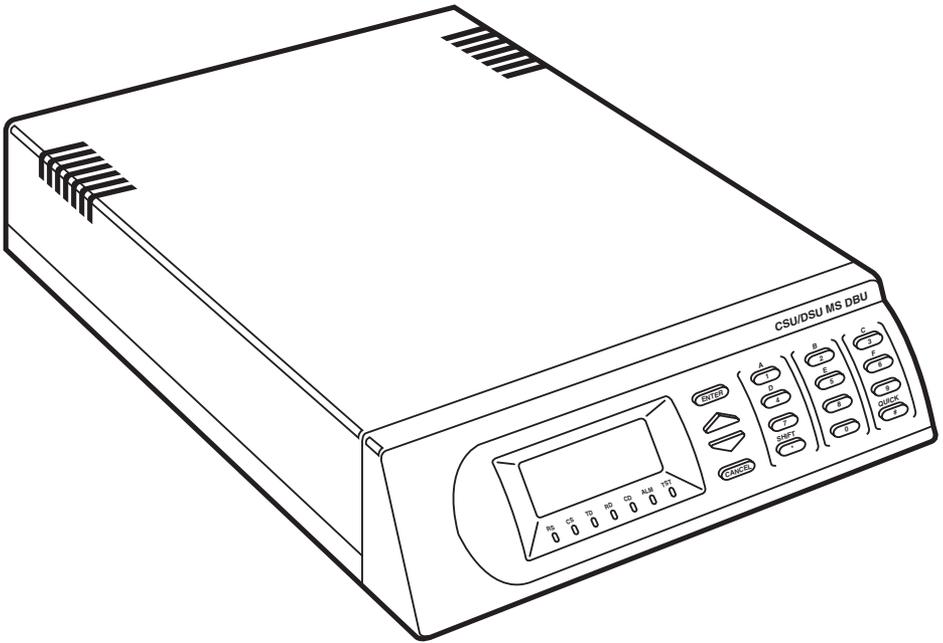




CSU/DSU MS DBU



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1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
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10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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 CSU/DSU MS DBU 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 VT100™ 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 CSU/DSU MS DBU 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 VT100 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.

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 Black Box 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 that is Part 68 compliant.
7. The following information may be required when applying to the local telephone company for leased-line facilities:

<u>Service Type</u>	<u>Digital Facility Interface Code</u>	<u>Service Order Code</u>	<u>Network Jacks</u>
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 Module:

<u>Service Type</u>	<u>SOC</u>	<u>REN</u>	<u>FIC</u>	<u>USOC</u>
Loop Start (V.34)	9.0Y	0.8B	02LS2	RJ-11C

9. The following information may be required when applying to the local telephone company for Switched 56 service for the S4W DBU Card:

<u>Service Type</u>	<u>SOC</u>	<u>REN</u>	<u>FIC</u>	<u>USOC</u>
PSDS	6.0F	N/A	04D45-56B	RJ-48S

10. The following information may be required when applying to the local telephone company for ISDN service for the ISDN Module:

<u>Service Type</u>	<u>SOC</u>	<u>REN</u>	<u>FIC</u>	<u>USOC</u>
Basic Rate ISDN	6.0F	N/A	021S5	RJ-49

11. 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.
12. 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.)

ISDN Service Ordering Information for the CSU/DSU MS DBU With ISDN Dial Backup

For CSU/DSU MS DBU ISDN applications, the following guide can be used as an aid in ordering basic ISDN service from your local telephone company. The CSU/DSU MS DBU ISDN includes NT1 and terminal-adaptor 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 CSU/DSU MS DBU ISDN SUPPORTS THE FOLLOWING SWITCH TYPES AND SOFTWARE PROTOCOLS:

AT&T[®] 5ESS Custom, 5E6 and later software, National ISDN-1
NT1 DMS-100 BCS-32 and later software (Pvc1), National ISDN-1 (Pvc2)
Siemens[®] EWSD National ISDN-1

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

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

Feature: *Value*
B1 Service: *On Demand (DMD)*
Data Line Class: *Point-to-Point*
Maximum B Channels: *1 (1B+D)*
Circuit Switched Data (CSD) Bearer Channels: *Any*
Number of CSD Calls: *1 (1B+D)*
Terminal Type: *Type A*

TURN THE FOLLOWING FEATURES OFF:

Packet Mode Data
Multi-line Hunt
Multiple Call Appearances
Electronic Key Telephone Sets (EKTS)
Shared Dictionary Numbers
Accept Special Type of Number
Intercom Groups
Network Resource Selector (Modem Pools)
Message Waiting
Hunting
InterLata Competition

FOR SERVICE OFFERED FROM A NORTHERN TELECOM DMS-100, REQUEST A POINT-TO-POINT MULTI-POINT LINE WITH THE FOLLOWING FEATURES:

Line Type: *Basic Rate, Functional*
Electronic Key Telephone Sets (EKTS): *No*
Call Appearance Handling (CACH): *No*
Non-Initializing Terminal: *No*
Circuit Switched Service: *Yes*
Packet Switched Service: *No*
TEI: *Dynamic*
Bearer Service: *Circuit Switched voice and data permitted on any B channel (packet mode data not permitted)*

Contents

Chapter	Page
1. Introduction.....	15
1.1 Overview	15
1.2 DDS Operation	16
1.3 Switched 56 Operation	16
1.4 SNMP	16
1.5 TELNET	17
1.6 Dial-Backup Operation	17
1.7 Dial Backup Modes	17
2. Installation	19
2.1 Unpack, Inspect, and Power Up	19
2.2 Rear Panel	20
3. Operation	24
4. Applications	30
4.1 LAN Application with SNMP/TELNET Management	30
4.2 Dial-Backup Application	33
5. Configuration Overview	36
6. Configuring Network Options	42
6.1 Loop Rate	43
6.2 Network Address	43
6.3 Remote Configuration.....	44
6.4 Network Type	44
6.5 Clock Source	44
7. Configuring DTE Options	45
7.1 DTE Rate	48
7.2 Connector Type	48
7.3 Data Format	48
7.4 DTE Command Option.....	49

Chapter	Page
7.5 Transmit Clock.....	49
7.6 Clear to Send (CS) Options	49
7.7 Anti-Stream.....	50
7.8 CD Options.....	50
7.9 Data Terminal Ready (TR) Options.....	50
7.10 Data Set Ready (SR) Options	50
8. Configuring Test Options	51
9. Configuring Dial Options	54
9.1 Phone Numbers	55
9.2 SW56 Auto Answer.....	55
9.3 DBU Options	56
9.3.1 Standard DBU Options	56
9.3.2 DBU Options for S4W	59
9.3.3 DBU Options for V.34 Card.....	60
9.3.4 DBU Options for ISDN Card	61
9.3.5 DBU Passcode	61
10. Configuring Management Functions.....	63
10.1 Interface	63
10.2 Control Rate	63
10.3 IP Options.....	64
10.3.1 Unit IP Address	64
10.3.2 Subnet Mask	64
10.3.3 Gateway IP Address	64
10.3.4 IP Security	64
10.3.5 IP Filter Address	64
10.4 SNMP Options	65
10.5 TELNET Options.....	66
10.6 Entering Letters Using the Front Panel.....	66

Chapter	Page
11. Configuring Unit Utilities	68
11.1 Manual Command	69
11.2 Time/Date	70
11.3 Software Revision	71
11.4 LAN MAC Address	71
11.5 Serial Number	71
12. Testing and Troubleshooting	72
12.1 Test Overview	72
12.1.1 Initiating a Test	72
12.1.2 Test Status Display.....	73
12.1.3 Exiting a Test.....	74
12.2 Troubleshooting	74
12.2.1 Messages from the DSU/CSU	74
12.2.2 Troubleshooting New Installations	76
12.3 Local Unit Diagnostics.....	77
12.3.1 DTE & Loop (LL)	78
12.3.2 Loop Only (RT)	79
12.3.3 DTE Only.....	79
12.3.4 DTE With Test Pattern	80
12.3.5 Test Pattern	81
12.3.6 Self-Test	82
12.4 Remote Unit Diagnostics.....	82
12.5 DBU Connection	84
13. Activating Dial Functions	86
14. Viewing Status Information	88
Appendix A. Pinouts	92
Appendix B. AT Commands	96

Chapter	Page
Appendix C. Terminal Menu Structure	98
C.1 Status Messages	102
C.2 Local/Remote Configuration Menus.....	102
C.2.1 DSU Configuration (DTE, Network, and Test Options)	103
C.2.2 DBU Configuration	103
C.2.3 Management Configuration.....	104
C.2.4 Utility Configuration.....	105
C.3 Local/Remote Test Menus	106
C.4 Dial SW56/Dial DBU.....	106
C.4.1 Dial SW56 Options	106
C.4.2 Dial DBU	107
Appendix D. Configuration Profiles.....	108
Appendix E. DSU-to-Modem Interconnect	111
Appendix F. Specifications	112

1. Introduction

1.1 Overview

The CSU/DSU MS DBU (data service unit with embedded SNMP) provides a reliable, high-speed data connection for customer data terminal equipment through digital data service (DDS) lines. The CSU/DSU MS DBU has an embedded SNMP agent that provides complete SNMP access to the unit through an integral SLIP or PPP async port. The CSU/DSU MS DBU's unique modular approach provides optional 10BASE-T Ethernet access for SNMP. Also, optional modular DBU cards provide automatic or manual dial backup for the dedicated circuit.

The following are features of the CSU/DSU MS DBU:

- 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 VT100 terminal configuration
- Two option slots
- 10BASE-T Ethernet SNMP port available with the SNMP Ethernet Module
- Automatic or manual DBU
- DBU available with DBU cards; options include 4-wire Switched 56, V.34, and ISDN
- Time-of-day and weekend lockout options

The CSU/DSU MS DBU 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 4-wire Switched 56 Module and the base unit's integrated SW56 capabilities are compatible with AT&T Accunet® and Sprint® SW56 type services. The V.34

Modem Module allows switched backup over the public switched telephone network (PSTN). The ISDN Module is compatible with National ISDN and supports a U-interface to the Basic Rate ISDN.

1.2 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 CSU/DSU MS DBU supports 2.4-kbps 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.

1.3 Switched 56 Operation

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 CSU/DSU MS DBU 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).

1.4 SNMP

The term SNMP (Simple Network-Management Protocol) 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 databases. 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 CSU/DSU MS DBU supports the MIB-II standard, RFC 1213, and Black Box Enterprise Specific MIB. MIB files are available from Black Box in the support section of the Black Box Web page at www.blackbox.com.

The CSU/DSU MS DBU's embedded SNMP feature allows the unit to be accessed and controlled by a network manager either through a device running SLIP or async PPP protocol (connected to the CONTROL port of the DSU) or through a LAN. LAN connection requires the SNMP Ethernet Module (part number MT140C). This card provides a 10BASE-T Ethernet interface to the LAN.

1.5 TELNET

TELNET provides a password-protected remote login facility for the CSU/DSU MS DBU. TELNET allows a user on a network manager to control the CSU/DSU MS DBU through the terminal menus. See Chapter 4 and Appendix C for more information.

1.6 Dial-Backup Operation

The CSU/DSU MS DBU's unique DBU cards are field-installable. See Chapter 2 for information on installing DBU cards. 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 Chapter 4 for more information, including an example of a dial-backup application.

1.7 Dial-Backup Modules**4-WIRE SWITCHED 56 MODULE**

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 MODULE

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 maximum of 14.4 kbps. In asynchronous mode the throughput at 57.6 kbps is less dependent on data types.

