

PowerStation RS9

User Guide

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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 7 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 PowerStation RS9 or RSPC9 Industrial PC. Designed as a stand-alone PC that can perform in the demanding factory environment, the RS9/RSPC9 can be used with CTC Parker's PowerStation RS Monitor or with any other industrial monitor. The system comes with multiple storage and read/write media, including a floppy disk drive, optional hard drive, Compact Flash slot, and CD-ROM drive. The system's unique design makes it exceptionally easy to service.

The PowerStation RS9 can be ordered with a Windows® or MS-DOS® operating system, and 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 RS9 and the RSPC9. Throughout the Guide, the term "RS9/RSPC9" is used to refer to both systems.

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Using this Manual

This manual is designed to help you set up and use your PowerStation RS9 or RSPC9 Industrial PC. 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 RS9/RSPC9: 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 internal devices, such as the watchdog timer, battery, and fans; and the system I/O addresses and IRQs.

Chapter 3 — Installation: Explains how to mount the system in an enclosure and how to start 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 PowerStation RS9 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.

PowerStation RS9 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 RS9/RSPC9 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 PowerStation RS9, MachineShop and Interact 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.

Table 1-1 shows the CTC Parker software that you will receive with your system. A description of the software follows the table.

Table 1-1: Software Components

CD/Disk Name and Part Number	RS9			RSPC9		
	DOS	Windows		Windows		
		95/98	NT	95	98	NT
Windows 95 CD-ROM Setup Boot Disk KA-73050		X		X		
Win NT 4.0 Emergency Recovery Disk KA-73057			X			X
MS-DOS 6.22 and Utilities Installation Disk KA-72953	X		X			
PowerStation Start Disk KA-83109	X	X	X			
MachineShop Installation CD KA-83103	X	X	X			
PC9 Industrial PC Drivers and Utilities CD KA-73049				X	X	X

Windows 95 CD-ROM Setup Boot Disk KA-73050: Contains the system's CD-ROM driver. Shipped only with systems running Windows 95.

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 systems running Windows NT 4.0.

MS-DOS 6.22 and Utilities Installation Disk KA-72953: Contains the MS-DOS operating system and utilities. Shipped only with RS9 systems running MS-DOS or Windows NT.

PowerStation Start Disk KA-83109: Contains the PowerStation utilities and drivers for the RS9.

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

Industrial PC Drivers and Utilities CD KA-73049: Contains system files, utilities, and most drivers for the RSPC9 Industrial PC.

Getting Started

Before operating your system, please complete the following steps:

1. Unpack the system, 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 system, you will receive a trial membership in our Product Support Program, which provides complimentary telephone technical support, information on product updates, and service bulletins.

Documentation Standards

This manual uses the following standards:

1. The names of buttons, tabs, menus, menu items, commands, and other important terms appear in **bold**.
2. Names of keyboard keys, dialog boxes, directories, folders, and files appear in Title Case, with file extensions in lower case (for example, “Autoexec.bat”).
3. 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 RS9/ RSPC9

This chapter describes the RS9/RSPC9'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 internal devices, such as the system's watchdog timer, battery, and fans, and it lists the system's I/O addresses and IRQs.

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Specifications

This section describes specifications for the PowerStation RS9 and the RSPC9 Industrial PC. Please familiarize yourself with these specifications before operating the system.

Physical Specifications

The system's physical specifications are shown in Table 2-1.

Table 2-1: Physical Specifications

Category	Specifications
CPU card	Small format NLX (8" x 10"). Conforms to NLX Specification V1.2.
Processor	Intel® Pentium III™ 600, 700, and 800MHz
Memory	32-512MB synchronous DRAM
Expansion memory	<ul style="list-style-type: none"> • 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 <p>Note: See Table 2-2 on page 11 for a list of recommended DRAM manufacturers.</p>
Storage	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Three 16-bit ISA slots <i>or</i> • Two 16-bit ISA slots and one PCI slot
Dimensions (H x W x D)	<ul style="list-style-type: none"> • 11.1" x 14" x 8.6" • 281.94mm x 355.60mm x 218.44mm
Weight	<ul style="list-style-type: none"> • 21.10 lbs.

Table 2-2: 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 RS9/RSPC9 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)

Environmental Specifications

The RS9/RSPC9 conforms to the environmental specifications shown in Table 2-3,

Table 2-3: Environmental Specifications

Category	Specifications
Operating temperature	41° to 122° F (5° to 50° C) ambient air temperature
Storage temperature	14° to 140° F (-20° to 60° C)
Relative humidity	5% to 95% non-condensing
Altitude	-200ft. to 10,000ft. (-60.96m to 3,048m)
Shock rating	<ul style="list-style-type: none"> • 10g, 11ms operating • 30g, 11ms non-operating
Vibration rating	<ul style="list-style-type: none"> • 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
NEMA rating	<p>NEMA 4/4X environment</p> <p>Note: The system is only rated NEMA 4 if it is installed in a NEMA 4-rated enclosure.</p>

Important Limit the system's exposure to adverse conditions, such as dust, oil, moisture, and corrosive vapors in order 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 RS9/RSPC9 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 Table 2-4.

Table 2-4: Electrical Specifications

Category	Unit Specifications
Power supply	84VAC to 264VAC @ 120W
Power output	<p>The power supply will provide the following outputs:</p> <ul style="list-style-type: none"> • 3.3VDC @ 9.0A • 5VDC @ 13A • 12VDC @ 2A • -5VDC @ 0.1A • -12VDC @ 0.1A
Expansion slots	<p>The voltage and total current available for all expansion cards are as follows:</p> <ul style="list-style-type: none"> • 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 RS9/RSPC9 conforms to the testing specifications listed in Table 2-5.

Table 2-5: Testing Specifications

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

Chemical Resistance

Surfaces of the RS9/RSPC9 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.

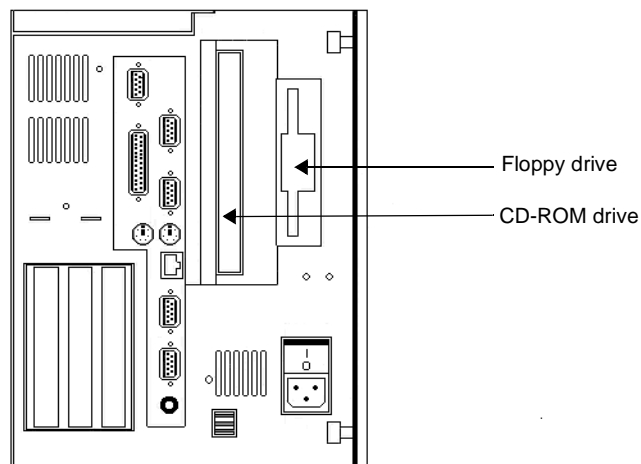
Drives

The RS9/RSPC9 is equipped with a variety of storage and read/write devices. They include a 3.5" floppy disk drive, hard disk drive (optional), 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 system has a 3.5", 1.44MB floppy drive, located on the left side of the unit, as shown in Figure 2-1.

Figure 2-1: External Disk Drives



Hard Drive

The system has an optional, internal hard disk drive for storing system files, projects, and applications.

Important In systems 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 must incorporate the information from Config.sys in the Startup directory into the main Config.sys file.

