Serial Server Installation Guide

For Lantronix MSS1-T and MSS1-T2 Micro Serial Servers and MSS100 Fast Ethernet Micro Serial Servers

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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.

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

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

(1) Cet appareil ne doit pas causer une interférence malfaisante.

(2) Cet appareil doît accepter n'importé quelle interférence reìue qui peut causer une opération indésirable.

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1 - Introduction

The MSS1-T and MSS1-T2 are multiprotocol micro serial servers that provide Ethernet connections for personal computers, terminals, modems, and devices that would not otherwise be connected to a network. The MSS100 additionally provides Fast Ethernet support.

> *NOTE:* *In this manual, all MSS models will be referred to as "the MSS" or "the Server" unless a distinction needs to be made between the models.*

The MSS can be used to start outbound Ethernet connections to hosts on TCP/IP, IPX/SPX, and LAT networks. It can also provide interactive access to a device connected to its serial port. However, unlike traditional print servers, the MSS does not support printing protocols such as LPR, RTEL, and PCONSOLE, or queueing.

This manual explains how to install the MSS products.

* The remainder of this chapter outlines MSS functionality.

* Chapter 2, *Installation*, explains how to install the MSS hardware and boot the server.

* Chapter 3, *Getting Started*, details different ways to log into the MSS and prepare the server for configuration.

* Chapter 4, *Basic Configuration*, covers basic configuration.

* Chapter 5, *Using the MSS*, provides an overview of how to use the MSS interactively and with host applications.

* Appendices provide information on Contact Information, Troubleshooting, Pinouts, Updating Software, and Specifications.

* The hypertext version of this manual, located on CD-ROM, includes more specific information about configuring and using the MSS and reloading MSS software.

Be sure to read the section of the configuration chapter that applies to the protocol you are using (TCP/IP, IPX/SPX, or LAT).

For more detailed information on the MSS, including a complete command reference, see the *MSS Reference Manual* located on the CD in HTML and PDF formats.

The PDF versions of the MSS manuals are located in the **manuals** directory of the CD. Use the Adobe Acrobat Reader (widely available on the Internet at no charge) to read and print all or parts of the manual from the PDF file.

1.1 Terms

In this manual, the following terms are used to describe parts of a network.

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

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.

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

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.

1.2 Protocols

A network protocol is a method of communicating over the Ethernet. Each protocol specifies a certain arrangement of data in the Ethernet packets, and provides different services for its users. The MSS supports the following protocols:

* TCP/IP

   Support includes Telnet, Rlogin, UDP, and DNS. 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. Rlogin is a protocol that 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 the use of Domain Name Servers (DNS), allowing a network nameserver to translate text node names into numeric IP addresses.

The MSS also implements basic Simple Network Management Protocol (SNMP) functionality. SNMP commands enable users, usually system administrators, to get 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.

- IPX/ SPX (NetWare)

  The MSS provides IPX/SPX access to the serial device from NetWare and any other IPX/SPX nodes. It allows users to download system files from NetWare hosts and log into the MSS via NetWare for remote configuration.

  The MSS supports all four NetWare frame types: Ethernet v2, Native mode, 802.2, and 802.2 SNAP.

- Local Area Transport (LAT)

  LAT is a protocol developed by Digital Equipment Corporation (DEC) for local network connections and is supported on most DEC operating systems. The MSS provides logins to remote hosts and host-initiated connections, as well as access to the MSS serial port from LAT hosts.

1.3 Software

The CD-ROM shipped with the MSS contains operational software. It also contains EZWebCon software which can be used to configure the unit.

The MSS is equipped with Flash ROM, so it is not necessary to download software each time the unit boots. Software must only be reloaded if there is a problem with the Flash ROM, or if a new software version is released.

1.4 Configuration

Each MSS has a unique name and network address printed on its underside. The name is based on the MSS Ethernet address and is referred to in the manual as **MSS_xxxxxx**. The xxxxxx string represents the last six digits of the MSS Ethernet address. Be sure to note the Ethernet address before configuring the unit.

When using IPX or LAT, it is possible to power up the MSS and have it work properly with no additional configuration required. TCP/IP users must give the unit an IP address.

> *NOTE:* *For more information about methods used to configure an IP*
>   *address, see IP Address Configuration in.*

Lantronix has provided EZWebCon software to help users install and configure the MSS. It is also possible to configure the MSS settings by logging into it over a network via Telnet or Rlogin. See the *Getting Started* chapter for more information.

Additionally, the MSS can be configured to download a configuration file containing boot commands from a NetWare or TCP/IP host at boot time. See the **Change Startup** command in the *MSS Reference Manual* on the CD-ROM for more information.

2 - Installation

This chapter covers the installation of the MSS in an Ethernet network and the attachment of a serial device. Basic knowledge of networking installation is assumed. Read this section completely before continuing.

2.1 MSS Components

The MSS front panel has a male DB25 serial connector. The following figure shows an MSS1 front panel. The MSS100 rear panels is more narrow.

Figure 2-1: MSS1 Front Panel

DB25 Serial Port
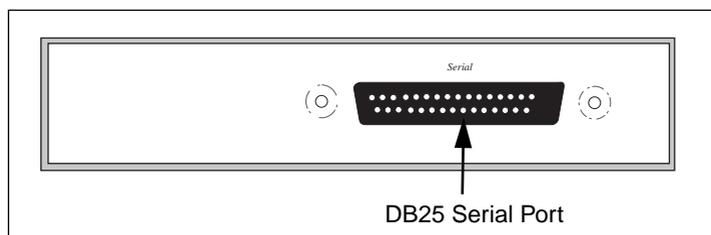
The MSS rear panel has an RJ45 Ethernet connector, a BNC Ethernet connector (MSS1-T2 only), a reset button, and a power connector. The following figure shows an MSS1 rear panel. The MSS100 rear panels is more narrow, and does not include a BNC connector.

