DSU III TDM

Data Service Unit Part Number 1200063L1 Document Number 61200063L1-20A

April 1999



Trademarks:

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



901 Explorer Boulevard P.O. Box 140000 Huntsville, AL 35814-4000 (256) 963-8000

© 1999 ADTRAN, Inc. All Rights Reserved. Printed in U.S.A.

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 ADT-RAN 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.

Digital Facility		Service Order	Network	
Service Type	Interface Code	Code	Jacks	
56 kbps Digital Interface	04DU5-56	6.0F	RJ-48S	
64 kbps Digital Interface	04DU5-64	6.0F	RJ-48S	

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

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

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

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



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

CANADIAN EMISSIONS REQUIREMENTS

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

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

CANADIAN EQUIPMENT LIMITATIONS

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

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

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

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



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

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

IMPORTANT SAFETY INSTRUCTIONS

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

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

SAVE THESE INSTRUCTIONS!

ADTRAN YEAR 2000 (Y2K) READINESS DISCLOSURE

ADTRAN has established a Year 2000 program to ensure that our products and operations will correctly function in the new millenium. ADT-RAN warrants that all products meet Year 2000 specifications regardless of model or revision. Information about ADTRAN's Year 2000 compliance program is available at the following:

Web Site	www.adtran.com
Product Matrix	www.adtran.com/Y2Kfax.html
Faxback Document Line	(256) 963-8200
	Y2K plans and product certifications
	are listed in the matrix
Y2K Project Line	(256) 963-2200
E-Mail	year 2000@adtran.com

Table of Contents

List of Figuresxiii
List of Tablesxv
Chapter 1. Introduction
Product Overview 1-1
DDS Operation 1-2
Dial Backup Operation 1-3
Overview of Dial Backup Options 1-3
4-Wire Switched 56 Backup Option1-3
2-Wire Switched 56 Backup Option1-4
V.32 bis Backup Option 1-4
1B+D Basic Rate ISDN Backup Option 1-4
Entering Dial Backup Mode 1-5
Loss of Sealing Current 1-5
Out of Service (OOS) Signal 1-5
No Receive Signal 1-5
All 1s or all 0s Condition 1-5
Conditions for Returning to the DDS Circuit
Warranty and Customer Service 1-7
Chapter 2. Installation
Unpack, Inspect, Power Up 2-1
Receipt Inspection 2-1
ADTRAN Shipments Include2-1
Customer Provides 2-2
Power Up
Network Connection 2-3
Telco Connectors
Control Port
DTE Connection
Configuration
Remote Command 2-6

Chapter 3. Operation Menu Structure

Menu Structure	3-1
Status	3-2
Network Rate, DTE Rate, and Data Format	
Dial Backup Information	3-3
Type of Dial Backup Service	3-3
Current Status of Dial Backup Mode	3-3
Multiplexer Status	3-5
Errored Seconds	3-5
DSU and Network Status	3-6
Current DSU III TDM Status	
Current DDS Network Status	3-6
Test	3-7
Configuration (CONFIG)	3-7
Dial	
Basic Menu Travel	
Front Panel	
LCD Window	
Enter	
Numeric Kevpad	3-10
Shift	3-10
Quick	3-11
Cancel	3-11
Up and Down Arrows	3-11
LED Description	3-11
Rear Panel	3-13
Chapter 4. Testing and Troubleshooting	
Test Overview	
Initiating a Test	
Test Status Display	
Exiting a Test	
Local Unit diagnostics	
DTE & Loop (ĽL)	
Test Description	
Test Purpose	
Initiating	
Interpreting Test Results	
Loop Only (RT)	
Test Purpose	
1	

Initiating	4-10
Interpreting Test Results	4-10
DTE Only	4-11
Test Purpose	4-12
Initiating	4-12
Interpreting Test Results	4-12
DTE With Test Pattern	4-13
Test Purpose	4-14
Initiating	4-14
Test Pattern Descriptions	4-14
Interpreting Test Results	4-15
Test Pattern	4-16
Test Purpose	4-17
Initiating	4-17
Interpreting Test Results	4-17
Self Test	4-18
Test Purpose	4-18
Initiating	1.18
Interpreting Test Results	1_18
Remote Unit Diagnostics	4-10
	4-20
Data from DTE	4-20
Data IIOIII DIE	4-21
	4-22
	4-22
	4-23
	4-23
Interpreting Test Results	4-23
DBU Connection	4-24
Test Purpose	4-25
Initiating	4-25
Interpreting Test Results	4-25
Troubleshooting	4-26
Messages from the DSU/CSU	4-26
Chapter 5. Configuration Overview	
Local and Remote Configuration.	. 5-1
Chapter 6 Configuring Network Options	
Network Options	<u>с</u> 1
	. U-I
Loop Mate	. 0-1

Clock Source	.6-3
Remote Configuration	.6-4
Chapter 7. Configuring DTE Options	
Dte Options	.7-1
DTE Rate	.7-1
Port Not Used	.7-2
DTE Pass Through Mode	.7-2
Data Format	.7-3
Transmit Clock	.7-4
Clear to Send (CS) Options	.7-5
Forced On	.7-5
Follows RS	.7-5
Carrier Detect (CD) Options	.7-6
Forced On	.7-6
Normal	.7-6
Data Set Ready (SR) Options	.7-7
Forced On	.7-7
Off OOS Only	7-7
Off Test Only	7-7
Off Test+OOS	7-7
Off Remt Idle	7_7
Chapter 8. Configuring Test Options	
Test Options	8-1
Test Timeout	8-1
Remote Digital Loonback (RDL)	8-2
DBU Answer Test	.0 2 8-3
	0-0
Chanter 9 Configuring Dial Ontions	
Dial Options	0.1
Dhan Number	.9-1
	.9-3
Southing the Southing Day (1) I double or (SDID)	.9-3
Setting the Service Profile Identifier (SPID)	.9-3
Setting the Local Directory (LOC) Number	.9-4
Dial Backup Options for All Models	.9-4
Automatic DBU	.9-4
Number to Dial	.9-4
Originate/Answer	.9-4
When Out of Service (OOS)	.9-4

No Receive (RX) Signal
No Sealing Current
When all 1s/0s
Auto Restore
Redial Counter
Fail Timer
Wait to Redial
2-Wire and 4-Wire Dial Backup Options
Network Type
V.32 bis Dial Backup Options
Error Control
Flow Control
Compression
ISDN Dial Backup Options
Switch Type 9-8
Chapter 10. Manual Command
Manual Command 10-1
Chapter 11 Dial Ontions
Dial Ontions 11-1
Answer Unit Connected to DDS Line 11-2
Dial Backup 11-2
Originate Unit Connected to DDS Line 11-2
Dial Backup 11-2
Stav on Leased 11-2
DBU Online Test
Dial Options During Dial Backup
Hang Un
Stav On Line
Appendix A. Pinouts
Appendix B. Configuration ProfilesB-1
0
Appendix C. DSU to Modem InterconnectC-1
Appendix D. EIA-232 ConnectorD-1
Appendix E. Specifications SummaryE-1

Append	dix F.	Glossary	 	 F-1
Index			 	 1

List of Figures

Figure 1-1.	Sample 64 kbps Application for the DSU III TDM 1-2
Figure 3-1.	Status Display Example
Figure 3-2.	Example of Basic Menu Travel
Figure 3-3.	DSU III TDM Front View
Figure 3-4.	DSU III TDM Rear View
Figure 4-1.	Normal Operation Before Initiating Loopback Test 4-2
Figure 4-2.	Initiating a Test 4-3
Figure 4-3.	Sample Test Status Displays 4-4
Figure 4-4.	Complete Test Menu
Figure 4-5.	DTE & Loop Test 4-7
Figure 4-6.	Initiating a DTE & Loop Test 4-8
Figure 4-7.	Loop Only Test 4-9
Figure 4-8.	Initiating a Loop Only Test
Figure 4-9.	DTE Only Test Diagram 4-11
Figure 4-1). Initiating a DTE Only Test
Figure 4-1	I. DTE with Test Pattern 4-13
Figure 4-12	2. Initiating a DTE Test with Test Pattern
Figure 4-13	3. Test Pattern Only 4-16
Figure 4-14	4. Initiating a Test Using a Test Pattern
Figure 4-1	5. Initiating a Self Test
Figure 4-1	3. V.54 Remote Digital Loopback w/Test Pattern
Figure 4-1	7. Port RDL
Figure 4-18	8. Initiating a Remote Test
Figure 4-19	9. DBU Connection Test
Figure 4-20). Initiating a DBU Connection Test
Figure 6-1.	Setting Loop Rate Options
Figure 6-2.	Setting the Clock Source 6-3
Figure 6-3.	Enabling/Disabling Remote Configuration
Figure 7-1.	DTE Rate Options
Figure 7-2.	Selecting Data Format
Figure 7-3.	Transmit Clock Options
Figure 7-4.	Selecting Clear to Send (CS) Options
Figure 7-5.	Selecting Carrier Detect (CD) Options

Figure 7-6.	Setting Data Set Ready (SR) Options	7-7
Figure 8-1.	Setting Test Timeout	8-1
Figure 8-2.	Remote Digital Loopback	8-2
Figure 8-3.	DBU Answer Test	8-3
Figure 9-1.	Dial Options	9-2
Figure 9-2.	Editing a Stored Phone Number	9-3
Figure 10-1.	Manual Command	10-1
Figure 11-1.	Dial Options Menu	11-1
Figure C-1.	DSU III TDM to Modem Interconnect	C-1
Figure D-1.	EIA-232 Connector.	D-1

List of Tables

Table 3-1.	Quick Key Functions 3-11
Table 4-1.	Test Selections 4-6
Table 4-2.	Remote Tests Selections 4-20
Table 4-3.	Messages from the DSU/CSU 4-27
Table 10-1.	Manual Commands 10-2
Table A-1.	Pin Assignments for EIA-232 Connectors
Table A-2.	Pin Assignments for Main Connector
Table A-3.	Pin Assignments for Backup Connector
Table A-4.	V.35 Pin Assignments for Adapter Cable
Table A-5.	EIA-232 Pin Assignments for Adapter CableA-5
Table B-1.	Default Configuration for the DSU III TDM B-2

Chapter 1 Introduction

PRODUCT OVERVIEW

The ADTRAN DSU III TDM (time division multiplexer) enables the user to run four DTE ports over a single 56/64 kbps Digital Data Service (DDS) circuit. One communications link is shared by up to four DTE devices by enabling each DTE to use the path exclusively at regular intervals. In this way a circuit capable of a relatively high information transfer rate is subdivided into time slots to provide a number of lower speed channels.

