PC9 Industrial PC

and

P9 PowerStation

User Guide

Copyright and Trademark Notice

Product Warranty Information

CTC Parker Automation provides top quality products through rigid testing and the highest quality control standards. However, should a problem occur with your hardware or with the software protection key, CTC Parker's standard product warranty covers these items for 15 months from the date of shipment from CTC. Exceptions appear below:

- Backlight bulbs have a 90-day warranty.

- Third-party products, such as bus cards, carry the manufacturer's specified warranty.

- For all displays, image retention (burn-in) is not covered by warranty.

- Software revisions that occur within 60 days after purchase are available, under warranty, upon request. Please review the MachineShop License Agreement for additional software warranty information.

Should you have any questions about your application or need technical assistance, please call CTC Parker's Technical Support department at 513-248-1714, 8:00 a.m. to 5:00 p.m., Eastern Time. You may call this same number after hours for emergency assistance. See *Customer Support Services* on page 8 of this manual for more information about CTC Parker's support products and services.

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Manual Overview and Support Services

Thank you for purchasing the PC9 Industrial PC or the PowerStation P9. This high-powered platform is designed and tested to suit the demanding environment of the factory floor. It comes with either a 12.1" or 15" display and multiple storage and read/write media, including a hard drive (optional in the P9), floppy drive, Compact Flash slot, and CD-ROM drive. The system's unique design makes it exceptionally easy to service, and its exclusive PowerSmart™ system monitor oversees critical system operating parameters.

Both the PC9 and P9 can be ordered with a Windows® or MS-DOS® operating system. The P9 comes bundled with CTC Parker's MachineShop™ suite, including Interact HMI software.

Important   Unless otherwise indicated, all of the information in this Guide applies to both the PC9 and the P9.

Chapter Contents

Using this Manual

This manual is designed to help you set up and use your PC9/P9. It describes the system's specifications, ports, and drive definitions. It also explains how to install the system, how to maintain it in good condition, and how to solve common problems that may occur in operation.

This manual is divided into the following chapters:

Chapter 1 — Manual Overview and Support Services: Presents an overview of this manual, the documentation and software provided with the system, and the steps to get the system up and running. This chapter also describes CTC's customer support services.

Chapter 2 — Introducing the PC9/P9: Describes the system's specifications, drives, and the ports available to connect it to other devices and to a power source. This chapter also describes important peripheral devices, such as the watchdog timer and Power-Smart system monitor; system I/O addresses and IRQs; and design issues specific to the P9.

Chapter 3 — Installation: Explains how to mount the system in an enclosure and how to start up the system.

Chapter 4 — Maintenance and Troubleshooting: Explains how to maintain the system and how to solve problems that may occur in operation.

Appendix A — Dimensional Drawings: Displays dimensional drawings that will be useful in mounting the system.

Documentation Components

The PC9/P9 documentation set contains all of the information you need to configure, install, and use your system. The documentation set is described below.

Release Notes—This document is provided whenever there is important information about your system that does not appear in this manual. Be sure to read the release notes before operating your system.

PC9 Industrial PC and PowerStation P9 User Guide—This is the document you are reading. It provides detailed information about your system and describes how to install, use, and maintain the system.

Software Components

Each PC9/P9 is pre-loaded with the operating system you have requested and necessary utilities so that you can run your system immediately upon arrival. If you have purchased a P9, Machine-Shop will be installed on your system. Backup copies of all installed software are provided on CDs and floppy disks should you need to reinstall any of it.

The table below shows the CTC Parker software that you will receive with your system. A description of the software follows the table.

CD/Disk Name and Part Number	PC9			P9		
	Windows			DOS	Windows	
	95	98	NT		95/98	NT
PC9 Industrial PC Drivers and Utilities CD KA-73049	X	X	X			
Windows 95 CD-ROM Setup Boot Disk KA-73050	X					
PC9 Win NT 4.0 Emergency Recovery Disk KA-73057			X			
MS-DOS 6.22 and Utilities Installation Disk KA-72953				X		X
PowerStation Start Disk KA-83109-101				X	X	X
MachineShop Installation CD KA-83103				X	X	X

PC9 Industrial PC Drivers and Utilities CD KA-73049: Contains system files, utilities, and most drivers for the PC9.

Windows 95 CD-ROM Setup Boot Disk KA-73050: Contains the CD-ROM driver for the PC9. Shipped only with PC9s running Windows 95.

PC9 Win NT 4.0 Emergency Recovery Disk KA-73057: Contains files to start Windows NT 4.0 in the event that the operating system is damaged. Shipped only with PC9s running Windows NT 4.0.

MS-DOS 6.22 and Utilities Installation Disk KA-72953:
Contains the MS-DOS operating system and utilities.

PowerStation Start Disk KA-83109-101: Contains the Power-
Station utilities and drivers for the P9.

MachineShop Installation CD KA-83103: Contains files for the
MachineShop Shell, MachineShop Toolbar, Interact, and touch-
screen and network drivers.

Getting Started

Before operating your system, please complete the following steps:

1. Unpack the unit, and verify that you have received all of the components that you ordered.

2. Fill out the product registration card, and return it to CTC Parker. When you register your unit, you will receive a trial membership in our Product Support Program, which provides complimentary telephone technical support, information on product updates, and service bulletins.

Special Note for P9 Users

Drivers and utilities for the P9 are stored in a zipped folder on the PowerStation Start Disk (KA-83109-101). Instructions for reinstalling all of the utilities at once are given in *Reinstalling P9 drivers and PowerStation utilities* on page 66. However, if you think that you may want to reinstall **individual** drivers or utilities, copy the following files from your hard drive or CF card onto one or more floppy disks, and store the disks in a safe place. If necessary, you can copy the files later into the appropriate directory on your hard drive or CF card.

File	Use	Directory
AUTOEXEC.BAT	Interact	Root
CONFIG.SYS	Interact	Root
MLCA.INI	MachineLogic	CTC
TOUCH.INI	Touchscreen driver	TOUCH\DOX
TCPIP.INI	Network driver	NET
NET.BAT	Network driver	NET
NET.CFG	Network driver	NET
PWRSMRT.EXE	PowerSmart	CTC

Documentation Standards

This manual uses the following standards:

1. Software commands and other important terms appear in **bold**.

2. Text to be entered from the keyboard appears in `Courier` font.

3. Buttons, menu titles, and keyboard keys appear in Leading Caps.

4. Indented paragraphs denote one of the following:

   • **Note**—Describes alternative approaches or issues that you should be aware of while using a function.

   • **Important**—Contains information that you should pay particular attention to while reading. Follow this information to save time and minimize problems.

   • **Warning**—Contains information on safety issues. Follow this information to prevent equipment damage or personal injury.

ISO Symbols

This symbol is the International Standards Organization (ISO) symbol for Caution (ISO 3864 No. B.3.1). This symbol denotes activity that could affect operation of the computer if instructions are not properly followed.

This symbol is the ISO symbol for Caution—risk of electrical shock (ISO 3864 No B.3.6). This symbol denotes activity that could cause personal injury from electrical shock or damage to equipment if instructions are not properly followed.

Customer Support Services

We welcome your thoughts and suggestions on our products and services. You can contact us by telephone, email, or fax. You can also visit CTC Parker on the World Wide Web to learn the latest about our hardware, software, and customer support services.

- Telephone: 513-831-2340
- Fax: 513-831-5042
- E-mail: sales@ctcusa.com or support@ctcusa.com
- World Wide Web: http://www.ctcusa.com

We recognize that every customer and every application has different support needs, so we offer a variety of support services designed to meet these needs. We offer three types of customer support services: Technical Support, Training and New Business Development, and the Product Support Program.

Technical Support

The Technical Support department welcomes any question that might arise as you develop or run your applications. We offer complimentary support for any customer, whether you are an end-user, original equipment manufacturer (OEM), system integrator, or distributor.

If you have a question about your system, be sure to complete the following steps:

1. Check any release notes shipped with the system.
2. Consult the documentation and other printed materials shipped with your system.
3. Review Chapter 4, *Maintenance and Troubleshooting*.

If you cannot find a solution using one of the above sources, contact our Technical Support department at 513-248-1714, 8:00 a.m. to 5:00 p.m., Eastern Time. You can call this same number after hours for emergency assistance.

Training and New Business Development

Our Training and New Business Development department provides service in two areas: training and consulting. We offer training on all of our products, either at CTC Parker in our state-of-the-art training center or at your site. You can learn how to write custom interfaces, develop specialized applications, and implement your complete operator interface application. Contact the Training Coordinator by phone at 1-800-233-3329 or by email at training@ctcusa.com.

We offer consulting services through our Professional Consulting Services (PCS) group. Our PCS group can build your application from the ground up by writing custom communications drivers or by designing special modules to perform functions unique to your application. Our team of specialists is flexible, so they can create a project development schedule that meets your needs. Contact the PCS Coordinator by phone at 1-800-233-3329 or by email at pcs@ctcusa.com.

Product Support Program

The Product Support Program (PSP) is designed to keep you up-to-date with the current versions of CTC Parker software. The PSP consists of a renewable, one-year membership that provides you with free upgrades, utilities, automatic notification of software updates, and other valuable tools for MachineShop, Interact, and MachineLogic. Single-user, site, and corporate licenses are available. The PSP is an easy, cost-effective way to automatically receive the most recent CTC Parker software and associated utilities. Contact the PSP Coordinator by phone at 1-800-233-3329 or by email at psp@ctcusa.com.

Introducing the PC9/P9

This chapter describes the PC9/P9's specifications, as well as its drives and the ports that you can use to link the system with other devices, such as a mouse, keyboard, printer, or other workstations. It also describes important peripheral devices, such as the watchdog timer and Power-Smart system monitor. Finally, the chapter lists the system's I/O addresses and IRQs and explains important design issues concerning touchscreens and hard drives in the P9.

Chapter Contents

Specifications

This section describes specifications for the PC9/P9. Please familiarize yourself with these specifications before operating the unit.

Physical Specifications

The system's physical specifications are shown in the following table.

Category	Specifications
CPU card	Small format NLX (8" x 10"). Conforms to NLX Specification V1.2.
Processor	Intel® Celeron™ 300, 433, 500MHz
Memory	32-512MB synchronous DRAM
Expansion memory	• 3.3V memory only DIMM configurations • 168-pin DIMM with gold contacts • 66 or 100MHz SDRAM • Non-ECC (64-bit) • Unbuffered single- or double-sided DIMM **Note:** See the table on page 13 for a list of recommended DRAM manufacturers.
Storage	• 1.44MB high-density floppy drive • 3.2GB or higher hard drive (optional in the P9) • At least 40X CD-ROM drive • 8, 16, 32, 48, 96, or 128MB solid state Compact Flash drive. Actual storage volumes may be higher. Field expandable.
I/O ports	• Three 9-pin RS232 ports • One 9-pin RS232/422/485 configurable port • Two 25-pin bi-directional parallel ports (one internal) • Two USB ports • One RJ45 Ethernet port (10Base-T/100Base-TX)
Expansion slots	• Three 16-bit ISA slots *or* • Two 16-bit ISA slots and one PCI slot
Dimensions (H x W x D)	• 12.1" display unit: 12.1" x 15.1" x 10.6" (307.3mm x 383.5mm x 269.24mm) • 15" display unit: 13.3" x 16.8" x 10.8" (337.8mm x 426.7mm x 274.32mm)
Weight	• 12.1" display unit: 27.76 lbs. • 15" display unit: 31.12 lbs.

Recommended DRAM Manufacturers		
Manufacturer	**Product Number**	**Available Sizes**
Hyundai	HYM71V653201	256MB
Hyundai	HYM7V65401BTRG-10S	32MB
Hyundai	HYM7V65801BTRG-10S	64MB
Hyundai	HYM7V651601BTRG-10S	128MB
Micron	ML8LSDT864AG-10CB4	64MB
Micron	MT16LSDT1664AG-10CB4	128MB
Micron	MT4LSDT464AG-10EC5	16MB
Micron	MT8LSDT864AG-10EC7	32MB
SEC	KMM374S823BT-GLQ	32MB
SEC	KMM374S403CT-GL	32MB
SEC	KMM374S1623BT-GLQ	128MB
Toshiba	THMY6480F1BEG-80	64MB
Toshiba	THMY6432G1EG-80	256MB

Operating Systems Supported

The PC9/P9 supports the following operating systems:

- MS-DOS 6.22
- Windows 95
- Windows 98
- Windows NT
- Windows 2000 (consult our Technical Support department at 513-248-1714 about availability and pricing)

Display Specifications

The PC9/P9 comes with either a 12.1" or 15" TFT, flat panel display. Each display can be ordered with or without touchscreen, and each can show up to 262,144 colors. The rest of the system's display specifications are shown in the following table.

Category	Specifications
Resolution	• 12.1" display: 800x600 SVGA • 15" display: 1024x768 XGA
Brightness	• 12.1" display: 270 nits (cd/m^2) • 15" display: 200 nits (cd/m^2)
Backlight lifetime	• 12.1" display: 30,000 hours • 15" display: 50,000 hours

Video Modes Supported

The display supports the video modes shown in the following table.

Resolution	Vertical Sync Frequency (Refresh Rate)	Horizontal Sync Frequency
640 X 350	70 Hz	31.47 Khz
720 X 400	70 Hz	31.47 Khz
640 X 480	60 Hz	31.47 Khz
640 X 480	72 Hz	37.86 Khz
640 X 480	75 Hz	37.50 Khz
640 X 480	85 Hz	43.27 Khz
800 X 600	56 Hz	35.16 Khz
800 X 600	60 Hz	37.88 Khz
800 X 600	72 Hz	48.08 Khz
800 X 600	75 Hz	46.87 Khz
800 X 600	85 Hz	53.67 Khz
1024 X 768	60 Hz	48.36 Khz
1024 X 768	70 Hz	56.48 Khz
1024 X 768	75 Hz	60.02 Khz

Environmental Specifications

The PC9/P9 conforms to the environmental specifications shown in the following table,

Category	Specifications
Operating temperature	41° to 122° F (5° to 50° C) ambient air temperature
Relative humidity	5% to 95% non-condensing
Altitude	-200ft. to 10,000ft. (-60.96m to 3,048m)
Shock rating	• 10g, 11ms operating • 30g, 11ms non-operating
Vibration rating	• 0.5g rms from 10 to 500Hz operating • 1.0g rms from 10 to 500Hz non-operating • With CD-ROM drive, 0.25g rms • With Compact Flash card, 1g rms from 10 to 500Hz operating
Faceplate designed for	NEMA 4/4X environment **Note:** The system is only rated NEMA 4 if it is installed in a NEMA 4-rated enclosure.

Important Limit the system's exposure to adverse conditions, such as dust, oil, moisture, and corrosive vapors to minimize maintenance and repair costs.

Remember that the temperature within a protective enclosure is generally higher than the external temperature. Thus, if the system is operating inside an enclosure at temperature levels above its rated ambient temperature, you must cool the enclosure.

Electrical Specifications

The PC9/P9 accepts AC input only. Consult our Technical Support department at 513-248-1714 if you wish to use DC power to operate the unit.

Electrical specifications for the system are shown in the following table.

Category	Unit Specifications
Power supply	84VAC to 264VAC @ 120W
Power output	The power supply will provide the following outputs: • 3.3VDC @ 9.0A • 5VDC @ 13A • 12VDC @ 2A • -5VDC @ 0.1A • -12VDC @ 0.1A
Expansion slots	The voltage and total current available for all expansion cards are as follows: • 3.3VDC @ 1A • 5VDC @ 2.5A • 12VDC @ 0.2A • -5VDC @ 0.1A • -12VDC @ 0.1A

Important The system's power supply automatically detects the input voltage level and adjusts accordingly. However, always use reliable sources of power, and isolate all communication cables from power lines to enhance noise immunity.

Testing Specifications

The PC9/P9 conforms to the testing specifications listed below.

Testing Criteria	Classification
Showering arc	NEMA showering arc
Surge withstanding capacitance	IEEE 472-1974
ESD requirements	IEC 801-2
Operating temperature	IEC 68-2-1
Electrical fast transient	IEC 801-4
European Harmonized EAC Standards	EN50082-2, EN55011
Operating vibration	IEC 68-2-6
Mechanical shock	IEC 68-2-27
Random vibration	MIL-STD-810D

Faceplate Chemical Resistance

The system's faceplate can resist the chemicals listed below, with no visible effect.

Faceplate Chemical Resistance		
Acetone	Sulfuric Acid 10%	Motor oil
MEK	Hydrochloric Acid 10%	Gasoline
Toluene	Acetic Acid 10%	Machine oil
Methylene Chloride	Phosphoric Acid	Salad oil
Isopropyl Alcohol	Sodium Hydroxide 10%	Silicone
Xylene	Carbon Tetrachloride	Silicone grease G31
Hexane	Potassium Hydroxide	Kerosene
Butyl Cellosolve	Ammonia water 10%	Gas oil
Cyclohexanone	Sodium Chloride 26%	Silicone oil
Trichloroethylene	Zinc Chloride 81%	Engine oil
Ethanol	Cottonseed oil	Cleanser
Methanol	Glycerin	
Nitric Acid 10%	Grease	

All system surfaces exposed outside of an enclosure are resistive to the following chemicals:

- Commercial glass cleaners
- Ammonia (10% dilute solution)
- Motor oil
- Hydraulic fluid
- Diesel fuel
- Gasoline (leaded, unleaded)
- Silicone based lubricant
- Alcohol (ethyl, methyl)
- Automatic transmission fluid

Important   Sustained exposure to brake fluid or Gunk[®] brand degreaser can cause damage to monitor materials.

Drives

The PC9/P9 is equipped with a variety of storage and read/write devices. They include a 3.5" floppy disk drive, hard disk drive (optional in the P9), CD-ROM drive, and Compact Flash (CF) card slot. These drives are described below, and their locations (except for the hard drive) are illustrated. Following the descriptions are tables detailing the system's drive definitions, memory map, and guidelines for using the system's memory and storage devices.

Floppy Drive

The PC9/P9 has a 3.5", 1.44MB floppy drive, located on the left side of the unit, as shown in the illustration below.

Floppy drive
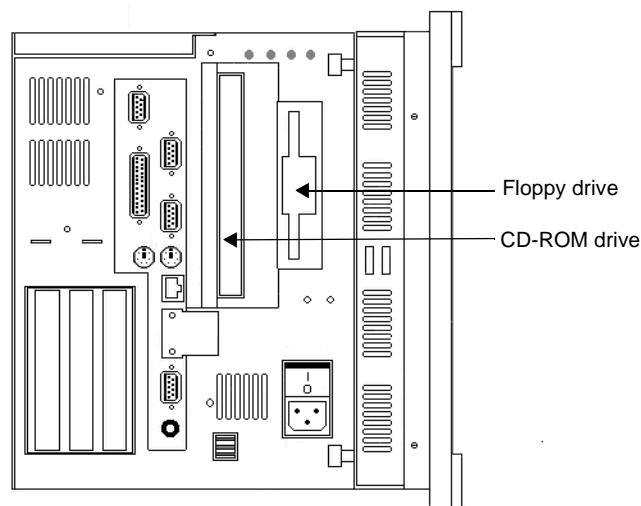
CD-ROM drive

Hard Drive

The system has an internal hard disk drive for storing system files, projects, and applications. This drive is optional in the P9.