Figure 2-2: MSS1 Rear Panel

RJ45 Ethernet Port   Power Connector
BNC Ethernet Port   Reset Button
(MSS1-T2 only)
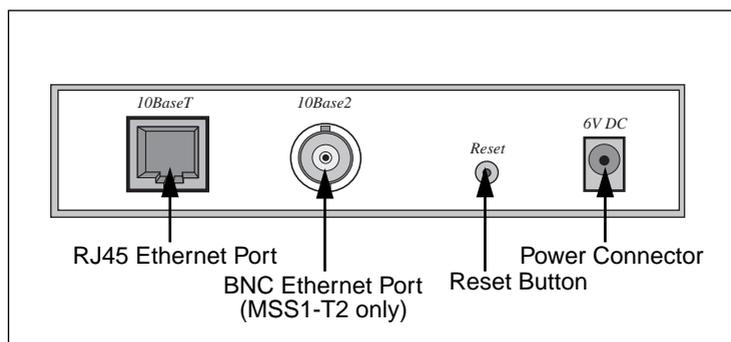
NOTE: *When the reset button is pressed and held during the power up and boot procedures, the MSS returns to its factory default configuration.*

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Four or five LEDs are located on the top of the unit. Table 2-1 explains their functions.

Table 2-1: MSS LEDs

LED	Function
Power	Glows green when power is supplied to the Server
Link	Glows green while the Server is connected properly to a 10BASE-T or 100BASE-T (MSS100 only) Ethernet network (The Link LED does not function for 10BASE2 connections)
100	MSS100 only: glows green to indicate a 100BASE-T Ethernet connection
OK	Blinks yellow, green, or red to indicate Server activity.
Serial	Blinks yellow, green, or red to indicate serial activity.

> *NOTE:* *Although a red LED during boot mode usually signals an error,*
> *red LED patterns are part of the normal operation of the MSS*
> *and are not necessarily indicative of errors or dangerous*
> *operation.*

2.2 Installation

Figure 2-3 shows an example hardware layout.

Figure 2-3: MSS Network Layout
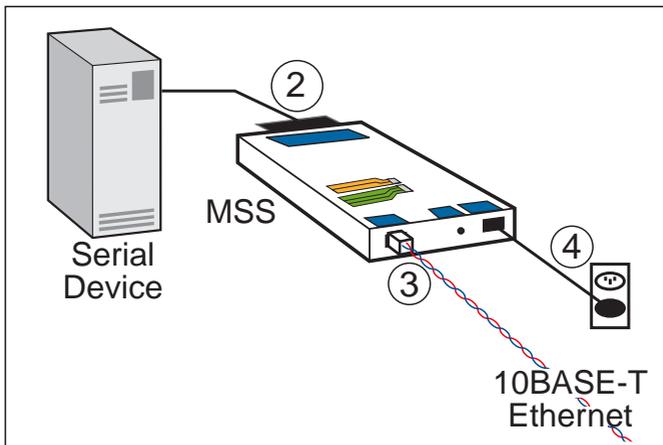
As you follow the installation steps, refer to the numbers in Figure 2-3.

1. Select a location.

    The MSS should be positioned close to the device it will be servicing. Since powering down the unit will terminate any active sessions, it may be desirable to place the server in a location secure from user access. Also be aware of the unit's environmental operating limits and cabling requirements. See Appendix D for details.

2. Connect the MSS to a serial device.

    The MSS1 and MSS100 are designed to connect to an RS232-based serial device. Connect one end of a serial cable to the DB25 connector on the front of the MSS. Connect the other end of the cable to your serial device's DB25, DB9, or RJ45 port.

    Initially, you may want to connect a terminal to the serial port. The terminal will display any error messages and will allow you to view commands as you configure the MSS.

    NOTE: *The serial port is initially set for 9600 baud, 8 data bits, one stop bit, and no parity.*

3. Connect the MSS to the Ethernet.

    The MSS1 can be connected to a 10BASE-T Ethernet network. The MSS100 can be connected to a 10BASE-T or 100BASE-T Ethernet network. Connect the appropriate twisted-pair Ethernet cable to the RJ45 connector on the back of the MSS. The MSS100 will autosense whether the attached Ethernet cable is 10BASE-T or 100BASE-T.

    The MSS1-T2 can also be connected to a 10BASE2 Ethernet network. Connect a 10BASE2 thin coaxial cable to the BNC connector on the back of the MSS. Also attach a valid network terminator if required. The MSS1-T2 can autosense which of the two Ethernet interfaces has been connected and operate accordingly.

    NOTE: *DO NOT connect cables to both MSS1-T2 interfaces at the same time. If you would like to change interfaces at a later time, be sure to power down the unit before switching Ethernet cables.*

4. Provide power to the MSS.

    Attach one end of the power cable to the MSS and plug the other end into a wall outlet. There is no power switch on the MSS; power will come on automatically when the unit is plugged in. Be sure to handle the unit carefully once it is plugged in.

> *NOTE:* *Be sure to use the MSS1 6V power supply for your MSS1 and*
> *the MSS100 5V power supply for your MSS100. Using a*
> *power supply with the wrong voltage will damage the MSS.*

Check to see if the Power and Link LEDs on the front of the server
light. If not, unplug the server and check the power supply, then
check the Ethernet connection and plug the server in again. If the
LEDs still do not light, refer to Appendix B, *Troubleshooting*.

2.2.1 Power-up Diagnostics

During normal operation, the boot process requires approximately 30 seconds
to complete its three basic steps.

1. The MSS runs through a set of power-up diagnostics for
   approximately five seconds. The Power LED should remain solid
   green. The Link LED should remain solid green for MSS1-T and
   MSS100 units. The OK and Serial LEDs should show varying
   patterns corresponding to the test being run.