Figure 1-1 on page 1-2 shows an example of a typical application using the DSU III TDM on a 64 kbps network. Each of the four DTE devices is allowed a portion of the dedicated circuit, not exceeding the allowable bandwidth of 60.8 kbps.

The major capabilities of the DSU III TDM include:

- 56/64 kbps leased line point-to-point DDS operation
- Four independent DTE ports
- Synchronous or asynchronous operation on all ports
- Single port operation
- Automatic remote configuration for critical options
- Optional dial backup capability (4-wire Switched 56, 2-wire Switched 56, ISDN, or V.32 bis)
- Extensive test functions for testing of DTE & Loop interfaces
- Extensive status monitoring



Figure 1-1. Sample 64 kbps Application for the DSU III TDM

DDS OPERATION

DDS is a nationwide service that allows interconnection and transport of data at speeds up to 64 kbps. The local exchange carriers provide the local loop service to DDS customers and may provide data for routing Inter-LATA to an interexchange carrier. In DDS mode, the DSU III TDM supports the 56/64 kbps DDS service rate.

DIAL BACKUP OPERATION

The DSU III TDM may be configured with optional dial backup cards. This allows the TDM to back up the DDS circuit in the event of an interruption. The TDM supports dial backup operation over 4-wire Switched 56, 2-Wire Switched 56, 1B+D ISDN, or analog (V.32 bis) public service telephone network (PSTN) when equipped with the appropriate dial backup module.

Contact your local telco provider to determine which services are available for your location.

The DSU III TDM equipped with a Switched 56 or ISDN module can automatically or manually back up all four ports in the event of a DDS circuit failure. Upon restoration of the DDS circuit, the DSU III TDM can be automatically or manually returned to dedicated operation.

When using analog V.32 bis backup, only port 1 is backed up.

When operating at a DDS loop rate of 64 kbps, the TDM is capable of backing up all four ports over the Switched 56 service if no more than 52.8 kbps of bandwidth has been allocated to the ports.

If more than 52.8 kbps of bandwidth has been allocated to the four ports, the TDM turns off ports during dial backup until the 52.8 kbps limit is not exceeded. Ports are turned off in the sequence 4, 3, and 2. For example, in *Figure 1-1 on page 1-2*, ports 3 and 4 would be turned off during dial backup.

Overview of Dial Backup Options

4-Wire Switched 56 Backup Option

This 4-Wire Switched 56 Service allows customers to pay for data connection only for the time the unit is active. The regional operating companies provide the 4-wire local loop service to SW56 customers.

2-Wire Switched 56 Backup Option

DATAPATH® is a Switched 56 service offered under various service names by the local service provider. The services are generally provided by the Northern Telecom DMS/SL100 family of central office switches. DATAPATH allows the customer to pay for high speed data transfer, up to 56 kbps, only when the unit is active. The dial up service is delivered via a 2-wire local loop that can be up to 18,000 feet at a signal level of -45dB.

V.32 bis Backup Option

The V.32 bis/42 bis modem in an asynchronous mode can use V.42 bis data compression to make up for a slower connection rate. V.42 bis increases the effective data throughput from 14.4 kbps to as high as 57.6 kbps, depending on the data type. No compression is supported in synchronous operation.

Due to the limited bandwidth of the V.32 modem, employing this type of service limits dial backup to only PORT 1. PORT 1 is backed up to a maximum of 14.4 kbps synchronous. For asynchronous operation, the backup module may be configured to employ data compression so data rates higher than 14.4 kbps may be supported.

1B+D Basic Rate ISDN Backup Option

ISDN service provides the customer with a switched 56/64 kbps circuit. The default data rate for this option is 56 kbps. The 64 kbps data rate may be accessed using the Smart Dial String as described in the chapter *Configuring Dial Options on page 9-1*. This option provides a U interface to the ISDN network.

Entering Dial Backup Mode

When a condition for entering dial backup mode is detected, the Alarm led turns on, and the buzzer sounds. The buzzer alternates between 30 seconds on and 30 seconds off unless the DDS line is restored or it is disabled by using the Quick key and selecting TURN OFF BEEP. See the section *Front Panel on page 3-10* for more information on the Quick key.

The following conditions can be enabled to cause the DSU III TDM to enter dial backup mode:

Loss of Sealing Current

Sealing current is a low voltage DC current provided by the central office (CO) to prevent corrosion of splices in copper wires used in the local loop. Sealing current may also be used for local loop testing purposes. An absence of sealing current generally is an indication that the loop is open.

Out of Service (OOS) Signal

An OOS signal, generated by the network, indicates a device (or devices) in the network is out of service. If the network has an excessive rate of errors, the DSU III TDMs can no longer communicate, causing an out of sync condition and resulting in dial backup operation if this option is selected.

No Receive Signal

This is an indication that the local loop copper pairs may be either open or shorted or the OCU in the telco central office is inoperative. In a private network this may indicate that the transmitter of the remote DSU is inoperative.

All 1s or all 0s Condition

This condition is usually generated by the network to indicate some device (or devices) on the network is inoperative. Upon detecting an all 1s or all 0s condition, the DSU III TDM will initiate a handshake routine to determine whether the remote unit's DTE is the source of the all 1s or 0s condition or an actual network failure exists.

For more information see the chapter Configuring Dial Options on page 9-1.

Conditions for Returning to the DDS Circuit

The DSU III TDM can be configured to revert automatically to the DDS circuit from the dial backup mode or wait to be returned to the DDS circuit manually. Once the DSU III TDM enters dial backup mode, the unit polls the DDS circuit once every 100 ms to determine if the condition causing the DDS circuit failure has been corrected. Once the DSU III TDM determines that the problem has been properly corrected and the DDS circuit is stable, it will wait for the amount of time specified in the restore timer (1 - 255 minutes) before reverting to the DDS circuit. Polling of the DDS circuit is non-intrusive, and return to the DDS circuit generally takes 2 - 3 seconds. The backup connection is maintained for one minute after the DDS circuit is restored.



The DDS circuit must be manually restored when **TDM Out of Sync** causes dial backup. For more information see the chapter Configuring Dial Options on page 9-1.

WARRANTY AND CUSTOMER SERVICE

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

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

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

Chapter 2 Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the DSU III TDM for any damages that may have occurred in shipment. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Customer and Product Service (see the last page of this manual). Keep the original shipping container to use for future shipment or verification of damage during shipment.

ADTRAN Shipments Include

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

- DSU III TDM unit
- An 8-position modular to 8-position modular cable
- The user manual
- A 4-position modular to 4-position modular cable if the 2-Wire Switched 56, V.32 bis or 1B+D ISDN backup option is installed. An 8position modular to 8-position modular cable is included for 4-Wire Switched 56 backup options.

Customer Provides

For EIA-232 applications, the customer must provide an EIA-232 interface cable with standard 25-pin male D-type connectors (Cannon or Cinch DB-19604-432).

For V.35 applications a six-foot adapter cable (part number 1200063L6 for male to male; part number 1200063L8 for male to female) is available from ADTRAN. This cable converts the EIA-232 on the rear panel of the unit to V.35. The pinout for the V.35 conversion is shown in the appendix *Pinouts on page A-1*.

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.



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

NETWORK CONNECTION

Telco Connectors

The DSU III TDM has two eight-position modular jacks labeled **MAIN** and **BACKUP**. The **MAIN** connector provides connection to the dedicated (DDS) network. See *Table on page A-2* for the connector's pin assignments.

The second eight-position modular jack labeled **BACKUP** provides connection to the switched telco circuit. The pinout for the **BACKUP** connector depends on the backup option selected. The pinouts for each of the dial backup options are located in *Table A-3* on page A-2.



The connector labled **BACKUP** is only active if the DSU III TDM is equipped with a dial backup module.

Control Port

The two RJ-45 eight-pin modular connectors located on the rear of the unit and labeled **CHAIN IN** and **CHAIN OUT** are reserved for future use with the ADTRAN SNMP management software.

DTE CONNECTION

Connection to DTE equipment is provided by four EIA-232 connectors labeled **PORT 1** through **PORT 4**. The maximum cables length recommended is 50 feet for EIA-232. The EIA-232 interface is provided on four standard DB-25 connectors. See *Table* on page A-1, for the EIA-232 interface pin assignments.

The V.35 adapter (1200063L6 or 1200063L8) is recommended for data rates above 19.2 kbps. If a V.35 interface is not used it may be necessary to use a special cable wired as shown in the appendix *EIA-232 Connector on page D-1*.



The EIA-232 interface should be used only for speeds up to 19.2 kpbs. Speeds over 19.2 kpbs should use the V.35 adapter.

CONFIGURATION

The DSU III TDM is configured from the front panel. The DSU III TDM contains four different user profiles (sets of configurations options) that are stored in read-only memory. These profiles are listed in the appendix *Configuration Profiles on page B-1*. The unit is shipped from the factory with profile 1 (default configuration) loaded into the nonvolatile configuration memory. If profile 1 matches the desired system requirements, then no additional configuration is required to put the unit into service. If profile 1 does not match the desired system requirements, modify the default configuration or select another profile more closely matching the desired configuration and modify.

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

See the chapter *Manual Command* on page 10-1 for information on loading default configuration profiles.

Ports 1 to 4 are initially configured as follows

DTE Rate	DTE 9.6K
Data Format	Synchronous
CD Option	Normal
CS Option	Follow RS
SR Option	Off OOS Only
Tx Clock Option	Normal
Loop Rate	56 kbps
Clock Source	From Network
Remote Configuration	Enabled
Test Timout	0
Remote Digital Loopback (RDL)	RDL Accepted

Remote Command

The DSU III TDM can be controlled remotely from another DSU III TDM. The Configuration (**CONFIG**) menu allows the DSU III TDM remote configuration capability to be enabled or disabled. For more information see the chapter *Configuration Overview* on page 5-1.

Chapter 3 Operation

MENU STRUCTURE

The DSU III TDM 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 to all other operations. There are four main menu branches: **STATUS**, **TEST**, **CONFIGURATION**, and **DIAL**.

Each main menu item has several functions and submenus to identify and access specific parameters. These items are described in the following sections.

Status

The **STATUS** screen displays during tests and when there is no front panel operation for 30 seconds. The **STATUS** screen displays the current operating data mode, loop status, DTE data rate and format, and DTE interface lead status.