CD-ROM Drive

A 40X CD-ROM drive is located on the left side of the unit (see the preceding illustration) and can be used to read files or load and run software.

> **Note** A combination CD-ROM/DVD drive or writeable CD-ROM drive can be used in the PC9/P9. Contact our Customer Service department at 513-831-2340 about availability and pricing.

Compact Flash Slot The PC9/P9 has a slot to accommodate a Compact Flash (CF) card. This slot is located at the back of the unit, as shown below.

CF slot
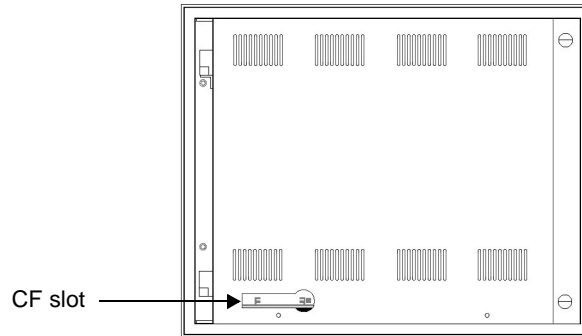
The CF card is like a removable hard drive and provides non-volatile memory storage. A CF card is often used as a supplement to, or a replacement for, a hard drive because the CF is well-suited to environments in which the unit may be vibrated or shaken. However, because the card is like a removable hard drive, you must treat it in the same way. For example, do **not** insert or remove the CF card while power to the system is on.

You can use the CF as the startup drive in the system or as a secondary IDE hard drive. Also, if necessary, you can reformat a CF card or update the application files on it. See *Reformatting a Compact Flash Card* on page 69 for complete instructions.

If you have purchased a CF card, we recommend that you purchase at least one additional card to serve as a backup; you may wish to have several cards to store different projects. You can purchase additional CF cards from CTC Parker. Call our Customer Service department at 513-248-2340.

To remove and replace the Compact Flash card, complete the following steps:

1. Turn off the system.

Important Always make sure that the system is turned off when inserting or removing a CF card.

2. Press the eject button, and remove the CF card by sliding it out of its slot toward you.

3. When you are ready, reinstall the CF card by carefully inserting it into its slot and pushing it into the slot until the card is securely seated (the eject button should pop out).

Important When inserting the CF card, align pin 1 on the card with the arrow that appears over the CF slot.

Drive Definitions

The table below provides information about the PC9/P9's drive definitions.

Drive Letter	Type	Size	Use
A	3.5" Floppy drive (read/write)	1.44MB	Can be used to install software or save files. Use it to download projects to the unit, back up files, and log data.
C	Hard drive (read/write) *Optional in the P9*	3.2GB or higher.	Primary drive when installed. Stores system startup files, projects, and applications. In the P9, also stores the MachineShop Shell, Interact, and Machine-Logic. Download files and log data to this drive.
E	CD-ROM drive (read only)	N/A	Can be used to load operating systems or new programs.
D	Compact Flash (CF) card (read/write) *Optional in the PC9 and P9*	8, 16, 32, 48, 96, or 128MB	Primary drive when no hard drive is installed; secondary drive when a hard drive is installed. Like a hard drive, can store system startup files, projects, and applications. In the P9, also stores the MachineShop Shell, Interact, and Machine-Logic. Download files to this drive. Log data to the CF only if its size is sufficient or if you are using it in combination with a hard drive.

Memory Map   The following table illustrates how the system allocates conventional memory and extended memory. The range of available address references is listed next to each device.

> **Note**   The factory default for the Compact Flash card maps from C8000 to CAFFF.

Address Range (decimal)	Address Range (hex)	Size	Description
1024K-524288K	100000-20000000	511MB	Extended memory
1008K-1024K	FC000-FFFFF	16KB	Boot block
1000K-1008K	FA000-FBFF	8KB	ESCD (plug and play configuration area)
931K-1,000K	E9000-F9FF	104KB	Phoenix system BIOS
895K-931K	E0000-E8FFF	16KB	Available high DOS memory (cannot be used by adapters)
800K-895K	C8000-DFFFF	132KB	Available high DOS memory (can be used by ISA or PCI adapters)
640K-800K	A0000-C7FFF	160KB	Video memory and BIOS
0K-640K	00000-9FFFF	640KB	Conventional memory

Memory Guidelines   If you are using Interact or MachineLogic to develop HMI or
control applications, refer to the memory guidelines listed below
for runtime and development systems.

Memory Type	Runtime	Development
System DRAM	8MB of system memory can run APM, AMM, GMM, and PTM run-time modules and two drivers. Extra modules require more memory.	32MB of system memory required.
Floppy drive	The 1.44MB floppy drive can be used to store logged data.	The 1.44MB floppy drive can store most applications.
Hard drive *Optional in the P9*	The hard drive can store applications and logged data.	The hard drive can store any application. 50MB is needed for the complete MachineShop development suite (Toolbar, Interact, and MachineLogic), 10MB for the Toolbar alone.
Compact Flash *Optional in the PC9 and P9*	An 8MB Compact Flash can store APM, AMM, GMM, and PTM, plus four additional runtime modules, two drivers, and approximately thirty screens. Extra modules require greater storage capacity (four modules/MB). Up to 1MB is needed to store MachineLogic applications. Log data to the CF only if its size is sufficient or if you are using the CF in conjunction with a hard drive.	

Ports   The PC9/P9 has the following ports:

- Four 16C550 external serial ports
- One internal serial port (optional) available for touchscreen systems only
- Two standard or bi-directional parallel ports (one internal)
- Two PS/2 ports: one each for mouse and keyboard
- One Ethernet port
- One sound port
- One video port
- Two USB ports.

The illustration below shows the location of these ports; the sections that follow explain the ports' uses and specifications.
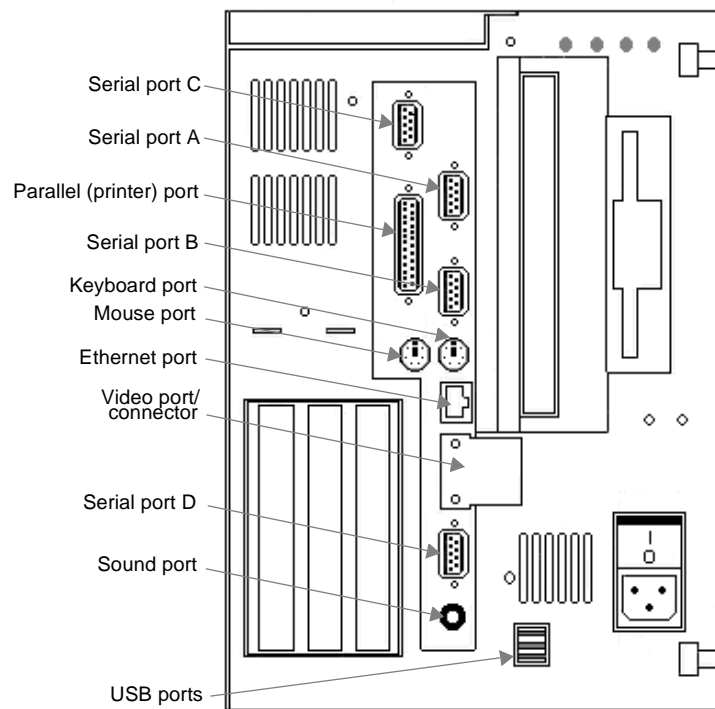
Serial Ports   The PC/P9 has four 9-pin serial ports that can be used to communicate with external devices. These ports are identified as A, B, C, and D. All are located on the left side of the unit (see the preceding illustration) through standard, 9-pin, female D-sub connectors, and all can be disabled or configured for different IRQs and I/O addresses via BIOS controls.

Ports A, B, and C support the RS-232 communication standard. Port D is configurable and supports RS-232, RS-422, and RS-485 standards. The default configuration is RS-485. The communication standard that you select for this port depends upon the distance between the system and the controller, as well as the communication standards that the controller supports:

- If you are using RS-232 communications, the length of the serial cable should not exceed 50 feet (15 meters).
- RS-422 and RS-485 communications offer greater noise immunity than RS-232 and increase the maximum cable length to 4,000 feet (1,200 meters).

RS-422 communications are full-duplex (can send and receive simultaneously). RS-485 communications are half-duplex (can only send or receive at one time).

For information on the specific connections required for Interact or MachineLogic drivers, look in the Help file associated with the driver.

For instructions on how to reconfigure Port D for the RS-232 or RS-422 protocol, see *Changing Jumper Settings* on page 92. You also may wish to read *Port D pinouts* on page 26 and *Port D Cable diagrams* on page 27.

Port A, B, and C pinouts

If you need to make a cable for communicating with ports A, B, or C, the following table shows the pinouts and signal information for these ports.

Pin #	Signal Name—RS 232
1	DCD, data carrier detect
2	RX, received data
3	TX, transmitted data
4	DTR, data terminal ready

Pin #	Signal Name—RS 232
5	GND, signal ground
6	DSR, data set ready
7	RTS, request to send
8	CTS, clear to send
9	RI, ring indicator

Port D pinouts

If you need to make a cable for communicating with port D, the table below shows the pinouts and signal information for this port. Port D is set to the RS-485 protocol by default.

Pin#	Signal Name		
	RS-232	**RS-422**	**RS-485**
1	DCD, data carrier detect	TX-, transmitted data -	TX-, transmitted data -
2	RX, received data	TX+, transmitted data +	TX+, transmitted data +
3	TX, transmitted data	RX+, received data +	RX+, received data +
4	DTR, data terminal ready	RX-, received data -	RX-, received data -
5	GND, signal ground	GND, signal ground	GND, signal ground
6	DSR, data set ready	DSR, data set ready	DSR, data set ready
7	RTS, request to send	RTS, request to send	RTS, request to send
8	CTS, clear to send	CTS, clear to send	CTS, clear to send
9	RI, ring indicator	RI, ring indicator	RI, ring indicator

Port D Cable diagrams

The following diagrams represent the pinouts and cable diagrams required for communicating with port D, using the RS-232, RS-422, or RS-485 protocol.

RS-232	RS-422	RS-485
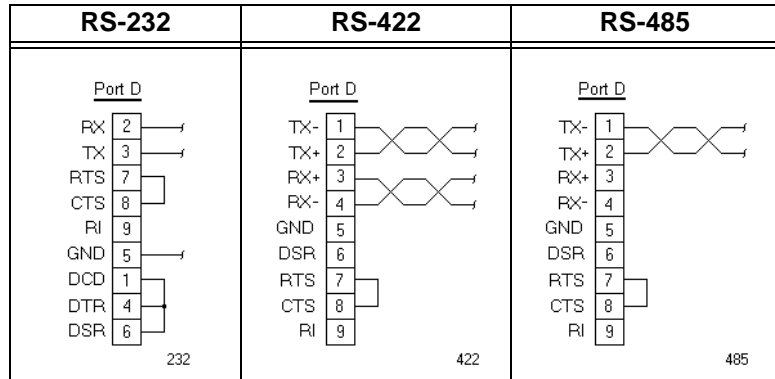
Important   Be careful not to connect any wires to unused connector pins.

Connecting to a PC

If you wish to transfer files via serial connection from another PC to your system, connect a serial cable with a null modem to an available serial port on the other PC. Connect the other end of the cable to a serial port on your system. If you need to construct your own cables, refer to the diagrams below.
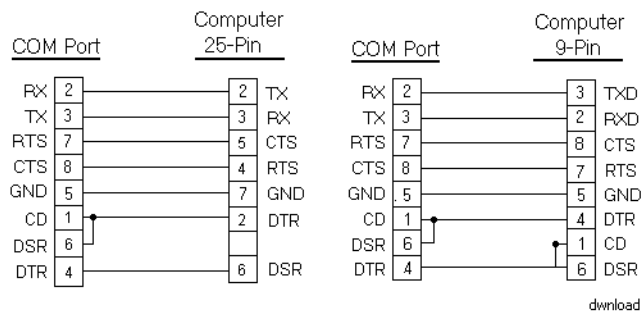
Parallel Port The PC9/P9 has two parallel ports:

- One external, printer port, located on the left side of the unit (see the illustration on page 24)

- One internal port, located on the system's CPU card.

The pinout information for the external printer port is shown in the following table.

Pin #	Signal Name
1	STB (-STROBE)
2	PD0 (+DATA BIT 0)
3	PD1 (+DATA BIT1)
4	PD2 (+DATA BIT 2)
5	PD3 (+DATA BIT 3)
6	PD4 (+DATA BIT 4)
7	PD5 (+DATABIT 5)
8	PD6 (+DATA BIT 6)
9	PD7 (+DATA BIT 7
10	ACK (- ACKNOWLEDGE
11	BUSY (+BUSY)
12	PE (PAPER END
13	SLCT (+ SELECT)
14	AFD (- AUTO FEED)
15	ERR (- ERROR)
16	INIT (- INITIALIZE PRINTER)
17	SLIN (- SELECT INPUT)
18-25	GND (GROUND)

The system can interface with any parallel printer designed for use with PCs. Connect a printer to the external parallel port, using a standard PC parallel cable.

PS/2 Port   The PC9/P9 has two PS/2 ports located at the left side of the unit (see the illustration on page 24)—one to connect a keyboard to the system and the other to connect a mouse. The pinout information for these ports is shown in the table below.

Pin	Signal Name
1	DATA
2	NC
3	GND
4	+5V (Fused)
5	CLOCK
6	NC

Ethernet Port   The system has an Ethernet RJ-45 port that allows you to connect the unit to a Local Area Network (see the illustration on page 24). This port uses an Intel 82559 10/100 Mbps PCI Fast Ethernet controller with an integrated IEEE 802.3 10Base-T and 100Base-TX interface. The port is software compatible with the NE-2000 protocol and supports all major network operating systems. The pinout information for this port is shown in the table below. Consult the manual that came with your network software for setup options.

Pin#	Signal
1	TX+
2	TX-
3	RX+
4	75 Ohm Terminator
5	75 Ohm Terminator
6	RX-
7	75 Ohm Terminator
8	75 Ohm Terminator

Sound Port   The system has a sound port (see the illustration on page 24) that will support external stereo speakers via an ESS Audio Drive® sound controller. The port provides a SoundBlaster Pro™-compatible sound interface.

> **Note**   We recommend using an amplified speaker system with the PC9/P9.

Video Port The PC9/P9 has a dedicated video port, to which a cable from the system's monitor is attached (see the illustration on page 24).

The video port has 2MB of embedded video memory, arranged in a 64-bit configuration. Up to 4MB of video memory is available. Please call CTC Parker at 513-523-2340 if you want to order additional memory.

The system's video output will support monochrome and high resolution color displays. Moreover, the PC9/P9 has an exclusive on-screen display (OSD) utility that enables users to increase or decrease the size of the video display among VGA, SVGA, and XGA resolutions.

> **Note** The maximum resolution of the system's display is 800x600 (12.1" display) and 1024x768 (15" display), but the video port can support up to 1280x1024.

If you wish, you may attach an external VGA, SVGA, or XGA monitor to the video port in place of the standard, flat-panel display. If you attach a signal splitter to this port, you can connect both the system's monitor and an external monitor to the signal splitter and use both monitors simultaneously. However, you will only be able to use a touchscreen in one of the two monitors.

For assistance in connecting two monitors to the system, contact our Technical Support department at 513-248-1714.

USB Ports The PC9/P9 has two external USB ports available at the left side of the unit (see the illustration on page 24). Each port can support one peripheral device. However, if you want to connect more than two USB devices, you can connect an external hub to either port. Self-identifying peripherals can be plugged in while the system is running, and the system has automatic mapping of function to driver and configuration.

> **Note** USB is supported only by drivers within Windows 98.

Watchdog Timer

The PC9/P9's CPU card supports a two-stage watchdog timer. In the first stage, if the processor does not read or write to the Timer Register within 1.6 seconds, the timer will generate an interrupt (IRQ10). You can program the second-stage time-out for an adjustable period, which, when timed out, will reset the board.

You can program the watchdog timer by setting the desired time-out into the 8-bit Watchdog Register (address 1FF7h + BASE). The register map appears below.

Address	1FF7h + BASE
Bit 7	WDS
Bit 6	BMB4
Bit 5	BMB3
Bit 4	BMB2
Bit 3	BMB1
Bit 2	BMB0
Bit 1	RB1
Bit 0	RB0

The most significant bit of the watchdog is the WDS.

- When WDS is set to 0, the watchdog will activate the IRQ/ output when the watchdog times out.
- When WDS is set to 1, the watchdog will output a negative pulse on the RST/output. This signal will reset the board.

The next five watchdog bits, BMB4-BMB0, store a binary multiplier. The two lower order bits, RB1-RB0, select the resolution, where 00 = 1/16 of a second, 01 = 1/4 of a second, 10 = 1 second, and 11 = 4 seconds.

- The watchdog timeout value is determined by multiplying the five-bit multiplier value by the two-bit resolution value.
- For example, writing 10001110 in the Watchdog Register = 3 x 1 second, or 3 seconds.

If the processor does not reset the timer within the specified period, the Watchdog (WF) flag is set, and the watchdog will reset the board. The timer resets when the processor performs a read or write of the Watchdog Register.

You can disable the watchdog timer by writing a value of 00h to the Watchdog Register. If you do this, the watchdog function will automatically be disabled at start-up, and the Watchdog Register will be cleared.

Battery

The PC9/P9 uses a 3.0V battery for real time clock backup and CMOS storage. The socketed battery is located on the CPU card and is replaceable. Please contact our Technical Support department at 513-248-1714 for details.

CAUTION for units with replaceable Lithium batteries

There is danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same type of battery or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Fans

The PC9/P9 has three cooling fans, one in each of the system's two internal compartments, the configuration bay and the maintenance compartment, and one on the system's CPU card, located in the configuration bay. The fans operate at two speeds, depending upon the temperature in each compartment. These speeds and the compartment temperatures are shown in the following table.

Compartment Temperature	Fan Speed
Less than 16° C	Off
16° C-33° C	Mid-speed (approx. 2,300 rpm)
Greater than 33° C	Full speed

All fans are run by a microcontroller, described in *PowerSmart,* on page 34. At system startup, all fans will run at full speed to insure that they are operating properly. After 10-15 seconds, the fans will change speeds if appropriate. They will switch off automatically if the system is cool or is being operated in a cool environment.

