

Serial Server Reference Manual

**For Lantronix MSS1-T, MSS1-T2, MSS100, and MSS485
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.

DEC, thickwire, thinwire, and VMS are trademarks of Digital Equipment Corporation. UNIX is a registered trademark of AT&T. Ethernet is a trademark of XEROX Corporation. HP-UX is a trademark of Hewlett-Packard Corporation. SunOS and Solaris are trademarks of Sun Microsystems, Inc. NetWare is a trademark of Novell Corp. Windows NT and Windows 95 are trademarks of Microsoft Corporation.

Copyright 1998, Lantronix. All rights reserved. No part of the contents of this book may be transmitted or reproduced in any form or by any means without the written permission of Lantronix. Printed in the United States of America.

The revision date for this manual is **October 7, 1998**.

Part Number: 900-157
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 doit accepter n'importe quelle interférence reçue qui peut causer une opération indésirable.

Contents

1	Introduction	
		<hr/>
1.1	RS-485 Networking Overview	1-1
1.1.1	RS-485 Protocols.....	1-2
1.1.2	Two-wire Mode.....	1-2
1.1.3	Four-wire Mode	1-2
1.2	RS-422 Networking Overview	1-3
1.3	Terms	1-3
1.4	Protocols.....	1-4
1.5	Software.....	1-4
1.6	Configuration	1-5
2	Configuration	
		<hr/>
2.1	Command Set	2-1
2.2	System Passwords	2-1
2.2.1	Privileged Password.....	2-1
2.2.2	Login Password.....	2-2
2.3	Protocol Configuration	2-2
2.3.1	IP Configuration.....	2-2
2.3.2	IPX Configuration.....	2-4
2.3.3	LAT Configuration	2-5
2.4	Serial Port Configuration.....	2-6
2.4.1	Access Mode	2-6
2.4.2	Baud Rate	2-6
2.4.3	Parity, Character Size, and Stop Bits.....	2-7
2.4.4	Flow Control.....	2-7
2.4.5	Modems and Modem Signalling	2-7
2.4.6	Logouts.....	2-9
2.4.7	Preferred Port Service	2-9
2.4.8	Dedicated Port Service	2-9
2.4.9	Autostart	2-10

3	Using the MSS	
		<hr/>
	3.1 Incoming Connections	3-1
	3.1.1 Socket Connections.....	3-1
	3.1.2 LAT Connections	3-2
	3.1.3 Host Applications	3-3
	3.1.4 Code Examples.....	3-3
	3.2 Interactive Connections	3-3
	3.2.1 Session Control.....	3-3
	3.2.2 Outgoing Connections	3-5
	3.2.3 Status Displays	3-6
	3.3 Emulating a Direct Serial Connection.....	3-8
	3.4 Multihost Mode.....	3-9
	3.4.1 Configuring Multihost Mode.....	3-9
4	Commands	
		<hr/>
A	Contact Information	
		<hr/>
B	Troubleshooting	
		<hr/>
C	Pinouts	
		<hr/>
D	Updating Software	
		<hr/>
E	Specifications	
		<hr/>
	Index	
		<hr/>

1

Introduction

1.1 RS-485 Networking Overview	1-1
1.1.1 RS-485 Protocols	1-2
1.1.2 Two-wire Mode	1-2
1.1.3 Four-wire Mode	1-2
1.2 RS-422 Networking Overview	1-3
1.3 Terms	1-3
1.4 Protocols	1-4
1.5 Software	1-4
1.6 Configuration	1-5

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.

The MSS485 is a multiprotocol serial server that provides Ethernet connections for devices connected to an RS-485 network.

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, configure, and use the MSS products.

- The remainder of this chapter outlines MSS functionality. For MSS485 users, it explains RS-485 networking.
- Chapter 2, *Configuration*, covers basic TCP/IP, NetWare, and LAT protocol configuration. It also explains serial port configuration, including modem configuration.
- Chapter 3, *Using the MSS*, provides an overview of how to use the MSS interactively and with host applications.
- Chapter 4, *Commands*, provides brief descriptions of each command in the MSS command set, including syntax and restrictions.
- Appendices provide Contact Information, Troubleshooting, Pinouts, directions for Updating Software, and Specifications.

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

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 RS-485 Networking Overview

The RS-485 standard allows a transmission line to be shared like a “party line.” As many as 32 devices can share the multidrop network. Typically, one device is the master and the other devices are slaves. There are a few important things to note about RS-485 networking with the MSS.

- The MSS can be used in either two-wire or four-wire mode. Refer to the following sections to determine which mode to use.
- The maximum RS-485 network cabling length (without repeaters) is 4,000 feet. Lantronix recommends the use of shielded twisted-pair cabling.

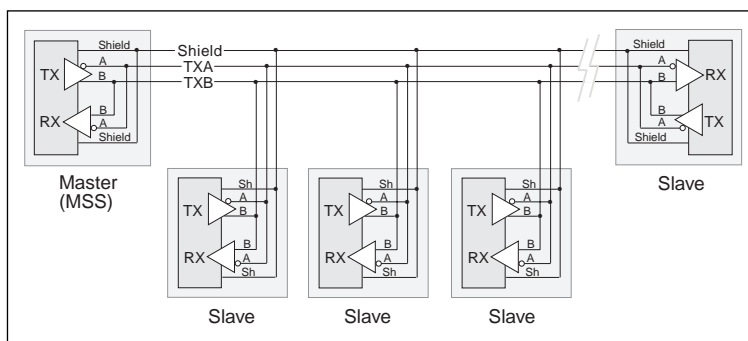
1.1.1 RS-485 Protocols

A large number and variety of protocols run over RS-485. However, the MSS does not convert or interpret serial data. It only moves data between serial and Ethernet. Any RS-485 protocol will have to be implemented by host software.

1.1.2 Two-wire Mode

In two-wire mode, the MSS operates in half duplex: one pair of wires shares transmit and receive signals, and an optional third wire can be used for shield/ground. The main advantage of using two-wire mode is reduced cabling costs.

Figure 1-1: Example Two-wire Mode Network



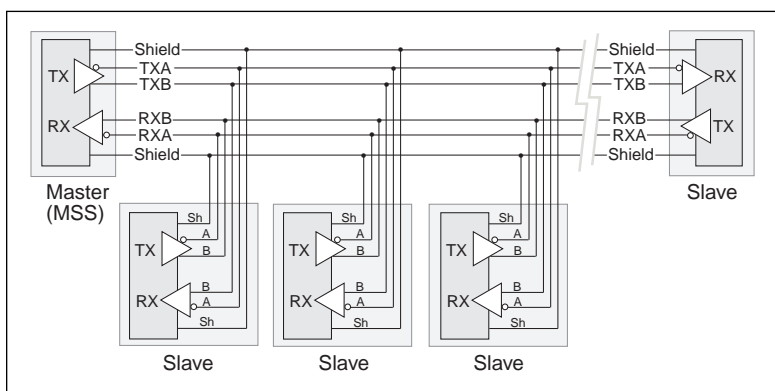
On a two-wire RS-485 network, the MSS must turn its transmitter on when it is ready to send data and then off a certain period of time after the data has been sent so that the line is available to receive again. At most baud rate settings, the timing delay is typically one character length with a maximum of 1.5 character lengths.

NOTE: For 600 baud and 4800 baud operation, the timing delay is doubled.

1.1.3 Four-wire Mode

In four-wire mode, the MSS operates in full duplex: one pair of wires functions as the transmit pair, another pair of wires functions as the receive pair, and there is a shield/ground wire for each pair. In a four-wire RS-485 network, one device, such as the MSS, acts as master while the other devices are slaves.

Figure 1-2: Example Four-wire Mode Network



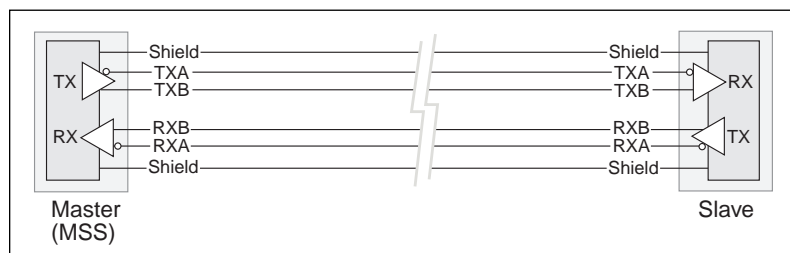
It is important to connect the transmitter of the master device to the wire that is connected to the receive terminals on the slave devices, and connect the receiver of the master device to the wire that is connected to the transmit terminals on the slave devices. In essence, the master device will be connected to the slave devices with a *swapped* cable.

The MSS transmitter is always driving and the receiver is always enabled, so the MSS is able to send and receive data simultaneously. The advantages of four-wire mode are double the throughput of two-wire mode and a guaranteed open path to each slave device's receiver.

1.2 RS-422 Networking Overview

The MSS485 is compatible with RS-422 networks. Connect the MSS to a single slave device using a *swapped* cable.

Figure 1-3: RS-422 Connection



All DIP switches must be set to the Down position.

1.3 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.
Master	The device that controls all other devices on an RS-485 network. An RS-485 network typically has one master device.
Slave	Any device on the RS-485 network that is not the master. An RS-485 network can have up to 31 slave devices.
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.

1.4 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.

1.5 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. See *Appendix D* for more information.

1.6 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 the Getting Started chapter of your Installation Guide.*

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 of your *Installation Guide* 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 on page 4-24 for more information.

2

Configuration

2.1 Command Set	2-1
2.2 System Passwords.....	2-1
2.2.1 Privileged Password	2-1
2.2.2 Login Password.....	2-2
2.3 Protocol Configuration.....	2-2
2.3.1 IP Configuration.....	2-2
2.3.2 IPX Configuration	2-4
2.3.3 LAT Configuration	2-5
2.4 Serial Port Configuration.....	2-6
2.4.1 Access Mode	2-6
2.4.2 Baud Rate	2-6
2.4.3 Parity, Character Size, and Stop Bits	2-7
2.4.4 Flow Control.....	2-7
2.4.5 Modems and Modem Signalling	2-7
2.4.6 Logouts	2-9
2.4.7 Preferred Port Service.....	2-9
2.4.8 Dedicated Port Service	2-9
2.4.9 Autostart.....	2-10

2 - 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.*

2.1 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. Some commands do not apply to the MSS485, and are so noted. The full command set is discussed in detail Chapter 4, *Commands*.

