# micros® Systems, Inc.

# Keyboard Workstation 4
# Setup Guide

# *Declarations*

## Warranties

Although the best efforts are made to ensure that the information contained in this manual is complete and correct, MICROS Systems, Inc. makes no warranty of any kind with regard to this material, including but not limited to the implied warranties of marketability and fitness for a particular purpose. Information in this manual is subject to change without notice. MICROS Systems, Inc. shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

## Trademarks

*MICROS is a registered trademark of MICROS Systems, Inc.*

*National Semiconductor is a trademark of National Semiconductor Corporation.*

*Geode, AMD, the AMD logo and combinations thereof are trademarks of Advanced Micro Devices, Inc.*

*Microsoft, Windows, and Windows CE, are trademarks of Microsoft Corporation in the United States of America and in other countries.*

*Adobe, Photoshop, and FrameMaker are either registered trademarks or trademarks of Adobe Systems, Incorporated in the United States of America and/or other countries.*

*All other trademarks found herein are the property of their respective owners.*

## 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.

1st Edition: July 2004

2nd Edition: **September 2004**

# Table of Contents

# Chapter 3: Installing and Operating the Workstation 4

# *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 Keyboard Workstation 4 (KWS4) hardware. It is not specific to a particular software application.

# How This Manual is Organized

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

Chapter 1 describes the workstation and each of its optional hardware and software components. The chapter also describes the hardware and software platform components and contains the KWS4 Specifications

Chapter 2 covers the KWS4 system unit hardware configuration. In addition to a System Board block diagram and technical description, other topics include how to remove the cover, identify the internal components, and perform basic hardware upgrades.

Chapter 3 provides information in the KWS4 Installation and Operation. Installation is covered from the basic environmental considerations for placement of the unit and external power supply, to describing the I/O connectors and arranging the cabling and using the built-in Client Application Loader to connect to the system server and obtain the application software. Operation includes how to use the power button to start and control the workstation power states, and how to use the internal Magnetic Card Reader.

Chapter 4 provides a basic troubleshooting chart as well as a description of the KWS4 POST error beep codes. Other topics include how to use the KWS4 Utility for basic diagnostics, and a procedure for updating the firmware on the Keyboard/MSR and LCD controllers.

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

**SHOCK HAZARD**

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

# *Notation Conventions*

## Symbols

### NOTE
This symbol brings special attention to a related item.

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

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

### STATIC SENSITIVE DEVICES
This symbol indicates that specific ESD handling procedures are required.

## Document Design and Production

Desktop Publishing by Adobe FrameMaker 6.0

Digital imaging by Nikon

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

*Chapter 1*

# *What is the Keyboard Workstation 4?*

This chapter describes the Keyboard Workstation 4 (KWS4), various optional accessories and discusses the various software components.

## *In this chapter*

## *The System*

The following section describes the hardware and software features of the Keyboard Workstation 4.

The MICROS KWS4 is a diskless Windows CE workstation running a x86 compatible AMD Geode SC3200 processor. Based on the highly successful Workstation 4 architecture, the KWS4 replaces the 12.1" LCD and touchscreen with a 240x64 STN monochrome LCD and 108 key fixed keyboard.

Figure 1-1 points out the main features.



*Figure 1-1: Keyboard Workstation 4 External Features*

Designed for high volume applications in indoor and outdoor environments, it features a rugged membrane keyboard and supports a wide range of operating temperatures.

### *108 Key Membrane Keyboard*

The Keyboard consists of a sheet of elastomer keys or buttons with white printed legends placed over a flexible circuit board containing the membrane key switches. A plastic grid fits over the elastomer keys and holds the entire assembly in place. The water resistant keyboard cover is held in place by a pair of magnets but easily lifts for quick menu legend changes.

### *3-Track Magnetic Card Reader*

The KWS4 features a 3-track Mag Stripe Reader. The mag stripe reader is mounted in a housing designed to direct liquids spilled into the mag stripe slot and away from the system board.

### Operator Power Switch

The recessed power switch is located at the lower right corner of the unit and used to power the workstation on or off, or to enter/exit the suspend mode.

### Operator LED

The Operator LED is capable of displaying three colors - Green, Amber, and Red. In addition, each color can be solid, or blink at rates of .25Hz, 1Hz, or 4Hz. It is used to display the unit's current power management state, and to indicate a POST error.

Figure 1-2 shows an underside view of the workstation featuring the I/O Connectors, Compact Flash, and PCMCIA slot.
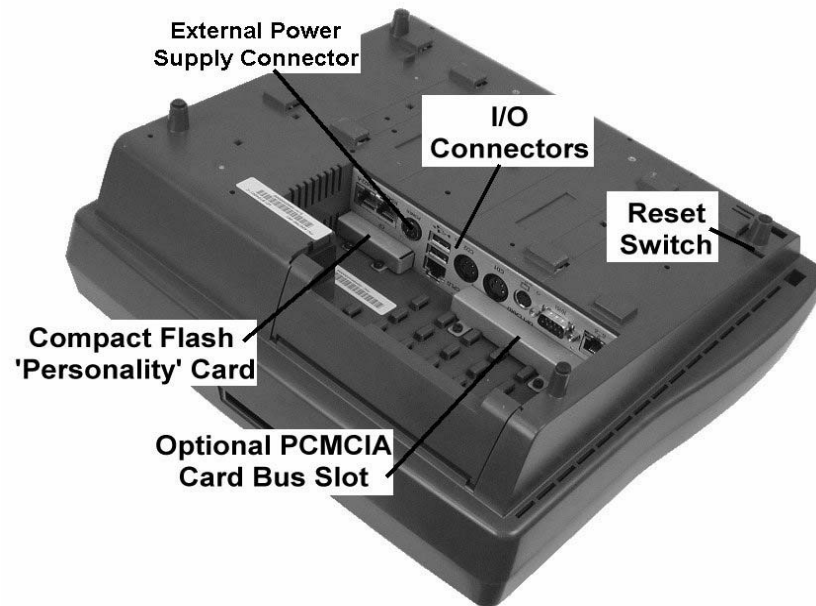


*Figure 1-2: Compact Flash and PCMCIA Card Access*

### I/O Connectors

The Input/Output (I/O) connector panel contains all external connectors. See the I/O Connector section in Chapter 3.

### External Power Supply Connector

The KWS4 uses a sealed 45W external power supply module.

### Compact Flash (CF) Personality Card

Standard on the KWS4, the CF card is secured behind a removable bracket at the IO connector panel. The CF card contains the POS application, system registry, and optionally, Stand Alone Resilient (SAR) totals. In other words, it contains the 'personality' of the workstation. Should the workstation fail, the CF card can be removed and installed in the replacement workstation. See page 3-17 for more information about the CF Card.

### Optional PCMCIA PC Card Bus Slot

The KWS4 includes an optional PCMCIA Card Bus Slot accessible from the rear of the unit. A wireless version is planned based on an 802.11b compatible PCMCIA card.

### Reset Switch

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

## Workstation Mounting Options

A number of mounting options are available for the Keyboard Workstation 4, as described in the following pages.

### *The Adjustable Stand*

One of several mounting options available for the KWS4 is the Adjustable Stand. The Adjustable Stand converts the low profile workstation into an adjustable display design.

The stand has a weighted base with large feet for stable operation, and features self-locking hinges that allow the workstation to be tilted in a range of between 25 and 70 degrees to avoid glare on the screen or keyboard.

Figure 1-3 shows both side and front views of the KWS4 mounted on the stand.



*Figure 1-3: The Adjustable Stand*

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



*Figure 1-4: KWS4 Adjustable Stand Cable Management*

### Pole Stand

Another mounting option for the KWS4 is the Pole Mount Stand. On the left of Figure 1-5 the components of the Pole Stand are shown, and on the right of the illustration shows the KWS4 mounted on the pole stand.



*Figure 1-5: The Pole Mount Stand*

The Pole Mount Stand consists of several components as shown. The base includes a wide stable mounting plate for counter surfaces, and includes a cable opening at the base. The adjustable section of the Pole Stand allows the height of the mounting plate to be positioned between approximately 12 and 16 inches from the counter surface. The mounting plate is non-adjustable and fixed at a 115° angle.

The workstation is placed in the VESA Compatible Mounting Adapter, which in turn is fastened to VESA compatible hole centers in the Pole Stand Mounting Plate.

The VESA Compatible Mounting Bracket is also available as a separate item for use as a Workstation Security Bracket suitable for mounting the LP Workstation on a counter surface. See the KWS4 Product Marketing Announcement (PMA) for information on pricing and part numbers.

### Adjustable Mounting Arm

The Adjustable Mounting Arm is yet another option for installing the KWS4, shown in the illustration below.



*Figure 1-6: The Adjustable Mounting Arm*

It can be used to mount the KWS4 to a counter surface, wall, or under a shelf. The VESA compatible mounting bracket attaches to the adjustable mounting arm plate and the KWS4 is attached to the adapter. See the KWS4 Product Marketing Announcement (PMA) for information on pricing and part numbers.

### Wall Mount Stand

In addition to the Adjustable Display and Pole Mount Stand, a flexible wall mount bracket is available as shown below in Figure 1-7



*Figure 1-7: The Wall Mount Stand*

The wall mount stand can be used to place the workstation on a wall surface, or to suspend it from under a counter or custom cabinets.

### Optional LCD Customer Displays

A pair of LCD based customer displays are available for the KWS4 and detailed in the following pages.

#### *Rear LCD Customer Display - LP and on Adjustable Stand*

The Rear or Integrated LCD Customer Display attaches directly to the KWS4 casework and receives power and data from a system board cable. Figure 1-8 shows front and rear views of the Integrated version installed on an LP or Adjustable Stand mounted workstation.



*Figure 1-8: Rear LCD Customer Display*

### Pole LCD Customer Display

The Pole LCD Customer Display can be located up to 5 feet from the workstation and is connected to the KWS4 I/O Panel. The hole pattern in the base matches those on MICROS cash drawers. The display is shown in Figure 1-9, below.



*Figure 1-9: Pole Mount Customer Display*

Both the Rear and Pole LCD Customer Displays use the same 240x64 monochrome STN LCD and Display Interface Board as the Operator Display.

Appendix A includes dimensional drawings for each available customer display options.

## *Software Components*

The Keyboard Workstation 4 is comprised of several software components, described below.

### Boot Loader

The Boot Loader is stored in a 2MB Flash EEPROM and is specific to the SC3200 processor. It configures all system board hardware at the register level, optionally executes a Power On Self Test (POST), then copies the OS image from the Disk On Chip (DOC) into RAM and starts it.

Also contained in the Boot Loader are custom extensions unique to the KWS4. These extensions permit access to platform specific hardware such as the Compact Flash Card, and handles such tasks as checking the CF card for an updated copy of the operating system at boot time, then copying it to the DOC if present.

### Windows CE

Windows CE is a modular operating system sometimes found in hand-held and portable information appliance devices. Classified as an embedded operating system, Microsoft provides a tool called the Windows CE Platform Builder (CEPB), that allows MICROS to custom build an operating system using only the modules and drivers required to support the hardware and application software. This results in an operating system where the memory footprint and CPU requirements are substantially less than a traditional desktop operating system.

On the KWS4, the Windows CE image resides in a hidden partition on the Disk On Chip (DOC). At start-up, the Boot Loader copies the image into the SDRAM.

### POS Application

The Keyboard Workstation 4 is supported by MICROS L&E 9700, Version 2.8.

### KWS4 Client Application Loader (KCAL)

The KWS4 CAL plays a key role in managing both the installation and ongoing maintenance of the KWS4 Operating system and POS application software. The CAL consists of two parts. One part resides on the KWS4, (CAL Client) and the second part resides on the system server (CAL Server). The KCAL client resides on the Disk On Chip in a folder called \MCRSCal. The CAL Server runs as service under Windows 2K and is installed at the same time the POS application is installed. This document describes the KCAL Client and its role in setting up a new workstation and maintaining the software on a day-to-day basis.

### New Installation

Through a registry setting, the CAL always starts when the Operating System starts. If the workstation is new or contains a default registry, when the KCAL starts, it checks the system registry and determines that the workstation is not yet configured. It broadcasts a Universal Datagram Protocol (UDP) discovery request and displays a User Interface (UI) displaying the name of any server that responds.

The UI displays the KCAL server name, along with the Server Application Type (9700 Sar Ops Client) - in most installations there will be only one CAL server. When the CAL server is selected, the installer is presented with a list of workstations, pre-programmed in the application's device database.

When the installer selects a workstation from the list, the KWS4 name and TCP/IP network configuration (DHCP or Static IP Address) are entered in the workstation's registry. The KCAL then transfers the application 'package' consisting of the POS Application and support files. On the server, a CAL configuration file called SETUP.DAT specifies the name of each file to be transferred as well as its destination. The POS application and all support files are copied to the CF Card.

When the transfer is complete, the CAL invokes a restart. After the restart, the KCAL again checks the registry settings and this time determines that an application is installed. It starts the application and uses the TCP/IP network configuration to establish a LAN connection with the server.

### Day-to-Day Operation

If the KWS4 is powered off each night, or should AC power fail, the KCAL client restarts the POS Application software when workstation is restarted.

As the KWS4 operates on day-to-day basis, the CAL client remains in the background, periodically checking the server for updated versions of the application, operating system, or even a new version of the CAL itself.

### POS Application Update

An update to the POS application becomes available. The updated application files are staged on the system server. A configuration file residing on the server determines the specific files that will be updated. The KCAL Client periodically checks with the CAL Server to see if updates are available and recognizes an updated application.

*   If the KCAL recognizes the update at boot time, it automatically downloads the updated application and/or support files, copies it over the old application, and starts it.

- If the CAL recognizes the update while the workstation is operating, it gives the user the choice of updating the application now or deferring to the next time the KWS4 is started. If the operator chooses to complete the update now, the updated files are retrieved, and copied over the application on the CF card. Upon completion, the workstation is restarted.

### Firmware Updates

In addition to the Operating System and Application updates, the KCAL can update the system Boot Loader or the firmware in the Keyboard/MSR and Operator/Rear LCD controller boards. The boot loader and firmware updates can be performed independently or in conjunction with an application or operating system update.

### Windows CE Operating System Update

During its routine check for updated applications on the system server, the KCAL Client also checks for an update to the Operating System (OS). An updated OS becomes available and is staged on the system server.

- If an OS update is found, it is copied from the server to the CF card.

- The KCAL invokes a cold boot of the KWS4.

- The Boot Loader detects the OS image (contained in a file called NK.BIN) on the CF, and transfers it to the DOC. The KCAL deletes the updated image from the CF card the next time it starts.



*Figure 1-10: OS Image Update Indication*

Should a power failure occur during an OS image update, the NK.BIN file remains on the CF Card. The boot loader detects the NK.BIN again and starts the process of copying it to the Disk On Chip.

### Workstation Personality Swap

An installed workstation becomes inoperative. A replacement workstation is installed, and the hardware peripherals transferred. The CF Card is removed from the defective workstation and installed in the replacement workstation.

- A CF card removed from the defective workstation contains the POS application and support files, SAR totals files, and the persistent registry. The persistent registry contains configuration data including KWS4 name, TCP/IP network settings, and the number and type of peripherals installed. This allows the replacement workstation to take on all of the characteristics of the defective workstation without the need to restore an image.

- When the CF card is installed in the replacement workstation and the unit powered-up, the KCAL starts, checks the registry settings, determines that an application is already installed, and takes no action other than starting the application that resides on the CF Card.

### Keyboard Workstation 4 Utility

Similar in scope to the Diagnostics Utility included with the Workstation 4, the KWS4 Utility is formatted to fit the 240x64 LCD Operator Display. It can be used to test the point-of-sale features of the workstation. In addition, it includes the ability to manually program the KWS4 Keyboard/MSR controller and LCD controller firmware as well as the Boot Loader and Disk On Chip. The KWS4 Utility resides on the Disk On Chip in the \Utilities folder. Starting and using this program is documented in Chapter 4.

## Memory Architecture

This section highlights the key features of the KWS4 memory architecture and defines where each of the various software components are stored.

### Boot Loader

The Boot Loader is contained on a system board Flash EPROM. The contents of the Boot Loader are shown in Figure 1-11.

| Boot Loader Hardware Initalization and POST | OEM Adaptation Layer (Platform Specific Code) | |
|---|---|---|

*Figure 1-11: KWS4 Boot Loader EPROM Contents*

The Boot Loader, similar to the BIOS in a PC, is specific to a given processor and chip set, in this case, the x86 compatible Advanced Micro Devices (AMD) SC3200 Geode. When the KWS4 is powered-up, the Boot Loader performs the following tasks.

- Hardware initialization and optionally, a Power On Self Test (POST). See Chapter 3 for more information about how to initiate a POST during start-up.
- The Boot Loader checks the CF card, looking for an updated OS image placed there by the CAL as part of an upgrade. If an OS image is not found on the CF, the Boot Loader copies the current OS image located on the DOC into system RAM and starts it.
- If an OS image is found on the CF card, it is copied over the existing OS image on the DOC, then copied into system RAM, and started.

The OEM Adaptation Layer (OAL) consists of custom extensions added to the Boot Loader to support platform specific hardware. In the KWS4, this includes the code to access the CF card and determine that an OS update image is available.

The Boot Loader can be upgraded either through the CAL or through a manual procedure. For more information, see the section on the KWS4 Utility.

### Disk On Chip (DOC)

The DOC is currently a 32M device factory populated in a 32-pin Dual In Line Package (DIP) socket. The DOC represents the non-removable half of the KWS4 mass storage solution.

Windows CE views the DOC as a Windows file system. In My Computer, it appears as '\DOC'.

The contents of this device are shown in Figure 1-12, below.

| Windows CE Image (Hidden Parition) | KCAL | KWS4 API | KWS4 Drivers |
|---|---|---|---|

*Figure 1-12: KWS4 Disk On Chip Contents*

- The Windows CE image resides in a hidden partition and includes a copy of the default system registry.

- The KWS4 Client Application Loader resides on the DOC in the \McrsCAL folder. Through a registry setting, KCAL starts each time the KWS4 starts.

- The KWS4 API is implemented as a DLL file and allows the POS Application to access hardware such as the cash drawers, mag stripe reader, and the Operator LCD and Customer Display options.

- The KWS4 Drivers is a collection of KWS4 platform specific DLL files that provide access hardware such as the Operator LED, power button, and the managing the persistent registry.

### Compact Flash (CF) Card

The Compact Flash (CF) Card represents the removable component of the KWS4 mass storage solution. Accessed from the IO panel, the device is factory populated and formatted, but contains no files when shipped. *The CF card must be installed in order for the workstation to start. In addition, the CF card interface is not provisioned for hot-swapping.*

A 64M device is currently installed, but larger sizes could be used. Consult the CF Card document on the Hardware Support section of the MICROS web site. Windows CE views the card as a Windows file system. In My Computer, it appears as '\CF'.

Figure 1-13 shows the contents after the workstation has been installed and configured.

| OS Update Image (NK.BIN Present only if update is being staged) | Persistant Registry | Application and Support Files | Optional SAR Totals |
|---|---|---|---|

*Figure 1-13: KWS4 Compact Flash Card Contents*

- Working from left to right in the illustration, the OS update image will be present only if the CAL detects that a newer version of Windows CE has been staged on the system server and places it on the CF Card.

If the OS update image file (NK.BIN) is present, the Boot Loader copies it over the existing OS image on the DOC. The KCAL subsequently removes NK.BIN from the CF card after the upgrade process is complete, prior to the next reboot.

- The CF Card contains the persistent registry. A KWS4 driver called the PRD (Persistent Registry Driver - PRD.DLL) loads the persistant registry files from the CF card when the OS starts, then periodically copies the working registry from RAM to the CF card. The PRD ensures that the the non-volatile CF card always contains the most recent version of the Windows CE registry.

- The POS Application, support and totals files. The CF card is blank when a new unit is shipped from the factory or repair depot, the KCAL copies these files when the unit is connected to properly configured server.

- The 9700 SAR Application uses a portion of the CF card to store off-line transaction totals.

### SDRAM - Working System RAM

System or 'working' RAM is contained in a single 168-Pin DIMM socket. Currently, a 128M PC133, 168-Pin, +3.3V, unbuffered SDRAM is populated in socket DIMM1. The contents are shown in Figure 1-14, below.



*Figure 1-14: KWS4 System RAM Contents*

- The RAM holds the runtime requirements of Windows CE and the POS Application code as the KWS4 operates. RAM contents are preserved when the workstation is placed in the **SUSPEND** state, but lost if AC power is removed.

- The RAM registry is the copy of the registry WinCE uses while it operates. It is placed in RAM for the fastest access. The Persistent Registry Driver (PRD) periodically copies the RAM Registry to the non-volatile CF card.

### Summary

The Disk On Chip provides a permanent means of storing the operating system and associated device drivers, as well as system utilities such as the KWS4 CAL, and the KWS4 Utility.

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

Should a workstation fail, the CF card can be removed and installed in a replacement unit, giving it the same configuration as the inoperative workstation from which it was removed.

Even though the KWS4 is diskless in the classical sense, the non-volatile solid state DOC and CF card preserve the application and registry settings that require a lifetime extending across system reboots. Through the KWS4 CAL, updates to the OS, application, or platform files are staged on the POS server and automatically propagated to each KWS4.

# *Power Management States*

This section introduces the Windows CE power management state nomenclature and describes how each state is displayed on the Operator LED. References to Windows CE power management states are specified in bold capitol letters, e.g., **NOPOWER**, **SUSPEND**, etc. Chapter 3 contains information on how to start the KWS4 and use the Power Button to enter and exit each power state.

### UNPLUGGED

- The AC power cord is not connected to a wall outlet. The KWS4 will be in this state when removed from the shipping container, or if the unit is not connected to a UPS and the site AC power fails during operation.

- The Operator LED is Off.

### 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.

### ON

- Windows CE and POS application are operating. RAM contents are maintained.

- The Operator LED is solid Green.

### SUSPEND

- Windows CE and POS application is not running. RAM contents are maintained. Restoring the unit from **SUSPEND** restores the Operator LCD and optional LCD Customer Displays, if attached.

- The Operator LED is solid Amber.

### PREHEAT

- Heating circuitry on the System Board and LCD Interface Board are active. Depending on the ambient temperature, the unit may take between 5 and 11 minutes to start.

- The Operator LED is solid Amber, but very dim.

### Power State Retention

The KWS4 retains the current power management state in an on-board EEPROM. If the unit is **ON** and AC power fails, it returns to **ON** when AC power is restored with no action required by the operator.

