Dual Nx56/64 Option Module

PN 1200142L1#HS
Plug-On Board PN 1200159L1

USER MANUAL

61200142L1-1C
August 2000

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Notes provide additional useful information.

Cautions signify information that could prevent service interruption.

WARNING

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

Federal Communications Commission Radio Frequency Interference Statement

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

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

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.

Warranty and Customer Service

ADTRAN will replace or repair this product within five (5) years from the date of shipment if it does not meet its published specifications or 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 ADTRAN Technical Support listed on the inside back page of this manual.

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Chapter 1 Introduction

DUAL NX56/64 V.35 OPTION MODULE OVERVIEW

The Dual Nx56/64 V.35 option module is one of the option modules available for use with the following ADTRAN equipment:

- TSU 100e
- TSU 600e
- TSU 610
- TSU 120e
- TDU 120e
- ESU 120e

The Dual Nx56/64 V.35 option module installs in the option slot of the TSU/TDU/ESU family of products and provides two additional synchronous V.35 interface ports. When used in these products, this interface port allows two additional DTEs to have access to the T1 service.

DUAL NX56/64 V.35 PLUG-ON BOARD OVERVIEW

The operations of the Dual Nx56/64 V.35 option module described in this manual are also applicable for the Dual Nx56/64 V.35 plug-on board. Operation of both is identical except for the physical installation.

Dual Nx56/64 V.35 Option Module and Plug-on Board Description

The Dual Nx56/64 V.35 option module operates in the option slot of the TSU/TDU/ESU products, while the plug-on board operates as a plug-on to any option module. Both are under the control of the TSU/TDU/ESU product. The option module and the plug-on board are configured from the front panel or by an external PC program. The internal menus for their configuration are part of the option module and plug-on board and are automatically installed when either is plugged into a TSU/TDU/ESU product.

Features of the Dual Nx56/64 V.35 Option Module

- Operates using one to twenty-four DS0s (32 in E1).
- Includes an elastic store for absorption of rate variations
- Outputs a 50 percent duty-cycle output clock at all rates
- Menu operation for easy configuration
- Executes and responds to V.54 looping codes
- Generates and checks a 511 test pattern
- Performs an extensive self-test
- Supports multiport dial backup operation
- Provides inband channel network management communication

Interfaces

- CCITT V.35 electrical (differential)
- 26-Pin Subminiature D (Amp PN 786200-1) to V.35 Winchester

Two cables are included with this product. See Appendix B for a detailed description of these cables.

- Loopbacks
  Port (toward the network)
  DTE (toward the DTE)
- Both loopbacks can be invoked locally or remotely (V.54)

Dual Nx56/64 V.35 Option Module Specifications

DTE Interface
CCITT V.35 Synchronous

Rates
56 kbps to 1.536 Mbps (T1) and 2048 Mbps (E1) in 56K or 64K steps

Clock Options
Normal, Inverted

Tests
- Local Loopback (Bilateral) - Menu activated
- Remote Loopback (V.54) - Menu activated
- Self-test

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.
Choices: On or Off

CTS, DCD, DSR Options
Choices: Normal or Forced On

Connector
26-Pin Subminiature D

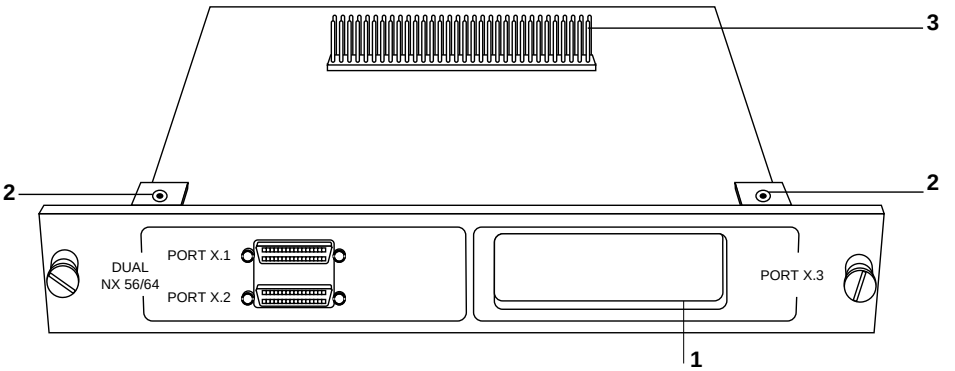
Inband Communication Channel
Enabled or Disabled

Physical Description

The Dual Nx56/64 V.35 option module plugs into the option slot in the rear of the TSU/TDU/ESU family of products (see Figure 1-1).