The current port number displays in reverse video in the upper right corner of the screen. The current port can be changed in the network rate screen (see *Figure 3-1*) by pressing the desired port number on the keypad. Pressing the number of a port while any other screen is displayed causes the display to jump to the next screen. The message **DTE OFF SYNC** appears if attempting to change to a port not in use.



Figure 3-1. Status Display Example

Network Rate, DTE Rate, and Data Format

The second screen of the Status display indicates the current loop rate (either 56K or 64K) on the first line. The DTE data rate and format (as selected in configuration) are shown on the second line. While this screen is displayed, the current port can be changed by pressing the desired port number on the keypad.

Dial Backup Information

Type of Dial Backup Service

The type of dial backup service installed in the DSU III TDM is indicated by one of the following messages

DU DBU Status	2-Wire Switched 56 backup option installed.
ISDN DBU Status	1 B+D Basic Rate ISDN backup option installed.
SW56 DBU Status	4-Wire Switched 56 backup option installed.
V.32 DBU Status	V.32 bis backup option installed.
DBU Status Not Installed	No backup service option card installed in the DSU III TDM unit.

Current Status of Dial Backup Mode

The current dial backup status is indicated by one of the following messages:

Answering Call	The DSU III TDM has detected incoming call messages and is starting the setup call procedure.
Call Disconnect	Call Disconnect message received from the remote end.
Called Unit Busy	The unit called is currently busy and cannot be connected at this time. This is an ISDN specific message.
Dialing	The unit is dialing the selected number.
Going to DBU	This message is briefly displayed before the unit enters dial backup mode.
Idle	Messages are not being transmitted but the service is immediately available for use.
Incoming Call	Incoming call messages being received.
In Dial Backup	The unit is currently in dial backup mode.
No RX Signal	The DSU III TDM detects sealing current but no data signal from telco.

Chapter 3.	Operation
------------	-----------

No wink from CO	Switched 56 provider has encountered a service problem (4-wire Switched 56).
Not Installed	No dial backup option is installed in the DSU III TDM.
OOS/OOF From Net	Out-of-service signal or out-of -frame condition exists. The call cannot be completed because either the called terminal or the called terminal's access line is out-of-service or is faulty (2-wire and 4-wire Switched 56).
Open Loop	The physical connection to the backup line has been broken (2-wire and 4-wire Switched 56).
DBU Line in RDL	Remote end has initiated a test.
Test From Telco	The network provider has activated the CSU Loopback (2-wire and 4-wire Switched 56).
DBU Test Pattern	The DSU III TDM is currently performing a test with a pattern.
Waiting for Call	The answering DSU III TDM is waiting on a call from the remote end.

Multiplexer Status

Messages indicating the muliplexer status include the following:

Normal	The multiplexer has achieved frame synchronization and is ready to pass data.
Out of Sync	The multiplexer has not been able to achieve frame synchronization and cannot pass data. Possible reasons for no synchronization are:
	Unit not connected to telco circuit
	No multiplexer on far end of telco
	Bad or noisy telco circuit
	Test in progress
INV CFG PORTx	(x=1-4) Normal Operation of the DSU III TDM requires that the local DTE RATE and DTE FORMAT be the same as the remote options on a port by port basis. The INV CFG PORT message is an indication that one or both of these options is not configured the same on both ends on the indicated port. To clear this error, configure the local DTE RATE and DATA FORMAT options. The remote options are updated automatically to match the local options.

Errored Seconds

The number of errored seconds encountered (up to a maximum of 255) in multiplexer frames is displayed. Errored seconds can be caused by various conditions including the following:

- Poor telco circuit
- Bad cabling to the DSU III TDM
- DSU III TDM malfunction

The errored seconds can be cleared to 000 by pressing 1 while the errored seconds are displayed.

DSU and Network Status

Current DSU III TDM Status

Possible messages indicating the current status of the DSU III TDM include the following:

Data Mode	In data mode, the data set ready (SR) and request to send (RTS) circuits are on, and the DSU III TDM is ready to send data.
Unit in Test	The DSU III TDM is currently in test mode. Use the arrow keys to display the type of test being performed.

Current DDS Network Status

For normal operation **LOOP IS NORMAL** should be displayed. The status of the main telco line is indicated by one of the following messages:

Answering Call	The DSU III TDM detects an incoming call.
Check Telco	The transmit and receive (Tx/Rx) pairs of the loop connection are reversed. The pairs should be swapped for normal operation.
Going To DBU	This message is displayed briefly when the unit is switching from the dedicated service to dial backup mode.
In Dial Backup	The DSU is in dial backup mode.
LL Test From Telco	An LL Test has been initiated from the telco.
Loop is Normal	The DSU is connected to the dedicated line.
OOS/OOF	The telco is transmitting an out of service code.
Open Loop	The DDS physical connection has been broken.
Waiting for Call	The DBU module is waiting for a call.
Test

The **TEST** selection is used to control local and remote testing. Select local or remote testing, and select the type of test and test pattern when required. See the chapter *Testing and Troubleshooting on page 4-1* for more information.

Configuration (CONFIG)

Configuration is used to select network and DTE operating parameters. When a 64 kbps loop rate is selected, a **SCRAMBLE** option submenu is displayed instead of the **DTE RATE** menu to control scrambling. The **CONFIG** menu branch is divided into several chapters for easier reference. The division includes a brief overview chapter followed by a separate chapter for each submenu of the **CONFIG** branch: *Configuring Network Options on page* 6-1, *Configuring DTE Options on page* 7-1, *Configuring Test Options on page* 8-1, *Configuring Dial Options on page* 9-1, and *Manual Command* on page 10-1.

Dial

DIAL provides manual dialing functions. Key in a number to dial or select one of the ten stored numbers. See the chapter *Dial Options on page 11-1* for more information.

BASIC MENU TRAVEL

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

Enter	Selects a displayed item	
Up Arrow	Scrolls up a menu tree	
Down Arrow	Scrolls down a menu tree	
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 menu items with 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. Press **Enter** to select the flashing item.

When a command is selected, the DSU III TDM issues one of two commands:

Command Accepted	Indicates a successful command processed by the DSU III TDM.
Command Rejected	Indicates improper configuration attempted. The command is not executed and no configuration change occurs.

The following example steps and *Figure 3-2 on page 3-9* illustrate how to select DSU III TDM options:

- 1. Select Configuration (CONFIG) by pressing 3 and then pressing Enter.
- 2. Select LOCAL or **REMOTE CONFIGURATION** by pressing the corresponding number and then pressing **Enter**.
- 3. Use the **Up** and **Down Arrows** to view submenu items.
- Choose an item on the submenu such as network options (NETWORK OPT).
- 5. To select **NETWORK OPT**, press **1** and then press **Enter**.
- 6. To select LOOP RATE options, press 1 and then press Enter.

	1= LOCAL	1= NETWORK OPT	1 = LOOP RATE
3= CONFIG		2= DTE OPTIONS	2= CLOCK SOURCE
	2= REMOTE	3= TEST OPTIONS	3= REMOTE CONFIG.
4		4= DIAL OPTIONS	
		5= MANUAL COMMAND	

Figure 3-2. Example of Basic Menu Travel

FRONT PANEL

The DSU III TDM faceplate is shown in *Figure 3-3*. Descriptions of the display keys and LEDs located on the front panel follow the figure.



Figure 3-3. DSU III TDM Front View

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 submenu item is invoked or a configuration parameter is set. The display of **COMMAND AC-CEPTED** 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 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 immediately to the main menu. During a test, the **Quick** key displays the exit test screen. During dial backup, **Quick** displays a menu with options to **HANG UP** or **STAY ON THE LINE**. The **Quick** key functions are defined in *Table 3-1*.

TDM Status	Pressing Quick Key Displays
Normal Operation	TOP MENU
During Dial Backup	1= HANG UP 2= STAY ON LINE
During Test	1= EXIT TEST 2= DISPLAY STATUS
Dial Backup Condition Exists	1= GO TO DIAL BACKUP 2= STAY ON LEASED

Table 3-1. Quick Key Functions

Cancel

Stops the current activity and returns to the previous menu. Repeat until the desired menu level is reached. When a submenu item is displayed, press **Cancel** to exit the current display and return to the previous menu. Repeat until the desired menu level is reached.

Up and Down Arrows

Up and **Down Arrows** scroll through the submenu items available in the current menu. Submenu items display two at a time in a circular or wrapping fashion. When the submenu 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 TDM has seven LED indicators: RS, CS, TD, RD, CD, ALM, and TST. These LEDs are identified as follows:

RS: Request to Send	Reflects the status of the request to send pin of the EIA-232 connector for the currently selected port.
CS: Clear to Send	Reflects the status of the clear to send pin of the EIA- 232 connector for the currently selected port.
TD: Transmit Data	This LED is active when the multiplexer transmits data to the DTE on the currently active port.
RD: Receive Data	This LED is active when data is received from the DTE on the currently active port.
CD: Carrier Detect	This LED is active when the multiplexer achieves frame synchronization and is ready to transfer data.
ALM: Alarm Indication	This LED is active whenever an alarm condition exists. Alarm conditions include:
	Open loop on network
	No frame synchronization
	Unit in dial backup
	Problem on dial backup line
TST: Test Mode	This LED is active whenever the unit is in test mode.

REAR PANEL

The DSU III TDM is equipped with four EIA-232 connectors labeled **PORT 1** through **PORT 4**, used to connect to DTE equipment. The EIA-232 interface is provided on four standard DB-25 connectors. Pin assignments for the DTE and network connections are described in the appendix *Pinouts on page A-1*. The DSU III TDM rear panel is shown in *Figure 3-4*.



ltem

Function

DTE connection
Used to turn power on or off
Connection to the dedicated circuit
Connection to dial backup
Reserved for future use
Reserved for future use
Power cord connection

Figure 3-4. DSU III TDM Rear View

Chapter 4 Testing and Troubleshooting

TEST OVERVIEW

The DSU III TDM 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.

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



Figure 4-1. 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** and then pressing **Enter**.
- 2. Specify local or remote testing by selecting the corresponding number, followed by **Enter.**
- 3. Use the **Up** and **Down** arrows to view test options.
- 4. Select a test from the available options by pressing the corresponding number, followed by **Enter**.

The example in *Figure 4-2* shows the menu path for initiating a local DTE and Loop test.

		1=DTE & LOOP(LL)
		2=LOOP ONLY (RT)
2=TEST	1=local UNIT	3=DTE ONLY
		4=DTE WITH TP
	2=REMOTE UNIT	5=TEST PATTERN
	3=DBU CONNECTION	6=SELF TEST

Figure 4-2. Initiating a Test

Once a test is initiated **Please Wait** is displayed briefly followed by the **STA-TUS** screen.

