

T1 Nx64 HTU-R Installation and Maintenance

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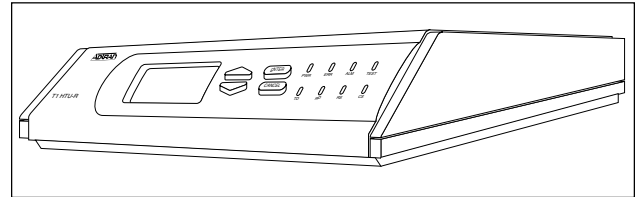


Figure 1. T1 Nx64 HTU-R

1. GENERAL

Functional Overview

The ADTRAN T1 Nx64 HTU-R is a network terminating unit which uses High-bit-rate Digital Subscriber Line (HDSL) technology to transport T1 data over copper loops. Each loop operates over a single pair of copper wire and carries half of the total bandwidth along with a small amount of overhead for maintenance and performance monitoring functions. **Figure 1** is an illustration of the T1 Nx64 HTU-R.

The T1 Nx64 HTU-R is a standalone unit which contains an integrated Data Service Unit (DSU). This eliminates the need for a separate DSU. The T1 Nx64 HTU-R provides Nx56 kbps or Nx64 kbps data transmission capability. Possible data rates range from 64 kbps to 1.536 Mbps and 56 kbps to 1.344 Mbps.

IMPORTANT

- A. The Nx64 HTU-R can be used in a variety of environments. When using this equipment, follow these basic safety precautions to reduce the risk of fire, electric shock and personal injury:**
- 1. Do not use this product near water (for example, near a bathtub, washbowl, sink, or laundry tub, in a wet basement or near a swimming pool).**
 - 2. Avoid using this or other telephone equipment (other than the cordless type) during an electrical storm.**
 - 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 this document. Do not dispose of batteries in a fire; check with local codes for possible special disposal instructions.**

The T1 Nx64 HTU-R can be deployed in pairs. This peer-to-peer arrangement allows for point-to-point deployment of Nx56 kbps or Nx64 kbps data service. In this configuration, one T1 Nx64 HTU-R is configured as a Master and the other T1 Nx64 HTU-R is configured as a Slave.

Figure 2 shows a typical system configuration for T1 Nx64 HTU-R pair deployment.

The T1 Nx64 HTU-R can also be deployed in circuits containing an ADTRAN Low Voltage T1 HTU-C. The T1 Nx64 HTU-R is compatible with all generations of ADTRAN T1 HDSL products. In this configuration, the T1 Nx64 HTU-R is configured as a Slave. **Figure 3** shows the system configuration for T1 Nx64 HTU-R deployment with an ADTRAN HTU-C.

Powering for the T1 Nx64 HTU-R can be provided from any AC power source ranging from 90 V to 240 V at frequencies of 50 Hz to 60 Hz.

System Configuration

A block diagram for deploying the ADTRAN HTU-R is shown in Figure 2. One HTU-R is referred to as the Local HTU-R and the other is referred to as the Remote HTU-R. When the ADTRAN HTU-R is deployed in a circuit with an ADTRAN T1 HTU-C, the HTU-R will be referred to as the Remote HTU-R. A Local HTU-R should always be configured to be the Master unit of the circuit. A Remote HTU-R should always be configured as the Slave unit of the circuit.

The rear panel of the T1 Nx64 HTU-R has all the connections for the HDSL local loop, the Customer Premises Equipment (CPE), power, and console port. The T1 Nx64 HTU-R connects to the HDSL local loop via an RJ48C female connector, and to the CPE through a M/34 female connector. The T1 Nx64 HTU-R connects to an AC power supply through a three-prong male IEC connector. Also, a VT-100 type terminal can be connected to the T1 Nx64 HTU-R through a DB9 female connector. Cabling is not included with the T1 Nx64 HTU-R. The V.35 to RS-449 adapter cable pinout is illustrated in **Figure 4**. **Figure 5** shows the T1 Nx64 HTU-R rear panel.

The front panel of the T1 Nx64 HTU-R features one LCD display, four pushbuttons, and eight LEDs. The LCD display and push buttons are used together for configuration, performance monitoring, and diagnostic testing of the T1 Nx64 HTU-R. The “Up” and “Down” arrow keys are used to travel up/down front panel menu trees. The up and down arrows also increase/decrease numeric values and scroll through selections. The “Enter” key is used to choose paths through front panel menus and make selections. The “Cancel” key is used to exit selections or front panel menus.

