



**Nx56/64 (EIA-530)  
Option Module**

**User Manual**

**Part Number  
1200054L2**

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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.*

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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.***



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## OVERVIEW

The Nx56/64 (EIA-530) option module is one of the option modules available for use with the ADTRAN TSU 100, 120, 600, and 610. The Nx56/64 (EIA-530) option module installs in the option slot of the TSU 100 and provides an additional synchronous EIA-530 interface port. When used in the TSU, this interface port allows an additional DTE to have access to the T1 service.

## Functional Description

The Nx56/64 (EIA-530) interface operates in the option slot of the TSUs, or as a plug-on to any option module and is under the control of the TSU. The Nx56/64 (EIA-530) option module is configured from the front panel or by an external PC program. The internal menus for its configuration are part of the Nx card and are automatically installed when the option module is plugged into the TSU.

## Features

- Operates using 1 to 24 DS0s
- Includes an elastic store for absorption of rate variations
- Capable of including an Nx56/64 (EIA-530) plug-on interface port, resulting in a dual port module
- Outputs a 50% 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

## Interfaces

- EIA-530 electrical (differential)
- Connector : DB-25 (EIA-530)
- Loopbacks:
  - Port (toward the network)
  - DTE (toward the DTE)

Both loopbacks can be invoked locally or remotely (V.54)

## Option Module Specifications

### DTE Interface

EIA-530

### Rates

56 kbps - 1.536 Mbps in 56K or 64K steps

### Clock Options

Internal, Internal-Inverted, External

### **Tests**

Local Loopback (Bilateral): Menu activated

Remote Loopback (V.54)

Menu activated: Self-test

### **Test Pattern**

511 with errored seconds display

### **Data Inversion**

Menu selectable

### **1s Density Protection**

Force 1s to network after one second of consecutive zeros from DTE. On/Off

### **CTS, DCD, DSR Options**

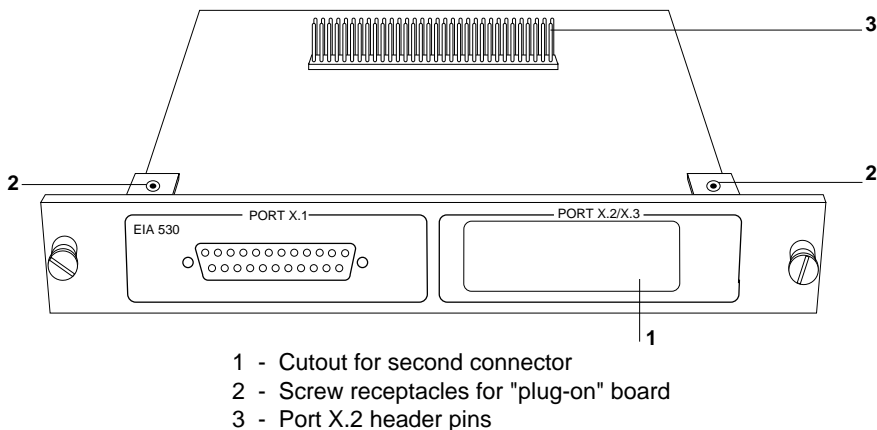
Normal or Forced On

### **Connector**

DB-25 (EIA-530)

## Physical Description

The Nx56/64 (EIA-530) is an option module which plugs into the option slot in the rear of the TSU product family. See Figure 1-1.



**Figure 1-1. Nx56/64 (EIA-530) Option Module**

The rear panel of the option module includes a plastic plug over a cutout for a second EIA-530 connector. This allows the addition of another plug-on module. The port **X.1** and **X.2** indication is linked to the port numbering philosophy of the TSU 100 product family. The **X** represents the slot number, into which the option module is plugged. For the TSU 100, there is only one option slot. Therefore, the port designation would be **1.1**. If a plug-on (EIA-530) is present, then the part designation would be port **1.2**. In a TSU 600 with six option slots, these port numbers would be port **1.1** to port **6.1**. The numbers appear in the front panel LCD menu displays.