Test Status Display

The **TEST STATUS** display appears automatically during a test. The **TEST STA-TUS** display is similar to the status screen described in the section *Status on page 3-2*, with additional prompts for the type of test and the number of errors (for tests with a test pattern).

Figure 4-3 on page 4-4 shows an example of a Test Status Display for a test with a test pattern.



Figure 4-3. 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 TestExits the current test and returns to the main menu.Display StatusReenters test display.

		1 = DTE & LOOP (LL) 2 = LOOP ONLY (RT)	
		3=DTE ONLY	SELECT PORT (1·4)
	1 = LO C AL UN IT	4=DTE WITH TP	1 = 2047 PATTERN 2 = 511 PATTERN 3 = STRESS PTRN 1 4 = STRESS PTRN 2 5 = STRESS PTRN 3
		5=TEST PATTERN	6 = STRESS PTRN 4 1 = 2047 PATTERN 2 = 511 PATTERN 3 = STRESS PTRN 1 4 = STRESS PTRN 2
2 = TE S T			5=STRESS PTRN 3 6=STRESS PTRN 4 SELF TEST
		6 = SELF TEST	CHECKSUM XXXX SELF TEST PASS
	2=REMOTE UNIT	1 = 2047 PATTERN 2 = 511 PATTERN 3 = STRESS PTRN 1 4 = STRESS PTRN 2 5 = STRESS PTRN 3 6 = STRESS PTRN 4	
		7 = DATA FROM DTE 8 = PORT RDL	SELECT PORT (1-4): 1
	3 = DBU CONNECTION	1 = DIAL STORED #	1 = XXXXXXXXXXX 2 = EMPTY
		2=ENTER DIAL #	****

Figure 4-4. Complete Test Menu

LOCAL UNIT DIAGNOSTICS

The local DSU III TDM can perform six different tests; see Table 4-1.

Front Panel Display	Description	
DTE & Loop (LL)	TD/RD and RX/TX Loopbacks	
Loop Only (RT)	RT/TX Loopback at Network Interface	
DTE Only	TX/RX Loopback at DTE Interface	
DTE with TP	RX/RX Loopback with test pattern	
Test Pattern	Transmit/Receive Test Pattern	
Self Test	Check Internal Components (Resets Unit)	
Exit Test	Stops test, returns to data mode	
TD= Customer Transmit Data RD= Customer Receive Data TX= Network Transmit Data RX= Network Receive Data		

DTE & LOOP (LL)

Test Description

The **DTE & LOOP** test splits the DSU III TDM 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 4-5* illustrates the loopback points and the signal paths for this 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 4-6* to initiate a **DTE & LOOP** test.



Figure 4-6. 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 TDM to be tested from the remote site over the actual communication circuit. *Figure 4-7* illustrates the loopback point and the signal paths for this test.



Figure 4-7. 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 4-8* to initiate a **LOOP ONLY** test.



Figure 4-8. Initiating a Loop Only Test

Interpreting Test Results

The Loop Only test is used for the purpose of looping the DDS circuit back to the telco. No test results are available from the local DSU III TDM.

DTE Only

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



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



Figure 4-9. 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 TDM.

Initiating

Follow the menu path outlined in *Figure 4-10* to initiate a **DTE ONLY** test.



Figure 4-10. 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

For the **DTE WITH TP** (test pattern), the test pattern is generated using the DSU/CSU internal test pattern generator. This test can be used to detect deficiencies within the network interface. *Figure 4-11* illustrates the loopback point and the data paths for this test.



Figure 4-11. DTE with Test Pattern

Test Purpose

A DTE test using a test pattern is used to verify the integrity of the network interface.

Initiating

Follow the menu path outlined in *Figure 4-12* to initiate a DTE test using a test pattern.



Figure 4-12. Initiating a DTE Test with Test Pattern

Test Pattern Descriptions

The test patterns are described as follows:

2047 Pattern	Standard 2047 pattern.
511 Pattern	Standard 511 random pattern.
Stress Pattern 1	Stress pattern with alternating high and low ones densities. Repeated pattern of 100 octets: 1111 1111; followed by 100 octets: 0000 0000.
Stress Pattern 2	Stress pattern with alternating medium and low ones densi- ties. Repeated pattern of 100 octets: 0111 1110; followed by 100 octets: 0000 0000.
Stress Pattern 3	Stress pattern with medium ones density. Continuous series of octets: 0011 0010.
Stress Pattern 4	Stress pattern with low ones density. Continuous series of octets: 0100 0000.

Interpreting Test Results

During this test, the DSU III TDM displays:

DTE WITH TP TST ERR=XX

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

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

Test Pattern

The **TEST PATTERN** option converts the local DSU III TDM into a BERT tester for the purpose of testing the DDS circuit. When this test is used, the remote DSU/CSU must be in loopback or transmitting a test pattern. *Figure 4-13* illustrates the data paths for this mode.



Figure 4-13. Test Pattern Only

Test Purpose

A **TEST PATTERN** test has the following purposes:

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

Initiating

Follow the menu path outlined in *Figure 4-14* to initiate a 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 #1
		4=DTE WITH TP	4=STRESS PTRN #2
	1=LOCAL UNIT	5=TEST PATTERN	5=STRESS PTRN #3
2=TEST		6=SELF TEST	6=STRESS PTRN #4
-	2=REMOTE UNIT		
	3=DBU CONNECTION	-	

Figure 4-14. Initiating a Test Using a Test Pattern

Interpreting Test Results

During this test, the display should show the following:

TST ERR = 00

Self Test

The **SELF TEST** verifies current operation of the DSU III TDM. 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 4-15* to initiate a **SELF TEST**.



Figure 4-15. 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 check-sum indicating the current firmware revision.

Possible **SELF TEST** results are as follows:

PASS EPROM CHECKSUM FAILURE!! RAM CHECK FAILED!! LOCAL LOOP SELF TEST FAILED!! NONVOLATILE MEMORY FAILED!! MUX SELF TEST FAILURE INVALID MUX CONFIG BLOCK

If any messages other than **PASS** or **INVALID MUX CONFIG BLOCK** are displayed, contact ADTRAN technical support (see the last page in this manual).

The **INVALID MUX CONFIG BLOCK** message is an indication that the multiplexer received invalid configuration information from the nonvolatile memory. This condition may be cleared by performing a factory default on the unit, then cycling power. If this does not clear the error, contact ADTRAN technical support (see inside back cover).

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. See *Table 4-2* for selections.

Front Panel	Description	
1=2047 PATTERN	Standard 2047 random data pattern	
2=511 PATTERN	Standard 511 random data pattern	
3=STRESS PTRN #1	DDS Stress Pattern #1	
4=STRESS PTRN #2	DDS Stress Pattern #2	
5=STRESS PTRN #3	DDS Stress Pattern #3	
6=STRESS PTRN #4	DDS Stress Pattern #4	
7=DATA FROM DTE	Data from DTE	
8=PORT RDL	Selects port to be looped back to the far end.	

Table 4-2. Remote Tests Selections

Test Patterns

The test selections with test patterns use the internal pattern generator of the DSU III TDM to transmit and verify a test pattern over the DDS network; see *Figure 4-16 on page 4-21*. The remote unit is placed in RDL automatically. The DSU III TDM is capable of transmitting six test patterns with its built-in test pattern generator. For more information on the test patterns see the section *DTE With Test Pattern on page 4-13*.

Data from DTE

This test loops back the remote end; data may then be transmitted and verified on any or all of the DTE ports, depending on the physical connection. See *Figure 4-16*.



Figure 4-16. V.54 Remote Digital Loopback w/Test Pattern

Port RDL

After selecting **PORT RDL** for the specific port, the selected port is looped back at the far end. Data entered into the selected port at the local end travels through the network to the remote end, where it is looped back and transmitted to the local end. This allows the whole network to be tested on a port-byport basis. The other three ports function normally during this test. See *Figure 4-17*.



Figure 4-17. Port RDL

Test Purpose

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

Initiating

Follow the menu path outlined in *Figure 4-18* to place a remote DSU III TDM into loopback.



Figure 4-18. Initiating a Remote Test

After selecting **REMOTE UNIT** from the menu, the following prompt is displayed for entering the address for the remote unit:

Enter Test Unit Address:XX

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

Test Results

If the test is successful, the Status menu is displayed. If not, **Unable to Execute Test** is displayed.

Interpreting Test Results

If the unit is functioning properly, the following message is displayed:

TST ERR = 00

DBU CONNECTION

When the DSU III TDM is equipped with a dial backup option, the **DBU CON-NECTION** option appears as one of the **TEST** menu selections. This test allows the dial backup network to be tested while data is passing on the DDS.

When this option is selected, choose a stored number or enter a number to dial. After establishing DBU connection, the DSU III TDM designated as the answer unit is placed into loopback and a test pattern is transmitted from the originate unit to the answer unit. Receive data is checked for errors and the results displayed on the front panel.

While running this test, errors may be injected by pressing **2** and cleared by pressing **1**.

During the DBU test, the LEDs scan back and forth and the **Test** LED is on.



The **DBU ANSWER** test option must be enabled. Enabling **DBU ANSWER** test does not affect the unit during dial backup.



Figure 4-19. DBU Connection Test

Test Purpose

To verify the DBU circuit and DBU modules in both the local and remote DSU III TDM are functioning properly.

Initiating

Follow the menu path outlined in *Figure 4-19* to initiate a DBU Connection test.



Figure 4-20. Initiating a DBU Connection Test

Interpreting Test Results

If the unit is functioning properly, the DSU III TDM displays:

DBU TEST PATTERN TST ERR = 0000

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 TDM 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 4-3* are displayed on the LCD.



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

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

Table 4-3. Messages from the DSU/CSU
Chapter 5 Configuration Overview

LOCAL AND REMOTE CONFIGURATION

The DSU III TDM can be configured locally using the front panel, or communications can be established with a remote DSU so the front panel of the local DSU can be used to configure the remote DSU. Selecting the **REMOTE** option allows configuration of the remote unit. During remote configuration the local DSU III TDM displays *REMOTE CONFIG LINK ESTABLISHED* before continuing to the **CONFIGURATION** menu. This option disrupts the flow of data until remote configuration is exited.

The **CONFIGURATION** menu consists of a group of five submenus relating to a specific interface or function of the DSU III TDM 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 TDM contains four different user profiles (sets of configurations options) that are stored in read only memory (see *Default Configuration for the DSU III TDM on page B-2*). 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 TDM is then configured with that profile every time power is turned on or until the unit is reset.



