MSSLite Installation Guide

For MSSLite-A, MSSLite-B, MSSLite-C and MSSLite-D Micro Serial Servers

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

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The revision date for this manual is **February 11, 1999**.

Part Number: 900-161
Rev. A

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.

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 doît accepter n'importé quelle interférence reìue qui peut causer une opération indésirable.

Contents

1: Introduction

The MSSLite models are the newest members of the Lantronix MSS family of micro serial servers. Micro serial servers allow users to connect devices to an Ethernet network that were not originally designed to be networked. The MSSLites achieve this by providing a variety of serial connectors on one end and a 10BASE-T Ethernet I/O port on the other end.

The MSSLite models are smaller than most other MSS models and are designed to be used in a wider variety of new applications. They are available with or without cases; the uncased MSSLite servers can be placed inside serial devices.

Throughout this manual, the term **MSS** referrs to the MSS family in general. The MSSLite models will be referred to, sometimes collectively, as **the MSSLite** or as **the Server**.

1.1 MSSLite Model Overview

There are four MSSLite models, designated as MSSLite-A, MSSLite-B, MSSLite-C, and MSSLite-D. The main differences between the models are their serial interfaces, power interfaces, LEDs, and the presence or absence of a real-time clock.

Table 1-1: MSSLite Models At-A-Glance

	MSSLite-A	MSSLite-B	MSSLite-C	MSSLite-D*
Normal Full Serial Ports	1	1	1	0
Dedicated Console Ports	1	0	1	1 (TTL Levels)
Connectors I/O	1 x DB25	1 x DB25	2 x IDC10	1 x 50-pin
Voltage Input**	+6-32 V DC	+4.75-5.25 V DC	+6-32 V DC	+4.75-5.25 V DC
Aux Voltage Input**	+4.75-5.25 V DC	+4.75-5.25 V DC	+4.75-5.25 V DC	N/A
LEDs	PWR, ACT, LNK	PWR, ACT, LNK	ACT, LNK	ACT, LNK
Real-time Clock	Yes	No	No	No
16-bit CPU I/O	No	No	No	Yes

** The MSSLite-D is not yet available as a build option. See Chapter 5 for more information about special orders.*

*** See Appendix E for complete power requirements.*

The models are functionally the same. All of them use the MSS command set as described in the *MSS Reference Manual*, located on the distribution CD-ROM in both HTML and PDF formats.

1.2 MSS Family Features

- TCP/IP and UNIX Compatibility

  The MSS supports a variety of TCP/IP features, including Telnet, Rlogin, and UDP. The Telnet terminal protocol, supported on most UNIX systems, is an easy-to-use interface that creates terminal connections to any network host supporting Telnet. The Rlogin protocol allows users to initiate a TCP/IP login session. UDP (User Datagram Protocol) is a connectionless protocol that results in smaller packet headers, no session overhead, and the ability to send to multiple hosts.

  The MSS also supports DNS, DHCP, and SNMP. Domain Name Servers (DNS) allow a network nameserver to translate text node names into numeric IP addresses. Dynamic Host Control Protocol (DHCP) allows a server to use a dynamic IP address assigned at boot time from an available pool of addresses. Simple Network Management Protocol (SNMP) commands enable system administrators to obtain information from and control other nodes on a local area network (LAN), and respond to queries from other network hosts. The MSS allows configuration of one community name with read/write access.

  For IP addressing, DHCP, BOOTP, and RARP are supported. See *Using a DHCP, BOOTP, or RARP Reply* on page 6-4.

- Connectivity

  The Server connects devices directly to the Ethernet network, which conserves physical ports on the host, allows the terminal to access more than one host, and simplifies terminal cabling.

- Small Size

  At 2.3x3.35 inches, the uncased version is small enough to be placed inside the serial device for which it is providing connectivity. The cased version is enclosed in a small housing designed to fit into any office environment. Because there is no internal fan in either version, the MSSLite operates silently.

- Ease of Use

  A simple but powerful command interface is provided for both users and system managers. The server's Local mode supports command line editing, command line recall, and command completion. An extensive **Help** facility is also provided.

  The EZWebCon utility (provided on the CD-ROM) allows users to configure the MSSLite from a any host machine running the Java Virtual Machine (JVM). It also allows remote host logins into the Server, which are similar to Telnet and LAT logins.

- Remote Configuration

  The Server can be logged into and remotely configured via network login, Telnet login to the remote console port, or EZWebCon.

- Context-Sensitive Help

  Context-sensitive on-line help is available at any point. You may type **HELP** by itself for overall help, **HELP <command>** for help on a specific command, or a partial command line followed by a question mark for help on what is appropriate at that particular point.

Note: *See the MSS Reference Manual for more information.*

- Reloadable Operating Software

  The Server operating code is downloaded automatically at power-up, making software upgrades as easy as copying a file. Flash-ROM Servers store their operating software permanently on-board, so they do not need to download code unless new versions become available. Servers can also be configured to request a downloaded configuration file at boot time.

- Security

  The Server includes several configurable security features. They include:

  - Automatic session logouts when a port is disconnected or a device is turned off.
  - Password protection for privileges, ports, services, maintenance commands, and the remote console.
  - The ability to secure certain ports, which prevents them from issuing privileged commands and giving them a limited view of the network.
  - An IP security table, which allows the server manager to restrict incoming and outgoing TCP/IP connections to certain ports and hosts. This allows managers to restrict Server access to a particular local network segment or host.

- Diagnostics

  Power-up and interactive diagnostics help system managers troubleshoot network and serial line problems.

1.3 Terms

The following terms are used throughout this manual.

Host
A computer attached to the network. The term host is generally used to denote interactive computers, or computers that people can log into.

Local Mode
The MSS user interface. It is used to issue configuration and session management commands and to establish connections. When in Local mode, users will see a **Local>** prompt.

Node
Any intelligent device directly connected to the Ethernet network such as a host, a printer, or a terminal server. All nodes have their own Ethernet addresses. The MSS is a node. Devices connected to the MSS are not nodes.

Server/server
Server, when capitalized, refers to your Lantronix MSS server product. When not capitalized, it refers to a generic network server machine.

Session
A logical connection to a service. A typical session is a terminal connected to a host through the server.

1.4 About The Manuals

The rest of this documentation is divided into chapters as follows:

- Chapters 2 through 5 contain model-specific installation and usage information. Read the chapter that corresponds to your MSSLite model.
- Chapter 6 contains configuration information to get the unit up and running. Read this chapter in its entirety, and be sure to configure the required items.
- Chapter 7 contains additional configuration information.
- Chapter 8 contains information about how the MSSLite models can be used. Read this chapter to get the most out of using the MSSLite in your situation.
- Appendices include *Contact Information*, *Troubleshooting*, *Pinouts*, *Software Updates*, and *Specifications*. Read them as necessary.
- The comprehensive Index can be used to find specific information.

The *MSS Reference Manual*, located on the CD-ROM in HTML and PDF formats, provides the full MSS family command set as well as additional configuration information.

2: MSSLite-A

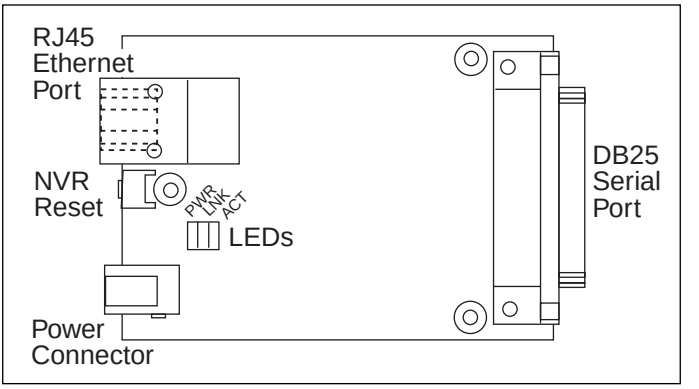
The MSSLite-A provides a full-featured main serial interface and a dedicated serial console port as well as a real-time clock. The MSSLite was designed to be connected to a serial device and a serial console simultaneously.

2.1 Components

2.1.1 Board Layout

The MSSLite-A has an RJ45 connector for 10BASE-T Ethernet, an NVR Reset button, a power connector, three LEDs, and a DB25 serial connector.

Figure 2-1: MSSLite-A Picture



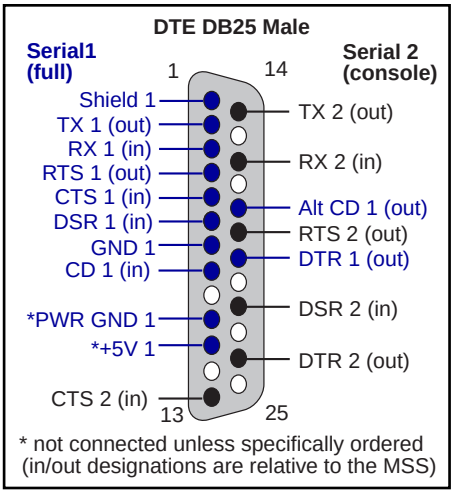
The LEDs show varying patterns when the MSSLite is booting, as explained in the installation instructions. During normal operation they will behave as follows:

- The **PWR** LED is solidly lit when power is supplied to the MSSLite.
- The **LNK** LED is solidly lit when there is a valid 10BASE-T connection.
- The **ACT** LED blinks green approximately every two seconds and occasionally yellow as packets are sent and received (serial and Ethernet).

2.1.2 DB25 Serial Connector

Pin connections for the DB25 serial connector are shown in Figure 2-2. The single connector provides one full serial port and one serial console port. The default configuration for both ports is 9600 baud, 8 bits, no parity, and one stop bit. The serial console port is not user-configurable.

Figure 2-2: Dual-serial-port DB25 Connector Pinouts



To connect the MSSLite-A to a serial device, you may need to make a ribbon cable that has a DB25 at one end and one or two connectors at the other end. The connector(s) at the serial device end will depend upon the serial device(s) used.

The MSSLite-A has an **Alt CD out** pin. If you connect it to another DTE device through a null modem cable, you can connect the **Alt CD out** pin to the other device's **CD in**. In this configuration, the MSSLite-A will act like a DCE device rather than a DTE device.

2.1.3 Power Connector

The MSSLite-A uses a standard barrel power jack and can accommodate a 12V power cube.

Lantronix also offers a version of the MSSLite-A that supplies power and ground through pins 11 and 10 of the DB25 connector. With one of these versions, pin 11 should be connected to your +5 V DC power supply and pin 10 should be connected to COM or ground return. Regualted power meeting the specifications listed in *Appendix E* must be provided.

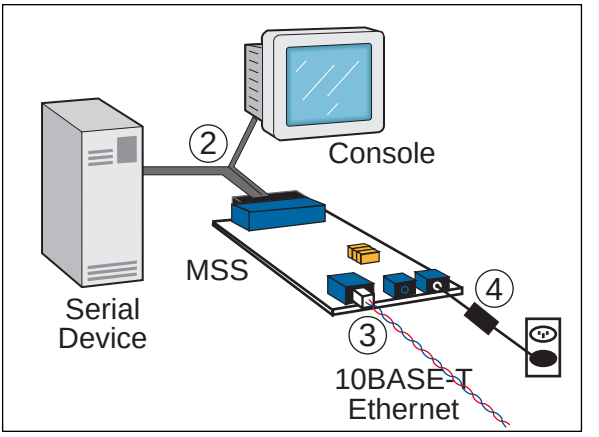
Note: *See Appendix E for complete MSSLite-A power requirements.*

DB25 pin 7 is a signal or reference ground, and therefore **should not** be used as the return path for power flowing into the MSSLite. Excessive current flowing into this pin could cause improper RS232 operation.

2.2 Installation

The following diagram shows a properly-installed MSSLite. The numbers in the diagram refer to the installation steps in this section.

Figure 2-3: MSSLite-A in Network



1 *If necessary*, make a custom ribbon cable with a DB25 connector at one end for the MSSLite DB25 port and a different connector at the other end. The serial connector at the other end will depend upon the serial device used.

Note: *A plain DB25 can be used to provide a basic serial port.*

2 Connect the serial device(s) to the MSSLite.

A Connect the custom end of the ribbon cable to the serial device(s). Lantronix recommends that you use a serial terminal for the initial connection both to ensure that your MSSLite is working and to configure the MSSLite.

B Connect the DB25 connector end of the ribbon cable to the MSSLite DB25 port.

3 Connect the MSSLite to an Ethernet network.

A Connect one end of a twisted-pair 10BASE-T cable to the Ethernet via a repeater or hub, depending on network topology.

B Connect the other end of the twisted-pair cable to the RJ45 Ethernet port on the back of the MSSLite.

4 Supply power to the MSSLite.

A Connect one end of the power cable to the MSSLite power jack. The MSSLite-A accepts 6-32 V DC power.

B Connect the other end of the power cable to a DC power supply with the proper voltage and polarity. The center pin should be positive (+).

When the MSSLite receives power, it will begin a three-step boot process.

- The MSSLite runs through a set of power-up diagnostics for five seconds. The **PWR** and **LNK** LEDs should remain solid green. The **ACT** LED should blink in varying patterns corresponding to the test being run.

