

Relio R2

User Manual | R2



SEALEVEL®

Contents

CONTENTS.....	2
FEATURES.....	4
COM EXPRESS MODULE/RAM CONFIGURATION OPTIONS.....	4
BEFORE YOU GET STARTED.....	5
WHAT'S INCLUDED.....	5
ADVISORY CONVENTIONS.....	5
OPTIONAL ITEMS.....	6
SPECIFICATIONS.....	8
MECHANICAL DIMENSIONS.....	8
ENVIRONMENTAL SPECIFICATIONS.....	8
OPERATING TEMPERATURE RANGE.....	8
POWER SUPPLY.....	9
POWER INPUT.....	10
SYSTEM OPERATION.....	11
POWER BUTTON.....	11
POWER STATES.....	11
RESET BUTTON.....	11
HIGH PERFORMANCE SERIAL COMMUNICATION PORTS.....	12
CMOS BATTERY.....	15
SYSTEM DESCRIPTION.....	16
FRONT PANEL I/O CONNECTORS.....	17
REAR PANEL I/O CONNECTORS.....	17
MECHANICAL DRAWINGS.....	18
GETTING STARTED.....	23
WHERE TO GET SOFTWARE.....	23
SEACOM WINDOWS INSTALLATION.....	24
SERVICEABLE PARTS.....	26
BIOS CONSIDERATIONS.....	33
APPENDIX A – HANDLING INSTRUCTIONS.....	34
APPENDIX B – ELECTRICAL INTERFACE.....	35
APPENDIX C – ASYNCHRONOUS COMMUNICATIONS.....	36
WARRANTY.....	37

Introduction

The Relio R2 is an exceptionally rugged embedded controller for operating in harsh environments. The R2's fanless and nearly cable-less structure ensures extensive durability for long-term usage. The R2 differs from traditional industrial computer systems in that it is built using the [PICMG COM Express architecture](#). Sealevel has partnered with the leading COM Express module manufacturers to ensure our customers benefit from the best in the industry. This manual will focus on the higher-level features of the R2 computer system. More detailed information (for example, connector pin outs) can be found in the 12000 COM Express carrier board manual.

<http://www.sealevel.com/support/article/AA-00588/>

The R2 is compatible with Basic and Compact form factor Type 6 pin out COM Express modules. COM Express is a widely supported implementation of Computer on Module (COM) design. The COM Express architecture reduces the complexity, cost and time required for custom computer system design by combining the processing, memory, video, Ethernet, and USB functionality in a small, highly integrated module. COM Express modules install on a carrier board that provides the application specific I/O and external connectors best suited for the system requirements.

Sealevel COM Express carrier boards leverage the company's years as a leader in I/O and communication products to provide carrier board and full system solutions in the fastest time possible. Common I/O features include serial, analog and digital I/O. Sealevel's extensive library of proven I/O circuits can be included as required to meet the specific I/O count, voltage ranges, and connector types.

Features

The following features are included and installed on the Relio R2 models.

- 1 Display Port Compatible Video Output
- 2 Gigabit Ethernet Ports
- 2 RS-232 Serial Ports
- 1 RS-485 Serial Port
- 4 USB 2.0 Ports
- 1 Audio Line Input
- 1 Audio Line Output
- Power and SATA Activity LED Indicators
- Reset Button
- Power Switch Button
- PCI Express Mini Card Expansion (half-length only)
- Accepts 2.5" SATA Disk Drive (not externally accessible)
- 18-36 VDC Input

COM Express Module/RAM Configuration options

Part Number	COM Express Module	COM Express Module Description	RAM
R21004	TCA/N2800	Type 6 Compact Module with Intel Atom N2800 Cedarview CPU	4GB DDR3 1333 Non-ECC
R23004	IBR-i3-3217UE	Type 6 Standard Module with Intel Core i3 3217UE Ivy Bridge CPU	4GB DDR3 1333 ECC
R23008	IBR-i3-3217UE	Type 6 Standard Module with Intel Core i3 3217UE Ivy Bridge CPU	8GB DDR3 1333 ECC
R23016	IBR-i3-3217UE	Type 6 Standard Module with Intel Core i3 3217UE Ivy Bridge CPU	16GB DDR3 1333 ECC
R27004	IBR-i7-3517UE	Type 6 Standard Module with Intel Core i7 3517UE Ivy Bridge CPU	4GB DDR3 1333 ECC
R27008	IBR-i7-3517UE	Type 6 Standard Module with Intel Core i7 3517UE Ivy Bridge CPU	8GB DDR3 1333 ECC
R27016	IBR-i7-3517UE	Type 6 Standard Module with Intel Core i7 3517UE Ivy Bridge CPU	16GB DDR3 1333 ECC

Before You Get Started

What's Included

The R2 is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel at 864.843.4343 for a replacement.

- **R2 Computer System**
- **BK1042 (Wall mount brackets)**
- **TR140-US AC/DC Power Supply – Desktop 100VAC-240VAC input, 24V 2.7A output w/AC power cable**

Advisory Conventions



Warning

The highest level of importance used to stress a condition where damage could result to the product, or the user could suffer serious injury.



Important

The middle level of importance used to highlight information that might not seem obvious or a situation that could cause the product to fail.



Note

The lowest level of importance used to provide background information, additional tips, or other non-critical facts that will not affect the use of the product.

OPTIONAL ITEMS

Depending upon your application, you are likely to find one or more of the following items useful with the R2. All items can be purchased from our website (www.sealevel.com) or by calling our sales team at (864) 843-4343.

DB9 Female to DB9 Male Extension Cable, 72" Length (Item# CA127)

The CA127 is a standard DB9F to DB9M serial extension cable. Extend a DB9 cable or locate a piece of hardware where it is needed with this six-foot (72) cable. The connectors are pinned one-to-one, so the cable is compatible with any device or cable with DB9 connectors. The cable is fully shielded against interference and the connectors are molded to provide strain relief. Dual metal thumbscrews secure the cable connections and prevent accidental disconnection.



9 Female to DB25 Male Standard RS-232 Modem Cable, 72" Length (Item# CA177)

The CA177 is a standard AT-style RS-232 modem cable with a DB9 female connector on one end and a DB25 male connector on the other end. Simply connect the DB9 female connector to the DB9 serial port on the R2, and then connect the DB25 male connector to your RS-232 serial modem or other compatible RS-232 serial device. The six-foot cable is fully shielded with dual thumbscrews at each connector. The molded connectors integrate strain relief to prevent damage to the cable or connectors. All DB9 modem control signals are implemented, and the cable is pinned to EIA-232 standards.



OPTIONAL ITEMS, CONTINUED

Terminal Blocks

DB9 Female to 9 Screw Terminal Block (Item# TB05)

The TB05 terminal block breaks out a DB9 connector to 9 screw terminals to simplify field wiring of serial connections. It is ideal for RS-422 and RS-485 networks, yet it will work with any DB9 serial connection, including RS-232. The TB05 includes holes for board or panel mounting. The TB05 is designed to connect directly to the R2 DB9 serial ports or any cable with a DB9M connector.



DB9 Female to 5 Screw Terminal Block (RS-485) (Item# TB34)

The TB34 terminal block adapter offers a simple solution for connecting RS-485 field wiring to the R2's serial port 3. The terminal block is compatible with 2-wire and 4-wire RS-485 networks. A pair of thumbscrews secures the adapter to the DB9 male connector and prevents accidental disconnection.



CAT5 Patch Cable, 7' In Length (Part# CA246)

Standard 7' CAT5 Unshielded Twisted Ethernet Pair Patch Cable (RJ45) with blue jacket.



CAT5 Patch Cable, 10' In Length (Part# CA247)

Standard 10' CAT5 Unshielded Twisted Pair Ethernet Patch Cable (RJ45) with blue jacket.



Specifications

Mechanical Dimensions

Length	7.820 inches (19.86 cm)
Width ¹	4.744 inches (12.04 cm)
Height	2.672 inches (6.90 cm)

Environmental Specifications

Specification	Operating	Storage
Temperature Range	-40°C – 50°C (-40°F – 122°F) ²	-40°C – 85°C (-40°F – 185°F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Operating Temperature Range

Part Number	COM Express Module	Operating Temperature Range	Comment
R21004	TCA/N2800	0 - 50 °C	Requires Industrial Temperature SSD for operating temperatures above 35C with no airflow or conduction. -40C to 50 °C optional. Contact Sales
R23004	IBR-i3-3217UE	-40 - 50 °C	Requires Industrial Temperature SSD ¹
R23008	IBR-i3-3217UE	-40 - 50 °C	Requires Industrial Temperature SSD ³
R23016	IBR-i3-3217UE	-40 - 50 °C	Requires Industrial Temperature SSD ³
R27004	IBR-i7-3517UE	-40 - 50 °C	Requires Industrial Temperature SSD ³
R27016	IBR-i7-3517UE	-40 - 50 °C	Requires Industrial Temperature SSD ³

¹ Width listed is for computer without mounting brackets. Total width with brackets is shown in drawings.