## **UNPACK & INSPECT**

Carefully inspect the Nx56/64 (EIA 530) option module for any shipping damage. If damage is suspected, file a claim immediately with the carrier and then contact ADTRAN customer service. If possible, keep the original shipping container for use in shipping the module back for repair or for verification of damage during shipment.

## **ADTRAN Shipments Include**

- The Nx56/64 (EIA-530) option module
- The user manual (to be inserted into the main TSU manual)

## **Customer Provides**

- DTE cable

## INSTALLING THE OPTION MODULE

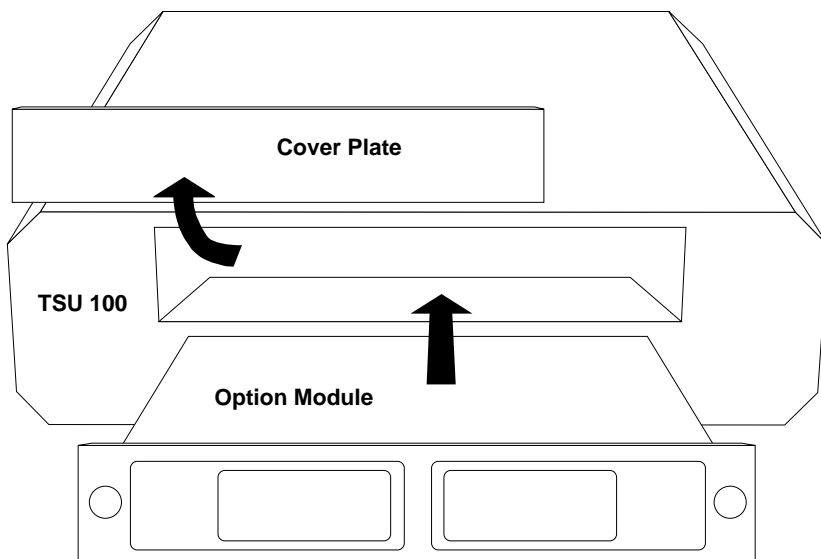


*Power to the TSU 100 should be Off when installing any option module.*

### Placement of the Option Module

Figure 2-1 shows the proper placement of the option module. To install the option module, perform the following steps:

1. Remove the cover plate from the TSU 100 rear panel.
2. Slide the option module into the rear panel of the TSU 100 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**

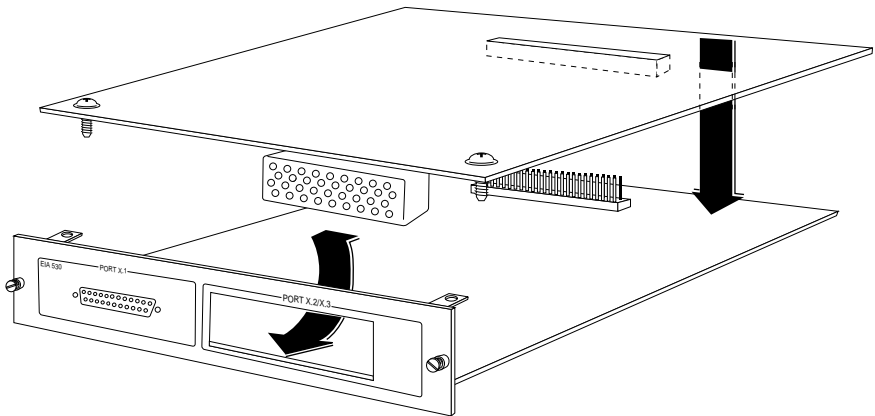
## Power Connection

Each option module derives power from the base TSU 100 unit. Power to the TSU 100 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 DTE connector plug into the opening in the option module back panel.
3. Move the plug-on board downward then secure the connection of the header pins at the front of the boards.
4. Install the two 4-40 screws at both edges of the option module.



