

ADURAN

DSU III DBU

Data Service Unit

USER MANUAL

| Part Number | Version |
|--------------------|--|
| 1200037L1 | Switched 4-Wire Version |
| 1202037L1 | Switched 4-Wire Version Second Generation |
| 1200037L2 | V.32 Version |
| 1202037L2 | V.32 Version Second Generation |
| 1200037L3 | Switched 2-Wire Version |
| 1202037L3 | Switched 2-Wire Version Second Generation |
| 1200037L4 | ISDN Version |
| 1202037L4 | ISDN Version Second Generation |
| 1202037L5 | V.34 Version |

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

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

7. The following information may be required when applying to the local telephone company for leased line facilities:

| Service Type | Digital Facility Interface Code | Service Order Code | Network Jacks |
|-----------------------------|---------------------------------|--------------------|---------------|
| 2.4 kbps Digital Interface | 04DU5-24 | 6.0F | RJ-48S |
| 4.8 kbps Digital Interface | 04DU5-48 | 6.0F | RJ-48S |
| 9.6 kbps Digital Interface | 04DU5-96 | 6.0F | RJ-48S |
| 19.2 kbps Digital Interface | 04DU5-19 | 6.0F | RJ-48S |
| 38.4 kbps Digital Interface | 04DU5-38 | 6.0F | RJ-48S |
| 56 kbps Digital Interface | 04DU5-56 | 6.0F | RJ-48S |
| 64 kbps Digital Interface | 04DU5-64 | 6.0F | RJ-48S |

8. The following information may be required when applying to the local telephone company for a dial-up line for the V.34 or V.32:

| Service Type | REN | FIC | USOC |
|-------------------|------|-------|--------|
| Loop Start (V.32) | 0.3B | 02LS2 | RJ-11C |
| Loop Start (V.34) | 0.8B | 02LS2 | RJ-11C |

9. The REN is useful in determining the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices should not exceed five. To be certain of the number of devices you may connect to your line as determined by the REN, call your telephone company to determine the maximum REN for your calling area.
10. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. (Contact your state public utility commission or corporation commission for information.)

**FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT**

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

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



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

CANADIAN EMISSIONS REQUIREMENTS

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

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Class A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

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

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

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

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

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

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

ISDN Service Ordering Information for the ADTRAN DSU III DBU With ISDN Dial Backup

For ADTRAN DSU III DBU ISDN applications, the following guide can be used as an aid in ordering basic ISDN service from your local telephone company. The ADTRAN DSU III DBU ISDN includes NT1 and Terminal adapter functionality and supports data rates up to 64 kbps.

Request an ISDN Basic Rate Interface (BRI) line with the following features:

U-interface reference point

2B1Q line coding

1B+D Service (supports up to 64 kbps)

The DSU III DBU ISDN supports the following switch types and software protocols:

AT&T 5ESS Custom, 5E6 and later software, National ISDN-1

NT1 DMS-100 BCS-32 and later software (Pvc1), National ISDN-1 (Pvc2)

Siemens EWSD National ISDN-1

Request that the ISDN line allocate one DYNAMIC Terminal Endpoint Identifier (TEI) for the number.

For service offered from an AT&T 5ESS, request a point-to-point line with the following features:

Feature: *Value*

B1 Service: *On Demand (DMD)*

Data Line Class: *Point-to-Point*

Maximum B Channels: *1 (1B+D)*

Circuit Switched Data (CSD) Bearer Channels: *Any*

Number of CSD Calls: *1 (1B+D)*

Terminal Type: *Type A*

Turn the Following Features Off:

Packet Mode Data

Multi-line Hunt

Multiple Call Appearances

Electronic Key Telephone Sets (EKTS)

Shared Dictionary Numbers

Accept Special Type of Number

Intercom Groups

Network Resource Selector (Modem Pools)

Message Waiting

Hunting

InterLata Competition

For service offered from a Northern Telecom DMS-100, request a Point-to-Point Multi-Point line with the following features:

Line Type: *Basic Rate, Functional*

Electronic Key Telephone Sets (EKTS): *No*

Call Appearance Handling (CACH): *No*

Non-Initializing Terminal: *No*

Circuit Switched Service: *Yes*

Packet Switched Service: *No*

TEI: *Dynamic*

Bearer Service: *Circuit Switched voice and data permitted on any B channel (packet mode data not permitted)*

Table of Contents

Chapter 1. Introduction

| | |
|---|---|
| Product Overview | 1 |
| DDS Operation | 3 |
| Dial Backup Operation | 4 |
| Dial Backup Options | 4 |
| 4-Wire Switched 56 Backup Option | 4 |
| 2-Wire Switched 56 Backup Option | 4 |
| V.32 bis Backup Option | 4 |
| V.34 Backup Option | 5 |
| 1B+D Basic Rate ISDN Backup Option | 5 |
| Entering Dial Backup Mode | 5 |
| Operation During Critical Times | 5 |
| Loss of Sealing Current | 5 |
| Out of Service (OOS) Signal | 6 |
| No Receive Signal | 6 |
| All 1s or all 0s Condition | 6 |
| Operation During Noncritical Times | 6 |
| Conditions for Returning to the DDS Circuit | 6 |
| Warranty and Customer Service | 7 |

Chapter 2. Installation

| | |
|---------------------------------------|----|
| Unpack, Inspect, Power Up | 9 |
| Receipt Inspection | 9 |
| ADTRAN Shipments Include | 9 |
| Customer Provides | 9 |
| Power Up | 10 |
| Network Interface Connection | 10 |
| DTE Data Connection/Primary DTE | 11 |
| Secondary Channel Connection | 13 |
| Configuration | 15 |
| Configuration Methods | 15 |
| AT Commands | 16 |
| V.25 bis Commands | 17 |
| SDLC Option | 17 |
| Character Format | 17 |
| Command Structure | 17 |

| | |
|---|----|
| Bi-Sync Option | 17 |
| Character Format | 17 |
| Command Structure | 17 |
| Asynchronous Option | 18 |
| Character Format | 18 |
| Command Structure | 18 |
| Command Descriptions..... | 18 |
| Syntax and Possible Responses | 19 |
| CNL (Configuration Local) | 19 |
| CNR (Configuration Remote) | 19 |
| Remote Command..... | 19 |
| | |
| Chapter 3. Operation | |
| Menu Structure | 21 |
| Main Menu | 21 |
| Status..... | 21 |
| Test | 22 |
| Configuration (CONFIG) | 22 |
| Dial | 22 |
| Basic Menu Navigation | 22 |
| Front Panel..... | 23 |
| LCD Window | 24 |
| Enter | 24 |
| Numeric Keypad | 24 |
| Shift | 24 |
| Quick | 25 |
| Cancel | 25 |
| Up and Down Arrows | 25 |
| LED Description | 25 |
| Rear Panel | 26 |
| | |
| Chapter 4. Configuration Overview | |
| Local and Remote Configuration | 29 |
| | |
| Chapter 5. Configuring Network Options | |
| Network Options | 33 |
| Loop Rate | 35 |
| Network Address | 36 |
| Remote Configuration | 36 |
| Clock Source | 37 |

Chapter 6. Configuring DTE Options

| | |
|--|----|
| DTE Options | 39 |
| DTE Rate | 39 |
| Connector Type | 42 |
| Data Format | 43 |
| DTE Command Option | 44 |
| Transmit Clock | 45 |
| Clear to Send (CS) Options | 46 |
| Anti -Stream | 48 |
| CD Options | 49 |
| Data Terminal Ready (TR) Options | 50 |
| Data Set Ready (SR) Options | 51 |
| Secondary Rate | 52 |

Chapter 7. Configuring Test Options

| | |
|-------------------------------------|----|
| Test Options | 55 |
| Test Timeout | 56 |
| Remote Digital Loopback (RDL) | 56 |
| EIA LLB | 57 |
| EIA RLB | 57 |
| DBU Answer Test | 58 |

Chapter 8. Configuring Dial Options

| | |
|---|----|
| Dial Options | 59 |
| Phone Number | 61 |
| ISDN Dial Backup | 61 |
| Setting the Service Profile Identifier (SPID) | 61 |
| Setting the Local Directory (LOC) Number | 62 |
| DBU Options for All Models | 63 |
| Automatic DBU | 63 |
| Number to Dial | 63 |
| Originate/Answer | 63 |
| When Out of Service (OOS) | 63 |
| No Receive (RX) Signal | 63 |
| No Sealing Current | 63 |
| When all 1s/0s | 64 |
| Auto Restore | 64 |
| Redial Counter | 64 |
| Fail Timer | 64 |
| Wait to Redial | 65 |

| | |
|--|----|
| DBU Options for 2-wire and 4-wire | 66 |
| Network Type | 66 |
| DBU Options for V.32 bis and V.34 | 66 |
| Error Control | 66 |
| Flow Control | 66 |
| Compression | 66 |
| DBU Options for ISDN | 68 |
| Switch Type | 68 |
| DBU Passcode | 68 |
| | |
| Chapter 9. Dial Options | |
| Dial Options | 69 |
| Answer Unit Connected to DDS Line | 70 |
| Dial Backup | 70 |
| Originate Unit Connected to DDS Line | 70 |
| Dial Backup | 70 |
| Stay on Leased | 70 |
| DBU Online Test | 70 |
| Dial Options During Dial Backup | 70 |
| Hang Up | 70 |
| Stay On Line | 70 |
| | |
| Chapter 10. Status | |
| Status | 71 |
| Network Rate, DTE Rate, and Data Format | 71 |
| Dial Backup Information | 72 |
| Type of Dial Backup Service | 72 |
| Current Status of Dial Backup Mode | 72 |
| DSU Operation and Network Status | 74 |
| Current DSU III DBU Status | 74 |
| Current DDS Network Status | 74 |
| DTE Control Leads and Status | 75 |
| | |
| Chapter 11. Testing and Troubleshooting | |
| Test Overview | 77 |
| Initiating a Test | 78 |
| Test Status Display | 79 |
| Exiting a Test | 79 |
| Troubleshooting | 81 |
| Messages from the DSU/CSU | 81 |

| | |
|---|-----|
| Troubleshooting New Installs | 82 |
| Test Sequence for Troubleshooting New Installs or Existing Circuits | 83 |
| Local Unit Diagnostics | 84 |
| DTE & Loop (LL) | 86 |
| Test Description | 86 |
| Test Purpose | 86 |
| Initiating | 87 |
| Interpreting Test Results | 87 |
| Loop Only (RT) | 88 |
| Test Purpose | 88 |
| Initiating | 88 |
| Interpreting Test Results | 89 |
| DTE Only | 90 |
| Test Purpose | 90 |
| Initiating | 90 |
| Interpreting Test Results | 91 |
| DTE With Test Pattern | 92 |
| Test Purpose | 92 |
| Initiating | 92 |
| Interpreting Test Results | 93 |
| Test Pattern | 94 |
| Test Purpose | 94 |
| Initiating | 95 |
| Interpreting Test Results | 95 |
| Self Test | 96 |
| Test Purpose | 96 |
| Initiating | 96 |
| Interpreting Test Results | 96 |
| Remote Unit Diagnostics | 97 |
| Test Purpose | 97 |
| Initiating | 98 |
| Test Results | 98 |
| Interpreting Test Results | 98 |
| DBU Connection | 99 |
| Test Purpose | 99 |
| Initiating | 100 |
| Interpreting Test Results | 100 |
| | |
| Chapter 12. Manual Command | |
| Manual Command | 101 |

| | |
|---|-----|
| Appendix A. AT Commands | 105 |
| Appendix B. Default Configuration Profiles | |
| Default Configuration Profiles | 109 |
| Profile 1 | 109 |
| Profile 2 | 109 |
| Profiles 3 and 4 | 109 |
| Appendix C. DSU to Modem Interconnect | |
| Modem Tail Circuit Application | 113 |
| Appendix D. EIA-232 Connector | |
| 56 and 64 kbps Application | 115 |
| Appendix E. Specifications Summary | |
| Specification and Features | 117 |
| Operating Modes | 117 |
| Data Rates | 117 |
| DTE Rates | 117 |
| DTE Interface Data Rates | 117 |
| FCC Approval | 117 |
| DTE Interfaces | 118 |
| Data Buffering | 118 |
| Clocking | 118 |
| Diagnostics | 118 |
| Line Requirements | 118 |
| Line Interface | 118 |
| Receiver Sensitivity | 118 |
| Environment | 118 |
| Physical | 118 |
| Power | 118 |
| Glossary | 119 |
| Index | 127 |
| List of Tables | |
| Table 2-A Pin Assignments for Line 1 Connector | 10 |
| Table 2-B Pin Assignments for Line 2 Connector | 11 |
| Table 2-C Pin Assignments for Primary EIA-232 Connector | 12 |

| | | |
|------------|--|-----|
| Table 2-D | Pin Assignments for Primary V.35 Connector | 13 |
| Table 2-E | Pin Assignments for Auxiliary EIA-232 Connector | 14 |
| Table 5-A | Network Options AT Commands | 34 |
| Table 6-A | DTE Rate Options AT Commands | 41 |
| Table 6-B | Data Format Commands | 43 |
| Table 6-C | Transmit Clock AT Commands | 45 |
| Table 6-D | CS Options AT Commands | 47 |
| Table 6-E | Short and Long Delays at Different Operating Speeds | 47 |
| Table 6-F | Anti-Stream AT Commands | 49 |
| Table 6-G | CD Options AT Commands | 50 |
| Table 6-H | TR Options AT Commands | 51 |
| Table 6-I | SR Options AT Commands | 52 |
| Table 6-J | Secondary Rate AT Commands | 53 |
| Table 7-A | Test Options AT Commands | 55 |
| Table 8-A | AT Commands for Storing Phone Numbers | 62 |
| Table 8-B | DBU Options AT Commands for All Models | 65 |
| Table 8-C | DBU Options AT Commands for V.32 bis and V.34 Backup | 67 |
| Table 11-A | Messages from the DSU/CSU | 81 |
| Table 11-B | Troubleshooting New Installs | 82 |
| Table 11-C | Test AT Commands | 84 |
| Table 11-D | DTE with Test Pattern Commands | 85 |
| Table 11-E | Remote Tests and AT Commands | 97 |
| Table 12-A | Manual Commands | 103 |
| Table A-A | AT Commands | 105 |
| Table B-A | Default Configuration Profiles | 110 |

List of Figures

| | | |
|------------|--|----|
| Figure 1-1 | Typical Point-to-Point Application for DSU III DBU | 2 |
| Figure 3-1 | Example of Basic Menu Navigation | 23 |
| Figure 3-2 | DSU III DBU Front View | 24 |
| Figure 3-3 | DSU III DBU Rear View | 27 |
| Figure 4-1 | Complete Configuration Menu | 31 |
| Figure 5-1 | Setting Loop Rate Options | 35 |
| Figure 5-2 | Setting the Network Address | 36 |
| Figure 5-3 | Remote Configuration | 36 |
| Figure 5-4 | Setting the Clock Source | 37 |
| Figure 6-1 | Selecting DTE Rates | 40 |
| Figure 6-2 | Selecting the Connector Type | 42 |
| Figure 6-3 | Selecting Asynchronous or Synchronous Data Format | 43 |
| Figure 6-4 | Selecting DTE Command Option | 44 |

| | | |
|--------------|--|-----|
| Figure 6-5 | Transmit Clock Options | 45 |
| Figure 6-6 | Selecting CS Options | 46 |
| Figure 6-7 | Anti-Stream Options | 48 |
| Figure 6-8 | Selecting CD Options | 49 |
| Figure 6-9 | Selecting Data Terminal Ready (TR) Options | 50 |
| Figure 6-10 | Setting Data Set Ready (SR) Options | 51 |
| Figure 6-11 | Setting the Secondary Rate | 52 |
| Figure 7-1 | Setting Test Timeout Option | 56 |
| Figure 7-2 | Remote Digital Loopback | 56 |
| Figure 7-3 | EIA Local Loopback Options | 57 |
| Figure 7-4 | EIA Remote Loopback Options | 57 |
| Figure 7-5 | DBU Answer Test Option | 58 |
| Figure 8-1 | Dial Backup Options | 60 |
| Figure 8-2 | Editing Stored Phone Numbers | 61 |
| Figure 9-1 | Dial Options Menu | 69 |
| Figure 10-1 | Status Display | 71 |
| Figure 11-1 | Normal Operation Before Initiating Loopback Test | 77 |
| Figure 11-2 | Initiating a Test | 78 |
| Figure 11-3 | Sample Test Status Displays | 79 |
| Figure 11-4 | Complete Test Menu | 80 |
| Figure 11-5 | DTE & Loop Test | 86 |
| Figure 11-6 | Initiating a DTE & Loop Test | 87 |
| Figure 11-7 | Loop Only Test | 88 |
| Figure 11-8 | Initiating a Loop Only Test | 89 |
| Figure 11-9 | DTE Only Test Diagram | 90 |
| Figure 11-10 | Initiating a DTE Only Test | 91 |
| Figure 11-11 | DTE with Test Pattern | 92 |
| Figure 11-12 | Initiating a DTE with Test and Test Pattern | 93 |
| Figure 11-13 | Test Pattern Only | 94 |
| Figure 11-14 | Initiating a Test Using a Test Pattern | 95 |
| Figure 11-15 | Initiating a Self Test | 96 |
| Figure 11-16 | V.54 RDL with Test Pattern | 97 |
| Figure 11-17 | Initiating a Remote Test | 98 |
| Figure 11-18 | DBU Connection Test | 99 |
| Figure 11-19 | Initiating a DBU Connection Test | 100 |
| Figure 12-1 | Manual Command | 102 |
| Figure C-1 | DSU to Modem Interconnect | 113 |
| Figure D-1 | EIA-232 Connector | 115 |

Chapter 1

Introduction

PRODUCT OVERVIEW

The ADTRAN DSU III DBU (dial backup data service unit) provides a reliable, high-speed data connection for customer data terminal equipment (DTE) through digital data service (DDS) lines. The DSU III DBU provides automatic dial backup of the dedicated circuit. There are five backup options available: 4-wire switched 56 (SW56), 2-wire SW56, V.32 bis/42 bis, V.34, and 1B+D ISDN. The DSU III DBU supports both synchronous and asynchronous data communication over the DDS or DBU networks.