The rear panel of the option module includes a plastic plug over a cutout for a second V.35 connector. This allows a Dual Nx56/64 V.35 plug-on board (or any other plug-on board) to be added to the Dual Nx56/64 option module, creating a multiport module. The **PORT X.1** and **X.2** indication is linked to the port numbering philosophy of the TSU/TDU/ESU product family. The **X** represents the slot number into which the option module is plugged.

For the TSU 1X0 there is only one option slot. Therefore the port designations are **1.1**, **1.2** and, if a Dual Nx56/64 Plug-On V.35 option module is present, ports **1.3** and **1.4**. The numbers appear in the front panel LCD menu displays.



1 - Cutout for second V.35 connector
2 - Screw receptacles for plug-on board
3 - Plug-on board header

Figure 1-1. Dual Nx56/64 V.35 Option Module

Chapter 2 Installation

UNPACK & INSPECT

Carefully inspect the option module or plug-on board for any shipping damage. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN Customer and Product Service (CAPS). If possible, keep the original shipping container for use in shipping the option module or plug-on board back for repair or for verification of damage during shipment. See product support information on the back page of this manual for information on how to contact ADTRAN.

ADTRAN Shipments Include

- The Dual Nx56 / 64 Module or Dual Nx56 / 64 Plug-on Board.
- The *Dual Nx56/64 Option Module User Manual* (to be inserted into the main *TSU/TDU/ESU User Manual*).
- Two interface cables (ADTRAN PN 3125I020) (Included only with system part number 4200142L1#HS or 4200159L1).
- Four 4-40 screws are provided with plug-on board (part number 1200159L1).

INSTALLING THE OPTION MODULE

Placement of the Option Module

Figure 2-1 shows the proper placement of the option module. Perform the following steps to install the option module:

1. Remove the cover plate from the TSU / TDU / ESU unit rear panel.
2. Slide the option module into the rear panel of the TSU / TDU / ESU unit until it is positioned firmly against the front of the unit.
3. Fasten the thumbscrews at both edges of the option module.

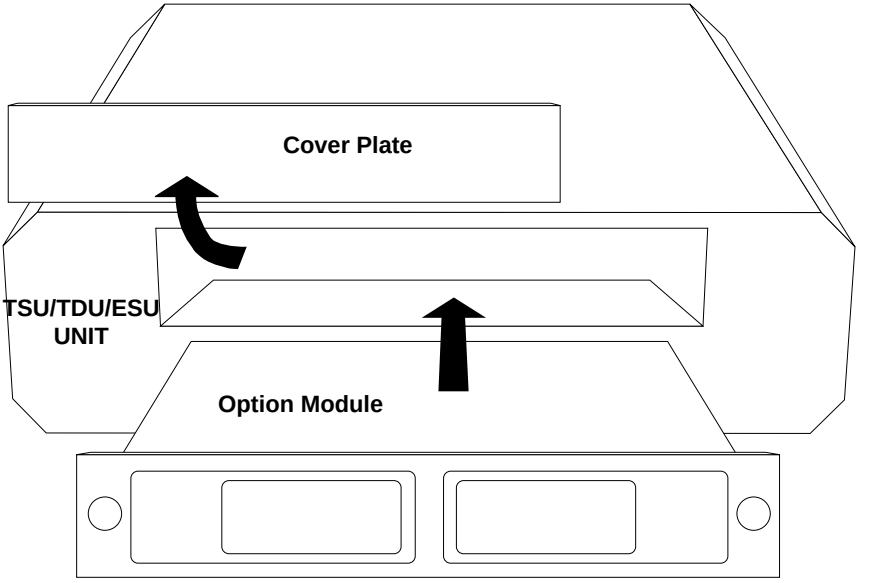


Figure 2-1. Installing the Option Module

Power Connection

Each option module derives power from the base TSU / TDU / ESU unit. Power to the base unit is supplied by a captive eight-foot power cord.