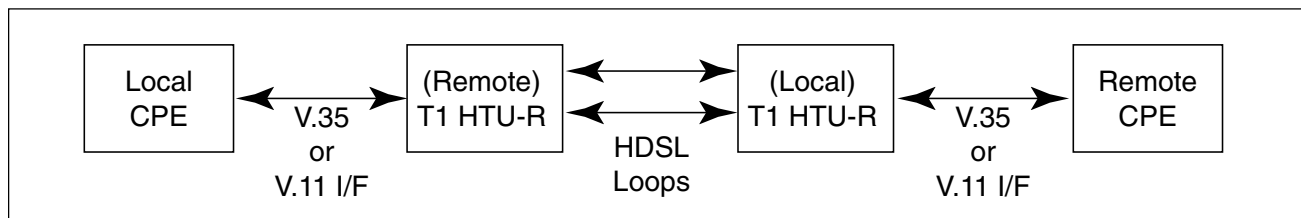


Figure 2. System Configuration for T1 Nx64 HTU-R Pair Deployment

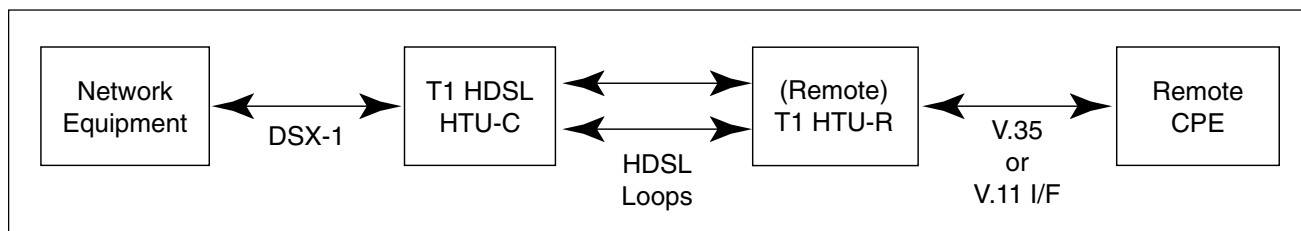


Figure 3. System Configuration for T1 Nx64 HTU-R Deployment with ADTRAN HTU-C

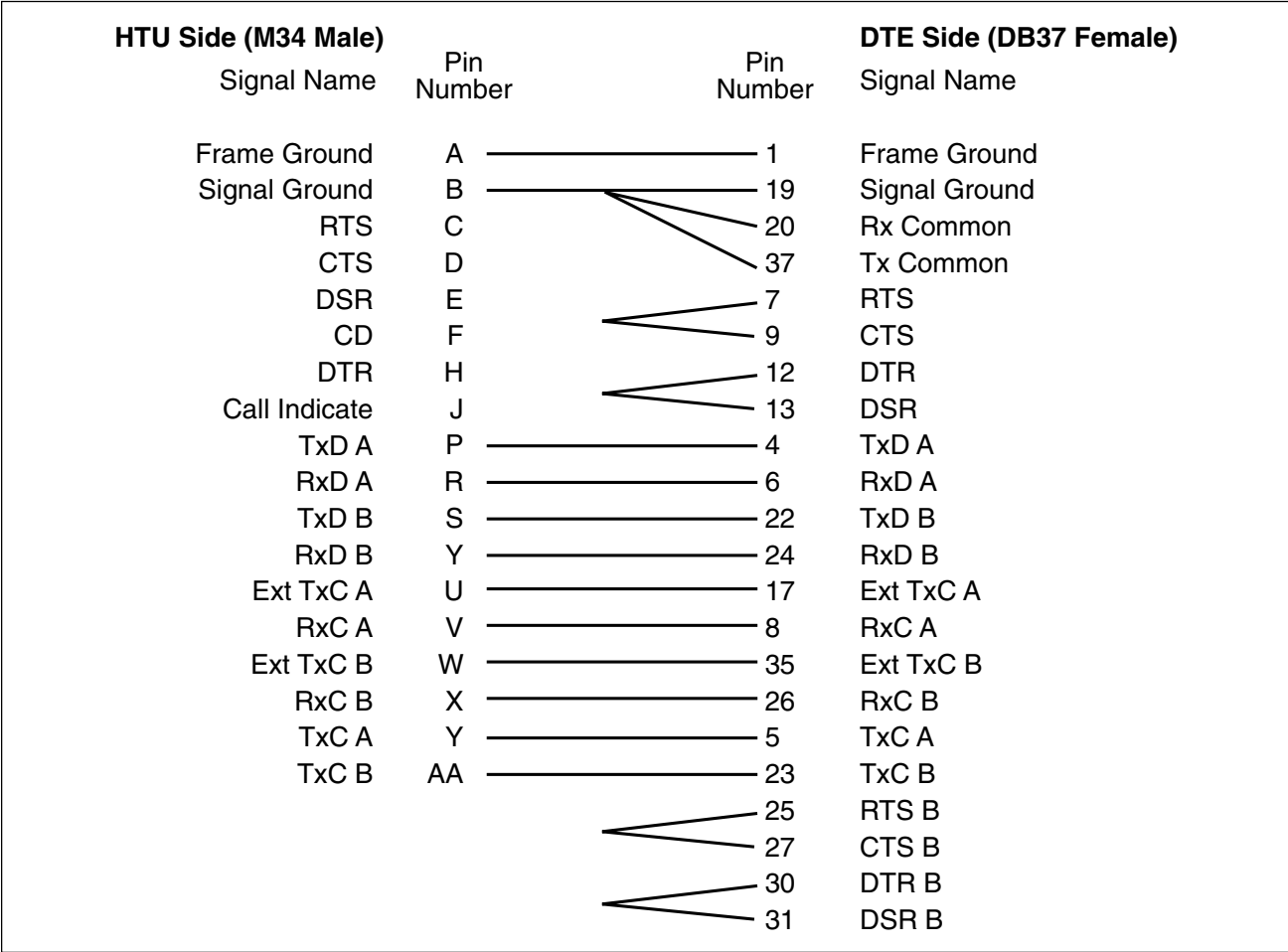


Figure 4. V.35 to RS-449 Adapter Cable Pinout

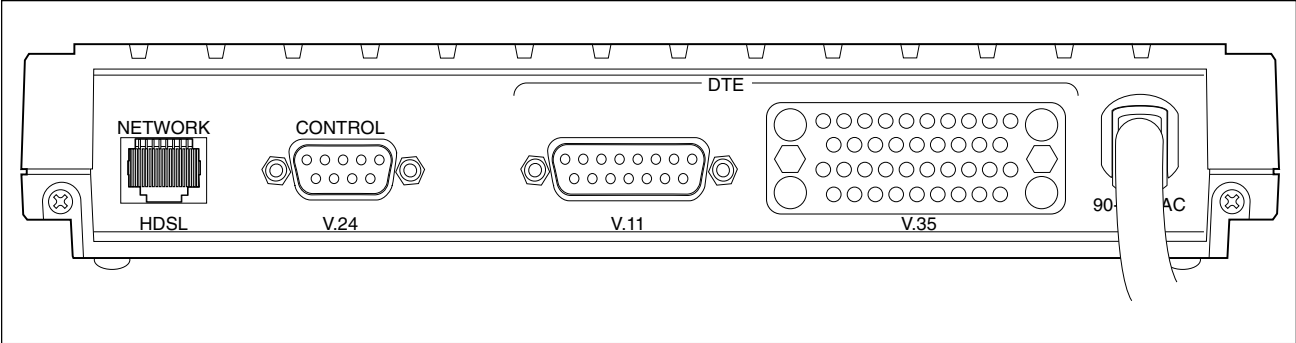


Figure 5. HTU-C Rear Panel

The front panel LEDs provide visual T1 Nx64 HTU-R status information regarding the HDSL loop, DTE interface, and test modes. These LEDs are described in **Table 1**.

Revision History

This revision provided to make changes to important note on page 1.

Table 1. Front Panel LED Indicators

Indicator	Description
L1	Indicates HDSL signal quality on Loop 1 Off No synchronization of HTU-C and HTU-R on Loop 1 Red Poor signal quality on Loop 1 ($> 10^{-7}$ BER) Yellow Marginal signal quality on Loop 1 (≤ 2 dB margin above 10^{-7} BER) Green Good signal quality on Loop 1 (> 2 dB margin above 10^{-7} BER) Blinking An error detected on either end of Loop 1 will cause this LED to blink briefly
L2	Indicates HDSL signal quality Loop 2 Off No synchronization of HTU-C and HTU-R on Loop 2 Red Poor signal quality on Loop 2 ($> 10^{-7}$ BER) Yellow Marginal signal quality on Loop 2 (≤ 2 dB margin above 10^{-7} BER) Green Good signal quality on Loop 2 (> 2 dB margin above 10^{-7} BER) Blinking An error detected on either end of Loop 2 will cause this LED to blink briefly
ALM	Indicates an alarm condition at the local or remote HDSL unit Off No alarm condition detected Red Local alarm condition detected Yellow Remote alarm condition detected
LBK	Indicates that a local loopback is active Off Local unit is not in loopback Yellow Local unit is in loopback
TD	Indicates the status of the Transmit Data (TD) lead on the DTE interface Off Data is being received from the DTE Green Data is not being received from the DTE
RD	Indicates the status of the Receive Data (RD) lead on the DTE interface Off Data is being received from the HDSL network Green Data is not being received from the HDSL network
DTE	Indicates that the DTE is ready to send Transmit and/or Receive Data Off DTE is not ready to send or receive data Green DTE is ready to send and/or receive data
HTU	Indicates that the T1 Nx64 HTU-R is ready to send Transmit and/or Receive Data Off T1 Nx64 HTU-R is not ready to send or receive data Green HDSL link is ready to send and/or receive data

2. INSTALLATION

Unpacking and Inspection

After unpacking the unit, inspect it for damage. If damage is discovered, file a claim the carrier, then contact ADTRAN. See *Warranty and Customer Service*.

