ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Adtran DSU IV ESP* at our website: *Click HERE*

# DSU IV ESP

## Data Service Unit with Embedded SNMP

### USER MANUAL

| Part Number | Version |
|---|---|
| 1204011L1 | DSU IV ESP |
| 1204001L1 | ESP 4-wire Switched 56 DBU Card |
| 1204002L1 | ESP V.34 DBU Card |
| 1204004L1 | ESP ISDN DBU Card |
| 1204005L1 | ESP Ethernet Card |

61204.011L1-1A
May 1997

**Trademark Information:**
Hayes is a registered trademark of Hayes Microcomputer Products, Inc.
Openview is a registered trademark of Hewlett-Packard Company.
SunNet Manager is a registered trademark of Sun Microsystems, Inc.
Netview is a registered trademark of IBM.

901 Explorer Boulevard
P.O. Box 140000
Huntsville, AL 35814-4000
Phone: (205) 963-8000

© 1997 ADTRAN, Inc.
All rights reserved.
Printed in USA.

## ABOUT THIS MANUAL

This manual is arranged so you can quickly and easily find the information you need. The following is an overview of the contents of this manual:

- Chapter 1, Introduction, familiarizes you with DDS, Switched 56, SNMP, and TELNET. This chapter also includes DSU IV highlights and describes the options that may be purchased for use with the DSU.

- Chapter 2, Installation, describes the DSU connectors (pin assignments are given in Appendix A) and provides an installation diagram.

- Chapter 3, Operation, explains how to operate your DSU using either the front panel or a VT 100 terminal interface.

- Chapter 4, Applications, provides examples of some common DSU applications, including network diagrams.

- Chapter 5, Configuration Overview, explains how to access the DSU configuration menu, including information on the different configuration methods. This chapter also provides a front panel menu tree.

- Chapters 6 through 11 provide brief explanations for selections made in the Configuration menus. These chapters are based on the front panel menu branches of the Configuration menu: Network Options, DTE Options, Test Options, Dial Options, Management, and Utilities.

- Chapter 12, Testing and Troubleshooting, describes the testing options available with the DSU IV and gives troubleshooting information.

- Chapter 13, Activating Dial Functions, describes the Dial options available from the Main menu.

- Chapter 14, Viewing Status Information, provides information on the status menus available for the base unit as well as the DBU cards.

- Appendix A provides pinouts for the connectors of the DSU and the DBU and Ethernet cards.

- Appendix B shows the AT commands available for the DSU.

- Appendix C describes the terminal menu interface (accessed through a VT 100 terminal or a TELNET session).

- Appendix D provides information on the unit's configuration profiles.
- Appendix E contains a DSU to modem interconnect diagram for a modem tail circuit application.
- Appendix F contains product specifications.




*Notes provide additional useful information.*




*Cautions signify information that could prevent service interruption.*




*Warnings provide information that could prevent damage to the equipment or endangerment to human life.*

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 are 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:

| Service Type | REN | FIC | USOC |
|---|---|---|---|
| Loop Start (V.34) | 0.8B/0.4A | 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.*

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

## CANADIAN EMISSIONS REQUIREMENTS

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

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

## CANADIAN EQUIPMENT LIMITATIONS

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

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

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

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

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

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

**ISDN Service Ordering Information for the ADTRAN DSU IV ESP With ISDN Dial Backup**

For ADTRAN DSU IV ESP ISDN applications, the following guide can be used as an aid in ordering basic ISDN service from your local telephone company. The ADTRAN DSU IV ESP 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 IV ESP 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
Switched 56 Operation ..... 4
SNMP ..... 4
Network Manager ..... 4
Agent ..... 4
MIB ..... 4
TELNET ..... 5
Dial Backup Operation ..... 5
ESP Dial Backup Options ..... 5
4-Wire Switched 56 Card ..... 5
V.34 Card ..... 6
ISDN Card ..... 6
Warranty and Customer Service ..... 6

**Chapter 2. Installation**
Unpack, Inspect, Power Up ..... 7
Receipt Inspection ..... 7
ADTRAN Shipments Include ..... 7
Customer Provides ..... 8
Power Up ..... 8
Rear Panel ..... 9
DBU and Ethernet Card Slots ..... 10
Telco Connector ..... 10
Network Interface Connection ..... 10
EIA-232 and V.35 Connectors ..... 10
DTE Data Connection/Primary DTE ..... 10
Control Port ..... 11

**Chapter 3. Operation**
Front Panel ..... 13
LCD Window ..... 13
Enter ..... 13
Keypad ..... 13
Shift ..... 13

Cancel ..... 14
Up and Down Arrows ..... 14
LED Descriptions ..... 14
Front Panel Menu Navigation ..... 17
Front Panel Menu Structure ..... 18
Main Menu ..... 18
Status ..... 18
Test ..... 18
Configuration ..... 19
Dial ..... 19
VT 100 Terminal Connection and Operation ..... 20

**Chapter 4. Applications**
LAN Application with SNMP/TELNET Management ..... 23
Minimum Configuration Requirements for SNMP/TELNET Access ..... 24
Interface ..... 24
IP Address ..... 24
Subnet Mask ..... 24
Gateway IP Address (if required) ..... 24
Special Features of this Application ..... 24
Dial Backup Application ..... 26
Entering Dial Backup Mode ..... 26
Operation During Critical Times ..... 26
Loss of Sealing Current ..... 26
Out of Service (OOS) Signal ..... 26
No Receive Signal ..... 27
All 1s or all 0s Condition ..... 27
Answer Always ..... 27
Operation During Noncritical Times ..... 27
Weekend and Time of Day Lockout ..... 27
Conditions for Returning to the DDS Circuit ..... 27

**Chapter 5. Configuration Overview**
Configuration Methods ..... 29
AT Commands ..... 33
V.25 bis Commands ..... 34
SDLC Option ..... 34
Character Format ..... 34
Command Structure ..... 34
Bi-Sync Option ..... 34

Character Format ..... 34
Command Structure ..... 34
Asynchronous Option ..... 35
Character Format ..... 35
Command Structure ..... 35
Command Descriptions ..... 35
Syntax and Possible Responses ..... 36
CNL (Configuration Local) ..... 36
CNR (Configuration Remote) ..... 36

**Chapter 6. Configuring Network Options**
Network Options ..... 37
Loop Rate ..... 39
Network Address ..... 40
Remote Configuration ..... 40
Network Type ..... 40
Clock Source ..... 40

**Chapter 7. Configuring DTE Option**
DTE Options ..... 41
DTE Rate ..... 45
Connector Type ..... 46
Data Format ..... 46
DTE Command Option ..... 46
Transmit Clock ..... 46
Clear to Send (CS) Options ..... 47
Anti-Stream ..... 47
CD Options ..... 48
Data Terminal Ready (TR) Options ..... 48
Data Set Ready (SR) Options ..... 48

**Chapter 8. Configuring Test Options**
Test Options ..... 49
Test Timeout ..... 50
Remote Digital Loopback (RDL) ..... 50
EIA LLB ..... 51
EIA RLB ..... 51
DBU Answer Test ..... 51

**Chapter 9. Configuring Dial Options**

Dial Options ..... 53
Phone Numbers ..... 55
ISDN Dial Backup ..... 55
Setting the Service Profile Identifier (SPID) ..... 55
Setting the Local Directory (LOC) Number ..... 55
SW56 Auto Answer ..... 56
DBU Options ..... 56
Standard DBU Options ..... 56
Automatic DBU ..... 56
Number to Dial ..... 56
Originate/Answer ..... 56
DBU Criteria ..... 57
When Out of Service (OOS) ..... 57
No Receive (RX) Signal ..... 57
No Sealing Current ..... 57
When all 1s/0s ..... 57
Answer Always ..... 57
Weekend Lockout ..... 57
Daily Lockout ..... 57
Lockout Start ..... 58
Lockout End ..... 58
Auto Restore ..... 58
Redial Counter ..... 58
Fail Timer ..... 59
Wait to Redial ..... 59
DBU Options for S4W Card ..... 62
Network Type ..... 62
DBU Options for V.34 Card ..... 62
Error Control ..... 62
Flow Control ..... 62
Compression ..... 62
DBU Options for ISDN Card ..... 64
Switch Type ..... 64
DBU Passcode ..... 64

**Chapter 10. Configuring Management Functions**

Interface ..... 66
Control Rate ..... 66
IP Options ..... 66
Unit IP Address ..... 66

Subnet Mask ..... 66
Gateway IP Address ..... 66
IP Security ..... 66
IP Filter Address ..... 66
SNMP Options ..... 67
Get Community ..... 67
Set Community ..... 67
Trap Community ..... 67
SNMP Traps ..... 67
Trap IP Address ..... 67
System Name, Contact, and Location ..... 68
Authentication Traps ..... 68
TELNET Options ..... 68
TELNET Password ..... 68
TELNET Timeout ..... 68
Entering Letters Using the Front Panel ..... 69

**Chapter 11. Configuring Unit Utilities**
Manual Command ..... 72
Time/Date ..... 74
Software Revision ..... 74
LAN MAC Address ..... 74
Serial Number ..... 74

**Chapter 12. Testing and Troubleshooting**
Test Overview ..... 75
Initiating a Test ..... 76
Test Status Display ..... 77
Exiting a Test ..... 77
Troubleshooting ..... 79
Messages from the DSU/CSU ..... 79
Troubleshooting New Installs ..... 80
Test Sequence for Troubleshooting New Installs or Existing Circuits ..... 81
Local Unit Diagnostics ..... 82
DTE & Loop (LL) ..... 84
Loop Only (RT) ..... 85
DTE Only ..... 86
DTE With Test Pattern ..... 87
Test Pattern ..... 89
Self Test ..... 90

Remote Unit Diagnostics ..... 91
DBU Connection ..... 93

**Chapter 13. Activating Dial Functions**
Dial Options ..... 95
Answer Unit Connected to DDS Line ..... 96
Dial Backup ..... 96
Originate Unit Connected to DDS Line ..... 96
Dial Backup ..... 96
Stay on Leased ..... 96
DBU Online Test ..... 97
Dial Options During Dial Backup ..... 97
Hang Up ..... 97
Stay On Line ..... 97

**Chapter 14. Viewing Status Information**
Status ..... 99
Network Rate, DTE Rate, and Data Format ..... 99
Dial Backup Information ..... 100
Type of Dial Backup Service ..... 100
Current Status of Dial Backup Mode ..... 100
DSU Operation and Network Status ..... 102
Current DSU IV ESP Status ..... 102
Current DDS Network Status ..... 102
DTE Control Leads and Status ..... 103

**Appendix A. Pinouts ..... 105**
**Appendix B. AT Commands ..... 111**
**Appendix C. Terminal Menu Structure ..... 113**
**Appendix D. Configuration Profiles ..... 129**
**Appendix E. DSU to Modem Interconnect ..... 133**
**Appendix F. Specifications Summary ..... 135**

**Glossary ..... 139**
**Index ..... 147**

**List of Tables**

Table 6-A Network Options AT Commands ..... 38
Table 7-A DTE Options AT Commands ..... 43
Table 7-B Short and Long Delays at Different Operating Speeds ..... 47
Table 8-A Test Options AT Commands ..... 50
Table 9-A AT Commands for Storing Phone Numbers ..... 55
Table 9-B DBU Options AT Commands for All Models ..... 60
Table 9-C DBU Options AT Commands for V.34 Card ..... 63
Table 11-A Manual Commands ..... 73
Table 12-A Messages from the DSU/CSU ..... 79
Table 12-B Troubleshooting New Installs ..... 80
Table 12-C Test AT Commands ..... 82
Table 12-D DTE With Test Pattern Commands ..... 83
Table 12-E Remote Tests and AT Commands ..... 91
Table A-A Pin Assignments for Telco Connector ..... 106
Table A-B Pin Assignments for ESP DBU Card Connectors ..... 106
Table A-C Pin Assignments for Primary EIA-232 Connector ..... 107
Table A-D Pin Assignments for Primary V.35 Connector ..... 108
Table A-E Pin Assignments for Control Connector ..... 108
Table A-F Pin Assignments for 10baseT Connector ..... 109
Table B-A AT Commands ..... 111
Table C-A Terminal Main Menu Dial Selection ..... 114
Table D-A Configuration Profiles ..... 130

**List of Figures**

Figure 1-1 Typical Point-to-Point Application for DSU IV ESP ..... 3
Figure 2-1 DSU IV ESP Rear View ..... 9
Figure 3-1 DSU IV ESP Front Panel ..... 15
Figure 3-2 Example of Basic Menu Navigation ..... 17
Figure 3-3 Terminal Interface Main Menu (SW56 Mode) ..... 21
Figure 4-1 SLIP/PPP LAN Application with SNMP/TELNET Management ..... 25
Figure 4-2 Ethernet LAN Application with SNMP/TELNET Management ..... 25
Figure 4-3 Dial Backup Application ..... 28
Figure 5-1 Front Panel Configuration Menu Tree ..... 31
Figure 6-1 Network Options Menu Tree ..... 39
Figure 7-1 DTE Options Menu Tree ..... 42
Figure 8-1 Test Options Menu Tree ..... 49
Figure 9-1 Dial Options Configuration Menu Tree ..... 54
Figure 10-1 Management Menu Tree ..... 65
Figure 11-1 Utilities Menu Tree ..... 71

Figure 12-1 Normal Operation Before Initiating Loopback Test ..... 75
Figure 12-2 Initiating a Test ..... 76
Figure 12-3 Sample Test Status Displays ..... 77
Figure 12-4 Complete Test Menu ..... 78
Figure 12-5 DTE & Loop Test ..... 84
Figure 12-6 Loop Only Test ..... 85
Figure 12-7 DTE Only Test Diagram ..... 86
Figure 12-8 DTE with Test Pattern ..... 87
Figure 12-9 Test Pattern Only ..... 89
Figure 12-10 V.54 RDL with Test Pattern ..... 91
Figure 12-11 Initiating a Remote Test ..... 92
Figure 12-12 DBU Connection Test ..... 93
Figure 12-13 Initiating a DBU Connection Test ..... 94
Figure 13-1 Dial Options Menu (SW56) ..... 95
Figure 13-2 Dial Options Menu (Dedicated) ..... 96
Figure 14-1 Status Display ..... 99
Figure C-1 Terminal Interface Main Menu ..... 114
Figure C-2 Terminal Menu Tree ..... 115
Figure C-3 Status Menu ..... 117
Figure C-4 Remote Configuration Options ..... 118
Figure C-5 Main Configuration Menu ..... 119
Figure C-6 DSU Configuration Menu ..... 120
Figure C-7 S4W Dial Backup ..... 121
Figure C-8 Management Menu ..... 122
Figure C-9 SNMP Management Menu ..... 123
Figure C-10 Utility Menu ..... 124
Figure C-11 Local Test Options Menu ..... 125
Figure C-12 Remote Test Options Menu ..... 126
Figure C-13 SW56 Dialing Menu ..... 127
Figure C-14 Dial ESP DBU Menu ..... 128
Figure E-1 DSU to Modem Interconnect ..... 133

# Chapter 1
# Introduction

## PRODUCT OVERVIEW

The ADTRAN DSU IV ESP (data service unit with embedded SNMP) provides a reliable, high speed data connection for customer data terminal equipment (DTE) through digital data service (DDS) lines. The DSU IV ESP has an embedded SNMP (simple network management protocol) agent that provides complete SNMP access to the unit through an integral SLIP or PPP async port. The DSU IV ESP's unique modular approach provides optional 10baseT ethernet access for SNMP. Also, optional modular ESP DBU cards provide automatic or manual dial backup for the dedicated circuit.

The following are features of the DSU IV:

- DDS rates supported from 2.4 to 64 kbps including 19.2 and 38.4
- 4-wire Switched 56 (SW56) operation
- Embedded SNMP and TELNET
- Control port provides SLIP and Async PPP access to SNMP or VT 100 terminal configuration
- Two ESP option slots
- 10baseT ethernet SNMP port available with ESP ethernet Card
- Automatic or manual DBU
- DBU available with ESP DBU cards; options include 4-wire Switched 56, V.34, and ISDN
- Time of day and weekend DBU lockout options

The DSU IV ESP provides both V.35 and EIA-232 electrical and physical DTE interfaces to accommodate a variety of applications.

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 ESP 4-wire SW56 DBU card and the base unit's integrated SW56 capabilities are compatible with AT&T Accunet and Sprint SW56 type services. The V.34 DBU card allows switched backup over the public switched telephone network (PSTN). The ESP ISDN 1B+D card 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 IV ESP.

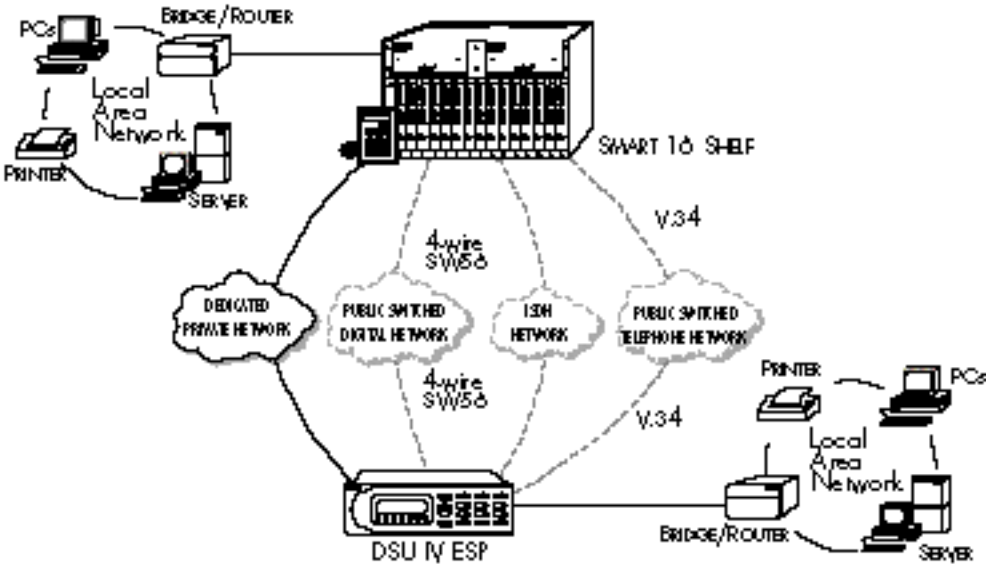



**Figure 1-1**
*Typical Point-to-Point Application for DSU IV ESP*

## 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 IV ESP supports 2.4 to 64 kbps DDS service rates 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 or 64 kbps service.

## SWITCHED 56 OPERATION

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

## SNMP

The term SNMP broadly refers to the message protocols used to exchange information between the network and the managed devices, as well as to the structure of network management data bases. SNMP has three basic components:

**Network Manager**
Control program that collects, controls, and presents data pertinent to the operation of the network devices. It resides on a network management station.

**Agent**
Control program that resides in each network device connected. This program responds to queries and commands from the network manager and returns requested information or invokes configuration changes initiated by the manager.

**MIB**
Index to the organized data within a network device. It defines the operation parameters that can be controlled or monitored.

The DSU IV supports the MIB-II standard, RFC 1213, and ADTRAN Enterprise Specific MIB. MIB files are available from ADTRAN in the support section of the ADTRAN Web page at www.adtran.com.

