BLACK BOX Catalogue Ltd
The Source for Connectivity

MTU9085-75
MTU9085-120

E1 NTU with SNMP Management User Guide

E1 NTU

Copyright

Product Limited Warranty

BLACK BOX warrants to buyer that any unit shipped to buyer, under normal and proper use, will be free from defects in material and workmanship for a period of 12 months from the date of shipment to buyer.

Disclaimer

BLACK BOX Ltd makes no representation of warranties with respect to the contents of this document and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. Further, BLACK BOX Ltd reserves the right to revise this publication and to make changes in it from time to time without obligation to notify any person or organization of such revision or changes.

ISO Compliance

Products Manufactured Under
An ISO 9001 Certified
Quality Management System

Warning

The E1 NTU complies with FCC Part 15 of the Federal Communications Commission (FCC) Rules concerning radio frequency emissions for Class A computing devices. The following section is required by the FCC.

Caution

In accordance with FCC Part 15 section 15.21, changes or modifications made by the buyer that are not expressly approved by BLACK BOX Ltd could void the buyer's authority to operate this equipment.

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

This Class A digital device meets all requirementsof the Canadian Interference-Causing Equipment Regulations.
Cet Appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

Customer Information

The equipment complies with Part 68 of the FCC Rules. You will find the label located on the bottom of the enclosure. This label contains the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your telephone company.

Incidence of harm: If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Rights of the telephone company: Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

Malfunction of the equipment: In the event this equipment should fail to operate properly, disconnect the unit from the telephone line. Try using another FCC approved telephone in the same telephone jack. If the trouble does not persist and appears to be with this unit, disconnect the unit from the telephone line and discontinue use of the unit until it is repaired. Please note that the telephone company may ask that you disconnect this equipment from the telephone network until the problem has been corrected or until you're sure that the equipment is not malfunctioning.

E1 NTU

Table of Contents

E1 NTU

Introduction

EI NTU Features

The E1 NTU (Data Service Unit) is a single data port DSU that enables access to high-speed public and private E1/FE1 (Fractional E1) networks.The E1 NTU is shown in Figure 1-1.

The E1 NTU transmits and receives a signal from a DTE device. The E1 NTU converts between X.21, V.35, RS-449, or EIA-530 compatible DTE data and G.703 presented on either a 75 or 120 ohm interface for E1/FE1 network transport.

The E1 NTU offers a full DSU interface with SNMP network management capability (including RFC 1406).

Figure 1-1   The E1 NTU

These management capabilities can be accessed directly, through a modem, or over the Ethernet (through the SNMP Managment processor.)

• The E1 NTU connects high-speed bridges, routers and other data terminal equipment to the Internet and frame relay networks. The E1 NTU readily supports point-to-network and multi-point configurations.

E1 NTU

shows a typical multi-point frame relay network application.
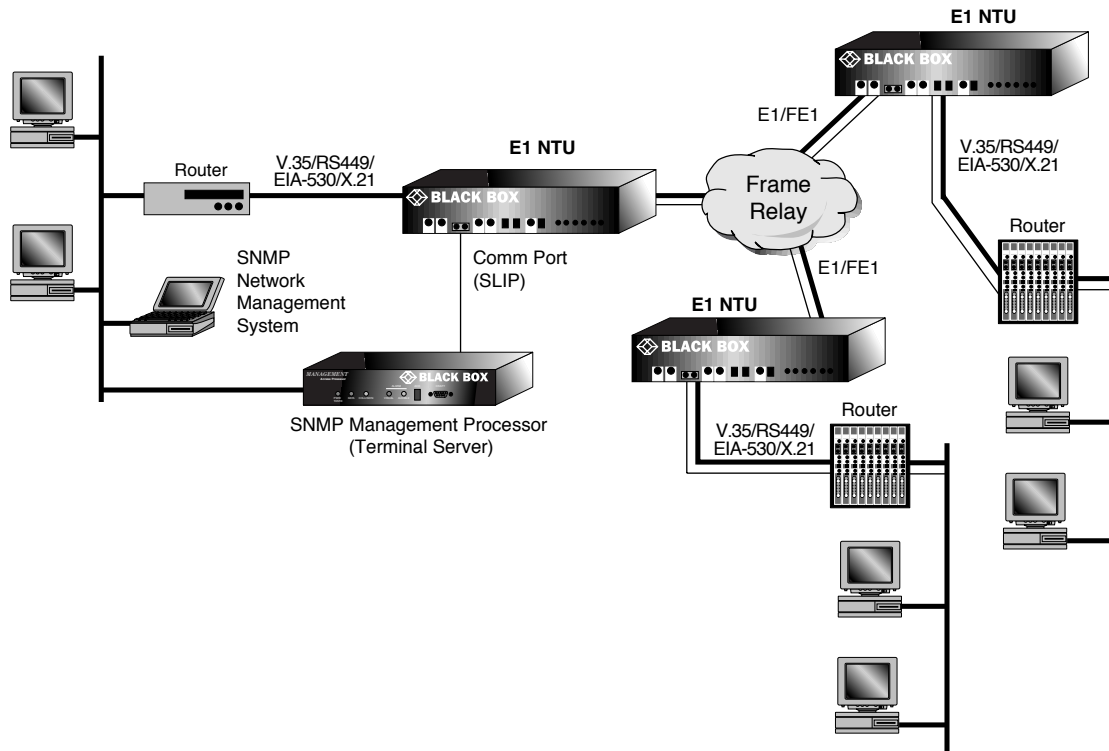
Figure 1-2   Typical Multi-point Frame Relay Network App.

Service Features

- E1/FE1 point-to-point connectivity
- Access to fast packet services such as Frame Relay and SMDS
- IBC-based communications with the far-end unit
- HDB3 line encoding schemes
- A single DATA port with:
    - Software configuration for V.35, RS-449, EIA 530 or X.21
    - DTE or DCE interface and a DB-25 connector on the back
    - Bandwidth mapping into contiguous or manually selected 64 kbps slots
    - Selectable data rates from 64 kbps to 1.984 Mbps
    - Smooth clock at all data rates
    - Timing options: SCTE, SCT or inverted SCT clock

Management Capabilities

Management is a critical aspect of any network. The management and configuration capabilities of the E1 NTU include a wide range of management access solutions including telnet, and SNMP management.

- Access for a terminal, telnet connection, modem or SNMP management station
- Embedded SNMP agent
- Support for SNMP RFC 1406 for E1, MIB II (RFC 1213) and enterprise MIBs

- Monitor the state of the E1 NTU
- Monitor the state of the NET and DTE ports
- View and set configuration parameters
- Perform diagnostics and display an Event Log
- Examine NET and DTE performance databases
- Front panel LEDs
- Performance monitoring and built-in test patterns and diagnostic tools to help maintain the line and troubleshoot problems
- Alarm reports sent to a terminal, printer or dial-out
- Downloadable code

E1 NTU

Installation

This chapter describes installing the E1 NTU:

Pre-Installation Checks

Before installing the E1 NTU or module, check the shipping package(s) and prepare the network information and the installation site.

Check the Package(s)

- Unpack and inspect the E1 NTU for damage that may have occurred during shipment.
- Save all enclosed packing slips and documents. Save shipping cartons and packing materials until you have completed the installation and verified device operation.
- Verify that all equipment ordered matches the packing slip. If the equipment does not match your order, contact Black Box.
- Fill out and mail the registration card.

Prepare Network Information

Request the following information from your network administrator before you install the E1 NTU:

- E1 NTU IP address—To enable a Telnet connection to the E1 NTU from a remote terminal.
- To use SNMP network management, one to three NMS IP addresses in addition to the above IP address. These addresses are where the E1 will send traps.

Terminal and DIP Switch Mode

On the rear of the E1 NTU are two DIP switch banks. DIP switch S2-12 allows the mode choice shown in Table 2-1.

Table 2-1   DIP Switch S2-12 Description

Switch Position	Mode	Description
Up	Terminal	Allows you to modify device configuration, monitor status, and perform tests.
Down (default)	DIP Switch	Allows you to monitor device status, and perform minimal testing.

E1 NTU

After you assign an IP address to the E1 NTU from a terminal, you can also use Telnet or SNMP to log on to the E1 NTU.

Cable Requirements

Table 2-2 lists the general communication cable requirements for the E1 NTU. (For Black Box Catalogue Ltd equipment model numbers and descriptions, refer to the tables in "Cable Connections" on page 2-10.)

Table 2-2   E1 NTU Cabling Equipment Requirements

Cabling Equipment	Description
One of:	
• Comm port cable (with a DE-9 male connector on one end)	• To connect a terminal, modem or SNMP workstation
• Multi-drop ribbon cable with multiple DE-9 connectors.	• To connect multiple E1 NTUs in a daisy chain (for centralized management)
• DE-9 to DB-25 adapters and null-modem adapter	• For connection to other DTE devices
DTE interface cable	DB-25 male connector to the E1 NTU and X.21 connector to the DTE (depends on required interface)
Network port cable	BNC Duplex (75 ohm) or RJ-45 (120 ohm) connector to the E1 NTU. Standard.

Table 2-3 list the power requirements for the E1 NTU. The shelf meets all the power requirements for the module.

Table 2-3   E1 NTU Power Requirements

Power	Description
AC Power cable	For connection to 100-240 VAC, 50/60 Hz
DC power requires a tray cable	Cable must be UL-approved for connection to -40 to -72 VDC, 14 AWG, 3 conductor, copper strand wire, electrical power and control tray cable, type TC: tray cable, 600 V 90°C. (An example is Alpha Wire Company No. 45443.)
Equipment grounding cable	Provides the earth ground connection.

NOTE: For cable and connector pin assignments, refer to Appendix B, "Connector and Pin Assignments"

Installing the E1 NTU

Install the E1 NTU on a flat surface or mount it in a 19" or 23" rack.

Installing on a Flat Surface

To install the E1 NTU on a flat surface:

1. **Attach the rubber feet to the bottom of the E1 NTU.**

2. **Place the E1 NTU on a flat, stable surface.**

   You may stack other similar units on top of the E1 NTU.

3. **Set the DIP switches.**

   Refer to "Setting the DIP Switches on the E1 NTU" on page 2-4."

4. **Connect AC or DC power.**

   Refer to "Connecting to AC or DC Power" on page 2-7).

Installing on a Tray

A tray can secure 2 E1 NTUs. Rack-mounting requires a mounting tray.

To mount the E1 NTU on a tray (Figure 2-1):

1. **Attach the E1 NTU to the tray:**

   a. **Place the E1 NTU on the tray and align the bottom holes of the E1 NTU with the holes in the tray.**

   b. **Use the screws (provided) and secure the E1 NTU to the tray.**

2. **Attach the tray to a 19 inch or 23 inch rack.**

   a. **Place the tray with the E1 NTU attached in the rack.**

   b. **Secure the tray to the rack with the screws (provided).**
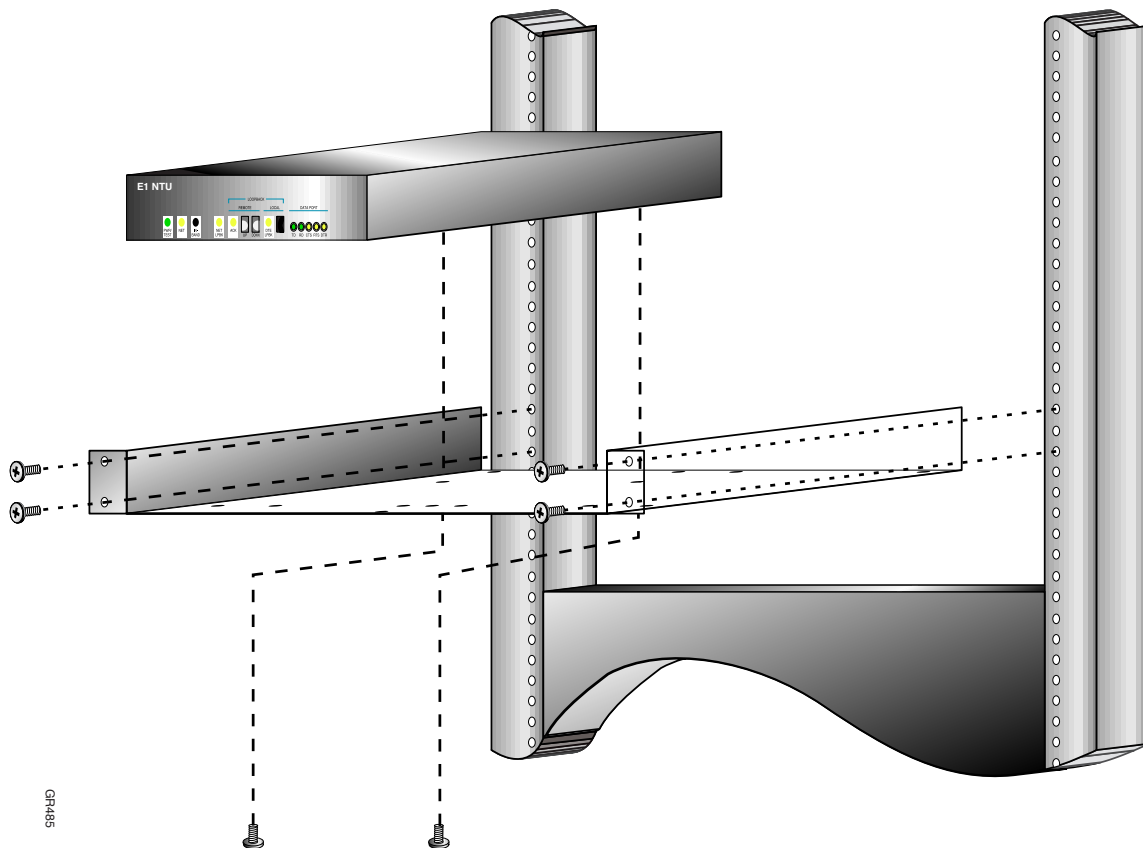
Figure 2-1   E1 NTU Tray and Rack Mount

Setting the DIP Switches on the E1 NTU

The S1 and S2 DIP switches are located in the rear of the E1 NTU.

DIP switch mode is the active mode by default (switch S2-12 is OFF). The default is all switches OFF (Figure 2-2).
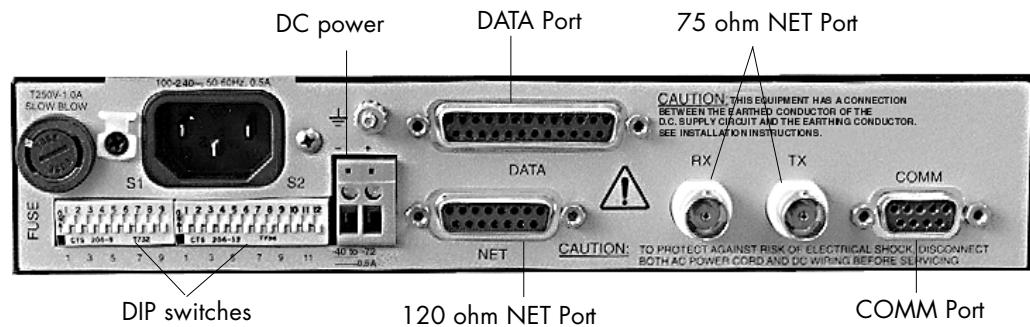
Figure 2-2   E1 NTU Rear Panel

Table 2-4 and Table 2-5 on page 2-7 describe the S1 and S2 DIP switches.

CAUTION: Only connect one network port at a time (75 or 120 ohm), unit may cause network harm if both ports are used.

NOTE: Switches 8,9 are not used on Bank S1 and switches 3,4 are not used on Bank S2.
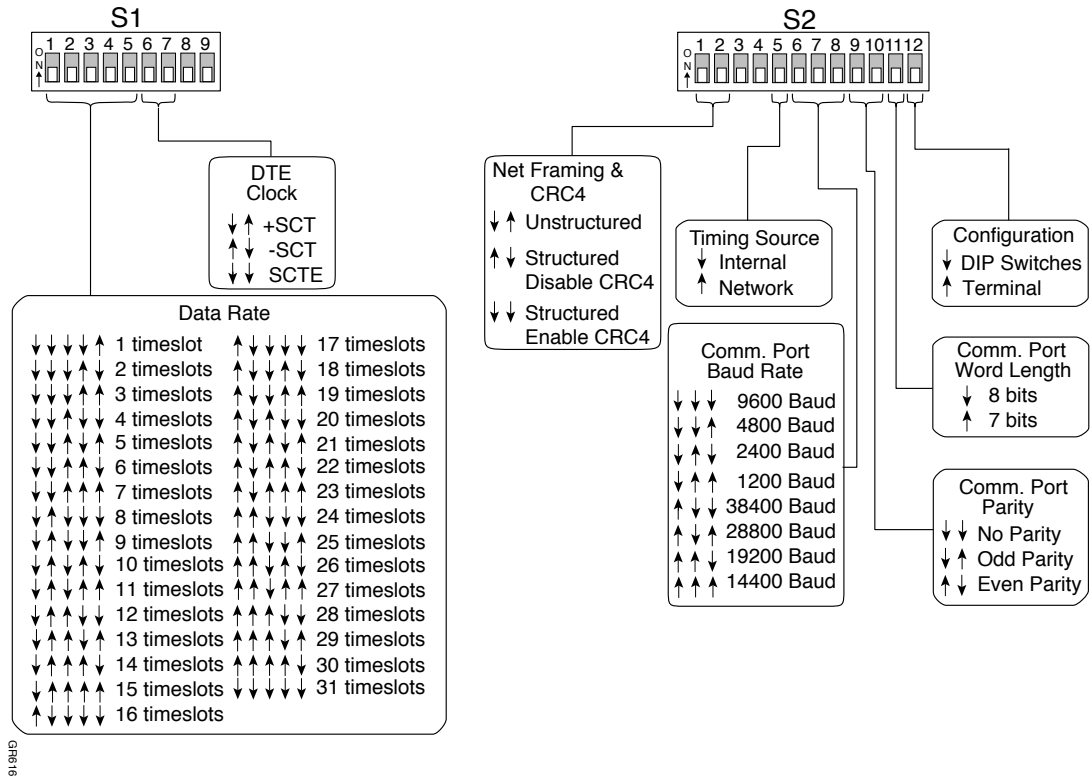
E1 NTU

Figure 2-3   S1 and S2 DIP Switch Settings

E1 NTU instructions for DIP switch configurations are located on the bottom of the unit (Figure 2-3).

