ADTRAN

TSU 100 & TSU 100e

User Manual

**Part Numbers
1202052L1
1202052L2**

Trademarks:

Windows is a registered trademark of Microsoft Corp.
T-WATCH Pro is a trademark of ADTRAN, Inc.
OpenView is a trademark of Hewlett Packard
SLC 96 is a trademark of AT&T

ADTRAN Year 2000 (Y2K) Readiness Disclosure

ADTRAN has established a Year 2000 program to ensure that our products will correctly function in the new millennium. ADTRAN warrants that all products meet Y2K specifications regardless of model or revision.

Information about ADTRAN's Y2K compliance program is available at the following locations:

ADTRAN Web Site	www.adtran.com
Product Matrix	www.adtran.com/y2kfax.html
Faxback Document Line	(256) 963-8200 *Y2K plans and product certifications are listed in the matrix.*
Y2K Project Line	(256) 963-2200
E-mail	year2000@adtran.com

Notes provide additional useful information.

Cautions signify information that could prevent service interruption.

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

FCC regulations require that the following information be provided to the customer

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 TSU 100 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 TSU 100, please contact ADTRAN 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

Federal Communications Commission Radio Frequency Interference Statement

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

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

CAUTION *Changes 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

NOTE

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

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

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

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

WARNING

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

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

The ringer equivalence number (REN) assigned to each terminal adapter is used to determine the total number of devices that may be connected to each circuit. The sum of the RENs from all devices in the circuit should not exceed a total of 5.0.

**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 voiceband analog signals 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 specifications.

- End user/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 services.

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

AFFIDAVIT FOR CONNECTION OF CUSTOMER PREMISES EQUIPMENT TO 1.544 MBPS AND/OR SUBRATE DIGITAL SERVICES

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

State of _____

County of _____

I, _____ (name), _____

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

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

( )I attest that all operations associated with the establishment, mainte-
nance, and adjustment of the digital CPE with respect to analog content
and encoded 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 ana-
log content and billing information has (have) been trained to perform
these functions by successfully having completed one of the following
(check appropriate blocks):

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

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

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

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

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

_____Signature

_____Title

_____ Date

Transcribed and sworn to before me

This _____ (Month/Day/Year)

_____

Notary Public

My commission expires:

_____

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 bath tub, 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 INSTRUCTIONS

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specifications or if it fails while in service. For detailed warranty, repair, and return information, see the ADTRAN Equipment Warranty and Repair and Return Policy Procedure.

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For Service, RMA requests, or more information, contact one of the numbers found at the inside back page of this manual.

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Chapter 1   Introduction

TSU 100 OVERVIEW

This manual covers the use of the following products:

- TSU 100
- TSU 100e

Unless otherwise stated, the TSU 100 refers to both products.

The TSU 100 is a T1/FT1 multiplexer with an Nx56/64 V.35 data port, one option slot and embedded SNMP management. The TSU 100e also offers a built-in dial back-up feature for the Nx port. The TSU 100's option slot accepts one of many available option modules for voice and data applications.

The TSU 100 serves as the link between user data sources such as local area network (LAN) bridges and routers, computers, CAD systems, teleconferencing equipment, and PBXs. Through the use of multiple data ports, the TSU 100 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 automatically change 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 TSU 100 offers a variety of network management options. You can manage via SNMP through the 10BaseT (TSU 100e only) or chain-in ports. If you are using T-WATCH Pro, a Microsoft Windows® program, you can manage the TSU 100 via the same 10BaseT (TSU 100e only) or chain-in ports. An enhanced VT-100 terminal interface is also provided.

Standard Features in the TSU 100

The following list describes the standard features in the TSU 100.

- A single T1 interface
- A Nx/DBU V.35 port (DBU in TSU 100e only)
- 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 in a liquid crystal display (LCD) window operated by a front panel keypad
- Two programmable configuration maps that define the bandwidth allocation between data ports
- Flash memory for software updates
- Selectable timing from the network, from the Nx56/64 port, internally, or from a secondary interface
- SNMP, Telnet, and T-WATCH Pro management via SLIP or 10BaseT (TSU 100e only)
- Ability to proxy for *agentless* units
- Enhanced terminal mode
- QRSS; 511 test patterns using Nx option
- Fractional T1 loopbacks as defined in Annex B of ANSI T1.403-1995
- Extensive self-testing and monitoring that ensures proper operation

TSU Option Modules

Table 1-1. TSU 100 Option Modules

Option 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 DS1 interface. It can also be used as a second DS1 interface to provide up to a 3 MB aggregate throughput.
Nx/DBU 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.
DSU DP	Provides two sync or async ports (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.
Router	Provides 10BaseT Port and integrates IP/IPX routing.
NxIQ	Provides Frame Relay monitoring capabilities.

Option Module Architecture

The TSU 100 features a unique architecture that allows you to add option modules and plug-on boards to accommodate additional applications. See Figure 1-1. This unique approach allows you to mix interface types to meet any application.
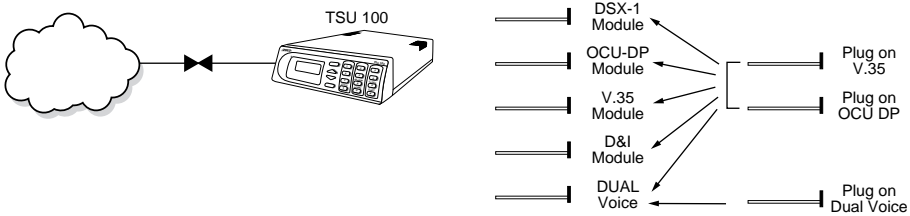
Figure 1-1. TSU 100 Option Modules

TSU 100 CONFIGURATION APPLICATIONS

The following examples illustrate possible configurations of TSU 100 applications.

Router, PBX, Video Conferencing Application

In this application, the base Nx56/64 provides a V.35 interface to a router. An OCU DP module and OCU DP plug on board provide two switched 56 circuits for video conferencing. The 10BaseT (TSU 100e only) port allows SNMP network management over the LAN. See Figure 1-2.
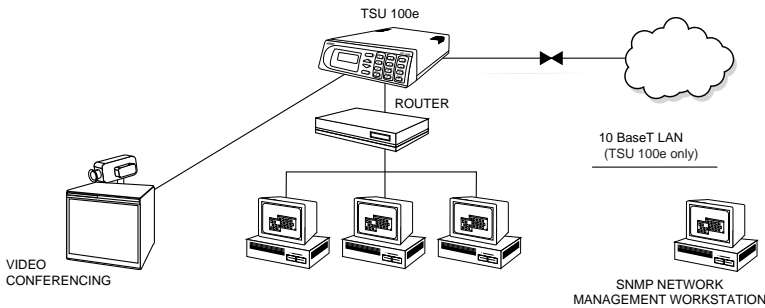
Figure 1-2. Router, PBX, Video Conferencing Application Set Up

Chapter 2   Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the TSU 100 for any shipping damages. If you suspect damage, file a claim immediately with the carrier and then contact ADTRAN Customer Service (see inside last page of this manual). If possible, keep the original shipping container for use in shipping the TSU 100 back for repair or for verification of damage during shipment.

ADTRAN Shipments Include

- The TSU 100 or TSU 100e
- A line interface cable: an 8-position modular to 8-position modular (15 ft.)
- A DB 25-to-modular adapter
- An 8-position modular cable for connection to the chain-in port (6 ft.)
- The *TSU 100 & 100e User Manual*

Customer Provides

- Cables for any expansion modules to be used with the TSU 100
- 10BaseT cable for connection to a LAN or router, if you plan to use remote management features (TSU 100e)

Power Connection

Each TSU 100 is equipped with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle.

CAUTION *Power to the TSU 100 must be from a grounded 90-120 VAC, 50/60Hz source.*

GROUNDING INSTRUCTIONS

Grounding instruction information from the *Underwriters' Laboratory UL 1950 3rd Edition*, is 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, and the equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

A supplementary equipment grounding conductor shall be installed between the product or system and ground that is in addition to the equipment grounding conductor in the power supply cord.

The supplementary equipment grounding conductor shall not be smaller in size than the ungrounded branch-circuit supply conductors. The supplementary equipment grounding conductor shall be connected to the product at the terminal provided, and shall be connected to 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.

Bare, covered, or insulated grounding conductors are acceptable. A covered or insulated grounding conductor shall have a continuous outer finish that is either green, or green with one or more yellow stripes.

The supplemental grounding conductor shall be connected to the equipment using a number 8 ring terminal. The terminal should be fastened to the grounding lug provided on the rear panel of the equipment. The ring terminal should be installed using the appropriate crimping tool (AMP P/N 59250 T-EAD Crimping Tool or equivalent).

Identification of Rear Panel Layout

The configurations of the rear panels of the TSU 100 and the TSU 100e are shown below in Figure 2-1 and Figure 2-2.
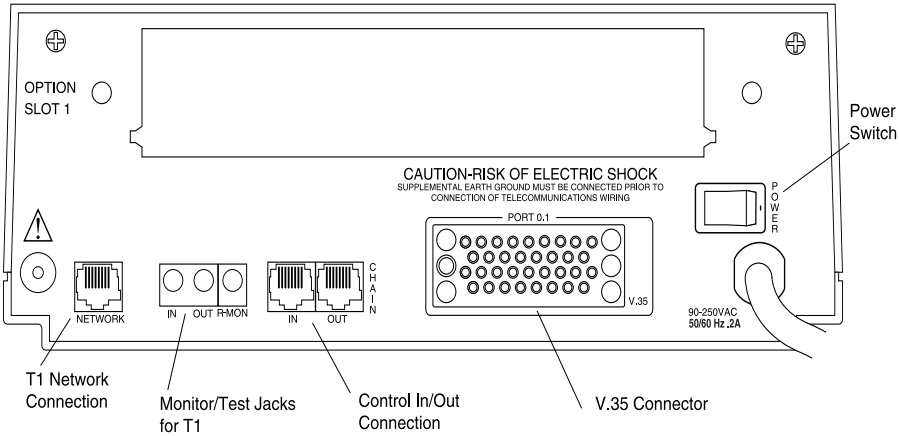
Figure 2-1. TSU 100 Rear Panel
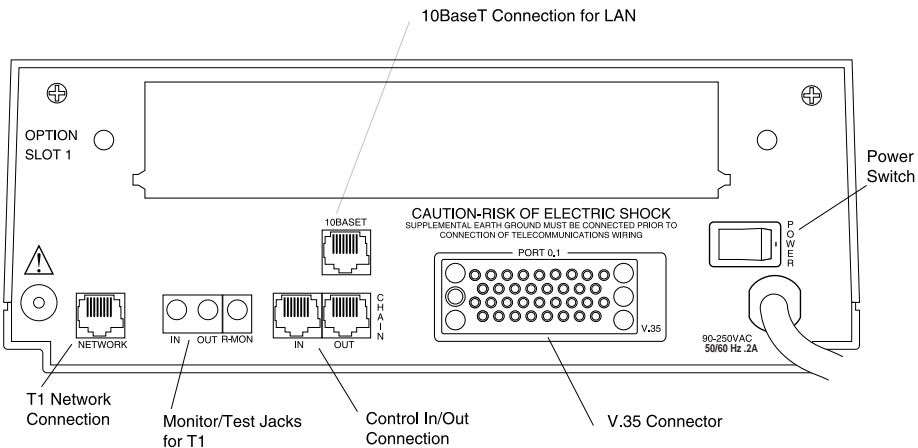
Figure 2-2. TSU 100e Rear Panel