The DSU IV's embedded SNMP feature allows the unit to be accessed and controlled by a network manager through either a device running SLIP or async PPP protocol (connected to the CONTROL port of the DSU) or through a LAN. LAN connection

requires the optional ESP ethernet card (part number 1204005L1). This card provides a 10baseT ethernet interface to the LAN.

### TELNET

TELNET provides a password-protected, remote login facility to the DSU IV. TELNET allows a user on a network manager to control the DSU IV through the terminal menus. See the chapter *Applications* and the appendix *Terminal Menu Structure* for more information.

## DIAL BACKUP OPERATION

The DSU IV ESP's unique DBU cards are field-installable by the customer. See the chapter *Installation* for information on installing DBU cards. All DBU cards are compatible with other ADTRAN ESP products supporting DBU (see the following note). The three backup options are described in the following sections. Contact the local telco provider to determine which services are available in your area. See the chapter *Applications* for more information, including an example of a dial backup application.




*The ESP V.34 DBU is not compatible with the TSU ESP.*

## ESP Dial Backup Options

#### 4-Wire Switched 56 Card

This dial-up 4-wire SW56 card 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. This card 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.

### V.34 Card

The V.34 card has all of a 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 33.6 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.

### ISDN Card

1B+D Basic Rate ISDN service provides the customer with a switched 56/64 kbps circuit. In addition to 56 and 64 kbps synchronous DTE rates, the card also supports synchronous and asynchronous DTE rates of 2.4, 4.8, 9.6, 19.2, and 38.4 kbps per CCITT V.120. The card also supports the DTE rate of 57.6 kbps async and is compatible with the 4-wire SW56 DBU card.

## 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 IV ESP 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 IV ESP for repair or for verification of damage during shipment.

#### ADTRAN Shipments Include

The following items are included in ADTRAN shipments of the DSU IV ESP:

- DSU IV ESP unit
- The user manual
- An 8-position modular to 8-position modular cable
- An 8-position modular to 8-position modular cable and a modular to female DB-25 adapter for access to the Control/SLIP/PPP port




*The ADTRAN DSU IV ESP MIB is available from ADTRAN in the support section of the ADTRAN Web page at www.adtran.com.*

The following items are included in ADTRAN shipments of ESP DBU cards:

- ESP DBU card
- An 8-position modular to 8-position modular cable for the 4-wire SW56 and 1B+D ISDN dial backup options. An 8-position modular to 4-position modular cable for the V.34 backup option.

### Customer Provides

The customer must provide either a male EIA-232 (standard 25-pin, D-type) or a male V.35 interface cable.

For SNMP management, the customer must provide access to the DSU IV ESP either through a SLIP port, Async PPP port (requires a male 25-pin D-type connector), or a 10baseT ethernet port (requires that an ADTRAN ESP Ethernet card be installed in the DSU IV ESP). See the appendix *Pinouts* for the pin assignments of the control port (for SLIP and Async PPP) and the ethernet port.

## Power Up

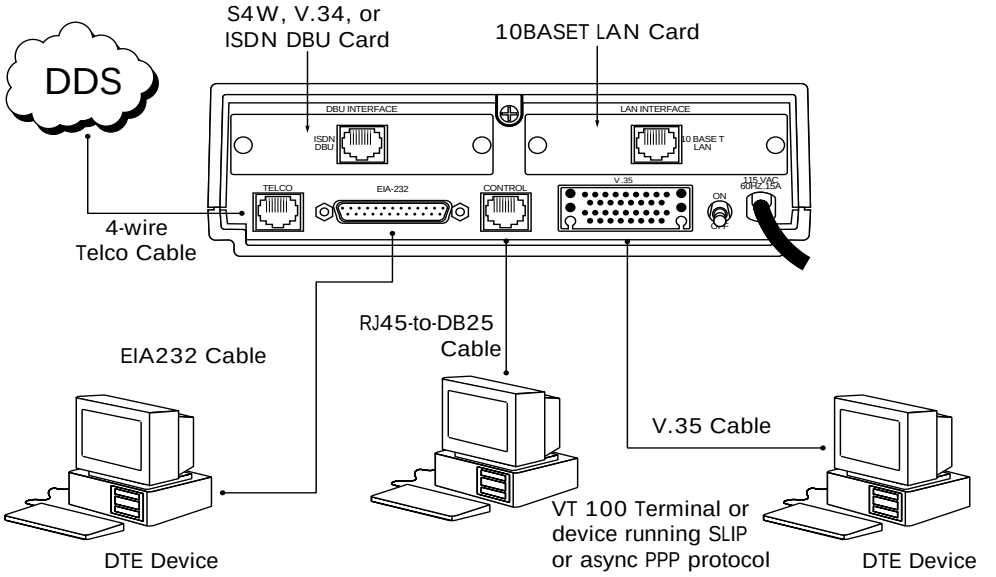
The DSU IV ESP is provided with a captive 8-foot power cord, terminated by a three-prong plug which connects to a grounded 115 VAC power receptacle.




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

## REAR PANEL

The rear panel contains two DTE connectors which provide primary channel V.35 or EIA-232. An 8-pin telco jack, a control port, a captive power cord, and a power switch are also located on the rear panel. Pin assignments for these connectors are listed in the appendix *Pinouts*. The DSU IV ESP rear panel is shown in Figure 2-1 with optional ESP cards installed.




| Item | Function |
|---|---|
| DBU Interface | ESP DBU card slot |
| LAN Interface | ESP Ethernet card slot |
| Telco | Connects to dedicated circuit |
| EIA-232 | Connects to a DTE interface |
| Control | Connects to a VT 100 terminal or a device running SLIP or async PPP protocol |
| V.35 | High speed DTE interface |
| Power Switch | Turns power on or off |
| 115 VAC Connection | Power cord connection |

**Figure 2-1**
*DSU IV ESP Rear View*

## DBU and Ethernet Card Slots

The DSU IV ESP rear panel has two card slots for the installation of dial backup and ethernet cards. To insert cards, perform the following procedure:

1. Remove power from the DSU IV ESP.
2. Slide the card into the corresponding rear slot until the card panel is flush with the DSU IV chassis.
3. Push card locks in (until they click) to secure the card and ensure proper installation.




*Card slots are keyed to prevent improper installation (i.e., putting a DBU card into the ethernet slot).*




*Remove power from the unit prior to installing or removing ESP option cards.*

## Telco Connector: Network Interface Connection

The DSU IV ESP has an 8-position modular jack labeled **TELCO**. The telco connector is used for connecting to the DDS network. The pinout for this connector is listed in the appendix *Pinouts.*

Each ESP DBU card has a connector which is used for connection to the switched backup network. The pinout for the connector depends on the card type. Pinouts for 4-wire Switched 56, V.34, and ISDN 1B+D DBU options are shown in the appendix *Pinouts*.

## EIA-232 and V.35 Connectors: DTE Data Connection/Primary DTE

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

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.




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

## Control Port

The DSU IV has an 8-position modular jack labeled **CONTROL**. The control port provides connection to a VT 100 EIA-232 compatible interface, a device running SLIP protocol, or a device running Async PPP protocol. An 8-foot adapter connector and cable provide a standard DB-25 EIA-232 interface. See the appendix *Pinouts* for the control port's pin assignments. A description of the operation of this port is covered in the *Operation* chapter.

The control port also functions as the SLIP or Async PPP port when configured for SNMP management. The pinouts are identical when operating in an SNMP management mode.

# Chapter 3
# Operation

## FRONT PANEL

The DSU IV ESP faceplate is shown in Figure 3-1. Descriptions of each part of the front panel follow.

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

### Enter
Selects active menu items. To select a menu item, press the number of the item. The menu item flashes, indicating it is activated. Press **Enter** to select the menu item.

### Keypad
The keypad contains dual-function keys numbered 0 through 9 with alpha characters A through F. These keys are used to activate menu items and enter information.

### Shift
Enter alpha characters by pressing and releasing **Shift** *before* pressing the key representing the desired character. To activate a menu item designated by an alpha character rather than a number press **Shift** and then the letter. The menu item flashes, indicating which parameter is activated. Press **Enter** to select the item.

If a key is pressed without using **Shift**, the numbered item becomes active instead of the alpha item.

### Cancel

Pressing the **Cancel** key 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.

### Up and Down Arrows

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

### LED Descriptions

The DSU IV ESP 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 DTE interface. |
| CS: Clear to Send | Reflects the status of the clear to send pin of the DTE interface. |
| 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 IV ESP is ready to transfer data. |
| ALM: Alarm Indication | This LED activates whenever an alarm condition exists. Alarm conditions include:<br>• Open loop on network<br>• No frame synchronization<br>• Unit in dial backup<br>• Problem on dial backup line |
| TST: Test Mode | This LED is on whenever the unit is in test mode. |

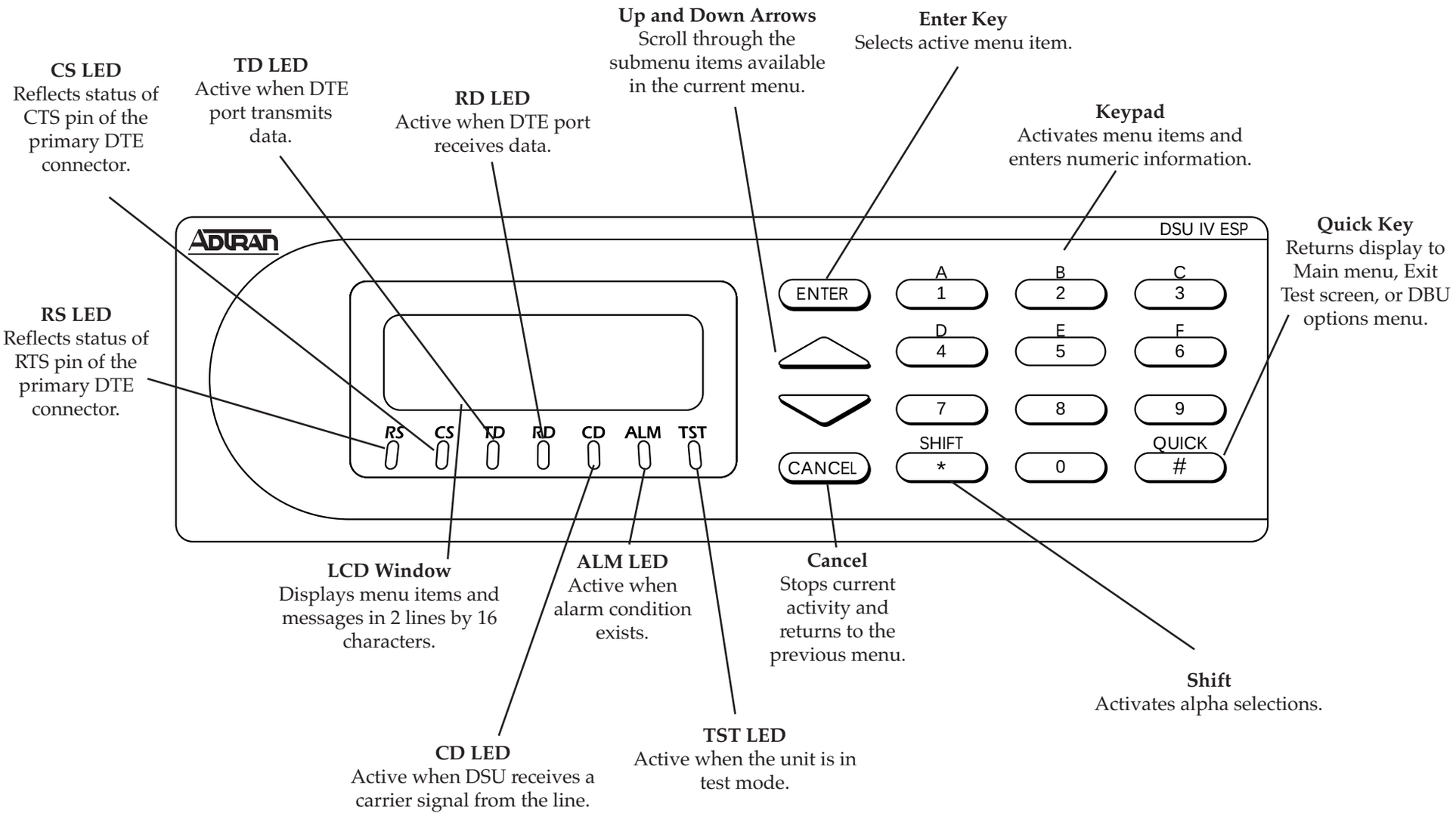



**Figure 3-1**
*DSU IV ESP Front Panel*

## Front Panel Menu Navigation

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 flashing menu item indicates which selection is activated. Press **Enter** to select the item. The following steps and Figure 3-2 illustrate how to select DSU IV ESP options:

1. Activate Configuration (CONFIG) by pressing **3**. The activated menu item will flash. Press **Enter**.
2. Select LOCAL or REMOTE configuration by pressing the corresponding number, then press **Enter**.
3. Use the arrow keys to view submenu items.
4. Choose an item on the submenu such as Network Options (NETWORK OPT).
5. Activate NETWORK OPT by pressing **1**. Press **Enter**.
6. Activate LOOP RATE options by pressing **1**. Press **Enter**.
7. Press the number corresponding to the desired loop rate. Press **Enter**.

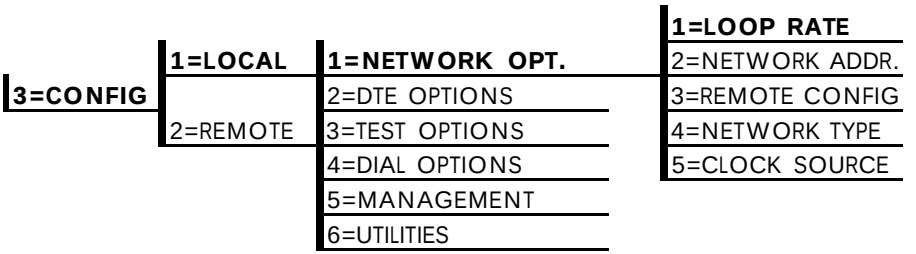



**Figure 3-2**
*Example of Basic Menu Navigation*

## Front Panel Menu Structure

The DSU IV ESP uses a multilevel menu approach to access its many features. All menu operations are displayed in the LCD window or the terminal. See Figure 3-3 for the terminal Main menu.

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.

Front panel LCD display of the Main menu:

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




*The Dial selection in the Main menu is only available when a SW56 network type is selected or when a DBU card is installed in the rear of the DSU IV ESP.*

### Main Menu

The branches of the front panel Main menu are divided into options for Status, Test, Configuration (CONFIG), and Dial.

#### Status

Status menus display all relevant information for the network and DTE interfaces. The system returns to the status display when idle. For more information see the chapter *Viewing Status Information*.

#### Test

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

### Configuration

Use Configuration menus to select network and DTE operating parameters, configure testing and dialing options, select management functions, and configure unit utilities. This menu branch is divided into several chapters for easier reference. The division includes a brief overview chapter followed by a separate chapter for each of the six submenus: *Configuring Network Options, Configuring DTE Options, Configuring Test Options, Configuring Dial Options, Configuring Management Functions,* and *Configuring Unit Utilities.*

### Dial

Dial provides manual dial backup or SW56 dial functions. For more information, see the chapter *Activating Dialing Functions*.

## VT 100 TERMINAL CONNECTION AND OPERATION

To control the DSU IV ESP using a VT 100 terminal, perform the following procedure:

1. Select a terminal interface through the front panel. Select **3 CONFIG, 5 MANAGEMENT, 1 INTERFACE, 1 TERM CONTROL**.

2. Set the CONTROL RATE to match the VT 100 terminal.

3. Using the provided VT 100 terminal adapter cable, connect the COM port of a VT 100 compatible terminal or equivalent to the eight-pin modular jack labeled CONTROL on the rear of the DSU IV ESP. This connection is used for both local and remote configuration.

4. Establish the connection and press **Enter** repeatedly until the Terminal Menu appears (Figure 3-3).

5. Make selections by entering the number corresponding to the chosen parameter. Press **ESC** to return to the previous screen.

NOTE

*Due to the increased display capabilities, the VT 100 menu structure differs from the front panel interface. The appendix **Terminal Menu Structure** includes the VT 100 screens as well as a complete menu tree for accessing configuration selections. Descriptions of individual menu options are provided throughout this manual based on the front panel menu structure. See Figure 5-1 for the front panel configuration menu tree.*

NOTE

*When establishing a TELNET session, the system prompts for a password. The default password is **adtran**. This password can be modified through the Management menu. See the chapter **Configuring Management Functions** for more information.*

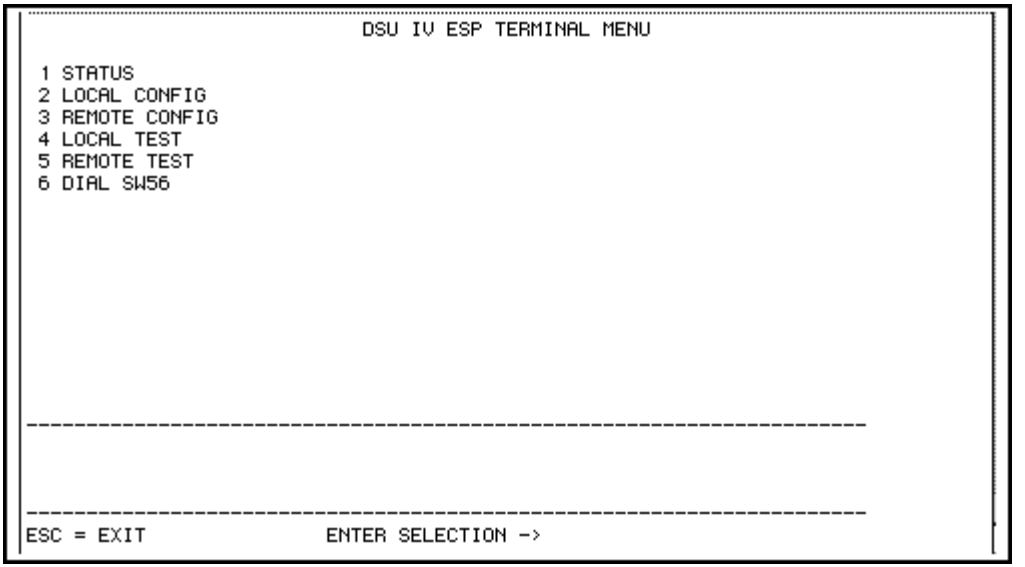



**Figure 3-3**
*Terminal Interface Main Menu (SW56 Mode)*

# Chapter 4
# Applications

This chapter provides examples of some common DSU IV ESP applications. The examples include LAN applications with both SLIP/PPP and ethernet management and a dial backup application.

## LAN APPLICATION WITH SNMP/TELNET MANAGEMENT

The DSU IV can be managed through an established TELNET session or an SNMP-based network manager like HP Openview®, IBM Netview®, or SunNet Manager®.




*The ADTRAN DSU IV ESP MIB is available in the support section of the ADTRAN Web page at www.adtran.com.*

SNMP and TELNET management are provided by one of the following interfaces:

- A device (i.e., a router) running SLIP protocol. Connection is made through the DSU IV's control port. See Figure 4-1.
- A device (i.e., a router) running async PPP protocol. Connection is made through the DSU IV's control port. See Figure 4-1.
- A LAN. Connection is made through the optional 10baseT ethernet interface provided on the ESP ethernet card (part number 1204005L1). See Figure 4-2.