- The MSSLite tries to obtain TCP/IP configuration information via DHCP, BOOTP, and/or RARP. This procedure takes 20 seconds if no hosts answer the request. The ACT LED blinks green approximately three times per second, and occasionally yellow as packets are sent and received.

- The MSSLite determines if the code in the Flash ROMs is valid. If so, it loads the code and begins normal execution. This step takes five seconds.

Once the unit is running normally, the **PWR** LED should be solidly lit to indicate the unit is ON, the **LNK** LED should be solidly lit to indicate a functioning Ethernet connection, and the **ACT** LED should blink green once every two seconds.

5 Supply power to the serial device(s).

6 Ensure the MSSLite is working. There are a few ways to check:

A Wait for approximately 30 seconds after powering the unit up. If the **PWR** and **LNK** LEDs are solidly lit and the **ACT** LED blinks green once every two seconds, the MSSLite is probably operating normally.

B If you have connected a serial terminal to the MSSLite, press the **Return** key. You should see several lines of start-up messages followed by a **Local>** prompt.

3: MSSLite-B

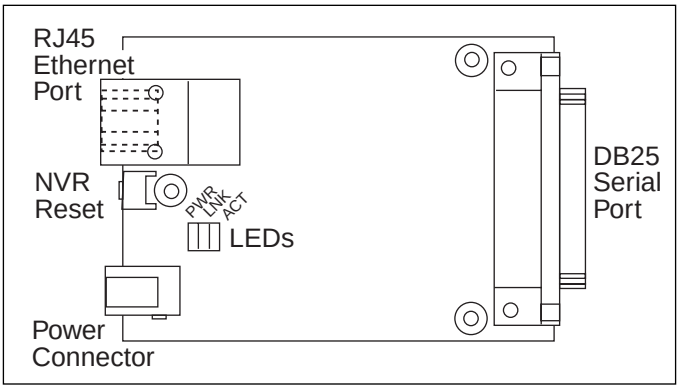
The MSSLite-B is the base model MSSLite. It has a single serial port interface, and is designed to be connected to a single serial device via a DB25 connector.

3.1 Components

3.1.1 Board Layout

The MSSLite-B has a power connector, an NVR Reset button, an RJ45 connector for 10BASE-T Ethernet, a DB25 serial connector, and three LEDs.

Figure 3-1: MSSLite-B Board Layout



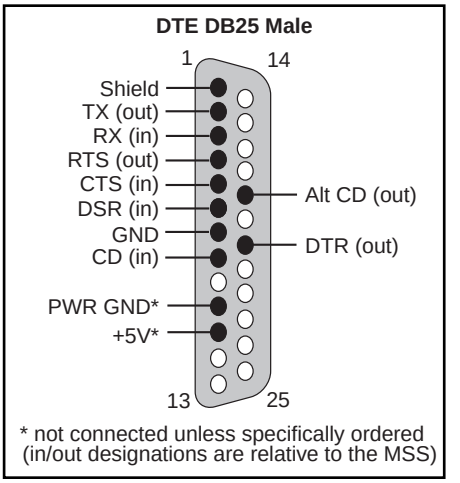
The LEDs show varying patterns when the MSSLite is booting, as explained in the installation instructions. During normal operation they behave as follows:

- The **PWR** LED is solidly lit when power is supplied to the MSSLite.
- The **LNK** LED is solidly lit when there is a valid 10BASE-T connection.
- The **ACT** LED blinks green approximately every two seconds and occasionally yellow as packets are sent and received (serial and Ethernet).

3.1.2 DB25 Connector

The MSSLite-B has a single serial port interface, as shown in Figure 3-2. The default settings are 9600 baud, 8 bits, no parity, and 1 stop bit. These settings can be changed.

Figure 3-2: DB25 Serial Port Pin Connections



The MSSLite-B has an **Alt CD out** pin. If you connect it to another DTE device through a null modem cable, you can connect the **Alt CD out** pin to the other device's **CD in**. In this configuration, the MSSLite-B will act like a DCE device rather than a DTE device.

3.1.3 Power Connector

The MSSLite-B uses a standard barrel power jack and accommodates a 5V power cube.

Lantronix also offers a version of the MSSLite-B that supplies power and ground through pins 11 and 10 of the DB25 connector, respectively. With one of these models, pin 11 should be connected to your +5 V DC power supply and pin 10 should be connected to COM or ground return. Regulated power meeting the specifications listed in *Appendix E* must be provided.

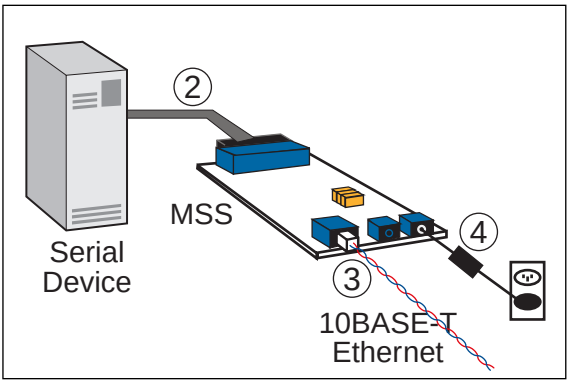
DB25 pin 7 is a signal or reference ground, and therefore **should not** be used as the return path for power flowing into the MSSLite. Excessive current flowing into this pin could cause improper RS232 operation.

Note: *See Appendix E for complete MSSLite-B power requirements.*

3.2 Installation

The following diagram shows a properly-installed MSSLite. The numbers in the diagram refer to the installation steps in this section.

Figure 3-3: MSSLite-B in Network



1 *If necessary*, make a custom ribbon cable with a DB25 connector at one end for the MSSLite DB25 port, and a different connector at the other end. The serial connector at the other end will depend upon the serial device used.

2 Connect the serial device to the MSSLite.

A Connect one end of a DB25 cable to the serial device. You may want to use a serial terminal for the first connection both to ensure that your server is working and to configure the necessary network settings.

B Connect the other end of the DB25 cable to the MSSLite DB25 port.

3 Connect the MSS to an Ethernet network.

A Connect one end of a twisted-pair 10BASE-T cable to the Ethernet network via a bridge or hub, depending on network topology.

B Connect the other end of the twisted-pair cable to the RJ45 Ethernet port on the back of the MSSLite.

4 Supply power to the MSSLite.

A Connect one end of the power cable to the MSSLite power jack . The MSSLite-B accepts +4.75 to 5.25 V DC power.

B Connect the other end of the power cable to a DC power supply with the proper voltage and polarity. The center pin should be positive (+).

When the MSSLite receives power, it will begin a three-step boot process.

- The MSSLite runs through a set of power-up diagnostics for five seconds. The **PWR** and **LNK** LEDs should remain solid green. The **ACT** LED should blink in varying patterns corresponding to the test being run.

- The MSSLite tries to obtain TCP/IP configuration information via DHCP, BOOTP, and/or RARP. This procedure takes 20 seconds if no hosts answer the request. The **ACT** LED blinks green approximately three times per second, and occasionally yellow as packets are sent and received.

- The MSSLite determines if the code in the Flash ROMs is valid. If so, it loads the code and begins normal execution. This step takes five seconds.

Once the unit is running normally, the **PWR** LED should be solidly lit to indicate the unit is ON, the **LNK** LED should be solidly lit to indicate a functioning Ethernet connection, and the **ACT** LED should blink green once every two seconds.

5 Supply power to the serial device.

6 Ensure the MSSLite is working. There are a few ways to check:

A Wait for approximately 30 seconds after powering the unit up. If the **PWR** and **LNK** LEDs are solidly lit and the **ACT** LED blinks green once every two seconds, the MSSLite is probably operating normally.

B If you have connected a serial terminal to the MSSLite DB25 port, press the **Return** key. You should see several lines of start-up messages followed by a **Local>** prompt.

4: MSSLite-C

The MSSLite-C provides IDC10 headers for both a full DCE serial port and a non-configurable DTE serial console port. The main serial port is available as either DCE or DTE (a second DTE port is available as a custom build option).

- The DCE1 header (Port 1) is a fully-functional serial port. It can be used to connect the MSS to a serial device such as a PC that has a DTE serial port; the internal MSSLite circuitry functions as a swapped cable.

  The DCE1 port also has a **CD out** pin to drive CD signals, so it can act like a modem.

- The DTE2 header (Port 2) is a non-configurable serial connection that provides the same signals as a standard PC serial port. It can be used as a serial console port.

- The optional DTE1 header is like the DCE1 header, but instead of driving CD, it has a **CD in** pin to receive CD signals. The DCE1 header acts like a modem, and the DTE1 header acts like a terminal.

  If you are interested in obtaining an MSSLite-C that includes the DTE1 header instead of or in addition to the DCE1 and DTE2 headers, contact Lantronix using the information provided in *Appendix A*.

If your serial device uses a standard DTE serial port configuration, you would connect it to the MSSLite-C via the DCE1 port. You could then use the MSSLite-C DTE2 port to provide a serial console port.

If your serial device uses a DCE serial port, you would either connect it to the MSSLite-C DCE1 port by swapping the cable, or connect it to the MSSLite-C via the optional DTE1 port. You could then use the DTE2 as a serial console port.

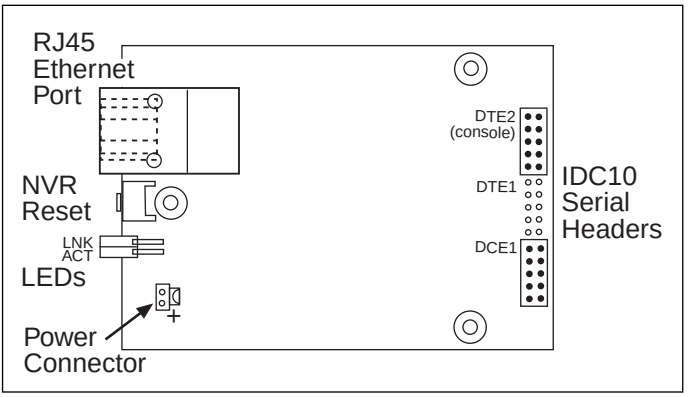
If you wanted to place the MSSLite-C inside a serial device such as a PC, you would connect the MSSLite-C to the PC via the DCE1 port, and then connect a cable to the DTE2 port and use it to provide an external serial console port. Using the DCE port to connect to the serial device is like using a null-modem cable, but the swapping takes place within the MSSLite board (a regular straight-through cable is used).

4.1 Components

4.1.1 Board Layout

The MSSLite-C has a power connector, an NVR Reset button, an RJ45 connector for 10BASE-T Ethernet, two 10-pin IDC headers for serial connections, and two LEDs.

Figure 4-1: MSSLite-C Board Layout



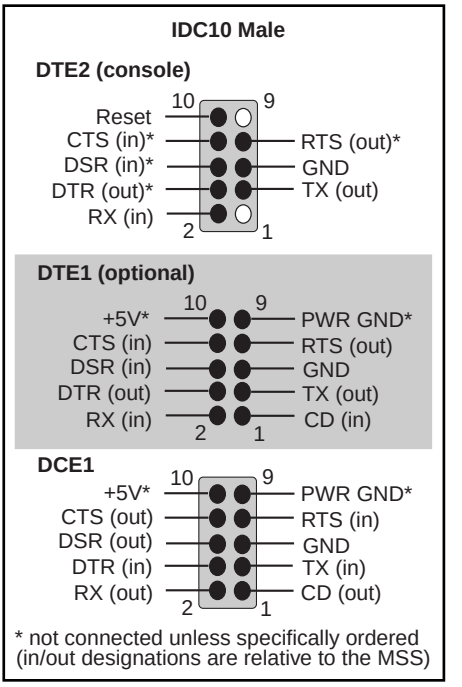
The LEDs show varying patterns when the MSSLite is booting, as explained in the installation instructions. During normal operation they will behave as follows:

- The **LNK** LED is solidly lit when there is a valid 10BASE-T connection.
- The **ACT** LED blinks green approximately every two seconds and occasionally yellow as packets are sent and received (serial and Ethernet).

4.1.2 IDC Headers

The MSSLite-C has two 10-pin IDC headers. One is a DCE serial port, and the other is a DTE serial port. The ports are labeled as DCE1, DTE1, and DTE2 on the circuit board.

Figure 4-2: MSSLite-C IDC10 Header Pin Connections



To connect a serial device to the MSSLite-C, you will need to make one or two custom ribbon cables with IDC10 connectors at one end. The connectors at the other end will depend upon the serial devices used. The default settings for both serial ports is 9600 baud, 8 bits, no parity, and 1 stop bit. The main serial port is configurable, but the DTE2 console port is not.

4.1.3 Power Connector

Power can be supplied to the MSSLite-C via the 2-pin snapfit connector.

Lantronix also offers a version of the MSSLite-C that can receive power and ground signals through pins 9 and 10 of the IDC headers (see Figure 4-2). With this version, pin 10 on the DCE1 or DTE1 header should be connected to your 5.1 V DCpower supply and pin 9 should be connected to COM or ground return.