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.*

2.2 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.*

2.2.1 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 2-1: 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 2-2: Changing Privileged Password

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

2.2.2 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 2-3: Changing Login Password

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

2.3 Protocol Configuration

2.3.1 IP Configuration

2.3.1.1 Subnet Mask

IP networks can be divided into several smaller networks by subnetting. When a network is subnetted, some of the host part of each address is given to the network part of the address. The amount is governed by the **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. 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 2-4: Setting the Subnet Mask

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

2.3.1.2 Gateway

Usually, a TCP/IP internet is broken down into networks and subnetworks; 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 2-5: 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 do not wish to use a gateway, specify 0.0.0.0 as the IP address in the above command. See **Change Gateway** on page 4-10 for more information.

2.3.1.3 Name Resolution

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 servers** (DNS). A DNS is a host that can translate text host names into the numeric addresses needed to make a connection. To specify a domain name server, use the following command:

Figure 2-6: Configuring a Name Server

```
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** on page 4-16 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 2-7: Configuring the Default Domain

```
Local>> CHANGE DOMAIN "widget.incorp.com"
```

2.3.1.4 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 2-8: IP Security Command

```
Local>> CHANGE IPSECURITY 192.0.1.254 DISABLED
```

Single addresses can also be specified. See **Change IPsecurity** on page 4-13 for more information.

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.

2.3.1.5 SNMP

Once you enable an SNMP write community, you can configure the following things on the MSS:

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 *, and AsyncPortAutobaud*. Items marked with an asterisk (*) are saved to NVR.

Character MIB: PortName, PortReset, PortInFlowType, PortOutFlowType, PortSessionMaximum, and SessionKill.

2.3.2 IPX Configuration

The first layer of an IPX Ethernet packet is the frame type, which includes routing information. By default, the MSS is configured to route packets of all four NetWare frame types.

2.3.2.1 Routing and Encapsulation

If more than one frame type is in use on the LAN, the MSS will advertise itself as a router to the network using its internal network number. This allows nodes and file servers to access the MSS regardless of the frame type being used.

2.3.2.1.1 Internal Routing

The MSS can be restricted to a single frame format, in which case it will not need routing support. Two commands control this behavior: **Change NetWare Routing** and **Change NetWare Encapsulation**.

- Change NetWare Routing enables or disables the use of the internal network number. By default, internal routing is enabled.

NOTE: *If two or more frame types are enabled, internal routing must be enabled. To see which frame types are enabled, use the Show NetWare command.*

- Change NetWare Encapsulation controls which of the frame types are used. The choices are Ether_II, Native, 802_2, and SNAP which provide for Ethernet v2, 802.3 Native mode, 802.2, and 802.2 SNAP encapsulation types.

Figure 2-9 displays an example routing and encapsulation configuration. The 802.3 Native mode and 802.2 SNAP frame types are enabled, while Ethernet v2 and 802.2 are disabled. Because two frame types are enabled, internal routing must also be enabled.

Figure 2-9: Enabling Selected Frame Types

```
Local>> CHANGE NETWARE ENCAPSULATION NATIVE ENABLED
Local>> CHANGE NETWARE ENCAPSULATION SNAP ENABLED
Local>> CHANGE NETWARE ENCAPSULATION ETHER_2 DISABLED
Local>> CHANGE NETWARE ENCAPSULATION 802_2 DISABLED
Local>> CHANGE NETWARE ROUTING ENABLED
```

2.3.2.2 Loadhost

A loadhost is a NetWare file server that the MSS will try to load from if an **Initialize Reload** command is entered. If the software loadfile or loadhost address changes, you will have to change the configured parameters for the next reboot. For the following example, the loadhost is 192.0.1.34, and the name of the loadfile is "MSS2.SYS."

Figure 2-10: Changing the NetWare Loadhost

```
Local_2>> CHANGE NETWARE LOADHOST hobbes
Local_2>> CHANGE SOFTWARE sys:login/NEWMSS.SYS
```

2.3.2.3 Internal Network Number

The internal network number is used when internal routing is enabled, and must be unique to a particular IPX node. When addressing IPX packets to a file server, devices use the file server's internal network number as the destination address.

The internal network number for the MSS is a four-byte number that defaults to the last four bytes of the unit's Ethernet address (for example, a3001234). It is unlikely that this number will need to be changed. See Chapter 4, *Commands* for more information.

NOTE: *The MSS should be rebooted if the internal network number is changed.*

2.3.3 LAT Configuration

Three LAT parameters can be configured for the MSS: the server's identification string, its service group list, and its internal circuit timer.

2.3.3.1 Server Identification String

The MSS has a default name (`mss_XXXXXX` where `XXXXXX` represents the hardware address) that it uses when announcing itself to the LAT network. Users can change the name string. Users can also configure a more descriptive identification string. This string must be placed in quotes to preserve case, spaces, or punctuation.

Figure 2-11: LAT Name and Identification

```
Local> CHANGE NAME "Bio5"  
Local> CHANGE LAT IDENTIFICATION "Biolab Server"
```

2.3.3.2 Service Groups

A service is any resource on the network that can be accessed locally or via a network connection, for example, a modem. The MSS serial port and the services on the network each belong to one or more **service groups**. When a user or device requests a connection to a service, the LAT host will check the service groups to which both the requester and the service belong. If any group number is common to both, the connection attempt will continue. If not, access will be denied.

The **Change LAT Groups** command establishes group numbers for the MSS and its serial port.

Figure 2-12: Changing Service Groups

```
Local>> CHANGE LAT GROUPS 1,7,13,105,210-216
```

NOTE: *Each time the Change LAT Groups command is entered, the previous group list is replaced.*

2.3.3.3 Circuit Timer

Message transmission on LAT networks is controlled by timers. The MSS circuit timer specifies when messages will be sent from the server to other network nodes. This timer value is set to a widely-used default at the factory and should not be changed unless necessary.

If you need to change the length of the circuit timer, use the **Change LAT CircTimer** command followed by a timer value integer. The timer value can range from 30 to 200 milliseconds.

Figure 2-13: Changing Timer Delay

```
Local>> CHANGE LAT CIRCTIMER 50
```

2.4 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 after configuration.

NOTE: *The console port is not user-configurable.*

2.4.1 Access Mode

The serial port's access mode controls what type of connections are allowed. Local access allows the port to initiate connections to services, and will permit local logins. A port set for Remote access will accept connection requests but will not permit local logins. A Dynamic port (the default) can initiate and receive connection requests. To change the serial port's access mode, use the **Change Access** command.

Figure 2-14: Changing Serial Port Access Mode

```
Local> CHANGE ACCESS LOCAL
```

2.4.2 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, 38400, 57600, 115200, and 230400 baud. The baud rate can be changed with the **Change Speed** command followed by a baud rate number.

Figure 2-15: Changing the Baud Rate

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

NOTE: *230400 baud is only available on the MSS100.*

The MSS supports Autobaud, which allows the serial port to match its speed to the attached serial device upon connection (see **Change Autobaud** on page 4-3 for an explanation of the baud rate negotiation process). Autobaud is disabled by default, but can be enabled with the following command.

Figure 2-16: Enabling Autobaud

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

2.4.3 Parity, Character Size, 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 2-17: Configuring Parity

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

2.4.4 Flow Control

NOTE: *Flow Control is not available on the MSS485.*

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 the control characters 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 2-18: 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, it will be unnecessary to enable Passflow in most situations. See Chapter 4, *Commands*, for more information.

2.4.5 Modems and Modem Signalling

NOTE: *Modem and Modem Signalling features are not available on the MSS485.*

The following section details some of the MSS modem settings and modem signalling parameters. These options are mutually exclusive. When you have finished configuring modem settings, refer to the *Modem Configuration Checklist* on page B-5.

NOTE: *Modem wiring issues are covered in Appendix C, Pinouts.*

2.4.5.1 Modem Control

The MSS needs to know when the serial port is idle and when it is in use. If a connection has ended, the MSS must logout the port and prepare to accept a new connection. If no connection is open, the MSS must know to ignore spurious characters from the port and only accept valid connection attempts. These two factors are governed by DSR/DTR signal handling.

The MSS is capable of DSR/DTR signal handling only when Modem Control is enabled. To enable modem control, enter the **Change Modem Control** command.

Figure 2-19: Enabling Modem Control

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

2.4.5.2 Signal Checking

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

When MSS signal checking is enabled, the MSS will check for the presence of a DSR signal before allowing incoming connections. Remote 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 2-20: Enabling Signal Checking

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

2.4.5.3 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 modems to answer an incoming call; many modems 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 2-21: Enabling DTRwait

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

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

2.4.5.4 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 prevent users from accessing other sessions by switching terminal lines.

Figure 2-22: Enabling DSRlogout

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

2.4.6 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 2-23: 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 2-24: Enabling Timed Inactivity Logout

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

2.4.7 Preferred Port Service

A default service 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 Telnet (TCP), Rlogin, SPX, or LAT command.

Figure 2-25: Defining a Preferred Service

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

2.4.8 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 2-26: 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 on page 4-6 for more information.

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

2.4.9 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 2-27: 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).

3

Using the MSS

3.1 Incoming Connections.....	3-1
3.1.1 Socket Connections.....	3-1
3.1.2 LAT Connections	3-2
3.1.3 Host Applications	3-3
3.1.4 Code Examples.....	3-3
3.2 Interactive Connections.....	3-3
3.2.1 Session Control.....	3-3
3.2.2 Outgoing Connections	3-5
3.2.3 Status Displays	3-6
3.3 Emulating a Direct Serial Connection.....	3-8
3.4 Multihost Mode.....	3-9
3.4.1 Configuring Multihost Mode	3-9

3 - 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.

3.1 Incoming Connections

3.1.1 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.*

3.1.1.1 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 3-1: TCP/IP Socket Connection

```
% TELNET mymss:2001
```

3.1.1.2 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 3-2: SPX Socket Connection