The DSU III DBU provides both V.35 and EIA-232 electrical and physical DTE interfaces to accommodate a variety of applications. A second EIA-232 interface is provided if the unit is configured for use on DDS with secondary channel services.

To ensure a reliable connection, the unit features an extended receiver capability which permits operation over long loops (3.4 miles or 5.5 km of 26 AWG at 56 kbps).

The 4-wire SW56 DBU model is compatible with AT&T Accunet and Sprint SW56 type services. The 2-wire SW56 DBU is compatible with DATAPATH® type of SW56 services. The V.32 bis/42 bis DBU and the V.34 DBU allow switched backup over the public switched telephone network (PSTN). The 1B+D ISDN model is compatible with National ISDN and supports a U-interface to the Basic Rate ISDN.

Figure 1-1 shows a typical point-to-point application for the DSU III DBU.

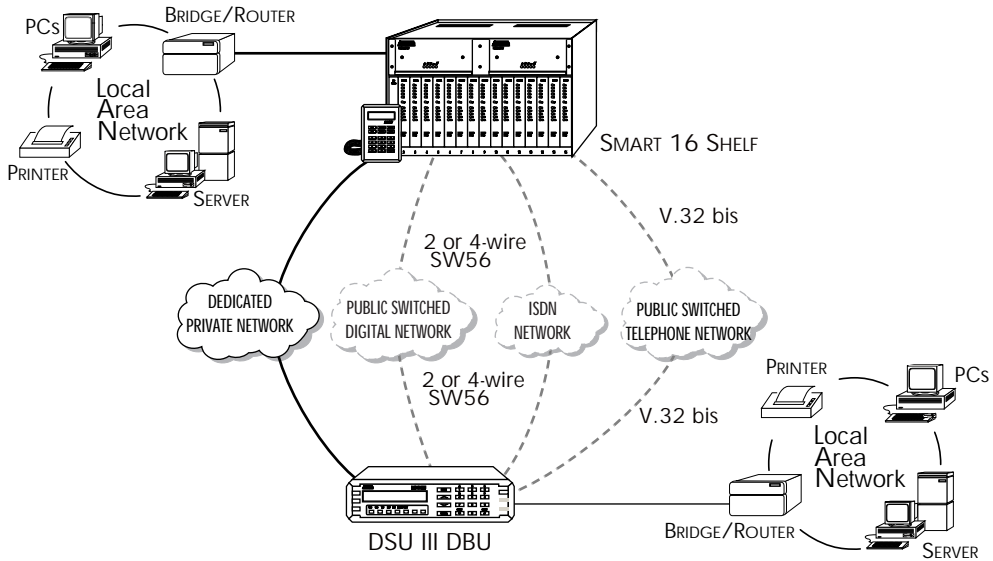


Figure 1-1
Typical Point-to-Point Application for DSU III DBU

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 DBU supports the 56/64 kbps DDS service rate yielding DTE rates of 2.4, 4.8, 9.6, 19.2, 38.4 (sync or async), 56 kbps, and 64 kbps. An additional rate of 57.6 is available in asynchronous mode. The unit can be configured to run slower DTE rates (async or sync) over the 56 kbps service. Secondary channel operation is supported at all service rates up to 56 kbps, providing terminal rates of 75, 150, 300, 600, 1200, and 2400 bps. The secondary rates available depend on the service rate configured.

DIAL BACKUP OPERATION

There are five backup options available: 4-wire SW56, 2-wire SW56, V.32 bis/42 bis, V.34, and 1B+D ISDN. Contact the local telco provider to determine which services are available.

Dial Backup Options

4-Wire Switched 56 Backup Option

This dial-up 4-wire DDS allows customers to pay for data connection only for the time the unit is active. The regional operating companies provide the 4-wire local loop service to SW56 customers. In SW56 mode, the DSU III DBU supports DTE rates of 2.4, 4.8, 9.6, 19.2, 38.4 (asynchronous or synchronous), and 56 kbps (synchronous). An additional DTE rate of 57.6 kbps is available in async modes.

2-Wire Switched 56 Backup Option

DATAPATH is a switched digital 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 -45 dB.

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. In synchronous applications the maximum speed supported for backup is 14.4 kbps.

V.34 Backup Option

The V.34 modem has all of the V.32 bis modem's modes of operation, plus V.34 and V.FC modes. This allows the V.34 option to run synchronous rates up to 28.8 kbps as opposed to the V.32 at 14.4 kbps. In asynchronous mode the throughput at 57.6 kbps is less dependent on data types.

1B+D Basic Rate ISDN Backup Option

1B+D Basic Rate ISDN service provides the customer with a switched 56/64 kbps circuit. The default data rate for this option is 56K. The 64 kbps data rate may be revised by using the SMART dial string as described in the section *ISDN Dial Backup* in the chapter *Configuring Dial Options*. 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* in the chapter *Operation* for more information on the **Quick** key.

Operation During Critical Times

The following four conditions will cause a DSU III DBU 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 over the 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.

No Receive Signal

This is an indication that the local loop copper pairs may be either open or shorted or the OCU in the CO 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) in the network is inoperative. Upon detecting an all 1s or all 0s condition, the DSU III DBU initiates a handshake routine to determine whether the remote unit's DTE is the source of the all 1s or 0s condition or if an actual network failure exists.

Operation During Noncritical Times

The DSU III DBU may be configured not to enter dial backup mode if data terminal ready (DTR) is low. This feature prevents the DSU III DBU from entering dial backup during noncritical times such as nights and weekends.

For more information, see the chapter *Configuring Dial Backup Options*.

Conditions for Returning to the DDS Circuit

The DSU III DBU can be configured to automatically revert to the DDS circuit from the dial backup mode or wait to be returned to the DDS manually. Once the DSU III DBU 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 DBU 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.

For more information see the chapter *Configuring Dial Backup Options*.

WARRANTY AND CUSTOMER SERVICE

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

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

For service, RMA requests, or further information, contact one of the numbers listed on the inside back cover of this manual.

Chapter 2

Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

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

ADTRAN Shipments Include

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

- DSU III DBU unit
- An 8-position modular to 8-position modular cable
- The user manual
- Appropriate cable for the backup option selected

Customer Provides

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

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 INTERFACE CONNECTION

The DSU III DBU has two eight-position modular jacks labelled **LINE 1** and **LINE 2**. The line 1 connector is used for connecting to the dedicated (DDS) network. The pinout for the line 1 connector is listed in Table 2-A.

Table 2-A
Pin Assignments for Line 1 Connector

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

The line 2 connector is used for connection to the switched backup network. The pinout for the line 2 connector depends on the model of DBU unit. Pinouts for 4-wire Switched 56, 2-wire Switched 56, V.32 bis, V.34, and 1B+D ISDN DBU options are shown in Table 2-B.

Table 2-B
Pin Assignments for Line 2 Connector

| Pin | Name | Description |
|--|------|--|
| 4-wire Switched 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 | T | Receive Data from Network to DSU-Tip |
| 8 | R | Receive Data from Network to DSU-Ring |
| 2-wire Switched 56, V.32 bis, V.34, and 1B+D ISDN | | |
| 1-3 | - | Not Used |
| 4 | T | Network-Tip |
| 5 | R | Network-Ring |
| 6 - 8 | - | Not Used |

DTE DATA CONNECTION/PRIMARY DTE

The primary DTE should be connected to either the EIA-232 DTE connector or the CCITT V.35 DTE connector. The maximum cable lengths recommended are 50 feet for the EIA-232, and 100 feet for the CCITT V.35. The pin assignments for the connectors are listed in Tables 2-C and 2-D.

The V.35 connector is recommended for use with data rates above 19.2 kbps. The EIA-232 connector works up to 56 kbps with a low capacitance cable or with the external transmit clock option selected. The primary DTE rate is configured from the front panel. The primary DTE equipment can operate in asynchronous or synchronous modes.



CAUTION

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

Table 2-C*Pin Assignments for Primary EIA-232 Connector*

| Pin | EIA | Description |
|------------|------------|------------------------------------|
| 1 | AA | Protective Ground (PG) |
| 2 | BA | Transmit Data (SD) |
| 3 | BB | Receive Data (RD) |
| 4 | CA | Request-to-Send (RS) |
| 5 | CB | Clear-to-Send (CS) |
| 6 | CC | Data Set Ready (SR) |
| 7 | AB | Signal Ground (SG) |
| 8 | CF | Received Line Signal Detector (CD) |
| 9 | - | +12 Test Point |
| 10 | - | -12 Test Point |
| 15 | DB | Transmit Clock (TC) |
| 17 | DD | Receive Clock (RC) |
| 18 | - | Local Loopback (LL) |
| 20 | CD | Data Terminal Ready (TR) |
| 21 | - | Remote Loopback (RL) |
| 22 | CE | Ring Indicator (RI) |
| 24 | DA | External TX Clock (ETC) |
| 25 | - | Test Indicator (TI) |

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

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

SECONDARY CHANNEL CONNECTION

If used, the secondary DTE should be connected to the auxiliary EIA-232 connector. The pinout for the connector is shown in Table 2-E.

Table 2-E*Pin Assignments for Auxiliary EIA-232 Connector*

| Pin | CCITT | Description |
|------------|--------------|---------------------------------------|
| 1 | AA | Protective Ground (PG) |
| 2 | BA | Transmit Data (SD) |
| 3 | BB | Receive Data (RD) |
| 4 | CA | Request to Send (RS) |
| 5 | CB | Clear to Send (CS) |
| 6 | CC | Data Set Ready (SR) |
| 7 | AB | Signal Ground (SG) |
| 8 | CF | Carrier Detect (CD) - on all the time |

CONFIGURATION

The DSU III contains four different user profiles (sets of configuration options) that are stored in read-only memory. These profiles are listed in the appendix *Default Configuration Profiles*. The unit is shipped from the factory with profile 1 (default configuration) loaded into the nonvolatile configuration memory. If profile 1 matches the desired system requirements, 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 DBU is then configured with that profile every time power is turned on or the unit is reset.

See the chapter *Manual Command* for information on loading default configuration profiles.

Configuration Methods

The DSU III DBU provides three methods for local configuration and three different methods for remote configuration: AT commands, V.25 commands, and front panel commands.

AT Commands

In addition to the front panel, the DSU III DBU can be configured and controlled with in-band AT commands from an asynchronous DTE port just as modems are.

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

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

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

Before the terminating character is transmitted, the command line can be edited by using the backspace character (ASCII 008) to erase errors so the proper commands can be entered.

Valid AT commands for the DSU III DBU are listed in the appendix *AT Commands*.

V.25 bis Commands

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

The V.25 bis option supports the following protocols:

- SDLC
- Bi-Sync
- Asynchronous

SDLC Option

Character Format

- Data bits - 8
- Parity bit - Ignored

Command Structure

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

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

Bi-Sync Option

Character Format

- Data bits - 7
- Parity bit - Odd

Command Structure

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

Asynchronous Option

Character Format

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

Command Structure

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

Command Descriptions

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

| | |
|-----|----------------------|
| CNL | Configuration local |
| CNR | Configuration remote |

Possible responses to V.25 bis commands follows:

| | |
|-------|------------------------------|
| VALA | Valid V.25 command processed |
| INV | An invalid command detected |
| INVCU | Unknown command detected |
| INVPS | Invalid parameter syntax |
| INVPV | Invalid parameter value |
| INVBL | Invalid local password |
| INVBM | Invalid remote password |

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

| | |
|-----|------------------------------|
| VAL | Valid V.25 command processed |
| INV | Invalid command received |

Syntax and Possible Responses

CNL (Configuration Local)

This command is used to pass AT commands to the local DSU via the V.25 bis command processor. This allows the DSU III DBU to be configured with AT commands using a synchronous interface. The format is as follows:

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

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

CNR (Configuration Remote)

This command is used to pass AT commands over the network to the remote DSU via the V.25 bis command processor. This allows a remote DSU III DBU to be configured from a synchronous interface. The format of this command follows:

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

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

Remote Command

The DSU III DBU can be controlled remotely from another DSU III DBU. The Configuration (CONFIG) menu allows the DSU III DBU remote configuration capability to be enabled or disabled. For more information, see the chapter *Configuration Overview*.

Chapter 3

Operation

MENU STRUCTURE

The DSU III DBU 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. Each Main menu item has several functions and submenus to identify and access specific parameters.

LCD display of the Main menu:

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

Main Menu

There are four branches of the main menu: Status, Test, Configuration (CONFIG), and Dial.

Status

Status is used to display all relevant information for the network and DTE interfaces. It displays the current operating data mode, loop status, DTE data rate and format, and DTE interface lead status. The system returns to the status display when idle.

Test

Test is used to control local and remote testing. Select local or remote testing, and the type of test and test pattern when required.

Configuration (CONFIG)

Configuration is used to select network and DTE operating parameters. When certain loop rates (56 or 64 kbps) are selected, a scramble option submenu is displayed instead of the DTE Rate menu to control scrambling.

Dial

Dial provides manual dialing functions. Key in a number to dial or select one of the ten stored numbers.

Basic Menu Navigation

Four function keys on the left side of the DSU III DBU 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 item.

The following example and Figure 3-1 illustrate how to select the DSU III DBU loop rate options:

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

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

Figure 3-1
Example of Basic Menu Navigation

FRONT PANEL

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

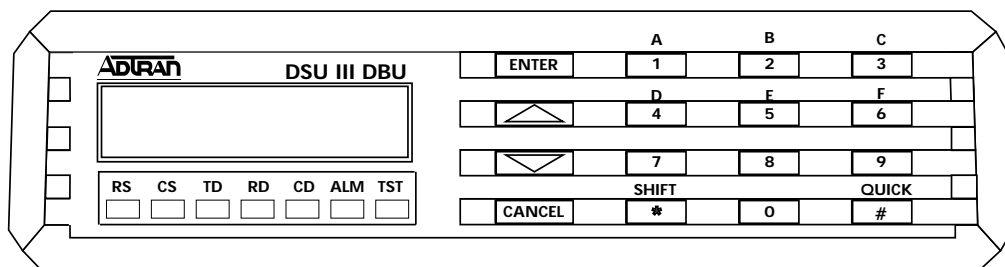


Figure 3-2
DSU III DBU Front View

The following function descriptions apply to both the stand-alone unit and the rackmount unit when using the DATAMATE modules.

LCD Window

The LCD window displays menu items and messages in 2 lines by 16 characters.

Enter

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

Numeric Keypad

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

Shift

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

To activate a menu item designated by an alpha character rather than a number, display the menu item using the **Up** and **Down Arrows**; press and release **Shift**, then press 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

The **Quick** key used during most operations 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.

Cancel

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 as necessary.

Up and Down Arrows

Up and **Down Arrows** scroll through the submenu items available in the current menu. Submenu items appear 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

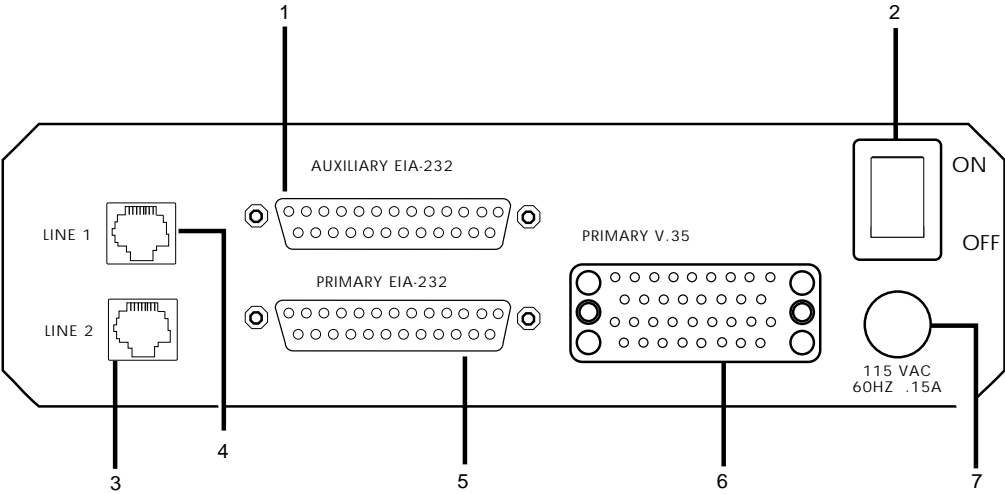
The DSU III DBU has seven LED indicators: RS, CS, TD, RD, CD, ALM, and TST. These LEDs are identified as follows:

| | |
|---------------------|--|
| RS: Request to Send | Reflects the status of the request to send pin of the EIA-232 connector. |
| CS: Clear to Send | Reflects the status of the clear to send pin of the EIA-232 connector. |
| TD: Transmit Data | This LED is active when data is transmitted from the DTE. |
| RD: Receive Data | This LED is active when data is received from the network. |

| | |
|-----------------------|--|
| CD: Carrier Detect | This LED is active when frame synchronization is achieved and the DSU III DBU is ready to transfer data. |
| ALM: Alarm Indication | This LED activates whenever an alarm condition exists. Alarm conditions include: <ul style="list-style-type: none">• Open loop on network• No frame synchronization• Unit in dial backup• Problem on dial backup line |
| TST: Test Mode | This LED is on whenever the unit is in test mode. |

REAR PANEL

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



Identification of Numbers

| Item | Function |
|-----------------------|-------------------------------------|
| 1. Auxiliary EIA-232 | Secondary channel services |
| 2. Power Switch | Used to turn power on or off |
| 3. Line 1 | Connection to the dedicated circuit |
| 4. Line 2 | Connection to dial backup |
| 5. Primary EIA-232 | DTE interface |
| 6. Primary V.35 | High speed DTE interface |
| 7. 115 VAC Connection | Power cord connection |

Figure 3-3
DSU III DBU Rear View

Chapter 4

Configuration Overview

LOCAL AND REMOTE CONFIGURATION

The DSU III DBU 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. During remote configuration the DSU III DBU prompts for the remote address before displaying the Configuration menus.

