MX1 Reference Guide

LXE
An EMS Technologies Company

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MX1A137REFGD
E-EQ-MX1RG-D

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Revision Notice

MX1 Reference Guide
Upgrade From Revision C to Revision D

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Chapter 4 – System Configuration	Marked PDTEST and SETHOST as unavailable as of Nov 2003. Replaced the appropriate sections of the "Sample NET.CFG Symbol 11MB Radio" section based on Datalight Stack Release changes as of Nov 2003. Updated the "Sample NET.CFG Symbol 11MB Radio" parameter "Memory" value from C9000 to CC000 for the MX1.
Chapter 6 – Network Configuration	Added note to "Encrypt_Key_ID" : This parameter is valid for Symbol FHSS radios only. Added "Encrypt_Enable_Index": This section replaces the old "Encrypt_Key_Index" parameter for Datalight stacks after Nov 2003. Bootstrap Protocol (BOOTP): Removed this sentence "For file server based networks, Sockets workstations can be configured in a similar way using the SETHOST utility."
Appendix B – MX1 API	Removed. Replaced by standalone user guide : E-SW-DOSAPIPG available on the LXE Manuals CD and the LXE website. Relettered Appendices C and D to B and C.

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Chapter 1 Introduction

The MX1 is a rugged, portable, hand-held PC-compatible computer capable of wireless data communications while being carried. The MX1 can transmit information using either a 900 MHz or 2.4 GHz radio. It can store information for later transmission through an RS-232 or InfraRed port. The MX1 is vertically oriented and features backlighting for the display.

The MX1 is a DOS compatible computer designed to run as a batch unit or to run software applications such as LXE's Terminal Emulator applications (ANSI Plus, LDS Plus, DOS 5250, DOS 3270, TN3270 and TN5250).

The heart of the MX1 is an Intel® 486 processor that is PC compatible. The MX1 features a graphics screen with electroluminescent backlight. The keypad is constructed of a phosphorescent material that needs no backlighting. The case is constructed of high-impact plastic designed to withstand multiple drops in an industrial environment.

Figure 1-1 The MX1 Hand Held Computer

Note: The "MX1 Installation and Operator's Guide" contains MX1 operating instructions for the general user. The guide is contained on the LXE Manuals CD.

When to Use This Guide

As the reference for LXE's MX1 computer, this guide provides detailed information on its features and functionality. Use this reference guide as you would any other source book -- reading portions to learn about the MX1, and then referring to it when you need more information about a particular subject. This guide takes you through all aspects of the installation and configuration of the LXE MX1.

Operating instructions for the general user are contained in the "MX1 Installation and Operator's Guide".

This chapter, **"Introduction",** briefly describes this reference guide structure, contains setup and installation instruction, and briefly describes data entry processes.

Chapter 2 "Physical Description and Layout" describes the function and layout of the configuration, controls and connectors on the MX1.

Chapter 3 "Power Supply" describes the power sources and battery charging stations.

Chapter 4 "System Configuration" takes you through the BIOS Setup and memory maps, the MX1 file structure, describes LXE's Terminal Emulation programs compatible with the MX1 and contains instructions for panning the display.

Chapter 5 "Utilities" explains the function of MX1-specific utilities.

Chapter 6 "RF Network Configuration" describes the functions and delivers instruction on changing RF networked radio configurations.

Chapter 7 "Troubleshooting" solutions are split into several areas. The solution may be found in one area or it may be a combination of the solutions in several areas. This chapter also contains POST messages and run time messages.

Appendix A "Key Maps" describes the keypress sequences for the different keypads – the full alpha-numeric keypads (ANSI, 3270, 5250) and the numeric-alpha keypad.

Appendix B "Technical Specifications" lists technical specifications for physical, environmental, display and the radios.

Appendix C "Commands" presents a listing and description of ROM-DOS command files.

Document Conventions

This reference guide uses the following document conventions:

ALL CAPS	All caps are used to represent disk directories, file names, and application names.
Menu|Choice	Rather than use the phrase “choose the Save command from the File menu”, this manual uses the convention “choose File|Save”.
“Quotes”	Indicates the title of a book, chapter or a section within a chapter (for example, “Document Conventions”).
< >	Indicates a key on the keyboard (for example, <Enter>).
	Indicates a reference to other documentation.
ATTENTION	Keyword that indicates vital or pivotal information to follow.
	Attention symbol that indicates vital or pivotal information to follow. Also, when marked on product, means to refer to the manual or operator’s guide.
	International fuse replacement symbol. When marked on the product, the label includes fuse ratings in volts (v) and amperes (a) for the product.
Note:	Keyword that indicates immediately relevant information.
Caution	Keyword that indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
WARNING	Keyword that indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
DANGER	Keyword that indicates a imminent hazardous situation which, if not avoided, will result in death or serious injury.

Getting Started

Note: When your MX1 is pre-configured, the radio card or PCMCIA data card and endcaps are assembled by LXE to your specifications. You may only need to install a handle or handstrap.

This section's instructions are based on the assumption that your new system is pre-configured and requires only accessory installation (e.g. handstrap or handle) and a power source.

LXE recommends that installation or removal of accessories be performed on a clean, well-lit surface. When necessary, protect the work surface, MX1, and components from electrostatic discharge.

In general, the sequence of events is:

1. Insert fully charged battery.
2. Install accessories.
3. Power the MX1 on.
4. Configure the software.

*Note: **New batteries must be fully charged prior to use**. This process takes approximately three hours per battery. LXE batteries are charged using LXE Battery Charger/Analyzers.*

	Refer to the documentation received with the battery charger / analyzer for operating instruction and technical information.

Quick Start -- Configure the Software

Please have the following information available before setting up your computer for the first time:

- IP Address
- Network SSID number of the Access Point

In Brief . . .

1. Insert a fully charged battery into a hand-held computer. Connect a vehicle mounted computer to an external power source.
2. Power up the computer.
3. Using the NED editing utility, edit the NET.CFG file in the PCTCP subdirectory.
4. Using the NED editing utility, edit the SOCKET.CFG file in the PCTCP subdirectory.
5. Using the TE utility, edit the Terminal Emulation parameters (if needed).
6. Reboot.

How To Edit DOS Files on Your Computer Using NED.EXE

The following DOS file edit commands are required for setup. These commands are not case sensitive. The following keystrokes will control ths cursor.

PgDn - Move cursor down
PgUp - Move cursor up
2nd PgUp - Move up a page
2nd PgDn - Move down a page
2nd CTRL PgUp - Move to the top of the file
2nd CTRL PgDn - Move to the bottom of the file

The cursor may not be visible on the screen. Use the key commands above to find the cursor when editing the NET.CFG and SOCKET.CFG files.

If the cursor is at the bottom of the file, the PgDn key and the 2nd PgDn keystrokes will not help you find the cursor.

How To Use F5 During Bootup

1. Power the computer on.
2. Press F5 when "Starting ROM-DOS" appears on the screen. It may flash quickly on the screen then disappear.
3. Press the Enter key at the Time prompt. Press the Enter key at the date prompt.
4. Type CLS and press the Enter key.
5. Type "Path=C:\DOS" and press the Enter key.
6. The DOS C:\ prompt appears on the screen.

How To Edit the NET.CFG File

Note: While editing the NET.CFG file, do not press Enter until all changes are completed.

1. At the C:\ prompt, type CD PCTCP. Then press *Enter*.
2. At the C:\PCTCP prompt, type NED NET.CFG. Then press *Enter*.
3. You should be at the top of the file. Use the *PgDn* (or *down arrow*) key to move down the screen. You may not see the cursor at first.
4. Move the cursor to the line of code that reads:

   SSID "" ; Must match Cisco Access Point setting

   ESS_ID "" ; Must match Symbol Access Point setting

   WaveLan_Network_Name "" ; Must match Lucent/Orinoco/Agere Access Point setting
5. At this line, move the cursor to the right using the End (or the right arrow) key
6. Edit the line to contain the network name of the Access Point the computer is to connect through.
7. If you will be using WEP or another authentication protocol, please contact your wireless network administrator to acquire the WEP/LEAP keys. Please refer to Chapter 6, "RF Network Configuration" for the WEP key procedure.
8. After edits are complete, press *Alt F* to access the menu and save.
9. Move the cursor down to *Save* or press *Enter* or press *F9*.

10. To exit, press *Alt F*.
11. Move the cursor to *Exit* and press *Enter* or press *Alt F4*.

How To Edit the SOCKET.CFG File

Note: While editing the SOCKET.CFG file, do not press Enter until all changes are completed.

1. At the C:\ prompt, type CD PCTCP. Press *Enter*.
2. At the C:\PCTCP prompt, type NED SOCKET.CFG. Press *Enter*.
3. You should be at the top of the file. Use the *PgDn key* (or *down arrow*) to move down the screen. You may not see the cursor at first.
4. Move the cursor down to the line that reads:

   IP address 0.0.0.1/16 // This is the default setting and allows the DHCP server to set the computer's IP address to be set each time the computer is powered up.

5. If a static IP address is to be set for the computer, edit this statement to read:

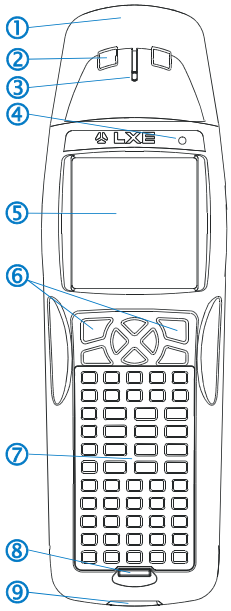
   IP address 'assigned IP address'/xx

   where 'xx' is the number of subnet bits for the assigned IP address.

   Note: If a static address was set, then a route might also be required if there is a gateway between the Access Points the system uses and a Session Manager (if used).

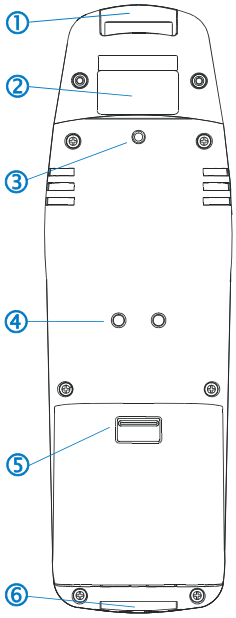
6. After edits are complete, press *Alt F* to access the menu.
7. Move the cursor down to *Save* or press *Enter* or press *F9*.
8. To exit, press *Alt F*.
9. Move the cursor to *Exit* and press *Enter* or press *Alt F4*.

Components



1. Endcap
2. Scan Indicators
3. Beeper
4. Status Indicator
5. Display
6. Scan Buttons
7. Keypad
8. Power Button
9. IR Port

MX1 Front



1. Scan Aperture
2. Warning Label
3. Upper Handstrap Connection
4. Handle Contacts
5. Battery Cover Latch
6. Lower Handstrap Connection

MX1 Back

Figure 1-2 MX1 Components

Note: ***MX1 Back :*** *Handle contacts (4) are covered with a label. The label must be removed before the handle is attached. When the handle is removed, the label should be replaced to keep the contacts clean.*

Insert Battery Pack

Note: ***New batteries must be charged prior to first use****. This process takes approximately three hours in an LXE Battery Charger/Analyzer and eight hours with the LXE Clip-on Portable Charger attached to the MX1.*

The MX1 Battery Compartment is located on the lower rear of the computer. Open the Battery Compartment door by sliding the door latch down (at the top of the compartment). Remove the battery door.

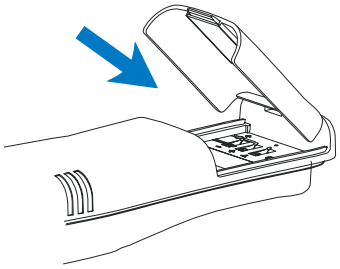


Figure 1-3 Open Battery Door

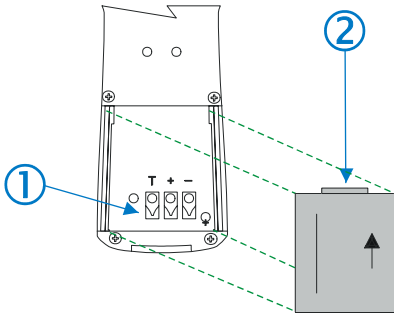


Figure 1-4 Inserting Battery Pack

Note: *If a hand strap is attached to the unit, there is no need to remove the strap – just open the closed loop fastener. See sections titled "Attach Hand Strap" and "Install Pistol Grip Handle" for instruction.*

These illustrations show the battery compartment with the door removed. The Battery Contacts (1) provide the electrical link between the battery pack and the computer. Care should be used when inserting or removing the battery pack so that damage does not occur to the contacts. If damage does occur, cease using the unit until inspection or repair can be performed by a qualified technician.

The MX1 Battery Pack should be inserted tab (2) end first so that the tab mates with the hole at the top of the battery compartment. The battery will then lay inside the battery compartment but will not be secure. To secure the battery, the battery compartment door must be in place and the door latch locked. This provides the tension necessary to hold the battery pack in place.

Note: *If a handstrap is installed, the battery door latch is hidden by the handstrap. Loosen the handstrap and shift it out of the way to have access to the battery door.*

Attach Hand Strap (Optional)

Note: An Upper Strap Bracket installation is a requirement prior to using the MX1 in a Docking Station. The strap is not a requirement.

An elastic handstrap is available for the MX1. Once installed, the handstrap provides a means for the user to secure the computer to a hand. It is adjustable to fit practically any size hand and is easily moved to allow installation or removal of the MX1 battery pack.

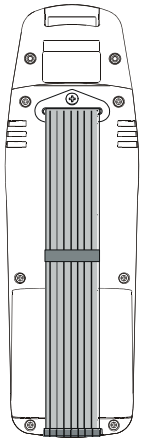


Figure 1-5 MX1 With Handstrap

Tool Required: #1 Phillips Screwdriver

Installation

1. If a handle is installed, remove it at this time. See section “Install Pistol Grip Handle” for instruction.
2. Slip the strap through the upper bracket prior to securing the upper bracket to the unit.

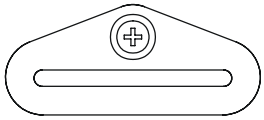


Figure 1-6 Upper Strap Bracket

3. When slipping the strap through the bracket make sure the closed loop fastener surface is up. After slipping the strap through the bracket, fold the strap over so that the two closed loop fastener surfaces mate evenly.

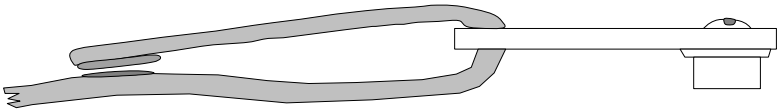


Figure 1-7 Strap Inserted in Upper Bracket

4. Prior to securing the upper bracket to the unit, install the provided pin through the bottom opening of the strap. Insert the pin into the strap slot on the bottom, rear of the MX1. Insure that both ends of the pin are securely installed.
5. After securing the bottom of the strap to the unit, loosen the closed loop fastener strap and then secure the upper bracket to the unit with a screw.

Removal

1. Separate the Closed loop fastener tabs and loosen the strap through the upper bracket.
2. Using a Phillips Screwdriver, remove the upper bracket screw.
3. Using a flat object depress either end of the pin at the bottom of the handstrap. Once the pin is depressed the pin should easily slip out of the strap slot.

Install Pistol Grip Handle (Optional)

The MX1 can be purchased with a customer-installable pistol grip handle. The handle allows the operator to hold the unit and activate the scanner with one hand. The handle is built of a durable and flexible plastic that is designed to detach from the MX1 if the unit is dropped.

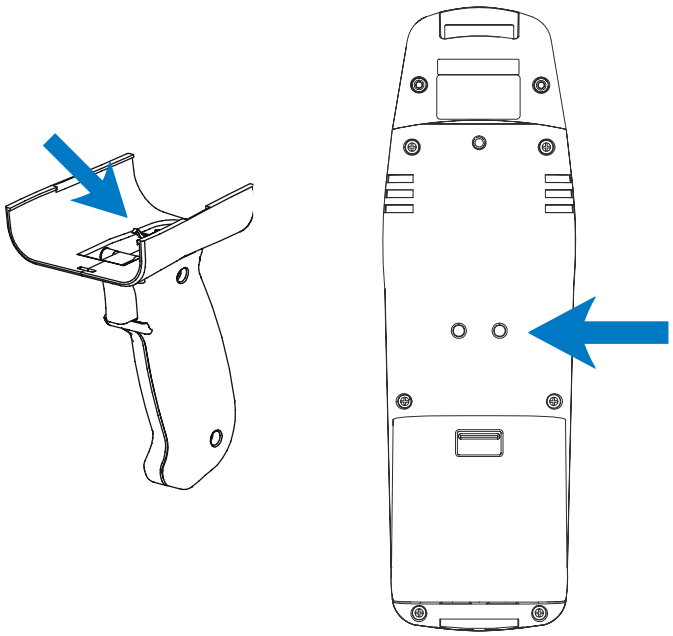


Figure 1-8 Pistol-Grip Handle and Contacts on the Back of the MX1

The top of the handle features a cradle arrangement with plastic tabs on each side that are designed to mate with the MX1 and provide a firm grip on the case. The handle features an integral trigger that is connected to the MX1 unit through contacts on the back of the MX1. The trigger contacts mate with contacts on the back of the MX1 when the handle is installed. When the handle is not installed, the MX1 contacts should be covered with the protective label delivered with the MX1.

Note: If a handstrap is installed, the handle trigger contacts are hidden by the handstrap. Remove the handstrap before installing the pistol-grip handle.

Preparation

Remove the protective adhesive Mylar label covering the handle contacts on the back of the MX1 unit. The contacts should be clean and free from obstructions. The MX1 unit must not have any other handle or strap installed. If a handle or strap is installed, remove it at this time.

Installation

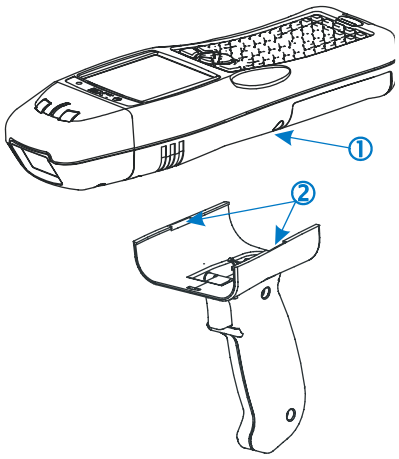


Figure 1-9 Connect Handle to MX1

In one hand grasp the MX1 unit so that the keypad is facing up and the endcap away from you. In the other hand grasp the pistol-grip by the handle with the u-shaped cradle up and the trigger mechanism away from you.

Place the pistol-grip handle u-shaped cradle under the MX1 unit and align the slots (2) on the upper ends of the u-shaped cradle with the tabs (1) in the slots on the sides of the MX1 unit. Press the MX1 unit into the u-shaped cradle until one of the tabs slides into the slot. Press the other tab slot over the other tab until you feel a positive catch. You should hear a “click” as the units join. Cautiously test the handle and unit to ensure proper, secure installation.

Removal

Insert a strong, flat object into one of the slots and gently pry the u-shaped cradle away from the MX1 unit. *Do not drop the MX1 unit*. Once the pistol-grip handle is no longer secured to the MX1 unit pull the handle directly away from the unit. Do not slide the unit in the u-shaped cradle since that may damage the contacts of either the handle or the unit.

Use and Operation

The pistol-grip handle enables the user of the MX1 to hold the unit while pointing and activating the scanner with one hand. Pressing the trigger activates the scanner and functions the same as the SCAN key on the keypad. With the handle installed the SCAN key on the keypad remains active. The trigger duplicates the operation.

Power On and Off

Turn On the MX1

Press the Power button until the display turns on. The power button is located at the bottom of the keypad.

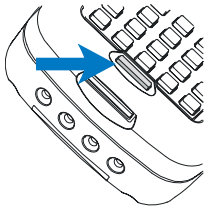


Figure 1-10 Location of the Power Button

When the MX1 is powered on, the display will begin scrolling power-on information as software and drivers are loaded. When the display has stopped scrolling and a DOS prompt is displayed or an application begins, the power on sequence is complete. (The Power Key can be disabled – see Power Key in BIOS Setup.)

Turn Off the MX1

Hold the Power button down. The unit will emit three short beeps and one long beep. After the long beep the MX1 will power down. The Power button and the display will turn off.

Note: Quickly tapping or releasing the Power button prior to the one long beep signal will place the MX1 in Suspend mode (if Suspend is enabled, see Power Key in BIOS Setup to configure the Suspend function).

Troubleshooting

The MX1 will not turn off – force a Power Off by holding the Power key down for 15 seconds and the MX1 will power off. Locate and correct the problem before powering the MX1 back on – e.g. very low battery power, radio conflict, unexpected software application result, etc.

Adjust Display and Volume

Set The Display Contrast

Adjusting screen contrast lightens or darkens the characters on the screen to make them visible at a comfortable level. The contrast is incremented or decremented one step each time the contrast key is pressed.

Full Alpha-Numeric

The full alpha-numeric keypad does not have a contrast key legend. Adjust the display contrast by pressing the:

- 2nd key, then the Shft key then the <C> key to enter Contrast change mode.
- Use the Up Arrow and Down Arrow keys to adjust contrast until the display lightens or darkens to your satisfaction.

Press the Enter key to exit this mode.

Numeric-Alpha Keypad

◐ To adjust screen contrast, locate the <F11> key at the bottom of the keypad. Adjust the display contrast by pressing the:

- 2nd key, then the <F11> key
- Use the Up Arrow and Down Arrow keys to adjust contrast until the display lightens or darkens to your satisfaction.

Press the Enter key to exit this mode.

Set The Beeper Volume

Note: An application may override the control of the beeper volume.

The audible alert or “beeper” volume can be adjusted to a comfortable level for the operator. The volume is increased or decreased one step each time the volume key is pressed.

Full Alpha-Numeric

The full alpha-numeric keypad does not have a Volume key legend. Adjust the beeper volume by pressing the:

- 2nd key, then the Shft key then the <V> key to enter Volume change mode.
- Use the Up Arrow and Down Arrow keys to adjust contrast until the beeper volume is satisfactory.

Press the Enter key to exit this mode.

Numeric-Alpha Keypad

◄ To adjust the beeper volume, locate the <F12> key at the bottom of the keypad. Adjust the beeper volume by pressing the:

- 2nd key, then the <F12> key
- Use the Up Arrow and Down Arrow keys to adjust contrast until the beeper volume is satisfactory.

Press the Enter key to exit this mode.

Endcaps

Refer to the "MX1 Installation and Operator's Guide" on the LXE Manuals CD for the section titled "Scanner Warnings and Labels" for important laser safety information **before** using the scanner.

Several scanner endcaps are available with the MX1. These consist of a High Performance, Long Range, Advanced Long Range and 2D Decoded Raster scanner endcaps. Externally they appear alike with similar indicators. Barcode scanner operation varies depending upon the application but once enabled, the scanners are activated by pressing either the "Scan" button on the keypad or pressing the trigger on the handle (if so equipped).

Each endcap type fulfills a different function. Changes may be required in application software when installing a different type of endcap.

Scanner and Scanner / RS-232 Endcaps

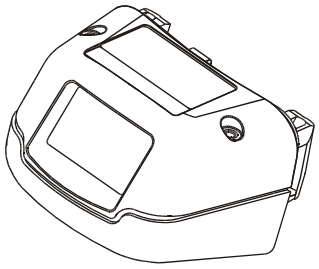


Figure 1-11 Scanner Endcap

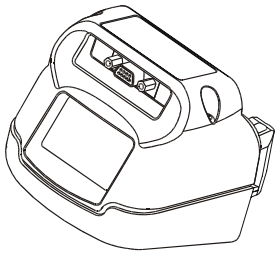


Figure 1-12 Scanner / RS-232 Endcap

The range of a scanner is dependent upon many outside influences including size of the barcode, quality of the barcode printing, material the barcode is printed on, and angle of the scanner endcap relative to the barcode label. Any of these factors may result in having to re-scan the label from a different distance or angle.

External differences between the types of scanner engines are reflected in the scanner labels. The scanner labels are on the side away from the scan indicators (the three indicators are on the endcap above the display). The scanner is labeled with CDRH Class II laser information.

The Scanner/RS-232 endcap does not support tethered scanners connected to the RS-232 port.

RS-232 Endcap

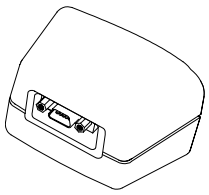
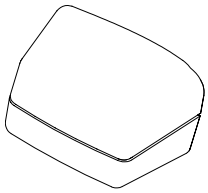


Figure 1-13 RS-232 Endcap

The RS-232 endcap, when installed, allows the computer to directly communicate with an external device such as a printer. An RS-232 cable must connect the endcap and the external device before data can be transferred. A data transfer application may also be required. The endcap is designed for IP65 environments (with an installed radio).

Plain Endcap

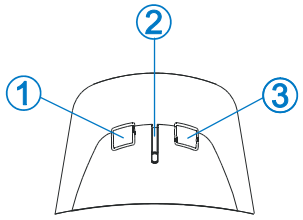


The Plain Endcap is used when other endcap options are not selected. It provides a seal against dirt and moisture for the top of the computer case. The endcap is designed for IP65 environments (with an installed radio).

Figure 1-14 Plain Endcap

Scanner Endcap Indicators

Read all cautions, warnings and labels **before** using the scanner endcaps.



1. Laser On Indicator
2. Beeper
3. Good Read Indicator

Figure 1-15 Scanner Endcap LEDs and Beeper

The left LED (1 - Laser On Indicator) on the top of the laser barcode endcap will light, indicating laser emission when the laser beam is being emitted. Following a good read, the right LED (3 - Good Read Indicator) flashes, indicating a successful scan. Beeps may be heard after a good read, depending on the application running on the MX1.

The laser automatically turns off after a successful read and is ready to scan again when the Scan key (or the trigger) is pressed.

Endcap Removal and Installation

When removing or installing the endcaps, protect the MX1 internal components and these particular accessories from electrostatic discharge.

All MX1 endcaps are installed similarly.

The software that controls the endcap will vary so endcap types are not considered easily interchangeable.

After installation of an endcap is complete, use the endcap for its intended function. If the operation is unsuccessful or erratic, remove and reinstall the ribbon connector – the Zero Insertion Force (ZIF) connector.

There are four types of scanner endcaps. All four are installed on the MX1 in the same way –

1. carefully place rubber o-ring gasket[1] on the endcap,
2. attach ZIF cable,
3. snap the endcap onto the MX1,
4. screw the endcap to the MX1, torquing the screws to no more than 3 in/lb. (.34 N/m).

ZIF Connector

All MX1 endcaps use ZIF connectors to maintain permanent connection between the endcap and the MX1.

The Zero Insertion Force (ZIF) Connector is a way to electronically connect devices without using excessive force during the installation of cables. Excessive force can cause bent connector pins or misaligned and/or damaged cables.

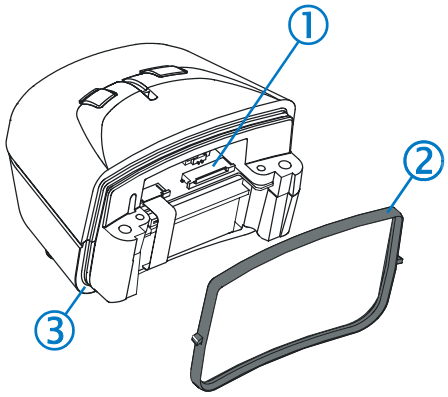
- Caution must be exercised when handling the endcaps. The electrical connectors are delicate and may damage easily.
- The ZIF connector is on the right hand side inside the cap when the MX1 is face up.

Preparation

1. If a handle is installed, remove it at this time.
2. Caution must be exercised when handling the endcaps. The electrical connectors are delicate and may damage easily.
3. Caution must be exercised when handling o-ring gaskets as they are delicate and may break if stretched.
4. Carefully align the o-ring to the endcap before reattaching the endcap.

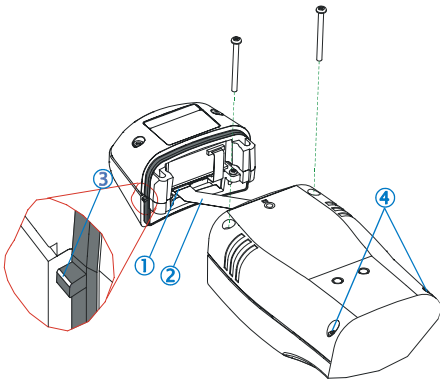
[1] The o-ring is directional and must be placed right side up on the endcap seal.

Tools Required: #1 Phillips Screwdriver



1. ZIF Connector
2. Rubber O-Ring Gasket
3. O-Ring Gasket Slot

Figure 1-16 MX1 Endcap with O-Ring Gasket



1. ZIF Connector
2. ZIF Cable or Ribbon Cable
3. Curved Edge
4. Middle Screw Set

Figure 1-17 Endcap and ZIF Ribbon Connector

Removal

1. Using a #1 Phillips screwdriver, remove the two screws securing the endcap. These screws are located on the upper rear of the unit.
2. Loosen the two screws in the middle (number 4 on the figure titled “Endcap and ZIF Ribbon Connector”. Do not remove middle screws.
3. When the top screws are removed detach the endcap and separate it from the MX1 unit no more than the length of the ribbon connector still connecting the endcap to the unit.
4. Carefully lift up the lock mechanism on the ZIF connector.

   Note: Use caution when performing this task since excessive pulling or twisting of the connector may result in damage to either the unit, the endcap and/or the ribbon connector.

5. Disconnect the ribbon cable from the ZIF connector in the endcap only.
6. If you anticipate keeping the endcap removed from the unit for a long period of time place the endcap in an enclosed storage container. Store in an area that is protected from dirt, moisture, and electrostatic contact.

Installation

1. Lay the MX1 unit face up on the work surface.
2. Carefully align the O-Ring Gasket in the O-Ring Gasket Slot -- making sure the curved edge of the side tabs are towards the back of the endcap.
3. Position the endcap with the open side of the endcap toward the open side of the unit. Connect the ribbon cable to proper ZIF connectors in the endcap. (See the Removal section on ZIF connectors.)
4. Gently separate the MX1 front cover from the back cover and mate the open ends of the endcap and the unit without pinching or stretching the O-Ring Gasket.
5. Check to make sure the ribbon connector is not pinched or otherwise caught between the endcap and the unit.
6. Place the screws in the screw holes on the back of the MX1. Torque the screws to no more than 3 inch pounds of pressure (.34 N/m). Overtorquing may cause damage to the MX1 unit.

PCMCIA Card Slot

When removing or installing PCMCIA cards, protect the MX1 internal components from electrostatic discharge.

Use and operation of the Personal Computer Memory Card International Association (PCMCIA) device (e.g. PC card) is dependent upon both the type of device installed and the application(s) running on the computer.

When installed, the PC card will not function properly unless the proper PC card management software is installed in the PC card/MX1. (See Chapter 4, "System Configuration" and the "PCMCIA Card Management and LXE DOS Computers User's Guide".) Make sure the proper software is pre-loaded and PC cards are properly configured.

There is one PC card slot in the MX1 typically used for the PC radio card. If there is a radio installed in the MX1, there is no slot available for an SRAM card.

When there is no radio installed, the PC card slot can be used for the SRAM card.

Note: Remove the radio card before installing a PC card.

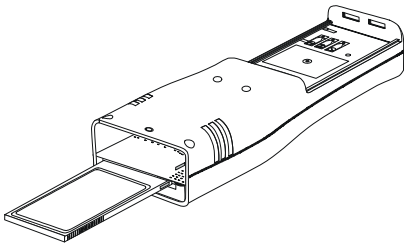


Figure 1-18 Insert / Remove PC Card

Preparation

If a handle is installed, remove it at this time. LXE recommends that installation of the PC card be performed on a clean, well-lit surface.

Loosen the installed endcap to allow access to the PC card slots inside the MX1.

Do not remove the endcap, instead, hold it out of the way.

Installation

1. Slide the PC Card, connector side first, into the slot until it seats. Use caution not to pull or snag the antenna connector on the Radio card, if installed.
2. If the PC Card is difficult to seat in the slot, remove the card, turn it around and re-install.

Removal

1. Grasp the top of the PC Card and pull it straight upward to remove.
2. Use caution not to pull or snag the antenna connector on the Radio card, if installed.

If you anticipate keeping the PC card out of the MX1 for a long period of time place it in an enclosed storage container. Store in an area that is protected from dirt, moisture, and electrostatic contact.

PCMCIA Radio Card

When removing or installing the radio, protect the MX1 internal components and the radio from electrostatic discharge.

When installed, the radio will not work unless the proper radio driver software is installed in the computer. (See Chapter 4, "System Configuration" and the "PCMCIA Card Management and LXE DOS Computers User's Guide".) Make sure the proper software is pre-loaded and a compatible radio network is available. LXE recommends purchasing pre-formatted PC cards.

Preparation

If a handle is installed, remove it at this time.

Loosen the installed endcap to allow access to the PC card slot inside the MX1.

Do not remove the endcap.

Installation

1. Slide the PCMCIA Radio, connector side first until it seats.
2. The radio antenna connector must be positioned up and toward the front of the MX1 (near the display). If the PCMCIA Radio is difficult to seat, remove the Radio card, turn it around and re-install.
3. Gently snap the antenna cable into the connector on the PCMCIA Radio. Use caution not to damage either the antenna cable connector or the connector on the radio.

   *Note: A 6400 System radio has one antenna cable. All other system antennas have two antenna cables. Connect **all** antenna cables to the PCMCIA radio.*

4. Reinstall the endcap.

Removal

1. Disconnect the antenna cable from the radio, using caution not to damage the radio connector or the antenna cable connector.
2. Move the cable aside and grasp the top of the radio card and pull straight up until the radio is removed from the MX1 unit.

If you anticipate keeping the radio card out of the MX1 for a long period of time place it in an enclosed storage container. Store in an area that is protected from dirt, moisture, and electrostatic contact.

Data Entry

Note: The MX1 will not run Microsoft® Windows® products i.e. Windows 3.1, Windows For Workgroups, Windows 95, Windows NT, etcetera.

The LXE MX1 computer accepts data entry from the keyboard, barcode scanner and the RS-232 input port when an LXE terminal emulation (TE) program is running and on batch (non-TE) units.

Keyboard Data Entry

Once the terminal emulation program is started, data can be entered with the MX1 keypads. Keyed data can be entered into a data field and transmitted to the host. You might respond to a prompt sent by the host application with a keypad entry, such as a menu listing choices for your next action.

Barcode Data Entry

The MX1 supports an accessory barcode label reading device. Keyboard data entries can be mixed with barcode data entries. Any scanner that decodes the barcode internally and outputs an RS-232 data stream may be used. The serial port parameters may need to be changed (using the terminal emulation's configuration utility) to match the parameters of the scanner. COM port 1 is designed to be used with a hand held barcode scanner or the following endcaps: scanner, RS-232, scanner/RS-232.

RS-232 Data Entry

The MX1 accepts input from an RS-232 device connected to either RS-232 port, COM1 or COM2.

Getting Help

All LXE user guides are now available on one CD and they can also be viewed/downloaded from the LXE website. Contact your LXE representative to obtain the LXE Manuals CD.

You can also get help from LXE by calling the telephone numbers listed on the LXE Manuals CD, in the file titled “Contacting LXE”. This information is also available on the LXE website www.lxe.com.

Explanations of terms and acronyms used in this manual are located in the file titled "Glossary" on the LXE Manuals CD and on the LXE website.

