ADTRAN

DSU III S2W
Data Service Unit

USER MANUAL

Trademarks:
DATAPATH is a registered trademark of CAE electronics and is used by Northern Telecom under license.

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ADTRAN

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 kbps Digital Interface	04DU5-48	6.0F	RJ-48S
9.6 kbps Digital Interface	04DU5-96	6.0F	RJ-48S
56 kbps Digital Interface	04DU5-56	6.0F	RJ-48S

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

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

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

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

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

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

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

Caution: 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.

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Chapter 1
Introduction

PRODUCT OVERVIEW

The ADTRAN Data Service Unit III Switched 2-Wire (DSU III S2W) provides a reliable, high speed data connection from a customer's Data Terminal Equipment (DTE) through 2-wire Switched 56 (SW56) network lines. This type of SW56 service is generally referred to as DATAPATH®. The DSU III S2W supports both synchronous and asynchronous data communication over SW56 networks.

The DSU III S2W provides both V.35 and EIA-232 electrical and physical DTE interfaces to accommodate a variety of applications. A second DB-25 labeled EIA-366/232 provides an EIA-366 parallel dialing interface. The unit features a receiver capability which permits operation over loops 14,000 ft on 26 AWG. Figure 1-1 shows a sample point-to-point application for the DSU III S2W.
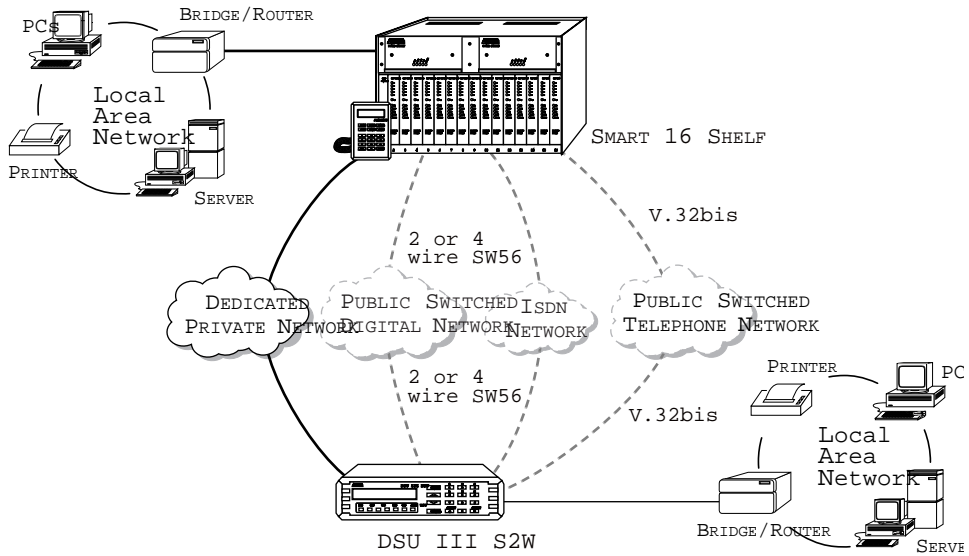
Figure 1-1
Sample Point-to-Point Application for DSU III S2W

GENERAL DATAPATH DESCRIPTION

DATAPATH is a 2-wire switched digital service offered by the local service provider. The services are generally provided by the Northern Telecom DMS/SL 100 family of Central Office switches. DATAPATH is always switched, which allows the customer to pay for high speed data transfer only when a call is active. The dial-up service is delivered by a 2-wire local loop up to 14,000 feet long on 26 AWG. The DSU III S2W uses a bipolar return-to-zero type of signal in a ping-pong (Time Compression Multiplexing) format.

Another basic component of DATAPATH technology is T-Link rate adaption protocol which adapts user data rates into network transport bit streams of 56 or 64 kbps. The units will connect and negotiate the most efficient rate at which to send data. The ADTRAN DSU III S2W can communicate and rate adapt with any T-Link compatible device. It can also interface with non T-Link compatible devices at 56 or 64 kbps, allowing the user to place a call to a 4-wire SW56 network or ISDN device.

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 inside back cover of this manual.

Chapter 2
Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the DSU III S2W for any shipping damages. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the DSU III S2W for repair or for verification of damage during shipment.

Equipment Provided

The following items are included in ADTRAN shipments of the DSU III S2W:

- DSU III S2W unit
- A 6-position modular to 6-position modular line interface cable
- The user manual

Equipment Sold Separately

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 EIA-366 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 115 VAC power receptacle. A telco connector is also provided for interface to the network.

CAUTION

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

NETWORK INTERFACE CONNECTION

The DSU III S2W has a six-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-A.

Table 2-A
Pin Assignments for Telco Connector

Pin	Name	Description
1		Not used
2		Not used
3	T	Network interface, tip
4	R	Network interface, ring
5		Not used
6		Not used

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 Tables 2-B and 2-C.

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. The primary DTE rate is configured from the front panel. The primary DTE can operate in asynchronous or synchronous modes.

CAUTION

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

Table 2-B

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

Table 2-C

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 (C
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
X	115	Receiver Signal Element Timing
P	103	Transmitted Data (SD-A)
S	103	Transmitted Data (SD-B)
Y	114	Transmitter Signal Element Timi
A A	114	Transmitter Signal Element Timi
U	113	External TX Signal Element (SCX
W	113	External TX Signal Element (SCX
NN	-	Test Indicator (TI)

DIALPORT CONNECTION

If used, the DTE dialing interface should be connected to the EIA-366/232 connector. The DIALPORT connector services an EIA-366 Type III interface. The pinout for the connector when used as EIA-366 is shown in Table 2-D.

Table 2-D

Pin Assignments for DIALPORT Connector

Pin	EIA	I/O	Description
1	Shield	I/O	Shield for cable
2	DPR	I	Digit Present
3	ACR	O	Abandon Call and Ret
4	CRQ	I	Call Request
5	PND	O	Present Next Digit
6	PWI	O	Power Indicator
7	SG	I/O	Signal Ground
13	DSC	O	Distant Station Conne
14	NB1	I	Digit LSB
15	NB1	I	Digit Bit 2
16	NB4	I	Digit Bit 3
17	NB8	I	Digit MSB
18	RC	O	Receive Common
19	SC	I	Send Common
22	DLO	O	Data Line Occupied
8 thru 12, 20, 21, 2 thru 25	NC	N/A	No Connection

CONFIGURATION

The DSU III S2W 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.* 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 S2W is then configured with that profile every time power is turned on or reset. See the chapter *Manual Command* for information on loading default configuration profiles.

Configuration Methods

The DSU III S2W provides three methods for local configuration: front panel, AT commands (in-band or via control port), and V.25 bis.

Front Panel

The Front Panel provides access to all operation parameters of the DSU III S2W through a multi-level menu structure which begins with the four-part Main menu.

STATUS - displays status of network and DTE interface
TEST - controls local and remote testing
CONFIG - displays/changes current configuration parameters
DIAL - provides manual dialing functions

AT Commands

The DSU III S2W 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 S2W. 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 S2W to configure most of the options or initiate tests to check both the DSU III S2W 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 S2W upon receipt of a terminating character. The default terminating character is a carriage return (ASCII 013), but it can be changed by writing a different value to register S3.

Before the terminating character is transmitted, the command line can be edited by using the backspace character (ASCII 008) to erase errors so the proper commands can be entered. Valid AT commands for the DSU III S2W are listed in the appendix *AT Commands.*

V.25 bis Commands

When configured for the V.25 bis option, the DSU III S2W accepts in-band dialing and configuration commands from both synchronous and asynchronous DTE ports.

The V.25 bis option supports the following protocols:

• SDLC/HDLC
• Bi-Sync
• Asynchronous

SDLC/HDLC 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 local DSUs. The ADTRAN V.25 bis command set follows:

CIC	Connect incoming call
CNL	Configuration local
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	An 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
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. 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 S2W to be configured with AT commands via a synchronous interface. The command has the following format:

```
CNL AT[ONE OR MORE AT COMMANDS]
```

Responses to CNL commands are returned in the data format currently configured. Possible responses include VAL and INVn.

Switched 56 Operation

CRN (Call Request with Number)
When the DSU III S2W is configured for SW56 operation, 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 S2W responds with the call failure indication CFINS (Call Failure Indication Not Stored). Possible responses include VAL, CNX, and CFIxx.

CRS (Call Request Using Stored Number)

The CRS command causes the DSU III S2W to dial the number stored in the specified register. The format of this command is as follows:

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

If this command is issued without the register number parameter, the INVPS (Invalid Parameter Syntax) response is issued. If this command is issued and the register parameter is not in the valid range for dialing registers, the INVPV (Invalid Parameter Value) response is returned. Other responses include VAL, CNX, and 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 S2W 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 S2W 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 S2W uses a multilevel 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**

To choose an item, press the number on the keypad corresponding with that item. That item will flash on and off to show that it is the currently active choice. Pressing either the **Up** or **Down Arrow** will deselect the current choice (it will stop flashing). Press the **Enter** key to select the item.

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 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. Refer to the chapter *Status Selection* for more detailed information.

Test

Test is used to control local and remote testing. Select local or remote testing, and select the type of test and test pattern when required. For more information see the chapter, *Testing and Troubleshooting.*

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, Configuring DTE Options, Configuring Test Options, Configuring Dial Options,* and *Manual Command.*

Dial

Dial provides dialing functions. Select a previously stored number, key in a number to dial, or use the speed call and autodial functions which must be purchased from the telco provider. See the chapter, *Dial Selection,* for more information.

Basic Menu Travel

Four function keys on the left side of the DSU III S2W keypad allow the various menu branches to be entered, exited, and scrolled through. The four function keys are defined below.

Enter	selects an activated 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 the alpha selections). 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 ECHO CANCEL option.

1. Select Configuration (CONFIG) by pressing **3**, then press **Enter**.
2. Use the **Up** and **Down Arrows** to view sub-menu items.
3. Choose an item on the sub-menu such as Network Options (NETWORK OPT).
4. To select NETWORK OPT press **1**, then press **Enter**.
5. To select ECHO CANCEL, press **1**, then press **Enter**.

```
                                                1=ECHO CANCE
                              1=NETWORK  OPT.    2=ADAPT
             3=CONFIG 2=DTE OPTIONS              3=VOLUME CNTL
                      3=TEST OPTIONS
                      4=DIAL OPTIONS
                      5=MANUAL COMMAND
```
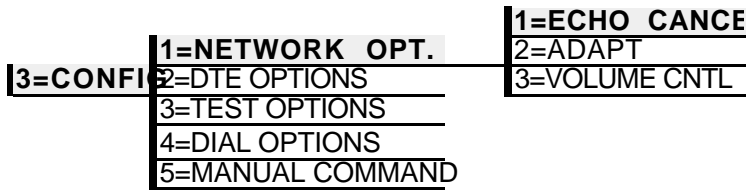
Figure 3-1
Example of Basic Menu Travel

FRONT PANEL

The DSU III S2W faceplate is shown in Figure 3-2.
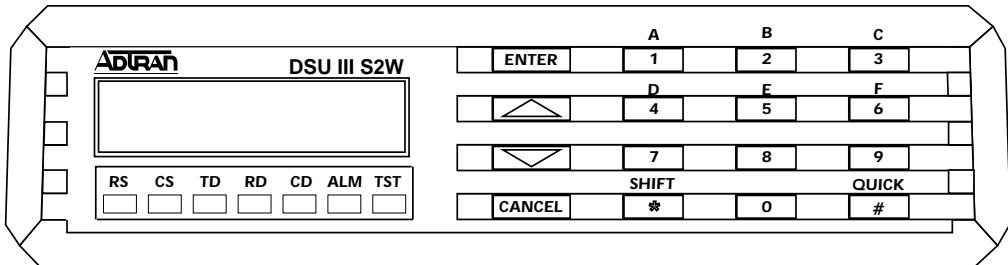
Figure 3-2
DSU III S2W Front View

The following function descriptions apply to the stand alone S2W.