```
Local> SPX MSS_XXXXXX_S1
```

3.1.2 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 3-3, **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 3-3: 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 3-4: 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 3-5: Connecting to the MSS

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

3.1.3 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.

3.1.4 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.

3.2 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.

3.2.1 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.

3.2.1.1 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 3-6: Changing Break Key

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

3.2.1.2 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 3-7: Defining a Local Switch

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

3.2.1.3 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 3-8. To specify a control character, precede it with a carat (^).

Figure 3-8: 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.

3.2.1.4 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.

3.2.1.5 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.

3.2.2 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.*

3.2.2.1 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 3-9: 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 3-8.

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.

3.2.2.2 Rlogin

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

Figure 3-10: 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.*

3.2.2.3 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 3-11: 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.

3.2.2.4 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 3-12: 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 3-13: 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.

3.2.3 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.

3.2.3.1 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.

3.2.3.2 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.

3.2.3.3 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.

3.2.3.4 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.

3.2.3.5 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.

3.2.3.6 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.

3.2.3.7 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.

3.2.3.8 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.

3.2.3.9 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.

3.2.3.10 Show Sessions

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

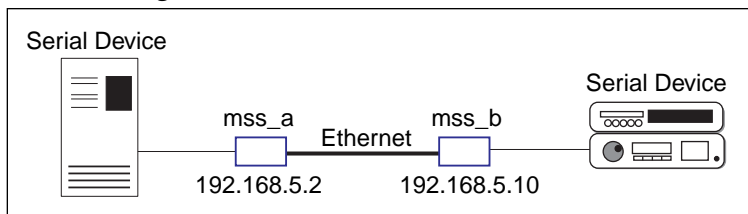
3.2.3.11 Show Users

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

3.3 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 3-14.

Figure 3-14: 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.*

3.4 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.*

3.4.1 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 3-15: 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 3-16: 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 3-17: 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 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 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).

4

Commands

4.1 Command Line Editing.....	4-2
4.2 Backward.....	4-2
4.3 Change Access.....	4-3
4.4 Change Autobaud.....	4-3
4.5 Change Autostart.....	4-4
4.6 Change Backward Switch.....	4-4
4.7 Change Bootgateway.....	4-5
4.8 Change BOOTP	4-5
4.9 Change Break.....	4-5
4.10 Change Buffering	4-6
4.11 Change Charsize	4-6
4.12 Change Dedicated.....	4-6
4.13 Change DHCP	4-8
4.14 Change Domain.....	4-8
4.15 Change DSRlogout.....	4-8
4.16 Change DTRwait.....	4-9
4.17 Change Flow Control	4-9
4.18 Change Forward Switch.....	4-10
4.19 Change Gateway	4-10
4.20 Change Inactive Logout.....	4-11
4.21 Change Inactive Timer	4-11
4.22 Change Incoming.....	4-12
4.23 Change IPaddress	4-12
4.24 Change IPsecurity	4-13
4.25 Change LAT CircTimer.....	4-13

4.26	Change LAT Groups.....	4-13
4.27	Change LAT Identification	4-14
4.28	Change Loadhost	4-14
4.29	Change Local Switch.....	4-14
4.30	Change Loginpass	4-15
4.31	Change Modem Control.....	4-15
4.32	Change Name	4-15
4.33	Change Nameserver	4-16
4.34	Change NetWare Encapsulation.....	4-16
4.35	Change NetWare Internal Network	4-17
4.36	Change NetWare Loadhost	4-17
4.37	Change NetWare Routing.....	4-17
4.38	Change Parity	4-18
4.39	Change Passflow	4-18
4.40	Change Password Incoming.....	4-18
4.41	Change Password Limit	4-19
4.42	Change Password Protect	4-19
4.43	Change Portname.....	4-19
4.44	Change Preferred	4-20
4.45	Change Privpass.....	4-21
4.46	Change RARP	4-21
4.47	Change Retransmit Limit.....	4-21
4.48	Change Rlogin	4-21
4.49	Change Secondary.....	4-22
4.50	Change Serial Delay.....	4-22
4.51	Change Session Limit	4-22
4.52	Change Signal Check.....	4-22
4.53	Change Silentboot	4-23
4.54	Change SNMPSetComm	4-23
4.55	Change Software	4-23
4.56	Change Speed	4-24
4.57	Change Startup.....	4-24
4.58	Change Stopbits.....	4-25
4.59	Change Subnet Mask	4-25
4.60	Change Telnetdest.....	4-26

4.61	Change Telnetpad	4-26
4.62	Change Termttype.....	4-26
4.63	Change Verify	4-27
4.64	Delete IPsecurity.....	4-27
4.65	Disconnect	4-27
4.66	Finger	4-27
4.67	Forward	4-28
4.68	Help.....	4-28
4.69	Host	4-28
4.70	Initialize	4-29
4.71	LAT.....	4-30
4.72	Logout Port	4-30
4.73	Netstat.....	4-31
4.74	Ping.....	4-31
4.75	Resume.....	4-31
4.76	Rlogin.....	4-31
4.77	Set Privileged	4-32
4.78	Show IPsecurity	4-32
4.79	Show Hostlist.....	4-32
4.80	Show NetWare.....	4-33
4.81	Show Nodes	4-33
4.82	Show Ports.....	4-33
4.83	Show Server	4-34
4.84	Show Services	4-34
4.85	Show Session.....	4-34
4.86	Show SNMP	4-35
4.87	Show Users.....	4-35
4.88	SPX.....	4-35
4.89	Telnet.....	4-35
4.90	Test	4-36
4.91	Zero	4-36

4 - Commands

This chapter describes the MSS command set. Each command and its basic syntax is shown, as well as whether the command is restricted to the privileged user. Where applicable, default settings are given.

When reading through this chapter, take note of the following:

- Commands are listed in alphabetical order.
- Some commands do not apply to the MSS485, and are so noted.
- Commands and keywords appear in **BOLD UPPERCASE**.
- User-entered parameters appear in *italics*. You must replace the italicized word with an appropriate entry.
- When two or more parameters appear in curly {braces}, you must choose one and only one of the items within each set of braces to complete the command.
- Parameters that appear in [brackets] are optional. If more than one parameter appears in a single set of brackets, only one parameter may be chosen at a time. Single parameters enclosed in brackets may be omitted from the command, or used in combination with one another.
- The MSS has a reduced command set from the EPS, ETS, and MPS product lines. **Change** commands replace the Set/Define Server and Set/Define Port commands used in the earlier products.

A single Change command will take effect immediately (like a Set command), and will remain in effect upon reboot until another Change command is issued (like a Define command). The Set Privileged command is still used, however.

4.1 Command Line Editing

The following table lists keys that can be used for command line editing.

Table 4-1: Command Line Editing Keys

Key	Purpose
Return	Executes the current command line
Delete	Deletes the character before the cursor
Ctrl-A	Toggles insertion mode (insert or overstrike)
Ctrl-D	Logs out of the server
Ctrl-E	Moves cursor to end of line
Ctrl-H or Backspace	Moves cursor to beginning of line
Ctrl-R	Redisplays the current command
Ctrl-U	Deletes the entire current line
Ctrl-Z	Logs out of the server
Left Arrow	Moves cursor left
Right Arrow	Moves cursor right
Ctrl-P or Up Arrow	Recalls previous command
Ctrl-N or Dn Arrow	Recalls next command
<i>!text</i>	Recalls last command starting with <i>text</i>
!!	Recalls and implements last command

4.2 Backward

BACKWARD

Moves the user to the previous session when entered in Local mode.

See Also Change Backward Switch, page 4-4.

4.3 Change Access

CHANGE ACCESS	{ LOCAL REMOTE DYNAMIC }
---------------	--------------------------------

Specifies which types of connections the serial port will accept.

Restrictions	Requires privileged user status.
Errors	Autobaud must be disabled for Dynamic and Remote ports (see <i>Host Applications</i> on page 3-3).
Parameters	<p>Local Allows the port to initiate connections to services, and permits only local logins.</p> <p>Remote Allows the port to accept network connection requests, but does not permit local logins.</p> <p>Dynamic Allows the port to initiate and receive connections.</p>
Defaults	Dynamic
See Also	Change Autobaud, page 4-3.

4.4 Change Autobaud

CHANGE AUTOBAUD	{ DISABLED ENABLED }
-----------------	-------------------------

Allows the port to detect the baud rate used for an incoming connection and then change its own baud rate at login time to match that of the remote device. Incoming carriage returns help the MSS decide the proper speed.

Restrictions	Requires privileged user status. Does not apply to the MSS485.
Errors	Autobaud must be disabled for Dynamic and Remote port access (see <i>Host Applications</i> on page 3-3). Autobaud only works for 8 bits with no parity, or for 7 bits with Even parity.
Default	Disabled

4.5 Change Autostart

CHANGE AUTOSTART	{ DISABLED ENABLED CHARACTER x }
------------------	--

Configures whether the port will wait for a Carriage Return before starting a connection. If enabled, the port will start automatically.

Restrictions	Requires privileged user status.
Errors	A port enabled for autostart will not be idle unless DSR is held low, and therefore will not be available for connections from the network.
Parameters	<p>Character Sets a character that will cause a login event so that users do not have to hit Return or configure Autostart Enabled for an extended period of time.</p> <p>x Enter the desired alphanumeric character. To specify a control character, precede it with a caret (^).</p>
Default	Disabled

4.6 Change Backward Switch

CHANGE BACKWARD SWITCH	{ <i>character</i> NONE }
------------------------	------------------------------------

Defines a key that will switch the user to a previous session without entering local mode. From local mode, the key functions as if the Backward command was entered. Any key can be specified unless it conflicts with MSS line editing, Break, or Forward keys, or keys used by remote operating systems.

Restrictions	Requires privileged user status.
Parameters	<p>character Specifies a character to serve as the switch key. To specify a control character, precede it with a caret (^).</p> <p>None Clears any previously-defined Backward Switch key.</p>
Default	No switch is configured
See Also	Backward, page 4-2; Change Break, page 4-5; Change Forward Switch, page 4-10; Change Local Switch, page 4-14; Forward, page 4-28.

4.7 Change Bootgateway

```
CHANGE BOOTGATEWAY IPaddress
```

Specifies a server to send packets to when downloading code so that units can boot without needing proxy arp on the router. This is **not** the loadhost—the packets will be addressed to the loadhost, but will be physically set to the bootgateway host.

Restrictions Requires privileged user status.

4.8 Change BOOTP

```
CHANGE BOOTP { DISABLED }
               { ENABLED }
```

Disables or enables querying for a BOOTP host at system boot time.

Restrictions Requires privileged user status.

Default Enabled

4.9 Change Break

```
CHANGE BREAK { LOCAL }
              { REMOTE }
              { NONE }
```

Determines where processing of the Break key will take place.

Restrictions Requires privileged user status.

Parameters **Local**
Tells the MSS to process the Break key and return the user to local mode.

Remote
Tells the MSS to ignore the Break key and pass it to the remote host.

None
Disables the Break key.

Default None

See Also Change Local Switch, page 4-14.

4.10 Change Buffering

