

Micro125
Embedded Device Server
User Guide

Intellectual Property

© 2017 Lantronix, Inc. 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, Inc. in the United States and other countries.

Lantronix is a registered trademark and *DeviceInstaller* is a trademark of Lantronix, Inc.

Patented: <http://patents.lantronix.com>; additional patents pending.

Windows is a trademark of the Microsoft Corporation.

Warranty

For details on the Lantronix warranty replacement policy, please go to our Web site at www.lantronix.com/support/warranty.

Contacts

Lantronix Corporate Headquarters

7535 Irvine Center Drive
Suite 100
Irvine, CA 92618, USA

Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support Online: www.lantronix.com/support

Sales Offices

For a current list of our domestic and international sales offices, go to the Lantronix web site at www.lantronix.com/about/contact.

Disclaimer

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.

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

All information contained herein is provided "AS IS." Lantronix undertakes no obligation to update the information in this publication. Lantronix does not make, and specifically disclaims, all warranties of any kind (express, implied or otherwise) regarding title, non-infringement, fitness, quality, accuracy, completeness, usefulness, suitability or performance of the information provided herein. Lantronix shall have no liability whatsoever to any user for any damages, losses and causes of action (whether in contract or in tort or otherwise) in connection with the user's access or usage of any of the information or content contained herein. The information and specifications contained in this document are subject to change without notice.

Revision History

Date	Rev.	Firmware	Comments
March 2011	A	6.7.0.2	Initial release
March 2013	B	6.8.0.4	Updated for firmware release 6.8.0.4.
July 2015	C	6.11.0.0	Updated for firmware release 6.11.0.0.
September 2017	D	6.11.0.0	Updated part number information.
December 2017	E		Updated enhanced password information.

For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

Table of Contents

Intellectual Property	2
Warranty	2
Contacts	2
Disclaimer	2
Revision History	3
List of Figures	7
List of Tables	7
1. Using This Guide	8
Purpose and Audience	8
Chapter Summary	8
Additional Documentation	9
Part Numbers	9
2. Introduction	10
Capabilities	10
Applications	10
Configuration Methods	11
Addresses and Port Numbers	11
Hardware Address	11
IP Address	11
Port Numbers	11
3. Getting Started	12
Physically Connecting the Unit	12
Required Information	13
Hardware Address	13
IP Address	13
4. Using the DeviceInstaller Utility	14
Installing the DeviceInstaller Utility	14
Assigning an IP Address	14
Accessing the Micro125 Using the DeviceInstaller Utility	15
Viewing the Current Configuration	15
5. Configuration Using Web Manager	18
Accessing Web-Manager Using the DeviceInstaller Utility	18
Network Configuration	19
Network Mode	20
Automatic IP Address Configuration	20
Static IP Address Configuration	21
Ethernet Configuration	22
Server Configuration	23
Server Configuration	24

Advanced	24
Host List Configuration	25
Retry Settings	25
Host Information	26
Channel 1 and Channel 2 Configuration	26
Serial Settings	26
Connection Settings - TCP	29
Connection Settings - UDP	33
Apply Settings	35
Apply Defaults	35
6. Configuration via Telnet or Serial Port (Setup Mode)	36
Accessing Setup Mode	36
Telnet Connection	36
Serial Port Connection	37
Exiting Setup Mode	37
7. Setup Mode: Server Configuration	38
Server Configuration (Option 0)	38
IP Address	38
Set Gateway IP Address	39
Netmask: Number of Bits for Host Part	39
Set DNS Server IP Address	39
Change Telnet/Web-Manager Password	40
DHCP Name	40
Enable DHCP FQDN Option	40
8. Setup Mode: Channel Configuration	41
Setup Mode (Option 2)	41
Channels	41
Baudrate	41
I/F (Interface) Mode	42
I/F Mode	43
Flow	43
Port Number	43
Connect Mode	44
Send the Escape Sequence (+++) in Modem Mode	49
Show IP addr after 'RING'	50
Auto Increment Source Port	50
Remote IP Address	50
Remote Port	50
DisConnMode	50
Flush Mode (Buffer Flushing)	51
Pack Control	52
DisConnTime (Inactivity Timeout)	53
Send Characters	53
Telnet Terminal Type	53
Channel (Port) Password	53

9. Setup Mode: Advanced Settings	54
Expert Settings (Option 5)	54
TCP Keepalive Time in Seconds	54
ARP Cache Timeout in Seconds	54
Monitor Mode at Bootup	55
HTTP Port Number	55
MTU Size	55
TCP Re-transmission Timeout	55
Ethernet Connection Type	55
Security Settings (Option 6)	55
Disable SNMP	56
SNMP Community Name	56
Disable Telnet Setup	56
Disable TFTP Firmware Upgrade	56
Disable Port 77FE (Hex)	57
77FEh Access Mode	57
Disable Web Server	57
Disable Web Setup	57
Disable ECHO Ports	57
Enable Encryption	57
Enable Enhanced Password	58
Default Settings (Option 7)	59
Channel 1 and Channel 2 Configuration Defaults	59
Expert Settings Defaults	59
Security Settings Defaults	59
10. Firmware Upgrades	61
Obtaining Firmware	61
Reloading Firmware	61
Using TFTP: Graphical User Interface	61
Using TFTP: Command Line Interface	62
Recovering the Firmware Using the Serial Port and the DeviceInstaller Application	62
11. Monitor Mode	64
Entering Monitor Mode Using the Serial Port	64
Entering Monitor Mode Using the Network Port	64
Monitor Mode Commands	64
12. Troubleshooting	67
Problems and Error Messages	67
A: Lantronix Technical Support	70
B: Binary to Hexadecimal Conversions	71
Converting Binary to Hexadecimal	71
Conversion Table	71
Scientific Calculator	72

List of Figures

Figure 3-1. Evaluation Board Connected to Serial Device and Network	12
Figure 5-1. Lantronix Web-Manager	19
Figure 5-2. Network Settings	20
Figure 5-3. Server Settings	23
Figure 5-4. Hostlist Settings	25
Figure 5-5. Channel Serial Settings	26
Figure 5-6. TCP Connection Settings	29
Figure 5-7. UDP Connection Settings	33
Figure 5-8. Applying Settings	35
Figure 5-9. Applying Default Settings	35
Figure 6-1. MAC Address	36
Figure 6-2. Setup Menu Options	37
Figure 8-1. Serial Port Parameters	41
Figure 8-2. Hostlist Option	46
Figure 9-1. Expert Settings	54
Figure 9-2. Security Settings	56
Figure 10-1. TFTP Window	62

List of Tables

Table 1-1 Micro125 Part Numbers	9
Table 7-1. BootP/DHCP/AutoIP options	38
Table 7-2. Standard IP Network Netmasks	39
Table 8-1. Interface Mode Options	42
Table 8-2. Common Interface Mode Settings	42
Table 8-3. Interface Mode Options	43
Table 8-4. Flow Control Options	43
Table 8-5. Reserved Port Numbers	43
Table 8-6. Connect Mode Options	44
Table 8-7. Manual Connection Address Example	46
Table 8-8. Modem Modes	47
Table 8-9. Modem Mode Messages	48
Table 8-10. Modem Mode Commands	49
Table 8-11. Disconnect Mode Options	50
Table 8-12. Flush Mode Options	51
Table 8-13. Pack Control Options	52
Table 9-1. Expert Settings: Default Values	54
Table 10-1. Firmware Files	61
Table 11-1. Monitor Mode Commands	65
Table 11-2. Command Response Codes	66

1. Using This Guide

Purpose and Audience

This guide covers the Lantronix® Micro125 embedded device server. It provides the information needed to configure, use, and update the Micro125 firmware and is intended for OEMs and system integrators who are embedding the Micro125 into their end product designs.

Chapter Summary

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Describes the main features of the Micro125 and the protocols it supports.
3: Getting Started	Provides information for physically connecting your unit.
4: Using the DeviceInstaller Utility	Provides information for getting your unit up and running, using the DeviceInstaller utility to assign an IP address.
5: Configuration Using Web Manager	Details using the Web-Manager to set parameters such as port and server properties.
6: Configuration via Telnet or Serial Port (Setup Mode)	Provides instructions for accessing Setup Mode (command line interface) using a Telnet connection through the network or a terminal or terminal emulation program through the serial port.
7: Setup Mode: Server Configuration	Details the network (server) settings
8: Setup Mode: Channel Configuration	Details the serial port settings.
9: Setup Mode: Advanced Settings	Details expert, and security settings and explains how to reset the unit to factory default values.
10: Firmware Upgrades	Provides instructions for obtaining the latest firmware and updating the Micro125 device.
11: Monitor Mode	Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems.
12: Troubleshooting	Describes common problems and error messages and how to contact Lantronix Technical Support.
A: Lantronix Technical Support	Provides information on how to contact Lantronix Technical Support.
B: Binary to Hexadecimal Conversions	Provides instructions for converting binary numbers to hexadecimals.

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
Micro125 Integration Guide	Provides information about the Micro125 hardware, testing the Micro125 using the evaluation board, and integrating the Micro125 into your product.
Com Port Redirector User Guide	Provides information on using the Lantronix Windows based utility to create a secure virtual com port.
DeviceInstaller Online Help	Provides information on using the DeviceInstaller utility to configure IP addresses and locate Lantronix devices on the network.
“Live” Tutorials on the Lantronix Web Site (English)	Explain and demonstrate assigning an IP address to the UDS and setting up the UDS and Com Port Redirector. See http://ltxfaq.custhelp.com/app/answers/detail/a_id/1119

Part Numbers

Micro 125 embedded device server part numbers are listed below.

Table 1-1 Micro125 Part Numbers

Part Number	Description
MO22AA0M3-01R	Micro125 Embedded Device Server, Modbus, Pin Header for Ethernet, Pin Header for LED, TTL Pin Header, RoHS
MO00AA003-01R	Micro125, No RJ45 connector, No LEDS, with TTL pin header, RoHS
MO00AA0E3-01R	AES Encrypted Micro125, No RJ45 connector, No LEDS, with TTL pin header, RoHS
MO11AA003-01R	Micro125 with RJ45 connector, LEDS, with TTL pin header, RoHS
MO11AA0E3-01R	AES Encrypted Micro125 with RJ45 connector, LEDS, with TTL pin header, RoHS
MO22AA003-01R	Micro125, Pin header for Ethernet, Pin header for LED connection, with TTL pin header, RoHS
MO22AA0E3-01R	AES Encrypted Micro125, Pin header for Ethernet, Pin header for LED connection, with TTL pin header, RoHS

2. Introduction

This chapter summarizes the Micro125 embedded device server's features and the basic information needed to get started.

Capabilities

The Micro125 device server has the following capabilities:

- ◆ Connects devices through a TCP data channel or through a Telnet connection to computers or to another device server. The Micro125 also supports UDP datagrams.
- ◆ Contains a web [HTTP] server allowing presentation of custom content and easy configuration through a browser.

Applications

The Micro125 device server connects serial devices such as those listed below to Ethernet networks using the IP protocol family.

- ◆ ATM machines
- ◆ CNC controllers
- ◆ Data collection devices
- ◆ Environmental sensors
- ◆ Universal Power Supply (UPS) management units
- ◆ Telecommunications equipment
- ◆ Data display devices
- ◆ Security alarms and access control devices
- ◆ Handheld instruments
- ◆ Modems
- ◆ Time/attendance clocks and terminals

The Micro125 device server uses the Internet Protocol (IP) for network communications. It uses the Transmission Control Protocol (TCP) to assure that no data is lost or duplicated, and that everything sent to the connection arrives correctly at the target.

Supported protocols include:

- ◆ ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, and SNMP for network communications and management.
- ◆ TCP, UDP, and Telnet for connections to the serial port.
- ◆ TFTP for firmware and web page updates.
- ◆ IP for addressing, routing, and data block handling over the network.
- ◆ User Datagram Protocol (UDP) for typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection.

Configuration Methods

For the unit to operate correctly on a network, it must have a unique IP address on the network. There are three basic methods for logging into the device server to assign an IP address and configure the unit:

DeviceInstaller: Assign an IP address and view the current Micro125 configuration using a Graphical User Interface (GUI) on a PC attached to a network. (See [Using the DeviceInstaller Utility](#).)

Web-Manager: Through a web interface, configure the Micro125 and its settings using the Micro125's Web-Manager. (See [Configuration Using Web Manager](#))

Serial & Telnet Ports: There are two approaches to accessing Serial Mode. Make a Telnet connection to the network port (9999) or connect a terminal (or a PC running a terminal emulation program) to the unit's serial port. (See [Configuration via Telnet or Serial Port \(Setup Mode\)](#).)

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the Ethernet address or the MAC address.

Note: Make note of the MAC address. It is needed to locate the Micro125 using the DeviceInstaller utility.

