

# TDU 120e User Manual

**Part Numbers** 

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#### Trademarks:

Windows is a registered trademark of Microsoft Corp. T-Watch is a trademark of ADTRAN, Inc. OpenView<sup>R</sup>



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

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NOTE

Notes provide additional useful information.

CAUTION

Cautions signify information that could prevent service interruption.



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 sv	vorn, 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

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 at his own expense.

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



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

## **Canadian Emissions Requirements**

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

Cet appareil 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.



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.

#### **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 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 incidental, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or information, 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 exclusion 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 7941
Training - email	training@adtran.com

# Table of Contents

List of Figuresxxi		
List of Tablesxxiii		
Chapter 1. Introduction		
TDU120e Overview 1-1		
Standard Features in the TDU 120e1-2		
TDU Option Modules1-3		
Option Module Architecture1-4		
TDU 120e Configuration Applications1-5		
Router, PBX, Video Conferencing Application1-5		
Chapter 2. Installation		
Unpack. Inspect. Power Up		
Receipt Inspection		
ADTRAN Shipments Include		
Customer Provides		
Power Connection		
Grounding Instructions		
Rear Panel Layout		
TDU 120e Interfaces		
Network Interface2-5		
Nx56/64 Serial Interface2-5		
DS-1 (PBX) Interface2-5		
Control Port Input		
Craft Port2-6		
Chain Port Output2-6		
10BaseT Interface		
External Alarm Connector2-6		
Power Up Testing		
Self-Test		
Board Level Tests2-7		
RAM and EPROM Tests2-7		

Unit Level Tests	2-7
Board-to-Board Interface Test	2-7
Initialization	2-8
Set User Passcode	2-8
Set Unit Identification	2-8
Set Control Port	2-8
Chain In (PC)	2-8
Chain In/Chain Out	2-9
Normal Power-Up Procedure	2-10
Chapter 3. Operation	
Menu Features	
Sample Terminal Screen with TDU 120e Menu	3-2
General Menu Operation	3-2
Select and Activate a Menu Item	3-2
Exit Any Menu Field Operation Or Display	3-4
Data Port Identification	3-5
Menu Structure	3-6
Telnet/Terminal Main Menu	3-6
Menu Options	3-7
Status	3-7
Config (Configuration)	3-7
Util (Utilities)	3-7
Test	3-7
Remote Menu Access	3-7
Management Configuration	3-7
Flash Download	3-7
Quit Session	3-7
Front Panel	3-8
ACO Switch	
Remote LED	
Craft Port	
Network Monitor Jack	
DS1 Monitor Jack	
Network Status LEDs	3-9
Port Status LEDs	
Port 1.1 Option Card Monitor Jacks	
Alternate Methods Of Control	
T-Watch Pro (ADTRAN PC Program)	
Setting up the TDU 120e to Work Over a LAN	
Setting up the TDU 120e to Work Over an EIA-232 Connection	1 3-12
SNMP	

Chapter 4. Status Menu	4-1
Network Performance Reports	4-2
Network Interface Errors	4-3
Active Alarms	4-3
View History	4-4
Port Status	4-4
Nx/DBU (0.1) Menu Items	4-4
DTE Data/Clock	4-4
DTE Status	4-5
DTE Port Rate	4-5
DBU Data/CNTRL	4-5
DBU Control	4-5
DBU Status	4-5
DS-1 (0.2) Menu Items (DS-1 Errors)	4-6
Remote Port	4-6
Clear Port Alarm	4-6
Ethernet Status	4-7
Chapter 5. Configuration Menu	5-1
Network (NI)	5-3
Network (NI) Menu Items	5-3
FORMAT	5-3
CODE	5-3
YELLOW ALARM	5-3
TRANSMIT PRMS	5-3
TIMING MODE	5-3
TDU 120e Clock Sources	5-4
Network Timed	5-4
Based DS-1	5-5
Base DTE Timing	5-5
Internal Timing	5-6
Secondary Timing	5-6
Normal (CSU) Timing	5-7
U-BR1TE	5-7
Set Line Buildout	5-7
Inband Loopback	5-8
Bit Stuffing	5-8
Unit Menu	5-8
Control Port Rate	5-8
Traps	5-8
Access	5-8
Init Modem	5-9

Control Port	5-9
IP Address	5-9
Subnet Mask	5-9
Default Router	5-9
SLIP Rate	5-9
SLIP Flow CTL5	ó-10
Proxy Traps5	ó-10
Map Exchange	<b>5-10</b>
OFF5	<b>5-10</b>
AUTO5	<b>5-10</b>
Map In Use	j-11
DS0 Maps5	j-11
DS0 Maps Configuration Menu5	ó-11
Creating a DSO Map5	ó-12
Initializing the Temp Map5	<b>5-12</b>
Editing the Temp Map5	<b>ó-13</b>
Applying the Temp Map5	ó-13
Copying Map5	<b>ó-14</b>
Reviewing Maps5	<b>ó-14</b>
Copy Map A (B) to Temp Map5	<b>5-14</b>
Create Temp Map5	<b>5-14</b>
Review Map A(B)5	ó-15
Review Temp Map5	ó-15
Edit Temp Map5	5-15
Apply Temp to Map A(B)5	5-15
Port Configuration (Port Config)	ó-15
Nx/DBU (0.1) Menu Items	<b>5-15</b>
Nx/DBU (0.1)	<b>5-15</b>
DSO Rate5	<b>5-16</b>
TX CLK CNTRL5	<b>5-16</b>
Data5	<b>ó-16</b>
CTS	<b>5-16</b>
DCD	<b>5-16</b>
DSR	<b>5-16</b>
"O" INHIB5	5-17
INBAND MODE5	5-17
TX CLK SOURCE5	5-17
Dial Backup Configuration5	5-18
Backup Mode	5-18
Backup On5	5-18
NET FAIL5	5-18
NET/DATA FAIL5	ó-18