CD-ROM Drive

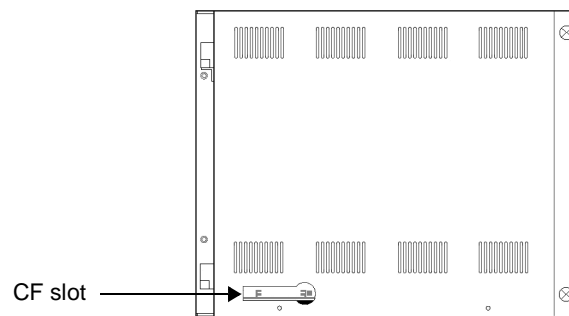
A 40X CD-ROM drive is located on the left side of the unit (see Figure 2-1 on page 15 for the location of this drive). It can be used to read files or load and run software.

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

Compact Flash Slot

The system has a slot to accommodate a Compact Flash (CF) card. This slot is located at the back of the unit, as shown in Figure 2-2.

Figure 2-2: Compact Flash 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 a CF card 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 a CF card as the startup drive 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 62 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. In fact, 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

Table 2-6 provides information about the system's drive definitions.

Table 2-6: 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) <i>Optional</i>	3.2GB or higher.	Primary drive when installed. Stores system start-up files, projects, and applications. In the RS9, stores the MachineShop Shell, Interact, and MachineLogic. 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.

Table 2-6: Drive Definitions

Drive Letter	Type	Size	Use
D	Compact Flash (CF) card (read/write) <i>Optional</i>	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 RS9, can be used to store the MachineShop Shell, Interact, and MachineLogic. 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

Table 2-7 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 a Compact Flash card maps from C8000 to CAFFF.

Table 2-7: Address Ranges

Address Range (decimal)	Address Range (hex)	Size	Description
1024K-524288K	100000-20000000	511MB	Extended memory
1008K-1024K	FC000-FFFFFF	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)

Table 2-7: Address Ranges

Address Range (decimal)	Address Range (hex)	Size	Description
800K-895K	C8000-DFFFFF	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

Memory guidelines for RS9/RSPC9 runtime and development systems are shown in Table 2-8.

Table 2-8: Memory Guidelines

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 <i>Optional</i>	The hard drive can store applications and logged data.	The hard drive can store any application. 50MB is needed for the MachineShop development suite (Toolbar, Interact, and MachineLogic), 10MB for the Toolbar alone.

Table 2-8: Memory Guidelines

Memory Type	Runtime	Development
Compact Flash <i>Optional</i>	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.	

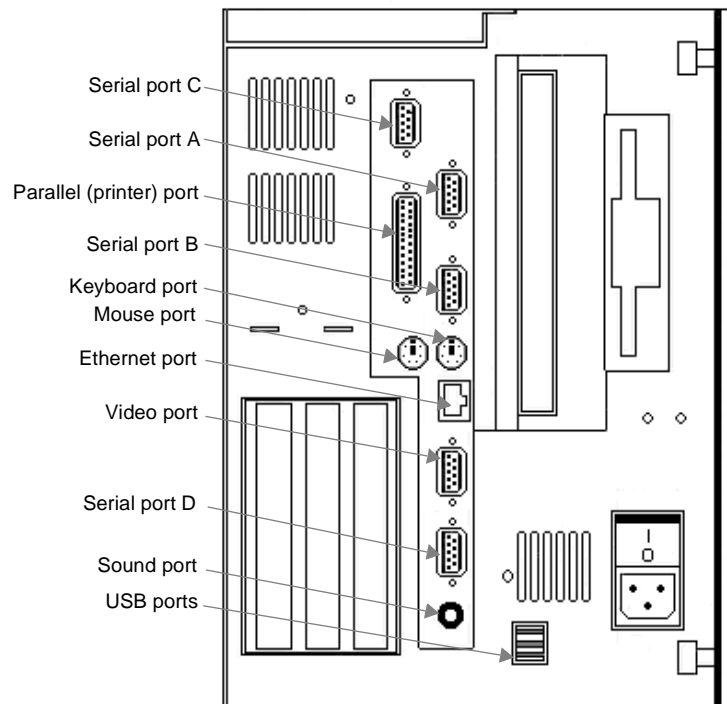
Ports

The RS9/RSPC9 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

Figure 2-3 shows the location of these ports. The sections that follow explain the ports' uses and specifications.

Figure 2-3: RS9/RSPC9 Ports



Serial Ports

The RS9/RSPC9 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 Figure 2-3 on page 21 for the location of these ports). All have 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 4000 feet (1200 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 70. You also may wish to read *Port D pinouts* on page 23 and *Port D cable diagrams* on page 24.

Port A, B, and C pinouts

If you need to make a cable for communicating with ports A, B, or C, Table 2-9 shows the pinout and signal information for these ports.

Table 2-9: Port A, B, and C Pinout Information

Pin #	Signal Name—RS 232
1	DCD, data carrier detect
2	RX, received data

Table 2-9: Port A, B, and C Pinout Information

Pin #	Signal Name—RS 232
3	TX, transmitted data
4	DTR, data terminal ready
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, Table 2-10 shows the pinout and signal information for this port. Port D is set to the RS-485 protocol by default.

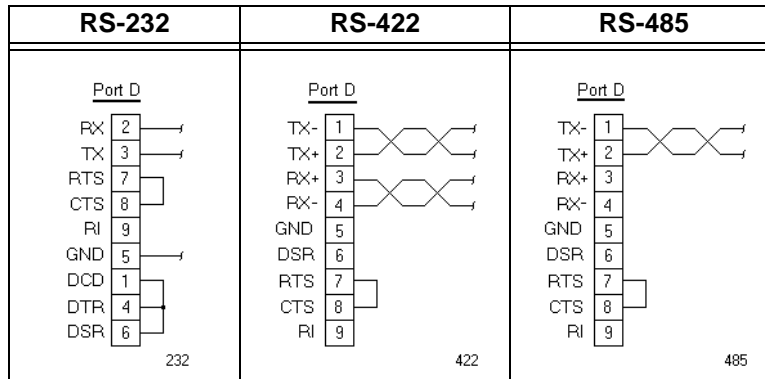
Table 2-10: Port D Pinout Information

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

Figure 2-4 shows the pinouts and cable diagrams required for communicating with port D, using the RS-232, RS-422, or RS-485 protocol

Figure 2-4: Port D Cable Diagrams.

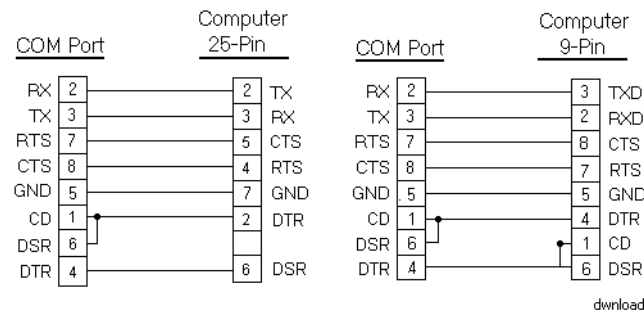


Important Be careful not to connect any wires to unused connector pins.

Connecting to a PC

If you wish to transfer files via serial connection from another PC to the RS9/RSPC9, 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 the RS9/RSPC9. If you need to construct your own serial cables, refer to the diagrams in Figure 2-5.

Figure 2-5: Serial Cable Diagrams



Parallel Port

The RS9/RSPC9 has two parallel ports:

- One external printer port, located on the left side of the unit (see Figure 2-3 on page 21 for the location of this port)
- One internal port, located on the system's CPU card.

The pinout information for the external printer port is shown in Table 2-11.

Table 2-11: Printer Port Pinout Information

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 (+ Data Bit 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 RS9/RSPC9 has two PS/2 ports located at the left side of the unit--one to connect a keyboard to the system, and the other to connect a mouse (see Figure 2-3 on page 21 for the location of these ports). The pinout information for these ports is shown in Table 2-12.