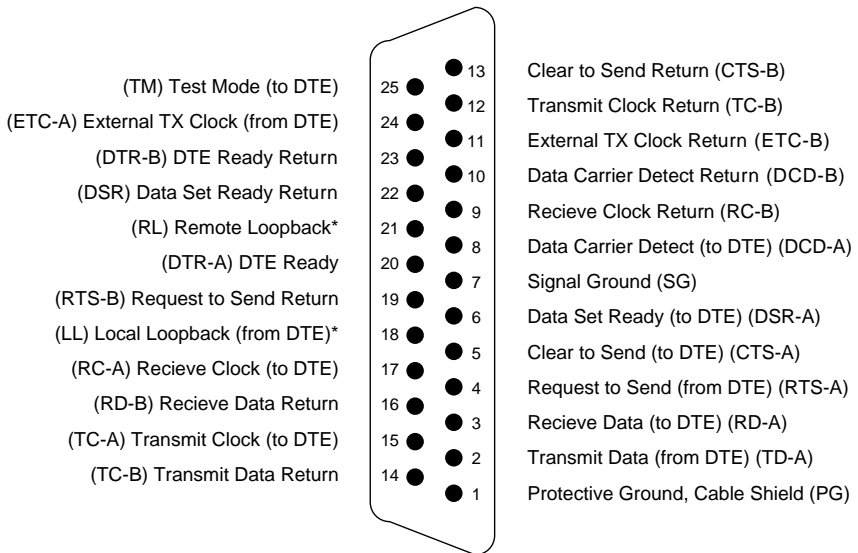
**Figure 2-2. Attaching the Plug-on Board**

### **WARNING**

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

## WIRING

The Nx56/64 (EIA-530) option module has a DB-25 Winchester-style connection, as shown in Figure 2-3.



\* Ignored by Nx56/64

**Figure 2-3. DB-25 Pin Connection**

## POWER-UP AND INITIALIZATION

The Nx56/64 (EIA-530) option module executes a self-test during the power-up sequence, as described in the *TSU 100 User Manual*. No initialization input is required. Upon power-up, any previously configured setting for the Nx56/64 (EIA-530) option module is automatically restored.

When the self-test is complete 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 Chapter 3, *Operation*, of the *TSU 100 User Manual*. If any alarms are detected during operation, the red LED labeled **ALARM** in the module group on the front panel turns ON.



## OVERVIEW

The Nx56/64 (EIA 530) option module is controlled as part of the TSU 100 using the same methods as described in the *TSU 100 User Manual*.

## Front Panel Indicators/Buttons

See the description of the TSU 100 front panel indicators and buttons in the *TSU 100 User Manual*.

## Menu Structure

The Nx56/64 menus appear as a subset of, and operate the same as, menus for the TSU 100. The menus are accessed by selecting **1.1 Nx56/64** under the Port menu items.

Figure 3-1 on page 3-2 shows the TSU 100 main menu. The Port menu items are in ***bold, italic*** type.

A complete TSU 100 menu tree diagram is found in the *TSU 100 User Manual*.

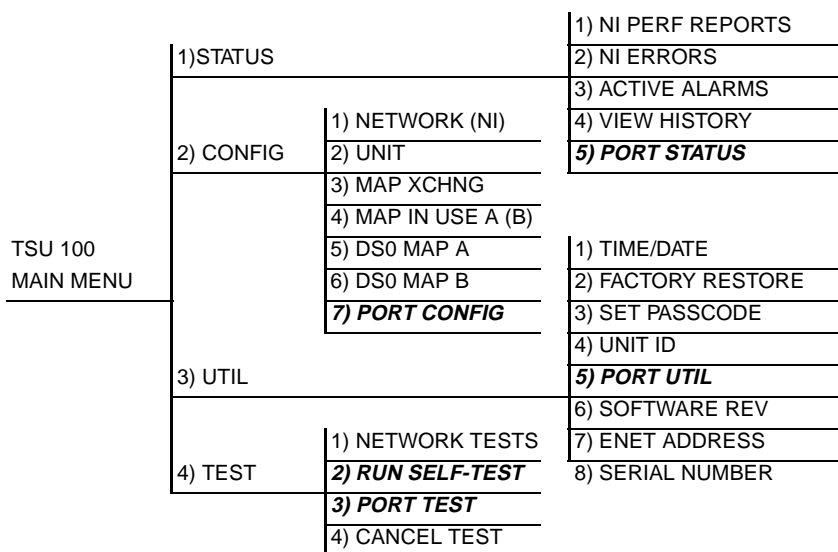


Figure 3-1. TSU 100 Main Menu Tree

## Nx56/64 Menus Are All Submenus

The Nx56/64 menus are accessed from and operated the same as menus for the TSU 100. As shown in the bold, italicized menu items in Figure 3-1, the Nx56/64 items are submenu choices of the four main menus. Each of the Nx56/64 submenu items is discussed in the following paragraphs. All are accessed by using the same method.