ISDN MODULE

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 Module.

2. Installation

2.1 Unpack, Inspect, Power Up

INSPECTION

Carefully inspect the CSU/DSU MS DBU for any shipping damage. If damage is suspected, file a claim immediately with the carrier and contact Black Box Customer Service. Keep the original shipping container for use in shipping the CSU/DSU MS DBU for repair or for verification of damage during shipment.

The following items are included with the CSU/DSU MS DBU:

- CSU/DSU MS DBU 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 DB25 adapter for access to the Control/SLIP/PPP port

NOTE

The Black Box CSU/DSU MS DBU MIB is available from Black Box in the support section of the Black Box Web page at www.blackbox.com.

The following items are included with the DBU Modules:

- DBU Module
- 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.

You must provide either a male EIA-232 (standard DB25) or a male V.35 interface cable.

For SNMP management, you must provide access to the CSU/DSU MS DBU through either a SLIP port, an async PPP port (requires a male DB25 connector), or a 10BASE-T Ethernet port (requires that an SNMP Ethernet Module be installed

in the CSU/DSU MS DBU). See Appendix A for the pin assignments of the control port (for SLIP and Async PPP) and the Ethernet port.

POWER UP

The CSU/DSU MS DBU is provided with a captive 8-foot power cord, terminated by a three-prong plug that connects to a grounded 115-VAC power receptacle.

CAUTION

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

2.2 Rear Panel

The rear panel contains two DTE connectors that 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 Appendix A. The CSU/DSU MS DBU rear panel is shown in Figure 2-1 with optional modules installed.

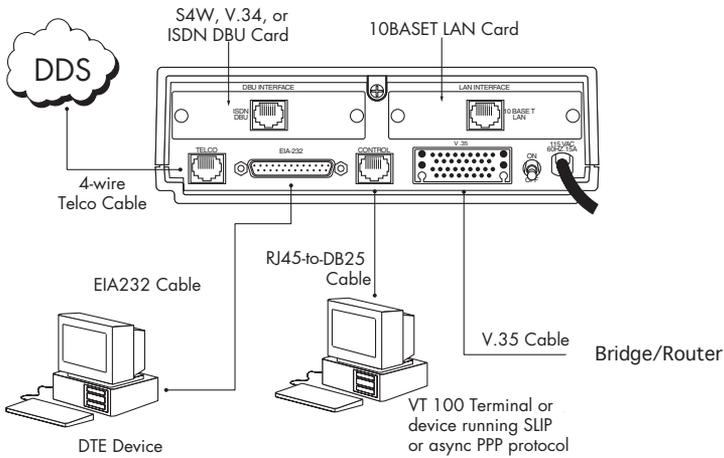


Figure 2-1. Rear View.

<u>Item</u>	<u>Function</u>
DBU Interface	DBU module card slot
LAN Interface	SNMP Ethernet Module slot
Telco	Connects to dedicated circuit
EIA-232	Connects to a DTE interface
Control	Connects to a VT100 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

DBU AND ETHERNET CARD SLOTS

CAUTION

Remove power from the unit prior to installing or removing modules.

The CSU/DSU MS DBU rear panel has two card slots for the installation of dial-backup and Ethernet cards. To insert cards:

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

NOTE

Card slots are keyed to prevent improper installation.

TELCO CONNECTOR: NETWORK INTERFACE CONNECTION

The CSU/DSU MS DBU 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 Appendix A.

Each DBU module 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 Appendix A.

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 (15 m) for the EIA-232, and 100 feet (30 m) for the V.35. The pin assignments for the connectors are listed in Appendix A.

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

CAUTION

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

CONTROL PORT

The CSU/DSU MS DBU has an 8-position modular jack labeled CONTROL. The control port provides connection to a VT100 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 DB25 EIA-232 interface. See Appendix A for the control port's pin assignments. A description of the operation of this port is in Chapter 3.

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.

3. Operation

The CSU/DSU MS DBU is shown in Figure 3-1. Descriptions of each part of the front panel follow.

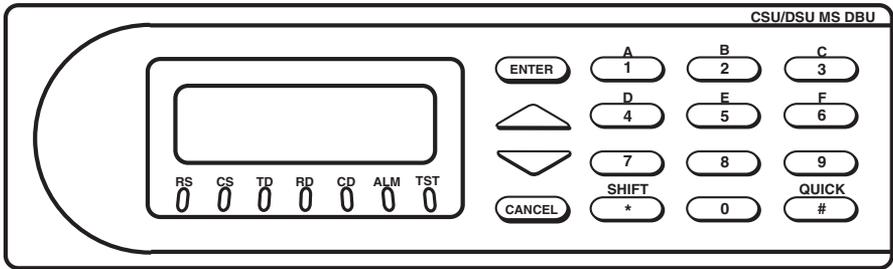


Figure 3-1. Front Panel.

LCD WINDOWS

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 letters A through F. These keys are used to activate menu items and enter information.

SHIFT

Enter letters 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 lettered 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 CSU/DSU MS DBU has seven LED indicators: RS, CS, TD, RD, CD, ALM, and TST.

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 CSU/DSU MS DBU is ready to transfer data.
TST (Test Mode)	This LED is on whenever the unit is in test mode.
ALM (Alarm Indication)	This LED activates whenever an alarm condition exists. Alarm conditions include: <ul style="list-style-type: none">• Open loop on network• No frame synchronization• Unit in dial backup• Problem on dial-backup line

FRONT-PANEL MENU NAVIGATION

To choose a menu item, press the corresponding number or letter 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 CSU/DSU MS DBU 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.

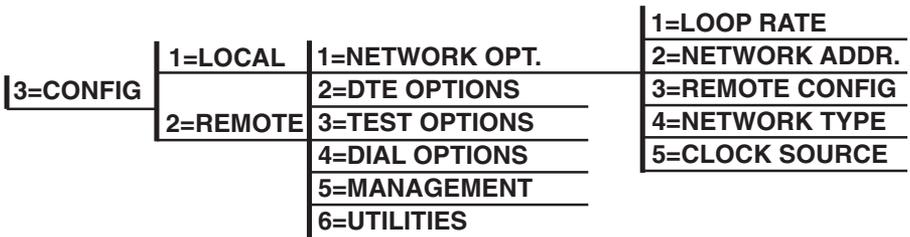


Figure 3-2. Example of Basic Menu Navigation.

FRONT-PANEL MENU STRUCTURE

The CSU/DSU MS DBU 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

NOTE

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 CSU/DSU MS DBU.

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 Chapter 14, 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 Chapter 12.

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 (Chapter 6), Configuring DTE Options (7), Configuring Test Options (8), Configuring Dial Options (9), Configuring Management Functions (10), and Configuring Unit Utilities (11).

Dial

Dial provides manual dial backup or SW56 dial functions. For more information, see Chapter 13.

VT100 Terminal Connection and Operation

To control the CSU/DSU MS DBU using a VT100 terminal:

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 VT100 terminal.
3. Using the provided VT100 terminal adapter cable, connect the COM port of a VT100 compatible terminal or equivalent to the eight-pin modular jack labeled CONTROL on the rear of the CSU/DSU MS DBU. 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 VT100 menu structure differs from the front-panel interface. Appendix C includes the VT100 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.

When establishing a TELNET session, the system prompts for a password. The default password is "blackbox." This password can be modified through the Management menu. See Chapter 10 for more information.

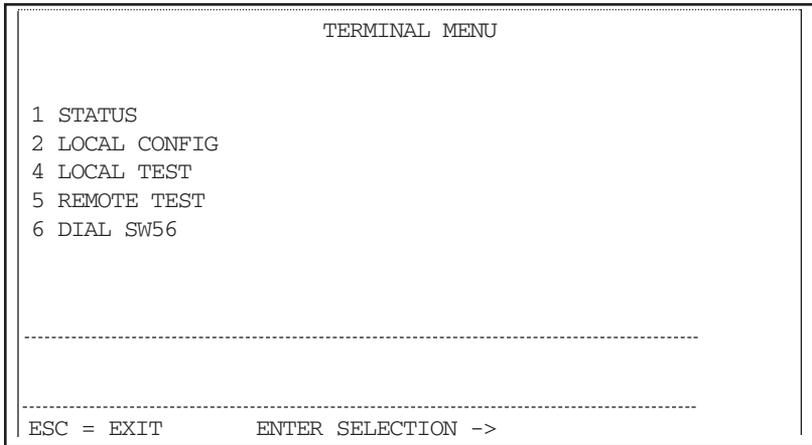


Figure 3-3. Terminal Interface Main Menu (SW56 Mode).

4. Applications

This chapter provides examples of some common CSU/DSU MS DBU applications. The examples include LAN applications with both SLIP/PPP and Ethernet management and a dial-backup application.

4.1 LAN Application with SNMP/TELNET Management

The CSU/DSU MS DBU can be managed through an established TELNET session or an SNMP-based network manager like HP® OpenView®, IBM® NetView®, or SunNet Manager.

NOTE

The Black Box CSU/DSU MS DBU MIB is available in support section of the Black Box Web page at www.blackbox.com.

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

- A device (a router, for example) running SLIP protocol. Connection is made through the CSU/DSU MS DBU's control port. See Figure 4-1.
- A device (a router, for example) running async PPP protocol. Connection is made through the CSU/DSU MS DBU's control port. See Figure 4-1.
- A LAN. Connection is made through the optional 10BASE-T Ethernet interface provided on the SNMP Ethernet Module (part number MT140C). See Figure 4-2.

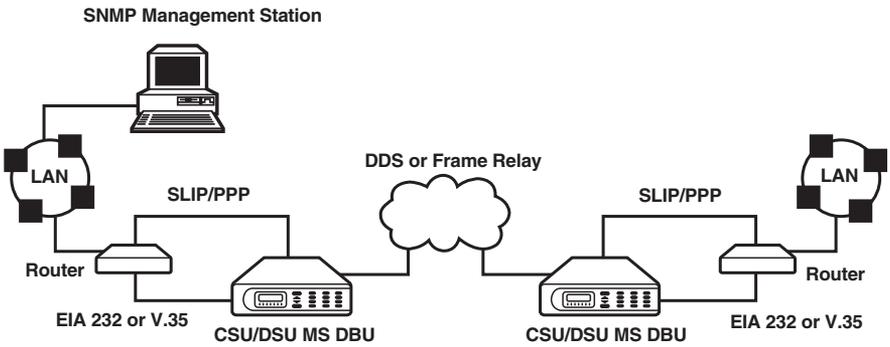


Figure 4-1. SLIP/PPP LAN Application with SNMP/TELNET Management.

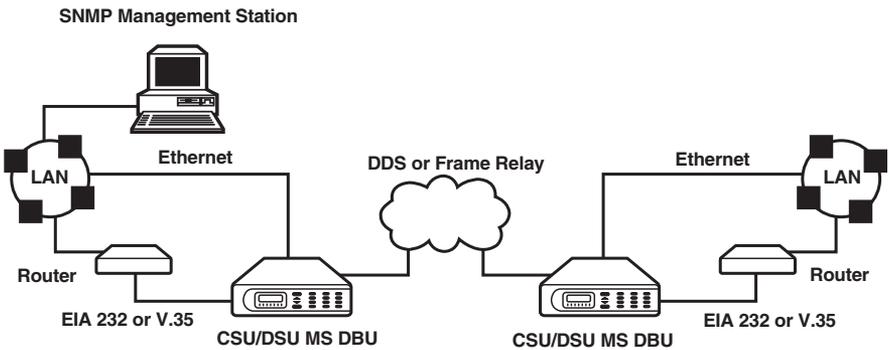


Figure 4-2. Ethernet LAN Application with SNMP/TELNET Management.