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. Numbers 0 through 9 are also used to 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 then 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

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.

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 S2W 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

REAR PANEL

The rear panel contains three DTE connectors which provide primary channel V.35 or EIA-232 and a Dialport (auxiliary EIA-366/232). A 6-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*. The DSU III S2W rear panel is shown in Figure 3-3.
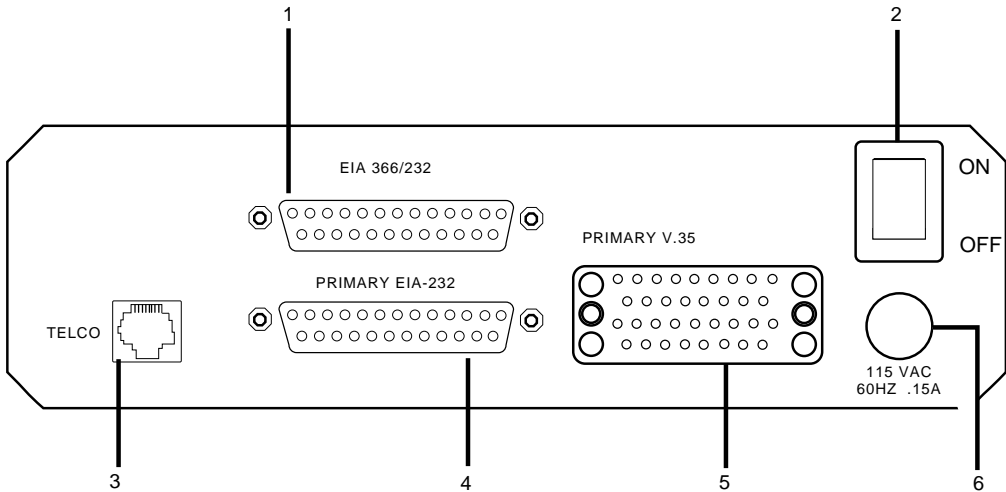
Identification of Numbers

Item	Function
1. Auxiliary EIA-366/232	EIA-366/232 dialport
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 digital data interface
6. 115 VAC Connection	Power cord connection

Figure 3-3
DSU III S2W Rear View

Chapter 4
Configuration Overview

LOCAL CONFIGURATION

The Configuration menu consists of a group of five sub-menus relating to a specific interface or function of the DSU III S2W 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 S2W contains four different user profiles (sets of configurations options) that are stored in read only memory (see the appendix, *Default Configuration Profiles).* The unit is shipped from the factory with profile number 1 (default configuration) loaded into the current (nonvolatile configuration) memory. If profile 1 matches requirements for the system, 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 S2W 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, Configuring DTE Options, Configuring Test Options, Configuring Dial Options,* and *Manual Command.*

A complete Configuration menu is shown in Figure 4-1.

(Fold Out of Complete Configuration Menu belongs here)

3=CONFIG

1=NETWORK OPT.

- 1=ECHO CANCEL
  - 1=DISABLE
  - 2=ENABLE ORIG.
  - 3=ENABLE ANSW
  - 4=ENABLE BOTH
- 2=ADAPT
  - 1=DISABLED
  - 2=ENABLED
  - 3=NO T-LINK 57.6
- 3=VOLUME CNTL
  - VOLUME LEVEL (0-3):0

2=DTE OPTIONS

- 1=DTE RATE
  - 1=DTE 1.2k
  - 2=DTE 2.4k
  - 3=DTE 4.8k
  - 4=DTE 9.6k
  - 5=DTE 19.2k
  - 6=DTE 38.4k
  - 7=DTE 48k
  - 8=DTE 56k/57.6k
  - 9=DTE 64k
- 2=CONNECTOR TYPE
  - 1=RS-232
  - 2=V.35
- 3=DATA FORMAT
  - 1=ASYNCHRONOUS
    - 1=ASYNC 7 BITS
    - 2=ASYNC 8 BITS
      - 1=EVEN PARITY
      - 2=MARK PARITY
      - 3=ODD PARITY
      - 4=NO PARITY
        - 1=1 STOP BIT
        - 2=2 STOP BITS
  - 2=SYNCHRONOUS
- 4=DTE CMD OPTION
  - 1=DISABLED
  - 2=AT COMMAND SET
  - 3=V.25 SYNC
  - 4=V.25 BSC/ASYNC
  - 5=V.25 SYNC (FLG)
- 5=TRANSMIT CLOCK
  - 1=NORMAL
  - 2=EXTERNAL
- 6=CS OPTIONS
  - 1=FORCED ON
  - 2=FOLLOWS RS
  - 3=FOLLOWS CD
    - 1=CS DELAY SHORT
    - 2=CS DELAY LONG
  - 4=FOLLOWS RS+CD
    - 1=CS DELAY SHORT
    - 2=CS DELAY LONG
  - 5=OFF WITH LOCD
- 7=CD OPTIONS
  - 1=FORCED ON
  - 2=NORMAL
  - 3=OFF WITH LOCD
- 8=TR OPTIONS
  - 1=IGNORED
  - 2=LEASED LINE
  - 3=IDLE WHEN OFF
  - 4=OFF>ON DIAL #1
  - 5=OFF>ON DIAL #2
- 9=SR OPTIONS
  - 1=FORCED ON
  - 2=OFF IDLE ONLY
  - 3=OFF LOCD ONLY
  - 4=OFF TEST ONLY
  - 5=OFF TEST +IDLE
  - 6=OFF TEST +LOCD

3=TEST OPTIONS

- 1=TEST TIMEOUT
  - ENTER TIMEOUT (0=OFF) : 00 SEC
- 2=RDL EN/DIS
  - 1=RDL IGNORED
  - 2=RDL ACCEPTED
- 3=EIA LLB EN/DIS
  - 1=DISABLED
  - 2=ENABLED
- 4=EIA RLB EN/DIS
  - 1=DISABLED
  - 2=ENABLED

4=DIAL OPTIONS

- 1=PHONE NUMBERS
  - STORED NUMBER TO EDIT (1-10): NNNNNNN
- 2=EDIT SC#
  - SPEED CALL # TO EDIT (1-10): NNNNNNN
- 3=EDIT AD #
  - NNNNNNN
- 4=AUTO ANSWER
  - 1=DISABLED
  - 2=ENABLED
- 5=RS366 EON
  - 1=DISABLED
  - 2=ENABLED
- 6=RING AGAIN
  - 1=DISABLED
  - 2=ENABLED

5=MANUAL COMMAND

- COMMAND:00
  - COMMAND:HH VALUE:00

Figure 4-1
Complete Configuration Menu

Chapter 5
Configuring Network Options

NETWORK OPTIONS

The NETWORK OPTIONS configuration parameters control the loop operation of the DSU III S2W. Once a parameter is set, **Command Accepted** is displayed briefly before returning to the active menu.

Echo Cancel

The ECHO CANCEL option enables/disables a PCM encoded 2100 Hz tone transmitted for one half second that causes the digital network to disable echo suppressors and echo cancellers so that digital signals proceed unimpeded.

```
                                                      1=DISABLE
                                                      2=ENABLE ORIG.
                              1=ECHO CANCEL 3=ENABLE ANS
                                                      4=ENABLE BOTH

        1=NETWORK  OPT.
                              2=ADAPT
                              3=VOLUME CNTL

3=CONFIG 2=DTE OPTIONS
         3=TEST OPTIONS
         4=DIAL OPTIONS
         5=MANUAL COMMAND
```
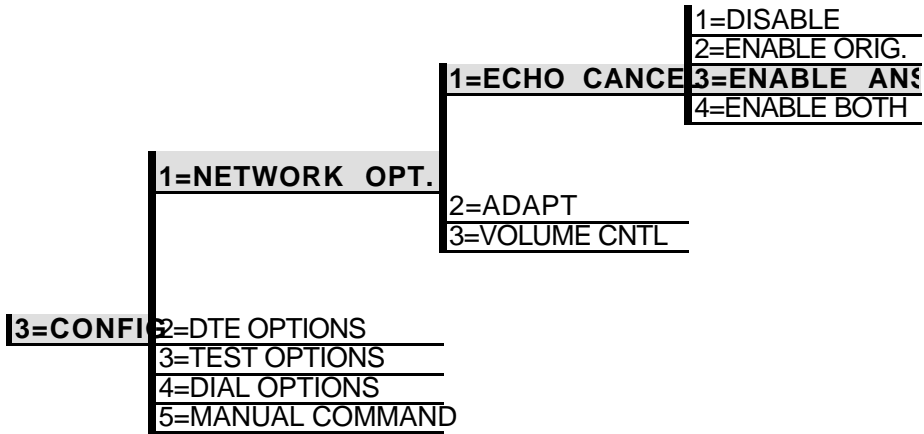
Figure 5-1
Setting Echo Cancel Options

The default factory setting is ENABLE ANSW. The selections are
listed in Table 5-A with the equivalent AT commands that perform
the same configuration functions.

Table 5-A
Echo Cancel Commands

Front Panel	AT Command	Description
1=DISABLE	&L0	Echo cancel disabled
2=ENABLE ORIG	&L1	Echo cancel on originate
3=ENABLE ANSW	&L2	Echo cancel on answer
4=ENABLE BOTH	&L3	Echo cancel on originate and an

Adapt

The ADAPT option enables/disables the DSU to rate adapt to its far end unit. Figure 5-2 shows the menu path used to enable or disable ADAPT. The factory default setting is ENABLED.

NOTE

The NO T-LINK 57.6 selection disables the T-link operation when 56K/57.6K is selected for immediate connection to a non T-link far end unit.

		1=ECHO CANCEL	
3=CONFIG	**1=NETWORK OPT.**		
	2=DTE OPTIONS		1=DISABLED
	3=TEST OPTIONS	**2=ADAPT**	**2=ENABLED**
	4=DIAL OPTIONS		3=NO T-LINK 57.6
	5=MANUAL COMMAND	3=VOLUME CNTL	
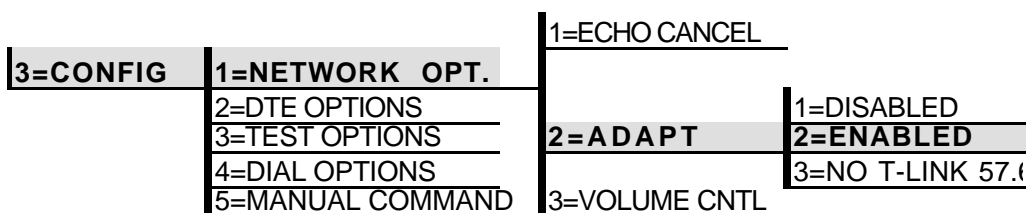
Figure 5-2
Enabling/Disabling Adapt

Table 5-B shows the AT commands for this option.

Table 5-B
Adapt Commands

Front Panel	AT Command	Description
1=DISABLE	TL0	Disables Adapt
2=ENABLE	TL1	Enables Adapt
3=NO T-LINK 57.6	TL2	Disables T-Link operation w 56K/57.6K

Volume Control

The VOLUME CNTL option allows the volume level to be adjusted.
Figure 5-3 shows the menu path for controlling the volume.
The factory default setting is OFF.

```
                 1=NETWORK  OPT.    1=ECHO CANCEL
                 2=DTE OPTIONS      2=ADAPT
3=CONFIG 3=TEST OPTIONS
                 4=DIAL OPTIONS                        VOLUME LEV
                 5=MANUAL COMMAND   3=VOLUME  CNTL(0-3):   0
```
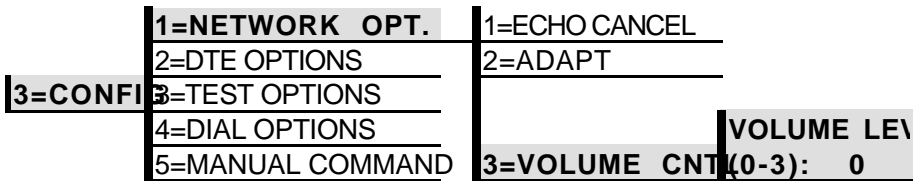
Figure 5-3
Adjusting the Volume Level

Table 5-C shows the equivalent AT commands for adjusting the
volume level.

