ADTRAN

TDU 120e
User Manual

Part Number

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Trademarks:

Windows is a registered trademark of Microsoft Corp.

T-Watch is a trademark of ADTRAN, Inc.

OpenView^R

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

The following conventions are used in this manual.

NOTE *Notes provide additional useful information.*

CAUTION *Cautions signify information that could prevent service interruption.*

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

Important Safety Instructions

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

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

Save These Important Safety Instructions

FCC regulations require that the following information be provided to the customer in this manual.

1. This equipment complies with Part 68 of the FCC rules. The required label is attached to the bottom of the chassis.

2. An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See installation instructions for details.

3. If your TDU 120e causes harm to the telephone network, the Telephone Company may discontinue your service temporarily. If possible, they will notify you in advance. If advance notice is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

5. If you experience trouble with the equipment TDU 120e, please contact ADT-RAN at (256) 963-8000 for repair/warranty information. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected, or until you are sure the equipment is not malfunctioning.

6. This unit contains no user serviceable parts.

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

Service Type	REN/SOC	FIC	USOC
1.544 Mbps -SF	6.0N	04DU9-BN	RJ-48C
1.544 Mbps - SF and B8ZS	6.0N	04DU9-DN	RJ-48C
1.544 Mbps - ESF	6.0N	04DU9-1KN	RJ-48C
1.544 Mbps - ESF and B8ZS	6.0N	04DU9-1SN	RJ-48C

8. The FCC recommends that the AC outlet to which equipment requiring AC power is to be installed is provided with an AC surge arrester.

Affidavit Requirements for Connection to Digital Services

- An affidavit is required to be given to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voice band analog signal and transmitted on the network.

- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specification.

- End use/customer will be responsible to file an affidavit with the local exchange carrier when connecting unprotected CPE to a 1.544 Mbps or subrate digital service.

- Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirements for subrate services are waived.

Affidavit for Connection of Customer Premises Equipment to 1.544 MBPS and/or Subrate Digital Services

For the work to be performed in the certified territory of _____ (telco name)

State of _____

County of _____

I, _____ (name), _____ (business address), _____ (telephone number) being duly sworn, state:

I have the responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specification. With respect to encoded analog content and billing protection:

( ) I attest that all operations associated with the establishment, maintenance and adjustment of the digital CPE with respect to encoded analog content and billing protection information continuously complies with Part 68 of the FCC rules and Regulations.

( ) The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

( ) The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s) maintainer(s) of the digital CPE responsible for the establishment, maintenance and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):

( ) A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) D. In lieu of the proceeding training requirements, the operator(s)/maintainer(S) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (telco's name) with proper documentation to demonstrate compliance with the information in the preceding paragraph, if so requested.

_____ Signature

_____ Title

_____ Date

Subscribed and sworn to before me

This _____ day of _____, 20__

_____
Notary Public

My commission expires: _____

Federal Communications Commission Radio Frequency Interference Statement

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

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

CAUTION

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

Canadian Emissions Requirements

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

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

Canadian Equipment Limitations

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

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

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

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

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

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

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Limited Product Warranty

ADTRAN warrants that for five (5) years from the date of shipment to Customer, all products manufactured by ADTRAN will be free from defects in materials and workmanship. ADTRAN also warrants that products will conform to the applicable specifications and drawings for such products, as contained in the Product Manual or in ADTRAN's internal specifications and drawings for such products (which may or may not be reflected in the Product Manual). This warranty only applies if Customer gives ADTRAN written notice of defects during the warranty period. Upon such notice, ADTRAN will, at its option, either repair or replace the defective item. If ADTRAN is unable, in a reasonable time, to repair or replace any equipment to a condition as warranted, Customer is entitled to a full refund of the purchase price upon return of the equipment to ADTRAN. This warranty applies only to the original purchaser and is not transferable without ADTRAN's express written permission. This warranty becomes null and void if Customer modifies or alters the equipment in any way, other than as specifically authorized by ADTRAN.

EXCEPT FOR THE LIMITED WARRANTY DESCRIBED ABOVE, THE FOREGO-ING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUS-TOMER AND THE EXCLUSIVE LIABILITY OF ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES (EXPRESSED OR IMPLIED). ADTRAN SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING (WITH-OUT LIMITATION), ALL WARRANTIES OF MERCHANTABILITY AND FIT-NESS FOR A PARTICULAR PURPOSE.   SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THIS EXCLUSION MAY NOT APPLY TO CUSTOMER.

In no event will ADTRAN or its suppliers be liable to Customer for any inciden-tal, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or informa-tion, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclu-sion may not apply to Customer.

Customer Service, Product Support Information, and Training

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specification, or if it fails while in service.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, see the toll-free contact numbers given below.

Presales Inquiries and Applications Support

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

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

Post-Sale Support

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

Technical Support	(888) 4ADTRAN

The Custom Extended Services (ACES) program offers multiple types and levels of service plans which allow you to choose the kind of assistance you need. For questions, call the ACES Help Desk.

ACES Help Desk	(888) 874-2237

Repair and Return

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

CAPS Department   (256) 963-8722

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

ADTRAN Customer and Product Service
901 Explorer Blvd.
Huntsville, Alabama 35806

RMA # _____

Training

The Enterprise Network (EN) Technical Training offers training on our most popular products. These courses include overviews on product features and functions while covering applications of ADTRAN's product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at your site. For more information about training, please contact your Territory Manager or the Enterprise Training Coordinator.

Training - phone	(800) 615-1176, ext. 7500
Training - fax	(256) 963-6700
Training - email	training@adtran.com

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Chapter 1   Introduction

TDU 120e OVERVIEW

The TDU 120e is a T1/FT1 multiplexer with the following features:

- Nx56/64 V.35 data port
- DS-1 (PBX) interface
- option slot
- embedded SNMP management

The TDU 120e's option slot accepts one of many available option modules for voice and data applications.

The TDU 120e serves as the link between user data sources such as:

- local area network (LAN) bridges and routers
- computers
- CAD systems
- teleconferencing equipment
- PBXs

Through the use of multiple data ports, the TDU 120e can simultaneously connect one or more of these devices to a T1 circuit. The amount of bandwidth allocated to each port is custom-programmable. You can manually allocate bandwidth or set the bandwidth to change automatically at predetermined times to use the available bandwidth most advantageously. Changes in the configuration do not disrupt data flow in channels that are not being reconfigured. The unique architecture and the availability of

option modules provides a path for growth to accommodate future requirements.

The TDU 120e offers a wide variety of network management options. The 10BaseT and control ports are compatible with both SNMP and T-Watch PRO management. An enhanced VT-100 terminal interface is also provided.

Standard Features in the TDU 120e

The following list describes the standard features in the enhanced TDU 120e.

- A single T1 interface.
- An Nx/DBU V.35 port and a DS-1 (PBX) interface.
- An inband communication channel requiring only 8k of bandwidth from a single DS0.
- One option slot to house option modules with up to four additional ports, including voice and data.
- Allows mix of port types to meet the data interface requirements.
- Easy configuration capabilities using simplistic menus displayed on a terminal or computer connected to the control port on the rear of the unit or the craft port on front of the unit.
- Two programmable configuration maps that define the bandwidth allocation between data ports.
- Data drop and insert, as well as full drop and insert.
- Flash memory for software updates.
- Timing is selectable from the network, from the Nx56/64 or DS-1 ports, internally, or from a secondary interface.
- QRSS; 511 test patterns using Nx option.
- Extensive self-testing and monitoring provides assurance of proper operation.
- SNMP, Telnet, and T-Watch PRO management via SLIP or 10-BaseT
- Ability to proxy for "agentless" units
- Enhanced terminal mode
- Fractional T1 loopbacks as defined in Annex B of ANSI T1.403-1995
- Software configurable long-haul or short-haul DS-1 port
- External alarm connector
- External alarm monitor

TDU 120e OPTION MODULES

Some of the option modules available for the TDU 120e are:

DSX-1
Provides a short haul T1 interface for operation with a PBX (Terminal Interface).

Full Drop and Insert
Permits the dropping of data and insertion of new data into the same DS0 time slot.

This module includes a long haul DS-1 interface. It can also be used as a second DS-1 interface to provide an up to 3 MB aggregate throughput.

Nx56/64 serial interface
Provides a V.35 serial interface in either single or dual versions.

Voice interface
Provides 2 or 4 channels FXS/FX0/E&M.

OCU DP
Interfaces to DDS or 4-wire Switched 56, dual or single versions.

DSU DP
Provides two sync or async ports (EIA-232 or V.35).

Dial backup
Allows for backup of data upon network T1 failure.

U-BR1TE
Allows ISDN lines to be extended over a T1 line.

Option Module Architecture

The TDU 120e features a unique architecture that allows the addition of one option module and plug-on board providing an opportunity for growth to accommodate another application. See Figure 1-1.
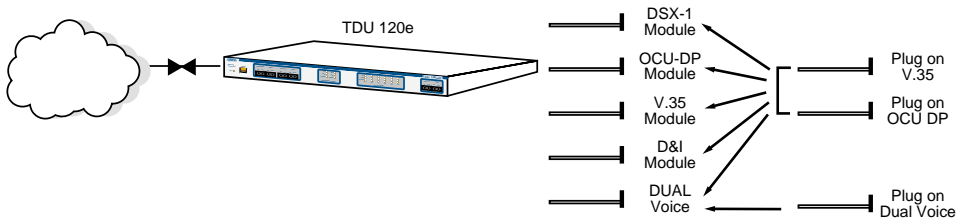
Figure 1-1. TDU 120e Option Modules

TDU 120e CONFIGURATION APPLICATIONS

The following examples illustrate possible configurations of TDU 120e applications.

Router, PBX, Video Conferencing Application

In this application, the Base Nx/DBU provides a V.35 interface to a router. The PBX is interfaced to the TDU 120e with the Base DS-1 interface. An OCU DP module and OCU DP plug-on board provide two switched 56 circuits for video conferencing. The 10BaseT port allows SNMP network management over the LAN. See Figure 1-2.
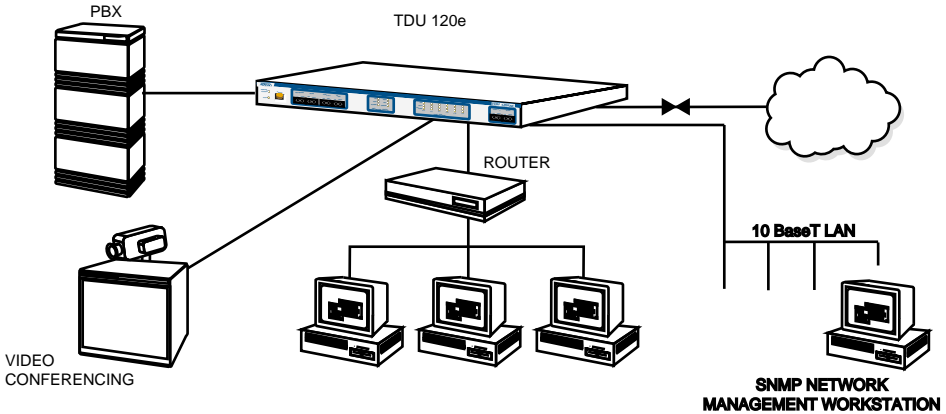
Figure 1-2. Bridge, PBX, Video Conferencing Application Set-up

Chapter 2   # Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the TDU 120e for any shipping damages. If you suspect damage, file a claim immediately with the carrier and then contact ADTRAN Customer Service (see the front section of this manual for contact information). If possible, keep the original shipping container for use in shipping the TDU 120e back for repair or for verification of damage during shipment.

ADTRAN Shipments

The following items are included in the ADTRAN shipment:

- The TDU 120e
- 2-line interface cables: A 15-foot, 8-position modular to 8-position modular
- A DB-25 to modular adapter
- A 6-foot, 8-position modular cable for connection to the chain-in port
- The user manual

Customer Provides

- Cables for any expansion modules to be used with the TDU 120e
- 10BaseT cable for connection to a LAN or router (if you plan to use remote management features)

POWER CONNECTION

AC Powered Units

Each TDU 120e AC unit is equipped with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle.

CAUTION

Power to the TDU 120e AC unit must be from a grounded 90-120 VAC, 50/60Hz source.

DC Powered Units

Each TDU 120e DC unit is provided with a two-pin power receptacle and mating plug. Power to the TDU 120e DC unit is $\pm$ 48 VDC or $\pm$24 VDC.

GROUNDING INSTRUCTIONS

Grounding instructions from the *Underwriters' Laboratory UL 1950 3rd Edition* are provided in this section.

An equipment grounding conductor that is not smaller in size than the ungrounded branch-circuit supply conductors is to be installed as part of the circuit that supplies the product or system.

- Bare, covered, or insulated grounding conductors are acceptable.
- Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green, or green with one or more yellow stripes.
- The equipment grounding conductor is to be connected to ground at the service equipment.
- The attachment-plug receptacles in the vicinity of the product or system are all to be of a grounding type.
- The equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.
- A supplementary equipment grounding conductor shall be installed between the product or system and ground that is in addition to the equipment grounding conductor in the power supply cord.
- The supplementary equipment grounding conductor shall not be smaller in size than the ungrounded branch-circuit supply conductors.
- The supplementary equipment grounding conductor shall be connected to the product at the terminal provided and shall be connected to the ground in a manner that will retain the ground connection when the product is unplugged from the receptacle.

- The connection to ground of the supplementary equipment grounding conductor shall be in compliance with the rules for terminating bonding jumpers at Part K or Article 250 of the National Electrical Code, ANSI/NFPA 70.

- Termination of the supplementary equipment grounding conductor is permitted to be made to building steel, to a metal electrical raceway system, or to any grounded item that is permanently and reliably connected to the electrical service equipment ground.

- The supplemental grounding conductor shall be connected to the equipment using a number 8 ring terminal.

- The terminal should be fastened to the grounding lug provided on the rear panel of the equipment.

- The ring terminal should be installed using the appropriate crimping tool (AMP P/N 59250 T-EAD Crimping Tool or equivalent).