The **DTE RATE** and **DATA FORMAT** options must be configured the same on both units for correct operation. For this reason, any change to these options on the local unit automatically updates the remote unit and these options do not appear in the remote configuration menus.

For detailed information on configuration see the chapters, *Configuring Network Options on page 6-1, Configuring DTE Options on page 7-1, Configuring Test Options on page 8-1, Configuring Dial Options on page 9-1, and Manual Command* on page 10-1.

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

Chapter 6 Configuring Network Options

NETWORK OPTIONS

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

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

Loop Rate

The **LOOP RATE** option sets the loop operating speed. The unit should be set to the rate required by the DDS.

The DSU III TDM supports loop rates of 56 and 64 kbps (shown in *Figure 6-1*). The default factory setting is 56 kbps.



Figure 6-1. Setting Loop Rate Options



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

Clock Source

The **CLOCK SOURCE** options specify the timing source for the DSU III TDM. The factory default setting is **FROM NETWORK** (see *Figure 6-2*), which means the network receive signal is the timing source. Selecting the **MASTER** option sets the DSU III TDM as the master timing source.



Figure 6-2. Setting the Clock Source

When operating on a DDS network, the timing should be **FROM NETWORK.** On a point-to-point private network, one DSU III TDM must be set for **MASTER**, the other set for **FROM NETWORK.**

Remote Configuration

This option sets up the DSU III TDM to accept or reject remote configuration commands. *Figure 6-3* shows the menu path for enabling/disabling remote configuration. The factory default setting is **ENABLED**.



Figure 6-3. Enabling/Disabling Remote Configuration

Chapter 7 Configuring DTE Options

DTE OPTIONS

The **DTE OPTIONS** menu is used to select the configuration parameters that control the operation of the DTE interface ports of the DSU III TDM. After selecting **DTE OPTIONS**, specify the port to be configured. The **DTE OP-TIONS** menu is then displayed with the specified port shown in the upper right corner. Port 1 is the default.

SELECT PORT

(1-4): 1



The **DTE RATE** and **DATA FORMAT** options must be configured the same on both the local and remote units to function correctly. For this reason, any change to these options on the local unit automatically updates the remote unit and these options do not appear in the configuration menus of the remote unit.

DTE Rate

This option sets the operating speed of the DTE interfaces. All four ports support several different DTE rates; however, the combined total for all four ports cannot exceed the maximum bandwidth. The maximum bandwidth for a loop rate of 56 kbps is 52.8 kbps, and 60.8 kbps for a loop rate of 64 kbps. If the maximum bandwidth is exceeded, the message *Max BANDWIDTH ExceEDED* is displayed. The factory default setting is DTE 9.6K. DTE rate options 7 through E are available only for synchronous data. See the appendix *Configuration Profiles on page B-1* for more information.

Port Not Used

Select **PORT NOT USED** for any port not connected to a DTE device.

DTE Pass Through Mode

Port 1 may be configured in a DTE pass through mode by selecting the menu option **F= PASS THRU**; see *Figure 7-1*. In this mode, the DSU III TDM acts as a single-port unit, bypassing the multiplexer, allowing port 1 to operate at the full loop rate. Ports 2 through 4 are not serviced.



Changing the **DTE RATE** on any port momentarily interrupts the flow of data on all four ports.



Figure 7-1. DTE Rate Options



If a 64 kbps main DDS line is switched to a 56 kbps backup line, the DSU III TDM drops DTEs starting with port 4 until the maximum bandwidth is no longer exceeded. The most important DTE device should be connected to port 1.

Data Format

The **DATA FORMAT** option is used to select synchronous or asynchronous mode of operation for the DTE interface. The factory default setting is **SYNCHRONOUS** (see *Figure 7-2*). In **DTE PASS THROUGH** mode, selecting **ASYNCHRONOUS** operation sets the rate to 57.6 kbps for port 1.



Figure 7-2. Selecting Data Format

Transmit Clock

The **TRANSMIT CLOCK** option selects the source of the clock used to transfer synchronous data from the DTE to the DSU III TDM. *Figure 7-3 on page 7-4* shows the menu path used to set the **TRANSMIT CLOCK** option. The factory default setting is **NORMAL**.



Figure 7-3. Transmit Clock Options

To use the internal clock of the DSU III TDM select **NORMAL**. To use the external transmit clock from the DTE select **EXTERNAL**.

The **EXTERNAL** clock option is normally used in modem tail circuit applications. A DSU to modem interconnect diagram for this application is shown in the appendix *DSU to Modem Interconnect on page C-1*.

The **EXTERNAL** clock option is also recommended when the EIA-232 connector is used for 56 kbps and 64 kbps applications. A special DSU cable diagram for this application is shown in the appendix *EIA-232 Connector on page D-1*. Using this option and special cable eliminates data errors caused by excessive delays in the DTE transmit clock receiver and transmit data driver.

Clear to Send (CS) Options

The **CS OPTIONS** menu is used to select one of two different control modes for the CS lead. *Figure 7-4 on page 7-5* shows the menu path used to access the **CS OPTIONS** menu. The factory default setting is **FOLLOWS RS**.

Forced On

The CS lead remains on and request to send (RS) is ignored as long as the unit is synchronized and able to pass data.

Follows RS

The CS state matches the RS state. No data can be received from the DTE device until RS is activated. The CS lead only follows RS when the unit is able to pass data, for example, when the unit it on-line and properly synchronized.



Figure 7-4. Selecting Clear to Send (CS) Options

Carrier Detect (CD) Options

The **CD OPTIONS** menu is used to select one of two different control modes for the receive line CD lead. The default factory setting is **NORMAL**; see *Figure 7-5 on page 7-6*.

Forced On

The CD lead remains active all the time.

Normal

The CD lead is active only when frame synchronization has been achieved and data is received from the far end. If a configuration problem has been detected (such as a port not configured the same on both ends of the network) CD remains off until the error is corrected.



Figure 7-5. Selecting Carrier Detect (CD) Options

Data Set Ready (SR) Options

The **SR OPTIONS** menu is used to select the operating mode for the SR lead. The factory default setting is **OFF OOS ONLY** (*Figure 7-6 on page 7-7*).

Forced On

The SR control lead remains on regardless of the state of the network.

Off OOS Only

The SR control lead is on except when the DSU III TDM receives an out of service condition from the network. For more information on OOS see the section *When Out of Service (OOS) on page 9-4*.

Off Test Only

The SR lead is on except when the DSU III TDM is executing a test.

Off Test+OOS

The SR lead is on except during a test or when receiving an out of service condition from the network.

Off Remt Idle

The local SR lead will follow the remote port TR lead.



Figure 7-6. Setting Data Set Ready (SR) Options

Chapter 8 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 TDM remains in a test mode before automatically returning to the data mode. Enter the time out in two-digit decimal value. The range is 0 to 99 seconds. The factory default setting is 0, which disables the timer so tests can run indefinitely. *Figure 8-1* shows the menu path used to access **TEST TIMEOUT**.



Figure 8-1. Setting Test Timeout

Remote Digital Loopback (RDL)

The **RDL EN/DIS** option determines whether the DSU III TDM accepts a remote digital loopback (RDL) request from the far end of the circuit. The factory default setting is **RDL ACCEPTED**. *Figure 8-2* shows the menu path used to access the **RDL EN/DIS** option.



Figure 8-2. Remote Digital Loopback

DBU Answer Test

The dial backup connection can be tested while data is passing on the DDS. In order for this test to be performed, **DBU ANSWER TEST** must be enabled on the remote; see *Figure 8-3*. If **DBU ANSWER TEST** is not enabled the remote unit will not accept a DBU test from the other end.



Figure 8-3. DBU Answer Test

Chapter 9 Configuring Dial Options

DIAL OPTIONS

The **DIAL OPTIONS** menu stores up to ten phone numbers and defines the dial backup operation of the DSU III TDM when the DDS circuit fails.

Figure 9-1 shows the full **DIAL OPTIONS** menu. Specified items are restricted to specific configurations or operation.

	_	STORED NUMBER TO	_		
	1=PHONE NUMBERS	EDIT (1-10):1	NNNNNN	_	
			ISDN	Dial Backup	
				EDIT SPID	_
			STORED NUMBER 9	NUMBER	NNNNNN
				FDIT LOC	
			STORED NUMBER 10		
			STORED NUIVIBER TO	DIRECTORT INUM	
		1=AUTOMATIC DBU	1=DISABLED		
			2=ENABLED		
_		2=NUMBER TO DIAL		1=DBU WITH #1	_
4=DIAL OPTIONS			_	2=DBU WITH #2	
		3=ORIGIN/ANSWER	1=DBU ORIGINATE		
			2=DBU ANSWER		
		4=WHEN OOS		1=DISABLED	_
				2=EINABLED	_
	Z=DBU OPTIONS	5=INO KX SGINL		_	
		6-NO SEAL CUP	Z=EINABLED	1-DISABLED	
				2=ENABLED	
		7=WHEN ALL 1s/0s	1=DISABIED		_
			2=ENABLED		
		8=AUTO RESTORE	_	RESTORE TIMER	
			-	(0=OFF): 1 MIN	
		9=REDIAL COUNTER	ENTER REDIAL	_	
			COUNT: 5		
		A=FAIL TIMER		AUTO DBU FAIL	_
			L	TIME: 3X10 SEC	_
		B=WAIT TO REDIAL	WAIT TO REDIAL		
		2 Wiro 8, 41	Aliro Dial Packup		
		C=NETWORK TYPE	1=AT&T/MCI/OTHER		
			2=US SPRINT	_	
				_	
		14.00 ki	Dial Daaluur		
		V.32 DIS	1=BLIFFERED		
		C=ERROR CONTROL	2=DIRECT	_	
		o-Enton oonnioe	3=RELIABLE MNP	_	
			4=AUTO MNP	_	
			5=RELIABLE V.42	1=DISABLED	
			6=REL. V.42/MNP	2=XON/XOFF	
			7=AUTO V.42/MNP	3=CTS ONLY	
		D=FLOW CONTROL	-	4=RTS/CTS	
			-	5=UNI. XON/XO	F
			1=DISABLED	_	
		E=COMPRESSION	2=ENABLED	_	
		ISDN I	Dial Backup		
		ISBN	1=AT&T 5FSS		
		C=SWITCH TYPE	2=NT DMS-100	_	
			3=NATIONAL ISDN1	_	
			-	_	

Figure 9-1. Dial Options

Phone Number

The DSU III TDM has storage available for ten numbers of 36 digits each. To edit a phone number, reenter the entire number. This process overwrites the previously stored number. *Figure 9-2* shows the menu path used to access the **PHONE NUMBER** option.