## OPERATION OF NX56/64 SUBMENUS

With the cursor on one of the four Main menu choices, press **Enter** or the number key. The first two submenu items with the cursor on the first item will display. Use the **SCROLL DOWN** key to place the cursor on the desired item; then press **Enter**. This displays the first two submenu choices.



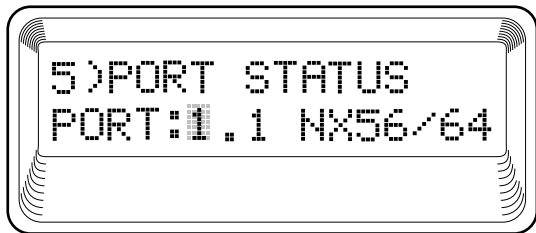
## 2)PORT Status, Submenu of 1)STATUS

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 Nx56/64 (EIA-530) option module and the data rate for which the Nx card is configured.

### Operation

To display Figure 3-2 on the TSU 100, place the cursor on main menu item **1)STATUS** and perform the following steps:

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 **Scroll Down** key to place the cursor on **5) PORT STATUS** and press **Enter**. This displays the first available port.
3. Use the **Scroll** keys to identify **1.1 Nx56/64** and press **Enter**.



**Figure 3-2. Port Status Submenu**

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

### **Nx56/64 Status**

Select 0.1 NX56/64

- 1) DTE DATA/CK
- 2) DTE STATUS
- 3) PORT RATE

### **DTE Data/CK**

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

- TXD** Transmit data to the DTE
- RXD** Receive data from 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*.

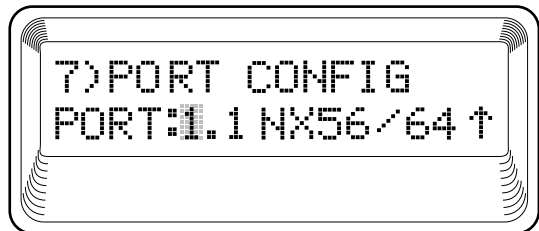
## 7)PORT CONFIG, Submenu of 2)CONFIG

The **7)PORT CONFIG** submenu is used for configuration of the Nx56/64 (EIA-530) option module.

### Operation

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

1. Press **Enter** or the number **2** key. This displays the first two Configuration submenu items. The cursor will be on **1)NETWORK (NI)**.
2. Use the **Scroll Down** key to place the cursor on **7)PORT CONFIG** and press **Enter**.
3. Use the scroll keys to identify **1.1 Nx56/64**. Only the bottom line of the display changes.



**Figure 3-3. Port Configuration Submenu**

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

### 1)INTERFACE

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

Choice: EIA-530

### **2)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* shown in the *TSU 100 User Manual*.

Choices: Internal, Int-Inv, or External

### **3)TX CLK**

Controls the clock used by the TSU 100 to accept the transmit (TX) data from the DTE. Normally this is set to **INTERNAL**. If the interface cable is long, causing a phase shift in the data, the clock can be selected as **INT/INV** (Internal/Inverted). This switches the phase of the clock which should compensate for a long cable.

If the DTE provides a clock with TX data, the clock selection is set to **EXTERNAL**. The TSU 100 depends on an externally supplied clock to accept the TX data.

Choices: Internal, Int-Inv, or External

### **4)DATA**

Used to control the inverting of the DTE data. This inversion can be useful when operating with a High Level Data Link (HLDC) protocol. Often used as a means to ensure 1s density.

Choices: Normal or Invert

### **5)CTS**

Used to control characteristics of CTS.

Choices: Normal or Force On (see Table 3-1 on page 3-7).

