BLACK BOX®

NETWORK SERVICES
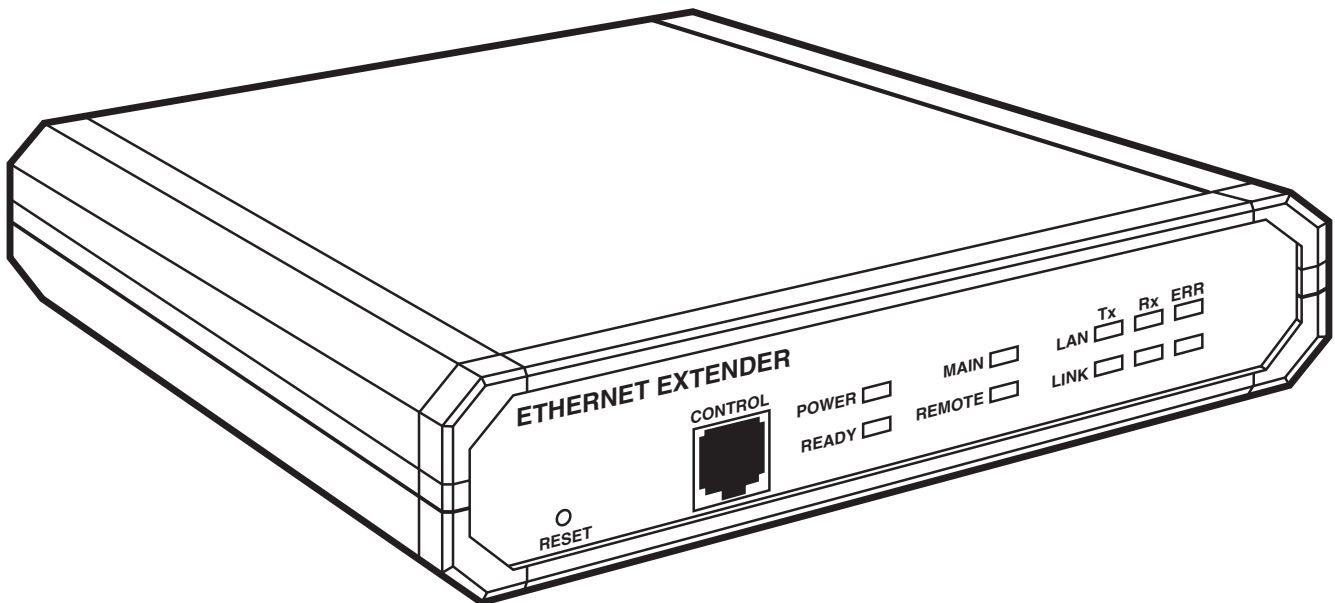
BLACK BOX®
NETWORK SERVICES

LB3104A-AUI-R3	LB3135A-AUI-R3	LB3804A-AUI-R3	LB3835A-AUI-R3
LB3104A-BNC-R3	LB3135A-BNC-R3	LB3804A-BNC-R3	LB3835A-BNC-R3
LB3104A-BT-R3	LB3135A-BT-R3	LB3804A-BT-R3	LB3835A-BT-R3
LB3124A-AUI-R3	LB3136A-AUI-R3	LB3824A-AUI-R3	LB3836A-AUI-R3
LB3124A-BNC-R3	LB3136A-BNC-R3	LB3824A-BNC-R3	LB3836A-BNC-R3
LB3124A-BT-R3	LB3136A-BT-R3	LB3824A-BT-R3	LB3836A-BT-R3

Ethernet Extenders
Installation Guide

FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
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 the Canadian Department of Communications.

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

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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.

Declaration of Conformity

These Ethernet Extenders conform to the following standards or other normative documents:

EMC: EN 55022 (1994)   Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

             EN 50082-1 (1992)   Electromagnetic compatibility—Generic immunity standards for residential, commercial, and light industry.

Safety: EN 60950 (1992/93)   Safety of information technology equipment, including electrical business equipment.

Supplementary Information:

The products herewith comply with the requirements of the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC. The products were tested in a typical configuration.

Telecommunication Safety

The safety status of each of the ports on the Ethernet Extender is declared according to EN 41003 and is detailed in the table below:

Safety Status	Ports
SELV	V.24, V.35, V.36, LAN
TNV operating within the limits of SELV	4W

SELV = Safety Extra-Low Voltage
TNV = Telecommunications Network Voltage

TRADEMARKS

IPX™ is a trademark of Novell Incorporated.

Any other trademarks mentioned in this manual are the property of the trademark owners.

Contents

1. Specifications

Indicators —   Ten LEDs: (1) POWER, green; (1) MAIN, green; (1) REMOTE, green; (1) LAN TX, yellow; (1) LAN RX, yellow; (1) LAN ERR, red; (1) LINK TX, yellow; (1) LINK RX, yellow; (1) LINK ERR, red; (1) READY, green

User Controls —   Reset (on the front panel), Power ON/OFF (on the rear panel)

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

Humidity Tolerance —   Up to 90%, noncondensing

Power —   100–230 VAC (±10%), 47–63 Hz, 10 VA maximum

Size —   1.8"H x 8.5"W x 11.8"D (4.6 x 21.6 x 30 cm)

Weight —   4.7 lb. (2.1 kg)

Table 1-1. Interfaces and Connectors

Code	# of Remote Users	WAN Interface	Ethernet Interface
LB3104A-AUI-R3	1	4-wire point-to-point using spade-lug connections	AUI
LB3104A-BNC-R3	1	4-wire point-to-point using spade-lug connections	BNC
LB3104A-BT-R3	1	4-wire point-to-point using spade-lug connections	BT (10BASE-T)
LB3124A-AUI-R3	1	V.24/RS-232 using a female DB25	AUI
LB3124A-BNC-R3	1	V.24/RS-232 using a female DB25	BNC
LB3124A-BT-R3	1	V.24/RS-232 using a female DB25	BT (10BASE-T)
LB3135A-AUI-R3	1	V.35 with a female M.34 block connector	AUI
LB3135A-BNC-R3	1	V.35 with a female M.34 block connector	BNC
LB3135A-BT-R3	1	V.35 with a female M.34 block connector	BT (10BASE-T)
LB3136A-AUI-R3	1	V.36/RS-422 with a female DB37 connector	AUI
LB3136A-BNC-R3	1	V.36/RS-422 with a female DB37 connector	BNC
LB3136A-BT-R3	1	V.36/RS-422 with a female DB37 connector	BT (10BASE-T)
LB3804A-AUI-R3	80	4-wire point-to-point using spade-lug connections	AUI
LB3804A-BNC-R3	80	4-wire point-to-point using spade-lug connections	BNC
LB3804A-BT-R3	80	4-wire point-to-point using spade-lug connections	BT (10BASE-T)
LB3824A-AUI-R3	80	V.24/RS-232 using a female DB25	AUI
LB3824A-BNC-R3	80	V.24/RS-232 using a female DB25	BNC
LB3824A-BT-R3	80	V.24/RS-232 using a female DB25	BT (10BASE-T)
LB3835A-AUI-R3	80	V.35 with a female M.34 block connector	AUI
LB3835A-BNC-R3	80	V.35 with a female M.34 block connector	BNC
LB3835A-BT-R3	80	V.35 with a female M.34 block connector	BT (10BASE-T)
LB3836A-AUI-R3	80	V.36/RS-422 with a female DB37 connector	AUI
LB3836A-BNC-R3	80	V.36/RS-422 with a female DB37 connector	BNC
LB3836A-BT-R3	80	V.36/RS-422 with a female DB37 connector	BT (10BASE-T)

LAN Interface

Standard —   Conforms to Ethernet/IEEE 802.3

Type —   10BASE5 (AUI), 10BASE2 (BNC), 10BASE-T (UTP)

Connectors —   10BASE5: DB15 female; 10BASE2: BNC female; 10BASE-T: RJ-45

LINK Interface

Interface —   V.35, V.24/RS-232, V.36/RS-422, 4W

Connectors —   V.35: 34-pin female; V.24/RS-232: DB25 female; V.36/RS-422: DB37 female (through adapter cable); 4W: 5-screw terminal block

Data Rates —   V.24/RS-232 (Synchronous): Up to 64 kbps; V.24/RS-232 (Asynchronous): 2.4 to 115.2 kbps; V.35, V.36/RS-422: Up to 512 kbps; 4W: 16 to 768 kbps

Control Interface

Type —   V.24/RS-232

Connector —   RJ-45

Data Rate —   2.4 to 19.2 kbps, 8 bits, no parity, automatic rate detection

2. Introduction

2.1 General Description

The Ethernet Extender connects up to 80 remote workstations, terminal servers, or other Ethernet devices to a central IEEE 802.3 Ethernet LAN. Connection is made through ISDN, Frame Relay, or leased or dialup lines.

IP routing is supported over PPP, SLIP, CSLIP, or Frame Relay (RFC 1490). IPX™ can be routed over PPP or Frame Relay (RFC 1490). Bridge mode is available if the Ethernet Extender operates opposite another Ethernet Extender.

The Ethernet Extender is a standalone unit. Two models are available:

- **Ethernet Extender-1 —** This is a single-WAN-port router/bridge. As a bridge, it enables remote connection of a single workstation to a central LAN. As a router, it enables connection of a remote Ethernet LAN.

- **Ethernet Extender-8 —** This is a single-WAN-port router/bridge. As a bridge, it enables connection of a remote Ethernet (consisting of up to 80 workstations) to a central Ethernet LAN. As a router, it enables connection of a remote Ethernet LAN.

NOTE

Unless otherwise stated, "Ethernet Extender" refers to both the Ethernet Extender-1 and Ethernet Extender-8.

The Ethernet Extender comes in one of these WAN interfaces: V.35, V.24/RS-232, V.36/RS-422, or 4-wire. The 4-wire option incorporates an internal short-range modem operating at selectable data rates up to 768 kbps. This option is suitable for campus environments where either single stations or workgroup LANs require remote connection to the central LAN. The wide range of interface options enables connection to most modems and public networks. We recommend operating the serial link at 9.6 kbps or higher to reduce response time and link delay.

Setup and configuration can be carried out from an ASCII terminal or PC terminal emulator connected to the Control port, from any SNMP management station or through TELNET.

2.2 Operational Description

2.2.1 ROUTING MODE

For a description of the IP/IPX routing, see the *Ethernet Extender Configuration Guide.*

2.2.2 BRIDGE MODE

In Bridge mode, Ethernet Extenders operate in pairs. Each Extender must be configured for its specific application, since the Local and Remote units differ in their function. See Figure 2-1 for an illustration of Ethernet Extender filtering and forwarding. Ethernet Extender operation is automatic, including serial link startup and recovery, and learning of address tables.

2.2.3 ETHERNET EXTENDER-1 OPERATION

The Remote Ethernet Extender learns the address of the remote workstation connected to it when the workstation attempts to access the network. The Remote Ethernet Extender then uses this workstation address to request the Local Ethernet Extender to insert into the Local (Main) LAN. The Remote Ethernet Extender forwards all frames originating from the remote workstation. The Local Ethernet Extender will forward to the link only those frames destined for the remote workstation including broadcast and multicast messages, unless they have been masked out.

2.2.4 ETHERNET EXTENDER-8 OPERATION

On power-up, both the Local and Remote Ethernet Extenders will connect to their respective LANs. The Remote Ethernet Extender continuously learns the addresses of workstations on the remote LAN and updates the Local Ethernet Extender with these addresses (up to 80 addresses).

The Remote Ethernet Extender forwards to the Main LAN all frames that are not addressed to workstations on the Remote LAN. The Local Ethernet Extender forwards all frames that have destination addresses belonging to one of the remote workstations to the link. Broadcast and Multicast packets are always forwarded in both directions, unless they are masked out using the Filtering tool (see the *Ethernet Extender Configuration Guide*).
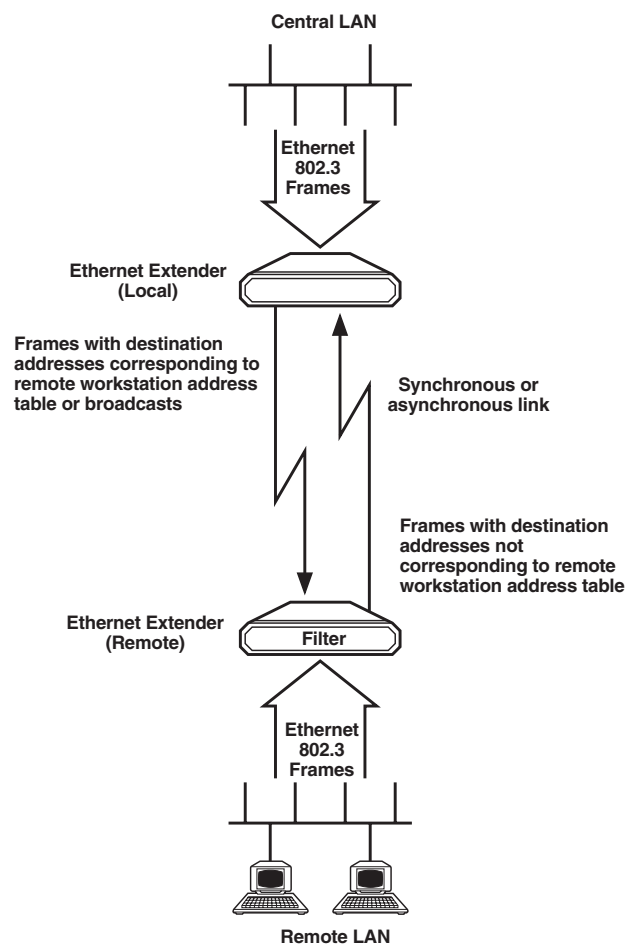

Figure 2-1. Ethernet Extender Filtering and Forwarding in Bridge Mode.

NOTE
Additional bridges cannot be connected to the Remote LAN. However, no limitations on additional bridging or routing apply to the Main LAN.

2.3 Functional Description

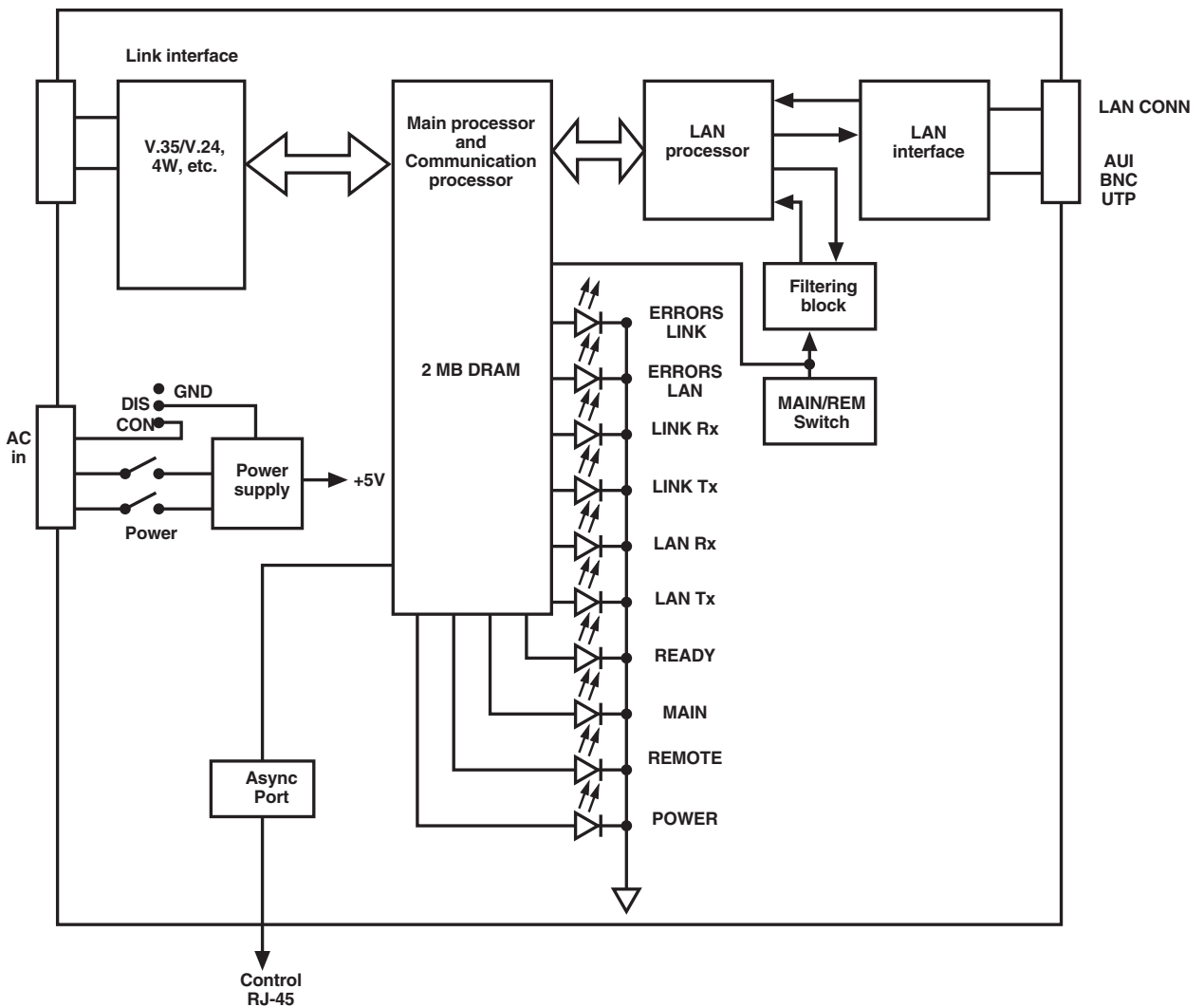Figure 2-2 is a functional block diagram for the Ethernet Extender.

Figure 2-2. Ethernet Extender Functional Block Diagram.

The Ethernet Extender is made up of the following main circuits (refer to Figure 2-2):

LAN Interface. The LAN interface provides the physical connection to an Ethernet LAN via various media types: UTP (10BASE-T), BNC (10BASE2), AUI (10BASE5). The LAN interface contains receiver and transmitter functions and clock extraction.

LAN Processor. The LAN processor performs the Medium Access Control (MAC) protocols of the Ethernet (that is, transmission and reception of frames according to the main processor's requests, and transmission of LAN status information to the main processor).

Link Interface. The link interface provides the physical connection to either V.24/RS-232, V.35, V.36, 4W. The 4W interface provides an internal short-range modem with internal clock. DCE mode is provided for bench testing by V.24 and V.35 link interfaces. In DCE mode, the internal clock rate can be adjusted by selecting options from the internal-clock-rate setup menu.

Main Processor and Communication Processor. The main process controls the LAN and communication processors. It performs buffer management and transfers the frames received from the LAN for transmission to the link and vice versa.

The communication processor provides a HDLC link for transmission and reception of frames to the main processor. Error checks and retransmissions ensure an error-free link.

Power Supply. The Ethernet Extender power supply provides required operating voltages. The power-supply input can range between 100 and 230 VAC.

Asynchronous Control Port. Provides setup, configuration, monitoring, and download interface through an RJ-45 control port using an asynchronous ASCII terminal as a terminal emulator.

3. Installation

3.1 General

The Ethernet Extender is delivered completely assembled. It is designed for installation on a desktop or in a 19-inch rack. This chapter describes the mechanical and electrical installation procedures for the Ethernet Extender.

After you install the unit, refer to **Chapter 5** for operating procedures.

If you have a problem, refer to **Section 5.3** for fault-isolation and troubleshooting procedures.

3.2 Unpacking

Follow these steps when unpacking your Ethernet Extender:

1. Place the container on a clean flat surface, cut all straps, and open or remove the top.

2. Take out the Ethernet Extender carefully and place it securely on a clean surface.

3. Remove all packing material.

4. Inspect the unit for damage. Immediately report any damage found.

3.3 Site Requirements

3.3.1 POWER

The Ethernet Extender unit should be installed within 5 feet (1.5 m) of an easily accessible, grounded AC outlet capable of providing 115 or 230 volts.

CAUTION

Never open the Ethernet Extender to repair or adjust it while the power is on. If such repairs must be made, they should be carried out only by skilled personnel.

3.3.2 FRONT AND REAR CLEARANCE

Allow at least 36 inches (91.5 cm) of frontal clearance for operator access. Allow at least 4 inches (10.2 cm) clearance at the rear of the unit for interface cable connections.

3.3.3 AMBIENT REQUIREMENTS

The Ethernet Extender should be used in an environment whose ambient temperature is 32 to 122°F (0 to 50°C) at a relative humidity of up to 90%, noncondensing.

3.4 Configuration

3.4.1 GENERAL

Ethernet Extenders operate in pairs. Each pair consists of one Ethernet Extender located on the main Ethernet LAN, and a second Ethernet Extender connected to the remote workstation(s) or terminal server(s). Each Ethernet Extender is configured differently depending on its location and the application. Configuration is performed through hardware switches and menu-driven software.

3.4.2 STARTING THE CONFIGURATION PROCEDURE

CAUTION

To avoid accidental electric shock, disconnect the Ethernet Extender power cord before opening the top cover.

Follow these steps to configure the Extender:

1. Disconnect the Extender's power cord from the wall socket. Also turn OFF the Ethernet Extender's POWER switch, located on the rear panel.

2. Remove the Ethernet Extender's top cover by loosening the screw located on the back of the unit.

3. Set the jumpers (refer to Figure 3-1) according to the instructions in the following paragraphs, using Table 3-1 as a reference for the jumper configuration.

4. Refit the cover.
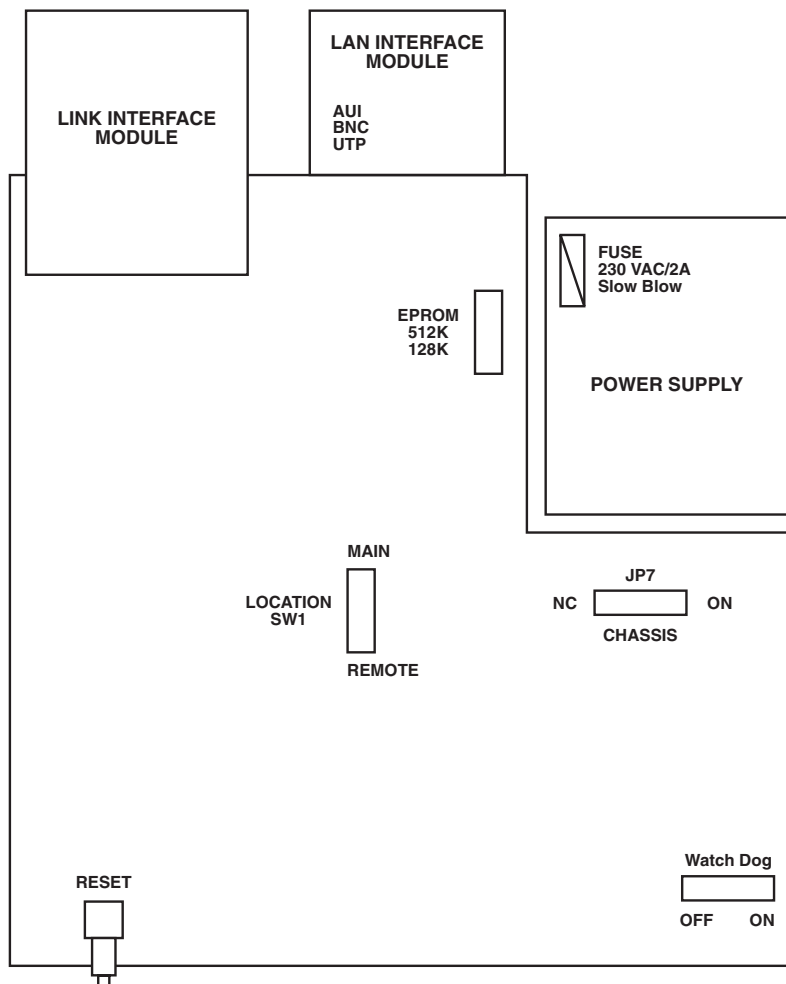
Figure 3-1. Ethernet Extender Printed Circuit Board.

3.4.3 CONFIGURING THE ETHERNET EXTENDER LOCATION IN BRIDGE MODE

• Select the REMOTE setting if the Ethernet Extender is located on the remote LAN.

• Select the MAIN setting if the Ethernet Extender is located on the main LAN.

3.4.4 SET THE CHASSIS GND JUMPER

Set the Chassis jumper to connect (ON) or disconnect (NC) between the signal ground and the chassis (protective) ground.

NOTE

Setting the jumper to NC may render the equipment unsafe for direct connection to unprotected telecommunication networks in certain locations where permanent excessive voltages may be present on the lines.

Table 3-1. Configuration Summary

See Figure	Switch/Jumper Name	Possible Settings	Factory Setting	Description
3-1	LOCATION SW1	REMOTE MAIN	MAIN	Select REMOTE if the Extender is located on the remote LAN. Select MAIN if the Extender is located on the main (local) LAN.
3-1	Chassis (Ground Connection) JP7	NC (Not Connected) ON (Connected)	NC	Select NC to disconnect signal ground from chassis (protective) ground. Select ON to connect signal ground to chassis (protective) ground.
3-1	RESET (Front-panel pushbutton)	—	—	System reset.
3-2	CLOCK SPEED (4W only)	16 Kbps 32 Kbps 48 Kbps 64 Kbps 96 kbps 128 kbps 256 kbps 768 kbps	768 Kbps	Select data rate on 4-wire internal modem. Select the highest possible data rate for respective range and wire gauge.
3-3	DTE/DCE jumper	DTE DCE	DTE	Select DTE mode for normal operation. Select DCE mode for bench testing.
3-4	STATION HUB switch (UTP only)	STATION HUB	HUB	Interchanges the RX pair with the TX pair.
3-1	EPROM size	512 KB 128 KB	512 KB	For manufacturer's use only.
3-1	Watch Dog	OFF ON	ON	For manufacturer's use only.

3.4.5 LINK INTERFACE CONFIGURATION (4-WIRE OPERATION)

Use the rotary switch on the 4W link interface card (see Figure 3-2) to select a data rate. The data rate can also be selected via the software. Derive the data rate for maximum required range from the table below.

Table 3-2. Ethernet Extender Four-Wire Data Rate Table

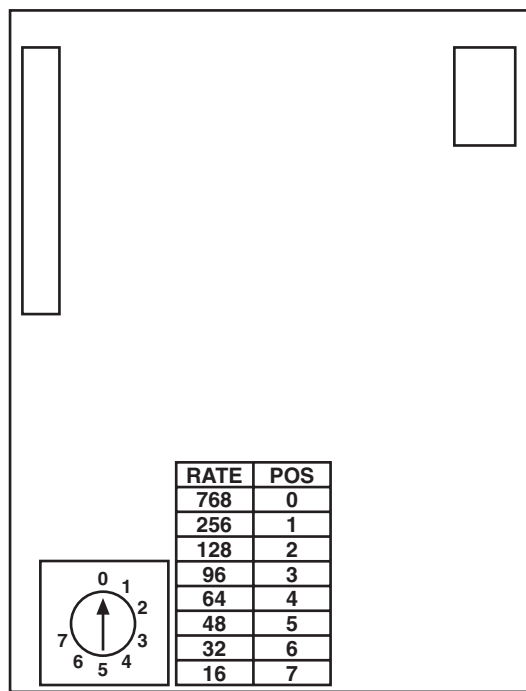| Data Rate (kbps)	Range (km)	Selector Switch Position
768	1	0
256	3	1
128	4.5	2
96	5.5	3
64	6	4
48	7	5
32	6.5	6
16	6	7

Figure 3-2. Deriving the Data Rate.

3.4.6 DTE/DCE JUMPER

The Ethernet Extender link interface can be configured as DTE or DCE. This feature is useful for bench testing, where one Ethernet Extender is configured as DTE and the other as DCE. Set the jumper to DTE for normal operation (see Figure 3-3 for jumper location).

3.4.7 STATION/HUB SWITCH (UTP OPTION ONLY)

To enable direct connection between the Ethernet Extender and a UTP interface in any workstation, set the STATION/HUB Switch to STATION. The factory-default is HUB (see Figure 3-4).
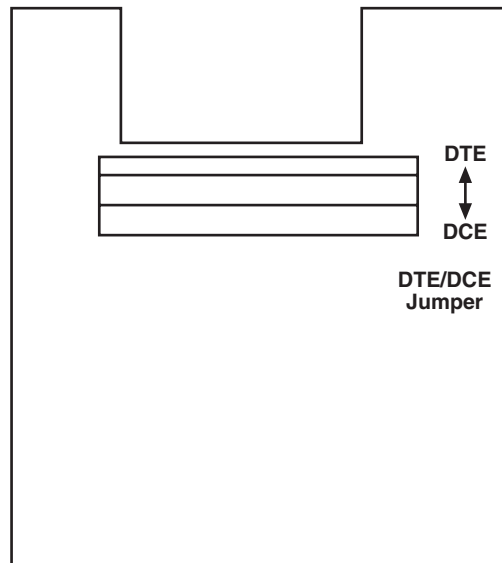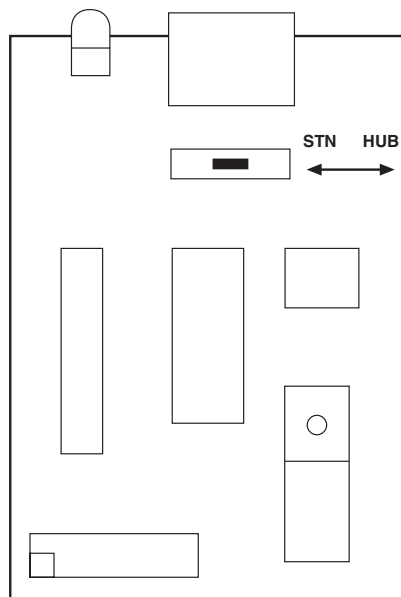

Figure 3-3. DTE/DCE Jumpers.

Figure 3-4. LAN Interface Module (UTP).

3.5 Installing the Extender in a Rack

3.5.1 GENERAL

The Ethernet Extender can be installed in 19-inch racks. Its height is 1U (1.75"), and the width is slightly less than half of the available mounting width. Two rack adapter kits are available; one kit provides the hardware necessary for installation of a single unit, and the other provides the hardware necessary for installation of two units, side by side.

Section 3.5.2 provides step-by-step instructions for rackmount installation of a single unit. **Section 3.5.3** provides step-by-step instructions for rackmount installation of two units.

CAUTION
Disconnect the units from AC power while performing the following procedures.

3.5.2 INSTALLING A SINGLE UNIT

The rack adapter kit for single-unit installation includes one short bracket and one long bracket. The brackets are fastened by means of screws to the two side walls of the case, as shown in Figure 3-5.
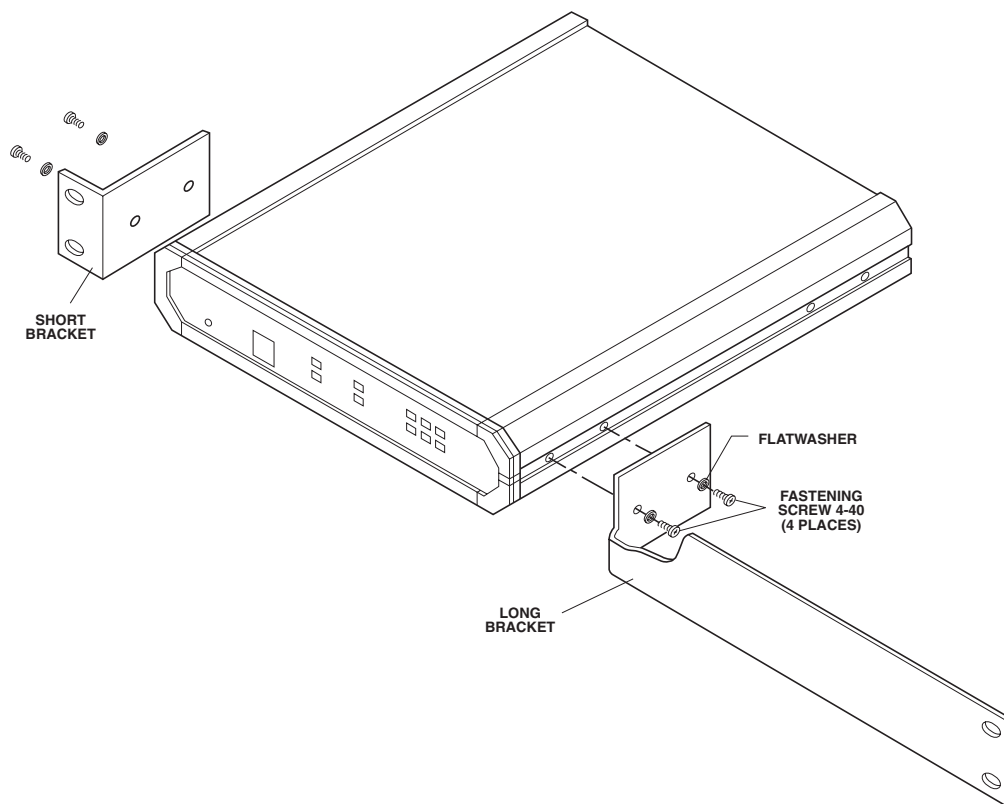
Figure 3-5. Installation in a 19-Inch Rack.

1. To prepare the unit for rack installation, attach the two brackets to the side walls of the unit. Each bracket is fastened with two screws (with flat washers), which are inserted into the two front holes on the side wall (nuts are already in place, on the inner side of the wall).

2. After the brackets are attached, the unit is ready for installation in the rack. Fasten the brackets to the side rails of the rack with four screws (not included in the kit), two on each side.

3.5.3 INSTALLING TWO UNITS

This installation uses a retainer sleeve to hold the two units together. Refer to Figure 3-6 when following these steps.

1. Fasten the retainer sleeve onto the left-hand unit with four screws (screws not provided).

2. Slide the other unit into the retainer sleeve and fit protective end caps.

3. Fasten one adapter bracket to the side wall of each unit. Use the four short screws and flat washers supplied in the kit.

4. The assembled units can now be fastened to the side rails of the 19" rack, by means of four screws (not included in the kit).
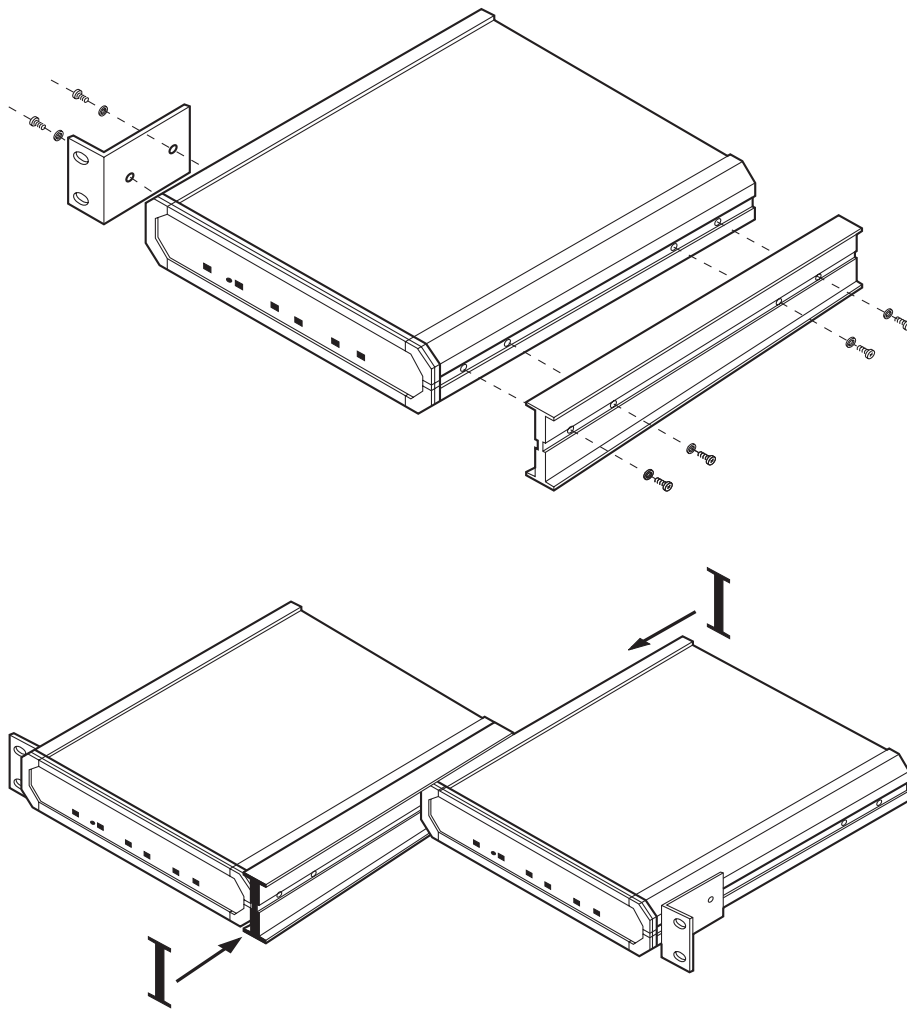

Figure 3-6. Installing Two Units in a 19-Inch Rack.

3.6 Cable Connections

3.6.1 GENERAL

Refer to Figure 3-7 for an illustration of the rear panel of the Ethernet Extender with AUI and RS-232 connectors. The back panel of other models will be similar, but with the connectors you ordered.
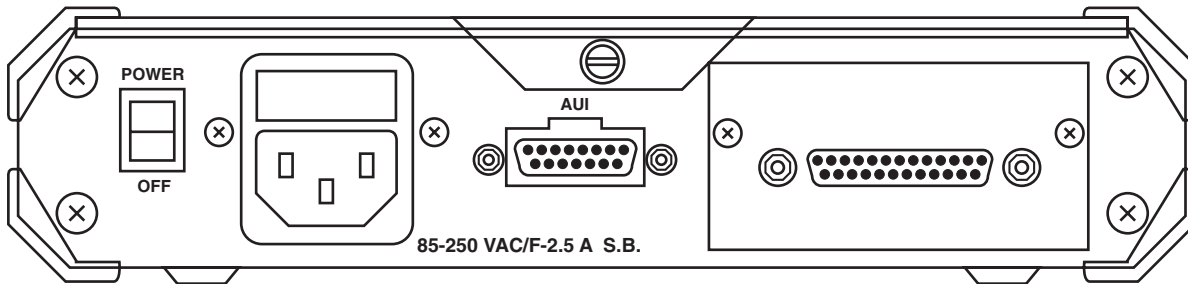
Figure 3-7. Ethernet Extender Rear Panel (Model LB3124A-AUI-R3 or LB3824A-AUI-R3).

3.6.2 AC POWER CONNECTION

AC power is supplied to the Ethernet Extender through a 5-foot (1.5-m) standard power cable terminated by a grounded 3-wire plug. The AC cord is plugged in at the rear panel AC power receptacle of the unit. A 2.5-A fuse is required for both 115V and 230V operation.

CAUTION

To prevent electrical fire hazard, always replace the fuse with the same type and rating as indicated.

3.6.3 LINK

A standard V.24, V. 35, or RS-530 connector is provided for connection to the communication link. For V.36, a pig-tail cable with the respective 37-pin connector is provided. Refer to Table A-1 for modem connector pin assignments. The 4-wire connection is provided by a five-terminal block (transmit, receive, and ground).

3.6.4 ETHERNET

A standard AUI (DB15), 10BASE2 (BNC), or 10BASE-T (RJ-45) connector is provided for connection to the LAN.

4. Configuration

For details on configuring your Ethernet Extender, refer to the *Ethernet Extender Configuration Guide.*

5. Operation

5.1 Front-Panel Controls and Indicators

Table 5-1 lists the functions of the front-panel controls and indicators. The numbers under the heading "Item" correspond to the identification numbers in Figure 5-1.
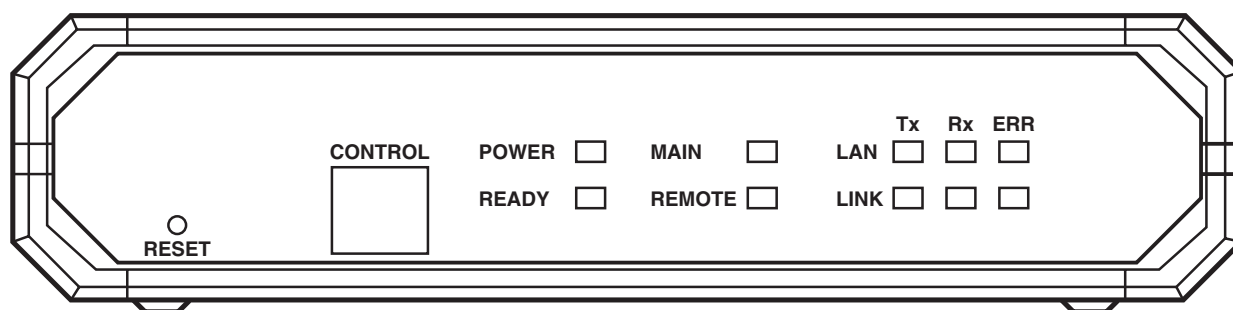
Figure 5-1. Ethernet Extender Front Panel.

Table 5-1. Controls and Indicators

Item	Controls and Indicators	Function
1	POWER	Green LED turns ON when Extender is powered on.
2	RESET	Resets the Extender.
3	READY	Green LED constantly lit during normal operation.
4	RJ-45 Socket (CONTROL)	Used for connection of terminal for diagnostics, configuration, monitoring, and downloading.
5	MAIN	Green LED turns ON when Extender is configured for local operation (applicable to Bridge mode only).
6	REMOTE	Green LED turns ON when Extender is configured for remote operation (applicable to Bridge mode only).
7	LAN TX	Yellow LED turns ON when packets are transmitted to the LAN.

Table 5-1 (continued). Controls and Indicators

Item	Controls and Indicators	Function
8	LAN RX	Yellow LED turns ON when packets are received by the LAN.
9	LAN ERR	Red LED is continuously ON when connection to the LAN has failed.
10	LINK TX	Yellow LED turns ON when a packet is transmitted to the LINK.
11	LINK RX	Yellow LED turns ON when a packet is received from the LINK.
12	LINK ERR	Red LED is ON when discontinuity occurs in the LINK, or other if other communication LINK faults exist.

5.2 Operating Procedure

CAUTION

This unit should always be grounded through the protective earth lead of the power cable.

When connecting AC power to this unit, the mains plug should be inserted only in a socket outlet provided with a protective earth contact. The protective action must not be negated by use of an extension cord (power cable) without a protective conductor (grounding). Interrupting the protective (grounding) conductor (inside or outside the unit) or disconnecting the protective earth terminal can make this unit dangerous.

Whenever it is likely that the fuse protection has been damaged, turn the unit off and secure it against unintended operation.

5.2.1 TURNING ON THE EXTENDER

Set the POWER switch on the rear panel to the ON position. The POWER indicator should light, indicating that the Ethernet Extender is powered on.

5.2.2 OPERATION

Configure the Extender according to the application. The Ethernet Extender operates entirely unattended. During normal operation, when the remote workstations are active, the READY indicator should light continuously, the TX and RX indicators should blink occasionally, and the LAN and LINK indicators should be OFF.

5.2.3 TURNING OFF THE EXTENDER

Move the POWER switch on the rear panel to the OFF position.

5.3 Fault Isolation and Troubleshooting

Some common faults and their solutions are listed in the table below. Observe safety precautions while working on the unit, especially if the cover is removed. Some faults may occur due to incorrect configuration settings with regard to Ethernet Extender application and location. If a persistent fault condition occurs, confirm that both Extenders are configured properly. Link errors are sometimes caused by loose contact between connectors or lack of cable continuity. Check that all connectors are plugged in properly and that cable quality is good. You can retrieve the Ethernet Extender error messages by connecting a terminal to the Ethernet Extender's control port and invoking the Ethernet Extender monitoring program.

Table 5-2. Troubleshooting Guide

| Symptom	Possible Cause	Recommended Course of Action
All front-panel indicators are OFF	The unit is not receiving power.	1. Check that power is supplied to the unit. 2. Check the fuse and have it replaced if necessary (by a qualified technician only).
Red LINK ERROR indicator is blinking	Corrupted frames are being received, or the physical connection is unstable.	Check the modem configuration and cables.
Red LINK ERROR indicator is ON	The LINK ERROR indicator will be ON if the link is configured in Synchronous mode, the link interface card is set to DTE, and no clock signal is being received.	1. Check configuration settings. 2. Check the modem configuration and cables.
Red LAN ERROR indicator is blinking	There is a temporary transmission problem.	Check cable connections and make sure that the proper cable type is being used.
Red LAN ERROR indicator is ON	There is a problem with the LAN connection.	Check that the LAN is connected properly.
READY indicator is OFF	If LAN ERROR indicator is ON, or all LINK ERROR indicators are ON, there is a possible connection problem with the LAN or Link.	Check LAN and Link connections.

Appendix. Interface Specifications

Table A-1. Interface Signal List

SIGNAL FUNCTION	V.24 RS-232 DB25 (FEMALE)	V.35 34-PIN (FEMALE) PIN CIRCUIT	EIA-530 DB25 (FEMALE) PIN CIRCUIT	V.36/ RS-449* DB37 (FEMALE) PIN CIRCUIT	DESCRIPTION
Protective Ground	1	A Frame 101	1	1	Chassis ground. May be isolated from Signal Ground.
Signal Ground	7	B Signal 102 GND	7 AB	19 SG	Common Signal and DC power supply ground.
Transmitted Data	2	S TD(B) 103 P TD(A) 103	2 BA(A) 14 BA(B)	4 SD(A) 22 SD(B)	Serial data output from unit. The data transitions must occur on the rising edge of the transmit clock.
Received Data	3	R RD(A) 104 T RD (B) 104	3 BB(A) 16 BB(B)	6 RD(A) 24 RD(B)	Serial data input to the unit. The data transitions occur on the rising edge of the clock.
Request To Send	4	C RTS 105	4 CA(A) 19 CA(B)	7 RS(A) 25 RS(B)	ON from the unit upon completion of the Self-Test.
Clear To Send	5	D CTS 106	5 CB(A) 13 CB(B)	9 CS(A) 27 CS(B)	Unit expects CTS ON.
Data Set Ready	6	E DSR 107	6 CC(A) 22 CC(B)	11 DM(A) 29 DM(B)	Not used.
Data Terminal Ready	20	H DTR 108	20 CD(A) 23 CD(A)	12 TR(A) 30 TR(B)	ON when unit is ready to transmit or receive data.
Carrier Detect	8	F DCD 109	8 CF(A) 10 CF(B)	13 RR(A) 31 RR(B)	Unit expects DCD ON.
Transmit Clock	15	Y SCT(A) 114 a SCT(B) 114	15 DB(A) 12 DB(B)	5 ST(A) 23 ST(B)	Unit requires clock for synchronization (in synchronous mode).
Receive Clock	17	X SCR(B) 115 V SCR(A) 115	17 DD(A) 9 DD(B)	8 RT(A) 26 RT(B)	Unit requires clock for synchronization (in synchronous mode).

*The V.36/RS-449 connection is made with an RS-530 to V.36 conversion cable supplied with the V.36 model.

Table A-2. Control Cable RJ-45 to DB25 RS-232 Connection

RJ-45		DB25	
Pin 4	GND	Pin 7	GND
Pin 5	TX	Pin 3	RX
Pin 6	RX	Pin 2	TX
Pin 7	RTS	Pin 5	CTS
Pin 8	CTS	Pin 4	RTS
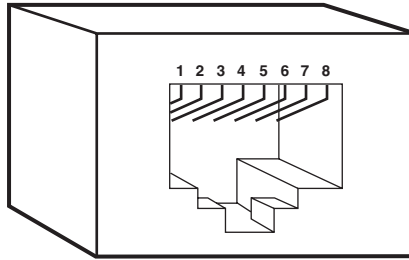
RJ-45 socket (female)
EXTERNAL view

Rx pair - 3 and 6
Tx pair - 1 and 2

Figure A-1. 10BASE-T RJ-45 Pinout.
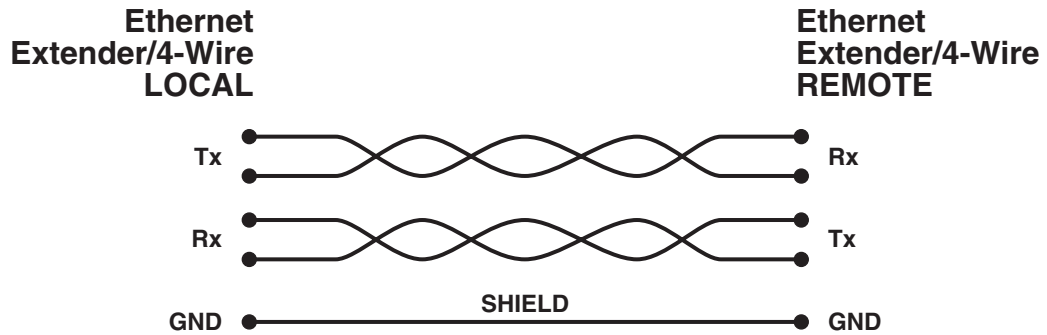
Figure A-2. 4-Wire Connection.

V.35/DB25   **V.35/34-pin**

Shield	1	A
Tx	2	P — Tx
	14	S
Rx	3	R — Rx
	16	T
R Clk	17	V
	9	X
E Clk	24	U
	11	W
T Clk	15	Y
	12	AA (a)
RTS	4	C
CTS	5	D
DCE Ready	6	E
Gnd	7	B
DCD	8	F
DTE Ready	20	H
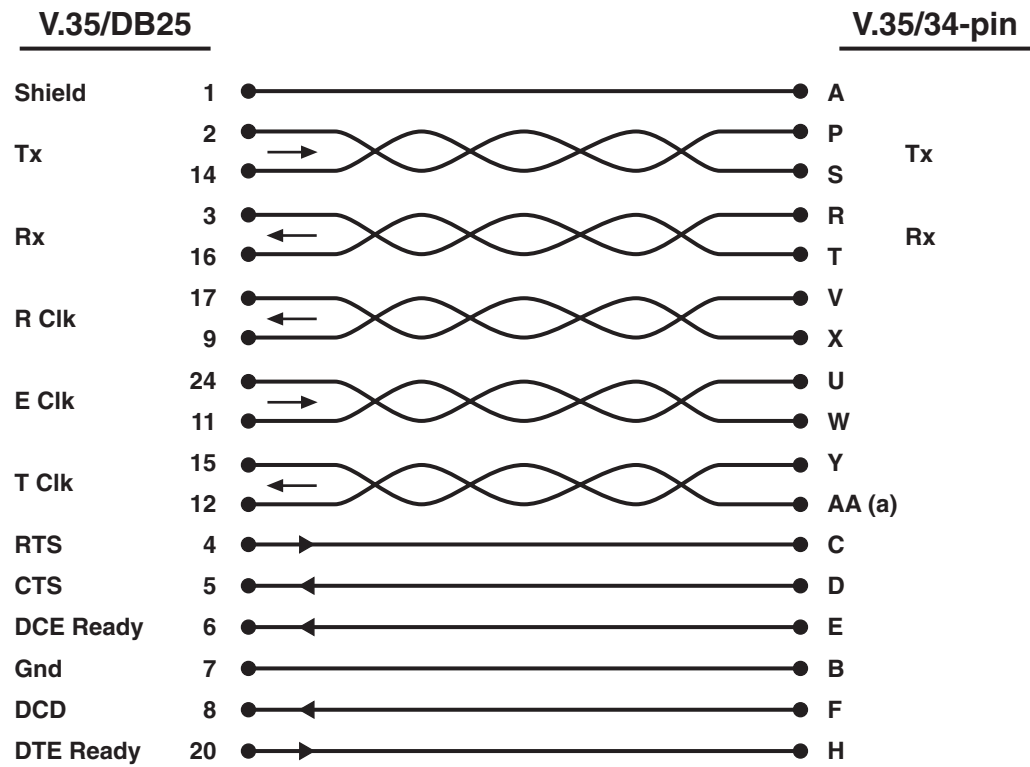
Figure A-3. Cable for V.35 Interface.

RS-530   **RS-449/V.36-37 pin**

RS-530	Pin		Pin	RS-449/V.36-37 pin
Shield	1	————————————————	1	Shield
TD-a	2	————————————————	4	SD-a
TD-b	14	————————————————	22	SD-b
RD-a	3	————————————————	6	RD-a
RD-b	16	————————————————	24	RD-b
RTS-a	4	————————————————	7	RS-a
RTS-b	19	————————————————	25	RS-b
CTS-a	5	————————————————	9	CS-a
CTS-b	13	————————————————	27	CS-b
DSR-a	6	————————————————	11	DM-a
DSR-b	22	————————————————	29	DM-b
DTR-a	20	————————————————	12	TR-a
DTR-b	23	————————————————	30	TR-b
Sig. GND	7	————————————————	19, 20, 37	SG
DCD-a	8	————————————————	13	RR-a
DCD-b	10	————————————————	31	RR-b
TC-a	15	————————————————	5	ST-a
TC-b	12	————————————————	23	ST-b
RC-a	17	————————————————	8	RT-a
RC-b	9	————————————————	26	RT-b
LL	18	————————————————	10	LL
RL	21	————————————————	14	RL
EXT-CK-a	24	————————————————	17	TT-a
EXT-CK-b	11	————————————————	35	TT-b
TM	25	————————————————	18	TM

Figure A-4. Cable for V.36 Interface.