> *NOTE:* *The Power and Link LEDs should remain solid green if the unit*
> *is plugged in and there is a valid connection to a 10BASE-T*
> *network.*

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

> *NOTE:* *For more information on BOOTP, RARP, or DHCP, refer to*
> *your operating system's documentation.*

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

When the unit is running normally, the OK LED blinks green once every two
seconds. If data is being transmitted on the Ethernet port, the OK LED blinks
yellow. The Serial LED blinks red when characters are transmitted through
the serial port, green when characters are received, and yellow when
characters are both transmitted and received.

2.3 Is It Working?

If the MSS appears to be working and the unit is connected to the network, there are three ways to confirm that it is working correctly:

- If there is a terminal attached, press the Return key and log in. If you are able to log in, the server is running normally.

- If an IP address has been configured for the MSS (see *IP Address Configuration* on page 3-2), ping the MSS from a TCP/IP host.

Figure 2-4: Pinging the MSS

```
unix% ping 192.0.1.233
```

When you are satisfied that the MSS is working properly, proceed to Chapter 3, *Getting Started*. If the server does not boot properly, see Appendix B, *Troubleshooting*.

3 - 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.

1. Incoming (Remote) Logins: EZWebCon is the preferred configuration method for TCP/IP and IPX users. For TCP/IP and LAT users, other remote login options are available (see *Telnet* on page 3-6).

2. 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.

3. 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 3-2).

• 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 4-1*).

• The remote console port is password protected (see *System Passwords* on *page 4-1*).

• Only one person at a time may be logged into the remote console port (port 7000), regardless of the protocol being used. 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.

3.1 IP Address Configuration

When using IPX or LAT, it is possible to power up the MSS and have it work properly with no additional configuration required. However, for TCP/IP use, an IP address must be configured for the MSS before any TCP/IP functionality is available. There are three ways to configure the IP address:

1. Using EZWebCon

2. Using an ARP entry and the ping command from a network host

3. Using a host DHCP, BOOTP, or RARP server

4. Using the serial console

3.1.1 Using EZWebCon

The MSS must have an IP address before you can log into it 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**.

3. Fill in the following information:

   A. The last three bytes of the MSS's hardware address. The hardware address is printed 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.

4. Click **OK**.

5. Cycle power on the server. EZWebCon will let you know whether the configuration was successful.

3.1.2 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 3-1). This process typically requires superuser privileges.

Figure 3-1: Entering ARP and Ping (UNIX)

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

In order 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 that you're working on. Once there is at least one entry in the ARP table, use the following commands to ARP the IP address to the MSS and make the MSS acknowledge the IP assignment.

Figure 3-2: 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 3-3: 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 assistance.

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.

3.1.3 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 (see the *Commands* chapter in the *MSS Reference Manual* on the CD-ROM).

3.1.4 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, a Local prompt will be displayed. You can become the privileged user and enter the Change IPaddress command at this prompt.

Figure 3-4: 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.

3.2 Incoming Logins

3.2.1 Controlling Incoming Logins

Incoming Telnet logins are enabled by default, and incoming LAT logins are disabled. This behavior can be changed with the **Change Incoming** command and one of the following parameters:

Telnet   Enables Telnet logins

LAT   Enables LAT logins

Both   Enables both Telnet and LAT logins

None   Disables Telnet and LAT logins

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 Password** command. The incoming password feature can be disabled with the **Change Incoming Nopass** command.

3.2.2 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.

3.2.3 Other Incoming TCP/IP Logins

3.2.3.1 Telnet

To log into the MSS, type "Telnet" followed by the MSS IP address. The MSS must have an IP address assigned.

Figure 3-5: A Telnet Connection

```
% telnet 192.0.1.88
```

3.2.3.2 Rlogin

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

Figure 3-6: An Rlogin Connection

```
% rlogin 192.0.1.88
```

3.2.4 Incoming LAT Logins

To get an MSS login prompt when connecting from a LAT host, use the command below. Substitute the last six digits of the MSS hardware address for *xxxxxx*.

Figure 3-7: LAT Login

```
$ SET HOST/LAT MSS_xxxxxx
```

3.3 Serial Port Logins

One way to connect to the MSS is to attach a terminal to the serial port and press the **Return** key. If there is a problem during the boot process, you can press any key to get 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*.

If the unit passes its power-up diagnostics and completes the boot procedure, the **Local>** prompt should be displayed. Proceed to Chapter 4 to configure the unit using the command line interface.

3.4 Remote Console Logins

The MSS enables a TCP/IP user 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's IP address and the remote console port number.

Figure 3-8: 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
```

3.5 Starting Outbound Connections

When logged into the MSS, users can make basic outgoing connections using the methods on the following page. See the MSS Reference Manual on CD-ROM for more information about incoming and outgoing connections.

> *NOTE: Outgoing connections cannot be made via the same method as the incoming connection was made. In other words, if a user Telnets into the MSS, he cannot Telnet back out.*

3.5.1 Telnet

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 3-9: Telnet Connection

```
Local> TELNET 192.0.1.66
```

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3.5.2 SPX

The MSS and the target device must advertise themselves via SAP announcements. To view all available SPX devices (those advertising themselves) type **Show Nodes SPX** at the Local prompt. Then type "SPX" followed by the target device's SAP name.

Figure 3-10: SPX Connection

```
Local> SPX sap_name
```

3.5.3 LAT

To connect to a LAT service, type the word "LAT" followed by the name of the desired host or service. To view available LAT nodes and services, enter **Show Nodes LAT** or **Show Services** at the Local prompt. The example below shows how to connect to the highest-rated service named "modem" on the network.

Figure 3-11: LAT Service Connection

```
Local> LAT "modem"
```

3.6 Logout

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

Figure 3-12: Logging out of the MSS

```
Local> LOGOUT
```

4 - Basic 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 shows 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.*

4.1 Command Set

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

> *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.*

4.2 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.*

4.2.1 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 4-1: 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 4-2: Changing Privileged Password

```
Local>> CHANGE PRIVPASS "walrus"
```

4.2.2 Login Password

The login password is required for remote console logins. 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 4-3: Changing Login Password