Table 2-4 and Table 2-5 describe the DIP switches for S1 and S2, respectively.

Table 2-4   E1 NTU DIP Switch S1

Name (Default)	DIP Number	Description/Options
Data Rate (31 timeslots)	1-5	Set DTE data rate, from 1 to 31 timeslots.
DTE Clock (SCTE)	6, 7	Sets DTE Clock: +SCT, -SCT, or SCTE.
Not Used	8, 9	For future expansion

Table 2-5 E1 NTU DIP Switch S2

Setting (Default)	DIP Number	Description/Options
CRC4 Check (CRC Enabled)	1	Enabled or disabled.
Not Used	2, 3, 4	For future expansion
Timing Source (Internal)	5	Internal or network
COMM Port kbps (9600 bps)	6, 7, 8	1200, 2400, 4800, or 9600 bps 14.4, 19.2, 28.8, or 38.4 kbps
COMM Port Parity (None)	9, 10	None, odd, or even. Use to detect transmission errors with an odd or even bit.
COMM Port Word Length (8)	11	Set the word length to 7 or 8 bits.
Configuration (DIP Switches)	12	Set configuration by using terminal or DIP switches.

Connecting to AC or DC Power

This section describes:

- "Connecting Standalone to AC Power" on page 2-7
- "Connecting to DC Power" on page 2-8
- "Grounding the E1 NTU" on page 2-9
- "Cable Connections" on page 2-10

To connect the E1 NTU to AC power:

1. **Insert the AC power cable into the power receptacle on the rear panel.**

2. **Connect the other end to a suitable AC outlet.**

The LEDs on the front panel flash as the E1 NTU automatically runs the Self Test at power up. The PWR/TEST LED blinks yellow and then illuminates green when the test is successful. If Self Test fails, the LED illuminates red for 10 seconds and then illuminates green.

CAUTION: The E1 NTU accepts use of any nationally approved cordset with an IEC 320 connector.

E1 NTU

Connecting to DC Power

For safety, install the E1 NTU in a Restricted Access Area in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70. An example is a dedicated equipment room or closet that is clean, well-ventilated, and free of environmental extremes. Allow two to three feet of clearance for access.

CAUTION: If you connect the E1 NTU improperly to DC power, you may damage the E1 NTU.

Use only a tray cable that is UL recognized 14 AWG, 3 conductors, copper strand wire, electrical power and control cable, type TC: tray cable, 600 V 90° C. An example is Alpha Wire Company No. 45443.

The E1 NTU will operate on -48 to -72 VDC sources.

To connect the E1 NTU to DC power **(Figure 2-4)**:

1. **Prepare the tray cable:**

   a. **Strip 5 cm (2 in) of jacket material off the tray cable.**

   b. **Strip 1.27 cm (½ in) of insulation off each wire.**

2. **Connect the tray cable to the E1 NTU DC power connector:**

   a. **Plug the colored wire to the positive (+) terminal.**

   b. **Plug the black wire to the negative (-) terminal.**

CAUTION: Verify that the connections are:
- DC source negative (-) to E1 NTU negative (-)
- DC source positive (+) to E1 NTU positive (+)

3. **Connect to the DC power source:**

   a. **Connect the colored wire to the positive (+) source.**

   b. **Connect the black wire to the negative (-) source.**

4. **Connect the earth ground wire to the ground stud.**

   Use a .63 cm (¼ in) wrench.

5. **Secure the tray cable with cable ties.**

   Use multiple cable ties to minimize disturbance to the wires through casual contact.

   Use at least four cable ties, a minimum of 10.16 centimeters (4 in) apart, with the first within 15.24 centimeters (6 in) of the terminal block. **Figure 2-4** shows the cable tie mount next to the fuse.

6. Connect the tray cable to the DC power source.

The LEDs on the front panel flash as the E1 NTU automatically runs the Self Test. The pwr/test LED blinks yellow and then illuminates green when the test is successful. If the test fails, the LED illuminates red for 10 seconds and then illuminates green.
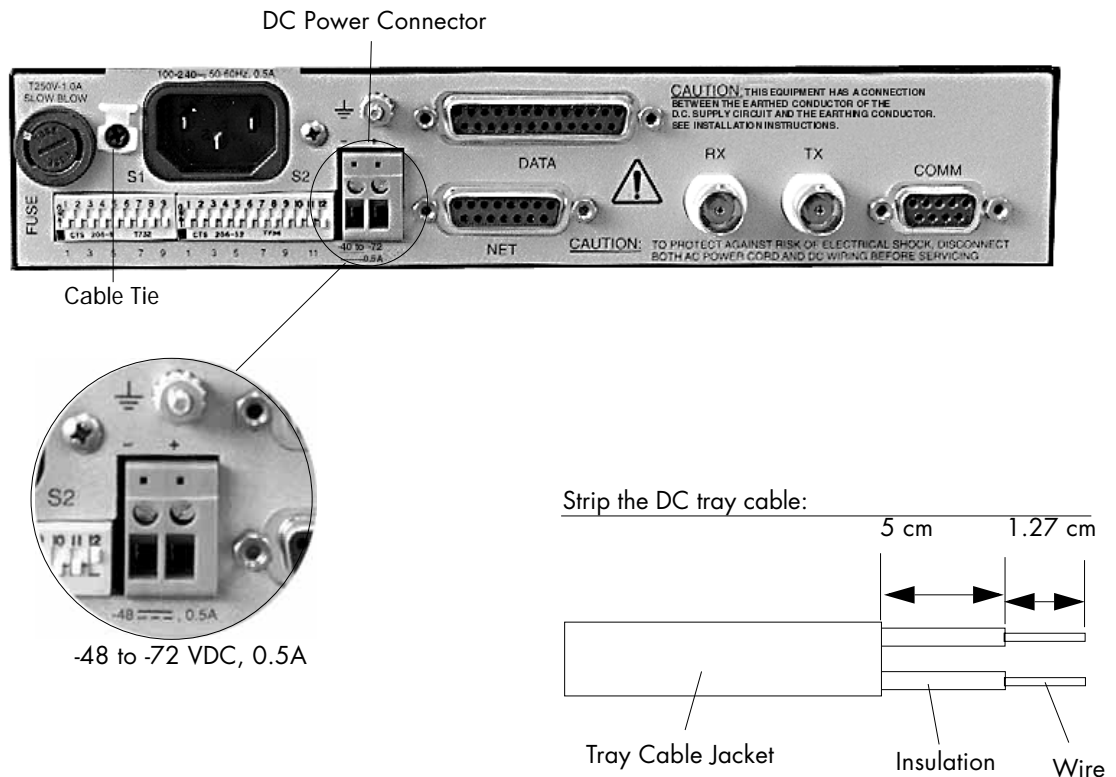
Figure 2-4   Preparing the DC Power Tray Cable

Grounding the E1 NTU

Ground the E1 NTU to earth ground using a grounding cable connected to the ground stud on the rear panel.

An equipment grounding conductor or cable is connected to ground at the service equipment and should be installed as part of the circuit supplying the system and should not be smaller in size than the ungrounded branch-circuit supply conductors.

The attachment-plug receptacle in the vicinity of the system should be a grounding type. The grounding conductor to it should be connected to earth ground at the service equipment.

A bare, covered or insulated grounding conductor is acceptable. A conductor that is individually covered or insulated should have an outer finish that has a green continuous outer finish, or green with one or more yellow stripes.

Cable Connections

To connect the E1 NTU (Figure 2-5):

1. **Connect the DTE cable (refer to Table 2-7):**

   a. **Connect the DTE cable to the E1 NTU DB-25 socket connector.**

   b. **Connect the opposite end to the DTE equipment.**

2. **Choose your network connection, either (refer to Table 2-6):**

   Socket:

   a. **Connect the network cable to the E1 NTU DA-15 socket connector.**

   b. **Connect the opposite end to the NET equipment.**

   BNC:

   a. **Connect a coaxial cable from the E1 NTU RX BNC to your network TX connector.**

   b. **Connect a coaxial cable from the E1 NTU TX BNC to your network RX connector.**

V.35, RS-449/EIA-530, X.21

Bridge
V.35

DTE (refer to Table 2-7)

Network BNCs

NET (refer to Table 2-6)

COMM (refer to Table 2-8)
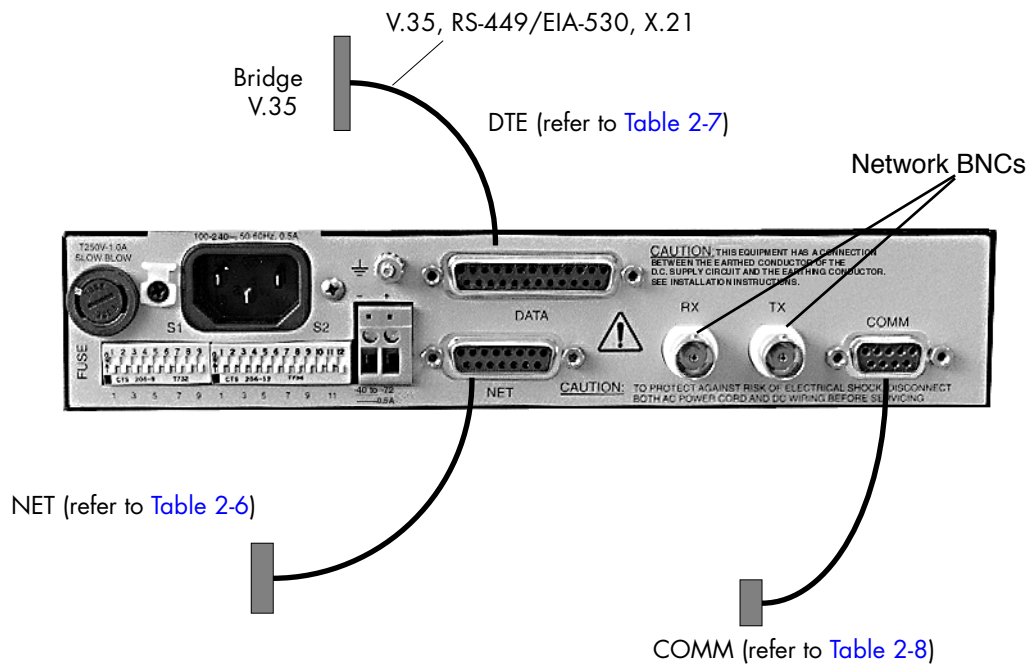
Figure 2-5   Connecting to DATA, COMM, and NET

NOTE: DA/B/E ports are 120 ohm and BNC ports are 75 ohm

Table 2-6   E1 NTU Network Cable Description

P/N	Description
G703CBL2M	Duplex 75 ohm coaxial network cable, 2 m
CBLRJ45	120 ohm network cable DA-15 male/RJ-45

Table 2-7   E1 NTU DTE Cable Descriptions

P/N	Description
DCEV35CBL	V.35 DB-25 plug to M-34 socket
DCEX21CBL	X.21 DB-25 plug to DA-15 socket
DCE449CBL	RS-449 DB-25 plug to DC-37 socket
DCE530CBL	EIA-530 DB-25 plug to DB-25 socket

Table 2-8   E1 NTU COMM Port Cable Description

P/N	Description
EHU1081	DE-9 socket to DE-9 plug, 2 connectors
EHU1082	DE-9 socket to DE-9 plug, 4 connectors
EHU1083	DE-9 socket to DE-9 plug, 8 connectors

Use EHU1081, EHU1082, and EHU 1083 to daisy-chain E1 NTUs.

Connecting a Terminal to the E1

Connect an ASCII terminal directly to the **COMM** port or indirectly, through a modem. A modem connection allows remote E1 NTU configuration. The **COMM** port requires a terminal or terminal emulation program that supports ANSI or VT100 modes.

Check the COMM Port Parameters

Verify that the **COMM** port parameters on the E1 NTU and terminal or modem match. The defaults are:

- Baud rate—9600

- Parity bit—none

- Word length—8

- Stop bits—2

To change the **COMM** port parameters on the E1 NTU. ()

NOTE: Cable length must not exceed 15.24 m (50 ft) with a direct connection set at 9600 baud.

Connect the Terminal to the COMM Port

To connect a terminal to the **COMM** port (Figure 2-5 on page 2-11):

3. **Plug the male DE-9 connector into the E1 NTU DE-9 COMM connector.**

   Use a 9-pin RS-232 straight cable.

4. **Plug the opposite end of the cable into the terminal connector.**

Connect a Modem

To change the E1 NTU settings, refer to Figure 2-3 on page 2-6.

To connect a modem to the **COMM** port, see Figure 2-5 on page 2-11:

1. **Match the baud rate, parity bit, word length and stop bit settings for the E1 NTU, both modems, and terminal.**

   If the settings are not the same, communication between the devices will fail or display miscellaneous characters.

2. **Connect the modem to the E1 NTU C connector.**

   Use a DE-9 plug to the E1 NTU, and a crossover (null modem) cable/adapter to the modem.

3. **Connect the remote terminal:**

   a. **Plug the phone line to the modem.**

   b. **Connect the modem to the remote terminal.**

To configure a remote E1 NTU, refer to Chapter3, Connecting Multiple E1 NTUs

You can connect Black Box Catalogue Ltd E1 NTUs in a daisy-chain configuration using a multidrop cable. With this configuration, you can connect multiple E1 NTUs to a single terminal, modem, or SNMP workstation. Use a ribbon cable (available from Black Box Catalogue Ltd) with DE-9 connectors. For part numbers, refer to Table 2-8 on page 2-12.

DE-9 Connector, Pin 8

Black Box Catalogue Ltd products implement a proprietary collision avoidance algorithm that uses the CTS signal on Pin 8 of the DE-9 connector.

NOTE: Make sure CTS (pin 8) on the socket DE-9 connector is not connected to Pin 8 on the male connector. CTS pin 8 must be connected between E1 NTUs, but must not be connected to the terminal.

To daisy-chain E1 NTUs, use a ribbon cable with DE-9 connectors:

4. **Connect the socket DE-9 connector to the terminal or modem (if at a remote site).**

5. **Connect the male DE-9 connector to the COMM port on each E1 NTU.**

Figure 2-6 shows three E1 NTUs connected to a terminal in a daisy-chain configuration.
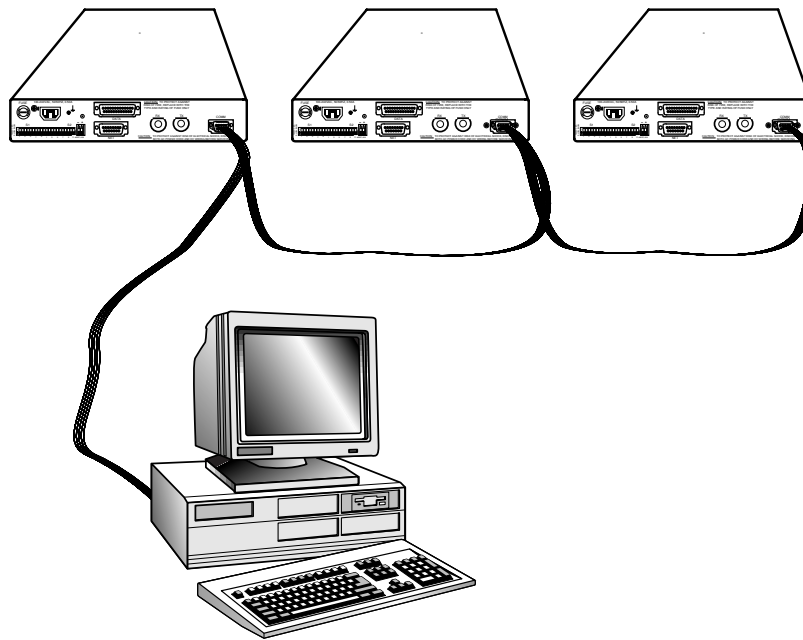
Figure 2-6   E1 NTUs Daisy-Chained to a Terminal

Configuration

This chapter provides procedures to set up the unit:

Logging On and Off

The conditions for logging on differ when the terminal interface is free or when another user is currently connected.