## Power Management State Table

| Fig 1-15 | Current State | Event Source | Scenario | New State |
|---|---|---|---|---|
| *1* | *UNPLUGGED* | AC Power | AC Power becomes available and the last recorded state was not the *ON* or *SUSPEND* state. | *NOPOWER* |
| *2* | *PREHEAT* | AC Power | AC Power available, but ambient temperature <-10°C. | *ON* |
| *3* | *NOPOWER* | Operator | The operator presses the power button for less than 5 seconds. | *ON* |
| *4* | *NOPOWER* | Operator | The operator presses the power button for more than 5 seconds. | *ON* |
| *5* | *NOPOWER* | Server Application | A server application sends a 'Wake On LAN' command. | *ON* |
| *6* | *ON* | Operator | The operator presses the power button for more than 5 seconds. | *NOPOWER* |
| *7* | *ON* | Operator | The operator presses the power button for less than 5 seconds. | *SUSPEND* |
| *8* | *ON* | Application | The application shuts down the workstation. | *NOPOWER* |
| *9* | *ON* | Application | The application places the KWS4 in *SUSPEND* state. | *SUSPEND* |
| *10* | *SUSPEND* | Operator | The operator presses the power button for less than 5 seconds. | *ON* |
| *11* | *SUSPEND* | Operator | The operator presses the power button for more than 5 seconds. | *NOPOWER* |
| *12* | *SUSPEND* | Server Application | A server application sends a 'Wake On LAN' command. | *ON* |
| *13* | *SUSPEND* | Application | The KWS4 application calls an application program at a predetermined time. | *ON* |
| *14* | *ON* | Server Application | A server application sends a "Wake On LAN" command. | *ON* |
| *15* | *ON* | Application | Warm boot is called by the application. | *NOPOWER* then *ON* |
| *16* | *NOPOWER* | AC Power Failure | AC Power Fails, then is restored | *NOPOWER* |
| *17* | *SUSPEND* | AC Power Failure | AC Power Fails, then is restored | *NOPOWER* |
| *18* | *ON* | AC Power Failure | AC Power Fails, then is restored | *ON* |

*Figure 1-15: KWS4 Power Management States*

### Keyboard Workstation 4 Power Management State Diagram

Figure 1-16 shows the workstation power states. The numbers in each bubble correspond to the left column in Figure 1-15.
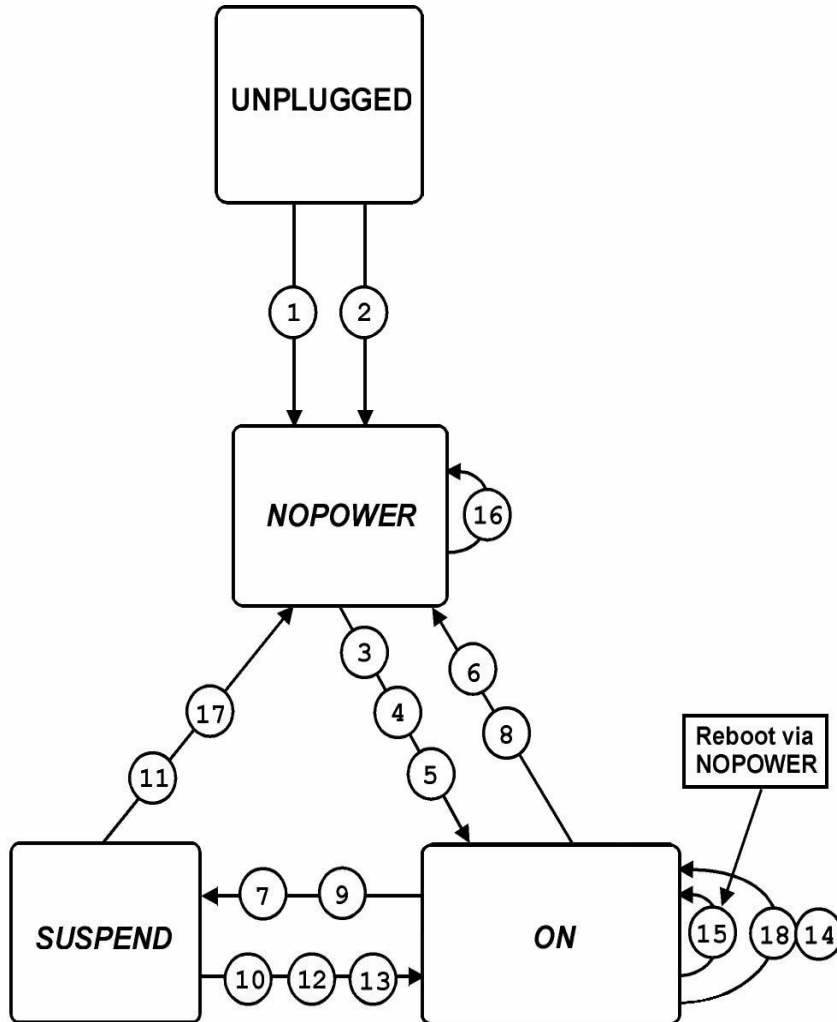


*Figure 1-16: KWS4 Power Management State Diagram*

## *Specifications*

The Keyboard Workstation 4 conforms to the following specifications.

| Specification | Parameters |
|---|---|
| Processor | AMD Geode SC3200 |
| Cache | 16KB Unified L1 Cache (No L2 Cache) |
| Display | 240x64 Monochrome STN LCD |
| Backlight | White Light Emitting Diode |
| Real Time Clock | Software compatible with DS1287 and MC146818. 100-year calendar with alarm features and century roll-over, includes 242 bytes of battery backed CMOS RAM. |
| Memory | One 168-Pin DIMM socket supports 32 MB to 256 MB of PC133 SDRAM (+3.3V, Unbuffered) |
| Mag Stripe Reader | 3-Track ABA compatible, operates in Magtek and Special modes. |
| Customer Display | Optional Integrated Rear Mount and Remote 240x64 Monochrome STN LCD. |
| USB Ports | Two external UHCI 1.1 compliant USB ports |
| LAN Interface | On-Board National DP83815 Ethernet Controller supports 10BaseT (IEEE 802.3) or 100BaseT (IEEE 802.3u) using twisted pair cabling. |
| Serial Ports | 1 DB9 RS232 Serial /w handshake, 2 Modular TX/RX RS232 Serial, no handshake |
| Input Power | 45W Max (+12V 3.75A External Power Supply) |
| Storage Temperature | -25 °C (-13°F) to 80°C (176°F) |
| Operating Temperature | -10 °C (14°F) to 60°C (140°F), 90% relative humidity non condensing at 60°C. |
| Weight | 7.7lb. (3.5 kg) / Shipping weight 11lb. (5 kg) |
| Case Material | ABS Plastic |
| Physical Dimensions | Refer to Appendix A |

## *Approvals*

The Workstation 4 meets the following safety and environmental certifications.

| Directive | Specification | Year | Expiration Date | Comments |
|-----------|--------------|------|-----------------|----------|
| SAFETY: | EN60950 | 2000 | 7/1/06 | |
| EMC: | EN 55022 | 1998 | Current | A1: 2000 (Radiated) |
| | EN 55024 | 1998 | Current | A1: 2001 |
| | EN 61000-3-2 | 2000 | Current | (Harmonics) |
| | EN 61000-3-3 | 1995 | Current | A1: 2001 (Flicker) |

*Chapter 2*

# *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 options, then shows how to reassemble the unit.

### *In this chapter*

## *Disassembling the Keyboard Workstation 4*

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

![arrow icon] **NOTE: Pre-Production Models**

The following procedures and illustrations apply to pre-production versions of the KWS4. As the unit enters production, minor changes will occur in the cabling, including the addition of torroids to several interface cables.

**1.** Remove all cables from the I/O panel.

**2.** Place a towel or other soft cloth on your work surface to protect keyboard and LCD, then place the workstation face down on this surface.

   o   The top cover is held in place by a pair of screws accessible from the underside of the unit as shown in the top half of Figure 2-1. The lower half of the illustration points out the hinges located at the rear of the base.
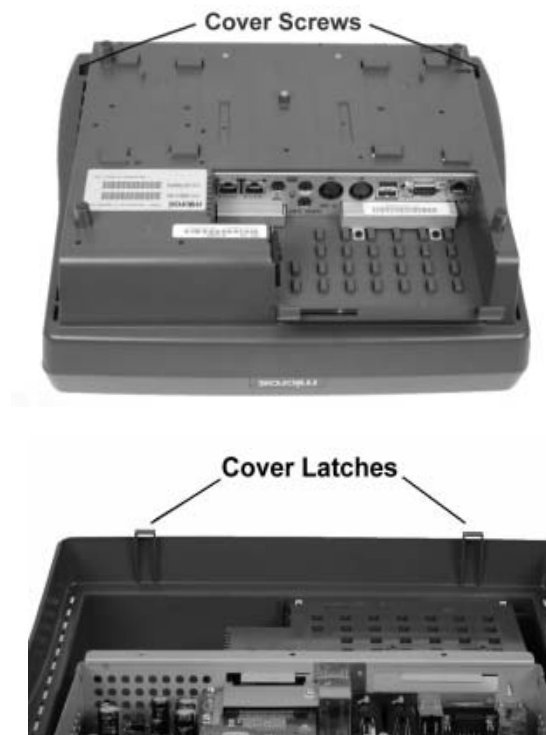


*Figure 2-1: KWS4 Cover Hinges and Screws*

3. Loosen the two captive screws from the under side of the unit as shown in Figure 2-1.

4. Return the unit to the normal operating position and remove the top cover. To avoid damaging the hinges on the rear of the base, push the top cover towards the rear of the base a little to release them, then lift up. *If you lift up on the cover without first releasing the hinges, you can break them.*

5. Place the top cover assembly face down on your work surface. Refer to Figure 2-2 and remove the screws that fasten the RF shield in place.
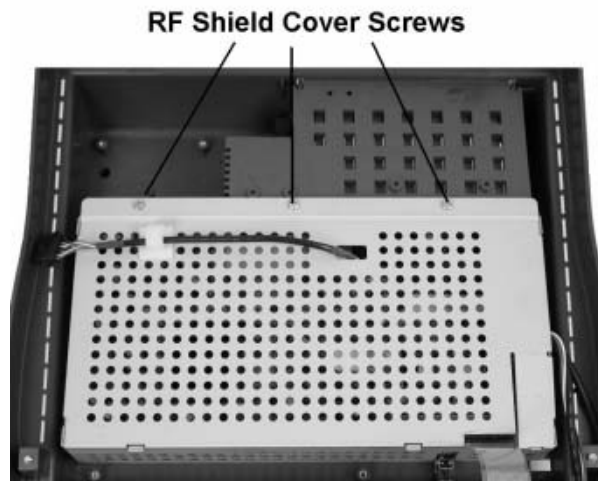


*Figure 2-2: Removing the RF Shield*

6. Remove the RF shield cover and place at the rear of the workstation base.

7. Refer to Figure 2-3 and remove the cables from the slot in the side of the RF shield base.
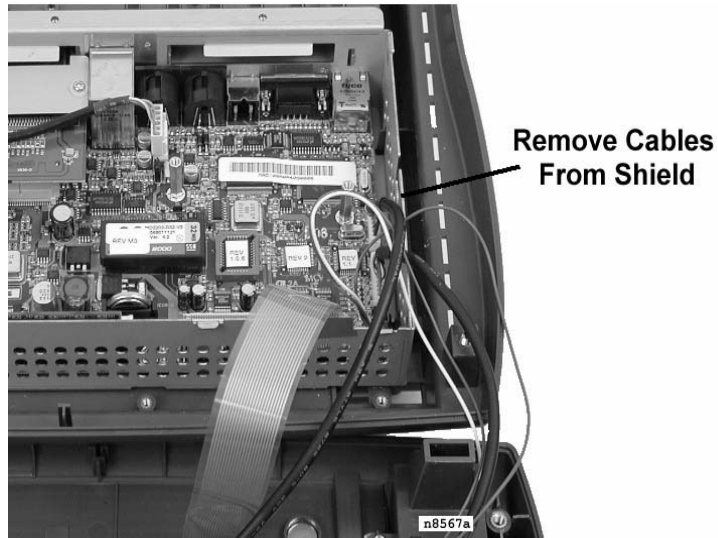


*Figure 2-3: Removing cables from the RF Shield*

8. Remove the top cover cables from the System Board.
   o Remove the keyboard ribbon cable from the system board connector. This connector has a latching mechanism to secure the cable. Pull up on the upper half of the connector body until the gap shown in the lower half of Figure 2-4 appears, then remove the cable.
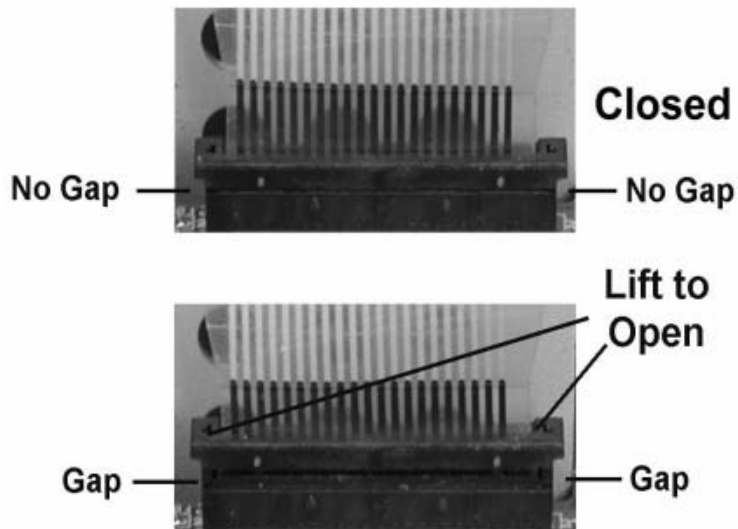


*Figure 2-4: Removing the Keyboard Ribbon Cable*

o Carefully remove the Operator Display, Magnetic Stripe Reader, and Operator LED cables from the system board. Figure 2-5.
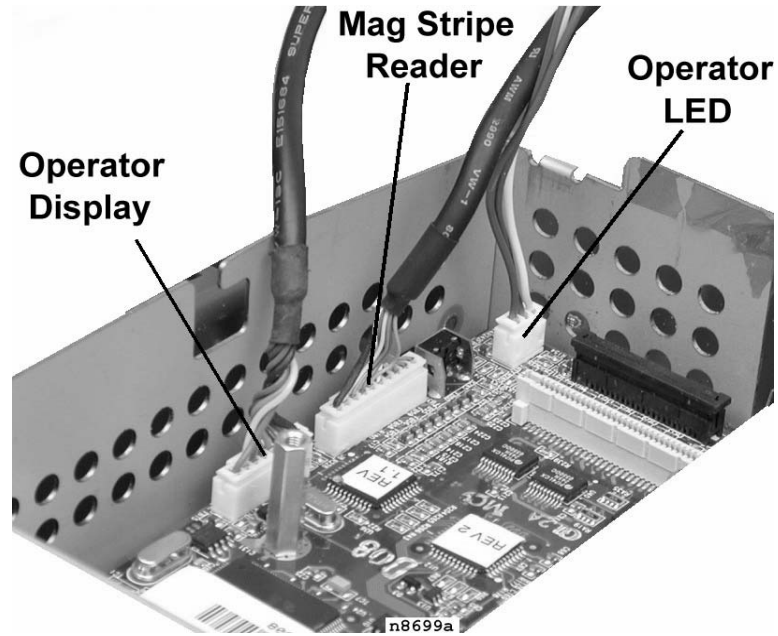


*Figure 2-5: Removing Cables from the System Board*

9. The top cover can now be set aside.

Figure 2-6 shows the interior of the base with the RF shield removed and points out system board and CF Daughter Card.
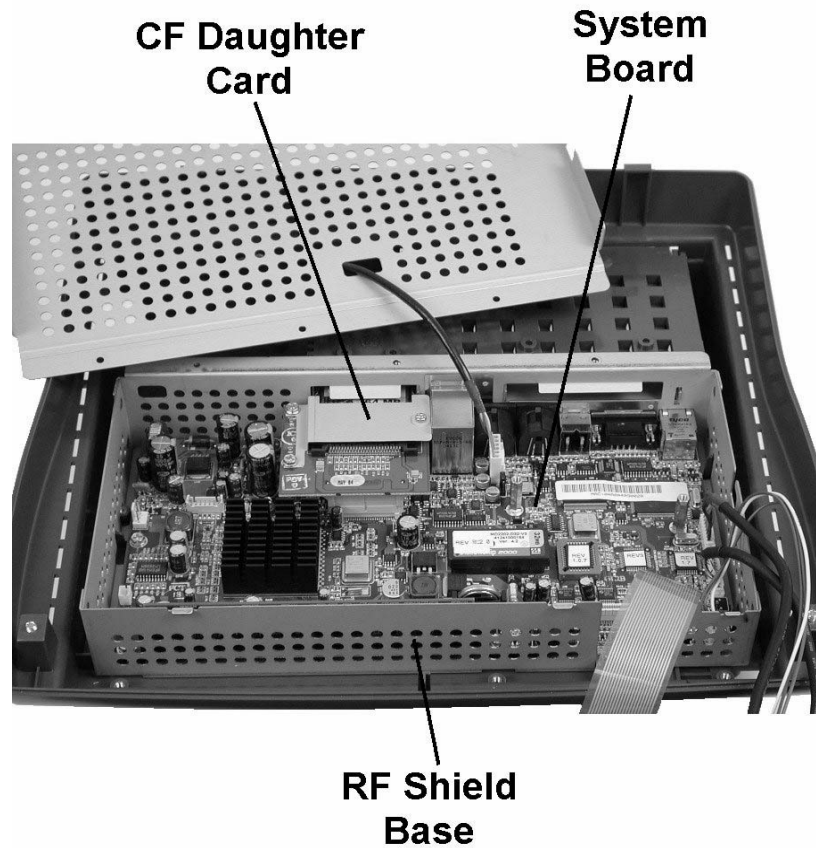


*Figure 2-6: Keyboard Workstation 4 Base with RF Shield Removed*

## System Board

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

### System Board Revision E - Integrated Circuits

Figure 2-7 shows the major integrated circuits on the KWS4 System Board.
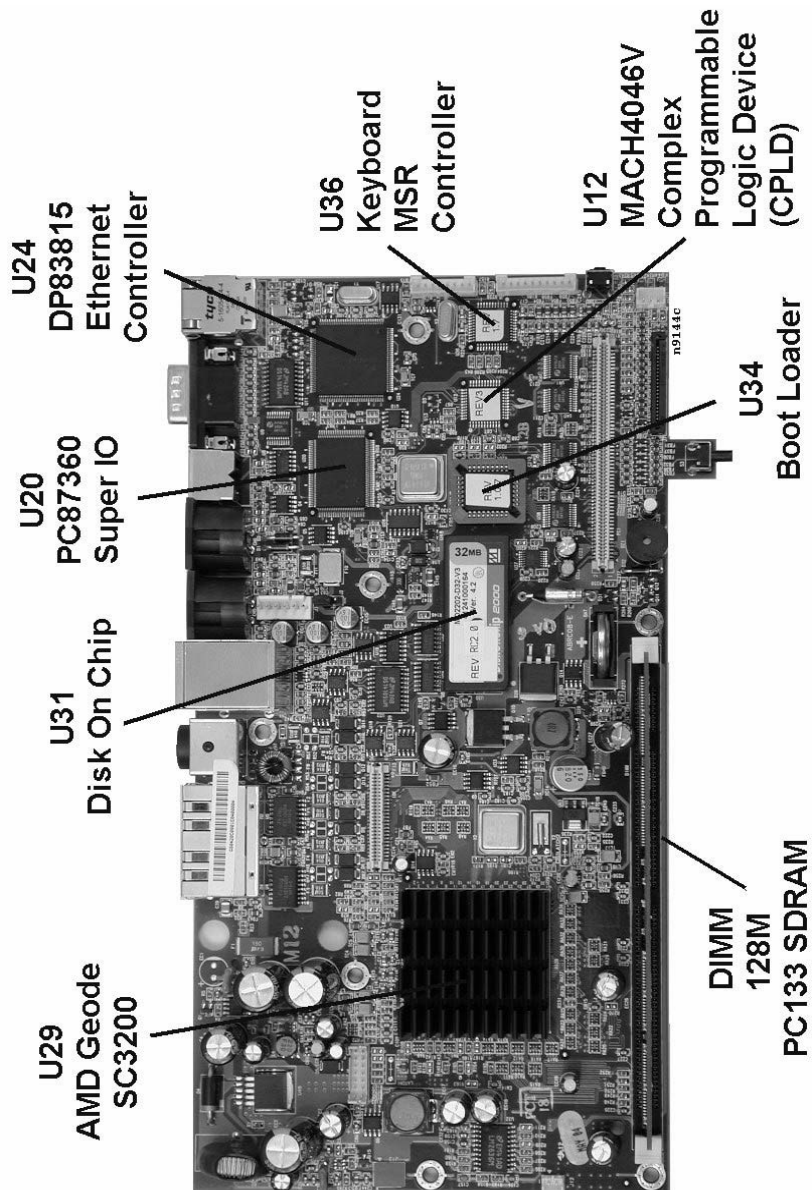


*Figure 2-7: System Board Integrated Circuits*

## System Board Revision E - Connectors

Figure 2-8 displays all KWS4 System Board connectors.
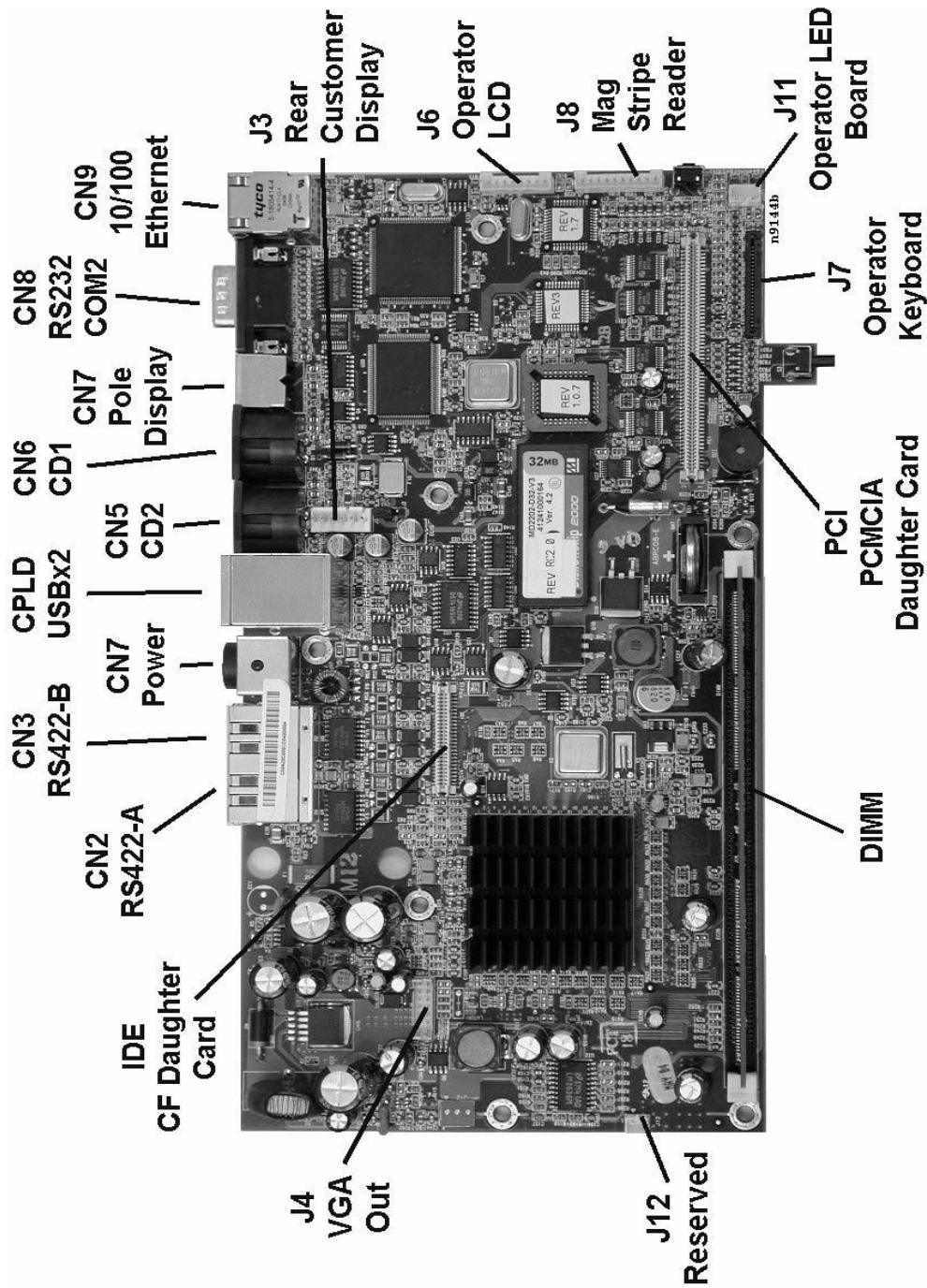


*Figure 2-8: System Board Connectors*

## System Board Revision E - Jumpers and Switches

Figure 2-9 points out all system board jumpers, switches and miscellaneous items
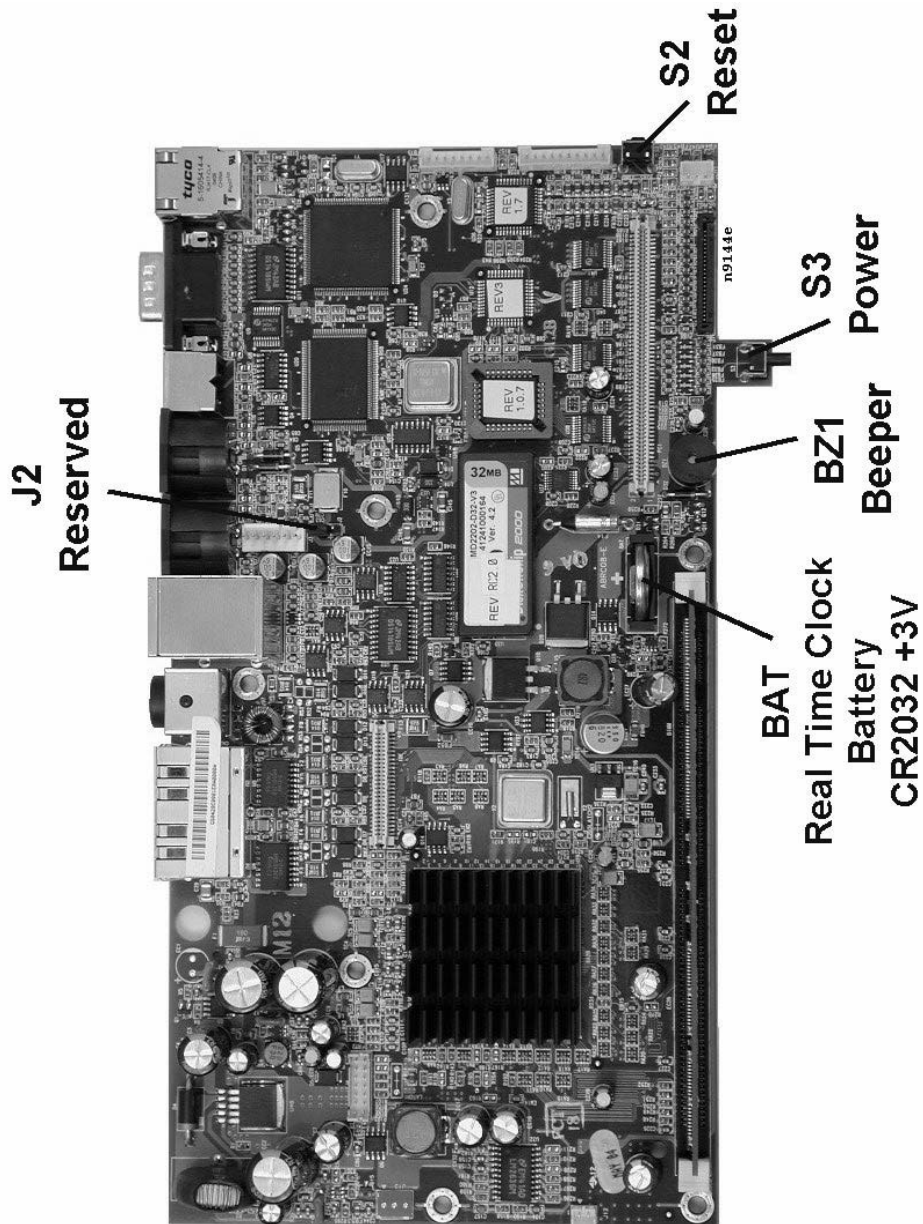
*Figure 2-9: System Board Jumpers and Switches*