```
Local>> CHANGE LOGINPASS "badger"
```

4.3 Protocol Configuration

Certain options can be configured for each of the protocols supported by the MSS. For more information on protocol configuration, refer to *MSS Reference Manual* on the CD-ROM.

4.3.1 TCP/IP Parameters

- **Subnet Mask**: This mask allows the server to decide at connection time whether a given TCP/IP host is part of the local network segment so that packets can be routed properly. A default subnet mask is created automatically when the MSS's IP address is configured, but it can be overridden.

    Ex: CHANGE SUBNET MASK 255.255.255.0

- **Name Resolution**: Hosts on TCP/IP networks generally have a text hostname and a numeric IP address. The MSS can resolve text host names into the numeric equivalents needed for most connections, provided that a DNS (domain name server) has been configured.

    Ex: CHANGE NAMESERVER 192.0.1.167

A default domain name can also be configured for the purpose of name resolution. When a user types a host name, the MSS will add the domain name and attempt the connection.

Ex: CHANGE DOMAIN "badger.incorp.com"

- **Gateway**: TCP/IP networks rely on gateways to transfer network traffic to hosts on other networks. The MSS will learn which hosts are gateways for the local network by listening to broadcasted IP routing packets, or it can be explicitly told which hosts are gateways.

    Ex: CHANGE GATEWAY 192.0.1.66

- **Loadhost**: The MSS loads its operational software from the specified loadhost when an Initialize Reload command is entered (see the *Commands* chapter of the *MSS Reference Manual*).

    Ex: CHANGE LOADHOST 192.0.1.73

- **IP Security**: The serial port can be restricted to allow connections only to and from certain hosts on the network. Configuration involves adding entries to the local host table, and specifying whether connections to/from those hosts should be allowed or denied.

    Ex: CHANGE IPSECURITY 192.0.1.255 DISABLED

4.3.2 IPX/SPX Parameters

- **Internal Network Number**: The MSS can advertise itself as a router to the network using its pre-configured internal network number. This number should not have to be changed.

- **Routing and Encapsulation**: When internal routing is enabled (the default), the MSS uses its internal network number to advertise itself to the network as a router. It can then route packets that are encapsulated into the following NetWare frame types: Ethernet v2 (Ether_II), 802.3 Native mode (Native), 802.2 (082_2), and 802.2 SNAP (Snap). All four frame types are enabled by default. Internal routing must be enabled when more than one frame type is enabled, and enabling routing enables all four frame types.

    Ex: CHANGE NETWARE INTERNAL ROUTING DISABLED
                 CHANGE NETWARE ENCAPSULATION SNAP ENABLED

4.3.3 LAT Parameters

- **Server Identification String**: The MSS can be given a descriptive identification string of up to 40 characters so that users on a LAT network can identify the MSS.

  Ex: CHANGE LAT IDENTIFICATION "Biolab Server"

- **Service Groups**: The MSS serial port and the services on the network each belong to one or more service groups. Devices can only connect to services if they both belong to a common service group.

  Ex: CHANGE LAT GROUPS 1,7,13,105,210-216

- **Circuit Timer**: Message transmission on LAT networks is controlled by timers which specify when messages will be sent from the server to other network nodes. The timer value is set to a default at the factory and should not need to be changed.

4.4 Serial Port Configuration

The serial port is set at the factory for 9600 baud, 8 data bits, one stop bit, and no parity. These and other serial port features can be configured as shown below. Remember that ports should be logged out or the MSS should be rebooted in order for the commands to take effect. For expanded information about serial port configuration, refer to the version of this chapter provided on CD-ROM.

NOTE: The console port is not user-configurable.

- **Port Access**: The serial port can be configured to initiate connections to services and permit local logins (local access), to accept only network connections (remote access), or to allow both incoming and outgoing connections (dynamic access, the default).

NOTE: If the MSS is connected to a device that will be generating data, set the port to Remote access.

  Ex: CHANGE ACCESS REMOTE

- **Baud Rate**: Specify a baud rate of 300, 600, 1200, 2400, 4800, 9600 (the default), 19200, 38400, 57600, or 115200 baud.

  Ex: CHANGE SPEED 19200

- **Autobaud**: The autobaud feature can be enabled or disabled (the default). When enabled, the MSS will automatically attempt to match its speed to that of the remote device upon connection.

    Ex: CHANGE AUTOBAUD ENABLED

- **Character Size**: The MSS can use 8 data bits (the default) or 7.

    Ex: CHANGE CHARSIZE 7

- **Stop Bits**: The MSS can use 1 stop bit (the default) or 2.

    Ex: CHANGE STOPBITS 2

- **Parity**: The MSS supports even and odd parity, as well as settings of Mark, Space, and None (the default).

    Ex: CHANGE PARITY EVEN

- **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, the default, sends particular characters through the data stream instead. If no flow control is desired, specify "None."

    Ex: CHANGE FLOW CONTROL CTSRTS

   NOTE: Applications that use the control characters will conflict with XON/XOFF flow control, in which case RTS/CTS is recommended.

- **Modem Control**: When enabled, this feature allows the MSS to check for signals coming from the modem (or other attached serial device) to establish whether a valid connection exists. When modem control is enabled, the port will be logged out whenever DSR is de-asserted, and the MSS will de-assert DTR to end the connection to the remote device. It is disabled by default.

    Ex: CHANGE MODEM CONTROL ENABLED

- **Signal Checking**: When signal checking is enabled, the MSS will check for the presence of a DSR signal before allowing an incoming connection. Remote connections to the serial port will not be permitted unless the DSR signal is asserted. It is disabled by default.

    Ex: CHANGE SIGNAL CHECK ENABLED

- **DTRwait**: DTRwait delays the MSS from asserting DTR until the port is actually in use, whether due to a login or a network connection. It is disabled by default.

     Ex: CHANGE DTRWAIT ENABLED

- **DSRlogout**: When a device connected to the MSS is disconnected or powered off, the DSR signal is de-asserted. If DSRlogout is enabled, the MSS will automatically log out the port when DSR is de-asserted. It is disabled by default.

     Ex: CHANGE DSRLOGOUT ENABLED

- **Inactivity Logout**: The MSS can be configured to automatically log out the serial port if it is idle for a specified period of time. This feature is disabled by default. See **Inactivity Timer**.

     Ex: CHANGE INACTIVE LOGOUT ENABLED

- **Inactivity Timer**: When **Inactivity Logout** is enabled, the port will automatically log out after an idle period of 1 to 120 minutes, depending upon the specified timer value. The default is 30 minutes.

     Ex: CHANGE INACTIVE TIMER 2

- **Preferred Services**: If preferred services are configured, the MSS will attempt to use those services for connections when no service names are specified in Telnet (TCP), Rlogin, SPX, or LAT connection commands. A preferred service can be defined for each protocol, or the **None** keyword can be use to denote that there is no preferred service for that protocol. No preferred services are enabled by default.

     Ex: CHANGE PREFERRED TCP *192.0.1.233*
                          CHANGE PREFERRED SPX NONE

   NOTE: *Both the Change Preferred and Change Dedicated commands can take environment strings. For complete command syntax, refer to the Commands chapter on CD-ROM.*

- **Dedicated Service**: The MSS can be configured to only provide connections to a single dedicated service. When a dedicated service is configured, users will be connected to the service immediately upon login, and will be disconnected from both the service and the MSS upon logout. They will never see the MSS Local> prompt.

A dedicated service is configured the same way as a preferred service. No dedicated service is configured for the MSS by default.

Ex: CHANGE DEDICATED LAT:LN=vax8:LD=0005

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

- **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. If modem control is enabled, the connection will be established as soon as the DSR signal is asserted.

  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).

  Ex: CHANGE AUTOSTART ENABLED

5 - Using the MSS

This chapter explains how to use the MSS interactively and with host applications. Host-initiated (incoming) connections include:

- Making socket connections to TCP/IP and IPX/SPX hosts.

- Making LAT connections to VMS, Ultrix, and OSF/1 hosts.

- Using host applications with the MSS.

- Using the code examples included with the MSS.

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.

- Using the MSS as a data pipe between a serial device and multiple hosts on the network.

5.1 Incoming Connections

5.1.1 Socket 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 and IPX connections can be made directly to the MSS serial port using sockets.

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.

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

5.1.1.1 TCP/IP Socket Connections

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 5-1: TCP/IP Socket Connection

