

micros[®] Systems, Inc.

Workstation 4 LX Setup Guide



WS4_{LX}

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Preface

In this preface, you'll find information about this manual. Refer to the preface if you have questions about the organization, conventions, or contents of this manual.

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Why Read This Manual?

Purpose

This guide is intended for those who will be setting up, installing and operating the MICROS Workstation 4 LX and as such is not specific to a particular software application.

The Workstation 4 LX is based on the popular Workstation 4 and from the outside, looks very much the same - using the same case, LCD Panel, touchscreen, and Mag Stripe Reader. A Blue Operator LED and IO panel labels distinguishes this unit from the original WS4.

Inside the unit however, a new system board combines a powerful AMD embedded processor and TFT LCD controller with USB Flash Drive technology for improved performance.

The Boot Loader in the original WS4 is replaced by the flexible General Software Embedded BIOS 2000 which adds pre-boot features such as factory restore.

How This Manual is Organized

This manual is divided into five chapters, briefly discussed below.

Chapter 1 describes the new WS4 LX workstation and each of its hardware and software components. The chapter also provides specifications, care and handling instructions, and information on how to connect peripherals to the I/O Connector Panel.

Chapter 2 cover the General Software's Embedded BIOS 2000 configuration.

Chapter 3 covers the WS4 LX system unit hardware configuration. Topics include how to remove the cover, identify and upgrade the major components.

Chapter 4 covers the WS4 LX installation from arranging cables at the connector panel to using the Client Application Loader to connect to the system POS server and obtain the application software.

Chapter 5 provides basic troubleshooting data in the form of BIOS error messages and beep codes.

A Reference section consisting of Glossary, Equipment Dimensions, FCC/DOC Statement, and Connector/Cable Diagrams can be found at the end of this manual.



SHOCK HAZARD

No user serviceable parts inside.
Refer servicing to qualified personnel.

Notation Conventions

Symbols



NOTE

This symbol brings special attention to a related item.



WARNING

This symbol indicates that specific handling instructions or procedures are required to prevent damage to the hardware or loss of data.



SHOCK HAZARD

This symbol calls attention to a potential hazard that requires correct procedures in order to avoid personal injury.



STATIC SENSITIVE DEVICES

This symbol indicates that specific ESD handling procedures are required.

Document Design and Production

Desktop Publishing by Adobe FrameMaker 6.0

Digital imaging by Nikon Coolpix 990 / Canon PowerShot A80

Image processing by Paint Shop Pro, Adobe Photoshop, CorelDraw.

What is The Workstation 4 LX?

This chapter introduces the Workstation 4 LX and optional accessories, then goes on to describe the memory and storage architecture and power management support.

In this chapter

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The System

The Workstation 4 LX is based on the popular Workstation 4 and from the outside looks very much the same - using the casework, power supply, LCD, touchscreen and Mag Stripe Reader from original model. A Blue Operator LED and IO panel labeling distinguishes the LX from the original WS4.

Inside the unit however, a new system board combines a powerful AMD embedded Processor/TFT LCD controller with USB Flash Drive technology for improved performance. From the application perspective, the LX is a new workstation and requires specific MICROS application versions to operate. See page 2-12 for application software requirements.

The Workstation 4 LX is a diskless Windows Embedded CE 6.0 client. Figure 1-1 illustrates the primary external features.

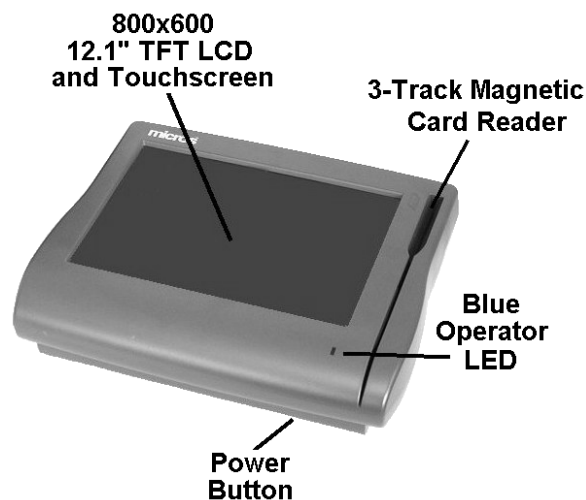


Figure 1-1: The Workstation 4 LX

Standard features include a 12.1 inch TFT LCD, 5-wire resistive touchscreen, and integrated 3-Track Mag Stripe Reader.

Case

The WS4 LX case is a low profile design that consists of a base to house the new system board and power supply. The LCD, touchscreen and MSR are attached to the top cover.

Operator LCD and Touchscreen

The Operator LCD consists of 12.1" TFT LCD, runs at a fixed resolution of 800x600 and is capable of supporting up to 64K colors. Placed over the LCD is a rugged 5-wire resistive touchscreen.

Magnetic Card Reader

The 3-track magnetic card reader can be serviced in just a few minutes. The reader is connected to the system board with a modular connector.

Operator LED

The WS4 LX Operator LED is Blue, the primary means to distinguish this unit from the original WS4 with a Green or Amber Operator LED.

Operator Power Switch

The recessed power switch is located at the lower right corner of the unit. It is used to power the workstation on or off.

Compact Flash (CF) Personality Card

Figure 1-2 shows an underside view of the workstation featuring the I/O Connectors, and Compact Flash access slots. Note that the labeling is Blue in color help distinguish the WS4 LX from the original WS4. More information about the I/O Panel Connectors can be found in Chapter 3.

The CF card is secured behind a removable bracket at the IO connector panel. The CF card contains the application, system registry, and optionally, Stand Alone Resilient (SAR) totals. In other words, it contains the ‘personality’ of the workstation. Should the workstation fail, the CF card can be removed and installed in the replacement workstation.

Mini-PCI Socket

The WS4 LX System Board includes a Mini-PCI socket, replacing the PCMCIA socket in the original WS4. The Mini-PCI socket can be used for a wireless interface card. The IO panel includes a cut-out for mounting a flexible rubber antenna.

Reset Switch

The Reset Switch can be activated by inserting a paper clip into the access hole.

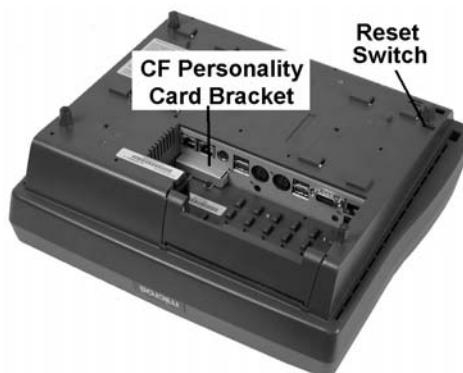


Figure 1-2: The Workstation 4 LX CF Personality Card

Mounting Options

Because there is no change to the casework, the WS4 LX can use all of the mounting options created for the original WS4 as described in the following pages.

The Adjustable Stand

The Adjustable Stand, shown in Figure 1-3, converts the low profile WS4 LX into an adjustable display design. The stand has a weighted base for stable operation, improved cable management, and self-locking hinges that allow the workstation to be positioned in the range of between 25 and 70 degrees. The base includes holes for mounting the LCD Customer Display shown in Figure 1-10.



Figure 1-3: The Adjustable Stand

Cable management is accomplished by bundling cables with tie wraps, then routing the bundle through a channel in the stand where they can exit from the side, rear, or bottom as shown in Figure 1-4, below.



Figure 1-4: Adjustable Stand Cable Management

Wall Mount Bracket

In addition to the Adjustable Display stand, a flexible wall mount bracket is available as shown below in Figure 1-5



Figure 1-5: The Wall Mounting Bracket

The wall mount bracket can be used to place the WS4 LX on a wall, or to suspend the unit under a counter or custom cabinets.

VESA Bracket

The optional VESA Bracket shown in Figure 1-6 attaches to the base of a WS4 LX, WS4 or KWS4 to accommodate VESA compatible mounting options. Both VESA 75 and VESA 100 standards are supported.



Figure 1-6: The VESA Bracket

The VESA Bracket can also be used to mount the unit to a wall or counter surface to provide a fixed, secure installation.

Pole Stand

This mounting option combines the VESA Bracket with an adjustable height pole assembly as shown in Figure 1-7. The base features an oversize mounting plate for stability and includes a large cable opening at the base. The adjustable section allows the height of the workstation to be positioned between approximately 16 and 20 inches from the counter surface. The mounting plate is fixed at an angle of 115°.

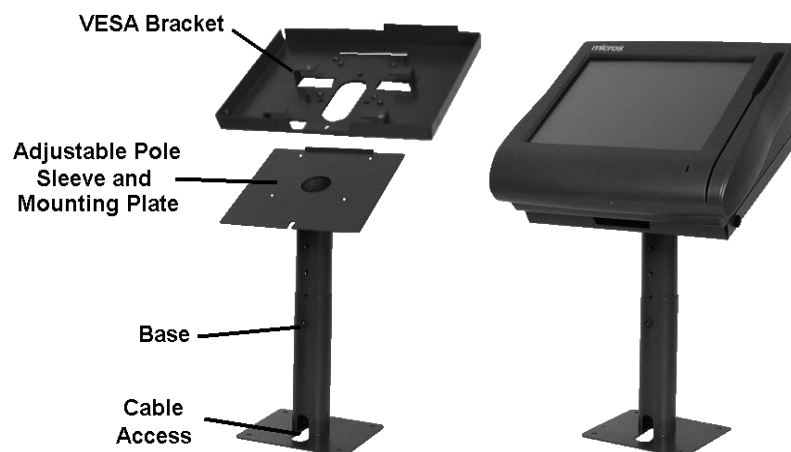


Figure 1-7: The Pole Stand

Adjustable Mounting Arm

The VESA Bracket can be combined with the Adjustable Mounting Arm to create yet another option for mounting the WS4 LX, shown in the illustration below.



Figure 1-8: The Adjustable Mounting Arm

The Adjustable Mounting Arm can be used to mount the unit to a counter surface, wall, or under a shelf. The VESA Bracket attaches to the base of the workstation and the bracket is attached to VESA 75 compatible hole centers on the mounting plate.

See the WS4 LX Product Marketing Announcement (PMA) for information on pricing and part numbers.

Customer Display Options

Integrated, Pole and Adjustable Stand Mounted LCD Customer Display options are available. The LCD Customer Display is based on a 240x64 monochrome STN LCD and companion LCD control board and is capable of emulating the 2x20 VFD Customer Display. MICROS Part numbers and pricing can be found in the Workstation 4 LX PMA.

Integrated LCD Customer Display

The Integrated LCD Customer Display receives power and data from a system board connector. Figure 1-9 two example of this display.



Figure 1-9: Integrated LCD Customer Display

Adjustable Stand Mounted LCD Customer Display

This version of the MICROS LCD Customer Display is attached to a six inch pole that in turn mounts to the base plate of the adjustable stand. This display receives power and data from an IO panel Mini-DIN connector also used for a Pole Display. An example of this display is shown in Figure 1-10, below. A 2x20 VFD Customer Display is also available.



Figure 1-10: LCD Customer Display Mounted to the Adjustable Stand

Pole Mount LCD Customer Display

Figure 1-11, below is an example of the Pole Mount LCD Customer Display. This display receives power and data from an IO panel Mini-DIN connector and can be placed on a counter surface up to four feet from the workstation. A 2x20 VFD Pole Display is also available.



Figure 1-11: Pole Mount LCD Customer Display



NOTE:

The 2x20 VFD Customer Display and the LCD Customer Display cannot be used at the same time. The Integrated LCD Customer Display and Pole or Stand Mount LCD Customer Display can be used at the same time.

Appendix A includes dimensional drawings for all versions of the LCD Customer Display.

Software Platform

The WS4 LX Software Platform is composed of the BIOS, Operating System, and a collection of LX specific drivers, configuration files, and software utilities. These components are pre-installed on each unit at the factory to create a foundation upon which applications can be installed.

General Software Embedded BIOS 2000

General Software is a leading provider of modular pre-boot 32-bit x86 embedded systems BIOS (Basic Input Output System). The modular architecture of the BIOS offers a high degree of configuration.

The modular BIOS consists of a 32-bit core and a collection of modules chosen to match the system board processor, chip set, and other system board architecture features.

The BIOS supports a custom POST, CMOS Configuration Screens and USB mass storage support. Perhaps the greatest feature of Embedded BIOS 2000 is the Firmbase environment, detailed below.

Firmbase®

Firmbase is General Software's optional firmware operating environment that runs Portable Execution Firmware Applications in the pre-boot environment. Firmbase applications run inside System Management Mode (SMM). The General Software Embedded BIOS 2000 uses SMM in a patented way to implement the environment that permits custom firmware applications to execute.

Firmware Applications

A firmware application is General Software's term for a custom 32-bit Portable Execution program, stored in the workstation's BIOS ROM and executed inside the Firmbase environment. The ability to execute custom firmware applications *before the operating system starts* is a powerful feature. It provides the WS4 LX with the ability to emulate the custom boot loader features found in the original WS4, and more.

For example, WS4 LX specific firmware applications check the CF card at start-up for a NK.BIN or BIOS binary file. If NK.BIN is found, it copies the file to the hidden boot partition on the USB flash drive or updates the BIOS as required. The Windows CE Factory Restore feature is another example of a custom pre-boot firmware application.

Operating Systems

The primary operating system for the WS4 LX will be Windows Embedded CE 6.0. Windows CE 4.x is not supported. Support for Windows XPE and WEPOS is possible.

WS4 LX Platform Files and Configuration Files

This section includes WS4 LX specific device drivers including new versions of the WS4 LX API, Power Button, Operator LED, Beeper and EEPROM drivers.

Configuration files include information about the hardware as well as information about the platform software and the CAL.

Utilities

Utilities included with the LX platform include an updated Client Application Loader (CAL), the DiagUtility for testing the unit, WCF to format the CF card, and a screen saver and backlight control utility.

POS Application

The Workstation 4 LX is a new workstation and includes an updated version of the CAL client. Updated CAL Client and Server components are required to distinguish the WS4 LX from the original WS4 sharing a network, because the operating system image and platform files are not compatible. Therefore the WS4 LX is not a true drop-in replacement for the original WS4. In addition, the WS4 LX is not supported by the legacy 8700 application.

Applications required to supported by the WS4 LX are listed below.

- CAL Server - Version 13 - Supplied with the following application updates:
- RES - Version 3.2 SP7 HF6 and Version 4.1 HF2
- 9700 - Version V3.0 SP15 and Version 3.1 SP3
- Symphony - Version 1.00
- e7 - Version 2.5

Refer to the appropriate application documentation for more information.

Memory and Storage Architecture

This section highlights the key features of the WS4 LX mass-storage architecture and defines where each of the various software components are stored, based on the Operating System installed.

BIOS

Figure 1-12, below displays the contents of the BIOS EEPROM in general terms.

BIOS Core and Component Modules	Hardware Initialization and POST	Firmware Applications (WS4 LX Specific Code)
--	---	---

Figure 1-12: WS4 LX BIOS EEPROM Contents

- The modular General Software Embedded BIOS 2000 consists of a core and a series of component modules that support the Processor, Chip Set, and other system board hardware.
- At power-up, the BIOS performs system board component initialization then conducts a Power On Self Test (POST) of critical components.
- The General Software Firmware environment provides the ability to execute custom firmware applications just after the completion of the POST, *and before the Operating System starts*. These custom firmware applications perform such tasks as moving the NK.BIN from the CF to the USB Flash Drive as part of a Windows CE OS or application upgrade, or upgrading the BIOS itself.

USB Flash Drive

The USB Flash Drive is factory installed on a 2x5 system board header. Initially a 128M device used, then 256M. It is divided into three partitions of equal size, two of which are 'hidden.' This is shown in Figure 1-13, below.

Partition 1 (Hidden) Windows Embedded CE 6.0 Boot Image	Partition 2 (Hidden) Factory Recovery Files	Partition 3 \DOC		
		CAL Client	WS4 LX API and Drivers DiagUtility	Screen Saver and Backlight Utility

Figure 1-13: WS4 LX USB Flash Drive Contents

- Starting at the left of the illustration, Partition 1 contains the operating system image. The WS4 LX boots to the Windows Embedded CE 6.0 image stored in this hidden partition.

- Partition 2 contains the files used by the Windows CE Factory Recovery feature. The partition includes a copy of the CE image and platform files and folders. See Chapter 2.
- Partition 3 is visible in 'My Device' as '\DOC', and contains the LX platform drivers, utilities and configuration files used on a day-to-day basis.
 - The \DOC partition contains the WS4 LX API, platform drivers, and configuration files. The API file is UWS4.DLL. The API allows POS Applications to access hardware such as the cash drawers, mag stripe reader, and the customer display options. Other platform DLLs support the Operator LED, Power Button, and system board EEPROM.
 - The \DOC\McrsCAL folder contains a copy of the MICROS CAL (Client Application Loader). Through a registry setting, the CAL starts each time the WS4 LX starts in order to download and manage applications and platform files.
 - The \DOC\Scrn saver folder contains the Screen Saver and Backlight Control utility. See Chapter 4 for more information on how to use the Screen Saver and Backlight utility.
 - The \DOC\Utilities folder contains the WS4 LX DiagUtility and Wipe Compact Flash (WCF) utility. See Chapter 5 for more information about the Diagnostics Utility.

Compact Flash (CF) Card

The Compact Flash (CF) Card represents the removable component of the WS4 LX mass storage solution. Accessed from the IO panel, a 128M or later a 256M device is installed at the factory, but contains no data.

In fact, CF card must be installed or the unit will not start Windows Embedded CE 6.0. A custom Power On Self Test (POST) test specifically checks for the presence of the CF card and halts the boot process if defective or not found.

Figure 1-14 displays the contents of a typical CF card after the workstation has been installed and connected to an application server through the CAL.

Update Files	Persistent Registry	Application and Support Files	Optional SAR Totals
NK.BIN for OS Updates HMLTON.BIN for BIOS Updates			

Figure 1-14: WS4 LX Compact Flash Card Contents

- Working from left to right, Update Files include NK.BIN for Windows Embedded CE 6.0, and or HMLTON.BIN for the BIOS. These files are normally placed on the CF card by the CAL as part of an operating system, or BIOS update and are removed after the update is complete.

- The CF Card contains the persistent registry. A platform driver periodically copies the working registry from RAM to the CF card. This ensures that any changes made to the working registry by the OS or application are placed on the non-volatile CF card.
- The application and support files are stored on the CF Card. The application is installed by the CAL after the unit is connected to an application server. Some applications such as E7 can be installed from a USB flash drive connected to an IO panel USB port and running a modified CAL installation script.
- Applications that support SAR use a portion of the CF card to store off-line transaction totals.

DDR SDRAM - Working System RAM

System or 'working' RAM is contained in a single 184-Pin DDR DIMM socket. Currently, a 256M DDR333 DIMM is populated in socket CN13 for Windows Embedded CE 6.0. The contents are shown in Figure 1-15, below.

Operating System Runtime Requirements	Working Registry	Application code and data
--	-----------------------------	--------------------------------------

Figure 1-15: WS4 LX System RAM Contents

- As the workstation operates, the RAM holds the runtime requirements of Operating System and Application code.
- The working copy of the registry is located in system RAM while unit operates. Periodically, or when the unit is turned off, the working registry is copied to the CF card to become the persistent registry.

Summary

The USB flash drive provides a permanent means of storing the operating system image, platform device drivers, restore files and system utilities such as the CAL, or DiagUtility.

The CF card contains the POS application and support files, a current copy of the system registry, and optionally application transaction data, or in other words, the workstation 'personality.' The CF card is accessible from outside of the unit, forming the basis of a 'personality swap.'

Even though the WS4 LX is diskless in the classical sense, the combination of the USB flash drive and CF card provide a mass storage solution that preserves platform, application and registry settings across system reboots. Through the CAL, updates to the Operating System, BIOS and or applications are staged on the application server and automatically propagated to each client.

Power Management States

This section introduces a sub-set of Windows Embedded CE 6.0 power management states supported on by the WS4 LX.

References to the supported power management states are specified in bold capitol letters, e.g., **NOPOWER**, and **ON**. See Chapter 4 for more information about using the Power Button to operate the WS4 LX.

UNPLUGGED

- The AC power cord is not connected to a wall outlet. Also referred to as ‘mechanical off’. The workstation can be disassembled when in this state.
- The Operator LED is Off.
- The Operator LCD is blank.

NOPOWER

- The AC power cable is attached, but the operating system and applications are not running. The majority of the system board components are shut down and RAM contents are undefined.
- The Operator LED is Off.
- The Operator LCD is Blank.

The **NOPOWER** mode is similar to the ACPI G2/S5 ‘soft-off’ mode where the unit consumes minimal power but several key circuits remained powered in order to detect a power-button event or Wake-On-Lan Ethernet packet. It is not safe to disassemble the workstation when in this state.

ON

- Windows Embedded CE 6.0 and application are operating. RAM contents are maintained.

Power State Retention

The WS4 LX retains the power state (ON or NOPOWER) in an system board EEPROM that can be read by the BIOS. In BIOS Setup, the Special Configuration Screen field named ‘Last Power State’ determines how the unit behaves when AC power to the unit fails and then returns.

The default setting of ‘Last State’ means that if the unit is **ON** and AC power fails, it returns to **ON** when AC power is restored with no action required by the operator.

Workstation 4 LX Power Management State Table

The table below highlights the WS4 LX power management states.

Current State	Event Source	Scenario	New State
UNPLUGGED	AC Power Connected	AC Power becomes available and Last Power State = Last State.	NOPOWER
NOPOWER	Operator	The operator presses the power button for less than 1 second.	ON
NOPOWER	Server Application	A server application sends a 'Wake On LAN' command.	ON
ON	Operator	The operator presses the power button for more than 4 seconds.	NOPOWER
ON	Application	The application shuts down the workstation.	NOPOWER
ON	Server Application	A server based application sends a "Wake On LAN" command.	ON
ON	Application	A warm boot is called the by the CAL.	NOPOWER to ON
NOPOWER	AC Power Failure	AC Power fails and restored. Last Power State = Last State	NOPOWER
ON	AC Power Failure	AC Power fails and restored. Last Power State = Last State	ON

Figure 1-16: WS4 LX Power Management States

Specifications

The Workstation 4 LX conforms to the following specifications.

Specification	Parameters
Processor	AMD Geode LX800
Display	12.1" TFT LCD (800x600)
Touchscreen	Five-wire resistive, 100 thousand points-per-inch resolution rated at a screen life of over 35 million touches.
Backlight(s)	Two CCFL Backlights with three intensity settings.
Real Time Clock	100-year calendar and 242 bytes of battery backed CMOS RAM.
Memory	Up to 1 GB DDR 333/400 SDRAM (256M for Windows Embedded CE 6.0 configurations)
Mag Stripe Reader	3-Track ABA compatible, operates in MAGTEK and Special modes.
Supported Customer Display	Optional 2 x 20 VFD pole or 240x64 LCD. Integrated and pole mount versions are available.
USB Ports	Four USB 2.0 ports.
LAN Interface	10/100/1000 Ethernet - Modular RJ45
Serial Ports	1 DB9 RS232 Serial /w handshake, 2 Modular TX/RX RS232 Serial, no handshake, or two full-duplex RS422.
Input Voltage	Universal Input - 85 to 264VAC, 47 to 63Hz.
Input Power	64W Max
BTU/Hour	207 (Typical) 248 (Maximum)
Storage Temperature	-25°C (-13°F) to 80°C (176°F)
Operating Temperature	0°C (32°F) to 45°C (113°F), 90% relative humidity max
Weight	7.75 lb. (3.5 kg) / Shipping weight 11 lb. (5 kg)
Case Material	PC-ABS Plastic
Physical Dimensions	See Appendix A

What is The Workstation 4 LX?

Approvals

Approvals

The Workstation 4 LX meets the following safety and environmental certifications.

Directive	Specification	Year	Expiration Date	Comments
SAFETY :	EN 60950-1 +A11	2001	Current	
EMC :	EN 55022+A1+A2	1998	Current	A1: 2000 (Radiated)
	EN 55024+A1+A2	1998	Current	A1: 2001
	EN 61000-3-2	2000	Current	(Harmonics)
	EN 61000-3-3+A1	1995	Current	A1: 2001 (Flicker)

Workstation 4 LX BIOS

This chapter describes the Workstation 4 LX BIOS and all configuration fields, then discusses BIOS Updates and the Windows CE Factory Restore Feature.

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Starting BIOS Setup

The Workstation 4 LX BIOS is based on the General Software Embedded 2000 BIOS.

Starting the System BIOS Setup

1. Connect a USB Keyboard to one of the USB ports located next to the DB9 Serial Connector.
2. Power-up the unit.
3. When the BIOS Splash screen with MICROS logo appears, press the [DEL] key.

Setup Screens

The WS4 LX BIOS Setup Utility screen is shown in Figure 2-1 below.

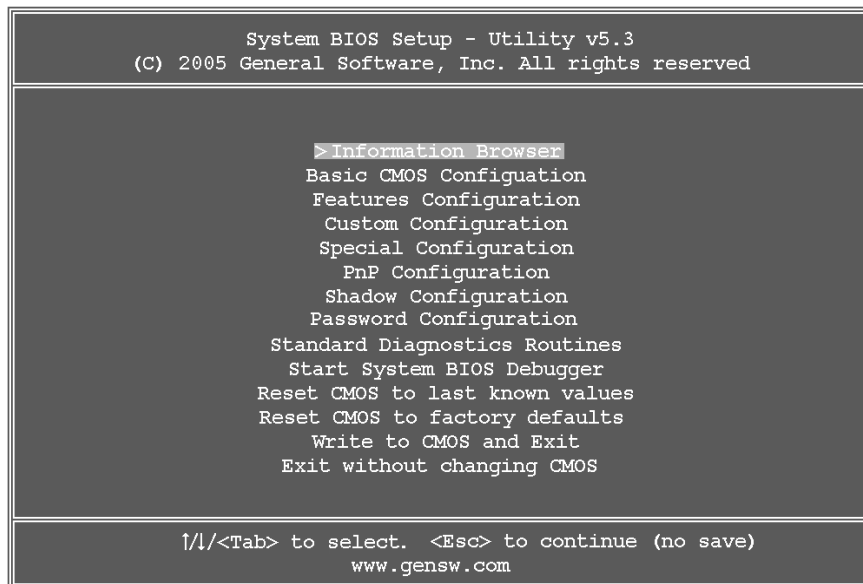


Figure 2-1: WS4 LX BIOS Setup Utility

Select a BIOS screen by using the arrow keys, then press Enter.

Basic CMOS Configuration

The Basic Setup Screen enables and configures solid state drive configurations, boot activities, POST optimization and setting the time and date.

Figure 2-2 shows the Basic CMOS Configuration screen on a unit configured to run Windows Embedded CE 6.0.

System BIOS Setup - Basic CMOS Configuration (C) 2005 General Software, Inc. All rights reserved			
DRIVE ASSIGNMENT ORDER:	Date: June 15, 2007	Typematic Delay : 250 ms	
Drive A: USB Floppy	Time: 15 : 55 : 25	Typematic Rate : 30 cps	
Drive B: (None)	NumLock: Disabled	Seek at Boot : None	
Drive C: USB Hard Drive	BOOT ORDER:	Show "Hit Del" : Enabled	
Drive D: Ide0/Pri Master		Config Box : Enabled	
Drive E: (None)		F1 Error Wait : Enabled	
Drive F: (None)		Parity Checking : (Unused)	
Drive G: (None)		Memory Test Tick : Enabled	
Drive H: (None)		Debug Breakpoints : Enabled	
Drive I: (None)		Debugger Hex Case : Upper	
Drive J: (None)	Boot 1st: Drive A:	Memory Test : StdLo FastHi	
Drive K: (None)	Boot 2nd: Drive C:		
Boot Method: Windows CE	Boot 3rd: Drive D:		
	Boot 4th: (None)		
	Boot 5th: (None)		
	Boot 6th: (None)		
FLOPPY DRIVE TYPES:	ATA DRV ASSIGNMENT: Sect Hds Cyls	Memory	
Floppy 0: Not installed	Ide 0: 3 = AUTOCONFIG, LBA	Base:	
Floppy 1: Not installed	Ide 1: 3 = AUTOCONFIG, LBA	632KB	
	Ide 2: 3 = AUTOCONFIG, LBA	Ext:	
	Ide 3: 4 = AUTOCONFIG, LBA	235MB	
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify Esc to return to main menu			

Figure 2-2: Basic CMOS Configuration Screen

DRIVE ASSIGNMENT ORDER:

This section contains a list of drive letters that can be mapped to a file system.

Drive A: is assigned to the optional USB Floppy Diskette.

Drive C: is assigned to the USB flash Drive, the primary boot device in Windows Embedded CE configurations.

Drive D: is assigned to the IDE0, the CF Card.

Boot Method - Selections: Boot Sector/Windows CE (Default = Windows CE)

When set to 'Windows CE', this enables the CE Ready™ feature of the BIOS and boots the workstation directly from the NK.BIN image file stored on the USB Flash Drive.