IP Address

Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit. The Micro125 is automatically assigned an IP address on DHCP-enabled networks, as it is DHCP-enabled by default.

Port Numbers

Every TCP connection and every UDP datagram is defined by a destination IP address and a port number. For example, a Telnet application commonly uses port number 23. A port number is similar to an extension on a phone system.

The unit's serial channel (port) can be associated with a specific TCP/UDP port number. Port number 9999 is reserved for access to the unit's Setup (configuration) Mode window. Ports 0-1024 are reserved as well. For more information on reserved port numbers, see [Table 8-5. Reserved Port Numbers](#).

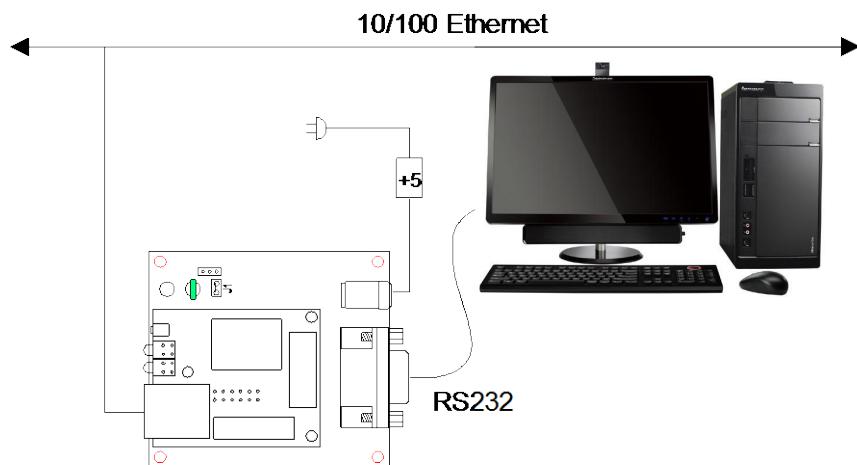
3. Getting Started

This chapter covers the steps required to get an embedded device physically connected.

Physically Connecting the Unit

The following diagram shows a properly installed Micro125. Other devices connect in a similar manner.

Figure 3-1. Evaluation Board Connected to Serial Device and Network



Connect a computer or serial device to your unit.

Connect an Ethernet cable to the RJ-45 Ethernet port.

Supply power to your unit using the power supply that was included in the packaging.

Note: The required input voltage for the Micro125 is 5VDC (+/-5% at ~200 mA). Other devices may require a different voltage.

Supply power to the serial device.

Required Information

Hardware Address

You need to know the unit's hardware address (also known as the MAC address), which is on the product label. It is in the format:

Hardware Address: 00 - 20 - 4a - _____ - _____ - _____

Or

Hardware Address : 00 - 80 - A3 - _____ - _____ - _____

IP Address

Your device server must have a unique IP address on your network. The systems administrator generally provides the IP address and corresponding subnet mask and gateway. The IP address must be within a valid range, unique to your network, and in the same subnet as your PC.

IP Address: _____ - _____ - _____ - _____

Subnet Mask: _____ - _____ - _____ - _____

Gateway: _____ - _____ - _____ - _____

You have several options for assigning an IP address to your unit. We recommend that you manually assign the IP address over the network using the DeviceInstaller utility software, which is described in [Using the DeviceInstaller Utility](#).

4. Using the DeviceInstaller Utility

This chapter covers the steps for getting the Micro125 device server online and viewing its current configuration.

Note: The Lantronix® DeviceInstaller application is a free utility program provided by Lantronix that discovers, configures, upgrades, and manages Lantronix Device Servers. It can be downloaded from the Lantronix website at www.lantronix.com/support/downloads.

For instructions on using the DeviceInstaller application to configure the IP address and related settings or for more advanced features, see the [DeviceInstaller Online Help](#).

Installing the DeviceInstaller Utility

To install the DeviceInstaller Utility:

1. Download the latest version of the DeviceInstaller utility from <http://www.lantronix.com/downloads>.
2. Run the executable to start the installation process.
3. Respond to the installation wizard prompts. (If prompted to select an installation type, select **Typical**).

Assigning an IP Address

The unit's IP address must be configured before it can work correctly on a network. You have several options for assigning an IP to your unit. We recommend that you manually assign the IP address over the network using the DeviceInstaller utility.

Note: To use a serial connection instead of an Ethernet connection to configure the device, see Chapter 6: [Configuration via Telnet or Serial Port \(Setup Mode\)](#).

The unit's IP address is normally set to 0.0.0.0 at the factory. The hardware address is on the product label. The unit is DHCP enabled as the default.

To assign an IP address manually:

1. Click **Start**→**All Programs** → **Lantronix**→**DeviceInstaller 4.4**→**DeviceInstaller**. If your PC has more than one network adapter, a message displays. Select an adapter and click **OK**.

Note: If the unit already has an IP address (e.g., DHCP has assigned an IP address), click the **Search** icon and select the unit from the list of Lantronix device servers on the local network.

2. Click the **Assign IP** icon .
3. If prompted, enter the hardware address (on the product label) and click **Next**.
4. Select **Assign a specific IP address** and click **Next**.

5. Enter the **IP address**. The **Subnet mask** displays automatically based on the IP address; if desired, you may change it. On a local network, you can leave the **Default gateway** blank (all zeros). Click **Next**.
 6. Click the **Assign** button and wait several seconds until a confirmation message displays. Click **Finish**.
 7. Select the device from the main window list and select **Ping** from the **Tools** menu. The Ping Device dialog box shows the IP address of the selected unit.
 8. From the **Tools** menu, click the **Ping** button. The results display in the Status window. Click the **Clear Status** button to clear the window so you can ping the device again.
- Note:** If you do not receive “Reply” messages, make sure the unit is properly attached to the network and that the IP address assigned is valid for the particular network segment you are working with. If you are not sure, check with your systems administrator.
9. Click the **Close** button to close the dialog box and return to the main window.

Accessing the Micro125 Using the DeviceInstaller Utility

1. Click **Start**→**Programs** → **Lantronix**→**DeviceInstaller**→**DeviceInstaller**.
2. Click the **Micro** folder. The list of available Lantronix Micro-type devices displays.
3. Expand the list of Micro125 devices by clicking the + symbol next to the Micro125 icon. Select the Micro125 unit by clicking on its IP address to view its configuration.

Viewing the Current Configuration

The DeviceInstaller application provides a view of the unit's configuration.

To view the unit's current settings:

1. Follow the instructions above to locate the Micro125.
2. In the right pane, click the **Device Details** tab. The current Micro125 configuration displays:

Device Details Settings	Description
Name	Configurable field. A name that identifies the Micro125. Double-click the field, type in the value, and press Enter to complete. This name is not visible on other PCs or laptops using the DeviceInstaller application.
DHCP Device Name	Non-configurable field. Displays the name associated with Micro125's current IP address, if the IP address was obtained dynamically. To change the DHCP device name, see sections, Configuration Using Web Manager or Configuration via Telnet or Serial Port (Setup Mode).
Group	Configurable field. A group name to categorize the Micro125. Double-click the field, type in the value, and press Enter to complete. This group name is not visible on other PCs or laptops using the DeviceInstaller utility.

Device Details Settings	Description
Comments	Configurable field. Information about the Micro125. Double-click the field, type in the value, and press Enter to complete. This description or comment is not visible on other PCs or laptops using the DeviceInstaller utility.
Device Family	Non-configurable field. Displays the Micro125's device family as Micro125.
Type	Non-configurable field. Displays the device type as Micro125.
ID	Non-configurable field. Displays the Micro125's ID embedded within the box.
Hardware Address	Non-configurable field. Displays the Micro125's hardware (or MAC) address.
Firmware Version	Non-configurable field. Displays the firmware currently installed on the Micro.
Extended Firmware Version	Non-configurable field. Displays the full version nomenclature of the firmware.
Online Status	Non-configurable field. Displays the Micro125's status as online, offline, unreachable (the Micro125 is on a different subnet), or busy (the Micro125 is currently performing a task).
IP Address	Non-configurable field. Displays the Micro125's current IP address. To change the IP address, click Assign IP on the DeviceInstaller menu bar.
IP Address was Obtained	Displays "Dynamically" if the device automatically received an IP address (e.g., from DHCP). Displays "Statically" if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: <ul style="list-style-type: none"> ◆ Obtain via DHCP with value of True or False. ◆ Obtain via BOOTP with value of True or False. ◆ Obtain via RARP with value of True or False ◆ Obtain via Auto IP with value of True or False
Subnet Mask	Non-configurable field. Displays the Micro125's current subnet mask.
Gateway	Non-configurable field. Displays the Micro125's current gateway.
Number of COB partitions supported	Non-configurable field. Displays the number of COB partitions supported.
Number of Serial Ports	Non-configurable field. Displays the number of ports on the Micro125.
TCP Keepalive	Non-configurable field. Displays 1-65s, the Micro125's TCP keepalive value. The default setting is 45.
Telnet Supported	Non-configurable field. Indicates whether Telnet is enabled on this Micro125.
Telnet Port	Non-configurable field. Displays the Micro125's port for Telnet sessions.
Web Port	Non-configurable field. Displays the Micro125's port for Web-Manager configuration.
Maximum Baud Rate Supported	Non-configurable field. Displays the Micro125's maximum baud rate. Note: the Micro125 may not currently be running at this rate.
Firmware Upgradeable	Non-configurable field. Displays True, indicating the Micro125's firmware is upgradeable as newer versions become available.

Device Details Settings	Description
Supports Configurable Pins	Non-configurable field. Displays False, indicating configurable pins are not available on the Micro125.
Supports Email Triggers	Non-configurable field. Displays False, indicating email triggers are not available on the Micro125.
Supports AES Data Stream	Non-configurable field. Displays True if the Micro125 unit supports AES encryption.
Supports 485	Non-configurable field. Displays True, indicating the Micro125 supports the RS-485 protocol.
Supports 921K Baud Rate	Non-configurable field. Displays False. Micro125 does not support baud rates up to 921 Kbps.
Supports HTTP Server	Non-configurable field. Displays True.
Supports HTTP Setup	Non-configurable field. Displays True.
Supports 230K Baud Rate	Non-configurable field. Displays True.
Supports GPIO	Non-configurable field. Displays False, indicating the Micro125 does not support communication via General Purpose Input Output (GPIO).

5. Configuration Using Web Manager

You must configure the unit so that it can communicate on a network with your serial device. For example, you must set the way the unit will respond to serial and network traffic, how it will handle serial packets, and when to start or close a connection.

The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after you change and store the configuration.

In this chapter, we describe how to configure the Micro125 using Web-Manager, Lantronix's browser-based configuration tool. (For information on using Setup Mode, our command line configuration interface, see [Chapter 6: Configuration via Telnet or Serial Port \(Setup Mode\)](#)).

Note: *The examples in this section show a typical device. Your device may have different configuration options.*

Accessing Web-Manager Using the DeviceInstaller Utility

Note: For more information on the DeviceInstaller application, see [Chapter 4: Using the DeviceInstaller Utility](#).

1. Run the DeviceInstaller application and search for the list of available Lantronix device servers.
2. Click on the **Micro** folder. The list of available Micro type devices displays.
3. Expand the list of Micro125 devices by clicking the + symbol next to the Micro125 icon.
4. Select the Micro125 unit by clicking its hardware address.
5. In the right pane, click the **Web Configuration** tab.
6. To view the Micro125's Web-Manager in the current DeviceInstaller window, click the **Go** button. To open the Web-Manager in a web browser, click the **External Browser** button.

Note: Alternatively, to open Web-Manager, open your web browser and enter the IP address of the Micro125.

