

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors which may appear in this guide.

DEC, thickwire, thinwire, VMS, VT100, and ULTRIX are trademarks of Digital Equipment Corporation. UNIX is a registered trademark of AT&T. Ethernet is a trademark of XEROX. NetWare is a trademark of Novell Corp. AppleTalk, Chooser and Macintosh are trademarks of Apple Computer Corp.

Copyright 1993, Lantronix. All rights reserved. No part of the contents of this book may be transmitted or reproduced in any form or by any means without the written permission of Lantronix. Printed in the United States of America.

The revision date for this manual is 1-December 1993

Part Number: 900-029

WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Warning: Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device.

Cet appareil doit se soumettre avec la section 15 des statuts et règlements de FCC. Le fonctionnement est subjecté aux conditions suivantes:

- (1) Cet appareil ne doit pas causer une interférence malfaisante.
- (2) Cet appareil doit accepter n'importe quelle interférence reçue qui peut causer une opération indésirable.

Contents

1 Introduction

Local Area Network Bridge.....	1-2
Filtering Packet Traffic	1-4
Networks and Protocols Supported.....	1-5

2 Installation

Contents of the Shipping Container.....	2-2
Installation Instructions.....	2-3
Initializing the LAN Bridge.....	2-4
Changing System Passwords.....	2-6
IP Address Configuration	2-6
Initial LAN Bridge Configuration	2-7
Power-up Troubleshooting	2-8

3 Setup and Operations

Accessing the LAN Bridge	3-2
SET/DEFINE and SHOW/LIST Commands	3-2
Connections from TCP/IP Hosts.....	3-3
Connections from a VMS Host using NCP/TSM	3-4
Connections from a PC Host using NetWare.....	3-5
Connections from a Macintosh Host using AppleTalk	3-6
Command Line Editing.....	3-7
Editing Keys.....	3-7
Completing a Partially Entered Command	3-8
Common Configuration Changes	3-9
Password Protection	3-9
System Configuration	3-10
LAN Bridge Port Characteristics	3-11
Bridge Configuration.....	3-12
Filter Configuration	3-13

<i>A LB Power and Environmental Specifications</i>	A-1
<i>B Serial Port Specifications</i>	B-1
<i>C Spanning Tree Algorithm</i>	C-1
<i>D Simple Network Management Protocol (SNMP) Support</i>	D-1
<i>E Updating LB Software</i>	E-1
<i>F Reporting Problems</i>	F-1
<i>Warranty Statement</i>	W-1

Chapter 1

Introduction

Local Area Network Bridge.....	1-2
Filtering Packet Traffic	1-4
Networks and Protocols Supported.....	1-5

Introduction	1-1
--------------	-----

Congratulations on your purchase of the Lantronix Model LB Local Area Network Bridge.

The LB connects to your Ethernet and divides your local area network into two segments. Installation of the LB will reduce unwanted traffic over your local area network.

The LB reduces traffic by isolating each segment's local packet traffic, *i.e.*, by **not** forwarding packet traffic destined for the same segment of the local area network.

This chapter of the manual discusses the nature and capabilities of a Local Area Network Bridge.

Local Area Network Bridge

As the name implies, a LAN Bridge provides a bridge or link between two local area network segments. The different segments are defined by where the LAN Bridge is placed.

When you want to isolate a portion of a local area network, you can install a bridge between the area to be isolated and the rest of the local area network.

In this way, a bridge will permit you to effectively manage the packet traffic between segments of your local area networks.

A LAN Bridge does not add or change any of the information in the packets that passes through the bridge. However, it can be configured to regulate the passage of certain packet traffic.

The primary feature of the LAN Bridge is its ability to reduce packet traffic by stopping packets that are **not** destined for the other segment of the local area network.

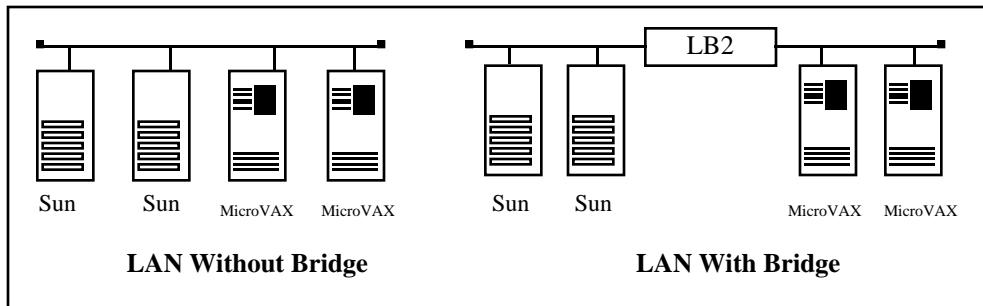


Figure 1-1: LANs With and Without Bridge

In the Local Area Network without a bridge (see Figure 1-1), incoming packets are examined by all hosts connected to the network. In the Local Area Network with a bridge installed, the only traffic on the Sun segment of the bridge will be between the Suns plus any traffic specifically directed to a VAX or directed to a Sun from a VAX. The same applies to the VAX segment of the network.

The other important feature of the Lantronix LB LAN Bridge is its ability to filter specific unwanted packet traffic from one segment to the other. This is accomplished in two ways. First, the Spanning Tree Algorithm prevents data packets from looping through the local area networks containing multiple bridges and segments. Second, you can configure filters to prevent the passage of particular packets.

A bridge differs significantly other methods of connecting Ethernet segments together. A few examples of segment connection (and the ways in which they differ from a network bridge) are discussed in the table below:

Method of Segment Connection	Comparison to Network Bridge
Connecting directly to the local area network (using a "T" or barrel connector)	An Ethernet has maximum cable lengths and maximum numbers of devices that can be connected. With a bridge installed, each segment connected by the bridge may use the maximum amount of cable length and maximum number of connected devices.
Connecting segments with a repeater	A repeater forwards <i>all</i> network traffic, including problems such as collisions. Rather than automatically forwarding all traffic, a bridge forwards only packets intended for that particular Ethernet segment. Nodes no longer receive unwanted traffic; this reduces network traffic on all segments.
Connecting segments with a router	A router must be configured for the different protocols being used on the network. A bridge is unaffected by the nature or contents of the data in the packets it receives; it requires no information about the different protocols being used on the network.

Filtering Packet Traffic

A LAN Bridge filters data packets in two different ways:

- 1) Using the internal destination address of each packet
- 2) User-defined filters

The LAN Bridge filters and forwards data packets using an internal table containing the source and destination addresses of the different devices on the network.

The internal table records all Ethernet addresses learned from the addresses contained in the packets. The table will also record the segment from which it last received a packet from a particular address. When a packet is received, the bridge will:

- Look at the source Ethernet address in the packet, check the address table to make sure the address is recorded, and check that the address is on the proper segment. If the source address is not in the table, it is recorded. On the rare occasion that it is in the table, but on another LAN port, it means that node has moved; if the bridge does not hear from the node within the weed timer's time limit, the bridge will remove the address from the address table.
- Look at the destination Ethernet address in the packet to see if the packet needs to be forwarded to the other segment. If not, the destination address must be in the same segment as the source address, and the packet is discarded.

If the destination address is not recorded in the table, the packet is forwarded to the other segment. Presumably, the address will be added when the device at the destination replies to the packet just forwarded. If not, the LB will continue to send these packets until the destination address is known.

After it is determined that a packet will be forwarded, the packet will be compared to any user-defined filters associated with that particular LAN port. User-defined filters can either permit or deny packet forwarding based on the packet's network protocol, source or destination Ethernet address, or data patterns within the packet.

Networks and Protocols Supported

The LB LAN Bridge supports and processes packets for any Ethernet network. The operation of the LB is fully compliant with both the IEEE 802.3 Ethernet specification and the IEEE 802.1d Bridge specification.

The LB operates independently of the different protocols used in packets. Unless you specify a particular protocol using the SET/DEFINE FILTER command, the bridge will pay no attention to a packet's protocol.

To directly access the LB, a terminal can be connected to the LB's serial console port, or a connection can be made through one of the LAN ports using one of the following protocols: AppleTalk, NetWare, Telnet/Rlogin, or MOP/NCP/TSM. See Chapter 3, *Set Up and Operations*, for more information about logging onto the LB through the network.

When the bridge boots up, it will be configured in the following manner:

- Automatic filtering and forwarding of packets will take place. To customize packet filtering, see *Filter Commands* in the LB Reference Manual.
- The Spanning Tree Algorithm will be enabled. This can be disabled or customized to particular needs; see Appendix C, *Spanning Tree Algorithm*, for more information.

To view diagnostic information as the LB boots up, a terminal must be connected to the LB. A serial cable is shipped with the bridge; this may be used to connect a terminal to the serial console port.