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 Chapter 10 for the front-panel menu path to these options.

Interface

Select SLIP Control, PPP Control, or Ethernet LAN as the CSU/DSU MS DBU interface type. The SNMP Ethernet Module must be installed to select Ethernet LAN.

IP Address

Enter the CSU/DSU MS DBU 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 CSU/DSU MS DBU 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 CSU/DSU MS DBU features:

- Designate SNMP hosts to receive SNMP traps from the CSU/DSU MS DBU (one to five entries).
- Secure the CSU/DSU MS DBU by limiting SNMP network management access. If enabled, the CSU/DSU MS DBU 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 Chapter 10 for more information.

4.2 Dial-Backup Application

The CSU/DSU MS DBU provides point-to-point connection to the network. With one of the DBU module 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, you can 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.

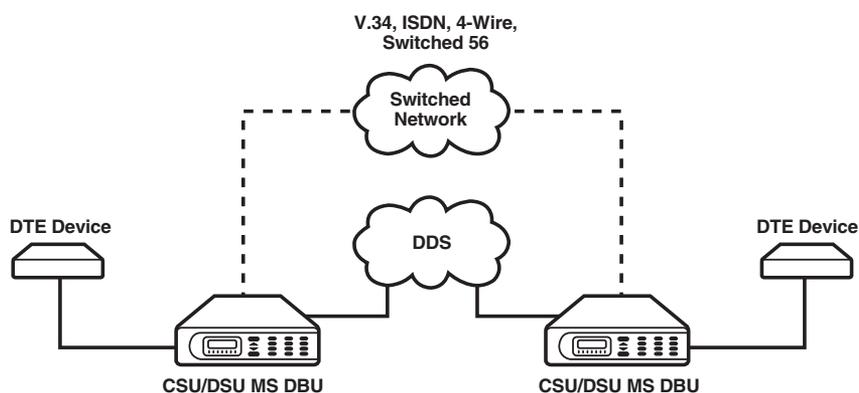


Figure 4-3. Dial-Backup Application.

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 unless it is disabled by using the **Quick** key and selecting **Turn Off Beep**. See Figure 3-1 in Chapter 3 for more information on the Quick key.

OPERATION DURING CRITICAL TIMES

The following four conditions will cause a CSU/DSU MS DBU to enter dial-backup mode:

Loss of Sealing Current

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

Out of Service (OOS) Signal

An OOS signal, generated by the network, indicates a device (or devices) in the network is out of service.

No Receive Signal

This is an indication that the copper pairs in the local loop may be either open or shorted, or that 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 that some device (or devices) in the network is inoperative. Upon detecting an all-1s or all-0s condition, the CSU/DSU MS DBU initiates a handshake routine to determine whether the remote unit's DTE is the source of the all-1s or all-0s condition or whether 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.

NOTE

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

OPERATION DURING NONCRITICAL TIMES

The CSU/DSU MS DBU may be configured not to enter dial-backup mode if Data Terminal Ready (DTR) is low. This feature prevents the CSU/DSU MS DBU from entering dial backup during noncritical times such as nights and weekends.

For more information, see Chapter 9.

Weekend and Time of Day Lockout

The CSU/DSU MS DBU may be configured not to enter dial-backup mode at certain times of day or on weekends. This protects the customer from being charged for a switched call during off hours should the dedicated circuit fail. See Chapter 9 for more information.

CONDITIONS FOR RETURNING TO THE DDS CIRCUIT

The CSU/DSU MS DBU can be configured to automatically revert to the DDS circuit from the dial-backup mode or wait to be returned to the DDS manually. Once the CSU/DSU MS DBU enters dial-backup mode, the unit polls the DDS circuit once every 100 ms to determine if the condition causing the DDS circuit failure has been corrected. Once the CSU/DSU MS DBU determines that the problem has been properly corrected and the DDS circuit is stable, it will wait for the amount of time specified in the restore timer (1 to 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 to 3 seconds. The backup connection is maintained for one minute after the DDS circuit is restored.

See Chapter 9 for more detailed information.

5. Configuration Overview

The CSU/DSU MS DBU contains four different user profiles (sets of configuration options) stored in read-only memory; see Appendix D. 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 CSU/DSU MS DBU is then configured with that profile every time power is turned on or the unit is reset.

Configuration Methods

The CSU/DSU MS DBU responds to the following methods of configuration:

- AT commands
- V.25 commands
- Front-panel commands
- A VT100 compatible terminal
- SNMP/TELNET through a device running SLIP/PPP protocol
- SNMP/TELNET through a LAN running Ethernet protocol (available when the SNMP Ethernet Module 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 Chapters 2 and 3 for more information on all other configuration methods. For an example application using the SLIP/PPP or Ethernet interface, see Chapter 4.

Descriptions of each Configuration menu item are given in Chapters 6 through 10.

A complete Configuration menu for the front panel is shown in Figure 5-1. The VT100 menu tree is shown in Appendix C.

NOTE

Because a VT100 terminal has better display capabilities, the VT100 menu structure differs from the front-panel interface. Appendix C includes the VT100 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.

COMMANDS

The CSU/DSU MS DBU can be configured and controlled with in-band AT commands from an asynchronous DTE port just as modems are.

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

Once the command mode is entered, AT commands can be transmitted to the CSU/DSU MS DBU to configure most of the options or initiate tests to check both the CSU/DSU MS DBU and the network connections. All command lines must begin with “AT” 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 by spaces for readability. The maximum length for a command line is 40 characters. Each command line is executed by the CSU/DSU MS DBU upon receipt of a terminating character. The default terminating character is a carriage return (ASCII 013), but it can be changed by writing a different value to register S3.

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

NOTE

Not all parameters can be selected using these commands. Valid commands are listed in Appendix B.

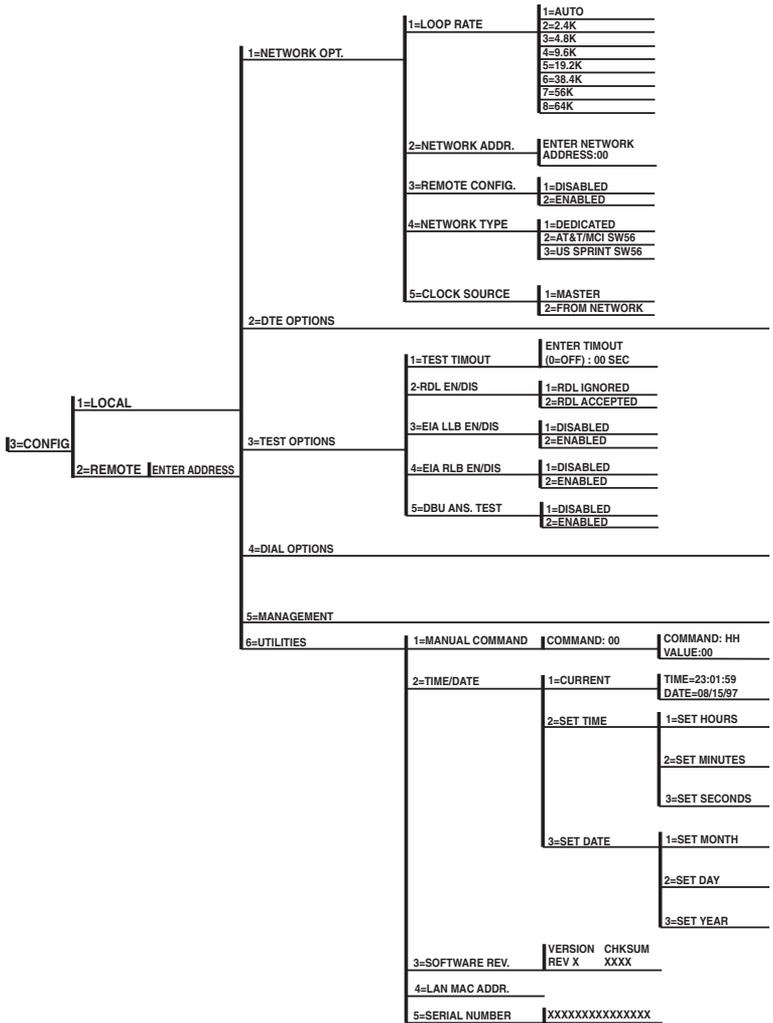


Figure 5-1. Front-Panel Configuration Menu Tree.

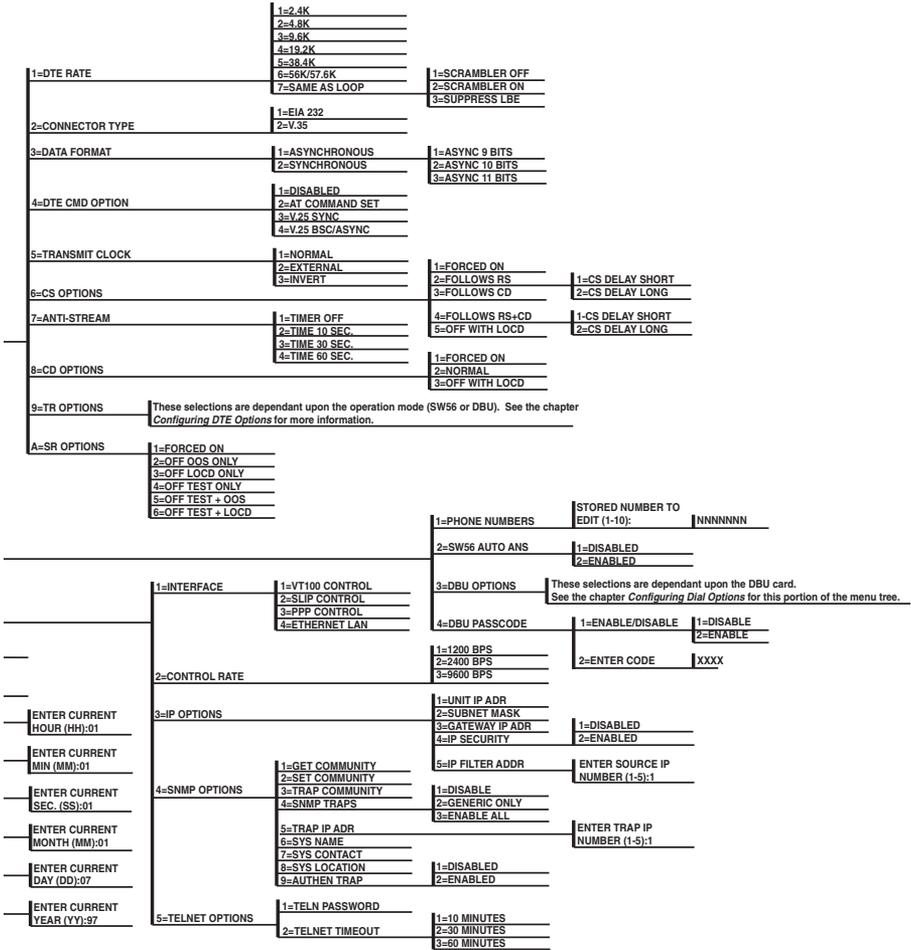


Figure 5-1 (continued). Front-Panel Configuration Menu Tree.