Table 5-C
Volume Level Commands

Front Panel	AT Command	Description
0	L0	Volume off
1	L1	Volume low
2	L2	Volume medium
3	L3	Volume high

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 S2W's DTE interface.

DTE Rate

The DTE RATE option sets the operating speed of the DTE interface. The supported DTE rates for a SW56k loop are shown in Figure 6-1. The factory default setting is 56k/57.6k.

```
                1=NETWORK OPT.                        1=DTE  1.2k
                                                      2=DTE  2.4k
                                      1=DTE  RATE     3=DTE  4.8k
                                                      4=DTE  9.6k
                                                      5=DTE  19.2k
                2=DTE  OPTIONS                         6=DTE  38.4k
                                                      7=DTE  48k
                                      2=CONNECTOR TYPE  8=DTE   56k/57.6
                                      3=DATA FORMAT    9=DTE  64k
3=CONFIG                              4=DTE CMD OPTION
                                      5=TRANSMIT CLOCK
                                      6=CS OPTIONS
                                      7=CD OPTIONS
                                      8=TR OPTIONS
                                      9=SR OPTIONS
                3=TEST OPTIONS
                4=DIAL OPTIONS
                5=MANUAL COMMAND
```
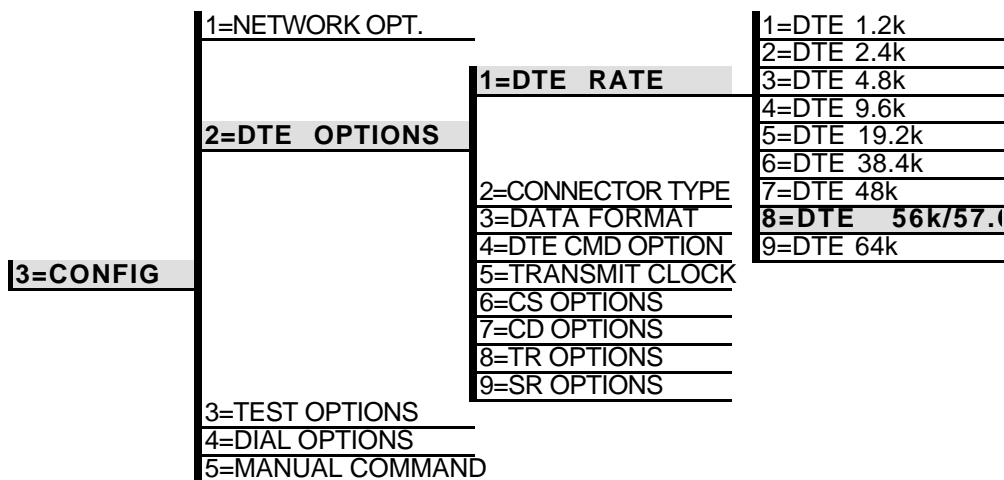
Figure 6-1
DTE Rates

The equivalent AT commands for setting the DTE rate are shown in Table 6-A.

Table 6-A
DTE Rate AT Commands

Front Panel	AT Command	Description
1=DTE 1.2k	%K1	DTE rate 1.2k sync and asy
2=DTE 2.4k	%K2	DTE rate 2.4k sync and asy
3=DTE 4.8k	%K3	DTE rate 4.8k sync and asy
4=DTE 9.6k	%K4	DTE rate 9.6k sync and asy
5=DTE 19.2k	%K5	DTE rate 19.2k sync and as
6=DTE 38.4k	%K6	DTE rate 38.4k sync and as
7=DTE 48k	%K7	DTE rate 48k sync (will disa commands on control port)
8=DTE 56k/57.6k	%K8	DTE rate 56k sync or 57.6k
9=DTE 64k	%K9	DTE rate 64k sync

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.

1=NETWORK OPT.

1=DTE RATE

2=DTE OPTIONS

1=RS-232
2=CONNECTOR TYPE2=V.35
3=DATA FORMAT
4=DTE CMD OPTION
5=TRANSMIT CLOCK
6=CS OPTIONS
7=CD OPTIONS
8=TR OPTIONS
9=SR OPTIONS

3=CONFIG
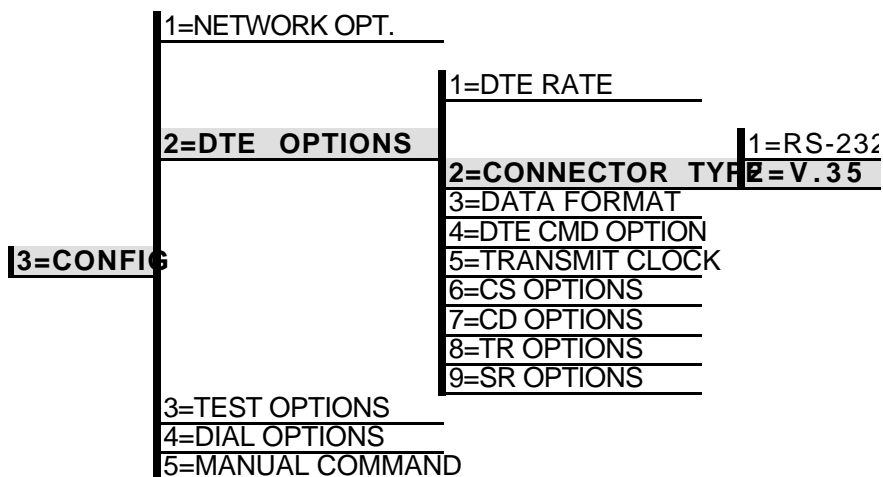
3=TEST OPTIONS
4=DIAL OPTIONS
5=MANUAL COMMAND

Figure 6-2
Selecting the Connector Type

Data Format

The DATA FORMAT option is used to select either the SYNCHRO-NOUS or ASYNCHRONOUS mode of operation for the DTE interface. The factory default setting is SYNCHRONOUS (see Figure 6-3). If ASYNCHRONOUS is chosen then byte length, parity, and stop bit information must be selected. The default settings are 8 bit bytes with no parity and one stop bit.
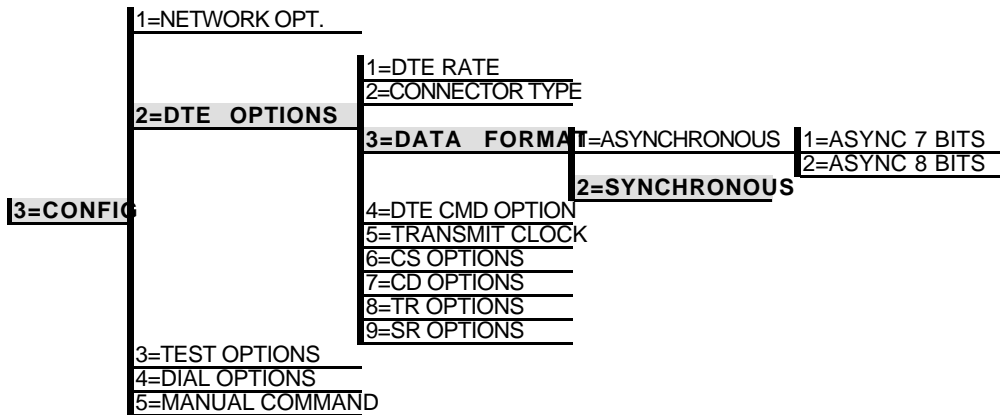
```
1=NETWORK OPT.

                          1=DTE RATE
                          2=CONNECTOR TYPE
        2=DTE  OPTIONS
                          3=DATA  FORMAT─1=ASYNCHRONOUS  1=ASYNC 7 BITS
                                                          2=ASYNC 8 BITS
                                         2=SYNCHRONOUS
3=CONFIG                  4=DTE CMD OPTION
                          5=TRANSMIT CLOCK
                          6=CS OPTIONS
                          7=CD OPTIONS
                          8=TR OPTIONS
                          9=SR OPTIONS
        3=TEST OPTIONS
        4=DIAL OPTIONS
        5=MANUAL COMMAND
```

Figure 6-3
Selecting Asynchronous or Synchronous Data Format

Table 6-B shows the AT commands that can be used to set the DATA FORMAT to ASYNCHRONOUS or SYNCHRONOUS.

Table 6-B
Data Format Commands

Front Panel	AT Command	Description
1=ASYNCHRONOUS	&Q0	Always asynchronous
2=SYNCHRONOUS	&Q2	Always synchronous

DTE Command Option

The DTE COMMAND option is used to enable the DTE interface for one of four command modes or disable all DTE command modes (see Figure 6-4). The default setting is DISABLED.
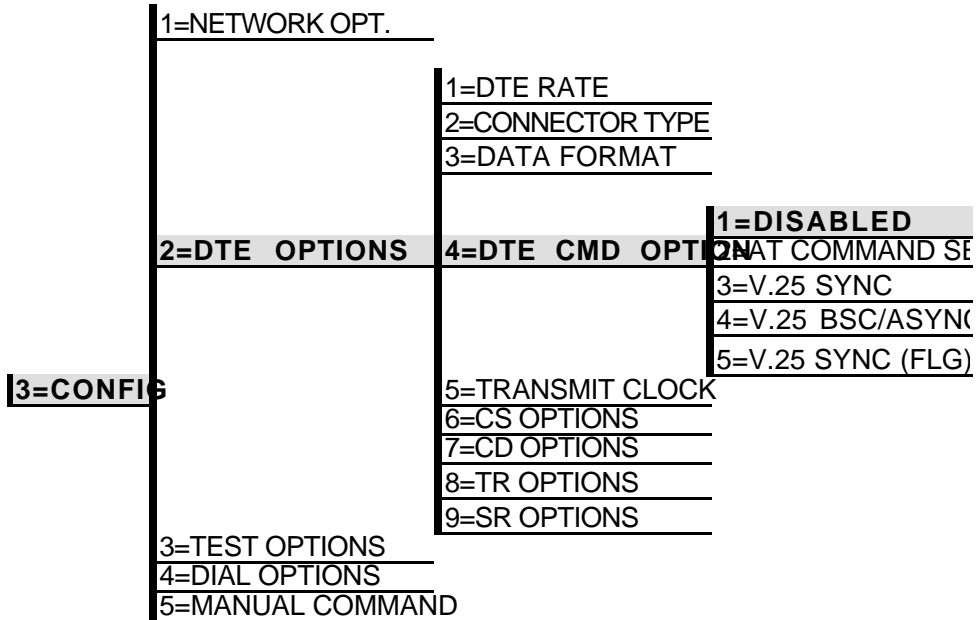

Figure 6-4
Selecting DTE Command Option

Table 6-C

DTE Command Descriptions

Front Panel	AT Command	Description
1=DISABLED	N/A	Disables all DTE command mo
2=AT COMMAND SET	N/A	Enables AT commands from D
3=V.25 SYNC	N/A	Enables V.25 bis (SDLC) com
4=V.25 BSC/ASYNC	N/A	Enables V.25 (BISYNC and AS
5=V.25 SYNC (FLG)	N/A	Enables V.25 bis (SDLC) com with flags

When the unit is in DTE CMD OPTION mode (idle in SW56, 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.