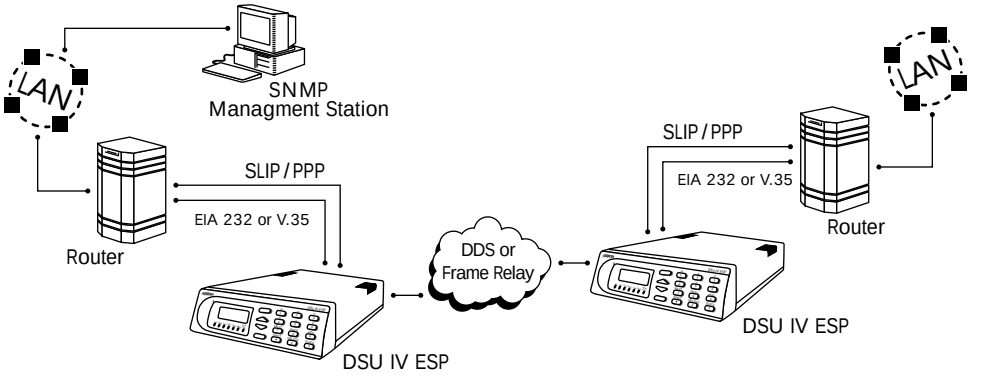



**Figure 4-1**
*SLIP/PPP LAN Application with SNMP/TELNET Management*

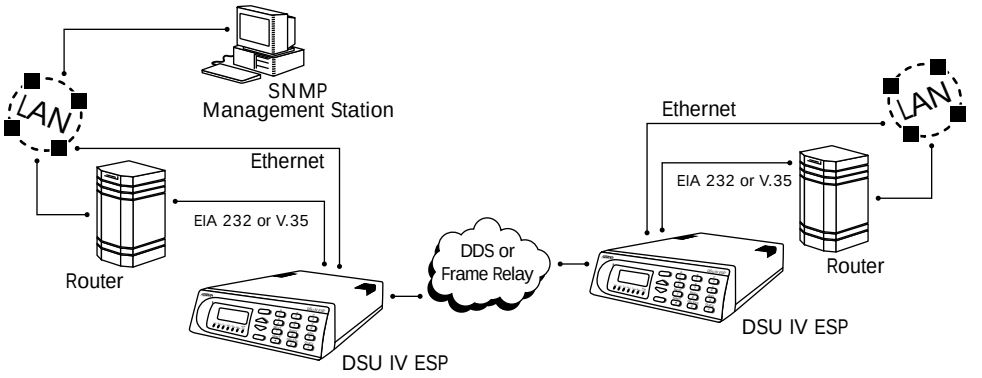



**Figure 4-2**
*Ethernet LAN Application with SNMP/TELNET Management*

## Minimum Configuration Requirements for SNMP/TELNET Access

The following options are the minimum configuration requirements for establishing SNMP or TELNET access. Once these options are configured, the remaining options may be configured using SNMP/TELNET. See the menu tree in Figure 10-1 in the chapter *Configuring Management Functions* for the front panel menu path to these options.

**Interface**
Select SLIP Control, PPP Control, or Ethernet LAN as the DSU IV interface type. The ESP ethernet card must be installed for the Ethernet LAN selection.

**IP Address**
Enter the DSU IV ESP IP address.

**Subnet Mask**
Enter the subnet number. This address is available from the network administrator.

**Gateway IP Address (if required)**
Enter the Gateway node IP address. This address is necessary only if the DSU IV and the network manager are connected through a Gateway node. This address is available from the network administrator.

## Special Features of this Application

Customize the SNMP/TELNET application using the following DSU IV ESP features:

- Designate SNMP hosts to receive SNMP traps from the DSU IV (one to five entries).
- Secure the DSU IV by limiting SNMP network management access. If enabled, the DSU IV only responds to a user-configured list of SNMP network managers (one to five entries).

Configure these options through the Management portion of the Configuration menu. See the chapter *Configuring Management Functions* for more information.

## DIAL BACKUP APPLICATION

The DSU IV provides point-to-point connection to the network. With one of the ESP DBU option cards installed, the unit is capable of dial backup, allowing the unit to dial around a failed network. See Figure 4-3.

With the DBU options, configure the unit to:
- Enter DBU under specific primary network conditions.
- Lock out DBU over the weekend and/or at specified times of the day.
- Dial a specified number when a DBU activation condition is detected.

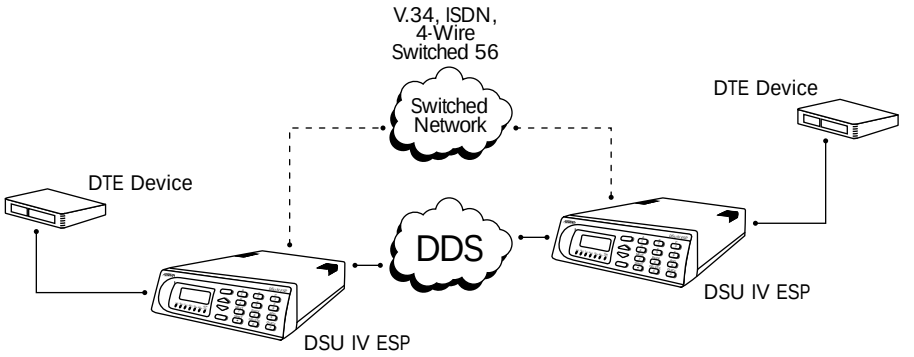



**Figure 4-3**
*Dial Backup Application*

### 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 IV ESP 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 IV ESP 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.

#### Answer Always

When this option is enabled, the unit goes into DBU mode if a call is present regardless of the status of the dedicated circuit. It is recommended that the DBU Passcode be used in this mode since inadvertent calls could stop data flow indefinitely.




*The DBU Answer Test is disabled if this option is chosen.*

#### Operation During Noncritical Times

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

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

#### Weekend and Time of Day Lockout

The DSU IV ESP may be configured not to enter dial backup mode based upon the time of day or weekend status. This protects the customer from being charged for a switched call during off hours should the dedicated circuit fail. See the chapter *Configuring Dial Options* for more information.

## Conditions for Returning to the DDS Circuit

The DSU IV ESP 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 IV ESP 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 IV ESP 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.

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

# Chapter 5
# Configuration Overview

The DSU IV ESP contains four different user profiles (sets of configuration options) stored in read only memory; see the appendix *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 IV ESP is then configured with that profile every time power is turned on or the unit is reset.

## CONFIGURATION METHODS

The DSU IV ESP responds to the following methods of configuration:

- AT commands
- V.25 commands
- Front panel commands
- A VT 100 compatible terminal
- SNMP/TELNET through a device running SLIP/PPP protocol
- SNMP/TELNET through a LAN running ethernet protocol (available when the optional ESP Ethernet card is installed)

AT and V.25 commands have limited access to configuration parameters. The commands are detailed in the following sections of this chapter. See the chapters *Installation* and *Operation* for more information on all other configuration methods. For an example application using the SLIP/PPP or ethernet interface, see the chapter *Applications*.

Descriptions of each Configuration menu item are given in the following chapters: *Configuring Network Options, Configuring DTE Options, Configuring Test Options, Configuring Dial Options, Configuring Management Functions,* and *Configuring Unit Utilities.*

A complete Configuration menu for the front panel is shown in Figure 5-1. The VT 100 menu tree is shown in the appendix *Terminal Menu Structure*.




*Due to the increased display capabilities, the VT 100 menu structure differs from the front panel interface. The appendix* ***Terminal Menu Structure*** *includes the VT 100 screens as well as a complete menu tree for accessing configuration selections. Descriptions of individual menu options are provided throughout this manual based on the front panel menu structure. See Figure 5-1 for the front panel configuration menu tree.*

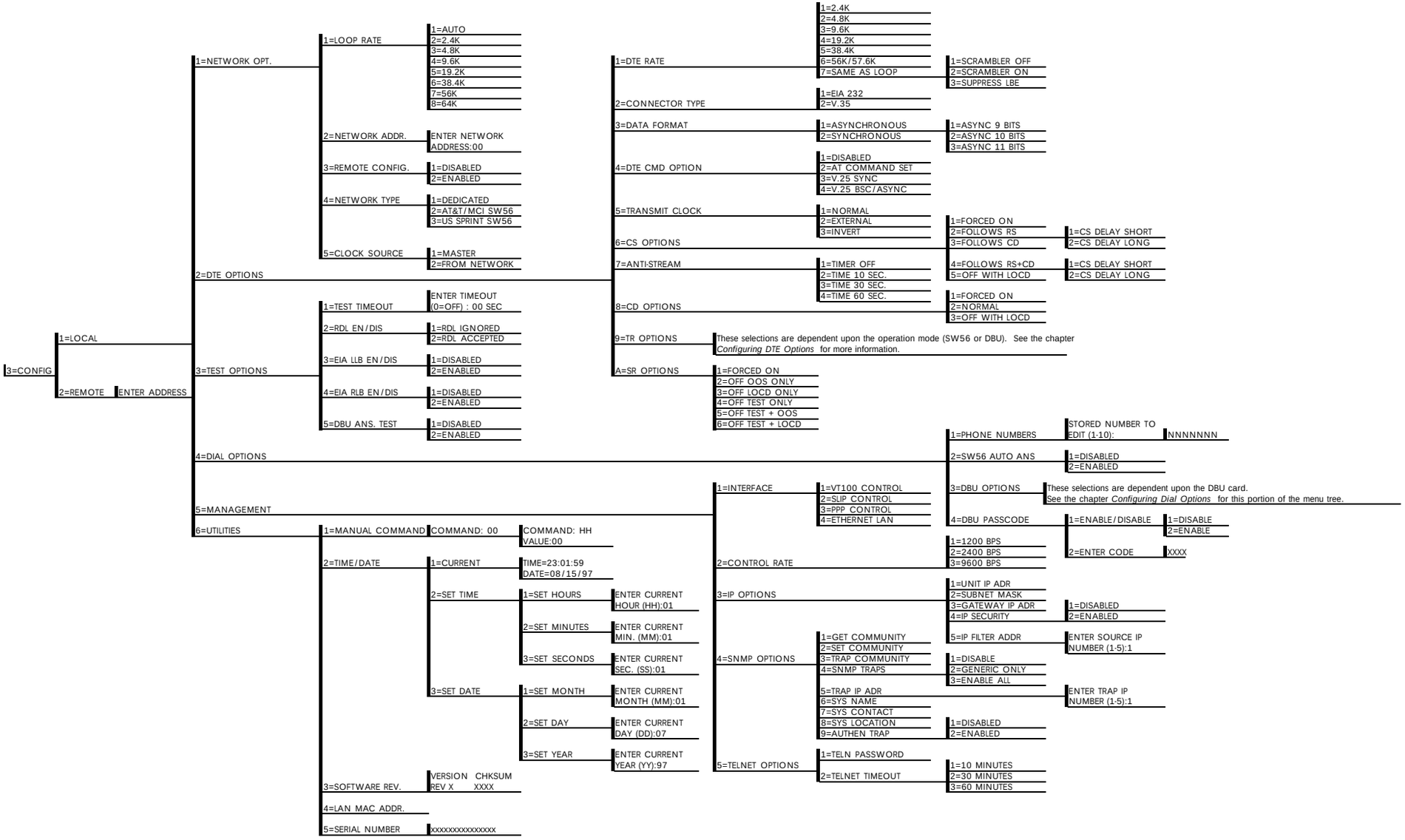



**Figure 5-1**
*Front Panel Configuration Menu Tree*

## AT Commands

The DSU IV ESP 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 IV ESP. 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 IV ESP to configure most of the options or initiate tests to check both the DSU IV ESP 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 IV ESP 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.




*Not all parameters can be selected using these commands. Valid commands are listed in the appendix* ***AT Commands****.*

## V.25 bis Commands

When configured for the V.25 bis option, the DSU IV ESP 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 IV ESP 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 IV ESP 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.

# Chapter 6
# Configuring Network Options

## NETWORK OPTIONS

The Network Options configuration parameters control the loop operation of the DSU IV ESP. Once a parameter is set, **Command Accepted** is displayed briefly before returning to the active menu. Table 6-A shows the AT commands used to set the Network Options. See Figure 6-1 for the Network Options menu tree.

**Table 6-A**
*Network Options AT Commands*

| Front Panel | AT Command |
|---|---|
| **Loop Rate** | |
| AUTO | %B0 |
| 2.4K | %B1 |
| 4.8K | %B2 |
| 9.6K | %B3 |
| 19.2K | %B4 |
| 38.4K | %B5 |
| 56K | %B6 |
| 64K | %B7 |
| **Network Address** | |
| XX (decimal) | _N=xx |
| **Remote Configuration** | |
| 1=DISABLED | &P4 |
| 2=ENABLED | &P5 |
| **Network Type** | |
| 1=DEDICATED | none |
| 2=AT&T/MCI SW56 | none |
| 3=US SPRINT SW56 | none |
| **Clock Source** | |
| 1=MASTER | _X0 |
| 2=FROM NETWORK | _X1 |

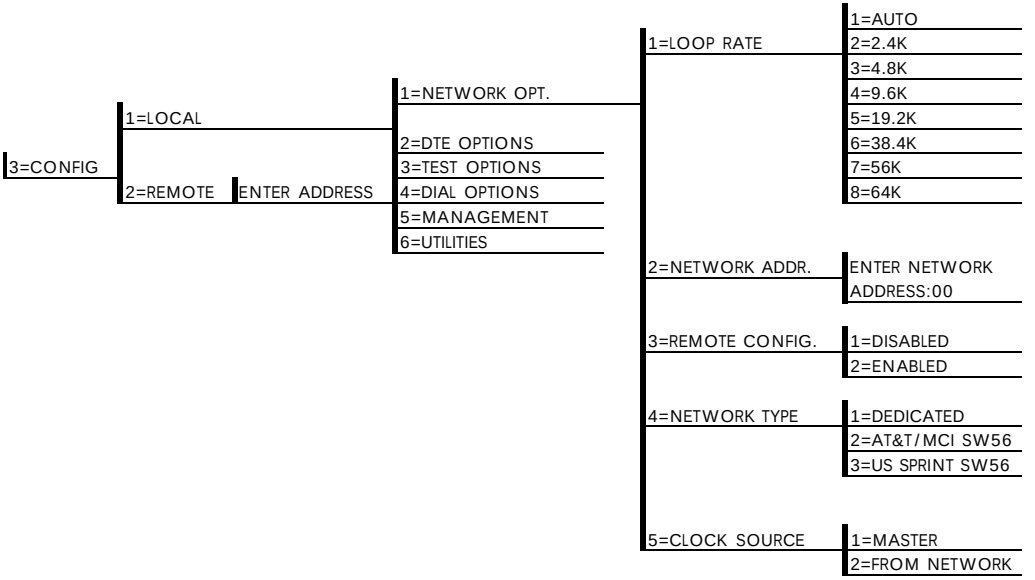



**Figure 6-1**
*Network Options Menu Tree*

## 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 IV ESP also supports subrate DTE data over a 56 or 64 kbps loop. The loop rate must be set independently of the DTE rate. Eight loop rate selections are available (shown in Figure 6-1).

The default factory setting is Auto. The various loop rates and format selections are listed in Table 6-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 IV ESP. This addressing capability makes it possible to perform remote configuration and testing in point-to-point and multi-drop networks. Figure 6-1 shows the menu path used to change the network address. The factory default setting is 0.

## Remote Configuration

This option sets up the DSU IV ESP to accept or reject remote configuration commands. The factory default setting is Enabled.

## Network Type

Select the appropriate network type. The choices are dedicated, AT&T/MCI SW56, and US Sprint SW56.

## Clock Source

The Clock Source option specifies the timing source for the DSU IV ESP's internal circuitry. The factory default setting is From Network.

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

# Chapter 7
# Configuring DTE Options

## DTE OPTIONS

The DTE Options menu is used to select the configuration parameters that control the operation of the DTE Interface of the DSU IV ESP. The DTE Options menu tree is shown in Figure 7-1. Table 7-A shows the available options and their AT commands.

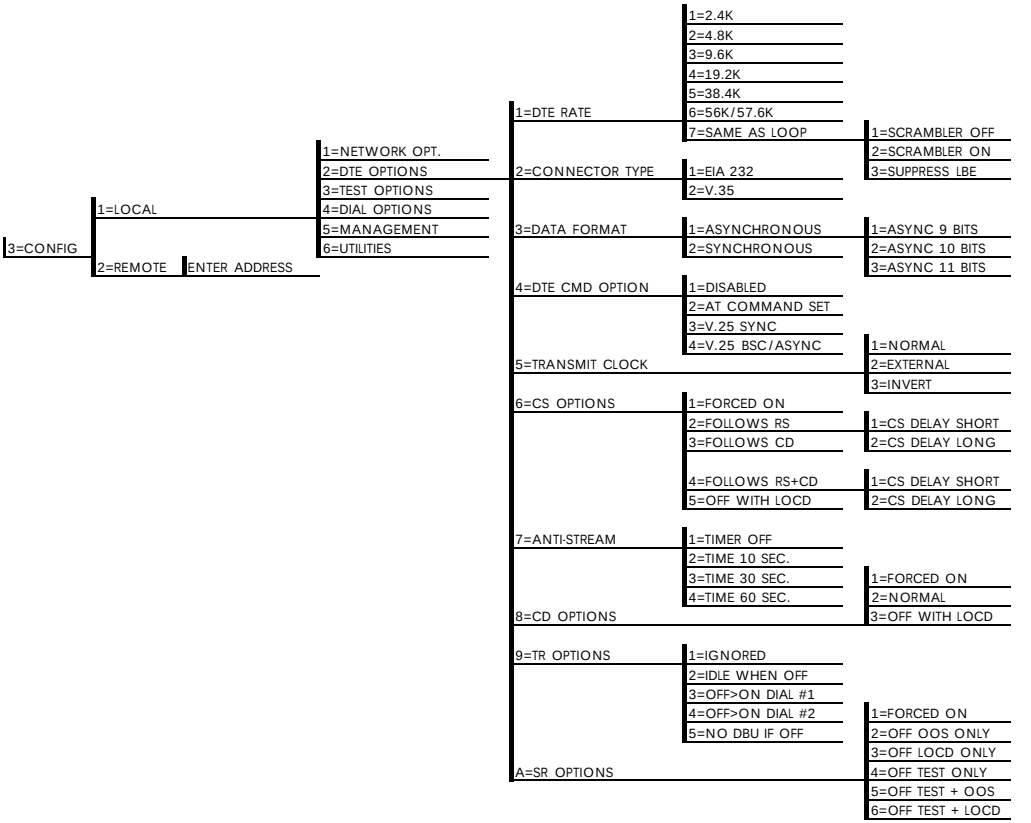



**Figure 7-1**
*DTE Options Menu Tree*

**Table 7-A**
*DTE Options AT Commands*

| Front Panel | AT Command | Description |
|---|---|---|
| **DTE Rate** | | |
| 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 (64 kbps loop rate only) |
| 2=SCRAMBLER ON | _F1 | DTE data scrambler enabled (64 kbps 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) |
| **Data Format** | | |
| 1=ASYNCHRONOUS | &Q0 | Asynchronous DTE operation mode |
| 2=SYNCHRONOUS | &Q2 | Synchronous DTE operation mode |
| **DTE CMD Option** | | |
| 1=DISABLED | none | Disables all DTE command modes |
| 2=AT COMMAND SET | none | Enables AT command mode for DTE |
| 3=V.25 SYNC | none | Enables V.25 (SDLC) command mode for DTE |
| 4=V.25 BSC/ASYNC | none | Enables V.25 (bisync or async) command mode for DTE |
| **Transmit Clock** | | |
| 1=NORMAL | &X0 | TX clock from DSU selected |
| 2=EXTERNAL | &X1 | ETC clock from DTE selected |
| 3=INVERT | &X3 | Inverted Tx clock from DSU selected |

**Table 7-A (Continued)**
*DTE Options AT Commands*

| Front Panel | AT Command | Description |
|---|---|---|
| **CS Options** | | |
| 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 |
| 5=OFF WITH LOCD | &R4 | Off 5 sec after LOCD (SW56 only) |
| 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 |
| **Anti-Stream** | | |
| 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** | | |
| 1=FORCED ON | &C0 | On all the time |
| 2=NORMAL | &C1 | On only when data present on loop |
| 3=OFF WITH LOCD | &C2 | On except after disconnect (SW56 only) |
| **TR Options** | | |
| 1=IGNORED | &D0 | Ignore the TR input |
| 2=IDLE WHEN OFF | &D2 | See the following note. |
| 3=OFF>ON DIAL #1 | &D3 | Dial Stored #1: TR goes off to on (SW56 only) |
| 4=OFF >ON DIAL #2 | &D4 | Dial Stored #2: TR goes off to on (SW56 only) |
| 5=NO DBU IF OFF (valid only when DBU ESP card is installed and Network Type is set to DEDICATED) | &D3 | No dial backup if TR is off. |

**Table 7-A (Continued)**
*DTE Options AT Commands*

| Front Panel | AT Command | Description |
|---|---|---|
| **SR Options** | | |
| 1=FORCED ON | &S0_C1 | Always on |
| 2=OFF OOS ONLY | &S1_C1 | Off when network out of service |
| 3=OFF LOCD ONLY | &S3 | Off 5 sec after disconnect (SW56 |
| 4=OFF TEST ONLY | &S0_C0 | Off for test only |
| 5=OFF TEST+OOS | &S1_C0 | Off for test and OOS |
| 6=OFF TEST + LOCD | &S5 | Off 5 sec after disconnect or test. |




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

## DTE Rate

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 IV ESP briefly displays **DTE RATE SAME AS THE NETWORK** before returning to the status screen. The factory default setting is **SAME AS LOOP**.

