

# **Vehicular Radio Computer (VRC) 4000**

## **Product Reference Guide**

**Vehicular Radio Computer 4000 Product Reference Guide**



**70-19725-02**  
**Revision A —October, 1997**

**VRC 4000**  
***Product Reference Guide***

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*Revision A*  
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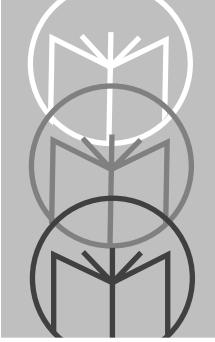
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## *About This Manual*

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This manual provides information for the system administrator on the basic use and maintenance of the VRC 4000 computer. Topics covered include installation and setup, basic operation, maintenance, technical support/troubleshooting, and product specifications.

The following are the specific chapter/appendix titles along with brief descriptions of the contents of each:

Chapter 1, *Introduction*, provides a system overview, explaining the physical pieces of the computer, the internal CPU, network software and card, and available accessories.

Chapter 2, *Installation and Maintenance*, describes the procedures involved in the physical installation of the VRC 4000, and in the maintenance of the touchscreen.

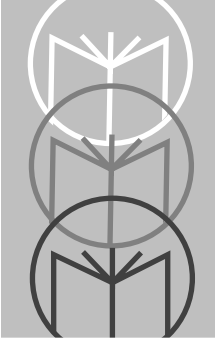
Chapter 3, *Basic Operation*, provides information on booting the computer, operating modes and environments, and the Touchscreen Subsystem and components.

Appendix A, *Troubleshooting, Technical Support, and Equipment Returns*, describes potential error messages, provides possible solutions, and gives instructions on how to return equipment, if necessary.

Appendix B, *System Reference*, provides technical information on the CPU, BIOS, Flash Drives, battery backup, and PCMCIA slots.

Appendix C, *Specifications*, provides the technical specifications for the product.





## Chapter 1 Introduction

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### VRC Information Systems Overview

Symbol Technologies' Vehicular Radio Computers (VRC) are PC-compatible computers ruggedized to withstand the physical shock and vibration extremes of harsh industrial or commercial environments. All VRC systems provide a touchscreen, full VGA display (either electroluminescent or color LCD), multiple network options and full I/O capability. Each VRC system is fully PC-compatible with the MS-DOS, Versions 3.3 through 6.22, Windows 3.1, Windows for Workgroups 3.11, Windows 95 and Windows NT operating systems.

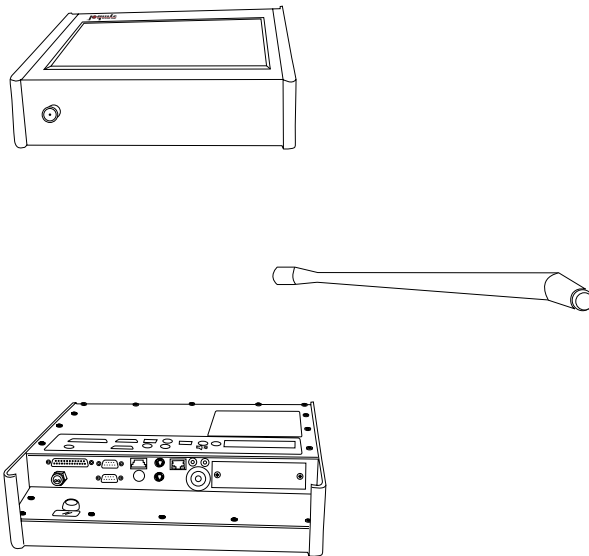


Figure 1-1. The Vehicular Radio Computer System



## VRC 4000

The VRC 4000 is designed for fixed-mount applications. It is powered by a standard 110VAC outlet via a plug-in power supply. It is hard-wired into the local area network (LAN). Standard Ethernet or Token Ring hard-wired LAN connections are supported. The VRC 4000 can also be equipped with wireless (RF) network communications and used in fixed-mount applications where the installation of a hard-wired LAN is not practical or cost-effective.

## VRC 4040

The VRC 4040 is designed for vehicular-mounted applications such as those on forklifts, hostlers and motorized pallets. It is powered from the vehicle's electrical system (battery) through a power converter. It uses Symbol's Spectrum 24 2.4 GHz spread-spectrum radio link to communicate with (RF) network access points hard-wired into the LAN. Antenna options include patch and 'rubber duck' types. Antenna connectors are non-standard to prevent antenna substitution and resultant operation in violation of FCC regulations.

## Front Panel

The VRC front panel consists of a gasketed infrared touchscreen mounted over a flat-panel video display. The VRC can be operated by touching the screen to activate functions and initiate actions. Programming guidelines for touchscreen-based applications are provided in the *VRC 4000 Software Driver Manual*, p/n 70-19723-xx. An online help file is available for Windows 95 and Windows NT. Press the help key to access the appropriate help file.

The VRC is factory-configured with either an electroluminescent or active-matrix color LCD flat-panel display system. All touchscreen/display combinations operate in a similar manner. The type of display provided in your particular VRC model is matched to the specific requirements of your application, including ambient lighting, available viewing angle and environmental extremes.

## Rear Panel

All cabled connections to the VRC are made through the rear panel, with the exception of the RF connection in wireless communication-equipped systems. Located on the rear panel are a RESET button, a power connector, a parallel I/O connector, two serial I/O connectors, and dual PCMCIA slots. Also located on the rear panel are connectors for an external PS/2 keyboard, mouse, network connections, stereo speaker and microphone connections, and a locking keyboard connector. To use the locking keyboard connector, please contact Symbol Technologies to order the mating cable, (p/n STI80-0275) Standard keyboard wedge connectors for connecting the scanner to the keyboard port are also available.

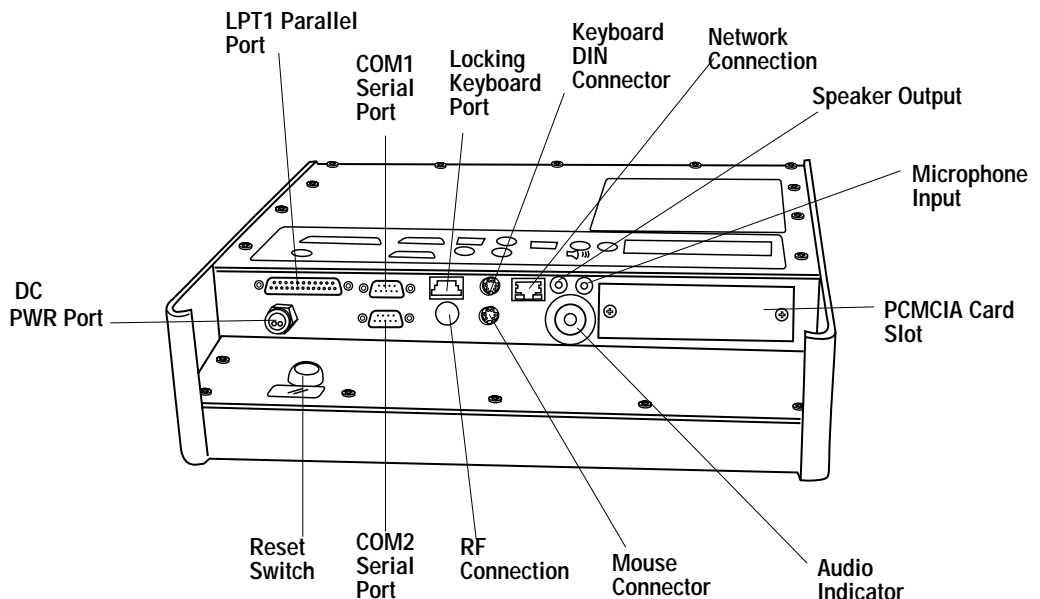


Figure 1-2. Rear Panel



## Internal Configuration

Figure 1-3 depicts the block diagram of the VRC system. Each of the blocks are described briefly below.

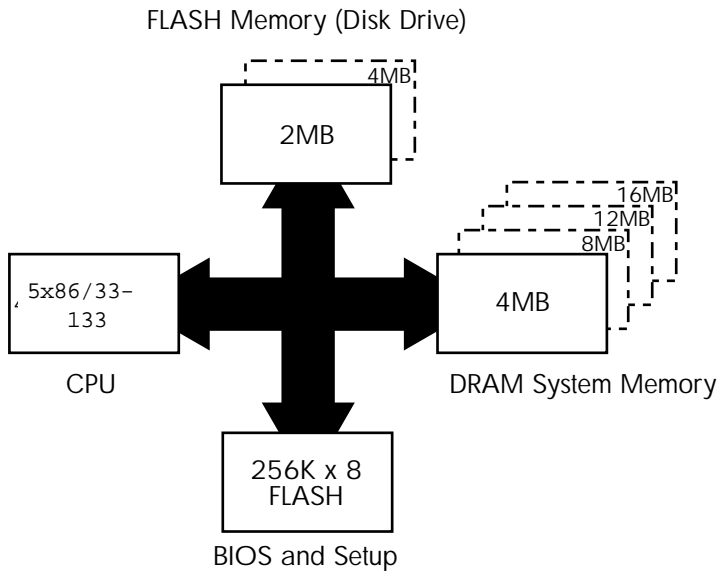


Figure 1-3. VRC Block Diagram

### CPU and Memory

The VRC is shipped with a 5x86 central processor unit (CPU). The system is configured with either 2 MB or 4 MB of non-volatile, solid-state FLASH memory to emulate standard drive functions. System memory is supplied as 4 MB, 8 MB, 12 MB, 16 MB, 20 MB, 24 MB, or 32 MB of dynamic RAM (DRAM). The specific memory configuration is determined at the time the system is ordered. The FLASH device may be configured as drive c: or d:. Please refer to Table 1-1.