TSU 100 Interfaces

The TSU 100 is equipped with a Nx56/64 data port, an option slot, management interfaces, and a T1 interface, in the rear panel. See Figure 2-3.
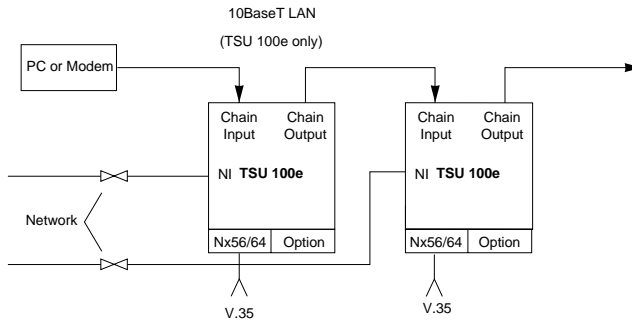
Figure 2-3. TSU 100 Interfaces

Network Interface

The Network Interface (NI) port provides the connection to the T1. This port complies with the applicable ANSI and AT&T standards. For more information see *Appendix C, Wiring on page C-1.*

Network Test Interface

The **In and Out test jacks** for the network interface provide intrusive test capability for the incoming T1. By connecting to these jacks with test equipment, the T1 connection will be broken, and the test equipment will terminate the incoming T1. The **R-MON test jack** provides a bridged access jack for non-intrusive monitoring of the incoming T1. When connected to this jack, the test equipment should be configured for a bridged termination.

Nx/DBU Serial Interface (TSU 100e only)

The Nx/DBU 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. (DBU in TSU 100e only.)

Chain Port Input

The control port input provides an EIA-232 input from a PC or a modem for control of the TSU 100. You can also use it as a chain input from another TSU 100e or the TSU 100. For more information see *Appendix C, Wiring on page C-1.*

Chain Port Output

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

10BaseT Interface (TSU 100e only)

The 10BaseT interface provides the LAN interface for managing the TSU 100 with SNMP or T-WATCH Pro. For more information see *Appendix C, Wiring on page C-1.*

Power Up Testing

When shipped from the factory, the TSU 100 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 front panel, and a passcode and Unit ID may be set using the **UTIL Menu**.

Self-Test

Upon a power-up, the LCD displays **Memory Test Now Testing** and the test LEDs are illuminated. When the self-test is completed with no failures detected, the OK LED lights up and the LCD momentarily displays **Memory Test(s) Passed**. If a failure is detected, a list of failures is displayed in the LCD window.

Initialization

Set User Passcode

The TSU 100 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 Menu on page 6-5* for details.

Set Chain Port

The TSU 100 can be configured from the chain-in port when either T-WATCH Pro, SNMP, or the terminal interface is being used. If the chain-in port is to be used, the chain-in 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 chain-in port baud rate from 9600 (factory default), 1200, 2400, 19200, or 38400 must be made using the Unit Configuration menu. See *Unit Menu on page 5-11* for details.

Unless locked out externally, the front panel can also control the unit.

Chain-In/Chain-Out

TSU 100 units and other TSUs can be linked together to form a chain. Figure 2-4 provides an example of a chain-in arrangement with a PC or a modem. The first TSU 100 in the chain receives controlling input from the PC or modem.
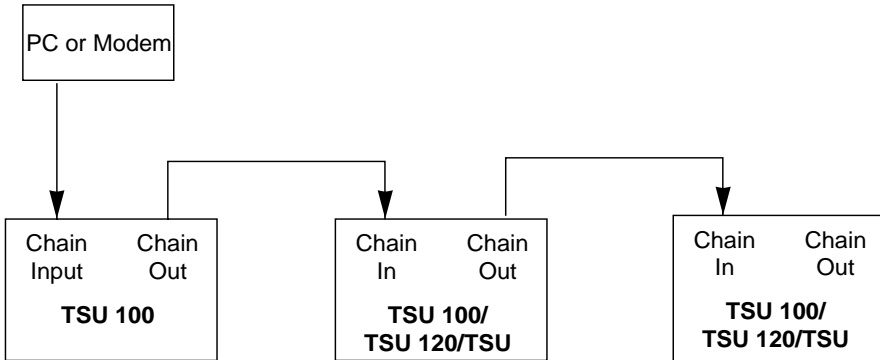
Figure 2-4. Example of Chain-In

Subsequent TSUs in the chain are in a position to intake information from another TSU. This in-taking of information from another TSU 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 that 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, the subsequent power-up procedures include only the power-up self-test followed by the request for a passcode (password) if this option was selected during initialization.

Use the **Number Keys** to enter the previously recorded passcode, and then press **Enter**.

Chapter 3   Operation

FRONT PANEL

The TSU 100 front panel monitors operation and controls the
configuration of the unit. The TSU 100 Front Panel is shown in
Figure 3-1 on page 3-3. Descriptions of each part of the front
panel follow.

Table 3-1. Front Panel Descriptions

Name	Description
LCD Window	Displays menu items and messages in two lines by 16 characters. It also displays alarm and status information.
Enter Key	Selects active menu items. To select a menu item, press the number of the item. The menu item flashes, indicating it is activated. Press Enter to select the menu item.
Up and Down Arrows	**Up** and **Down Arrows** scroll through and activate the submenu items available in the current menu. When the submenu items are scrolled, the flashing cursor indicates the active parameters.
Cancel Key	Pressing the **Cancel** key stops the current activity and returns to the previous menu. Repeat until the desired menu level is reached. When a submenu item is displayed, press **Cancel** to exit the current display and return to the previous menu.
Numeric Keypad	The numeric keypad contains the numbers **0** through **9** which are used to activate menu items and enter information (such as the IP address).

Table 3-1. Front Panel Descriptions

Name	Description
Shift (entering special function keys)	Enter special function keys by *pressing* and *holding* **Shift** before pressing the key representing the desired character. See *Operation Keys on page 3-6* for a description of the function keys. To activate a special function key rather than a number, press **Shift** and then the button. If a key is pressed without using **Shift**, the numbered item becomes active instead of the special function key.

LED Descriptions

CSU Status LEDs

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

Name	Description
OK (green)	Indicates the operation is in the normal mode and no errors have been detected.
Test (yellow)	Indicates that the network interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring on the network interface.
Error (red)	Indicates an error such as a **BPV, OOF**, or **CRC**.
Alarm (red)	Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the **OK LED** activates (turns on). To view an alarm condition, select the active alarm menu item or select **Alarm** by pressing **Shift 8**. 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.

Figure 3-1. TSU 100 Front Panel

No.	Description	Action/Status
1	LCD Window	Displays menu items and messages in 2 lines by 16 characters.
2	Up and Down Arrows	Scroll through and activate the submenu items available in the current menu. The flashing cursor indicates the active parameter.
3	Enter Key	Selects active item.
4	Alarm	Quick access to the active display menus.
5	Clear	Clears data/results fields.
6	Shift	Provides access to special function keys.
7	OK (DSU Status)	Operation is in normal mode with no detected errors.
8	Test (DSU Status)	Active when the module is in test mode.
9	Alarm (DSU Status)	Active when an alarm condition has been detected.
10	OK (Module Status)	Operation is in normal mode with no detected errors.
11	Test (Module Status)	Active when the module is in test mode.
12	Alarm (Module Status)	Active when an alarm condition has been detected.
13	Cancel	Stops current activity and returns to the previous menu.
14	Copy	Copies last data entered into the current DSO.
15	OK (CSU Status)	Operation is in normal mode with no detected errors.
16	TEST (CSU Status)	Active when the network interface is in test mode.
17	Error (CSU Status)	Indicates errors such as BPV, OOF or CRC.
18	Home	Returns to the main menu.
19	Alarm (CSU Status)	Active when an alarm condition has been detected on the network interface.

DSU Status LEDs

The DSU status LEDs display the operational condition of the
Nx56/64 included in the TSU 100. It also reflects the status of
the DBU in the TSU 100e.

Name	Description
OK (green)	Indicates the operation is in the normal mode and no errors have been detected.
Test (yellow)	Indicates that one of the interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring in at least one of the module ports.
Alarm (red)	Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the **OK LED** activates (turns on). To view an alarm condition, select the active alarm menu item or select **Alarm** by pressing **Shift+8**. 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.

Module Status LEDs

The module status LEDs display the operational condition of ports installed in the option slots.

Name	Description
OK (green)	Indicates the operation is in the normal mode and no errors have been detected.
Test (yellow)	Indicates that one of the interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring in at least one of the module ports.
Alarm (red)	Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the **OK LED** activates (turns on). To view an alarm condition, select the **active alarm menu item** or select **Alarm** by pressing **Shift+8**. 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.

Operation Keys

Key	Description
Copy	Used in the DS0 mapping menu operations to copy the last data entered into the current DS0. This key operates without pressing the **Shift** key.
Home	Returns home to the Main Menu from any menu location.
Alarm	Used as quick access to the active alarm display menus. This can be activated while any other menu item is in use. When the Alarm Menu is exited, the unit returns to the location of the same menu that was active when **Alarm** was selected.
Clear	Used in various menus to clear **Data/Result** fields.

General Menu Operation

The TSU 100 uses a multilevel menu structure containing both menu items and data fields. All menu operations and data are displayed in the LCD window. The menu items are numbered and can be viewed by scrolling with the **Up and Down arrows**.

Name	Description
Data Field	You can edit menu items followed by a colon (:).
Display Only Field	You cannot edit menu fields followed by an equal symbol (=). This symbol identifies a field used for value display only.
Arrows	Menus that display small **Up** or **Down Arrows** in the lower right corner indicate there are more menu items than are visible on a two-line LCD. Access the additional items with the **Up** or **Down Arrows**. You can also access undisplayed menu items by using the appropriate menu number.

Select and Activate a Menu Item

To choose menu items, place the cursor on the desired menu item by pressing the number corresponding to the menu item or highlighting the menu item with the **Up** and **Down Arrow**.

The following example describes how to activate the Alarm List option from the **Status Menu**.

Step	Action
1	Activate the **Status Menu** using the **arrow keys** or by pressing **1**. The cursor will flash on the number next to the activated selection.
2	Press **Enter**.
3	View submenu items by using the **arrow keys**.
4	Choose an item on the submenu such as **ACTIVE ALARMS**. Select the submenu with the **arrow keys** or by pressing **3**.
5	Press **Enter**.
6	View the **ALARM LIST** by using the **arrow keys**.

