DSU III S4W

Data Service Unit
Part Number 1202013L1
Document Number 61202013L1-20A

January 2000

ADTRAN

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IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1. Do not use this product near water, such as near a bath tub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.
2. Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord, power supply, and / or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check local codes for any special disposal instructions.

SAVE THESE INSTRUCTIONS!

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the equipment housing is a label that shows the FCC registration number and Ringer Equivalence Number (REN) for this equipment. If requested, provide this information to the telephone company.
2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.
3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment; advance notification and the opportunity to maintain uninterrupted service is given.
4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected or it is certain the equipment is not malfunctioning.
5. This unit contains no user-serviceable parts.
6. An FCC compliant telephone cord with a modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.
7. The following information may be required when applying to the local telephone company for leased line facilities.

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
2.4 kbps Digital Interface	04DU5-24	6.0F	RJ-48S
4.8 kpbs Digital Interface	04DU5-48	6.0F	RJ-48S
9.6 kpbs Digital Interface	04DU5-96	6.0F	RJ-48S
56 kbps Digital Interface	04DU5-56	6.0F	RJ-48S

8. In the event of equipment malfunction, all repairs should be performed by ADTRAN. It is the responsibility fo users requiring service to report the need for service to their distributor or ADTRAN. See the last page of this manual for information on contacting ADTRAN for service.

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 instructions, 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.

Shielded cables must be used with this unit to ensure compliances with Class A FCC limits.

WARNING *Changes or modifications to this unit not expressly approved by ADTRAN will void the user's authority to operate the equipment.*

CANADIAN EMISSIONS REQUIREMENTS

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

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

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

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

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or an electrician, as appropriate.

The **Load Number** (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100.

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five years from the date of shipment if it does not meet its published specifications or fails while in service. For detailed warranty, repair, and return information refer to the ADTRAN Equipment Warranty and Repair and Return Policy Procedure.

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For service, RMA requests, or further information, contact one of the numbers listed on the last page of this manual.

LIMITED PRODUCT WARRANTY

ADTRAN warrants that for ten (10) years from the date of shipment to Customer, all products manufactured by ADTRAN will be free from defects in materials and workmanship. ADTRAN also warrants that products will conform to the applicable specifications and drawings for such products, as contained in the Product Manual or in ADTRAN's internal specifications and drawings for such products (which may or may not be reflected in the Product Manual). This warranty only applies if Customer gives ADTRAN written notice of defects during the warranty period. Upon such notice, ADTRAN will, at its option, either repair or replace the defective item. If ADTRAN is unable, in a reasonable time, to repair or replace any equipment to a condition as warranted, Customer is entitled to a full refund of the purchase price upon return of the equipment to ADTRAN. This warranty applies only to the original purchaser and is not transferable without ADTRAN's express written permission. This warranty becomes null and void if Customer modifies or alters the equipment in any way, other than as specifically authorized by ADTRAN.

EXCEPT FOR THE LIMITEDWARRANTY DESCRIBED ABOVE, THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AND THE EXCLUSIVE LIABILITY OF ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES (EXPRESSED OR IMPLIED). ADTRAN SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING (WITHOUT LIMITATION), ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THIS EXCLUSION MAY NOT APPLY TO CUSTOMER.

In no event will ADTRAN or its suppliers be liable to Customer for any incidental, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Customer.

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Chapter 1 Introduction

PRODUCT OVERVIEW

The ADTRAN Data Service Unit III Switched 4-Wire (DSU III S4W) provides a reliable, high-speed data connection for customer data terminal equipment (DTE) through 4-wire Switched 56 (SW56) network lines. The DSU III S4W supports both synchronous and asynchronous data communication.

The DSU III S4W provides both V.35 and EIA-232 electrical and physical DTE interfaces to accommodate a variety of applications. A second EIA-232 auxiliary port is provided for out-of-band AT command, V.25 bis, or EIA-366 dialing. The DSU III S4W is compatible with AT&T Accunet and Sprint SW56 services. To ensure a reliable connection on those services, the unit features an extended receiver capability which permits operation over long loops (3.4 miles or 5.5 km at 26 AWG).

Figure 1-1 shows a sample switched 56 application for the DSU III S4W.

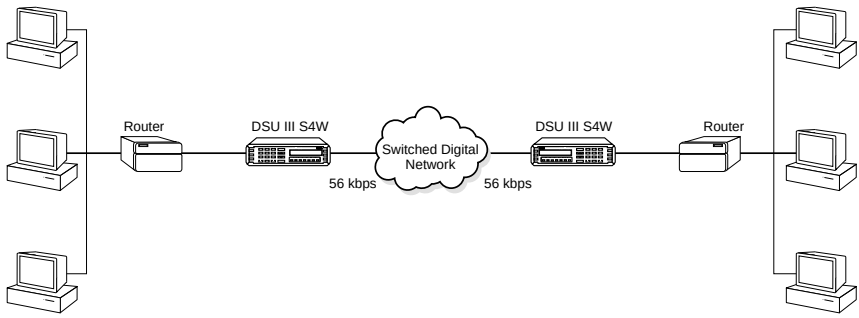


Figure 1-1. Sample Switched 56 Application for DSU III S4W

Switched 56 Overview

This dial-up, 4-wire SW56 digital data service (DDS) allows customers to pay for data connection only for the time the unit is active. The regional operating companies provide the 4-wire local loop service to SW56 customers. The DSU III S4W supports DTE rates of 2.4, 4.8, 9.6, 19.2, 38.4, and 56 kbps (synchronous) and 2.4, 4.8, 9.6, 19.2, 38.4, and 57.6 kbps (asynchronous).

Chapter 2 Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the DSU III S4W for any shipping damage. 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 DSU III S4W for repair or for verification of damage during shipment.

Equipment Provided

The following items are included in ADTRAN shipments of the DSU III S4W:

- DSU III S4W unit
- An 8-position modular to 8-position modular cable
- The user manual

The customer must provide an EIA-232 interface cable with standard 25-pin male D-type connectors (Cannon or Cinch DB-19604-432) or V.35 cable and a cable for the auxiliary EIA-232 dialport if used.

Power Up

Each DSU unit is provided with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle. A telco connector is also provided for interface to the network.

Power to the DSU must be provided from a grounded 115 VAC, 60 Hz receptacle.

NETWORK INTERFACE CONNECTION

The DSU III S4W has an eight-position modular jack labeled **TELCO**. The connector is used for connecting to the network when the unit is configured for either dedicated or switched operation. The pin assignments for the **TELCO** connector are listed in *Table 2-1*.

Table 2-1. Pin Assignments for Telco Connector

Pin	Name	Description
1	R1	Transmit Data from DSU to Network-Ring 1
2	T1	Transmit Data from DSU to Network-Tip 1
3-6	-	Not Used
7	T	Receive Data from Network to DSU-Tip
8	R	Receive Data from Network to DSU-Ring

DTE DATA CONNECTION/PRIMARY DTE

The primary DTE should be connected to either the EIA-232 DTE connector or the CCITT V.35 DTE connector. The maximum cable lengths recommended are 50 feet for the EIA-232, and 100 feet for the CCITT V.35. The pin assignments for the connectors are listed in *Table 2-2* and *Table 2-3* on page 2-4.

The V.35 connector is recommended for use with data rates above 19.2 kbps. The EIA-232 connector works up to 56 kbps with a low capacitance cable or with the **EXTERNAL TRANSMIT CLOCK** option selected (See *Transmit Clock* on page 6-5). The primary DTE rate is configured from the front panel. The primary DTE can operate in asynchronous or synchronous modes.

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

Table 2-2. Pin Assignments for Primary EIA-232 Connector

Pin	EIA	Description
1	AA	Protective Ground (PG)
2	BA	Transmit Data (TD)
3	BB	Receive Data (RD)
4	CA	Request to Send (RS)
5	CB	Clear to Send (CS)
6	CC	Data Set Ready (SR)
7	AB	Signal Ground (SG)
8	CF	Received Line Signal Detector (CD)
9	-	+12 Test Point
10	-	-12 Test Point
15	DB	Transmit Clock (TC)
17	DD	Receive Clock (RC)
18	-	Local Loopback (LL)
20	CD	Data Terminal Ready (TR)

Table 2-2. Pin Assignments for Primary EIA-232 Connector

Pin	EIA	Description
21	-	Remote Loopback (RL)
22	CE	Ring Indicator (RI)
24	DA	External TX Clock (ETC)
25	-	Test Indicator (TI)

Table 2-3. Pin Assignments for Primary V.35 Connector

Pin	CCITT	Description
A	101	Protective Ground (PG)
B	102	Signal Ground (SG)
C	105	Request to Send (RS)
D	106	Clear to Send (CS)
E	107	Data Set Ready (SR)
F	109	Received Line Signal Detector (CD)
H	-	Data Terminal Ready (TR)
J	-	Ring Indicator (RI)
L	-	Local Loopback (LL)
N	-	Remote Loopback (RL)
R	104	Received Data (RD-A)
T	104	Received Data (RD-B)
V	115	Receiver Signal Element Timing (SCR-A)
X	115	Receiver Signal Element Timing (SCR-B)
P	103	Transmitted Data (SD-A)
S	103	Transmitted Data (SD-B)
Y	114	Transmitter Signal Element Timing (SCT-A)
AA	114	Transmitter Signal Element Timing (SCT-B)
U	113	External TX Signal Element (SCX-A)
W	113	External TX Signal Element (SCX-B)
NN	-	Test Indicator (TI)

AUXILIARY EIA-232 DIALPORT

If used, the DTE dialing interface should be connected to the Auxiliary EIA-232 connector. The connector services an EIA-366A interface or EIA-232 as shown in *Table 2-4*.

Table 2-4. Pin Assignments for EIA-366A Connector

Pin	EIA	Description
1	Shield	Shield for Cable
2	DPR	Digit Present
3	ACR	Abandon Call and Retry
4	CRQ	Call Request
5	PND	Present Next Digit
6	PWI	Power Indicator
7	SG	Signal Ground
13	DSC	Distant Station Connector
14	NB1	Digit LSB
15	NB1	Digit Bit 2
16	NB4	Digit Bit 3
17	NB8	Digit MSB
18	RC	Receive Common
19	SC	Send Common
22	DLO	Data Line Occupied
8, 9, 10, 11, 12, 20, 21, 23, 24, 25	NC	No Connection

CONFIGURATION

The DSU III S4W contains four different user profiles (sets of configurations options) that are stored in read-only memory. These profiles are listed in the appendix *Default Configuration Profiles* on page B-1. 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, then 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 DSU III S4W is then configured with that profile every time power is turned on or reset.

See the chapter *Manual Command* on page 9-1 for information on loading default configuration profiles.

Configuration Methods

The DSU III S4W provides methods for both local and remote configuration. These methods are described in the following paragraphs.

Front Panel

The front panel provides access to all operation parameters of the DSU III S4W through a multi-level menu structure which begins with a four part **MAIN** menu (see the chapter *Installation* on page 2-1).

AT Commands

The DSU III S4W 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 DSU III S4W. 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 DSU III S4W to configure most of the options or initiate tests to check both the DSU III S4W 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 DSU III S4W 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, edit the command line by using the backspace character (ASCII 008) to erase errors so the proper commands can be entered. Valid AT commands for the DSU III S4W are listed in the appendix *AT Commands* on page A-1.

V.25 bis Commands

When configured for the V.25 bis option, the DSU III S4W 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
INV	Invalid command detected
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 line. There are no parameters associated with this command. Possible indications include VAL, CNX, and CFIxx.