V.25 BIS COMMANDS

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

The V.25 bis option supports the following protocols:

- SDLC
- Bi-Sync
- Asynchronous

*SDLC Option***Character Format**

- Data bits - 8
- Parity bit - Ignored

Command Structure

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

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

*Bi-Sync Option***Character Format**

- Data bits - 7
- Parity bit - Odd

Command Structure

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

*Asynchronous Option***Character Format**

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

Command Structure

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

Special V.25 Configuration Commands

In addition to the CCITT commands supported, Black Box has added configuration commands for both local and remote DSUs:

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 CSU/DSU MS DBU to be configured with AT commands using a synchronous interface. The format is as follows:

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

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

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 CSU/DSU MS DBU to be configured from a synchronous interface. The format of this command follows:

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

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

6. Configuring Network Options

The Network Options configuration parameters control the loop operation of the CSU/DSU MS DBU. Once a parameter is set, “Command Accepted” is displayed briefly before returning to the active menu. Table 6-1 shows the AT commands used to set the Network Options. See Figure 6-1 for the Network Options menu tree.

Table 6-1. 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

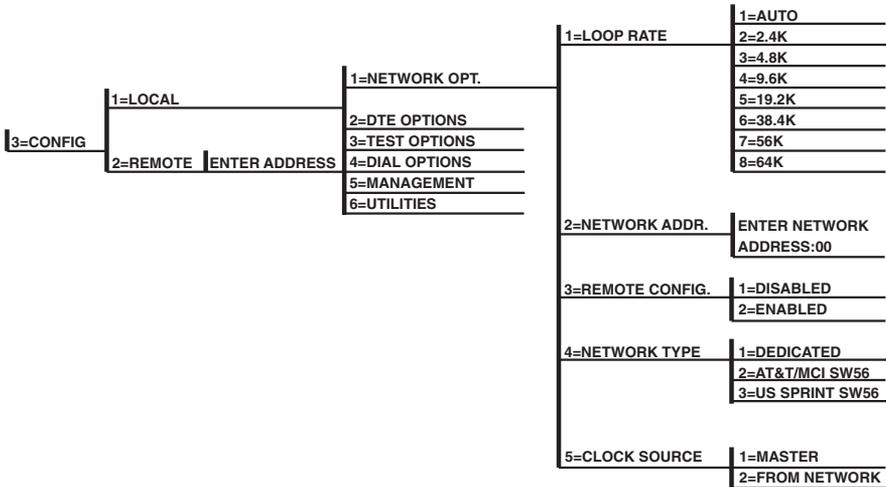


Figure 6-1. Network Options Menu Tree.

6.1 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 CSU/DSU MS DBU also supports subrate DTE data over a 56-kbps 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 6-1 with the equivalent AT commands that perform the same configuration functions.

6.2 Network Address

A two-digit decimal address can be assigned to each CSU/DSU MS DBU. 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.

6.3 Remote Configuration

This option sets up the CSU/DSU MS DBU to accept or reject remote configuration commands. The factory-default setting is Enabled.

CAUTION

Any type of remote configuration disrupts data flow.

6.4 Network Type

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

6.5 Clock Source

The Clock Source option specifies the timing source for the CSU/DSU MS DBU'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 CSU/DSU MS DBU must be set for Master, the other set for From Network.

7. Configuring DTE Options

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

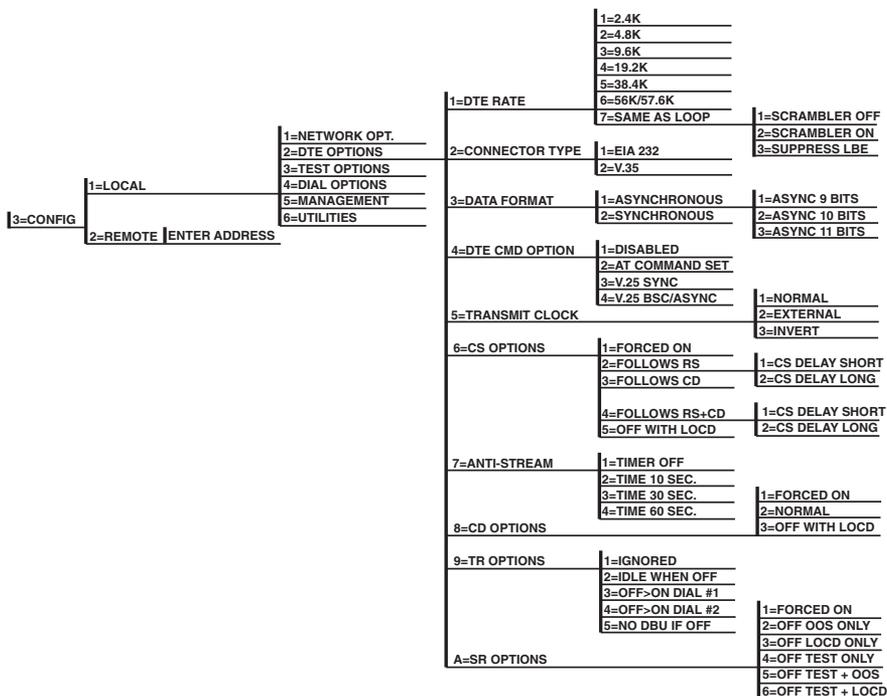


Figure 7-1. DTE Options Menu Tree.

Table 7-1. DTE Options AT Commands

Front Panel	AT Command	Description
DTE Rate 1=2.4K 2=4.8K 3=9.6K 4=19.2K 5=38.4K 6=56K/57.6K 7=SAME AS LOOP 1=SCRAMBLER OFF 2=SCRAMBLER ON 3=SUPPRESS LBE	%K3 %K4 %K5 %K6 %K7 %K8 %K9 _F0 _F1 _F2	DTE rate: 2.4K sync and async DTE rate: 4.8K sync and async DTE rate: 9.6K sync and async DTE rate: 19.2K sync and async DTE rate: 38.4K sync and async DTE rate: 56K sync or 57.6K async DTE rate matches loop rate DTE data scrambler disabled (64-kbps loop rate only) DTE data scrambler enabled (64-kbps loop rate only) 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 2=SYNCHRONOUS	&Q0 &Q2	Asynchronous DTE operation mode Synchronous DTE operation mode
DTE CMD Option 1=DISABLED 2=AT COMMAND SET 3=V.25 SYNC 4=V.25 BSC/ASYNC	none none none none	Disables all DTE command modes Enables AT command mode for DTE Enables V.25 (SDLC) command mode for DTE Enables V.25 (bisync or async) command mode for DTE
Transmit Clock 1=NORMAL 2=EXTERNAL 3=INVERT	&X0 &X1 &X3	TX clock from DSU selected ETC clock from DTE selected Inverted Tx clock from DSU selected
CS Options 1=FORCED ON 2=FOLLOWS RS 3=FOLLOWS CD 4=FOLLOWS RS+CD	&R0 &R1 &R2 &R3	CS always on CS state same as RS state CS state same as CD state CS state same as RS and CD state

Table 7-1 (continued). DTE Options AT Commands

Front Panel	AT Command	Description
CS Options (continued)		
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 note on the next page.
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 module is installed and Network Type is set to DEDICATED)	&D3	No dial backup if TR is off.
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 only)
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.

NOTE

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.

7.1 DTE Rate

If a DTE rate higher than the current loop rate is selected, the DTE rate automatically set to match the slower loop rate; the CSU/DSU MS DBU briefly displays DTE RATE SAME AS THE NETWORK before returning to the status screen. The factory-default setting is SAME AS LOOP.

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

CAUTION

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 CSU/DSU MS DBU.

7.2 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.

7.3 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 7-1 shows the AT commands that can be used to set the Data Format to asynchronous or synchronous.

7.4 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.

7.5 Transmit Clock

The Transmit clock option is used to select the source of the clock used to transfer data from the DTE into the CSU/DSU MS DBU. Table 7-1 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 Appendix E. 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.

7.6 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 7-1 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 7-2.

Table 7-2. Short and Long Delays at Different Operating Speeds

<u>Rate</u>	<u>Short Delay</u>	<u>Long Delay</u>
64	1.1 ms	16.1 ms
56	1.1 ms	16.1 ms
19.2	1.5 ms	16.5 ms
4.8	1.5 ms	16.5 ms
2.4	1.5 ms	16.5 ms

7.7 Anti-Stream

The Anti-Stream option is used to select the anti-stream timeout. The anti-stream timeout is the maximum time the CSU/DSU MS DBU transmits data into the network from the DTE. This feature prevents one DTE device on a multi-drop network from continuously tying up the transmit circuit back to the master DSU.

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

The factory-default setting is Timer Off. Table 7-1 shows the available options and their AT commands.

7.8 CD Options

The CD Options menu is used to select the control mode for the receive line signal detector (CD) lead. The factory-default setting is Normal. Table 7-1 shows the equivalent AT commands for setting CD options.

7.9 Data Terminal Ready (TR) Options

The TR Options menu is used to select the CSU/DSU MS DBU response to the Data Terminal Ready (TR) lead. The factory-default setting is Ignored. Table 7-1 shows the equivalent AT commands for setting TR options.

NOTE

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

To disable DBU when DTR is off, set this option for IDLE WHEN OFF.

7.10 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 7-1 shows the AT commands for setting SR options.

8. Configuring 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 their AT commands are listed in Table 8-1.

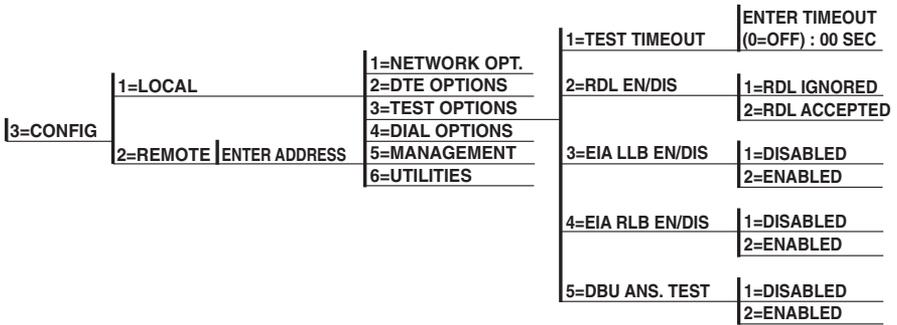


Figure 8-1. Test Options Menu Tree.

Table 8-1. 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 2=RDL ACCEPTED	&T5 &T4	RDL request from remote DSU ignored RDL request accepted
EIA LLB Enable/Disable 1=DISABLED 2=ENABLED	_A0 _A1	No response to local loopback Responds to local loopback
EIA RLB Enable/Disable 1=DISABLED 2=ENABLED	_R0 _R1	No response to remote loopback Responds to remote loopback
DBU Answer Test 1=DISABLED 2=ENABLED	none none	Remote unit does not accept DBU tests from far end Remote unit accepts DBU tests from far end

TEST TIMEOUT

The Test Timeout option sets the length of time a CSU/DSU MS DBU remains in a test mode before automatically returning to the data mode. Enter the timeout as a two-digit decimal value. The factory-default setting is off (0).

REMOTE DIGITAL LOOPBACK (RDL)

The RDL option specifies whether the CSU/DSU MS DBU 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 CSU/DSU MS DBU 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 CSU/DSU MS DBU 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.