The Configuration menu consists of a group of five submenus relating to a specific interface or function of the DSU III DBU 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 DBU contains four different user profiles (sets of configuration options) stored in read only memory; see the appendix *Default Configuration Profiles*. The unit is shipped from the factory with profile number 1 (default configuration) loaded into the current (nonvolatile configuration) memory. If profile 1 matches requirements for the system, then no additional configuration is required to put the unit into service. If profile 1 does not match system requirements it can be modified, or one

of the other profiles that more closely matches the system requirements can be loaded into current memory. When a different profile is loaded, or the existing profile is modified, it is stored in the current (nonvolatile configuration) memory. The DSU III DBU is then configured with that profile every time power is turned on or until the unit is reset.

For detailed information on configuration see the chapters *Configuring Network Options*, *Configuring DTE Options*, *Configuring Test Options*, *Configuring Dial Backup Options*, and *Manual Command*.

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

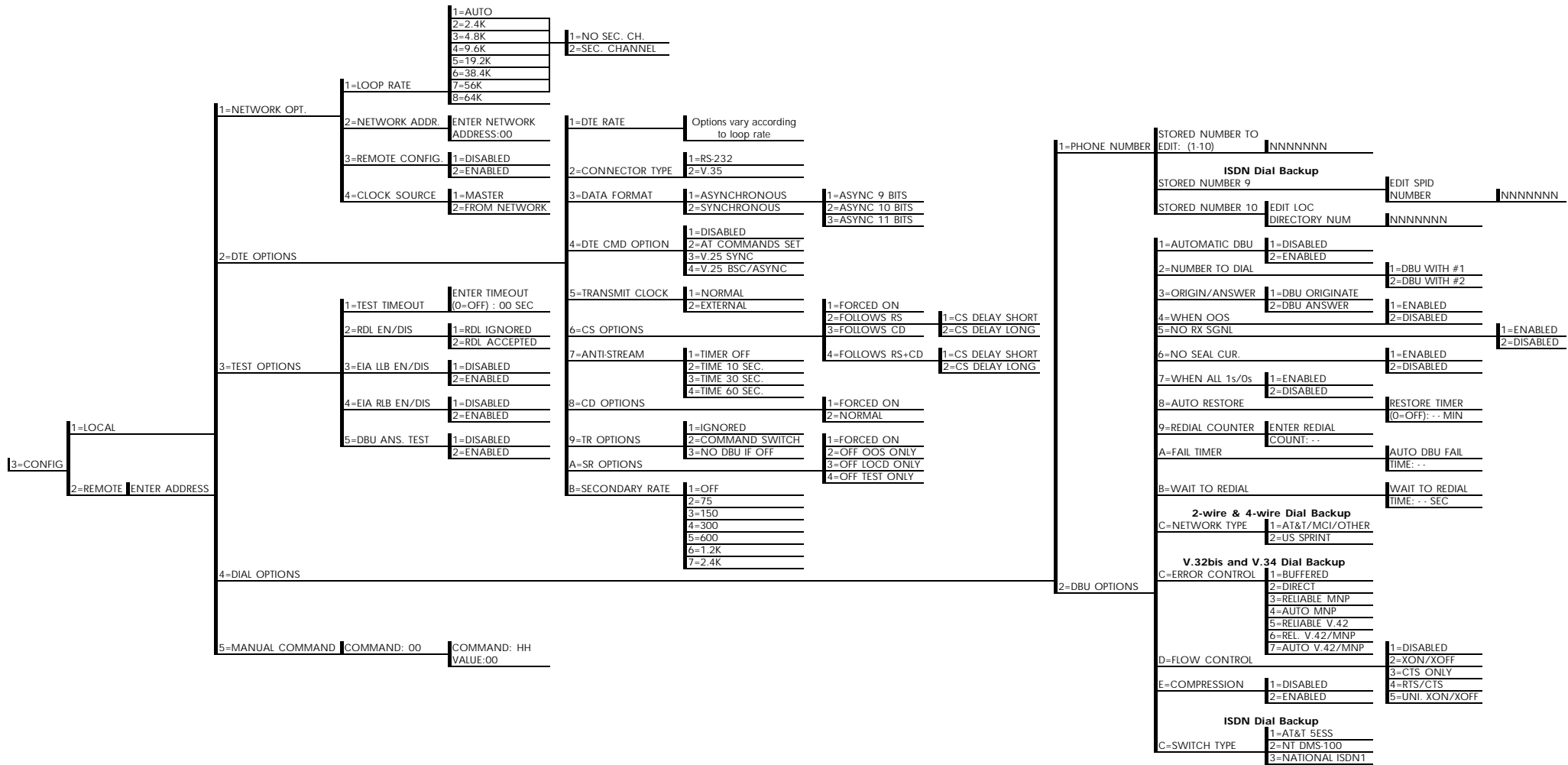


Figure 4-3
Complete Configuration Menu

Chapter 5

Configuring Network Options

NETWORK OPTIONS

The Network Options configuration parameters control the loop operation of the DSU III DBU.

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

Table 5-A shows the AT commands used to set the Network Options.

Table 5-A
Network Options AT Commands

| Front Panel | AT Command |
|------------------------------|------------|
| Loop Rate Commands | |
| AUTO no secondary channel | %B0 |
| 2.4K no secondary channel | %B1 |
| 4.8K no secondary channel | %B2 |
| 9.6K no secondary channel | %B3 |
| 19.2K no secondary channel | %B4 |
| 38.4K no secondary channel | %B5 |
| 56K no secondary channel | %B6 |
| 64K clear channel | %B7 |
| 2.4K with secondary channel | %B9 |
| 4.8K with secondary channel | %B10 |
| 9.6K with secondary channel | %B11 |
| 19.2K with secondary channel | %B12 |
| 38.4K with secondary channel | %B13 |
| 56K with secondary channel | %B14 |
| Network Address | |
| XX (decimal) | _N=xx |
| Remote Configuration | |
| Disabled | &P4 |
| Enabled | &P5 |
| Clock Source | |
| Master | _X0 |
| From Network | _X1 |

Loop Rate

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

Eight loop rate selections are available (shown in Figure 5-1). After selecting any loop rate other than Auto or 64 kbps the option for a secondary channel is available. The secondary channel rate is determined by the current loop rate.



The DSU III DBU does not support subrates operating over a 64 kbps loop rate.

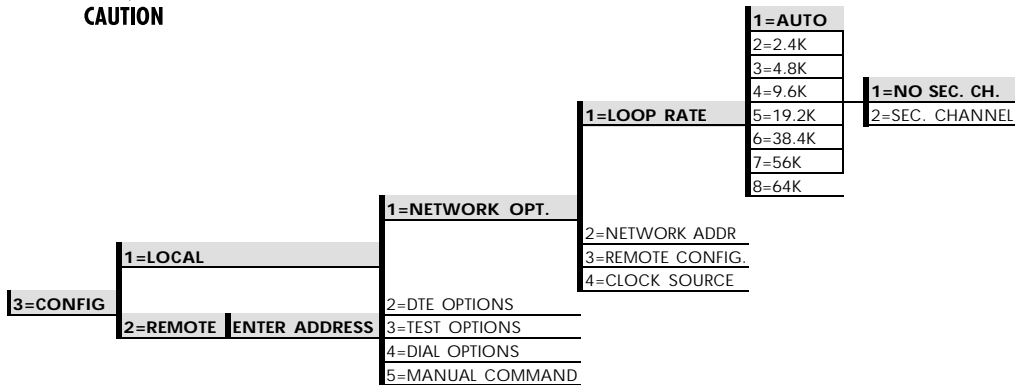


Figure 5-1
Setting Loop Rate Options

The default factory setting is Auto, with no secondary channel. The various loop rates and format selections are listed in Table 5-A with the equivalent AT commands that perform the same configuration functions.

Network Address

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

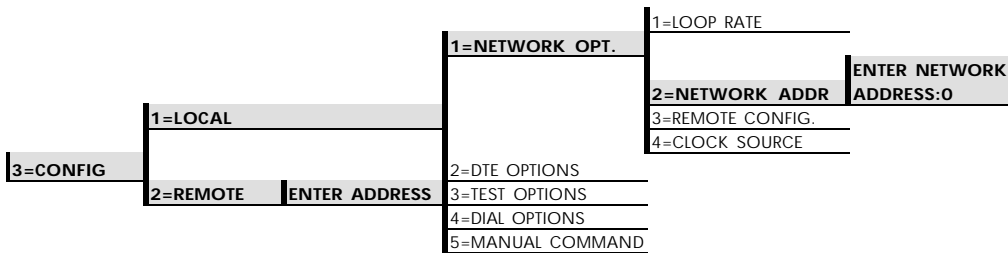


Figure 5-2
Setting the Network Address

Remote Configuration

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

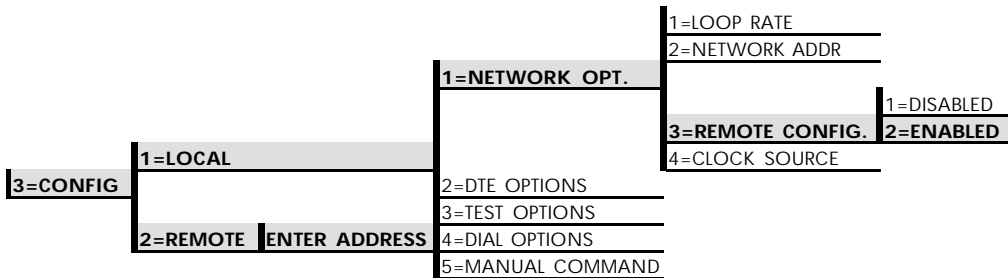


Figure 5-3
Remote Configuration

Clock Source

The Clock Source options specify the timing source for the DSU III DBU's internal circuitry. The factory default setting is From Network (see Figure 5-4).

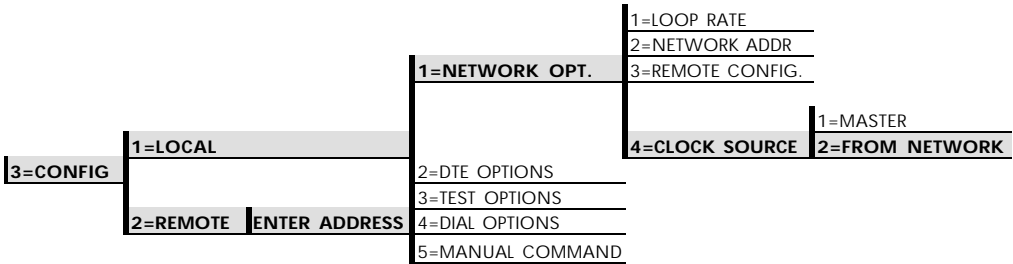


Figure 5-4
Setting the Clock Source

When operating on a DDS network, the timing should be From Network. On a point-to-point private network, one DSU III DBU must be set for Master, the others set for From Network.

Chapter 6

Configuring DTE Options

DTE OPTIONS

The DTE Options menu is used to select the configuration parameters that control the operation of the DTE Interface of the DSU III DBU.

DTE Rate

The DSU III DBU supports six DTE rates over a 56 kbps circuit with no secondary channel and seven DTE rates over a 64 kbps circuit. If a DTE rate higher than the current loop rate is selected, the DTE rate automatically sets to match the slower loop rate; the DSU III DBU briefly displays **DTE RATE SAME AS THE NETWORK** before returning to the status screen. The factory default setting is **SAME AS LOOP**.

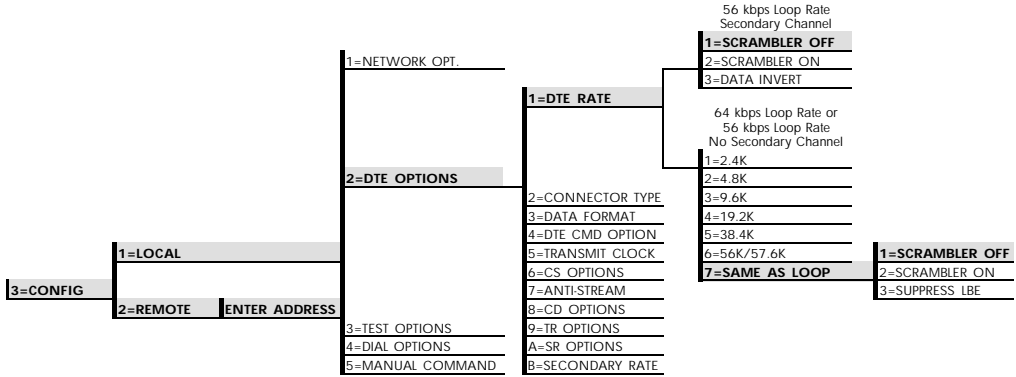


Figure 6-1
Selecting DTE Rates

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

Table 6-A
DTE Rate Options AT Commands

| Front Panel | AT Command | Description |
|-----------------|------------|---|
| 1=2.4K | %K3 | DTE rate: 2.4K sync and async |
| 2=4.8K | %K4 | DTE rate: 4.8K sync and async |
| 3=9.6K | %K5 | DTE rate: 9.6K sync and async |
| 4=19.2K | %K6 | DTE rate: 19.2K sync and async |
| 5=38.4K | %K7 | DTE rate: 38.4K sync and async |
| 6=56K/57.6K | %K8 | DTE rate: 56K sync or 57.6K async |
| 7=SAME AS LOOP | %K9 | DTE rate matches loop rate |
| 1=SCRAMBLER OFF | _F0 | DTE data scrambler disabled |
| 2=SCRAMBLER ON | _F1 | DTE data scrambler enabled |
| 3=DATA INVERT | _F2 | DTE data invert enabled (56 kbps secondary channel loop rate only) |
| 3=SUPPRESS LBE | _F2 | Suppresses loopback enable code (LBE) in transmit data from the DTE after 30 bytes in a row detected (64 kbps loop rate only) |

If the DSU III DBU is set for a loop rate of 56 kbps secondary channel or 64 kbps then scrambler on/off options are available. The factory default setting is Scrambler Off.



For point-to-point operation at 56 kbps with secondary channel, the network requires that the primary and secondary channel data not be all zeros simultaneously. For HDLC protocol applications, this constraint can be eliminated by selecting either the Data Invert option or the Scrambler On option.

For 64 kbps clear channel operation, there is a possibility 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 DBU.

Connector Type

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

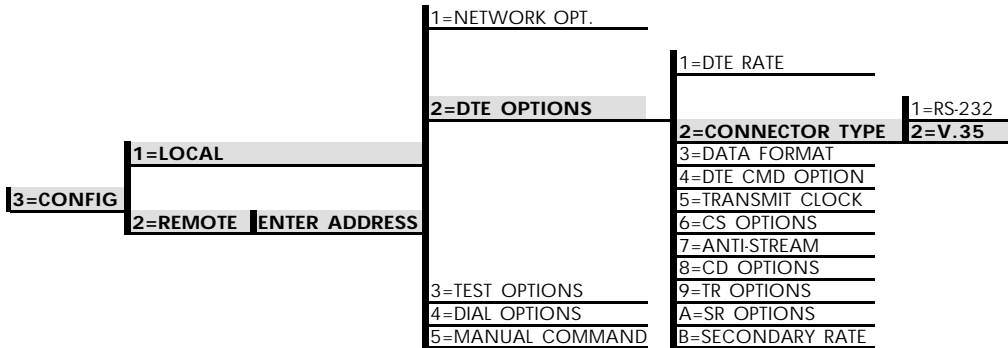


Figure 6-2
Selecting the Connector Type

Data Format

The Data Format option is used to select either the synchronous or asynchronous mode of operation for the DTE interface. The factory default setting is Synchronous (see Figure 6-3). If asynchronous is chosen, the length of the data bytes must be selected.

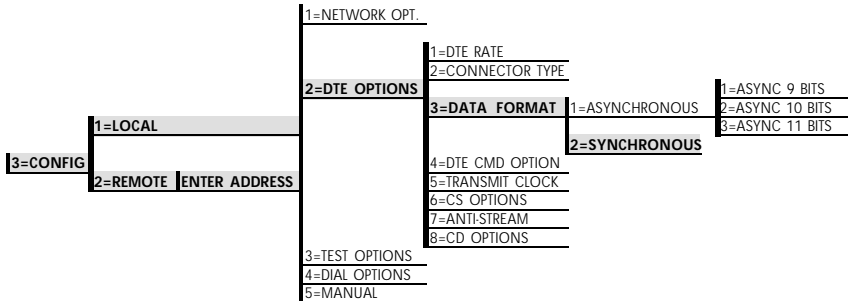


Figure 6-3
Selecting Asynchronous or Synchronous Data Format

Table 6-B shows the AT commands that can be used to set the Data Format to asynchronous or synchronous.

Table 6-B
Data Format Commands

| Front Panel | AT Command | Front Panel |
|--|------------|------------------------|
| 1=ASYNCHRONOUS | &Q0 | 1=ASYNCHRONOUS |
| 2=SYNCHRONOUS | &Q2 | 2=SYNCHRONOUS |
| For asynchronous options, select the length of the data bytes. | | |
| 1=ASYNCHRONOUS 9 BITS | N/A | 1=ASYNCHRONOUS 9 BITS |
| 2=ASYNCHRONOUS 10 BITS | N/A | 2=ASYNCHRONOUS 10 BITS |
| 3=ASYNCHRONOUS 11 BITS | N/A | 3=ASYNCHRONOUS 11 BITS |

DTE Command Option

The DTE Command option is used to enable AT commands from the DTE, enable V.25 bis (SDLC) commands, enable V.25 (Bisync and Async), or disable all DTE command modes (see Figure 6-4).

