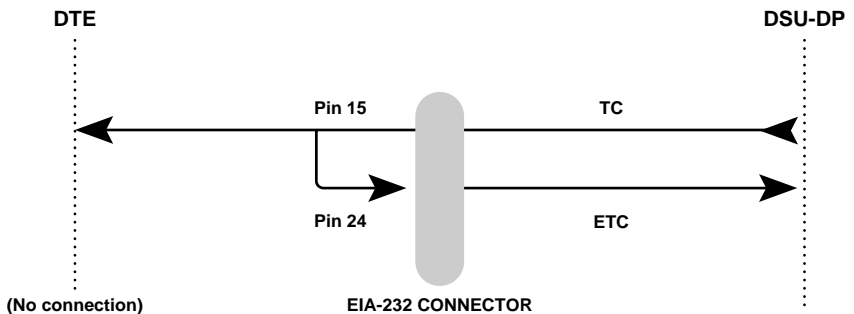


# Appendix D

## EIA-232 Connector

### 56 AND 64 KBPS APPLICATION

The EIA-232 connector, shown in Figure D-1, may be used for 56 and 64 kbps applications. Using the External clock option and this cable should eliminate data errors caused by excessive delays in the DTE transmit clock receiver and transmit data driver. When creating this cable at the DTE interface EIA-232 connector, tie transmit clock lead (TC) to external transmit (ETC) as shown.



**Figure D-1**  
*EIA-232 Connector*



# Appendix E

## Dual DSU-DP Configuration Menu Tree

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This appendix contains a foldout page of the DSU-DP configuration menu tree, Figure E-1.



# Appendix F

## Troubleshooting Supplement

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This appendix contains information on the TSU Alarm and History Buffer.

In the TSU/HSU Menu menus the first item is STATUS; the fourth item under status is VIEW HISTORY.

### **TSU History Buffer Alarms**

Two alarms that occur in the TSU History Buffer are:

- OUT OF SERVICE
- DTE STREAMING

These two alarms also show up in the third STATUS item, 3) ACTIVE ALARMS.

### **OUT OF SERVICE (OOS)**

The unit detects an out-of-service condition from the telco. This indicates the telco is having problems with the DDS circuit or that the remote unit is turned off, disconnected, or mis-optioned. When this alarm occurs, do the following:

- Check the remote unit
- Contact telco service provider
- If problem persists, contact telco service provider

### **DTE Streaming**

If the anti-stream timer has been activated, this alarm will occur if the anti-stream timer has overflowed. When this alarm occurs, do the following:

- Verify the timer is set for a long enough time period.
- Check DTE device for proper operation

### **When Alarms Clear**

When either DTE Streaming or Out of Service alarms clear, the Status History will show:

- OOS CLEAR
- DTE STREAM CLEAR

### **Non-Alarm Conditions in History Buffer**

The following are other status conditions that may occur in the History Buffer:

#### **OCU LB BY CO**

This indicates the telco initiated OCU LOOPBACK.

#### **CSU LB BY CO ON**

This indicates the telco initiated CSU LOOPBACK.

#### **DSU LB BY CO ON**

The unit in the telco initiated DSU LOOPBACK.

#### **IN RDL BY FAR**

This indicates an RDL (remote digital loopback) test was initiated by the far-end DSU.

#### **SLAVED RMT CNF**

This indicates the unit was in remote configuration initiated by the far-end DSU.

#### **EIA LLB ON**

This indicates the unit was in a test, initiated by the LLB signal on the DTE interface.

**LOCAL TEST ON**

This indicates the unit was in a test, initiated from the front panel.

**REMOTE TEST ON**

This indicates the unit placed the far end DSU into remote digital loopback.

**REMOTE CONF ON**

This indicates the unit had the far-end DSU in remote configuration mode.

**TEST OFF**

This indicates the unit exited a previously initiated test.

**REMOTE CONF OFF**

This indicates the unit exited remote configuration mode.





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## Product Support Information

### Presales Inquiries and Applications Support

Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering      (800) 615-1176  
Sales                                      (800) 827-0807

### Post-Sale Support

Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support                      (800) 726-8663

### Repair and Return

If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Return Material Authorization (RMA) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact RMA directly at the following number:

RMA Department                      (205) 971-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN, Inc.  
RMA Department  
901 Explorer Boulevard  
Huntsville, Alabama 35806-2807

RMA # \_\_\_\_\_