Pattern Verify	5-18
Backup Delay	5-18
Restore Delay	5-19
Retry Delay	5-19
Num Retries	5-19
Backup Testing	5-19
WKEND Lockout	5-19
DS-1 (0.2) Menu Items	5-20
Format	5-20
Code	5-20
Yellow Alarm	5-20
Line Length (ft)	5-20
Inband Loopback (INBANK LPBACK)	5-21
Robbed Bit Signaling	5-21
RBS Start	5-21
RBS End	5-21
	0.1
Chapter 6. Utility Menu	6-1
Time/Date	6-2
Factory Restore	6-2
Set Passcode	6-3
Change/Set a Passcode	6-3
Lost Passcode	6-3
No Passcode Desired	6-3
Unit ID	6-3
To Set the Unit Identification	6-4
No Unit ID Desired	6-4
Software Revision	6-4
Port Utility	6-4
Ethernet Address	6-4
Chanter 7 Test Menu	7-1
Network Tests	11 7_9
Loonback Tests	1 2 7_9
Network Interface Loonbacks	7 2 7_9
I ing	1-2 7_9
Pavload	7 2 7-3
Local Loophek	7 -3 7_3
Line On	7=3 7_२
Pavload On	२०७ ७_२
No Loonback	१-७ 7-२
Remote Loopback	ז־ט 7_ע
NUMBLE LOOPDACK	1-3

ATT In-Band LLB7-4
ANSI FDL PLB7-4
ANSI FDL LLB
ANSI FT1 LLB7-4
No Loopback7-4
Test Pattern7-4
All Ones7-4
All Zeros7-4
QRSS Pattern7-5
Pattern Result7-6
ES7-6
BES7-6
SES7-6
*SYNC7-6
Run Self-Test7-7
Port Tests7-8
Port Test Menu Items Nx/DBU (0.1)7-9
DTE LOOPBACK
PORT/LOCAL7-9
REMOTE7-9
OFF7-9
REM V.54 Cont7-9
511 PATTRN7-10
511 RESULTS7-10
DBU LOOPBACK7-10
DBU TEST7-10
DBU DATA/CNTRL7-11
DBU TST RESULT7-11
DS-1 (0-2) Option Ports7-11
Loopback7-11
Cancel Tests7-11
Chapter 8. Remote/Management Menus
Remote Menu Access
Management Configuration
Unit Access Table
SNMP Read Community8-4
SNMP Read/Write Community8-4
SNMP Trap Community8-4
Host 1 Trap IP Address8-4
Host 2 Trap IP Address8-5
Host 3 Trap IP Address8-5

Ho	ost 4 Trap IP Address	8-5
Sys	stem Name	8-5
Sys	stem Contact	8-5
Sys	stem Location	8-5
Au	ıth. Fail Traps Sent	8-5
Pol	ll Link Status Traps Sent	8-5
Pin	ng IP Host	8-5
Tel	lnet/Terminal Timeout	8-6
Tel	Inet/Terminal Password	8-6
Exi	it	8-6
Flash Dow	nload	8-6
XN	MODEM	8-6
Tri	ivial File Transfer Protocol (TFTP)	8-6
TF	TP Server IP Address: 0.0.0.0.	8-6
TF	TP Server File name: T120e.biz	8-7
Beg	gin Firmware update	8-7
Quit Sessio	on	8-7
Appendix A. S	SNMP	A-1
Appendix B. C	Connector Pinouts	B-1
Appendix C. S	System Messages	C-1
Appendix D. S	Specifications	D-1
Index		Index-1

# List of Figures

Figure 1-1.	TDU 120e Option Modules 1-4
Figure 1-2.	Bridge, PBX, Video Conferencing Application Set Up1-5
Figure 2-1.	TDU 120e Rear Panels2-4
Figure 2-2.	TDU 120e Interfaces
Figure 2-3.	Example of Chain-in2-9
Figure 3-1.	Sample Terminal Screen with TDU 120e Menu
Figure 3-2.	Example of Basic Menu Travel
Figure 3-3.	Telnet/Terminal Main Menu
Figure 3-4.	TDU 120e Front Panel Layout 3-8
Figure 4-1.	Status Menu Tree 4-1
Figure 4-2.	Network Interface Performance Report 4-2
Figure 5-1.	Configuration Menu Tree5-2
Figure 5-2.	Network Timed Clock Source
Figure 5-3.	DS-1 Timed Clock Source 5-5
Figure 5-4.	Base DTE Timing Clock Source 5-5
Figure 5-5.	Internal Clock Source
Figure 5-6.	Secondary Clock Source
Figure 5-7.	Normal (CSU) Timing5-7
Figure 5-8.	DS0 Temp Map 5-11
Figure 5-9.	DS0 Map Designations5-14
Figure 6-1.	Utility Menu Tree
Figure 7-1.	Test Menu Tree
Figure 7-2.	Network Loopback Tests
Figure 8-1.	Unit Access Table