Attaching the Plug-On Board

Figure 2-2 shows the proper attachment of a plug-on board to the option module. Perform the following steps to install the plug-on board:

1. Hold the plug-on board above the option module.
2. Using a downward and right-to-left motion, slip the plug-on board connector into opening in the option module back panel.
3. Moving the plug-on board downward, secure the connection of the header pins at the front of the boards.
4. Install two 4-40 screws at both front edges of the option module.
5. Install two 4-40 screws on each of the standoffs on the rear of the plug-on module.

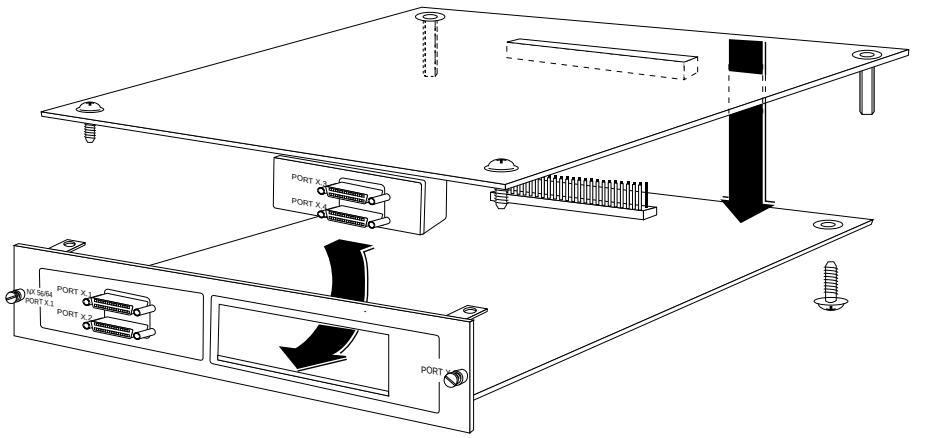


Figure 2-2. Attaching the Plug-On Board

WARNING *The connection of the header pins between the option module and the plug-on board must be visually verified. An improper connection can cause severe damage to the equipment.*

Wiring

The Dual Nx56/64 option module has two 26-pin sub-miniature D connectors. Each connector is pinned out as shown in Table 2-1.

Table 2-1. Subminiature D Connection

PIN	DESCRIPTION
1	Protective ground (PG)
4	Request to send (RTS) from DTE
5	Clear to send (CTS) to DTE
6	Data set ready (DSR) to DTE
7	Signal ground (SG)
8	Received line signal detector (DCD) to DTE
9	Transmitted data (TD-A) to DTE
10	Transmitted data (TD-B) to DTE
11	Received data (RD-A) to DTE
12	Received data (RD-B) to DTE
13	External TX clock (ETC-A) from DTE
19	Test mode (TM) to DTE
22	TX clock (TC-A) to DTE
23	TX clock (TC-B) to DTE
24	RX clock (RC-A) to DTE
25	RX clock (RC-B) to DTE
26	External TX clock (ETC-B) from DTE

Power-Up Testing and Initialization

The option module executes a self-test during the power-up sequence, as described in the TSU / TDU / ESU manual of the base unit. No initialization input is required. Upon power-up, any previously configured setting for the option module is automatically restored unless the software has changed revision.

When the self-testing is completed and the configuration is successfully restored, the LED labeled **OK** in the module group on the front panel turns **On**. For more information, see *Front Panel Operation* in the *Operation* chapter of the appropriate TSU / TDU / ESU user manual. If any alarms are detected during operation, the red LED labeled **ALARM** in the module group on the front panel turns **On**.

Chapter 3 Operation

OVERVIEW

The Dual Nx56/64 V.35 option module is controlled as part of the TSU/TDU/ESU using the same methods as described in the appropriate TSU/TDU/ESU user manual.

Front Panel Indicators/Buttons

Refer to the description of the TSU/TDU/ESU front panel indicators and buttons in the appropriate user manual.