```
% TELNET mymss:2001
```

5.1.1.2 IPX/SPX Socket Connections

The MSS supports SPX socket connections to port 9001. To make a socket connection, use the **SPX** command followed by the SAP name of the MSS.

Figure 5-2: SPX Socket Connection

```
Local> SPX MSS_xxxxxx_S1
```

5.1.2 LAT Connections

Most VMS applications require the creation of a LAT **application port** to access the MSS serial port. Programs can use the LAT application port as they would use a physical port for input and output. For example, an application might be configured to use port LTA3419 which would allow it to access a device connected to the MSS serial port.

To configure LAT on your VMS host, create a new and unique application port using the host's LATCP program (in Figure 5-3, **LTAnnnn** represents any unused LAT port number). Map the application port to the MSS by specifying the MSS node name and the serial port name. Enter the following commands at the VMS prompt:

Figure 5-3: Creating a LAT Application Port

```
$ RUN SYS$SYSTEM:LATCP
LCP> CREATE PORT LTAnnnn/APPLICATION
LCP> SET PORT LTAnnnn/node=mssname/port=port_1
LCP> SHOW PORT LTAnnnn
LCP> EXIT
```

NOTE: The procedure is similar for DEC UNIX LAT.

If heavy input or output loads are expected on the LTA port, you can set alternate type ahead to reduce flow control on the ports.

Figure 5-4: Reducing Flow Control

```
$ SET TERM/PERM/ALTYPEAHD LTAnnnn
```

To connect to the MSS serial port from a VMS host, use the command below and include the appropriate LAT application port number:

Figure 5-5: Connecting to the MSS

```
$ SET HOST/DTE ltannnn
```

5.1.3 Host Applications

The MSS can be used with applications on Unix, Windows, Windows NT, OS/2, LAT, and Macintosh hosts, and any other hosts that have a TCP/IP or SPX 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.

- Timing and serial signals are not preserved.

5.1.4 Code Examples

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

5.2 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.

5.2.1 Session Control

When a user makes a connection to a service on the network (via Telnet, Rlogin, SPX, or LAT), 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.

5.2.1.1 Break Key

The **Break** key allows users to leave an active session and return to the MSS's 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 5-6: Changing Break Key

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

5.2.1.2 Local Switch

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

Figure 5-7: Defining a Local Switch

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

5.2.1.3 Backward and Forward Switches

The **Backward** and **Forward** commands, when entered in local mode, allow users to navigate through current sessions. The **Change Backward Switch** and **Change Forward Switch** commands define keys that can be used to switch sessions without returning to local mode. The MSS intercepts and processes these switch keys; it does not pass them to the remote host.

No backward or forward switch keys are enabled by default. They must be explicitly defined using the commands in Figure 5-8. To specify a control character, precede it with a carat (^).

Figure 5-8: Defining Switches

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

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:

1.   Thor

2.   Duff

3.   Conan

In the example, 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.

5.2.1.4 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.

5.2.1.5 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.

5.2.2 Outgoing Connections

The MSS can make outgoing connections to hosts on TCP/IP, IPX/SPX, and LAT networks.

> *NOTE: Outgoing connections can only be made from the serial port.*

5.2.2.1 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 5-9: Opening a Telnet Connection