² Operating temperature is dependent on particular model. See the Operating Temperature Range section for model capabilities.

³ The minimum operating temperature rating of the SSD determines the minimum operating range of the entire system during a cold start scenario. To ensure the full operating range, an SSD rated to operate at -40C is required. Max operating temperature of 85C is required for operation at 50C.

OPERATING TEMPERATURE RANGE, CONTINUED

The R27004, R27008 and R27016 can operate with no airflow at 50C as long as the steady-state CPU usage does not exceed 50%. If CPU usage is sustained at a workload greater than 50%, the CPU will throttle itself back to keep its internal temperature in a safe range.

If the application environment requires the computer to operate at 50C with steady state CPU usage greater than 50%, some additional cooling must be used to ensure safe operation of the electronics.

The R2 computer system is a fan-less, solid state computer that relies on thermal conduction to move heat from internal components to the outside of the enclosure. The lid is designed as a finned heat sink to increase overall surface area. Three main cooling methods can be used to optimize removal of heat from the system.

1. Airflow
2. Thermal conduction through mounting
3. Computer orientation

Airflow over the lid provides the most effective heat removal of these three options. It is optimal to mount the computer in an area that has either natural or forced airflow to constantly remove heat from the enclosure.

Mounting the computer to a large thermally conductive surface (such as an I-Beam, steel cabinet or other large metal surface) allows heat to travel through the enclosure and be dissipated into the large structure.

Power Supply

The power supply provided has a universal AC input. It provides 24 VDC @ 2.7 A max output to the R2 system. Typical power consumption varies depending on COM Express Module, memory capacity, OS/software activity and peripheral devices. AC current draw will never exceed 1.4 A.



The included AC/DC power supply has an operational temperature range of 0 °C to 40 °C. If the computer must be located in an environment greater than 40 °C, a different power source should be used. Ensure the power source can supply the power listed below.

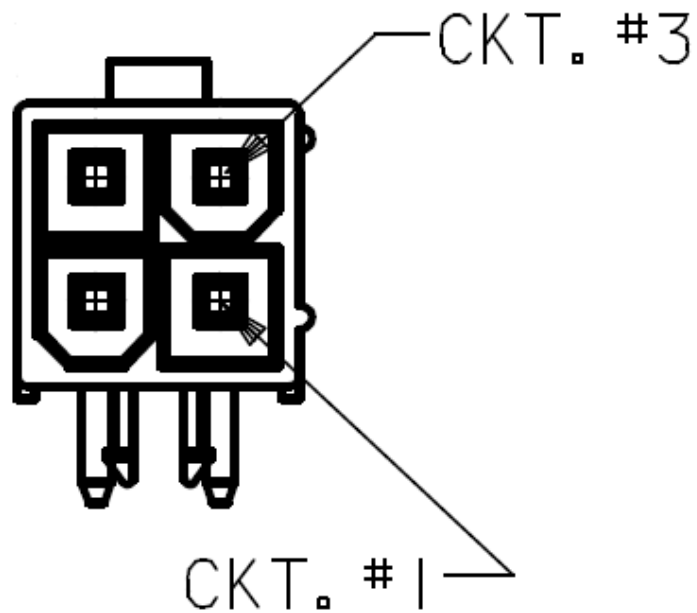
All necessary system voltages are generated from a single DC input capable of accepting 18 VDC to 36 VDC (fed by above DC power supply).

Acceptable System Input Voltage	18 VDC-36 VDC
DC Current Rating (Dependent on COM Express Module , input voltage and load)	375 mA-2150 mA

OPERATING TEMPERATURE RANGE, CONTINUED

Power Input

The 12000 carrier board is designed to operate from 18VDC up to 36VDC. The current draw varies across this range and is heavily dependent on the COM Express module, peripheral devices, and installed software. The connector at J11 is Molex PN 39-30-1040. Use Molex 39-01-2040 connector housing with Series 5556 Mini-Fit Jr crimp terminals.



CKT #	Signal	Name
1	+	Positive DC Power
2	+	Positive DC Power
3	-	Negative DC Power (GND)
4	-	Negative DC Power (GND)

System Operation

Power Button

The power button on the front of the computer can be used to turn the system on, shut the system down or place the computer in sleep states S3 or S4 (depending on OS support and configuration). The power button can also wake the system up from sleep states S3 or S4.

The power button has a 3 second hardware debounce/delay built in so accidental shutdown does not occur. This 3 second delay is present at all times so the power button must be held for 3 seconds before system power up, power down, sleep or wake occurs.

Power States

The R2 is designed to operate in four Power States as defined by ACPI.

S0 – Fully powered and operational

S3 – Suspended to memory (known as sleep in Windows)

S4 – Suspended to disk (known as Hibernate in Windows)

S5 – Powered down in standby (Windows Shutdown)

The system can transition from S0 to any of the three listed standby states (S3, S4, or S5) by either software command or the Power Button. The system can then be awoken from either listed sleep/standby state by holding the Power Button for 3 seconds. The system can also be awoken from S3 or S4 with a USB input device such as a HID compliant keyboard or mouse.



To be awoken from a standby state with a USB device, the device must be present when the computer enters the sleep state and must remain connected for the duration of the sleep state.

These power states are supported by Windows 8, Windows 7, Windows Vista, and Windows XP.

Reset Button

The reset button at BP1 (located near the USB Type A and RJ45 connectors) generates a system level reset (CPU included). Hold for 1 second to activate.

SYSTEM OPERATION, CONTINUED

High Performance Serial Communication Ports

The R2 provides three high speed serial communication ports supporting data rates up to 921.6 kbps. Ports 1 and 2 are RS-232 serial ports. Port 3 is an RS-485 port for communication with equipment up to 4000 ft. away from the computer or in noisy environments. The RS-485 2-wire mode is optimized for “Multi-Drop” or “Party-line” operations selecting data from multiple peripherals (as many as 32-unit load devices can be connected on an RS-485 bus).

In RS-485 mode, our special auto-enable feature allows the RS-485 ports to be viewed by the operating system as a COM: port. This allows the software application to utilize the serial port for RS-485 communication without the need to control the direction of data between the master and slave device. Our on-board hardware automatically handles the RS-485 driver enable.

Features of the serial ports include:

- 16C954 buffered UARTs with 128-byte FIFOs
- Software configurable clock prescaler and divisor support wide range of baud rates
- Supports 9-bit protocol framing
- Each port supports data rates to 921.6 kbps
- All modem control signals implemented on RS-232 ports
- RS-485 line termination, pull-up and pull-down resistors are selectable via dipswitch on Port 3
- Automatic RS-485 enable/disable in hardware on Port 3
- Uses Sealevel’s SeaCOM enhanced serial driver

Serial Port Setup

The R2 Serial Ports are assigned I/O addresses and IRQs by the COM Express module BIOS or by a “Plug-n-Play” Operating System.

Clock Modes

The R2 Serial ports are implemented on a PCIe x1 lane and therefore derive a 62.5MHz clock from the PCI express link which is divided by an 8-bit clock prescaler and a 16-bit clock divisor to provide a wide range of possible baud rates. Note that there are many combinations that can give the same result (e.g., Prescaler=1 and Divisor = 8, Prescaler =2 and Divisor = 4, or Prescaler=8 and Divisor = 1). As long as the calculated data rate is within +/- 2% you should communicate fine.

SYSTEM OPERATION, CONTINUED

Baud Rates

The following table shows some common data rates and the rates you should choose to achieve them when using the R2 computer.

