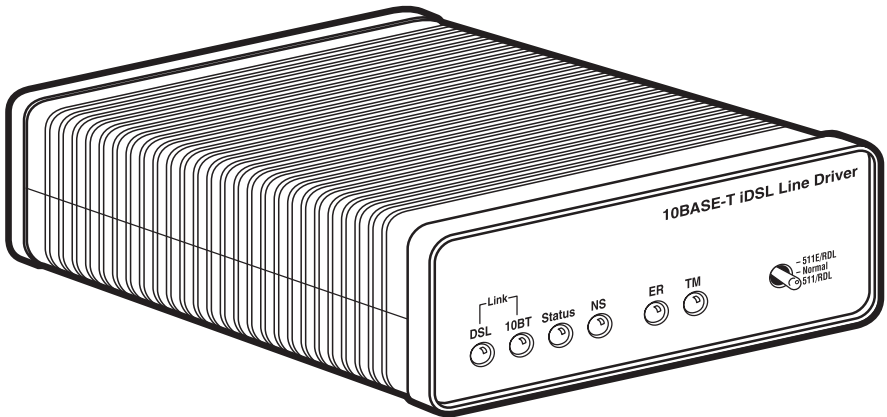




## IDSL Line Driver w/10BT (RJ-45)



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

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

*This digital apparatus does not exceed the Class A 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 la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

**EUROPEAN UNION DECLARATION OF CONFORMITY**

This equipment complies with the requirements of the European EMC Directive 89/336/EEC.



**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.

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# 1. Specifications

**Transmission Format:** Synchronous or asynchronous

**Transmission Line:** Single unconditioned twisted pair

**Clocking:** Internal or receive loopback

**Distance:** See Table 1-1

**Table 1-1. 2-wire distance.**

Data Rate	AWG Wire Gauge			
	19 AWG (0.9 mm)	22 AWG (0.6 mm)	24 AWG (0.5 mm)	26 AWG (0.4 mm)
All rates	10.8 (17.4)	7.2 (11.6)	5 (8)	3.4 (5.5)

**Data Rates:** Synchronous 19.2, 32, 56, 64, and 128 kbps; Asynchronous: 0 to 38.4 kbps

**Diagnostics:** V.52-compliant bit error rate pattern (511/511E pattern) generator and detector with error injection mode; Local Line Loopback and Remote Digital Loopback, activated by front-panel switches or via the serial interface

**Indicators:** LEDs: DSL, 10BASE-T, Status, NS (no signal), ER (error), and TM (test mode)

**Connectors:** RJ-45 on line side, shielded RJ-45 on Ethernet port

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

**Altitude:** Up to 15,000 ft. (4572 m)

**Humidity:** 5 to 95% noncondensing

**Power:** 100 to 240 VAC, 50 to 60 Hz (universal input option); 5 watts

**Size:** 1.6"H x 4.1"W x 6"D (4.1 x 10.4 x 15.2 cm)

**Weight:** 2 lb. (0.9 kg)

## 2. Introduction

### 2.1 Description

The IDSL Line Driver with 10BT provides seamless MAC Layer connectivity between two peered 10BASE-T LANs. You no longer need to hassle with recurring leased-line costs, or a bridge and a CSU/DSU. The Line Driver allows you to add additional nodes to a LAN that has reached its maximum distance limits or separate high-traffic areas of a LAN. The Line Driver connects peered LANs and automatically forwards and receives LAN broadcasts, multicasts, and frames across a 2-Wire DSL span. It supports PPP (RFC 1661) and BCP (RFC 1638).

The Line Driver features include loopback diagnostics, inband SNMP/HTTP remote management capabilities using NetLink Plug-and-Play, and externally accessible configuration switches. As a symmetric DSL modem, the Line Driver offers the same data rates in both directions over a single pair of regular telephone lines using 2BIQ modulation. The Line Driver connects to the DSL line via an RJ-45 jack and is powered by a universal (100- to 240-VAC) power supply.