WARNING *Do not use this product near water, such as in a wet basement.*

NOTE *For DC-powered devices, the supply power for the product must be installed near the equipment and be easily accessible.*

IDENTIFICATION OF REAR PANEL LAYOUT

Figure 2-1 shows the configuration of the rear panel of the TDU 120e (AC powered and DC powered units).
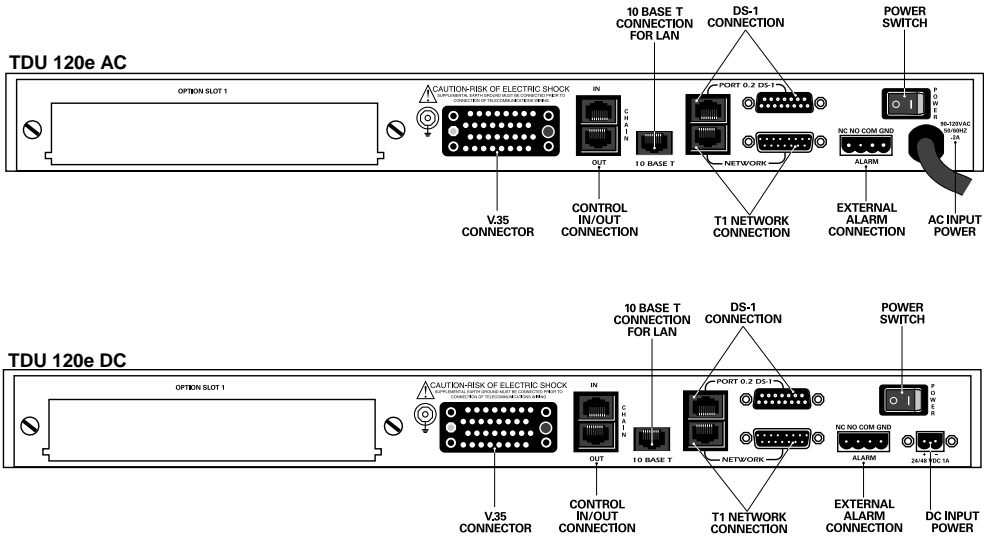
Figure 2-1. TDU 120e Rear Panels

TDU 120e Interfaces

The TDU 120e rear panel is equipped with an Nx/DBU data port, a DS-1 interface, an option slot, management interfaces, an external alarm connector, and a T1 interface. See Figure 2-2.
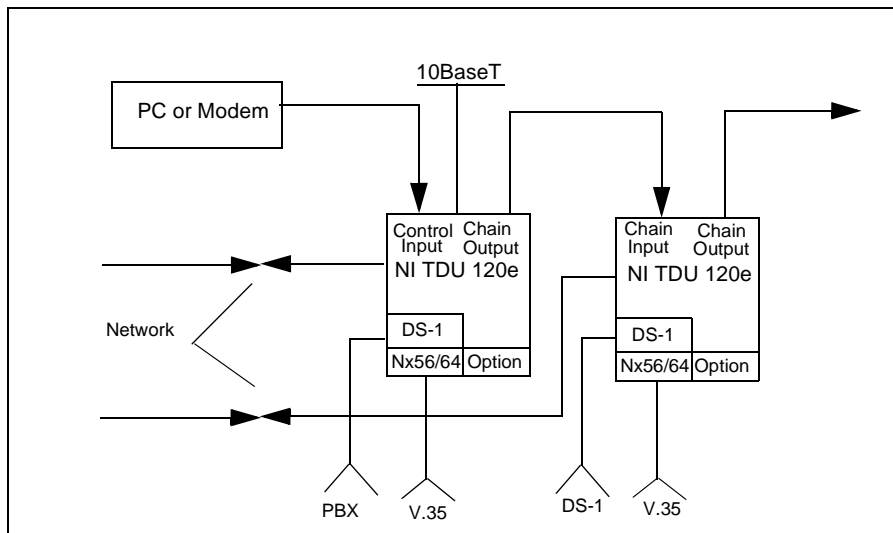
Figure 2-2. TDU 120e Interfaces

Network Interface

The Network Interface (NI) port provides the connection to the T1. This port complies with the applicable ANSI and AT&T standards. For more information see *Appendix B*.

Nx56/64 Serial Interface

The Nx56/64 provides a serial V.35 port that operates from 56 kbps to 1.536 Mbps. This port provides 511 pattern generation and detection and remote loopback capability.

DS-1 (PBX) Interface

The DS-1 interface provides a T1 for a PBX or other equipment. This port complies with ANSI T1.102. It can be software configured for either long-haul or short-haul.

Control In Port

The control port input provides an RJ-45 input from a PC or a modem for control of the TDU 120e. You can also use it as a chain input from another TDU 120e or TSU 100. For more information, see *Appendix B*.

Craft Port

The craft port provides the same functionality as the Control Port Input. Both the craft port and the control port input may be connected simultaneously, but only one port may be active at a time. For more information, see *Appendix B*.

Control Out Port

The chain port output provides an RJ-45 output to chain control to other TDUs or to TSUs. For more information see *Appendix B*.

10BaseT Interface

The 10BaseT interface provides the LAN interface for managing the TDU 120e with SNMP or T-Watch PRO. For more information, see *Appendix B*.

External Alarm Connector

The external alarm connector provides the capability of connecting an external alarm device to the TDU 120e. The alarm relay will activate on any alarm. The relay will remain activated until the automatic cut-off (ACO) button on the front panel is pushed. For more information, see *Appendix B*.

POWER UP TESTING

When shipped from the factory, the TDU 120e is set to factory default conditions. At the first application of power, the unit automatically executes a memory self-test. A full self-test can be run from the terminal. A passcode and unit ID may be set using the **UTILITY** menu. See page 6-3.

Self-Test

When...	Then...
Initiating a self-test	The terminal displays **System Self-test Now Testing** and **Memory Test Now Testing.** The test LEDs are illuminated.
The self-test is completed	All LEDs go back to their normal state. The terminal momentarily displays **System Self-test Tests** passed.
A failure is detected	A list of failures is displayed on the terminal.

The full self-test procedure (invoked from the terminal or T-Watch PRO) consists of the following tests:

Type of Test	Explanation
Board level tests	The TDU 120e contains an on-board processor which executes a series of tests checking the circuitry on the board. RAM and EPROM tests Verify on-board circuitry
Unit level tests	Front panel LED verification Board-to-board interface test A test pattern is sent from the controller through a loopback on all other boards and checked on the controller. This verifies the data path, clocks, and control signals for the entire chassis.

INITIALIZATION

Set User Passcode

The TDU 120e is designed to operate with or without the use of a passcode. The default condition is without a passcode.

> **NOTE**
> *If the unit is to be remotely accessed using T-Watch PRO, you must enter a passcode. When managing a number of units, the passcode can be the same for all the units.*

The passcode should be a number easily remembered. Once entered, the passcode is required to access any operation other than viewing. See *Set Passcode* on page 6-3 for details.

Set Unit Identification

The **UNIT ID** sets the unit to respond to remote control (controlled by a device other than the front panel or terminal). If no Unit ID is recorded it is not possible to operate from any remote control device, including the local PC for T-Watch PRO or SNMP. See *Unit ID* on page 6-3 for details.

Set Control Port

The TDU 120e can be configured from the control port when T-Watch PRO, SNMP, or the terminal interface are being used. If the control port is to be used, the control port baud rate must also be selected.

Chain In (PC)

The unit can be controlled from an external PC connected directly or via modem to the Chain-In port. When using Chain-In, the selection of the Control Port baud rate from 9600 (factory default), 1200, 2400, or 4800, 19200, or 38400 must be made using the **UNIT CONFIGURATION** menu. See *Unit Menu* on page 5-14 for details.

Chain In/Chain Out

TDU 120e units and other TDUs and TSUs can be linked together to form a chain. Figure 2-3 provides an example of a chain-in arrangement with a PC or a modem. The first TDU 120e in the chain receives controlling input from the PC or modem.
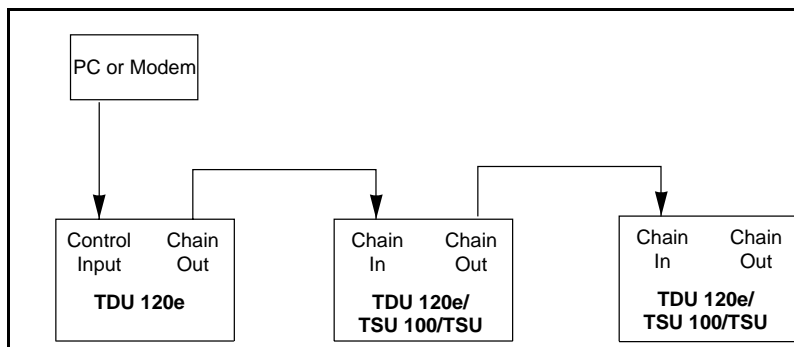
Figure 2-3. Example of Chain-in

Subsequent TDU/TSUs in the chain are in a position to in-take information from another TDU or TSU. This in-tak-ing of information from another TDU in the chain is identified as Chain In. The baud rate for the chained units must match that of the first unit.

Unless locked out externally, the front panel can also con-trol the unit.

At this point, the unit initialization procedure is concluded. If the unit is to be configured remotely, there are no additional items necessary to complete prior to executing remote configuration.

The Passcode, the Unit ID, and the Control Port settings are stored in a nonvolatile memory. This ensures they are operable for subsequent power-up sequences.

NORMAL POWER-UP PROCEDURE

After the unit has been put into operation with the initial power-up and initialization, subsequent power-up procedure includes only the Power-Up self-test followed by the request for a passcode (password) if this option was selected during initialization.

Type the previously recorded passcode and press **Enter**.

Chapter 3   Operation

MENU OPERATION

The TDU 120e uses a VT-100 type terminal to display control and monitor menus. Initiate this mode by keying in **<CTRL> PTT** on the terminal once it is connected to the Control In or Craft port.

When you begin the Telnet session, you will be prompted for a password. The default password is ADTRAN. You can change this password using the **MANAGEMENT** submenu.

For detailed information on this method of control, see the *Telnet/Terminal Main Menu* on page 3-5.

You can also connect to the TDU 120e via Telnet. Before attempting to connect via Telnet, first define the IP address, the default gateway, and the subnet mask.

See **DEFAULT UNIT PASSCODE** in the *Unit Access Table* on page 8-2 for details. The Telnet session will time-out after a predefined value that is also set in the **MANAGEMENT** menu.

NOTE   *Only one Telnet session can be active at one time.*

Sample Terminal Screen with TDU 120e Menu

An example of a PC screen with a TDU 120e menu is shown in Figure 3-1.

```
                    Main Menu

        1) Status

        2) Config

        3) Util

        4) Test

        5) Remote Menu Access

        6) Management Config

        7) Flash Download

        8) Quit Session

        Command:
```
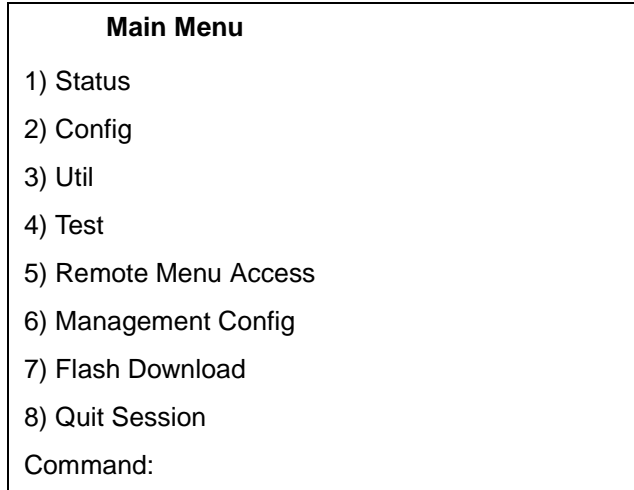
Figure 3-1. Sample Terminal Screen with TDU 120e Menu

General Menu Traversal

The TDU 120e uses a multilevel menu structure containing both menu items and data fields. All menu operations and data are displayed on the terminal.

Select and Activate a Menu Item
To choose a menu item, place the cursor on the desired menu item by:

• pressing the number corresponding to the menu item, or

• using the up and down arrows.

The following steps and Figure 3-2 describe how to activate the alarm list option from the Status Menu.

Step	Action	Result
1	Activate the **STATUS** menu using the arrow keys or by pressing **1**.	The cursor will flash on the number next to the activated selection.
2	Press **Enter**.	The **STATUS** submenus will display.
3	Use the arrow keys to view submenu items.	
4	Choose an item on the submenu such as **ACTIVE ALARMS**.	The cursor will flash on the number next to the activated selection.
5	Press **Enter**.	The **ACTIVE ALARM LIST** will display.
6	View the **ALARM LIST**.	

STATUS		
	1) NETWORK (NI) PERFORMANCE REPORTS	
	2) NETWORK (NI) ERRORS	
	3) ACTIVE ALARMS	(ALARM LIST)
	4) VIEW HISTORY	END OF LIST
	5) PORT STATUS	
	6) REMOTE PORT	
	7) CLEAR PORT ALARM	
	8) ETHERNET STATUS	

Figure 3-2. Example of Basic Menu Travel

Edit the Data Field

You can edit data fields preceded by a colon (:). To edit a data field perform the following steps:

Step	Action	Result
1	Position the cursor on the submenu item number and press **Enter**.	The cursor moves to the data field (to the right of the submenu item name).
2	Using the space bar, scroll to scan the available value settings.	The value settings display one-at-a-time in the data field position.
3	When the desired value is displayed in the data field position, press **Enter** to set that value.	When the value is set, the cursor moves back to the submenu item position.
4	Select another submenu field or press **Escape** to return to the submenu.	This indicates the operation is complete.

Exit Any Menu Field Operation or Display

Press **Escape** as many times as required to return to the desired menu level.

Data Port Identification

When configuring the unit, menu selections will include options from data port submenus. Selecting data ports is necessary because the TDU 120e uses a Slot-Port method to identify the data port the menu item is referencing. If a module containing a PBX DSX-1 option card with an Nx56/64 plug-on interface is installed in the option slot, it would be designated as:

DSX-1 Passthru (1.1)
Where slot=1 and port=1.
The DSX-1 is located in the option slot and is the first port in that slot.

Nx56/64 (1.2)
Where slot=1 and port=2.

The Nx is located in the option slot and is the second port in that slot.

The ports that are built into the TDU 120e are referenced as Slot 0. The Nx/DBU is designated as 0.1 and the DS-1 is referenced as 0.2.

MENU STRUCTURE

Telnet/Terminal Main Menu

The TDU 120e uses a multilevel menu structure containing both menu items and data fields. All menu operations and data display in the terminal window.

The first menu displayed after the Telnet/terminal session is established is the **MAIN** menu. See Figure 3-3. The default Telnet/terminal password is ADTRAN.

```
ADTRAN - TDU 120e

Password: XXXXXX

Main Menu

1) Status

2) Config

3) Util

4) Test

5) Remote Menu Access

6) Management Config

7) Flash Download

8) Quit Session
```

Figure 3-3. Telnet/Terminal Main Menu

NOTE *Only one Telnet/terminal session may be active at a time.*

Menu Options

The opening menu is the access point to all other operations. Each **MAIN** menu item has several functions and submenus to identify and access specific parameters.

Status
Displays all relevant information for the network and DTE interfaces. For detailed information on status options, see *Chapter 4, Status Menu.*

Config (Configuration)
Displays and sets the TDU 120e operational configuration, including all network interface parameters, the allocation of the DS0s, and the port parameters. For detailed information on configuration options, see *Chapter 5, Configuration Menu.*

Util (Utilities)
Displays and sets system parameters. For detailed information on utility options, see *Chapter 6, Utility Menu.*

Test
Initiates different types of unit tests and displays test results in the terminal window. For detailed information on test options, see *Chapter 7, Test Menu.*

Remote Access Menu
Displays Telnet menus for a remote device. For detailed information, see *Chapter 8, Remote/Management Menus.*

Management Configuration
Displays management information. For detailed infor-
mation, see *Chapter 8, Remote/Management Menus.*

Flash Download
Allows you to manually perform a Flash download. For
detailed information, see *Chapter 8, Remote/Management
Menus.*

Quit Session
Terminates the Telnet/terminal session.

FRONT PANEL

The TDU 120e front panel monitors operation and con-
trols the configuration of the unit. The TDU 120e front
panel is shown in Figure 3-4.
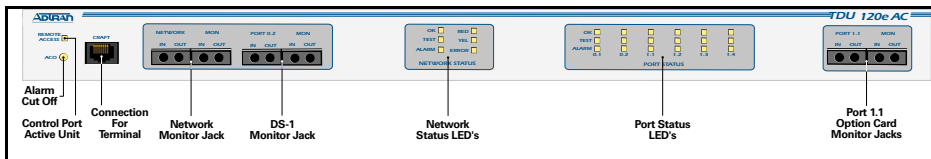
Figure 3-4. TDU 120e Front Panel Layout

The following pages contain descriptions of each part of
the front panel.