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 DSU III S4W 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 DSU III S4W 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 com-

mands are returned in the data format currently configured. Possible responses include VAL and INVn.

Switched 56 Operation

CRN (Call Request with Number)

The CRN command causes the DSU to dial the supplied number. The command's 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 DSU III S4W responds with the call failure indication CFINS (Call Failure Indication Not Stored).

If the number supplied contains non-dialable digits, they are ignored and only the dialable digits are dialed. Possible responses include VAL,CNX, and CFIxx.

CRS (Call Request Using Stored Number)

The CRS command causes the DSU III S4W 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 are VAL,CNX, and CFIxx.

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 INVPV 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 DSU III S4W 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 INVPV 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 DSU III S4W responds with a list of all the registers and the stored numbers. This list is followed by the VAL response.

Chapter 3 Operation

MENU STRUCTURE

The DSU III S4W uses a multi-level menu approach to access its many features. All menu operations are displayed in the LCD window.

The opening menu is the access point for all other operations. There are four **MAIN** menu branches: **STATUS**, **TEST**, **CONFIGURATION** and **DIAL**.

Each **MAIN** menu item has several functions and sub-menus to identify and access specific parameters.

LCD Display of the Main Menu

1=STATUS 2=TEST
3=CONFIG 4=DIAL

Main Menu

The following paragraphs briefly describe the **MAIN** menu's four branches. More detailed information is provided in the individual chapters for each branch.

Status

STATUS is used to display all relevant information for the network and DTE interfaces. It displays the current operating data mode, loop status, DTE data rate and format, and TR, SR, LL, and RL DTE interface lead status. The display returns to the **STATUS** menu when the front panel is not accessed. See the chapter *Status Selection* on page 12-1 for more detailed information.

Test

TEST is used to control local and remote testing. Select **LOCAL** or **REMOTE** testing, define unit address for **REMOTE** testing, and select the type of test and test pattern when required. For more information see the chapter *Configuring Test Options on page 7-1*.

Configuration (CONFIG)

CONFIGURATION is used to select network and DTE operating parameters. This menu branch is divided into several chapters for easier reference. The division includes a brief overview chapter followed by a separate chapter for each of the five sub-menus of the **CONFIG** branch: *Configuring Network Options on page 5-1*, *Configuring DTE Options* on page 6-1, *Configuring Test Options on page 7-1*, *Configuring Dial Options* on page 8-1, and *Manual Command* on page 9-1.

Dial

DIAL provides manual dialing functions. Key in a number to dial, select one of the ten stored numbers, or redial the last dialed number. This menu is available for use only when Accunet SW56 or US SPRINT SW56 is the selected **NETWORK TYPE**. See the chapter *Dial Selection* on page 10-1, for more information.

Basic Menu Travel

Four function keys on the left side of the DSU III S4W keypad allow the various menu branches to be entered, exited, and scrolled through. The four function keys are defined below.

ENTER	Selects a displayed item.
UP ARROW	Scrolls up the sub-menu items.
DOWN ARROW	Scrolls down the sub-menu items.
CANCEL	Exits (back one level) from the current branch of the menu.

To choose a menu item, press the corresponding number or alpha character on the keypad (press **SHIFT** to activate alpha characters). The item flashes on and off to show it is the currently selected (active) choice. Pressing either the **UP** or **DOWN** arrow scrolls through the available menu items. Pressing **ENTER** selects the flashing item.

The following example and *Figure 3-1* illustrate how to select the DSU III S4W **NETWORK TYPE** option.

1. Select **CONFIGURATION** (**CONFIG**) by pressing **3**, then press **ENTER**.
2. Select **LOCAL** or **REMOTE** test by pressing the corresponding number, then press **ENTER**.
3. Use the **UP** and **DOWN** arrows to view sub-menu items.
4. Choose an item on the sub-menu such as **NETWORK OPTIONS** (**NETWORK OPT**).
5. To select **NETWORK OPT** press **1**, then press **ENTER**.
6. To select **NETWORK TYPE** options, press **1**, then press **ENTER**.
7. The current network type rate is flashing. Scroll up or down to view possible options. To select a new network type, press the corresponding number then press **ENTER**.

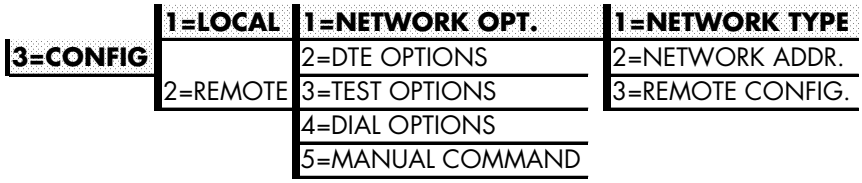


Figure 3-1. Example of Basic Menu Travel

FRONT PANEL

The DSU III S4W faceplate is shown in *Figure 3-2.*

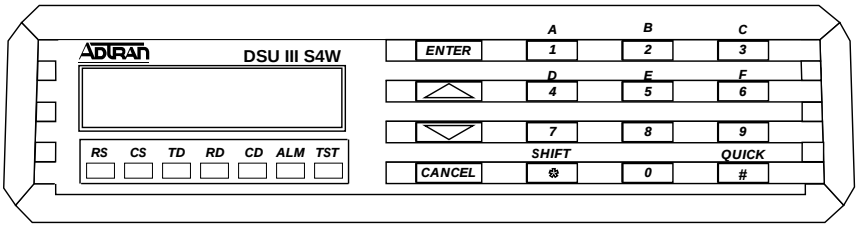


Figure 3-2. DSU III S4W Front View

The following function descriptions apply to the DSU III S4W front panel.

LCD Window
Displays menu items and messages in 2 lines by 16 characters.

Enter
Selects active menu items. To activate a menu item, press the number of the item. When the menu item is flashing, press **ENTER** to select it. A sub-menu item is invoked or a configuration parameter is set. The display of **COMMAND ACCEPTED** indicates a valid operation.

Numeric Keypad
The numeric keypad contains the numbers **0** through **9** and alpha characters **A** through **F**, which are used to activate menu items or enter parameters.

Shift
Alpha characters are entered by pressing **SHIFT** before each desired character.

To activate a menu item designated by an alpha character rather than a number, display the menu item using the up and down arrows, press **SHIFT** and the letter. Press **ENTER** to select the item.

If a key is pressed without using **SHIFT**, the numbered item becomes active instead of the alpha item. If this happens, repeat the correct procedure.

Quick Key

During most operations, the **QUICK** key returns the display to the **MAIN** menu. During a test, the **QUICK** key returns to the top of the **TEST** menu. In SW56 operation, if the unit is not in test, the **QUICK** key returns to the **DIAL** menu.

Cancel

The **CANCEL** key stops the current activity and returns to the previous menu. Repeat until the desired menu level is reached.

Up and Down Arrows

The up and down arrows scroll through the sub-menu items available in the current menu. Sub-menu items appear two at a time in a circular or wrapping fashion. When the sub-menu items are scrolled, they continuously appear from beginning to end in a forward (down arrow) or reverse (up arrow) pattern.

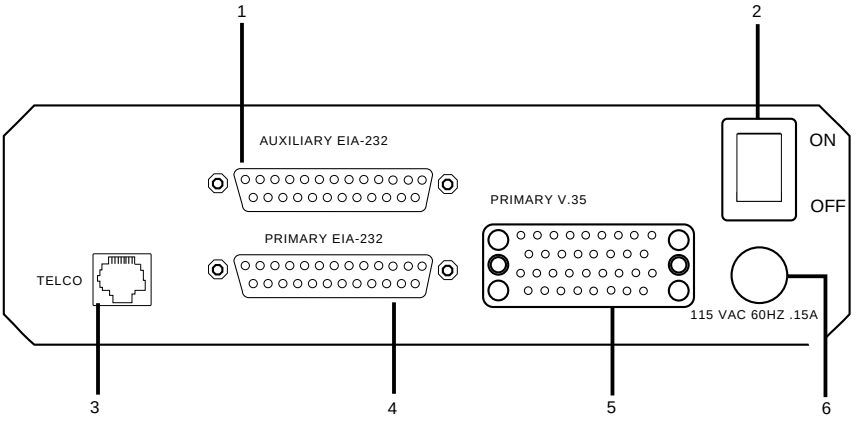
LED Description

The DSU III S4W has seven LED indicators: RS, CS, TD, RD, CD, ALM and TST. These LEDs are identified as follows:

RS:	Request to Send
CS:	Clear to Send
TD:	Transmit Data
RD:	Receive Data
CD:	Carrier Detect
ALM:	Alarm Indication
TST:	Test Mode Manual

REAR PANEL

The rear panel contains three DTE connectors which provide primary channel V.35 or EIA-232/EIA-366, and a second EIA-232 port (auxiliary EIA -232). An 8-pin telco jack, a captive power cord, and a power switch are also located on the rear panel. Pin assignments for the DTE and network connections are listed in the chapter *Installation* on page 2-1. The DSU III S4W rear panel is shown in *Figure 3-3.*



	Item	Function
1.	Auxiliary EIA-232	Secondary channel services
2.	Power Switch	Used to turn power on or off
3.	Telco Connection	Connection to the dedicated circuit
4.	Primary EIA-232	DTE interface
5.	Primary V.35	High-speed DTE interface
6.	115 VAC Connection	Power cord connection

Figure 3-3. DSU III S4W Rear View

Chapter 4 Configuration Overview

LOCAL AND REMOTE CONFIGURATION

The DSU III S4W can be configured locally using the front panel or remotely by establishing communications with another DSU. The front panel of the local DSU can then be used to configure the remote DSU. During remote configuration, the DSU III S4W prompts for the remote address before continuing to the **CONFIGURATION** (**CONFIG**) menus.

The **CONFIGURATION** menu consists of a group of five sub-menus relating to a specific interface or function of the DSU III S4W that requires setup:

1=NETWORK OPT.	Network Interface Parameters
2=DTE OPTIONS	DTE Interface Parameters
3=TEST OPTIONS	Unit Test Options
4=DIAL OPTIONS	Unit Dialing Options
5=MANUAL COMMAND	ADTRAN Specific Commands

The DSU III S4W contains four different user profiles (sets of configurations options) that are stored in read-only memory (see the appendix, *Default Configuration Profiles on page B-1)*. 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, then no additional configuration is required to put the unit into service. If profile 1 does not match system requirements it can be modified, or one of the other profiles 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 III S4W is then configured with that profile every time power is turned on or until the unit is reset.

For detailed information on configuration see the chapters *Configuring Network Options on page 5-1, Configuring DTE Options on page 6-1, Configuring Test Options on page 7-1, Configuring Dial Options on page 8-1,* and *Manual Command on page 9-1.*

A complete **CONFIGURATION** menu is shown on the enclosed insert.

Chapter 5 Configuring Network Options

NETWORK OPTIONS

The **NETWORK OPTIONS** configuration parameters control the loop operation of the DSU III S4W.

Once a parameter is set, **COMMAND ACCEPTED** is displayed briefly before returning to the active menu.

Network Type

This option configures the DSU III S4W for the specific type of network being used. The factory default setting is **AT&T/MCI/OTHER** (see *Figure 5-1*).

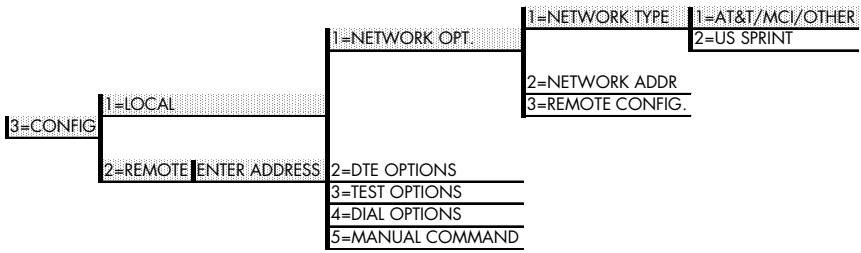


Figure 5-1. Setting Network Type Options

Table 5-1 shows the equivalent AT commands that perform the same configuration functions.