For This Data Rate	Clock Prescaler	Choose This Divisor DLM:DLL
1200 bps	3.625	898
2400 bps	3.625	449
4800 bps	1.875	434
9600 bps	1.875	217
19.2K bps	1.375	148
38.4K bps	1.375	74
57.6K bps	22.625	3
115.2K bps	1	34
230.4K bps	1	17
460.8K bps	2.125	4
921.6K bps	2.125	2



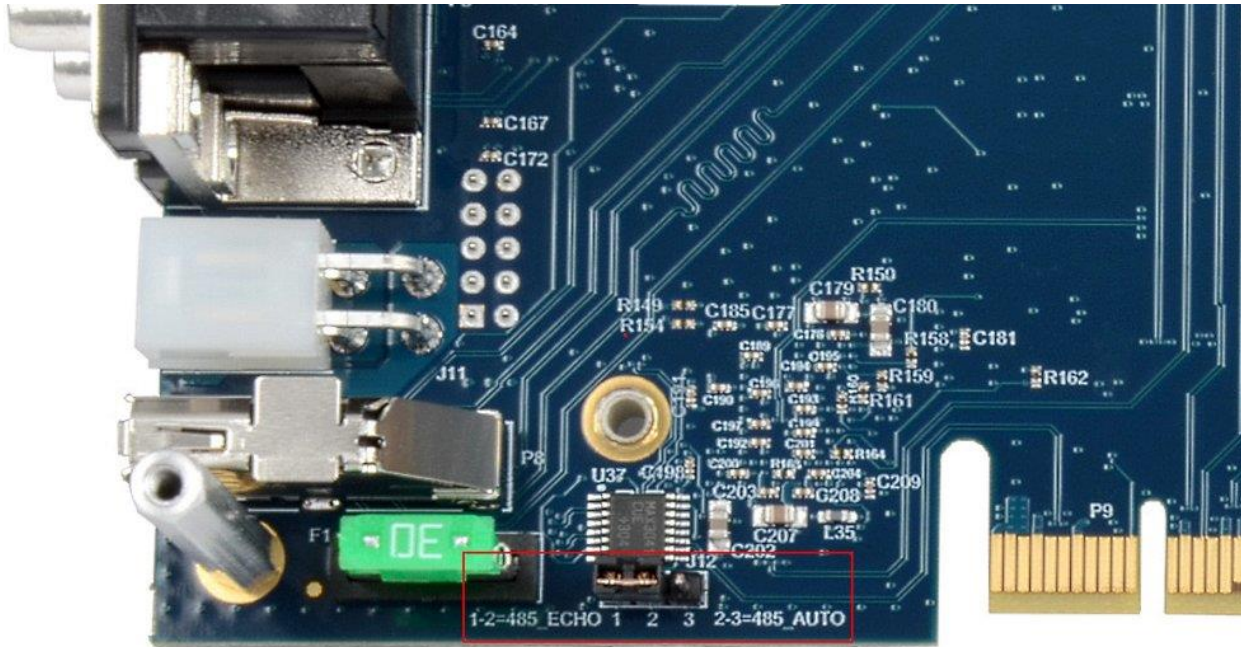
Many non-standard baud rates can be achieved by adjusting the Prescaler and Divisor. Contact Sealevel Systems Technical Support for assistance in determining the correct parameters for your application.

Serial Port 3 Operation

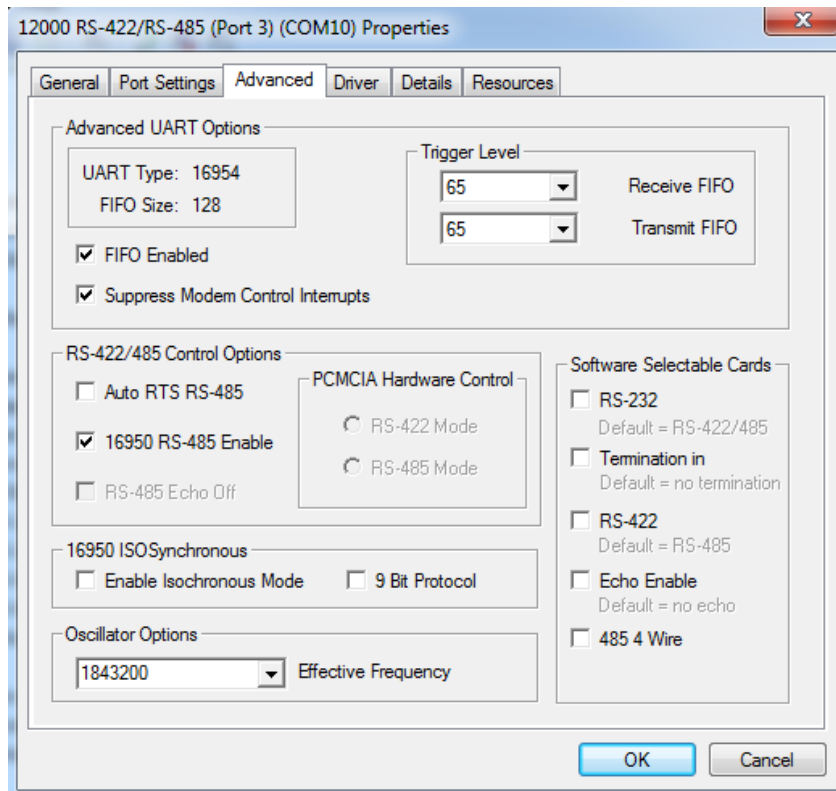
Serial port 3 is the RS-485 serial port on the R2 system.



For RS-485 half-duplex mode, set the jumper on J12 to pins 2-3 and, in the Device Manager Port Properties Advanced tab, enable the "16950 RS-485 Enable" feature. The COM Express carrier board must be removed to access the J12 and SW1 to configure the Port 3.



See the Serviceable Parts section of the manual for steps to access the internal electronics.



SYSTEM OPERATION, CONTINUED

Typical settings for Serial Port 3 configuration options are shown below:

Switch	Pin	RS485 4 Wire	RS485 2 Wire
J12	N/A	Connect pins 1 and 2	Connect pins 2 and 3
SW1-1	T ⁴	ON	ON
SW1-2	PU	ON	ON
SW1-3	PD	ON	ON
SW1-4	L	OFF	ON
SW1-5	L	OFF	ON

Switch	Name	Function
1	T	Adds or removes the 120-ohm termination.
2	PU	Adds or removes pull-up resistor in the RS-485 receiver circuit
3	PD	Adds or removes pull-down resistor in the RS-485 receiver circuit
4	L	Connects the TX+ to RX+ for RS-485 two-wire operation.
5	L	Connects the TX- to RX- for RS-485 two-wire operation.

CMOS Battery

The R2 includes a 3V DC type CR2032 battery that supplies the RTC and CMOS memory of the COM Express CPU module.



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

To fulfill the requirements of EN 60950, the R2 incorporates two current-limiting devices (resistor and diode) in the battery power supply path.

⁴ Termination, Pull-Up, and Pull-Down may not be necessary depending on the equipment to which the R2 Port 3 is connecting.

System Description

The following I/O connectors use industry standard pin outs for maximum compatibility.

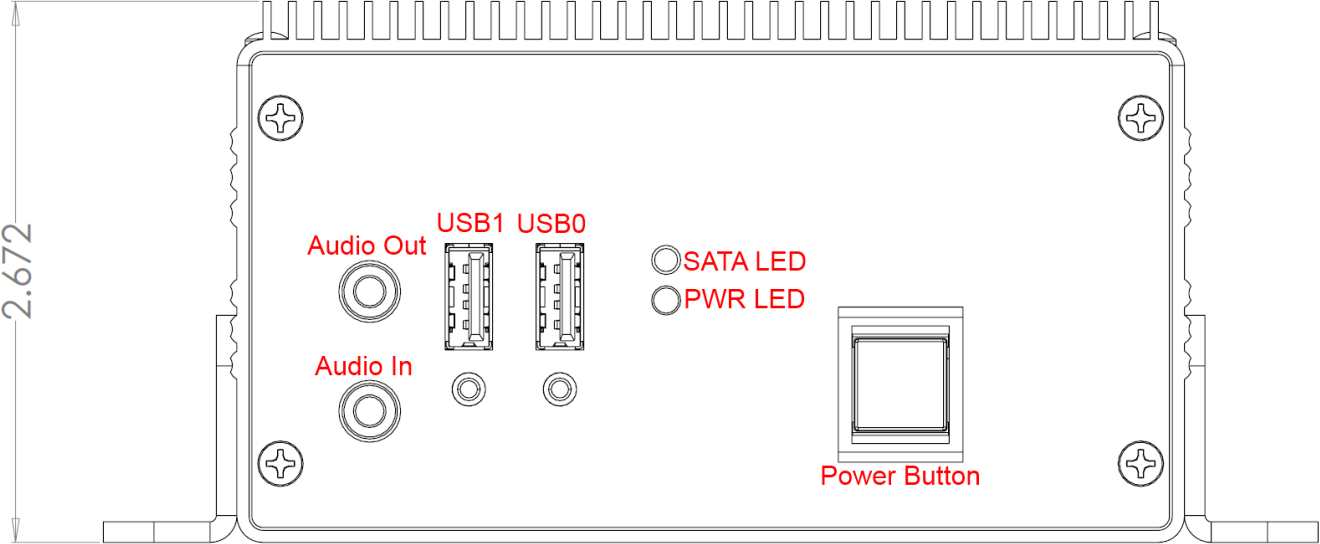
The Reference Designators are printed on the PCB and are provided for quick reference to the 12000 manual. See the 12000 (carrier board only) product manual for detailed connector descriptions.