FLOPPY DRIVE TYPES:

The WS4 LX supports an optional external USB Floppy Drive. Legacy Floppy Drives are not supported. However, when the optional USB drive is installed, it appears in the Floppy 0: field as “1.44, 3.5”

Date, Time and Numlock State

The Date and Time settings are found at the top center of the Basic CMOS Configuration screen.

To adjust the Date and Time fields, use the up-down arrows to select the appropriate field. Use the PageUp or PageDown keys to adjust each value.

Numlock state enabled/disabled (Default = Disabled)

If a keyboard is connected at power-up, the Numlock field determines if Num Lock function is enabled.

BOOT ORDER:

The Boot Order consists of six fields, ‘Boot 1st’ through ‘Boot 6th.’ Each field includes a set of pre-defined actions that can be associated with it.

Figure 2-2 displays the default boot order configuration for a WS4 LX running Windows Embedded CE 6.0. After the POST completes, the BIOS checks each field, in order, until an operating system is found.

The ‘Boot 1st:’ field is assigned to Drive A:, the optional USB Floppy Drive.

The ‘Boot 2nd:’ Field is assigned to Drive C:, the USB Flash Drive.

The ‘Boot 3rd:’ field is assigned to Drive D:, the Compact Flash Card.

ATA DRV ASSIGNMENT:

This section refers to rotating media ATA IDE hard drives, not supported in the WS4 LX. In Windows Embedded CE 6.0 configurations, a Compact Flash Card installed in the Primary IDE slot (Ide 0:). The CF Card is a Mass Storage Device, so it will not appear conventional ATA drive.

ATA DRV ASSIGNMENT: Sect Hds Cyls

Ide 0: 3 = AUTOCONFIG, LBA

Ide 1: 3 = AUTOCONFIG, LBA

Ide 2: 3 = AUTOCONFIG, LBA

Ide 3: 4 = AUTOCONFIG, LBA

Basic CMOS Configuration Screen - Upper Right Column

Typematic Delay : Disabled, 250ms, 500ms, 750ms, 1000ms (Default = 250ms)

Typematic Rate : 6/8/10/12/15/20/24/30 characters per second (Default = 30 cps)

Seek at Boot : None/Both/Ide/Floppy (Default = None)

Refers to a Legacy Floppy Diskette, a device not supported in the WS4.

Show 'Hit Del' : Enable/Disable (Default = Enabled)

When set to Enabled, the message "Press Del key to enter BIOS Setup Menu" appears on the BIOS splash screen.

Config Box : Enabled/Disabled (Default = Enabled)

The Config Box appears after the BIOS splash screen as the OS image loads. It displays information about the system processor, chip set, memory size, BIOS build date, serial port configuration and other hardware information.

F1 Error Wait : Enabled/Disabled (Default = Enabled)

Should a non-fatal POST error occur at start-up, the screen will prompt: "Halt on Error, Press F1 to continue."

Parity checking : (Default = Unused)

Parity checking is not supported by the LX800 memory controller.

Memory Test Tick : Enabled/Disabled (Default = Enabled)

As the High and Low memory test icons display at the lower left of the BIOS splash screen, the system board beeper emits a 'Click' sound.

Debug Breakpoints : Enabled/Disabled (Default = Enabled)

Embedded BIOS 2000 Debugger configuration setting.

Debugger Hex Case : - Lower/Upper (Default = Upper)

Embedded BIOS 2000 Debugger configuration setting.

Memory Test : (Default = StdLo FastHi)

Selections include FullHi/FastLo, StdHi/FastLo, FastHi/FullLo, FullHi/FullLo, StdHi/FullLo, FastHi/StdLo, FullHi/StdLo, StdHi/StdLo, FastHi.

System memory is divided into two regions; 'Lo' (less than 1MB) and 'Hi' (greater than 1Mb). For each region, one of three POST tests can be executed.

The 'Std' selection sizes the amount of memory installed and performs no testing.

The 'Fast' selection provides some level of testing, but consumes more time.

The 'Full' selection provides an exhaustive test that checks every bit, but takes a great deal of time.

The default selection of 'StdLo' and 'FastHi' provides the fastest possible boot time while providing some level of testing above 1MB.

The Standard Diagnostics Routines includes a more rigorous test of system memory.

BIOS Features Configuration

This screen features two columns of IDE, USB configurations as well as access to the custom Windows CE Factory Restore feature. A sample of this screen is shown in Figure 2-3, below.

System BIOS Setup - Features Configuration			
(C) 2005 General Software, Inc. All rights reserved			
ACPI 2.0	: Enabled	System Management Mode	: Enabled
POST Memory Manager	: Disabled	Graphical/Audio POST	: Enabled
System Management BIOS	: Enabled	Firmware Instrumentation	: Disabled
Quick Boot	: Disabled	Primary IDE UDMA	: Enabled
Secondary IDE UDMA	: Disabled	Firmware Debug Console	: 2f8h
UsbMassStorage	: Enabled	AtaMassStorage	: Enabled
PlatformUpdateFacility	: Disabled	User	: Enabled
Network	: Disabled	Shell	: Disabled
WIN_CE_FACTORY_RESTORE	: Disabled		
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify <Esc> to return to main menu			

Figure 2-3: BIOS Setup Features Configuration Screen

Features Configuration Screen - Left Column

ACPI 2.0 : Enable/Disable (Default = Enabled)

When enabled, the BIOS builds a collection of data structures in memory that describe the hardware resources and power management capabilities to an ACPI compatible Operating System.

POST Memory Manager : Enable/Disable (Default = Disabled)

This field enables or disables the POST Memory Manager (PMM). PMM support is required by the Pre-boot Execution Environment (PXE) option ROMs, to enable a PXE Network Boot. The WS4LX can perform a PXE network boot by pressing the Alt-P key combination while the BIOS splash screen is displayed.

System Management BIOS : Enable/Disable (Default = Enabled)

Enables the SMM BIOS functionality.

Quick Boot : Enable/Disable (Default = Disabled)

The Quick Boot field, when Enabled, allows the POST to skip certain tests in order to speed boot time. However, due to the custom POST codes added to support the CF card and USB Flash Drive, setting this field to Enabled does not speed up the POST.

Secondary IDE UDMA : Enable/Disable (Default = Disabled)

The WS4 LX system board does not support the secondary IDE bus.

UsbMassStorage : Enabled/Disabled (Default = Enabled)

Enables BIOS support for all forms of USB storage including USB Floppy Disk Drives, USB Thumb Drives, USB Flash Drives, and USB CD-DVD Drives. It also enables USB 2.0 on all ports.

PUF : Enabled/Disabled (Default = Disabled)

Enables the Remote Support feature of the Platform Update Facility, currently not implemented. Do not change this setting from the current default.

Network : Enabled/Disabled (Default = Disabled)

This field is associated with the Remote Support feature of the BIOS, not yet implemented. Do not change this setting from the current default.

WIN_CE_FACTORY_RESTORE : Enabled/Disabled (Default = Disabled)

Setting this field to 'Enabled' starts the Windows Embedded CE6.0 Factory Restore feature. This field is a 'one-time' setting that automatically returns to 'Disabled' after use. See the Factory Restore procedure located at the end of this chapter.

Features Configuration Screen - Right Column

System Management Mode : Enable/Disabled (Default = Enabled)

Must be set to 'Enabled' to support Firmware Applications.

Graphical/Audio POST : Enabled/Disabled (Default = Enabled)

This setting enables the BIOS Splash screen with MICROS logo prior to booting.

Firmbase Instrumentation : Enabled/Disabled (Default = Disabled)

This selection is for development purposes only. This field is used in combination with the 'Firmbase Debug Console' and 'Shell' fields to display debugging information during the BIOS development process.

Primary IDE UDMA : Enabled/Disabled (Default = Enabled)

Supports DMA operation of the Compact Flash card if supported by the CF Card.

Firmbase Debug Console : 3f8h/2f8h/None/Custom (Default = 2f8h)

This field is for development purposes only.

AtaMassStorage : Enabled/Disabled (Default = Enabled)

AtaMassStorage refers to storage devices located on the IDE bus such as the CF Card.

User : Enabled/Disabled (Default = Enabled)

Enables firmware applications in the Firmbase environment. This field must be set to 'Enabled.'

Shell : Enabled/Disabled (Default = Enabled)

This field is for development purposes only. It is used in conjunction with the 'Firmbase Instrumentation' and 'Firmbase Debug Console' field.

Custom Configuration

The Custom Configuration BIOS screen is composed of two columns that provide configuration settings for PCI Interrupt assignments, COM port resource assignments, video settings, IDE and USB fields and Processor/Memory Bus Speed (CPU/GLIU speed). The PCI Interrupt and COM Port assignments are factory configured and should not be changed.

The lower section of the screen contains display fields to indicate the CPU temperature and core speed, memory and PCI bus speeds, plus the AMD Geode LX800 and CS5536 Companion Device silicon revisions.

A sample of this screen is shown in Figure 2-4, below.

System BIOS Setup - Custom Configuration (C) 2005 General Software, Inc. All rights reserved			
PCI INT A Assignment	: IRQ 10	PCI INT B Assignment	: IRQ 10
PCI INT C Assignment	: IRQ 10	PCI INT D Assignment	: IRQ 10
COM 1 (238/IRQ 12)	: Winbond UART1	COM 2 (338/IRQ 11)	: Windbond2 COM1
COM 3 (3E8/IRQ 4)	: GX UART2	COM 4 (2E8/IRQ 3)	: GX UART1
IRDA	: Disabled	LPT1: (3BC)	: Winbond LPT
Primary video device	: Auto	Geode LX graphics	: 16 MB
Video device mode	: 1024x768	Video refresh rate	: 60 Hz
Video data width	: 1 pix/clk	Video panel type	: LVDS
Memory Timings	: Optimal	Legacy USB support	: Enabled
IDE cable type	: 40-Wire	Floppy controller	: Disabled
USB Device Controller	: Disabled	CPU/GLIU speed	: 500/400 Mhz
USB Port 4 Function	: Host		
CPU temp	: 64°C	PCI bus Frequency	: 66 MHz
Core CPU Frequency	: 500 MHz	LX Rev. Number	: C1
Memory Frequency	: 333 MHz DDR	CS5536 Rev. Number	: B1
CAS Latency	: 2.5 CLKS	Board Revision	: Rev C
↑/↓/+/-/<CR>/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu			

Figure 2-4: WS4 LX Custom Configuration BIOS Setup Screen

Custom Configuration Screen - Left Column

PCI INT A Assignment : IRQ5/IRQ10/IRQ11/AUTO (Default = AUTO)

PCI INT C Assignment : IRQ5/IRQ10/IRQ11/AUTO (Default = AUTO)

The PCI interrupt assignments are factory configured and should not be modified.

COM 1 (238/IRQ 12) : Location: Winbond UART1

COM 3 (3E8/IRQ 4) : Location: GX UART2

COM Port assignments are factory configured to function with current MICROS applications and do not require modification.

IDRA : Enabled/Disabled (Default = Disabled)

IRDA communications are not supported.

Primary video device : None/PCI VGA card/LX Graphics/Auto (Default = Auto)

The WS4 LX supports a single video output from the TFT Graphics Processor in the LX800. This field is factory configured and should not be modified.

Video device mode : Disabled/320x240/640x480/800x600/1024x768/1152x864/1280x1024/1600x1200 (Default = 800x600)

The WS4 LX uses a 12.1" LCD with a fixed resolution of 800x600. The default setting is locked down and cannot be changed.

Video data width : 1 pix/clock 2 pix/clock (Default = 1 pix/clock)

This field is factory configured and should not be modified.

Memory Timings : Conservative/Optimal (Default = Optimal)

This field is factory configured and should not be modified.

IDE cable type : 40-Wire/80-Wire (Default = 40-wire)

The IDE cable type field is associated with IDE hard drives, not supported in the WS4 LX.

USB Device Controller : Enabled/Disabled (Default = Disabled)

Refers to the 'USB On the Go' feature of the of the AMD CS5536 Companion Device. This feature is not supported.

USB Port 4 Function : Disabled/Device/Host (Default = Host)

This field is factory configured and cannot be modified.

Custom Configuration Screen - Left Column Display Fields

The display fields show the LX800 processor internal temperature, processor core frequency, and Memory bus frequency.

CPU temp : 60°C

This field displays the internal temperature of the LX800 CPU. Temperature is measured by an on-die thermal diode and processed by the hardware monitor in Super IO U36.

Core CPU Frequency : 500 MHz

This field displays the Processor core frequency. It will always be 500Mhz, the rated core speed of the AMD Geode LX800

Memory Frequency : 333 or 400 Mhz DDR

This field displays the memory bus frequency. The LX may use a DDR 333 or DDR 400 MHz DIMMs.

CAS Latency : 2.5 CLKS

CAS is an abbreviation for Column Address Strobe and refers to a physical memory location in an array comprised of rows and columns of capacitors that form a dynamic random access memory module. Strictly speaking, CAS latency is defined as the number of clock cycles, (in this case 2.5), that occur between the memory controller sending a request to read a memory location and the data appearing at the output pins of the DIMM.

Custom Configuration Screen - Right Column

PCI INT B Assignment : IRQ5/IRQ10/IRQ11/AUTO (Default = AUTO)

PCI INT D Assignment : IRQ5/IRQ10/IRQ11/AUTO (Default = AUTO)

The PCI INT B and INT D assignments are factory configured and should not be modified.

COM 2 (220/IRQ 7) Location : Winbond UART2

COM 4 - (2E8/IRQ 3) Location : GX UART1

COM Port assignments are factory configured and should not be modified.

LPT1 : (3BC) Disabled/Winbond LPT (Default = Winbond LPT)

This setting is factory configured and should not be modified.

Geode LX graphics : Disabled/2 MB/4 MB/8 MB/16 MB (Default = 16 MB)

This field determines the amount of system memory that will be assigned to the graphics frame buffer during boot, while in DOS or BIOS Setup.

When the OS starts and the LX800 graphics driver loads, it may re-allocate the size of graphics memory based on screen size/number of colors.

Video refresh rate : 60 Hz/70 Hz/75 Hz/85 Hz/100 Hz (Default = 60 Hz)

This setting is factory configured and should not be modified.

Video panel type : TFT/LVDS (Default = LVDS)

This setting is factory configured and should not be modified.

Legacy USB support : Auto/Enabled/Disabled (Default = Enabled)

This selection enables USB Keyboard/Mouse support.

Floppy controller : Selection locked to 'Disabled'

Refers to a legacy floppy controller, not supported by the WS4 LX system board.

CPU/GLIU speed : Selections are 200/200, 233/200, 233/233, 266/200, 300/266, 300/300, 333/200, 333/266, 333/333, 366/200, 366/266, 366/333, 366/366, 400/266, 400/333, 400/366, 400/400, 433/266, 433/433, 433/366, 433/400, 466/300, 466/333, 466/366, 466/400, 500/300, 500/333, 500/366, 500/400, (Default = 500/400)

The CPU/GLIU speed setting corresponds to the CPU Core Speed/GeodeLink Interface Unit Speed. The GLIU speed is similar to the FSB or 'memory bus' speed used with some processor architectures.

The 'Core CPU Frequency' field at the lower left column displays the processor core speed in MHz. This will always be 500 Mhz.

The 'Memory Frequency' field at the lower left column displays the current GLIU speed setting. This field will display either 333 or 400 MHz depending on the device installed.

Custom Configuration Screen - Right Column Display Fields

These display fields show the PCI Bus Frequency, LX800 and companion chip revisions and the System Board hardware revision.

PCI Bus Frequency : 66MHz

Displays the current PCI Bus frequency.

LX Rev. Number : C1

This field displays the Revision or 'Stepping' of the AMD Geode LX800 silicon.

CS5536 Rev. Number : B1

This field displays the Revision or 'Stepping' of the AMD CS5536 Companion Device silicon.

Board Revision : Rev C

This field displays the WS4 LX System Board Hardware Revision.

Special Configuration

The Special Configuration BIOS screen contains several configuration settings unique to the WS4 LX system board and its architecture. Figure 2-5 displays an example of this screen, with default settings.

System BIOS Setup - Special Configuration			
(C) 2005 General Software, Inc. All rights reserved			
PXE boot	: Disabled	Cash drawer voltage	: 12V
Boot Test Image	: Normal	Personality Module	: CF
Last Power State	: Last State	COM5 (220/IRQ 7)	: Winbond UART2
COM6 (208/IRQ 5)	: Windbond2 COM2		
Vcore : 1.216V		Vccmem : 2.624V	
Vcc3 : 3.424V		Vcc+12 : 12.12V	
Vcc-12 : -12.186V			
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify Esc to return to main menu			

Figure 2-5: The Special Configuration Screen

Special Configuration Screen - Left Column

PXE Boot : Enabled/Disabled (Default = Disabled)

A PXE Boot can be accomplished in one of two ways. Setting this field to 'Enabled' causes the WS4 LX to attempt PXE boot each time it is powered up. Pressing the Hot key combination 'Alt - P' when the BIOS splash screen appears causes the unit to attempt a PXE boot one time.

Boot Test Image : Alternate/Normal (Default = Normal)

The 'Normal' setting causes the unit to boot to Windows Embedded CE 6.0 from the USB Flash Drive. If an NK.BIN file is located on the CF card, it is copied to the USB Flash Drive before the unit boots.

The 'Alternate' setting provides the ability to boot from an external USB Flash Drive or thumb drive attached to an IO Panel USB port for test or recovery purposes. The Alternate setting disables the USB Flash Drive so that the BIOS can boot from an NK.BIN file located on the external USB Flash Drive. If an NK.BIN file is located on the CF card, it will not be copied to the USB flash drive.

Last Power State : Power Off/Power On/Last State (Default = Last State)

This selection determines how the WS4 LX recovers from a power failure. The default selection of [Last State] causes the workstation to return to the power state before power failed. For example, if the WS4 LX is on and AC power fails, it will automatically restart when AC power returns.

Conversely, if the unit was connected to AC power, but in the **NOPOWER** state when AC power fails, it remains in the **NOPOWER** state when AC power returns.

The [Power Off] selection, if enabled, requires the user to press the power button to restart the unit after a power failure.

The [Power On] selection causes the unit to automatically power-up when AC power is connected to the unit.

Special Configuration Screen - Right Column

Cash Drawer voltage : 12V/24V (Default = 12V)

This selection determines the Cash Drawer Solenoid voltage. The default setting of 12V is for use with all MICROS cash drawers.

Personality Module : CF/USBFlashDrive (Default = CF)

This field determines the location of the persisted registry. In the Windows Embedded CE 6.0 configuration, the CF card is the default location of the system registry and must be installed in order for the workstation to start.

Plug-n-Play Configuration

Embedded BIOS 2000 provides plug and play (PnP) functionality compatible with PnP Specification version 1.0A. Some highlights from the Plug and Play specification include eliminating resource conflicts during POST, support plug and Play ISA Cards, etc.

With the advent of Advanced Configuration and Power Interface (ACPI), the importance of Plug and Play has diminished somewhat; except perhaps for Operating Systems such as Windows Embedded CE 6.0 that do not fully support the ACPI specification.

The illustration below displays a sample of the WS4 LX Plug and Play Configuration screen. We recommend that you do not change any settings on this screen.

System BIOS Setup - Plug-n-Play Configuration					
(C) 2005 General Software, Inc. All rights reserved					
Enable PnP Support			:	Enabled	
Enable PnP O/S			:	Enabled	
Assign IRQ0 to PnP			:	Disabled	
Assign IRQ1 to PnP			:	Enabled	
Assign IRQ2 to PnP			:	Enabled	
Assign IRQ3 to PnP			:	Enabled	
Assign IRQ4 to PnP			:	Disabled	
Assign IRQ5 to PnP			:	Enabled	
Assign IRQ6 to PnP			:	Disabled	
Assign IRQ7 to PnP			:	Disabled	
Assign DMA0 to PnP			:	Disabled	
Assign DMA1 to PnP			:	Disabled	
Assign DMA2 to PnP			:	Disabled	
Assign DMA3 to PnP			:	Enabled	
Assign IRQ8 to PnP			:	Disabled	
Assign IRQ9 to PnP			:	Disabled	
Assign IRQ10 to PnP			:	Disabled	
Assign IRQ11 to PnP			:	Enabled	
Assign IRQ12 to PnP			:	Enabled	
Assign IRQ13 to PnP			:	Enabled	
Assign IRQ14 to PnP			:	Enabled	
Assign IRQ15 to PnP			:	Enabled	
Assign DMA4 to PnP			:	Enabled	
Assign DMA5 to PnP			:	Enabled	
Assign DMA6 to PnP			:	Disabled	
Assign DMA7 to PnP			:	Enabled	
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify					
Esc to return to main menu					

Figure 2-6: WS4 LX Plug and Play Configuration Screen

Shadow/Cache Configuration

Shadowing is the ability to move the contents of slower ROM devices to faster DDR memory in order to improve performance.

The Embedded BIOS 2000 allows selective enabling/disabling of shadowing in 16KB section, except for the top 64KB of the BIOS EPROM, which is shadowed as a unit.

By default, shadowing is enabled at C400 to enhance VGA ROM BIOS performance, and from E000 - F000 to maximize system ROM BIOS performance. This is shown in Figure 2-7. We recommend that you do not change the fields in the Shadow/Cache Configuration screen.

System BIOS Setup - Shadow/Cache Configuration (C) 2005 General Software, Inc. All rights reserved		
Shadowing	: Chipset	Shadow 16KB ROM at C000 : Enabled
Shadow 16KB ROM at C400	: Enabled	Shadow 16KB ROM at C800 : Disabled
Shadow 16KB ROM at CC00	: Disabled	Shadow 16KB ROM at D000 : Disabled
Shadow 16KB ROM at D400	: Disabled	Shadow 16KB ROM at D800 : Disabled
Shadow 16KB ROM at DC00	: Enabled	Shadow 16KB ROM at E000 : Enabled
Shadow 16KB ROM at E400	: Enabled	Shadow 16KB ROM at E800 : Enabled
Shadow 16KB ROM at EC00	: Enabled	Shadow 64KB ROM at F000 : Enabled
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify Esc to return to main menu		

Figure 2-7: Shadow/Cache Configuration Screen

Set Password

The Set Password screen can be used to change the default BIOS system password. The system password is 'Hmlton' (case sensitive). The system password is required to change the default password and to use the Windows CE Factory Restore feature. The Set Password screen allows change the system password to one of your choosing. Figure 2-8 displays a sample of the Set Password screen.

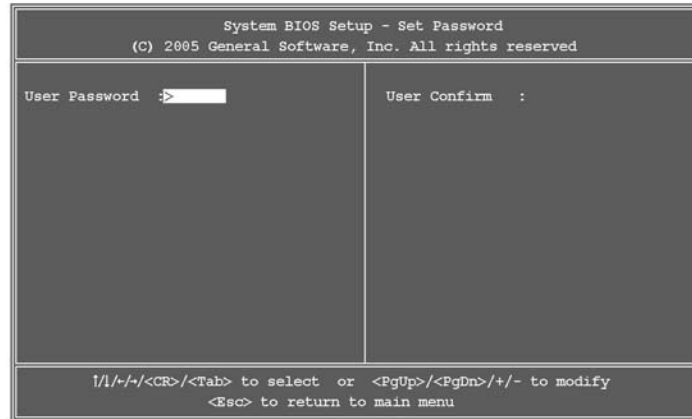


Figure 2-8: Set Password Screen

To change the default BIOS password see the procedure below.

1. From the System BIOS Setup Screen, scroll to the 'Password Configuration' screen and press [Enter].
 - The 'Enter password' prompt appears.
2. Enter the default password 'Hmlton' and press Enter.
 - If the unit beeps twice and the prompt 'Incorrect Password Enter Password or hit ESC to Reboot' appears, the password is incorrect. If the password is correct, the 'Set Password' screen appears as shown above.
3. In the 'User Password' field, type the new password. Note: Passwords are case sensitive.
4. Press the tab key and re-enter the password in the 'User Confirm' field.
 - If the User Password and User Confirm passwords do not agree, an error prompt appears.
5. Press [ESC], then 'Y' to return to the System BIOS Setup screen, then scroll down to the 'Write to CMOS and Exit field and press enter.' Press 'Y' to save changes and restart the unit. The new password does not take affect until you complete this step.

The system password can be reset to the default of 'Hmlton' by using the CMOS Reset Jumper, J8. See Page 3-8.

Standard Diagnostics Routines

The Standard Diagnostics Routines are part of the default Burn-In Diagnostics included with General Software BIOS.

An example of the Burn-In Diagnostics screen is shown in Figure 2-9.

System BIOS Setup - Burn-In Diagnostics			
(C) 2005 General Software, Inc. All rights reserved			
CPU Core	: Disabled	BIOS Video Services	: Disabled
BIOS Equipment Services	: Disabled	BIOS Low Memory Size	: Disabled
Low Memory (<1MB)	: Disabled	BIOS Block Disk Services	: Disabled
Extended Memory (>1MB)	: Disabled	BIOS Serial Services	: Disabled
DMA Controller(s)	: Disabled	BIOS System Services	: Disabled
Real-Time Clock	: Disabled	BIOS Parallel Services	: Disabled
BIOS Time/Date Services	: Disabled	BIOS User Timer Tick	: Disabled
Floppy Disk I/O	: Disabled	IDE Disk I/O	: Disabled
CMOS RAM & Battery	: Disabled		
Continuous Testing	: Disabled	Tests Begin on ESC?	: Disabled
↑/↓/←/→/CR/Tab to select or PgUp/PgDn/+/- to modify			
<Esc> to return to main menu			

Figure 2-9: WS4 LX Burn-In Diagnostics Screen

By default, all tests are disabled. Each test provides the option to run once or continuously.

For example, to run a continuous memory test, navigate to the 'Low Memory' and 'Extended Memory' fields and set each to [Enabled]. Then select the 'Continuous Testing' and 'Tests Begin on ESC?' fields and press [ESC] to start the test.

A counter appears, and the test checks each byte of memory until terminated by an error or the user. Press any key to stop the test and return to the main menu.

Upgrading the WS4 LX BIOS

The General Software Embedded BIOS 2000 Platform Update Facility provides the ability to perform BIOS upgrades by simply placing the BIOS binary file and several configurations files on on the Compact Flash Card and restarting the unit.

HMLTON.BIN file to the Compact Flash Card

The BIOS image is contained in a binary file called HMLTON.BIN. It is placed on the CF card along with the configuration files HMLTON.LOG, Hchksum.log, and DEFAULTS.LOG by the CAL as part of a BIOS upgrade.

The CAL copies the required files to the CF card and restarts the unit. When the unit restarts, the Platform Update Facility detects the BIN file, performs a file size and date comparasion, then runs a checksum test using the Hchksum.log file. If all three are successful, the BIOS update runs, a process that takes about one minute.

After the BIOS update is complete, the unit restarts and the CAL removes all files related to the BIOS upgrade from the CF card. More details about the process can be found below.

CMOS Settings to Factory Defaults

Resetting the CMOS to factory defaults is required if a new field is added or a change occurs to an existing field. The reset is normally performed by the operator just after flashing the BIOS, by selecting 'Reset CMOS to factory defaults' from the main menu then, 'Write to CMOS and Exit' and restarting.

The DEFAULTS.CFG file automates this process. If the file contains the line DEFAULTS = 1, the reset to factory defaults is performed automatically. If the file is not present, or contains the line DEFAULTS = 0, a reset is not performed.

BIOS Binary File Checksum Test

To prevent flashing a corrupted BIOS file, the binary file is accompanied by a file called Hchksum.log that contains a 9-digit checksum value. The platform update facility generates a 9-digit checksum against the binary file and compares this to the checksum contained in the file. The checksums must match in order for the BIOS update to start. An example is shown on the next page.

If the checksum values do not match, the error messages:

'BIOS File Chksum Failure!'

'BIOS Not Updated'

will appear on the LCD. A file called Hbios_err.log is created on the CF card and the HMLTON.BIN file is deleted from the CF card.

BIOS Update in Progress

A sample of the BIOS Update screen is shown in Figure 2-10, below.

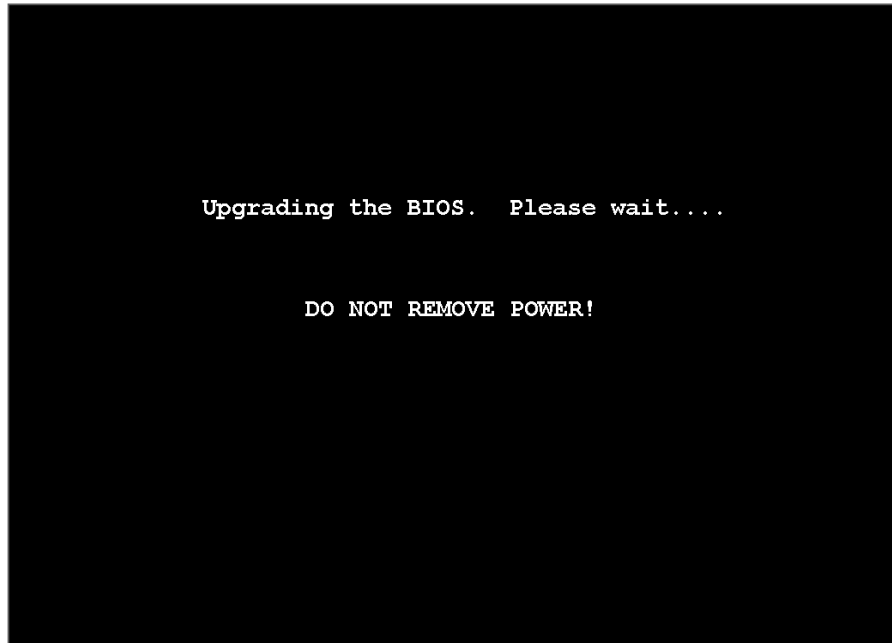


Figure 2-10: BIOS Update in Progress - Do Not Remove Power!