Manuals and Accessories

Manuals

The following manuals are available on the LXE Manuals CD:

- MX1 Installation and Operator’s Guide
- Integrated Scanner Programming Guide
- PCMCIA Card Management and LXE DOS Computers
- Getting the Most from Your Batteries
- ANSI Plus Reference Guide [2.4GHz and 900MHz radio]
- LDS Plus Reference Guide [2.4GHz and 900MHz radio]
- 3270 Terminal Reference Guide (3270 DOS TE) [900MHz radio]
- 3270 Programmer’s Reference Guide
- 5250 Terminal Reference Guide (5250 DOS TE) [900MHz radio]
- 5250 Programmer’s Reference Guide
- 6200 Network Management Guide [900MHz radio]
- TN3270 Terminal Reference Guide [2.4GHz radio]
- TN5250 Terminal Reference Guide [2.4GHz radio]
- DOS Autoconfigurator Instructions
- SNMP Agent Reference Guide
- Client Configuration Manager Reference Guide

Accessories

Tethered Scanners	
Scanner, LS3203, Ext Rng, 8’ Cbl, EC	8011LS3203ERC08DEC
Scanner, LS3203, Ext Rng, 8’ Cbl, US	8011LS3203ERC08DUS
Scanner, LS3203, Ext Rng, 20’ Cbl, US	8011LS3203ERC20DUS
Scanner, 530092IP, 7’ Cbl, WW	8110IP530092C07DWW
Scanner, 530092IP, 15’ Cbl, US	8110IP530092C15DUS
Scanner, P302FZY, Std, 8’ Cbl, WW	8200A326SCNRP3028DA9F
Scanner, P302FZY, Std, 20’ Cbl, WW	8200A327SCNRP30220DA9F
Scanner, P304 PRO, 2-D, 8’ Cbl, WW	8210A326PRO8DA9F
Scanner, P304 PRO, 2-D, 20’ Cbl, US	8210A327PRO20DA9F
Scanner, PowerScan, Std, 8’ Cbl, WW	8300A326SCNRPWRSR8DA9F
Scanner, PowerScan, Std, 12’ Cbl, WW	8300A327SCNRPWRSR12DA9F
Scanner, PowerScan, LR, 8’ Cbl, WW	8310A326SCNRPWRLR8DA9F
Scanner, PowerScan, LR, 12’ Cbl, WW	8310A327SCNRPWRLR12DA9F
Scanner, PowerScan, XLR, 8’ Cbl, WW	8320A326SCNRPWRXLR8DA9F
Scanner, PowerScan, XLR, 8’ Cbl, WW	8320A327SCNRPWRXLR12DA9F
Cables	
Cable, Modem, DA-9F to DB-25F, 6 ft.	9000A052CBL6D9D25
Cable, Printer/PC, DA-9F to DB-25M, 6 ft.	9000A053CBL6D9D25
Cable, PC, DA-9F to DA-9F, 6 ft.	9000A054CBL6D9D9
Cable, DIN to D9 for Renegade Printer	9000A055CBL6DIN8D9
Printers	
Printer, PA400, DA9 RS-232, 120AC, Fastrap	PA400-050-11100
Printer, PT400, DA9 RS-232, 120AC, Fastrap	PT400-050-11100
Printer, MF4T, Std Belt Clip	MF200114-000
Printer, MF4T, Swivel Belt Clip	MF200115-000
PCMCIA Cards	
PCMCIA SRAM Card, 1 MB	9000A101PCC1SRAM
Radio Kits	
Kit Radio, 2.4GHz MX1	2330A276RADKIT24
Canadian 900MHz Radio Kit	2330A278RADKITCA
Endcap Modules	
Endcap, Scanner SE1223 HP	MX1A332SCNR1223HP
Endcap, Scanner SE 1223 LR	MX1A327SCNR1223LR
Endcap, Scanner SE 1223 ALR	MX1A334SCNR1223ALR
Endcap, RS232 MX1	MX1A351RS232
Endcap, Plain MX1	MX1A353PLAIN
Endcap, Scanner SE 1223 HP/RS-232	MX1A333SCNR1223HPRS

Endcap, Scanner SE 1223 LR/RS-232	MX1A330SCNR1223LRRS
Endcap, Scanner SE 1223 AL/RS-232	MX1A335SCNR1223ALRRS
Endcap, Scanner SE 2223 2D	MX1A339SCNR22232D
Endcap, Scanner SE 1223 HP/RS-232 Combo	MX1A358SCNRHPRS232
Endcap, Scanner SE 1223 LR/RS-232 Combo	MX1A359SCNRLRRS232
Endcap, Scanner SE 1223 ALR/RS-232 Combo	MX1A360SCNRALRR232
Batteries and Battery Chargers	
6 Unit Charger	2330A378CHGR6WW
3 Unit Battery Analyzer	2330A379ANLZR3WW
Battery, 1500 mAh, NiMH, MX1	2330A381BATT1500
Portable Charger Module (Portable Charger, Clip On)	2335A376PORTACHGR
Charging and Communications Cradles	
Communication Multi-Dock (4 Bay Comm Multi-Dock w/ AC)	2330A013MULTIDOCK
Single Unit Power Dock (Single Comm Dock w/ AC)	2330A010ACSINGDOCK
Single Unit Power Dock w/ DC Pwr (Single Comm Dock w/ DC)	2330A011DCSINGDOCK
Holding Accessories	
Handle, MX1	2330A401HANDLE
Strap, Hand, MX1, Nylon	2330A402STRAP
Nylon Holster with Belt	2330A403HOLSTER1
Nylon Holster with Belt (for MX1 with handle)	2330A403HOLSTER2
Nylon Holster, Wall Mount	2330A403HOLSTER3
Nylon Case with Shoulder Strap	MX1A405CASE1
Nylon Case with Handle and Shoulder Strap	MX1A405CASE2
*Nylon Case with Shoulder Strap	2335A403CASE1
*Nylon Case with Handle and Shoulder Strap	2335A403CASE2

* For MX1 with RS-232 Endcap or Plain Endcap only; also for use with MX1 shipped before February 2002 (box style endcap).

Chapter 2 Physical Description and Layout

Hardware Configuration

System Hardware

The MX1 hardware configuration is shown in the following figure.

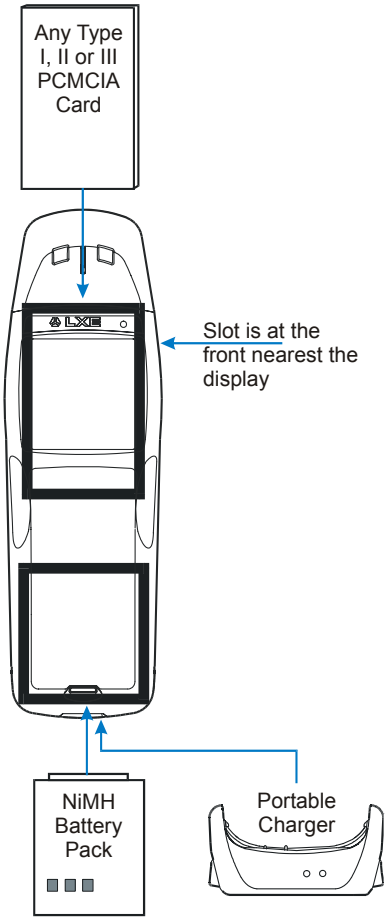


Figure 2-1 System Hardware

Central Processing Unit

The LXE MX1 CPU is an Intel® 486 running at 25 MHz.

AT Compatible Core Logic

The LXE MX1 utilizes AT-compatible core logic. The MX1 supports the following I/O components of the core logic:

- One PCMCIA slot (supporting Type I, II or III PCMCIA cards).
- One InfraRed port.
- One Endcap port (supporting Barcode Scanning or RS-232 communication). All endcaps provide beeper support.

System Memory

Main system memory is 8MB Internal Flash Array. The CPU also contains a 1MB BIOS Flash.

Upper Memory Block

The upper memory area, or Upper Memory Block (UMB) consists of memory between 640KB and 1 MB. It occupies most of the address range A0000H-FFFFFH and includes the areas used to shadow various system software components.

Internal Flash Array

The Internal Flash Array (IFA) is used to store all of the system files on the 8MB C drive that are used during system startup.

Video Subsystem

The display has a 160 pixel (horizontal) by 160 pixel (vertical) format which provides 10 rows of 20 characters in VGA 8 x 16 text mode and 20 rows of 20 characters in 8 x 8 text mode.

Character size is 2.28mm (width) by 4.92mm (height) in VGA 8x16 text mode and 2.28mm (width) by 2.28mm (height) in 8x8 text mode. The display contrast is adjustable with the contrast control keys or key sequences. Backlighting is available and can be configured through the BIOS Setup (not to be confused with the TE Configuration Utility).

The display controller supports VGA text and graphics modes.

The display includes icons arranged across the top to indicate “Low Main Battery”, “Backup Battery Charging”, “CAPS Lock”, “Alpha Mode”, and whether the “2nd”, “Control”, “Alt”, or “Shift” modifier keys have just been pressed.

Power Supply

The LXE MX1 typically uses two batteries for operation.

- A replaceable 1500 mAh (or greater) Nickel Metal Hydride (NiMH) battery pack. The battery pack is rechargeable while in the MX1 with the MX1 in a charging docking station or with the optional Clip-On Portable Charger attached. The main battery pack can be removed and placed in an LXE battery charger.
- An internal 50 mAh Nickel Cadmium (NiCd) backup battery. The backup battery is recharged directly by the NiMH battery when it is installed and the unit turned on. Full charging of the internal battery may take several hours. The recharging of the backup battery is automatically controlled by the MX1. The backup battery must be replaced by qualified service personnel.

COM Ports

Both the COM1 port (endcap) and COM2 port (IR) support 115K baud communications. Power to the COM ports may be turned off using a terminal emulation configuration utility.

The COM1 port uses Data Carrier Detect and Ring Indicator as computer wake-up events only.

The COM2 port supports two signals, Receive Data and Transmit Data. Therefore, COM2 only supports half-duplex communications.

PCMCIA Slot

The MX1 features an internal PCMCIA slot that conforms electrically to PCMCIA 2.1 specifications. The slot is located at the top of the MX1 nearest the display.

The slot accepts cards of Types I, II and III. The PC card slot, and the PC card in it, are managed by Phoenix PicoCard software products which refers to the *PC slot as slot 0*. The software (resident in the MX1) can be used to format PC cards.

When formatting PC cards, Phoenix PicoCard identifies the PC cards by slot number and DOS drive letters. For example, an ATA PC card formatted in slot 0 is given disk drive letter D. If the MX1 is booted from the ATA PC Card in slot 0, the drive automatically becomes Drive C. The on-board flash drive changes to drive D until the MX1 is rebooted without an ATA card in Slot 0. If the MX1 is booted from an SRAM card in Slot 0, the drive automatically becomes Drive A. The on-board flash drive remains as Drive C.

See the "PCMCIA Card Management and LXE DOS Computers User's Guide", for further information.

Physical Controls

On/Off Switch

The power (on/off) switch is a push button located at the base of the keypad.

When the system is turned off, the current contents of RAM are lost. Save any needed data and exit in an orderly fashion from any running programs before turning the system off.

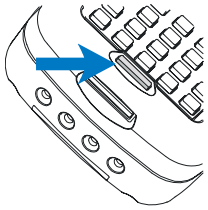


Figure 2-2 Location of the Power (PWR) Button

The Power button is used to turn the MX1 on and off and place it into the Suspend state. The button will beep when pressed and beep again every second while it is held down.

How To

• Turn the MX1 off	Hold the Power key down for 4 beeps (signifies 3 or more seconds) then release.
• Turn the MX1 on	Hold the Power key down until the display turns on.
• Force the Suspend state	Tap the Power key (1 beep). The Suspend state is useful for breaks or when swapping batteries as the unit does not need to be turned off prior to replacing the Main Battery.
• Wake from Suspend	Wake the MX1 from Suspend by tapping the Power button.
• Force a Power Off	If the MX1 will not turn off – force a Power Off by holding the Power key down for 15 seconds and the MX1 will power off. Locate and correct the problem before powering the MX1 back on – e.g. IRQ conflict, very low battery power, radio conflict, unexpected software application result, etc.

Note: The ability of the Power Key to turn off or suspend the MX1 is configurable in the BIOS Setup.

Critical Suspend Mode and the Off Timer

The MX1 is automatically turned Off when the Off Timer expires. The Off Timer runs when the MX1 is in Critical Suspend mode. The MX1 automatically goes into Critical Suspend mode when the main battery is dead or removed. The Off Timer default is 5 minutes. The value can be adjusted using the BIOS Setup.

Power Status and the Status LED

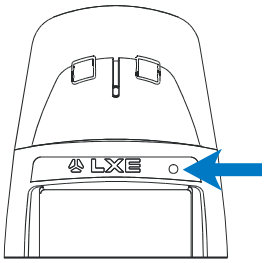


Figure 2-3 Power Status and the Status LED

The Status LED is located next to the LXE logo on the MX1. The LED changes color and state depending on power status.

Status LED	Condition
Off	MX1 is Off. *OR* The MX1 is powered On and the display is On.
Steady Green	The MX1 is powered On and the display is Off. Press any key to turn the display On.
Blinking Green	The MX1 is in the Suspend state. Tap the Power key to exit the Suspend state. Hold the Power key down for 4 beeps to turn the MX1 off.
Steady Red	Main Battery Low Warning or Low Main Battery. Replace the main battery, place the unit in a powered charging station or attach a portable charger.
Blinking Red	Main Battery Power Failure or the Main Battery is depleted, the MX1 is in Critical Suspend. The MX1 is drawing power from the backup battery. Replace the main battery or place the unit in a powered charging station. The MX1 will turn off in 5 minutes (default) (or the value selected in BIOS Setup for the Off Timer limit) if no action is taken.

Power Management and the Keypad

Status LED is Steady Green. When the MX1 is in the Display Off state, any keypress returns the computer to the On state and the display activates. The key pressed (key value) is not sent to the Operating System or application.

If the 2nd, Ctrl, Shift, or Alt keys were active (and the icons were on the display) when the MX1 entered Display Off or Suspend states, the modifier keys and their icons are cleared from the display when the MX1 wakes up.

Suspend State

Status LED is Blinking Green. The display and backlight is turned off.

The purpose of the Suspend state is to reduce the power consumption of the unit to a very low point and still retain the condition of the processor and memory. This state is primarily meant for breaks (lunch, afternoon) or for battery hot-swapping. The Suspend state is entered when the unit is inactive for the amount of time set by the Suspend Timer (typically 5 minutes) or the operator tapped the Power key (1 beep) to place the MX1 in the Suspend state.

The Suspend Timer is reset every time the MX1 wakes up and normal activity occurs (keypresses, etc.). The Suspend Timer can be changed from its default time (5 minutes) in incremental steps of one minute up to 63 minutes. The Suspend state can be disabled (Suspend Timer set to 0) when the MX1 is docked/not docked or by setting Docked PM Off in BIOS Setup.

If the 2nd, Ctrl, Shift, or Alt keys were active (and the icons were on the display) when the MX1 entered Suspend, the function keys and their icons are cleared from the display when the MX1 wakes up.

Critical Suspend State

Status LED is Blinking Red. The display and all backlights are turned off.

The Critical Suspend state is only entered when the main battery has failed or has been removed and the unit is being powered by the backup battery. Once in this state, a fully charged backup battery will provide enough energy to keep the unit in this state for at least 5 minutes. As the energy in the backup battery is depleted, the unit will turn off and a reboot will be required.

Since the backup battery is supplying power in this state, the MX1 limits the amount of time it stays in the Critical Suspend state via the Off Timer. The Off Timer is configurable in incremental steps of one minute (the default is 5 minutes). The backup battery will supply power for at least five minutes. As the Off Timer expires the unit will turn off and a reboot will be required.

Note: Setting the Off Timer to zero will then turn the MX1 off immediately when the main battery is removed.

Once in the Critical Suspend state (and the main battery has not been replaced) the MX1 is automatically turned Off when the Off Timer expires or the backup battery is depleted. When a fully charged main battery is installed, the MX1 transitions to the Suspend state. Exit the Suspend state by tapping the Power key.

Display

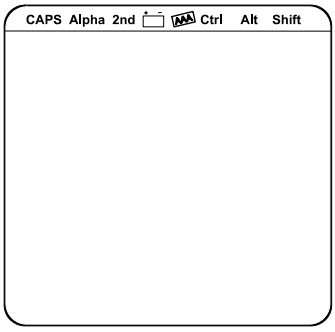


Figure 2-4 MX1 Display

The MX1 display is a transflective monochrome VGA LCD unit capable of supporting gray scales.

The display measures three inches diagonally and provides .33mm dot pitch. It is a 160 x 160 pixel (20 columns by 20 rows) display area.

Two font sizes are supported. The choice between 8x8 or 8x16 is made in the BIOS Setup. Font size selection may be overridden by a user supplied application, such as the ANSI Plus TE.

VGA graphics are supported with this display.

The display is automatically turned off when the MX1 enters the Suspend state, Critical Suspend or the Display Timer expires (Display Timer default is 15 seconds).

Icons

Across the top of the display are icons that provide visual cues to current computer operation.

Icon	When highlighted ...
CAPS	CAPS is on when upper case letters are selected. To enable or disable CAPS, press 2nd, then SHIFT, then the left arrow key. Use the BIOS Setup to set CapsLock and/or NumLock upon bootup to either On or Off..
2nd	The 2nd functions of the keypad are active.
+ -	Low Main Battery indicator. This indicates that the Main Battery charge is low and the battery should be replaced.
AAA	The backup battery is charging. The backup battery provides power to the unit for a short amount of time when the main battery has been removed or has failed.
Alpha	*Numeric-Alpha keypad only*. The A/# key is in Alphabetic mode. Operation in Numeric Mode is indicated by the absence of the Alpha icon. Toggling between Alphabetic and Numeric modes is accomplished by pressing the A/# key.

Icon	When highlighted ...
Ctrl	The Control functions of the keypad are active.
Alt	The Alternate functions of the keypad are active.
Shift	Shifts key output between upper and lower case letters.

Display and Display Backlight Timer

When the Display Timer expires the display is turned off. The default value for this parameter is 15 seconds.

When the Display Backlight Timer expires the display backlight is turned off. The default value for this parameter is 3 seconds.

Both values can be adjusted using the BIOS Setup. The Display Backlight parameter must be set to Timed to enable the Display Backlight Timer function.

Any of the following will wake the display and display backlight:

- Display update by host or currently running application on the MX1
- Trigger
- Any key on the keypad

When the display wakes up, the Display Backlight Timer will begin the countdown again. When any of the above events occurs prior to the timer expiring, the timer starts the countdown again.

Panning

The MX1 display can be panned around using keypress sequences so the user can view an entire virtual 640 x 480 pixel screen. Initially, the 20 columns and 20 rows in the top left corner of a virtual screen are displayed. When the Pan Home key sequence is pressed, the cursor moves to the top left hand corner of the virtual screen display.

When the initial 20 row x 20 column portion of the screen is displayed:

- and the Pan Right key sequence is pressed, columns 10 through 30 are shown on the display.
- and the Pan Down key sequence is pressed, rows 5 through 25 are shown on the display.

Panning activation and the pan Factor are configurable in BIOS Setup.

Display Window and Virtual Screen

When the host sends a virtual screen to the MX1, the display window cannot show the whole virtual screen. The display window can only show parts of the virtual screen.

The *virtual screen* is a 25 line x 80 column screen that the host sends to the MX1. The *display window* is the part of the virtual screen viewed on the MX1. Usually the window is either 10 lines x 20 columns or 20 lines x 20 columns.

The size of the display window is set by the default font parameter in the BIOS Setup. A default font size of 8x8 initiates a 20 line x 20 column screen and a default font size of 8x16 initiates a 10 line x 20 column screen display.

Full Alpha-Numeric Keypad (60 keys)

Up, Down, Left and Right	2nd key then the arrow key
Pan Home	2nd and Shift key and letter I keys

Numeric-Alpha Keypad (41 keys)

Up, Down, Left and Right	2nd and Ctrl and the arrow key
Pan Home	2nd and Ctrl and the Enter key

Panning and LXE's Terminal Emulation Programs

The manual panning key sequence is CTRL-Arrow with no Home function. The spacing between each pan keypress will be determined by the LXE terminal emulation (TE) program running on the MX1. LXE TE programs contain active panning (with the exception of LDS and LDS Plus).

Cleaning the Display and Scan Aperture

Keep fingers and rough or sharp objects away from the scan aperture and display. If the glass becomes soiled or smudged, clean only with a standard household cleaner such as Windex® without vinegar or use Isopropyl Alcohol. Do not use paper towels or harsh-chemical-based cleaning fluids since they may result in damage to the glass surface. Use a clean, damp, lint-free cloth. Do not scrub optical surfaces. If possible, clean only those areas which are soiled. Lint/particulates can be removed with clean, filtered canned air.

Display Repair

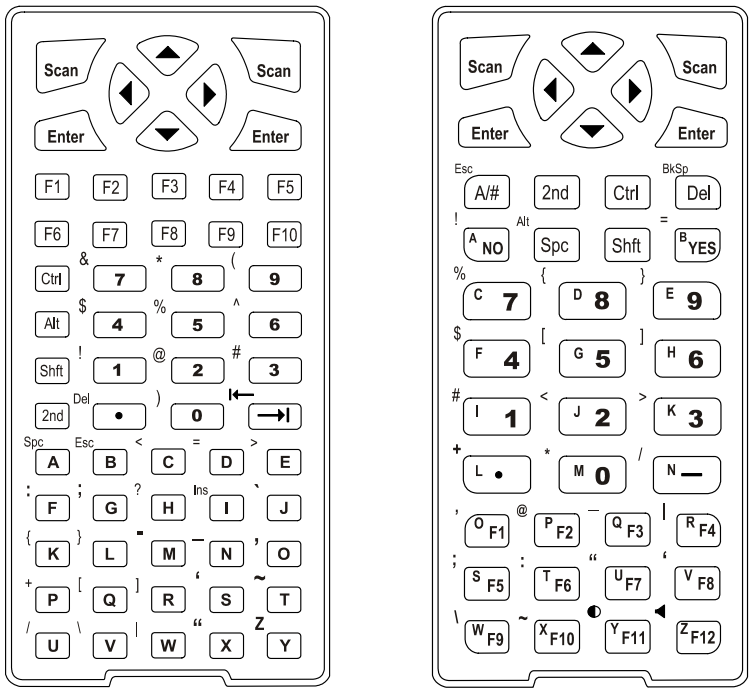
There are no user-repairable or replaceable components in the LXE MX1 Display or Scan Aperture system.

Keypads

The keymaps (keypress sequences) are described in Appendix A, “Key Maps”.

The MX1 keypad is an elastomer device that is water and dust resistant and designed for long life in an industrial environment. All keypads are phosphorescent. A phosphorescent keypad does not require a backlight.

All keypads are installed and configured by LXE. Full Alpha-Numeric (60 key) keypads are available that are directly suited to ANSI, IBM 3270 and IBM 5250 host computer systems.



Full Alpha-Numeric (60 Key) Numeric-Alpha (41 Key)

Figure 2-5 Keypads

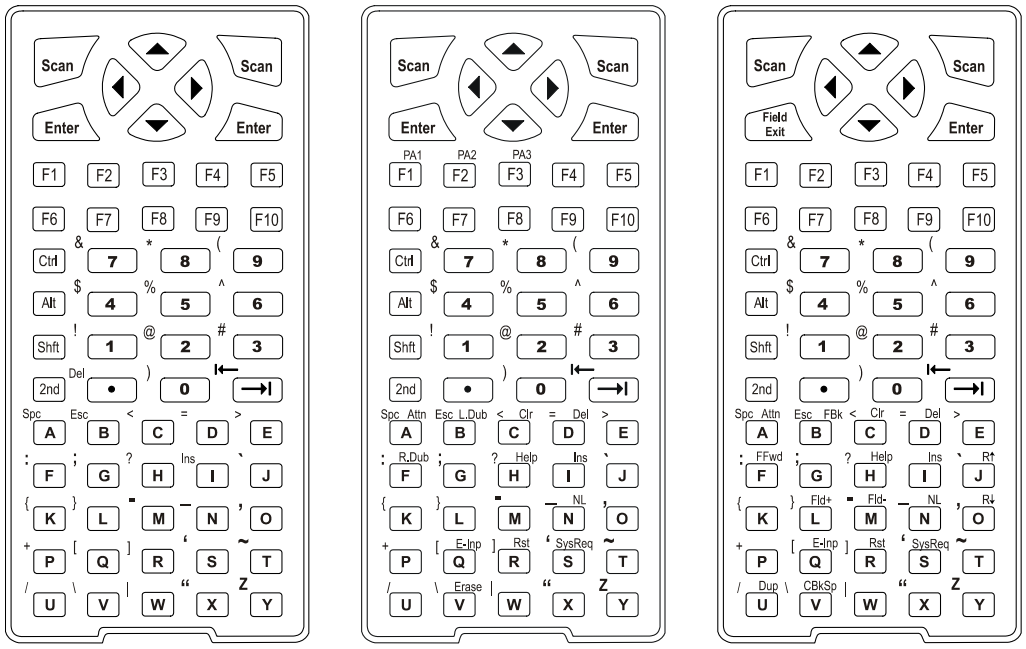


Figure 2-6 Three Special Use Keypads

Key Functions

Scan Key Function

The Scan key activates the scanner when a scanner endcap is installed and either of the two Scan buttons are pressed. This feature accommodates both left and right handed users comfortably.

Enter Key Function

The Enter key is used to confirm a forms entry or to transmit information. How it is used is determined by the application running on the computer. There are two Enter keys on all keypads except for the IBM 5250 Full Alpha-Numeric keypad which has one Enter key.

Field Exit Key Function (IBM 5250 Only)

The Field Exit key is used to exit an input field. If the field is an Auto Enter field, the auto transmit function is activated. This key is present on the IBM 5250 specific keypad only.

Arrow / Cursor Key Function

The arrow keys (also called the cursor movement keys) are used to scroll through the active display or to move the cursor around the screen.

2nd Key Function

2nd

The 2nd key is used to activate the 2nd functions of the keypad. Printed above many keys are yellow characters that represent the 2nd function of that key. Using the 2nd key activates the second key function. Note that the 2nd key only stays active for one keystroke. Each time you need to use the 2nd function you must press the 2nd key. To cancel a 2nd function before pressing another key, press the 2nd key again. When the 2nd function is active, the 2nd icon stays on the screen.

For example:

- Full Alpha-Numeric : 2nd plus the I key initiates INSERT mode.
- Numeric-Alpha : 2nd plus the SPC key initiates ALT mode.

CTRL Key Function

Ctrl

The CTRL key enables the control functions of the keypad. This function is similar to a regular keyboard's Control key. Note that the Ctrl key only stays active for one keystroke. Each time you need to use a Ctrl function, you need to press the Ctrl key before pressing the function key. When the Ctrl function is active, the Ctrl icon stays on the screen.

ALT Key Function

Alt

Note: Full alpha-numeric keypad only.

The ALT key enables the alternate functions of the keypad. This function is similar to a regular keyboard's Alt key. Note that the Alt key only stays active for one keystroke. Each time you need to use an alternate function, you need to press the Alt key before pressing the function key. When the Alt function is active, the Alt icon stays on the screen.

SHFT Key Function

Shft

The Shft key enables the shifted functions of the keypad. This function is similar to a regular keyboard's Shift key. Note that the Shift key only stays active for one keystroke. Each time you need to use a Shifted function, you need to press the Shft key before pressing the function key. When the Shft function is active, the Shft icon stays on the screen.

When the Shft key is pressed the next key is determined by the major key legends, i.e., the alpha keys display lower case letters when the CAPs key is On and function keys enable the shifted function key.

SPC Key Function

Spc

Note: Numeric-alpha keypad only. SPC is a 2nd function on the full alpha-numeric keypad.

The Spc key adds a space to the line of data on the display. This function is similar to a regular keyboard's Spacebar. Note that the SPC key only stays active for one keystroke.

Mode Key Functions

CAPS Mode

This function is similar to a regular keyboard's CapsLock key. Note that the CapsLock mode stays active until the CapsLock key sequence is pressed again. Each time you need to use a Caps function, you need to press the Caps key sequence first. To cancel a CapsLock function press the Caps key sequence again. When the CapsLock mode is active, the Caps icon stays on the screen.

On the alpha-numeric and the numeric-alpha keypad, Caps is accessed through the key sequence 2nd plus Shft plus Left Arrow.

Alpha to Numeric Toggle with A /

A/#

Note: Numeric-alpha keypad only.

When the keypad is in Alpha mode, the Alpha icon stays on the screen. When the Alpha icon is not displayed, the keypad is in numeric mode. Note that the Alpha or Numeric mode stays active until the A / # key is pressed again.. To toggle the A / # mode press the A / # key again.

The exception to this rule -- when the keypad is in numeric mode and you want to type one alpha character within a sequence of numbers, pressing 2nd plus Enter keys will toggle the keypad to alpha mode for one character – the next key pressed. Then the keypad returns to numeric mode. Likewise for toggling alpha to numeric for one key only.

Reset Key Sequence

Note: The Reset key sequence is configurable in the BIOS Setup.

Reset Key Sequence is **Ctrl plus Alt plus Del.**

- Del is a 2nd function on the full alpha-numeric keypad.
- Alt is a 2nd function on the numeric-alpha keypad.

Infrared (IR) Port

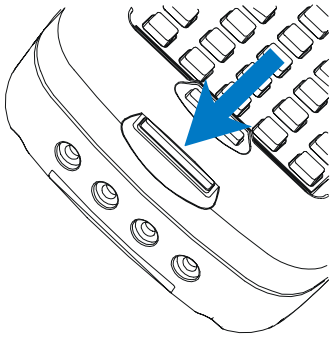


Figure 2-7 Infrared Port - COM2 Port

At the bottom, front of the MX1 computer there is an Infrared (IR) Data Port. The IR Port is designed to provide a data link between the MX1 and a similarly equipped piece of equipment such as a printer. The IR port is the MX1's COM2 port and is a bi-directional half-duplex communication port. It supports baud rates up to 115k (although restricted if using IrDA software to 19.2k baud).

The IR operating envelope has a distance range of 2 cm (.79 inches) to 1 meter (3.2 feet) with a viewing angle of 30 degrees. When sending data through the IR port while the MX1 is docked, make sure the IR port on the docking station and the IR port on the second MX1 are in close proximity to each other.

IrDA software is NOT installed or maintained by LXE.

IR Communication Reliability

Transmitted data is sometimes reflected into the receiver and the software programmer needs to make sure the data is cleared before the IR port starts it's receive routines.

When the MX1 is transmitting data to the PC, it starts to fill up its Tx FIFO buffer (First In First Out). During transmission, any reflections or light disturbances from the IR medium are going to get interpreted as data and is clocked into the Rx FIFO buffer. Unless software developers take preventative steps, when it goes to access the Rx FIFO buffer to determine if an ACK was received, it may find data and "thinks" it did not receive an ACK because it contains corrupted data due to the reflections or disturbances coming in from the IR medium. Software must be able to handle these types of reflections or disturbances at any time during transmit or receive when using IR communications on the MX1. If the receive algorithm requires that a specific character be present in a specific sequence, extra precautions/steps must be taken to properly manipulate the receive sections of the system. For example, if the software expects the first character received after a transmission to be an "ACK", the software design must be such that the receive buffers and shift registers are cleared first of any other characters before getting the "ACK".

Endcaps

The MX1 can be configured with several different endcaps. Endcaps are mounted on the top of the computer case and contain the beeper. All endcaps use ZIF connectors to maintain permanent connection between the endcap and the MX1.

If a Scanner or RS-232 endcap is not required the MX1 should be fitted with a plain endcap. It provides a seal against dirt and moisture and houses the beeper.

For more information on installing endcaps refer to Chapter 1, “Introduction”, section titled “Installing Accessories”. See the “Integrated Scanner Programming Guide”, available on the LXE Manuals CD-ROM, for barcodes when setting up scanner parameters for the scanner endcaps.

COM1 / COM2

The optional endcap with an RS-232 serial port, when installed in the MX1, is COM1.

A MX1 scanner endcap is COM1.

A MX1 scanner / RS232 endcap is COM1.

The MX1’s IR Port is COM2.

When an MX1 (**without** the RS-232 serial endcap installed) is in the MX1 Docking Cradle, that has a Power/Communications Module attached, the Cradle’s RS-232 serial port is COM2.

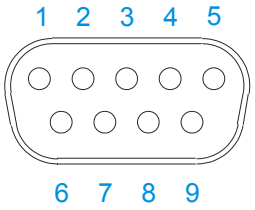
When an MX1 (**with** the RS-232 serial endcap installed) is in the MX1 Docking Cradle, that has a Power/Communications Module attached, the MX1’s endcap RS-232 serial port takes precedence over the Cradle’s RS-232 serial port.

The COM1 port uses Data Carrier Detect and Ring Indicator as computer wake-up events only.

The COM2 port supports two signals, Receive Data and Transmit Data.

RS-232 Endcap

RS-232 connection is made through an RS-232 Endcap if installed. The connector is an industry-standard RS-232. The connector includes a PC/AT standard 9-pin “D” male connector.



PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carrier Detect (Available for computer wakeup. See Power Management)
2	RXD	Receive Data - Input
3	TXD	Transmit Data - Output
4	DTR	Data Terminal Ready - Output
5	GND	Signal/Power Ground
6	DSR	Data Set Ready - Input
7	RTS	Request to Send - Input
8	CTS	Clear To Send - Input
9	RI or +5V DC	Ring Indicator - Input (Available for computer wakeup. See Power Management) ***NOT available on the Scanner/RS232 endcap.***

Figure 2-8 9-Pin RS-232 Description

Scanner Endcaps

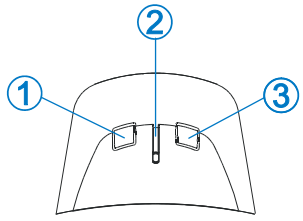
> Refer to the MX1 Installation and Operator's Guide and the section titled "Scanner Warnings and Labels" for important laser safety information **before** using the scanner.

The MX1 can be outfitted with a laser scanner endcap module or the RS-232/Scanner combination module.

The MX1 Barcode Scanner Endcap is used to collect barcoded data from any nearby compatible barcode label. Depending on the size of the barcode, size of bars and spacing and quality of the barcode, the scanners are used to read barcodes at the distances shown in the "Integrated Scanner Programming Guide", available on the LXE Manuals CD-ROM, under "Decode Zone".

After running the program, BCWEDGE, on the MX1 first -- the LXE scanner modules are activated when the Scan button or the trigger on the optional handle is/are depressed. Tethered scanners are activated only when the trigger on the tethered scanner is depressed. See the previous section titled "RS-232 Endcap" for the RS-232/Scanner serial port pinouts.

Scanner Endcap LEDs and Beeper



1. Laser On Indicator
2. Beeper
3. Good Read Indicator

Figure 2-9 Scanner Endcap LEDs and Beeper

The left LED (1 - Laser On Indicator) on the top of the laser barcode endcap will light, indicating laser emission when the laser beam is being emitted. Following a good read, the right LED (3 - Good Read Indicator) flashes, indicating a successful scan. Beeps may be heard (2) after a good read, depending on the application running on the MX1. The beep function is activated by external software programs running in the MX1.

The laser automatically turns off after a successful read and is ready to scan again when the Scan key (or the trigger) is pressed.

When necessary, use a damp, soft cloth to clean the laser module lens or housing.

Laser scanner parameters are programmed using barcodes in the "Integrated Scanner Programming Guide", available on the LXE Manuals CD-ROM.

To ensure proper operation, reboot the MX1 after programming Laser Scanner parameters.