Chapter 2

Installation

Contents of the Shipping Container.....	2-2
Installation Instructions.....	2-3
Initializing the LAN Bridge.....	2-4
Changing System Passwords.....	2-6
IP Address Configuration	2-6
Initial LAN Bridge Configuration	2-7
Power-up Troubleshooting	2-8
Installation	2-1

Contents of the Shipping Container

When you receive your Lantronix Model LB Local Area Network Bridge, the following items will be included:

- The LB LAN Bridge
- The LAN Bridge manual
- A cable kit including one DB25 to RJ45 adapter, a wire splice, and a six foot RJ45 cable
- One 3.5" floppy diskette (formatted for DOS) including the LB.SYS load file and the NetWare EPSCON utility program

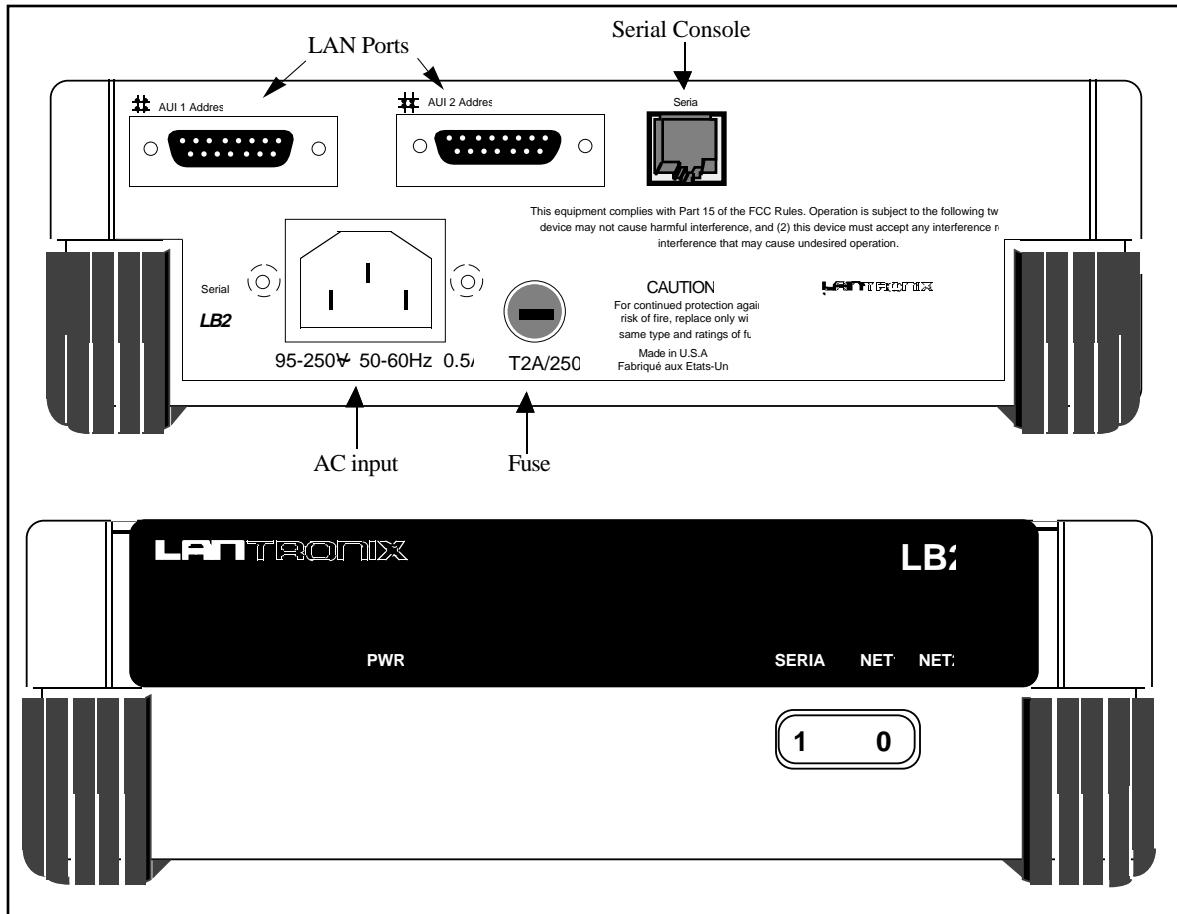


Figure 2-1: LB Back and Front Panels

Installation Instructions

To connect the LB LAN Bridge to your Local Area Network, complete the following steps:

- Connect one or both of the LAN Bridge's network ports to an Attachment Unit Interface (AUI) cable or to a transceiver.
- Connect a terminal to the LAN Bridge's serial console port (optional.) The port is configured at the factory for 9600, 8 data bits, no parity bit, and one stop bit.
- Plug the power cord into the LAN Bridge and an AC power source.

For connector specifications and configuration, see Appendix B.

The LB LAN Bridge is configured at the factory to operate in any network configuration. However, you may wish to utilize some of the features of the LAN Bridge. See Chapter 3 for set up and operation instructions.

The following two illustrations (Figures 2-2 and 2-3) are examples of the placement and connection of the LB LAN Bridge to different types of networks. *Thickwire*, *Thinwire*, and *10BASE-T*, as shown in the illustrations, are different types of Ethernet interconnect methods.

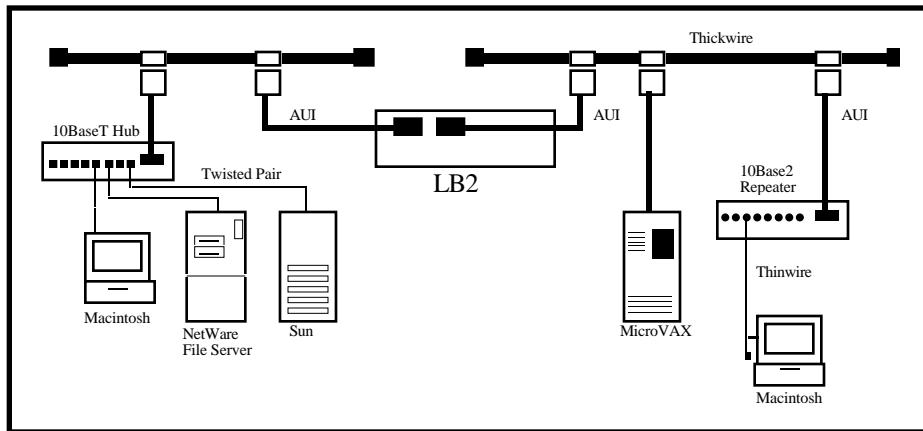


Figure 2-2: Network Configuration Example (*Thickwire*)

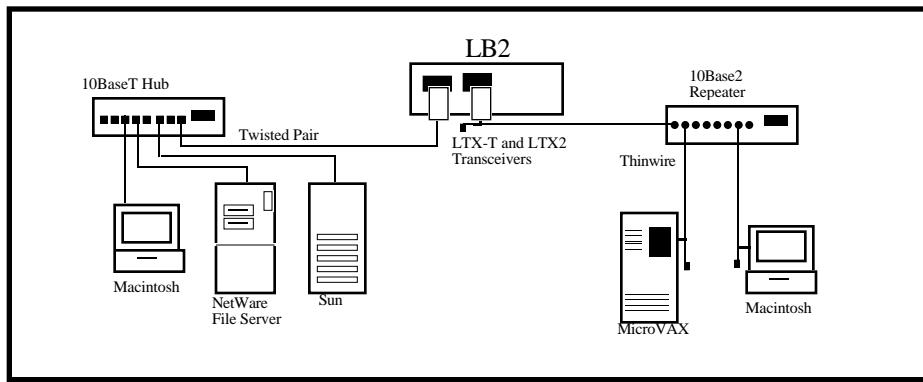


Figure 2-3: Network Configuration Example (Thinwire/10BASE-T-T)

Initializing the LAN Bridge

Every time you turn the LB on, it will go through an initialization process. The process consists of the following steps:

- Power-on diagnostic tests will last approximately 15 seconds.
- An attempt will be made to obtain IP address and loadhost information which will last up to approximately thirty seconds.
- The contents of the LB's internal Flash ROM will be checked for validity and then executed. This will take approximately two minutes.

When you turn on the LB the LEDs will display as follows:

- During power-up diagnostics, the three rightmost LEDs will display varying patterns depending on the test being run. If the unit fails power-up diagnostics, it will display a fixed pattern. Contact Lantronix customer support for additional information. If the unit passes its power-up diagnostics, all three LEDs will show green for three seconds.
- During the second two initialization steps above, the Serial LED will blink green at 1 second intervals. The two Network Port LEDs may blink occasionally.

- When the LB is operational, the Serial LED will be green and blink every second, or more often if the serial console port is being used. The Network Port LEDs will blink roughly in accordance with the traffic on the two network ports. If there is no activity on a port the LED will remain off. If there is no transceiver connected to a port or the port has a faulty network connection, the Network Port LED will be solid orange.
- If there is a problem during the initialization process, after the process is complete, the Serial LED will be orange. If this occurs, see the ***Power-up Troubleshooting*** section of this chapter.