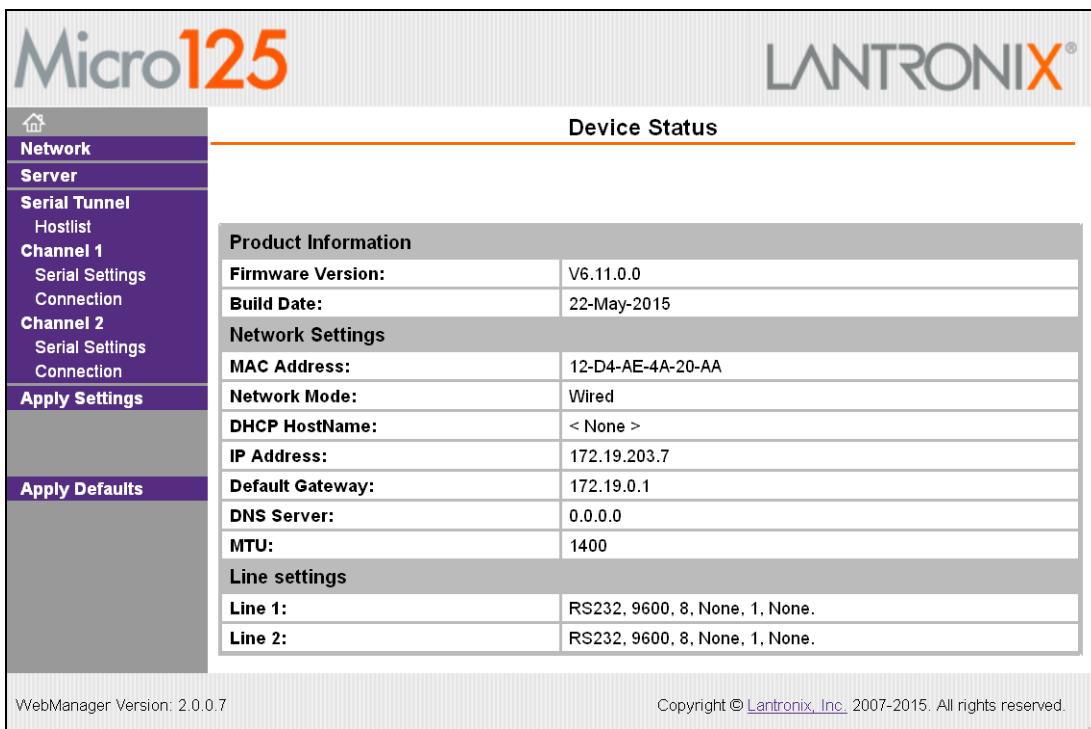
A dialog box appears to prompt for a **User name** and **Password**.

7. Perform one of the following:
 - ♦ If no Telnet/Web Manager password has been defined, leave both fields blank and click **OK**.
 - ♦ If a Telnet/Web Manager password has been defined, leave the username blank, type in the password, and then click **OK**.

The Web-Manager displays.

Note: We recommend that you always use the enhanced password setting and create a strong 16 character password. See [Security Settings \(Option 6\)](#) on page 55.

Figure 5-1. Lantronix Web-Manager



The main menu is in the left pane of the Web-Manager window.

Network Configuration

The unit's network values display when you select **Network** from the main menu. The following sections describe the configurable parameters on the Network Settings page.

Figure 5-2. Network Settings

Network Settings

Network Mode: **Wired Only**

IP Configuration

- Obtain IP address automatically
- Auto Configuration Methods
 - BOOTP: Enable Disable
 - DHCP: Enable Disable
 - AutoIP: Enable Disable
- DHCP Host Name:
- Use the following IP configuration:

IP Address:	172.19.203.7
Subnet Mask:	255.255.0.0
Default Gateway:	172.19.0.1
DNS Server:	0.0.0.0

Ethernet Configuration

- Auto Negotiate
- Speed: 100 Mbps 10 Mbps
- Duplex: Full Half

OK

Network Mode

1. Click **Network** from the main menu.
2. Select **Wired Only**. It is the only choice for Network Mode as it enables the Ethernet network connectivity.

Automatic IP Address Configuration

An IP address can be assigned automatically. You then enter related network settings.

To assign an IP address automatically:

1. On the main menu, click **Network**.
2. Select **Obtain IP address automatically**.
3. Enter the following (as necessary):

Dynamic IP Setting	Description
BOOTP	Select Enable to permit the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically. Enable is the default.
DHCP	Select Enable to permit the Dynamic Host Configuration Protocol (DHCP) to assign a leased IP address to the Micro125 unit automatically. Enable is the default.
AutoIP	Select Enable to permit the Micro125 to generate an IP in the 169.254.x.x address range with a Class B subnet. Enable is the default.
DHCP Host Name	Enter the desired host name for the Micro125.

Note: Disabling BOOTP, DHCP, and AutoIP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.

4. When you are finished, click the **OK** button.
5. On the main menu, click **Apply Settings**.

Static IP Address Configuration

You manually assign an IP address to the unit and enter related network settings.

To assign an IP address manually:

1. On the main menu, click **Network**.
2. Select **Use the following IP configuration**.
3. Enter the following (as necessary):

Static IP Settings	Description
IP Address	If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP address must be set to a unique value in the network.
Subnet Mask	A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.
Default Gateway	The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network.
DNS Server	The DNS server allows the name of a remote machine to be resolved automatically. Enter the IP address of the DNS server. If the device is DHCP enabled, the DHCP server provides the DNS server IP address, which will override this configured value. Note: This setting is applicable only in Manual Connection mode.

4. When you are finished, click the **OK** button.
5. On the main menu, click **Apply Settings**.

Ethernet Configuration

You must specify the speed and direction of data transmission.

To specify how data will be transmitted:

1. On the main menu, click **Network**.
2. Enter the following (as necessary):

Ethernet Settings	Description
Auto Negotiate	With this option, the Ethernet port auto-negotiates the speed and duplex with the hardware endpoint to which it is connected. This is the default. If this option is not selected, the complete the fields that become available: <ul style="list-style-type: none">◆ Speed: The speed of data transmission. The default is 100 Mbps.◆ Duplex: The direction of data transmission. The default is Full.

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Server Configuration

The unit's server values display when you select **Server** from the main menu. The following sections describe the configurable parameters on the Server Settings page.

Figure 5-3. Server Settings

Server Settings

Server Configuration

Enhanced Password: Enable Disable

Telnet/Web Manager
Password:

Retype Password:

Advanced

ARP Cache Timeout (secs):

TCP Keepalive (secs):

Monitor Mode @ Bootup: Enable Disable

HTTP Server Port:

Config Server Port:

MTU Size:

TCP Re-transmission timeout (ms):

To configure the Micro125's device server settings:

1. On the main menu, click **Server**.
2. Configure or modify the following fields:

Server Configuration

Server Configuration Settings	Description
Enhanced Password	Select whether to enable enhanced password: <ul style="list-style-type: none"> ◆ Enable: selecting this option enables advanced password creation, allowing you to create passwords up to 16 bytes in length. ◆ Disable: selecting this option disables advanced password creation, allowing you to create basic passwords up to 4 bytes in length.
Telnet/Web Manager Password	Enter the password required for Telnet configuration and Web Manager access.
Retype Password	Re-enter the password required for Telnet configuration and Web Manager access.

Advanced

Advanced Settings	Description
ARP Cache Timeout (secs)	When the unit communicates with another device on the network, it adds an entry into its ARP table. ARP Cache timeout defines the number of seconds (1-600) before it refreshes this table.
TCP Keepalive (secs)	TCP Keepalive time defines how many seconds the unit waits during an inactive connection before checking its status. If the unit does not receive a response, it drops that connection. Enter a value between 0 and 60 seconds. 0 disables keepalive. The default setting is 45 .
Monitor Mode @ Bootup	Select Disable to disable entry into the monitor mode using the ' yyy ' or ' xx1 ' key sequence at startup. This field prevents the unit from entering monitor mode by interpreting the stream of characters that are received during the device server's initialization at startup.
HTTP Server Port	This option allows the configuration of the web server port number. The valid range is 1-65535 . The default port is 80 .
Config Server Port	Not applicable for this product.
MTU Size	The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default is 1400 bytes.
TCP Re-transmission timeout (ms)	The desired TCP re-transmission timeout value. If the ACK is not received for a packet sent from the Micro125 device, then the unit will retransmit the data. The valid range is 500-4000 msec.

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Host List Configuration

The Micro125 scrolls through the host list until it connects to a device listed in the host list table. After a successful connection, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until the next successful connection.

The host list supports a minimum of 1 and a maximum of 12 entries. Each entry contains an IP address and a port number.

Note: The host list is disabled for Manual and Modem Mode. The unit does not accept a data connection from a remote device when the hostlist option is enabled.

To configure the Micro125's host list:

1. On the main menu, click **Hostlist**.

Figure 5-4. Hostlist Settings

Hostlist Settings					
Retry Settings					
Retry Counter: <input type="text" value="3"/>		Retry Timeout: <input type="text" value="250"/>			
Host Information					
No.	Host Address	Port	No.	Host Address	Port
1	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	2	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
3	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	4	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
5	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	6	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
7	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	8	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
9	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	10	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
11	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>	12	<input type="text" value="0.0.0.0"/>	<input type="text" value="0"/>
<input type="button" value="OK"/>					

2. Enter or modify the following fields:

Retry Settings

Retry Settings	Description
Retry Counter	Enter the value for the number of times the Micro125 should attempt to retry connecting to the host list.
Retry Timeout	Enter the duration (in milliseconds) the Micro125 should abandon attempting a connection to the host list.

Host Information

Host Information Settings	Description
Host Address	Enter or modify the host's IP address.
Port	Enter the target port number.

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Channel 1 and Channel 2 Configuration

The Channel 1 and Channel 2 configuration defines how the serial port responds to network and serial communication.

Serial Settings

To configure the channel's serial settings:

1. On the main menu, click **Serial Settings** (under **Channel 1** or **Channel 2**) to display the Serial Settings window.

Figure 5-5. Channel Serial Settings

Serial Settings

Channel 1

Disable Serial Port

Port Settings

Protocol: RS232	Flow Control: None
Baud Rate: 9600	Data Bits: 8
Parity: None	Stop Bits: 1

Pack Control

<input type="checkbox"/> Enable Packing	Idle Gap Time: 12 msec
Match 2 Byte Sequence: <input type="radio"/> Yes <input checked="" type="radio"/> No	Send Frame Immediate: <input type="radio"/> Yes <input checked="" type="radio"/> No
Match Bytes: 0x00 0x00 (Hex)	Send Trailing Bytes: <input checked="" type="radio"/> None <input type="radio"/> One <input type="radio"/> Two

Flush Mode

Flush Input Buffer	Flush Output Buffer
With Active Connect: <input checked="" type="radio"/> Yes <input type="radio"/> No	With Active Connect: <input type="radio"/> Yes <input checked="" type="radio"/> No
With Passive Connect: <input type="radio"/> Yes <input checked="" type="radio"/> No	With Passive Connect: <input type="radio"/> Yes <input checked="" type="radio"/> No
At Time of Disconnect: <input type="radio"/> Yes <input checked="" type="radio"/> No	At Time of Disconnect: <input type="radio"/> Yes <input checked="" type="radio"/> No

OK

2. In the available fields, enter the following information:

Channel 1 or Channel 2

Channel Setting	Description
Disable Serial Port	<p>Available on Channel 2 settings only. When selected, disables communication through the serial port. The Disable Serial Port option will always be disabled for Channel 1.</p> <p>Note: Using a telnet session (see Baudrate) you may enter a baud rate of 00 in channel settings to disable the serial port.</p>

Port Settings

Port Settings	Description
Protocol	From the drop-down menu, select the protocol type for the selected channel.
Flow Control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. None is the default.
Baud Rate	The unit 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 are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200 or 230400.
Data Bits	Indicates the number of bits in a transmitted data package. The default is 8.
Parity	Checks for the parity bit. The default is None.
Stop Bits	The stop bit follows the data & parity bits in serial communication. It indicates the end of transmission. The default is 1.

Pack Control

Pack Control Settings	Description
Enable Packing	<p>Select to enable packing on the Micro125. Two firmware-selectable packing algorithms define how and when packets are sent to the network.</p> <p>The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters, while keeping the packet count low.</p> <p>The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.</p> <p>Disabled by default.</p>
Idle Gap Time	Select the maximum time for inactivity. The default time is 12 milliseconds.
Match 2 Byte Sequence	Use to indicate the end of a series of data to be sent as one group. The sequence must occur sequentially to indicate end of the data

Pack Control Settings	Description
	collection to the Micro125. The default is No .
Match Bytes	Use to indicate the end of a series of data to be sent as one group. Set this value to 00 if specific functions are not needed.
Send Frame Immediate	After the detection of the byte sequence, indicates whether to send the data frame or the entire buffer. Select Yes to send only the data frame. The default setting is No .
Send Trailing Bytes	Select the number of bytes to send after the end-of-sequence characters. The default is None .

Flush Input Buffer (Serial to Network)

Flush Input Buffer Settings	Description
With Active Connect	Select Yes to clear the input buffer with a connection that is initiated from the device to the network. The default is No .
With Passive Connect	Select Yes to clear the input buffer with a connection initiated from the network to the device. The default is No .
At Time of Disconnect	Select Yes to clear the input buffer when the network connection to or from the device is disconnected. The default is No .

Flush Output Buffer (Network to Serial)

Flush Output Buffer Settings	Description
With Active Connect	Select Yes to clear the output buffer with a connection that is initiated from the device to the network. The default is No .
With Passive Connect	Select Yes to clear the output buffer with a connection initiated from the network to the device. The default is No .
At Time of Disconnect	Select Yes to clear the output buffer when the network connection to or from the device is disconnected. The default is No .