## Keyboard Workstation 4 Block Diagram

Figure 2-10 shows a block diagram of the Keyboard Workstation 4, including the system board.
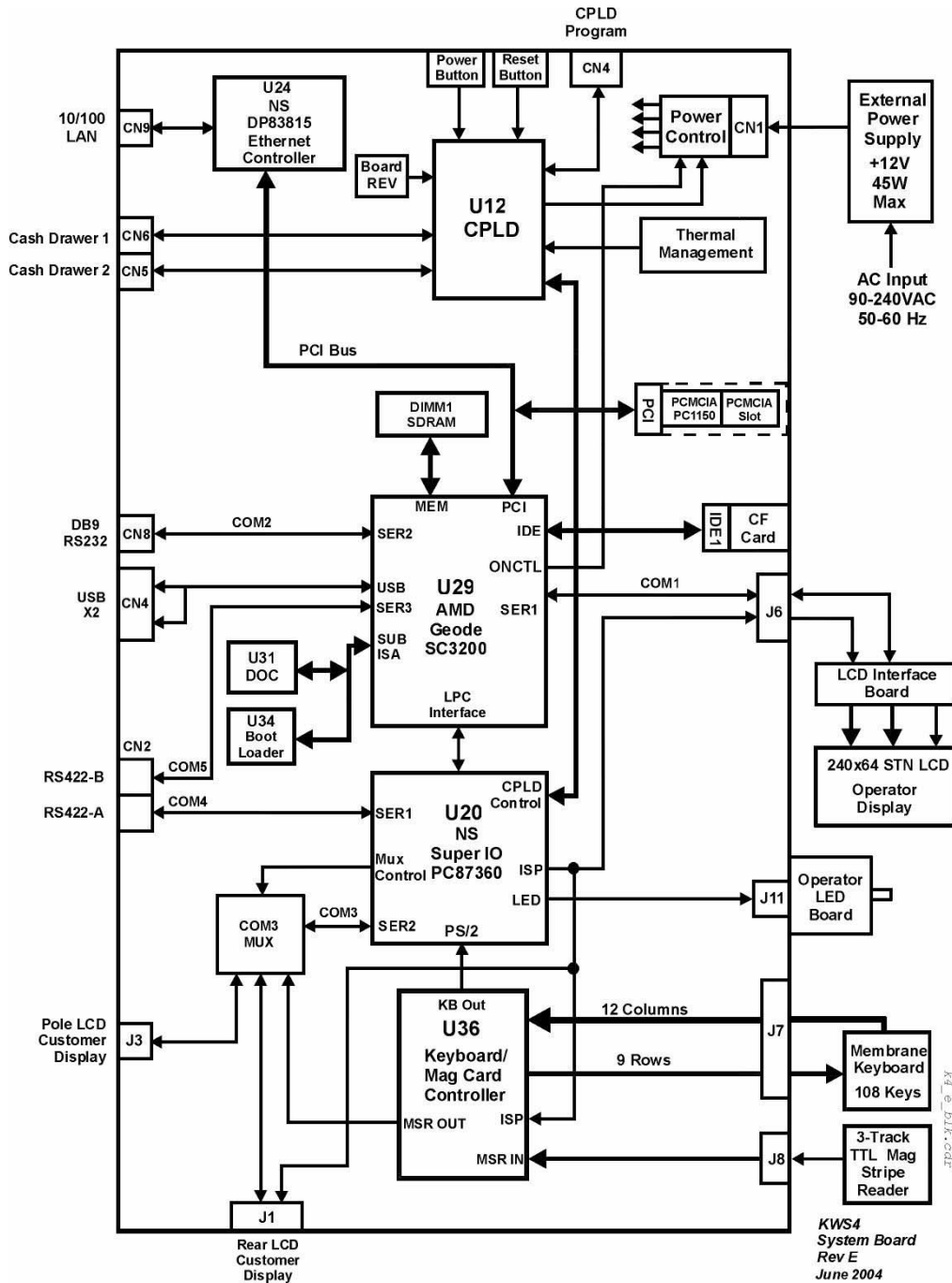


*Figure 2-10: KWS4 Block Diagram*

### Advanced Micro Devices (AMD) Geode SC3200

The SC3200 is now a member of the Advanced Micro Devices (AMD) Geode family of highly integrated x86 system devices. AMD purchased the National Semiconductor Corporation Geode processor line in 2003. The SC3200 consists of a GX1 processor core integrated with a TFT LCD video controller, x86 PC compatible core logic and super IO. The features of this chip are listed below.

- GX1 266MHz 32-bit x86 compatible processor with MMX instruction set support.

- 64-Bit SDRAM memory controller (78Mhz memory bus)

- TFT LCD Video Processor with 2D hardware acceleration support. (The TFT Video Processor does not drive the KWS4 Operator Display, is active during operation, driving System Board video header J4.)

- PC AT functionality core logic

- PCI Bus Controller

- Low Pin Count Interface to external Super IO

- ATA33 IDE Interface

- Sub ISA Bus Interface to Boot Loader EPROM and DiskOnChip

- USB Interface, Open HCI 1.0 compliant

- Three serial ports

- One parallel port

- Two ACCESS.bus Interface Ports

- ACPI 1.0 Power Management Support.

### PC87360 Super IO

The PC87360 is a member of the National Semiconductor Super IO family, and a companion to the Geode SC3200. Outstanding features of the device include:

- Low Pin Count (LPC) Interface to the SC3200

- PS/2 Keyboard and Mouse Controller

- Two Serial Ports

- One Parallel Port

- LED Driver

- Up to 45 General Purpose IO pins. On the KWS4 System Board, these pins are dedicated to RS422/RS232 Serial port control, TX/RX multiplexer, and interface to the Complex Programmable Logic Device (CPLD).

### DP83815 Ethernet Controller

The National Semiconductor DP83815 is a highly integrated fast Ethernet controller coupled with a 10BaseT (IEEE 802.3) or 100BaseT (IEEE 802.3u) twisted pair cable interface.

- 10/100 Ethernet Controller - Twisted Pair Cabling

- PCI Interface with Bus Master Capability

- EEPROM stores MAC address and vendor ID data

- Wake On LAN Support

- Activity LED and Link/Integrity Speed LED integrated into the modular connector which can be viewed from the rear mounted connector panel.

### Disk On Chip (DOC)

The Disk On Chip 2000 is part of M-Systems 3rd generation of Disk On Chip products. It combines a disk controller and TrueFFS firmware with flash memory in a single device to provide a cost effective solid state alternative to the conventional hard disk.

The DOC is housed in a 32-Pin Dual In Line (DIP) Package. The unit ships with a 32M part. The TrueFFS firmware allows the DOC to appear as a windows file system to Windows CE.

Windows CE resides in a hidden partition. Each time the workstation starts, the Boot Loader is responsible for copying the OS image from the DOC into system RAM and starting it.

### Compact Flash (CF) Card

The CF Card is accessible from the IO connector panel. In a compromise between accessibility and security, the CF card is covered by a bracket that must be removed with a hex head allen wrench. *The CF card must be installed in order for the KWS4 to start. In addition, the CF card should not be removed or inserted when power is on.*

Like the DOC, the Windows CE operating system views the card as a Windows file system. Currently, a 64M card is used. Other sizes may be used, but consult the approved CF card list located in the hardware support section of the MICROS web site.

The CF card contains the POS Application, support files, and SAR data files. In addition, the CF card contains the working copy of the Windows CE registry that we call the persistent registry. As the KWS4 operates, changes to the registry are copied to the CF card by the Persistent Registry Driver (PRD).

Because the CF card contains a current copy of the Windows CE Registry as well as the POS application and totals, it represents the 'personality' of the KWS4. This is why it is accessible from the IO panel. It can be removed from a defective workstation and installed in the replacement in a matter of minutes.

Should an operating system update become available, the Keyboard Workstation Client Application Loader (CAL) places a copy of the operating system image file (NK.BIN) on the CF card. When the workstation restarts, the Boot Loader detects the file and copies it over the existing OS image on the DOC. The CAL deletes the image from the CF card before it restarts the workstation. See the Memory Architecture description in Chapter 1 for more information about the CAL.

### Boot Loader

The Boot Loader is U34, a 2MB Flash EPROM located on the system board. When the KWS4 is powered-up, the first lines of code executed are in this device. The first task is to initialize all on-board hardware at the register level, present the MICROS logo and progress bar on the LCD display, and monitor the IDN ports for a Power On Self Test (POST) request. If a POST is requested by inserting an RS422 loopback connector into one of the IDN port connectors, the boot loader executes a test of major sub-system components.

If the POST is successful, the boot loader copies the Windows CE image, located in a hidden partition in the Disk On Chip, into the system RAM and starts it. See Chapter 3 for more information about how to start the POST, and Chapter 4 to interpret POST errors should they occur.

The Boot Loader also includes a collection of functions unique to the Keyboard Workstation 4 hardware which may be accessed as the unit starts or during operation. This code permits access to platform specific features such as the CF card, memory, IO ports, etc, and handles such tasks as power management, and checking the CF card for an updated copy of the operating system image.

### Keyboard and MSR Controller

U36 is an 8-bit microcontroller with built-in firmware dedicated to the 108 key keyboard and TTL based Mag Stripe Reader.

### Keyboard

The keyboard consists of 12 columns and 9 rows. The controller sequentially activates each row, with individual key closures appearing on the column outputs. U36 converts the row/column switch closures to standard PC keyboard scan codes and presents them to the PS/2 Keyboard input of U20, the Super IO.

### Magnetic Stripe Reader

A 3-track TTL mag card reader produces data and synchronous clock signals for each track along with a media detect signal to indicate the presence of the mag card in the reader.

U36 converts the raw track data into a format similar to the magnetic stripe readers used in MICROS Workstation 4 and PCWS Eclipse. The serial mag card data is presented to the COM3 Transmit/Receive Multiplexer shown in Figure 2-10.

Control signals from Super IO U20 manage the TX/RX multiplexer operation, allowing COM3 to support a total of three devices; the Magnetic Stripe Reader, and the Integrated and Pole LCD customer displays.

## Operator LCD and Display Interface Board

The KWS4 Operator LCD uses an Optrex 240x64 STN monochrome LCD module, optimized to perform at the temperature extremes encountered by the workstation. All pixels on the LCD are individually addressable.

The Operator LCD is driven by the Display Interface Board, connected to the system board through a high-speed serial interface, assigned to COM1. The interface board includes an 8-bit microcontroller with programmable firmware, contrast and backlight circuitry. The Optrex LCD and Display Interface Board combination are also used for the optional Integrated and Pole Customer Displays.

The on-board microcontroller converts serial display data and commands into a parallel 8-bit format compatible with the LCD module. The on-board firmware translates commands issued by the KWS4 API into features such as blinking, scrolling, and inverse video as well as contrast and backlight brightness levels.

## Complex Programmable Logic Device (CPLD)

This device manages the Power and Reset switches, and provides signals to the on-board power supply regulators to control the KWS4 power management states. In addition, the CPLD controls the Cash Drawers.

## Thermal Management

This section of the system board is designed to warm the interior of the workstation in situations where the ambient temperature is at or below -10°C (5°F).

A system board sensor activates a heater circuit composed of 20 1W resistors distributed throughout the underside of the board. A second sensor and two 1W resistors are located on the Operator LCD Control Board. The optional Rear and Pole LCD Customer Displays include the same heater circuit.

In addition to activating the heater circuit, the output of the system board temperature sensor is also fed to the CPLD, which disables the power button. At the same time, the Operator LED glows dim Amber, to indicate that the unit is in the **_PREHEAT_** state.

When the heater circuit raises the internal temperature to near 0°C (32°), it is disabled. The CPLD simulates a power button press to start the workstation. Depending on the ambient temperature, this can take from 5 to 11 minutes.

A cold start procedure can be found in Chapter 3.

## *Top Cover Assembly*

Figure 2-11 shows a view of the KWS4 top cover assembly including the keyboard, Operator LCD and Display Board, and the mag stripe reader housing.
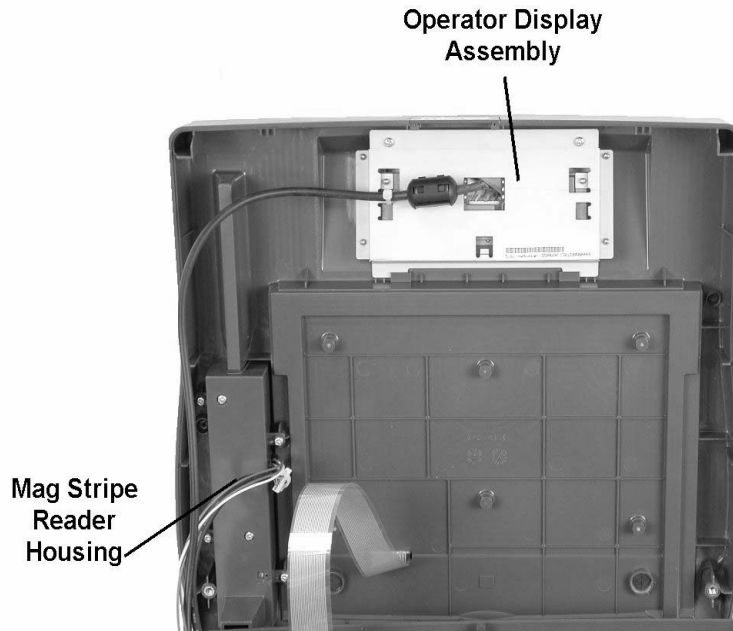


*Figure 2-11: KWS4 Top Cover Assembly*

### Operator Display

The Operator Display and Display Interface Board are mounted to a sheet metal bracket positioned behind the LCD cover.

### Magnetic Stripe Reader Housing

The water resistant Mag Stripe Reader housing contains the 3-track TTL Mag Stripe Reader, and Operator LED Board. The housing is positioned along the mag stripe reader slot to collect liquid spills and direct them to the spout located at the bottom of the illustration. When the cover is installed, the spout is positioned over a slot in the workstation base to direct liquid spills away from the system board.

# *Hardware Updates*

This section includes procedures for removing and replacing the Keyboard Workstation 4 options.

## CF Daughter Card

The CF Daughter Card is mounted to the base of the workstation with three stand-off's, two of which are mounted to the base and the third mounted to system board. The bracket prevents the CF from falling into the interior of the workstation should it be installed incorrectly.

You may remove the CF card prior to removing the daughter card, but this is not required.

### Removal and Installation

1. Remove the KWS4 Top cover and RF shield as described on page 2-2.
2. Locate the CF Daughter card and remove the screws shown in Figure 2-12.
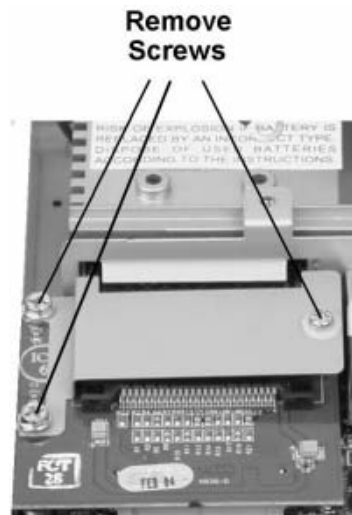


*Figure 2-12: Removing the Compact Flash Daughter Card*

3. Remove the daughter card and bracket from the system board socket, then pull it slightly forward to allow the CF socket to clear the opening in the I/O panel.
4. To reinstall the daughter card, position it so that the CF card projects through the slot in the I/O bracket. When the holes in the daughter card are positioned over each stand-off, press the card down to seat it in system board socket. Reinstall the bracket and install the screws.
5. See page 2-26 to reinstall the top cover.

## Magnetic Stripe Reader

The Magnetic Stripe Reader is mounted inside a water resistant housing that in turn is fastened to the top cover with four screws. This procedure describes how to remove the housing and change the reader assembly.

### Procedure:

1. Remove the top cover and RF shield as described on page 2-2.

2. Using a towel or other soft cloth, place the top cover face down on your work surface.

3. Refer to Figure 2-13 and remove the four screws that fasten the housing to the top cover.
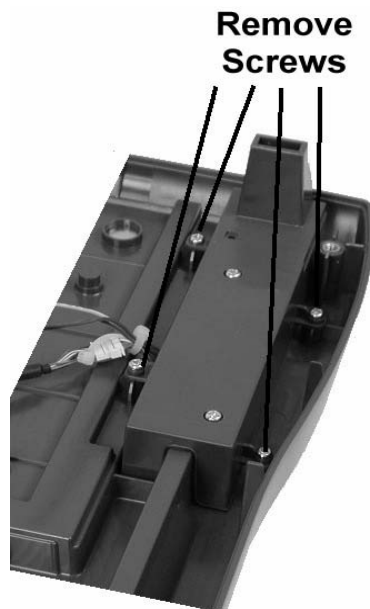
*Figure 2-13: Removing the Mag Stripe Reader Housing*

4. Remove the mag stripe reader assembly from the housing by removing two screws. See Figure 2-14 below.

5. Orient the card reader cable as shown in Figure 2-14, place it in the housing, then fasten the pair of screws as shown.
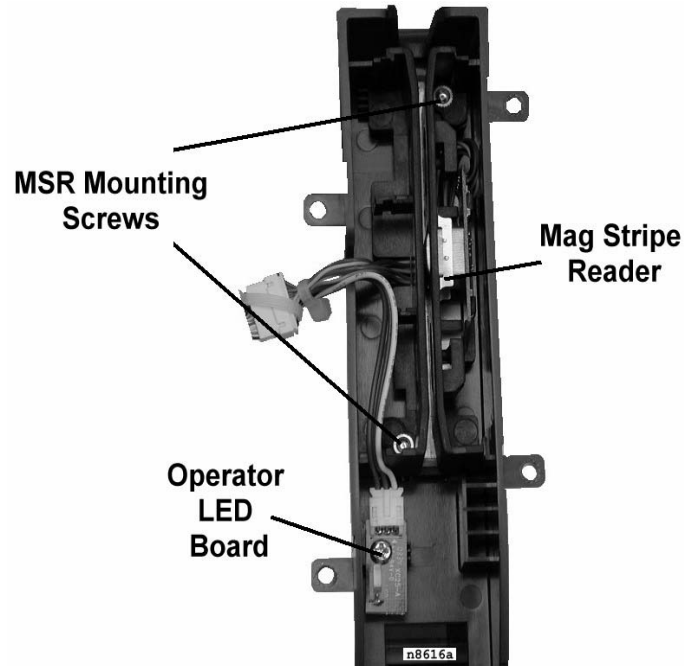


*Figure 2-14: Mag Stripe Reader Housing Details*

6. Reinstall the housing in the top cover.
7. See page 2-26 to reinstall the top cover.

## Optional PCMCIA Daughter Card

The optional PCMCIA Daughter Card mounts to the system board on two stand-off, pre-installed at the factory. Refer to the KWS4 PMA for more information on wireless options.

### Installation

1. Remove the KWS4 Top cover and RF shield as described on page 2-2.

2. Refer to Figure 2-15 and note the location of the each stand-off in relation to the daughter card socket.
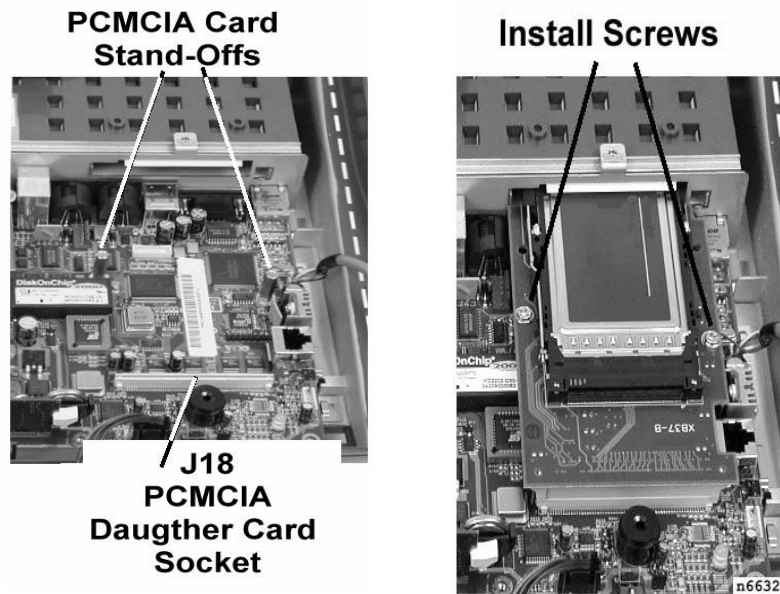


*Figure 2-15: PCMCIA Daughter Card Installation*

3. Install the PCMCIA Card in the Daughter Card. A Cisco wireless LAN card is shown as an example.

4. Position the daughter card so that the bracket and PCMCIA card project from the I/O bracket slot. When the holes in the card line up with each system board stand-off, press down on the daughter card to seat it in the connector.

5. Install screws in each stand-off as shown on the right side of Figure 2-15.

6. Reinstall the RF shield and KWS4 top cover.

7. Place the unit face down and connect the antenna to the card.

8. Route the antenna lead through the slot in the bracket supplied in the kit, then install the bracket with two hex screws.

## Rear LCD Customer Display

This procedure describes how to attach the optional Rear LCD Customer Display to the KWS4. The LCD Customer Display is provided as a complete assembly, ready to install. The LCD Customer Display connects to a pre-installed system board cable.

1. Remove the KWS4 top cover as shown on page 2-2.

2. Connect the cable from the LCD Display housing to the cable protruding through the opening in the shield cover. Figure 2-16.



*Attach Rear Display Connector*

*Factory Installed Rear LCD Customer Display Cable*
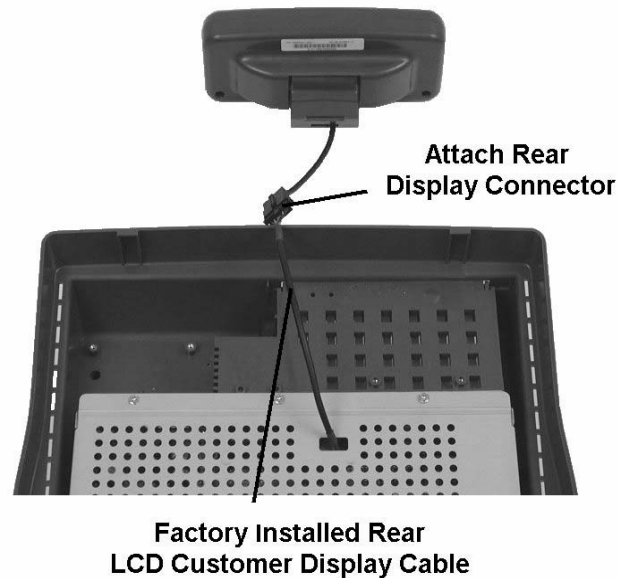
*Figure 2-16: Connecting the LCD Customer Display Cable*

3. Remove the logo plate located at the rear of the top cover.

4. Place the excess cable inside the workstation.

5. Orient the LCD assembly as shown in Figure 2-17 on the next page, then place the hinge in the cut-out and fit the top cover to the base.

*Figure 2-17: Installing the LCD Customer Display*

**6.** Place the workstation face down and secure the top cover to the base.

**7.** The LCD Customer Display can be tested by starting the KWS4 Utility as described in Chapter 4 and executing the 'LCD Display' selection.

## Pole LCD Customer Display

The following procedure describes how to connect the optional Pole LCD Customer Display to the KWS4. The pole LCD Customer Display is provided as a kit and consists of the LCD Display Assembly /w cable, pole, base, pole extension cable, and nut. The installer must provide mounting hardware. The cable length is approximately 5 feet.