Miscellaneous Connectors

Handle Contacts

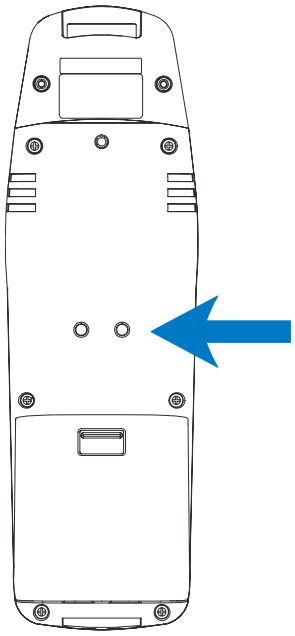


Figure 2-10 Handle Contacts

Two contacts are located on the back of the MX1 unit to interface with the optional handle when installed. Normally the contacts are covered by an adhesive Mylar cover. The Mylar cover must be removed when the handle is installed.

Battery Charging Contacts

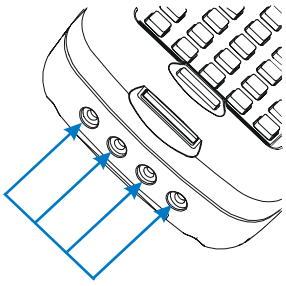


Figure 2-11 Battery Charging Contacts

The LXE MX1 computer has a row of charging contacts located on the bottom of the unit. They are designed to provide charging voltage to the battery pack when the unit is placed in a charging station or connected to the Clip-On Portable Charger.

Chapter 3 Power Supply

Introduction

The MX1 computer is designed to work with a Nickel Metal Hydride (NiMH) battery pack from LXE.

The LXE MX1 receives continuous power from two batteries. There is a 1500 mAh (or greater) Nickel Metal Hydride (NiMH) Main Battery Pack that can be recharged separately by an LXE approved battery charging unit or while installed in an LXE approved charging station. There is a 50 mAh Nickel-Cadmium (NiCd) Backup Battery inside the MX1 that is recharged only by the Main Battery Pack.

The MX1 maintains the date and time for a minimum of four days using a Main Battery that has reached the Low Warning point and a fully charged Backup Battery. The MX1 retains data, during a Main Battery hot swap, for at least 5 minutes.

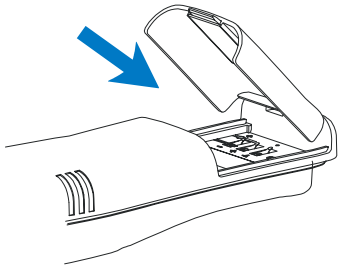


Figure 3-1 Battery Compartment

Note: ***New batteries must be charged prior to use****. This process takes approximately three hours per battery. LXE batteries are charged using LXE Battery Charger/Analyzers and eight hours with the LXE Clip-on Portable Charger attached to the MX1.*

Refer to the documentation received with the battery charger/analyzer for complete information.

See Also: “Getting the Most from Your Batteries”, located on the LXE Manuals CD.

Main Battery Pack

The main battery pack has a rugged plastic enclosure that is designed to withstand the ordinary rigors of an industrial environment. Exercise care when transporting the battery pack making sure it does not come in contact with excessive heat or any power source other than the LXE battery charger/analyzer unit.

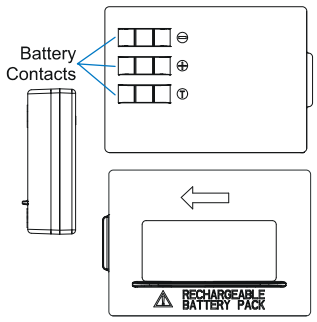


Figure 3-2 Main Battery Pack

The MX1 Main Battery Pack is a 1500 mAh (or greater) Nickel Metal Hydride energy source used to operate the MX1. When the battery is properly installed in the unit it provides up to eight hours of operation depending upon operation and accessories installed. The battery pack is resistant to impact damage and falls of up to four feet to a concrete surface.

Under normal conditions it should last approximately eight hours before requiring a recharge. The more you use the scanner or the transmitter, the shorter the time required between battery recharges.

LXE Docking Cradles and the MX1

The amount of time required to fully recharge the backup battery does not change when the MX1 is in an LXE approved powered docking cradle. The backup battery may be discharged and charged while the MX1 is in the docking cradle. The main battery pack can be recharged by the main power source of the docking cradle at the same time.

Battery Charger Analyzer

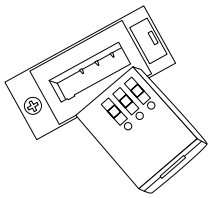


Figure 3-3 Battery and Battery Charging Cup

The MX1 Battery Pack can only be charged in the LXE Charger Analyzer equipped with the appropriate Charging Cup. Insert the Battery Pack with the arrow on the Battery Pack pointing **UP**, away from the charger. Make sure that the groove on the back of the battery mates with the slot on the battery charging cup. Failure to follow these instructions can result in damage to the battery pack or the charger.

Low Battery Warning

It is recommended that the Main Battery Pack be removed and replaced when electrical power depletes. When the Low Battery Warning sounds (alternating one second beeps) do an orderly shut down of the unit, minimizing the operation of any installed devices and insuring any information is saved that should be.

Note: Once you receive the Low Battery Warning, you have approximately 5 minutes to perform an orderly shutdown and replace the main battery pack before the unit powers off. The Low Battery Warning will transition to Critical Suspend before the computer powers off.

Backup Battery

The MX1 has a backup battery that is designed to provide limited-duration electrical power in the event of Main Battery Pack failure. The Backup Battery is a 50 mAh Nickel Cadmium (NiCd) battery that is factory installed in the unit. The need for recharging of the backup battery is automatically detected and controlled by the MX1. The energy needed to charge the backup battery comes from the Main Battery.

It takes several hours of operation before the Backup Battery is capable of supporting the operation of the computer. The duration of Backup Battery life is dependent upon operation of the MX1, its features and any operating applications.

The backup battery is replaced by LXE. See Chapter 1, “Introduction”, section titled “Getting Help”.

Backup Battery Discharge Utility

Note: Make sure there is a fully charged main battery in the MX1 ***before*** *running the Backup Battery Discharge Utility.*

The NiCd backup battery should be discharged completely once or twice a year. The Main Battery Pack will fully charge the backup battery using a trickle charge. This process will allow longer life for the Backup Battery.

The backup battery is discharged by running the Battery Discharge Utility (BBDIS35.EXE) file (located in the Utilities subdirectory on the MX1 – see Chapter 5, “Utilities”, for further information). The discharge utility shows the progress of the discharging. At this time, the program can be exited while continuing the discharge process. Normal use of the MX1 can resume during the discharge, with the exception of Hot-Swapping the Main Battery. When the backup battery is fully discharged, the MX1 will automatically stop the discharge process and begin to recharge the backup battery.

DO NOT REMOVE THE MAIN BATTERY PACK from the MX1 until the backup battery is completely discharged (with BBDIS35.EXE) in approximately 1 hour and recharged in approximately 2.5 hours.

Battery Hot-Swapping

ATTENTION	**Powering off the MX1 before a write (to disk) function has completed, may result in the corruption of the flash drive.**

*Note: If you are **not** hot-swapping the battery, make sure the MX1 is turned OFF before removing the battery.*

When the main battery power level is low, the MX1 will signal the operator with a continuous, one-second beep. Beeping will continue until the battery is replaced, the battery completely depletes or the MX1 is placed in a powered docking station.

You can replace the main battery without shutting the unit off. Simply remove the weak or discharged battery and install a strong or charged battery.

When the Main Battery is removed, the MX1 automatically transitions to the Critical Suspend state. During Critical Suspend, the MX1's backup battery will continue to power the unit for at least five minutes. Though data is retained, the MX1 cannot be used until a new main battery pack is installed. After installing the new battery, the MX1 automatically transitions to the Suspend state. To resume from the Suspend state, press the Power key for 1 beep. Recovery from Resume can take several seconds while the radio (if installed) is reestablishing an RF link.

If the Critical Suspend timer expires before a fully charged main battery can be inserted, the MX1 will turn off and must be rebooted after the main battery pack is installed.

Status LED and the Battery

Blinking Green	The MX1 is in the Suspend state. Lowest battery power consumption setting.
Steady Red	Main Battery Low Warning or Low Main Battery. Replace the main battery or place the unit in a powered charging station.
Blinking Red	Main Battery Power Failure or the Main Battery is depleted. The MX1 is in the Critical Suspend state drawing power from the backup battery. Replace the main battery or place the unit in a powered charging station.

Handling Batteries Safely

Never dispose of a battery in a fire. This may cause an explosion.

Do not replace individual cells in a battery.

Be careful when handling NiCd or NiMH batteries. If a battery is broken or shows signs of leakage do not attempt to charge it. Dispose of it using proper procedures.

Caution

Nickel-based cells contain a chemical solution which burns skin, eyes, etc. Leakage from cells is the only possible way for such exposure to occur. In this event, rinse the affected area thoroughly with water. If the solution contacts the eyes, get immediate medical attention.

Caution

NiCd and NiMH batteries are capable of delivering high currents when accidentally shorted. Accidental shorting can occur when contact is made with jewelry, metal surfaces, conductive tools, etc., making the objects very hot. Never place a battery in a pocket or case with keys, coins, or other metal objects.

Getting the Most from Your Batteries

The LXE publication “Getting the Most from Your Batteries” is available on the LXE Manuals CD and is a single-source guide to battery management. The document contains information about battery recharging, conditioning, and other pertinent issues.

Single and Multi-Unit Charging Stations

Note: An Upper Strap Bracket installation is a requirement prior to using the MX1 in a Docking Station. The Bracket, as well as the spring clips, helps to secure the MX1 in the Docking Station cradle. The strap is not a requirement.

LXE offers several docking station configurations. The following figure shows two versions of stationary powered docking stations. The MX1 and extra batteries are charged in powered docking stations only. LXE also offers vehicle mounted powered docking stations, table mounted powered docking stations and a vehicle printer/docking station that charges the MX1 batteries.

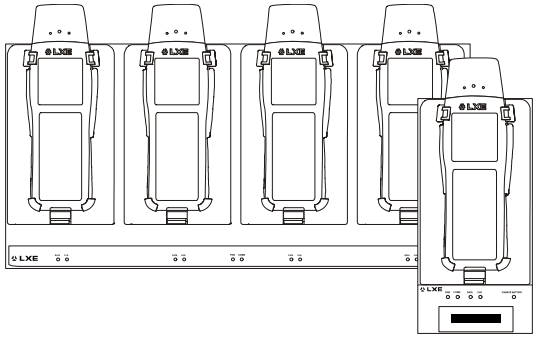


Figure 3-4 Multidock and Single Dock Communicating Charger

The Multidock (connected to a local power source) charges the Main Battery in the MX1.

The Single Communicating Charger (connected to a local power source) charges the Main Battery in the MX1 and a spare Main Battery.

How To Insert MX1 in a Docking Cradle

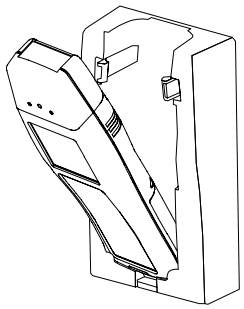


Figure 3-5 Insert MX1 in Cradle

1. Push the MX1 (with or without the hand trigger-grip) into the cradle “tail first”.
2. Gently push the MX1 down past the spring clips until both click into place over the top of the MX1.

The MX1 can be removed or inserted with one hand.

For complete installation information for a Multi-Unit Communicating Charger, please refer to the “2330 Multidock Reference Guide” on the LXE Manuals CD.

The Docking Cradle Family of chargers (not shown) charge the Main Battery in the MX1. The vehicle, wall or table mounted chargers must have a Power/Charging Communications module installed and be connected to an external power source.

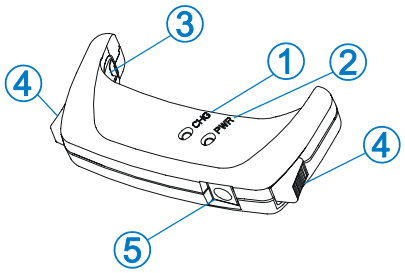
> For complete installation information for a 2330 Docking Cradle Family, please refer to the "2330 Docking Cradle Family Operator's Guide" on the LXE Manuals CD.

Optional Clip-on Portable Charger

The MX1 Battery Pack can be fully charged using the Clip-on Portable Charger. A complete recharge of a dead main battery with the MX1 in an Off state will take 8 hours.

Note: The unit will not operate correctly on charger power without a battery installed in the MX1.

Charge only at ambient temperature above 32°F / 0°C.



1. Charging LED
2. Power LED
3. Catch pins
4. Spring loaded arms
5. Power Jack connector

Figure 3-6 Clip-on Portable Charger

How To

Snap the Clip-on Portable Charger to the base of the MX1 by aligning the catch pins with the notches in the Battery Door.

Plug the Wall Mount adapter into a power source before connecting the Power Jack to the Clip-on Portable Charger on the MX1.

Remove the Clip-on Portable Charger from the MX1 by depressing the spring loaded arm at the base of the module.

Then remove the adapter from its power source.

Indicators

The green Power LED on the Clip-on Portable Charger indicates voltage is present in the charger. The yellow Charging LED indicates the battery is being charged. When a battery is present in the MX1, the Charging LED is always lit.

The intensity of the Charging LED indicates the following states:

Bright	The Portable Charger is using its high charge rate. The charger detected a battery low state and is charging the battery until a full battery condition is detected.
Dim	The Portable Charger is using its low charge rate. The charger detected a full battery or that the battery only requires “topping off”.
Unlit	There is no battery in the MX1. No charge rate is being applied. The indicator does NOT turn off when charging is complete.

The Clip-on Portable Charger must be powered by one of the following:

- Power Supply, External, AC, US
- Power Supply, External AC, International

Chapter 4 System Configuration

Introduction

There are many different aspects to the setup and configuration of the MX1. Many of the setup and configuration settings are dependent upon the optional features, such as hardware and software, installed on the unit. The examples found in this chapter are to be used as samples only, the configuration of your specific MX1 computer may vary. The following sections provide a general reference for the configuration of the MX1 and some of its optional features.

Installed Software

When you order an MX1 you receive the software files required by the separate programs needed for operation and communication. The files are loaded by LXE and stored in subdirectories in the MX1.

This section lists the contents of the subdirectories and the general function of the files. Files installed in each MX1 are specific to the intended function of the MX1 -- an MX1 using ANSI Plus and a 2.4GHz radio driver software will have a different file structure than that of an MX1 being used for DOS batch functions.

Files installed in each MX1 configured for an RF environment contain PCMCIA card radio specific drivers – the drivers for each type of radio, for example 900 MHz versus 2.4 GHz, are specific to the radios installed in the RF environment and are not interchangeable.

Drive C Internal Flash Array

The on-board Internal Flash Array (IFA) is 8MB, and it is configured as the C: drive - i.e., the equivalent of a disk drive in a PC. One inherent difference between Flash technology and a rotating media disk drive is the fact that it is solid-state, therefore it is much more rugged than a rotating media would be. Another difference is that its write (but not read) time can be slower than a rotating media.

Depending on which software configuration is ordered, the following sections list the files that may be stored on the Flash or C drive.

ATTENTION	**Powering off the MX1 before a write (to disk) function has completed, may result in the corruption of the flash drive.**

Software Loaded on Drive C

The software loaded on the MX1 computer consists of BIOS, Card and Socket Services, PCMCIA card drivers, utilities, DOS 6.22, a protocol stack for 2.4 GHz radio support, radio drivers, and/or an LXE terminal emulator.

The software supported by the MX1 is summarized below:

LXE Terminal Emulations

Note: Only one LXE terminal emulator can be actively running on the MX1 at any one time (see Dual TE section for exceptions).

- ANSI Plus 2.4 GHz Terminal Emulator
- ANSI Plus 900 MHz Terminal Emulator
- DOS LDS Plus 900 MHz Terminal Emulator
- DOS LDS Plus 2.4 GHz Terminal Emulator
- DOS IBM 3270 900 MHz Terminal Emulator
- DOS IBM 5250 900 MHz Terminal Emulator
- TN3270 2.4 GHz Terminal Emulator
- TN5250 2.4 GHz Terminal Emulator

Datalight Sockets TCP/IP Stack

Used for 2.4 GHz radio management.

ROM-DOS Version 6.22

DOS Version 6.22 files are loaded in the DOS subdirectory. Only those DOS files required for optimum performance are loaded on the MX1. Not all DOS 6.22 files are available on the MX1, but may be added to the flash disk at a later time by the system administrator.

PCMCIA

Used for PCMCIA card management. The following file types are resident in the MX1.

- Socket Services
- Card Services
- PCMCIA SRAM MTD
- PCMCIA ATA MTD

Radio Drivers

Only one radio is installed in the MX1 at any one time. The radio resident on the MX1 determines the radio card drivers (900 MHz or 2.4 GHz) installed in the MX1.

SNMP DOS Agent

The SNMP DOS agent executable resides in the \AGENT directory. For information on enabling the SNMP Agent, please refer to the “DOS Autoconfigurator Instructions”. For details on Agent operation, please refer to the “SNMP Agent Reference Guide”. Both manuals are available in electronic format on the LXE Manuals CD.

Utilities

See Chapter 5, “Utilities”.

C Root Directory

AUTOEXEC.BAT	The AUTOEXEC.BAT file is not essential to the operation of the MX1. The MX1 will boot without it. The AUTOEXEC.BAT file is a batch file that contains a series of DOS commands. The MX1 reads the AUTOEXEC.BAT file and executes the commands in the order in which they appear. The information in this file may be altered and some software applications will automatically alter it during their installation process.
CONFIG.SYS	The CONFIG.SYS file is not essential to the operation of the MX1, but it is essential to the operation of certain software programs. The information in this file may be altered, some software applications will automatically alter it during their installation process.
TERMTYPE.EXE	Identifies the computer type for SNMP agent.

\DOS Files

ANSI.SYS	Interprets ANSI escape sequences.
CHKDSK.EXE	Checks the status of a disk and displays a report. Can also fix disk errors.
COMMAND.COM	A DOS file that runs programs, manages files, controls information processing, directs input and output, among other functions.
FORMAT.COM	Formats a read-write disk drive (flash and RAM drives only) removing all data.
HIMEM.SYS	Extended memory manager.
MEM.EXE	Displays the amount of used and free memory on a computer.
MODE.COM	Configures system devices.
MORE.COM	Displays 25 lines of output at a time.
NED.CFG	Configuration file for NED.EXE ASCII text editor.
NED.EXE	This program is used when editing ASCII text files.
REMDISK.EXE	Companion file to REMSERV.EXE. Each computer must use the same baud rate and packet or non-packet-style transmission. This file runs on one computer and REMSERV.EXE runs on the other.
REMSERV.EXE	Companion file to REMDISK.EXE. This file runs on one computer and REMDISK.EXE runs on the other. Used for manipulating files on two computers’ hard disks. Use a null modem cable connecting both serial ports.
REV.BAT	Displays software revision level.
SYS.COM	Adds system files to disks.
VER	Displays the current version identity of DOS. This command is run at the DOS prompt.
XCOPY.EXE	Copies multiple files and, optionally, subdirectories from one disk to another.

\AGENT

The SNMP agent files are loaded on MX1's with a 2.4GHz radio.

Please refer to the "SNMP Agent Reference Guide" and "Client Configuration Manager" for more details on the SNMP agent.

AGENT.EXE	Diagnostic agent. Provides limited access to the LXE Private MIB.
CFGAGENT.EXE	Configuration agent. Provides full access to the LXE Private MIB.
REV.BAT	Displays software revision level.

\PCMCIA Files

Please refer to "PCMCIA Card Management and LXE DOS Computers User's Guide" on the LXE Manuals CD and on the LXE website, for complete instructions or troubleshooting when using these files.

CISDUMP	Permits user to list and interpret contents of a PC Card's Card Information Structure (CIS) for debug use.
CNFIGNAM.EXE	Driver that specifies which PC configuration should be accessed from the PCM.INI file. This file is added to the CONFIG.SYS file.
DPMS.EXE	Novell driver that provides memory management services.
PCM.EXE	DOS-based utility for reviewing, modifying, or creating PC Card configurations. *Note: May or may not be present.*
PCM.INI	Stores PCMCIA configuration parameters.
PCMATA.SYS	Device driver for ATA–IDE hard disk emulation. Used with SRAM cards, rotating disk cards, or solid-state mass storage cards. This file is added to the CONFIG.SYS file.
PCMCS95.EXE	Card Services (driver), the operating-system–level program that manages all PCMCIA cards. This file is added to the CONFIG.SYS file.
PCMFDISK.EXE	Edits partition table for ATA PC Cards.
PCMRMAN.SYS	Device driver that reads Card Services resources, passes data to Card Services which then makes device allocations. This file is added to the CONFIG.SYS file.
PCMSCD.EXE	Device driver for FAX/Modem and LAN cards. This file is added to the CONFIG.SYS file.
PCMSS.EXE	Socket Services (driver), the BIOS–level program that functions as the interface between the card socket and the Card Services program.

\UTILS

BBDIS35.EXE	Battery Discharge Utility. Condition the 50 mAh NiCd Backup Battery mounted on the system board. The battery discharge starts and when discharged switches to backup battery charge mode.
BBTST35.EXE	Backup Battery Test Utility. Indicates the current status of the backup battery and the voltage.
BCWEDGE.EXE	Barcode Wedge utility. Interprets data from barcode scanner as keyboard data. Does not function in Win95.
BEEP35.EXE	Beeper Utility. Changes the volume of the beeper using the up and down arrow keys on the keypad/keyboard.
COMTST35.EXE	Communication Port Utility. To diagnose the serial communication port, a simple loop back test routine is included in this file. The figure showing how to build a loop back plug is included in this chapter. The test results will read PASS or FAIL. A failure is identified and described.
DISP35.EXE	Display Utility. Activates every pixel on the display to verify functionality.
KEY2335.EXE	Keyboard Utility. This utility performs a contact functional test of each key on the keyboard. When activated, the key labels appear on the screen and then each key, when initialized, clears the key label from the screen.
LXEF.EXE	**(Obsolete – Replaced by REMSERV and REMDISK)** File Transfer Utility. Transfer files using serial port or IR ports.
PARAM35.EXE	Parameter Dump Utility. This utility collects the setup configurable parameters and lists them in a text file.
REV.BAT	Displays software revision level.
SETAPI_4.EXE	Set An API Function. Runs an API call to set a mode or change a parameter.

Terminal Emulation Directories

Please refer to the specific Terminal Emulation's reference guide for complete instructions.

Batch MX1's do not have terminal emulation (TE) files and may or may not have a radio card. When a need exists to convert a batch MX1 to a TE unit or a different radio card, contact LXE Customer Services for assistance.

Note: 900 MHz radio files are loaded in the Terminal Emulation subdirectories, i.e. /APLUS, /LDSPLUS, /IBM (for both 3270 and 5250).

Following are the directory names containing the TE program files:

/APLUS	ANSI Plus with 2.4 GHz radio
/APLUS	ANSI Plus with 900 MHz radio
/LDSPLUS	DOS LDS Plus with 900 MHz radio
/LDS24	DOS LDS Plus with 2.4 GHz radio
/IBM	DOS IBM 3270 with 900 MHz radio
/IBM	DOS IBM 5250 with 900 MHz radio
/IBM24	TN3270 with 2.4 GHz radio
/IBM24	TN5250 with 2.4 GHz radio

Note: Dual TE's are supported on MX1 computers with an 8 Meg. Flash drive. MX1's with a 4 Meg. Flash drive DO NOT support dual TE's.

Radio-Specific Subdirectory

\PCTCP (2.4GHz Radio Specific Files)

The PCTCP files are included with MX1's that have a 2.4 GHz radio installed.

IPSTAT.EXE	Gives statistics on IP and memory.
LSL.COM	Link Support Layer driver.
NET.CFG	Contains radio parameters.
ODIPKT.COM	ODI Packet driver.
PDTEST.EXE	Test or diagnose the packet driver. *(removed in Rev D)*
REV.BAT	Displays software revision level.
SETHOST.EXE	Manage host names and IP addresses. *(removed in Rev D)*
SOCKET.CFG	Contains options for SOCKETP.EXE
SOCKETP.EXE	Sockets TCP/IP kernel for use with packet drivers.
TCP.EXE	Manipulate or view TCP parameters and status.
XPING.EXE	Test installation with a continuous ping.

Lucent Specific

WVLAN43 (all WVLAN44 files)	Lucent radio driver files.
DRIVER.1ST	Radio driver file.

Proxim Specific

RL2PCM.COM	Proxim radio driver file.

Cisco Specific

CSCODI	Cisco radio driver file (350 series radio only).
AWCO48C	Cisco radio driver file (340 series radio only).
WEPDOS.EXE	Set WEP key into Cisco radio.
AWCLEAP.EXE	DOS utility to sep LEAP (350 series radio only).
SETLEAP.BAT	Batch file to run AWCLEAP (350 series only).
SETLEAP2.BAT	Not used on this version of the MX1.
CLEAR.BAT	Batch file to clear LEAP username and password (350 series radio only).
CLEAR2.BAT	Not used on this version of the MX1.

Symbol Specific

11ODIPC.COM	Symbol radio driver file (DS 11Mb only)

LXE 900Mhz Radio Files

Note: The LXE 900MHz radio files are installed in the Terminal Emulation subdirectories.

LXE900SS.EXE	Spread spectrum radio driver.
LXE900SS.HEX	Modem control codes.
PCRFLIB.EXE	Interface between the radio driver and the terminal emulator.
RFPARSE.EXE	Used by PCRFLIB to obtain configuration settings.

Sample AUTOEXEC.BAT File

For 900MHz Radio

@ECHO OFF	Do not display batch command text during AUTOEXEC.BAT file run
SET TEMP=C:\TEMP	Place temporary files/data here
PATH=c:\dos;c:\pcmcia;c:\utils\c:\;	*/ When the computer starts up, the operating system will look in these directories for the files it needs
prompt pg	
C:	Move DOS pointer to the C drive
cd \aplus	Move DOS pointer to the LXE Terminal Emulation (e.g. ANSI Plus) subdirectory
lxe900ss	Load the radio driver
xxxxx.xxx	Load the keyboard driver (for ANSI Plus only)
pcrflib	Load the interface between the radio driver and the terminal emulator
w84nsync	
aplus	Run the TE interface program (e.g. ANSI Plus)

For 2.4GHz Radio (with ANSI Plus)

@ECHO OFF	Do not display batch command text during AUTOEXEC.BAT file run
PATH=c:\dos;c:\pcmcia;c:\utils\c:\pctcp;c:\;	*/ When the computer starts up, the operating system will look in these directories for the files it needs
SET TEMP=C:\TEMP	Place temporary files/data here
set sockets =c:\pctcp	
c:\pctcp\lsl.com	
C:\pctcp\XXXXXX	Load the 2.4GHz radio driver here: WVLAN43 for Lucent radio RL2PCM for Proxim radio AWCO48C for Cisco radio 11ODIPC for Symbol radio
c:\pctcp\odipkt.com 0 0x69	
c:\pctcp\socketp.exe c:\pctcp\socket.cfg	Look in this file for TCP/IP parameters Note: The Proxim radio requires that /m=12288 follows socketp.exe
C:	Move DOS pointer to the C drive
cd \aplus	Move DOS pointer to the LXE Terminal Emulation (e.g. ANSI Plus) subdirectory
xxxxx.xxx	Load the keyboard driver (for ANSI Plus loads only)
aplus	Run the TE interface program (e.g. ANSI Plus)

Sample CONFIG.SYS File

Note: Do not use these examples for your operation, as each computer configuration is different.

Please refer to commercially available ROM-DOS User's Guides for complete instructions or troubleshooting when using these DOS files.

```
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
FILES=45
STACKS=9,256
DOS=HIGH,UMB
LASTDRIVE=Z

Rem Card and Card Socket Services
DEVICE=C:\PCMCIA\DPMS.EXE
DEVICEHIGH=C:\PCMCIA\CNFIGNAM.EXE /DEFAULT
DEVICEHIGH=C:\PCMCIA\PCMSS.EXE
DEVICEHIGH=C:\PCMCIA\PCMCS95.EXE
DEVICEHIGH=C:\PCMCIA\PCMRMAN.SYS
DEVICEHIGH=C:\PCMCIA\PCMSCD.EXE
DEVICEHIGH=C:\PCMCIA\PCMATA.SYS
NEWFILE=C:\RADIO.SYS
```

Sample NET.CFG Files

Note: Hex values are indicated with a leading 0x. NET.CFG values do not use the 0x.

See Chapter 6, “RF Network Configuration”, for explanations of NET.CFG parameters.

Lucent Radio NET.CFG File

```
Link Support
  buffers  4 1550

Protocol ODIPKT
  Bind WVLAN43

Link Driver WVLAN43
  FRAME ETHERNET_II
  WaveLAN_Network_Name  ANY
  Station_Name "station_name"
  AP_Distance  1
  Microwave_Robustness = N
  Transmit_Rate   3
  Medium_Reservation  2347
  Card_Power_Management 1
  Maximum_Sleep_Duration 100
  Receive_All_Multicasts N

  Enable_Encryption N
```

Proxim Radio NET.CFG File

```
Link Support
  BUFFERS 2 1550

Protocol ODIPKT
  BIND RL2PCM

;IP address is maintained in the socket.cfg file

Link Driver RL2PCM
  Socket          A
  Initialize_365  N
  Int             3
  Mem #1          C100
  Port            300
  Inactivity_Min  0
  Inactivity_Sec  1
  Sniff_Time      0
  Domain          0 ; set per customer settings
  Station_Type    0
  Peer_To_Peer    N
  Roam_Config     1
  Mac_Optimize    1
  Channel         1
  SubChannel      1
  Frame           Ethernet_II
; Frame           Ethernet_802.2
; Frame           Ethernet_802.3
```

Cisco Radio NET.CFG File

```
;Configuration settings for LSL.COM (Link Support Layer)
;  Buffers 4 1550     : required to avoid "Network jammed" message in
;                     : Clarkson Terminal Emulator
Link Support
        BUFFERS 4 1550

;Configuration for Packet Driver shim.  This shim is used by
;Clarkson Terminal Emulator (CUTE) and other 3rd party protocol
;stacks.
;  BIND CSCODI          : binds to the Cisco 350 driver
Protocol ODIPKT
       Bind CSCODI

file handles=60

LINK DRIVER CSCODI

        ;Initialization file for Infrastructure operating mode

        ; NOTE: The following are some keyword parameters that may
        ;be modified.  Any commented or omitted keyword parameter
        ;assumes the factory default.  For most situations the
        ;factory defaults will be appropriate.  In situations where
        ;the factory default needs to be modified, uncomment or add the
        ;keyword parameter line and set the appropriate keyword value.

        SSID            "" ;Must match Access Point setting
        ;NodeName        ""            ;Descriptive station name

        LEAP            "OFF"     ;LEAP authentication (OFF -or- ON)
        PowerSaveMode   "FASTPSP" ;Power save modes (CAM, FASTPSP, PSP)
        MaxPowerSave    "ON"     ;Maximum power save mode (OFF -or- ON)

        LongRetryLimit   6

        ;WorldMode       "OFF"   ;World mode (OFF -or- ON)
        ;ShortPreamble   0 ;PLCP short preamble (0=auto, 1=long, 2=short)

        ;FragThreshold   2312   ;Packet size to start fragmenting
        ;RTSThreshold    2312   ;Packet size to start sending RTS/CTS
        ;DataRate1       0x02   ;(1)   Mbps supported data bit rate
        ;DataRate2       0x04   ;(2)   Mbps supported data bit rate
        ;DataRate3       0x0B   ;(5.5) Mbps supported data bit rate
        ;DataRate4       0x16   ;(11)  Mbps supported data bit rate
        ;RefreshInterval 10000  ;Inactivity time to check association

      ;To enable WEP uncomment the following line and set the
      ;key with the wepdos.exe utility
      authtype    "open"      ; Set WEP key in radio before wepopen
(WEPOPEN, WEPSHARED, MIXEDOPEN, MIXEDSHARED)

      ;The diversity parameter must be set according to the
      ;number of antennas for each terminal.
      ;setting for MX1, MX3 = on
      ;setting for 1380,1390,VX1,VX2,VX4 = right
      ;setting for 2325,MX2 = right
      diversity    "on"   ; for use on terminals with 2 antennas
      ;diversity   "left"; for use on terminals with 1 antenna left port
       ;diversity "right"; for use on terminals with 1 antenna right port
```

```
            ;The adapter needs 32 16-bit I/O ports, and 1 non-sharable IRQ.
            ;The following lines should be uncommented and the appropriate
            ;values set in the following scenarios:
            ; 1) PCMCIA mode: Override the I/O port base and/or IRQ
            ;                 assigned by PCMCIA card services.
            ; 2) PCMCIA mode: PCMCIA card services is not being used.
            ; 3) ISA mode: Override the I/O port base and/or IRQ assigned
            ;              by Plug and Play.
            ; 4) ISA mode: Non-Plug and Play operation.

            ;PortBase        140
            ;IRQ             5

            ;If the PCMCIA interface is being used without PCMCIA card
            ; services, uncomment the following lines and set the appropriate
            ; values.

            Memory          CC000
            Socket          1

            ;If the PCMCIA interface is not being used, set the appropriate
            ;value of "ISA" or "PCI".

            BusType           "PCMCIA"

          Frame ETHERNET_II
          ; Frame ETHERNET_802.3
          ; Frame ETHERNET_802.2

protocol IPX 0 ETHERNET_II
show dots=on
```

Symbol 4121 11Mb Radio NET.CFG File

See Chapter 6, “RF Network Configuration”, for explanations of NET.CFG parameters.

```
;  1. A semicolon as the first non blank character denotes a
;     comment line.
;  2. Commented out parameter lines create the default setting.
;  3. Rate control only works with 2 Mbps (or greater) radios
;  4. Encryption controls only work with 2Mbps (or greater)
;     radios
;  5. ESSID must be changed to reflect the local network.

link support
 Buffers 4 1550

Protocol ODIPKT
 Bind s11odi

link driver s11odi
 frame ethernet_II
; frame ethernet_802.2

;  The ESS_ID can be a string of 1 to 32 case sensitive characters.

 ess_id 101
 station_name
```

```
;  Use the following keyword to specify rates at which the Adapter
;  is allowed to operate.  If no rates are specified, the Adapter
;  will use all rates available on the radio.  Regardless of what is
;  specified, the radio will allow either 1 and 2 Mbps or all four
;  rates, i.e., 1, 2, 5.5, and 11 Mbps.
;  Tx_Rate 1 (1 Mbps)
;  Tx_Rate 2 (2 Mbps)
;  Tx_Rate 5 (5.5 Mbps)
;  Tx_Rate 11 (11 Mbps)
;
; Tx_Rate 1
; Tx_Rate 2
; Tx_Rate 5
; Tx_Rate 11

;  Note: IO Mode is required if using Card/Socket Services

 Mode IO
 IOAddress 340
 Memory CC000
 Interrupt 5

; Set performance index to "0" for VX1 and "1" for MX3. 0=CAM ,
1=Power Management On
 performance_index 1

; Set diversity to "Both" for two antennas and "A" for one antenna.
 diversity BOTH
```

WEP – Prior to November 2003

```
; To enable WEP you must set encrypt_enable to "y" and then set the
; encryption key to the same value as the AP is set for. For 128 bit
; encryption keys you must have 13 pairs of hex digits and 5 pairs of
; hex digits for 40 bit encryption. Once the key is set use the
; "encrypt_key_index" parameter to select which key is transmitted.

; encrypt_enable y
; Encrypt_Key1 12 34 56 78 90 12 34 56 78 90 12 34 56
; Encrypt_Key2 12 34 12 34 12 34 12 34 12 34 12 34 12
; Encrypt_Key3 AB CD EF 12 34 56 78 90 AB CD EF 12 34
; Encrypt_Key4 12 34 56 78 12 34 56 78 12 34 56 78 12
; encrypt_key_index 1
; encrypt_level 2
```

WEP – After November 2003

```
; To enable WEP you must set Encrypt_Enable_Index to the number of the
; Encrypt_Key# to use and then set the encryption key to the same
; value as the AP is set for. Zero means No Encryption and is the
; default.
; For 128 bit encryption keys you must have 13 pairs of hex digits and
; 5 pairs of hex digits for 40 bit encryption.

; Encrypt_Enable_Index 0
; Encrypt_Key1 12 34 56 78 90 12 34 56 78 90 12 34 56
; Encrypt_Key2 12 34 12 34 12 34 12 34 12 34 12 34 12
; Encrypt_Key3 AB CD EF 12 34 56 78 90 AB CD EF 12 34
; Encrypt_Key4 12 34 56 78 12 34 56 78 12 34 56 78 12
```

Sample SOCKET.CFG File

See Chapter 6, “RF Network Configuration”, for explanations of SOCKET.CFG parameters.