ACO Switch

The Alarm Cut-Off (ACO) switch deactivates the alarm relay after an alarm condition has occurred. If the alarm that activated the alarm relay is cleared, then reoccurs, the alarm relay will re-energize.

Remote LED

The remote LED (yellow) indicates a management session (terminal mode or Telnet) is active. The LED does not activate (turn on) during SNMP sessions.

Craft Port

The Craft Port is used as an RJ-45 port to connect the unit to a computer, a modem, or to another TDU/TSU multiplexor or a TSU 100.

Network Monitor Jack

This jack connects the unit to the network.

DS1 Monitor Jack

This jack connects the unit to a PBX or other terminal equipment.

LEDs

Network Status LEDs

The network status LEDs display the operational condition of the network interface located on the controller board in the unit.

LED Display	Color	Indicates that...
OK	**Green**	The operation is in the normal mode and no errors have been detected.
Test	**Yellow**	The network interface is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring on the network interface.
Error	**Red**	An error has occurred, such as a BPV, OOF, or CRC.
Alarm	**Red**	An alarm condition has been detected. Any alarm condition will activate the alarm relay for the external alarm device. When the alarm condition is no longer valid, the OK LED activates (turns on). To view an alarm condition, select the active alarm menu item.

NOTE *If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the* **UNIT HISTORY** *menu.*

Port Status LEDs

LED Display	Color	Indicates that...
OK	**Green**	The operation is in the normal mode and no errors have been detected.
Test	**Yellow**	One of the interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, also indicates that normal data flow is not occurring in at least one of the module ports.
Alarm	**Red**	An alarm condition has been detected. Any alarm condition will activate the alarm relay for the external alarm device. When the alarm condition is no longer valid, the OK LED activates (turns on). To view an alarm condition, select the active alarm menu item.

> **NOTE**
>
> *If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the **UNIT HISTORY** menu.*

Port 1.1 Option Card Monitor Jacks

These are used to connect option cards to the computer.

ALTERNATE METHODS OF CONTROL

T-Watch PRO (ADTRAN PC Program)

T-Watch PRO is the ADTRAN PC control program. It provides complete control over the configuration of the TDU 120e using a graphical interface. The T-Watch PRO program displays the same status and performance data as the terminal screen. This data is displayed in tables and graphs.

The T-Watch PRO program has the following capabilities:

- Interfaces with a modem which permits dialing into a remote TDU 120e location to configure the unit or read the status or performance of the unit.
- Receives traps from any TSU product.
- Records and creates display performance data over a 30-day period.
- Accesses units via the local area network (LAN).

Setting up the TDU 120e to Work over a LAN

To set up the TDU 120e to work with T-Watch PRO over the LAN, follow these steps:

Step	Action
1	Set the Unit ID using the Front Panel. See Unit ID on page 6-3 for details.
2	Set control port interface to Normal (10BaseT) or SLIP (chain-in port).
3	Configure the IP address, default gateway, and subnet mask.
4	Follow the installation instructions for T-Watch PRO to start the program and connect to the unit.

Setting up the TDU 120e to Work over an EIA-232 Connection

To set up the TDU 120e to work with T-Watch PRO over a direct EIA-232 connection, follow these steps:

Step	Action
1	Set the Unit ID and set a passcode. See page 6-3.
2	Set the control port rate to the same setting as the PC Com port.
3	Connect the PC Com port to the Chain-In port on the TDU 120e using the DB-25 adapter and modular cable provided.
4	Follow the installation instructions for T-Watch PRO to start the program and connect to the unit.

SNMP

The ADTRAN TDU 120e supports the Simple Network Management Protocol (SNMP) through the 10BaseT or chain in (SLIP) interface. See Appendix A, *Understanding SNMP*, for more information.

To use SNMP with the TDU 120e, follow these steps:

Step	Action
1	Set the control port to either Normal (10BaseT) or SLIP (Chain-in port).
2	Set the IP address, default gateway, and subnet mask through the front panel.
3	Load the appropriate MIB browser into the Network Management Station. The MIB browser issues SNMP and sets the TDU 120e. See the ADTRAN webpage at: **http://www.adtran.com**.

Chapter 4 — Status Menu

STATUS

The **STATUS** menu branch allows you to view the status of the TDU 120e operation. See Figure 4-1.

1)STATUS			
	1) NETWORK (NI) PERFORMANCE REPORTS	%AS / %EF / ES / SES / UAS	
	2) NETWORK (NI) ERRORS		NETWORK (NI)
	3) ACTIVE ALARMS		RED ALARM / LOSS OF SIGNAL / END OF LIST
	4)VIEW HISTORY	(HISTORY LIST) / END OF HISTORY	
	5) PORT STATUS	Nx/DBU (0.1)	1) DTE DATA CLOCK / 2) DTE STATUS / 3) DTE PORT RATE / 4) DBU DATA/CNTRL / 5) DBU CONTROL / 6) DBU STATUS
	6) REMOTE PORT	DS-1 (0.2) / (OPTION LIST)	DS-1 ERRORS
	7) CLEAR PORT ALARM		
	8) ETHERNET STATUS		

Figure 4-1. Status Menu Tree

Menu flow is depicted from left to right. At every level of the menu, pressing **ESCAPE** returns the system to the previous menu level. Press **ESCAPE** repeatedly to return the system to the main menu.

Network (NI) Performance Reports

The **NETWORK INTERFACE PERFORMANCE REPORTS** (see Figure 4-2) display the performance data. The TDU 120e maintains this performance data on the network in compliance with ANSI T1.403 and AT&T document TR54016. The data displayed is data accumulated over the last 15 minutes and over the last 24 hours.

Where	Means
%AS	Percentage of available seconds
%EF	Percentage of error free seconds
ES	Number of errored seconds (1 or more errors/second)
SES	Number of severely errored seconds (more than 320 errors/second)
UAS	Number of unavailable seconds (10 or more consecutive seconds)

Figure 4-2. Network Interface Performance Report

> **NOTE**
>
> *If insufficient time has passed to collect data, NA displays. Continue with standard operating procedures to exit the display.*

Network Interface (NI) Errors

The NI Errors submenu displays the types of errors the Network Interface (NI) detects. A blinking CSU error LED indicates that network errors are detected.

The asterisk (*) above an item indicates the type of errors detected. The error types are listed below:

CRC
CRC-6 bit errors based on the FDL. This is valid only in ESF mode.

BPV
Bipolar violations

XSO
Excess zeros

FER
Framing errors

Active Alarms

This menu item displays a list of current alarms reported by either the base controller or any of the ports. If no alarms are current, using this menu item displays **END OF LIST**.

This display (see Table 4-1 on page 4-4) includes two text fields. The left field is the alarm source. The right field is the alarm message. A list of alarm messages is found in *Appendix C, System Messages*.

If one or more of the Alarm LEDs are illuminated, an alarm is present. Press **Escape** to return to the previous menu item

Table 4-1. Alarm Message Display

Active Alarms
Network (Ni)
Red Alarm
Loss Of Signal
End Of List

View History

This menu item both displays and clears the accumulated status changes of the unit.

VIEW HISTORY displays a history of the last 20 status changes in the unit, including the date, time, and type of change. The unit also records for viewing the date and time an alarm became active and inactive, as well as the date and time of test activation and deactivation.

To clear the **VIEW HISTORY** display, press **C**.

Port Status

PORT STATUS displays the signals monitored on the data ports. For example, the Nx/DBU interface monitors the RTS, CTS, RD, and RD, along with other signal lines. When a port is selected, the terminal indicates if the signal is present.

The base Nx interface shows the status screen listed in this section. When using other option cards, refer to the appropriate separate manual for a definition of any status screens offered.

The **PORT STATUS** of Nx/DBU shows how to use this item.

Nx/DBU (0.1) Menu Items

DTE Data/Clock
An asterisk (*) indicates an active status of the following lines:

TXD
Transmit data from the DTE

RXD
Receive data toward the DTE

XSO
Excess zeros from the DTE

LCK
Lock status of the phase locked loop

DTE Status
An asterisk (*) indicates an active status of the following lines:

RTS
Request to send from DTE

CTS
Clear to send to DTE

DCD
Data carrier detect to DTE

DSR
Data set ready to DTE

DTE Port Rate
The **PORT RATE** displays the current setting of the Nx port. Continue with standard operating procedures to exit the display.

DBU Data/CNTRL

An asterisk (*) indicates an active status on the following lines:

TXD
Transmit data to the DCE

RXD
Receive data from the DCE

DCD
Data carrier detect from the DCE

RI
Ring indicate from the DCE

DBU Control

An asterisk (*) indicates an active status on the following lines:

RTS
Request to send the DCE

CTS
Clear to send from the DCE

DTR
Data terminal ready to the DCE

DSR
Data set ready from the DCE

DBU Status

DBU SECS
Total seconds in current DBU session

IN DBU
YES/NO indication of active DBU status

DS-1 (0.2) Menu Items (DS-1 Errors)

CRC
An asterisk displays under the CRC if there are CRC errors in extended superframe format (ESF) mode. If the DS-1 is configured for D4 Frame format, the terminal displays **N/A**.

BPV
An asterisk displays under the **BPV** if the DS-1 detects bipolar violations.

SLIP
An asterisk displays under the **SLIP** if the DS-1 detects frame slips. This is caused by multiple clock sources in the application.

FER
An asterisk displays under the FER if the DS-1 detects frame bit synchronization errors.

Remote Port

REMOTE PORT displays the status of activity on the Control In remote port. This is useful for troubleshooting communication sessions, and for verifying cabling.

RX
Characters received at remote port

ID
Unit ID received at remote port

CRC
Correct CRC received

PC
Correct passcode received

TX
Characters transmitted from the remote port

Clear Port Alarm

Clears the **LINK FAILED** alarms on option modules that have been removed from the TDU 120e chassis.

Ethernet Status

TX
Indicates that data is being transmitted from the 10BaseT port.

RX
Indicates that data is being received by the 10BaseT port.

LNK
Indicates the current status of the 10BaseT link integrity test (this should always be on when the unit is connected to a functional 10BaseT hub).

CPU
Active when the CPE is accessing the 10BaseT interface.

Chapter 5   # Configuration Menu

CONFIG

The **CONFIGURATION** menu sets the TDU 120e operational configuration, including all network interface parameters, the allocation of the DS0s, and the port parameters. See the TDU 120e Config Menu Tree on page 5-2.

Menu flow is depicted from left to right. At every level of the menu, pressing **Escape** returns the system to the previous menu level. Pressing **Escape** repeatedly returns the system to the **MAIN** menu.

	1) NETWORK (NI)	See Figure 5-2 on page 5-3.	
	2) UNIT	See Figure 5-3 on page 5-4.	
	3) MAP EXCHANGE	AUTO/ OFF	MAP A@00:00*
			MAP B@00:00*
	4) MAP IN USE	A/B	

TEMP MAP

DSO #	PORT	DSO#	PORT
1	IDLE	13	IDLE
2	IDLE	14	IDLE
3	IDLE	15	IDLE
4	IDLE	16	IDLE
5	IDLE	17	IDLE
6	IDLE	18	IDLE
7	IDLE	19	IDLE
8	IDLE	20	IDLE
9	IDLE	21	IDLE
10	IDLE	22	IDLE
11	IDLE	23	IDLE
12	IDLE	24	IDLE

CONFIG — 5) DS0 MAPS

1) COPY MAP A TO TEMP MAP
2) COPY MAP B TO TEMP MAP
3) CREATE TEMP MAP
4) CREATE AUTO MAP
5) REVIEW MAP A
6) REVIEW MAP B
7) REVIEW TEMP MAP
8) EDIT TEMP MAP
9) APPLY TEMP MAP TO MAP A
10) APPLY TEMP MAP TO MAP B

6) PORT CONFIG

CONFIG -- Select Port
1) PORT 1
2) PORT 2
3) PORT 3
N) EXIT
COMMAND:

7) EXIT

*Only available if map exchange set to Auto.

Figure 5-1. TDU 120e Config Menu Tree

	1) FORMAT	ESF/D4/SLC96
	2) CODE	B8ZS/AMI
	3) YELLOW ALARM	ENA/DISA
	4) TRANSMIT PRMS	ON/OFF
	5) TIMING MODE	NORMAL (CSU)
		INTERNAL/NETWORK (NI)
		BASE DTE/U-BR1TE (SLOT 1)
1) NETWORK		BASE DS-1/SECONDARY (SI)
	6) SET LINE BUILD OUT	0.0/ 7.5/ 15.0/ 22.5/ AUTO
	7) REMOTE LOOPBACK DET	ACCEPT ALL
		REJECT ATT
		REJECT FT1
		REJECT ATT & FT1
		REJECT ALL
	8) BIT STUFFING	ENABLE/ DISABLE
	9) TR-08 OPTIONS	1) ALARM REPORT [SEND ALARMS/DISABLE ALARM
		2) ALARM FORMAT [ORB-13/ORB-16
		3) BPV THRESHOLD [10-4/10-6/10-5]
		4) EXIT
	10) EXIT	

Figure 5-2.   Network (NI) Menu Tree

		1) CONTROL PORT RATE	38400 / 19200 / 9600 / 2400 / 1200
		2) TRAPS	ENABLE/DISABLE
		3) ACCESS	DIRECT/DIAL
		4) INIT. MODEM	NONE
			CUSTOM
			HAYES
			MOTOROLA
			USR COURIER
2) UNIT		5) CONTROL PORT:	NORMAL
		6) IP ADDRESS	000.000.000.000
		7) SUBNET ADDRESS:	000.000.000.000
		8) DEFAULT ROUTER:	000.000.000.000
		9) SLIP RATE:	38400 / 19200 / 9600 / 2400 / 1200
		10)SLIP FLOW CONTROL	NONE/HARDWARE
		11) PROXY TRAPS	ENABLE/DISABLE
		12) EXTERNAL ALARMS	ENA/DISA
		13) EXIT	

Figure 5-3.   Unit Menu Tree

NETWORK (NI)

This menu item accesses the configuration of parameters associated with the network interface in the base unit. There are nine submenu items that include setting the format, the line build out (LBO), and the timing mode. Submenu items do not include setting the parameters which may be necessary for a secondary interface (DS-1 Passthru, etc.).

Network (NI) Menu Items

FORMAT
Sets the frame format for the NI.
Choices: **D4, ESF, SLC96**.

NOTE *D4 is equivalent to superframe format (SF).*

CODE
Sets the line code for the NI.
Choices: **AMI** and **B8ZS**.

YELLOW ALARM
Enables and disables the transmitting of yellow alarms.
Choices: **ENABLED** and **DISABLED**.

TRANSMIT PRMS
Enables and disables the sending of PRM data on the facility data link (FDL). The PRM data continues to be collected even if Transmit PRMS are disabled (possible only with ESF Format).
Choices: **OFF** and **ON**.

TIMING MODE

Selects the clock source for transmission toward the net-work from the NI.

Choices: **NETWORK, BASE DTE, BASE DS-1, NORMAL (CSU)** (only with DSX-1 option card)**, U-BR1TE** (only with U-BR1TE option card)**, INTERNAL,** and **SECONDARY (SI)** (only with secondary port option card).