If you have a terminal attached to the serial console port, text similar to the following will be displayed on the terminal as initialization progresses.

```
Lantronix LB Initialization
Boot Rom Version n.n (Month Day, Year)
  Port 1: Ethernet Address: 00-80-A3-xx-xx-xx
  Port 2: Ethernet Address: 00-80-A3-xx-xx-xx
  Internet Address:           (Undefined)

Current Diagnostics Report:
  RISC:             3051 (4K I)      CPU Speed:        20 MHz
  RAM Size:         1 MB          Flash Size:       512 K
  Flash Version:   n.n          Gate Array Rev:  n.n
  Errors:          None

Request BOOTP: no valid reply received.
Request RARP: no valid reply received.

Checking 8 sections from flash:
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
  From address 0xnnnn to 0xnnnn, nnn bytes) -> ....
Loaded nnnnnn bytes.

Load Completed - Boot in Progress

%% Lantronix LB
%% Ethernet 1 Address: 00-80-A3-xx-xx-xx  Internet Address:
(Undefined)
%% Ethernet 2 Address: 00-80-A3-xx-xx-xx
```

When all of the above (see previous page) is complete , the LAN Bridge is running normally. If the above messages do not appear, see the ***Power-up Troubleshooting*** section of this chapter.

If the characters displayed on the terminal are incoherent, check the settings in your terminal, the cable connections, and turn the LB on again.

Changing System Passwords

There are two important passwords on the LB: the privileged password and the login password.

The privileged password is the password that must be entered to become the privileged user. It defaults to "SYSTEM", and can be changed via SET/DEFINE SYSTEM PRIVILEGED PASSWORD.

The login password is required for logging into the LB "console" via a network connection. It defaults to "ACCESS" and can be changed via SET/DEFINE SYSTEM LOGIN PASSWORD. To change these passwords, use the commands:

```
Local_1> SET PRIV
Password> SYSTEM
Local_1>> SET SYSTEM PRIVILEGED PASSWORD "HOBSES"
Local_1>> DEFINE SYSTEM PRIVILEGED PASSWORD "HOBSES"
Local_1>>
Local_1>> SET SYSTEM LOGIN PASSWORD "CALVIN"
Local_1>> DEFINE SYSTEM LOGIN PASSWORD "CALVIN"
```

IP Address Configuration

The LB's IP address must be configured before any TCP/IP functionality is available. The address can be defined using a terminal connected to the serial port, or via a host BOOTP or RARP server.

To define the IP address via the serial port, connect a terminal to the LB, become the privileged user and issue the SET and DEFINE PROTOCOL I P IPADDRESS commands (see the steps on the following page).

```
Local_1> SU  
Password> SYSTEM (not echoed)  
Local_1>> SET PROTOCOL IP IPADDRESS xxx.xxx.xxx.xxx  
Local_1>> DEFINE PROTOCOL IP IPADDRESS xxx.xxx.xxx.xxx
```

To configure the IP address using RARP or BOOTP, see the RARP/BOOTP server's documentation. Keep in mind that many BOOTP daemons will not reply to a BOOTP request if the download filename in the configuration file does not exist. If this is the case, create a file in the download path to get the BOOTP daemon to respond.

Any host wishing to access the LB will have to be told of the LB's IP address. This is typically configured in the file **/etc/hosts** or via a nameserver. Refer to the host's documentation for additional information.

Initial LAN Bridge Configuration

The LB LAN Bridge will operate properly in all local area networks without the need for any configuration changes.

After the power-up initialization process, the LAN Bridge will automatically start learning the different node addresses connected to its two LAN ports and will start to process traffic within approximately one minute of power-up.

You may wish to configure the LAN Bridge further in order to filter certain packet traffic, or change the LAN Bridge to allow logins from other network nodes.

There are several ways to enter commands that will configure the LB LAN Bridge:

- Connect a terminal to the LAN Bridge's serial console port
- Log onto the LAN Bridge over the network using one of the network protocols; AppleTalk, NetWare, LAT, NCP/MOP/TSM, Telnet/Rlogin
- Send BOOTP directions from a TCP/IP network host
- Send SNMP commands from a SNMP manager

These topics will be discussed, and instructions will be provided in Chapter 3, ***Set-up and Operations***.

Power-up Troubleshooting

There are several possible error situations if the unit does not display the welcome message or the LEDs do not light properly.

Condition: All three LEDs display a specific pattern denoting the exact failure. A terminal connected to the serial console port may also display an error message. The LB will be unable to proceed further.

Cause: The LB has detected a fatal hardware fault.

Action: Contact your hardware dealer or Lantronix.

Condition: An error has been detected during power-up that is non-fatal, *i.e.*, the LB will continue to boot up but will not begin normal operations. The Serial LED will stay blink orange. If a terminal is connected to the serial console port, a diagnostic message will be displayed. The terminal will also display a **Boot>** prompt and await a response.

Cause: The LB has detected network errors on one or both of the LAN ports.

Action: You will want to connect a terminal to the serial console port if you haven't already. Check the network connection, and verify that power is reaching the MAUs.

Condition: All tests have passed successfully but the instructions stored in the Flash ROM have become corrupted. The LAN Bridge will automatically attempt to find and load a file containing the instructions from a host on the local area network. Both of the Network Port LEDs will be alternating as the LB looks for new software.

The following text will be displayed on the terminal connected to the serial console port:

```
Checking X sections from flash: invalid checksum found.
```

```
Attempting TFTP boot....  
Attempting NetWare boot.....  
Attempting MOP boot....
```

```
Will wait 1 minute for next download attempt...
```

If the last line in the above message appears, the LAN Bridge has been unsuccessful in finding and loading the file containing instructions into the LB's Flash ROM.

Cause: Usually this occurs when the LB is disturbed when downloading the file containing the instructions for the LB's Flash ROM. The stored instructions become corrupted.

Action: You will want to attempt to reload the file containing the Flash ROM instructions. See the Appendix E, *Updating LB Software* for instructions.

Condition: All tests have passed, the unit is operating normally but it appears that no packet traffic is being forwarded by the LAN Bridge to the different segments of the local area network.

Cause: There are various conditions that can cause this problem. Often it is caused by incorrect or faulty network cable connections, or incorrect network hardware configuration.

Action: To determine the cause of the problem, you will need to access the LAN Bridge with a terminal connected to the serial console port. Entering the following commands on the terminal may help to determine the problem.

SHOW BRIDGE COUNTERS - This command will display the number and status of packets received by the LAN Bridge, *i.e.*, filtered packets, errors, forwarded packets, *etc..* If packet traffic is not being received by the LAN Bridge, or packet traffic is being received and forwarded by one LAN port but are not appearing on the other LAN port, check both network attachments to the LAN Bridge.

SHOW BRIDGE ADDRESSES - This command will display which nodes the LAN Bridge has learned about on the network. When there are no nodes identified in the display, it indicates that the LAN Bridge is not receiving any packet traffic from other local area network nodes.

SHOW BRIDGE STATUS - This command will display the forwarding state of the LAN Bridge ports. Under normal operation the port state for both LAN Bridge ports should be *forwarding*. See Appendix C *Spanning Tree Algorithm* for further information .

If these displays are insufficient to diagnose the problem, contact your dealer or Lantronix.

Chapter 3

Set-up and Operations

Accessing the LAN Bridge	3-2
SET/DEFINE and SHOW/LIST Commands	3-2
Connections from TCP/IP Hosts.....	3-3
Connections from a VMS Host using NCP/TSM	3-4
Connections from a PC Host using NetWare.....	3-5
Connections from a Macintosh Host using AppleTalk	3-6
Command Line Editing.....	3-7
Editing Keys.....	3-7
Completing a Partially Entered Command	3-8
Common Configuration Changes	3-9
Password Protection	3-9
System Configuration	3-10
LAN Bridge Port Characteristics	3-11
Bridge Configuration.....	3-12
Filter Configuration	3-13

Accessing the LAN Bridge

Set-up and Operations	3-1
-----------------------	-----

There are two ways to issue commands to the LAN Bridge; (1) through a terminal connected to the serial console port or (2) through a console somewhere on your local area network.

Connecting a terminal to the serial console port is discussed in Chapter 2, *Installation*. To start using the terminal after it is physically connected, press Return a couple of times.

How you access the LAN Bridge through one of the LB's LAN ports will depend on the requirements of the host on your network. There are several different host protocols:

- A TCP/IP network host and one using Telnet/Rlogin.
- A VAX/VMS network host using NCP/TSM.
- A NetWare network host.
- An AppleTalk network host.

Each of the above requires a somewhat different approach when connecting over your network to the LB.

Note: You need not log in to the LB for it to recognize certain SNMP queries and commands.

SET/DEFINE and SHOW/LIST Commands

Among the commands discussed frequently in this chapter are the SET/DEFINE and SHOW/LIST commands. It is important to note the difference between these commands. SET makes an immediate change, but is not permanent. Conversely, DEFINE makes a permanent change, but it doesn't take effect until the LB is rebooted.

Note: Two of the DEFINE commands take effect before the LB is rebooted. DEFINE PORT and DEFINE PRINTER commands will take effect as soon as the port is logged out or finishes a print job. For this reason, many examples in this manual contain DEFINE PORT commands followed by a LOGOUT PORT command to make the DEFINE PORT take effect.

Changes made with the SET command can be made permanent using the SAVE command. For information on using the SAVE command, refer to the *LB Reference Manual*.

The SHOW and LIST commands function in a similar manner to the SET/DEFINE commands. SHOW displays the current settings (including those SET but not saved

as permanent changes); the LIST command displays permanent settings (excluding those SET but not saved as permanent changes.)

Connections from TCP/IP Hosts

A TCP/IP host or a TCP/IP host using Telnet/Rlogin can be used to access the LB directly. What you actually type at the prompt with these two methods is slightly different.