NOTE

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

9. Configuring 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.

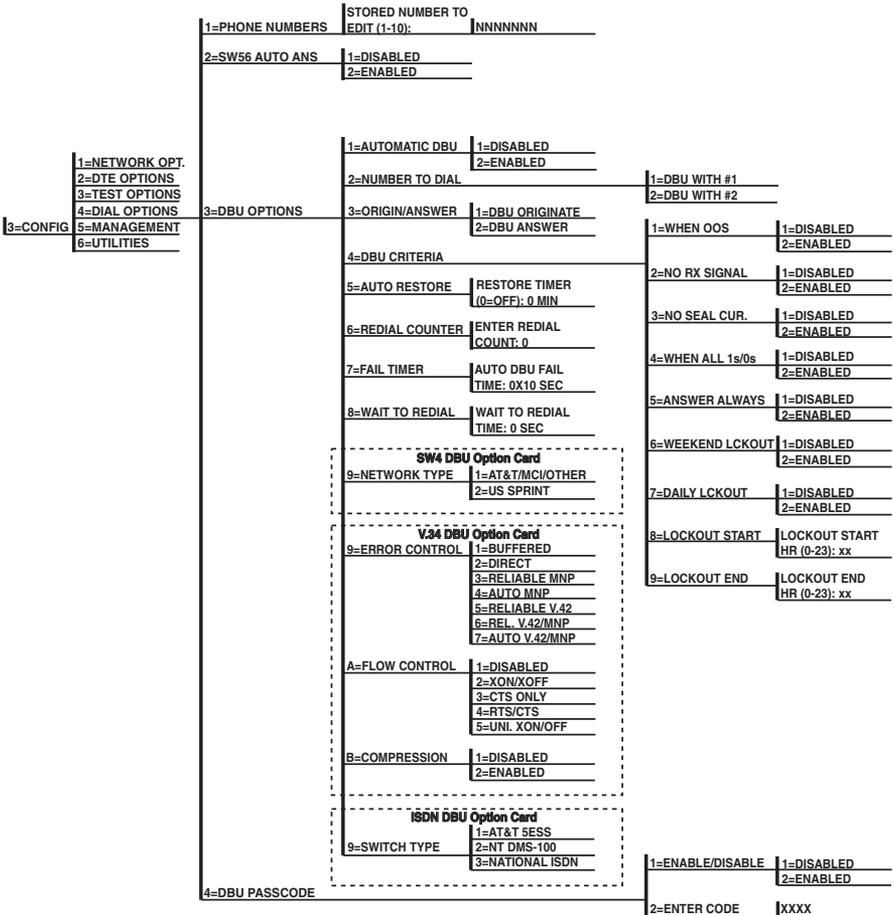


Figure 9-1. Dial Options Configuration Menu Tree.

9.1 Phone Numbers

The CSU/DSU MS DBU 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 9-1 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 a 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 9-1. AT Commands for Storing Phone Numbers

<u>AT Command</u>	<u>Description</u>
&Zn=	Store Phone Number
&Z9=	Enter SPID Number for ISDN dial backup
&Z10=	Edit LDN for ISDN dial backup

9.2 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 CSU/DSU MS DBU. 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.

9.3 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 9-2 lists the DBU options and their AT commands for all models.

9.3.1 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 CSU/DSU MS DBU is set to originate, it dials the numbers (first #1, then #2) 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 CSU/DSU MS DBU originates or waits to answer if the dedicated circuit fails. One end must be set to Originate and the other to Answer. The factory-default setting is Answer.

DBU Criteria

These options specify the conditions that will cause the CSU/DSU MS DBU to enter the backup mode.

When Out of Service (OOS): When enabled, the CSU/DSU MS DBU enters backup mode if an out-of-service condition is detected. The factory-default setting is Enable.

No Receive (RX) Signal: When enabled, the CSU/DSU MS DBU enters backup mode when a loss of signal is detected. The factory-default setting is Enable.

No Sealing Current: When enabled, the CSU/DSU MS DBU enters backup mode when a loss of sealing current is detected. The factory-default setting is Enable.

When all 1s/0s: When this option is enabled, the CSU/DSU MS DBU monitors the receive data for strings of 1s or 0s that are longer than the Fail Timer. If this condition is detected, the local CSU/DSU MS DBU initiates a handshake routine with the remote unit to determine if the DTE is generating the constant data pattern or if the network has failed.

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.

NOTE

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 CSU/DSU MS DBU remains in backup until the DDS circuit is active for the length of time specified for the restore timer. The selection is entered in minutes (up to 255). If the restore timer is 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 CSU/DSU MS DBU 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 CSU/DSU MS DBU encounters a busy or reorder, it attempts to establish the call the specified number of times. The factory-default setting is 5.

```
ENTER REDIAL  
COUNT:   ___  ___
```