If the DSU IV ESP is set for a loop rate of 64 kbps, then scrambler on/off options are available. The factory default setting is Scrambler Off.




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

## Connector Type

The Connector Type option is used to specify which of the primary channel connectors is used to connect to the DTE. The factory default setting is V.35. There are no AT commands available to set 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. If asynchronous is chosen, the length of the data bytes must be selected.

Table 7-A shows the AT commands that can be used to set the Data Format to asynchronous or synchronous.

## DTE Command Option

The DTE Command option is used to enable a DTE command mode or disable all modes. The available modes are AT , V.25 synchronous, and V.25 bisynchronous/asynchronous commands.

## 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 IV ESP. Table 7-A shows the AT commands used to set the Transmit Clock options.

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. Using this option eliminates data errors caused by excessive delays in the DTE transmit clock receiver and transmit data driver.

The Invert clock option is recommended when the EIA-232 connector is used for rates other than 56 kbps or 64 kbps.

## Clear to Send (CS) Options

The CS Options menu is used to select the control mode for the CS lead. The default factory setting is Follows RS with CS Delay Short.

If one of the options chosen involves request to send (RS), then the delay from RS to CS must be selected. Table 7-A shows the AT Commands used to set the CS options.

Specified times for the short and long delays at the different operating speeds are shown in Table 7-B.

**Table 7-B**

*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. The anti-stream timeout is the maximum time the DSU IV ESP 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 IV ESP stops transmitting DTE data into the network but continues to accept data from it. This condition exists until the DTE deactivates the RS input.

The factory default setting is Timer Off. Table 7-A shows the available options and their AT commands.

## 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. Table 7-A shows the equivalent AT commands for setting CD options.

## Data Terminal Ready (TR) Options

The TR Options menu is used to select the DSU IV ESP response to the data terminal ready (TR) lead. The factory default setting is Ignored. Table 7-A shows the equivalent AT commands for setting TR options.




*The NO DBU IF OFF selection is available only when a DBU ESP card is installed and the Network Type is set to DEDICATED.*




*To disable DBU when DTR is off, set this option for IDLE WHEN 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. Table 7-A shows the AT commands for setting SR options.

# Chapter 8
# Configuring Test Options

## TEST OPTIONS

The Test Options menu enables or disables different test modes and specifies the maximum test time allowed. See Figure 8-1 for the Test Options menu tree. The available options and the their AT commands are listed in Table 8-A.

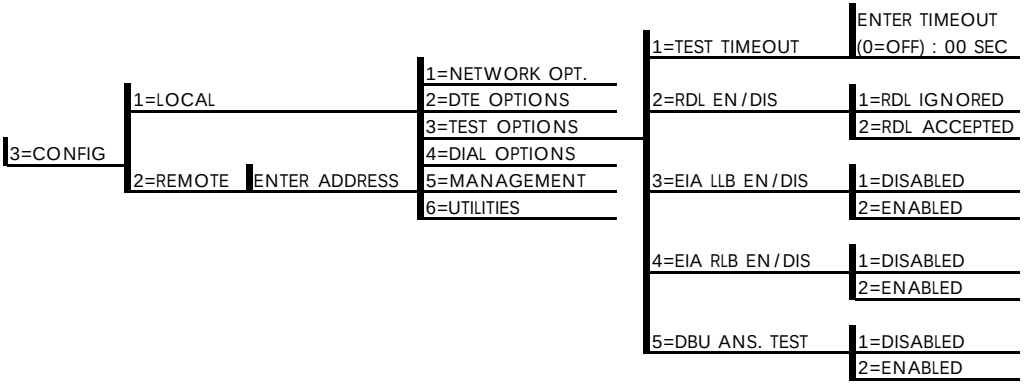



**Figure 8-1**
*Test Options Menu Tree*

**Table 8-A**
*Test Options AT Commands*

| Front Panel | AT Command | Description |
|---|---|---|
| **Test Timeout** | | |
| ENTER TIMEOUT | S18=x | Specify 0 - 255 second test timeout |
| **RDL Enable/Disable** | | |
| 1=RDL IGNORED | &T5 | RDL request from remote DSU ignored |
| 2=RDL ACCEPTED | &T4 | RDL request accepted |
| **EIA LLB Enable/Disable** | | |
| 1=DISABLED | _A0 | No response to local loopback |
| 2=ENABLED | _A1 | Responds to local loopback |
| **EIA RLB Enable/Disable** | | |
| 1=DISABLED | _R0 | No response to remote loopback |
| 2=ENABLED | _R1 | Responds to remote loopback |
| **DBU Answer Test** | | |
| 1=DISABLED | none | Remote unit does not accept DBU tests from far end |
| 2=ENABLED | none | Remote unit accepts DBU tests from far end |

## Test Timeout

The Test Timeout option sets the length of time a DSU IV ESP 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).

## Remote Digital Loopback (RDL)

The RDL option specifies whether the DSU IV ESP responds to an RDL request from the far end of the circuit. The factory default setting is RDL Accepted.

### EIA LLB

The EIA LLB (Electronics Industries Association local loopback) option specifies whether the DSU IV ESP responds to the local loopback input from the DTE. The factory default setting is Disabled.

### EIA RLB

The EIA RLB (remote loopback) option specifies whether the DSU IV ESP responds to the RLB input from the DTE. The factory default setting is Disabled.

### 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. The factory default setting is Disabled.




*The DBU Answer Test is not available if the DBU Criteria option Answer Always is Enabled.*

# Chapter 9
# Configuring Dial Options

## DIAL OPTIONS

The Dial Options menu stores up to ten phone numbers, enables/disables the SW56 auto answer capability, defines the dial backup operation when the DDS circuit fails, and programs the passcode security feature.

Figure 9-1 shows the full Dial Backup Options (4=Dial Options) menu. Note that some items are restricted to certain DBU cards.

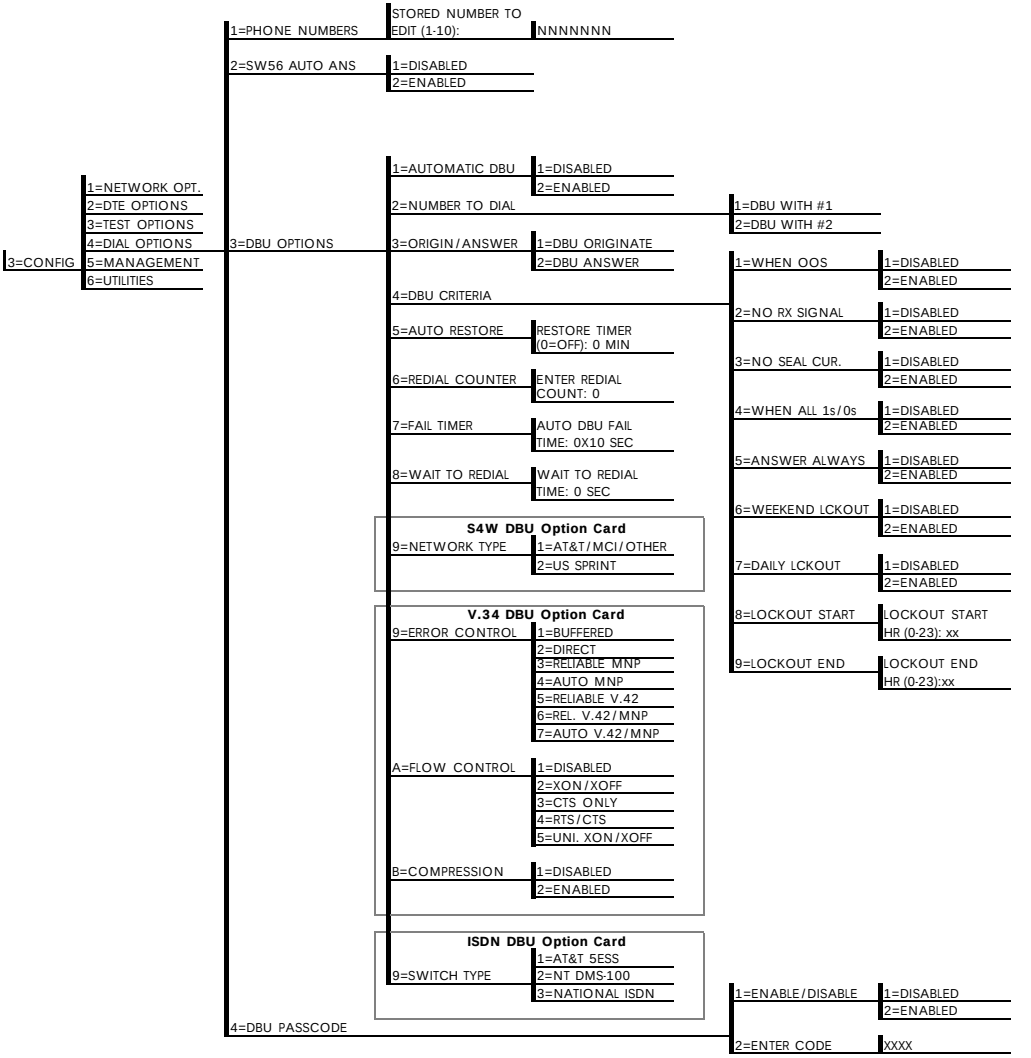



**Figure 9-1**
*Dial Options Configuration Menu Tree*

## PHONE NUMBERS

The DSU IV ESP stores up to 10 numbers of 36 digits each. Edit a phone number by reentering the entire number. This process overwrites the previously stored number.

Table 9-A shows the AT Commands available for the Phone Number options.

## ISDN Dial Backup

### 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 (LDN) Number

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

**Table 9-A**

*AT Commands for Storing Phone Numbers*

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

## SW56 AUTO ANSWER

The SW56 Auto Answer option is used to specify how incoming calls are to be answered. If ENABLED, incoming calls are automatically answered by the DSU IV. If DISABLED, an incoming call can be answered manually, by an AT or V.25 command from the DTE, or by raising TR from the DTE.

## DBU OPTIONS

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 9-B lists the DBU options and their AT commands for all models.

## Standard DBU Options

### 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 Disabled.

### 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 IV ESP 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 With #1.

### Originate/Answer

This option specifies whether the DSU IV ESP 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.

### DBU Criteria

These options specify the conditions that will cause the DSU IV ESP to enter the backup mode.

**When Out of Service (OOS)**
When enabled, the DSU IV ESP 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 IV ESP enters backup mode when a loss of signal is detected. The factory default setting is Enable.

**No Sealing Current**
When enabled, the DSU IV ESP 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 IV ESP 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 IV ESP 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.

**Answer Always**
If enabled, the answer unit answers any incoming call regardless of failed conditions.

**Weekend Lockout**
If enabled, no backup will occur from midnight Friday to midnight Sunday.




*Weekend and daily lockout apply to automatic DBU only. Manual DBU is not affected. Also, this parameter affects the originate end only. The answer end remains DBU-capable at all times.*

**Daily Lockout**
Enable/disable the daily lockout specified by the fields Enable Hour and Disable Hour.

**Lockout Start**
Enter the hour that the daily lockout begins and dial backup is disabled (0 to 23). Only applies if the Daily Lockout parameter is ENABLED.

**Lockout End**
Enter the hour that the daily lockout ends and dial backup is reactivated (0 to 23). Only applies if the Daily Lockout parameter is ENABLED.

### Auto Restore

Once the DDS circuit is down, the DSU IV ESP 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 IV ESP re-dials 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 IV ESP 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 IV ESP attempts

backup. The amount of time, which is manually entered, can be up to 990 seconds. The factory default setting is 30 seconds.

**AUTO DBU FAIL**
**TIME: __ __ x 10sec**

### 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 99 seconds. The factory default setting is 10 seconds.

**WAIT TO REDIAL**
**TIME: __ __ SEC**

**Table 9-B**
*DBU Options AT Commands for All Models*

| Front Panel | AT Command | 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 |
| **DBU Criteria** | | |
| WHEN OUT OF SERVICE | | |
| 1=Disabled | _G0 | No DBU for OOS |
| 2=Enabled | _G1 | DBU when OOS |
| NO RECEIVE (RX) SIGNAL | | |
| 1=Disabled | _H0 | No DBU when RX signal absent |
| 2=Enabled | _H1 | DBU when RX signal absent |
| NO SEALING CURRENT | | |
| 1=Disabled | _I0 | No DBU when sealing current absent |
| 2=Enabled | _I1 | DBU when sealing current absent |
| WHEN ALL 1S/0S | | |
| 1=Disabled | _P0 | No DBU when all 1s/0s detetected |
| 2=Enabled | _P1 | DBU when all 1s/0s condition exists |
| ANSWER ALWAYS | | |
| 1=Disabled | none | Answer unit answers only under specified conditions. |
| 2=Enabled | none | Answer unit answers any incoming call regardless of failed condition. |

**Table 9-B (Continued)**
*DBU Options AT Commands for All Models*

| Front Panel | AT Command | Description |
|---|---|---|
| WEEKEND LOCKOUT | | |
| 1=Disabled | none | Disables weekend lockout feature |
| 2=Enabled | none | No backup occurs from midnight Friday to midnight Sunday |
| DAILY LOCKOUT | | |
| 1=Disabled | none | Sets dial backup lockout starting hour |
| 2=Enabled | none | Sets dial backup lockout ending hour |
| LOCKOUT START | none | Sets hour to enable dial backup |
| LOCKOUT END | none | Sets hour to disable dial backup |
| **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 S4W Card

**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 IV ESP when dialing. Options include: AT&T/MCI/Other and US Sprint.

## DBU Options for V.34 Card

Table 9-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.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.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 33.6 kbps for the V.34. The factory default setting is Enabled.

**Table 9-C**
*DBU Options AT Commands for V.34 Card*

| 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=UNI XON/XOFF | \Q4 | Unidirectional XOn/XOff |
| **Compression** | | |
| 1=DISABLED | %C0 | Compression disabled |
| 2=ENABLED | %C1 | Compression enabled |

## DBU Options for ISDN Card

### 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 ISDN

## DBU Passcode

The dial backup passcode adds an additional level of security to the DSU IV ESP. 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 10
# Configuring Management Functions

The Management menu is used to select the desired management interface type and to set up the necessary parameters for establishing TELNET or SNMP management. See Figure 10-1 for the Management menu tree.

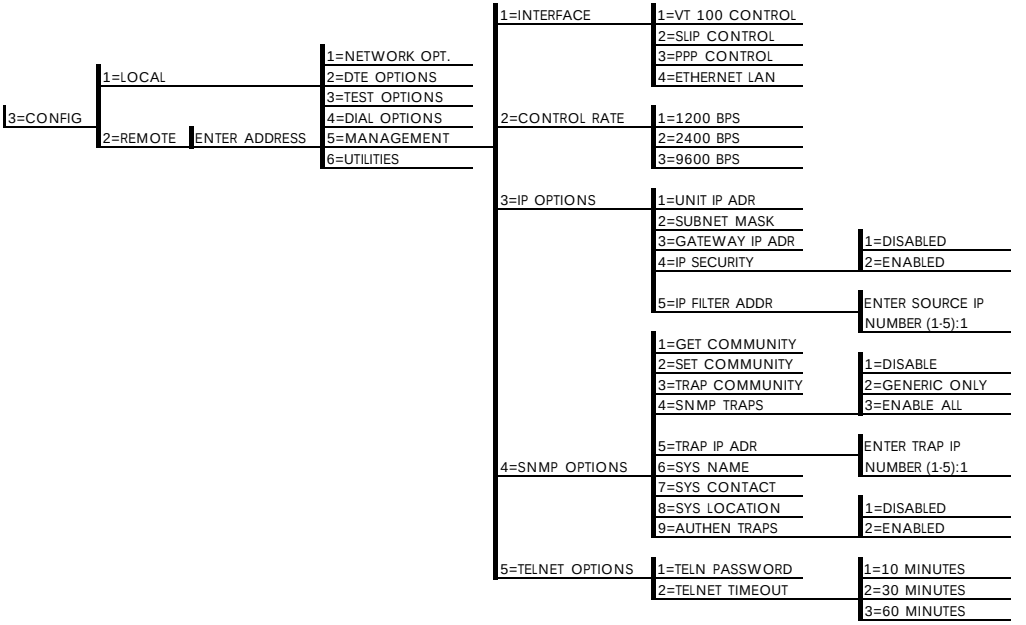



**Figure 10-1**
*Management Menu Tree*

## Interface

Select the management interface type (VT 100 terminal, SLIP, or PPP) or select Ethernet LAN (ESP Ethernet card must be installed).

## Control Rate

Select the control port operating speed to match the connected device (this selection only applies when the interface options is set for VT 100 terminal, SLIP, or PPP).

## IP Options




*When configuring the DSU IV with the front panel, use the "*" key to enter a decimal point.*

### Unit IP Address

Enter the DSU IV ESP IP address in dotted decimal notation.

### Subnet Mask

Enter the subnet number in dotted decimal notation. This address is available from the network administrator.