Obtaining an IP Address

If you wish to log into the LB from a TCP/IP host instead of using the serial console port, an IP address is required. The address can be defined using a terminal connected to the serial port, or via a host BOOTP or RARP server.

To define the IP address via the serial port, connect a terminal to the LB, become the privileged user and issue the SET and DEFINE PROTOCOL I P IPADDRESS commands (see the steps below).

```
Local_1> SU  
Password> SYSTEM (not echoed)  
Local_1>> SET PROTOCOL IP IPADDRESS xxx.xxx.xxx.xxx  
Local_1>> DEFINE PROTOCOL IP IPADDRESS xxx.xxx.xxx.xxx
```

To configure the IP address using RARP or BOOTP, see the RARP/BOOTP server's documentation. Keep in mind that many BOOTP daemons will not reply to a BOOTP request if the download filename in the configuration file does not exist. If this is the case, create a file in the download path to get the BOOTP daemon to respond.

Any host wishing to access the LB will have to be told of the LB's IP address. This is typically configured in the file **/etc/hosts** or via a nameserver. Refer to the host's documentation for additional information.

TCP/IP Connections

From your TCP/IP host prompt type one of the following:

```
unix% telnet nnn.nnn.nnn.nnn  
or  
unix% rlogin nnn.nnn.nnn.nnn
```

where **nnn.nnn.nnn.nnn** is the IP address of the LB LAN Bridge. **nnn** can be a decimal number from 0 to 255. The periods **must** be included.

Your display will show:

```
Trying nnn.nnn.nnn.nnn
```

```
Connected to nnn.nnn.nnn.nnn
Escape character is '^]'
```

At the # prompt, type the login password. The default password is *access*. The password you enter will not be displayed. Note: This password can be changed using the SET/DEFINE SYSTEM LOGIN PASSWORD command.

Your display will then show:

```
Lantronix LB Version n.n/n(yymmdd)
Type Help at the 'Local_1>' prompt for assistance.
```

```
Username>
```

Enter your user name at the prompt and you will be connected. The LB can then be configured as if you were connected to the LB's serial console port

You may end the session by typing Ctrl-D or LOGOUT.

A **TCP/IP** host login can be disabled by entering the SET/DEFINE SYSTEM INCOMING NONE command.

Connections from a VMS Host using NCP/TSM

If you wish to access the LB using a VMS network host, type the following:

```
$ RUN SYS$SYSTEM:NCP
```

and then type

```
NCP> CONNECT NODE lbname
```

```
#
```

lbname is the name of the LB as identified in the NCP address database. See your NCP documentation for information about the address database.

At the # prompt, type the login password. The default password is *access*. The password you enter will not be displayed. (**Note:** This password can be changed using the SET/DEFINE SYSTEM LOGIN PASSWORD command.)

Your display will then show:

```
Lantronix LB Version n.n/n(ymmd)
Type Help at the 'Local_1>' prompt for assistance.

Username>
```

Enter your user name at the prompt and you will be connected. The LB can then be configured as if you were connected to the LB's serial console port.

You may end the session by typing Ctrl-D or LOGOUT.

Connections from a PC Host using NetWare

The EPSCON utility program is supplied with the LB LAN Bridge on the DOS diskette. You can use this utility to either log onto or issue commands to the LB.

In order to use the EPSCON utility, you must be either logged into a NetWare file server, or the NetWare workstation shell program must be running.

Copy the EPSCON utility program to your hard disk or, insert the LB diskette into the A: drive and type:

```
C:> EPSCON
```

The following will be displayed.

Epscon Ver. 1.2	

epscon list	list available units
epscon <LBname>	establish a console connection
epscon <LBname>	shows NetWare protocol info
epscon <LBname>show [....]	send show command to bridge
epscon <LBname> netstat	display bridge network status
epscon <LBname> name newname	set the bridge name
epscon <LBname> serial	set serial port parameters
epscon <LBname> reload	reload the LB code

The list above displays the available parameters that can be included with the EPSCON command.

LBname is the LB service name which can be found on the rear of the LB. To log into the LB, enter the following:

```
C:\> EPSCON LB_xxxxxx
```

Your display will show:

```
Connection established (Ctrl-break to terminate)  
#
```

At the # prompt, type the login password. The default password is *access*. The password you enter will not be displayed. (**Note:** This password can be changed using the SET/DEFINE SYSTEM LOGIN PASSWORD command.)

Your display will then show:

```
Lantronix LB Version n.n/n(yyymmdd)  
Type Help at the 'Local_1>' prompt for assistance.  
Username>
```

Enter your user name at the prompt and you will be connected. The LB can then be configured as if you were connected to the LB's serial console port.

To logout of the LB, press Ctrl-D or type LOGOUT.

Connections from a Macintosh Host using AppleTalk

The MACCON utility program is supplied with the LB LAN Bridge on the Macintosh diskette. You can use this utility to either log onto, or issue commands to the LB.

To install the MACCON utility program, either copy it onto your hard disk drive, or run it directly from the diskette.

Double click on the MACCON icon to launch it. The screen will display AppleTalk zones and known Lantronix devices connected on the network.

Clicking on any AppleTalk zone name will display the devices in that zone.

Double click on any node name to log into, or enter configuration commands. Click on the Quit button to exit the MACCON utility program.

Command Line Editing

The LB LAN Bridge provides the following features to assist you when entering commands.

- Editing Keys
- Automatic command completion

Please note that these features are not available in boot mode.

Editing Keys

The following table lists the special keys used for command line editing.

Key	Purpose
Return	Causes the command line to be executed.
Delete	Deletes the character just left of the cursor.
Ctrl-A	Toggles insert mode (insert or overwrite)
Ctrl-D or Ctrl-Z	Logs you out of the bridge.
Ctrl-E	Moves cursor to the end of the line.
Ctrl-H or Backspace	Moves cursor to the beginning of the line.
Ctrl-R	Re displays the current command
Ctrl-U	Deletes the entire current line.
Right Arrow	Moves the cursor right.
Left Arrow	Moves the cursor left.
Up Arrow or Ctrl-P	Recalls the previous command.
Down Arrow or Ctrl-N	Recalls the next command forward.
!!Return	Executes the previously entered command.
!textReturn	Recalls last command starting with <i>text</i> .

Recalling Commands

The Up Arrow and Down Arrow keys permit you to display previously entered commands. The Up Arrow key scrolls backward through the a list of commands, and the Down Arrow key scrolls forward.

Once displayed, the command can be executed again, or edited and then executed. You can scroll back through a list of up to nine previous commands. Commands are added to the list when they are different from all previously executed commands on the list. If there are no commands on the list, a blank line will be displayed.

Many UNIX systems have a *command history list* feature. The UNIX system feature is usually activated by typing exclamation (!) marks. Entering two exclamation marks (!!) executes the pervious command. Typing a single exclamation mark and one or more text characters will cause an attempt to recall the previous command starting with the characters entered with the exclamation mark. The LB completely supports this UNIX system feature.

Completing a Partially Entered Command

The LB LAN Bridge provides a feature that will permit you to partially type a command and press either the Space Bar or the Tab key. The LB will attempt to complete the rest of the command for you. If it cannot figure out the rest, it will leave the cursor in the same position, beep, and allow you to type more of the command.

This feature can be enabled or disabled using the SET/DEFINE PORT COMMAND COMPLETION command. See this command in Chapter 4 *Command Reference - Port Commands* section.

For example, if you type the following:

```
Local> SET FI
```

and press the Space Bar or the Tab key, the word FILTER will be typed for you.

Common Configuration Changes

As was stated in Chapter 2, *Installation*, the LB LAN Bridge requires **no** configuration changes in order to operate properly in a local area network. So, if you do not need to change any parameters on the LB, you can skip this section.

The following sections provide information on the following processes and configuration capabilities of the LAN Bridge:

- Password protection
- System configuration
- LAN Bridge serial console port characteristics
- Bridge configuration
- Filter configurations

Password Protection

The LB is protected with two levels of passwords: the *login* password and the *privileged* password.

The *login* password will provide you with access to the LB. Most of the commands that do not change the LAN Bridge configuration can be entered after logging with the *login* password. The *privileged* password permits access to additional commands.

When you receive the LB, the *login* password will be ACCESS. The default *privileged* password is "SYSTEM". These passwords can be changed using the SET/DEFINE SYSTEM LOGIN PASSWORD and SET/DEFINE SYSTEM PRIVILEGED PASSWORD commands.

To obtain privileged user status enter a SET PRIVILEGED command as follows:

```
Local_1> SET PRIVILEGED  
Password> SYSTEM  
Local_1>>
```

Note: The password in the syntax above will not be shown on your display. Also note that the prompt changes to indicate that the current LAN Bridge port has a *privileged* user connected.

System Configuration

There are several parameters that are typically changed. The following talks about these commands and provide an example. If you need more information about the use of the commands, see the *LB Reference Manual*.

System Name

The system name is used by LAT, NetWare, and AppleTalk networks when accessing the LAN Bridge from the network.