Fail Timer

This option sets the amount of time the dedicated circuit failure condition must be active before the CSU/DSU MS DBU attempts backup. The amount of time, which is manually entered, can be as long as 990 seconds and as short as 100 ms if the 0 (zero) option is selected. 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
```

Transition Timer Dial Backup Option

This option sets the amount of time the DSU keeps the DBU connection up after the auto-restore function transitions back to the dedicated circuit. The factory-default setting is 60 seconds. A value of 0 seconds causes the DSU to drop the DBU call immediately after transition to the dedicated line.

Table 9-2. DBU Options AT Commands for All Models

Front Panel	AT Command	Description
Automatic DBU 1=DISABLED 2=ENABLED	_K0 _K1	Automatic DBU disabled Automatic DBU enabled
Number to Dial 1=DBU WITH #1 2=DBU WITH #2	_B0 _B1	Dial stored #1 Dial stored #2
Originate/Answer 1=DBU ORIGINATE 2=DBU ANSWER	_E0 _E1	Originates call if DDS fails Answers call if DDS fails
DBU Criteria WHEN OUT OF SERVICE 1=Disabled 2=Enabled NO RECEIVE (RX) SIGNAL	_G0 _G1	No DBU for OOS DBU when OOS

Table 9-2 (continued). DBU Options AT Commands for All Models

Front Panel	AT Command	Description
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 detected
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.
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

9.3.2 DBU OPTIONS FOR S4W

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 CSU/DSU MS DBU when dialing. Options include: AT&T/MCI/Other and US Sprint.

9.3.3 DBU OPTIONS FOR V.34 CARD

Table 9-3 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 compression is 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 Card. The factory-default setting is Enabled.

Table 9-3. DBU Options AT Commands for V.34 Card

DBU Options	CMD AT	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.

Table 9-3 (continued). DBU Options AT Commands for V.34 Card

DBU Options	CMD AT	Description
Error Control 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 2=XON/XOFF 3=CTS ONLY 4=RTS/CTS 5=UNI XON/XOFF	\Q0 \Q1 \Q2 \Q3 \Q4	Flow control disabled Enables XOn/XOff flow control Enables CTS flow control from DCE Enables CTS flow control from DCE and RTS from DTE Unidirectional X-ON/X-OFF
Compression 1=DISABLED 2=ENABLED	%C0 %C1	Compression disabled Compression enabled

9.3.4 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

9.3.5 DBU PASSCODE

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

When a dial-backup connection is established, the originate unit transmits a pre-programmed passcode to the answer unit over the dial-backup connection before the connection is considered valid. The answer unit compares the received passcode to a pre-programmed passcode. If the passcode matches, the receive unit sends a Passcode OK message to the originate unit and goes on-line. If the

passcode does not match, the answer 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 enabled, the dial-backup connection is terminated.

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.

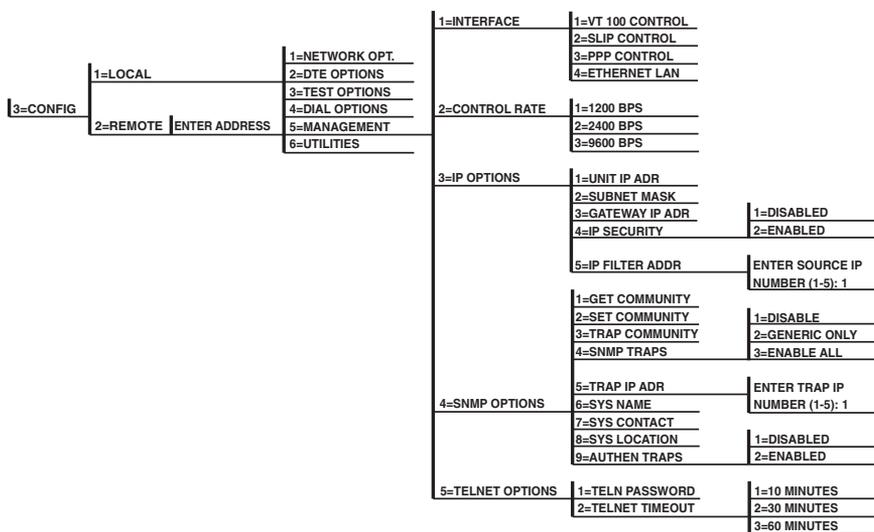


Figure 10-1. Management Menu Tree.

10.1 Interface

Select the management interface type (VT100 terminal, SLIP, or PPP) or select Ethernet LAN (the SNMP Ethernet Module must be installed).

10.2 Control Rate

Select the control port operating speed to match the connected device (this selection only applies when the interface options is set for VT100 terminal, SLIP, or PPP).

10.3 IP Options

NOTE

When configuring the CSU/DSU MS DBU with the front panel, use the “*” key to enter a decimal point.

10.3.1 UNIT IP ADDRESS

Enter the CSU/DSU MS DBU IP address in dotted decimal notation.

10.3.2 SUBNET MASK

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

10.3.3 GATEWAY IP ADDRESS

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

10.3.4 IP SECURITY

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

10.3.5 IP FILTER ADDRESS

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

10.4 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 CSU/DSU MS DBU uses this string to validate SNMP Get (read) requests. The default value is public. If using front-panel entry, see Section 10.6 for more information.

SET COMMUNITY

For SNMP operation, view and edit the Set community string. The CSU/DSU MS DBU uses this string to validate SNMP Set (write) requests. The default value is private. If using front-panel entry, see Section 10.6 for more information.

TRAP COMMUNITY

For SNMP operation, view and edit the Trap community string. The CSU/DSU MS DBU sends this string in SNMP trap messages to the network manager. The default value is "MT136A". If using front-panel entry, see Section 10.6 for more information.

SNMP TRAPS

Specify which traps the CSU/DSU MS DBU will send to the network manager. When enabled, the CSU/DSU MS DBU 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 Black Box CSU/DSU MS DBU MIB.

TRAP IP ADDRESS

Enter up to five IP addresses of the SNMP managers to which the CSU/DSU MS DBU 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 Section 10.6 for more information.

AUTHENTICATION TRAPS

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

NOTE

The Black Box CSU/DSU MS DBU MIB is available in the support section of the Black Box Web page at www.blackbox.com.

10.5 TELNET Options**TELNET PASSWORD**

View/edit the TELNET password. If using front-panel entry, see Section 10.6 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.

10.6 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.

NOTE

A block cursor signifies movement from field to field. When you see a black cursor, 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 you see an underline cursor, pressing the Up- and Down-Arrow keys scrolls the alphabet.

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.

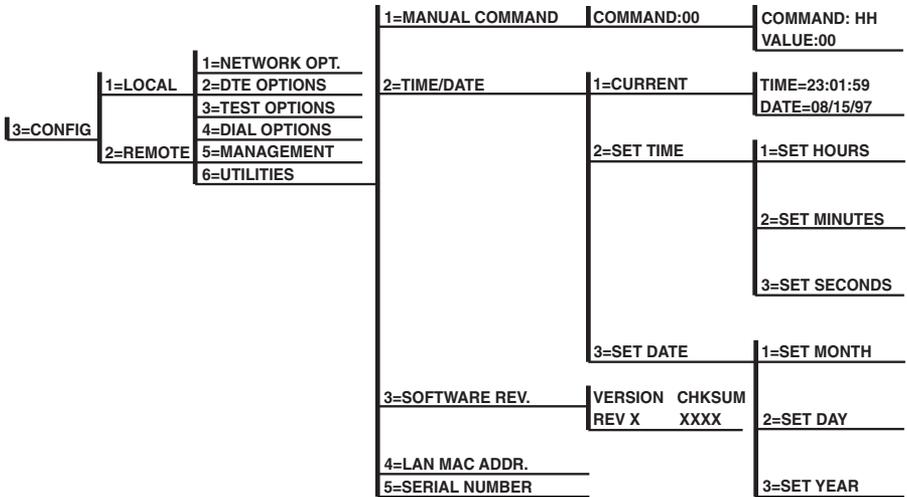


Figure 11-1. Utilities Menu Tree.

11.1 Manual Command

The Manual Command option is a shortcut method for entering configuration and control commands for the CSU/DSU MS DBU. Figure 11-1 shows the menu path for the manual command. The available manual commands are listed in Table 11-1. 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 you 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 11-1. Manual Commands

Command Description	Command	Value
AT Command Echo		
Disable	82	00
Enable	82	01
AT Result code		
Enable	85	00
Disable	85	01
AT Long or Short code		
Short form (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

11.2 Time/Date

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

NOTE

The CSU/DSU MS DBU has been tested for year 2000 compliance.

11.3 Software Revision

View the current revision of the software installed in the CSU/DSU MS DBU.

11.4 LAN MAC Address

View the LAN MAC address. This address is available when the SMP Ethernet Module is installed.

11.5 Serial Number

View the CSU/DSU MS DBU's serial number.

12. Testing and Troubleshooting

12.1 Test Overview

The CSU/DSU MS DBU performs a variety of diagnostic functions that isolate portions of the circuit to identify the source of the problem. Tests may be initiated and terminated through the front panel, VT100 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.

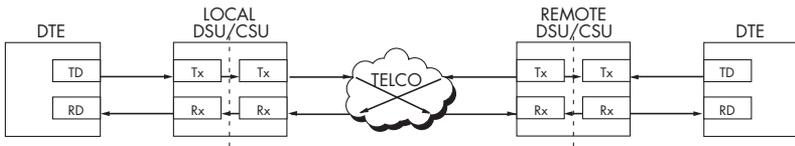


Figure 12-1. Normal Operation Before Initiating Loopback Test.

CAUTION

All diagnostic tests disrupt data flow.

12.1.1 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.

- 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.

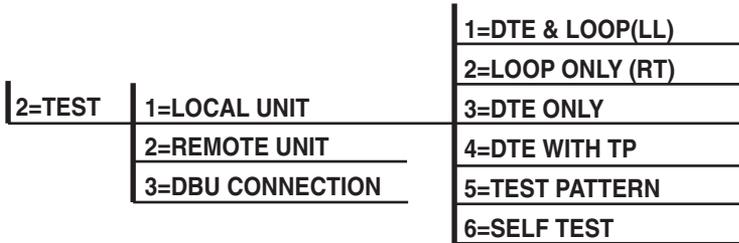


Figure 12-2. Initiating a Test.

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

12.1.2 TEST STATUS DISPLAY

The Test Status display appears automatically during a test. The Test Status display is similar to the status screen described in Chapter 14, 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.

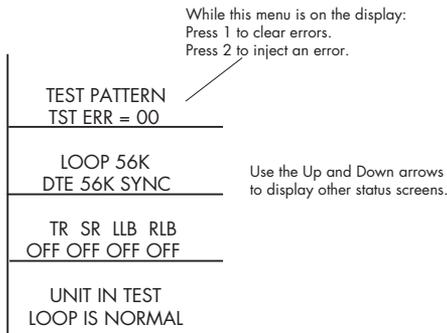


Figure 12-3. Sample Test Status Displays.

12.1.3 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.

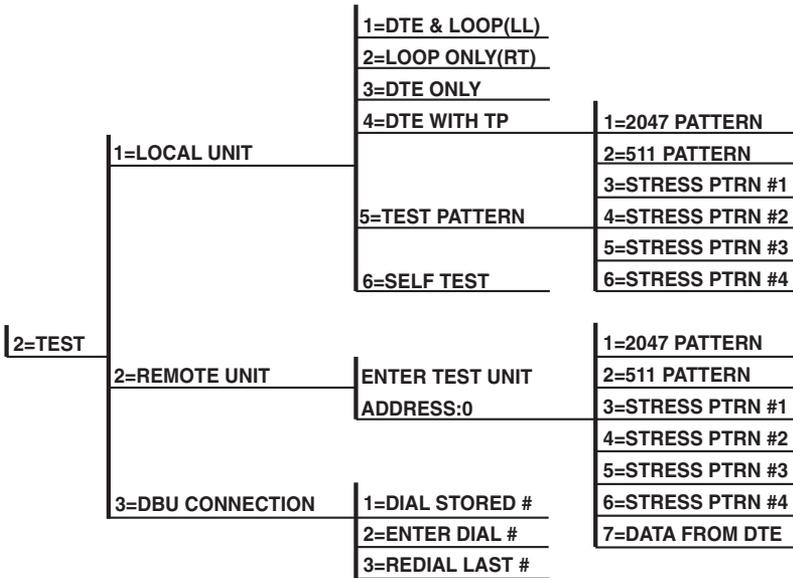


Figure 12-4. Complete Test Menu.

12.2 Troubleshooting

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

12.2.1 MESSAGES FROM THE DSU/CSU

Messages on the LCD display and LEDs give 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 12-1 are displayed on the LCD.

NOTE

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

Table 12-1. Messages from the DSU/CSU

Message	Meaning	Probable Cause	Action
Loop is normal	Ground 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.

12.2.2 TROUBLESHOOTING NEW INSTALLATIONS

Before initiating diagnostics on a newly installed unit and/or DDS circuit and before contacting Black Box Technical Support, please check the items in Table 12-2 to ensure the unit is configured properly.

After verifying the items listed in Table 12-2, 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 the diagnostics described below the table.

Table 12-2. Troubleshooting New Installations

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, 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. Either use the ATZ command or turn the CSU/DSU off, then on again. The LCD will show whether it passes the self-test.

If your DSU is receiving excessive errors requiring retransmission of data, first perform a DTE with Test Pattern test (Section 12.3.4) to determine whether the unit's internal transmitter and receiver are operating error-free. If the problem persists, perform a Remote Test to verify the connection between the local and

remote unit is error free. Run the test using all available test patterns.

NOTE

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

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

If the unit fails any of these tests or the problem has not been determined, contact Black Box.

12.3 Local Unit Diagnostics

The local CSU/DSU MS DBU can perform six different tests; see Table 12-3.

Table 12-3. 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 RD = Customer Receive Data TX = Network Transmit Data RX = Network Receive Data		

The test patterns shown in Table 12-4 are available for the DTE with Test Pattern and Test Pattern tests.

Table 12-4. 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.

12.3.1 DTE & LOOP (LL)

The DTE & Loop test splits the CSU/DSU MS DBU into two separate DTE and loop interface sections and then loops the receive data of each interface back to its respective transmit data. The DTE & Loop test provides a bidirectional loopback at the DSU/CSU. Figure 12-5 illustrates the loopback points and the signal paths for this test.

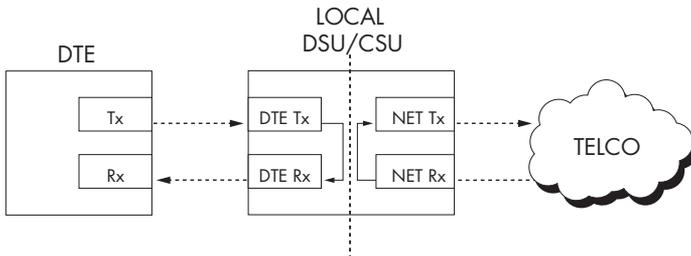


Figure 12-5. DTE & Loop Test.

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.

12.3.2 LOOP ONLY (RT)

The Loop Only (RT) test allows the loop interface and a major portion of the DTE interface for the local CSU/DSU MS DBU 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.

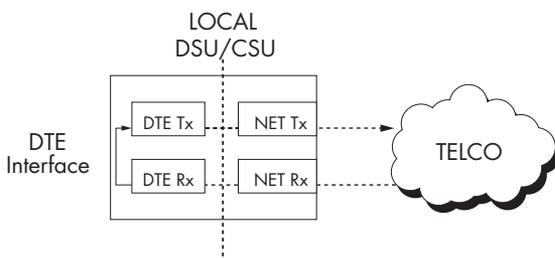


Figure 12-6. Loop Only Test.

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 CSU/DSU MS DBU.

12.3.3 DTE ONLY

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

NOTE

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

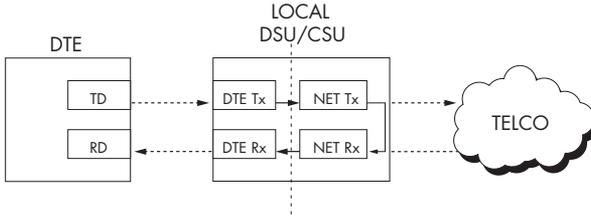


Figure 12-7. DTE Only Test Diagram.

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 CSU/DSU MS DBU.

Interpreting Test Results

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

12.3.4 DTE WITH TEST PATTERN

The DTE with TP (test pattern) test exercises the internal data paths of the CSU/DSU. The transmit data is looped back to the receive data at a point close to the physical network interface. The test pattern is generated using the DSU/CSU’s internal test-pattern generator. This test can be used to detect deficiencies within the internal circuitry of the CSU/DSU MS DBU. Figure 12-8 illustrates the loopback point and the data paths for this test.

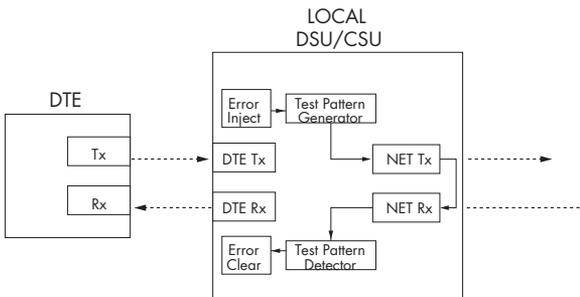


Figure 12-8. DTE with Test Pattern.

Test Purpose

A DTE with TP test verifies the internal transmit and receive circuitry of the CSU/DSU MS DBU.

Interpreting Test Results

If the unit is functioning properly, the CSU/DSU MS DBU displays:

```
DTE WITH TP
TST ERR=XX
```

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

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

12.3.5 TEST PATTERN

The Test Pattern option converts the local CSU/DSU MS DBU into a BERT tester for the purpose of testing the DDS circuit. If this test is used, the remote DSU/CSU must be in loopback or transmitting a test pattern. Figure 12-9 illustrates the data paths for this mode.

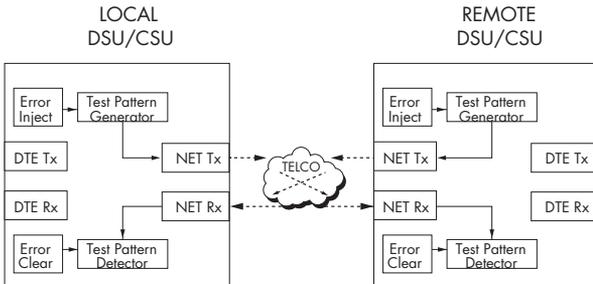


Figure 12-9. Test Pattern Only.

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 that 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.

12.3.6 SELF-TEST

The self-test verifies current operation of the CSU/DSU MS DBU. It can be performed at any time and is recommended if there is any question about the DSU's health.

Test Purpose

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

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.

12.4 Remote Unit Diagnostics

A remote CSU/DSU MS DBU can perform seven different tests; see Table 12-5.

Table 12-5. Remote Tests and AT Commands

<u>Front Panel</u>	<u>AT Command</u>	<u>Description</u>
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.

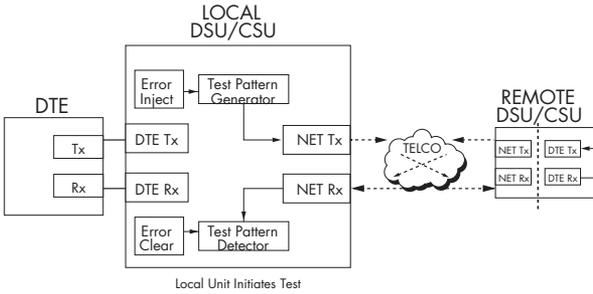


Figure 12-10. V.54 RDL with Test Pattern.

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 CSU/DSU MS DBU into loopback.

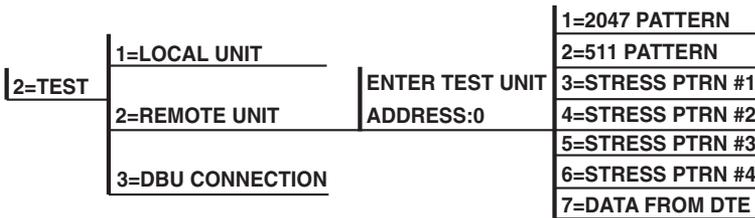


Figure 12-11. Initiating a Remote Test.

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.

12.5 DBU Connection

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

When this option is selected, choose a stored number, enter a number to dial, or redial the last dialed number. After establishing DBU connection, the CSU/DSU MS DBU designated at the answer unit is placed into loopback and a test pattern is transmitted from the originate unit to the answer unit. Receive data is checked for errors and the results displayed on the front panel. While running this test, errors may be injected by pressing 2 and cleared by pressing 1. During the DBU test, the Test LED is On.

NOTE

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

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

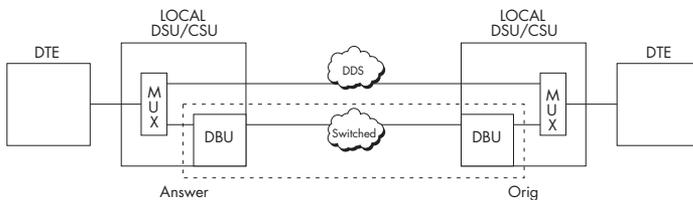


Figure 12-12. DBU Connection Test.

Test Purpose

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

Initiating

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

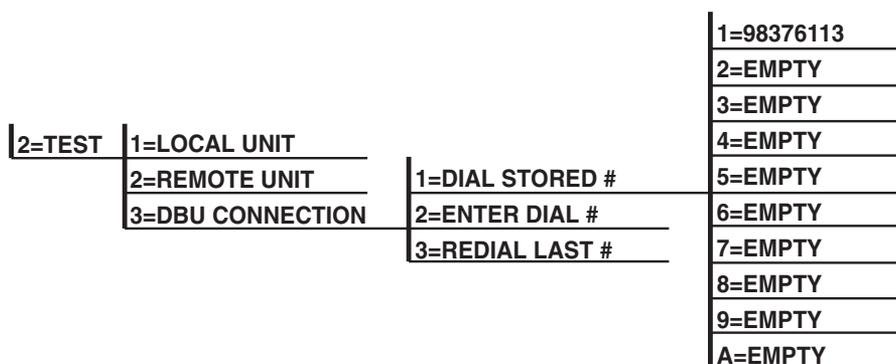


Figure 12-13. Initiating a DBU Connection Test.

Interpreting Test Results

If the unit is functioning properly, the CSU/DSU MS DBU displays:

```

DBU TEST PATTERN
TST ERR = 0000
  
```

13. Activating Dial Functions

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.

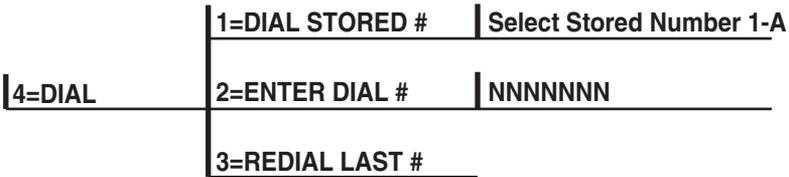


Figure 13-1. Dial Options Menu (SW56).

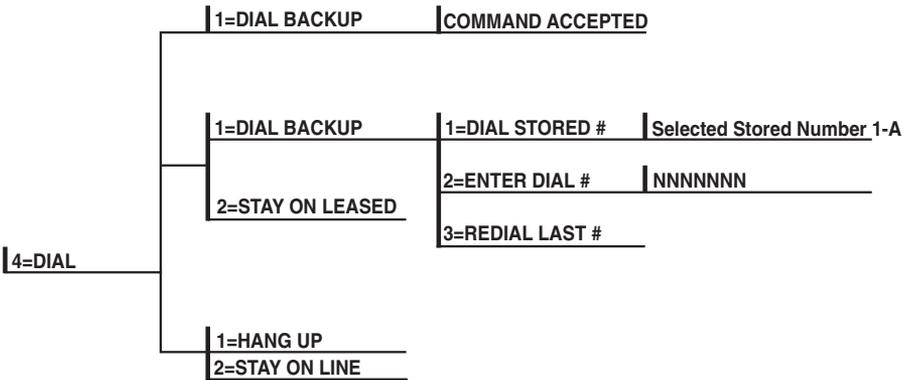


Figure 13-2. Dial Options Menu (Dedicated).

ANSWER UNIT CONNECTED TO DDS LINE

Dial Backup

The message COMMAND ACCEPTED is displayed and the CSU/DSU MS DBU waits for an incoming call. When an incoming call is detected, the CSU/DSU MS DBU answers the call and enters dial backup.

ORIGINATE UNIT CONNECTED TO DDS LINE

Dial Backup

The CSU/DSU MS DBU prompts to dial a stored number or enter a number to dial for dial backup.

Stay on Leased

The CSU/DSU MS DBU 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 re-establish communication on the DDS line.

Stay On Line

This CSU/DSU MS DBU remains in dial-backup mode and returns to the Status menu.

14. Viewing Status Information

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 CSU/DSU MS DBU automatically reverts to the Status display; see Figure 14-1.

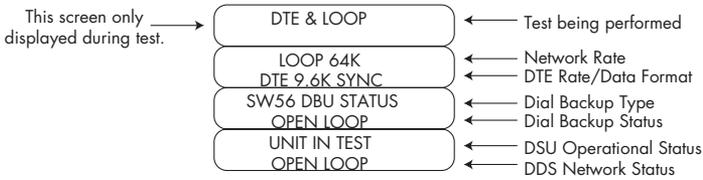


Figure 14-1. Status Display.

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 CSU/DSU MS DBU. The following messages are displayed according to the dial-backup option installed in the CSU/DSU MS DBU:

- | | |
|--------------------------|--|
| 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 CSU/DSU MS DBU. |

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 CSU/DSU MS DBU detected an incoming-call message and is initiating call-setup procedure.
Call Disconnect	Call-disconnect message received from the remote end.
Called Unit Busy	The unit called is currently busy and cannot be connected (ISDN only).
Dialing	The unit is dialing the selected number.
Going to DBU	The CSU/DSU MS DBU is entering dial-backup mode.
Idle	Messages are not being transmitted, but the service is immediately available for use.
Incoming Call	Incoming-call messages being received.
In Dial Backup	The CSU/DSU MS DBU 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 CSU/DSU MS DBU.
OOS/OOF From Net	Out-of-service signal or out-of-frame condition exists. The call cannot be completed because the called terminal or the called terminal's access line is out of service or is faulty (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 CSU/DSU MS DBU is currently performing a test with a pattern.
Waiting for Call	The originating CSU/DSU MS DBU is waiting on a call from the remote end.
Inactive	A DBU card is installed, but the CSU/DSU MS DBU 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 CSU/DSU MS DBU Status

This display line (see Figure 14-1) indicates current CSU/DSU MS DBU status. Possible messages are:

Data Mode	In data mode, the Data Set Ready (SR) and Request To Send (RTS) circuits are on, and the CSU/DSU MS DBU is ready to send data.
Unit in Test	The CSU/DSU MS DBU is currently in test mode; use the Arrows to scroll through the menus to display the type of test being performed.

Current DDS Network Status

This display line (see Figure 14-1) displays the status of the main telco line. For normal operation this should display LOOP IS NORMAL; these are the other possible messages:

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

DTE CONTROL LEADS AND STATUS

Four additional DTE interface leads are displayed with their current status (on or off) displayed below:

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 on the back of the CSU/DSU MS DBU, the DBU cards, and the SNMP Ethernet Module. For more information on the connectors, see Chapter 2.

Table A-1. Pin Assignments for Telco Connector

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

Table A-2. Pin Assignments for 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-3. Pin Assignments for Primary EIA-232 Connector

<u>Pin</u>	<u>EIA</u>	<u>Description</u>
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-4. Pin Assignments for Primary V.35 Connector

<u>Pin</u>	<u>CCITT</u>	<u>Description</u>
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-5. Pin Assignments for Control Connector

<u>RJ Pin#</u>	<u>Function</u>	<u>Direction</u>
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-6. Pin Assignments for 10BASE-T 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-1 shows the AT commands available for the CSU/DSU MS DBU.

Table B-1. AT Commands

<u>Command</u>	<u>Title</u>	<u>Default</u>
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 Defaults	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
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

Table B-1 (continued). AT Commands

<u>Command</u>	<u>Title</u>	<u>Default</u>
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 CSU/DSU MS DBU through either a VT100 terminal interface or a TELNET session. Examples of the terminal screens as well as a menu tree (Figure C-2) are provided.

NOTE

Because VT100 terminals have better display capabilities, the VT100 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.

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

NOTE

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-1.

Table C-1. Terminal Main Menu Dial Selection

<u>Network Type Selected</u>	<u>DBU Card</u>	<u>Sixth Selection</u>
DEDICATED	installed	DIAL DBU
SW56	N/A	DIAL SW56
DEDICATED	not installed	no selection available

```
                                TERMINAL MENU
1 STATUS
2 LOCAL 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).