```
CHANGE BUFFERING buffersize
```

Specifies the size of the buffer (in bytes) to use for network connections. The default size should be sufficient in most cases, but the size can be increased for larger data transfers.

Restrictions	Requires privileged user status.
Parameters	buffersize Specify a size ranging from 128 bytes to 4096 bytes.
Default	4096 bytes

4.11 Change Charsize

```
CHANGE CHARSIZE { 7 }  
                  { 8 }
```

Sets the number of data bits per character for the serial port.

Restrictions	Requires privileged user status.
Errors	Autobaud will only work for 8 data bits, or for 7 data bits with Even parity.
Default	8 data bits
See Also	Change Autobaud, page 4-3; Change Parity, page 4-18.

4.12 Change Dedicated

```
CHANGE DEDICATED {  
                  HOSTLIST  
                  LAT [servicename:envString]  
                  NONE  
                  SPX SAPname  
                  TCP hostname:envString  
                  }
```

Dedicates a port to a Telnet, Rlogin, or SPX host, or to a LAT service. Once logged into the port, a user is automatically connected to the host or service; the user cannot return to local mode or enter MSS commands. Upon exiting the remote host, the user is logged out of the MSS.

Restrictions	Requires privileged user status. There can only be one dedicated service configured at a single time.
Errors	Defining the MSS's single port as a dedicated port leaves no easy way to log into the server. Only remote console port and EZWebCon connections will work.

Parameters

Hostlist

Dedicates the port to a list of hosts. For more information, see the **Host** command on page 4-28.

LAT

Dedicates the port to a LAT service.

servicename

Enter the name of the desired LAT service.

None

Disables all previously-configured dedicated hosts.

SPX

Dedicates the port to an SPX host.

SAPname

Enter the target device's SAP name.

TCP

Specifies a Telnet host, or an Rlogin connection if the optional **:R** environment string is appended to the TCP keyword (with no space separating the two).

By default, TCP opens a regular Telnet connection that includes Telnet IAC option negotiation. The **:T** environment string allows you to open a raw TCP socket with no Telnet option negotiation, if desired. A socket number can also be added to connect to a socket other than the default.

hostname

Enter a text host name or a numeric IP address.

envString

Add the desired TCP or LAT environment keys. Options must be separated by colons.

Table 4-2: Environment String Key Letters

D	+D = Backspace mode	-D = Delete mode
E	+E = Local Echo mode	-E = Remote Echo mode
I	I = Interactive mode	
P	+P = Passall mode	-P = Passthru mode
C	+C = CR to CRLF,	-C = CR to LF
T	TCP mode (raw uninterpreted data stream)	
U	UDP mode (the default UDP socket is 4096)	
R	Rlogin protocol (sets port number to 513 if not already set)	
LD=port#	Sets the LAT destination port to port#	
LN=node#	Sets the target LAT node to node#	
<i>mmm</i>	socket number (TCP only)	

Default

Disabled

Examples Local> CHANGE DEDICATED TCP chimaera:2001T
(forms a raw Telnet connection to socket 2001 on host chimaera)

See Also Host, page 4-28; *Multihost Mode*, page 3-9.

4.13 Change DHCP

CHANGE DHCP { DISABLED } { ENABLED }

Enables or disables querying for a DHCP host at system boot time.

Restrictions Requires privileged user status.

Errors Configuring an IP address will automatically disable DHCP.
Enabling DHCP will remove the IP address saved in NVR.

See Also *IP Address Configuration*, page 3-2 of the *Installation Guide*.

4.14 Change Domain

CHANGE DOMAIN [<i>DomainName</i>] NONE

Specifies the default domain name to be used when attempting to resolve text TCP/IP host names.

Restrictions Requires privileged user status.

Parameters **DomainName**
Enter a domain name of no more than 64 characters.

None
Disables a configured domain.

4.15 Change DSRlogout

CHANGE DSRLGOUT { DISABLED } { ENABLED }

If enabled, the port will be logged out when its DSR signal is de-asserted. This logout usually happens only when the attached device is turned off or disconnected. The feature is intended to keep users from switching terminal lines to access other sessions. Open connections will be closed before logout.

When modem control is enabled, DSRlogout is implicitly enabled because the two features use the same signals. However, modem control must be disabled to use DSRlogout.

Restrictions Requires privileged user status. Does not apply to the MSS485.

Default Disabled

4.16 Change DTRwait

CHANGE DTRWAIT { DISABLED } { ENABLED }
--

If enabled, the MSS will not assert the DTR signal on the serial port until a user logs into the port, or until a network connection is made to the port.

Restrictions	Requires privileged user status.
	Does not apply to the MSS485.
Default	Disabled

4.17 Change Flow Control

CHANGE FLOW CONTROL { CTSRTS } { NONE } { SLOWCTS } { XONXOFF }
--

Sets the type of flow control to be used on the port.

Restrictions	Requires privileged user status.
	Does not apply to the MSS485.
Parameters	<p>CTSRTS Hardware flow control is used.</p> <p>None Flow control is not used.</p> <p>SlowCTS A less aggressive method of hardware flow control is used in which the MSS flow-controls the sender sooner than it would when using CTS/RTS flow control. SlowCTS allows the MSS to reliably communicate with devices that implement CTS/RTS flow control in software, and therefore cannot respond to changes in the same way as true hardware flow control.</p> <p>XONXOFF Software flow control is used.</p>
Default	XONXOFF

4.18 Change Forward Switch

CHANGE FORWARD SWITCH { <i>character</i> } NONE }
--

Defines a key that will switch the user to the next session without entering local mode. From local mode, the key functions as if the Forward command was entered. Any key can be specified unless it conflicts with MSS line editing, Break, or Backward keys, or keys used by remote operating systems.

Restrictions	Requires privileged user status.
Parameters	<p>character Type a character to serve as the switch key. To specify a control character, precede it with a caret (^).</p> <p>None Clears the previously-defined Forward Switch key.</p>
Default	No switch is configured
See Also	Change Backward Switch, page 4-4; Change Break, page 4-5; Change Local Switch, page 4-14; Forward, page 4-28.

4.19 Change Gateway

CHANGE [SECONDARY] GATEWAY <i>IPaddress</i>

Specifies the host that is to be used as a TCP/IP gateway between networks. If a connection to a machine on a different network is attempted, messages will be directed to the gateway for forwarding.

Restrictions	Requires privileged user status.
Errors	If a gateway is not defined, an error will be returned.
Parameters	<p>Secondary Configures a secondary gateway to be used when the primary gateway is unavailable.</p> <p>IPaddress Specify a host using the numeric IP address format. Specifying an IP address of 0.0.0.0 removes the previously-defined gateway.</p>
See Also	Change Subnet Mask, page 4-25.

4.20 Change Inactive Logout

CHANGE INACTIVE LOGOUT { DISABLED } { ENABLED }
--

Determines whether a port will be automatically logged out after a period of inactivity. **Inactivity** is defined as having no keyboard or network activity on the port. The inactivity period is set with the Change Inactive Timer command. Open network connections will be closed before logout.

Restrictions	Requires privileged user status.
Default	Disabled
See Also	Change Inactive Timer, page 4-11.

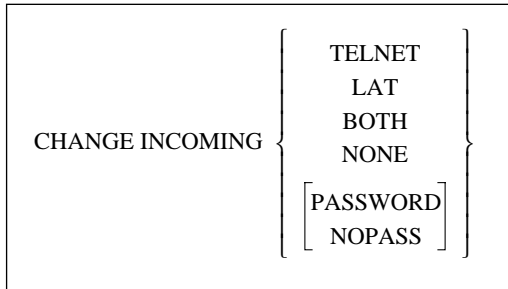
4.21 Change Inactive Timer

CHANGE INACTIVE TIMER <i>period</i>

Sets the period of time after which a port with Inactive Logout enabled will be considered inactive and automatically logged out.

Restrictions	Requires privileged user status.
Parameters	period Enter a length of time in minutes (1 to 120) or seconds (5 to 60). For minutes, add an m after the number. For seconds, add an s after the number.
Default	30 minutes
Examples	Local> CHANGE INACTIVE TIMER 10m
See Also	Change Inactive Logout, page 4-11.

4.22 Change Incoming



Permits or denies incoming Telnet and LAT connections and enforces password protection. The Show Server command shows the status of incoming connection parameters.

Restrictions	Requires privileged user status.
Parameters	<p>Telnet Enables incoming Telnet connections.</p> <p>LAT Enables incoming LAT connections.</p> <p>Both Enables incoming Telnet and LAT connections.</p> <p>None Disables incoming connections.</p> <p>Password Prompts the user to specify an incoming password of no more than 6 characters.</p> <p>Nopass Requires no password for incoming connections.</p>
Defaults	Telnet, Nopass
See Also	Change Loginpass, page 4-15.

4.23 Change IPaddress

CHANGE IPADDRESS <i>IPaddress</i>

Sets the MSS's IP address. The IP address must be set before any TCP/IP functionality is available. If there are any active TCP logins or sessions, the new IP address will take effect when the MSS is rebooted.

Restrictions	Requires privileged user status.
Parameters	<p>IPaddress Specify the IP address in standard numeric format.</p>
See Also	Change DHCP, page 4-8.

4.24 Change IPsecurity

```
CHANGE IPSECURITY IPaddress { DISABLED }
                       { ENABLED }
```

Adds or edits entries in the IP Security table.

Restrictions	Requires privileged user status.
Parameters	IPaddress Specify an address in standard numeric format. An address with 0 or 255 in any segment restricts all addresses in that range.
Default	Disabled
Examples	Change IPsecurity 192.0.220.77 Disabled Restricts the single IP address from the table. Change IPsecurity 192.0.1.255 Disabled Restricts all addresses between 192.0.1.0 and 192.0.1.255.
See Also	<i>IP Security</i> , page 2-3.

4.25 Change LAT CircTimer

```
CHANGE LAT CIRCTIMER timerValue
```

Specifies the delay between messages sent from the server to other network nodes. This parameter should not need to be altered, and should not be altered when there are active sessions.

Restrictions	Requires privileged user status.
Parameters	timerValue Specify a value from 30 to 200 milliseconds.
Default	80 (milliseconds)

4.26 Change LAT Groups

```
CHANGE LAT GROUPS { ALL }
                   { groupList }
                   { NONE }
```

Restrictions	Requires privileged user status.
Parameters	groupList Specify a list of groups to replace the current list. Use commas to separate group numbers, and use hyphens to separate ranges.
Default	0 (only group zero is configured)
Examples	CHANGE LAT GROUPS 17, 21-28, 118-211, 220
See Also	<i>LAT</i> , page 3-6; <i>Change LAT Identification</i> , page 4-14.

4.27 Change LAT Identification