The microcontroller will attempt to run the fans at full speed whenever it detects that they are running too slow or are stopped. This is to try to dislodge any obstruction in the fan blades.

If the CPU fan is out of specification, the configuration bay fan will run at full speed to compensate until the CPU fan can be replaced.

PowerSmart

The PC9/P9 comes with a PowerSmart system monitor utility that continuously monitors the system's power supply output voltage, internal temperatures, fan speeds, and hours of operation.

On systems running Windows 95 or 98, PowerSmart appears as a graphical display, shown below. You can activate this display by clicking the PowerSmart icon on the Windows desktop.
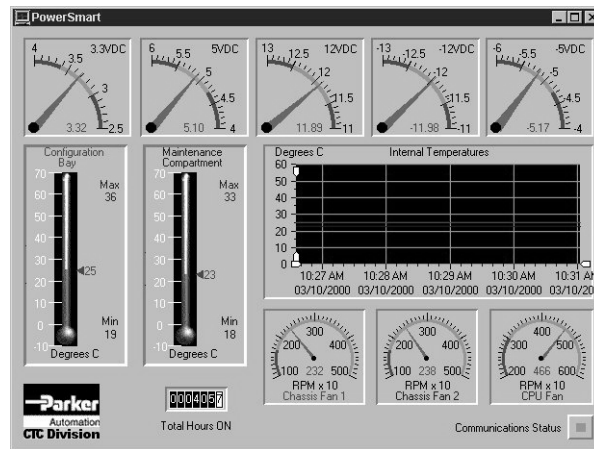
On systems running MS-DOS, you can access a text-based version of this display by running the file **Pwrsmrt.exe** at the DOS prompt.

Under either Windows or MS-DOS, PowerSmart continually monitors the system regardless of whether the displays are shown.

Important   PowerSmart will not run under Windows NT. On systems running Windows NT, start up the system in MS-DOS mode, insert the PowerStation Start Disk (P9) or PC9 Drivers and Utilities CD, and run **Pwrsmrt.exe** from the source disk.

As the illustration above shows, PowerSmart tracks and reports the following data:

• The system's five power supply output voltages

• Temperatures in the system's two internal compartments: the configuration bay and maintenance compartment (the Internal Temperatures window displays temperature data for the last 24 hours)

- Fan speeds of the system's three fans: configuration bay (Chassis Fan 1), maintenance compartment (Chassis Fan 2), and CPU fan)
- Total hours that the system has been in operation
- Communication errors in system monitoring devices (Communications Status)

Using a mouse to move the small, white zoom arrows in the Internal Temperatures window will enable you to see more precise temperature and time readings.

If any system parameters are out-of-limit, the PowerSmart display will change color, and the gauges will show the error condition. If the display has been minimized, the PowerSmart button on the Windows taskbar will flash continually. Click on the button to show the display.

If any communication errors occur in system monitoring devices, the Communications Status light (in the lower right corner of the display) will change from green to red, and a COM ERROR dialog box will appear to describe the problem.

See *Problems Signaled by PowerSmart* on page 106 for suggestions on how to respond to error conditions.

To perform its functions, PowerSmart uses the I^2C devices shown in the table on the following page. All devices are connected on a two-wire SMBus.

I²C Device	Location	Function
Microcontroller (87LPC764)	Riser card (U10)	Programs and monitors all other peripheral devices on the bus. Determines the presence of error conditions. Controls fan speeds. Logs error counts, temperature extremes, and hours of operation. Communicates error and status information to the SMBus host interface.
Peripheral monitor (DS1780)	Riser card (U9)	Monitors power supply voltages, configuration bay temperature, and fan speeds in the configuration bay and maintenance compartment.
Temperature monitor (LM 75)	Riser card (U12)	Monitors temperature in the maintenance compartment.
EEPROM (24C02)	Riser card (U11)	Stores error counts, temperature extremes, operation hours, and system configuration information.
CPU fan monitor (LM79)	CPU card (U38)	Monitors CPU fan speed.

I/O Addresses and IRQs

This section describes the I/O addresses and IRQs used by the PC9/P9.

I/O Addresses

The table below indicates the I/O addresses used by the PC9/P9. Make sure that any adapter cards you install do not conflict with these addresses.

Address	Function
0000-000F	DMA Controller 1
0020-0021	Interrupt Controller 1
0040-0043	Counter timer 1
0048-004B	Counter timer 2
0060-0064	Keyboard, NMI, speaker
0070-0071	Real time clock/NMI mask
0072-0073	Accesses upper 128-byte extended bank of RAM
0080-008F	DMA page register, POST checkpoint
00A0-00A1	Interrupt Controller 2
00C0-00DE	DMA Controller 2
00F0	Reset co-processor
0170-0177	Secondary IDE channel (opt)
01F0-01F7	Primary IDE channel
0278-02FF	Parallel port 2 (opt)
02E8-02EF	Serial port 4 (opt)
02F8-02FF	Serial port 2 (default)
0376	Secondary IDE port (opt)
0377	Floppy channel 2 command
0377 bit 7	Floppy disk change, channel 2
0377 bit 0:6	Secondary IDE channel status port
0378-037F	Parallel port 1 (opt)
03BC-03BF	Parallel port 3 (opt)
03E8-03EF	Serial port 3 (opt)
03F0-03F5	Floppy channel
03F6-03F7	Primary IDE and floppy
03F8-03FF	Serial port 1 (opt)
04D0-04D1	Edge/level interrupts

Address	Function
0CF8-0CFF	PCI configuration
4295-4296	LM79 Monitor Device registers

IRQs   The PC9/P9 configures IRQs as shown in the table below.

IRQ	Default	Option	Option
NMI	Parity/System errors		
0	System timer		
1	Keyboard		
2	Cascade for IRQ 8-15		
3	COM2/COM4		
4	COM1/COM3		
5	MachineLogic hardware adapter	Available to user	Parallel port 2
6	Floppy controller		
7	Touchscreen	Parallel port 1	
8	Real time clock		
9	Available to user	COM4	COM3
10	Available to user		
11	Available to user	COM3	COM4
12	Reserved/PS/2 mouse		
13	Co-processor		
14	Primary IDE		
15	Available to user	Compact Flash	

If you choose to change IRQ settings, keep the following in mind:

•   If you have a touchscreen system, and you assign IRQ7 to parallel port 1, you must assign the touchscreen a different IRQ.

- Any IRQ designated as "Available to user" can be taken by the PCI Ethernet adapter, which is a plug and play device. To see which IRQ the Ethernet adapter is using in systems running under Windows, click **Start** on the Windows taskbar. Then click **Control Panel/System/Device Manager/Network Adapters/PCI adapter/Properties**.

P9 Design Issues

This section concerns special design issues in P9s using touchscreens and hard drives. If you do not have a P9 with either of these features, you may skip this section.

Using a Touchscreen with Interact

If you are using a touchscreen with Interact, and your application uses PTM slide input tools, be sure to select the Arrow cursor type using the Interact Settings command in Application Manager. When you select the Arrow cursor type, touching the slide tool selects the tool, and moving your finger over the touchscreen moves the slide knob.

If you use the Box Cursor type, the slide knob immediately moves to the location where you press the tool. For example, if the knob is currently positioned at 100, and you press the touchscreen at a value of 800, the knob immediately moves to 800 and writes this value to the controller.

Warning Using the Box Cursor with a touchscreen and an application that uses slide input tools may cause you to inadvertently select input values. If your application requires you to use a cursor, select the Arrow cursor type instead.

Using a P9 with Hard Drive

In P9s using a hard drive as the storage device, the main CONFIG.SYS file (in the root directory of drive C) cannot call a user's CONFIG.SYS file that may be included in the Startup directory. In this case, you will need to incorporate the information from CONFIG.SYS in the Startup directory into the main CONFIG.SYS file.

Chapter 3

Installation

This chapter gives guidelines for selecting an appropriate location for the PC9/P9. It also provides instructions for creating a cutout, mounting the system in an enclosure, and starting up.

Chapter Contents

Selecting a Location

The first step in installing your PC9/P9 is to select an appropriate location. This is the most important aspect of installation because the location you select can affect the system's performance, ease-of-use, and life-expectancy. This section provides some guidelines to follow when selecting a location.

Class I, Division 2 Guidelines

If you purchased a Class I, Division 2-compliant system, you must always follow these guidelines to maintain a safe operating environment:

1. Suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations only.

2. **Warning: Explosion Hazard**—Do not disconnect equipment or replace or insert cards unless power has been switched off, or the area is known to be non-hazardous.

3. **Warning: Explosion Hazard**—Substitution of components may impair suitability for Class 1, Division 2.

4. Make sure that the power cord is always secured to the system using the supplied L-bracket.

Environmental Guidelines

The environment is the area where the system will be located. In general, you should select a place that limits the system's exposure to adverse conditions, such as dust, oil, moisture, and corrosive vapors.

Faceplate considerations

The faceplate is designed for a NEMA 4/4X environment. However, it is only rated NEMA 4 if it is installed in a NEMA 4-rated enclosure

The system's faceplate is resistant to a variety of chemicals. See *Faceplate Chemical Resistance* on page 17 for a complete list.

Electrical Guidelines
To minimize unwanted electrical interference, select a location away from machinery that produces intense electrical noise (arc welders, for example). If this cannot be avoided, isolate input power to the system, and separate all data communication cables from power lines.

Important In order to comply with UL 508 and 1604 requirements, use copper wire with 60C or 60/75C insulation and a tightening torque of 7.0 lb./in. (0.79 N-m) when connecting field terminal wiring to the system.

The PC9/P9 accepts AC input only. See *Electrical Specifications* on page 16 for a list of the system's electrical specifications. Consult our Customer Service department (513-831-2340) if you wish to use DC power to operate the unit. Make sure that your power source is completely compatible with the system before starting up.

Temperature Guidelines
You can safely operate the system within the temperature range specified in *Environmental Specification*s on page 15. However, if you are using a protective enclosure, remember that the temperature within an enclosure is generally higher than the external temperature. If the system is operating inside an enclosure at temperature levels above its rated ambient temperature, you must cool the enclosure.

Enclosure Guidelines
Select an enclosure that is large enough to allow free airflow in and around the system. Allow a minimum of 2 inches around the unit for airflow. Allow at least 3.5" between the enclosure and the left side of the unit so that the CD-ROM drive tray can open (see *Accessing Ports, Drives, and Other Controls,* below).

Make sure that the surface where the unit will meet the front panel of the enclosure is flat in order to ensure a NEMA seal.

Accessing Ports, Drives, and Other Controls
As shown on page 24, most of the system's available ports, including its serial ports, printer port, USB ports, PS/2 mouse and keyboard ports, Ethernet port, and power input, are located on the left side of the unit, behind the display.

Also located there are the On/Off switch, on-screen display (OSD) controls, floppy disk drive, and CD-ROM drive.

Important   Allow at least 3.5" between the enclosure and the left side of the unit so that the CD-ROM drive tray can open.

The Compact Flash slot is located at the back of the unit, on the lower left-hand side as you face the back.

Be sure to design your enclosure with these locations in mind. See *Dimensional Drawings* on page 115 for your system's depth and port dimensions. You can use these dimensions to customize the mounting of your unit.

Creating the Cutout

In order to mount the system in an enclosure, you first will have to create a cutout for the unit and clean the cutout area of all dirt or debris.

To create a cutout, complete the following steps:

1. Cut a space in which to mount the unit. The cutout dimensions will depend upon the size of your system's monitor and are shown in the table below.

| Monitor Size	Cutout Height	Cutout Width
12.1"	11.25" (285.75mm)	14.15" (359.41mm)
15"	12.40" (314.96mm)	15.90" (403.86mm)

2. Debur the cutout area.

3. Make sure that the front panel mounting surface is clean and flat.

Mounting the System

Once you have created the cutout, you can mount the PC9/P9 in its enclosure. The necessary mounting clamps and screws are shipped with your system.

To mount the system in an enclosure, complete the following steps:

1. Slide the unit into the cutout from the front.

2. Attach the mounting clamps to the back of the unit, as shown below.

Mounting clamps

Front of enclosure
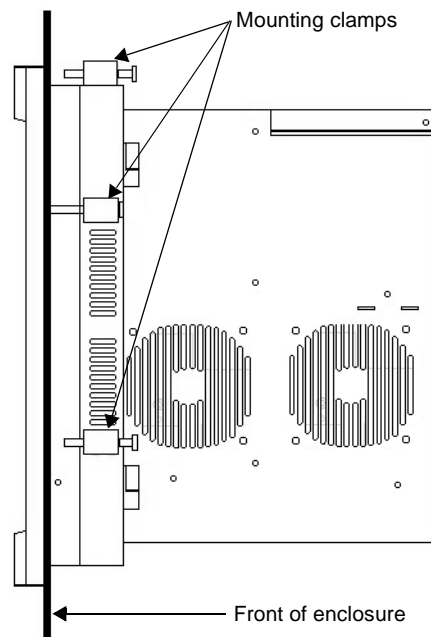
- If you have a system with a 12.1" monitor, attach 6 mounting clamps, with their screws, to the back of the unit in the spaces provided for them. You will place 2 clamps at the top and bottom of the unit and 1 on each side.

- If you have a system with a 15" monitor, attach 8 mounting clamps, with their screws, to the back of the unit in the spaces provided for them. You will place 2 clamps at the top and bottom of the unit and 2 on each side, as shown in the preceding illustration.

Note The prongs at the bottom of each clamp should face backward, as in the illustration below, and should hook into the slots in each space. The end of each screw should point toward the front of the enclosure.

Front of enclosure

Clamp with prongs facing backward
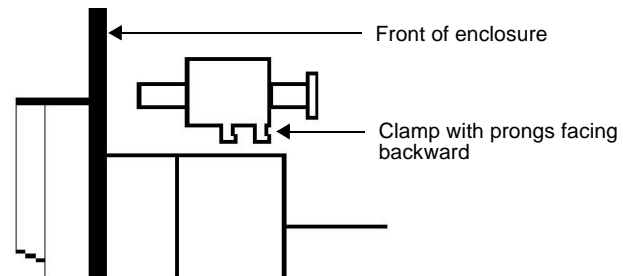
3. Tighten each screw against the front of the enclosure to a torque of 8 lb./in.

Starting Up

Once the PC9/P9 has been mounted, you are ready to start it up. This procedure is described below.

Before connecting power to the unit, make sure that you have read and understood *Electrical Specifications* on page 16 and *Testing Specifications* on page 17. Also, make sure that you follow the guidelines listed below:

• For **permanently connected equipment**, a readily accessible disconnect device must be incorporated in the fixed wiring.

• For **pluggable equipment**, the socket-outlet must be installed near the equipment and should be easily accessible.

Important Proper installation of the system in European Union countries requires the use of a harmonized power cord (the power cord must be identified with the <HAR> symbol). Make sure that the system is only connected to the main supply with a harmonized power cord.

1. Make sure that the power switch is off.

2. Connect the power cord to a voltage source. Voltage input to the system should be within the range specified in *Electrical Specifications* on page 16.

3. Connect the power cord to the system.

4. Turn the system on.

   The power input and On/Off switch are shown in the illustration at the top of the next page.

   The fan should come on, followed immediately by the display.

On/Off switch

Power input
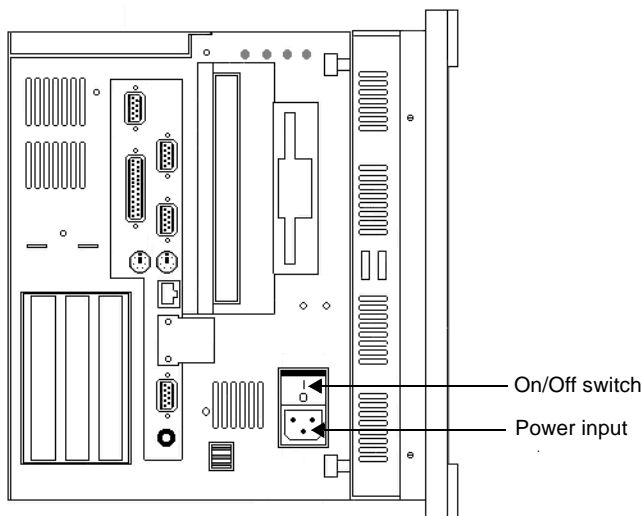
Following are guidelines for starting up under Windows, 95, 98, or NT; under a multiboot system; or under MS-DOS.

Starting in Windows 95 or 98

If you are running Windows 95 or 98, the system will automatically load your Windows operating system.

Starting in Windows NT

To load Windows NT at startup, complete the following steps:

Important   You must have a keyboard connected to the system in order to load Windows NT.

1. Start up the system, and press **Crtl+Alt+Delete.**

2. When the Logon Information window prompts you for the Administrator's password, press **Enter**, or click **OK** (the password is blank by default).

3. Click **Close** in the Help window if you do not want Help when you first enter Windows NT.

Starting in Multiboot Systems

When starting in a multiboot system, you will be shown a menu, in which you will have the option of booting into Windows NT or MS-DOS. The system is set to default to Windows NT. You may change the default so that each time the unit starts up, it defaults to MS-DOS. You may wish to do this so that operators do not have to change the default selection every time the unit starts up.

To set MS-DOS as the default operating system, complete the following steps:

1. Select **Windows NT** as the operating system. This is the default selection when starting the unit.

2. On the Windows taskbar, click **Start**; then click **Settings** and **Control Panel**.

   The Control Panel window will open.

3. In the Control Panel window, click **System**.

   The System Properties dialog box will open.

4. In the System Properties dialog box, click the **Startup/Shutdown** tab.

5. Select **MS-DOS** from the Startup drop-down list.

6. From the "Show List For" spin box, select the number of seconds the menu is displayed upon startup.

7. Click **OK**.

The next time the system starts, MS-DOS will be the default operating system.

Starting in MS-DOS

If you are running a P9 under MS-DOS, the system will automatically load the MachineShop Shell.

You are now ready to begin using your system.

If you are using Interact or MachineLogic software, refer to the *Interact Getting Started Guide* or the *MachineLogic Getting Started Guide* for help in developing your projects. Refer to the *MachineShop Getting Started Guide* for information about how to download projects.

Maintenance and Troubleshooting

Occasionally, you may need to perform routine maintenance on some system components. This chapter provides instructions for maintenance, as well as steps for solving problems that may occur in operation.