1. Using the base of the pole as a template, attach it to the counter surface.

2. After mounting the base to the counter surface, route the extension cable through the pole and connect the LCD assembly cable. Figure 2-18. Place the LCD assembly on the pole, position the display at the desired position and use a 1mm hex screw to lock the display in place.
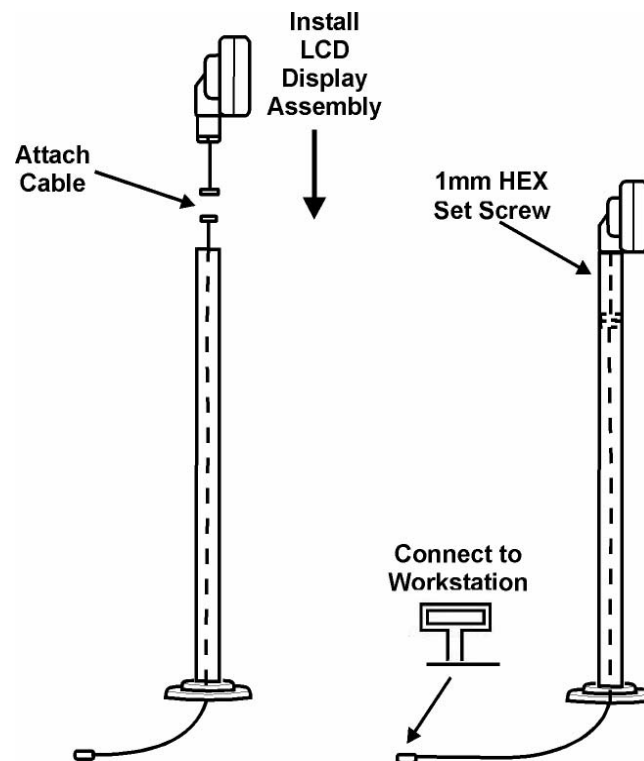


*Figure 2-18: Assembling the Pole LCD Display*

3. Power-off the KWS4 and attach the 4-pin DIN cable to the Customer Display connector on the workstation IO panel shown in Figure 2-19, below.
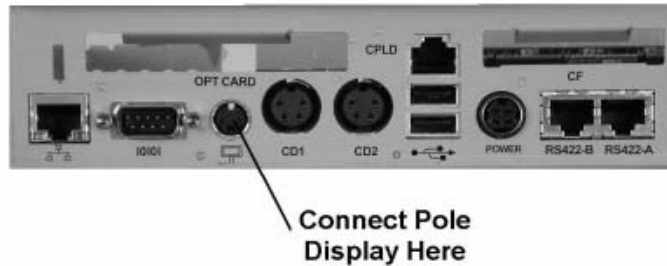


*Figure 2-19: Connecting the Pole Display to the KWS4*

4. Power-up the KWS4, and the pole display is ready for use. The display can be tested by starting the KWS4 Utility as described in Chapter 4 and running the 'LCD Display' selection.

## Disk On Chip

The Disk On Chip (DOC) is located in a 32-Pin DIP socket at the center of the system board. As you can see in Figure 2-20 below, the DOC is somewhat larger than the socket.
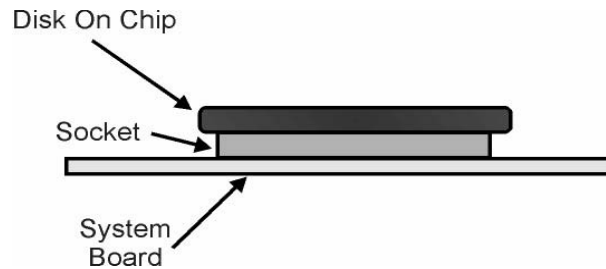


*Figure 2-20: Disk On Chip Mounting*

To avoid damaging the socket or pins on the device as it is removed, the series of illustrations in Figure 2-21 show how to use a flat blade screw driver to gently lift one side of the DOC, then the other before removing the DOC from its socket.
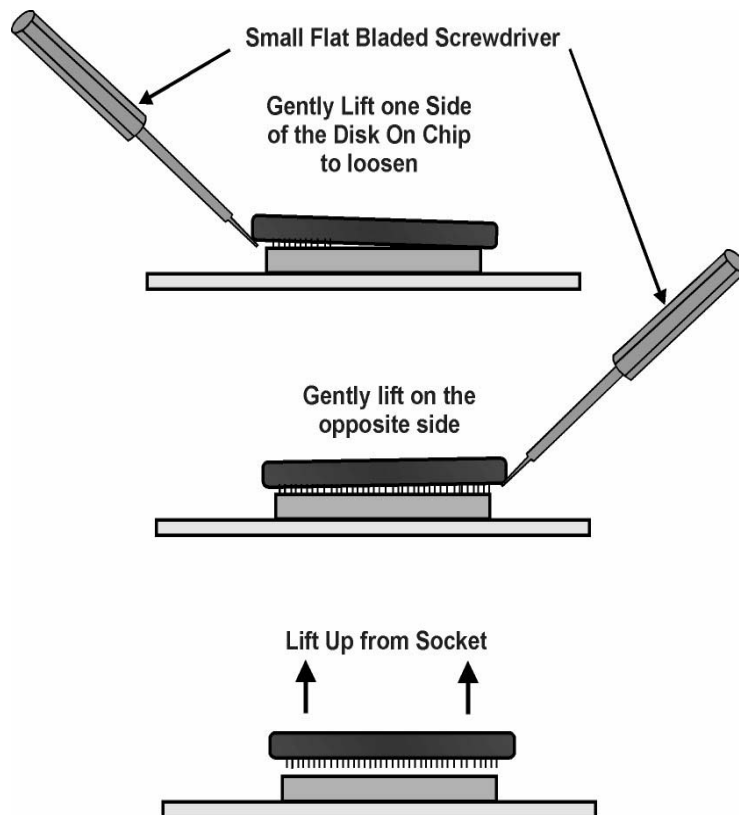


*Figure 2-21: Disk On Chip Removal*

## *Reassembling the KWS4*

The following procedure describes how to reassemble the Keyboard Workstation 4.

**1.** Reconnect the top cover cables to the system board. Place the top cover in front of the base and system board.

   o   Install the Keyboard ribbon cable. See Figure 2-22. Before inserting the cable, make sure two parts of the connector are open as shown in the top illustration. Insert the cable, then press down on the upper half connector to lock the cable in place.
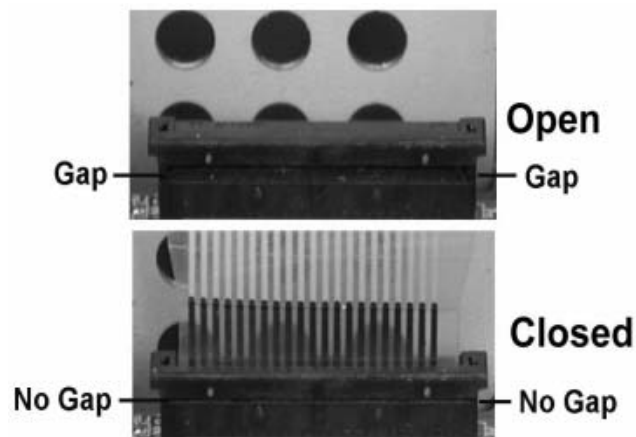


*Figure 2-22: Installing the Keyboard Ribbon Cable*

   o   Connect the remaining top cover cables as shown in Figure 2-23.
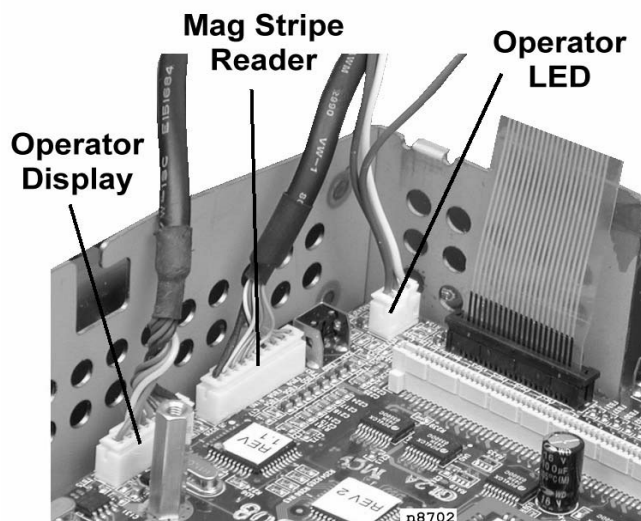


*Figure 2-23: Installing the Top Cover Cables*

2. Make sure the LCD Customer Display Cable is attached to System Board Connector J3.

3. Place the top cover cables in the slot on the right side of the RF shield base.



*Figure 2-24: Placing the Top Cover Cables in the Shield Cover Slot*

4. Route the LCD Customer Display Cable through the opening near the center of the shield cover.

5. Install the Shield Cover and fasten with three screws.

6. If the optional Rear LCD is not installed, fit the top cover on the base and proceed to Step 6. To install this display, continue with the sub-steps below.

   ᵒ To install the optional Rear LCD Customer Display, see Figure 2-16, on page 2-21.

   ᵒ Orient the LCD assembly as shown in Figure 2-17, Page 2-22, then place the hinge in the cut-out and fit the top cover to the base.

7. Place the workstation face down and secure the top cover to the base.

*Chapter 3*

# *Installing and Operating the KWS4*

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

## In this chapter

## *Care and Handling*

Tips on placing the unit in an environmentally sound location and cleaning the workstation 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 throughput a 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 Keyboard Workstation 4 can operate in temperatures between -10°C (14°F) and 60°C (140°F). A constant humidity between 40% and 90% is required for proper operation of the equipment.

Before applying power to the unit, ensure that its temperature is within 8°C (46°F) of room temperature to prevent damage to the LCD or internal circuitry.

### 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 KWS4 Display, Cabinet, and Magnetic Stripe Reader

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

> *SHOCK HAZARD*
>
> Always turn the KWS4 off using the power button and remove the power cable from the IO panel before cleaning or performing any preventive maintenance.

### LCD Cover

The plastic LCD cover can be cleaned using any common household glass cleaner applied with a clean cotton cloth. Always spray the cloth with the cleaner first, then use the cloth to clean the touchscreen.

### Cabinet

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

## Magnetic Card Reader

Depending on how much they are used, magnetic card readers may require periodic cleaning. MICROS recommends cleaning the heads 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 using P/N 600439-003 and P/N 600439-004. Be sure to follow the instructions supplied with the cleaning kits.

## *The IO Panel*

Figure 3-1 shows the Keyboard Workstation 4 IO Panel Connectors.
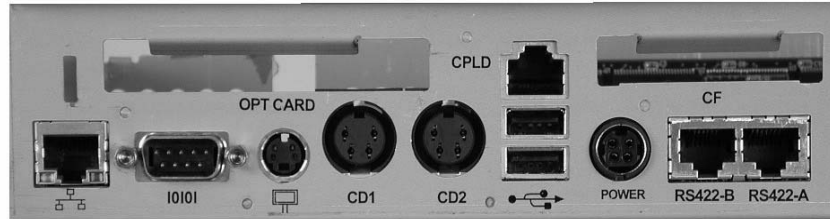


*Figure 3-1: Keyboard Workstation 4 I/O Connectors*

A brief description of each connector is listed below.

### OPT Card (Optional)

At the top left of the I/O Panel is access to an optional PCMCIA Daughter Card. Access to the slot is protected by a bracket mounted to the unit with two hex screws.

Currently, PCMCIA device driver support in Windows CE is limited. Support for a wireless PCMCIA card is planned at a future date. Consult the KWS4 PMA or your MICROS representative for more information.

### CF (Compact Flash Card)

The CF card is installed at the factory. In a compromise between security and accessibility, the CF card is protected by a bracket fastened to the case with two hex screws.

After the KWS4 is installed and placed in operation, the CF card contains the 'personality' of the workstation, storing a copy of the Windows CE registry, as well as the POS application and optionally SAR totals. See the Memory Architecture section in Chapter 1 for more details about how the CF card is utilized.

### 10/100 Ethernet

The KWS4 system board includes a National Semiconductor PCI based 10/100 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 and features Wake On LAN support.

### IOIOI RS232 (COM2)

This industry standard DB9 male connector can be used for serial printer if supported by the POS application. The port is supported by an 16550A UART with a 16-byte receive buffer.

### Customer Display

This connector supports a pole mount Remote Customer Display.

### CD1 CD2

These connectors support standard and low profile MICROS cash drawers with DIN style connectors. In addition, a system board jumper can be set to support +24V solenoids.

### CPLD

This modular connector can be used to update the firmware contained in the system board Complex Programmable Logic Device (CPLD) should it be required. Because it is similar to the 10/100 Ethernet and RS422 port connectors, access to this port is blocked by a removable plastic plug.

### USB

The Universal Serial Bus (USB) interface supports the host controller functions with a built-in Root Hub and 2 USB ports. The USB circuitry is implemented based on Open HCI Version 1.1, the Open Host Specification.

### Power

The KWS4 uses an external +12V power supply (45W max). The mini-din connector is the locking type, preventing its accidental removal. See Page 3-7 for more information about installing the power supply.

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

These multi-purpose 8-pin ports are configured through application software as either four-wire full-duplex RS422 ports capable of supporting MICROS IDN printing devices or RS232 ports for supported peripherals.

> ⚠ *WARNING:*
>
> Do not insert a 6-Pin modular plug into the 8-Pin RS422-A and RS422-B connectors. The 6-Pin plug can push pins 1 and 8 of the connector (used by the RS232 Interface) out of position. Should you wish to use the RS232 Interface at a later time, it may not function. Always use cable P/N 300319-001 to connect an IDN printer to the workstation.

## *Installation*

This section describes how to install the external power supply and discusses the recommended method of cabling the workstation when used with the Adjustable Stand.

### Installing the External Power Supply

This section describes how to connect the external power supply to the KWS4.

> ⚡ *POWER SUPPLY SHOCK HAZARD*
>
> **If the KWS4 external power supply is exposed to moisture a shock hazard exists. The unit is sealed, but rated for indoor use only. If installed in an outdoor environment, to minimize the risk of electric shock, the external power supply must be kept dry by protecting it from liquid spills, rain, or snow.**

1. With the AC cable removed from the external power supply, connect the DC output cable to the DIN connector shown in Figure 3-2 below. See Figure 3-3 for more information about installing the power cable.
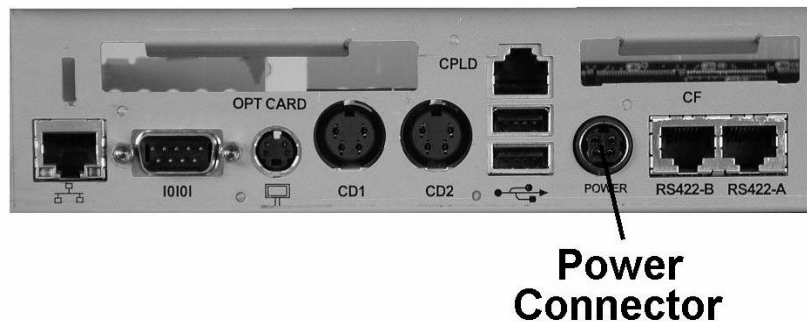


*Figure 3-2: Connecting the External Power Supply*

2. Connect the AC power cable to the external power supply, then connect the plug to the AC outlet. See Page 3-11 for more information on how to use the KWS4 power switch.

3. Again, to minimize the risk of electric shock if used in an outdoor environment, make sure the external power supply is installed in a dry location.

## Cabling the Keyboard Workstation 4

The following procedure suggests a method of cabling the KWS4 before attaching the unit to the optional Adjustable Stand.

4. Attach the DC Power cable to the Input Connector. Use tie-wraps to secure the cable and in-line toroid to the cleats as shown on the upper left side of Figure 3-3. This cable can serve as the strength member for the remaining cables.

5. Connect each peripheral cable to the appropriate I/O connector. Bundle all cables together and attach two tie wraps to the bundle as shown on the right side of Figure 3-3. The tie wrap installed near the I/O panel must be positioned as shown to prevent the cable bundle from interfering with the cut-outs in the stand.
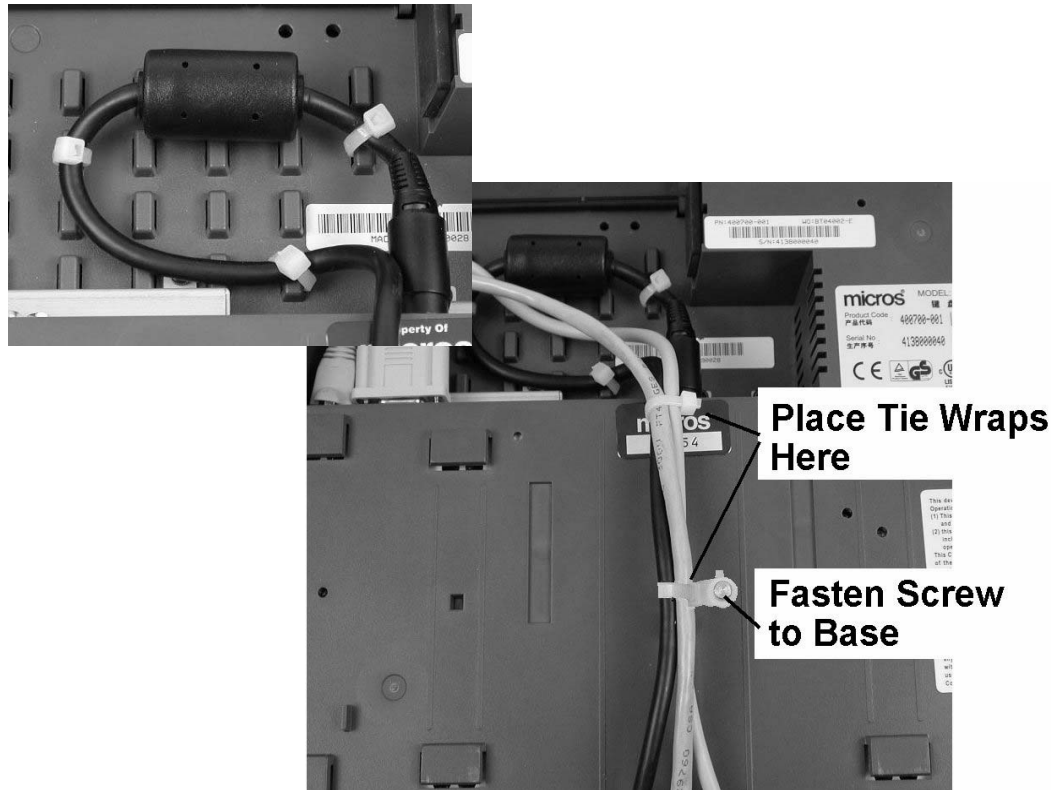


*Figure 3-3: Cabling the KWS4 for the Adjustable Stand*

The second tie wrap is supplied with the stand and is secured to the case with the screw supplied.

6. Line up the four plastic hooks on the workstation with the four rectangular holes on the stand bracket and place the unit as shown in Figure 3-4. The workstation will slide down and lock into place.
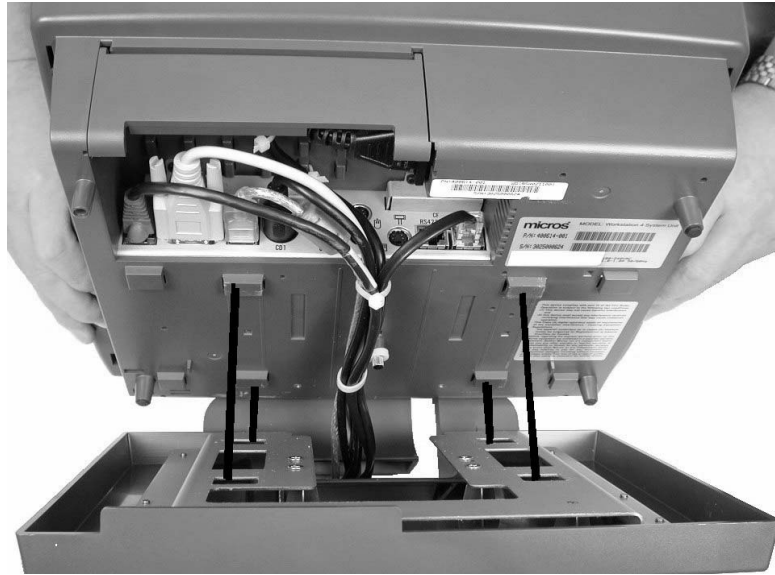


*Figure 3-4: Attaching the KWS4 to the Adjustable Stand*

7. Tilt the stand to the fully reclined position and secure it to the stand with the provided thumbscrews. Figure 3-5.
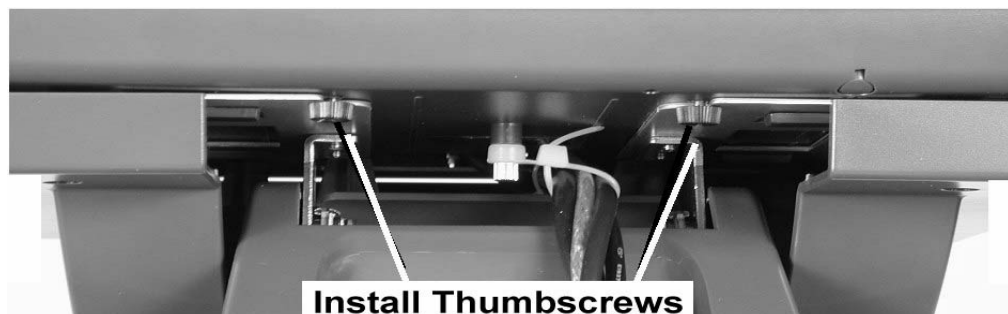


*Figure 3-5: Securing the KWS4 to the Adjustable Stand*

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

9. Connect the AC power cord to an electrical outlet installed in accordance with the 9700 Site Preparation Guide, P/N 100151-508.

## *Operation*

This section presents operational procedures for the KWS4 including how to use the power button to transition the unit between the **NOPOWER**, **ON** and **SUSPEND** power states.

Figure 3-6 points out the location of the Power Button, Operator LED, Magnetic Card Reader, and the Operator LCD.

*Figure 3-6: Keyboard Workstation 4 Operator Features*

### Operator LCD

The Operator LCD is 240x64 monochrome STN Graphics display. The KWS4 Utility partitions the display into 5 lines, with up to 40 characters per line. The 9700 application may partition the display to other formats.

### Power Button

The power button is used to transition the KWS4 between the **ON** and **SUSPEND** or **NOPOWER** power management states.

### Operator LED

The Operator LED displays the current power state and is capable of displaying three colors - Green, Amber, and Red. In addition, each color can be solid, or blink at one of three rates .25Hz, 1Hz, or 4Hz.

### Internal Beeper

A Beeper located on the system board provides information to the operator about the Workstation's status.

## Starting the Keyboard Workstation 4

This procedure describes how to start the workstation from the **NOPOWER** state. If you wish to execute the KWS4 POST (Power On Self Test), see Step 2 before applying power to the unit..

> **NOTE:**
>
> If the ambient temperature is near or below -10°C (14°F), refer the KWS4 Cold Start Procedure on page 3-15.

### Procedure:

1.  Refer to page 3-7 to connect the external power supply.
2.  To execute a Power On Self Test, insert an 8-pin loopback connector (P/N 200152-004) in the RS422-A or RS422-B port located on the I/O connector panel.
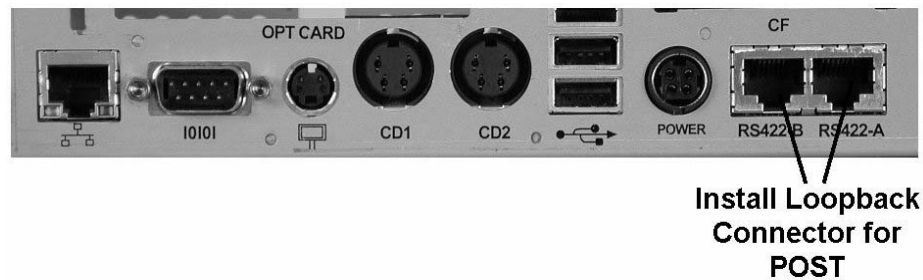


*Figure 3-7: Running a KWS4 POST*

3.  Press and hold the power button for 2 seconds, then release it.
    - The Operator LED glows Amber, and starts blinking every four seconds. If you inserted an RS422 loopback connector to start the POST, the Operator LED will blink 4 times a second.
    - The Internal Beeper produces a single beep.
    - The Operator LCD displays a boot splash screen similar to that shown in Figure 3-8. Under the MICROS logo, is a progress bar to indicate that the boot process is under way.



*Figure 3-8: KWS4 Start Up Logo and Progress Bar*

- If the workstation hangs at the splash screen and does not boot, you should execute the POST as described in Step 2. If a failure occurs, an error beep code will sound. The Operator LED flashes Red four times per second. The error beep code repeats three times, and the KWS4 powers off. Refer to the POST section in Chapter 4.