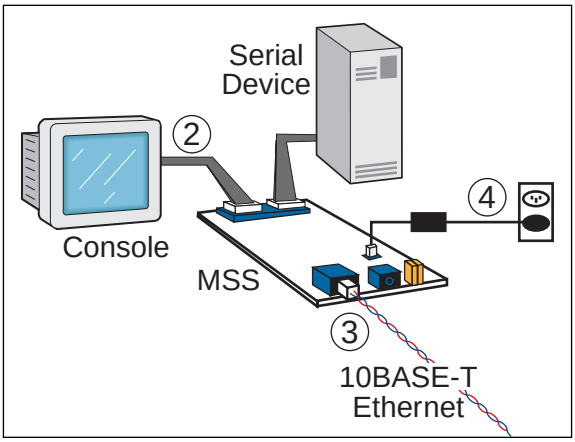
Note: *See Appendix E for complete MSSLite-C power requirements.*

IDC pin 5 is a signal or reference ground, and therefore **should not** be used as the return path for power flowing into the MSSLite-C (pin 9, PWR GND, should be used instead). Excessive current flowing into this pin could cause improper RS232 operation.

4.2 Installation

The following diagram shows a properly-installed MSSLite. The numbers in the diagram refer to the installation steps in this section.

Figure 4-3: MSSLite in Network



1 Make one or two custom ribbon cables that have 10-pin IDC connectors on one end. The connectors at the other end(s) will differ depending on the serial device(s) used.

Generally speaking, you should make one cable to connect your serial device to the MSSLite DCE1 header and another cable to connect a console to the MSSLite DTE2 IDC header. The cables would have 10-pin IDC connectors at one end to connect to the MSSLite, and other connectors such as DB9s at the other end to connect to the serial device or console terminal.

2 Connect the MSS to the serial device(s).

A Connect the DCE IDC10 connector to the MSS DCE1 header.

B Connect the DTE IDC10 connector to the MSS DTE2 header.

C Connect the other end(s) of the ribbon cable(s) to your serial device(s).

3 Connect the MSS to an Ethernet network.

A Connect one end of a twisted-pair 10BASE-T cable to the Ethernet via a repeater or hub, depending on the network topology.

B Connect the other end of the twisted-pair cable to the RJ45 Ethernet port on the back of the MSS.

4 Supply power to the MSS.

A Connect one end of the power cable to the MSSLite snapfit power connector. The MSSLite-C accepts 6-32 V DC power.

Note: *Optionally, +4.75-5.25 V DC power can be supplied via the IDC headers.*

B Connect the other end of the power cable to a DC power supply with the proper voltage and polarity.

When the MSSLite receives power, it will begin a 3-step boot process.

- The MSSLite runs through a set of power-up diagnostics for five seconds. The **LNK** LED should remain solid green. The **ACT** LED should blink in varying patterns corresponding to the test being run.

- The MSSLite tries to obtain TCP/IP configuration information via DHCP, BOOTP, and/or RARP. This procedure takes 20 seconds if no hosts answer the request. The **ACT** LED blinks green approximately three times per second, and occasionally yellow as packets are sent and received.

- The MSSLite determines if the code in the Flash ROMs is valid. If so, it loads the code and begins normal execution. This step takes five seconds.

Once the unit is running normally, the **LNK** LED should be solidly lit to indicate a functioning Ethernet connection, and the **ACT** LED should blink green once every two seconds.

5 Supply power to the serial device(s).

6 Ensure the MSSLite is working. There are a few ways to check:

A Wait for approximately 30 seconds after powering the unit up. If the **LNK** LED is solidly lit and the **ACT** LED blinks green once every two seconds, the MSSLite is probably operating normally.

B If you have connected a serial terminal to the serial port, press the **Return** key. You should see several lines of start-up messages followed by a **Local>** prompt.

5: MSSLite-D

The MSSLite-D was designed to be placed inside a serial device. It has a 50-pin OEM-style connector for both serial signals and power, and a 16-bit direct CPU interface. Other specifications have yet to be determined.

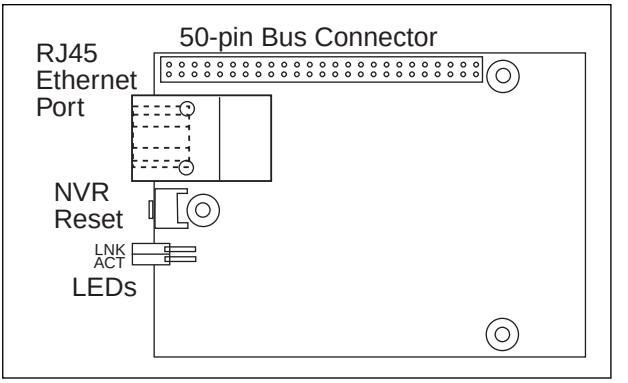
If such a model would be useful for your application, contact Lantronix using the information found in *Appendix A: Contact Information*. An MSSLite-D reference specification will be posted to the Lantronix World Wide Web site as soon as it becomes available (http://www.lantronix.com).

Note: *The information listed in this chapter is for evaluation purposes only, and is subject to change.*

5.1 Board Layout

The MSSLite-D has a 50-pin OEM-style serial connector, an RJ45 connector for 10BASE-T Ethernet, a Reset button, and two LEDs.

Figure 5-1: MSSLite-D Board Layout



The LEDs show varying patterns when the MSSLite is booting. During normal operation they will behave as follows:

- The **LNK** LED is solidly lit when there is a valid 10BASE-T connection.
- The **ACT** LED blinks green approximately every two seconds and occasionally yellow as packets are sent and received (serial and Ethernet).

6: Getting Started

This chapter covers all of the steps needed to get the MSS on-line and working. There are three basic methods used to log into the MSS and begin configuration.

- Incoming (Remote) Logins: EZWebCon is the preferred configuration method.
- Serial Port Logins: Users can connect a terminal directly to the serial port, log in, and use the command line interface to configure the unit.
- Remote Console Logins: TCP/IP users can make a Telnet connection to the remote console port (port 7000).

It is important to consider the following points before logging into and configuring the MSS:

- The MSS IP address must be configured before any TCP/IP functionality is available (see *IP Address Configuration* on page 6-2).
- Connecting a terminal to the serial port or logging into the remote console port does not automatically create privileged user status. You must use the **Set Privileged** command to configure the unit (see *Privileged Password* on page 7-1).
- The remote console port is password protected (see *System Passwords* on page 7-1).
- Only one person at a time may be logged into the remote console port (port 7000). This eliminates the possibility of several people simultaneously attempting to configure the MSS.
- Remote console logins cannot be disabled. The system manager will always be able to access the unit.
- Only one terminal at a time may be connected to the serial port.

6.1 IP Address Configuration

6.1.1 Using EZWebCon

To assign the IP address from EZWebCon:

1. Start EZWebCon. Instructions for installing, running, and using EZWebCon can be found on the distribution CD-ROM.
2. Click on the Lantronix logo menu in the bottom left corner of the EZWebCon window, then select **Assign IP Address to Server**. Fill in the following information:
   - **A** The last three bytes of the MSS hardware address. The hardware address is printed on a label on the bottom of the Server.
   - **B** The desired IP address.
   - **C** The subnet, if you wish to use a subnet other than the default.
   - **D** The IP address of the TFTP server you wish to use, if desired.
3. Click **OK**.
4. Cycle power on the Server. EZWebCon will let you know whether the configuration was successful.

6.1.2 Using an ARP Entry and the Ping Command

The ARP/ping method is available under UNIX, Windows 95, and Windows NT. If the MSS has no IP address, it will set its address from the first directed IP packet it receives.

Note: *The ARP/ping method only works during the first two minutes of MSS operation. After two minutes, an alternate method must be used or the MSS must be rebooted.*

On a **UNIX** host, create an entry in the host's ARP table and substitute the intended IP address and the hardware address of the server, then ping the server (See Figure 6-1). This process typically requires superuser privileges.

Figure 6-1: Entering ARP and Ping (UNIX)

```
# arp -s 192.0.1.228 00:80:a3:xx:xx:xx
% ping 192.0.1.228
```

For the ARP command to work on **Windows**, the ARP table on the PC must have at least one IP address defined other than its own. Type **ARP -A** at the DOS command prompt to verify that there is at least one entry in the ARP table. If there is no other entry beside the local machine, ping another IP machine on your network to build the ARP table. This has to be a host other than the machine on which you're working.

Use the following commands to ARP the IP address to the MSS and make the MSS acknowledge the IP assignment.

Figure 6-2: Entering ARP and Ping (Windows)

```
C:\ ARP -S 192.0.1.228 00-80-A3-XX-XX-XX
C:\ PING 192.0.1.228
```

Note: *There should be replies from the IP address if the ARP command worked.*

When the MSS receives the ping packet, it will notice that its IP address is not set and will send out broadcasts to see if another node is using the specified address. If no duplicate is found, the server will use the IP address and will respond to the ping packet.

The MSS will not save the learned IP address permanently. This procedure is intended as a temporary measure to enable EZWebCon to communicate with the server, or allow an administrator to Telnet into the MSS. Once logged in, the administrator can enter the **Change IPaddress** command to make the address permanent.

Figure 6-3: Changing the IP Address

```
% telnet 192.0.1.228

Trying 192.0.1.228

Lantronix Version n.n/n (yymmdd)
Type Help at the 'Local_>' prompt for assis-
tance.

Enter Username> gopher
Local> SET PRIVILEGED
Password> system (not echoed)
Local>> CHANGE IPADDRESS 192.0.1.228
```

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

6.1.3 Using a DHCP, BOOTP, or RARP Reply

A host-based DHCP, BOOTP, or RARP server can provide information for the MSS to use to configure an IP address when the unit boots. See the host-based man pages for configuration information. Keep in mind that many BOOTP daemons will not reply to a BOOTP request if the download file name 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.

DHCP, BOOTP, and RARP are all enabled by default on the MSS. If you wish to disable them, use the **Change DHCP**, **Change BOOTP**, and **Change RARP** commands.

6.1.4 Using the Serial Console

Connect a terminal to the serial console and press the **Return** key. If the MSS is running normally when you press the **Return** key, the Local> prompt will be displayed. You can become the privileged user and enter the **Change IPaddress** command at this prompt.

Figure 6-4: Entering the IP Address at the Local Prompt

```
Local> SET PRIVILEGED
Password> system (not echoed)
Local>> CHANGE IPADDRESS 192.0.1.228
```

If the MSS has encountered a problem with the Ethernet network, it will send an alert message to the console and wait ten seconds to detect serial port activity before attempting to finish booting. If you press a key during that ten second time period, the MSS will display the Boot prompt at which you can enter the **Change IPaddress** command to set the unit's IP address.

Note: *For more information on Boot Configuration Program (BCP) commands, see Appendix B.*

6.2 Incoming Logins

6.2.1 Controlling Incoming Logins

Incoming Telnet logins are enabled by default. This behavior can be changed with the **Change Incoming None** command.

For security reasons, you may wish to disable incoming logins. If it is undesirable to disable incoming logins, the MSS can be configured to require a login password for incoming connections with the **Change Incoming** command. The incoming password feature can be disabled with the **Change Incoming Nopass** command.

6.2.2 EZWebCon Login and Configuration

EZWebCon enables users on TCP/IP networks to log into and configure the MSS. The program offers a simple interface that prompts the user for the information necessary to configure the server. Instructions for installing, running, and using EZWebCon are included on the CD-ROM.

6.2.3 Other Incoming TCP/IP Logins

6.2.3.1 Telnet

To log into the MSS, type **Telnet** followed by the MSS IP address. The MSS must have an IP address assigned in order for this command to work.

Figure 6-5: A Telnet Connection

```
% telnet 192.0.1.88
```

6.2.3.2 Rlogin

Rlogin allows users to connect to a remote device as if they were on the local network. Rlogin is enabled by default.

Figure 6-6: An Rlogin Connection

```
% rlogin 192.0.1.88
```

6.2.4 Serial Port Logins

Attach a terminal to the serial port and press the **Return** key. If the unit passes its power-up diagnostics and completes the boot procedure, the **Local>** prompt should be displayed. Proceed to the *Configuration* chapter to configure the unit using the command line interface.

If there is a problem during the boot process, pressing any key will display the Boot prompt. This prompt enables you to enter a special set of commands, called Boot Configuration Program (BCP) commands, which are discussed in *Appendix B*.

6.2.5 Remote Console Logins

The MSS enables users to configure the server via a single Telnet connection to the remote console port, designated as port 7000. Connections to the console port cannot be disabled. This ensures that administrators will always be able to log into the port.

To connect to the remote console port, use the **Telnet** command followed by the MSS IP address and the remote console port number. You will have to enter the login password. The default login password is **access**.

Figure 6-7: Connecting to the Console Port

```
% telnet 192.0.1.88 7000
Trying 192.0.1.88
Connected to 192.0.1.88
Escape character is '^]'

# access (not echoed)

Lantronix MSS Version n.n/n (yymmdd)
Type Help at the 'Local>' prompt for assistance.

Enter Username> jerry
```

6.2.6 Starting Outbound Connections

To start an outgoing Telnet session, type **Telnet** at the Local> prompt, followed by either the host's name or its numeric IP address.