### Gateway IP Address

Enter the Gateway node IP address in dotted decimal notation. This address is necessary only if the DSU IV and network manager are connected through a Gateway node. If an IP packet with an unknown IP address is received, the DSU IV sends it to the Gateway.

### IP Security

Enable/disable the IP security option. If enabled, the DSU IV only accepts management commands from the IP addresses (up to 5) entered into the IP Filter Address field.

### IP Filter Address

Enter the IP addresses of the management stations from which the DSU IV should accept management commands. This filter must be enabled though the IP Security field.

## SNMP Options

The following options must be configured when SNMP management is used.

**Get Community**
For SNMP operation, view and edit the Get community string. The DSU IV uses this string to validate SNMP Get (read) requests. The default value is *public*. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

**Set Community**
For SNMP operation, view and edit the Set community string. The DSU IV uses this string to validate SNMP Set (write) requests. The default value is *private*. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

**Trap Community**
For SNMP operation, view and edit the Trap community string. The DSU IV sends this string in SNMP trap messages to the network manager. The default value is *dsuiv*. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

**SNMP Traps**
Specify which traps the DSU IV will send to the network manager. When enabled, the DSU IV sends SNMP traps to network managers for alarm conditions. The options are DISABLE, GENERIC ONLY, and ENABLE ALL. The GENERIC ONLY option enables the Generic Standard traps specified in the SNMP standard, RFC 1157. The ALL option sends both Generic Standard traps and the enterprise-specific traps specified in the ADTRAN DSU IV MIB.

**Trap IP Address**
Enter up to five IP addresses of the SNMP managers to which the DSU IV should send traps.

#### System Name, Contact, and Location

These data fields are general information strings (defined in MIB-II standard, RFC 1213) which can be stored by the user and retrieved by the SNMP management station. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

#### Authentication Traps

Enable/disable the DSU IV to send SNMP authentication traps to the SNMP management station. If enabled, the DSU IV sends these traps when an SNMP request with an invalid community name string is received.




*The ADTRAN DSU IV ESP MIB is available in the support section of the ADTRAN Web page at www.adtran.com.*

## TELNET Options

#### TELNET Password

View/edit the TELNET password. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

#### TELNET Timeout

Select the inactivity time limit. If the unit is idle for the designated amount of time the unit times out, closing the TELNET

session.

## ENTERING LETTERS USING THE FRONT PANEL

Some Management menus require the entry of letters rather than numbers. When configuring the unit using the front panel, special steps must be taken in order to perform these entries. The following example of entering the TELNET Password illustrates this procedure:

1. Press **5**, then **Enter** to select TELNET OPTIONS from the Management menu.
2. Press **1**, then **Enter** to select TELN PASSWORD.
3. Press the **Up Arrow** to delete the existing entry.
4. Press the **Shift** key. The cursor appears as an underscore ( _ ).
5. Use the **Up** and **Down Arrow** keys to scroll to the appropriate letter.
6. Once the letter is displayed, press **Shift**. A block cursor appears in the next field.
7. To enter another letter, press **Shift**. The cursor again appears as an underscore.
8. Repeat this procedure until all letters have been entered.
9. Once password entry is complete, press the **Enter** key.




*A block cursor signifies movement from field to field. When this cursor is active, pressing the **Up Arrow** key deletes the current entry of that field. Pressing the **Down Arrow** key advances the cursor to the next field. An underscore cursor signifies letter entry. When active, pressing the **Up** and **Down Arrow** keys scrolls the alphabet.*

# Chapter 11
# Configuring Unit Utilities

The Utilities menu is used to enter manual commands, set/view the time and date, and view the software version, LAN MAC address, and unit serial number . See Figure 11-1 for the Utilities menu tree. AT commands are not available for this menu.

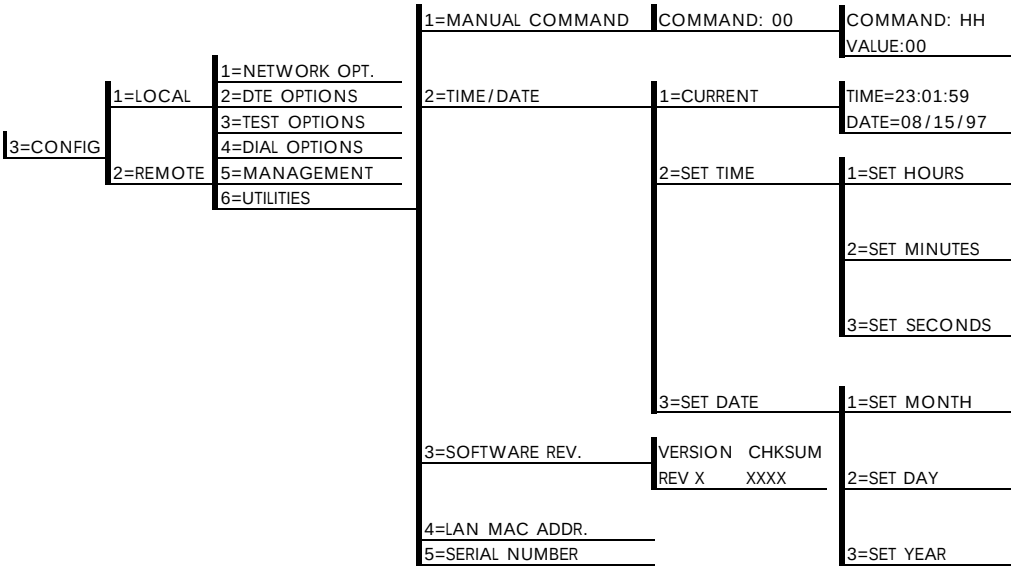



**Figure 11-1**
*Utilities Menu Tree*

## Manual Command

The Manual Command option is a shortcut method for entering configuration and control commands for the DSU IV ESP. Figure 11-1 shows the menu path for the manual command. The available manual commands are listed in Table 11-A. When using the front panel, perform the following steps to enter a manual command:

1. Select 3=CONFIG from the Main menu.
2. Select 1=LOCAL.
3. Select 6=UTILITIES.
4. Select 1=MANUAL COMMAND.
5. The first display prompts for command number entry:

   **COMMAND:00**

   Use the **Up Arrow** key to delete the current entry, then use the number keys to enter the new value. Press **Shift** to activate letters A-F.
6. Press **Enter** to complete the Command entry.
7. 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**

8. Use the number keys to enter the hexadecimal value. Press **Enter** to complete. The system briefly displays **Command Accepted** (if the entry is valid) and returns to the active menu.

**Table 11-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 |

### Time/Date

View/set the current time and date. Entering this information is only necessary for the Weekend and Time of Day Lockout features.




*The DSU IV ESP has been tested for year 2000 compliance.*

### Software Revision

View the current revision of the software installed in the DSU IV.

### LAN MAC Address

View the LAN MAC address. This address is available when the ESP ethernet option card is installed.

### Serial Number

View the DSU IV's serial number.

# Chapter 12
# Testing and Troubleshooting

## TEST OVERVIEW

The DSU IV ESP performs a variety of diagnostic functions that isolate portions of the circuit to identify the problem source. Tests may be initiated and terminated through the front panel, VT 100 terminal, SNMP, or TELNET. 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. See Figure 12-1.

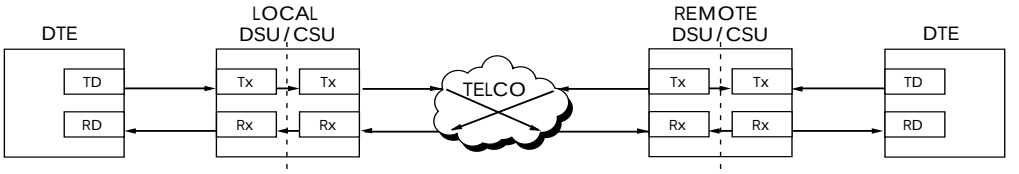



**Figure 12-1**
*Normal Operation Before Initiating Loopback Test*

**CAUTION**

*All diagnostic tests disrupt data flow.*

## Initiating a Test

Initiate tests using the following procedure:

1. Select Test from the Main menu by pressing **2**, 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 12-2 shows the menu path for initiating a local DTE and Loop test.

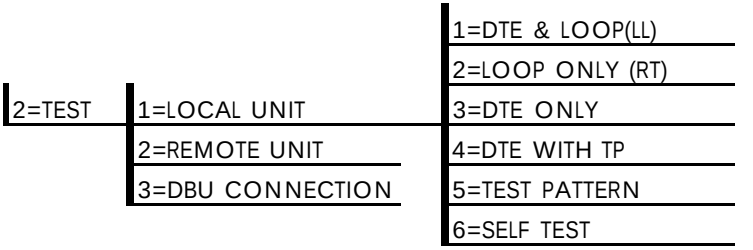



**Figure 12-2**
*Initiating a Test*

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 12-3 shows an example of a Test Status Display for a test with a test pattern.

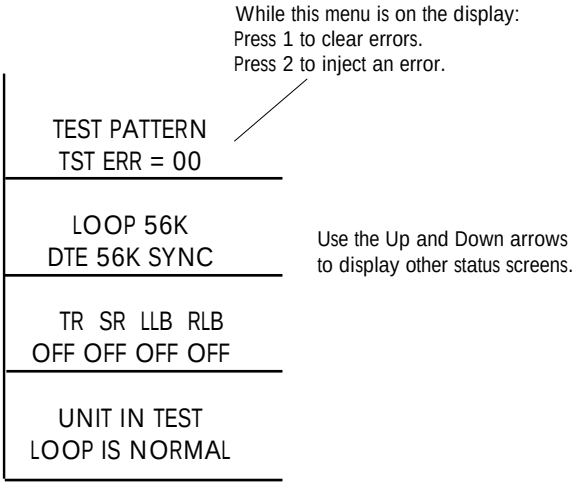



**Figure 12-3**
*Sample Test Status Displays*

## 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 12-4):

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

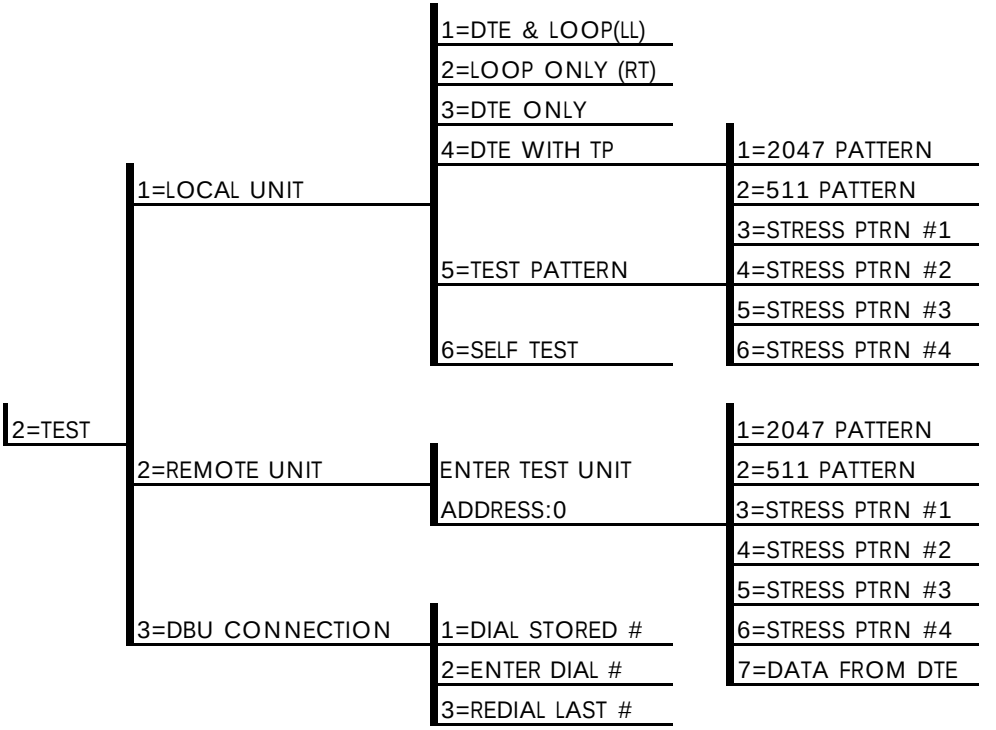



**Figure 12-4**
*Complete Test Menu*

## 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 gives 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 12-A are displayed on the LCD.




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

**Table 12-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 12-B to ensure the unit is configured properly.

After verifying the items listed in Table 12-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 12-B**
*Troubleshooting New Installs*

| Configuration Item to Check | Option Selection | Action |
|---|---|---|
| **DTE Type** | EIA-232 or V.35 | From the Configuration menu, select the type of DTE interface option to connect to the DSU/CSU. |
| **Loop Rate** | Auto, 2.4 to 64 kbps | From the Configuration menu, select the DDS loop rate of the DDS circuit. |
| **Data Format** | Async or Sync | From the Configuration menu, select the type of data to be used. |
| **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 whether 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 whether the unit's internal transmitter and receiver are 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.




*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 IV ESP can perform six different tests; see Table 12-C.

**Table 12-C**
*Test AT Commands*

| Front Panel Display | AT Command | Description |
|---|---|---|
| DTE & Loop (LL) | &T10 | TD/RD and RX/TX Loopbacks |
| Loop Only (RT) | &T11 | RX/TX Loopback at Network Interface |
| DTE Only | &T1 | TX/RX Loopback at DTE 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<br>RD = Customer Receive Data<br>TX = Network Transmit Data<br>RX = Network Receive Data | | |

The test patterns shown in Table 12-D are available for the DTE with Test Pattern and Test Pattern tests.

**Table 12-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)

The DTE & Loop test splits the DSU IV ESP 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 12-5 illustrates the loopback points and the signal paths for this test.

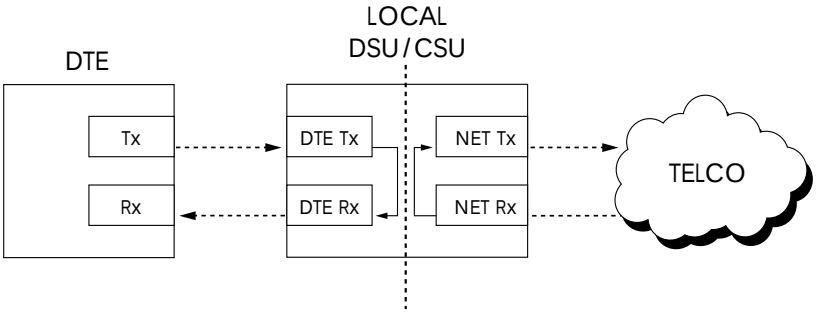



**Figure 12-5**
*DTE & Loop Test*

### 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.

### 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 IV ESP to be tested from the remote site over the actual communication circuit. Figure 12-6 illustrates the loopback point and the signal paths for this test.

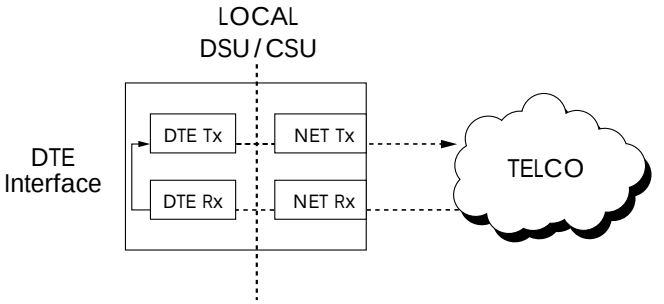



**Figure 12-6**
*Loop Only Test*

### Test Purpose

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

### 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 IV ESP.

## DTE Only

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

NOTE

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

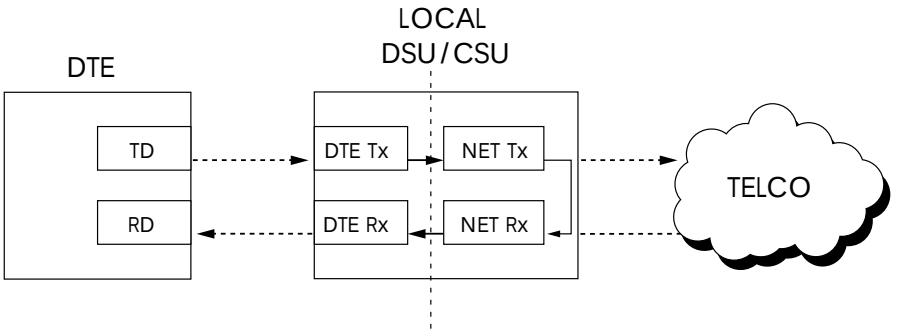



**Figure 12-7**
*DTE Only Test Diagram*

### 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 IV ESP.

### 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 IV ESP. Figure 12-8 illustrates the loopback point and the data paths for this test.

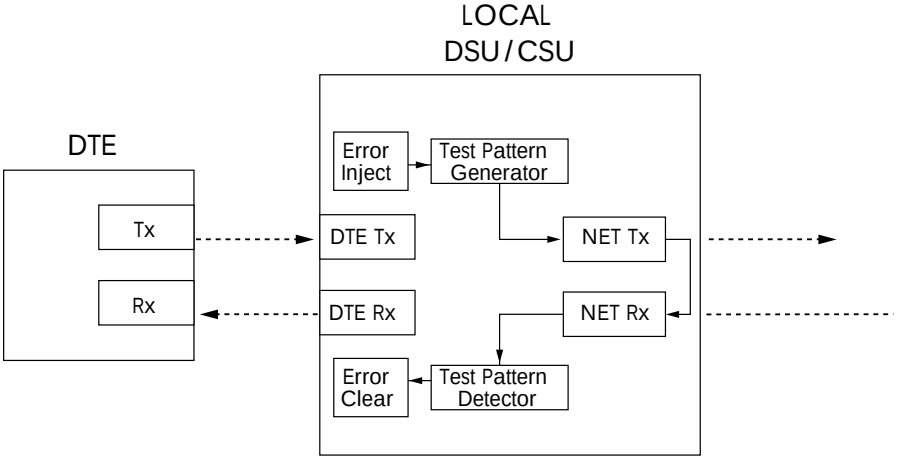



**Figure 12-8**
*DTE with Test Pattern*

### 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 IV ESP.

### Interpreting Test Results

If the unit is functioning properly, the DSU IV ESP 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 IV ESP 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 12-9 illustrates the data paths for this mode.

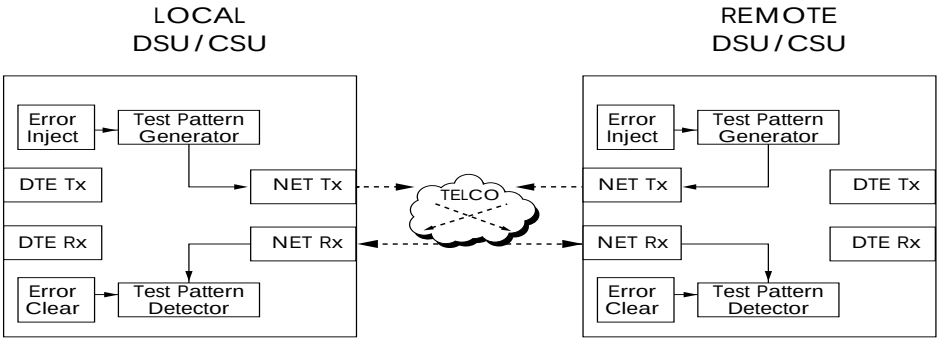



**Figure 12-9**
*Test Pattern Only*

### 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.

### 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 IV ESP. 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 it to determine if the DSU is functioning properly.