```
CHANGE LAT IDENTIFICATION identString
```

Sets the text string that identifies the MSS on LAT networks.

Restrictions Requires privileged user status.

Parameters **identString**
A string of 40 characters or less. Identification strings must be enclosed in quotes if they contain lower-case letters, spaces, or punctuation.

4.28 Change Loadhost

```
CHANGE [SECONDARY] LOADHOST IPaddress
```

Specifies the host to be used for TCP/IP downloads to provide the MSS with runtime code.

Restrictions Requires privileged user status.

Parameters **Secondary**
Configures a secondary loadhost to be used when the primary loadhost is unavailable.

IPaddress
Specify a host using standard numeric format—host names cannot be resolved via a nameserver. Specifying an IP address of 0.0.0.0 removes the previously-defined gateway.

4.29 Change Local Switch

```
CHANGE LOCAL SWITCH { character }  
                     { NONE }
```

Defines a key that will switch the user between local mode and remote connections. The Local Switch key functions the same as the Break key. Any key can be specified unless it conflicts with MSS line editing, Break, Forward, or Backward keys, or keys used by remote operating systems.

Restrictions Requires privileged user status.

Parameters **character**
Specify a character to serve as the switch key. To specify a control character, precede it with a caret (^).

None
Disables the Local Switch key.

Default No switch is configured

See Also Change Backward Switch, page 4-4; Change Forward Switch, page 4-10.

4.30 Change Loginpass

```
CHANGE LOGINPASS
```

Specifies the password used to log into the server from the serial port or the network. The user will be prompted for a new password of no more than 6 alphabetic characters (this password is not displayed when typed). Users are only required to provide this password if the port has Password Protect enabled.

Restrictions	Requires privileged user status.
Default	access
See Also	Change Password Protect, page 4-19.

4.31 Change Modem Control

```
CHANGE MODEM CONTROL { DISABLED }
                       { ENABLED }
```

Specifies whether the modem control lines can be monitored, and whether their configurations can be changed. The MSS supports partial modem control (DSR/DTR).

Restrictions	Requires privileged user status. Does not apply to the MSS485.
Errors	Modem Control must be disabled to use DSRlogout. Modem Control implies Dsrlogout, in that the MSS will attempt to log out any connections if the port's DSR signal is de-asserted.
Default	Disabled
See Also	Change DSRlogout, page 4-8.

4.32 Change Name

```
CHANGE NAME serverName
```

Renames the MSS. The unit's default name, which is based on its default Ethernet address, is printed on its underside.

NOTE: *Changing the server name will also change the name of advertised IPX SAP packets, which will affect Redirector operation. See your Lantronix Redirector documentation for more information.*

Restrictions	Requires privileged user status.
Errors	The server name must be unique to the network.
Parameters	serverName A string of up to 16 characters. Strings must be enclosed in quotes if they contain lower-case letters, spaces, or punctuation.

4.33 Change Nameserver

```
CHANGE [SECONDARY] NAMESERVER IPaddress
```

Specifies the nameserver to be used during TCP/IP connections. This host will attempt to resolve text host names into numeric IP address form.

Restrictions Requires privileged user status.

Parameters **Secondary**
Specifies a secondary nameserver to be used when the primary nameserver is unavailable.

IPaddress
Specify a host using standard numeric format—host names cannot be resolved via a nameserver.

See Also *Name Resolution*, page 2-3.

4.34 Change NetWare Encapsulation

```
CHANGE NETWARE ENCAPSULATION {
    ETHER_II
    NATIVE
    SNAP
    802_2
} {
    DISABLED
    ENABLED
}
```

Configures the frame types that the MSS will pay attention to during IPX connections. When NetWare routing is enabled with the **Change NetWare Routing** command, all frame types are enabled regardless of the settings made with this command.

Restrictions Requires privileged user status.

Errors When more than one frame type is enabled, NetWare routing must also be enabled.

Parameters **Ether_II**
Enables Ethernet v2 frame type.

Native
Enables the “native mode” NetWare frame type.

Snap
Enables the 802.2 frame type with SNAP SAPs.

802_2
Enables the 802.2 frame type with NetWare SAPs.

Defaults Enabled (all)

Internal routing enabled

See Also *Change NetWare Internal Network*, page 4-17; *Change NetWare Routing*, page 4-17; *Show NetWare*, page 4-33.

4.35 Change NetWare Internal Network

```
CHANGE NETWARE INTERNAL NETWORK number
```

Changes the MSS's preset internal network number. Each MSS has a default internal network number derived from the unit's Ethernet address. This number is used for internal NetWare routing.

- Restrictions** Requires privileged user status.
- Parameters** **number**
Specify the MSS's new internal network number in the format **annnnnnn** where **a** represents a letter and each **n** represents a number.
- See Also** Change NetWare Encapsulation, page 4-16; Change NetWare Routing, page 4-17; Show NetWare, page 4-33.

4.36 Change NetWare Loadhost

```
CHANGE NETWARE LOADHOST [ fileserver ]  
                          NONE  
                          " "
```

Specifies the name of the fileserver from which download attempts will be made at boot time.

- Restrictions** Requires privileged user status.
- Parameters** **fileserver**
Enter the name of the desired fileserver using no more than 8 characters.
- None**
Specifies that no loadhost will be used.
- " "**
The null string server the same function as the None parameter.
- See Also** Change Software, page 4-23.

4.37 Change NetWare Routing

```
CHANGE NETWARE ROUTING { DISABLED }  
                       { ENABLED }
```

If enabled, allows the MSS to act as an internal router whenever there are multiple NetWare frame types in use on the LAN.

- Restrictions** Requires privileged user status.
- Default** Enabled
- See Also** Change NetWare Encapsulation, page 4-16; Change NetWare Internal Network, page 4-17; Show NetWare, page 4-33.

4.38 Change Parity

CHANGE PARITY	{	EVEN	}
		MARK	
		NONE	
		ODD	
		SPACE	}

Sets the serial port's parity.

Restrictions Requires privileged user status.

Errors Autobaud will not work unless the port is using 8 bit characters, or 7 bit characters with Even Parity.

Default None

See Also Change Autobaud, page 4-3; Change Charsize, page 4-6.

4.39 Change Passflow

CHANGE PASSFLOW	{	DISABLED	}
		ENABLED	}

Specifies whether XON/XOFF characters will be stripped from the data stream. This applies only when using XON/XOFF flow control.

4.40 Change Password Incoming

CHANGE PASSWORD INCOMING	{	DISABLED	}
		ENABLED	}

Controls whether the MSS will ask users for an incoming password when they attempt to connect to the network socket connection ports (ports 2001 and 3001).

Restrictions Requires privileged user status

See Also *TCP/IP Socket Connections*, page 3-1.

4.41 Change Password Limit

```
CHANGE PASSWORD LIMIT number
```

Limits the number of failures allowed when entering the Set Privileged command. After the specified number of retries, the port will be logged out. The user can abort the password process by typing Ctrl-Z instead of the password.

Restrictions	Requires privileged user status.
Parameters	number Enter a value between 0 (no limit) and 100.
Default	3

4.42 Change Password Protect

```
CHANGE PASSWORD PROTECT { DISABLED }  
                          { ENABLED }
```

Controls whether a password is needed to log into the MSS from the serial port. The **Change Loginpass** command is used to set the password.

Restrictions	Requires privileged user status.
Default	Disabled

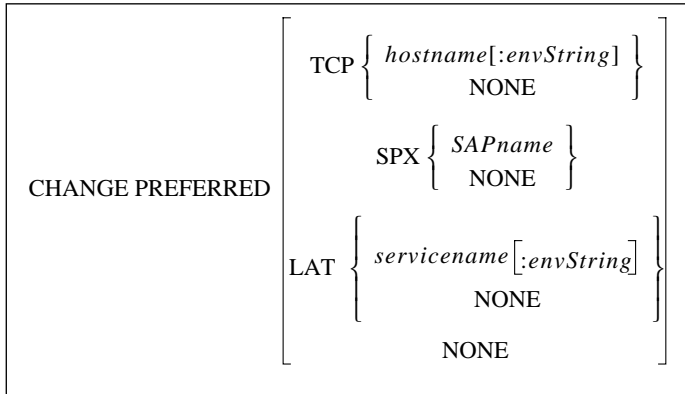
4.43 Change Portname

```
CHANGE PORTNAME name
```

Renames the serial port.

Restrictions	Requires privileged user status.
Parameters	name Enter a 16-character name composed of alphanumeric characters or the underscore character enclosed in quotation marks. If the name is not enclosed in quotation marks, it will be converted to uppercase.
Default	Port_1

4.44 Change Preferred



Specifies a default service for the port. The MSS will attempt to use the preferred service for autoconnecting, or when no host name is specified for a TCP (Telnet), Rlogin, SPX, or LAT connection command.

Restrictions Requires privileged user status.

Errors A dedicated service will override all preferred services.

Only one preferred service can be configured at a given time.

Parameters

TCP

Specifies a Telnet host, or an Rlogin connection if the optional “:R” environment string is appended to the TCP keyword (with no space separating the two). See *Change Dedicated* on page 12-6 for more information.

hostname

Enter a text host name or a numeric IP address.

SPX

Specifies an SPX host for the preferred connection.

SAPname

Enter the target device’s SAP name.

LAT

Specifies a LAT service for the preferred connection.

servicename

Enter the name of the desired LAT service.

envString

Add the desired TCP or LAT environment keys. Multiple options must be separated by colons. See *Change Dedicated* on page 12-6 for the available key letters.

None

Clears all preferred services, or the preferred service for a protocol when added after a protocol keyword.

See Also Change Dedicated, page 4-6.

4.45 Change Privpass

```
CHANGE PRIVPASS
```

Sets the password needed to become the privileged user of the MSS. The user will be prompted to enter a new password of no more than six alphanumeric characters. This password will not be displayed when typed.

- Restrictions** Requires privileged user status.
- Default** system
- See Also** Set Privileged, page 4-32.

4.46 Change RARP

```
CHANGE RARP { DISABLED }
             { ENABLED }
```

Disables or enables querying for a RARP host at system boot time.

- Restrictions** Requires privileged user status.
- Default** Enabled

4.47 Change Retransmit Limit

```
CHANGE RETRANSMIT LIMIT number
```

Specifies the number of retries attempted if a network message receives no acknowledgment. This limit may have to be increased on especially noisy or heavily-used networks.

- Restrictions** Requires privileged user status.
- Parameters** **number**
Enter a value between 4 and 100.
- Default** 10

4.48 Change Rlogin