Figure 6-8: Telnet Connection

```
Local> TELNET 192.0.1.66
```

6.2.7 Logout

To manually log out of the MSS, type **Logout** or **Logout Port** at the Local> prompt or press Ctrl-D.

Figure 6-9: Logging out of the MSS

```
Local> LOGOUT
```

7: Configuration

Certain parameters must be configured before the MSS can function in the network. EZWebCon is the recommended way to communicate with and configure the MSS. This chapter explains an additional method of configuration: the command line interface and MSS command set.

Note: *Instructions for using EZWebCon are included on the distribution CD-ROM. EZWebCon also has on-line help to assist you with configuration.*

7.1 Command Set

The command line interface allows users to enter commands at the Local> prompt to configure, monitor, and use the MSS. This chapter covers many of the MSS commands. The full command set is discussed in detail in the *MSS Reference Manual*.

Note: *To return to factory defaults, press and hold the Reset button while cycling power on the unit, or enter the Initialize Factory command at the Local> prompt.*

7.1.1 System Passwords

There are two important passwords for the MSS: the privileged password and the login password. These passwords have default settings and are discussed in the following sections.

Note: *Default passwords may pose a security risk and should be changed as soon as possible. This is especially true of the privileged password.*

7.1.1.1 Privileged Password

Only the privileged user can change Server or port settings. To become the privileged user, enter the following command. The default privileged password is **system**.

Figure 7-1: Set Privileged Command

```
Local> SET PRIVILEGED
```

If another user is currently the privileged user for the MSS, use the **Set Privileged Override** command to forcibly become the privileged user. To relinquish privileged status, enter the **Set Noprivilege** command.

The privileged password can be changed with the **Change Privpass** command. Specify a new password of up to six alphanumeric characters.

Figure 7-2: Changing Privileged Password

```
Local> SET PRIVILEGED
Password> system (not echoed)
Local>> CHANGE PRIVPASS “walrus”
```

7.1.1.2 Login Password

The login password is required for remote console logins and when the MSSLite password protection feature is enabled. The default login password is **access**. To specify a new login password, use the **Change Loginpass** command and specify a new password of up to six alphabetic characters.

Figure 7-3: Changing the Login Password

```
Local> SET PRIVILEGED
Password> system (not echoed)
Local>> CHANGE LOGINPASS “badger”
```

7.2 TCP/IP Configuration

7.2.1 IP Address

Procedures for setting the MSSLite IP address are covered in *Section 6.1*.

7.2.2 Subnet Mask

IP networks can be divided into several smaller networks by subnetting. When a network is subnetted, a subnet mask is created that allows the MSS (and other network devices) to decide at connection time whether a given TCP/IP host is part of the local network segment and route packets accordingly.

Note: *All hosts must agree on the subnet mask for a given network.*

When the IP address is configured, a default subnet mask will be configured. If your network is divided into subnetworks, you will need to create a custom subnet mask; the default subnet mask will not be correct for your network. Use the **Change Subnet Mask** command.

Figure 7-4: Setting the Subnet Mask

```
Local>> CHANGE SUBNET MASK 255.255.255.0
```

7.2.3 Gateway

Usually, a TCP/IP internet is broken down into networks and subnetworks, and a host is able to see only the hosts on its own network. TCP/IP networks rely on routers or gateways to transfer network traffic to hosts on other networks. Gateways are typically connected to two or more networks and will pass or route TCP/IP packets across network boundaries.

The MSS can be told which hosts are the gateways for the local network. If no gateway is specified, the MSS will listen to broadcasts on the network from other gateways to decide which hosts are acting as gateways. The command below tells the MSS which host is the preferred gateway.

Figure 7-5: Specifying a Gateway

```
Local>> CHANGE GATEWAY 192.0.1.73
```

A secondary gateway can also be configured in case the primary gateway is unavailable. If you wish to clear the gateway configuration, specify 0.0.0.0 as the IP address in the above command. See **Change Gateway** in the *MSS Reference Manual* for more information.

7.2.4 Name Server

A TCP/IP host generally has an alphanumeric host name, such as Phred, in addition to its IP address. For this reason, the MSS supports domain name service (DNS). DNS translates text host names into the numeric addresses needed to make a connection. To specify a domain name server, use the following command:

Figure 7-6: Configuring a Nameserver

```
Local>> CHANGE NAMESERVER 192.0.1.67
```

A secondary nameserver can also be specified for use when the primary nameserver is unavailable. See **Change Nameserver** in the *MSS Reference Manual* for more information.

Note: *If the MSS cannot resolve a text host name, the numeric address must be entered.*

The MSS also allows you to set a default domain name to be appended to any host name for the purpose of name resolution. When a user types a host name, the MSS will add this domain name and attempt the connection. Name checking applies to any MSS commands that require text name resolution, such as Telnet, Rlogin, and Ping. To set the default, enter the **Change Domain** command, followed by the desired domain name in quotes

Figure 7-7: Configuring the Default Domain

```
Local>> CHANGE DOMAIN “widget.incorp.com”
```

7.2.5 IP Security

IP security allows the system administrator to restrict incoming and outgoing TCP/IP sessions and access to the serial port. Connections are allowed or denied based upon the source IP address for incoming connections and the destination IP address for outgoing connections.

IP security information can be added to the IP local host table. To add an entry, specify an IP address and whether to allow or deny connections. For example, the command below disables outgoing connections for all addresses between 192.0.1.1 and 192.0.1.254.

Figure 7-8: IP Security Command

```
Local>> CHANGE IPSECURITY 192.0.1.255 DISABLED
```

Single addresses can also be specified. To view the host table entries, enter the **Show IPSecurity** command. To remove an entry, use the **Delete IPSecurity** command followed by the IP address that you want to remove.

7.2.6 SNMP

The MSS supports the SNMP network protocol, which allows hosts on the network to query nodes for counters and network statistics and change some parameters on those nodes. The form of these requests is documented by RFC 1098. The list of items that can be queried and/or set and the type of data used, such as integer and string, are both documented in various Management Information Bases (MIBs). MIBs cover a variety of things, such as port status, counters, and IP address resolution tables.

The MSS has one SNMP community configured by default, named **public**, and it allows only read access. To create an SNMP community with read/write access, enter a command of the following form, where `tahoe` is the new community name.

Figure 7-9: Creating SNMP Write Community

```
Local>> CHANGE SNMPSETCOMM “tahoe”
```

Note: *See **Change SNMPSetComm** in the MSS Reference Manual for more information about configuring MIB usage.*

Once you enable an SNMP write community, you can configure the following settings. Items marked with an asterisk (*) are saved to NVR.

RS232 MIB:

PortInSpeed*
PortOutSpeed* (changing either of the previous two changes both)
PortInFlowType*
PortOutFlowType * (changing either of the previous two changes both)
AsyncPortBits*
AsyncPortStopBits*
AsyncPortParity *
AsyncPortAutobaud*

Character MIB:

PortName
PortReset
PortInFlowType
PortOutFlowType
PortSessionMaximum
SessionKill.

7.3 Serial Port Configuration

The MSSLite has one (model B) or two (models A and C) serial ports. The first is a full-featured serial port, and the optional second is a serial console port. The configuration in this section refers to the full-featured serial port. The serial console port is not user-configurable.

Serial ports are set at the factory for 9600 baud, 8 data bits, one stop bit, and no parity. These and other serial port features can be customized on the full-features serial port as shown in the following sections. Remember that ports should be logged out after configuration.

7.3.1 Access Mode

The serial port access mode governs which connections the port can accept. **Local** access permits local logins on the serial port. **Remote** access allows network hosts to connect to the MSS serial port. **Dynamic** access (the default) allows both local and remote access.

To change the serial port's access mode, use the **Change Access** command.

Figure 7-10: Changing Serial Port Access Mode

```
Local>> CHANGE ACCESS LOCAL
```

7.3.2 Autostart

Normally, the serial port will wait for a carriage return before starting a connection. When the Autostart option is enabled, the connection will be established as soon as the unit boots (or if modem control is enabled, as soon as the DSR signal is asserted). To control this feature, enter the **Change Autostart** command.

Figure 7-11: Enabling Autostart

```
Local>> CHANGE AUTOSTART ENABLED
```

A port set for Autostart will not be idle, and therefore will not be available for network connections. If network connections are desired, Autostart should remain disabled (the default).

Autostart can also be triggered by a specific input character. There is no default Autostart character, you will have to configure one. For example, when using *Modem Emulation Mode*, you may want to use **A** so that Autostart will happen as soon as an **AT** modem command is entered. See *Enabling Modem Mode* on page 8-8 for more information.

Figure 7-12: Configuring an Autostart Character

```
Local>> CHANGE AUTOSTART CHARACTER "A"
```

7.3.3 Baud Rate

The MSS and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates for the MSS are 300, 600, 1200, 2400, 4800, 9600 (the default), 19200, and 38400 baud. The baud rate can be changed with the **Change Speed** command followed by a baud rate number.

Figure 7-13: Changing the Baud Rate

```
Local>> CHANGE SPEED 19200
```

The MSS supports Autobaud, which allows the serial port to match its speed to the attached serial device upon connection (see **Change Autobaud** in the *MSS Reference Manual* for an explanation of the baud rate negotiation process). Autobaud is disabled by default, but can be enabled with the following command.

Figure 7-14: Enabling Autobaud

```
Local>> CHANGE AUTOBAUD ENABLED
```

7.3.4 Character Size, Parity, and Stop Bits

The default character size of 8 data bits can be changed to 7 data bits. Similarly, the default stop bit count of 1 bit can be changed to 2 bits. Parity is normally None, but can also be Even, Mark, Odd, or Space. To change these parameters, use the following commands:

Figure 7-15: Configuring Serial Port Parameters

```
Local>> CHANGE CHARSIZE 7
Local>> CHANGE STOPBITS 2
Local>> CHANGE PARITY EVEN
```

7.3.5 Flow Control

Both RTS/CTS (hardware) and XON/XOFF (software) flow control methods can be used on the MSS. RTS/CTS controls data flow by sending serial port signals between two connected devices. XON/XOFF controls data flow by sending particular characters through the data stream: **Ctrl-Q** to accept data (XON) and **Ctrl-S** when data cannot be accepted (XOFF).

Note: *Applications that use Ctrl-Q and Ctrl-S will conflict with XON/XOFF flow control, in which case RTS/CTS is recommended.*

To switch between flow control methods, use the **Change Flow Control** command followed by the preferred method. If you do not wish to use flow control at all, specify **None**.

Figure 7-16: Enabling Recommended Flow Control

```
Local>> CHANGE FLOW CONTROL CTSRTS
```

If you're using XON/XOFF flow control, the XON/XOFF characters will be removed from the data stream by default. To prevent this removal, the Passflow option can be enabled. However, passflow is unnecessary in most situations. See the *Commands* chapter in the *MSS Reference Manual* for more information.

7.3.6 Modems and Modem Signalling

The following sections explain some of the MSS options that are typically considered to be modem-related. They do not apply exclusively to modems, but to communications devices in general. Most options are mutually exclusive when enabled.

Note: *Modem Emulation Mode, in which the MSS acts like a modem and only accepts AT modem commands, is discussed in Chapter 8.*

Once you are finished configuring modem-related settings, refer to the *Modem Configuration Checklist* on page B-7.

Note: *Modem wiring issues are covered in Appendix C.*

7.3.6.1 Modem Control

If a connection has ended, the MSS should be able to log out the port and prepare to accept a new connection. Similarly, if no connection is open, the MSS should know to ignore spurious characters from the port and only accept valid connection attempts. The MSS can do both of these when modem control is enabled. Modem control implies three things:

- DSRLogout enabled, meaning the MSS will log out the port when DSR is dropped.
- DTR wiggle on logout, meaning the MSS will hold DTR low for approximately 3 seconds after the port is logged out.
- No Autostart until the attached device asserts DTR.

To enable modem control, enter the **Change Modem Control** command.

Figure 7-17: Enabling Modem Control

```
Local>> CHANGE MODEM CONTROL ENABLED
```

7.3.6.2 Signal Checking

The MSS uses the Data Signal Ready (DSR) input signal to decide if there is a valid device connection. When a connection is lost, the MSS should log out the port and close any sessions. If it does not do so, security problems may result when the next user logs in.

When MSS signal checking is enabled, the MSS will check for the presence of a DSR signal before allowing incoming connections. Remote (network) connections to the serial port will not be permitted unless the DSR signal is asserted. To enable DSR signal checking, use the **Change Signal Check** command.

Figure 7-18: Enabling Signal Checking

```
Local>> CHANGE SIGNAL CHECK ENABLED
```

7.3.6.3 DSRlogout

When a device connected to the MSS is disconnected or powered off, the DSR signal is de-asserted. The MSS can be configured to automatically log out the port when this occurs using the **Change DSRLogout Enabled** command. This also prevents users from accessing other sessions by switching terminal lines.

Figure 7-19: Enabling DSRLogout

```
Local>> CHANGE DSRLOGOUT ENABLED
```

7.3.6.4 DTRwait

Spurious characters from the modem may be interpreted as a user login, which could cause the port to be unavailable for connections. To avoid this behavior, the MSS uses the Data Transmit Ready (DTR) output line to signal the serial device that a connection is possible or acceptable.