Table 2-12: PS/2 Port Pinout Information

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

Ethernet Port The RS9/RSPC9 has an Ethernet RJ-45 port that allows you to connect the unit to a Local Area Network (see Figure 2-3 on page 21 for the location of this port). The Ethernet 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 Table 2-13. Consult the manual that came with your network software for setup options.

Table 2-13: Ethernet Port Pinout Information

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 RS9/RSPC9 has a sound port that will support external stereo speakers via an ESS Audio Drive® sound controller (see Figure 2-3 on page 21 for the location of this port). The port provides a SoundBlaster Pro™-compatible sound interface.

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

Video Port The RS9/RSPC9 has a dedicated video port located at the left side of the unit (see Figure 2-3 on page 21 for the location of this port).

You may attach the PowerStation RS Monitor or any VGA, SVGA, or XGA monitor to this port. If you attach a signal splitter to the port, you can connect two monitors 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.

The system's video output will support monochrome and high resolution color displays. 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.

USB Ports The system has two external USB ports available at the left side of the unit (see Figure 2-3 on page 21 for the location of these ports). 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. The system has automatic mapping of function to driver and configuration.

Note USB is supported only by drivers within Windows 98.

Watchdog Timer

The RS9/RSPC9'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. When this period is up, the watchdog 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 in Table 2-14.

Table 2-14: Watchdog Register Addresses

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 RS9/RSPC9 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.



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.

Please contact our Technical Support department at 513-248-1714 for information about how to replace the battery.

Fans

The RS9/RSPC9 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 Table 2-15.

Table 2-15: Fan Speeds

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 31. 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 possible obstruction in the fan blades.

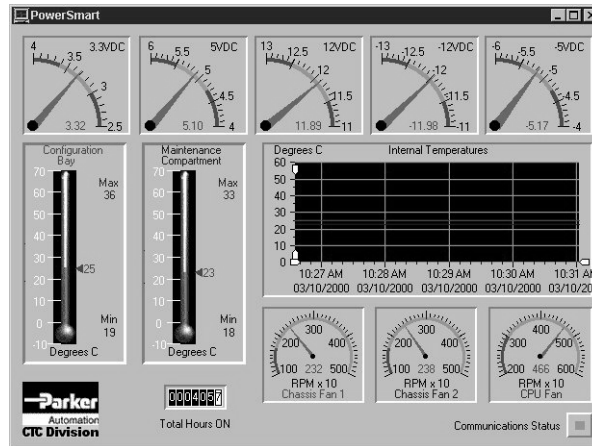
If the CPU fan is out of specification, the configuration bay fan will run at full speed to compensate until the CPU fan can be replaced.

PowerSmart

The RS9/RSPC9 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 in Figure 2-6. You can activate this display by clicking the PowerSmart icon on the Windows desktop.

Figure 2-6: PowerSmart Display



On systems running MS-DOS, you can access a text-based version of the 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 the system in MS-DOS. Then insert the the PowerStation Start Disk (for the RS9) or the PC9 Industrial PC Drivers and Utilities CD (for the RSPC9), 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 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)

If you want to see more precise temperature and time readings, use a mouse to move the small, white zoom arrows in the Internal Temperatures window.

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 COMERROR dialog box will appear to describe the problem.

See *Problems Signaled by PowerSmart* on page 83 for suggestions on how to respond to error conditions.

To perform its functions, PowerSmart uses the I²C devices shown in Table 2-16. All devices are connected on a two-wire SMBus.

Table 2-16: PowerSmart I²C Devices

I ² C 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.

Table 2-16: PowerSmart I²C Devices

I ² C Device	Location	Function
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 RS9/RSPC9.

I/O Addresses

Table 2-17 shows the I/O addresses used by the RS9/RSPC9. Make sure that any adapter cards you install do not conflict with these addresses.

Table 2-17: I/O 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)

Table 2-17: I/O Addresses

Address	Function
04D0-04D1	Edge/level interrupts
0CF8-0CFF	PCI configuration
4295-4296	LM79 Monitor Device registers

IRQs The RS9/RSPC9 configures IRQs as shown in Table 2-18.

Table 2-18: IRQs

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 have a touchscreen monitor, 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, look in the PCI adapter Properties dialog box.

To find the PCI adapter Properties dialog box, complete the following steps:

1. On the Windows task bar, click **Start**, and then click **Settings** and **Control Panel**.

The Control Panel will appear.

2. Click **System**.

The System Properties dialog box will appear.

3. Click the **Device Manager** tab.

4. On the Device Manager tab, click the + sign next to **Network Adapters**.

A list of installed network adapters will appear.

5. Select the **Intel 8255X-BaseD PCI Ethernet Adapter (10/100)**, and then click the **Properties** button.

The Intel 8255X-BaseD PCI Ethernet Adapter (10/100) Properties dialog box will appear.

Installation

This chapter gives guidelines for selecting an appropriate location for the RS9/RSPC9. It also provides instructions for mounting the system in an enclosure, connecting the system to a monitor, and starting the system.

Chapter Contents

<i>Selecting a Location</i>	38
<i>Mounting the System</i>	39
<i>Connecting to a Monitor</i>	40
<i>Starting the System</i>	41

Selecting a Location

The first step in installing the RS9/RSPC9 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 follow these guidelines to maintain a safe operating environment:

1. The system is rated 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, select a place that limits the system's exposure to adverse conditions, such as dust, oil, moisture, and corrosive vapors.

The system's surface is resistant to a variety of chemicals. See *Chemical Resistance* on page 14 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 RS9/RSPC9 accepts AC input only. See *Electrical Specifications* on page 13 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.

Temperature Guidelines

You can safely operate the system within the temperature range specified in *Environmental Specifications* on page 12. 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 operating temperature, you must cool the enclosure.

Enclosure Guidelines

If you install the RS9/RSPC9 in an enclosure, allow a minimum of 2 inches around the unit for airflow. Also, be sure to allow easy access to the system's drives, ports, and switches, which are located on the left side of the unit. In particular, allow at least 3.5" between the enclosure and the left side of the unit so that the CD-ROM drive tray can open.

Also, allow access to the system's Compact Flash slot, located at the back of the unit, on the lower left-hand side. See Figure 2-2 on page 16 for the location of this slot.

Make sure that the surface where the unit will meet the front panel of the enclosure is flat.

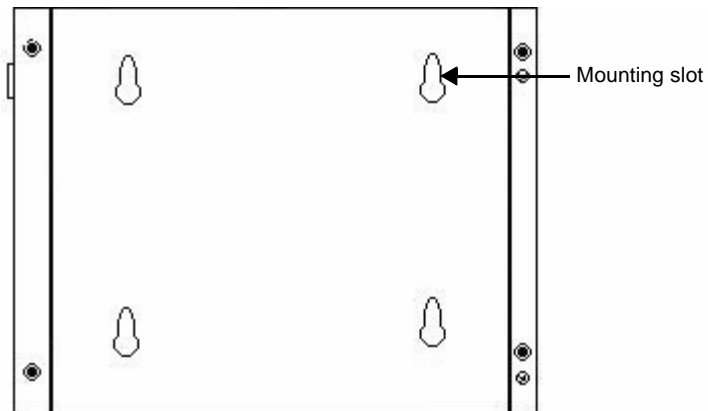
See *Appendix A: Dimensional Drawings*, beginning on page 89, for all of the measurements you will need in order to mount your system. These include the unit's height, width, and depth; location measurements for the system's drives, ports, and switches; and measurements for the unit's mounting slots.