```
Local> TELNET 192.0.1.66
```

> *NOTE: If a preferred or dedicated 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 *Emulating a Direct Serial Connection* on page 5-11.

Sometimes the presence of Newline characters creates a problem during a Telnet session. When the MSS Telnet padding feature is enabled with the **Change Telnetpad** command (the default), the server will automatically pad carriage returns with null characters. This behavior works for most applications and is recommended in the Telnet RFC.

5.2.2.2 Rlogin

Rlogin allows a user to log into a remote host as if he or she were a local user. For example:

Figure 5-10: Connecting with Rlogin

```
Local> RLOGIN shark lola
```

In the example above, **shark** is the remote host and **lola** is the username. Unless the username is password protected or Rlogin is disabled on the remote host, 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.*

5.2.2.3 SPX

For SPX connections on IPX networks, the connecting device and the target device must advertise themselves via SAP announcements. The MSS advertises itself at boot time as **MSS_xxxxxx_S1** where **xxxxxx** represents the last six digits of its hardware name.

As long as the target device is advertising itself via SAP announcements, the MSS should be able to make an SPX connection. Enter the following command including the target device's SAP name.

Figure 5-11: Making an SPX Connection

```
Local> SPX sap_name
```

To view all available SPX devices (those advertising themselves via SAP announcements) enter the **Show Node LAT/SPX** command.

5 - 7

5.2.2.4 LAT

LAT devices broadcast their services to the network along with **ratings**, which are estimates of how busy the services are. Ratings range from 0 to 255; a 255 rating means that the service can accept connections while a zero rating means that the service is in use and connection attempts will be denied. By default, connection attempts are made to the highest-rated service bearing a given name.

To connect to a LAT service, type the word "LAT" followed by the service name. To view available LAT nodes and services, enter **Show Nodes LAT** or **Show Services** at the Local> prompt. The example below shows how to connect to the highest-rated service named *modem* on the network.

Figure 5-12: Connecting to a Service

```
Local> LAT modem
```

Connections to particular hosts and ports can be forced if desired. Forcing a connection in this way may be necessary if more than one host on a network can provide a given service, or if the desired host does not have the highest rating for that service. For example, the following command will attempt a connection to a service named *modem* on port 5 of a VAX host named **vax8**.

Figure 5-13: Connecting to a Specific Port

```
Local> LAT modem LN=vax8:LD=0005
```

> *NOTE:* *If the information supplied in the command is incorrect, or if there is no such service on the specified host or port, the connection will be refused.*

If the MSS has been configured to allow incoming LAT logins, the MSS will also show up as a service on the network. Users can connect to the MSS from another LAT-based server by typing the appropriate connection command.

5.2.3 Status Displays

These eleven commands 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.

5.2.3.1 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.

5.2.3.2 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.

5.2.3.3 Show NetWare

All necessary information related to IPX/SPX connections can be viewed including the name of the NetWare loadserver and the number of frames transmitted. Specifically, a user can find out which frame types are enabled, if internal routing is enabled, and what internal network number governs internal routing.

5.2.3.4 Show Node LAT/SPX

This command shows the LAT or SPX nodes that the MSS can see. For LAT, the name of each service node is listed along with its identification string and availability. For SPX, node information includes each node's socket number, hop count, frame type, and status.

5.2.3.5 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 those shown by the **Show Server Counters** command.

5.2.3.6 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.

5.2.3.7 Show Server Characteristics

This command displays network-related server identification information including the MSS's 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.

5.2.3.8 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.

5.2.3.9 Show Services

This command displays characteristics of LAT services offered on the network. Information shown includes service names, service ratings, group codes, offering nodes, service identification strings, and availability.

5.2.3.10 Show Sessions

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

5.2.3.11 Show Users

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

5.3 Emulating a Direct Serial Connection

Two MSS serial servers can be connected to emulate a direct serial connection on a LAN. Servers connected in this way can pass data only. They will not be able to pass status signals (DSR, DTS, CTS/RTS, etc.) or preserve timing between characters. The basic network configuration for this virtual serial line is shown in Figure 5-14.

Figure 5-14: Back-to-back MSS Connection
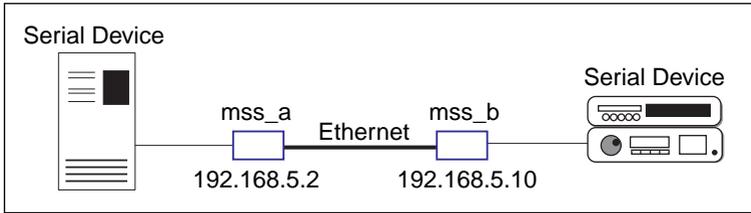
Assuming the MSS serial port parameters have been configured properly, they would be configured as follows:

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 two Servers are on different IP subnets, the default gateway on each unit will have to be configured with the Change Gateway command (see page 4-10).*

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. Similarly, the commands for **mss_b** ensure that it is always available to accept connections from **mss_a**.

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.

In UDP mode, each MSS would have to be configured to both send packets to and accept packets from the other MSS. The configuration is as follows:

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).

> *NOTE:* *Autostart can be disabled if you want the MSS to wait for a carriage return before sending data. Also, the Autostart character can be changed, if desired, using the Change Autostart command.*

5.4 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 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 not packetize or perform conversions, nor will it change the data to show which host(s) it came from; the host(s) and serial device handle this independent of the MSS.

> *NOTE:* *The MSS hardware automatically turns off the transmitter after the last character goes out. The latency is within 1.5 character times.*

5.4.1 Configuring Multihost Mode

To configure the MSS for multihost mode, first set the MSS for a dedicated multihost connection using the **Change Dedicated Hostlist** command.

Figure 5-15: Setting the MSS for Multihost Mode

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

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

Next, configure the list of hosts with which to communicate using the **Host Add** command. The host list can include up to 12 host entries in any combination of LAT, SPX, Telnet, Rlogin, and UDP addresses. For more information about formatting host list entries, see the Host command on page 4-28.

Figure 5-16: Adding Entries to the Host Table