Note: The values for some parameters are dependent on the type of radio card installed. Please refer to Chapter 6, “RF Network Configuration” for appropriate values for a specific radio card.

```
# Socket.cfg sets the options for Data Light socketp.exe
# The section xxx.xxx.xxx.xxx is for this machines IP.
# The net mask is specified as part of the ip address.
# In the ip address command an optional/net_bits can be
# used to indicate the number of bits in the network ID.

#   Net Bits   Net Mask        Class   IP address range
#   8          255.0.0.0       A       0.x.x.x to 127.x.x.x
#   16         255.255.0.0     B       128.x.x.x to 191.x.x.x
#   24         255.255.255.0   C       192.x.x.x or higher

# The network can be subdivided by two for every net bit added.

#   Net Bits   Net Mask   Net Bits   Net Mask
#   1          128        5          248
#   2          192        6          252
#   3          224        7          254
#   4          240        8          255

# To enable DHCP set the IP address to 0.0.0.1

IP address 0.0.0.1/16

# The ARP INIT parameter makes this stack the same as
# before. The stack will not send a DHCP ARP (DEFAULT) when
# booting up. For added IP address checking you may comment
# this line out if you are NOT using proxy ARP.

ARP INIT GRAT

# Interface sets the physicalinterfaces
# pdr=packet driver
# if0=interface_card
# dix=frame type
# 1500=MTU
# 10=Buffers
# 0x69=ioaddr

Interface pdr if0 dix 1500 10 0x69

# When using a gateway (IP router) to the rest of the world,
# replace "XXX.XXX.XXX.XXX" with your gateway ip and
# remove the # at the beginning of the line.

# route add default if0 XXX.XXX.XXX.XXX

# When using a domain name server (DNS),
# replace XXX.XXX.XXX.XXX with the IP address of the DNS,
# and remove the # at the beginning
# of the line

# domain server XXX.XXX.XXX.XXX

# domain suffix         # example lxe.com
```

```
# Redisplay IP information

IP address

# options, refer to documentation to change

ip ttl 15
tcp mss 1360
tcp window 2920
tcp retry 8
tcp irtt 500ms
```

LXE DOS Terminal Emulations

Note: Narrowband radios are not supported at this time. For details concerning future capabilities, contact the LXE Product Marketing department.

All terminal emulation radio controlled data flows and exchanges are over the radio to the 62XX, 64XX, 65XX or 67XX units, then to the computer network and then to a host computer. The LXE Network Management System, as part of the wired network, can remotely configure the MX1's terminal emulation parameters.

MX1's with 900MHz spread spectrum radios communicate ***only*** with 62XX Base Stations with installed 900MHz radios.

Note: MX1's with 2.4GHz spread spectrum radios communicate only with Access Points with installed 2.4GHz radios. There are three different series of 2.4GHz radios (64XX, 65XX, and 67XX). Each series of radio can only communicate with Access Points that have the same series of radio installed. For example, MX1's with 65XX series 2.4GHz spread spectrum radios communicate only with 65XX Access Points with installed 65XX 2.4GHz radios.

Please refer to the system specific terminal emulation reference guide for instruction when using an MX1 in a specific TE environment. A list of LXE reference guides is located at the end of this chapter in the section titled "Manuals". The manuals are in electronic format and contained on the LXE Manuals CD.

Terminal Emulation Screen Sizes

The font/screen sizes available on the MX1 in Batch mode or at the DOS prompt are:

- 10 rows by 20 columns
- 20 rows by 20 columns

DOS Terminal Emulation User Defined Stored Forms

DOS terminal emulations have the following space requirements for each user defined stored form and (for the 2223 2D scanner endcap) the barcode input buffer limits:

Terminal Emulator	Stored Form Limit	2D Barcode Input Buffer Limit
ANSI and ANSI Plus	2K	256 bytes
LDS and LDS Plus	520 bytes	256 bytes
IBM 3270	1K	1024 bytes
IBM 5250	1K	1024 bytes
TN3270	1K	1024 bytes
TN5250	1K	1024 bytes

Dual Terminal Emulation

Note: Dual TE's are supported on MX1 computers with an 8 MB Flash drive. MX1's with a 4 MB Flash drive DO NOT support dual TE's.

Dual TE's (if ordered) may be resident when the unit is used in conjunction with the LXE 6224 Session Manager, subject to the following conditions:

- Multiple Terminal Emulators on the same client device must use the same radio type (900MHz or 2.4GHz), and
- Only one IBM Terminal Emulator can be installed on the same client device (3270 or TN3270 or 5250 or TN5250).

For more information on items in this section, please refer to the LXE electronic manual titled "DOS Autoconfigurator Instructions" on the LXE Manuals CD.

TE Selection Menu

The user is presented with the TE Selection Menu listing the available terminal emulators. For example, a user could see:

```
[5] Launch 5250
[A] Launch ANSIPLUS
[E] Exit to DOS
Please select option:  [5, A, E]?
```

Upon selecting one of the terminal emulator options, the desired TE is launched. When the user selects E, the screen is cleared and system is returned to the DOS prompt.

In addition to multiple TE's, the TE Selection Menu can also display multiple Autologin hosts for some TE's. Please refer to the applicable TE Reference Guide for more information on multiple hosts.

Switching Terminal Emulators

2.4GHz Radios

When the user quits the TE with an ALT-X, the screen is cleared and the menu is presented again.

900MHz Radio

After exiting the active terminal emulator, the computer reboots and displays the TE Selection Menu.

Single Terminal Emulator Present

After the initial auto-configuration, the system will boot up and immediately launch the terminal emulator. No menu is presented.

Menu Customization

The system administrator may change almost every facet of the menu display by modifying the variables found at the top of **TESELECT.BAT**.

Details on modifying the TESELECT.BAT file are included in the "DOS Autoconfigurator Instructions".

BIOS Setup

Be very careful when using this utility to modify BIOS Setup parameters. The MX1 may generate unexpected results when incorrect or conflicting parameter values are entered. The parameters should only be modified by Information Services personnel or the system administrator.

Note: Make sure there is a fully charged battery in the MX1 ***before*** *accessing BIOS Setup.*

Accessing the BIOS Setup

When you turn the MX1 on the unit will start to boot programs from the Internal Flash Array (IFA). If the Main Menu Setup Msg parameter is toggled On, watch the bootup sequence and when the following is displayed:

```
Press F2 to Enter Setup
```

Press the [F2] key. When the Main Menu Setup Msg parameter is toggled Off (default), the [F2] key is still available during the bootup sequence. The next screen displayed is the BIOS Setup Main Menu.

BIOS Setup has three menus: Main, Advanced and Exit.

BIOS Setup Default Values by Option

Menu Option	Menu / Section	Default Value
Boot	Main	A: then C:
Caps	Advanced / Keyboard	Off
COM1 Pin 9	Advanced / Other	RI
CPU	Advanced / Power Mgt	Aggressive
CtlAltDel	Advanced / Keyboard	Reboot
Date	Main	09/02/1988
Disp. BL	Advanced / Power Mgt	Timed
Disp. BL	Advanced / Power Mgt	3 s
Display	Advanced / Power Mgt	15 s
Docked PM	Advanced / Power Mgt	PM Disabled
DOS Font	Advanced / Other	8x16
NumLock	Advanced / Keyboard	On
Off Timer	Advanced / Power Mgt	5 m
POST Msg	Main	Disabled
Power Key	Advanced / Power Mgt	Susp-Off
Power Mgt	Advanced / Power Mgt	On
Rpt Delay	Advanced / Keyboard	0.5 s
Rpt Rate	Advanced / Keyboard	10 /s
Setup Msg	Main	Off
Summary	Main	Off
Suspend	Advanced / Power Mgt	5 m
Time	Main	00:00:00

Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when Exit With Save is selected and the BIOS setup program closes.

Changed parameter values will take effect when the MX1 reboots upon exiting BIOS Setup. If the MX1 does not automatically reboot upon exit, please reboot the MX1.

Using the Keypad

The set of keypad commands used to select menu items and parameters, as well as modify parameter values is as follows:

Exit a menu	Esc
Activate Help Screen	F1
Modify parameter value	Space key or alpha-numeric key
Move to next parameter	Enter or Arrow Key
Move from menu to menu	Arrow key

Note: Refer to Appendix A, "Key Maps", for equivalent key press sequences based on the type of keypad being used: full alpha-numeric or numeric-alpha.

Main Menu Options

- To edit parameters, use the up and down arrow key to move from parameter to parameter.
- Use the space key or an alpha-numeric key to modify a parameter value.
- Press F1 to activate the help screen then use the panning function to move around the help screen. Press ESC to close the help screen.
- Use the left and right arrow keys to move from menu to menu.
- Press the ESC key or key sequence to go directly to the Exit Menu.

Main Menu Parameters

When changes have been made, press an arrow key to go to another parameter or menu or press ESC to go to the Exit Menu.

Menu Option	Default Value
Time	00:00:00
Date	01/04/2000
Boot	A: then C:
Setup Msg	Off
POST Msg	Off
Summary	Off

Parameter Changes

Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when “Save and Exit” is selected and the BIOS Setup program closes.

Changed and saved parameter values take effect after the MX1 is rebooted.

Time

Specifies the current system time.

This parameter is shown in the following format:

```
hh:mm:ss
```

where:

hh is hours
mm is minutes
ss is seconds.

Each of these fields is selected and modified separately. When the parameter is highlighted, type the desired numeric entry and then press the <Tab> key to move from hours to minutes to seconds. The system time is set according to the standard 24-hour clock.

```
Default:  00:00:00
```

Date

Specifies the current system date.

This parameter is shown in the following format:

```
month/day/year
```

Each of these fields is selected and modified separately. When the parameter is highlighted, type the desired numeric entry and then press the <Tab> key to move from month to day to year. The backslashes are automatically added by the system. When daylight savings occurs, the system date is ***not*** automatically changed.

```
Default:  9/2/1999
```

Boot

This option is used to define how the system treats drive A: when booting. Booting can occur from A drive or directly from the C drive (Flash drive). To reduce the amount of time required to boot, the boot sequence should be set to "`C: only`".

```
Values:    A: then C:   Boot from the A drive, or if no media
                        is present in the A drive, boot from
                        the C drive.
           C:           Boot from the C drive without
                        searching for an A drive.
Default:   A: then C:
```

*Note: The A: drive is read only when an SRAM card is inserted. The MX1 does **not** recognize a radio card as an SRAM card. When there is no SRAM card installed, drive A: is ignored.*

Setup Msg

Use this option to allow or disallow the display of the message "Press F2 to enter Setup" upon initial bootup or reboot. When the parameter is set to Off, the message is not displayed to the user although the F2 key can still be pressed at the appropriate time to enter the Setup Menu.

```
Values:   On, Off
Default:  Off
```

Post Msg

Set this parameter to On to stop the boot process if the Power On Self Test (POST) procedure encounters errors. Otherwise, the system continues to attempt to boot despite many startup error messages that display.

See Chapter 7 “Troubleshooting”, for more information on POST messages.

```
Values:   On, Off
Default:  Off
```

A parameter setting of On only affects the following error conditions (messages are displayed) and the bootup is halted:

Messages that Halt Bootup

- IDE Unit Error

  No media connected
  Configured for 0 cylinders
  Controller reset failed
  Media not ready
  Track 0 seek timed out
  Media initialization failed
  Media recalibration failed
  Last track seek failed
- Timer Error

  System timer (0) failed
- Disk Error for Debug

  Floppy type does not match setup only for debug capabilities
- I/O Chip Error

  I/O conflicts exist for serial ports, parallel ports, and IDE units (any or all)
- Other Error

  IRQ conflict, unsupported COM port configuration, keyboard locked

Bootup Continues after These Messages

This option does not affect the following error conditions (messages are displayed and the bootup continues):

- Keyboard Error

  Keyboard reset failed
  Keyboard interrupts failed
- CMOS Error

  CMOS checksum failed
  CMOS time and date not set
  Real time clock failure
- Configuration Error

  Previous POST execution was incomplete
- Scanner Error

  Scanner detected, but attempts to read scanner configuration failed.

Summary

This option is used to enable or disable a summary of the system configuration which displays before the operating system starts to load. To speed up booting, this parameter can be set to Off.

```
Values:   On, Off
Default:  Off
```

Advanced Menu Options

The Advanced Menu contains several sections – Power Management, Keyboard and Other. **To view all sections, press the down arrow key instead of using the Pan Down command.**

See the section titled "Panning Function" earlier in this chapter. Panning commands are used to view a 25 row by 80 column virtual screen display using specific keypresses and a 20 row by 20 column screen.

- To edit parameters, use the up and down arrow key to move from parameter to parameter.
- Use the space key or an alpha-numeric key to modify a parameter value.
- Press F1 to activate the help screen then use the panning function to move around the help screen. Press ESC to close the help screen.
- Use the left and right arrow keys to move from menu to menu.
- Press the ESC key or key sequence to go directly to the Exit Menu.

Parameter List

Menu Section	Option	Default Value
Power Mgt	Power Mgt	On
	CPU	Aggressive (1 s)
	Disp BL	Timed
	Disp BL	3 s
	Display	15 s
	Suspend	5 m
	Off Timer	5 m
	Docked PM	Off
	Power Key	Susp-Off
Keyboard	Caps	Off
	NumLock	On
	Rpt Delay	0.5s
	Rpt Rate	10 s
	CtlAltDel	Reboot
Other	Font	8x16
	COM1 Pin 9	RI

Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when "Save and Exit" is selected and the BIOS Setup program closes.

Changed and saved parameter values take effect after the MX1 is rebooted.

Power Management

When changes have been made, press an arrow key to go to another parameter or menu or press ESC to go to the Exit Menu.

Power Mgt

This parameter must be set to On before timer options can be activated. When Power Management is Off, the CPU setting is Full Speed.

Note: ***Critical Suspend.*** *The Off Timer is ignored when Power Management is disabled -- the MX1 will skip critical suspend mode (running on backup battery) and turn off immediately. It will not use any backup battery power and currently unsaved information will be lost.*

```
Values:   On, Off
Default:  On
```

CPU and Suspend Timers and RF Communication

When using an MX1 with a 2.4GHz radio driver (see previous section titled "\PCTCP Files"), the CPU and Suspend timers can be affected by the radio.

The 2.4 radio has a time-out setting. This time-out setting is in the PROTOCOL.INI file under inactivity time. This time, by default, is 5 seconds and is the lowest possible value. During this 5 seconds, the radio is polled which is detected by the MX1 BIOS as "activity". As a result, the MX1's Power Management keeps resetting the CPU and Suspend timers.

CPU

Note: *Pwr Mgt Modes - Power Mgt must be set to On before the value in CPU has any effect on the MX1.*

The CPU setting determines how Power Management values control the CPU.

Aggressive setting maximizes battery life.

Moderate will balance battery life and performance.

Light will maximize performance.

Full Speed disables power management of the CPU only.

Custom setting is used to set the CPU timer in 1 second increments.

```
Values:       Aggressive (1 second)
              Moderate (5 seconds)
              Light (15 seconds)
              Full Speed
              Custom (user configurable in 1 second increments;
              range = 1 - 63 seconds)
Default:      Aggressive (1 second)
```

Custom Setting

CPU Custom Setting is user configurable in 1 second increments up to 63 seconds. After selecting Custom, press the down arrow to move the highlight to the seconds setting. Use the numeric keys to enter number of seconds. Higher second values will adversely affect battery life.

Disp BL

The DispBL parameter is used to set which of three modes the Display Backlight will be in.

Off - the most battery-efficient way to operate the display.

On - provides full time backlighting whenever the unit is on.

Timed - provides backlighting for a predetermined amount of time from the last key input or display update. Set the time with the Disp BL timer parameter.

```
Values:   On, Off, Timed
Default:  Timed
```

Note: When the Timed option is selected, use the Disp BL time parameter to set the amount of time the display backlight remains on. If the Disp BL timer is set to a period of time longer than the Display Timer, the backlight will be forced off when the display turns off.

Disp BL

The Disp BL timer works in conjunction with the parameter setting of *Pwr Mgt Modes - Disp BL*.

The display backlight timer is reset every time the following occurs: video write, touch (on a touch screen), or any keypress.

```
Values:   1 - 63 seconds (in 1 second increments)
Default:  3 seconds
```

Note: If Pwr Mgt Modes - Disp BL setting is not "Timed" this setting is ignored.

Display

The Display parameter designates, in seconds, how long the MX1 senses inactivity on the MX1 before shutting down. The display timer is reset every time the following occurs: video write, touch (on a touch screen), or any keypress.

When the display timer expires and the display turns off, the Status LED turns steady green.

When the display is off, the MX1 is still powered on. Trigger presses will initiate activity. Communications through the radio or serial ports will still continue. However, the keypad clears all sticky key modes and icons and a key press functions only as a wakeup event (does not send to the operating system or application).

Press any key once to wake the display.

```
Values:   0 - 63 seconds (in 1 second increments)
Default:  15 seconds
```

A value of 0 means Full On.

Note: If the Disp BL timer is set to a period of time longer than Display, the display backlight will be forced off when the display turns off.

Suspend

This parameter establishes how long the MX1 senses inactivity on the system before entering Suspend Mode. This option is used to conserve battery life.

Pressing the Power key once also places the MX1 in Suspend Mode. Once in the Suspend state, the Status LED blinks green.

Use the Power key to wake the MX1 from suspend mode or a touch on an installed touch screen.

The Suspend Timer is reset every time one of the following occurs:

Video write	Keypress
Disk / IFA Access	COM 1 or COM 2 access
PCMCIA Slot 0 IRQ and Controller IRQ	

Note: Disabling the Suspend timer does not disable the Off Timer.

```
Values:   0 - 63 minutes (in 1 minute increments)
Default:  5 Min
```

A value of 0 means “Disabled”.

Note: Suspend can be disabled when the MX1 is to be in a docking / charging station. See the Docked PM parameter.

Off Timer

Note: When the Off Timer parameter is set to 0, the MX1 will skip Critical Suspend mode and turn off immediately. It will not use backup battery power. The currently unsaved information is lost.

Off Timer designates, in minutes, how long the MX1 waits in critical suspend mode before shutting down.

The Off Timer begins its countdown when the MX1 is in the critical suspend state. Critical suspend state is initiated when there is a Main Battery Power Fail caused by the inserted battery pack failing or the main battery being removed from the MX1. The Off Timer begins the countdown as soon as power draw is transferred from the Main Battery pack to the Backup battery.

Note: A fully charged Backup battery can keep the MX1 in the critical suspend state for at least 5 minutes.

```
Values:   0 - 63 minutes (in 1 minute increments)
Default:  5 minutes
```

The backup battery will continue to operate the MX1, in very low power mode, for the number of minutes set in the Off Timer parameter.

When the MX1 is in critical suspend mode the main battery icon appears on the screen, all peripherals shut down, the CPU clock is stopped, power is removed from the PCMCIA cards, and the Status LED is blinking red.

The MX1 is saving the state prior to the main battery failing and cannot be used.

- If a fully charged main battery pack is installed before the Off Timer time expires the MX1 will transition to Suspend. Exiting from Suspend allows the MX1 to resume operation where it left off – install the new battery pack.

- If the Off Timer expires the MX1 will turn itself off and all unsaved information is lost. Insert a fully charged battery pack and press the Power button to turn the MX1 back on.
- When the Off Timer parameter is set to 0, the MX1 skips the critical suspend state and turns off immediately – it will not use backup battery power. The currently unsaved information is lost.
- When the main battery pack is removed and the MX1 completely drains the backup battery, the MX1's date and time settings are lost but all other parameters are recovered. When a fully charged battery pack is again inserted in the MX1, the backup battery will recharge itself using the power in the battery pack. The main battery life during the recharge session is lessened.

Docked PM

Use the Docked PM parameter to set the power management preferences for the MX1 when it is in a docking / charging station. Some LXE approved docking / charging stations allow RF communications while the MX1 is in the dock.

Selecting *Lights Off* will turn off the display and keypad backlights.

Selecting *Unchanged* maintains the current power management settings.

Selecting *Off* disables power management settings when the MX1 is in a powered docking or charging station.

```
Values:     Off
            Unchanged
            Lights Off
Default:    Off
```

Touch Wake

This parameter has no effect on an MX1 without a touch screen.

Power Key

Use this option to determine how the Power key will function when pressed.

When *Disabled* is selected and the user presses the Power key, nothing happens. The user will not be able to place the unit in Suspend with the Power key or turn the unit off.

Note: When the Power key is disabled, the MX1 will power off only when both the Main and Backup batteries are depleted.

When *Suspend* is selected, the MX1 will enter Suspend state upon a Power key press.

When *No Susp* is selected and the user presses the Power key, nothing will happen unless the user holds the key down for 4 beeps. In other words, the user cannot suspend the MX1. The user can only turn the MX1 off.

When *Suspend-Off* is selected, the user can both suspend and power off the MX1. If the user holds the Power key down for less than 4 beeps, the MX1 will transition to the Suspend state. If the user holds the Power key down for 4 beeps, the MX1 will power off.

```
Values:       Disabled
              Suspend
              No Susp
              Suspend-Off
Default:      Susp-Off
```

Before leaving this screen, make sure the Power Key status is correct.

Troubleshooting

The MX1 will not turn off -- force the MX1 to power off by holding the Power key down for 15 seconds -- the MX1 will power off. Locate and correct the problem before powering the MX1 back on – e.g. IRQ conflict, very low battery power, radio conflict, unexpected software application result, etc.

Keyboard

When changes have been made, press an arrow key to go to another parameter or menu or press ESC to go to the Exit Menu.

Caps

This parameter is used to determine whether the CAPS function is turned on or off at bootup.

```
Values:   On, Off
Default:  Off
```

NumLock

Use this option to set NumLock at boot time. When NumLock is On, the keypad is locked in numeric mode.

Alpha-Numeric - Whether NumLock at Boot is Off or On, no icon is displayed on the screen and the keypad functions normally. To enter "number" number keys instead of "alpha" number keys, the user must press 2ND+SHIFT plus the number key when NumLock is On. After bootup, pressing the 2ND+SHIFT+RightArrow toggles NumLock on and off. See Appendix A, "Key Maps".

Numeric-Alpha - When NumLock is Off, the Alpha icon is displayed on the screen and the number keys function as alphabetic keys. When NumLock is On, the Alpha icon is not displayed on the screen and the number keys function as number keys. Toggling between Alphabetic and Numeric modes is accomplished by pressing the A/# key.

Note: ***Numeric-Alpha Only.*** *NumLock and the A/# key are two separate entities. The A/# key toggles between the number and alpha legends on the keypad. NumLock state determines if scan codes for the number keys on a 101-key keyboard's number keypad can be generated by pressing 2nd+SHIFT+number. The number keypad numbers can be generated if NumLock is On.*

When the keypad is in numeric mode and the user wants to type one alpha character within a sequence of numbers, pressing 2nd plus Enter key will toggle the keypad to alpha mode for one character – the next key pressed. Then the keypad returns to numeric mode.

```
Values:   On, Off
Default:  On
```

Rpt Delay

The Rpt Delay parameter will designate the period of time from the depression of a key until the key repeats.

```
Values:     0.25 to 2.00 second
            (0.25, 0.5, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00)
Default:    0.5 seconds
```

Rpt Rate

The Rpt Rate parameter sets the number of times a keystroke will be repeated, per second, as the key is depressed.

```
Values:     2 to 30 chars per second
            (2, 6, 10, 15, 20, 30)
Default:    10 chars per second
```

CtlAltDel

This parameter determines whether the user can restart the MX1 by pressing the reboot key sequence: CTRL+ALT+DEL.

When this parameter is *No Reboot*, the reboot key sequence will have no effect.

```
Values:   Reboot, No Reboot
Default:  Reboot
```

Other

When changes have been made, press an arrow key to go to another parameter or menu or press ESC to go to the Exit Menu.

Font

The Font parameter selects the screen display font size.

Note: This font size choice may be overridden by an application.

```
Values:     8x8
            8x16
Default:    8x16
```

COM1 Pin9

This option is used to configure the serial port COM1. The MX1 COM1 port is the endcap port – scanner, RS-232, plain and scanner/RS-232 combination.

```
Values:     RI (Ring Indicator)
            5V
Default:    RI
```

Note: This setting is overridden by the BIOS when a scanner, plain, or scanner/RS-232 combination endcap is present. This setting should be changed to 5V by the user when an RS-232 endcap is installed.

Exit Menu Options

To edit parameters, use the up and down arrow key to move from parameter to parameter.

Press F1 to activate the help screen then use the panning function to move around the help screen. Press ESC to close the help screen.

Use the left and right arrow keys to move from menu to menu.

Press the ESC key or key sequence to go directly to the Exit Menu.

As changes are made to Setup values and the values saved, the next time the MX1 is turned on or rebooted, those saved values will be in effect.

Save and Exit

Use this option to immediately save current Setup settings to CMOS RAM and into the Flash Boot Device (FBD).

When “Save and Exit” is highlighted, press <Enter> to save. When the saving process is complete, press <Enter> again to exit and reboot with the current values.

Exit w/o Save

Use this option when any current changes made to Setup parameters are to be ignored. The parameters revert to their state when Setup was entered.

When this option is highlighted, press <Enter> and the boot process continues. The system reboots with unchanged values.

Load Defaults

This option is used to reset the Setup values to the original, default values that were set at the factory, before suppliers or end users made changes.

As changes are made to Setup values and the values saved, the next time the MX1 is turned on or rebooted, those saved values will be in effect.

Save this change by selecting “Save and Exit”.

Load Previous

Use this option to immediately restore CMOS RAM and update the current Setup settings from the Flash Boot Device.

Save this change by selecting “Save and Exit”.

Save Changes

Used to save BIOS Setup changes without rebooting. The changed parameters will be in effect the next time the MX1 is powered on or rebooted.

Reboot by selecting either “Exit w/o Save” or “Save and Exit”.

API Calls

See Also: LXE DOS API Programming Guide E-SW-DOSAPIPG-A

The LXE DOS Computer Application Programmer's Interface (API) is designed to enable application programmers to access the functionality of the computer hardware without requiring them to understand the details of the hardware design.

The LXE MX1 Hand-Held Computer is architecturally an AT Clone with power management features required for mobile use. Like all AT computers, it uses a BIOS software layer to provide a hardware programming interface to both DOS and the Application Programs. It is functionally a 486 mobile AT customized for data collection applications. Both BIOS and DOS are available for programming ease, but applications must be customized to make use of the enhanced features as well as to operate with the reduced function LCD and keypad. The MX1 is not designed to be a general-purpose computer.

API services are accessed through software interrupts 10h and 15h. The 486 API is the application-level and driver-level software interface for all of the unique MX1 hardware.

A simple register-based procedure parameter passing architecture has been implemented with a similar structure used by IBM BIOS. All procedural calls to the 486 API microcode is to be done via a software interrupt.

Sample Code for API Calls

The following is a brief code segment that enables the scanner on the combination Scanner/RS-232 endcap, demonstrating the proper use of API calls:

```
#include <stdio.h>
#include <dos.h>

#define PROT_INT        0x15
#define PROT_EXT        0xba
#define SCAN_CONTROL    0x56
#define COM1_MODE       0x41
#define SCANNER         0x00
#define RS_232          0x01

union REGS        inRegs, retRegs

main(){

      inRegs.h.ah=PROT_EXT;
      inRegs.h.al=SCAN_CONTROL;
      inRegs.h.bh=COM1_MODE;
      inRegs.h.bl=SCANNER;
      int86(PROT_INT, &inRegs, &retRegs);

}
```

Chapter 5 Utilities

Introduction

Note: Make sure there is a fully charged battery in the MX1 ***before*** *beginning a process described in this chapter. When using the Docking Cradle power supply, make sure there is an uninterrupted power source during file transfer.*

This chapter contains descriptions and instructions for the following MX1 resident utilities:

LXE BCWEDGE

This Terminate and Stay Resident (TSR) program is used to redirect input from COM1 or COM2 to the BIOS key ring buffer. With this TSR running, input from a communication port appears as if it was typed in from the keyboard.

This utility is most useful with applications that do not know about the MX1's scanner that is connected to COM1. This utility, therefore, allows an off-the-shelf application to accept barcode data.

LXE Diagnostics

Use the utility programs to verify, test and program the MX1:

- Comm Port Utility
- Keyboard Utility
- Display Utility
- File Transfer Utility
- Scanner Config Utility
- Beeper Utility
- Battery Discharge Utility
- Backup Battery Test Utility
- Parameter Auto-Detection Utility
- Set an API Function

NED ASCII Text Editor

A menu-based text editor provided for use with ROM-DOS. This editor uses the standard Microsoft Windows interface for cut, copy and paste.

Serial File Transfer Utility

The file transfer utility consists of two programs.

- REMSERV is run on the host computer, usually the mobile computer.
- REMDISK is run on the client computer, usually a desktop or laptop PC.

The computers are connected with a null modem cable. This utility moves files from one computer to the other over the serial line using DOS Copy or Xcopy commands.

LXE BCWEDGE

This DOS based utility, BCWEDGE.EXE, is installed on a **batch** MX1 by LXE.

This Terminate and Stay Resident (TSR) program is used to redirect input from COM1 or COM2 to the BIOS key ring buffer. This DOS based utility enables the use of a barcode scanner on a COM port, provided power is available on that port. The software interprets data from the scanner as keyboard data, thus it will work with DOS applications such as EDIT. It will not function on Microsoft Windows 95 platforms.

When a terminal emulator program is started after the wedge utility has initialized, the keyboard interrupt used by the wedge utility is trapped and used by the terminal emulator. The keyboard interrupt needed by the wedge utility is no longer available.

Note: It is the responsibility of the application programmer to make the MX1 beep on errors, etc., when running the wedge utility.

Parameters

Command line:

```
BCWEDGE c=# b=baud s=dps [opt unitname]
```

Example:

```
BCWEDGE c=1 b=9600 s=8N1 2330
```

Sets BCWEDGE to use COM1, 9600 baud, 8 data bits, no parity, and 1 stop bit on an MX1 platform.

The command to unload the wedge TSR is BCWEDGE -u.

Default options for BCWEDGE are: COM1, 9600 baud, 8, N, 1. Options are not case sensitive.

-h	Displays BCWEDGE command line options.
-u	Uninstall the TSR
c=#	Communications port. Default: COM1 Options: 1, 2 *Note: The optional endcaps on an MX1 are COM1. The MX1's IR Port is COM2.*
B=baud	Sets the baud rate. Default: 9600 Options: 9600, 19200

s=dps	data / parity /stop **Data** Default: 8 Options: 5, 6, 7, 8 **Parity** Default: N Options: N, O, E, M, S (None, Odd, Even, Mark, Space) **Stop** Default: 1 Options: 1, 2
unitname	Optional. Enables the scanner for the specifically designated computer. Default: 2330 Options: 1330, 2330

LXE Diagnostics

Note: Make sure there is a fully charged battery in the MX1 ***before*** *beginning a diagnostic process. When using a Docking Cradle power supply, make sure there is an uninterrupted power source.*

The MX1 comes equipped with several utility programs. These programs can be run to make adjustments as indicated.

LXE does not recommend running these commands in a DOS window from any Microsoft Windows application.

BBDIS35.EXE	Battery Discharge Utility Condition the 50 mAh NiCd Backup Battery mounted on the system board. The battery discharge starts and when discharged switches to backup battery charge mode.
BBTST35.EXE	Backup Battery Test Utility Indicates the current status of the backup battery and the voltage.
COMTST35.EXE	Communication Port Utility To diagnose the serial communication port, a simple loop back test routine is included in this file. The figure showing how to build a loop back plug is included in this chapter. The test results will read PASS or FAIL. A failure is identified and described.
DISP35.EXE	Display Utility Activates every pixel on the display to verify functionality.
KEY2335.EXE	Keyboard Utility This utility performs a contact functional test of each key on the keyboard. When activated, the key labels appear on the screen and then each key, when initialized, clears the key label from the screen.
LXEF.EXE	File Transfer Utility Transfer files to and from a PC through either the MX1's serial port or IR port, as well as act as the agent for the Win32 Developer Toolkit Application.
PARAM35.EXE	Parameter Dump Utility This utility collects the setup configurable parameters and lists them in a text file.
SCU35.EXE	Scanner Configuration Utility Allows programming multiple scanners with the same data.
SETAPI_4.EXE	Set An API Function Runs an API call to set a mode or change a parameter.

Backup Battery Test Utility (BBTST35.EXE)

This command is run at the DOS prompt. There are no parameters. Run this command file to view the current status of the backup battery and the voltage. If the backup battery needs to be replaced, the unit must be returned to LXE for service (see Chapter 1, "Introduction", section titled "Getting Help".)

Battery Discharge Utility (BBDIS35.EXE)

This command is run at the DOS prompt. There are no parameters. Use this command file to condition the backup battery mounted on the system board. When the program is initiated, the battery discharge process begins, "Discharging" is displayed on the screen and the voltage changes are displayed. When discharge is complete (at approximately 4V), the battery charge process begins. The word "Charging" appears on the screen and the voltage changes are displayed.

If the backup battery needs to be replaced, the unit must be returned to LXE for service (see Chapter 1, "Introduction", section titled "Getting Help".)

Communication Port Utility (COMTST35.EXE)

This command is run at the DOS prompt. There are no parameters. **The program requires LXE cable part number 155746-0001**.

This command file is used to test the TX, RX and handshaking lines of the unit's COM port. A loopback connector is needed to perform this test. The configuration of the connector for each RS-232 endcap follows.

Note: The optional endcap with an RS-232 serial port, when installed in the MX1, is COM1. An MX1 scanner endcap is COM1. An MX1 scanner / RS232 endcap is COM1. The MX1's IR Port is COM2.

