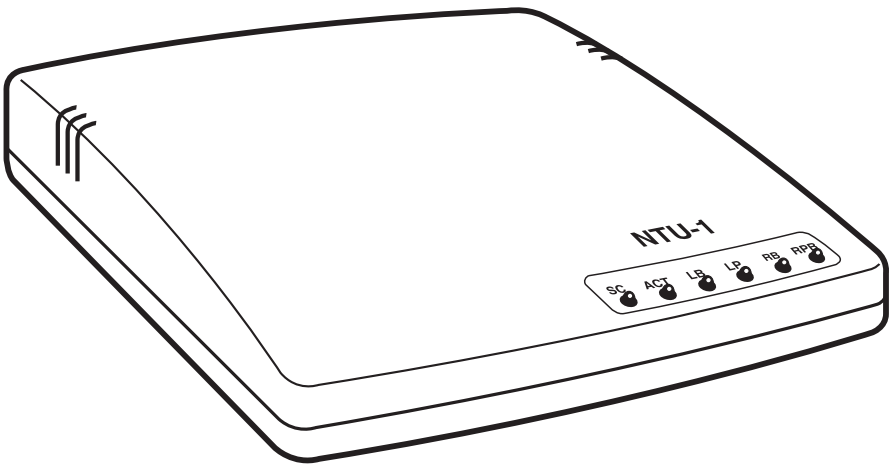




NTU-1



**CUSTOMER
SUPPORT
INFORMATION**

Order toll-free in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

**FEDERAL COMMUNICATIONS COMMISSION
and INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS**

Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

Caution:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

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1. Specifications

Maximum Operating Distance—18,000 ft. (5486 m)

U Interface Coding—2B1Q

Operating Temperature—32 to 122°F (0 to 50°C)

Humidity—Up to 95% noncondensing

Power Consumption—5 watts maximum

Wallmount Transformer Output—34 VAC

Size—1.5"H x 6.3"W x 5.1"D (3.8 x 16 x 13 cm)

Weight—2.5 lb. (1.1 kg) with transformer

2. Introduction

2.1 Description

The Network Termination Device (NTU-1) is designed for the ISDN basic rate communication system. It installs between the Central Office U interface, and the customer premise S or T interface. It effectively converts the central office 2-wire echo-canceled 2B1Q code to a customer premise 4-wire alternate space inversion code (see Figure 2-1). Both point-to-point and multipoint configurations are supported.

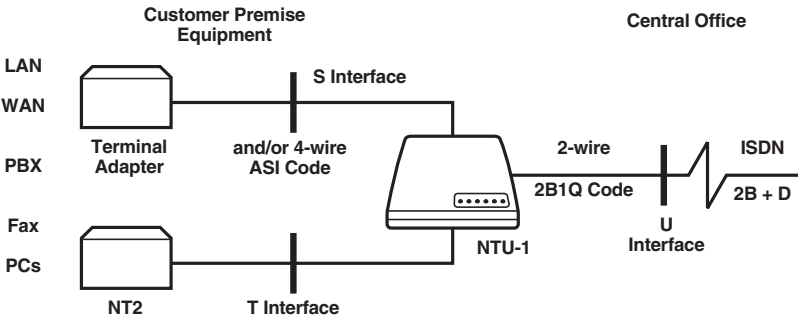


Figure 2-1. Typical ISDN interface arrangements.

The NTU-1 can reside on a desk or be wall mounted. Six light-emitting diodes (LEDs) show unit status. The rear panel houses the power jack, two jacks for either an S or T interface to the customer premise equipment, one U jack for connection to the central office, and one 4-position DIP switch for terminating resistor selection. Power is supplied by the wall transformer, which also provides power to the associated terminal devices via the S/T jacks.

2.2 What the Package Includes

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500.

- Network Termination Unit (NTU-1)
- U interface cable

- Power supply
- This users' manual

2.3 Features

- Mounts on a wall or desktop
- Point-to-point or multipoint configuration
- Built-in surge protection
- All options and connections are accessible via the rear panel
- Up to 18,000 feet (5486 m) operating distance
- 2B1Q to alternate space inversion interface coding
- Standard RJ-45 jacks on all interfaces
- Wall transformer and U interface cable included
- Automatic remote (backup) power pickup

2.3.1 ISDN FEATURES

- Loss of power notification
- Embedded operations channel 2B+D loopback
- Integral metallic termination circuit (sealing current)
- Warm start activation
- Remote activated quiet mode and insertion loss tests in maintenance modes

2.3.2 COMPLIANCE

Complies with these standards:

- ANSI T1.601-1992 network side
- ANSI T1.605

3. Installation and Operation

3.1 Preparing the Site

The installation area should be free from extreme temperatures, humidity, shock, and vibration. Allow sufficient space for cable clearance. For wallmount applications, a template is provided to help locate the retaining screw holes (see **Appendix**).