Mounting the System

You can mount the RS9/RSPC9 by drilling four mounting screw holes in the panel on which you want to mount the unit. The holes should correspond to the mounting slots in the front cover of the system, shown in Figure 3-1 on page 40. You then will screw mounting screws into the holes in the panel and mount the unit over the mounting screws. Mounting screws are shipped with your system.

To mount the system, complete the following steps:

1. Drill four mounting holes in the panel where you will mount the system. Measurements for the mounting holes are shown in *Appendix A: Dimensional Drawings*, on page 89.
2. Make sure that the panel mounting surface is clean and flat.
3. Screw the mounting screws into the holes that you drilled, but do **not** tighten the screws all the way down.

Figure 3-1: Front Cover with Mounting Slots

4. Mount the system by placing the large openings in the mounting slots in the front cover over the screws in the mounting panel and sliding the unit downward so that the narrow ends of the mounting slots fit underneath the screw-heads.

The unit should fit snugly on the mounting screws. If the unit fits too loosely, remove it, tighten the mounting screws, and remount the unit.

Connecting to a Monitor

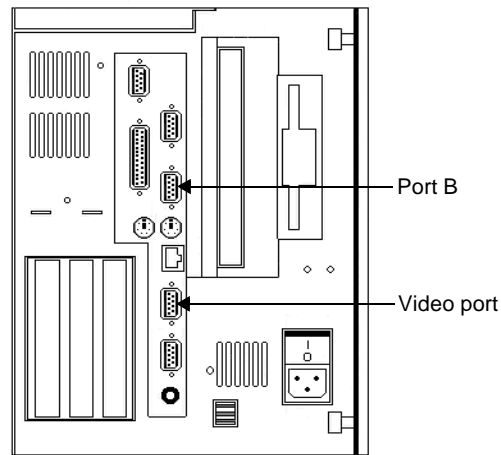
Once you have chosen a location for the RS9/RSPC9 and installed the unit, you are ready to connect it to a monitor. This section explains how to connect the system either to CTC's PowerStation RS Monitor or to another monitor.

Connecting to a PowerStation RS Monitor

To connect the system to the PowerStation RS Monitor, simply connect the following cables:

- Connect a 15-pin video cable between the monitor's Analog Video Input port and the video port at the left side of the RS9/RSPC9, shown in Figure 3-2 on page 41. A 15-pin video cable will be shipped with the RS Monitor.
- If you have a touchscreen monitor, connect a 9-pin touchscreen cable to the 9-pin serial port on the RS Monitor and serial port B on the RS9/RSPC9, shown in Figure 3-2. A 9-pin touchscreen cable will be shipped with the RS Monitor.

Figure 3-2: Video Port and Serial Port B



Connecting to other Monitors

To connect the system to a non-PowerStation RS Monitor, connect a 15-pin video cable between the video port on the RS9/RSPC9 and the monitor's video port.

Starting the System



Once you have mounted the RS9/RSPC9 and connected it to a monitor, you are ready to start the system. This procedure is described below.

Before connecting power to the RS9/RSPC9, make sure that you have read and understood *Electrical Specifications* on page 13 and *Testing Specifications* on page 14. 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.

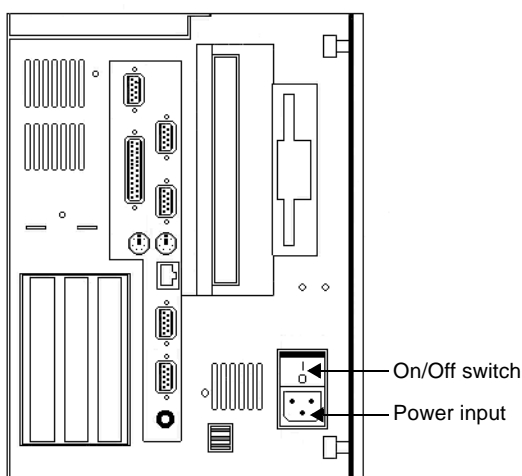
Important Proper installation of the system in European Union countries requires the use of a harmonized power cord (the power cord must be identified with the <HAR> symbol). Make sure that the system is connected to the main supply with a harmonized power cord.

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 13.
3. Connect the power cord to the RS9/RSPC9.
4. Turn the system on.

The power input and On/Off switch are shown in Figure 3-3. The fan should come on, followed immediately by the display.

Figure 3-3: Power Input and On/Off Switch



Following are guidelines for starting 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 the system, and press Ctrl+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 RS9/RSPC9 is set to default to Windows NT. You may change the default so that each time the unit starts, 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.

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/Shut-down** 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 will be 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 an RS9 under MS-DOS, the system will automatically load the MachineShop Shell.

You are now ready to begin using your RS9/RSPC9.

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.

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<i>Reformatting a Compact Flash Card</i>	62
<i>Performing Internal Maintenance</i>	63
<i>Resolving Common Problems</i>	75

Reinstalling Software

The RS9/RSPC9 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 RS9/RSPC9 under Windows and MS-DOS:

- CD-ROM Driver
- Network driver
- PowerSmart system monitor
- Video driver
- Audio driver
- PowerStation utilities
- MachineShop Shell

Reinstalling Software under Windows

The instructions in this section explain how to reinstall essential drivers and utilities in the RS9/RSPC9 under Windows 95, 98, and NT 4.0. If you are not running your system under Windows, you may skip this section.

To reinstall drivers and utilities under Windows, you will need the following CDs/disks:

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

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

Reinstalling the CD-ROM driver and Windows

Under Windows, the computer's CD-ROM driver is part of the Windows operating system that you use (Windows 95, 98, or NT). The most important reason why you might have 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, network, audio, and PowerSmart drivers.

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:** 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 the system.
2. As the system is starting, press F2 to enter the BIOS.
3. Click the **Advanced** menu, and then click on **I/O Device Configuration**.
4. Change the setting for serial ports 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, 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) into the system's floppy disk drive.

3. Start the system.

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 system 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 Industrial PC 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 47, and change the setting for serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, network, audio, and PowerSmart drivers. For instructions, see *Reinstalling the video driver* on page 50, *Reinstalling the network driver* on page 52, *Reinstalling the audio driver* on page 54, and *Reinstalling PowerSmart* on page 57.

To reinstall the CD-ROM driver and Windows 98, 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 the system.
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 47, and change the setting for serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, network, audio, and PowerSmart drivers. For instructions, see *Reinstalling the video driver* on page 50, *Reinstalling the network driver* on page 52, *Reinstalling the audio driver* on page 54, and *Reinstalling PowerSmart* on page 57.

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

1. Insert the Win NT 4.0 Emergency Recovery Disk into the system's floppy disk drive.
2. Start the system, 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 47, and change the setting for serial ports C and D back to **Auto**.

Important After reinstalling the operating system, you will have to reinstall the video, network, audio, and PowerSmart drivers. For instructions, see *Reinstalling the video driver* on page 50, *Reinstalling the network driver* on page 52, *Reinstalling the audio driver* on page 54, and *Reinstalling PowerSmart* on page 57.

Reinstalling the video driver

Use the following instructions to reinstall the Chips 69000 video driver in the RS9/RSPC9 under Windows 95, 98, or NT 4.0.

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

1. Start the system, and insert the PC9 Industrial PC 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.

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

1. Start the system, and insert the PC9 Industrial PC 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.

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

1. Start the system.
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 Industrial PC 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

Reinstalling the network driver

Use the following instructions to install the Pro/100B Ethernet adapter in the RS9/RSPC9 under Windows 95, 98, or NT 4.0.

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

1. Start the system.
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 Industrial PC 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 under Windows NT 4.0, complete the following steps:

1. Start the system.
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 and will display a list of network adapters.

6. Do **not** select an adapter from this list. Instead, insert the PC9 Industrial PC 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 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 RS9/RSPC9 under Windows 95, 98, or NT 4.0.