Table 5-1. Network Type Commands

Front_Panel	AT Command	Description
1=AT&T/MCI/OTHER	&L1	Long distance service provider is other than Sprint
2=US SPRINT	&L2	Long distance service provider is Sprint

When AT&T/MCI/OTHER or US SPRINT is selected, the ***MAIN*** *menu displays the* ***DIAL*** *selection.*

Network Address

A two-digit decimal address can be assigned to each DSU III S4W. This addressing capability makes it possible to perform remote configuration and testing. *Figure 5-2* shows the menu path used to change the network address. The factory default setting is 0.

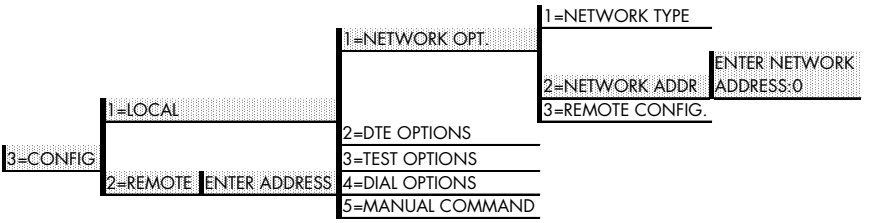


Figure 5-2. Setting the Network Address

Table 5-2 shows the AT command used to set the network address.

Table 5-2. Network Address Command

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

Remote Configuration

This option sets up the DSU III S4W to accept or reject remote configuration commands. *Figure 5-3* shows the menu path for enabling/disabling remote configuration. The factory default setting is **ENABLED**.

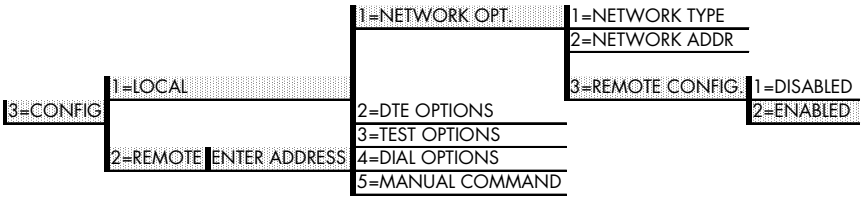


Figure 5-3. Enabling/Disabling Remote Configuration

Table 5-3 shows the equivalent AT commands used to enable or disable remote configuration.

Table 5-3. Remote Configuration Commands

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

Chapter 6 Configuring DTE Options

DTE OPTIONS

The **DTE OPTIONS** menu is used to select the configuration parameters that control the operation of the DSU III S4W's DTE interface.

DTE Rate

The supported DTE rates for a 56 kbps loop are shown in *Figure 6-1*.

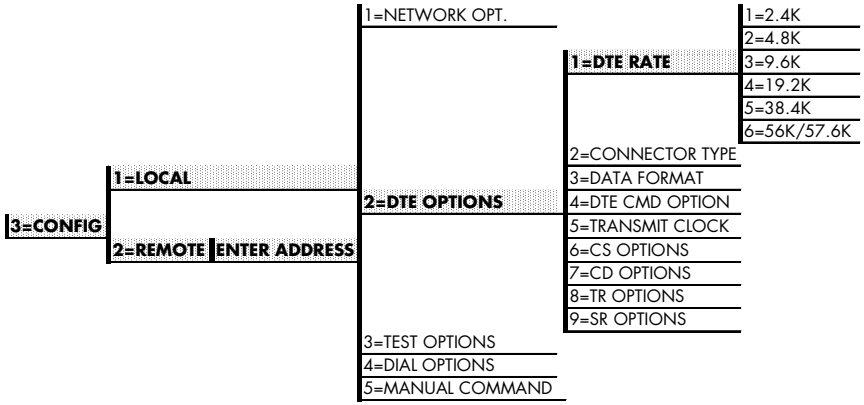


Figure 6-1. Selecting DTE Rates

The equivalent AT commands for setting the DTE rate for a 56 kbps loop rate are shown in *Table 6-1*.

Table 6-1. DTE Rate AT Commands

Front Panel	AT Command	Description
1=DTE 2.4K	%K3	DTE rate 2.4K sync and async
2=DTE 4.8K	%K4	DTE rate 4.8K sync and async
3=DTE 9.6K	%K5	DTE rate 9.6K sync and async
4=DTE 19.2K	%K6	DTE rate 19.2K sync and async
5=DTE 38.4K	%K7	DTE rate 38.4K sync and async
6=DTE 56K/57.6K	%K8	DTE rate 56K sync or 57.6 async

Connector Type

The **CONNECTOR TYPE** option is used to specify which of the primary channel connectors is used to connect to the DTE. *Figure 6-2* shows the menu path used to set the connector type. The factory default setting is **V.35**. There are no AT commands available to set the connector type.

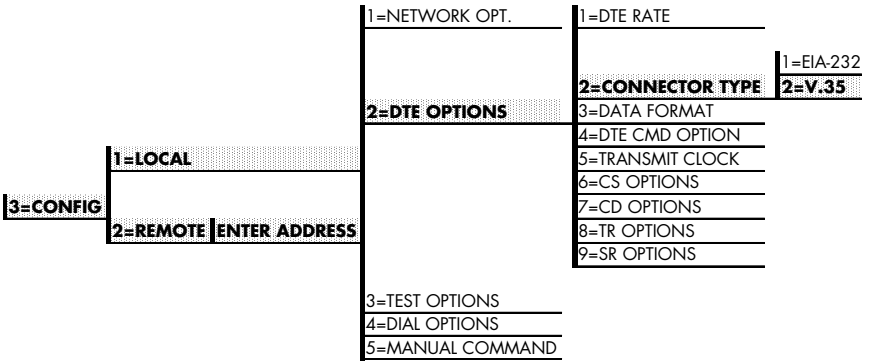


Figure 6-2. Selecting the Connector Type

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 6-3*). If **ASYNCHRONOUS** is chosen, the length of the data bytes must be selected.

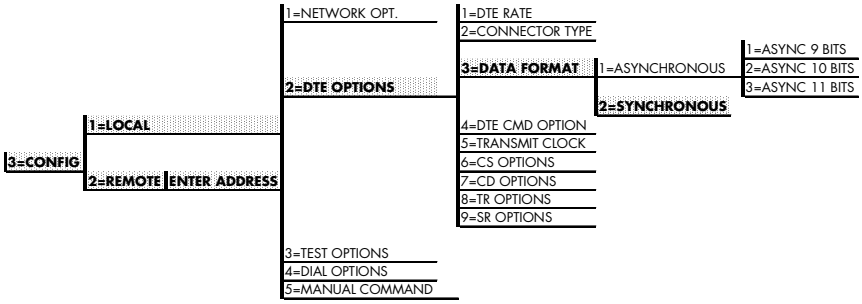


Figure 6-3. Selecting Asynchronous or Synchronous Data Format

Table 6-2 shows the AT commands that can be used to set the **DATA FORMAT**.

Table 6-2. Data Format Commands

Front Panel	AT Command	Description
1=ASYNCHRONOUS	&Q0	Always asynchronous
2=SYNCHRONOUS	&Q2	Always synchronous
For asynchronous options, select the length of the data bytes.		
1=ASYNC 9 BITS	N/A	9 bits including start, stop, parity
2=ASYNC 10 BITS	N/A	10 bits including start, stop, parity
3=ASYNC 11 BITS	N/A	11 bits including start, stop, parity

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 6-4*).

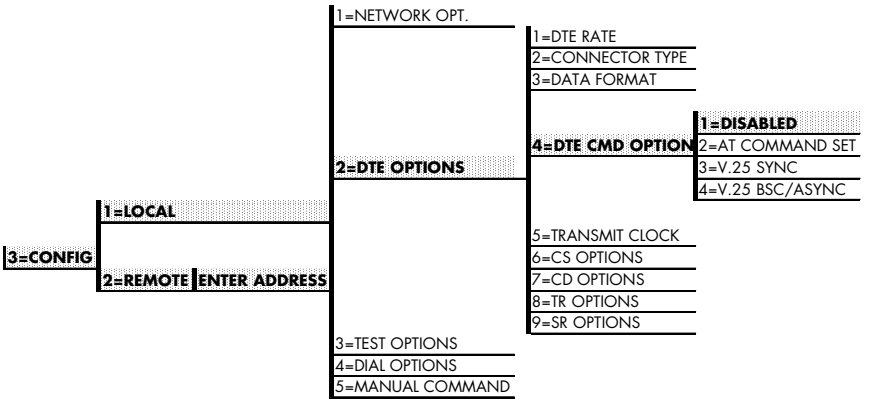


Figure 6-4. Selecting DTE Command Option

NOTE

*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 III S4W. *Figure 6-5* shows the menu path used to set the **TRANSMIT CLOCK** option.

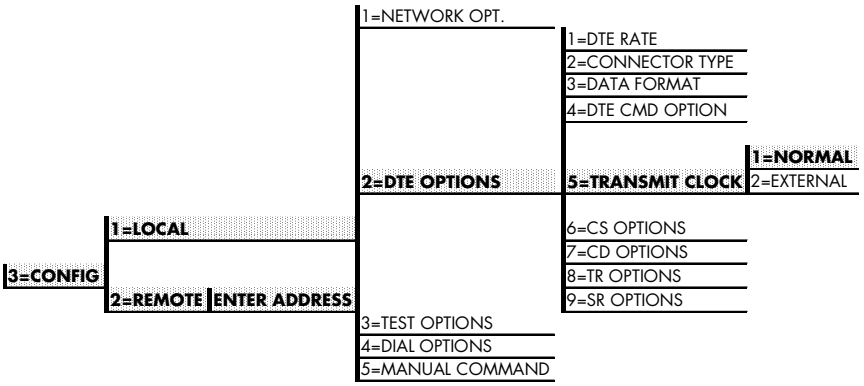


Figure 6-5. Transmit Clock Options

Table 6-3 shows the AT commands used to set the **TRANSMIT CLOCK** option.

Table 6-3. Transmit Clock AT Commands

Front Panel	AT Command	Description
1=NORMAL	&X0	TX clock from DSU selected
2=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 on page C-1*.

The **EXTERNAL** clock option is also recommended when the EIA-232 connector is used for 56 kbps applications. A special DSU cable diagram for this application is shown in the appendix, *EIA-232 Connector on page D-1*. Using this option and 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 five different control modes for the CS lead. *Figure 6-6* shows the menu path used to access the **CS OPTIONS** menu. The default factory setting is **FOLLOW RS** with **CS DELAY SHORT**.

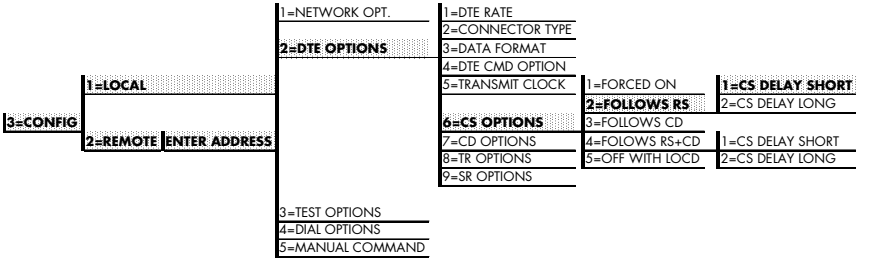


Figure 6-6. Selecting CS Options

If one of the options chosen involves request to send (**RS**), then the delay from **RS** to **CS** must be selected. *Table 6-4* shows the AT Commands used to set the **CS OPTIONS**.