<http://www.sealevel.com/support/article/AA-00588/>

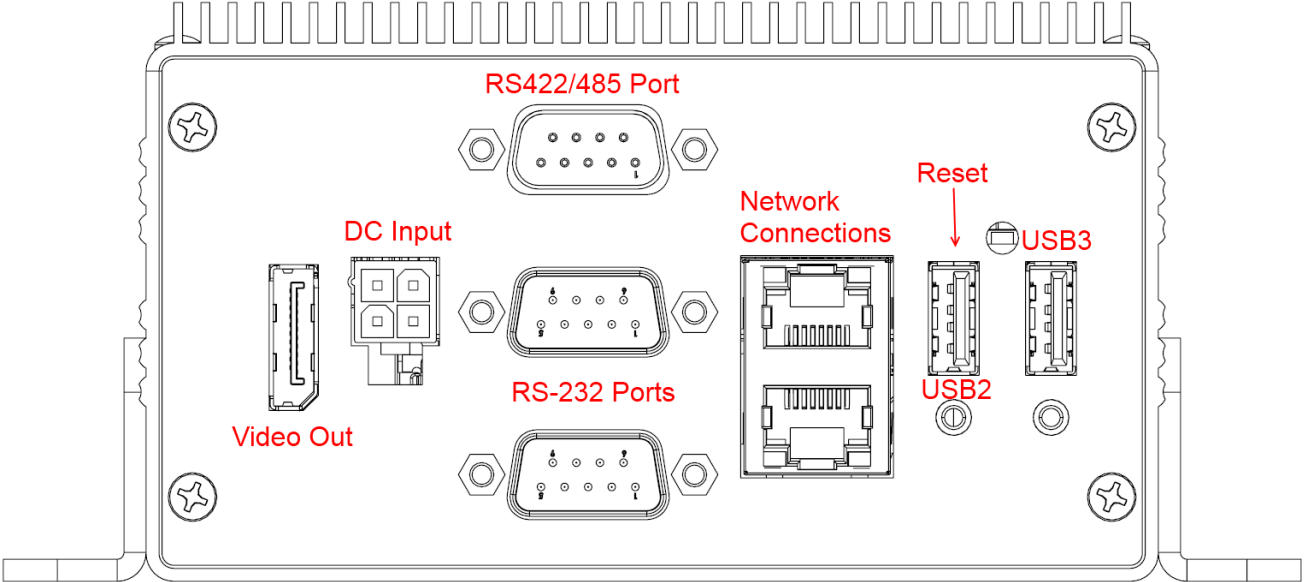
Reference Designator	Function	Connector Type
P8	Video Output	DisplayPort
P3	10/100/1000 (Gigabit Ethernet) Network Connections	RJ45
P5	RS-232 Serial Ports	DB9 Male
J2	USB 2.0 Device	USB Type A
J5	USB 2.0 Device	USB Type A
J6	USB 2.0 Device	USB Type A
J8	USB 2.0 Device	USB Type A
P2	Audio Input/output	3.5mm stereo headphone
CN1	PCIe Mini Card	PCIe Mini card connector
P4	SATA Disk Drive	22 pin SATA