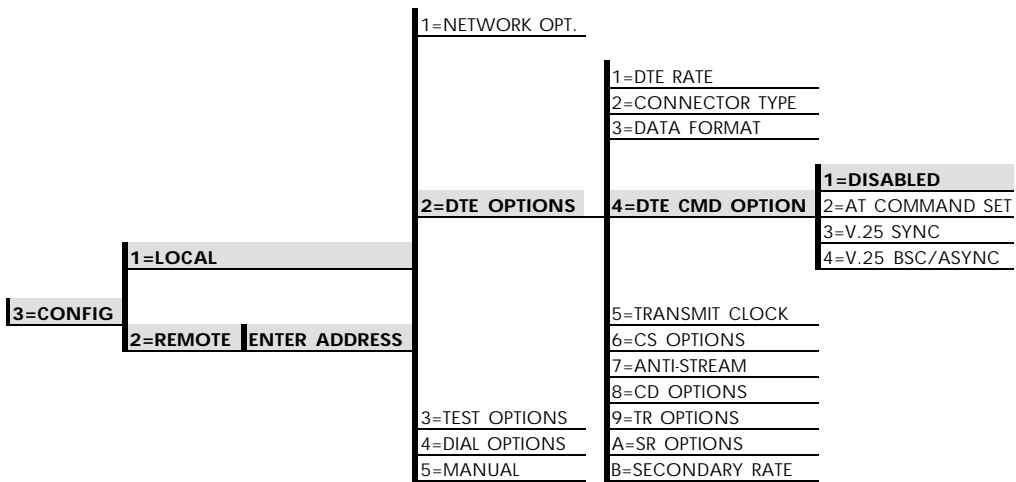


Figure 6-4
Selecting DTE Command Option

Transmit Clock

The Transmit Clock option is used to select the source of the clock used to transfer data from the DTE into the DSU III DBU. Figure 6-5 shows the menu path used to set the Transmit Clock option.

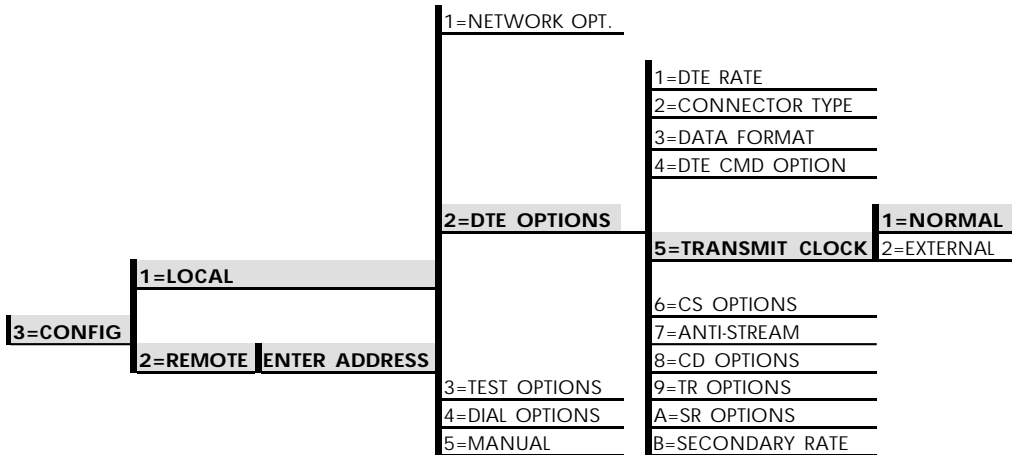


Figure 6-5
Transmit Clock Options

Table 6-C shows the AT commands used to set the Transmit Clock options.

Table 6-C
Transmit Clock AT Commands

| Front Panel | AT Command | Description |
|-------------|------------|-----------------------------|
| 1=NORMAL | &X0 | TX clock from DSU selected |
| 2=EXTERNAL | &X1 | ETC clock from DTE selected |

The External clock option is normally used in modem tail circuit applications. A DSU to modem interconnect diagram for this application is shown in the appendix *DSU to Modem Interconnect*. The External clock option is also recommended when the

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

Clear to Send (CS) Options

The CS Options menu is used to select the control mode for the CS lead. Figure 6-6 shows the menu path used to access the CS options menu. The default factory setting is Follows RS with CS Delay Short.

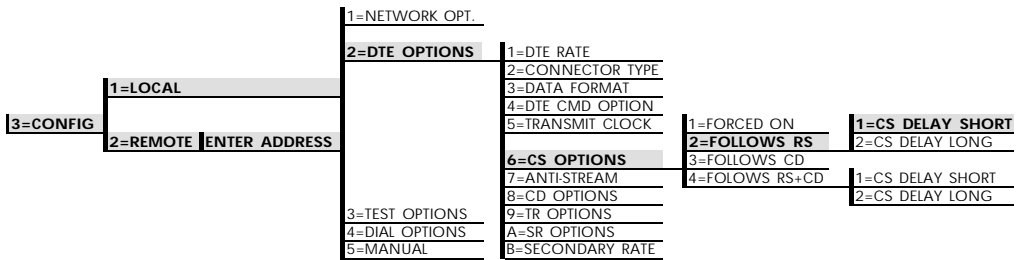


Figure 6-6
Selecting CS Options

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

Table 6-D
CS Options AT Commands

| Front Panel | AT Cmd. | Description |
|---|---------|------------------------------------|
| 1=FORCED ON | &R0 | CS always on |
| 2=FOLLOWS RS | &R1 | CS state same as RS state |
| 3=FOLLOWS CD | &R2 | CS state same as CD state |
| 4=FOLLOWS RS+CD | &R3 | CS state same as RS and CD state |
| For Follows RS options, select the length of the delay. | | |
| 1=CS DELAY SHORT | _D0 | Short delay from RS to CS selected |
| 2=CS DELAY LONG | _D1 | Long delay from RS to CS selected |

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

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

| Rate | Short Delay | Long Delay |
|------|-------------|------------|
| 64 | 1.1ms | 16.1ms |
| 56 | 1.1ms | 16.1ms |
| 19.2 | 1.5ms | 16.5ms |
| 4.8 | 1.5ms | 16.5ms |
| 2.4 | 1.5ms | 16.5ms |

Anti-Stream

The Anti-Stream option is used to select the anti-stream timeout. Figure 6-7 shows the menu path used to access the Anti-Stream options menu. The anti-stream timeout is the maximum time the DSU III DBU transmits data into the network from the DTE. This feature prevents one DTE device on a multi-drop network from continuously tying up the transmit circuit back to the master DSU.

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

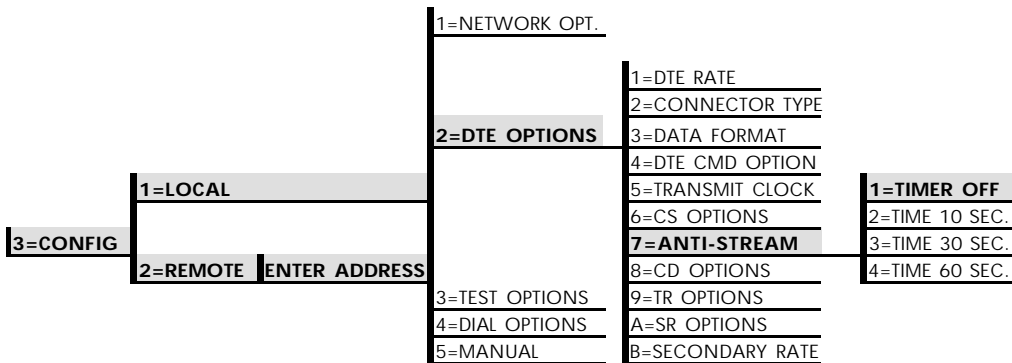


Figure 6-7
Anti-Stream Options

The factory default setting is Timer Off. Table 6-F shows the available options and their AT commands.

Table 6-F
Anti-Stream AT Commands

| Front Panel | AT Command | Description |
|----------------|------------|----------------------------|
| 1=Timer Off | %T0 | Anti-stream timer disabled |
| 2=Time 10 Sec. | %T1 | Timeout equals 10 seconds |
| 3=Time 30 Sec. | %T2 | Timeout equals 30 seconds |
| 4=Time 60 Sec. | %T3 | Timeout equals 60 seconds |

CD Options

The CD Options menu is used to select the control mode for the receive line signal detector (CD) lead. The default factory setting is Normal; see Figure 6-8.

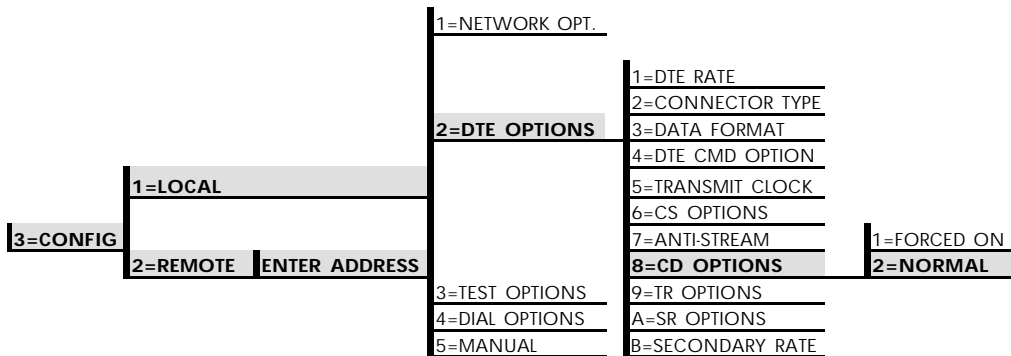


Figure 6-8
Selecting CD Options

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

Table 6-G
CD Options AT Commands

| Front Panel | AT Command | Descriptions |
|-------------|------------|-----------------------------------|
| 1=FORCED ON | &C0 | On all the time |
| 2=NORMAL | &C1 | On only when data present on loop |

Data Terminal Ready (TR) Options

The TR Options menu is used to select the DSU III DBU response to the data terminal ready (TR) lead. The factory default setting is Ignored; see Figure 6-9.

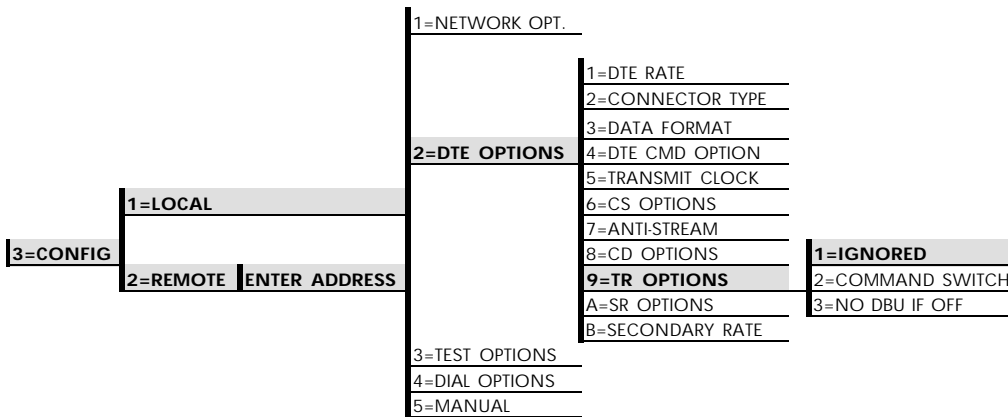


Figure 6-9
Selecting Data Terminal Ready (TR) Options

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

Table 6-H
TR Options AT Commands

| Front Panel | AT Command | Descriptions |
|------------------|------------|--------------------------------------|
| 1=IGNORE | &D0 | Ignore the TR input |
| 2=COMMAND SWITCH | &D2 | Switch to command state if TR is off |
| 3=NO DBU IF OFF | &D3 | No dial backup if TR is off |

Data Set Ready (SR) Options

The SR Options menu is used to select the operating mode for the data set ready (SR) lead. Use **Shift + A** to activate the SR Options submenu press **Enter** to enter the SR Options submenu. The factory default setting is Off Test Only (shown in Figure 6-10).

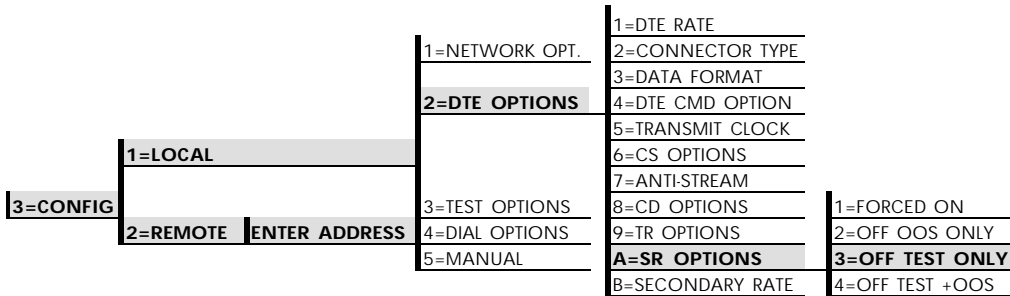


Figure 6-10
Setting Data Set Ready (SR) Options

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

Table 6-1
SR Options AT Commands

| Front Panel | AT Command | Descriptions |
|-----------------|------------|---------------------------------|
| 1=FORCED ON | &S0_C1 | Always on |
| 2=OFF OOS ONLY | &S1_C1 | Off when network out of service |
| 3=OFF TEST ONLY | &S0_C0 | Off for test only |
| 4=OFF TEST+OOS | &S1_C0 | Off for test and OOS |

Secondary Rate

The Secondary Rate option is used to select the operating speed for the secondary channel if the secondary channel option was selected during setup of the Network Options. See Figure 6-11.

Use **Shift + B** to activate the secondary rate submenu. The factory default is Off.

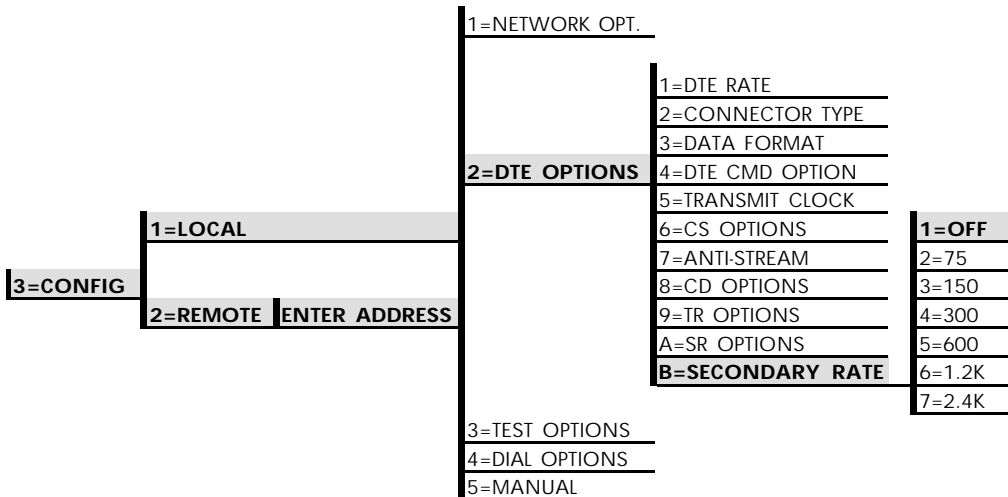


Figure 6-11
Setting the Secondary Rate

Table 6-J shows the equivalent AT commands for setting the secondary rate option.

Table 6-J
Secondary Rate AT Commands

| Front Panel | AT Command | Descriptions |
|--------------------|-------------------|----------------------------------|
| 1=OFF | _Y0 | No secondary channel selected |
| 2=75 | _Y1 | Secondary channel rate: 75 bps |
| 3=150 | _Y2 | Secondary channel rate: 150 bps |
| 4=300 | _Y3 | Secondary channel rate: 300 bps |
| 5=600 | _Y4 | Secondary channel rate: 600 bps |
| 6=1.2K | _Y5 | Secondary channel rate: 1200 bps |
| 7=2.4K | _Y6 | Secondary channel rate: 2400 bps |

Chapter 7

Configuring Test Options

TEST OPTIONS

The Test Options menu enables or disables different test modes and specifies the maximum test time allowed. Table 7-A shows the AT commands for setting the Test options.

Table 7-A
Test Options AT Commands

| Front Panel | AT Command | Description |
|--------------------|-------------------|-------------------------------------|
| Enter Timeout | S18=x | Specify 0 - 255 second test timeout |
| RDL Ignored | &T5 | RDL request from remote DSU ignored |
| RDL Accepted | &T4 | RDL request accepted |
| EIA LLB Disabled | _A0 | Responds to local loopback |
| EIA LLB Enabled | _A1 | No response to local loopback |
| EIA RLB Disabled | _R0 | No response to remote loopback |
| EIA RLB Enabled | _R1 | Responds to remote loopback |

Test Timeout

The Test Timeout option sets the length of time a DSU III DBU remains in a test mode before automatically returning to the data mode. Enter the timeout in two-digit decimal value. The factory default setting is off (0). Figure 7-1 shows the menu path used to access Test Timeout.

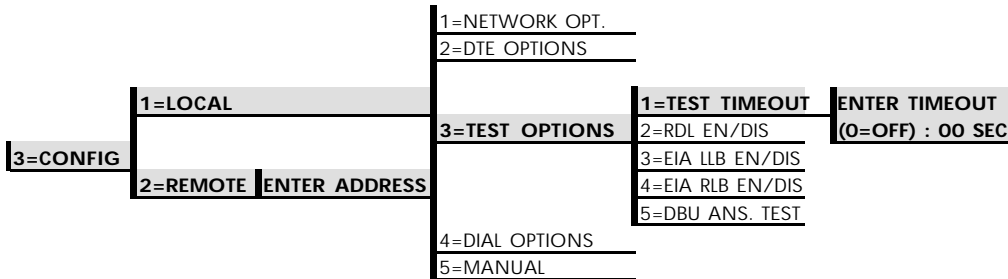


Figure 7-1
Setting Test Timeout Option

Remote Digital Loopback (RDL)

The RDL option specifies whether or not the DSU III DBU responds to an RDL request from the far end of the circuit. The factory default setting is RDL Accepted. Figure 7-2 shows the menu path for the RDL option.