The default system name can be found on the back label of the LB LAN Bridge. It will be identified as LB_xxxxxx. You can change this name by entering the following commands (in the example below, the name is changed to *LAB_BRIDGE*):

```
Local_1> `SET PRIVILEGED  
Password> SYSTEM  
Local_1>> SET SYSTEM NAME LAB_BRIDGE  
Local_1>> DEFINE SYSTEM NAME LAB_BRIDGE
```

The new name (*LAB_BRIDGE*) will be used to identify the bridge to a LAT network as well as a Lantronix device to the MACCON AppleTalk utility and to the EPSCON NetWare utility.

Incoming Network Logins

By default the LB will permit only remote console logins using Telnet NCP/TSM connections. To permit LAT logins without a password, use the following command:

```
Local_1>> SET SYSTEM INCOMING NOPASSWORD  
Local_1>> DEFINE SYSTEM INCOMING NOPASSWORD
```

To prevent any network logins, use the following command:

```
Local_1>> SET SYSTEM INCOMING NONE  
Local_1>> DEFINE SYSTEM INCOMING NONE
```

AppleTalk Zone

If the LB is attached to an AppleTalk network that includes a router, the LB will join the default zone specified by the router. In this case, the LB and other Macintosh devices in the same zone will be *seen* by each other. Devices outside the zone will not be *visible*.

If the LB is attached to an AppleTalk network that has **no** router, zones are not configured and all devices on the network (including the LB) will be visible and accessible to all other Macintosh clients.

A different zone may be specified by entering a SET/DEFINE PROTOCOL APPLETALK ZONE command as follows:

```
Local_1> SET PRIV
Password> SYSTEM
Local_1>> SET PROTOCOL APPLETALK ZONE RADON_LAB
Local_1>> DEFINE PROTOCOL APPLETALK ZONE RADON_LAB
```

Note that the MACCON utility program and the specified zone are of consequence only when you desire to connect to the LB through the AppleTalk network.

LAN Bridge Port Characteristics

The LB LAN Bridge has two local area network ports (LAN ports) and one serial console port. You may want to change the settings of the **serial console port**. This is accomplished using SET/DEFINE PORT commands.

To make SET PORT commands permanent, use the SAVE command. For information on the SAVE command, refer to the *LB Reference Manual*.

Note: DEFINE PORT commands work differently from other DEFINE commands. The LB doesn't need to be rebooted in order for these commands to take effect; DEFINE PORT commands will take effect as soon as the port is logged out or finishes a print job.

Note that when you change the port characteristics, you may have to change your terminal characteristics to match.

Below is a listing of the default characteristics:

```
Local_1> LIST PORT

Port 1: Username: Physical Port 1 (Idle)

Char Size/Stop Bits: 8/1 Input Speed: 9600
Flow Ctrl: Xon/Xoff Output Speed: 9600
Parity: None Modem Control: None
Terminal Type: Soft
```

Characteristics:

Bridge Configuration

There are two general groups of commands available to configure how the bridge operates: Spanning Tree commands, and LAN Bridge Ethernet port commands.

The Spanning Tree process can be completely disabled if necessary. The Spanning Tree process is enabled by default. In addition to being able to enable and disable the Spanning Tree process, there are several other command parameters available. The first five commands are Spanning Tree features that can be altered using SET/DEFINE BRIDGE commands. (For a more detailed explanation of the Spanning Tree process, see Appendix C, *Spanning Tree Algorithm*.) The following three parameters can be used to control individual port settings.

- FORWARD DELAY - controls the delay interval between the LAN Bridge's *listening*, *learning*, and *forwarding* states.
- HELLO TIME - controls the interval between Spanning Tree packet multicasts.
- MAXIMUM AGE - controls the interval the LB will wait after the last Spanning Tree packet before it looks for a new root bridge.
- PATH COST - controls how *expensive* a port is; in terms of packet forwarding time.
- WEED - controls the interval the LB will wait before it removes a node's hardware address when it has not heard from that node.
- STATE - will prevent packet traffic through a LAN port
- PRIORITY - assigns a value that will be used to determine if the bridge will become the root bridge
- FILTER - associates a filter list with one of the LB's Ethernet ports

Filter Configuration

When a packet is received at a LAN Bridge port, the source and destination addresses of the packet are compared. If the address of the source and destination of a packet are the same, the packet is presumed to be at its final destination and doesn't need to travel any further. Once it is determined that a packet is **not** at its destination (the source and destination addresses do not match), a packet may then be subject to any existing **filters**.

About Filters

LAN bridge filters function in a similar manner to everyday filters; they permit desired material (packets) to pass through the bridge, and filter out undesirable packets. Each of the LAN Bridge's Ethernet ports can be associated with a filter list. The filter list is comprised of one or more filters you have defined. The two ports can have different filter lists, or can have one filter list specified for both.

Each filter tells the LAN Bridge to compare the specified criterion with incoming packets, and perform an action; either permit access (forward the packet through the LAN Bridge), or deny access (discard the packet).

When a packet is received on one of the LAN Bridge's ports, the list associated with the port is consulted. The first filter on the list is compared to the packet; if there is a match, the action is taken and the comparison process stops. If there is no match, the next filter on the list is compared. If the entire filter list is has been compared and no matches were found, the packet is forwarded.

Note: The extra time to do the comparisons may cause a performance degradation. Filter lists with fewer than 6-7 items should not be noticeable, but very long lists can significantly impact packet throughput by increasing the amount of time a packet remains in the LAN Bridge before it is forwarded.

There are four types of filters:

- Comparisons based on the type (broadcast or multicast) of packet
- Comparisons based on the source or destination Ethernet address of the packet
- Comparisons based on a network protocol
- Comparisons based on a pattern of data within the packet

For example, you might want a filter list to perform the following functions:

- Deny all multicasts
- Allow all IP email traffic
- Allow all AppleTalk printing traffic
- Deny all IP traffic

All incoming packets would first be examined to determine if there were any multicast packets destined for a different segment of the network. Any multicast packets would be discarded. Of the remaining packets, all IP email traffic and AppleTalk printing traffic would be forwarded. Any IP (non-email) packets would be discarded.

Note that the ordering of a filter list is **very** important; switching the positions of two filters can have very different effects. For example if you order a filter list in the following manner:

- Allow all IP email traffic
- Deny all IP traffic

only IP email traffic will be forwarded. If the order of the filter list were reversed, as displayed below:

- Deny all IP traffic
- Allow all IP email traffic

any IP packet traffic (including IP email packets) would **not** be forwarded, as the processing of IP traffic stops at the first match on the filter list.

Configuring a filter list

To configure a filter list, you must first associate one of the LAN Bridge's Ethernet ports with a filter list.

There is a maximum of two filter lists on the LB. A single filter list can be associated with both Ethernet ports. To link a port with a filter list, use the SET BRIDGE FILTER command:

```
Local_1> SET PRIVILEGED  
Password> SYSTEM  
Local_1>> SET BRIDGE ETHERNET 2 FILTER 1
```

The above SET BRIDGE command indicates that LAN Bridge port two will use filter list number one. If NONE is specified instead of a filter number, no filter list will be consulted. This will ensure the fastest packet forwarding.

After associating a filter list with a LAN port, you must specify the filters' configuration with SET/DEFINE FILTER commands. SET/DEFINE FILTER commands require that you to specify the filter list number, where you want to place the new filter in the list, the actual packet specification you wish to filter, and whether you want to forward or discard the specified packet.

For a complete explanation of the different command options, refer to the *LB Reference Manual*.

Below is an example of a filter list configuration.

```
Local_1> SET PRIVILEGED
Password> SYSTEM
Local_1>> SET FILTER 2 APPEND MULTICAST DENY
Local_1>> SET FILTER 2 APPEND PROTOCOL IP UDP SMTP ALLOW
Local_1>> SET FILTER 2 APPEND PROTOCOL APPLETALK PAP ALLOW
Local_1>> SET FILTER 2 APPEND PROTOCOL IP DENY
```


Appendix A

LB Power and Environmental Specifications

Power Requirements

Input Voltage	95-250 VAC 3-wire single phase
Operating Current	.5 Amp at 120 Volts (maximum)
Power Consumption	30 Watts (maximum)
Frequency	50 to 60 Hz

Temperature Limitations

Operating range: 5° to 50° C (41° to 122° F)

Storage range: -40° to 66° C (-40° to 151° F)

Maximum temperature change per hour: 20° C (36° F) Rapid temperature changes may affect operation.

Altitude Limitations

Operating: 2.4 km (8000 ft.)

Storage: 9.1 km (30,000 ft.)

If operating the LB above 2.4 km (8000 ft.), decrease the operating temperature rating by 1.8° C for each 1000 m (1° F for each 1000 ft.).

Relative Humidity Limitations

Operating: 10% to 90% (noncondensing)
 40% to 60% recommended

Storage: 10% to 90% (noncondensing)

Power Supply Cord Specifications

Cord type: 3 conductors, 1.0 mm² minimum conductor size (approx. 18 AWG)

Rated for 250 Volts AC, 10 Amps

Length ≤ 3.0 meters

The cord should have a harmonized cable type number. (“Harmonized” refers to an internationally standardized cable description, and is prefixed by the letters HAR.) An example of a valid harmonized cord type is:

HAR HO5VV-F 3G1.00

Connectors

The cord should terminate in a molded-on IEC 320-C13 female connector body at one end for proper insertion into the terminal server. The other end should be of a plug configuration appropriate to the country in question.