Systems with blank IDs are always logged on and cannot be logged off until you assign a unit ID to that unit. (Refer to "Basic Parameters Using Menu-4 Main Configuration" on page 3-6).

Use one of these two methods to log on to the E1 NTU:

- From a terminal (directly or through a modem)
- From a remote terminal through a telnet connection

The Unit ID

To log on to a E1 NTU, press `Ctrl-X`, and enter the unit ID of that E1 NTU.

To display the unit ID of the E1 NTU, press `Ctrl-X` five times. The unit ID appears on the left side of the screen. (For first time setup, the unit is usually factory configured with an alphanumeric number.)

If the ID does not appear, check the **COMM** port configuration and connection.

NOTE: To reset the unit to factory configuration, press and hold the three buttons located on the front of the unit for 10 seconds.

Log On from a Terminal

When you log on for the first time, use the following steps:

1. **Press `Ctrl-X`, type the unit ID, and press Return.**

The screen will not reflect this information as it is typed.

If the module is password protected and no other user is logged on, you are prompted with a message similar to:

```
Current Unit ID is MAUI.

Now you need a password to log in:
```

If there is no password protection, Menu-1 Status will automatically launch (always occurs with a new installation).

2. **Type in the password, and press Return.**

Menu-1 Main Status appears. If there is no response, you may have an incorrect ID or a bad **COMM** port connection.

Log On Through Telnet

The E1 NTU may or may not have a user logged on. To log on through telnet (when no other user is logged on):

1. **Enter the telnet command and the IP address of that E1 NTU.**

Example of system response:

```
Current Unit ID is MAUI.

Now you need a password to log in:
```

2. **Enter the normal or Superuser password.**

For Superuser/normal user information refer to .

NOTE: After a fifth unsuccessful attempt to log on, the E1 NTU closes the telnet connection. To clear the attempts, type **Ctrl-X** five times, then start log on again.

Logging Off

To log off, press **Ctrl-X**.

When the terminal stops responding to your keystrokes, you are logged off.

Access Rights

The E1 NTU supports Superuser or normal user access rights. The Superuser has the highest priority.

Assigning User Passwords

It is important that you specify unique Superuser and normal user passwords.

Two access methods to the E1 NTU(s) are available (using a terminal connected to the **COMM** port or a telnet connection from a remote terminal). The security of your network depends on proper authorization:

- If you set only one password, both Superuser and user passwords become the same.

- As Superuser, this user can gain exclusive control of the terminal interface.

- A "no passwords" situation gives any user logging on Superuser access rights. If any user sets one password, both passwords become the same and are known only to that user. The result is one user gaining exclusive control of the E1 NTUs.

NOTE: Black Box Catalogue Ltd. recommends that you set both passwords.

Setting Password Protection for the Terminal Interface

When you log on to the E1 NTU for the first time, set the Superuser and the user password parameters (case-sensitive) in Menu-8 Alarm II.

The default value is an empty text string. No password is required to log on for the first time. If you do not set a password for either parameter, any user can access the E1 NTU.

You can set both password parameters or only the Superuser password. If you set only Superuser password, the E1 NTU sets the user password to the Superuser password.

Having the Superuser password allows you to set or change the passwords (refer to "Menu-8 Alarm II Configurations" on page 3-17).

Configuring Password Protection:

Go to Menu-8 - Alarms II.

Highlight the `Miscellaneous Mgmt. Config.` option and press Enter.

```
Normal User Password        *

Superuser Password          *
```

Move cursor down to the `Normal User` or `Superuser Password` asterisk (*) to highlight the field you want to change.

Press Enter, then you will get the receive the following message:

```
Please enter a password [10 characters max]?
```

Type in the password (while you type this in, the asterisk (*) on the screen remains unchanged). Press Enter.

Then you will receive the message:

```
Please retype password:
```

Type the password again, the press Enter. You will then be asked:

```
Do you really want to change the Password[Y/N]?
```

Press **y** and the password will be set.

The steps work the same for both Superuser and Normal User Password settings.

E1 NTU

User And Superuser Log On Rights

The E1 NTU responds depending on who (user or Superuser) is logged on. The Superuser always has access to the E1 NTU, and disconnects any user that is currently logged on to that E1 NTU.

Superuser

The Superuser has the rights to access E1 NTU at anytime. If a user is logged on through telnet and the Superuser logs on, the E1 NTU responds:

> The Terminal User Interface is already in use. Please enter the superuser password to force the other user to log off or type **<Ctrl-X>** and try again later.

Enter the Superuser password to log off the user, or press **Ctrl-X** to abort your log on attempt.

User

Under general operations, use the user password to log on to the E1 NTU. Should the Superuser log on, the E1 NTU automatically closes the user connection. If the user attempts to log on, the E1 NTU responds:

> The superuser is already logged on. Try again later.

Using The Terminal Interface

```
SW Ver 2.1.c  MIB Ver 1.9       Black Box E1 NTU                    5/18/98
HW Ver A                        Menu-1 Main Status                 11:11:11
                                Local:JD0138          Remote:JD0008
                                ------------          -------------
   Unit Status                      Normal                Normal

   Network Status                   Normal                Normal


   DATA DTE Status          Loss Of Signal        Loss Of Signal
   Alarm Input Status               Normal                Normal

   Error Free Seconds               100.0%                100.0%
   Errored Seconds Ratio              0.0%                  0.0%
   Severely Errored Seconds Ratio     0.0%                  0.0%
   Background Block Error Ratio       0.0%                  0.0%
   CRC4 Errors                           0                     0
   Code Violations                       0                     0

--------------------------------------------------------------------------
0-SNMP Config.   1-Main Status    2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I     8-Alarm II  9-Diagnostics

C-clears the counters                                            _
```

Figure 3-1   Menu-1 Main Status

To access a menu, enter the code (press one of the 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9 keys) for that menu. Modify information in the menus that appears in bold-face. The arrow keys provide movement through the settings and also offer choices for each setting.

To redraw the screen anytime, press Ctrl-l (control-lowercase L for refresh).

When you log on, the E1 NTU displays Menu-1 Main Status (Figure 3-1). (Refer to "Menu-1 Main Status" on page 4-2 for more information.)

Table 3-1   Navigation Keys

Keys	Use to:
Arrow	Navigate a parameter choice.
Number	Choose a menu, or (if in Diagnostics) a test.
Ctrl-X	End session.
Alphanumeric	Suggest a parameter, enter a Unit ID, Time, Date, etc.
Return	Accept a change, or edit a parameter.

NOTE: The **u** (up), **d** (down), **r** (right), and **l** (left) keys also function as arrow keys. If a remote unit is connected, the **r** and **l** key functions are changed to move the cursor from the remote (**r**) to local (**l**) fields. Use the up (**u**) and down (**d**) keys to move within the respective unit field items.

Setting a Parameter

To set or change a parameter:

1. **Choose the menu.**

2. **Use the up and down arrow keys to move to the value you want to change.**

   If you want to access the time and date field, you must use the right and left arrow in Menu-4.

3. **Press Return to activate edit mode (the field blinks).**

4. **Use the up or down arrow keys to cycle through the available options.**

5. **Choose the desired option by pressing the Return key to select that option.**

6. **If prompted to confirm your action, type y.**

   If you type any other key, your action is denied. If you use the escape (ESC) key, you will leave the field unchanged.

To access the functions and features, the E1 NTU uses the menus shown in Table 3-2.

Table 3-2   E1 NTU Terminal Interface Menus

Menu	Function	Description Reference
0	SNMP Configuration	"Menu-0 SNMP Configuration" on page 3-13
1	Main Status	"Menu-1 Main Status" on page 4-2
2	Data Status	"Menu-2 Data Status" on page 4-4
3	Performance Reports	"Check Efficiency with Menu-3 Performance Reports" on page 4-5
4	Main Configuration	"Basic Parameters Using Menu-4 Main Configuration" on page 3-6
5	Data Configuration	"Configuring the DATA Port" on page 3-9
6	Timeslot Configuration	"Allocating Timeslots" on page 3-11
8	Alarm II	"Menu-8 Alarm II Configurations" on page 3-17
9	Diagnostics	"Running A Diagnostic" on page 5-1

First time configuration for local or remote

Set the items in this order for proper functionality:

1. Unit ID, Date, Time and E1 network parameters

2. **DATA** port parameters

3. Timeslot allocations

4. SNMP parameters (if required)

5. Alarm conditions, thresholds, and passwords

Basic Parameters Using Menu-4 Main Configuration

To configure the basic parameters, use Menu-4 Main Configuration (Figure 3-2). The content of this menu depends on the E1 NTU configuration.

```
SW Ver 2.1.c  MIB Ver 1.9         Black Box E1 NTU              6/02/98
HW Ver A                      Menu-4 Main Configuration         15:17:10
S/N                              Local:JD0034        Remote:JD0008
                                 ------------        -------------
UNIT   Protect Mode                 Disabled            Disabled
       Idle Code                      0xFF
NET    Framing                     CRC4 Enabled        CRC4 Enabled

       Main/Alt Sync.                NET/int             NET/int
       In-Band Communications Bit       4                   4




----------------------------------------------------------------------
0-SNMP Config.   1-Main Status    2-Data Status   3-Reports   4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I     8-Alarm II  9-Diagnostics
E-Flash Download
CR-changes a selection            Arrow Keys-move the selection
```

Figure 3-2   Menu-4 Main Config.

Table 3-4 describes the parameters of Figure 3-2.

NOTE: In the `Main/Alt Sync.` parameter, the uppercase letters indicate which clock is currently in use; lowercase indicates the clock not in use. Clocking sources vary depending on your network, be sure to check this or you will experience problems.

Setting Unit ID

1. **Activate Terminal mode by setting switch S2-12 UP (ON).**

Figure 3-3   Dip Switch 12 Up

2. **Press 4 to go to Menu-4 Main Configuration.**

3. **Use the arrow keys to move to the ID field.**

4. **Press the Return key to start edit mode.**

   The field blinks and at the bottom of the screen you will type a unit ID when this prompt appears.

```
Please Enter an ID [6 characters max]:
```

The ID accepts up to 6 alphanumeric characters but cannot begin with a number. The default ID is a version of the E1 NTU serial number.

5. **Press the Return key, then you will be prompted with the following:**

```
Do you really want to change the Configuration [Y/N]?
```

6. **Type y to accept the new ID.**

Setting Date or Time

To set the date and time:

1. **Move to the date field using the right arrow or r key. Use the up or down arrow key to move between date and time.**

2. **Press Return to activate edit mode.**

```
Please enter a date [mm/dd/yy]

Please enter a time [hh:mm:ss]
```

3. **Type the date or time.**

   For example, entering 8/16/94 yields 08/16/94 or 2:46:7 yields 02:46:07 (The clock is a 24-hour clock.)

4. **At the prompt, press y to set the date or time. You must use the right or left arrow key to move out of this feature set.**

NOTE: The menu clock is reset to a predetermined value each time you power up or a reset after a software download. After power interruption or reset, you must reset the correct time and date.

Configuring Network Parameters

Net Framing needs to match settings on local and remote, otherwise the remote unit settings are not visible. The factory setting is set to CRC4 enabled.

In-band bit must match on the local and remote units. The factory setting default is 4.

If changing Frame or Inband settings, change remote first. The remote will temporarily disappear. Then change the local unit to match the new parameter and the remote unit will reappear.

Table 3-3   Menu-4 Main Config. Parameters

Parameter (Default)	Settings	Description
UNIT Protect Mode (Disabled)	Enabled Disabled	Enabled—locks out access to the front panel. Disabled—you can run tests from the front panel.
UNIT Idle code (0XFF)	Hex value	Choose any hex value between 0x00 and 0xFF
NET Framing (CRC4 Enabled)	CRC4 Enabled CRC4 Disabled Unstructured	• CRC4 Enabled—uses Cyclic Redundancy Check 4. Performs a CRC calculation and uses 4 frame bits to store the CRC over the content of the frame. • CRC4 Disabled—Does not count CRCs. • Unstructured does not support G.704 framing or CRC multi-framing.
Main/Alt Sync. (NET/int)	net int data01 ext[2048]	Select the clock source for the E1 network transmitter. Specify the Main clock source, then the Alternate. (Each clock source offers the same options.) If the network is the clock source, select NET. If the clock source is DTE, select DATA.
In-Band Communications Bit (4)	4 5 6 7 8 Disabled	Select a national bit (from 4 to 8) in timeslot 0 for the in-band 4Kbps communications link with the remote unit. If this feature is disabled, all national bits are set to 1.

Configuring the DATA Port

To configure the DATA port, select Menu-5 Data Configuration (Figure 3-4).

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                    5/18/98
HW Ver A                     Menu-5 Data Configuration                11:46:20
                  Local:JD0138                        Remote:JD0008
            ---------------------------          ---------------------------
            Loss   Mode  Format   Clock          Loss   Mode  Format   Clock
DATA1       RTS    DCE    V.35    +SCT            RTS    DCE    V.35    +SCT




            
            
            
            ---------------------------------------------------------------
0-SNMP Config.   1-Main Status     2-Data Status    3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I       8-Alarm II   9-Diagnostics

CR-changes a selection              Arrow Keys-move the selection
```

Figure 3-4   Menu-5 Data Config.

Table 3-4 describes the parameters of Figure 3-4.

Table 3-4   Menu-5 Data Config.

Parameter (Default)	Settings	Description
Loss (RTS)	DTR RTS None	Select the criteria for detecting loss of signal on the **DATA** port. The loss appears when detected by the E1 NTU.
Mode (DCE)	DTE DCE	Configure the **DATA** port as a DTE (Data Terminal Equipment) or a DCE (Data Circuit Equipment).
Format (V.35)	X.21 V.35	Select V.35 or X.21 operation.
Clock (+SCT)	+SCT -SCT SCTE	For DTE timing, select SCT. You can invert the clock (-SCT) or not (+SCT). Use SCT inversion (-SCT) or SCTE to correct delays in clocking due to cable length. When the **DATA** port is a DTE, SCTE is the only **DATA** port timing option.

Allocating Timeslots

The default factory network timeslot allocation for bandwidth is 31 DS0 timeslots allocated to DATA port 1 (Figure 3-5):

- Allocate by Port—displays allocated timeslots for one port at a time only.

- Network Time Slot Map displays the entire timeslot configuration.

- The default factory allocation appears in Allocate by Port as: `DATA01 TS01-TS31 1984Kb/s`

NOTE: Navigate these fields with the arrow keys. To edit a field, navigate to that field, and press the Return key to activate Edit mode. Make your selection and press the Return key again to set that choice.

In some cases, the E1 NTU requests that you confirm your action. Type *y* to do so, or any other key to stop the process.

Allocation Methods

Select the allocation method in the Allocation Type field:

- Contiguous (default)—Allocate timeslots in a contiguous order.

- Manual—The manual method allows you to allocate timeslots in an arbitrary random order.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                    5/18/98
HW Ver A                    Menu-6 Timeslot Configuration            11:46:35
                 Local:JD0138                    Remote:JD0008
                 ------------                     -------------
Allocation Type  Contiguous                       Contiguous

Allocate by port:
                 DATA01 TS01-TS31   1984Kb/s      DATA01 TS01-TS31   1984Kb/s


Allocate by timeslot:
                         Network Time Slot Map
           1    2    3    4    5    6    7    8    9    10   11   12   13   14   15   16
Local     D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01
Remote    D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01

           17   18   19   20   21   22   23   24   25   26   27   28   29   30   31
Local     D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01
Remote    D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01  D01
---------------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II    9-Diagnostics

CR-changes a selection         Arrow Keys-move the selection           _
```

Figure 3-5   Menu-6 Timeslot Config. in Default Mode

E1 NTU

Allocating Contiguous Timeslots

In this example, we allocate DATA port 1, slots 1 through 14, and start with the default status—the allocation mode is Contiguous.

To allocate DATA port 1—slots 1 through 14:

1. **Set Allocation Type to Contiguous:**

   a. **Select Allocation Type.**

   Use the arrow keys to move to this field.

   b. **Press the Return key to activate edit mode.**

   c. **Select `Contiguous`.**

   Use the up/down arrow keys. Press the Return key to choose Contiguous. Type **y** to confirm this action.

2. **Allocate by Port:**

   a. **Select the `Allocation by Port` parameter.**

   Use the arrow keys to move to this field.

   b. **Press the enter key to activate edit mode.**

   ```
   Type a port number (NN for a data port, I for Idle, or the UP or Down
   arrow):
   ```

   c. **Type 1**

   For DATA port 1. (You can specify only port 1.)

   d. **Press the enter key.**

   Menu-6 displays `DATA01` in `Allocate by Port` (first field).

   At the bottom of the screen you will see:

   ```
   Type the start timeslot (NN), or 0, or I for IDLE or the UP or DOWN arrows:
   ```

3. **Set the start and end timeslots:**

   a. **Type `1` and press the enter key to set the start timeslot to 1.**

   Menu-6 displays `DATA01 TS01`. The end timeslot field blinks.

   ```
   Please type the end timeslot (NN):
   ```

   b. **Type `14`, press the enter key, and type `y` to set the end timeslot to 14.**

   `Allocate by Port` displays `DATA01    TS01–TS14    896 Kb/s`

   timeslots 1 through 14 are allocated to port 1; all other slots are idle.