Enter only the phone number; do not add dashes, parentheses or commas.



Figure 9-2. Editing a Stored Phone Number

ISDN Dial Backup

If a clear channel 64 kbps circuit is required to back up the DDS circuit, placing #4 at the end of the smart dial string (phone number entered into Stored Number 1-8) causes the ISDN DBU mode to establish the backup connection at 64 kbps instead of 56 kbps. For example: 2059718000#4.

Setting the Service Profile Identifier (SPID)

For ISDN dial backup, the service profile identifier (SPID) must be entered in Stored Number 9. The SPID is a sequence of digits used to identify ISDN terminal equipment to the ISDN switch when more than one ISDN set has been attached to the same central office line. The SPID is assigned by the telco when the ISDN line is installed and normally resembles the phone number.

Generally, the 5ESS custom switch is configured for a point-to-point network and a SPID is not required. SPID is required for 5ESS or Northern Telecom switches with ISDN National 1 interface.

Setting the Local Directory (LOC) Number

For ISDN dial backup, the local directory number (LOC) must be entered in Stored Number 10. The LOC is assigned by the telco.

Dial Backup Options for All Models

The **DBU OPTIONS** are used to select the modes of operation for the dial backup features, such as under what conditions the unit enters dial backup, and how the unit responds to a change in one of the dial backup conditions. There are 11 standard options available with additional options for specific backup services.

Automatic DBU

If **AUTOMATIC DBU** is enabled, the DSU III TDM enters dial backup automatically when one of the conditions for backup exists. If **AUTOMATIC DBU** is disabled, dial backup mode must be entered manually. The factory default setting is **DISABLE**.

Number to Dial

The **NUMBER TO DIAL** option offers a selection of stored numbers for the unit to automatically dial. If the leased line fails, and the DSU III TDM is set to originate, it dials the number specified under this option to set up the dial backup line. The factory default setting is **DIAL STORED #1**.

Originate/Answer

This option specifies whether the DSU III TDM is the originate end or the answer end for dial backup operation. One end must be set to **ORIGINATE** and the other to **ANSWER**. The factory default setting is **ANSWER**.

When Out of Service (OOS)

When enabled, the DSU III TDM enters backup mode when an out of service or TDM out of sync condition is detected. The factory default setting is **ENABLE**.

No Receive (RX) Signal

When enabled, this option allows the DSU III TDM to enter backup mode when a loss of signal is detected. The factory default setting is **ENABLE**.

No Sealing Current

When enabled, the DSU III TDM enters backup mode when a loss of sealing current is detected. The factory default setting is **ENABLE**.

When all 1s/0s

When this option is enabled, the DSU III TDM monitors the receive data for strings of 1s or 0s that are longer than the **FAIL TIMER**. If this condition is detected, the local DSU III TDM initiates a handshake routine with the remote unit to determine if the DTE is generating the constant data pattern or if the network has failed.

Auto Restore

Once the DDS circuit is restored, the DSU III TDM remains in backup until the DDS circuit is active for the length of time specified for the **RESTORE TIMER**. The selection is entered in minutes (up to 255). If set to 0, the DDS must be restored manually. The factory default setting is 1 minute.

RESTORE TIMER (0=OFF) __ __ MIN

Redial Counter

This option sets the number of times the originate unit attempts to redial the answer unit if a busy or reorder is encountered while trying to establish dial backup. The redial count, which is manually entered, has a maximum of 99 attempts. The factory default setting is **5**.

ENTER REDIAL COUNT: ____

Fail Timer

This option sets the amount of time the dedicated circuit failure condition must be active before the DSU III TDM attempts backup. The maximum time, which is manually entered, is 99 seconds. The factory default setting is 3 seconds.

AUTO DBU FAIL TIME: __ __ SEC

Wait to Redial

This option works in conjunction with the preceding Redial Counter, setting the amount of time between redial attempts to connect the backup line. The maximum time, which is manually entered, is 99 seconds. The factory default setting is 10 seconds

WAIT TO REDIAL TIME: ____ SEC

2-Wire and 4-Wire Dial Backup Options

Network Type

This option selects the company providing the Switched Digital Service. When US Sprint is selected, an automatic Echo Canceller tone is emitted by the DSU III TDM when dialing. Options include: AT&T/MCI/Other and US Sprint.

V.32 bis Dial Backup Options

Error Control

This option determines the type of error control to be negotiated at the start of a V.32 bis modem connection. The factory default setting is **BUFF-ERED**. The options are described as follows:

Buffered	Normal operation. No error control. Allows speed matching, buffering, and flow control.
Direct	Direct operation. No error control, no buffer, and no flow control.
Reliable MNP	Reliable MNP operation. Uses MNP error control.
Auto MNP	Auto-reliable MNP operation. Tries MNP error control first; uses normal operation if necessary.
Reliable V.42	Reliable V.42 (LAPM) operation. Uses V.42 (LAPM) error control; if V.42 (LAPM) error control cannot be used the call is disconnected.

Rel. V.42/MNP	Reliable V.42 (LAPM) or MNP operation. Uses
	either V.42 (LAPM) or MNP error control. If
	neither can be used the call is disconnected.
Auto V.42/MNP	Auto-reliable V.42 (LAPM) or MNP operation.
	Tries to use V.42 (LAPM) error control first; MNP
	error control next. If neither can be used, then
	Normal operation is used.

Flow Control

This option is used to select the type of flow control used by the V.32 bis modem. The factory default setting is **CTS ONLY**. The flow control options are described as follows:

Disabled	Flow control disabled
XOn/XOff	Enables XOn/XOff flow control
CTS Only	Enables CTS flow control from DCE
RTS/CTS	Enables CTS flow control from DCE and RTS from DTE
Un. XOn/XOff	Unidirectional XOn/XOff

Compression

This option is used to select data compression for the V.32 bis operation when running asynchronously. When enabled, the effective data throughput to speeds as high as 57.6 kbps may be achieved. For synchronous applications the speed is limited to a maximum of 14.4 kbps. The factory default setting is **ENABLED**.

ISDN Dial Backup Options

Switch Type

This option selects the type of telco central office switch providing the ISDN service. There are three options for ISDN switch types:

- AT&T 5ESS
- NT DMS-100
- National ISDN1

Chapter 10 Manual Command

MANUAL COMMAND

The **MANUAL COMMAND** option allows configuration commands to be entered without using the menu structure. A complete listing of manual commands is shown in *Table 10-1 on page 10-2. Figure 10-1* shows the menu path for manual command.



Figure 10-1. Manual Command

When **MANUAL COMMAND** is selected, the following prompt is displayed:

COMMAND:00

After the command is entered, the command number and the current setting for the command are displayed:

COMMAND: XX VALUE: 00 At this time, the setting may be changed by entering a new hexadecimal command number or it can be accepted by pressing **Enter**. The system briefly displays *COMMAND ACCEPTED* and returns to the active menu.

Command Description	Command	Value
Load Factory Option		
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 O	91	00
Save to Profile 1	91	01
Select User Profile		
Power Up Profile O	93	00
Power Up Profile 1	93	01
Front Panel		
Disable	AA	00
Enable	AA	01
RS-CS Delay Port 1		
RS-CS Delay Short (Default)	49	00
RS-CS Delay Long	49	01
RS-CS Delay Port 2		
RS-CS Delay Short (Default)	4A	00
RS-CS Delay Long	4A	01
RS-CS Delay Port 3		
RS-CS Delay Short (Default)	4B	00
RS-CS Delay Long	4B	01
RS-CS Delay Port 4		
RS-CS Delay Short (Default)	4C	00
RS-CS Delay Long	4C	01
Copy Local DTE Configuration to Remote Unit	5F	0
Copy Port 1 Configuration to Other Ports	63	0

Table 10-1. Manual Commands

Chapter 11 Dial Options

DIAL OPTIONS

The **DIAL** Options available in the dial menu (4=**DIAL**) vary whether the DSU III TDM is connected to the DDS line and designated as the **ANSWER** or **ORIGINATE** unit, or is currently in dial backup mode (see *Figure 11-1*).



Figure 11-1. Dial Options Menu

Answer Unit Connected to DDS Line

Dial Backup

The message *COMMAND ACCEPTED* is displayed and the DSU III TDM waits for an incoming call. When an incoming call is detected, the DSU III TDM answers the call and enters dial backup.

Originate Unit Connected to DDS Line

Dial Backup

The DSU III TDM attempts dial backup connection. One of the previously stored numbers can be used, or a new number can be entered.

Stay on Leased

The DSU III TDM remains on the leased line and does not enter dial backup mode.

DBU Online Test

This option allows the dial backup connection to be tested manually without interrupting the data on the DDS. A stored number can be used or a number entered manually.



DBU ANSWER TEST must be enabled on the far end to perform a DBU on-line test.

Dial Options During Dial Backup

Hang Up

Terminates the dial backup connection and attempts to reestablish communication on the DDS line.

Stay On Line

The DSU III TDM remains in dial backup mode and returns to the main menu.

Appendix A Pinouts

EIA-232 CONNECTORS

The DSU III TDM is equipped with four EIA-232 connectors labeled **PORT 1** through **PORT 4**. *Table A-1* shows the pin assignments for these connectors. For more information see the sections *Rear Panel on page 3-13* and *DTE Connection on page 2-4*.

Pin	EIA	Description
1	AA	Protective Ground (PG)
2	BA	Transmit Data (SD)
3	BB	Receive Data (RD)
4	СА	Request to Send (RS)
5	СВ	Clear to Send (CS)
6	CC	Data Set Ready (SR)
7	AB	Signal Ground (SG)
8	CF	Received Line Signal Detector (CD)
9	-	+12 Test Point
10	-	- 12 Test Point
15	DB	Transmit Clock (TC)
17	DD	Receive Clock (RC)
20	CD	Data Terminal Ready (TR)
24	DA	External TX Clock (ETC)

Table A-1. Pin Assignments for EIA-232 Connectors

TELCO CONNECTORS

The DSU III TDM has two eight-position modular jacks labeled **MAIN** and **BACKUP**. *Table A-2* shows the pin assignments for the **MAIN** connector and *Table A-3* shows the pin assignments for the **Backup** connector. See the section *Network Connection on page 2-3* for more information.