Menu Structure

The Dual Nx56/64 V.35 option module menus appear as a subset of, and operate the same as, menus for the TSU/TDU/ESUs. The menus for the Dual Nx56/64 option module are accessed by selecting the following from the Port menu: **<SLOT>.<PORT> NX56/64**.

Slot

SLOT is the slot number in which the option module is installed.

- In the TSU unit with one option card slot (for example, TSU 100), this number will always be **1**.
- In the TSU unit with six option card slots (for example, TSU 600), this number will be **1** through **6**.

Port

- PORT is the port ID of the V.35 interface to be configured. Each slot may have up to four independent ports.
- The **PORT ID** for each port on the Dual Nx56/64 option module and the Dual Nx56/64 plug-on board is printed next to each connector on the faceplate.

The main menu for the TSU 100 is used as an example. Figure 3-1 shows the TSU 100 main menu with the PORT menu items printed in bold italics. The main menu for the other TSU/TDU/ESU units operates in a similar way.

See *Appendix A* in the *TSU 100 User Manual* for a complete menu tree diagram.

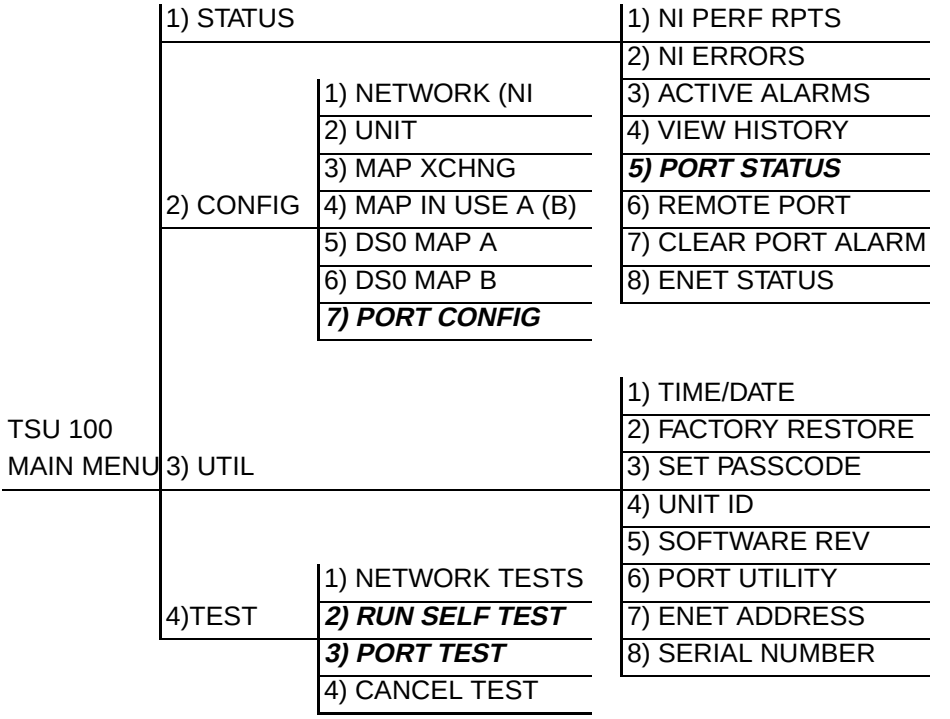


Figure 3-1. TSU 100 Main Menu Tree

Dual Nx56/64 V.35 Menus Are All Submenus

The Dual Nx56/64 V.35 option module menus are accessed from and operated the same as menus for the TSU 100. Menu items in the main menu in Figure 3-1 on page 3-2 printed in bold italics are submenu choices for Dual Nx56/64 V.35 option modules (see Figure 3-2). Each of these submenu items is discussed in the following paragraphs. All are accessed by the same method.