SYSTEM DESCRIPTION, CONTINUED

Front Panel I/O Connectors

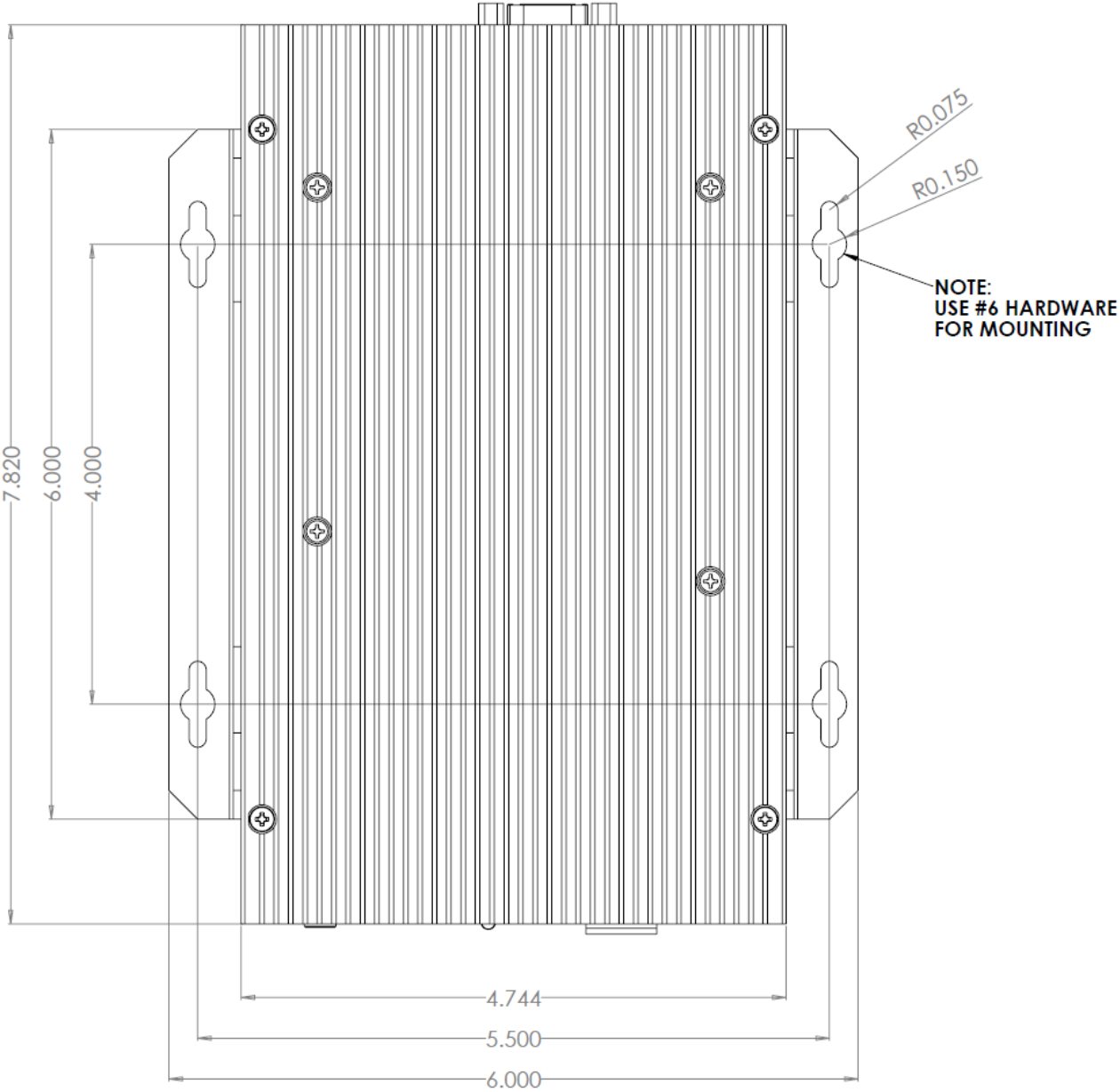


Rear Panel I/O Connectors



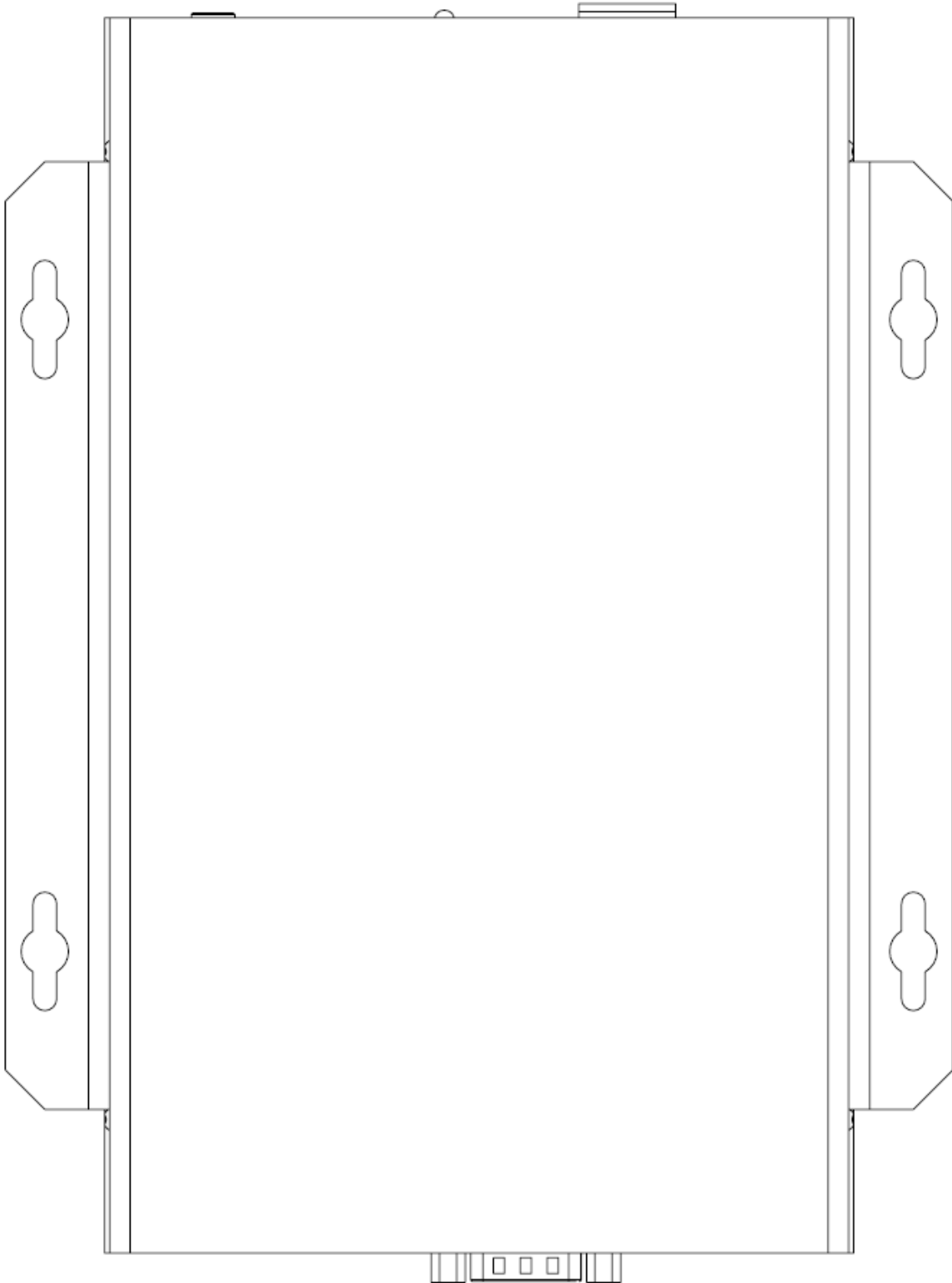
Mechanical Drawings

TOP VIEW



MECHANICAL DRAWING, CONTINUED

Bottom View

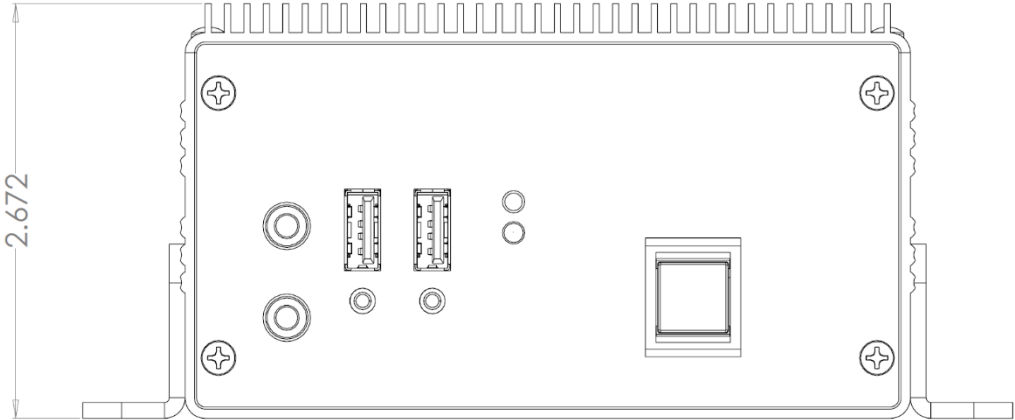


MECHANICAL DRAWING, CONTINUED

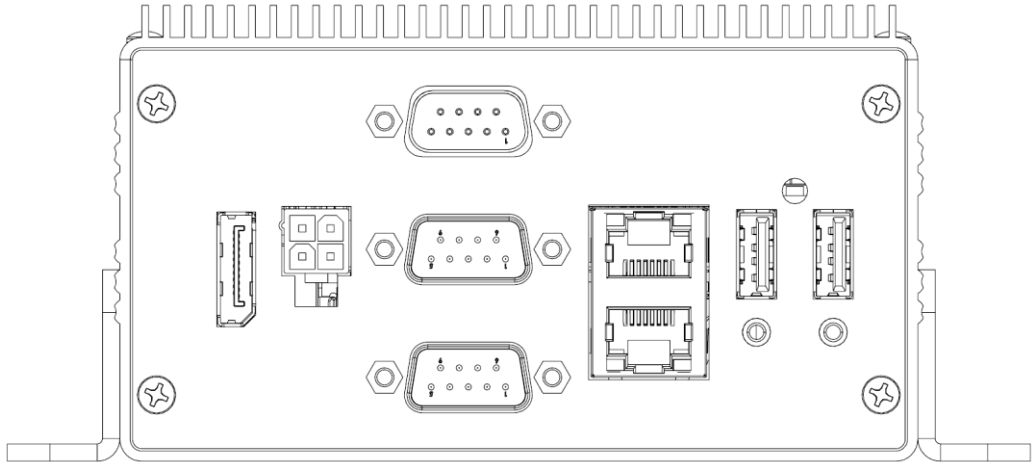
The mounting brackets included with the computer allow options for two methods.

- **Flush Mounting** - If the computer is to be mounted to a thermally conductive surface it is recommended to mount the computer flush to the surface to transfer heat into the structure.