```
CHANGE RLOGIN { DISABLED }
              { ENABLED }
```

Restricts the use of the Rlogin command from the Server. When disabled, incoming Rlogin connections are permitted, but users may not log into remote hosts. To view the current status of Rlogin connections, enter the Show Server command.

- Restrictions** Requires privileged user status.
- Default** Disabled

4.49 Change Secondary

Users can configure a secondary gateway, loadhost, and nameserver in case the primary ones are unreachable. For information, please see the **Change Gateway**, **Change Loadhost**, and **Change Nameserver** command entries.

4.50 Change Serial Delay

```
CHANGE SERIALDELAY number
```

Changes the amount of time the MSS will allow serial characters to accumulate before sending them out to the Ethernet.

Restrictions	Requires privileged user status
Errors	This command has no effect when entered at the Local> prompt.
Parameters	number Enter the number of milliseconds for the delay. The range is 0 to 2,000 and is rounded to the nearest 10 milliseconds. Entries of 15 milliseconds or less are not guaranteed to be accurate.

4.51 Change Session Limit

```
CHANGE SESSION LIMIT number
```

Limits the number of active sessions on the server's single port.

Restrictions	Requires privileged user status.
Parameters	number Enter a value between 0 and 8.
Default	Four

4.52 Change Signal Check

```
CHANGE SIGNAL CHECK { DISABLED }  
                     { ENABLED }
```

Determines whether the MSS will check for the DSR signal when connections are made from the network to the serial port. If the DSR signal is not present, the connection will be rejected.

Restrictions	Requires privileged user status. Does not apply to the MSS485.
Default	Disabled

4.53 Change Silentboot

```
CHANGE SILENTBOOT { DISABLED }
                  { ENABLED }
```

Causes the unit to attempt to boot without sending any status messages to the console port (unless there are errors).

Restrictions Requires privileged user status.

Default Disabled

See Also Show Server, page 4-34.

4.54 Change SNMPSetComm

```
CHANGE SNMPSETCOMM communityname
```

Creates an SNMP community name for the MSS and gives that community read/write access.

Restrictions Requires privileged user status.

Parameters **communityname**
Enter an alphanumeric string of up to 15 bytes.

See Also *TCP/IP*, page 1-4.

4.55 Change Software

```
CHANGE SOFTWARE filename
```

Specifies the name of the download file the MSS will attempt to load at boot time when a reload has been requested. For IP loadhosts, this is the file that will be requested at boot time.

Restrictions Requires privileged user status.

Parameters **filename**
Specify the name of the loadfile, 11 characters or less. A **.SYS** extension will be added. The complete pathname can also be entered if the file is to be loaded via TFTP. The filename must be placed in quotes to preserve case.

See Also Change Loadhost, page 4-14.

4.56 Change Speed

```
CHANGE SPEED rate
```

Specifies the baud rate of the serial port.

Restrictions	Requires privileged user status.
Errors	An error is displayed if an unsupported baud rate is specified.
Parameters	rate Available speeds (baud rates) are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400 baud (MSS100 only).
Default	9600 baud
See Also	Change Autobaud, page 4-3.

4.57 Change Startup

```
CHANGE STARTUP FILE
```

```

host:filename
node::filename
node\sys:\login\filename
NONE
[RETRY num]

```

Configures the startup configuration file that the MSS will attempt to download at boot time. This file contains the MSS commands that will configure the server before any users and services are started. If a text hostname is used for TFTP, the name must be resolvable at boot time, otherwise you must use an IP address.

The Telnet console is available at the time the server attempts to download the startup file. If there is a problem with the download, you can still log into the server and determine what went wrong.

Restrictions	Requires privileged user status.
Parameters	<p>host:filename Used to load from a TCP/IP host via TFTP. Enter a TCP/IP hostname or IP address followed by a colon and a startup file name of up to 47 characters. If you use a text host name, it must be resolvable at boot time.</p> <p>node::filename Used to load from a VAX machine via LAT. Enter the nodename followed by two colons and the startup file name of up to 47 characters.</p> <p>To download source files via LAT, your LAT host must be running a download server process called ets\$configd whose source code is provided on the CD-ROM. See the <i>LAT Host Setup</i> chapter of the <i>ETS/EPS Reference Manual</i> for more information.</p> <p>node\SYS:\LOGIN\filename Used to load from a Novell fileserver. Enter the proper node and filename. The entire path should be no more than 47 characters long.</p>

None

Clears any previously configured startupfile name, host, and retry setting.

Retry

Instructs the MSS to re-attempt load of the startupfile a certain number of times before giving up.

num

Specify the desired number or retry attempts. If zero is specified, the server will retry until the startupfile is read (indefinitely).

Defaults

Retrynum: 5

Examples

Local> CHANGE STARTUP FILE "bob:start"

Local> CHANGE STARTUP FILE hevax::start.com

Local> CHANGE STARTUP FILE "engfs\sys:\login\start.cmd"

Local> CHANGE STARTUP FILE RETRY 6

See Also

Change Loadhost, page 4-14; *Reloading MSS Software*, page D-2.

4.58 Change Stopbits

CHANGE STOPBITS { 1 } { 2 }

Specifies how many stop bits the port will use.

Restrictions

Requires privileged user status.

Default

1

See Also

Change Autobaud, page 4-3; Change Charsize, page 4-6; Change Parity, page 4-18.

4.59 Change Subnet Mask

CHANGE SUBNET MASK <i>mask</i>

Sets an IP subnet mask for the MSS. The mask is applied to target IP addresses to determine whether the destination address is on the local network segment. If the address is not on the local segment, the server's gateway host will be accessed to provide the connection.

A mask is created by default when the IP address is set, but can be overridden with this command.

Restrictions

Requires privileged user status.

Parameters

mask

Specify a mask in numeric IP format, for example, 255.255.255.0.

See Also

Change IPaddress, page 4-12; Change Gateway, page 4-10; *Subnet Mask*, page 2-2.

4.60 Change Telnetdest

```
CHANGE TELNETDEST { CONSOLE }
                  { SERIAL }
```

Controls what happens when users Telnet into the MSS using the default Telnet socket (23).

Restrictions	Requires privileged user status.
Parameters	Console Users are connected in Local> mode.
	Serial Users are connected to the serial port, as they would be if they Telnetted to port 2001.
Default	Console

4.61 Change Telnetpad

```
CHANGE TELNETPAD { DISABLED }
                 { ENABLED }
```

When enabled, Telnetpad tells the MSS to pad Carriage Returns with null characters for Telnet sessions. The Telnet RFC (Request for Comments) specifies Telnetpad Enabled.

Restrictions	Requires privileged user status.
Default	Enabled

4.62 Change Termtyp

```
CHANGE TERMTYPE { termstring }
                { NONE }
```

Specifies a terminal type for the port. The MSS reports this string to the remote host.

Parameters	termstring Enter a string of up to 16 characters. The string is converted to all uppercase unless it is enclosed in quotes in the command.
	None Clears the terminal type field.
Default	None
Examples	CHANGE TERMTYPE VT100 CHANGE TERMTYPE IBM1000

4.63 Change Verify

```
CHANGE VERIFY { DISABLED }
               { ENABLED }
```

Controls informational messages whenever a session is connected, disconnected, or switched.

Restrictions Requires privileged user status.

Default Enabled

4.64 Delete IPsecurity

```
DELETE IPSECURITY { IPaddress }
                  { ALL }
```

Removes entries from the IP Security table.

Restrictions Requires privileged user status.

Errors An error will be returned if the IPSecurity entry does not exist.

See Also Change IPsecurity, page 4-13; Show IPsecurity, page 4-32.

4.65 Disconnect

```
DISCONNECT session
```

Terminates the current or specified session(s).

4.66 Finger

```
FINGER [username] [[@]hostname]
```

Displays information about local and remote users. This command is an implementation of the Unix Finger command. Port information will not be displayed.

Restrictions An error is returned when the host cannot be accessed.

Parameters **username**
Enter a username to display information about that particular MSS user.

hostname
Enter a hostname to display information about all of the users at the specified host site.

username@hostname
Enter both parameters with the at symbol (@) to display information about a particular user on the host.

4.67 Forward

FORWARD

When entered in local mode, moves users forward to the current session.

See Also Backward, page 4-2; Change Backward Switch, page 4-4; Change Forward Switch, page 4-10; Change Local Switch, page 4-14.

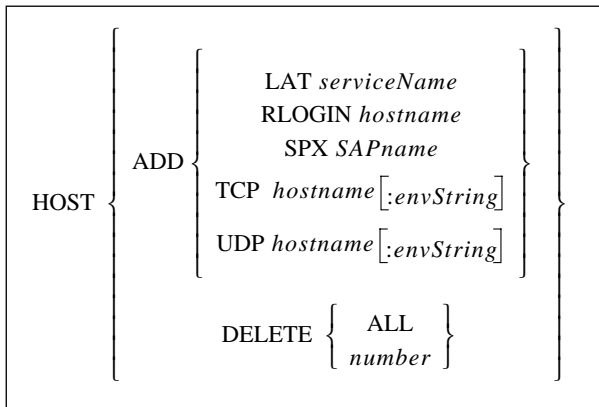
4.68 Help

HELP [*keyword*]

Allows the user to view command syntax levels. Typing **Help** alone will show a list of top-level commands.

Parameters **keyword**
Specify one of the top-level commands to view suboptions of that command.

4.69 Host



Edits the hostlist used for multihost mode connections.

Restrictions Requires privileged user status.

Parameters **LAT**
Adds a LAT host entry to the host table.

servicename
Enter the name of the desired LAT service.

Rlogin
Adds an Rlogin host entry to the host table.

host
Enter the IP address of the target host. For TCP and UDP, resolvable hostnames can be used. Multicast IP addresses may also be used.

SPX

Adds an SPX host entry to the host table.

SAPname

Enter the target device's SAP name.

TCP

Adds a TCP host entry to the host table. By default, TCP opens a regular Telnet connection that includes Telnet IAC option negotiation.

UDP

Adds a UDP host entry to the host table.

envString

Enter a :T to change a TCP host connection from Telnet to raw TCP, or a socket number to use a TCP or UDP socket other than the default.

Delete

Removes one or all entries from the hostlist.

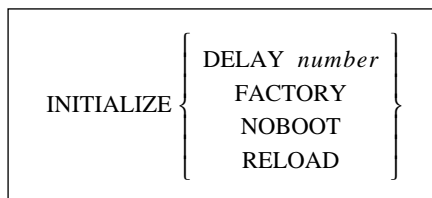
number

Specify which host entry to remove. To view configured host entries, enter the **Show Hostlist** command.

See Also

Multihost Mode, page 3-9; *Change Dedicated*, page 4-6; *Show Hostlist*, page 4-32.

4.70 Initialize



Reboots the server. When Reload or Factory Initialization takes place, all user-entered commands are lost; the server must be reconfigured.

Restrictions

Requires privileged user status.

Parameters

Delay

Reboots the server after a specified number of minutes.

number

Enter the number of minutes you wish to delay. To reboot immediately, enter the number zero.

Factory

Reboots the server with its factory-configured settings.

Noboot

Cycles power on the server, but without booting. The server will remain in the Boot Configuration Program.

Reload

Downloads operational software upon reboot.

See Also

Appendix D, *Updating Software*.

4.71 LAT