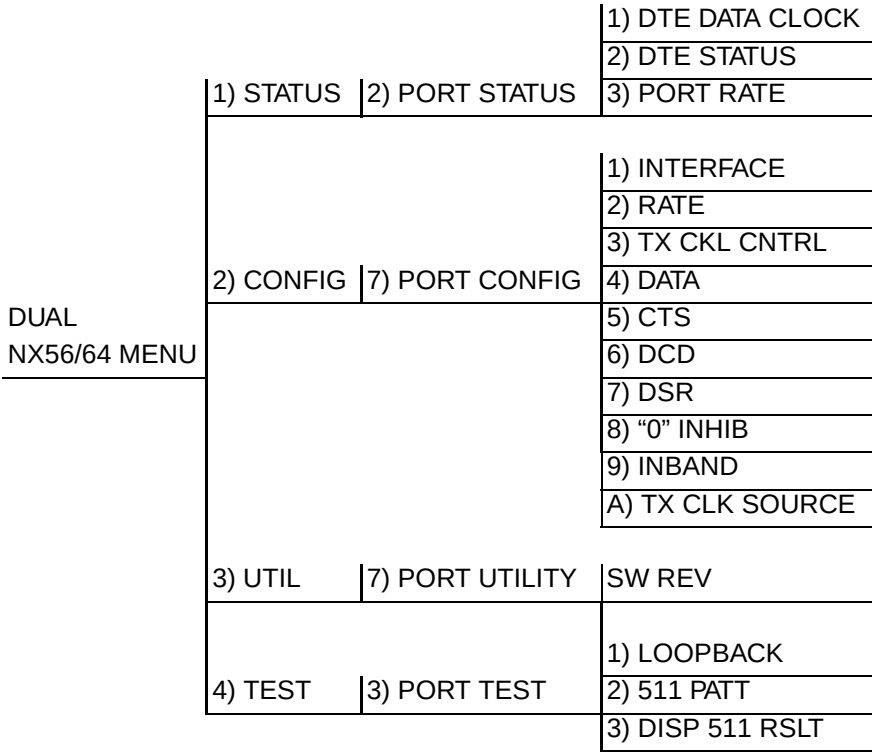


Figure 3-2. Dual Nx56/64 V.35 Menu Tree

Operation

With the cursor on one of the four main menu choices, press **Enter** or the number key. This displays the first two submenu items with the cursor on the first item. Use the down arrow key to place the cursor on the desired item; then press **ENTER**. This displays the first two submenu choices.

PORT Status

The **STATUS** menu branch allows you to view the status of the TSU 100 operation. It displays the status of the monitored signal line on the Dual Nx56/64 V.35 option board and the data rate for which the option module is configured.

Operation

To display Figure 3-3 on the TSU 100, place the cursor on main menu item **1)STATUS**, and do the following:

1. Press **Enter** or the number **1** key. This displays the first two Status submenu items with the cursor on **1)NI PERF RPTS**.
2. Use the down arrow to place the cursor on **5) PORT STATUS**, and press **Enter**. This displays the first available port.
3. Use the up and down arrow keys to identify **1.1 Nx56/64 V.35,** and press **Enter**.

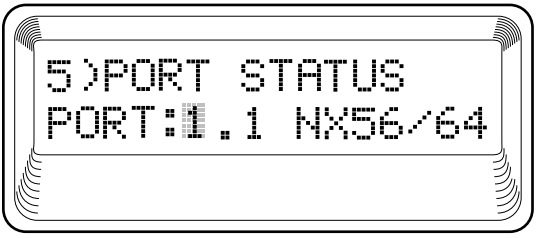


Figure 3-3. Port Status Submenu

The Dual Nx interface offers the status screens listed in this manual. For other option modules, refer to the appropriate user manual.

Dual NX56/64 Status

Select 1.1 NX56/64
DTE DATA/CK
DTE STATUS
PORT RATE

DTE DATA/CK

Shows the status (active or not active) of the following lines:

TXD	Transmit data from the DTE
RXD	Receive data to the DTE
ETC	External transmit clock from DTE
LCK	Lock status of the phase locked loop

DTE Status

Shows the status (active or not active) 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

Displays the data rate to which the NX port is set.

Exit the displays as described in the *TSU 100 User Manual.*

PORT CONFIG

The **7)PORT CONFIG** submenu is used for configuration of the Dual Nx56/64 V.35 option module.

Operation

To display Figure 3-4 on the TSU 100, place the cursor on main menu item **2)CONFIG**, and do the following:

1. Press **Enter** or the number **2** key. This displays the first two Configuration submenu items with the cursor on **1)NETWORK (NI)**.
2. Use the down arrow key to place the cursor on **7)PORT CONFIG,** and press **Enter**.
3. Use the up and down arrow keys to identify **1.1 DUAL NX56/64 V.35** option module. Only the bottom line of the display changes.