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

Table A-2. Pin Assignments for Main Connector

Table A-3.	Pin Assignments	for Backup	Connector
------------	-----------------	------------	-----------

Pin	Name	Description
4-wire Swite	ched 56	
1	R1	Transmit Data from DSU to Network-Ring 1
2	T1	Transmit Data from DSU to Network-Tip 1
3-6	-	Not Used
7	Т	Receive Data from Network to DSU-Tip
8	R	Receive Data from Network to DSU-Ring
2-wire Swite	ched 56, V.3	2 bis and ISDN
1-3	-	Not Used
4	Т	Network-Tip
5	R	Network-Ring
6 - 8	-	Not Used

V.35 ADAPTER CABLE

The V.35 adapter cable allows the DSU II TDM to interface with DTE equipment using the V.35 interface. The cable supports data rates of 2.4 kbps to 64 kbps and is powered from ± 12 V supplied by the DSU III TDM. The cable (part number 1200063L6) is a 6 foot cable.

Electrical Interface

DTE	Standard V.35 signal interface
DCE	Standard EIA-232 signal interface

Mechanical Interface

DTE	The V.35 interface is provided on a M-34 male connector.
	The pinout is shown in <i>Table A-4 on page A-4</i> .

DCE The EIA-232 interface is provided on a 25-pin male D connector. The pinout is shown in *Table A-5 on page A-5*.

Power Requirements

Power is supplied on pins nine and ten of the DB-25 DCE connector as follows:

- + 12 V Pin 9, 50 mA max
- 12 V Pin 10, 50 mA max

Pin	Description	From
A	Frame Ground	-
В	Signal Ground	-
С	Request to Send	DTE
D	Clear To Send	DCE
E	Data Set Ready	DCE
F	Carrier Detect	DCE
Н	Data Terminal Ready	DTE
J	Not Used	-
К	Not Used	-
L	Not Used	-
М	Not Used	-
N	Not Used	-
Р	Transmit Data-A	DTE
R	Receive Data-A	DCE
S	Transmit Data-B	DTE
Т	Receive Data-B	DCE
U	External Transmit Clock-A	DTE
V	Receive Clock-A	DCE
W	External Transmit Clock-B	DTE
Х	Receive Clock-B	DCE
Y	Transmit Clock-A	DCE
Z	Not Used	-
AA	Transmit Clock-B	DCE
BB	Not Used	-
CC	Not Used	-
DD	Not Used	-
EE	Not Used	-
FF	Not Used	-
HH	Not Used	-
ມ	Not Used	-
КК	Not Used	-
LL	Not Used	-
MM	Not Used	-
NN	Not Used	-

Table A-4. V.35 Pin Assignments for Adapter Cable

Pin	Description	From
1	Frame Ground	-
2	Transmit Data	DTE
3	Receive Data	DCE
4	Request to Send	DTE
5	Clear to Send	DCE
6	Data Set Ready	DCE
7	Signal Ground	-
8	Carrier Detect	DCE
9	+12V (50mA Max)	DCE
10	- 12V (50mA Max)	DCE
11	Not Used	-
12	Not Used	-
13	ETC Select	DCE
14	Not Used	-
15	Transmit Clock	DCE
16	Not Used	-
17	Receive Clock	DCE
18	Not Used	-
19	Not Used	-
20	Data Terminal Ready	DTE
21	Not Used	-
22	Not Used	-
23	Not Used	-
24	External Transmit Clock	DTE
25	Not Used	-

Table A-5. EIA-232 Pin Assignments for Adapter Cable
Appendix B Configuration Profiles

CONFIGURATION PROFILES

The DSU III TDM contains four different user profiles (sets of configurations options) stored in read only memory; see *Table B-1 on page B-2*. The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See the chapters *Installation* on page 2-1 and *Manual Command* on page 10-1 for more information.

Profile 1

Profile 1 is configured for a 56 kbps loop rate with port speeds set at 9.6 kbps, synchronous, point-to-point operation. **Automatic DBU** has been disabled for this configuration profile.

Profile 2

Use profile 2 for a 56 kbps loop rate with port speeds set at 9.6, asynchronous, point-to-point operation, with an EIA-232 connector. **Automatic DBU** has been disabled for this configuration profile.

Profiles 3 and 4

Profiles 3 and 4 are used for enabling dial backup using two DSU III TDM units. One unit must be set for **Answer** and the other for **Originate**. Use profile 3 to set the remote unit to **Answer** and profile 4 to set the host unit to **Originate**.

	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
Manual Command				
TDM Abort Call Timer	50=32H	50=32H	50=32H	50=32H
Test Pattern Type	2047	2047	2047	2047
Front Panel En/Dis	Enable	Enable	Enable	Enable
Inactivity Timer	Off	Off	Off	Off
Network Options				
Loop Rate	56 kbps	56 kbps	56 kbps	56 kbps
Scrambler Mode	OFF	OFF	OFF	OFF
Remote Conf. En/Dis	Enable	Enable	Enable	Enable
Clock Source	From Network		From Network	
DTE Options				
DTE Rate (56k loop)	9.6 kbps	9.6 kbps	9.6 kbps	9.6 kbps
DTE Data Format	SYNC	ASYNC	SYNC	SYNC
Transmit Clock	Normal	Normal	Normal	Normal
CS Options	Follow RS	Follow RS	Follow RS	Follow RS
CD Option	Normal	Normal	Normal	Normal
SR Option	Off OOS Only		Off OOS Only	
Test Options				
Test Timeout	Off	Off	Off	Off
RDL En/Dis	RDL Accepted		RDL Accepted	
DBU Answer Test	Disable	Disable	Disable	Disable
Dial Options				
Automatic DBU	Disable	Disable	Enable	Enable
DBU Number to Dial	#1	#1	#1	#1

Table B-1. Default Configuration for the DSU III TDM

	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
DBU Originate/Answer	Answer	Answer	Answer	Originate
DBU when OOS	Enable	Enable	Enable	Enable
DBU when No RX Signal	Enable	Enable	Enable	Enable
DBU when No Sealing Current	Enable	Enable	Enable	Enable
DBU Auto Restore Timer	1 minute	1 minute	1 minute	1 minute
DBU Redial Counter	5	5	5	5
DBU Fail-Timer (x10)	3 seconds	3 seconds	3 seconds	3 seconds
DBU Redial Wait Time	10	10	10	10
When all 1s/Os	Disable	Disable	Disable	Disable
Network Type	AT&T	AT&T	AT&T	AT&T
Error Control	Buffered	Buffered	Buffered	Buffered
Flow Control (V.32)	CTS Only	CTS Only	CTS Only	CTS Only
Data Compression (V.32)	Enabled	Enabled	Enabled	Enabled

Table B-1. Default Configuration for the DSU III TDM

Appendix C DSU to Modem Interconnect

MODEM TAIL CIRCUIT APPLICATION

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



Figure C-1. DSU III TDM 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 TDM.

Network Interface

Line rate

56k/64 kbps

Physical interface

RJ48S, 4-wire

DTE Interface

Four EIA-232 DTE connectors V.35 adapters available

Port 1

2400 - 64 kbps synchronous

2400 - 57.6 kbps asynchronous

Ports 2, 3, and 4

2400 - 38.4 kbps synchronous/asynchronous

Switched Mode Dialing

Stored number dialing Front panel keypad

Backup Options

Automatic or Manual

4-wire switched 56 2-wire switched 56 1 B+D ISDN V.32 bis

Diagnostics

Network

CSU/DSU loopbacks *User* Local DTE and loop, V.54 *Test Patterns* 2047, 511, DDS stress patterns 1 through 4

Clocking

Normal DDS or private network Private network master (internal) Private network master (external)

Physical

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

Environment

Operating Temperature

0 to 50 °C (32 to 122 °F)

Storage Temperature

-20 to 70 °C (-4 to 158 °F)

Relative Humidity

Up to 95%, non-condensing

Appendix F Glossary

2047

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

511

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

2-wire Switched 56

A Northern Telecom proprietary 56 kbps switched digital data service offered by telco service providers, and delivered to users over a single pair of copper wires. Compatible with the ADTRAN DSU III S2W and with the DSU III TDM 2-wire Switched 56 TDM option.

4-wire Switched 56

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

asynchronous

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

AT&T Publication 41458

An AT&T specification titled "Special Access Connections to the AT&T Communications Network," used to design compatibility into DSU/CSU products.

AT&T Publication 62310

An AT&T specification titled "Digital Data System Channel Interface Specification," used to design compatibility in DSU/CSU products.

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.

CD

carrier detect. A signal generated by a modem or DSU/CSU. CD indicates its connection status. If the CD light is on, the device is speaking to another device.

channel service unit (CSU)

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

clocking

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

control port

An interface to a device or system that allows users to issue commands pertaining to dialing, configuration, diagnostics, managements, etc.

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.

СРЕ

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.

CSA

Canadian Standards Association. The Canadian counterpart to the UL.

CS

See CTS.

CSU

See channel service unit.

CSU loopback

A telco initiated test which loops the CSU portion of the DSU/CSU back to the telco and allows the telco to test the DDS circuit as well as the CSU portion of the customers DSU/CSU.

CTS

clear to send. A signal on the DTE interface indicating that the DCE is clear to send data.

data compression

A technique for encoding information so that fewer data bits are required to represent a given amount of data. Compression facilitates the transmission of more data for a given amount of transmission time and circuit capacity. It also reduces the amount of memory required for data storage.

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.

data service unit (DSU)

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

dB

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

DDS

digital data service also called digital data system. A private line digital service, for transmitting data end-to-end at speeds of 2.4, 4.8, 9.6, and 56 kbps and in some cases 19.2, 38.4, or 64 kbps. The systems can use central hub offices for obtaining test access, bridging legs of multipoint circuits, and cross connecting equipment. DDS is offered on an inter-LATA basis by AT&T and on an intra-LATA basis by the Bell operating companies.

DDS II

Same as DDS but provides a slower speed secondary channel in addition to the main DDS channel.

DDS Stress Patterns 1-4

A series of test patterns designed to test DDS circuits. Each pattern is designed to stress the DDS circuit in a particular manner to assure its reliability.

DSU

See data service unit.

DSU loopback

A telco initiated test which loops the DSU back to the telco and is used to test the DDS circuit as well as the DSU/CSU.

DTE

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

DTE to loop rate matching

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

DTR-dialing

data terminal ready. A control signal sent from the DTE to the DCE that indicates the DTE is powered on and ready to communicate. DTR dialing allows a DSU/CSU to dial a predetermined number when DTR goes high.

FCC Part 15 of Class A

Radiated and conducted emissions standards set for commercial and industrial use.

FCC Part 15 of Class B

Radiated and conducted emissions standards set for residential use.