Chapter Contents

Reinstalling Software

The PC9/P9 comes pre-loaded with the operating system that you requested, as well as all other necessary utilities so that you can run your system immediately upon arrival. Backup copies of this software are provided on the CDs and floppy disks shipped with your system. Should any of the drivers or other utilities on your system become lost or corrupted, you may want to reinstall them from these source disks. The procedures in this section tell you how to reinstall the following software in the PC9 and P9:

• CD-ROM Driver
• Touchscreen driver
• Network driver
• PowerSmart system monitor
• Video driver (PC9 only)
• Audio driver (PC9 only)
• PowerStation utilities (P9 only)
• MachineShop Shell (P9 only)

Reinstalling in the PC9

The instructions in this section explain how to reinstall drivers and utilities in the PC9 under Windows 95, 98, and NT 4.0. If you do not have a PC9, you may skip this section.

To reinstall drivers and utilities in the PC9, you will need the following CDs/disks:

• PC9 Industrial PC Drivers and Utilities CD (KA-73049-100)
• Windows 95, 98, or NT 4.0 distribution CDs/disks

> **Note** If you need additional help reinstalling drivers and utilities in the PC9, you may want to consult the readme files included on the PC9 Drivers and Utilities CD, or call our Technical Support department at 513-248-1714.

Reinstalling the CD-ROM driver and Windows

The CD-ROM driver for the PC9 is part of the Windows operating system that you use (Windows 95, 98, or NT). The most important reason why you might need to reinstall the CD-ROM driver is if your operating system is damaged. In that case, you will need to reinstall the CD-ROM driver in order to reinstall the operating system from your Windows distribution CD. Fortunately, you can do this by using a special startup disk, along with your operating

system distribution CD. The special startup disk will enable you to reinstall the CD-ROM driver and the operating system in one procedure. After reinstalling the operating system, you also will have to reinstall the video, touchscreen, network, audio, and PowerSmart drivers in the PC9.

To complete the CD-ROM driver/operating system installation, you will need the following:

- **Windows 95 users:** Windows 95 distribution CD and Windows 95 CD-ROM Setup Boot Disk (KA-73050)

- **Windows 98 users:** Windows 98 distribution CD and Windows 98 Boot Disk (the Boot Disk is included with the distribution CD)

- **Windows NT 4.0 users:** PC9 Win NT 4.0 Emergency Recovery Disk (KA-73057)

Before reinstalling any operating system, you will have to make a change to the BIOS (Basic Input Output System), a set of routines that interfaces between your operating system and the computer.

To change the BIOS, complete the following steps:

1. Start up the system.

2. As the system is starting up, press **F2** to enter the BIOS.

3. Click the **Advanced** menu, and then click on **I/O Device Configuration**.

4. Change Serial Port C and D to **Disabled.**

5. Save your new settings, and exit the BIOS.

   You are now ready to reinstall your CD-ROM driver and Windows operating system.

To reinstall the CD-ROM driver and Windows 95 in the PC9, complete the following steps:

1. Insert the Windows 95 distribution CD into the system's CD-ROM drive.

2. Insert the Windows 95 CD-ROM Setup Boot Disk (KA-73050-100) into the system's floppy disk drive.

3. Start up the PC9.

    A message will appear, asking you to contact CTC Parker if the installation is not successful.

4. Press any key.

    At the next screen, press **Enter**, and follow the prompts to complete the installation.

5. When installation is complete, remove all disks, and restart the system.

    Important   You must restart the system for your installation to take effect.

6. After the unit restarts, use Windows Explorer to locate the folder Windows\Other\Usb on your CD-ROM drive.

7. Click the file **Usbsupp.exe**, and follow the installation wizard.

8. When installation is complete, re-start the system.

9. Remove the Windows 95 distribution CD, and insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

10. Use Windows Explorer to locate the PCIbridge folder on the CD-ROM drive.

11. In the PCIbridge folder, click **Setup.exe**, and follow the installation wizard.

12. When installation is complete, restart the system.

    You might need to restart the system several times to complete the installation process.

    Important   You must restart the system for your installation to take effect.

13. If you will need to use COM3 and COM4, follow the procedure for Changing the BIOS on page 53, and change serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, touchscreen, network, audio, and PowerSmart drivers in the PC9. For instructions, see *Reinstalling the video driver* on page 57, *Reinstalling the touchscreen driver* on page 59, *Reinstalling the network driver* on page 60, *Reinstalling the audio driver* on page 62, and *Reinstalling PowerSmart* on page 65.

To reinstall the CD-ROM driver and Windows 98 in the PC9, complete the following steps:

1. Insert the Windows 98 distribution CD into the system's CD-ROM drive.

2. Insert the Windows 98 Boot Disk into the system's floppy disk drive.

3. Start up the PC9.

   A screen will appear offering three start-up alternatives.

4. Type **1** for **Start Windows 98 Setup from CD-ROM**.

5. Press **Enter** to execute this command.

   Windows will load several drivers. Then the Welcome to Windows 98 Setup screen will appear.

6. Press **Enter** to install Windows 98.

7. When installation is complete, remove all disks, and restart the system.

Important You must restart the system for your installation to take effect.

8. If you will need to use COM3 and COM4, follow the procedure for Changing the BIOS on page 53, and change serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, touchscreen, network, audio, and PowerSmart drivers in the PC9. For instructions, see *Reinstalling the video driver* on page 57, *Reinstalling the touchscreen driver* on page 59, *Reinstalling the network driver* on page 60, *Reinstalling the audio driver* on page 62, and *Reinstalling PowerSmart* on page 65.

To reinstall the CD-ROM driver and Windows NT 4.0 in the PC9, complete the following steps: .

1. Insert the PC9 Win NT 4.0 Emergency Recovery Disk into the system's floppy disk drive.

2. Start up the PC9, and follow the prompts to reinstall Windows NT and the CD-ROM driver.

3. When installation is complete, remove all disks, and restart the system.

Important You must restart the system for your installation to take effect.

4. If you will need to use COM3 and COM4, follow the procedure for Changing the BIOS on page 53, and change serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, touchscreen, network, audio, and PowerSmart drivers in the PC9. For instructions, see *Reinstalling the video driver* on page 57, *Reinstalling the touchscreen driver* on page 59, *Reinstalling the network driver* on page 60, *Reinstalling the audio driver* on page 62, and *Reinstalling PowerSmart* on page 65.

Reinstalling the video driver

Use the following instructions to reinstall the Chips 69000 video driver on the PC9 under Windows 95, 98, or NT 4.0.

To reinstall the video driver in the PC9 under Windows 95, complete the following steps:

1. Start up the PC9, and insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

2. On the Windows taskbar, click **Start** and then **Run**.

3. Next to the word "Open," type `D:\Video\95\ w95500.exe`, and then click **OK**.

   > **Note** In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

4. Follow the installation wizard to install the video driver.

5. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect.

6. If necessary, switch on the on-screen display (OSD) controls, and optimize your OSD settings. See *Adjusting the Video Image* on page 71 for instructions on using the OSD controls.

To reinstall the video driver in the PC9 under Windows 98, complete the following steps:

1. Start up the PC9, and insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

2. On the Windows taskbar click **Start** and then **Run**.

3. Next to the word "Open," type `D:\Video\98\ w98600.exe`, and then click **OK**.

   > **Note** In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

4. Follow the installation wizard to install the video driver.

5. When installation is complete, restart the system.

Important   You must restart the system for your installation to take effect.

6. If necessary, switch on the on-screen display (OSD) controls, and optimize your OSD settings. See *Adjusting the Video Image* on page 71 for instructions on using the OSD controls.

To reinstall the video driver in the PC9 under Windows NT 4.0, complete the following steps:

1. Start up the PC9.

2. On the Windows taskbar, click **Start**; then click **Settings** and **Control Panel**.

   The Control Panel will appear.

3. Click **Display**.

   The Display Properties dialog box will appear.

4. Click the **Settings** tab.

   The Settings dialog box will appear.

5. Click **Display Type**.

   The Change Display Type dialog box will appear.

6. Click **Change in Adapter Type**.

   The Select Device dialog box will appear.

7. Insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

8. Click **Have Disk.**

   The Install from Disk dialog box will appear.

9. Under "Copy manufacturer's files from," type **D:\Video\ WINNT 40**, and then click **OK**.

   Note   In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

10. Select **Chips Video Accelerator** from the Display list, and then click **OK**.

    A warning about third-party drivers will appear.

11. Click **Yes** to complete the installation.

12. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect

13. If necessary, switch on the on-screen display (OSD) controls, and optimize your OSD settings. See *Adjusting the Video Image* on page 71 for instructions on using the OSD controls.

Reinstalling the touchscreen driver

Use the following instructions to reinstall the touchscreen driver in the PC9 under Windows 95, 98, or NT 4.0. If you do not have a touchscreen, you may skip this section.

To reinstall the touchscreen driver under Windows 95, 98, or NT 4.0, complete the following steps:

1. Insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

2. On the Windows taskbar, click **Start** and then **Run**.

3. Next to the word "Open," type **D:\Touch\Win9x\ Install.exe** (Windows 95/98) or **D:\Touch\WinNT\ Install.exe** (Windows NT), and then click **OK**.

   Note In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

4. Follow the installation wizard to install the video driver.

5. When prompted:

   • Set the Port Type to **Custom**.

   • Set the Interrupt to **7**.

   • Set the I/O Address to **338h**.

   Note These settings match the factory defaults.

6.   After installation is complete, restart the system.

Important   You must restart the system for your installation to take effect.

7.   Recalibrate the touchscreen if necessary. See *Recalibrating the Touchscreen* on page 78 for instructions.

Reinstalling the network driver

Use the following instructions to install the Pro/100B Ethernet adapter in the PC9 under Windows 95, 98, or NT 4.0.

To reinstall the network driver in the PC9 under Windows 95 or 98, complete the following steps:

1.   Start up the PC9.

2.   On the Windows taskbar, click **Start**; then click **Settings** and **Control Panel.**

     The Control Panel will appear.

3.   Click **System**.

     The System Properties dialog box will appear.

4.   Click the Device Manager tab.

5.   Click the + sign next to **Network adapters**.

     A list of installed network adapters will appear.

6.   Select the **Intel 8255X-BaseD PCI Ethernet Adapter (10/ 100)**.

       Note   This adapter should have an exclamation point (**!**) next to it.

7.   Click **Remove**, and follow the prompts on screen to uninstall the driver.

8.   Restart the system.

     The New Hardware Found dialog box will appear. It will identify the network adapter as a PCI Ethernet Controller.

9.   Insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

10. In the Update Device Driver Wizard, click **Next.**

    The wizard will list the driver it has found as **Intel (R) PRO/ 100+ PCI Adapter.**

11. Click **Finish**.

    > **Note**   If prompted, insert the Windows 95 distribution CD.

12. When installation is complete, restart the system.

> **Important**   You must restart the system for your installation to take effect.

To reinstall the network driver in the PC9 under Windows NT 4.0, complete the following steps:

1. Start up the PC9.

2. On the Windows taskbar, click **Start**; then click **Settings** and **Control Panel**.

    The Control Panel will appear.

3. Click **Network**.

    The Network dialog box will appear.

4. Click the **Adapter** tab.

5. On the Adapter tab, click **Add**.

    The Select Network Adapters dialog box will appear with a list of network adapters.

6. Do **not** select an adapter from this list. Instead, insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

> **Important**   You **must** load the Ethernet driver provided by CTC Parker. If you use the any of the drivers provided by Windows, your system will go to General Protection Fault; all programs will fail to respond.

7. Click **Have Disk**.

    The Install from Disk dialog box will appear.

8. Under "Copy manufacturer's files from," type **D:\Pro100 Ethernet**, and then click **OK**.

    Note In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

9. Follow the prompts to complete the installation.

10. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect.

Reinstalling the audio driver

Use the following instructions to reinstall the audio driver in the PC9 under Windows 95, 98, or NT 4.0.

To reinstall the audio driver in the PC9 under Windows 95, complete the following steps:

1. Start up the PC9.

2. On the Windows taskbar, click **Start**; then click **Settings** and **Control Panel.**

    The Control Panel will appear.

3. Click **System**.

    The System Properties dialog box will appear.

4. Click the Device Manager tab.

5. Click the + sign next to **Other Devices**.

    A list of installed drivers will appear.

6. Click the **PCI Multimedia Audio Device (ES1938 PCI Audio Drive)**.

7. A Device Properties dialog box will appear.

8. Click the **Driver** tab.

9. On the Driver tab, click **Update Driver**, and follow the installation wizard to install the driver. The path for the driver will be **D:\Audio\W95.**

10. When installation is complete, restart the system.

    The New Hardware Found dialog box will appear.

11. Click **Driver from disk provided by hardware manufac-
    turer**, and insert the PC9 Drivers and Utilities CD into the
    system's CD-ROM drive.

12. Select the path **D:\AUDIO\W95**, and then click **OK**.

    Note In this example, D represents the letter of your CD-ROM
    drive. If your system has assigned a different letter to the
    CD-ROM drive, type the appropriate letter.

13. In the next dialog box, click **OK**.

14. When installation is complete, restart the system.

Important You must restart the system for your installation to take
effect.

**To reinstall the audio driver in the PC9 under Windows 98,
complete the following steps:**

1. Start up the PC9.

2. On the Windows taskbar, click **Start**; then click **Settings** and
   Control Panel.

   The Control Panel will appear.

3. Click **System**.

   The System Properties dialog box will appear.

4. Click the Device Manager tab.

5. Click the + sign next to **Sound, video and game controllers**.

   A list of installed drivers will appear.

6. Select the **ES1938 PCI Audio Driver**.

   Note This driver should have an exclamation point (**!**) next to it.

7. Click **Remove**, and follow the prompts on screen to uninstall
   the driver.

8. Restart the system.

   The New Hardware Found dialog box will appear.

9. Select **Display a list of all the drivers in a specific location**, and then click **Next.**

10. Select **Sound, video and game controllers**, and then click **Next.**

11. In the next dialog box, click **Have Disk**.

12. Insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

13. Select the path **D:\AUDIO\W95**, and then click **OK**.

    Note In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

14. In the next dialog box, click **OK**.

15. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect.

To reinstall the audio driver in the PC9 under Windows NT 4.0, complete the following steps:

1. Start up the PC9.

2. Insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

3. On the Windows taskbar, click **Start** and then **Run**.

4. Next to the word "Open," type **D:\ Audio\WINNT40\ Setup.exe**, and then click **OK**.

    Note In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

5. Follow the installation wizard to complete the installation.

6. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect.

Reinstalling PowerSmart

Use the following instructions to reinstall the PowerSmart system monitor utility in the PC9 under Windows 95 or 98.

Note PowerSmart will not run under Windows NT. Systems running under Windows NT must be started in MS-DOS mode and must use the DOS version of PowerSmart (see *PowerSmart* on page 34 for more information about how to use this utility.

To reinstall the PowerSmart utility in the PC9 under Windows 95 and 98, complete the following steps:

1. Start up the PC9, and insert the PC9 Drivers and Utilities CD into the system's CD-ROM drive.

2. On the Windows taskbar, click **Start** and then **Run**.

3. Next to the word "Open," type **D:\PowerSmart\WIN9x\ Setup.exe**, and then click **OK**.

    Note In this example, D represents the letter of your CD-ROM drive. If your system has assigned a different letter to the CD-ROM drive, type the appropriate letter.

4. Follow the installation wizard to install the video driver.

5. When installation is complete, restart the system.

Important You must restart the system for your installation to take effect.

Reinstalling in the P9

The instructions in this section explain how to reinstall essential drivers, PowerStation utilities, and the MachineShop Shell in the P9. If you do not have a P9, you may skip this section.

Important The procedures described below should be completed under MS-DOS. If you are running Windows 95, 98, or NT on your P9, restart the system in MS-DOS mode. If you need additional help reinstalling drivers and utilities in the P9, call our Technical Support department at 513-248-1714.

Reinstalling P9 drivers and PowerStation utilities

The following procedure is for installing **all** of the P9 drivers and PowerStation utilities, which are stored in a zipped folder on the PowerStation Start Disk (KA-83109-101). If you want to reinstall **individual** drivers or utilities, you will need to have copied the following files from your hard drive or CF card onto one or more floppy disks (see *Getting Started* on page 6). You then can copy the file(s) you need into the appropriate directory on your hard drive/CF card.

File	Use	Directory
AUTOEXEC.BAT	Interact	Root
CONFIG.SYS	Interact	Root
MLCA.INI	CD-ROM driver	CTC
TOUCH.INI	Touchscreen driver	TOUCH\DOX
TCPIP.INI	Network driver	NET
NET.BAT	Network driver	NET
NET.CFG	Network driver	NET
PWRSMRT.EXE	PowerSmart	CTC

To reinstall all necessary drivers and utilities in the P9, complete the following steps:

1. Insert the PowerStation Start Disk into the system's floppy disk drive.

2. If necessary, change to the root directory of drive A by typing
    A:

3. Press **Enter** to execute this command.

4. At the DOS prompt, type **Install A: C:**

Important   In this example, C represents the drive letter of the device on which you want to install the PowerStation Utilities— either your hard drive or CF card. If you are using both a hard drive and a CF card in your P9, type the appropriate drive letter.

5. Press **Enter** to execute this command.

    You will be asked if this installation is for a Model P1.

6. Type **N** for No.

   You will be asked if this installation is for a Model P9.

7. Type **Y** for Yes.

   The system will copy the necessary PowerStation files from the Start Disk and unzip them.

   At the end of the installation, you will be asked if you would like the factory-default AUTOEXEC.BAT and CONFIG.SYS files to be copied to the root directory of drive C. If you answer **Yes**, the existing AUTOEXEC.BAT and CONFIG.SYS files will be renamed as AUTOEXEC.OLD and CONFIG.OLD. If you answer **No**, the factory-default files will be copied as AUTOEXEC.CTC and CONFIG.CTC in the CTC directory of drive C.

8. We recommend that you type **Y** for Yes.

9. After the AUTOEXEC.BAT and CONFIG.SYS files have been copied onto your system, press any key to continue.

   The PowerStation utilities installation is complete.

   You will be asked if you want to recalibrate the touchscreen.

10. If you have a P9 with touchscreen, type **Y** for Yes, and recalibrate the touchscreen (see *Recalibrating the Touchscreen on page 78* for instructions). If you do not have a touchscreen, type **N** for No.

    At this point, you will be prompted to install the MachineShop Shell. If you have to do this, see *Reinstalling the MachineShop Shell* on page 68 for instructions.

11. Restart the P9.

Important　You must restart the system for your installation to take effect.

Reinstalling the MachineShop Shell

To reinstall the MachineShop Shell in the P9, complete the following steps:

1. Insert the MachineShop Shell Installation Disk into the system's floppy disk drive.

   Note The MachineShop Shell Installation Disk is part of the Runtime Workstation Disk Set, which you can create from the MachineShop Installation CD (KA-83103) shipped with your P9. See the *MachineShop Installation Booklet* for instructions on how to create this disk.