> **NOTE**
>
> *The selected clock option always designates the clock source for transmission. Clocking necessary for receiving data is always recovered from incoming data.*

Network Timed

The network is the source of timing. The received data clocking is looped back to the network, where it is used to determine the transmission timing. This option is also referred to as loop timed as the transmission clock is derived from the received clock. See Figure 5-4.
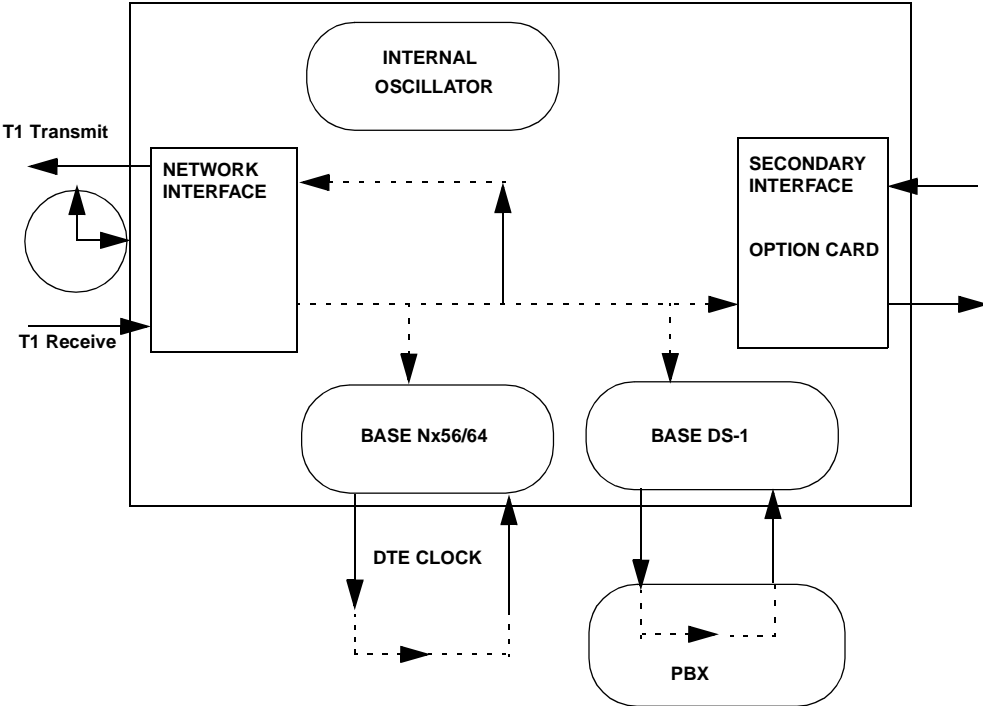
Figure 5-4. Network Timed Clock Source

Base DS-1

The PBX is the source of timing. The TDU 120e uses the clock derived by the Base DS-1 interface for transmission timing. See Figure 5-5.
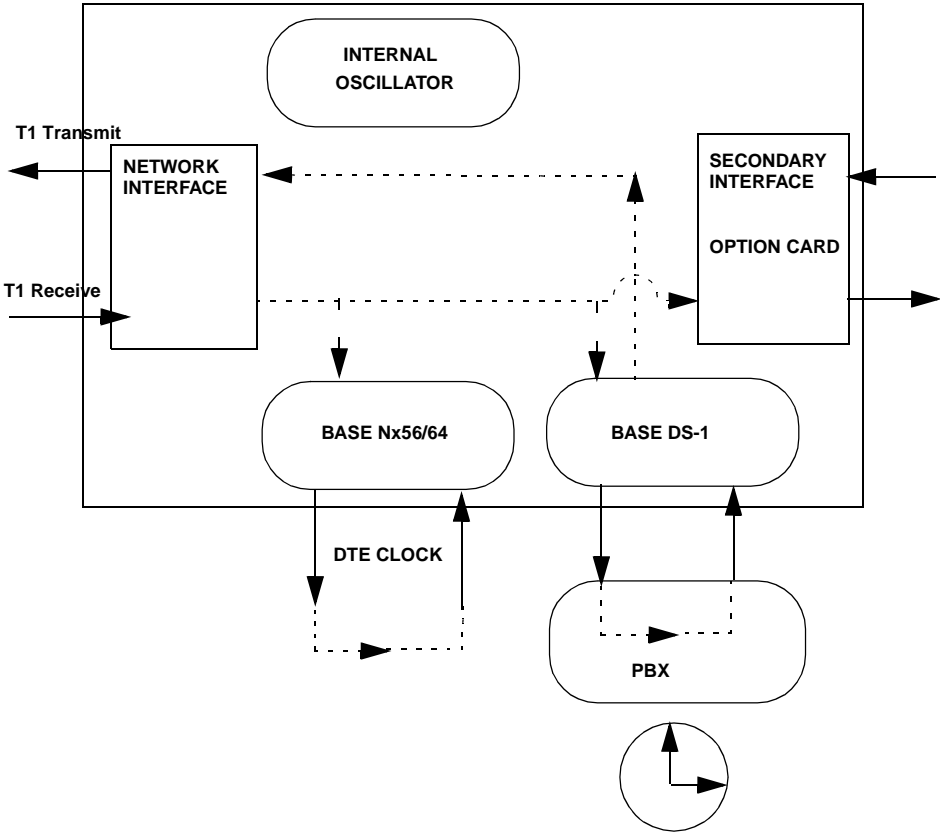
Figure 5-5. Base DS-1 Timed Clock Source

Base DTE Timing

The Base DTE is the source of timing. The TDU 120e uses the incoming DTE clock to determine the transmission timing. This is typically used in applications where it is necessary to have the DTE as the primary clock source (such as limited distance line drivers). See Figure 5-6.
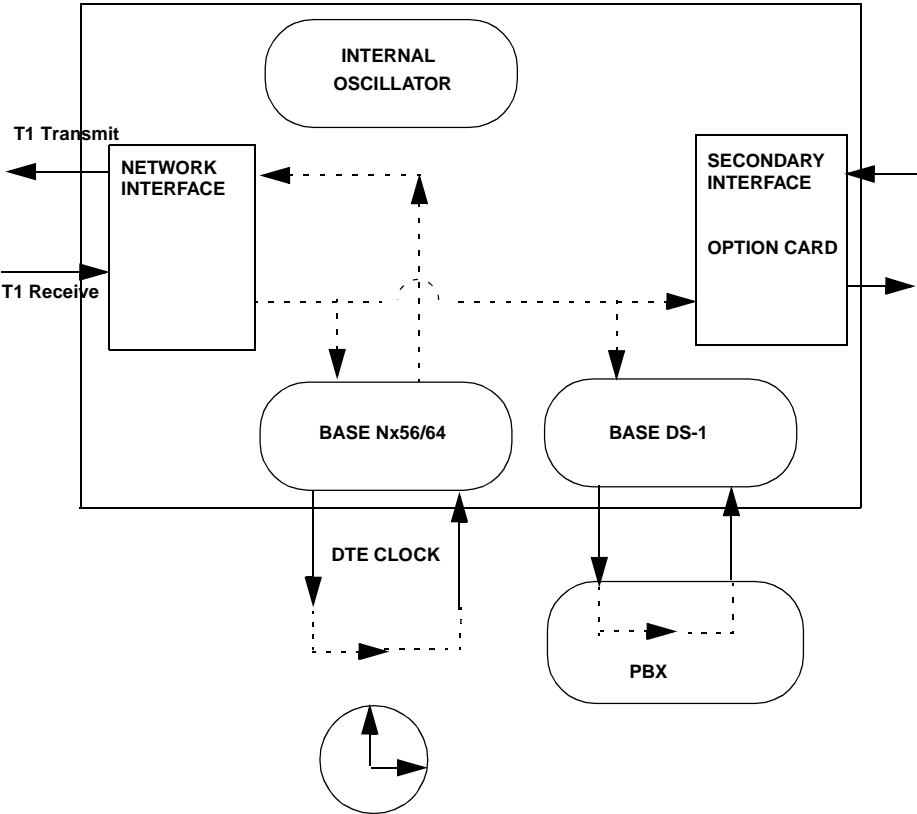
Figure 5-6. Base DTE Timed Clock Source

TDU 120e User Manual

Internal Timing

The TDU 120e is the source of timing. The TDU 120e is configured to use its own internal oscillator as the source of timing. Applications include private line driver circuits where one end is set to network and the other to internal. See Figure 5-7.
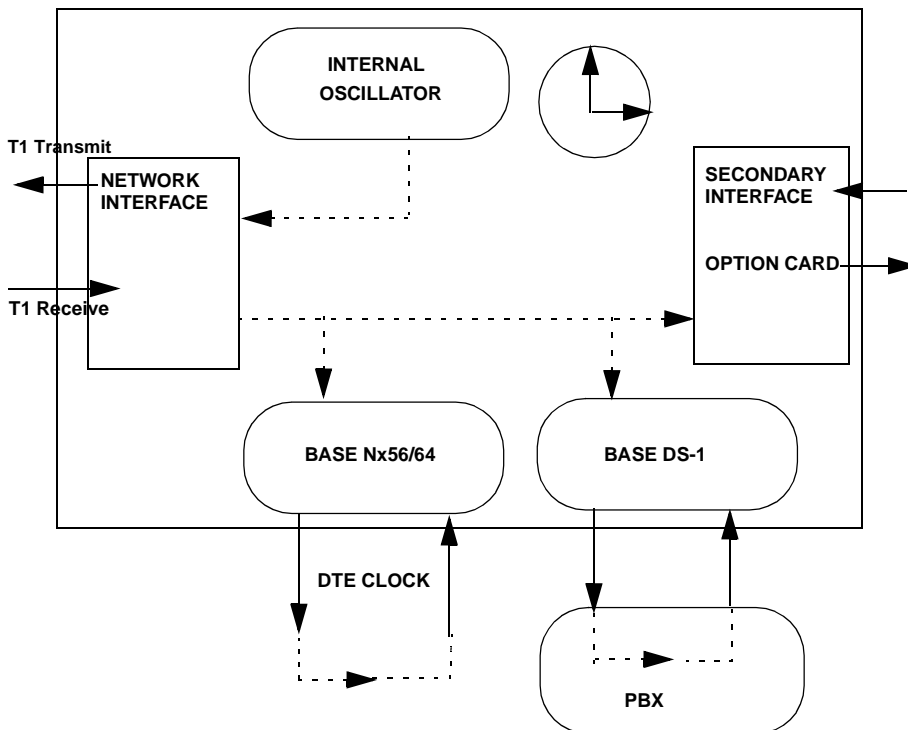
Figure 5-7. Internal Clock Source

Secondary Timing

The secondary interface is the source of timing. The TDU 120e uses the clock derived by the secondary interface for transmission timing. See Figure 5-8.
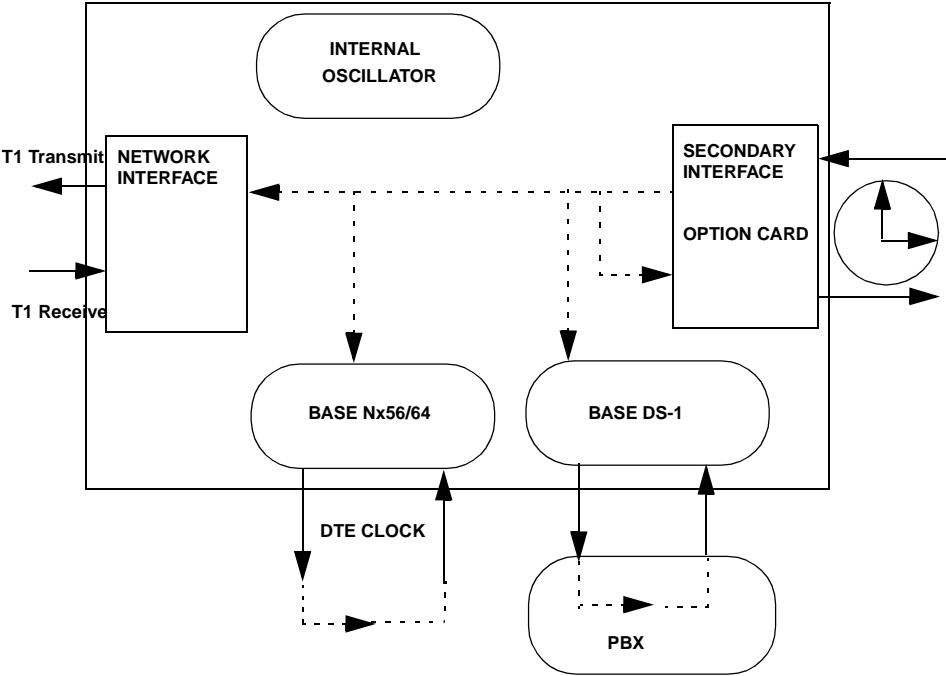
Figure 5-8. Secondary Clock Source

Normal (CSU) Timing

The typical timing option arrangement is shown in Figure 5-9. The PBX is looped timed sending data to the TDU 120e which is actually synchronous to the received data. The Network Interface (NI) is the actual source of all timings. This timing option is the same as that typically used for CSUs. It works equally well when the PBX is the source of timing. In that configuration the network would not be providing timing.
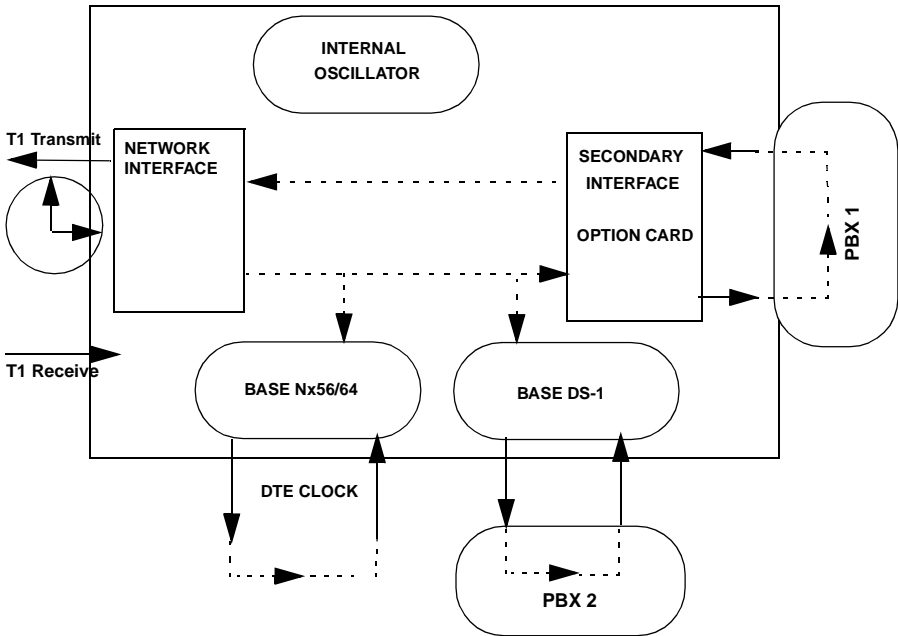
Figure 5-9. Normal (CSU)

The network interface and secondary interface clocking options are set by using the Network (NI) Configuration menu options.

U-BR1TE
The timing selection U-BR1TE works like **NORMAL** (CSU) except that timing is derived from the U interface on port 1.1.

Set Line Buildout
Selects the line buildout for the network interface. In AUTO mode, the TDU 120e sets the LBO based on the strength of the receive signal and displays the selected value.
Choices: **0.0 dB, 7.5 dB, 15 dB, 22 dB, and Auto**.

> **NOTE**
> *To activate the -36 dB receiver sensitivity, set the LBO to **AUTO**. This action is useful in a point-to-point application where no network elements are involved. If a network element such as a Smart Jack is installed on the circuit, the LBO should be set to **0 dB**.*

Remote Loopback Det
Sets unit to accept or reject the network interface loop-up and loop-down codes as defined in ANSI T1.403.
Choices: **ACCEPT ALL**, **REJECT ATT**, **REJECT FT1**, **REJECT ATT & FT1**, **REJECT ALL**.