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

1. Start the system.
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 manufacturer**, and insert the PC9 Industrial PC 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 under Windows 98, complete the following steps:

1. Start the system.
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 Industrial PC 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 under Windows NT 4.0, complete the following steps:

1. Start the system.
2. Insert the Industrial PC 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 RSPC9 under Windows 95 or 98. If you have an RS9, you may skip this section.

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 31 for more information about how to use this utility).

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

1. Start the system, and insert the PC9 Industrial PC 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 Software under MS-DOS

The instructions in this section explain how to reinstall essential drivers, PowerStation utilities, and the MachineShop Shell in the RS9 under MS-DOS. If you have an RSPC9, you may skip this section.

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

- PowerStation Start Disk (KA-83109)
- MachineShop Shell Installation Disk.

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 the RS9. See the *MachineShop Installation Booklet* for instructions on how to create this disk.

If you are running under Windows 95, 98, or NT and want to perform these reinstallations under MS-DOS, restart the system in MS-DOS mode.

If you need additional help reinstalling drivers and utilities in the RS9, call our Technical Support department at 513-248-1714.

Reinstalling drivers and PowerStation utilities

RS9 drivers and PowerStation utilities are stored in a zipped folder on the PowerStation Start Disk.

To reinstall all essential RS9 drivers and PowerStation utilities, complete the following steps:

1. Insert the PowerStation Start Disk into the RS9'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 system, 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 PowerStation RS Monitor with touchscreen, type **Y** for Yes, and recalibrate the touchscreen. If you do not have an RS Monitor with touchscreen, type **N** for No.

Important The procedure just described installs a touchscreen driver for CTC's PowerStation RS Monitor. If you are not using this monitor and want to disable the driver, follow the procedure under *Disabling the RS Monitor touchscreen driver*, below.

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 60 for instructions.

11. Restart the system.

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

Disabling the RS Monitor touchscreen driver

To disable the RS Monitor touchscreen driver, complete the following steps:

1. Start the system, and when you see the message “Starting MS-DOS,” press the F5 key on your keyboard.

The DOS C:\ prompt will appear.

2. At the C:\ prompt, type **Edit Autoexec.bat**.

The text of the Autoexec.bat file will appear.

3. Type the word **REM** before the following lines:

```
SET TOUCH_ADDR=2F8
SET TOUCH_IRQ=3
SET TOUCH_PATH=c:\TOUCH
CALL %TOUCH_PATH%\TCHINIT.BAT
```

4. Exit the Autoexec.bat file, and go to the root directory of the drive where your PowerStation utilities are stored.
5. Delete the Touch directory.
6. Restart the system.

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

Reinstalling the MachineShop Shell

To reinstall the MachineShop Shell in the RS9, 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 the RS9. 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 system, 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 system's hard drive or CF card. It will copy Shell files into the CTC directory, and network drivers into the NET directory.

7. Restart the system.

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 your RS9, 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 an RSPC9, or if you use a hard drive as the start-up drive in your RS9, you may skip this section.

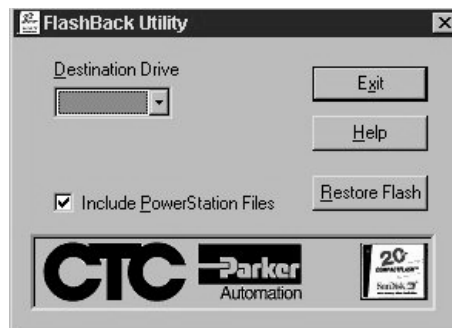
You can easily reformat a Compact Flash card by using CTC's FlashBack utility, which restores the MS-DOS operating system and PowerStation operating files to a CF card in one, simple operation. To do this, you will open FlashBack on the MachineShop Installation CD (KA-83103) shipped with the RS9 and use the instructions in the FlashBack online Help to reformat the CF card.

To reformat a CF card for the RS9, complete the following steps:

1. Insert the MachineShop Installation CD into the RS9's CD-ROM drive.
2. Use Windows Explorer to locate the file FlashUtil.exe on the CD-ROM drive. (The file will be in the Utilities\Flashback directory.)
3. Click FlashUtil.exe.

The FlashBack Utility dialog box will appear as shown in Figure 4-1.

Figure 4-1: FlashBack Utility Dialog Box



Note If you have a hard drive with MachineShop installed on it, FlashBack also will be installed. You can start FlashBack by clicking the **FlashUtil** button on the MachineShop toolbar.

4. Click the **Help** button to find complete, online instructions for using the FlashBack utility.

Performing Internal Maintenance

This section includes important information about performing internal maintenance on the RS9/RSPC9, 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:

- CD-ROM drive
- Configuration bay fan
- CPU card
- CPU fan
- DRAM modules
- Floppy disk drive
- Hard disk drive
- Maintenance compartment fan
- Power supply

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.

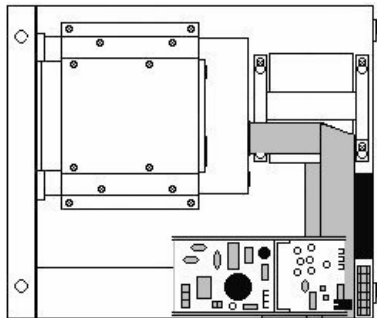
- To avoid electric shock, always disconnect the power from the unit before you remove the back cover or backshell. Do not touch any cards while the unit is on.
- Disconnect power before making any hardware configuration changes. The sudden rush of power as you connect a jumper or install a card may 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

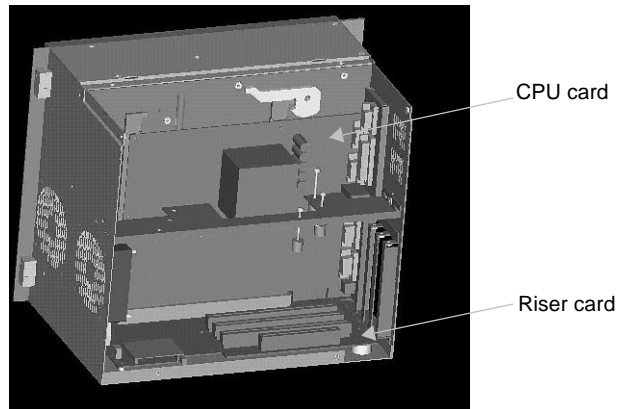
The RS9/RSPC9 has two different areas in which you might perform maintenance:

- The maintenance compartment, located behind the front cover, contains the power supply, floppy drive, CD-ROM drive, hard drive, and monitor card. The maintenance compartment is shown in Figure 4-2.

Figure 4-2: Maintenance Compartment



- The configuration bay, located behind the back cover, contains the CPU card (including the system's DRAM modules) and the riser card (including ISA/PCI slots). Figure 4-3 on page 65 shows the configuration bay.

Figure 4-3: Configuration Bay

You can access the maintenance compartment by opening the system's hinged front cover. You can access the configuration bay by removing the back cover. Both procedures are described below, along with the steps for closing the unit after you have serviced it.



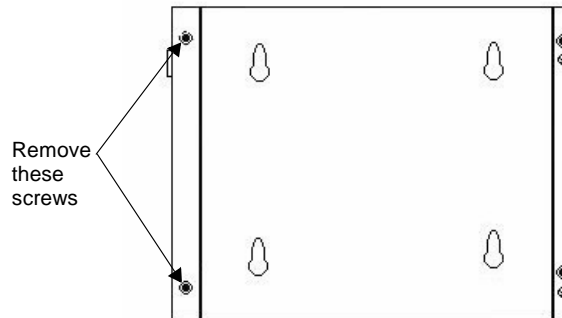
Warning For safety reasons, the system should be opened only by qualified service personnel.