Approvals

The cord connectors you use should bear the approval mark of at least one of the following regulatory and safety agencies:



Belgium (CEBEC)



Finland (EI)



Austria (OVE)



Denmark (DEMKO)



Germany (VDE)



Netherlands (KEMA)



Norway (NEMKO)



Switzerland (SEV)



Sweden (SEMKO)



United Kingdom (BSI)



United Kingdom (ASTA)



France (UTE)



Italy (IMQ)

(Note: The above symbols are approximate representations of the actual approval symbols, and are for the user's reference only.)

Appendix B

Serial Port Specifications

A cable, an adapter, and a wire splice connector are included with the Lantronix LB LAN Bridge.

The cable has an RJ-45 connector on each end. The RJ-45 connector plugs into the LB's serial console port.

The adapter permits you to convert the RJ-45 connector on one end of the cable into an DB-25 connector. A DB-25 connector will plug into any RS-232 serial device such as a terminal, printer, or modem.

The wire splice connector can be used to help construct your own cable with an RJ-45 connector on one end and a DB-25 or DB-9 connector on the other.

The following diagram (Figure B-1) shows how to wire the RJ45 to DB25 adapter.

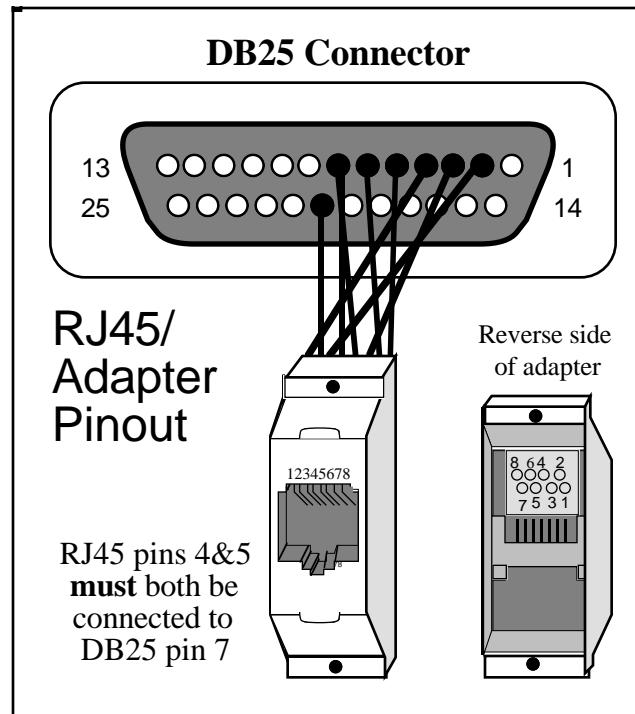


Figure B-1: RJ45 to DB25 Adapter

Signal Name at LB	Pin Number at LB	Pin Number at Adapter	DB25 Pin Number
RTS out	8	1	4
DTR out	7	2	20
Transmit	6	3	2
Transmit Return	5	4	7
Receive Return	4	5	7
Receive	3	6	3
DSR in	2	7	6
CTS in	1	8	5

Note: The table above assumes the use of a swapped cable. The inner six pins (2-7) can be used with existing RJ12 connectors, but will not provide RTS/CTS flow control.

A small square connector is provided with the LB adapters. This connector is used to connect both transmit and receive grounds from the RJ45 cable to the single signal ground on the DB25. The connector internally “splices” the two wires together and provides one wire into the DB25 connector. It is used as shown:

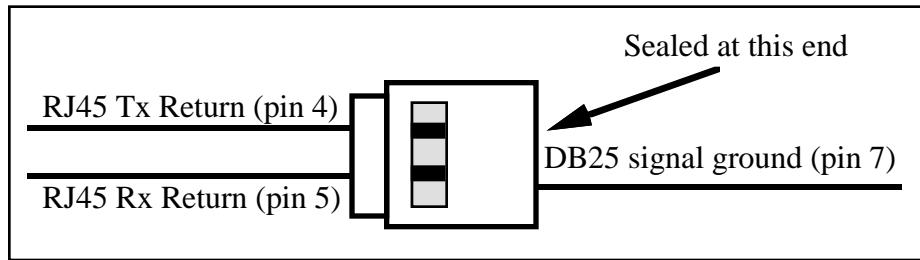


Figure B-2: Wire "Splicer"

It does not matter which wire extends to the DB25 connector, only that both are connected within the “splicer”. To splice the wires, cut off the end of the wire that does NOT extend through the connector and insert both wires into the connector. Make sure that the wire that does not extend through the connector is in as far as possible to ensure a solid connection. Carefully squeeze the connector using a pair of pliers to make sure it is fully latched.

RJ45 to DB9 (IBM PC Standard) Pinouts

To connect the LB serial port to a DB9 connector using IBM PC standard pinouts, the following pinouts should be used.

Signal Name at LB	Pin Number at LB	Pin Number at Adapter	DB89 Pin Number
CTS in	8	1	7
DSR in	7	2	4
Receive	6	3	3
Receive Return	5	4	5
Transmit Return	4	5	5
Transmit	3	6	2
DTR out	2	7	6
RTS out	1	8	8

Note: The table above assumes the use of a swapped cable. The inner six pins (2-7) can be used with existing RJ12 connectors, but will not provide RTS/CTS flow control.

Serial Cable Limits

Note that the Lantronix servers are RS-423 compliant, and are thus limited by the equipment at the remote end of the serial line. If the LB is connected to an RS-232 device, it is subject to the RS-232 limits shown below. If connected to an RS-422 device, it is subject to the RS-422 limitations.

RS-232 lines are limited to 15m (50 ft) in length at 9600 baud. They will generally work at longer lengths.

RS-422 lines are limited to 300m (1000 ft).

Appendix C

Spanning Tree Algorithm

Whenever two or more LAN Bridges are connected to a local area network, the possibility exists that more than one bridge could connect the same segments. This could result in endless loops of packet traffic on the network (see Figure C-1).

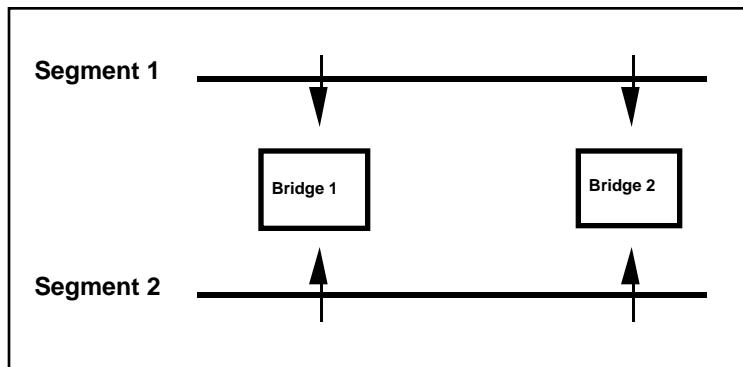


Figure C-1: Multiple Paths Between Segments

The Spanning Tree Algorithm is a method used to sense the structure of the network and prevent multiple paths between network segments.

The LB LAN Bridge uses the Spanning Tree Algorithm as defined by the IEEE specification 801.2d.

The Spanning Tree Algorithm looks at the network and, if it senses more than one path from one segment to another, it will disable all except one path (see Figure C-2). A disabled path may affect more than one port on more than one bridge.

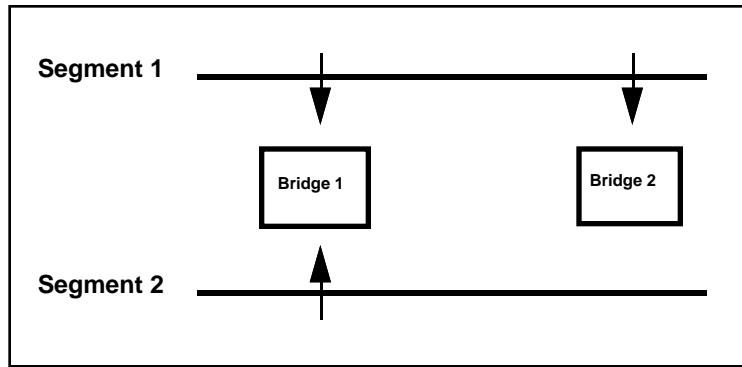


Figure C-2: Network Using Spanning Tree Algorithm

Each disabled port will continue to listen to packet traffic, but will not forward any packets through the bridge, or will not transmit any packets out of the disabled port.

When multiple paths to the same segment have been identified, the path(s) with the highest path cost will be disabled.

The Spanning Tree Algorithm will respond to changes in network configuration. If a LAN port has been disabled due to duplicate paths, and the single operational path becomes inoperable, a disabled LAN port will be re-enabled in order to recreate the path.

The Spanning Tree Algorithm is fully incorporated into the LB LAN Bridge and will be enabled by default. You may however, use the LB's SET/DEFINE BRIDGE SPANNING command to disable the process.