Bit Stuffing
When enabled, bit stuffing causes the TDU 120e to monitor for ones (1s) density violations and insert a one (1) when needed to maintain 1s at 12.5%.
Choices: **ENABLE** or **DISABLE**.

TR-08 Options
The **TR-08** submenu configures the unit for TR-08 applications. The submenu items and their descriptions follow:

Alarm Report
Enables and disables the transmission of alarm reports.
Choices: **SEND ALARMS**, **DISABLE ALARMS**

Alarm Format
Sets the alarm format to 13 frames or 16 frames.
Choices: **ORB-13**, **ORB-16**

BPV Threshold
Sets the threshold for BPVs to trigger an alarm.
Choices: **10-4**, **10-5**, **10-6**

Exit
This selection will exit to the main configuration menu.

Unit Menu

The Unit menu changes the baud rate of the Control In port and the setup of the Dial Out port. The menu items are:

Control Port Rate
Sets the baud rate for communication with the PC or modem.
Choices: **1200**, **2400**, **9600**, **19200**, and **38400 KBPS**

Traps
Enables or disables the transmission of trap messages.
Choices: **ENABLE** and **DISABLE**

Access
Sets the method of connection from the TDU 120e to T-Watch PRO or SNMP.
Choices:
Direct: Used if connected directly to the PC.
Dial: Used when connection is through a modem. The dial string is entered from T-Watch PRO or SNMP.

Init Modem
Allows you to choose an industry standard or a custom initialization string for a modem connected to the control port.
Choices: **NONE, CUSTOM, HAYES, MOTOROLA,** and **USR COURIER**

Control Port
Selects the TCP/IP physical interface: Normal (10BaseT Ethernet) or SLIP using the RS-232 serial port.
Choices: **NORMAL** or **SLIP**

> **NOTE**
> *If the Control Port option is set to SLIP, the RS-232 port **cannot** be used as a terminal interface.*

IP Address
This is the IP address that uniquely identifies the TDU 120e on a TCP/IP network. This address is composed of four decimal numbers, each in the range of 0 to 255, separated by periods. This value is used for either the 10BaseT Ethernet or SLIP interface, depending on the control port setting.

Subnet Address
This defines which part of a destination IP address is the Network number. It is used along with the TDU 120e IP address to determine which nodes must be reached through the default IP Gateway. This value is set to 0.0.0.0 when the control port option is set to SLIP.

Default Router
All IP Packets destined for nodes not on the TDU 120e unit's local network are not forwarded through this IP address. Normally, this address defines a router connected to the TDU 120e unit's local network. This value is ignored when the control port option is set to SLIP.

SLIP Rate
This sets the baud rate for the Chain-In port when used as the SLIP connection for SNMP management.
Choices: **1200**, **2400**, **9600**, **19200**, **38400**

SLIP Flow Control
This is used to activate flow control on the Chain-In port when used as the SLIP interface. Hardware mode uses RTS and CTS.
Choices: **NONE**, **HARDWARE**

Proxy Traps
This determines whether or not traps are forwarded to the IP Interface from units being "proxied" for.
Choices: **ENABLE**, **DISABLE**

External Alarm
Sets unit to accept or reject external alarms attached to Pin 6 or Pin 7 of the Chain-In Port. A connection to ground indicates an alarm condition.
Choices: **ENABLE**, **DISABLE**

Exit
This selection will exit to the main configuration menu.

Map Exchange

The **MAP EXCHANGE** menu enables and sets the automatic time of day map switch. The unit provides selection of the hour, minute, and seconds for the map switching to take place. The menu items are:

OFF
Indicates the map in use does not change. The automatic map change feature is disabled.

AUTO
Indicates that the map in use will change at a user-selected time of day. The automatic map change feature is enabled.

When **AUTO** is selected, the unit displays the screens to set times for switching.

After editing Map A, press **Enter** to record the Map A settings and activate the selection fields for Map B. Use the same operation to edit switching time for Map B.

When ESF is used with an FDL channel between units, the units automatically coordinate the automatic map switch by sending a map switch command from end-to-end over the FDL. Only one end needs to be set to **AUTO** for this to work.

Map In Use

This menu item controls the DS0 map the TDU 120e uses and displays the map in current use.

DS0 Map A and DS0 Map B

The DS0 maps designate which DS0s are assigned to which port. The three maps are:

DS0 Map A
Default map.

DS0 Map B
Alternate map.

Temp
Temporary map used as a scratch pad.

DS0 Maps Configuration Menu

The DS0 maps configuration menu takes advantage of the 24-line VT-100 display. Upon entering this menu, the current Temp (temporary) map displays and is followed by nine selections that you can use for configuring and reviewing map information. See Figure 5-10.

```
                       TEMP MAP
DS0#    PORT                      DS0#    PORT
1       IDLE                      13      IDLE
2       IDLE                      14      IDLE
3       IDLE                      15      IDLE
4       IDLE                      16      IDLE
5       IDLE                      17      IDLE
6       IDLE                      18      IDLE
7       IDLE                      19      IDLE
8       IDLE                      20      IDLE
9       IDLE                      21      IDLE
10      IDLE                      22      IDLE
11      IDLE                      23      IDLE
12      IDLE                      24      IDLE
1) COPY MAP A TO TEMP MAP
2) COPY MAP B TO TEMP MAP
3) CREATE TEMP MAP
4) REVIEW MAP A
5) REVIEW MAP B
6) REVIEW TEMP MAP
7) EDIT TEMP MAP
8) APPLY TEMP MAP TO MAP A
9) APPLY TEMP MAP TO MAP B
```

Figure 5-10. DS0 Temp Map

You can use the **up and down arrows** or **number keys** to move the cursor from one selection to another. Press **Enter** to perform the action displayed to the right of the cursor.

Creating a DSO Map

To configure a DS0 Map, perform the following steps:

Step	Explanation
1	Initialize the **TEMP** Map to one of three configurations (current Map A, current Map B, or all IDLE). This step is optional.
2	Edit the Temp Map so that it reflects the desired map configuration.
3	Replace the current DS0 Map A or B configuration with the Temp map configuration.

Initializing the Temp Map

Upon entering the DS0 maps **CONFIGURATION** menu, the Temp map reflects its last configured state.

If you want to...	Enter selections...
Initialize the Temp map from its current configuration to one which reflects the currently stored Map A or B configurations, respectively.	**1 - 2**
Initialize the Temp map to an all IDLE state.	**3**

Editing the Temp Map

If further changes to the **TEMP** map are needed, do the following:

Step	Action	Explanation
1	Use selection 7 to enter the Temp map edit mode.	Upon entering this mode, the cursor location moves to DS0 number one in the DS0 field of the Temp map.
2	Move the cursor from one DS0 to another by using the up and down arrows	Locate the DS0 number whose assigned port needs to be changed.
3	Press **Enter.**	The cursor will move into the **PORT** field.
4	Use the **up** and **down arrows** to scroll through the possible port selections.	To restore the previous port assignment and return to the DS0 field, press **ESC**.
5	To save the current selected port and return to the DS0 field, press **Enter**.	
6	When the cursor is again located in the Temp map DS0 field, press **Esc**.	This causes the cursor to return to selection 1 below the Temp map display.

Applying the Temp Map

Once the Temp map reflects the desired configuration, use selections 8 or 9 to apply this configuration to Map A or B, respectively.

Copying Map

To copy Map A to Map B, copy Map A to the Temp map and then apply the Temp map to Map B. See Figure 5-11.
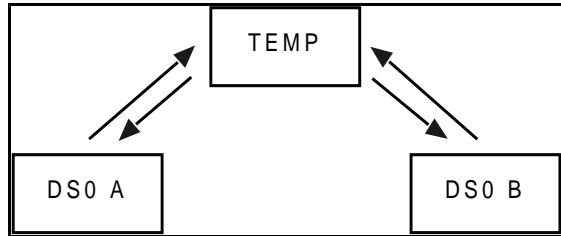
Figure 5-11. DS0 Map Designations

Reviewing Maps
Selections 4 through 6 give a summary of the number of ports assigned to Map A, Map B, and the Temp map, respectively. The menu items and their descriptions follow:

Copy Map A (B) to Temp Map
Copies the current map A (B) into a TEMP map area.

This permits modification without disturbing the existing map. When the modifications are completed, the TEMP map is written to current MAP A (B) by selecting **APPLY TEMP MAP TO MAP A (B)**.

Create Temp Map
Creates a map by defining a port or Idle for all DS0s. When **CREATE TEMP MAP** is first selected, all DS0s are set to Idle.

Possible port selections include **IDLE**, **TST**, **+** option module ports.

TST designates which DS0s are used for QRSS testing when activated under the **TEST** menu.

When not used for testing, the **TST** designation is identical to **IDLE**.

NOTE

Selecting **APPLY TEMP MAP TO MAP A (B)** *will not disrupt the operation of unmodified ports.*

Review Map A (B)
Permits a quick review of the number of DS0s assigned to each port and the number of unassigned DS0s (**IDLE** or **TST**) as defined in the currently applied Map A (B).

Review Temp Map
This menu item is operated the same as **REVIEW MAP A (B)**.

Edit Temp Map
The map in the TEMP file can be edited to whatever configuration is desired. If Map A had been copied into the TEMP file, then after editing, the TEMP file could be applied to MAP A or MAP B.

Apply Temp to Map A (B)
Writes the TEMP map into Map A (B). Apply is usually the last step in updating a map.

Port Configuration (Port Config)

PORT CONFIGURATION selects and configures the parameters associated with any data port in the unit. For example, parameters for the DS-1 (PBX) interface are set through this menu. The items that can be set depend on which option module is installed. The list of option ports will vary with the configuration.

The TDU 120e is designed so that any additional ports developed in the future will contain the appropriate menu selections to provide access by using this menu item.

The **CONFIG** menus for options ports are described in separate sections of the manual supplied with the option card.

Nx/DBU (0.1) Menu Items

The Nx/DBU port has two main menus: **Nx56/64 CONFIG** -- Nx operation and **DBU CONFIG** -- DBU operation.

Nx56/64 Config

Under **Nx56/64 CONFIG**, the menu items are:

DS0 RATE

This sets the base DS0 rate of the interface. The actual data rate depends on the number of DS0s assigned to the Nx port.
Choices: **56K OR 64K**

TX CLK CNTRL

Controls the clock used by the TDU 120e to accept transmit (TX) data from the DTE. The default is **NORMAL**. If the interface cable is long, causing a phase shift in the data, the clock can be selected as **INVERT**. This switches the phase of the clock which should compensate for a long cable.
Choices: **NORMAL, INVERT**

DATA

Used to control the inverting of the DTE data. This inversion can be useful when operating with an HDLC protocol. Often used as a means to ensure 1s density.
Choices: **NORMAL** or **INVERT**

NOTE

*If **INVERT** is selected, zero (0) inhibit should also be selected to prevent an open DTE input from placing zeros on the network.*

CTS

Used to control characteristics of CTS.
Choices: **NORMAL**, (see Table 5-1 on page 5-25) or
FORCE ON

DCD

Data Carrier Detect. Indicates to the DTE when a
valid signal is being received at the Network Inter-
face.
Choices: **NORMAL** (see Table 5-1 on page 5-25) or
FORCE ON

DSR

Data Set Ready. This signal indicates to the DTE
when the DCE is turned on and ready for operations.
Choices: **NORMAL** (see Table 5-1 on page 5-25) or
FORCE ON

"0" INHIB

The Nx interface will detect an uninterrupted string
of zeros (0s) being transmitted toward the network.
If 0s are transmitted for more than 1 second, the TDU
120e will force 1s.
Choices: **ON** or **OFF**

INBAND MODE

The Nx56/64 port is capable of providing an inband
communications channel (for T-Watch PRO and
SNMP) between units. This is accomplished by using
8 kbps of the first DS0 assigned to that particular
Nx56/64 port. If in 56K mode, no data bandwidth
will be used. Inband must also be enabled at the des-
tination port.
Choices: **ON** or **OFF, ON DEMAND**

TX CLK SOURCE

Controls the source of the clock used by the TDU
120e to accept transmit data from the DTE. The
default option is **INTERNAL**.

If the application requires that the DTE device pro-
vide the clock with the transmit data, the External
setting is used.
Choices: **INTERNAL, EXTERNAL**

Table 5-1. Normal Mode of Operation

RTS	V.54 Loopback	511 TST ON	Self Test Active	Netwk Test Active	No DS0 Mapped	Network Alarm
CTS	Follows	OFF	OFF	OFF	OFF	OFF
DCD	—	—	OFF	—	OFF	OFF
DSR	—	OFF	OFF	OFF	OFF	—
Where "—" = don't care						
Force On = On under all conditions						

> **NOTE**
>
> *This table indicates conditions which cause the* **PORT CONTROL SIGNALS** *to be deactivated.*

Dial Backup Config

Under **DBU CONFIG**, the menu items are:

Backup Mode

In a backup condition, both ends of the circuit must detect backup conditions before backup is activated. One DBU is set to **ORIGINATE** and the other to **ANSWER**. Upon a network failure, only the Originate DBU initiates backup by dialing the **ANSWER END**. Once called, the **ANSWER DBU** goes into backup mode only if a backup condition is detected. This is ideal for controlling where calls originate.
Choices: **DISABLE**, **ORIGINATE**, **ANSWER**

Backup On

Selects the conditions that cause the Nx/DBU to initiate Backup.

NET FAIL

Backup occurs on **RED ALARM**, **YELLOW ALARM**, **BLUE ALARM** and **LOS**.

NET/DATA FAIL

Backup occurs on the same conditions as **NET FAIL** plus loss of data transitions on the data the Nx56/64 receives from the network.

Pattern Verify

Selects whether or not the DBU will use its pattern generator and receiver to authenticate backup attempts. When the local and remote units are both Nx/DBUs, set to **ENABLE**; otherwise set to **DISABLE**. Choices: **ENABLE**, **DISABLE**

Backup Delay

Selects the time allowed to elapse between the network going into alarm or no data transmissions and the backup beginning.
Choices: **1 SEC, 3 SEC, 10 SEC, 30 SEC, 1 MIN, 5 MIN, 10 MIN**

Restore Delay

Selects the time that elapses between the network going out of alarm or data being received and the backup call being taken down. If **NEVER** is selected, the user must deactivate the backup mode.
Choices: **1 SEC, 3 SEC, 10 SEC, 30 SEC, 1 MIN, 5 MIN, 10 MIN, NEVER**

Retry Delay

Selects the time between redialing the external DCE after failed dial attempts.
Choices: **10 SEC, 30 SEC, 1 MIN, 5 MIN, 10 MIN**

Num Retries

Selects the number of times the DBU will attempt to redial if unable to connect.
Choices: **NONE**, **UNLIMITED**, **3 TIMES**, **10 TIMES**.

Backup Testing

Selects the options for the automatic ISDN verification feature of the Nx/DBU. Verification of the backup circuit does not disrupt data on the T1.