	1) NI PERF RPTS	
	2) NI ERRORS	
	3) ACTIVE ALARMS	**(ALARM LIST)**
	4)VIEW HISTORY	END OF LIST
1)STATUS	5) PORT STATUS	
	6) REMOTE PORT	
	7) CLEAR PORT ALM	
	8) ENET STATUS	

Figure 3-2. Example of Basic Front Panel Menu Travel

Set the Data Field

To edit data fields preceded by a colon (:), do the following:

Step	Action
1	Position the cursor on the submenu item number and press **Enter**. The cursor moves to the data field, (to the right of the submenu item name).
2	Using the arrows, scroll to scan the available value settings. The value settings display one-at-a-time in the data field position.
3	When the desired value is displayed in the data field position, press **Enter** to set that value.
4	When the value is set, the cursor moves back to the submenu item position indicating the operation is complete.
5	Select another submenu field or press **Cancel** to return to the submenu.
6	Pressing **Cancel** before pressing **Enter** voids any data changes. The original data value is restored and the cursor returns to the submenu field.

Display Only Data Fields

Data fields preceded by an equal (=) symbol cannot be edited. To view information in this field, do the following:

Step	Action
1	Press **Enter** to move the cursor to the data field.
2	Use arrows to select **AUTO** and press **Enter**. The unit automatically sets the Line Build Out and the display field shows the value actually set. The equal symbol after LBO in the second line indicates the information that follows is displayed data and cannot be edited. See Figure 3-3 on page 3-9.
3	To exit the Menu Field Operation or display, press **Cancel** as many times as required to return to the desired menu level or press **Shift+Home** to return to the main menu.

.


```
6>SET LBO:AUTO          ——— Data Field

LBO=     0.0            ——— Display Field
```
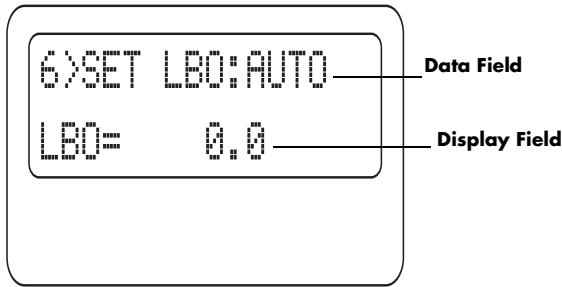
Figure 3-3. Display and Data Fields

Data Port Identification

When configuring the unit, menu selections will include options from data port submenus. Selection of data ports is necessary because the TSU 100 uses a Slot-Port method to iden-tify which data port the menu item is referencing. If a module containing a PBX DSX-1 option card with an Nx/DBU 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.

Nx/DBU=1.2

Where slot=1 and port=2.

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

The Nx56/64 port that is built into the TSU 100 is referenced as **Slot 0**, **Port 1**. On the TSU 100e, **Slot 0.1** is an Nx/DBU.

Front Panel Menu Structure

The TSU 100 uses a multilevel menu structure containing both menu items and data fields. All menu operations and data display in the LCD window.

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.

The front panel LCD of the Main Menu contains the following options:

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

Status Menu

The Status menu 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) Menu

The Configuration menu displays sets the TSU 100 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) Menu

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

Test Menu

The Test menu initiates different types of unit tests and displays test results in the LCD window. For detailed information on test options, see *Chapter 7, Test Menu on page 7-1*.

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 TSU 100 using a graphical interface. The T-WATCH Pro program displays the same status and performance data as the front panel LCD. This data is displayed in the form of tables and graphs.

The T-WATCH Pro program has the following capabilities:

- Interfaces with a modem which permits dialing into a re-mote TSU 100 location to configure the unit or read the sta-tus 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 (TSU 100e only).

T-WATCH Pro/LAN Connection

To set up the TSU 100 to work with T-WATCH Pro over the LAN, follow these steps:

Step	Action
1	Set the **Unit ID** and **Passcode** using the front panel. See *Unit ID Menu on page 6-5* for details.
2	Set **Control Port interface** to **Normal** by using the front panel.
3	Configure the **IP address, default gateway,** and **subnet mask** using the front panel.
4	Follow the installation instructions for T-WATCH Pro to start the program and to connect to the unit.

T-WATCH Pro EIA-232 Connection

To set up the TSU 100 to work with T-WATCH Pro over a direct EIA-232 connection, follow these steps:

Step	Action
1	Set the **Unit ID** and set a passcode using the front panel. See *Unit ID Menu on page 6-5* and *Change/Set a Passcode on page 6-4* for details.
2	Set the **Chain-in port rate** to the same setting as the **PC Com port**.
3	Connect the **PC Com port** to the **Chain-in port** on the TSU 100 using the DB25 adapter and modular cable provided.
4	Follow the installation instructions for T-WATCH Pro to start the program and to connect to the unit.

SNMP

The ADTRAN TSU 100 supports the Simple Network Management Protocol (SNMP) through the chain-in (SLIP) interface. Additionally, the TSU 100e offers a 10BaseT Connection which also supports SNMP. See *Appendix A*, *Understanding SNMP on page A-1* for detailed information.

To use SNMP via 10BaseT (TSU 100e only) follow these steps:

Step	Action
1	Set **Control Port** to **Normal**.
2	Set the **IP address**, **default gateway**, and **subnet mask**.
3	Load the appropriate MIB browser into the Network Management Station. For more information, see the ADTRAN webpage at **http//www.adtran.com.**
4	The MIB browser issues SNMP gets/sets to the TSU 100e.

To use SNMP via the SLIP port, follow these steps:

Step	Action
1	Set **Control Port** to **SLIP**.
2	Set the **IP address**. The **default gateway** and **subnet mask** are not used in SLIP.
3	Load the appropriate MIB browser into the Network Management Station. For more information, see the ADTRAN webpage at **http//www.adtran.com.**
4	The MIB browser issues SNMP gets/sets to the TSU 100e.

Terminal Mode

The TSU 100 provides the front panel menus to a VT 100-type terminal. This mode can be used to configure and monitor the unit. Initiate this mode by typing **<CTRL> PTT** on the terminal once it is connected to the **Control-in port**. For information, see *Chapter 8, Telnet/Terminal Menus on page 8-1*.

Telnet

To connect to the TSU 100 via TELNET, follow these steps:

Step	Action
1	Before attempting to connect via TELNET, define the **IP address**, the **default gateway**, and **the subnet mask** using the front panel.
2	When you begin the TELNET session, you will be prompted for a password. The default password is **ADTRAN**.
3	You can change this password using the Management submenu. The **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. The TELNET session will time out after a predefined value that is also set in the Management submenu.

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

Chapter 4   Status Menu

The **Status Menu** branch provides the ability to view the status of the TSU 100 operation. See Figure 4-1 on page 4-2.

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, pressing **Cancel** returns the system to the previous menu level. Repeatedly pressing **Cancel** returns the system to the **Main Menu**.

.

		%AS
		%EF
1) NI PERF RPTS		ES
		SES
2) NI ERRORS		UAS

1)STATUS

		(ALARM LIST)
3) ACTIVE ALARMS		END OF LIST
4)VIEW HISTORY	(HISTORY LIST)	
	END OF HISTORY	

		1) DTE DATA/CLOCK
5) PORT STATUS	0.1 Nx56/64	2) DTE STATUS
		3) PORT RATE
6) REMOTE PORT		4) DBU DATA/CNTRL*
		5) DBU CONTROL*
7) CLEAR PORT ALM		6) DBU STATUS*
	(OPTION LIST)	
8) ENET STATUS		

*TSU 100e

Figure 4-1. Complete Status Menu

Network Performance Reports (NI PERF RPTS)

The Network Interface Performance Reports display the user copy of the performance data. The TSU 100 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.

Use the scroll keys to access the complete display of the following report fields:
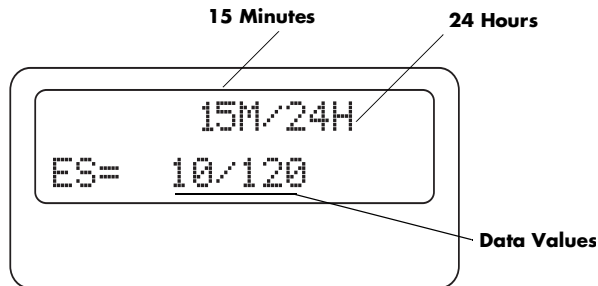
Figure 4-2. Network Interface Performance Report

%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)

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

When this menu is active, performance data can be cleared by pressing **Clear (Shift+9)** on the keypad. Only the user copy of the performance data is cleared.

Since only the user's copy of performance data is cleared by the TSU 100, the data displayed here might be different from the data sent to the network as PRM data.

Network Interface Errors (NI ERRORS)

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

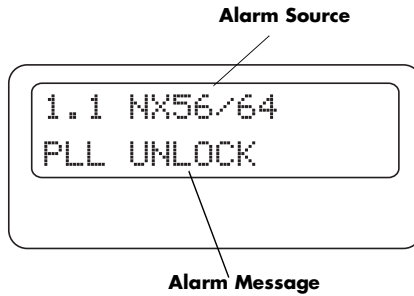The asterisk (*) above an item indicates the type of errors detected. The error types are the following:

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

BPV   Bipolar violations.

XS0   Excess zeros.

FER   Framing errors.

Active Alarms

This menu item displays a list of current alarms (Alarm List) reported by either the base controller or any of the ports. If no alarms are current, using this menu item displays **End of List**.

This display includes two lines of text. The top line is the alarm source. The bottom line is the alarm message. See Figure 4-3 on page 4-5. A list of alarm messages is found in *Appendix D, System Messages on page D-1*.

In addition to normal menu operation, you can also access this menu item with the Alarm function (**Shift+8**) on the keypad. If one or more of the Alarm LEDs are illuminated, an alarm is present. Pressing **Cancel** returns to the previous menu item.

Alarm Source

```
┌─────────────────────────────┐
│  ┌───────────────────────┐  │
│  │ 1.1 NX56/64           │  │
│  │ PLL UNLOCK            │  │
│  │                       │  │
│  └───────────────────────┘  │
│                             │
└─────────────────────────────┘
```

Alarm Message

Figure 4-3. Display of Alarm Message

View History

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

View History displays a history of the first 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 **Clear (Shift+9)** with the **View History** menu active.

Port Status

Port Status displays the signals monitored on the data ports. For example, the Nx/DBU interface monitors the RTS, CTS, RD, and TD, along with other signal lines. When a port is selected, the LCD 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 is examined as an example of how to use this item. The DBU feature is only for the TSU 100e.

0.1 Nx56/64 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

XS0   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

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 (TSU 100e)

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 for the DCE

DBU Control (TSU 100e)

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 form the DCE

DBU Status (TSU 100e)

DBU SECS Total seconds in current DBU session

IN DBU YES/NO indication of active DBU status

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 Alm

Clears the **Link Failed** alarms on option modules that have been removed from the TSU 100 chassis.

ENET Status (TSU 100e)

TX   Indicates data is being transmitted from the 10BaseT port

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

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

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

Chapter 5   Configuration Menu

The **Configuration Menu** sets the TSU 100 operational configuration, including all network interface parameters, the allocation of the DS0s, and the port parameters. See *Figure 5-1, Complete Configuration Menu on page 5-2*.

