micros® Systems, Inc.

PC Workstation 2015
Setup Guide

Declarations

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Printing History

New editions of this manual incorporate new and changed material since the previous edition. Minor corrections and updates may be incorporated into reprints of the current edition without changing the date or edition number.

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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.

In this section

Why Read This Manual?

Purpose

This guide is intended for those who will be setting up, installing and operating the MICROS PC Workstation 2015. It is not specific to a particular software application.

How This Manual is Organized

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

Chapter 1 describes the workstation and each of its hardware and software components. The chapter also provides product specifications, care and handling recommendations, and information on how to connect peripherals to the IO Connector Panel.

Chapter 2 describes the BIOS Setup screen and fields in detail..

Chapter 3 covers the PCWS 2015 System Unit hardware configuration. Topics include how to open the unit, identify and remove/replace the major components.

Chapter 4 covers the operational aspects of the unit from using the power button and mag stripe reader to arranging cables at the connector panel for the optional Adjustable Stand. A detailed description of the start-up screens and a discussion of how to use the Client Application Loader to connect to the system POS server and obtain application software.

Chapter 5 provides basic troubleshooting data and overview of the PCWS 2015 Diagnostics Utility.

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

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

Digital Images: Canon, Nikon

Image Processing: Paint Shop Pro

Line Drawings: CorelDraw

Chapter 1

What is the PCWS 2015

This chapter describes the basic hardware and options, then goes on to describe the software platform.

In this chapter

The System

The MICROS PCWS 2015 sets a new standard for performance in a Point of Sale terminal. Based on the Intel Calpella mobile platform, it provides the processing power demanded by the latest applications, while at the same time maintaining a low thermal output and minimal power consumption.

Two dual-core mobile processors from this family are available: the Intel Celeron P4505 or Core i5-520.

The PCWS 2015 is designed to operate along side the Workstation 5A, retaining similar styling and compatibility with existing stands, customer displays, magnetic card readers, biometric devices and other peripherals.

Operator Features

Figure 1-1 points out the primary external operator controls.
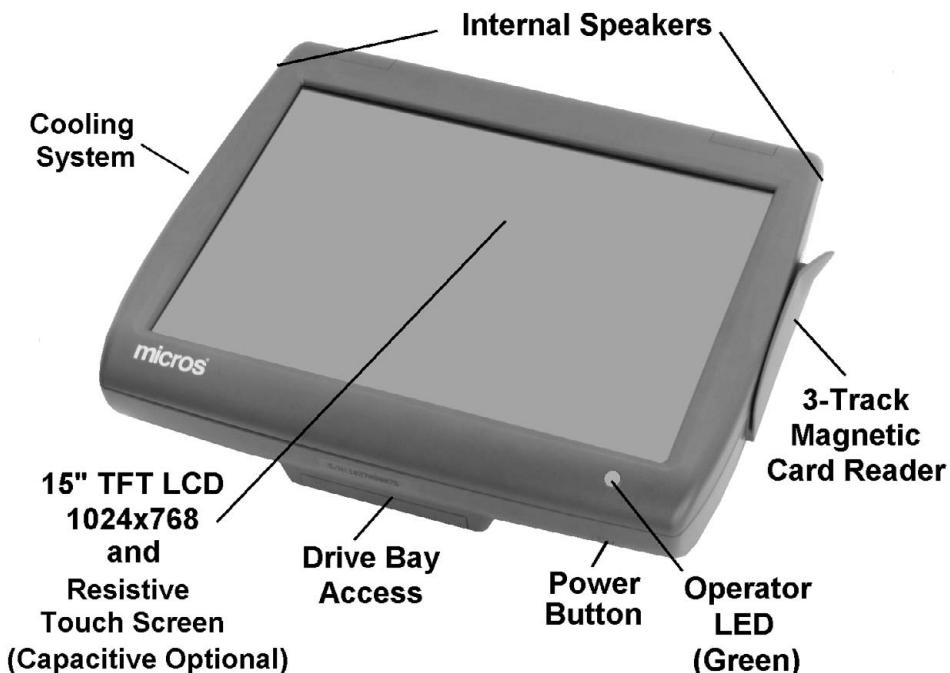
Figure 1-1: The PCWS 2015 - Operator Features

15" TFT LCD and Resistive Touchscreen

The Operator LCD consists of a 15" TFT LCD, at a fixed resolution of 1024x768 and is capable of supporting up to 262K colors. Placed over the LCD is a five-wire resistive touchscreen. An optional capacitive touchscreen will be available after release.

Operator LED

The PCWS 2015 Operator LED is Green to easily distinguish the unit from the Workstation 5A, which shares similar casework.

The Operator LED blinks two times per second as the workstation starts-up and performs the Power On Self Test (POST). After the operating system starts and loads the PCWS API, the Operator LED turns solid Green.

Power Button

The recessed illuminated power button is located on the lower right of the base. It is used to power the PCWS 2015 on and off. The illuminated power button is identified by the international symbol for power on/off.

3-Track Magnetic Card Reader

The low profile 3-Track Mag Card Reader is the same as used in the Workstation 5A.

Cooling System

The dual-core Celeron and i5 processor selections consume sufficient power to require active cooling. After conducting extensive thermal simulations, heat pipe cooling technology was selected for the PCWS 2015.

Heat Pipes combine the principles of thermal conductivity and phase transition to efficiently manage the transfer of heat between 'warm' and 'cold' surfaces. A heat pipe consists of a sealed pipe or tube made of copper, connected to both the 'hot' and 'cold' ends. A vacuum pump is used to remove all air from the empty heat pipe, and then it is filled with a small amount of coolant chosen to match the operating temperature.

On the PCWS 2015, the 'warm' end of the heat pipe is heatsink attached to the processor and the 'cold' end of the heat pipe is located under the power supply cover. The power supply cover is shaped to form a 'cooling tunnel.'

The 60mm CPU fan pulls ambient air through the front of the base, across the heat pipe radiator and power supply, before it exits from the left side of the workstation base. This is illustrated in Chapter 3.

The CPU fan runs at full speed when you start the workstation, then slow to about 2500 RPM in about two minutes. The fan continues to run at this speed as long as the workstation is on. If the CPU fan temperature sensor exceeds 47°C, the CPU fan will increase speed to compensate.

Internal Speakers

The PCWS 2015 introduces Intel High Definition Audio capability. The digital audio controller in the PCH is coupled to the analog RealTek ALC268-VB1 High Definition codec.The IO Panel includes a Line-Out audio jack for driving external powered speakers.

The illustration below points out features located on the bottom of the workstation.
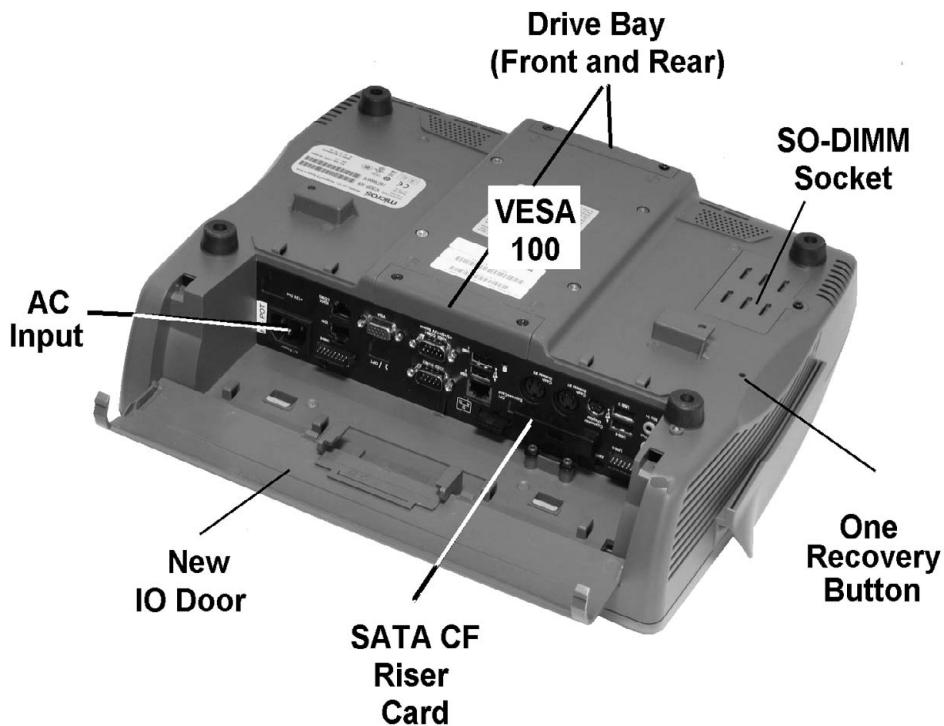
Figure 1-2: PCWS 2015 Features - Bottom View

Mass Storage

The PCWS 2015 can use standard 2.5" form factor SATA drives, but is also capable of booting from a USB Hard Drive.

2.5" SATA Drive Bay

The PCWS supports one or two laptop form factor (2.5") SATA drives, accessed from the front and rear of the base. The PCWS 2015 ships with a single 2.5" SATA drive installed in bay 0, near the IO panel. A second drive can be added for expansion or two drives can be used in combination to build a RAID 0 or RAID 1 array.

2.5" SATA Solid State Drives (SSD) are available, but are currently substantially more expensive than spinning drives and not yet available in a standard PCWS 2015 configuration.

Each bay is secured by access panels with captive allen head screws. Chapter 3 contains more information about adding and removing hard drives.

eUSB Flash Drive

The PCWS 2015 includes a dedicated 2x5 header reserved for an eUSB flash drive, similar to that used in the Workstation 5 and 5A. This device can be installed for additional storage and backup purposes. It can also be configured as boot device and primary storage for POSReady 2009 or Linux images. eUSB Flash Drives are available in multiple capacities as described in the PMA.

Compact Flash Card

Like most MICROS workstations, the PCWS 2015 includes an externally accessible Type 1 Compact Flash Card Socket. It is secured by a plate held in place by allen head screws.

Like the USB Flash Drive, a CF card can be used for additional storage and backup. However, it is not recommended that the CF Card be used as the primary storage device as this prevents the socket from being used for an optional Recovery CF.

Optional Recovery CF Cards are available for both POSReady 2009 and Windows 7 that can return the unit to an out-of-box condition within minutes. The Recovery CF ships with a current factory image, but customer specific images can be substituted by simply editing a text file.

Pressing the Recovery Button, accessed through a hole in bottom of the workstation is detected by the BIOS. On the next power cycle, the BIOS changes the boot order to boot from the Recovery CF. A recovery script automatically starts GHOST to transfers the image to the primary storage device.

Once the image transfer is complete, the unit automatically reboots, the default boot order is restored and the workstation boots from the primary storage device.

The PCWS 2015 uses a new CF Riser Card, called the SATA to CF Riser Card. The new riser card installs in the same physical location as the original CF Riser Card so that it is accessible from the IO panel, but does not use the same system board connector used by the original CF Riser Card, which it replaces.

See Chapter 3 for more information about the SATA to CF Riser Card.

Memory Expansion

Current PCWS 2015 configurations ship with a single 2GB DDR3 SO-DIMM installed in socket SO-DIMM1, located on the top of the system board.

Removing a small door on the bottom of the workstation exposes the second SO-DIMM socket. Adding a second 2GB DDR3 SO-DIMM can increase the total memory size to 4GB.

AC Input

The IO Panel AC Input connector is similar to that used on the Workstation 5/5A, and uses the same angled AC input connector compatible with the Workstation 5 and 5A Adjustable Stand.

IO Door

To accommodate the 10mm increase the overall height of the base, the 2015 uses a new IO Door. The new door features a flexible tab on one end to ease removal and installation.

VESA 100 Mount

The VESA 100 compatible mount on the base of the PCWS 2015 can support virtually any mounting from under a shelf to wall mount or an adjustable arm.

Features

This section discusses the standard IO capabilities and expansion options available for the PCWS 2015.

Expansion Capabilities

This section lists both IO Panel and system board expansion connectors.

Serial Ports

The PCWS 2015 features a total of 4 serial ports, configured in the following manner.

2 DB9 Serial Ports, COM1 and COM2.

- COM1 offers BIOS selectable +5V, +9V and +24V outputs.
- COM2 is a non-powered DB9 serial port.

COM4 IDN Port. RJ45 Modular Connector combines an RS422/RS232 Interface. This port can be used for IDN printers, serial printers or other serial peripherals.

COM5 Modular RS232 Port. RJ45 'full-featured' RS232 interface supports a number of peripherals and interfaces.

USB Ports

The PCWS 2015 features a wide selection of available external USB ports on the IO Panel and internal headers located on the system board.

Type A USB Ports

A total of four Type A USB connectors (USB1 - USB4) are available at the IO Panel for general purpose use. With the addition of the USB Extension Cable option one USB port can be made available at the front of the optional Adjustable Stand.

Powered USB Ports

The PCWS 2015 IO panel includes two unique powered USB ports. Unlike standard powered USB, these ports are not constrained to a single voltage and are smaller than traditional powered USB ports.

The port voltage is determined by the dongle connected to it. One port can provide either +5V, +12V, or +24V; the second port can provide either +5V or +12V.

Typical uses for these ports are powered USB peripheral such as the Protege Display System. MICROS has tested the Epson TM-T88V Powered USB Printer on port USB5. This implementation is shown on the next page.

Figure 1-3 shows the proprietary Powered USB implementation with a six foot custom powered USB Cable connected between the workstation and the USB module of the Epson TM- T88V thermal printer.

Figure 1-3: Powering the TM-T88V from the optional +24V Powered USB Dongle

+5V and +12V Powered USB Dongles are also available. See the Specifications page for more details on voltages and available power.

Figure 1-4, below shows the optional MICROS Protege Customer Display System connected to the USB5 or USB6 ports using a custom cable that carries both USB port data and +12V to operate a new class of intelligent USB peripheral devices.
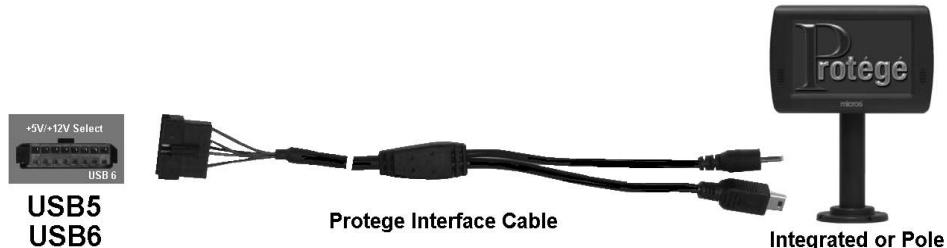
Figure 1-4: MICROS Protege Customer Display Connected USB5 or USB6

System Board USB Headers

A total of seven 2x5 USB headers are located on the System Board. One is dedicated to the optional eUSB flash drive, and one port is dedicated to the resistive or capacitive touch controller. This leaves additional headers available for options such as the integrated biometric fingerprint reader and or an 802.11 compatible USB WiFi card.

USB Port Security

All IO Panel USB ports can be individually disabled to prevent the use of keyboards, flash drives or other USB devices. USB per-port control is currently implemented in the BIOS. Future versions of the 2015 will allow USB per-port control through the PCWS API.

Mini-PCI Socket

The System Board Mini-PCI socket can accommodate one of two available options, listed below.

- 802.11 a/b/g/n Wireless Card.
- Mini-PCI Modem

  The Mini-PCI Modem can be used with WIN32 operating systems, and is certified for use in North America.
- Future Products.

Workstation Mounting Options

The mounting options available for the Workstation 5 and 5A also apply to the PCWS 2015.

The Adjustable Stand

The Adjustable Stand converts the low profile PCWS 2015 into an adjustable display design. The stand has a weighted base for stable operation, generous cable area, a compartment for storing a printer power supply, and locking hinges to allow the workstation to be positioned between 25° and 70°.
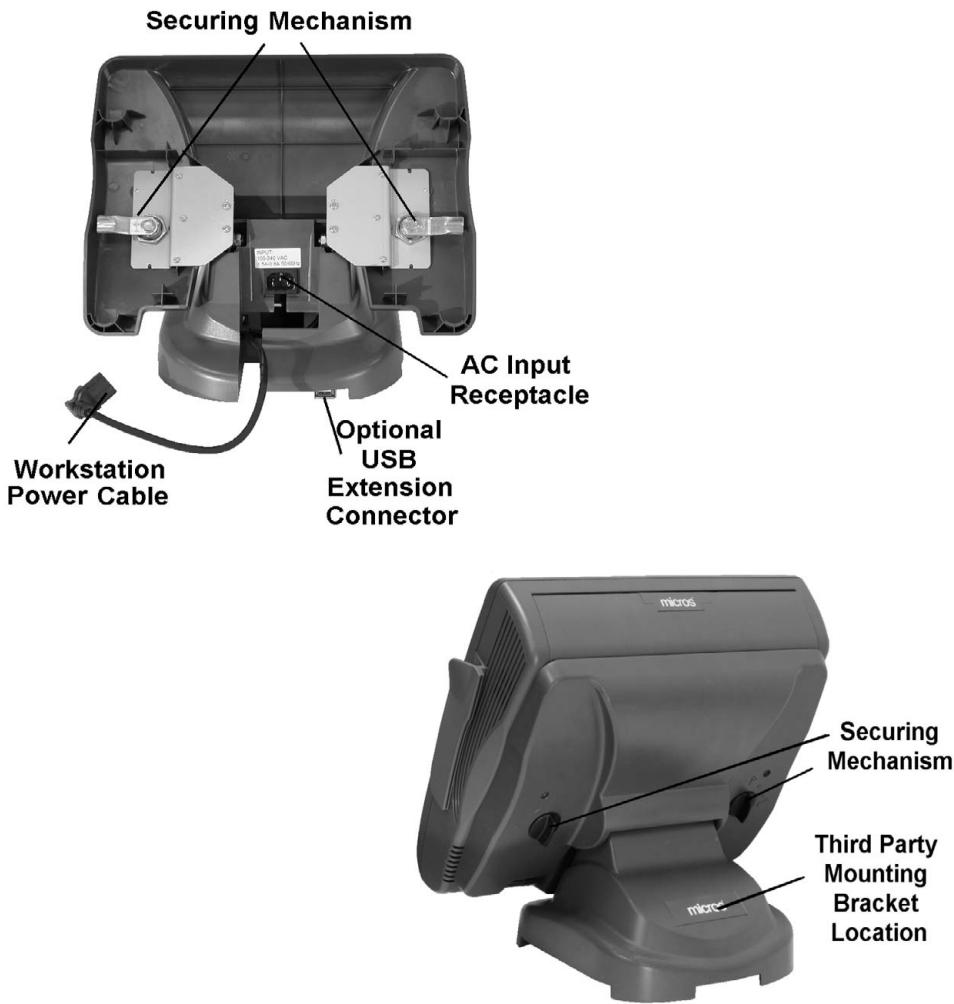
Figure 1-5: The Adjustable Stand

The rear of the stand includes a pair of knobs that secure the workstation to the stand. The base includes a knock-out for a custom bracket that supports third party peripherals.

Power Supply Compartment

Figure 1-6, below shows a view of the stand base plate and the compartment for housing an optional Printer Power Supply. AC power is connected to a receptacle in the throat of the stand using a low profile angled connector. An internal 'Y' cable distributes power to both the workstation and printer power supply compartment.
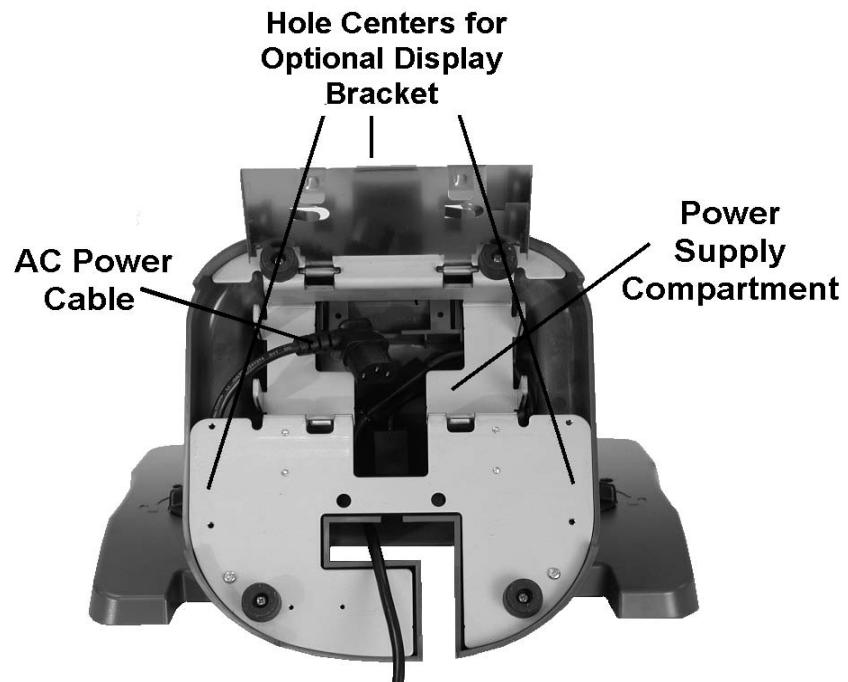
Figure 1-6: Adjustable Stand - Power Supply Compartment

Three pairs of mounting holes are provided at the left, right and rear of the plate sized for optional Adjustable Stand Mounting Bracket.

LCD Customer Display Options

The PCWS 2015 supports the 240x64 LCD Customer Display and the Protege Customer Display System. Integrated, Pole and Adjustable Stand Mounted versions are available, as detailed in the following pages.

240x64 LCD Customer Display

This display is based on a 240x64 monochrome STN LCD and companion LCD control board. It can emulate the 2x20 VFD Customer Display or operate in full graphics mode.

Figure 1-7 displays Integrated and Pole versions of the 240x64 LCD Customer Display. The lower right hand corner shows how the integrated version receives power and data through the IO Panel Remote Display Connector.

Figure 1-7: The 240x64 LCD Customer Display

Protege LCD Customer Display System

The MICROS Protege Customer Display System is a customer facing 7" LCD, providing a greater level of detail than traditional 2x20 VFD or the MICROS 240x64 graphical LCD.

The Protege is an intelligent display, featuring a microprocessor, internal Flash and RAM storage, and LCD controller. For the user, the Protege is equipped with a 7" 800x400 TFT LCD, 4-wire resistive touch screen, stereo speakers, internal microSD Card, and room for future expansion.

The Protege displays full transaction detail, allowing customers to confirm accuracy and improve speed of service in fast transaction environments. During idle times, the Protege can display customized visual content (e.g. slide shows), for use as a marketing and advertising tool.

Figure 1-8: The Protege Customer Display System

Software Platform

Software components include the BIOS, Operating System, the PCWS API, platform specific drivers, and utilities. These components are pre-installed on each unit to create a foundation upon which POS applications are installed using the Client Application Utility (CAL).

BIOS

The PCWS 2015 is based on the Phoenix SecureCore Tiano (SCT) BIOS. It is built on a decade of support for industry initiatives to handle the widest possible range of processors chip set and IO interfaces. The BIOS includes a pre-boot environment called UEFI (Unified Extensible Firmware Interface) to provide optional features such as CF Recovery.

Operating Systems

Operating Systems supported by the PCWS 2015 includes both 32 and 64-bit versions Windows 7 Professional Embedded or Windows Embedded POSReady 2009. Formerly known as Windows Embedded for Point of Service (WEPOS), Windows Embedded POSReady 2009 is derived from Windows XP Professional, and tailored for the point of service environment.

Additionally, a Windows XP Professional image will be available for those who wish to downgrade from Windows 7 Professional.

PCWS API and MICROS OPOS Drivers

The PCWS API is used by MICROS applications to control MICROS specific ports such as the cash drawers, IDN printers, customer displays and mag card reader. The API also controls the operator display brightness and operator LED, while the most recent version included with the PCWS 2015 adds the ability to enable/disable the external USB ports.

Third party application designers can choose to utilize the PCWS API to directly control these ports or use the MICROS OPOS (Open POS) drivers. The MICROS OPOS drivers provide third party application developers an industry standard structure for controlling point of sale peripherals. The OPOS drivers interact with the PCWS API in place of controlling the ports directly.

The MICROS OPOS drivers are included in the POSReady 2009 and Windows 7 Professional images, but not installed.

PCWS 2015 Diagnostics Utility

Utilities included with the PCWS 2015 include the WIN32 Client Application Loader (CAL), and an updated Diagnostics Utility for testing the unit.

MICROS CAL32

The MICROS CAL32 provides many of the same application level functionality as the MICROS CE based CAL Client, but does not perform operating system or platform updates. CAL32 can be used to install MICROS client applications and updates, as well as PCWS 2015 drivers and utilities.

CAL 32 is included with all factory images, but is not installed.

Simphony Prerequisite Software

To simplify the installation of Simphony applications, the MICROS PCWS 2015 platform is pre-loaded with most of the prerequisite required by Simphony, including SQL Express, Visual C++ 2008 Runtime, and POS for .NET.

POS Application

The PCWS 2015 is shipped without a Point of Sale application installed. The MICROS Client Application Loader (CAL) included with each unit can connect to any MICROS application server and download the application in minutes.

The table below summaries the applications that have tested.

Operating System	RES/3700	LES/9700	Simphony
POSReady 2009	All 4.X as Client & Server RES 5.0 Client Only	9700 V3.6 Client	As Client on Simphony 1.x and 2.x
Windows 7 Professional	RES 5.0 as Client & Server	TBA	As Client on Simphony 2.X

Disk images for MICROS PC Workstations are posted in the Member Login Area of the MICROS Web Site: Members -> Product Support -> Hardware -> Downloads, Disk Images.

Intel AMT

Intel Active Management Technology is the next generation of advanced manageability features developed as a direct result of IT customer feedback gained through market research. Intel AMT reduces the TCO Total Cost of Ownership (TCO) through features such as asset tracking and remote manageability. Intel AMT extends the manageability capability for IT through Out Of Band (OOB) operation, allowing asset information, remote diagnostics, and recovery on client systems even when they are in the ACPI S5 (Soft-Off) state, or in situations where the operating system hangs.

Power Management States

Introduction

This section introduces the PCWS 2015 power management states.

References to power management states are specified in bold capital letters, e.g., **NOPOWER**, and **ON**. See chapter 3 for more information about operating the PCWS 2015.

UNPLUGGED

- The AC power cord is not connected to a wall outlet. This state is also referred to as "ACPI G3 Mechanical Off."
- The Operator LED is Off.
- The Operator LCD is blank.

The workstation can be safely disassembled when in this state.

NOPOWER

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

   This is the ACPI S5 'soft-off' state where the power supply remains active, delivering minimal power to several key circuits in order to detect the power-button, recovery button or Wake-On-Lan event.

It is not safe to disassemble the workstation when in this state. Power supply components remain energized, presenting a shock hazard. Always remove the AC power cord from the IO Panel before disassembling the PCWS 2015.

ON

- The Operating System and POS application are operating. RAM contents are maintained.
- The Operator LED is solid Green.

Standby and Hibernate

Standby is available with POSReady and the more advanced Hibernate is available with Windows 7 Professional. Both power saving modes are supported at the hardware level, but may not be supported in some POS applications.

Last Power State Retention

The PCWS 2015 retains the last power state (**ON** or **NOPOWER**) in non-volatile memory. In BIOS Setup, the Power Failure Restoration field in the Advanced - Special Configuration menu determines how the unit behaves when AC power to the workstation fails and then returns.

The default setting of 'Last State' means that if the workstation is **ON** and AC power fails, it returns to **ON** when AC power is restored with no action required by the operator. See Chapter 3 for more information.

PCWS 2015 Power Management State Table

	Current State	Event Source	Scenario	New State
1	*UNPLUGGED*	AC Power	AC Power becomes available and the last recorded state was not the **ON** state.	*NOPOWER*
2	*NOPOWER*	Operator	The operator presses the power button for less than 1 seconds.	*ON*
3	*NOPOWER*	Operator	The operator presses the power button for more than 4 seconds.	*ON*
4	*NOPOWER*	Server Application	A server application sends a 'Wake On LAN' command.	*ON*
5	*ON*	Operator	The operator presses the power button for more than 4 seconds.	*NOPOWER*
6	*ON*	Application	The application shuts down the workstation.	*NOPOWER*
7	*ON*	Server Application	A server application sends a "Wake On LAN" command.	*ON*
8	*ON*	Application	Warm boot is called by the CAL.	*NOPOWER* then *ON*
9	*NOPOWER*	AC Power Failure	AC Power fails and restored	*NOPOWER*
10	*ON*	AC Power Failure	AC Power fails and is restored	*ON*

Figure 1-9: PCWS 2015 Power Management States

Specifications

The PCWS 2015 conforms to the following specifications.

Specification	Parameters
Processor Selections	Intel Celeron P4505, Dual Core 1.8GHz, or Intel i5-520, Dual Core, 2.4GHz
IO Controller	QM57 Platform Controller Hub
Display	15" TFT LCD (1024x768)
Touchscreen	EloTouchSystems Five-wire resistive, 100 thousand points-per-square inch resolution rated at a screen life of over 35 million touches in one location. Capacitive option available.
Display Backlights	LED Backlights with three intensity settings programmable through the PCWS API.
Real Time Clock	100-year calendar with alarm features and century roll-over, includes 242 bytes of battery backed CMOS RAM.
Memory	2 SO-DIMM Sockets - Max 8GB DDR3 1066
Mag Stripe Reader	3-Track ABA compatible.
Optional Customer Displays	240x64 STN graphics based LCD Protege Customer Display System
USB Ports	Fourteen USB 2.0 Ports > Eight Internal > Six external (Four USB type A, two MICROS Powered USB). External USB ports can be disabled.
LAN Interface	10/100/1000 Ethernet - Modular RJ45
Serial Ports	1 DB9 RS232 Powered Serial w/ handshake 1 DB9 RS232 Serial /w handshake 1 Modular RS232 Serial /w handshake 1 Modular RS422/RS232 Serial (IDN)
Input Voltage	Universal Input - 85 to 264VAC, 47 to 63Hz.
Input Power	35W Typical
BTU/Hour	120 Typical, 290 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

Specification	Parameters
Weight	10.5 lbs. (4.7 kg) / Shipping weight 14.0 lbs. (6.35 kg)
Case Material	PC-ABS Plastic
Physical Dimensions	See Appendix A

Approvals

The PCWS 2015 meets the following safety and environmental certifications.

Directive	Specification	Year
Safety	EN 60950-1:2006+A11+A1	2010
(2006/95/EC)	IEC 60950-1:2005+A1	2010
EMC	EN 55022:2006	2006
(2004/108/EC)	EN 55024:1998+A1+A2	2003
	EN 61000-3-2:2006	2006
	EN 61000-3-3:2008	2008

Chapter 2

PCWS 2015 BIOS

This chapter describes the PCWS 2015 BIOS. Supported BIOS Versions include:

- O1201r (Revision C System Board Only)
- O1301 (Revision C System Board Only)
- O1301g (Revision D or later System Boards Only)

In this chapter

Starting BIOS Setup Utility

This section describes how to start and use the Phoenix SecureCore Tiano Setup Utility.

Warning: Many of the Setup Screens contain fields which could cause the workstation to malfunction if set incorrectly. MICROS recommends you do not change BIOS fields unless specifically instructed to do so.

- PCWS 2015 specific settings are contained in the Advanced -> Special Menu.

- To control the IO Panel USB Ports through the BIOS, refer to page 2-20.

PCWS 2015 BIOS Version and System Board Compatibility

The table below describes BIOS compatibility with system board revision.

O1201r	O1301	O1301g
Revision C	Revision C	Revision D

System Board Revision C

- Requires BIOS Versions O1201r or O1301.

  These versions can only be used System Board Revision C. Not compatible with System Board Revision D.

System Board Revision D (or later)

- Requires BIOS Version O1301g or later.

  The Revision D System Board includes the following hardware changes that require the new BIOS.

  - USB Port Switches controlled by GPIO lines to manage the IO Panel USB Ports from the Diagnostics Utility or BIOS.

  - The Powered USB voltages on USB5 and USB6 are cycled on-off-on when the workstation is rebooted.

Starting BIOS Setup

1. Connect a USB Keyboard to one of the USB ports located on the IO panel.

2. Power-up or restart the PCWS 2015 using the power button.

3. Just as the BIOS Splash screen with MICROS logo appears, press the [F2] key.

   The current MICROS BIOS Version is displayed in the upper left hand corner of the splash screen.

   A section of the Phoenix SecureCore Tiano Setup Main screen shown below appears.

```
              Phoenix SecureCore Tiano Set
 Main      Advanced      Security


   System Date            [11/08/2011]
   System Time            [12:48:22]
 ▸System Information
 ▸Boot Features
 ▸Error Manager


```
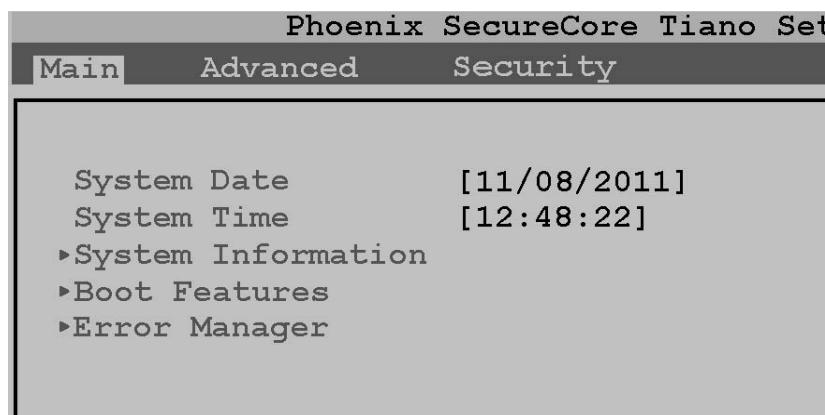
Figure 2-1: PCWS 2015 BIOS Setup Main Screen (O1301g or later)

4. To adjust the System Date and Time, follow the help instructions shown at the bottom of the screen.

5. To view the System Information Screen, scroll to the 'System Information' selection and press Enter.

System Information Screen

The System Information Screen for each processor configuration is shown in Figure 2-2.

```
                    Phoenix SecureCore Tiano Setup
  Main

                        System Information

BIOS Version                [O1201r]
Build Time                  [04/14/2011]
Processor Type              [Intel (R) Core(TM)  i5 CPU  E 520 @ 2.40GH]
Processor Speed             [2.40GHz
System Memory Speed         [1066 MHz
L2 Cache RAM                [256 KB
Total Memory                [2048 MB
Memory Mode                 [Memory MODE_DUAL_INTERLEAVE
Memory Channel A Slot 0 [2048 MB  (DDRIII1067)
Memory Channel A Slot 1
Memory Channel B Slot 0
Memory Channel B Slot 1
```

```
                    Phoenix SecureCore Tiano Setup
  Main

                        System Information

BIOS Version                O1301g
Build Time                  09/23/2011
Processor Type              Intel (R) Celeron (R) CPU  P4505 @ 1.87GHz
Processor Speed             1.87 GHz
System Memory Speed         1067 MHz
L2 Cache RAM                256 KB
Total Memory                2048 MB
Memory Mode                 Memory MODE_DUAL_INTERLEAVE
Memory Channel A Slot 0 2048 MB  (DDRIII1067)
Memory Channel A Slot 1
Memory Channel B Slot 0
Memory Channel B Slot 1
```

Figure 2-2: PCWS System Information Screen (i5 Core and P4505 Processors)

BIOS Version and Build Time

The MICROS BIOS Version and build time are displayed.

Processor Type and Speed

The Processor Number and Clock Speed are displayed in this field. Two processors are available, listed below.

- i5 520E @ 2.40GHz.
- Celeron P4505 @ 1.8GHz.

System Memory Speed

Displays the Memory 'Front Side Bus' speed.

L2 Cache RAM

Displays the L2 Cache size.