# List of Tables

Table 1-1.	TDU 120e Option Modules 1	-3
Table 3-1.	Activating Alarm List from Status Menu	3-3
Table 3-2.	Editing a Data Field 3	3-4
Table 4-1.	NI Error Types	-3
Table 4-2.	Alarm Message Display 4	-3
Table 5-1.	Normal Mode of Operation5-	17
Table 8-1.	Unit Access Commands	3-3
Table B-1.	Network Pinout of the 8-Pin Modular ConnectorB	8-1
Table B-2.	Network Pinout of the Male 15-Pin D-ConnectorB	5-2
Table B-3.	Control In/Chain In PinoutB	6-2
Table B-4.	Chain-Out PinoutB	3-3
Table B-5.	Craft Port PinoutB	3-3
Table B-6.	V.35 Pinout for Nx56/64 DTEB	6-4
Table B-7.	Base DS-1 Pinout of the 8-Pinout Modular ConnectorB	6-5
Table B-8.	Base DS-1 Pinout of the 15-Pin Female D-ConnectorB	6-5
Table B-9.	10BaseT Ethernet ConnectorB	6-6
Table B-10	). External Alarm Device ConnectorB	6-6
Table B-11	. Power Connector (for DC powered units)B	6-6
Table C-1.	Network Interface (NI) Alarms C	:-2
Table C-2.	Nx/DBU Interface AlarmsC	:-2
Table C-3.	DS-1 (PBX) Interface Alarms C	:-3
Table C-4.	Network Interface (NI) Status Messages C	:-3
Table C-5.	Nx/DBU Interface Status Messages C	:-4
Table C-6.	DS-1 (PBX) Interface Status Messages C	;-4
Table D-1.	T1/FT1 InterfaceD	)-1
Table D-2.	Nx/DBU Interface - Port 0.1-Nx56/64 (V.35 Interface) D	)-2

Table D-3.	DS-1 Interface - Port 0.2	.D-3
Table D-4.	Chain In/Out Ports & Craft Port	. D-4
Table D-5.	10BaseT Interface	. D-4
Table D-6.	Option Slot Interface	.D-4

## TDU120e 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. You can manage via SNMP through the 10BaseT or chain-in ports. If you are using T-Watch Pro, a Microsoft Windows® program, you can manage the TDU 120e via the same 10BaseT or chain-in ports. An enhanced VT-100 terminal interface is also provided.

## Standard Features in the TDU 120e

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

- A single T1 interface.
- A Nx/DBU V.35 port and 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 or the Craft Jack 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

## **TDU Option Modules**

Table 1-1 shows a list of option modules and their descriptions for the TDU 120e.

#### Table 1-1. TDU 120e Option Modules

Module	Description
DSX-1	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 DS1 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	2/4 channel 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

## 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 Include**

The following items are included in the ADTRAN shipment:

- The TDU 120e
- 2-line interface cables: A 15-foot, 8-position modular to 8position 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 is equipped with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle.



Power to the TDU 120e AC 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 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.
- It shall be connected to 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 he 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.

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

NOTE

# **REAR PANEL LAYOUT**

Figure 2-1 shows the configuration of the TDU 120e rear panels of the for both the AC powered unit and the DC powered unit.



Figure 2-1. TDU 120e Rear Panels

## **TDU 120e Interfaces**

The TDU 120e 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, in the rear panel. 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 *Wiring* on page B-1.

## Nx56/64 Serial Interface

The Nx56/64 provides a serial V.35 port that operates from 56kbps to 1.536Mbps. 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 Port Input**

The control port input provides an EIA-232 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 *Wiring* on page B-1.

## 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 *Wiring* on page B-1.

#### Chain Port Output

The chain port output provides an EIA-232 output to chain control to other TDUs or to TSUs. For more information, see *Wiring* on page B-1.

#### 10BaseT Interface

The 10BaseT interface provides the LAN interface for managing the TDU 120e with SNMP or T-Watch Pro. For more information, see *Wiring* on page B-1.

#### **External Alarm Connector**

The external alarm connector allows you to connect an external alarm device to the TDU 120e. The alarm relay will activate on any alarm. The relay will remain activated until the ACO button on the front panel is pushed. For more information, see *Wiring* on page B-1.
# 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 **UTIL** menu.

# Self-Test

When	Then
Initiating a self-test	The terminal displays <b>System Self-test Now</b> <b>Testing</b> and <b>Memory Test Now Testing.</b> The test leds are illuminated.
The self-test is completed	All LEDs go back to their normal state. The ter- minal momentarily displays <b>System Self-test</b> <b>Tests</b> 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:

#### **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 5-8 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 shows 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 intake information from another TDU or TSU. This intaking 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 control 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.

# MENU FEATURES

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 *Telnet/Terminal Main Menu* on page 3-6.

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 Table 8-1 on page 8-3 for details. The telnet session will time-out after a predefined value that is also set in the **MANAGEMENT** menu.



Only one telnet session can be active at a 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:	



# **General Menu Operation**

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.

Table 3-1 on page 3-3 describe how to activate the alarm list option from the Status Menu.