Front View



Rear View



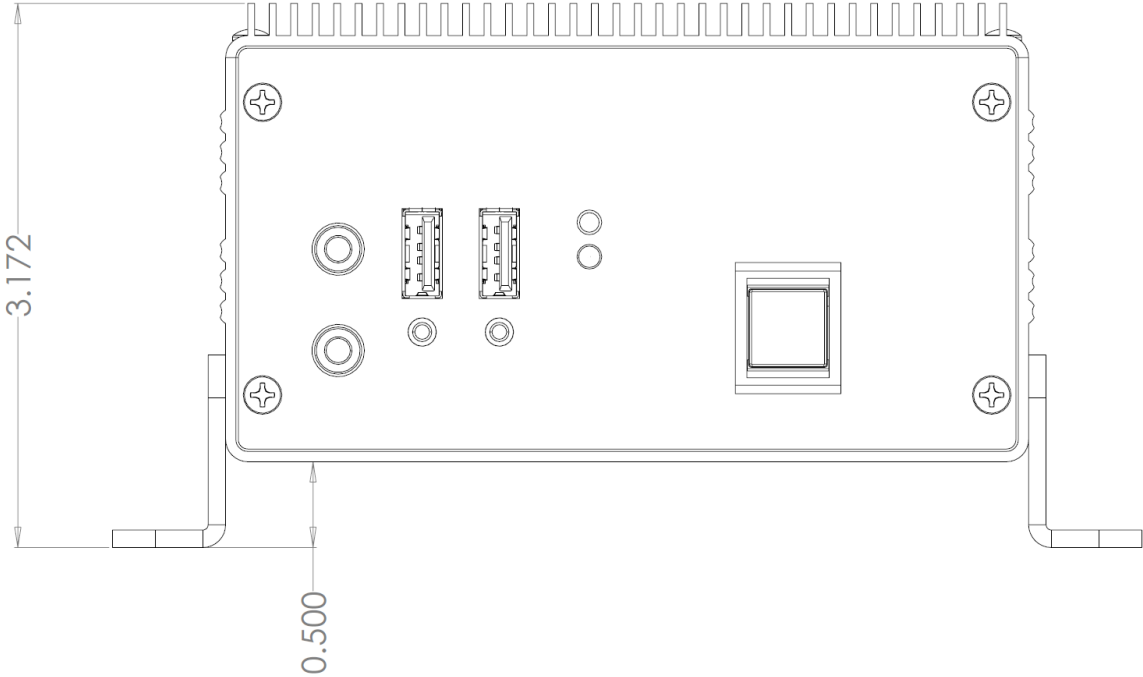
Side View



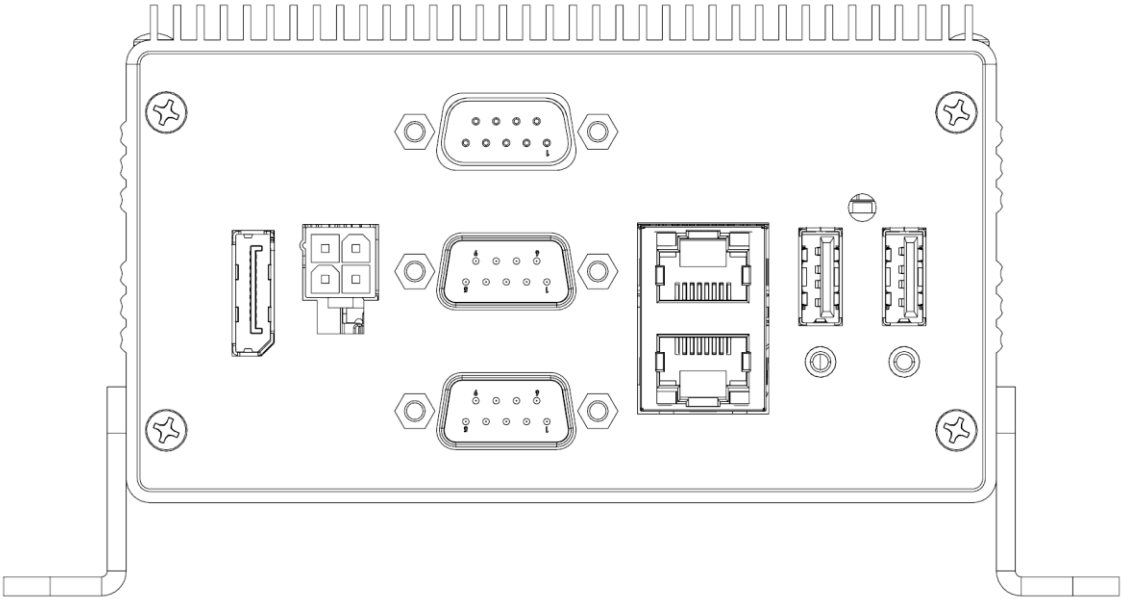
MECHANICAL DRAWING, CONTINUED

- **Raised Mounting** - If the computer is to be mounted to a thermally insulating surface (such as a plastic or wood surface); it is recommended to use the method that raises the computer 0.5" off the surface. This will allow additional airflow to remove heat from the bottom of the enclosure.

Front view (raised)

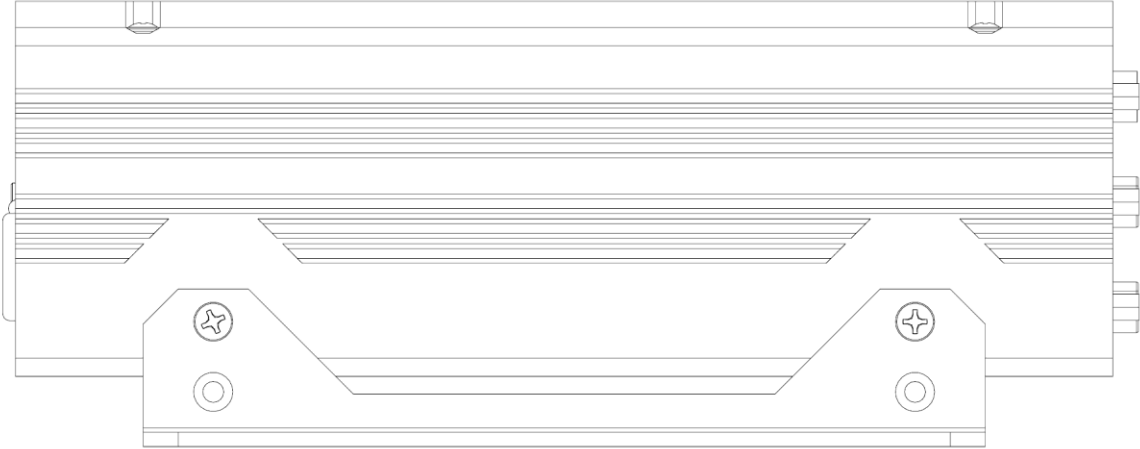


Rear view



MECHANICAL DRAWING, CONTINUED

Side view



N If no airflow is present in the application environment, orienting the computer so the heat sink fins run in the Z direction (vertically up and down) facilitates natural convection improving heat removal.

Getting Started

The Base R2 computer system does not include a solid-state drive or operating system. These can be added at the time of purchase and will be installed by Sealevel's experienced technicians. If you purchase the computer with a solid-state drive, the OS and all necessary software drivers will be preinstalled.

If you wish to install the operating system yourself, you will need to install the applicable drivers. Some drivers apply to the hardware on the COM Express module; some are for devices present on the carrier board. The following table lists the devices that will require drivers.

Device	Location	Driver Source
Chipset	COM Express Module	COM Express Module Manufacturer
Integrated Graphics	COM Express Module	COM Express Module Manufacturer
Audio Interface	COM Express Module	COM Express Module Manufacturer
Network Connection 1	COM Express Module	COM Express Module Manufacturer
Network Connection 2	Carrier Board	Intel website
Serial Ports	Carrier Board	Sealevel website
I2C Bus	Carrier Board	Sealevel website

Where to Get Software

The current versions of Sealevel software packages can be obtained from the Sealevel website (see following instructions). If you already have the Sealevel software, proceed to the Windows or Linux installation section.

The following table provides the COM Express module manufacturers for the different models of R2 computers.

Model	Manufacturer	Vendor Website	Module Family
R210XX	Congatec	www.congatec.com	Conga-TCA
R230XX	ADlink	www.adlinktech.com	Express-IBR
R270XX	ADlink	www.adlinktech.com	Express-IBR

The network adapter on the carrier board is implemented with an Intel 82574IT NIC on a PCIe x1 lane and provides (1) 10/100/1000Mbps 802.3 compliant Ethernet connection. Install Intel's "Network Adapter Driver for Windows 7" driver (version 18.4). This can be found at <https://downloadcenter.intel.com/>

Sealevel software drivers for this computer system can be found at the following link:

<http://www.sealevel.com/support/article/AA-00584>.

Choose the link for the desired software package and click on the "Download File" link for the current driver.

- Install [Sealevel's SeaCOM driver](#) to use Serial Ports.

SeaCOM Windows Installation



To install Sealevel software, you must log in as an administrator or have administrator privileges.

1. When the InstallShield Wizard window appears, click the **Next** button to initiate the software installation.
2. When the “License Agreement” window appears, accept the terms, and click **Next** to continue. You can click the **Print** button to print out a copy of the agreement for your records. If you do not accept the terms of the agreement, the installation will stop.
3. When the **Ready to Install the Program** window appears, click the **Install** button to install the software onto the hard drive of your computer. The files will be automatically installed into the **C:\Program Files** folder on your computer. Some versions of Windows will halt the installation and provide you with a dialog box which will ask you for permission for the installer to make changes to your computer. Click on the **Allow** button to continue installation of your Sealevel software.
4. The following dialog box may appear, as shown below. Click the **OK** button to continue.



SEACOM WINDOWS INSTALLATION, CONTINUED

N All Sealevel Systems software drivers have been fully tested by Sealevel. Clicking **OK** will not harm your system.

5. The following dialog box may appear, as shown below. Click the **OK** button to continue.



N This is a notification that if you are upgrading from a previous driver version, you should remove the associated Device Manager hardware entries and reinstall the adapter after the installing the SeaCOM software.

6. The setup file will automatically detect the operating environment and install the proper components. Next follow the information presented on the screens that follow. Once the installation is complete, close the disk installation window.
7. Refer to the Physical Installation section to connect and install your adapter.

Upgrading to the current SeaCOM driver

1. Download the current driver using the Instructions from the Where to Get Software section above. Please take note of the destination directory it will save to.
2. Uninstall the currently loaded driver SeaCOM driver found in the Control Panel. In Windows 7 and later Oss, it will be found in the **Programs and Features** list.
3. Navigate to the Device Manager and remove the Sealevel adapter by right clicking on the line item choosing **Uninstall**. Depending on your product, it can be found under either **Multiport Serial Adapters** or **Universal Serial Bus Controllers**.
4. In the Device Manager under **Action**, choose **Scan for Hardware Changes**. This will prompt the installation of the adapter and associate it with the newly installed SeaCOM driver.

Linux Support

The 12000 Serial Ports are supported natively in Linux kernels 2.6.28 and later.

Serviceable Parts

The R2 has three features that may require service in the field:

- An input current protection fuse
- Hardware configuration for Serial Port 3
- A 2.5" disk drive

Removal of Core Electronics

To access the 12000 Carrier board to replace the fuse or change the serial port configuration, follow these steps.

1. Safely shutdown the computer and remove power.
2. Move the computer to an ESD safe work area (See Appendix A – Handling Instructions).
3. Using a #1 Phillips screwdriver, remove and retain the 4 Flat head screws on the rear end of the computer.



SERVICEABLE PARTS, CONTINUED

- Using a #1 Phillips screwdriver, remove and retain the 4 pan head screws on the edges of the enclosure lid.