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, pressing **Cancel** returns the system to the previous menu level. Repeatedly pressing **Cancel** returns the system to the **Main Menu**.
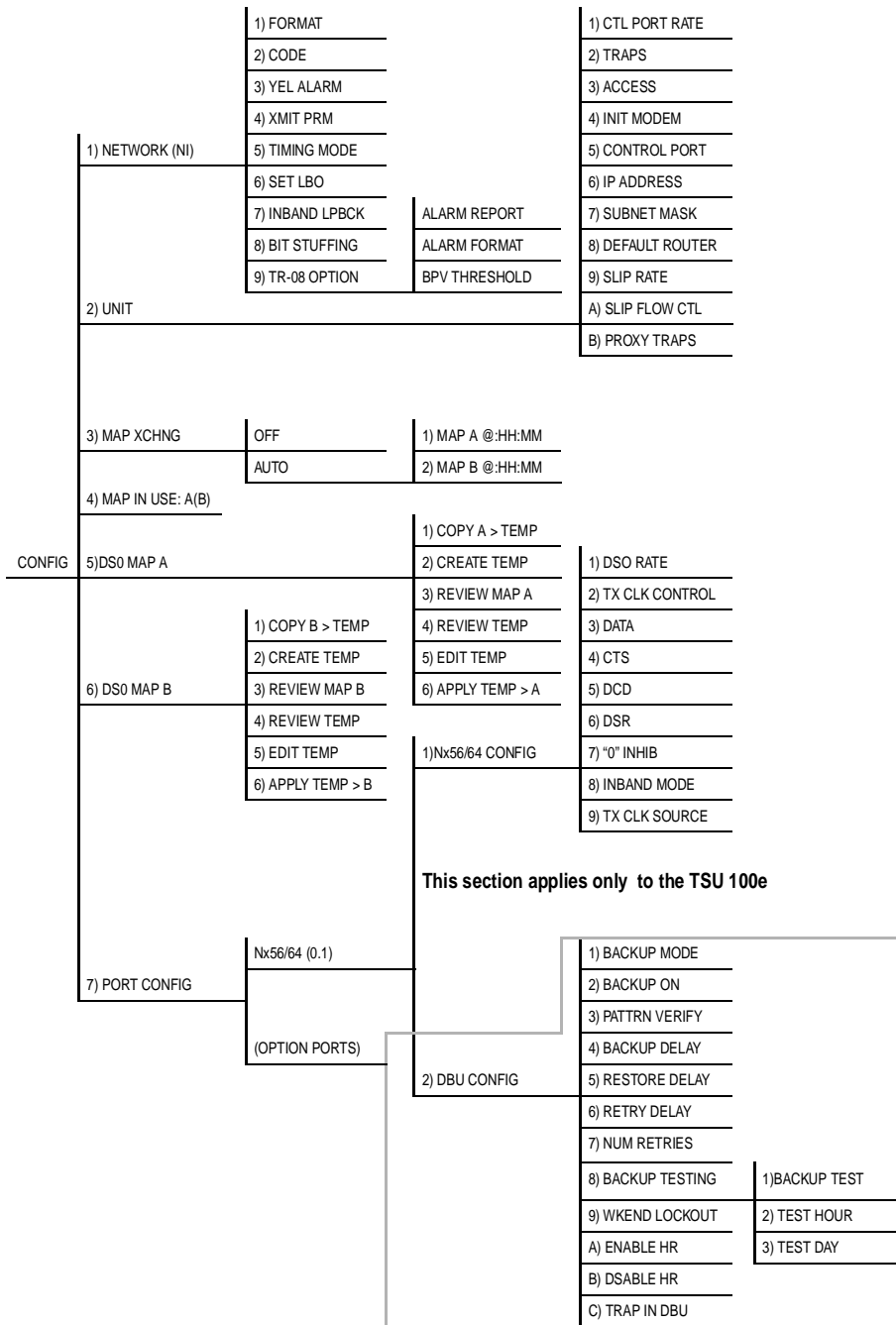
Figure 5-1. Complete Configuration Menu

NETWORK (NI)

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

Network (NI) Menu Items

The menu items are:

Menu Item	Description
FORMAT	Sets the frame format for the NI. Choices: D4, ESF, and SLC96. NOTE *D4 is equivalent to superframe format (SF).*
CODE	Sets the line code for the NI. Choices: AMI, B8ZS.
YEL ALARM	Enables and disables the transmitting of yellow alarms. Choices: ENA, DISA.
XMIT PRM	Enables and disables the sending of PRM data on the facility data link (FDL). The PRM data continues to be collected even if XMIT PRM is disabled (possible only with ESF Format). Choices: Off, On.
TIMING MODE	Selects the clock source for transmission toward the network from the NI. See *TSU 100 Clock Sources on page 5-5.* Choices: Network, Base DTE (Slot 1), Normal (CSU), U-BR1TE (Slot 1), Internal, and Secondary (SI).

Menu Item	Description
SET LBO	Selects the line build out for the network interface. In **Auto** mode, the TSU 100 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, 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 LPBCK	Sets unit to accept or reject the network interface loop-up and loop-down codes as defined in ANSI T1.403. Choices: Accept, Reject.
BIT STUFFING	When enabled, bit stuffing causes the TSU 100 to monitor for ones (1s) density violations and insert a one (1) when needed to maintain 1s at 12.5 percent. Choices: Enable, Disable.
TR-08	The TR-08 submenu configures the unit for TR-08 applications. The submenu items and their descriptions follow. **Alarm Report** Enables and disables the transmitting of alarm reports. Choices: SEND ALARMS, DISABLE ALARMS **Alarm Format** Sets the alarm frame format to 13 frames or 16 frames. Choices: ORB-13, ORB-16 **BPV Threshold** Sets the threshold for BPVs to trigger an alarm. Choices: 10-4, 10-5, 10-6

TSU 100 Clock Sources

The TSU 100 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
- DTE Timing
- Internal Timing
- Secondary Timing
- Normal (CSU)
- U-BR1TE

NOTE

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

Network Timed

The network is the source of timing. The received data clocking is looped back to the network where it is used to determine the transmission timing. This option is also referred to as loop timed as the transmission clock is derived from the received clock.
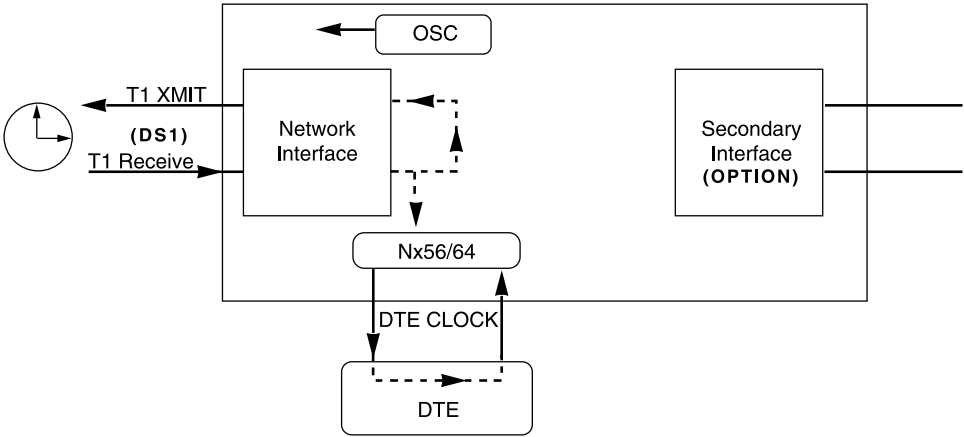
Figure 5-2. Network Timed Clock Source

DTE Timed

The DTE is the source of timing. The TSU 100 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 5-3.
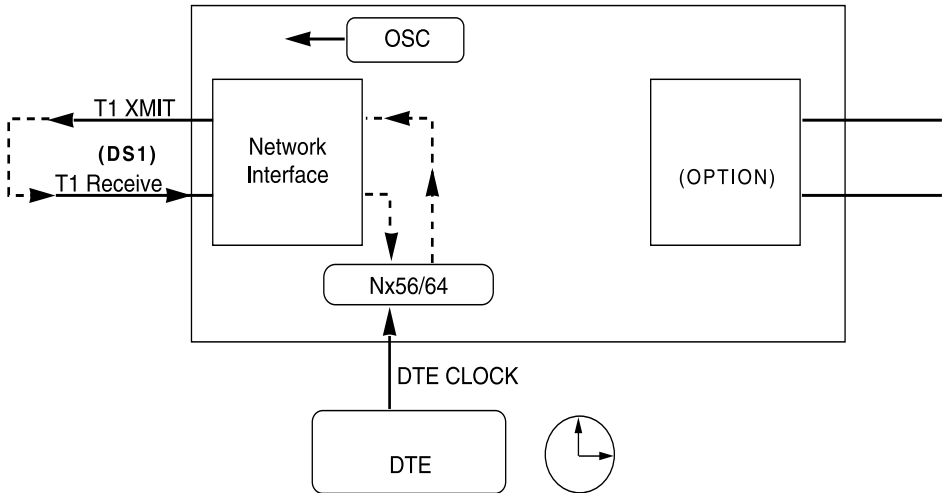
Figure 5-3. DTE Timed Clock Source

Internal Timing

The TSU 100 is the source of timing. The TSU 100 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 5-4.
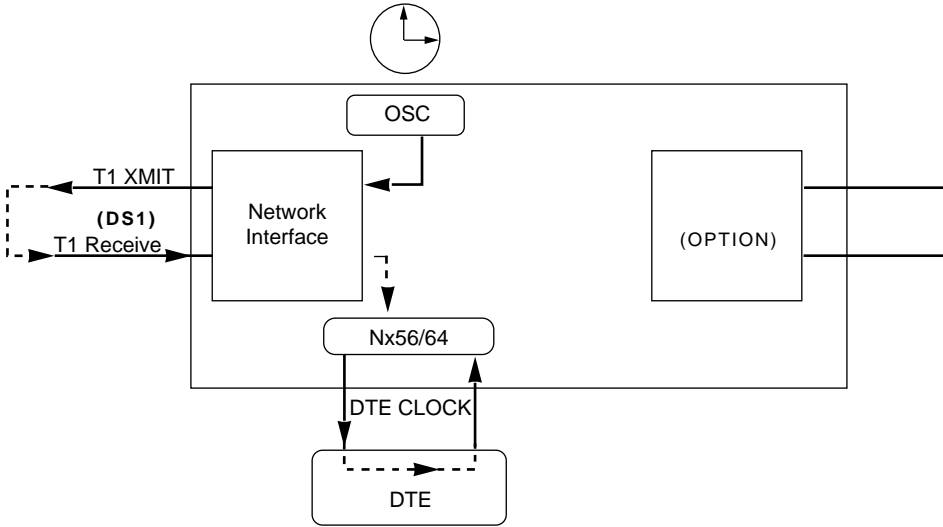
Figure 5-4. Internal Clock Source