Backup Test: Selects the frequency of automatic backup circuit verification by the DBU.
Choices: **MANUAL**, **HOURLY, DAILY**, **WEEKLY**

Test Hour: Selects the hour of the day the Backup test will occur.
Choices: **0 - 23**

Test Day: If weekly Backup test is selected, selects which day to perform the test.
Choices: **MONDAY - SUNDAY**

WKEND Lockout

If no backup is desired from midnight Friday to midnight Sunday, set this selection on **ON**; otherwise set to **OFF**.
Choices: **ON**, **OFF**

Enable HR: The hour backup will be enabled. Enter from the numeric keyboard.
Choices: **0-23**

Disable HR: The hour that the backup will be disabled. Enter from the numeric keyboard.
Choices: **0-23**

> **NOTE**
>
> *For these items to function properly, verify that the time and date in the TDU are set correctly. See page 6-2 for instructions on setting date and time.*

Trap in DBU:
If traps are enabled (see **UNIT CONFIGURATION**), this parameter will send either a single trap upon going into a DBU session or send repeated traps for the duration of the DBU session.
Choices: **SINGLE**, **REPEATED**

DS-1 (0.2) Menu Items

Format
Format sets the frame format for the base DS-1 interface.
Choices: **D4, ESF**

Code
CODE sets the line code for the base DS-1 interface.
Choices: **AMI, B8ZS**

Yellow Alarm
YELLOW ALARM enables and disables the transmitting of yellow alarms.
Choices: **ENABLE**, **DISABLE**

Line Length (ft)
LINE LENGTH provides selection of the proper output level for the base DS-1 based on the length of the interface cable.

Choices:
SHORT HAUL INTERFACES (ft) - 1-133, 133-266, 266-399, 399-533, 533-655

LONG-HAUL INTERFACES - 0dB -7dB, -15dB, -22dB, auto

Inband Loopback
(**INBAND LPBACK**)
IN-BAND LOOPBACK sets the base DS-1 to accept or reject in-band loopup or loopdown codes (per ANSI T1.403 specification) which may be sent to the card over the DS-1 interface. This loopback is a line loopback.
Choices: **ACCEPT, REJECT**

Robbed Bit Signaling
This menu option is used to enable/disable robbed-bit signaling.

Whenever the base DS-1 interface is connected to terminal equipment (e.g., PBX/SW56) for voice or dialed data services, this option should be enabled.

Exception: When the terminal equipment is using a form of common channel signaling (e.g., PRI).

For applications requiring robbed-bit signalling as well as a messaging channel (e.g., some proprietary PBX channels), the **ON: ENA BLOCK** selection is provided. Choices: **OFF, ON: ALL DSOs, ON: ENA BLOCK**

RBS Start
When Robbed Bit Signaling option is set to **ON: ENA BLOCK**, this item defines the first DS0 to extract signaling from.

RBS End
When the Robbed Bit Signaling option is set to **ON: ENA BLOCK**, this item defines the last DS0 to extract signaling from.
Example: RBS Start and RBS End together define a block of DS0s for Robbed Bit Signaling.

Chapter 6   Utility Menu

UTIL

The **UTILITY** menu displays and sets system parameters. See Figure 6-1. This includes setting the time and date, re-setting all parameters to factory values, or reinitiating the unit. This menu also displays the unit software revision and the unit ID setting.
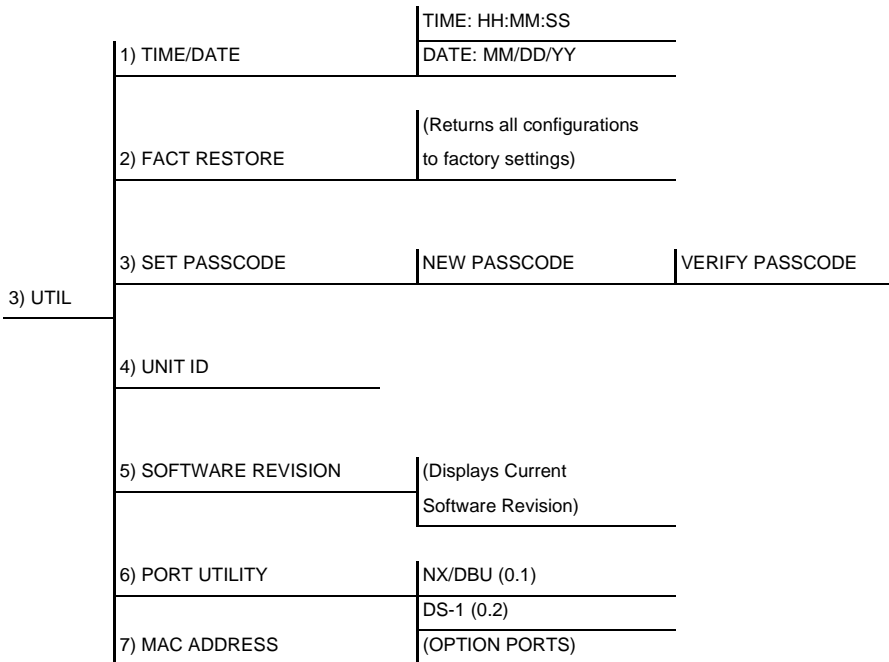
Figure 6-1. Utility Menu Tree

Menu flow is depicted from left to right. At every level of the menu, press **Escape** to return the system to the previous menu level. Pressing **Escape** repeatedly returns the system to the **Main** menu.

Time/Date

This menu option displays or edits the current time and date. The TDU 120e maintains the time and date during power-off conditions.

If you want to...	Do this...
Record a numeric change	Press **Enter** (this records the entry and moves to the next editing position)
Move to a different field to edit	Press **Enter** at the editing position without making any changes, or use the **up** and **down arrow keys**.
End the editing process	Press **Escape.**

Factory Restore

There are two ways to execute a factory restore -- through the menus and by holding the ACO button down during power-up. The factory restore menu item restores the factory default settings for all unit parameters, including configured DS0 maps. The **CONTROL PORT RATE**, **PASS-CODE**, **UNIT ID**, and **IP PARAMETERS** are not affected by the **FACTORY RESTORE** command.

A factory reinitialization can also be executed by holding the ACO button down during power-up. All factory options including control port rate, Pass code, Unit ID, and IP parameters are restored to factory settings with this procedure. During a factory reinitialization, the Remote LED will turn on. The Remote LED will turn off after the factory reinitialization is complete. The ACO button may be released at this time.

Set Passcode

Change/Set a Passcode
The passcode can be changed or set at any time or eliminated altogether through the Utility menu item **SET PASSCODE**.

The passcode can be numeric only. After entering the desired passcode, press **Enter**.

Set a null passcode at the **SET PASSCODE** menu by pressing **Enter** without any numbers. This sets a null passcode and grants unlimited access.

Lost Passcode
If the passcode number is lost, contact ADTRAN Technical Support for assistance (see page xi of this manual).

No Passcode Desired
At the **NEW PASSCODE** prompt (in the Set Passcode menu), press **Enter** without any numerical entry. The system nullifies the need to enter a password for subsequent use and proceeds to the Unit ID prompt.

NOTE

If the unit is to be remotely accessed using T-Watch PRO, a passcode must be entered. When managing a number of units, the passcode can be the same for all.

Unit ID

This menu is used to access the current **UNIT ID** setting. Viewing is available in limited access mode. Editing or changing the **UNIT ID** requires the use of a password as in editing mode. Unit Identification numbers must be between **2** and **999**. If an out-of-range number is entered, the unit assumes the upper limit number of 999.

To Set the Unit Identification

In the **UNIT ID** menu under the **UTIL** menu, enter any value between **2** and **999**. The number **1** is reserved for the PC.

Pressing **Enter** records the Unit ID number and establishes its availability for operation by remote control. The unit proceeds to the **SET CONTROL PORT** prompt.

No Unit ID Desired

Without entering any numbers at the Unit ID prompt, press **Enter.** Pressing **Enter** with no Unit ID recorded establishes the unit as not able to be operated by remote control.

Software Revision

This menu provides access to the display of the current software revision level loaded into the base unit controller. This information is required when requesting assistance from ADTRAN Technical Support or when updates are needed. Press **Escape** to exit.

Port Utility

This menu provides access to the display of the current software information for each port installed in the unit. This information is required when requesting assistance from ADTRAN Technical Support or when updates are needed.
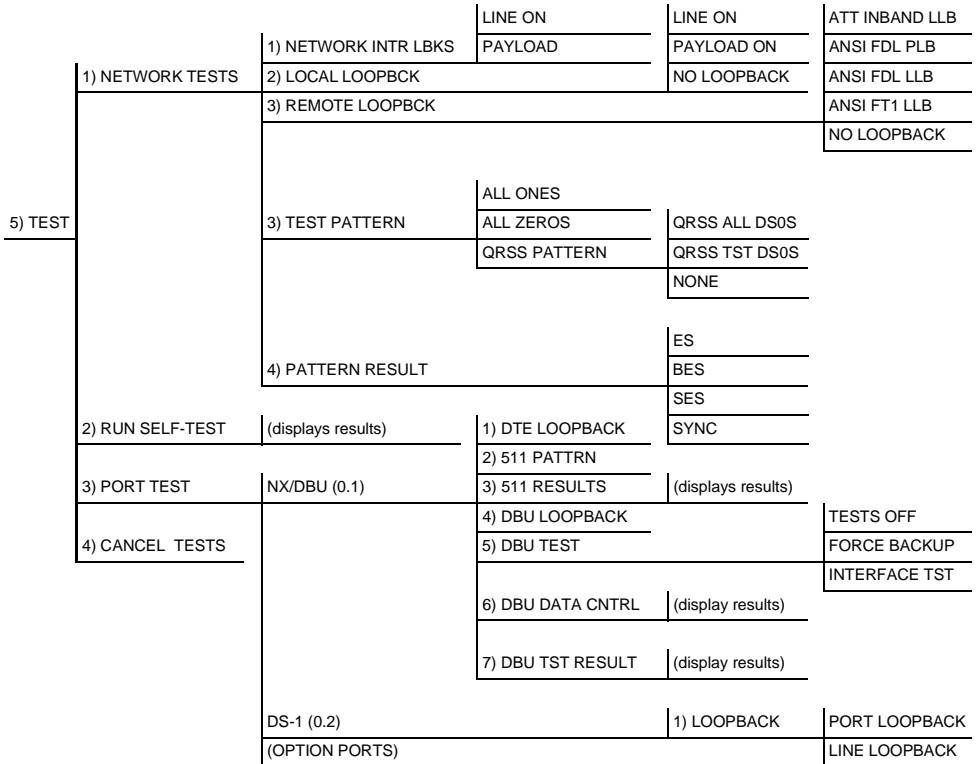
MAC Address

Displays the Ethernet Mac address for the 10BaseT port.

Test Menu

TEST

The **TEST** menu initiates different types of unit tests and displays test results. The **TEST** menu contains four items. See Figure 7-1.

5) TEST				
	1) NETWORK TESTS	1) NETWORK INTR LBKS	LINE ON	LINE ON
			PAYLOAD	PAYLOAD ON
		2) LOCAL LOOPBCK		NO LOOPBACK
		3) REMOTE LOOPBCK		
				ATT INBAND LLB
				ANSI FDL PLB
				ANSI FDL LLB
				ANSI FT1 LLB
				NO LOOPBACK
		3) TEST PATTERN	ALL ONES	
			ALL ZEROS	QRSS ALL DS0S
			QRSS PATTERN	QRSS TST DS0S
				NONE
		4) PATTERN RESULT		ES
				BES
				SES
	2) RUN SELF-TEST	(displays results)	1) DTE LOOPBACK	SYNC
			2) 511 PATTRN	
	3) PORT TEST	NX/DBU (0.1)	3) 511 RESULTS	(displays results)
			4) DBU LOOPBACK	TESTS OFF
	4) CANCEL TESTS		5) DBU TEST	FORCE BACKUP
				INTERFACE TST
			6) DBU DATA CNTRL	(display results)
			7) DBU TST RESULT	(display results)
		DS-1 (0.2)	1) LOOPBACK	PORT LOOPBACK
		(OPTION PORTS)		LINE LOOPBACK

Figure 7-1. Test Menu Tree

> **NOTE** *Executing tests will disrupt some of the normal operation. See individual menu items concerning tests before executing.*

Menu flow is depicted from left to right. At every level of the menu, pressing **Escape** returns the system to the previous menu level. Pressing **Escape** repeatedly returns the system to the **MAIN** menu.

Network Tests

Network tests control the activation of loopbacks and the initiation of data test patterns.

Network tests are run on the Network Interface (NI). You can select three different test configurations to determine the type of loopback and the pattern to run. Test results display in the LCD window.

> **NOTE** *Executing Network Tests will disrupt normal data flow unless only TST DS0s are selected for testing.*

Loopback Tests

A number of different loopbacks can be invoked locally from the front panel, by T-Watch PRO commands, or remotely by using special in-band codes (AT&T D4 network loop-up and loop-down codes). Additionally, the loopbacks can be remotely controlled by means of out-of-band commands by the T1 ESF FDL or from T-Watch PRO by a modem connection.

Network Interface Loopbacks

Network interface loopbacks affect the entire T1 data stream. See Figure 7-2. The two types of network loopbacks are:

Line
Loops all of the received data back toward the network. The transmitted data is the identical line code that was received, including any bipolar violations or framing errors.

Payload
Similar to line loopback, except that the framing is extracted from the received data and then regenerated for the transmitted data.
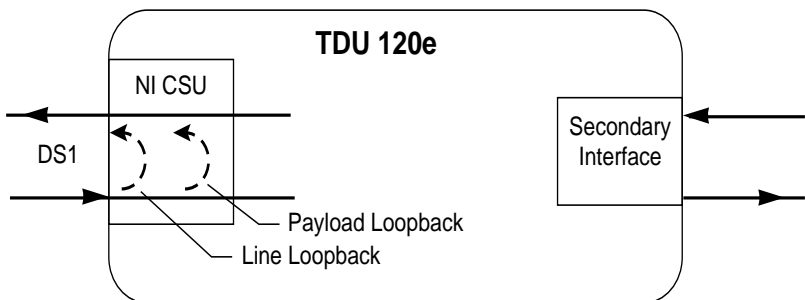
Figure 7-2. Network Loopback Tests

Local Loopback

There are three available choices for setting the local loopback:

Line On
Activates the line loopback.

Payload On
Activates the payload loopback.

No Loopback
Deactivates the loopback. Scroll to select a setting and press **Enter** to record the setting.

Remote Loopback

Activates the same loopbacks as **LOCAL LOOPBACK**, but at the far end.

Uses either the inband loopup code as specified by ANSI T1.403 for line loopback (ATT In-Band LLB), or the FDL as specified in ANSI T1.403 for payload and line loopback codes.

 The following options are available:

ATT In-Band LLB
Activates the line loopback using inband code.

ANSI FDL PLB
Initiates the transmission of an FDL payload loopup code toward the far end.

ANSI FDL LLB
Initiates the transmission of an FDL line loopup code toward the far end.

ANSI FT1 LLB
Initiates the transmission of an FT1 loopback using the inband code described in T1.403.

No Loopback
Deactivates the loopback.

NOTE   *Remote Loopback can only be used with Fractional T1 if the ANSI FT1 LLB is selected.*

After a **REMOTE LOOPBACK** option is selected, the TDU 120e verifies that the far end is actually in a loopback by checking for the receipt of a code looped back from the far end.

Once the **REMOTE LOOPBACK** type is selected, the terminal displays the loopback progress by displaying **LOOPING** until loopback is verified.

Test Patterns

All Ones
Sends an all ones pattern to the network.

All Zeros
Sends an all zeros pattern to the network.

QRSS Pattern
The QRSS pattern is commonly used to simulate real data in T1 interfaces. This pattern can be assigned to appear in all DS0s or only in **TST DS0s**. When QRSS is set in all DS0s and one of the network loopbacks previously described is activated at the far end, a total end-to-end integrity check can be run without the need for any external test equipment.