Normally DTR will be asserted when the port is idle, which allows devices to answer an incoming connection; many devices will not do so unless DTR is asserted. The DTRwait feature can be used to delay the MSS from asserting DTR until the port is actually in use (whether due to a login or a network connection). To control DTRwait, use the **Change DTRWait** command.

Figure 7-20: Enabling DTRWait

```
Local>> CHANGE DTRWAIT ENABLED
```

The MSS will generally assert DTR when a connection begins and de-assert DTR when the connection ends.

7.3.7 Logouts

In addition to DSRlogouts, the port can be manually logged out, or it can be configured to automatically log out when it has been inactive for a pre-determined length of time. To manually log out of the MSS, type **Logout** at the Local> prompt, or press **Ctrl-D**.

Figure 7-21: Logging out of the MSS

```
Local>> LOGOUT
```

To log out the port after a specified period of inactivity, use the **Change Inactive Logout** command. This command works in conjunction with the **Change Inactive Timer** command which defines how long a port must remain idle before it is automatically logged out.

For example, to make the MSS log out the port after two minutes of inactivity, use the following commands.

Figure 7-22: Enabling Timed Inactivity Logout

```
Local>> CHANGE INACTIVE LOGOUT ENABLED
Local>> CHANGE INACTIVE TIMER 2m
```

The inactivity logout timer period can also be specified in seconds. For example, changing **2m** in the example to **120s** produces the same results.

7.3.8 Preferred Port Service

A default host for a port can be defined using the **Change Preferred** command. The MSS attempts to use the preferred service for connections when no service name is specified in a connection command.

Figure 7-23: Defining a Preferred Service

```
Local>> CHANGE PREFERRED TCP 192.0.1.66
```

7.3.9 Dedicated Port Service

A dedicated service can also be defined for the port using the **Change Dedicated** command. A dedicated port automatically connects users to the specified host; they cannot return to local mode. When the connection is closed, the users are automatically logged out of the MSS.

Figure 7-24: Defining a Dedicated Service

```
Local>> CHANGE DEDICATED TCP 192.0.1.66
```

Environment strings can be added to the command to change connection characteristics. See the **Change Dedicated** command in the *MSS Reference Manual* for more information.

Note: *Because dedicated connections leave no easy way to log into the MSS, configuring the single MSS serial port for dedicated service is not recommended unless incoming logins are enabled. Otherwise, only Telnet console port connections are possible.*

8: Using the MSSLite

This chapter explains how to use the MSS. Host-initiated (incoming) connections include socket connections, using host applications, and using the code examples included on the MSS distribution CD-ROM. Interactive uses include manipulating sessions, making outgoing connections, and viewing server and network information with the help of the Show commands.

In addition, explanations are provided for:

- Setting up two MSS units to emulate a direct serial connection over the LAN (Section 8.5, *Serial Tunnel*).
- Using the MSS as a data pipe between a serial device and multiple hosts on the network (Section 8.6, *Multihost Mode*).
- Making the MSS look like a modem so that it can be used with existing communications software (Section 8.7, *Modem Emulation Mode*).
- Using the Lantronix COM Port Redirector software to redirect PC COM ports (Section 8.8, *COM Port Redirector*).

8.1 Incoming Connections

Each node on a network has a node address, and each node address can allow connections on one or more sockets. Sometimes these sockets are referred to as ports. TCP/IP connections can be made directly to the MSS serial port using sockets.

Note: *If the serial port is in use, the socket connection will be refused.*

There are two categories of sockets. Well-known sockets are those that have been defined in RFCs (Requests for Comments). For example, port 23 is used for Telnet connections. There are also custom sockets that users and developers define for their specific needs.

The MSS supports TCP/IP socket connections to ports 2001 and 3001. Opening a TCP session to port 3001 will form a raw TCP/IP connection to the serial port. Port 2001 can be used when Telnet IAC interpretation is needed.

To specify a connection to a socket, use the **Telnet** command followed by the MSS IP address (or resolvable name) and the desired socket number.

Figure 8-1: TCP/IP Socket Connection

```
Local>> Telnet 192.0.1.228:2001
```

8.2 Host Applications

The MSS can be used with applications on Unix hosts, and any other hosts that have a TCP/IP socket interface.

When a host application makes a socket connection to the MSS, it uses the socket as a data pipe to send and receive data. The host application performs general read/write tasks, and works with the MSS as if it were a directly-attached serial device.

There are some important points to remember when making a socket connection.

- Port access must be set to either Dynamic or Remote to allow network connection requests. Local access does not allow a port to receive connection requests from the network. To change the port's access type, use the **Change Access** command followed by either Dynamic or Remote.
- The port must be idle. Use the **Show Ports** command to verify that the port is not in use. To ensure that the port will be idle, Telnet to the remote console port rather than attaching a terminal to the serial port.
- Only one serial port connection is allowed at a time, except in the case of *Multihost Mode* (see Section 8.6).
- Timing between serial signals (such as DSR, RTS, and CD) is not preserved, and the state of such signals is not readable.

8.3 Code Examples

The MSS distribution CD-ROM includes examples of code for TCP/IP applications. Refer to the Readme file included with the code examples for further information and instructions.

8.4 Interactive Connections

Interactive mode refers to entering commands at the Local> prompt. Commands can be used to configure the MSS, connect to remote services, manipulate a connection, or receive feedback. Interactive use requires an input device, such as a terminal.

8.4.1 Outgoing Connections

The MSS can make outgoing connections to hosts on TCP/IP networks via its serial port. Telnet and Rlogin connections are supported. In addition, environment strings are supported within the connection commands. See the *Command Reference* chapter of the *MSS Reference Manual* on the CD-ROM for more information.

8.4.1.1 Telnet

To start an outgoing Telnet session to a remote host on a TCP/IP network, type **Telnet** at the Local> prompt, followed by either the host's name or its numeric IP address.

Figure 8-2: Opening a Telnet Connection

```
Local> TELNET 192.0.1.66
```

Note: *If a preferred service has been configured, a host name is not required.*

You can also make a Telnet connection to a specific port number, as described in *Serial Tunnel* on page 8-6.

8.4.1.2 Rlogin

Rlogin allows a user to log into a remote host as if he or she were a local user. In the example below, **shark** is the remote host and **lola** is the username.

Figure 8-3: Connecting with Rlogin

```
Local> RLOGIN shark "lola"
```

Unless the username is password protected, the user will be logged in normally.

Note: *Because Rlogin can bypass the normal password/login sequence and is therefore a potential security problem, it may be disabled on some hosts. It is disabled by default on the MSS.*

8.4.2 Session Control

When a user makes a connection to a service on the network (via Telnet, Rlogin), a session is created. A user can have several connections to various services at once, although only one is displayed on the screen at a time. Each separate connection is a session.

8.4.2.1 Break Key and Local Switch

The Break key allows users to leave an active session and return to the MSS Local> prompt without disconnecting sessions. By default, the MSS handles the Break key locally. Users can change whether the Break key is processed by the MSS (Local), processed by the remote host (Remote), or ignored (None) using the **Change Break** command.

Figure 8-4: Changing the Break Key

```
Local>> CHANGE BREAK REMOTE
```

If your terminal does not have a Break key, you can configure a local break switch key with the **Change Local Switch** command.

Figure 8-5: Defining a Local Switch

```
Local>> CHANGE LOCAL SWITCH ^L
```

8.4.2.2 Backward, Forward, and Switches

The **Backward** and **Forward** commands, when entered at the Local> prompt, allow users to navigate through current sessions.

A user's open sessions can be thought of as a list from the earliest to the most recently created. *Forward* refers to a more recent connection, while *backward* refers to a session started earlier. The list is also circular; going forward from the most recently created session takes you to the earliest session, and going backward from the earliest session resumes the most recent session. For example, user Bob connects to host Thor. He then breaks to local mode and connects to host Duff. After working, he breaks and connects to host Conan. His session list, shown with the **Show Session** command, would be:

Thor
Duff
Conan

Conan is the **current session**. The current session is either the session to which a user is currently connected, or the last session the user was in before entering local mode. If Bob presses the backward key while working in Conan, he will resume his session on Duff. If he presses the forward key while working in Conan, he will move to his session on Thor.

The **Change Backward Switch** and **Change Forward Switch** commands define keys that can be used to switch sessions without returning to local mode. No backward or forward switch keys are enabled by default. They must be explicitly defined.

Figure 8-6: Defining Switches

```
Local>> CHANGE BACKWARD SWITCH ^B
Local>> CHANGE FORWARD SWITCH ^F
```

Note: *To specify a control character, precede it with a carat (^).*

Note: *The MSS intercepts and processes switch keys; it does not pass them to the remote host.*

8.4.2.3 Disconnect and Resume

Users need a method of controlling and disconnecting sessions from local mode. For example, if a session on a remote host freezes or hangs while executing code, the user can exit the session using the Break key, then terminate the connection by entering the **Disconnect** command at the Local> prompt. A user may resume a session after returning to local mode by entering the **Resume** command. Both commands can affect any active sessions, not just the current session.

8.4.2.4 Session Limits

The number of active session a user can have on the MSS is limited by three factors: available server memory resources, a server-wide limit, and a port-specific limit. The absolute maximum number of sessions for the MSS is eight. To reduce the limit further, enter the **Change Session Limit** command followed by a number from one to seven.

8.4.3 Status Displays

The commands listed in this section display information about the current configuration and operating status of the MSS. The following sections describe what a user will see when typing the Show commands in interactive (local) mode.

8.4.3.1 Show Hostlist

This command shows the current contents of the host table used for multihost mode connections. Host entries are numbered from 1 to 8.

8.4.3.2 Show IPsecurity

This command shows the current TCP/IP security table, if one exists. Addresses or ranges of addresses are listed according to the kind of restrictions placed upon them.

8.4.3.3 Show Ports

This command displays the configuration and connection status of the serial port. Settings such as flow control, baud rate, parity, and default hosts are shown. In addition, users can view the status of DSR and DTR serial signals, port access type, and login status. Errors are summarized, although in less detail than in the **Show Server Counters** display.

8.4.3.4 Show Server Bootparams

This command displays MSS identification and boot procedure information. The first lines display the MSS version, hardware address, network name and node number, identification string, and how long the MSS has been running. Software and ROM versions, configured loadhosts, and startup files are also displayed.

8.4.3.5 Show Server Characteristics

This command displays network-related server identification information including the MSS hardware address, node address, IP address, domain, any configured gateways and nameservers, and the subnet mask. In addition, inactivity and retransmission limits, password restrictions, and the types of incoming logins permitted are shown.

8.4.3.6 Show Server Counters

This command enables the system administrator to view quantitative information about send and receive errors. It also displays error information for the Ethernet and TCP/IP protocols that can be used to diagnose network transmission problems.

8.4.3.7 Show Sessions

This command displays information about current sessions including each active port, user, and type of session.

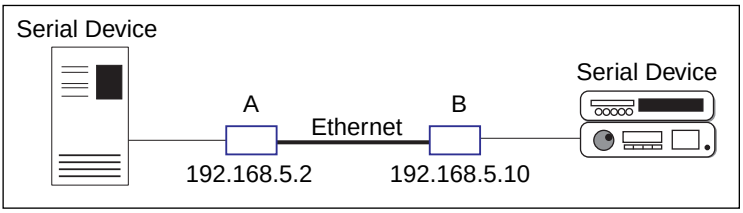
8.4.3.8 Show Users

This command displays the name, port number, and connection status of all current users, or a specified user.

8.5 Serial Tunnel

Two MSS's can be connected to emulate a direct serial connection across a LAN or WAN. Servers connected in this way can pass data only—they will not be able to pass status signals (DSR/DTR, CTS/RTS, etc.) or preserve timing between characters. The basic network configuration for this virtual serial line is shown in Figure 8-7.

Figure 8-7: Back-to-Back MSS Connections



8.5.1 TCP Configuration

Assuming the MSS serial port parameters have been configured properly, the Servers would be configured as follows:

MSS_A

```
Local>> CHANGE DEDICATED TCP 192.168.5.10:3001T
Local>> CHANGE AUTOSTART ENABLED
```

MSS_B

```
Local>> CHANGE ACCESS REMOTE
Local>> CHANGE DEDICATED NONE
Local>> CHANGE AUTOSTART DISABLED
```

Note: *If the Servers are on different IP subnets, the default gateway on each unit will have to be configured with the Change Gateway command.*

The above commands create a raw (8-bit clean) TCP connection between the serial ports of the two Servers once the units have been power-cycled. The commands for **MSS_A** ensure that it will automatically connect to **MSS_B** each time it is booted. The commands for **MSS_B** ensure that it is always available to accept connections from **MSS_A**.

8.5.2 UDP Configuration

When the UDP protocol is used, there is no connection; each MSS must be told explicitly which hosts it is allowed to accept packets from. Broadcast or multicast IP addresses can be specified to allow an MSS to send packets to all hosts on a subnet. Each MSS would have to be configured to both send packets to and accept packets from the other MSS.