CAUTION

For wallmount applications, position the NTU-1 with connectors and cables exiting downward. Make sure that the LEDs are visible during operation.

3.2 Wall Mounting

Using the template found on the last page of this manual, mark the wall and insert three number 6 pan-head type screws. Allow the screw heads to protrude $\frac{1}{10}$ ". After inserting all three screws, position the NTU-1 in place by engaging the screw heads and sliding it to the right until it's secure. You might have to adjust the screws for a snug fit.

NOTE

On some installations, it may be easier to make connections or position DIP switches before wall mounting.

3.3 DIP-Switch Options

When you install the NTU-1, you must set the terminating resistors to match the applications shown in Figure 3-1.

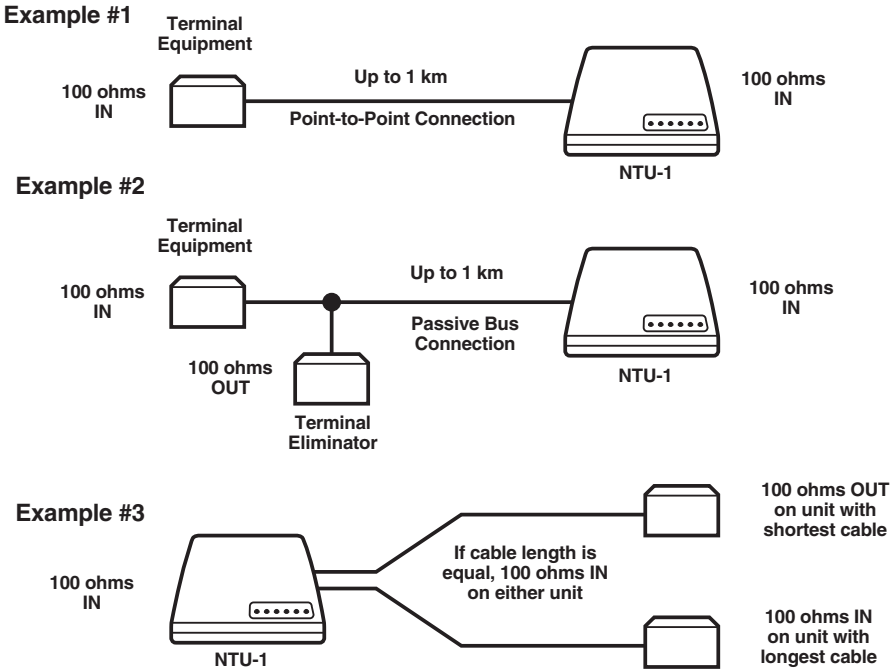


Figure 3-1. Examples using terminating resistor settings.

DIP-switch S1 positions 1 and 4 control the resistors. S1-1 selects the transmit resistor and S1-4 selects the receive resistor. The ON (down) position puts the terminating resistors in the circuit. You can access the switch from the rear panel. It is numbered and labeled (see Figure 3-2). The NTU-1 is shipped with all positions switched ON (S1 positions 2 and 3 are not used).

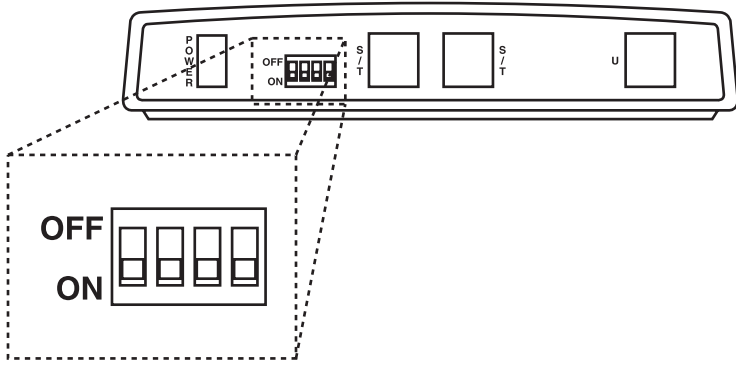


Figure 3-2. DIP-switch location.