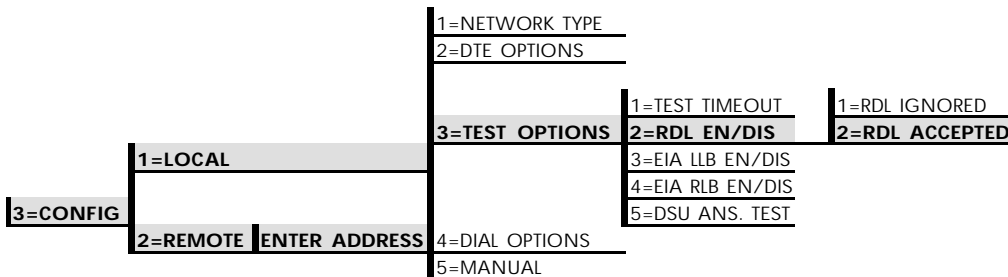


Figure 7-2
Remote Digital Loopback

EIA LLB

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

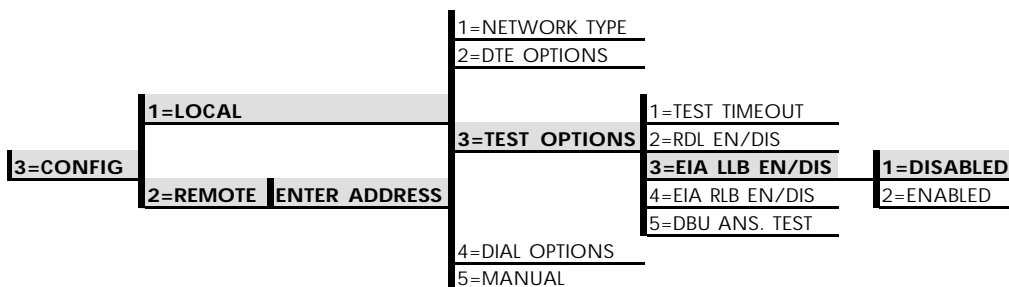


Figure 7-3
EIA Local Loopback Options

EIA RLB

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

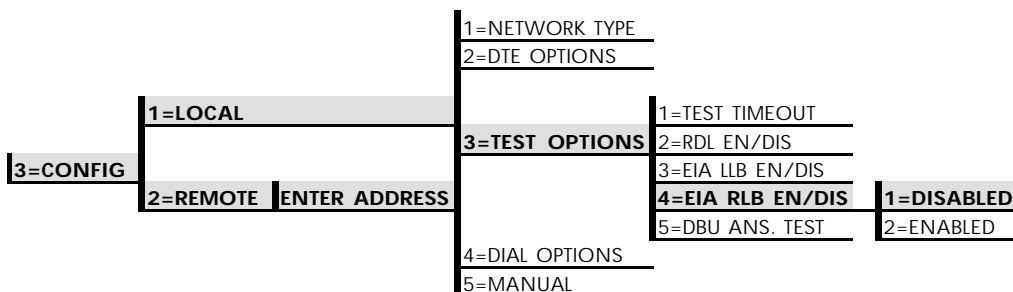


Figure 7-4
EIA Remote Loopback Options

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 unit. If DBU Answer Test is not enabled, the remote unit will not accept a DBU test from the other end.

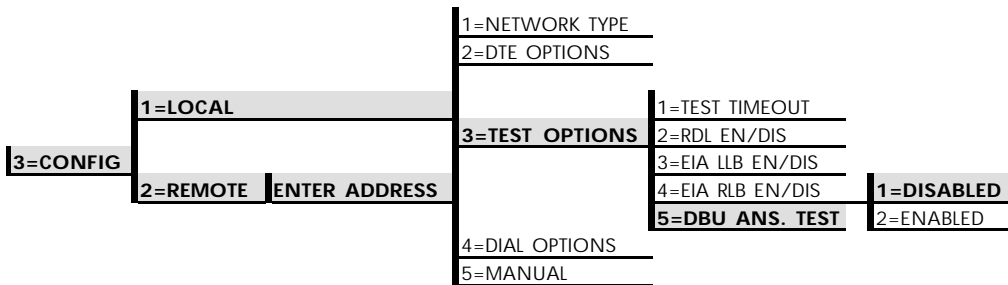


Figure 7-5
DBU Answer Test Option

Chapter 8

Configuring Dial Options

DIAL OPTIONS

The Dial Options menu stores up to ten phone numbers, defines the dial backup operation when the DDS circuit fails, and programs the passcode security feature of the DSU III DBU.

Figure 8-1 shows the full Dial Backup Options (4=Dial Options) menu. Shaded items are restricted to the specified DBU version.

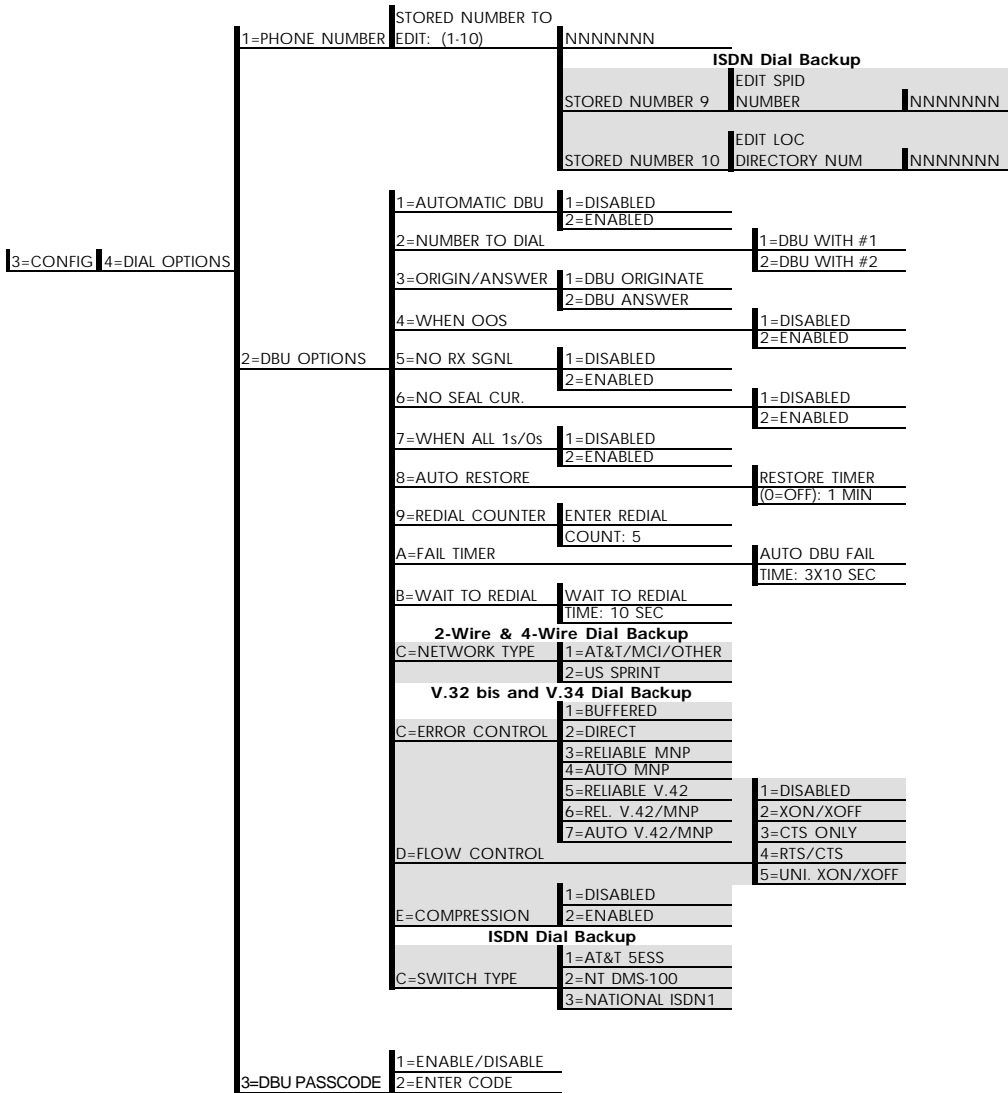


Figure 8-1
Dial Backup Options

Phone Number

The DSU III DBU stores up to ten numbers of 36 digits each. Edit a phone number by reentering the entire number. This process overwrites the previously stored number. Figure 8-2 shows the menu path used to access the Phone Number option.

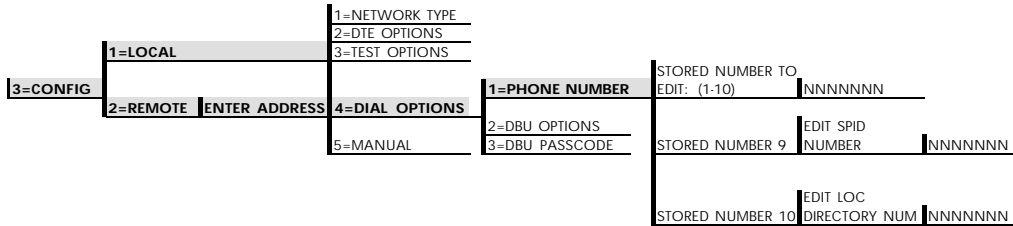


Figure 8-2
Editing Stored Phone Numbers

ISDN Dial Backup

Table 8-A shows the AT Commands available for the Phone Number options.

If a clear channel 64 kbps circuit is required to back up the DDS circuit, placing a #4 at the end of the SMART dial string (phone number entered into stored number 1-8) establishes 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) is stored in Stored Number 9. The SPID is a sequence of digits identifying 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.

Only the AT&T 5ESS switch is capable of recognizing a point-to-point configuration, eliminating the need for a SPID. All other switch types require a SPID.

Setting the Local Directory (LOC) Number

For ISDN dial backup, the LOC is stored in Stored Number 10.

Table 8-A
AT Commands for Storing Phone Numbers

| AT Command | Description |
|-------------------|--|
| &Zn= | Store Phone Number |
| &Z9= | Enter SPID Number for ISDN dial backup |
| &Z10= | Edit LOC for ISDN dial backup |

DBU Options for All Models

The DBU Options are used to select the modes of operation for the Dial Backup features. There are ten standard options available with additional options for specific backup services. Table 8-B lists the DBU options and their AT commands for all models.

Automatic DBU

The Automatic DBU option specifies whether the unit automatically enters dial backup mode or waits for manual setup. 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 DBU is set to originate, it dials the numbers (in chronological order) 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 DBU originates or waits to answer if the dedicated circuit fails. 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 DBU enters backup mode if an out-of-service condition is detected. The factory default setting is Enable.

No Receive (RX) Signal

When enabled, the DSU III DBU enters backup mode when a loss of signal is detected. The factory default setting is Enable.

No Sealing Current

When enabled, the DSU III DBU 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 DBU 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 DBU 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 DBU 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 DSU III DBU redials the far end when entering backup mode. The redial count, which is manually entered, can be up to a maximum of 99 attempts. If the DSU III DBU encounters a busy or reorder, it attempts to establish the call the specified number of times. 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 DBU attempts backup. The amount of time, which is manually entered, can be up to a maximum of 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. It selects the amount of time between redial attempts to connect the backup line. The amount of time, which is manually entered, can be up to a maximum of 99 seconds. The factory default setting is 10 seconds.

WAIT TO REDIAL

TIME: __ __ SEC

Table 8-B

DBU Options AT Commands for All Models

| DBU Options | AT CMD | Description |
|----------------------------------|-----------|-------------------------------------|
| Automatic DBU | | |
| 1=Disabled | _K0 | Automatic DBU disabled |
| 2=Enabled | _K1 | Automatic DBU enabled |
| Number to Dial | | |
| 1=DBU with #1 | _B0 | Dial stored #1 |
| 2=DBU with #2 | _B1 | Dial stored #2 |
| Originate/Answer | | |
| 1=DBU Originate | _E0 | Originates call if DDS fails |
| 2=DBU Answer | _E1 | Answers call if DDS fails |
| When Out of Service (OOS) | | |
| 1=Enabled | _G1 | DBU when OOS |
| 2=Disabled | _G0 | No DBU for OOS |
| No Receive (RX) Signal | | |
| 1=Enabled | _H1 | DBU when RX signal absent |
| 2=Disabled | _H0 | No DBU when RX signal absent |
| No Sealing Current | | |
| 1=Enabled | _I1 | DBU when sealing current absent |
| 2=Disabled | _I0 | No DBU when sealing current absent |
| When all 1s/0s | | |
| 1=Disabled | _P0 | No DBU when all 1s/0s detected |
| 2=Enabled | _P1 | DBU when all 1s/0s condition exists |
| Auto Restore | S31=x | Sets restore timer |
| Redial Counter | S57=x | Sets redial counter |
| Fail Timer | S58=x | Sets fail timer |
| Wait to Redial | S59=x | Sets time between redial attempts |

DBU Options for 2-wire and 4-wire

Network Type

This option selects the company providing the switched digital service. When US Sprint is selected, an automatic echo canceler suppressor tone is emitted by the DSU III DBU when dialing. Options include: AT&T/MCI/Other and US Sprint.

DBU Options for V.32 bis and V.34

Table 8-C shows the equivalent AT commands for setting Error Control, Flow Control, and Compression options.

Error Control

This option determines the type of error control to be negotiated at the start of a V.32 bis or V.34 modem connection. The factory default setting is AUTO V.42/MNP.

Flow Control

This option is used to select the type of flow control used by the V.32 bis or V.34 modem. The factory default setting is CTS Only.

Compression

This option is used to select V.42 bis data compression for V.32 bis or V.34 operation when running asynchronously. When enabled, data throughput speeds as high as 57.6 kbps may be achieved. For synchronous applications, the speed is limited to a maximum of 14.4 kbps for the V.32 and 28.8 kbps for the V.34. The factory default setting is Enabled.

Table 8-C
DBU Options AT Commands for V.32 bis and V.34 Backup

| DBU Options | AT CMD | Description |
|----------------------|-------------------|--|
| Error Control | | |
| 1=Buffered | \N0 | Normal operation. No error control. Allows speed matching, buffering, and flow control. |
| 2=Direct | \N1 | Direct operation. No error control, no buffer, and no flow control. |
| 3=Reliable MNP | \N2 | Reliable MNP operation. Uses MNP error control. |
| 4=Auto MNP | \N3 | Auto-Reliable MNP operation. Tries MNP error control first; uses normal operation if necessary. |
| 5=Reliable V.42 | \N4 | Reliable V.42 (LAPM) operation. Uses V.42 (LAPM) error control. If V.42 (LAPM) error control cannot be used the call is disconnected. |
| 6=Rel. V.42/MNP | \N5 | 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. |
| 7=Auto V.42/MNP | \N6 | Auto-Reliable V.42 (LAPM) or MNP operation. Tries to use V.42 (LAPM) error control first, and MNP error control next. If neither can be used, then Normal operation is used. |
| Flow Control | | |
| 1=Disabled | \Q0 | Flow control disabled |
| 2=XON/XOFF | \Q1 | Enables XOn/XOff flow control |
| 3=CTS Only | \Q2 | Enables CTS flow control from DCE |
| 4=RTS/CTS | \Q3 | Enables CTS flow control from DCE and RTS from DTE |
| 5=UN. XON/XOFF | \Q4 | Unidirectional XOn/XOff |
| Compression | | |
| 1=Disabled | %C0 | Compression disabled |
| 2=Enabled | %C1 | Compression enabled |

DBU Options for ISDN

Switch Type

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

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

DBU Passcode

The dial backup passcode adds an additional level of security to the DSU III DBU. A passcode of one to ten characters can be programmed into the unit.

When a dial backup connection is established, the originate unit transmits a pre-programmed passcode to the answer unit over the dial backup connection before the connection is considered valid. The answer unit compares the received passcode to a pre-programmed passcode. If the passcode matches, the receive unit sends a Passcode OK message to the originate unit and goes on-line. If the passcode does not match, the receive unit sends an Invalid Passcode message to the originate unit and terminates the dial backup connection. If a passcode is not received by an answer unit with passcode enable, or if the Passcode OK message is not received by an originate unit with passcode enable, the dial backup connection is terminated.

Chapter 9

Dial Options

DIAL OPTIONS

The dial options available in the dial menu (4=Dial) vary whether the DSU III DBU is currently in dial backup mode or connected to the DDS line (see Figure 9-1).

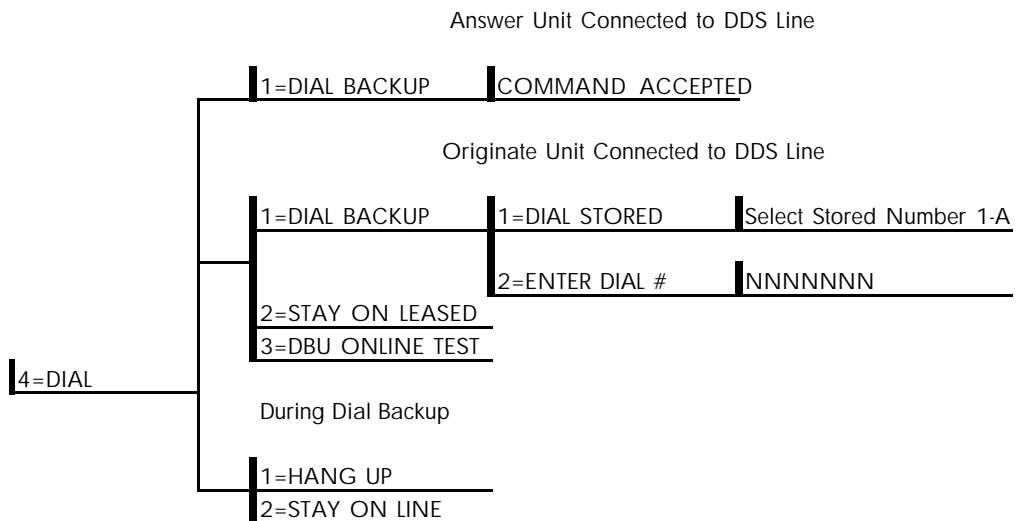


Figure 9-1
Dial Options Menu

Answer Unit Connected to DDS Line

Dial Backup

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

Originate Unit Connected to DDS Line

Dial Backup

The DSU III DBU prompts to dial a stored number or enter a number to dial for dial backup.

Stay on Leased

The DSU III DBU 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 or manually entered number can be used.



NOTE

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

This DSU III DBU remains in dial backup mode and returns to the Main menu.

Chapter 10

Status

STATUS

The status selection displays two lines of the current operational status of the network and the DTE interfaces.

After 30 seconds of no front panel operation the DSU III DBU automatically reverts to the Status display; see Figure 10-1.