### 2.2 Features

- Provides MAC Level Data Link (Layer 2) connection between two peered 10BASE-T Ethernet LANs.
- Operates transparently to higher-level protocols such as TCP/IP, DECnet™, NetBIOS, and IPX™.
- PPP (Point-to-Point Protocol, RFC 1661) with Bridge Control Protocol (RFC 1638).
- Automatically learns, loads, and removes MAC addresses.
- Point-to-point distances up to 5 miles (all data rates) on 24-AWG twisted pair.
- HTTP/SNMP Manageable as CP (Customer Premises) Unit with CO (Central Office) Rack Card (ME0001C) and management card (RM261C-SNMP).
- Internal or receive recovered clocking between units.
- LED indicators for 10BASE-T Link, DSL Link, Status, No Signal, Error, and Test Mode.
- Remote digital loopback, local line loopback diagnostic modes.



## IDSLS LINE DRIVER W/10BT (RJ-45)

- Synchronous data rates: 19.2, 32, 56, 64, and 128 kbps.
- Full-duplex operation over a single twisted pair (2-wires).
- Multi-Rate Symmetric DSL.
- Interoperable with 2-Wire IDSL Line Driver Rack Card (ME0001C).
- Universal power supply (90 to 260 VAC).
- Small, convenient desktop unit.
- CE marked.

### 2.3 SNMP Management

The IDSL Line Driver is SNMP manageable when it is connected to a rack-mounted IDSL Rack Card (ME0001C-10BT). SNMP management is enabled through a Managed Micro Rack SNMP/HTTP Card (RM261C-SNMP) located in the a Managed Micro Rack (RM260).

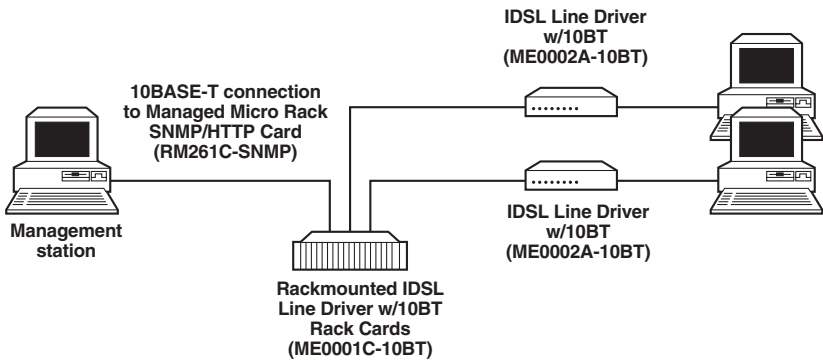


Figure 2-1. Typical application.

#### HTTP/HTML MANAGEMENT

The Managed Micro Rack SNMP/HTTP Card (RM261C-SNMP) maintains HTML pages that can be viewed through a web browser. You can display remote statistics and configure IDSL Line Driver (ME0002A) parameters simply by entering the SNMP/HTTP Card's IP address into the browser.

## 3. PPP Operational Background

PPP is a protocol used for multiplexed transport over a point-to-point link. PPP operates on all full-duplex media and is a symmetric peer-to-peer protocol, which can be broken into three main components:

1. A standard method to encapsulate datagrams over serial links;
2. A Link Control Protocol (LCP) to establish, configure, and test the data-link connection;
3. A family of Network Control Protocols (NCPs) to establish and configure different network layer protocols.

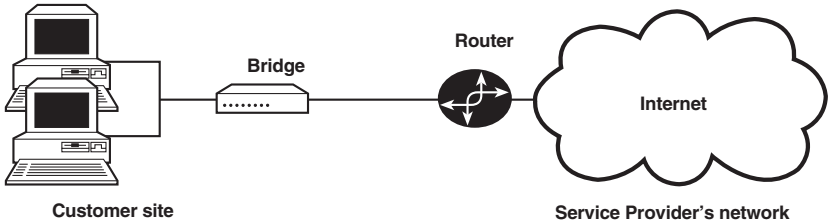
In order to establish communications over a point-to-point link, each end of the PPP link must first announce its capabilities and agree on the parameters of the link's operation. This exchange is facilitated through LCP Configure-Request packets.