Opening the front cover

To open the front cover, 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.
4. Remove the unit from its mounted location by lifting the unit up and off its mounting screws.
5. Place the unit on a static dissipative mat, in a location free from dirt and moisture and protected against static discharge.
6. Remove the two screws at the left side of the front cover, as shown in Figure 4-4 on page 66.

Note These screws unscrew from the back side of the unit.

Figure 4-4: Opening the Front Cover

7. Swing the front cover open, left to right, on its hinges.

Closing the front cover

To close the front cover, complete the following steps:

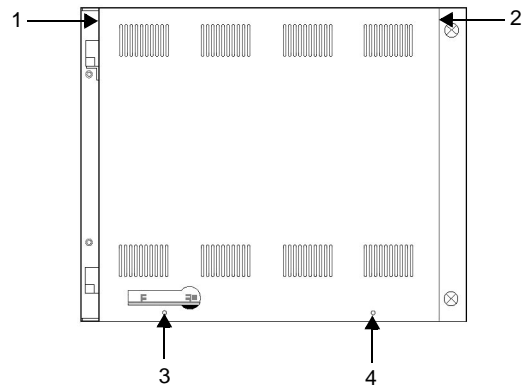
1. Close the cover, and fasten it in place with the two screws that you removed in step 6 on page 65.
2. Reinstall the system in its mounted location.
3. Reconnect power and other cables to the system.
4. Reconnect the system to the power source.
5. restart the system.

Removing the back cover

To remove 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 in Figure 4-5 on page 67.

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.

Figure 4-5: Opening the Back Cover

Remove the four
back cover screws

4. Lift the back cover from the system.

Replacing the back cover

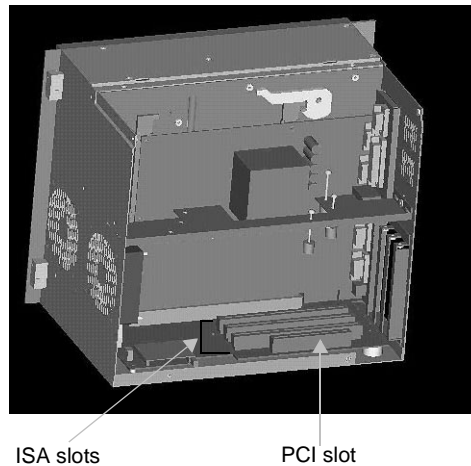
To replace the back cover, complete the following steps:

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 unit.
2. Reinstall the screws that you removed in step 3 of *Removing the back cover* on page 66.
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 RS9/RSPC9 supports both ISA- and PCI-bus expansion cards. The system's expansion slots are shown in Figure 4-6.

Figure 4-6: Expansion Slots



As with most ISA-bus computer port addresses, 300 through 31F are available for adapter functions. See *I/O Addresses and IRQs* on page 34 for a list of the addresses and IRQs used by the system. Make sure that any adapter cards you install do not conflict with these IRQs or addresses.

Table 4-1 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 address. In all cases, use the highest address location possible. This will provide contiguous memory for applications.

Table 4-1: PLC Adapter Cards that Support Interact

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

Table 4-1: PLC Adapter Cards that Support Interact

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

Plug and Play configuration

If you add an expansion card that is not configured for Plug and Play (a “legacy” card), you must configure your system in order to avoid resource conflicts:

To reconfigure your system for a legacy expansion card, complete the following steps:

1. Turn on the system, and **before** the system boots, press the Delete key on your keyboard.
The CMOS Setup Utility screen will appear.
2. Use the Down Arrow key to tab to **PNP/PCI Configuration**, and then press Enter.
The PNP/PCI Configuration screen will appear.
3. On the PNP/PCI Configuration screen, be sure that **Resources Controlled By** is set to **Manual**.
If necessary, use the Down Arrow key to tab to **Resources Controlled By** and the Page Up and Page Down keys to change the setting to **Manual**.
4. Use the Down Arrow key to tab to **IRQ used by the Legacy card**.
5. Use the Page Up and Page Down keys to change **PCI/ISA PnP** to **Legacy ISA**.
6. Press Esc.
7. Press F10.
The **Save to CMOS and Exit** prompt will appear.
8. Select **Y**, and then press Enter.
Your settings will be saved to CMOS, and you will exit the CMOS Setup Utility.

Changing Jumper Settings

Like other PCs, the RS9/RSPC9 uses jumpers to control certain system functions. This section explains how to change jumper settings in order to:

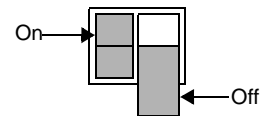
- Enable or disable the ethernet port
- Set the parallel port interrupt

- Set the communication protocol for port D
- Enable or disable the sound port

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

To change jumper settings, first open the back cover (see *Removing the back cover* on page 66 for instructions). Then follow the procedures outlined in this section. Jumpers set to “on” and “off” should look like those in Figure 4-7.

Figure 4-7: On and Off Jumper Settings



Note “Off” jumpers can be completely removed or placed as in the illustration above.

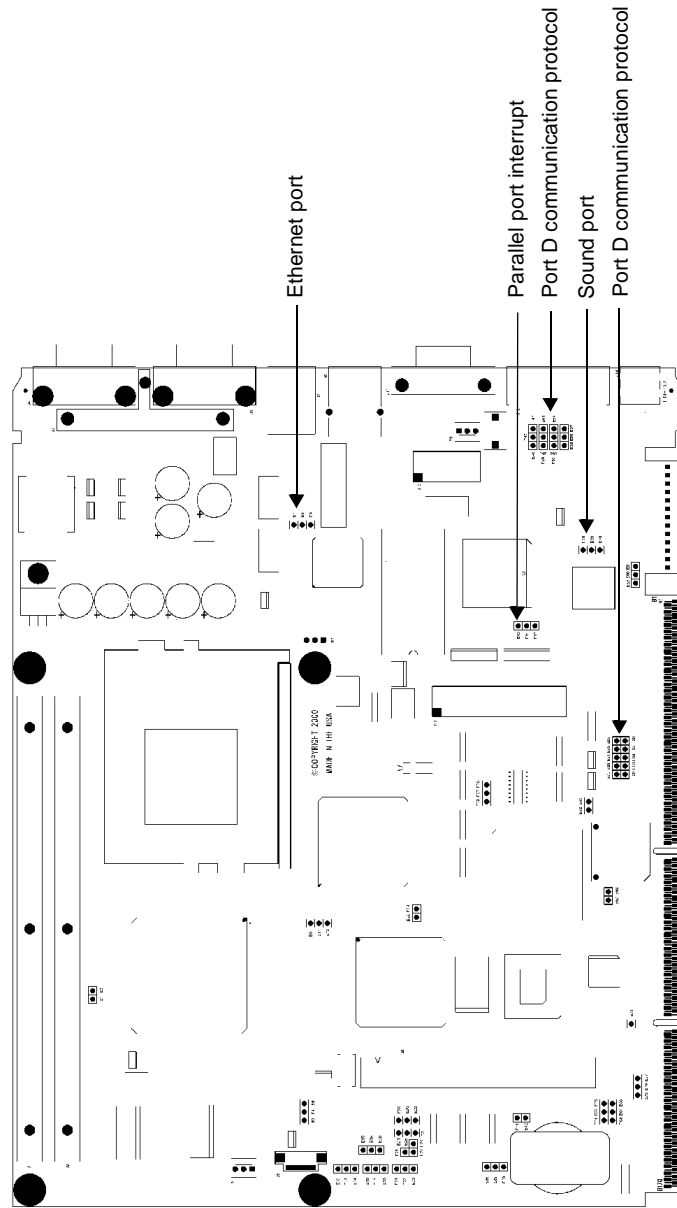
Ethernet port

Jumpers that enable or disable the ethernet port are E7, E8, and E9, located on the CPU card. The specific location of these jumpers is shown in Figure 4-8 on page 72. The default settings, with the ethernet port enabled, are shown in Table 4-2, as are the settings for “disabled.”