2. If necessary, change to the root directory of drive A by typing **A:**.

3. Press **Enter** to execute this command.

4. At the DOS prompt, type **Install A: C:**

   Important In this example, C represents the drive letter of the device on which you want to install the MachineShop Shell— either your hard drive or CF card. If you are using both a hard drive and a CF card in your P9, type the appropriate drive letter.

5. Press **Enter** to execute this command.

   You will be asked if you want to continue with the installation.

6. Type **Y** for Yes in order to continue.

   The system will copy the MachineShop Shell files onto the P9's hard drive or CF card. It will copy Shell files into the CTC directory, touchscreen drivers into the TOUCH \DOX directory, and network drivers into the NET directory.

7. Restart the P9.

   Important You must restart the system for your installation to take effect.

   The system should display the MachineShop Shell.

Reformatting a Compact Flash Card

If you use a Compact Flash (CF) card as the startup drive in a P9, you may need to create a bootable CF card for the system from a blank or used card. This procedure may be necessary to replace deleted or corrupted files on a CF card or to prepare a new card for use. If you have a PC9, or if you use a hard drive as the start-up drive in a P9, you may skip this section.

To complete this procedure, you will need the following:

- MS-DOS 6.22 and Utilities Installation Disk (KA-72953)
- PowerStation Start Disk (KA-83109-101)
- MachineShop Shell Installation Disk

   Note The MachineShop Shell Installation Disk is part of the Runtime Workstation Disk Set, which you can create from the MachineShop Installation CD (KA-83103) shipped with your P9. See the *MachineShop Installation Booklet* for instructions on how to create this disk.

To reformat a CF card for the P9, complete the following steps:

1. With the system switched off, insert the CF card into the unit.

   Important Always switch off the system when inserting or removing a CF card.

2. Insert the MS-DOS 6.22 and Utilities Installation Disk into the system's floppy disk drive, and start up the system.

   Important Reformatting a CF must be done under MS-DOS. If you are running Windows 95, 98, or NT on your P9, start the system in MS-DOS mode, using the MS-DOS 6.22 and Utilities Disk.

3. If necessary, change to the root directory of drive A by typing **A:**

4. Press **Enter** to execute this command.

5. At the DOS prompt, type **`Format C:`**

Important   In this example, D represents the drive letter of your CF card if you have a hard drive installed. Be sure to type the correct drive letter for your CF card, or **you could accidentally erase the contents of your hard drive.** If you do not have a hard drive, type the appropriate drive letter for your CF card.

6. Press **Enter** to execute this command.

To install the MS-DOS 6.22 operating system and utilities on the CF card, complete the following steps:

1. At the next A: prompt, type **`Install A: D:`**

Important   In this example, D represents the drive letter of your CF card. If you do not have a hard drive, type the appropriate drive letter. If you are using both a CF card and a hard drive in your P9, type the appropriate drive letter.

2. Press **Enter** to execute this command.

    This will install the MS-DOS 6.22 system files, utilities, and necessary drivers into the DOS directory of the CF card.

    Note   You will have two choices when installing DOS: a small or large installation. A small installation will install approximately 5 files in the DOS directory. A large installation will install approximately 1MB of files in the DOS directory.

    The CF card is now reformatted and ready to use in the P9.

3. Eject the MS-DOS 6.22 Disk from the floppy drive, and restart the P9.

Install the PowerStation utilities on the reformatted CF card. See *Reinstalling P9 drivers and PowerStation utilities* on page 66 for instructions.

Install the MachineShop Shell on the reformatted CF card. See *Reinstalling the MachineShop Shell* on page 68 for instructions.

Maintaining the Display

This section contains instructions for:

- Cleaning the display screen
- Adjusting the video image
- Reconfiguring the touchscreen driver
- Recalibrating the touchscreen

Cleaning the Display Screen

If you wish to clean the display screen, do so using warm, soapy water and a cloth. You also may use any non-abrasive cleaner. Do not use any harsh material or powder, such as steel wool or abrasive cleansers. See *Faceplate Chemical Resistance* on page 17 for a list of substances the screen can resist with no visible effect.

If you have a touchscreen monitor, the touchscreen surface is sensitive to scraping, sharp blows, or punctures. Therefore, keep screwdrivers or other sharp objects away from the surface.

Important   P9 users, do **not** clean the unit while Interact is in Run mode. Clean the unit only when power is off to keep from inadvertently activating an Interact device (button, slide, etc.).

Adjusting the Video Image

The PC9/P9 is equipped with on-screen display (OSD) controls that allow you to adjust the video image for the best possible picture.

You can adjust the video image by using the four buttons at the top left side of the monitor, as shown below.
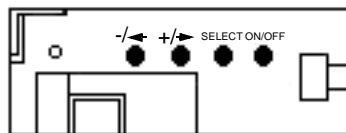
These buttons work as follows:

- **On/Off** — Switches the OSD controls on and off.
- **Select** — Selects the OSD setting you want to adjust and, in most cases, displays a control bar showing the increase or decrease in adjustment.

+/━━▶

Functions like an arrow key on a keyboard, enabling you to progress through the OSD icons in order to select the setting you want to adjust. Once you have selected a setting, this button enables you to increase the value of the adjustment.

-/◀━━

Functions like an arrow key on a keyboard, enabling you to reverse through the OSD icons in order to select the setting you want to adjust. Once you have selected a setting, this button enables you to decrease the value of the adjustment.

When you press the On/Off button, you will see the following icons in the on-screen display:
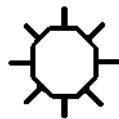
Brightness — Adjusts the backlight level in order to increase or decrease the brightness of the screen image.

Contrast — Adjusts contrast in the screen image.

Red (red palette) — Adjusts the red in the screen image.

Green (green palette) — Adjusts the green in the screen image.

Blue (blue palette) — Adjusts the blue in the screen image.

Phase — Adjusts the focus of the screen image.

Vertical Position — Adjusts the vertical position of the screen image.

**Horizontal Position** — Adjusts the horizontal position of the screen image.
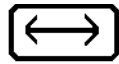
Horizontal Size — Adjusts the horizontal size of the screen image.

Expand Display — When you press the Select button, expands or decreases the image size for video modes with resolutions less than the monitor's pixel format.
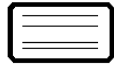
OSD Background — Switches the OSD background on or off when you press the Select button.
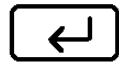
Default Settings — Loads the factory default video settings when you press the Select button.

To adjust the video image on your monitor, complete the following steps:

1. Press the On/Off button to display the OSD.

2. Use the +/- buttons to choose the icon for the adjustment you want to make.

3. Press the Select button to activate the adjustment you want to make.

   In the following settings, the monitor will display a control bar or arrows, and a range scale for making your adjustment:

   • Brightness

   • Contrast

   • Red

   • Green

   • Blue

   • Phase

   • Vertical Position

   • Horizontal Position

   • Horizontal Size

In the following settings, the Select button acts as a toggle switch, turning the settings on or off:

- Expand Display
- OSD Background
- Default Settings

4. In those settings that display the control bar, use the +/- buttons to make your adjustment.

The results of your changes will be immediately visible. The monitor will "remember" all OSD adjustments so that you will not need to repeat them each time you turn on the monitor.

Note   If the OSD is turned on and left unattended, it will automatically shut off in 25 seconds.

Some of the video adjustments you can make are global and affect all video modes, while others affect picture quality only for the video mode in use. You may need to make the latter adjustments whenever you change the video resolution or refresh rate.

The following table shows which adjustments are global and which are unique for the video mode in use.

Adjustment	Nature of Value
Brightness	Global
Contrast	Global
Red	Global
Green	Global
Blue	Global
Phase	Unique for each video mode
Vertical position	Unique for each video mode
Horizontal position	Unique for each video mode
Horizontal size	Unique for each video mode
Expand display	Unique for each video resolution
OSD background	Global
Default settings	Global values are all updated. Unique values are updated only for the current video mode.

Reconfiguring the Touchscreen Driver

Your system will be shipped with the appropriate touchscreen driver installed. However, you may have to reconfigure the touch-screen driver if it becomes corrupted, if you reinstall it, or if you change the touchscreen jumper settings.

This section explains how to reconfigure the touchscreen driver under Windows 95, 98, or NT 4.0, and under MS-DOS (P9 only).
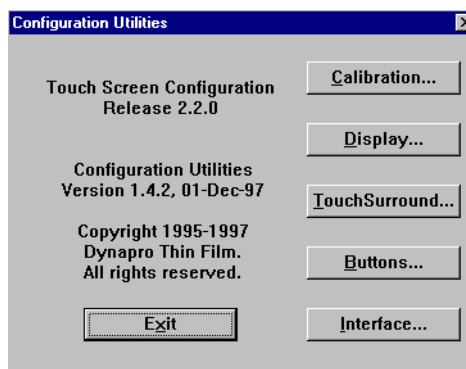
Reconfiguring under Windows

To configure the touchscreen driver under Windows 95, 98, or NT 4.0, complete the following steps:

1. On the Windows taskbar, click **Start**; then click **Programs** and **Touchscreen Utilities**.

    The Touchscreen Utilities folder will open.

2. Click the **Configuration** icon.

    The Calibration Utilities dialog box will appear as shown below.

3. In the Calibration Utilities dialog box, click **Interface**.

    The Interface Configuration Options dialog box will appear.

4. The factory default settings for the touchscreen are Port Custom, Interrupt IRQ7, Address 338h. Click on the drop-down arrows if you wish to change these settings.

    Note   As you change the COM port, the other settings will change automatically.

5. Click **OK** when you are finished.
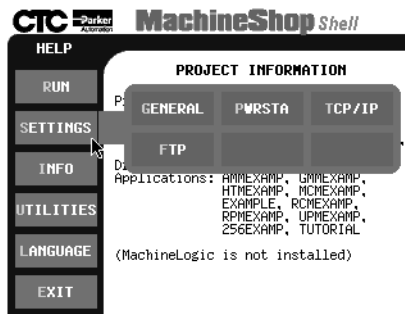
6.   Restart the system.

Important   You must restart the system for your changes to take effect.

Reconfiguring under MS-DOS (P9 only)

To configure the touchscreen driver on a P9 under MS-DOS, complete the following steps:
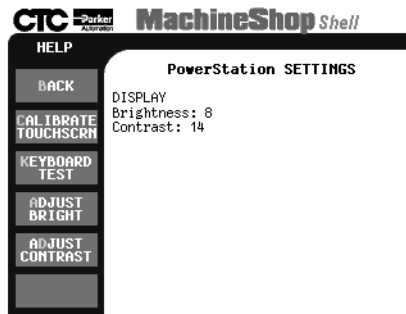
1.   On the MachineShop Shell main menu, click **Settings**.

The settings submenu will appear as shown below.

2.   Press the **PWRSTA** button.

The PowerStation Settings screen will appear as shown below.

3.   Press the **Calibrate Touchscrn** button.

A message window will appear, reminding you that a keyboard is required.

4. When you have connected a keyboard to the P9, click **Yes** to continue.

   The following screen will appear.

```
The calibration program will now be started automatically. To
calibrate your touchscreen, perform the following steps in the
calibration program:

     - First, select option C to calibrate

     - Then select option V to select video modes

     - Select an appropriate video mode (must do modes 3,
       12, and 101 - selections 2, 0, and 11 respectively)

     - Select C to calibrate the selected mode

     - Repeat until all needed video modes are calibrated

Strike a key when ready . . .
```

5. Press any key on the keyboard when you are ready to continue.

   The following touchscreen driver configuration screen will appear.

```
Touch Screen Driver Configuration Utility 2.0.2 02-Nov-98
Dynapro Technologies Inc (C)

     Calibration
     Display
     Touchsurround
     Buttons
     Interface
     eXit

     Enter your selection  (C\D\T\B\I\X) :
```

6. Type **I** for Interface.

   The following Interface Configuration Options screen will appear.

```
   Interface Configuration Options

   Interrupt:           IRQ11
   Address:             3E8h
   Connection:          UART
   calibratioN data:    Controller
   Set COM1:
   Set COM2:
   Set COM3:
   Set COM4:
   Reset:
   aDvanced:
   Ok:

   Enter your selection (I/A/C/N/1/2/3/4/R/D/O) :
```

7. Type **I** to change the Interrupt (the default setting is **7)**.

8. Type **A** to change the Address (the default setting is **338h**).

9. Type **C** to change the Connection.

Important   The Connection must be set to **UART**.

10. Type **O** to set your touchscreen driver.

11. Press **Escape** or **X** to exit.

12. Restart the system.

Important   You must restart the system for your changes to take effect.

Recalibrating the Touchscreen

Your system's touchscreen will be calibrated at the factory. However, you may need to recalibrate the touchscreen when you begin using the system for the first time or whenever the cursor location and the place on the screen where the user touches do not match.

If you are running Windows, you can calibrate the touchscreen under Windows 95, 98, or NT 4.0. If you have a P9, you can calibrate the touchscreen under MS-DOS from the MachineShop Shell.

Recalibrating under Windows

To recalibrate the touchscreen under Windows 95, 98, or NT 4.0, complete the following steps:

1. On the Windows taskbar, click **Start**; then click **Programs** and **Touchscreen Utilities**.

    The Touchscreen Utilities window will appear.

2. In the Touchscreen Utilities window, click **Configuration**.

   The Configuration Utilities dialog box will appear as shown below.
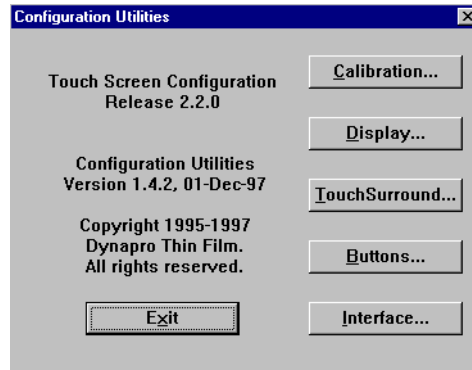
3. Click **Calibration**.

   The Calibration dialog box will appear.

4. Click **Calibrate**.

5. Place your finger on the target in the upper left corner of the screen, and follow the instructions on the screen.
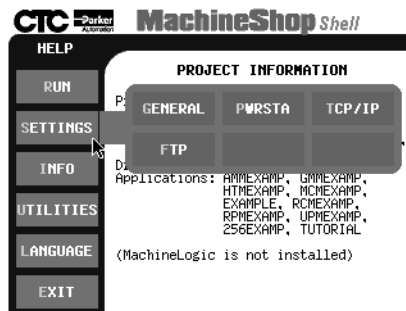
6. Click **Exit** when you are finished.

Recalibrating under MS-DOS (P9 only)

To recalibrate the touchscreen on a P9 under MS-DOS (from the MachineShop Shell), complete the following steps:

> **Note**   This procedure requires a keyboard.

1. On the MachineShop Shell main menu, press the **Settings** button.

   The Settings submenu will appear as shown below.

2. Press the **PWRSTA** button.

   The PowerStation Settings menu will appear as shown below.
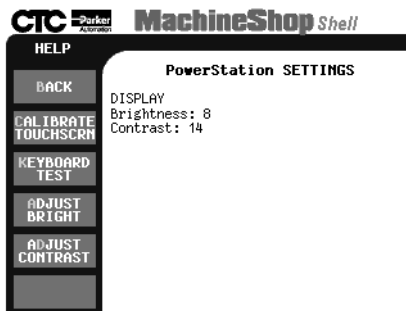
3. On the PowerStation Settings submenu, press the **Calibrate Touchscrn** button.

   You will be prompted that a keyboard is needed to calibrate the touchscreen. Then you will be asked if you want to continue.

4. If necessary, install a keyboard on the P9.

5. When you have attached a keyboard to the P9, press the **Yes** button to continue the calibration.

   The following screen will appear.

```
The calibration program will now be started automatically. To
calibrate your touchscreen, perform the following steps in the
calibration program:

     - First, select option C to calibrate

     - Then select option V to select video modes

     - Select an appropriate video mode (must do modes 3,
       12, and 101 - selections 2, 0, and 11 respectively)

     - Select C to calibrate the selected mode

     - Repeat until all needed video modes are calibrated

Strike a key when ready . . .
```

6. Press any key on the keyboard when you are ready to begin the calibration program.

   The following screen will appear:

```
Touch Screen Driver Configuration Utility 2.0.2 02-Nov-98
Dynapro Technologies Inc (C)

     Calibration
     Display
     Touchsurround
     Buttons
     Interface
     eXit

     Enter your selection  (C\D\T\B\I\X) :
```

7. Type **C** for Calibration.

   When the next screen appears, you will be calibrating video mode 80 x 25 Text (2,3).

8. Type **C** again for Calibrate.

9. When the next screen appears, follow the instructions on the screen by touching each square as it appears until you hear a beep—there will be three squares all together.

   After you touch the third square, a new screen will appear.

10. When the new screen appears, press **V** to select a new video mode.

11. When the next screen appears, type **0** for 640x480 16-color Graphics mode.

12. Press **Enter**.

13. When the next screen appears, type **C** for Calibrate.

14. When the next screen appears, follow the instructions on the screen by touching each square as it appears until you hear a beep—there will be three squares all together.

    After you touch the third square, a new screen will appear.

15. When the new screen appears, type **V** for video mode.

16. When the next screen appears, type **11** for 640x480 256-color Graphics mode.

17. Press **Enter**.

18. When the next screen appears, type **C** for Calibrate.

19. When the next screen appears, follow the instructions on the screen by touching each square as it appears until you hear a beep—there will be three squares all together.

    After you touch the third square, a new screen will appear.

20. When the new screen appears, type **O** for OK.

21. Press **Escape** or **X** to exit the calibration utility.

Important   After calibrating the touchscreen, enter Interact in Program Mode. Verify that the cursor appears on the screen where you touch. If it does not, recalibrate the touchscreen. The calibration must be accurate to avoid activating a button unintentionally during Run Mode.

Performing Internal Maintenance

This section includes important information about performing internal maintenance on the PC9/P9, including:

- Replacing field-replaceable components
- Observing electrostatic discharge (ESD) precautions
- Opening and closing the system
- Adding expansion cards
- Changing jumper settings

Replacing Components

The following components are field-replaceable:

- DRAM modules
- Floppy disk drive
- Hard disk drive
- CD-ROM drive
- CPU card
- Power supply
- Configuration bay fan
- Maintenance compartment fan
- CPU fan
- Monitor backlight bulbs
- Monitor bezel (touchscreen or non-touchscreen)

We recommend that you order replacement components and installation kits for these items from CTC Parker at 513-831-2340. Replacement components purchased from CTC Parker are designed and tested to work effectively in your system. Complete installation instructions are included with each item.

Important If you wish to purchase replacement components from another source, call our Technical Support department at 513-248-1714 for a list of recommended manufacturers.