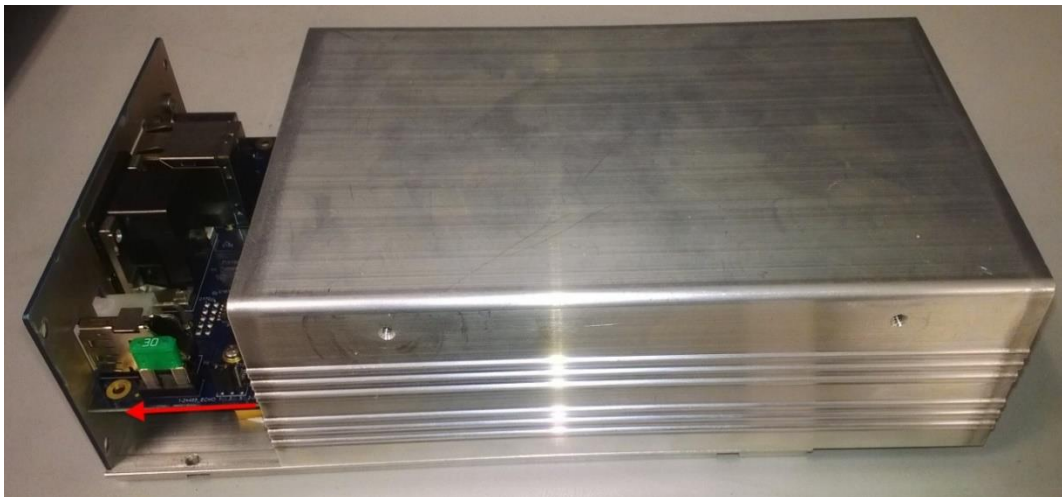
SERVICEABLE PARTS, CONTINUED



The power button is mounted to the front of the computer and connected to the 12000 carrier board with a short lead. It must be disconnected if the electronics are to be completely removed from the computer chassis. This is not recommended unless necessary.



5. Carefully slide the lid and core electronics out of the rear end of the computer by no more than 2".



The power button cable can remain plugged in if the board is moved no more than 2".

6. To reassemble, carefully slide the core electronics back into place ensuring the two cables are not pinched between hard surfaces.
7. Carefully reinstall the 4 lid screws then reinstall the 4 end screws. Do not cross thread any screws.



For optimal reliability, apply a small amount of Loctite 242 Medium Strength threadlocker to the threads of each screw. Torque screws between 3 in-lb. and 5 in-lb.

SERVICEABLE PARTS, CONTINUED

Serial Port 3 Configuration

Serial Port 3 is configured as RS485 Half Duplex (2-Wire). Configuration features are found on the 12000 carrier board near the protection fuse via SW1 and J12. See the Serial Port 3 Operation section for detailed configuration options.

Input Current Protection Fuse

The fuse holder located at location F1 is located on the positive power input path of the 12000 carrier board. To protect the user and the computer system from major system faults, the system is designed to have the fuse fail if DC current of 30A or greater is present.

The 12000 carrier board uses an automotive style Mini-Blade Fuse (Littlefuse PN 0997030.WXN).

To replace the fuse:

1. Follow the steps found in the Removal of Core Electronics section above to access the fuse.
2. Once exposed, grip the fuse, and wiggle it back and forth while pulling up until the fuse slides out of the holder.
3. Place the blades of the new fuse in the holder and press it straight down into the holder until the blades are completely hidden by the fuse holder contacts.



Support the circuit board underneath the fuse holder while removing or installing the fuse.

Disk Drive Removal

The disk drive can be accessed by completely removing the core electronics from the enclosure. See the steps above for electronics removal instructions.



Be sure to unplug the power switch cable from the 12000 carrier board before completely removing the core electronics. Failure to do so could damage the circuit board or switch.

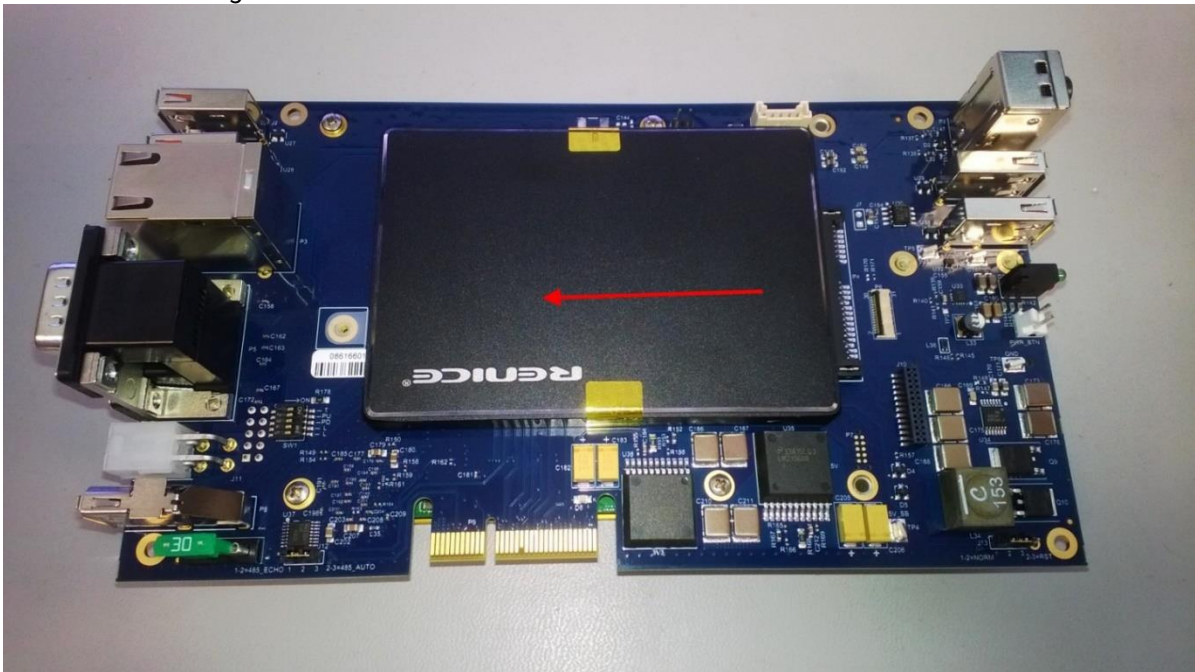
Once the core electronics are removed, see the following steps for drive removal/installation.

SERVICEABLE PARTS, CONTINUED

1. Remove the screw with a #1 Phillips screwdriver.

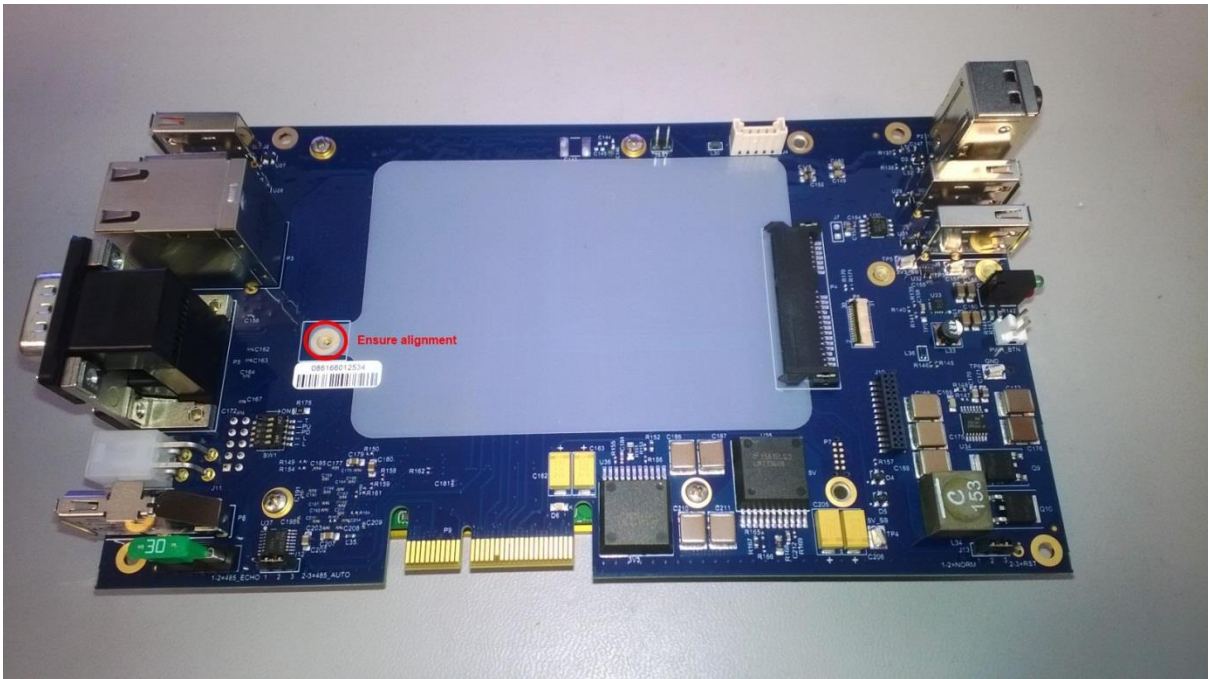


2. Remove the drive mounting bracket.
3. Slide the drive straight forward until it is free of the board mount SATA connector.