Memory Mode

The processor selections feature a dual channel memory controller for improved performance. The memory controller runs in the Dual-Channel symmetric or interleaved configuration when two SO-DIMMs are installed. In this configuration, memory, addresses are ping-bonged between each channel after each cache line.

Memory Channel A Slot 0

This field displays the SO-DIMM installed in the SO-DIMM1 socket.

Memory Channel B Slot 0

This field displays the SO-DIMM installed in the SO-DIMM2 socket.

Advanced

The Advanced tab contains the majority of BIOS settings listed under a number of headings shown in Figure 2-3, below.

```
              Phoenix SecureCore Tiano Setup
   Main   Advanced   Boot    Exit

     Select Language                 [English]
   ▸ Boot Configuration
   ▸ ACPI Configuration
   ▸ Processor Configuration
   ▸ Peripheral Configuration
   ▸ HDD Configuration
   ▸ IMC Configuration
   ▸ South Bridge Configuration
   ▸ Network Configuration
   ▸ Winbond Configuration
   ▸ Special Configuration
   ▸ AMT Configuration
   ▸ ME Configuration
     Setup Warning:
     Setting items on this screen to incorrect
     values may cause system to malfunction!
```

Figure 2-3: PCWS 2015 BIOS Advanced Menu (Version O1201r)

Note: All PCWS 2015 specific fields are contained in the 'Special Configuration' Menu.

Select Language

Three selections are available.

Boot Configuration

The Boot Configuration menu contains fields that determine how information is displayed at boot time, provide support for legacy USB devices, and enables console redirection for debugging.

```
              Phoenix SecureCore Tiano Setup
          Advanced

                    Boot Configuration


     Quick Boot                    [Disabled]
     High Resolution Graphics      [Enabled]
     Diagnostic Splash Screen      [Disabled]
     Diagnostic Summary Screen     [Disabled]
     BIOS Level USB                [Enabled]
     USB Legacy                    [Enabled]
     Console Redirection           [Disabled]
     UEFI Boot                     [Enabled]
     Legacy Boot                   [Enabled]
     Boot in Legacy Video Mode     [Disabled]
     Load  OPROM                   [On Demand]
```
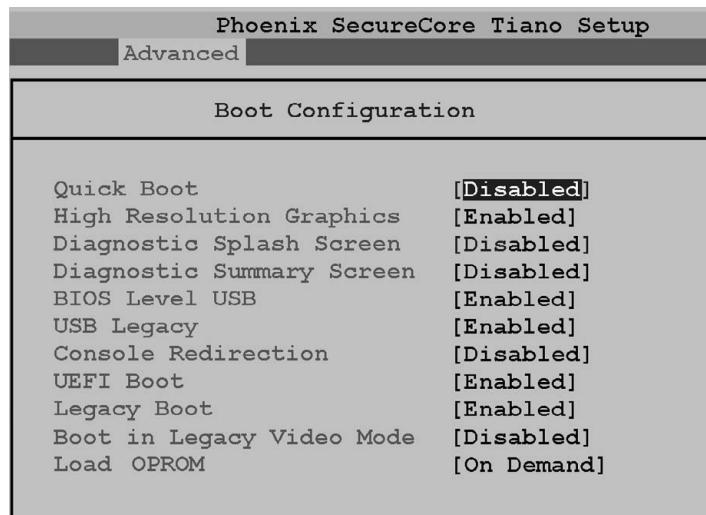
Figure 2-4: Advanced - Boot Configuration

Quick Boot [Disabled]

Enables time-optimized POST, causing certain pre-configured OEM optimizations to be made when the system boots.

High Resolution Graphics [Enabled]

Enables High Resolution Graphics BIOS Splash Screen.

Diagnostics Splash Screen [Disabled]

Enables a Graphical POST, including animation, sound, icons, advertisements, and other multi-media objects that may be configured by the OEM. On the PCWS 2015, this is confined to the Blue splash screen with MICROS logo. The BIOS Version is displayed in the upper left corner of the splash screen.

Diagnostics Summary Screen [Disabled]

Enables the diagnostic summary screen. The default setting of [Disabled] decreases the boot time.

BIOS Level USB [Enabled]

Enables BIOS support for USB Keyboards and Mice.

USB Legacy [Enabled]

Enables support for USB devices such as keyboards and mice, but adds support for mass storage.

Console Redirection [Disabled]

Console Redirection is a debug feature where the display console is redirected over a serial port.

[Enabled] - causes the BIOS to always use the serial port as the console, without testing for the presence of the terminal emulation program.

[Disabled] - causes the BIOS to never invoke console redirection, but instead always use the main keyboard and video display.

UEFI Boot [Enabled]

This selection enables the Unified Extensible Firmware Interface, a specification that defines a software interface between an operating system and platform software. The UEFI Specification is developed by the Unified EFI Platform Forum, an industry-wide organization. UEFI specification 2.3, was approved in May 2009.

UEFI is not restricted to a particular processor architecture, and can run on top of or in place of traditional BIOS implementations. The Phoenix SecureCore Tiano BIOS fully supports the UEFI implementation.

UEFI includes a pre-boot environment capable of selecting a boot device and booting to the operating system, a key feature for using the Recovery CF.

Legacy Boot [Enabled]

When Enabled, this option will skip some tests to speed up the POST.

Load OPROM [On Demand]

Load all Option ROMs or on demand according to the boot device.

Boot Priority [UEFI First]

Select the priority of the boot option between UEFI and legacy devices.

ACPI Configuration

The PCWS 2015 defines two thermal zones, SYS and CPU. Each zone contains a sensor coupled to fan controllers located in the Super IO. At start-up, the BIOS configures the fan controllers using the default active trip points for the CPU and SYS fans.

```
              Phoenix SecureCore Tiano Setup
        Advanced

                  ACPI Configuration


   Active Trip Point SYS Fan     [55 C]
   Active Trip Point CPU Fan     [47 C]
   Passive Trip Point            [95 C]
   Passive TC1 Value             [ 1]
   Passive TC2 Value             [ 5]
   Passive TSP Value             [10]
   Critical Trip Point           [POR]
   HPET Support                  [Enabled]
   HPET Memory Map BAR           [0FED0000]
   Enabled PTID                  [Disabled]
   FACP - PM Timer Flag Value    [Disabled]
```
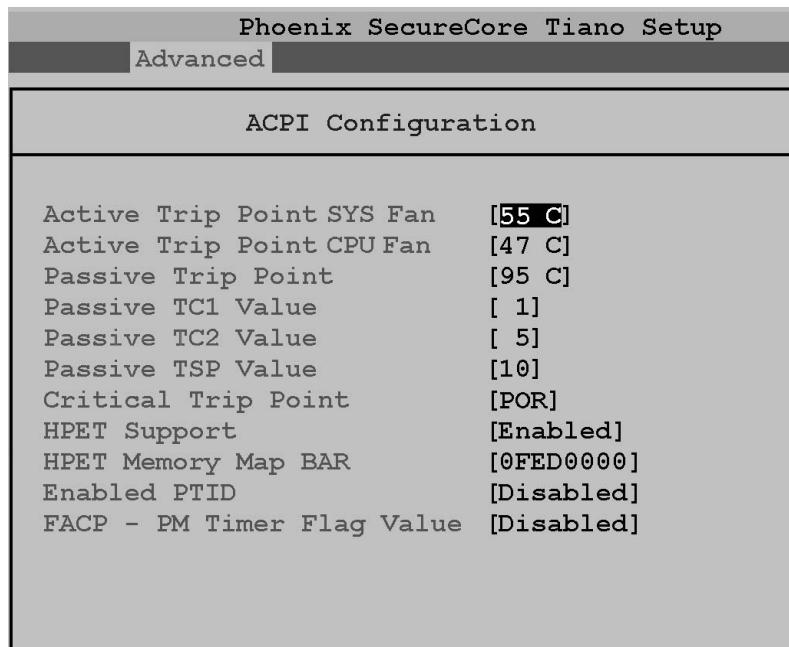
Figure 2-5: Advanced - ACPI Configuration Fields

Active Trip Point SYS Fan

This field displays the temperature at which the SYS thermal zone activates the SYS fan. The SIO SYS fan controller continuously compares the system zone temperature to the SYS Active Trip Point. When the system temperature reaches 55°C (131°F), the fan starts. As the fan runs, the SYS fan thermal zone will cool to below 55°C and the fan slows down.

Note: the SYS Fan may not be installed on later production units.

Active Trip Point CPU Fan

This field displays the temperature at which CPU thermal zone increases the CPU fan speed. At start-up, the BIOS programs the controller to run the CPU fan at a continuous speed of about 2500RPM.

When the CPU zone temperature (as measured by T2, located near the CPU) exceeds the trip point value of 47°C, the CPU fan speed increases. When the increased fan speed brings the zone temperature below 47°C, the CPU fan speed returns to about 2500RPM.

Passive Trip Point [95C]

If the processor exceeds the Passive Trip Point Temperature the passive cooling policy is implemented. This may result in processor clock speed throttling.

Passive TC1 Value [1]

The Passive Thermal Compares Value is used as a constant for the TC1 Passive Cooling formula.

Passive TC2 Value [5]

The Passive Thermal Compares Value is used as a constant for the TC2 Passive Cooling formula.

Passive TSP Value [10]

The Passive Thermal Sampling Period value (in tenths of seconds) is used used to implement the Passive cooling equation. TSP along with TC1 and TC2, enables the proper hysteresis required by the system to accomplish an effective passive cooling policy.

Critical Trip Point [POR]

The Critical Trip Point is the temperature at which the operating system performs a critical, but orderly shutdown of the system. The default value 'POR' is the Plan of Record for the installed processor.

HPET Support [Enabled]

The PCH contains two High Precision Event Timers (HPET) used for ACPI Interrupt Mapping.

HPET Memory Map BAR (Base Address Register) [0FED0000]

Indicates the HPET Memory Map Base Register Address.

Enabled PTID [Disabled]

Enable or Disable Power and Temperature Instrumentation Details.

FACP - PM Timer Flag Value [Disabled]

FACP (Fixed ACPI Description Table) includes various fixed length entries that describe the ACPI features of the hardware.

The Fixed ACPI Description Table starts with the FCAP signature. The FADT describes the implementation and configuration details of the ACPI hardware registers on the platform.

Processor Configuration

This screen contains many processor related settings summarized in Figure 2-6, below.

```
              Phoenix SecureCore Tiano Setup
          Advanced

                  Processor Configuration

  Active Processor Cores              [All]
  Intel (R) HT Technology             [Enabled]
  Enabled XD                          [Enabled]
  Machine Check                       [Enabled]
  Fast Strings                        [Disabled]
  Intel(R) Virtualization Technology  [Disabled]
 ▶Processor Power Management

          P-States (GV3)              [Enabled]
          Boot Performance Mode       [Auto]
          C-States                    [Enabled]
          Extend C-States             [Disabled]
          C6-State                    [Disabled]
          FACP - RTC S4 Flag Value    [Enabled]
          APIC - IO APIC Mode         [Enabled]
          ALS Support                 [Legacy]
          EMA Support                 [Disabled]
          MEF Support                 [Disabled]
          ACPI 3.0 T-States           [Disabled]
```

Figure 2-6: Processor Configuration and Power Management

Active Processor Cores [All]

Enable all available processors and threads.

Intel (R) HT Technology [Enabled]

Hyper-Threading Technology allows an execution core to function as two logical processors. The feature must be enabled in the BIOS and requires operating system support.

Some execution resources such as caches, execution units, and busses are shared, each logical processor has its own architectural state and its own set of general purpose registers and control registers.

Enabled XD [Enabled]

Enable or Disable Memory segregation for improved security.

Machine Check [Enabled]

Enable or Disable Machine Check exception handling.

Fast Strings [Disabled]

Enable or Disable Processor Fast Strings.

Intel (R) Virtualization Technology [Disabled]

Intel Virtualization Technology (Intel VT) makes a single system appear as multiple independent systems to software. This allows multiple, independent operating systems and applications to be running simultaneously on a single system.

Intel VT comprises technology components to support virtualization of platforms based on Intel architecture microprocessors and chip-sets.

Virtualization allows the creation of one or more partitions on a single system. This could be multiple partitions in the same operating system, or there can be multiple operating systems instances running on the same system, offering benefits of consolidation, legacy migration, activity partitioning or security.

Processor Power Management

Scroll to the Processor Power Management selection and press Enter to view the following fields.

P-States (GV3) [Enabled]

Enable or Disable Processor Performance States. ACPI supports placing the system processor cores into one of four power states while in the working (G0) state.

Boot Performance Mode [Auto]

Configures the max performance state at power up.

C-States [Enabled]

Enable or Disable Processor C-States.

When the processor is idle, low power idle states (C-states) are used to save power. The higher the c-state, the more power saving actions are performed.

Systems like the PCWS 2015 implement C-states by having the processor control the states. The chipset exchanges messages with the processor as part of the C-state flow.

Extend C-States [Disabled]

Enable or Disable ACPI 2.0 or later support for extended power states beyond C3. C States are processor power management states.

C6 - State [Disabled]

Enable or Disable deep power saving mode.

FACP - RTC S4 Flag Value [Enabled]

Controls the value for the RTC S4 flag in the FACP table.

Enabled - The RTC alarm can wake the system from the S4 state.

Disabled - The RTC alarm can wake the system from the S1, S2, or S3 sleep states.

APIC - IO APIC Mode [Enabled]

Enable or Disable the Advanced Programmable Interrupt Controller (APIC) - IO APIC Mode.

ALS Support [Legacy]

Specifies the type of ACPI support.

Legacy - ALS support through the IGT INT10 function.

ACPI - ALS support through an ACPI ALS driver.

EMA Support [Disabled]

Enable or Disable the EMA device in an ACPI environment.

MEF Support [Disabled]

Enable or Disable the 'Mobile East Fork' support in an ACPI environment.

ACPI 3.0 T-States [Disable]

Enables all ACPI 3.0 T-States.

Peripheral Configuration

The Peripheral Configuration fields are listed below.

Spread Spectrum Clock [Disabled]

Enable or Disable the Spread Spectrum clock chip feature.

Enable CRID [Disabled]

The CRID (Compatible Revision ID) is an 8-bit hard-wired value assigned by Intel during the manufacturing process. Normally, the value assigned as the CRID will be identical to the SRID (Stepping Revision ID) value of the previous stepping of the product with which the new product is deemed compatible.

PCIe SR-IOV Support [Disabled]

Enables support for a 'Single Root I/O Virtualization' which enables sharing of a single I/O device among multiple virtual machines.

HDD Configuration

The entire HDD Configuration screen is shown in Figure 2-7, below. Scroll down to view the drives installed in each Serial ATA port.

```
                Phoenix SecureCore Tiano Setup
        Advanced

                    HDD Configuration

SATA Device                    [Enabled]
Interface Combination          [AHCI]
Enabled SATA Controller SALP   [Disabled]
SATA Port 0 External Port      [Disabled]
SATA Port 0 Hot Plug           [Disabled]
SATA Port 0 Port Multplier     [Disabled]
SATA Port 1 External Port      [Disabled]
SATA Port 1 Hot Plug           [Disabled]
SATA Port 1 Port Multiplier    [Disabled]
SATA Port 2 External Port      [Disabled]
SATA Port 2 Hot Plug           [Disabled]
SATA Port 2 Port Multiplier    [Disabled]
SATA Port 3 External Port      [Disabled]
SATA Port 3 Hot Plug           [Disabled]
SATA Port 3 Port Multiplier    [Disabled]
SATA Port 4 External Port      [Disabled]
SATA Port 4 Hot Plug           [Disabled]
SATA Port 4 Port Multiplier    [Disabled]
SATA Port 5 External Port      [Disabled]
SATA Port 5 Hot Plug           [Disabled]
SATA Port 5 Port Multiplier    [Disabled]
   Serial ATA Port 0           [INTEL SSDSA2M0  -]
   Serial ATA Port 1           [Not Installed   ]
   Serial ATA Port 2           [Not Installed   ]
   Serial ATA Port 3           [Not Installed   ]
   Serial ATA Port 4           [Not Installed   ]
   Serial ATA Port 5           [Not Installed   ]
```

Figure 2-7: HDD Configuration Screen (BIOS O1201r and O1301)

SATA Device [Enabled]

Enables the SATA Controller in the QM57 PCH.

Interface Combination [AHCI]

Determines the SATA Controller's operational mode. Three selections are supported.

> IDE - Integrated Device Electronics. Legacy Disk standard, supported by the BIOS for compatibility with older operating systems.

> AHCI - Advanced Host Controller Interface. A new SATA programming interface developed through a joint industry effort. AHCI defines transactions between the SATA controller and software and requires an operating system such as Windows 7 to support all features.

RAID - Redundant Array of Inexpensive Drives. The QM57 PCH provides several diverse RAID options. With a limit of two drives, the PCWS 2015 can support RAID Level 0 (Performance) or RAID Level 1 (Mirroring) configurations. See Chapter 3 for more information about the supported RAID configurations.

Enabled SATA Controller SALP [Disabled]

Enable the SATA Controller Aggressive Link Power Management feature. When enabled, the SATA controller supports auto-generating link requests to the partial or slumber states when there are no commands to process.

The following three fields are available for each of the six SATA Ports 0 through 5. Most of these features are not supported.

SATA Port 0...5 External Port [Disabled]

When enabled, the controller treats the selected port as an external port. This feature is not available on the PCWS 2015.

SATA Port 0...5 Hot Plug [Disabled]

When enabled, the selected port is designated hot pluggable. Note: this requires hardware support to function properly.

SATA Port 0...5 Port Multiplier [Disabled]

When enabled allows a single SATA port to support multiple drives, a feature that is not supported on the PCWS 2015.

Serial ATA Port 0 [ID String - if installed]

Displays the ID String of the SATA HDD/SSD installed in the PCWS 2015 Drive Bay 1 (Rear) in this example, an Intel X25-V 40GB Solid State Drive is installed in Bay 1.

SATA Port 0 [ID String - if installed]

Displays the ID String of the SATA HDD/SSD installed in the PCWS 2015 Drive Bay 0 (Rear).

SATA Port 1 [ID String - if installed]

Displays the ID String of the SATA HDD/SSD installed in the PCWS 2015 Drive Bay 1 (Front).

SATA Port 2 [Reserved for CF Card]

SATA Port 2 is reserved for the CF Card on both Revision C and D System boards.

SATA Port 3 [Reserved for SATA to CF Riser]

SATA Port 3 is assigned to the SATA to CF Riser Card connector found on Revision D or later system boards.

Serial ATA Port 4 and 5 [Not Used Available]

SATA Port 4 and 5 connectors are not implemented. The selections are not available.

IMC Configuration

The IMC (Integrated Memory Controller) accesses the North Bridge Common Configuration, Video, Arrandale and IGD Configuration. This grouping of apparently unrelated menus is due to the fact that both the Memory and Graphics controllers are located in the same package as the i5 or Celeron Processor.

> NB Common Configuration

The 'North Bridge' Common Configuration Menu allows access to a single field, listed below.

VT for Directed I/O (VT-d) [Disabled]

Enable/Disable Intel (R) Virtualization Technology for Directed I/O (VT-d) by reporting the I/O Device assignments to VMM through DMAR ACPI Tables.

> Video Configuration

The following video BIOS fields do not apply to the PCWS 2015.

Always Enable PEG [Disabled]

PEG0 (Processor PCI Express Port 0) are PCI Express lanes connected directly to the processor and intended for 'graphics card attach.'

On a typical desktop PC, the PEG0 lanes are routed to a PCIe x16 connector, for installation of a 2D/3D video card.

PEG X1 Mode [Disabled]

Forces the Processor PCI Express Graphics lanes into the X1 transfer mode.

> Arrandale Configuration

PEG0 Configuration [Disabled]

Enable or Disable PEG0 Active Power State Management.

> *IGD Configuration*

The Integrated Graphics Device configuration screen contains the 2015 BIOS related video configuration settings. All configurations are factory configured and should not be changed. A sample of this screen is shown in the illustration below.

```
                 Phoenix SecureCore Tiano Setup
              Advanced

                        IGD Configuration

  IGD - Dev2 Fun1                [Enabled]
  IGD - Boot Type                [CRT + LFP]
  Primary Display Selection      [IGD]
  Pre-Allocated                  [32M]
  DVMT Memory Size               [DVMT MAX]
  IGD - LCD Panel Type           [1024x768 LVDS Colo]
  IGD - Panel Scaling            [Auto]
  IGD - Portrait Mode            [Auto]
  Inverter Connection            [Internal]
  GMCH BLC Control               [PWM]
  BIA                            [Auto]
  Spread Spectrum clock Chip     [off]
  IGD - TV Control               [VBIOS Default]
  IGD - TV2 Control              [VBIOS Default]
```

Figure 2-8: BIOS IGD Configuration

IGD - Dev2 Fun1 [Enabled]

The Integrated Graphics Device (IGD) located at Device 2 Function 1 is the primary graphics device for the 2015. This is the Display Link interface between the graphics processor and PCH, which drives the LVDS outputs to the LCD panel.

IGD - Boot Type [CRT + LFP]

Determines the video device that will be active during POST. On the PCWS 2015, CRT refers to the IO Panel VGA connector and LFP refers to the workstations 15" LCD.

If an LCD monitor is connected to the IO Panel VGA connector, it will display the POST messages. Start-up messages always appear on the built-in 15" LCD.

Primary Display Selection [IGD]

Enables the Integrated Graphics Device as the primary display controller in the PCWS 2015.

Pre-Allocated [32M]

This field defines graphics memory allocated to the BIOS splash screen and setup screens.

DVMT Memory Size [DVMT MAX]

This field determines the size of the memory that the Intel Dynamic Video Memory Technology graphics driver will use when an operating system is active.

IGD - LCD Panel Type [1024x768 LVDS Color]

This field is set to match the standard PCWS 2015 15" LCD.

IGD - Panel Scaling [Auto]

Select the Panel Scaling method used by the IGD. This feature may not be supported.

IGD - Portrait Mode [Auto]

Select Portrait mode to be used by the IGD. This feature may not be supported.

Inverter Connection [Internal]

Selects the backlight inverter connection.

Internal - Use GMCH PWM.

External - Use PCH PWM.

GMCH BLC Control [PWM]

Select Graphics Memory Controller Hub output to control backlights.

PWM - Connect to PWM.

GMBus - Connect to GMBus.

BIA [Auto]

Select BIA control and Aggressiveness Level.

Spread Spectrum clock Chip [off]

Not Supported.

IGD - TV Control [Disabled]

Not Supported.

IGD - TV2 Control [Disabled]

Not Supported.

South Bridge Configuration

The South Bridge Configuration menu contains a number of IO related fields including audio and USB Enable/Disable.

SMBus Device [Enabled]

Enable or Disable all System Board SMBus Devices.

Port 80h Cycles [LPC Bus]

Specifies if the Port 80h POST codes are sent to the LPC Bus or PCI Bus. The default of LPC Bus routes the POST codes to J8, the system board debug header.

PCI Clock Run Logic [Enabled]

Enable or Disable the PCIe clock gate power saving feature.

Azalia [Enabled]

Enables detection of the ALC268 High Definition Audio Codec. 'Azalia' is the original Intel code name for High Definition Audio.

Azalia PME Enabled [Disabled]

Enable or Disable the Azalia Power Management Event option.

Azalia Vci Enabled [Disabled]

Enable or Disable Azalia Virtual Channel support.

Azalia internal HDMI codec [Enabled]

Enable or Disable the High Definition Audio controller in the QM57 PCH.

EHCI1 and 2 [Enabled]

Enables support for the pair of Enhanced Host Controllers Interface controllers which support up to 14 USB Ports. The PCH also contains two Rate Matching Hubs (RMH) that support USB full-speed, and low-speed capable.

USB Ports Per-Port Disable Control [Enabled]

This selection controls the PCWS 2015 USB ports on Revision C or D System Boards. By default, all USB ports are enabled.l

> **NOTICE:**
>
> Updating the PCWS 2015 BIOS or using the 'Load Setup Defaults' selection from the BIOS Exit menu re-enables all USB ports.

- To disable IO Panel USB Port(s) scroll to the USB Port Per-Port Disable Control field and select [Enabled].
  - The screen expands to show all 14 USB Ports as shown in the upper half of Figure 2-9. IO Panel Ports USB1 through USB6 are highlighted to distinguish them from System Board USB ports.
- To disable one or more IO Panel USB ports, scroll to the individual field and press Enter. Disabling internal USB ports is not recommended.
- Select [Disable] from the pop-up, then [Enter]. When complete, press [F10], [Y] to save and restart.

```
           Phoenix SecureCore Tiano Setup
         Advanced


            South Bridge Configuration


  USB Ports Per-Port Disable Control [Enabled]
  USB Port #0 Enable/Disable          [Enabled]   System Board
  USB Port #1 Enable/Disable          [Enabled]   IO Panel
  USB Port #2 Enable/Disable          [Enabled]   IO Panel
  USB Port #3 Enable/Disable          [Enabled]   IO Panel
  USB Port #4 Enable/Disable          [Enabled]   IO Panel
  USB Port #5 Enable/Disable          [Enabled]   IO Panel
  USB Port #6 Enable/Disable          [Enabled]   IO Panel
  USB Port #7 Enable/Disable          [Enabled]   System Board
  USB Port #8 Enable/Disable          [Enabled]   System Board
  USB Port #9 Enable/Disable          [Enabled]   System Board
  USB Port #10 Enable/Disable         [Enabled]   System Board
  USB Port #11 Enable/Disable         [Enabled]   System Board
  USB Port #12 Enable/Disable         [Enabled]   System Board
  USB Port #13 Enable/Disable         [Enabled]   System Board
```

Figure 2-9: USB Per Port Enable/Disable USB1 - USB6

> [!CAUTION]
> **CAUTION**
>
> Disabling system board USB ports can cause USB peripherals such as the touchscreen controller to fail or cause USB based options such as WiFi or the fingerprint reader to fail.
> BIOS Version O13101g or later prevents USB0 (USB Hard Disk) and USB7 (touchscreen interface) from being disabled at the BIOS level.

> SB PCI Express Config

Pressing Enter provides access to the PCI Express configuration menu, shown in the Figure below.

```
              Phoenix SecureCore Tiano Setup
          Advanced

              SB PCI Express Config


 PCI Express Root Port Clock Gating    [Disabled]
 PCI Express Controller DMI Setting    [L0S And L1]
▸PCI Express Port 1 Config
▸PCI Express Port 2 Config
▸PCI Express Port 3 Config
▸PCI Express Port 4 Config
▸PCI Express Port 5 Config
 PCI Express Port 6 is dedicated to LAN.
▸PCI Express Port 7 Config
▸PCI Express Port 8 Config
```
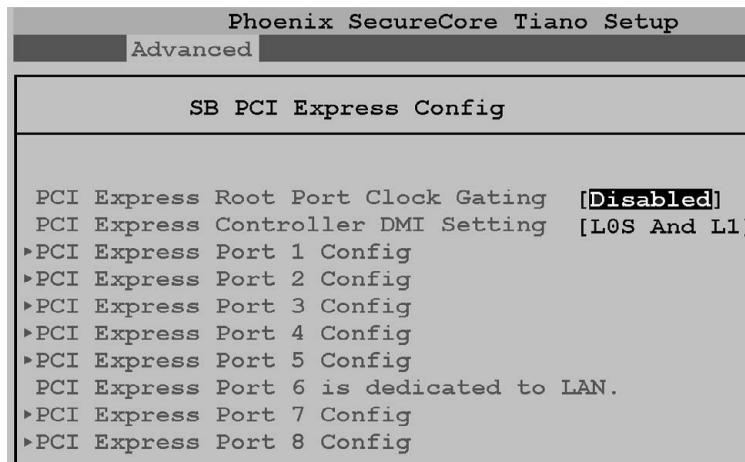
Figure 2-10: South Bridge PCI Express Port Configuration Menu

PCI Express Root Port Clock Gating [Disabled]

Enables or Disables dynamic clock gating of the shared resource link clock domain.

PCI Express Controller DMI Setting [L0S And L1]

Configures the DMI settings of the PCI Express controller.

> PCI Express Root Port 1 Config

PCI Express Root Port 1 is assigned to CN15, a PCIe x1 connector. This connector is currently not assigned.

> PCI Express Root Port 2 Config

PCI Express Root Port 2 is assigned to CN14, the future PCI Express Riser Card connector. Details of this screen are shown in the Figure below.

```
                    Phoenix SecureCore Tiano Setup
               Advanced

                    SB PCI Express Config


 PCI Express Root Port Clock Gating   [Disabled]
 PCI Express Controller DMI Setting   [L0S And L1]
▸PCI Express Port 1 Config
▸PCI Express Port 2 Config
▸PCI Express Port 3 Config
▸PCI Express Port 4 Config
▸PCI Express Port 5 Config
 PCI Express Port 6 is dedicated to LAN.
▸PCI Express Port 7 Config
▸PCI Express Port 8 Config

                         PCI Express Root Port 2


            PCI Express Root Port 2   [Enabled]
            ASPM                      [Auto]
            HOT PLUG                  [Disabled]
            URR                       [Disabled]
            FER                       [Disabled]
            NFER                      [Disabled]
            CER                       [Disabled]
            CTD                       [Enabled]
            SEFE                      [Disabled]
            SENFE                     [Disabled]
            SECE                      [Disabled]
            PME Interrupt             [Disabled]
            PME SCI                   [Disabled]
```

Figure 2-11: PCI Express Root Port 2 Configuration Details

ASPM [Auto]

Auto Detects PCI Express Active State Power Management Settings.

HOT PLUG [Disabled]

Enable or Disable Hot Plug events on PCI Express Root Port 2.

URR [Disabled]

Enable or Disable PCI Express Root Port 2 Unsupported Request Reporting.

FER [Disabled]

Enable or Disable PCI Express Root Port 2 Fatal Error Reporting.

NFER [Disabled]

Enable or Disable PCI Express Root Port 2 Non-Fatal Error Reporting.

CER [Disabled]

Enable or Disable PCI Express Root Port 2 Device Correctable Error Reporting.

CTD [Enable]

Enable or Disable the PCI Express Root Port 2 Completion Time-out mechanism.

SEFE [Disabled]

Enable or Disable the PCI Express Root Port 2 System Error on Fatal Error mechanism.

SENFE [Disabled]

Enable or Disable the PCI Express Root Port 2 System Error on Non-Fatal Error mechanism.

SECE [Disabled]

Enable or Disable the PCI Express Root Port 2 System Error on Correctable Error mechanism.

PME Interrupt [Disabled]

Enable or Disable the PCI Express Root Port 2 Power Management Event Interrupt generation mechanism.

PME SCI [Disabled]

Enable or Disable the PCI Express Root Port 2 Power Management Event System Control Interrupt mechanism.

> PCI Express Port 3 - Port 8 Config

With the exception of PCI Express Port 6, which is dedicated to the Ethernet interface, PCI Express Ports 3, 4, 5, 7, and 8 are not assigned.

Network Configuration

This selection contains all network related sections.

PCH Internal LAN [Enable]

Enable or Disable the PCH Integrated Gigabit LAN Controller.

LAN OPROM Selection

Enable or Disable support for LAN Option ROM Selection.

Wake on LAN [Enable]

Enable or Disable the Wake On LAN feature.

ASF Support [Enable]

Enable or Disable support fro the Alert Standard Format Specification.

Winbond Configuration

The Figure below displays the pre-assigned PCWS 2015 Serial Port IO Address, and Interrupt resources for each COM Port. The COM Port resources apply to all BIOS Versions and System Board Revisions and are shown for reference only.

```
            Phoenix SecureCore Tiano Setup
         Advanced

              Winbond Configuration

Winbond SIO UART1    [Enabled]
  Base I/O address:  [0x238]
  Interrupt:         [6]
Winbond SIO UART2    [Enabled]
  Base I/O address:  [0x338]
  Interrupt:         [11]
Winbond SIO UART3    [Enabled]
  Base I/O address:  [0x3e8]
  Interrupt:         [4]
Winbond SIO UART4    [Enabled]
  Base I/O address:  [0x3f8]
  Interrupt:         [3]
Winbond SIO UART5    [Enabled]
  Base I/O address:  [0x220]
  Interrupt:         [7]
Winbond SIO UART6    [Enabled]
  Base I/O address:  [0x228]
  Interrupt:         [5]
```

Figure 2-12: Super IO COM Port Assignments

The Table shown below maps each COM Port to a physical connector.

PORT	I/O Addr	IRQ	SIO Port	Connector/Function
COM1	238h	6	UART1	CN8A - DB9M (Powered)
COM2	338h	11	UART 2	CN8B - DB9M (Non Powered)
COM3	3e8h	4	UART 3	CN2 - Pole J5 - Integrated
COM4	3f8h	3	UART 4	CN11B - IDN
COM5	220h	7	UART 5	CN11A - RJ45 RS232
COM6	228h	5	UART 6	CN12 - Mag Stripe Reader

Figure 2-13: COM Port Assignments and Connector Mapping

Special Configuration

The Special Configuration screen is shown in Figure 2-14, below. It contains custom BIOS fields specific to the PCWS 2015. This includes settings to determine the Powered RS232 Voltage, Cash Drawer Voltage or enable the WIN32 Factory Recovery feature.

```
                  Phoenix SecureCore Tiano Setup
            Advanced

                      Special Configuration


     Boot Test Image                   [Normal]
     Cash Drawer Voltage               [12V]
     Com Port Voltage                  [0V]
     Personality Module                [CF]
     Power Failure Restoration         [Last State]
     SATA Port 2                       [Enabled]
     Win32 Factory Recovery            [Disabled]
```
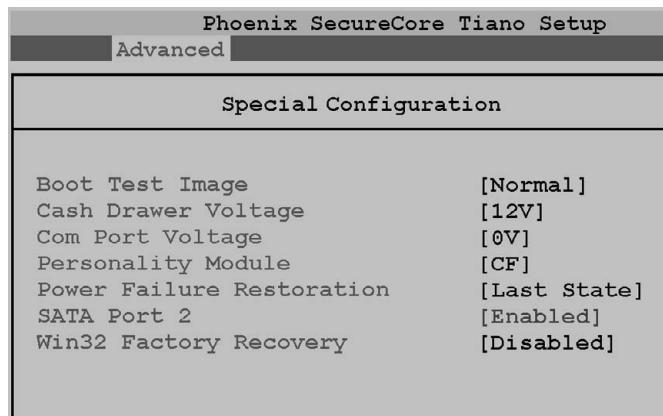
Figure 2-14: Special Configuration Menu (BIOS O1301g)

Boot Test Image [Normal]

Enable or Disable the eUSB Hard Drive socket J3. The default selection of [Normal] causes the BIOS to boot from the USB Flash Drive socket (if installed).

Setting this field to [Alternate] disables the eUSB Hard Drive by removing power from socket J3, forcing the BIOS to boot from a removable thumb drive attached to an IO panel USB Port.

Boot Test Image is used for Windows CE configurations, and is not valid when used in WIN32 booting from a SATA disk drive or RAID.

Cash Drawer Voltage [12V]

This selection determines the Cash Drawer solenoid voltage. The default selection of 12V is suitable for all MICROS Cash Drawers.

COM Port Voltage [5V] or [0V]

This selection determines the voltage used by COM1, the Powered RS232 Port on the IO Panel. Selections include 5V, 9V, and 12V.

BIOS Version O1301g or later defaults to 0V.

Personality Module [CF]

This field determines the location of the persistent registry; either the CF or USB Flash Drive. It is used for Windows CE configurations, and is not valid when used with WIN32 operating systems.

Power Failure Restoration [Last State]

This selection determines how the PCWS 2015 recovers from a power failure, should it occur during operation.

The default selection of [Last State] causes the workstation to return to the previous power state before AC power failed. For example, if the PCWS 2015 is ON and AC power suddenly fails, it automatically restarts when AC power is restored.

Conversely, if the 2015 is in the **NOPOWER** (Soft-Off) state when AC power fails, it remains in the **NOPOWER** state when AC power is restored.