MSS_A

```
Local>> CHANGE DEDICATED TCP 192.168.5.10:4096U
Local>> CHANGE AUTOSTART ENABLED
Local>> CHANGE ACCESS DYNAMIC
```

MSS_B

```
Local>> CHANGE DEDICATED TCP 192.168.5.2:4096U
Local>> CHANGE AUTOSTART ENABLED
Local>> CHANGE ACCESS DYNAMIC
```

Setting up Dedicated hosts ensures that the units will always talk to each other. Enabling Autostart for both units enables one MSS to send data to the other MSS without having to wait for a serial carriage return to start the session. Finally, when Autostart is enabled, the access mode must be either Local or Dynamic (more flexible).

8.6 Multihost Mode

Multihost mode is used to set up a data pipe between a serial device attached to the MSS and multiple hosts on the network. Data from any network host goes out of the MSS serial port, and data from the serial port is sent to all connected network hosts. The MSS does not alter the data in any way, it merely forwards it from one point to another.

There are a few important things to note about multihost connections:

- The MSS attempts to send data in the order it is received. That is, it reads in and sends data from one host before reading in any data from another host.
- The MSS will ping TCP and UDP hosts before sending packets to make sure the remote hosts are alive. If they are alive, the MSS makes the real connection and passes the data. If not, the MSS will retry later. Similarly, if one of the host connections is terminated prematurely, the MSS will attempt to reconnect at preset intervals.

  Note: *Retry affects data flow to all hosts, so unreliable hosts should be removed from the host list.*

- If a host's flow control or other settings block the MSS from sending, the MSS will skip it and send the data to the other hosts. However, the MSS does not keep a list of which hosts were skipped in the past—it consults all hosts each time it has data to send.
- When the MSS serial port is logged out, all host sessions are disconnected and the port becomes idle.

8.6.1 Enabling Multihost Mode

To configure the MSS for a dedicated multihost connection, use the **Change Dedicated** command.

Figure 8-8: Enabling Multihost Mode

```
Local>> CHANGE DEDICATED HOSTLIST
```

When a dedicated connection is enabled, local mode hotkeys for session manipulation are disabled.

8.6.2 Adding Hosts

The host list can include up to twelve host entries in any combination of TCP (raw, Telnet, and Rlogin) and UDP addresses.

Figure 8-9: Adding Entries to the Host Table

```
Local>> CHANGE DEDICATED HOSTLIST
Local>> HOST ADD TCP 192.0.1.35:T
Local>> HOST ADD UDP 192.0.2.255
Local>> LOGOUT PORT 1
```

In the example, the UDP host entry is actually a broadcast IP address. Data is sent to all hosts on that particular subnet.

8.6.3 Removing Hosts

To remove an entry from the host table, use the **Show Hostlist** command to find out its entry number, and then use the **Host Delete** command to delete it.

Figure 8-10: Removing Entries from the Host Table

```
Local>> SHOW HOSTLIST
Local>> HOST DELETE 2
```

8.7 Modem Emulation Mode

In modem emulation mode, the MSS presents a modem interface to the attached serial device: it accepts AT-style modem commands, and wiggles the modem signals correctly.

Normally there is a modem connected to a PC and a modem connected to some other remote machine. A user must dial from his PC to the remote machine and accumulate phone charges for each connection. With the MSS in modem mode, you can replace your modems with MSS's and use an Ethernet connection instead of a phone call, all without having to change communications applications. You can then connect to any remote machine that has a modem without making potentially-expensive phone calls.

Note: *If the MSS is in modem emulation mode and the serial port is idle, the MSS can still accept network TCP connections to the serial port.*

To use modem mode, enable modem emulation and set your MSS for Autostart using **A** as the autostart character. This will trigger the MSS to enter modem mode whenever it encounters a modem-style **AT** command.

Figure 8-11: Enabling Modem Mode

```
Local>> CHANGE MODEM EMULATION ENABLED
Local>> CHANGE AUTOSTART CHARACTER "A"
Local>> LOGOUT PORT 1
```

As soon as someone types an **AT** command, the MSS will enter modem mode and begin processing the **AT** commands.

8.7.1 Modem Mode Commands

The following commands are available only in modem mode—they will have no effect when typed at the Local> prompt.

Table 8-1: Modem Mode Commands

Command	Function
AT?	Help; gives list of valid AT commands.
ATC <command>	Pass-through to normal command line interface. **Ex:** `ATC CH NAMESERV 192.0.1.76`
ATDT <ipaddress>	Forms a TCP connection to the specified host. Two IP address formats are allowed. The first uses periods, while the second omits periods and adds zeroes to segments less than 3 characters long: **Ex:** `ATDT 192.0.55.22:3001T` **Ex:** `ATDT 192000055022:3001T` Users can specify sockets as well; in the examples, **:3001T** tells the MSS to form a raw TCP connection to socket 3001.
ATE	Echo mode off (ATE0) or on (ATE1, the default).
ATH	Disconnects the network session.
ATI	Displays modem version information.
ATQ	Result codes on (ATQ0, the default) or off (ATQ1).
ATV	Result codes in text (ATV0, the default) or numeric (ATV1) style.
ATZ	Accepted but ignored.
AT&W	Writes modem settings to NVR.
AT&Z	Restores modem settings from NVR.
AT&F	Resets modem NVR to factory default settings.
+++	Returns the user to the command prompt when entered from the serial port during a remote host connection.

Multiple commands can be entered on the same line (for example, `ATE0Q1V0` will work). However, if the MSS encounters a command that it doesn't recognize, it will ignore the whole command line. For this reason, you should enter only one command per line.

8.7.2 Wiring Requirements

Serial signals work differently when the MSS is in modem mode. First, the MSS will enable DTRWait and will not drive DTR until a valid connection is made with the ATDT command (see Section 8.7.1). Second, the MSS will drop DTR whenever the TCP session is disconnected. DSRLogout is enabled implicitly.

For these reasons, you will need to change the way you wire your MSSLite-A and MSSLite-B DB25 adapters.

- The serial device's **DTR** goes out to BOTH its own **DSR in** and the MSS **DSR in**. When the device asserts its DTR, it will see its DSR asserted. That way the device thinks that the "modem" (the MSS) is ready to accept commands all the time and the MSS can log out the serial port when the device disconnects.

- The MSS **DTR out** goes to the serial device's **CD in**. That way the MSS can signal the serial device that there is a valid connection, and the serial device will know it can send data to the remote device.

The MSSLite-C has a **CD out** pin, and it drives **CD out** the same way it drives **DTR**. Users can wire the MSS **CD out** to the PC's **CD in**.

8.8 COM Port Redirector

The Lantronix COM Port Redirector application allows PCs to share modems and other serial devices connected to an MSS using Microsoft Windows or DOS communication applications. Using their existing communications software, PC users dial out to a remote host through a modem connected to the MSS.

The Redirector intercepts communications to specified COM ports and sends them over an IP network connection to the MSS serial port. This enables the PC to use the MSS serial port as if it were one of the PC COM ports.

The COM Port Redirector software and installation instructions are included on the distribution CD-ROM.

A: Contact Information

A.1 Technical Support Requests

If you are experiencing problems with the MSS or have suggestions for improving the product, please contact Lantronix Technical Support.

Technical Support

Support Phone: 800/422-7044 or 949/453-3990
Support Fax: 949/450-7226
Internet: support@lantronix.com

If you are submitting a problem, please provide the following information:

- Your name, company name, address, and phone number
- Product name
- Product serial number
- Software version (issue the **Show Server** command)
- Network configuration including the output of a **Netstat** command
- Description of the problem
- Debug report (stack dump) if applicable
- Product status when the problem occurred; please try to include information on user and network activity at the time
- If the problem is related to the serial port, please include the results of **Show Ports** and **Show Server Characteristics**

A.2 Complete Contact Information

Company Headquarters

Address: 15353 Barranca Parkway, Irvine, CA 92618, USA
Phone: 949/453-3990
Fax: 949/453-3995
World Wide Web: http://www.lantronix.com

North American Sales

Direct Sales: 800/422-7055
Reseller Sales: 800/422-7015
Sales Fax: 949/450-7232
Internet: sales@lantronix.com

International Sales

Direct Sales: 949/450-7227
Sales Fax: 949/450-7231
Internet: intsales@lantronix.com

B: Troubleshooting

This Appendix discusses how to diagnose and fix errors quickly yourself without having to contact a dealer or Lantronix. It will help to connect a terminal to the serial port while diagnosing an error to view any summary messages that are displayed.

Note: *When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.*

Note: *Some unexplained errors may be caused by duplicate IP addresses on the network. Make sure that your MSS IP address is unique.*

B.1 Problems and Error Messages

Problem situations and error messages are listed in Table B-1. If you cannot find an explanation for your problem, try to match it to one of the other errors. If you cannot remedy the problem, contact your dealer or Lantronix Technical Support.

Table B-1: Problems and Error Messages

Problem/Message	Error	Remedy
The MSS is connected to a power source, but there is no LED activity.	The unit or its power supply is damaged.	Contact your dealer or Lantronix Technical Support for a replacement.
The MSS is unable to complete power-up diagnostics.	This generally indicates a hardware fault. One of the LEDs will be solid red for three seconds, followed by one second of another color.	Note the blinking LED and its color, then contact your dealer or Lantronix Technical Support. The MSS will not be operational until the fault is fixed.
The MSS completes its power-up and boot procedures, but there's no noticeable serial activity.	There is a problem with the serial connection or the set-up of the serial device.	Check the terminal setup and the physical connections, including the cable pinouts (see *Appendix C*). Try another serial device or cable, or cycle power on the MSS.
	A rapidly-blinking OK LED may signal boot failure.	Reboot the unit. When the MSS is running normally, the OK LED blinks every two seconds.

Table B-1: Problems and Error Messages, cont.

Problem/Message	Error	Remedy
The terminal shows a Boot> prompt rather than a Local> prompt.	The MSS is not connected properly to the Ethernet.	Ensure that the MSS is firmly connected to a functional and properly-terminated network node.
	The MSS Ethernet address is invalid.	The MSS Ethernet address is located on the bottom of the unit. Use the Change Hardware command to set the correct address, then reboot.
	Init Noboot command was entered.	See *Entering Commands at the Boot Prompt* on page B-4.
The MSS passes power-up diagnostics, but attempts to download new Flash ROM code from a network host.	If the OK LED blinks rapidly, the Flash ROM code may be corrupt.	Reboot the unit. If you get the same message, you will need to reload Flash ROM. See *Reloading MSS Software* on page D-2.
	If you did not request a TFTP boot, the flash ROM code is corrupt. The unit will remain in boot mode.	

B.2 DHCP Troubleshooting

Table B-2: DHCP Troubleshooting

Area to Check	Explanation
Is DHCP enabled on the Server?	Use the Define Server DHCP Enabled command. If you manually enter an IP address, DHCP is disabled.
Is the DHCP server operational?	Check to see that the DHCP server is on and is functioning correctly.
Did the Server get its IP address from the DHCP server?	Refer to the DHCP Manager on your DHCP server for information about addresses currently in use. If the DHCP server does not list your Server's IP address, there may be a problem.

B.3 BOOTP Troubleshooting

BOOTP failure does not disable the unit from booting. If the BOOTP request fails even though you have configured your host to respond to the request, check the following areas:

Table B-3: BOOTP Troubleshooting

Area to Check	Explanation
Is BOOTP in your /etc/services file?	BOOTP must be in the /etc/services file as a real TCP/IP service. It must not be commented out.
Is the MSS in the loadhost's /etc/hosts file?	The MSS must be in this file for the host to answer a BOOTP or TFTP request.
Is the download file in the right directory? Is it world-readable?	The download file must be in the correct directory and be world-readable for the BOOTP request to be answered.BOOTP implementations frequently add a default pathname to the download filename if no explicit path is present in the configuration file. You should generally specify the complete pathname for the download file in the BOOTP configuration file.
Are the MSS and the host in the same IP network?	Some hosts do not allow BOOTP replies across IP networks. For example, if the MSS IP address is 192.0.1.10 and the host's is 192.0.2.30, some host operating systems will not provide BOOTP replies to the MSS. Use a host that is running a different operating system, or change the MSS so that it is on the same IP network as the host.

B.4 TFTP Troubleshooting

If the TFTP request fails even though you have configured your host to respond to the request, check the areas discussed in the following table.

Table B-4: TFTP Troubleshooting

Area to Check	Explanation
Is TFTP enabled on the loadhost?	Ensure that the **/etc/inetd.conf** file has an uncommented line enabling the TFTP daemon. Machines may have the TFTP daemon line commented out. If the **/etc/inetd.conf** file has to be modified, the TCP/IP server process (daemon) has to be told of this via a signal. Find the process ID (PID) of the inet daemon, and then signal the process. Normally, the process is signalled by sending it a HUP signal (kill -HUP nnnnn). The **/etc/inetd.conf** or **/etc/netd.conf** file is re-read whenever the UNIX host boots. See the man pages (man inetd) for more information.
Is the filename correct?	The name and case of the software download file must be correct. The software file names are uppercase, but can be renamed. The server will look for uppercase names by default.