```
Local>> HOST ADD LAT commserv
Local>> HOST ADD SPX sap_name
Local>> HOST ADD TCP 192.0.1.35:T
Local>> HOST ADD UDP 192.0.2.255
Local>> LOGOUT PORT 1
```

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

NOTE: *Any changes to the host table don't take effect until the port is logged out or the MSS is initialized.*

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.

Figure 5-17: Removing Entries from the Host Table

```
Local>> SHOW HOSTLIST
Local>> HOST DELETE 2
Local>> LOGOUT PORT 1
```

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

- The MSS will pingTCP 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 any of them aren't alive, the MSS doesn't connect or retry.

- If one of the host connections is terminated prematurely, the MSS will attempt to reconnect at preset intervals. If a UDP connection attempt receives an ICMP Unavailable message, the MSS will wait ten seconds before retrying. The waiting period for Telnet and Rlogin is 120 seconds, and for LAT it is 30 seconds.

- If a host's flow control blocks the MSS from sending, the MSS will not send any serial data to that host, but it will send the data to the other hosts in the host list. The MSS consults all hosts each time it has data to send; it doesn't keep track of which hosts wouldn't accept data in the past.

- When the MSS serial port is logged out, all host sessions are disconnected and the port becomes idle. Depending upon the port's Autostart setting, it will either wait for serial data (Autostart disabled) or start the connection again immediately (Autostart enabled).

A - Contact Information

If you are experiencing problems with the MSS or have suggestions for improving the product, please contact Lantronix Technical Support at (800) 422-7044 or (949) 453-3990.

FAQs are available at http://www.lantronix.com. We are also reachable via Internet email at 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**.

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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 will be 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. Either the OK or Serial LED 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.

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

Problem/Message	Error	Remedy
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.
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 (see page B-5), 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. If you did not request a NetWare or TFTP boot, the flash ROM code is corrupt. The unit will remain in boot mode.	Reboot the unit. If you get the same message, you will need to reload Flash ROM. See *Reloading MSS Software* on page D-3.

B.2 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-2: 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. 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. 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.3 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-3: 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*).
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.4 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/MSS1.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 MSS IP 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 MSS.SYS from the host at 192.0.1.188.

The following commands are available from within the Boot Configuration Program.

- **Help** displays a one-page summary of available commands and what they do.

- **Init 451** reboots the MSS after it has been configured. It will restart itself with full functionality. If it can't, the server will attempt to reload continuously.

- **Change** *option* tailors your server configuration and is used with one or more of the options listed below.

    - **BOOTP {Enabled, Disabled}** enables or disables the sending of BOOTP queries during the boot sequence. It is enabled by default.

    - **DHCP {Enabled, Disabled}** enables or disables the sending of DHCP queries during the boot sequence. It is enabled by default.

    - **Hardware** *xx-xx-xx* specifies the last three numbers of the server's Ethernet address. The first three numbers will be supplied automatically.

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

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- **Ipaddress** *ip_address* specifies this server's IP address. Uses the standard numeric format.

- **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).

- **Netwserver** *fileserver* specifies the NetWare fileserver from which the MSS will attempt to load the loadfile.

- **RARP {Enabled, Disabled}** enables or disables the sending of RARP queries during the boot sequence. It is enabled by default.

- **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.

- **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). The default is MSS.SYS.

  TCP/IP users must use the **Software** option to specify the loadhost, the loadfile, and their own network address. NetWare and TFTP users can specify a complete path name (up to 31 characters) if the file is located in a directory other than the default. For TFTP, the case of the filename must match that of the filename loaded onto the host computer; enclose the pathname in quotes to preserve case.

- **Show Server** can be used before and/or after issuing other commands to view the current MSS setup.

- **Flush NVR** 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 but excluding the hardware (Ethernet) address.

- **Flash** 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.5 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

In the following diagrams, unlabeled pins are not connected.

C.1 DB25 Connector

The figure below shows the pin connections of the MSS DB25 connector.

Figure C-1: Pinout of DB25 Serial Port
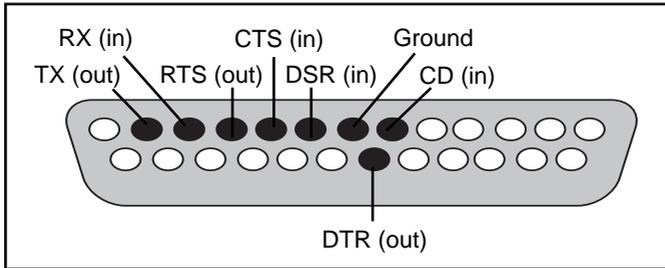
C.2 RJ-45 Connector

Lantronix servers are RS-423 compliant, and are thus limited by the equipment at the remote end of the serial line. If the Server is connected to an RS-232 device, it is subject to RS-232 limits.

RS-232 lines are limited to 15m (50 ft.) in length at 9600 baud, and to 2m (6 ft.) at 115.2K baud, although they will generally work at longer lengths.

Figure C-2: Pinout of RJ45 Serial Port

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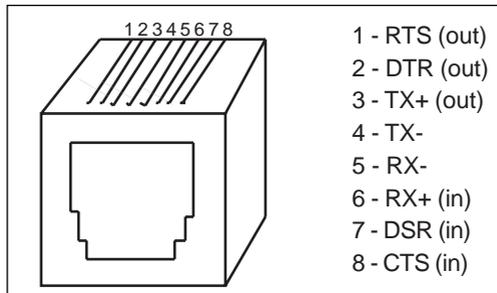
C.3 Modem Wiring

C.3.1 DSR (Data Signal Ready) versus CD (Carrier Detect)

By default, most modems assert CD only during a valid connection. In this case the modem's CD pin may be wired to the Server's DSR pin. Alternately, many modems can be configured such that DSR acts like CD. In this case, the modem's DSR pin may be wired to the Server's DSR pin.

C.3.2 DTR (Data Terminal Ready)

The MSS normally asserts DTR. When modem control is enabled on the MSS, the server will de-assert DTR for three seconds each time the port is logged out and each time a user disconnects from a modem service. The modem must be configured to hang up and recycle when DTR is de-asserted. If the modem is not configured in this way, sessions may not be properly disconnected.

D - Updating Software

The latest version of the Lantronix MSS operating software and its associated release notes can be downloaded directly from Lantronix in one of two ways: anonymous FTP through the Internet or dial-up via modem.

Comments and/or requests for help via email are welcome - send them to support@lantronix.com and they will be routed appropriately. Comments regarding the FTP/download process can be sent to ftp@lantronix.com. Mail can also be sent from within the dial-in modem menu.

D.1 Obtaining New Software

D.1.1 Via FTP

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 normal and Unix compress formats (filename.z); 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)
Name (ftp.lantronix.com:jerry): anonymous
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 UNIX. [your type displayed here]
Using binary mode to transfer files.
ftp>
```