Once the link has been established and optional facilities have been negotiated, PPP will attempt to establish a network protocol. PPP will use Network Control Protocol (NCP) to choose and configure one or more network layer protocols. Once each of the network layer protocols have been configured, datagrams from the established network layer protocol can be sent over the link. The link will remain configured for these communications until explicit LCP or NCP packets close the link down, or until some external event occurs.

The PPP Bridging Control Protocol (BCP), defined in RFC 1638, configures and enables/disables the bridge protocol on both ends of the point-to-point link. BCP, a Network Control Protocol of PPP, uses the same packet-exchange mechanism as the Link Control Protocol (LCP). With BCP, bridge packets may not be exchanged until PPP has reached the network layer protocol phase.

### Applications

In situations where a routed network requires connectivity to a remote Ethernet network, the interface on a router can be configured as a PPP IP half-bridge. The serial line to the remote bridge functions as a Virtual Ethernet interface, effectively extending the router's serial port connection to the remote network. The bridge device sends bridge packets (BPDU's) to the router's serial interface. The router will receive the Layer 3 address information and will forward these packets based on its IP address.



**Figure 3-1. Cisco router with serial interface configured as a PPP half-bridge.**

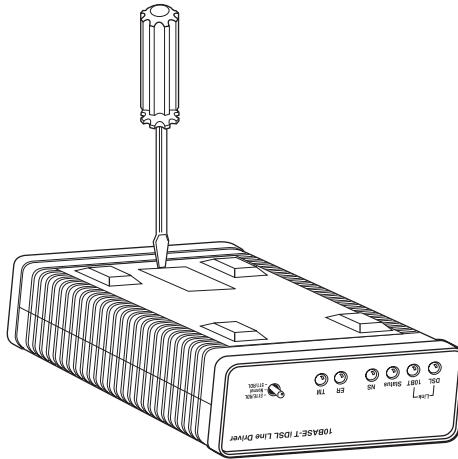
Figure 3-1 shows a typical Cisco® router with a serial interface configured as a PPP half-bridge. The router's serial interface uses a remote device that supports PPP bridging to function as a node on the remote Ethernet network. The serial interface on the Cisco router will have an IP address on the same Ethernet subnet as the bridge.

For example, the customer site is assigned the addresses 192.168.1.0/24 through 192.168.1.1/24. The address 192.168.1.1/24 is also the default gateway for the remote network. The above settings remove any routing/forwarding intelligence from the CPE. The associated Cisco configuration will set serial interface (s0) to accommodate half-bridging for the example in Figure 3-1.

## 4. Configuring the Hardware DIP Switches

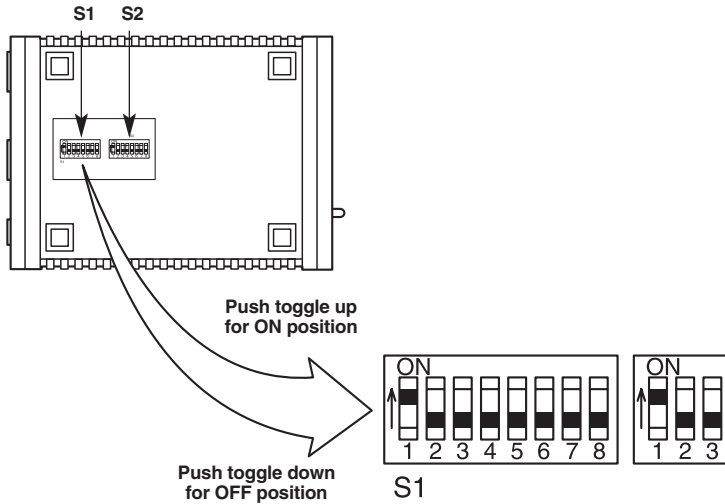
The IDSL Line Driver is equipped with two sets of eight DIP switches. This chapter describes switch locations and explains all possible configurations.

The Line Driver uses a unique set of 16 external mini DIP switches that allow for configuration to a wide range of applications. The 16 external switches are grouped into two eight-switch sets and are externally accessible from the underside of the Line Driver (see Figure 4-1).



**Figure 4-1. Removing the cover to access DIP-switches S1 and S2.**

The two sets of DIP switches on the underside of the IDSL Line Driver are called S1 and S2. Figure 4-2 shows that the orientation of all DIP switches is the same with respect to “ON” and “OFF” positions.