B.5 Entering Commands at the Boot Prompt

If the Boot> prompt appears on the serial console instead of the Local> prompt, one of two things may be wrong. Either the MSS does not have enough information to boot, or the network or flash boot has failed. If pressing the **Return** key does not display a prompt, press any other key. The Boot> prompt should appear.

If the MSS does not have enough information to boot, or the network or flash boot has failed, it will print a message to the console and wait ten seconds for serial port activity. If it detects serial port activity, it will continue booting provided the flash is good. However, if the user presses a key during that ten second time period, the MSS will display the Boot> prompt.

Note: *If the message "Will attempt another download in x minutes" is displayed, press any key for the Boot> prompt.*

A series of commands called Boot Configuration Program (BCP) commands can be entered at the Boot> prompt to configure the MSS. These commands are a subset of the entire MSS command set. For example, a typical TCP/IP configuration might use the following commands:

Figure B-1: BCP Command Examples

```
Boot> CHANGE IPADDRESS 192.0.1.229
Boot> CHANGE SOFTWARE /tftpboot/MSSLITE.SYS
Boot> CHANGE LOADHOST 192.0.1.188
Boot> CHANGE SECONDARY LOADHOST 192.0.1.22
Boot> FLASH
% Initialization begins in 5 seconds.....
```

These commands set the Server's address, the software loadfile, and the loadhost's IP address (as well as that of a backup loadhost). The server then reboots using the **Flash** command and will attempt to load the file MSSLITE.SYS from the host at 192.0.1.188.

HELP

Displays a one-page summary of available commands and what they do.

INIT 451

Reboots the MSS after it has been configured. If the MSS can find and load the specified software loadfile, it will restart itself with full functionality. If the loadfile is not found, the server will attempt to reload continuously. If there is an error, or if the console's **Return** key is pressed, the MSS will re-enter the Boot Configuration Program.

CHANGE BOOTP {Enabled, Disabled}

Enables or disables the sending of BOOTP queries during the boot sequence. It is enabled by default.

CHANGE DHCP {Enabled, Disabled}

Enables or disables the sending of DHCP queries during the boot sequence. It is enabled by default.

CHANGE HARDWARE xx-xx-xx

Specifies the last three numbers of the server's Ethernet address. The first three numbers will be supplied automatically.

The Ethernet address should have been set at the factory. Setting an incorrect address could cause serious network problems.

CHANGE IPADDRESS ip_address

Specifies this server's IP address. Uses the standard numeric format.

CHANGE LOADHOST ip_address

Specifies the host to attempt to load the file from. The IP address should be in standard numeric format (no text names are allowed).

CHANGE RARP {ENABLED, DISABLED}

Enables or disables the sending of RARP queries during the boot sequence. It is enabled by default.

CHANGE SECONDARY ip_address

Specifies a backup loadhost. The IP address should be in standard numeric format (no text names are allowed). The backup loadhost will be queried if the primary host cannot load the server.

CHANGE SOFTWARE filename

Specifies the name of the file to load. The MSS will automatically add **.SYS** to the filename you specify. Note that all protocols must have a filename specified (either the default or set by the user). For more information, see *Appendix D*.

TCP/IP users must use the Software option to specify the loadhost, the loadfile, and their own network address.

TFTP users can specify a complete path name (up to 31 characters) if the file is located in a directory other than the default. The case of the filename must match that of the filename loaded onto the host computer.

SHOW SERVER

Use this command before and/or after issuing other commands to view the current MSS setup.

FLUSH NVR

This command is used to restore the MSS's non-volatile RAM to its factory default settings. It will reset everything that is configurable on the server, including the unit's IP address.

FLASH

This command will force the MSS to download new operational code and reload it into Flash ROM. This is necessary when a new version of software is released and you wish to upgrade your unit. If the server cannot download the file, the code in Flash ROM will still be usable.

B.6 Modem Configuration Checklist

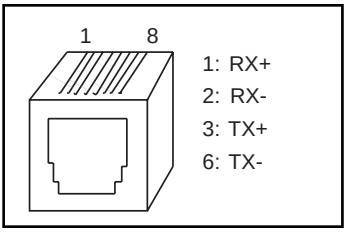
Most modem problems are caused by cabling mistakes or incorrect modem configuration. However, the following items should be verified after any modem configuration, and re-checked when there is modem trouble.

- The modem must disconnect immediately when DTR is de-asserted.
- The modem must assert CD (or DSR, if connected) when connected to another modem. It must not assert CD when disconnected. The modem may optionally assert CD during outbound dialing.
- The modem and MSS must agree on the flow control method and baud rate scheme.
- The modem must not send result codes or messages to the server except optionally during outgoing calls.
- The modem should be set to restore its configuration from non-volatile memory when DTR is dropped.
- The modem should be configured to answer the phone if incoming connections are to be supported. Generally this is done with the **ats0=1** command.
- The modem should not be configured to answer the phone unless the MSS asserts DTR.
- MSS Modem control must be enabled. Using modems on ports without modem control enabled will lead to security problems.
- The MSS Autobaud feature should be enabled only when required.

C: Pinouts

C.1 Ethernet Connector

Figure C-1: RJ45 Ethernet Connector Pinout



C.2 Serial Connectors

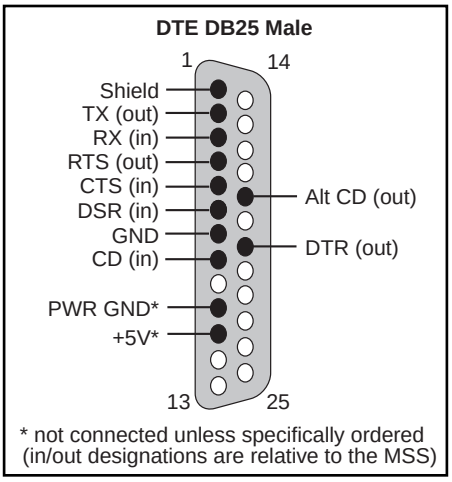
The main difference between MSSLite models is the serial interface. All have an RS232 serial port, The connectors are explained in the following order:

- The MSSLite-B has a DB25 connector that provides a single RS232 serial port. This interface will be discussed first because it is the simplest.
- The MSSLite-A has a DB25 connector that provides both an RS232 serial port and a pared-down serial console port.
- The MSSLite-C has two 10-pin IDC headers that provide a DCE main serial port and a pared-down DTE serial console port.
- The MSSLite-D has a 50-pin OEM style connector. Pinouts for this connector are determined jointly by Lantronix and the individual customer.

C.2.1 DB25 Single (MSSLite-B)

The MSSLite-B serial port is a DTE RS232 serial port. The default serial port settings are 9600 baud, 8 bits, no parity, and 1 stop bit. These settings can be customized. See Section C.2.3 for an explanation of the **Alt CD** pin.

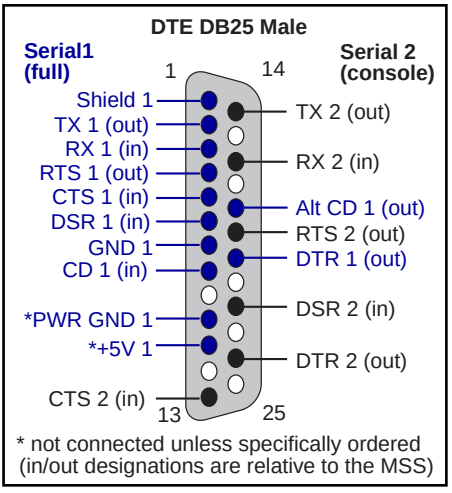
Figure C-2: DB25 Serial Port Pinout (single)



C.2.2 DB25 Double (MSSLite-A)

The MSSLite-A DB25 is wired for two serial ports. In addition to the full-featured RS232 serial port connections, six other pins are connected to make a serial console port. The settings for the serial console port are 9600 baud, 8 bits, no parity, and 1 stop bit. These settings cannot be changed. See Section C.2.3 for an explanation of the **Alt CD** pin.

Figure C-3: DB25 Serial Connector Pinout (Double)



C.2.3 DB25 “Alt CD” Pin

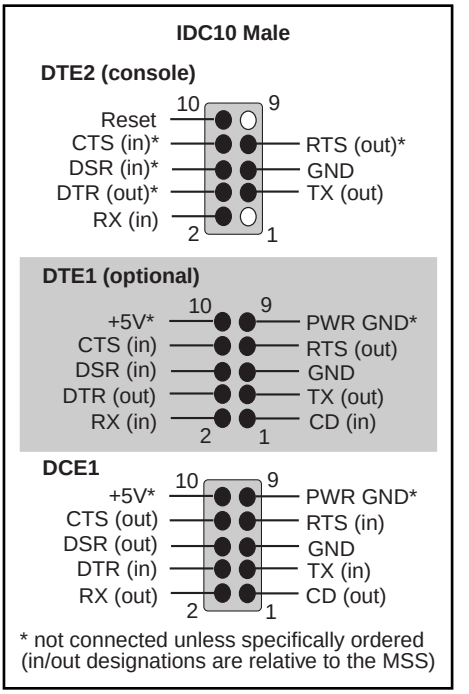
The MSSLite-A and MSSLite-B have an **Alt CD out** pin. This pin is an output pin for the MSS; currently it only mimics the state of the DTR output.

If you connect one of these models to another DTE device through a null modem cable, you can connect the **Alt CD out** pin to the other device’s **CD in**.

C.2.4 IDC10 Serial Headers (MSSLite-C)

The MSSLite-C has three 10-pin IDC headers on the bottom end of the board. Currently, only the DCE1 and DTE2 headers are usable. The headers are explained further in *Chapter 4, MSSLite-C*.

Figure C-4: IDC10 Header Pinout



When connected, the Reset pin on the DTE2 port functions as a remote (software-controlled) reset switch. It is active low.

C.2.5 50-Pin OEM Bus Connector (MSSLite-D)

Pinouts for the 50-pin OEM-style connector are determined jointly by Lantronix and the individual customer.

C.3 Power Connectors

Power is normally supplied to the MSSLite by using one of the connectors mentioned in this section. However, Lantronix offers models that receive power through pins in the serial connectors. For more information about power supply alternatives, see the chapter that corresponds with your MSS model and the full power requirements listed in *Appendix E*.

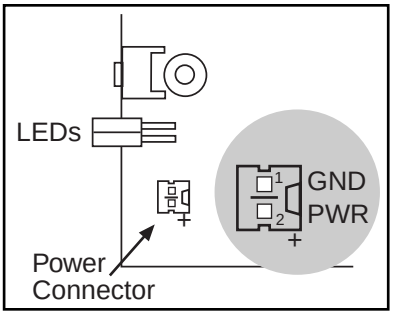
C.3.1 Power Jack (MSSLite-A & MSSLite-B)

The MSSLite-A and MSSLite-B use a standard barrel power jack whose inner conductor is positive. Power requirements for the two models are different, however. See *Power Requirements* in *Appendix E* for more information.

C.3.2 Snapfit Power Header (MSSLite-C)

The MSSLite C can receive power and ground via a 2-pin header located near the LEDs (see Figure C-5). See *Power Requirements* in *Appendix E* for more information.

Figure C-5: Snapfit Power Connector



D: Software Updates

The latest version of the Lantronix MSS operating software and its associated release notes can be downloaded directly from Lantronix via anonymous FTP through the Internet.

Comments and/or requests for help via email can be sent to **support@lantronix.com**. Comments regarding the FTP/download process can be sent to **ftp@lantronix.com**.

D.1 Obtaining New Software

Server software resides on the Lantronix FTP server (ftp.lantronix.com) whose current IP address is 192.73.220.84. This is subject to change at any time; the text name should be used if possible.

The files are stored in both normal and Unix compress (filename.z) formats; if you have access to the Unix compress utility, you should download the compressed versions. These files are binary data, so the binary option must be used to transfer the files.

To log into the FTP server, use the username `anonymous` and enter your full email address as the password. If the FTP server cannot verify the username or email address, you will be denied access. The machine that issues 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 such as a gateway or nameserver.

Once a connection has been made, the following text will be displayed:

Figure D-1: Lantronix FTP Session

```
220-Welcome to the Lantronix FTP Server.
220-Direct questions to support@lantronix.com or 1.800.422.7044.
220-Questions about this ftp account only to ftp.lantronix.com.
220-nexus FTP server (Ver. wu-2.4(1) Wed Sep 7 12:32:43 PDT 1994)
331 Guest login ok, send your complete e-mail address as password
Password: jerry@widgets.com [your e-mail address, not echoed]
230-Welcome to the Lantronix FTP Server.
230-IMPORTANT: Please get the README file before proceeding.
230-IMPORTANT: Set BINARY mode before transferring executables.
230-
230 Guest login ok, access restrictions apply
Remote system type is [your type displayed here].
ftp>
```

All released files are in the pub directory. Always download the README file first; it contains a directory of available software versions.