NOTE

Transmit Clock

The TRANSMIT CLOCK option selects the source of the clock used to transfer data from the DTE into the DSU III S2W. Figure 6-5 shows the menu path used to set the TRANSMIT CLOCK option. The default setting is NORMAL.
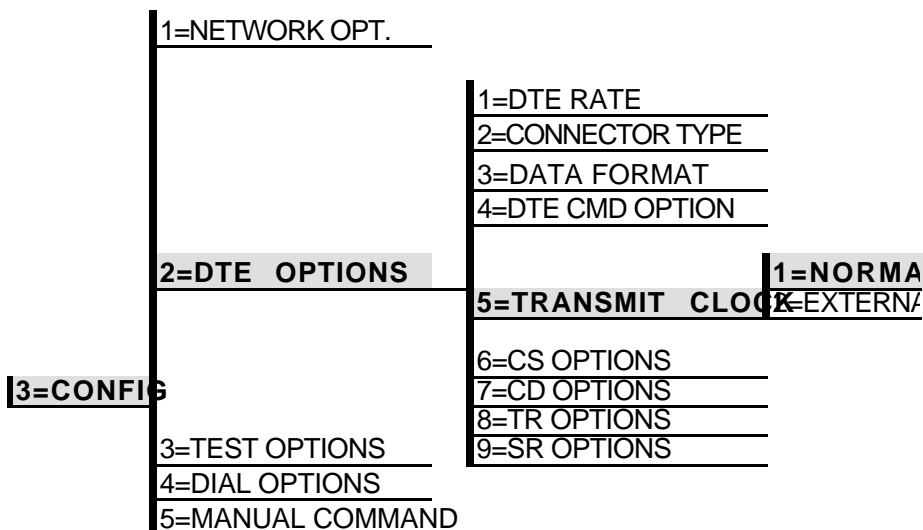
```
1=NETWORK OPT.

                                        1=DTE RATE
                                        2=CONNECTOR TYPE
                                        3=DATA FORMAT
                                        4=DTE CMD OPTION

            2=DTE  OPTIONS                                      1=NORMA
                                        5=TRANSMIT  CLOCK   2=EXTERN/

                                        6=CS OPTIONS
                                        7=CD OPTIONS
   3=CONFIG                             8=TR OPTIONS
                                        9=SR OPTIONS

            3=TEST OPTIONS
            4=DIAL OPTIONS
            5=MANUAL COMMAND
```

Figure 6-5
Transmit Clock Options

Table 6-D shows the AT commands used to set the Transmit Clock option.

Table 6-D
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.*

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

CS Options

The CS OPTIONS (clear to send) 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 FOLLOWS RS with CS DELAY SHORT.
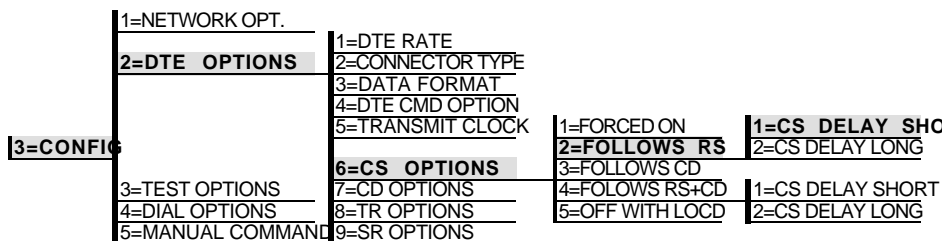

	1=NETWORK OPT.			
	2=DTE OPTIONS	1=DTE RATE		
		2=CONNECTOR TYPE		
		3=DATA FORMAT		
		4=DTE CMD OPTION	1=FORCED ON	**1=CS DELAY SHO**
		5=TRANSMIT CLOCK	**2=FOLLOWS RS**	2=CS DELAY LONG
3=CONFIG			3=FOLLOWS CD	
		6=CS OPTIONS	4=FOLOWS RS+CD	1=CS DELAY SHORT
	3=TEST OPTIONS	7=CD OPTIONS	5=OFF WITH LOCD	2=CS DELAY LONG
	4=DIAL OPTIONS	8=TR OPTIONS		
	5=MANUAL COMMAND	9=SR OPTIONS		

Figure 6-6
Selecting CS Options

If the option chosen involves request to send (RS), then the delay from RS to CS must be selected (CS DELAY SHORT or CS DELAY LONG). Table 6-E shows the AT Commands used to set the CS OPTIONS.

Table 6-E
CS Options AT Commands

Front Panel	AT Cmd.	Description
1=FORCED ON	&R0	CS always on
2=FOLLOWS RS	&R1	CS state same as RS state
3=FOLLOWS CD	&R2	CS state same as CD state
4=FOLLOWS RS+CD	&R3	CS state same as RS and CD
5=OFF WITH LOCD	&R4	Off 5 sec after disconnect in SW56 applications
For RS options, select the RS to CS delay length		
1=CS DELAY SHORT	_D0	Short Delay from RS to CS s
2=CS DELAY LONG	_D1	Long Delay from RS to CS se

Specified times for the short and long delays at the different operating speeds are shown in Table 6-F.

Table 6-F
Short and Long Delays at Different Operating Speeds

Rate	Short Delay	Long Delay
64k	1.1ms	16.1ms
56k	1.1ms	16.1ms
48k	1.1ms	16.1ms
38.4k	1.5ms	16.5ms
19.2k	1.5ms	16.5ms
4.8k	1.5ms	16.5ms
2.4k	1.5ms	16.5ms

CD Options

The CD OPTIONS menu is used to select one of three control modes for the receive line signal detector (CD) lead. The default factory setting is NORMAL (see Figure 6-7).

```
                                    1=DTE RATE
                1=NETWORK OPT.      2=CONNECTOR TYPE
                2=DTE  OPTIONS      3=DATA FORMAT
                3=TEST OPTIONS      4=DTE CMD OPTION
3=CONFIG        4=DIAL OPTIONS      5=TRANSMIT CLOCK
                5=MANUAL COMMAND    6=CS OPTIONS        1=FORCED ON
                                    7=CD  OPTIONS       2=NORMAL
                                    8=TR OPTIONS        3=OFF WITH LOC
                                    9=SR OPTIONS
```
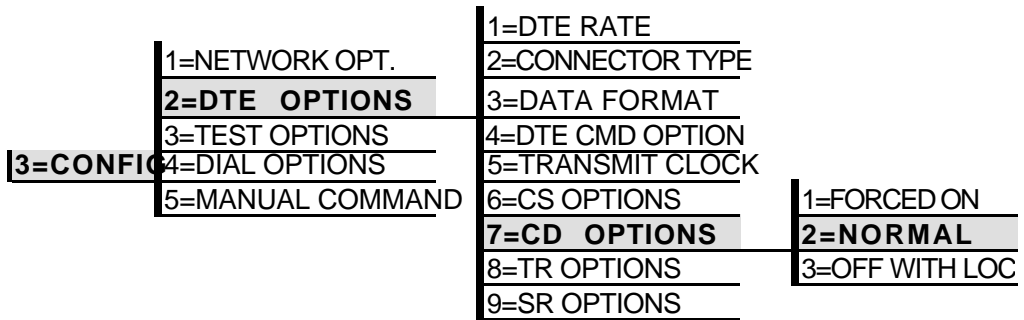
Figure 6-7
Selecting CD Options

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

Table 6-G
CD Options AT Commands

Front Panel	AT Command	Descriptions
1=FORCED ON	&C0	On all the time
2=NORMAL	&C1	On only when data present o
3=OFF WITH LOCD	&C2	On except after disconnect i Switched 56 application

TR Options

The TR OPTIONS menu is used to select the DSU III S2W response to the data terminal ready (TR) lead. The factory default setting is IDLE WHEN OFF (see Figure 6-8).

Figure 6-8
Selecting TR Options

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

Table 6-H
TR Options AT Commands

Front Panel	AT Command	Descriptions
1=IGNORE	&D0	Ignore the TR input
2=LEASED LINE	&D1	Virtual leased line (stored with DTR active
3=IDLE WHEN OFF	&D2	TR off will cause the DSU to on hook (idle) and the unit dial out.
4=OFF>ON DIAL #1	&D3	Dial Stored #1: TR goes off
5=OFF>ON DIAL #2	&D4	Dial Stored #2: TR goes off

SR Options

The SR OPTIONS menu is used to select the operating mode for the data set ready (SR) lead. Press **Shift** and then **A** to activate the SR OPTIONS sub-menu. The factory default setting is OFF TEST + IDLE (shown in Figure 6-9).

Figure 6-9
Setting SR Options

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

Table 6-I
SR Options AT Commands

Front Panel	AT Command	Descriptions
1=FORCED ON	&S0_C1	Always on
2=OFF IDLE ONLY	&S1_C1	Off when idle (no data connection)
3=OFF LOCD ONLY	&S2_C1	Off 5 seconds after discon
4=OFF TEST ONLY	&S0_C0	Off when unit in test
5=OFF TEST +IDLE	&S1_C0	Off in test or idle
6=OFF TEST +LOCD	&S2_C0	Off 5 seconds after discon 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 S2W 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.

```
1=NETWORK OPT.
2=DTE OPTIONS

                               1=TEST  TIMEOUT  ENTER TIMEOUT
              3=TEST  OPTIONS  2=RDL EN/DIS      (0=OFF) : 00 SE
3=CONFIG                       3=EIA LLB EN/DIS
                               4=EIA RLB EN/DIS

4=DIAL OPTIONS
```
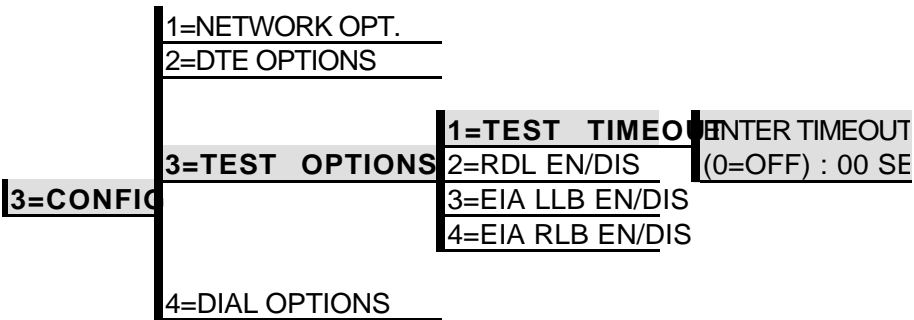
Figure 7-1
Setting Test Timeout Option

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

Table 7-A
Test Timeout AT Commands

Front Panel	AT Command	Description
Enter Timeout	S18=x	Specify 0 - 255 seconds test

Remote Digital Loopback

The RDL (Remote Digital Loopback) option specifies whether or not the DSU III S2W 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.