Table 6-4. CS Options AT Commands

Front Panel	AT Command	Description
1=FORCED ON	&R0	CS always on.
2=FOLLOWS RS	&R1	CS on with RS after delay; off when RS or if DSU cannot pass data.
3=FOLLOWS CD	&R2	CS off when CD goes off or if DSU cannot pass data.
4=FOLLOWS RS+CD	&R3	CS follows RS after delay and also off if CD off. If CD goes off after RS is on, DSU III S4W will turn off CS but continue to pass data until RS goes off. CS also off if DSU cannot pass data.
5=OFF WITH LOCD	&R4	Off 5 sec after LOCD. Valid only in SW56 mode. CS is forced on but will turn off for 5 seconds after a call is disconnected.
For RS options, select the RS to CS delay length.		
1=CS DELAY SHORT	_D0	Short Delay from RS to CS selected.
2=CS DELAY LONG	_D1	Long Delay from RS to CS selected.

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 6-7*).

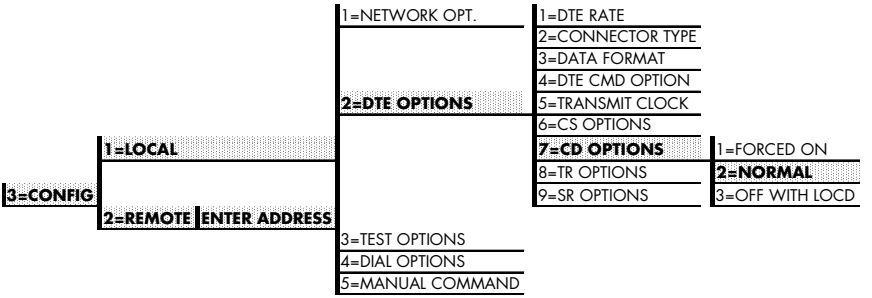


Figure 6-7. Selecting CD Options

Table 6-5 shows the equivalent AT commands for setting **CD** options.

Table 6-5. CD Options AT Commands

Front Panel	AT Command	Description
1=FORCED ON	&C0	On all the time
2=NORMAL	&C1	On only when data present on loop
3=OFF WITH LOCD	&C2	On except 5 seconds after disconnect in Switched 56 application

TR Options

The **TR OPTIONS** menu is used to select the DSU III S4W response to the data terminal ready (**TR**) lead. The factory default setting is **IGNORED** (see *Figure 6-8*).

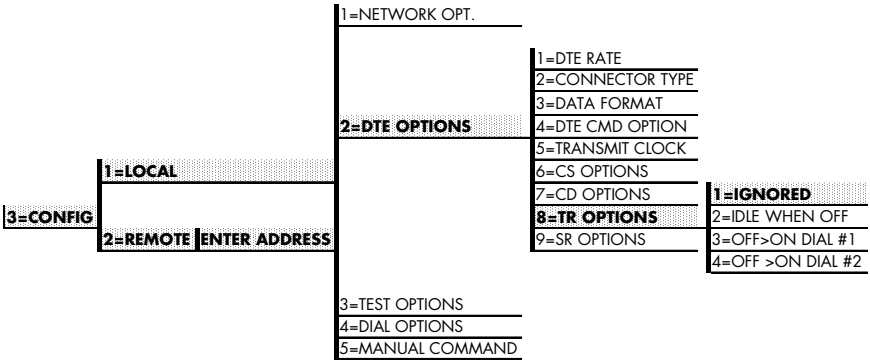


Figure 6-8. Selecting TR Options

Table 6-6 shows the equivalent AT commands for setting **TR OPTIONS**.

Table 6-6. TR Options AT Commands

Front Panel	AT Command	Description
1=IGNORE	&D0	Ignore the TR input
2=IDLE WHEN OFF	&D2	On hook when TR off (idle)
3=OFF>ON DIAL #1	&D3	Dial Stored #1: TR goes off to on
4=OFF>ON DIAL #2	&D4	Dial Stored #2: TR goes off to on

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 TEST ONLY** (shown in *Figure 6-9*).

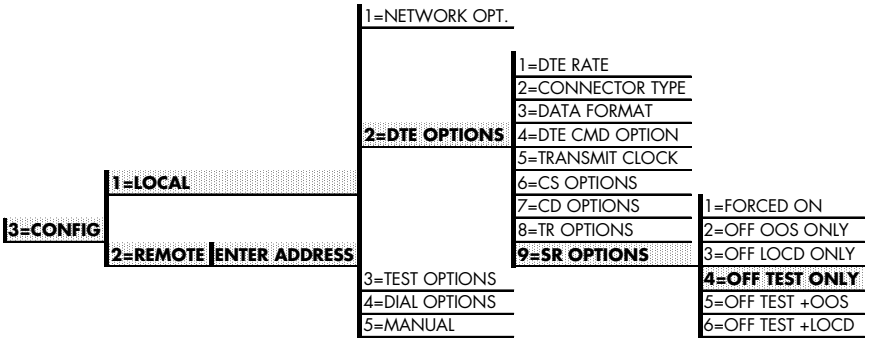


Figure 6-9. Setting SR Options

Table 6-7 shows the AT commands for setting **SR OPTIONS**.

Table 6-7. SR Options AT Commands

Front Panel	AT Command	Description
1=FORCED ON	&S0	Always on
2=OFF OOS ONLY	&S1	Off when network Out Of Service (OOS)
3=OFF LOCD ONLY	&S3	Off 5 seconds after disconnect (SW56 only)
4=OFF TEST ONLY	&S0_C0	Off when unit is in test
5=OFF TEST +00S	&S1_C0	Off in test or OOS
6=OFF TEST +LOCD	&S5	Off 5 seconds after disconnect or test

Chapter 7 Configuring Test Options

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 III S4W 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 7-1* shows the menu path used to access **TEST TIMEOUT**.

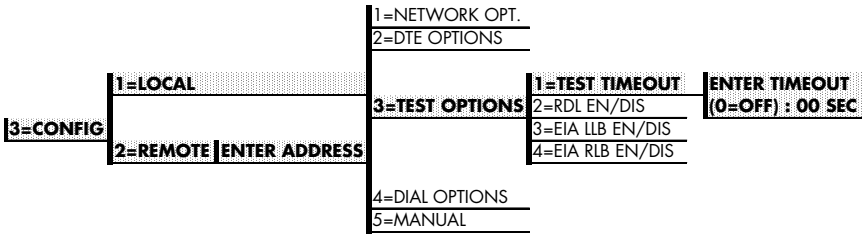


Figure 7-1. Setting Test Timeout Option

Table 7-1 shows the equivalent AT commands for setting the **TEST TIMEOUT**.

Table 7-1. Test Timeout AT Commands

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 III S4W responds to an RDL request from the far end of the circuit. The factory default setting is **RDL ACCEPTED**. *Figure 7-2* shows the menu path used to access this option.

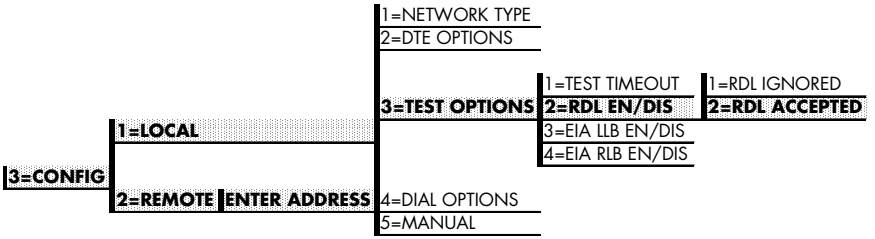


Figure 7-2. Remote Digital Loopback

Table 7-2 shows the equivalent AT commands for setting the **RDL** option.

Table 7-2. Remote Digital Loopback AT Commands

Front Panel	AT Command	Description
1=RDL IGNORED	&T5	RDL request from remote DSU ignored
2=RDL ACCEPTED	&T4	RDL request accepted

EIA Local Loopback

The **EIA LLB** (Electronics Industries Association local loopback) option specifies whether or not the DSU III S4W responds to the LLB input from the DTE. The factory default setting is **DISABLED**. *Figure 7-3* shows the menu path used to access the **EIA LLB** option.

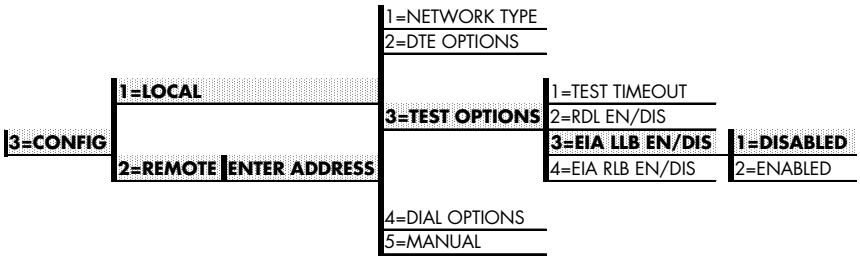


Figure 7-3. EIA Local Loopback Options

Table 7-3 shows the equivalent AT commands for setting the **EIA LLB** options.

Table 7-3. EIA Local Loopback AT Commands

Front Panel	AT Command	Description
1=DISABLED	_A0	EIA LLB disabled
2=ENABLED	_A1	EIA LLB enabled

EIA Remote Loopback

The **EIA RLB** (Electronics Industries Association remote loopback) option specifies whether or not the DSU III S4W responds to the RLB input from the DTE. The factory default setting is **DISABLED**. *Figure 7-4* shows the menu path for the **EIA RLB** options.

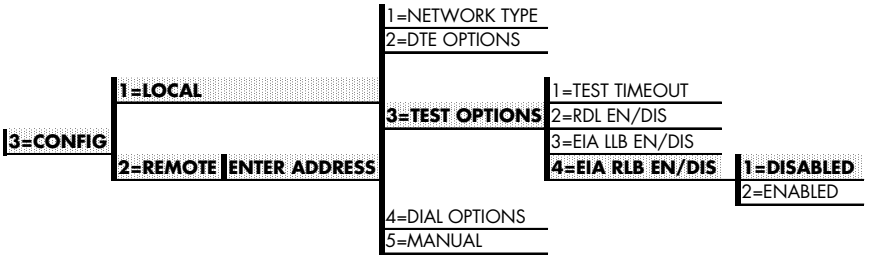


Figure 7-4. EIA Remote Loopback Options

Table 7-4 shows the equivalent AT commands for setting the **EIA RLB** options.

Table 7-4. EIA Remote Loopback AT Commands

Front Panel	AT Command	Description
1=DISABLED	_R0	EIA RLB disabled
2=ENABLED	_R1	EIA RLB enabled

Chapter 8 Configuring Dial Options

DIAL OPTIONS

The **DIAL OPTIONS** menu stores up to ten phone numbers and defines the answer operations of the DSU III S4W when it is configured for Switched 56 operation.

Phone Number

The DSU III S4W stores up to ten numbers of 36 digits each. Edit a phone number by reentering the entire number. This process overwrites the previously stored number. *Figure 8-1* shows the menu path used to access the **PHONE NUMBER** option.