WARNING

When the screen shown above is displayed, pressing the power button or removing AC Power from the unit could result in a corrupted BIOS flash chip.

Win CE Factory Restore

For Windows Embedded CE 6.0 configurations a custom pre-boot firmware application we call Win CE Factory Restore is available. This is a new tool designed to ease depot maintenance. Should the OS Image or platform files become corrupt or otherwise unusable, Factory Restore replaces all files on the USB flash drive and erases the CF card, returning the unit to the ‘out-of-box’ or factory condition.

To understand how Factory Restore works, let’s examine how the USB flash drive is partitioned, as shown in Figure 2-11 below.

Starting on the left, Partition 1 is the hidden boot partition, containing the OS image file NK.BIN. Partition 2 is also hidden and contains the factory restore files. This includes a duplicate set of platform files, configuration files and folders, utilities, and the NK.BIN file. Partition 3 is visible and appears as ‘\DOC’ in ‘My Devices’

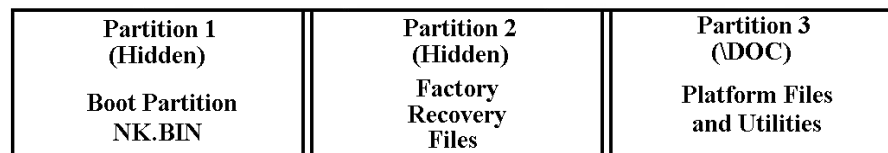


Figure 2-11: USB Flash Disk Partitions

Figure 2-12 illustrates how Factory Restore copies the image file and platform files to the correct partitions.

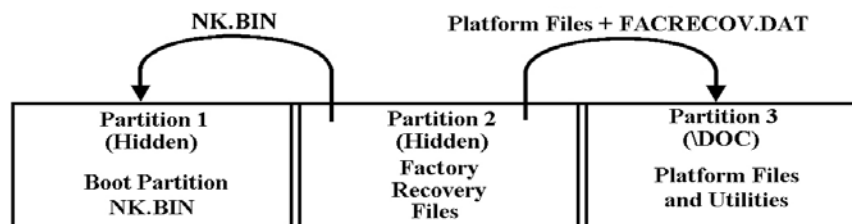


Figure 2-12: Windows CE Factory Restore Operation

The OS image, NK.BIN is copied from Partition 2 to Partition 1, the boot partition. The platform files and folders are copied from Partition 2 to Partition 3, the visible \DOC partition. Finally, a Wipe CF is performed to remove all files from the Compact Flash card.

Included with the Platform Files is a file called FACRECOV.DAT. This text file resides in the \DOC folder and contains information about the Factory Recovery feature. It can be viewed from the WS4LXDiagUtility System Information screen by touching the [Recovery Image Info] button. See Chapter 5 for more information.

The procedure to initiate the Factory Restore feature can be found below.



WARNING:

Factory Restore deletes all files from the Compact Flash Card. If required, take steps to preserve files on the CF card before running Factory Restore.

1. Connect a USB Keyboard to the workstation, and power-up.
2. When the Blue BIOS splash screen appears, press the key combination [ALT-M]. Note: some keyboards may not initialize in time to detect this key combination. As an alternative, you can press [Del] to enter BIOS Setup, select the Features Configuration screen, and set the WIN_CE_FACTORY_RESTORE field to 'Enabled.' Press [ESC] to continue.
 - The screen prompts for the system password.
3. If you have not changed the default system password, enter 'Hmlton' (case sensitive) and press enter. Press 'Y' to confirm.
 - The screen returns to the Setup Main Menu.
4. Select 'Write to CMOS and Exit' and press enter. Press 'Y' to confirm.
 - The unit restarts and prompts 'Factory Restore in Progress - Please Wait.'
5. When the process is complete, the unit restarts.

The workstation is now running the CE image and platform files placed in the factory restore partition when the unit was manufactured. After the unit is placed in the field, subsequent CAL updates to platform files and or OS image may occur. The updated files received through the CAL are not added to the Recovery Partition, therefore it is possible that some files will eventually become out of date.

However, since the primary purpose of Factory Restore is to repair a workstation that previously did not boot, the unit can now be pointed to a properly configured application server where it will receive the latest available platform and OS updates along with a copy of the POS application.

A Utility to update the Recovery Partition files is planned in the future.

What's Inside?

This chapter describes how to open the unit, provides a description of the system board, how to remove and install some components, then shows how to reassemble the unit.

In this chapter

Disassembling the Workstation 4 LX	3-2
System Board Components.....	3-6
System Board Block Diagram	3-9
System Board Description	3-10
LCD/Touchscreen and Mag Stripe Reader Assembly	3-15
Hardware Updates.....	3-17
Reassembling the WS4 LX.....	3-25

Disassembling the Workstation 4 LX

The following procedure describes how to disassemble the workstation and access the internal components.



SHOCK HAZARD

When the AC Power Cable is connected to the workstation, hazardous AC and DC voltages are present in the power supply. Always remove the AC power cable from the unit **before** you open the cover.

1. Remove all cables from the Workstation LX I/O panel including the *AC Power Cable* before disassembling the unit.
2. Place a towel or other soft cloth on your work surface to protect the LCD and touchscreen glass, then place the workstation face down on this surface.
 - The WS4 LX cover is held in place by a pair of screws accessible from the underside of the unit as shown in the top half of Figure 3-1. A pair of hinges are located at the rear of the base.

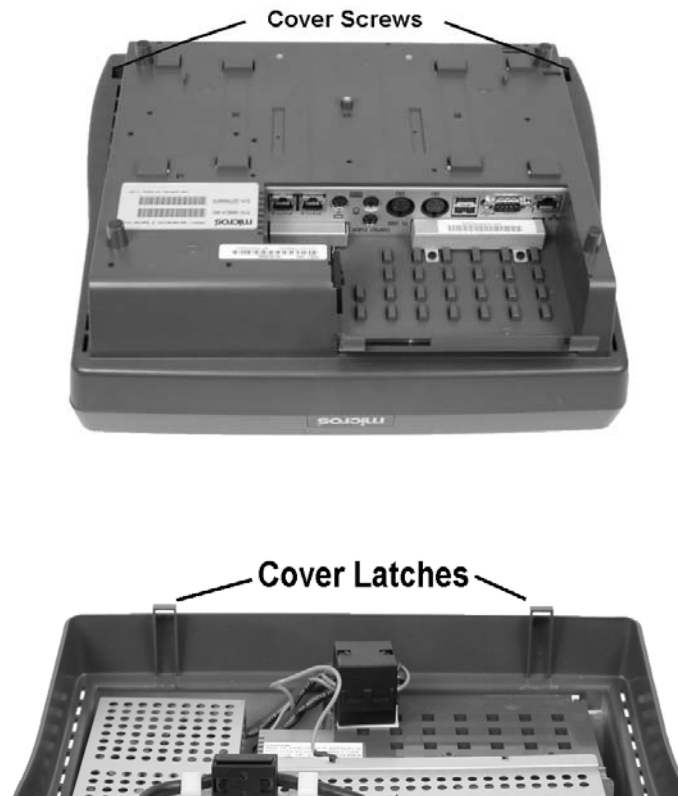


Figure 3-1: WS4 LX Cover Hinges and Screws

3. Loosen the two captive screws from the underside of the unit as shown in Figure 3-1.
4. Remove the top cover from the base. To avoid damaging the hinges on the rear of the base, push the top cover towards the rear of the base a little to release them, then lift up. *If you lift up on the cover without first releasing the hinges, you can break them.*
5. Lift the top cover and place it directly in front of the base.
6. Remove the torroid on LCD cable from the clips that hold it to the RF Shield.
7. Remove the remaining cables between the top cover and the base. Refer to Figure 3-2.
 - o Use a flat bladed screwdriver to release the Magnetic Stripe Reader Cable modular connector from its system board socket.
 - o Remove the backlight cable from the backlight board.
 - o Remove the touchscreen cable from the touchscreen extension cable.
 - o Remove the customer display cable from the Rear LCD Display (if this option is installed).
 - o Remove the LCD cable from the Sharp LCD panel.

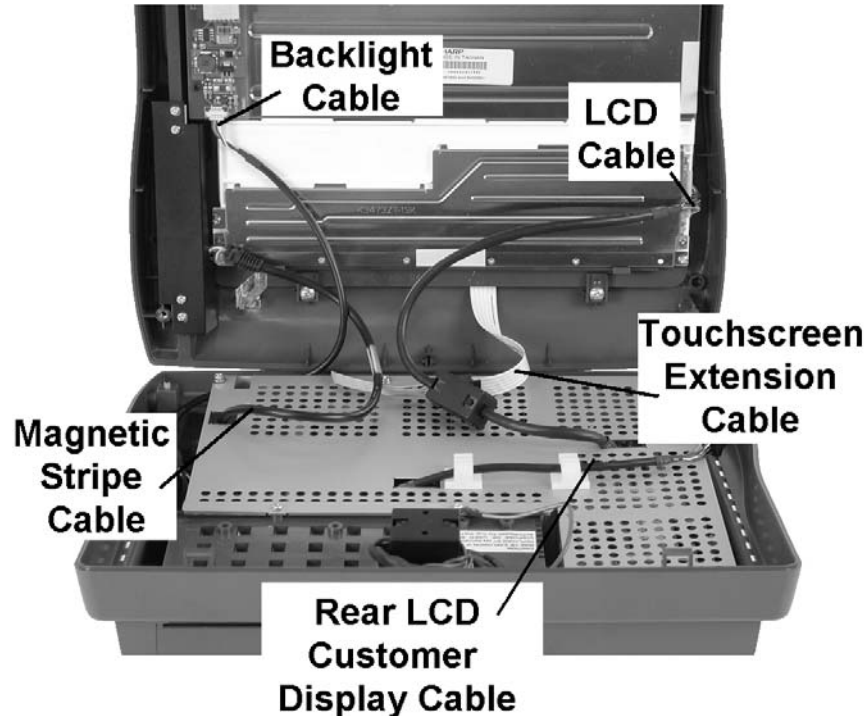


Figure 3-2: Removing Cables from the Top Cover

What's Inside?

Disassembling the Workstation 4 LX

8. Set the Top Cover aside and remove the RF shield. First, remove the five screws shown in Figure 3-3.

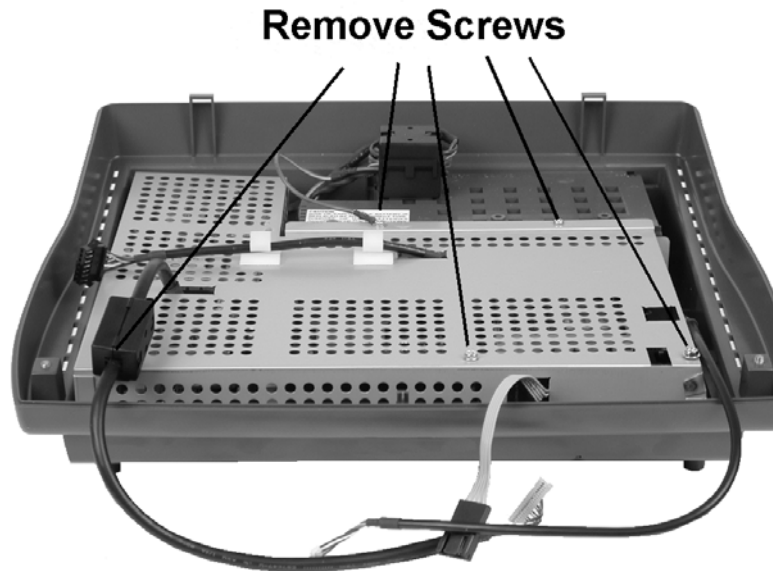


Figure 3-3: Removing the RF Shield Screws

9. Remove the Rear Customer Display cable, LCD cable and torroid from the clips on the RF shield. Remove the torroid from the LCD cable by releasing the latch as shown in Figure 3-4.

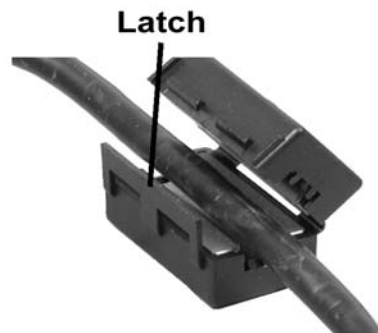


Figure 3-4: Removing the torroid from the LVDS Cable

10. Remove the RF Shield. Take care not to damage the LCD, Backlight Inverter, or Touchscreen Extension cables.

Figure 3-5 shows the WS4 LX with the RF shield removed. Note the location of the Power Supply, System Board, CF Daughter Card and cover, USB flash drive and DDR DIMM,

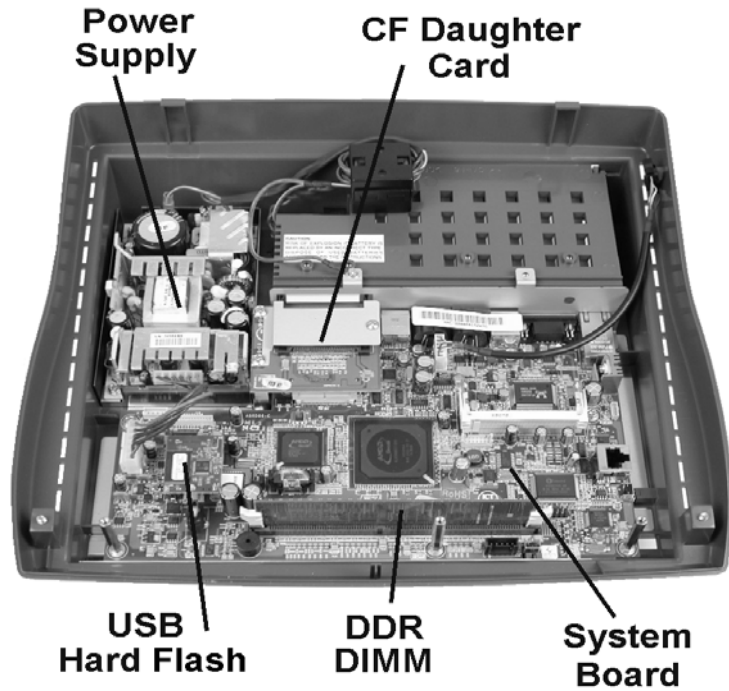


Figure 3-5: WS4 LX with RF Shield Removed

System Board Components

This section shows the system board components, connectors, and jumpers. A block diagram and brief technical description is also included.

Primary Chips

Figure 3-6 shows the major components of the WS4 LX system board.

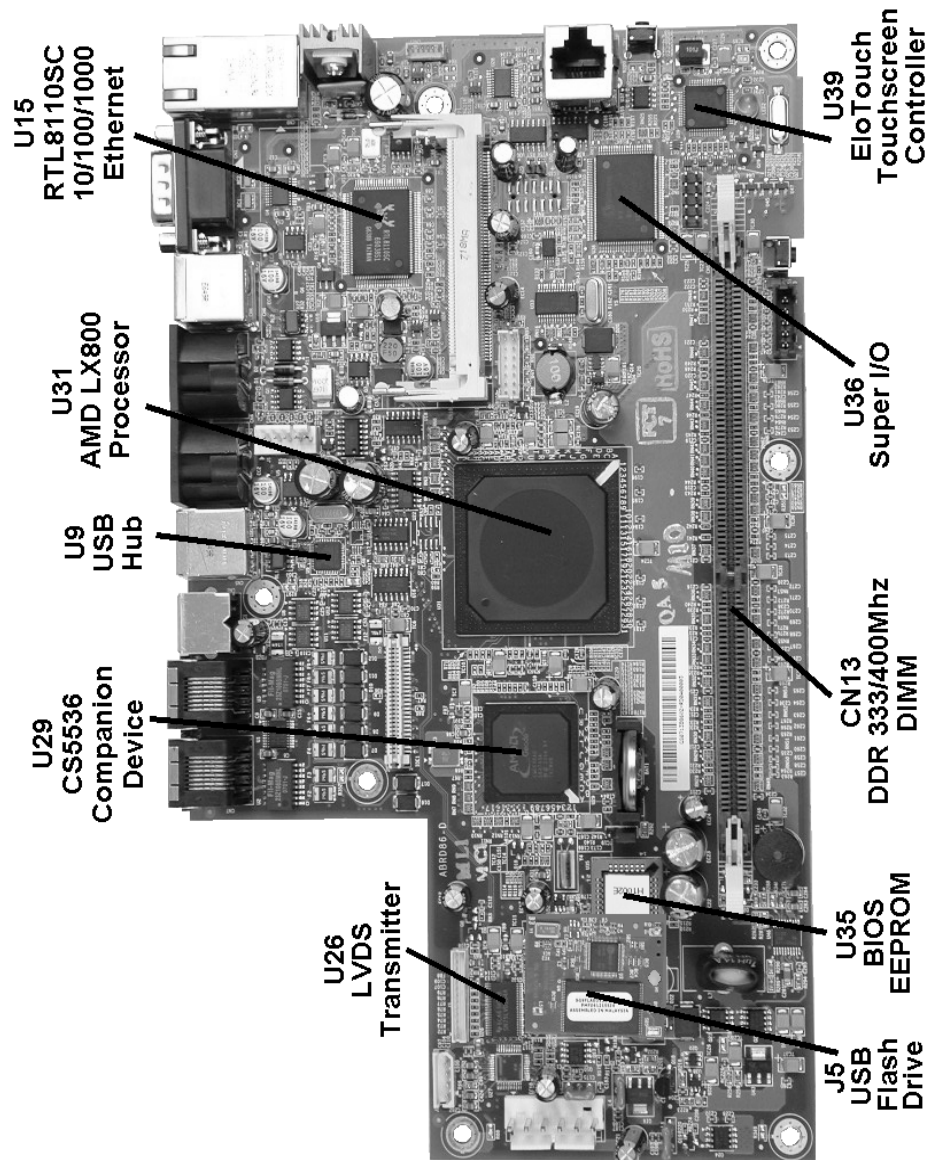


Figure 3-6: WS4 LX System Board - Primary Components

Connectors

Figure 3-7 shows the WS4 LX System Board connectors.

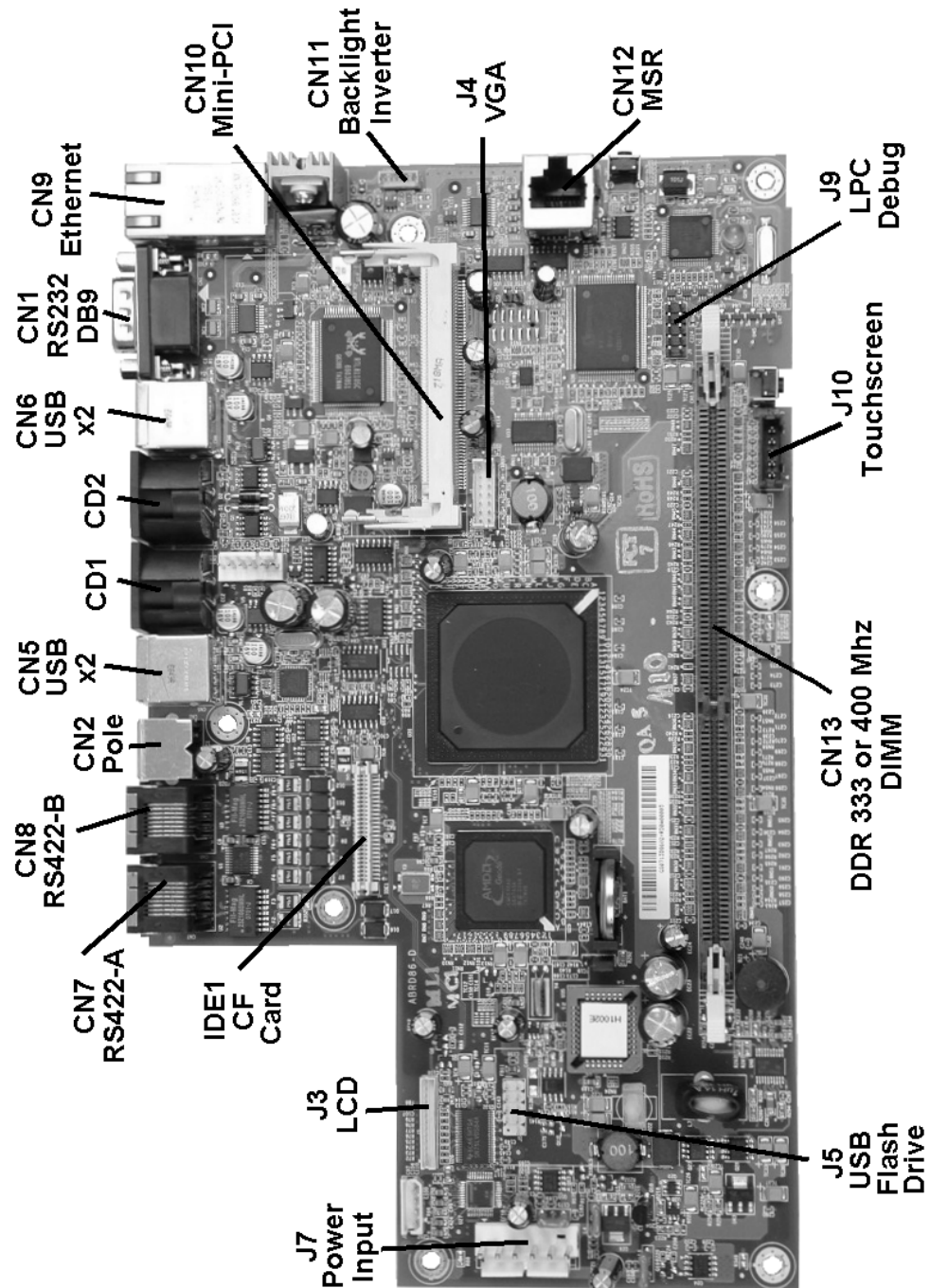


Figure 3-7: WS4 LX System Board Connectors

Jumpers, Switches and Battery

Figure 3-8 points out the system board jumpers and switches.

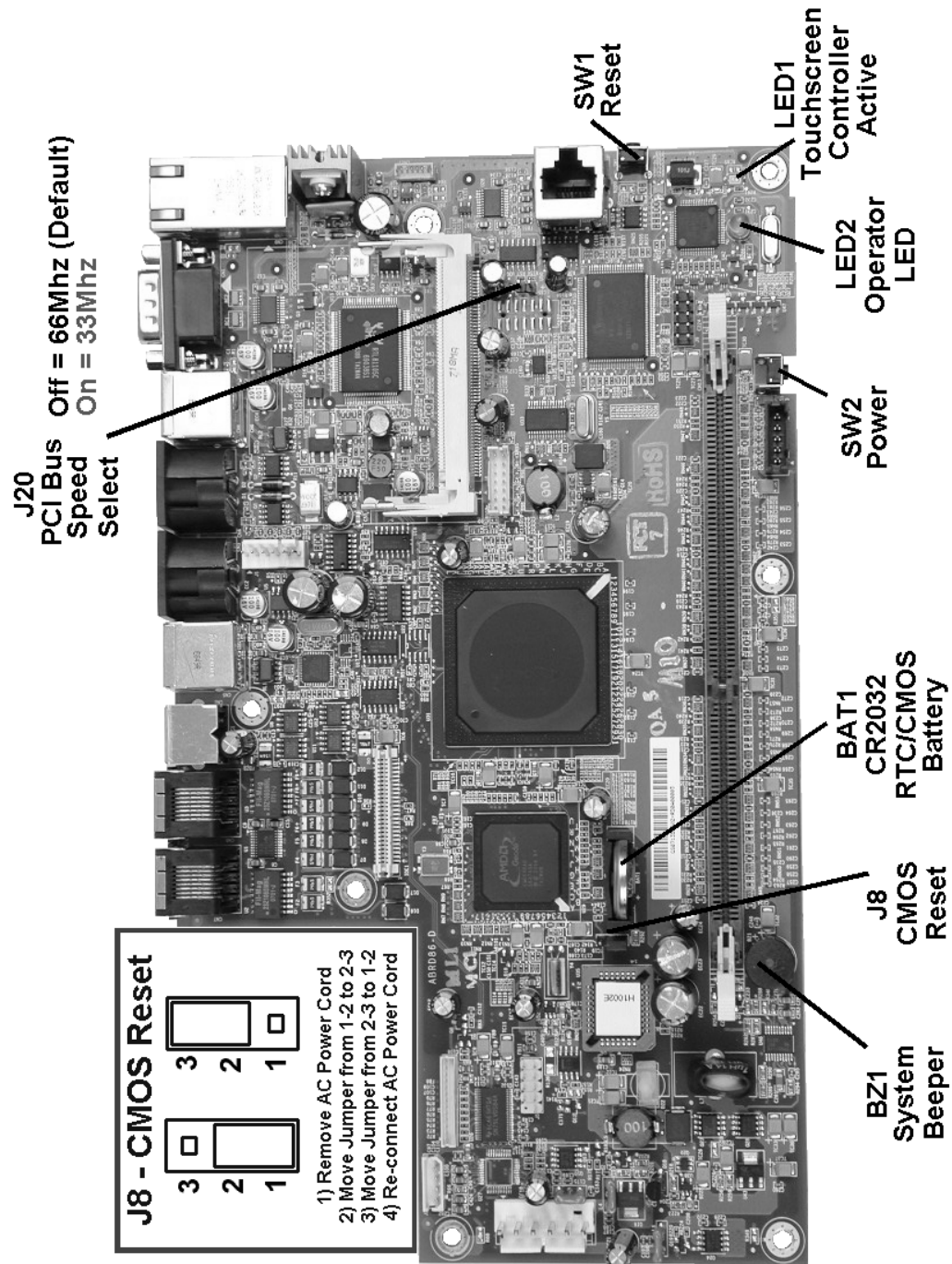


Figure 3-8: WS4 LX System Board Jumpers and Switches

System Board Block Diagram

Figure 3-9 shows a block diagram of the Workstation 4 LX, including the system board, internal power supply, touchscreen, backlight inverter, and LCD.

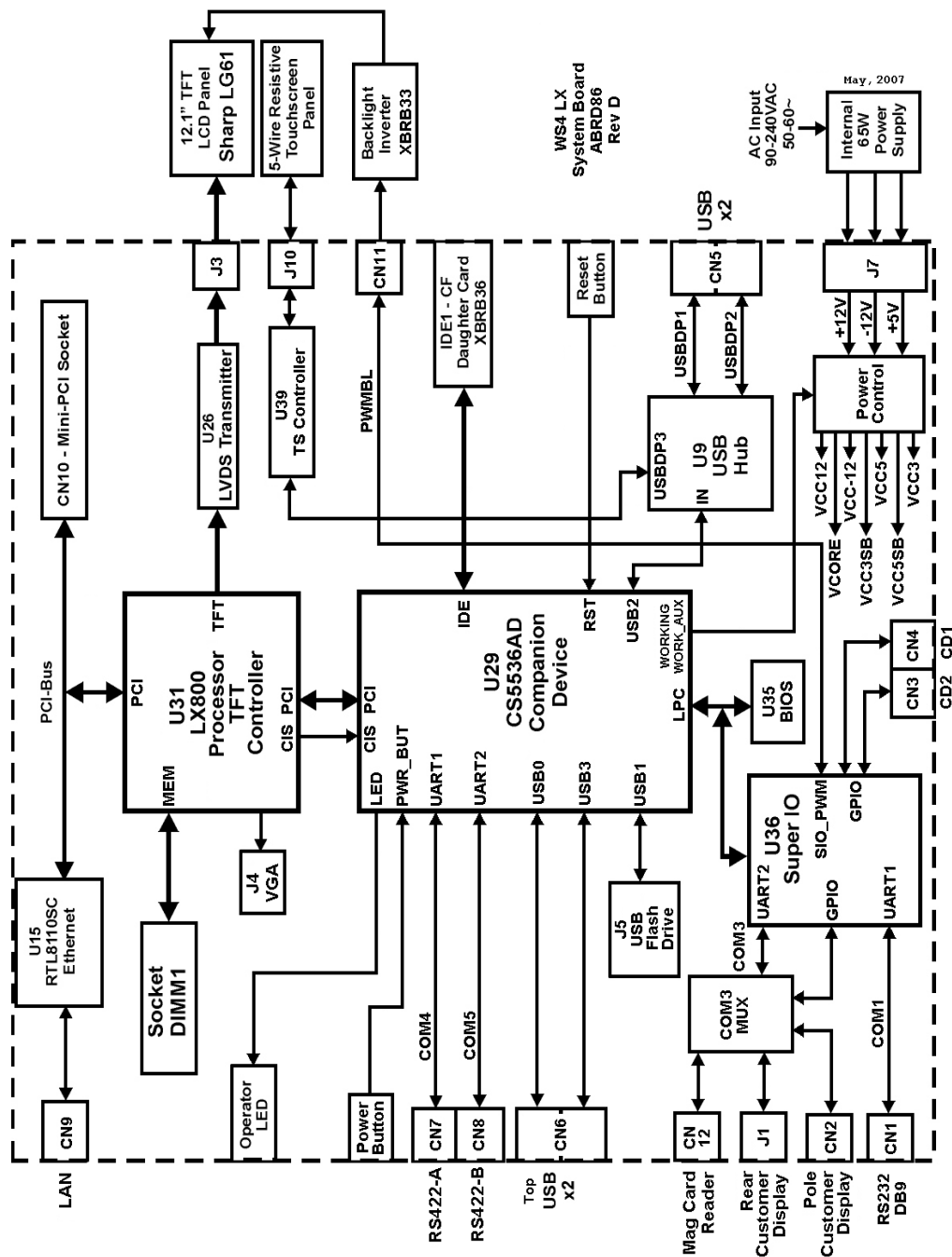


Figure 3-9: Workstation 4 LX Block Diagram

System Board Description

This section contains a description of the WS4 LX System Board block diagram shown in Figure 3-9.