**Figure 4-2. DIP-switches S1 and S2.**

## 4.1 DIP-Switch S1

Use the eight switches in DIP-switch S1 to configure the data rate, asynchronous or synchronous data format, transmit clock source, and response to RDL request. The following table summarizes default positions of DIP-switch S1. Detailed descriptions of each switch follow the table.

**Table 4-1. S1 summary.**

Position	Function	Factory Default
S1-1	Data Rate	On
S1-2	Data Rate	Off
S1-3	Reserved	On
S1-4	Reserved	On
S1-5	Async/Sync Data Format	Off Async/Sync
S1-6	TX Clock Source	On
S1-7	TX Clock Source	On } Internal Clock
S1-8	Response to RDL Request	On Enable

**NOTE**

When setting the IDSL Line Driver to SNMP Management, the DTE rate switches (S1-1, S1-2, and S2-1) must be set to the ON position. Therefore, to set a Line Driver to SNMP Management mode, the S1-1, S1-2, and S2-1 must all be set to ON.

**4.1.1 SWITCHES S1-1 AND S1-2: DATA RATE**

Use Switches S1-1 and S1-2 to configure the asynchronous or synchronous data rate of the IDSL Line Driver. Each setting represents one synchronous data rate and one asynchronous data rate.

**Table 4-2. Sync and async data rate settings.**

<b>S1-1</b>	<b>S1-2</b>	<b>Sync Data Rate</b>	<b>Async Data Rate</b>
On	On	32 kbps	Reserved
Off	On	56 kbps	Reserved
On	Off	64 kbps	Reserved
Off	Off	128 kbps	0 to 38.4 kbps

**NOTE**

The IDSL Line Driver can also operate at the 19.2 kbps synchronous rate. To operate at 19.2 synchronous, set Switches S1-1 and S1-2 both to the OFF position and Switch S2-1 to the ON position (see Section 4.2.1 for a description of Switch S2-1).

Switches S1-3 and S1-4: Must be set to the ON position (Reserved).

**Table 4-3. Reserved switch settings.**

<b>S1-3</b>	<b>Setting</b>	<b>S1-4</b>	<b>Setting</b>
On	Reserved	On	Reserved

### 4.1.2 SWITCH S1-5: ASYNCHRONOUS/SYNC OPERATION

Use Switch S1-5 to configure the IDSL Line Driver for async/sync operation. Switch S1-5 must be set in the Off position. There is no other valid setting.

**Table 4-4. Async/sync switch settings.**

S1-5	Setting
Off	Async/Sync

### 4.1.3 SWITCHES S1-6 AND S1-7: SYSTEM CLOCK MODE

Use Switches S1-6 and S1-7 to configure the IDSL Line Driver for internal or receive recover clock mode.

**Table 4-5. System clock mode switch settings.**

S1-6	S1-7	Clock Mode	Description
On	On	Internal	System clock generated internally
On	Off	Receive Recover	System clock derived from the received line signal
Off	Off	Hardware Reset	

### 4.1.4 SWITCH S1-8: RESPONSE TO RDL REQUEST

Use Switch S1-8 to allow IDSL Line Driver to enter the Remote Digital Loopback diagnostic test when requested to do so by the far-end Line Driver. For example, when Switch S1-8 is set to “ON,” it will enter RDL mode when requested to do so by the remote IDSL Line Driver.

**Table 4-6. Remote digital loopback switch settings.**

S1-8	Setting
On	Response to RDL Request Enabled
Off	Response to RDL Request Disabled



## 4.2 DIP-Switch S2

Use the eight DIP switches in Switch S2 to enable 19.2 kbps synchronous operation and set the loopback modes. Table 4-7 summarizes default positions of DIP-switch S2. Detailed descriptions of each switch follow the table.

**Table 4-7. S2 summary.**

<b>Position</b>	<b>Function</b>	<b>Factory Default</b>
S2-1	19.2 kbps enable	Off
S2-2	Front-panel switch disable	Off
S2-3	Reserved	Off
S2-4	Reserved	Off
S2-5	Reserved	Off
S2-6	Reserved	Off
S2-7	Reserved	Off
S2-8	Reserved	Off

### 4.2.1 SWITCHES S2-1: 19.2 KBPS SYNCHRONOUS RATE ENABLE

Use Switch S2-1 to allow the IDSL Line Driver w/10BASE-T (ME0002A-10BT) to operate at the 19.2 kbps synchronous data rate.

**Table 4-8. Synchronous data rate.**

<b>S2-1</b>	<b>Activation</b>	<b>Description</b>
Off	Disabled	Synchronous data rate is 32 to 128 kbps as defined by switches S1-1 and S1-2
On	Enabled	Operates at synchronous 19.2 kbps data rate*

### **\*NOTE**

To operate at 19.2 kbps, Set Switches S1-1 and S1-2 to the OFF position and S2-1 On (see Section 4.1.1).

### 4.2.2 SWITCH S2-2: FRONT-PANEL SWITCH DISABLE

Use switch S2-2 to enable or disable the front-panel toggle switches.

**Table 4-9. Front-panel toggle switches.**

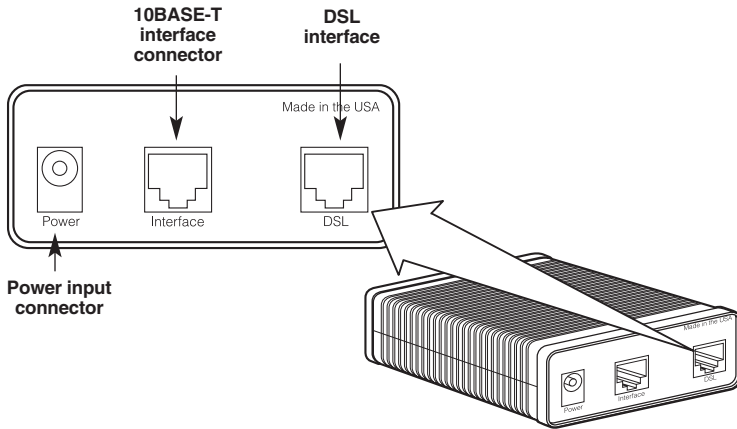
<b>S2-2</b>	<b>Setting</b>
On	Disable the front-panel switches
Off	Enable the front-panel switches

### 4.2.3 SWITCHES S2-3, S2-6, S2-7, AND S2-8: RESERVED

These switches are reserved for future use.

## 5. Installation

When the ISDL Line Driver has been properly configured, it may be connected to the DSL twisted-pair interface, the 10BASE-T Ethernet interface, and the power source. This chapter describes these connections.



**Figure 5-1. Rear view of the ISDL Line Driver.**

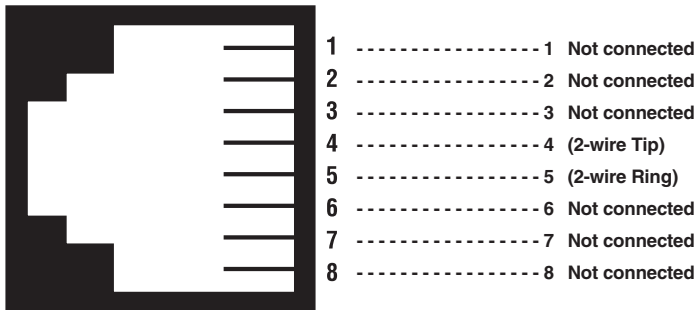
### 5.1 Connecting the DSL Interface

The ISDL Line Driver supports communication between 10BASE-T hubs or workstations at distances of up to 5 miles (8 km) over 24-AWG (0.5-mm) twisted-pair wire. There are two requirements for installing the Line Driver.

1. These units operate as a pair. Both units at the end of the twisted-pair DSL span must be set for the same DTE rate.
2. To function properly, the Line Driver needs one twisted pair of metallic wire. This twisted pair must be unconditioned, dry, metallic wire, between 19 (0.9 mm) and 26 AWG (0.4 mm); the higher-number gauges will limit distance. Standard dial-up telephone circuits, or leased circuits that run

through signal equalization equipment, or standard, flat modular telephone type cable, are not acceptable.