1=NETWORK TYPE
2=DTE OPTIONS

1=TEST TIMEOUT
3=CONFIG 3=TEST OPTIONS 2=RDL EN/DIS 1=RDL IGNORED
3=EIA LLB EN/DIS 2=RDL ACCEPT
4=EIA RLB EN/DIS

4=DIAL OPTIONS
5=MANUAL
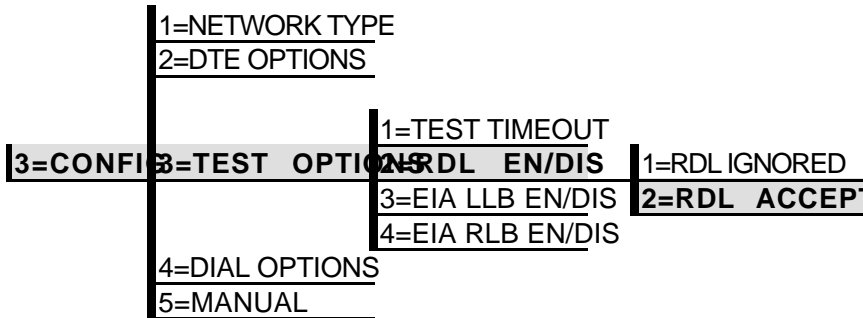
Figure 7-2
Remote Digital Loopback

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

Table 7-B
Remote Digital Loopback AT Commands

Front Panel	AT Command	Descriptions
1=RDL IGNORED	&T5	RDL request from remote DSU
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 S2W 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.
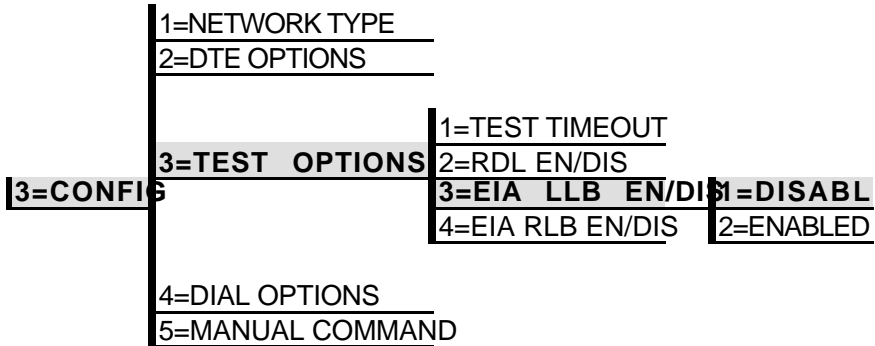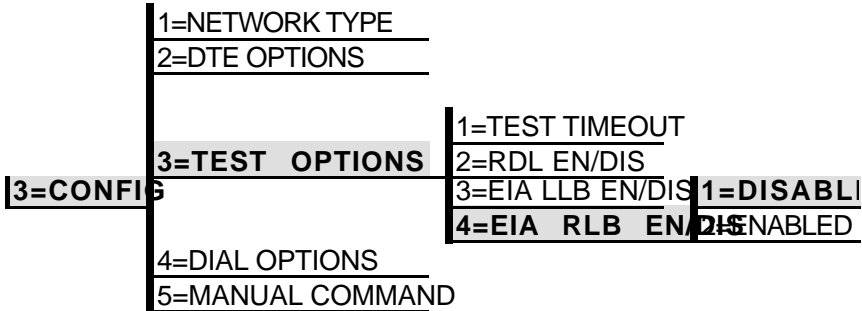
Figure 7-3
EIA Local Loopback Options

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

Table 7-C
EIA Local Loopback AT Commands

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

EIA Remote Loopback

The EIA RLB (Remote Loopback) option specifies whether or not the DSU III S2W 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.

```
                    1=NETWORK TYPE
                    2=DTE OPTIONS

                                      1=TEST TIMEOUT
                    3=TEST  OPTIONS   2=RDL EN/DIS
    3=CONFIG                          3=EIA LLB EN/DIS 1=DISABL
                                      4=EIA  RLB  EN/DIS 2=ENABLED

                    4=DIAL OPTIONS
                    5=MANUAL COMMAND
```

Figure 7-4
EIA Remote Loopback Options

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

Table 7-D
EIA Remote Loopback AT Commands

Front Panel	AT Command	Descriptions
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 AUTO ANSWER operation of the DSU III S2W when it is configured for Switched 56 operation.

Phone Number

The DSU III S2W 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 NUMBERS option.
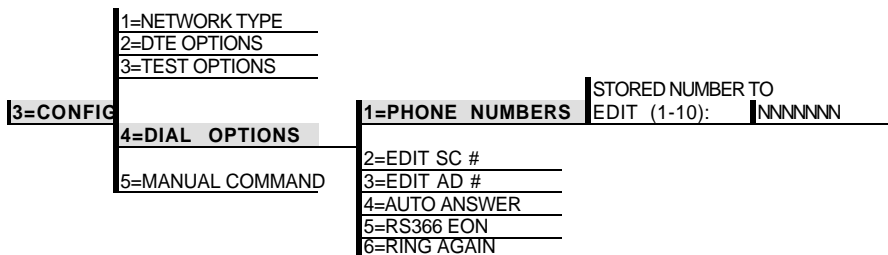
Figure 8-1
Editing Stored Phone Numbers

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

AT Command	Description
&Zn=	Store Phone Number

Edit SC#

The EDIT SC# (Edit Speed Call) option is used to program the local telco switch to support speed dialing. This option must be purchased from the telco provider. Figure 8-2 shows the menu path for this option.

1=NETWORK TYPE		
2=DTE OPTIONS	1=PHONE NUMBER	
3=TEST OPTIONS		
	2=EDIT SC #	SPEED CALL # TO
3=CONFIG	3=EDIT AD #	EDIT (1-10): 1
4=DIAL OPTIONS	4=AUTO ANSWER	
	5=RS366 EON	
5=MANUAL	6=RING AGAIN	
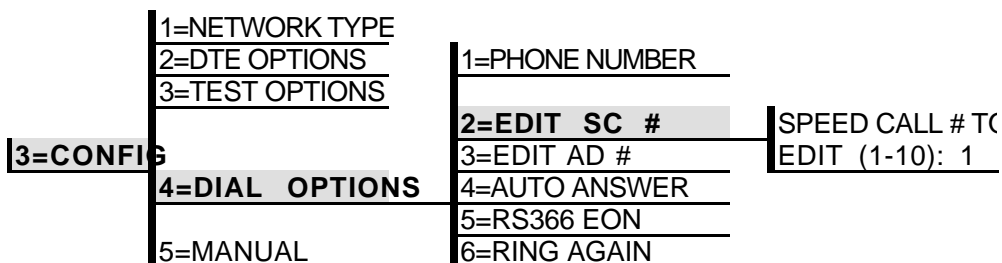
Figure 8-2
Editing Speed Call Numbers

Table 8-B
AT Command for Editing Speed Call Numbers

AT Command	Description
PSn=	Edit Speed Call Number

Edit AD#

The EDIT AD# (Edit Auto Dial) option is used to program a single telephone number to be auto-dialed. This option must be purchased from the telco provider.

1=NETWORK TYPE	1=PHONE NUMBER	
2=DTE OPTIONS		
3=TEST OPTIONS	2=EDIT SC #	
3=CONFIG	**3=EDIT AD #**	NNNNNNN
4=DIAL OPTIONS	4=AUTO ANSWER	
	5=RS366 EON	
5=MANUAL	6=RING AGAIN	

Figure 8-3
Editing Auto Dial Numbers

Table 8-C
AT Command for Auto Dialing

AT Command	Description
PA=	Edit Auto Dial Number

Auto Answer

The Auto Answer option is used to specify whether incoming calls are to be automatically answered by the DSU III S2W. If AUTO ANSWER is disabled, an incoming call can be answered by an AT or V.25 command from the DTE, or by raising TR from the DTE. Figure 8-4 shows the menu path used to enable or disable this option. With AUTO ANSWER enabled, the call will be automatically answered even with TR off (used for remote testing). The default setting is DISABLED.

```
┌──────────────────┬──────────────────┬─────────────┐
│1=NETWORK TYPE    │1=PHONE NUMBER    │             │
│2=DTE OPTIONS     │                  │             │
│3=TEST OPTIONS    │2=EDIT SC #       │             │
│                  │3=EDIT AD #       │             │
│3=CONFIG 4=DIAL OPTIONS │4=AUTO ANSWER │1=DISABLE   │
│                  │5=RS366 EON       │2=ENABLED    │
│5=MANUAL COMMAND  │6=RING AGAIN      │             │
└──────────────────┴──────────────────┴─────────────┘
```

Figure 8-4
Enabling/Disabling the Auto Answer Function

Table 8-D show the AT Commands available for the Auto Answer option.

Table 8-D
AT Command for Auto Answer

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

RS366 EON

If enabled, the DSU III S2W will detect the End Of Number character from the RS-366 dial string. The default setting is ENABLED.

```
┌──────────────────┬──────────────────┬─────────────┐
│1=NETWORK TYPE    │1=PHONE NUMBER    │             │
│2=DTE OPTIONS     │                  │             │
│3=TEST OPTIONS    │2=EDIT SC #       │             │
│                  │3=EDIT AD #       │             │
│3=CONFIG 4=DIAL OPTIONS │4=AUTO ANSWER │             │
│                  │5=RS366 EON       │1=DISABLED   │
│5=MANUAL COMMAND  │6=RING AGAIN      │2=ENABLED    │
└──────────────────┴──────────────────┴─────────────┘
```

Figure 8-5
Selecting RS366 EON Option

Ring Again

When the RING AGAIN option is enabled, the DSU III S2W automatically redials the far end if busy. This option must be purchased from the telco provider. The factory default setting is DISABLED.

1=NETWORK TYPE	1=PHONE NUMBER	
2=DTE OPTIONS		
3=TEST OPTIONS	2=EDIT SC #	
	3=EDIT AD #	
3=CONFIG 4=DIAL OPTIONS	4=AUTO ANSWER	
	5=RS366 EON	1=DISABLE
5=MANUAL COMMAND	6=RING AGAIN	2=ENABLED

Figure 8-6
Selecting Ring Again Options

Table 8-E
AT Commands for Ring Again

Front Panel	AT Command	Descriptions
1=DISABLED	RI0	Ring again disabled
2=ENABLED	RI1	Ring again 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 S2W.

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-A.

```
                    1=NETWORK OPT.
                    2=DTE OPTIONS
                    3=TEST OPTIONS
         3=CONFIG   4=DIAL OPTIONS
                                              COMMAND:0
                    5=MANUAL  COMMAND COMMAND:0 VALUE:00
```
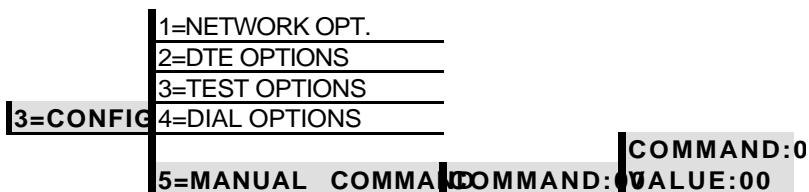
Figure 9-1
Manual Command

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-A

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
Long form	86	01
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	19	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

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. Figure 10-1 shows the menu path used to access these options.

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.

```
                      1=DIAL STORED #   Select  Stored  Numbe
4=DIAL
                      2=ENTER DIAL #
                      3=SPEED CALL
                      4=AUTO DIAL
```
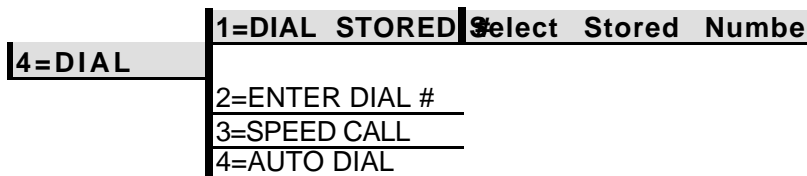
Figure 10-1
Dial Options Menu

```
1=NETWORK TYPE
2=DTE OPTIONS                          STORED NUMBER
3=TEST OPTIONS        1=PHONE NUMBERS  DIGIT (1-10):    NNNNNNN
                      2=EDIT SC #
3=CONFIG              3=EDIT AD #
                      4=AUTO ANSWER
4=DIAL  OPTIONS       5=RS366 EON
                      6=RING AGAIN
5=MANUAL COMMAND
```
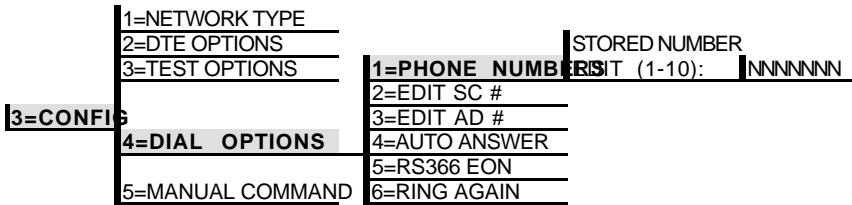
Figure 10-2
Path to Storing Numbers

Table 10-A
AT Command for Dialing Stored Numbers

AT Command	Description
DSn	Dial stored number in register n

See the chapter *Configuring Dial Options* for more information.