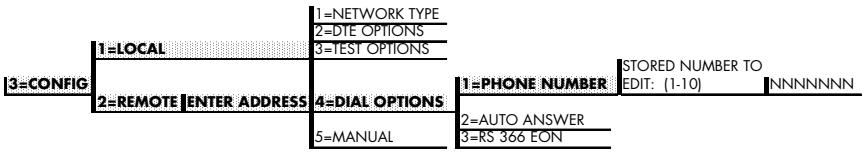


Figure 8-1. Editing Stored Phone Numbers

Table 8-1 shows the AT Command for storing phone numbers.

Table 8-1. 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 III S4W. 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 8-2* shows the menu path used to enable or disable this option.

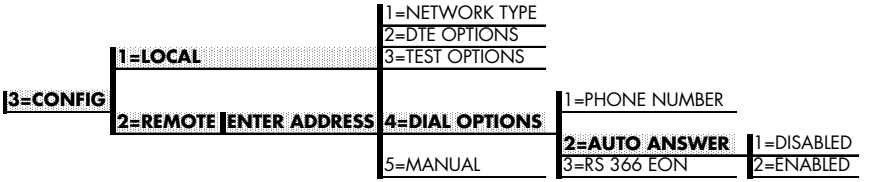


Figure 8-2. Enabling/Disabling the Auto Answer Function

Table 8-2 show the AT Commands available for the **AUTO ANSWER** option.

Table 8-2. AT Commands for Auto Answer

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

RS366 EON

When the **RS366 EON** (end of number) option is enabled, the DSU III S4W will detect the EON character from the RS366 dial string.

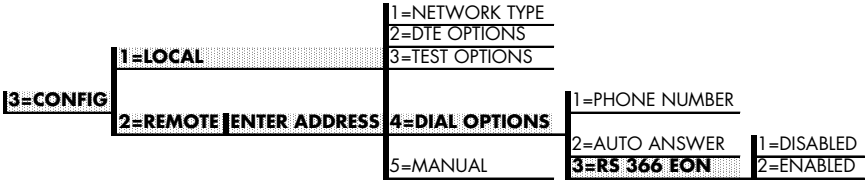


Figure 8-3. Enabling/Disabling the RS366 EON Function

Table 8-3. AT Commands for RS366 EON Function

Front Panel	AT Command	Description
1=DISABLED	N/A	RS366 EON disabled
2=ENABLED	N/A	RS366 EON enabled

Chapter 9 Manual Command

MANUAL COMMAND

The **MANUAL COMMAND** option is a shortcut method for entering configuration and control commands for the DSU III S4W.

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

COMMAND:00

Figure 9-1 shows the menu path for **MANUAL COMMAND**. The available manual commands are listed in *Table 9-1* on page 9-3.

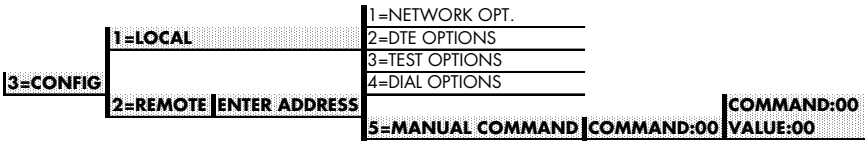


Figure 9-1. Manual Command

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: 00

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 9-1. 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
Option Set #3	8A	02
Option Set #4	8A	03
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

Chapter 10 Dial Selection

DIAL OPTIONS

The **DIAL** selection available in the **MAIN** menu (**4=DIAL**) includes options for manual dialing, redialing, and dialing stored numbers. The **DIAL** selection is available for use only if **AT&T/MCI SW56** or **US SPRINT SW56** is the selected **NETWORK TYPE**. *Figure 10-1* shows the menu path used to access these options.

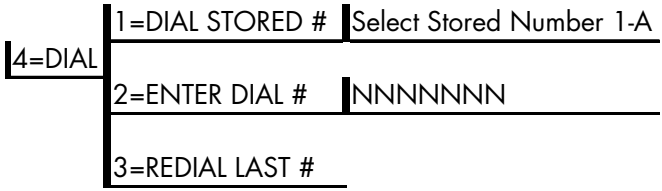


Figure 10-1. Dial Options Menu

Dial Stored

This option allows a previously stored number to be dialed. The numbers are stored within the **CONFIG** selection. *Figure 10-2* shows the menu path used to access the **PHONE NUMBERS** option.

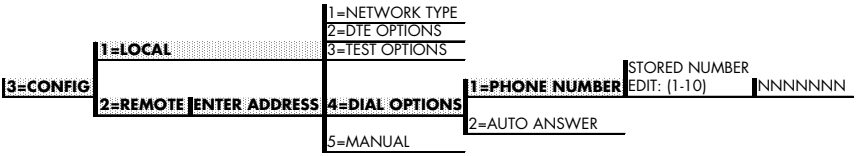


Figure 10-2. Path to Storing Numbers Option

See the section *Phone Number* on page 8-1 for more information.

Enter Dial

This option allows you to enter a phone number of up to 36 digits for the DSU III S4W to dial.

Redial Last

Selecting this option redials the last phone number entered.

Chapter 11 Testing and Troubleshooting

TEST OVERVIEW

The DSU III S4W 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.

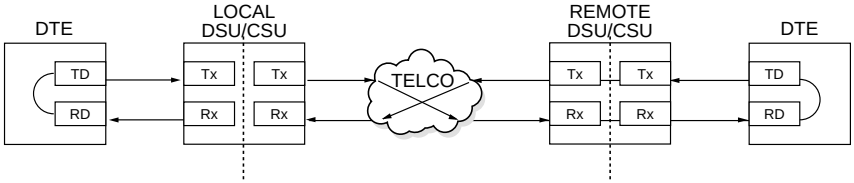


Figure 11-1. Normal Operation Before Initiating Loopback Test

CAUTION

All diagnostic tests disrupt data flow.

Initiating a Test

Initiate tests using the following procedure:

1. Select **TEST** from the **MAIN** menu by pressing **2** and then pressing **Enter**.
2. Specify **LOCAL** or **REMOTE** testing by selecting the corresponding number followed by **Enter**.
3. Use the up and down arrows to view test options.
4. Select a test from the available options by pressing the corresponding number, followed by **Enter**.

The example in *Figure 11-2* shows the menu path for initiating a local **DTE & LOOP TEST**.

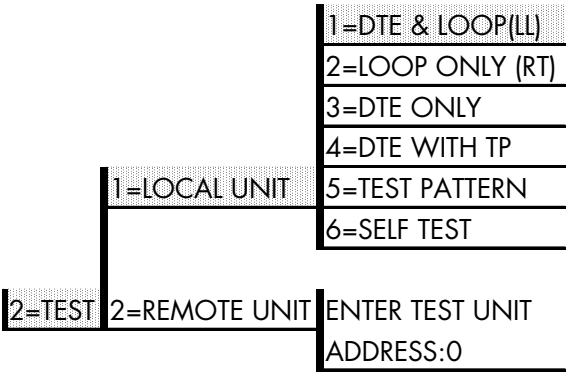


Figure 11-2. Initiating a Test

Once a test is initiated **PLEASE WAIT** is displayed briefly followed by the **STATUS** screen.

Test Status Display

The **TEST STATUS** display appears automatically during a test. The **TEST STATUS** display is similar to the **STATUS** screen described in the chapter *Status Selection on page 12-1*, with additional prompts for the type of test and the number of errors (for tests with a test pattern).

Figure 11-3 shows an example of a **TEST STATUS** display for a test with a test pattern.

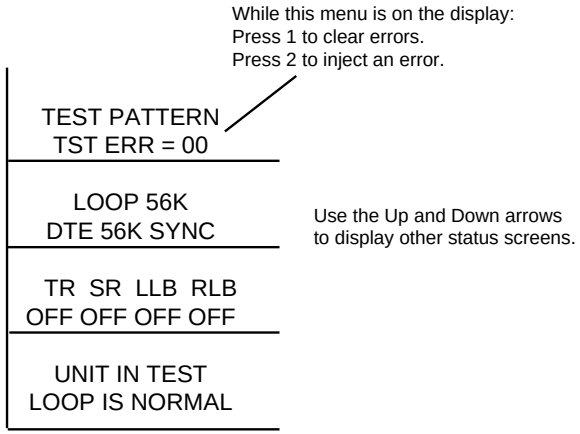


Figure 11-3. Sample Test Status Displays

Exiting a Test

During a test, press **Quick** to access the **EXIT TEST/DISPLAY STATUS** menu or press **Cancel** to return to the **MAIN** menu. The **EXIT TEST/DISPLAY STATUS** menu provides the following options, which are available only after a test has been initiated:

EXIT TEST	Exits the current test and returns to the **MAIN** menu.
DISPLAY STATUS	Reenters test display.

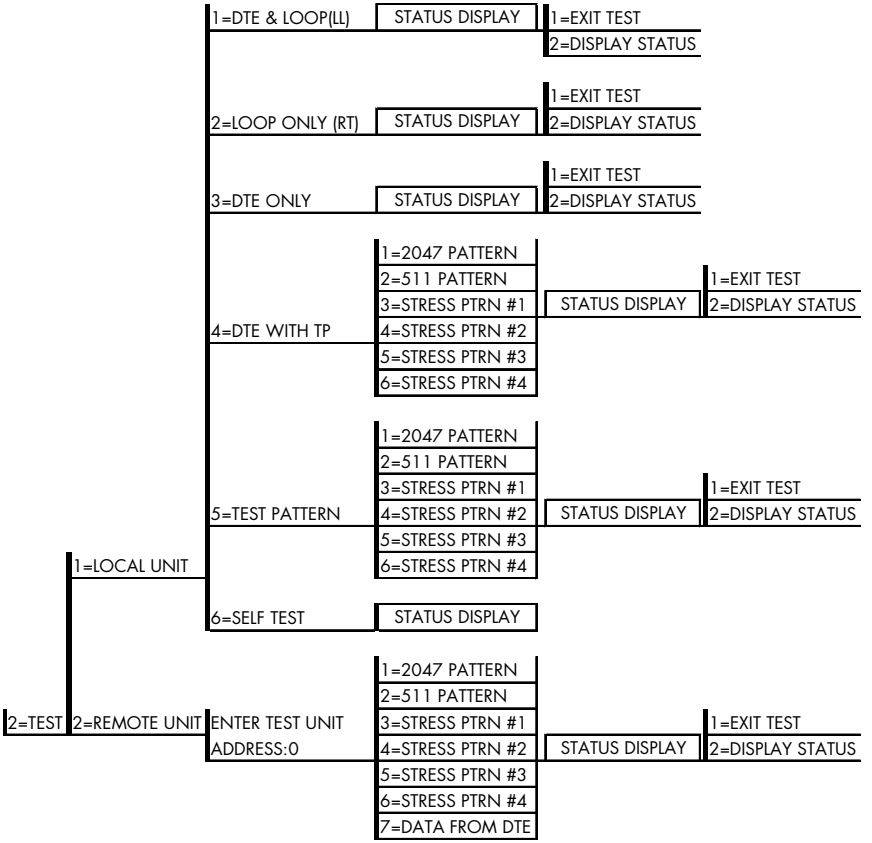


Figure 11-4. Complete Test Menu

LOCAL UNIT DIAGNOSTICS

The local DSU III S4W can perform six different tests; see Table 11-1.

Table 11-1. Test AT Commands

Front Panel Display	AT Command	Description
DTE & Loop (LL)	&T10	TD/RD and RX/TX Loopbacks
Loop Only (RT)	&T11	RX/TX Loopback at Network Interface
DTE Only	&T1	TX/RX Loopback at DTE Interface
DTE with TP	&T8	RX/RX Loopback with Test Pattern
Test Pattern	&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		

The test patterns shown in *Table 11-2* on page 11-6 are available for the **DTE WITH TEST PATTERN** and **TEST PATTERN** tests.