AMD Geode LX800 Processor

The WS4 LX System Board includes U31, the AMD Geode Family LX800 Processor. The LX800 incorporates a 64-bit DDR SDRAM Memory Controller, 2D Video Processor and TFT Controller, and the GeodeLink Architecture.

Processor speed - 500Mhz.

Cache - Based on a split Instruction/Data/TLB (Translation Look-Aside Buffer).

- 64Kb Instruction
- 64Kb Data
- 128Kb L2 cache configured as Instruction or Data or both.

The Geode LX800 Processor contains the following functional blocks.

CPU Core

The x86 core consists of an Integer Unit, cache memory subsystem, and x87 compatible FPU (Floating Point Unit). The Integer Unit consists of a single issue 8-stage pipeline and all the necessary support hardware to keep the pipeline running efficiently.

The memory sub-system of the CPU core includes the instruction and data caches, translation look-aside buffers (TLBs), and an interface to the GeodeLink Interface Units (GLIUs). The cache and TLB subsystem supplies the integer pipeline with instructions, data, and translated addresses as necessary.

The supported instruction set is a combination of Intel's Pentium[®], and the AMD K-6[®] microprocessor and the Athlon[™] FPU, plus the AMD Geode LX processor model specific instructions.

GeodeLink Architecture

The following is a basic description of the GeodeLink architecture as implemented on the WS4 LX system board.

The LX800 Processor features Dual GeodeLink Interface Units (GLIU0 and GLIU1) for device interconnect. GLIUs are the heart of GeodeLink interface, featuring a built-in arbiter that enables dynamic allocation of memory bandwidth, with on-the-fly prioritization.

Together, GLIU0 and GLIU1 make up the internal bus comprised of the GeodeLink architecture. GLIU0 connects to the five modules with high bandwidth requirements, and GLIU1 connects to the five low bandwidth modules.

The GeodeLink architecture is generally invisible to the user or even a system programmer. GeodeLink configuration and support is handled by the WS4 LX BIOS by providing a *Virtual PCI Configuration Space* to abstract the architecture to industry standard interfaces. Through the Virtual PCI Configuration Space, all GeodeLink devices appear in one PCI multi-function configuration space header on the external PCI bus.

GeodeLink Memory Controller

The GeodeLink Memory Controller (GLMC) supplies all memory needs of the LX800. The GLMC is capable of handling multiple requests for memory data from the CPU core, the Graphics Processor, the Display Controller and the external PCI bus via the GeodeLink Interface Units (GLIUs). Contention for memory bandwidth between the various modules is minimized by extensive buffering logic. Because the GLMC supports the memory requirements of both the CPU core and display sub-system, it is classified as a Unified Memory Architecture (UMA) subsystem.

The WS4 LX System Board utilizes a single 184-pin DDR compatible DIMM socket, capable of supporting 1GB maximum.

2D Graphics Processor

The integrated LX Graphics Processor is composed of the following functional blocks.

The Graphics Processor (GP)

The Graphics Processor is based on the Graphics processor used in the Geode Processor, but adds the GeodeLink memory interface and other features to support improved performance and functionality.

The Display Controller (DC)

The DC module is similar to that found in the Geode GX processor line with additional hardware for graphics filter functions. It consists of a Graphical User Interface (GUI) block, a VGA interface block, and back-end filter/scaling. The GUI and VGA blocks share a single display FIFO and display refresh memory interface to the GeodeLink Memory Controller (GLMC).

The Graphical User Interface (GUI) Block is optimized for high resolution, high color depth display modes and provides all graphics functionality for the Microsoft Windows CE graphical environment.

The VGA controller block consists of an independent CRT controller and pixel formatting units and provides full hardware support for all VGA text and graphics modes. The VGA output is available at System Board connector J4.

The DC module retrieves graphics, video, and overlay streams from the frame buffer, serializes the streams, performs any necessary color look-ups and output formatting, then interfaces to the Video Processor for driving the display device.

The Video Processor adds video overlay features then forwards this information to the DAC (to generate the analog red, blue and green signals), and buffer the sync signals. The output of the DAC drives the TFT Controller block.

AMD Geode CS5536AD Companion Device

U29, the Geode CS5536 Companion Device is an IO expansion device specifically designed for use with the LX800, a processor with an integrated memory controller. The LX800 and CS5536 companion device communicate through a dedicated 66Mhz PCI Bus Interface.

The Geode Companion Device supports many LX System Board IO functions, highlighted below.

Serial Ports

The CS5536 includes two high-speed industry standard serial ports, assigned to the RS422-A (COM 4) and RS422-B (COM 5) ports. The UARTs are both 16550 and 16450 software compliant and supports baud rates up to 115.2 kbps.

USB Ports

The CS5536 supports four Universal Serial Bus (USB) 2.0 compliant ports, supporting low speed, full speed, and high-speed operation. All USB ports support wake-up events, and feature over-current and power control support. The ports can be enabled individually to react to over-current events. The ports are assigned as follows:

- USB Ports 1 and 4 - Assigned to IO Panel Connector CN6.
- USB Port 3 - Assigned to the system board USB Hub chip.
- USB Port 2 - Assigned to J5, the USB flash drive connector.

The on-board hub device, U9 provides three USB ports. Two of the ports are assigned to IO connector CN5. The third port is assigned to U39, the USB Touchscreen Controller.

ATA Controller

The Geode companion device ATA controller is compliant with the ATA-5 specification, often referred to as ATA/66. This includes a fully buffered UDMA 0-4 mode IDE Interface.

The IDE Interface is a single channel supporting two devices that can operate in PIO modes 1 to 4, MDMA (Multi-DMA) modes 0 to 2, or UDMA modes 0 to 4, at speeds up to 66 MB/s. The ATA controller pins are multiplexed with an industry standard Flash interface, but this feature is not used. The WS4 LX System Board uses the ATA controller for the Compact Flash Card.

Low Pin Count (LPC) Interface

The Low Pin Count Port (LPC) provides an industry standard interface based on Intel's LPC Interface Specification Version 1.0. The LPC interface supports memory, IO, DMA, and Intel's Firmware Hub Interfaces.

On the WS4 LX board, Super IO U36 and EEPROM U35 reside on the LPC Bus, along with debug connector J9. The Companion device is configured through strapping options to boot from BIOS EEPROM U35.

The Super IO, a Winbond W83627HF, provides two high-speed serial ports, hardware monitor, keyboard controller, and several General Purpose IO (GPIO) lines.

Real Time Clock (RTC) and CMOS RAM

The Geode CS5536 companion device includes a real time clock for system timekeeping. Powered by a system board battery BAT1, the clock maintains timekeeping when system power is not available. The RTC maintains registers for seconds, minutes, hours, days (day of the week and day of the month), months and years. The timing reference is provided by crystal Y4.

The CMOS RAM, also maintained by BAT1, consists of 242 bytes of static CMOS RAM, and used to store BIOS configuration settings and other system parameters.

System Management Bus (SMB)

The SMB is a two-wire synchronous serial interface compatible with the System Management Bus physical layer. It is designed to support a number of devices such as EEPROMs, Super I/Os, and DIMMs.

For example, at start-up the BIOS uses the SMB to read the contents of the SPD EEPROM on the DIMM to determine the size and memory bus speed requirements of the device.

General Purpose IO (GPIO)

The GPIO consists of up to 28 pins that can be independently dedicated to input or output functions as required by the needs of the system board circuitry.

For example, GPIO pins on the companion device are assigned to power button, power management, and control pins to manage the RS422-A and RS422-B communications ports.

Power Management Controller (PMC)

The PMC controls all aspects of system power management. It is compatible with industry standard power management capabilities as defined in the Advanced Configuration and Power Interface (ACPI) V2.0 specification.

USB Flash Drive/Compact Flash Storage Architecture

The WS4 LX mass storage architecture consists of a USB flash drive to house the Windows Embedded CE 6.0 Operating System and platform files, and a Compact Flash (CF) card to store a copy of the system registry, POS application, and optional SAR totals. The USB based flash drive is considerably faster than the ISA based M-Systems Disk On Chip used in original WS4.

The Compact Flash Card is accessible from the IO Panel where it can be used as 'personality' module, allowing it to be moved to another unit in the event of malfunction.

Ethernet Port

The WS4 LX System Board uses a RealTek RTL8110SC 10/100/1000 Ethernet Controller coupled to an industry standard 8-pin modular connector.

BIOS

The W4 LX BIOS is based on General Software's Embedded 2000 BIOS.

A more detailed discussion of the BIOS and supported operating systems can be found in Chapter 1.

LCD/Touchscreen and Mag Stripe Reader Assembly

Figure 3-10 shows a rear view of the top cover. In addition to the Backlight Inverter and Mag Stripe Reader assembly, the top cover houses the 5-wire resistive touchscreen and Sharp LCD Panel.

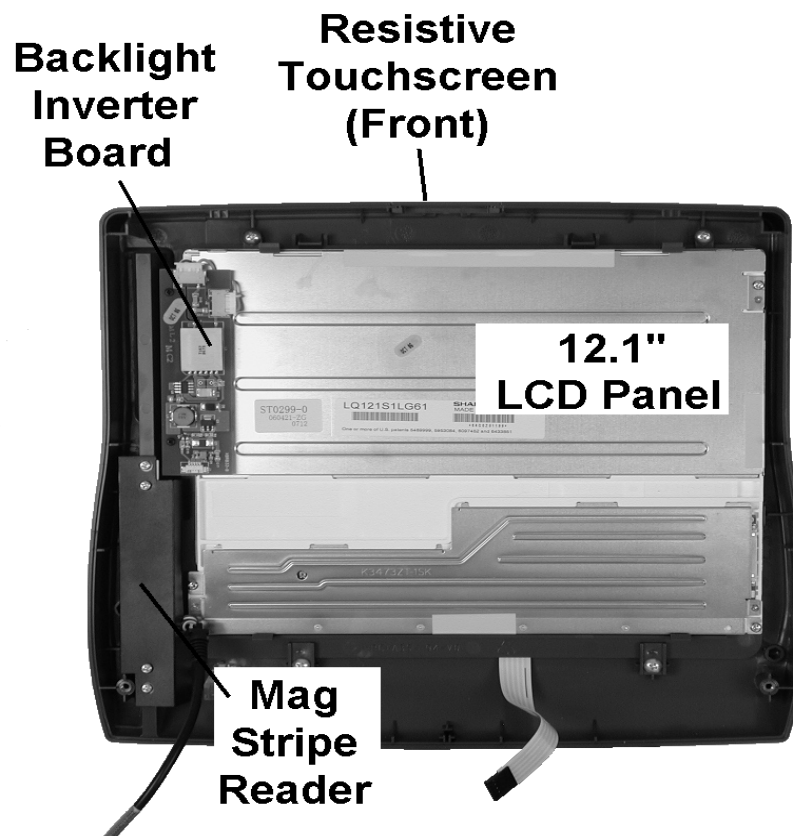


Figure 3-10: WS4 LX Top Cover Assembly

What's Inside?

LCD/Touchscreen and Mag Stripe Reader Assembly

LCD

The 12.1" Sharp LCD operates at a fixed resolution of 800x600. The WS4 LX currently uses the LQ121S1LG61 panel.

5-Wire Resistive Touchscreen

Sandwiched between the plastic cover and LCD panel is a 5-wire resistive touchscreen. A gasket between the touchscreen glass and top cover affords some resistance to moisture or spillage.

Backlight Inverter Board

The Backlight Inverter Board is mounted to the LCD bracket. The board receives +10.4VDC and a Pulse Width Modulation (PWM) signal from the system board to control backlight brightness.

Magnetic Card Reader

The 3-track serial interface magnetic card reader assembly is mounted in the mag stripe channel on the top cover with two brackets. The interface cable attaches to a modular connector located on the system board. The mag card reader cover is shaped in the form of a trough to divert liquid spills into a slot in the base, away from the system board.

Hardware Updates

This section includes procedures for installing the optional wireless card kit and removing/replacing some System Board components.

USB Flash Drive

This section provides instructions for removing and replacing a USB flash drive.

USB Flash Drive Removal

1. Remove the System Board RF Shield.
2. Refer to Figure 3-11. Use a pair of needle nose pliers to pinch the stand-off and remove the device from J5.

Stand-Off

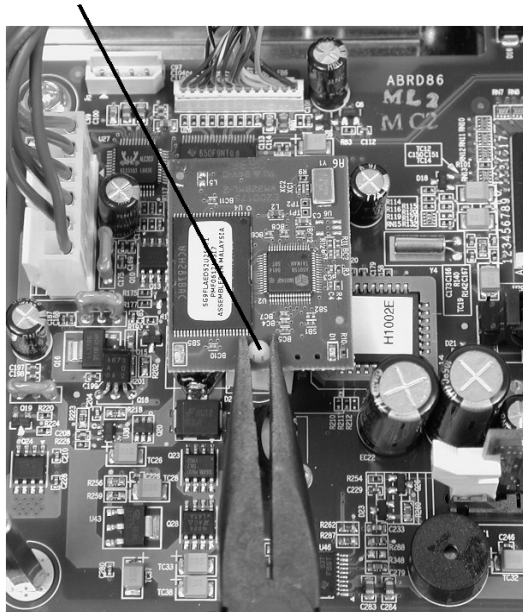


Figure 3-11: Removing the USB Flash Drive

USB Flash Drive Installation

1. Note the key arrangement on the USB flash drive connector and the Yellow 2x5 system board connector, J5. Refer to Figure 3-12, and install the USB flash drive. Make sure the stand-off projects through the hole in the board.

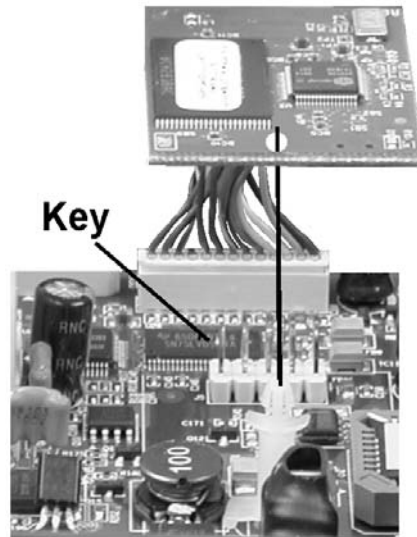


Figure 3-12: Installing a USB Flash Drive

2. Make sure the USB flash drive is seated properly on J5, as shown in Figure 3-13, below.



Figure 3-13: Checking the USB Flash Drive Orientation

CF Daughter Card

The CF Daughter Card and bracket is mounted to the base and system board with three screws. You may remove the CF card prior to removing the daughter card, but this is not required.

Removal and Installation

1. Remove the WS4 LX Cover.
2. Remove the LX system board RF shield.
3. Locate the CF Daughter card and remove the screws shown in Figure 3-14.

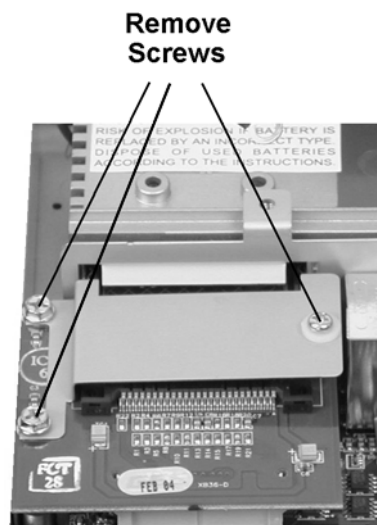


Figure 3-14: Removing the Compact Flash Daughter Card

4. Lift up on the daughter card to remove it from its system board socket, then pull it slightly forward to allow the CF socket to clear the I/O panel bracket.
5. To reinstall the daughter card, position it to allow the CF card to project through the slot in the I/O bracket. When the holes in the daughter card are positioned over each stand-off, press the card down to seat it in system board socket J4. Reinstall the bracket and install the screws.

Optional Mini-PCI Wireless Card

The WS4 LX system board includes a Mini-PCI socket to accommodate a 802.11a/b/g compatible wireless kit. The kit includes the Mini-PCI wireless card, antenna, and antenna mounting hardware.

Installation

1. Remove the RF Shield that covers the System Board. The Mini-PCI card slot is CN10.
2. Attach the antenna connector to the IO Panel. Use the nut and lock washer shown in Figure 3-15. Fasten securely.

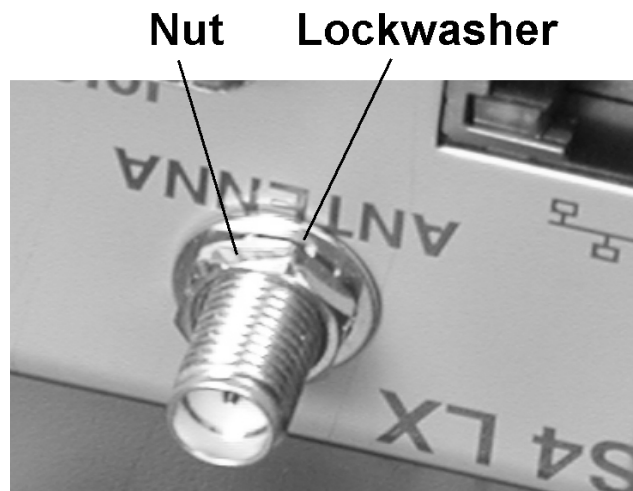


Figure 3-15: Mounting the Antenna Connector to the IO Panel

3. Observe the notch and begin by inserting the card at a 30 degree angle relative to the socket as shown in the top left of Figure 3-16. When the card is fully inserted, rotate it down until the side rails lock the board in place as shown in the middle of Figure 3-16. Finally, attach the antenna lead to the 'Main' terminal on the wireless card.

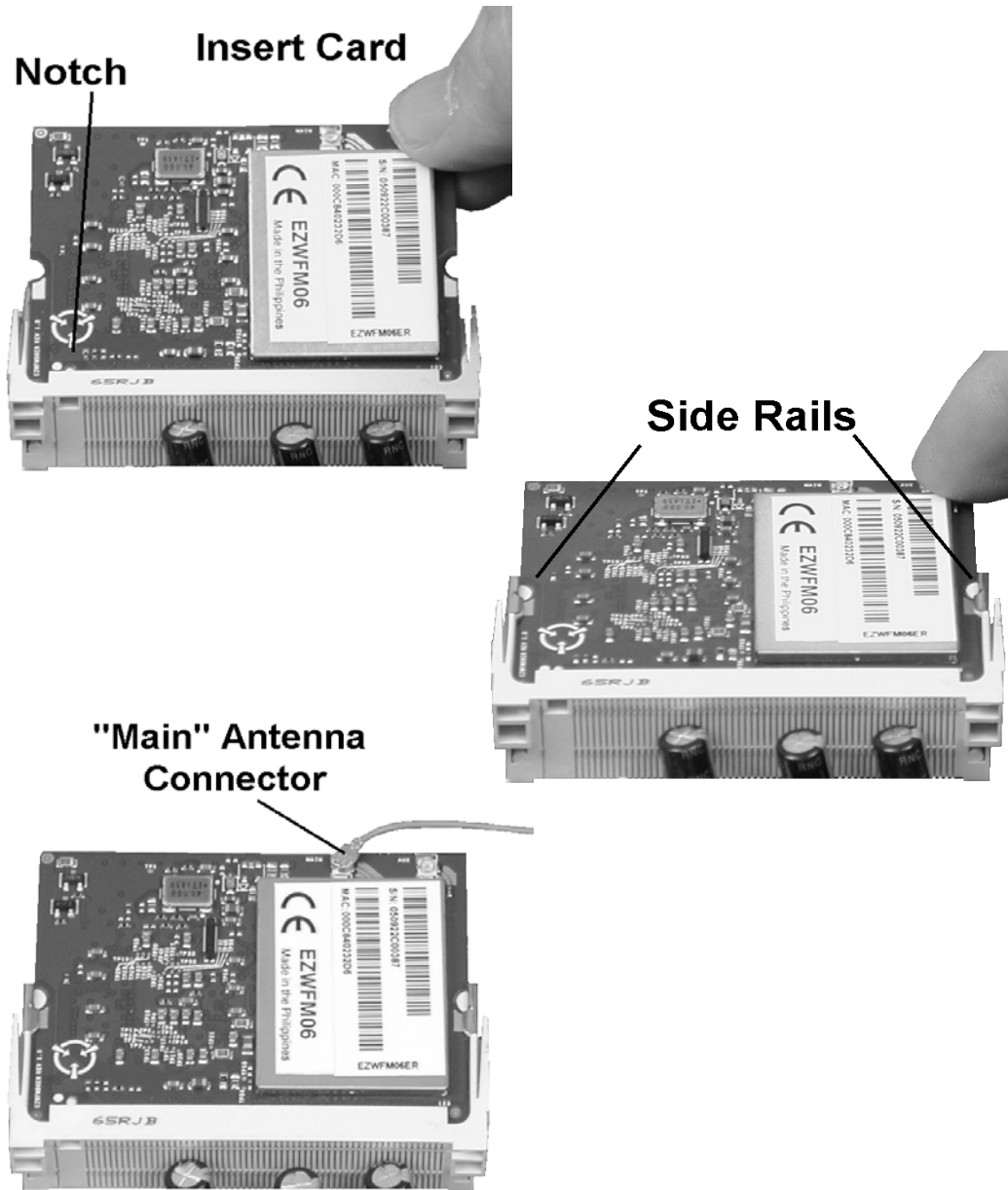


Figure 3-16: Inserting the Mini-PCI Card in the Socket

- To remove the card, release the socket side rails. It will flip up to a 30 degree angle where it can be removed.

Customer Display

The WS4 LX supports several types of Customer Displays. It can automatically detect and use each type.

IEE 2x20 Vacuum Fluorescent Display (VFD)

One supported display is the pole mount IEE 2x20 VFD, available in two versions, each with different pole lengths. It is not available as an integrated unit and cannot be used with the LCD Customer Display described below. MD0000-101 describes how to install these displays.

When you connect the VFD to the unit, be sure the power switch is off. When you power up the unit, it will automatically detect the VFD.

LCD Customer Display

The second optional display is called the LCD Customer Display. It is available in both integrated and pole versions and is not compatible with the VFD customer display. Installation details for the LCD customer display can be found below.

Rear Customer Display

The following procedure describes how to attach the Rear LCD Customer Display to the case and connect it to the system board cable. The display is provided as a complete assembly, ready to install.

1. Remove the AC power cable (if installed), then remove the top cover.
 - The interface cable is pre-installed on the System Board.
2. Connect the LCD Display Assembly to pre-installed interface cable as shown to Figure 3-17.

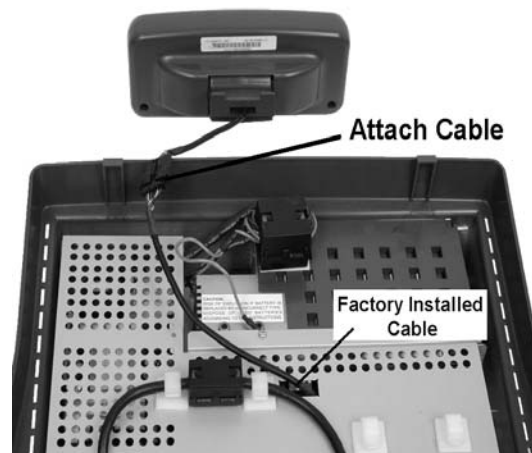


Figure 3-17: Connecting the LCD Customer Display

3. Remove the logo plate from the cut-out at the rear of the top cover.
4. Place any excess cable inside the workstation.
5. Orient the LCD assembly as shown in Figure 3-18, placing the hinge assembly in the cut-out and fitting the top cover to the base.



Figure 3-18: Installing the Rear Customer LCD

6. Fasten the pair of screws on the underside of the workstation.
The WS4 LX will automatically detect LCD Customer Display when you power up the unit.

Pole LCD Customer Display

This procedure describes how to assemble and connect the Pole LCD Customer Display to the WS4 LX. The pole version is provided as a kit consisting of the LCD Display Assembly /w 5 ft. cable, pole, base, extension cable, and nut. Due to the varying thickness and materials used for a given counter surface, the installer must provide the base mounting hardware.

1. Use the base as a template to locate the mounting holes in the counter surface.
2. After mounting the pole display base to the counter surface, route the extension cable through the pole and connect the LCD assembly cable.
Figure 3-19.

3. Mount the LCD assembly to the pole, position the display head in the desired position and use a 1mm hex wrench to lock the display in place.

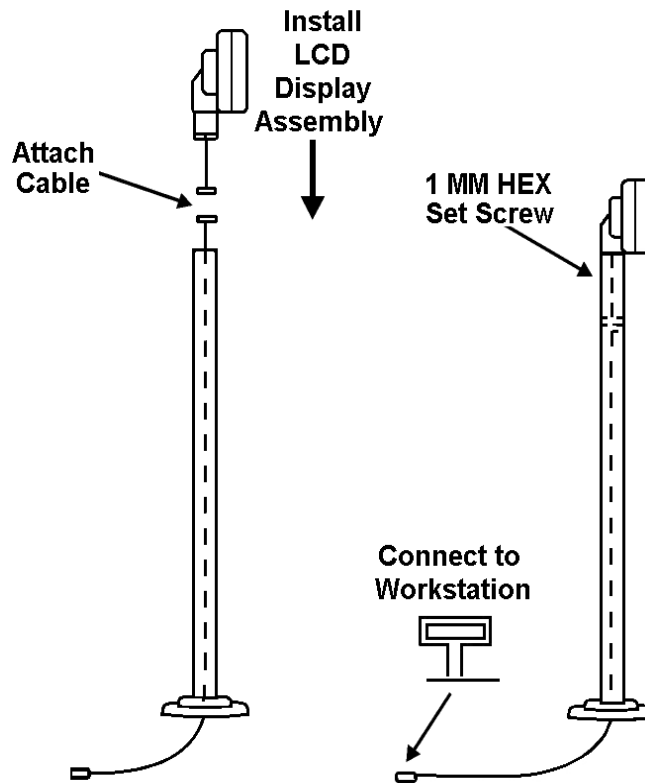


Figure 3-19: Assembling the LCD Pole Display

4. Figure 3-20 points out the location of the Pole Display connector. Power-off the WS4 LX and attach the keyed 4-Pin connector on the cable to the Customer Display Connector on the WS4 LX IO Panel.

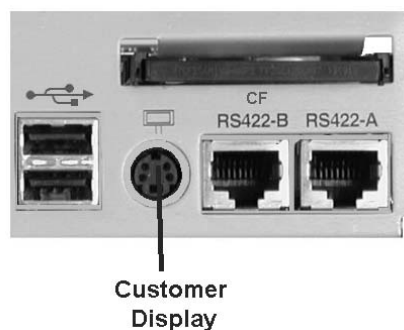


Figure 3-20: Connecting the Pole Display to the WS4 LX IO Panel

The WS4 LX will automatically detect LCD Customer Display type when you power up the unit.

Reassembling the WS4 LX

1. Make sure the AC input cable is disconnected from the unit.
2. Reinstall the RF Shield. Figure 3-21 shows the details.
 - o Place the AC input cables in the cutout at the rear of the shield as shown on the left.
 - o Route the optional customer display cable through the opening at the center of the RF shield.
 - o Route the LCD cable through the opening on the top left of the shield. Reinstall the torroid on the cable and place the torroid/cable in the holders as shown.
 - o The touchscreen extension cable should project from the opening in the front of the shield and the backlight cable should exit the shield through the cut-out on the right side.