## System Software

A 256Kx8 flash device contains the System BIOS, the Video BIOS, and a Setup Utility.

## Network Interface Card and Software

The VRC is shipped with an on-board single-chip ethernet controller. It may also be factory-configured with a Local Area Network Interface Card (NIC), which is installed in the system expansion slot. The specific NIC is determined by the type of network to be used, i.e. hard-wired or wireless. Each NIC has a unique hardware address and interrupt and DMA channel assignments, but no logical unit designation. The NIC allows the VRC to be configured for a variety of network environments.

The VRC is factory-configured with network protocol layers specific to the operating system or NIC. VRC network communication require the installation of a network driver (IPX). Both ODI and NDIS drivers support standard LAN operating systems.

## ATA Socket

The VRC is equipped with an internal dedicated ATA socket. The socket can be accessed by removing the rear cover. A standard Type II or Type III PC card, such as a Flash Card or miniature disk drive, can be installed. The ATA socket and on-board Flash memory are configured via jumper JP7, located adjacent to the socket. Please refer to Table 1-1.

**Table 1-1. Jumper JP7**

<b>Jumper JP7</b>	<b>On-Board Flash</b>	<b>ATA Socket (P10)</b>
Removed	Drive C: (master)	Drive D: (slave)
Installed	Drive D: (slave)	Drive C: (master)

## *Caution*

The ATA card is NOT hot-swappable. Power must be removed from the system before a card is installed or removed.



## **Accessories**

### **VRC 4000**

The VRC 4000 computer is supplied with:

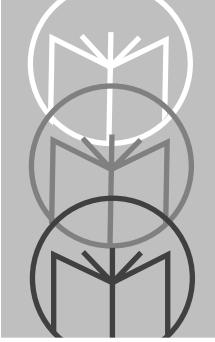
- Wall-mounted 110VAC Power Supply
- Bracket (optional, required for vehicle-mounting)
- Antenna (required for wireless configurations)
- This User Manual
- The VRC 4000 Software Driver Manual (70-19723-xx)

### **VRC 4040**

The VRC 4040 computer is supplied with:

- Vehicle Mounting Bracket
- DC Power Converter (optional for propane or electric powered vehicles)
- Vehicular Electrical System Access Cord
- Antenna
- This User Manual
- The VRC 4000 Software Driver Manual (70-19723-xx)





## *Chapter 2 Installation and Maintenance*

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### **Physical Installation**

#### **VRC 4000**

The VRC 4000 can be fixed-mounted almost anywhere that is convenient to the operator. The mounting location must be near a standard 110VAC electrical outlet, and there must be sufficient space below the unit for cable access to the rear panel, which faces downward when the unit is wall-mounted. The optional mounting bracket should be secured to the wall prior to attaching the VRC 4000 to the bracket.

All cable connections should be made to the VRC 4000 before the system is powered up. Since there is no ON/OFF switch, the unit powers up as soon as the power supply connections are completed and the power supply is plugged in to the 110VAC outlet.

Power line transients, spikes and sags induced by other equipment in the operating environment can stress the VRC's power supply, and can reduce the voltage at the VRC below its nominal +12VDC operating voltage. To avoid the possibility of large inrush currents which will open the power supply's internal fuses (necessitating the premature replacement of the power supply) the use of a single-outlet surge suppressor/spike protector is highly recommended.



## VRC 4040

The VRC 4040 mounts to a forklift or other vehicle with a universal mounting bracket. Operating power is obtained from a DC power converter that attaches to the vehicle's electrical system via an access cord. Installation of the VRC 4040 requires mounting the bracket, installing the DC power converter, and attaching the access cord to the vehicle's electrical system. Since vehicle electrical systems vary, the wiring instructions given here are intended as a guide only. If you require specific instructions for a particular make and model forklift, hostler, or motorized pallet, please contact Symbol Technologies' technical support at 1-800 653-5350.

The mounting bracket should be located so that the VRC 4000 touchscreen is clearly visible, easily accessible and easily operated. Also, make sure that the intended mounting location provides adequate access for cables to the rear panel (bottom) of the VRC 4000. To provide maximum safety for both the vehicle operator and the equipment, the VRC 4000 and its DC power converter should both be mounted completely within the vehicle's outer dimensions and profile.

If required, mark and drill the mounting holes, using the mounting bracket as a template. Mount the bracket, and if used, the remote antenna. Mount the VRC to the bracket using the knobs and washers prior to making any final cable connections.

**Note:** When installing the computer on an electrical vehicle, electrical isolation between the vehicle chassis ground and the exterior case of the computer should be maintained. The standard mounting bracket provides the necessary isolation *provided that* the computer is positioned such that it does not make direct contact with the vehicle chassis.

### DC Power Converter Installation

The DC power converter mounts to a steel surface on the vehicle via its magnetic feet. It should be located so as not to interfere with either moving parts on the vehicle or the operator's vision. Be certain that the VRC 4040 DC power cable from the converter can reach the mating connector on the VRC 4040.

## **Electrical Harness Access Cable**

The access cable should be connected to the vehicle's electrical system, at a point that provides power at all times, and that is filtered and fused. Never connect the access cable directly to the battery terminals/ Possible connection points are at the horn, lights (feed) or ignition switch (feed).

### **24-48V Power Converter**

The electrical harness access cable for the 24-48V Power Converter has two leads at one end which are permanently wired into the vehicle's electrical system. The other end of the cable has a circular 2-pin connector with rubber boot that mates with a similar connector on the DC power converter's power input cable.

The BLACK harness wire is connected to a POSITIVE voltage source. The WHITE harness wire is connected to the NEGATIVE voltage source. The booted connector end of the cable should be accessible for convenient attachment to the DC power converter.

Make sure the DC power converter ON/OFF switch is in the OFF position. Once the access cable is wired to the electrical system, mate the connectors on the access cable and the DC power converter power input cable. All cable connections must be completed before applying power to the VRC 4040.

### **12V Power Converter**

The electrical harness access cable for the 12V Power Converter has three leads at one end which are permanently wired into the vehicle's electrical system. The leads are WHITE and BLACK, plus a third lead that is either shield braid or GREEN. The other end of the cable has a circular 3-pin connector with rubber boot that mates with a similar connector on the DC power converter's power input cable.

The BLACK harness wire is connected to a POSITIVE voltage source. The WHITE harness wire is connected to the NEGATIVE voltage source. The GREEN or braided lead is connected to chassis ground. The booted connector end of the cable should be accessible for convenient attachment to the DC power converter.



Make sure the DC power converter ON/OFF switch is in the OFF position. Once the access cable is wired to the electrical system, mate the connectors on the access cable and the DC power converter power input cable. All cable connections must be completed before applying power to the VRC 4040.

## Network Connections

The VRC is factory-equipped with a network interface card (NIC) and the appropriate network software for communicating with the network. The physical network connection requirements for hard-wired and wireless operation are provided below. The network port on the VRC uses different connectors, depending on the type of network for which the VRC is factory-configured. For Token Ring connections, a DB9 connector is used. For Ethernet connections, an RJ-45 connector is used. For wireless network communications, a non-standard RF antenna connector (reverse BNC, reverse TNC or reverse SMA) is provided.

### Hard-wired Network Connection

In a hard-wired, fixed-mount application, the VRC connects to the LAN and server by connecting a cable to the NET connector on the computer's rear panel. The VRC 4000 supports Token Ring and Ethernet connections.

### Token Ring

The VRC system can be configured to support a 16 megabyte per second (Mbps) Token Ring connection.

### Set-up Parameters

If your are using an Intel Token Express PCLA8130 connection (factory-installed default), the following parameters must be specified:

Memory	:	not used
I/O Address	:	A20-A3FH
Int	:	IRQ 5
No DMA Programmed I/O		

## Ethernet

When specified to use Ethernet connections, the VRC system is supplied with the appropriate Ethernet adapter which operates with most network adapters that comply with IEEE 802.3 10Base2 (thin coax), 10Base5 (thick coax) or 10BaseT (twisted pair) standards.

If you are using an Intel ethernet card, part number PCLA8120, Etherexpress 16TP (factory-installed default), then the following parameters must be set:

I/O address	:	340-34FH
Int	:	IRQ 5
Connector	:	Auto-detect
Forces 8-bit	:	No
No RAM mapped		
Flash/boot ROM Address	:	Disabled
No Flash Remote Boot Program		

## Wireless Network Connections

In wireless applications, the radio link between the VRC and hard-wired network access points provides the network connection. The VRC is equipped with Symbol's Spectrum 24 2.4 GHz spread-spectrum radio transceiver and antenna which provide the link to strategically-located network access points which are hard-wired into the network. These access points provide overlapping RF coverage (cells) within a building or other facility which enables uninterrupted network communications regardless of vehicle location. Line-of-sight configurations are recommended whenever possible. A site survey should be performed to measure the link quality and received signal strengths prior to permanently mounting the access points. For detailed information regarding the planning of a wireless network, please contact Symbol Technologies directly.

