NT1 ACE

USER MANUAL

1203019L1:	**NT1 ACE with Power Supply**
1203019L2:	**NT1 ACE**
1203019L3:	**NT1 ACE International**
336048VUR-2:	**Power Supply**

61203019L1-1D
January 1999

FCC ID: HDC1203019L1

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING *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 Standards Association

This device must be powered by a CSA approved power supply or a power supply meeting the requirements of CS03, Part I Section 1.4.2.

Warranties

ADTRAN will repair or replace 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 and Repair and Return Policy Procedure. Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN. (See inside back cover for phone and address.)

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

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the equipment housing is a label that shows the FCC registration number for this equipment. If requested, provide this information to the telephone company.

2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.

3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment; advance notification and the opportunity to maintain uninterrupted service is given.

4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the net-

work until the problem is corrected, or it is certain the equipment is not malfunctioning.

5. This unit contains no user-serviceable parts.

6. An FCC compliant telephone cord with a modular plug is provided with this equipment. In addition, an FCC compliant cable appropriate for the dial backup option ordered is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.

7. The following information may be required when applying to the local telephone company for leased line facilities.

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
ISDN	02IS5	6.0N	RJ-49C

ADTRAN YEAR 2000 (Y2K) READINESS DISCLOSURE

ADTRAN has established a Year 2000 program to ensure that our products and operations will correctly function in the new millennium. ADTRAN warrants that all products meet Year 2000 specifications regardless or model or revision. Information about ADTRAN's Year 2000 compliance program is available at the following:

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	year 2000@adtran.com

CANADIAN EMISSIONS REQUIREMENTS

This digital apparatus does not exceed the Class B 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 numerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class B prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

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

Before installing this equipment, 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). 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 water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should 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 requirement that the total of the Load Numbers of all devices does not exceed 100.

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 digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

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

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

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

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

( ) 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 _____ day of _____, 199___

_____

Notary Public

My commission expires:

_____

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons. The precautions are listed below.

1. Do not use this product near water (for example, near a bath tub, wash bowl, kitchen sink or 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 may be a remote risk of electric 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 local codes for any special disposal instructions.

SAVE THESE INSTRUCTIONS.

Table of Contents

Figures

Tables

Unit Overview

The ADTRAN NT1 ACE provides a basic rate interface between customer ISDN terminal equipment (TE) and the ISDN network (U). Figure 1 is an illustration of the NT1 ACE.

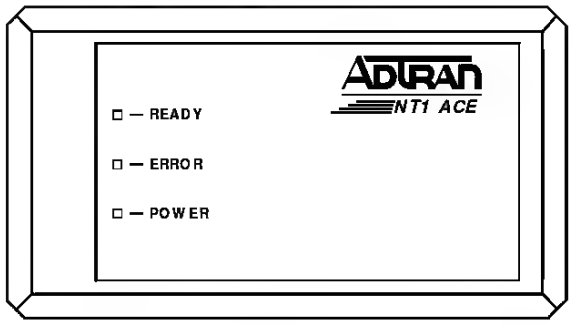

Figure 1. ADTRAN NT1 ACE

Two jacks are provided on the rear panel of the unit for this purpose, as illustrated in Figure 2.

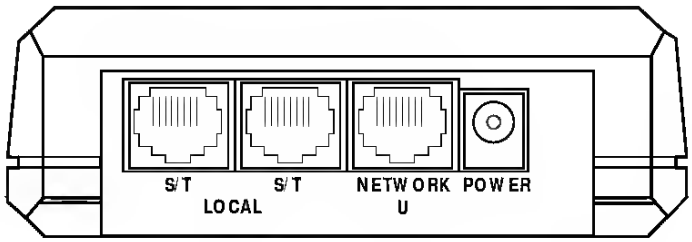

Figure 2. Interface Connectors

A single RJ-49C connector labeled **NETWORK U** connects to the network. Two additional data jacks labeled **S/T** connect to the local bus.

NOTE *The U-interface complies with ANSI T1.601 and ITU-TI.430 Recommendation Standard. The S/T-interface complies with ANSI T1.605 and ETSI ETS 300012 Standard.*

The ADTRAN NT1 ACE is a stand-alone unit. An external power source must be provided for the NT1 ACE. External power is supplied by the ADTRAN Power Supply, part number 336048VUR-2. The two S/T bus connectors on the rear of the unit enable the NT1 ACE to supply power to the TE.