Table 11-2. DTE With Test Pattern Commands

Front Panel	AT Command	Description
1=2047 PATTERN	_T0&T8	Standard 2047 random data pattern.
2=511 PATTERN	_T1&T8	Standard 511 random data pattern.
3=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.
4=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.
5=STRESS PTRN #3	_T4&T8	Stress pattern with medium ones density. Continuous series of octets: 0011 0010.
6=STRESS PTRN #4	_T5&T8	Stress pattern with low ones density. Continuous series of octets: 0100 0000.

DTE & Loop (LL)

Test Description

The **DTE & LOOP** test splits the DSU III S4W into two separate DTE and loop interface sections and then loops the receive data of each interface back to its respective transmit data. The **DTE & LOOP** test provides a bidirectional loopback at the DSU / CSU. *Figure 11-5* illustrates the loopback points and the signal paths for this test.

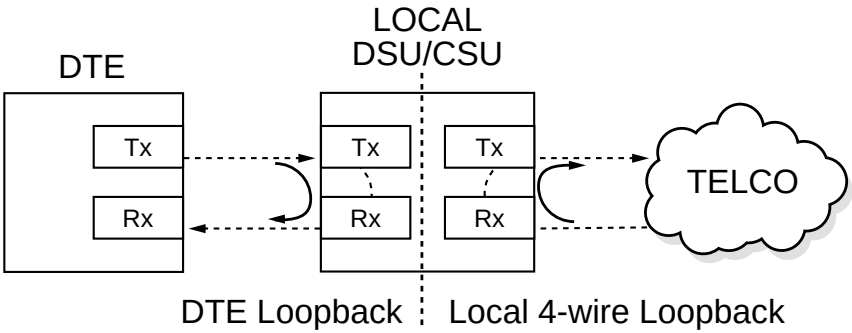


Figure 11-5. DTE & Loop Test

Test Purpose

The **DTE & LOOP** 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 11-6* to initiate a **DTE & LOOP TEST**.

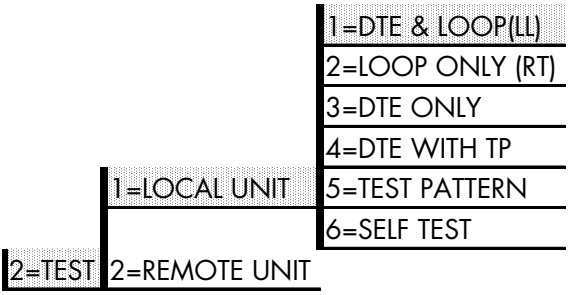


Figure 11-6. Initiating a DTE & Loop Test

Interpreting Test Results

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

Loop Only (RT)

The **LOOP ONLY** (**RT**) test allows the loop interface and a major portion of the DTE interface for the local DSU III S4W to be tested from the remote site over the actual communication circuit. *Figure 11-7* illustrates the loop-back point and the signal paths for this test.

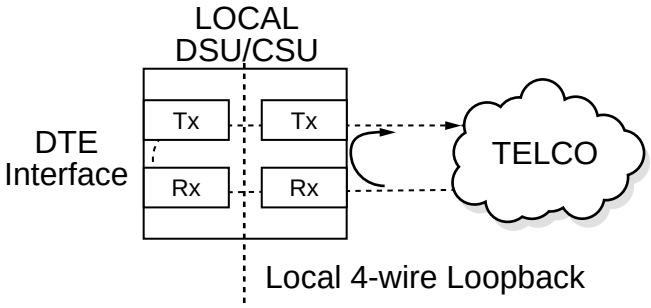


Figure 11-7. Loop Only Test

Test Purpose

The **LOOP ONLY** test is used to provide a loopback for network tests.

Initiating

Follow the menu path outlined in *Figure 11-8* to initiate a **LOOP ONLY** test.

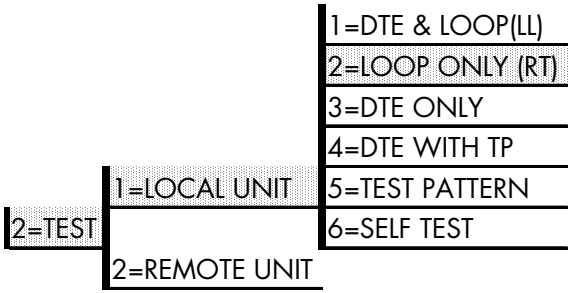


Figure 11-8. Initiating a Loop Only Test

Interpreting Test Results

The **LOOP ONLY** test is used for the purpose of looping the circuit back to the telco. No test results are available from the local DSU III S4W.

DTE Only

The **DTE ONLY** test provides a method for testing both the DTE interface drivers and receivers of the local DSU III S4W, plus its loop transmitter and receiver. For this test, the loop transmit data is connected to the loop receive data at a point close to the physical network interface. This test can be used to verify proper operation between the local DTE and the local DSU III S4W.

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

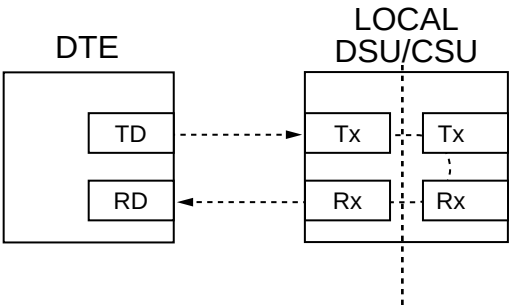


Figure 11-9. DTE Only Test Diagram

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 III S4W.

Initiating

Follow the menu path outlined in *Figure 11-10* on page 11-11 to initiate a **DTE ONLY** test.

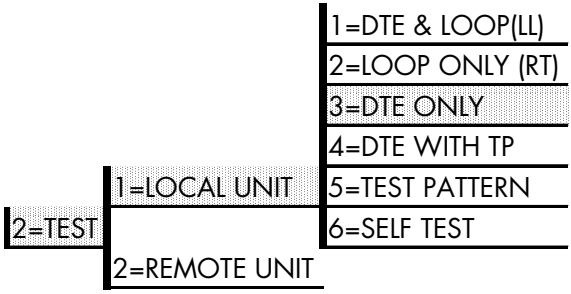


Figure 11-10. Initiating a DTE Only Test

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/CSU internal test pattern generator. This test can be used to detect deficiencies within the internal drivers and receivers of the DSU III S4W. *Figure 11-11* illustrates the loopback point and the data paths for this test.

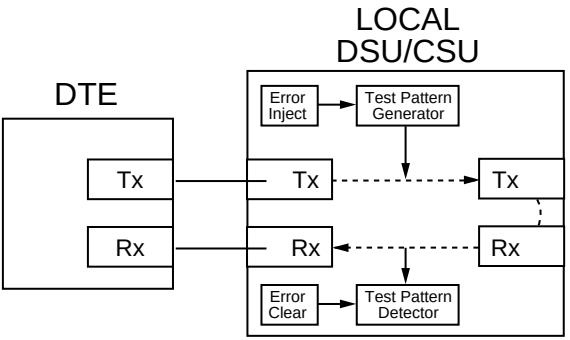


Figure 11-11. DTE with Test Pattern

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 III S4W.

Initiating

Follow the menu path outlined in *Figure 11-12* on page 11-13 to initiate a **DTE WITH TEST PATTERN** test.

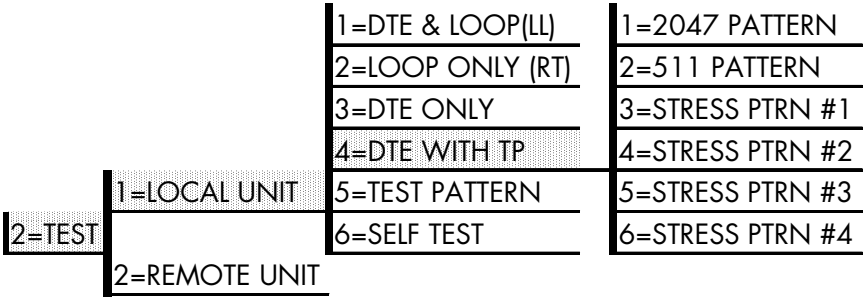


Figure 11-12. Initiating a DTE Test with Test Pattern

Interpreting Test Results

The DSU III S4W should display:

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.

Test Pattern

The **TEST PATTERN** option converts the local DSU III S4W into a BERT tester for the purpose of testing the circuit. When this test is used, the remote DSU / CSU must be in loopback or transmitting a test pattern. *Figure 11-13* illustrates the data paths for this mode.

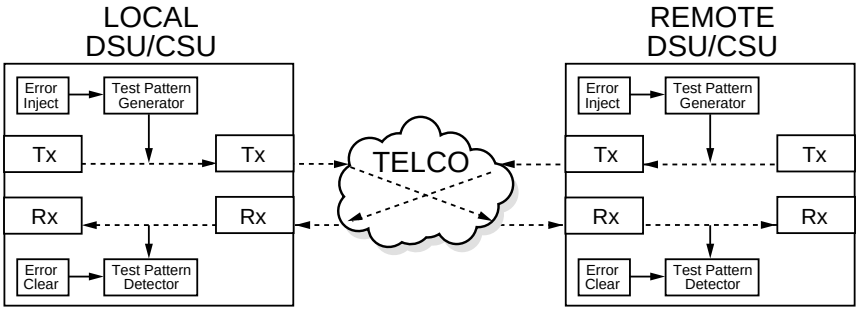


Figure 11-13. Test Pattern Only

Test Purpose

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

- Transmit user selected test pattern using an internal test pattern generator, and compare the received data using internal test pattern detector to detect if there are any errors on the circuit
- Inject errors and verifiy the unit transmits data across the communication circuit to the remote unit.
- Help determine from which direction the circuit is receiving errors.

Initiating

Follow the menu path outlined in *Figure 11-14* on page 11-15 to initiate a test using a test pattern.

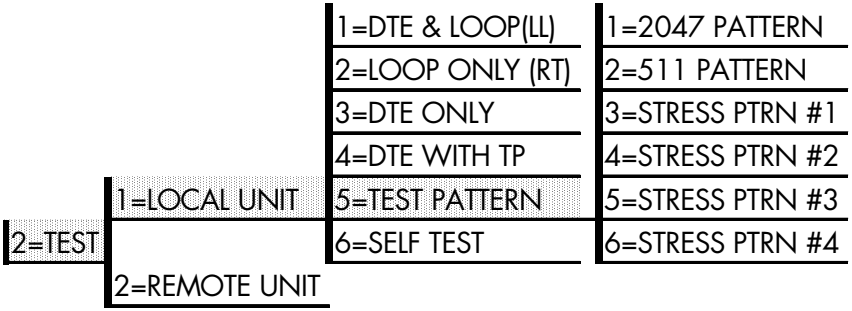


Figure 11-14. Initiating a Test Using a Test Pattern

Interpreting Test Results

The display should show the following:

TST ERR = 00

Self Test

The **SELF TEST** verifies current operation of the DSU III S4W. It can be performed at any time and is recommended if there is any question about the DSU's health.

Test Purpose
Determine if the DSU is functioning properly.

Initiating
Follow the menu path outlined in *Figure 11-15* to initiate a **SELF TEST**.