The factory setting should work for most installations. S/T interface links that have unusual characteristics may experience improved performance by putting resistors in or out of the circuit. The units on the opposite end of the S/T line also have terminating resistors that you must consider. As a general rule, the units at either end have the resistance in while add-on nodes have the resistance out. Table 3-1 shows the switch settings.

Table 3-1. DIP-switch functions

DIP-Switch Position	Transmit Resistor		Receive Resistor	
	S1-1	OFF 100 ohms out	ON* 100 ohms in	
S1-4			OFF 100 ohms out	ON* 100 ohms in

*Default setting.

NOTES

ON=Down and OFF=up. Set both resistors the same, either both ON or both OFF.

S1-2 and S1-3 are not used.

3.4 ISDN and Terminal Hookup

Connecting the NTU-1 is simple and straightforward. The supplied U cable inserts into the U jack on the NTU-1. The opposite end connects to the ISDN wall jack.

Similar cables are used to connect the S/T jacks to the designated terminal endpoint equipment.

3.5 Wallmount Transformer

The NTU-1 is normally powered from the wallmount transformer. The transformer and power-supply circuitry provides 5 watts for up to two terminal devices connected to the S/T interface. Connect the transformer barrel connector to the power jack on the rear panel. Plug the transformer into a standard 120-VAC wall socket.

3.6 Remote Power

The NTU-1 can receive remote (backup) power over the U interface connector. The input must be nominally 48 VDC and 5 watts minimum. Both local and backup power is routed to the S/T interface connectors to power the associated terminal equipment. Pins 7 and 8 on the U interface provide remote power to both S/T jacks and the NTU-1.

NOTE

Remote power must be provided to the wall jack U connection by the site facilities.

3.7 Signal Power

The NTU-1 routes local and remote power to the signal leads of the S/T interface. For phantom powering applications, S/T interface connector pins 4 and 5 (transmit) are the negative power leads and pins 3 and 6 (receive) are the positive power leads.

3.8 Operation

After installation and configuration, the NTU-1 operates automatically and unattended.

3.9 LEDs

The LEDs display certain operating functions and will indicate if malfunctions are occurring.

- **LP (Local Power):** ON indicates that the wallmount transformer is plugged in and 120 VAC is present.
- **RP (Remote Power):** ON indicates that the remote power source is connected and functional.
- **RPR (Remote Power Reversed):** ON indicates that the remote power source is connected but polarity is reversed. This must be corrected by the site facilities.
- **LB (Loopback):** ON indicates that the ISDN switch has sent a 2B+D loopback command to the NTU-1.
- **SC (Sealing Current):** ON indicates the presence of the metallic termination test voltage from the ISDN switch.
- **ACT (Activity):** ON indicates that a link-up between the terminal equipment and ISDN central office via the NTU-1 has been achieved and transmission can take place.

If a disruption occurs between the U interface and the ISDN switch, the LED flickers (8 Hz).

If a disruption occurs between the S/T interface and the terminal equipment, the LED blinks once per second (1 Hz). If the LED flashes slowly, the S/T device may not be plugged in.

If a disconnect occurs on both interfaces, the LED goes out.

4. Connector Pinouts

The NTU-1 connects to the central office (CO) and customer premise equipment (CPE) with standard 8-pin RJ-45 modular connectors. All connections are on the rear panel and are labeled.

4.1 NTU-1 to ISDN U Interface

The U jack connects the NTU-1 to the ISDN. Pin functions are shown in Table 4-1.

Table 4-1. Pin functions for U jack

Pin	Function
1	Not used
2	Not used
3	Not used
4	Transmit to/Receive from ISDN network
5	Transmit to/Receive from ISDN network
6	Not used
7	Remote power source (-)
8	Remote power source (+)

4.2 NTU-1 to Terminal Endpoint Equipment

The S/T jacks connect the NTU-1 to the terminal equipment. Either jack can be an S interface or a T interface. Pin functions are shown in Table 4-2.

Table 4-2. Pin functions for S/T jacks

Pin	Function
1	Not used
2	Not used
3	Receive + from terminal equipment
4	Transmit + to terminal equipment
5	Transmit - to terminal equipment
6	Receive - from terminal equipment
7	Terminal equipment power (-)
8	Terminal equipment power (+)

5. Troubleshooting

5.1 Calling Black Box

If you determine that your NTU-1 is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

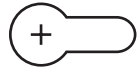
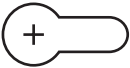
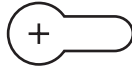
5.2 Shipping and Packaging

If you need to transport or ship your NTU-1:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the NTU-1 for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.

Appendix. Wallmount Template

Use this template to mount the NTU-1 on the wall.





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