Secondary Timing

The secondary interface is the source of timing. The TSU 100 uses the clock derived by the secondary interface for both transmission and receive signal timing. See Figure 5-5.
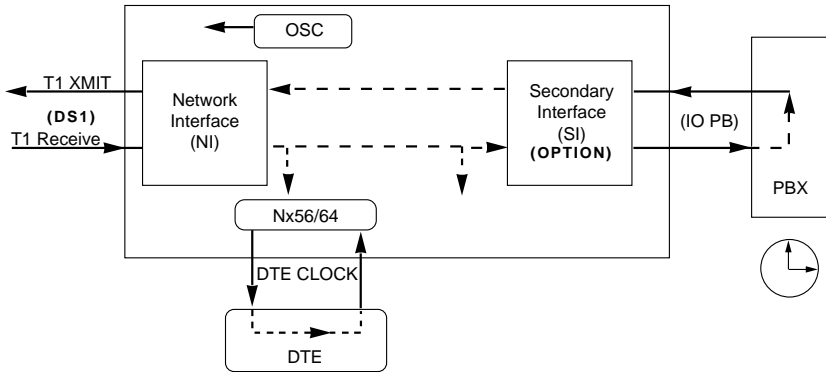
Figure 5-5. Secondary Clock Source

> **NOTE**
>
> *Either a* **DSX-1 Option Module** *or a* **Drop and Insert Option Module** *must be installed in the TSU 100 for this mode to function.*

Normal (CSU) Timing

In the Normal (CSU) timing mode, the Receive Clock is derived from the network, while the Transmit Clock is derived from the PBX or other alternative timing source, connected to the Secondary interface (e.g., Drop and Insert or DSX-1). This timing option is the same as that typically used for CSUs. This is the preferred mode for use with a PBX application.
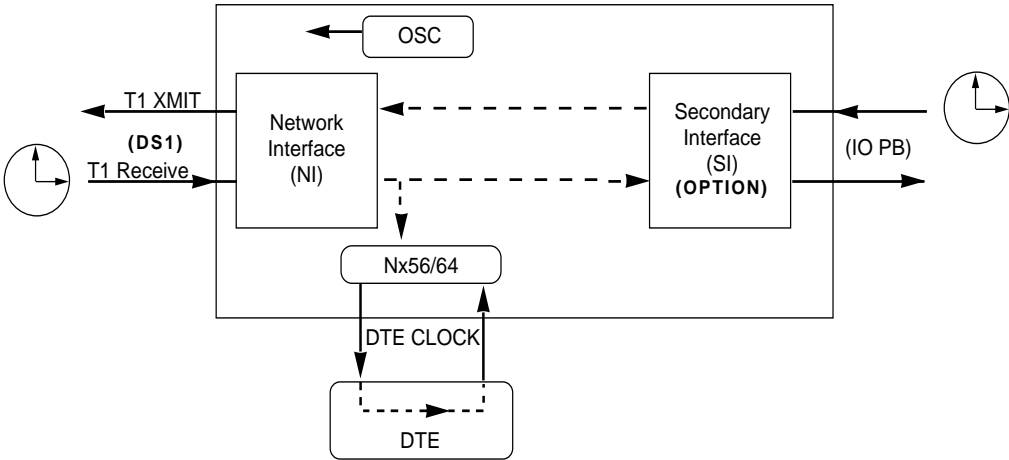
Figure 5-6. Normal (CSU)

> **NOTE** *The network interface and Secondary Interface Clocking Options are set by using the **Network (NI) Configuration Menu Options**. Either a **DSX-1 Option Module** or a **Drop and Insert Option Module** must be installed in the TSU 100 for this mode to function.*

U-BR1TE

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

Unit Menu

The Unit Menu changes the baud rate of the chain-in port and the setup of the dial-out port.

The menu items are:

Menu Item	Description
Ctl Port Rate	Sets the baud rate for communication with the PC or modem. Choices: 1200, 2400, 9600, 19200, 38400 kbps
Traps	Enables or disables the transmission of trap messages. Choices: Enable, Disable
Access	Sets the method of connection from the TSU 100 to T-WATCH Pro/SNMP. Choices: Direct - Used if connected directly to the PC. Dial - Used when connection is through a modem. The dial string is entered from T-WATCH Pro/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, Custom Initialization String
Control Port	Selects the TCP/IP physical interface, Normal, (10BaseT Ethernet), or SLIP (using the EIA-232 serial port). Choices: Normal, SLIP **NOTE** *If this option is set to SLIP, the EIA-232 port **may not** be used as a terminal interface. (10BaseT is only available in the TSU 100e).*

Menu Item	Description
IP Address	Uniquely identifies the TSU 100 on a TCP/IP network. Composed of four decimal numbers, each in the range of 0 to 255, separated by periods. Used for either the 10BaseT Ethernet or SLIP interface, depending on the IP interface setting. (10BaseT is only available in the TSU 100e)
Subnet Mask	Defines which part of a destination IP address is the Network number. Used along with the TSU 100 IP address to determine which nodes must be reached through the default IP Gateway. Value is ignored when the IP Interface is set to SLIP.
Default Router	All IP Packets destined for nodes not on the TSU 100 unit's local network are not forwarded through this IP address. Normally, this address defines a router connected to the TSU 100 unit's local network. Value is ignored when the IP Interface is set to SLIP.
SLIP Rate	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	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	Determines whether or not traps will be forwarded from units being "proxied" for. Choices: Enable, Disable

Map Exchange (Map Xchng)

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:

Menu Item	Description
OFF	Indicates the map in use does not change (disabled).
Auto	Indicates that the map in use will change at a user-selected time of day (enabled).

Table 5-1. Using Map Exchange

Step	Action
1	Scroll to select **Auto** to enable or **Off** to disable the Automatic Map Change feature.
2	Press **Enter** to activate the selection. When Auto is selected, the unit displays the screens to set times for switching.
3	Edit Map A; then press **Enter** to record the Map A settings and activate the selection fields for Map B.
4	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: A(B)

This menu item controls the DS0 map the TSU 100 uses and displays the map in current use.

DS0 Map A and DS0 Map B

The DS0 maps designate which DS0s are assigned to which port. See Figure 5-6. There are three maps, DS0 Map A, DS0 Map B, and the Temporary (Temp) map.
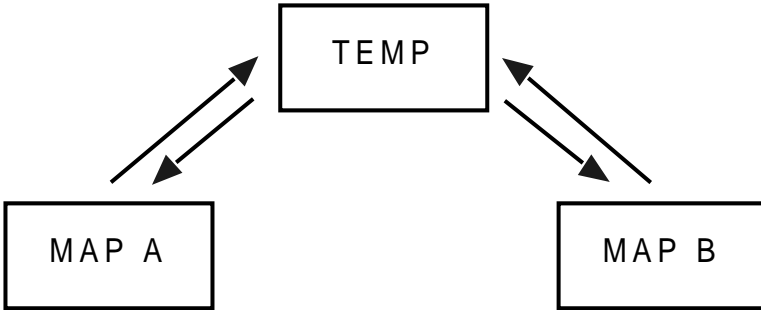
Figure 5-7. DS0 Map Designations

Map A and Map B are the current maps the TSU 100 uses. The Temp map generates a map before putting it into use.

You can copy Map A to Map B by copying the Map A map into the TEMP map. Then apply (write) the TEMP map into Map B.

The menu items are:

Menu Item	Description
COPY A >TEMP	Copies the current map (A or B) into a TEMP map area and permits modification without disturbing the existing map. When modifications are complete, the TEMP map is written to current MAP A (B) by selecting **Apply**.
CREATE TEMP	Creates a map by defining a port or Idle for all DS0s. When **CREATE TEMP** is first selected, all DS0s are set to Idle. See *DS0 Map Example on page 5-16* for a sample selection.
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	Menu item is operated the same for the TEMP map as is **3)REVIEW MAP A or Map B**
EDIT TEMP	Used to edit the **TEMP** file to whatever configuration is desired. If Map A has been copied into the TEMP file, then after editing, the **TEMP** file could be applied to **MAP A or MAP B**. The menu operation is identical to **2) CREATE TEMP** with the exception that the existing port selections display.
APPLY TEMP > A(B)	Writes the TEMP map into Map A (B). Selecting **Apply** is usually the last step in updating a map and is accessed automatically at the end of editing or creating a temporary map. Currently, it can be bypassed by selecting another menu choice.

DS0 Map Example

A sample selection follows:

DS0: 01 to 24

PORT: IDLE, TST, + option module ports

TST designates which DS0s are used for QRSS testing when activated under the **4)TEST Menu**. When not used for testing, the TST designation is identical to **Idle**.

1. With the cursor on **CREATE TEMP**, press **Enter**. The unit displays the selection screen with the cursor positioned on the first selection DS0 number. See Figure 5-8.

Select DS0 Number

```
DS0:01
PORT:1.1 NX56/64
```

Select Port
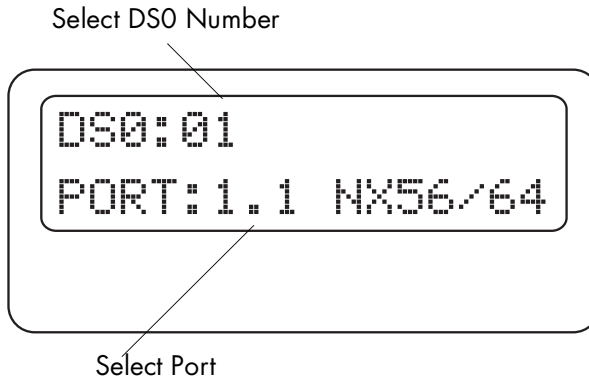
Figure 5-8. Create Temp Selection Screen

2. Use either the **Arrow Keys** or **Numbers** to enter the DS0 number (do not mix the use of the keys).
3. Press **Enter** to complete the selection and move the cursor to **Port**, the next field.
4. Use the **Arrow Keys** to select the port which is dependent on the installed option card.
5. Press **Enter** to complete the selection and move the cursor back to the DS0 field.
6. With the cursor on the DS0 field, the DS0 number can be incremented or decremented by scrolling.

7. If you press **Copy**, the contents of the last DS0 entered are placed in the new DS0 number.

8. When all entries are complete, press **Cancel** to move the cursor to the last of the submenu choices, **6)APPLY**.

9. Either apply the newly created DS0 map or press **Cancel** to return to the **DS0 Map A (B)** submenu choices.

NOTE *Selecting* **Apply** *will not disrupt the operation of unmodified ports.*

Port Configuration (Port Config)

Port Configuration selects and configures the parameters associated with any data port in the unit. For example, parameters for the Nx56/64 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 TSU 100 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 Config Menus for options ports are described in separate sections of the manual supplied with the option card.

0.1 Nx56/64 Port Configuration Menu Items

There are two major menu items under NxDBU configuration: **Nx/DBU Config** and **DBU Config**. Only the TSU 100e offers the DBU feature.