### Spectrum 24 Network Set-up

**Note:** Refer to the Spectrum 24 User Documentation for more specific information on how to configure your network.



In configuring a Spectrum 24 network for use with your VRC 4040 computer, there are specific parameters in the netcfg file which must be set.

- **SOCKET:** indicates the PCMCIA socket in which the adapter is installed

Syntax:                    SOCKET N

where <sup>N</sup> is the socket number (1 or 3 for ISA adapters)

- **UNITYPE:** indicates the internal configuration of the driver for the Mobile Unit type.

Syntax:                    UNITYPE N

where <sup>N</sup> is the type in hex. (0x2000 for ISA adapters)

## Verifying Spectrum 24 Card Installation

Debug.exe can be used to verify the network card installation and set-up, by entering the following:

```
C:\>debug
-I 300
24
-D000:800
D000:0800 41 FF 00 FF....
-Q
```

When you perform these tests, replace the value 300 with your port number and replace D000 with your memory address. The expected value from the port request is 24 and the expected memory information is 41 FF 00. If you see these values, your system is configured properly.

## Connecting External/Optional Equipment

With the exception of the antenna connection for wireless operation, all connections to the VRC system are made via connectors on the rear panel.

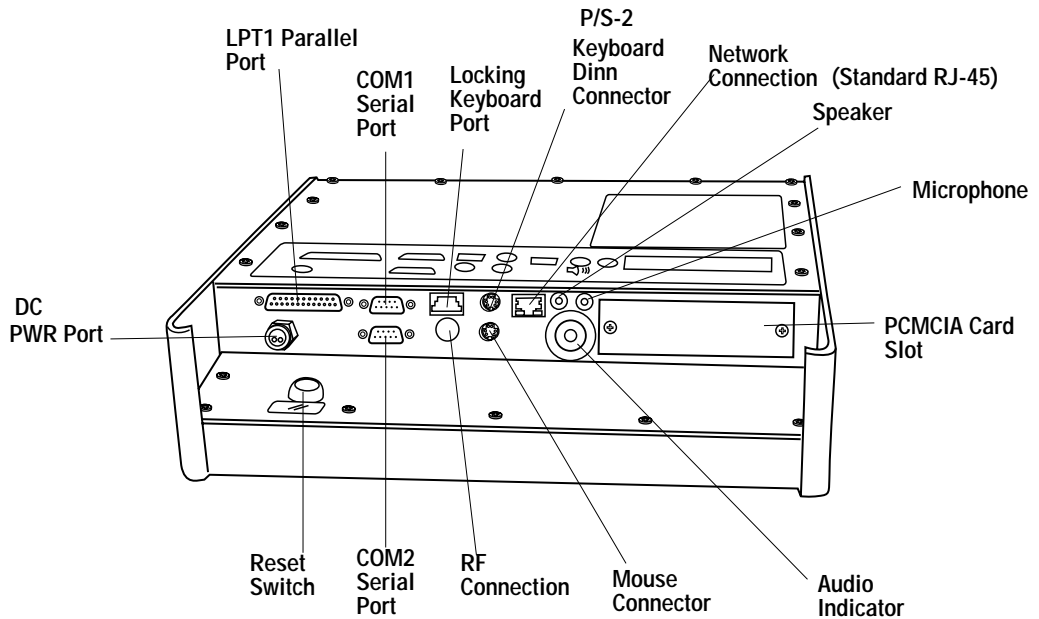


Figure 2-1. Rear Panel Connectors

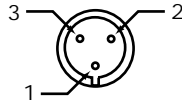
## DC Power Connector

The DC power connector is a locking 3-pin connector that accepts +12VDC from either a wall-mounted power supply in fixed-mount installations, or the DC power converter in mobile, wireless installations. The power converter connector is a locking type. Remove by pulling back the connector shell. Do not attempt to remove the power supply connector by unscrewing the strain relief.



**Table 2-1. DC Connector Pinout**

<b>Pin</b>	<b>Signal</b>
1	No connection
2	GND (+12V return; NOT chassis ground)
3	+12VDC

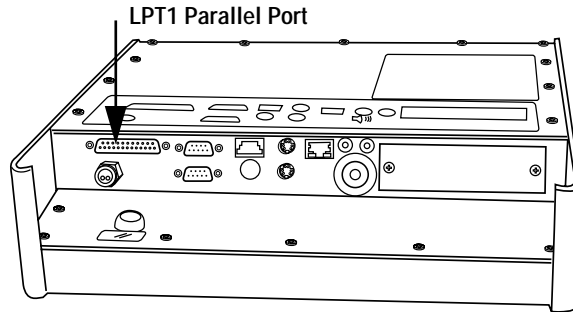


**Figure 2-2. DC Power Connector Pinout**



## LPT1

The LPT1 printer port is an enhanced parallel port with a 25-pin (DB25) female connector. It provides bi-directional data communications. Line printers and floppy drives are connected to the VRC via this parallel port.



**Figure 2-3. LPT1 Parallel Port Connector Pinout**

**Table 2-2. LPT1 Parallel Port Connector Pinout**

Pin	Signal
1	PSTB; data strobe
2	PLD0; data 0
3	PLD1; data 1
4	PLD2; data 2
5	PLD3; data 3
6	PLD4; data 4
7	PLD5; data 5
8	PLD6; data 6
9	PLD7; data 7
10	PACK; acknowledge



**Table 2-2. LPT1 Parallel Port Connector Pinout**

Pin	Signal
11	PBUSY; busy
12	PPE; paper end
13	PSLCT; printer selected
14	PAFD; auto feed
15	PERR; printer error
16	PINIT; printer initialized
17	PSLIN; printer select
18-23	Ground
24	Ground; parallel not floppy; connect to +5V to switch the EPP to the floppy mode
25	Ground

## Serial Communication Ports

The VRC provides two serial ports, labeled COM1 and COM2. These ports are used to connect devices such as serial printers, a mouse, an external modem, or to make a serial network connection.

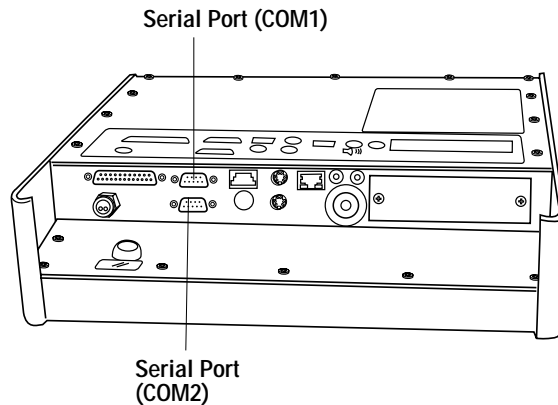
COM1 is a 9-pin (DB9) DOS compatible RS-232C serial port, with its own address. COM1 occupies two input/output locations. The maximum supported data rate for serial channel operation through any of these ports is programmable up to 115.2K baud. The serial controller tied to these ports conforms to the UART industry-standard PC16550 device architecture (including 16-byte FIFOs) with fully independent baud rate generation. Pin 9 (RI) on COM1 is factory-configured as a +5 VDC supply for optional barcode scanner power.

COM2 is a 9-pin (DB9), DOS compatible serial port that can be software-configured to support RS232C or RS422/RS485 protocols. COM2 has its own address, and occupies two input/output locations. The maximum supported data rate for serial channel operation through any of these ports is programmable UART industry-standard PC16550 device architecture (including 16-byte FIFOs) with fully independent baud rate generation.

Software-configuration of COM2 port protocol is accomplished by running the Setup Utility and specifying which protocol is to be used.

**Table 2-3. Serial Port Configuration**

Port	Base I/O	IRQ
COM1	03F8	4
COM2	02F8	3



**Figure 2-4. Serial Port (DB9) Connector Pinout**



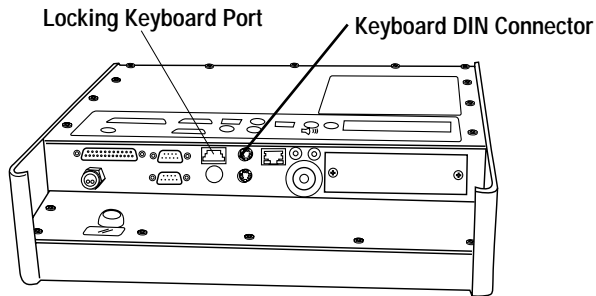
**Table 2-4. Serial Port Connector Pinout**

<b>Pin</b>	<b>Signal</b>
1	DCD; data carrier detect
2	RXD; receive data
3	TXD; transmit data
4	DTR; data terminal ready
5	GND; ground
6	DSR; data set ready
7	RTS; request to send
8	CTS; clear to send
9	RI; ring indicator /5V (COM1 only)

## Keyboard Ports

Two keyboard connectors are provided. One is an IBM PS/2 standard, 6-pin mini-DIN connector. This connector accepts an optional traditional ASCII keyboard. Wedge-type barcode scanners should be connected to this port; the (optional) keyboard should then be plugged into the barcode scanner.

The other keyboard port is a 4-pin locking connector. It is typically used in mobile applications where movement and vibration would require a more robust connection than the standard connector can provide. The part number for the locking keyboard connector is AMP p/n 4-520424-1.