FCC Part of 68

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

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.

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.

MIB

management Information Base. An informational database stored in devices that allow the device to provide management information to an SNMP management system or proxy agent.

multidrop

A communications arrangement in which multiple devices share a common transmission channel, although only one may transmit at a time.

out-of-band

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

private network tributary clocking

Clocking in which the timing is derived from the DDS loop.

private network master clocking

Clocking in which timing is derived internally from the DSU.

private network master - slaved to external clock

Clocking in which timing is slaved to the DSU's external transmit clock.

PSTN

public switched telephone network. A direct distance dialing telephone network that is available for public use. The network is an integrated system of transmission and switching facilities, signaling processors, and associated operations support systems that is shared by customers. PSTN also is called public network, public switched network, or public telephone network.

point-to-point

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

RDL

remote digital loopback.

receiver sensitivity

The magnitude of the received signal necessary to produce objective bit error rate or channel noise performance.

remote configuration

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

remote V.54 test

A diagnostic feature that allows testing of the DDS circuit by looping the remote DSU/CSU back to the local DSU/CSU.

RJ-45S

Registered jack. An 8-pin connector used for data transmission over standard telephone wire. Single line, 2-wire T/R, PR/PC, programmed data, 8 position, keyed.

EIA-232C

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 connector pin assignments. The standard applies to both synchronous and asynchronous binary data transmission.

scrambler

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

service

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

SMART 16

An ADTRAN rackmount system that allows up to 16 devices such as DSU/CSUs, ISDN Terminal Adapters, or T1 DSU/CSUs to be mounted in a 19 inch or 23 inch cabinet.

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

switched

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

synchronous

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

tail circuit

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

TDM

time division multiplexing. A method for sending two or more signals over a common transmission path by assigning the path sequentially to each signal, each assignment being for a discrete time interval.

U interface

A twisted-pair subscriber loop carrying an ISDN 160 kbps digital signal between the ISDN central office and the NT1 at the customer premises.

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.

UL 1459

A UL rating that assures the connected equipment (DSU/CSU) provides protection from current overloads and power line crosses.

V.25 bis

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

V.32 bis

Higher speed CCITT standard for full-duplex transmission on two-wire leased and dial-up lines at 4.8, 7.2, 9.6, 1.2, and 14.4 kbps. They do not rely on compression to achieve that high speed.

VT 100

A non-intelligent terminal or terminal emulation mode used for asynchronous communications. Used to configure the ADTRAN Smart 16 Shelf.

Index

Numerics

1B+D basic rate ISDN 1-4 2-wire Switched 56 backup option 1-4 4-wire Switched 56 backup option 1-3

Α

abort call timer 10-2 Alarm (ALM) 3-12 all 1s or all 0s condition 1-5 ALM 3-12 Answering Call 3-3, 3-6 AT command echo 10-2 AT commands 4-6 AT long code 10-2 AT result code 10-2 AT short code 10-2 AT&T 5ESS 9-8 auto restore 9-5 automatic DBU 9-4

В

back space character 10-2 backup connector A-2 pin assignments A-2 backup options E-2

С

Call Disconnect 3-3 called unit busy 3-3 cancel 3-8

cancel key 3-11 carriage return character 10-2 carrier detect (CD) 3-12, 7-6 CD 3-12 Check Telco 3-6 clear to send (CS) 3-12, 7-5 clock source 6-3 clocking E-2 compression 9-7 configuration 2-5 dial options 9-1 DTE options 7-1 local 5-1 network options 6-1 test options 8-1 configuration (CONFIG) 3-7 configuration profiles B-1 connector EIA-232 D-1 **TELCO 2-3** V.35 2-4 CS 3-12

D

data format 7-3 Data Mode 3-6 data set ready (SR) 7-7 DATAPATH 1-4 DBU answer test 8-3 DBU connection 4-24 DBU Line in RDL 3-4 DBU Online Test 11-2 **DBU Status Not Installed 3-3** DBU Test Pattern 3-4 DDS network status 3-6 diagnostics E-2 Dial 3-7 dial backup 11-2 **ISDN 9-3** status information 3-3 dial backup messages 3-3 dial backup mode 11-1 dial backup mode status 3-3 dial backup operation 1-3 dial backup options 9-4 2-Wire & 4-Wire 9-6 V.32 bis 9-6 dial options 5-1, 11-1 configuration 9-1 during dial backup 11-2 dialing 3-3 digital data service (DDS) 1-2, 1-5 down arrow 3-8, 3-11 DSU Status 3-6 DSU to modem interconnect C-1 DTE & loop (LL) 4-7 DTE interface 4-1, E-1 DTE interface parameters 5-1 DTE off sync 3-2 DTE only 4-11 DTE options 5-1 DTE pass through 7-2 DTE rate 7-1 factory default 7-1 DTE rates 7-2 DTE with test pattern 4-13 DTR initiated command timeout 10-2 DTR recognize delay 10-2 DU DBU Status 3-3

Ε

EIA-232 2-2, A-1 adaptor cable pin assignments A-5 EIA-232 connector 3-13, D-1 EIA-232 connectors E-1 electrical interface A-3 enter 3-8 enter key 3-10 eprom checksum failure 4-19 equipment provided 2-1 sold separately 2-2 error control 9-6 errored seconds 3-5 escape character 10-2 exit test 4-4 external clock 7-4, D-1

F

fail timer 9-5 flow control 9-7 Follows RS 7-5 Forced On 7-5, 7-6, 7-7 front panel 3-10 enable/disable 10-2 function keys 3-8

G

Going to DBU 3-3, 3-6

Н

hang up 11-2

I

Idle 3-3 In Dial Backup 3-3, 3-6 Incoming Call 3-3 installation 2-1 invalid mux config block 4-19 ISDN dial backup 9-3 ISDN DBU status 3-3

L

LCD window 3-10 LED description 3-11 line feed character 10-2 line rate E-1 LL Test From Telco 3-6 local configuration 5-1 local loop self test failed 4-19 local unit test 4-6 Loop is Normal 3-6 loop only (RT) 4-9 loop rate 6-1 loss of sealing current 1-5

Μ

main connector pin assignments A-2 main connectors A-2 main menu 3-11, 4-4 manual command 5-1, 10-1 abort call timer 10-2 back space character 10-2 carriage return character 10-2 data terminal ready (DTR) 10-2 data terminal ready (DTR) timer 10-2 escape character 10-2 front panel enable/disable 10-2 line feed character 10-2 load factory option 10-2 network address lock 10-2 network address unlock 10-2

select user profile 10-2 store user profile 10-2 mechanical interface A-3 menu structure 3-1 modem tail circuit application 7-4, C-1 multiplexer status 3-5 mux self test failure 4-19

Ν

national ISDN1 9-8 network interface connection 2-3 interface parameters 5-1 network address lock 10-2 unlock 10-2 network interface E-1 network options 3-8, 5-1, 6-1 network rate 3-2 network type 9-6 no receive (RX) signal 1-5 No RX Signal 3-3 no sealing current 9-5 No Wink from CO 3-4 nonvolatile memory failed 4-19 Normal 3-5 Not Installed 3-4 NT DMS-100 9-8 number to dial 9-4 numeric keypad 3-10

0

Off OOS Only 7-7 Off Test Only 7-7 Off Test+OOS 7-7 OOS/OOF 3-6 OOS/OOF from Net 3-4 Open Loop 3-4, 3-6 operation 3-1 originate 9-4 originate/answer 9-4 out of service (OOS) signal 1-5 Out of Sync 3-5

Ρ

phone number 9-3 physical E-2 pin assignments backup connector A-2 EIA-232 A-5 main connector A-2 primary EIA-232 connector A-1 telco connector A-2 V.35 A-4 power requirements A-3 power up 2-2 product overview 1-1

Q

quick key 3-11

R

RAM check failed 4-19 RD 3-12 rear panel 3-13 receipt inspection 2-1 receive data (RD) 3-12 redial counter 9-5 remote configuration 6-4 remote digital loopback (RDL) 8-2 Request to Send (RS) 3-12 return material authorization (RMA) 1-7 RS 3-12

S

select user profile 10-2

self test 4-18 shift key 3-10 status dial backup mode 3-3 Status menu 3-2 status messages Answering Call 3-6 answering call 3-3 Call Disconnect 3-3 Called Unit Busy 3-3 Check Telco 3-6 Data Mode 3-6 DBU Line in RDL 3-4 DBU Status Not Installed 3-3 DBU Test Pattern 3-4 DDS network 3-6 Dialing 3-3 DU DBU Status 3-3 Going to DBU 3-3, 3-6 Idle 3-3 In Dial Backup 3-3, 3-6 Incoming Call 3-3 ISDN DBU Status 3-3 LL Test from Telco 3-6 Loop is Normal 3-6 No Rx Signal 3-3 No Wink from CO 3-4 Normal 3-5 Not Installed 3-4 OOS/OOF 3-6OOS/OOF from Net 3-4 Open Loop 3-4, 3-6 Out of Sync 3-5 SW56 DBU Status 3-3 Test from Telco 3-4 Unit in Test 3-6 V.32 DBU Status 3-3 Waiting for Call 3-4, 3-6 stay on leased 11-2 stay on line 11-2

store user profile 10-2 SW56 DBU status 3-3 switch type 9-8 switched mode dialing E-1

Т

TD 3-12 TELCO 2-3 telco connectors A-2 pin assignments A-2 Test 3-7 test DTE only 4-11 DTE with test pattern 4-13 self 4-18 test pattern 4-16 test commands 4-6 Test from Telco 3-4 test mode (TST) 3-12 test options 5-1 configuration 8-1 test pattern 4-16 test status display 4-4 test timeout 8-1 testing 4-1 transmit clock 7-4, D-1 transmit data (TD) 3-12 TST 3-12

U

unit dialing options 5-1 Unit in Test 3-6 unit test options 5-1 up arrow 3-8, 3-11 user profiles 5-1

V

V.32 bis backup option 1-4 V.32 bis/42 bis 1-4 V.32 DBU status 3-3 V.35 adaptor cable pin assignments A-4 V.35 adapter cable A-3 electrical interface A-3 mechanical interface A-3 V.35 adaptor cable power requirements A-3 V.35 connector 2-4

W

wait to redial 9-6 Waiting for Call 3-4, 3-6 warranty 1-7

Product Support Information

Presales Inquiries and Applications Support

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

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

Post-Sale Support

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

Technical Support (888) 4ADTRAN

Repair and Return

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

CaPS Department (256) 963-8722

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

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

RMA # _____