Observing ESD Precautions

Modern integrated electronic devices, especially circuit cards and memory chips, are extremely sensitive to electrostatic discharges and fields. Before you open the system, be sure to follow these simple precautions to protect you and the unit from harm resulting from ESD.

- To avoid electric shock, always disconnect the power from the unit before you remove the back cover or backshell. Do not touch any cards while the unit is on.

- Disconnect power before making any hardware configuration changes. The sudden rush of power as you connect a jumper or install a card may damage electronic components.

- Only handle internal components in an ESD-safe location, using appropriate grounding methods.

- Wear a grounding wrist strap for continuous protection.

- Always ground yourself before you touch a card.

- Do not touch the chips on a card.

- Keep any card in its anti-static packaging when it is not installed in the system, and place it on a static dissipative mat when you are working on it.

Opening and Closing the System

The PC9/P9 has three different areas in which you might perform maintenance.

- The faceplate assembly, located at the front of the unit, contains the monitor, backlights, display adapter board, and inverter.

- The maintenance compartment, located behind the faceplate in the hinged access area, contains the power supply, floppy drive, CD-ROM drive, hard drive, and monitor card.

    The faceplate assembly and maintenance compartment are shown below.

Maintenance compartment   Faceplate assembly
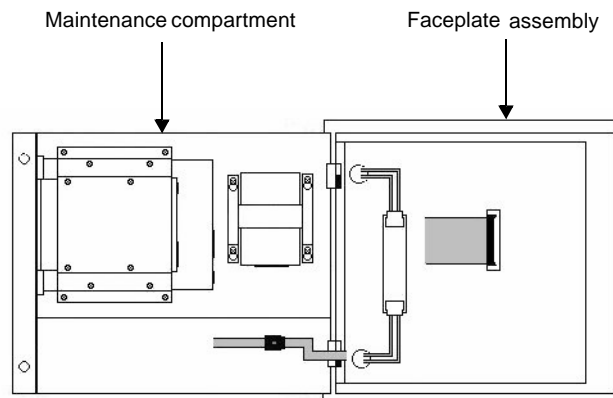
• The configuration bay, located at the back of the unit, contains the CPU card (including the system's DRAM modules) and the riser card (including ISA/PCI slots). The following illustration shows the configuration bay.
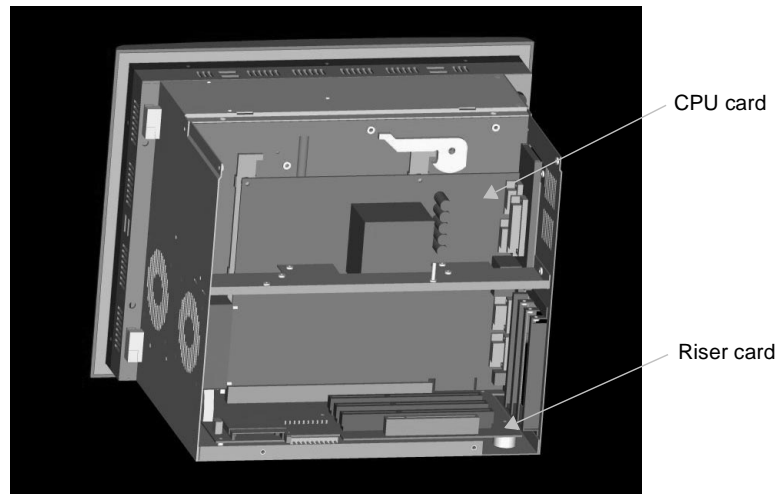
You can access the faceplate assembly and maintenance compartment by opening the system's hinged backshell. You can access the configuration bay by opening the back cover. Both procedures are described below, along with the steps for closing the unit after you have serviced it.

Warning For safety reasons, the system should be opened only by qualified service personnel.

Opening the Backshell

To prepare to open the backshell, complete the following steps:

1. Turn off the system.

2. Disconnect the system from the power source.

3. Disconnect all cables attached to the system.

   Note You need not disconnect the video cable unless you intend to remove the CPU card from the unit.

If you want to work on components in the maintenance compartment, complete the following steps:

1. Remove the two screws securing the backshell to the faceplate assembly, as shown below.

Remove this bracket

Remove these screws
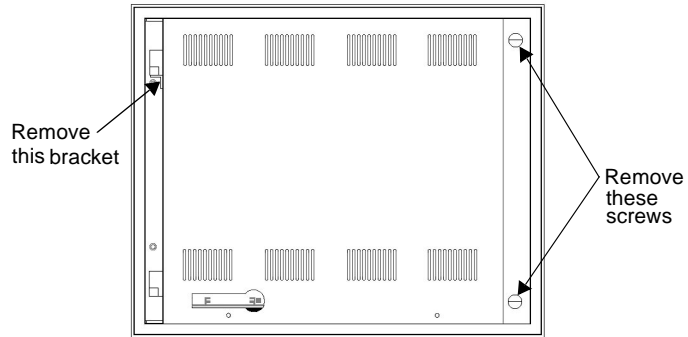
Important When you open the unit, you will encounter several different screw sizes. When you reassemble the unit, be sure to replace the same size screw in the same location as the one that was removed. If you don't, you could damage the unit.

2. Swing the backshell away from the faceplate.

3. Disconnect the three cables connecting the faceplate assembly and backshell, as shown below.
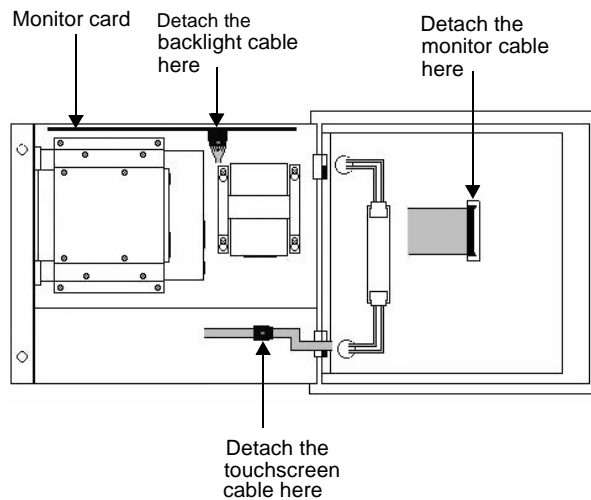
Monitor card   Detach the backlight cable here   Detach the monitor cable here

Detach the touchscreen cable here

    a. Detach the monitor (ribbon) cable from its connection at the center of the monitor frame (push back the locking clamps from either side of the connector).

    b. If your system has a touchscreen, detach the touchscreen cable from its extender in the maintenance compartment.

    c. Detach the backlight cable from its connection on the monitor card (press down on the small tab on the lower half of the connector, and pull the cable out).

4. Remove the safety bracket below the upper hinge of the backshell by removing the screw that holds the bracket in place. This bracket is shown in the first illustration on page 86.

Warning   Make sure that both the faceplate assembly and backshell are supported when you remove the safety bracket and when you open the backshell.

5. Lift the backshell off its hinges, and place it on a static dissipative mat in a location free from dirt and moisture and protected against static discharge. You may leave the faceplate mounted in the enclosure.

Warning   When lifting the backshell, grasp it from the outside. If you have a P9, be careful **not** to touch the monitor card, located inside the top of the maintenance compartment. The monitor card is shown in the preceding illustration.

If you want to work on components in the faceplate assembly, complete the following steps:

1. After preparing to open the backshell (steps 1-3 on page 85), remove the entire system from its enclosure, and place it upright on a static dissipative mat in a location free from dirt and moisture and protected against static discharge.

2. Remove the two screws securing the backshell to the faceplate assembly, as shown in the first illustration on page 86.

3. Swing the backshell away from the faceplate on its hinges.

4. Disconnect the three cables connecting the faceplate assembly and backshell. These cables are shown in the preceding illustration.

    a. Detach the monitor (ribbon) cable from its connection at the center of the monitor frame (push back the locking clamps from either side of the connector).

   b.   If your system has a touchscreen, detach the touchscreen
        cable from its extender in the maintenance compartment.

   c.   Detach the backlight cable from its connection on the
        monitor card (press down on the small tab on the lower
        half of the connector, and pull the cable out).

5.   Remove the safety bracket below the upper hinge of the back-
     shell by removing the screw that holds the bracket in place.
     This bracket is shown in the preceding illustration.

Warning   Make sure that both the faceplate assembly and backshell
              are supported when you remove the safety bracket and
              when you open the backshell.

6.   Lift the backshell off its hinges, and place it to one side.

Warning   When lifting the backshell, grasp it from the outside. Be
              careful **not** to touch the monitor card, located inside the top
              of the maintenance compartment.

7.   Place the faceplate assembly face-down on the static dissipa-
     tive mat.

Closing the Backshell

To close the backshell, complete the following steps:

1.   Replace the backshell on its hinges.

Warning   When lifting the backshell, grasp it from the outside. Be
              careful **not** to touch the monitor card, located inside the top
              of the maintenance compartment.

2.   Replace the safety bracket below the upper hinge of the back-
     shell, and fasten it in place with its retaining screw.

3.   Reconnect the backlight cable, touchscreen cable (if neces-
     sary), and monitor cable to their connections. (Press the
     monitor cable into its connector until the locking clamps on
     either side of the connector snap into place).

4.   Close the backshell against the faceplate assembly.

5.   Tighten the two screws that you unscrewed when opening the
     backshell.

6.   Reinstall the system in its enclosure if necessary.

7. Reconnect power and other cables to the system.

8. Reconnect the system to the power source.

9. Start up the unit.

Opening the Back Cover

To open the back cover, complete the following steps:

1. Turn off the system.

2. Disconnect the system from the power source.

3. Remove the four screws securing the back cover to the system, as shown below.

> **Note** Screws 1 and 2 are located at the sides of the cover; screws 3 and 4 are in the back of the cover, near the bottom of the unit.
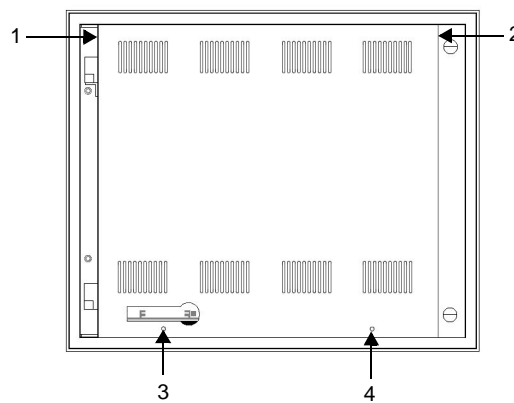
Remove the four
back cover screws

4. Lift the back cover from the system.

Closing the Back Cover

To close the back cover, complete the following steps:

1. Insert the two tabs at the top of the back cover into the slots at the top of the configuration bay, and slide the cover onto the back of the system.

2. Reinstall the screws that you removed when opening the back cover.

3. Reconnect power to the system.

4. Restart the system.

Adding Expansion Cards

With three ISA expansion slots, or two ISA slots and one PCI slot, the PC9/P9 supports both ISA- and PCI-bus expansion cards. The system's expansion slots are shown below.

ISA slots   PCI slot
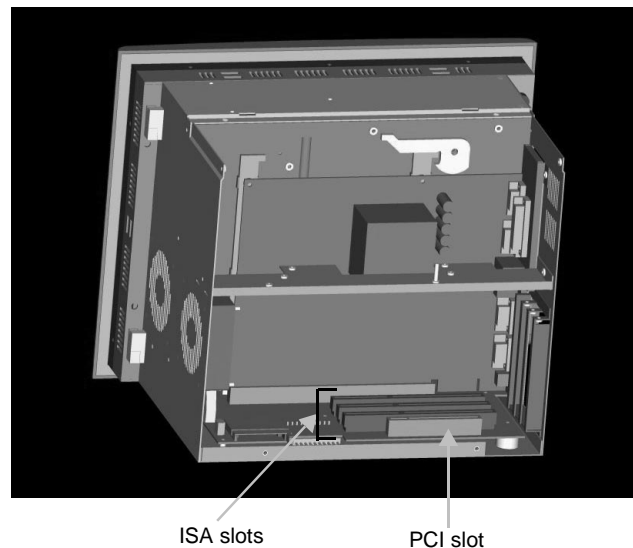
As with most ISA-bus computer port addresses, 300 through 31F are available for adapter functions. See *I/O Addresses and IRQs* on page 37 for a list of the addresses and IRQs used by the PC9/P9. Make sure that any adapter cards you install do not conflict with these IRQs or addresses.

If you have purchased a P9, the table on the next page lists PLC adapter cards that can be used with CTC Parker's Interact software and the address range for each card. Do **not** put all cards at the

same location. In all cases, use the highest address location possible. This will provide contiguous memory for applications.

Driver Name	Address Range	Space Required	Memory Boundary
ACCESS4000 (ACC)	C800 - DFFF	2K	Resides on 2K boundaries
Allen-Bradley Remote I/O (ABREMIO)	C800 - DFFF	32K	Resides on 32K boundaries
CTC Parker Automation MachineLogic Control Adapter (MLCA)	C800- EFFF	4, 8, 16, or 32K	Dependent upon "Space Required"
DCSNET PC Link Module (DCSNET)	A000 - FC00	16K	Resides on 16K boundaries
Device Net (DVNT)	C800 - E000	16K	Resides on 16K boundaries
GE Fanuc Genius I/O (GENIUS)	C000 - E000	16K	Resides on 16K boundaries
Giddings & Lewis (GLP9)	C000 - E180	2K	Resides on 2K boundaries
Mitsubishi A7BDE (MITS) - MELSEC-NET and A3N	C800 - DFFF	16K	Resides on 16K boundaries
Mitsubishi A7BDE (MITS) - RS4	C800 - DFFF	8K	Resides on 8K boundaries
Modicon ModBus Plus (MBPL)	C800 - DFFF	2K	Resides on 2K boundaries
OMRON SYSMAC Link (SLNK)	C000 - D800	2K	Resides on 2K boundaries
Opto 22 (MIST)	C000 - E180	2K	Resides on 2K boundaries
Reliance R-NET PC Link Module (RLNT)	C800 - DFFF	16K	Resides on 16K boundaries
Siemens TIWAY (TIWAY)	C000 - E000	4K	Resides on 4K boundaries
Square D SY/MAX Module (SDSL)	CA00 - D300	4K	Resides on 4K boundaries
Sutherland-Schultz SD Adapter (SSSD)	C800 - DFFF	32K	Resides on 32K boundaries

Driver Name	Address Range	Space Required	Memory Boundary
Texas Instruments Remote I/O (TIRIO)	C800 - DFFF	1K	Resides on 1K boundaries

Changing Jumper Settings

Like other PCs, the PC9/P9 uses jumpers to control certain system functions. This section explains how to change jumper settings in order to do the following:

• Enable or disable the ethernet port

• Set the parallel port interrupt

• Set the communication protocol for port D

• Enable or disable the sound port

• Change the touchscreen IRQ and address

Other jumpers in the PC9/P9 have been factory set for optimal system performance and should not be changed.

To change jumper settings, first open the back cover (see page 88 for instructions). Then follow the procedures outlined in this section. Jumpers set to "on" and "off" should look like those in the following illustration.
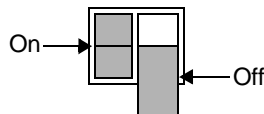
Note   "Off" jumpers can be completely removed or placed as in the illustration above.

Ethernet port

Jumpers that enable or disable the ethernet port are E7, E8, and E9, located on the CPU card (see the illustration on page 93). The default setting, with the ethernet port enabled, is shown in the following table, as is the setting for "disabled."

Jumpers	Enabled (Default)	Disabled
E7	On	Off
E8	On	On
E9	Off	On

CPU Card
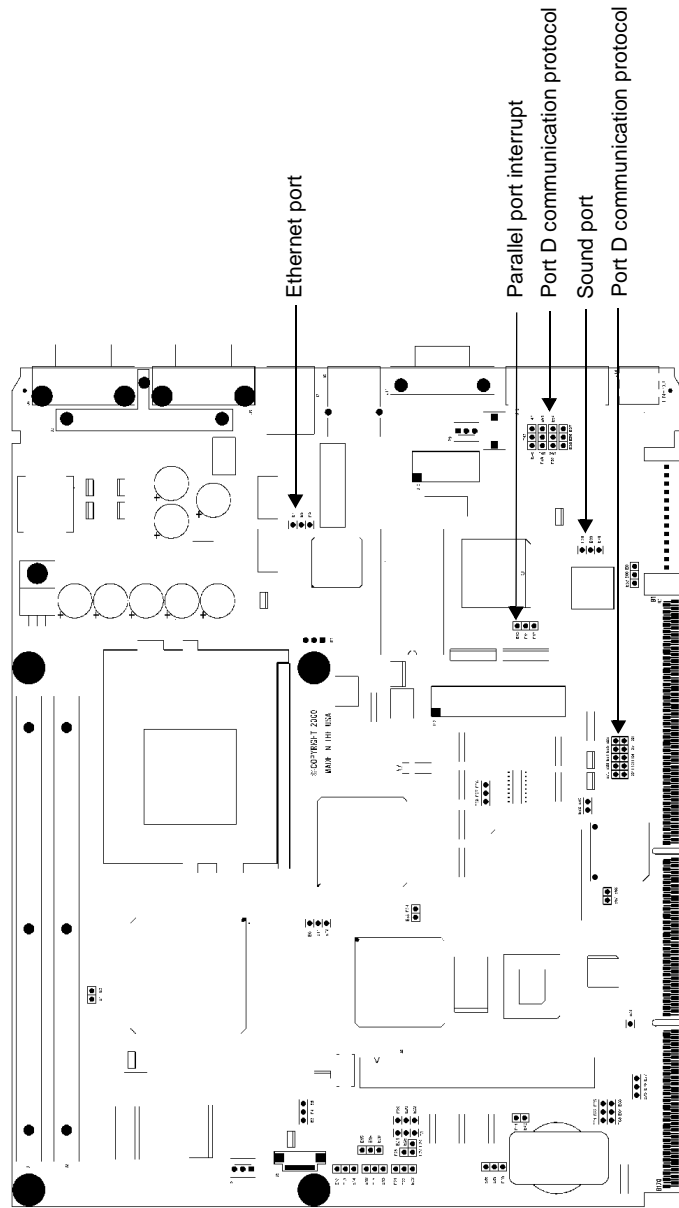
Parallel port interrupt

Jumpers that set the parallel port interrupt are jumpers E43, E44, and E45, located on the CPU card (see the illustration on page 93). The default setting, for IRQ5, is shown below, along with the alternate setting for IRQ7.