Important: Caution should be exercised when disabling the Spanning Tree Algorithm. If there are multiple paths, packets could be forwarded continuously, resulting in packet storms and node crashes. It is highly recommended that **all** bridges on a network enable the Spanning Tree Algorithm. If one or more bridges have the Spanning Tree Algorithm disabled, care must be taken so as not to introduce network loops.

The Spanning Tree Algorithm designates one of the bridges as the primary or root bridge on the network. If there is only one bridge, it is obviously the root bridge. If there is more than one, the hardware addresses and priority factors will be used to select the root bridge.

Once a root bridge is chosen, it will send out packets called Bridge Protocol Data Units to each of its segments. Bridges receiving the BPDUs will send them out their other segment thereby propagating BPDUs throughout the network.

Each bridge throughout the network will then know from which LAN port it should be receiving Bridge Protocol Data Units. If a bridge receives one on a different port, it knows that there has been a change in the network configuration and it will re-establish a single path to each LAN segment. Conversely, if the bridge stops hearing Bridge Protocol Data Units completely, it will know a link has failed and a new path must be established.

If the root bridge happens to stop operating, a new root will be selected based on Bridge priority and hardware address.

When using the Spanning Tree Algorithm LAN ports can be in one of five different conditions or states:

- **Listening:** A LAN Bridge port will listen for multicast Bridge Protocol Data Unit packets from other bridges for the interval specified by the SET/DEFINE BRIDGE FORWARD DELAY command. The bridge starts in this state when it is initialized.
- **Learning:** The bridge will collect hardware address information for its internal address table. The learning state is entered when the *listening* FORWARD DELAY interval has expired and will remain in the *learning* for another FORWARD DELAY interval.
- **Forwarding:** The bridge will forward packets from one segment to the other unless prevented, *i.e.*, unless the port is blocked or disabled, or there is a user-defined filter preventing the passage.
- **Blocked:** A port on a bridge is prevented from passing packets from one segment to the other. This is brought about by the Spanning Tree Algorithm, *i.e.*, there are multiple paths to the segment and forwarding a packet through this port onto the segment will cause a loop.
- **Disabled:** A port on a bridge has been disabled with a SET/DEFINE BRIDGE STATE command.
- **Testing:** The bridge has detected an error in a particular segment (for example, it is disconnected), and is testing the segment to determine if the error has been fixed.

Certain events on the network can cause the bridge to return to the **Listening** and **Learning** states. Selection of a new root bridge is usually the event that will cause this transition.

If the Spanning Tree is disabled with a SET/DEFINE BRIDGE SPANNING command, the port state can only be **Disabled**, **Forwarding**, or **Testing**. The other three states are only reachable when the Spanning Tree Algorithm is enabled.

Appendix D

Simple Network Management Protocol (SNMP) Support

The Lantronix LB LAN Bridge includes the ability to access the facilities of the Management Information Base for SNMP command management on TCP/IP-based networks.

The LB LAN Bridge implements the Management Information Bases MIB-2 and Bridge MIB. The MIBs, and SNMP in general are documented in RFCs 1066, 1286, 1067, 1098, and 1213.

The LB supports the following SNMP object groups:

system	OBJECT IDENTIFIER ::= {mib-2 1}
interfaces	OBJECT IDENTIFIER ::= {mib-2 2}
at	OBJECT IDENTIFIER ::= {mib-2 3}
ip	OBJECT IDENTIFIER ::= {mib-2 4}
icmp	OBJECT IDENTIFIER ::= {mib-2 5}
tcp	OBJECT IDENTIFIER ::= {mib-2 6}
udp	OBJECT IDENTIFIER ::= {mib-2 7}
ethernet transmission	OBJECT IDENTIFIER ::= {mib-2 10}
snmp	OBJECT IDENTIFIER ::= {mib-2 11}
dot1dbridge	OBJECT IDENTIFIER ::= {mib-2 17}

The LB does not implement the SET functions of SNMP at this time.

Appendix E

Updating LB Software

This Appendix discusses two types of software updates: reloading current system software in the event of file corruption, and obtaining the latest version of the LB software from Lantronix. Current LB software can be reloaded from the LB's internal Flash ROM; this procedure is discussed in the first section of this Appendix.

If you wish to obtain the latest version of the Lantronix LB software and its associated release notes, these can be downloaded directly from the Lantronix development systems through the Lantronix bulletin board system (BBS) or by using anonymous ftp through the Internet. Using the Lantronix BBS and using anonymous ftp are discussed later in this Appendix.

Questions or comments regarding the ftp or downloading processes can be addressed via electronic mail: the Internet mailing address is ftp@lantronix.com.

Reloading Flash ROM

The LB LAN Bridge stores its software in Flash ROM. This software controls the initialization process, the operation of the LB, and the processing of commands. The contents of the Flash ROM can be updated by downloading a new version of the operational software.

The Flash ROM instructions are contained in a file called LB.SYS, provided with the LB on a floppy diskette. This file must be accessible when updating the LB's instructions contained in the Flash ROM.

The instructions contained in the LB's Flash ROM can be re-loaded from a network host using one of the following host protocols.

Updating the LB using a TCP/IP host

First, you must make the LB.SYS file available on your system so that it can be accessed and loaded into the LB.

Second, you must connect your host to the LB (see *Accessing the LAN Bridge* in Chapter 3.)

Loading the LB.SYS file into the LB is accomplished using the TFTP (Trivial File Transfer Protocol). TFTP requires: (1) the LAN Bridge's IP address, (2) the host's IP address, and (3) that the LB.SYS file name be identified.

If your network host provides BOOTP support, it can be used to query the network host for required information. You can use BOOTP commands to identify the LB's name, IP address, hardware address, and the file name and path to the BOOTP information file. The path and file name of the BOOTP configuration is usually called */usr/etc/bootptab*.

To load the LB.SYS file into the LB using a TCP/IP host and TFTP, enter the following commands.

```
Local_1> SET PRIVILEGE
Password> SYSTEM
Local_1>> DEFINE SYSTEM IPADDRESS xxxx.xxx.xxx.xxx
Local_1>> DEFINE SYSTEM SOFTWARE "/path/lb.sys"
Local_1>> DEFINE SYSTEM LOADHOST xxx.xxx.xxx.xxx
Local_1>> INITIALIZE RELOAD
```

If the pathname contains lower case characters, the name must be enclosed in quotation marks. There is an eleven character length limit for the path name and an eight character limit for the file name. See the SET/DEFINE SYSTEM command in the *LB Reference Manual* for more details.

The DEFINE SYSTEM commands are used here because SET SYSTEM commands will be lost when the LB is initialized. Use the LIST SYSTEM command to check the LB settings before using the INITIALIZE RELOAD command.

The initialization process will take approximately two minutes from the time the INITIALIZE command is issued.

If the LB.SYS file cannot be found or accessed, the LB can be re-initialized using the current contents of the LB's Flash ROM.

As described in Chapter 2 *Installation*, during this process, the OK LED will blink quickly while the LB is in boot mode (and reloading code) and then slowly when it returns to normal operational mode.

Updating the LB using a VAX/VMS host

The LB.SYS file must first be copied onto your system into the MOM\$LOAD directory. When the LB.SYS file is to be loaded using MOP, the file name is the only parameter required by the LB.

You will need to make sure the LB's service characteristic is enabled on the host's Ethernet circuit. See your documentation on NCP for more details about the service characteristics.

Enter the following commands to re-load the LB.SYS file into the LB.

```
Local_1> SET PRIVILEGE  
Password> SYSTEM  
Local_1>> INITIALIZE RELOAD
```

The initialization process will take approximately two minutes from the time the INITIALIZE command is issued.

If the LB.SYS file cannot be found or accessed, the LB will re-initialize using the current contents of the LB's Flash ROM.

As described in Chapter 2, *Installation*, during this process, the OK LED will blink quickly while the LB is in boot mode (and reloading code) and then slowly when it returns to normal operational mode.

Updating the LB using a NetWare host

Copy the LB.SYS file into the LOGIN directory on the NetWare file server.

The LB will not actually log into the NetWare file server; consequently it can only access files in the LOGIN directory itself.

Enter the following commands to re-load the LB.SYS file into the LB.

```
Local_1> SET PRIVILEGE  
Password> SYSTEM  
Local_1>> DEFINE SYSTEM SOFTWARE "sys:\login\lb.sys"  
Local_1>> DEFINE SYSTEM NETWARE LOADHOST fileserver  
Local_1>> INITIALIZE RELOAD
```

If the path/file name contains lower case characters, it must be enclosed in quotation marks. There is a twenty-four character length limit for the path and file name. See the SET/DEFINE SYSTEM command in the *LB Reference Manual* for more details.

The DEFINE SYSTEM commands are used here because SET SYSTEM commands will be lost when the LB is initialized. Use the LIST SYSTEM command to check the LB settings before using the INITIALIZE RELOAD command.

You may also update the LB through NetWare by using the EPSCON utility program. The EPSCON utility program considerably simplifies re-loading process. EPSCON will copy the new version of LB.SYS from a floppy diskette into the LOGIN directory of the file server, configure the LB with the proper download file name and path, and issue the re-load command.