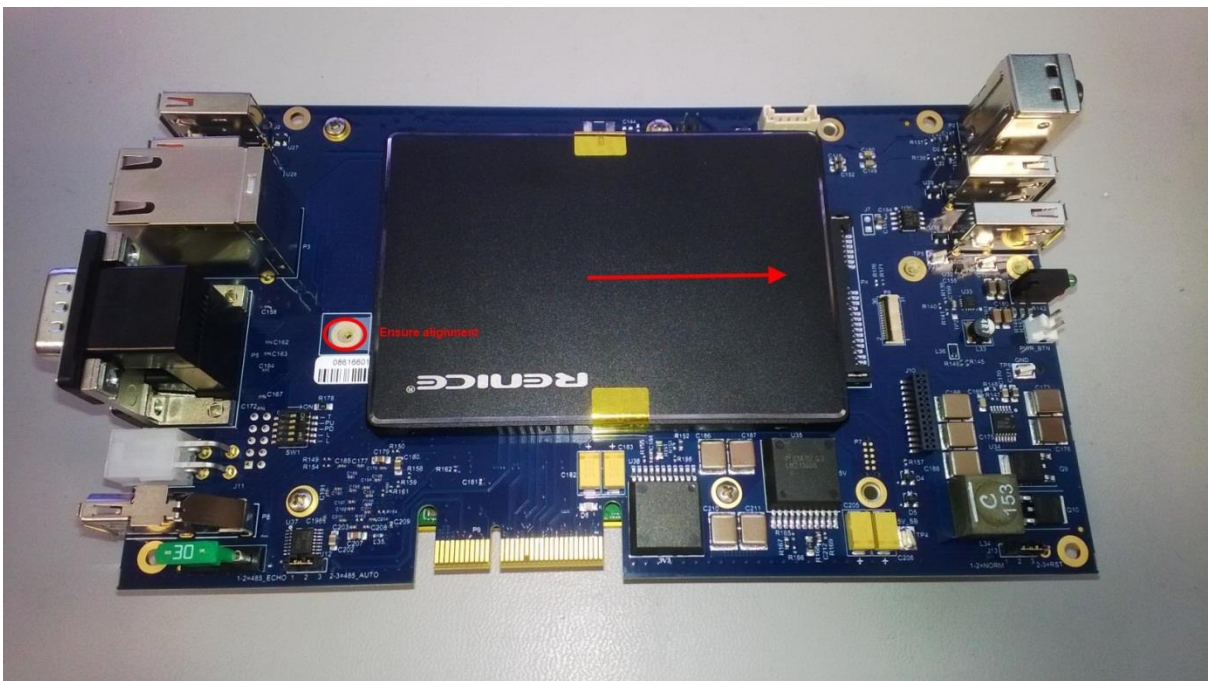


Ensure the protective Mylar sheet remains with the 12000 carrier board. It must be used to reinstall the drive.

4. To install a drive, place the Mylar sheet on the 12000 carrier board so the hole lines up with the threaded insert.



5. Place the drive flat on the sheet and slide it backwards until it is fully seated on the board mount SATA connector.



Ensure the hole in the Mylar sheet is still aligned with the threaded insert in the board.

6. Place the SATA drive mounting bracket over the end of the disk drive and install the screw in the threaded insert in the 12000 carrier board.



For optimal reliability, apply a small amount of Loctite 242 Medium Strength threadlocker to the threads of the screw. Torque the screw between 3 and 4 in-lbs.



If the screw is lost, it should be replaced with a M2 x 6mm screw with 0.4mm thread pitch.

BIOS Considerations

The BIOS functions, features, and settings are fully contained on the COM Express module. Refer to the COM Express module manufacturer's website for detailed BIOS settings. A few settings are generally present among COM Express Modules that can affect functionality.

- COM Express Type 6 modules have DDIs (Digital Display Interfaces) that can be implemented as DisplayPort, HDMI, or DVI interfaces. The R2 carrier board implements DisplayPort only. Ensure DDI1 is set to DisplayPort interface in the BIOS.



Some Passive DisplayPort to DVI adapters have been found which require DDI1 to be set to HDMI/DVI with the R21004 BIOS. This is the exception, not normal behavior.



If DDI1 is inadvertently set to HDMI/DVI, video will not work on native DisplayPort monitors or most DisplayPort to HDMI/DVI/VGA adapters. If this happens, the computer must be booted, and the BIOS must be entered "blindly" to restore the computer to a usable state. This example of steps will describe how to recover an R21004 (Conga-TCA family module) from this state.

1. Attach a USB keyboard to the computer.
2. Apply power and immediately press the delete key, repeatedly for 15 seconds. This will ensure the computer has had time to boot and enter the BIOS.
3. Press the F9 key to load optimal defaults then press enter to validate the change.
4. Press the following key pattern:
 - Right arrow,
 - Enter
 - Down arrow 9 times
 - Enter
 - Up arrow
 - Enter
 - F10
 - Enter
5. If performed properly, the DDI1 setting will have been restored to DisplayPort, the BIOS settings were saved to flash memory and the computer was rebooted. The display should now be working. If this does not work, contact Sealevel Systems Technical support.
6. Once the computer has rebooted and video is working, it is a good idea to disable the LVDS flat panel interface. It was enabled by restoring "Optimal Defaults"
7. Enter the BIOS, go to the Graphics section, and change the "Active LFP" setting to "No LVDS"
8. Change the "Power Loss Control" setting to "Turn On" (or the setting that is appropriate for your application environment).
9. Press F10 to save settings and exit.



"PowerOn after PWR Failure" is a setting present in most BIOS. This setting determines if the computer boots when power is applied. R2 computers are shipped with this set to always power on however "Remain Off" and "Last State" are valid settings.

Appendix A – Handling Instructions

ESD Warnings

Electrostatic Discharges (ESD)

- A sudden electrostatic discharge can destroy sensitive components. Proper packaging and grounding rules must therefore be observed. Always take the following precautions:
Transport boards and cards in electrostatically secure containers or bags.
- Keep electrostatically sensitive components in their containers, until they arrive at an electrostatically protected workplace.
- Only touch electrostatically sensitive components when you are properly grounded.
- Store electrostatically sensitive components in protective packaging or on anti-static mats.

Grounding Methods

The following measures help to avoid electrostatic damages to the device:

- Cover workstations with approved antistatic material. Always wear a wrist strap connected to a properly grounded workplace.
- Use antistatic mats, heel straps, and/or air ionizers for more protection.
- Always handle electrostatically sensitive components by their edge or by their casing.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting and removing connectors or connecting test equipment.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools such as cutters, screwdrivers, and vacuum cleaners that are conductive.

Appendix B – Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. The IBM PC computer defined the RS-232 port on a 9-pin D-sub connector, and subsequently, the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the 9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange. Both implementations are in widespread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20K bps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 is a single-ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. The RS-232 and the EIA/TIA-574 specification define two types of interface circuits: Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE).

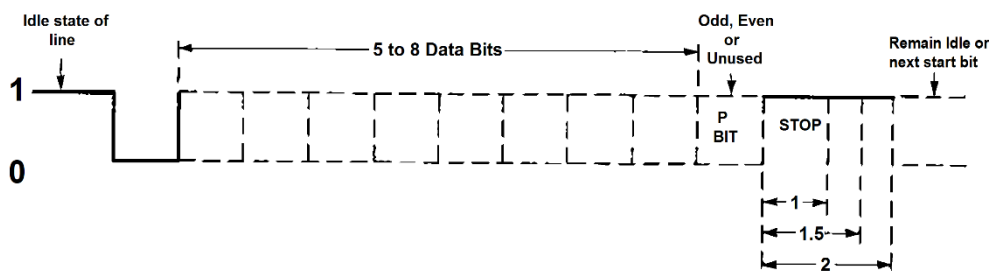
RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party line or multi-drop applications. The output of the RS-485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two wire and four wire mode. Two wire mode does not allow for full duplex communication and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

Appendix C – Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications are the standard means of serial data communication for PC compatible and PS/2 computers. The original PC was equipped with a communication or COM port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5, or 2). An extra bit used for error detection is often appended before the stop bits. The diagram below demonstrates asynchronous communication bits.



This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e., 9600,N,8,1).

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured I/O products. Relio™ industrial computers are warranted for a period of two years and the R9 family is warranted for a five-year period from date of purchase. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing. Sealevel achieved ISO-9001:2008 certification in 2011.

Warranty Policy

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for the warranty period. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect, abuse, accidents, or acts of nature are not covered under this warranty.

Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

Non-Warranty Repair/Retest

Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

How to obtain an RMA (Return Merchandise Authorization)

If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please contact Sealevel Systems, Inc. Technical Support for assistance:

Available	Monday – Friday, 8:00AM to 5:00PM EST
Phone	864-843-4343
Email	support@sealevel.com

Trademarks

Sealevel Systems, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.