Figure 3-4. Port Configuration Submenu

To select **PORT CONFIGURATION**, press **Enter**. This displays the first of eight submenu items. They are:

Interface

This selects the active interface for the Nx port. The Nx ports, which are installed as option modules, have only one type of interface.
Choice: V.35

Rate 56/64

This sets the base rate of the interface. The actual data rate depends on the number of DS0s assigned to the Nx port. The DTE data rate versus the number of DS0s appear in the DTE Data Rate Chart appendix of the *TSU 100 User Manual.*
Choices: 56K or 64K

Transmit Clock (TX CLK)

Controls the clock used by the TSU 100 to accept the transmit (TX) data from the DTE. This is usually set to **NORMAL**. If the interface cable is long and causes a phase-shift in the data, the clock can be selected as **INVERTED**. This switches the phase of the clock, which should compensate for a long cable.
Choices: Normal; Inverted

Data

Used to control the inverting of the DTE data. This inversion can be useful when operating with a high level data link (HDLC) protocol. Often used as a means to ensure 1s density.
Choices: Normal or Inverted

Clear to Send (CTS)

Used to control characteristics of CTS.
Choices: Normal or Force On (see Table 3-1 on page 3-8).

Data Carrier Detect (DCD)

Indicates to the DTE when a valid signal is being received at the Network Interface.
Choices: Normal or Force On (see Table 3-1 on page 3-8).

Data Set Ready (DSR)

This signal indicates to the DTE when the DCE is turned On and ready for operation.
Choices: Normal or Force On (see Table 3-1 on page 3-8).

Table 3-1 on page 3-8 shows conditions which cause the port control signal to be deactivated

Table 3-1. Normal Mode Operation

SIGNAL	RTS	V-54 LOOPBACK	511 TEST ON	SELF TEST ACTIVE	NETWORK TEST ACTIVE	NO DS0 MAPPED	NETWORK ALARM
CTS	Follows	off	off	off	off	off	off
DCD	—	—	—	off	off	off	off
DSR	—	off	off	off	off	off	—

— = Do not care

Force On = On under all conditions

0 INHIB

If the Nx interface detects an uninterrupted string of 0s being transmitted toward the network, and if 0s are transmitted for more than one second, then the TSU 100 forces 1s towards the network.
Choices: On; Off

INBAND

Inband Configuration Channel - Used to enable / disable an 8 kbps remote configuration channel (see Figure 3-5 on page 3-9). When this option is set to ON, the first DS0 mapped to the Nx interface operates in 56K mode and the DTE clock rate is reduced by 8 kbps. The TSU / HSU uses this 8 kbps channel to send and receive configuration data across a T1 span. As shown in Figure 3-5, this allows the PC connected to the chain-in port on TSU 600 A to monitor / configure both TSU 600 A and B. This feature is useful when FDL connectivity is not available across the T1 span.

The 8 kbps channel is only taken out of the first DS0. If two 64K DS0s are mapped, the DTE rate would be 120 kbps instead of 128 kbps.

This menu option can also be set to **ON-DEMAND** which will activate the Inband Channel only when commands are sent from T-Watch Pro to the remote unit (TSU 600 B in Figure 3-5). If no T-Watch Pro activity is detected for 10 minutes, the Inband Channel is deactivated.

TX CLK SOURCE

Controls the clock used by the DTE. Normally this is set to **INTERNAL**. If the DTE provides a clock with TX data, the clock selection is set to **EXTERNAL**. The Nx56/64 will depend on an externally supplied clock to accept the TX data.