Nx56/64 Menu Items

Menu Item	Description
DS0 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, 64K
TX CLK CNTRL	Controls the clock used by the TSU 100 to accept transmit (TX) data from the DTE. 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, Force On *See Table 5-2 on page 5-20.
DCD	Data Carrier Detect. Indicates to the DTE when a valid signal is being received at the Network Interface. Choices: *Normal, Force On *See Table 5-2 on page 5-20

Menu Item	Description
DSR	Data Set Ready. This signal indicates to the DTE when the DCE is turned on and ready for operations. Choices: *Normal, Force On *See Table 5-2 on page 5-20
0 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 TSU 100e will force 1s. Choices: On, Off
INBAND MODE	The Nx56/64 port is capable of providing an inband communications channel (for T-WATCH Pro and SNMP) between units. This is accomplished by using 8 kbps of the first DS0 assigned to that particular Nx/DBU port. If in 56 K mode, no data bandwidth will be used. Inband must also be enabled at the destination port. Choices: On, Off, On Demand
TX CLK SOURCE	This controls the source of the clock used by the TSU 100 to accept transmit data from the DTE. The default is Internal. If the application requires that the DTE device provides the clock with the transmit data, the External setting is used. Choices: Internal, External

Table 5-2. Normal Mode of Operation

Signal	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	OFF
DCD		—	—	OFF	—	OFF	OFF
DSR		OFF	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.							

DBU Configuration Menu (TSU 100e only)

Menu Items	Description
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 NxDBU receives from the network.

Menu Items	Description
Pattrn Verify	Selects whether or not the DBU will use its pattern generator and receiver to authenticate backup attempts. When the local and remote units are both Nx/DBUs, set **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

Menu Items	Description
Backup Testing, (cont.)	**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 to **On**; otherwise set to **Off**. Choices: ON, OFF
Enable HR	The hour backup will be enabled. Enter the number from the numeric keyboard. Choices: 0-23
Disable HR	The hour that the backup will be disabled. Enter from the numeric keyboard. Choices: 0-23 NOTE *For these items to function properly, verify that the time and date in the TSU are set correctly. See the appropriate TSU User Manual for instructions on setting date and time.*
Traps 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

Chapter 6   Utility Menu

The **Utility Menu** tree displays and sets system parameters (see Figure 6-1 on page 6-2). This includes setting the time and date, resetting all parameters to factory values, or reinitiating the unit. This menu also displays the unit software revision and the Unit ID setting.

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, press **Cancel** to return the system to the previous menu level. Repeatedly pressing **Cancel** returns the system to the **Main Menu**.

		TIME: HH:MM:SS
	1) TIME/DATE	DATE: MM/DD/YY
	2) FACT RESTORE	(Returns all configurations to factory settings)
	3) SET PASSCODE	NEW PASSCODE
3) UTIL			VERIFY PASSCODE
	4) UNIT ID	
	5) PORT UTILITY	(Displays Current Software Revision
	6) SOFTWARE REV	0.1 Nx/DBU (DBU in TSU 100e)
	7) ENET ADDRESS	(OPTION PORTS)
	8) SERIAL NUMBER	
	9) CMD MODE	
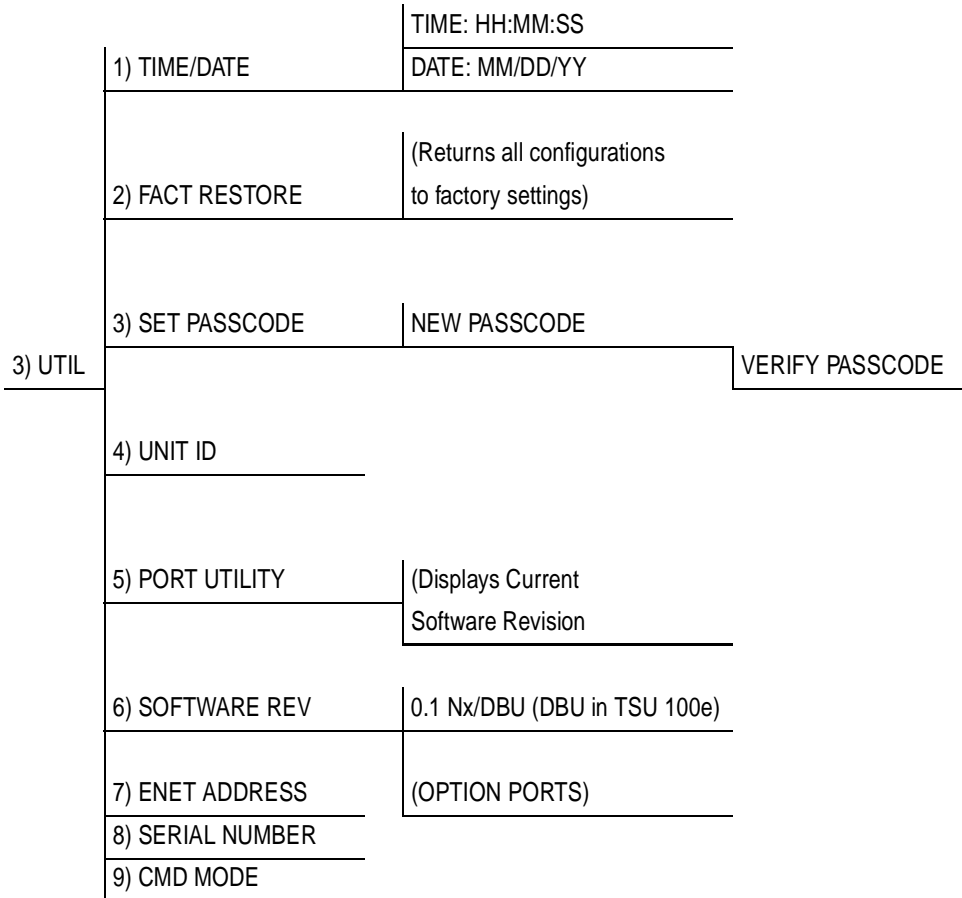
Figure 6-1. Complete Utility Menu Tree

Time/Date

This menu option displays or edits the current time and date. The TSU 100 maintains the time and date during power-off conditions.

If you want to...	Do this...
Record the entry and move to the next editing position	Press **Enter** after any numeric change
Move to a different field to edit	Press **Enter** at the editing position without making any changes, or Use the **Up** and **Down Arrow keys**
End the editing process	Press **Cancel**

Factory Restore (Fact Restore)

This menu item restores the factory default settings for all unit parameters, including configured DS0 maps.

Set Passcode

Enter Passcode from Other Menus

The Passcode prompt may make an unexpected appearance from other menu operations. This happens only when the unit is operating in the limited access mode, i.e., without an active passcode. The limited access mode may become active even if a passcode was entered as it does when there is no activity for ten minutes. 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.

The unexpected appearance of the Passcode prompt occurs, for example, while operating in a limited access mode and attempting to change the data rate, **(2)CONFIG, 2)UNIT, 1)CTL PORT RATE**. Use the number keys to enter the correct passcode and press **Enter**. The unit displays **Access Granted**.

Pressing any key after entering a passcode causes the unit to return to the previous active menu. In this case it returns to **2)CONFIG, 2)UNIT, 1)CTL PORT RATE** to permit changing the data rate.

Change/Set a Passcode

The passcode can be changed or set at any time or eliminated altogether through the Utility Menu item **3)SET PASSCODE.** This procedure requires the current passcode (if one is established) for operation.

The passcode can only be entered by using numbers. After entering the desired passcode, press **Enter**.

Set a null passcode at the **3)SET PASSCODE** menu by pressing **Enter** without any numbers. This sets a null passcode and grants unlimited access.

Passcode Automatic Time-out

For added security protection the unit is equipped with an automatic time-out for operation with the password. After ten minutes of inactivity, the unit reverts to limited access operation. To make changes in the configuration, the passcode can be reentered.

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.

Unit ID Menu

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 ID 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 (item 4) under the **UTIL Menu**, enter any value between **2** and **999**. The number **1** is reserved for the PC.

Press **Enter** to record the Unit ID number and establish 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.

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.

Software Revision (Software Rev)

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 **Cancel** to exit.

ENET Address (TSU 100e)

Displays the Ethernet address for the 10BaseT port.

Serial Number

Displays the serial number of the unit.

CMD Mode

Reserved for factory use.

Chapter 7   Test Menu

The **Test Menu** initiates different types of unit tests and displays test results in the LCD window. The Test Menu contains four items (see Figure 7-1).

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. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, pressing **Cancel** returns the system to the previous menu level. Repeatedly pressing **Cancel** returns the system to the **Main Menu**.

Figure 7-1. Complete Test Menu

Network Tests

Network tests control the activation of loop-backs 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 loop-back 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 loop-backs can be invoked locally from the front panel, by T-WATCH Pro commands, or remotely by using special in-band codes (AT&T D4 network loop-up and loop-down codes). Additionally, the loop-backs 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 loop-backs affect the entire T1 data stream. See *Figure 7-2*. There are two types of network loop-backs, line loop-back and payload loop-back.

Line loop-back

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 loop-back

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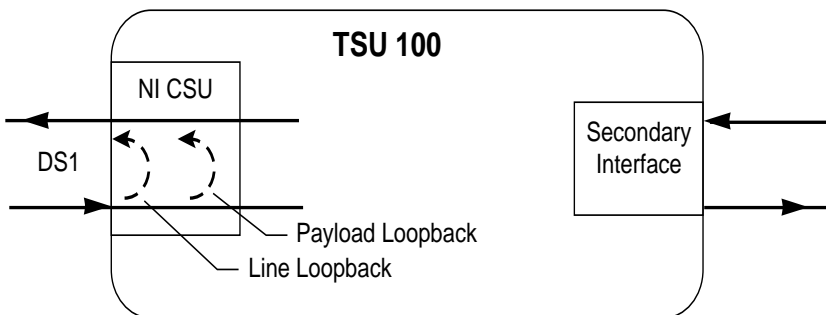
Figure 7-2. Network Loopback Tests

LOCAL LOOPBCK

There are three available choices for setting the local loop-back:

Line On   Activates the line loop-back

Payload On   Activates the payload loop-back

No Loopback   Deactivates the loop-back

Scroll to select a setting and record it by pressing **Enter**. The unit returns the display of **1)LOCAL LOOPBCK** and **2)REMOTE LOOPBCK**.

REMOTE LOOPBK

This activates the same loop-backs as Local Loopback but at the far end. It uses either the inband loop-back code as specified by ANSI T1.403 for line loop-back (ATT In-Band LLB), or the FDL as specified in ANSI T1.403 for payload and line loop-back codes. The following options are available:

ATT In-Band LLB   Activates the line loop-back using inband code

ANSI FDL PLB   Initiates the transmission of an FDL payload loop-up code toward the far end

ANSI FDL LLB   Initiates the transmission of an FDL line loop-up code toward the far end

FT1 LPBK   Initiates the transmission of a FT1 loop-back using the inband code described in T1.403.

No loop-back   Deactivates the loop-back

NOTE *Remote loop-back can only be used with Fractional T1 if the FT1 LPBK is selected.*

After a **Remote loop-back** option is selected, the TSU 100 verifies that the far end is actually in a loop-back by checking for the receipt of a code looped back from the far end. Once the Remote Loopback type is selected, the LCD displays the loop-back progress by displaying **Looping** until loop-back is verified.

Test Patterns

All Ones

Sends an all ones pattern to the network.