Configuring the T1 Nx64 HTU-R

The T1 Nx64 HTU-R contains options used to properly configure the unit. These configuration options are accessible through the front panel LCD and push buttons. The T1 Nx64 HTU-R configuration options are shown in **Table 2**.

Table 2. Configuration Options for a Remote (Slave) Unit

Configuration	Description
HTU-R Mode	Selects between Master and Slave mode for the T1 Nx64 HTU-R Master (HTU-C) The T1 Nx64 HTU-R is configured as the Local (Master) unit Slave (HTU-R) The T1 Nx64 HTU-R is configured as the Remote (Slave) unit
Clock	Selects the HDSL timing source Network The T1 Nx64 HTU-R will derive HDSL timing from the network Internal The T1 Nx64 HTU-R uses its internal oscillator to generate HDSL timing DTE The T1 Nx64 HTU-R derives HDSL timing from the DTE
DTE INT. TYPE	Selects the DTE interface connector being used V.35 Select this option if the DTE is connected to the M/34 connector V.11 Select this option is the DTE is connected to the DB11 connector
RATE 56/64	Selects the channel data rate of either 56 kbps or 64 kbps 56 Selects 56 kbps 64 Selects 64 kbps
CHANNELS	Selects between contiguous or alternating DS0s CONT Contiguous DS0s ALT Alternating DS0s
DTE TX CLK	Selects the timing source for the transmit data clock INT_INV Inverted form of the internal DTE-TX-CLK setting AUTO Measures the delay between the DTE data and its clock and automatically selects between INTERNAL and INT_INV INTERNAL Allows the Nx64 HTU-R to provide transmit data clock EXTERNAL Derives DTE transmit clock from the DTE device
START CHAN	Selects the starting channel (01 thru 24) for Nx56/64 kbps operation
# OF CHAN.	Selects the number N (01 thru 24) for Nx56/64 kbps operation
DATA	Controls the state of the TD and RD leads NORMAL Forces normal data format INVERT Forces inverted data format
CTS	Controls the state of the CTS lead from the HTU-R NORMAL Causes CTS to follow RTS FORCE ON Causes CTS to be forced on and RTS ignored
DCD	Controls the state of the DCD lead from the HTU-R NORMAL DCD is active when loops are in sync and/or when a T1 carrier is present FORCE ON Causes DCD to be forced on always
DSR	Controls the state of the DSR lead from the HTU-R NORMAL Causes DSR to follow DTR FORCE ON Causes DSR to be forced on and DTR ignored

To configure the T1 Nx64 HTU-R, first familiarize yourself with the operation of the front panel LCD and push buttons. Then follow the steps listed below.

Step 1. Apply power to the T1 Nx64 HTU-R using a customer provided power cord. The front panel LCD will indicate that the T1 Nx64 HTU-R is initializing. Upon completion of initialization, the T1 Nx64 HTU-R will display its user menu. The user can now configure the T1 Nx64 HTU-R.

Step 2. The T1 Nx64 HTU-R comes factory default configured as a Slave unit. To properly configure the T1 Nx64 HTU-R, the user must configure the HDSL interface options concerning T1 Nx64 HTU-R mode (Master/Slave) and the T1 Nx64 HTU-R clock source (Network/Internal/DTE). Next the user must configure the DTE interface options. The following factory default configuration options are recommended for the Slave unit.

```
HTU MODE: SLAVE (HTU-R)
CLOCK SOURCE: NETWORK
DTE INT. TYPE: V.35
RATE 56/64: 64
CHANNELS: CONT
DTE TX CLK: AUTO
START CHAN: 01
# OF CHAN: 24
DATA: NORMAL
CTS: NORMAL
DCD: NORMAL
DSR: NORMAL
```

If two T1 Nx64 HTU-Rs are deployed as Master and Slave, follow Step 3 to properly configure the Master unit. If you are deploying the T1 Nx64 HTU-R as a remote unit in a circuit with an ADTRAN T1 HTU-C, verify that the HTU-C is properly installed and configured according to the appropriate ADTRAN T1 HTU-C Installation and Maintenance Practice and proceed to Step 4.

Step 3. Configure the second T1 Nx64 HTU-R as a Master unit. To properly configure the T1 Nx64 HTU-R, the user must configure the HDSL interface options concerning T1 Nx64 HTU-R mode (Master/Slave) and the T1 Nx64 HTU-R clock source (Network/Internal/

DTE). Next the user must configure the DTE interface options. Descriptions and explanations of all configuration options are shown in **Table 2**.

```
HTU MODE: MASTER (HTU-C)
CLOCK SOURCE: INTERNAL
DTE INT. TYPE: V.35
RATE 56/64: 64
CHANNELS: CONT
DTE TX CLK: AUTO
START CHAN: 01
# OF CHAN: 24
DATA: NORMAL
CTS: NORMAL
DCD: NORMAL
DSR: NORMAL
```

Step 4. If you plan on using a VT-100 or compatible terminal for maintenance, and diagnostics, connect an RS-232 cable to the 9-pin DB9 female connector. Connect the other end to the dumb terminal. Use of the dumb terminal for maintenance, and diagnostics is described in subsection 4 of this practice.

Connecting T1 Nx64 HTU-R to HDSL Local Loop

The T1 Nx64 HTU-R connects to the HDSL local loop using an RJ-48C connector. This connection is made through a user-supplied cable. You will need to construct this cable in order to ensure proper connections between the HDSL local loop and the T1 Nx64 HTU-R. This cable should be constructed to match the HDSL local loop signals on one end and the T1 Nx64 HTU-R HDSL loop signals on the other end. The RJ-48C connector pin designations are detailed in **Table 3**.