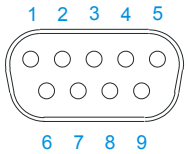


Figure 5-1 MX1 RS-232 Endcap Serial Connector (COM1) and Pinout

Pin	Signal	Description
1	DCD	Data Carrier Detect – Input
2	RXD	Receive Data – Input
3	TXD	Transmit Data – Output
4	DTR	Data Terminal Ready – Output
5	GND	Signal/Power Ground
6	DSR	Data Set Ready – Input
7	RTS	Request to Send – Output
8	CTS	Clear to Send – Input
9	RI or +5V DC	Ring Indicator – Input (Default) or Bar Code Scanner Power -400mA max (Use BIOS Setup software to configure)

RS-232 Endcap COM Port Loopback Configuration

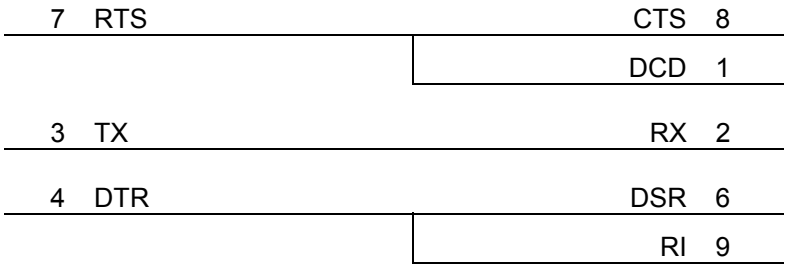


Figure 5-2 RS-232 Endcap COM Port Loopback Configuration

RS-232/Scanner Endcap Connector

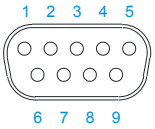


Figure 5-3 MX1 RS-232/Scanner Endcap Serial Connector (COM1) and Pinout

Pin	Signal	Description
1	DCD	Data Carrier Detect – Input
2	RXD	Receive Data – Input
3	TXD	Transmit Data – Output
4	DTR	Data Terminal Ready – Output
5	GND	Signal/Power Ground
6	DSR	Data Set Ready – Input
7	RTS	Request to Send – Output
8	CTS	Clear to Send – Input
9	RI	Ring Indicator – Input (Default)
	or	or
	+5V DC	Bar Code Scanner Power -400mA max (Use BIOS Setup software to configure)

RS-232/Scanner Endcap COM Port Loopback Configuration

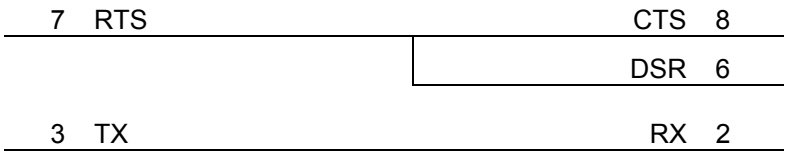


Figure 5-4 RS-232/Scanner Endcap COM Port Loopback Configuration

Display Utility (DISP35.EXE)

This command is run at the DOS prompt. There are no parameters.

Run this command file to test the screen display. It will draw a border around the display, wait for an <Enter> keypress, and then fill the inside of the box by turning on all the pixels. There are a total of 160 pixels across and 160 pixels down the display area – 0,0 is located at the upper left and 159,159 is located at the lower right.

File Transfer Utility (LXEF.EXE)

(Obsolete -- Replaced by REMSERV and REMDISK)

The LXEF.EXE utility gives you the ability to both transfer files to and from a PC through either the MX1's serial port or IR port, as well as act as the agent for the Win32 Developer Toolkit Application. If neither the transmit file (/t) or the receive file (/r) option is specified, LXEF runs in client mode, and will respond to both file transfer requests and remote information requests from the Win32 Developer Toolkit Application.

Syntax:

```
LXEF  [ /option1 /option2 … ] [ filename ]
```

Options:

/Com? [: #]	where either Com1 or Com2 is used to indicate which com port is to be used and optionally # can be set to represent the baud rate. E.g.: /Com2:9600 (default) tells the utility to use the serial transfer protocol through com2 at 9600 baud. The serial protocol is also compatible with multiple LXE MX1's running concurrently in LXE's powered docking cradles.
/Irda [: #]	where Irda indicates that the utility should use the IrDA protocol through the IrDA port. # represents the baud rate and by default (and with some of the cradles) is set to 9600 baud.
/h	displays the help message for the LXEF command.
/o	Existing files may be overwritten during file transfers. If this option is not used, file transfers will return an error if the specified file exists.
/r	receives the specified file and then LXEF exits.
/t	transmits the specified file and then LXEF exits.
/q	Indicates that the LXEF utility should restrict its display messages to a minimum.

Filename is either the name of the file to send or receive if LXEF is being used to transfer files.

Keyboard Utility (KEY2335.EXE)

This command is run at the DOS prompt. There are no parameters.

Use this command file to display the keyboard key labels on the screen. As each key is pressed, its label is cleared from the screen.

Parameter Auto-Detect Utility (PARAM35.EXE)

The Parameter Auto-Detect Utility (PARAM35.EXE) is used to search for user-configurable parameter files and then write the data to a text file. The utility is a DOS stand-alone program -- it does not require that other files (except standard DOS operating system files) be present in the MX1 before it will run.

The utility captures data from the following files:

AUTOEXEC.BAT	DOS command file. See Chapter 4, “System Configuration”.
CONFIG.SYS	DOS command file. See Chapter 4, “System Configuration”.
LXE.INI file	LXE terminal emulation parameter file.
PROTOCOL.INI file	Radio command file. See Chapter 4, “System Configuration”.
PCTCP.INI file	Radio command file. See Chapter 4, “System Configuration”.
BIOS Setup	The MX1 setup parameters. See Chapter 4, “System Configuration”.

and places the data in an ASCII text file called PARAM.DAT.

The text file should then be printed out or copied to a PC or floppy disk and stored for safekeeping. The information in the text file may be used, as a reference, to reconstruct parameter values if the files become unreadable or to program several MX1’s with the same values.

The Parameter Auto-Detect Utility filename is PARAM35.EXE and it creates a text file called PARAM.DAT. The PARAM.DAT file may be renamed and the next time PARAM35.EXE is run, a new PARAM.DAT file will be created. The combined file size is approximately 50K and both files may be deleted from the MX1 if more disk space is needed in the unit.

Run Parameter Auto-Detect Utility

The file must be run from the DOS command line.

Using DOS commands, change the DOS prompt to the drive letter and subdirectory of the DOS files (for example, C:>\DOS).

At the DOS prompt type the following command to run the utility:

`PARAM35` and press Enter.

The PARAM.DAT file is created and stored in the DOS subdirectory on the MX1.

Use DOS commands to copy the PARAM.DAT file to another media or print the file.

Scanner Configuration Utility (SCU35.EXE)

This utility allows programming multiple scanners with the same data. It copies barcode setup parameters from one barcode scanner and places them in a file. The file can then be sent to another barcode scanner, and when the receiving unit reboots, the receiving unit's initial scanner configuration is replaced with the new configuration. This utility is used for MX1's with a scanner endcap and the RS-232/Scanner endcap.

This command is run at the DOS prompt.

The file can be sent to another MX1 using the MX1's IR ports. The file can be transferred from one MX1 to another on an SRAM card. Or, the file can be transferred to a PC with a data transfer communication program installed and a commercially available null modem cable attached to a serial port. The cable must have a connector compatible with the MX1's RS-232 endcap's DB9 female connector (micro D style 9 pin for the RS-232/scanner endcap) and the calling PC.

The MX1 is set up with data transfer communication parameters of 9600 baud, 8 data bits, 1 stop bit, and No parity when the SCU35.EXE utility runs on the MX1.

Menu Options

1. Parameter Request

   Select this option to collect barcode configuration data from a barcode scanner.

   The data is stored in a file on the calling PC. Give the file an 8-character name, using standard DOS naming conventions, e.g. *yourfile*. No extension is necessary. Press <Enter>.

   The scanner configuration file is given an extension of .SCN. The file can be copied to another directory or PC or renamed after it's creation.

2. Parameter Send

   Select this option to send barcode configuration data to a barcode scanner.

   When "Open File" appears on the screen, type the name of e.g. *yourfile* and press <Enter>. The receiving MX1 reboots when the scanner configuration file has finished transferring.

3. Exit

   Select this option to exit the scanner configuration utility.

Set An API Function (SETAPI_4.EXE)

This command is run at the DOS prompt.

Run this command at the DOS prompt to set a mode or change a parameter.

All arguments are in HEX format. Put an X in the place of arguments that are not used.

Format for INT 10:

SETAPI_4 *arg1 arg2 arg3 arg4 arg5 arg6*

where

- *arg*1 is always 10
- arg2 - (AH) = 12
- arg3 - (BL) = BA (Panning) or BC (DOS Font)
- arg4 - (AL) = Function Requested
- arg5 - (BH) = Value Requested
- arg6 - (CX) = Value Requested

Format for INT 15:

SETAPI_4 *arg1 arg2 arg3 arg4 arg5 arg6 arg7*

where

- *arg1* is always 15
- arg2 - (AH) = BA
- arg3 - (AL) = Service Group
- arg4 - (BH) = Function Number
- arg5 - (BL) = Action
- arg6 - (CX) = 16 Bit Register Value (where appropriate)
- arg7 - (DX) = 16 Bit Register Value (where appropriate)

INT 15 Example:

Sound Beeper `SETAPI_4 15 BA 53 4 30 07D0 000A`

Please refer to the "LXE DOS API Programming Guide", for complete information about the MX1 Application Programming Interfaces.

The NED ASCII Text Editor

NED uses the standard Microsoft Windows interface for cut, copy, and paste operations. Del and Shift+Del both move the selected block to the clipboard. There is no true undo command, but Ctrl+V or Shift+Ins may be used to paste the clipboard contents to the current cursor position. Table 1 lists all the default shortcut keys.

The NED editor is a menu-based text editor available for use with ROM-DOS. This editor is similar to other desktop editors but has special functions designed for use in editing C-source and assembly code.

To start the editor, enter

```
NED [filename] [filename]
```

NED may be initiated with or without filename arguments. Wildcard file specifications are allowed.

Up to ten files can be entered on the command line. If NED is run without arguments, it loads all files accessed during the last editing session, returning you to the exact position in the file. You can switch between the open files.

You can also enter

```
NED @errfile
```

where *errfile* is the name of your compiler error output file. NED loads all files that had errors and allows you to move between errors.

Once NED is running, you may load files into memory by using the File/Open menu command. File/Reload replaces the current file with a new file or reloads a new copy of the same file. File/Reload confirms before replacing an unsaved file.

- If a search string is all lowercase, NED treats it as a case-insensitive search. If a search string contains any uppercase letters, it is case sensitive. The replacement string is inserted exactly as entered. Repeating a Search command repeats the last Forward or Backward Search operation, not the last Replace operation.
- There is one bookmark for all files. Once the bookmark is set, going to the bookmark returns you to the file and position where you set it.
- The Indent and Remove-indent (referred to as Undent in the Options/Do Command) commands work on tabs. Indent inserts a tab at the beginning of the current line, or if a block is active, at the beginning of each line in the block. Remove-indent removes the first tab from the current line or from each line in the block. If there are no tabs, Remove-indent has no effect.
- Toggle case inverts the case of the current character if no block is active. If a block is active, Toggle case sets the entire block to uppercase if the first character was lower and to lowercase if the first character was uppercase.
- Tabs are currently set to 3 for .C, .H, .CPP, .HPP, and .T files. They are set to 8 for all other files.
- File/Print prints the current block if there is one, otherwise it prints the current file. NED prompts for a device to print to, which may be a filename. Tabs are expanded to spaces.
- The Options/Do Command is intended primarily for debugging. This command allows you to execute any editor command by choosing it from a menu list.
- The macro commands (Record Macro/Play Macro) allow you to define a sequence of keystrokes that can be repeated repetitively. Select Record Macro (ALT=), enter the

keystrokes, then press ALT= again. The macro sequence can be played by selecting Play Macro or by pressing ALT-. Keyboard bindings are saved in NED.CFG in the same directory as NED.EXE. NED.CFG also contains the list of active files and positions.

- If you record and play a recursive macro, it plays continuously.
- If you press an invalid key on a menu, NED operates as if you pressed enter.
- If you run out of memory, such as when you have more than 300KB of files open, NED returns to DOS.

NED Default Hot Keys

Many of the editor commands can be accessed directly by pressing key combinations. For example, press Alt-X to exit the editor and save any open files. The following table lists the default hot keys.

Key	Function	Key	Function
Alt-Q	Quit without saving	F1	Help
Alt-X	Exit, saving as needed	F7	Load file into current buffer
Ctrl-A	Search again	F9	Save file
Ctrl-B	Search backward	F10	Exit asking for save as needed
Ctrl-C	Copy the block to clipboard	Left-Arrow	Left one character
Ctrl-D	Find the mark	Right-Arrow	Right one character
Ctrl-E	Erase to end-of-line	Up arrow	Up one line
Ctrl-F	Search forward	Down arrow	Down one line
Ctrl-G	Go to a line number	Home	Beginning of line
Ctrl-I	Indent the block	End	End of line
Ctrl-K	Toggle block mode	Page Up	Up one screen
Ctrl-L	Delete line to the clipboard	Page Down	Down one screen
Ctrl-M	Set the mark	Center (5)	Center the cursor onscreen
Ctrl-N	Read a file into a new buffer	Ctrl-Left-Arrow	Left one word
Ctrl-P	Move to the previous position	Ctrl-Right-Arrow	Right one word
Ctrl-Q	Quote the next character	Ctrl-Up-Arrow	Up one C function
Ctrl-R	Replace text	Ctrl-Down-Arrow	Down one C function
Ctrl-S	Switch to the next buffer	Ctrl-Home	Scroll toward beginning of file
Ctrl-T	Toggle the case of character(s)	Ctrl-End	Scroll toward end of file
Ctrl-U	Remove indent from the block	Ctrl-Page	Up Beginning of file
Ctrl-V	Insert the clipboard	Ctrl-Page	Down End of file
Ctrl-W	Delete word to the clipboard Ins	Toggle	Insert/Overwrite mode
Ctrl-X	Delete block to the clipboard	Del	Delete character
Ctrl-Z	Cancel the selected block	Backspace	Delete character backward
Alt =	Start/end recording macro	Ctrl-Ins	Copy block to clipboard.
Alt -	Playback macro	Ctrl-BackSpace	Delete word backward
Alt-F7	Previous error	Shift-Ins	Insert the clipboard
Alt-F8	Next error	Shift-Del	Delete block to clipboard

Serial File Transfer Utility

A null modem cable must be used to connect the two computers. Both computers must have both REMSERV and REMDISK set to the same settings. REMSERV is run on the host (which is usually the mobile computer). REMDISK is run on the client (which is usually a desktop or laptop PC).

Using this utility you can move files from one computer to the other over the serial line using the DOS Copy or Xcopy commands.

REMSERV

```
REMSERV.EXE  d: [/T] [/H] [/Bxxxx][+|-] [/COMn] [/IRQn]
```

/Bxxxx	Set the baud rate. Choose from 300, 1200, 2400, 19200, 38400, 57600, 115. A '+' after the BAUD specifies 'packet' style transfers. By default, packet transfers will be used for all baud rates higher than 9600. Use '-' after the BAUD to force polling operation under Microsoft Windows 95. Both sides must agree on using either '+' or '-'.
/COMn	Set the communications port. Choose 1, 2, 3 or 4.
/IRQn	Set the IRQ for the communications port. choose 3-15.
/S	Silent (no output)
/Tnnn	Set the timeout in seconds. Choose 2-3640, 15 seconds is not unusual for FLASH drives.
/H	Use Hardware Handshaking for flow control.

Example:

```
REMSERV D: /B38400- /COM2 /T10
```

Default:

```
/B115+ /COM1 /T2
```

REMDISK

```
REMDISK  [/?] [/U] [/T] [/H] [/Bxxxx][+|-] [/COMn] [/IRQn]
```

/Bxxxx	Set the baud rate. Choose from 300, 1200, 2400, 19200, 38400, 57600, 115. A '+' after the BAUD specifies 'packet' style transfers. By default, packet transfers will be used for all baud rates higher than 9600. Use '-' after the BAUD if REMSERV is running under Microsoft Windows 95. Both sides must agree on using either '+' or '-'.
/COMn	Set the communications port. Choose 1, 2, 3 or 4.
/IRQn	Set the IRQ for the communications port. Choose 3-15.
/Tnnn	Set the timeout in seconds. Choose 3-3640, 15 seconds is not unusual for FLASH drives.
/H	Use Hardware Handshaking for flow control.
/U	Unload REMDISK from memory

Examples:

```
(in CONFIG.SYS)     DEVICE=REMDISK.EXE /T15
(in AUTOEXEC.BAT)   REMDISK /B9600 /COM2 /T10
```

Default:

```
/B115K+ /COM1 /T3
```

IRSEND and IRECV Files

Compile IRSEND.C and IRECV.C files using Borland C/C++ Version 4.5 compiler. The "include" files listed are standard Borland C/C++ Version 4.5 library files.

Note: When using these files, the receiving MX1 or PC must have IRPLUS.EXE and IRECV files loaded. The sending MX1 or PC must have IRPLUS.EXE and IRSEND loaded.

IRSEND.C

```
#include  <stdio.h>
#include  <ctype.h>
#include  <io.h>
#include  <fcntl.h>
#include  <sys\stat.h>
#include  <conio.h>
#include  <dos.h>
#include  <bios.h>
#include  <time.h>

#define BUF_SIZE 4096   // 60
char          buf[BUF_SIZE];

void delay_ms(unsigned int tm)
{
clock_t tmp, endTm;

    tmp = clock() + tm;
    while (1) {
        endTm = clock();
        if (endTm > tmp);
           break;
    }
}

unsigned stopExec() // return TRUE if "ESC" key or "CONTROL D" key
{
int key;

     /* Read and display keys until ESC or "CNTL D" is pressed. */
     while( kbhit() ) {
        /* If first key is 0, then get second extended. */
        key = getch();
        if( (key == 0) || (key == 0xe0) )
               key = getch();

        /* Echo character response to prompt. */
        if(( key == 0x1b) || ( key == 4)) // "ESC" key or "COntrol D"
                    return (1);
     }

    return (0);
}
```

```
void main (int argc, char *argv[])
{
int       status, count, fh, i, comPort = 0xffff;
unsigned long    bytesSend = 0;
unsigned char    *c;
clock_t      start, tmp;

   /* IS.EXE filename */

   fprintf(stderr, "\nIrPlus Version 1.00, write size %d bytes.\n",
BUF_SIZE);

   // check which COM port
   __asm {
      mov ax, 0ffffH
      mov dx, 0ffffH
      int 14H
      cmp ax, dx
      jz  COMM
      jmp DONE
   COMM:
      mov comPort, ax
   DONE:
   }
   if (comPort < 0) {
      fprintf(stderr, "IrPlus is not installed.\n");
      return;
   }
   if (argc <= 1) {
      fprintf(stderr, "enter a filename to send.\n");
      return;
   }
#if 0
   /* comPort 0 for COMM1 */
   if (((status = _bios_serialcom(_COM_STATUS, comPort, 0)) < 0)) {
      fprintf(stderr, "IrPlus does not exit, status %x\n", status);
      return;
   }
#endif
   /* open file */
   if ((fh = open(argv[1], O_RDONLY|O_BINARY)) == -1) {
      fprintf(stderr, "cannot open the %s file.\n", argv[1]);
      return;
   }

   /* open connection */
   fprintf(stderr, "connecting...\n");
   __asm {
      mov ax, 0fffeH
      mov dx, comPort
      int 14H
      mov status, ax
   }

   if (status < 0) {/* cannot open connection */
      close(fh);
      fprintf(stderr, "connection timeout\n");
      goto CLOSE_CONN; //return;
   }
   else
      fprintf(stderr, "sending file %s \n", argv[1]);
```

```
    //delay_ms(2000);
    start = clock();
    status = 0;
    while (status >= 0) {
        if (stopExec())
            break;
        putchar('|');
        count = read(fh, buf, sizeof(buf));
        if (! count) {
            fprintf(stderr, "\nsend complete\n");
            break;
        }
        if (count == -1) {
            fprintf(stderr, "\nreading %s error\n", argv[1]);
            break;
        }
        /* send data */
        for (c = buf, i = 0; i < count; i++, bytesSend++) {
            //while (_bios_serialcom(_COM_STATUS, comPort, 0) < 0){;}
            /* send a char */
            if ((status = _bios_serialcom(_COM_SEND, comPort, *c++)) < 0) {
                fprintf(stderr, "\nsend error %x\n", status);
                break;
            }
            if (! (bytesSend & 0x00ff))
                putchar('.');
        }
    }

    start = clock() - start;
    fprintf(stderr, "\n%lu ms\n", start);

    fprintf(stderr, "send %lu bytes\n", bytesSend);
#if 0
    // close 5 second later
    start = clock() + 5000;
    while (1) {
        tmp = clock();
        if (tmp > start)
            break;
    }
#endif
    close(fh);

CLOSE_CONN:
    /* close connection */
    __asm {
        mov ax, 0ffffH
        mov dx, comPort
        int 14H
        mov status, ax
    }

    if (status < 0) {/* cannot disconnection */
        fprintf(stderr, "disconection failured, status %x\n", status);
    }

}
```

IRECV.C

```
#include  <stdio.h>
#include  <ctype.h>
#include  <io.h>
#include  <fcntl.h>
#include  <sys\stat.h>
#include  <conio.h>
#include  <dos.h>
#include  <bios.h>

#define   BUF_SIZE  4096   // 60
char      buf[BUF_SIZE];

unsigned stopExec() // return TRUE if "ESC" key or "CONTROL D" key
{
int key;

    /* Read and display keys until ESC or "CNTL D" is pressed. */
    while( kbhit() ) {
        /* If first key is 0, then get second extended. */
        key = getch();
         if( (key == 0) || (key == 0xe0) )
            key = getch();

         /* Echo character response to prompt. */
         if(( key == 0x1b) || ( key == 4))     // "ESC" key or "COntrol
D"
                  return (1);
     }

   return (0);
}

void main (int argc, char *argv[])
{
unsigned char    *c;
unsigned long    bytesRecvd = 0;
int       status, comPort = 0xffff;
int       fh;
unsigned int     i, writen;

     /* IR.EXE filename */

   fprintf(stderr, "\nIrPlus Version 1.00, read buffer size %d bytes.\n",
BUF_SIZE);

   // check which COM port
   __asm {
      mov ax, 0ffffH
      mov dx, 0ffffH
      int 14H
      cmp ax, dx
      jz  COMM
      jmp DONE
   COMM:
      mov comPort, ax
   DONE:
   }
   if (comPort < 0) {
      fprintf(stderr, "IrPlus is not installed.\n");
      return;
   }
```

```
    if (argc <= 1) {
        fprintf(stderr, "enter a filename.\n");
        return;
    }
#if 0
    /* comPort 0 for COMM1 */
    if (((status = _bios_serialcom(_COM_STATUS, comPort, 0)) < 0)) {
        fprintf(stderr, "IrPlus does not exit, status %x\n", status);
        return;
    }
#endif
     fh = -1;
     if (_dos_creat((const char *)argv[1], _A_NORMAL, &fh) != 0) {
        fprintf(stderr, "cannot create a file %s\n", argv[1]);
        return;
     }
     if (fh < 0){
        fprintf(stderr, "cannot open a file %s\n", argv[1]);
        return;
     }

    /* open connection */
    fprintf(stderr, "connecting...\n");
    __asm {
        mov ax, 0fffeH
        mov dx, comPort
        int 14H
        mov status, ax
    }

    if (status < 0) {    /* cannot open connection */
        close(fh);
        fprintf(stderr, "connection timeout\n");
        goto CLOSE_CONN; //return;
    }
    else
          fprintf(stderr, "write to file %s\n", argv[1]);

     /* read data */
     for (i = 0, c = buf; (1); bytesRecvd++) {
#if 1
        if (stopExec())
           break;
#endif
        if (! (bytesRecvd & 0x00ff))
           putch('.');
          status = _bios_serialcom(_COM_RECEIVE, comPort, 0);
          if (status < 0)
          {       /* timeout */
               if (i) {
               putch('|');
                      if (_dos_write(fh, buf, i, &writen) != 0)
                      fprintf(stderr, "\nwrite file error3\n");
                  else {
                         if (i != writen)
                         fprintf(stderr, "\nwrite file error4\n");
                     }
              }
              break;
         }
```

```
            *c++ = (unsigned char)status;
            if (++i >= sizeof(buf)) {
              putch('|');
                  if (_dos_write(fh, buf, i, &writen) != 0) {
                      fprintf(stderr, "\nwrite file error1\n");
                      break;
                  }
                  if (i != writen) {
                      fprintf(stderr, "\nwrite file error2\n");
                      break;
                  }
                   i = 0; c= buf;
            }
        }

        _dos_close(fh);
        fprintf(stderr, "\n%lu bytes received\n", bytesRecvd);

    CLOSE_CONN:
        /* close connection */
        __asm {
            mov ax, 0ffffH
            mov dx, comPort
            int 14H
            mov status, ax
        }

        if (status < 0) {   /* cannot disconnection */
            fprintf(stderr, "disconection failured, status %x\n", status);
        }
    }
```

Chapter 6 RF Network Configuration

Introduction

> *Note: The information and programs in this section only pertain to LXE's 2.4GHz system radios. They do not work with LXE's 900MHz system radios. Set / adjust 900MHz radio parameters using the terminal emulation CONFIG utility.*

Change the 2.4GHz dio parameters by editing the NET.CFG file in the PCTCP directory. This can be done with any ASCII text editor or NED. The NET.CFG file is the configuration file used by the radio card's ODI driver. The NET.CFG file determines the wireless network name, the workstation name and other information regarding the wireless system.

2.4GHz radio parameters cannot be changed using LXE's terminal emulation (TE) configuration utilities.

The Sockets software package provides an interface to all of the TCP/IP parameters. Parameter configuration is performed by editing the file SOCKET.CFG.

Note: See section titled "Quick Start – Configure the Software" for instruction on using NED.EXE to edit the NET.CFG and SOCKET.CFG files.

SNMP DOS Agent

The SNMP DOS agent executable resides in the \AGENT directory. For information on enabling the SNMP Agent, please refer to the "DOS Autoconfigurator Instructions". For details on Agent operation, please refer to the "SNMP Agent Reference Guide". Both manuals are available in electronic format on the LXE Manuals CD.

The agent is placed into memory as a TSR and uses approximately <70k of memory. When the agent is not being polled, it is invisible to the user. When it is being polled, there is a slight delay, depending on how much data is being retrieved by the agent.

NET.CFG Parameters

Lucent Parameters

The following is a list of parameters that can be modified in the NET.CFG file for computers with Lucent 2.4GHz radios. For additional information about the parameters in this file see the WVLAN43.CFG file located in the PCTCP directory. To set the TCP/IP parameters see the *SOCKET.CFG* file documentation.

Link Support

Parameter used to define resources for the LSL.COM file. Any modifications may cause resource conflicts.

Protocol

Instructs TCP/IP stack to bind to radio driver.

WaveLAN_Network_Name

Identifies the WaveLAN network the station will connect to.

```
Valid:    0 - 32 string of printable uppercase characters.
Default:  ANY
```

Note: Setting this value to ANY will enable the station to connect to any IEEE 802.11 network.

Note: The string for WaveLAN_Network_Name is case-sensitive. The WaveLAN DOS ODI driver requires the use of only UPPERCASE characters. If you have configured the Access Points with lower-case names you will need to change your Access Point WaveLAN_Network_Name parameter to UPPERCASE characters for proper operation.

Or, place double quotes around the WaveLAN_Network_Name to allow proper operation with upper and lower case letters e.g. "NameofUnit".

Station_Name

Identifies the stations on the network. This parameter is used when performing diagnostic tests.

```
Valid:    0 to 32 string of printable characters.
Default:  station_name
```

AP_Distance

Controls the roaming sensitivity of your computer. This parameter must be set according to the settings of the WavePOINT-II access points.

```
Valid:      1=Low
            2=Medium
            3=High
Default:    1
```

Microwave_Robustness

This option should only be used when troubleshooting slow performance of the network that could be related to in-band interference from microwave ovens.

Use this option when experiencing recurrent "bursts" of in-band interference exhibited by specific units where the unit (or the access point) is close to a microwave oven or a microwave oven is located in the signal path between the unit and the access point. The radio will try to retransmit the "lost messages". When retransmission fails again, the radio in Auto Transmit Rate Select Mechanism mode will attempt to retransmit the message again at a lower data speed. (See Transmit_Rate)

Selecting "Y" will enable fragmentation of data frames when the automatic transmit rate selection switches to a lower transmit rate. Fragmentation will avoid increased vulnerability due to longer frame lengths of transmissions at lower data speeds.

```
Valid:    Y=Yes, N=No
Default:  N
```

Transmit_Rate

Controls the data rate the WaveLAN card will use. Supported rates depend on the card. If the card does not support the selected rate, the default value of 3 is selected automatically.

```
 Valid:      1=Fixed Low
             2=Fixed Standard
             3=Auto Rate Select (High)
             4=Fixed Medium
             5=Fixed High
             6=Auto Rate Select (Standard)
             7=Auto Rate Select (Medium)
Default:  3
```

Medium_Reservation

Enables RTS/CTS communications. Sets the frame length threshold that determines when the station should start using RTS/CTS.

```
Valid:    0-2347
Default:  2347
```

Note: The use of Medium Reservation is recommended in network environments where the density of the WaveLAN stations and WavePOINT-II access points is very low, and where there is poor network performance due to excessive frame collisions at the WavePOINT-II access points.

Card_Power_Management

Configures the power management used by the station in an ESS. The recommended mode is Enhanced Power Management (EPM) for hand held computers. In this mode, the station switches between Power Save Mode (PSM) and Continuous Active Mode (CAM), based on activity. Any frame transfer switches the station to CAM. Inactivity for 100ms switches the station to PSM. For vehicle mount computers, the default is CAM.

```
Valid:      0=CAM     (No power management)
            1=EPM
            2=PSM     (Maximum power savings)
Default:  1
```

Maximum_Sleep_Duration

Configures the maximum amount of time the radio will stay in Sleep mode.

```
Valid:    1-65535
Default:  100 (10 seconds)
```

Receive_All_Multicasts

Configures whether this station will receive Multicast packets.

```
Valid:    Y=Yes or N=No
Default:  N
```

Enable_Encryption

Configures whether this station will receive/send encrypted data traffic. When "Y" is chosen, the unit will be able to receive both non-encrypted data and messages encrypted with one of the listed WEP encryption key values (see Transmit_Key_ID).

If encryption is enabled (Y) while the card does not support WEP, an error is reported.

```
Valid:    Y=Yes or N=No
Default:  N
```

Transmit_Key_ID

If you enable WEP encryption, you can select one key for wireless data transmissions from the list of WEP Encryption Key Values.

Key1 abcde
Key2 0x123456789a
Key3 abcdefghijkl2
Key4 0x112233445566778899AABBCCDD

```
Valid:    1-4
Default:  1
Format    Transmit_Key_ID 1
```

Proxim Parameters

The following is a list of parameters that can be modified in the NET.CFG file. To set the TCP/IP parameters see the *SOCKET.CFG* file documentation.

Link Support

Parameter used to define resources for the LSL.COM file. Any modifications may cause resource conflicts.

Protocol

Instructs TCP/IP stack to bind to radio driver.

Int

Sets the interrupt (IRQ) line to be used. MX1 specific setting is int 5.

```
Default:  5
```

Port

Sets the I/O port address. Use 270 for the MX1.

```
Default:  0x280
```

Mem#1 (ODI)

Memory_address sets the resource memory location (0xC000 to 0xE800). Upper memory blocks from 0xA000 to 0xCFFF are used by MX1 system software.

```
Default:  ce00
```

Domain

Sets the network domain. It can be any number from 0 through 15 and must match the domain of the server or access point to which you want to connect.

```
Valid:    0 through 15
Default:  0
```

Station_type

Sets the status of the PC card as a master (2), alternate master (1), or nonmaster (0) station.

```
Valid:    0, 1, 2
Default:  0
```

Socket

Sets the PCMCIA socket (A, B, C, or D) that has the PC card installed.

```
Valid:    A, B, C D
Default:  A
```

Initialize_365

Determines whether to initialize the Intel 82365SL PCMCIA controller chip.

```
Valid:    Y, N
Default:  Y
```

Inactivity_min

Sets the number of minutes of inactivity before the PC card goes to sleep. To minimize draw on the vehicle battery, set this to 0.

```
Valid:    0 through 20 minutes
Default:  0
```

Inactivity_sec

Sets the number of seconds of inactivity before the PC card goes to sleep. Valid settings are 0 through 55 (values above 5 are rounded to the nearest multiple of 5). To minimize draw on the vehicle battery, set this as low as possible, preferably to 1.

```
Valid:    0 through 55 seconds
Default:  1
```

Channel

Sets the channel to be used when the PC card is acting as the master.

```
Valid:    1 through 15
Default:  1
```

Subchannel

Sets the subchannel to be used when the PC card is acting as the master.

```
Valid:    1 through 15
Default:  1
```

Mac_optimize

Optimizes the PC card for the number of concurrent modes.

```
Valid:                          0 (light) or 1 (normal)
Default:                        1
```

Roam_config

Sets the roaming speed.

```
Valid:    0 (slow), 1 (normal) or 2 (fast)
Default:  1
```

Peer_to_peer

Sets the ability of the PC card to talk to other peers.

```
Valid:    N (off) or Y (on)
Default:  N
```

Cisco Parameters

The following is a list of parameters that can be modified in the NET.CFG file. To set the TCP/IP parameters see the *SOCKET.CFG* file documentation.

Link Support

Parameter used to define resources for the LSL.COM file. Any modifications may cause resource conflicts.

Protocol

Instructs TCP/IP stack to bind to radio driver.

SSID

Identifies the 802.11B wireless network the station will connect to.

```
Default:  ""
```

Note: Setting this value to "" will enable the station to connect to any IEEE 802.11b network.

LEAP

Used to set LEAP (Light Extensible Authentication Protocol) authentication on LXE computers equipped with Cisco 350 series radios.

```
Valid:    OFF or ON
Default:  OFF
```

Note: This parameter is valid for Cisco 350 series radios only.

WorldMode

Allows the radio to adopt the maximum transmit power level and frequency range of the access point to which it is associated (available only in infrastructure mode).

```
Valid:    OFF or ON
Default   OFF
```

Note: This parameter is valid for Cisco 350 series radios only.

ShortPreamble

This parameter allows the radio to use short radio headers (or preambles). Short radio headers improve throughput performance. Long radio headers ensure compatibility if a client or access point does not support short radio headers.

```
Valid:        0=auto
              1=long
              2=short
Default:      0
```

Note: This parameter is valid for Cisco 350 series radios only

AWCLEAP

AWCLEAP is a DOS utility used to set LEAP (Light Extensible Authentication Protocol) authentication for Cisco 350 radios. The SETLEAP.BAT file runs the AWCLEAP utility. To set LEAP, type *setleap <username> <password>* at the c:\pctcp prompt.

The CLEAR.BAT file is used to clear the LEAP username and password. To clear LEAP, type *clear* at the c:\pctcp prompt.

Note: This version of the MX1 ***DOES NOT*** *use the SETLEAP2.BAT and CLEAR2.BAT files.*

FragThreshold

Packet size to start fragmenting.

```
Default: FragThreshold    2312
```

RTSThreshold

Packet size to start sending RTS/CTS.

```
Default: RTSThreshold     2312
```

DataRateX

To set a data rate other than 11 MB default uncomment rate desired and all data rates less than that rate. Example to set for 5.5MB data rate uncomment the DataRate1, DataRate2 and DataRate3.

1 Mbps supported data bit rate

```
DataRate1         0x02
```

2 Mbps supported data bit rate

```
DataRate2         0x04
```

5.5 Mbps supported data bit rate

```
DataRate3         0x0B
```

11 Mbps supported data bit rate

```
DataRate4         0x16
```

RefreshInterval

Inactivity time to check association with AP

```
RefreshInterval  10000
```

PowerSaveMode

PowerSaveMode "FASTPSP"

```
Fast Power Save Mode
```

MaxPowerSave

Maximum power save mode

```
MaxPowerSave      "ON"
```

NodeName

Descriptive station name

```
NodeName          " "
```

WEP enable

To enable WEP uncomment the following line and set the key with the wepdos.exe utility

```
authtype     "wepopen"
```

Set WEP key in radio before wepopen using the WEPDOS program in the PCTCP directory.

Diversity

The diversity parameter must be set according to the number of antennas for each computer.