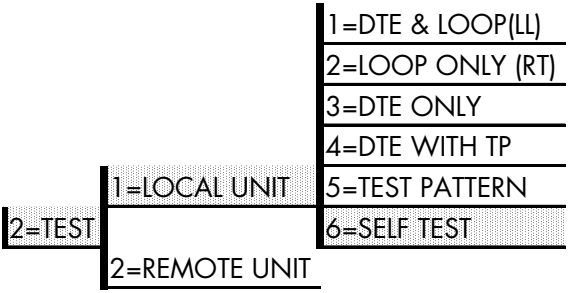


Figure 11-15. Initiating a Self Test

Interpreting Test Results
Once **SELF TEST** is activated, the LEDs cycle on and off as the system runs the self test. A pass or fail status will be displayed on the LCD along with a checksum indicating the current firmware revision.

REMOTE UNIT DIAGNOSTICS

The **REMOTE UNIT** submenu allows a remotely installed DSU to be placed into loopback. Establish a call before initiating any remote tests. There are six test patterns to choose from or data from the DTE may be selected (see Table 11-3). The **DATA FROM DTE** test loops back the remote end, allowing data to be transmitted and verified.

Table 11-3. 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

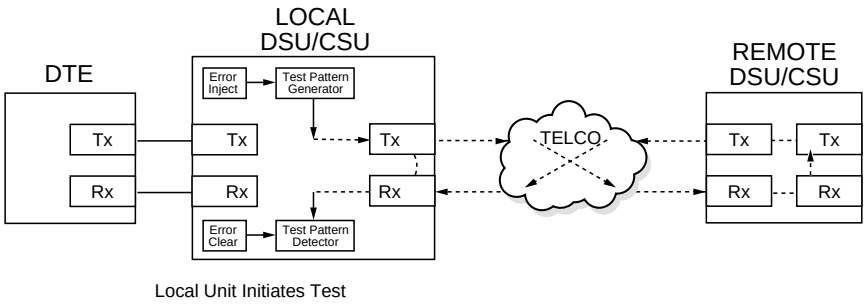


Figure 11-16. V.54 Remote Digital Loopback with Test Pattern

Test Purpose

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

Initiating

Follow the menu path outlined in *Figure 11-17* to place a remote DSU III S4W into loopback.

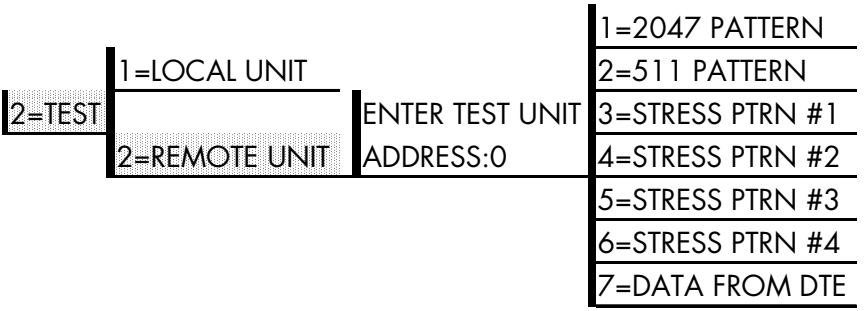


Figure 11-17. Initiating a Remote Test

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

The display should show:

TST ERR = 00

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.

Messages from the DSU/CSU

The DSU III S4W 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 11-4* on page 11-20 are displayed on the LCD.

*The **STATUS** menu must be selected in order for the unit to display status messages. Pressing **QUICK** returns to the **MAIN** menu where **STATUS** can be selected.*

Table 11-4. Messages from the DSU/CSU

Message	Meaning	Probable Cause	Action
LOOP IS NORMAL	Good local loop signal being received from the telco.	Good local loop.	No action required; unit properly connected to telco circuit.
OPEN LOOP	Unit not receiving a signal from the telco.	Bad telco cable from the DSU to telco jack or bad circuit to telco.	Replace telco cable from DSU to wall jack. If a problem persists, contact telco provider.
NO RX SIGNAL	Unit detects sealing current but no data signal from telco.	Bad conductor in telco cable from DSU to telco jack or bad circuit to telco.	Replace telco cable from DSU to wall jack. If a problem persists, contact telco provider.
OOS/OOF FROM NET	Unit detects an Out of Service or Out of Frame condition from the telco.	Telco is having problems with the circuit or remote unit is turned off or disconnected.	Check remote unit. Contact telco service provider.
CHECK TELCO LINE	Transmit/receive pair reversal detected.	Telco wall jack wired incorrectly.	Switch wire pairs in wall jack or contact telco service provider.
TEST FROM TELCO	Telco activated a loopback to test the circuit.	Telco is testing circuit.	Wait until test is complete or contact telco service provider.

Troubleshooting New Installs

Before initiating diagnostics on a newly installed unit and before contacting ADTRAN Technical Support, please check the items in Table 11-5 to ensure the unit is configured properly.

After verifying the items listed in Table 11-5, the unit should operate properly and display the following:

IDLE
LOOP IS NORMAL

If a status message other than **IDLE LOOP IS NORMAL** is shown, begin performing diagnostics described in the section *Test Sequence for Troubleshooting New Installs or Existing Circuits* on page 11-22.

Table 11-5. Troubleshooting New Installs

Configuration Item to Check	Option Selection	Action
DTE Type	EIA-232 or V.35	Select the type of DTE interface option to connect to the DSU/CSU 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 connector on the DSU/CSU.
Telco Cable	N/A	Verify the telco cable is securely connected to the DSU/CSU and wall jack.
Power the unit Off and then On.	N/A	Verify the unit passes self test during power-up (displayed on the LCD).

Test Sequence for Troubleshooting New Installs or Existing Circuits

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

A call must first be established before performing any remote diagnostics.

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 last page of manual.

Chapter 12 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.

After 30 seconds of no front panel operation, the DSU III S4W automatically reverts to the **STATUS** display. Examples of possible status displays are shown in *Figure 12-1*.

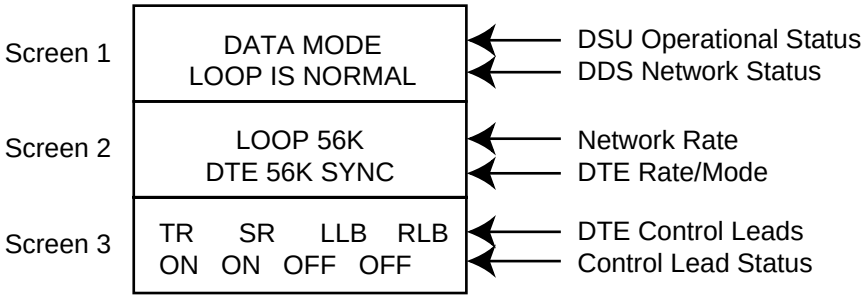


Figure 12-1. Examples of Status Displays

Status Menu Items

Data Mode
The DSU III S4W is ready to send data.

Idle
Messages are not being transmitted but the service is available for immediate use.

Incoming Call
Incoming call messages being received.

Answering Call
The DSU III S4W has detected incoming call messages and is starting the set up call procedure.

Dialing
The unit is dialing the selected number.

Loop Is Normal
The DSU III S4W is connected to the dedicated line.

Loop XX
Indicates the rate of the service unit from the network.

DTE 56K SYNC
Indicates the DTE data rate and format.

DTE Control Leads and Status

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

TR-	Data terminal ready
SR-	Data set ready
LLB-	Local loopback
RLB-	Remote loopback

Appendix A AT Commands

Table A-1 shows the AT commands available for the DSU III S4W.

Table A-1. 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&Kn	Flow Control	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-1. AT Commands (Continued)

Command	Title	Default
AT&Xn	Transmit Clock	0
AT&Yn	Power Up User Profile	0
AT&Zn=x	Store Phone Number	none
AT\Tn	Inactivity Timer	
AT%Bn	Loop 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_Bn	DBU Number to Dial	0
AT_Cn	SR Control During Test	0
AT_Dn	RTS-CTS Delay	0
AT_En	DBU Originate/Answer	0
AT_Fn	Scrambler Control	0
AT_Jn	Auto Answer Enable/Disable	0
AT_N=xx	Set Network Address	none
AT_Pn	Front Panel Enable/Disable	0
AT_Rn	LB Enable/Disable	0
AT_S=xx	Set Serial Number	none
AT_Tn	Select Test Pattern	0
AT_Xn	Clock Source Select	0

Appendix B Default Configuration Profiles

DEFAULT CONFIGURATION PROFILES

The DSU III S4W contains four different user profiles (sets of configurations options) stored in read only memory (see *Table B-1*). The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See the chapters *Installation* on page 2-1 and *Manual Command* on page 9-1 for more information.

Profile 1

Profile 1 is configured for a 56 kbps, synchronous, point-to-point or dial up operation with a V.35 connector.

Profile 2

Use profile 2 for a 56 kbps, synchronous, point-to-point or dial up operation with an EIA-232 connector.

Profile 3

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

Profile 4

Use profile 4 for a SW56 operation with DTR idle when off.

Table B-1. Default Configuration Profiles

	Profile Numbers			
	(00) 1	**(01) 2**	**(02) 3**	**(03) 4**
Manual Command				
Escape Character	+(2B)	+	+	+
CR Character	CR(0D)	CR	CR	CR
LF Character	LF(0A)	LF	LF	LF
BS Character	BS(08)	BS	BS	BS
Abort Timer	30 sec	30 sec	30 sec	30 sec
Escape Guard Timer	50 (x20ms)	50	50	50
Command Echo	Disable	Enable	Enable	Enable
Result Code	Disable	Enable	Enable	Enable
Long or Short Code	Long	Long	Long	Long
Test Pattern Type	2047	2047	2047	2047
DTR Recog. Delay (x2.5ms)	3	3	3	3
DTR Command Timeout (x1 sec)	8	8	8	8
Front Panel En/Dis	Enable	Enable	Enable	Enable
AT Password Control	Disable	Disable	Disable	Disable
Network Options				
Network Type	AT&T	AT&T	AT&T	AT&T
Network Address	0	0	0	0
Remote Conf. En/Dis	Enable	Enable	Enable	Enable
DTE Options				
DTE Rate	Compress 512K	56K/57.6K	9.6K	9.6K
Connector Type	V.35	EIA232	EIA232	EIA232
DTE Data Format	SYNC	ASYNC	ASYNC	SYNC
DTE Command Options	Disable	AT Command	AT Command	Disable
Transmit Clock	Normal	Normal	Normal	Normal
CS Options	Follow RS	Forced On	Forced On	Follow RS
CS Delay	Short	Short	Short	Short
CD Options	Normal	Forced On	Forced On	Normal
TR Options	Idle When Off	Idle When Off	Idle When Off	Idle When Off
SR Options	Off Test+OOS	Off Test+OOS	Off Test+OOS	Off Test+OOS

Table B-1. Default Configuration Profiles (Continued)

	Profile Numbers			
	(00) 1	**(01) 2**	**(02) 3**	**(03) 4**
Test Options				
Test Timeout	0 sec (Off)	0	0	0
RDL En/Dis	Enable	Enable	Enable	Enable
EIA Controlled LLB	Disable	Disable	Disable	Disable
EIA Controlled RLB	Disable	Disable	Disable	Disable
Dial Options				
Auto Answer	Disable	Enable	Enable	Enable

Appendix C DSU to Modem Interconnect

MODEM TAIL CIRCUIT APPLICATION

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

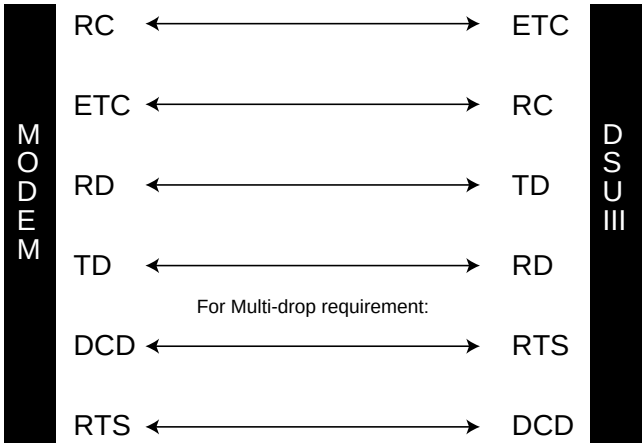


Figure C-1. DSU to Modem Interconnect

Appendix D EIA-232 Connector

56 KBPS APPLICATION

The EIA-232 connector, shown in *Figure D-1* , may be used for 56 kbps applications. Using the **External Clock** option (See page 6-5) 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.