Enter Dial

This option allows you to enter a phone number of up to 36 digits for the DSU III S2W to dial.

```
                      1=DIAL STORED #

4=DIAL                2=ENTER  DIAL  NNNNNNN
                      3=SPEED CALL
                      4=AUTO DIAL
```
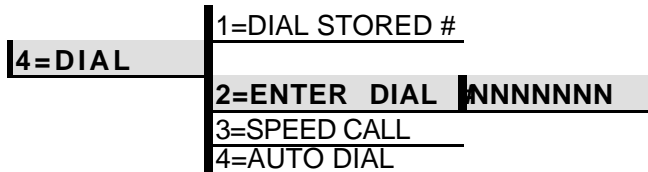
Figure 10-3
Entering Dial Number

AT Command	Description
Dn	Dial number

Speed Call

This option allows you to select a telco register number that was previously programmed. See the chapter *Configuring Dial Options* for information on programming speed call numbers.

1=DIAL STORED #	
2=ENTER DIAL #	
4=DIAL	
	SPEED CALL #
3=SPEED CALL	**1-10: N**
4=AUTO DIAL	
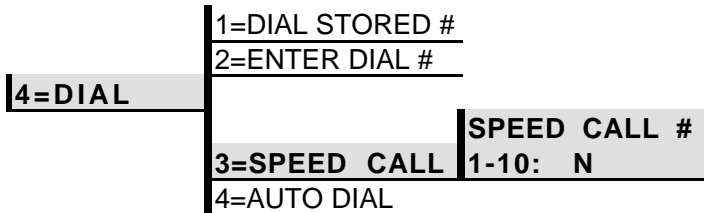
Figure 10-4
Path to Speed Calling

Table 10-C
AT Command for Speed Calling

AT Command	Description
SCn	Dial speed call register number

Auto Dial

This option allows you to select a previously programmed number from the telco. See the chapter *Configuring Dial Options* for information on programming auto dial numbers.

	1=DIAL STORED #
	2=ENTER DIAL #
4=DIAL	3=SPEED CALL
	4=AUTODIAL

Figure 10-5
Path to Auto Dialing

Table 10-D
AT Command for Auto Dialing

AT Command	Description
AD	Dial auto dial number

Chapter 11
Testing and Troubleshooting

TEST OVERVIEW

The DSU III S2W 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.
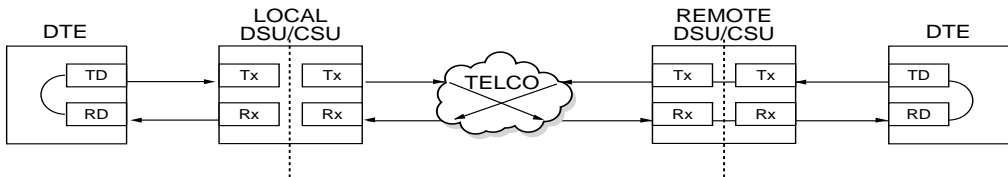
Figure 11-1
Normal Operation Before Initiating Loopback Test

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**, then press **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 and Loop test.

		1=DTE & LOOP(LL
	1=LOCAL UNIT	2=LOOP ONLY (RT
		3=DTE ONLY
		4=DTE WITH TP
2=TEST	2=REMOTE UNIT	5=TEST PATTERN
		6=SELF TEST
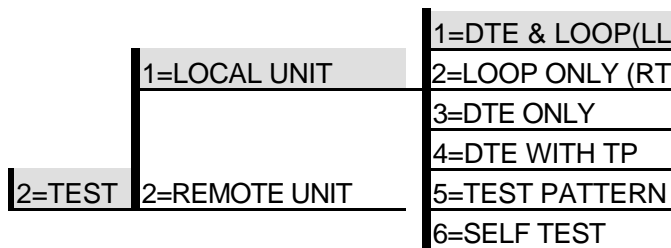
Figure 11-2
Initiating a Test

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*, 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.

While this menu is on the display:
Press 1 to clear errors.
Press 2 to inject an error.

```
 TEST PATTERN
TST ERR = 0000


  LOOP 56K          Use the Up and Down arrows
DTE 56K SYNC        to display other status screens.


  TR  SR  LLB  RLB
OFF OFF OFF OFF


 UNIT IN TEST
LOOP IS NORMAL
```
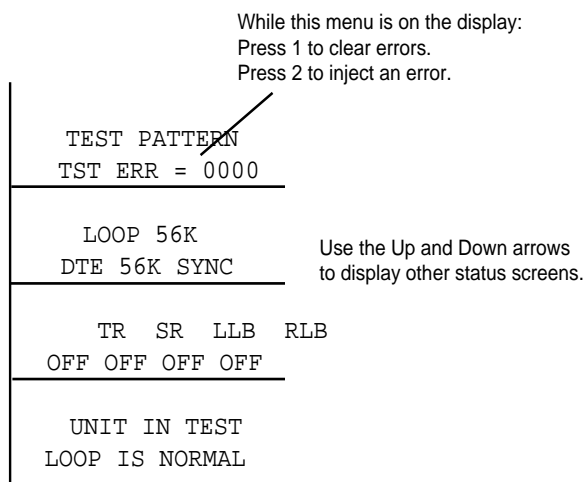
Figure 11-3
Sample Test Status Displays

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
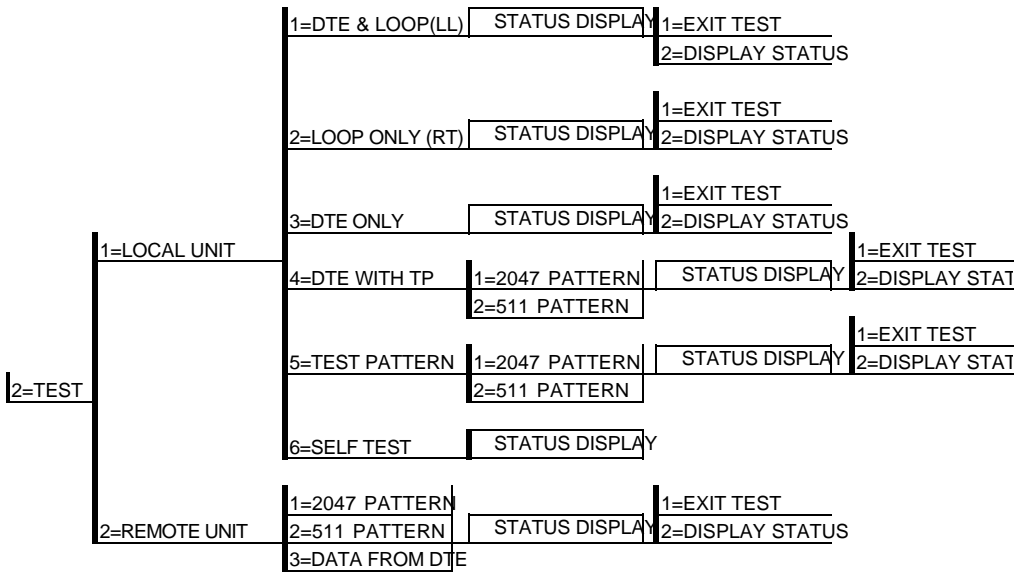
Figure 11-4
Complete Test Menu

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.

Messages from the DSU/CSU

The DSU III S2W 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-A is displayed on the LCD.

NOTE

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.*

<div align="right">**Table 11-A**

Messages from the DSU/CSU</div>

Message	Meaning	Probable Cause	Action
LOOP IS NORMAL	Good local loop signal being received from telco.	Good local loop.	No action required; u properly connected t telco circuit.
LOSS OF TCM SYNC	Unit not receiving a from the telco.	Bad telco cable from DSU to telco jack or circuit to telco.	Replace telco cable f DSU to wall jack. If problem persists, co telco provider.
CO TEST	Telco activated a loopback to test the circuit.	Telco is testing circu	Wait until test is con or contact telco serv provider.
WAITING FOR PTS	Acknowledgement si was not received fro network when dialing	Message for longer t 5 seconds indicates switch not configure properly at CO.	Contact telco provid
RATE NEGOTIATION	Unit is attempting to adapt to the far end I	Message for longer t 30 seconds indicates switch not configure properly at CO.	Contact telco provid
INCOMING CALL	DSU is attempting to answer an incoming but is unable to.	Auto Answer is disab	Enable Auto Answer Dial menu option (se chapter Configuring I Options).

Troubleshooting New Installs

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

After verifying the items listed in Table 11-B 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.*

Table 11-B
Troubleshooting New Installs

Configuration Item to Check	Option Selection	Action
DTE Type	EIA-232 or V.35	Select the type of DTE interface option connect to the DSU/CSU from the Configuration menu.
Data Format	Async or Sync	Select the type of data to be used from Configuration menu.
DTE Cable	N/A	Verify DTE cable connection to the pro connector on the DSU/CSU.
Telco Cable	N/A	Verify the telco cable is securely conn the DSU/CSU and wall jack.
Power the unit Off and then On.	N/A	Verify the unit passes self test during (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 is 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.

NOTE

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

If an external BERT (Bit Error Rate Tester) is available, these additional tests may be performed:

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

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

LOCAL UNIT DIAGNOSTICS

The local DSU III S2W can perform six different tests; see Table 11-C.

Table 11-C

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 Int
DTE Only	&T1	TX/RX Loopback at DTE Interfac
DTE with TP	&T8	RX/RX Loopback with Test Patt
Test Pattern	&T9	Transmit/Receive Test Pattern
Self Test	Z	Check Internal Components (Res
Exit Test	&T0	Stops test, returns to data mod
TD = Customer Transmit Data		
RD = Customer Receive Data		
TX = Network Transmit Data		
RX = Network Receive Data		

The test patterns shown in Table 11-D are available for the DTE with Test Pattern and Test Pattern tests.

Table 11-D

DTE With Test Pattern Commands

Front Panel	AT Command	Description
1=2047 PATTERN	_T0&T8	Standard 2047 random data p
2=511 PATTERN	_T1&T8	Standard 511 random data pa

DTE & Loop (LL)

Test Description

The DTE & Loop test splits the DSU III S2W 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.
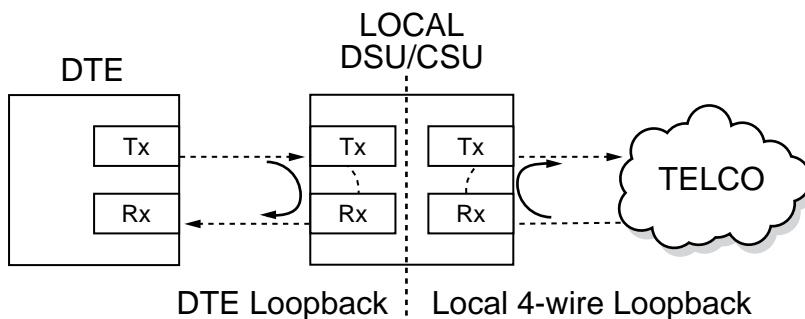
Figure 11-5
DTE & Loop Test

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.