- After the progress bar completes moving from left to right, WinCE starts, followed by the MICROS Client Application Loader (CAL). Figure 3-9



*Figure 3-9: The KWS4 CAL Start-Up Screen*

- If a POS application is not installed, the KWS4 CAL determines this and listens for a CAL server on the LAN. When contact is established, CAL displays a screen similar to that shown in the lower half of Figure 3-10, below.
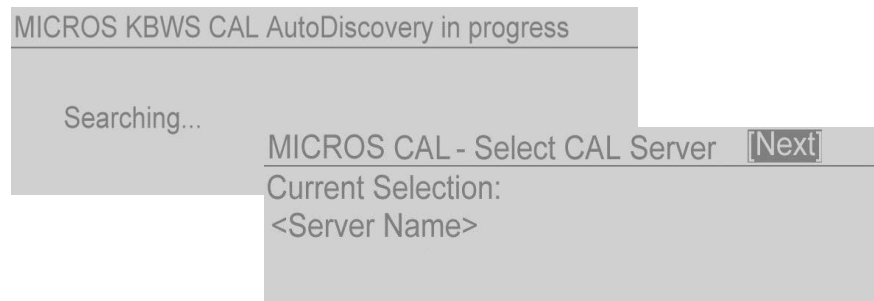


*Figure 3-10: The Keyboard Workstation 4 CAL*

- If the POS application is already installed, the CAL establishes a connection with the CAL server and checks for updates. If no updates are required, the CAL starts the POS application.

- If the MICROS logo and progress bar do not appear, or the progress bar stops, or if the KWS4 logo does not appear, power off the unit, and refer to Step 2 to execute a Power On Self Test. See Chapter 4 more information.

  See the next page for more KWS4 CAL keyboard commands.

## KWS4 Client Application Loader Keyboard Commands

The KWS4 CAL responds to the following key commands entered through the integrated 108 key keyboard. All commands require that both the <Ctrl> (Control) and <Shift> keys be pressed simultaneously along with a third key, listed below.

- <Ctrl><Shift>-<End> Shut down the CAL.

- <Ctrl><Shift>-<R> - Display the CAL Configuration screen.

- <Ctrl><Shift>-<A> - Restart the POS Application. (this one is currently broken)

- <Ctrl><Shift>-<E> - Access CAL Command Line Mode.

- <Ctrl><Shift>-<L> - Check for updates on the server immediately. (The KCAL normally checks for updates every 60 seconds).

- <Ctrl><Shift>-<D> - Start the KWS4 Utility (when the KWS4 CAL is in the background, i.e., not visible on the operator display). See Chapter 4 for more information about using the KWS4 Utility.

## Turning the KWS4 from *ON* to *NOPOWER*

**1.** Press and hold the power button until the Operator LED changes from solid Green to OFF, then release it. This takes from four to five seconds.

## Using SUSPEND

If the KWS4 will not be used for a prolonged period of time, it may be placed in the **SUSPEND** mode by the operator. **SUSPEND** differs from the **NOPOWER** state by preserving memory contents. Restoring the unit from the **SUSPEND** state to **ON** requires less time than the **NOPOWER** to **ON** sequence.

### Entering SUSPEND

**1.** When the KWS4 is **ON**, press and the power button for less than two seconds, then release it.

- The Operator LED indicator changes from solid Green to solid Amber.

- The Operator Display and backlight are off. If customer display(s) are attached, they will also be off.

- When the KWS4 is in the **SUSPEND** mode, it will not respond to the keyboard, swiping a magnetic card, or the use of any peripheral device.

- To return the unit to the **ON** state the power button must be used, as described below.

### Turning the KWS4 from SUSPEND to ON

**1.** When the KWS4 is in **SUSPEND**, press and release the power button for one second.

- The Operator LED changes from solid Amber to solid Green.

- The previous Operator Display screen data is restored. If customer display(s) are connected, the previously displayed data is restored.

### Starting the KWS4 in Cold Temperatures

If the ambient temperature is near -10°C (14°F) follow the procedure below to start the workstation.

#### Cold Start Procedure:

1. See Page 3-7 for more information on connecting the Power Supply.

2. When AC power is applied to the unit in these conditions, the following occurs:

   • A system board sensor determines when the interior temperature is -10°C or less and activates a heater circuit on the system board, operator display board, and optional LCD customer displays (if attached). While the heater operates, the Operator LED glows a dim Amber, and the power button is disabled.

      • The amount of time required to warm the interior of the unit varies with the ambient temperature. If the ambient temperature is -15°C (5°F), the heater may operate for between 10 and 11 minutes. If the ambient temperature is -10°C (14°F), the heater may operate for about 5 minutes. In other words, the lower the ambient temperature, the longer the heater must operate.

   • As the interior of the unit warms to near 0° (32°), the heater circuit is disabled and the Operator LED turns off. The CPLD simulates a power button press, and the KWS starts automatically. To determine the next course of action, the processor checks the previous power management state stored in EEPROM U10.

      • If the workstation was previously in the *NOPOWER* or *SUSPEND* state, it returns to the *NOPOWER* state. A factory fresh KWS4 will be in this state. Press and hold the power button for two seconds to start the workstation.

      • If the workstation was previously in the *ON* state, it returns to the *ON* state.

3. When the MICROS boot splash screen and progress bar appear, refer to the start-up procedure on page 3-11.

## Using the Magnetic Stripe Card Reader

The Integrated Magnetic Stripe Reader slot is located to the right of the Keyboard and Operator Display. To read a card, follow the procedure below while referring to Figure 3-11.

- Orient the card with the mag stripe facing as shown.
- Insert the card into the reader slot near the Operator Display then pull it down through the slot past the reader head.



*Figure 3-11: Using the Magnetic Card Reader*

> **NOTE:**
>
> The Integrated 3-Track Magnetic Stripe Reader reads a card only when swiped in the direction shown by the arrow in the illustration above. It is not configured to read cards inserted at the bottom of the slot and swiped upwards towards the top of the unit.

### 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 magnetic stripe. If the 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. Cleaning kits are available from a number of sources including MICROS by using P/N 600439-003 or 600439-004.

## *Personality Swap*

The following procedure describes how to remove the Compact Flash card from an inoperative KWS4 and install it in a replacement KWS4.

### Getting to know the Compact Flash Card

If you have not used a Compact Flash Card before, take a moment to familiarize yourself with this device.

- *The CF Card must be installed in order for the KWS4 to start.*

    As the WinCE operating system starts, it attempts to read critical system files from the CF card. If the CF card is not installed, WinCE will not start.

- *The CF card only be inserted into the KWS4 one way.*

    A CF card installed at the factory includes a label that shows the correct orientation as the card is installed. See Figure 3-14.

    It is possible to force a CF card into the daughter card socket upside down. Keep in mind that if the card is properly oriented, very little force is required to insert it.

- *Never remove or insert the CF card when the power cable is connected. The KWS4 System Board and CF Daughter Card are not provisioned for 'hot-swapping'.*

### Tools Required

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

### Procedure:

1. Remove all cables from the inoperative workstation's I/O panel.

    - It may be helpful to create a diagram of where each cable is connected before removing them.
    - If a cable is fastened to the cable cleats with tie-wraps, use the wire cutters to clip them.
    - If the KWS4 is mounted to the optional stand, remove (but do not cut) the tie wrap fastened with a screw to the base of the unit. This and other tie-wraps used to bundle the cables can be re-used.

2. Place the inoperative unit face down on a counter surface to access the personality card bracket. Figure 3-12.



*Figure 3-12: KWS4 Personality Card Location*
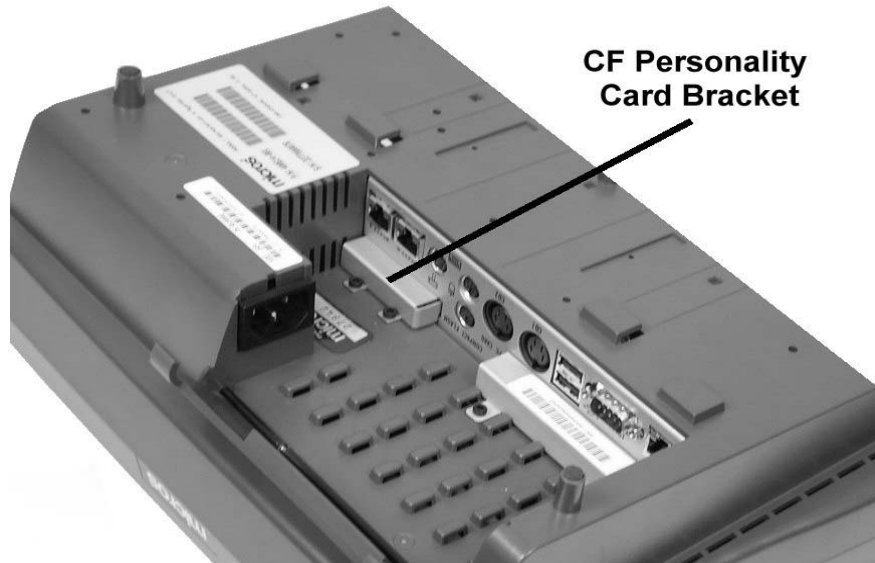
3. Insert the hex wrench into the bracket screws and turn it counter clock-wise to remove each screw.

4. Remove the bracket. Set the bracket and screws aside for the moment.

   • Figure 3-13 shows the personality card with the bracket removed. Note the keying lip on the bottom of the card and the guides that hold it in place.
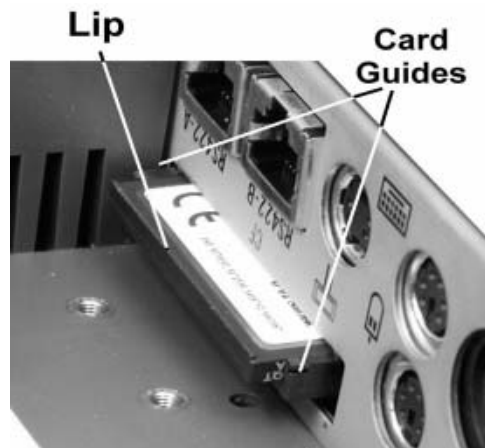


*Figure 3-13: Removing the Personality Card*

5. Remove the card from the inoperative KWS4. Use your thumbnail or pen to catch the lip and remove the card from the socket. Figure 3-13. *Hold on to this card - it must be inserted into the replacement KWS4.*

6. Remove the replacement KWS4 from the packing material. If a CF card is installed in this unit, repeat Step 4 to remove the bracket, then Step 5 to remove the personality card. Set this card aside for the moment.

   To assist in orienting the card as you install it, the personality card includes a label similar to that shown in Figure 3-14. Note the arrow showing the proper orientation of the card.
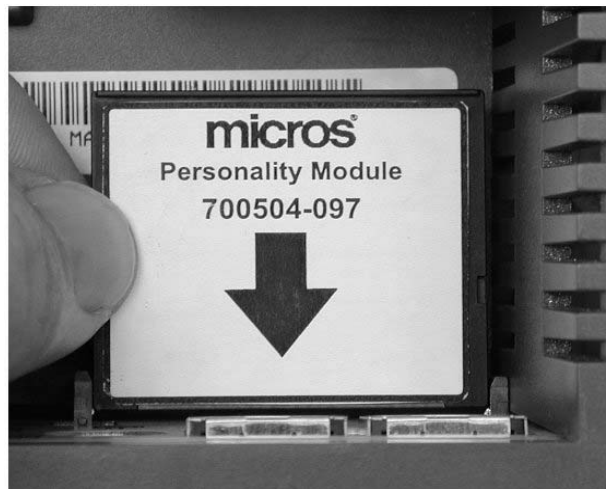


*Figure 3-14: CF Personality Card Label*

If the label is not present, Figure 3-15 denotes the location of a lip that can also assist you in orienting the card as it is installed.
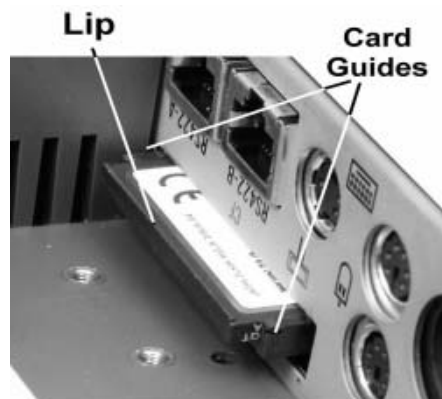


*Figure 3-15: Personality Card Orientation*

7. Install the card removed from the inoperative KWS4. Refer to Figure 3-16, it displays a series of illustrations describing how to insert the card.



*Figure 3-16: Inserting the CF Card*

Starting at the top of Figure 3-16, position the CF card as shown with the lip and label facing you, then insert it into the guides. When the card is properly aligned in the guides, rotate it to the position shown in the middle illustration. Push the card in until it is fully inserted as shown in the bottom image.

It does not require a great deal of force to insert the card. If it does, recheck the orientation of the card.

8.  Re-install the CF card bracket and fasten with the pair of screws.

9.  Re-cable the replacement KWS4. Reconnect each cable to the appropriate I/O connector. When complete, this unit will be ready for use.

10. Install the CF card removed from the replacement KWS4 in the inoperative KWS4 as described in Step 7. Replace the bracket and screws. Use the packing material to box the unit for return to a depot repair center.

*Chapter 4*

# KWS4 Diagnostics

This chapter includes diagnostics information on the Keyboard
Workstation 4.

## In this chapter

## *Basic Troubleshooting*

This section provides a brief troubleshooting guide for common problems encountered when installing or operating the KWS4.

| Problem | Possible Cause | Solution |
|---------|----------------|----------|
| Operator LED is blank. Operator LED is Off. Beeper does not sound. | No Power to KWS4 | Be sure the AC power cable from the external power adapter is connected to a wall outlet or surge protector. The output cable from the external power adapter should be connected to the 'Power' input of the KWS4. Press the power switch for 2 seconds, then release it. |
| Operator LCD is blank. LED Indicator is solid Amber. KWS4 does not respond to keyboard or mag card swipe. | KWS4 is in Suspend mode | Press the power button for two seconds, then release it. The Operator Display should be restored and the Operator LED Green. |
| Operator LCD displays MICROS logo, but beeper sounds multiple times. Operator LED is blinking Red four times per second (.25Hz). | Power On Self Test (POST) Error See POST Section | Replace KWS4. |
| The Beeper Sounds once. Operator LCD displays blue screen but unit does not boot. Operator LED is blinking Amber times per second (.25Hz). | Defective or Corrupted Disk On Chip. | Replace KWS4. |
| KWS4 does not connect to LAN. | Network Patch cable not connected. | Install appropriate patch cable between workstation and wall jack. |
| System cannot read mag cards. | Mag card swiped in wrong direction.<br><br>Mag card read head dirty or contaminated.<br><br>Mag card reader defective. | Mag card must be swiped down through reader. Refer to Chapter 3.<br>Use mag card cleaning kit on reader.<br><br>Replace mag stripe reader. |

# Power On-Self Test (POST) Failure Codes

As noted in Chapter 3, the KWS4 does not automatically execute a POST at start up. If the workstation does not complete booting, we recommend you run the POST. Should the multiple beeps occur, consult the table below. The error code repeats three times and the KWS4 will enter the **NOPOWER** mode. All POST errors are considered fatal, and prevent the workstation from starting.

While the POST is executing, the Operator LED blinks amber 4 times a second. Should an error be detected, Operator LED blinks Red once every four seconds.

KWS4 POST errors are summarized in the following table.

| Beep Code | LED | Description | Note |
|---|---|---|---|
| 1 Short (No other beeps) | Amber 0.25Hz | POST OK - No Problem Found - System should boot to Windows CE | |
| 1 Long | Red Solid | DOC present, but OS image not found | 1 |
| Short-Long-Short | Red 0.25Hz | Missing or defective DOC | 2 |
| Short-Short | Red 0.25Hz | Missing Compact Flash Card | 3 |
| Long-Short | Red 0.25Hz | Defective SDRAM (DIMM1) | 4 |
| Long-Short-Long | Red 0.25Hz | Defective EEPROM U10 | 5 |
| Long-Long | Red 0.25Hz | PCI Bus Error | 6 |

### Note 1

The POST successfully detected the Disk On Chip, but the boot partition and or Windows CE OS image was not found.

### Note 2

The POST cannot detect the Disk On Chip. This could happen if the device is not installed, installed incorrectly, not formatted, defective, or if a system board/socket problem.

### Note 3

The POST cannot detect the Compact Flash (CF) Card. It is either not installed, defective, not formatted as a Windows file system, or a system board/socket problem is preventing the POST from accessing the CF card.

### Note 4

The SDRAM test toggles each bit in each memory location by reading and writing 0xAA and 0x55 patterns. The test will not detect a missing DIMM. If the DIMM is not installed or not seated properly, the Operator LED will glow solid Amber and the MICROS logo does not appear on the LCD.

### Note 5

EEPROM U10 stores the system board serial number and the last power management state as well as other information.

### Note 6

This error indicates a problem was found on the PCI Bus and could point to any of the following PCI bus devices.

- Ethernet Controller and Serial EEPROM.

- USB Controller.

- IDE Controller.

# Keyboard Workstation 4 Utility

The Keyboard Workstation 4 Utility combines the KWS4 Diagnostics and Utilities in a single menu. The diagnostics routines are similar to that found in the Workstation 4, providing a comprehensive test of the internal hardware and peripherals including IDN printing devices.

## Keyboard Configuration

Figure 4-1 shows the KWS4 default keyboard configuration. When making selections in the KWS4 Utility, use the number keys in the second row.

*Figure 4-1: Keyboard Configuration in the KWS4 Utility*

### Running the KWS4 Utility

The KWS4 Utility can be executed at start-up or at any time after the CAL is in the background.

**NOTE**

When making selections in the KWS4 Utility, use the number keys in the second row of the keyboard shown in Figure 4-1.

### Start Up Procedure:

The KWS4 Utility can be started in one of several ways.

1. When the KWS4 CAL is in the background, press the <Ctrl><Shift><D> key combination.

   o   The KWS4 Utility Main Menu is shown in the illustration below.

2. If you are executing a VNC session or using a CRT, from the Desktop, double click the My Computer icon twice. Connecting a CRT to the workstation requires an adapter cable connected to J4. See Appendix B for a cable diagram.

   o   Click the 'DOC' icon twice.

   o   Double Click the Utilities folder.

   o   Double Click the 'DiagUtilty' icon to start.

3. To run 4) System Utilities, see. page 4-14

```
KWS4 Utility Version 1.11 Main Menu
1) System Info      5) Cash Drawer
2) LCD Display      6) Keyboard Test
3) MSR              7) LED
4) System Utilites  8) COM Port Tests
```

*Figure 4-2: KWS4 Utility Menu Selections*

A brief summary of each selection is provided below.

### 1) System Info

The System Info screen provides information about the KWS4 hardware and software platform. Selecting 1) to enter the System Info Menu provides the following sub-menus.

#### 1) HW Info

The Hardware Information screen lists the following platform related data:

o   Hardware Revision

This field displays the KWS4 System Board hardware revision. It is read directly from the system board by the KWS4 API driver (KWS4.DLL). The KWS4 will ship with Revision E system boards.

○ Motherboard Serial Number

This field displays a unique 19-digit serial number. The serial number is stored in a serial EEPROM.

○ CPLD Version

The CPLD (Complex Programmable Logic Device) is located on the KWS4 System Board. The device contains a microprocessor and firmware, therefore the CPLD Version field refers to the firmware version.

The CPLD can only be changed using a specialized programmer. Factory and authorized repair centers will have this capability.

○ Boot loader Version

The Boot Loader chip is located on the KWS4 system Board. After a KWS4 leaves the factory, the Boot Loader can be updated in one of two ways. One way is through the KWS4 Utility. The KWS4 Utility also supports upgrading the boot loader in command line mode. This allows the Client Application Loader (CAL) to upgrade the Boot Loader as part of an application download or upgrade. In either case, programming the boot loader requires that a binary file called LOADER.ROM is located on the root of the CF card.

○ Physical Address (Ethernet MAC Address)

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

Press [ESC] to see more selections.

○ CF Serial Number

This field displays the CF Card serial number. The number displayed is actually derived from the Volume Serial Number assigned to the card when the Windows File System format is applied by the manufacturer of the CF card.

Press [ESC] again to return to the System Info Menu.

### *2) Driver Info*

The Driver Information screen lists the software version of each KWS4 platform driver. These files reside on the \DOC and can be individually replaced. A brief description of each file is provided.

o  *KWS4.DLL*

This file contains the KWS4 Application Programming Interface (API). The POS application calls this driver to perform platform specific operations such as opening the cash drawer writing to the Operator LCD or Customer Display, or retrieving mag stripe card data.

o  *KWS4Power.DLL*

This driver, in conjunction with the CPLD, controls KWS4 Power Button when the operating system is running. It polls the CPLD every 150 milliseconds checking for switch closures and transitions the workstation between the various supported power management states.

o  *PRD.DLL*

The PRD, or Persistent Registry Driver ensures that the non-volatile CF card always contains the most recent version of the WinCE Registry. When the operating system starts, the PRD retrieves the registry files from the CF card. As the workstation operates, changes are made to the registry by the applications or utilities such as the CAL are automatically copied to the CF card in the background.

o  *LED.DLL*

This file controls the Operator LED color and blink rate while the operating system is running. At start-up, the Boot Loader controls the Operator LED. Just as the operating system starts, the LED driver loads and turns the LED solid green. A POS application can use LED.DLL to control the LED while the application is running.

o  *EEPROM.DLL*

This file accesses the on-board serial EEPROM U10, used to store display contrast brightness/contrast settings, system board serial number and last power management state.

Press ESC to view more information.

o  *KWS4Beep.DLL*

This file controls the system board beeper while the operating system is running. The Boot Loader controls the beeper at start up or should a POST error occur.

o  *ISPDRV.DLL*

This file manages the Keyboard/MSR and LCD Display Controller firmware updates. It is called by the KWS4 Utility when firmware updates are performed. The same file is used on the WS4.

Press [ESC] to return to the Driver Info Menu.

### 3) SW Config Info

The Software Configuration screen lists the following information:

o   WinCE Version

o   MICROS Build Version

    The MICROS Build version represents the combination of WinCE operating system and the internal drivers. An internal driver is not accessible in the same manner as the KWS4 platform drivers located on the \DOC, but are imbedded within the OS by the WinCE Platform Builder. All WinCE device drivers fall into this category. Should a change be required to one or more of these drivers, a new operating system image is required and the MICROS Build Version is updated to note this.

o   KCAL Version

    Displays the software version of the KCAL client software version. The KCAL places this information in the registry the first time it starts.

o   RAM Space Available

    This field displays the amount of available RAM, located in the single DIMM socket on the system board. The value displayed may not always agree with yours. All units currently ship with a 128M DIMM.

o   CF Space Available

    This field displays the space available on the CF Card. This will vary depending on if an POS application is not installed, or the CF card is blank. All units currently ship with a 64M CF Card.

Press [ESC] to see more entries.

o   DOC Space Available.

    This field displays the free space available on the Disk On Chip. All systems ship with a 32M device; migration to a larger device is not expected. The value displayed in this field should be consistent across all workstations. This is because the DOC contains the WinCE 4.2 operating system, and the hardware platform files and utilities.

o   DHCP Server Address.

o   IP Address-Dynamic

Press [ESC] to return to the System Info Menu.

### 4) View Counters

The View Counters selection accesses a group of counters that keep track of the following items. The counter totals are stored in the system registry.

o   CD 1 Open

o   CD 2 Open

     o   Bad MSR Swipes

        The number of times a card was swiped, but one or more tracks did not read incorrectly.

     o   MSR Swipes

     o   Track 1 Present

Press [ESC] to view more counters.

     o   Track 2 Present

     o   Track 3 Present

Press [ESC] to return to the System Info Menu

### 5) Dump System Info

The Dump System Info selection consolidates all System Info fields and writes them to a single ASCII text file located on the Disk On Chip. The file can be retrieved and viewed with any text viewer.

## 2) LCD Display

The LCD Display Menu displays the current firmware version and provides diagnostic tests for the Operator Display and the optional Rear and Pole LCD Customer Displays. Selections include Backlight Control, Contrast Control, Pixel Tests, and the ability to Reset each display.

1. From the KWS4 Main Menu, press [2] to Enter the LCD Display Menu.

2. Press [1] to check the Operator LCD firmware version and test this display, or [2] to check the Rear and Pole LCD firmware version or test these displays.

     o   Figure 4-3, below displays an example, of the Customer Display Menu, displaying the firmware version of the Rear and Pole LCD Customer Displays, if installed.

```
Customer Display Menu
(Rear FW Ver :1.10) (Pole FW Ver :1.10)
1) Backlight Control 4) Display Tests
2) Contrast Control  5) Reset
3) Pixel Tests
```

*Figure 4-3: Checking the Customer Display Firmware Versions*

Press [ESC] to return to the KWS4 Utility Menu.

### 3) MSR

The MSR selection tests the integrated 3-Track Mag Stripe Reader. Figure 4-4, below displays the main menu as well as the current version firmware version running on the system board Keyboard/MSR Controller.

```
MSR Menu  (FW Ver :1.9)
1) Magtek Track 123  5)Special 2 Track
2) Magtek Track 1    6)Special 3 Track
3) Magtek Track 2    7) Reset
4) Magtek Track 3
```

*Figure 4-4: Mag Stripe Reader Testing*

Press [ESC] to return to the KWS4 Utility Menu.