Other selections include [Power On] and [Remain Off].

The [Remain Off] setting requires the user to press the power button to restart the unit after AC power is restored.

The [Power On] setting causes the unit to automatically power-up when the AC power cable is connected to the unit or when AC power is restored after an AC Power failure.

SATA Port 2 [Enabled]

On 2015 Revision C Boards, the BIOS temporarily disables SATA Port 2 at start-up to avoid excessive delays at boot time if a CF card is not installed.

WIN32 Factory Recovery [Disabled]

Enable or Disable the WIN32 Factory Recovery.

WIN32 Factory Recovery requires an optional PCWS 2015 Recovery CF for each supported operating system, currently POSReady 2009 and Windows 7 Professional.

When you install the Recovery CF and set this field to [Enabled], the BIOS changes the system boot order to boot from the Recovery CF.

Each Recovery CF contains a pre-boot environment and start-up scripts that automatically start the GHOST utility and transfer the factory (or user specified) image to the PCWS 2015 boot device. When the image transfer is complete, the workstation re-starts and boot order is reset to the previous configuration.

BIOS Version 1301g or later optionally adds the ability to require a password to start the recovery CF.

If you have BIOS O1301g or later, see page 2-32 to configure the Supervisor password that will be required to start the Recovery CF.

See Chapter 4 for more information about using the Recovery CF.

> AMT Configuration

Figure 2-15 shows the Intel Active Management Technology Extension BIOS screen.

```
              Phoenix SecureCore Tiano Setup
          Advanced

                     AMT Configuration

    Intel AMT                              [Enabled]
    Intel AMT Setup Prompt                 [Enabled]
    Intel AMT SPI Protected                [Disabled]
    Intel AMT Password Write Enable        [Disabled]
    HECI Timeout                           [Disabled]
    Amt Wait Timer                         [   1]
    Activate Remote Assistance Process     [Disabled]
    Un-Configure ME                        [Disabled]
    Hide Un-Configure ME Confirmation      [Disabled]
    MEBx Debug Message Output              [Disabled]
    Verbose Mebx Output                    [Enabled]
    USB Provision                          [Disabled]
    PET Progress                           [Enabled]
    AMT CIRA Timeout                       [   1]
    WatchDog                               [Disabled]
    OS Timer                               [   1]
    KVM Feature                            [Disabled]
    ME FW Downgrade                        [Disabled]
```

Figure 2-15: Intel Active Management Technology BIOS Extension Settings

Intel AMT [Enabled]

Enable or Disable the Intel Active Management Technology BIOS Extension. Using AMT requires additional ME firmware stored in SPI Flash EEPROM U54.

Intel AMT Setup Prompt [Enabled]

Enable or Disable the Intel AMT Setup Prompt to wait for hot-key to enter setup.

Intel AMT SPI Protected [Disabled]

Enable or Disable write protection for the ME Firmware for the AMT SPI device.

Intel AMT Password Write Protect [Disabled]

Enable or Disable the AMT Password write protect feature. Password is writable when set to Enable.

HECI Timeout [Disabled]

Enable or Disable HECI Timeout for Send/Read Message and Wait for Initialization.

Amt Wait Timer [1]

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

Activate Remote Assistance Process [Disabled]

Trigger CIRA Boot.

Un-Configure ME [Disabled]

Un-Configure the Management Engine without a password.

Hide Un-Configure ME Confirmation [Disabled]

Hide the Un-Configure ME without password Confirmation Prompt.

MEBx Debug Message Output [Disabled]

Enable or Disable MEBx debug message output.

Verbose Mebx Output [Enabled]

Enable or Disable Verbose MEBx Output.

USB Provision [Disabled]

Enable or Disable the USB Provision function.

PET Progress [Enabled]

Enable or Disable PET events progress to receive PET events.

AMT CIRA TImeout [1]S

Define the time-out period for the MPS connection to establish.

Watchdog [Disabled]

Enable or Disable the watchdog timer.

OS Timer [1]

Set the OS Watchdog Timer value.

KVM Feature [Disabled]

Enable or Disable the KVM feature.

ME FW Downgrade [Disabled]

Enable or Disable the ability to downgrade the Intel ME firmware.

> ME Configuration

This selection enables the Intel Management Engine and displays the Management Engine Firmware version.

Intel ME [Enabled]

Enable or Disable the Management Engine.

ME FW Version [6.1.20.1059]

Display the Management Engine Firmware version stored in U54.

ME Firmware [Full SKU Firmware]

Display the Management Engine firmware capabilities.

End of BIOS Message [Disabled]

Enable or Disable the BIOS sending an End of POST message to the Management Engine.

Security

The BIOS Security Menu is not available in Version O1201r. The Security Menu is available BIOS Version O1301, but does not support a password to start the optional Recovery CF. BIOS version O1301g or later implements the ability to require a password to start the optional Recovery CF. The procedure can be found below.

SecureCore Tiano includes a user level security system that provides a means of authenticating users to start the system, or authenticating users to enter the BIOS and optionally, to start the PCWS 2015 Recovery CF.

The Phoenix SecureCore Tiano Setup screen example is shown in the Figure below. By default, all security features are disabled.

```
                    Phoenix SecureCore Tiano Setup
    Main    Advanced    Security    Boot    Exit

      Supervisor Password is:          Cleared
      User Password is:                Cleared

      Set Supervisor Password          [Enter]
      Supervisor Hint String           [                    ]

      Set User Password                [Enter]
      User Hint String                 [                    ]

      Min. password length             [ 1]

      Authenticate User on Boot        [Disabled]

      HDD Password Select              [User Only]
      HDD Security Status
      HDD00 Password State             Frozen

      Trusted Platform Module (TPM)
      TPM Not Detected

      Flash Controller Lock            [Enabled]
```

Figure 2-16: BIOS Security Menu (Default Settings)

Set Supervisor Password

To configure the workstation to require a password to start the PCWS 2015 Recovery CF, set the Supervisor Password as described below.

Once the Supervisor Password is configured, it will be required to enter the BIOS Setup menu in addition to starting the optional PCWS 2015 Recovery CF.

Assigning a Supervisor Password (BIOS O1301g or later)

When shipped from the factory, the Supervisor and User Password are cleared. To assign a Supervisor Password, see the procedure below.

1. Scroll to the 'Set Supervisor Password' field and press [Enter]. The Set Supervisor Password dialog box shown below appears.

```
          Set Supervisor Password

Enter New Password      [********_          ]
Confirm New Password [                      ]
```
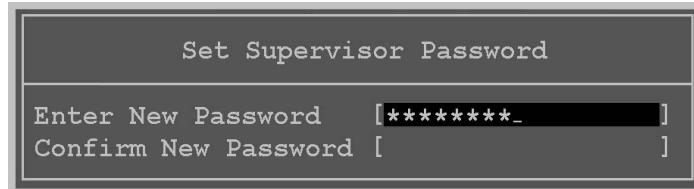
Figure 2-17: Assigning and Confirming a Supervisor Password

2. Enter the password (maximum of twenty characters) and press enter. MICROS recommends a 'strong' password using a combination of letters and numbers. Confirm the password by typing it again and pressing enter.

   • The Supervisor password will be required to enter the Phoenix SecureCore Tiano Setup Menu and to start the optional PCWS 2015 Recovery CF.

3. Optionally, scroll to the 'Supervisor Hint String' field and press Enter to type a word or phrase that can serve as a hint for the Supervisor Password.

Change or Clear the Supervisor Password

To change or remove the Supervisor Password see the procedure below.

1. Scroll to the Set Supervisor Password field and press [Enter]. The Set Supervisor dialog box with three fields appears.

```
          Set Supervisor Password

Enter Current Password [********_          ]
Enter New Password     [                    ]
Confirm New Password   [                    ]
```

Figure 2-18: Clearing or Disabling the Supervisor Password

2. To change the Supervisor Password:
   • Type the Current Password and press [Enter].
   • Type the new Password and press [Enter].
   • Confirm the new Password and press [Enter].

3. To clear the Supervisor Password:
   • Type the current Supervisor Password and press [Enter].
   • Press [Enter] twice (without typing characters) to clear the password. Press [Enter] again to confirm.

Boot

The Boot Tab displays the Boot Priority Order. The default boot order is shown in Figure 2-19, below.

```
             Phoenix SecureCore Tiano Setup
  Main    Advanced   Security   Boot    Exit


  Boot Priority Order
      1.  USB HDD:
      2.  ATA HDD0:INTEL SSDSA2M040G2GC
      3.  ATA HDD1:
      4.  ATA HDD2:
      5.  ATA HDD3:
      6.  ATA HDD4:
      7.  ATA HDD5:
      8.  Other HDD
      9.  USB CD:
     10.  USB FDD:
     11.  ATAPI CD:
     12.  Internal Shell
     13.  PCI LAN:IBA GE Slot 00C8 v1330
```
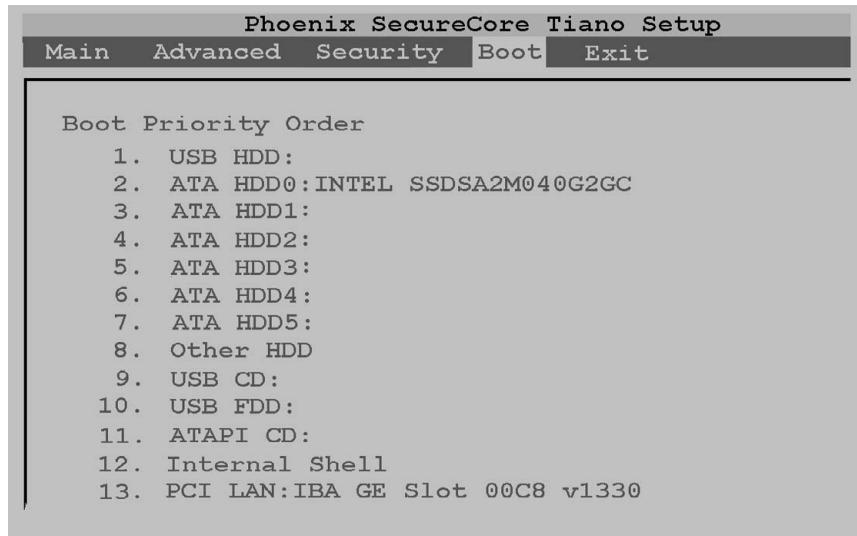
Figure 2-19: PCWS 2015 BIOS Boot Order

After the Workstation completes POST, the BIOS starts at number 1 in the Boot Priority List and works its way down, skipping inactive devices until it finds a device with a boot sector. If no bootable device is found, the BIOS displays the UEFI Shell, a text screen.

When a device is found, the ID string appears to the right of the device. In the example shown above, the optional Intel 40GB SSD is installed on ATA HDD0.

ATA HDD0 - ATA HDD3

The PCWS 2015 supports booting from up to four SATA devices, ATA HDD0 through ATA HDD3. ATA HDD0: and ATA HDD1: are reserved for SATA drives located in the Drive Bay, while ATA HDD3: supports the SATA CF Riser Card on Revision C System Boards and ATA HDD2: on Revision D System Boards.

USB HDD

Refers to a external USB Hard disk or thumb drive connected to an IO Panel USB Port. If the device is bootable, you can use the [Shift][+] keys to move USB HDD to the top of the boot order.

In some BIOS versions, the USB HDD field defaults to the top of the boot order. If a USB thumb drive is installed for backup purposes, the unit may skip the SATA disk and boot directly from the thumb drive.

USB CD

Supports booting from an external USB CD or DVD-ROM Drive. To boot from this device, use the [Shift][+] keys to move USB CD selection in front of the hard disks.

When the workstation starts, you must press a key to boot from the USB CD device.

USB FDD

Supports booting from an external USB Floppy Diskette.

Internal Shell

Refers to the Unified Extensible Firmware Interface (UEFI). Note: If no hard drives or bootable USB devices are attached to the unit, the BIOS will display the UEFI Shell.

PCI LAN:IBA GE Slot 00C8 v1330

Enables network boot.

Exit

The Exit menu provides a means of saving, discarding, or reloading the CMOS Settings.

```
                  Phoenix SecureCore Tiano Setup
    Main    Advanced   Boot    Exit


       Exit Saving Changes
       Exit Discarding Changes
       Load Setup Defaults
       Load Optimized Defaults
       Discard Changes
       Save Changes
```
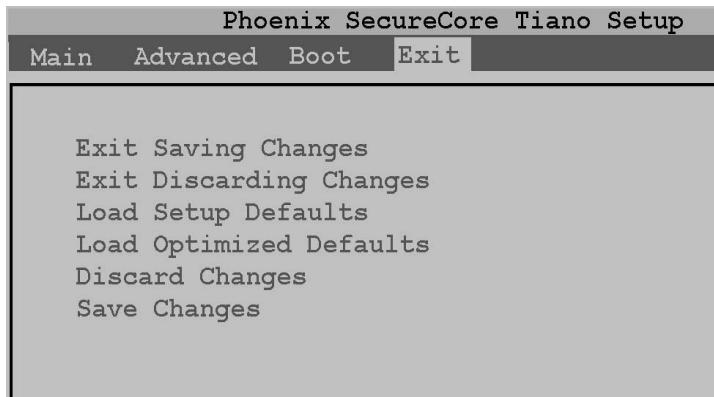
Figure 2-20: BIOS Exit Screen

Exit Saving Changes

After making any changes to any BIOS configuration screen, select 'Exit Saving Changes' and press [Enter], then [YES] to confirm and exit.

A faster way to save BIOS changes and restart is to use the F10 key.

Exit Discarding Changes

If you wish to exit Setup and discard any changes made, select 'Exit Discarding Changes' [Enter] and [Y] to restart.

Load Setup Defaults

This selection resets all Setup screen fields to factory defaults. You can also press [F9].

Note: Loading Setup Defaults will re-enable IO Panel USB Ports that were previously disabled.

Load Optimized Defaults (Do Not Use)

Do not use this selection. This field has been removed in BIOS O1301g or later.

Discard Changes

Selecting this field causes the BIOS to discard all changes, but does not exit the Setup Menu.

Save Changes

Save all changes on all menus to CMOS. The workstation remains at the BIOS Exit menu and does not restart.

Chapter 3

What's Inside?

This chapter describes how to open the workstation, provides a description of the system board and peripheral boards, shows how to install available options.

In this chapter

Disassembling the PCWS 2015

The following procedure describes how to disassemble the unit and access the system board and peripheral components.

CAUTION: DOUBLE POLE/NEUTRAL FILTERING
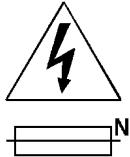
The PCWS 2015 Power Supply contains a permanently connected fuse in the neutral line. After fuse operation, parts of the power supply remain energized and present a shock hazard as long as the AC Power Cord is connected.
Always disconnect the AC power cord before opening the unit for service or configuration.

---

1. Remove all cables from the IO Panel including the AC Power cable before disassembling the unit.

2. Place a towel or other soft cloth on you work surface to protect the touchscreen, then place the workstation face down on this surface. If an option such as the Finger Print reader is attached to the front cover, take care not to rest the workstation on the housing.

   o The cover is held in place by a pair of captive screws assessable from the underside of the unit as shown in Figure 3-1.

3. Loosen the captive screws as shown. Return the unit to the normal operating position. Remove the top cover from the base by lifting at the front as shown in the lower half of Figure 3-1.

Loosen Screws

Figure 3-1: Removing the Top Cover

4. Remove the screw that fastens the LCD/Touchscreen assembly to the base as shown at the top of Figure 3-2.

5. Start to remove the LCD/Touchscreen assembly by pulling forward, then placing it to towards the right of the base.

   o   If you encounter resistance when removing the assembly check for a snagged cable.

   o   To place the LCD/Touchscreen face down, remove the LVDS Cable from system board connector J19.
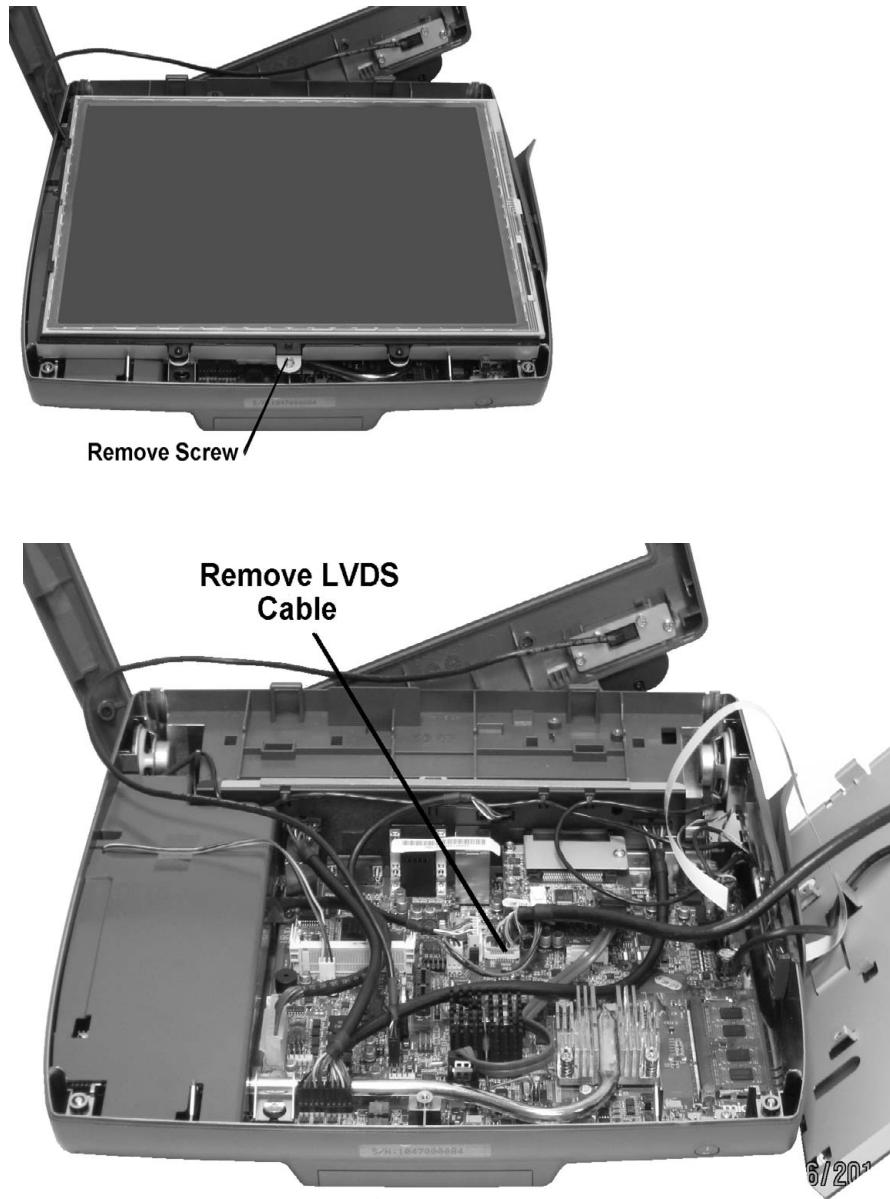
Figure 3-2: Removing the LCD/Touchscreen Assembly

6. If a Finger Print reader or other option is attached to the top cover, remove the interface cable from the System Board connector.

7. To remove the LCD/Touchscreen assembly, remove the following cables from the System Board, then set the assembly to the right side.

    Resistive Touchscreen

    o   Remove the LVDS data cable from J19 if you have not already.

    o   Remove the Backlight cable from J1.

    o   Remove the resistive touchscreen connector from J6.

    Capacitive Touchscreen

    o   Remove the LVDS data cable from J19 if you have not already.

    o   Remove the Backlight cable from J1.

    o   Remove the capacitive touchscreen interface cable from J2.

    For more information about each LCD/Touchscreen Assembly, see pages 3-30 and 3-31.

The PCWS 2015 Base

The PCWS 2015 base originates from the Workstation 5A, and adds about 10mm in overall height.

The 10mm increase in height combined with

a new copper bonding process to eliminate the faraday cage found in the Workstation 5A, allows a pair of laptop form factor SATA II drives to be installed in the base, under the System Board as shown in Figure 3-7.

The following pages show examples of the base with a Revision C or Revision D system board installed and points out the changes.

Figure 3-3 below, points out the major components of the PCWS 2015 base with the Revision C System Board.
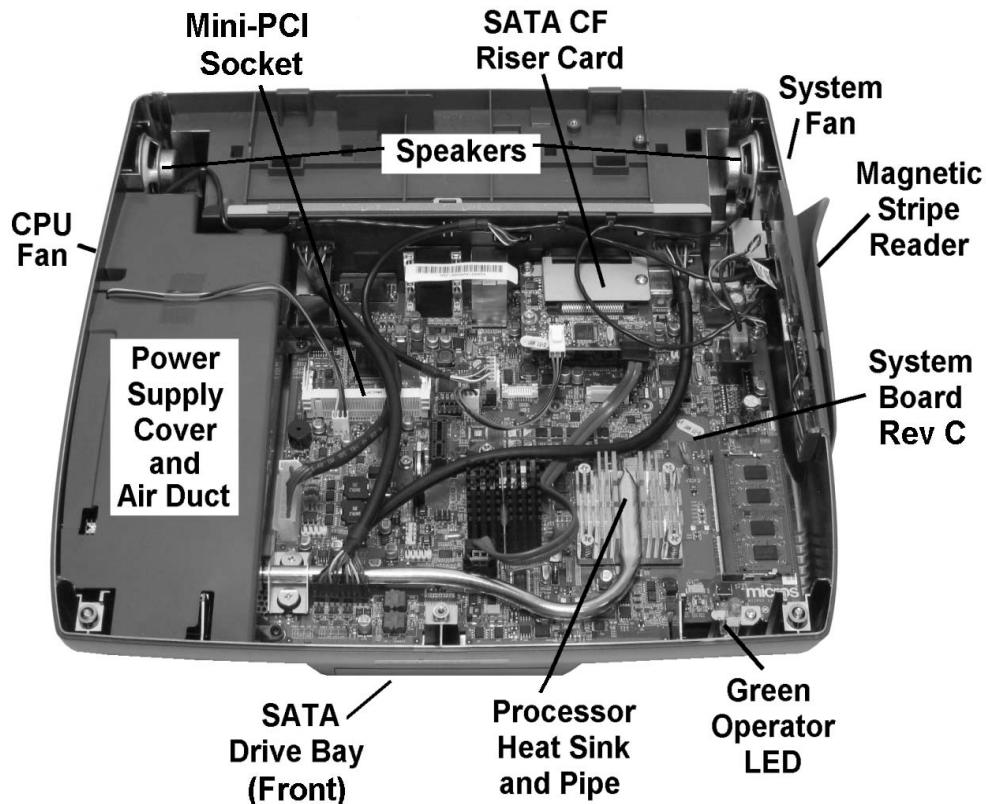
Figure 3-3: PCWS 2015 Base Assembly with Revision C System Board

System Board Revision C

- Requires BIOS Versions 1201r or 1301 only. Not compatible with the 1301g or later BIOS used on the Revision D System Board.

- USB Ports can be managed through the BIOS South Bridge Configuration menu, not available through the PCWS Diagnostics Utility.

- This board is not compatible with the DMA Enabled CF Card used on Revision C System Boards and all version of the WS5 and WS5A.

Figure 3-4, below points out the components of the PCWS 2015 base with the Revision D System Board installed.
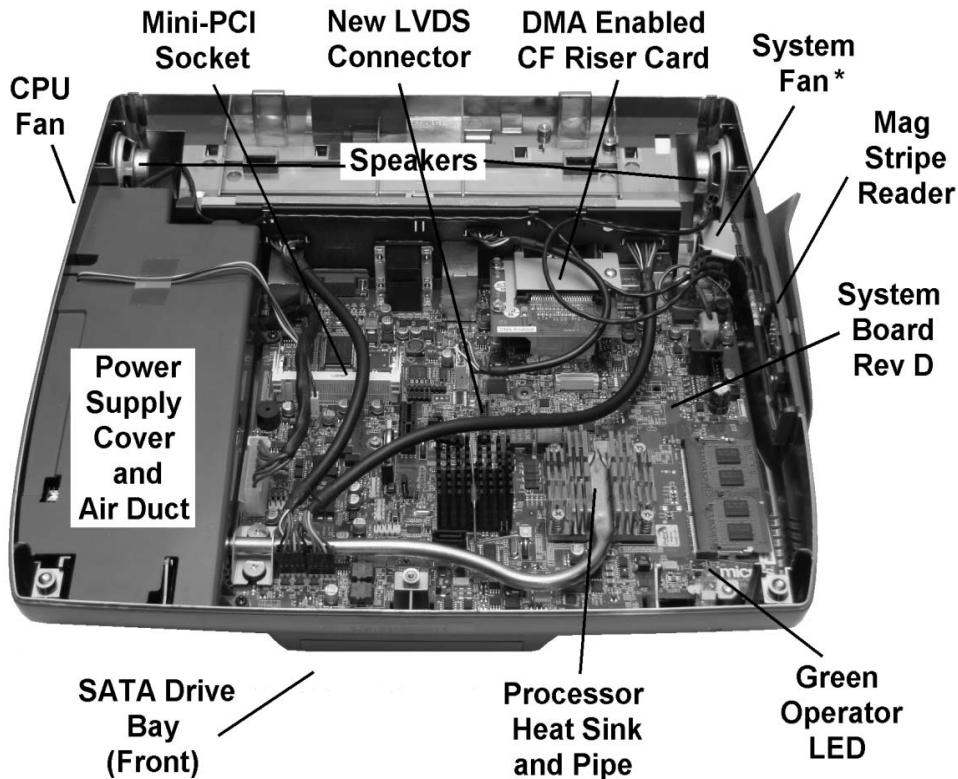
Figure 3-4: PCWS 2015 Base Assembly with Revision D System Board

System Board Revision D

The Revision D System Board includes the following changes.

- Requires BIOS Version O1301g or later. BIOS Versions O1201r and O1301 used on the Revision C Board is not compatible.

- High Speed USB switches controlled by GPIO lines to manage the IO panel USB ports. USB Ports can be managed through the PCWS Diagnostics Utility.

- The LVDS connector, J19 changes to accommodate a new LVDS cable that is not compatible with the LVDS cable used on the Revision C system board and the WS5/WS5A workstations.

- The SATA to CF Riser Card changes to the DMA Enabled CF Riser Card used on the Workstation 5A and 5A DC.

Power Supply Cover and Fans

Figure 3-5 shows the Power Supply Cover and 60mm CPU fan positioned over the base. The CPU fan speed is controlled by a sensor located near the CPU.

The CPU fan draws ambient air in through slots at the front of the base. The power supply cover forms a duct to direct the incoming air across the heat pipe radiator and power supply before it exits the unit on the left side of the base.

The CPU fan runs at full speed at start-up. After the operating system starts, the CPU fan slows to an inaudible 2500 RPM and runs continuously.
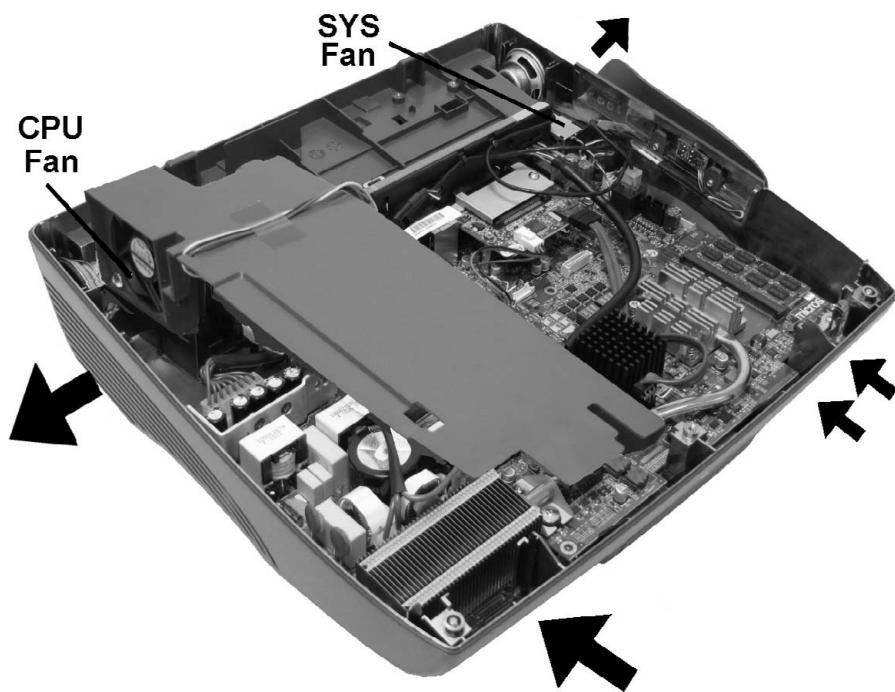
Figure 3-5: PCWS 2015 Fan Operation

Should the CPU thermal zone trip point value exceed 47°C, the fan speed increases to compensate. Increasing the fan speed cools the CPU thermal zone and eventually, when the trip point drops below 47°C, the CPU fan slows to 2500RPM.

The 30mm System Fan is located on the right side of the base, just in front of the right speaker. The System Fan is controlled by a sensor located near the SODIMM1 Socket. The SYS fan runs only when necessary, drawing ambient air across the SO-DIMM sockets and the remainder of the System Board before exiting the right side of the base.

The System Fan will be removed after the first 1000 units.

Removing the Power Supply Cover/Air Duct

To remove the Power Supply Cover and CPU fan, see the procedure below.

1. Remove the AC Power Cable from the PCWS 2015.

> ⚡ **SHOCK HAZARD**
>
> When the AC Power Cable is connected to the workstation, hazardous AC and DC voltages may be present on the power supply heatsink(s).
> Always remove the AC Power Cable from the unit before removing the Power Supply Cover.

2. Remove the CPU fan connector from J11.

3. Loosen the three captive screws, two from the system board as shown in Figure 3-6, below.

Figure 3-6: Removing the Power Supply Cover and CPU Fan

4. Remove the Power Supply cover and integrated fan, then remove the fan cable from J11.

o   Do not operate the PCWS 2015 without the Power Supply Cover installed and the CPU fan connected to J11.

Drive Bay

Figure 3-7 shows the PCWS 2015 base with the system board removed to expose the drive bay. Each drive is installed/removed from access panels on the bottom of the unit.

The copper bonding process appears as a shiny silver coating on most of the interior surfaces.
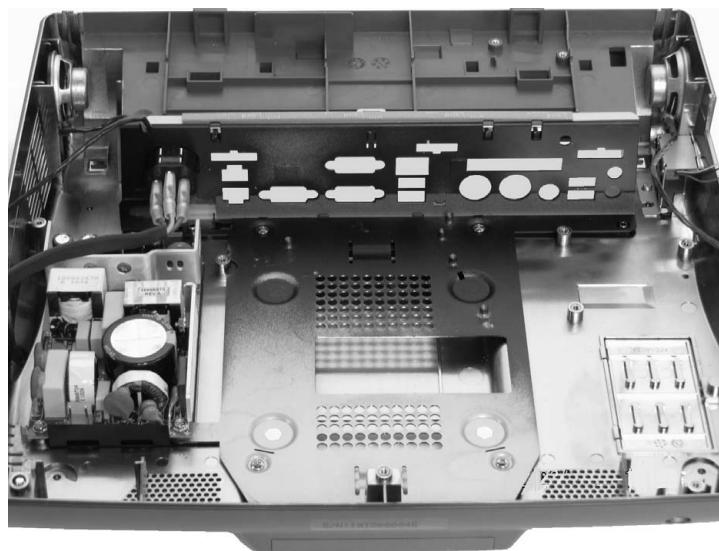
Figure 3-7: PCWS 2015 Drive Bay

Figure 3-8 is an edge-on view of the system board to illustrate how the SATA HDD Daughter Card is attached to CN16 on the solder side of the system board.
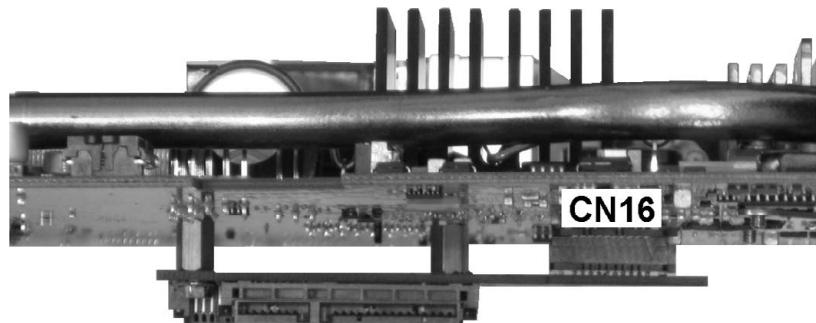
Figure 3-8: SATA Daughter Card Attached to the System Board

CF Riser Cards

Like all recent MICROS Workstations, the PCWS 2015 includes a CF Card slot accessible from the IO Panel. It can be used for the available Recovery CF Cards. Also, CF Cards of virtually any size can added for removable mass storage. With the introduction of the PCWS 2015 System Board Revision D, the DMA Enabled CF Card used in the WS5A returns.

SATA CF Riser XBRG15 (Revision C System Board Only)

The PCWS 2015 with a Revision C board uses a version of the CF Riser Card called the SATA CF Riser Card. Unlike the original CF Riser Card, the SATA CF Riser Card contains active circuitry in the form of a SATA to IDE bridge and uses a modified CF bracket as shown below.

The SATA CF Riser Card installs in the same footprint as the original CF Riser Card but does not attach to the IDE1 connector. In other words, it will not install in any MICROS workstation with the exception of the PCWS 2015 with a Revision C System Board.

The SATA CF Riser Card includes two connectors, one for data and one for power. Figure 3-9 displays the power and data cables that must be attached to the Revision C System Board.

Figure 3-9: SATA CF Riser Card with System Board Cables (Revision C System Board)

DMA Enabled CF Card XBRB36 (Revision D or later System Board)

With the introduction of the Revision D System Board, the SATA to IDE Bridge located on the SATA CF Riser Card moves to the System Board. The SATA CF Riser Card used on Revision C System Boards is not compatible with the Revision D and later boards.

On PCWS 2015 System Boards, the IDE1 connector returns allowing the DMA Enabled CF Riser Card already used in most MICROS Workstations to be used.

The left side of Figure 3-10 shows the SATA CF Riser Card used on 2015 Revision C System Boards, while the right side is an example of the DMA Enabled Riser Card used on 2015 Revision D (and later) System Board or the Workstation 5A and 5A DC.

The left side of shows a DMA Enabled CF Riser Card and bracket from the Workstation 5A while the right side displays the PCWS 2015 SATA CF Riser Card and Bracket.
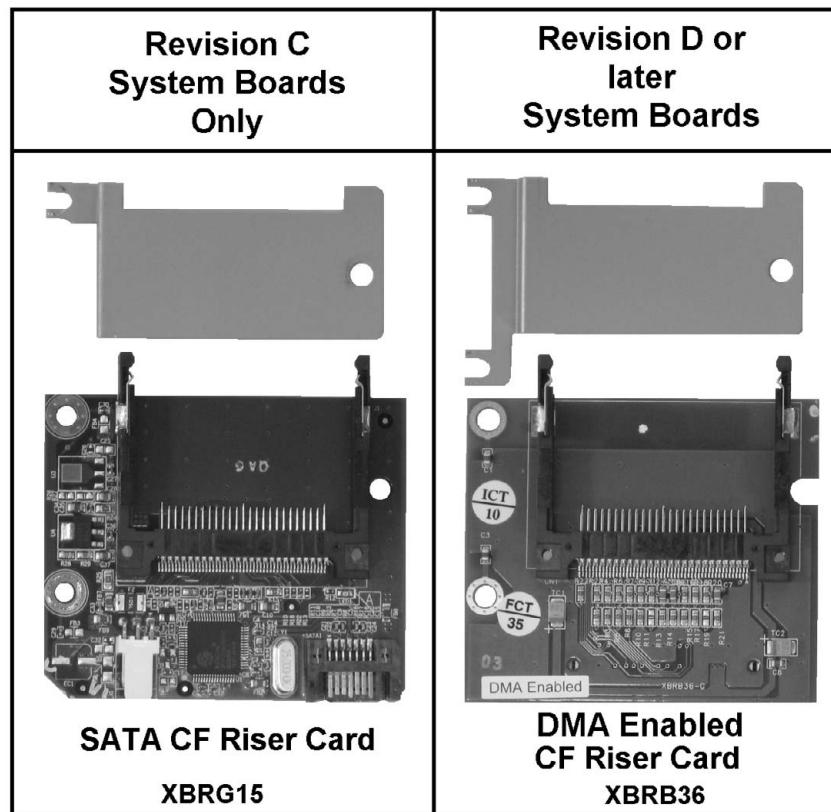
Figure 3-10: PCWS 2015 CF Riser Cards Compared

System Board Description

This section displays a Block Diagram of the PCWS 2015, then goes on to point out the System Board components, connectors and jumpers.