```
LAT serviceName [:envString]
```

Establishes a connection with a LAT service. If no service or hostname is specified, a connection to the preferred host or service is attempted. In a case where more than one node or port offers the same LAT service, a particular node and/or port can be specified. Otherwise, the MSS will attempt a connection with the node offering the highest-rated service.

Parameters

serviceName

Enter the name of the desired LAT service. For example, a LAT service "modem" can be specified.

envString

Add the desired environment keys for the LAT session. Multiple options must be separated by colons.

Table 4-3: Environment String Key Letters

D	+D = Backspace mode	-D = Delete mode
E	+E = Local Echo mode	-E = Remote Echo mode
I	I = Interactive mode	
P	+P = Passall mode	-P = Passthru mode
C	+C = CR to CRLF,	-C = CR to LF
LD=xxxx#	Sets the LAT destination port to port#	
LN=xxxx#	Sets the target LAT node to node#	

Examples

```
Local> LAT modem:LD=port5
```

4.72 Logout Port

```
LOGOUT PORT [number]
```

Logs out the serial port, disconnecting any existing sessions.

Parameters

number

Enter a port number to disconnect network logins.

4.73 Netstat

```
NETSTAT
```

Displays the currently-active network connections. Information is displayed for NetWare and TCP/IP protocols, and is primarily intended for debugging network problems.

4.74 Ping

```
PING hostname
```

Sends a TCP/IP echo packet request to another network host, and provides an easy way to test TCP/IP network connections. In general, any host that supports TCP/IP will respond if it is able, regardless of login restrictions, job load, or operating system. If the host does not reply, there may be a network TCP/IP configuration problem.

Parameters**hostname**

Enter either a text host name or a numeric IP address.

4.75 Resume

```
RESUME [session]
```

Leaves local mode and resumes the current (most recently active) session.

Errors

An error is returned if there is no active session.

Parameters**session**

Specify the number of the particular session you wish to resume.

4.76 Rlogin

```
RLOGIN IPaddress [username]
```

Connects a user to a remote host, enabling the user to log in as a local user. The host can be specified with either a text name or an IP address.

Parameters**IPaddress**

Specify a host by name or by its numeric IP address. This parameter is optional only if a preferred Telnet service has been defined.

username

Specify a name to be used as the login name.

4.77 Set Privileged

```
SET [PRIVILEGED [OVERRIDE]
    NOPRIVILEGE]
```

Changes the port's privileged status. When the command is entered, the MSS will prompt the user for the privileged password. If the password is forgotten, the server can be reset to factory defaults.

Restrictions Secure users may not become the privileged user.
 Only one port can be the privileged port at one time.

Parameters **Privileged**
 Allows a user to become the port's privileged user.

Override
 Forces the current port to become the privileged port (the previous port loses the privilege).

Noprivilege
 Removes privileged status for the port.

See Also Change Privpass, page 4-21.

4.78 Show IPsecurity

```
SHOW IPSECURITY
```

Displays the current TCP/IP security table. Each address or range is shown, along with the direction of concern.

See Also *Status Displays*, page 3-6.

4.79 Show Hostlist

```
SHOW HOSTLIST
```

Displays the current list of remote hosts to use for multihost mode connections.

See Also *Status Displays*, page 3-6; *Multihost Mode*, page 3-9; *Host*, page 4-28.

4.80 Show NetWare

```
SHOW NETWARE
```

Displays NetWare characteristics, including enabled frame types, routing status, and current internal network number.

See Also *Status Displays*, page 3-6.

4.81 Show Nodes

```
SHOW NODES { LAT }  
            { SPX }
```

Displays information about the desired LAT service nodes.

Errors All nodes will be shown if no node is specified.

Parameters **LAT**
Shows LAT nodes, including their identification strings and availability.

SPX
Shows information about SPX nodes including their hop counts, frame types, and availability.

See Also *Status Displays*, page 3-6.

4.82 Show Ports

```
SHOW PORTS
```

Displays all serial port settings. Settings include the port's connection status, including the number of sessions and information about the current session; the flow control state (enabled or disabled) as well as the state of DSR and DTR serial signals; the access type and login status of the port; and additional settings including baud rate, parity, and dedicated or preferred services.

See Also *Status Displays*, page 3-6.

4.83 Show Server

```
SHOW SERVER [ BOOTPARAMS
             COUNTERS
             CHARACTERISTICS ]
```

Displays different types of server information. If no keyword is entered after Show Server, the MSS will display server characteristics.

Parameters

Bootparams

Displays general MSS parameters that relate to the boot procedure and reloading the software file.

Counters

Displays error information for the Ethernet and TCP/IP protocols.

Characteristics

Displays the MSS's serial port settings including hardware address, timer limit, password limit, session limit, retransmission limit, IP address, subnet mask, nameserver, gateway, and more.

See Also

Status Displays, page 3-6.

4.84 Show Services

```
SHOW SERVICES [serviceName]
```

Displays the characteristics of the LAT services on the network.

Restrictions

This list is masked by the service groups that the port is able to see. In other words, users will not be able to see services to which they cannot connect.

Parameters

serviceName

Specify a service whose information you want to see. Wildcards are permitted. To view available services, use the Show Services command without adding this parameter.

All services will be shown if no service is specified.

See Also

Status Displays, page 3-6.

4.85 Show Session

```
SHOW SESSION
```

Displays information about the serial port's current session(s).

See Also

Status Displays, page 3-6.

4.86 Show SNMP

```
SHOW SNMP
```

Displays configured SNMP communities and their access modes (read-only or read/write). The default community name is **public**, and allows read-only access. There is one additional user-configurable SNMP community.

See Also *Status Displays*, page 3-6; *Change SNMPSetComm*, page 4-23.

4.87 Show Users

```
SHOW USERS
```

Displays the current users logged into the MSS. For each user, the port username and current connection information will be displayed.

See Also *Status Displays*, page 3-6.

4.88 SPX

```
SPX SAPname
```

Attempts a connection to an SPX-enabled device on the network. SPX devices announce their availability to the network with SAP names; the target device must be advertising itself via SAP announcements for the MSS to make a connection.

Parameters **SAPname**
Enter the target device's SAP name, for example, MSS_XXXXXX.

4.89 Telnet