**Figure 2-5. Keyboard DIN Connector**

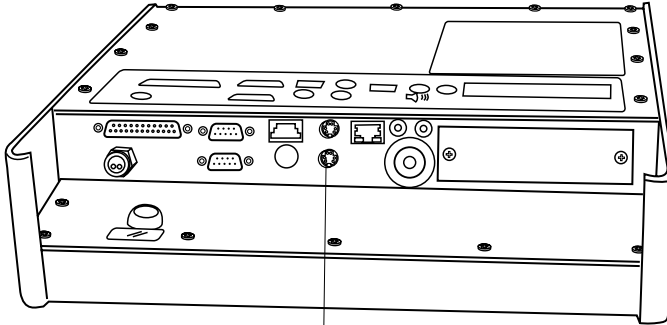
**Table 2-5. Keyboard 6-pin DIN Connector Pinout**

Pin	Signal
1	Keyboard data
2	No connection
3	Ground
4	+5V
5	Keyboard clock
6	No connection



## Mouse Connector

The mouse connector is an IBM PS/2 standard, 5-pin mini-DIN connector.

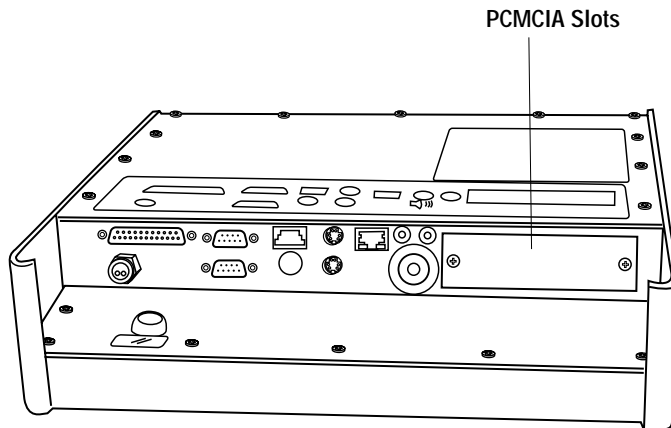


Mouse  
Connector

## PCMCIA Slots

The VRC is supplied with dual PCMCIA slots which provide an interface for portable memory cards, miniature disk drives, modems, fax/modem cards, and network connections. The VRC system software is provided with the appropriate PCMCIA drivers which work with all operating systems supported by the VRC. The VRC's two PCMCIA slots each contain a standard 68-pin PCMCIA connector and can accept both Type II (add-on devices such as Flash Cards, modems and network adapters) and Type III (miniature disk drive interface) cards. PCMCIA Type I (SRAM) cards are also supported. Memory and storage cards will typically appear on the system as drive D:\ or E:\. With the exception of the ATA cards, PCMCIA cards are hot-swappable. That is, PCMCIA cards may be swapped while the computer is powered on.

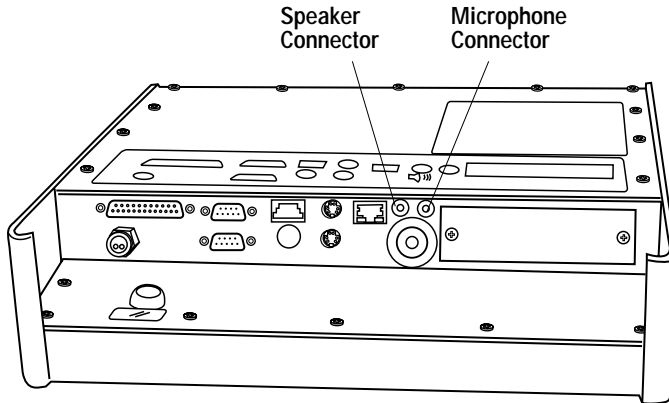
PCMCIA cards are inserted into Slot 0 (lower) or Slot 1 (upper) on the rear panel by holding the card with the connector facing toward the slot and sliding the card into the slot until firmly seated. System access of the card can be verified under the operating system software.





## Audio Input/Output

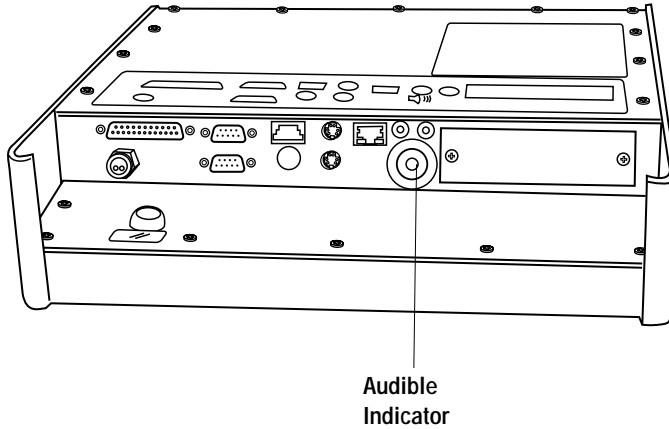
The VRC is equipped with a 16-bit Plug N-Play audio input/output sound system (Windows and Soundblaster compatible). Standard 3.5 mm phono jacks are provided on the rear panel for connection to a microphone input and headphone/line output.





## Audible Indicator

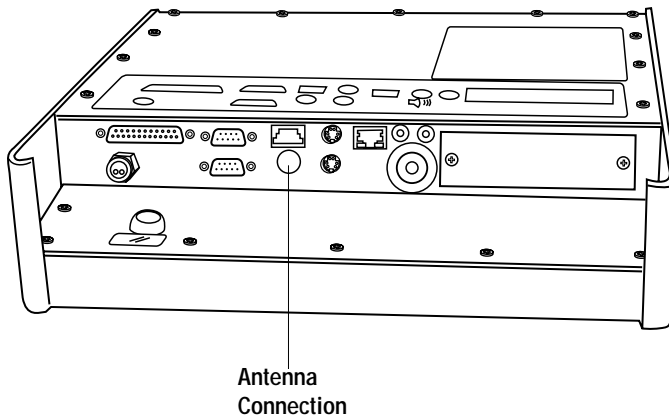
The VRC is equipped with a 95dBA @ 12" ceramic audible indicator. The indicator is activated by writing a logic "1" to I/O address 300H, Bit 1.





## Antenna Connection

VRC systems configured with Symbol's Spectrum 24 2.4 GHz spread-spectrum transceiver for wireless operation can be supplied with patch or 'rubber duck' type antennas. Antenna connections are made to a connectors mounted on the top or bottom of the case, or internally, depending on the specific system configuration. All antenna connections use non-standard connectors to prevent antenna substitution and subsequent violation of FCC regulations.



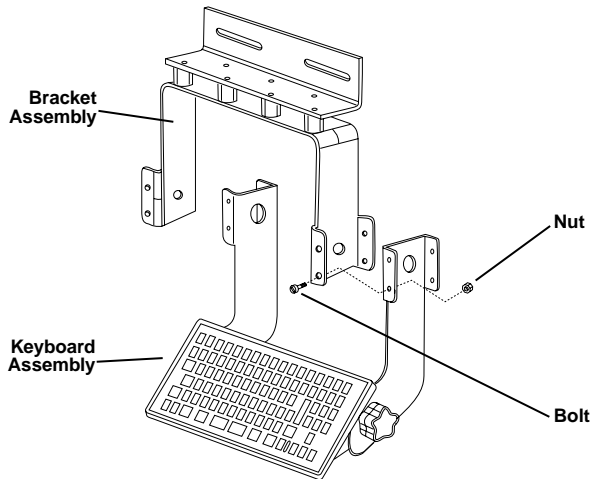
## Bracket Installation

There are three brackets available for mounting the VRC system on a vehicle.

**Note:** All rubber washers should be installed between the U-shaped piece and the computer itself. Mounting hardware to attach the Hyster and Crown brackets to the lifts is not provided.

## Keyboard Assembly

The VRC mounting assembly may be configured with or without the keyboard assembly. If the keyboard assembly is not originally configured, it can be added to the mounting assembly at a later time. To mount the keyboard assembly onto the mounting bracket assembly:



1. Remove power from the VRC.
2. Disconnect all cables connected to the VRC.
3. Remove two knob screws securing the VRC and rubber friction washers to the mounting bracket assembly.
4. Align mounting wings of keyboard assembly with mounting wings of mounting bracket.
5. Insert eight bolts, supplied with the keyboard assembly, through mounting holes in mounting bracket and keyboard assembly bracket.
6. Secure bolts using eight nuts.
7. Install VRC as described in the VRC 4000 Installation Guide, p/n 70-32536-xx..
8. Connect keyboard cable to connector on rear panel of VRC.

**Note:** The Symbol-supplied ruggedized keyboard has a special locking connector which is designed to



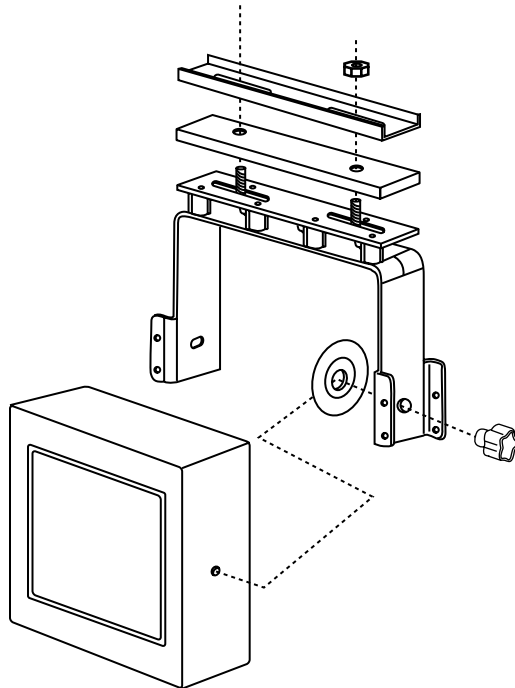
ensure good contact in the high-vibration vehicle mount application.