   OR

   If a remote unit is attached, you will get the following message:

   ```
   Do you want to change the local unit, the remote, or both (L, R, or B):
   ```

      i. **Press r for remote.**

      Do you really want to change the configuration? [Y/N]

    c. **Press y for yes.**

Allocating Timeslots Manually

In this example, you will set timeslot to Idle mode. All timeslot are configured individually using the same procedure.

1. **Edit the** `Allocation Type` **parameter.**

   a. **Select** `Manual.`

   Do you really want to change the configuration [Y/N]?

   b. **Select y for yes.**

2. **Allocate by timeslot:**

   a. **Press enter to select** `timeslot 1.`

   This highlights `Local D01` on the `Network Time Slot Map`.

3. **Press enter, and** `D01` **will begin blinking.**

   Type the UP or DOWN arrows to change the selection, or type a port number (NN or I for IDLE):

4. **Type _i_ (for IDLE)**

   Timeslot 1 displays a dashed line starts to blink.

   a. **Press enter and then you receive the prompt:**

   Do you really want to change the configuration [Y/N]?

5. **Type y for yes.**

Menu-0 SNMP Configuration

To configure the E1 NTU for SNMP management capability, use Menu-0 SNMP Config.

Have an IP address for the E1 NTU and the NMS (Network Management Station) that receives TRAP messages.

The GET, SET, and TRAP community strings function as passwords, and prevent another SNMP management station from gaining access to the E1 NTU.

E1 NTU

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU       ≥              5/18/98
HW Ver A                        Menu-0 SNMP Config                     12:33:06
                                Local:JD0138                        Remote:JD0008
                                ------------                        -------------
UNIT   SNMP                       Disabled                            Disabled
       IP Address                 0.0.0.0                             0.0.0.0
       IP Mask                    0.0.0.0                             0.0.0.0
       Forward Over IBC          Disabled                            Disabled

TRAP   1st NMS IP Address         0.0.0.0                             0.0.0.0
       2nd NMS IP Address         0.0.0.0                             0.0.0.0
       3rd NMS IP Address         0.0.0.0                             0.0.0.0
       Output Port                  COMM                                COMM

Community Strings
       Get                         public                              public
       Set                         public                              public
       Trap                        public                              public

-----------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status     3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I         8-Alarm II   9-Diagnostics

CR-changes a selection            Arrow Keys-move the selection          _
```

Figure 3-6   Menu-0 SNMP Config.

Table 3-5 describes the parameters of Figure 3-6.

Table 3-5   Menu-0 SNMP Config. Parameters

Parameter (Default)	Settings	Description
UNIT SNMP (Disabled)	Enabled Disabled	Enabled—Enables the NMS. Disabled—The NMS is not used.
IP Address (0.0.0.0)	nnn.nnn.nnn.nnn	nnn—0 through 255
IP Mask (0.0.0.0)	nnn.nnn.nnn.nnn	nnn—0 through 255
Forward Over IBC (Disabled)	Enabled Disabled	Enabled—Enables the automatic forwarding of SNMP packets over the in-band communication link from the local E1 NTU to the remote unit.
TRAP NMS IP Address (0.0.0.0) (applies to 1st, 2nd and 3rd TRAPS)	nnn.nnn.nnn.nnn	nnn—0 through 255. Enter the IP address of the NMS (Network Management Station) that will receive trap messages from the E1 NTU SNMP agent. (Note: If all the TRAP NMS IP addresses are set, the E1 NTU sends a trap to all three network management servers.)
TRAP Output Port (COMM)	COMM IBC	Select the port that the E1 NTU SNMP agent uses to send TRAP messages to the NMS.

Table 3-5   Menu-0 SNMP Config. Parameters (Continued)

Parameter (Default)	Settings	Description
Get (public)	text string	Enter an alphanumeric text string (maximum—32 characters). The E1 NTU SNMP agent uses this text string to check GET requests for the SNMP configuration from the NMS.
Set (public)	text string	Enter an alphanumeric text string (max—32 characters). The E1 NTU SNMP agent uses this text string to check SET requests from the NMS to set the SNMP configuration.
Trap (public)	text string	Enter an alphanumeric text string (maximum—32 characters). The E1 NTU SNMP agent inserts in SNMP TRAPs it sends to the NMS.

Menu-7 Alarm I Conditions

Alarm conditions are categorized as network and DATA port alarm conditions. Alarm conditions affecting network or DATA port signals are reported on the terminal user interface and through SNMP.

The E1 NTU recognizes and reports the following network alarm conditions:

- Loss of carrier signal
- Loss of network synchronization
- Threshold violations
- Unframed All Ones
- Remote Alarm Indication

DATA port alarm condition recognizes and reports the loss of DTE, by setting the E1 NTU to recognize loss of RTS or loss of DTR.

Use Menu-7 Alarm I to set the alarm conditions (Figure 3-7).

```
SW Ver 2.1.c  MIB Ver 1.9          Black Box E1 NTU                    5/18/98
HW Ver A                          Menu-7 Alarm I                      11:46:43
                                  Local:JD0138              Remote:JD0008
                                  ------------              -------------
Block All Alarms                       [No]                          No
   NET Carrier Loss Alarm            Enabled                     Enabled
   NET Sync Loss Alarm               Enabled                     Enabled
   NET UA1 Received Alarm            Enabled                     Enabled
   NET RAI Received Alarm            Enabled                     Enabled



   DATA DTE Signal Loss Alarm        Enabled                     Enabled
   CV Threshold Alarm               Disabled                    Disabled
   CRC Threshold Alarm              Disabled                    Disabled


---------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

CR-changes a selection          Arrow Keys-move the selection        _
```

Figure 3-7   Menu-7 Alarm I

Setting alarm I parameters is optional.

Table 3-6 describes the parameters of Figure 3-7.

Table 3-6   Menu-7 Alarm I Parameters

Parameter (Default)	Settings	Description
Block All Alarms (No)	Yes No	Yes—Blocks the reporting of alarms. No—Enables the E1 NTU to report alarms.
NET Carrier Loss Alarm (Enabled)	Enabled Disabled	Enabled—The E1 NTU generates an alarm when a Network Carrier Loss of Signal occurs. Disabled—Disables the function.
NET Sync Loss Alarm (Enabled)	Enabled Disabled	Enabled—The E1 NTU generates an alarm when a Network Sync Loss occurs. Disabled—Disables the function.
NET UA1 Received Alarm (Enabled)	Enabled Disabled	The NET UA1 device detects unframed all ones from network. Enabled—Device detects a NET UA1, it generates an alarm. Disabled—Disables the alarm.
NET RAI Received Alarm (Enabled)	Enabled Disabled	(RAI—Remote Alarm Indication) Enabled—The E1 NTU generates an alarm when it receives an RAI. Disabled—disables the function.

Table 3-6   Menu-7 Alarm I Parameters (Continued)

Parameter (Default)	Settings	Description
DATA DTE Signal Loss Alarm (Enabled)	Enabled Disabled	Enabled—The E1 NTU generates an alarm when a DATA DTE Signal Loss occurs. Disabled—Disables the function.
CV Threshold Alarm (Disabled)	Enabled Disabled	(CV—Code Violation). A x 10^B Set A and B in A x 10^B. Maximum threshold is 6 x 10^{-3}; minimum threshold is 2 x 10^{-8}. Example: 6 x 10^{-6}. When the rate of CVs exceed the set threshold, the device generates an alarm.
CRC Threshold Alarm (Disabled)	Enabled Disabled	(CRC—Cyclic Redundancy Check). A x 10^B Set A and B in A x 10^B. Maximum threshold is 1, minimum threshold is 5 x 10^{-5}. Example: 3 x 10^{-2}. When the CRCs exceed the set threshold, the device generates an alarm.

Menu-8 Alarm II Configurations

When you choose Menu-8, the E1 NTU shows these sub-menu choices. The module version shows an additional sub-menu choice called External Alarm Configuration. (Figure 3-8).

```
SW Ver 2.0G   MIB Ver 1.9        Black Box E1 NTU                  2/05/96
HW Ver A      Slot # 10          Menu-8 Alarm II                  01:13:09
                           External Alarm Configuration
                                Local: E1S10
                                ------------
External Alarm Input Indication      Disabled
External Alarm Input Contacts        Normally Open
External Alarm Input Message

External Alarm Output Indication     Disabled
External Alarm Output Contacts       Normally Open




----------------------------------------------------------------------
0-SNMP Config.    1-Main Status    2-Data Status   3-Reports    4-Main Config
5-Data Config.    6-Timeslot Config. 7-Alarm I     8-Alarm II   9-Diagnostics
CR-changes a selection              Arrow Keys-move the selection
```

Figure 3-8   Menu-8 Alarm II

E1 NTU

Miscellaneous Management Configuration

Use Miscellaneous Management Configuration to define external communications parameters.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                 5/18/98
HW Ver A                         Menu-8 Alarm II                  11:46:59
                        Miscellaneous Management Configuration

                                   Local:JD0138            Remote:JD0008
                                   ------------            -------------
Connection                             Direct                    Direct
Timeout When Logged On               Unlimited                 Unlimited
Timeout When Not Logged On           Unlimited                 Unlimited
Phone Number 1
Phone Number 2
Normal User Password                     *                         *
Superuser Password                       *                         *
COMM   DCD                            Disabled                  Disabled
       XON/XOFF                       Disabled                  Disabled

DLC IBC Link Loss Alarm               Enabled                   Enabled
Dial Out Time Interval                0 Min.                    0 Min.
--------------------------------------------------------------------------
0-SNMP Config.    1-Main Status     2-Data Status   3-Reports   4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I      8-Alarm II  9-Diagnostics

CR-changes a selection          Arrow Keys-move the selection        _
```

Figure 3-9   Menu-8 Alarm II—Misc. Mgmt. Config.

Table 3-7 describes the parameters of Figure 3-9.

Table 3-7   Menu-8 Alarm II Parameters

Parameter (Default)	Settings	Description
Connection (Direct)	Direct Modem In-Band Comm	Direct—connection through a null modem Modem—connection through a modem IBC—connection through IBC.
Timeout When Logged On (Unlimited)	1 min 10 min 30 min Unlimited	Select a time option. Applies only when you are logged on. If the E1 NTU does not detect terminal activity after the specified time span has elapsed, the E1 NTU warns that log off is in 30 seconds.
Timeout When Not Logged On (Unlimited)	1 min 10 min 30 min Unlimited	Select a time option. Applies only when you are connected through a modem and not logged on. When the E1 NTU does not detect terminal activity when the specified time span has elapsed, the E1 NTU closes the connection. Recommend—1 min
Phone Number 1 (empty text string)		Enter a unique, valid Hayes-modem dial string.

Table 3-7   Menu-8 Alarm II Parameters (Continued)

Parameter (Default)	Settings	Description
Phone Number 2 (empty text string)		Enter a unique, valid Hayes-modem dial string. If this fails, the E1 NTU waits five minutes then automatically tries the first number and repeats this pattern until connected.
Normal User Password (empty text string)		Use a unique text string. Enter a password (10 characters maximum, case sensitive). As you type, asterisks appear.
Superuser Password (empty text string)		Use a unique text string. Enter a password (10 characters maximum, case sensitive). As you type, asterisks appear.
COMM Port DCD (Disabled)	Enabled Disabled	Enabled—drops DCD (Data Carrier Detect signal) to close the connection. If your modem does not use DCD, set to Disabled.
COMM Port XON/XOFF (Disabled)	Disabled	Disables XON/XOFF.
	XOFF until ANY	Use Ctrl-S to stop data flow from remote E1 NTU, and any key to resume flow.
	XOFF until XON	Use Ctrl-S to stop data flow from remote E1 NTU, and Ctrl-Q to resume flow.
DLC IBC Link Loss Alarm (Enabled)	Enabled Disabled	When enabled, an alarm alerts loss of IBC.
Dial Out Time Interval (0 min.)	0 to 255 minutes	Use to extend time interval before modem dials out.

Modem Initialization Strings

To initiate a modem connection, the E1 NTU sends +++ followed by the first modem initialization string. The E1 NTU waits for the modem response. The E1 NTU waits for modem response so that it can guard against the possibility of losing the characters right after the modem reset command. After receiving the modem response, the E1 NTU sends the second initialization string (if programmed).

NOTE: The E1 NTU assumes that the modem always sends a response; do not program the modem to override the response.

Figure 3-10 shows the Menu-8 Alarm II.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                    5/18/98
HW Ver A                         Menu-8 Alarm II                     11:47:11
                              Modem Initialization Strings

 Local
      String 1  ATE0V0Z0
      String 2  ATV0E0Q0F1C1S0=1S2=43S3=13S4=10S7=30S12=50&C1&D0

 Remote
      String 1  ATE0V0Z0
      String 2  ATV0E0Q0F1C1S0=1S2=43S3=13S4=10S7=30S12=50&C1&D0




      --------------------------------------------------------------------
 0-SNMP Config.   1-Main Status    2-Data Status    3-Reports    4-Main Config.
 5-Data Config.   6-Timeslot Config.  7-Alarm I     8-Alarm II   9-Diagnostics
 CR-changes a value
 Up/Down Arrow Keys-move the selection              F-default modem strings _
```

Figure 3-10 Menu-8 Alarm II—Modem INIT Strings

If you use the modem reset command, set all parameters up to the reset command as the first modem initialization string. Set the rest of the commands as the second modem initialization string.

Remote E1 NTU-Modem Connection

Use Menu-8 Alarm II to set the unti to report alarms to a remote terminal (through a modem connection):

- Connection—Modem
- **COMM** port DCD—Enabled
- Set Phone Number 1 and Phone Number 2 with unique, valid Hayes-modem dial strings.

NOTE: If your modem does not pass the Data Carrier Detect (DCD) signal, set the **COMM** port DCD to Disabled.

Maintenance

This chapter discusses maintenance methods for the E1 NTU:

The E1 NTU collects and displays performance data to help you manage and troubleshoot problems on the network. It monitors the line continuously and displays the data on a terminal screen.

You can monitor and manage the E1 NTU:

- From an ANSI terminal
- A Telnet connection
- An SNMP network management station (NMS) connected to the **COMM** port.

The front panel LEDs also show the E1 NTU status .

Monitor the status of the E1 NTU from Menu-1 Main Status and the status of the single **DATA** port from Menu-2 Data DTE Status.

Use the menus to troubleshoot the E1 NTU:

- Menu-1 Main Status—displays E1 NTU status
- Menu-3 Performance Reports—displays carrier and user registers, and the event log.
- Menu-9 Diagnostics—to verify connections and circuits and troubleshoot problems

How Alarms Are Reported and Displayed

The E1 NTU always reports all alarm conditions to either:

- The device connected to its **COMM** port (such as a terminal, printer, or modem).

- The device connected to the **COMM** port of the remote device if `Connection` is set to `IBC` (in Menu-8 Alarm II) on the local device.

If SNMP is enabled, SNMP TRAPs are sent as configured in Menu-0 SNMP Configuration; otherwise, the connection indicated in Menu-8 Alarm II.

If SNMP is not enabled, the alarm shows up at the bottom of the screen and scrolls. The alarm automatically goes away when the screen is refreshed.

When the terminal is connected to the **COMM** port and you are logged on, alarms are shown at the bottom of the screen (but above the menu choices). For example, a carrier loss condition on the **DATA** port shows as (if the device is set to use SNMP, all information passes to the NMS):

```
--Local  ID:Oahu  Data1 Carrier Loss   Start: 07:17:37 1/12/97
```

The alarm information is:

- Local or remote device
- Unit ID
- Type of alarm
- Start or end of alarm condition
- Date and time.

The alarm remains on the screen until a new alarm occurs or until you select a new menu. When no alarm is present, a dotted line is shown.

In SNMP mode, the device sends the alarm as an SNMP TRAP to the NMS and it does not send file text to the screen.

If the local E1 NTU is connected to a modem and an alarm occurs, the E1 NTU causes the modem to dial out if in Menu-8 Alarm II. Connection is set to `Modem`; valid telephone numbers are set in `Phone Number 1` or `Phone Number 2`).

Menu-1 Main Status

The E1 NTU counts error conditions on the network and **DATA** ports (Figure 4-1).

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                      5/18/98
HW Ver A                         Menu-1 Main Status                   11:11:11
                                 Local:JD0138              Remote:JD0008
                                 ------------              --------------
   Unit Status                      Normal                     Normal

   Network Status                   Normal                     Normal


   DATA DTE Status           Loss Of Signal            Loss Of Signal
   Alarm Input Status               Normal                     Normal

   Error Free Seconds              100.0%                     100.0%
   Errored Seconds Ratio             0.0%                       0.0%
   Severely Errored Seconds Ratio    0.0%                       0.0%
   Background Block Error Ratio      0.0%                       0.0%
   CRC4 Errors                        0                          0
   Code Violations                    0                          0

--------------------------------------------------------------------------
0-SNMP Config.   1-Main Status    2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Alarm I    8-Alarm II   9-Diagnostics

C-clears the counters                                                    _
```

Figure 4-1   Menu-1 Main Status

During testing, Menu-1 Main Status displays the test status. All parameters in Menu-1 are read-only. When you clear the counters:

- Seconds in Current 15 minutes continues to count.
- Error Free Seconds returns to 100%.
- Network Status is cleared of exceeded threshold messages.
- The 24-hour archive does not change.
- Values for CRC Errors and Code Violations are set to 0.