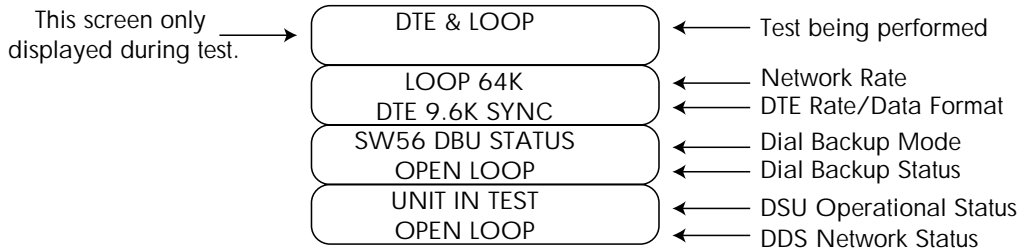


Figure 10-1
Status Display

Network Rate, DTE Rate, and Data Format

This display line (see Figure 10-1) indicates the current loop rate on the first line. The DTE data rate and format (as selected in configuration) are shown on the second line.

Dial Backup Information

Type of Dial Backup Service

This display line (see Figure 10-1) indicates the type of dial backup service installed in the DSU III DBU. The following messages are displayed according to the dial backup option installed in the DSU III DBU:

| | |
|-----------------------------|--|
| 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 backup option installed. |
| V.34 DBU Status | V.34 backup option installed. |
| DBU Status Not Installed | No backup service option card installed in the DSU III DBU unit. |

Current Status of Dial Backup Mode

This display line (see Figure 10-1) indicates the backup service status. Possible messages include the following:

| | |
|-----------------|---|
| Answering Call | The DSU III DBU detected an incoming call message and is initiating call setup procedure. |
| Call Disconnect | Call disconnect message received from the remote end. |

| | |
|------------------|---|
| Called Unit Busy | The unit called is currently busy and cannot be connected (ISDN only). |
| Dialing | The unit is dialing the selected number. |
| Going to DBU | The DSU III DBU is entering 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 DSU III DBU is currently in dial backup mode. |
| No RX Signal | Sealing current detected but no data signal received from telco. |
| No wink from CO | Switched 56 provider encountered a service problem (4-Wire SW56 only). |
| Not Installed | No dial backup option installed in the DSU III DBU. |
| OOS/OOF From Net | Out-of-service signal or out-of-frame condition exists. The call cannot be completed because the called terminal or the called terminal's access line is out of service or is faulty (2-wire and 4-wire SW56 only). |
| Open Loop | The physical connection to the backup line has been broken (2-wire and 4-wire SW56 only). |
| DBU Line in RDL | Remote end initiated a test. |

| | |
|------------------|--|
| Test From Telco | The network provider has activated the CSU loopback (2-wire and 4-wire SW56 only). |
| DBU Test Pattern | The DSU III DBU is currently performing a test with a pattern. |
| Waiting for Call | The originating DSU III DBU is waiting on a call from the remote end. |

DSU Operation and Network Status

Current DSU III DBU Status

This display line (see Figure 10-1) indicates current DSU III DBU status. Possible messages are:

| | |
|--------------|---|
| Data Mode | In data mode, the data set ready (SR) and request to send (RTS) circuits are on, and the DSU III DBU is ready to send data. |
| Unit in Test | The DSU III DBU is currently in test mode, use the Arrows to scroll through the menus to display the type of test being performed. |

Current DDS Network Status

This display line (see Figure 10-1) displays the status of the main telco line. For normal operation this should display **LOOP IS NORMAL**, other possible messages are described as follows:

| | |
|----------------|---|
| Answering Call | The DSU III DBU 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 while 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. |

DTE Control Leads and Status

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

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

Chapter 11

Testing and Troubleshooting

TEST OVERVIEW

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

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.

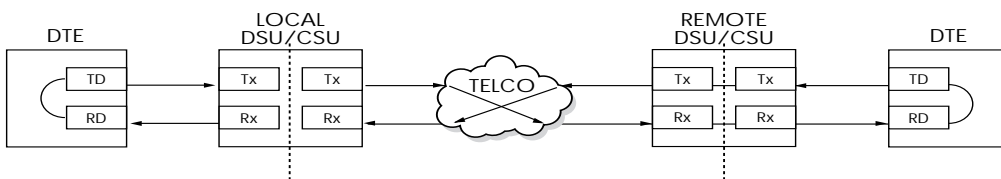


Figure 11-1

Normal Operation Before Initiating Loopback Test



All diagnostic tests disrupt data flow.

Initiating a Test

Initiate tests using the following procedure:

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

The example in Figure 11-2 shows the menu path for initiating a local DTE and Loop test.

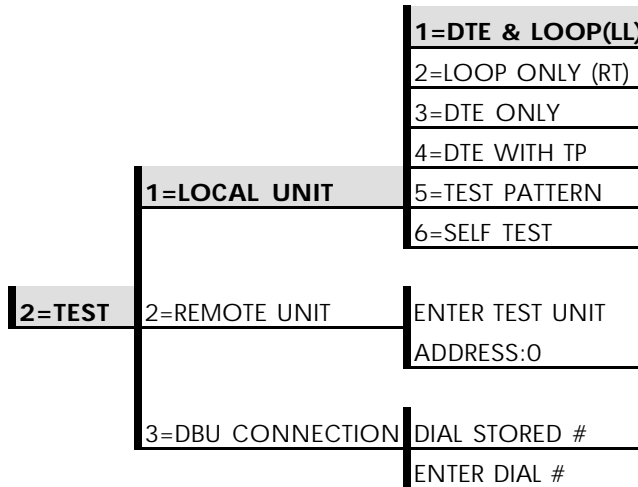


Figure 11-2
Initiating a Test

Once a test is initiated, **Please Wait** is displayed briefly followed by the status screen.

Test Status Display

The Test Status display appears automatically during a test. The Test Status display is similar to the status screen described in the chapter *Status*, with additional prompts for the type of test and the number of errors (for tests with a test pattern).

Figure 11-3 shows an example of a Test Status Display for a test with a test pattern.

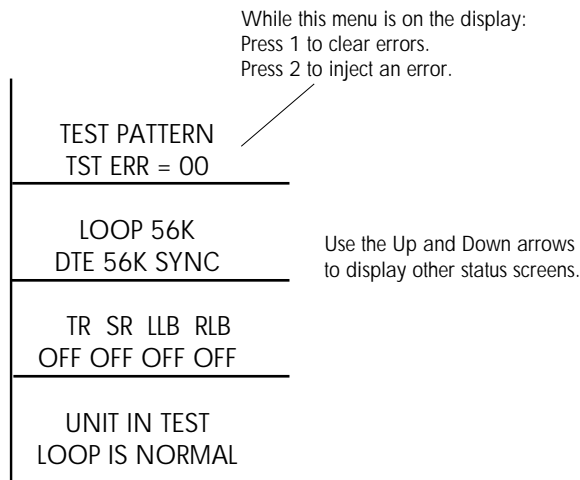


Figure 11-3
Sample Test Status Displays

Exiting a Test

During a test, press **Quick** to access the Exit Test/Display Status menu or press **Cancel** to return to the Main menu. The Exit Test/Display Status menu provides the following options, which are available only after a test has been initiated (see Figure 11-4):

| | |
|----------------|--|
| Exit Test | Exits the current test and returns to the Main menu. |
| Display Status | Reenters test display. |

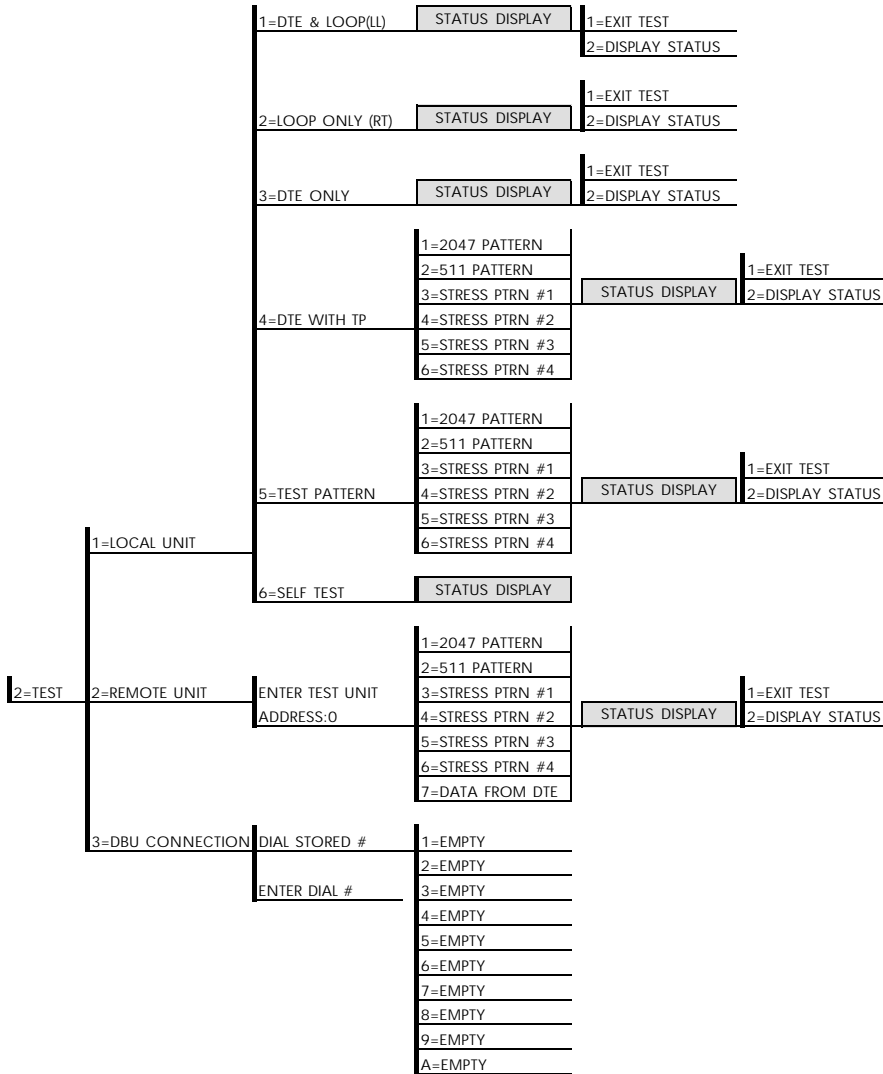


Figure 11-4
Complete Test Menu

TROUBLESHOOTING

This section is intended to provide a quick and easy means of diagnosing suspected problems associated with local or remotely attached ADTRAN DSU/CSUs.

Messages from the DSU/CSU

Messages on the LCD display and LEDs display information concerning the status of the unit and the local loop. If the Alarm LED is *On*, one or more of the messages shown in Table 11-A is displayed on the LCD.



NOTE

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

Table 11-A
Messages from the DSU/CSU

| Message | Meaning | Probable Cause | Action |
|-------------------------|--|---|---|
| LOOP IS NORMAL | Good local loop signal being received from the telco. | Indicates 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. |

Troubleshooting New Installs

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

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

**DATA MODE
LOOP IS NORMAL**

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

Table 11-B
Troubleshooting New Installs

| Configuration Item to Check | Option Selection | Action |
|--|-------------------------|--|
| DTE Type | RS-232 or V.35 | Select the type of DTE interface option to connect to the DSU/CSU from the configuration menu. |
| Loop Rate | Auto, 2.4 to 64 kbps | Select the DDS loop rate of the DDS circuit from the configuration menu. |
| Data Format | Async or Sync | Select the type of data to be used from the configuration menu. |
| DTE Cable | N/A | Verify DTE cable connection to the proper DTE connector on the DSU/CSU. |
| Telco Cable | N/A | Verify the telco cable is securely connected to the DSU/CSU and wall jack. |
| Power the unit Off and then On. | N/A | Verify the unit passes self test during power-up (displayed on the LCD). |

Test Sequence for Troubleshooting New Installs or Existing Circuits

If your DSU is suspected of having problems, perform a **Self Test** to determine if the unit is in good health.

If your DSU is receiving excessive errors requiring retransmission of data, first perform a **DTE with Test Pattern** to determine if the unit's internal transmitter and receiver is operating error free. If problem persists, perform a **Remote Test** to verify the connection between the local and remote unit is error free. Run the test using all available test patterns.



NOTE

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

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

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

LOCAL UNIT DIAGNOSTICS

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

Table 11-C
Test AT Commands

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

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

Table 11-D
DTE With Test Pattern Commands

| Front Panel | AT Command | Description |
|--------------------|-------------------|--|
| 1=2047 PATTERN | _T0&T8 | Standard 2047 random data pattern. |
| 2=511 PATTERN | _T1&T8 | Standard 511 random data pattern. |
| 3=STRESS PTRN #1 | _T2&T8 | Stress pattern with alternating high and low ones densities. Repeated pattern of 100 octets: 1111 1111, followed by 100 octets: 0000 0000. |
| 4=STRESS PTRN #2 | _T3&T8 | Stress pattern with alternating medium and low ones densities. Repeated pattern of 100 octets: 0111 1110, followed by 100 octets: 0000 0000. |
| 5=STRESS PTRN #3 | _T4&T8 | Stress pattern with medium ones density. Continuous series of octets: 0011 0010. |
| 6=STRESS PTRN #4 | _T5&T8 | Stress pattern with low ones density. Continuous series of octets: 0100 0000. |

DTE & Loop (LL)

Test Description

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

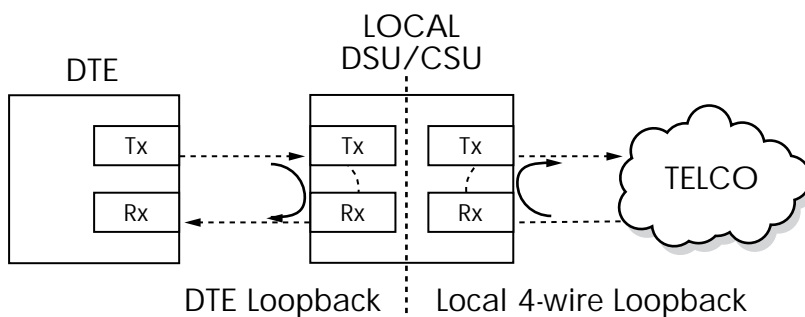


Figure 11-5
DTE & Loop Test

Test Purpose

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

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

Initiating

Follow the menu path outlined in Figure 11-6 to initiate a DTE & Loop Test.

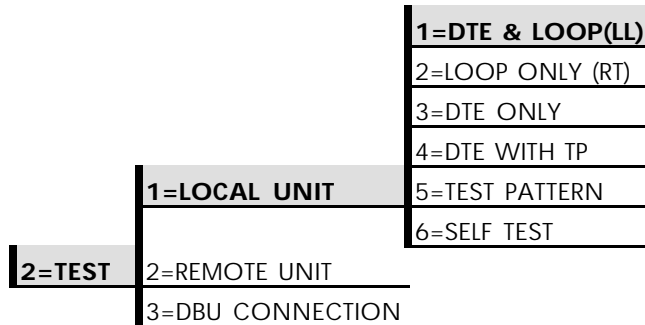


Figure 11-6
Initiating a DTE & Loop Test

Interpreting Test Results

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

Loop Only (RT)

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

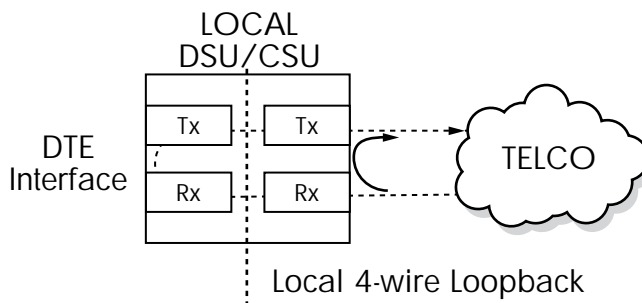


Figure 11-7
Loop Only Test

Test Purpose

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

Initiating

Follow the menu path outlined in Figure 11-8 to initiate a Loop Only test.

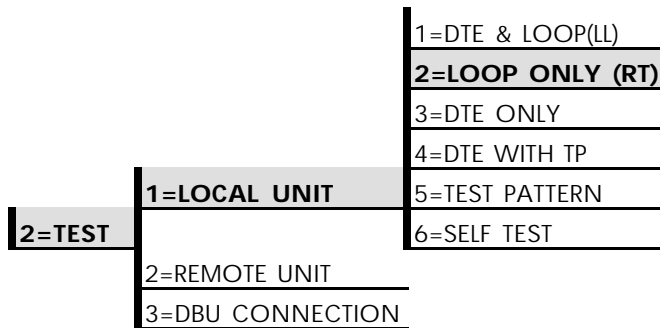


Figure 11-8
Initiating a Loop Only Test

Interpreting Test Results

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

DTE Only

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



NOTE

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

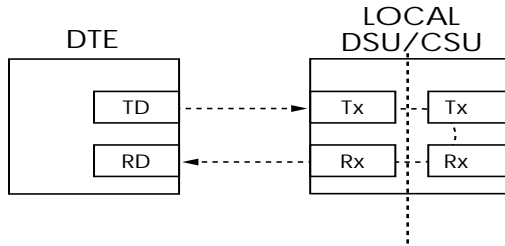


Figure 11-9
DTE Only Test Diagram

Test Purpose

The DTE Only test is used for the following purposes:

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

Initiating

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

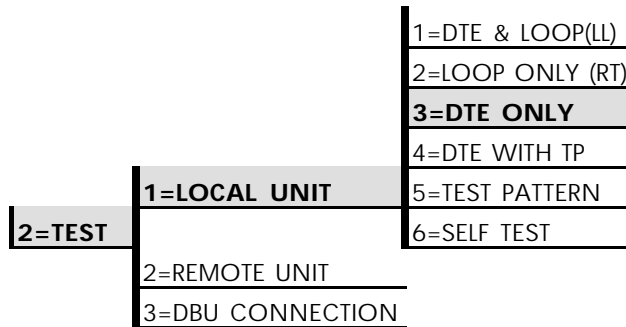


Figure 11-10
Initiating a DTE Only Test

Interpreting Test Results

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

DTE With Test Pattern

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

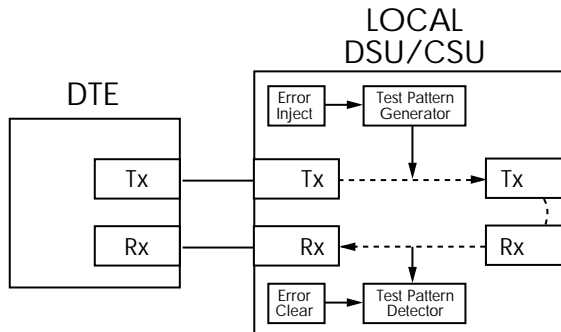


Figure 11-11
DTE with Test Pattern

Test Purpose

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

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

Initiating

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

| | | | |
|---------------|---------------------|----------------------|------------------|
| | | 1=DTE & LOOP(LL) | 1=2047 PATTERN |
| | | 2=LOOP ONLY (RT) | 2=511 PATTERN |
| | | 3=DTE ONLY | 3=STRESS PTRN #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 11-12
Initiating a DTE Test with Test Pattern

Interpreting Test Results

If the unit is functioning properly, the DSU III DBU 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 DBU into a BERT tester for the purpose of testing the DDS circuit. If this test is used, the remote DSU/CSU must be in loopback or transmitting a test pattern. Figure 11-13 illustrates the data paths for this mode.