Figure 3-2 on page 3-3 shows an example of basic menu travel.

Step	Action	Result
1	Activate the STATUS menu using the arrow keys or by pressing <b>1</b> .	The cursor will flash on the num- ber next to the activated selec- tion.
2	Press Enter.	The status submenus will dis- play.
3	Use the arrow keys to view submenu items.	
4	Choose an item on the submenu such as <b>ACTIVE ALARMS</b> .	The cursor will flash on the num- ber next to the activated selec- tion.
5	Press Enter.	The active alarm list will display.
6	View the Alarm List.	

### Table 3-1. Activating Alarm List from Status Menu



### Figure 3-2. Example of Basic MenuTravel

You can edit data fields preceded by a colon (:). To edit a data field, perform the steps in Table 3-2:,

## Table 3-2. Editing a Data Field

Step	Action	Result
1	Position the cursor on the sub- menu item number and press Enter.	The cursor moves to the data field (to the right of the sub- menu 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 dis- played in the data field position, press <b>Enter</b> to set that value. Another submenu field may be selected, or press <b>ESCAPE</b> to return to the submenu.	When the value is set, the cur- sor moves back to the sub- menu item position. 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 of 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 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: XXXXXXXX			
Main Menu			
<ol> <li>Status</li> <li>Config</li> <li>Util</li> <li>Test</li> <li>Remote Menu Access</li> <li>Management Config</li> <li>Flash Download</li> <li>Quit Session</li> </ol>			

Figure 3-3. Telnet/Terminal Main Menu



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 on page 4-1.

### **Config (Configuration)**

Displays 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 on page 5-1.

### Util (Utilities)

Displays and sets system parameters. For detailed information on utility options, see *Chapter 6*, Utility Menu on page 6-1.

#### 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 on page 7-1.

#### **Remote Menu Access**

Displays Telnet menus for a remote device. For detailed information, see *Remote Menu Access* on page 8-1.

#### **Management Configuration**

Displays management information. For detailed information, see *Management Configuration* on page 8-1.

#### **Flash Download**

Allows you to manually perform a Flash download. For detailed information, see *Flash Download* on page 8-6.

#### **Quit Session**

Terminates the telnet/terminal session.

# **FRONT PANEL**

The TDU 120e front panel monitors operation and controls the configuration of the unit. The TDU 120e front panel is shown in Figure 3-4.



Figure 3-4. TDU 120e Front Panel Layout

Descriptions of each part of the front panel follow.

# **ACO Switch**

The Alarm Cut-Off 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 reenergize.

# 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 EIA-232 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.

# **Network Status LEDs**

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

Network Status LED Display	Indicates that
OK (green)	the operation is in the normal mode and no errors have been detected.
Test (yellow)	the network interfaces is operating in a test mode. This includes a self-test or a test loop- back. When illuminated, this LED also indi- cates that normal data flow is not occurring on the network interface.
Error (red)	an error has occurred, such asBPV,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 <b>OK LED</b> acti- vates (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**

Port Status LED Display	Indicates that
OK (green)	the operation is in the normal mode and no errors have been detected.
T <b>est</b> (yellow)	one of the interfaces is operating in a test mode. This includes a self-test or a test loop- back.
	When illuminated, it 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 <b>OK LED</b> acti- vates (turns on).
	To view an alarm condition, select the active alarm menu item.
	If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the <b>UNIT HIS-</b> <b>TORY</b> 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.

#### 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	Explanation
1	Set the Unit ID using the Terminal or Telnet. 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	Explanation
1	Set the Unit ID and set a passcode. See <i>Set Passcode</i> on 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 *SNMP*, on page A-1, for more information.

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

Step	Explanation
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 Terminal mode.
3	Load the appropriate MIB browser into the Net- work Management Station. The MIB browser issues SNMP gets to and sets the TDU 120e. See the ADTRAN webpage at: http://www.adtran.com.

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



#### Figure 4-1. Status Menu Tree

Menu flow is normally 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 Performance Reports**

The Network Interface Performance Reports display the user copy of 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.

	15MIN/24 HR
%AS - %EF - ES - SES -	0.0/NA 0.0/NA 0/NA 0/NA
UAS -	900/NA

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 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 shown in Table 4-1.

Error Type	Description
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

Table 4-1. NI Error Types

# **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**.

The display in Table 4-2 on page 4-3 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* on page C-1.

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

### Table 4-2. Alarm Message Display

ACTIVE ALARMS NETWORK (NI) NETWORK (NI) END OF LIST

LOSS OF SIGNAL RED ALARM

## **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, TD, and RD, along with other signal lines. When a port is selected, the terminal indicates if the signal is present.

The base Nx interface offers 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.

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 Figure 5-1 on page 5-2.

Menu flow is normally 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.