```
TELNET IPaddress[:envString]
```

Initiates a Telnet connection to a remote host. An environment string can also be specified as described below.

Errors There can be no space between the hostname and the colon (:), or between the colon and the environment string.

Parameters **IPaddress**
Can be either a text name or an IP address. This parameter is only optional if a preferred service has been defined.

envString
Add the desired environment keys for the Telnet session. Multiple options must be separated by colons. For more information about the available environment strings, see **Change Dedicated** on page 4-6.

Examples Local> Telnet 192.0.1.201:T
 (Forms a raw TCP connection to the specified host)

Local> Telnet phred:7000
 (Connects to the remote console port on host phred)

See Also *Status Displays*, page 3-6.

4.90 Test

TEST [DTR [DELAY num]]

Tests the serial port's connection. When the Test command is entered by itself, test lines of 70 characters are sent to the serial port until a key is pressed.

Restrictions Nonprivileged users may only test their own port.

Parameters **DTR**
 Lowers and then raise the DTR signal on the serial port. If a delay is not specified, DTR will lower for approximately one second and then raise.

Delay
 Lowers DTR will for the specified delay length, then raises DTR.

num
 Enter a delay time in milliseconds ranging from 50 to 3,000.

4.91 Zero

ZERO

Rests all counters on the MSS (both serial and Ethernet).

Restrictions Requires privileged user status.

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**.

LANTRONIX

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

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

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

Technical Support: 800/422-7044 or 949/453-3990
Technical Support Fax: 949/450-7226
Internet: support@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 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.
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-4), then reboot.
	Init Noboot command was entered.	See <i>Entering Commands at the Boot Prompt</i> on page B-3.
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 <i>Reloading MSS Software</i> on page D-2 for details.
	If you did not request a NetWare or TFTP boot, the flash ROM code is corrupt. The unit will remain in boot mode.	

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 <code>/etc/services</code> file?	BOOTP must be in the <code>/etc/services</code> file as a real TCP/IP service. It must not be commented out.
Is the MSS in the loadhost's <code>/etc/hosts</code> 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's 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.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?	<p>Ensure that the <code>/etc/inetd.conf</code> file has an uncommented line enabling the TFTP daemon. Machines may have the TFTP daemon line commented out.</p> <p>If the <code>/etc/inetd.conf</code> 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 (<code>kill -HUP nnnnn</code>).</p> <p>The <code>/etc/inetd.conf</code> or <code>/etc/netd.conf</code> file is re-read whenever the UNIX host boots. See the man pages (<code>man inetd</code>) for more information.</p>
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/MSS1485.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 MSS.SYS from the host at 192.0.1.188.

B.4.1 HELP

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

B.4.2 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.

B.4.3 CHANGE option

Tailors your server configuration.

B.4.3.1 BOOTP {Enabled, Disabled}

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

B.4.3.2 DHCP {Enabled, Disabled}

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

B.4.3.3 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.*

B.4.3.4 IPADDRESS ip_address

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

B.4.3.5 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).

B.4.3.6 NETSERVER fileserver

Specifies the NetWare fileserver from which the MSS will attempt to load the loadfile.

B.4.3.7 RARP {ENABLED, DISABLED}

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

B.4.3.8 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.

B.4.3.9 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**. 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.

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.

B.4.4 SHOW SERVER

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

B.4.5 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.

B.4.6 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.

See Appendix D in the CD-ROM copy of the documentation for more information on updating software.

B.5 Modem Configuration Checklist

NOTE: *Modem functions do not apply to the MSS485.*

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.

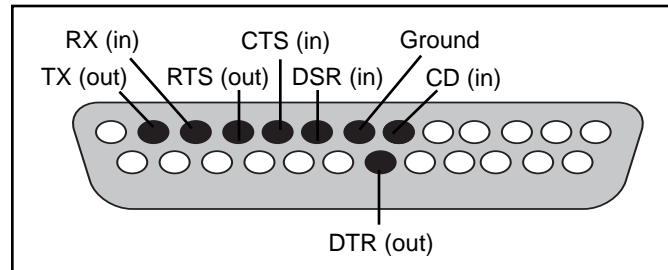
C - Pinouts

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

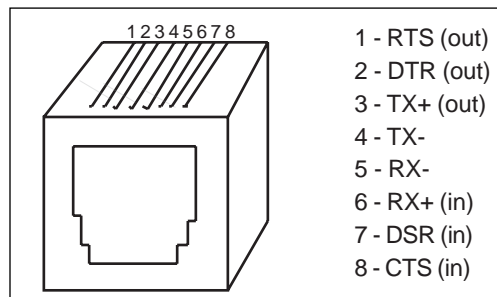


C.2 RJ-45 Connector

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.

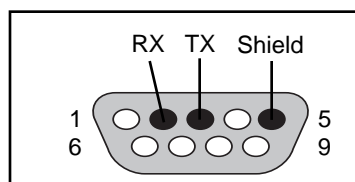
Figure C-2: Pinout of RJ45 Serial Port



C.3 Console DB9 Connector

The figure below shows the pin connections of the MSS485 DB9 connector.

Figure C-3: Pinout of DB9 Console Port



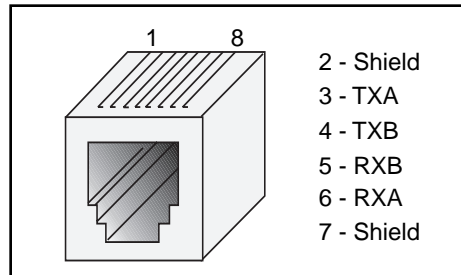
C.4 RS-485 Connectors

The MSS485 RJ45 and Screw Terminal Block RS-485 connectors are wired in parallel. Only one of these ports can be used at a time.

C.4.1 RS-485 RJ45 Connector

The figure below shows the pin connections of the MSS485 (RS-485) RJ45 connector only.

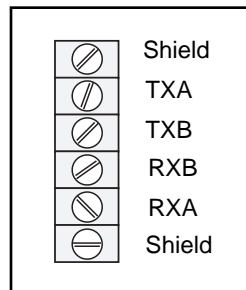
Figure C-4: Pinout of RS-485 RJ45 Connector



C.4.2 Screw Terminal Block

The figure below shows the pin connections of the MSS485 (RS-485) screw terminal block.







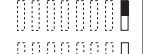
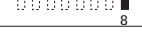


Figure C-5: Pinout of Screw Terminal Block



C.5 DIP Switches

There are eight DIP switches located on the bottom of the MSS485, labeled left to right. For more information about their configuration, see page 2-7 of your *Installation Guide*.

Figure C-6: DIP Switch Block and Label on Bottom of MSS

 1 2 3 4 5 6 7 8	Switch Group Functions
	2 Wire 485
	4 Wire 485
	4 Wire 485 Termination
	2 Wire 485 Termination
	No Termination
	2 or 4 Wire 485 RX Biasing
	No RX Biasing
	Ground Shield
	Float Shield

C.6 Modem Wiring

NOTE: *Modem wiring does not apply to the MSS485.*

C.6.1 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.6.2 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** (MSS1-T and MSS1-T2 models) or **MSS485.SYS** (MSS485 model only), 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.
- 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 on page D-4.*

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 NETWORK 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
```

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-readable. 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 mA (MSS1) 5 V DC at 700 mA (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.*

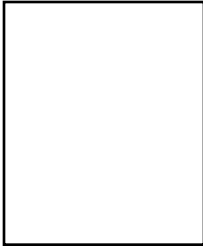
E.3 Relative Humidity Limitations

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).



Index

A

Access mode 4-3
Altitude limitations E-1
Autobaud 2-6, 4-3, B-5
Autostart 3-8, 4-4

B

Backward switch 3-4, 4-2, 4-4
Baud rate 2-6, 3-7, 4-24
BCP (Boot Configuration Program) B-3
Boot commands B-3
Boot prompt B-1, B-3
Boot troubleshooting B-1
BOOTP 4-5, B-3, D-3
Break key 3-3, 4-5
Broadcast 3-9
Buffering 4-6

C

CD (Carrier Detect) B-5, C-3
Character size 4-6
Circuit timer 2-5, 4-13
Commands 2-1
Community name (SNMP) 1-4, 4-23
Configuration file 1-5
Configuration, modem 2-7
Connections, socket 3-1
Counters 3-7, 4-36

D

DB25 connector C-1
Dedicated 3-8
Dedicated connections 3-8, 4-6
Defaults, restoring B-4
DHCP 4-8, B-4
Disconnect command 4-27

Displaying current settings B-4
Domain 3-7, 4-8
Domain name server (DNS) 1-4, 2-3
Downloading software D-1
DSR (Data Signal Ready) 2-8, 2-10, 3-7, B-5
 Signal checking 4-22
DSRlogout 2-8, 4-8
DTR (Data Transmit Ready) 2-8, 3-7, B-5
DTR wait 2-8, 4-9

E

Encapsulation 2-4
Environment strings 4-7, 4-35
Error messages B-2
Ethernet address B-4
Examples, code 3-3
EZWebCon 1-4, 1-5

F

Factory defaults B-4
Finger 4-27
Flash ROM 1-4, B-1, B-5
Flow control 2-7, 3-7, 4-9
Flush NVR B-4
Forward switch 3-4, 4-10, 4-28
Frame types 1-4, 2-4, 4-16

G

Gateway 2-2, 3-7, 4-10

H

Hardware address 3-7, B-4
Hardware flow control 2-7
Help, CLI 4-28
Host 1-3
Host applications 3-3
Host list 3-9, 4-7, 4-28, 4-32

Humidity limitations E-1

I

Inactivity logouts 2-9

Inactivity timer 4-11

Incoming connections 4-12

Incoming password 4-12, 4-18

Initialize 4-29

Interactive use 3-3

Internal network number 2-4, 4-17

Internal routing 2-4

IP address 3-7, 4-12, B-1

 Broadcast 3-8, 3-9

 Setting B-4

IP security 2-3, 3-6, 4-13, 4-27, 4-32

IPX (NetWare) 1-4, 1-5, 2-4, D-2

 Node 2-4

IPX/SPX 4-35

L

Lantronix FTP server D-1

LAT 2-5, 3-2, 4-30, 4-33

 Circuit timer 4-13

 Groups 4-13

 Identification 4-14

Loadfile B-4

Loadhost 2-4, 3-7, 4-14, 4-17, B-4

Local host table 2-3

Local prompt 1-3, 2-9, B-1

Local switch 3-4, 4-14

Login password 4-15

Logouts 2-9, 4-30

 Inactivity 4-11

M

Master 1-3

Modem

 Configuration checklist B-5

 Control 2-7, 2-10, 4-15

 DTRwait 2-8

 Wiring C-3

Monitoring counters B-5

MSS.SYS file D-2, D-3

MSS485 1-1

Multihost mode 3-9, 4-32

N

Name resolution 2-3

Nameserver 3-7, 4-15

Netmask 4-25

Netstat 4-31

NetWare 1-4, 1-5, 4-33, D-2, D-3

 Encapsulation 4-16

 Internal network number 4-17

 Loadhost 4-17

 Routing 4-17

 Specifying fileservers B-4

Node 1-3, 3-1, 3-7

NVRAM B-4

O

OK LED B-1

Outgoing connections 3-5

P

Parity 3-7, 4-18

Passflow 2-7, 4-18

Passwords 2-1, 3-7

 Incoming 4-18

 Limit 4-19

 Login 4-15

 Privileged 4-21, 4-32

 Protect 4-19

Ping 2-3, 4-31

Port name 4-19

Port speed 4-24

Ports, socket 3-1

Power specifications E-1

Power-up troubleshooting B-1

Preferred connections 4-20

Privileged password 4-21, 4-32

Prompts

 Boot B-1, B-3

 Local 1-3, B-1

R

RARP 4-21, B-4, D-3

Rebooting 4-29, B-3

Release notes D-1

Reloading Flash ROM B-5

- Restoring defaults B-4
- Resume 4-31
- Retransmit limit 4-21
- RFCs 3-1
- Rlogin 1-5, 2-3, 3-5, 4-21, 4-31
- Routing, NetWare 2-4, 4-17
- RS-422 1-3
- RS-485 1-1, C-2
 - Four-wire mode 1-2
 - Master 1-3
 - Protocols 1-2
 - Slave 1-3
 - Two-wire mode 1-2
- RTS/CTS 2-7
- S**
- Serial delay 4-22
- Serial LED B-1
- Server name 4-15
- Service groups 2-5
- Services 4-34
- Sessions 1-3, 3-3, 3-4, 3-7, 4-34
 - Limit 4-22
- Set privileged 4-32
- Show commands 4-32
- Signal checking 4-22
- Silent boot 4-23
- Slave 1-3
- SNMP 1-4, 4-23, 4-35
 - Community name 1-4
- Sockets 3-1
- Software 1-4, 3-7, 4-23, D-1
 - Reloading D-2
- Specifications E-1
- SPX 3-2, 3-3, 3-5, 4-35
- Startup file 4-24
- Stop bits 4-25
- Subnet mask 2-2, 3-7, 4-25
- Superuser privileges 2-1
- Switch
 - Backward 4-4
 - Forward 4-10
 - Local 4-14

T

- TCP/IP 3-3, B-1, D-2, D-3
 - Configuration 2-2
- Technical support A-1
- Telnet 1-5, 2-3, 3-1, 3-5, 4-35
- Telnet pad 4-26
- Temperature limitations E-1
- Terminal type 4-26
- Test command 4-36
- TFTP D-3
- Timers
 - Circuit 4-13
 - Inactivity 4-11
- Troubleshooting
 - Boot B-1
 - Error messages B-2
 - Flash ROM updates D-4
 - Modems B-5
 - Power-up B-1

U

- UDP 1-4, 3-8, 4-7
- Users 4-35

V

- Verification 4-27

W

- Wiring, modem C-3

Z

- Zeroing counters 4-36