LED Indicators

Table 1 describes the status of the LEDs located on the front panel of the NT1 ACE.

Table 1. Status Indicators

LED	Color	Description
READY	Green	S/T- and U-interfaces ready to place call
ERROR	Red	S/T- or U-interface not ready
POWER	Green	Unit has power

If the ERROR indicator is illuminated, check the flash rate of the READY indicator to determine the source of the error. A faster 8 Hz flash rate indicates a network problem. A slower 1 Hz rate indicates an S/T interface problem.

If the ERROR indicator is not illuminated and the READY indicator is flashing, a network test is in progress. Network command tests cause a faster 8 Hz flash rate. Terminal equipment commanded tests produce a slower 1 Hz flash rate.

Passive Bus Description

The Local Bus interface may be used to connect up to eight TEs to the NT1 ACE. This arrangement is referred to as a *Passive Bus.* See the section *Short Passive Bus Configuration* on page 9 for detailed information.

Inspection

After unpacking the unit, immediately inspect it for possible shipping damage. If damage is discovered, file a claim immediately with the carrier; then contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the NT1 ACE for repair or for verification of damage during shipment.

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Maintenance

The ADTRAN NT1 ACE requires no routine maintenance to operate. In case of equipment malfunction, refer to the sections *Remote Testing* and *Repair and Return* or remove the unit and replace it with another unit optioned in an identical manner.

Remote Testing

Network test features include a loopback test initiated at the central office. This test confirms network integrity to the NT1 ACE.

Repair and Return

Repairs should not be performed in the field. Repair services can be obtained by returning the unit to the ADTRAN Customer and Product Service (CAPS) Department at the address listed on the inside back cover of this manual.

Setting the Option Switches

Two option switches located on the side of the unit configure the Local Bus of the NT1 ACE, as shown in Figure 3.

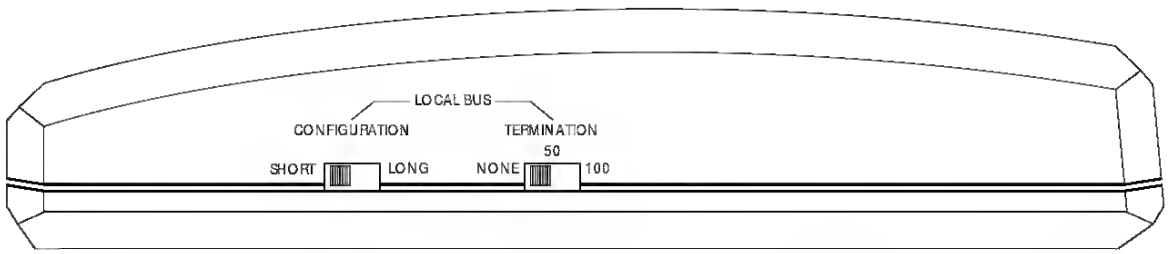

Figure 3. Switch Locations

The switch labeled **TERMINATION** sets the Local Bus termination. The options available are **NONE**, **50**, and **100**. See *Powering TEs from the NT1 ACE* on page 6 for more information concerning Local Bus configurations.

The switch labeled **CONFIGURATION** has two possible options. When set in the **LONG** position, the Local Bus is configured for *Extended* Passive Bus. When set in the **SHORT** position, the Local Bus is configured for *Short* Passive Bus. Configuration and switch settings are discussed in ***Short Passive Bus Configuration*** on page 9 and in ***Extended Passive Bus Configuration*** on page 10.

The Power Supply provides up to 10 watts of power for the NT1 ACE and the TE. Table 2 gives pin assignments.