### 4) System Utilities

The selections available from the System Utilities Menu are listed in the System Utilities section, detailed on page 4-14.

### 5) Cash Drawer

The Cash Drawer Menu allows you to test fire the cash drawer solenoid and check the drawer closed switch.

When this test is selected, a six-digit number appears in the Key field. Apply the following formula:

Digit 1 x Digit 2 + Digit 4 + Digit 6 = Access Code

For example, if the number is 374236, the formula would be 3 x 7 + 2 + 6 = 29.

To access the Cash Drawer Test menu, enter the calculated access code in the Password field and press enter. The access code remains active as long as the KWS4 Utility runs.

Press [ESC] to return to the KWS4 Utility Menu.

### 6) Keyboard Test

This selection allows you to determine the Keyboard/MSR firmware version, or test an individual key switch on the integrated keyboard. The firmware version appears on the top line of the Keyboard Test Menu.

As a key is pressed, the keyboard beeper sounds and the legend printed on each key should appear in the 'Symbol' field.

Press [ESC] twice to return to the KWS4 Utility Menu.

### 7) LED

The LED selection exercises the Operator LED. You can set the LED to Red, Green, or Orange at blink rates of 0.25Hz, 1 Hz, or 4 Hz, or solid.

### 8) COM Port Tests

The COM Port Tests Menu tests all KWS4 Serial Ports. The selections are shown in Figure 4-5, below.

```
COM Port Tests Menu
1) RS232 Loopback  5) Configuration
2) IDN Loopback
3) IDN Printer
4) RS232 Printer
```

*Figure 4-5: COM Ports Menu Selections*

The RS232 and IDN ports can be tested with the loopback method, or each port can be tested by connecting the appropriate printer and cable and executing the IDN or RS232 Print Test. Figure 4-6 shows the location of the RS232 and IDN ports on the IO panel.



*Figure 4-6: IO Panel Serial Ports*

#### 1) RS232 Loopback

To run these tests, Port 1 requires DB9 RS232 Loopback Connector P/N 200152-006, while the Port 4 and 5 RS232 Loopback test require 8-pin modular loopback connector P/N 200152-004. Diagrams for each loopback connector can be found in Appendix B.

#### 2) IDN Loopback

To run the IDN Loopback test, install RS422/RS232 loopback connector, P/N 200152-004 in the appropriate connector.

### 3) IDN Printer

This selection prints a test pattern on the selected IDN printer using the serial port communications settings defined in the Configuration menu, below.

**NOTE**

Do not insert a 6-Pin modular plug into the 8-Pin RS422-A or RS422-B connectors. The 6-pin plug can push the outside pins (used by the RS232 Interface) out of position. Should you attempt to use the RS232 Interface at a later time, it may not function. Always use an 8-Pin modular cable to connect IDN printers to the workstation.

### 4) RS232 Printer

This selection prints a test pattern on the selected RS232 printer using the serial port communications settings defined in the Configuration menu, below.

### 5) Configuration

This selection is used to change the COM port settings from the default of 9600 N81. Changing a setting in this menu affects all RS232 and or IDN ports.

## *System Utilities*

The System Utilities main menu is shown in Figure 4-7 below.

```
System Utilites Menu
1) File Management  5) Admin
2) Wipe CF Utility
3) Firmware Utility
4) Beeper Utility
```
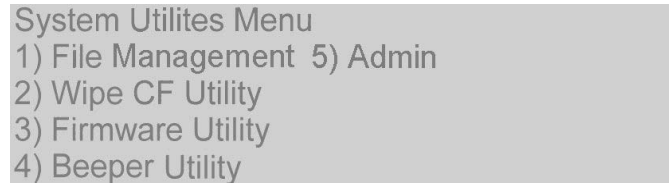
*Figure 4-7: KWS4 System Utilities Main Menu*

In addition to basic file management, this menu supports the Wipe CF Utility found in the WS4, and adds the ability to program the LCD Display Controller and Keyboard/MSR Controller firmware.

### 1) File Management

This collection of utilities, shown in Figure 4-8, provides access to files and folders located on the Disk On Chip and CF Card. The File Management Menu contains six selections, shown in Figure 4-8, below.
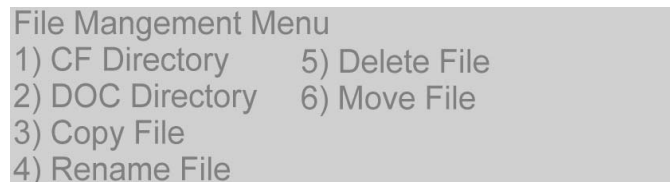
```
File Mangement Menu
1) CF Directory      5) Delete File
2) DOC Directory     6) Move File
3) Copy File
4) Rename File
```

*Figure 4-8: KWS4 File Management Main Menu*

#### *1) CF Directory*

This selection displays of the \CF directory. To see all available files, use the Up/Down arrow keys. Sub-folders are displayed in brackets. Example: [Documents and Settings], but currently cannot be accessed.

#### *2) DOC Directory*

This selection displays the \DOC directory. To see all available files, use the Up/Down arrow keys. Sub-folders are displayed in brackets. Example: [Utilities], but currently cannot be accessed. A future release of the KWS4 Utility should correct this.

### 3) Copy File

This selection allows you to copy a file from the \CF to the \DOC or the \DOC to the \CF and leaves the original file in place. When you enter the Copy File selection, the display prompts 'Please input filename'.

o   Type the full path and filename plus extension of the source file, and press [Enter]. Wildcard characters are not supported.

   o   The cursor moves to the next line.

o   Type the full path and filename plus extension of the destination file and press [Enter]. Wildcard characters are not supported.

   o   Press [1] to complete the operation or [2] to abort.

### 4) Rename File

This selection allows you to rename a file. When you enter the Rename File selection, the display prompts 'Please input filename'.

o   Type the full path and filename plus extension of the file you wish to rename and press [Enter]. Wildcard characters are not supported.

   o   The cursor moves to the next line.

o   Type the full path and new file name plus extension, and press [Enter]. Wildcard characters are not supported.

   o   Press [1] to complete the operation or [2] to abort.

### 5) Delete File

This selection allows you to delete a single file. When you enter the Delete File selection, the display prompts 'Please Input File Name'.

o   Type the full path and file name (including extension), to delete, and press [Enter]. Wildcard characters are not supported.

   o   Press [1] to complete the operation or [2] to abort.

### 6) Move File

This selection allows you to move a file from one location to another. When you enter the Move File selection, the display prompts 'Please Input File Name'.

o   Type the full path and filename plus extension of the source file and press [Enter]. Wildcard characters are not supported.

   o   The cursor moves to the next line.

o   Type the full path and filename plus extension of the destination file, and press [Enter].

   o   Press [1] to complete the operation or [2] to abort.

## 2) Wipe CF Utility

The Wipe CF utility allows you to delete the contents of the CF Card including the registry and the POS application. We feel the utility is useful as a service tool.

1.  See page 4-5 for more information about starting the KWS4 Utility.
2.  From the KWS4 Utility Main Menu, select 4) System Utilities, 2) Wipe CF Utility.
3.  The Wipe CF Menu presents three selections, shown in the illustration below.

```
Wipe CF Menu
1) Wipe Registry
2) Wipe Files
3) Wipe Both
```

*Figure 4-9: Wipe CF Utility Menu Selections*

4.  After any selection is executed, the workstation enters the **NOPOWER** state. Press the power button to restart.

### 1) Wipe Registry

This selection deletes the registry and shuts down the KWS4. POS application and SAR files are not deleted.

### 2) Wipe Files

This selection deletes the registry files along with the POS application and SAR files, if present. Note: The Wipe Files selection does not format the CF card. To format a CF, it must be removed from the KWS4 and installed in a USB or PCMCIA CF Card reader and formatted using My Computer.

### 3) Wipe Both

This selection deletes all files on the CF Card. It is used at the factory just prior to shipping to remove all test files and place the unit in the 'out-of-box' state. When used on a workstation that already has an application installed, it forces a new application to be downloaded by the KCAL.

### 3) Firmware Utility

The Firmware Utility Menu is the central location for upgrading the System Board Boot Loader, Disk On Chip, Keyboard/MSR Controller and the Operator and Rear LCD firmware. The selections available from this menu are shown in Figure 4-10, below.
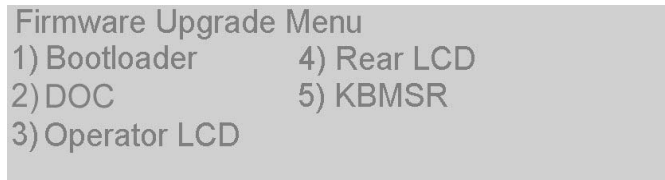
```
Firmware Upgrade Menu
1) Bootloader        4) Rear LCD
2) DOC               5) KBMSR
3) Operator LCD
```

*Figure 4-10: Firmware Upgrade Menu*

However, the KWS4 Client Application Loader (KCAL) is fully capable of performing any firmware update automatically as part of a POS application install or upgrade.

All firmware upgrade procedures require that a specific binary file is located on the root of the Compact Flash card (CF\). The specific file is included in each procedure.

#### 1) Bootloader

This selection updates U34, the system board boot loader chip. A binary file called LOADER.ROM must be located on the root of the CF Card.

1. Before proceeding, make sure the file 'LOADER.ROM' is located on the root of the Compact Flash Card (CF\).

2. Press 1) to update the boot loader contents.

   o  If the message 'File Not Found' is displayed, make sure the LOADER.ROM file is located on CF\.

3. When the message 'Update Complete' appears, the update is complete.

#### 2) DOC (Disk On Chip)

This selection updates the WinCE image. It copies a binary file called NK.BIN located on CF\ to U31, the System Board Disk On Chip.

1. Before proceeding, make sure the file 'NK.BIN' is located on the root of the Compact Flash Card (CF\).

2. Press 2) to update the Disk On Chip.

   o  If the message 'No nk.bin.' appears, make sure the file is located on the CF\.

3. When the message 'Update Complete' appears, the update is complete.

4. Delete the NK.BIN file from the CF card in order to prevent the boot loader from copying the file to the DOC when the workstation is restarted. When the CAL performs this operation, it automatically deletes the NK.BIN file at the next re-boot.

### 3) Operator LCD

This selection updates the Operator LCD firmware. The firmware resides on the LCD Interface Board, located in the top cover. The firmware, contained in a binary file called LCD.HEX, can be used for the built-in Operator LCD as well as the optional Rear/Pole LCD Customer Displays.

1. Before proceeding, make sure the file 'LCD.HEX' is located on the root of the Compact Flash Card (CF\).

2. Press 2) to update the Operator LCD.

   o If the message 'Fail To Open File' appears, this means the required 'LCD.HEX' file is not located on the CF. Press ESC to return to the System Utilities Menu.

   If the LCD.HEX file is found:

   o The message 'Detecting Device' appears on the Operator LCD.

   If the message 'Fail to find MCR' appears, this means that the KWS4 Utility is unable to communicate with the LCD microcontroller in the Operator LCD. Be sure the Operator LCD Display cable is fully seated in the system board cable.

   o The Operator LCD backlight turns off.

   o The backlight turns on, the display returns to the LCD firmware menu and reports 'Completed.'

3. Press [ESC] to return to the Firmware Upgrade Menu.

4. To verify the firmware version or test the Operator Display, see the LCD procedure on page 4-10.

#### 4) Rear LCD

This selection updates the Rear LCD Customer Display firmware. The firmware, contained in a binary file called LCD.HEX is used for the Operator LCD and optional Rear/Pole LCD Customer Displays. This selection is also used to update the firmware in the Pole LCD Customer Display by temporarily removing the display assembly from the pole and attaching it to the Rear LCD Customer Display Cable. See page 4-21 for more information.

1. Before proceeding, make sure the file 'LCD.HEX' is located on the root of the Compact Flash Card (CF\).

2. Press 4) to update the Rear LCD firmware.
   - o If the message 'Fail To Open File' appears, this means the required 'LCD.HEX' file is not located on the CF. Press ESC to return to the System Utilities Menu.

   If the LCD.HEX file is found:
   - o The message 'Detecting Device' appears.

     If the message 'Fail to find MCR' appears, this is an indication that the KWS4 Utility is unable to communicate with the LCD microcontroller in the Rear LCD Customer Display assembly. Be sure the LCD Display assembly cable is connected to the system board cable.
   - o The operator LCD reports the upgrade progress ('erasing and upgrading').
   - o When the upgrade is complete, the Operator Display reports 'Completed.'

3. Press [ESC] to return to the Firmware Upgrade Menu.

4. To verify the firmware version or test the Rear and Pole LCD, see the LCD procedure on page 4-10.

#### 5) KBMSR (Keyboard/MSR Controller)

This selection programs the firmware on U36, the Keyboard/MSR Controller, U36.

1. Before proceeding, make sure the binary file 'KEY_MSR.HEX' is located on the root of the Compact Flash Card (CF\).

2. Press 5) to update the system board Keyboard/MSR Controller firmware.
   - o If the message 'Fail To Open File' appears, this means the required 'KEY_MSR.HEX' file is not located on the CF. Press ESC to return to the System Utilities Menu.

   If the KEY_MSR.HEX file is found:

○ The Operator LCD reports the progress of the upgrade and displays 'Completed' when the process is complete.

3. Press [ESC] to return to the Firmware Upgrade Menu.

4. To determine or verify the Keyboard/MSR Controller firmware version, select 3) MSR, or 6) Keyboard Test from the KWS4 Utility Main Menu. Either selection displays the firmware version on the first line of the display.

## 4) Beeper Utility

This selection can be used to disable the system board keyboard beeper if required.

## 5) Admin

When this selection is executed, the KWS4 Utility invokes the command line mode and runs the name of the program contained in a text file called ADMIN.TXT located in \DOC\UTILITES.

In the GR 1.0 platform release, ADMIN.TXT contains a single line of text, CEVNCSVR.EXE. This file is the x86 Windows CE compatible implementation of the Real VNC Server. VNC means Virtual Network Computing, a form of remote control software that allows you to interact with the KWS4 (the "server") from a another computer using a simple program (the "viewer") over an Ethernet connection. The viewer program and configuration instructions can be found at www.realvnc.com.

The primary use of VNC is to run the Cisco or Microsoft wireless card configuration utility, programs not configured to run on the 240x64 Operator LCD. Programs such as these have to be modified to map video to the LCD screen coordinates. Other uses for VNC include remote support and file maintenance.

## *Upgrading the Pole LCD Customer Display Firmware*

The Pole LCD Customer Display attaches to the 4-pin DIN connector on the workstation IO panel. The 4-pin connector does not support the two ISP (In Circuit Programming) pins required to update the Pole LCD firmware.

To upgrade the firmware, the LCD Customer Display assembly must be temporarily removed from the pole and attached to the Rear LCD Customer Display Cable located on the workstation.

Refer to Figure 4-11.

1. Remove the 4-pin DIN cable from the KWS4 IO Panel.

2. Loosen the setscrew that holds the LCD Customer Display assembly in the pole.

3. Remove the Customer Display assembly from the pole just enough to access the connector.

4. Disconnect the LCD Customer Display assembly cable from the pole cable.

5. Connect the cable from the LCD Customer Display assembly to the Rear LCD Customer Display cable projecting from the RF shield cover as shown in the illustration.

6. Start the workstation and enter the KWS4 Utility. Select 4) System Utilities, 3) Firmware Utilities, then 4) Rear LCD.

7. Press 4) to update the firmware.

   o   If the firmware file 'LCD.HEX' is not located on the root of the CF card, the message 'No Header File' appears. Press 1) to Abort and return to the Firmware Upgrade Menu. Press 2) to Continue.

   If the LCD.HEX file is found:

   o   The Operator Display prompts 'Detecting Device'.

   o   The Operator LCD and Customer Display backlights turn off.

   o   In approximately ten seconds, Operator LCD reports 'Completed.'

8. Press [ESC] to return to the Firmware Upgrade Menu.

9. Power off the workstation before removing the LCD Customer Display assembly from the cable.

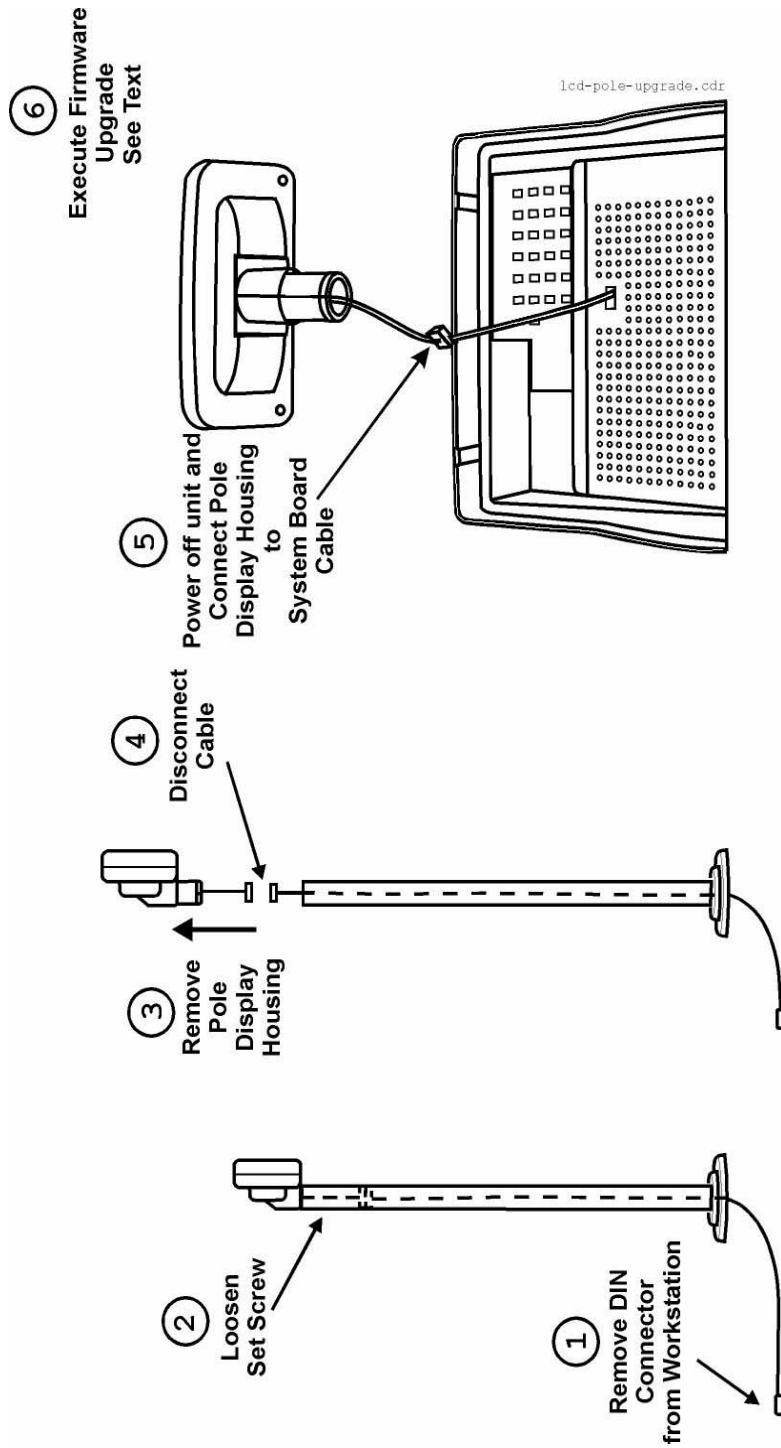10. Reinstall the LCD Customer Display assembly in the pole, and reconnect the cables.

*Figure 4-11: Upgrading the LCD Pole Display Firmware*

# *Glossary*

# *KWS4 Glossary*

**API**

Abbreviation for Application Programming Interface (API). The KWS4 API is a direct descendant of the PCWS hardware API that resides between an application and the hardware, providing a set of hardware services that the application programmer can call upon to access the POS features of the Keyboard Workstation 4.

For example, to open a cash drawer, the programmer calls an API function. The API determines which system board is installed and selects the appropriate register and bit in the CPLD to open the drawer. Changes to a register port address, or a new version of the system board is handled by the API and thus are transparent to the programmer.

**Backlight**

> The KWS4 Operator Display and Customer Display backlight is based on a White LED. It illuminates the panel to make the background brighter and its contents sharper, especially under dim lighting.

**Boot Loader**

> The KWS4 Boot Loader is contained in a 2M Flash EEPROM located on the system board. Boot loaders are specific to a given CPU and chip set, in this case, the x86 compatible AMD Geode SC3200 WebPad on a Chip, which includes the GX1 processor core.

> When the KWS4 starts, the boot loader performs platform initialization and if an 8-pin loopback connector is installed in the RS422-A or RS422-B ports, runs a Power On Self Test (POST) customized for the system board hardware. Once the POST is complete, the boot loader copies the Windows CE image into RAM and starts it.

> The boot loader also contains a collection of functions unique to the KWS4 hardware platform. These functions permit access to platform specific hardware such as memory, IO ports and handles such tasks as checking the CF card for OS image updates, managing the Operator LED and controlling backlight brightness.

**CAL**

> Abbreviation for Client Application Loader. The MICROS CAL is a software utility that assists in the installation of the Keyboard Workstation 4 application software, then manages the ongoing maintenance of the operating system and application software. The CAL consists of two parts, one part resides on the KWS4 client and the second part resides on the system server.

**CEPC**

> Abbreviation for Windows CE Platform Builder. The CEPC is a tool used to build the WinCE OS image. The CEPC allows the developer to target a hardware platform like the x86 based KWS4 and build it with selected components appropriate to the platform.

**CF Card**

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

CF cards are available in sizes ranging from 8M to 1G. The KWS4 currently uses a 64M CF Card installed in an accessible but secure location on the I/O panel connector. Larger sizes may used in the future. In the KWS4 memory architecture, the CF card contains workstation 'personality'. It contains the POS application, a current copy of the Windows CE registry, and optionally, SAR data.

### Client

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

### COM Port

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

### CPLD

Abbreviation for Complex Programmable Logic Device. The KWS4 system board uses a CPLC, custom programmed to handle such tasks as power button management, and controlling cash drawers.

### Customer Display

A display that shows the customer information about the transaction being performed on the workstation. A customer display can be attached directly to the workstation or mounted at eye level on a pole.

The KWS4 supports both optional Rear and Pole mounted Customer Displays based on a 240x64 monochrome LCD.

### DIMM

Abbreviation for Dual In Line Memory Module.

### Device Driver

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

## DOC

Abbreviation for Disk On Chip. The KWS4 uses the Disk On Chip 2000, a single chip solid state flash drive packaged in a 32-Pin-Dual-In-Line Package (DIP). Combining a disk controller with flash memory, the device is available in capacities ranging from 16M to 1G. Future versions will offer increased capacity. The KWS4 currently ships with a 32M part.

Using TrueFFS technology, the Disk On Chip appears as a windows file system and includes the ability to boot the Windows CE operating system. The Disk On Chip contains the Windows CE OS image along with all device drivers and utility programs such as diagnostics and the MICROS CAL.

## IDN

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

The Keyboard Workstation 4 has two RS422 ports, labelled RS422-A and RS422-B, each of which is capable of driving IDN devices. However the application software determines which port will be used for IDN printing.

## LED

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

The Keyboard Workstation 4 Operator LED is a two color device, modified to display Green, Amber, and Red colors. Each of the three colors can be combined with 4 unique blink rates to provide twelve discreet indications.

## LCD

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

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

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

## Magnetic Stripe Card

A plastic or paper card with a magnetic stripe attached. The magnetic stripe has the same qualities as magnetic tape.

See Also MAGTEK Mode and Special Mode.

## MSR

Abbreviation for Magnetic Stripe Reader. An MSR contains a transducer that reads the data from multiple tracks on a mag stripe card. The KWS4 is equipped with a 3-track MSR.

See also: MAGTEK Mode and Special Mode.

## MAGTEK Mode

MAGTEK mode emulates the output from the MAGTEK series of card readers manufactured by MAGTEK, Inc. In MAGTEK mode, the KWS4 hardware converts the MSR track data into a series of keystrokes that the API directs into the window that has focus under Windows CE.

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

See Also: Special Mode.

## Memory

A generic term for a device that stores information in a form that the CPU can recognize and manipulate. Memory appears in several forms, each of which has a specific role in the Keyboard Workstation 4.

A distinction must be made between the primary and secondary storage in microprocessor based systems. Memory devices such as Flash EEPROMs and SDRAM, are considered to be primary storage because they store information in a form that is immediately accessible to the processor through its address and data busses.

Secondary storage (sometimes called mass storage) is composed of the Disk On Chip and Compact Flash both of which serve as the KWS4 long term memory. The Disk On Chip contains a copy of WinCE and drivers and is configured to boot the workstation. The CF card stores the WinCE registry, POS application and optionally transaction data.

To be of use, this data must be moved from the mass storage device into primary storage, in this case, the SDRAM where it can be accessed and manipulated by the CPU. The bootloader and WinCE OS manage this.