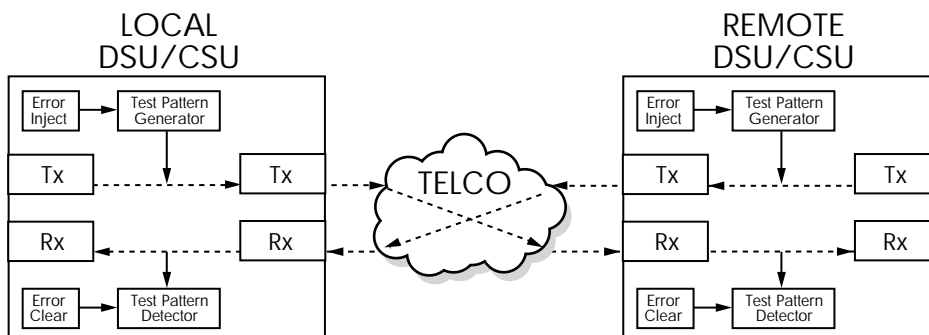


Figure 11-13
Test Pattern Only

Test Purpose

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

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

Initiating

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

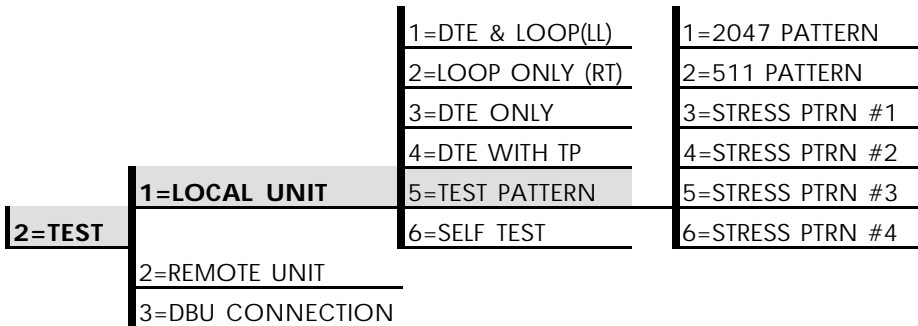


Figure 11-14
Initiating a Test Using a Test Pattern

Interpreting Test Results

If the unit is functioning properly, the test error count should be 0.

Self Test

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

Test Purpose

The purpose of this test is to determine if the DSU is functioning properly.

Initiating

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

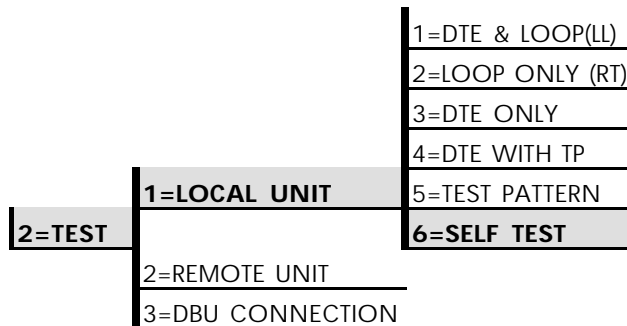


Figure 11-15
Initiating a Self Test

Interpreting Test Results

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

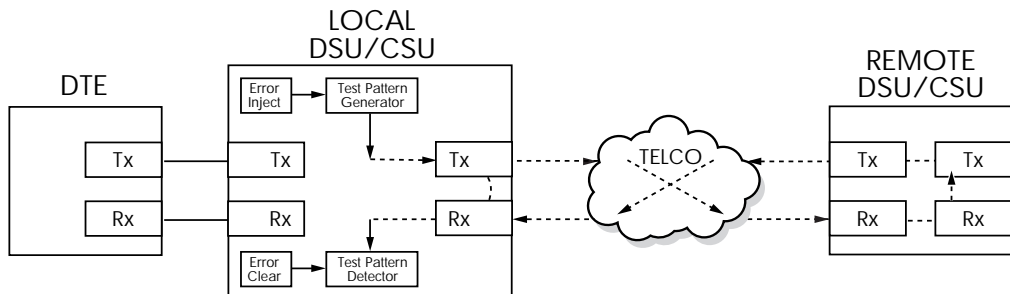
REMOTE UNIT DIAGNOSTICS

A remote DSU III DBU can perform seven different tests; see Table 11-E.

Table 11-E
Remote Tests and AT Commands

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

The Remote Unit submenu allows a remotely installed DSU to be placed into loopback. There are six test patterns to choose from or Data from the DTE may be selected.



Local Unit Initiates Test

Figure 11-16
V.54 RDL with Test Pattern

Test Purpose

The test purpose is to test the local DSU, the DDS circuit, and the remote DSU.

Initiating

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

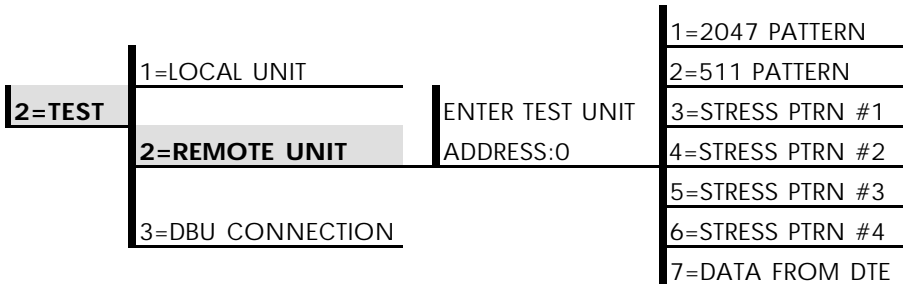


Figure 11-17
Initiating a Remote Test

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

**ENTER TEST UNIT
ADDRESS:XX**

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

Test Results

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

Interpreting Test Results

If the unit is functioning properly, the test error count should be 0.

DBU CONNECTION

When the DSU III DBU is equipped with a dial backup option, the DBU Connection option appears as one of the Test menu selections. This test allows the dial backup network to be tested while data is transmitted on the main line.

When this option is selected, choose a stored number or enter a number to dial. After establishing DBU connection, the DSU III DBU designated at 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*.

When running at a subrate over a 56k or 64k loop (or a 64k loop with Scrambler activated), the DSU will not send data during a DBU test.



NOTE

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

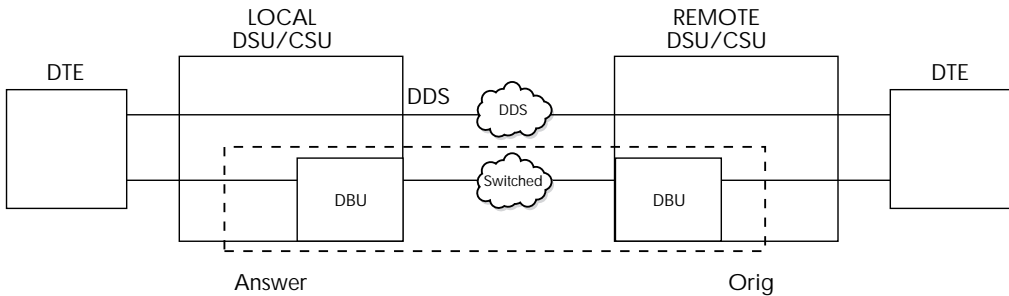


Figure 11-18
DBU Connection Test

Test Purpose

The purpose of this test is to verify the DBU circuit and DBU modules in both the local and remote DSU III DBU are functioning properly.

Initiating

Follow the menu path outlined in Figure 11-20 to place a remote DSU III DBU into loopback.

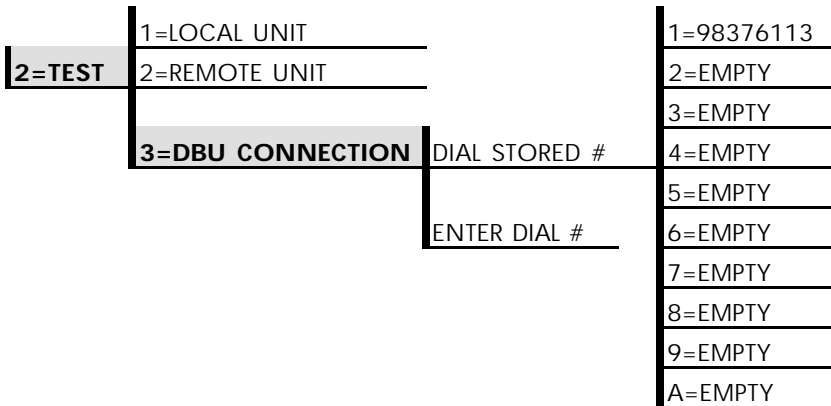


Figure 11-19
Initiating a DBU Connection Test

Interpreting Test Results

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

**DBU TEST PATTERN
TST ERR = 0000**

Chapter 12

Manual Command

MANUAL COMMAND

The Manual Command option is a shortcut method for entering configuration and control commands for the DSU III DBU.

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

COMMAND:00

Figure 12-1 shows the menu path for manual command. The available manual commands are listed in Table 12-A.

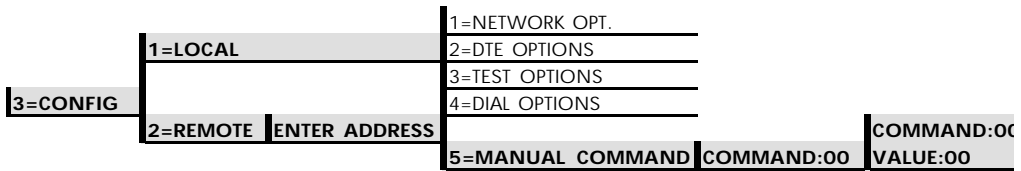


Figure 12-1
Manual Command

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

COMMAND: XX
VALUE: 00

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

Table 12-A
Manual Commands

| Command Description | Command | Value |
|-------------------------------|----------------|--------------|
| AT Command Echo | | |
| Disable | 82 | 00 |
| Enable | 82 | 01 |
| AT Result code | | |
| Enable | 85 | 00 |
| Disable | 85 | 01 |
| AT Long or Short code | | |
| Short form (Numeric) | 86 | 00 |
| Long form (Verbose) | 86 | 01 |
| AT Escape Character | 2 | 00 to FF |
| AT CR Character | 3 | 00 to FF |
| AT LF Character | 4 | 00 to FF |
| AT BS Character | 5 | 00 to FF |
| AT Escape Char. Timer | 0C | 00 to FF |
| Abort Call Timer | 7 | 00 to FF |
| DTR Recognize Delay | 19 | 00 to FF |
| DTR Initiated Command Timeout | 28 | 00 to FF |
| Load Factory Opt. | | |
| Option Set #1 | 8A | 00 |
| Option Set #2 | 8A | 01 |
| Option Set #3 | 8A | 02 |
| Option Set #4 | 8A | 03 |
| Network Address Lock | | |
| Network Addr. Unlock | C3 | 00 |
| Network Addr. Lock | C3 | 01 |
| Front Panel En/Dis | | |
| Disable | AA | 00 |
| Enable | AA | 01 |

Appendix A

AT Commands

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

Table A-A
AT Commands

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

Table A-A (Cont'd)
AT Commands

| Command | Title | Default |
|----------------|-------------------------------|----------------|
| AT&Xn | Transmit Clock | 0 |
| AT&Zn=x | Store Phone Number | none |
| AT\Nn | MNP Option (V.32 DBU) | 0 |
| AT\Tn | Inactivity Timer | |
| AT%Bn | Loop Rate Select | 0 |
| AT%Cn | Compress Option (V.32 DBU) | 0 |
| AT%Kn | DTE Rate Select | |
| AT%P | Password Control | 0 |
| AT%P=x | Password Entry | 0 |
| T%P>x | Password Verify | 0 |
| AT%Rx | Initiate Remote Config. | |
| AT%Tn | Anti-stream Option | 0 |
| AT_An | LLB Control | 0 |
| AT_Bn | DBU Number to Dial | 0 |
| AT_Cn | SR Control During Test | 0 |
| AT_Dn | RTS-CTS Delay | 0 |
| AT_En | DBU Originate/Answer | 0 |
| AT_Fn | Scrambler Control | 0 |
| AT_Gn | DBU When OOS | 0 |
| AT_Hn | DBU When No RX Signal | 0 |
| AT_In | DBU When No Sealing Current | 0 |
| AT_Jn | Auto Answer Enable/Disable | 0 |
| AT_Kn | DBU Enable/Disable | 0 |
| AT_Ln | DTE Routing Main/Backup | 0 |
| AT_N=xx | Set Network Address | none |
| AT_Pn | Front Panel Enable/Disable | 0 |
| AT_RR | LB Enable/Disable | 0 |
| AT_S=xx | Set Serial Number | none |
| AT_Tn | Select Test Pattern | 0 |
| AT_Xn | Clock Source Select | 0 |
| AT_Yn | Secondary Channel Rate Select | 0 |

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

| Command | Title | Default |
|----------------|----------------------------------|----------------|
| AT&T10 | Local DTE & Loop | none |
| AT&T11 | Local Loop Only | none |
| AT&T1 | Local DTE Only | none |
| AT&T8 | Local DTE with TP | none |
| AT&T9 | Local Test Pattern | none |
| AT&T0 | Exit Test | none |
| AT_T0&T7 | Remote test using 2047 pattern | none |
| AT_T1&T7 | Remote test using 511 pattern | none |
| AT_T2&T7 | Remote test using stress PTRN #1 | none |
| AT_T3&T7 | Remote test using stress PTRN #2 | none |
| AT_T4&T7 | Remote test using stress PTRN #3 | none |
| AT_T5&T7 | Remote test using stress PTRN #4 | none |
| AT_T0&T8 | Local test using 2047 pattern | none |
| AT_T1&T8 | Local test using 511 pattern | none |
| AT_T2&T8 | Local test using stress PTRN #1 | none |
| AT_T3&T8 | Local test using stress PTRN #2 | none |
| AT_T4&T8 | Local test using stress PTRN #3 | none |
| AT_T5&T8 | Local test using stress PTRN #4 | none |
| AT&T6 | Remote test using data from DTE | none |

Appendix B

Default Configuration Profiles

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

Profile 1

Profile 1 is configured for a 56 kbps, synchronous, point-to-point or dial-up operation with a V.35 connector. Automatic DBU has been disabled for this configuration profile.

Profile 2

Use profile 2 for a 56 kbps, asynchronous, point-to-point or dial-up 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 DBU 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.

Table B-A
Default Configuration Profiles

| | Profile Numbers | | | |
|----------------------------|-----------------|--------------|--------------|--------------|
| | (00) 1 | (01) 2 | (02) 3 | (03) 4 |
| Manual Command | | | | |
| Escape Character | 43=2BH | 43=2BH | 43=2BH | 43=2BH |
| CR Character | 13=0DH | 13=0DH | 13=0DH | 13=0DH |
| LF Character | 10=0AH | 10=0AH | 10=0AH | 10=0AH |
| BS Character | 8 | 8 | 8 | 8 |
| DBU Abort Call Timer | 50=32H | 50=32H | 50=32H | 50=32H |
| Escape Guard Timer | 50=32H | 50=32H | 50=32H | 50=32H |
| Command Echo | Enable | Enable | Enable | Enable |
| Result Code | Enable | Enable | Enable | Enable |
| Long or Short Code | Long | Long | Long | Long |
| Test Pattern Type | 2047 | 2047 | 2047 | 2047 |
| CS Delay | Short | Short | Short | Short |
| DTR Recog. Delay (x100ms) | 3 | 3 | 3 | 3 |
| DTR Command Timeout (x100) | 8 | 8 | 8 | 8 |
| Front Panel En/Dis | Enable | Enable | Enable | Enable |
| Inactivity Timer | Off | Off | Off | Off |
| AT Password Control | Disable | Disable | Disable | Disable |
| Network Options | | | | |
| Loop Rate | AUTO | AUTO | AUTO | AUTO |
| Network Address | 0 | 0 | 0 | 0 |
| Remote Conf. En/Dis | Enable | Enable | Enable | Enable |
| Clock Source | From Network | From Network | From Network | From Network |
| DTE Options | | | | |
| Remote DSU Address | 0 | 0 | 0 | 0 |
| DTE Rate (56k loop) | 56k/57.6k | 56k/57.6k | 56k/57.6k | 56k/57.6k |
| Scrambler Mode | OFF | OFF | OFF | OFF |
| Connector Type | V.35 | RS232 | V.35 | V.35 |
| DTE Data Format | SYNC | ASYN | SYNC | SYNC |
| DTE Command Options | DIS | DIS | DIS | DIS |
| Transmit Clock | Normal | Normal | Normal | Normal |
| CS Options | Follow RS | Follow RS | Follow RS | Follow RS |
| Anti-stream Timer | Timer Off | Timer Off | Timer Off | Timer Off |
| CD Option | Normal | Normal | Normal | Normal |
| TR Options | Ignored | Ignored | Ignored | Ignored |
| SR Options | Off Test+OOS | Off Test+OOS | Off Test+OOS | Off Test+OOS |
| Secondary Channel Rate | OFF | OFF | OFF | OFF |