PCWS 2015 Revision C System Board /w Resistive Touchscreen
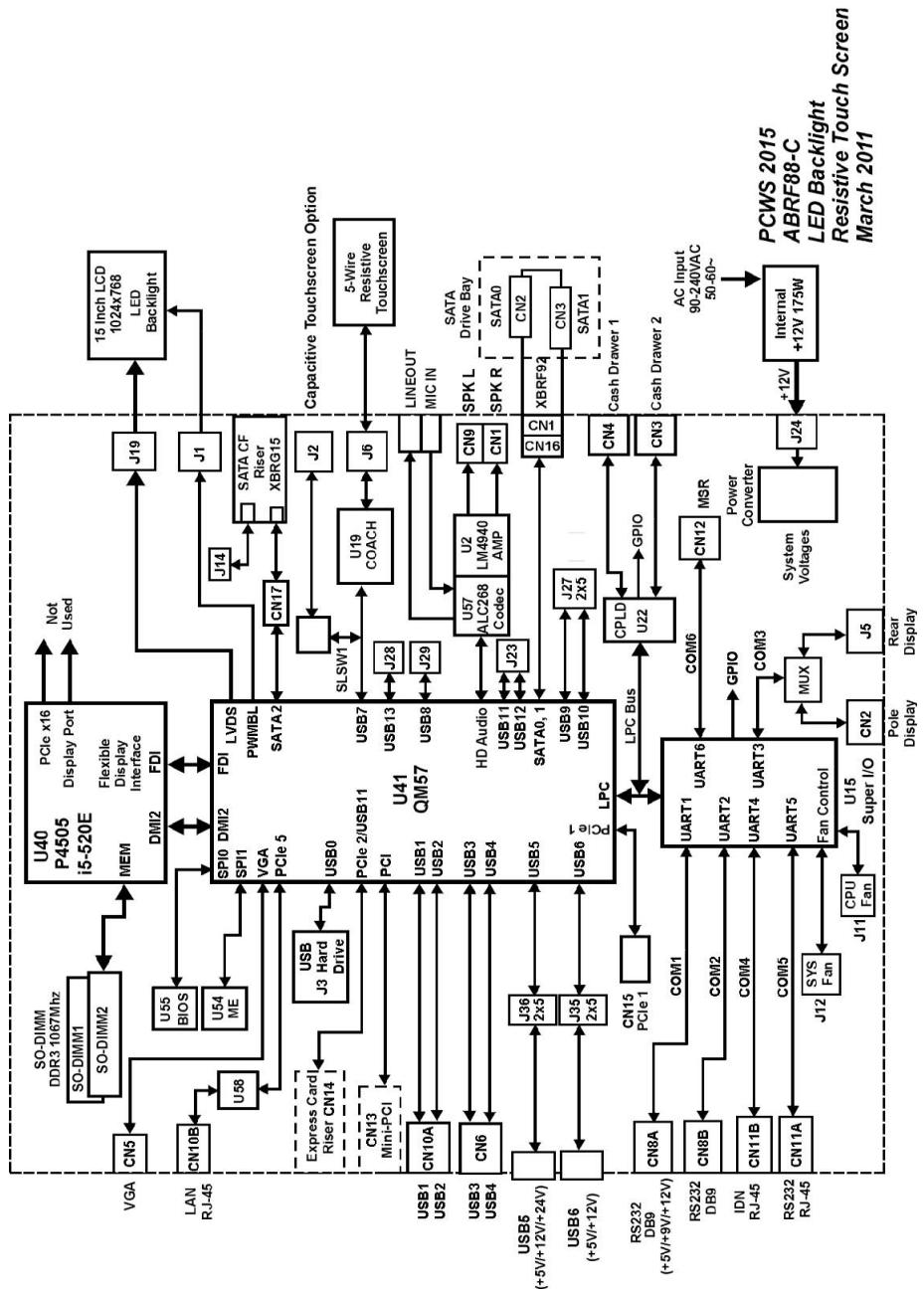
Figure 3-11: Block Diagram /w Revision C System Board

PCWS 2015 Revision C System Board /w Optional Capacitive Touchscreen
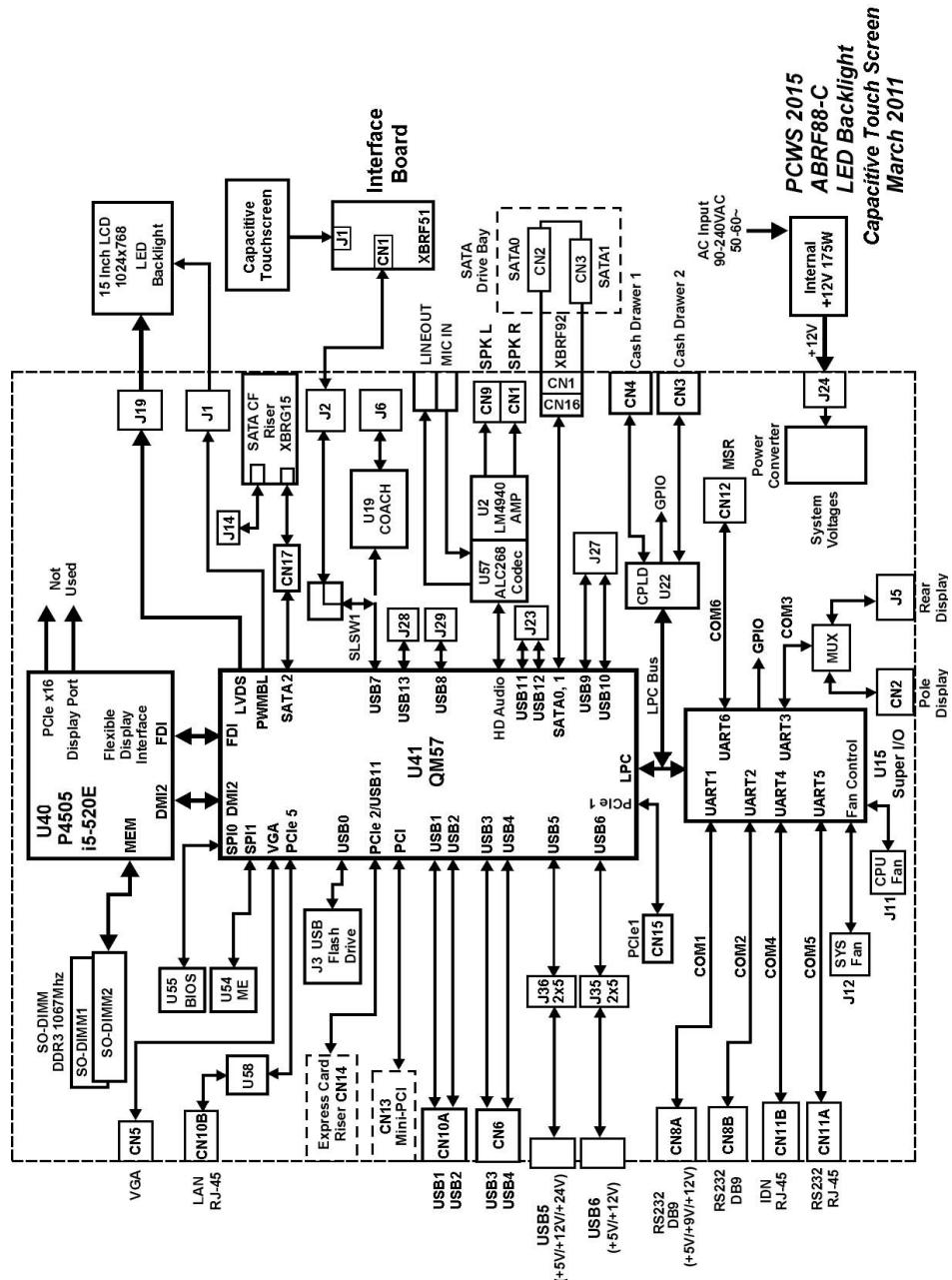
Figure 3-12: Block Diagram /w Rev C System Board and Optional Capacitive Touchscreen

PCWS 2015 Revision D System Board with Resistive Touchscreen

The Revision D System Board uses the DMA Enabled CF Riser Card and adds support for IO Panel USB Control.
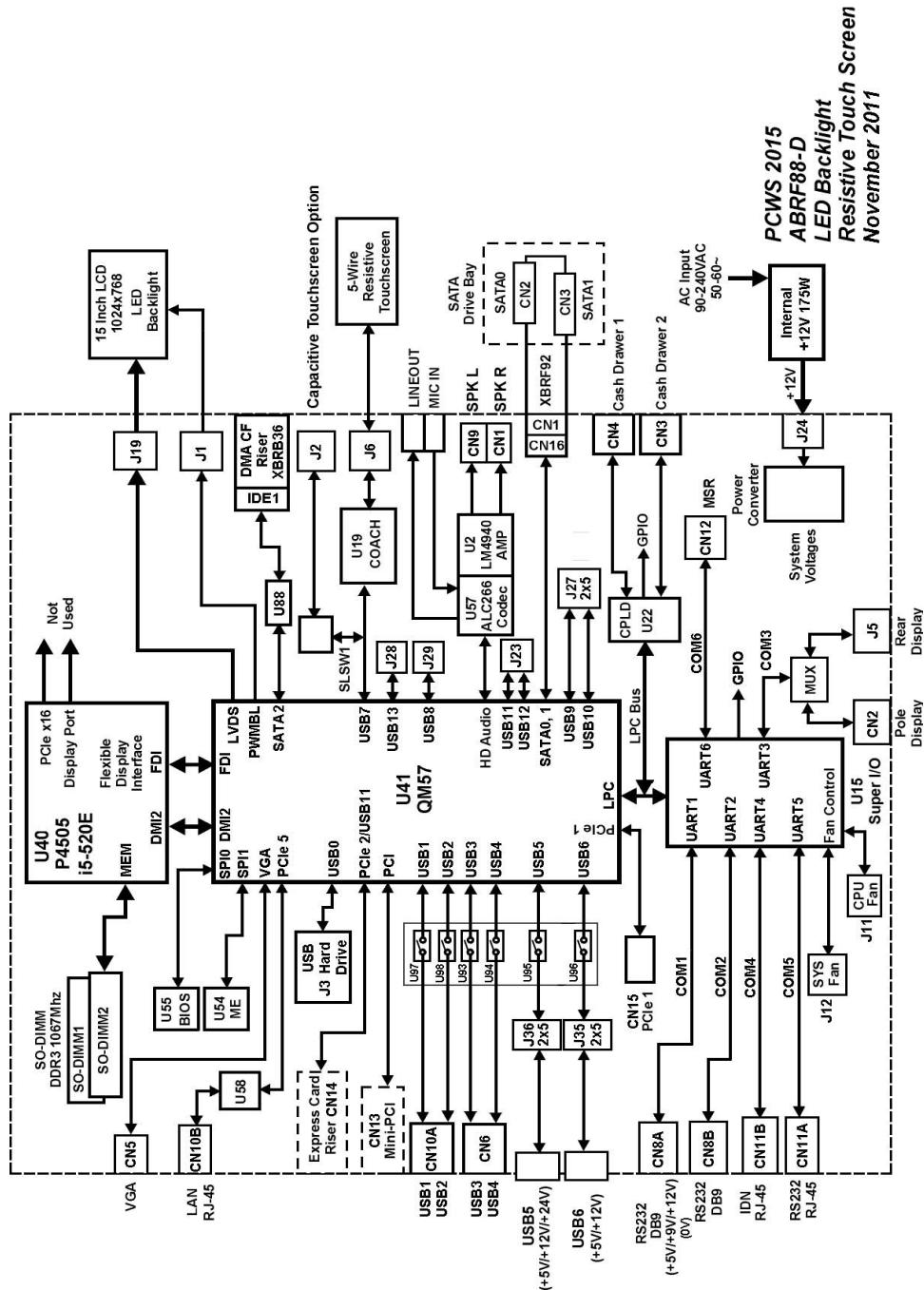
Figure 3-13: PCWS 2015 Block Diagram /w Revision D System Board

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PCWS 2015 System Board Revision C Primary Components
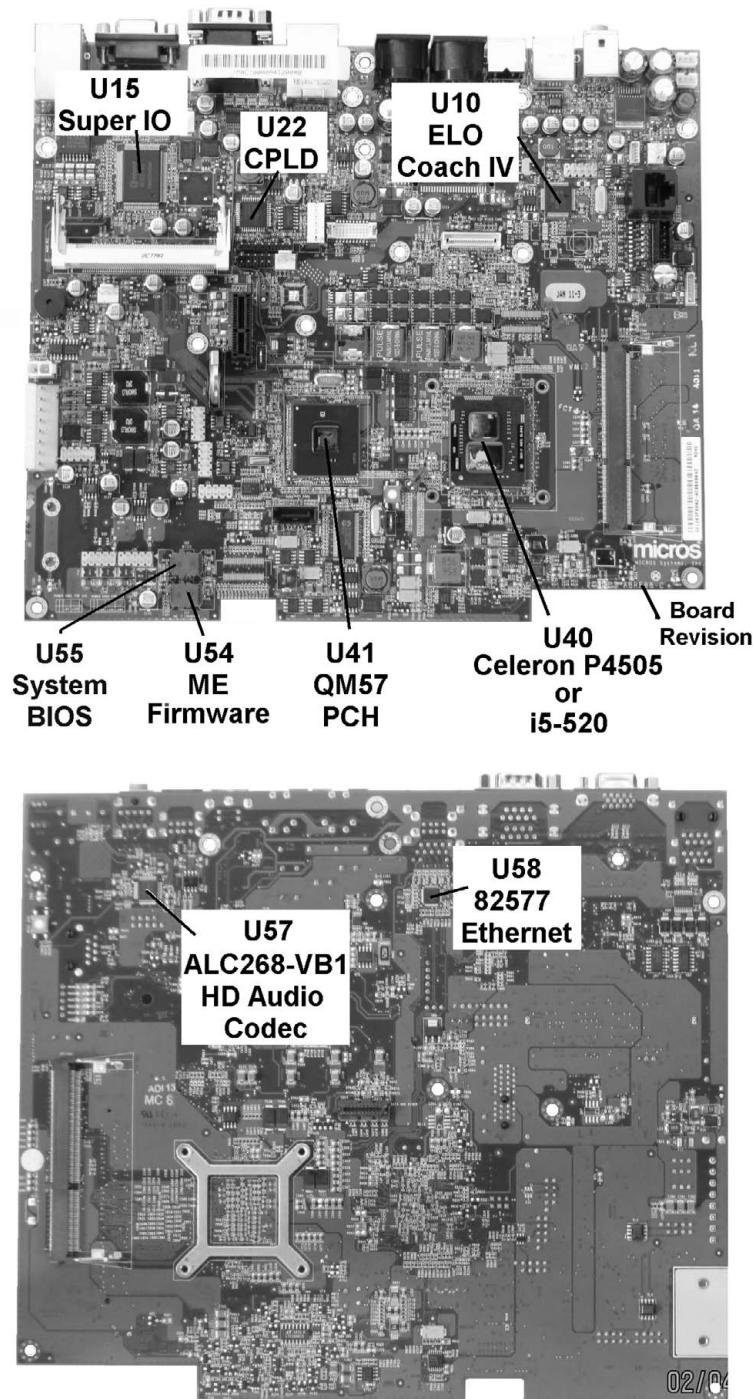
Figure 3-14: System Board Revision C - Primary Components

PCWS 2015 System Board Revision C Connectors

The Figure below shows all connectors on the Revision C Board.
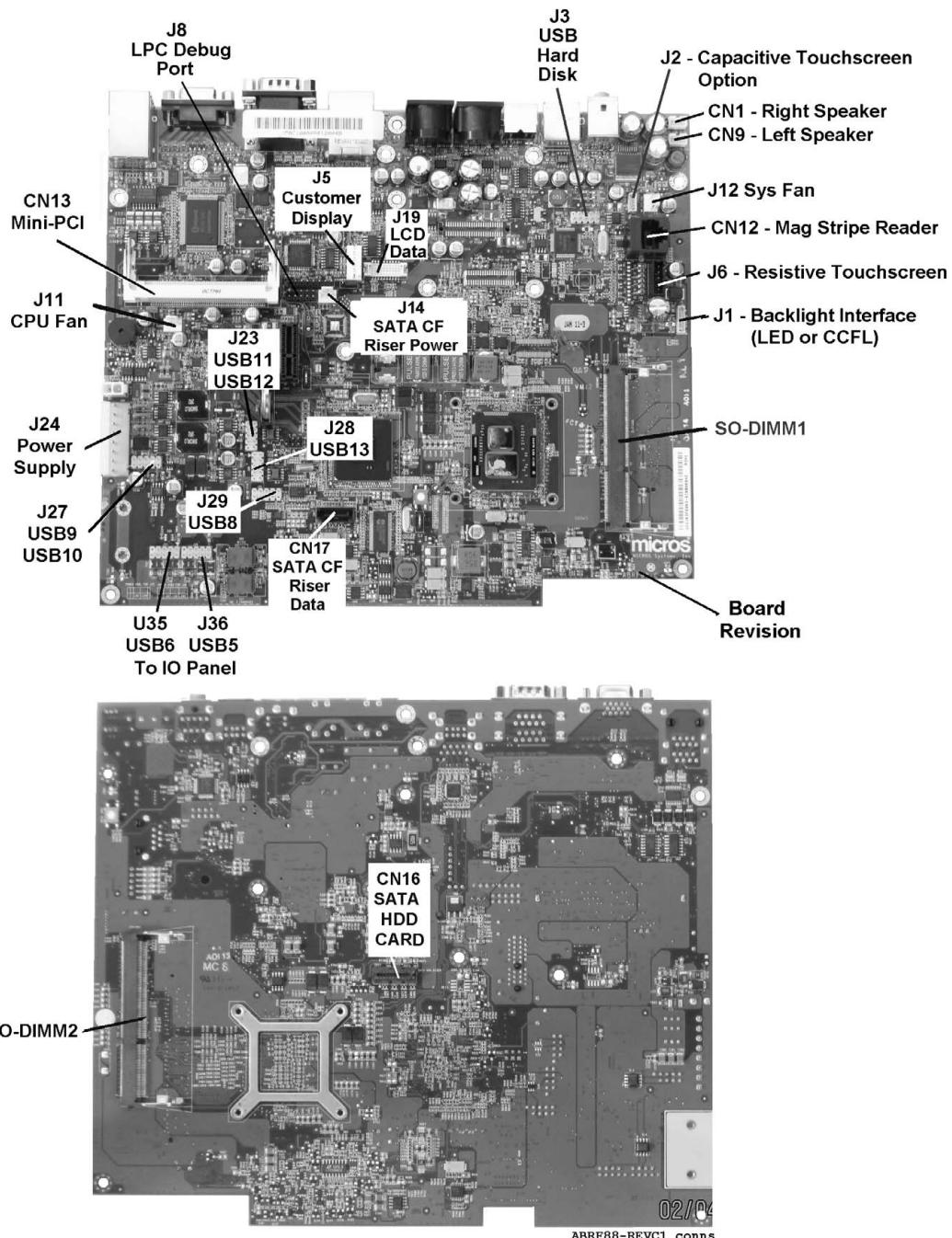
Figure 3-15: System Board Revision C - Connectors

PCWS 2015 System Board Revision D Primary Components
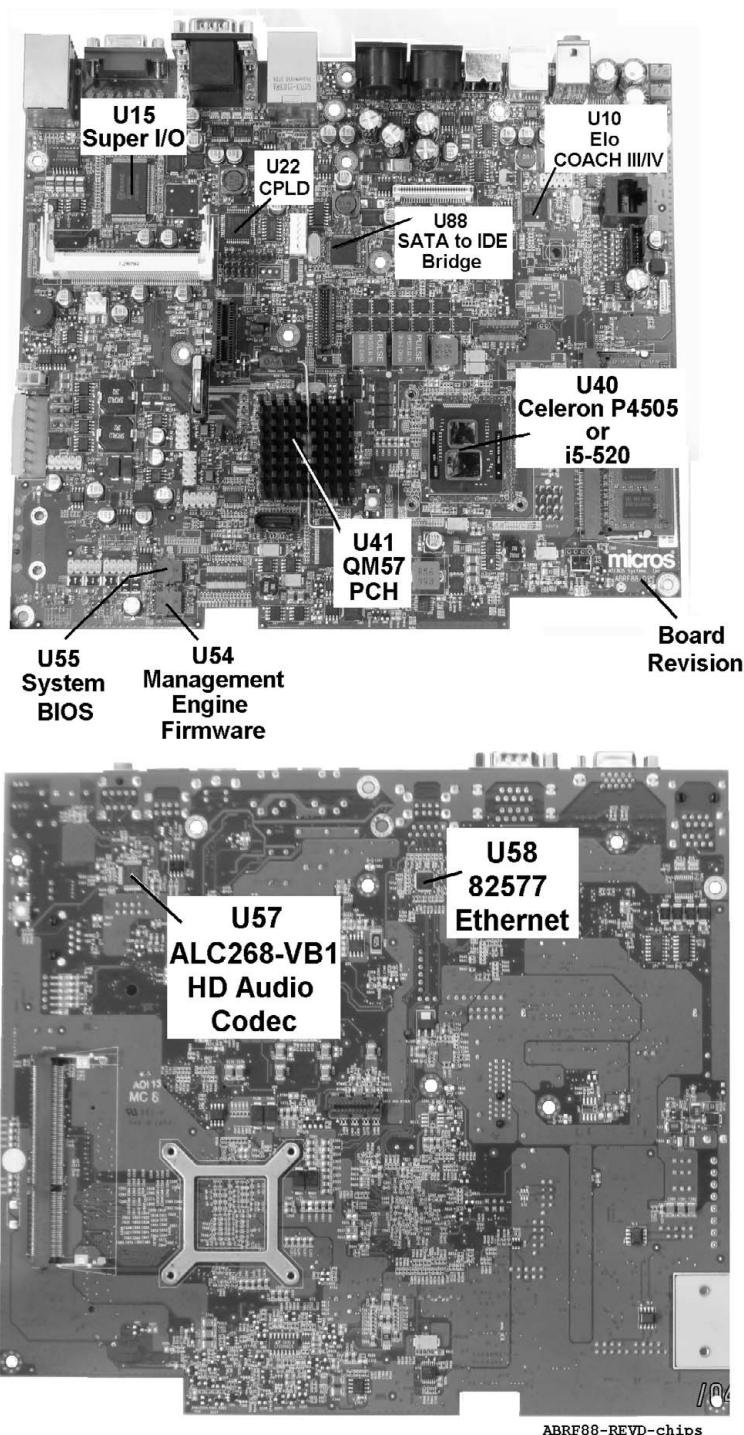
Figure 3-16: System Board Revision D Primary Components

PCWS 2015 System Board Revision D Connectors

The Revision D System Board introduces a new LVDS Connector.
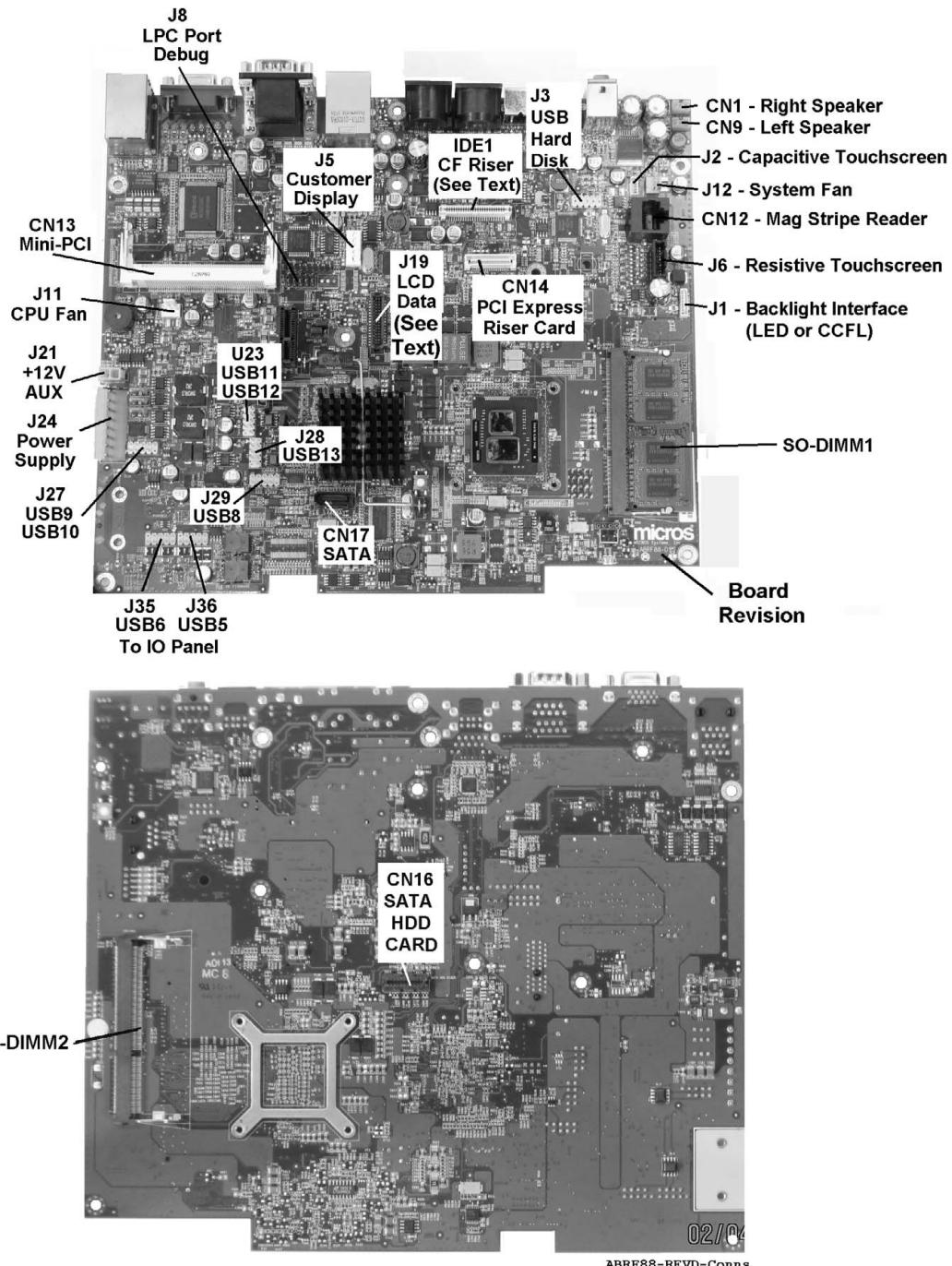
Figure 3-17: System Board Revision D Connectors

PCWS 2015 System Board Revision C and D Jumpers and Switches

The Revision D System Board adds a new configuration jumper.
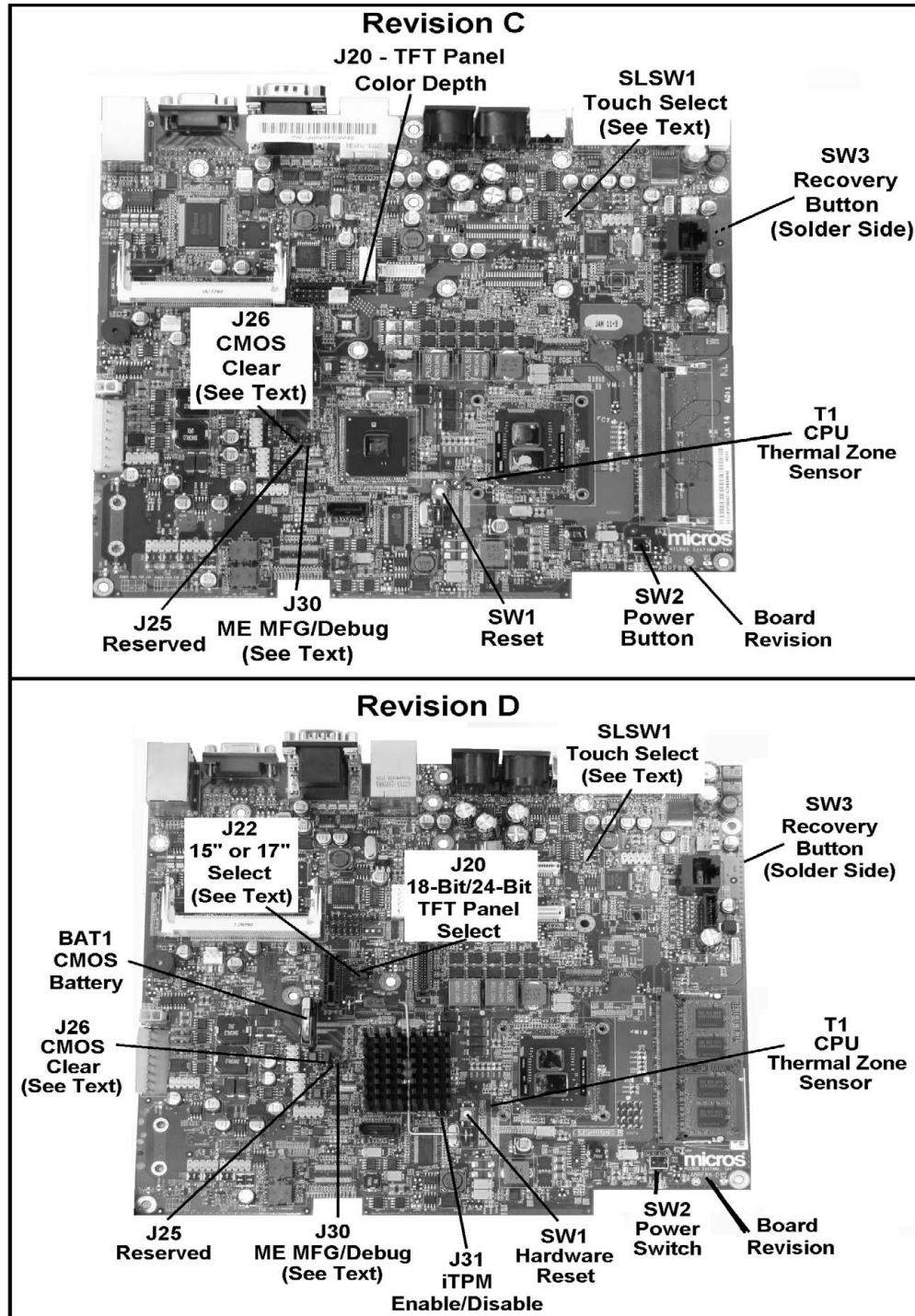
Figure 3-18: System Board Revision C and D Jumpers and Switches

System Board Jumper Configuration

The following pages provide details and procedures for using the System Board jumpers.

SLSW1 Touchscreen Select (Revision C and D)

The PCWS 2015 System Board uses a slide switch to select the touch screen interface, detailed below.

SLSW1 is a low profile surface mount DPDT slide switch in series with USB7, used for the touch screen interface. Figure 3-19, below displays how the switch is set to support the resistive (A) or optional capacitive (B) touch screens.
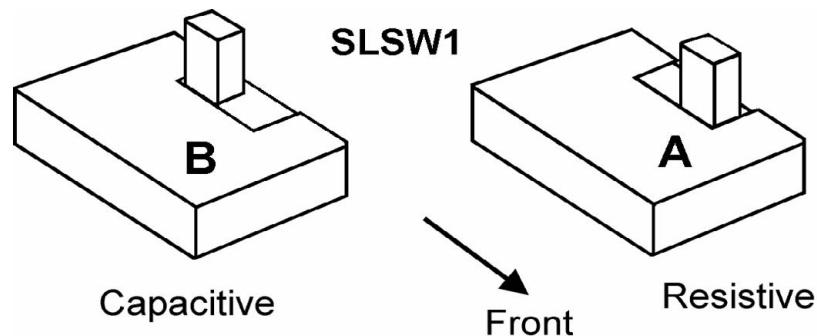
Figure 3-19: Selecting the Touchscreen Interface

J20 - TFT Panel Color Depth Mode (Revs C and D)

J20 determines the color depth supported by the AUO LCD. 24-Bits is the default configuration.
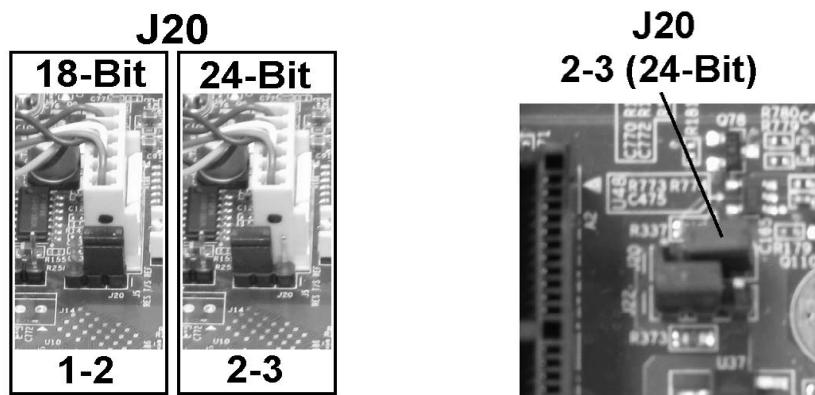
Figure 3-20: Configuration Jumper J20

J22 - LCD Size Select (Revision D System Board Only)

J22 is a new jumper located on Revision D or later System Boards. The default position of 1-2 supports the current 15" LCD. The 2-3 position supports a possible future 17" LCD, not in production at this time.

**J22
1-2 (15")**
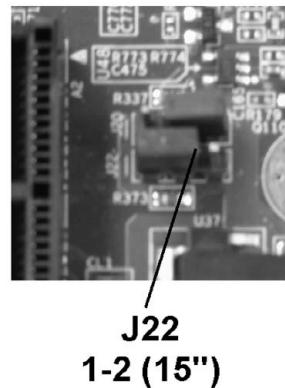
Figure 3-21: System Board J22 Configuration

J30 - Management Engine Firmware MFG/Debug Enable (Revs C and D)

J30 is a 1x2 jumper used to place the Intel Management Engine Firmware in the Manufacturing or Debug mode only. In normal operation the jumper is not installed. Figure 3-22 below.

J30

Not Installed
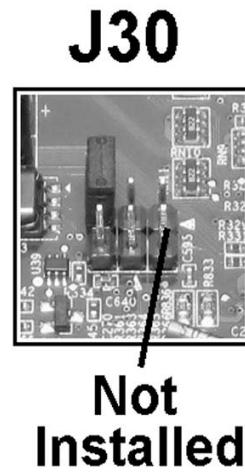
Figure 3-22: Configuration Jumper J30

A procedure for updating the Intel Management Engine Firmware was not available at press time.

SW3 - Recovery Button

SW3 is used to start Factory Recovery. See Chapter 4 for more information.