### 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 IV ESP can perform seven different tests; see Table 12-E.

**Table 12-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.

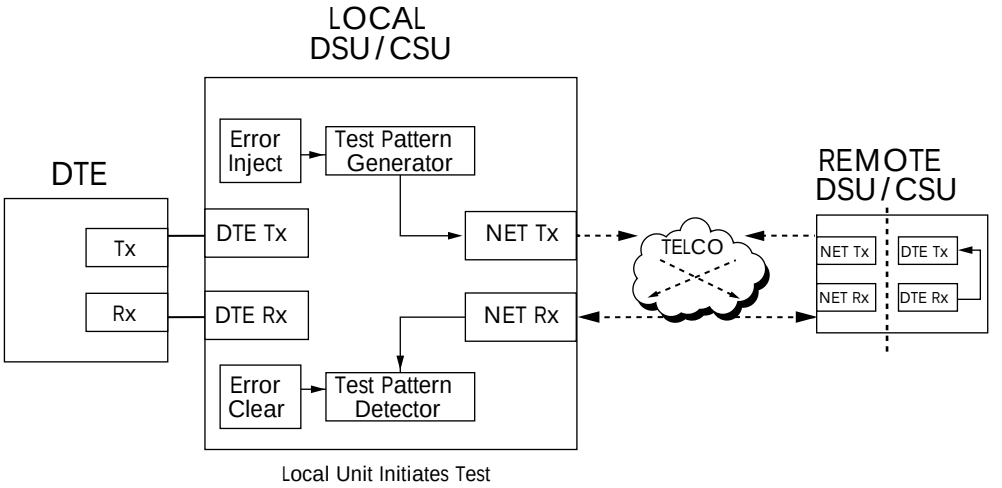



**Figure 12-10**
*V.54 RDL with Test Pattern*

### 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 12-11 to place a remote DSU IV ESP into loopback.

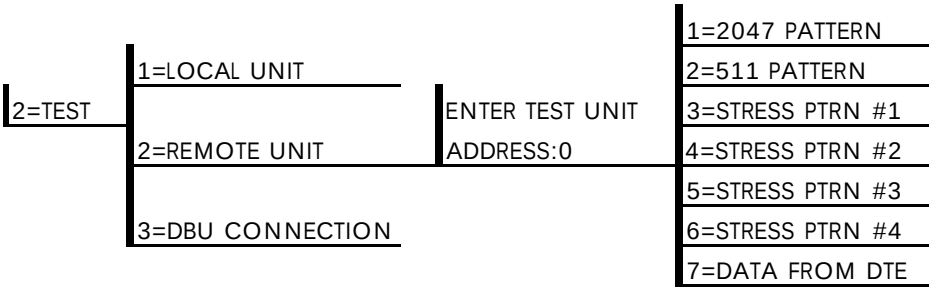



**Figure 12-11**
*Initiating a Remote Test*

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 IV ESP 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, enter a number to dial, or redial the last dialed number. After establishing DBU connection, the DSU IV ESP 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 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.*

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

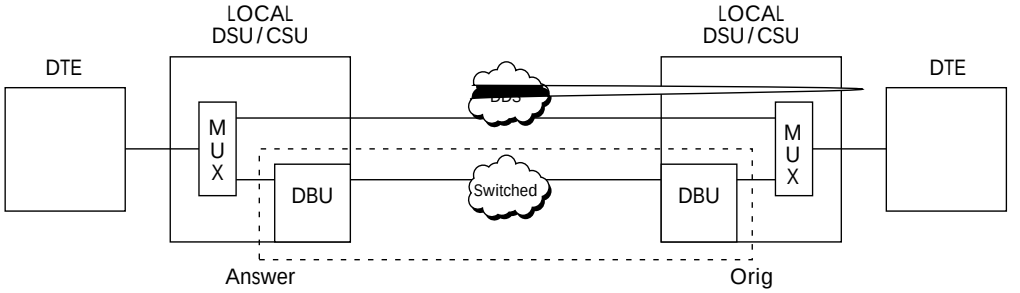



**Figure 12-12**
*DBU Connection Test*

### Test Purpose

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

### Initiating

Follow the menu path outlined in Figure 12-13 to initiate a DBU connection test.

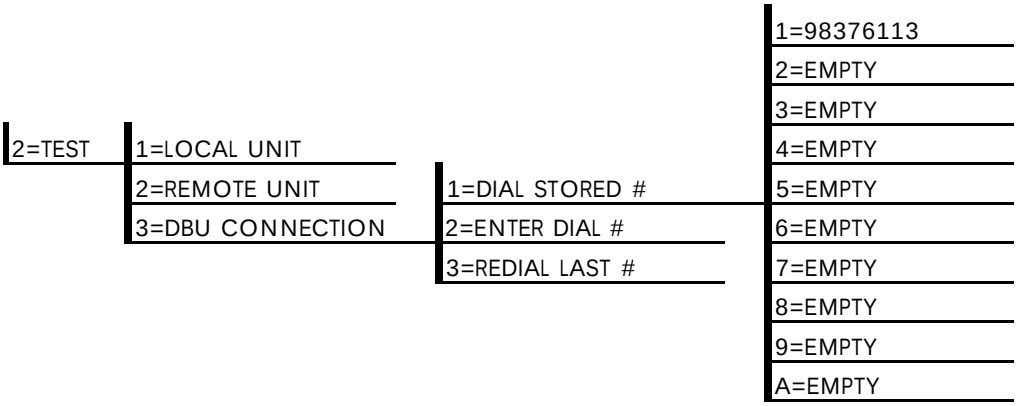



**Figure 12-13**
*Initiating a DBU Connection Test*

### Interpreting Test Results

If the unit is functioning properly, the DSU IV ESP displays:

**DBU TEST PATTERN**
**TST ERR = 0000**

# Chapter 13
# Activating Dial Functions

## DIAL OPTIONS

The dial options available from the Main menu (4=Dial) vary depending on the network type selection (3=CONFIG, 1=NETWORK OPT, 4=NETWORK TYPE). If AT&T/MCI SW56 or US SPRINT SW56 is selected, the options appear as shown in Figure 13-1. If DEDICATED is selected and a DBU card is installed, the options appear as shown in Figure 13-2.

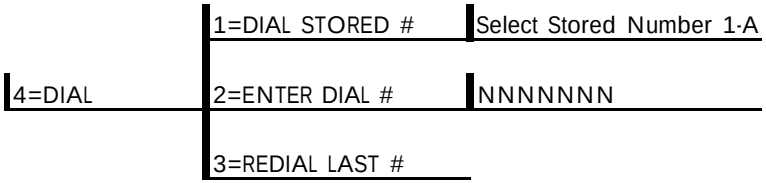



**Figure 13-1**
*Dial Options Menu (SW56)*

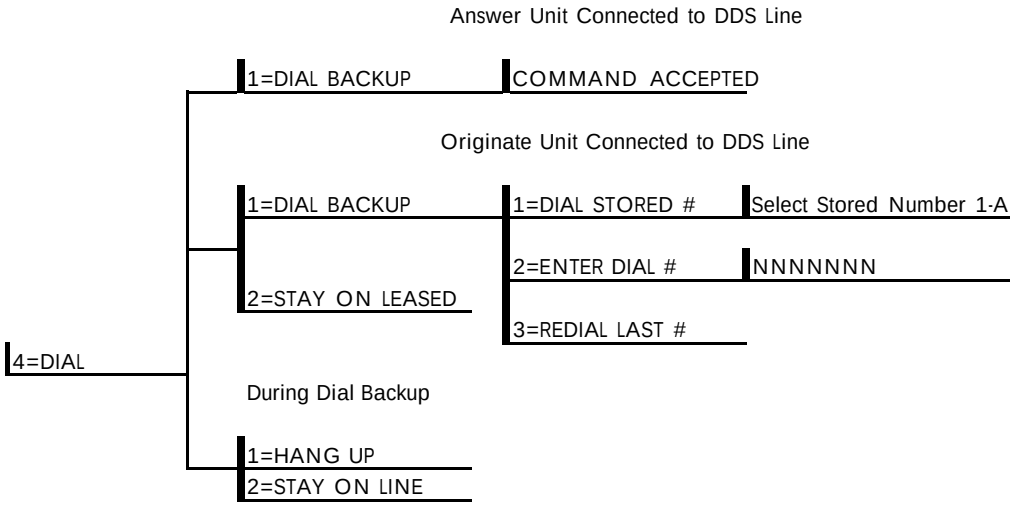



**Figure 13-2**
*Dial Options Menu (Dedicated)*

### Answer Unit Connected to DDS Line

#### Dial Backup

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

### Originate Unit Connected to DDS Line

#### Dial Backup

The DSU IV ESP prompts to dial a stored number or enter a number to dial for dial backup.

#### Stay on Leased

The DSU IV ESP remains on the leased line and does not enter dial backup mode.

### 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 IV ESP remains in dial backup mode and returns to the Status menu.

# Chapter 14
# Viewing Status Information

## 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 IV ESP automatically reverts to the Status display; see Figure 14-1.

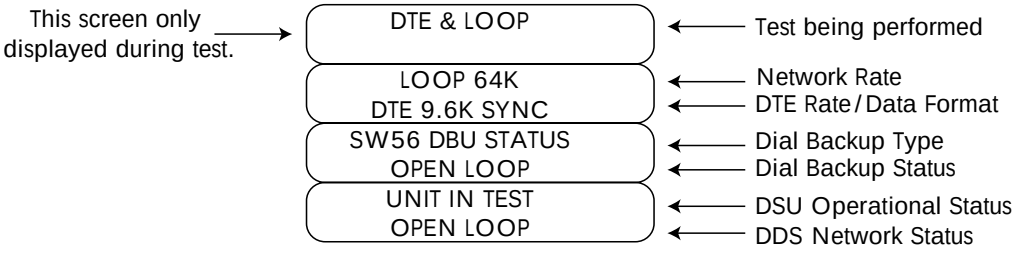



**Figure 14-1**
*Status Display*

### Network Rate, DTE Rate, and Data Format

This display line (see Figure 14-1) 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 14-1) indicates the type of dial backup service installed in the DSU IV ESP. The following messages are displayed according to the dial backup option installed in the DSU IV ESP:

| | |
|---|---|
| ISDN DBU Status | 1 B+D Basic Rate ISDN backup option installed. |
| SW56 DBU Status | 4-wire Switched 56 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 IV ESP unit. |

### Current Status of Dial Backup Mode

This display line (see Figure 14-1) indicates the backup service status. Possible messages include the following:

| | |
|---|---|
| Answering Call | The DSU IV ESP 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 IV ESP 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 IV ESP is currently in dial backup mode. |
| No RX Signal | Sealing current detected but no data signal received from telco. Also indicates ISDN line is inactive. |
| 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 IV ESP. |
| 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 (4-wire SW56 only). |
| Open Loop | The physical connection to the backup line has been broken (4-wire SW56 only). |
| DBU Line in RDL | Remote end initiated a test. |
| Test From Telco | The network provider has activated the CSU loopback (4-wire SW56 only). |
| DBU Test Pattern | The DSU IV ESP is currently performing a test with a pattern. |
| Waiting for Call | The originating DSU IV ESP is waiting on a call from the remote end. |

| | |
|---|---|
| Inactive | A DBU card is installed but the DSU IV ESP is set to SW56 mode. |
| Getting TEI | The ISU card is getting its first terminal endpoint identifier from the network. |
| Register SPID | The ISU card is registering its first SPID with the network. |

### DSU Operation and Network Status

#### Current DSU IV ESP Status

This display line (see Figure 14-1) indicates current DSU IV ESP 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 IV ESP is ready to send data. |
| Unit in Test | The DSU IV ESP 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 14-1) 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 IV ESP 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.

# Appendix A
# Pinouts

The following tables give the pin assignments for the connectors located on the back of the DSU IV ESP, the DBU cards, and the ESP ethernet card. For more information on the connectors, see the chapter *Installation*.

**Table A-A**

*Pin Assignments for Telco Connector*

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

**Table A-B**

*Pin Assignments for ESP DBU Card Connectors*

| 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 |
| **V.34 and 1B+D ISDN** | | |
| 1-3 | - | Not Used |
| 4 | T | Network-Tip |
| 5 | R | Network-Ring |
| 6 - 8 | - | Not Used |

**Table A-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 A-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) |

**Table A-E**

*Pin Assignments for Control Connector*

| RJ Pin# | Function | Direction |
|---|---|---|
| 1 | GND | |
| 2 | RTS | I |
| 3 | TD | I |
| 4 | DSR | O |
| 5 | RD | O |
| 6 | CTS* | O |
| 7 | not used | not used |
| 8 | not used | not used |
| *Used for hardware flow control. | | |

**Table A-F**
*Pin Assignments for 10baseT Connector*

| Pin | Name | Description |
|---|---|---|
| 1 | TD+ | The positive signal for the TD differential pair. This signal contains the serial output data stream transmitted onto the network. |
| 2 | TD- | The negative signal for the TD differential pair (pins 1 and 2). |
| 3 | RD+ | The positive signal for the RD differential pair. This signal contains the serial input data stream received from the network. |
| 4, 5 | N/A | not used |
| 6 | RD- | The negative signal for the RD differential pair (pins 3 and 6). |
| 7, 8 | N/A | not used |

# Appendix B
# AT Commands

Table B-A shows the AT commands available for the DSU IV ESP.

**Table B-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 | CD Option | 0 |
| AT&Dn | TR Option | 0 |
| AT&Fn | Restore Factory Options | none |
| AT&Ln | Network Type | 0 |
| AT&Pn | Remote Configuration | |
| AT&Qn | DTE Data Format | 0 |
| AT&Rn | CS Options | 0 |
| AT&Sn_Cn | SR Options | 0 |

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

| Command | Title | Default |
|---|---|---|
| AT&Zn=x | Store Phone Number | none |
| AT\Nn | Error Control (V.34 DBU) | 0 |
| AT\Qn | Flow Control (V.34 DBU) | |
| AT\Tn | Inactivity Timer | |
| AT%Bn | Loop Rate Select | 0 |
| AT%Cn | Compress Option (V.34 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_Rn | RLB 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 |

# Appendix C
# Terminal Menu Structure

This appendix describes the terminal menus used when managing the DSU IV ESP through either a VT 100 terminal interface or a TELNET session. Examples of the terminal screens as well as a menu tree (Figure C-2) are provided.




*Due to the increased display capabilities, the VT 100 menu structure differs from the front panel interface. Descriptions of individual menu options are provided throughout this manual based on the front panel menu structure. See Figure 5-1 for the front panel configuration menu tree.*

## TERMINAL INTERFACE MAIN MENU

The terminal Main menu is the opening menu to all operations of the DSU IV. Select one of the choices by pressing the corresponding number; then press **Enter**. See Figure C-1.




*The Dial selection in the terminal Main menu is determined by two things: the Network Type selected in the Configuration menu and the presence/absence of a DBU card. See Table C-A.*

**Table C-A**
*Terminal Main Menu Dial Selection*

| Network Type Selected | DBU Card | Sixth Selection |
|---|---|---|
| DEDICATED | installed | DIAL ESP DBU |
| SW56 | N/A | DIAL SW56 |
| DEDICATED | not installed | no selection available |

```
                    DSU IV ESP TERMINAL MENU

 1 STATUS
 2 LOCAL CONFIG
 3 REMOTE CONFIG
 4 LOCAL TEST
 5 REMOTE TEST
 6 DIAL SW56

--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
ESC = EXIT                ENTER SELECTION ->
```

**Figure C-1**
*Terminal Interface Main Menu (SW56 Network Type Selected)*

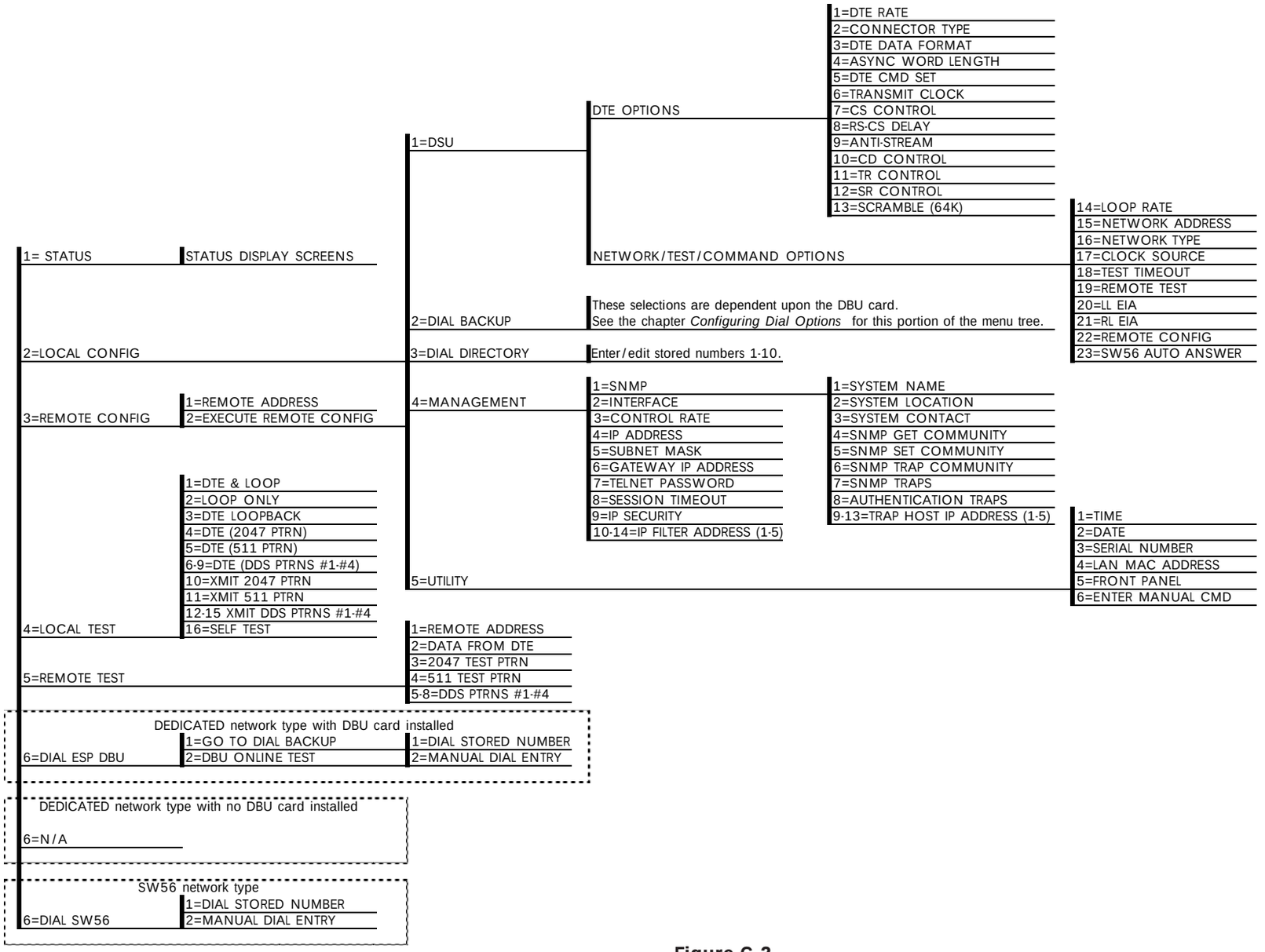



**Figure C-2**
*Terminal Menu Tree*

## Status Menus

Status menus display all relevant information for the network and DTE interfaces. For more information, see the chapter *Viewing Status Information*. See Figure C-3.