Table 4-2: Ethernet Port Jumper Settings

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

Figure 4-8: CPU Card



Parallel port interrupt

Jumpers that set the parallel port interrupt are jumpers E43, E44, and E45, located on the CPU card. The specific location of these jumpers is shown in Figure 4-8 on page 72. The default settings, for IRQ5, are shown in Table 4-3, along with the alternate settings for IRQ7.

Table 4-3: Parallel Port Jumper Settings

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. The specific location of these jumpers is shown in Figure 4-8 on page 72. The default protocol for port D is RS-485. The jumper settings for this protocol are shown in Table 4-4, along with alternate settings for RS-232 and RS-422 communications.

Table 4-4: Port D Jumper Settings

Jumper	RS-485 (Default)	RS-232	RS-422
E46-E47-E48	E47-E48 On	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. The specific location of these jumpers is shown in Figure 4-8 on page 72. The default settings, with the sound port enabled, are shown in Table 4-5, as are the settings for “disabled.”

Table 4-5: Sound Port Jumper Settings

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

Resolving Common Problems

This section provides basic troubleshooting steps to help you identify and correct problems that you may have with your RS9/RSPC9. 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	75
The fans do not start, and the display is blank	76
The fans start, but the display does not	76
The RAM test fails, or the total memory installed does not match the total contiguous RAM listed in the display following the RAM test	77
The system locks up while starting and will not restart (<i>RS9s only</i>)	77
The DOS prompt is displayed instead of the Machine-Shop Shell main menu (<i>RS9s only</i>)	78
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Problems when Starting

Some of the most common problems that users encounter with PCs occur when they start 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 in *Removing the back cover* on page 66.
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 in *Replacing the back cover* on page 67.
8. Connect the system to the power source.
9. Restart the system.

The fans start, but the display does not

1. Turn off the system.
2. Open the front cover, following the procedure in *Opening the front cover* on page 65.
3. Make sure that the video cable is firmly connected to its extender in the maintenance compartment.
4. Close the front cover, following the procedure in *Closing the front cover* on page 66.
5. Open the back cover, following the procedure in *Removing the back cover* on page 66.
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 in *Replacing the back cover* on page 67.
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 in *Removing the back cover* on page 66.
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 in *Replacing the back cover* on page 67.
6. Reconnect the system to the power source.
7. Restart the system.

The system locks up while starting and will not restart
(RS9s 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* on page 79 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 You can use the **DOS copy** command to overwrite the corrupted file, as described on page 83.
 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 defaults.
 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 (*RS9s only*)

1. If the system appears to be operating correctly otherwise, restart it.
2. If the problem persists, turn off the unit.
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 and Autoexec.bat files 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 You can use the **DOS copy** command to overwrite the corrupted file, as described on page 83.

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 (RS9s only)

In RS9 systems with Interact, 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) shipped with your RS9.

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
SET TOUCH_ADDR=2F8
SET TOUCH_IRQ=3
PATH C:\;C:\DOS;C:\CTC

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

C:\CTC\IDPWR -T -S
```

```
IF ERRORLEVEL 3 GOTO ITSAP1
LH C:\CTC\BIOSTSR

REM*****
REM If an external mouse is connected, MOUSE will install
REM successfully
REM 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\IDPWR -V -S
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\APPPFILES
```

```

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 (determined by MLDU.EXE return value 0
REM = ENABLED, 1 = 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 NOVCP1 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 NOVCP1 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 NOVCP1 X=C800-CFFF
```

```

REM X=D800-D8FF I=E000-EFFF
REM
REM IMPORTANT: Always include the NOEMS and NOVCP
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. Then overwrite the suspect file with the Autoexec.ctc or Config.ctc file from your CTC directory. For example, if the Autoexec.bat file is 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 RS9/RSPC9 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 31 for information about how the PowerSmart utility works.

Table 4-6 shows the values monitored by PowerSmart.

Table 4-6: 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)	3000 rpm	1600 rpm	N/A
Maintenance compartment fan speed (Chassis Fan 2)	3000 rpm	1600 rpm	N/A
CPU fan speed	4650 rpm	3000 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

Table 4-6: Values Monitored by PowerSmart

Parameter	Nominal Value	Minimum Value	Maximum Value
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 13).
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 13).
4. Make sure that the maximum rated operating temperature for the system has not been exceeded (see *Environmental Specifications* on page 12).

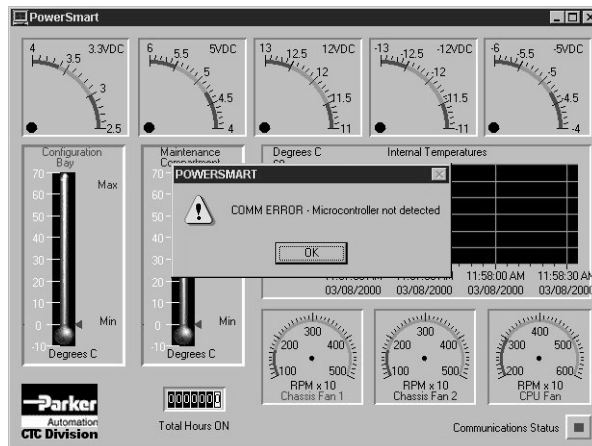
An error condition exists for a fan

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 84 for instructions.
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 in Figure 4-9.

Figure 4-9: PowerSmart COM ERROR Display



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 Table 4-7 on page 86. See *PowerSmart* on page 31 for a description of the devices' functions.

Table 4-7: PowerSmart Peripheral Devices

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 Peripheral Devices

This section discusses problems with peripheral devices 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 RS9/RSPC9. 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.
2. If the problem persists, turn off the system.
3. Connect a keyboard to the system.

4. Restart the system 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 and Autoexec.bat files 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 an installed adapter card