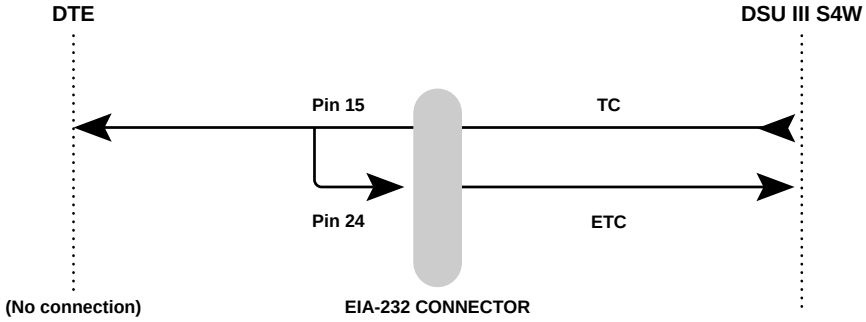


Figure D-1. EIA-232 Connector

Appendix E Specifications Summary

SPECIFICATIONS AND FEATURES

This section describes the standard specifications and features incorporated in the DSU III S4W.

Operating Modes

4-wire Switched 56

DTE Rates

DTE rates to match service rates

DTE to loop rate matching in both dedicated and switched modes
Synchronous rates: 2.4, 4.8, 9.6, 19.2, 38.4, and 56 kbps

Asynchronous rates: 2.4, 4.8, 9.6, 19.2, 38.4, and 57.6 kbps

Switched mode service rate: 56 kbps

FCC Approval

FCC part 15, class A and part 68

DTE Interfaces

Both EIA-232 and V.35 electrical and physical DTE interfaces

EIA-366/232 dialport

Data Buffering

Internal slack buffer

Clocking

Normal DDS or private network tributary
(slaved to network receive clock)
Private network master (internal)
Normal DDS with tail circuit
Private network master
(slaved to external clock)

Switched Mode Dialing Options

Stored number
Front panel keypad
DTR dialing of stored number
In-band AT commands
V.25 bis (SDLC) in-band dialing

Diagnostics

Network: CSU and DSU loopbacks
User: Local DTE and loop, remote V.54
Test Patterns: 2047, 511, DDS, stress patterns 1-4

Line Requirements

Loop transmission parameters as defined in:
AT&T PUB 62310: Dedicated DDS
AT&T PUB 41468: Switched 56
SPRINT TS 0046: Switched 56

Line Interface

RJ-48S, 4-wire, full duplex

Receiver Sensitivity

-45 db at all rates

Physical

Dimensions: 2.25"H, 8.75"W, 10.25"D

Weight: 3 lbs

Power: 115 VAC, 60 Hz, 8 Watts

Environment

Operating Temperature: 0 to 50 ^{o}C (32 to 122 ^{o}F)

Storage Temperature: -20 to 70 ^{o}C (-4 to 158 ^{o}F)

Relative Humidity: Up to 95% non-condensing

Appendix F Glossary

2047

A pseudorandom test pattern that is repeated every 2047 bits; used to test DSU / CSUs.

511

A pseudorandom test pattern that is repeated every 511 bits; used to test DSU / CSUs.

4-wire switched 56

An AT&T proprietary 56 / 64 kbps switched digital data service offered by telco service providers and delivered to users over 4 copper wires. Compatible with the ADTRAN DSU III S4W and with the DSU III TDM 4-wire Switched 56 TDM option.

asynchronous

A method of data transmission which allows characters to be sent at irregular intervals by preceding each character with a start bit, followed by a stop bit.

AT commands

Also known as the Hayes® Standard AT Command Set. A language that enables PC communications software to control asynchronous and Hayes-compatible modems. "AT" is short for attention.

AWG

American Wire Gauge. Standard measuring gauge for nonferrous conductors (i.e. non-iron and non-steel). The higher the AWG number, the thinner the wire.

BERT

Bit error rate test. A known pattern of bits is transmitted and the errors received are counted to figure the bit error rate. The idea is to

measure the quality of data transmission. The bit error rate is the ratio of received bits that are in error, relative to the number of bits received (usually expressed in a power of 10).

bisync

Bisynchronous transmission. A half-duplex, character-oriented, synchronous data communications transmission method originated by IBM in 1964.

carrier detect

CD. A signal generated by a DCE (a modem or DSU/CSU). CD informs the DTE device if the DCE is receiving a carrier signal from the line. If the CD light is on, the device is speaking to another device.

channel service unit

CSU. A DCE device used to connect a digital phone line (T1 or Switched 56 line) coming in from the phone company to either a multiplexer, channel bank, or directly to another device producing a digital signal (for example, a digital PBX, a PC, or data communications device). A CSU performs certain line-conditioning and equalization functions, and responds to loopback commands sent from the central office. A CSU regenerates digital signals, monitors them for problems, and provides a way of testing the digital circuit.

clocking

An oscillator-generated signal that provides a timing reference for a transmission link. A clock provides signals used in a transmission system to control the timing of certain functions. The clock has two functions: (1) to generate periodic signals for synchronization, and (2) to provide a time base.

customer premise equipment

CPE. All telecommunications terminal equipment located on the customer premises, including telephone sets, private branch exchanges (PBXs), data terminals, and customer-owned coin-operated telephones.

clear to send

CTS (also called CS). A signal on the DTE interface indicating that the DCE is clear to send data.

data service unit

DSU. A device designed to transmit and receive digital data on digital transmission facilities.

data set ready

SR. A signal on the EIA-232 interface that indicates if the communications is connected and ready to start handshaking control signals so communications can begin.

data terminal equipment

DTE. In the EIA-232C standard specification, the EIA-232C is connected between the DCE and a DTE. The main difference between the DCE and the DTE is that pins two and three are reversed.

dB

Decibel. A unit of measure of signal strength, usually the relation between a transmitted signal and a standard signal source.

DTE to loop rate matching

A feature designed into ADTRAN DSU/CSU products that allows slower DTE devices to communicate over 56/64 kbps digital circuits.

DTR

Data terminal ready. A control signal sent from the DTE to the DCE that indicates the DTE is powered on and ready to communicate.

EIA-232

A set of standards specifying various electrical and mechanical characteristics for interfaces between computers, terminals, and modems. Defines the mechanical and electrical characteristics for connecting DTE and DCE data communications devices. It defines what the interface does, circuit functions, and their corresponding connector pin assignments. The standard applies to both synchronous and asynchronous binary data transmission.

EIA-366
An EIA interface standard for autodialing.

FCC part 15 of class A
Radiated and conducted emissions standards set for commercial and industrial use.

FCC part 15 of class B
Radiated and conducted emissions standards set for residential use.

FCC part 68
FCC Rules and regulations intended to provide protection of the telephone network from harm caused by connection of equipment to the network.

full duplex
A circuit designed to transmit and receive data simultaneously.

half duplex
A circuit designed to both transmit and receive data, but not at the same time.

in-band
Signaling (dialing, diagnostics, management, configuration, etc.) over the same channel used for data.

ISDN
Integrated Services Digital Network. A network architecture that enables end-to-end digital connections. The network supports diverse services through integrated access arrangements and defines a limited set of standard, multipurpose interfaces for equipment vendors, network providers, and customers. Interworking with a public switched telephone network is retained.

LATA
Local Access and Transport Area. One of 161 local geographical areas in the US within which a local telephone company may offer telecommunications services --local or long distance.

local DTE and loop test

A test initiated by the user that loops the DSU to the central office and back. This is used to test the local DSU's DTE and local loop.

multi-point

A communications arrangement in which multiple devices share a common transmission channel, although only one may transmit at a time. Also referred to as multi-drop.

nonvolatile memory

Memory that is not lost when the power is shut off.

out-of-band

Signaling that is separated from the channel carrying information (voice, data, video, etc.). Typically the separation is accomplished by a filter. The signaling includes dialing and other supervisory signals.

parity bit

A binary bit appended to an array of bits to make the sum of all the bits always odd or always even.

point-to-point

A private circuit, conversation, or teleconference in which there is one person at each end, usually connected by some dedicated transmission modem.

read only memory

ROM. A memory device which is programmed at the factory and whose contents thereafter cannot be altered.

remote digital loopback

RDL

remote configuration

A feature designed into ADTRAN DSU/CSU products that allows a remote DSU/CSU to be configured from a local DSU/CSU or VT 100 compatible terminal.

scrambler

A device that transposes or inverts signals, or otherwise encodes a message at the transmitter, to make it unintelligible at a receiver not equipped with an appropriately set descrambling device.

synchronous data link control

SDLC. A bit-oriented synchronous communications protocol developed by IBM where the message may contain any collection or sequence of bits without being mistaken for a control character.

service

The provision of telecommunications to customers by a common carrier, administration, or private operating agency using voice, data, and/or video technologies.

simple network management protocol

SNMP. A control and reporting scheme widely used to manage devices from different vendors. SNMP operates on top of the Internet protocol.

start bit

In asynchronous data communications, characters are sent at arbitrary intervals. In order for the computer to make sense of what is coming in, each character starts its transmission with a start bit. This way if the first bit of the character to be transmitted is a 0, the fact of receiving a start bit (always a 1) tips off the computer that the next bit is part of a transmitted character and not just part of the inter-character gap. See stop bit.

stop bit

The stop bit is an interval at the end of each asynchronous character that allows the receiving computer to pause before the start of the next character. The stop bit is always a 0. See start bit.

switched

In regard to DSU/CSUs, the ability to perform the functions of establishing and releasing connections on a per call basis between two or more circuits, services, or communications systems. The DSU III S2W and DSU III S4W are examples of Switched 56 DSU/CSUs.

synchronous

Communications in which the timing is achieved by sharing a single clock. Each end of the transmission synchronizes itself with the use of clocks and information sent along with the transmitted data.

tail circuit

A feeder circuit, which may be digital or analog, that provides an access line to a digital or analog network.

UL

Underwriters Laboratories. A laboratory established by the National Board of Fire Underwriters that tests equipment, materials, and systems that may affect insurance risks, with special reference to fire dangers and other hazards to life.

V.25 bis

Automatic calling and answering command set including the ability to work with async, bisync, and HDLC devices. Provides a small subset of the functions of the Hayes Standard AT Command Set.

V.35

CCITT standard for trunk interface between a network access device and a packet network that defines signaling for data rates greater than 19.2 kbps.

VT 100

A non-intelligent terminal or terminal emulation mode used for asynchronous communications.

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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	(888) 4ADTRAN

Repair and Return

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

CaPS Department	(256) 963-8722

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

ADTRAN, Inc.
CaPS Department
6767 Old Madison Pike
Progress Center
Building #6, Suite 690
Huntsville, AL 35807

RMA # _____