Table 2. Network Connector Pin Assignments

Pin	Description
1	No connection
2	No connection
3	No connection
4	U-interface network connection
5	U-interface network connection
6	No connection
7	Negative power input
8	Positive power input

Powering TEs from the NT1 ACE

The ADTRAN NT1 ACE can be used to provide power for TEs connected to the local interface. The NT1 ACE, part number 1203019L1, supplies power by a separate wire pair (PS2) on the two data jacks marked LOCAL, as shown in Figure 2 on page 1. The ADTRAN NT1 ACE International, part number 1203019L3, also incorporates power source 1 (PS1) which provides power over the transmit and receive pairs. Table 3 lists Local Bus connector pin assignments. Before attempting to power any TE from the NT1 ACE, verify that it can accept power from a PS1 or PS2 power source.

Table 3. Local Bus Connector Pin Assignments

Pin	Description
1	No connection
2	No connection
3	S/T interface Receive Power Source 1 (Positive)
4	S/T interface Transmit Power Source 1 (Negative)
5	S/T interface Transmit Power Source 1 (Negative)
6	S/T interface Receive Power Source 1 (Positive)
7	Power Source 1 (Negative)
8	Power Source 2 (Positive)

Powering with the NT1 Power Supply

The ADTRAN NT1 Power Supply, part number 336048VUR-2, provides up to 10 watts of power at -48 VDC. The NT1 ACE requires 1.1 watts, leaving approximately 8.9 watts to power the TE(s). Before connecting any TE to be

powered from the NT1, verify that the total power requirement of the connected TE is less than 8.9 watts.

To connect the NT1 ACE to the NT1 Power Supply, perform the following steps as illustrated in Figure 4.

1. Connect the Power Supply to the NT1 ACE at the **POWER** jack located on the NT1 ACE.
2. Plug the Power Supply into the nearest wall outlet supplying 110 VAC, 60 HZ.
3. On the NT1 ACE, verify that the POWER and ERROR indicators are illuminated. After approximately 15 seconds, the READY indicator should flash at a 1 Hz rate. Should any of the indicators fail to operate as stated, see the section *Troubleshooting* on page 11.

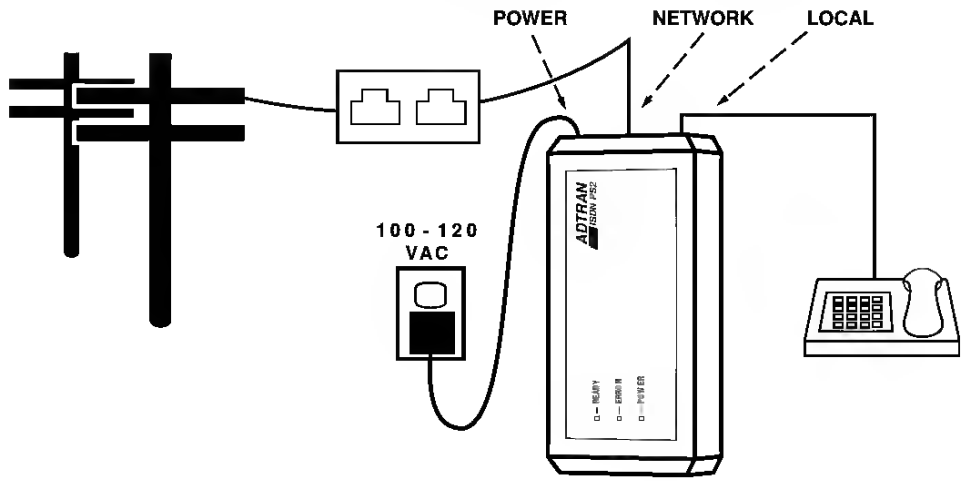

Figure 4. Power Supply Connection

Connecting the Terminal Equipment

After successfully powering up the NT1 ACE, the POWER and ERROR indicators should be on and the READY indicator should be flashing. Make sure that terminal equipment (TE) is properly terminated as instructed in *Setting the Option Switches* on page 4. Plug the TE into one of the Local Bus connectors at the rear of the unit. A second TE may be plugged into the remaining Local Bus connector. If more than two TEs need to be connected to the NT1 ACE, additional connections can be made in parallel to the S/ T bus using RJ-45 connectors.

.TEs commonly have additional jacks wired in parallel. These may be used to connect more than two TEs as provided for by the NT1 ACE. See the TE documentation for further information.

After the TE powers up, the ERROR indicator should go out. There may be some delay between plugging in the TE and the ERROR indicator going out, depending on the specific TE in use. If the ERROR indicator fails to go out, see the section *Troubleshooting* on page 11.