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

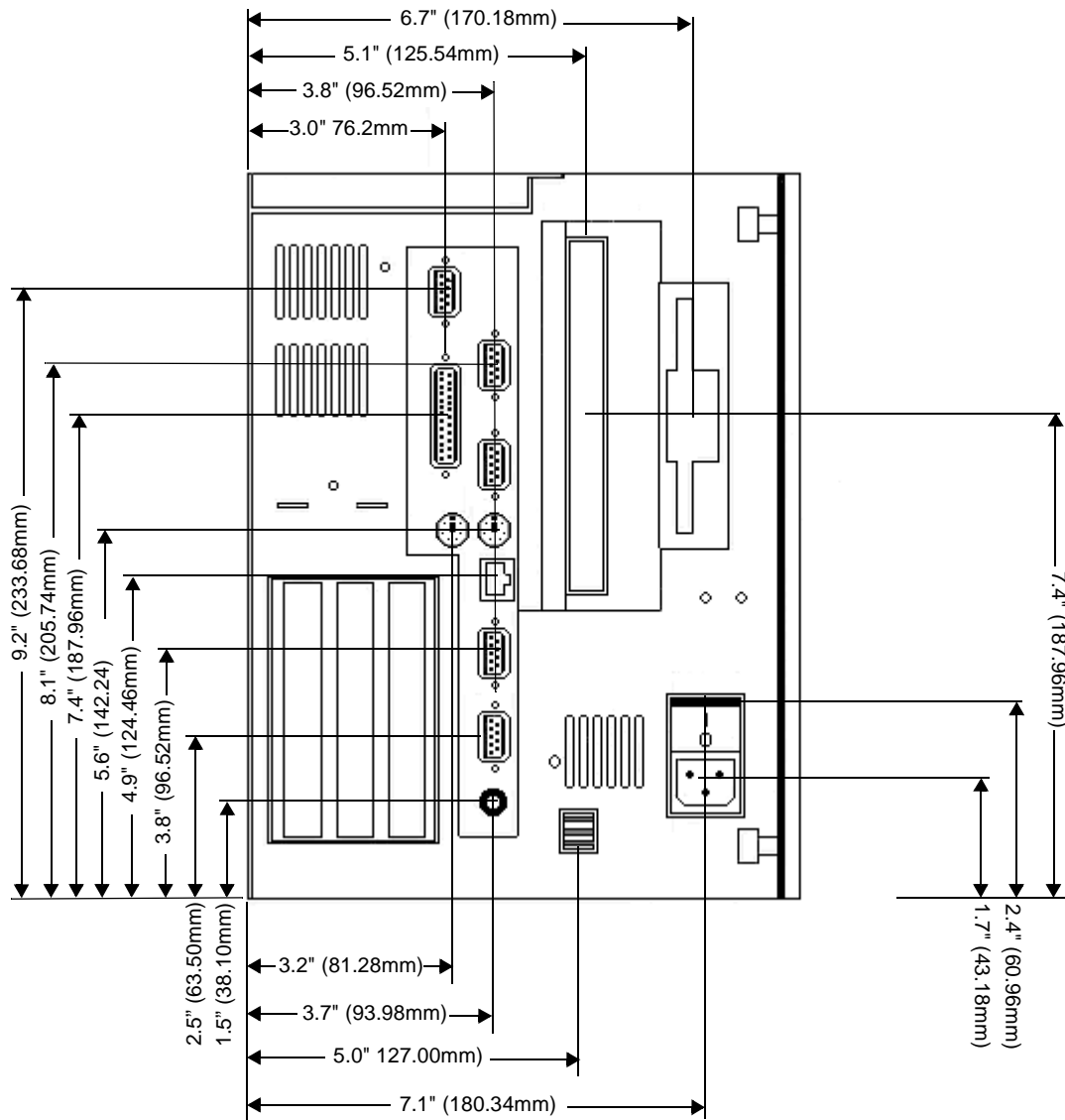
See *Adding Expansion Cards* on page 68 for a list of I/O addresses available to expansion cards. See *I/O Addresses and IRQs* on page 34 for the addresses and IRQs used by the RS9/RSPC9.

2. Make sure that the adapter card is supported by the RS9/RSPC9.

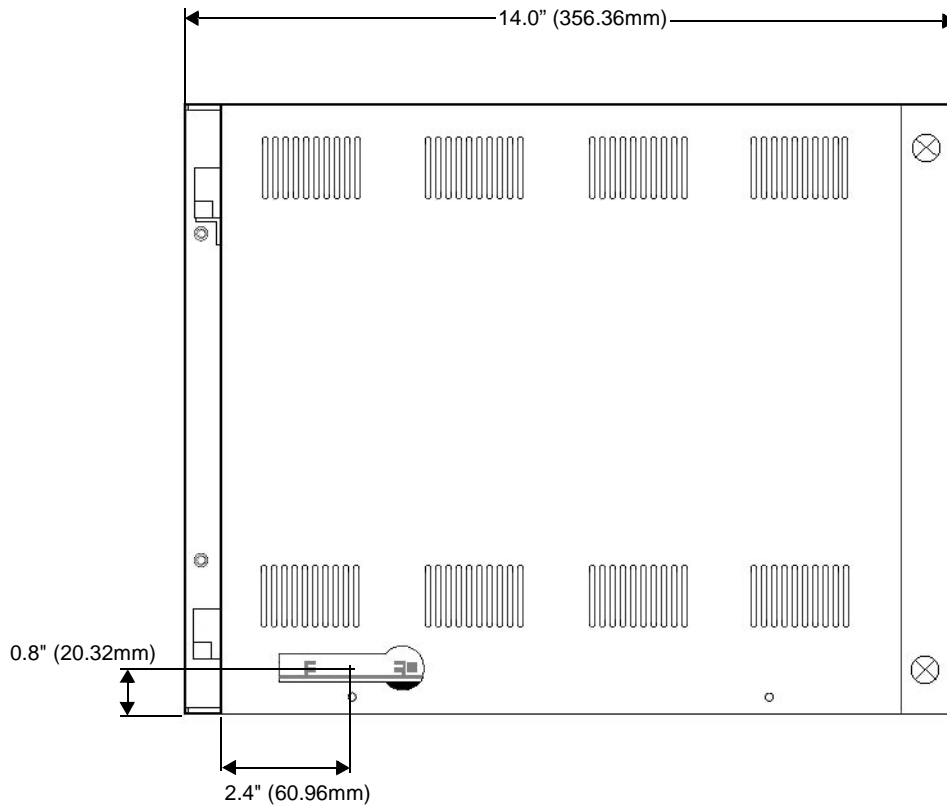
See *Adding Expansion Cards* on page 68 for a list of adapter cards that the RS9/RSPC9 will support and their memory locations.

Note 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).

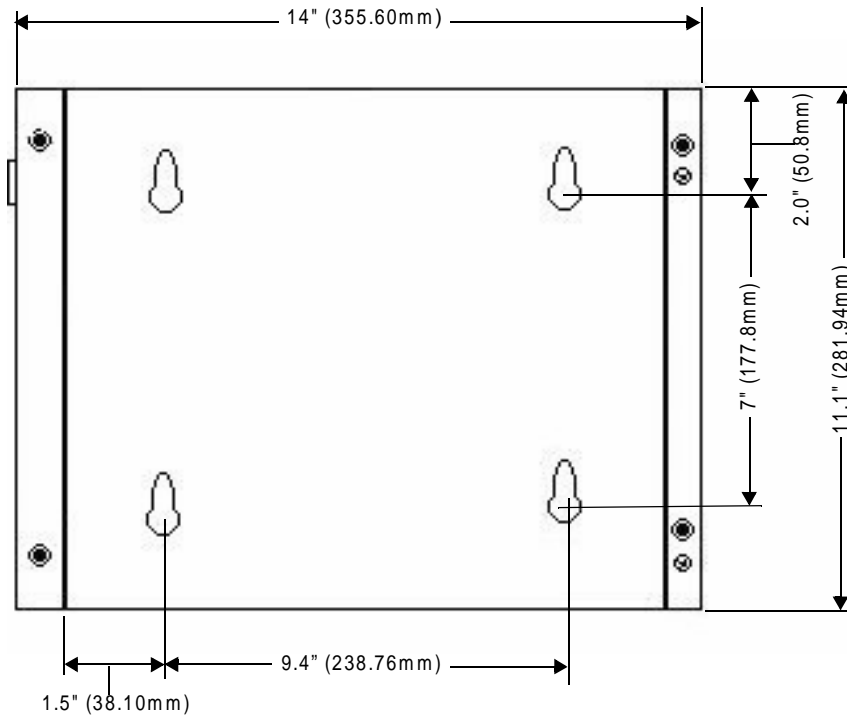
Port Dimensions



RS9/RSPC9—Back View



RS9/RSPC9—Front View



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