J26 - CMOS Clear (Revision C and D)

J26 clears the CMOS memory, but does not clear the system time/date. However, clearing the CMOS re-enables all default settings including IO Panel USB ports that may have been disabled for PCI-DSS compliance.

J26 is a 1x2 header. Workstations are shipped with the header installed in a 'park' (inactive) position as shown in the Figure below.
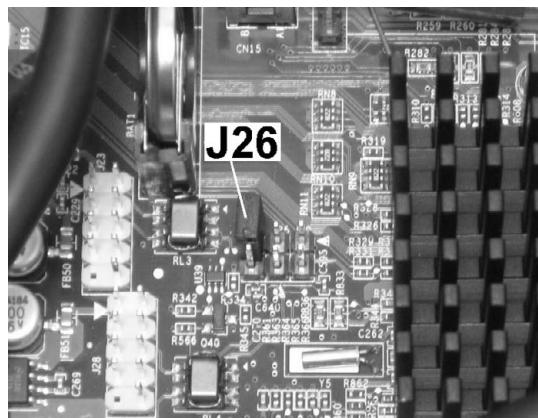
Figure 3-23: J26 - CMOS Clear Jumper (Inactive Position)

1. **Remove the AC Power Cable from the workstation!** This is required to remove all standby voltages from the RTC circuitry.

   > ⚠ **WARNING: Hazard to Equipment**
   >
   > Failure to remove the AC Power Cable from the unit when using J26 could result in damage to the System Board.

2. Move the jumper from the inactive position to pins 1-2 for a few seconds, then move the jumper back to the inactive position.

   o   If the AC power cable remains connected, the unit may power up at this point. To avoid damage, remove power from the board immediately.

3. Connect a USB Keyboard and AC power cable to the workstation.

4. If the unit does not start when the AC power cable is reconnected, press the power button to start the unit. When the Blue splash screen appears, press [F2] to enter the BIOS Configuration screen.

   o   Refer to Chapter 3 to selectively disable USB Ports USB1 through USB6 as required.

System Board Technical Description

The available PCWS 2015 Processors are based on the low power-high performance 45nm Nehalem micro-architecture, and consists of a two-chip platform.

The two-chip platform consists of the Processor and Platform Controller Hub (PCH) a configuration that enables higher performance, lower cost, and smaller footprint.

The Processor integrates the Intel HD Graphics Engine and Integrated Memory Controller on the same package as the processor core. This is known as a multi-chip package (MCP) processor. In Figure 3-24 below, the processor core is housed in the larger of the two packages.

Figure 3-24: Celeron P4505 or i5-520 Processor Multi-Chip Package

Intel i5 General Features

- Two execution cores

- A 32-KB instruction and 32-KB data first-level cache (L1) for each core.

- A 256-KB shared instruction/data second-level cache (L2) for each core.

- Up to 4-MB shared instruction/data third level cache (L3), shared among all cores.

- Thermal Management via TM1 and TM2.

  ### *Supported Technologies*

  o   Intel Virtualization Technology (Intel VT-x).

  o   Intel Virtualization Technology for Directed I/O (Intel VT-d).

o   Intel Trusted Execution Technology (Intel TXT).

o   Intel Streaming SIMD Extensions 4.1 (Intel SSE4.1)

o   Supplemental Streaming SIMID Extensions 4.2 (Intel SSE4.2)

o   Intel Hyper-Threading Technology (Intel HT Technology)

o   Intel 64 architecture

o   Execution Disable Bit

o   Intel Turbo Boost Technology

o   Processor Context Identifier (PCID)

System Memory Support

The following applies to either processor selection.

One or two channels of DDR3 memory with a maximum of one SO-DIMM per channel.

1GB or 2GB DDR3 DRAM technologies are supported for x8 and x16 devices.
2 x 2GB = 4GB

Using 2GB device technologies, the largest memory capacity possible is 8GB, assuming dual channel mode with two sockets.

Up to 32 simultaneous open pages, 16 per channel (assuming 4 ranks of 8 Bank Devices)

Memory organization:

- Single-channel modes (one DIMM)

- Dual Channel modes - Intel Flex Memory Technology

   Dual-channel symmetric (Interleaved)

- Dual Channel asymmetric

- Single and Dual Channel memory organization modes.

- Data burst length of eight for all memory organization modes.

- DDR3 transfer rates of 800 MT/s (Celeron P4505) and 1066 MT/s (i5-520M)

Intel HD Graphics Controller

The available Celeron P4505 or i5-520 processors have identical graphics controllers.

The graphics controller is powered by a refresh of the fifth generation graphics and supports twelve, fully programmable execution cores. The integrated graphics controller contains several types components including the graphics engines, planes, pipes, port and the Intel FDI.

The HD Graphics controller includes the following features:

- MPEG2 Hardware Acceleration.

- WMV9/VC1 Hardware Acceleration.

- AVC Hardware Acceleration.

- ProcAmp

- Advanced Pixel Adapter De-interlacing.

- Sharpness Enhancement.

- De-noise Filter.

- High Quality Scaling.

- Intel TV Wizard.

- Dedicated analog (VGA) and digital display ports (LVDS) are supported through the PCH.

Intel Flexible Display Interface (FDI)

The FDI transports video from the graphics controller in the processor to the legacy display connectors attached to the QM57 PCH.

The FDI utilizes differential signalling to transport data from a pixel source (the processor graphics controller) to a sink (the PCH). The FDI is composed of two pipelines, Pipe A and Pipe B. Each pipeline consists of the following.

- Four Tx differential-pairs comprising the data link that transports pixel and framing data from the display engine.

- One single-ended FDI_INT, which is used for interrupts from the PCH to the processor.

Each FDI pipeline can be configured according to the bandwidth requirements. 1, 2, 3, or 4 lanes may be used to transport frame data over the link. Each Lane transports at a rate of 2.7 Gbps and uses ANSI 8b10b encoding.

QM57 General Features

The QM57 PCH on the PCWS 2015 system board is part of a larger family of Intel 5 Series Chipsets encompassing home, office and mobile applications. The QM57 is targeted for low power mobile applications and provides all IO support to the workstation platform as described in the following pages.

USB 2.0 Ports

The QM57 contains two Enhanced Host Controller Interface (EHCI) host controllers supporting fourteen USB 2.0 high speed root ports (each with per-port disable capability). The QM57 contains rate matching logic that determines whether a USB port is managed by the UHCI controller or EHCI controller.

IO Panel

Four USB 2.0 connectors are located on the IO Panel and designated USB1 through USB4 using a standard Type A receptacle. Two unique powered USB ports, USB5 and USB6 are available at the IO Panel. The six USB Ports available at the IO Panel can be disabled through the BIOS.

On Revision C System Boards USB Port enable/disable functions are performed at the PCH level register, through the O1201r or O1301 BIOS.

Revision D or later System Boards add high-speed USB port switches controlled by GPIO lines to enable/disable the IO Panel USB Ports, similar to the Workstation 5A. The USB Port switches allow the IO Panel USB Ports to be managed from the PCWS Diagnostics Utility, and take effect without having to restart the workstation.

System Board

The remaining USB ports are reserved for various IO devices within the workstation. This includes a number of 2x5 USB headers available for internal options such as a WiFi Card or finger print reader.

USB Port 7 is routed through a miniature DPDT slide switch that connects it to either the on-board ELO COACH Resistive Touch Controller or off-board Capacitive Touchscreen Interface board through J2.

PCI Express

Complies with PCI Express Base Specification, Revision 2.0.

SPI (Serial Peripheral Interface)

The PCH contains two SPI Interfaces.

o   The SPI0 channel is dedicated to the Management Engine firmware stored in U54.

o   The SPI1 channel is dedicated to the System BIOS chip, U55.

SATA (Serial Attached ATA)

The PCH is compatible with the Serial ATA Specification, Version 2.5. Includes Serial ATA II: Extensions to Serial ATA 1.0, Revision 1.0, and supports independent DMA operation on up to three ports with data transfer rates of up to 3.0 Gb/s. Each channel consists of a transmit and receive pair.

SATA0 and SATA1 are routed to CN16 along to support the SATA HDD Card.

SATA2 is reserved for an on-board SATA to IDE Bridge chip found on Revision D System Boards, but not available on the 2015 Revision C System Board. Appears as ATA HDD2: in the BIOS Boot Order or F5 Boot Menu.

SATA3 is routed to CN17 for use by the SATA CF Riser Card used on Revision C boards. Appears as ATA HDD3: in the BIOS Boot Order or F5 Boot Menu.

PCI Bus

The PCI Bus conforms to the PCI Local Bus Specification, Version 2.3.

The QM57 integrates up to four external PCI Bus masters. PCI Bus signals are routed to CN13, the Mini-PCI expansion slot.

Ethernet

The QM57 integrates a Gigabit Ethernet Controller that is compatible with the Intel 82867 Gigabit LAN Platform Connect Device.

The QM57 integrated GbE controller supports multi-speed operation of 10/100/1000 Mb/s. The interface can operate in full duplex at all supported speeds or half-duplex at 10/100 Mb/s and complies with the IEEE 802.3x Flow Control Specification.

HD Audio

The QM57 contains an High Definition Audio (HDA) controller that communicates with an external codec over the Intel High Definition Audio serial link. The HDA protocol is controller synchronous, based on a 24MHz Bit Clock sent by the QM57 HDA controller.

The input and output streams, including command and PCM data, are isochronous with a 48Khz frame rate. The QM57 implements four DMA output engines and four DMA input engines. The output DMA engines move digital data from system memory to the D-A converter in the codec. The input DMA engines move digital data from the A-D converter in the codec to system memory.

The PCWS 2015 System Board uses a Realtek ALC268-VB1 HD Audio Codec. Like the WS5/WS5A case work on which it based, the PCWS 2015 includes two speakers mounted to the left and right side of the base. A two watt per channel amplifier drives the speakers. In addition, the PCWS 2015 includes Microphone Input and Line Output connectors on the I/O Panel.

GPIO

General Purpose IO signals are used to activate IDN Port Control, provide selectable voltages to the powered USB and RS232 ports, manage the recovery button and last state flip-flops among other items.

Most the GPIO signals on PCWS 2015 Revision C System Board originate from the CPLD, U22. On the Revision D System Board, many of the additional GPIO lines required to manage the USB port switching and voltage control are supplied by the the QM57.

LPC

The QM57 implements an LPC interface based on the Low Pin Count Interface Specification Revision 1.1.

On the PCWS 2015 System Board, several devices are connected to the LPC Bus.

CPLD U22, and Super IO U15 are the primary devices on this bus in addition to LPC Debug Port, J8.

SMBus

The System Management Bus is compatible with System Management Bus Specification, Version 2.0.

The QM57 contains an SMBus Host interface that allows the processor to communicate with SMBus Slaves. This interface is compatible with most I2C devices. Special I2C commands are implemented.

The SMBus also implements hardware based Packet Error Checking for data robustness and the Address Resolution Protocol (ARP) to dynamically provide addresses to all SMBus devices.

LCD and Touchscreen Assembly

The PCWS 2015 currently ships with a 15" Resistive Touchscreen and AUO LCD with LED Backlights. The available Capacitive Touchscreen option is shown on the next page.

Resistive Touchscreen Details

The LCD/Touchscreen Assembly with resistive touchscreen is shown in Figure 3-25, below. In the lower left corner, note the two different LVDS connectors corresponding to the System Board Revision.
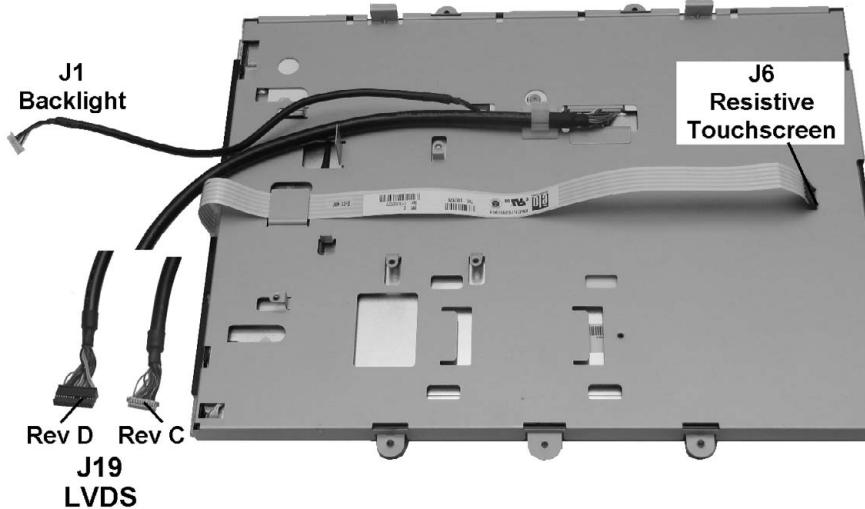

Figure 3-25: The PCWS 2015 /w Resistive Touchscreen and LED Backlights

The LVDS connector J19, changes on Revision D. The illustration shows examples of both connectors, based on board revision.

Optional Capacitive Touchscreen Details

The LCD/Touchscreen Assembly with the optional capacitive touchscreen is shown in Figure 3-26.
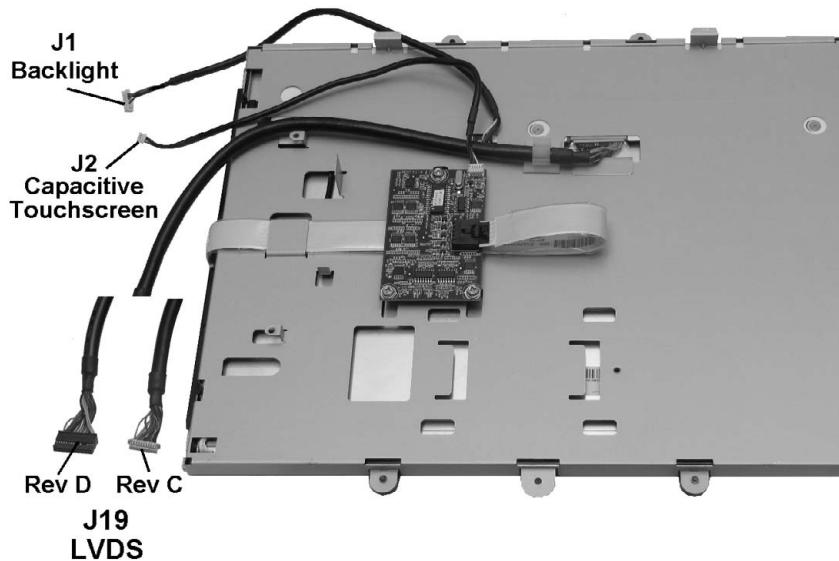
Figure 3-26: PCWS 2015 /w Optional Capacitive Touchscreen and LED Backlights

The Capacitive Touchscreen Option adds the Capacitive Touchscreen Interface Board and interface cable. The capacitive touchscreen plugs directly into the Capacitive Touchscreen Interface Board.

The LVDS connector J19, changes on Revision D. The illustration shows examples of both connectors, based on board revision.

Installing Options

This section includes procedures for removing and replacing PCWS 2015 internal components and options.

Magnetic Card Reader

The PCWS 2015 uses the same Magnetic Card Reader assembly as the Workstation 5 and 5A. The reader head and interface cable is pre-mounted to a plastic channel located along the right side of the base.

The Mag Card Reader connects to CN12, as shown in Figure 3-27, below.
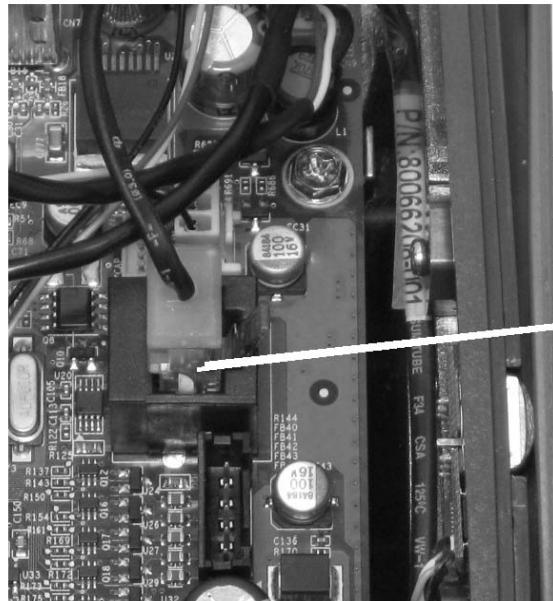
Figure 3-27: Removing the Mag Card Reader Connector

DDR3 SO-DIMMs

This section specifies the approved memory devices and describes how to remove and replace DDR3 SO-DIMMs.

The PCWS 2015 System Board includes a pair of SO-DIMM sockets SO-DIMM1, accessible on the top of the system board, and SO-DIMM2 accessed by removing an access door on the base.

Up to 8GB of memory is possible, using 2 x 4GB SO-DIMMs. Limited testing has been performed tested to confirm this. However, a 64-bit Operating System is required to fully utilize 8GB of system memory.

The current Windows 7 Professional, POSReady 2009, and Windows XP Professional OS images are 32-bits; each is limited to a max of 4GB of system memory.

Approved SO-DIMM list

Figure 3-28, below lists DDR3 SO-DIMMs currently approved for use in the PCWS 2015.

Size	MICROS P/N	Description
2GB	700502-180	Unigen U625U6400M8SU-9BA
2GB	700502-180	Transcend TS256MSK64V1N

Figure 3-28: Approved SO-DIMMs for the PCWS 2015

SO-DIMM Configuration

Current configurations ship with a single 2GB DDR3 SO-DIMM installed in socket SO-DIMM1, located on the top of the System Board. One additional 2GB DDR SO-DIMM can be installed in socket SO-DIMM2.

See the next page to remove or install an SO-DIMM in SO-DIMM1 or SO-DIMM2.

Remove

• Remove the retension clips from each side of the SO-DIMM then raise it to a 30° angle before removing it from the socket.
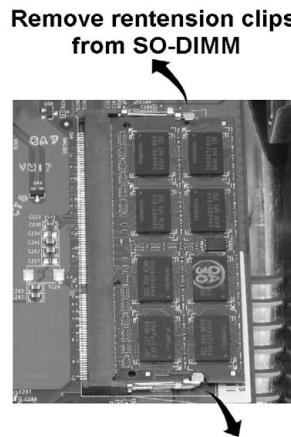

Figure 3-29: Removing a SO-DIMM

Install DIMMs

• To access SO-DIMM2, use a 2.5mm hex wrench to loosen the hex head screw and remove the access door.

• Insert the SO-DIMM into the socket at a 30° angle. When it is fully inserted, press down to lock the retension clips into place.
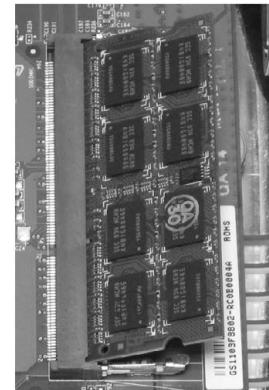
Figure 3-30: Installing a SO-DIMM

Removing the IO Door

The PCWS 2015 IO Door includes a new release tab to avoid having to bend the door to remove or install it.

Figure 3-31 shows an example of the IO Door release.

- To remove the IO Door, simply depress the tab and lift it out of the IO panel.

Figure 3-31: Removing the PCWS 2015 I/O Door

Installing the Rear LCD Customer Display

This procedure describes how to attach the Integrated LCD Customer Display to the PCWS 2015. The display is provided as a complete assembly, ready to install.

1. Remove the AC power cable from the unit.

2. Place a towel or soft cloth on your work surface to protect the touchscreen glass, then place the workstation face down on this surface.

3. Remove the IO Door, and remove the logo plate. Re-install the door and return it to the closed position.

4. Feed the interface cable through the cut-out then insert the LCD customer display bracket until the side clips snap into place as shown in Figure 3-32.

5. Connect the interface cable to the IO panel 'Rear Display' connector as shown in Figure 3-32.
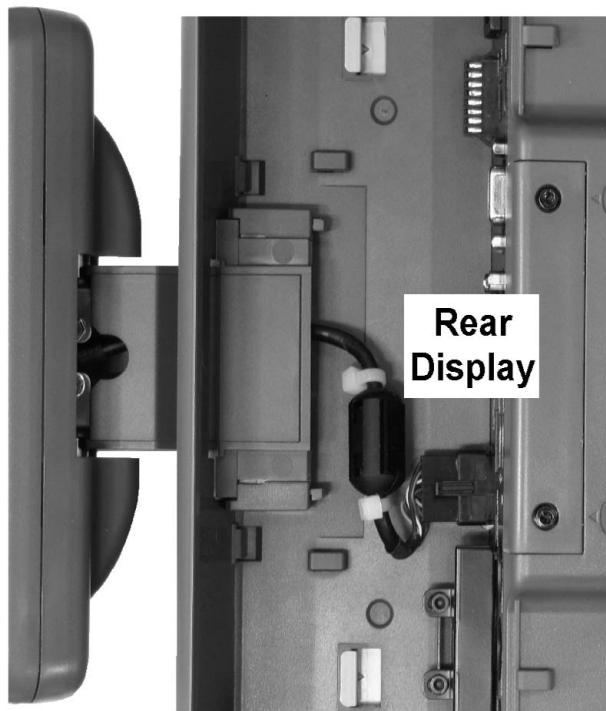
Figure 3-32: Installing the Rear LCD Customer Display

6. Return the unit to the normal operating position, connect the AC power cord and press the power button. The LCD Customer Display is automatically detected and ready for use.

Pole LCD Customer Display

This procedure describes how to install and connect the Pole LCD Customer Display to a PCWS 2015. The pole version is provided as a kit consisting of the LCD Display Assembly /w 5 ft. cable, 18" pole, base, extension cable, and nut. Due to the varying thickness and materials used on the counter surface, the installer must provide the base mounting hardware. The cable length is approximately 5 feet.

1. Use the base as a template to locate the mounting holes in the counter surface.

2. After mounting the pole and base to the counter surface, route the extension cable through the pole and connect it to the LCD assembly cable. Attach the LCD assembly to the pole, position the display head in the desired position and use a 1.5 mm hex wrench to lock the display in place.
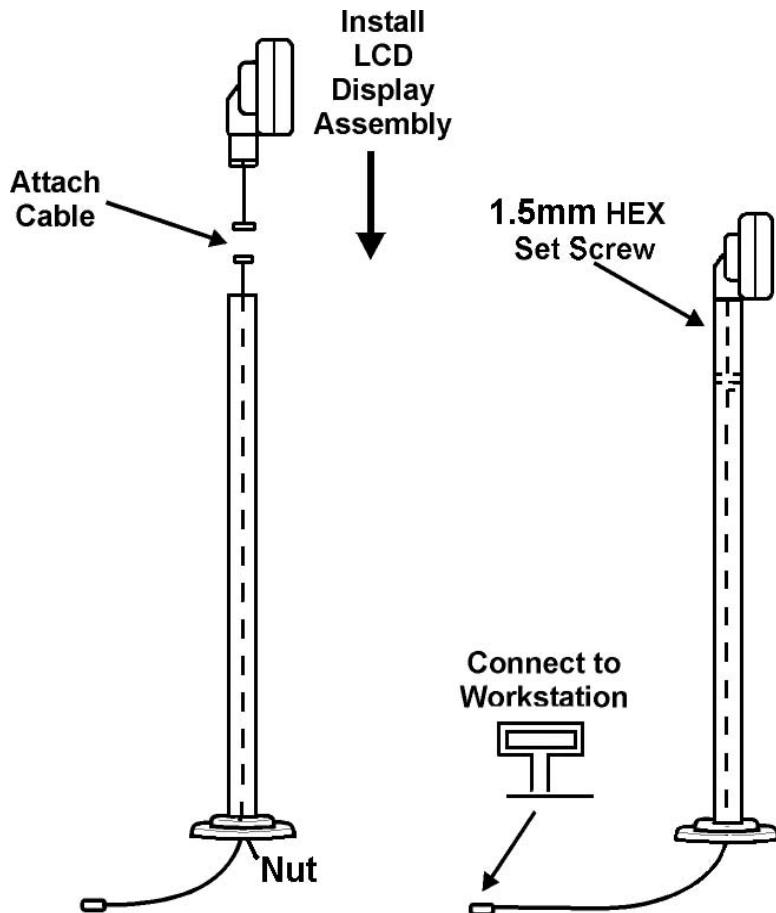
Figure 3-33: Assembling the Pole Customer Display

3. Power-off the unit and attach the keyed 4-Pin Mini-DIN connector to the 'Customer Display' connector on the IO Panel.

4. The LCD Pole Display is automatically detected by the API at power-up.

### Testing the Integrated and Pole LCD Customer Display

5. From the Windows Desktop double tap the DiagnosticsUtility Shortcut.

    o   The DiagUtility Main Screen is displayed.

6. Touch the 'Cust Disp' tab. Press the [Send] button to send a message to the customer display.

    o   The message should display on the LCD Customer Display.

PCWS 2015 and Adjustable Stand and Pole Display

The Adjustable Stand Pole Display can be used with the PCWS 2015. The kit consists of a the LCD customer display, 6" Pole, mounting bracket and hardware.

1. Determine the location of the mounting bracket on the base plate. It can be mounted to the left, right, or rear of the Base Plate.

2. Attach the Mounting Bracket to the Base Plate. Be sure to use the spacers included in the kit between the base plate and bracket.

3. Refer to the numbered steps in Figure 3-34 to attach the pole to the bracket, run the interface cable, and attach the LCD to the pole.

4. Rotate the LCD to the desired position and use a 1.5mm hex wrench to tighten the set screw and lock the display in place.
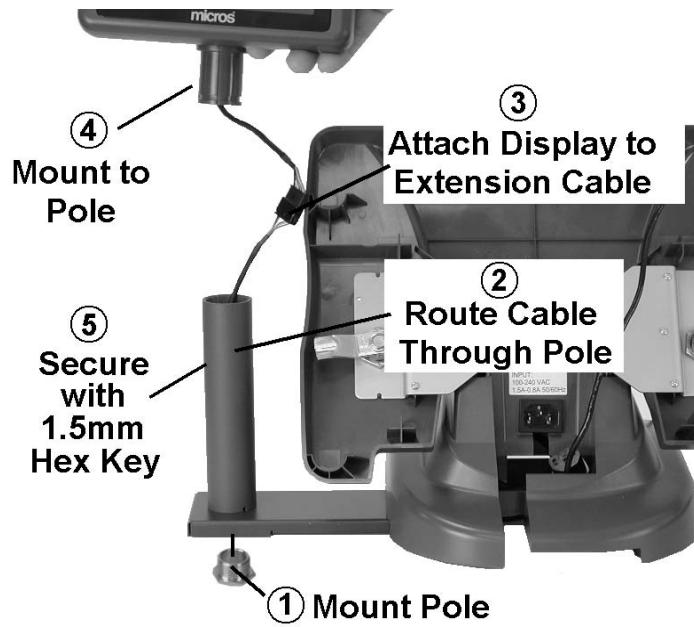
Figure 3-34: Assembling the Adjustable Stand Pole Display

5. Make sure the interface cable is routed up through the stand in order to attach it to the IO Panel. Before placing the workstation on the Stand, connect the interface cable to Customer Display IO Connector.

Protégé Customer Display System - Integrated

This procedure describes how to install the Protégé on the PCWS 2015 when support becomes available.

1. Power off the workstation, remove cables, place the unit face down to access the IO Panel.

2. Remove the MICROS Logo plate from the IO Door. Reinstall the door and make sure it is in the closed position.

3. Orient the Protégé with the speakers facing the bottom of the workstation, then insert the bracket in the IO door cut-out. Slide the Protégé and bracket into the housing until the clips lock into place.

4. Attach the 1x8 connector to USB5 as shown in the as shown in the illustration below.
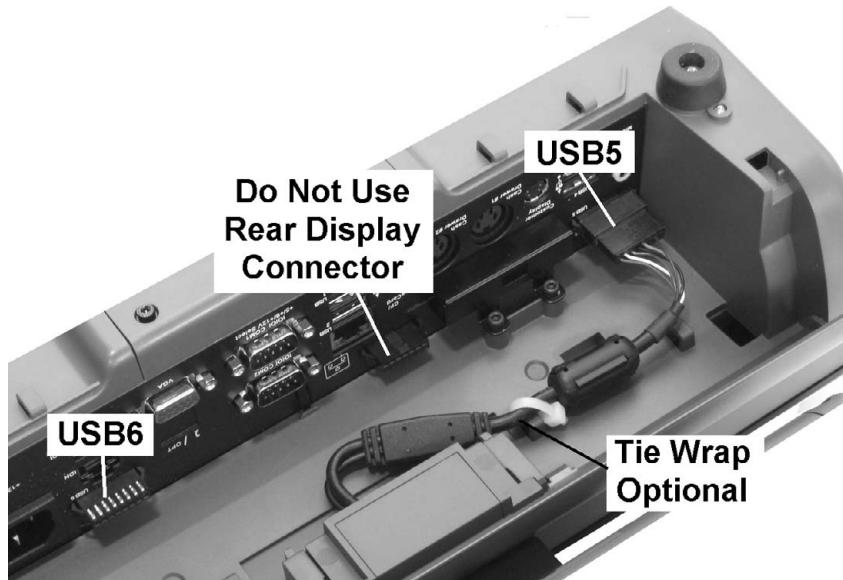
Figure 3-35: Installing the Protégé Integrated Customer Display

• Alternately, the Protégé can be connected to USB6.

Protégé Customer Display System - Pole Mount

The Pole Mount Protégé is shipped pre-assembled with a 19" interface cable, 6" Pole, base and nut. The Protégé can attach to one of the two custom powered USB ports on the 2015 IO Panel.

1. Attach the base to a cash drawer, or using the base of the pole as a template, attach to the counter surface. Appendix A provides details of the base hole pattern dimensions.

2. Route the Protégé Display Cable through the pole and through the stand (if used) to the PCWS 2015 IO Panel.

   o *Note: The Protege Customer Display System cabling is based in 1x8 connectors and is not compatible with the LCD Customer Display cable, which uses a 1x7 connector.*

3. Attach the Protégé to the pole. When the display is in the desired position, tighten the 1.5mm set screw.
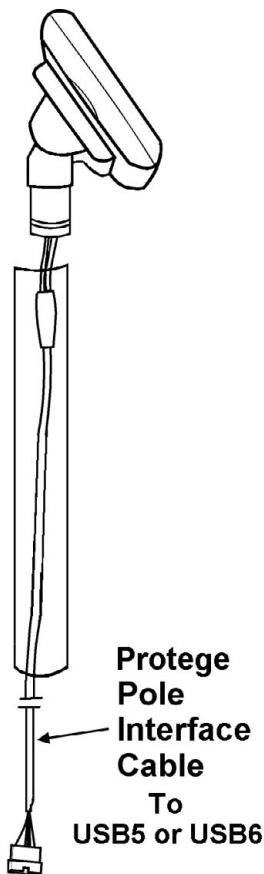
Figure 3-36: Attaching the Protégé Customer Display System to a 6" Pole

4. Connect the Protégé to the USB5 or USB6 on the PCWS 2015 IO Panel.

Hard Drive Installation

This section describes the PCWS 2015 Hard Drive configuration and shows how to install or remove a disk drive.

> ⚠ **CAUTION**
>
> Before installing or removing disk drives, always power off the unit and remove the AC Power Cable.

> ➡ **A Note About SATA Drives**
>
> SATA drives do not require Master/Slave jumper configuration.

As shown in Figure 3-37, below the front and rear access doors have been removed. A hard drive is installed in the SATA 0 bay, located near the IO panel.

Figure 3-37: PCWS 2015 SATA Drive Bay Locations

Single drive configurations are factory installed in the SATA 0 bay, located near the IO Panel.

Installing a Second Hard Disk

To install a second SATA drive in an existing workstation, see below.

1. Power off and remove the AC power cable from the unit.

2. Remove the SATA 1 access door at the front of the unit.

3. When installing the drive, make sure the SATA connectors are oriented as shown in Figure 3-39, below.
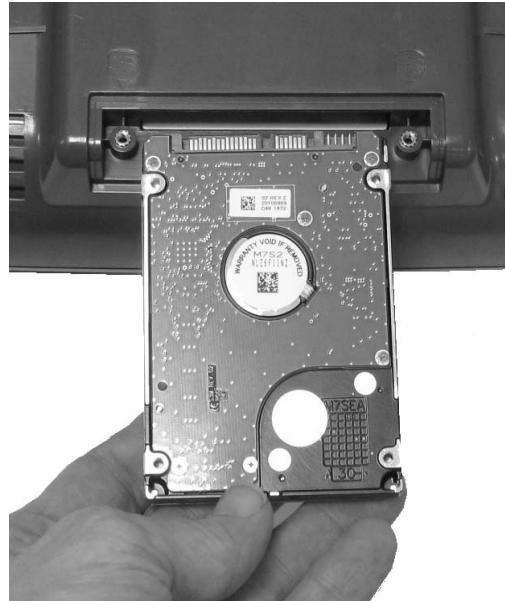
Figure 3-38: Orienting the SATA Disk Drive before Installation

4. When sliding the drive into bay, avoid applying lateral force to the drive as you install it.

5. If you apply a slight downward force on the drive as you install it, the connectors can ride up and over the SATA HDD board connectors as shown at the bottom of Figure 3-39.

6. Push the drive into the bay until the connectors mate with the SATA HDD card connectors.

o   The left side of Figure 3-39 shows the correct method of installing the disk, at right angles to the base. The disk will slide all the way into the compartment and mate with the SATA Riser Card connectors.

o   The right side of Figure 3-39 shows slight downward pressure on the drive as it is installed. This can result in the drive riding up and over the SATA Riser Card connectors as shown in Figure 3-39, below.
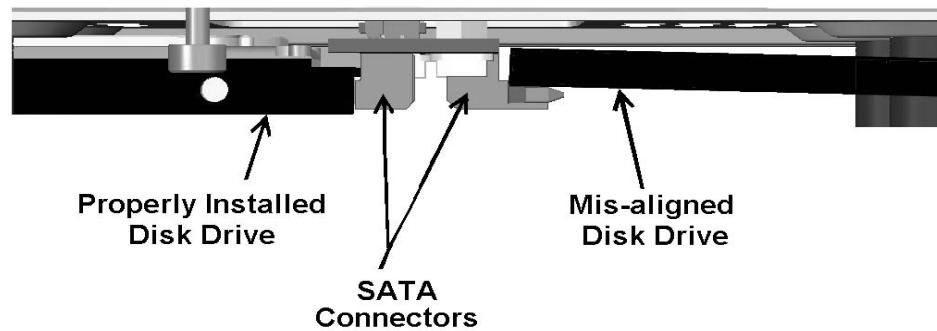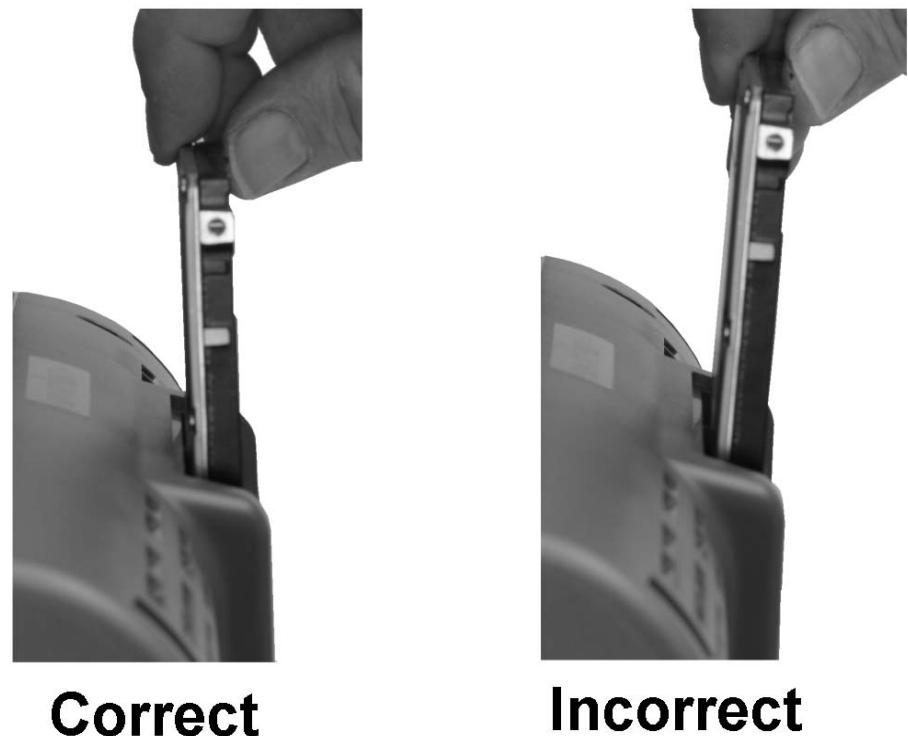
Figure 3-39: Installing a SATA Disk Drive

Configuring the 2nd Drive

After you install the 2nd drive, the next time POSReady or Windows 7 starts, it will automatically detect the drive. However, you must use the Disk Management utility to partition and format the drive before it can be used. This is true if installing a new drive or a previously used drive.