MX1 computers = 2 antenna

```
Diversity "on" - for 2 antennas
Diversity "left" - for 1 antenna left port
Diversity "right" - for 1 antenna right port
```

PortBase – IRQ – Memory - Socket

The adapter needs 32 16-bit I/O ports, and 1 non-sharable IRQ. Any commented lines are set by PCMCIA card & socket services and should not be changed or uncommented.

```
;PortBase   140
;IRQ        5
Memory     C9000
;Socket     1
```

BusType

PCMCIA interface is used on all LXE DOS computers.

```
BusType    "PCMCIA"
```

Frame

Frame type of wired and wireless network.

```
(Default) Frame ETHERNET_II
Frame ETHERNET_802.3
Frame ETHERNET_802.2
```

LongRetryLimit

Specifies the number of times an unfragmented packet is retried before it is dropped and a transmit error is reported to the driver.

```
Valid:    0 - 255
Default:  6
```

WEPDOS

WEPDOS utility is used to program the WEP key into the Cisco 340 radios. Once the key value and key number to be used is set the authtype parameter in NET.CFG file must be modified. To set the key type *wepdos* at the c:\pctcp prompt.

Syntax

```
WEPDOS [-ascii|-hex] [-key#|-home] key    ;set a key
WEPDOS [-key#|-home] -clear       ;clear a key
WEPDOS [-tx#]                     ;select transmit key index
WEPDOS [-d]                       ;display settings
```

Where

key is a 5 character ascii string
key is a 10 character hex-digit number
WEP128 allows 5 or 13 character ascii, and 10 or 26 hex-digit keys
-*key#* is default key index 1, 2, 3 or 4
-*home* selects the home key for use with home access points
-*tx#* selects the transmit key index 1, 2, 3 or 4 (enterprise networking)

Standard Options

-p[iobase]	io base address (hex) [380]
-b[membase	memory base address (hex) [D000]
-i[irq]	interrupt request (decimal) [10]
-s[slot]	slot number (decimal) [0]
-365	82365 startup of card
Default:	no startup, IO:380, MEM:D000:0, IRQ:10, SLOT:0

Examples

To check wep key on a LXE computer the correct syntax type at c:\ prompt

```
Wepdos -365 -p340 -bc00 -d
```

To set key for use type

```
Wepdos -365 -hex -key# <10 or 26 byte key> -tx# -d
```

WEPDOS supports up to 4 keys. As an example of setting key number 3 to 0f0f0f0f0f for use in transmitting type:

```
Wepdos -365 -p340 -bcc00 -s1 -hex -key3 0f0f0f0f0f -tx3 -d
```

Symbol Parameters

The following is a list of parameters that can be modified in the NET.CFG file. To set the TCP/IP parameters see the *SOCKET.CFG* file documentation.

Link Support

Parameter used to define resources for the LSL.COM file. Any modifications may cause resource conflicts.

Protocol

Instructs TCP/IP stack to bind to radio driver.

ESS_ID

Identifies the 802.11B wireless network the station will connect to. The ESS_ID is a string of 1 to 31 case sensitive characters. Spaces may be included by using quotes.

```
Default:  "LXE"
```

mode

IO mode required if using card and socket services.

```
Default: IO
```

ioaddress

Sets the I/O address location.

```
Default:  300
```

memory

Sets the resource memory location.

```
Default:  CC00
```

interrupt

Sets the interrupt (IRQ) line to be used.

```
Default:  5
```

performance_index

Configures whether the Symbol 4121 series radio will perform power management.

```
Valid:    0=CAM Constant Awake Mode
          1=Power Management On
Default:  1
```

Auth_type

This parameter is used to enable and manage the 802.11 WEP encryption. The radio card will only associate with APs that support the same Auth_type.

```
Valid:    "Open_System" or "Shared_Key"
Default:  "Open_System"
```

Encrypt_Key#

Updates the first, second, third or fourth encryption key, according to the value of #.

For Symbol 4121 series radio cards, use 5 pairs of hex digits for 40 bit encryption. Use 13 pairs of hex digits for 128 bit encryption.

encrypt_enable

Enables encryption on Symbol 4121 series radios.

```
Valid:    yes or no
Default:  yes
```

Note: This parameter was removed from the Symbol NET.CFG file by LXE effective 11/ 2003.

Encrypt_Key_ID

The key ID indicates which key the adapter is to use for encrypting packets.

```
Valid:    1 to 4
Default:  1
```

Note: This parameter is valid for Symbol FHSS radios only.

Encrypt_Enable_Index

Previously named *encrypt_key_index*. This parameter indicates which key the adapter is to use for encrypting packets for transmission. Zero means No Encryption (i.e. turn encryption off), and numbers 1 through 4 mean turn encryption on and use the specified key (i.e. key #1, key #2, key #3 or key #4). The key to be used to decrypt packets being received is contained in the received packet.

```
Valid:    0,1,2,3,4
Default:  0    (No Encryption)
```

Note: This parameter is valid for Symbol 4121 series radios only.

diversity

Set diversity to "both" for two antennas and "A" for one antenna.

```
Default:   both
```

Tx_rate

Use this parameter to specify that rates at which the radio is allowed to operate. If no rates are specified, the radio will use all available rates.

```
Valid:    1      1 Mbps
          2      2 Mbps
          5      5.5 Mbps
          11     11 Mbps
```

SOCKETS TCP/IP Stack

Introduction

SOCKET.CFG sets the options for SOCKETP.EXE. The section XXX.XXX.XXX.XXX is for this machines IP. The net mask is specified as part of the ip address. In the ip address command an optional /net_bits can be used to indicate the number of bits in the network ID.

Net Bits	Net Mask	Class	IP address range
8	255.0.0.0	A	0.x.x.x to 127.x.x.x
16	255.255.0.0	B	128.x.x.x to 191.x.x.x
24	255.255.255.0	C	192.x.x.x or higher

The network can be subdivided by two for every net bit added.

Net Bits	Net Mask	Net Bits	Net Mask
1	128	5	248
2	192	6	252
3	224	7	254
4	240	8	255

Bootp

BOOTP is a UDP/IP based protocol that provides a means to assign an IP address to a booting host dynamically and without user supervision. BOOTP can also supply the net mask, host name, and address of a domain name server. One obvious advantage of this procedure is the centralized management of network addresses, which eliminates the need for per-host unique configuration files. Sockets implements the BOOTP client whenever it is started with no (or the 0.0.0.0) IP address supplied.

DHCP

DHCP is a UDP/IP based protocol that provides a means to assign the IP address dynamically to a booting host and without user supervision. It can also supply the net mask, host name, address of a domain name server, and other parameters. An advantage of this procedure is the centralized management of network addresses, which eliminates the need for per-host unique configuration files. Sockets implements the DHCP client whenever it is started with the 0.0.0.1 IP address supplied. All LAN interfaces specified when this IP address is in use will attempt to use DHCP to resolve the IP address, the subnet mask, hostname, default router and DNS server(s).

Setting SOCKETS.CFG Parameters

Set IP Address

To enable DHCP set the IP address to 0.0.0.1

```
IP address XXX.XXX.XXX.XXX/16
```

where

XXX.XXX.XXX.XXX is the IP address

16 indicates the number of bits in the network ID

Set ARP INIT

Controls whether a DHCP ARP is sent when booting up.

```
ARP INIT GRAT
```

Using this option makes the stack behave the same as before. The stack does not send a DHCP ARP when booting up (In this mode, the ARP contains the MAC and IP addresses in the sender's field). This option is the default.

```
ARP INIT DHCP
```

Using this option sends a DHCP ARP on boot up (the sender's IP address field is zero filled).

Set Interface

For all radios except Symbol DS 11MB

Interface sets the physical interfaces

```
Interface pdr if0 dix 1500 10 0x69
```

where

pdr = packet driver
if0 = interface_card
dix = frame type
1500 = MTU
10 = Buffers
0x69 = ioaddr

For Symbol DS 11MB radios

Interface sets the physical interfaces

```
Interface pdr if0 dix 1400 10 0x69
```

where

pdr = packet driver
if0 = interface_card
dix = frame type
1400 = MTU
10 = Buffers
0x69 = ioaddr

Set Router IP (Gateway only)

When using a gateway (IP router) to the rest of the world, replace “XXX.XXX.XXX.XXX” with your gateway ip and remove the # at the beginning of the line.

```
# route add default if0 XXX.XXX.XXX.XXX
```

Set Domain Name Server

When using a domain name server (DNS), replace XXX.XXX.XXX.XXX with the IP address of the DNS, and remove the # at the beginning of the line.

```
# domain server XXX.XXX.XXX.XXX
```

Display IP Address

Redisplay IP information when SOCKET.CFG runs.

```
IP address
```

Options

For all radios except Symbol DS 11MB

Refer to documentation to change.

```
ip ttl 15
tcp mss 1460
tcp window 2920
tcp retry 8
tcp irtt 500ms
```

For Symbol DS 11MB radios

Refer to documentation to change.

```
ip ttl 64
tcp mss 1360
tcp window 2920
tcp retry 8
tcp irtt 500ms
```

SOCKET.CFG Parameters

domain

If a host name is not a decimal (dotted) address and it is not found in the HOSTS file and at least one Domain Name Server has been defined, an attempt is made to obtain the address from the defined DNS server(s). The number of times any server is polled (retries), in addition to the time to wait for a response, can also be specified. A suffix may be specified and is attached to all names not containing any dots.

All of the following sub-commands can be issued without the optional parameters to obtain information on the current status.

Syntax

```
domain server [host_name]
domain retry [retry_count]
domain time [wait_time]
domain suffix [domain]
```

domain server adds a DNS address or lists the current servers if host_name not specified.

domain retry specifies the retry count for polling each server. domain retry lists the retry count if retry_count not specified.

domain time specifies or lists the time (milliseconds) to wait for a response before attempting retry.

domain time lists the time (milliseconds) to wait if wait_time not specified.

domain suffix specifies the domain suffix to add to all simple names; names that contains no dots.

domain suffix lists the domain suffix if domain is not specified.

Example

```
domain retry 3
domain server 196.2.1.1
domain suffix myorg.co.za
domain time 2000
```

iface

iface is a synonym for the interface command.

interface

interface informs Sockets of the hardware or software communications interface(s) to be used at the network interface level. At least one network interface is required, and two or more are used in gateway (router) applications.

The class or mode of each interface defines the encapsulation used for packaging the data frame into the transport frame. Some types of interface support only one class.

When using more than one interface, Sockets assigns the previous given IP address in the .CFG file to this interface and uses its net mask to add a route to that net through this interface. Using the same IP address would result in multiple routes to the same network. The default route is set on the first interface with an IP address with a zero net mask (for example, IP address 19.63.10.11/0).

Each interface statement uses the IP address from the last supplied IP address statement.

Syntax (general)

```
interface type name class other parameters
```

Syntax (specific)

```
interface pdr name dix mtu numbuf intvec [irq]
interface asy name [slip | cslip | ppp] mtu buflim ioaddr
iovec speed [modemfile]
```

Parameters

type

type defines the type of hardware or software interface.

interface supports the following software interfaces.

Interface	Description
Asy	Standard PC asynchronous interface (RS232 port)
Pdr	packet driver interface

name

name defines the name by which the interface is known on the local host. *name* is a symbolic name known only to the local host on which it is used.

name may be arbitrarily assigned. Each interface command on the same host must have a unique name assigned. This name is used by commands such as route, trace, param, and so on.

class

class specifies how IP datagrams are to be encapsulated in the link level protocol of the interface.

Some interfaces offer a choice between classes while others use a fixed class. The following classes are available and are listed with their associated types.

Type	Class (defined in the following list)
Pdr	dix, ieee, token, driver, slip
Asy	raw, slip, cslip, ppp

Class	Description
Dix	The DEC/Intel/Xerox Ethernet interface also known as Blue Book Ethernet or Ethernet II.
Token	IBM Token Ring. Source routing is supported for multiple rings.
Ieee	IEEE: 802.3 Ethernet with SNAP headers.
Driver	Use the default class for the packet driver.
Slip	Serial Link Internet Protocol (SLIP) for point-to-point asynchronous links. This mode is compatible with UNIX SLIP.
Cslip	Compressed Serial Link Internet Protocol (SLIP) for faster reaction over point-to-point synchronous links.
Ppp	Point-to-point protocol over asynchronous links.

mtu

mtu specifies the Maximum Transmission Unit size, in bytes. Datagrams larger than this limit are fragmented into smaller pieces at the IP layer. The maximum value of *mtu* for the various interfaces is:

Ethernet - 1500

For serial links a standard value for *mtu* is 576. (576 is the maximum according to specifications, but may be increased on reliable connections as long as both sides use the same value.)

numbuf

numbuf specifies how many incoming datagrams may be queued on the receive queue at one time. If this limit is exceeded, further received datagrams are discarded. This mechanism is used to prevent fast interfaces from filling up memory when data cannot be handled fast enough.

buflim

buflim specifies the maximum number of outgoing datagrams or packets to queue before starting to discard datagrams. This mechanism is used to prevent the memory from filling up when a serial link goes down.

bufsize

bufsize specifies the size of the ring buffer in bytes to be allocated to the receiver in raw mode.

intvec

intvec specifies the software interrupt number (vector) in hexadecimal to use for resident packet drivers.

ioaddr

ioaddr is the I/O base address in hexadecimal of a serial port or the hardware controller and must correspond with the jumper or switch settings used during the setup of the controller board. The standard values for serial ports are:

COM1	03F8h
COM2	02F8h
COM3	03E8h
COM4	02E8h

iovec

iovec is the hardware interrupt vector used by the serial port or controller and must correspond with the jumper or switch settings used during setup of the controller. The standard values for serial ports are:

COM1	4
COM2	3
COM3	4
COM4	3

irq

irq is the hardware interrupt vector used by the network interface controller. This is only used for faster response in Sockets.

modemfile

A file containing the modem commands and scripts.

speed

speed specifies the transmission speed for serial interface devices (baud rate). Before using a serial connection you have to set flow control with the param command.

Examples

```
interface pdr if0 dix 1500 5 0x60
interface asy ser0 cslip 576 15 0x3f8 4 9600
interface asy p0 ppp 1500 30 0x3f8 4 9600 pppmod.mod
```

ip

ip displays or sets the values of the options selected when defining the IP (internet protocol) host address of the next interface to be defined.

Syntax

```
ip address [hostid [/net_bits] ]
ip status
ip ttl [number]
```

ip address sets the IP host address of the next interface to be defined. A route is automatically added to each interface for the default or specified net mask for its address. To make an automatic route the default, specify the net bits as zero. When specified without the optional parameters, ip address displays the current value(s) of the local host IP address(es). To assign different IP addresses to different interfaces on the same host, an ip address statement must precede each interface definition. The last IP address given is used in case of missing ip address statements.

ip status displays Internet Protocol (IP) statistics, such as total packet counts and error counters of various types. It also displays statistics on the Internet Control Message Protocol (ICMP). This includes the number of ICMP messages of each type sent or received.

ip ttl sets the default time-to-live value which is placed in each outgoing IP datagram. The ttl value limits the number of gateway hops the datagram is allowed to take in order to kill datagrams that got stuck in loops.

Parameters

hostid

hostid specifies the IP host address to assign to the next interface to be defined. This may be a symbolic name from the HOSTS file, or a dotted decimal address.

/net_bits

A net mask can be specified for the host. In the ip address command an optional */net_bits* can be used to indicate the number of bits in the network ID. The net mask is used to determine whether an incoming datagram is a broadcast and also for sending UDP broadcasts.

Net masks are more easily represented in binary or hexadecimal format. For example, the IP address 128.1.1.5/24

corresponds to a net mask of 255.255.255.0 (FFFFFF00h),

25 bits to 255.255.255.128 (FFFFFF80h)

and 26 bits to 255.255.255.192 (FFF FFC0h).

The default net mask used corresponds to the class of address used if not explicitly specified.

Net Bits	Net Mask	Class	IP address range
8	255.0.0.0	A	0.x.x.x to 127.x.x.x
16	255.255.0.0	B	128.x.x.x to 191.x.x.x
24	255.255.255.0	C and higher	192.x.x.x or higher

If you want to subdivide your network, you can divide it by two for every net bit added. The following table provides information on converting between net bits and net mask. The number of net bits to add when changing a 0 in the net mask to:

Net Bits	Net Mask	Net Bits	Net Mask
1	128	5	248
2	192	6	252
3	224	7	254
4	240	8	255

number

When *number* is omitted, **ip ttl** displays the current value of the time to live parameter.

param

param invokes a device-specific control routine. When executed without parameters, param displays defined interface names and device-specific flags. param operates differently for each interface type and even interface mode. In many cases it is used to interrogate the status of an interface. The ifstat and param commands perform similar and, in some cases, exactly the same function.

Syntax

```
param ifname [arg1...argn]
```

Parameters

ifname

ifname defines the name used in the interface command for the device to be controlled.

arg1...argn

These parameters depend on the type of interface in use.

Example

To display current serial link settings and restart the statistics on it, use:

```
param sl0 clear
```

param, Alternative Routing Control Sub-commands

The Alternative Routing Control Sub-commands set up and check the Sockets alternative route mechanism. More than one route can be specified to a target host or network. The first route which has an associated interface in the up state is used.

An interface is in the up state when it is defined by the interface command. It enters the query state when it does not receive valid input within a specified up-time period after sending data expecting a response. At this stage three (catering for links with a high data loss) ICMP echo requests (ping) are sent to a query IP address. It enters the down state by a Sockets command or when it does not receive valid input within the specified up-time period after entering the query state. If an up-time has never been specified or a value of 0 is specified, the interface will stay in the up state whether valid input is received or not.

An interface enters the up state by a Sockets command or when valid input is received on that interface when in the down or query states. An ICMP echo request is sent on an interface in the

down state every down-time period. If a down-time has never been specified or a value of 0 is specified, the ICMP echo request will not be sent. Up-time and down-time is specified in seconds.

Syntax

```
param ifname [ uptime | downtime ] time
param ifname query hostname
```

Example Alternative Routing

Two X.25 interfaces are used to get to the target network 192.6.1.0. The first interface, named if0 should preferably be used, but if it stops receiving for a period of 20 seconds, it should try to ping 192.6.1.2 and if no response is received within another 20 seconds, if1 should take over, but if0 should be tried every five seconds. Interface if1 should disconnect after 80 seconds of no traffic.

The SOCKET.CFG file should contain the following:

```
interface x25 if0 ... ... ...
param if0 uptime 20
param if0 downtime 5
param if0 query 192.6.1.2
interface x25 if1 ... ... ...
param if1 uptime 80
param if1 downtime 5
param if1 query 192.6.1.2
route add 192.6.1.0 if0
route add 192.6.1.0 if1
```

In the case of both if0 and if1 failing, both are tried every five seconds until one comes up. The return paths should also be maintained in a similar way with Sockets or by using RIP.

param, RIP Advertising Sub-command for Interfaces

When the rip advertise command has been used, this param sub-command makes allowance to disable and re-enable RIP advertising on a specific interface.

Syntax

```
param ifname [ ripadv | noripadv ]
```

Examples

```
param if0 noripadv
param if1 ripadv
```

route

route creates an entry in the IP routing table for Sockets to determine where to send data. The Alternative Routing mechanism allows more than one route to be specified to a particular host or network. Failure of one route causes an automatic switch to the next route.

Refer also to the ip address command for specifying the net mask, because a route is automatically added to each interface for the default or specified net mask for that address. When multiple routes are defined to the same address, Sockets uses the route with the network size (largest number of bits in the net mask).

Syntax (general)

```
route [ add | drop destination ifname [gateid |none [ metric
[proxy] [private] [static] ] ] ]
```

Syntax (specific)

```
route add [ hostid | netid ] ifname [gateid]
route add [ hostid | netid[/mask] ] ifname [gateid]
route add default ifname
route drop [ hostid | netid ]
route drop [ hostid | netid[/mask] ]
route drop default
```

Parameters

add or drop

Sub-command to add or drop (remove) a route from the routing table.

default

All transmissions to IP addresses not otherwise defined in routing commands are sent via the network interface specified by *ifnam*e.

hostid

hostid is the IP address of a destination remote host to which data must be sent, or a remote host which must be removed from the routing table (dropped).

netid

netid is the IP address of a destination network to which data must be sent. Any host with this IP network address is able to receive the data. Whether a particular host will use the data depends on the host portion of the specific IP address in the IP header.

mask

mask specifies the number of bits in the network portion of the address if sub-netting is used. If not used, the network portion of the address is determined according to the class (A, B or C) of the address.

ifname

ifname defines the name used in the interface command for the immediate network on which the data for the designated host must be sent. This is the network level interface to be used by the local host to reach the remote host.

gateid

gateid parameter specifies the IP address of a host, on the same physical network as the local host, which is used as a gateway or router to a different network. The gateway or router host specified in *gateid* must be directly reachable on the same physical network as the local host defining this gateway. In other words, this must be the nearest gateway to this local host.

metric

When using RIP or Proxy ARP a value from 0 to 16 for *metric* must be specified indicating the distance or cost of that route. A *metric* of 16 indicates that the route is down.

proxy, private and static

To support the Routing Information Protocol (RIP) the route command utilizes the proxy, private and static key words. These words can be used in any order following *metri*c.

Proxy ARP should be used with care and not in conjunction with RIP. When more than one host responds to an ARP request, it can cause confusion and even lead to system crashes. This is possible in situations where more than one gateway implements Proxy ARP to a common destination.

When “RIP advertising” is selected, all interfaces advertise all routes except those routes making use of that specific interface (split horizon) and routes marked private. A route which is dropped as a result of a RIP update or which becomes unavailable as a result if its associated interface going into the down state, is immediately advertised as being infinite (metric = 16) and is not advertised until it becomes available again. In order for an interface to be used for advertising, a route without a gateway using that interface must be available. The advertisement is sent as a sub-net broadcast using the net mask of the host and the IP address of the interface.

When “RIP using” is selected, routes are updated according to received RIP advertisements. Routes added or amended as a result of RIP, have a timeout associated with them. If another RIP advertisement is not received during that time, the route is dropped. A route is also dropped if an advertisement of infinity (metric = 16) is received. To prevent dropping a route, it must be marked as static. The metric of a route marked static is never updated by a RIP advertisement. Instead a duplicate route is added before the static route. If the duplicate route is dropped as a result of a timeout or RIP, the static route is used again.

Examples

```
route add default ipx0
route add unix_net eth0
route add unix_host ipx1 unx_gate
route add unix_net2 eth0 /eth 1
route add unix_ net ipx0 unx_ gate
route add subnet/26 eth0 sub_gw
route drop unix_net
```

route can specify a Proxy ARP on a route, as follows:

```
route add net interface gateway metric [proxy]
```

When using Proxy ARP, gateway and metric must be specified. If no gateway is used, none can be specified. For example:

```
route add 192.6.1.0 ifx25 none 5 proxy
```

tcp

tcp commands display or set various TCP operating parameters. The TCP configuration commands are put into SOCKETS.CFG.

Syntax

```
tcp irtt [time]
tcp lport [port_number]
tcp mss [size]
tcp retry [number]
tcp rtt [time]
tcp smss [size]
tcp timemax [time]
tcp window [size]
```

Parameters

time

time is the new time value in seconds, or milliseconds if "ms" is appended to the number, as in 2000ms.

port_number

port_number is the local port starting number.

size

For tcp mss, *size* is the maximum segment size in bytes sent on all outgoing TCP connect requests (SYN segments). *size* tells the remote host the size of the largest segment that may be received by this host. When changing the MSS value, any existing connections remain unchanged.

For tcp smss, *size* is the send maximum segment size in bytes sent on all outgoing TCP connect requests. This limits the size of the largest segment that may be sent by this host. When changing the SMSS value, any existing connections remain unchanged.

For tcp window, *size* is the size of the receive window in bytes for any new TCP connections. Existing connections are unaffected.

number

number is the number of retries attempted without receiving an acknowledge from the remote host before the connection is broken. If the value exceeds 255, it implies an infinite number of retries; such a connection does not time-out. The default value for *number* is 6.

tcp irtt Sub-command

tcp irtt displays or sets the initial round-trip-time estimate. When specified without an argument, the command displays the current values of TCP parameters including the initial round-trip-time in milliseconds.

time is the initial round-trip-time (IRTT) estimate and is used for new TCP connections until the actual value can be measured and adapted to. By increasing this value when operating over slow communication links, unnecessary retransmissions that otherwise occur before the smoothed estimate value approaches the correct value are minimized. The system default is 5000 milliseconds.

To affect incoming connections, tcp irtt should be executed before the servers are started.

Example

```
tcp irtt 120
```

Sample Output

```
TCP: IRTT 5 ms Retry 6 MSS 1460 SMSS 1460 Window 2920
```

tcp lport Sub-command

tcp lport specifies the local port starting number. When specified without a number the current value of the next free local port number is displayed.

Example

```
tcp lport 2004
```

Sample output

```
Lport = 2004
```

tcp mss Sub-command

tcp mss displays or sets the TCP maximum segment size in bytes. When size is not specified, the current values of the TCP parameters, including the maximum segment size, are displayed. It is recommended to reduce the MSS and SMSS on bad network connections.

Example

```
tcp mss 1460
```

tcp retry Sub-command

tcp retry displays or sets the retry count before a connection is broken. When specified without the number parameter, tcp retry displays the current values of TCP parameters, including the retry count.

tcp rtt sub-command

tcp rtt replaces the automatically computed round-trip time (RTT) for the specified connection with the time in milliseconds. Sockets calculates the RTT as a smooth average of past measured RTTs, starting with the IRTT on a new connection.

To get the current RTT in use for a connection n, use the tcp status n command that will give the smoothed average RTT indicated by SRTT.

Because tcp rtt provides a manual override of the normal back-off retransmission timing mechanisms, it may be used to speed up recovery from a series of lost packets.

Example

```
tcp rtt 4 100
```

tcp smss sub-command

tcp mss displays or sets the TCP send maximum segment size in bytes. When size is not specified, the current values of the TCP parameters, including the SMSS, are displayed.

A small SMSS causes the remote to reduce its segment size. tcp mss can reduce the MSS and SMSS on bad network connections with high loss rates or where large packets get lost.

Example

```
tcp smss 512
```

tcp window sub-command

tcp window displays or sets the default and maximum receive window size.

When specified without the size parameter the current TCP parameters, including the current window size, are displayed.

Example

```
tcp window 2920
```

tcp timemax sub-command

tcp timemax sets the maximum duration of a tcp retry. If a value greater than 255 seconds is specified, connections will never timeout.

This is very useful in wireless applications where nodes roam in and out of service.

Example

```
tcp timemax 2000ms
```

Chapter 7 Troubleshooting

Problem Determination Tips

Use the tips in this chapter as a guide. They include solutions to the simplest problems as well as things to observe when trying to diagnose more serious problems.

Consider the following:

- If a problem occurs while you're working, stop immediately. If you continue, you may lose data and destroy problem-related information.
- Observe what is happening. Write down what the MX1 and any optional devices are doing as well as what actions you took immediately before the problem occurred.
- Consider the simplest solution first. Ask yourself logical questions and consider alternatives.
- Which part of the system is operating erratically? Keypad? Disk/Flash Drive? Barcode Scanner? Radio? Display? Each produces different symptoms.
- What program and/or optional devices are you using?
- What appears on the screen? Do you see any messages or random characters? Look up any messages in the documentation for your software, (e.g. DOS, etc.)
- Are any LEDs illuminated? Which ones?
- Do you hear any beeps? How many? Are they long or short?
- Is the MX1 making any unusual noises?
- See if you can cause the problem to occur again. This may help you understand the source of the problem and will help you describe the problem if you must call for technical assistance.
- Make sure you are operating under the specified environmental conditions discussed in Chapter 3, "Power Supply", and Appendix B, "Technical Specifications", subsection "Environmental Specifications".

Use the troubleshooting procedures that follow these tips and, if necessary, perform any diagnostic procedures that may apply. LXE technical help telephone numbers and contact information are located in the "Contacting LXE" file on the LXE Manuals CD and on the internet at www.lxe.com

Based on the answers to the previous questions and suggestions, try to narrow the problem down to one of the following areas:

- Startup Problems
- Hardware Problems - (i.e. power source, keypad, display, hard drive, PCMCIA cards, optional devices, etc.)
- Radio Problems
- Software Related Problems
- Memory

The following sections provide more detailed troubleshooting information about each of these areas.

Startup Problems

This section lists some of the configuration error messages that may appear at system startup and their possible solutions.

Note: If you press the Power key and the MX1 remains off, refer to the "Power Source" section of this chapter.

Problem	Solution
MX1 computer stops working and locks up each time you start it.	Your CONFIG.SYS or AUTOEXEC.BAT file might be corrupt. To recover from this error, follow the steps in the "Bypassing the Configuration Files" section of this chapter.
The MX1 displays the "Non-System disk or disk error" message.	Make sure the MX1 is booting from the proper drive. To recover from this error, follow the steps in the "Verifying Boot Order" section of this chapter.
The MX1 displays the "Bad or missing Command Interpreter" message.	You're missing the COMMAND.COM file, which should be located in the root directory of the C drive. To recover from this error, follow the steps in the "Missing COMMAND.COM" section of this chapter.
The MX1 displays either "CMOS time and date not set" or "Real time clock failure" messages.	There may be a problem with the Backup Battery. Follow the steps in the "Setting System Time and Date" section of this chapter.

Bypassing the Configuration Files

If you are using DOS 6.0 or higher, you may want to bypass the configuration files and restore configuration files from backup. To bypass the configuration files:

1. Turn on the MX1.
2. When "Starting DOS" appears press the <F5> key.

Verifying Boot Order

1. During bootup, the <F2> key must be pressed to enter BIOS Setup. Turn on the MX1. Press <F2>. (If Main Menu BIOS parameter Setup Msg is turned Off, the "Press F2" message is not seen but the <F2> key function is still available.)
2. At the BIOS Setup Main Menu, view the Boot parameter.
3. If the Boot parameter is not already highlighted, press the <DownArrow> until it is highlighted.
4. Make sure the field entry is set to "C:", if not press SP, and change the field entry to "C:".
5. Press <Right Arrow> until you reach the Exit menu.
6. Select "Save and Exit" to save the changes. Press <Enter>. If the MX1 does not reboot automatically, reboot the MX1.

If the error continues please contact LXE Technical Support.

Missing COMMAND.COM

If the computer displays “Bad or missing Command Interpreter”, the computer is configured to start from the hard disk and...

- the COMMAND.COM file was accidentally deleted, or
- the operating system can’t find the COMMAND.COM file (it may be in a directory other than the root directory), or
- an incompatible version of COMMAND.COM was copied over the COMMAND.COM version supplied with the MX1.

To replace the command interpreter, follow these steps:

1. Make sure the MX1 is powered off.
2. Remove the endcap.
3. Insert the DOS boot SRAM card into Slot 0, the bottom slot.

   Note: You should have created a DOS boot SRAM when you received the MX1.
4. Power on the MX1.
5. If you receive the “Bad or missing command interpreter” message continue with step 6, otherwise go to step 12.

Edit BIOS Setup

6. During bootup the <F2> key must be pressed to enter BIOS Setup. You may need to reboot.
7. At the BIOS Setup Main Menu, view Boot parameter.
8. If the Boot Sequence parameter is not already highlighted, press the <DownArrow> until it is highlighted.
9. Press SP until the field entry is changed to “A: then C:”.
10. Press <Right Arrow> until you reach the Exit menu.
11. Select “Save and Exit” to save the changes. Press <Enter>.

Copy File

12. When the DOS prompt appears, type

```
SYS C:
```

and press <Enter>.

13. Type

```
Type  C:\AUTOEXEC.BAT
```

and press <Enter>.

If your AUTOEXEC.BAT file contains a COMSPEC command, confirm that it identifies the correct location for COMMAND.COM (i.e. the C:\ directory).

Please refer to commercially available DOS User's Guides for complete instructions or troubleshooting when using these DOS files or commands.

14. Type

```
Type  C:\CONFIG.SYS
```

and press <Enter>.

If your CONFIG.SYS file contains a SHELL command, confirm that it identifies the correct location for COMMAND.COM (the C:\ directory).

15. Power off the MX1.

16. Remove the DOS boot SRAM card.

17. Replace the endcap.

18. Power on the MX1.

Setting System Time and Date

1. If the MX1 is not already powered up, turn it on.
2. During bootup the <F2> key must be pressed to enter BIOS Setup.
3. At the BIOS Setup Main Menu, move the highlight to the Time parameter.
4. Type the desired entry and then press the <Tab> key to move from hours to minutes to seconds. The colons are automatically added by the system.
5. Press the <DownArrow> to move to the Date parameter.
6. Type the desired entry and then press the <Tab> key to move from month to day to year. The backslashes are automatically added by the system.
7. Press <Right Arrow> until you reach the Exit menu.
8. Select “Save and Exit” to save the changes. Press <Enter>.

If the MX1 does not automatically reboot, turn the MX1 off and then on again.

Hardware Problems

This section lists possible solutions to some common problems with hardware.

Power Source

The MX1 receives power from an internal battery pack. The MX1's battery can be recharged while it is in a charging station (battery only) or docking stations (MX1 with battery).

Problem	Solution
The computer won't start.	Make sure the main battery is installed and fully charged.
Power key will not turn the unit off	Force a Power Off by holding the Power key down for 15 seconds. Locate and correct the problem before powering the unit back on – e.g. IRQ conflict, very low battery power, radio conflict, unexpected software application result, etc.

If you cannot find the source of the problem, consult LXE Technical Support.

Keypad

The following table provides solutions to common keypad problems:

Problem	Solution
Get an unexpected character or function when pressing some keys.	Make sure the correct keyboard and radio drivers are loaded.
The keyboard locked and you cannot use <Ctrl> + <Alt> + <Del> to reboot.	The Ctl+Alt+Del function may be disabled in BIOS Setup. Use the Power key to reboot the MX1.

Display

The Display has Turned Dark or Very Light

Full Alpha-Numeric Keypad

The full alphanumeric keypad does not have a contrast key legend. Adjust the display contrast by pressing the:

- 2nd key, then the Shft key then the <C> key to enter Contrast change mode.
- Use the Up Arrow and Down Arrow keys to adjust contrast until the display lightens or darkens to your satisfaction.

Press the Enter key to exit this mode.

Numeric-Alpha Keypad

◐ To adjust screen contrast, locate the <F11> key at the bottom of the keypad. Adjust the display contrast by pressing the:

- 2nd key, then the <F11> key
- Use the Up Arrow and Down Arrow keys to adjust contrast until the display lightens or darkens to your satisfaction.

Press the Enter key to exit this mode.

Hard Disk Drive

Note: Primary storage is accomplished by an integrated flash circuit. BIOS software in the MX1 provides an interface layer between the operating system and the hardware. To the operating system (DOS) and the application software, the flash looks like a small hard disk drive. The flash drive is still susceptible to many of the same problems as a hard drive. If the computer is interrupted while writing data to a disk, the disk may become corrupted. Interruptions include such things as power failure, operator generated power removal, operator generated reboot or catastrophic software failure (crash).

If you have problems with the hard disk drive, run the DOS CHKDSK utility. CHKDSK analyzes the directories, files and File Allocation Table (FAT) on the flash disk.

For information on running CHKDSK, refer to the DOS documentation.

If CHKDSK does not report any errors and the hard disk still has problems, contact LXE Technical Support.

PCMCIA Cards

Problem	Solution
You are having trouble accessing data on a PCMCIA card or some of the data appears to be missing.	Run the DOS CHKDSK command, which analyzes the directories, files and the File Allocation Table (FAT) on the card.
CHKDSK reports no errors and you're still experiencing problems.	Can you access the PCMCIA card? Try to view the contents of the directory. For example, try using the DOS DIR command. If the DIR command doesn't display all the files stored in the directory, recovering data is unlikely.
SRAM card will not work.	PicoCard supports SRAM cards with the Phoenix ATA driver PCMATA. Format the SRAM in another computer and try again.
Data files are damaged or corrupted.	Refer to your software documentation for file recovery procedures. Many software packages automatically create backup files.
Receive message "Warning: conflict with system COM".	The COM port selected is already being used by another device. If you know what COM ports are available, you can edit the PCM.INI file and change the COMORDER= number to an available COM port. Note: COM4 seems to be the best choice for PC Cards.
Receive message "Invalid command line switch".	Command line switches are in the PCM.INI file, not the CONFIG.SYS file.