To clear the counters type **c**, then **y** to confirm. (Press any other key to abort.)

Any status related to the counters may take up to a minute to clear.

Unit Status

Unit Status shows if the E1 NTU is operating normally or if a special conditions exists.

Table 4-1   Unit Status

Condition	Description
Normal	No abnormal conditions exist.
Self Test	Unit is running self test.
DTE Loopback (full or fraction)	Unit is in DTE loopback.
Net Loopback (full)	Unit is in network loopback.
PLD Loopback (full or fraction)	Unit is in payload loopback.
Send User 1 (full or fraction)	Unit is sending User 1 pattern.
Send User 2 (full or fraction)	Unit is sending User 2 pattern.
Send 1:1 (full or fraction)	Unit is sending alternate 1s and 0s pattern.
Send 1:2 (full or fraction)	Unit is sending standard loopdown remote code continuously.
Send 1:4 (full or fraction)	Unit is sending standard loopup remote code continuously.
Send 1:7 (full or fraction)	Unit is sending 1:7 pattern.
Send 3:24 (full or fraction)	Unit is sending 3:24 pattern.
Send QRW (full or fraction)	Unit is sending QRW code.
Send All 1s (full or fraction)	Unit is sending all ones signal.
Send All 0s (full or fraction)	Unit is sending all zeros signal.
LP UP Remote (full or fraction)	Unit is sending loopup code to remote unit for 15 seconds.
LP DN Remote (full or fraction)	Unit is sending loopdown code to remote unit for 15 seconds.

Network Status

Network Status indicates any abnormal conditions present on the received E1 signal.

Table 4-2   Network Status

Condition	Description
Normal operation	No abnormal conditions exist.
Loss of Signal	Unit network signal is missing.
Loss of Frame	Unit network frame is missing.
RAI Received	Unit is receiving RAI.
CV Threshold Exceeded	CV threshold exceeded.
CRC Threshold Exceeded	CRC threshold exceeded.

Table 4-2   Network Status

Condition	Description
UA1 Received	Unit is receiving UAI.
Set Code Received	Unit is receiving a set code.
Reset Code Received	Unit is receiving a reset code.

Error Statistics

Default—Normal, default alarm status messages are displayed.

User-defined—enter up to 20 characters to replace the normal message.

Table 4-3   Menu-1 Alarm Input Status

Parameter	Description
Error Free Seconds	The percentage of seconds the unit does not have errors.
Errored Seconds Ratio	Total number of errored seconds divided by all available seconds unit is operating up to a maximum of 24 hour intervals, then multiplied by 100.
Severely Errored Seconds Ratio	(Total number of severely errored seconds/24 hours total number of available seconds) *100
Background Block Error Ratio	(Background block errors/number of available blocks)*100. Number of available blocks is (number of available seconds)*1000.
CRC4 Errors (Cyclic Redundancy Check)	An error checking scheme used to check the received data. The last 6 frame bits are calculated using the contents of the frame. The calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremented.
Code Violations	An error checking scheme. A code violation occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

Menu-2 Data Status

Menu-2 (Figure 4-2) shows the current status of the local and remote ports. If the local or remote device does not have a port in this position the parameter is blank.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                  5/01/98
HW Ver A                        Menu-2 Data Status                 15:56:22

Port   Local           Remote
------  --------------  --------------
DATA1  Loss Of Signal  Loss Of Signal




                              



------------------------------------------------------------------------
0-SNMP Config.    1-Main Status     2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I       8-Alarm II   9-Diagnostics

                                                                    -
```

Figure 4-2   Menu-2 Data DTE Status

DATA Status

Data Status shows any abnormal conditions present on the received Data DTE signal on a DTE port.

Table 4-4   Data Status

Parameter	Description
Normal Operation	No abnormal conditions exist.
Loss of Signal	Loss of DTR or RTS DTE lines, user defined.

Check Efficiency with Menu-3 Performance Reports

The E1 NTU maintains counts of different error conditions on the network and on the **DATA** port. This information is maintained in ongoing counters as well as in a database that covers the performance of the service over the last 24 hours (separated into 96 intervals of 15 minutes).

Menu-3 Performance Reports provides access to (Figure 4-4):

• Performance Reports (Carrier and User Registers)

• Event Log—presents a log of information during the past 24-hour period.

Use the arrow keys to choose a menu and press the return key to go to that menu.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                    5/18/98
HW Ver A                    Menu-3 Performance Reports               11:07:49



          Please select a report:

               Carrier Registers, current interval
               Carrier Registers, total over 24 hours
               Carrier Registers, 24 hour detail
               User Registers, 24 hour detail
               Event Log




    ----------------------------------------------------------------------------
    0-SNMP Config.   1-Main Status      2-Data Status   3-Reports    4-Main Config.
    5-Data Config.   6-Timeslot Config. 7-Alarm I       8-Alarm II   9-Diagnostics

    CR-selects a report               Up/Down Arrow Keys-move the selection   _
```

Figure 4-3   Menu-3 Performance Reports

Carrier Registers, Current Interval

The E1 NTU displays performance data for the most current 15-minute interval as shown in Figure 4-4.

```
SW Ver 2.1.c  MIB Ver 1.9         Black Box E1 NTU                5/18/98
HW Ver A                    Menu-3 Performance Reports             11:14:48
                          Carrier Registers, Current Interval

                          Local:JD0138          Remote:JD0008
                          ------------          -------------
       Unavailable Signal State      No                    No


       Current Interval Timer        690                   698

       Errored Seconds (ES)           0                     0
       Unavailable Seconds (UAS)      0                     0
       Severely Errored Seconds (SES) 0                     0
       Background Block Error (BBE)    0                     0




   ----------------------------------------------------------------------
   0-SNMP Config.    1-Main Status     2-Data Status   3-Reports   4-Main Config.
   5-Data Config.    6-Timeslot Config. 7-Alarm I      8-Alarm II  9-Diagnostics

                                                                        -
```

Figure 4-4   Menu-3 Perf. Reports—Carrier Reg., Cur. Interval

Table 4-5 describes the parameters shown in Figure 4-4.

Table 4-5   Carrier Registers, Current Interval Parameters

Parameter	Description
Unavailable Signal State	Yes, when Unavailable Seconds counter is activated. No, otherwise.
Current Interval Timer	Counts number of seconds in current interval.
Errored Seconds (ES)	A second with one or more frame errors or CRC-4 errors.
Unavailable Seconds (UAS)	The number of seconds elapsed after 10 consecutive SES events are received.
Severely Errored Seconds (SES)	A second during which 300 or more CRC-4 violations or OOF events have occurred.
Background Block Error (BBE)	An errored block not occurring as part of an SES.

Carrier Registers, Total over 24 Hours

E1 NTU

The Menu-3 Performance Reports, Carrier Registers, Total Over 24 Hours menu selection is the same as the previous menu except the time period is 24 hours. See Table 4-5 for parameter descriptions.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                  5/18/98
HW Ver A                    Menu-3 Performance Reports              11:48:40
                       Carrier Registers, total over 24 hours


                       Local:JD0138              Remote:JD0008
                       ------------              -------------
     Errored Seconds (ES)             0                        0
     Unavailable Seconds (UAS)        0                        0
     Severely Errored Seconds (SES)   0                        0
     Background Block Error (BBE)      0                        0


     Total Valid Intervals           11                       11




  -----------------------------------------------------------------------
  0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
  5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics
```

Figure 4-5   Menu-3 Perf. Reports, Carrier Reg., over 24 hours

Table 4-6   Carrier Registers, over 24 hours

Parameter	Description
Errored Seconds (ES)	A second with one or more frame errors or CRC-4 errors.
Unavailable Seconds (UAS)	The number of seconds elapsed after 10 consecutive SES events are received.
Severely Errored Seconds (SES)	A second during which 300 or more CRC-4 violations or OOF events have occurred.
Background Block Error (BBE)	An errored block not occurring as part of an SES.
Total Valid Intervals	Total number of valid intervals in the last 24 hours.

Carrier Registers, 24-Hour Detail

The data is organized and displayed in 96 15-minute intervals. Performance data for the last 24 hours is displayed in the Carrier Registers, 24-hour detail menu as shown in the example in Figure 4-6.

```
SW Ver 2.1.c  MIB Ver 1.9         Black Box E1 NTU                    5/18/98
HW Ver A                       Menu-3 Performance Reports             11:25:26
                            Carrier Registers, 24 hour detail
                         Local:JD0138                  Remote:JD0008
Local Interval          ------------                   --------------
Start      ES   UAS   SES     BBE              ES   UAS   SES     BBE
11:03:18    0    0     0        0               0    0     0        0
10:48:18    0    0     0        0               0    0     0        0
10:33:18    0    0     0        0               0    0     0        0
10:18:18    0    0     0        0               0    0     0        0
10:03:18    0    0     0        0               0    0     0        0
09:48:18    0    0     0        0               0    0     0        0
09:33:18    0    0     0        0               0    0     0        0
09:18:18    0    0     0        0               0    0     0        0
09:03:18    0    0     0        0               0    0     0        0
08:48:18   ---  ---   ---    ------            ---  ---   ---    ------
08:33:18   ---  ---   ---    ------            ---  ---   ---    ------
08:18:18   ---  ---   ---    ------            ---  ---   ---    ------
                            Page 1 of 8
-------------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II    9-Diagnostics

Up/Down Arrow Keys-scroll the registers
```

Figure 4-6   Menu-3, Carrier Registers, 24-Hour Detail

User Registers, 24-Hour Detail

Performance data in the user registers for the last 24 hours is displayed in the User Registers, 24-hour detail menu as shown in the example in Figure 4-7.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                    5/18/98
HW Ver A                  Menu-3 Performance Reports                 11:45:17
                        User Registers, 24 hour detail
            Local:JD0138                            Remote:JD0008
Interval    -------------                           -------------
Start      ES  US  CRC     CV              ES  US   CRC     CV
11:18:18    0   0    0      0               0   0     0      0
11:03:18    0   0    0      0               0   0     0      0
10:48:18    0   0    0      0               0   0     0      0
10:33:18    0   0    0      0               0   0     0      0
10:18:18    0   0    0      0               0   0     0      0
10:03:18    0   0    0      0               0   0     0      0
09:48:18    0   0    0      0               0   0     0      0
09:33:18    0   0    0      0               0   0     0      0
09:18:18    0   0    0      0               0   0     0      0
09:03:18    0   0    0      0               0   0     0      0
08:48:18  --- --- -----  -----            --- ---  ----- -----
08:33:18  --- --- -----  -----            --- ---  ----- -----
                              Page 1 of 8
-----------------------------------------------------------------------------
0-SNMP Config.   1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

Up/Down Arrow Keys-scroll the registers         C-clears the registers  _
```

Figure 4-7   Menu-3, User Registers, 24-Hour Detail

Only the User Registers performance report can be cleared (which resets the Error Free Seconds in Menu-1 Main Status to 100%.)

Event Log

From the Event Log menu, you can display the events of the last 500 events (Figure 4-8):

1. **Use the arrow keys to select the event.**

2. **Press the Return key.**

The event log displays on the screen.

```
SW Ver 2.1.c  MIB Ver 1.9       Black Box E1 NTU              5/18/98
HW Ver A                   Menu-3 Performance Reports         12:03:40
                                Event Log

Log  Local      Module  All           Event  0. All Events

Seq. No.    Status  Module          Description              Time/Date
----------  ------  ------  ----------------------------------  ----------------
        9   start   System  Remote Responds to DLC IBC       00:00:24  1/01/96
        8   end     Net     UA1 Received                     00:00:11  1/01/96
        7   start   Net     UA1 Received                     00:00:11  1/01/96
        6   end     Unit    Self Test                        00:00:11  1/01/96
        5   end     Net     Loss of Frame                    00:00:05  1/01/96
        4   start   Net     Loss of Frame                    00:00:05  1/01/96
        3   start   Unit    Self Test                        00:00:05  1/01/96
        2   start   DATA01  Loss of Signal                   00:00:03  1/01/96
        1   action  Unit    Unit Power On                    00:00:03  1/01/96

                Page  1 of  1           9 out of   9 selected
-----------------------------------------------------------------------------
0-SNMP Config.    1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.    6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics

Up/Down Arrow Keys-scroll the log                 C-clears the log
```

Figure 4-8   Menu-3 Performance Reports—Event Log

Table 4-7 shows which status changes can be logged as events.

Table 4-7   Events

Parameter (Default)	Events
Log (Local)	Local or Remote
Module (All)	Displays either Unit, DTE (Data01) (Full Bandwidth), Network, System or All
Unit	Unit Power On, Self Test, No Clock, Lamp Test, Smart Jack Reset, Smart Jack Set, Send UA1, Send RAI, Controlled Slip, Inject a Pattern Error, Clear Pattern Error Counter, Clear Event Log, Clear Current Carrier Registers, Clear Carrier Archives, Clear Carrier ESF Error Events, Clear Current User Registers, Clear User Archives, Clear User CRC Errors, Clear User CV Errors, Clear User FE Errors, Clear All user Error Counters, Clear 24 Hour User Registers, Back to Factory Config. Full test: Net Loopback Full or Fraction tests: DTE Loopback, PLD Loopback, LP UP Remote, LP DN Remote, Send User 1, Send User 2, Send 1:1, Send 1:2, Send 1:4, Send 1:7, Send 3:24, Send QRW, Send All 1s, Send All 0s
DTE	Loss of Signal, Local Test
Network	Loss of Signal, Loss of Frame, UA1 Received, RAI Received, Set Code Received, Reset Code Received, CV Threshold Exceeded, CRC Threshold Exceeded, FE Threshold Exceeded

Table 4-7   Events

Parameter (Default)	Events
System	External Alarm, Power Supply Failure, Controller Module Missing, Remote Responds to DLC IBC
Event (0, All)	Allows a particular type of event to be displayed
Seq. No	A string of 32-bit numbers from 1 to 2^{32}-1 that uniquely identify a DSU/CSU.

Diagnostics

This chapter explains using diagnostics to locate and resolve problems with the E1 NTU and/or equipment connected to the E1 NTU.

Verify your connections and circuits to troubleshoot problems by running built-in diagnostic and pattern tests. These tests can isolate problems when they occur. In most cases, you won't need to use test equipment.

Diagnostic Considerations

Running a test interrupts payload traffic. Run the tests at off-peak hours or during a designated maintenance window.

Running A Diagnostic

To run a test with Menu-9 Diagnostics (Figure 5-1):

1. **Select the test in the** `Next Test.`

    These are Full Bandwidth loop code, Fractional loop code and USER1 Pattern and USER2 Pattern. The selections for fractions are Full (Bandwidth), and DATA01.

    The 20 test selections cycle with the up or down arrow key. For quick access to a specific test use the shortcut key (refer to Table 5-1).

2. **Set the** `Next Test Length: unlimited, 60 min, 15 min, 1 min.`

3. **Press s to start the test.**

4. **Press y to confirm.**

    Press any other key to cancel your action.

    The test results are shown in the upper half of the screen.

5. **To end the test, press e, then y to confirm**

    Or any other key to leave the test running.

6. **To clear the pattern error counter, press c , then y to confirm.**

    Or any other key to cancel.

```
SW Ver 2.1.c  MIB Ver 1.9        Black Box E1 NTU                   5/18/98
HW Ver A                       Menu-9 Diagnostics                  11:47:17
                                 Local:JD0138              Remote:JD0008
                                 ------------              -------------
Current Test                            Idle                        Idle

Pattern Test Status                     Idle                        Idle
Pattern Error Counter
CRC4 Errors                              0                            0
Code Violations                          0                            0
Frame Error Events                       0                            0
Last Self Test Result          Self Test Passed          Self Test Passed

Next Test (Fraction)            1. Self Test              1. Self Test
Next Test Length                  Unlimited                 Unlimited
Full Bandwidth Loop Code           Standard                  Standard
Fractional Loop Code               Standard                  Standard
USER1 Pattern           00110011001100110011          00110011001100110011
USER2 Pattern           00010001000100010001          00010001000100010001
--------------------------------------------------------------------------
0-SNMP Config.   1-Main Status    2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Alarm I    8-Alarm II   9-Diagnostics
S-starts a test  CR-changes a value           I-injects a pattern error
E-ends a test    Arrow keys-move selection    C-clears pattern error counter
```

Figure 5-1   Menu-9 Diagnostics

Table 5-1, Table 5-2, and Table 5-3 describe the Menu-9 Diagnostics parameters of Figure 5-1.

Shortcut

When you are in Menu-9, `Next Test (Fraction)` is automatically highlighted.

1. **Press Enter.**

   `Use the UP or DOWN arrow keys or type a test index to select a new test:`

2. **There are 20 tests, if you know the number, type it in, otherwise toggle through the menu choices.**

   If the number is a single digit, you must type a **0** in the first space.

   The number you type is not visible.

3. **Press Enter.**

   `Do you really want to change the Configuration [Y/N]?`

4. **Type y for yes and the test will begin.**

The tests available in the Next Test parameter are shown in Table 5-2.