To start the disk manager, from the Control Panel, select Administrative Tools -> Computer Management -> Storage -> Disk Management.

When you start Disk Management, a prompt may appear requesting that you Initalize the disk before the Disk Manager can access it. Press [OK] to initalize the disk.

Once the drive is initialized, it must be partitioned, formatted and a drive letter assigned.

RAID Overview

The following discusses the various options available for using a RAID on the PCWS 2015. With two drives available and RAID support included in the PCH and BIOS, basic RAID Level 0 and 1 configurations are possible. The following section provides consideration of each type, then goes on to describe how to configure the BIOS to build a two-drive RAID.

RAID Level 0 - Striping (Performance)

Simple stripe sets are referred to as RAID Level 0. This configuration provides improved performance and additional storage but no redundancy or fault tolerance.

Failure of either disk destroys the array, and the likelihood of failure increases with more disks in the array. With two drives, catastrophic data loss is twice as likely compared to a single drive without RAID.

A single disk failure destroys the array because when data is written to a RAID 0 volume, it is broken into a number of fragments called blocks. The number of blocks is dictated by the stripe size, a configuration parameter supplied when building the RAID. The blocks are written to each disk simultaneously on the same sector. This allows smaller sections of the entire chunk of data to be read from the drive in parallel, increasing bandwidth. RAID 0 does not implement error checking, so should an error occur, it is uncorrected.

RAID Level 1 - (Mirroring)

RAID Level 1 offers data security and limited fault tolerance by mirroring identical data on two drives. This is often called a mirrored set.

The two drive array provides fault tolerance from single disk errors or failures and the array will continue to operate as long as one drive is still operating.

Increased read performance occurs when using a multi-threaded operating system such as Windows 7 that supports split seeks, as well as a very small reduction in performance when writing to the mirrored set.

A RAID 1 Mirrored Set is no Substitute for Regular Data Backups

Data may become damaged or destroyed without physical harm to drive(s) on which they are stored. Examples include data becoming overwritten by a system malfunction; files may be damaged or deleted by user error or malice and not be noticed for days or weeks.

RAID 1 is also vulnerable to controller failure, and it may not be possible to migrate the drives to new system board without data loss.

Building the RAID Array

The following provides an overview of the steps required to build a two-drive RAID.

1. Select the drives for use in the RAID array.

    o   For best results, the drives should be from the same manufacturer, have the same model number and capacity.

2. Install both drives.

    o   Refer to Figure 3-39 for an example of installing a SATA disk drive.

3. With a USB keyboard attached, start the unit and press [F2] to enter the System BIOS.

4. Proceed to the Advanced tab, scroll down, select 'HDD Configuration' and press [Enter].

    o   The HDD configuration screen appears.

5. Scroll to the 'Interface Combination' field press enter. Select 'RAID' and press [F10] then 'Y' to save and reboot.

    o   Immediately after the blue splash screen, a screen similar to that shown below should appear.

```
Intel(R) Rapid Storage Technology - Option ROM - 9.5.0.1021
Copyright(C) 2003-09 Intel Corporation. All Rights Reserved.

RAID Volumes:
None Defined.



Physical Devices:
Port Device Model     Serial  #                      Size  Type/Status(VOL ID)
 0    SAMSUNG HM161GI   S24NJDZZ906213                149.0GB Non-RAID Disk
 1    SAMSUNG HM161GI   S24NJDZZ906127                149.0GB Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility..
```
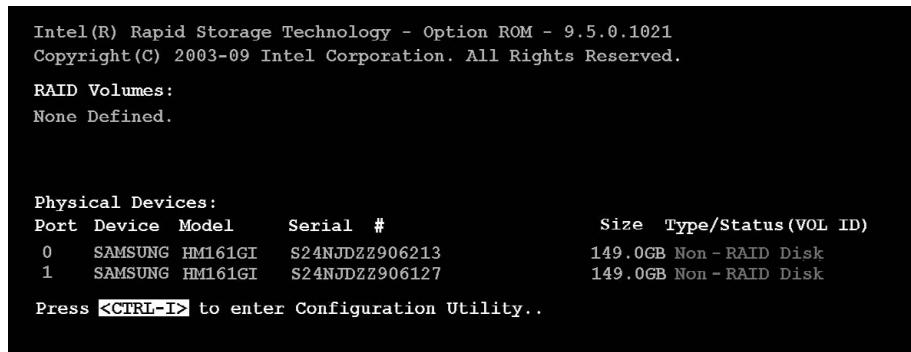
Figure 3-40: Using CTRL-I to enter the RAID Option ROM

o   The RAID Option ROM is integrated into the main BIOS to provide, prior to each boot, a pre-boot text mode user interface where you create or delete RAID volumes or select recovery options should they be required.

o   When you enable RAID, two drives must be installed or the menu shown above does not appear.

6. Press [Control-I] to enter the 'Intel Rapid Storage Technology Option ROM'. A sample of this screen is shown below.

```
Intel(R) Rapid Storage Technology - Option ROM - 9.5.0.1021
Copyright(C) 2003-09 Intel Corporation. All Rights Reserved.
==================[ MAIN MENU ]==================
    1.  Create RAID Volume        4.  Recovery Volume Options
    2.  Delete RAID Volume        5.  Acceleration Options
    3.  Reset Disks to Non-RAID   6.  Exit
============[ DISK/VOLUME INFORMATION ]============
RAID Volumes:
None defined.


Physical Devices:
Port Device Model      Serial  #                Size  Type/Status(VOL ID)
0     SAMSUNG HM161GI   S24NJDZZ906213         149.0GB Non-RAID Disk
1     SAMSUNG HM161GI   S24NJDZZ906127         149.0GB Non-RAID Disk











    [↑↓]-Select              [ESC]-Exit              [ENTER]-Select Menu
```

Figure 3-41: Creating a RAID Volume

o This example shows two drives and the Type/Status field for each drive reports 'Non-RAID Disk.'

If you installed one or more drives from an existing system, select [2] to delete any previous RAID partitions, then [3] to reset each disk status fields to 'Non-RAID' before proceeding.

7. From the Main Menu, select [1] to create a RAID.

o From the Create Volume Menu, use the tab key to move between each field and select the type of RAID and other required parameters.

o When you create a RAID volume, the Option ROM exports the volume data to the Phoenix BIOS Boot Priority Order.

8. Image the RAID. OS images created for a single drive will not boot on a RAID system. Conversely, OS images created for a RAID will not boot on a single drive configuration.

o RAID and non-RAID PCWS 2015 images can be obtained from the MICROS HSG Portal.

o RAID and non-RAID images for the 2015 are posted in the Member Login Area of the MICROS Web Site: Members -> Product Support -> Hardware -> Downloads, Disk Images.

Reassembling the PCWS 2015

The following procedure describes how to reassemble the PCWS 2015.

Procedure:

1. Before installing the power supply cover, make sure the power supply cable is routed through the cable guide located just behind the power supply as shown in the left of Figure 3-42, below.
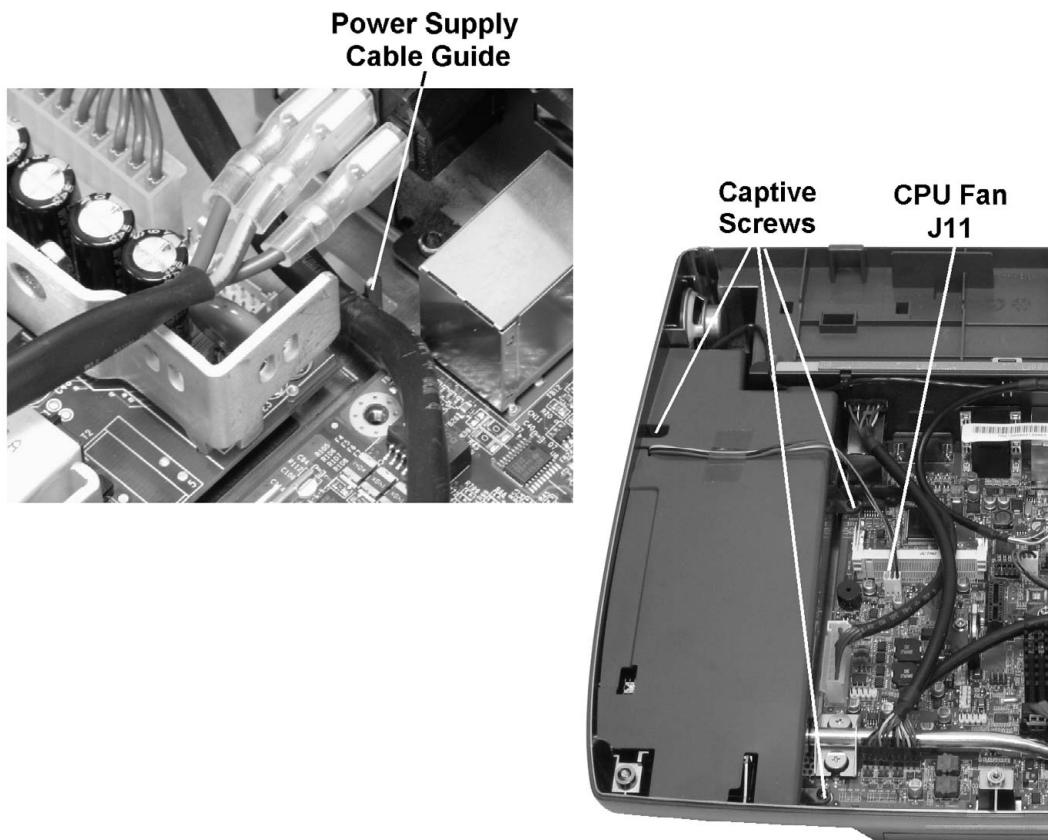

Figure 3-42: Installing the Power Supply Cover

o Fit the power supply cover in place and fasten the three captive screws to provide a good seal.

o Connect the CPU fan to J11.

o Make sure the power supply cable is connected to J24 on the system board.

2. If an optional finger print reader or other device is installed in the top cover, make sure the cable enters on the right or left to avoid interference with the LCD/Touchscreen Assembly as shown in Figure 3-43. The option cable can be attached to J29.
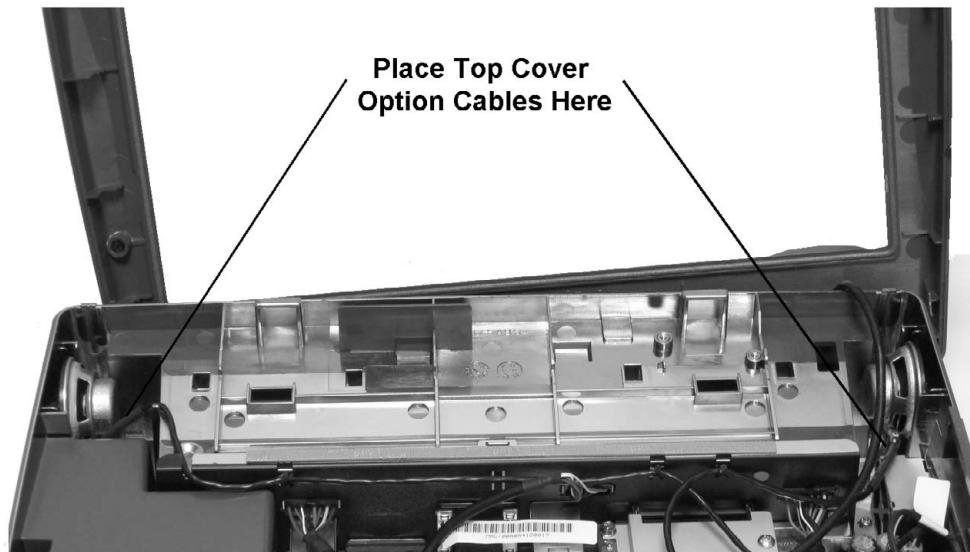
Figure 3-43: Top Cover Option Cable Routing

3. Place the LCD/Touchscreen Assembly to the right of the base and connect the interface cables as shown in Figure 3-44.
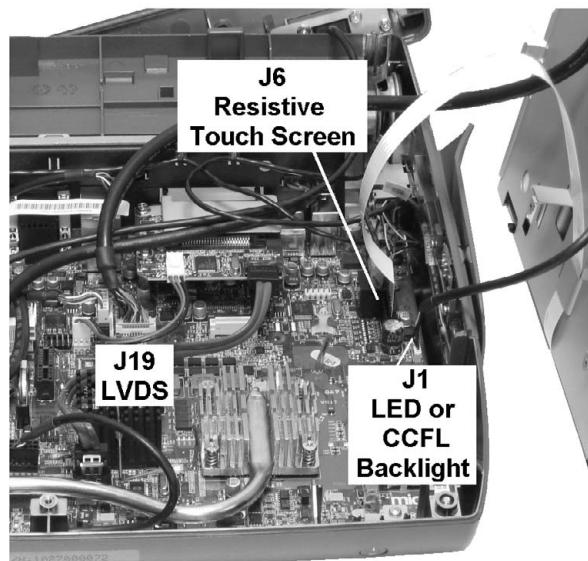
Figure 3-44: Installing the LCD/Touchscreen Cables

    o   LVDS Cable to J19. See page 3-30 (Resistive) and 3-31 (Capacitive) for more information about changes to this cable.

    o   LED Backlight Cable to J1.

    o   Resistive Touchscreen connector to J6.

        If a capacitive touchscreen is installed, connect the interface cable to J2. J6 is not used.

4. Install the LCD/Touchscreen Assembly in the base. The top of Figure 3-45, below shows the tabs at the rear of the assembly and the slots in the base. Insert the tabs into the base.

Figure 3-45: Installing the LCD/Touchscreen Assembly

5. Be sure to install the screw that secures the LCD/Touchscreen Assembly to the base.
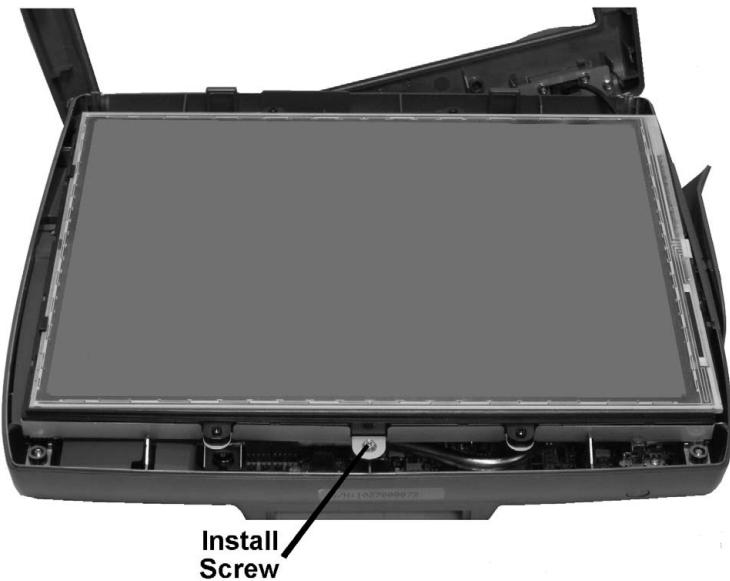
Figure 3-46: Securing the LCD/Touchscreen Assembly to the Base

6. Examine the top cover gasket to ensure it is seated in the groove. Install the top cover by first attaching to the hooks at the rear of the base then rotate downward to snap the cover in place.
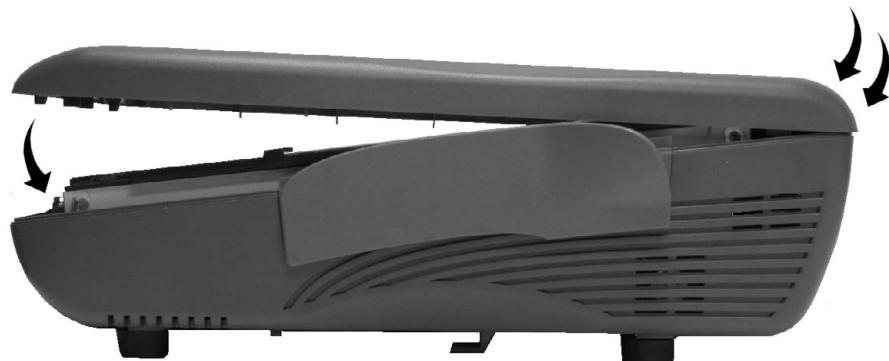
Figure 3-47: Installing the Top Cover

7. Tighten the captive screws to secure the cover.

Chapter 4

Installing and Operating the Workstation 2015

This chapter describes the environmental requirements for the workstation, describes the IO Panel, and covers the basic operational procedures such as Factory Recovery.

In this chapter

Care and Handling

Tips for placing the unit in an environmentally sound location and instructions for cleaning the workstation cabinet are presented in this section.

Equipment Placement

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

Location

- Appendix A contains dimensional data for the workstation and peripheral devices. Before you decide on the space each piece of equipment will occupy, take measurements and compare them to ours.

- Locate all equipment so that it is accessible to service personnel.

- Tile is the recommended floor surface for areas surrounding the equipment. If the floor covering adjacent to the equipment is carpeted, an anti-static grade of carpeting is recommended.

- If the carpeting surrounding the area housing the equipment is not composed of anti-static material, the use of static discharge mats is recommended. An anti-static mat incorporates a grounding clip with a cable that can be attached to earth ground.

Proximity to Foreign Materials

Spilled liquids can cause damage to the circuits in MICROS equipment.

- Do not place equipment near food preparation areas, glass racks, or water stations.

Another source of potential hazards to the equipment are foreign objects, including paper clips, staples, and any other metallic objects.

- Safeguards should be taken to prevent the accidental dropping of such materials into the equipment.

Noise Induction

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

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

- Devices that emit RF energy, such as cordless phones, and walkie-talkies should be kept at least 8 inches from the equipment or cable during operation.

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.

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 is recommended in areas near the workstation.

Temperature and Humidity

The PCWS 2015 can operate in temperatures between 0°C (32°F) and 45°C (113°F). A constant humidity between 40% and 90% is required for proper operation of the equipment.

AC Power and Data Cabling Requirements

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

Cleaning the Display, Cabinet, and Magnetic Stripe Reader

Recommendations for cleaning the Cabinet, Magnetic Stripe Reader and LCD cover are described below.

> **SHOCK HAZARD**
>
> Before performing preventive maintenance or cleaning the workstation, use the power button to turn the unit off.

LCD Cover

The Operator Display overlay can be cleaned using any common household cleaner applied with a clean cotton cloth. Always spray the cloth with the cleaner first, then use the cloth to clean the overlay.

Cabinet

Always use a chamois or clean lint-free cloth to clean the cabinet and screen 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 as often as once a day if the reader is subjected to heavy usage.

Cleaning kits are available from a variety of sources including MICROS 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 PC Workstation 2015 IO Panel layout.
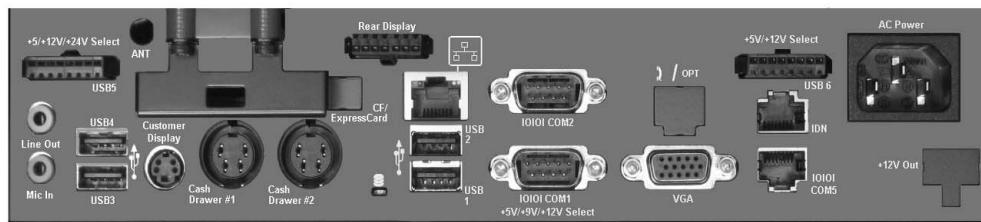
Figure 4-1: The PCWS 2015 I/O Panel

Working from left to right in the illustration, each connector is detailed below.

Line Out - Mic In

The Green Line Out connector is an output, capable of driving external powered speakers. The internal speakers are still active when this output is used.

The Mic In jack allows you to connect a microphone to record sound clips. Windows Embedded CE 6.0 configurations do not include sound recording software.

+5V/+12V/+24V Select - USB5

The USB5 connector combines a USB 2.0 compatible interface with either +5V, +12V or +24V.

Three optional dongles are available, one for each voltage. Each dongle terminates with a standard Powered USB connector identified by its color. For example, to use a powered USB Printer that requires +24V, a +24V dongle must be purchased.

⟜ USB1 - USB4

The PCWS 2015 includes four standard Type A USB 2.0 compatible ports, labeled USB1 through USB4. When the unit it shipped, all ports are enabled.

For PCI-DSS compliance, all I/O Panel USB Ports (including USB5 and USB6) can be disabled through the BIOS.

Customer Display

This 4-pin mini-din connector supports either a stand or pole mount LCD Customer Display. See Chapter 1 for more information about optional customer displays.

Cash Drawer #1 - Cash Drawer #2

This pair of connectors support standard MICROS +12V cash drawers with 4-pin DIN connectors. +24V Cash Drawers are supported through a BIOS setting.

CF/Express Card

This slot is shared by the SATA CF Riser Card or optional Express Riser Card. The CF / Express Card slot is protected by a bracket fastened to the case with two hex screws. The bracket also includes a slot first introduced on the Workstation 5A.

CF Card

On the PCWS 2015, the primary role of the CF Card slot is image recovery of the primary boot device. Optional Automated Recovery CFs for supported operating systems will be available.

Much like the PCWS 2010, the PCWS 2015 is intended for 32-bit or 64-bit operating systems such as POSReady 2009, Windows XP Professional, Windows 7 Professional Embedded, and Windows Server 2003.

Support for Windows Embedded CE 6.0 is not planned. This changes the role of the CF card somewhat. In Windows Embedded CE 6.0 configurations, the CF card is *required* to store the persistent registry, application files, and possibly SAR totals. For WIN32/64 configurations, all files are stored on the boot media (SATA HDD/SSD or RAID Volume) and the CF card is not required, thus freeing it up for recovery purposes.

ExpressCard

The optional, future CF Express Card is an extension of the older PCMCIA specification and presents a number of possible IO Options for the workstation. However, it shares the same physical location as the SATA to CF Riser Card.

Tips for using the optional Recovery CF Card

- The CF card is a keyed device - but it is possible to force the card into the socket the wrong way.
- Never remove or insert a CF Card when the unit is ON. Always use the power button to turn the workstation off before removing or inserting a Recovery CF Card or CF Card used for mass storage.

Rear Display

This connector is reserved for the Integrated 240x64 LCD Customer Display.

10/100/1000 Ethernet

The PCWS 2015 includes a 10/100/1000 Ethernet Controller with a UTP modular connector. The modular connector features an integrated isolation transformer as well as a link status and network activity indicators. The interface is fully IEEE 802.3 compliant.

COM 2

COM2 is a standard RS232 port based on the DB9 male connector.

COM 1 +5V/+9V/+12V Select

COM 1 is an industry standard powered RS232 Port based on the DB9 male connector.

The powered voltage appears on pin-9 of the DB9 connector. By default +5V appears on this pin. To change the voltage start the workstation with a USB Keyboard attached and press [F2] to enter the BIOS Setup Menu. Proceed to the Advanced Tab, then scroll down to 'Special Configuration' and press enter. Scroll to the 'COM Port Voltage' field and press [Enter] to select the desired RS232 voltage.

/ OPT

This RJ45 knock out is reserved for the a Mini-PCI Modem or other future Mini-PCI option.

VGA

The PCWS 2015 supports dual independent displays allowing the desktop to be displayed across two monitors.

+5V/+12V Select - USB 6

The USB6 connector combines a USB 2.0 compatible interface with either +5V, or +12V.

Two optional dongles are available, one for each voltage. Each dongle terminates with a standard Powered USB connector identified by its color.

IDN

The modular IDN port resides on COM4 and is physically identical to the RS422-A and RS422-B ports on the Workstation 4 and 4 LX, KWS4, and KW270, as well the single IDN port on the Workstation 5, Workstation 5A and PCWS 2010.

The IDN port contains both RS422 and RS232 interfaces that can be configured as a full-duplex RS422 interface to support IDN printing devices. It can also be configured as two-wire RS232 interface to support a number of peripheral devices. Use cable P/N 300319-102 for RS232 devices, or 300319-036 (3ft.), or 300319-120 (10ft.) for IDN devices.

> **WARNING:**
>
> Do not insert a 6-Pin modular plug into the 8-Pin IDN port. 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 components. Always use an 8-Pin modular plug when you connect IDN or RS232 peripherals to the workstation.

IOIOI COM 5

COM5 is a full featured modular RS232 Interface. This port is identical in function to COM5 port on the Workstation 5, Workstation 5A and PCWS 2010. Use RJ45 to RS232 DB9 Adapter Cable, P/N 300319-103.

+12V Out

This knock-out is reserved for a future optional external power connector.

Installation

This section describes how to install the AC adapter, and discusses the recommended method of cabling the workstation.

Cabling the Adjustable Stand

This procedure describes how to attach the PCWS 2015 to the Adjustable Stand.

1. Install the optional Printer Power Supply, if required. Refer to Figure 4-2. Open the power supply compartment door and attach the AC power connector to the power supply. Close the compartment door.
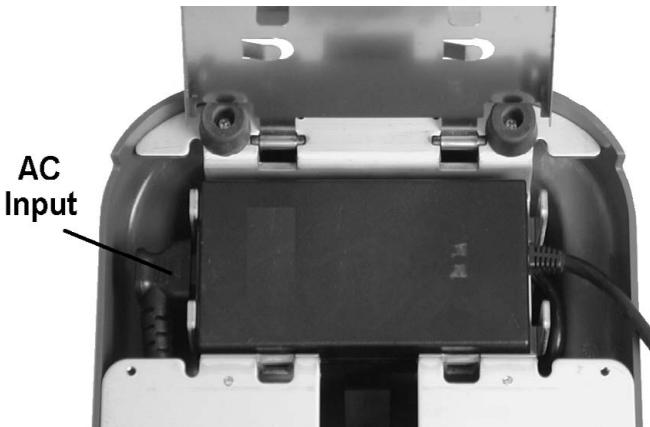
Figure 4-2: Installing the Optional Printer Power Supply

2. Refer to Figure 4-3, and prepare to mount the workstation on the stand.

   • Connect the AC Power Cable supplied in the loose parts kit to the AC receptacle in the base of the stand. Use the longer of the two cables for the workstation.

   • Cable the workstation. Several cable tie points are provided in the cover, and a pair of re-usable velcro cable ties supplied with the stand can be used to bundle the cables. Figure 4-3 shows two cable ties, but these may not be needed in some situations.

   • Before placing the unit on the stand, make sure the securing latches are in the 'open' position and close the I/O door.

.
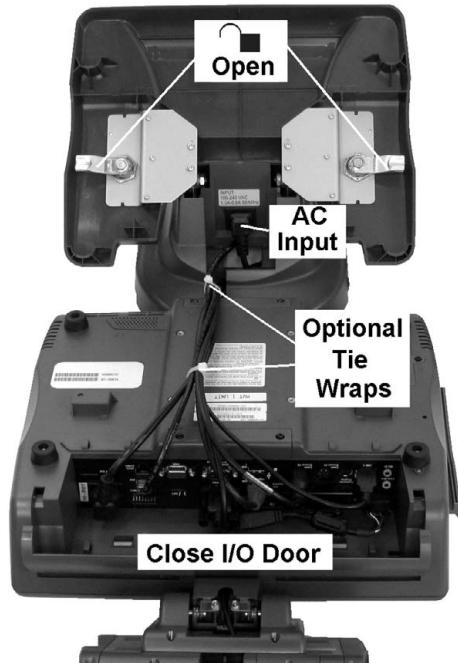
Figure 4-3: Preparing to Attach the PCWS 2015 to the Adjustable Stand

3. Mount the cabled workstation by placing the rubber feet into the receptacles on the adjustable stand. Figure 4-4, below.

Figure 4-4: Mounting the Workstation to the Adjustable Stand

4. When the workstation is fully seated on the stand, turn the knobs on the rear of the stand to the 'Locked' position as shown in Figure 4-5.
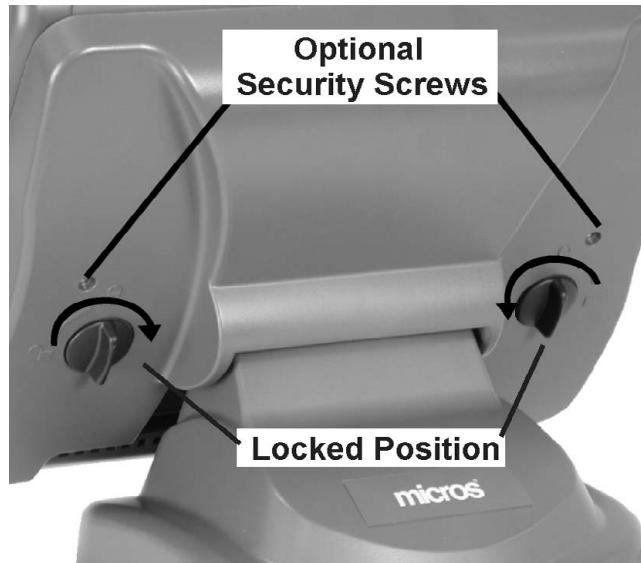
Figure 4-5: Securing the Workstation to the Adjustable Stand

5. For additional security, a pair of 17mm screws are provided in the Adjustable Stand loose parts kit to help secure the knobs in the locked position. Make sure the knobs are in the 'Locked' position and use the hex wrench supplied in the workstation loose parts kit to install the screws.

6. Place your peripherals near the workstation and attach cables as required.

7. Connect the AC power cord to an electrical outlet installed in accordance with the appropriate site prep guide. See Chapter 4 for more information about starting the workstation.

Operation

This section presents operational procedures for the PCWS 2015 including how to use the power button to transition the unit between the **NOPOWER**, and **ON** power states.

PCWS 2015 Operator Features

Figure 4-6 points out the location of the PC Workstation 2015 Power Button, Green Operator LED, Magnetic Card Reader, and 15" LCD/Touchscreen.
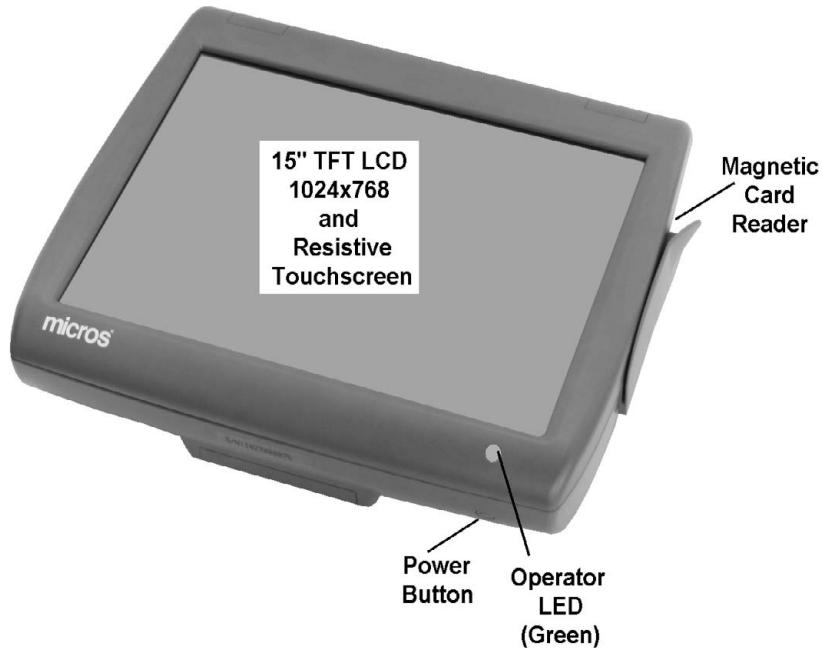
Figure 4-6: PCWS 2015 Operator Features

Operator LCD

The Operator LCD is a 15" Active Matrix LCD with a resolution of 1024x768. The standard 5-wire resistive or optional capacitive touchscreen is positioned over the LCD.

Power Switch

The power switch is used by the operator to transition the Workstation between the **NOPOWER** and **ON** states.

Operator LED

The Green Operator LED blinks during start-up and turns solid Green to indicate the PCWS API has started.

Turning the Workstation from NOPOWER to ON

See Chapter 1 for a description of the supported power management states.

When the PCWS 2015 is in the **_NOPOWER_** state, the Operator LCD will be blank and the Operator LED is off.

1. Be sure the AC Power Cable is connected to an AC source.

2. Press the power button, then release it.

    *   The CPU Fan should start running at full speed.

    *   The Operator LED starts flashing green.

    *   After several seconds, a progress bar appears in the lower right corner of the screen, then the BIOS Splash Screen /w MICROS logo appears.

        *   If RAID is enabled, the Intel Rapid Storage Technology Option ROM displays the current status of the array. Pressing [CNTRL-I] at this point allows you to enter the RAID configuration utility.

3. To enter the Phoenix SecureCore Tiano Setup utility, press [F2] as soon as the BIOS Splash Screen appears. See Chapter 2 for more information about configuring and using the PCWS 2015 BIOS.

Figure 4-7: PCWS 2015 BIOS Splash Screen Example

*   The MICROS BIOS Version is displayed in the upper left corner of the splash screen.

*   After the Intel ME and perhaps the Intel AMT text prompts, the screen clears and operating system starts.

4. If the workstation is new 'out-of-the-box' or the OS image newly restored, you must enter site specific information such as the workstation name, location, login name/password, time zone, preferences, etc.

---

5. After the Operating System and or POS Application starts, the following should occur.

- The Operator LED stops blinking and turns solid Green when the workstation loads the PCWS API.

- The CPU fan slows down to about 2500 RPM, and the System Fan remains off unless the ACPI active trip point of 55°C is exceeded. The System Fan will be removed after the first 1000 units have been produced.

6. Install the WIN32 CAL Client if required. See the related application documentation for more information on installing the WIN32 CAL Client and using it to download the POS application.

Windows 7 Professional

- The WIN32 CAL Client Setup program resides in the C:\McrsCALSetup folder.

- Click Start, and in the 'Search programs and files' dialog box, enter 'C:\McrsCALSetup' Double Click the Setup.exe file start the WIN32 CAL Client install.

POSReady 2009 or Windows XP Professional

- Click Start, then select 'Install Win32 CAL Client' from the top of the Start Menu.

Backlight Control

The following describes how the PCWS 2015 LCD Backlights are expected to operate.

Windows 7 Professional

After five minutes of inactivity, the Windows 7 'Balanced' power scheme is set to dim the backlights.

POSReady 2009

- After five minutes of inactivity, the PCWS 2015 API sets the backlights to DIM and displays a floating PCWS 2015 logo.

- After 20 minutes of inactivity, the Windows "Presentation' Power Scheme turns off the backlights.

You can change the backlight settings by touching Start -> Control Panel -> Power Options.

Troubleshooting

- If the CPU fan does not start when you press the Power Button, and the Operator LED stays off, refer to Chapter 5 for troubleshooting information.