Choices: INTERNAL or EXTERNAL

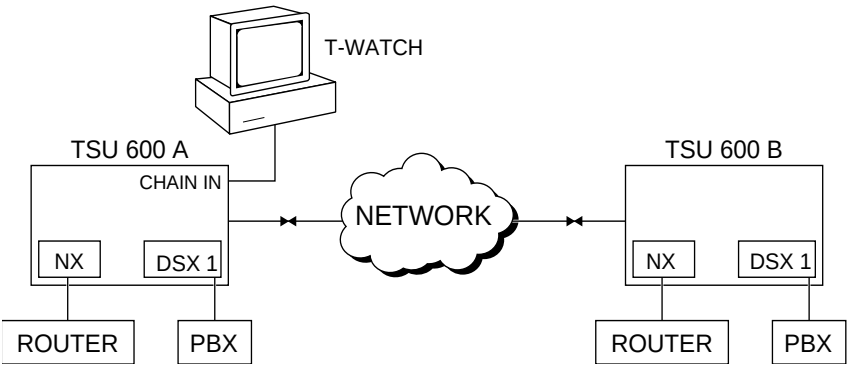


Figure 3-5. Inband Remote Configuration

Although a router can accommodate this 8K rate reduction, some DTE devices may not (i.e., video). Determination should be made if the connected DTE can handle this reduced clock source. A second option would be to operate in 56K/DS0.

Factory Restore

This selection is used to restore the factory default settings for all pass-through option module parameters.

Operation

To return the unit to the opening main menu with all the factory default settings restored, do the following:

1. Follow the standard operating procedure to access the **3)UTIL** menu items.
2. With the cursor on **2)FACT RESTORE**, press **Enter**.

Port Utility

The Port Utility submenu is used primarily to access the display of the current software information for each port installed in the unit. This information is required when requesting assistance from ADTRAN Technical Support or when updates are needed.

Operation

To display Figure 3-6, do the following:

1. Follow the standard operating procedure to access the **3)UTIL** menu items.
2. With the cursor on **6)PORT UTILITY**, press **Enter**. This displays the first available port.

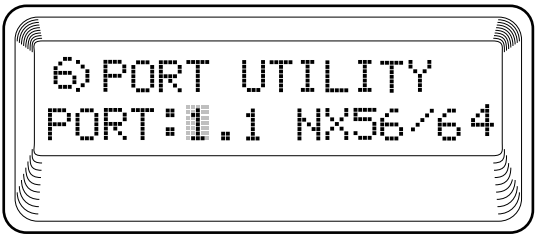


Figure 3-6. Port Utility Submenu

To display the port name and the software version installed as shown in Figure 3-7, do the following:

1. Use the arrow keys to move through the available ports, or enter the port number with the number key.
2. When the desired port name is displayed, press **Enter**.
3. Press **Cancel** to exit or to select another port.

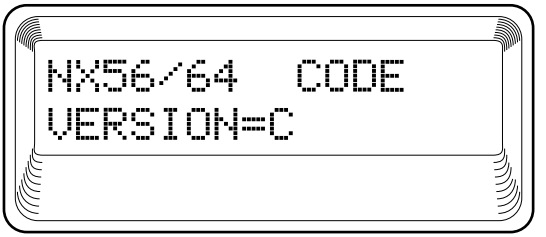


Figure 3-7. Port Name and Software Version Display

Run Self-Test

This menu item is used to execute both the internal test of the TSU / TDU / ESU and of the Dual Nx56 / 64. This is the same test executed during power-up. The results of the self-test are shown on the TSU 100 display. For additional information on Self-Test, see the *Operation* chapter of the appropriate TSU / TDU / ESU user manual.

To activate a self-test, do the following:

1. Follow the standard operating procedure to access the **4)TEST** menu items.
2. With the cursor on **2)RUN SELFTEST**, press **Enter**. The TSU / TDU / ESU display changes and shows the test outcome.

Port Test

This menu item is used to activate testing of specific data ports. It also controls the activation of loopbacks and the initiation of data test patterns. Test results are shown on the TSU/TDU/ESU display.

Port Test execution disrupts normal data flow in the port being tested.

Operation

To display Figure 3-8 on the TSU 100, place the cursor on **3)PORT TEST**, and press **Enter** or the number **3** key. This displays the available ports.

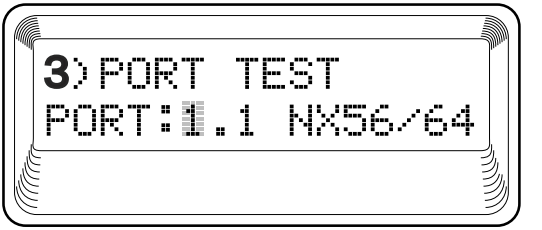


Figure 3-8. Port Test Submenu

1.1 Dual Nx56/64

The Nx interface offers the following test functions:

LOOPBK
Initiates a loopback.