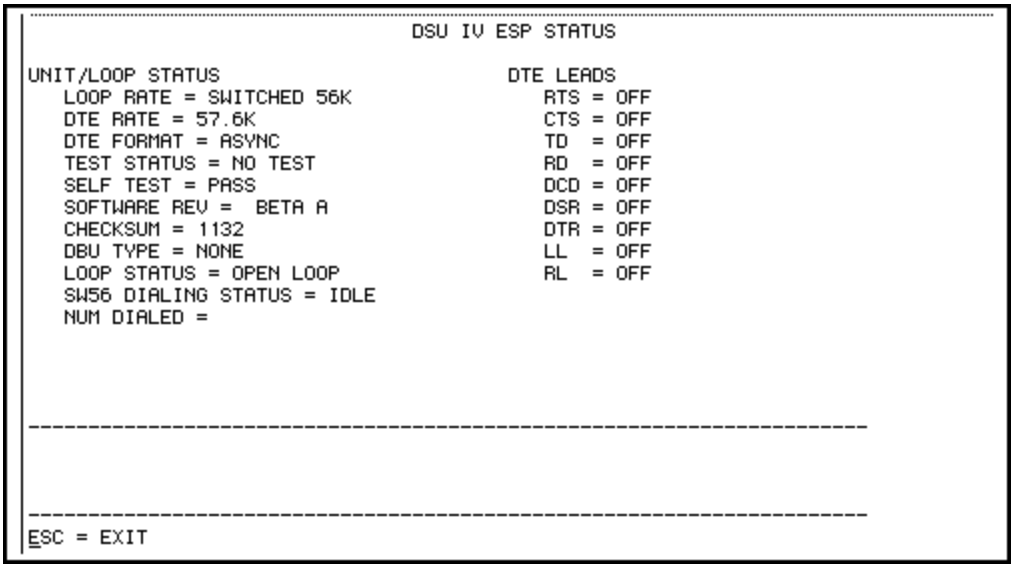



**Figure C-3**
*Status Menu*

## Local/Remote Configuration Menus

When Local Configuration is selected, the screen in Figure C-5 appears. For Remote Configuration, the remote address must be entered through the menu shown in Figure C-4. After entering the address, the menu in Figure C-5 appears.

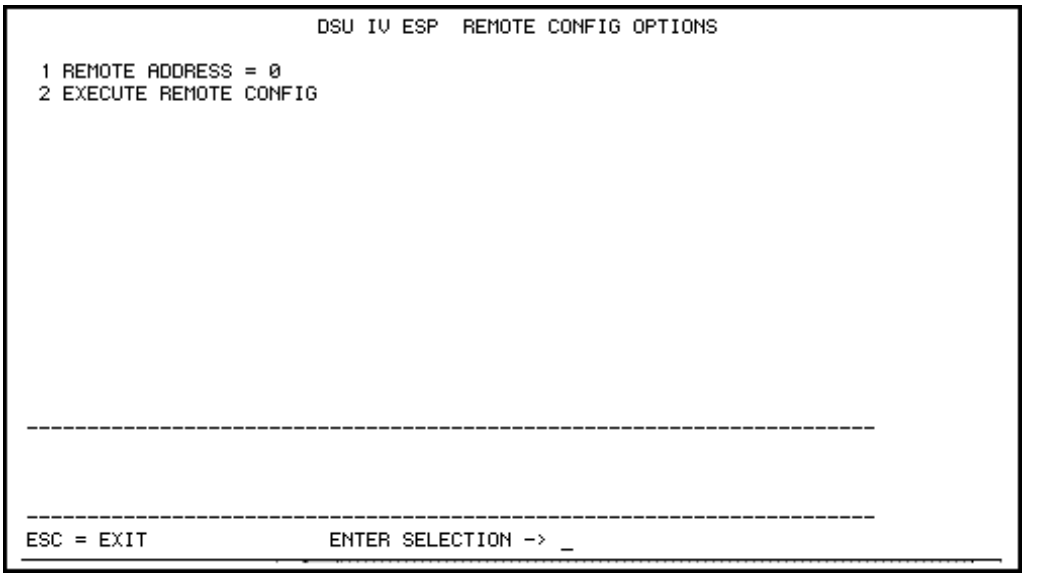



**Figure C-4**
*Remote Configuration Options*

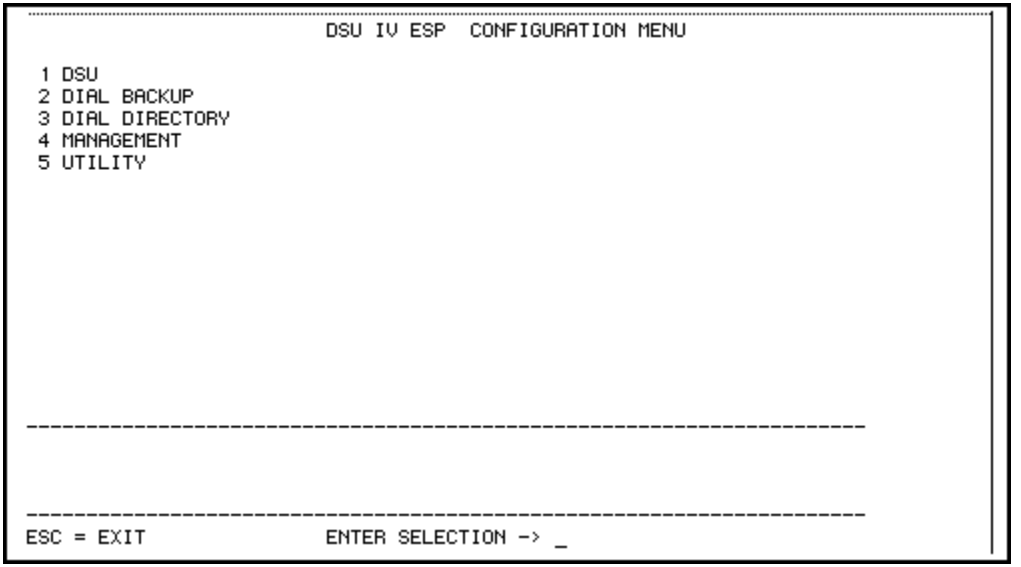



**Figure C-5**
*Main Configuration Menu*

### DSU Configuration (DTE, Network, and Test options)

The chapters *Configuring Network Options*, *Configuring DTE Options*, *Configuring Test Options*, and *Configuring Dial Options* include detailed descriptions of these parameters. See Figure C-6.

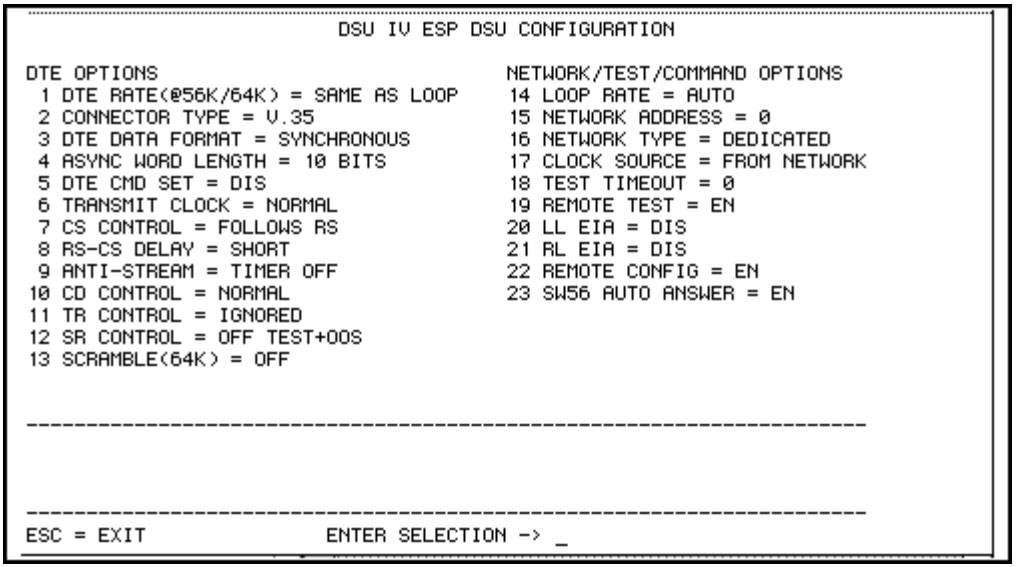



**Figure C-6**
*DSU Configuration Menu*

### DBU Configuration

This menu changes depending on which DBU card is installed. See the chapter *Configuring Dial Options* for more information. The menu for the S4W DBU card is shown in Figure C-7.




*If DBU Configuration is selected when no DBU card is installed, the message DSU IV ESP DBU NOT INSTALLED appears. Press the* ***ESC*** *key to return to the previous screen of selections. If this message is received when a card is installed, ensure that the card is properly seated in the slot and then restart the unit.*

```
                        DSU IV ESP S4W DIAL BACKUP

DBU OPERATION                          DBU CRITERIA
 1 DBU PASSCODE = 123                   11 DBU EN/DIS = DIS
 2 PASSCODE = DIS                       12 W/OOS = DIS
 3 NUM TO DIAL = NUM 1                  13 W/NO RX = DIS
 4 ORG/ANS = ANS                        14 W/NO SEAL CURR = DIS
 5 AUTO RESTORE TIMER = 1               15 ALL 1s/0s = DIS
 6 REDIAL COUNTER = 5                   16 ANSWER ALLWAYS = DIS
 7 FAIL COND TIMER = 3                  17 WEEKEND LOCKOUT = DIS
 8 WAIT TO REDIAL = 10                  18 DAILY LOCKOUT = DIS
 9 DBU NETWORK TYPE = US SPRINT         19 LOCKOUT EN HOUR = 17
10 DBU ONLINE TEST = DIS                20 LOCKOUT DIS HOUR = 08

--------------------------------------------------------------------------

--------------------------------------------------------------------------
```

**Figure C-7**
*S4W Dial Backup*

### Dial Directory Configuration

Enter/edit stored numbers See the chapter *Configuring Dial Options* for more information.

### Management Configuration

Select the management interface and set the unit up to respond to the selected interface. See the chapter *Configuring Management Functions* for more information. The Management menu is shown in Figure C-8. The SNMP menu which branches from the Management menu is shown in Figure C-9.

```
                              DSU IV ESP MANAGEMENT

 1 SNMP
 2 INTERFACE = TERM
 3 CONTROL RATE = 9.6K
 4 IP ADDRESS = 198.79.126.59
 5 SUBNET MASK = 255.255.255.000
 6 GATEWAY IP ADDRESS = 192.230.230.1
 7 TELNET PASSWORD = adtran
 8 SESSION TIMEOUT = 10 MIN
 9 IP SECURITY = DIS
10 IP FILTER ADDRESS 1 = 000.000.000.000
11 IP FILTER ADDRESS 2 = 000.000.000.000
12 IP FILTER ADDRESS 3 = 000.000.000.000
13 IP FILTER ADDRESS 4 = 000.000.000.000
14 IP FILTER ADDRESS 5 = 000.000.000.000


--------------------------------------------------------------------------------



--------------------------------------------------------------------------------
ESC = EXIT                  ENTER SELECTION -> _
```

**Figure C-8**
*Management Menu*

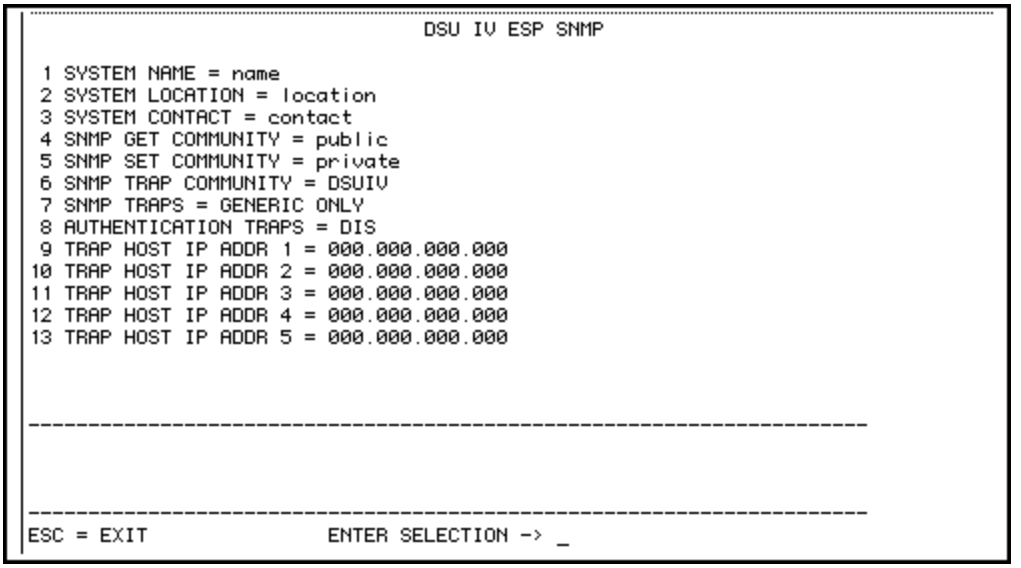



**Figure C-9**
*SNMP Management Menu*

### Utility Configuration

View/set the time of day and date, view the LAN MAC address (if the ESP ethernet card is installed), enable/disable the front panel, or enter manual commands. The chapter *Configuring Unit Utilities* provides more detailed information. See Figure C-10.

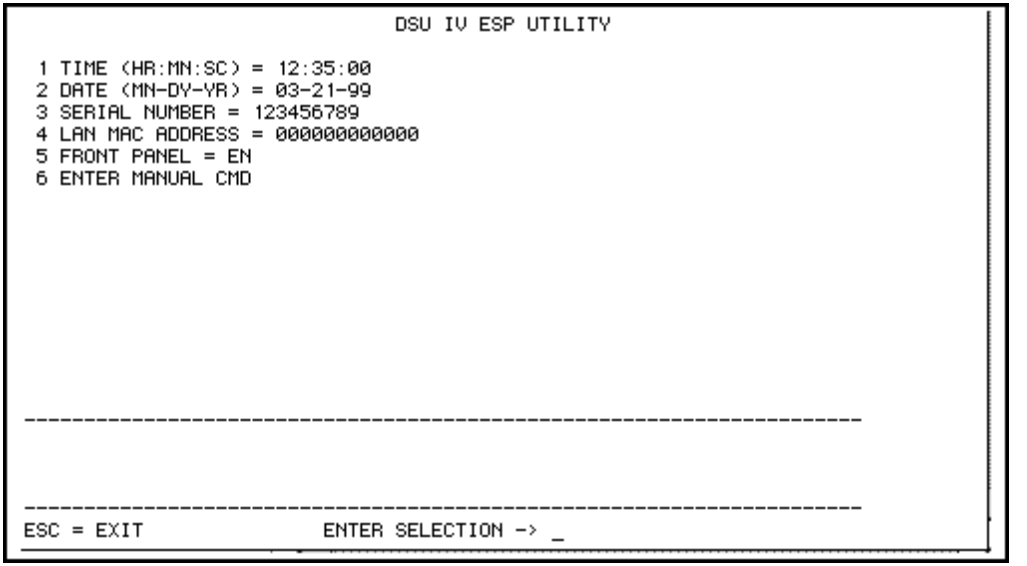



**Figure C-10**
*Utility Menu*

## Local/Remote Test Menus

The Local Test Options menu is shown in Figure C-11. The Remote Test Options menu is shown in Figure C-12. For information on these menu items, see the chapter *Testing and Troubleshooting*.

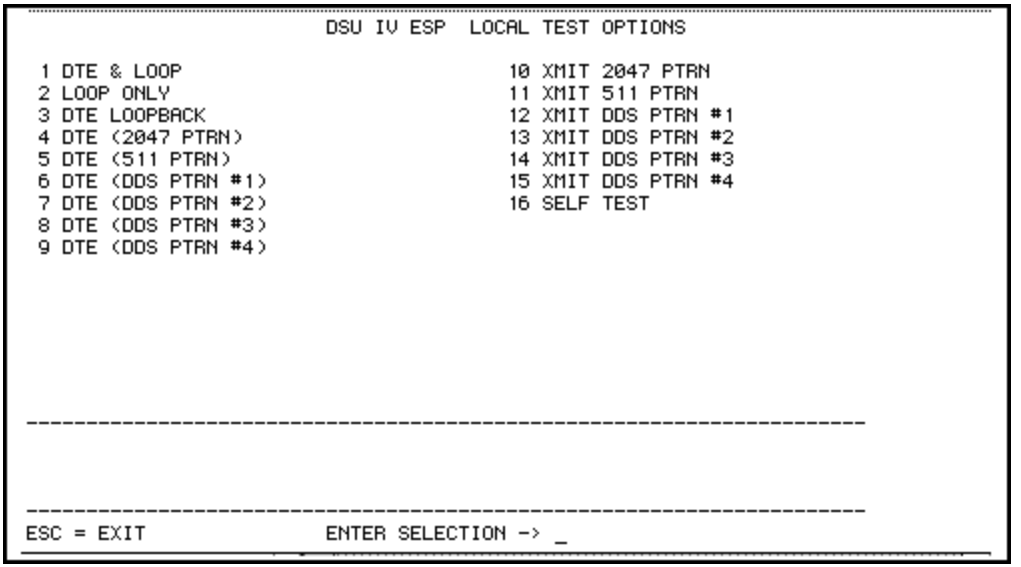



**Figure C-11**
*Local Test Options Menu*

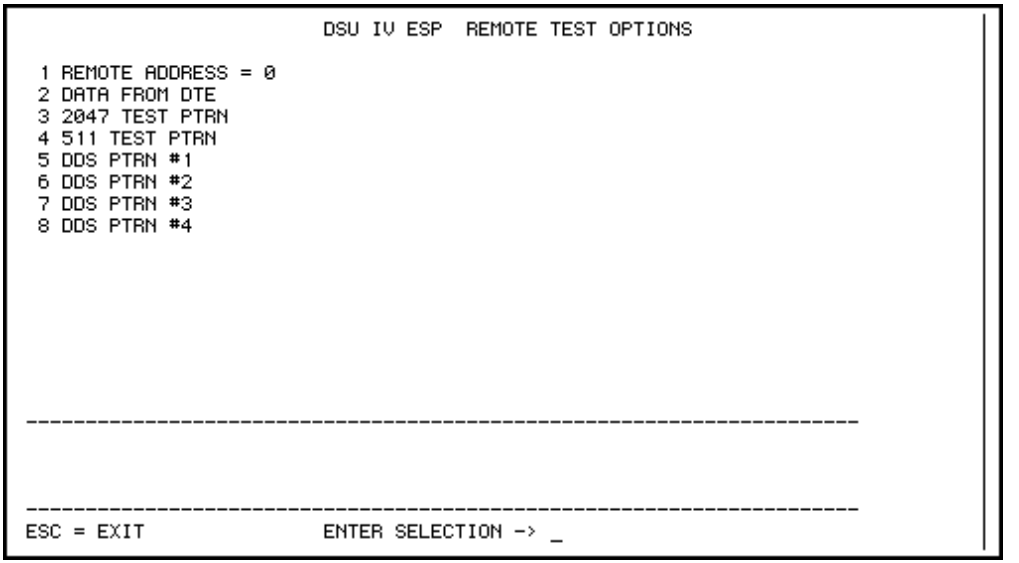



**Figure C-12**
*Remote Test Options Menu*

## Dial SW56/Dial ESP DBU

When in SW56 mode (SW56 Network Type selected), the Dial SW56 selection is shown in the Terminal Interface Main menu (see Figure C-1 and Table C-A). When a DBU ESP card is installed and the DEDICATED Network Type is selected, the Dial ESP DBU selection is shown instead.