9. If a scanner is attached to the VRC, a special “Y” cable (P/N STI180-0275) is required to connect the keyboard and scanner to the keyboard connector on the rear panel:
  - a. Connect the keyboard connector to the mating connector on the special cable.
  - b. Connect the scanner connector to the mating connector on the special cable.
  - c. Connect the special cable to the keyboard connector on the rear panel of the VRC.
10. Connect all cables removed in step 2.
11. Apply power to the VRC.

## Universal Mounting Bracket (MTG-BKT03U)

This bracket is the most common and caters to installations where a location to clamp onto is present. The universal bracket has a “sandwich” like clamp design, attached to a U-shaped mounting piece via rubber isolation mounts, which allows it to adapt to a variety of surfaces at a variety of angles. The most common application finds the universal mounting bracket clamped on to the roof cage of a sit-down lift, usually at a 45-degree angle to the driver, thus retaining the operator’s maximum sight lines. This location also allows for ease of use of the computer from both a visual and touch interface perspective.

The width of the clamp area is adjusted by loosening or tightening the supplied 3/8x16x3 carriage bolts. The bracket can be installed with the clamp either hanging as described or 180 degrees opposite. Caution should be taken to avoid obstruction with moving parts, gauges, etc.

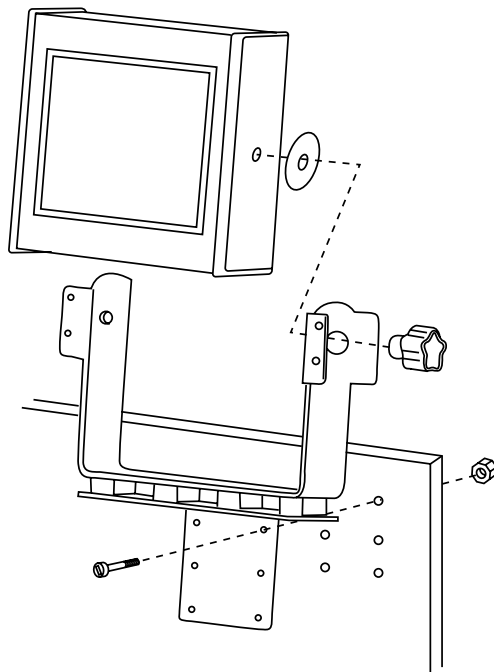




## Hyster Mounting Bracket (MTG-BKT02H)\

**Note:** Nuts and bolts are not supplied; a minimum of 4 3/8" diameter (length as appropriate) bolts are recommended to complete this installation.

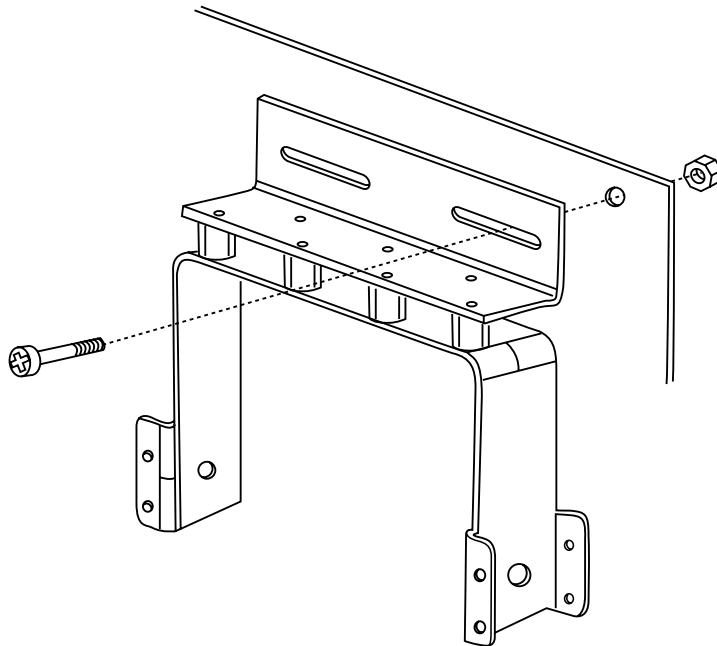
Originally designed for a Hyster sit-down lift, this bracket provides an L-shaped mounting plate, (MTG-1002-1), which offers six holes through which mounting hardware attaches the plate to the firewall of the forklift. The mounting hardware for the plate can enter from either the front or the back of the firewall. The U-shaped bracket (MTG-1001-1), attached to the plate via rubber isolation mounts, holds the computer via the knobs, (KNOB-1420-1.5M). Viewing angle is achieved by adjusting the unit and tightening the knobs. Caution should be paid to mounting the unit away from any hydraulic lines, forks, gauges, etc. Consult your forklift manual for keep-out areas. This bracket can be used on any lift that offers the appropriate mounting space.



## Crown Stand-up Bracket (MTG-BKT01C)

**Note:** Nuts and bolts are not supplied; 2 3/8" diameter bolts are required to complete this installation.

This bracket has been specifically designed for use with a Crown stand-up lift. The mounting plate (MTG-1003-1) has two offset slots that align with the pre-drilled holes on the roof crossbeam of most Crown stand-up lifts. The pre-drilled holes are present for those customers who wish to install a warning light on their lift, as supplied by Crown. An alternative bracket style should be chosen if in fact the pre-drilled holes are being used by the warning light. The U-shaped mounting piece attached to the slotted section via rubber isolation mounts provides for hanging the computer. Maximum viewing and touch angle should be achieved and subsequently held by tightening the knobs.

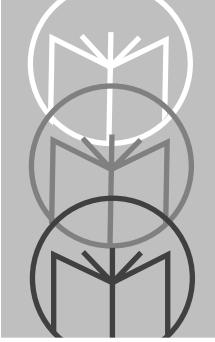




## **Maintenance**

The VRC computer is designed to operate normally in industrial environments which may contain high levels of airborne contaminants including dirt and smoke. Periodic cleaning of the VRC is recommended to remove build-up of foreign substances on the case and touchscreen. Before cleaning the VRC, remove power from the unit. Wipe accumulated dirt and dust from the aluminum case with a slightly dampened cloth, paying particular attention to the angled edge of the bezel. Clean the touchscreen with a commercial brand of computer screen cleaner and a soft, damp cloth, or compressed air.





## *Chapter 3*

# *Basic Operation*

---

## **Power-Up**

Before powering up the VRC for the first time, be sure it is securely mounted, that all cable connections have been made, and that the DC power cable is securely attached to the DC connector on the rear panel.

The VRC computers do not have an ON/OFF switch. Both models power up immediately when they receive incoming electrical power. **It is important to make all peripheral connections BEFORE powering up the VRC system.**

To turn on the VRC 4000, plug the wall-mounted power supply into a surge-protected 110VAC outlet. To eliminate potential damage to the VRC 4000, be sure the power supply is removed from the wall outlet before connecting or disconnecting the power cord to the rear panel.

To turn on the VRC 4040, turn the DC power converter ON/OFF switch to ON.

## **System Configuration Utility (SCU)**

The System Configuration Utility is accessed by pressing CTRL-ALT-S on the keyboard when prompted during boot-up. This prompt occurs just after the system memory tests. The system settings (CMOS) may now be configured.

### **Start Up**

The Start Up menu contains the date and time, fast/normal boot and boot device options.

### **Boot Device**

Set the boot configuration to full if you are using DOS or Windows 3.x operating systems.



Set the boot configuration to boot devices only if you are using Windows 95.

These options allow the sound and ethernet controllers to be properly configured and activated. (See Ethernet and Sound System Controller sections in Appendix B).

## Disks

The disks menu contains settings for diskette and hard disk configurations.

## Components

The components menu contains settings for COM ports, Parallel ports, the Ethernet port and Keyboard settings.

## Booting-Up

Upon receiving electrical power, the VRC boots up immediately with no action required. On power up, the VRC conducts a power-on self-test, runs the hardware initialization program, and then boots DOS. (If your system does not boot, or does not have a factory-installed version of DOS, refer to the following section, *Installing the DOS Operating System*.) The system then processes the config.sys and autoexec.bat start-up files from the boot drive, which is typically the Flash Drive (C:\). When the boot process is completed, the C:\ prompt is displayed on the screen. If Windows is installed, the system then loads the Windows graphical user interface.

PCMCIA cards appear as unique drives under the VRC operating system. Their drive designation depends on the particular card and the PCMCIA slot in which it is installed. See Table 1-1 for more information.

## Reboot

If the system freezes or locks up during normal operation, the system can be reset by performing a reboot. The type of reboot depends upon the desired state of the VRC system.

Perform a warm boot when you:

- need to clear the system's memory to run another program,

- do not want the computer to perform a self-test.

You must have a keyboard or keyboard emulator previously attached to the system to perform a warm boot.

Perform a cold boot when the screen is frozen, or the system is otherwise locked up. The cold boot is essentially a power-up sequence.

## **Warm Boot**

To perform a warm boot:

1. Press CTRL-ALT-DEL on the keyboard or keyboard emulator on the touchscreen. This causes the system to reprocess the config.sys and autoexec.bat files.
2. Reload the desired software application, if necessary.