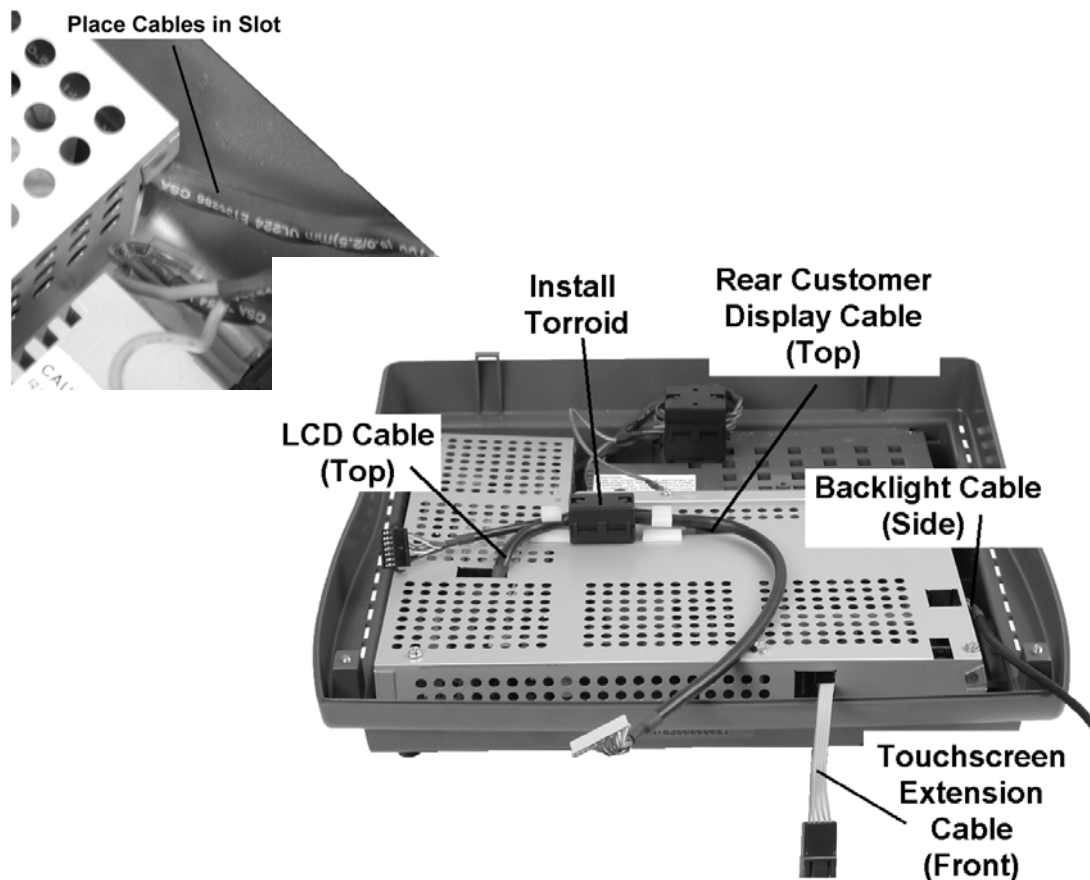


Figure 3-21: Routing cables through the RF Shield

3. Fit the RF shield in place over the power supply and system board.



WARNING:

Before continuing, take a moment to ensure the shield is fitted to the *outside* of the power supply tray, in particular, the area near the *power supply AC fuse and input cables*.

4. Fasten the RF shield screws. Figure 3-22. Be sure to install the ground wire fastened with left rear shield screw.

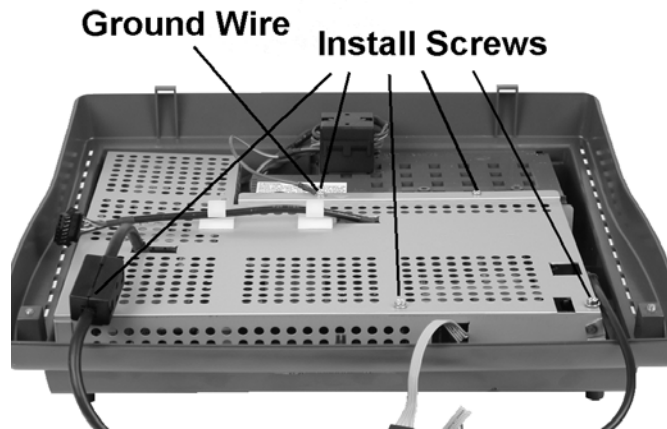


Figure 3-22: Securing the RF Shield and Fastening the AC Ground Wire

5. Position the top cover directly in front of the base.

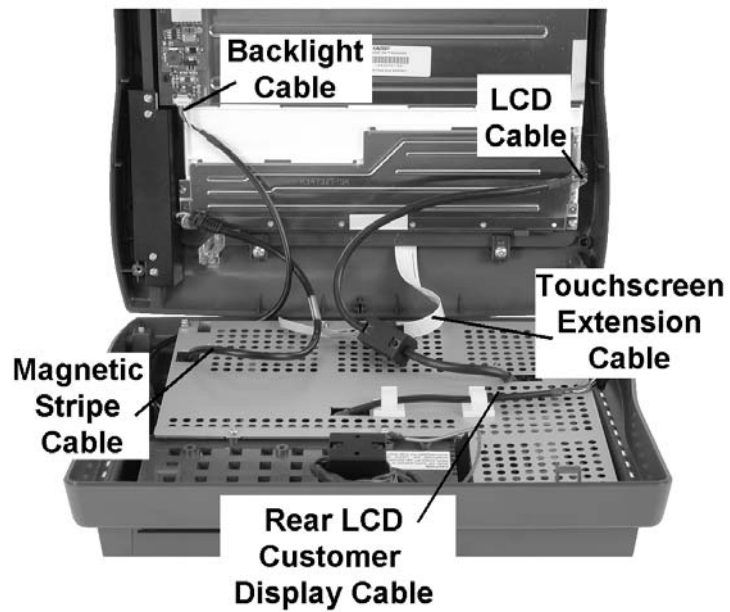


Figure 3-23: Connecting Cables to the Top Cover Components

6. Connect the following cables to the top cover.
 - Touchscreen ribbon cable to the keyed extension cable projecting from the front of the shield.
 - Insert the modular connector on the Mag Stripe Reader Cable through the cut-out in the shield and attach it to the system board connector.
7. Tighten the cover screws to secure the top cover to the base.

Installing and Operating the Workstation 4 LX

This chapter describes how to install and the operate the Workstation 4 LX.

In this chapter

Care and Handling	4-2
The IO Panel	4-5
Installation	4-7
Operation	4-9
Personality Swap.....	4-16

Care and Handling

Following are some considerations for placement of the workstation and related peripheral equipment.

Equipment Placement

To ensure proper operation of the WS4 LX, consider the following guidelines for placement of the unit.

Before you decide on the space each device should occupy or if you plan to provide custom enclosures, refer to the dimensional data for the workstation and peripheral printers found in Appendix A of this manual.

Location

- Appendix A contains dimensional drawings of the unit and peripheral equipment.
- Locate all equipment so that it is accessible to service personnel.
- Tile is the recommended floor surface for areas surrounding the workstation. If the floor covering adjacent to the equipment is carpeted, an anti-static grade is recommended.
- If the carpeting surrounding the area containing the equipment is not composed of anti-static material, the use of static-discharge mats should be considered. An anti-static mat incorporates a grounding clip with a cable to provide a discharge path to ground.

Proximity to Foreign Materials



WARNING:

Do not use sharp objects such as a pen or pencil to press keys on the touchscreen as this could damage the sensing layer. Liquid spillage can cause damage to the circuits in the unit. Do not place the equipment near food preparation areas, dish racks, or water stations. The LCD includes a gasket seal around the touchscreen which may afford some protection from liquid spillage.

If any type of liquid is spilled onto the touchscreen or on the top of the unit, turn off power as quickly as possible by removing the AC power cord from the wall plate. Do not reconnect the AC power cord to an outlet until it has been determined that no spillage remains inside the unit.

Noise Induction

In addition to the AC Power Requirements outlined in Chapter 3 or the appropriate Site Preparation Guide, other sources of electromagnetic interference must be eliminated to ensure trouble-free operation of the equipment.

- Noise radiating from the AC power lines throughout a site can be absorbed by MICROS AC power and communications cables and induced in to the equipment. Consequently, no exposed cable dedicated to the MICROS equipment should be run in the vicinity of any AC power lines.

Electrostatic Discharge (ESD)

The occurrence of electrostatic discharge (ESD) usually takes the form of a discharge from the operator's hand to cash drawers, the workstation, the magnetic stripe card reader or other peripherals connected to the workstation.

ESD is more common in dry climates during the winter, and less common in moist climates. The workstation has excellent built-in immunity to ESD in most environments. However, tile or anti-static carpet should still be employed in areas near the workstation.

Temperature and Humidity

The WS4 LX can operate in temperatures between 32°F and 113°F (0°C to 45°C). A constant humidity between 40% and 90% is required for proper operation of the equipment.

Before applying power to the unit, ensure that its temperature is within 15°F (8°C) of room temperature to prevent damage to the LCD or internal circuitry.

To maintain the internal temperature of the equipment at specified levels, adequate ventilation is required. Consequently, the equipment must not be mounted in an enclosure that could impede airflow to any side of the workstation. A three sided (front and back open) enclosure with 4 inches of clearance on all sides is acceptable.

AC Power and Data Cabling Requirements

AC Power and ground cabling, Ethernet, and MICROS IDN data cabling should be installed in accordance with the appropriate MICROS Site Preparation Guide.

Cleaning the Workstation 4 LX Touchscreen and Cabinet

Instructions for cleaning the cabinet and LCD/Touchscreen are described below.



SHOCK HAZARD

Always turn the unit off and remove the AC cable before cleaning or performing preventive maintenance.

LCD/Touchscreen

The touchscreen surface can be cleaned using any common household glass cleaner applied with a clean cotton cloth. Always spray the cloth with the cleaner and then use the cloth to clean the touchscreen.

Cabinet

Always use a chamois or clean lint-free cloth to clean the cabinet and touchscreen surface. Do not use chemical, alcohol, or petroleum based cleaners that are not recommended for plastics.

Magnetic Card Reader

Depending on how much they are used, magnetic card readers may require periodic cleaning. MICROS recommends cleaning the heads once a day if the reader is subjected to heavy usage.

Cleaning kits are available from a variety of sources including MICROS using P/N 600439-003 and P/N 600439-004. Be sure to follow the instructions supplied with the cleaning kits.

The IO Panel

Figure 4-1 shows the rear mounted Workstation 4 LX Connector Panel.



Figure 4-1: Workstation LX 4 I/O Connector Panel

The most obvious difference between the WS4 and the WS4 LX is the addition of two USB ports replacing the PS/2 mouse and keyboard ports. In addition, the I/O Panel markings are blue to help distinguish it from the original WS4.

ANTENNA

This location is reserved for an SMA female RF connector, part of the optional wireless card kit. The kit includes an 88mm (4 1/2") flexible antenna that attaches to the RF connector.



Ethernet

The WS4 LX system board includes a 10/100/1000 Ethernet Controller with a UTP modular connector. The modular connector features an integrated isolation transformer and a pair of indicators LED#1 and LED#2, to indicate link speed and status. When LED#1 is Green, this indicates a 100Mbit connection. When LED#1 is Orange, this indicates a 1Gbit connection. When LED#2 is Green, this indicates a 10Mbit connection.

IOIOI RS232

This industry standard DB9 male connector is used to support a serial printer if supported by the POS application.



USB

The Workstation 4 LX IO Panel includes four USB ports, grouped in two pairs. One pair of connectors replace the PS/2 mouse/keyboard connector on the original WS4. All ports are USB 1.1 compliant, (full speed and low speed) or USB 2.0 compliant, capable of supporting high speed operation.

Cash Drawers 1 and 2

These connectors support MICROS approved cash drawers with MICROS DIN style connectors.



Customer Display

This connector supports a pole mount Customer Display. See chapter 1 for more information about supported devices.

Compact Flash (CF)

The Compact Flash Card (CF) is factory populated on a daughter card in the Windows Embedded CE 6.0 configuration, and is accessible from the I/O Panel. In a compromise between security and accessibility, the CF card is protected by a bracket fastened to the case with two hex screws.

After the WS4 LX is installed and in operation, the CF card contains the ‘personality’ of the WS4 LX, storing a copy of the Windows CE registry, as well as the POS application and optionally SAR totals. See the Memory Architecture in Chapter 1 for more details about how the CF card is utilized.

How to use the Compact Flash (CF) Card

If you have not used a CF card before, take a moment to familiarize yourself with this device.

- The CF Card must be installed for Windows Embedded CE 6.0 configurations or the WS4 LX will not start. A POST error will occur. See Chapter 4.
- Never remove or insert the CF card when the AC power is connected.
- The CF card is a keyed device - but it is possible to force it into its socket the wrong way. When properly oriented, very little force is required to insert the card. See Figure 4-8 for more information.
- If you purchase CF cards, MICROS recommends that you use extended temperature range devices.

RS422-A (COM4) and RS422-B (COM5)

This pair of multi-purpose ports can be configured through application software as either full-duplex RS422 ports capable of supporting MICROS IDN printing devices or two wire RS232 ports.



WARNING:

Do not insert a 6-Pin modular plug into the 8-Pin RS422-A and RS422-B connectors. A 6-Pin plug can push some pins out of position where they can short to the connector shell and possibly damage the IDN and or RS232 Interface. Always use an 8-Pin modular plug when you connect IDN printers or RS232 peripherals to the workstation

Installation

This section discusses the recommended method of cabling the workstation when used with the Adjustable Stand.

Cabling the Workstation

This procedure describes how to cable the WS4 LX and attach it to the optional adjustable stand.

Attach the AC Power cable to the AC input connector. Secure it to the 'cable cleats' with a pair of tie wraps as shown on the left side of Figure 4-1. The AC cable is somewhat heavier than most peripheral cables and will serve as the 'strength member' for the entire bundle.

1. Connect each peripheral cable to the appropriate I/O connector. Bundle each peripheral together with the AC power cable and attach two tie wraps to the bundle as shown on the right side of Figure 4-1.

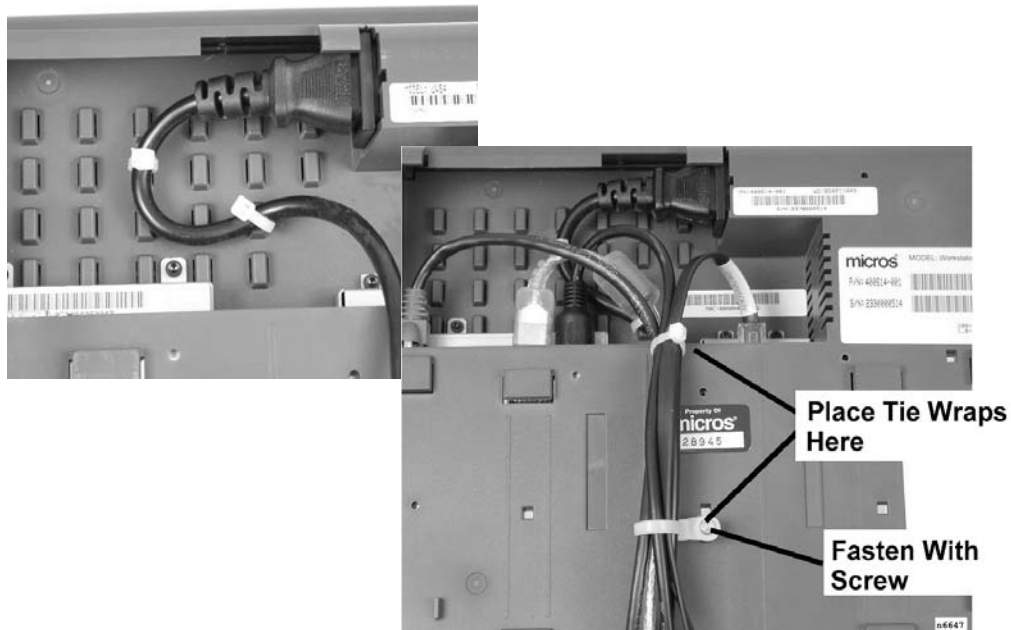


Figure 4-1: Securing the AC Power Cable and Bundling the Peripheral Cables

Figure 4-1 shows two tie wraps. The tie wrap shown in the upper portion of the illustration near the IO panel must be installed as shown to prevent the cable bundle from interfering with cut-outs in the stand when you attach it. The second tie wrap is supplied with the stand and must be fastened to the bottoms of the case with the screw supplied.

2. Line the four inside plastic hooks on the workstation with the four rectangular holes on the stand and place the unit on the stand as shown in Figure 4-2. The workstation will slide down and lock into place.

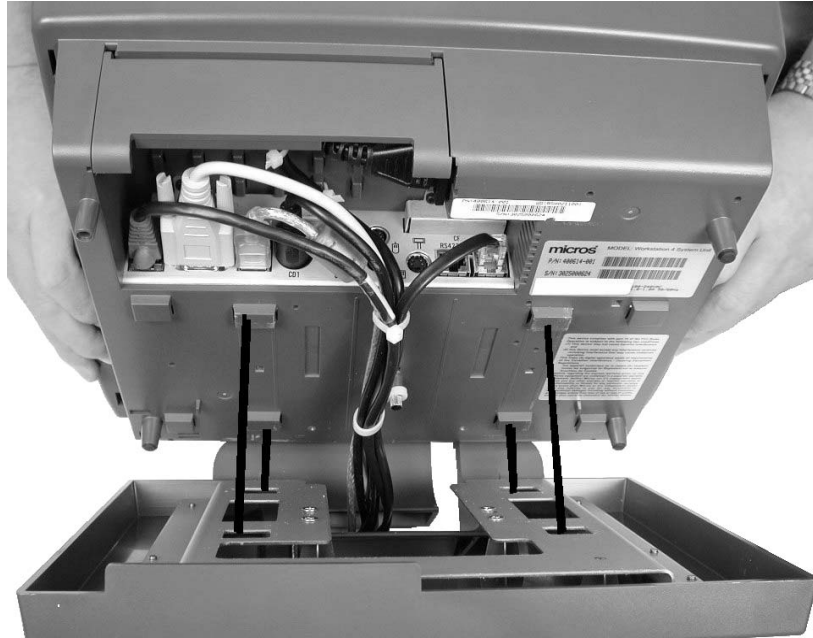


Figure 4-2: Attaching the Workstation to the Adjustable Stand

3. Tilt the workstation to the fully reclined position and install the pair of thumbscrews supplied with the stand to secure it to the workstation. Figure 4-3.

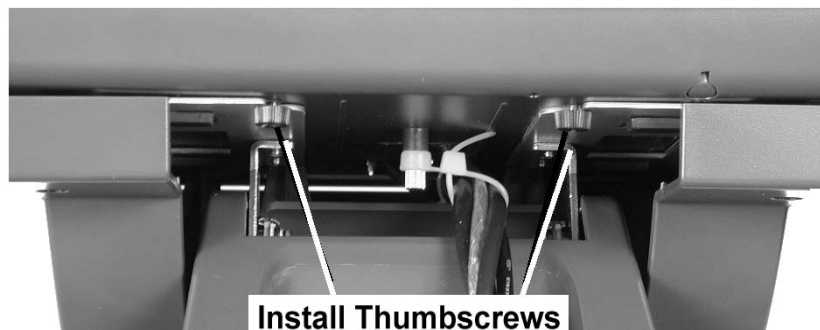


Figure 4-3: Securing the Workstation to the Adjustable Stand

4. Place your peripherals near the workstation and attach cables as required.
5. Connect the AC power cord to an electrical outlet installed in accordance with the appropriate site prep guide.

Operation

This section presents operational procedures for the Workstation 4 LX including how to use the Power Button to transition the unit between the **NOPOWER** and **ON** power states.

Figure 4-4 points out the location of the Workstation 4 LX Power Button, Operator LED, Magnetic Card Reader, and the Operator LCD.

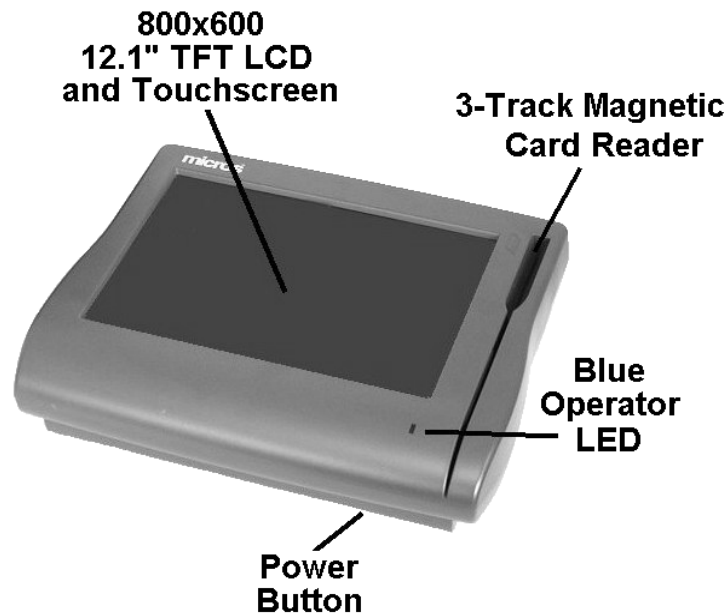


Figure 4-4: Workstation 4 LX Operator Features

Operator LCD

The Operator LCD is an 12.1" Active Matrix Display with a resolution of 800x600. The 5-wire resistive touchscreen glass is positioned over the LCD.

Power Button

The power button is used by the operator to transition the Workstation 4 LX between the **ON** and **NOPOWER** power management states.

Operator LED

The Operator LED is solid Blue while the workstation operates. The Blue LED differentiates the WS4 LX from the Green LED on the original WS4.

Internal Beeper

A Beeper is located inside the workstation to provide information to the operator about the Workstation's status.

Turning the Workstation from NOPOWER to ON

This section describes how to start the workstation and displays examples of typical start-up screens as the unit starts up.

When the WS4 LX is in the **NOPOWER** state, the Operator LCD and LED will be off. See Chapter 1 for a complete description of the supported power management states.

1. Be sure the workstation is connected to AC power.
2. Press the power button, then release it.
 - The Operator LCD displays the BIOS splash screen similar to that shown in the upper half of Figure 4-5. The BIOS version is reported at the top left corner. Three icons appear at the bottom left to track the progress of the POST.
 - The Operator LED is flashing.
 - Behind the scenes, a pre-boot firmware application is checking the CF Card, looking for the NK.BIN file or HMLTON.BIN binary files as part of an Operating System or BIOS upgrade.



Figure 4-5: Workstation 4 X BIOS Splash and Boot Screen

- In most cases, the NK.BIN and or BIOS binary file(s) are not present, and the message 'NK.BIN not found on CF,' appears on the first line. This is not an error message - the pre-boot firmware application that handles operating system upgrades is stating that the upgrade file is not present and continues with the boot process.
If the NK.BIN and or HMLTON.BIN files are present on the CF card, the pre-boot firmware application displays the appropriate information, but you do not see the 'Black Border' displayed by the original WS4 when an operating system update takes place.
- The prompt 'Loading Windows CE' appears, followed a series of dots that progress across the screen as the Windows Embedded CE 6.0 kernel and operating system drivers load.
- After several more seconds the screen clears, the LED stops blinking and turns solid Blue, and the Windows Embedded CE 6.0 Desktop appears.
- The MICROS Client Application Loader (CAL) starts. If a POS application is already installed, the CAL starts it. If a POS application is not installed, the CAL presents a User Interface and proceeds to look for CAL server as previously described.
- If the WS4 LX boot splash screen does not appear, or Windows Embedded CE 6.0 does not start, refer to Chapter 4 for troubleshooting information.

Turning the Workstation from *ON* to *NOPOWER*

The WS4 LX must be powered down with the power button, not from within Windows Embedded CE 6.0.

1. Press and hold the power button about four seconds. The Operator LED changes from solid Blue to OFF and the LCD is blank.

Starting the Workstation for the First Time

When a new workstation is powered up for the first time, the CAL starts and examines the persistent registry and determines that a POS application is not installed. CAL presents its User Interface (UI) and proceeds to search the network for a server running the CAL service. When contact is established, a list of CAL servers are displayed. Note: Specific CAL Server and Application software versions are required to support the WS4 LX hardware. See Chapter 1 or the WS4 LX PMA for a complete list.

1. Double click the server entry. This will connect you to the device database and display a list of pre-programmed Workstation 4 LXs. See your application programming documentation.
2. Select your Workstation 4 LX from the list. Double-click the entry.
 - Each workstation in the database is pre-programmed with a workstation name, IP address, and other application related settings.
 - If the version of the CAL on your workstation is older than the version of CAL on the server, CAL will first update itself and reboot before proceeding to download the application.
 - The Workstation proceeds to download the application 'package' to the CF card, updates the registry and reboots when complete. After this restart, the CAL automatically starts the application.

Using the Magnetic Stripe Card

The Workstation 4 LX Magnetic Stripe Reader is mounted on the right side of the top cover as shown in Figure 4-6, below. A symbolic representation of how the card should be inserted is embossed on the cover. Figure 4-6 shows how to insert the card and pull it through the reader slot past the reader head.



Figure 4-6: Using the Magnetic Card Reader

Tips for using Magnetic Cards

Magnetic cards should always be kept dry, and away from magnets or sharp objects that could damage the encoded information on the card. If a mag card is damp or wet, or appears damaged in any way, DO NOT insert into the reader.

If the unit does not read the mag cards consistently, the read head may be dirty or contaminated. A cleaning card can be used to clean the reader head. This type of card has a felt strip in place of the magnetic stripe which cleans the head as it is swiped through the reader.

The Enhanced Screen Saver and Backlight Utility

The Workstation 4 LX includes a new version of the Windows CE Screen Saver Utility that adds the ability to control the LCD Backlights. Both the screen saver and backlight control features are enabled by default. LCD backlight control improves backlight longevity.

After five minutes of inactivity, the screen saver engages and displays the Workstation 4 LX logo. If the workstation remains inactive for another 20 minutes, the LCD backlights turn off. The Operator LED remains solid Blue. Touching the screen or swiping a magnetic card through the reader restores the backlights. Moving a mouse or touching a key (if attached) will also restore the backlights.

Using the Enhanced Screen Saver and Backlight Utility

1. Select Start -> Settings -> Control Panel, locate and select the 'Screen Saver' icon.
 - To disable the screen saver and backlight control, open the Screen Saver Properties Window and remove the check mark from the 'Screen Saver is Active' check box, then press 'Apply' to continue.

Load a Custom Bitmap

You can load a custom logo, but the file type must be BMP.

- Start the Screen Saver Applet. Locate the [Browse] button, click and navigate to the location where the bit map is stored. We recommend you store this file in the Srcnsaver folder. After loading the custom bitmap, be sure to touch [Apply], then [OK] to preserve the changes to the registry.



NOTE:

The screen saver preserves all settings in the registry. If you use the WCF utility to wipe the registry, erase all files, and/or format the CF card, the screen saver will return to the default configuration as described above.

Calibrating The Touchscreen

Calibrating the touchscreen is the process of aligning the touchscreen glass with the underlying video display.

When to Calibrate the Touchscreen

- When installing a new workstation.
- Any time the cursor does not follow the movement of your finger, or does not reach the edges of the touchscreen.
- If the LCD panel or touchscreen glass has been replaced.
- After Performing a workstation 'ID' or personality swap.

Tips for Calibrating the Touchscreen

- Perform the calibration procedure in the position (sitting or standing) that the workstation is normally used.
- Face the Touchscreen directly. If the workstation is on the adjustable stand, adjust it to the optimum viewing angle.

Procedure

1. Locate the 'Elo Calibration' icon on the desktop and double-touch to start.
 - The calibration screen appears with a target located at the upper left area of the screen. The calibrate process will terminate within 20 seconds if you do not touch the screen.
2. Position your fingertip precisely over the target, touch and lift. Touch each target indicated.
 - The message appears: 'Touch the Screen. Does the cursor follow your finger?'
3. Make sure the cursor follows your finger at each corner of the screen. Press [Yes] to complete the calibration procedure or [No] to run the calibration utility again.

Personality Swap

The following procedure describes how to remove the Compact Flash personality card from an inoperative WS4 LX and install it in a replacement WS4 LX. This procedure is provided for reference only, as the CAL can be used to easily configure a replacement workstation, especially in situations where totals need not be preserved.

Tools Required

- 2.5mm hex wrench. Included with each unit.
- Small or Medium Wire Cutters. Most installations use tie wraps to secure cables to the cable cleats at the I/O panel. These tie-wraps must be removed before a workstation can be replaced.

Procedure:

1. Remove all cables from the inoperative workstation's I/O panel including the AC Power Input.
 - It may be helpful to create a diagram of where each cable is connected as you remove it.
 - If a cable is fastened to the cable cleats with tie-wraps, use the wire cutters to clip them.
 - If the WS4 LX is mounted to the adjustable stand, remove (but do not cut) the tie wrap fastened with a screw to the base of the unit. This and other tie-wraps used to bundle the cables can be re-used.
2. Place the inoperative unit face down on a counter surface to access the Personality Card bracket. Figure 4-7.



Figure 4-7: WS4 LX Personality Card Location

3. Insert the hex wrench into the bracket screws and turn it counter clock-wise to remove each screw.
4. Remove the bracket. Set the bracket and screws aside for the moment.
 - Figure 4-8 shows the CF personality card. Note the keying lip on the bottom of the card and the guides that hold it in place.