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Connection Settings - TCP

To configure a channel's TCP settings:

1. On the main menu, click **Connection**. The Connection Settings window for the channel displays.

Figure 5-6. TCP Connection Settings

The screenshot shows the 'Connection Settings' window for 'Channel 1'. The 'Connect Protocol' is set to 'TCP'. The 'Protocol' dropdown also shows 'TCP'. Under 'Connect Mode', 'Passive Connection' is selected with 'Accept Incoming' set to 'Yes'. 'Password Required' is set to 'No'. 'Modem Escape Sequence Pass Through' is set to 'Yes'. Under 'Active Connection', 'Active Connect' is set to 'None', 'Start Character' is '0D' (in Hex), 'Modem Mode' is 'None', and 'Show IP Address After RING' is set to 'Yes'. In the 'Endpoint Configuration' section, 'Local Port' is '10001', 'Remote Port' is '0', and 'Remote Host' is '0.0.0.0'. Under 'Common Options', 'Telnet Com Port Cntrl' is 'Disable', 'Connect Response' is 'None', 'Terminal Name' is empty, 'Use Hostlist' is set to 'No', and 'LED' is 'Blink'. In the 'Disconnect Mode' section, 'On Mdm_Ctrl_In Drop' is set to 'No', 'Check EOT(Ctrl-D)' is set to 'No', 'Hard Disconnect' is set to 'Yes', and 'Inactivity Timeout' is '0 : 0' (mins : secs). At the bottom is an 'OK' button.

Connection Settings			
Channel 1			
Connect Protocol			
Protocol:	TCP		
Connect Mode			
Passive Connection: Accept Incoming: Yes Password Required: <input type="radio"/> Yes <input checked="" type="radio"/> No Password: <input type="password"/> Modem Escape Sequence Pass Through: <input checked="" type="radio"/> Yes <input type="radio"/> No		Active Connection: Active Connect: None Start Character: 0D (in Hex) Modem Mode: None Show IP Address After RING: <input checked="" type="radio"/> Yes <input type="radio"/> No	
Endpoint Configuration:		Local Port: 10001 Remote Port: 0 <input type="checkbox"/> Auto increment Local Port for active connect Remote Host: 0.0.0.0	
Common Options:		Telnet Com Port Cntrl: Disable Connect Response: None Terminal Name: <input type="text"/> Use Hostlist: <input type="radio"/> Yes <input checked="" type="radio"/> No LED: Blink	
Disconnect Mode		On Mdm_Ctrl_In Drop: <input type="radio"/> Yes <input checked="" type="radio"/> No Hard Disconnect: <input checked="" type="radio"/> Yes <input type="radio"/> No Check EOT(Ctrl-D): <input type="radio"/> Yes <input checked="" type="radio"/> No Inactivity Timeout: 0 : 0 (mins : secs)	
<input type="button" value="OK"/>			

2. In the available fields, enter or modify the following information:

Connect Protocol

Connect Protocol Setting	Description
Protocol	From the drop-down menu, select TCP .

Connect Mode: Passive Connection

Passive Connection Mode Settings	Description
Accept Incoming	Select Yes to accept incoming connections. The default is Yes .
Password Required	Determines whether a password is required for an incoming passive connection. This field is not available when a password is set for Telnet mode.
Password	If Password Required was set to Yes , enter the password for passive connections.
Modem Escape Sequence Pass Through	Disable or enable the unit's ability to send the escape sequence. The default is Y (Yes) (send the escape sequence).

Connect Mode: Active Connection

Active Connection Mode Settings	Description
Active Connect	Select None to disable Active Connect . Otherwise, indicate the connection type from the drop-down list: <ul style="list-style-type: none"> ◆ With Any Character: Attempts to connect when any character is received from the serial port. ◆ With Active Mdm Ctrl In: Accepts external connection requests only when the Modem Control In input is asserted. ◆ With Start Character: Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return. ◆ Manual Connection: Attempts to connect when directed by a command string received from the serial port. ◆ Auto Start: Automatically connects to the remote IP address and port after booting up.
Start Character	If Active Connect is set to With Start Character , enter the start character in this field.
Modem Mode	Indicates the on-screen response type when in Modem Mode (if Modem Mode is enabled).
Show IP Address After RING	Indicates whether to display the remote IP address upon connection. The default setting is Yes .

Endpoint Configuration

Endpoint Configuration Settings	Description
Local Port	Enter the local port number.
Auto increment for Local Port for active connect	Select to auto-increment the local port number for new outgoing connections. The range of auto-incremented port numbers is 50,000 to 59,999 and loops back to the beginning when the maximum range is reached.
Remote Port	Enter the remote port number.
Remote Host	Enter the IP address of the remote device.

Common Options

Common Option Settings	Description
Telnet Com Port Cntrl	This field is available for configuration only when Active Connect is set to None . Select Enable to permit Telnet communication to the unit. The Telnet Com Port Cntrl feature is used in conjunction with the Com Port Redirector (CPR) utility. (See the <i>CPR Online Help</i> for details.)
Terminal Name	This field is available for configuration only when Telnet Mode is set to Enable . Use the terminal name for the Telnet terminal type. Enter only one name. When this option is enabled, the unit also reacts to the end of record (EOR) and binary options, which can be used for applications such as terminal emulation to IBM hosts.
Connect Response	A single character is transmitted to the serial port when there is a change in connection state. Default setting is None .
Use Hostlist	If this option is set to True , the device server scrolls through the host list until it connects to a device listed in the host list table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it connects to another IP in the host list. The host list is disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled.
LED	Select Blink for the status LEDs to blink upon connection or None for no LED output.

Disconnect Mode

Disconnect Mode Settings	Description
On Mdm_Ctrl_In Drop	Set to Yes for the network connection to or from the serial port to disconnect (drop) when Modem Control In transitions from an asserted state to not asserted state. The default setting is No .
Hard Disconnect	When set to Yes , the TCP connection closes even if the remote site does not acknowledge the disconnect request.

Disconnect Mode Settings	Description
Check EOT (Ctrl-D)	Select Yes to drop the connection when Ctrl-D or Hex 04 is detected. Both Telnet Com Port Cntrl and Check EOT (Ctrl+ D) must be enabled for Disconnect with EOT to function properly. Ctrl+D is only detected going from the serial port to the network. The default setting is No .
Inactivity Timeout	<p>Use this parameter to set an inactivity timeout. The unit drops the TCP connection to port 10001/10002* if there is no activity on the serial line before the set time expires. Enter time in the format mm:ss, where m is the number of minutes and s is the number of seconds. To disable the inactivity timeout, enter 00:00.</p> <p>Note*: The default port number for Port 1 is 10001 and 10002 for Port 2. However, port numbers may be set to a different value.</p>

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Connection Settings - UDP

To configure a channel's UDP settings:

1. On the main menu, click **Connection**. The Connection Settings window for the selected channel displays.
2. In the available fields, enter or modify the following information:

Figure 5-7. UDP Connection Settings

The screenshot shows the 'Connection Settings' window for 'Channel 1'. The 'Protocol' dropdown is set to 'UDP'. Under 'Datagram Mode', 'Datagram Type' is '00' and 'Accept Incoming' is 'Yes'. In 'Endpoint Configuration', 'Local Port' is '10001', 'Remote Port' is '0', and 'Remote Host' is '0.0.0.0'. A checkbox for 'Use Broadcast' is unchecked. The 'Device Address Table' contains 16 rows, each with a number from 0 to 15 and a 'Dev Addr' field containing '0'. At the bottom is an 'OK' button.

Connect Protocol

Connection Protocol	Description
Protocol	Select UDP from the drop-down menu.

Datagram Mode

Datagram Mode Settings	Description
Datagram Type	Configures the remote IP or network broadcast address and the remote port. Enter 01 for directed or broadcast UDP. The default setting is 00 .
Accept Incoming	Select Yes to accept incoming UDP datagrams.

Endpoint Configuration

Endpoint Configuration Settings	Description
Local Port	Enter the local port number.
Remote Port	Enter the port number of the remote device.
Remote Host	Enter the IP address of the remote device.
Use Broadcast	Select to broadcast the UDP datagram. The default is not to broadcast. Note: <i>Datagrams are sent as subnet-directed broadcasts.</i>
Device Address Table	The table is enabled when Datagram Type is set to FD . Enter values between 1 and 255 to identify units on the local network of device servers. Note: <i>Lantronix Tech Support supports Datagram type 01. Datagram Type FD is for OEM use.</i>

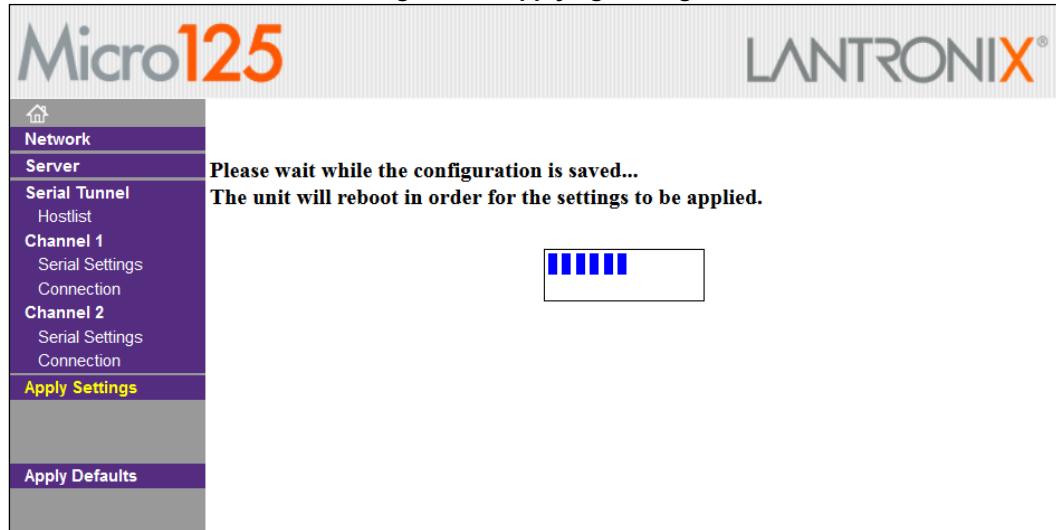
3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

Apply Settings

- To save and apply the configuration changes to the device server, click the **Apply Settings** button.

Note: Clicking **OK** on each page does not change the configuration on the device. Clicking the **OK** button tells the MatchPort what changes to use; the **Apply Settings** makes the changes permanent and reboots the Micro125.

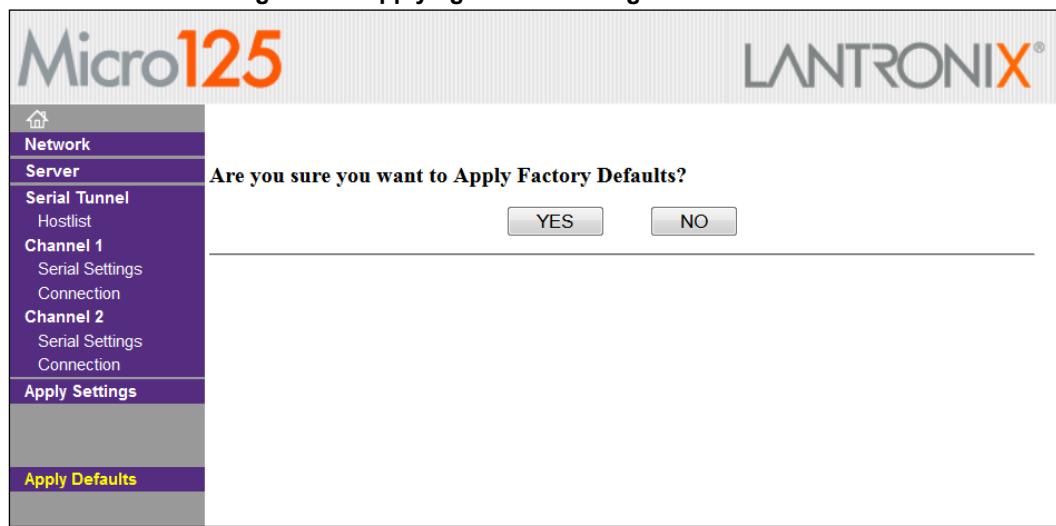
Figure 5-8. Applying Settings



Apply Defaults

- Click the **Apply Defaults** button to set the device server back to the default settings. For details see [Default Settings](#) on page 58.
- Click **Yes** to set factory settings, or click **No** to cancel.

Figure 5-9. Applying Default Settings



6. Configuration via Telnet or Serial Port (Setup Mode)

You must configure the unit so that it can communicate on a network with your serial device. As an alternative to using a web browser, as described in the previous chapter, you can use the following procedures remotely or locally:

- Use a Telnet connection to configure the unit over the network.
- Use a terminal or terminal emulation program to access the serial port locally.

The series of prompts at which you enter configuration settings is called **Setup Mode**.

Note: Detailed information about other setup methods is available from your Lantronix Sales Associate.