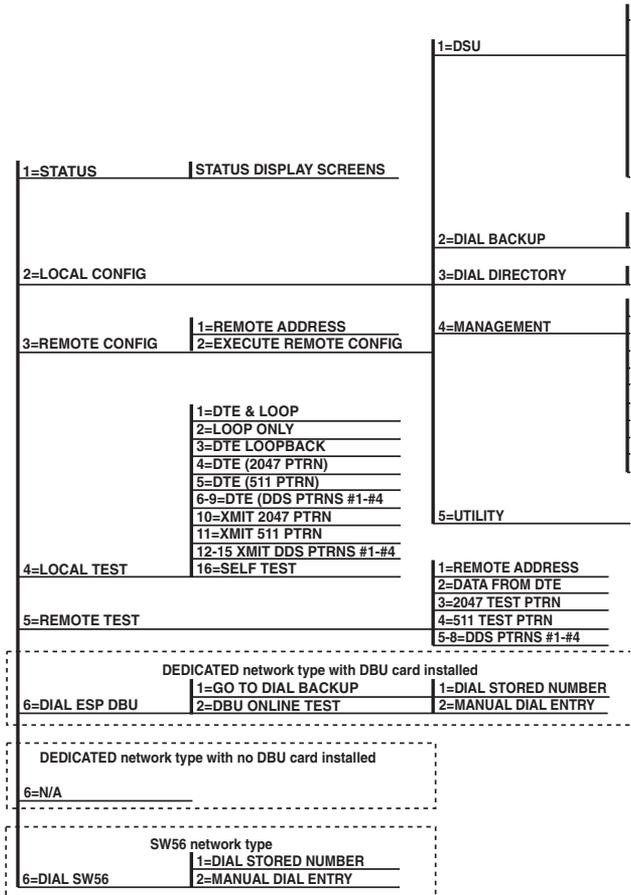


Figure C-2. Terminal Menu Tree.

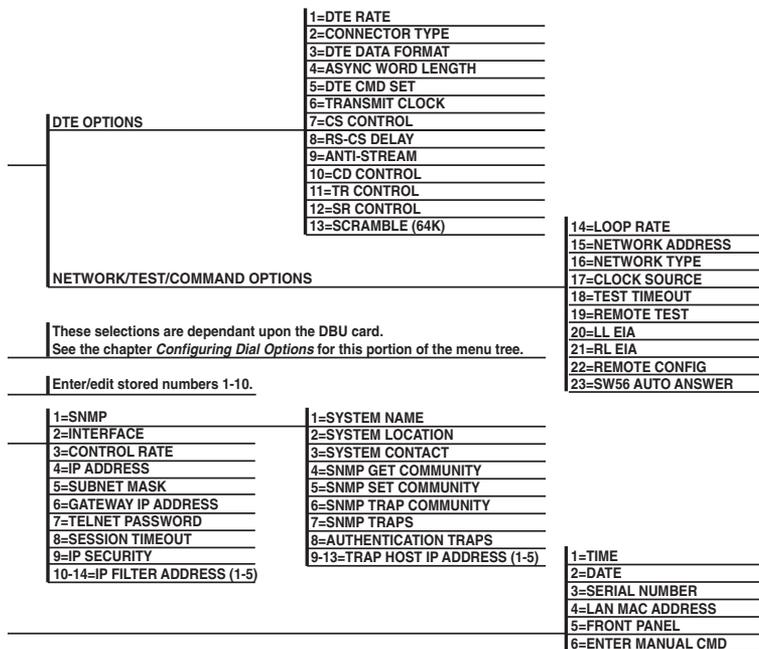


Figure C-2 (continued). Terminal Menu Tree.

C.1 Status Menus

Status menus display all relevant information for the network and DTE interfaces. For more information, see Chapter 14.

```

                                STATUS
UNIT/LOOP STATUS                DTE LEADS
LOOP RATE = SWITCHED 56K        RT = OFF
DTE RATE = 57.6K                CTS = OFF
DTE FORMAT = ASYNC              TD = OFF
TEST STATUS = NO TEST          RD = OFF
SELF TEST = PASS                DCD = OFF
SOFTWARE REV = BETA A           DSR = OFF
CHECKSUM = 1132                 DTR = OFF
DBV TYPE = NONE                 LL = OFF
LOOP STATUS = OPEN LOOP         RL = OFF
SW56 DIALING STATUS = IDLE
NUM DIALED =

-----
ESC = EXIT

```

Figure C-3. Status Menu.

C.2 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.

```

                                REMOTE CONFIG OPTIONS
1 REMOTE ADDRESS = 0
2 EXECUTE REMOTE CONFIG

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

```

Figure C-4. Remote Configuration Options.

```

CONFIGURATON MENU

1 DSU
2 DIAL BACKUP
3 DIAL DIRECTORY
4 MANAGEMENT
5 UTILITY

-----

-----

ESC = EXIT          ENTER SELECTION -> _
    
```

Figure C-5. Main Configuration Menu.

C.2.1 DSU CONFIGURATION (DTE, NETWORK, AND TEST OPTIONS)

Chapters 6–9 include detailed descriptions of these parameters. See Figure C-6.

```

DSU CONFIGURATON

DTE OPTIONS                                NETWORK/TEST/COMMANO OPTIONS
1 DTE RATE (@56K/64K) = SAME AS LOOP      14 LOOP RATE = AUTO
2 CONNECTOR TYPE = V.35                    15 NETWORK ADDRESS = 0
3 DTE DATA FORMAT = SYNCHRONOUS          16 NETWORK TYPE = DEDICATED
4 ASYNC WORD LENGTH = 10 BITS              17 CLOCK SOURCE = FROM NETWORK
5 DTE CMD SET = DIS                        18 TEST TIMEOUT = 0
6 TRANSMIT CLOCK = NORMAL                  19 REMOTE TEST = EN
7 CS CONTROL = FOLLOWS RS                  20 LL EIA = DIS
8 RS-CS DELAY = SHORT                      21 RL EIA = DIS
9 ANTI-STREAM = TIMER OFF                  22 REMOTE CONFIG = EN
10 CO CONTROL = NORMAL                     23 SW56 AUTO ANSWER = EN
11 TR CONTROL = IGNORED
12 SR CONTROL = OFF TEST+00S
13 SCRAMBLE (64K) = OFF

-----

-----

ESC = EXIT          ENTER SELECTION -> _
    
```

Figure C-6. DSU Configuration Menu.

C.2.2 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.

NOTE

If DBU Configuration is selected when no DBU card is installed, the message “CSU/DSU MS 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, make sure that the card is properly seated in the slot and then restart the unit.

```

S4W DIAL BACKUP
DBU OPERATIO          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 ALWAYS = DIS
7 FAIL COND TIMER = 3  17 WEEKEND LOCKOUT = DIS
8 WAIT TO REDIAL = 10  18 DIALY 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 Chapter 9 for more information.

C.2.3 MANAGEMENT CONFIGURATION

Select the management interface and set the unit up to respond to the selected interface. See Chapter 10 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.

```

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.

```

                                SNMP
1 SYSTEM NAME = NAME
2 SYSTEM LOCATION = LOCATION
3 SYSTEM CONTACT = CONTACT
4 SNMP SET COMMUNITY = PUBLIC
5 SNMP SET COMMUNITY = PRIVATE
6 SNMP TRAP COMMUNITY = DSUIV
7 SNMP TRAPS = GENERIC ONLY
8 AUTHENTICAITON TRAPS = DIS
9 TRAP HOST IP ADDR 1 = 000.000.000.000
10 TRAP HOST IP ADDR 2 = 000.000.000.000
11 TRAP HOST IP ADDR 3 = 000.000.000.000
12 TRAP HOST IP ADDR 4 = 000.000.000.000
13 TRAP HOST IP ADDR 5 = 000.000.000.000
-----
-----
ESC = EXIT                ENTER SELECTION -> _

```

Figure C-9. SNMP Management Menu.

C.2.4 UTILITY CONFIGURATION

View/set the time of day and date, view the LAN MAC address (if the SNMP Ethernet Module is installed), enable/disable the front panel, or enter manual commands. Chapter 11 provides more detailed information. See Figure C-10.

```

                                UTILITY
1 TIME (HR: MN: SC) = 12:35:00
2 DATE (MM-DV-YR) = 03-21-99
3 SERIAL NUMBER = 123456789
4 LAN MAC ADDRESS = 000000000000
5 FRONT PANEL = EN
6 ENTER MANUAL CMD
-----
-----
ESC = EXIT                ENTER SELECTION -> _

```

Figure C-10. Utility Menu.

C.3 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 Chapter 12.

```

LOCAL TEST OPTIONS

1 DTE & LOOP                10 XMIT 2047 PTRN
2 LOOP ONLY                 11 XMIT 511 PTRN
3 DTE LOOPBACK             12 XMIT DDS PTRN #1
4 DTE (2047 PTRN)         13 XMIT DDS PTRN #2
5 DTE (511 PTRN)          14 XMIT DDS PTRN #3
6 DTE (DDS PTRN #1)       15 XMIT DDS PTRN #4
7 DTE (DDS PTRN #2)
8 DTE (DDS PTRN #3)
9 DTE (DDS PTRN #4)
16 SELF TEST

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

```

Figure C-11. Local Test Options Menu.

```

REMOTE TEST OPTIONS

1 REMOTE ADDRESS = 0
2 DATA FROM DTE
3 2047 TEST PTRN
4 511 TEST PTRN
5 DDS PTRN #1
6 DDS PTRN #2
7 DDS PTRN #3
8 DDS PTRN #4

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

```

Figure C-12. Remote Test Options Menu.

C.4 Dial SW56/Dial 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-1). When a DBU module is installed and the DEDICATED Network Type is selected, the Dial DBU selection is shown instead.

C.4.1 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.

```

DIALING MENU
1 DIAL STORED NUMBER
2 MANUAL DIAL ENTRY

-----

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

Figure C-13. SW56 Dialing Menu.

C.4.2 DIAL DBU

This menu is available when a module is installed in the CSU/DSU MS DBU and the Network Type is set to DEDICATED. See Chapter 13 for more information on individual menu selections.

```

DBU CONTROL MENU
DBU OPERATIONS
1 GO TO DIAL BACKUP
2 DBU ONLINE TEST

-----

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

Figure C-14. Dial DBU Menu.

Appendix D. Configuration Profiles

The CSU/DSU MS DBU contains four different user profiles (sets of configuration options) stored in read-only memory; see Table D-1. The unit is shipped from the factory with profile 1 loaded into the nonvolatile configuration memory. See Section 11.1 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 CSU/DSU MS DBU. One 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-1. Configuration Profiles

Manual Command	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
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

Table D-1 (continued). Configuration Profiles

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

Table D-1 (continued). Configuration Profiles

	Profile Numbers			
	(00) 1	(01) 2	(02) 3	(03) 4
Test Options (continued)				
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	Auto	Auto	Auto
	V.42/MNP	V.42/MNP	V.42/MNP	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.

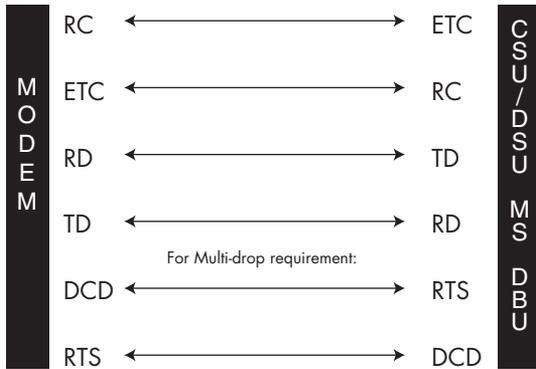


Figure E-1. DSU to Modem Interconnect.

Appendix F. Specifications

Operating Modes

- Dedicated DDS (point-to-point, multipoint)
- 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 to 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-48 female and DB25
- Optional 10BASE-T interface with SNMP Ethernet Module
- 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-48 female, 4-wire, full duplex

Receiver Sensitivity

-45 dB at all rates

Agency Approvals

UL® 1950

C-U.L. 1950

FCC Part 15, Class A

FCC Part 68

CS03

Environment

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

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

Relative Humidity: Up to 95%, noncondensing

Hardware Specifications

Dimensions: 2.4"H x 8"W 10.4"D (6.1 x 20.3 x 26.4 cm)

Weight: 4.5 lb. (2 kg)

Power: 115 VAC, 75 mA max., 8.6 watts



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