Table 3. T1 Nx64 HTU-R HDSL Interface Pin Assignments

Pin	Signal
1	HDSL Loop 1 Ring
2	HDSL Loop 1 Tip
3	Not used
4	Not used
5	Not used
6	Not used
7	HDSL Loop 2 Ring
8	HDSL Loop 2 Tip

If two T1 Nx64 HTU-Rs are deployed as Master and Slave, connect the HDSL interface cable for each unit. If you are deploying the T1 Nx64 HTU-R as a remote unit in a circuit with an ADTRAN T1 HTU-C, verify that the HTU-C is properly connected to the HDSL local loop according to the appropriate ADTRAN T1 HTU-C Installation and Maintenance Practice.

With units at both ends of the circuit properly connected to the HDSL local loop, the units will sync up automatically. When the T1 Nx64 HTU-R is properly synchronized, the LEDs L1 and L2 will be *On* (green). If the T1 Nx64 HTU-R is not properly synchronized, the L1 and/or L2 LEDs will be *Off*. If the L1 and/or L2 LED is RED, this indicates that the loop is synchronized, but the signal quality or loop loss is marginal.

Once the T1 Nx64 HTU-R is synchronized, you can check the signal quality and loop loss for both Loop 1 and Loop 2. To do this, first be sure that the LCD displays the top level screen, then follow the procedure below.

- Scroll by pressing the up or down arrow buttons until the cursor is at the “(1) STATUS” selection.
- Press the “ENTER” button.
- Scroll to the “(1) HDSL STATUS” selection. Press “ENTER.”
- Scroll to the “(1) Signal Quality” Selection. Press “ENTER.”
- Scroll to view the signal quality indication for Loop 1 and Loop 2.

The signal quality indication should be between 7 and 9 for an error free circuit. Any signal quality indication less than 7 indicates the possibility of bit errors.

The Loop Loss value can be displayed by executing the following procedure.

- Scroll by pressing the up or down arrow buttons until the cursor is at the “(1) STATUS” selection.
- Press the “ENTER” key.
- Scroll to the “(1) HDSL STATUS” selection. Press “ENTER.”
- Scroll to the “(2) Loop Loss” Selection. Press “ENTER.”

- Scroll to view the Loop Loss value for Loop 1 and Loop 2.

A loop loss value of 27dB or less indicates proper HDSL loop length. Any loop loss value greater than 27dB indicates that the HDSL loop is too long and the circuit is prone to make bit errors.

Connecting the T1 Nx64 HTU-R to the DTE

You are now ready to connect the DTE to the T1 Nx64 HTU-Rs DTE interface using a customer supplied cable. The T1 Nx64 HTU-R provides a V.35 interface using a M/34 female type connector. The pinout of the V.35 connector is shown in **Table 4**.

Table 4. V.35 Signal Designations

Pin Number	Signal Description
A	Frame Ground
B	Signal Ground
C	Request to Send
D	Clear to Send
E	Data Set Ready
F	Carrier Detected
H	Data Terminal (DTE) Ready
K	Test Mode
P	Transmit Data A
R	Receive Data A
S	Transmit Data B
T	Receive Data B
U	External Transmit Clock A
V	Receive Clock A
W	External Transmit Clock B
X	Receive Clock B
Y	Transmit Clock A
AA	Transmit Clock B
NN	Test Mode

The T1 Nx64 HTU-R will also support an RS-449 interface using an adapter cable to convert the M/34 female connector to a DB37 female connector. The pinout for the adapter cable is illustrated in **Figure 6**.

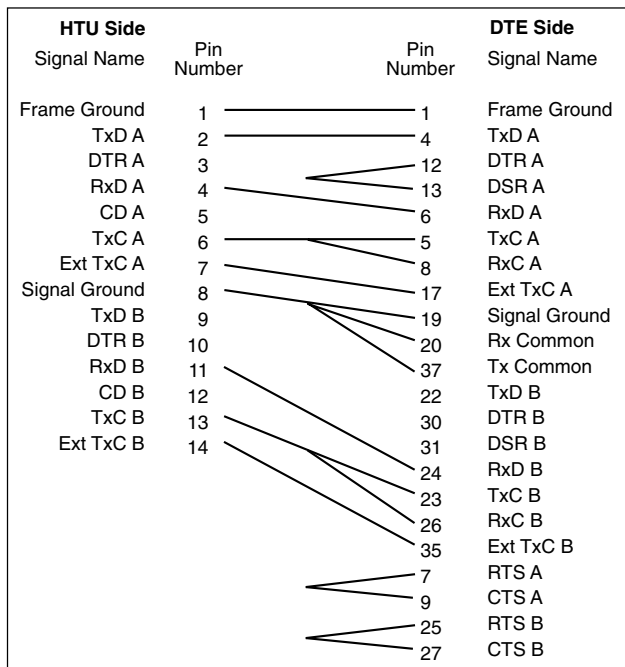


Figure 6. V.11 to RS-449 Adapter Cable Pinout

3. OPERATION

Once the ADTRAN T1 Nx64 HTU-R is properly configured and installed, it should operate transparently. This section describes how to use the front panel LCD to access status information and perform diagnostic loopback tests. Also, this section describes how to use a dumb terminal interface to configure, monitor, and test the T1 Nx64 HTU-R.

Loopback Testing

The T1 Nx64 HTU-R provides two diagnostic loopback tests for verifying proper data path operation. These loopbacks are used in conjunction with bit error rate test (BERT) equipment. The loopbacks are valuable in troubleshooting and isolating any system level problems that may occur either at installation or operation of the HDSL circuit.

Local Loopback - The T1 Nx64 HTU-R's HDSL transceivers are looped back at a point immediately before the HDSL termination, or toward the DTE interface. This loopback enables a complete diagnostic of the HTU-R data path.

Remote Loopback - The T1 Nx64 HTU-R's HDSL transceivers are looped back at a point immediately before the DTE interface, or toward the HDSL interface. This loopback enables a complete diagnostic of the local HTU-R data path, the HDSL link, and the remote HTU-R data path.

Front Panel Status Information

The front panel LCD can be used to display useful information about the HDSL interface as well as the DTE interface. This information provides a way to determine if an HDSL circuit is performing within limits necessary to ensure error-free operation. Similarly, DTE status information provides information to determine proper operation of the customer premises equipment.

HDSL Status

Three parameters are measured and displayed for the HDSL interface. These parameters are available for both Loop 1 and Loop 2. These parameters are "SIGNAL QUALITY," "LOOP LOSS," and "LOOP SYNC."

SIGNAL QUALITY - This measurement provides a relative indication of signal quality. A reading of "9" indicates the best possible signal quality whereas a reading of "0" indicates the worst possible signal quality. Signal quality is a good indication of BER performance on either loop.

LOOP LOSS - This measurement provides a numeric indication of the HDSL signal attenuation. ADTRAN specifies BER performance better than 10^{-7} for a loop loss of less than 36dB. If you encounter a loop loss of greater than 36dB, shorten the HDSL loop length or check for excessive bridge tap length.