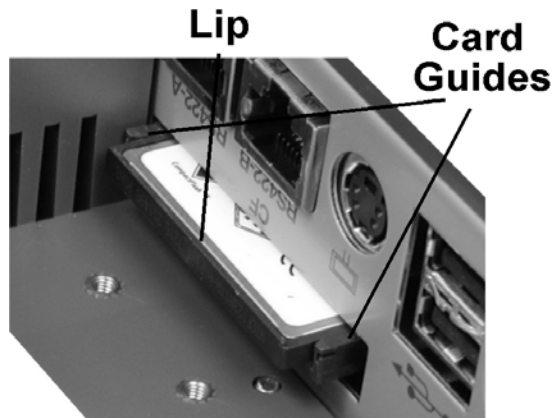


Figure 4-8: Compact Flash Card Removal

5. Remove the CF card from the inoperative WS4 LX. Use your thumbnail or pen to catch the lip and remove the card from the socket. Figure 4-8.
6. Remove the packing material from the replacement WS4 LX. Remove the CF card from this unit by repeating Step 4 to remove the bracket, and Step 5 to remove the CF card. Set this card aside for the moment.
7. Install the CF card removed from the inoperative WS4 LX. Figure 4-9, below denotes the location of the lip that assists you in orienting the card properly as you install it. When the card is placed in the guides, push it in until only a few millimeters are visible.



Figure 4-9: Inserting the CF Card

Starting at the top of Figure 4-9, position the CF card as shown with the lip and label facing you, then insert it into the guides. When the card is properly aligned in the guides, rotate it to the position shown and push the card in until fully inserted. A great deal of force is not required to insert the card.

- 8.** Re-install the CF card bracket and fasten with the pair of screws.
- 9.** Re-cable the replacement WS4 LX. Reconnect each cable to the appropriate I/O connector. When complete, this unit will be ready for use.
- 10.** Install the CF card removed from the replacement WS4 LX in the inoperative WS4 LX as described in Step 7. Replace the bracket and screws. Use the packing material and re-box this unit for return to the depot repair center.

Workstation 4 LX Diagnostics

This chapter includes diagnostics information on the Workstation 4 LX.

In this chapter

Basic Troubleshooting	5-2
Power On-Self Test (POST) Errors	5-4
Workstation 4 Diagnostics Utility.....	5-6

Basic Troubleshooting

This section provides a brief troubleshooting chart for the Workstation 4 LX.

Problem	Possible Cause	Solution
Operator LED is Off. No response to the power button. Operator LCD does not display blue splash screen. Beeper does not sound.	No Power to WS4 LX	Be sure AC power cable is connected to the workstation and surge protector outlet, UPS or wall outlet. Press the power switch for 1 second, then release it to start the unit.
The unit does not start. The beeper sounds three times. The Operator LCD is blank. The Operator LED is blinking four times per second.	Power On Self Test (POST) indicates a Missing or Defective system board DIMM	Install a MICROS approved DDR 333/400 DIMM in socket or re-seat to insure the DIMM is fully seated.
The unit does not start. The beeper sounds four times. The Operator LCD displays the message 'NO CF FOUND. Press DEL key to enter BIOS Setup Menu.' Operator LED is blinking four times per second	Power On Self Test (POST) Error. CF Card not installed, not recognized or defective.	Make sure a MICROS approved CF card is fully seated in the Daughter Card Socket.
The unit does not start. The beeper sounds five times. The Operator LCD displays the message 'No USB Flash Drive Found. Press Delete key to enter BIOS Setup Menu'. Operator LED is blinking four times per second.	Power On Self Test (POST) Error. USB Flash Drive not installed or defective.	Make sure USB Flash Drive is properly installed in J5. Chapter 3.

Problem	Possible Cause	Solution
The Beeper Sounds once. Operator LCD displays BIOS splash screen and boots to the Operating System, but Operator LED flashes four times a second. The POS application may report errors or not start. If the Operator LED continues to flash after the the OS starts, this indicates that WS4 LX API and platform driver files did not load properly.	The USB Flash Drive is not configured properly, corrupt, or defective. Or External USB Thumb Drive is connected the IO Panel, and the 'Boot Test Image' field in the Special Configuration screen of BIOS Setup is set to 'Alternate'	Replace the USB Flash Drive. Or Remove external USB Thumb Drive and change 'Boot Test Image' field to 'Normal'
WS4 LX operates normally, but appears to turn-off after about 25 minutes and inactivity. The Operator LED is solid Blue.	The Enhanced Screen Saver and Backlight Utility automatically turns-off the backlights by default.	Touch the screen or swipe a mag stripe card through the reader to restore the screen.
WS4 LX does not connect to LAN.	Network Patch cable not connected.	Install appropriate patch cable between workstation and wall jack.
System cannot read mag cards.	Mag card read head dirty or contaminated.	Use mag card cleaning kit on reader.
	Mag card reader defective.	Replace mag stripe reader.

Power On-Self Test (POST) Errors

Prior to the custom POST that checks for the CF Card and USB Flash Drive, the General Software Embedded BIOS 2000 POST executes. The following table lists these POST errors, reported as beep codes..

Error	Beeps	Description
POST_BEEP_REFRESH	1	memory refresh not working.
POST_BEEP_PARITY	2	parity error in 1st 64kb.
POST_BEEP_BASE64KB	3	memory failure in 1st 64kb.
POST_BEEP_TIMER	4	timer T1 not operational.
POST_BEEP_CPU	5	CPU test failed.
POST_BEEP_GATE20	6	gate A20 failure.
POST_BEEP_DMA	7	DMA page/base registers.
POST_BEEP_VIDEO	8	video error (non-fatal).
POST_BEEP_KEYBOARD	9	keyboard failure.
POST_BEEP_SHUTDOWN	10	CMOS shutdown register failed.
POST_BEEP_CACHE	11	external cache not working.
POST_BEEP_BOARD	12	board initialization failure.
POST_BEEP_LOWMEM	13	exhaustive low memory test.
POST_BEEP_EXTMEM	14	exhaustive extended memory test.
POST_BEEP_CMOS	15	CMOS restart byte failed.
POST_BEEP_ADDRESS_LINE	16	address line failed.
POST_BEEP_DATA_LINE	17	data line test failed.
POST_BEEP_INTERRUPT	18	interrupt controller failure.
POST_BEEP_HUGEMEM	19	exhaustive huge memory test.
POST_BEEP_EBDA_LOC	20	address manager failed to reloc EBDA.
POST_BEEP_ADDR_MGR	21	address manager failed to initialize.
POST_BEEP_ADSYNC	22	address manager failed to sync memory parameters.

Workstation 4 Diagnostics Utility

The Workstation 4 LX includes a diagnostics utility as part of the Platform Files. Based on Diagnostics Utility found in the original WS4, it has been updated to match the new hardware and software architecture of the WS4 LX. The Utility provides a great deal of information about the workstation hardware and software components, and includes tests of the system board point-of-sale hardware and supported peripherals.

Running the WS4 LX Diagnostics Utility

The diagnostics utility is located in the \DOC\ Utilities folder of the USB flash drive.

Procedure:

1. From the Desktop, touch My Device twice, then touch 'DOC'
2. Touch the Utilities folder, then touch 'WS4LXDiagUtility' twice.

System Information Screen

When the Diagnostics Utility starts-up, it displays the System Information Screen, as shown in the Figure below.

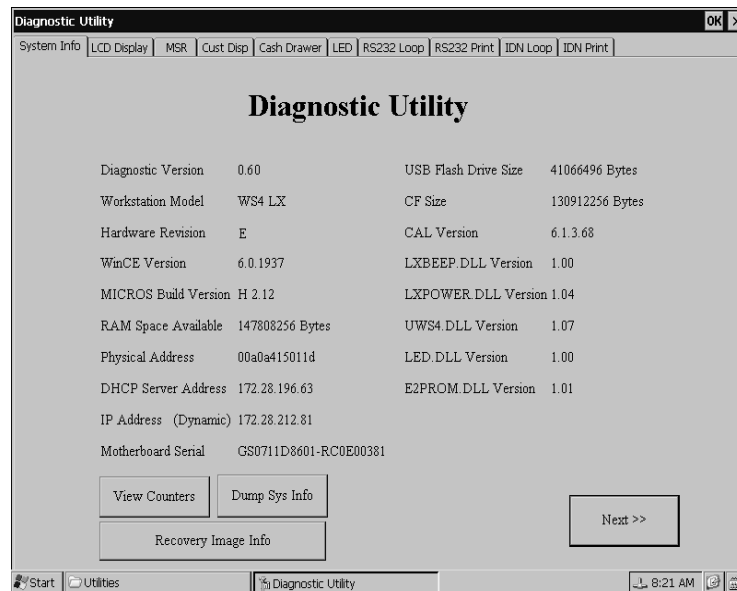


Figure 5-1: The WS4 LX System Information Screen

The System Information screen combines many of the WS4 LX hardware and software components into a central location. In addition, three buttons located at the lower left of the screen allow you to view the mag stripe and cash drawer counters, dump the contents of each system info field and peripheral counters to a text file, or examine information about the Windows CE Factory Recovery feature. A brief description of each field and button follows.

Diagnostics Version

This field displays the WS4 LX Diagnostics Utility Software version.

Workstation Model

This field identifies the unit as the Workstation 4 LX, an updated version of the original Workstation 4. For those familiar with the original DiagUtility, the 'Workstation Model' is a new field.

Hardware Revision

This field displays the WS4 LX System Board hardware revision.

WinCE Version

This field reports the Windows Embedded CE 6.0 Build Number.

MICROS Build Version

The MICROS Build Version represents the combination of the Windows Embedded CE 6.0 image components and internal drivers. Note the 'H' in this field denotes a Workstation 4 LX. An internal driver is not accessible in the same manner as the WS4 LX platform drivers available on the \DOC, but are included in the image by the Windows CE Platform Builder. Should an internal driver be changed, added or removed, or new component added or removed from the Windows CE image, a new build is generated and the 'MICROS Build Version' increments.

RAM Space Available

This field displays the amount of available RAM, located on the single DDR DIMM installed on the system board. Please note that this field displays the available memory reported by the operating system, and will vary depending on a number of factors. Units with Windows Embedded CE 6.0 installed will ship with 256M of memory.

Physical Address

This field displays the network Media Access Control (MAC) number assigned to the system board Ethernet Controller. Each workstation will display a unique value in this field.

DHCP Server Address

This field displays the DHCP Server Address when the workstation operates on DHCP based network.

IP Address (Dynamic or Static)

This field displays the WS4 LX IP Address when the workstation operates in DHCP or Static IP mode. When 'Dynamic' is displayed, the field displays the DHCP IP address. When 'Static' is displayed, this indicates the unit is configured to use a Static IP address.

Motherboard Serial

Displays the WS4 LX System Board serial number.

USB Flash Drive Size

This field displays the size of the \DOC partition of the USB Flash Drive. Windows Embedded CE 6.0 configurations start with a 128M and later move to a 256M device. In this example, a 128M device is installed. The USB Flash Drive contains three partitions of roughly equal size, but only the \DOC partition is visible. Therefore the USB Flash Drive Size field displays about 1/3 of the total size.

CF Size

This field displays the total size of the CF Card in bytes.

CAL Version

Displays the Client Application Loader software version.

LXBEEP.DLL Version

This driver allows POS applications to access the system board beeper. At boot time, the BIOS controller the beeper.

LXPOWER.DLL Version

This driver helps manage the power button while operating system is running. In addition, applications such as the CAL call on this driver to force a restart of the WS4 LX during an application download or upgrade.

UWS4.DLL Version

This file contains the WS4 LX API, or Application Programming Interface. POS Applications use the API to access POS hardware such as the cash drawer interface, Mag Stripe Reader, and IDN Interface.

LED.DLL Version

This driver controls the Operator LED blink rate when the operating system is running. At start-up, the LED blinks, then turns solid blue as the operating system starts and loads LED.DLL.

E2PROM.DLL Version

This driver provides access to a system board serial EEPROM that is used to store information such as the serial number reported in the System Information screen of the Diagnostics Utility.

Activity Counters, Dump Sys Info and Recovery Image Info

Located at the lower left side of the System Information screen are the [View Counters], [Dump Sys Info], and [Recovery Image Info] buttons. Descriptions of each button can be found below.

[View Counters]

The Diagnostic Utility maintains a set of counters that track the number of times an MSR swipe occurs and the number of times each cash drawer is opened. Press the [View Counters] button to view the counters. Each counter is stored in the registry and is reset if the CF card is wiped or formatted.

[Dump Sys Info]

When you press this button, a file called WS4LXdump.txt is created on \CF. This text file contains all of the fields and counters reported by the System Information screen in a comma separated ASCII text format. The text file can be retrieved from the CF card and examined for troubleshooting purposes.

[Recovery Image Info]

Touch this button to determine the version of the factory restore files and the number of times the feature has been activated. The information is contained in file called FACRECOV.DAT, located in the \DOC folder. The Figure below shows an example of this screen, but may contain pre-release software versions. Each field is explained in more detail below.

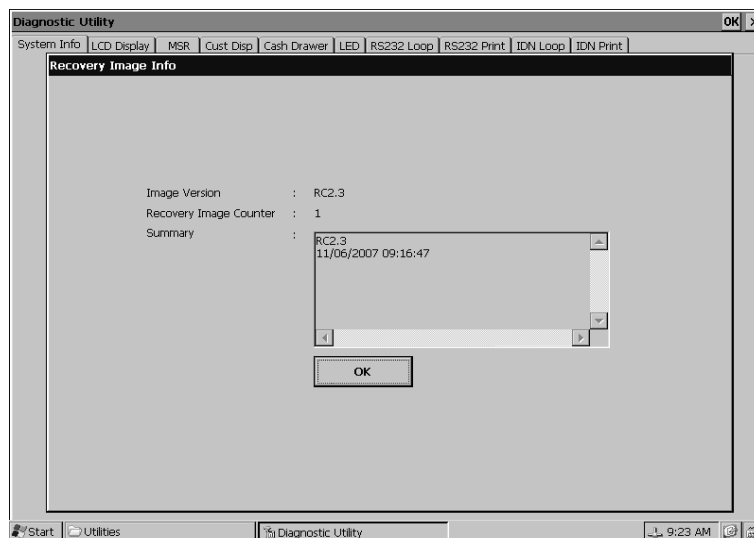


Figure 5-2: Displaying Factory Restore Information Screen

The 'Image Version' fields displays the version of the restore files. The restore files are contained in a hidden partition on the USB Flash Drive.

The 'Recovery Image Counter' field displays the number of times the WinCE Factory Restore feature has been used.

The 'Summary' field includes a text box that displays the version of the restore files and a date/time stamp listing each time the recovery feature is used. In this case, the WinCE Factory Restore feature has been activated one time. Note the date format is DD/MM/YYYY.

Wipe Compact Flash (WCF) Utility

In addition to the Diagnostics Utility, the \DOC\Utilities folder also contains WCF.EXE, the Wipe Compact Flash utility. Originally developed for the WS4 production line, we feel it has use as a service tool.



CAUTION:

However, if used in a careless or malicious manner, WCF is capable of deleting optional SAR totals and rendering a functioning workstation temporarily inoperable. WCF is provided as a convenience and is not required during on-site setup and operation of the WS4 LX.

When you start WCF, it displays three options, detailed below. After the selection of any option, the unit enters the **NOPOWER** mode.

- *Clear all Registry Settings?*

This selection deletes the copy of the persistent registry stored on the CF Card. It is used at the factory just prior to shipping the unit to clear any registry changes made during testing.

- *Erase Compact Flash?*

This selection removes all files from the CF card including the persistent registry folder, the POS application and SAR totals, if present.

- *Format Compact Flash?*

This selection formats the CF Card, erasing all files and removing any corruption, if present by reprogramming the file allocation table.



WARNING:

Erasing or Formatting the CF card can delete SAR or E7 totals files.

Press the power button to start the unit. Clearing the registry files or formatting the card clears the registry to its default settings. The default registry starts the CAL client, and after pointing it to a properly configured POS application server, a new application can be obtained in minutes.

Glossary

WS4 LX Glossary

The following is glossary of terms used throughout this manual.

ACPI

Abbreviation for Advanced Configuration and Power Interface. ACPI provides control, configuration (PnP) and power management functions to Operating Systems that support it.

ACPI support starts with compliance at the hardware level including the CPU, chip set, and Super I/O components, etc. The BIOS continues this by building and placing a number of ACPI descriptor tables in memory for access by the operating system. Finally, the OS references the data contained in the ACPI tables, using it to provide device configuration and power management as required.

The LX800 and CS5536 Processor/Companion Chip support ACPI through power management registers.

From the Operating System perspective, Windows Embedded CE 6.0 provides limited ACPI support, while XPE and WEPOS provide full ACPI 2.0 support.

API

Abbreviation for Application Programming Interface (API). The WS4 LX API is a direct descendant of the original WS4 API that resides between an application and the hardware, providing a set of hardware services that the application programmer can call upon to access POS features. For example, to open a cash drawer, the programmer calls an API function. The API determines which system board is installed and selects the appropriate hardware register and bit required to open the drawer and or monitor its open/closed status.

With each new hardware platform release, the API is updated to match the underlying hardware changes. In some cases, such as the change-over from the original Workstation 4 to the Workstation 4 LX, a new API file is required since the underlying hardware ports change, but this is transparent to the application programmer.

Backlight

A Backlight consists of one or more Cold Cathode Fluorescent (CCFL) tubes usually located at the top and bottom or along the sides of the LCD panel housing. The 12" LCD panels used in the LX use a pair of tubes, located at the top and bottom of the unit. CCFLs provide the basic illumination for the panel, to make the background brighter and its contents sharper, especially under dim lighting.

The WS4 LX API provides three levels of backlight brightness, Bright Normal, and Dim. The brightness settings can be accessed by the POS application or tested with the WS4LXDiagUtility.

BIOS

Abbreviation for Basic Input Output System. The BIOS is more complex and sophisticated than the Boot loader used in the original WS4.

The WS4 LX system board runs General Software's Embedded BIOS 2000. General Software provides a modular pre-boot 32-bit x86 embedded systems BIOS. The modular BIOS consists of a processor independent core and a collection of personality modules that match the processor, chip set, super IO, and other board features.

CAL

Abbreviation for Client Application Loader. The MICROS CAL is a software utility that assists in the installation of the WS4 LX POS application software, then manages the ongoing maintenance of the operating system and application software. The CAL consists of two parts, one part resides on the client and the second part resides on the system server.

First introduced with the original WS4, the CAL has been updated for the Workstation 4 LX and to accommodate a variety of hardware platforms including the PCWS 2010 (WIN32 CAL) and Hand Held Terminals such as the MC50 and MC70 (CAL Mobile).

CEPC

Abbreviation for Windows CE Platform Builder. The CEPC is a tool used to build the WinCE OS image. The CEPC allows the developer to target a hardware platform like the x86 based WS4 LX and build it with selected components appropriate to the platform.

CF Card

Abbreviation for Compact Flash Card. Compact Flash is a matchbook size removable mass storage device first introduced in 1994 by SanDisk Corporation. CF cards are designed with flash technology, producing a non-volatile storage solution that does not require a battery to maintain. Because the CF card is solid state device with no moving parts, it provides five to ten times the reliability of a conventional magnetic disk drive. CF cards are available from many vendors in sizes ranging from 32M to 4G.

The Workstation 4 LX uses 128M or 256M cards in the Windows Embedded CE 6.0 configuration. In this configuration the CF card houses the persistent registry and all application related files. *Therefore the CF card must be present in order for the workstation to start.*

Client

A workstation or personal computer that requests services from a server over the network. The server is usually a high-speed personal computer with fast hard drives providing access to database services. The client provides the user interface and may perform some or all of the application processing depending on which POS application software is in use.

CMOS Memory

A small amount of non-volatile memory address space associated with the Real Time Clock. The BIOS uses CMOS memory to store equipment configuration and user options associated with the operation of the BIOS, and the BIOS Setup Screen. The CMOS Memory and Real Time Clock are located in the AMD CS5536 Companion Device and connected to a battery to maintain configuration settings and time keeping.

See Also: RTC.

COM Port

A type of IO Port generally referred to as a serial interface or asynchronous communications port. This type of IO port transmits information to and from the computer in a serial fashion, one bit at a time.

Customer Display

A display that shows the customer information about the transaction being performed on the workstation. A customer display may be mounted directly to the terminal or mounted at eye level on a pole located near the workstation. Two types of Customer Displays are available for the WS4 LX.

The LCD Customer Display is a graphics based and is available in both Integrated and Pole versions. This display is capable of graphics or can emulate the 2x20 character format of the VFD Customer Display.

The Workstation 4 LX VFD Customer Display is a pole mount version which displays alpha-numeric character in a 2x20 format.

DIMM

Abbreviation for Dual In Line Memory Module. DIMMs appear in many sizes and pin configurations. The WS4 LX System Board uses 184-pin DDR 333 or 400 DIMMs.

Device Driver

A program that is linked with and extends the operating system to provide an interface to a hardware not originally supported by the operating system. Device drivers are typically included with add-on hardware devices such as modems or Mini-PCI cards.

DOC

Abbreviation for Disk On Chip. See USB Flash Drive.

Firmware

One of Embedded BIOS 2000s greatest strength lies in the optional pre-boot environment known as Firmware. Firmware is General Software's term for a custom 32-bit portable execution program stored in the system board BIOS ROM. Firmware applications run inside System Management Mode (SMM). Embedded BIOS 2000 uses SMM in a patented way to implement the firmware environment that permits custom firmware application to execute. Firmware applications perform such operations as image file manipulation or BIOS updates and factory recovery.

Firmware Application

Firmware Application is General Software's term for a custom 32-bit Portable Execution program, stored in the LX system board's BIOS ROM that executes before the Operating System starts and runs inside Firmware environment. The WS4 LX includes several pre-boot Firmware Applications.

Firmware applications can be used to integrate crash protection and recovery, remote administration, custom thermal management, and other solutions that run from software stored directly in the BIOS chip.

See Also: Platform Update Facility and System Management Mode.

IDN

Abbreviation for Integrated Device Network. Also referred to in previous MICROS documentation as the Stand-alone Device Network or Remote Printer Networks. The MICROS IDN is based on a full-duplex RS422 interface designed to support Printers connected in a multi-drop or daisy chain configuration. IDN devices primarily consist of thermal and dot matrix based roll printers.

The Workstation 4 LX has two RS422 ports, labelled RS422-A and RS422-B, each of which is capable of driving IDN devices.

LCD

Abbreviation for Liquid Crystal Display. This type of display consists of a sandwich constructed from two plastic sheets with a special liquid made from rod-shaped or *nematic* molecules. By applying an electrical current, the molecules can be aligned in grooves in the plastic to bend the polarity of the light that passes through them. A polarized filter laminated over the electrodes blocks the polarized light, transmitting only the non-polarized light. In this manner, a grid of electrodes can selectively turn on a pixel that contains the liquid crystal, making it turn dark.

LCDs are available in two forms, *active* and *passive*. Passive LCD panels have a grid of horizontal and vertical conductors, with a pixel located at the intersection of these conductors. The pixel is darkened by sending current through the conductors to the liquid crystal. This is called a passive matrix LCD.

The alternate design, an active matrix, puts a transistor at every pixel. When a small current is sent through it, the transistor switches on, providing a much higher current to activate the LCD pixel. Active matrix LCDs are more expensive than passive displays but are many times brighter and can be viewed from greater angles.

LVDS

Abbreviation for Low Voltage Differential Signalling.

MSR

Abbreviation for Magnetic Stripe Reader. An MSR used in the LX contains a transducer that reads the data from multiple tracks on a mag stripe card and converts the information to a RS232 serial format. The Workstation 4 LX is equipped with a 3-track MSR.

See Also: MAGTEK Mode and Special Mode.

MAGTEK Mode

MAGTEK mode emulates the output from the MAGTEK series of card readers manufactured by MAGTEK, Inc. In MAGTEK mode, the API converts MSR track data into a series of numeric keystrokes that can be directed into the window that has focus in the operating system.

MAGTEK mode is typically used for swiping MICROS employee and manager cards in MICROS applications.

See Also: Special Mode.

Mini-PCI Interface

Mini-PCI is an adaptation of the Peripheral Component Interconnect (PCI) bus found in many desktop computers, but intended for laptop, tablet PCs and other small computer systems. Three Mini-PCI form factors are available, Type I, Type II and Type III. The WS4 LX system board includes a 124-pin Type IIIB card edge connector to accommodate a 802.11a/b/g Wireless Card.

The Mini-PCI bus is functionally the same as PCI version 2.2. In other words, it is a 32-bit 33 or 66 MHz bus with powered (+3.3V) connectors and support for bus mastering and Direct Memory Access (DMA).

Operator LED

Abbreviation for Light Emitting Diode. A LED is a semiconductor that converts electrical energy to light. LEDs are available in many colors and typically used as power or status indicators.

The Workstation 4 LX Operator LED is Blue in color. The Operator LED blinks when the unit is booting or encounters a POST error and turns solid Blue as the operating system starts. The Blue LED distinguishes the LX from the original WS4, which uses the same casework but the Operator LED is Green.

Operator Power Button

The WS4 LX Power Button, located at the lower right front of the case. The Operator Power Button is used to transition the unit between the ON and NOPOWER states.

Operating System

System software that acts as a master control program to manage the execution of application programs. The kernel, or core of the operating system resides in memory to receive user input as well as to provide an interface to the hardware. Operating systems perform other tasks such as establishing the structure of the disk file system, moving executable files from disk to memory, network communications, and system security.

Examples of operating systems include Microsoft Windows Embedded CE 6.0, Microsoft Windows XP Professional Embedded (XPE).

Platform Update Facility (PUF)

The Platform Update Facility is supplied by General Software and runs inside Firmbase. The WS4 LX uses this program in the pre-boot environment to perform automatic BIOS updates, and copy the Windows Embedded CE 6.0 image file, NK.BIN from the CF card to the USB Flash Drive during upgrades.

See also: Firmbase.

Poly Switch

Like a traditional fuse, a Poly switch fuse or equivalent limits the amount of current flowing through a circuit to prevent damage should a fault condition occur. Unlike traditional fuses however, when the over-current fault is removed, the poly switch automatically resets and does not have to be physically removed from the board and replaced.

The WS4 LX system board uses poly switches on the remote customer display, backlight inverter, cash drawer outputs, and USB ports.

POST

Abbreviation for Power On Self Test. The POST is part of the BIOS, executing each time the workstation is powered up. It checks for the presence of the USB Flash Drive and Compact Flash Card, checks several key hardware circuits. If these devices are missing or defective, the POST sounds the beeper in a predefined fashion to report the error.

Power Management

In general terms, power management provides mechanisms in both software and hardware to minimize system power consumption, and manage thermal limits. Power management involves trade-offs among system speed, noise, processing speed and AC power consumption.

Registry

The registry is a database that acts as a central repository for all hardware and software configuration information for all Windows operating systems and applications.

When Windows starts up, it loads the registry in RAM so it can be quickly accessed. A driver periodically copies the working registry in RAM to the Compact Flash card where it becomes the *Persistent* registry. This protects the registry contained in RAM, which will be lost if AC power fails.

Because the CF card contains in addition to an up-to-date copy of the system registry, the POS application and optionally SAR data, it represents the personality of the workstation.

Registry Editor

An editor that can modify the contents of the *Working* registry directly, but is only used for technical reasons or as a last resort. Registry settings are typically modified by the CAL or application programs, or by changing settings in the Control Panel.

RJ-11 Connector

A four or six pin modular telephone connector. The IDN connector located on IDN devices is an example of a six-pin RJ-11 connector.

RJ-45 Connector

An eight-pin modular telephone connector. A 10/100 BaseT Ethernet connector is an example of an RJ-45 connector.

RS232

Abbreviation for Recommended Standard 232. A physical layer standard for serial transmissions between computers and serial devices (mice, modems, printers) that are less than 50 feet apart. The RS232 specification defines signal lines, voltage levels, and connector pin-outs and is issued by the Electronics Industry Association and Telecommunications Industry Association.

The Workstation 4 LX has a total of three RS232 ports.

RS422

Abbreviation for Recommended Standard 422. A physical layer standard for serial transmissions that extend beyond RS232.

The RS422 specification defines signal lines, and voltage levels and is issued by the Electronics Industry Association and Telecommunications Industry Association.

A full-duplex version of RS422 is used by the Workstation 4 LX to drive IDN printing devices. The workstation has two RS422 ports, labeled RS422-A and RS422-B.

RTC

Abbreviation for Real Time Clock. The RTC is connected to a battery and separate crystal oscillator to maintain time-keeping when the workstation is unplugged or turned-off. When an operating system such as WinCE CE starts, it reads the contents of the RTC to obtain the current time and date.

See Also: CMOS Memory.

SAR Client

Abbreviation for Stand Alone Resilient Client. SAR is an option available with some POS applications that permit the client workstation continue to perform basic POS transactions should the server or network connection fail. Transaction data is stored locally on the CF Card until the network connection or server is restored.

When the network connection or server is restored, system totals are automatically balanced, allowing a smooth return to normal operations.

Special Mode

A Magnetic Stripe Reader input mode in which the API buffers each track without removing any information and notifies the application that track data is available. The application can then retrieve the track data for credit card authorization.