## Figure 5-1. Configuration MenuTree

		6) UBRITE	5) CONTROL PORT		
		6) SET LINE BUILD OUT	6) IP ADDRESS		
	1) NETWORK (NI)	7) INBAND L00PBACK	7) SUBNET MASK		
		8) BIT STUFFING	8) DEFAULT ROUTER		
	2) UNIT		9) SLIP RATE		
			10) SLIP FLOW CONTROL		
	3) MAP EXCHANGE	OFF	11) PROXY TRAPS		
	4) MAP IN USE		-	1) MAP A @:HH:MM	
		AUTO		2) MAP B @:HH:MM	_
					_
3) CONFIG	5)DS0 MAPS	1) COPY MAP A TO TEMP MAP			
		2) COPY MAP B TO TEMP MAP			
		3) CREATE TEMP MAP		1) DSO RATE	
		4) REVIEW MAP A		2) TX CLK CONTROL	_
		5) REVIEW MAP B		3) DATA	_
		6) REVEIW TEMP MAP		4) CTS	_
		7) EDIT TEMP MAP		5) DCD	_
		8) APPLY TEMP MAP TO MAP A	1) Nx56/64 CONFIG	6) DSR	_
		9) APPLY TEMP MAP TO MAP B		7) "0" INHIBIT	_
				8) INBAND MODE	_
		1) Nx/DBU (0.1)		9) TX CLK SOURCE	_
					_
			2) DBU CONFIG	1) BACKUP MODE	
	6) PORT CONFIG			2) BACKUP ON	
		2) DS-1 (0.2) OPTION PORTS	1) FORMAT	3) PATTERN VERIFY	
			2) CODE	4) BACKUP DELAY	
			3) YELLOW ALARM	5) RESTORE DELAY	
			4) LINE LENGTH	6) RETRY DELAY	_
			5) INBAND L00PBACK	7) NUM RETRIES	_
			6) ROB BIT SIGNL	8) BACKUP TESTING	1) BACKUP TEST
			7) RBS START	9) WKEND LOCKOUT	2)TEST HOUR
			8) RBS END	A) ENABLE HR	3)TEST DAY
				B) DISABLE HR	
				C) TRAP IN DBU	_

1) CONTROL PORT RATE

2) TRAPS

3) ACCESS

4) INIT MODEM

1) FORMAT 2) CODE

3) YELLOW ALARM

4)TRANSMIT PRMS

5) TIMING MODE

# **NETWORK (NI)**

This menu item accesses the configuration of parameters associated with the network interface in the base unit. There are eight 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 Passthrough, etc.).

# Network (NI) Menu Items

### FORMAT

Sets the frame format for the NI. Choices: D4 and ESF.



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 network from the NI. See *TDU 120e Clock Sources* on page 5-4 for a description of the timing choices.

Choices: Network, Base DTE, Base DS-1, Normal (CSU), U-BR1TE, Internal, and Secondary (SI).

#### TDU 120e Clock Sources

NOTE

The TDU 120e is operable from various clock sources, permitting it to perform properly in many different applications. Set the network interface clocking options with the clocking options set by the Network (NI) Configuration menu options.

The following clock source options are available:

- Network Timed
- Base DS-1
- Base DTE Timing
- Internal Timing
- Secondary Timing
- Normal (CSU)
- U-BR1TE

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 5-2.



Figure 5-2. Network Timed Clock Source

#### Based 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 5-3.





#### 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 5-4.



Figure 5-4. Base DTE Timing Clock Source

#### **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 5-5.





#### **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 5-6.



#### Figure 5-6. Secondary Clock Source

#### Normal (CSU) Timing

The typical timing option arrangement is shown in Figure 5-7. 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. This is the preferred mode for use with a PBX application.

This timing mode works equally well when the PBX is the source of timing. In that configuration the network would not be providing timing.



Figure 5-7. Normal (CSU) Timing

NOTE

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

### **U-BR1TE**

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

### Set Line Buildout

Selects the line build-out 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** In order to activate the -36 dB receiver sensitivity, the LBO should be set to **AUTO**. This feature 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**.

#### Inband Loopback

Sets unit to accept or reject the network interface loop-up and loop-down codes as defined in ANSI T1.403. Choices: Accept or Reject.

## 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.

# 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 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 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: Industry standard and Custom Initialization String

### **Control Port**

Selects the TCP/IP physical interface; Normal (10BaseT Ethernet) or SLIP using the EIA-232 serial port. Choices: Normal or SLIP



If this option is set to SLIP, the EIA-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 IP interface setting.

### Subnet Mask

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 IP interface 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 IP interface 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, 4800, 9600, 19200, 38400

### **SLIP Flow CTL**

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 traps are forwarded to the IP Interface from units being "proxied" for. Choices: Enable, Disable

# 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.

## Αυτο

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

Explanation:

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 Maps**

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 5-8.

	TEMP M	٩P	
DS0# 1 2 3 4 5 6 7 8 9 10 11 12	PORT IDLE IDLE IDLE IDLE IDLE IDLE IDLE IDLE	DS0# 13 14 15 16 17 18 19 20 21 22 23 24	PORT IDLE IDLE IDLE IDLE IDLE IDLE IDLE 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 5-8. 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**

Map configuration involves these steps.

Step	Explanation	
1	Intializes the Temp map to one of three configurations (current Map A, current Map B, or all IDLES). This step is optional.	
2	Edits the Temp map so that it reflects the desired map configuration.	
3	Replaces 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 cur- rent 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 or space bar to scroll through the possible port selections.	To restore the previous port assign- ment and return to the DS0 field, press <b>ESC</b> . To save the current selected port and return to the DS0 field, press <b>Enter</b> . When the cursor is again located in the Temp map DS0 field, press <b>ESC</b> a sec- ond time. 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; then apply the Temp Map to Map B. See Figure 5-9.