After becoming the supervisor on the NetWare host, type:

```
A:> EPSCON EPS_xxxxxx RELOAD
```

The following will appear:

```
File Server: file_server_name  
Download filename [LB.SYS]:  
File Destination [F:\LOGIN]:  
Reloading LB_xxxxxx. This will take about 2 minutes.  
A:>
```

If you then connect to the LB and enter the SHOW SYSTEM command, the new software version should be displayed.

If the LB.SYS file cannot be found or accessed, the LB will re-initialize using the current contents of the LB's Flash ROM.

As described in Chapter 2 *Installation*, during this process, the OK LED will blink quickly while the LB is in boot mode (and reloading code) and then slowly when it returns to normal operational mode.

Updating the LB using the internal Boot Configuration Program (BCP)

The Boot Configuration Program is contained within the LB and provides several commands which can be used to configure the LB. BCP commands become available when the LB has failed during initialization, or when you have entered an INITIALIZE NOBOOT command.

Typically, this feature is rarely used. However, if the LB does not successfully initialize, the BCP commands become available and can be used to isolate and solve the problem.

The following is a list of BCP commands that can be entered from a terminal connected to the LB's serial console port.

- **HELP**

Displays a one page summary of the BCP commands.

- **INIT 451**

Re-initializes the LB. Use this command after you have entered other configuration commands.

- **SET SYSTEM HARDWARE *xx-xx-xx***

Specifies the LB's base hardware address. *xx-xx-xx* is the last three bytes (hexadecimal characters) of the bridge's Ethernet address. The first three bytes will be supplied automatically. The address of the other LAN port is computed from this base address automatically.

- **SET SYSTEM IPADDRESS *address***

Specifies the LB's IP address. ***address*** must be entered in the following form: ***nnn.nnn.nnn.nnn*** where ***nnn*** can be a decimal number from 0 to 255. The periods **must** be included.

- **SET SYSTEM LOADHOST *address***

The LB will check this host address when attempting to load the LB.SYS file. ***address*** must be entered in the following form: ***nnn.nnn.nnn.nnn*** where ***nnn*** can be a decimal number from 0 to 255. The periods **must** be included.

- **SET SYSTEM NETSERVER *fileserver***

Specifies the name of the NetWare file server from which the LB will attempt to load the LB.SYS file. ***fileserver*** is any combination of characters.

- **SET SYSTEM SOFTWARE *filename***
Specifies the name of the file to load. The LB will automatically add .SYS to the file name you specify.
- **SHOW SYSTEM**
This command is used to display the current LB settings.
- **FLASH**
Forces the LB to attempt to reload the contents of the Flash ROM. This is necessary, for example, if a new version of software is released and you wish to upgrade your unit.

Troubleshooting Flash ROM Updates

If your attempt to load new FLASH ROM instructions into the LB fails, proceed as follows:

First, examine the error message the LB writes to the terminal connected to the serial console port. It is typically very descriptive and normally points to the problem. If the error is not obvious, the following errors are quite common:

For NetWare users, make sure the LB.SYS file is in the LOGIN directory. Since the LB cannot actually log into the NetWare file server, it has very limited access to the file server's directories.

For TCP/IP hosts using TFTP, check the file and directory permissions. Make sure the loadhost name and address are specified correctly and that their case matches the case of the file names on the host system. Also make sure the host has TFTP enabled. Several major UNIX vendors ship their systems with TFTP disabled.

For VMS hosts using MOP, the Ethernet circuit must have the *service* characteristic enabled. Verify that the MOM\$LOAD search path includes the directory containing the LB.SYS file.

Obtaining Software via the Lantronix BBS

The Lantronix bulletin board system (BBS) uses Telebit T2500 modems capable of v.32, v.42, v.42bis, 9600/2400/1200 baud operation. Kermit and PEP file transfer protocols are available to download the file. Make sure the Kermit file type is set to **binary mode**.

The BBS phone number is: **(714) 367-1051**
The account name is: **LB**
The password is: **BRIDGE**

The following information will be displayed:

```
Username: LB
Password: LANBRIDGE (the password will not be echoed)
```

```
Welcome to the Lantronix Software Distribution System.
```

File Name	Version	File Name

LB.SYS	V1.0/10	[.1010]LB.SYS

```
Please download and read release notes before installing
new code. (Note: this is important...)
```

```
NOTE: All software is also available via anonymous ftp at
      ftp.lantronix.com. Questions and/or comments can be
      mailed to support@lantronix.com.
```

```
Please enter your first name: xxx
Please enter your last name: xxx
Please enter your company name: xxx
```

```
Lantronix Product Menu
```

- 1) Use Kermit to Download Software
- 2) Use Kermit to Download Release Notes
- 3) Send Mail Message to Lantronix
- 4) List the Currently Available Uploadable Files
- 5) Logout

```
Please enter option:
```

When downloading has been completed, use option 5 to logout of the bulletin board system.

Obtaining Software via the Internet

You can obtain the latest version of the Lantronix LB software and its associated release notes directly from Lantronix using ftp (file transfer protocol) through Internet.

To access the Lantronix ftp file server, use **ftp.lantronix.com**. This currently resolves to IP address 192.73.220.81, but is subject to change at any time.

Note that the machine issuing the ftp command must be resolvable via the INADDR.ARPA DNS record for the connection to succeed.

If access is denied, try using a *known* machine as a gateway or nameserver. If you think the connection should work and it does not, send email to **ftp@lantronix.com** with the machine name(s) and IP address(es) you are trying from and the DNS information will be checked. Remember that the file (LB.SYS) is image data and should only be transferred in binary mode. If binary mode is not used, the files will be corrupted and unusable.

```
% ftp ftp.lantronix.com  
  
Connected to ftp.lantronix.com  
220 Welcome to the Lantronix FTP server.  
220 [...] (Welcome message)  
Name: (ftp.lantronix.com:xxxx): anonymous  
331: Guest login ok, send ident as password.  
Password: Enter your email address here  
Guest login ok, access restrictions apply.  
ftp>
```

All released files are in the **pub** directory. Always transfer the README file in the **pib** directory before transferring anything else. The README file contains a directory of available versions.

Appendix F

Reporting Problems

If you are experiencing problems with the LB or have suggestions for improving the product, please contact Lantronix Technical support at (800) 422-7044 or (714) 453-3990. We are also reachable via Internet electronic mail; the address is support@lantronix.com.

Lantronix
15353 Barranca Parkway
Irvine, CA 92718
FAX 714-453-3995

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number.
- The Lantronix model number.
- The serial number of the unit.
- The software version (use the SHOW SYSTEM command to display).
- Network configuration, including the information from a NETSTAT command.
- Description of the problem.
- Provide a DEBUG report (stack dump) if applicable.
- The status of the unit when the problem occurred. Please try to include information on user and network activity at the time of the problem.

Warranty Statement

Lantronix warrants for a period of FIVE YEARS from the date of shipment that each Lantronix LAN Bridge supplied shall be free from defects in material and workmanship.

During this period, if the customer experiences difficulties with a product and is unable to resolve the problem by phone with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of a RMA number, the customer is responsible for returning the product to Lantronix, freight prepaid. Lantronix, upon verification of warranty will, at its option, repair or replace the product in question, and return it to the customer freight prepaid.

If the product is not under warranty, Lantronix will contact the customer who then has the option of having the unit repaired on a fee basis or having the unit returned.

No services are handled at the customer's site under this warranty.

Lantronix warrants software for a period of sixty (60) days from the date of shipment that each software package supplied shall be free from defects and shall operate according to Lantronix specifications. Any software revisions required hereunder cover supply of distribution media only and do not cover, or include, any installation. The customer is responsible for return of media to Lantronix and Lantronix for freight associated with replacement media being returned to the customer.

Lantronix shall have no obligation to make repairs or to cause replacement required through normal wear and tear of necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such a manner for which it was not designed, or by causes external to the Product, such as, but not limited to, power or failure of air conditioning.

There are no understandings, agreements, representations or warranties, express or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out above or by any existing contract between the parties. Any such contract states the entire obligation of Lantronix. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship.

The information, recommendation, description and safety notations in this or other documents supplied by Lantronix are based on general industry experience and judgment with respect to such hardware and software. THIS INFORMATION SHOULD NOT BE CONSIDERED TO BE ALL INCLUSIVE OR COVERING ALL CONTINGENCIES.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS, DESCRIPTIONS AND SAFETY NOTATIONS CONTAINED HEREBY AND IN HARDWARE AND SOFTWARE SPECIFICATION DOCUMENTATION, OR INSTRUCTIONS SUPPLIED BY LANTRONIX. In no event will Lantronix be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing software, hardware, equipment or facilities, or claims against the user by its employees or customers resulting from the use of the information, recommendations, descriptions and safety notations supplied by Lantronix. Lantronix liability is limited (at its election) to (1) refund of buyer's purchase price for such affected products (without interest); (2) repair of such products, or (3) replacement of such products, provided however, that the buyer follows the procedures set forth herein.

Warranty claims must be received by Lantronix within the applicable warranty period. A replaced product, or part thereof, shall become the property of Lantronix and shall be returned to Lantronix at the Purchaser's expense. ALL RETURN MATERIAL MUST BE ACCOMPANIED BY A RETURN MATERIAL AUTHORIZATION NUMBER ASSIGNED BY LANTRONIX.