Upper Memory Conflicts

Some drivers require an unused upper memory block. In this case, "unused" means that the upper memory block[2] does not contain any ROM or RAM.

Driver	Memory Required	Default Address Range
PCMCS95.EXE	4K	C800-C8FF
PCMATA.SYS	16K per SRAM card	C900
PCMFFCS.EXE	4K to 64K	D000 - (dependent on variable size)
PCMFDD.EXE	16K	D000-D3FF

Available upper memory (C800 - DFFF) is crucial to using PCMCIA cards successfully. The addresses shown above have the following characteristics:

- The system has no RAM at these addresses.
- The system has no ROM at these addresses.
- Run a utility, such as MSD.EXE (not included with the MX1) which shows the memory requested with ADDR= and /BASE= parameters listed as "available".

IRQ Assignments

AT compatible systems have 16 IRQs, numbered 0 through 15, many of which are already assigned as follows:

IRQs	Device(s)
IRQ0	Timer Output
IRQ1	Keyboard
IRQ2	Route to Interrupt Controller 2, IRQ8-IRQ15
IRQ3	Serial Port COM2
IRQ4	Serial Port COM1
IRQ5	Reserved for PC Cards
IRQ6	Floppy Disk Controller
IRQ7	Power Management
IRQ8	Real Time Clock
IRQ9	Keyboard
IRQ10	PC Card Controller
IRQ11	Reserved for PC Cards
IRQ12	Touch Screen Data
IRQ13	80x87 Math Coprocessor
IRQ14	Hard Disk Controller
IRQ15	Some Hard Disk/SCSI Controllers (Default)

[2] UMB is fully allocated in the MX1. Do not load drivers that require UMB or EMM386.EXE.

Optional Devices

This section provides information on solving problems related to optional devices.

Note: Make sure the MX1 is powered on before you turn on any powered optional devices.

To help determine which device is causing the problem:

- Check that all connecting cables are correctly and firmly attached. Loose cables can cause erroneous or intermittent signals. You may need to inspect connecting cables for loose wires, and check connectors for loose pins.
- Isolate the problem. Turn the computer off and remove all devices. Turn the computer on and write down any error messages.
- Turn the computer off. Add one optional device and turn the computer on again. Continue this procedure of adding one device at a time until you resolve the problem.
- Device Configuration. The smooth operation of the system depends on the interaction of all devices, programs and features.

Note: Before you make any changes to your configuration files, make a copy of each file (typically with a different extension, for example, copy AUTOEXEC.BAT to AUTOEXEC.OLD). After you modify the configuration files, restart the computer for the changes to take effect.

The following table provides some solutions to common configuration problems:

Problem	Solution
You connected a device and the device isn't operating properly.	If you start programs or drivers from the configuration files (CONFIG.SYS and AUTOEXEC.BAT), remove the commands that start those programs from the configuration files and restart the computer. Add the program commands back into the configuration files one at a time until the problem reappears. Experiment with the order of the programs. (Keep in mind that some files must be loaded prior to others in order for your system to operate properly. Check the software documentation for any configuration requirements.)
You connected an external device and the computer isn't operating properly.	Make sure you chose the correct setting for the device in the BIOS Setup utility. You may have plugged in a device when the MX1 was on. Turn the MX1 off, reconnect the device and turn the MX1 on again. The cable wiring may be faulty. Try a different cable or check the device's wiring requirements. Check all the connections. Try operating the system again.

Radio Problems

Problem	Solution
The radio is on, configured properly and still won't transmit or receive data.	Make sure the sending system is not busy or off-line.

The 2.4GHz Radios

Problem	Solution
The Proxim 2.4GHz radio won't receive or transmit properly.	Check the settings in the NET.CFG or SOCKETS.CFG files (i.e. communications parameters: station type, Domain, etc.) Refer to Chapter 6, "RF Network Configuration" for information on how to modify these settings.
The Lucent 2.4GHz radio won't connect to the network even though everything else seems to be working properly.	Check WaveLAN/IEEE Advanced Setup configuration for the Access Point and to see if you have configured the wireless network as a "Closed System". If this is the case then the WaveLAN Network Name on the station must match what is configured in the Access Point. OR The string for WaveLAN_Network_Name is case-sensitive. The WaveLAN DOS ODI driver requires the use of only UPPER-CASE characters. If you have configured the Access Points with lower-case names you will need to change your Access Point WaveLAN_Network_Name parameter to UPPER-CASE characters for proper operation.

The 900MHz Radios

Problem	Solution
The 900MHz radio won't receive or transmit properly.	Refer to the appropriate Terminal Emulation Reference Guide for information on how to modify RF parameters for the 900MHz PCMCIA radio.

Software Related Problems

Consider the following:

- If an error message appears while you are using a software package, check the software documentation first. It usually includes a troubleshooting section or summary of error messages. If you cannot find the error message in the software documentation, look for the message in the ROM-DOS documentation.
- If you cannot load a software package, the SRAM card (or diskette if using REMSERVE.EXE) may be corrupt, try another card/disk. If you have received a bad disk/SRAM card call the manufacturer for a new one.
- Some software may be incompatible with other software already installed. If the problem continues, contact the manufacturer of the software program.
- Some software may require more time than the Video Timer parameter maximum value (15 minutes) to install. In this case, press an arrow key or the spacebar to keep the MX1 "awake" until the software installation is complete.
- Be sure you have enough memory and hard disk space to handle the software being installed.

IP Stack

If you cannot connect to the network or if you do not have any success using XPING try the following:

1. Ensure that you have restarted your system, after making changes to any configuration files. Changes to your configuration files will not take effect until you restart your system.
2. Verify that you have a valid entry in the SOCKET.CFG file for IP addresses.
3. Ensure that network driver parameters and configuration files, such as NET.CFG, have the correct entries.
4. Verify that your system files (AUTOEXEC.BAT and CONFIG.SYS) have the correct entries. (Refer to Chapter 4, "System Configuration" for the correct configuration of AUTOEXEC.BAT and CONFIG.SYS.)

Memory

This section lists possible solutions to some common memory problems.

Conventional Memory

If your program reports that there isn't enough memory for it to run, you may not have enough conventional memory available for that program. To determine the memory needs of the program and the availability of memory in the MX1, follow these steps:

1. Check the software documentation to see what kind of memory the program can use (conventional, extended or expanded).
2. At the system prompt, type MEM to run the DOS MEM command and check how much conventional memory is left for your programs. (MEM reports the number of bytes available.)
3. Refer to the program's documentation to verify that this is enough memory to run the program. If not, you may need to remove device drivers or memory-resident programs from the CONFIG.SYS or AUTOEXEC.BAT files. (If unsure of how to accomplish this, contact LXE Technical Support.)

When you start the computer and it displays an error during the memory test, write down the error and call LXE Technical Support.

Extended Memory

To use software with extended memory, the software must be compatible with the Extended Memory Specification (XMS).

System Testing

Power On Self Test (POST)

Each time the MX1 is turned on (or is rebooted using <Ctrl> + <Alt> + <Del>), a series of comprehensive hardware tests are performed. These tests are called the Power On Self Test, or POST.

In the event that the system does not complete the POST, a beep code will sound. If this happens, contact LXE Customer Support.

If the LXE MX1 display is operational and the unit appears to boot when you turn it on, yet behaves in a manner that leads you to believe it is not working properly, contact LXE Customer Support. You may need to return the MX1 for service.

POST Error Messages

The following table lists the POST error messages for the MX1. If problems persist, contact LXE Customer Support.

Message

```
System CMOS checksum bad – run SETUP
```

Possible Cause

The backup battery may be completely drained.

Action

Insert a new battery pack. The battery pack will begin charging the backup battery. Wait until the AAA icon disappears from the display. Turn the power off, then back on again. If the problem persists, contact LXE Customer Support.

Message

```
Stuck Key
```

Possible Cause

A keypad key may be stuck in the down position.

Action

Check the keypad for a physically stuck key and loosen the key. Turn the power off, then back on again. If the problem persists, contact LXE Customer Support.

Message

```
Previous boot incomplete - Default configuration used
```

Action

Run BIOS Setup to recall the previously saved settings. Turn the power off, then back on again. If the problem persists, contact LXE Customer Support.

Messages Probably Requiring Repair

Message

```
Operating system not found
Keyboard error
K System RAM Failed at offset:
K Shadow Ram Failed at offset:
K Extended RAM Failed at offset:
System cache error - Cache disabled
System timer error
Real time clock error
Keyboard controller error
```

Action

Turn the power off, then back on again. If the problem persists, contact LXE Customer Support for repair instruction.

POST Beep Codes

The system speaker emits a coded beep to alert the user that the system failed the Power On Self Test. If this happens, contact qualified service personnel. Do not attempt to fix the problem yourself.

Beep codes are listed below with a short description of the error.

Beep Seq.	Description
1-2-2-3	BIOS ROM Checksum Failure
1-3-1-1	DRAM Refresh Failure
1-3-1-3	Keyboard Controller Failure
1-3-4-1	512KB Base Address Line Failure
1-3-4-3	512KB Base Memory Failure
2-1-2-3	ROM Copyright Notice Error
2-2-3-1	Unexpected Interrupt

If You Need Further Assistance

Since some problems you experience may be related to the operating system or software, it is important to investigate other sources of assistance first. Try the following before contacting LXE.

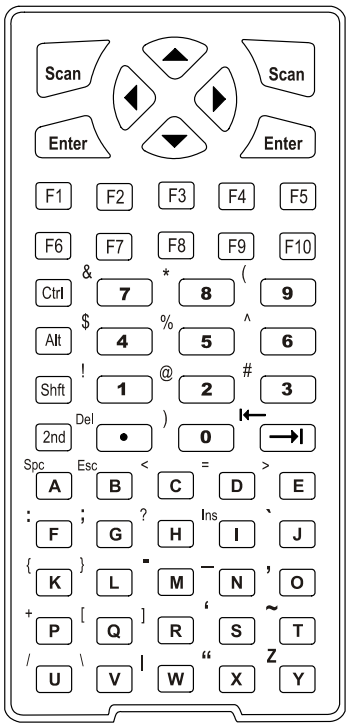
- Review the troubleshooting information in commercially available DOS documentation.
- If the problem occurs while running software applications loaded after your purchase of the MX1, consult the software documentation for troubleshooting suggestions. Contact the software company's technical support department for assistance.

If you have followed these recommendations and are still having problems, you may need additional technical assistance.

LXE technical help telephone numbers and contact information are located in the "Contacting LXE" file on the LXE Manuals CD and on the LXE web page : www.lxe.com

Appendix A Key Maps

Full Alpha-Numeric Key Map (60 Key)



Full Alpha-Numeric Keypad

The key maps that follow represent the commands used with batch units and when running LXE's ANSI Plus (with either 900MHz or 2.4GHz radios) or LDS Plus (with 900MHz radios) Terminal Emulation (TE) programs. When running these programs on the MX1, please refer to the following terminal emulation reference guides for equivalent keys and keypress sequences:

- ANSI Plus Reference Guide
- LDS Plus Reference Guide

Note: The manuals can be viewed on the LXE Manuals CD.

Full Alpha-Numeric Key Map 101-Key Equivalencies for Batch Units

Note: The batch unit key mapping is used on hand held computers that are NOT running an LXE Terminal Emulator.

When using a sequence of keys that includes the 2nd key, press the 2nd key first then the rest of the key sequence. Set the On/Off condition of NumLock before pressing a key sequence. There is no visual indication of the condition of NumLock.

Note: When the computer boots, the default condition of NumLock is On. NumLock can be set using BIOS Setup or toggled with a 2nd-Shift-Right Arrow key sequence.

Note: When the computer boots, the default condition of Caps (or CapsLock) is Off. The Caps (or CapsLock) condition can be set using BIOS Setup or toggled with a 2nd-Shift-Left Arrow key sequence. CAPS is displayed on the screen when CapsLock is On.

To get this key	Press These Keys and Then					Press this key
	2nd	Shift	Ctrl	Alt	NumLock	
Contrast	x	X				C
Volume	x	X				V
2nd						2nd
Shift						Shft
Alt						Alt
Ctrl						Ctrl
Scan						Scan
Enter						Enter
Esc	x					B
Back Space	x	x				B
Tab						Tab
BackTab	x					Tab
Space	x					A
Break	x	x				D
Pause	x	x				Q
Up Arrow						Up Arrow
Down Arrow						Down Arrow
Right Arrow						Right Arrow
Left Arrow						Left Arrow
Pan Up	x					Up Arrow
Pan Down	x					Down Arrow
Pan Right	x					Right Arrow
Pan Left	x					Left Arrow
Pan Home	x	x				I
Insert	x					I
Delete	x					DOT

To get this key	Press These Keys and Then					Press this key
	2nd	Shift	Ctrl	Alt	NumLock	
Home	x	x				H
End	x	x				E
Page Up	x	x				Up Arrow
Page Down	x	x				Down Arrow
NumLock (Toggle)	x	x				Right Arrow
CapsLock (Toggle)	x	x				Left Arrow
Right Shift	x		x			1
Right Alt	x		x			4
Right Ctrl	x		x			7
ScrollLock	x	x				L
F1						F1
F2						F2
F3						F3
F4						F4
F5						F5
F6						F6
F7						F7
F8						F8
F9						F9
F10						F10
F11	x					F1
F12	x					F2
a		x				A
b		x				B
c		x				C
d		x				D
e		x				E
f		x				F
g		x				G
h		x				H
i		x				I
j		x				J
k		x				K
l		x				L
m		x				M
n		x				N
o		x				O
p		x				P
q		x				Q
r		x				R

To get this key	Press These Keys and Then					Press this key
	2nd	Shift	Ctrl	Alt	NumLock	
s		x				S
t		x				T
u		x				U
v		x				V
w		x				W
x		x				X
y		x				Y
z[3]	x					Y
A						A
B						B
C						C
D						D
E						E
F						F
G						G
H						H
I						I
J						J
K						K
L						L
M						M
N						N
O						O
P						P
Q						Q
R						R
S						S
T						T
U						U
V						V
W						W
X						X
Y						Y
Z[4]	x	x				Y
1 (alpha)						1
2 (alpha)						2

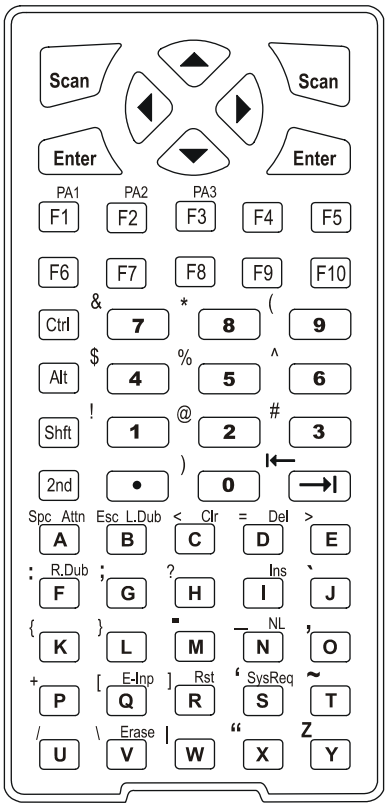
[3] To get lowercase z, make sure CapsLock is off (CAPS icon is NOT on the display).

[4] To get capital Z with CapsLock on (CAPS icon is on the display), press 2nd + Y. To get capital Z with CapsLock off, press 2nd + Shift + Y. The default boot setting of Caps is Off.

To get this key	Press These Keys and Then					Press this key
	2nd	Shift	Ctrl	Alt	NumLock	
3 (alpha)						3
4 (alpha)						4
5 (alpha)						5
6 (alpha)						6
7 (alpha)						7
8 (alpha)						8
9 (alpha)						9
0 (alpha)						0
DOT (alpha)						DOT
1 (numeric)	x	x			On	1
2 (numeric)	x	x			On	2
3 (numeric)	x	x			On	3
4 (numeric)	x	x			On	4
5 (numeric)	x	x			On	5
6 (numeric)	x	x			On	6
7 (numeric)	x	x			On	7
8 (numeric)	x	x			On	8
9 (numeric)	x	x			On	9
0 (numeric)	x	x			On	0
DOT (numeric)	x	x			On	DOT
- (numeric)	x	x	x			M
+ (numeric)	x	x	x			P
/ (numeric)	x	x	x			U
* (numeric)	x	x	x			Y
Home (numeric)	x	x	x		Off	7
End (numeric)	x	x	x		Off	1
PgDn (numeric)	x	x	x		Off	3
PgUp (numeric)	x	x	x		Off	9
Lt Arrow (numeric)	x	x	x		Off	4
Rt Arrow (numeric)	x	x	x		Off	6
Up Arrow (numeric)	x	x	x		Off	8
Dn Arrow (numeric)	x	x	x		Off	2
Insert (numeric)	x	x	x		Off	0
Del (numeric)	x	x	x		Off	DOT
<	x					C
>	x					E
=	x					D
: (colon)	x					F
; (semicolon)	x					G
?	x					H

To get this key	Press These Keys and Then					Press this key
	2nd	Shift	Ctrl	Alt	NumLock	
`	x					J
{	x					K
}	x					L
- (minus sign)	x					M
_ (underscore)	x					N
, (comma)	x					O
+	x					P
[	x					Q
]	x					R
‘ (apostrophe)	x					S
~ (tilde)	x					T
/	x					U
\	x					V
|	x					W
“	x					X
!	x					1
@	x					2
#	x					3
$	x					4
%	x					5
^	x					6
&	x					7
* (asterisk)	x					8
(	x					9
)	x					0

IBM 3270 and TN3270 Terminal Emulator Keypad



IBM 3270 Specific Keypad

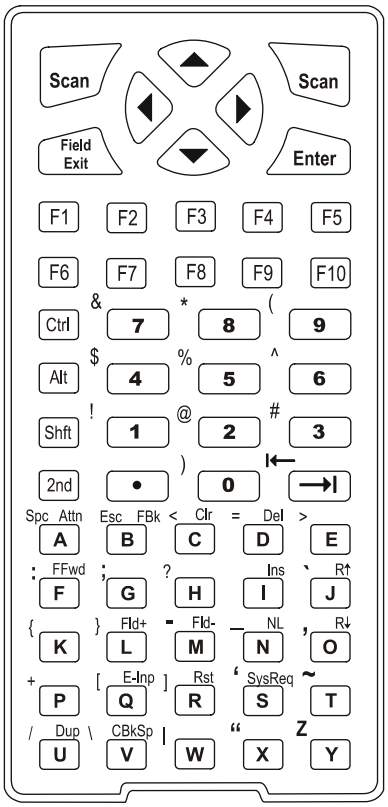
This keypad is designed to allow the user to enter terminal emulator commands when running LXE's IBM 3270 and TN3270 Terminal Emulation (TE) programs.

When running these programs on the MX1, please refer to the following terminal emulation reference guides for equivalent keys and keypress sequences:

- 3270 Terminal Reference Guide (3270 DOS TE)
- 3270 Programmer's Reference Guide
- TN3270 Terminal Reference Guide

Note: The manuals can be viewed on the LXE Manuals CD.

IBM 5250 and TN5250 Terminal Emulator Keypad



IBM 5250 Specific Keypad

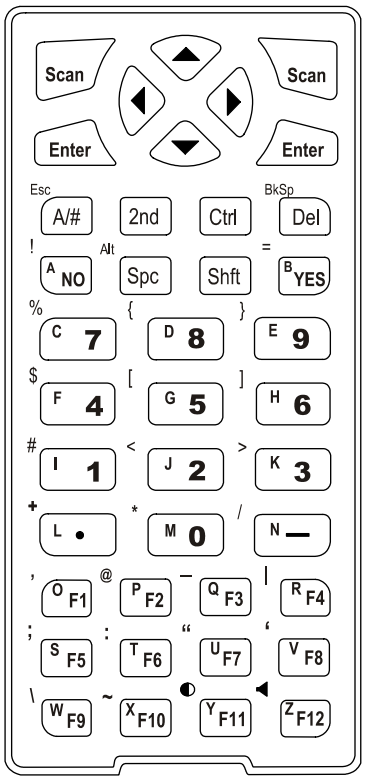
This keypad is designed to allow the user to enter terminal emulator commands when running LXE's IBM 5250 and TN5250 Terminal Emulation (TE) programs.

When running these programs on the MX1, please refer to the following terminal emulation reference guides for equivalent keys and keypress sequences:

- 5250 Terminal Reference Guide (5250 DOS TE)
- 5250 Programmer's Reference Guide
- TN5250 Terminal Reference Guide

Note: The manuals can be viewed on the LXE Manuals CD.

Numeric-Alpha Key Map (41 Key)



Numeric-Alpha Keypad

When running the ANSI Plus, LDS Plus, 3270, 5250, TN3270 or TN5250 terminal emulation programs with this keypad, please refer to the following terminal emulation reference guides for equivalent keys and keypress sequences:

- 3270 Terminal Reference Guide (3270 DOS TE)
- 5250 Terminal Reference Guide (5250 DOS TE)
- ANSI Plus Reference Guide
- LDS Plus Reference Guide
- TN3270 Terminal Reference Guide
- TN5250 Terminal Reference Guide

Note: The manuals can be viewed on the LXE Manuals CD.

Numeric-Alpha Key Map 101-Key Equivalencies for Batch Units

When using a sequence of keys that include the A/# key, first press the A/#. When CAPS is On, the CAPS icon is displayed on the screen and alphabetic characters are toggled to uppercase.

When using a sequence of keys that include the A/# key and the 2nd key, first press the A/# key then the 2nd key. When using a sequence of keys that do not include the A/# key and includes the 2nd key, press the 2nd key first then the rest of the key sequence.

Note: The batch unit key mapping is used on hand held computers that are NOT running an LXE Terminal Emulator.

To get this result	Press These Keys and then					Press this key
	A / #	2nd	Shift	Ctrl	NumLock	
Contrast		x				F11
Volume		x				F12
CAPS[5]		x	x			Left Arrow
2nd		x				2nd
Shift						Shft
NO						NO
YES						YES
Alt		x				Spc
A / #[6]						A / #
a / #		x				Enter
Ctrl						Ctrl
Scan						Scan
Enter						Enter
Esc		x				A / #
Back Space		x				Del
Forward Tab		x				Right Arrow
Back Tab		x				Left Arrow
Space						Spc
Break		x	x			Right Arrow
Pause		x	x			F3
Up Arrow						Up Arrow
Down Arrow						Down Arrow
Right Arrow						Right Arrow
Left Arrow						Left Arrow
Pan Up		x		x		Up Arrow
Pan Down		x		x		Down Arrow
Pan Right		x		x		Right Arrow
Pan Left		x		x		Left Arrow

[5] CAPS icon is toggled on and off. When On, icon appears on the display.
[6] Alpha icon is toggled on and off. When On, icon appears on the display.

To get this result	Press These Keys and then					Press this key
	A / #	2nd	Shift	Ctrl	NumLock	
Pan Home		x		x		Enter
Insert		x	x			F10
Delete						Del
Home		x	x			Up Arrow
End		x	x			Down Arrow
Page Up		x				Up Arrow
Page Down		x				Down Arrow
NumLock						Determined by BIOS Setup
CapsLock[7]		x	x			Left Arrow
Right Shift		x	x			F7
Right Alt		x	x			F8
Right Ctrl		x	x			F9
ScrollLock		x	x			F4
F1						F1
F2						F2
F3						F3
F4						F4
F5						F5
F6						F6
F7						F7
F8						F8
F9						F9
F10						F10
F11						F11
F12						F12
1 (numeric)		x	x		On	1
2 (numeric)		x	x		On	2
3 (numeric)		x	x		On	3
4 (numeric)		x	x		On	4
5 (numeric)		x	x		On	5
6 (numeric)		x	x		On	6
7 (numeric)		x	x		On	7
8 (numeric)		x	x		On	8
9 (numeric)		x	x		On	9
0 (numeric)		x	x		On	0
1 (alpha)					Off	1
2 (alpha)					Off	2

[7] CAPS icon is toggled on and off. When On, icon appears on the display.

To get this result	Press These Keys and then					Press this key
	A / #	2nd	Shift	Ctrl	NumLock	
3 (alpha)					Off	3
4 (alpha)					Off	4
5 (alpha)					Off	5
6 (alpha)					Off	6
7 (alpha)					Off	7
8 (alpha)					Off	8
9 (alpha)					Off	9
0 (alpha)					Off	0
A[8]	x		x			NO
B	x		x			YES
C	x		x			7
D	x		x			8
E	x		x			9
F	x		x			4
G	x		x			5
H	x		x			6
I	x		x			1
J	x		x			2
K	x		x			3
L	x		x			DOT
M	x		x			0
N	x		x			Minus Sign
O	x		x			F1
P	x		x			F2
Q	x		x			F3
R	x		x			F4
S	x		x			F5
T	x		x			F6
U	x		x			F7
V	x		x			F8
W	x		x			F9
X	x		x			F10
Y	x		x			F11
Z	x		x			F12
a[9]	x					NO
b	x					YES

[8] To use capital letters, both the Alpha icon and the CAPS icon must be displayed on the screen.

[9] To use lower case letters, both the Alpha icon and the CAPS icon must NOT be displayed on the screen.

To get this result	Press These Keys and then					Press this key
	A / #	2nd	Shift	Ctrl	NumLock	
c	x					7
d	x					8
e	x					9
f	x					4
g	x					5
h	x					6
i	x					1
j	x					2
k	x					3
l	x					DOT
m	x					0
n	x					Minus Sign (alpha)
o	x					F1
p	x					F2
q	x					F3
r	x					F4
s	x					F5
t	x					F6
u	x					F7
v	x					F8
w	x					F9
x	x					F10
y	x					F11
z	x					F12
%		x				7
^		x	x	x		6
&		x	x	x		7
* (asterisk)		x				0
(		x	x	x		9
)		x	x	x		0
+ (numeric)		x	x			F11
- (numeric)		x	x			F12
* (numeric)		x	x			NO
/ (numeric)		x	x			YES
DOT (alpha)		x	x	x		3
?		x	x	x		8

Appendix B Technical Specifications

Physical Specifications

Features		Specifications	Comments	
CPU		Intel 486 25 MHz	32 bit CPU (with on-chip cache)	
Memory	ROM RAM	1MB BIOS Flash 4 MB Dynamic RAM	 System Memory	
Display	Controller LCD	VGA Compatible Controller Monochrome Transflective	512 KB of Video RAM Transflective LCD. Customer Configurable Backlighting	
Mass Storage	Flash	8 MB	Drive C:	
	Removable PC Card (Customer Installable)	SRAM or Flash PCMCIA Type II PC Cards (Various Sizes) Bootable SRAM PC Card, ATA Flash PC Card, or ATA Hard Drive PC Card	Configurable as Drive D: SRAM PC card Boots as Drive A: Others boot as Drive C:	
		Solid State Disk and ATA Rotating Hard Drive PCMCIA Type III Drive (Various Sizes)	Configurable as Drive D:	
PCMCIA Interface		One (1) PCMCIA Slot: Accepts Type I, II and III PCMCIA cards	Compatible with the PCMCIA version 2.1 standard.	
Weights		Unit with radio, battery and scanner endcap	Less than 30 oz	>850g
		Battery	5.6 oz	157g
		Radio Card - 2.4GHz Type II Radio Card - 900MHz	1.0 oz 1.6 oz	28g 45g
		Handle	2.6 oz	73g
		Plain Endcap	1.8 oz	51g
		Scanner Endcap Scanner/RS232 Combination	3.7 oz 4.2 oz	105g 118g
		SRAM Card	1 oz	28g
External Connectors/Interface		IrDA Connector (COM 2) bi-directional half-duplex	Supports 115k baud (IrDA software restricts to 18.2k baud)	
		Endcap - One Optional External RS-232C Serial Port (COM 1)	9 Pin “D” (male) connector provides connection to external devices such as a printer.	

Features		Specifications	Comments	
		Handle Contacts	Provide electrical contact between the MX1 unit and the optional handle. Covered with Mylar strip until installation of handle	
		Beeper	Installed in every endcap option.	
Power Connector		5.5V - 14 VDC Input Power	External Battery Charger Contacts	
Dimensions w/Scanner Endcap		Length	10.4”	264mm
		Width	2.87”	73mm
		Depth	1.6”	41mm
Batteries	Main	1500 mAh (or greater) Nickel Metal Hydride (NiMH)	In-Unit Chargeable or Externally Chargeable	
	Backup (CMOS)	Internal Nickel-Cadmium (NiCd)	Automatically charges from Main Battery during normal operation Keeps MX1 operational for 5 minutes (depending upon usage) when Main Battery is depleted	

Environmental Specifications

Feature	Specification
Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Storage Temperature	-22°F to 140°F (-30°C to 60°C)
Water and Dust	IEC IP65 Category 1 (with IP65 endcaps)
Operating Humidity	5% to 95% non-condensing at 104°F (40°C)
Vibration	Based on MIL Std 810D
ESD	8 KV air, 4kV direct contact
Shock	Multiple 4 foot drops to concrete

Display Specifications

Feature	Specification	Comments
Type	Transflective Monochrome LCD	Power Managed Backlighting
Resolution	160x160 pixels	(20 lines x 20 characters) (10 lines x 20 characters)
Cell Size	DOS Mode	8 x 8 8 x 16
Size	3” Diagonal	
Dot Dimensions	0.33mm x 0.33mm	
Gray Scale	16/64 Shades of Gray	

Battery Chargers

Clip-on Portable Charger

Operating Temperature	-4°F to 122°F (-20°C to 50°C) Charge only at temperatures above 32°F / 0°C
Storage Temperature	-22°F to 140°F (-30°C to 60°C)
Operating Humidity	Up to 90% non-condensing at 104°F (40°C)
Vibration	Per cell phone industry testing: 5 - 500 Hz, 1.5 mm, 1.5G, 0.1 oct/min X, Y, Z, 1 cycle per direction
Shock	Multiple 4 foot drops to concrete

US AC Wall Adapter

Operating Temperature	32°F to 104°F (-0°C to 40°C)
Storage Temperature	-22°F to 140°F (-30°C to 60°C)
Operating Humidity	Up to 90% non-condensing at 104°F (40°C)

International AC Adapter

Operating Temperature	32°F to 104°F (-0°C to 40°C)
Storage Temperature	-22°F to 140°F (-30°C to 60°C)
Operating Humidity	Up to 90% non-condensing at 104°F (40°C)

Radio Specifications

PCMCIA 900 MHz Type III

Bus Interface:	PCMCIA 2.0, Type III slot
Radio Frequencies:	902.2 MHz to 927.8 MHz FH SS
RF Data Rates:	64K bits/sec CPFSK
RF Power Output:	250 mW ± 2.0 dB into 50 Ohms
Channel Spacing:	400 KHz or 200 KHz
Operating Temperature MX1	-20°C to +50°C, -4°F to 122°F
Storage Temperature MX1	-40°C to 70°C, -40°F to 158°F
Connectivity:	Novell, TCP/IP, Ethernet, NDIS, ODI

LXE 6400 PCMCIA 2.4 GHz Type II

Bus Interface:	PCMCIA 2.0, Type II slot
Radio Frequencies:	2.4 - 2.4835 GHz FH SS
RF Data Rates:	0.8 / 1.6 Mbps
RF Power Level:	100 mW
Channels	15
Operating Temperature	see MX1 Environmental Specs
Storage Temperature	see MX1 Environmental Specs
Connectivity:	Novell, TCP/IP, Ethernet, NDIS, ODI

LXE 6500 PCMCIA 2.4 GHz Type II

Bus Interface:	PCMCIA 2.0, Type II slot
Radio Frequencies:	2.4 - 2.4835 GHz IEEE 802.11 DS SS
RF Data Rates:	1 / 2 Mbps
RF Power Level:	50 mW nominal
Channels	11 US, 13 Europe, 4 France, 1 Japan
Operating Temperature	see MX1 Environmental Specs
Storage Temperature	see MX1 Environmental Specs
Connectivity:	Novell, TCP/IP, Ethernet, ODI

PCMCIA Cisco 2.4 GHz Type II

Bus Interface:	PCMCIA 2.0, Type II slot
Radio Frequencies:	2.4 - 2.4835 GHz IEEE 802.11b DS SS
RF Data Rates:	11 Mbps maximum
RF Power Level:	35 mW nominal
Channels	11 US, 13 Europe, 4 France, 1 Japan
Operating Temperature	see MX1 Environmental Specs
Storage Temperature	see MX1 Environmental Specs
Connectivity:	Novell, TCP/IP, Ethernet, ODI
Antenna	Internal

PCMCIA Symbol 11Mb 2.4 GHz Type II

Bus Interface:	PCMCIA 2.0, Type II slot
Radio Frequencies:	2.4 - 2.5 GHz IEEE 802.11b DS SS
RF Data Rates:	11 Mbps maximum
RF Power Level:	100 mW
Channels	11 US, 13 Europe, 4 France, 1 Japan
Operating Temperature	see MX1 Environmental Specs
Storage Temperature	see MX1 Environmental Specs
Connectivity:	Novell, TCP/IP, Ethernet, ODI
Antenna	Internal

Appendix C Commands

Introduction

This appendix describes the Datalight ROM-DOS commands *that are loaded in the MX1 by LXE*. The information in this appendix is taken from Datalight's "ROM-DOS 6.22 User's Guide" and is used by permission.

ROM-DOS Commands

Each entry includes an explanation of the command's purpose, the command entry syntax, remarks, and examples. Where applicable, command syntax and parameters are given. Parameters may be supplied using either uppercase or lowercase letters, and the hyphen (-) may be substituted for the forward slash (/).

Each command also has a label to designate whether it is an internal or external command. Internal commands are part of the command processor program, COMMAND.COM. These functions are available only while COMMAND.COM is running. External commands are actually stand-alone utility programs. They are independent from COMMAND.COM.

ANSI.SYS

Type

Installable Device Driver

Purpose

ANSI.SYS is a console device driver that allows you to support ANSI codes on the local display.

Syntax

```
Device=ANSI.SYS [options]
```

Remarks

ANSI.SYS supports standard ANSI escape sequences.

ANSI.SYS writes directly the screen when using text video mode.

Options

The */K* option forces use of the extended keyboard BIOS calls which sense F11 and F12.

The */X* option lets you redefine the extended keys independently.

The */S* option disables the keyboard redefinition feature.

The /*Tnn* option indicates that the video mode *nn* is a text mode. By default, modes 0, 1, 2, 3 and 7 are text modes.

Examples

```
DEVICE=ANSI.SYS
```

This example loads ANSI.SYS with default settings.

```
DEVICE=ANSI.SYS /T54 /S
```

Load ANSI.SYS with mode 54h as a video text mode and disable keyboard redefinition.

ATTRIB.EXE

Type

External

Purpose

The ATTRIB command either displays or modifies the attribute of a file.

Syntax

```
ATTRIB [+ ¦ -][option][filespec]
```

Remarks

The file attributes define the characteristics of a file. They determine if a file may be deleted or modified, or if it is archived. The ATTRIB command is used to manage these file attributes.

Wildcard characters may be used in the ATTRIB **filespec**.

The ATTRIB command will modify file attributes if modify commands are given to ATTRIB. The modify commands are:

+/-	Add(+) or remove(-) attribute
A	Archive attribute
C	Clear all attributes
H	Hidden file attribute
R	Read only attribute
S	System file attribute

If no modify commands are found by ATTRIB, then the files are displayed along with the file names and their current attributes.