PRT/LCI
The Nx port activates both a local loopback (Back toward the DTE) and a port loopback when either is invoked

REMOTE
The remote loopback causes a V.54 code to be sent to the far end. The Nx at the far end activates a PORT/LCL loopback on detection of the V.54 code.

REM V.54 CONT
This loopback causes continuous V.54 code to be sent to the far end. The Nx at the far end activates a **PORT/LCL** loopback upon detection of the V.54 code.

OFF
The loop is deactivated.

The TSU/TDU/ESU checks the remote loopback activation by detecting a proper response from the remote end. While waiting for the response, the display shows ***Looping****. If successful, the display changes to* ***Looped Up****. If unsuccessful, the display shows* ***Failed****.*

511 PATT
Activates the generation of the 511 test pattern.

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

OFF
The pattern generation and check is disabled

DIS 511 RESLT
Displays the results of the 511 test indicated above. 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**). A bit error may be inserted into the data stream by pressing the **2** key.

Appendix A System Messages

ALARM MESSAGES

Network Interface (NI)

Red Alarm
NI unable to align frame with incoming signal

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

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

Loss of Signal
No signal detected at NI

Dual Nx56/64 V.35 Option Module

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

PLL Alarm
Unable to lock phase lock on the clock provided by the network interface

Zeros Alarm
All 0s data being sent to the network interface

No EXT Clock
No external transmit clock at DTE (when applicable)

STATUS MESSAGES

Network Interface (NI)

Payload On
Payload loopback activated

Line On
Line loopback activated

Loopback Off
All loopbacks deactivated

Factory Restore
Factory setting restored

Power On
Unit powered on

Self-Test
Internal self-test performed

Dual Nx56/64 V.35 Option Module

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

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

511 Pattern On
Sending a 511 pattern towards the network interface

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

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

Appendix B 26-Pin Subminiature D to V.35 Winchester Cable

The interface cables (26-Pin Subminiature D to V.35 Winchester Cables) shipped with the Dual Nx56/64 Option Module and the Dual Nx56/64 Plug-On Board are pinned out as shown in Table B-1 on page B-2.

Subminiature D connector should be AMP PN 750850-3 or equivalent.

V.35 Winchester cable should be Positronic PNV3400000.70 with GMCT34F0000YR-695 or equivalent.

Pins A through NN are V.35 connector pins; pins 101 through 114 are CCITT pins.

Table B-1. 26-Pin Subminiature D to V.35 Winchester Cable

SUBMINIATURE D PIN & SIGNAL		V.35 WINCHESTER PIN & SIGNAL (CCITT)	
Pin	**Signal**	**Pin**	**Signal**
1	Frame Ground	A (101)	Frame Ground
2	NC	B (102)	Signal Ground
3	NC	C (105)	RTS
4	RTS	D (106)	CTS
5	CTS	E (107)	DSR
6	DSR	F (109)	DCD
7	SIGNAL GROUND	H —	DTR
8	DCD	J —	RI
9	TD-A	K —	TM
10	TD-B	L —	LL
11	RD-A	M —	—
12	RD-B	N —	—
13	ETC-A	P (103)	TD-A
14	NC	R (104)	RD-A
15	NC	S (103)	TD-B
16	NC	T (104)	RD-B
17	RI	U (113)	ETC-A
18	LL	V (115)	RC-A
19	TM	W (113)	ETC-B
20	DTR	X (115)	RC-B
21	SIGNAL GROUND	Y (114)	TC-A
22	TC-A	Z —	—
23	TC-B	AA (114)	TC-B
24	RC-A	BB —	—
25	RC-B	CC —	—
26	ETC-B	DD —	—
		EE —	—
		FF —	—
		HH —	—
		JJ —	—
		KK —	—
		LL —	—
		MM —	—
		NN —	TM

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Product Support Information

Pre-Sales Inquiries and Applications Support

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

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

Post-Sale Support

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

Technical Support	(888) 4ADTRAN

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 (below address), and return to the following address:

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

RMA # _____