		1=DTE & LOOP(LI
		2=LOOP ONLY (RT
	1=LOCAL UNIT	3=DTE ONLY
		4=DTE WITH TP
2=TEST	2=REMOTE UNIT	5=TEST PATTERN
		6=SELF TEST
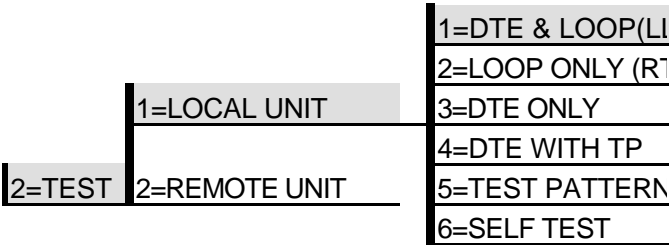
Figure 11-6
Initiating a DTE & Loop Test

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 S2W to be tested from the remote site over the actual communication circuit. Figure 11-7 illustrates the loopback point and the signal paths for this test.
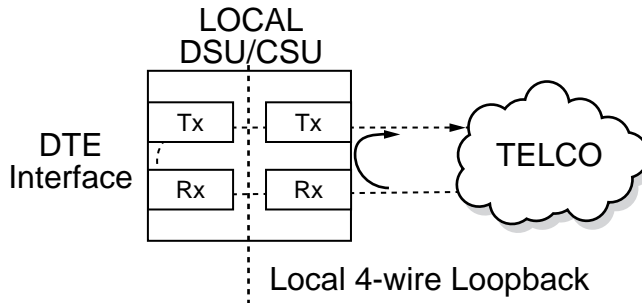
Figure 11-7
Loop Only Test

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.
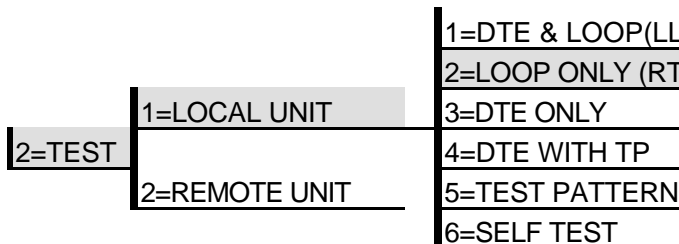
Figure 11-8
Initiating a Loop Only Test

Interpreting Test Results

The Loop Only test is used to loop the circuit back to the telco. No test results are available from the local DSU III S2W.

DTE Only

The DTE Only test provides a method for testing both the DTE interface drivers and receivers of the local DSU III S2W 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 S2W.

NOTE

When this test is implemented, the far unit receives an OOS/OOF message from the network and enters an alarm state.
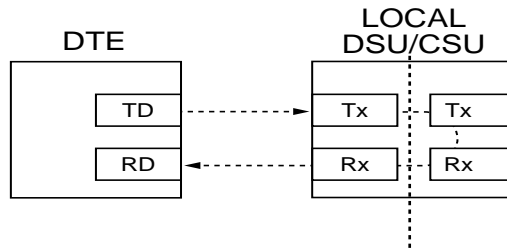
Figure 11-9
DTE Only Test Diagram

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 S2W.

Initiating

Follow the menu path outlined in Figure 11-10 to initiate a DTE Only test.

2=TEST	1=LOCAL UNIT	1=DTE & LOOP(L
		2=LOOP ONLY (R
		3=DTE ONLY
	2=REMOTE UNIT	4=DTE WITH TP
		5=TEST PATTERN
		6=SELF TEST
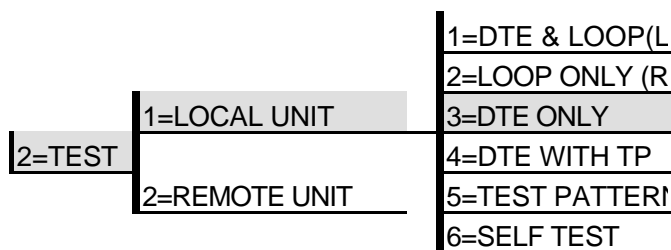
Figure 11-10
Initiating a DTE Only Test

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 S2W. Figure 11-11 illustrates the loopback point and the data paths for this test.
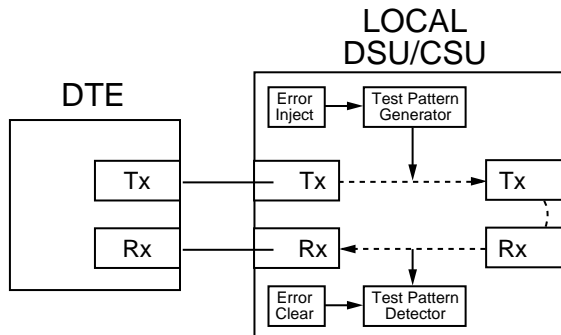
Figure 11-11
DTE with Test Pattern

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 S2W.

Initiating

Follow the menu path outlined in Figure 11-12 to initiate a DTE Test using a Test Pattern.

		1=DTE & LOOP(LL)	1=2047 PATTERN
		2=LOOP ONLY (RT)	2=511 PATTERN
		3=DTE ONLY	3=STRESS PTRN ⚡
		4=DTE WITH TP	4=STRESS PTRN ⚡
	1=LOCAL UNIT	5=TEST PATTERN	5=STRESS PTRN ⚡
2=TEST		6=SELF TEST	6=STRESS PTRN ⚡
	2=REMOTE UNIT		

Figure 11-12
Initiating a DTE Test with Test Pattern

Interpreting Test Results

The DSU III S2W displays:

DTE WITH TP
TST ERR=XX

The first line of the display indicates the type of test being per-
formed 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 TST ERR display.

Test Pattern

The Test Pattern option converts the local DSU III S2W 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.
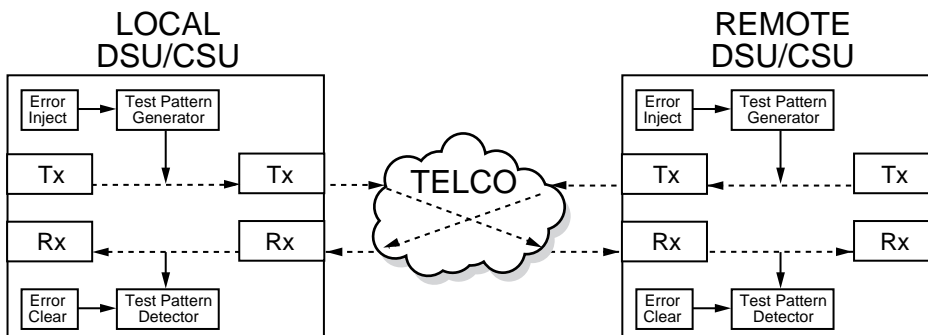
Figure 11-13
Test Pattern Only

Test Purpose

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

• Transmits user-selected test pattern using an internal test pattern generator, and compares the received data using an internal test pattern detector to detect if there are any errors on the circuit

- Injects errors and verifies the unit transmits data across the communication circuit to the remote unit.
- Helps determine from which direction the circuit is receiving errors.

Initiating

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

2=TEST	1=LOCAL UNIT	1=DTE & LOOP(LL)	
		2=LOOP ONLY (RT)	
		3=DTE ONLY	
	2=REMOTE UNIT	4=DTE WITH TP	1=2047 PATTERN
		5=TEST PATTERN	2=511 PATTERN
		6=SELF TEST	
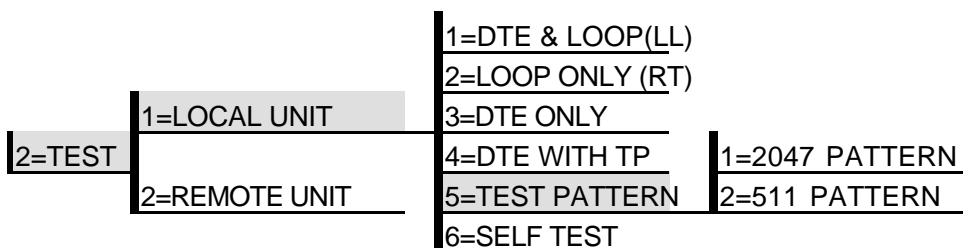
Figure 11-14
Initiating a Test Using a Test Pattern

Interpreting Test Results

The display should show the following:

TST ERR = 0000

Self Test

The Self Test verifies current operation of the DSU III S2W. It can be performed at any time and is recommended if there is any question about the DSU's health.

Test Purpose

To determine if the DSU is functioning properly.

Initiating

Follow the menu path outlined in Figure 11-15 to initiate a self test.

```
                                      1=DTE & LOOP(L
                                      2=LOOP ONLY (R
                     1=LOCAL UNIT     3=DTE ONLY
 2=TEST                               4=DTE WITH TP
                     2=REMOTE UNIT    5=TEST PATTERN
                                      6=SELF TEST
```
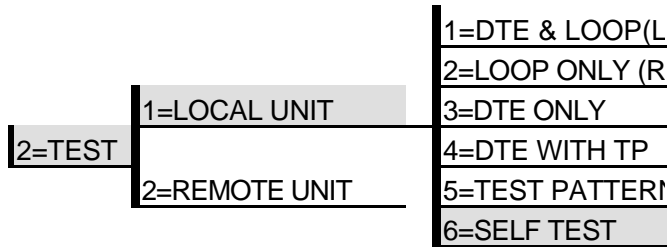
Figure 11-15
Initiating a Self Test

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 performing any remote diagnostics. There are two test patterns to choose from or Data from the DTE may be selected (see Table 11-E).

Table 11-E
Remote Tests and AT Commands

Front Panel	AT Command	Description
1=2047 PATTERN	_T0&T7	Standard 2047 random data
2=511 PATTERN	_T1&T7	Standard 511 random data p...
3=DATA FROM DTE	&T6	Data from DTE

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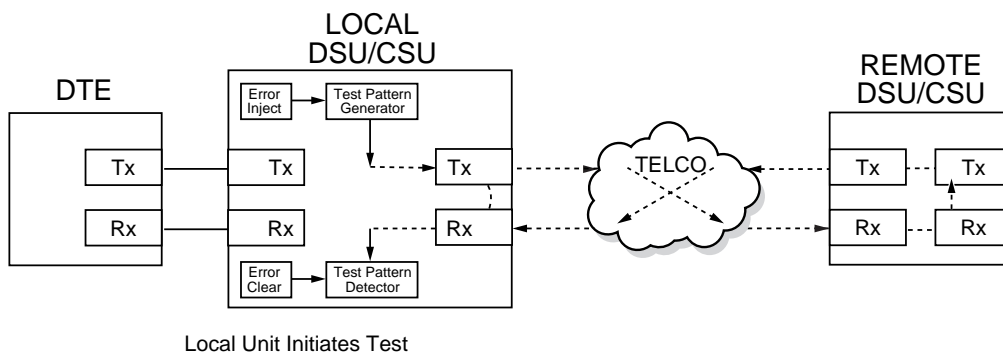
Figure 11-16
V.54 Remote Digital Loopback with Test Pattern

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 S2W into loopback.

```
               ┌─1=LOCAL UNIT
        2=TEST─┤                    ┌─1=2047  PATTERN
               └─2=REMOTE UNIT──────┤  2=511  PATTERN
                                    └─3=DATA FROM DTI
```
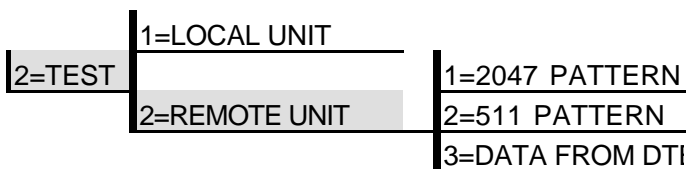
Figure 11-17
Initiating a Remote Test

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 = 0000

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 approximately 60 seconds of no front panel operation, the DSU III S2W automatically reverts to the status display. Examples of possible status displays are shown in Figure 12-1.