## Turning the Workstation from *ON* to *NOPOWER*

- Exit the application. For Windows 7, when you press the power button, the workstation performs an orderly shutdown.

- For POSReady2009, if you touch the power button, a 'Shut Down Windows' dialog box appears. Select 'Shut down' from the menu or press [OK] button to restart the unit.

Controlling the IO Panel USB Ports

The following procedure describes how to manage the IO Panel USB Ports USB1 through USB6. Revision C System Boards require that you enter the South Bridge Configuration menu in the BIOS to change the status of each port. Revision D System Boards implement USB switches for each USB Port, allowing these ports to be managed from within the operating system with the Diagnostics Utility or BIOS.

System Board Revision C

1. Connect a USB Keyboard to the workstation and power-up.
2. Press [F2] to enter BIOS Setup.
3. From the Main screen select the Advanced Tab.
4. Scroll to 'South Bridge Configuration' then press [Enter].
5. Scroll to the 'USB Ports Per-Port Disable Control' field and select [Enter].
   - The screen expands to display all 14 USB ports. All ports are [Enabled].
   - The top of Figure 4-8 displays this screen with USB1 through USB6 highlighted to avoid the System Board USB ports. The lower half of the illustration points out the location of IO Panel USB port.

```
              Phoenix SecureCore Tiano Setup
        Advanced

             South Bridge Configuration


USB Ports Per-Port Disable Control  [Enabled]
USB Port #0 Enable/Disable          [Enabled]    System Board
USB Port #1 Enable/Disable          [Enabled]    IO Panel
USB Port #2 Enable/Disable          [Enabled]    IO Panel
USB Port #3 Enable/Disable          [Enabled]    IO Panel
USB Port #4 Enable/Disable          [Enabled]    IO Panel
USB Port #5 Enable/Disable          [Enabled]    IO Panel
USB Port #6 Enable/Disable          [Enabled]    IO Panel
USB Port #7 Enable/Disable          [Enabled]    System Board
USB Port #8 Enable/Disable          [Enabled]    System Board
USB Port #9 Enable/Disable          [Enabled]    System Board
USB Port #10 Enable/Disable         [Enabled]    System Board
USB Port #11 Enable/Disable         [Enabled]    System Board
USB Port #12 Enable/Disable         [Enabled]    System Board
USB Port #13 Enable/Disable         [Enabled]    System Board
```

Figure 4-8: USB Per Port Enable/Disable (BIOS)

6. To disable one or more IO Panel USB ports, scroll to the individual field and press Enter.

7. Select [Disable] from the pop-up, then [Enter]. When complete, press [F10], [Y] to save and restart. Repeat this step for each port.

    • Disabling USB1 through USB4 can prevent access to BIOS Setup. If this occurs, you can reset the USB port access by performing the CMOS clear procedure described in Chapter 3.

    • Disable only the highlighted ports 1 through 6. Disabling other ports could cause the touchscreen to stop functioning.

    • When you change the status of one or more ports, it does not take effect until you restart the workstation.l

> *NOTICE:*
>
> Updating the PCWS 2015 BIOS or using the 'Load Setup Defaults' selection from the BIOS Exit menu re-enables all USB ports.

System Board Revision D

This method requires a Revision D System Board, BIOS Version O1301g, and Diagnostics Utility Version 1.6 or later, included in the Windows 7 image. Windows Embedded POSReady 2009 users with image version 1.4 should use the BIOS method should the need arise to disable IO panel USB ports.

1. From the Windows 7 Desktop tap the Diagnostics Utility shortcut twice.

    • The Diagnostics Utility System Information Screen displays. The version must be 1.6 or later to support USB port management.

2. Tap the 'USB Port Config' tab, and a password dialog box appears.
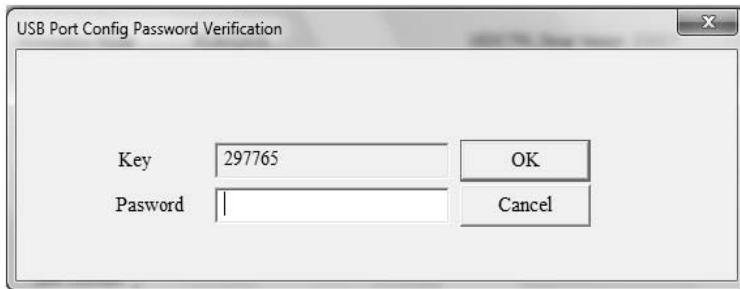
Figure 4-9: USB Port Control Password Entry Dialog Box

3. Apply the formula below to the six-digit number that appears in the 'key' field.

    Digit 1 x Digit 2 + Digit 4 + Digit 6 = Password

    In the example above, the key field displays 297765 (2 x 9 + 7 + 5 = 30).

4. Enter the password with the soft keyboard and press enter.

The USB Port Config tab contains six checkboxes, corresponding to a specific IO Panel connector. This includes the standard Type A ports USB1 through USB4 and the optional powered USB ports, USB5 and USB6. The location of each connector is shown in the 'IO Back Panel' illustration.

All IO Panel USB ports are enabled when the workstation is shipped as shown in the Figure below.
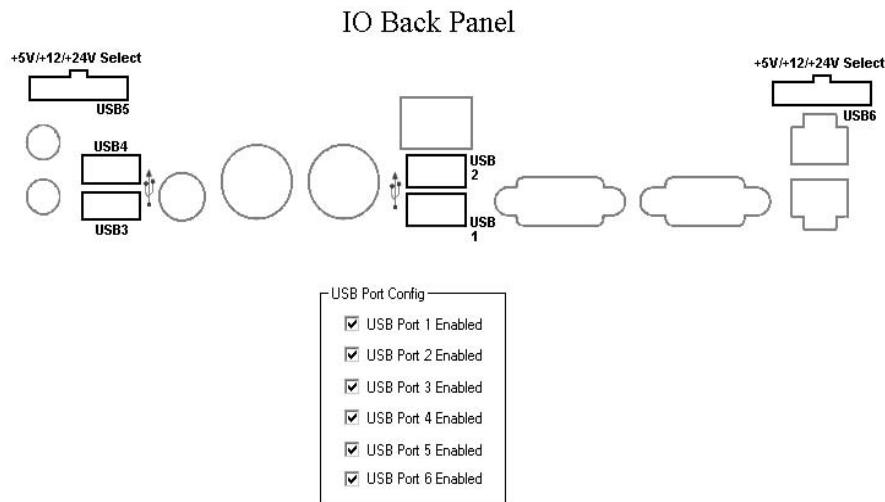
Figure 4-10: IO Panel USB Port Identification

- To disable a USB port, touch the box to remove the check mark from the corresponding port. To enable a USB port touch the box and the check-mark appears.

  - The change in USB port status take effect immediately, a restart is not required.

  - When complete, exit the Diagnostics Utility.

  - Using the CMOS jumper or updating the BIOS resets all USB ports to enabled.

Image Recovery

The following general procedures can be used for PCWS 2015 Windows 7 or POSReady 2009 Recovery CF Card when available. How you start the optional Recovery CF is dependant on the System Board Revision and the BIOS installed.

- Revision D System Boards with BIOS Version O1301g or later can use the Recovery Button located on the bottom of the unit to start the Recovery CF. BIOS O1301g or later also supports the optional entry of a password to start the Recovery CF. See Chapter 3 to setup a Supervisor password.

- Revision C System Boards with the O1301 BIOS can support the Recovery CF through the[F5] boot menu option.

- Revision C System Boards with the O1201r BIOS can support the Recovery CF if you manually change the BIOS Boot Order to boot from the Recovery CF.

General Notes on the Recovery CF

- In all cases, the Recovery CF should not be 'hot-swapped'. When installing or removing a Recovery CF, the power down the workstation.

- The optional Workstation 5A Recovery CF is not compatible with the PCWS 2015 hardware.

Revision D System Board - BIOS Version O1301g

This combination of System Board and BIOS supports the Recovery Button located on the bottom of the workstation.

- With the Recovery CF installed, press the recovery button when the workstation is powered down, but connected to a functional AC power source. This is also known as the ACPI S5 or 'Soft-Off' state.

- Power up the workstation with the power button.
  - The workstation will power up for 4 seconds, (display is blank), shut down for 2 seconds, then power up.
  - Splash screen appears, then clears.

- A password prompt appears if you configured a Supervisor password in BIOS Version O1301g or later.
  - The workstation should boot from the Recovery CF, perform the image recovery, restart the workstation and boot from the primary boot media, normally a SATA hard disk or RAID config.

Revision C System Board - BIOS Version O1300

This combination of System Board and BIOS can use the BIOS Boot Menu to start the Recovery CF. The F5 Boot Menu allows you to boot to an alternate device such as the Recovery CF 'one time' then return the default boot order.

- Connect a USB Keyboard to the Workstation.
- With the Recovery CF installed, start the workstation.
- When the Blue Splash Screen with MICROS logo appears, press [F5].
  - The Boot Menu appears. It displays all devices capable of containing an operating system. An example of the Boot Menu with a one SATA Disk Drive and the Recovery CF installed is shown below.
- Using the keyboard, select 'ATA HDD3:' as shown below and press enter.

```
Boot Menu App Menu
  1. ATA HDD0:SAMSUNG HM161GI
  2. ATA HDD3:DISK
  3. Internal Shell
  4. PCI LAN:IBA GE Slot 00C8 v1330
```

Figure 4-11: Using the Boot Menu to Enable the Optional Recovery CF

- ATA HDD3: is the CF slot on Revision C System Boards. The name displayed may be 'RECOVERY' or the name of a CF Card maker.
- If the ATA HDD3: field does not appear in the Boot Menu, the Recovery CF is not installed, is defective or the CF Riser Card may be defective.
- After the image transfer completes, restart the workstation, but do not press the [F5] key. The workstation should boot from the primary boot device, a SATA hard disk or RAID.

Revision C System Board - BIOS Version O1201r

With this combination of System Board and BIOS you can enter the BIOS Boot Menu and temporarily move the Recovery CF to the top of the boot order, restore the image, then manually remove it after recovery is complete.

• Connect a USB Keyboard to the Workstation.

• With the Recovery CF installed, start the workstation.

• When the Blue Splash Screen with MICROS logo appears, press [F2] to enter the BIOS Setup Menu.

• Select Boot from the Main Menu.

 • An example of the Boot Menu is shown in the Figure below.

```
                  Phoenix SecureCore Tiano Setup
   Main    Advanced   Boot   Exit

  Boot Priority Order
       1.  ATA HDD0:SAMSUNG HM251HI
       2.  ATA HDD1:
       3.  ATA HDD2:          ┌─────────────────┐
       4.  ATA HDD3:TRANSCEND │ Move ATA HDD3:  │
       5.  ATA HDD4:          │   in Front of   │
       6.  ATA HDD5:          │    ATA HDD0:    │
       7.  Other HDD          └─────────────────┘
       8.  USB HDD:
       9.  USB CD:
      10.  USB FDD:
      11.  ATAPI CD:
      12.  Internal Shell
      13.  PCI LAN:IBA GE Slot 00C8 v1330
```
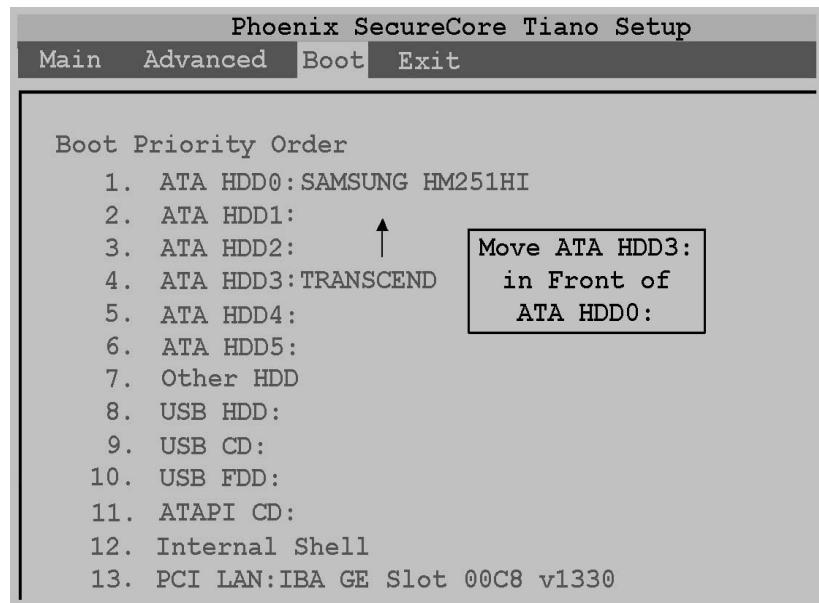
Figure 4-12: Using the BIOS Boot Menu to Boot from the Recovery CF

 • The Recovery CF when installed, occupies the ATA HDD3 slot.

• As shown the figure above, select the 'ATA HDD3:' field place it in front of the of the ATA HDD0: selection.

• Press [F10], then [Y] to save the new boot order and restart the workstation.

• After the image transfer completes, you can remove the Recovery CF from the workstation and the workstation will boot to the SATA Disk Drive. If the recovery CF will remain installed, enter the BIOS, proceed to the Boot tab and move the ATA HDD0: selection to the top of the boot order.

Using the Magnetic Stripe Card

The PCWS 2015 Magnetic Stripe Reader is mounted on the right side of the top cover as shown in Figure 4-13, below.

Orient the card with the mag stripe facing towards the workstation and facing down. Insert the card completely into the slot and pull it past the reader head.

Figure 4-13: 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.

Calibrating The Touchscreen

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

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 have been replaced.

Tips for Calibrating the Touchscreen

• Perform the calibration procedure in the position (sitting or standing) that the workstation is normally used.

• If the workstation is placed on the optional adjustable stand, adjust for optimum viewing angle.

Windows 7 Professional

1. To begin, double tap or click the desktop Calibrate Touchscreen icon.

   • The Elo Touchscreen Properties window appears.

2. Touch the 'Align' button.

   • Touch the target that appears in the upper left corner. Position your fingertip precisely over the target, touch and lift your finger.

3. Continue to touch and release each target as it appears.

4. After touching three targets you will be prompted to accept the new calibration values or run the calibration procedure again. Press [ACCEPT] to store the new calibration values and return to the desktop.

5. Press the Checkmark button to save the new calibration values and continue.

POSReady 2009

1. To begin double tap or click the Calibrate Touchscreen Icon located on the desktop.

   • Touch and release the target that appears in the upper left corner. Position your fingertip precisely over the target, touch and lift your finger.

2. Continue to touch and release each target as it appears.

3. After touching three targets you will be prompted to accept the new calibration values or run the calibration procedure again. Press [ACCEPT] to store the new calibration values and return to the desktop.

Chapter 5

Diagnostics

This chapter includes basic troubleshooting procedures for the unit and describes how to use the PCWS 2015 Diagnostic Utility.

In this chapter

Basic Troubleshooting

This section provides a brief troubleshooting guide for common problems encountered when installing or operating the PCWS 2015. For a detailed start-up description for the 2015, see chapter 4.

Problem	Possible Cause	Solution
When the power button is pressed, there is no response. The fan(s) do not turn on and the Operator LED remains off. Operator LCD is blank.	No Power to PCWS 2015	Be sure AC power cable is connected to the workstation and surge protector outlet, UPS or wall outlet. If unit is located on the Adjustable Stand, make sure power cable is connected to base. Press the power switch and release to start the unit.
When the power button is pressed, the fan(s) start and the Operator LED blinks, but the Operator LCD remains blank. The unit runs for several seconds, then shuts down. After about 5 seconds, the unit powers up and the process repeats.	Possible missing or defective DDR3 SO-DIMM(s).	Install or re-seat a DDR3 1066 SO-DIMM in the SO-DIMM1 socket.
When the power button is pressed, the fan(s) start, the Operator LED blinks, but the Operator LCD remains blank.	Possible defective LCD LVDS cable, LED backlight cable or system board.	Check LCD LVDS Cable, LED Backlight Cable, replace the system board
When the power button is pressed, the fan(s) start, the Operator LED blinks, the Operator LCD Displays the blue splash screen and text messages, but the operating system does not start. Prompts such as "Operating System Not Found", or Windows Resume Loader.	Defective Hard Disk or Corrupt Operating System Image.	Re-place hard disk and re-image.

Problem	Possible Cause	Solution
When the power button is pressed, the fan(s) start, the Operator LED blinks, the Operator LCD Displays the blue splash screen and text messages, but the operating system does not start. Instead, a blinking cursor appears in the upper left corner of the LCD.	Non-Bootable USB thumb drive installed in IO Panel USB Port. Or Defective Hard Disk	Remove and re-install the USB thumb drive after workstation boots. Replace Hard Disk
When the power button is pressed, the PCWS 2015 boots to the operating system. The Operator LED continues to blink after the OS starts. The MICROS POS application may report errors or not start.	PCWS API not loaded. Or Custom image may not contain PCWS API.	Include PCWS API Version 6.0.0.3 or later in OS image.
PCWS 2015 does not connect to LAN.	Network Patch cable not connected.	Install appropriate patch cable between workstation and wall jack.
PCWS 2015 cannot read mag cards.	Mag card read head dirty or contaminated. Mag card reader defective.	Use mag card cleaning kit on reader. Replace mag stripe reader.

PC Workstation 2015 Diagnostic Utility

The PCWS 2015 Diagnostic Utility extends the PC Workstation line, descended from the PCWS 2010. It provides information about the hardware platform as well as comprehensive testing of all workstation point of sale ports and peripherals.

This edition covers Diagnostics Version 1.5 and the updated Version 1.6.

Running the Diagnostics Utility

A Desktop shortcut is placed on the desktop of the Windows 7, POSReady and Windows XP Professional factory images.

1. From the Desktop, double tap the DiagUtility shortcut.

   o The DiagUtility starts and displays the System Information screen.

System Information Screen

Figure 5-1 displays Diagnostics Version 1.5 System Info screen running on a Revision C System Board with BIOS Version O1201r.
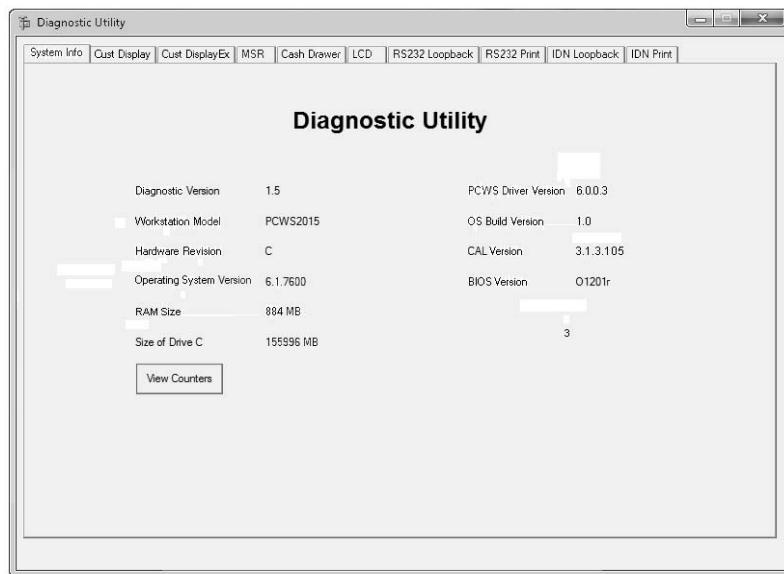
Figure 5-1: The PCWS 2015 Diagnostics Utility System Information Screen (V1.5)

The Figure on the next page displays the Diagnostics Version 1.6 System Info screen running on a Revision D System Board with BIOS Version O1301g.
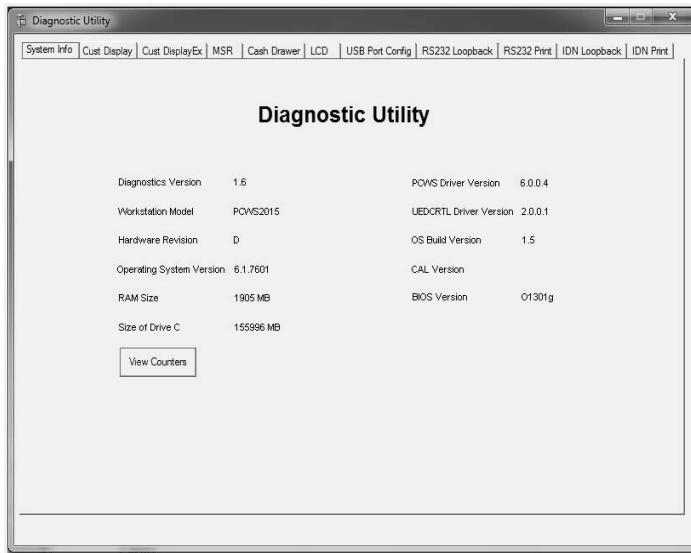
Figure 5-2: The PCWS 2015 Diagnostics Utility System Information Screen (V1.6)

A brief description of each field and button follows.

Diagnostics Version

This field displays the PCWS 2015 Diagnostics Utility Software version.

Workstation Model

This field displays the workstation model to distinguish it from other MICROS workstations.

Hardware Revision

This field displays the PCWS 2015 System Board Hardware Revision.

Operating System Version

This field the displays the operating system version, in this case Windows 7 Professional. Other supported operating systems include POSReady 2009 and Windows XP Professional.

RAM Size

This field displays the amount of available RAM.

Size of Drive C

This field displays the size of the system boot drive. In this example, the system boot drive is a SATA 160GB HDD, but could also be an optional RAID volume, or Solid State SATA drive.

PCWS Driver Version

This field displays the PC Workstation API Version.

UEDCRTL Driver Version (Diagnostics Version 1.6 or later)

This new API is not available in older PCWS 2015 images. The USB Port Config' tab in the Diagnostics Utility Version 1.5 or later uses this API to control the IO Panel USB ports on System Board Revision D or later. In addition, this API can be called by POS applications to manage the IO Panel USB ports.

OS Build Version

This field displays the factory image version. The most recent image version are listed below.

o   Windows 7 Professional = 1.5.

o   Windows Embedded POSReady 2009 = 1.4.

CAL Version

Displays the WIN32 CAL Client Version if installed. If the WIN32 CAL Client is not installed, this field will be blank. The WIN32 CAL Client is shipped with the PCWS 2015 platform, but not installed.

BIOS Version

This field displays the MICROS PCWS 2015 BIOS Version. Three BIOS versions maybe found, O1200r, O1301, and O1301g. See Chapter 3 for more details about each version.

The 'O' in the version number is short for 'Ocean City', the PCWS 2015 internal project name. Workstation project names are selected from a list of cities located in Maryland USA.

Activity Counter

The [View Counters] button is located on the System Information screen.

Touching this button displays a set of counters maintained by the Diagnostics Utility as shown in Figure 5-3, below.

The Diagnostic Utility tracks the number of successful and unsuccessful MSR swipes for each track, and the number of times each cash drawer is opened. Press the [View Counters] button to view the counters. All counters are stored in the registry.
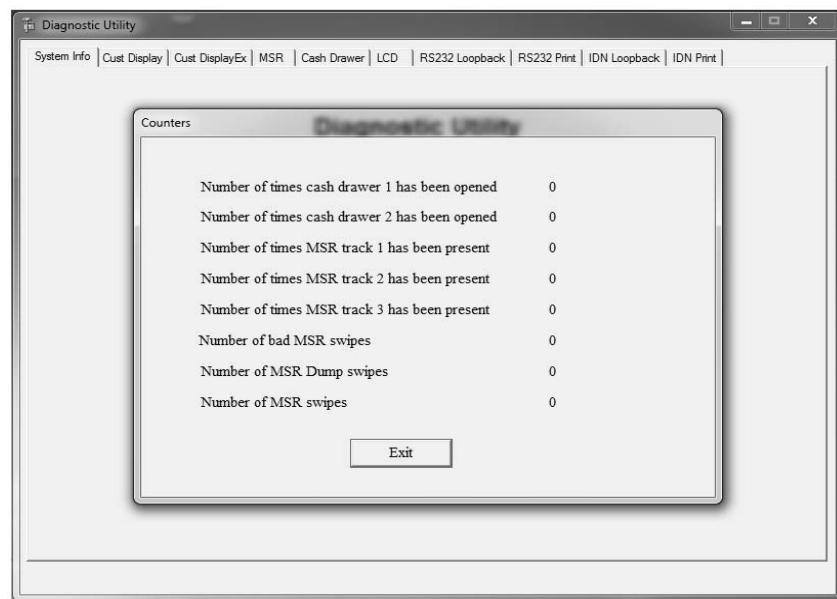
Figure 5-3: Diagnostics Utility Activity Counters

Testing Cash Drawers

To test cash drawers, press the Cash Drawer tab. The screen displays the prompt below.
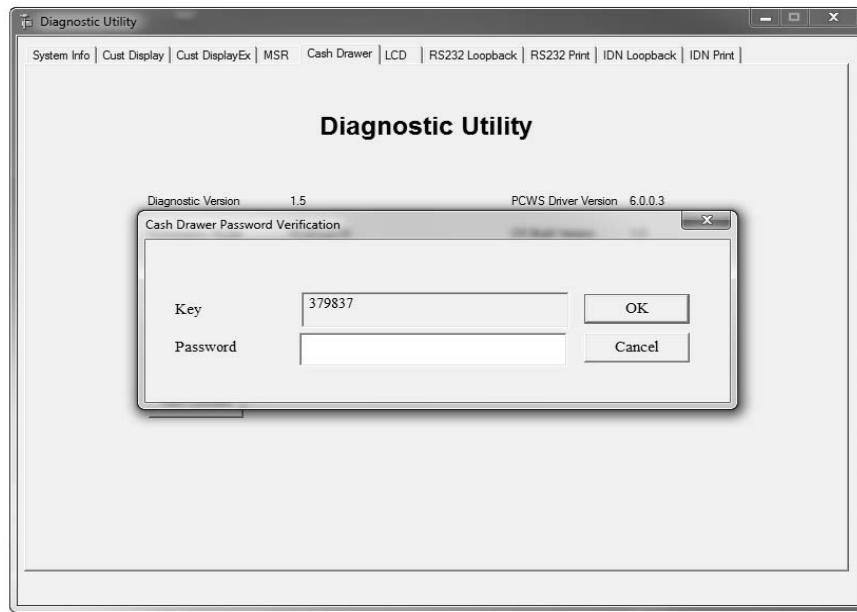
Figure 5-4: Testing Cash Drawers

Accessing the Cash Drawer test requires a password. Apply the following formula to the six-digit number that appears in the 'Key' field.

Digit 1 x Digit 2 + Digit 4 + Digit 6 = Password

In the example, the Key is 379837. Applying the formula to this value results in 78. (3 x 7 + 8 + 7 = 36).

Controlling the IO Panel USB Ports

This method requires a Revision D System Board, BIOS Version 1301g, and Diagnostics Utility Version 1.6 or later.

1. From the Windows 7 Desktop, tap the Diagnostics Utility shortcut twice.

    o   The Diagnostics Utility System Information Screen displays. The Diagnostics Utility version must be 1.6 or later to support USB port management.

2. Tap the 'USB Port Config' tab, and a password dialog box appears.

3. Apply the formula below to the six-digit number that appears in the 'key' field.
   Digit 1 x Digit 2 + Digit 4 + Digit 6 = Password

   For example, the key field displays 297765 (2 x 9 + 7 + 5 = 30).

4. Type the password with the soft keyboard and press enter.

   The USB Port Config tab contains six check-boxes, corresponding to a specific IO Panel connector. This includes the standard Type A ports USB1 through USB4 and the optional powered USB ports, USB5 and USB6. The location of each connector is shown in the 'IO Back Panel' illustration, located on the next page.

   All IO Panel USB ports are enabled when the workstation is shipped as shown in the Figure below.

Figure 5-5: IO Panel USB Port Identification

- To disable a USB port, touch the box to remove the check mark from the corresponding port. To enable a USB port touch the box and the check-mark appears.

  o The change in USB port status take effect immediately, a restart is not required.

  o When complete, exit the Diagnostics Utility.

  o Using the CMOS jumper or updating the BIOS resets all USB ports to enabled.

Appendix A

Equipment Dimensions

In this appendix

PC Workstation 2015 Low Profile

NOTES:

1. Cables from IO Panel exit through bottom 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.
6. Optional Finger Printer Reader can be mounted to left or right of the Top Cover

Optional Finger Print Reader

330mm (13.0")

130mm (5.12")

Magnetic Card Slot

Green LED

Power Button

Optional Finger Print Reader Location

330mm (13.00")

380mm (15.0")

PC Workstation 2015 Low Profile with Customer Facing Display

Optional Finger Print Reader

330mm (13.00")

150mm (5.90")

Optional Customer Facing Display
240x64 LCD 410mm (16.14")
OR
protégé 450mm (17.70")

Magnetic Card Slot

Green LED

Power Button

390mm (15.40")
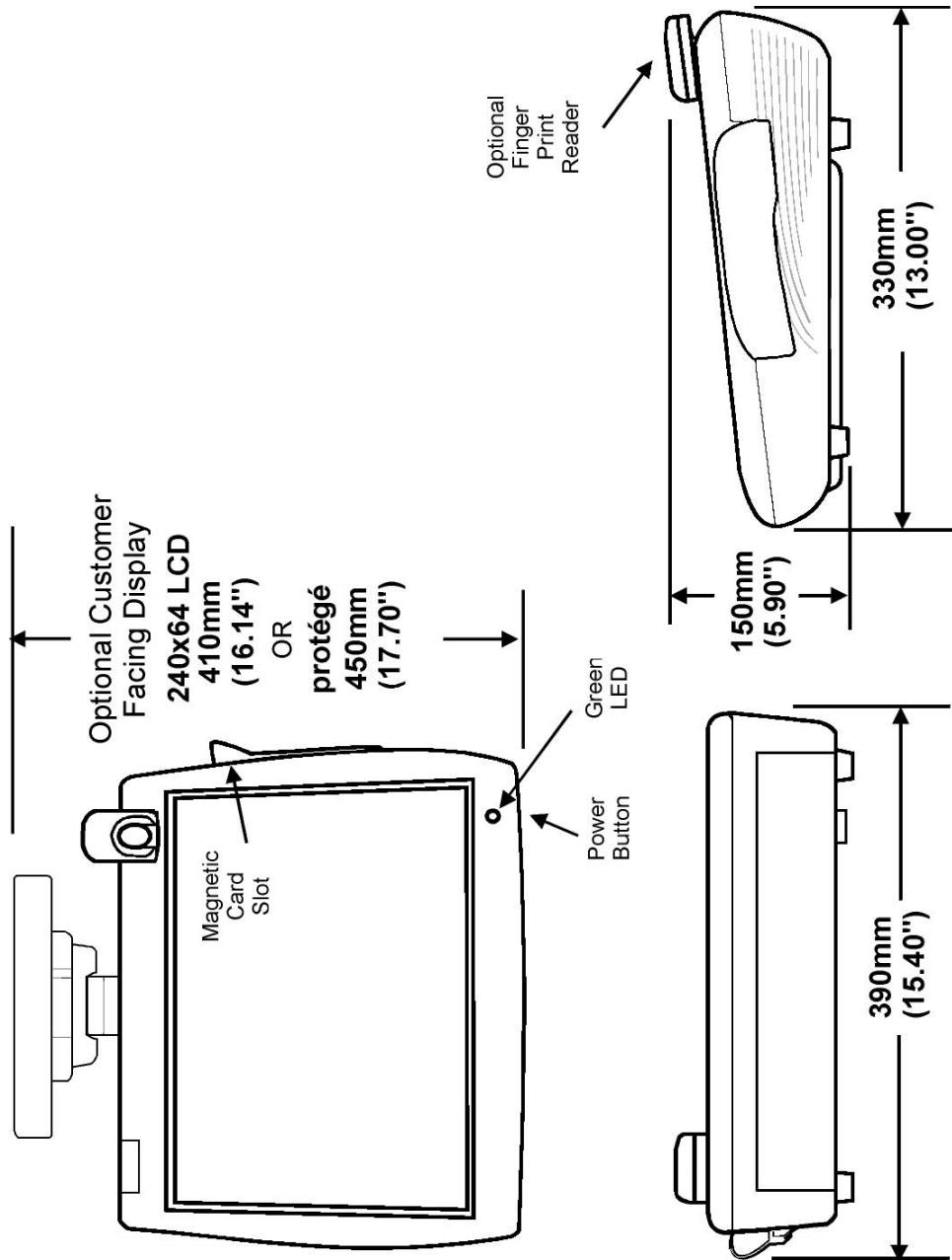
PC Workstation 2015 on Adjustable Stand
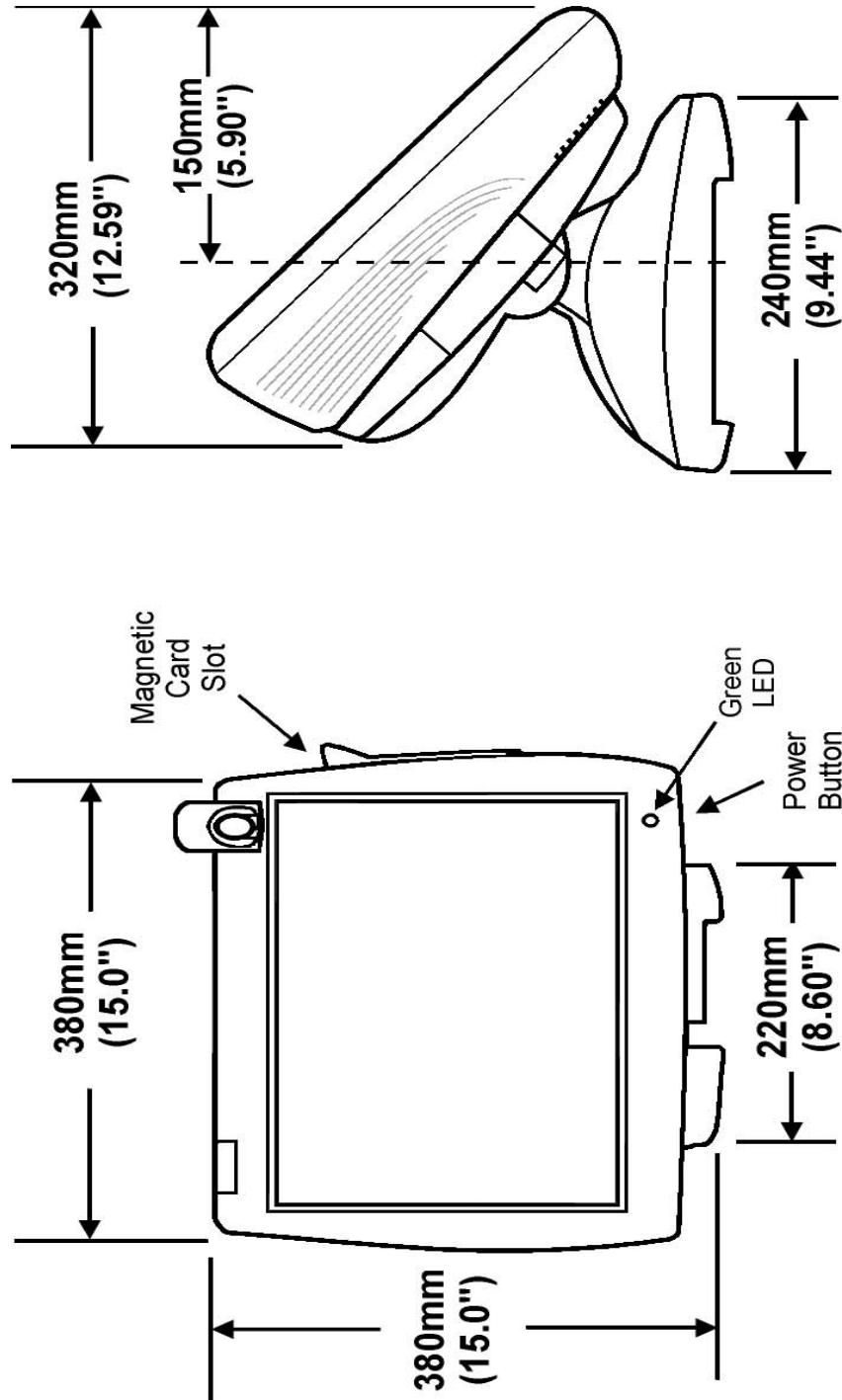
PC Workstation 2015 on Adjustable Stand /w Protege