D.2 Reloading MSS Software

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

The MSS can be reloaded from network hosts using TCP/IP or MOP. Reloading instructions are given in the following subsections. Regardless of which protocol is used to update Flash ROM, the following points are important:

- The Flash ROM software is contained in a file called **MSSLITE.SYS**, provided with the MSS media. This file must be accessible when updating Flash ROM.
- The MSSLITE.SYS download file should be world-readable on the host, regardless of which download protocol is used.
- Use the **Show Server Bootparams** command to check the MSS settings and verify that the correct download file has been configured before using the **Initialize Reload** command to reboot the server and reload the code.

Note: *It is very important to check the MSS settings before using the Initialize Reload command to ensure you are reloading the correct software file.*

The reloading sequence is as follows:

1. If BOOTP, DHCP, or RARP is enabled, the MSS will request assistance from a BOOTP, DHCP, or RARP server before starting the download attempts. The MSS will then try TFTP and MOP booting, in that order, provided that it has enough information to try each download method.
2. The MSS will download and rewrite the Flash ROM. This step will take approximately two minutes from the time the Initialize command is issued.
3. If the download file cannot be found or accessed, the MSS can be rebooted with the code still in Flash ROM. As noted in the installation instructions, the OK LED will blink quickly while the MSS is booting and reading code, and then slowly when it returns to normal operation.

Note: *If you experience problems reloading Flash ROM, refer to Troubleshooting Flash ROM Updates.*

D.2.1 TCP/IP

Downloading involves the Trivial File Transfer Protocol (TFTP), and optionally BOOTP. The MSS will make a BOOTP query each time it boots. If a host provides BOOTP support, it can be used to set the Server's IP address and loadhost information.

Note: *FTP must be enabled on the host for downloading to work. Several major Unix vendors ship their systems with TFTP disabled*

Add the Server's name, IP address, hardware address, download path, and loadfile name to the BOOTP file (usually **/usr/etc/bootptab**). The path and filename are case sensitive; they must be enclosed in quotation marks. Also, the file and directory must be world-readable for the MSS to be able to access the loadfile.

Some BOOTP and TFTP implementations require a specific directory for the MSSLITE.SYS file. In this case, the path should not be specified in the bootptab file—the file must be placed in the bootptab directory. If BOOTP cannot be used to configure the Server's IP parameters, configure them by hand using the following commands:

Figure D-2: Reloading Flash ROM from TCP/IP

```
Local>> CHANGE IPADDRESS 192.0.1.77
Local>> CHANGE SOFTWARE "/path/MSSLITE.SYS"
Local>> CHANGE LOADHOST 192.0.1.83
Local>> SHOW SERVER BOOTPARAMS
Local>> INITIALIZE RELOAD
```

Note: *Before the MSS can be booted across an IP router, the router must be configured to perform proxy arping for the MSS.*

D.2.2 MOP

Copy the MSSLITE.SYS file to the MOM$LOAD directory. The MSSLITE.SYS filename is the only parameter that the MSS needs to reload via MOP. Make sure the **service** characteristic is enabled on the host's Ethernet circuit, then reload the server using the following command:

Figure D-3: Reloading Flash ROM from VMS

```
Local>> INITIALIZE RELOAD
```

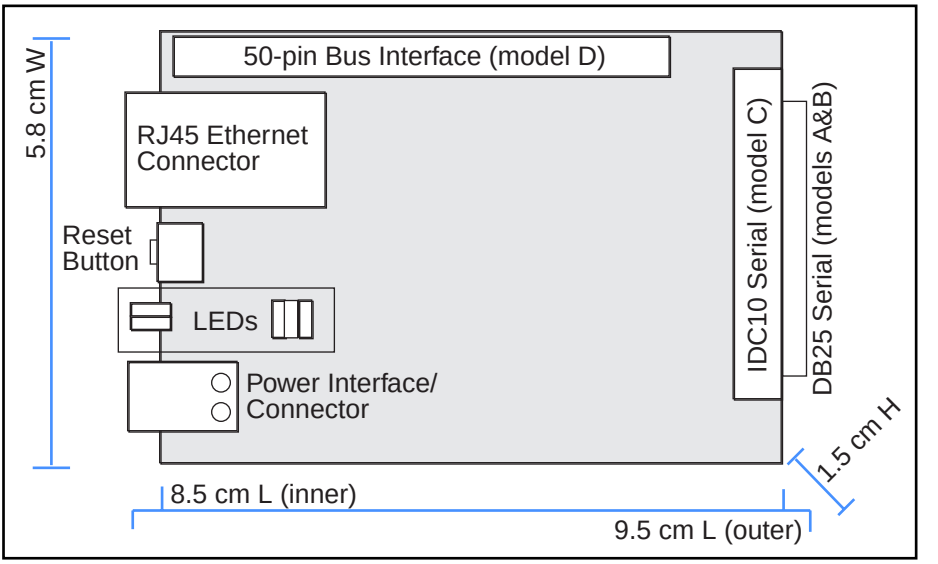
The MOM$LOAD search path must include the directory containing the MSSLITE.SYS file.

E: Specifications

E.1 Board Layouts

The MSSLite models share the same basic layout, as seen in Figure E-1. The main differences are the serial connectors, the LEDs, and the power components. The following diagram shows a rough approximation of the MSSLite board layout.

Figure E-1: MSSLite General Board Layout



The model-specific board diagrams that follow show the proper components and positioning for the four different models.

Figure E-2: MSSLite-A and MSSLite-B

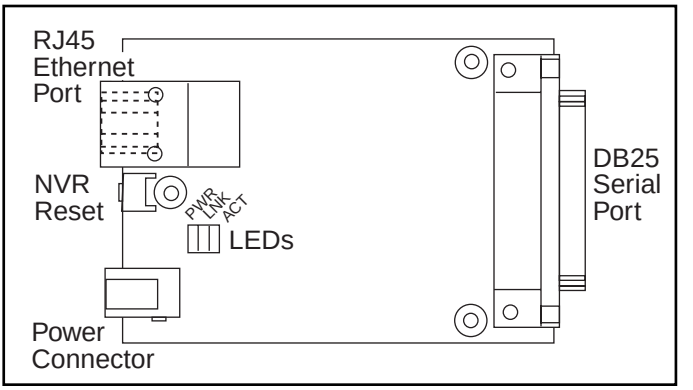


Figure E-3: MSSLite-C

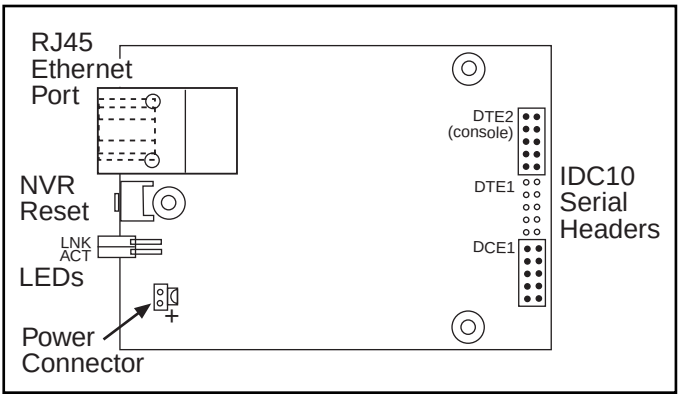
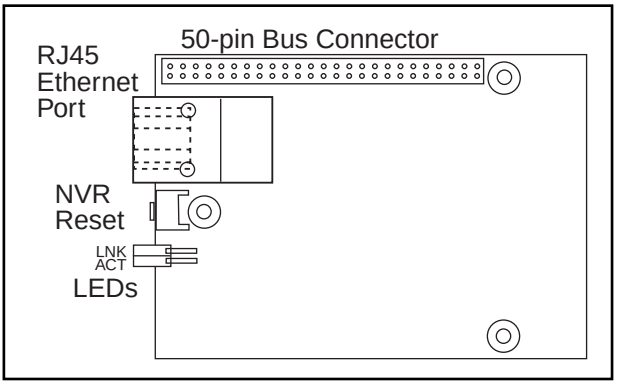


Figure E-4: MSSLite-D



E.2 Environmental Information

E.2.1 Temperature Limits

Operating Range	5˚ to 50˚ C (41˚ to 122˚ F)
Storage Range	-40˚ to 66˚ C (-40˚ to 151˚ F)
Maximum Temperature Change	20˚ C (36˚ F) per hour Rapid temperature changes may affect operation. Do not operate the MSS near heating or cooling devices, large windows, or exterior doors.

E.2.2 Relative Humidity Limits

Operating Range	10% to 90% noncondensing, 40% to 60% recommended
Storage Range	10% to 90% noncondensing

E.2.3 Altitude Limits

Operating Limit	2.4 km (8,000 feet) If you are operating the MSS above 2.4 km (8,000 feet), decrease the operating temperature rating by 1.8˚C for each 1,000 m (1˚F for each 1,000 feet).
Storage Limit	9.1 km (30,000 feet)

E.3 Power Requirements

The following information applies to all MSSLite models.

Adapter Input Voltage	115 V AC US, 230 V AC International
Power Consumption	4.2 W (maximum)

Note: *For help in determining whether your power supply meets the requirements, contact Lantronix using the information in Appendix A.*

The rest of the power specifications are broken down by model. Notice that while models A and B have the "same" barrel-style power jack, the power requirements are different.

Note: *See the MSSLite Model Overview in the Introduction chapter for more information on how the models differ.*

E.3.1 MSSLite-A & MSSLite-C

The MSSLite-A and MSSLite-C contain a small, highly-efficient 5V switching regulator, so there is a wide range of powering options. Because the switching regulator is roughly 80% efficient, heat issues are greatly diminished, meaning that the MSSLite-A and MSSLite-C can be operated in a 0-70˚C environment over the entire input voltage range.

Input Voltage	+6.0 Vdc min, +32.0 Vdc max The minimum input voltage is set by the worst-case dropout voltage of the switching regulator at its maximum allowable junction temperature of 125˚ C and maximum output current of 300 mA. The dropout voltage in a switching regulator depends upon a number of factors, including FET resistance, inductor resistance, and maximum switch duty cycle. Adding these factors, the voltage at the power pins **must not** drop below 6.0 V DC. The maximum input voltage is set by the voltage ratings of the power components of the MSSLite's switching regulator. If your application requires a higher input voltage than 32.0 Vdc, please contact Lantronix using the information listed in Appendix A. Provisions for up to 60 Vdc can be made.
Ripple Voltage (peak)	100 mV ptp @ 6Vin —> 3V @ 12 Vin The maximum ripple is set by the regulator drop-out and minimum voltage allowable as seen by the board circuitry. At 12V input, the ripple rejection is substantial. However, this ripple rejection is reduced as the supply voltage is dropped toward 6V (the instantaneous voltage at the input **must not** drop below 6.0V). For applications powered by unregulated supplies, remember that 60Hz is slow compared to microprocessor clocks, and the MSSLite built-in voltage monitor will reset the device if input voltage drops too low, even for a fraction of the 60Hz cycle.
Operating Current	220 mA @ 6 Vin —> 110 mA @ 12 Vin typical 300 mA @ 6 Vin —> 150 mA @ 12 Vin max

E.3.2 MSSLite-B

The MSSLite-B contains no 5V voltage regulator. You must supply the MSSLite-B with pre-regulated 5V power.

Input Voltage	+4.75 Vdc min, +5.25 Vdc max The minimum input voltage is set by the worst-case threshold of the MSSLite-B on-board voltage monitor. To prevent the MSSLite-B voltage monitor from triggering an unintentional reset, you **must** supply tightly-regulated (±5%) power to the unit (4.75 V minimum as seen at the power connector). The maximum input voltage is set by the voltage tolerance of the 5V ICs on the MSSLite-B and is therefore a hard limit. Do NOT supply greater than 5.25 Vdc to the MSSLite-B (as seen at the power pins) or you may damage the board.
Ripple Voltage (peak)	100 mV ptp The maximum ripple is set by the minimum allowable input voltage. The input must remain above +4.75 V at all times. Remember that 60Hz is quite slow compared to microprocessor clocks, and the MSSLite built-in voltage monitor will reset the device if input voltage drops too low, even for a fraction of the 60Hz cycle.
Operating Current	200 mA typical, 250 mA max

Warranty Information

Lantronix warrants for a period of FIVE YEARS from the date of shipment that each Lantronix MSS Micro Serial Server 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.

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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.

Declaration of Conformity

(according to ISO/IEC Guide 22 and EN 45014)

Manufacturer's Name	Lantronix

Declares that the product:

Manufacturer's Address	15353 Barranca Parkway Irvine, CA 92718 USA
Product Name	Serial Server
Model Number	MSSLite (configurations A, B, C, and D)

Conforms to the following standards:

Safety	EN 60950:1988 + A1, A2
EMC	EN 55022:1988 class B EN 50082-1:1992 IEC 801-2:1991/prEN55024:1992-4kV CD, 8kV AD IEC 801-3:1992/prEN55024-3:1991-3V/m IEC 801-4:1988/prEN55024-4:1992-0.5kV Signal Lines, 1kV Power Lines

Supplementary Information

"The product complies with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC."

Manufacturer's Contact	Director of Quality Assurance Lantronix 15353 Barranca Parkway Irvine, CA 92718 General Tel: x714-453-3990; Fax: x714-453-3995

P/N 310-081

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