Table 5-1   Meru-9 Diagnostic Parameters

Parameter	Value	Description
Pattern Test Status	Idle Searching Locked Relocked	Locked Seconds is displayed if the current pattern test is locked. The Locked Seconds is a 16-bit counter which is reset to 0 if the current pattern is unlocked. The counter label will change to Relocked Seconds if the current pattern is unlocked and then relocked.
Pattern Error Counter	Error count	Shows number of errors encountered.
CRC4 Errors	Error count	Shows number of errors encountered. If CRC4 is not enabled, this function is not available.
Code Violations	Error count	Shows number of errors encountered.
Frame Error Events	Error count	Shows number of errors encountered.
Last Self Test Result	Self Test Passed Failure indication: 0-5	Error nn (0 to 5). See Table 5-4 on page 5-4 for discussion of error codes.

Table 5-2   Next Test Diagnostics

Shortcut	Test	Options
1	Self Test	See "Self Test" on page 5-4
2	DTE Lpbk	FULL, DATA01
3	NET Lpbk	FULL, DATA01
4	PLD Lpbk	FULL, DATA01
5	LP UP Remote	FULL, DATA01
6	LP DN Remote	FULL, DATA01
7	Send QRW	FULL, DATA01
8	Send 1:7	FULL, DATA01
9	Send 3:24	FULL, DATA01
10	Send 1:1	FULL, DATA01
11	Send All 1s	FULL, DATA01
12	Send All 0s	FULL, DATA01
13	Send 1:2	FULL, DATA01
14	Send 1:4	FULL, DATA01
15	Send User 1	FULL, DATA01
16	Send User 2	FULL, DATA01
17	Smart Jack Set	FULL, DATA01
18	Smart Jack Reset	FULL, DATA01
19	Lamp Test	Tests all LEDs display operation
20	Loop DTE/NET	See Table 5-3

Table 5-3   Next Test Diagnostics Parameters

Parameter	Value	Description
Next Test Length	15 min 1 min 60 min Unlimited	Does not apply with the Self Test, loopup remote and loopdown remote.
Full Bandwidth Loop Code	Standard Alternate Disabled	Standard—sends a series of 0s and 1s. Alternate—sends the opposite of the Standard (1s and 0s).
Fractional Loop Code	Standard Alternate Disabled V.54	Standard—sends a series of 0s and 1s. Alternate—sends the opposite of the Standard (1s and 0s).
USER 1 Pattern USER 2 Pattern	User defined	Enter a sequence of 1s and 0s, between 1 and 24 characters in length.

Self Test

The Self Test checks the DSU/CSU electronic components and performs a signal path check of transmit and receive directions utilizing a simulated 1219.2 meter (4000 ft) E1 line.

Possible messages are RUNNING SELF TEST, SELF TEST PASSED or ERROR <N>, where <N> is one of the error codes shown in Table 5-4.

Table 5-4   Self Test Error Indicators

Error Code	Description
0	ROM Checksum test failed
1	RAM test failed
2	EEPROM Checksum test failed
3	DTE test failed
4	Pattern test failed
5	Flash Proms Checksum test failed

The Loop DTE Test

The Loop DTE test verifies the operation of the DSU/CSU and the associated DTE cabling and equipment by looping the E1 network transmit signal through a 4 000 foot simulated line to the DSU/CSU network receive circuitry (Figure 5-2 shows both Full and Fractional Bandwidth).

The DTE equipment should receive the same signal (a series of 1s and 0s) it transmitted. The E1 network transmitter continues to transmit the pattern toward the network while the DSU/CSU is in DTE loopback.

E1 payload transmission is interrupted during this test.
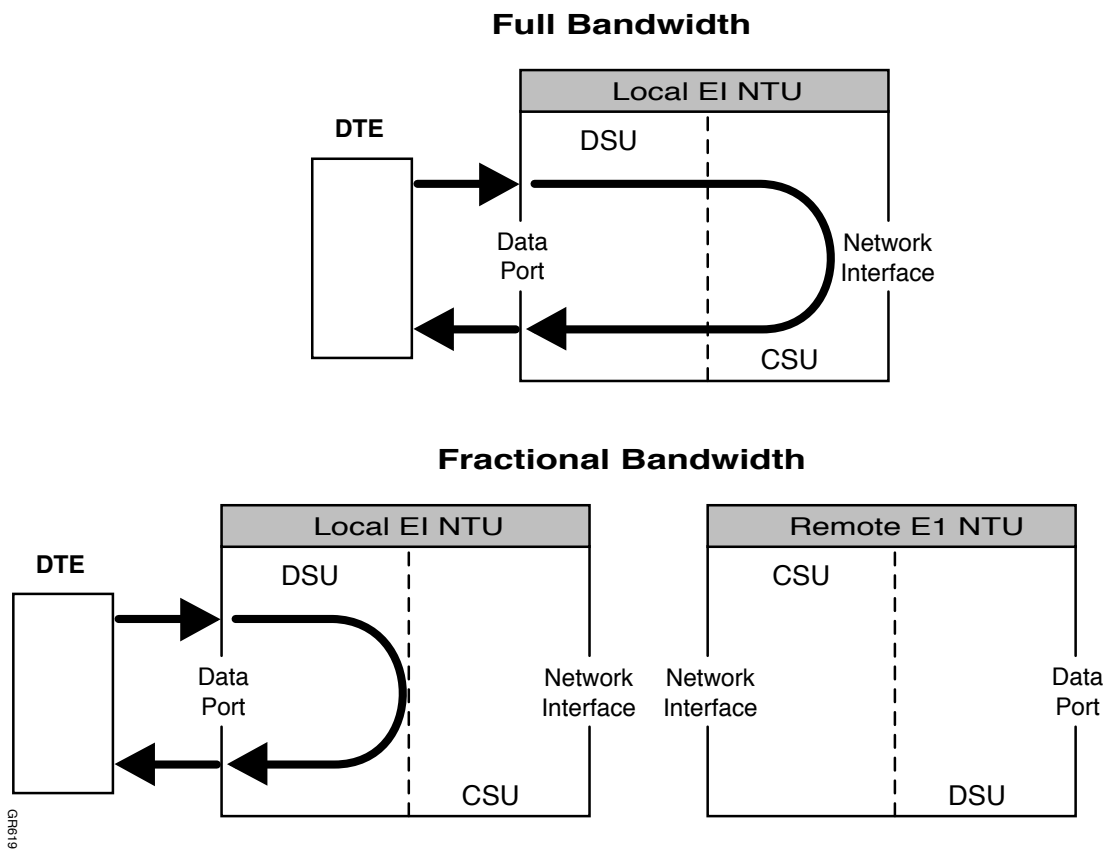
Figure 5-2   Loop DTE Test—Full and Fractional Bandwidth

Alternate Option

The signal sent is exactly opposite the signal sent in standard mode. This is useful for testing a remote unit that has other equipment in between the local and remote. The other equipment does not recognize the signal and passes it through to the remote.

NOTE: The DTE device must be able to recognize its own test pattern for Loop DTE to verify the DTE cabling and equipment. Without this capability, the Loop DTE test can only verify the DSU/CSU.

The Loop NET Test

The Loop NET test, available only on full bandwidth, verifies the operation of the E1 network. (Figure 5-3).

It loops the data received from the E1 network back to the network. The data is regenerated before it is looped back, however, the DSU/CSU does not perform additional processing of the data.

This minimizes the impact of the DSU/CSU during the test so that network problems can be isolated.
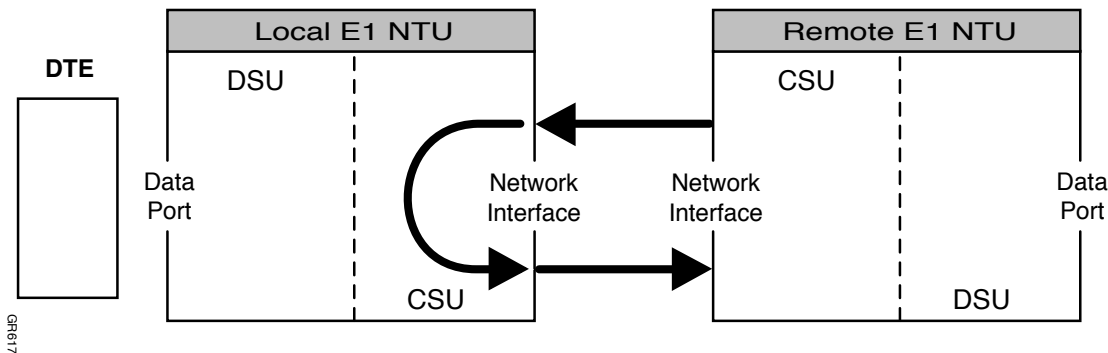
Figure 5-3   Loop NET Test

The Loop Payload Test

The loop payload test verifies proper operation of the DSU/CSU and the E1 network (Figure 5-4).

It loops the payload data received from the E1 network back toward the network. Before it is looped back, the data is regenerated and a new framing pattern is inserted. Thus, the proper E1 framing of the DSU/CSU and network can be verified.
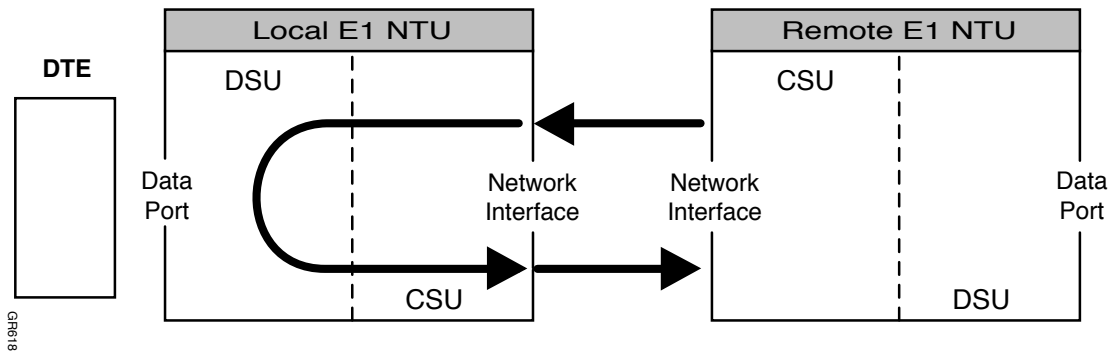
Figure 5-4   Loop Payload Test

The individual channel loop payload loops a selected "fraction" of the E1 signal toward the network. In this mode, the selected data is corrected for BPV, CRC and framing errors, and the IBC is regenerated before the data is looped back to the network.

Receive and transmit clocks and data are suppressed toward the V.35 port on the DTE channels.

The DTE/NET Test

The loop DTE/NET test combines the loop DTE on full bandwidth, and the loop NET tests.

Running Multiple Payload Tests

To run multiple loopbacks, the device must have more than two DTE ports. You can run multiple loop payload tests simultaneously from Menu-9 or SNMP, but not from the front panel interface.

You can run multiple fractional loop payload tests by sending fractional loop codes from the remote DSU/CSU via SNMP, DLMS, a terminal, or from the front panel interface.

NOTE: To run multiple fractional loop payload tests, you must first terminate any current tests (other than a fractional payload test).

The Loopup/Down Remote Tests

The loopup remote test puts the remote DSU/CSU into network loopback. Once in loopup remote, test patterns can be sent to verify the Bit Error Rate (BER) performance of the bidirectional E1 network signal (Figure 5-5).

To put the remote DSU/CSU into network loopback, the local DSU/CSU momentarily transmits the loopup code to the remote DSU/CSU. If the remote DSU/CSU does not go into network loopback within 15 seconds, a failure is declared and the DSU/CSU stops sending the loopup code.

The loop code and network parameters for the local and remote DSU/CSUs must match. Use the loopdown remote test to terminate the remote loopback.

NOTE: The full bandwidth loopup code puts the remote DSU/CSU in a full bandwidth network loopback. The fractional loopup code puts the DSU/CSU in a fractional (per individual port) payload loopback.

To run this test from the front panel, refer to "Loopup Remote and Loopdown Remote" on page 5-11.
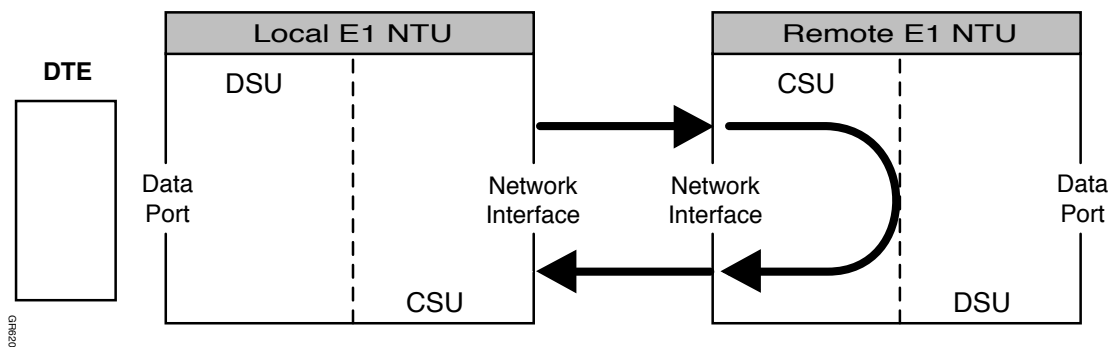
Figure 5-5   Loopup Remote Test

Pattern Tests

Table 5-2 contains a list of these pattern tests.

The QRW Test

QRW (Quasi Random Word) is a pseudo random signal which catches problems not exposed by other test patterns. The DSU/CSU transmits a QRW pattern to the E1 network, the remote system loops it back to the DSU/CSU which monitors the signal for QRW bit errors.

You can also use the QRW code to isolate a E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote system transmit QRW (the remote is not put into loopback).

This test is available on any fraction of the E1.

To simulate live traffic, QRW testing is strongly recommended.

The Send 1:7 Test

This pattern stresses the timing recovery circuits of repeaters and other intermediate equipment.

The Send 3:24 Test

This pattern tests for 1s density (consecutive zeros) tolerance on AMI lines.

The Send 1:1 Test

This pattern sends alternate 1s and 0s to test for bridge taps.

The Send All Ones Test

This pattern is used for signal power measurements. All 1s simulates the highest spectral components and the highest energy out of the DSU/CSU and out of the line repeaters on the E1 line.

The Send All Zeros Test

This pattern checks the correct operation of the HDB3 (E1) line coding.

The Send 1:4 (or alternate) Test

Use when the loopup remote test fails to put the remote system into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code, and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on the **DATA** ports.

The full bandwidth code puts the remote system into full network loopback. When used on a **DATA** port, the code puts the corresponding remote port into loop payload.

NOTE: If the loopup remote test fails to place the remote system into loopback, check that the loop code and Network Framing parameters are the same at each end of the link.

The Send 1:2 Test

Use the 1:2 loopdown code when the loopdown remote test fails to terminate the remote loopback.

You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received.

The selections are available on the full bandwidth and on **DATA** port 1. The full bandwidth code takes the remote system out of full network loopback. When used on **DATA** port 1, the code takes the corresponding remote port out of loop payload.

The User 1 Pattern and User 2 Pattern Tests

These two user programmable (up to 24 bits) patterns enable you to generate a test pattern rather than use pre-programmed patterns or live traffic.

The Lamp Test

Use this test to verify the LEDs. During the test, all LEDs on the front panel illuminate.

Status LEDs

Use the LEDs to verify the test progress (Table 5-5).

Table 5-5   Front Panel LEDs Status

LED	Condition	Description
PWR/TEST	Turns yellow	Test is running. The test is identified in current test.
PWR/TEST	Blinks	Self-test in progress.
ACK	Blinks quickly for 3 seconds	Loopup remote or loopdown remote is successful.

Running Tests From Front Panel

From the front panel you can run the (Figure 5-6):

- DTE/NET loopback test
- Loopup remote test and loopdown remote test

To start a test, press a front panel button for no less than 0.5 seconds.

Figure 5-6   E1 NTU Front Panel

The PWR/TEST LED shows test status (Table 5-6).

Table 5-6   PWR/TEST LED Status Indicators

Condition	Description
Blinks yellow	A test is running

Table 5-6   PWR/TEST LED Status Indicators

Condition	Description
Turns green	A test is complete
Turns red for 10 seconds, then turns green	Test failed

DTE/NET Loopback

To start this test:

1. **Press DTE/LPBK to start the DTE/NET loopback test.**

2. **Press DTE/LPBK again to end the test.**

Loopup Remote and Loopdown Remote

To start this test:

1. **To run the test, press REMOTE LPBK UP to loopup the remote E1 NTU.**

2. **To loopdown the remote E1 NTU, press REMOTE LPBK DOWN.**

When a test is running, the PWR/TEST LED shows yellow.

The Pattern Tests

Thoroughly test a line between two E1 NTUs or between the customer premises and the service provider with a pattern test:

• Use a pattern test in conjunction with a loop test by placing one E1 NTU in loopback mode toward the network while the other generates and detects the test sample.

The E1 NTU generating the pattern detects and counts errors in the pattern received and displays the errors.

• Run a pattern test by configuring both E1 NTUs to perform the same pattern test at the same time.

Both E1 NTUs report detected errors in their respective received signals, and you can determine from which direction (and which E1 NTU) the errors are occurring.

The tests also look for bit errors in both circuit directions when the remote unit is looped up. In this case, the E1 NTU CSU transmits the QRW to the E1 network, the remote unit loops it back to the E1 NTU CSU which monitors the signal for errors. You can also use the QRW code to isolate a E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote units transmit QRW (the remote is not put into loopback).