Jumpers	IRQ5 (Default)	IRQ7
E43	On	Off
E44	On	On
E45	Off	On

Port D communication protocol

Jumpers that set the communication protocol for port D are located on the CPU card (see the illustration on page 93). These jumpers are shown in the following table. The default protocol for port D is RS-485. The jumper settings for this protocol are shown in the table, along with alternate settings for RS-232 and RS-422 communications.

Jumper	RS-485 (Default)	RS-232	RS-422
E46-E47-E48	E47-E48On	E46-E47 On	E47-E48 On
E49-E50-E51	E50-E51 On	E49-E50 On	E50-E51 On
E52-E53-E54	E53-E54 On	E52-E53 On	E53-E54 On
E55-E56-E57	E56-E57 On	E55-E56 On	E56-E57 On
E79-E82	Off	On	Off
E80-83	On	Off	Off
E81-E84	Off	On	On
E85-E87	Off	Off	On
E86-88	On	Off	Off

Sound port

Jumpers that enable or disable the sound port are E60, E69, and E70, located on the CPU card (see the illustration on page 93). The default setting, with the sound port enabled, is shown in the table below, as is the setting for "disabled."

Jumpers	Enabled (Default)	Disabled
E60	Off	On
E69	On	On
E70	On	Off

Touchscreen IRQ and address

If you do not have a system with touchscreen, you may skip this section.

Jumpers for configuring the touchscreen IRQ and address are located on the system's riser card. These jumpers are shown in the partial illustration of the riser card that appears below.
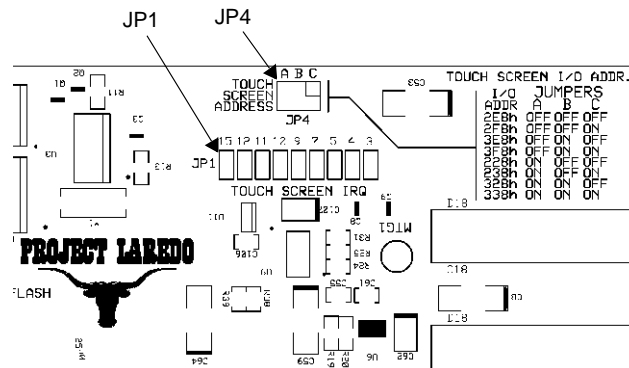
Touchscreen IRQ

Jumper JP1 sets the touchscreen IRQ. The default setting is for IRQ7, as shown below.

IRQ	Setting
15	Off
12	Off
11	Off
10	Off
9	Off
7 (Default)	On
5	Off
4	Off
3	Off

To change this IRQ, remove the jumper clips from IRQ7, and place them on the new IRQ setting (setting it to "on").

Important After changing jumper settings for the touchscreen IRQ, you must reconfigure the touchscreen for the changes to be implemented. See *Reconfiguring the Touchscreen Driver* on page 75 for information about how to do this

Touchscreen Address

Jumper JP4, located just above JP1, sets the touchscreen address. The default setting, with all three jumpers set to "on," as shown below, is 338h. A table printed on the riser card alongside the jumpers tells how to set them for different addresses.

Jumpers	338h (Default)
A	On
B	On
C	Off

When you have finished changing jumper settings for the touch-screen IRQ and address, recalibrate the touchscreen (see page 78 for instructions).

Resolving Common Problems

This section provides basic troubleshooting steps to help you identify and correct problems that you may have with your PC9/P9. Each problem is described, followed by one or more possible solutions. Begin with the first solution and continue until you have solved the problem or exhausted the possible solutions.

If you cannot solve the problem yourself, or if you encounter a problem that is not documented here, contact your CTC Parker equipment supplier or our Technical Support department at 513-248-1714.

Use the following table to find discussions of specific problems.

Problem	Page
Problems when starting up	98
The fans do not start, and the display is blank	98
The fans start, but the display does not	99
The RAM test fails, or the total memory installed does not match the total contiguous RAM listed in the display following the RAM test	99
The system locks up while starting and will not restart *(P9 only)*	100
The DOS prompt is displayed instead of the Machine-Shop Shell main menu *(P9 only)*	101
AUTOEXEC.BAT and CONFIG.SYS problems *(P9 only)*	101
Problems signaled by PowerSmart	106
An error condition exists for a power supply voltage	106
An error condition exists for a temperature	107
An error condition exists for a fan	107
PowerSmart display shows a COMM ERROR	107
Problems with the video mode	108
An "Unsupported Video Mode" message appears	108
Problems with touchscreens	109
After startup, the touchscreen is blank	109
After startup, the touchscreen does not work properly, or touchscreen calibration is incorrect	110
After calibrating the touchscreen, it either does not work or does not follow your finger	110

Problem	Page
Problems with the displayed image	110
The image does not fill the screen	110
The image extends beyond the screen	111
The characters shimmer or appear fuzzy	111
When the video mode is changed, the image shifts left or right	111
When the video mode is changed, the image shifts up or down	112
Vertical bands appear in the image	112
The image appears faded or "washed out"	112
The top or bottom half of the screen looks dark	112
Problems with peripheral devices	113
A PS/2 mouse does not work	113
A keyboard does not work	113
The Ethernet port does not work	113
A driver does not work with the installed adapter card	114

Problems when Starting Up

Some of the most common problems that users encounter with PCs occur when they start up their systems. This section discusses problems that may occur during startup.

The fans do not start, and the display is blank

> **Note** If the system is cold or operating in a cool environment, the fans will normally shut off after 10-15 seconds. They should restart when the system warms up.

1. Turn off the system.

2. Make sure that the power cord is firmly plugged into both the system and the power source.

3. Restart the system.

   If the fan does not come on, continue with step 5.

4. Disconnect the system from the power source.

5. Open the unit's back cover, following the procedure on page 89.

6. Check the fan connection at the lower left side of the riser card to see if the fan is firmly plugged in.

7. Close the back cover, following the procedure on page 90.

8. Connect the system to the power source.

9. Restart the unit.

The fans start, but the display does not

1. Turn off the system.

2. Open the backshell, following the procedure on page 85.

3. Make sure that the video cable is firmly connected to its extender in the maintenance compartment.

4. Close the backshell, following the procedure on page 88.

5. Open the back cover, following the procedure on page 89.

6. Check installation of the DRAM modules at the top of the CPU card. Make sure that the modules are firmly seated in their sockets and that the socket latches are fully engaged.

7. Make sure that all cards are firmly seated.

8. Close the back cover, following the procedure on page 90.

9. Restart the system.

The RAM test fails, or the total memory installed does not match the total contiguous RAM listed in the display following the RAM test

1. Turn off the system.

2. Disconnect the system from the power source.

3. Open the back cover, following the procedure on page 89.

4. Re-seat the DRAM modules on the riser card. Make sure that the modules are firmly seated in their sockets and that the socket latches are fully engaged.

5. Close the back cover, following the procedure on page 90.

6. Reconnect the system to the power source.

7. Restart the system.

The system locks up while starting and will not restart *(P9 only)*

1. Turn off the system.

2. Connect a keyboard to the system.

3. Restart in MS-DOS mode.

4. When the message "Starting MS-DOS" appears, press the **F8** key.

    This will cause the system to step through the CONFIG.SYS and AUTOEXEC.BAT files line-by-line.

    Note   If the "Starting MS-DOS" message does **not** appear, go to step 8.

5. Step through the CONFIG.SYS and AUTOEXEC.BAT files until you find the cause of the lockup.

    *   See *AUTOEXEC.BAT and CONFIG.SYS problems (P9 only)* on page 101 for the correct text of both files.

    *   In particular, if your system is running on a Compact Flash, make sure that the memory region used by the CF is excluded (with the **X/=** parameter) when loading EMM386.EXE.

6. Remove or correct the offending line in the CONFIG.SYS or AUTOEXEC.BAT file.

    Note   Use the **DOS copy** command to overwrite the corrupted file, as described on page 105.

7. Restart the system to see if the problem has been solved.

8. If the system locks up before the "Starting MS-DOS" message appears, restart the unit, and press the **F2** key to enter the BIOS setup program.

9. In the Exit menu, select the **Load Setup Defaults** option or its equivalent .

    This will restore the CMOS settings to their factory default configuration.

10. In the Advanced menu, change the Reset Configuration Data to **Yes**.

    When the system restarts, this setting will automatically switch back to **No**.

11. Save these settings, and exit the setup program.

12. Restart the system.

The DOS prompt is displayed instead of the MachineShop Shell main menu *(P9 only)*

1. If the P9 appears to be operating correctly otherwise, restart the system.

2. If the problem persists, turn off the P9.

3. Connect a keyboard to the unit.

4. Restart the system.

5. When the message "Starting MS-DOS" appears, press the **F8** key.

    This will cause the system to step through the CONFIG.SYS or AUTOEXEC.BAT file line-by-line.

6. The AUTOEXEC.BAT file may have been corrupted or modified. Compare the lines in the AUTOEXEC.BAT file with the correct text, contained in *AUTOTEXEC.BAT AND CONFIG.SYS problems,* below.

7. Remove or correct the offending line.

    Note   Use the **DOS copy** command to overwrite the corrupted file, as described on page 105.

8. Verify that the following lines (which load the MachineShop Shell) appear at the end of the AUTOEXEC.BAT file and do **not** have the word "REM" in front of them:

    ```
    CD \CTC
    PSU
    ```

9. Restart the system.

AUTOEXEC.BAT and CONFIG.SYS problems *(P9 only)*

In the P9, some startup problems might be caused by a corrupted or modified AUTOEXEC.BAT or CONFIG.SYS file. Backup

copies of these files (AUTOEXEC.CTC and CONFIG.CTC) are included on the PowerStation Start Disk (KA-83109-101) shipped with your P9.

The correct text for the AUTOEXEC.BAT and CONFIG.SYS files is shown below. Compare your AUTOEXEC.BAT and CONFIG.SYS files to these models.

AUTOEXEC.BAT

```
@ECHO OFF
REM***************************************************
REM PowerStation Autoexec.bat file
REM Copyright (c)1999 CTC Parker Automation
REM***************************************************

PROMPT $p$g
SET TEMP=C:\DOS
PATH C:\;C:\DOS;C:\CTC

REM***************************************************
REM Install PowerStation Special Functions if not running
REM on a P1.
REM***************************************************

C:\TOUCH\IDTOUCH -S
IF ERRORLEVEL 3 GOTO ITSAP1
LH C:\CTC\BIOSTSR

REM***************************************************
REM If an external mouse is connected, MOUSE will install
REM successfully and create a new MOUSE.INI file.
REM***************************************************

CD \CTC
IF EXIST C:\CTC\MOUSE.INI DEL C:\CTC\MOUSE.INI
LH C:\CTC\MOUSE

:ITSAP1

REM***************************************************
REM Load VESA TSR if not already supported by the video
REM system.
REM***************************************************

C:\CTC\ISVESA
IF NOT ERRORLEVEL 1 GOTO YESVESA
LH C:\CTC\VESA
:YESVESA

REM***************************************************
```

```
REM Load the MachineLogic Control Adapter driver if it is
REM present.
REM*****************************************************

IF NOT EXIST C:\MACHLOG\NUL.EXT MD C:\MACHLOG
CD \MACHLOG
IF NOT EXIST C:\CTC\MLCA.EXE GOTO NOMLCA
CD \CTC
LH C:\CTC\MLCA

:NOMLCA

REM*****************************************************
REM Initialize touchscreen drivers.
REM*****************************************************

SET TOUCH_PATH=C:\TOUCH
CALL %TOUCH_PATH%\TCHINIT.BAT

REM*****************************************************
REM Set up Interact and MachineLogic environment variables
REM for MS Shell.
REM*****************************************************

SET INTERACT=C:\INTERACT
SET INTERACT_FILES=C:\INTERACT\APPFILES
SET INTERACT_STARTUP=C:\STARTUP
SET MACHINELOGIC=C:\MACHLOG

REM*****************************************************
REM Load NETWORK drivers -- NOVELL and/or TCPIP stack.
REM Remove REM on the CALL statement to load NOVELL
REM network batch file. If used, this must be called
REM BEFORE loading the TCPIP stack.
REM*****************************************************

CD \NET
REM CALL C:\NET\NET.BAT
LH C:\NET\TCPIP

REM*****************************************************
REM Load CD-ROM driver
REM*****************************************************
LH C:\DOS\MSCDEX.EXE /D:TEAC_CDI /M:15

REM*****************************************************
REM Load MachineLogic if ML kernel present, and set for
REM boot operation.
REM (determined by MLDU.EXE return value 0 = ENABLED, 1 =
REM DISABLED)
REM*****************************************************
```

```
IF NOT EXIST C:\MACHLOG\NUL.EXT MD C:\MACHLOG
CD \MACHLOG
IF NOT EXIST C:\MACHLOG\MACHLOG.EXE GOTO NOML
C:\CTC\MLDU
IF ERRORLEVEL 1 GOTO NOML

C:\MACHLOG\RTXDOS
C:\MACHLOG\MACHLOG

:NOML

REM****************************************************
REM Call AUTOEXEC.BAT file contained in project, if it
REM exists.
REM****************************************************

IF NOT EXIST C:\STARTUP\NUL.EXT MD C:\STARTUP
CD \STARTUP
IF EXIST C:\STARTUP\AUTOEXEC.BAT CALL
C:\STARTUP\AUTOEXEC.BAT

REM****************************************************
REM Start the MachineShop Shell.
REM****************************************************

CD \CTC
PSU
```

CONFIG.SYS

```
;MS-DOS V6.22, EMM386.EXE V4.49
SHELL=C:\COMMAND.COM /E:1024 /P
FILES=30
BUFFERS=30
STACKS=9,256
DEVICE=C:\DOS\HIMEM.SYS
REM
REM MachineLogic uses the High Memory Area (HMA) to store
REM all I/O and variable data. Therefore, DOS should be
REM loaded entirely into conventional memory. If Machine
REM Logic is not being used, then DOS should be loaded
REM HIGH into the HMA to conserve conventional memory.
REM To load DOS HIGH use DOS=HIGH,UMB -- otherwise use
REM DOS=LOW,UMB.

REM DOS=HIGH,UMB
DOS=LOW,UMB
REM
REM                         !!! NOTE !!!
REM EMM386 can be used to free up more conventional memory
REM for use by MachineLogic and Interact, by allowing TSRs
REM to be loaded high.
REM Just remove the word REM in front of the appropriate
```

```
REM command, and adjust the parameters as required for
REM your system's configuration.
REM
REM If EMM386 is used, any upper (UMB) memory used by
REM adapter cards must be excluded with the "X="
REM parameter, as shown in the example below. This
REM example is for a MachineLogic Control Adapter at
REM address D800, configured to use 4KB of NVRAM (the
REM factory default).
REM Please adjust the "X=" parameter to match your system
REM configuration.
REM
REM DEVICE=C:\DOS\EMM386.EXE NOEMS NOVCPI X=D800-D8FF
REM
REM The following settings can be used on a system using
REM the SST Profibus ISA I/O adapter (D000-D7FF), with the
REM MachineLogic Control Adapter configured to provide
REM 32KB of NVRAM (D800-DFFF).
REM
REM DEVICE=C:\DOS\EMM386.EXE NOEMS NOVCPI X=D000-DFFF
REM
REM On a P1 PowerStation, the range C800 through CFFF must
REM be excluded and the E000-EFFF range must be explicitly
REM included. Use the following command for loading EMM386
REM on a P1.
REM
REM DEVICE=C:\DOS\EMM386.EXE NOEMS NOVCPI X=C800-CFFF
REM X=D800-D8FF I=E000-EFFF
REM
REM IMPORTANT: Always include the NOEMS and NOVCPI
REM switches when using EMM386 with MachineLogic and
REM Interact.
REM
REM
REM Load the Teac CD-ROM driver for DOS
REM
DEVICEHIGH=C:\CDROM\TEAC_CDI.SYS /D:TEAC_CDI
```

If you suspect a problem with the AUTOEXEC.BAT or
CONFIG.SYS file, use the **DOS copy** command to create a
backup copy of your current file, and overwrite the suspect file
with the appropriate backup. For example, if the
AUTOEXEC.BAT file becomes suspect, type the following
commands at the DOS prompt:

```
copy autoexec.bat autoexec.old
copy \ctc\autoexec.ctc autoexec.bat
```

Problems Signaled by PowerSmart

The PC9/P9 comes with the exclusive PowerSmart system monitor that keeps track of the unit's power supply output voltage, internal temperatures, fan speeds, and hours of operation. It also signals communication errors by any of PowerSmart's monitoring devices. See *PowerSmart* on page 34 for information about how this utility works.

The following table shows the values monitored by PowerSmart.

Parameter	Nominal Value	Minimum Value	Maximum Value
Configuration bay temperature	N/A	N/A	65**°**C
Maintenance compartment temperature	N/A	N/A	65**°**C
Configuration bay fan speed (Chassis Fan 1)	3,000 rpm	1,600 rpm	N/A
Maintenance compartment fan speed (Chassis Fan 2)	3,000 rpm	1,600 rpm	N/A
CPU fan speed	4,650 rpm	3,000 rpm	N/A
3.3V power supply	3.3 VDC	3.0 VDC	3.6 VDC
5V power supply	5.0 VDC	4.75 VDC	5.5 VDC
12V power supply	12.0 VDC	11.5 VDC	12.5 VDC
-5V power supply	-5.0 VDC	-5.5 VDC	-4.75 VDC
-12V power supply	-12.0 VDC	-12.5 VDC	-11.5 VDC

If any of the system's voltage, temperature, or fan speed parameters is out-of-limit, the PowerSmart display will change color, and the gauges will show the error condition. If the display has been minimized, the PowerSmart button on the Windows taskbar will flash continually. Click the button to show the display.

This section explains how to respond if PowerSmart indicates that any parameters are out of limit.

An error condition exists for a power supply voltage

1. If the power supply value is 0 VDC, check for loose wires on the power supply output harnesses.

2. If the power supply shows low voltage, make sure that any expansion cards installed are not exceeding the recommended power supply load limit (see *Electrical Specifications* on page 16).

3. Use a voltmeter to measure the power supply. If the voltmeter confirms the error, replace the power supply.

An error condition exists for a temperature

1. If a fan error also exists, see *An error condition exists for a fan*, below.

2. Make sure that the fan blades are not obstructed.

3. Make sure that any expansion cards installed are not exceeding the recommended power supply load limit (see *Electrical Specifications* on page 16).

4. Make sure that the maximum rated ambient temperature for the PC9/P9 has not been exceeded (see *Environmental Specifications* on page 15).

An error condition exists for a fan

1. Make sure that the fan has not become unplugged.

2. Make sure that the fan blades are not obstructed.

3. Check for an error condition on the 12V power supply. If one exists, see *An error condition exists for a power supply voltage* on page 106.