All Zeros

Sends an all zeros pattern to the network.

QRSS Pattern

The QRSS pattern is commonly used to simulate real data in T1 interfaces. This pattern can be assigned to appear in all DS0s or only in TST DS0s. When QRSS is set in all DS0s and one of the network loop-backs 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.*

Example:

1. Select **QRSS ALL DS0s** by using the **arrow keys**.
2. Press **Enter** to record the selection. The TSU 100 generates a QRSS test pattern and inserts the pattern into all DS0s.
3. Select **None** to end the test.

Pattern Result

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

Press **2** to inject 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 not (no) valid. An asterisk (*) indicates if pattern sync has been lost since the start of testing.

Clear results by pressing **Shift+9**. 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. You can run an end-to-end test on the Fractional DS0s by:

1. Setting for Map B the TST in the same DS0 as used by Map A to receive data from an Nx/DBU port, and
2. By looping the far end using a V.54 loop-back code on the Nx/DBU port (DBU is TSU 100e only).

In addition, 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 SelfTest

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 a front panel menu or from T-WATCH Pro.

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

This menu selection is used to execute a full internal self-test. The results of the self-tests are displayed in the LCD. Upon invoking the command, the LCD displays **System Self-Test** and the test LEDs are illuminated. Test failures are displayed in the LCD window. The self-test consists of the following tests:

Board Level Tests
Each of the TSU 100 boards contain an on board processor which executes a series of tests checking the circuitry on the board.

- RAM tests; EPROM checksum
- DS0 map tests
- On board data path; sending a known test pattern through an on-board loop

Unit Level Tests
- Front panel LED verification
- Phase Lock Loop verify
- Board-to-board interface test

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

If a failure is detected, note the failure number prior to contacting ADTRAN Technical Support.

Executing the self-test will disrupt normal data flow and prevent remote communication until it is completed.

Port Tests

The Port Tests Menu is used to activate testing of specific data ports. It controls the activation of loop-backs and the initiation of data test patterns. Test results are displayed in the LCD window.

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

Port Test Menu Items for 0.1 Nx56/64

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

DTE Loop-Back

This initiates a loop-back. The following options are available:

PORT/ LOCAL	The Nx port activates both a Local loop-back (back toward the DTE) and a Port loop-back when either is invoked.
REMOTE	The remote loop-back causes a V.54 code to be sent to the far end. The Nx at the far end activates a PRT/LCL loop-back upon detection of the V.54 code.
OFF	The loop is deactivated.

NOTE *The TSU 100 checks the remote loop-back activation by detecting a proper response from the remote end. While waiting for the response, the display shows Looping. If successful, the display changes to Looped-Up. If unsuccessful, the display shows Failed.*

511 PATTRN

Activates the generation of the 511 test pattern.

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

OFF   The pattern generation and check is disabled

511 RESULTS

Displays the results of the 511 test indicated in the 511 option. The results are in the form of the number of errored seconds. The error count can be cleared by pressing the **Clear Key** (**Shift+9**).

DBU LOOPBACK (TSU 100e)

ON   Initiates a loop-back from the DBU toward the external DCE

OFF   Terminates the loop-back test

DBU TEST (TSU 100e)

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

Test Name	What it does...
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 (TSU 100e)

Allows status of DCD and RI to be monitored while the INTER-FACE TST is on. If the dial up network is correctly configured and dialed up, there should be an asterisk (*) over DCD.

DBU TST RESULT (TSU 100e)

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

Cancel Tests

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

Chapter 8   Telnet/Terminal Menus

MAIN MENU

The **TELNET/Terminal Main Menu** is the first menu displayed after the TELNET/Terminal session is established (see Figure 8-1). The default TELNET/Terminal password is ADTRAN.

NOTE   *Only one TELNET/Terminal session may be active at a time.*

```
ADTRAN - TSU 100

Password:  XXXXXXXX

Main Menu

 1)  Status
 2)  Config
 3)  Util
 4)  Test
 5)  Remote Menu Access
 6)  Management Config
 7)  Flash Download
 8)  Quit Session
```

Figure 8-1. Telnet/Terminal Main Menu

Status, Config, Util, and Test Menu Options

These menu items can access the same modified menus that you can access through the front panel. For detailed information on the available menu options, refer to the following sections:

- *Status Menu on page 4-1*
- *Configuration Menu on page 5-1*
- *Utility Menu on page 6-1*
- *Test Menu on page 7-1*

DS0 Maps Configuration Menu

The TELNET/Terminal version of 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.

```
                         TEMP MAP

  DS0 #   PORT              DS0 #   PORT

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

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

Figure 8-2. 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 in the LCD to the right of the cursor.

Map configuration involves these steps:

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

Initializing the Temp Map

Upon entering the DS0 maps configuration menu, the Temp map reflects its last configured state. You can use the following selections to initialize the temp map.

If you want to initialize ...	Use these selections...
the displayed Temp Map to one of three configurations.	**1** through **3**
the Temp Map from its current configuration to one which reflects the currently stored Map A or B configurations, respectively.	**1** and **2**
the Temp Map to an all IDLE state.	**3**

Editing the Temp Map

To edit the Temp map, follow these steps:

Step	Action
1	To make additional changes to the Temp Map, use **Selection 7** to enter the Temp Map edit mode. **Explanation**: Upon entering this mode, the cursor location moves to DS0 number one in the DS0 field of the Temp Map.
2	The cursor may be moved from one DS0 to another using the **Up** and **Down arrows** until it is located at the DS0 number whose assigned port needs to be changed.
3	Press **Enter** to cause the cursor to move into the port field.
4	Use the **Up** and **Down arrows** to scroll through the possible port selections.
5	Press **ESC** to restore the previous port assignment and return to the DS0 field, or Press **Enter** to save the current selected port and return to the DS0 field.
6	Press **ESC** a second time when the cursor is again located in the Temp Map DS0 field. 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.

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.

Remote Menu Access

Remote Menu Access displays TELNET menus for a remote device. This may be another TSU/TDU or any other ADTRAN product that supports TELNET via its EIA-232 chain port. After selecting this option, the user may choose to connect to a device entered in the Unit Access Table or enter a Unit ID for a unit not in the Unit Access Table. **<CTRL> + X** terminates the session and returns to the TSU 100 Main Menu.

Management Configuration

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

Unit Access Table

This menu is used to create and edit 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 8-3 on page 8-6*). An entry in the table is required only to support proxy SNMP MIB access or polling. For MIB access, an entry is required only if the unit's passcode is not the same as the **Default Unit Passcode**, or the unit is a single port TSU Standalone.

NOTE

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

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

```
_____Unit Access Table_____


Unit ID      Passcode    Type              Polled      PollStatus
20           DEFAULT     Standard          No
3            0033        Standard          Yes         UP
6            0095        TSU Standalone    No
8            0022        Standard          Yes         UP