When QRSS is assigned to **TST DS0s**, an integrity check of the link can be run along with normal data flow. The **TST DS0s** are user assigned as part of the DS0 Map.

This sets the pattern for the test and initiates the transmission of the pattern. The test is terminated by selecting **NONE**.

The following patterns are available:

QRSS All DS0s
Generates a QRSS test pattern and inserts the pattern into all DS0s.

QRSS TST DS0s
Inserts a QRSS pattern in those DS0s mapped as TST in the currently active map (A or B).

None
Terminates pattern generation.

NOTE   *QRSS always runs at 64K/DS0.*

Instructions for Generating a QRSS Test Pattern

Step	Action
1	Select **QRSS ALL DS0s**.
2	Press **Enter** to record the selection. The TDU 120e starts to generate a QRSS test pattern and inserts the pattern into all DS0s.
3	To end the test, select **None**.

Pattern Result

Displays the results of the test currently active. Leaving and returning to this menu item does not interrupt the test.

Pressing **2** injects errors into the test pattern. These errors are detected by the device performing the pattern check.

ES
The number of seconds with at least 1 bit error.

BES
The number of seconds with more than 1 bit error and less than 320.

SES
The number of seconds with more than 320 bit errors.

*SYNC
Indicates if pattern sync is (**YES**) or is not (**NO**) valid. The asterisk (*****) indicates if pattern sync has been lost since the start of testing.

Clear results by pressing **C**. The results are accumulated until the test pattern is set to **NONE** or **CLEARED**.

Using TST DS0s for testing can be very useful, particularly in Fractional T1 applications.

How to Run an End-to-End Test on Fractional DS0s

Step	Action
1	Set the TST for Map B in the same DS0 as used by Map A to receive data from an Nx56/64 port.
2	Loop the far end using a V.54 loopback code on the Nx56/64 port.

NOTE	*A single DS0 can be used for continuous testing while other DS0s are passing normal data. This will also provide an end-to-end check on the entire link. Set each end to send QRSS in TST DS0s (using 1 DS0) and occasionally view the results on the Pattern Result menu selection.*

Run Self-Test

The self-test checks the integrity of the internal operation of the electronic components by performing memory tests and by sending and verifying data test patterns through all internal interfaces. Although actual user data cannot be passed during these tests, the self- test can be run with the network and DTE interfaces in place and will not disturb any external interface.

The memory portion of the self-test automatically executes upon power-up.

A full self-test can be commanded from terminal/telnet menu or from T-Watch PRO.

In addition to the specified self-tests, background tests are also run on various parts of the internal electronics. These run during normal operation to confirm continued correct functioning.

This menu selection is used to execute a full internal self-test. The results of the self-tests are displayed on the terminal. Upon invoking the command, the terminal displays System Self-Test and the Test LEDs are illuminated. Test failures are displayed on the terminal.

The self-test consists of the following:

Test Name	What it does...
Board level tests	Each of the TDU 120e boards contains an on-board processor which executes the following series of tests checking the circuitry on the board: • RAM tests; EPROM checksum • DS0 map tests • On-board data path (sending a known test pattern through an on-board loop)
Unit level tests	Unit level tests consist of: • Front panel LED verification • Phase Lock Loop verification • Board-to-board interface test

A test pattern is sent from the controller through a loop-back on all other boards and is checked on the controller. This verifies the data path, clocks, and control signals.

If a failure is detected, note the failure number prior to contacting ADTRAN Technical Support (see page xi of this manual).

NOTE   *The execution of the self-test will disrupt normal data flow and prevent remote communication until the self-test is completed.*

Port Tests

The **PORT TESTS** menu is used to activate testing of specific data ports. It controls the activation of loopbacks and the initiation of data test patterns. Test results are displayed on the terminal screen.

NOTE   *The execution of Port Tests will disrupt normal data flow in the port being tested.*

Nx/DBU (0.1) Menu Items

Nx/DBU (0.1) is the base Nx interface. It offers the following test functions:

DTE LOOPBACK
This initiates a loopback. The following options are available:

REMOTE
The remote loopback causes a V.54 code to be sent to the far end.

The Nx at the far end activates a PORT/LOCAL loopback upon detection of the V.54 code.

OFF
The loop is deactivated.

REM V.54 Cont.
The remote loopback causes a continuous V.54 code to be sent to the far end. The Nx at the far end activates a PORT/LOCAL loopback upon detection of the V.54 code.

> **NOTE**
>
> *The TDU 120e checks the remote loopback activation by detecting a proper response from the remote end. While waiting for the response, the display shows Looping. If successful, the display changes to Looped-Up. If unsuccessful, the display shows Failed.*

511 PATTRN
Activates the generation of the 511 test pattern.

ON
The pattern check circuitry is enabled and a test started. The test is ended by selecting OFF.

OFF
The pattern generation and check is disabled.

511 RESULTS
Displays the results of the 511 test indicated in the 511 option. The results are in the form of the number of errored seconds. The error count can be cleared by pressing **C**.

DBU LOOPBACK

ON
Initiates a loopback from the DBU towards the external DCE.

OFF
Terminates the loopback test.

DBU TEST
This selection is used to force a backup to occur even if a backup condition does not exist.

TEST OFF
Turns off DBU tests.

FORCE BACKUP
Forces a backup regardless of time-of-day lockouts or network conditions.

INTERFACE TST
Causes the external DCE to dial its stored number. After the connection is established, the DBU sends a test pattern to verify the backup network. This test does not disrupt data or the primary network.

DBU DATA/CNTRL
Allows status of DCD and RI to be monitored while the **INTERFACE TST** is on. If the dial up network is correctly configured and dialed up, there should be an asterisk (*) over DCD.

DBU TST RESULT
When an interface test is active, this screen will show the total number of DATA blocks received and the number of blocks with errors.

DS-1 (0.2) Menu Items

Loopback
LOOPBACK activates the loopback function on the base DS-1 interface. The available loopbacks are:

Port Loopback
Towards the NI.

Line Loopback
Towards the PBX or other terminal equipment.

Cancel Tests

Use this menu selection to deactivate all active tests, including tests on option modules.

Chapter 8 Remote/Management Menus

The **REMOTE/MANAGEMENT** menu initiates Telnet/terminal sessions with remote devices and displays various management information.

REMOTE MENU ACCESS

This menu displays Telnet menus for a remote device (may be another TSU/TDU or any other ADTRAN product that supports Telnet via its EIA-232 chain port). After selecting this option, the user may choose to connect to a device entered in the Unit Access Table or enter a unit ID for a unit not in the Unit Access Table. **CTRL + X** terminates the session and returns to the TDU 120e Main menu.

MANAGEMENT CONFIGURATION

This menu sets management information, such as SNMP community names and trap destination addresses.

UNIT ACCESS TABLE

This menu edits/creates the Unit Access Table and stores the Unit ID, Passcode, and Unit Type for units connected via chain ports or connected remotely to the TSU/TDU (see Figure 8-1).

An entry in the table is required only to support proxy SNMP MIB access or polling. For MIB access, an entry is required only if the unit's passcode is not the same as the **DEFAULT UNIT PASSCODE**, or the unit is a single port TSU Standalone.

> **NOTE**
>
> *It is not necessary to have an entry in this table for a remote unit in order to Telnet to it or forward SNMP traps from it. In the Telnet case, the Remote Menu Access menu is selected from the Main menu and a unit ID is entered which may or may not be in the Unit Access Table.*

Units accessed via T-Watch PRO over TCP/IP use the unit ID and passcode set by T-Watch PRO running on the PC.

```
_____Unit Access Table_____
Unit ID              Passcode        Type           Polled     Poll Status
20                   DEFAULT         Standard       No
3                    0033            Standard       Yes        UP
6                    0095            TSU Standalone No
8                    0022            Standard       Yes        UP
1) Add New Unit
2) Modify Unit
3) Delete Unit
4) Default Unit Passcode  0022
5) OK
```

Figure 8-1. Unit Access Table

The following chart describes each command of the Unit Access Table.

Table 8-1. Unit Access Table Commands

Command	What it does...
Add New Unit	Adds a new device to the table.
	You must enter a device Unit ID, passcode, Unit type, and polled flag. Unit type can be:
	Standard (which supports any TSU/TDU Multiplexer and the ISU 512), or TSU Standalone (a single port TSU with no option card slot).
	A passcode of **0** to **9999** for each device or **DEFAULT** may be selected, which results in the default passcode being used (defined as **0022** in Figure 8-1 on page 8-2).
	Traps are normally sent from the unit in alarm to the TDU 120e. For units in the Unit Access Table that are not chained directly to the TDU 120e but are managed over Inband or the FDL, traps are not automatically forwarded. Polling must be enabled on the TDU 120e for these units in order to receive Traps on the NMS. The TDU 120e can be configured to poll selected units for traps by enabling the polled option when adding or modifying a unit entry.
Modify Unit	Allows unit ID, passcode, device type, and polled flag to be changed for an existing entry in the table.
Delete Unit	Deletes an entry in the table.
Default Unit Passcode	Sets the default passcode for all devices in the table that have passcodes set to **DEFAULT**, or for any unit not listed in the table.
OK	Returns to the **CONFIGURE AGENT** menu.

SNMP Read Community

SNMP READ COMMUNITY NAME defaults to public. NMSs using this community name have Read access for all supported MIB objects but do not have the ability to change MIB objects. This value must be set to the same value on both the TDU 120e and the NMS (OpenView®, etc.) in order for the NMS to have Read access to MIBs supported by the TDU 120e. This value must be a text string of 16 characters or less.

SNMP Read/Write Community

SNMP NMS using this community name have full Read/Write access to all supported MIB objects (defaults to private). This setting must be the same value on both the TDU 120e and the NMS in order for the NMS to have Read/Write access to MIBS supported by the TDU 120e. This value must be a text string that is 16 characters or less.

> *To access other units external to the TDU 120e (proxied units) using an SNMP MIB browser, append a period and the unit ID of the external device to the Read Only and Read/Write community name used in the MIB Browser, for example public.4. See Appendix A, Understanding SNMP, for more information.*

SNMP Trap Community

This community name is used for all SNMP traps forwarded by the TDU 120e. Traps received from daisy-chained units have a period and the unit ID appended to the trap community name.

Host 1 Trap IP Address
The first of four entries for SNMP trap destination addresses. The TDU 120e forwards all SNMP traps to the IP address specified in this entry. If the address is set to the default value of 0.0.0.0, no traps are forwarded for this particular value.

Host 2 Trap IP Address
Defaults to 0.0.0.0. Second destination address for SNMP traps.

Host 3 Trap IP Address
Defaults to 0.0.0.0. Third destination address for SNMP traps.

Host 4 Trap IP Address
Defaults to 0.0.0.0. Fourth destination address for SNMP traps.

System Name
A text string that can uniquely identify an SNMP managed node.

System Contact
A text string containing the name, phone number, and so forth, of the individual responsible for maintaining an SNMP managed node.

System Location
A text string describing the physical location of an SNMP managed node (for example, SECOND FLOOR PBX ROOM).

Auth. Fail Traps Sent
When enabled, the TDU 120e issues an SNMP trap when any SNMP request is received with an invalid community name. Can be used for security purposes.
Choices: Disabled, Enabled. Defaults to Disabled

Poll Link Status Traps Sent
(DISABLED, ENABLED, defaults to DISABLED)
When enabled, the TDU 120e sends an SNMP trap whenever a device configured to be polled fails to respond. When the device begins responding to polls, a poll link-up trap is sent. The format of the traps are defined in the agent MIB.
Choices: Disabled, Enabled. Defaults to Disabled

Ping IP Host

Allows the user to ping a specific IP address.

Telnet/Terminal Timeout

The TDU 120e terminates a Telnet or terminal session if no activity is detected for this length of time. Only one Telnet or terminal session may be active at one time. This timeout prevents an unattended session from blocking interactive access to the agent. The default value is five minutes.

Telnet/Terminal Password

This option allows modification of the password required for entry into a Telnet or terminal session. The default value is **ADTRAN**.

Exit

Returns to the TDU 120e Main menu.

Flash Download

The TDU 120e uses flash memory that allows software updates via the EIA-232 port or the 10BaseT port.

XMODEM

Open a terminal session to the TDU 120e and select **XMODEM FLASH DOWNLOAD**. This selection allows the user to perform a flash upgrade using XMODEM protocol.

Trivial File Transfer Protocol (TFTP)

Open a Telnet session to the TDU 120e and select **TFTP FLASH DOWNLOAD**. This selection allows the user to set the IP address of the server where the upgrade file resides. The user can also set the filename of the upgrade file if it is other than default.

TFTP Server IP Address: 0.0.0.0.
Enter the IP address of the server where the upgrade file resides.

NOTE   *The server address is not retained over a power cycle.*

TFTP Server File name: T120e.biz
Enter the name of the upgrade file that resides on the TFTP Server.

NOTE   *The default filename may already be correct.*

Begin Firmware update.
 Select this item and press **Enter** to begin the flash upgrade using TFTP. After the download is complete, the TDU 120e will close the Telnet session to reprogram the software. The Telnet session may be opened again several minutes later. If the upgrade fails after the Telnet session is closed, the unit must be Flash downloaded using XMODEM.

Quit Session

Terminates the Telnet/terminal session.

Appendix A   Understanding SNMP

WHAT IS SNMP?

The term SNMP broadly refers to the message protocols used to exchange information between the network and the managed devices, as well as to the structure of network management databases.

SNMP came about as local area network (LAN) environments became standardized over the past ten years and multi-vendor equipment grew with competition. It became necessary to manage the various vendor equipment from a single control console. Thus, the SNMP emerged as the standard for managing commercial TCP/IP networks.

Basic Components of SNMP

SNMP has three basic components: Network Manager, Agent, and MIB.

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

Agent
This is a control program that responds to queries and commands from the network manager and returns requested information or invokes configuration changes initiated by the manager. It resides in each network device.

MIB

This is an index to the organized data within a network device. It defines the operating parameters that can be controlled or monitored. When requesting the network manager to retrieve or modify a particular piece of information about a network device, the network manager transmits the request to that network device. The agent in that device interprets the incoming request, performs the requested task, and sends its response to the network manager. The network manager collects all the data from the various network devices and presents it in a consistent form.

Commands

Using SNMP Version 1, the network manager can issue three types of commands:

GetRequest

Retrieves a single item or the first in a series from a network device.

GetNextRequest

Retrieves the next item in a series from a network device.

SetRequest

Writes information to a network device.

Message

The network device issues two types of messages:

GetResponse
The response to a network manager **GETREQUEST** or **GETNEXTREQUEST** command.

Trap
An unsolicited message issued by a network device to report an operational anomaly or an alarm condition to the network manager.

These messages are typically encased within informational packets and transported over the LAN or WAN (wide area network).

TDU 120e SNMP Access

By default, SNMP MIB Browser access to the TDU 120e IP address with the configured community names, accesses the host. The TDU 120e can also act as an SNMP proxy agent for external units.

To access MIB variables on externally chained devices, append a period and the Unit ID of the device to the Read and Read/Write community names.

Example:

If...	Then...
The Read community name configured in the TDU 120e is **public**,	Specify **public.3** as the community name in the SNMP MIB Browser. This allows reading SNMP MIB variables from externally chained unit 3.
The external unit's passcode is not the default,	An entry must be added to the Unit Access Table for SNMP MIB access. However, SNMP traps for the unit can be forwarded without the entry. See Unit Access Table on page 8-2, for more information.