Figure 5-9. 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 are listed below.

#### Copy Map A (B) to Temp Map

Copies the current map Å (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** is used to select and configure 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 use of this menu item.

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

#### Nx/DBU (0.1) Menu Items

#### Nx/DBU (0.1)

The Nx/DBÚ port has two main menus:

Nx56/64 config -- Nx operation

DBU config -- DBU operation

Under Nx56/64 config, the menu items are:

#### **DSO** Rate

This sets the base 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) or Force On

### DCD

Data Carrier Detect. Indicates to the DTE when a valid signal is being received at the Network Interface. Choices: Normal (see Table 5-1) 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) or Force On

#### "O" INHIB

The Nx interface will detect an uninterrupted string of zeros (0s) being transmitted toward the network. If 0s are transmitted for >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 and SNMP) between units. This is accomplished by using 8 kbps of the first DS0 assigned to that particular Nx56/64 port. If in 56 K mode, no data bandwidth will be used. Inband must also be enabled at the destination 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. Default: Internal.

If the application requires that the DTE device provide 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						

This table indicates conditions which cause the Port Control Signals to be deactivated.

#### **Dial Backup Configuration**

Under Dial Backup (DBU) configuration, 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 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 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

For these items to function properly, verify that the time and date in the TDU are set correctly. See Time/Date on page 6-2 for information on setting the time and date.

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

NOTE

#### 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 (INBANK LPBACK)

In-band Loopback sets the base DS-1 to accept or reject inband loop-up 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 (for example, 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 (for example, PRI).

For applications requiring robbed-bit signalling as well as a messaging channel (such as 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. The **UTILITY** menu tree displays and sets system parameters. See Figure 6-1. This includes setting the time and date, resetting all parameters to factory values, or re-initiating the unit. This menu also displays the unit software revision and the unit ID setting.

		TIME: HH:MM:SS	
	1) TIME/DATE	DATE: MM/DD/YY	
		(Returns all configurations	
	2) FACT RESTORE	to factory settings)	
	3) SET PASSCODE	NEW PASSCODE	VERIFY PASSCODE
3) UTIL			
	4) UNIT ID		
	5) SOFTWARE REVISION	(Displays Current	
		Software Revision	
		DS-1 (0.2)	
	7)ETHERNET ADDRESS	(OPTION PORTS)	

#### Figure 6-1. Utility Menu Tree

Menu flow is normally 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 <b>Enter</b> (this records the entry and moves to the next editing position).
Move to a different field to edit	Press <b>Enter</b> at the editing position without making any changes, or use the up and down arrow keys.
End the editing process	Press Escape.

## **Factory Restore**

This menu item restores the factory default settings for all unit parameters, including configured DS0 maps. The control port rate, Passcode, Unit ID, and IP parameters are not affected by the Factory Restore command.

A factory reinitialization can 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 **SET PASSCODE** on the **UTILITY** menu.

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 Customer Service for assistance.

#### 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.

If the under the second second

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 Customer Service 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 customer service or when updates are needed.

## **Ethernet Address**

Displays the Ethernet Mac address for the 10BaseT port.

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

.

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

#### Figure 7-1. Test Menu Tree

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

Menu flow is normally 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.

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 commands, or remotely by using special in-band codes (AT&T D4 network loop-up and loopdown 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 on page 7-3. 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 Loopbck

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 loop-up 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 a FT1 loopback using the inband code described in T1.403.

#### No Loopback

Deactivates the loopback.



*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 Pattern**

#### 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.

For an example, perform the following steps:

Step	Action
1	Select QRSS ALL DS0s.
2	Press <b>Enter</b> 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 <b>None</b> .

#### Pattern Result

Displays the results of the test currently active. The process of 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.

To run an end-to-end test on Fractional DSOs, complete the following steps:

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

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**

NOTE

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 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 pat- tern through an on-board loop)
Unit level tests	Unit level tests consist of:
	Front panel LED verification Phase Lock Loop verify Board-to-board interface test

A test pattern is sent from the controller through a loopback 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.

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.

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

#### Port Test Menu Items Nx/DBU (0.1)

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:

#### PORT/LOCAL

The Nx port activates both a Local loopback (back toward the DTE) and a Port loopback when either is invoked.

#### REMOTE

The remote loopback causes a channelized 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.



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.

#### ΟΝ

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

#### ΟΝ

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.

#### FORCED 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) Option Ports

#### 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.

## 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. Press **CTRL + X** to terminate the session and return 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.
- This table 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 on page 8-2).

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.



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

	Ur	it Access Table_		
Unit ID	Passcode	Туре	Polled	Poll Status
20	DEFAULT	Standard	No	
3	0033	Standard	Yes	UP
б	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

Table 8-1 on page 8-3 describes each command of the Unit Access Table.

Table 8-1.	Unit Access	Commands
	01111/100000	oominanao

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:
	<i>Standard</i> (which supports any TSU/TDU Multiplexer and the ISU 512), or <i>TSU Standalone</i> (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).
	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 config- ured 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.
ок	Returns to the <b>ConFigure Agent</b> 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.) 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 NMSs 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, 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. The System Name is displayed at the top of each menu in telnet and terminal mode with the exception of the map editing menu.

#### **System Contact**

A text string containing the name, phone number, etc. 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

(DISABLED, ENABLED: defaults to DISABLED) 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.

#### 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.

#### **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.

NØTE

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.



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.

## ABOUT 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.

## **Network Manager 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.

### **Network Messages**

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.

For example:

lf	Then
The Read community name configured in the TDU 120e is <b>public</b> ,	Specify <b>public.3</b> 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 <i>Unit Access Table</i> on page 8-1, 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 generateTrap 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. <i>For example</i> : If the administrator is managing TDU 120e and ISU 512 devic- es, 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 ap- pended. See <i>TDU 120e SNMP Access</i> on page A-3 for more informa- tion.
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 from the ADTRAN anonymous ftp site (ftp.adtran.com), or by dial-up from the BBS (256 -963-8169). The MIB files are also located on the ADTRAN website at http://www.adtran.com.

## **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.

|--|

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

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

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

### **Control In/Chain In**

This is used as an EIA-232 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 I	n/Chain In Pinout
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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

### **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 EIA-232 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

Pin	Name	Description
Α	101	Protective ground (PG)
В	102	Signal ground (SG)
С	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
Т	104	Received data (RD-B) to DTE
V	115	RX clock (RC-A) to DTE
Х	115	RX clock (RC-B) to DTE
Р	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

Table B-6. V.35 Pinout for Nx56/64	DTE
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\*(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 for the pinout of the female 15-pin D-Connector.

Pin		Name	Description
1	R1	TXDATA-RING	Send data toward the DTE (PBX)
2	T1	TXDATA-TIP	Send data toward the DTE (PBX)
3		UNUSED	_
4	R	RXDATA-RING	Receive data from the DTE (PBX)
5	Т	RXDATA-TIP	Receive data from the DTE (PBX)
6, 7, 8		UNUSED	—

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

Table B-8.	Base DS-1	Pinout of the	15-Pin F	emale [	D-Connector
		i mout or the	10 1 111 1	Cilluic L	

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

### 10BaseT

10BaseT is used to connect the TDU 120e to the local area network.

Connector Type (USOC): Shielded 8-pin, modular

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

Table B-9. 10BaseT Ethernet Connector

### Alarm

This is used to connect the TDU 120e to an external alarm device.

Connector Type: 4-pin, Eurostyle connector

Table B-10.	External Alarm	<b>Device Connector</b>
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Pin	Name	Description
1	NC	Normally closed
2	NO	Normally open
3	СОМ	Common
4	GND	Connected to unit chassis

Table B-11.	Power	Connector	(for	DC	powered	units)
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Pin	Name	Description
1	+	+24 or +48 VDC
2	_	-24 or -48 VDC

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

### ALARM MESSAGES

Network Interface	See Table C-1 on page C-2.
NxDBU Interface	See Table C-2 on page C-2.
DS-1 (PBX) Interface	See Table C-3 on page C-3.

### STATUS MESSAGES

Network Interface (NI)	See Table C-4 on page C-3.
NxDBU Interface	See Table C-5 on page C-4.
DS-1 (PBX) Interface	See Table C-6 on page C-4.

Alarm Name	Description
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

#### Table C-2. Nx/DBU Interface Alarms

Alarm Name	Description
Clock Slip	Difference in frequency of the data clock at the net- work 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)

#### Table C-3. DS-1 (PBX) Interface Alarms

Alarm Name	Description
Red Alarm	Not able to frame data coming to the DS-1 inter- face; 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

Table C-4. Network Interface (NI) Status Messages

Name	Description
Payload On	Payload loopback activated
Line On	Loopback off
Loopback Off	All loopbacks deactivated
Factory Restore	Factory setting restored
Power On	Unit powered on
Self-Test	Internal self-test performed

Table C-5. Nx/DBU Interface Status Mes
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Name	Description
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 re- mote device
511 Pattern On	Sending 511 pattern towards the network inter- face
Loop Down	Data is no longer looped back at the network inter- face or DTE interface
511 Pattern Off	No longer sending 511 pattern towards the net- work interface

#### Table C-6. DS-1 (PBX) Interface Status Messages

Name	Description
Frame Slip	Indicates a Frame Slip has occurred on the DS-1 in- terface. This is present in Alarm History only
Line Loop Up	Line loopback activated
Port Loop Up	Port loopback activated
Loopdown	Loopback has been deactivated

### **ELECTRICAL SPECIFICATIONS**

#### Table D-1. T1/FT1 Interface

Name	Description
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)
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

Table D-2. Nx/DBU Interface - Port 0.1-Nx56/64 (V.35	Interface)
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Name	Description
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 consecu- tive zeros from DTE. User selectable (On/Off)
CTS, DCD, DSR	Normal or Force On
Connector	Winchester (V.35) female (on the Y cable)

#### Table D-3. DS-1 Interface - Port 0.2

Name	Description
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
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

#### Table D-4. Chain In/Out Ports & Craft Port

Name	Description
Interface Devices	PC Serial Port, Modem or SLIP connection to router
Interface Type	RS-232
Data Rates	1200, 2400, 9600, 19200, 38400
Data Format	RS-232 N81
Protocols	T-WATCH/ADLP, ATEL/ADLP, TCP/IP/SLIP
Connector	8-pin, modular

#### Table D-5. 10BaseT Interface

Name	Description
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

#### Table D-6. Option Slot Interface

Name	Description
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.



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

### **Environmental Specifications**

Input Power

AC powered devices: 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

#### Α

AC powered units, TDU 120e 2-2 ACES help desk xi affidavit connection for digital services, v connection of CPE equipment, vi alarm messages, C-1 alarms 4-3 applications support how to contact xi architecture for option modules, 1-4 в base DTE timing (clock source), 5-5 bit stuffing, 5-8 Board level tests, 2-7 Board-to-Board Interface Test, 2-7 С cables included with shipment, 2-1 provided by customer, 2-1 Canadian emissions requirements, viii Canadian equipment limitations, ix CAPS department how to contact xii Chain B-3 chain in/chain out with PC or modem, 2-9 chain-in port, 2-8 change/set passcode, 6-3 clear port alarm, 4-6 clock sources, 5-4 Commands, network manager A-2 configuration applications, 1-5 configuration menu tree 5-2 **Connector Pinouts B-1** control port, 2-8 CSU timing, 5-7 Customer extended service plan xi customer service xi customer service plans ACES xi D

data fields

how to edit, 3-4 data port identification. 3-5 dial backup configuration, 5-18 DS0 map creating a DS0 map, 5-12 DS0 maps configuration menu, 5-11 DS0 maps, 5-11 DS0 temp map, 5-11 DS-1 menu items, 5-20 DS-1 option ports, 7-11 DS-1 timed clock source, 5-5 Е

electrical specifications D-1 environmenta specifications, D-5 ethernet status, 4-7 F

factory restore, 6-2 FCC radio frequency interference, viii FCC regulations, iv features. 1-2 flash download. 8-6

#### G

grounding instructions 2-2 inband loopback, 5-8 initialization. of unit. 2-8 internal clock source, 5-6

#### L

leased line, service type, iv line buildout 5-7 local loopback, 7-3 Loopback tests 7-5 loopback tests, 7-2 lost passcode, 6-3 Μ main menu items and descriptions, 3-7

management configuration menu, 8-1 map exchange menu, 5-10 map in use menu, 5-11 menu how to select and activate, 3-2

menu features. 3-1 menu operation, 3-2 Menu Structure 3-6 Message, network manager A-2 Ν network connectors B-1 network interface errors 4-3 network interface loopback, 7-2 network performance reports 4-2 Network Status LEDs 3-9 network tests. 7-2 network timing, 5-4 Network, wiring B-1 Ο overview. 1-1 Ρ passcodes, 2-8 pattern generation 7-5 pattern result of active tests, 7-6 PC control program, 3-11 pinouts 10BaseT ethernet connector, B-6 8-pin modular connector, B-1 base DS-1 for 12-pin female D-connector, Bbase DS-1 for 8-pinout modular connector, B-5 chain-out. B-3 control in/chain in, B-2 craft port. B-3 DC powered units, B-6 external alarm device, B-6 network pinout-male 15-pin connector, B-2 V.35 for Nx56/64, B-4 port configuration menu, 5-15 port control signals normal operation, 5-15 Port Status LEDs 3-10 port status. 4-4 port test menu, 7-8 port utility 6-4 post-sales information xi power connection for AC powered units, 2-2 for DC powered units, 2-2 power-up procedure, 2-10 Power-Up Testing 2-7

presales inquiries how to contact xi product support information xi product warranty x Q QRSS patterns 7-5 R RAM and EPROM Test. 2-7 rear panel layout, 2-4 receipt inspection, 2-1 remote loopback, 7-3 remote menu access, 8-1 remote port, 4-6 Remote/Management menu 8-1 REN/SOC information. iv repair and return information xii RMA requests xi router, PBX, video conferencing application, 1-5 run self test. 7-7 S safety instructions iii secondary clock source, 5-6

self-test, for TDU 120e unit at power-up 2-7 set passcode, 6-3 shipments include 2-1 shipping damages, 2-1 SNMP Agent. A-1 basic components, A-1 MIB browser configuration, A-5 MIB files. A-6 MIB. A-1 network manager commands, A-2 network manager, A-1 network messages, A-2 trap configuration, A-4 SNMP access. A-3 SNMP MIB Browser Configuration A-5 SNMP read community, 8-4 SNMP read/write community, 8-4 SNMP trap community, 8-4 SNMP Trap Configuration A-4 SNMP. about. A-1 software revision 6-4 specifications environmental. D-5 status menu tree 4-1 status messages, C-1

#### Т

TDU 120e features. 1-2 TDU 120e Interfaces 2-5 TDU 120e overview, 1-1 technical support xi telnet/terminal main menu, 3-6 temp map copying, 5-14 how to edit. 5-13 initializing, 5-12 terminal screen with main menu. 3-2 Test Menu Tree 7-1 test menu. 7-1 test patterns, 7-4 tests pattern generation 7-5 QRSS patterns 7-5 training information how to contact xii

T-Watch Pro 3-11 setting up over LAN, 3-11 with EIA-232 connection, 3-12 U U-BR1TE timning selection, 5-7 Unit 6-3 unit access commands, 8-3 unit access table creating and editing, 8-1 unit ID 2-8, 6-4 how to set up, 6-4 unit ID menu. 6-3 Unit level tests, 2-7 unit menu. 5-8 utility menu, 6-1 V view history, 4-4 w warranty x