1) Add New Unit
2) Modify Unit
3) Delete Unit
4) Default Unit Passcode  0022
5) OK
```

Figure 8-3. Unit Access Table

Add New Unit

Add New Unit adds a new device to the table. You must enter a device **Unit ID, Passcode, Unit Type,** and **Polled Flag.**

- Unit type can be Standard (which supports any TSU/TDU Multiplexer and the ISU 512) or TSU Standalone (a single port TSU with no option card slot).

- A passcode of **0** *to* **9999** for each device or **DEFAULT** may be selected, which results in the default passcode being used (defined as **0022** in Figure 8-3).

- Traps are normally sent from the unit in alarm to the TSU 100.

- For units in the Unit Access Table that are not chained directly to the TSU 100 but are managed over Inband or the FDL, traps are not automatically forwarded.

- Polling must be enabled on the TSU 100 for these units in order to receive Traps on the NMS. The TSU 100 can be configured to poll selected units for traps by enabling the polled option when adding or modifying a unit entry.

Modify Unit

Allows **Unit ID**, **Passcode**, **Device Type**, and **Polled Flag** to be changed for an existing entry in the table.

Delete Unit

Deletes an entry in the Unit Access Table.

Default Unit Passcode

Sets the default passcode for all devices in the table that have passcodes set to **DEFAULT**, or for any unit not listed in the table.

OK

Returns to the Configure Agent Menu.

SNMP Read Community

- SNMP Read Community Name defaults to public.
- NMSs using this community name have **Read Access** for all supported MIB objects but do not have the ability to change MIB objects.
- This value must be set to the same value on both the TSU 100 and the NMS (OpenView®, etc.) in order for the NMS to have Read access to MIBs supported by the TSU 100.
- This value must be a text string of 16 characters or less.

SNMP Read/Write Community

- SNMP NMS using this community name have full read/write access to all supported MIB objects (defaults to private).
- This setting must be the same value on both the TSU 100 and the NMS in order for the NMS to have read/write access to MIBS supported by the TSU 100.
- This value must be a text string that is 16 characters or less.

NOTE

To access other units external to the TSU 100 (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 on page A-1 for more information.

SNMP Trap Community

This community name is used for all SNMP traps forwarded by the TSU 100. 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 TSU 100 forwards all SNMP traps to the IP address specified in this entry. If the address is set to the default value of 0.0.0.0, no traps are forwarded for this particular value.

Host 2 Trap IP Address

Defaults to 0.0.0.0. Second destination address for SNMP traps.

Host 3 Trap IP Address

Defaults to 0.0.0.0. Third destination address for SNMP traps.

Host 4 Trap IP Address

Defaults to 0.0.0.0. Fourth destination address for SNMP traps.

System Name

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

System Contact

A text string containing the name, phone number, 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 TSU 100 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 TSU 100 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 formats 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 TSU 100 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 TSU 100 Main menu.

Flash Download

The TSU 100 uses flash memory that allows software updates via the EIA-232 port. This menu selection allows you to manually perform a flash download using XMODEM. T-Flash is also available to automate this process.

Quit Session

Terminates the TELNET/Terminal session.

Appendix A   Understanding SNMP

ABOUT SNMP

As local area network (LAN) environments became standardized over the past ten years, 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.

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.

Basic Components

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

Network Manager

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

Agent

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

MIB

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

Commands

Using SNMP Version 1, the network manager can issue three types of commands: **GetRequest, GetNextRequest**, and **SetRequest**.

GetRequest

This command retrieves a single item or the first in a series from a network device.

GetNextRequest

This command retrieves the next item in a series from a network device.

SetRequest

This command writes information to a network device.

Messages

The network device issues two types of messages: **GetResponse** and **Trap**.

GetResponse

This message is the response to a network manager **GetRequest** or **GetNextRequest** command.

Trap

This is 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).

TSU 100 SNMP Access

By default, SNMP MIB Browser access to the TSU 100 IP address with the configured community names, accesses the host. The TSU 100 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, if the Read community name configured in the TSU 100 is **public**, specifying **public.3** as the community name in the SNMP MIB Browser allows reading SNMP MIB variables from externally chained unit with a Unit ID of **3**.

If the external unit's passcode is not the default, an entry must be added to the Unit Access Table for **SNMP MIB** access. See the *Unit Access Table* on page 8-5, for more information. However, SNMP traps for the unit can be forwarded without the entry.

SNMP Trap Configuration

Traps received by the TSU 100 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 TSU 100, 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 loading the device specific MIBs and loading or creating device-specific Trap Definition Files. The current product MIBs contain keywords embedded in comments that can be used by some network management platforms to automatically generate Trap Definitions. Otherwise, the descriptions may be used as a template for Trap Definitions.

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

Definitions for Poll Link Up/Down traps are included in the TSU 100 MIB file: **TSU 100e.MIB**.

NOTE   *The TSU 100 and TSU 100e share the same MIB.*

SNMP MIB BROWSER CONFIGURATION

The following steps are required to configure Network Manager MIB variable access through the TSU 100:

Table A-1. How to Configure Network Manager MIB

Step	Action
1	Load the desired product MIBs on the network management station. If, for example, the administrator is managing TSU 100 and ISU 512 devices, load **TSU 100.MIB, ISU512.MIB**, and **RFC1406.MIB**.
2	Create device entries in the NMS database for all units that are to be managed through the TSU 100. 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 TSU 100.
3	Set community names in the device's entries for external units to the TSU 100 community name with the device Unit ID appended as defined in the previous section *TSU 100 SNMP ACCESS on page A-3.*
4	Set the device timeout for all device entries in the NMS device database to five seconds, including the host unit.

SNMP MIB Files Supported by the TSU 100

Standard MIBs	ADTRAN Enterprise-specific MIBs
MIB-II (RFC-1213) **DS1 T1/E1 MIB** (RFC-1406) **Ethernet MIB** (RFC-1643) (TSU 100e)	**ADTRAN Product MIB** (ADTRAN.MIB) **ADTRAN DS1 extensions** MIB (ADS1.MIB) **TSU/TDU Enterprise MIBs** (TSU 100e.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 following sources: • ADTRAN anonymous ftp site: **ftp.adtran.com** • By dial-up from the BBS: **256 -963-8169**) • ADTRAN web site: **http://www.adtran.com**

Appendix B   Understanding TR-08

The TSU 100 chassis functions as a **Remote Terminal in Digital Loop Carrier** and as **Integrated Digital Loop Carrier Systems** as described in TR-TSY 000008. The TSU 100 supports SLC96 framing, Mode I operation, ORB-13 and ORB-16 alarm formats, alarm reporting, and user-definable BPV threshold detection rate.

A basic familiarity with DLC systems, IDLC systems, and TR-TSY-000008 is assumed, but the following information will be useful:

- All received **TR-TSY-000008 specific alarms** are reported locally within the history feature of the TSU 100.

- When the **DISABLE ALARMS** option is selected, no alarms will be sent on the DLF, but received alarms will be reported locally in the history.

- Other alarms normally reported by the TSU 100 will also be placed in history.

- Each TSU 100 needs to be configured as the **A SHELF**, as it is provisioned as a separate entity.

- All alarms will refer to **A SHELF** when received from TSU 100.

The following table explains what conditions trigger alarms and how alarms are processed when received by the TSU 100.

Table B-1. Alarm Conditions

Name	Explanation
FELP	When the TSU 100 receives a FELP alarm, it will loop the incoming data directly to the outgoing data. LINE ON is placed in history. The alarms and loopback are cleared when FELP is no longer received.
Loss of Data	The TSU 100 will send **MINOR ALARM** and the **A SHELF ALARM** for 2.5s when it quits receiving the data link on the T-Span. It will also report TR-08 DL Down in the history. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link.
OOF	The TSU will send **MINOR ALARM** and **A SHELF ALARM** upon receiving an out-of-frame condition. **TR-08 DL Down** and **RED ALARM** are declared in history for severe framing errors. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link.
Loss of Signal	The TSU 100 will send **MINOR ALARM** and the **A SHELF ALARM** for 2.5s when it quits receiving a signal from the far end. It will also report **TR-08 DL Down** and **LOS** in the history. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link, and **RED ALARM** is declared in history.
BPVs	BPVs that are received at a rate greater than the threshold set under **TR-08** options, will cause **MINOR ALARM** and **A SHELF ALARM** to be sent on the DL. If the BPVs remain above the threshold for 2.5s, the TSU 100 will send **MAJOR ALARM** and on the DL. No events are placed in history.
Protection Line Switch	The TSU will not respond to this alarm.

TR-08 DS0 Conversion Table

The following table contains the mapping conversions needed to map voice ports to the TR-08 network.

Table B-2. TR-08 DS0 Conversion Table

DS0	TR-08 Channel Number	Port
1	1	1.1
3	2	1.2
5	3	1.3
7	4	1.4

Appendix C   Network Pinouts

WIRING

Network

On the rear panel of the TSU 100 is an eight-position modular jack labeled NETWORK. This connector is used for connecting to the network. See Table B-1 for the pinout for the network connector.

Network Connections

The network connections are as follows:

Connector type   (USOC) RJ-48C
Part number   AMP# 555164-2

Table C-1. Network Pinouts

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	T TXDATA-TIP	Send data toward the network
6,7,8	UNUSED	

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 100 or TSU 100 (Chain In). See Table B-2 for the pinout for the control/chain-in connector.

Chain-in Connections

The chain-in connections are as follows:

Connector type   RJ-48
Part number   AMP# 555164-2

Table C-2. Control In/Chain In Pinout

Pin	Name	Description
1	GND	Ground-connected to unit chassis
2	RTS	Request to send - flow control
3	RXDATA	Data received by the TSU 100
4	UNUSED	
5	TXDATA	Data transmitted by the TSU 100
6,7	UNUSED	
8	CTS	Clear to send - flow control

Chain Out

This is used to connect to another TSU 100 chain-in connector. See Table B-3 for the pinout for the chain-out connector.

Chain-Out Connections

The chain-out connections are as follows:

Connector type   RJ-48
Part number   AMP# 555164-2

Table C-3. Chain Out Pinout

Pin	Name	Description
1	GND	Ground-connected to unit chassis. Connected to GND of next unit (pin 10).
2	UNUSED	
3	TX DATA	Data transmitted to chained units by the TSU 100. Connect to RX DATA of the next unit (chain-in pin 3).
4	UNUSED	
5	RX DATA	Data received from chained units by the TSU 100. Connect to TX DATA of the next unit (chain-in pin 5).
6,7,8	UNUSED	

Nx56/64 DTE (V.35)

See Table B-4 for the V.35 pinout Nx56/64 DTE pinout.

Connections

The DTE interface pinout is as follows:

Connector type	V.35
Part number	AMP# 92-4883-3-x

Table C-4. V.35 Pinout - Nx/DBU DTE (DBU is TSU 100e only)

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

*(ignored by TSU 100)

10BaseT (TSU 100e only)

10BaseT is used to connect the TSU 100e to the local area network. See Table B-5.

10BaseT Connections

The required wiring connections are:

Connector Type (USOC)   RJ-45
Part number   AMP # 555164-1

Table C-5. 10BaseT Ethernet (TSU 100e only)

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

Appendix D   System Messages

This appendix lists and defines the alarm and status messages that appear on the TSU 100 screen.

ALARM MESSAGES

Network Interface (NI)

Red Alarm	NI unable to frame align with incoming signal
Yellow Alarm	Remote alarm indication (RAI) being received from far end
Blue Alarm	Unframed all ones (1s) (AIS) being received at NI
Loss of Signal	No signal detected at NI

Nx56/64 Interface

Clock Slip	Difference in frequency of the data clock at the network and DTE
PLL Alarm	Unable to achieve Phase Locked Loop on the clock provided by the network interface.
Zeros Alarm	All zeros (0s) data being sent toward the network interface
No EXT Clock	No external transmit clock at DTE (only appears if EXT CLK is selected)

STATUS MESSAGES

Network Interface (NI)

Payload On	Payload loopback activated
Line On	Loopback Activated
Loopback Off	All loopbacks deactivated
Factory Restore	Factory setting restored
Power On	Unit powered on
Self-Test	Internal self-test performed
TR-08 DL Down	TR-08 data link is down
TR-08 DL Up	TR-08 data link is up
Minor Alarm*	Loss of sync, carrier loss, BPV threshold exceeded, or data link failure.
Major Alarm*	Conditions for a minor alarm have continued for more than 2.5 seconds.

> **NOTE**
>
> *TR-08 alarm messages appearing in the alarm or history log have been received from the far end. If the NI detects one of the above conditions, it will send the appropriate alarm (if enabled) to the far end but no message will appear in the alarm or history log.*

Nx56/64 Interface

Loop Up	Data is looped at both the network interface and DTE interface of the card
Remote Loop Up	Sending V.54 pattern in an attempt to loop up a remote device
511 Pattern On	Sending 511 pattern towards the network interface
Loop Down	Data is no longer looped back at the network interface or DTE interface
511 Pattern Off	No longer sending 511 pattern towards the network interface

Appendix E   Specifications

ELECTRICAL SPECIFICATIONS

T1/FT1 Interface

T1 Line Rate	1.544 Mbits/s ± 75 bps
Line Code	Bipolar,RZ; AMI or B8ZS
Framing	D4(SF), ESF, or SLC96
FT1 Line Rate	DS0 Channelized (multiple of 64 kbps)
Transmit Timing	Network, DTE, U-BR1TE Secondary NI, Normal (CSU) or Internal
Input Signal	0 to -36 dB (DS-1)
Line-Build-Out	0, 7.5, 15, 22.5 dB, AUTO
Connector	RJ-45
Test Jacks	Bantam jacks: TX and RX (to Network) and MON

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

Nx56/64 (V.35 Interface)

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

Management Interfaces

Chain In/Out Ports

Interface Devices	PC Serial Port, Modem or SLIP connection to router
Interface Type	EIA-232
Data Rates	9600, 2400, 1200, 2400, 4800, 9600, 19200, 38400
Data Format	EIA-232 N81
Protocols	TWATCH/ADLP, ATEL/ADLP, TCP/IP/SLIP
Connector	RJ-45

10BaseT Interface (TSU 100e)

Interface	IEEE 802.3 Compliant
Rate	10 Mbps
Connector	RJ-45
Receiver	accepts signal > 300 mV
Protocols	*Network:* IP
	Transport: TCP, UDP
	Service: SNMP, TELNET, ICMP, ARP, PING, T-WATCH

Option Slot Interface

Interface	ADTRAN proprietary, accepts standard TSU Option Modules.

Chassis Specifications

Height	Less than 3.5 inches (will fit in a 2U rack mount opening)
Width	Two units will fit within a 19-inch rack

Environmental Specifications

Input Power	90-120 VAC, 47-63 Hz
Fuse	0.6 A, 250 V
Operating Temperature	0 to 45 ° C
Max Power Consumption	15 Watts
Max Current	0.2 A

TSU 100 User Manual

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Product Support Information

Pre-Sales Inquiries and Application Support
Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

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

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

Technical Support	(888) 4ADTRAN

Repair and Return
If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Customer 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, and return to the following address:

ADTRAN, Inc.
CaPS Department
6767 Old Madison Pike
Progress Center
Building #6, Suite 690
Huntsville, Alabama 35807

RMA #_____