### Dial SW56 Options

This menu (see Figure C-13) is available when operating in SW56 mode. Choose to dial a stored number or enter a number manually.

```
                          DSU IV ESP DIALING MENU

 1 DIAL STORED NUMBER
 2 MANUAL DIAL ENTRY

--------------------------------------------------------------------------

--------------------------------------------------------------------------
ESC = EXIT              ENTER SELECTION -> _
```

**Figure C-13**
*SW56 Dialing Menu*

### Dial ESP DBU

This menu is available when an ESP option card is installed in the DSU IV ESP and the Network Type is set to DEDICATED. See the chapter *Activating Dial Functions* for more information on individual menu selections.

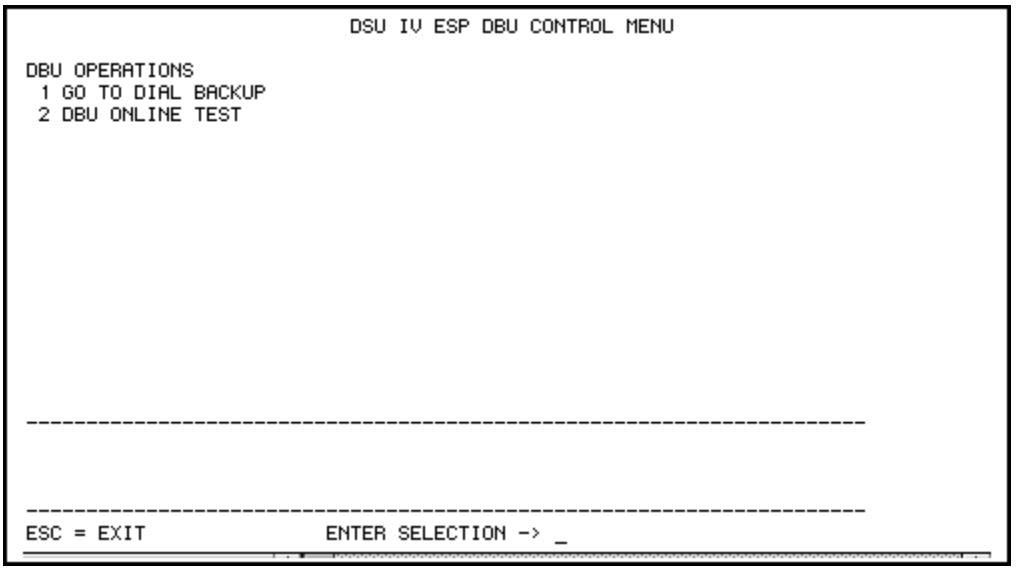



**Figure C-14**
*Dial ESP DBU Menu*

# Appendix D
# Configuration Profiles

The DSU IV ESP contains four different user profiles (sets of configurations options) stored in read-only memory; see Table D-A. The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See the section *Manual Command* of the *Utilities* chapter for more information on entering the manual commands required to load these profiles.

**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 identical to profile 1 with the addition of dial backup capability. These profiles are used for enabling dial backup using two DSU IV ESP 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 D-A**
*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 | ASYNC | 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 D-A (Cont'd)**
*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/0s | 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 E
# DSU to Modem Interconnect

## MODEM TAIL CIRCUIT APPLICATION

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

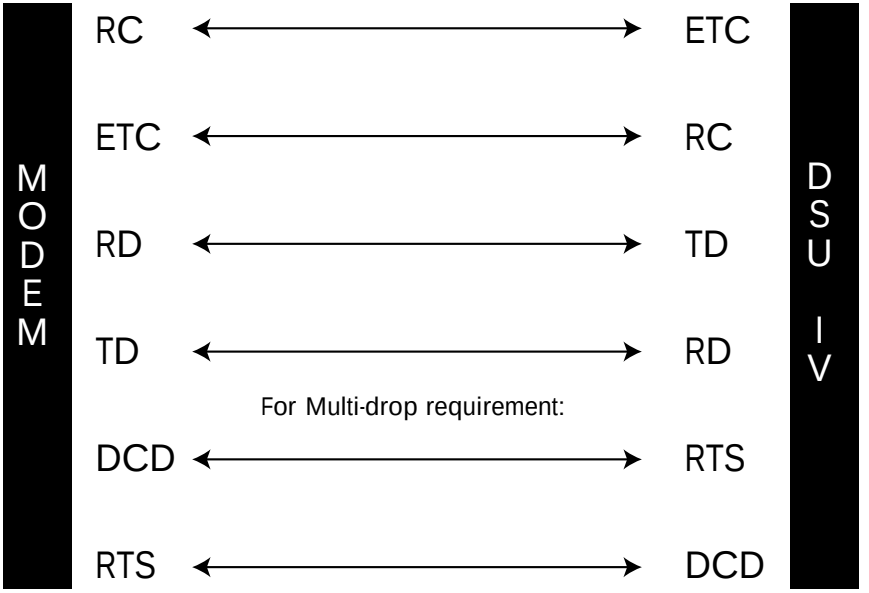



**Figure E-1**
*DSU to Modem Interconnect*

# Appendix F
# Specifications Summary

This section describes the standard specifications and features incorporated in the DSU IV ESP.

### Operating Modes

- Dedicated DDS (point-to-point, multi-point)
- Switched 56 (4-wire)
- ISDN (1B+D)
- PSTN (V.34)

### Network 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.
- Dial Backup:
  - Switched 56 (56 kbps)
  - V.34 (2.4 - 33.6 kbps)
  - ISDN (56 or 64 kbps)

### DTE Rates Provided

- DTE rates match service rates
- DTE-to-loop rate matching in both dedicated and switched modes
- Synchronous rates: 2.4, 4.8, 9.6, 19.2, 38.4, 56, and 64 kbps
- Asynchronous rates: 2.4, 4.8, 9.6, 19.2, 38.4, and 57.6 kbps

### DTE Interfaces

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

**SNMP and TELNET**
- Integrated SLIP/PPP port
- Physical Connector RJ-48S and DB-25
- Optional 10baseT interface with ESP Ethernet Card
- MIB II RFC 1213 complaint
- Enterprise-specific MIB
- SNMP traps

**Clocking**
- Normal DDS (slaved to network receive clock)
- Private network master (internal)
- Normal DDS tail circuit
- Private network master (slaved to external clock)

**Switched Mode Dialing Options**
- Stored number
- Front panel keypad
- DTR dialing of stored numbers
- In-band AT commands
- V.25 bis in-band dialing

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

**Line Requirements**
Loop transmission parameters as defined in:

AT&T PUB 62310: Dedicated DDS
AT&T PUB 4146B: Switched 56
Sprint TS 0046: Switched 56

**Line Interface**
RJ-48S, 4-wire, full duplex

**Receiver Sensitivity**
-45 dB at all rates

**Agency Approvals**
U.L. 1950
C-U.L. 1950
FCC Part 15, Class A
FCC Part 68
CS03

**Environment**
Operating Temperature: 0 to 50 °C (32 to 122 °F)
Storage Temperature: -20 to 70 °C (-4 to 158 °F)
Relative Humidity: Up to 95%, non-condensing

**Hardware Specifications**
Dimensions: 10.4"D x 8.0"W x 2.4"H
Weight: 4.5 lbs.
Power: 115V ac, 75 mA max
8.6 watts

# Glossary

***10baseT***
Ethernet IEEE standard on 24 gauge unshielded twisted pair wiring, a baseband medium, at 10 megabits per second.

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

***4-Wire Switched 56***
An AT&T proprietary 56/64 kbps switched digital data service offered by telco service providers and delivered to users over four copper wires.

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

***agent***
The implementation of a network management protocol which exchanges network management information with a network management station.

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

***AT&T Publication 41458***
An AT&T specification titled "Special Access Connections to the AT&T Communications Network," used to design compatibility into DSU/CSU products.

***AT&T Publication 62310***
An AT&T specification titled "Digital Data System Channel Interface Specification," used to design compatibility in DSU/CSU products.

***BERT***
bit error rate test. A known pattern of bits is transmitted and the errors received are counted to figure the bit error rate. The idea is to measure the quality of data transmission. The bit error rate is the ratio of received bits that are in error, relative to the number of bits received. Usually expressed in a power of 10.

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

***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***
channel service unit. 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.

***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.

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

***DCE***
data communications equipment. Device that provides all the functions required for connection to telephone company lines and for converting signals between telephone lines and DTE.

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

***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-232 standard specification, the EIA-232 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***

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-232***

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

***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.

***IP***

A connectionless-mode network service protocol.

***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.

***LAN***
A privately owned network that offers high-speed communications channels to connect information processing equipment in a limited geographic area.

***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.

***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.

***private network master clocking***
Clocking in which timing is derived internally from the DSU.

***private network tributary clocking***
Clocking in which the timing is derived from the DDS loop.

***private network master - slaved to external clock***
Clocking in which timing is slaved to the DSU's external transmit clock.

***protocol***
A set of rules governing transfer of data.

***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.

***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-45***

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.

***router***

A device that supports LAN-to-LAN communications.

***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.

***SDLC***

synchronous data link control. A link-level communications protocol used in an international business machines (IBM) systems network architecture (SNA) network that manages synchronous, code-transparent, serial information transfer over a link connection. SDLC is a subset of the HDLC protocol developed by ISO.

***sealing current***
A 4 to 20 mA direct current used by OCU DPs to reduce corrosion in the wires and to verify the connection of a device on the loop.

***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.

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

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

***TCP***
transport control protocol. The transport protocol offering a connection-oriented transport service in the internet suite of protocols.

***trap***
An unsolicited message issued by a network device to report an operational anomaly or an alarm condition.

***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.34***

Latest high-speed 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.

***WAN***

wide area network. Any one of a number of technologies providing geographically distant transfer.

# Index

## Symbols

10baseT 139
10baseT connector 8, 23
  pin assignments 109
1B+D ISDN 2
1s/0s 57
2047 139
4-wire SW56 139
4-wire SW56 DBU card 2
4-wire switched 56 1, 5
511 139

## A

agent 4, 139
alarm LED 14
all 1s or all 0s condition 27, 57
ALM 14
answer
  AT command 56
  call 100, 102
answer always 57
anti-stream 47–48
applications 23
  dial backup 26
  LAN with SNMP/TELNET 23
arrows 14
async PPP 1, 8, 11
asynchronous 139
AT commands 29, 33, 75, 111, 112
  phone number 55
AT&T 5ESS 64
AT&T Publication 41458 139
AT&T Publication 62310 140
auto answer 56
auto DBU fail 59
auto restore 58
automatic DBU 56

## B

BERT 140

## C

call disconnect 100
called unit busy
  status message 100
cancel key 14
cards (options) 10
  installation 10
carrier detect 140
carrier detect (CD) 14, 48
CD 14, 48, 140
check telco 102
clear to send 141
clear to send (CS) 14, 47
clock source 40
clocking 136, 140
compression 62
Config 17
configuration 17, 19
  dial options 53–64
  DTE options 41
  local 36

management 65
methods 29
network options 37
overview 29
test options 49–51
utilities 71
configuration menus
terminal 118
configuration profiles 129
configuration remote 36
connector type 46
control
port 20
control connector
pin assignments 108
control port 1, 9, 11, 23, 140
control rate 66
CPE 140
CS 14, 47, 140
CSU 140
CSU loopback 141
CTS 140, 141
customer premise equipment 140
customer service 6, 7

## D

daily lockout 58
data communications equipment 141
data format 46, 99
data mode
status message 102
data service unit 141
data set ready (SR) 48, 103
data terminal equipment 142
data terminal ready (TR) 48, 103
dB 141
DBU
AT commands
all models 60, 61
V.34 card 63
DBU answer test 51
DBU card
pin assignments 106
DBU cards 5
DBU configuration 121
DBU connection 93
DBU criteria 57
DBU interface 9
DBU line in RDL 101
DBU lockout options 1
DBU operation 5
DBU options
all models 56
ISDN card 64
S4W card 62
V.34 card 62–63
DBU passcode 64
DBU status 100
DBU test pattern
status message 101
DCE 141
DDS 1, 26, 28, 40, 141
DDS rates 1
DDS circuit
returning to 28
DDS network status 102
DDS operation 3
DDS stress patterns 1-4 141
diagnostics 136
dial 19
dial backup 1, 96
ISDN 55
mode
entering 26
status 100
status information 100
dial directory 121
dial functions
activating 95–97
dial operations 127
dial options
configuration 53–64
menu tree 54–64
dedicated network type 96–97
SW56 network type 95–97
dial up operation 129
dialing 100
dialing options 136
down arrow 14

DSU 141
DSU configuration
  terminal 120
DSU loopback 141
DSU status 102
DSU to modem interconnect 133
DTE 1, 142
  primary 10
DTE & loop (LL) 84
DTE command option 46
DTE connectors 9
DTE control leads 103
DTE interface 9, 135
DTE only 86
DTE options 41
  AT commands 43, 44, 45
  menu tree 42
DTE rate 45, 99, 135
  same as the network 45
DTE status 103
DTE to loop rate matching 142
DTR 142

## E

EIA local loopback (LLB) 51
EIA remote loopback (RLB) 51
EIA-232 2, 9, 10, 142
EIA-232 connector
  pin assignments 107
enter key 13
environment 137
error control 62
ethernet 1, 8, 23
exit test 77
external clock 46

## F

fail timer 58
FCC Part 15 of Class A 142
FCC Part 15 of Class B 142
FCC Part 68 142
flow control 62
front panel 13
  alpha entry 69
  illustration/functions 15
  operation 17
front panel commands 29

## G

gateway IP address 25, 66
Get community 67
getting TEI
  status message 102
glossary 139
going to DBU 101, 102

## H

hang up 97

## I

idle 101
in dial backup 101, 103
in-band 142
inactive
  status message 102
included in shipment 7, 8
incoming call 101
installation 7–11
interface 25, 66
INV 35
INVBL 35
INVBM 35
INVCU 35
invert clock 47
INVPS 35
INVPV 35
IP 142
IP address 25, 66
IP filter address 66
IP security 66
ISDN 1, 6, 55, 143
  DBU options 64
  DBU status 100
  dial backup 55

## K

keypad 13

## L

LAN 5, 23, 29, 143
LAN interface 9
LAN MAC address
  viewing 74
LCD window 13
LED
  description 14
line interface 136
line requirements 136
LL test from telco 103
LOC 55
local DTE and loop test 143
local loopback 75, 103
local unit
  test 82
lockout
  weekend/time of day 28
lockout end 58
lockout start 58
loop is normal 102, 103
loop only (RT) 85
loop rate 39
loss of sealing current 27

## M

main menu 77
  front panel 18
management configuration 122
management functions 65–69
  menu tree 65–69
manual commands 72
  entering 72
  list of 73
menu items
  selecting 13
menu navigation 17
menu structure
  front panel 18
  VT 100 20
MIB 4, 23, 68
modem tail circuit
  application 133
multidrop 143

## N

national ISDN1 64
network address 40
network data rates 135
network manager 4
network options 37–40
  AT commands 38–40
  menu tree 39–40
network rate 99
network status 102
network type 40, 62
no DBU installed - DBU status 100
no receive (RX) signal 27, 57, 101
no sealing current 57
no wink from CO 101
not installed 101
NT DMS-100 64
number to dial 56

## O

OOS/OOF from net 101
OOS/OOF from telco 103
open loop 101, 103
operating modes 135
operation 13–21, 75–94
  during critical times 27
  during noncritical times 28
originate 56
originate/answer 56
out of service (OOS) 57
  signal 27
out-of-band 143

## P

password 20
phone number 55
  AT command 55

pin assignments
10baseT connector 109
control connector 108
ESP DBU card connector 106
primary EIA-232 connector 107
primary V.35 connector 108
telco connector 106
pinouts 105
point-to-point 143
point-to-point operation 129
power cord 9
power switch 9
power up 8
PPP 1
private network master
slaved to external clock 143
product overview 1
protocol 143
PSTN 144

## R

RD 14
RDL 50, 144
rear panel 9
receipt inspection 7
receive (RX) signal 57
receive data 14
receiver sensitivity 136
redial counter 58
register SPID
status message 102
remote command 11
remote configuration 40, 118, 144
remote digital loopback (RDL) 50
remote loopback 75, 103
remote V.54 test 144
request to send (RS) 14
restore timer 58
return material authorization (RMA) 6
RJ-45 144
router 144
RS 14
RS to CS delay 47

## S

scrambler 45, 144
SDLC 144
sealing current 57, 145
secondary channel
connection 11
services 9
self test 90
service 145
Set community 67
SHIFT key 13, 17
SLIP 1, 8, 11, 23
SLIP/PPP 29
SNMP
1, 4, 8, 11, 23, 25, 123, 136, 145
configuring options 67
ethernet LAN application 24
network manager 23
SLIP/PPP LAN application 24
SNMP access
configuring for 25
SNMP traps 67
SNMP/TELNET management
application 23
software revision
viewing 74
specifications 135
SPID 55
SR 48, 145
status 18, 99
DDS network 102
dial backup mode 100
status menus
terminal 117
stay on leased 96
stay on line 97
subnet mask 25, 66
SW56 1
SW56 DBU status 100
switch type 64
switched 145
synchronous 145
synchronous operation 75
system contact 68

system location 68
system name 68

## T

tail circuit 145
TCP 145
TD 14
telco 9
telco connector 10
  pin assignments 106
telco jack 9
TELNET 1, 20, 23, 25, 113, 136
  configuring for 25
  ethernet LAN application 24
  SLIP/PPP LAN application 24
TELNET options 68
TELNET password 68
TELNET timeout 68
terminal
  connection/operation 20
terminal menu structure 113
test 18, 103
  DTE only 86
  loop only 85
  self 90
  test pattern 89
test commands 82
test from telco 101
test menu 78
test menus 125
test mode manual 14
test options 125
  AT commands 50–51
  configuration 49–51
  menu tree 49–51
test pattern 89
test timeout 50
time/date
  viewing/editing 74
TR 48
transmit clock 46
transmit data 14
trap 145
Trap community 67
trap IP address 67

## U

U interface 146
UL 146
UL 1459 146
unit in test
  status message 102
up arrow 14
utilities 71
  menu tree 71
utility configuration 124

## V

V.25 bis commands 29, 34, 75, 146
  asynchronous option 35
  bi-sync option 34
  SDLC option 34
V.34 1, 2, 6, 62, 146
  DBU status 100
V.35 2, 9, 10
V.35 connector 11
  pin assignments 108
V.FC 146
VALA 35
VT 100 1, 29, 113, 146

## W

wait to redial 59
waiting for call 103
  status message 101
WAN 146
weekend lockout 57
when out of service (OOS) 57

# Product Support Information

**Pre-Sales 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 # _____

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP