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XL-12000B

High-Speed Network Modem

USER GUIDE



TUT SYSTEMS

Warranty Policy

Warranty Summary

This Tut Systems product is warranted against defects in material and workmanship and will substantially conform to Tut Systems product documentation for a period of one (1) year from the date of shipment.

Y2K Compliance

The Company's products, including separately sold software applications, are designed to be used prior to, during, and after the calendar year 2000 and will operate during each such time period without error relating to date data, specifically including any error relating to, or the product of, date data which represents or references different centuries or more than one century.

Tut Systems will, at its option, either repair or replace products that prove to be defective. For warranty or repair, return this product to a service facility designated by reseller in accordance with reseller instructions which such instructions shall be in accordance with those set forth in Tut Systems Standard Terms and Conditions of Sale.

Limitations of Warranty

The foregoing warranty shall not apply to defects resulting from abuse, neglect by Buyer, improper installation or application by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, acts of God, or improper site preparation or maintenance.

Note: No other warranty is expressed or implied by statute or otherwise, regarding the product including their fitness for any purpose, their quality, their merchantability, non-infringement or otherwise.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Tut Systems shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based upon contract, tort, or any other legal theory. Warranties apply only to original purchaser or end-user and cannot be assigned or transferred to subsequent parties. Tut Systems Standard Terms and Conditions of Sale contain the full text of the product limited warranty.

Assistance

For assistance, contact your nearest Tut Systems Sales and Service office.

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.



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

The information contained in this publication is the latest available. However, Tut Systems reserves the right to change specifications of hardware and software without prior notice. Purchasers of Tut Systems' products should make their own evaluation to determine the suitability of each product for their specific application. Tut Systems' obligations regarding the use or application of its products shall be limited to those commitments to the purchaser set forth in its Standard Terms and Conditions of Sale for a delivered product.

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1.0 XL-12000B Product Overview

The XL-12000B modem is a high-speed, SDSL (Symmetrical Digital Subscriber Line) point-to-point modem created to extend Local Area Networks (LANs) up to 12,000 feet using ordinary telephone wires. The modem uses Digital Subscriber Line (DSL) transmission technology to deliver data at 2 Mbps.

The XL-12000B is designed for easy installation. Front panel LEDs provide status and operational information. The modem is ideally suited for connecting LANs in a campus environment where LANs may be spread out over two miles. The XL-12000B units function as a pair; one as Master and the other as Slave. The XL-12000B will function as a bridge using Spanning Tree Protocol (STP) connecting two independent segments. This mode allows the modem to pass both IP and non-IP packets transparently making the segments a single network. Examples of non-IP packets include Novell's IPX™ and Apple's AppleTalk™.



2.0 Technical Specifications

Data Rate:	2.048 Mbps
Line Length:	Up to 12,000 ft. on 24 AWG wire Up to 9,000 ft. on 26 AWG wire
Ethernet Interface:	Compliant with IEEE 802.3 10Base-T
Operating Voltage:	120/240 VAC 50/60 Hz wall transformer
Power Consumption:	5 Watts
Operating Temperature:	-5° to 55° C
Storage Temperature:	-40° to +70° C
Relative Humidity:	5% to 90% (non-condensing)
Compliance:	UL, CSA, CE, FCC Part 15 Class A
Software:	Spanning Tree Protocol (STP) Bridging (rfc-1493)

3.0 What's in the Box

Confirm that there is one each of the following items:

Description

- XL-12000B Modem
- XL-12000B User Guide
- RJ-45 10Base-T Straight-through Cable
- RJ-11 DSL Line Cable
- Wall Transformer w/ Lightning Protection



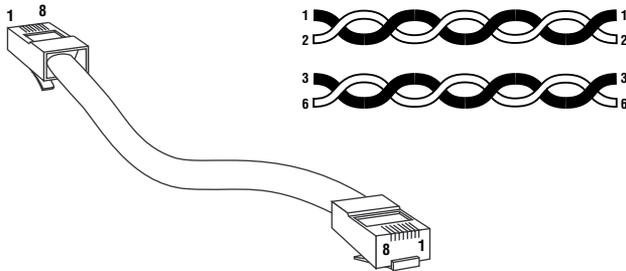
4.0 Installation

1. Remove the modem and wall transformer from the shipping carton. Remove the wall transformer from its box. Remove the plastic wrapper from around the modem.
2. Remove the cable ties from each of the cables and place them side by side.

Each of the cables is identified as follows:

- (1) RJ-45 10Base-T straight-through cable: A cable with RJ-45 connectors is used to connect the modem to a 10Base-T hub or node. If connecting to a node (PC, server or workstation), the switch on the back of the modem will allow this cable to be used like a cross-over cable (Figure 4.1).

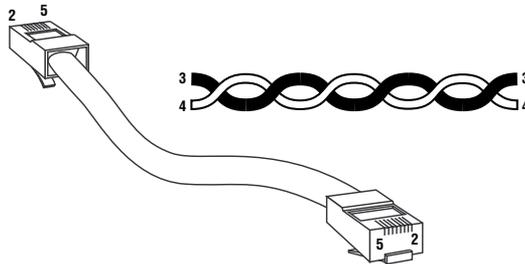
Figure 4.1 RJ-45 10 Base-T Straight-through Cable



- (2) RJ-11 DSL Line cable: A cable with RJ-11 connectors at each end. RJ-11 connectors have four contacts and are smaller than the RJ-45 connectors, which have eight contacts. The diameter of the RJ-11 cable is smaller than the RJ-45 cable. This cable is used to connect the modem to the telephone jack (Figure 4.2).

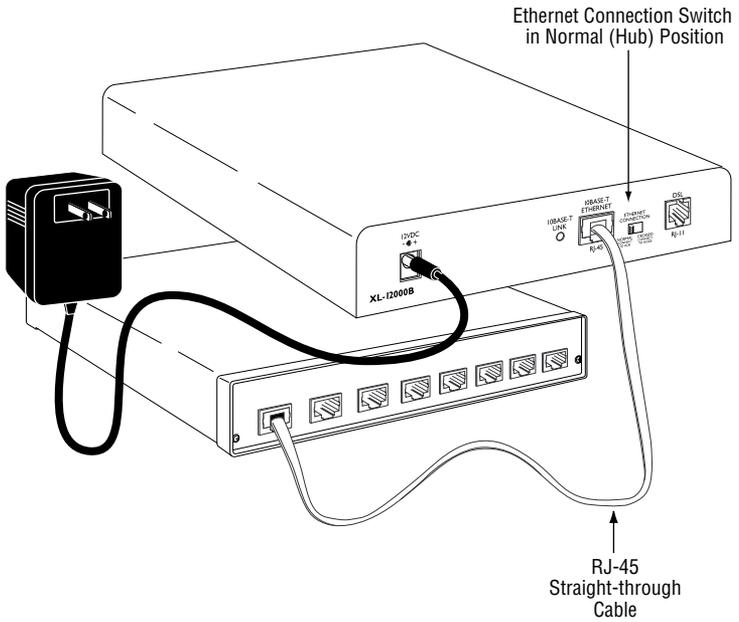
Note: RJ-11 cables generally have four contacts and six pinout positions. The pinout assignments for the RJ-11 and RJ-45 connectors are provided in Appendix A.

Figure 4.2 RJ-11 DSL Line Cable



3. Select a convenient location near the Ethernet device to which the modem will be connected. The modem should be kept away from excessive heat or cold. Operating temperature range is -5°C to 55°C .
4. Connect an RJ-45 straight-through cable from the 10Base-T Ethernet connector of the XL-12000B to an Ethernet device (PC, server, workstation or hub) as shown in Figure 4.3. If connecting to a PC, server, or workstation, set the Ethernet connection switch on the back of the modem to the “Crossed” position. If connecting to a 10Base-T hub, set the switch to “Normal”.
5. Connect the RJ-11 DSL Line cable from the DSL connector on the modem to the telephone jack.
6. Verify that you have a telephone line linking the two XL-12000B modems. Verify that this line has no bridge taps and is generally free of noise.
7. Connect the wall transformer as shown in Figure 4.3.

Figure 4.3 XL-12000B Installation with a Hub or Node.



Note: The Ethernet connection switch facilitates use with either type of device.

5.0 Panel Indicators and Connectors

This section describes the indicators and connectors on the front and rear of the XL-12000B modem.

5.1 Front Panel Indicators

Fig. 5.1 shows the LED indicators that provide status and operational information on the XL-12000B Modem.

Power LED

The blue Power LED remains lit while the unit has power.

Activity LEDs

The DSL RX and DSL TX LEDs flash green when receiving and transmitting data.

Status LED

At power up, the Status LED flashes red while the modem performs a diagnostic self-test and performs software decompression. After the modem completes its self-test, the LED will extinguish, indicating that the modem is ready for normal operations.

Steady red indicates one of two conditions: 1) the link is lost and the modems are trying to establish a link or 2) there is a unit failure.

DSL Link

A flashing DSL link LED indicates that the modem is in the process of linking to the other modem. After the two XL-12000B units have secured the DSL link, the DSL Link LED glows a steady green. The LED is off when there is no link.

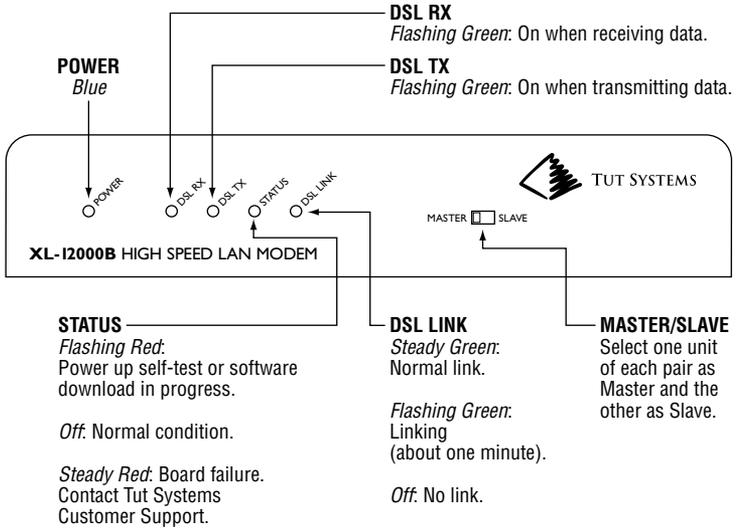
Master/Slave Switch

One XL-12000B serves as the Master unit and the other serves as Slave. It does not matter which unit of the pair is set to “Master” and which is set to “Slave”, but the pair must have opposite settings. Changing this switch does not require the user to reboot the modems.



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Figure 5.1 XL-12000B Front Panel



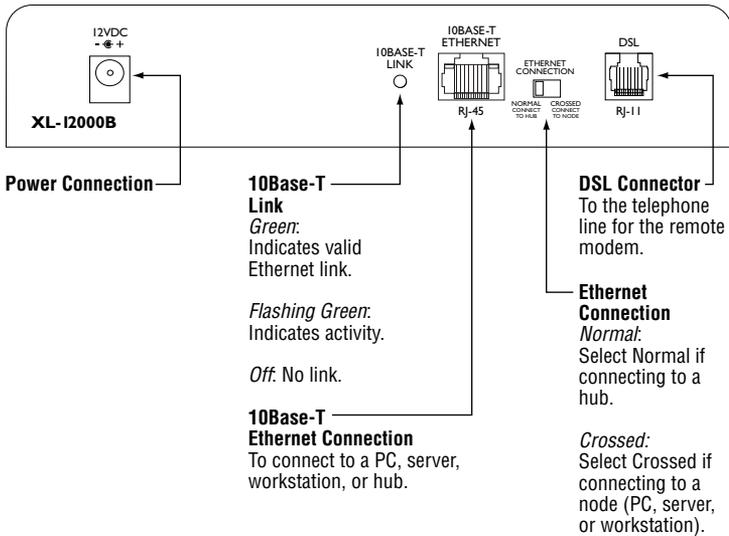


5.2 Rear Panel Indicators and Connectors

10Base-T Link LED

A green LED indicates a valid Ethernet link. When flashing, the LED indicates traffic on the link. When the LED is off, there is no valid link.

Figure 5.2 XL-12000B Rear Panel





6.0 Power and Boot Up Sequence

1. Verify that the LAN and DSL lines are connected according to the wiring diagram described in the “Installation” section (see Figure 4.3).
2. Plug the 120 VAC/12 VDC wall transformer (220VAC for international use) into a wall outlet. Verify that the Power (blue) LED comes on.
3. Verify that the 10Base-T Link (green) LED on the rear panel is illuminated. If the unit is not connected to an Ethernet (10Base-T) source (e.g., computer), this LED will illuminate momentarily on power-up and then extinguish. When properly connected, the 10Base-T Link LED will be lit continuously.
4. Immediately upon power-up, the modem will begin its boot-up routine. The Status LED flashes red as the modem cycles through its initialization process. After initialization the DSL link light will blink and the Status light will remain red. If the DSL link light does not blink, refer to the “Troubleshooting” section. If the link time takes longer than one minute, refer to the “Troubleshooting” section.
5. The modem is now ready for operation.

7.0 Troubleshooting

This section is designed to assist in troubleshooting the XL-12000B. It also describes how to reach Technical Support at Tut Systems. Tut Systems takes pride in its products and would be more than happy to help with problems associated with the XL-12000B. Please take a moment and review the following answers to commonly asked questions before calling Technical Support.

1. The blue Power LED remains off.

Verify that the wall transformer is plugged into an electrical outlet and that the connection to the modem is secure.

Confirm the modem is plugged into a “live” electrical outlet. Make sure no light switch controls the plug and has been inadvertently turned off. It is not a recommended configuration to have the modem plugged into an electrical outlet that is controlled by a light switch.

2. The Status LED continues to stay red and the DSL link LED is not blinking.

Try power cycling the modem by unplugging the modem and plugging it back in.

If after power cycling the Status LED remains red, contact Customer Support.

3. The DSL Link LED never starts blinking.

The DSL line is not plugged in or the DSL line is not properly connected to the “remote” end. Verify that the cable is properly connected at both ends.

Both modems have the same setting on the Master/Slave switch. Verify by checking both modems’ Master/Slave switch on the front panel. Make sure that one of the modems is a Master and the other is a Slave. Check all patch cables to be sure the pinout is correct and connections are well seated.



4. The DSL Link LED blinks for a long time.

Blinking for a long time can indicate failure to communicate with the other modem within the acceptable noise parameters or that the distance between modems exceeds 12,000 feet. Verify the length of the DSL line and ensure it meets the length limits described in Appendix B. If it meets the limits, then have the line tested for defects.

Another reason for continuous blinking is that both modems are either Masters or Slaves. Verify by checking both modem's Master/Slave switch on the front panel. Make sure that one of the modems is a Master and the other is a Slave. A Master modem will send out a pulse on the wire to try and communicate with a Slave modem.

5. The 10Base-T LED never illuminates.

If connecting to a hub, make sure the Ethernet connection switch on the back of the modem is set to "Normal". Check the hub to see that its link light is illuminated. If the light is still not illuminated, try a different straight-through cable.

If connecting to a PC, server, or workstation, make sure the Ethernet connection switch on the back of the modem is set to "Crossed". Verify that the link light is illuminated on the PC.

If the 10Base-T cable being used was not the cable provided, make sure it adheres to the pinout assignments for 10Base-T (see Appendix A).

8.0 Technical Assistance and Customer Support

Maintenance and Repair

Tut Systems offers a comprehensive range of customer support services, including technical assistance, installation, and maintenance agreements. For further information and pricing on Tut's service products, contact your sales representative.

Advance replacement, on-site, or remote technical support are all available 7 days a week, 24 hours a day through the Premier Maintenance Contract program. Extended Warranty options are also available. See your sales representative for details. Further product information is available at www.tutsys.com.

Technical Support

Application notes and answers to the most common functionality, installation, and configuration questions can be found on our web site (www.tutsys.com) in the Service & Support section. If you are unable to resolve any question or believe you have defective equipment, contact Tut Systems Monday - Friday 5:00am to 8:00pm (Pacific Time) at (800) 998-4888. If you do not have access to 800 service, please call (925) 682-6510, press "0" and ask for Technical Support.

Equipment Return and Repair

If you are unable to correct a problem or are instructed by Technical Support to return the unit for further testing or repair, you will be provided with directions on how to return equipment. Do not return products to Tut Systems without first obtaining a return authorization number.

Steps prior to shipping equipment:

- Contact the Technical Support department and request an RMA number (return merchandise authorization).
- Write the RMA number on outside of shipping box.
- Units without proper return authorization will be returned to sender.

Return all equipment to:

Tut Systems, Inc., 2495 Estand Way, Pleasant Hill, CA 94523
(925) 682-6510 • (925) 682-2170 fax



Appendix A: Pinout Assignments

Table A.1. RJ-45 10Base-T Ethernet Connector on Rear of Modem

Pin #	Mnemonic	Function
1	Tx+	10Base-T differential transmit signal (+)
2	Tx-	10Base-T differential transmit signal (-)
3	Rx+	10Base-T differential receive signal (+)
4	NC	Unused
5	NC	Unused
6	Rx-	10Base-T differential receive signal (-)
7	NC	Unused
8	NC	Unused

Note: Assumes the switch on the rear of the unit is in the “Normal” position.

Table A.2. RJ-11 DSL Line Connector on Rear of Modem

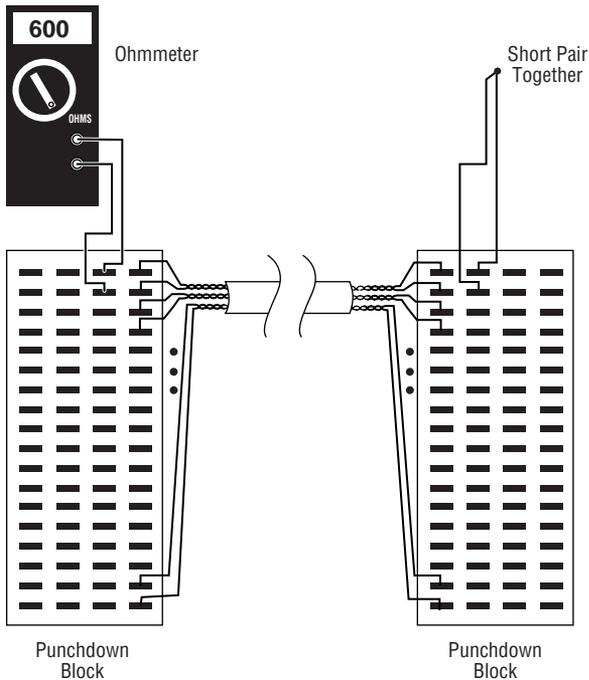
6-pin connector			4-pin connector		
Pin #	Mnemonic	Function	Pin #	Mnemonic	Function
1	NC	Unused	1	NC	Unused
2	NC	Unused	2	TIP	DSL (+)
3	TIP	DSL (+)	3	RING	DSL (-)
4	RING	DSL (-)	4	NC	Unused
5	NC	Unused			
6	NC	Unused			

Appendix B: Measure Line Length

Measuring Phone Wire

1. Use a cable scanner or an ohmmeter to measure the lengths of phone wire that will connect the modems. When using an ohmmeter, short-circuit one end of the phone wire and measure the resistance between the two wires at the other end .

Figure B.1 Using an Ohmmeter to Measure the Length of Phone Wire



2. Multiply the resistance by 20 to find the length of the wire in feet. For example, 600 ohms would indicate a cable length of about 12,000 feet: $600 \times 20 = 12,000 (+/-)$. This formula works for 24-gauge phone wire.



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