The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

This chapter tells you how to access Setup Mode and the general procedure for using it. To complete the configuration, continue with [Chapters 7 Setup Mode: Server Configuration](#), [8 Setup Mode: Channel Configuration](#), and [9 Setup Mode: Advanced Settings](#).

Note: The menus in the configuration chapters show a typical device. Your device may have different configuration options.

Accessing Setup Mode

Telnet Connection

To configure the unit over the network, establish a Telnet connection to port 9999.

Note: You can also use the DeviceInstaller application to access Telnet. Select the device from the main window list, and click the **Telnet Configuration** tab. Skip steps 1 and 2.

To establish a Telnet connection:

1. From the Windows **Start** menu, click **Run** and type the following command, where x.x.x.x is the IP address, and 9999 is the unit's fixed network configuration port number:

Windows: telnet x.x.x.x 9999
UNIX: telnet x.x.x.x:9999

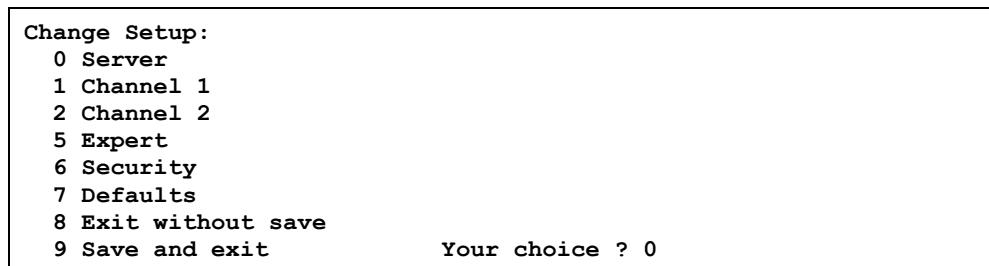
2. Click **OK**. The following information displays.

Figure 6-1. MAC Address

```
MAC address 12D4AE4A20AA
Software version V6.11.0.0 (150522) M125
Press Enter for Setup Mode
```

3. To enter Setup Mode, **press Enter within 5 seconds**. The configuration settings display, followed by the Change Setup menu.

Figure 6-2. Setup Menu Options



4. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.
5. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.
6. When you are finished, save the new configuration (option 9). The unit reboots.

Serial Port Connection

To configure the unit through a serial connection:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port.
2. Set the terminal emulator serial port settings to 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.

Note: *The Micro125 always uses these serial port settings on boot-up.*

3. Reset the Micro125 unit by cycling the unit's power (turning the power off and back on). Immediately upon resetting the device, enter three lowercase **x** characters (**xxx**).

Note: *The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while resetting the unit. You must do this within three seconds of resetting the Micro125.*

At this point, the screen display is the same as when you use a Telnet connection. To continue, go to step 4, above under the section, [Telnet Connection](#).

Exiting Setup Mode

To exit setup mode, utilize one of the following two options:

- ◆ To save all changes and reboot the device, select option **9 Save and exit** from the Change Setup menu. All values are stored in nonvolatile memory.
- ◆ To exit the configuration mode without saving any changes or rebooting, select option **8 Exit without save** from the Change Setup menu.

7. Setup Mode: Server Configuration

This chapter explains how to configure the network settings.

Note: Current values appear in parentheses.

Server Configuration (Option 0)

The unit's basic network parameters display when you select **Server configuration** (option 0). The **IP Address**, **Set Gateway IP Address**, and **Netmask** fields display the current values.

```
IP Address : (172) . (019) . (203) . (007)
Set Gateway IP Address (Y) ?
Gateway IP addr (172) . (019) . (000) . (001)
Netmask: Number of Bits for Host Part (0=default) (16)
Set DNS Server IP addr (N) ?
Change Telnet/Web Manager password (N) ?
```

IP Address

If DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press **Enter** between each section. The current value displays in parentheses.

```
IP Address : (172) . (019) . (203) . (007)
```

If DHCP is used, the third octet of the IP address sets the BootP/DHCP/AutoIP options. The following table shows the bits you can manually configure to force the Micro125 to disable AutoIP, DHCP, or BootP. To disable an option, set the appropriate bit.

Table 7-1. BootP/DHCP/AutoIP options

Options	Bit
AutoIP	0
DHCP	1
BootP	2

For example, if the third octet is 0.0.5.0, the AutoIP and BootP options are disabled; only DHCP is enabled. (The value 5 results from adding the binary equivalents of 0 and 2.) This is the most common setting when using DHCP.

Set Gateway IP Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. The default is **N** (No), meaning the gateway address has not been set. To set the gateway address, type **Y** and enter the address.

```
Set Gateway IP Address (Y) ?
Gateway IP addr (172) .(019) .(000) .(001)
```

Netmask: Number of Bits for Host Part

A netmask defines the number of bits taken from the IP address that are assigned for the host part.

```
Netmask: Number of Bits for Host Part (0=default) (16)
```

Note: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits

The unit prompts for the number of host bits to be entered, then calculates the netmask, which appears in standard decimal-dot notation (for example, 255.255.255.0) when the saved parameters display.

Table 7-2. Standard IP Network Netmasks

Network Class	Host Bits	Netmask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

Set DNS Server IP Address

The DNS server allows the name of a remote machine to be resolved automatically. The default is **N** (No), indicating the DNS server address has not been set. To set the DNS server address, type **Y**. At the prompt, enter the DNS server address. If the device is DHCP enabled, the DHCP server provides the DNS server IP address, which will override this configured value.

Note: This setting is applicable only in Manual Connection mode.

```
Set DNS Server IP addr (N) ?
```

Change Telnet/Web-Manager Password

Setting the Telnet/Web-Manager password prevents unauthorized access to the setup menu through a Telnet connection to port 9999 or through web pages.

Please protect your device from unauthorized access and follow the instructions below:

- ◆ Always select Y to enable Telnet/Web Manager password
- ◆ Enable the enhanced password setting and create a strong 16-character password. For details, see [Security Settings \(Option 6\)](#) on page 55.

Note: We do not recommend that you only use the 4-character basic password as it does not offer sufficient security. Using no password is very dangerous.

```
Change Telnet/Web Manager password (N) ?
```

DHCP Name

If a DHCP server has automatically assigned the IP address and network settings, you can discover the unit by using the DeviceInstaller network search feature.

There are three methods for assigning DHCP names to the unit.

Default DHCP Name: If you do not change the DHCP name, and you are using an IP of 0.0.0.0, then the DHCP name defaults to CXXXXXX (XXXXXX is the last 6 digits of the MAC address shown on the label on the bottom/side of the unit). For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456.

Custom DHCP Name: You can create your own DHCP name. If you are using an IP address of 0.0.0.0, then the last option in Server configuration is **Change DHCP device name**. This option allows you to change the DHCP name to an alphanumeric name (LTX in our example).

```
Change DHCP device name (not set) ? (N) Y
Enter new DHCP device name : LTX
```

Numeric DHCP Name: You can change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name is LTXYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, then the DHCP name is LTX12. This method only works with 2 digit numbers (01-99).

Enable DHCP FQDN Option

A fully qualified domain name (FQDN) is the complete domain name for your device in network. The FQDN consists of two parts, the hostname and the domain name. For example, an FQDN for your device might be myxport.lantronix.com. The hostname is myxport, and the host is located within the domain lantronix.com. The option to enable DHCP FQDN becomes available if DHCP is enabled.

```
Enable DHCP FQDN option : (N) ?
```

8. Setup Mode: Channel Configuration

This chapter explains how to configure the serial port. Two channels may be configured in Micro125: Channel 1 and Channel 2.

Note: The directions for configuring Channel 1 provided below may also be used for Channel 2.

Setup Mode (Option 2)

Channels

Select **Channel 1** (option 1) from the Change Setup menu to define how the serial port responds to network and serial communications. The following sections describe the configurable parameters within the **Channel** configuration menu.

Figure 8-1. Serial Port Parameters

```
Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10002) ?
ConnectMode (C0) ?
Send '+++ in Modem Mode (Y) ?
Show IP addr after 'RING' (Y) ?
Auto increment source port (N) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (0) ?
DisConnMode (00) ?
FlushMode (00) ?
DisConnTime (00:00) ?:
SendChar 1 (00) ?
SendChar 2 (00) ?
```

Baudrate

The unit 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 are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400 bits per second. The current value is displayed in parentheses. Entering a baud rate of 00 in channel settings in a telnet sessions disables the serial port.

```
Baudrate (9600) ?
```

I/F (Interface) Mode

The Interface (I/F) Mode is a bit-coded byte entered in hexadecimal notation.

I/F Mode (4C) ?

The following table displays available I/F Mode options:

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to either a 0 or 1 value.

Table 8-1. Interface Mode Options

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C ⁽¹⁾						0	0	
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 stop bit	0	1						
2 stop bits ⁽¹⁾	1	1						

(1) 2 stop bits are implemented by the software. This might influence performance.

The following table demonstrates how to build some common Interface Mode settings:

Table 8-2. Common Interface Mode Settings

Common I/F Mode Setting	Binary	Hex
RS-232C, 8-bit, No Parity, 1 stop bit	0100 1100	4C
RS-232C, 7-bit, Even Parity, 1 stop bit	0111 1000	78

I/F Mode

Additional settings for RS-422 4-wire and RS-485 2-wire are available on the Micro125. However, this feature is only supported on channel 1.

Note: All bit positions in the table that are blank represent “don’t care” bits, for that particular option, which can be set to either a 0 or 1 value.

Table 8-3. Interface Mode Options

I/F Mode Option	7	6	5	4	3	2	1	0
RS-422 4-wire						0	1	
RS-485 2-wire						1	1	

Flow

Flow control sets the local handshaking method for stopping serial input/output.

Flow (00) ?

Use the following table to select flow control options:

Table 8-4. Flow Control Options

Flow Control Option	Hex
No flow control	00
XON/XOFF flow control	01
Hardware handshake with RTS/CTS lines	02
XON/XOFF pass characters to host	05

Port Number

The setting represents the source port number in TCP connections. It is the number that identifies the channel for remote initiating connections.

Port No (10001) ?

The default setting for Port 1 is **10001**. The range is **1-65535**, except for the following reserved port numbers:

Table 8-5. Reserved Port Numbers

Port Numbers	Reserved for
1 – 1024	Reserved (well known ports)
9999	Telnet setup
14000-14009	Reserved for Redirector
30704	Reserved (77F0h)
30718	Reserved (77FEh)

WARNING: We recommend that you not use the reserved port numbers for this setting as incorrect operation may result.

Use Port **0** for the outgoing local port to change with each connection. The port range is **50,000** to **59,999**. Each subsequent connection increments the number by 1 (it wraps back around to 50,000).

Only use this automatic port increment feature to initiate a connection using TCP. Set the port to a non-zero value when the unit is in a passive mode or when using UDP instead of TCP.

Connect Mode

Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network.

ConnectMode (C0) ?

Enter Connect Mode options in hexadecimal notation.

Note: All bit positions in the table that are blank represent “don’t care” bits, for that particular option, which can be set to either a 0 or 1 value.

Table 8-6. Connect Mode Options

Connect Mode Option	7	6	5	4	3	2	1	0
a) Incoming Connection								
Never accept incoming	0	0	0					
Accept with active Modem Control In	0	1	0					
Always Accept	1	1	0					
b) Response								
Nothing (quiet)					0			
Character response (C=connect, D=disconnect, N=unreachable)					1			
c) Active Startup								
No active startup						0	0	0
With any character						0	0	1
With active Modem Control In						0	0	1
With a specific start character						0	0	1
Manual connection						0	1	0
Autostart						0	1	1
Hostlist	0	0	1	0				
d) Datagram Type								
Directed UDP						1	1	0
e) Modem Mode								
No Echo				0	0		1	1

Connect Mode Option	7	6	5	4	3	2	1	0
Data Echo & Modem Response (Numeric)			0	1		1	1	1
Data Echo & Modem Response (Verbose)			0	1		1	1	0
Modem Response Only (Numeric)			0	0	1	1	1	1
Modem Response Only (Verbose)			0	0	1	1	1	0

a) Incoming Connection

Incoming Connection Mode	Description
Never Accept Incoming	Rejects all external connection attempts.
Accept with active Modem Control In	Accepts external connection requests only when the Modem Control In input is asserted. Cannot be used with Modem Mode.
Always Accept	Accepts any incoming connection when a connection is not already established. Default setting.

b) Response

Response Mode	Description
Character Response	<p>A single character is transmitted to the serial port when there is a change in connection state: C = connected, D = disconnected, N = host unreachable. The IP address of the host connecting to the CoBos device will be provided when you use verbose mode.</p> <p>This option is overridden when the Active Start Modem Mode or Active Start Host List is in effect. Default setting is Nothing (quiet).</p>

c) Active Startup

Active Startup Mode	Description
No Active Startup	Does not attempt to initiate a connection under any circumstance. Default setting.
With Any Character	Attempts to connect when any character is received from the serial port.
With active Modem Control In	Attempts to connect when the Modem Control In input changes from not asserted to asserted.
With a Specific Start Character	Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return.