LOOP SYNC - This measurement gives an indication of the state of each HDSL loop. INACTIVE indicates that the HDSL loop is not in sync. SYNC indicates that the HDSL loop is synchronized.

Test Pattern Generator

The Test Pattern generates a 511 test pattern on all active DS0s, compares it to the pattern returned from the far end, and records any errors in the Pattern Results option under the Test menu. To initiate this test pattern from the front panel LCD, go to the Main menu and select the following menu options as they appear:

- Test menu
- Bert Tests option
- Test Pattern option
- 511 ACT.DS0s

PATTERN RESULTS - Clear results by pressing "Enter."

Insert Errors Feature

This feature is located under the BERT Tests option of the Test menu using the front panel LCD. This option is only valid if the Nx64 is already running the Test Pattern. This feature inserts an error into the test pattern each time the Enter key is pressed. The error is shown in the Pattern Results option which is also located under the BERT Tests option of the Test menu.

Passcode

This option, located under the UTIL menu, allows for restricted access of the Nx64 by requiring that a passcode be entered before any options can be selected from the front panel, while still allowing the user to view settings without restriction. Set the passcode by way of the Set Passcode option under the UTIL menu. Then lock the Keypad option under the UTIL menu. In order to gain access to the unit, unlock the Keypad option and enter the correct passcode.

V.54 Loopback

This option is located under the Remote feature of the Loopbacks option of the Test menu. The V.54 Loopback command loops up the far-end Nx64 HTU-R device allowing for testing purposes. To enable this feature, turn on the Nx64 HTU-R LB setting of the Remote option. The Remote option is under the Loopbacks feature of the Test menu. The unit initiating the loopback will give an indication when the far end is looped.

Menu Screen Descriptions

On-screen abbreviations for the menu screens are detailed in **Table 5**.

Table 5. Screen Abbreviations

Abbreviation	Definition
AMI	Alternate Mark Inversion
BPV	Bipolar Violation
CUST	Customer
ES	Errored Seconds
ESF	Extended Superframe
LBO	Line Build-out
LP1	Loop 1
LP2	Loop 2
NET	Network
NIU	Network Interface Unit
RX	Receive
S/N	Serial Number
SES	Severely Errored Seconds
SF	Superframe
UAS	Unavailable Seconds
15 M	Fifteen-minute (period)
24 H	Twenty-four-hour (period)

From the Introductory Menu, illustrated in **Figure 7**, the Main Menu may be selected. The Main Menu provides access to detailed performance and configuration information, as illustrated in **Figure 8**, HDSL Main Menu Screen.

From the Main Menu the following screens can be accessed.

1. Current System Status
2. Performance History
3. ADTRAN Information
4. Loopback Options
5. Self-Test
6. Provisioning
7. Troubleshooting