150mm (5.90")

410mm (16.15")

240mm (9.44")

Display Rotates Approximately 112°

Unit Rotates between 25° and 70°

Magnetic Card Slot

Green LED

Power Button

380mm (15.0")

214mm (8.42")

220mm (8.60")

430mm (16.92")

LCD Pole Display

Display Rotates Approximately 330 degrees

lcd-pole-dim.cdr
March 2004

180mm (7.08")

80mm (3.14")

480mm (18.89")

Display Reclines Approximately 45 degrees

60mm (2.36")

95mm (3.74")

560mm (22.04")
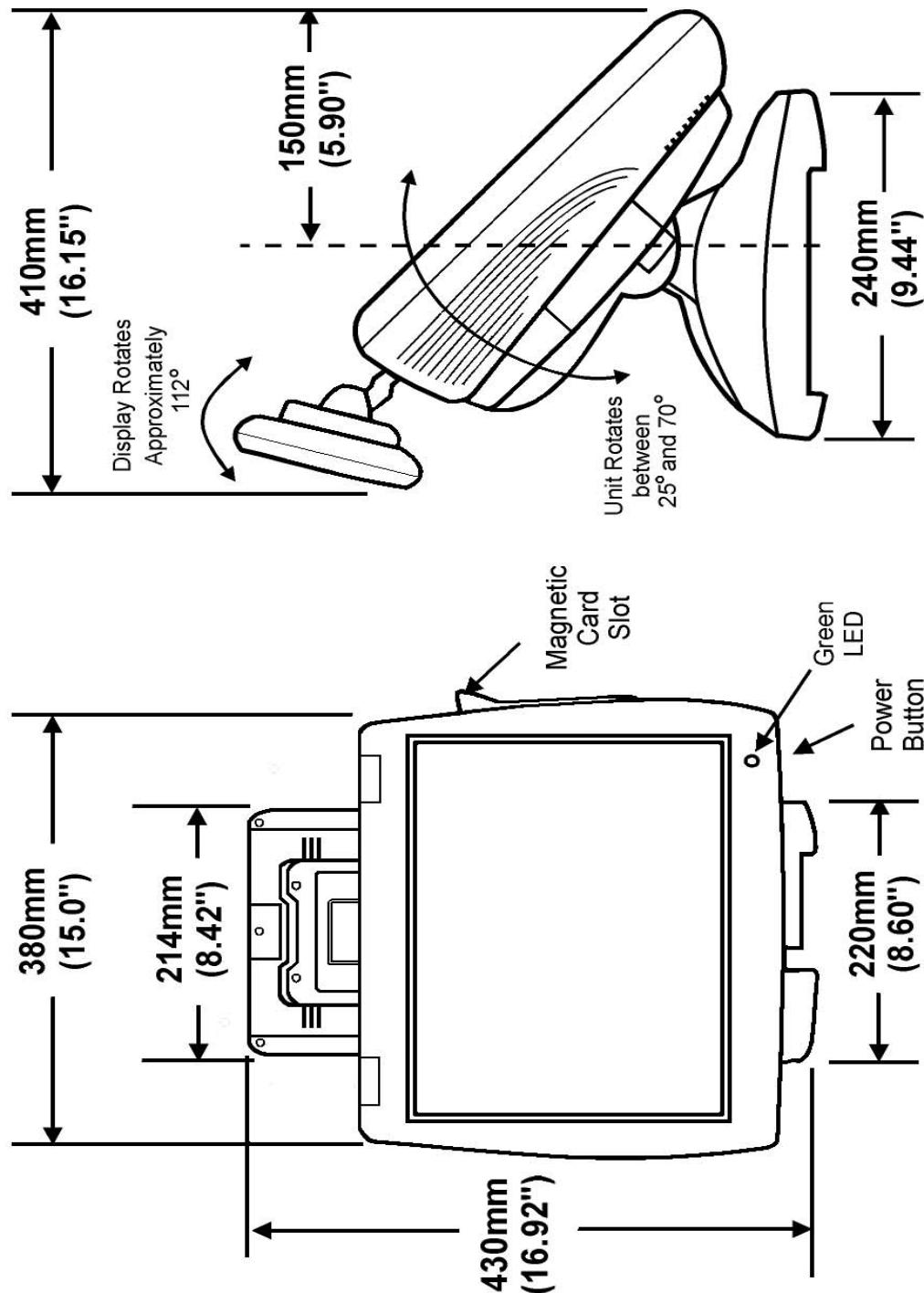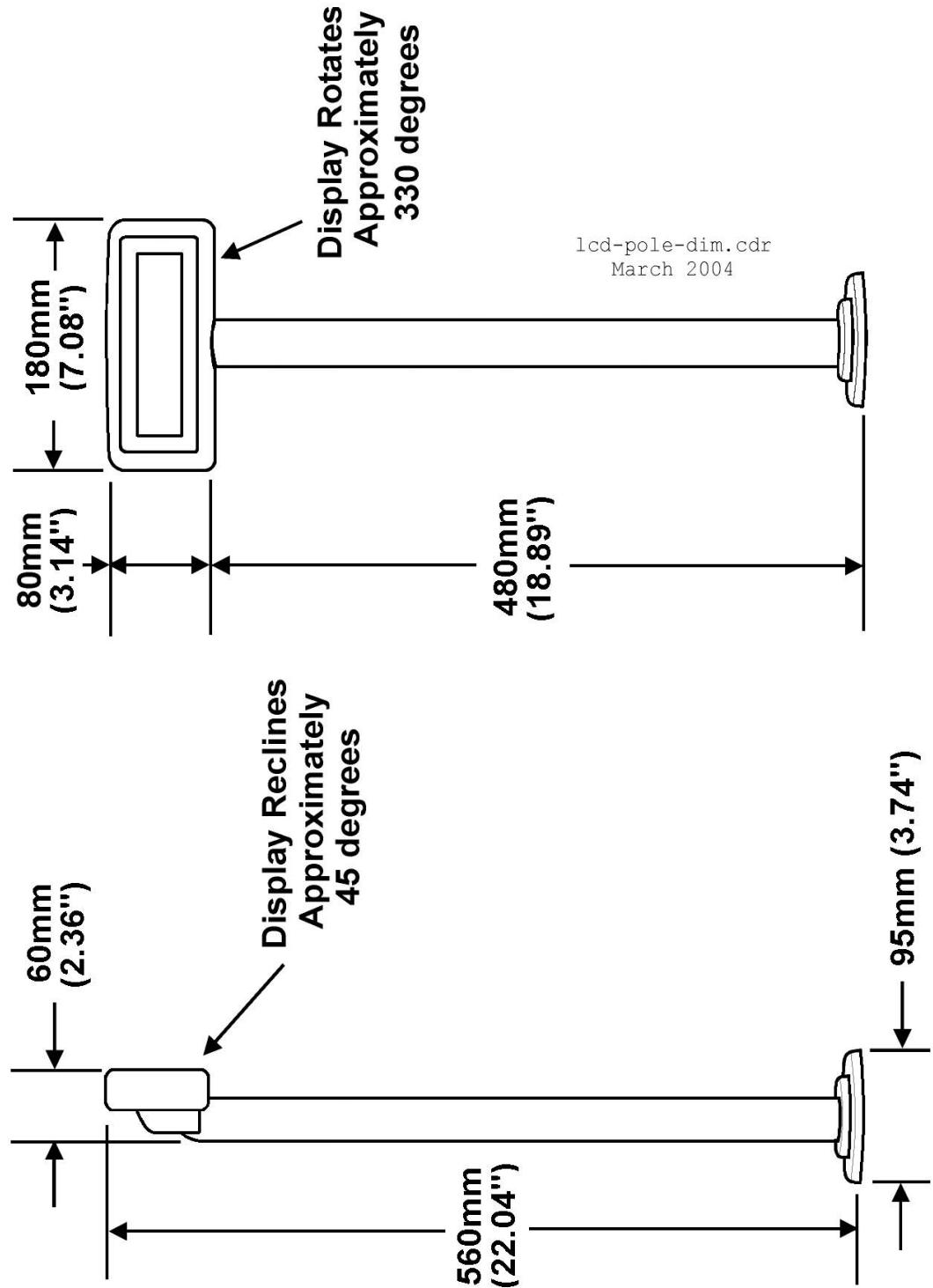
Cash Drawers

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

Pole Display
Mounting Holes
8-32 x 1/2"
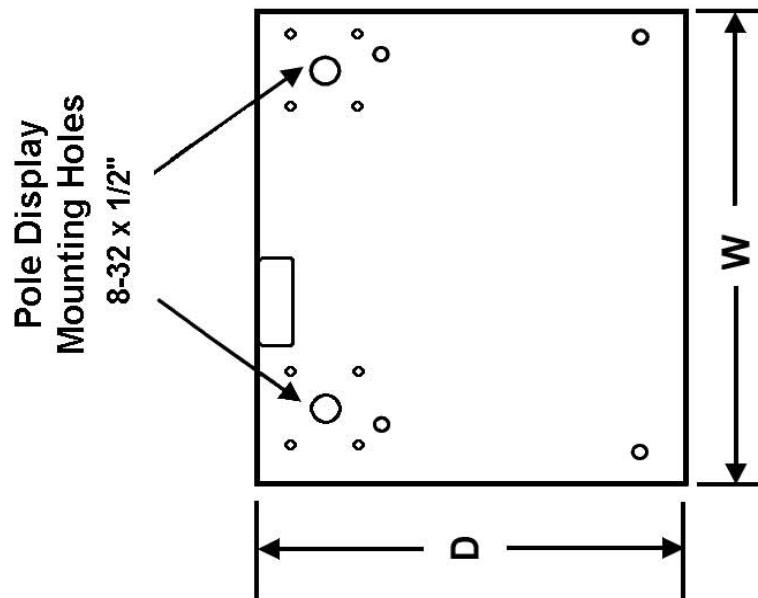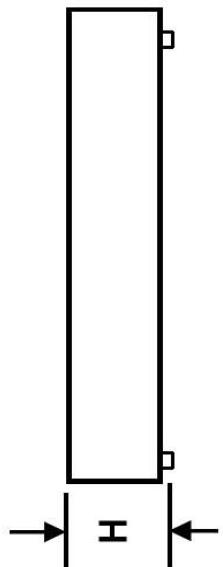
Appendix B

Connector and Cable Diagrams

On the pages that follow, you will find diagrams of the PCWS 2015 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

The following connectors are located on the IO Panel.

IDN Port

The IDN connector is a combination RS422/RS232 port associated with COM4. This port is functionally equivalent to the RS422-A and RS422-B ports on the WS4, WS4 LX, KWS4, and the IDN Port on the Workstation 5 and 5A. Two configurations are possible, determined by application settings.

> ⚠ **WARNING:**
>
> Do not insert a 6-Pin modular plug into the 8-Pin IDN Port. 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 - use cable P/N 300319-001.

IDN Port - Driving IDN Printers

The most popular configuration of the IDN Port is the RS422 based IDN(+) mode configured as COM4. Figure B-1 shows the pin-out for this configuration.

```
    1 2 3 4 5 6 7 8

1 ——
2 —— RS422 TXD(+)
3 —— RS422 TXD(-)
4 —— RS422 RXD(+)
5 —— RS422 RXD(-)
6 ——
7 —— SHIELD
8 —— GROUND
```
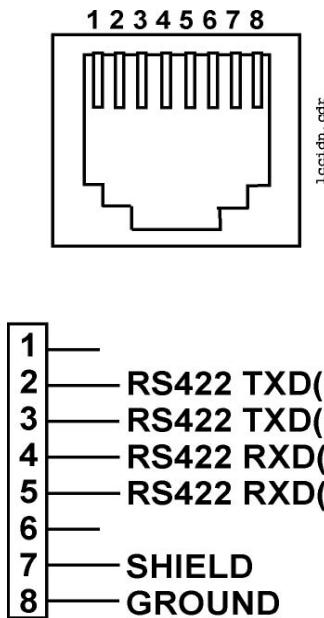
Figure B-1: IDN Connector Configured for RS422 IDN

IDN - RS232 Peripheral

Figure B-2 shows the IDN port configuration for a basic RS232 interface. Use cable P/N 300319-102 to convert this port to a DB9 connector.
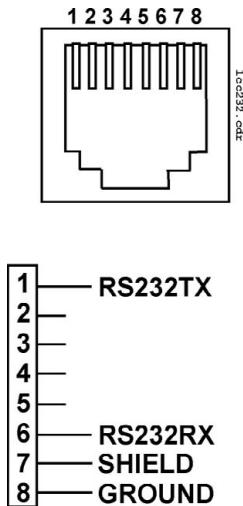
Figure B-2: IDN Port Configured for RS232

COM 5

The PCWS 2015 includes one modular COM port, assigned to COM5. This is a 'full-featured' COM port that also appears on the WS5, WS5A, PCWS Eclipse, and PCWS 2010. Use cable P/N 300319-103 to convert this port to a DB9 connector.
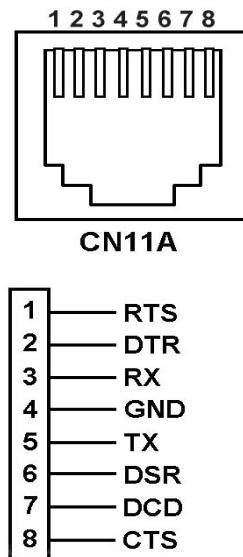
Figure B-3: COM5 Modular RS232 Connector

DB9 RS232 Connectors

The PCWS 2015 includes two DB9 connectors assigned to COM1 and COM2. COM1 is a powered DB9F RS232 connector assigned to COM1. Pin 9 is powered. The pin-out of each port is shown below.

COM1	COM2
1 - DCD	1 - DCD
2 - RXD	2 - RXD
3 - TXD	3 - TXD
4 - DTR	4 - DTR
5 - GND	5 - GND
6 - DSR	6 - DSR
7 - RTS	7 - RTS
8 - CTS	8 - CTS
9 - DSUB PWR	9 - RI
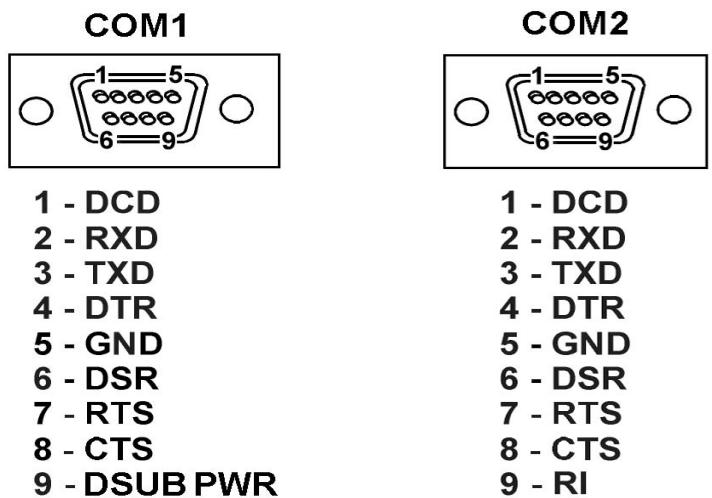
Figure B-4: DB9 RS232 Connector Diagram

For COM1, the DSUB Pin voltage is determined by the COM Port Voltage setting in the BIOS. The default is +5V. To select another voltage, enter BIOS Setup and select the Advanced tab. Scroll to the Special Configuration Menu, press enter, then select the 'Come Port Voltage'. The available voltages are shown in the Figure below.
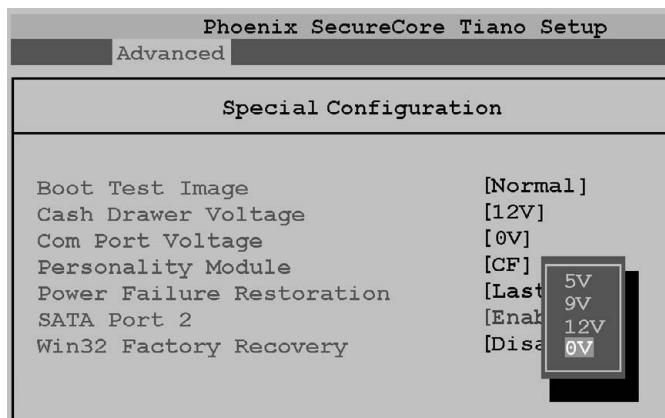
Figure B-5: Selecting the COM1 Voltage

Cash Drawer 1 and 2 Connectors
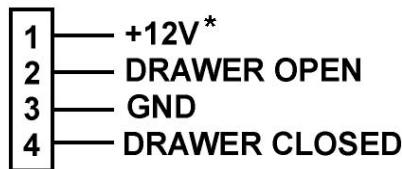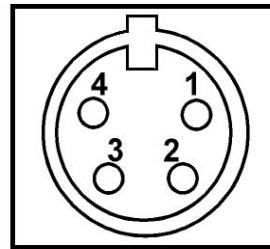
Figure B-6: Cash Drawer Connector Diagram

Remote Customer Display Connector

This port supports either the 2x20 VFD customer display or the graphics based LCD customer display.
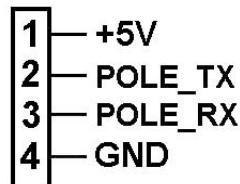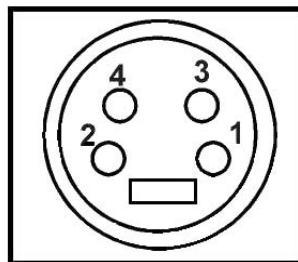

Figure B-7: Customer Display Connector Diagram

System Board Connectors

This section details connectors located on the PCWS 2015 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-8,
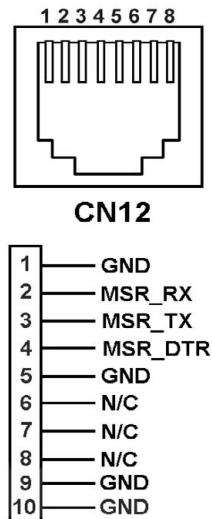
Figure B-8: PCWS 2015 System Board MSR Connector

Hook-up Cables

The following pages show wiring diagrams of various hook-up cables that may be used with the PC Workstation 2015.

IDN Port RS232 Cables

Figure B-9 displays a cable that includes the RS232 signals from the IDN Port to a DB9 male connector. This cable is available from MICROS by ordering P/N 300319-102.
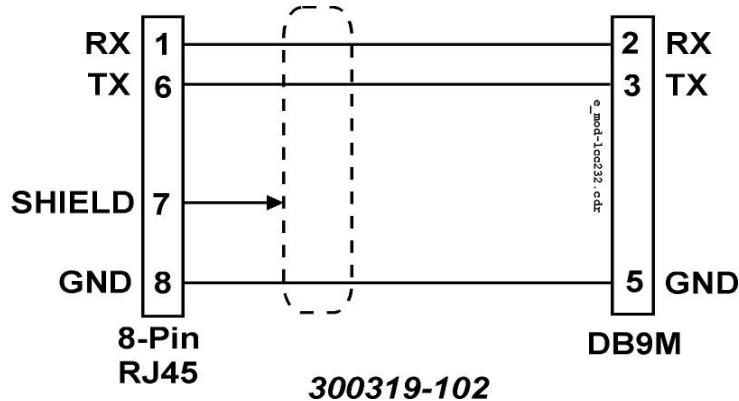
Figure B-9: IDN Port to RS232 DB9 Male Connector

Figure B-10 shows a cable diagram that adapts the IDN port to a DB25 connector.
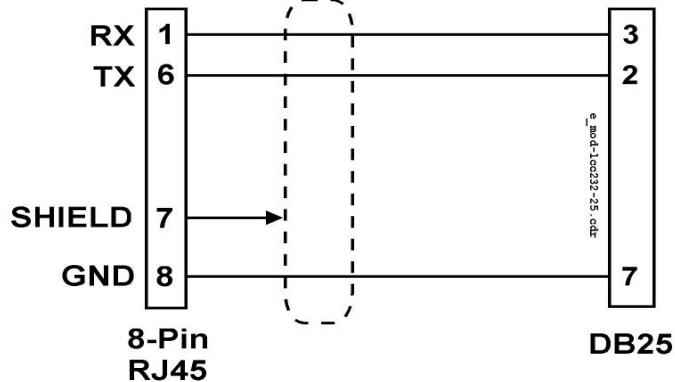
Figure B-10: IDN Port to RS232 DB25 Connector

COM5 RS232 Cables

Figure B-11 displays a diagram of an extension cable that brings all RS232 signals from the COM5 port to a DB9 connector.
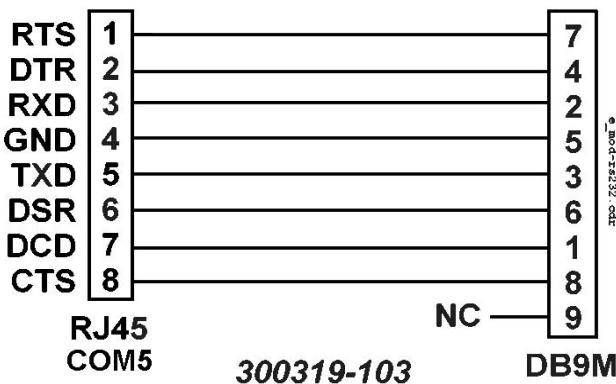
Figure B-11: COM5 RS232 Extension Cable (DB9M)

LCD Customer Display Cables

The LCD based Customer Display includes two cable assemblies. The function of each cable is detailed in the following pages.

LCD Customer Display Housing Interface Cable

The LCD Customer Display Housing consists of the LCD Panel, Interface Board, mounting bracket and interface cable. A diagram of this interface cable is shown in Figure B-12.

When the LCD Customer Display is attached directly to the Workstation, this cable plugs into the 'Rear Display' IO Panel connector shown in Figure B-14.
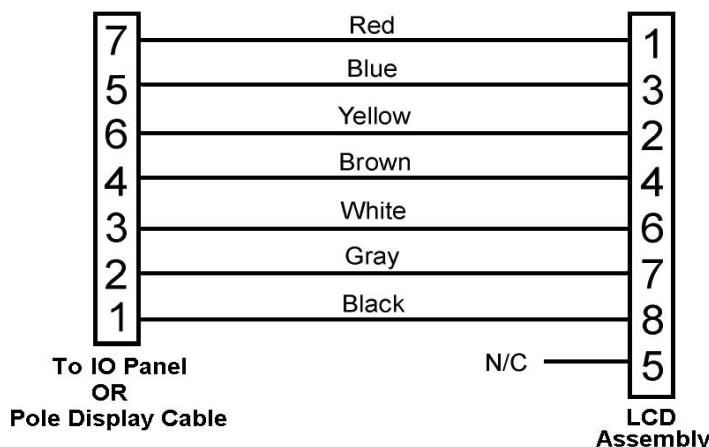

Figure B-12: LCD Customer Display Housing Cable

Remote Pole LCD Customer Display

The cable shown in Figure B-13 is supplied with the Pole LCD Customer Display or Adjustable Stand Pole Display kit. It attaches between the 4-pin Mini-DIN connector on the I/O panel, through the pole to mate with the cable from the LCD Customer Display Housing Cable shown in Figure B-12.
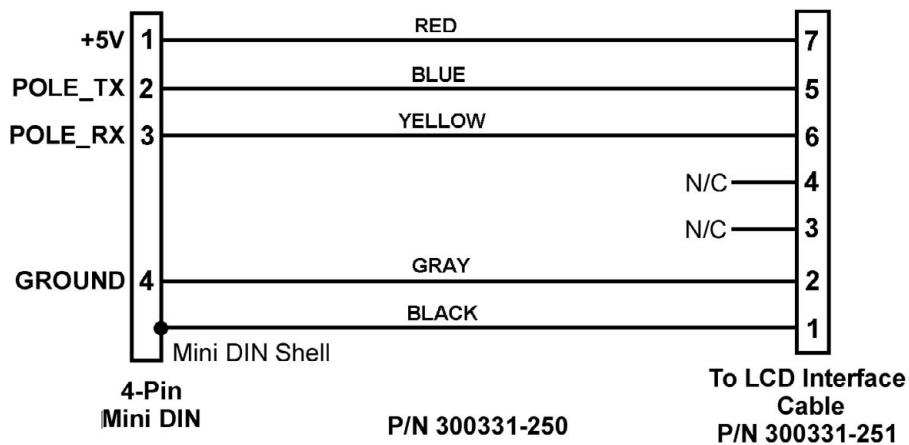

Figure B-13: Remote Pole LCD Customer Display Assembly

IO Panel Customer Display Connector

The PCWS 2015 places the integrated or rear customer display connector on the IO Panel. A diagram of this connector is shown below.
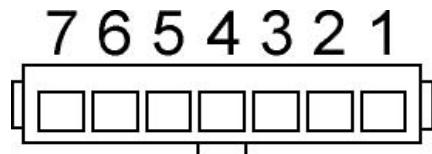

1 - N/C
2 - Ground
3 - LCD_PSEN#
4 - LCD_RST
5 - REAR_RX
6 - REAR_TX
7 - +5V

Figure B-14: IO Panel Integrated LCD Connector

Ethernet

Figure B-15 shows a diagram of a standard Cat 5 Ethernet hook-up cable. This cable would be connected from a workstation or server to the system hub.
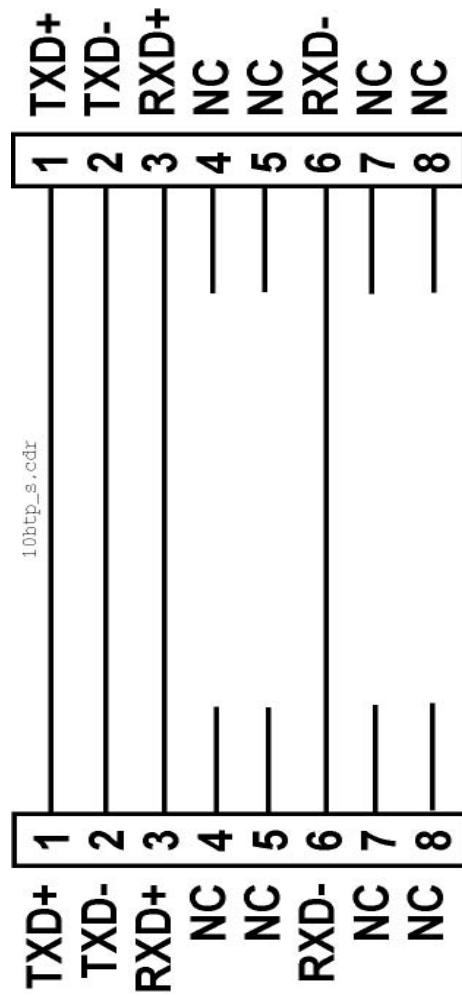
Figure B-15: EIA/TIA-568-A Cat 5A Ethernet Hook-up Cable Diagram

Cross-over Pinning

Figure B-16 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.
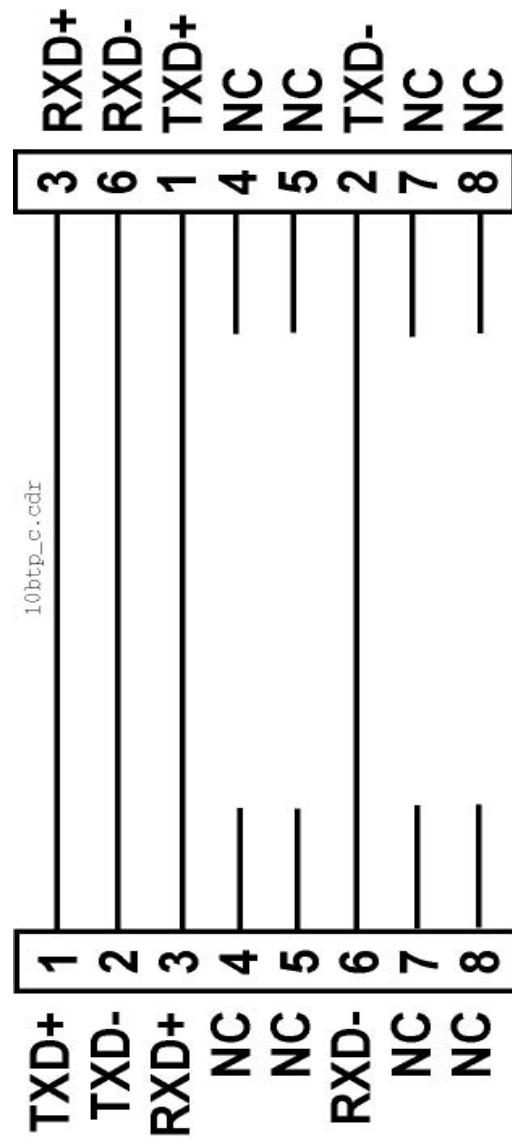

Figure B-16: Cat 5 Ethernet Hook-up Cable Diagram (cross-over)

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

This cable brings out the RS422 signals from the IDN port connector to a 6-pin wall plate connector or directly to the IDN connector on the printing device.
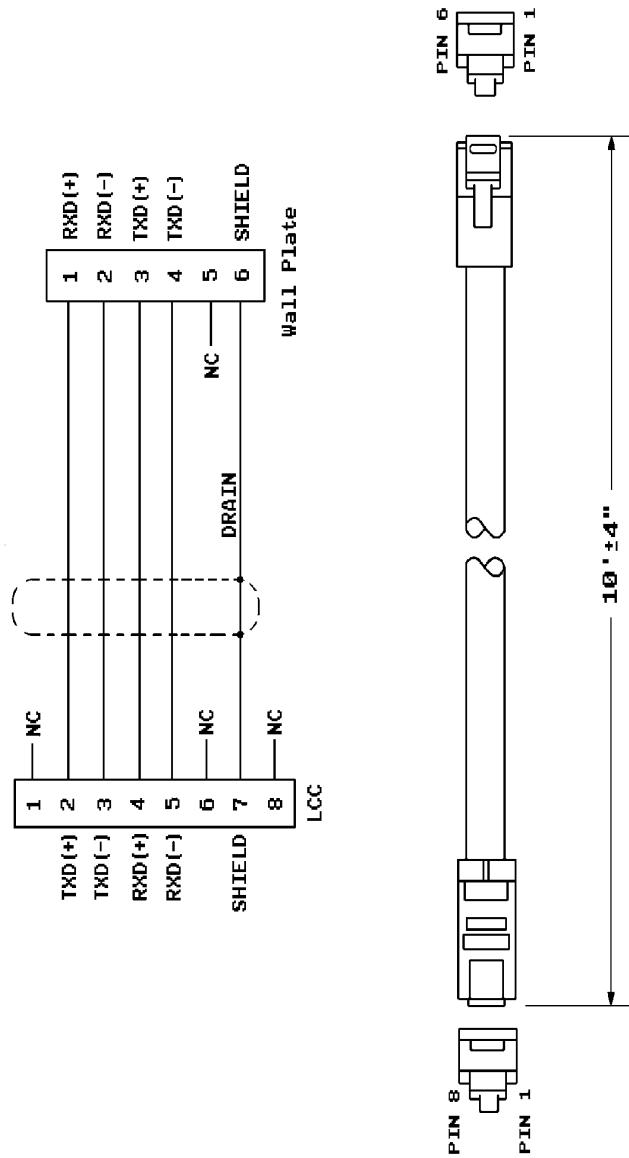

Figure B-17: 8-Pin to 6-Pin IDN Hook-up Cable Diagram

Cash Drawer Extension Cable

4 PIN
CIRC DIN
FEMALE

| 1 | 2 | 3 | 4 |

See P/N

MICROS P/N

300290-006 - 6 Feet
300290-012 - 12 Feet

4 PIN
CIRC DIN
MALE

| 1 | 2 | 3 | 4 |
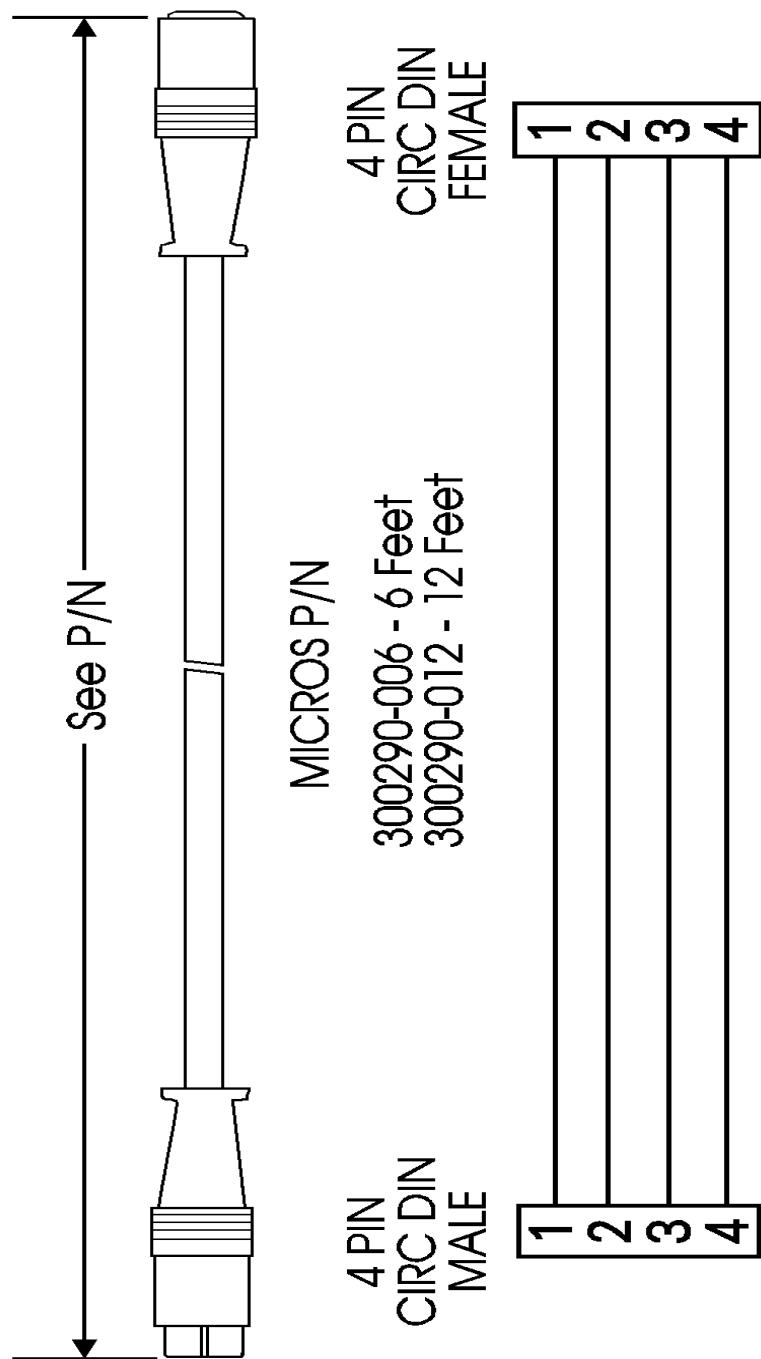
Appendix C

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'êmet 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.

> ⚠️ **Attenition:**
>
> Tous changement ou modification, non expressément agrées par la partie responsable pour la conformité de l'installation, pourraient annuler l'authorisation de l'exploitation par l'utilisateur du materiel installé. Il est obligatoire d'utiliser pour la communication ou la réalisation d'intorfaces un cable blindé, afin d'être en conformité avec les limites légales d'émission.