Screen 1	DATA MODE ←	DSU Operational
	LOOP IS NORMAL ←	Network Status
Screen 2	DTE 56K SYNC ←	DTE Rate
	TX CLK NORM ←	DTE Clock
Screen 3	TR SR LL← RL	DTE Control Lead
	ON ON OFF OFF←	Control Lead Sta
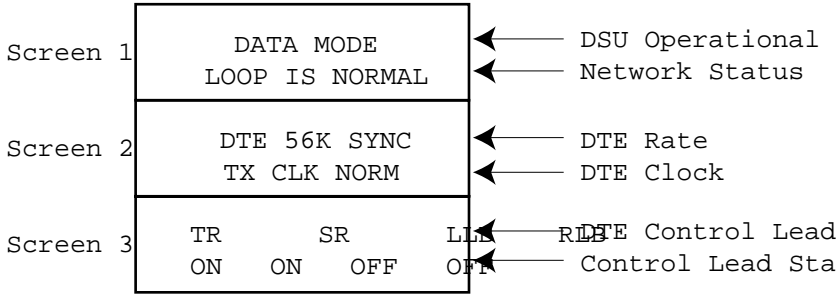
Figure 12-1
Examples of Status Displays

DSU Operational Status

Data Mode

In data mode, the data set ready (SR) and request to send (RS) circuits are on, and the DSU III S2W is ready to send data.

Network Status

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

Incoming Call
DTR Active

The DSU III S2W detects an incoming call.

Data Mode
Loop is Normal

The DSU is connected to the dedicated line.

Idle
Loss of TCM Sync

The DDS physical connection has been broken.

DTE Rate

DTE 56K Sync
Tx Clk Norm

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

DTE Clock

The message displayed on this line of the Status display screen indicates the DTE clock source (as selected in configuration).

DTE Control Leads and Status

Four 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-A shows the AT commands available for the DSU III S2W.

Table A-A

AT Commands

Command	Title	Default
A /	Re-execute Command	none
ATA	Answer	none
ATAD	Dial Auto Dial Number	none
ATDn	Dial Number	none
ATDSn	Dial Stored Number Reg n	none
ATE	Echo Command	0=disable
ATH	Hang Up Call	none
ATL	Volume Control	0=off
ATO	Go Online	none
ATPA=x	Store Phone Number (auto dial)	none
ATPSn=x	Store Phone Number (speed call)	none
ATQn	Result Code Display	1=disable
ATRI	Ring Again Control	0=disable
ATSn?	Read S Register	none
ATSCn	Dial Speed Call Reg n	none
ATSn=x	Write to S Register	none
ATTL	T-Link Adapt Control	1=enable
ATVn	Result Code From	1=long form

<div align="right">

Table A-A (Cont'd)

AT Commands

</div>

Command	Title	Default
ATZ	Reset	none
AT&Cn	DCD Option	1=normal
AT&Dn	DTR Option	2=idle when o
AT&Fn	Restore Factory Options	none
AT&Ln	Network Echo Canceler	2=enable for answer
AT&Qn	DTE Data Format	2=synchronou
AT&Rn	CS Options	1=follows RS
AT&Sn	SR Options	1=off test + id
AT&Tn	Test Commands	0=no test
AT&V	View Current Configuration	none
AT&Wn	Store User Profile	0=profile 0
AT&Xn	Transmit Clock	0=internal
AT&Yn	Power Up User Profile	0=profile 0
AT&Zn=x	Store Phone Number	none
AT%Kn	DTE Rate Select	8=56 kbps
AT_An	LLB Control	0=disable
AT_Cn	SR Control During Test	0=off in test
AT_Dn	RTS-CTS Delay	0=short
AT_Jn	Auto Answer Enable/Disable	0=disable
AT_Pn	Front Panel Enable/Disable	1=enable
AT_Rn	RLB Control	0=disable
AT_S=xx	Set Serial Number	none
AT_Tn	Select Test Pattern	0=2047

Appendix B
Default Configuration Profiles

DEFAULT CONFIGURATION PROFILES

The DSU III S2W contains four different user profiles (sets of configurations options) stored in read only memory (see Table B-A). The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See the chapters *Installation* and *Manual Command* for more information.

Profile 1
Profile 1 is configured for a 56 kbps, synchronous operation with a V.35 connector, DTE commands disabled, and Auto Answer disabled.

Profile 2
Use profile 2 for a 57.6 kbps, asynchronous operation with an EIA-232 connector, DTE AT commands enabled, and Auto Answer enabled.

Profile 3
Use profile 3 for a 9.6 kbps, asynchronous operation with an EIA-232 connector, DTE AT commands enabled, and Auto Answer enabled.

Profile 4
Use profile 4 for a 9.6 kbps, synchronous operation with an EIA-232 connector, DTE commands disabled, and Auto Answer enabled.

Table B-A

Default Configuration Profiles

	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
Manual Command				
Escape Character	43=2BH	43=2BH	43=2BH	43=2BH
CR Character	13=0DH	13=0DH	13=0DH	13=0DH
LF Character	10=0AH	10=0AH	10=0AH	10=0AH
BS Character	8	8	8	8
SW56 Abort Call Timer	50=32H	50=32H	50=32H	50=32H
Escape Guard Timer	50=32H	50=32H	50=32H	50=32H
Command Echo	Disable	Disable	Disable	Disable
Result Code	Disable	Enable	Enable	Enable
Long or Short Code	Long	Long	Long	Long
Test Pattern Type	2047	2047	2047	2047
CS Delay	Short	Short	Short	Short
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
Network Options				
T-Link Adapt	Enable	Enable	Enable	Enable
Volume Level	OFF	OFF	OFF	OFF
Echo Cancel	On Answ	On Answ	On Answ	On Answ
DTE Options				
DTE Rate (56k/64k loop)	56k	57.6k	9.6k	9.6k
Connector Type	V.35	EIA232	EIA232	EIA232
DTE Data Format	SYNC	ASYNC	ASYNC	SYNC
DTE Command Options	DIS	AT	AT	DIS
Transmit Clock (DTE)	Normal	Normal	Normal	Normal
CS Options	Follow RS	Forced On	Forced On	Follow RS
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+Idle	Off Test+Idle	Off Test+Idle	Off Test+Idle
Async Format	N81	N81	N81	N81

	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
Test Options				
Test Timeout	Off	Off	Off	Off
RDL En/Dis	RDL Accepted	RDL Accepted	RDL Accepted	RDL Accepted
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.

MODEM

RC ⟷ ETC
ETC ⟷ RC
RD ⟷ TD
TD ⟷ RD

For Multi-drop requirement:

DCD ⟷ RTS
RTS ⟷ DCD

DSU III
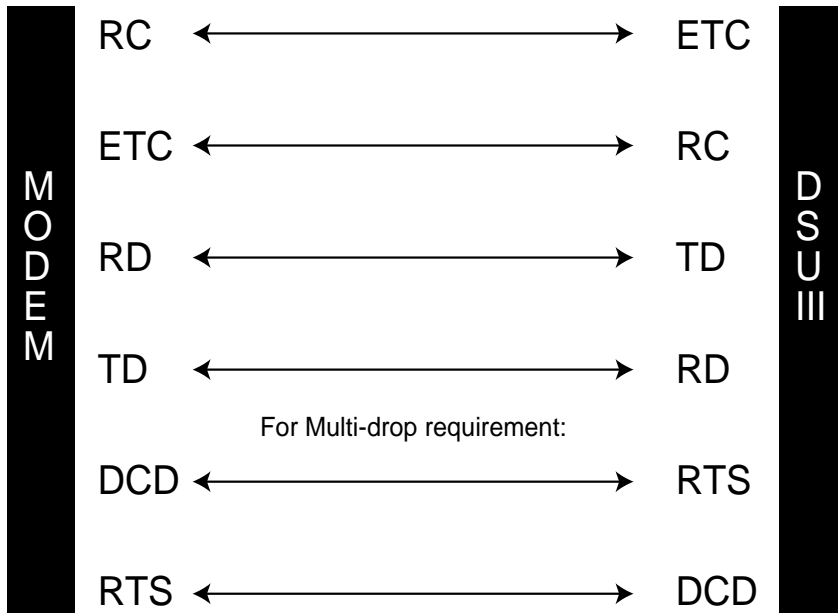
Figure C-1
DSU to Modem Interconnect

Appendix D
EIA-232 Connector

56 AND 64 KBPS APPLICATION

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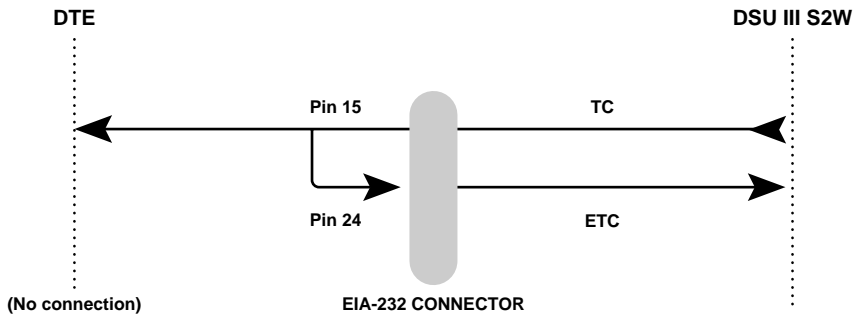
Figure D-1
EIA-232 Connector

Appendix E
Specifications Summary

SPECIFICATIONS AND FEATURES

This section describes the standard specifications and features incorporated in the DSU III S2W.

Network Interface
2-wire Switched 56 based on Northern Telecom Datapath technology

Line Interface
RJ-11

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

DTE Rates
DTE-to-loop rate matching in both switched and virtual private line modes
Synchronous rates: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 48, 56, and 64 kbps
Asynchronous rates: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, and 57.6 kbps

FCC Approval
UL 1950, CSA, and FCC part 15, class A

Tests
Local: DTE, DTE/LOOP, DTE with test pattern, loop only, test pattern
Remote: V.54 with 2047, 511, or DTE data; T-link with 2047, 511, or DTE data

Dialing Options
EIA-366 or AT out-of-band
AT in-band dial commands
Front panel keypad
V.25 bis in-band (async, bi-sync, SDLC)
Stored Number
Switch Stored Number
Switch Speed Dial
DTR Stored Number

Physical
Dimensions: 2.25"H, 8.75"W, 10.25"D
Weight: 3 lbs
Power: 115 VAC, 60 Hz, 8 Watts

Environment
Operating Temperature: $0^{o}C$ to $50^{o}C$ ($32^{o}F$ to $122^{o}F$)
Storage Temperature: $-20^{o}C$ to $70^{o}C$ ($-4^{o}F$ to $158^{o}F$)
Relative Humidity: Up to 95% non-condensing

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.

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.

CD

Carrier detect. A signal generated by a DCE (a modem or DSU). CD informs the DTE device if the DCE is receiving a carrier signal from the line.

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.

controller card

The card installed in slot 1 of an ADTRAN SMART 16 shelf, used to connect a VT 100 terminal or DATAMATE for configuring SMART 16 DSU/CSU products.

CPE

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

CS

Clear to send. A signal from the DCE to the DTE indicating the DTE can send data.

DATAMATE

An ADTRAN designed and manufactured device that provides a hand-held means of configuring the SMART 16 shelf. The DATAMATE plugs into the front of the controller card and provides a 2x16 LCD display and full numeric keypad.

dB

Decibel. A unit of measure of signal strength.

DCE

Data communications equipment. A DSU, modem, or TA.

DSU

Data service unit. A device designed to transmit and receive digital data on digital transmission facilities. A DSU is the interface between a DTE and either a DMS_100 Data Line Card or a D4 Datapath Extension Unit.

DTE
> Data terminal equipment. The computer or terminal.

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.

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

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.

nonvolatile memory

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

parity bit

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

RDL

Remote digital loopback.

ROM

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

SDLC

Synchronous data link control. 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.

SNMP

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

SR

Data service unit. A signal from the DCE EIA-232 interface used to indicate if the DCE is ready to pass data.

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. The start bit is always a 0.

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 1. See start bit.

switched

In regard to DSUs, 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* DSUs.

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.

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. Used to configure the ADTRAN SMART 16 Shelf.

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