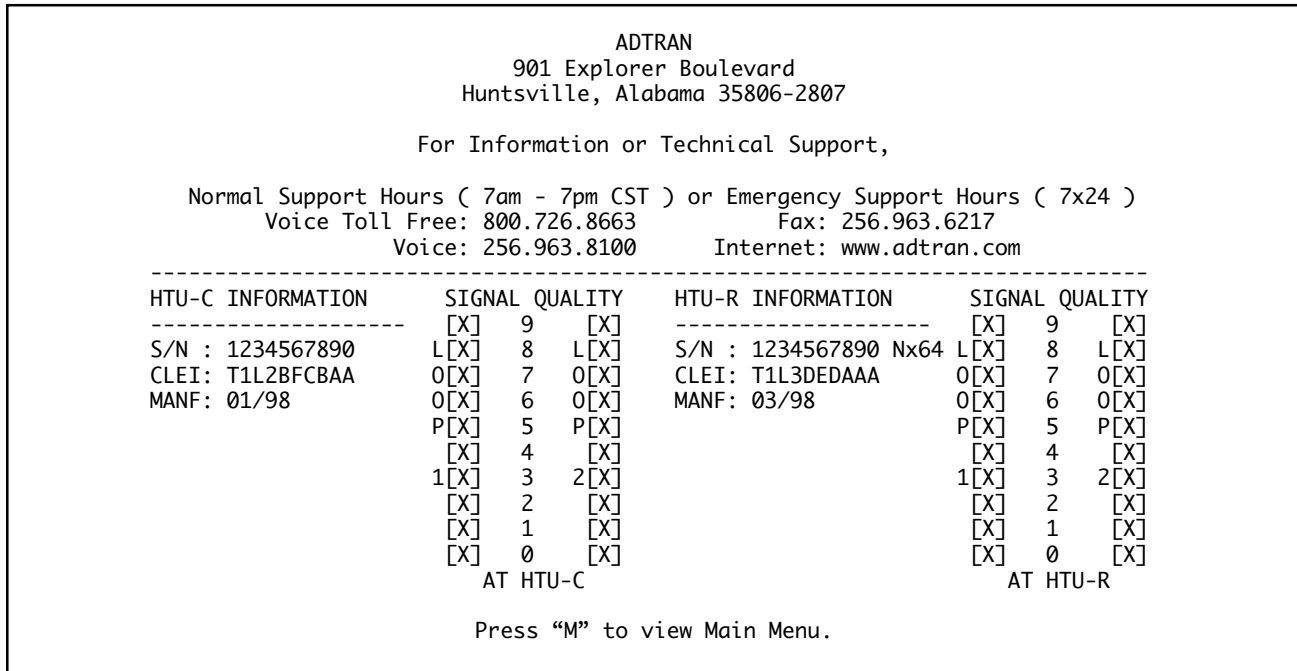


Figure 7. Introductory Menu Screen

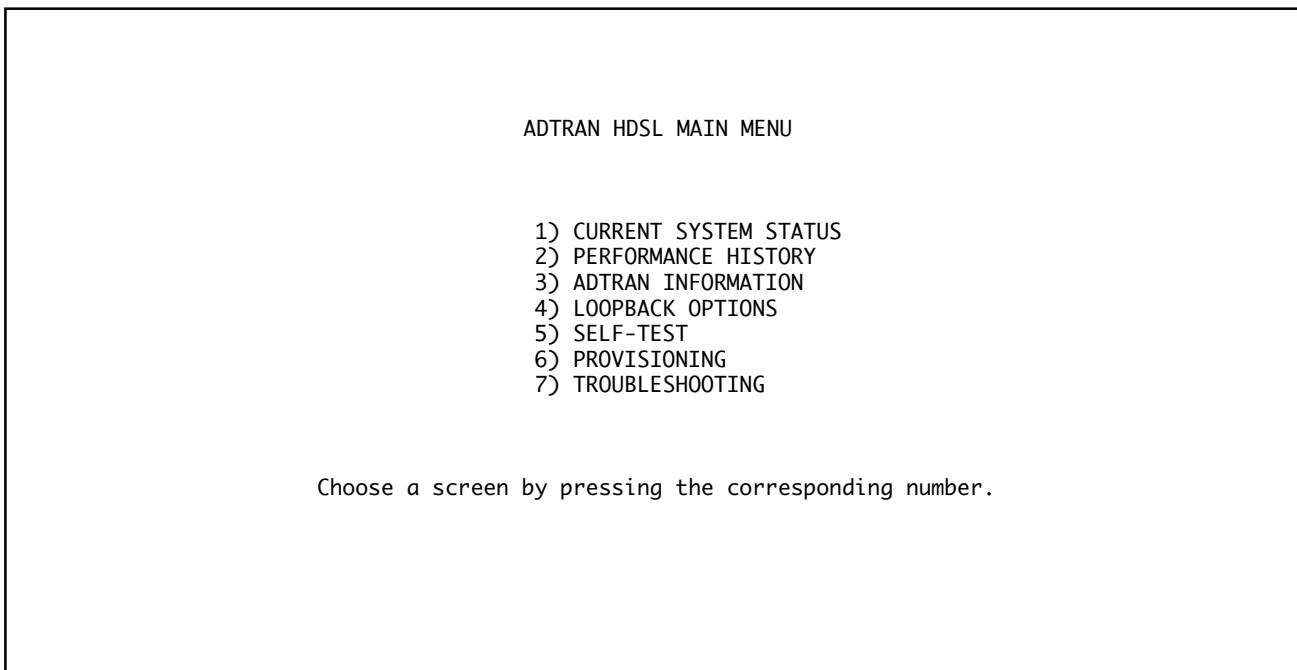


Figure 8. HDSL Main Menu Screen

The Current System Status Screen, illustrated in **Figure 9** provides quick access to status information for both the HTU-C and Nx64 HTU-R. Type the letter “H” at the Current System Status Screen to view the HRE screen.

Type the letter “Z” at the Current System Status Screen in order to reset performance registers to zero at both the Current System Status and Performance History Screens.

Figure 9 consolidates current information for the HDSL interface. A key to the information provided appears in the center of the screen.

LOSS Pulse Attenuation Measurement
 SYNC HDSL Loop 1 and Loop 2 Sync Status
 ES 15M/24H Errored Seconds
 SES 15M/24H .. Severely Errored Seconds
 UAS 15M/24H . Unavailable Seconds

Status and configuration information for the signal is located in the center of the screen near the bottom.

A measure of signal quality for each HDSL loop appears on the bottom right and left of the screen. Guidelines for interpreting the measure indicators are given below.

Measure	Signal Quality	Noise Margin
0	Poor	≤ 0 dB ($\approx 10^{-7}$ BER)
1-8	Marginal	above 10^{-7} BER in dB
9	Excellent	≥ 9 dB above 10^{-7} BER

Predicting performance based upon signal quality varies with each loop. Generally, a noise margin of 0 or higher will support a BER of better than 10^{-7} .

ADTRAN defines the following as guidelines that correspond to the operation of the NTU faceplate LEDs labeled LP1 and LP2.

Margin < 0 Poor Signal Quality
 $0 \leq$ Margin ≤ 2 Marginal Loop Quality
 Margin > 2 Good Loop Quality

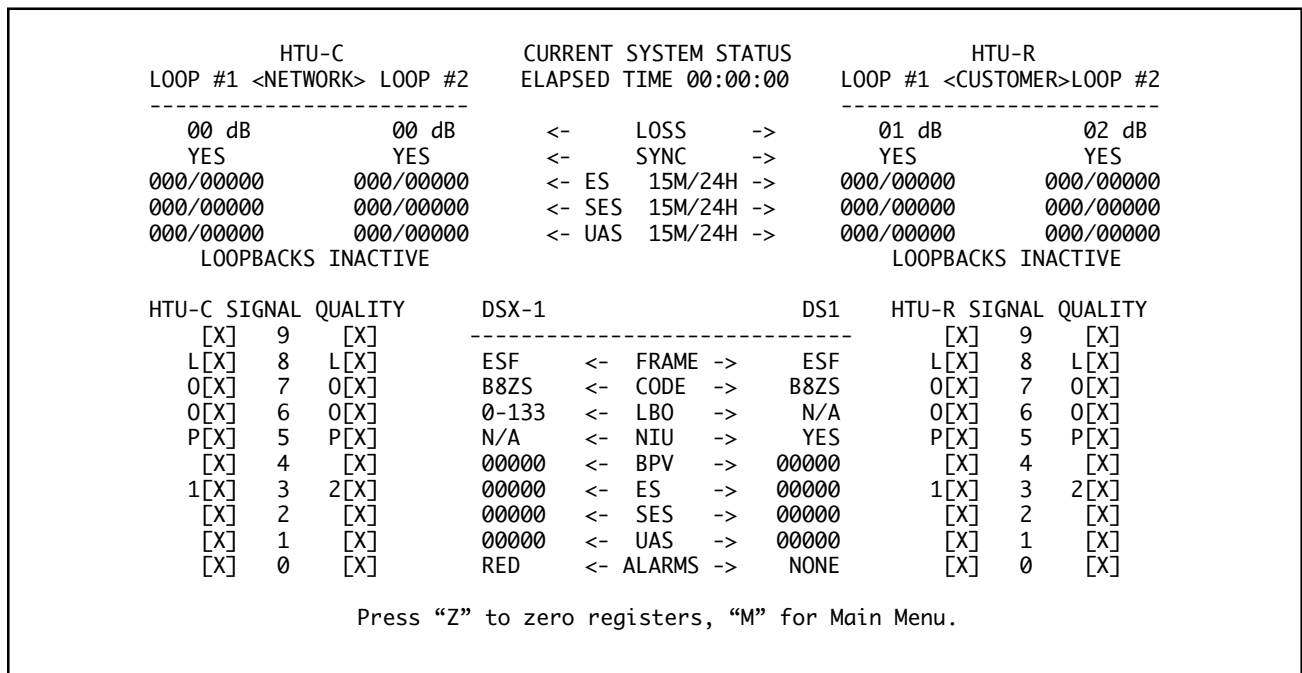


Figure 9. Current System Status Screen

The HDSL Loopback Options screen is illustrated in **Figure 10**. The Self-Test Options Screen is illustrated in **Figure 11**. Loopbacks and Self-Test may be evoked or terminated using these screens. A status of current loopback conditions is also provided.

