NT1 ACE

User Manual

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

61203019L1-1D
September 1999

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. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.

4. Do not use the telephone to report a gas leak in the vicinity of the leak.
5. 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.
6. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
7. Use caution when installing or modifying telephone lines.

SAVE THESE INSTRUCTIONS.

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 of 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

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:
_____

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.
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 network 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

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.

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Figures

Tables

Chapter 1. NT1 ACE Overview

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

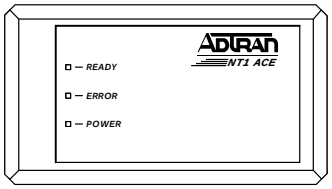

Figure 1-1. ADTRAN NT1 ACE

Three jacks are provided on the rear panel of the unit for connecting the ISDN circuit and user equipment to the NT1 ACE (see Figure 1-2).

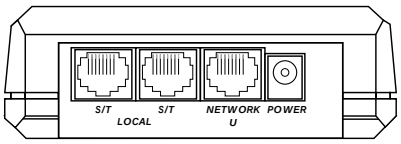

Figure 1-2. Interface Connectors

A single RJ-49C connector labeled **NETWORK U** connects to the ISDN network. Two data jacks labeled **S/T** connect to the S/T interface of the customer's TE.

The ADTRAN NT1 ACE is a stand-alone unit, and is powered by an external power supply. The NT1 ACE can be ordered with the power supply included (Part Number 1203019L1), or the power supply, Part Number 336048VUR-2, can be ordered separately. The NT1 ACE can supply power to TE attached through the S/T interface.

LED Indicators

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

Table 1-1. Status Indicators

POWER	ERROR	READY	Description
Off	--	--	Unit does not have power.
Solid Green	--	--	Unit has power.
Solid Green	Off	Solid Green	S/T and U interfaces are ready.
Solid Green	Solid Red	Slow Flashing Green	S/T interface problem.
Solid Green	Solid Red	Fast Flashing Green	ISDN Network problem

Chapter 2. Installation

Before Installing the NT1 ACE

After unpacking the NT1 ACE, carefully inspect it for shipping damage. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Technical Support. If possible, keep the original shipping container for use in shipping the NT1 ACE for repair or for verification of damage during shipment.

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 2-1.

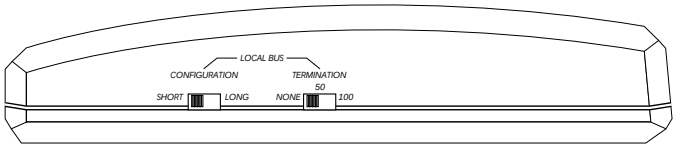

Figure 2-1. Switch Locations

Termination Switch

For reliable operation, the S/T bus must be properly terminated. In addition to the termination resistor provided in the NT1 ACE, bus termination resistors can be provided in the TE or externally. (See Table 2-2 on page 9 for pin assignments.)

TE can provide termination resistor:

Enable 100 ohm termination resistor on one TE, and disable the termination reistor on all other TE(s) attached to this bus. If all of the unterminated TE(s) are within 20 feet of the NT1 ACE, set the NT1 ACE's termination switch to 50. Otherwise, set the NT1 ACE's termination switch to 100.

TE does not provide termination resistor:

In this case, an external terminating resistor must be used, and the NT1 ACE's termination switch should be set to NONE.

Configuration Switch

The configuration switch is set according to how far away the TEs are from the NT1 ACE.

When the configuration switch is set to **SHORT**, the maximum allowable distance between the NT1 ACE and the furthest TE is 600 feet, as shown in Figure 2-2.

When the configuration switch is set to **LONG**, the maximum allowable distance between the NT1 ACE and the furthest TE is 3000 feet, as shown in Figure 2-3.

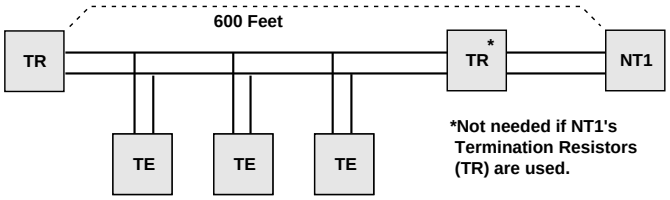

Figure 2-2. Short Passive Bus Configuration

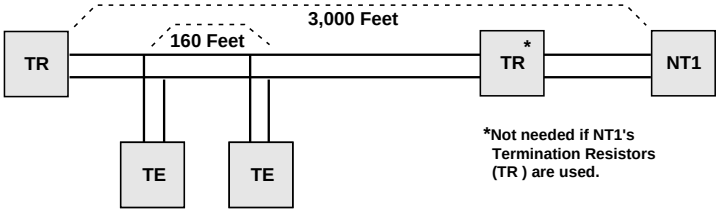

Figure 2-3. Extended Passive Bus Configuration

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 NT 1ACE to the NT1 Power Supply, perform the following steps as illustrated in Figure 2-4.

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 10.

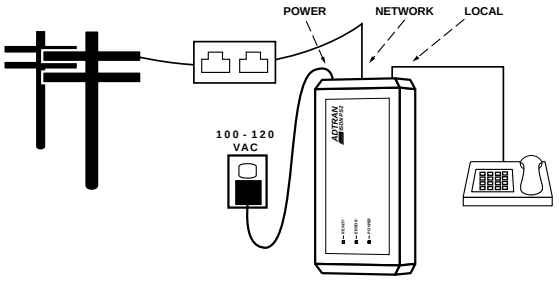

Figure 2-4. Power Supply Connection

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 3. 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 10.

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 10.

Powering TEs from the NT1 ACE

The ADTRAN NT1 ACE can be used to provide power for TEs connected to the S/T interface. The NT1 ACE supplies power by a separate wire pair (PS2) on the two data jacks marked S/T, as shown in Figure 2-1. The ADTRAN NT1 ACE SP, part number 1203019L3, also incorporates power source 1 (PS1) which provides power over the transmit and receive pairs. Before attempting to power any TE from the NT1 ACE, verify that it can accept power from a PS1 or PS2 power source.

Table 2-1 gives network connector pin assignments, and Table 2-2 provides guidelines for properly terminating the local bus.

Table 2-1. 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

Table 2-2. 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)

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.

Symptom	Action
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 3.

Symptom	Action
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

U-Interface ..... ANSI T1.601, ITU-T1.430
S/T-Interface ..... ANSI T1.605, ETS-1 ETS 300012

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

Environment

Temperature ..... 0 to 50 °C (32 to 104 °F) operating
-20 to 70 °C (-4 to 158 °F) storage
Relative Humidity.... Up to 95%, non-condensing
FCC Approval..... FCC Part 15 Class B, FCC Part 68, UL, CUL, CSA, CS03

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

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.

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 # _____