See also: SDRAM.

## Operating System

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

Examples of operating systems are Microsoft Windows CE, Microsoft Windows XP.

## PCMCIA

Abbreviation for Personal Computer Memory Card International Association. The Keyboard Workstation 4 includes a single Type II 32-bit PCMCIA CardBus slot, accessible from the connector IO panel. The CardBus PC Card is a 32-bit version of the original 16-bit PC Card standard, offering higher levels of performance.

Part of the PC Card family, a CardBus PC Card conforms to an established physical form factor, providing a rugged card that can be inserted completely in its host workstation without any external cabling (except when the card must be attached to a LAN, telephone line, or a wireless antenna).

## Poly Switch

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

The KWS4 system board uses poly switches on the, Rear/Pole LCD Customer Display, cash drawer, and USB ports.

## POST

Abbreviation for Power On Self Test. In the Keyboard Workstation 4, the POST is contained in the system board Boot Loader and it's execution is optional.

To run a POST, you must power-off the workstation and insert an 8-pin loopback connector (P/N 200152-004) into the RS422-A or RS422-B connectors on the IO panel, then power up the unit.

When the POST executes, it checks for the presence of the Disk On Chip and Compact Flash Card, checks several key hardware circuits. If these devices are missing or defective, the beeper sounds in a pre-defined pattern to report the error. See Chapter 4 for more information about the POST.

**Registry**

In all Windows Operating Systems, the registry is a database that acts as a central repository for all hardware and software configuration information, that it may use as it starts, or operates. The POS Application and utilities such as the KWS4 CAL also add, delete, examine, or modify registry entries as they operate.

When the workstation is running, the registry is located in RAM so that it can be quickly accessed and is called the *Working* registry. If a sudden power failure occurs, the contents of the Working registry are lost because RAM is volatile.

To prevent this, a KWS4 driver called the Persistent Registry Driver (PRD.DLL) periodically copies the *Working* Registry from RAM to the non-volatile Compact Flash card where it becomes the *Persistent* registry. At start-up, the PRD copies the registry from the CF card to RAM.

**Registry Editor**

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

**RJ-11 Connector**

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

**RJ-45 Connector**

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

**RS232**

Abbreviation for Recommended Standard 232. A physical layer standard for serial transmissions between computers and serial devices (mice, modems, printers) that are less than 50 feet apart.

The RS232 specification defines signal lines, voltage levels, and connector pin-outs and is issued by the Electronics Industry Association and Telecommunications Industry Association.

The Keyboard Workstation 4 has a total three RS232 ports.

**RS422**

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

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

A full-duplex version of RS422 is used by the Keyboard Workstation 4 to drive IDN printing devices. The workstation has two of these ports.

## RTC

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

## SAR Client

Abbreviation for Stand Alone Resilient Client. SAR is an option available with some POS applications that permit the client workstation continue to perform basic POS transactions should the server or network connection to the server fail. Transaction data is stored locally on the client until the network connection or server is restored. POS applications supporting the SAR Client on the KWS4 use the CF card to store transaction data.

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

## SDRAM

Abbreviation for Synchronous Dynamic RAM. SDRAM is a dynamic RAM that can be synchronized with the system clock. SDRAM memory interleaves two or more internal memory arrays so that while one array is being accessed, the next one is being prepared for access, making it faster than EDO RAM. Random access times are the same as those for EDO RAM, but an SDRAM's burst mode obtains the second and subsequent, contiguous locations at the rate of 10ns, some five to six times faster than the first location, so that it can handle bus speeds of up to 133MHz. SDRAM technology allows two pages of memory to be opened simultaneously.

## Special Mode

A Magnetic Stripe Reader input mode which buffers track data into the API, allows the POS application to detect that the MSR track data is available, then allows the application to retrieve MSR data for processing.

See Also: MAGTEK Mode.

## System Board

The motherboard or main board for the Keyboard Workstation 4. The System Board contains the majority of the workstation circuitry including the CPU, Chipset, SDRAM, Disk On Chip, Compact Flash, and Input/Output Ports.

## TCP/IP

Abbreviation for Transport Control Protocol/Internet Protocol.

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

**UPS**

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

**USB**

Abbreviation for Universal Serial Bus, a PC serial bus endorsed by Intel and Microsoft. It supports simultaneous data access between a host computer and a wide range of peripherals. The SC3200 Chipset in the KWS4 supports the USB 1.1 specification. The USB carries data using a host-scheduled token based protocol that provides a total bandwidth of 1.5MB/s or 12 MB/s over a daisy chain of up to 128 peripheral devices.

The KWS4 includes two USB 1.0 compatible ports. Currently, only a USB keyboard and mouse are supported.

# Appendix A

# Equipment Dimensions

## In this appendix

## *KWS4 - Low Profile*



NOTES:

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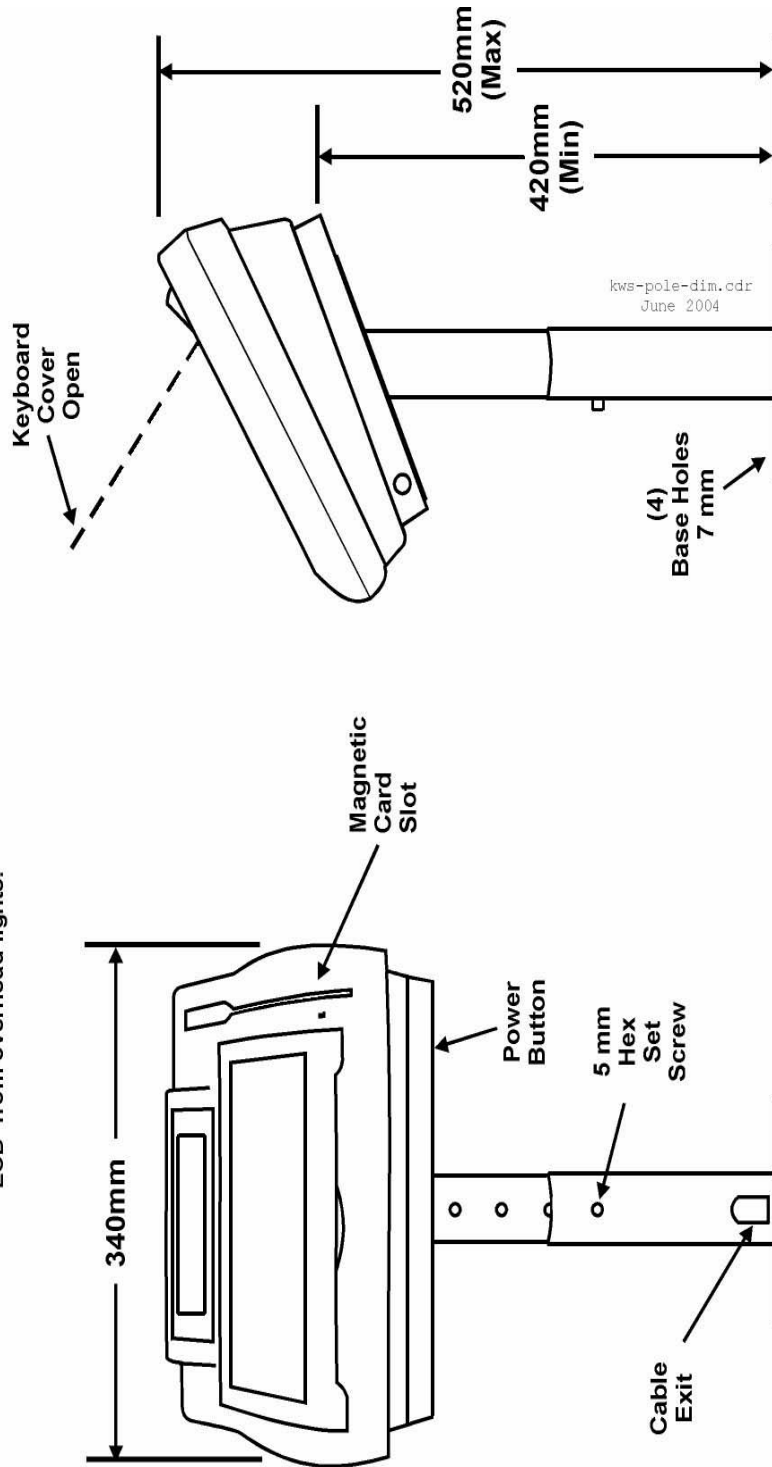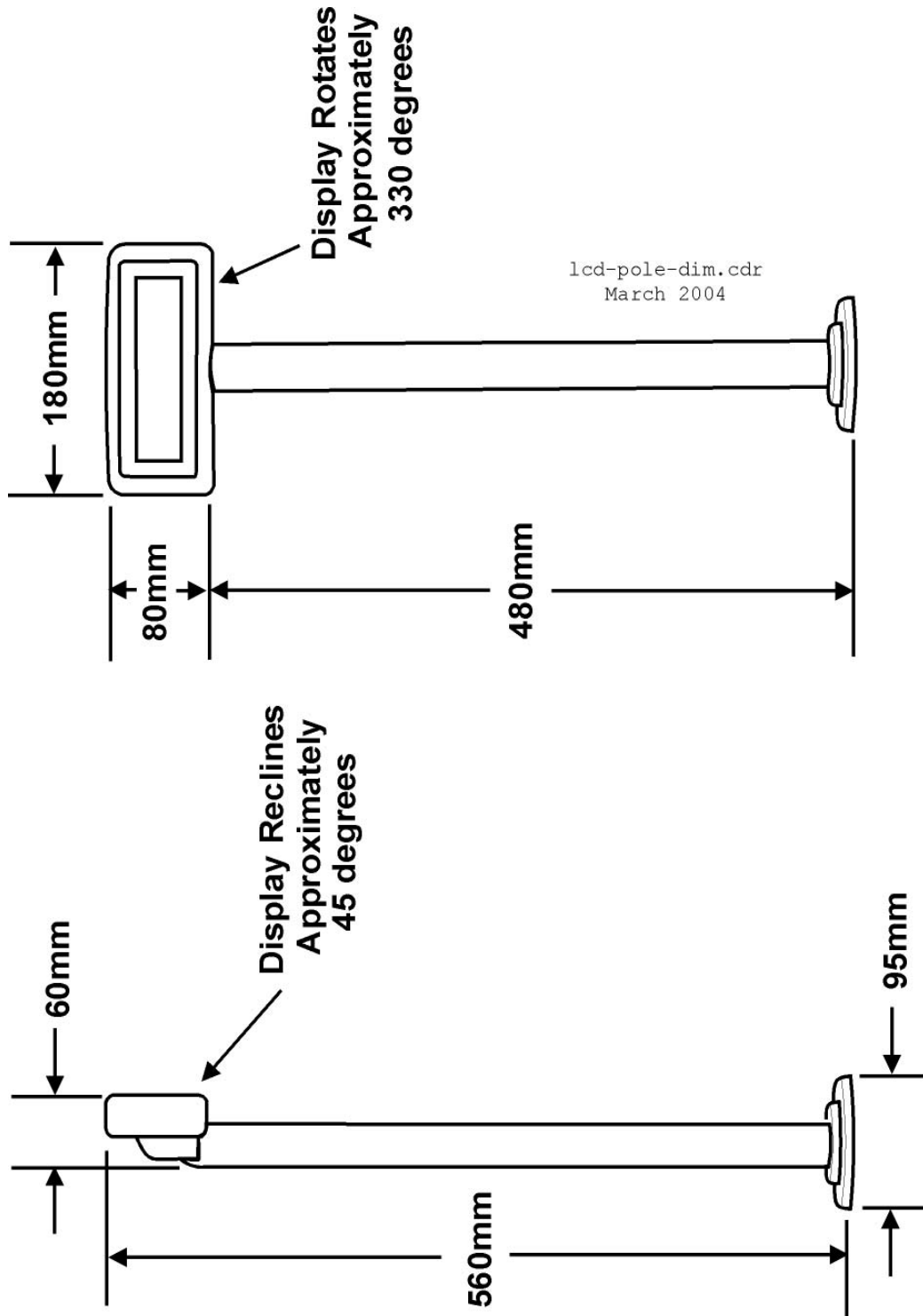5. 77mm hole required under unit if Cash Drawer mounted under counter.

kws-lp-cdr
April 2004

Keyboard Cover Open

290mm

150mm

280mm

Magnetic Card Slot

Power Button

340mm
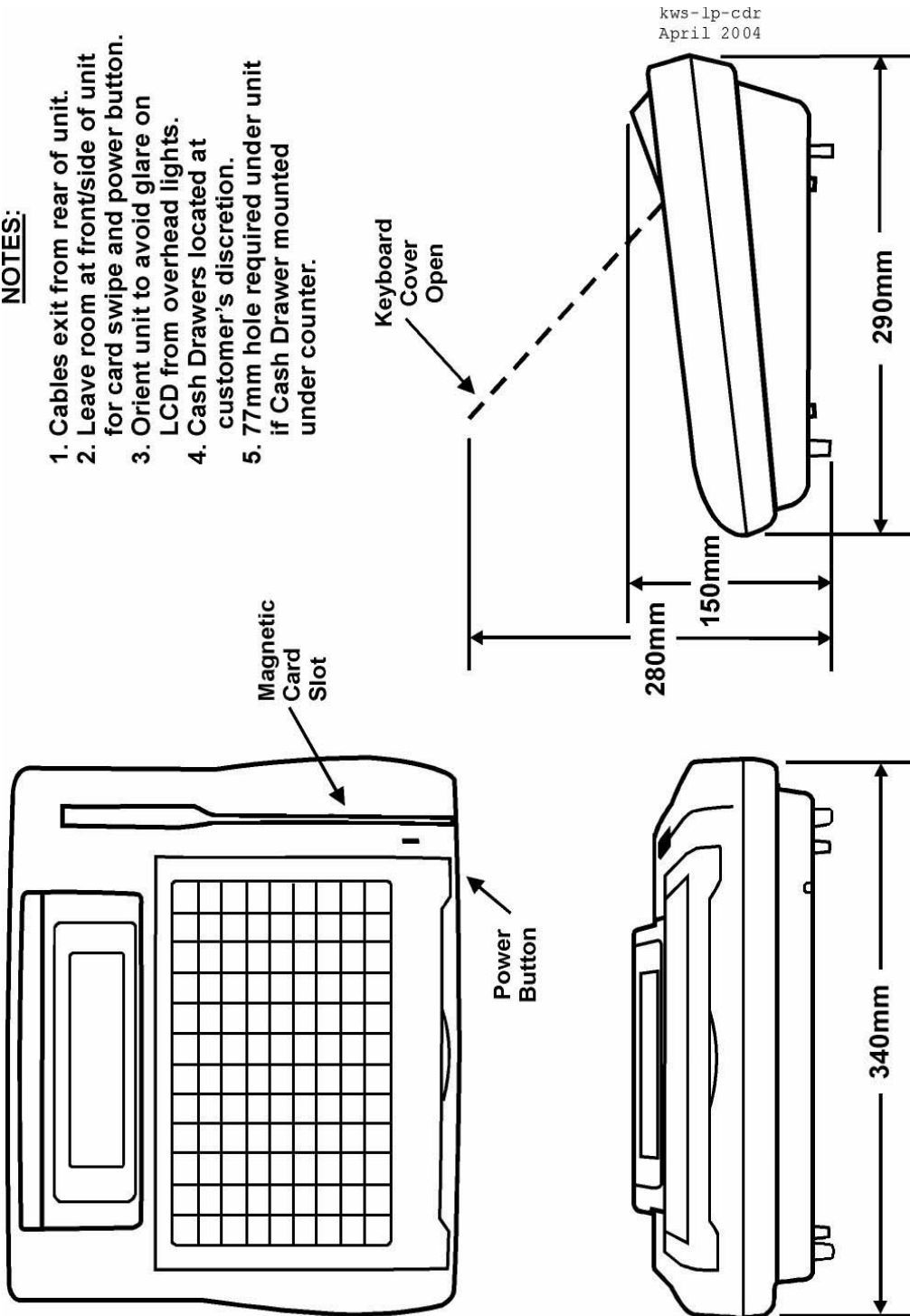
## KWS4 - Low Profile with Integrated LCD Customer Display



NOTES:

1. Cables exit from rear of unit.
2. Leave room at front/side of unit for card swipe and power button.
3. Orient unit to avoid glare on LCD from overhead lights.
4. Cash Drawers located at customer's discretion.
5. 77mm hole required under unit if Cash Drawer mounted under counter.
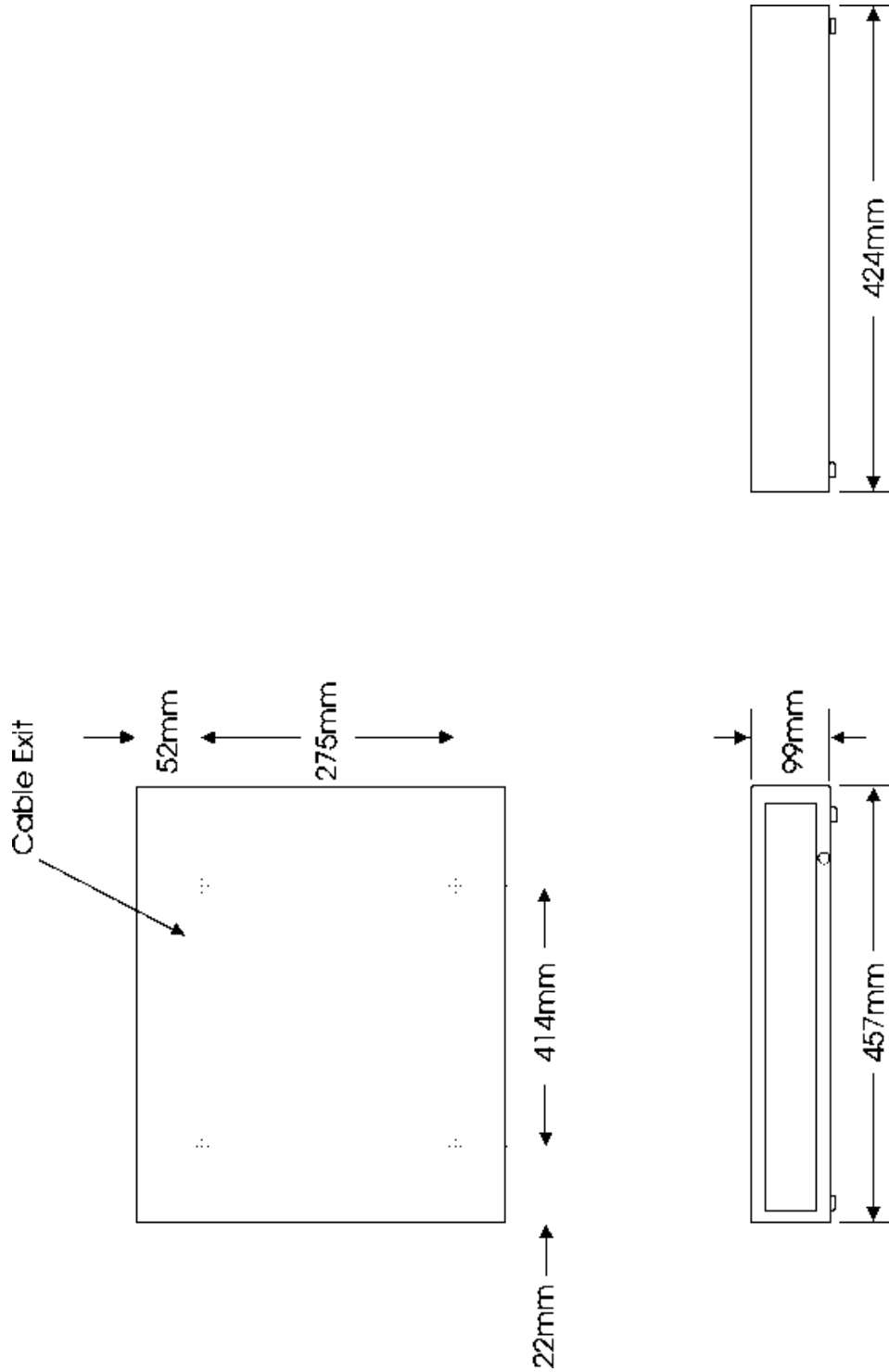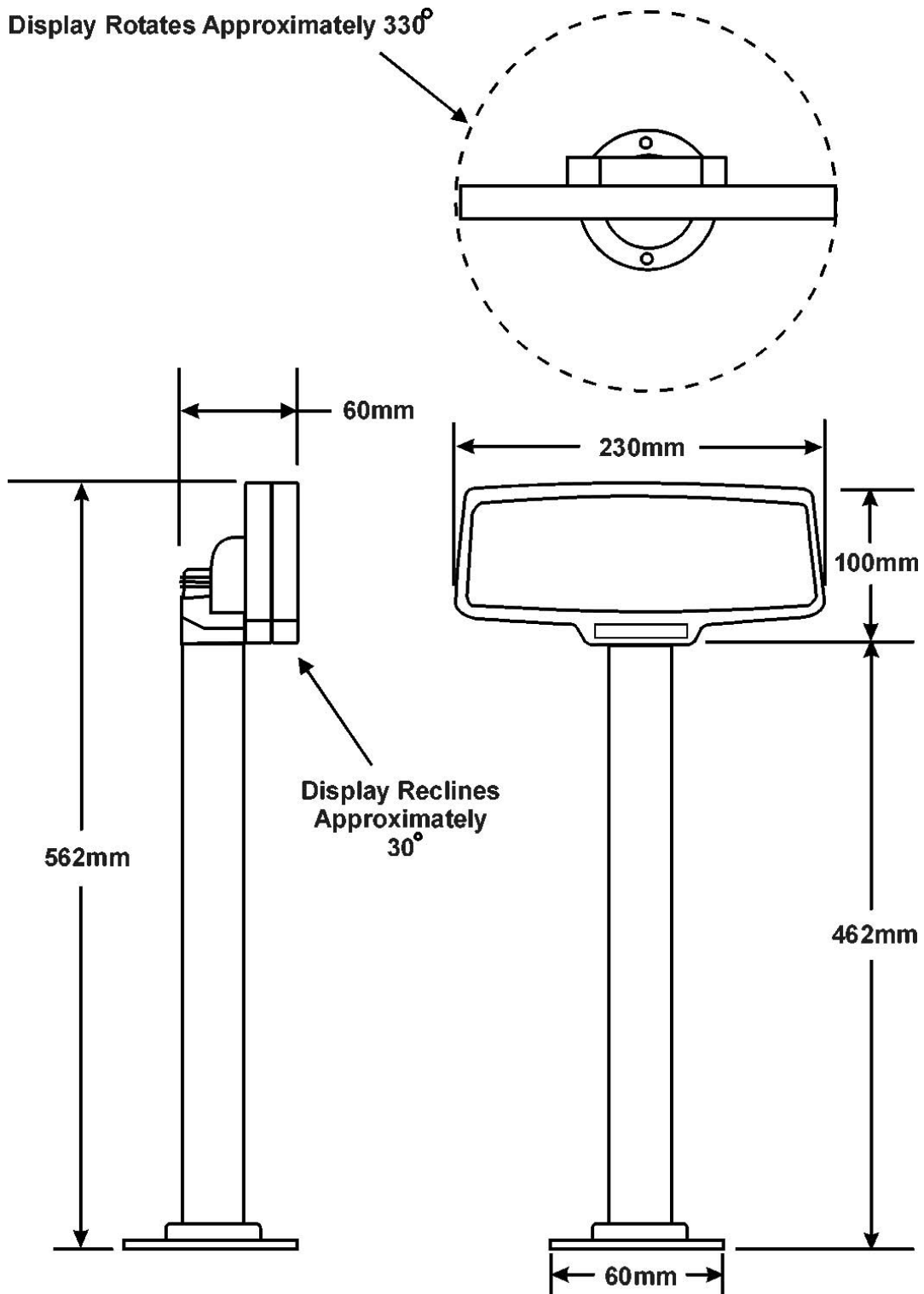
Display Rotates Approximately 112°

kws-lp-rd.cdr
April 2004

Keyboard Cover Open

390mm

150mm

280mm

Magnetic Card Slot

Power Button

180mm

340mm

## *KWS4 - Adjustable Stand*



kws-st.cdr
May 2004

Magnetic
Card
Slot

Power
Button

Cable
Slot

340mm

325mm

204mm

330mm
(max)

290mm
(max)

204mm

**NOTES:**

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

*KWS4 - Adjustable Stand with Integrated LCD Customer Display*



NOTES:

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

kws-st-rd.cdr
April 2004

Magnetic Card Slot

Power Button

Cable Slot

340mm

180mm

204mm

390mm (max)

390mm (max)

204mm

Display Rotates Approximately 112°

*KWS4 on Pole Stand*

NOTES:

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

520mm (Max)

420mm (Min)

kws-pole-dim.cdr
June 2004

Keyboard Cover Open

(4) Base Holes 7 mm

Magnetic Card Slot

Power Button

5 mm Hex Set Screw

340mm

Cable Exit

*Pole LCD Customer Display*

*Cash Drawer*

425mm

275mm

Cable Exit

22mm

383mm

413mm

205mm

110mm

457mm

56mm

37mm

95mm

55mm

## *Cash Drawer, Low Profile*

424mm

Cable Exit

52mm    275mm

99mm

414mm

22mm

457mm
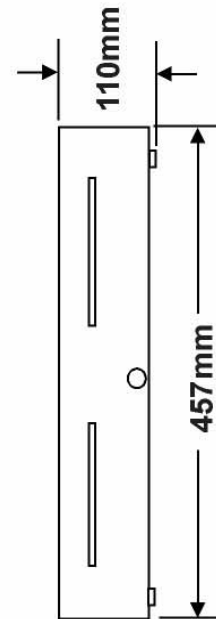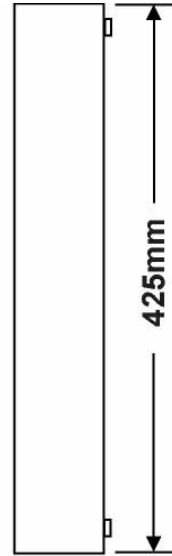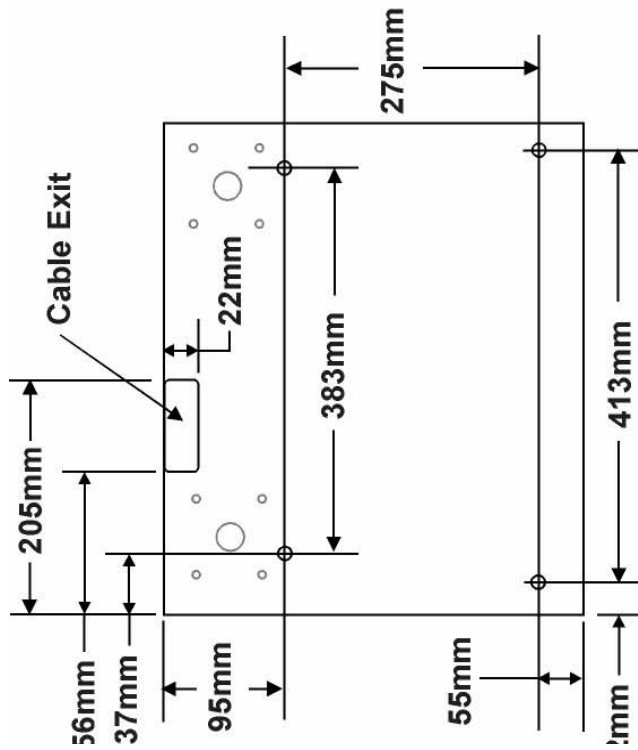
*VFD Pole Display*

Display Rotates Approximately 330°

60mm

562mm

Display Reclines
Approximately
30°

230mm

100mm

462mm

60mm

# *Appendix B*

# Connector and Cable Diagrams

On the pages that follow, you will find diagrams of the Keyboard Workstation 4 I/O Panel connectors, system board connectors, and hook-up cable schematics. 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 KWS4 IO Panel.