Table 8-7. Manual Connection Address Example

Command String	Result if remote IP is 129.1.2.3 and remote port is 1234
C121.2.4.5/1	Complete override; connection is started with host 121.2.4.5, port 1
C5	Connects to 129.1.2.5, port 1234
C28.10/12	Connects to 129.1.28.10, port 12
C0.0.0.0/0	Enters Monitor Mode
Cwww.lantronix.com/80	Tries to connect to the Lantronix web server if the <hostname:domain> (www.lantronix.com) is configured in the DNS server database.
Autostart (Automatic Connection)	If you enable Autostart, the unit automatically connects to the remote IP address & remote port specified when the firmware starts.
Hostlist	If you enable this option, the device server scrolls through the hostlist until it connects to a device listed in the hostlist table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it is able to connect to another IP in the hostlist. Hostlist supports a minimum of 1 and a maximum of 12 entries. Each entry contains the IP address and the port number. The hostlist is disabled for Manual and Modem Modes. The unit does not accept a data connection from a remote device when the hostlist option is enabled.

Figure 8-2. Hostlist Option

```

Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?
ConnectMode (25) ?
Send '+++' in Modem Mode (Y) ?
Auto increment source port (N) ?

Hostlist :
01. IP : 172.019.000.001 Port : 00023
02. IP : 172.019.000.002 Port : 03001
03. IP : 172.019.000.003 Port : 10001

Change Hostlist ? (N) ? Y
01. IP address : (172) .(019) .(000) .(001) Port : (23) ?
02. IP address : (172) .(019) .(000) .(002) Port : (3001) ?
03. IP address : (172) .(019) .(000) .(003) Port : (10001) ?
04. IP address : (000) .(000) .(000) .(000) Port : (10001) ?

Hostlist :
01. IP : 172.019.000.001 Port : 00023
02. IP : 172.019.000.002 Port : 03001
03. IP : 172.019.000.003 Port : 10001

DisConnMode (00) ?
FlushMode (00) ?
DisConnTime (00:00) ?:
SendChar 1 (00) ?
SendChar 2 (00) ?

```

To enable the hostlist:

1. Enter a **Connect Mode** of 0x20 (2X), where X is any digit. The menu shows you a list of current entries already defined in the product.
2. To delete, modify, or add an entry, select **Yes**. If you enter an IP address of **0.0.0.0**, that entry and all others after it are deleted.
3. After completing the hostlist, repeat the previous step if necessary to edit the hostlist again.
4. For **Retrycounter**, enter the number of times the Lantronix unit should try to make a good network connection to a hostlist entry that it has successfully ARPed. The range is **1-15**, with the default set to **3**.
5. For **Retrytimeout**, enter the number of seconds the unit should wait before failing an attempted connection. The time is stored as units of milliseconds in the range of **10-65535**. The default is **250**.

d) Datagram Type

Datagram Type	Description
Directed UDP	When selecting this option, you are prompted for the Datagram type. Enter 01 for directed or broadcast UDP. Datagrams of type 01 can be sent as a broadcast by enabling the Send as Broadcast option. The default is not to broadcast. When the UDP option is in effect, the unit never attempts to initiate a TCP connection because it uses UDP datagrams to send and receive data.

e) Modem Mode

In Modem (Emulation) Mode, the unit presents a modem interface to the attached serial device. It accepts AT-style modem commands and handles the modem signals correctly.

Normally, there is a modem connected to a local PC and a modem connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection. Modem Mode allows you to replace modems with Micro125 units, and to use an Ethernet connection instead of a phone call. By not having to change communications applications, you avoid potentially expensive phone calls.

To select Modem Mode, set the Connect Mode to **C6** (no echo), **D6** (echo with full verbose), **D7** (echo with numeric response), **CF** (modem responses only, numeric response), or **CE** (modem responses only, full verbose).

Note: If the unit is in Modem Mode, and the serial port is idle, the unit can still accept network TCP connections to the serial port if Connect Mode is set to **C6** (no echo), **D6** (echo with full verbose), **D7** (echo with numeric response), **CF** (modem responses only, numeric response), or **CE** (modem responses only, full verbose).

Table 8-8. Modem Modes

Modem Mode	Description
Without Echo	In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does <i>not mean</i> to echo data that is transferred. Quiet Mode (without echo) refers to the modem <i>not</i> sending an answer to the commands received (or displaying what was typed).

Data Echo & Modem Response	Full Verbose: The unit echoes modem commands and responds to a command with a message string shown in the table below. Numeric Response: The unit echoes modem commands and responds to a command with a numeric response.
Modem Responses Only	Full Verbose: The unit does not echo modem commands and responds to a command with a message string shown in the table below. Numeric Response: The unit does not echo modem commands and responds to a command with a numeric response.

Table 8-9. Modem Mode Messages

Message	Meaning
Full Verbose	
OK	Command was executed without error.
CONNECT	A network connection has been established.
NO CARRIER	A network connection has been closed.
RING n.n.n.n.	A remote device, having IP address n.n.n.n, is connecting to this device.
Numeric Response	
0	OK
1	Connected
2	Ring
3	No Carrier
4	Error

Received commands must begin with the two-character sequence **AT** and be terminated with a carriage return character.

The unit ignores any character sequence received *not* starting with **AT**, and only recognizes and processes single **AT**-style commands. The unit treats compound **AT** commands as unrecognized commands.

If the **Full Verbose** option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly (begins with **AT** and ends with carriage return) with the "OK" message and takes no further action.

If the **Numeric Response** option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly with the "OK" message and takes no further action.

When an active connection is in effect, the unit transfers data and does not process commands received from the serial interface.

When a connection is terminated or lost, the unit reverts to command mode.

When an active connection is in effect, the unit terminates the connection if it receives the following sequence from the attached serial device:

- ◆ No serial data is received for one second.
- ◆ The character sequence +++ is received, with no more than one second between each two characters.

- ◆ No serial data is received for one second after the last + character. At this time, the unit responds affirmatively per the selected echo/response mode.
- ◆ The character string **ATH** is received, terminated with a carriage return. The unit responds affirmatively according to the selected echo/response mode and drops the network connection. The serial interface reverts to accepting command strings.

If this sequence is not followed, the unit remains in data transfer mode.

Table 8-10. Modem Mode Commands

Modem Mode Command	Function
ATDTx.x.x.x,pppp, ATDTx.x.x.x/pppp, or ATDTx.x.x.x:pppp	Makes a connection to an IP address (x.x.x.x) and a remote port number (pppp).
ATDTx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATD0.0.0.0	Forces the unit into Monitor Mode if a remote IP address and port number are defined within the unit.
ATD or ATDT	Forces the unit into Monitor Mode if a remote IP address and port number are not defined within the unit.
ATDx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATH	Hangs up the connection (Entered as +++ATH).
ATS0=n	Enables or disables connections from the network going to the serial port. n=0 disables the ability to make a connection from the network to the serial port. n=1-9 enables the ability to make a connection from the network to the serial port. n>1-9 is invalid.
ATEn	Enables or disables character echo and responses. n=0 disables character echo and responses. n=1 enables character echo and responses.
ATVn	Enables numeric response or full verbose. n=0 enables numeric response. n=1 enables full verbose.

Note: The unit recognizes these AT commands as single commands such as ATE0 or ATV1; it does not recognize compound commands such as ATE0V.

Send the Escape Sequence (++) in Modem Mode

Send '+++' in Modem Mode (Y) ?

Disable or enable the Micro125's ability to send the escape sequence. The default is Y (Yes) (send the escape sequence).

Show IP addr after 'RING'

Show IP addr after 'RING' (Y) ?

Disable or enable the Micro125's ability to show the IP address after RING in Modem Mode. The default is Y (Yes), to show the IP address.

Auto Increment Source Port

Auto increment source port (N) ?

Y (Yes) auto increment the source port. The Micro125 increments the port number used with each new connection.

Remote IP Address

This is the destination IP address used with an outgoing connection.

Remote IP Address : (000) .(000) .(000) .(000)

Note: This option does not display when Hostlist is enabled from the ConnectMode prompt (see [Connect Mode](#) on page 44 for more information).

Remote Port

You must set the remote TCP port number for the unit to make outgoing connections. This parameter defines the port number on the target host to which a connection is attempted.

Remote Port (0) ?

To connect an ASCII terminal to a host using the unit for login purposes, use the remote port number 23 (Internet standard port number for Telnet services).

Note: This option does not display when Hostlist is enabled from the ConnectMode prompt (see [Connect Mode](#) on page 44 for more information).

DisConnMode

This setting determines the conditions under which the unit will cause a network connection to terminate.

DisConnMode (00) ?

Notes:

- ◆ In DisConnMode (Disconnect Mode), Modem Control In drop either drops the connection or is ignored.
- ◆ All bit positions in the table that are blank represent “don't care” bits, for that particular option, which can be set to either a 0 or 1 value.

Table 8-11. Disconnect Mode Options

Disconnect Mode Option	7	6	5	4	3	2	1	0
Disconnect when Modem Control In is not asserted ⁽⁶⁾	1							
Ignore Modem Control In	0							

Disconnect Mode Option	7	6	5	4	3	2	1	0
Telnet Com Port Cntrl and terminal type setup ⁽¹⁾	1							
Channel (port) password ⁽²⁾					1			
Hard disconnect ⁽³⁾					0			
Disable hard disconnect						1		
State LED off with connection ⁽⁴⁾							1	
Disconnect with EOT (^D) ⁽⁵⁾				1				

- (1) The **Telnet Com Port Control** feature is used in conjunction with Com Port Redirector. The unit sends the **Terminal Type** upon an outgoing connection.
 (2) A password is required for a connection to the serial port from the network.
 (3) The TCP connection closes even if the remote site does not acknowledge the disconnection.
 (4) When there is a network connection to or from the serial port, the state LED turns off instead of blinking.
 (5) When **Ctrl+D** or Hex **04** is detected, the connection is dropped. Both **Telnet Com Port Cntrl** and **Disconnect with EOT** must be enabled for **Disconnect with EOT** to function properly. **Ctrl+D** is only detected going from the serial port to the network.
 (6) When **Modem Control In** transitions from a high state to a low state, the network connection to or from the serial port drops.

Flush Mode (Buffer Flushing)

Using this parameter, you can control line handling and network buffers with connection startup and disconnect.

FlushMode (00) ?

You can also select between two different packing algorithms.

Note: All bit positions in the table that are blank represent “don’t care” bits, for that particular option, which can be set to either a 0 or 1 value.

Table 8-12. Flush Mode Options

Function	7	6	5	4	3	2	1	0
Input Buffer (Serial to Network)								
Clear with a connection initiated from the device to the network					1			
Clear with a connection initiated from the network to the device				1				
Clear when the network connection to or from the device is disconnected		1						
Output Buffer (Network to Serial)								
Clear with a connection initiated from the device to the network								1
Clear with a connection initiated from the network to the device							1	
Clear when the network connection to or from the device is disconnected						1		
Alternate Packing Algorithm (Pack Control)								
Enable	1							

Pack Control

The packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters, while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

Pack control settings are enabled in Flush Mode. Set this value to **00** if you do not need specific functions.

Note: All bit positions in the table that are blank represent “don’t care” bits, for that particular option, which can be set to either a 0 or 1 value.

Table 8-13. Pack Control Options

Option	7	6	5	4	3	2	1	0
Packing Interval								
Interval: 12ms							0	0
Interval: 52ms							0	1
Interval: 250ms							1	0
Interval: 5sec							1	1
Trailing Characters								
None					0	0		
One					0	1		
Two					1	0		
Send Characters								
2-Byte Send Character Sequence				1				
Send Immediately After Send chars			1					

Packing Interval

Packing Interval defines how long the unit should wait before sending accumulated characters. This wait period is between successive network segments containing data. For alternate packing, the default interval is 12 ms.

Trailing Characters

In some applications, CRC, Checksum, or other trailing characters follow the end-of-sequence character; this option helps to adapt frame transmission to the frame boundary.

Send Characters

- ◆ If **2-Byte Send Character Sequence** is enabled, the unit interprets the sendchars as a 2-byte sequence; if this option is not enabled, the unit interprets them independently.
- ◆ If **Send Immediately After Characters** is *not* set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If this option is set, the unit sends immediately after recognizing the transmit condition (sendchar or timeout).

Note: A transmission might occur if status information needs to be exchanged or an acknowledgment needs to be sent.

DisConnTime (Inactivity Timeout)

Use this parameter to set an inactivity timeout. The unit drops the TCP connection to port 10001/10002* if there is no activity on the serial line before the set time expires. Enter time in the format mm:ss, where m is the number of minutes and s is the number of seconds.