As the ERROR indicator extinguishes, the READY indicator should illuminate. The TE will now be ready to place and receive calls. There may be a slight delay between the appearance of the READY indicator and the TE's ability to place and receive calls, depending on the specific TE in use. If the READY indicator fails to illuminate or if you are unable to place or receive calls, see the section *Troubleshooting* on page 11.

Short Passive Bus Configuration

This configuration allows you to connect up to eight TEs at any point on the bus. The bus length is limited to 600 feet, as shown in Figure 5. To select the Short Passive Bus configuration, the **CONFIGURATION** switch must be set to the **SHORT** position. The bus terminating resistors can be placed at any point along the bus. If the TEs have internal terminating resistors that can be optioned, only one TE's termination resistor should be enabled. The **TERMINATION** switch should be placed in the 100 position, and only one of the TEs connected should be terminated with 100 ohm. If the unterminated TEs are placed within 20 feet of the NT1, the **TERMINATION** switch should be in the 50 position, and the TEs **should not be terminated**. These switch settings should always be maintained, unless an external 100 ohm resistor is being used. If an external terminating resistor is used, set the **TERMINATION** switch to the **NONE** position.

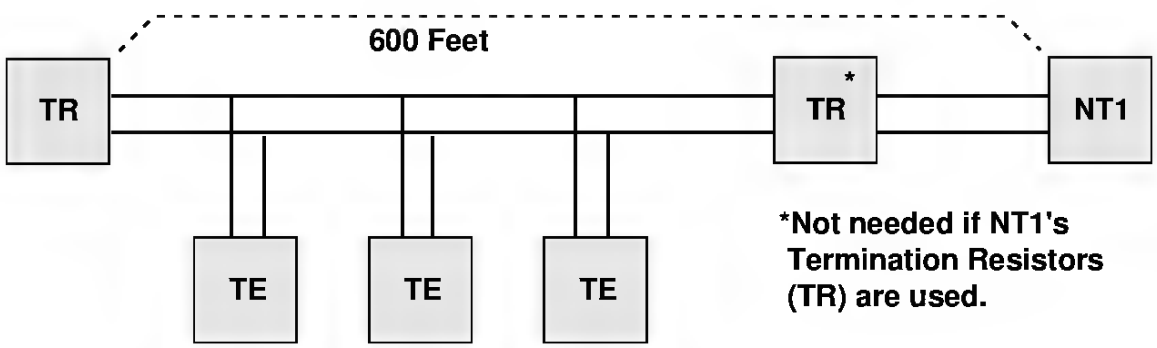

Figure 5. Short Passive Bus Configuration

Extended Passive Bus Configuration

This configuration allows you to connect up to eight TEs at greater ranges than the Short Passive Bus. This group of TEs can be located at up to 3000 feet from the NT1, as shown in Figure 6. To select the Extended Passive Bus configuration, the **CONFIGURATION** switch must be set to the **LONG** position. A termination resistor must be centrally located to the TEs. If the TEs have internal terminating resistors that can be optioned, only one TE's terminating resistor should be enabled. The **TERMINATION** switch should be placed in the 100 position, and only one of the TEs connected should be terminated with 100 ohm. These switch settings should always be maintained, unless an external 100 ohm resistor is being used. If an external termination resistor is installed, set the **TERMINATION** switch to the **NONE** position.