Table B-A (Cont'd)
Default Configuration Profiles

| | Profile Numbers | | | |
|------------------------------|------------------|------------------|------------------|------------------|
| | (00) 1 | (01) 2 | (02) 3 | (03) 4 |
| Test Options | | | | |
| Test Timeout | Off | Off | Off | Off |
| RDL En/Dis | RDL Accepted | RDL Accepted | RDL Accepted | RDL Accepted |
| EIA Controlled LLB | Disable | Disable | Disable | Disable |
| EIA Controlled RLB | Disable | Disable | Disable | Disable |
| DBU Answer Test | Disable | Disable | Disable | Disable |
| Dial Options | | | | |
| Automatic DBU | Disable | Disable | Enable | Enable |
| DBU Number to Dial | #1 | #1 | #1 | #1 |
| 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 seconds) | 3 | 3 | 3 | 3 |
| 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 | Auto V.42/MNP | Auto V.42/MNP | Auto V.42/MNP | Auto V.42/MNP |
| Flow Control (V.32) | CTS Only | CTS Only | CTS Only | CTS Only |
| Data Compression (V.32) | Enabled | Enabled | Enabled | Enabled |

Appendix C

DSU to Modem Interconnect

MODEM TAIL CIRCUIT APPLICATION

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

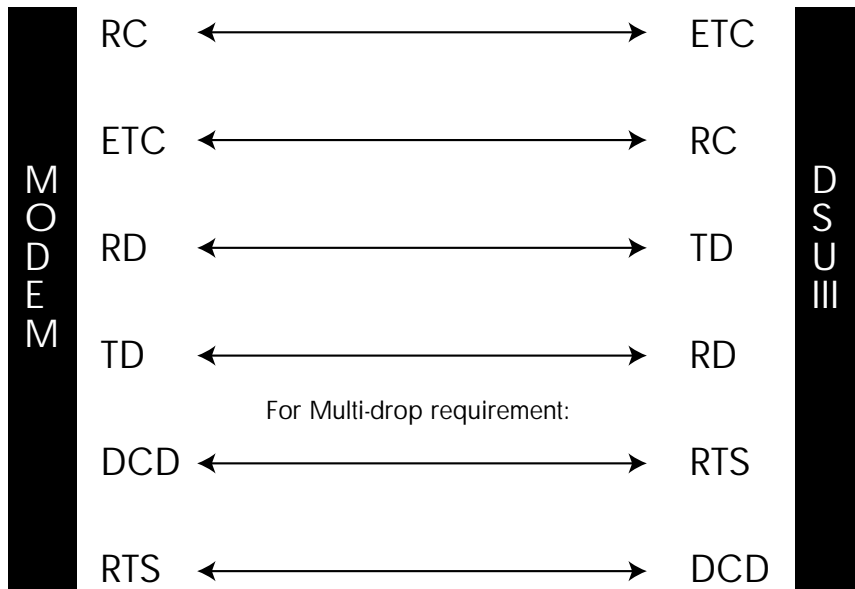


Figure C-1
DSU to Modem Interconnect

Appendix D

EIA-232 Connector

56 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 the transmit clock lead (TC) to the external transmit clock lead (ETC) as shown.

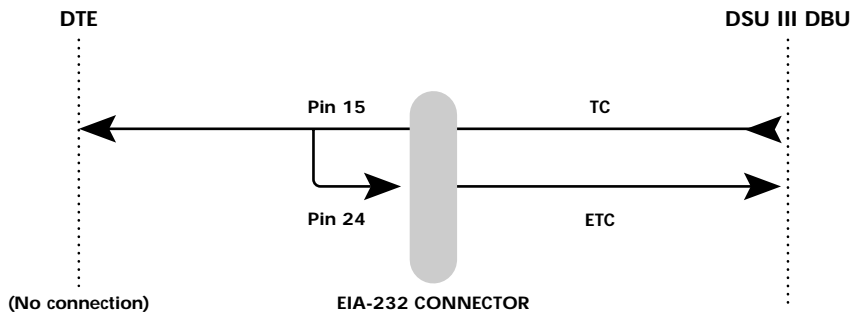


Figure D-1
EIA-232 Connector

Appendix E

Specifications Summary

SPECIFICATIONS AND FEATURES

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

Operating Modes

Dedicated DDS: Point-to-point and multipoint

Switched Backup: (Automatic or manual) 4-wire Switched 56, 2-wire Switched 56, V.32 bis/V.42 bis, or ISDN (1B+D)

Data Rates

Dedicated mode service rates: 2.4, 4.8, 9.6, 19.2, 38.4, 56, and 64 kbps

Switched mode service rate: 56 kbps and 64 kbps

DTE Rates

DTE-to-loop rate matching in both dedicated and switched modes

Synchronous rates: 2.4, 4.8, 9.6, 19.2, 38.4, 56, and 64

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

DTE Interface Data Rates

V.35 and EIA-232: up to 57.6 kbps async, up to 64 kbps sync

FCC Approval

FCC part 15, class A and Part 68

DTE Interfaces

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

Data Buffering

Internal slack buffer

Clocking

Normal DDS or private network tributary
(slaved to network receive clock)

Private network master (internal clock)

Private network master (slaved to external clock)

Diagnostics

Network: CSU and DSU loopbacks

User: Local DTE and loop, remote V.54

Test Patterns: 2047, 511, DDS, and stress patterns 1-4

Line Requirements

Loop transmission parameters as defined in:

AT&T PUB 62310: Dedicated DDS

AT&T PUB 41468: Switched 56

SPRINT TS 0046: Switched 56

Line Interface

RJ-48S, 4-wire, full duplex

Backup as applicable

Receiver Sensitivity

-45dB at all rates

Environment

Operating Temperature: 0°C to 50°C (32°F to 122°F)

Storage Temperature: -20°C to 70°C (-4°F to 158°F)

Physical

Relative Humidity: Up to 95%, non-condensing

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

Weight: 3 lbs

Power

115 VAC, 60 Hz, 8 W

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.

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 four copper wires.

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

CPE

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

CS

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 customer's DSU/CSU.

CTS

Clear to send. A signal on the DTE interface indicating that the DCE is clear to send data. Sometimes referred to as CS.

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.

data service unit

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

DDS

Dataphone Digital 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 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.

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

EIA-366A

An EIA interface standard for autodialing.

FCC Part 15 of Class A

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

FCC Part 15 of Class B

Radiated and conducted emissions standards set for residential use.

FCC Part 68

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

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.

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.

remote configuration

A feature designed into ADTRAN DSU/CSU products that allow a 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. 8-pin connector used for data transmission over standard telephone wire. Single line, 2-wire T/R, PR/PC, programmed data, 8 position, keyed.

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.

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 communication is connected and ready to start handshaking control signals so communication 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.

tail circuit

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

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, 12, and 14.4 kbps. They do not rely on compression to achieve that high speed.

V.34

Latest high-speed CCITT standard for full-duplex transmission on two-wire leased and dial-up lines at the following rates: 2.4, 4.8, 7.2, 9.6, 12, 14.4, 16.8, 19.2, 21.6, 24, 26.4, and 28.8 kbps without compression. The maximum connection rate between two V.34 modems is 28.8 kbps. Occasionally, connections occur at 26.4, 24, and 21.6 kbps because line quality differs from one call to the next.

V.FC (V. Fast Class)

Proprietary modulation scheme developed by Rockwell International for data communication speeds up to 28.8 kbps.

VT 100

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

Index

Symbols

1B+D basic rate ISDN 5
2-Wire Switched 56 4–5, 119
2047 119
4-Wire Switched 56 4, 119
511 119

A

all 1s or all 0s condition 6, 64
answer
 AT command 63, 105
 call 72, 74
anti-stream 48–49
 AT command 49, 106
 factory default 48
 time 110
asynchronous
 word length 111
AT commands 16, 77, 105–107
 answer 105
 anti-stream 49
 auto answer enable/disable 106
 auto restore 65
 automatic DBU 65
 clear to send (CS) 47, 105
 clock source select 106
 compress option 106
 compression 67

data format 43
data set ready (SR) 52, 105
 control during test 106
data terminal ready (DTR) option 105
data terminal ready (TR) 51
DBU
 enable/disable 106
 number to dial 106
 originate/answer 106
 when no RX signal 106
 when no sealing current 106
 when OOS 106
DBU options 67
dial number 105
DTE
 data format 105
 rate 40, 106
 routing main/backup 106
echo command 105
error control 67
fail timer 65
flow control 67, 105
front panel 106
go online 105
hang up 105
inactivity timer 105
initiate remote configuration 106
LLB control 106
loop rate select 106

- network address 106
 - network type 105
 - no receive (RX) signal 65
 - no sealing current 65
 - number to dial 65
 - originate/answer 65
 - out of service (OOS) 65
 - password
 - control 106
 - entry 106
 - verify 106
 - phone number 62, 105
 - power up user profile 105
 - re-execute command 105
 - redial counter 65
 - reset 105
 - restore factory options 105
 - result code display 105
 - result code from firmware 105
 - RTS-CTS delay 106
 - S-register
 - read 105
 - write to 105
 - scrambler control 106
 - secondary rate 53
 - serial number 106
 - test commands 105
 - test pattern 106
 - transmit clock 45, 105
 - view current configuration 105
 - wait to redial 65
 - AT password control 110
 - AT&T 5ESS 68
 - AT&T Publication 41458 119
 - AT&T Publication 62310 119
 - auto answer enable/disable
 - AT command 106
 - auto DBU fail 64
 - auto restore
 - AT commands 65
 - automatic DBU 63
 - AT commands 65
 - auxiliary EIA-232 27
- B**
- back space character 110
 - BERT 119
- C**
- call disconnect 72
 - cancel 22, 25
 - carriage return character 110
 - carrier detect (CD) 26, 49, 110
 - channel service unit 120
 - check telco 74
 - clear to send (CS) 25, 46–47, 110
 - AT commands 47, 105
 - clock source 37
 - AT command 106
 - clocking 118, 120
 - command echo 110
 - compress option
 - AT command 106
 - compression 66
 - AT commands 67
 - configuration 22
 - dial backup 59–68
 - DTE options 39
 - local 29
 - methods 15
 - network options 33
 - remote 29
 - test options 55–58
 - configuration local 19
 - configuration remote 19
 - connector
 - EIA-232 115
 - connector type 42
 - factory default 42

control port 120
CPE 120
CS 120
CSU 120
CSU loopback 121
CTS 120, 121
customer service 7, 9

D

data buffering 118
data compression 111, 121
data format 43, 71
 AT commands 43
 factory default 43
data invert option 41
data mode 74
data rates 117
data service unit 121
data set ready (SR) 51–52, 75
 AT commands 52, 106
 factory default 51
data terminal ready (TR) 50–51, 75
 AT commands 51
 factory default 50
DATAPATH 1, 4
DBU abort call timer 110
DBU answer test 58
DBU auto restore time 110
DBU connection 99
DBU enable/disable
 AT command 106
DBU line in RDL 73
DBU number to dial 110
 AT command 106
DBU online test 70
DBU options
 2-wire and 4-wire 66
 all models 63–65
 AT commands 67
 ISDN 68
 V.32 bis 66–67
DBU originate/answer 110
 AT command 106
DBU passcode 68
DBU status 72
DBU when no RX signal 110
 AT command 106
DBU when no sealing current
 AT command 106
DBU when OOS 110
 AT command 106
DDS 121
DDS circuit
 conditions for returning to 6
DDS network status 74
DDS stress patterns 1-4 121
diagnostics 118
dial 22
dial backup 70
 configuration 59–68
 ISDN 61
 mode 69
 entering 5
 status 72
 status information 72
dial number
 AT command 105
dial options 29, 69–70
dial up operation 109
dialing 73
digital data service (DDS)
 1, 3, 5, 6, 10, 37, 69
down arrow 22, 25
DSU 121
DSU loopback 121
DSU status 74
DSU to modem interconnect 113
DTE 122
DTE & loop (LL) 86
DTE command option 44

DTE command set 110
DTE connectors 26
DTE control leads 75
DTE data connection 11
DTE data format 110
 AT command 105
DTE interface 27, 77, 118
 parameters 29
DTE only 90
DTE options 29
DTE rate 39, 71, 110, 117
 AT commands 40
 factory default 39
 for 56 kbps loop rate with no secondary 40
 same as the network 39
 select AT command 106
DTE routing main/backup
 AT command 106
DTE status 75
DTE to loop rate matching 122
DTE type 110
DTR command timeout 110
DTR option
 AT command 105
DTR recognize delay 110
DTR-dialing 122
DU DBU status 72

E

echo command
 AT command 105
EIA controlled LLB 110
EIA controlled RLB 110
EIA local loopback (LLB) 57
EIA remote loopback (RLB) 57
EIA-232 connector 115
 auxiliary 14
 pin assignments 12, 14
EIA-232 interface 1

EIA-232C 122
EIA-366A 122
enter 22, 24
environment 118
error control 66
 AT commands 67
escape character 110
escape guard timer 110
exit test 79
external clock 45, 115

F

fail timer 64
 AT command 65
FCC Part 15 of Class A 122
FCC Part 15 of Class B 122
FCC Part 68 122
flow control 105
 AT commands 66, 67
front panel
 AT commands 106
 enable/disable 110
function keys 22

G

go online
 AT command 105
going to DBU 73, 74

H

hang up 70
 AT command 105

I

idle 73
in dial backup 73, 75
in-band 122
inactivity timer 110
 AT command 105

incoming call 73
initiate remote configuration
 AT command 106
installation 9–19
INV 18
INVBL 18
INVBM 18
INVCU 18
INVPS 18
INVPV 18
ISDN 123
 DBU options 68
 DBU status 72
 dial backup 61

L

LB enable/disable
 AT command 106
LCD window 24
LED
 description 25, 26
line 1 connector 10
line 2 connector 10
line feed character 110
line interfaces 118
line requirements 118
LL test from telco 75
LLB control
 AT command 106
local configuration 29
local DTE and loop test 123
local loopback 75, 77
local unit
 test 84
long code 110
loop is normal 74, 75
loop only (RT) 88
loop rate 23, 34, 111
 AT command 106
loss of sealing current 5

M

main menu 21, 25, 79
manual command 29, 101–103
menu navigation 21, 22, 23
modem tail circuit
 application 113
multidrop 123

N

national ISDN1 68
network
 interface connection 10
 interface parameters 29
network address 36
 AT command 106
network options 23, 29, 33–37
network rate 71
network status 74
network timing 110
network type 66
 AT command 105
no DBU installed - DBU status 72
no receive (RX) signal 6, 63, 73
 AT commands 65
no sealing current 63
 AT commands 65
no wink from CO 73
not installed 73
NT DMS-100 68
number to dial 63
 AT commands 65
numeric keypad 24

O

OOS/OOF from net 73
OOS/OOF from telco 75
open loop 73, 75
operating modes 117
operation 21–27, 77–100

originate 63
originate/answer 63
 AT commands 65
out of service (OOS) 63
 AT commands 65
 signal 6
out-of-band 123

P

password control
 AT command 106
password entry
 AT command 106
password verify
 AT command 106
phone number 61
 AT command 62, 105
pin assignments
 auxiliary EIA-232 connector 14
 line 1 connector 10
 line 2 connector 11
 primary EIA-232 connector 12
 primary V.35 connector 13
point-to-point 123
point-to-point operation 41, 109
power 118
power cord 27
power switch 27
power up 10
primary DTE 11
primary EIA-232 27
primary V.35 27
private network master
 slaved to external clock 123
private network master clocking 123
private network tributary clocking 123
PSTN 123

Q

quick 25

R

RDL 124
 enable/disable 110
re-execute command
 AT command 105
read S-register 105
rear panel 26
receipt inspection 9
receive (RX) signal 63
receive data 25
receiver sensitivity 118
redial counter 64
 AT commands 65
remote command 19
remote configuration 29, 124
 enable/disable 36, 110
remote digital loopback (RDL) 56
remote loopback 75, 77
remote V.54 test 124
rest
 AT command 105
restore factory options
 AT command 105
restore timer 64
result code 110
result code display 105
result code from
 AT command 105
return material authorization (RMA) 7
RJ-45S 124
RTS-CTS delay
 AT command 106
RX-CTS delay 110

S

S-register

- read 105
- write 105
- scrambler 124
- scrambler control
 - AT command 106
- scrambler mode 111
- scrambler on option 41
- scrambler on/off
 - factory default 41
- sealing current 63
- secondary channel 26, 52
 - connection 13
 - rate 111
 - services 27
- secondary rate 52–53
 - AT commands 53
 - factory default 52
- self test 96
- serial number
 - AT command 106
- service 124
- shift 24
- short code 110
- SNMP 124
- specifications 117
- SR 124
- SR options 110
 - AT command 105
- status 21, 71
 - DDS network 74
 - dial backup mode 72
- stay on leased 70
- stay on line 70
- SW56 DBU status 72
- switch type 68
- switched 124
- synchronous operation 77

T

- tail circuit 125

- telco jack 26
- temperature 118
- test 22, 75
 - DTE only 90
 - loop only 88
 - self 96
 - test pattern 94
- test commands 84
 - AT commands 105
- test from telco 74
- test menu 80
- test mode manual 26
- test options 29
 - configuration 55–58
- test pattern 94
 - AT command 106
- test pattern type 110
- test timeout 56, 110
- TR option 110
- transmit clock 45, 115
 - AT command 45, 105
 - timing source 110
- transmit data 25

U

- U interface 125
- UL 125
- UL 1459 125
- unit dialing options 29
- unit in test 74
- unit test options 29
- up arrow 22, 25

V

- V.25 bis 125
- V.25 bis commands 17, 77
 - asynchronous option 18
 - bi-sync option 17
 - SDLC option 17

- V.32 bis 125
- V.32 bis backup option 4
- V.32 bis/42 bis 1, 4
- V.32 DBU status 72
- V.34 1, 5, 10, 66, 125
 - DBU status 72
- V.35 connector 11, 13
 - pin assignments 13
- V.FC (V. Fast Class) 125
- VALA 18
- view current configuration
 - AT command 105
- VT 100 125

W

- wait to redial 65
 - AT commands 65
- waiting for call 74, 75
- when out of service (OOS) 63
- write to S-register 105

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 Return Material Authorization (RMA) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact RMA directly at the following number:

RMA Department (205) 963-8722

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

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

RMA # _____