SNMP Trap Configuration

Traps received by the TDU 120e from external units and the host unit are converted into SNMP traps and forwarded to the configured NMS. The source of the trap is uniquely identified at the NMS by a combination of the IP address of the TDU 120e, and the Unit ID of the sending device. The Unit ID is present in the trap packet appended to the end of the trap community packet name, for example public.4. It is also included as an Octet String variable (adProdPhysAddress) in the trap packet as defined in the individual product MIBs. The latest versions of the product MIBs, by default, display the appended trap community name in their descriptions.

Typical steps required for Management Station trap configuration are:

1. loading the device specific MIBs, and
2. loading or creating device-specific Trap Definition Files.

The current product MIBs contain keywords embedded in comments that can be used by some network management platforms to automatically generate Trap Definitions. Otherwise, the descriptions may be used as a template for Trap Definitions.

If individual option card port and slot identification is required, it is present in the four-byte **adProdPhysAddress** field of the trap packet. The first two bytes are the Unit ID of the base controller (least significant byte first). The next two bytes are port and slot number. This field is the second object identifier in all traps sent from TSU/TDU products. For traps from the ISU 512, the Unit ID is the first object identifier. See the product MIBs for more information.

Definitions for Poll Link Up/Down traps are included in the TDU 120e MIB file: **TDU 120e.MIB**.

SNMP MIB Browser Configuration

The following steps are required to configure Network Manager MIB variable access through the TDU 120e:

Step	Action
1	Load the desired product MIBs on the network management station. *Example*: If the administrator is managing TDU 120e and ISU 512 devices, load **TDU 120e.MIB**, **ISU512.MIB**, and **RFC1406.MIB**.
2	Create device entries in the NMS database for all units that are to be managed through the TDU 120e. The host unit should be configured as the Proxy agent for the external units. The IP address or host name used for the proxy designation is that of the TDU 120e.
3	Set community names in the device's entries for external units to the TDU 120e community name with the device Unit ID appended. See *TDU 120e SNMP ACCESS* on page A-4 for more information.
4	Set the device timeout for all device entries in the NMS device database to five seconds, including the host unit.

SNMP MIB Files

The TDU 120e supports several standard MIBs including:

- MIB-II (RFC-1213),
- DS1 T1/E1 MIB (RFC-1406), and
- the Ethernet MIB (RFC-1643).

It also supports several ADTRAN enterprise-specific MIBs including:

- ADTRAN Product MIB (ADTRAN.MIB),
- ADTRAN DS1 extensions MIB (ADS1.MIB), and
- all TSU/TDU Enterprise MIBs, such as TDU 120e.MIB.

The standard MIB files are usually included with most SNMP network management software. The latest version of the ADTRAN enterprise specific MIBs are available in the following places:

- ADTRAN anonymous ftp site: ftp.adtran.com
- Dial-up: BBS (256 -963-8169).
- Adtran web site: http://www.adtran.com.

Appendix B Connector Pinouts

WIRING

Network

On the rear of the TDU 120e are two connectors labeled **NETWORK**. These connectors are used for connecting to the network. See Table B-1 for the pinout for the 8-pin modular connector and Table B-2 on page B-2 for the pinout of the male 15-pin D-connector.

Table B-1. Network Pinout of the 8-Pin Modular Connector

Pin		Name	Description
1	R1	RXDATA-RING	Receives data from the network
2	T1	RXDATA-TIP	Receives data from the network
3		UNUSED	
4	R	TXDATA-RING	Sends data toward the network
5	T	TXDATA-TIP	Sends data toward the network
6,7,8		UNUSED	

Table B-2. Network Pinout of the Male 15-Pin D-Connector

Pin		Name	Description
1	T	TX DATA TIP	Sends data toward the Network
2	FG	FRAME GROUND	
3	T1	RXDATA-TIP	Receives data from the Network
4	FG	FRAME GROUND	
5,6,7,8		UNUSED	
9	R	TXDATA-RING	Sends data toward the Network
10		UNUSED	
11	R1	RXDATA-RING	Receives data from the Network
12,13,14,15		UNUSED	

Control In/Chain In

This is used as an RJ-45 port for connection to a computer or modem (Control In) or to another TSU/TDU family multiplexer or TSU 100 (Chain-In). See Table B-3 for the pinout for the control/chain-in connector.

Table B-3. Control In/Chain In Pinout

Pin	Name	Description
1	GND	Ground - connected to unit chassis
2	RTS	Request to send - flow control
3	RXDATA	Data received by the TDU 120e
4	UNUSED	
5	TXDATA	Data transmitted by the TDU 120e
6	Ext Alarm A	When grounded, generates Alarm A
7	Ext Alarm B	When grounded, generates Alarm B
8	CTS	Clear-to-send-flow control

Control-Out/Chain-Out

This is used to connect to another TDU/TSU family multiplexer chain-in connector. See Table B-4 for the pinout for the chain-out connector.

Table B-4. Chain-Out Pinout

Pin	Name	Description
1	GND	Ground - connected to unit chassis.
2	UNUSED	
3	TX DATA	Data transmitted to chained units by the TDU 120e. Connect to RX DATA of the next unit (chain-in pin 3).
4	UNUSED	
5	RX DATA	Data received from chained units by the TDU 120e. Connect to TX DATA of the next unit (chain-in pin 5).
6,7,8	UNUSED	

Craft Port

This is used as an RJ-45 port for connection to a computer or modem (Control In) or to another TSU/TDU family multiplexer or TSU 100 (Chain-In). See Table B-5 for the pinout for the craft port connector.

Table B-5. Craft Port Pinout

Pin	Name	Description
1	GND	Ground - connected to unit chassis
2	RTS	Request to send - flow control
3	RXDATA	Data received by the TDU 120e
4	UNUSED	
5	TXDATA	Data transmitted by the TDU 120e
6,7	UNUSED	
8	CTS	Clear to send-flow control

Nx56/64 DTE (V.35)

See Table B-6 for the V.35 pinout Nx56/64 DTE pinout.

Connector type   V.35

Table B-6. V.35 Pinout for Nx56/64 DTE

Pin	Name	Description
A	101	Protective ground (PG)
B	102	Signal ground (SG)
C	105	Request to send (RTS) from DTE
D	106	Clear to send (CTS) to DTE
E	107	Data set ready (DSR) to DTE
F	109	Received line signal detector (DCD) to DTE
L, J	—	Local loopback (LL)*
N, BB	—	Remote loopback (RL)*
R	104	Received data (RD-A) to DTE
T	104	Received data (RD-B) to DTE
V	115	RX clock (RC-A) to DTE
X	115	RX clock (RC-B) to DTE
P	103	Transmitted data (TD-A) from DTE
S	103	Transmitted data (TD-B) from DTE
Y	114	TX clock (TC-A)
AA	114	TX clock (TC-B)
U	113	External TX clock (ETC-A) from DTE
W	113	External TX clock (ETC-B) from DTE
NN	—	Test mode (TM) to DTE
*(ignored by TDU 120e)		

Base DS-1 (PBX)

On the rear of the TDU 120e are two connectors labeled DS-1. These connectors are used for connecting to a PBX or other terminal equipment.

See Table B-7 for the pinout of the 8-pin modular connector and Table B-8 on page B-7 for the pinout of the female 15-pin D-Connector.

Table B-7. Base DS-1 Pinout of the 8-Pinout Modular Connector

Pin		Name	Description
1	R1	TXDATA-RING	Sends data toward the DTE (PBX)
2	T1	TXDATA-TIP	Sends data toward the DTE (PBX)
3		UNUSED	
4	R	RXDATA-RING	Receives data from the DTE (PBX)
5	T	RXDATA-TIP	Receives data from the DTE (PBX)
6, 7, 8		UNUSED	

Table B-8. Base DS-1 Pinout of the 15-Pin Female D-Connector

Pin		Name	Description
1	T	RXDATA-TIP	Receives data from the DTE (PBX)
2	FG	FRAME GROUND	
3	T1	TXDATA-TIP	Sends data toward the DTE (PBX)
4	FG	FRAME GROUND	
5, 6, 7, 8		NOT USED	
9	R	RXDATA-RING	Receives data from the DTE (PBX)
10		NOT USED	
11	R1	TXDATA-RING	Sends data toward the DTE (PBX)
12,13,14,15		NOT USED	

10BaseT

This is used to connect the TDU 120e to the local area network. See Table B-9.

Connector type (USOC), Shielded 8-pin, module TDU 120e.

Table B-9. 10BaseT Ethernet Connector

Pin	Name (To Nic)
1	TX1
2	TX2
3	RX1
6	RX2

Alarm

This is used to connect the TDU 120e to an external alarm device. See Table B-10.

Connector Type 4-pin, Eurostyle connector

Table B-10. External Alarm Device Connector

Pin	Name	Description
1	NC	Normally closed
2	NO	Normally open
3	COM	Common
4	GND	Connected to unit chassis

Power

Table B-11. Power Connector (DC powered units)

Pin	Name	Description
1	+	+24 or +48 VDC
2	_	-24 or -48 VDC

Appendix C   System Messages

This appendix lists and defines the alarm and status messages that appear on the monitor screen.

ALARM MESSAGES

Network Interface (NI)

Red Alarm
NI unable to frame align with incoming signal.

Yellow Alarm
Remote alarm indication (RAI) being received from far end.

Blue Alarm
Unframed all ones (1s) (AIS) being received at NI.

Loss of Signal
No signal detected at NI.

Nx/DBU Interface

The following messages indicate an alarm condition on the Nx/DBU port:

Clock Slip
Difference in frequency of the data clock at the network and DTE.

PLL Alarm

Unable to achieve Phase Locked Loop on the clock provided by the network interface.

Zeros Alarm

All zeros (0s) data being sent toward the network interface.

FIFO Alarm

Error in propagation of data through the FIFOs.

No EXT Clock

No external transmit clock at DTE (only appears if EXT CLK is selected).

DS-1 (PBX) Interface

The following messages indicate a condition on the Base DS-1 (PBX) interface:

Red Alarm

Not able to frame data coming to the DS-1 interface; sometimes referred to as out-of-frame (OOF).

Yellow Alarm

Remote alarm indicator (RAI) being received by the DS-1 interface.

Blue Alarm

Receiving unframed all 1s at the DS-1 interface [alarm indicator signal (AIS)].

Loss of Signal

No signal detected by the DS-1 interface.

Status Messages

Network Interface (NI)

Payload On
Payload loopback activated.

Line On
Line Loopback activated.

Loopback Off
All loopbacks deactivated.

Factory Restore
Factory setting restored.

Power On
Unit powered on.

Self-Test
Internal self-test performed.

Nx/DBU Interface

The following messages indicate the status of the Nx/DBU card:

Loop Up
Data is looped at both the network interface and DTE interface of the card.

Remote Loop Up
Sending V.54 pattern in an attempt to loop up a remote device.

511 Pattern On
Sending 511 pattern towards the network interface.

Loop Down
Data is no longer looped back at the network interface or DTE interface.

511 Pattern Off
No longer sending 511 pattern towards the network interface.

DS-1 (PBX) Interface

The following messages indicate the status of the DS-1 interface:

Frame Slip
Indicates a Frame Slip has occurred on the DS-1 interface. This is present in Alarm History only.

Line Loop Up
Line loopback activated.

Port Loop Up
Port loopback activated.

Loopdown
Loopback has been deactivated.

Appendix D Specifications

ELECTRICAL SPECIFICATIONS

T1/FT1 Interface

T1 Line Rate
1.544 Mbits/s +/- 75bps

Line Code
Bipolar, RZ; AMI or B8ZS

Framing
D4(SF) or ESF

FT1 Line Rate
DS0 Channelized (multiple of 64 kbps)

Transmit Timing
Network, DTE, U-BR1TE, Secondary, NI, Normal (CSU)
or Internal

Input Signal
0 to -36 dB (DS-1)

Line-Build-Out
0, -7.5, -15, -22.5 dB, AUTO

Connector
RJ48C, DB 15 (male)

Test Jacks
Bantam jacks: Tx and Rx MON, Tx and Rx (to network)

Compatibility

> **T1 Interface**
> Pub 62411
>
> **ESF Format Interface**
> TR. 194
>
> **ESF Performance Monitoring**
> TR. 54016 and T1.403
>
> **Approvals**
> FCC Part 15, FCC Part 68, UL 1950

Nx/DBU Interface - Port 0.1-Nx56/64 (V.35 Interface)

> **DCE Interface**
> CCITT V.35 Synchronous
>
> **Rates**
> 56kbps - 1.536Mbps in 56k or 64k increments
>
> **Clock Options**
> Normal/Inverted and internal/external
>
> **Tests**
> Local Loopback (bilateral); Remote Loopback (V.54)
>
> **Test Pattern**
> 511 with errored seconds display and error inject capability
>
> **Data inversion**
> Menu selectable
>
> **1s Density Protection**
> Force 1s to network after one second of consecutive zeros from DTE. User selectable (On/Off)
>
> **CTS, DCD, DSR**
> Normal or Force On

Connector
Winchester (V.35) female (on the Y cable)

DS-1 Interface - Port 0.2

Line Rate
1.544 Mbps

Capacity
1 to 24 DS0s

Line Codes
AMI, B8ZS

Framing
ESF per ANSI T1.403 and AT&T Pub.TR 54016
D4 per AT&T Pub. 62411

Line Length
Short haul mode: -3 dBDsx to 655 feet in 110 ft steps

Line Build-out
Long haul mode: 0, -7.5,-15, -22.5, AUTO

Timing
Supports network, secondary, and CSU timing modes

Test Capability
Line loopback, port loopback (internal toward mux)

Connector
RJ48C, DB15 (female)

Test Jacks
Rx/Tx MON, Rx and Tx (toward PBX)

Compatibility

> **T1 Interface**
> Pub 62411
>
> **ESF Format Interface**
> TR.194
>
> **ESF Performance Monitoring**
> TR. 54016 and T1.403
>
> **Approvals**
> FCC Part 15, FCC Part 68, UL 1950

Management Interfaces

Chain In/Out Ports/Craft Port

> **Interface Devices**
> PC Serial Port, Modem or SLIP connection to router
>
> **Interface Type**
> RJ-45
>
> **Data Rates**
> 1200, 2400, 9600, 19200, 38400
>
> **Data Format**
> N81
>
> **Protocols**
> T-Watch PRO/ADLP, ATEL/ADLP, TCP/IP/SLIP
>
> **Connector**
> 8-pin, modular

10BaseT Interface

Interface
IEEE 802.3 Compliant

Rate
10 Mbps

Connector
shielded 8-pin, modular

Receiver
accepts signal > 300mV

Protocols
Network: IP

Transport: TCP, UDP

Services: SNMP, TELNET, ICMP, ARP, PING, T-Watch PRO

Option Slot Interface

Interface
ADTRAN proprietary, accepts standard TSU/TDU Option Modules.

Test Jacks
Rx/Tx MON, Rx and Tx (toward incoming service, i.e., T1, FT1, PBX, etc.) This is for selected option modules only.

Chassis Specification

1 U High (1-3/4-inch), 19-inch rack mount, 12 inches deep.

> NOTE
>
> *An adapter kit is available to mount the unit into a 23-inch rack (1200.171L1).*

Environmental Specifications

Input Power
*AC powered device*s: 90-120VAC, 47-63 Hz

DC powered devices: $\pm$ or $\pm$ 48 VDC

Fuse
AC powered devices: 0.6A, 250V

DC powered devices: 1.5 A, 250 V

Operating Temperature
0 deg C to 45 deg C

Max Power
15 Watts

Max Current
AC powered devices: 0.2 A

DC powered devices: 1A

Index

Numerics

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