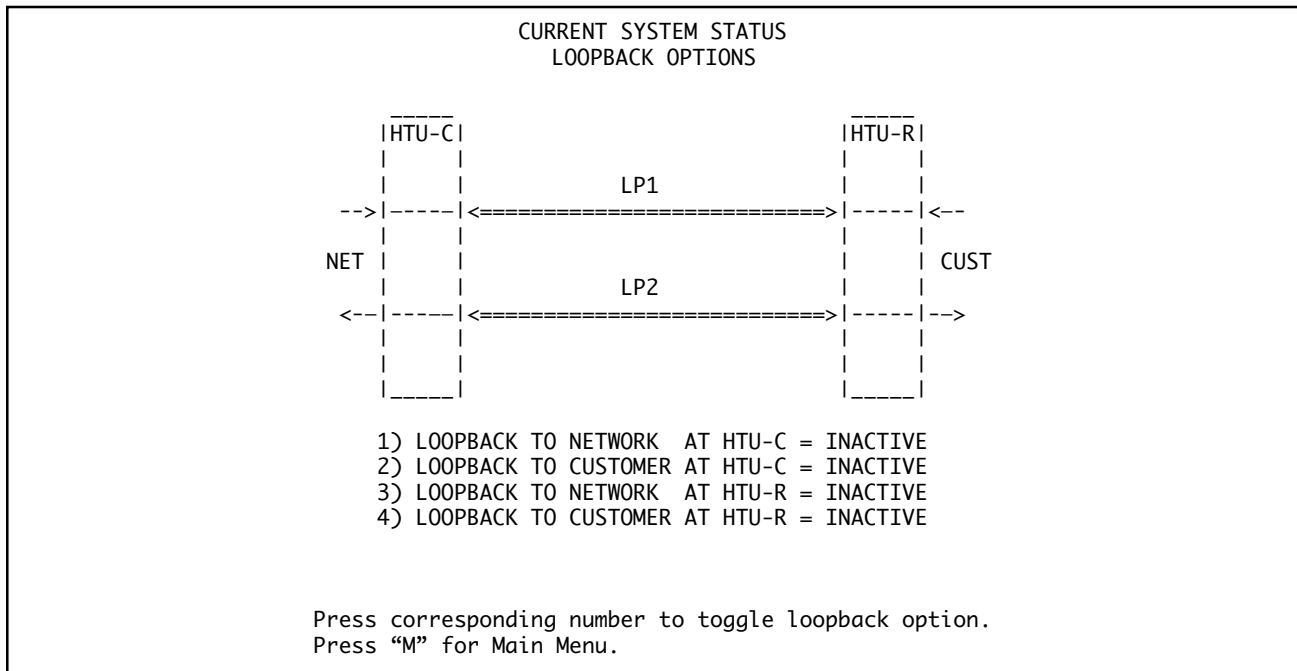


Figure 10. Loopback Options Screen

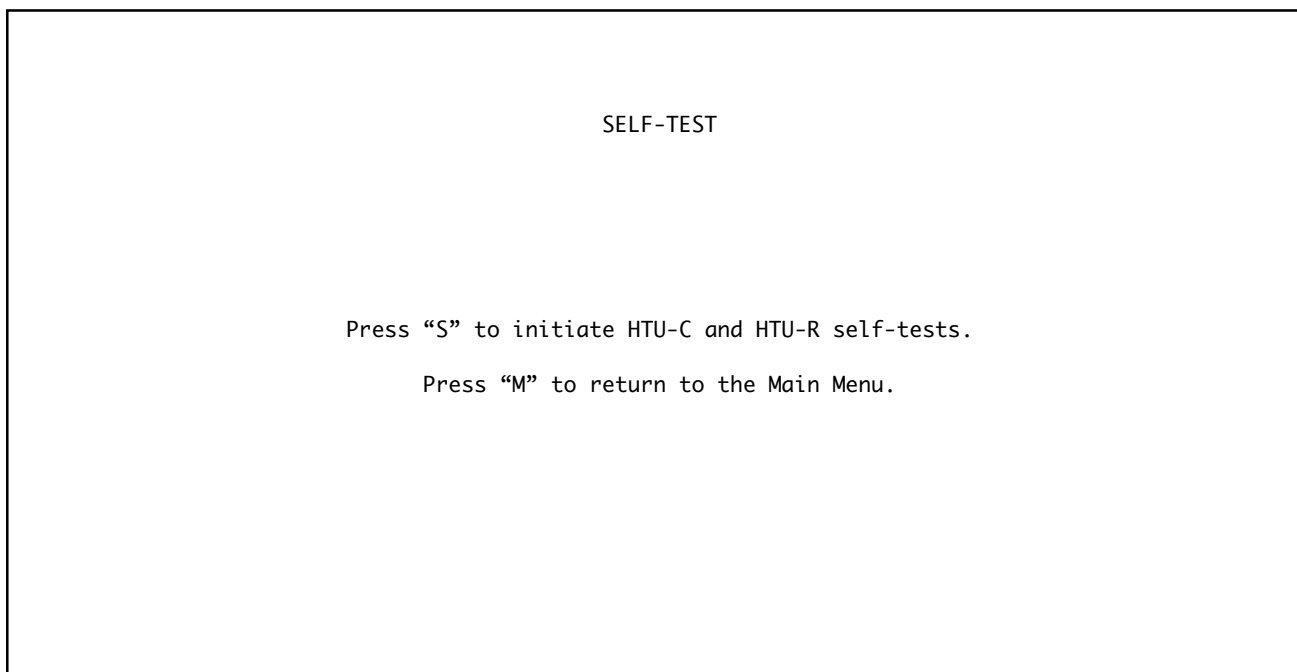


Figure 11. Self-Test Options Screen

The Provisioning Options Screen is illustrated in **Figure 12**. Provisioning may be viewed by the HTU-C but may not be changed. Provisioning changes may only be implemented through the Nx64.

The Troubleshooting Display Screen, illustrated in **Figure 13**, graphically depicts an HDSL circuit. The unit reviews red, yellow, and blue alarm conditions in the circuit to automatically predict where a fault is located. Once a fault location is suspected, the corresponding portion of the circuit on the screen is highlighted and a message describing the failure will appear.