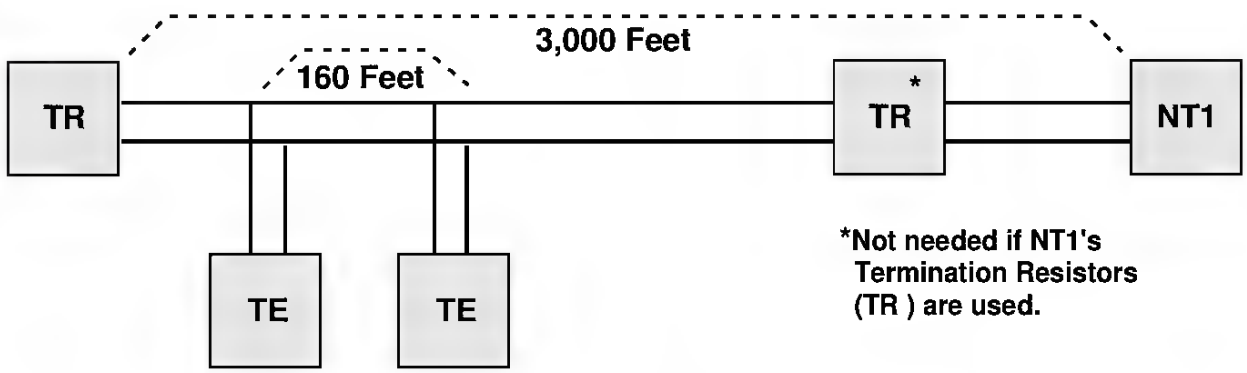

Figure 6. Extended Passive Bus Configuration

Troubleshooting

If your NT1 ACE does not operate properly, please check the lists of symptoms and solutions below. For further assistance, please contact ADTRAN technical support at 888-4ADTRAN.

POWER indicator does not illuminate.

- Verify power connection.
- Move power supply to another circuit.
- Call ADTRAN technical support for assistance.

ERROR indicator illuminated; READY indicator flashes at a faster 8 Hz rate.

Network activation failure:

- Wall jack wiring is incorrect: Check wall jack.
- Problem with ISDN line: Contact telephone company.

ERROR indicator illuminated; READY indicator flashes at a slower 1 Hz rate.

Local bus failure:

- TE not connected: Connect TE.
- TE not receiving power from NT1: Consult TE documentation.
- TE not terminated properly: Review the section *Setting the Option Switches* on page 4.

READY indicator does not illuminate.

- Problem with ISDN network: Contact telephone company.
- ISDN line not plugged into **NETWORK** jack: Plug ISDN line into **NETWORK** jack.

Unable to make or receive a call.

- TE is not compatible with ISDN network: Contact telephone company.

Specifications

Network Interface (U)

Line.....2-Wire (Tip and Ring)
Operating Mode .....Full-Duplex
Data Rate .....160 kbps total, 144 kbps to customer
Signal Format.....2B1Q
Output Amplitude .....2.5 volts, zero-to-peak
Tx Source Impedance....As per ANSI T1.601
Rx Source Impedance....As per ANSI T1.601
Receiver Sensitivity.....As per ANSI T1.601

Customer Interface (S/T)

Line.....4-Wire (Tx and Rx Pair)
Operating Mode .....Full-Duplex
Data Rate .....192 kbps total, 144 kbps to customer
Signal Format.....Alternate Mark Inversion, 100% duty cycle
Output Amplitude .....0.75 volt, zero-to-peak
Tx Source Impedance....As per ANSI T1.605
Rx Source Impedance....As per ANSI T1.605
Receiver Sensitivity.....As per ANSI T1.605

Faceplate Indicators

ERROR ..... U-interface or S/T interface not ready
READY ..... Steady light - Network ready to place a call
8 Hz (faster) flashing - U-interface not ready
1 Hz (slower) flashing - S/T interface not ready
POWER ..... Unit has power

Network Compatibility

Interface ..... ISDN

Mechanical

Size ..... 6.25" wide, 3.75" long, 1.35" high
Weight ..... 9.5 ounces
Mounting ..... Wall or desktop

Power

-48 VDC ..... 1.1 W dissipation
Sources S/T power up to 8.9 W

Environmental

Temperature ..... 0 to 40 °C (32 to 104 °F) operating
-20 to 70 °C (-4 to 158 °F) storage
Relative Humidity .... Up to 95%, non-condensing
FCC Approval ..... Part 15, Class B

Power Supply Specifications

Size ..... 2.5“wide, 3.0" long, 1.9" high
Weight ..... 1.5 lb
Power Input ..... 110 VAC, 60 Hz
Power Output ..... 10 W
Voltage ..... -48 VDC

Technical Support and Warranty Information

Presales Inquiries and Applications Support

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

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

Post-Sale Support

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

Technical Support	(888) 4ADTRAN

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 Customer and Product Service
6767 Old Madison Pike
Progress Center/ Building #6 Suite 690
Huntsville, Alabama 35807 RMA # _____