Note*: The default port number for Port 1 is 10001 and 10002 for Port 2. However, port numbers may be set to a different value.

DisConnTime (00:00) ?:

To disable the inactivity timeout, enter **00:00**. Range is 0 (disabled) to **5999** seconds (99 minutes, 59 seconds). Default is **0**.

Send Characters

Enter up to two characters in hexadecimal representation in sendchar.

SendChar 1 (00) ? SendChar 2 (00) ?
--

If the unit receives a character on the serial line that matches one of these characters, it sends the character immediately, along with any awaiting characters, to the TCP connection. This action minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT). Setting the first sendchar to 00 disables the recognition of the characters. Alternatively, the unit can interpret two characters as a sequence (see [Pack Control](#) on page 52).

Telnet Terminal Type

This parameter displays only if you enabled the terminal type option in Disconnect Mode. With this option enabled, you can use the terminal name for the Telnet terminal type. Enter only one name.

With terminal type option enabled, the unit also reacts to the EOR (end of record) and binary options, useful for applications like terminal emulation to IBM hosts.

Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode. With this option enabled, you can set a password on the serial port.

9. Setup Mode: Advanced Settings

Expert Settings (Option 5)

Note: You can change the Enable alternate MAC setting using telnet or serial connections only. It is not available through the Web-Manager.

CAUTION: Only an expert should change these parameters. You must definitely know the consequences the changes might have.

Figure 9-1. Expert Settings

```
TCP Keepalive time in s (1s - 65s; 0s=disable) : (45) ?
ARP Cache timeout in s (0s - 600s) : (600) ?
Disable Monitor Mode @ bootup (N) ?
HTTP Port Number : (80) ?
MTU Size (512 - 1400) : (1400) ?
TCP Re-transmission Timeout (500 - 4000) (ms) : (500) ?
Enable alternate MAC (N) ?
Ethernet connection type: (0) ?
```

The default settings are listed below:

Table 9-1. Expert Settings: Default Values

Device Details Settings	Description
TCP Keepalive time in s (1s – 65s; 0s=disable)	45
ARP Cache timeout in s (1s – 600s)	600
Disable Monitor Mode @ bootup	No
HTTP Port Number (1-65535)	80
MTU Size (512 – 1400)	0 (resulting in an operational value of 1400)
TCP Re-Transmission Timeout (500-4000)	500 (msec)
Alternate MAC	Disabled
Ethernet connection type	Auto-negotiate

TCP Keepalive Time in Seconds

This option allows you to change how many seconds the unit waits during a silent connection before attempting to see if the currently connected network device is still on the network. If the unit gets no response, it drops that connection.

```
TCP Keepalive : 45s
```

ARP Cache Timeout in Seconds

Whenever the unit communicates with another device on the network, it adds an entry into its ARP table. The ARP Cache timeout option allows you to define how many seconds (1-600) the unit will wait before timing out this table.

ARP cache timeout: 600s

Monitor Mode at Bootup

This option allows you to disable all entries into Monitor Mode during startup, except for the 'xxx' sequence. This prevents entry using **yyy**, **zzz**, **xx1**, and **yy1** key sequences (only during the bootup sequence). The default for Monitor Mode at bootup is **N** (No). (See [11: Monitor Mode](#).)

Monitor Mode @ bootup : enabled

HTTP Port Number

This option allows the configuration of the web server port number. The valid range is 1-65535. The default HTTP port number is 80.

HTTP Port Number : 80

MTU Size

The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between **512** and **1400** bytes. The default is **1400** bytes.

MTU Size: 1400

TCP Re-transmission Timeout

This feature allows the configuration of the desired TCP re-transmission timeout value. If the ACK is not received for a packet sent from the Micro125 device, then the unit will retransmit the data. The valid range is 500-4000 msec.

TCP Re-transmission timeout: 500 ms

If necessary, enable the alternate MAC address (if specified in the OEM setup record).

Enable alternate MAC (N) ? _

Ethernet Connection Type

The Micro125 allows for the Ethernet speed and duplex to be manually configured. Enter **0** for auto-negotiation (default). To select the speed and duplex, enter one of the following: **2** (10Mbit/half duplex), **3** (10Mbit/full duplex), **4** (100Mbit/half duplex), or **5** (100Mbit/full duplex).

Ethernet connection type: auto-negotiate
--

Security Settings (Option 6)

Note: You can change security settings by means of Telnet or serial connections only, not on the Web-Manager. We recommend that you set security over the dedicated network or over the serial setup to prevent eavesdropping.

CAUTION: Disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network. Disabling Port 77FE also disables the Web from configuring the device.

Select **6** to configure security settings.

Figure 9-2. Security Settings

```

Disable SNMP (N) ?

SNMP Community Name (public):

Disable Telnet Setup (N) ?

Disable TFTP Firmware Update (N) ?

Disable Port 77FEh (N) ?

77FEh Access Mode (0=Read & Write, 1=Read Only): (0) ?

Disable Web Server (N) ?

Disable Web Setup (N) ?

Disable ECHO ports (Y) ?

Enable Encryption (N) ?

Enable Enhanced Password (N) ?

```

Disable SNMP

This setting allows you to disable the SNMP protocol on the unit for security reasons.

```
Disable SNMP (N) ?
```

SNMP Community Name

The SNMP Community Name is a required field for NMS to read or write to a device. Enter a string of 1 to 13 characters.

```
SNMP Community Name (public):
```

The default entry is **public**. The current value is displayed in parentheses.

Disable Telnet Setup

Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.

This setting defaults to the **N** (No) option. The **Y** (Yes) option disables access to Setup Mode by Telnet (port 9999). It only allows access locally using the web pages and the serial port of the unit.

```
Disable Telnet Setup (N) ?
```

Disable TFTP Firmware Upgrade

This setting defaults to the **N** (No) option. The **Y** (Yes) option disables the use of TFTP to perform network firmware upgrades. With this option, you can download firmware upgrades over the serial port using the DeviceInstaller application's Recover Firmware procedure. (See [10: Firmware Upgrades](#).)

```
Disable TFTP Firmware Update (N) ?
```

Disable Port 77FE (Hex)

If you choose to disable this option, keep in mind that disabling both the Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network. Port 77FE is a setting that allows DeviceInstaller, WebManager, and custom programs to configure the unit remotely. You may wish to disable this capability for security purposes.

Disable Port 77FEh (N) ?

Note: The default setting is the **N** (No) option, which enables remote configuration. You can configure the unit by using the DeviceInstaller utility, web pages, Telnet, or serial configuration. The **Y** (Yes) option disables remote configuration and web sites. The **Y** (Yes) option also disables many of the GUI tools for configuring the unit, including the embedded WebManager tool.

77FEh Access Mode

Configuring this setting is available if port 77FE is enabled. This option will not be listed if port 77FE is disabled.

Set 0 for Read & Write mode, and 1 for Read Only mode. Default value of this setting is Read-Write(0).

If access mode is Read-only, then read operation can be done through port 77FE, if Read-Write access is selected, then both read and write of data can be done through port 77FE.

77FEh Access Mode (0=Read & Write, 1=Read Only): (0) ? _
--

Disable Web Server

This setting defaults to the **N** (option). The **Y** (Yes) option disables the web server.

Disable Web Server (N) ?

Disable Web Setup

The **Y** (Yes) option disables configuration using the Web-Manager. This setting defaults to the **N** (option).

Disable Web Setup (N) ?

Disable ECHO Ports

This setting controls whether port 7 echoes characters it receives.

Disable ECHO ports (Y) ?

Enable Encryption

Rijndael is the block cipher algorithm chosen by the National Institute of Science and Technology (NIST) as the Advanced Encryption Standard (AES) to be used by the US government. The Micro125 supports 128-, 192-, and 256-bit encryption key lengths.

Note: Configuring encryption should be done through a local connection to the serial port of the Micro125, or via a secured network connection. Initial configuration information, including the encryption key, is sent in clear text over the network.

To configure AES encryption on the Micro125:

1. When prompted to enable encryption, select **Y**.
 2. When prompted, enter the encryption key length. The Micro125 supports 128-, 192-, and 256-bit encryption key lengths.
 3. When prompted to change keys, select **Y**.
 4. At the **Enter Keys** prompt, enter your encryption key. The encryption keys are entered in hexadecimal. The hexadecimal values are echoed as asterisks to prevent onlookers from seeing the key. Hexadecimal values are 0-9 and A-F.
 - ◆ For a 128-bit key length, enter 32 hexadecimal characters.
 - ◆ For a 192-bit key length, enter 48 hexadecimal characters.
 - ◆ For a 256-bit key length, enter 64 hexadecimal characters
 5. Continue pressing **Enter** until you return to the Change Setup menu.
 6. From the Change Setup menu, select option **9** to save and exit.

Encryption only applies to the port selected for data tunneling (default 10001), regardless of whether you are using TCP or UDP.

Generally, one of these situations applies:

- Encrypted Micro125-to-Micro125 communication. Be sure to configure both Micro125 devices with the same encryption key.
 - Third-party application to Micro125-encrypted communication: Micro125 uses standard AES encryption protocols. To communicate successfully, products and applications on the peer side must use the same protocols and the same encryption key as the Micro125.
 - Lantronix Secure Com Port Redirector provides an encrypted connection from Windows-based applications to the Micro125. Information about SCPR is available on our web site, www.lantronix.com/device-networking/utilities-tools/scpr. A 30-day trial version of SCPR is available.

Note: Developers can license the Lantronix Encryption Library Suite. See www.lantronix.com/device-networking/utilities-tools.

Enable Enhanced Password

The Enhanced Password setting allows you to set a password of up to 16 characters for protecting Telnet and Web Page access. We recommend that you select the **Y** (Yes) option and enable the enhanced password setting.

Avoid using either the 4 character basic password setting or no password at all as they are not secure options.

Enable Enhanced Password (N) ?

Default Settings (Option 7)

Select 7 to reset the unit's channel configuration and expert settings to the default settings. The server configuration settings for IP address, gateway IP address, and netmask remain unchanged. The specific settings that this option changes are listed below:

Channel 1 and Channel 2 Configuration Defaults

Channel Setting	Default Configuration
Baudrate	9600
I/F Mode	4C (1 stop bit, no parity, 8 bit, RS-232C)
Flow	00 (no flow control)
Port number	10001 (channel 1) 10002 (channel 2)
Connect Mode	C0 (always accept incoming connection; no active connection startup)
Send '+++ in Modem Mode	Enabled
Show IP addr after 'RING'	Enabled
Auto increment source port	Disable
Hostlist retry counter	3
Hostlist retry timeout	250 (msec)
Start character for serial channel 1	0x0D (CR)
All other parameters	0

Expert Settings Defaults

Expert Setting	Default Configuration
TCP Keepalive time in s	45
ARP Cache timeout in s	600
Disable Monitor Mode @ bootup	No
HTTP Port Number	80
MTU Size	0 (resulting in an operational value of 1400)
TCP Re-Transmission Timeout (500-4000)	500 (ms)
Alternate MAC	Disabled (for OEM use only)
Ethernet Connection Type	0 (auto-negotiate)

Security Settings Defaults

Security Setting	Default Configuration
Disable SNMP	No
SNMP community name	public

Security Setting	Default Configuration
Disable Telnet setup	No
Disable TFTP Firmware Update	No
Disable Port 77FEh	No
Disable Web Server	No
Disable Web Setup	No
Disable ECHO ports	Yes
Enable Encryption	No
Enable Enhanced Password	No

10. Firmware Upgrades

Obtaining Firmware

You can obtain the most up-to-date firmware and release notes for the unit from the Lantronix web site (www.lantronix.com/support/downloads) or by using anonymous FTP (ftp.lantronix.com/pub).

Reloading Firmware

There are several ways to update the unit's internal operational code (*.ROM): using the DeviceInstaller utility (the preferred way), using TFTP, or using the serial port. You can also update the unit's internal Web interface (*.COB) using TFTP or the DeviceInstaller application.

Here are typical names for those files. Check the Lantronix web site for the latest versions and release notes.

Table 10-1. Firmware Files

ROM File	COB
m125e_61100.rom	m125_webm_2007.cob

Please refer to the DeviceInstaller online Help for information about reloading firmware using the DeviceInstaller application. The other methods are discussed below.

Using TFTP: Graphical User Interface

To download new firmware from a computer:

1. Use a TFTP client to put a binary file to the unit (*.ROM to upgrade the unit's internal operational code and *.COB to upgrade its internal web interface).

Note: TFTP requires the *.rom* (binary) version of the unit's internal operational code.

2. In the TFTP server field, enter the IP address of the unit being upgraded.
3. Select Upload operation and Binary format.
4. Enter the full path of the firmware file in the Local file name field.
5. In the Remote file name field, enter the current internal operational code or WEB1 to WEB6 for the internal web interface.