The pattern tests are listed in Table 5-7.

Table 5-7   Pattern Tests

Pattern Test	Description
Send All Ones	Use this test to expand circuit as a maximum density signal, it is also used to test synchronization circuits.
Send All Zeroes	Use to test the zero suppression circuit. As a minimum density signal, it is also used to test synchronization circuits.
Send 1:1	This pattern sends alternate ones and zeros. It is used in testing for bridge taps.
Send 1:2 Pattern	The 1:2 code is the standard loopdown remote code. Use it when the loopdown remote test fails to terminate the remote loopback. You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received.
Send 1:4 Pattern	The 1:4 code is the standard loopup remote code. It is typically used when the loopup remote test fails to put the remote unit into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code and monitoring the network status to see if the pattern is being received.
Send 1:7 Pattern	This pattern stresses the timing recovery circuits of repeaters and other intermediate equipment.
Send 3:24 Pattern	This pattern tests for ones density (consecutive zeros) tolerance on AMI lines.
User 1/User 2 Patterns	These two user programmable patterns (up to 24 characters) enable you to generate a test pattern rather than use pre-programmed patterns or live traffic.
QRW Pattern	The Quasi-Random Word (QRW) test measures Bit Error Rates on the E1 network. The E1 NTU CSU sends a QRW into the network and monitors the received E1 network signal for QRW bit errors.

Troubleshooting

The E1 NTU Does Not Power Up

Table 6-1   Problem List

Problems
"The E1 NTU Does Not Power Up" on page 6-1
"The E1 NTU Does Not Dial Out When An Alarm Occurs" on page 6-1
"Current Tests Terminate Without My Intervention" on page 6-2
"The E1 NTU can not Enter Network Loopback from the Carrier" on page 6-2
"The Unit Suffers Loss Of Signal or Loss Of Frame on the Network Port" on page 6-2
"Unframed All 1s Are Received On The Network Port" on page 6-2
"The E1 NTU can not enter into Payload Loopback from the Network" on page 6-2
"The NET LED does not Illuminate" on page 6-2
"The NET LED is Constantly Red" on page 6-3
"The NET LED Remains a Constant Yellow" on page 6-3
"The NET LED Flickers Intermittently between Red, Yellow and Green" on page 6-3
"The Data Port TD/RD LEDs do not Illuminate" on page 6-3
"The DATA Port RTS/CTS LEDs do not Illuminate" on page 6-4
"The DTE Device Shows Intermittent Errors" on page 6-4
"No LEDs Illuminate" on page 6-4
"After Powerup, the Clock Does Not Show the Correct Time or Date" on page 6-4

If the unit is AC powered, make sure the E1 NTU is plugged into a live AC outlet. If the unit is DC powered, make sure the respective DC leads are not crossed.

Check all fuses for opens and replace as needed.

The E1 NTU Does Not Dial Out When An Alarm Occurs

Make sure the connection between the **COMM** Port and the modem is a crossover (null) modem connection.

A DCE port is represented the same way as the modem port.

Make sure Connection is set to Modem and two valid telephone numbers are set in Phone Number 1 and Phone Number 2 in Menu 8 Alarm II.

Make sure Block all Alarms is set to No in Menu-7 Alarm and the occurring alarm is set to Enabled.

Current Tests Terminate Without My Intervention

Make sure the E1 NTU is set to run the test for an unlimited amount of time.

Test length options are 15 min, 1 min, 60 min, Unlimited.

The E1 NTU can not Enter Network Loopback from the Carrier

Verify:

• The network carrier is sending a network loopup code.

• The E1 NTU is set to receive loopup codes, not alternate loopup codes.

• The E1 NTU is set to receive the same or alternate code as the network.

Using your E1 test set, send a loopup code into the E1 NTU.

The Unit Suffers Loss Of Signal or Loss Of Frame on the Network Port

An RAI is sent in the direction of the network port.

In the alarm menu, the Network status reports "Loss of Signal" or "Loss of Frame" and CTS is de-asserted.

Unframed All 1s Are Received On The Network Port

In the alarm menu, set the Network status to "RAI Received."

The RLSD line on the **DATA** port is de-asserted.

Typically represents an E1 service alarm.

The E1 NTU can not enter into Payload Loopback from the Network

Make sure the E1 NTU is set for V.54 fractional loopback code, if the network is sending V.54 to loop it up.

Make sure the payload portion you are attempting to loopup has assigned bandwidth.

If the E1 NTU still does not loopup, use your E1 test set to inject a fractional loopback signal into the payload you wish to loopup.

The NET LED does not Illuminate

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

Make sure the E1 line from your service provider is connected to the DA-15 female connector on the back of the E1 NTU.

Remove the E1 line from the back of the E1 NTU and place the E1 test set in its place. Connect the transmit of the E1 test set to the receive of the network plug (pins 3 and 11, 3—tip, 11—ring). If the **NET** LED changes to any color, i.e., green or red, contact your service provider for assistance with cutting over the E1 line.

If the **NET** LED does not light, place the E1 loopback plug on the network connector on the back of the E1 NTU. If it then changes color, troubleshoot your test setup. If no test plug is available, loopback pins 1 and 3, and pins 9 and 11. The **NET** LED should light green.

The NET LED is Constantly Red

Make sure the E1 line framing format matches the E1 NTU framing format.

Check the E1 NTU for excessive errors.

In CRC4 mode, check for CRC and CVs; in unstructured mode, check for CVs only. If excessive errors appear, place your E1 test set or your loopback plug on the DA-15 female connector on the back of the E1 NTU to see if the errors stop.

If they do, contact your service provider for assistance.

The NET LED Remains a Constant Yellow

Check to see if the E1 NTU is receiving a RAI alarm or an UA1 alarm.

Make sure the remote/far end E1 NTU is receiving a proper E1 signal. If it is not, it will be generating an RAI alarm towards your equipment.

If the E1 NTU is still receiving an RAI alarm, place the E1 test set or the E1 loopback plug on the DA-15 female connector on the back of the E1 NTU. If the RAI alarm stops, contact your service provider for assistance.

If, after all above steps have been satisfied, your E1 NTU still shows a yellow **NET** LED, call Black Box Catalogue Technical Support for assistance.

If the yellow alarm is disabled, this condition is ignored. In the alarm menu, indicate "RAI" for Network status. The CTS line on Data DTE is de-asserted.

The NET LED Flickers Intermittently between Red, Yellow and Green

Make sure the timing source is properly configured. Timing should be set to NETWORK if the network is the source.

If it is not the source, timing should be set to INTERNAL at one E1 end, and NETWORK at the other end.

If you're not sure that the network is the source, contact the network provider and discuss your circuit order. The provider will tell you if the E1 network is the source.

If the timing source is properly configured and the **NET** LED continues to flicker between red, yellow, and green, isolate the E1 NTU with the E1 test set to see if the problem clears.

Place the E1 test set into the proper timing mode (provide timing or recover timing). You cannot use the loopback plug in this application since it would require us to provide timing and would not allow us to see if we can recover timing from a valid E1 source.

If the **NET** LED continues to flicker, call Black Box Catalogue Technical Support for assistance.

The Data Port TD/RD LEDs do not Illuminate

Make sure the DTE cable is plugged into the appropriate connector on the back of the unit. The connectors are labeled port one, port two, etc., depending on your E1 NTU type.

Check the timeslot allocation to make sure bandwidth is allocated to the specific **DATA** port.

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

Make sure the DTE devices connected physically to the units are sending data to each other. The serial line will not transmit data or receive data if it is shut down.

Using the terminal interface, set `DATA Port Status` = "`Loss of Signal.`"

If you have eliminated the above as a cause, place your data test set on the problem port.

The DATA Port RTS/CTS LEDs do not Illuminate

If the DTE device does not support the RTS or DTR signalling, set the port DTE loss to None (default—RTS) in the Data DTE Configuration menu.

The CTS LED should light and remain lit.

RTS and DTR are signals sent from the DTE device connected to the Data Port.

Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working.

The DTE Device Shows Intermittent Errors

You may have a timing error, check network statistics.

If you are timing the E1 NTU from the DTE device, set the data port as the source of the timing signal. You need a special DTE cable to enable you to configure the E1 NTU as a DTE device. The cable you use depends on your application.

If the cable and the timing are correct, place a data test set at both ends of the E1 line in place of the DTE devices to see if the errors continue.

No LEDs Illuminate

Test the LEDs by running a lamp test from Menu-9 Diagnostics.

After Powerup, the Clock Does Not Show the Correct Time or Date

Each time you power up, the time and date reset to a default value. You must enter the correct time and date in the time and date fields in Menu-4 Main Configuration.

Technical Specifications

This appendix lists information on both the E1 NTU.

Table A-1   Network Interface

Item	Rating
Transmit bit rate	2.048 Mbps ± 50 ppm
Receive bit rate	2.048 Mbps ± 75 ppm
Line code	HDB3
Framing	ITU-TS G.704/CTR 12
Pulse shape	ITU-TS G.703/CTR 12
Jitter	ITU-TS G.823/CTR 12
Output level	ITU-TS G.703/CTR 12
Input level	0 to -26 dB
Impedance	75 ohm (BNC) unbalanced or 120 ohm (DA-15) balanced

Table A-2   Data Interface

Item	Specification
Interface types	V.35, X.21 or RS-449/EIA-530
Data rates	Nx64 kbps (N=1 through 31)
Line code	Normal only
Clocking options	SCTE, SCT, inverted SCT
System timing	Internal, Network, DATA Port, External
Mode	DTE or DCE

Table A-3   Power

Item	Specification
AC Power	100-240 VAC, 50-60 Hz/0.5 A
DC Power	-48 VDC to -72 VDC, 0.5 A
Power Consumption	6 W maximum
AC Power Connection	AC power cord attached to AC receptacle

Table A-3   Power   (Continued)

Item	Specification
DC Power Connection	Through two-position Phoenix connector
Fuse	External AC fuse or internal DC fuse.

Table A-4   Environmental

Item	Specification
Operating Temperature	0° to 50°C ambient
Storage Temperature	-20° to +60°C
Relative Humidity	0 to 95% noncondensing
Altitude	4.6 km (15,000 ft)

Table A-5   Reliability and Equipment Life

Product	Item	Specification
Stand-alone	MTBF	12 years minimum
	MTTR	30 minutes maximum
Module	MTBF	16 years minimum
	MTTR	30 minutes maximum

Regulatory

Applicable European harmonized standards:

- 89/336/EEC
- 92/31/EEC
- 93/68/EEC
- 73/23/EEC
- 98/13/EC

To maintain EMC Class B (CE Label) compliance, shielded cables should be used with the unit.

Table A-6   Mechanical Specifications

E1 NTU Mechanical Specifications
Dimensions—21.8 cm W x 4.3 cm H x 30.5 cm D (8.6 in W x 1.7 in H x 12 in D)
Mounting—Desktop or tray mounted on a19-inch or 23-inch rack
Weight—2.54 kg (5.6 lb)

Table A-7   Network Management Interface

Item	Description
User Interface	Menu driven
Electrical	RS-232
Mechanical	DE-9 D-subminiature
COMM Port	DCE
Interface Device	Serial ASCII terminal, SNMP workstation or Hayes-compatible modem

Table A-8   Timing Requirements

Item	Specification
Loop	Preferred timing source unless a private line is used.
Network	If the unit is set for loop timing and the network received signal is lost, timing automatically reverts to Internal.
Internal	If using private line applications, set one DSU/CSU to Internal.
DATA01	Nx64 kHz or 2048 kHz

Diagnostics

The unit is designed to facilitate the maintenance of the line and troubleshooting of problems by incorporating comprehensive diagnostics tools into the unit. In most cases, these tools will eliminate the need for test equipment when diagnosing network problems.

Table A-9   Diagnostics and Tests

Item	Diagnostics And Tests
Loopbacks	E1 Network, E1 payload, DTE, Fractional E1 payload, Fractional DTE
E1 Loopback Control	E1 Set/Reset Code, In-Board Commands, Front Panel, **COMM** Port
Fractional Payload	
Loopback Control	CCITT V.54 Sequence, **COMM** Port
Test Patterns	QRW, 1-in-1, 1-in-7, 3-in-24, All 1s, All 0s, Smart jack, 2-User Programmable 24 Bit Patterns
Alarm Parameters	

Table A-9   Diagnostics and Tests (Continued)

Item	Diagnostics And Tests
E1 Network Port	NET Carrier Loss Alarm
	NET Sync Loss Alarm
	NET UAI Alarm
	NET RAI Alarm
	CRC, CV, RE Threshold Alarm
DATA Ports	RTS Loss Alarm

Telnet and SNMP Management

The E1 NTU supports the industry-standard Telnet and Simple Network Management Protocol (SNMP) Management Information Base (MIB II). Full embedded SNMP agent through SNMPv1, supporting RFC 1213, RFC 1406, MIB II, with enterprise MIB.

Telnet through the **COMM** port operates at one of the following baud rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800, and 38400.

Connector and Pin Assignments

Table B-1 lists the pin assignments for the DA15 network interface connector.

Table B-1   Network Interface Pin Assignments

Pin	Signal
1	Send toward Network Tip (T1)
9	Send toward Network Ring (R1)
2	Frame Ground
3	Receive from Network Tip (T)
11	Receive from Network Ring (R)
4	Frame Ground
5, 6, 7, 8, 10, 12,13,14,15	N/C

Table B-2 describes **DATA** port signals from the E1 NTU to the equipment.

Table B-2   DATA Port Signals—E1 NTU to Equipment

Name	V.35	EIA-530	X.21	RS-449	Description
Serial Clock Transmit	SCT-A, B (Y,AA)	SCT-A, B (15, 12)		SCT -A, B (15,23)	Clock for SD. SD changes on positive transition of SCT (A) - SCT(B)
Serial Clock Receive	SCR-A SCR-B (V, X)	SCR-A SCR-B (17,9)	Signal Element Timing (6,13)	RT -A, B (8,26)	Clock for RD. RD changes on positive transition of SCT (A) - SCT(B)
Receive Data	RD-A RD-B (R,T)	RD-A RD-B (3,16)	Receive (4,11)	RD -A, B (6,24)	Received data from the DCE
Data Set Ready or Data Mode	DSR (E)	DCE RDY-A, B (6,22)		DM-A, B (11,29)	Described in Table B-4
Receive Line Signal Detect	RLSD (F)	RLSD-A, B (8, 10)	Indication (5,12)	RR-A, B (13,31)	Described in Table B-4
Clear To Send	CTS (D)	CTS-A, B (5,13)		CS-A, B (9,27)	Described in Table B-4
Ring Indicator	RI (J)				Always inactive
Test Mode		TM (25)		TM (18)	Described in Table B-4

E1 NTU

Table B-3 describes **DATA** port signal from the equipment to the DSU.

Table B-3   DATA Port Signals—Equipment to E1 NTU

Name	V.35	EIA-530	X.21	RS-449	Description
Send Data	SD A, B (P, S)	TD-A, B (2, 14)	Transmit (2, 9)	SD A, B (4,22)	Data stream from DTE.
Data Terminal Ready	DTR (H)	DTE READY (20,23)		RT A, B (12,30)	Can be used to indicate loss of DTE signal. The **DATA** port can be programmed to recognize Loss of DTE as either loss of RTS signal, loss of DTR signal or neither (the condition is never recognized). The hardware also supports the detection of all zero condition from the DTE which could be used to indicate a loss of DTE but currently not supported.
Request To Send	RTS (C)	RTS (4, 19)	Request To Send (3,10)	RS A, B (7,25)	Affects assertion of CTS and sending of Blue Alarm only if loss is set to RTS.
Local Test/Local Loop	LT (K)	LL (18)		LL (10)	When line is asserted by DTE, unit enters fractional DTE Loopback test and remains in test for as long as signal is held active.
Send Clk Transmit Echo	SCTE A, B (U,W)	TT-A, B (24,11)		TT A, B (17,35)	SCTE can be either a timing source to clock in the SD signal or an external timing source for use as a network transmit timing reference
Ground					
Signal Ground	SG(B)	SG(7)		SG(19)	
Frame Ground	A	1[1]			DTE side connection only.

1.   ONE = OFF = MARK = V(A) < V(B) or V(A) < 0, and ZERO = ON = SPACE = V(A) > V(B) or V (A) > 0

Table B-4 describes **DATA** port signals.

Table B-4   DATA Port Signal Overview

Item	Specification
DSR/DM Line	The DSR line is dropped when a test is performed to prevent use of the unit for payload traffic. The **DATA** Port is asserted unless one of following is true: • DSU or CSU Loopback • Loop Up Remote Test • Loop Down Remote Test • Self Test in progress • DSU performing pattern test
TM Line	The TM line to the **DATA** Port is asserted if one of following tests is running: • DSU or CSU Loopback • Loop Up Remote Test • Loop Down Remote Test • DSU performing pattern test
CTS Line	The CTS line is asserted if DTE is not lost (RTS or DTR asserted if enabled), if no Out of Frame alarm is received from the network indicating the remote unit cannot receive transmitted signal and when no test (other than DTE Loopback) is running. To enable the test equipment to send a test signal—CTS is asserted in DTE Loopback.
RLSD/RR Line	The RLSD line drops to indicate the received line data is not valid payload traffic. (Includes cases when DSR is not asserted, indicating a test is running and is preventing the unit from carrying customer data.)