## **Cold Boot**

To perform a cold boot:

1. Remove power from the VRC by removing the power supply from the wall outlet (VRC 4000), or turning off the power ON/OFF switch on the DC power converter (VRC 4040).
2. Turn the power back on by plugging the power supply back into the wall outlet (VRC 4000) or turning on the power ON/OFF switch on the DC power converter (VRC 4040).

OR,

3. Push the RESET button on the rear panel of either unit.

## **Operating Modes And Environments**

The VRC 4000 systems can be operated in either a client-server environment, or in a terminal emulation mode. Operating software installation is briefly described for each mode.



## Client-Server Environment

### Installing The DOS Operating System

If your VRC system has not been factory-configured with a bootable Flash drive, the unit displays the following message on power-up after completion of the self-tests.

No Boot Device Found

For information on initializing a bootable Flash disk, refer to Appendix B, System Reference.

To install a DOS operating system using the floppy disk drive, perform the following procedure. Please note that in order to load the VRC 4000 system via a floppy disk, the Symbol-modified backpack floppy drive is required.

1. Remove power from the system to turn it off. Unplug the VRC 4000 system's wall-mounted power supply, or turn off the power switch on the DC-DC power converter.
2. Attach the floppy drive (p/n FLOPPY-BP-MOD) to the LPT1 parallel port on the rear panel of the VRC. If there is no keyboard connected to the VRC, attach one to the KEYBOARD connector on the rear panel.
3. Insert a bootable disk in the floppy drive.
4. Power up the VRC unit again.
5. Press CTRL-ALT-S on the keyboard to go into the Setup Mode.
6. When prompted, set the drive for a 1.44MB diskette.
7. Select Save and reboot in the Exit menu.

DOS will now boot.

## **Loading DOS Applications**

### **FLASH Disk**

Standard DOS applications can be developed and tested on a floppy or hard disk and then conveniently moved onto the FLASH disk.

The FLASH disk can be loaded with DOS or another suitable operating system to serve as the system boot device. This allows programs to be executed without the need to boot from a floppy drive or other external disk drive.

### **Floppy Disk**

If there is no floppy drive attached to the VRC, install one using steps 1-4 of the previous procedure (Installing the DOS Operating System). In step 3, instead of a bootable disk, insert the disk containing the software application to be loaded into the drive.

### **Downloading from the Network**

When multiple copies of a software application must be installed on a number of VRC units, copy the software application from the server onto the Flash drive (C:\) of each VRC using the DOS copy command.

## **Installing Windows 95**

Windows 95 (CD) can be installed on the VRC's ATA drive. To do so, the ATA drive is first formatted and prepared, then the software is installed from the CDROM as described below. It is recommended that the ATA drive be configured as the Master C: drive. (Please refer to Table 1-1.)

1. Connect the backpack floppy drive to the VRC's parallel port, and install the floppy drive in the setup portion of the System Configuration Utility (SCU).
2. Set the Boot Device to BOOT DEVICES ONLY (WIN95), and either enable or disable the Ethernet controller as desired.
3. Format the VRC's ATA drive using the WIN95 ATA Drive Prep diskette. Once the drive is prepared, disconnect the floppy drive and remove the drive in the SCU.



4. Connect the backpack CDROM drive to the parallel port.
5. Boot the system from the ATA drive (C:). The CDROM drive should be visible as either Drive D: or E:.
6. Install the Windows 95 CD in the CDROM drive, and run Setup. Windows 95 will prompt you for the remainder of the installation . Note that the Touchbase driver for Windows 95 is available from Symbol Technologies, and may be installed after the Windows 95 installation is complete.

### **Logging On to the Network**

The VRC 4000 is shipped with network drivers that will allow a specific network connection whenever the system is booted.

### **Terminal Emulation Mode**

The VRC 4000 system can be configured to operate in terminal emulation mode by running a terminal emulation application loaded on a PCMCIA card or Flash Disk. Terminal emulation programs are available from Symbol Technologies.

## **The Touchscreen Subsystem and Touch-based Operation**

The touchscreen subsystem is a collection of components that provide the touch-based control of the VRC computer. These components control firmware and allow touch-based applications to be implemented on the VRC system.

### **Touchscreen Components**

#### **Touch Frame and Protective Bezel**

The touch frame is a screen overlay mounted on top of the VRC's video display. Around the periphery of the overlay, behind a protective bezel, are 34 horizontal and 26 vertical infrared emitter/detector pairs mounted on opposite sides. These emitter/detector pairs form a grid of scanning beams which detect where the video display is touched. The location information is passed to the VRC's CPU by the touch system controller firmware.

## **Touch Controller Firmware and Driver Software**

The touch controller firmware accepts and interprets incoming coordinate data from the touch frame. The firmware outputs specific coded data based upon the physical location on the screen that was touched. The touch driver software provides additional smoothing and anti-aliasing to support cursor tracking for mouse-based touch applications. The VRC system currently supports DOS, Windows, Windows 95, Windows NT, and Windows for Workgroups drive software.

## **Programming Touch-based Applications**

The following information is provided to impart an overview of how touch-based applications are structured. For specific details on programming touch-based applications, please refer to the programming manual supplied with your system, *VRC 4000 Software Driver Manual*, part number 70-19723-xx. An online help file is available directly in both Windows 95 and Windows NT. Press the help key for the appropriate help file.

## **General Functions and Guidelines**

The VRC is designed and configured for touch-based applications, where the video screen displays graphical icons whose corresponding function is activated when touched by a user. Touch-based applications can be divided into two different categories:

- Graphical User Interface (GUI) applications, based on a GUI operating system, such as Windows
- DOS-based applications

For GUI applications, a “mouse-like” touch driver is installed allowing standard applications to be executed. However, for optimum ease of use, applications should:

- use only one button
- avoid double-clicks whenever possible
- keep touch targets large (for example, scroll bars are very difficult to see)

With these provisions, applications can be developed using standard tools and practices including Visual C++, Visual Basic, etc.



Touch-based applications are composed of three parts: an application program, a touch library, and a graphics library. Each of these is described below.

## **Main Application Program**

The main application program must perform the functions of system initialization, enabling of touch targets, processing of touch input data, and providing feedback to the user.

During system initialization, the program initializes the system hardware, establishes a communication path to the touch system, checks the touch system status, and converts the touch system coordinates to screen coordinates, thereby allowing the application's display to fit on the VRC's video display.

After initializing the system, the program must establish a list of active target areas which correspond to the current graphics menu. The target manager does this by loading a specific set of targets from a previously created target database.

To process touch input, a touch system handler and the target manager are used. When a touch is detected, the main program module calls the target processing function from the target manager, which in turn calls a low-level input routine from the touch handler. The low-level routine accepts and processes touch reports and exit reports while polling other input devices.

When writing touch-based applications, it is important to provide visual feedback to the user that their input has been accepted. Without some form of feedback, it is easily assumed that the system is not functioning properly. Reversing the touched icon or "zooming" to the next screen are two examples of visual feedback.

## **Touch Library**

The touch library manages the application's touch targets and also sends and receives information from the touch system and the CPU.

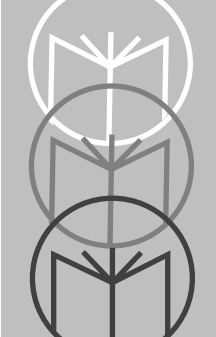


A touch target is a very specific area of the display screen that the user touches to accomplish a task. The target consists of two pieces the task or function to be performed, and an invisible touch target that resides directly over and completely contains the graphic icon. The touch target should be at least as large as the end of a typical finger, and should completely cover its associated touch target so that a touch anywhere on the icon activates the target. Large, well-spaced targets allow quick and precise selections. Touch targets should be separated by large non-active touch areas (“dead” zones) to prevent unintentional activation of more than one target at the same time.

### **Graphics Library**

The graphics library portion of the touch-based application contains the graphics displayed on the VRC video display. These graphic images are maintained separately until they are needed in response to input from the touch system.





## *Appendix A Troubleshooting, Technical Support & Equipment Returns*

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### **Introduction**

This chapter provides a checklist of common problems and their potential solutions.

### **Initial Checklist**

Perform an initial check of the VRC unit as follows:

1. Check the unit for any signs of exterior damage.
2. Check and reseal all rear panel cable connections.
3. Check to be sure the VRC is receiving operating power.
  - a. VRC 4000 - Check the circuit breakers feeding the 110VAC wall outlet supplying power to the VRC. Make sure the wall-mounted power supply is firmly seated in the wall outlet. If a surge protector is installed between the wall-mounted power supply and the wall outlet, make sure that if it has an ON/OFF switch, that it is on, and that any fuses or circuit breakers on the surge protector have not blown or tripped.
  - b. VRC 4040 - Be sure the vehicle's battery is not dead. Verify that the ON/OFF switch on the DC power converter is on. Reseat the connectors on both the power input and output cables on the DC power converter.

### **Specific Problems**

The following pages present solutions to specific problems or malfunctions.

#### **Touchscreen Does Not Respond**

The video display appears to be working properly; however, touching the screen does not cause anything to happen.



## **Possible Causes and Solutions**

The touchscreen drivers did not load, the touchscreen may be disconnected or defective. Reboot the VRC. If this does not solve the problem, contact the factory for assistance.

In DOS applications, in the CONFIG.SYS file, verify the command line reads:

```
TBDRIVER /A: 2AO /I:91
```

## **Application Program Does Not Appear**

An image is displayed on the display, such as the self-test message, but the application is not displayed.