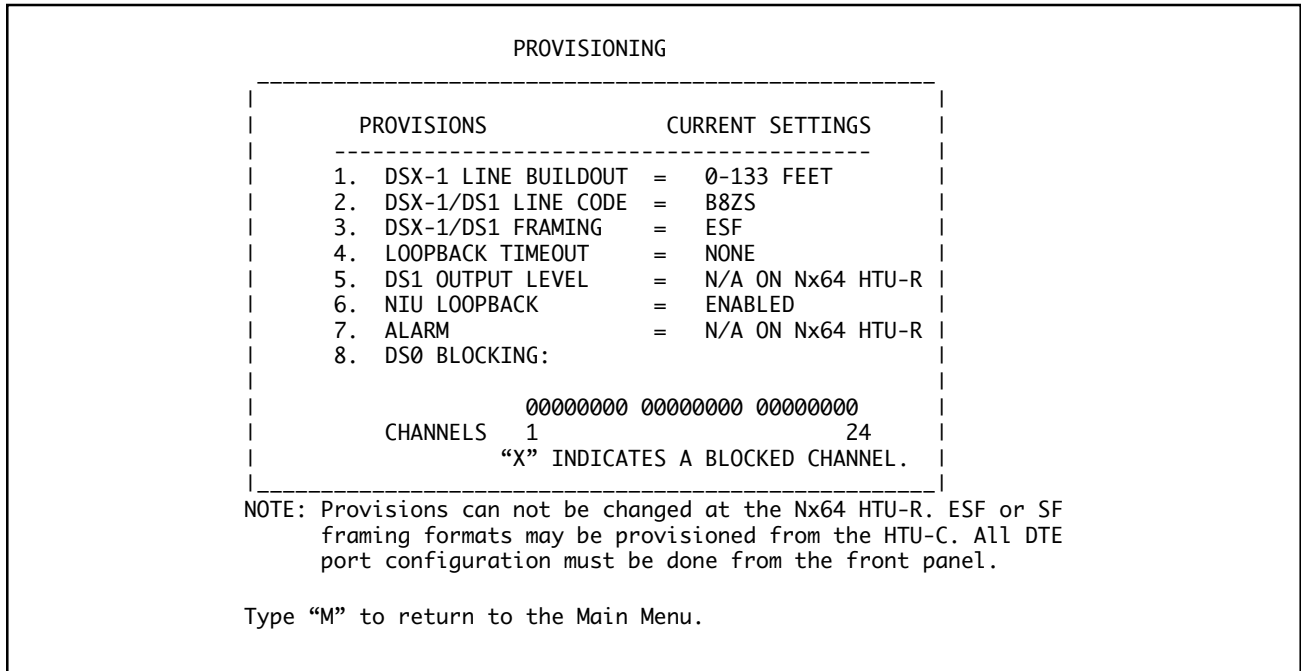


Figure 12. Provisioning Options Screen

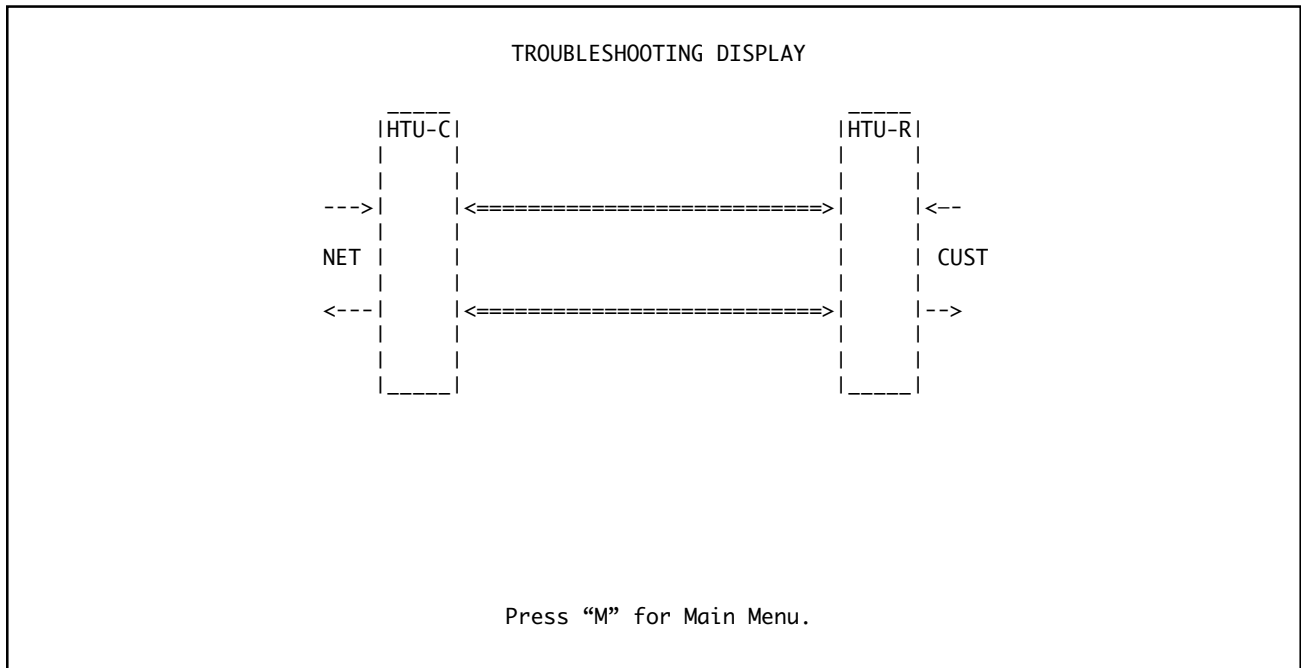


Figure 13. Troubleshooting Screen

4. PRODUCT SPECIFICATIONS

Product specifications for the T1 Nx64 HTU-R are detailed in **Table 6**.

Table 6. Product Specifications

<u>Network Interface</u>	
Line Rate	T1 HDSL per Bellcore TA-NWT-001210
<u>Physical Interface</u>	
HDSL	RJ45
DTE	M34F, DB15
Framing	SF/ESF Auto Detection
ESF Format	AT&T 54016 ANSI T1.403
Line Code	2B1Q
DS0 Assignment	Contiguous Alternating
HDSL Timing	Network Internal DTE
<u>DTE Interface</u>	
Bit Rate	56kbps to 1.536 Mbps, Nx56 or Nx64 kbps (N=1 to 24) CCITT V.35 (M34F Connector) CCITT V.11 (DB15F Connector)
DTE Transmit Clock	Automatic Internal External
<u>Performance Monitor Performance Data</u>	
BPVs/CRCs, ES, SES, UAS, Alarms, Errors	
Tests	Local Loopback Remote Loopback
Agency Approvals	FCC part 15, Class A UL 1459
<u>Environment</u>	
Operating	0 to 50°C (32° to 122° F)
Storage	-20° to 70°C (-4° to 158°F)
Relative Humidity	Up to 95%, non-condensing
<u>Physical</u>	
Dimensions	1.5" high, 9.0" wide, 6.25" deep
Weight	2 lbs.
Power	90-230V, 50-60Hz, 5W

5. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five 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 refer to the ADTRAN *Equipment Warranty, Repair, and Return Policy and Procedure* document 60000087-10A.

Contact Customer And Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

ADTRAN Sales

Pricing and availability
(800) 827-0807

ADTRAN Technical Support

Presales Applications/Post-sale Technical Assistance
(800) 726-8663

Standard hours: Monday-Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for repair / upgrade
(256) 963-8722

Repair and Return Address:

ADTRAN, Inc.
CAPS
901 Explorer Boulevard
Huntsville, Alabama 35806-2807