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

D.1.2 Via a Modem

The Lantronix BBS system uses modems capable of v.32, v.34, v.42, v.42bis, 9600/2400/1200 baud operation for the physical connection and the KERMIT software package for file transfer. The modem number is USA (714) 367-1051, the account name is **ets**, and the password is **server** (see Figure -D-2).

> *NOTE:* *The download files (*.SYS) are image data and should only be transferred in binary mode. If binary mode is not used, the files will be corrupted.*

Figure D-2: Lantronix BBS New User Setup

```
Connected to nexus.
Escape character is '^]'
SunOS UNIX (nexus)

login: ets
Password: server (not echoed)
Last login: Wed Apr 18 16:13:13 from widgets.com
SunOS Release 4.1.3_U1 (NEXUS) #2: Fri Dec 2 10:08:39 PST 1994

Welcome to the Lantronix BBS Type 'h' for help

userid ('new' for new user): new
Welcome new user! Enter a valid userid, 1-12 characters, no spaces
Userid: jerry.smith (not echoed)
Enter Password: platypus (not echoed)
User Name: jerry
Terminal Type (default=vt100):
Email address, if any: jerry@widgets.com
```

You will be prompted to enter different letters. You can get help at any time by pressing the **h** key. When downloading is complete, type **g** to log out of the bulletin board system.

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 NetWare, 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 **MSS.SYS**, provided with the MSS media. This file must be accessible when updating Flash ROM. MSS485 users should substitute MSS485.SYS when the reload instructions refer to MSS.SYS.

- The MSS.SYS download file should be world-readable on the host, regardless of which download protocol is used.

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- 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; this ensures you are reloading the correct software file.

The reloading sequence is as follows:

1. If BOOTP or RARP is enabled, the MSS will request assistance from a BOOTP or RARP server before starting the download attempts. The MSS will then try TFTP, NetWare, 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 Chapter 2, 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 NetWare

The MSS.SYS file should be placed in the login directory on the NetWare file server. The MSS cannot actually log into the file server; it knows no username or password. It can only access files in the login directory itself. On the MSS, become the privileged user and specify the fileserver name, filename, and path.

Figure D-3: Reloading Flash ROM using NetWare

```
Local>> CHANGE NETWARE LOADHOST hobbes
Local>> CHANGE SOFTWARE "sys:\login\MSS.SYS"
Local>> LIST SERVER BOOT
Local>> INITIALIZE RELOAD
```

D.2.2 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. 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 (""").

Some BOOTP and TFTP implementations require a specific directory for the MSS.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-4: Reloading Flash ROM from TCP/IP

```
Local>> CHANGE IPADDRESS 192.0.1.77
Local>> CHANGE SOFTWARE "/path/mss.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.2.3 MOP

Copy the MSS.SYS file to the MOM$LOAD directory. The MSS.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-5: Reloading Flash ROM from VMS

```
Local>> INITIALIZE RELOAD
```

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D.3 Troubleshooting Flash ROM Updates

Many of the problems that occur when updating Flash ROM can be solved by checking the following:

NetWare   The loadfile must be in the login directory; the MSS cannot actually log into the fileserver.

TFTP   The file and directory must be world-read-able.
The loadhost name and address must be specified correctly, and their cases must match those of the files on the host system. FTP must be enabled on the host; several major Unix vendors ship their systems with TFTP disabled.

MOP   The Ethernet circuit **service** characteristic must be enabled.

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

E - Specifications

This appendix lists the power requirements, temperature requirements, altitude limitations, and relative humidity limitations of the MSS.

E.1 Power Specifications

The MSS power cube adaptor has the following specifications:

Adapter input voltage:

110 V AC US, 220 V AC international

Adapter output voltage: 6 V DC at 700 mÅ (MSS1)
5 V DC at 700 mÅ (MSS100)

Operating current: 700 mA at 6 V

Power consumption: 4.2 Watts (maximum)

E.2 Temperature Limitations

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

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

Max temperature change/hr: 20˚C (36˚F)

> *NOTE:* *Rapid temperature changes may affect operation. Do not operate the MSS near heating or cooling devices, large windows, or doors that open to the outdoors.*

E.3 Relative Humidity Limitations

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

Storage range: 10% to 90% (noncondensing)

E.4 Altitude Limitations

Operating: 2.4 km (8,000 ft)

Storage: 9.1 km (30,000 ft)

If you are operating the MSS above 2.4 km (8,000 ft), decrease the operating temperature rating by 1.8˚C for each 1,000 m (1˚F for each 1,000 ft).

Warranty Statement

Lantronix warrants for a period of FIVE YEARS from the date of shipment that each Lantronix **MSS Mini 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. 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.

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Declaration of Conformity

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

Manufacturer's Name: Lantronix

Manufacturer's Address: 15353 Barranca Parkway
Irvine, CA 92618 USA

declares that the product:

Product Name: Micro Serial Server

Model Number(s): MSS1-T, MSS1-T2, MSS100

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/pr
EN55024-3:1991-3V/m
IEC 801-4:1988/pr
EN55024-4:1992-0.5kV 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
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