See Also: MAGTEK Mode.

System Board

The motherboard or main board of the Workstation 4 LX. The System Board contains the majority of the workstation circuitry including the CPU, Chip set, memory, USB Flash Drive, Compact Flash Card, Display Interface, and Input/Output Ports.

System Management Mode (SMM)

In addition to the real and protected modes of operation, processors since the 80486 have incorporated a third operating mode called System Management Mode. SMM was created to transparently run power management code such as APM in the background without causing interference to foreground operating systems and applications. ACPI is now the standard power management standard, replacing APM and freeing SMM for other uses.

The General Software Embedded BIOS 2000 uses System Management Mode in a patented way to allow firmware applications to run before the operating system starts or along side an operating system that is running, crashed or not even installed.

See Also: Firmbase and Platform Update Utility.

TCP/IP

Abbreviation for Transport Control Protocol/Internet Protocol.

Windows Embedded CE 6.0 is supplied with a TCP/IP stack and is the only network transport protocol supported.

UPS

Abbreviation for Un-interruptible Power Supply. A backup power supply that provides power to the workstation when the line voltage fails or drops to unacceptable levels. The UPS keeps the workstation running with a battery powered DC-to-AC inverter circuit. The amount of time the UPS can power the workstation is determined by the load requirements of the workstation and the capacity of the UPS.

USB

Abbreviation for Universal Serial Bus. USB is an asymmetric bus design, consisting of a host controller connected to multiple daisy chained peripheral devices. The addition of one or more USB hubs to the chain allows branching into a tree structure with no more than 5 levels of branching per controller and a maximum of 127 devices including controllers.

USB standards are developed by the Device Working Group of the USB Implementers Forum and currently supports three data rates:

A Low Speed data rate, at speeds up to 1.5 Mbit/s. Generally used for Human Interface Devices (HID) such as mice, keyboards and joysticks. USB 1.1.

A Full Speed data rate, at speeds up to 12 Mbit/s. USB 1.5.

A Hi-Speed rate of up to 480 Mbit/s. USB 2.0.

Detection and enumeration

When a USB device is attached, the host identifies it and loads the required device driver. Devices attached to the USB bus are generally associated with a specific *device class*. Each device class defines an expected behavior in terms of functionality so the same device driver may be used for any device of the same class.

Some typical device classes include Human Interface Devices (mouse, keyboard touchscreens), printers, USB hubs and removable mass storage devices.

Removable mass storage devices appear in many forms including flash drives, portable hard drives, portable CD/DVD-RW drives, and digital media players. Since each of these unique devices conform to the removable mass storage device class, a single driver can support all of them.

USB Flash Drive

Generic term for a USB flash memory based hard drive. Currently there are several providers of such devices and each uses a unique trade name, hence the generic term 'USB Flash Drive' used throughout this manual.

The original Workstation 4 used a device from M-Systems Inc., called a 'Disk On Chip' that resided on the legacy ISA bus. The Workstation 4 LX uses a USB based device that may be called depending on the supplier, a 'uDOC' (M-Systems, Inc.), 'Embedded USB Hard Drive' (Smart Modular Technologies), or 'USB Flash Disk Module' (SimpleTech). Because these devices are USB, they provide a considerable increase in transfer speeds over the ISA based Disk On Chip, resulting in faster boot times and file copy speeds.

A typical USB Flash Drive consists of a small rectangular shaped circuit board that attaches to a 2x5 system board header. Capacities range from 128M to 4G and beyond; however, 256M is adequate for the Windows Embedded CE 6.0 configuration.

Internally, a typical USB Flash Drive consists of a processor and USB 2.0 interface, coupled to one or more large flash memory chips. The processor executes firmware that emulates the Windows fat file system while at the same time mapping file data to and from the flash memory devices. All devices implement some form of wear leveling to maximize flash life expectancy.

Data integrity is guaranteed by using error detection (EDC) and error correction (ECC) methods. On WS4 LXs running Windows Embedded CE 6.0, the USB Flash Drive is configured as the boot device (Drive C) and contains the operating system image and platform files.

Equipment Dimensions

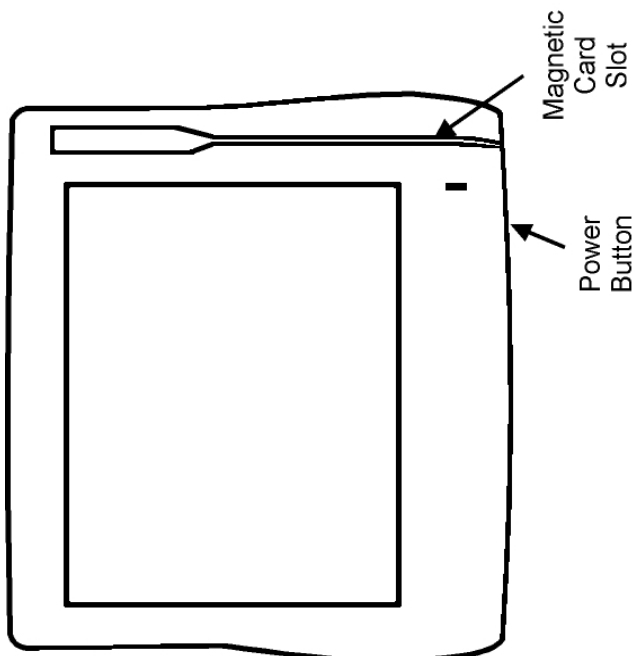
In this appendix

Workstation 4 LX Low Profile	A-2
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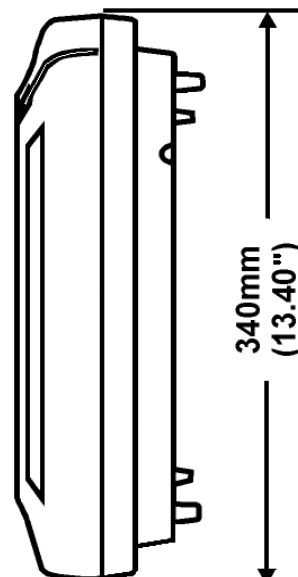
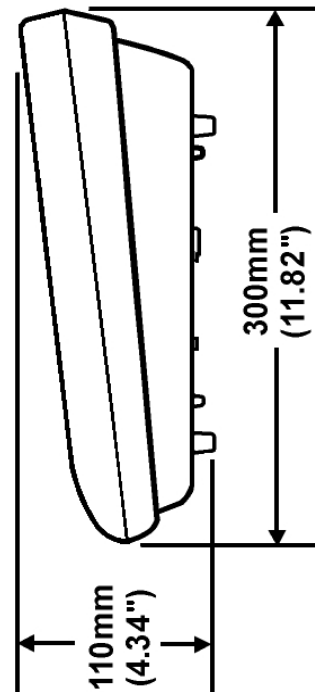
Workstation 4 LX Low Profile

NOTES:

1. Cables exit from rear of unit.
2. Leave room at front/side of unit for card swipe and power button.
3. Orient unit to avoid glare on touchscreen from overhead lights.
4. Cash Drawers located at customer's discretion.
5. 77mm hole required under unit if Cash Drawer mounted under counter.



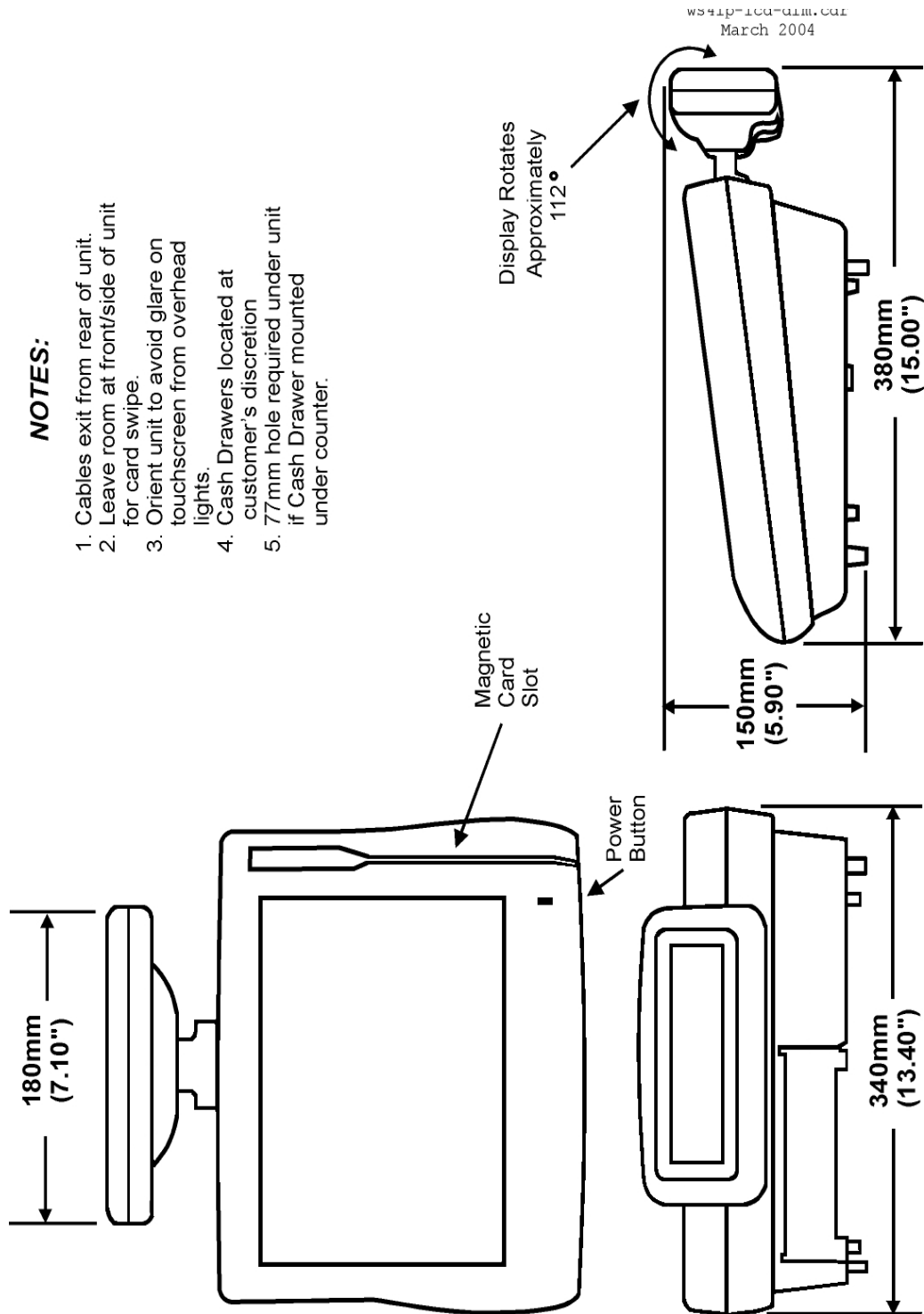
ws4lp-dim.cdr
March 2004



Workstation 4 LX - Low Profile with Rear LCD Customer Display

NOTES:

1. Cables exit from rear of unit.
2. Leave room at front/side of unit for card swipe.
3. Orient unit to avoid glare on touchscreen from overhead lights.
4. Cash Drawers located at customer's discretion
5. 77mm hole required under unit if Cash Drawer mounted under counter.



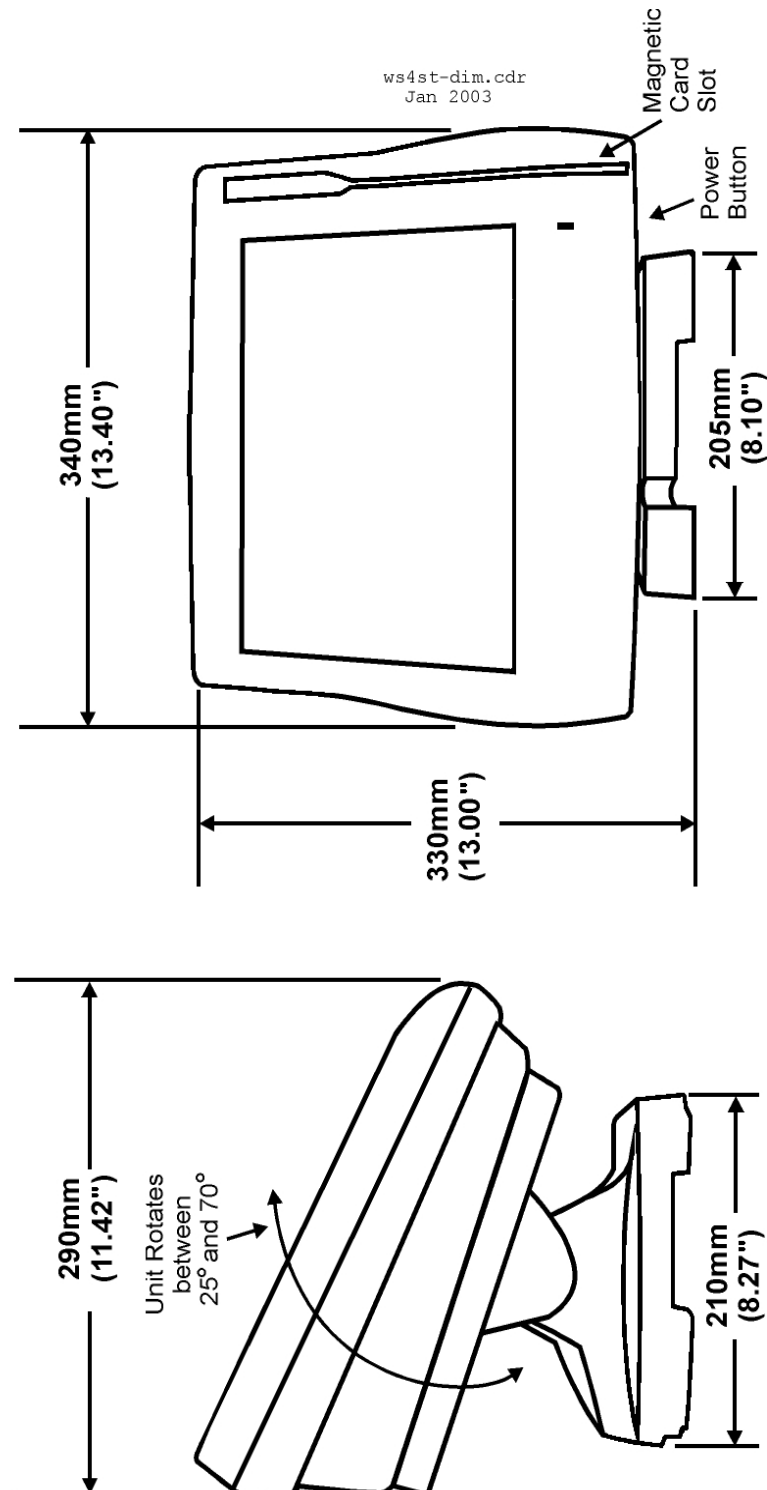
Equipment Dimensions

Workstation 4 LX on Adjustable Stand

Workstation 4 LX on Adjustable Stand

NOTES:

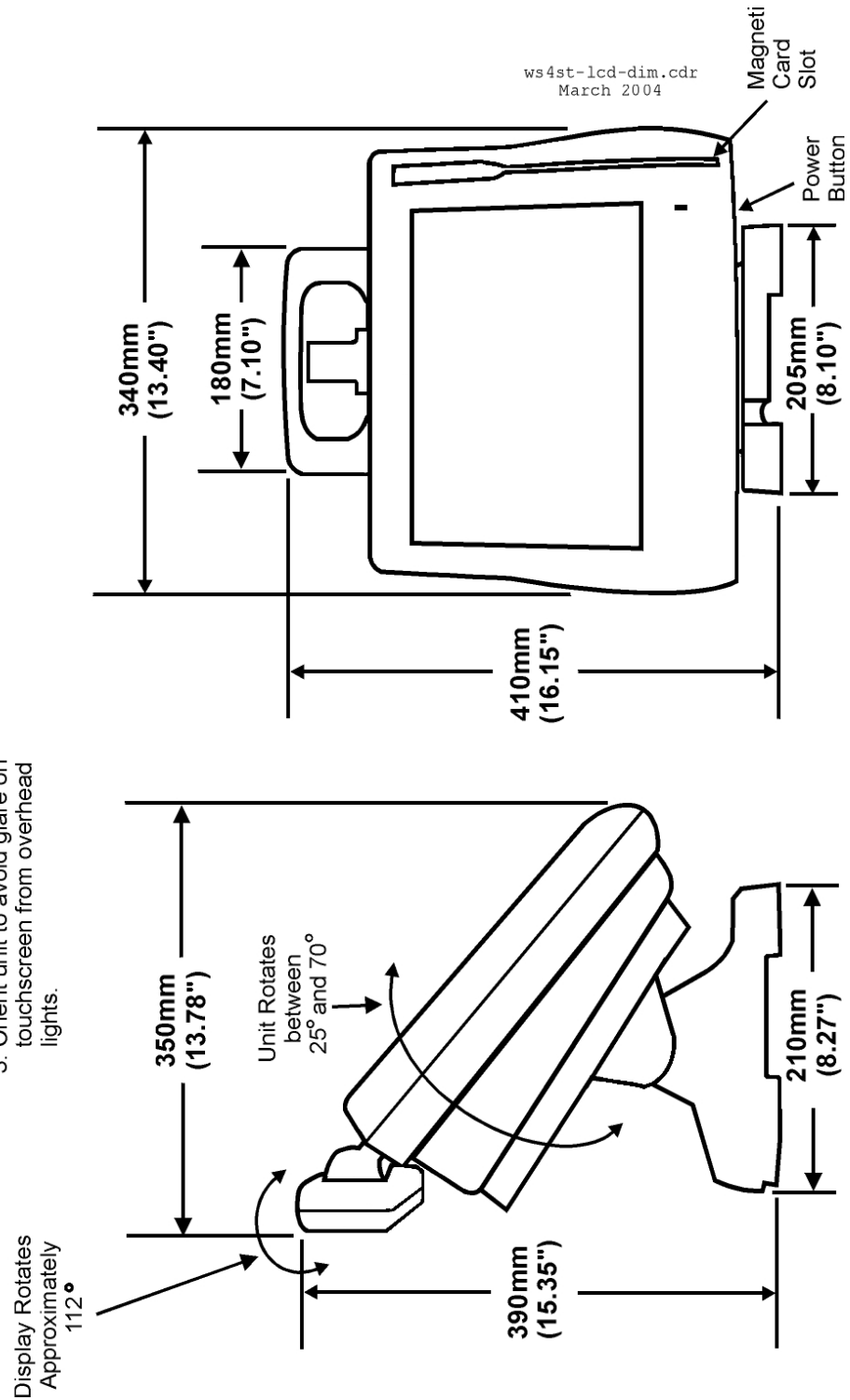
1. Cables from IO Panel routed through cable slot to exit stand
2. Leave room at front/side of unit for card swipe and power button.
3. Orient unit to avoid glare on touchscreen from overhead lights.
4. Cash Drawers located at customer's discretion.
5. 77mm hole required under unit if Cash Drawer mounted under counter.



WS4 LX on Adjustable Stand with Rear LCD Customer Display

NOTES:

1. Cables from IO Panel routed through cable slots to exit stand.
2. Leave room at front/side of unit for card swipe and power button.
3. Orient unit to avoid glare on touchscreen from overhead lights.
4. Cash Drawers located at customer's discretion.
5. 77mm hole required under unit if Cash Drawer mounted under counter.



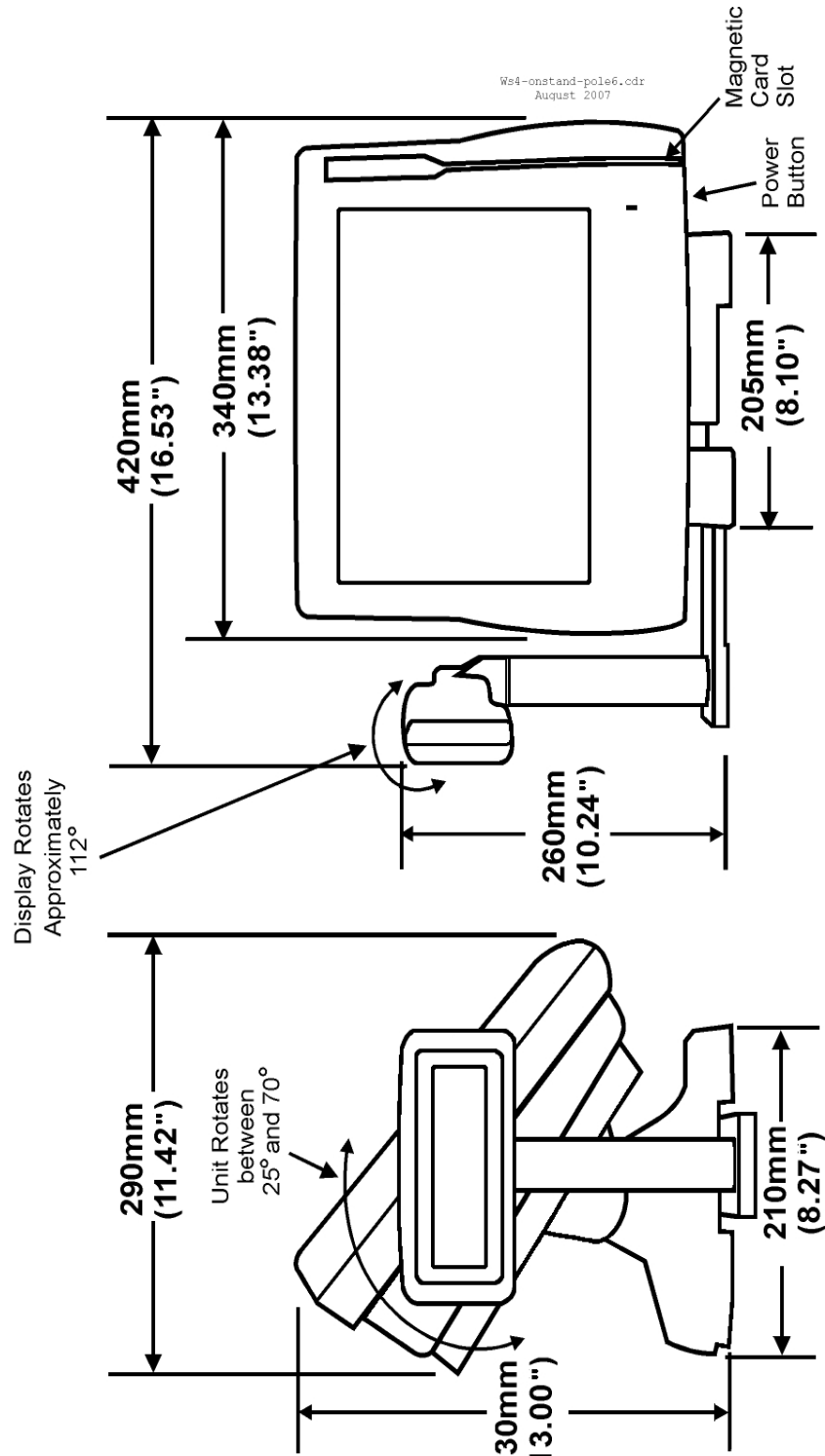
Equipment Dimensions

Workstation 4 LX on Adjustable Stand with 6" LCD Pole Display

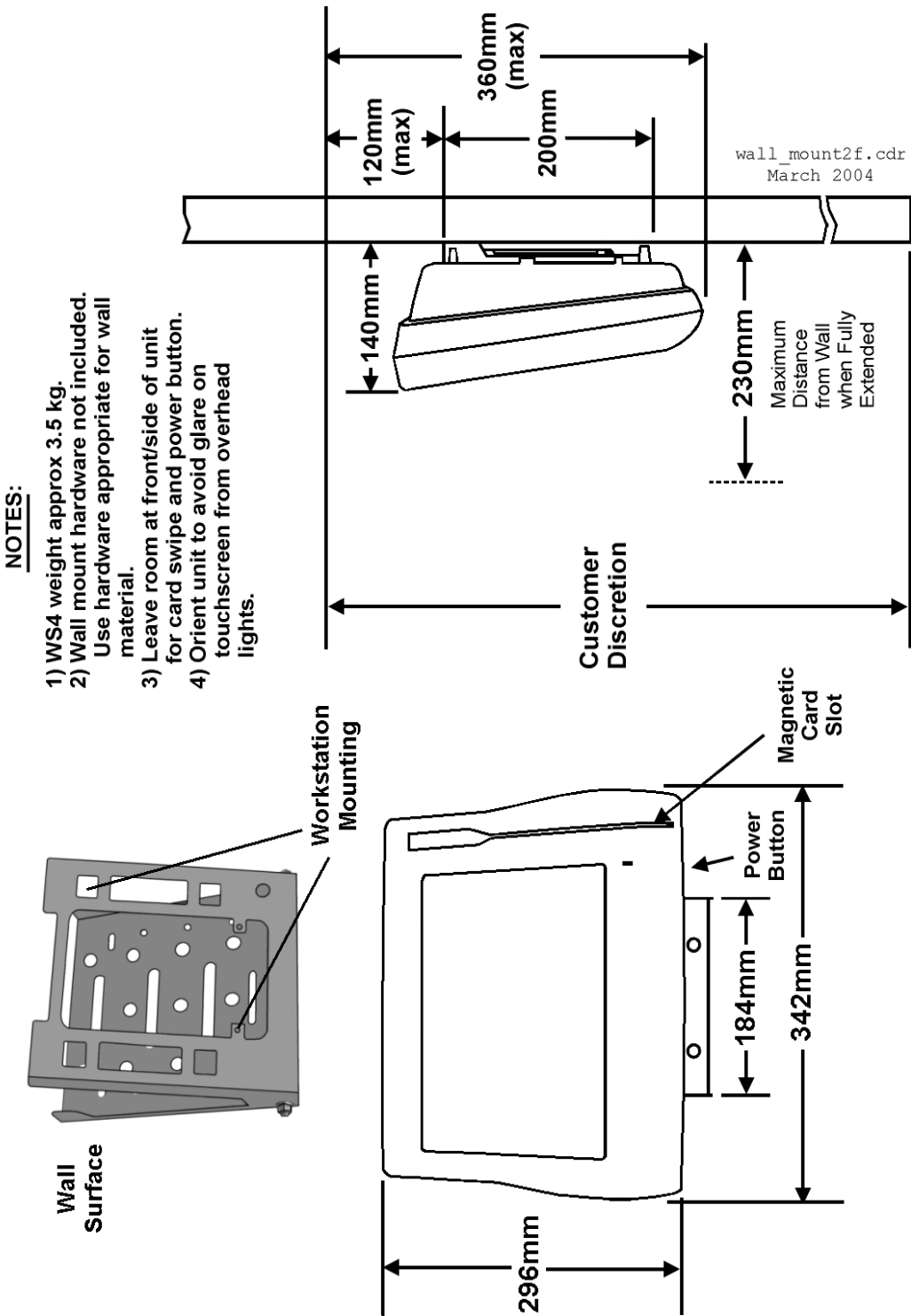
Workstation 4 LX on Adjustable Stand with 6" LCD Pole Display

NOTES:

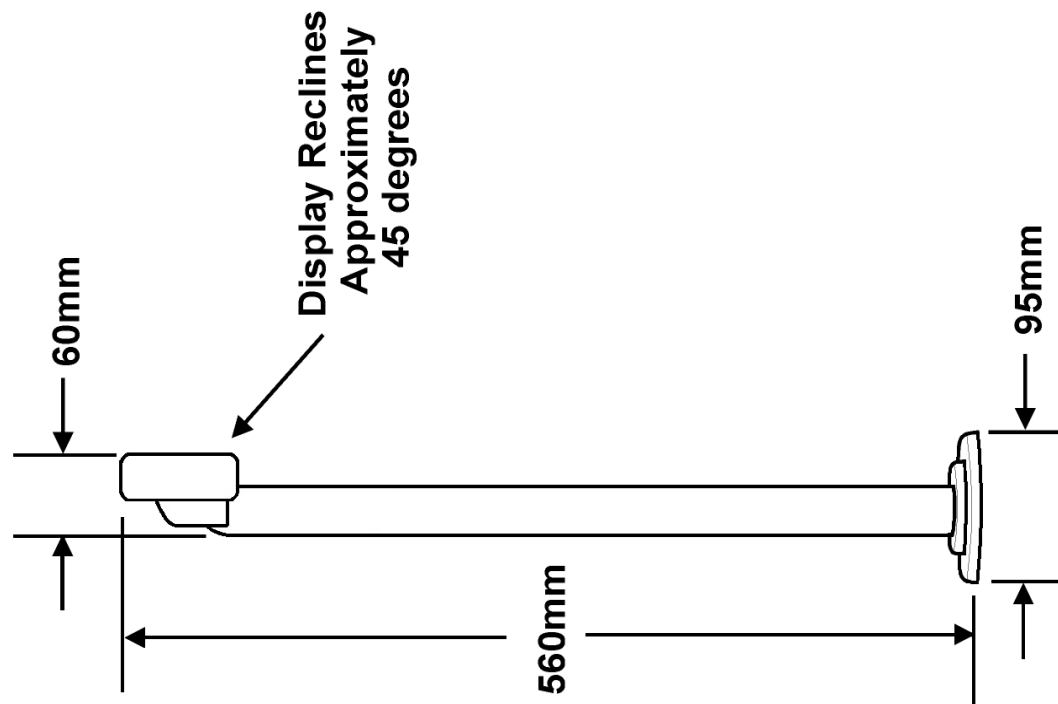
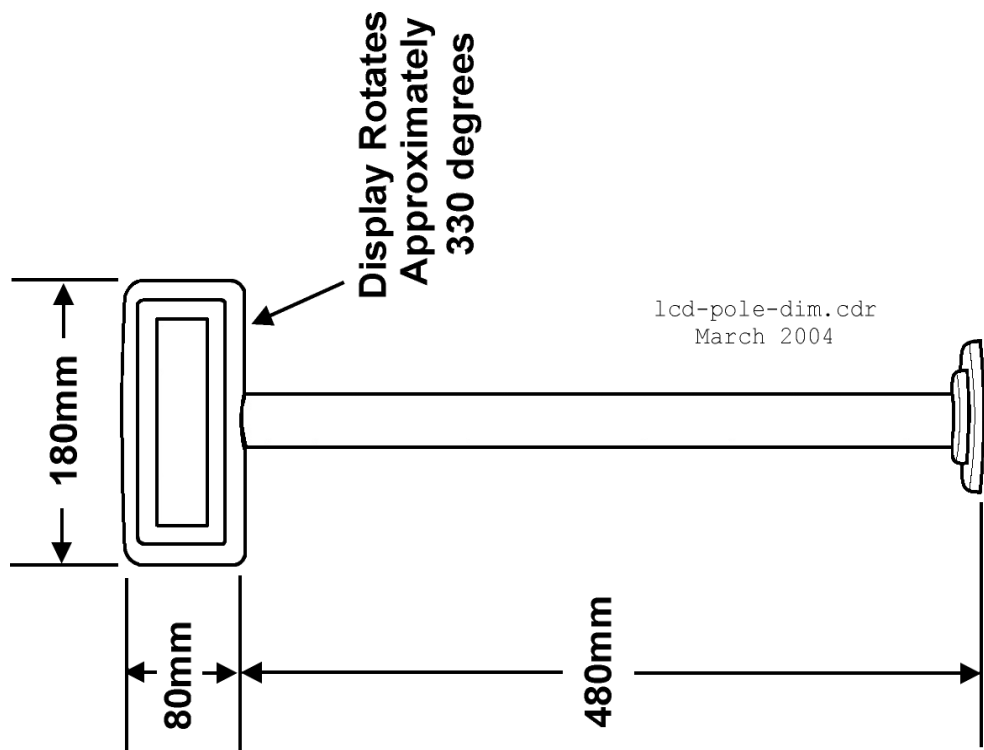
1. Cables from IO Panel routed through cable slot to exit stand.
2. Leave room at front/side of unit for card swipe and power button.
3. Orient unit to avoid glare on touchscreen from overhead lights.
4. Cash Drawers located at customer's discretion.
5. 77mm hole required under unit if Cash Drawer mounted under counter.