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

These connectors are wired identically and assigned to COM4 and COM5 respectively. Port usage is determined by application software settings and can be RS422 or RS232. The pin assignments of each configuration are detailed in the following pages.

### RS422 - IDN(+)

This configuration is used to drive printers with IDN modules. The RS422-A port is configured as COM4, and the RS422-B port is configured as COM5. Figure B-1 shows the RS422 configuration.
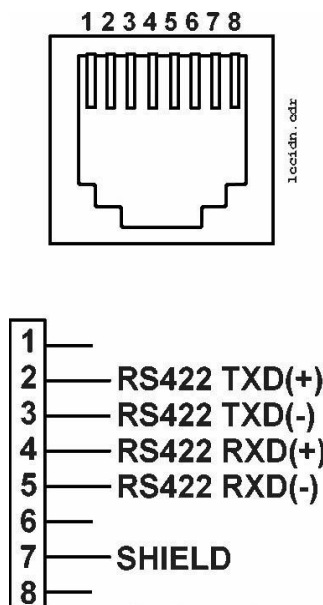


*Figure B-1: RS422-A and B Ports Configured for IDN Printing*

> **NOTE:**
>
> Do not insert a 6-Pin modular plug into the 8-Pin RS422-A and RS422-B connectors. The 6-Pin plug can push pins 1 and 8 of out of position. These pins are used by the RS232 Interface (See Figure B-2). Should you wish to use the RS232 Interface at a later time, it may not function. Always use cable P/N 300319-001 to connect an IDN printer to the workstation.

**RS232**

The RS422-A (COM4) and RS422-B (COM5) ports also support a basic RS232 interface as supported by the application software. This configuration is shown in below.
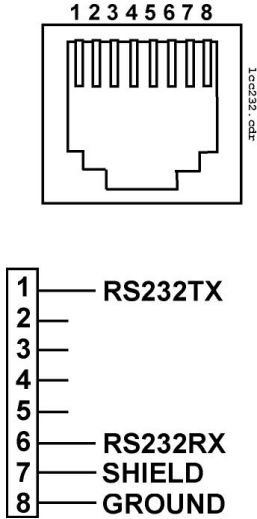


*Figure B-2: LCC Port Configured for RS232*

## 10/100 Ethernet Connector

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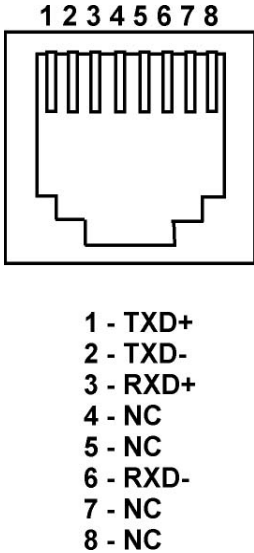


*Figure B-3: 10/100 Ethernet Connector Diagram*

### RS232 Connector

A single DB9F RS232 connector assigned to COM2 is provided on the IO Panel. The pin-out is shown below.
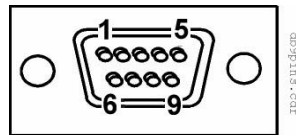


*Figure B-4: DB9 RS232 Connector Diagram*

### USB Connectors

A pair of USB ports are located on the IO panel, shown in Figure B-5, below.
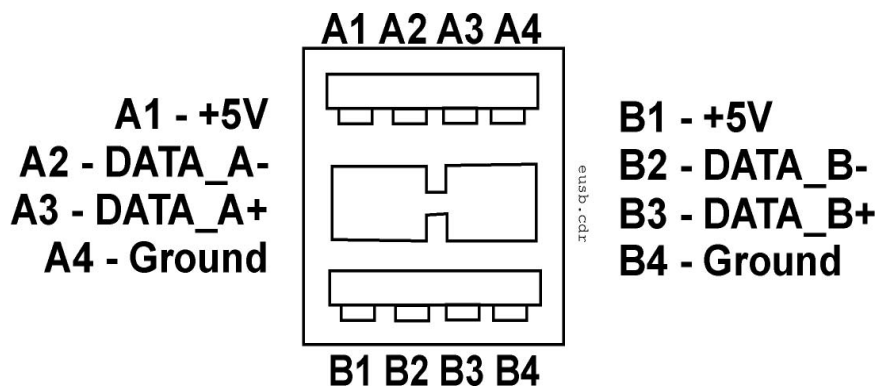


*Figure B-5: Universal Serial Bus Connector Diagram*

## Cash Drawer 1 and 2 Connectors
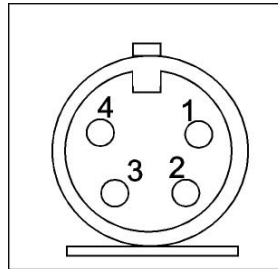


*Figure B-6: Cash Drawer Connector Diagram*

## Pole Display Connector

This port, shown in Figure B-7 is located on the KWS4 IO Panel. It is capable of driving the LCD Pole Customer Display.
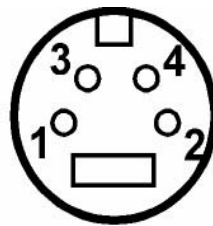


*Figure B-7: Customer Display Connector Diagram*

## Power Input Connector

Figure B-8 shows a pin-diagram of the IO Panel DC input connector.
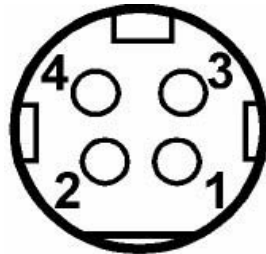


1 - +12V
2 - +12V
3 - GND
4 - GND

*Figure B-8: KWS4 Power Input Connector*

*POWER SUPPLY SHOCK HAZARD*

**If the KWS4 external power supply is exposed to moisture a shock hazard exists. The unit is sealed, but rated for indoor use only. If installed in an outdoor environment, to minimize the risk of electric shock, the external power supply must be kept dry by protecting it from liquid spills, rain, or snow.**

## *System Board Connectors*

This section details connectors located on the KWS4 system board.

### Magnetic Stripe Interface Header

The internal magnetic card reader connector is CN10, located on the system board. The pin-outs for this connector are shown in Figure B-9,

```
    M1GND  | 1  |
   CLK_OUT | 2  |
  DATA_OUT | 3  |
MEDIA_DETECT| 4 |
  CLK_OUT1 | 5  |
 DATA_OUT1 | 6  |
    GROUND | 7  |
       +5V | 8  |
  CLK_OUT2 | 9  |
 DATA_OUT2 | 10 |

       KWS4 System
          Board
           J8
```
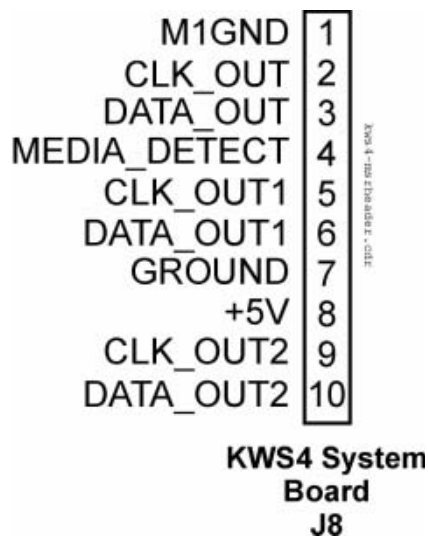
*Figure B-9: System Board MSR Interface*

### VGA Header

Figure B-10 shows a pin-out of J4, the system board VGA header, which should be mounted on production versions of the board.

```
              J4
GND  —  1    2  — VSYNC
GND  —  3    4  — HSYNC
GND  —  5    6  — BLUE
GND  —  7    8  — GREEN
GND  —  9   10  — RED
GND  — 11   12  — N/C
GND  — 13   14  — N/C
```
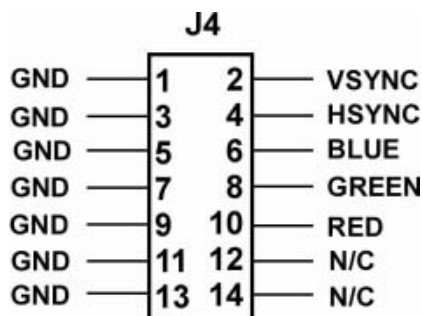
*Figure B-10: System Board VGA Header*

## Hook-up Cables

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

### RS232 from the RS422-A and RS422-B Ports

Figure B-11 shows a cable that includes the RS232 signals from RS422-A and RS422-B ports to a DB9 male connector. This cable is available from MICROS by ordering P/N 300319-102 and also works with the WS4 and PCWS Eclipse.
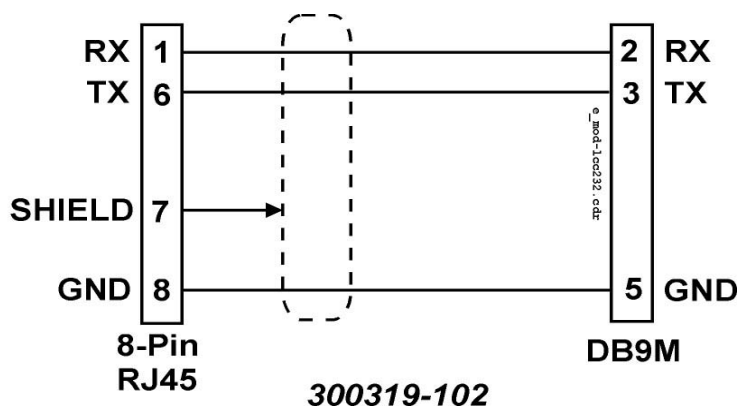


*Figure B-11: Modular LCC/RS232 to DB9 Male Connector*

Figure B-12 shows a cable diagram that adapts the RS422-A and RS422-B ports to a DB25 connector.
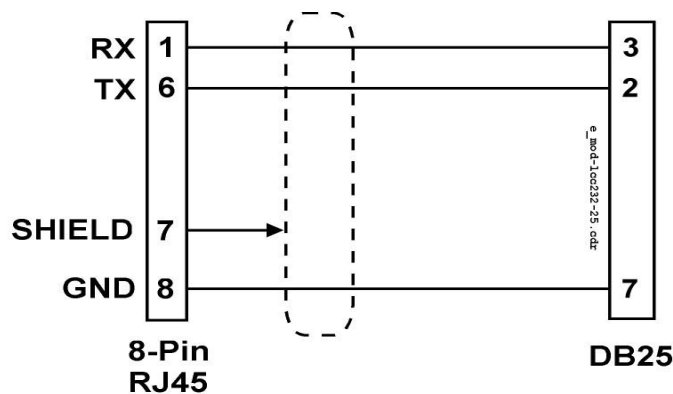


*Figure B-12: Modular LCC/RS232 to DB25 Connector*

## IDN Hookup Cable

Figure B-13 shows a diagram of the 8-Pin to 6-Pin IDN Cable (MICROS P/N 300319-001) that should always be used to connect the RS422-A and or RS422-B ports to a wall plate or IDN device. Plugging a 6-pin modular connector into the 8-pin receptacles can damage the port.
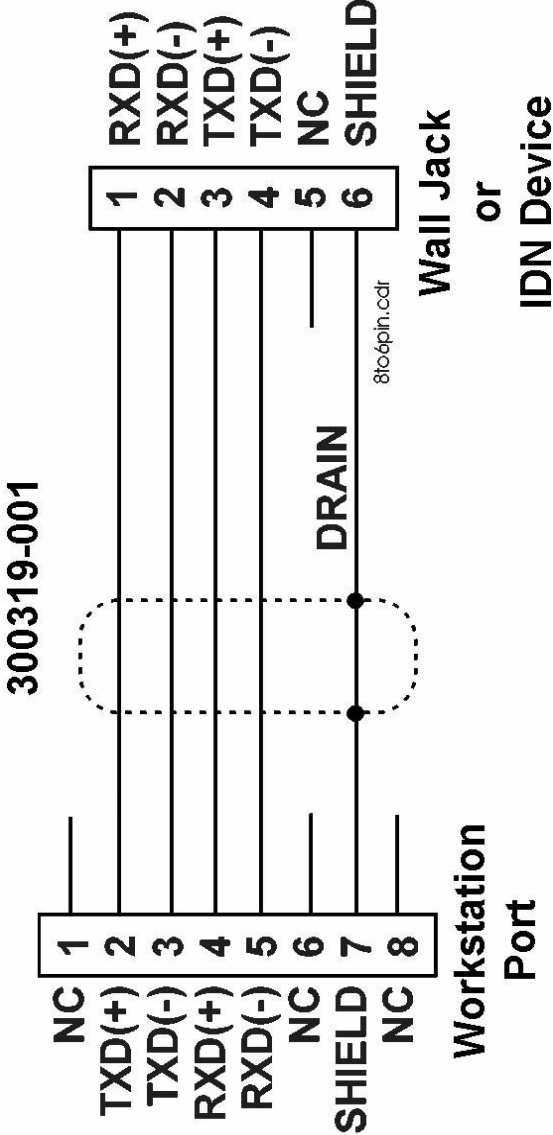


*Figure B-13: IDN Hook-up Cable Diagram*

## LCD Customer Display Cables

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

### System Board Integrated Cable

This cable is pre-installed on System Board connector J3. A diagram is shown in Figure B-14. This cable mates with the cable from the Rear LCD Customer Assembly, shown in Figure B-15.
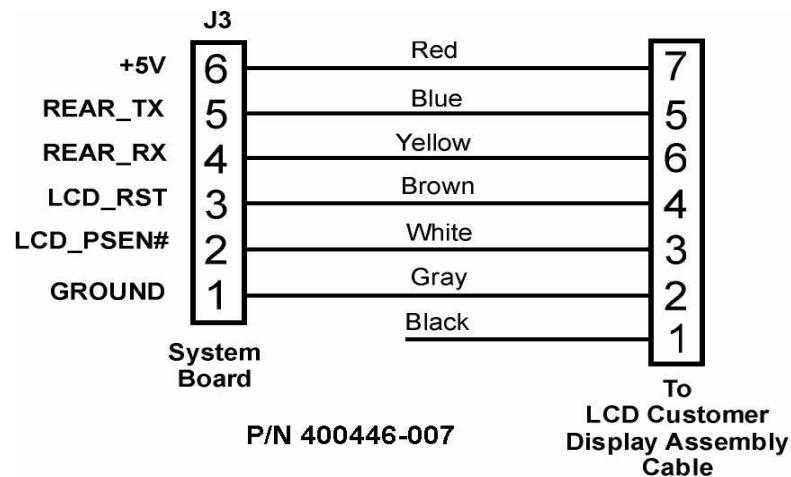


*Figure B-14: System Board to Rear LCD Display Cable*

### LCD Customer Display Assembly Cable

The LCD Customer Display Assembly includes the LCD Display Housing, which in turn consists of LCD Panel, Interface Board, mounting bracket and interface cable. A diagram of this interface cable is shown in Figure B-15. The only difference between the Rear and Pole versions of the LCD customer display housing is the mounting hinge.

When the LCD customer display is attached directly to the rear of the workstation, this cable plugs into the system board cable shown in Figure B-14.

When the LCD customer display assembly is mounted in a a pole, this cable attaches to the cable shown in Figure B-16, below.
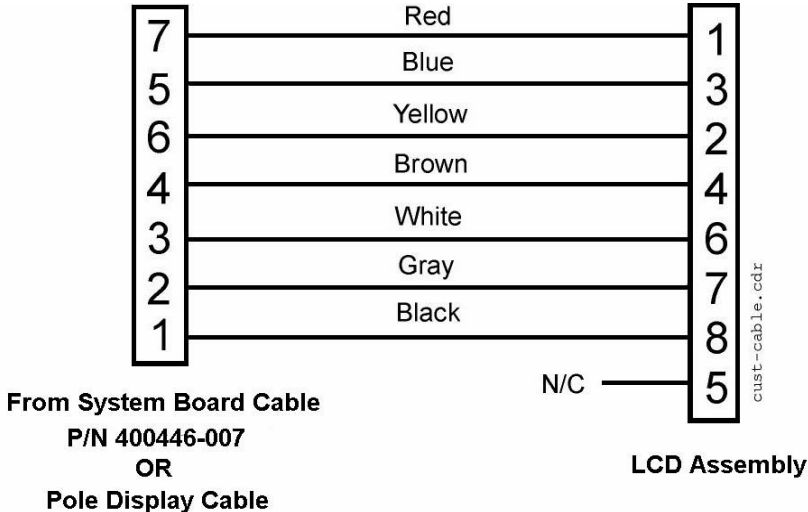
*Figure B-15: LCD Display Assembly Cable*

### Remote Pole LCD Customer Display Cable

This cable, shown in Figure B-16 is supplied with the Pole LCD customer display kit. It attaches between the 4-pin DIN customer display connector on a WS4 or KWS4 IO Panel, up through the pole to mate with the cable from the LCD Display assembly shown in Figure B-15.
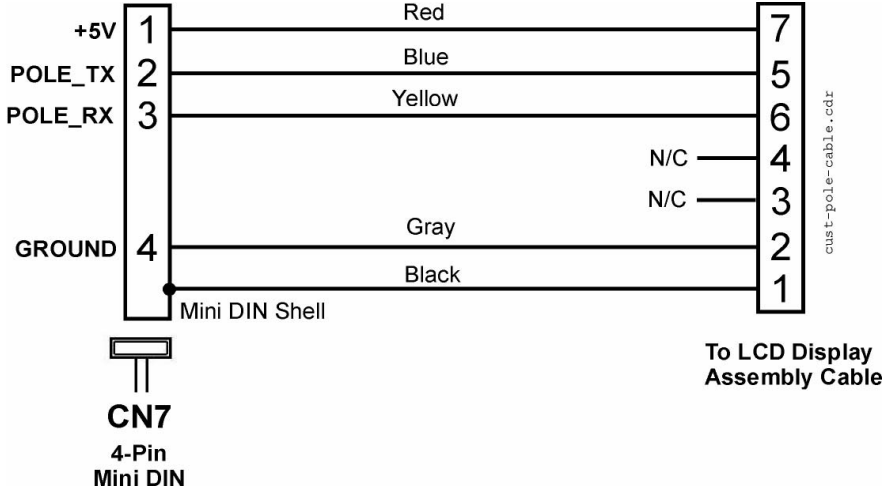


*Figure B-16: Remote Pole Display Cable*

### VGA Cable

The System Board includes J4, a 14-pin header that provides standard VGA output signals from the on-board TFT Controller. Figure B-17 displays a diagram of a cable that could be constructed and connected between the KWS4 system board and CRT or LCD monitor.
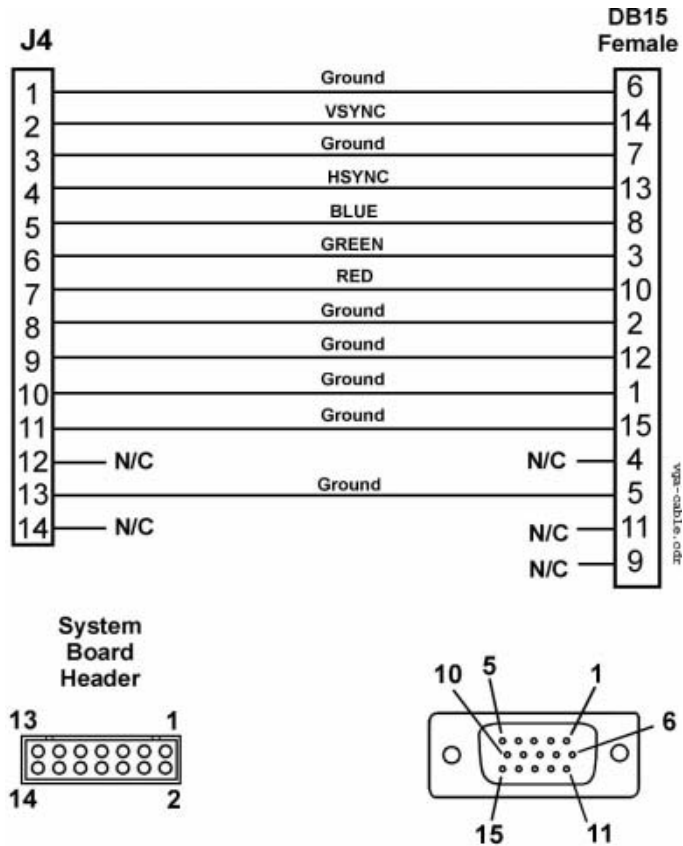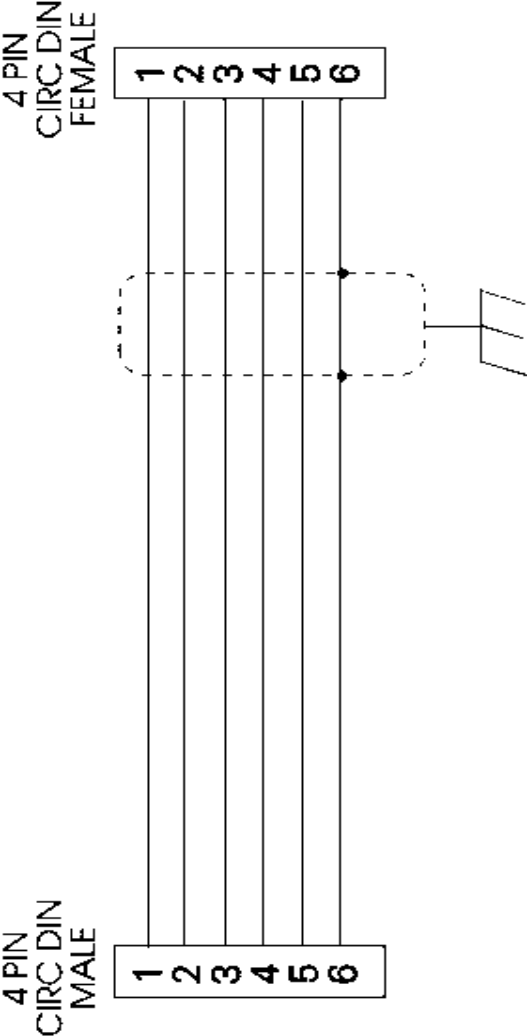


*Figure B-17: VGA Cable Diagram*

## Cash Drawer Extension Cable