4. Replace the fan.

The PowerSmart display shows a COMM ERROR

When a communications error occurs in a monitoring device, the Communications Status light in the PowerSmart display will change from green to red, and a COM ERROR dialog box will appear describing the error. Information provided by the device will not display. If the microcontroller fails, no information will display on any gauge because the microcontroller decides what information to display. This problem is illustrated at the top of the next page.
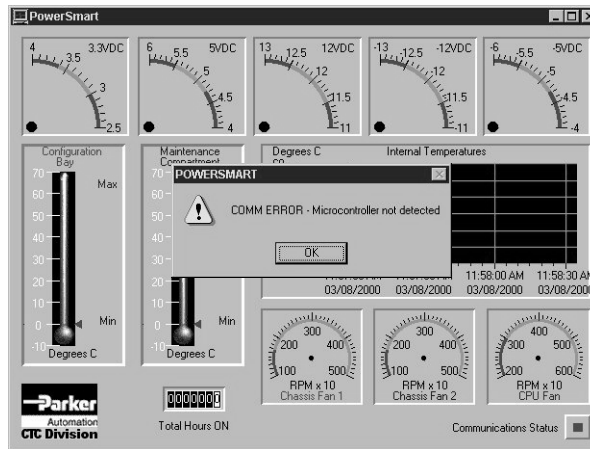
> **Note** If the Communications Status light is red, but no dialog box appears, click on the light to see the COMM ERROR.

1. Check for loose or shorted pins on the PowerSmart peripheral device showing the error. The devices and their locations are shown in the following table. See *PowerSmart* on page 34 for a description of the devices' functions.

Device	Location
Microcontroller (87LPC764)	Riser card (U10)
Peripheral monitor (DS1780)	Riser card (U9)
Temperature monitor (LM 75)	Riser card (U12)
EEPROM (24C02)	Riser card (U11)
CPU fan monitor (LM79)	CPU card (U38)

2. Replace the device showing the error.

Problems with the Video Mode

An "Unsupported video mode" message appears

1. The currently chosen video mode is not in the system's list of supported modes. Consult the chart of *Video Modes Supported* on page 11, and set up your system to use only those modes.

2. On systems running any Windows version, reduce the color palette—for example, from **High Color** to **256-color** mode.

Problems with Touchscreens

This section discusses problems that may occur in systems that have a touchscreen display. If you do not have a system with touchscreen, you may skip this section.

After startup, the touchscreen is blank

1. If the system appears to be operating correctly otherwise, restart the system.

2. The touchscreen calibration might be in error. Recalibrate the touchscreen, following the instructions in *Recalibrating the Touchscreen* on page 78.

P9 only

3. If the problem persists, turn off the system.

4. Connect a keyboard to the unit.

5. Restart in MS-DOS mode.

6. When the message "Starting MS-DOS" appears, press the **F8** key.

   This will cause the system to step through the CONFIG.SYS or AUTOEXEC.BAT file line-by-line.

7. Compare the lines in the AUTOEXEC.BAT file with the correct text, contained in *AUTOEXEC.BAT and CONFIG.SYS problems (P9 only)* on page 101.

   a. Verify that the following lines appear in the AUTOEX-EC.BAT file before the lines that load touchscreen driver:
   ```
   IF EXIST C:\CTC\MOUSE.INI DEL C:\CTC\MOUSE.INI
   LH C:\CTC\MOUSE
   ```
   b. Verify that the touchscreen drivers are being loaded. Look in the AUTOEXEC.BAT FILE for the following line:
   ```
   LH C:\TOUCH\DOX\SC3DOX /NOBOUNDS
   ```

   Note Use the **DOS copy** command to overwrite a corrupted AUTOEXEC.BAT file, as described on page 105.

After startup, the touchscreen does not work properly, or touchscreen calibration is incorrect

You may need to reconfigure or recalibrate the touchscreen.

See *Reconfiguring the Touchscreen Driver* on page 75 and *Recalibrating the Touchscreen* on page 78 for instructions.

After calibrating the touchscreen, it either does not work or does not follow your finger

1. Open the back cover, following the procedure on page 89.

2. Make sure that the touchscreen cable is properly connected to the riser card at the upper left side of the card.

3. Close the back cover, following the procedure on page 90.

4. Open the backshell, following the procedure beginning on page 85.

5. Make sure that the touchscreen cable is properly connected to its extender in the maintenance compartment.

6. If the touchscreen cable is damaged, replace the touchscreen. Contact our Technical Support department at 513-248-1714 for information about purchasing a replacement.

Problems with the Displayed Image

In the PC9/P9, a combination of incorrect on-screen display (OSD) adjustments can cause problems with the displayed image.

If you are having any of the problems listed below, a good first step is to select the Default Settings icon in the OSD and reload the factory default settings. This will set up your monitor with standard video timings and provide a good starting place for fine-tuning adjustments.

See *Adjusting the Video Image* on page 71 for instructions on how to use the OSD controls.

The image does not fill the screen

The current video mode has a resolution less than the monitor's pixel format. For example, the video mode is 640x480, and the monitor's pixel format is 800x600. Set the OSD Expand Display adjustment to **On**.

The image extends beyond the screen

1. The horizontal and/or vertical position is not correct for the current video mode. Use the OSD Horizontal Position and/or Vertical Position adjustment to center the image on the screen.

2. The horizontal size is not correct for the current video mode. Use the OSD Horizontal Size adjustment to fit the image completely on the screen

Characters shimmer or appear fuzzy

1. The clock phase for the current video mode is not correct. Use the OSD Phase adjustment to sharpen the image.

2. The horizontal size is not correct for the current video mode. Use the OSD Horizontal Size adjustment to fit the image completely on the screen.

Important This problem may occur if the horizontal size is mis-adjusted by as little as one pixel, so make as precise an adjustment as possible.

3. The current vertical refresh rate may not be optimal. Change the vertical refresh rate until you find one that produces the best image.

When the video mode is changed, the screen image shifts left or right

The image's horizontal position has not been optimized for the new video mode. Use the OSD Horizontal Position adjustment to center the image horizontally on the screen.

Note This adjustment is saved for each video mode individually, so you may have to make the adjustment for each video mode you use. You will only have to adjust once for each video mode since the adjustment will be saved permanently by the computer.

When the video mode is changed, the screen image shifts up or down

The image's vertical position has not been optimized for the new video mode. Use the OSD Vertical Position adjustment to center the image vertically on the screen.

> **Note** This adjustment is saved for each video mode individually, so you may have to make the adjustment for each video mode you use. You will only have to adjust once for each video mode since the adjustment will be saved permanently by the computer.

Vertical bands appear in the image

1. The clock phase for the current video mode is not correct. Use the OSD Phase Control adjustment to sharpen the image.

2. The horizontal size is not correct for the current video mode. Use the OSD Horizontal Size adjustment to fit the image completely on the screen.

> **Important** This problem may occur if the horizontal size is mis-adjusted by as little as one pixel, so make the adjustment as precise as possible.

3. The current vertical refresh rate may not be optimal. Change the vertical refresh rate until you find one that produces the best image.

The image appears faded or "washed out"

The contrast is set too high. Use the OSD Contrast adjustment to lower the contrast setting.

The top or bottom half of the screen looks dark

One of the backlight bulbs may be burned out. Replace both backlight bulbs. Contact CTC Parker to order a backlight replacement kit.

Problems with Peripheral Devices

This section discusses problems that may occur after startup.

A PS/2 mouse does not work

1. Make sure that you are using a Microsoft PS/2 mouse.

    Some PS/2 mice that claim to be Microsoft-compatible will not work correctly with the PC9/P9. Do **not** use a serial mouse with a serial-to-PS/2 port adapter.

2. Make sure that your mouse is plugged into the PS/2 mouse port.

3. Try using a new PS/2 mouse.

A keyboard does not work

1. Make sure the keyboard is an AT-compatible keyboard, not an XT keyboard.

2. Make sure that your keyboard is plugged into the PS/2 keyboard port.

3. Try using a new keyboard.

The Ethernet port does not work

1. Make sure that the Ethernet cable is securely plugged into the Ethernet port.

P9 only

2. If the problem persists, turn off the system.

3. Connect a keyboard to the unit.

4. Restart in MS-DOS mode.

5. When the message "Starting MS-DOS" appears, press the **F8** key.

    This will cause the system to step through the CONFIG.SYS or AUTOEXEC.BAT file line-by-line.

6. Make sure that the networking software is being loaded. Specifically, verify that the following lines appear in the AUTOEXEC.BAT file and do **not** have the word "REM" in front of them:

    ```
    CD \NET
    CALL C:\NET\NET.BAT
    ```

A driver does not work with the installed adapter card

1. Make sure that there are no interrupt or memory conflicts with other adapter cards.

   See *Adding Expansion Cards* on page 90 for a list of I/O addresses available to expansion cards. See *I/O Addresses and IRQs* on page 37 for the addresses and IRQs used by the PC9/ P9.

P9 only

2. Make sure that the adapter card is supported by the P9.

   See *Adding Expansion Cards* on page 90 for a list of adapter cards that the P9 will support and their memory locations.

Note	P9 users, for additional information about adapter cards supplied by CTC Parker, see the Windows help file that corresponds to your Interact Device Driver or the I/O Driver help file (accessible from the MachineShop toolbar).

Dimensional Drawings

12.1" Display—Left Side View

Unit Dimensions

0.5" (12.70mm)

11.1" (281.94mm)

8.1" (205.74mm)

9.9" (251.46mm)

0.75" (19.05mm)
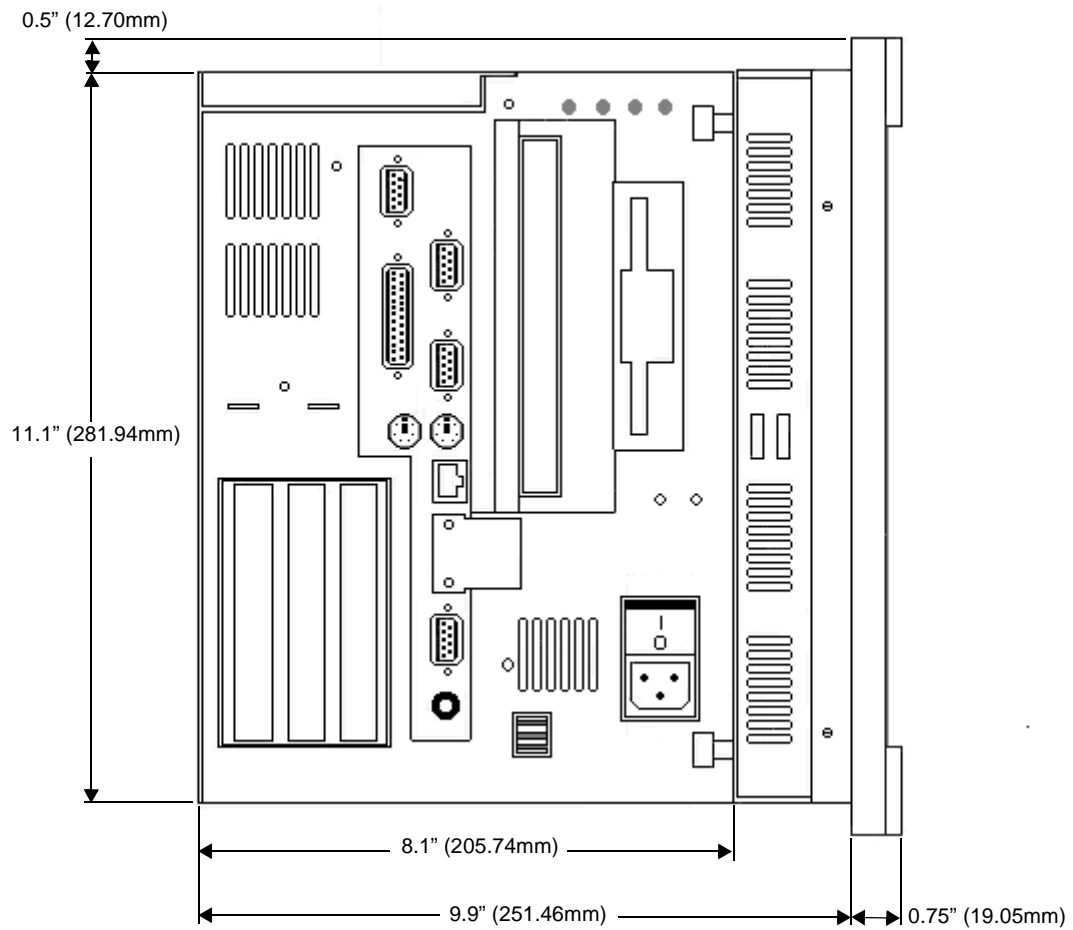
Port Dimensions

12.1" Display—Back View

14.0" (356.36mm)

0.8" (20.32mm)

2.4" (60.96mm)
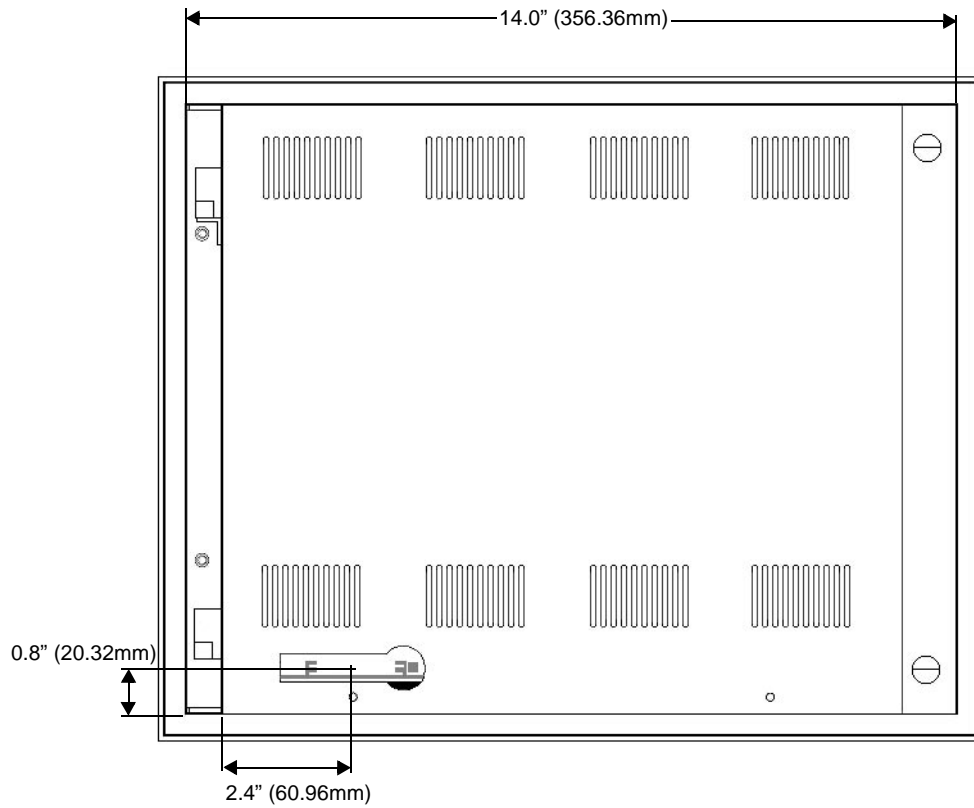
15" Display—Left Side View
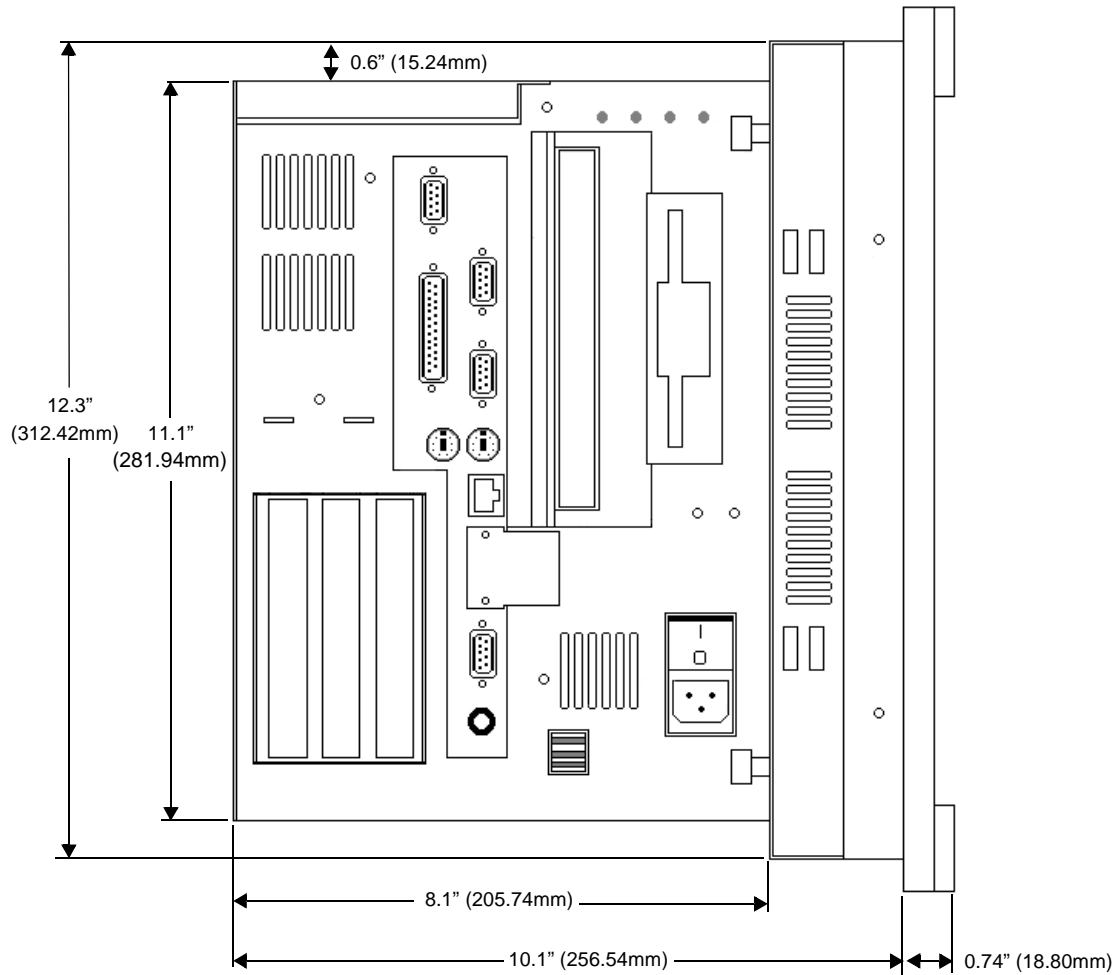
Unit Dimensions

Port Dimensions

15" Display—Back View

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