Examples

ATTRIB will add the read-only attribute to the file myfile.dat.

```
ATTRIB +r myfile.dat
```

ATTRIB will remove the read-only attribute and the archive attribute for all files with the DAT extension.

```
ATTRIB -a -r *.dat
```

ATTRIB will display the attributes of all files with the DAT extension.

```
ATTRIB *.dat
```

CHKDSK.EXE

Type

External

Purpose

The CHKDSK command checks the disk directories and File Allocation Table (FAT) and displays a disk and memory report.

Syntax

```
CHKDSK [d:][path][filespec][/C] [/F] [/V]
```

Remarks

CHKDSK examines a disk and determines if the disk has any errors in the File Allocation Table (FAT) and will optionally fix errors.

Options

The */F* option causes CHKDSK to fix errors on the disk if any were found. The errors that can be found are directory or FAT errors. If the /F is not specified then CHKDSK acts as if it will fix the disk, but the corrections will not be written out to the disk.

If errors are detected, you will be prompted with a message similar to the following:

```
15 lost allocation units found in 5 chains.
Convert lost chains to files?
```

If you answer Y for Yes, each lost chain will be written to a file in the root directory of the current default drive. Each file will have the name file*nnnn*.chk. *nnnn* will be a sequential number. The first chain will be in FILE000.CHK. These files can be verified to see if they contain valuable information, and then deleted if desired. Answering N for No to the above prompt, CHKDSK will still make the corrections however the lost chains will not be saved to the disk.

The */C* option allows CHKDSK to correct errors without user confirmation. This option must be used along with the /F option for corrections to be made.

The */V* option causes CHKDSK to display each path and file as it is processed.

If a file specification is specified, then CHKDSK displays all files matching the specification that have noncontiguous data areas on the disk. Files that are stored in noncontiguous areas, especially .exe files, have slower disk access times. If CHKDSK reports a large number of files with this problem, a utility program that optimizes the files and free space on your disk should be used.

After checking the disk, CHKDSK displays any error messages followed by a report on the state of the disk that was checked. An example of the report is shown below.

```
Volume ROM-DOS created June 1,1990 1:00a
Volume Serial Number is 190E-4AA2
    362496 bytes total disk space
    0 bytes in 1 hidden files
    6144 bytes in 2 user files
    356352 bytes available on disk
    655360 bytes total memory
    595360 bytes free
```

CHKDSK does not wait for a disk to be inserted before the checking is initiated nor does it repair any errors.

Examples

CHKDSK will check the integrity of drive A. The report will be printed to the console.

```
CHKDSK a:
```

CHKDSK will check the integrity of RAM disk D. The report will be saved in a file called DRIVE_D.RPT.

```
CHKDSK d: >drive_d.rpt
```

COMMAND.COM

Type

External

Purpose

Start a new command processor.

Syntax

```
COMMAND[device][/E:number][/K:filename]
                                    [/P][/C string][/MSG]
```

Remarks

This command starts a new copy of the ROM-DOS command processor. The command processor is the program that has all the internal DOS commands in it.

Starting a new command processor will also produce a new environment. The size of the environment is 128 bytes by default, but it can be changed using the /E switch.

Command and its arguments can also be used in a SHELL= statement in your config.sys file. See the full description of SHELL for more details.

Options

The *device* option specifies that COMMAND.COM should use a different device, such as AUX, for input and output.

The */E:number* switch sets the environment size. Number represents the size of the environment in bytes. Number must be in the range from 160 to 32768. All other values will be ignored and the default value of 256 will be used. ROM-DOS will round the value entered up to the nearest multiple of 16.

The */K:filename* option tells the command processor to run the specified filename and then display the ROM-DOS command prompt. It is not recommended that this option be used in a CONFIG.SYS SHELL= statement.

The */P switch* causes COMMAND not to exit, or in other words, to remain permanent. The /P switch should be used only when command is used in a CONFIG.SYS SHELL statement.

The */c string* switch causes COMMAND to execute the command in string and then terminate. The string command can be any internal or external command.

The */MSG* option indicates that all error messages should be stored in memory. This option is recommended only for diskette based systems. ROM-DOS keeps many of its error messages in the resident part of COMMAND.COM rather than using valuable memory to store them. If an error message is needed and you have loaded ROM-DOS from a diskette, the message will only be

available if the boot disk is still in the drive. By using the /MSG option, the messages will be available in memory at all times. The /P option must be used along with the /MSG option.

Examples

The following command will cause a new copy of COMMAND to be executed. It will perform a DIR command on the C drive and then exit back to the previous Command Processor.

```
COMMAND /C DIR C:
```

The following example shows loading of a permanent copy of command with an environment size of 256 bytes.

```
SHELL=C:\COMMAND.COM /P /E:256
```

DELTREE.EXE

External Command

The DELTREE command deletes one or more directory trees or individual files.

Syntax

```
DELTREE [/Y] [drive:]path [[drive:]path[...]]
```

Remarks

/Y prevents DELTREE from prompting before deleting.

[drive:]path indicates the name(s) of the file(s) or directory tree(s) to delete. Wildcards are allowed.

Examples

Datalight DELTREE deletes one or more directory trees. For example, to delete all files and directories in the tree C:\TEMP, enter

```
DELTREE C:\TEMP.
```

You can also use DELTREE to delete individual files, one at a time, using wildcards. For example, to delete selected files in the current directory, enter

```
DELTREE *.*
```

DELTREE then prompts you for each file it finds, allowing you to choose whether to delete them.

Caution: *Take care when using wildcards with DELTREE. DELTREE deletes all specified files and subdirectories regardless of their attributes. Multiple files and/or subdirectories may be specified.*

FORMAT.COM

External Command

The FORMAT command initializes a disk so ROM-DOS can access files on that disk. A disk must be formatted before ROM-DOS can use it.

Syntax

```
FORMAT [drive:] [/options]
```

Remarks

FORMAT initializes the disk and directory of the specified drive. The size of the formatted disk is the largest possible size that the specified drive supports, unless a different size is specified via a command line option.

Options

The */4* switch causes the floppy disk to be formatted as a 360KB disk even if the drive is a 1.44MB, 2.88MB, or 1.2MB drive.

The */7* switch causes the floppy disk to be formatted as a 720KB disk even if the drive is a 1.44MB or 2.88MB drive.

The */B* option causes FORMAT to used BIOS Int 13h calls. By default, FORMAT checks the DOS version, and if it is DOS 5.0 or higher, it uses the floppy device driver to do the format. Using the /B option forces FORMAT to bypass the floppy or hard disk controller and use BIOS calls. /B makes FORMAT device independent.

The */C* switch causes FORMAT to format one disk without operator input. The disk is assumed to be in the specified drive, and FORMAT exits immediately when the format is complete. This switch is useful in batch files or programs that require a formatted disk without user input.

The /*F*:*size* option specifies the size of the floppy disk to be formatted. Available size values are 360, 720, 1.2, 1.44, and 2.88, and are entered as /F:*siz*e. For example, /F:1.2.

The */H* switch causes the system files not to be hidden or write-protected. This can be used along with the /S option.

The */I* option forces FORMAT to use IOCTL calls and never use BIOS calls. Normally, FORMAT first tries to access the device driver IOCTL calls to format the disk. If this fails, BIOS calls are used (unless the /B option is specified). BIOS calls are always used for DOS 3.3 and earlier.

The */Q* option causes FORMAT to do a quick format. A quick format reinitializes the disk, deleting each file and subdirectory from the disk. A quick format can only be performed on a previously fully formatted disk.

The */S* switch causes FORMAT to copy the ROM-DOS system files, ROM-DOS.SYS and COMMAND.COM, onto the disk. The file ROM-DOS.SYS is renamed and stored on the disk as files IBMBIO.COM and IBMDOS.COM, which are stored as hidden files, unless the /H option is used.

The */V*:LABEL switch causes FORMAT to place a volume label on the disk. If the volume label is not provided on the command line, you are prompted for the volume label once the format is complete.

The */[* switch causes FORMAT to run without display of the sign-on message.

If FORMAT encounters an error, the exit code returned to DOS indicates the type of error. The error codes are listed in the following table.

Error Level	Type of Error
0	No error encountered
1	Invalid drive
2	Unsupported drive format
3	Attempted hard drive format (unsupported)
4	Write-protect error

HIMEM.SYS

Installable Device Driver

The HIMEM.SYS device driver manages extended memory and the High Memory Area (HMA) in a 286, 386 or greater, or PS/2 systems. HIMEM prevents programs from simultaneously using the same area of memory for two different purposes. HIMEM supports the Extended Memory Specification (XMS) 2.0. HIMEM is installed as a device driver in CONFIG.SYS.

Syntax

```
DEVICE = [d:] [path] HIMEM.SYS [/machine:n] [/A20[+]] [/PS2]
[/CONTROLA20:OFF]
```

Remarks

The HIMEM driver can be used to allow ROM-DOS to run in High Memory.

HIMEM supports a default of 32 handles.

HIMEM should not be used with older versions of Datalight's VDISK. Current versions of VDISK use XMS memory if it is available.

HIMEM recognizes PS/2-style A20 line control and determines whether to use the PS/2 A20 control or the AT A20 control method automatically by calling Int 15h, function C0h (get system configuration). This automatic detection can be overridden with the /Machine:n, /A20, A20+, or /PS2 command line switches in the event that the auto detection on a given system fails.

/Machine:1 and /A20 both designate the PC AT A20 control method. These switches instruct HIMEM *not* to wait for the A20 line to settle.

/Machine:2 and /PS2 both designate the PS/2 control method.

/A20+ is similar to /A20 but instructs HIMEM to wait for the A20 line to settle.

/Machine:3 designates support for the Phoenix Cascade BIOS A20 control methods.

Alternately, /CONTROLA20:OFF instructs HIMEM to *not* detect the control method for the A20 line and assumes the A20 line is always on.

The /BIOS switch forces the use of BIOS Int15h, Function 87h, for data transfers to and from XMS memory.

The /QUIET switch forces HIMEM to remove the sign-on message when loading.

Error Conditions

No Extended Memory—An extended memory error condition can occur if the BIOS (via Int 15H, function 88H) notifies HIMEM that there is no extended memory. In this situation, HIMEM displays an appropriate error message and does not install.

Failure to Control the A20 Line—When HIMEM installs, it attempts to control the A20 line, which controls access to the HMA. HIMEM first attempts control via the AT method (using the 8259 keyboard control). If that fails, HIMEM then attempts control via the PS/2 method (using I/O port 60H). If both methods fail, HIMEM assumes it can't control the A20 line and displays the message

```
A20 Control (OFF)
```

If either of these errors occur, try using the /A20, /A20+, or /PS2 in the HIMEM command line.

Note also that some older programs assume that the machine is a 1MB 8086 and so require that the A20 line to be disabled (OFF) while they run. Current programs typically do not require that the A20 line be disabled.

Examples

```
Device = HIMEM.SYS
```

Installs the XMS device driver. Once this driver is installed, accessing the HMA and Extended Memory (XMS) memory areas are legal. The Extended Memory area can contain up to 2GB of memory. Typical systems have 4, 8, or 16MB of XMS memory installed.

```
Device = HIMEM.SYS /machine:1
```

Forces the use of the AT-style A20 line control.

The HIMEM driver fails to load when either the machine does not have memory above the 1MB boundary or the BIOS does not provide support for it. It also fails to load when another XMS manager has been previously installed.

MEM.EXE

External Command

The MEM command displays the used and free memory in your system.

Syntax

```
MEM [/BiosExtensions] [/Classify] [/Raw]
```

Remarks

Options	Description
/B	Displays each BIOS extension and its size.
/C	Classifies the memory usage.
/R	Does raw dump of the MCB chain.

MEM displays a list of the DOS memory contents, what free space is available, and how much memory is in conventional memory, upper memory, the HMA and extended memory. This program is useful to fine tune the system to have as much free memory as possible for applications.

Options

The */B* option displays BIOS extensions in the range from C000:0 to F800:0.

The */C* option shows program, TSR, and device driver sizes.

The */R* option shows a low-level DOS listing of MCBs (Memory Control Blocks).

MODE.COM

External Command

The MODE command modifies the operation of the printer, serial port, and active video display.

Syntax

```
MODE LPT#[:]=COM#[:]
MODE COM#:baud[,parity[,databits[,stopbits[,P]]]]
MODE <video mode>
MODE <display lines>
```

Remarks

The first syntax above redirects line printer output to the serial port.

The second syntax above changes the operation of the specified communications port. The options that can be modified are listed below. InValid for any of the options are flagged with an error message.

```
baud 110, 150, 300, 600, 1200, 2400, 4800, 9600
parity N - None, O - Odd, E - Even
databits Either 7 or 8
stopbits Either 1 or 2 stop bits
P Printer Port
```

Using the P option as the last argument causes output to be sent repeatedly to the printer port until successfully received. Without the P, output is sent only once, causing a critical error if unsuccessful.

The third syntax changes the active video mode for the display terminal. The valid choices for this version of the MODE command are as follows:

*4*0—Indicates 40 characters per line.

*8*0—Indicates 80 characters per line.

*bw4*0—For a color graphics adapter with color disabled and 40 characters per line.

*bw8*0—For a color graphics adapter with color disabled and 80 characters per line.

*co4*0—Indicates a color monitor with color enabled and 40 characters per line.

*co8*0—Indicates a color monitor with color enabled and 80 characters per line.

*mon*o—For a monochrome display. Assumes 80 characters per line.

The final syntax sets the number of display lines. Valid included L25, L43, and L50.

Note: A serial port should be initialized before an LPT device is redirected to it.

Examples

```
MODE COM1:9600,n,8,1
```

Modifies the settings for the COM1 device to a baud rate of 9600, no parity, eight data bits, and one stop bit.

```
MODE LPT2:=COM2
```

Redirects the output from LPT2 to the COM2 serial port. All following output to LPT2 actually goes to the COM2 device.

```
MODE mono
```

Indicates a monochrome display adapter.

MORE.COM

External Command

The MORE command displays a text file one screen at a time.

Syntax

```
MORE [filename]
or
<command> | MORE
```

Remarks

The input to MORE may come from a file, or it may be piped in from another filter or a DOS command. If the *filename* is present, then the file is viewed; otherwise MORE reads from the Standard Input.

Once a screen has been viewed, a line is displayed on the bottom of the screen indicating the percent of the file that has been viewed. At this point, there are several options for the next lines of text to be viewed.

B	Display the previous full page.
<enter>	Display just one more line.
T	Display starting at the top of the file.
Spacebar	Display the next full page of text.
Q	Exit MORE

Examples

```
DIR | MORE
```

Displays a directory one screen at a time.

```
MORE READ.ME
```

Displays the file READ.ME one page at a time.

NED.EXE and NED.CFG

External Command

ASCII text Editor Program

The NED editor is a menu-based text editor available for use with ROM-DOS. This editor is similar to other desktop editors but has special functions designed for use in editing C-source and assembly code.

Starting the Editor

To start the editor, enter

```
NED [filename] [filename]
```

NED may be initiated with or without filename arguments. Wildcard file specifications are allowed.

Up to ten files can be entered on the command line. If NED is run without arguments, it loads all files accessed during the last editing session, returning you to the exact position in the file. You can switch between the open files.

You can also enter

```
NED @errfile
```

where *errfile* is the name of your compiler error output file. NED loads all files that had errors and allows you to move between errors.

Once NED is running, you may load files into memory by using the File/Open menu command. File/Reload replaces the current file with a new file or reloads a new copy of the same file. File/Reload confirms before replacing an unsaved file.

Basic Editor Operation

NED uses the standard Microsoft Windows interface for cut, copy, and paste operations. Del and Shift+Del both move the selected block to the clipboard. There is no true undo command, but Ctrl+V or Shift+Ins may be used to paste the clipboard contents to the current cursor position. Table 1 lists all the default shortcut keys.

If a search string is all lowercase, NED treats it as a case-insensitive search. If a search string contains any uppercase letters, it is case sensitive. The replacement string is inserted exactly as entered. Repeating a Search command repeats the last Forward or Backward Search operation, not the last Replace operation.

There is one bookmark for all files. Once the bookmark is set, going to the bookmark returns you to the file and position where you set it.

The Indent and Remove-indent (referred to as Undent in the Options/Do Command) commands work on tabs. Indent inserts a tab at the beginning of the current line, or if a block is active, at the beginning of each line in the block. Remove-indent removes the first tab from the current line or from each line in the block. If there are no tabs, Remove-indent has no effect.

Toggle case inverts the case of the current character if no block is active. If a block is active, Toggle case sets the entire block to uppercase if the first character was lower and to lowercase if the first character was uppercase.

Tabs are currently set to 3 for .C, .H, .CPP, .HPP, and .T files. They are set to 8 for all other files.

File/Print prints the current block if there is one, otherwise it prints the current file. NED prompts for a device to print to, which may be a filename. Tabs are expanded to spaces.

The Options/Do Command is intended primarily for debugging. This command allows you to execute any editor command by choosing it from a menu list.

The macro commands (Record Macro/Play Macro) allow you to define a sequence of keystrokes that can be repeated repetitively. Select Record Macro (ALT=), enter the keystrokes, then press ALT= again. The macro sequence can be played by selecting Play Macro or by pressing ALT-. Keyboard bindings are saved in NED.CFG in the same directory as NED.EXE. NED.CFG also contains the list of active files and positions.

If you record and play a recursive macro, it plays continuously.

If you press an invalid key on a menu, NED operates as if you pressed enter.

If you run out of memory, such as when you have more than 300KB of files open, NED returns to DOS.

PRINT.COM

External Command

The PRINT command prints a single file or a list of files.

Syntax

```
PRINT [/drive:] [filename] [/options]
```

Remarks

PRINT allows you to enter between one and 32 files for spooling to the printer. The files are output to the device in a spooled manner (while you perform other operations).

If PRINT is entered without any parameters, it displays all the files that are in the queue.

The first time PRINT is used, the operator is prompted with this message for the device to perform the operation.

```
Name of list device [PRN]:
```

The legal devices for printing are LPT1, LPT2, LPT3, LPT4, COM1, COM2, COM3, COM4, AUX, or PRN.

Options

The */B* option sets the buffer size. The default buffer size is 512 bytes. A larger buffer size causes print to operate faster. The maximum buffer size is 32KB and the minimum size is 256 bytes. This option is only allowed the first time PRINT is run.

The */C* option cancels only the filenames listed after the /C command.

The */F* option sets the maximum number of files to be queued up at one time. The default number of files is ten. The minimum is two and the maximum is 32. Support for more files is often useful when using wildcards in filenames. This option is only allowed the first time PRINT is run (or until the next system reboot).

The */P* option causes all files listed after this option to be submitted for printing. This is the default for filenames encountered on the PRINT command line.

The */T* option cancels all the files from the print queue (list).

The */H* option displays the help screen.

Examples

```
PRINT FILE1.TXT FILE2.TXT FILE3.TXT
```

Puts three files into the print queue. The first file prints after the command ends.

```
PRINT /C FILE2.TXT
```

Removes file FILE2.TXT from the print queue. All other files in the queue print normally.

```
PRINT /T
```

Cancels all files in the print queue. Printing may continue for a short time because of the buffer in your printer.

REMDISK.EXE

Remote Disk Program

See Also: REMSERV.EXE

REMSERV is usually run on the MX1 (host). REMDISK is usually run on the client (e.g. a desktop PC).

The remote disk program allows you to access a disk drive on a remote system via a serial cable and standard PC-style (8250UART) serial port. In a remote disk setup, one system, the one that shares its drives, is termed the server. The other system, the one that accesses and uses the remote drives, is called the client. The serial ports on both systems must be connected via a null modem cable. Remdisk / Remserv works across a standard 3-pin serial cable. The cable does not require the CTS/RTS DTS/DTR pins.

To use the remote disk, both REMDISK and REMSERV must be running on their respective systems and must use the same baud rate and packet or nonpacket-style transmission. After starting both programs, you can access the new drive on the client system. You can change the default directory to this new drive, copy files to and from the remote drive, and also run utilities such as CHKDSK on the drive. The remote drive on the server system can be used as any other drive on the client system.

Syntax

The program REMDISK runs on the client system and creates a new drive letter for the client. REMDISK uses the next available system drive letter.

For example, if the last assigned drive was D:, REMDISK creates drive E:. This drive acts like any other drive, except that it requires the serial port. REMDISK.EXE can be loaded by a DEVICE= command in the CONFIG.SYS or AUTOEXEC.BAT files or it can be entered at the DOS prompt.

```
CONFIG.SYS --- DEVICE=REMDISK.EXE /T15
          AUTOEXEC.BAT - REMDISK /B9600 / COM2 /T10
```

The syntax for REMDISK is:

```
REMDISK [/U] [/H] [/Bnnnn] [+|-][/Tnnn] [/COMn]
```

The default is : `/B115K+ /COM1 /T3`

Option	Description
/U	Unloads REMDISK from memory, thereby disabling the drive letter and freeing the memory occupied by REMDISK. This option can only be used when REMDISK is installed from the DOS command line. A remote disk installed via

Option	Description
	CONFIG.SYS cannot be unloaded.
/H	Selects hardware handshaking for flow control.
/*Bnnnn*	Selects the baud rate for transmission. Available baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115000. The default baud rate is 115000.
+/-	The plus sign (+) specifies packet-style transmission and is recommended for any baud rate over 19200. The default setting is to include + for packet transmission. Use the minus sign (-) to specify polling operation under Microsoft Windows 95. Both sides must agree on using either (+) or (-).
/*Tnnn*	Sets the time-out in the range of 3 to 3,640 seconds. 15 seconds is not unusual for Flash drives.
/IR*Qn*	Set the IRQ for the communications port. Valid settings are 3 – 15. Default is IRQ3 for COM 2 and COM4, and IRQ4 for COM1 and COM3.
CO*Mn*	Selects the communication port. Choose 1, 2, 3 or 4. COM1 is the default port.

To install the REMDISK program from CONFIG.SYS at 19200 baud, on COM1, using packet-style transmission, insert the following line in CONFIG.SYS and then reboot the system (remember to include the full path to find REMDISK.EXE if not located in the root directory).

```
DEVICE=REMDISK.EXE /B19200 +
```

To display a help screen for REMDISK from the DOS prompt, enter

```
REMDISK /?
```

To install REMDISK from the DOS prompt or from a batch file (such as AUTOEXEC.BAT) at 9600 baud, without packet-style transmission, on COM2, enter

```
REMDISK /B9600 /COM2
```

To unload the REMDISK installed from the batch file or the DOS prompt, enter `REMDISK /U`

REMSERV.EXE

Remote Disk Program

See Also: REMDISK.EXE

REMSERV is usually run on the MX1 (host). REMDISK is usually run on the client (e.g. a desktop PC).

The remote disk program allows you to access a disk drive on a remote system via a serial cable and standard PC-style (8250UART) serial port. In a remote disk setup, one system, the one that shares its drives, is termed the server. The other system, the one that accesses and uses the remote drives, is called the client. The serial ports on both systems must be connected via a null modem cable. Remdisk / Remserv works across a standard 3-pin serial cable. The cable does not require the CTS/RTS DTS/DTR pins.

To use the remote disk, both REMDISK and REMSERV must be running on their respective systems and must use the same baud rate and packet or nonpacket-style transmission. After starting both programs, you can access the new drive on the client system. You can change the default directory to this new drive, copy files to and from the remote drive, and also run utilities such as CHKDSK on the drive. The remote drive on the server system can be used as any other drive on the client system.

The server system runs the program REMSERV.EXE that can make a single drive on the server system available to the client. The available drive can be changed at any time by quitting the REMSERV program and then running the program again with a new drive letter.

The server program can be terminated at any time by pressing the Esc key. The client can then no longer access the server's drive until the REMSERV program is run again.

Syntax

```
REMSERV.EXE d: [/Tnnnn] [/H] [/Bnnnn][+|-] [/COMn] [/IRQn]
[/Tnnn] [/S]
```

where d: represents the letter of the drive the server makes available to the client.

The default is `/B115+ /COM1 /T2`

Option	Description
/*Bnnnn*	Selects the baud rate for transmission. Available baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115000. The default baud rate is 115000.
+/-	The plus sign (+) after the BAUD specifies packet-style transmission and is recommended for any baud rate over 19200. The default setting is to include + for packet transmission. Use the minus sign (-) to specify polling operation under Microsoft Windows 95. By default, packet transfers will be used for all baud rates higher than 9600. Both sides must agree on using either (+) or (-).
CO*Mn*	Selects the communication port. Available ports are 1, 2, 3 or 4. COM1 is the default port.
/IR*Qn*	Set the IRQ for the communications port. Valid settings are 3 – 15. Default is IRQ3 for COM 2 and COM4, and IRQ4 for COM1 and COM3.
/*Tnnn*	Sets the time-out in the range of 2 to 3,640 seconds. 15 seconds is not unusual for Flash drives.
/S	Instructs REMSERV to run without any display output (Silent).
/H	Selects hardware handshaking for flow control.

Example

To select drive B: as the available server drive at 115000 baud, packet transmission, using COM1, enter

```
REMSERV B:
```

To set drive C: as the server disk at 38400 baud, without packet-style transmission, on COM2, with a timeout of 10 seconds, enter:

```
REMSERV C: /B38400 /COM2 /T10
```

SYS.COM

External Command

The SYS command copies the ROM-DOS system files ROM-DOS.SYS and COMMAND.COM from the disk in the default drive to the disk in the specified drive. The file ROM-DOS.SYS is renamed and stored on the disk as files IBMBIO.COM and IBMDOS.COM, which are stored as hidden files.

Syntax

```
SYS drive: [/options]
```

Remarks

Use the SYS command to transfer the ROM-DOS system files to a floppy disk or hard disk. The disk can be a formatted blank disk or can contain files; it is not necessary for the system files to be the first files on the disk. The only requirement is that there is enough contiguous free space on the disk for the new system files to be placed. If the disk already contains system files, installing the new system files deletes the existing files.

The command processor, COMMAND.COM, is also transferred to the disk and does not need to be copied into the same contiguous space as the system files.

You can run SYS three different ways. The first is to boot and run your system with ROM-DOS. When you run the SYS command this way, SYS copies the ROM-DOS system files and COMMAND.COM from the root directory of the default/current disk drive.

The second method is to run SYS from the root directory of a disk drive that has been previously prepared with the SYS command, but isn't booted and running. For example, you can run SYS from a bootable floppy disk to copy the files to the hard disk without actually booting from the floppy disk itself.

The third method uses the file ROM-DOS.SYS, the equivalent of the hidden system files IBMBIO.COM and IBMDOS.COM. ROM-DOS.SYS should be present in the same directory with COMMAND.COM and SYS.COM. These three files can be placed in the root directory or subdirectory on a floppy disk (that need not be booted or bootable), or in a subdirectory on the hard drive. Run the SYS command from the directory where the files reside to transfer the system files to the destination drive.

Options

The */C* option prevents confirmation before transferring system files.

The */H* option shows the newly transferred system files on the destination disk.

The */]* option prevents display of the sign-on message.

Example

```
SYS B:
```

Copies the ROM-DOS system files to drive B:.

VER

Type

Internal

Purpose

Displays the version number of ROM-DOS in use. Allows revision of this version number.

Syntax

```
VER [n.nn] [/R]
```

Remarks

If a new version number is specified, two digits after the decimal are required. Note that this command revises only the record of the DOS version number; it does not change the actual operating system loaded in the computer.

The version command shows both the version of the VER command itself and the version of DOS in operation.

Options

The */R* option shows the full version and release number of ROM-DOS.

Example

The following example changes the record of current DOS version in use to DOS 5.0. Any programs that are executed, following this command, will recognize that DOS 5.0 is running.

```
VER 5.0
```

XCOPY.COM

External Command

The XCOPY command copies multiple files and, optionally, subdirectories from one disk to another.

Syntax

```
XCOPY [source] [target] [/options]
```

Remarks

Use the XCOPY command to copy multiple files and subdirectories, if they exist.

The *source* and the *target* parameter are complete drive-path and file-specification descriptions.

If you do not specify a path, XCOPY assumes the default path. If a filename is not specified, then *.* is assumed.

The ATTRIB command may be used to modify the archive bit for the various XCOPY options that check the archive status of files. Refer to the ATTRIB command for instructions.

Options

The */A* option copies only source files that have the archive bit set in them. The archive is not reset.

The */D<mm-dd-yy>* option copies only those files with a date later than that specified.

The */E* option creates subdirectories on the target even if they are empty.

The */M* option copies only those source files that have the archive bit set. Once the source file is copied, the archive bit is reset.

The */P* option prompts before each file is copied. The prompt appears as follows; enter Y to copy the file:

```
C:\COMMAND.COM (Y/N)?
```

The */S* option copies files in subdirectories of the source directory.

The */V* option verifies each write to the disk.

The */W* option waits before starting to copy files and prompts with the following message.

```
Press any key to begin copying file(s)
```

Example

```
XCOPY \bin\*.exe a: /a
```

Copies all files in the BIN subdirectory to the A: drive that have an .EXE extension and that have the archive bit set.

ROM-DOS 6.22 Command Summary

For information on ROM-DOS commands, please refer to a commercially available ROM-DOS user guide.

Following are brief descriptions of ROM-DOS commands, including batch file commands.

Note: The external ROM-DOS files loaded on the MX1 by LXE (and supported by LXE) are marked with an asterisk in the table that follows. ROM-DOS internal commands are a part of the ROM-DOS operating system.

Note: International keyboards and code pages require COUNTRY.SYS, DISPLAY.SYS, and KEYB.COM. These files are placed on the computer by the user when needed. They are not part of the LXE installed and LXE supported file load.

ROM-DOS Command	Command Type	Description
?	Internal	CONFIG.SYS command. It directs ROM-DOS to pause for confirmation before processing a command.
@	Internal	Used to suppress the display of a single batch-file command line.
;	Internal	Identifies nonexecuting lines. The same as the REM command.
ANSI.SYS*	Installable	A console device driver that allows you to support ANSI codes on the local screen.
ATTRIB.COM*	External	Displays or modifies the attributes associated with a file.
BREAK	Internal	Turns on or off the ability to stop program execution at a non-I/O point.
BUFFERS	Internal	Sets the number of internal data buffers.
CALL	Internal	Batch file command. Invokes execution of a secondary batch file.
CHDIR (also CD)	Internal	Changes the current directory (also CD).
CHKDSK.COM*	External	Checks the integrity of data on a disk. Displays information.
CLS	Internal	Clears all information from the monitor's screen.
COMMAND.COM*	External	Starts a second DOS command processor.
COPY	Internal	Copies files from one storage location to another.
COUNTRY.SYS	External	Designates the country code for displays. Not loaded nor supported by LXE.
CTTY	Internal	Changes the default terminal interacting with ROM-DOS.
DATE	Internal	Displays the date from the system's internal calendar. Allows revision.
DEL	Internal	Deletes specified files.
DELTREE.EXE*	External	Deletes one or more directory trees or individual files.
DEVICE	Internal	Installs a device driver into ROM-DOS.

ROM-DOS Command	Command Type	Description
DEVICEHIGH	Internal	Loads a device into the upper memory area, if available.
DIR	Internal	DIRectory. Lists contents of a specified directory.
DISPLAY.SYS	Installable	Displays international letters and symbols. Not loaded nor supported by LXE.
DOS (ROM-DOS)	Internal	Installs ROM-DOS into High Memory Area (HMA).
ECHO	Internal	Batch file command. Turns on or off display of batch execution on the monitor.
EGA/EGA3.CPI	Internal	Font data files for use with the International video display driver, DISPLAY.SYS.
ERASE	Internal	Erases specified files (same as DEL).
EXIT	Internal	Used to exit nested running of ROM-DOS within another program.
FCBS	Internal	Specifies the number of File Control Blocks (FCBS) open at one time.
FILES	Internal	Sets the maximum number of files that can be open at one time on the system.
FOR	Internal	Batch file command. Performs one DOS command on a set of files.
FORMAT.COM*	External	Initializes a disk so that ROM-DOS can access files on that disk.
GOTO	Internal	Batch file command. Moves control to a specified line in the batch file.
HELP	Internal	Lists all available ROM-DOS commands along with brief descriptions.
HIMEM.SYS*	Installable	Manages extended memory and the high memory area in a 286, 386, PS/2 system.
IF	Internal	Batch file command. Performs a command based on a specified condition.
INCLUDE	Internal	Allows instructions in one configuration block to be included with instructions in another configuration block.
INSTALL	Internal	Loads Terminate and Stay Resident (TSR) programs during CONFIG.SYS processing.
KEYB.COM	External	Allows altering of the keyboard layout for a different language or nationality. Not loaded nor supported by LXE.
KEYBOARD/ KEYBRD2.SYS	Internal	Keyboard code page data files for use with the International keyboard driver, KEYB.COM.
LASTDRIVE	Internal	Sets the maximum number of drives.
LOADHIGH	Internal	Loads a program into the upper memory area, if available.
MEM.EXE*	External	Displays the used and free memory in your system.

ROM-DOS Command	Command Type	Description
MENUCOLOR	Internal	Allows setting of text and background colors for the startup menu.
MENUDEFAULT	Internal	Sets the default menu-item choice and time-out value for making a selection.
MENUITEM	Internal	Specifies an item to be placed on the startup menu display during system boot
MKDIR	Internal	Creates a new subdirectory.
MODE.COM*	External	Modifies the operation of the printer, serial port, and active video display.
MORE.COM*	External	Displays a text file one screen at a time.
MOVE.EXE	Internal	Moves files and renames files and directories.
NED.CFG*	Installable	Configuration file for NED.EXE ASCII text editor.
NED.EXE*	Installable	This program is used when editing ASCII text files.
NEWFILE	Internal	Allows continuation of CONFIG.SYS processing from a new file.
NUMLOCK	Internal	Sets the NUMLOCK keyboard key to on or off when your computer starts. This setting is ignored by the VXX OS.
PATH	Internal	Displays current command search path(s). A new path line can be specified.
PAUSE	Internal	Batch file command. Causes execution to halt until a key is pressed.
PRINT.COM*	External	Prints a list of files, up to ten files.
PROMPT	Internal	Resets the appearance of the system prompt line.
REM	Internal	A batch file command for identifying non-executing lines.
REMDISK.EXE*	Installable	A remote disk management program. Usually run on the client.
REMSERV.EXE*	Installable	A remote disk management program. Usually run on the host.
REN	Internal	Renames files.
RMDIR (also RM)	Internal	Deletes a specified subdirectory.
SET	Internal	Sets environment variables and command processor strings.
SHELL	Internal	Allows selections of a command interpreter other than COMMAND.COM.
SHIFT	Internal	Batch file command. Shifts replaceable parameters one position to the left.
STACKDEV.SYS	Internal	Increases the number of stacks available for IRQ handlers and Int13h.
STACKS	Internal	Allows for the use of dynamic data stacks to handle interrupts.

ROM-DOS Command	Command Type	Description
SUBMENU	Internal	Defines a menu item that represents a secondary menu.
SWITCHES	Internal	Allows special CONFIG.SYS file options.
SYS.COM*	External	Transfers the hidden system files to a specified drive.
TIME	Internal	Displays current time from the system's internal clock. Also allows revision.
TYPE	Internal	Displays the contents of a text file on the monitor.
UMBLINK.SYS UMBLINK.EXE	Internal	A non-protected mode program that can allow the creation of Upper Memory Blocks using existing RAM areas.
VER*	Internal	Displays current version of ROM-DOS on the monitor.
VERIFY	Internal	Displays the current VERIFY state or sets the VERIFY state to on or off.
VERSION.SYS	Internal	Modifies the version number ROM-DOS reports.
VOL	Internal	Displays the volume label on a disk.
XCOPY.COM*	External	Copies multiple files and optionally subdirectories.

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