Table B-5 describes the pin assignments for the DB-25 to RS-449 **DATA** port connector.

Table B-5   DB-25 to RS-449 DATA Port Connector Pin Assign.

RS-449	DB-25	Signal Name	Signal
17	24	TT A	To DCE
35	11	TT B	To DCE
7	4	RS A	From DTE
25	19	RS B	From DTE
24	16	RD B	To DTE
6	3	RD A	To DTE
22	14	SD B	From DTE
4	2	SD A	From DTE
11	6	DM A	To DTE

Table B-5   DB-25 to RS-449 DATA Port Connector Pin Assign.

RS-449	DB-25	Signal Name	Signal
29	22	DM B	To DTE
27	13	CS B	To DTE
9	5	CS A	To DTE
13	8	RR A	To DTE
31	10	RR B	To DTE
26	9	RT B	To DTE
8	17	RT A	To DTE
5	15	ST A	To DTE
23	12	ST B	To DTE
19	7	Signal Ground	
NC	NC		
1	NC	Frame Ground	From DTE
18	25	TM	To DTE
12	20	DTR	To DCE
30	23	DTR	To DCE

Table B-6 describes the pin assignments for the DB-25 to V.35 DCE cable. For connection to DCE equipment

Table B-6   DB-25 to V.35 DCE Cable Pin Assignments

V.35	DB-25
S	16
P	3
T	14
R	2
H	6
NC	NC
E	20
NC	NC
C	8
NC	NC
W	9
U	17
V	24
X	11

Table B-6   DB-25 to V.35 DCE Cable Pin Assignments

V.35	DB-25
F	4
NC	NC
B	7
NC	NC
NC	1

Table B-7 describes the DB-25 to RS-449 DCE cable pin assignments. For connection to DCE equipment.

Table B-7   DB-25 to RS-449 DCE Cable Pin Assignments

RS-449	DB-25
8	24
26	11
13	4
31	19
22	16
4	3
24	14
6	2
12	6
30	22
29	23
11	20
25	10
7	8
35	9
17	17
19	7
NC	NC
NC	1

Table B-8 describes the communication port pin assignments.

Table B-8   Communication Port Pin Assignments

Pin	Signal	Description
1	DCD	Carrier Detect
2	SD	Send Data (from E1 NTU to terminal)
3	RD	Receive Data (from terminal to DSU)
4		No connection
5	SG	Signal Ground (I-directional)
6		No connection
8		No connection
8[1]	CTS	Clear To Send (I/O to all DSUs only)
9		No connection

1. CTS is used by the E1 NTU as a collision avoidance line. This line should not be connected at the CRT terminal end of the Communication Port cable.

Table B-9 lists the Communication Port parameter options.

Table B-9   Communication Port Parameter Options

Parameter (Default)	Option
Baud rate (9600)	1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400
Parity (None)	Even, Odd and None
Word length (8)	7 or 8
Stop bits (2)	1 or 2

Table B-10 lists the pinout assignments for this adapter.

Table B-10 DE-9 to DB-25 Adapter Pinouts

DE-9	DB-25
3	2
2	3
7	4
8	5
6	6

Table B-10 DE-9 to DB-25 Adapter Pinouts

DE-9	DB-25
5	7
1	8
9	23
4	21

E1 NTU

Factory Default Configuration

Table C-1   Factory Default Configuration

Item	Default	Item	Default
Unit			
Unit ID	Unique ID assigned	Protect Mode	Disabled
Network			
CRC4	Enabled	In-Band Communications Bit	Disabled
Main Synch Source	Network	Alternate Synch Source	Internal
Data Port Configuration			
Loss	DTR	Format	X.21
Mode	DCE	Clock	SCTE
Timeslot Allocation			
Allocation Type	Contiguous	All Bandwidth Allocations	DATA01
Diagnostic			
User Pattern 1	00110011001100110011		
User Pattern 2	000000010000000100000001		
Alarm			
Block All Alarms	Disabled	Loss of Signal from **DATA** port	Enabled
Net Carrier Loss Alarm	Enabled	NET Sync Loss Alarm	Disabled
Net UA1 Received Alarm	Enabled	CV Threshold Alarm	Disabled
Net RAI Received Alarm	Enabled	CRC Threshold Alarm	Disabled
SNMP			
IP Address	0.0.0.0	IP Subnet Mask	0.0.0.0
1st NMS Address	0.0.0.0	2nd NMS Address	0.0.0.0
3rd NMS Address	0.0.0.0	Set Community String	public

Table C-1   Factory Default Configuration   (Continued)

Item	Default	Item	Default
Get Community String	public	TRAP Community String	public
Forward over IBC	Disabled	Output Port	COMM

COMM Port and Terminal

Item	Default	Item	Default
Connection	In-Band Communications	Phone Number 2	Not Assigned
Timeout when not Logged on	Unlimited	Phone Number 1	Not Assigned
Timeout when not Logged on	Unlimited	Normal User Password	Not Assigned
COMM Port XON/XOFF	XOFF until XON	Superuser Password	Not Assigned
COMM Port	9600, 8, no parity, 2 stop bits	COMM Port DCD	Disabled

Configuration Worksheet

Print, fill out, and keep this chart near the device.

Table D-1   Configuration Worksheet

Item	Setting	Item	Setting
Unit			
Unit ID		Protect Mode	
Network			
CRC4		In-Band Communications Bit	
Main Synch. Source		Alternate Synch Source	
Data Port Configuration			
Loss		Format	
Mode		Clock	
Timeslot Allocation			
Allocation Type		All Bandwidth Allocations	
Diagnostic			
User Pattern 1			
User Pattern 2			
Alarm			
Block All Alarms		Loss of Signal from data port	
Net Carrier Loss Alarm		Net Sync Loss Alarm	
Net UA1 Received Alarm		CV Threshold Alarm	

E1 NTU

Table D-1   Configuration Worksheet (Continued)

Item	Setting	Item	Setting
Net RAI Received Alarm		CRC Threshold Alarm	
SNMP			
IP Address		IP Subnet Mask	
1st NMS Address		2nd NMS Address	
3rd NMS Address		Set Community String	
Get Community String		TRAP Community String	
Forward over IBC		Output Port	
COMM Port and Terminal			
Connection		Phone Number 2	
Timeout when not Logged on		Phone Number 1	
Timeout when not Logged on		Normal User Password	
COMM Port XON/XOFF		Superuser Password	
COMM Port		COMM Port DCD	

Software Download

Menu-4A Download Utility

The Download feature provides a quick method to upgrade the device firmware. The features are:

- Separates the downloading operation from switching to new operational code, where these operations can be performed at separate times. The menu lets you set a time when to initialize the E1 NTU with the new code.
- Allows the E1 NTU to store two images of executable code, so you can switch between the two images.
- Enables downloading of the new operation code to be done while the E1 NTU is operational and passing data. The code can be downloaded through:
  - XMODEM via the terminal user interface using an asynchronous connection.
  - TFTP from a NMS to the E1 NTU via SLIP with an asynchronous connection.
  - TFTP from a NMS to the E1 NTU via SLIP through the ethernet (with a MAP installed).

Using the Download Utility

Use the DOWNLOAD UTILITY menu, accessed through the Menu-4 Main Configuration, to download software updates, using XMODEM or TFTP. When switching from one executable image to another, the operational software in the E1 NTU is restarted, which results in a temporary service interruption of from one to two minutes.

During the download sequence, while executing the download operation or when executing from the Boot code, the Power/Test LED alternates red and green.

Figure E-3 is an example of the Menu-4A Download Utility using a PC transfer.

Flash Download

Shown at the bottom of the Menu-4 Main Configuration (Figure E-1) is the Flash download option function that allows:

- Setting the FLASH Download parameters
- Downloading code.

```
SW Ver 2.1.c  MIB Ver 1.9          Black Box E1 NTU                      6/02/98
HW Ver A                      Menu-4 Main Configuration                  15:17:10
S/N                                 Local:JD0034                  Remote:JD0008
                                    ------------                   -------------
UNIT   Protect Mode                    Disabled                        Disabled
       Idle Code                          0xFF
NET    Framing                       CRC4 Enabled                   CRC4 Enabled

       Main/Alt Sync.                   NET/int                        NET/int
       In-Band Communications Bit           4                              4




       ------------------------------------------------------------------------
0-SNMP Config.   1-Main Status      2-Data Status    3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Alarm I        8-Alarm II   9-Diagnostics
E-Flash Download
CR-changes a selection              Arrow Keys-move the selection
```

Figure E-1   Menu-4 Main Config.—Flash Download

NOTE: Before beginning any upgrade, you need to create a new directory on your hard drive and load the new code on to the PC.

Setting Up for TFTP

The procedures for local or remote TFTP download are the same, except when you do not have a SLIP or telnet connection to a unit. The local unit is always the unit you are logged into and it's parameters appear on the left side of the screen. The remote E1 parameters appears on the right side of the screen.

If you do not have a SLIP or telnet connection to a remote unit, you need to perform the following steps before proceeding to set up for a TFTP.

1. **Connect via SLIP or telnet to the local unit.**

2. **Go to Menu-0 to set up the IBC connection (IBC runs over a netlink). (Figure E-2)**

3. **Arrow down to the** `Forward Over IBC` **field and make sure it is set to** `enabled`**.**

Now proceed to Menu-4 and follow the steps for TFTP set up.
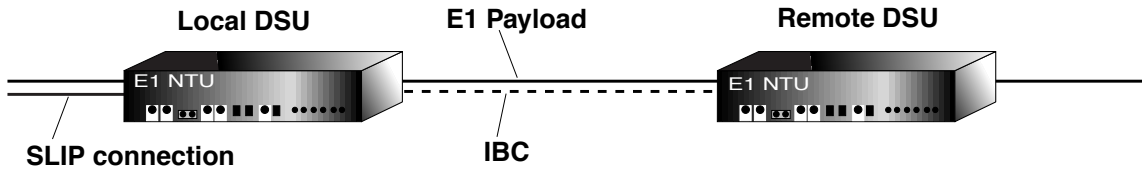
Figure E-2   Remote connection over IBC

Initiating TFTP

1. **From Menu-4 Main Configuration (Figure E-1), type F** *(as instructed in the Menu-4A (Figure E-3) for FLASH Download)* **to start the download session.**

2. **Set** `Protocol` **to TFTP.**

3. **Type** `1` **to initiate the local download, or type** `3` **to initiate remote download over IBC.**

4. **Start the TFTP transfer from the workstation.**

The E1 NTU supports TFTP PUT. TFTP download requires binary mode and TFTP PUT.

From a UNIX workstation, the command sequence is:

```
# tftp ip_address_of_target_unit

# bin

# put filename
```

```
SW Ver 2.0D    MIB Ver 1.9         Black Box E1 NTU                      9/17/97
HW Ver A                      Menu-4A DownLoad Utility                   03:05:49
                              Local: SOLOE1          Remote: DL600E
                              -------------          --------------
CODE FILE 1 Version           (Cur)  SOLO  2.0D                   Absent
          2 Version                  SOLO  2.0C                   Absent

DOWNLOAD   Code File                        2                          2
           Status                        Idle                      Error
           Error                                   5 2097152            0
           Bytes Received                   0                          0
           Protocol                    XMODEM                     XMODEM

CHANGE     Code File                     NONE                       NONE
           Method                   SCHEDULED                  SCHEDULED
           Scheduled Date            01/01/96                   01/01/96
           Scheduled Time            00:00:00                   00:00:00
           Count Down          Press 2 to Start           Press 4 to Start

--------------------------------------------------------------------------------
0- Return to Menu 4    1- Local DownLoad         2- Local Codefile Change
3- Remote DownLoad     4- Remote CodeFile Change

CR-changes a selection           Arrow Keys-move the selection
```

Figure E-3   Menu-4A Download Utility

Setting Up for XMODEM

To download new software:

1. **Create a new directory on your hard drive and load the new code onto the PC.**

2. **From Menu-4 Main Configuration, type `F` (as instructed in the menu for FLASH Download) to start the download session.**

3. **Set Protocol to XMODEM.**

4. **Type `1` to initiate the local download.**

5. **Start the XMODEM transfer from the PC and send the new code from the directory created in step 1 (or from a diskette).**

Table E-1 describes the parameters of Figure E-3.

Table E-1 Download Utilities Groups

Group	Field	Description
CODE FILE	1 Version	Version of the operational software in Code File 1. This field displays: • Cur, for current operational software, with the version • Absent, if there is no operational software stored
CODE FILE	2 Version	Version of the operational software in Code File 2. This field displays: • Cur, for current stored software, with the version • Absent, if there is no operational software stored
DOWNLOAD	Code File	The Code File that will receive the downloaded operational-code, and that is currently not operational.
	Status	Shows the status of the download. This field shows either Success, Failed, or In Progress. Status is idle when no download is taking place. If the operation fails, a number indicates the specific problem of the failure.
	Error	Shows an error code if a failure occurs.
	Bytes Received	Shows the number of bytes received during a TFTP download.
	Protocol	Download protocol. Choices are XMODEM and TFTP.

Table E-1   Download Utilities Groups

Group	Field	Description
CHANGE	Code File	Code File to be switched over when the scheduled time is reached. Choices are NONE, 1, and 2. NONE indicates that no change is desired, and can be used to cancel a scheduled change.
	Method	Either SCHEDULE or NOW. NOW: change occurs immediately; SCHEDULE: change occurs when the actual time reaches the scheduled time.
	Scheduled Date	Expressed in mm/dd/yy (month/day/year) at which the switch-over will occur.
	Scheduled Time	Expressed in hh:mm:ss (hours:minutes:seconds) at which the switch-over will occur.
	Count Down	Shows the time interval hh:mm:ss (hours:minutes:seconds) for the switch-over to occur after it has been initiated. If the switch-over has not been initiated, then it shows "Press 2 To Start" or "Press 4 To Start" for the local and remote E1 NTU, respectively.

The menu and download options for the Download Utility are shown in Table E-2.

Table E-2   Menu and Download Options

Menu	Description
0-Return to Menu 4	Returns to Menu-4 Main Configuration.
1-Local Download	Begins the download to the local E1 NTU.
2-Local Code File Change	Begins the Code File change in the local E1 NTU.
3-Remote Download	Begins the download to the remote E1 NTU.
4-Remote Code File Change	Begins the Code File change in the remote E1 NTU.

NOTE: If you select menu options 2 or 4, the Code File to be changed next must not show ABSENT; otherwise, changes are not allowed.

Abnormal Termination

The download process fails if any of these conditions occur:

• A corrupt software load.

- There are transmission errors.

- Failure of the downloading computer, the modem (if one is used), the connection between the downloading computer and the unit or a failure of the unit, (includes a power failure).

- User aborts the download process.

- A time-out occurs according to the XMODEM or TFTP protocols.

Typically, abnormal termination of the download process leaves the Code File in a corrupted state. The Download Utility indicates that the Code File is absent, or corrupted.

Error Indicators

If the download utility or the operational software fails, an error indicator appears. Depending on the error indicator listed below, you can take the following action or at least be apprised of the condition, as shown in Table E-3.

Table E-3   Download Utility Error Indicators

Error Indic.	Error Type	Description (Message)
1	General	Software error. Note the specific error information, and call Black Box Technical Support.
2	General	Load Received is corrupted.
3	General	Load Received has invalid embedded length.
4	General	Load Received is invalid for this unit.
5	Hardware	Flash-ROM Not Supported.
6	Hardware	Flash-ROM With Protected Sector.
7	Hardware	Flash-ROM Failed To Erase.
8	Hardware	Flash-ROM Failed To Program.
9	XMODEM	XMODEM Abort Received.
10	XMODEM	XMODEM Data Timeout.
11	XMODEM	XMODEM Invalid Sequence.
12	XMODEM	XMODEM Unexpected Data.
13	XMODEM	XMODEM Packet Timeout.
14	XMODEM	XMODEM Packet Corrupted.
15	XMODEM	XMODEM Failed to Acknowledge.
16	XMODEM	XMODEM Reserved.
17	XMODEM	XMODEM Reserved.
18	XMODEM	XMODEM Reserved.
19	TFTP	TFTP Error Packet Received
20	TFTP	TFTP Invalid Mode.

Table E-3   Download Utility Error Indicators (Continued)

Error Indic.	Error Type	Description (Message)
21	TFTP	TFTP Invalid Opcode.
22	TFTP	TFTP Unexpected Opcode Sequence.
23	TFTP	TFTP Invalid Packet Length.
24	TFTP	TFTP Invalid Data Packet Sequence.
25	TFTP	TFTP Request Timeout.
26	TFTP	TFTP Data Packet Timeout.
27	TFTP	TFTP Failed to Acknowledge.

Download Aborted by User

You may abort the XMODEM downloading process by typing `Ctrl-X`.

To perform the downloading abort, instruct the terminal emulator program to abort the XMODEM download process and return to terminal mode. The specific procedure depends on the terminal emulator program being used. The recovery is the same as explained under Abnormal Termination.

With TFTP, the procedure to discontinue the TFTP session depends on the TFTP setup. Again, the recovery is the same as explained under Abnormal Termination.

E1 NTU

Index

E1 NTU