Workstation 4 LX on Wall Mount Stand

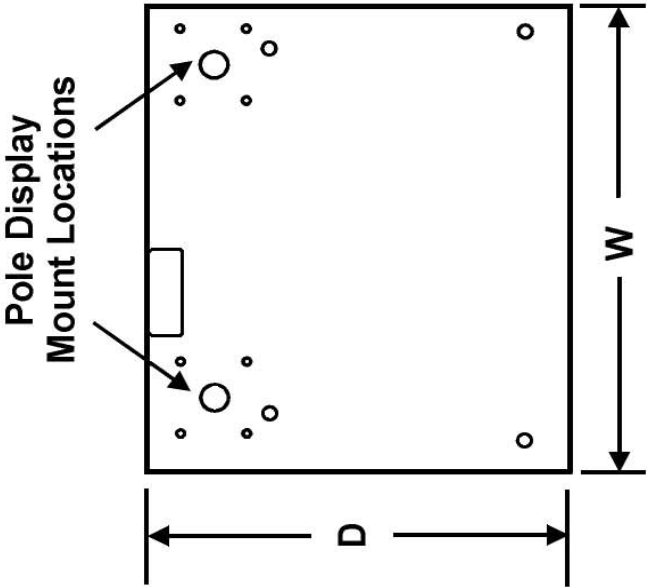
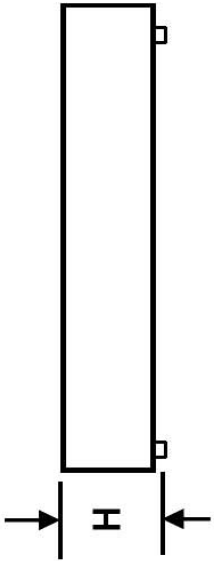


LCD Pole Display



Cash Drawers

MICROS P/N	W	D	H
400018-026	18.0"	16.71"	4.17"
	457.2 mm	424.4 mm	106 mm
400018-027	18.0"	16.71"	4.17"
	457.2 mm	424.4 mm	106 mm
400018-028	18.8"	20.0"	4.17"
	477.5 mm	508mm	106 mm
400018-029	18.8"	20.0"	4.17"
	477.5 mm	508mm	106 mm
400018-033	13.0 "	16.71"	4.17"
	330 mm	424.4 mm	106 mm



Appendix B

Connector and Cable Diagrams

On the pages that follow, you will find diagrams of the Workstation 4 LX I/O Panel connectors, system board connectors, and commonly used hook-up cables. A description of how each cable or connector is used is provided.

In this appendix

IO Panel Connectors	B-2
System Board Connectors.....	B-6
Hook-up Cables	B-7

IO Panel Connectors

The following connectors are located on the WS4 LX IO Panel.

RS422-A (COM4) and RS422-B (COM5)

The Workstation 4 LX includes a pair of these connectors wired identically. Each may be used in one of two different configurations, RS422 or RS232. The specific port configuration is determined and configured through the POS application. The two configurations are detailed in the following pages.



WARNING:

Do not insert a 6-Pin modular plug into the 8-Pin RS422-A and RS422-B connectors. The 6-Pin plug can push pins 1 and 8 of the connector out of position. These pins are used by the RS232 Interface. Should you wish to use the RS232 Interface at a later time, it may not function. Always use an 8-Pin modular plug to connect an IDN printer to the workstation.

IDN(+)

The most popular configuration is the RS422 based IDN(+) mode. The RS422-A port is configured as COM4, and the RS422-B port is configured as COM5. Either port is capable of driving MICROS IDN printing devices when supported by POS application. Figure B-1 shows the pin-out for this configuration.

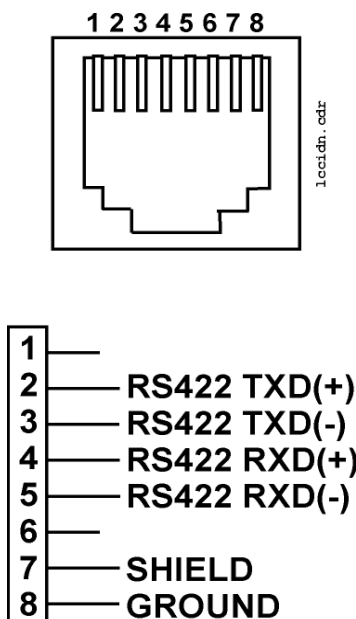


Figure B-1: RS422-A or RS422-B Ports Configured for IDN Printing

RS232

The RS422-A (COM4) and RS422-B (COM5) ports support a basic RS232 interface. This configuration is shown in below.

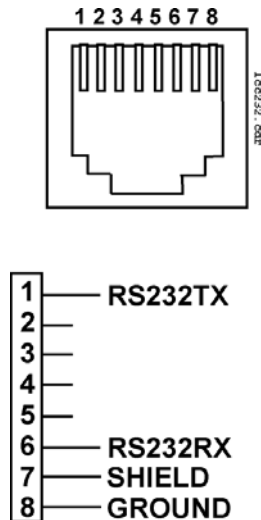


Figure B-2: RS422-A or RS422-B Ports Configured for RS232

10/100/1000 Ethernet Connector

The pin-out for the 10/100/1000 Ethernet port is shown in Figure B-3, below.

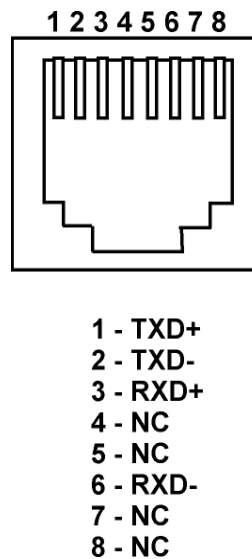
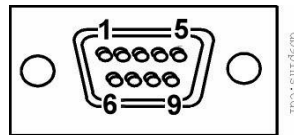


Figure B-3: 10/100/1000 Ethernet Connector Diagram

RS232 Connector

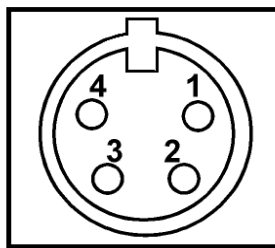
A single DB9F RS232 connector assigned to COM1 is provided. The pin-out is shown below.



- 1 - DCD
- 2 - RXD
- 3 - TXD
- 4 - DTR
- 5 - GND
- 6 - DSR
- 7 - RTS
- 8- CTS
- 9- RI

Figure B-4: DB9 RS232 Connector Diagram

Cash Drawer 1 and 2 Connectors



- | | | |
|---|---|---------------|
| 1 | — | +12V * |
| 2 | — | DRAWER OPEN |
| 3 | — | GND |
| 4 | — | DRAWER CLOSED |

* +24V is available through BIOS Setting
See Chapter 3

Figure B-5: Cash Drawer Connector Diagram

Remote Customer Display Connector

This port supports either LCD Customer Display or the IEE 2x20 VFD Customer Display.

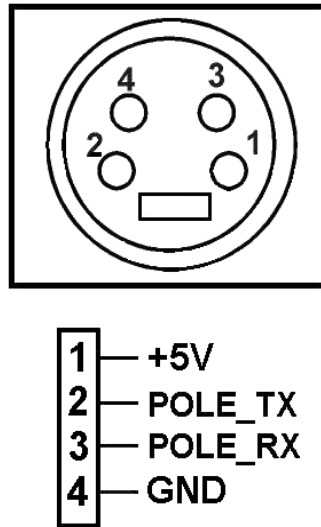


Figure B-6: Customer Display Connector Diagram

System Board Connectors

This section details connectors located on the Workstation 4 LX system board.

Magnetic Stripe Interface

The internal magnetic card reader connector is CN12, located on the system board. The pin-outs for this connector are shown in Figure B-7,

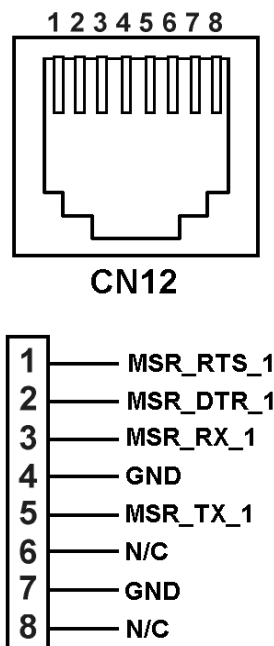


Figure B-7: LX System Board Magnetic Card Reader Connector

Hook-up Cables

The following pages show wiring diagrams of various hook-up cables that may be used with the Workstation 4 or 4 LX.

RS232 from the RS422-A and RS422-B Ports

Figure B-8 shows a cable that brings out the RS232 signals from RS422-A and RS422-B ports to a DB9 male connector. This cable is available from MICROS by ordering P/N 300319-102.

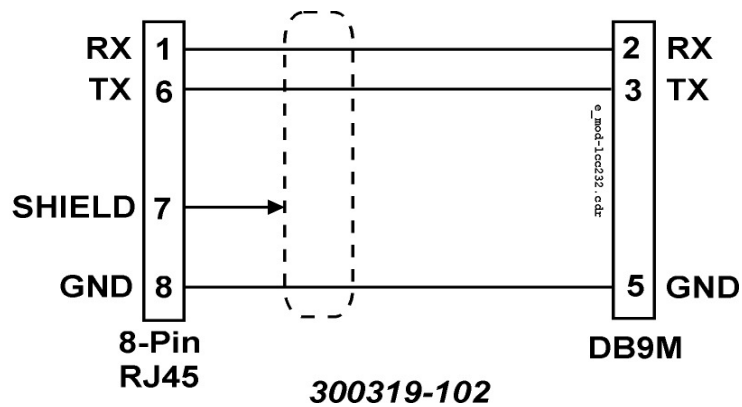


Figure B-8: Modular LCC/RS232 to DB9 Male Connector

Figure B-9 shows a cable diagram that adapts the same RS422-A and RS422-B ports to a DB25 connector.

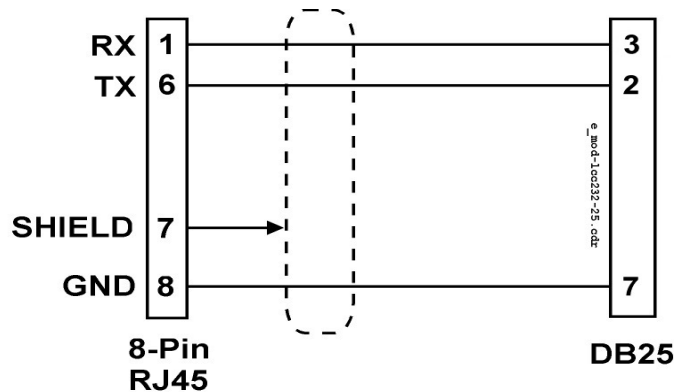


Figure B-9: Modular LCC/RS232 to DB25 Connector

LCD Customer Display Cables

The new LCD based Customer Display is accompanied by three new cable assemblies. The function of each cable is detailed in the following pages.

System Board Integrated Cable

This cable is pre-installed on the WS4 LX System Board. A diagram is shown in Figure B-10. This cable mates with the cable from the LCD customer display housing, shown in Figure B-11.

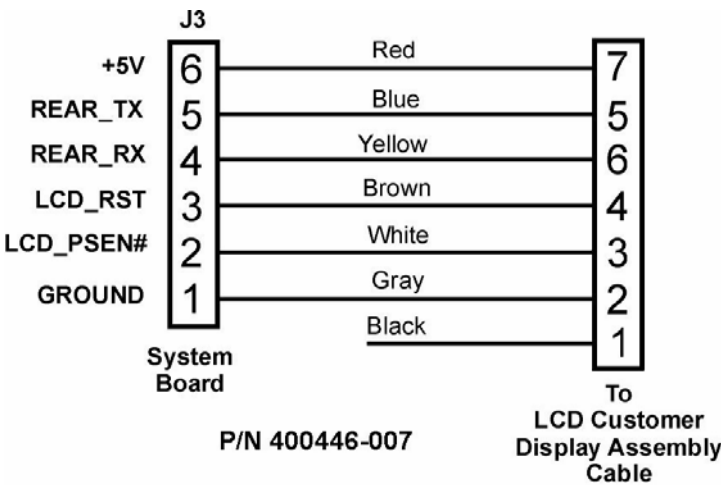


Figure B-10: System Board to Rear LCD Customer Display

LCD Customer Display Assembly Interface Cable

The LCD Customer Display Assembly includes the LCD Display Housing, which in turn consists of LCD Panel, Interface Board, hinge assembly, and interface cable. A diagram of this interface cable is shown in Figure B-11. The only difference between the Rear and Pole versions of the LCD customer display housing is the mounting hinge.

When the LCD customer display is attached directly to the rear of the workstation, this cable plugs into the system board cable shown in Figure B-10.

When the LCD customer display assembly is mounted on the pole, this cable attaches to the cable shown in Figure B-12, below.

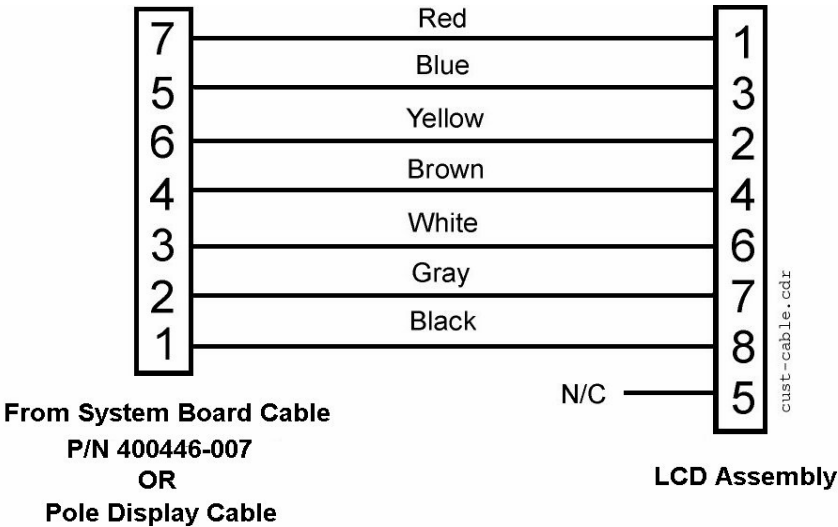


Figure B-11: LCD Customer Display Housing Cable

Remote Pole LCD Customer Display

This cable, shown in Figure B-12, is supplied with the Pole LCD Customer Display kit. It attaches between the 4-pin mini-DIN customer display connector on a WS4, WS4 LX, KWS4 or PCWS 2010 IO Panel, up through the pole to mate with the cable from the LCD Display Assembly shown in Figure B-11.

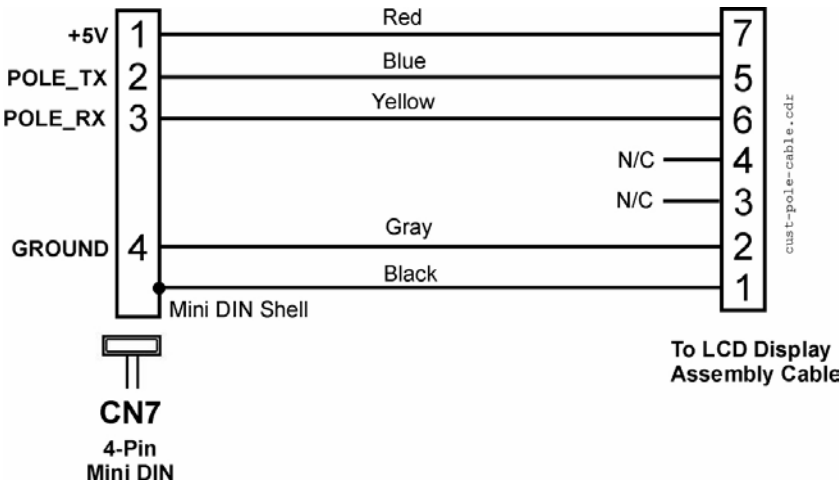


Figure B-12: Remote Pole LCD Customer Display Assembly

Ethernet

Figure B-13 shows a diagram of a standard Category 5 Ethernet hook-up cable. This cable would be connected from a workstation or server to the a switch.

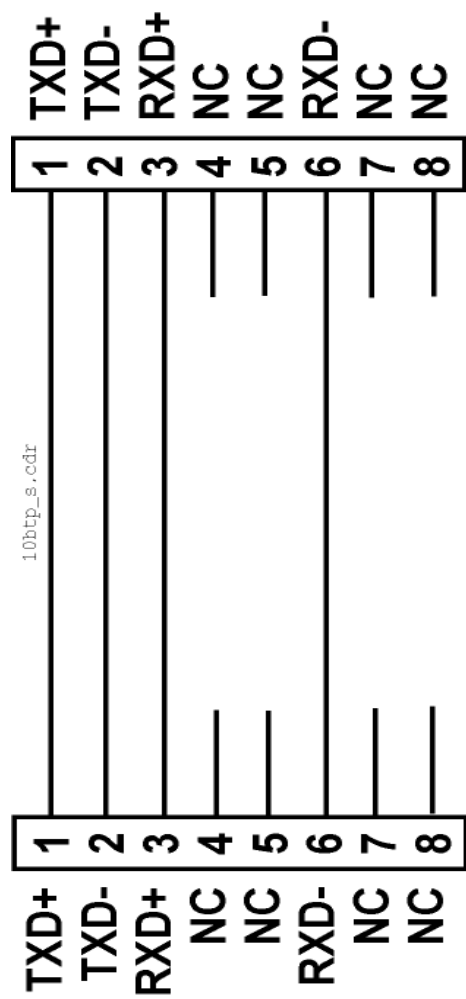


Figure B-13: EIA/TIA-568-A Cat 5 Ethernet Hook-up Cable Diagram

Cross-over Pinning

Figure B-14 shows a diagram of a typical Category 5 hook-up cable with the transmit/receive cross-over pinning implemented. This cable can be used when only two devices must be connected. For example it can be used to connect two workstations, or a server connected to a single client.

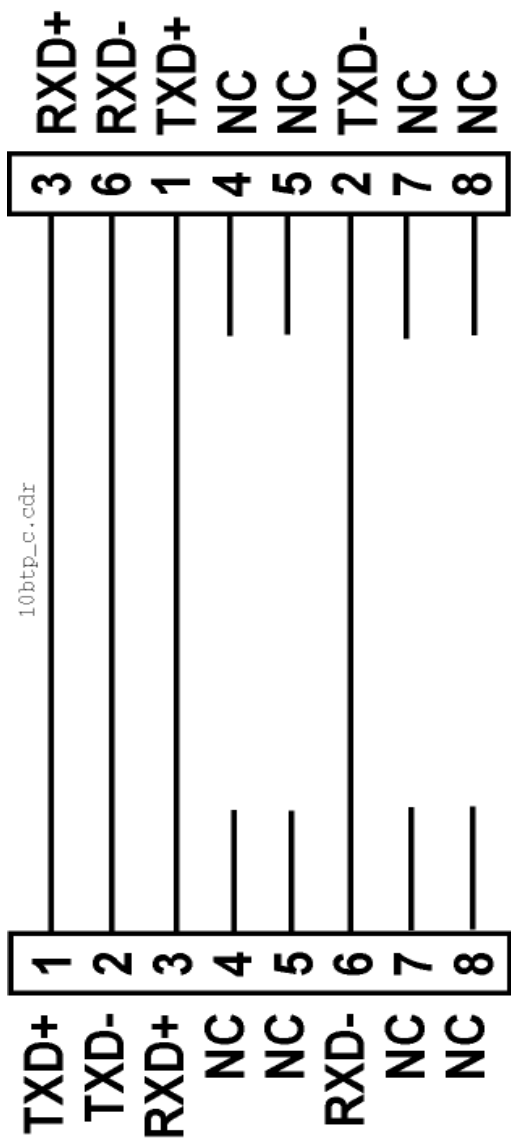


Figure B-14: Cat 5 Ethernet Hook-up Cable Diagram (cross-over)

8-Pin to 6-Pin Hook-up RS422 Cable (300319-001)

This cable brings out the RS422 signals from the 8-pin LCC/RS232 connector to a 6-pin wall plate or directly to the 6-pin connector located on the IDN device.

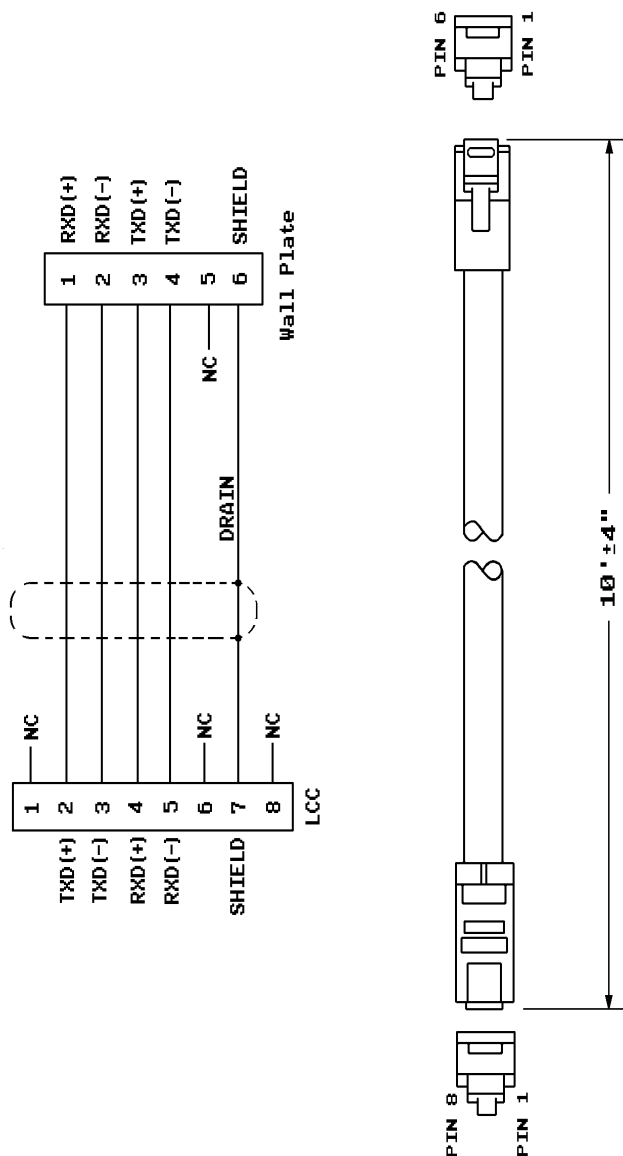


Figure B-15: 8-Pin to 6-Pin RS422 Hook-up Cable Diagram

Cash Drawer Extension Cable

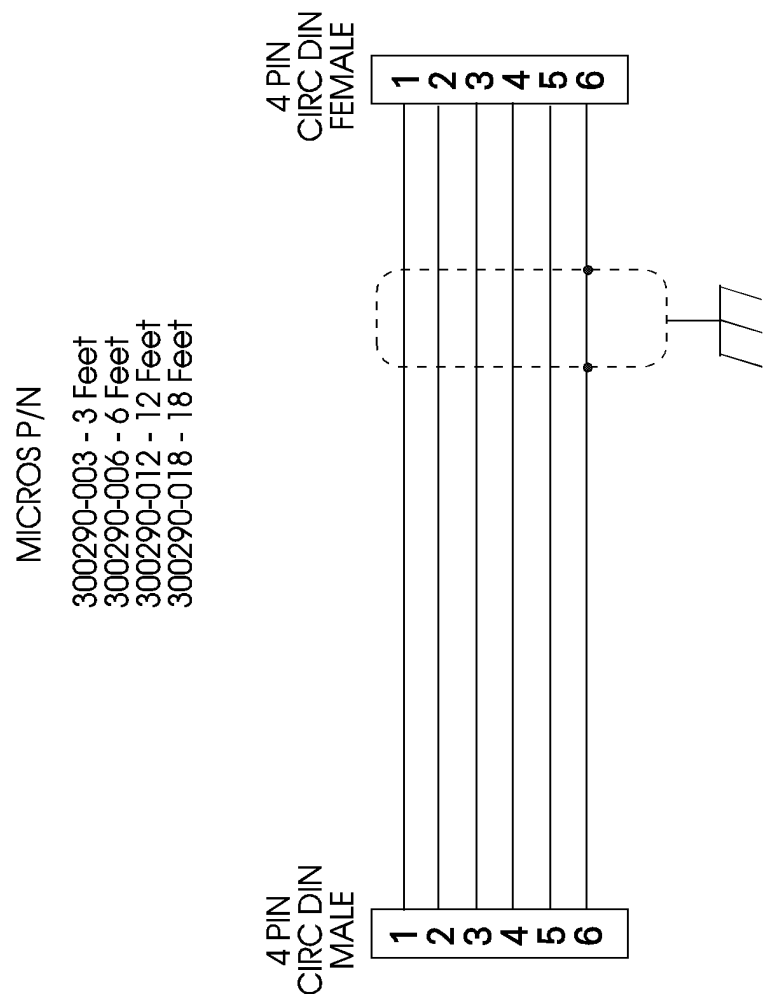


Figure B-16: Cash Drawer Extension Cable

Appendix C

FCC/DOC Statement

Federal Communications Commission Radio Frequency Interference Statement

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in equipment, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If this equipment appears to cause interference the user could consult the installer/dealer or an experienced radio television technician.

A booklet prepared by the Federal Communications Commission entitled "How to Identify and Resolve Radio - TV Interference Problems" may be useful. This booklet may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. with stock number #004-000-00345-4.

**Caution**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded interface cables must be used in order to comply with the emission limits.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class A/Class B (whichever applies) limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A/de Classe B (selon le cas) prescrites dans Le Règlement sur le Brouillage Radioélectrique Idicté par le Ministère des Communications du Canada.

**Attention:**

Tous changement ou modification, non expressément agréés par la partie responsable pour la conformité de l'installation, pourraient annuler l'autorisation de l'exploitation par l'utilisateur du matériel installé. Il est obligatoire d'utiliser pour la communication ou la réalisation d'interfaces un câble blindé, afin d'être en conformité avec les limites légales d'émission.