### **6)DCD**

Data Carrier Detect - 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 3-7).

### **7)DSR (Data Set Ready)**

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 3-7).

**8)0 INHIB**

The Nx interface detects an uninterrupted string of 0s being transmitted toward the network. If 0s are transmitted for more than one second, the TSU 100 forces 1s towards the network.

Choices: On or Off

Table 3-1 shows the 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
DSR	-	Off	Off	Off	Off	Off	-

- = Do not care  
Force On = On under all conditions

**3)FACTORY RESTORE, Submenu of 3)UTIL**

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 **3)FACT RESTORE**, press **Enter**.

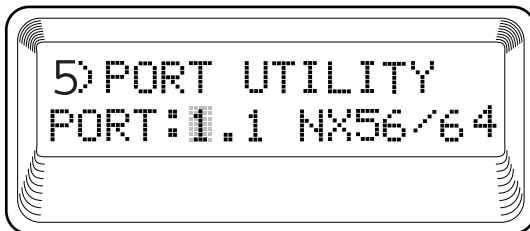
## 5)PORT UTILITY, Submenu of 3)UTIL

The **5)PORT UTILITY** submenu is primarily used 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 3-4 on the TSU 100, do the following:

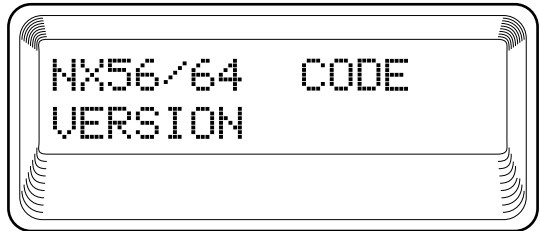
1. Follow the standard operating procedure to access the **3)UTIL** menu items.
2. With the cursor on **5)PORT UTILITY**, press **Enter**. This displays the first available port.



**Figure 3-4. Port Utility Submenu**

To display the port name and the software version installed, as shown in Figure 3-5, do the following:

1. Use the **Scroll** 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 3-5. Port Name and Software Version Display**

## **2)RUN SELF-TEST, Submenu of 4)Test**

This menu item is used to execute both the internal test of the TSU 100 and of the Nx56/64 (EIA-530) option module. 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 Chapter 3, *Operation* in the *TSU 100 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 SELF-TEST**, press **Enter**. The TSU 100 display will show the test outcome.

### 3)PORT TEST, Submenu of 4)Test

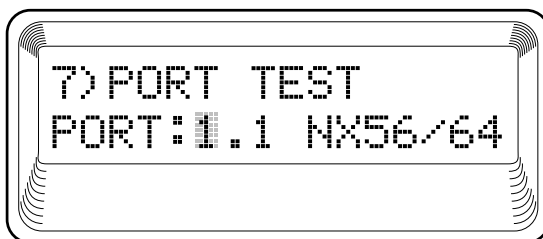
This menu item is used to activate testing of specific data ports. It also controls the activation of loopbacks and the initiation of data test patterns. Test results are shown on the TSU 100 display.



*The execution of port tests disrupts normal data flow in the port being tested.*

#### Operation

To display Figure 3-6 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 3-6. Port Test Submenu**

#### 1.1 Nx56/64

The Nx interface offers the following test functions:

1)LOOPBK: Initiates a loopback.

**PRT/LCL:** The Nx port activates both a local loopback (back toward the DTE) and a port loopback when either is invoked. See Chapter 1, *Introduction*, of the *TSU 100 User Manual*, for more information.

**Remote:** The remote loopback causes a V.54 code to be sent to the far end. The Nx at the far end activates a PRT/LCL loopback on detection of the V.54 code.

**Off:** The loop is deactivated.





*The TSU 100 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*.*

2)511 PATT: 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.

3)DIS 511 RESULT: Displays the results of the 511 test indicated in item 2, above. The results are in the form of the number of errored seconds. The error count can be cleared by pressing **Clear (shift + 9)**.



## 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

### Nx56/64 Card

**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

**FIFO Alarm**

Error in propagation of data through the FIFOs

**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

## Nx56/64 Card

### **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



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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 # \_\_\_\_\_