### **Possible Causes and Solutions**

The application software is corrupted, or the config.sys and autoexec.bat files are not set up properly. Reload the application software on the system, verify the config.sys and autoexec.bat files are set up correctly to load the application program and reboot the system.

## **PCMCIA Card(s) Not Working**

The peripheral on the PCMCIA card does not function, or the system does not display the card as drive D:\ or E:\ (memory cards).

### **Possible Causes and Solutions**

Verify the config.sys and autoexec.bat files are set up correctly to recognized PCMCIA cards, try the card in the other PCMCIA slot, or check to make sure the card is firmly seated in the slot.

## **Modem Card Does Not Work**

With a PCMCIA modem card installed in one of the slots, the VRC does not receive a dial tone.

### **Possible Causes and Solutions**

Check to be sure the modem card is firmly seated in the PCMCIA slot. Check the modem setup strings in the software package used with the modem card. Check the telephone line connections.

## **VRC 4000 Does Not Communicate with the Network**

The VRC 4000 is operating but does not communicate with the network through its hard-wired connection.

### **Possible Causes and Solutions**

Check for cable breaks, shorts and bad crimps using a cable scanner. Check for electrical interference. Check the security ID and domain station type.

## **VRC 4040 Does Not Communicate with the Network**

The VRC 4040 is operating but does not communicate with the network through its wireless connection.

### **Possible Causes and Solutions**

Check that the antenna connection is secure. Replace broken antennas or cables. Check the security ID and domain station type.

**Ethernet Connection:** Remove any other installed NICs in the ISA expansion slot or PCMCIA slots. Check that the network configuration is set for I/O 240, interrupt 15 and DMA 3. Check that the Ethernet is enabled.



## Service Information

If you have a problem with your equipment, contact the Symbol Support Center. Before calling, have the model number and serial number.

Call the Support Center from a phone near the equipment so that the service person can try to talk you through your problem.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

***Note:** Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.*

## Symbol Support Center

For service information, warranty information or technical assistance, call:

### USA

SYMBOL SUPPORT CENTER  
**1-800-653-5350**

### Canada

Mississauga, Ontario  
Canadian Headquarters  
(905) 629-7226

### Europe

Wokingham, England  
European Headquarters  
0734-771-222 (Inside UK)  
+44-1734-771222 (Outside UK)

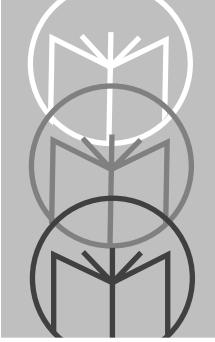
## **Asia**

Singapore  
Symbol Technologies Asia, Inc.  
337-6588 (Inside Singapore)  
+65-337-6588 (Outside Singapore)

If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.







## *Appendix B System Reference*

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### **CPU**

The VRC main circuit board assembly contains the central processing unit (CPU), DRAM, and an optional Flash-ROM configured as a DOS device. The VRC is configured with an AMD 5x86 processor. This CPU is driven by a 33MHz clock signal from the main timer circuits. It runs internally at 133MHz.

### **System Cache**

The VRC is configured with a 16KB Level 1 processor cache memory. Optional configurations include 128KB or 256 KB Level 2 processor cache memory.

### **VRC BIOS**

The VRC System BIOS is an industry-standard basic input/output system configured to support all onboard input/output (I/O) functions. It incorporates an advanced system set-up utility, as well as an extensive series of internal diagnostics for system test and verification.

The standard BIOS is contained in a single 128Kbyte Flash device and uses non-volatile CMOS RAM to store the real-time clock, system configuration, and system diagnostic information. The Flash device supports in-circuit reprogramming for BIOS updates, adding features, or reconfiguring certain system parameters.

The BIOS has been initialized to facilitate all communications between the operating system, CPU and peripheral devices. The VRC BIOS includes the main System BIOS, the Video BIOS, and the system Set-Up Utility. Additional device drivers can also be added.

The System BIOS consists of a routine designed to test the system hardware, bootstrap load the operating system and bootstrap load the device drivers. The 64Kbyte System BIOS module resides in memory address spaces  $0C,0000_H$  to  $0C,FFFF_H$ .



The 32Kbyte Video BIOS module resides in memory address spaces  $0E,0000_H$  to  $0E,7FFF_H$ .

The Set-Up Utility is used to configure the system parameters.

## System Memory Configuration

The VRC system memory can be configured with up to 64 MB of dynamic random access memory (DRAM). The DRAM is implemented in two 3.3 volt SODIMMs (small outline dual in-line memory modules) that plug in to sockets on the motherboard. Each SODIMM socket can hold either a SODIMM containing 4, 8, or 16 MB. All system memory above 1 MB is accessible as extended memory. Table B-1 illustrates some possible DRAM combinations installed in the two SIMM sockets.

**Table B-1. System Memory SIMM Combinations**

Total RAM	Socket 1	Socket 2
4MB	4	0
8MB	4	4
8MB	8	0
16MB	8	8
16MB	16	0

## CMOS RAM

On-board feature configuration information is stored in AT-style CMOS random access memory (RAM). The VRC integrates 128 bytes of CMOS RAM and real time clock (RTC) into the main system controller. The system's CMOS RAM is accessed via I/O locations  $0070_H$  -  $0071_H$ . Table B-2 shows the configuration of the system's available memory.

**Table B-2. CMOS RAM Memory Allocation**

Location	Description
0 - 13	Real-time clock (RTC) functions
14 - 127	General low-power static RAM

Multiple memory locations in the VRC are reserved for storing BIOS-dependent configuration information. To access CMOS RAM, the index address (0 to 7F<sub>H</sub>) is output to port 70<sub>H</sub>, and the data is then read or written at port 71<sub>H</sub>. Interrupts should be inhibited while the entire port 70<sub>H</sub>/71<sub>H</sub> sequence is completed. Alternatively, the port sequence can occur during an interrupt service routine before re-enabling interrupts. If these precautions are not observed, an interrupt service routine could potentially intervene between the output to port 70<sub>H</sub> and the subsequent I/O to port 71<sub>H</sub>, overwriting the port 70<sub>H</sub> value.

## Flash Drives

The VRC contains 2MB or 4MB of Flash memory configured as a solid-state drive. The on-board flash array is supported as a bootable, read-writable drive using the True Flash File System (TFFS). TFFS requires two software components that are either installed in the System BIOS device, or at the start of the Flash Array. Once these components are installed and the Flash Array is formatted, the array becomes a bootable drive and is accessible as a normal DOS fixed disk (such as drive C:\). Standard start-up files config.sys and autoexec.bat can be placed on the TFFS drive to tailor the system configuration and automatically start application programs. Any standard DOS application developed and tested on floppy or hard disks can be moved onto the Flash drive using standard DOS utilities and commands, such as copy, etc.

When initializing or preparing a Flash drive, software components can be placed on either the Flash Array or in the BIOS device. To initialize a Flash drive:



1. Boot from a floppy with the following lines in the config.sys file

```
device = fdass.com
device = tffs.com
```
2. Add fdass.com and tffs.com in the root directory of the diskette and format.com, fddass4m.bin.  
As the system boots, the sign-on messages will be displayed. When the system completes booting:
3. Run format c: /s:fddass4m.bin.  
This runs the low-level format and transfers the boot image to the start of the FLASH Array.
4. Edit the config.sys file to remove the TFFS drivers.
5. Place the bootable floppy in the drive and reboot the system. This time, the TFFS drivers will be loaded from the boot image in the Flash Array.
6. From the A:\ prompt, run the standard DOS format

```
Format C:/S/U
```

Once the format is completed, remove the floppy and reboot the system.

## Real-Time Clock

The CMOS real time clock combines a complete time-of-day clock and alarm with a one hundred year calendar and a programmable periodic interrupt.

## Battery Backup

An on-board, socket-mounted, Rayovac FB2325 H2 six volt battery operates the clock and maintains RAM amount, video adapter type and I/O device configuration information when external electrical power is removed from the system. Symbol Technologies recommends replacing the battery every 10 years.

## Interrupt Controller

Hardware-level interrupts are used to support several of the VRC system's on-board I/O functions. The system controller incorporates two programmable interrupt controllers that are compatible with the Intel 82C59A. These controllers accept requests from peripherals, resolve priority on both pending interrupts and interrupts in service, issue interrupt requests to the CPU, and provide a vector used by the CPU as an index to determine which interrupt service routine to execute.

The controllers are addressed and cascaded in a manner compatible with the IBM AT. The Master controller is located at I/O addresses 020<sub>H</sub> - 021<sub>H</sub>, while the Slave controller is located at addresses 0A0<sub>H</sub> - 0A1<sub>H</sub>. The priority assignment modes can be reconfigured at any time during system operation, allowing the complete interrupt subsystem to be restructured, as needed.