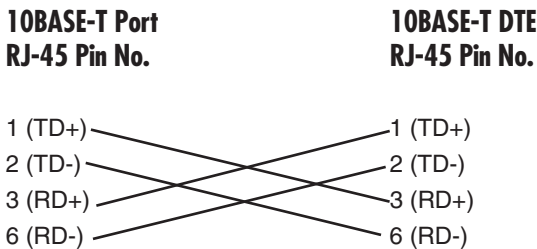
The RJ-45 connector on the Line Driver's twisted-pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationships are shown in Figure 5-2.



**Figure 5-2. Twisted-pair line interface.**

### 5.2 Connecting the 10BASE-T Ethernet Port to a PC (DTE)

The 10BASE-T interface is configured as DTE (Data Terminal Equipment). If the Line Driver will be connected to another DTE device such as a 10BASE-T network interface card, construct a 10BASE-T crossover cable and connect the wires as shown in Figure 5-3.



**Figure 5-3. Connecting the 10BASE-T Ethernet port to a PC.**

**5.3 Connecting the 10BASE-T Ethernet Port to a Hub (DCE)**

The 10BASE-T interface is configured as DTE (Data Terminal Equipment), just like a 10BASE-T network interface card in a PC. Therefore, it “expects” to connect to a 10BASE-T hub using a straight-through RJ-45 cable. Use Figure 5-4 to construct a cable to connect the 10BASE-T interface to a 10BASE-T hub.

<b>10BASE-T Port RJ-45 Pin No.</b>	<b>10BASE-T Hub RJ-45 Pin No.</b>
1 (TD+) -----	1 (TD+)
2 (TD-) -----	2 (TD-)
3 (RD+) -----	3 (RD+)
6 (RD-) -----	6 (RD-)

**Figure 5-4. Connecting the 10BASE-T interface to a 10BASE-T hub.**

**5.4 Power Connection**

The IDSL Line Driver uses a 5-VDC, 2-A universal input 100- to 240-VAC power supply (center pin is +5V). The universal power supply has a male IEC-320 power entry connector. This power supply connects to the Line Driver via a barrel jack on the rear panel.

The IDSL Line Driver powers up as soon as it is plugged into an AC outlet. It does not have a power switch.

# 6. Operation

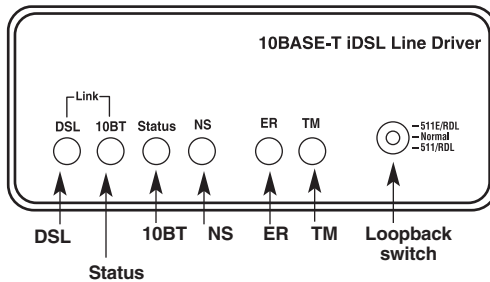
When the IDSL Line Driver has been properly configured and installed, it should operate transparently. This chapter describes power-up, LED status indicators, and the built-in loopback test modes.

## 6.1 Power-Up

Before applying power to the Line Driver, please read **Section 5.4** and make sure that the unit is connected to the appropriate power source.

## 6.2 LED Status Indicators

The IDSL Line Driver features six front-panel LEDs that monitor connections on the DSL and 10BASE-T links, signaling, error, and test modes (see Figure 6-1 for the location of each LED). Descriptions of each LED follow.



**Figure 6-1. Front-panel LEDs.**

- **DSL Link: (Active Green)** Solid green (On) indicates that the end-to-end DSL Framers Link is up, signifying that the link across the DSL span is active. The DSL Link LED is Off when the link is down.
- **Status (511E/RDL, Normal, and 511/RDL):** Blinks yellow from one to eleven times to indicate system status. Each pulse pattern is separated by a 2-second “off” period. Greater pulse patterns have higher priority (buffer saturation has greater priority than an empty MAC table). Valid system statuses are:

1 pulse = system status is okay

2 pulses = no MAC entries in the MAC Address Table

3 pulses = Clear to Send (CTS) or Carrier Detect (DCD) from base unit are not asserted