Figure 10-1. TFTP Window

- Click the **Upload Now** button to transfer the file to the unit. The unit performs a power reset after the firmware has been loaded and stored.

Using TFTP: Command Line Interface

To download new firmware from a computer:

- Enter the following from a TFTP command line interface:

```
tftp -i <ip address> put <local filename> <destination file name>
```

The following examples demonstrate the TFTP command sequence to download the .rom file and the .cob file:

```
tftp -i 192.168.1.111 put m125e_61100.rom 5M
tftp -i 192.168.1.111 put m125_webm_2007.cob WEB1
```

Recovering the Firmware Using the Serial Port and the DeviceInstaller Application

If for some reason the firmware is damaged, you can recover the firmware file by using the DeviceInstaller utility to download the *.ROM file over the serial port.

To recover firmware:

- Start DeviceInstaller. If your PC has more than one network adapter, a message displays. Select an adapter and click **OK**.
- From the **Tools** menu, select **Advanced/Recover Firmware**. The Serial Port Firmware Upgrade window displays.
- For **Port on PC**, enter the COM port on the PC that is connected to the serial port of the Lantronix unit.

Note: Make sure the Micro125 on which you are recovering firmware is connected to this selected port on your PC.

- For **Device Model**, be sure the appropriate Micro125 device is selected.
- For **Firmware File**, click the **Browse** button and go to the location where the firmware file resides.

6. Click **OK** to download the file.
7. When prompted, reset the device. Status messages and a progress bar at the bottom of the screen show the progress of the file transfer. When the file transfer completes, the message “Successful, Click **OK** to Close” appears.
8. Click the **OK** button to complete this procedure.

Note: For more information, see *Recovering Firmware in the DeviceInstaller online Help*.

11. Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes.

There are two ways to enter Monitor Mode: locally using the serial port or remotely using the network.

Entering Monitor Mode Using the Serial Port

To enter Monitor Mode locally:

1. Follow the same steps used for setting the serial configuration parameters (see [Serial Port](#) on page 37).
2. Instead of typing three **x** keys, however:
3. Type **zzz** (or **xx1**) to enter Monitor Mode with network connections.
4. Type **yyy** (or **yy1**) to enter Monitor Mode without network connections.

A **0>** prompt indicates that you have successfully entered Monitor Mode.

Entering Monitor Mode Using the Network Port

To enter Monitor Mode using a Telnet connection:

5. Establish a Telnet session to the configuration port (9999). The following message appears:

```
MAC address 12D4AE4A20AA  
Software version V6.11.0.0 (150522) M125  
  
Press Enter for Setup Mode
```

6. Type **M** (upper case).

A **0>** prompt indicates that you have successfully entered Monitor Mode.

Monitor Mode Commands

The following commands are available in Monitor Mode. Many commands have an IP address as an optional parameter (xxx.xxx.xxx.xxx). If you enter the IP address, the command is applied to another unit with that IP address. If you do not enter the IP address, the command is executed locally.

Note: All commands must be in capital letters. Responses to some of the commands are in Intel Hex format.

Table 11-1. Monitor Mode Commands

Command	Command Name	Function
VS x.x.x.x	Version	Queries software header record (16 bytes) of unit with IP address x.x.x.x.
GC x.x.x.x	Get Configuration	Gets configuration of unit with IP address x.x.x.x as hex records (120 bytes).
SC x.x.x.x	Send Configuration	Sets configuration of unit with IP address x.x.x.x from hex records.
PI x.x.x.x	Ping	Pings unit with IP address x.x.x.x to check device status.
AT	ARP Table	Shows the unit's ARP table entries.
TT	TCP Connection Table	Shows all incoming and outgoing TCP connections.
NC	Network Connection	Shows the unit's IP address, gateway, subnet mask, and DNS server.
RS	Reset	Resets the unit's power.
QU	Quit	Exits diagnostics mode.
G0, G1, . . . , Ge, Gf	Get configuration from memory page	Gets a memory page of configuration information from the device.
S0, S1, . . . , Se, Sf	Set configuration to memory page	Sets a memory page of configuration information on the device.
GM	Get MAC address	Shows the unit's 6-byte MAC address.
SS	Set Security record	Sets the Security record without the encryption key and length parameters. The entire record must still be written, but the encryption-specific bytes do not need to be provided (they can be null since they are not overwritten).
SA	Scan	Initiates a wireless scan if the wireless interface is enabled. Reports any stations found, including BSSID, SSID, and RSSI. If SA is followed by a string, the string is used to filter SSIDs before reporting. If the BSS does not broadcast its SSID, only the BSSID and RSSI are returned.
NS	Network Status	Reports the network interfaces' statuses. Includes potentially negotiated parameters like speed/duplex for Ethernet or BSSID, encryption, authentication for wireless interfaces.
co	Set IP address, hostbits, gateway, and DNS server IP	Example: co 192.168.0.10 8 192.168.0.1 10001 192.168.1.10 with 192.168.0.10 = IP address of the Micro125 8 = number of hostbits 192.168.0.1 = gateway IP address 10001 = port number of the Micro125 192.168.1.10 = IP address of the DNS Server The Micro125 stores the setup and performs a reset. It sends an X before the reset if the command was OK.
VN	Query full firmware version	This command queries and displays full firmware version in readable string format.

Command	Command Name	Function
WC	Flash write count	This command shows serial flash write counts, valid on serial flash products.

Note: Entering any of the commands listed above generates one of the following command response codes:

Table 11-2. Command Response Codes

Response	Meaning
0>	OK; no error
1>	No answer from remote device
2>	Cannot reach remote device or no answer
8>	Wrong parameter(s)
9>	Invalid command

12. Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact a dealer or Lantronix. It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may display. When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.

Note: Some unexplained errors might be caused by duplicate IP addresses on the network. Make sure that your unit's IP address is unique.

When troubleshooting the following problems, make sure that the Micro125 is powered up. Confirm that you are using a good network connection.

Problems and Error Messages

Problem/Message	Reason	Solution
When you issue the ARP -S command in Windows, the "ARP entry addition failed: 5" message displays.	Your currently logged-in user does not have the correct rights to use this command on this PC.	Have someone from your IT department log you in with sufficient rights.
When you attempt to assign an IP address to the unit by the ARP method, the "Press Enter to go into Setup Mode" error "(described below)" message displays. Now when you Telnet to the device server, the connection fails.	When you Telnet to port 1 on the device server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press Enter quickly, the device server reboots, causing it to lose the IP address.	Telnet back to Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press Enter quickly.
When you Telnet to port 9999, the "Press Enter to go into Setup Mode" message displays. However, nothing happens when you press Enter , or your connection is closed.	You did not press Enter quickly enough. You only have 5 seconds to press Enter before the connection is closed.	Telnet to port 9999 again, but press Enter as soon as you see the "Press Enter to go into Setup Mode" message.
When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time.	You may have entered the Ethernet address incorrectly with the ARP command.	Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons.
	The IP address you are trying to assign is not on your logical subnet.	Confirm that your PC has an IP address and that it is in the same logical subnet that you are trying to assign to the device server.

Problem/Message	Reason	Solution
	The device server may not be plugged into the network properly.	Make sure that the Link LED is lit. If the Link LED is not lit, then the device server is not properly plugged into the network.
When you try to assign an IP with the DeviceInstaller application, you get the following : "No response from device! Verify the IP, Hardware Address and Network Class. Please try again."	The cause is most likely one of the following: The hardware address you specified is incorrect. The IP address you are trying to assign is not a valid IP for your logical subnet. You did not choose the correct subnet mask.	Double-check the parameters that you specified. Note: You cannot assign an IP address to a device server through a router.
The device server is not communicating with the serial device to which it is attached.	The most likely reason is the wrong serial settings were chosen.	The serial settings for the serial device and the device server must match. The default serial settings for the device server are RS-232, 9600 baud, 8 character bits, no parity, 1 stop bit, no flow control.
When you try to enter the setup mode on the device server using the serial port, you get no response.	The issue is most likely something covered in the previous problem, or possibly, you have Caps Lock on.	Double-check everything in the problem above. Confirm that Caps Lock is not on.
You can ping the device server, but not Telnet to the device server on port 9999.	There may be an IP address conflict on your network You are not Telnetting to port 9999. The Telnet configuration port (9999) is disabled within the device server security settings.	Turn the device server off and then issue the following commands at the DOS prompt of your computer: ARP -D X.X.X.X (X.X.X.X is the IP of the device server). PING X.X.X.X (X.X.X.X is the IP of the device server). If you get a response, then there is a duplicate IP address on the network. If you do not get a response, use the serial port to verify that Telnet is not disabled.

Problem/Message	Reason	Solution
The device server appears to be set up correctly, but you are not communicating with your device attached to the device server across the network.	If you are sure that the serial port setting is correct, then you may not be connecting to the correct socket of the device server. Another possibility is that the device server is not set up correctly to make a good socket connection to the network.	You can check to see whether there is a socket connection to or from the device server by looking at the Status LED. If the Status LED is blinking consistently, then there is a good socket connection. If the Status LED is solid green, then the socket connection does not exist. Use the Connect Mode option C0 for making a connection to the device server from the network. Use Connect Mode option C1 or C5 for a connection to the network from the device server. See the full list of Connect Mode options in Connect Mode on page 44.
When connecting to the Web-Manager within the device server, the "No Connection With The Device Server" message displays.	Your computer is not able to connect to port 30718 (77FEh) on the device server.	Make sure that port 30718 (77FEh) is not blocked with any router that you are using on the network. Also, make sure that port 77FEh is not disabled within the Security settings of the device server.

A: Lantronix Technical Support

Lantronix offers many resources to support our customers and products at <http://www.lantronix.com/support>. For instance, ask a question, find firmware downloads, access the FTP site and search through tutorials, FAQs, bulletins, warranty information, extended support services, and product documentation.

To contact technical support or sales, look up your local office at <http://www.lantronix.com/about/contact.html>. When you report a problem, please provide the following information:

- ◆ Your name, company name, address, and phone number
- ◆ Lantronix product and model number
- ◆ Lantronix MAC number or serial number
- ◆ Firmware version and current configuration
- ◆ Description of the problem
- ◆ Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem).

B: Binary to Hexadecimal Conversions

Many of the unit's configuration procedures require assembling a series of options (represented as bits) into a complete command (represented as a byte). Convert the resulting binary value to a hexadecimal representation.

Converting Binary to Hexadecimal

Following are two simple ways to convert binary numbers to hexadecimals.

Conversion Table

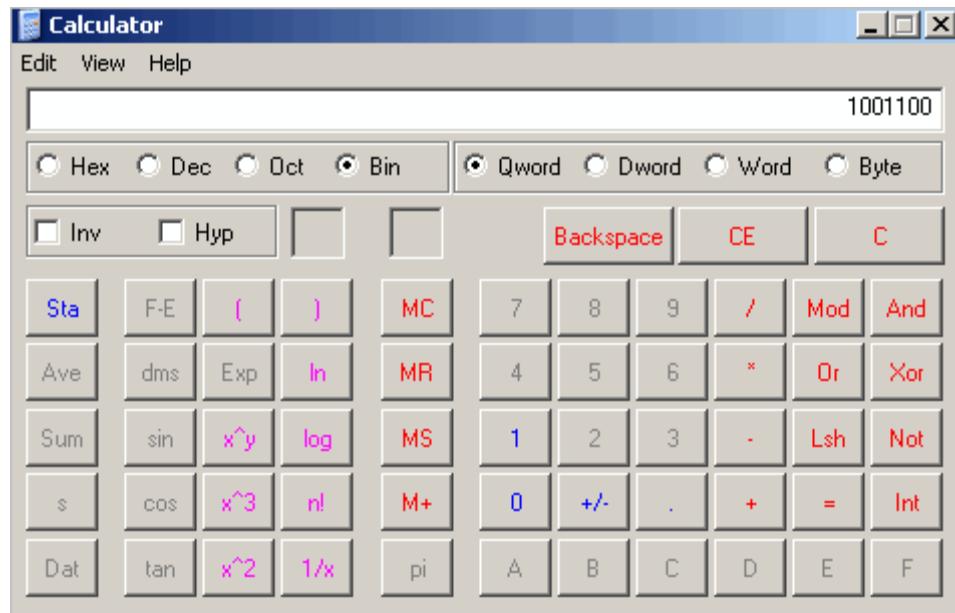
Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, the upper and lower four bits are treated separately, resulting in a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Scientific Calculator

Another simple way to convert binary to hexadecimals is to use a scientific calculator, such as the one available on Windows operating systems. For example:

1. On the Windows Start menu, click **Programs→Accessories→Calculator**.
2. On the **View** menu, select **Scientific**. The scientific calculator displays.
3. Select **Bin** (Binary), and type the number to convert.



4. Click **Hex**. The hexadecimal value displays.