**Table B-3. Hardware Interrupts**

Interrupt	Level	Function
NMI	02 <sub>H</sub>	Parity
IRQ0	08 <sub>H</sub>	Counter/Timer (18.2 fps)
IRQ1	09 <sub>H</sub>	Keyboard
IRQ2	0A <sub>H</sub>	Slaved from IRQ8 - IRQ15
IRQ3	0B <sub>H</sub>	COM2/COM4
IRQ4	0C <sub>H</sub>	COM1/COM3
IRQ5	0D <sub>H</sub>	unassigned
IRQ6	0E <sub>H</sub>	Floppy disk
IRQ7	0F <sub>H</sub>	Parallel port
IRQ8	70 <sub>H</sub>	Real-time clock (RTC)
IRQ9	71 <sub>H</sub>	Touchscreen, slaved to IRQ2 in software
IRQ10	72 <sub>H</sub>	unassigned
IRQ11	73 <sub>H</sub>	Mouse (no connector)
IRQ12	74 <sub>H</sub>	unassigned



**Table B-3. Hardware Interrupts**

<b>Interrupt</b>	<b>Level</b>	<b>Function</b>
IRQ13	75 <sub>H</sub>	Co-processor
IRQ14	76 <sub>H</sub>	Fixed disk (not supported)
IRQ15	77 <sub>H</sub>	Audio

## DMA Controller

The direct memory access (DMA) controller handles requests for input/output activity that can transfer data without intervention from the CPU. This allows data transfers to occur at a 5 to 10 MB per second rate.

Each of the two controllers is a four-channel DMA device that can generate the memory addresses and control signals necessary to transfer information directly between a peripheral device and memory. The two DMA controllers are internally cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1), and three channels for transfers to 16-bit peripherals (DMA2). Table 4 provides a summary of the DMA channel assignments.

## Programmable Interval Timer

Table B-4. VRC IBM AT-Standard DMA Channel Assignments

Channel	I/O Address	Description
DMA0	000 <sub>H</sub> - 00F <sub>H</sub>	
DMA1	0C0 <sub>H</sub> - 0DF <sub>H</sub>	I/O addresses 080H - 080FH are occupied by the DMA page registers.
DMA2		DMA2 is occupied by the on-board floppy disk controller.
DMA3		Provides the cascade interconnection for the two DMA devices, thereby maintaining IBM AT compatibility.
DMA4		Unused
DMA5		Audio playback
DMA6		Audio record
DMA7		Unused

The programmable interval timer is equivalent to the Intel 8254, and occupies I/O addresses 0040<sub>H</sub> through 0043<sub>H</sub>. This general purpose counter/timer generates accurate time delays under software control.

### Counter/Timer Circuit

The counter control circuit (CCC) contains three independently operating, 16-bit counters driven by a common 1.19 MHz clock. Each counter counts in binary or binary-coded decimal (BCD). Each can be programmed for operation as either a counter or timer. Common control logic decodes the information written to the counter control circuit to load, read, configure, and control each timer.

Counter 0 connects to IRQ0 of the internal interrupt controller for system time-keeping and task-switching.

Counter 1 generates pulses for the DRAM refresh generator.



Counter 2 is used as an interval time, counter, or gated rate/pulse generator. Counter 2 output can be used as an audio speaker tone generator.

Each counter can be programmed to operate in any of the six modes shown in Table 5. It should be noted that modes 1 and 5 do not have external hardware trigger signals.

**Table B-5. Counter Modes**

Mode	Function
0	Interrupt on terminal count
1	Hardware-retriggerable one-shot
2	Rate generator
3	Squarewave generator
4	Software-triggered strobe
5	Hardware-retriggerable strobe

## PCMCIA Slots

The following is the typical PCMCIA section of config.sys supporting ATA drivers:

```
DEVICE HIGH = C:\CARDSOFT\SS365SL.EXE
DEVICE HIGH = C:\CARDSOFT\SC.EXE
DEVICE HIGH = C:\CARDSOFT\ATADRV.EXE /S:2
DEVICE HIGH = C:\CARDSOFT\MTSDRV.EXE
DEVICE HIGH = C:\CARDSOFT\MTDDR.V.EXE
DEVICE HIGH = C:\CARDSOFT\CARD ID.EXE
```

To remove the PCMCIA driver, modify the autoexec.bat file by deleting or remarking the line that reads:

```
LOADHIGH C:\PCMCIA_2\CS_APM.EXE
```

Save the changes, return to the Program Manager, and reboot the system. The PCMCIA driver will not be deleted if the system is not rebooted.



To disable a pre-loaded PCMCIA driver, modify the config.sys file by typing “rem” (remark) in front of every device showing PCMCIA. This instructs the operating system to ignore those lines. Save the changes, return to the Program Manager, and reboot the system. The PCMCIA drivers will not be disabled if the system is not rebooted.

## **Audible Indicator**

The VRC is equipped with an audio beeper capable of producing tones at output levels of 95dBA at one foot. This can be used to alert the system operator to error conditions, acknowledge data entry or to provide other (audible) feedback. It is controlled at I/O 300, Bit 1.

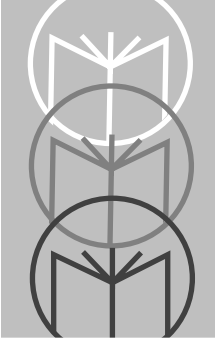
## **ATA-Drive Socket**

The VRC is equipped with an internal ATA-drive socket. Options using this dedicated slot are factory-configured.

## **System Expansion**

The VRC is equipped to accommodate single ISA bus expansion options. Options using these slots are factory-configured.





## Appendix C Specifications

**Table C-1. Specifications**

<b>CPU</b>	5x86 (133MHz)
<b>Operating System Compatibility</b>	Fully PC-compatible, industry-standard software environment
	MS-DOS, Version 3.3 through 6.22
	Windows, Version 3.1
	Windows 95
	Windows NT
<b>System Memory</b>	4, 8 12, 16, 20, 24, and 32 MB
<b>SystemCache</b>	16KB Level 1 standard 128KB and 256KB Level 2 optional
<b>Supported Network Interfaces</b>	Ethernet; 10Mbps (Plug-n-Play)
	Token Ring; 4/16Mbps
	Wireless; spread-spectrum Symbol Spectrum 24 2.4G Hz (802.11) compliant)
<b>Input/Output</b>	
Serial I/O	1 channel; RS232C, DB9 standard 1 channel; RS-232C/422/485 Software-configurable;DB9
Parallel I/O	1 port, enhanced; DB25 standard
Keyboard	IBM PS/2 standard 5-pin mini-DIN 4-pin locking connector
Mouse	IBM PS/2 standard 5-pin mini-DIN
Power	3-pin locking circular connector
Network	Token Ring, 16 Mbps, DB9 Ethernet, 10 Mbps; RJ-45 Wireless, local and remote antenna options



**Table C-1. Specifications (Continued)**

Audio	16-bit, Plug-N-Play sound system (Windows and Soundblaster compatible). 3.5mm phone jack for microphone and headphone/line out
Audible Indicator	95 dBA at 12" (30cm), typical
<b>Clock</b>	Real-time, battery-backed; time/day/date
<b>Battery Backup</b>	Rayovac FB2325 H2; 6 volts 10 year expected life
<b>Audio Indicator</b>	95dBA at 12" (30cm), typical
<b>Solid-state Storage</b>	2MB & 4MB FLASH disk
<b>PCMCIA Slots</b>	
Slot A	
Type	PCMCIA type 2
Compatibility	Type II; Slot A can be used alone or with Slot B while using Type II devices.
	Type III; Slot A must be used alone while using Type III devices; do not use Slot B
Slot B	
Type	PCMCIA V2
Compatibility	Type II; Slot B can be used alone or with Slot A while using Type II devices.
	Type III; Slot B must be used alone while using Type III devices; do not use Slot A
<b>Video Display Subsystem</b>	
Video Memory	1MB; with hardware-based Windows acceleration
<b>Electro-luminescent (EL)</b>	
Color	amber
Gray Levels	64
Viewing Angle	160 degrees
Active Area	8.31" x 6.23" (21.11cm x 15.83cm)

**Table C-1. Specifications (Continued)**

	10.4" (26.41cm) diagonal
Pitch	.33 x .33 mm
<b>Active-Matrix Liquid Crystal Display (LCD)</b>	color
Colors	262,140
Active Area	9.70" x 7.06" (24.65cm x 17.94cm)
	10.4" (26.41cm) diagonal
Pitch	.33 x .33 mm
VGA Resolution	640 x 480
SVGA Resolution	800 x 600
<b>Touchscreen Controller</b>	
Height	9.47" (24.05 cm)
Width	11.78" (29.92 cm)
Depth	0.36" (0.91 cm)
Scan Rate	45 scans/second; typical
Reporting Modes	Scan/coordinate
Operating Modes	Enter Point; Tracking; Continuous; Exit Point; Add Exit Point (modifier)
<b>Input Power Requirements</b>	
VRC	+12VDC
	1500mA maximum
	<25W dissipation; typical
VRC 4000 Wall-Mount Power Supply	230V/50Hz
	0.6A
24-48 V DC Power Converter	+17.0 to +48.0VDC input voltage
12V DC Power Converter	+6.0 to +20VDC input voltage



**Table C-1. Specifications (Continued)**

<b>Physical</b>	
Height	10.5" (26.67 cm)
Width	12.0" (30.48 cm)
Depth	3.5" (8.89 cm)
Weight	< 7 pounds (<3.18 kg)
Case Material	Aluminum
Case Finish	Black
<b>Operating Temperature Range</b>	
Electro-luminescent Display	0°C to +50°C
Active Matrix Color Liquid Crystal Display	0°C to +50°C
<b>Storage Temperature Range</b>	
Electro-luminescent Display	-40°C to +85°C
Active Matrix Color Liquid Crystal Display	-40°C to +85°C
<b>Relative Humidity</b>	0 to 95%, non-condensing
<b>Reliability</b>	
Mean Time Between Failure	50,000 hours; estimated (MIL-HDBK-217E)
Mean Time to Repair	Less than 30 minutes

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