4 pulses = buffer is saturated

5 pulses = WAN receive frame(s) too large

6 pulses = WAN receive frame(s) not octet aligned

7 pulses = WAN receive frame(s) aborted

8 pulses = Detected WAN receive frame(s) with CRC

9 pulses = Detected LAN receive frame(s) too large

10 pulses = Detected LAN receive frame(s) not octet aligned

11 pulses = Detected LAN receive frame(s) with bad CRC

- **10BT Link:** (Active green) Solid green indicates that the 10BASE-T Ethernet interface has detected a valid SQE heartbeat, signifying a valid 10BASE-T connection.
- **NS:** (Active red) Solid red indicates that the Digital Signal Processors (DSPs) are not linked.
- **ER:** (Active red) Flashing red indicates CRC errors on DSL (framer) side if DSL Link is active or if bit errors are received during loop/BER test. ER flashes once to indicate a CRC error (during normal operation) or bit errors (during Remote Loopback 511/511E tests).
- **TM:** (Active yellow) Solid yellow indicates an Active Test Mode. The unit may be placed in test mode by the local user or by the remote user.

## 6.3 Test Modes

The IDSL Line Driver offers two proprietary loopback test modes (plus a built-in V.52 BER test-pattern generator) to evaluate the condition of the modems and the communication link. These tests can be activated via the interface or physically from the front panel.

### 6.3.1 REMOTE DIGITAL LOOPBACK (RDL)

The Remote Digital Loopback (RDL) test checks the performance of both the local and remote Line Drivers, and the communication link between them. Any characters sent to the remote Line Driver in this test mode will be returned back to the originating device (see Figure 6-2). For example, characters typed on the keyboard of the local terminal will appear on the local terminal screen after having been passed to the remote Line Driver and looped back.

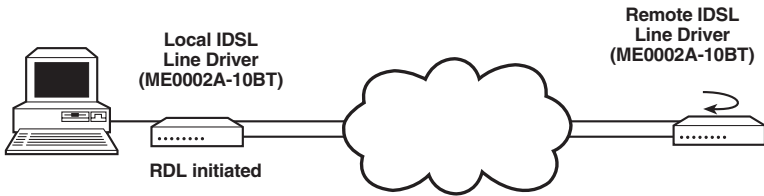


Figure 6-2. Remote digital loop.

## CAUTION

**Do not send a 511 test pattern from the test equipment when you connect external test equipment to the IDSL Line Driver.**

To perform an RDL test, follow these steps:

1. Activate RDL. This may be done in two ways:
  - Move the front-panel toggle switch to appropriate position.
  - Set remote loopback from the SNMP screen.



2. Perform a V.52 BER test as described in **Section 6.3.2**. If the BER test equipment indicates a fault, and the Local Line Loopback test was successful for both Line Drivers, you may have a problem with the twisted-pair line between the modems. You should then check the twisted-pair line for proper connections and continuity.

### 6.3.2 USING THE V.52 (BER) TEST-PATTERN GENERATOR

To use the V.52 BER tests in conjunction with the Remote Digital Loopback tests, follow these instructions:

1. Locate the “511/511E” toggle switch on the Line Driver’s front panel and move it **DOWN**. This activates the V.52 BER test mode and transmits a “511” test pattern into the loop. If any errors are present, the local modem’s red “ER” LED will blink sporadically.
2. If the above test indicates no errors are present, move the V.52 toggle switch **UP**, activating the “511E” test with errors present. If the test is working properly, the local modem’s red “ER” LED will blink approximately once per second. A successful “511E” test will confirm that the link is in place, and that the Line Driver’s built-in “511” generator and detector are working properly.

### NOTE

**The above V.52 BER tests can be used independently of the Remote Digital Loopback tests. This requires two operators: one to initiate and monitor the tests at the local IDSL Line Driver, and one to do the same at the remote IDSL Line Driver. In this case, the test pattern sent by each Line Driver will not be looped back, but will be transmitted down the line to the other Line Driver. While one operator initiates test, the other monitors for errors.**

# Appendix. Troubleshooting

## A.1 Calling Black Box

If you determine that your IDSL Line Driver 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.

## A.2 Shipping and Packaging

If you need to transport or ship your IDSL Line Driver:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the IDSL Line Driver 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.



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