



RMB-C2B[®] System Technical Manual

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Technical Support telephone: 1-303-426-4521

E-mail Technical Support: support@octagonsystems.com

Applications Notes (via web): www.octagonsystems.com

Revision History

| Revision | Reason for Change | Date |
|----------|------------------------------------------------------------------------------------------------|----------|
| A09 | Production release | 08/2009 |
| B10 | Add cradle mount pictures and COM port details | 03/08/10 |
| C12 | Change front panel assy to add Option and ANT3 connectors | 01/06/12 |
| D13 | Specification Updates | 03/28/13 |
| E13 | Environmental & Display Cautions added on page 6 | 05/08/13 |
| F13 | Clarify fusing in Power section | 07/17/13 |
| G14 | Remove reference to Odometer Input, clarify cable signal quality, add CAN Bus Polling messages | 01/21/14 |

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RMB-C2B Functional Overview

Description

The RMB-C2B is a 32-bit, Pentium® -class computer in a rugged enclosure. The enclosure and all components are designed for maximum reliability in industrial environments with high shock, vibration and temperature. The connectors and interfaces are located on external panels for easy access. The system is designed for mobile applications.

The RMB-C2B provides the following external interfaces: two USB 2.0 ports; CAN Bus; VGA video; digital I/O with five dedicated inputs and two dedicated outputs; one Ethernet port; two RS-232 COM ports, mono audio port (line input, line output and speaker output), and manual reset.

For Additional flexibility, the user can define up to 18 signals which can be brought out to the front panel. The four antenna connectors are available for user-defined wireless units.

Internally the RMB-C2B has a CompactFlash socket; two SATA drive connectors; two additional USB ports; a keyboard/mouse port; a Mini PCI interface; and PC/104 and PC/104-*Plus* interfaces. The RMB-C2B comes standard with a 4 GB, industrial grade, error-correcting CompactFlash.

An optional Uninterruptible Power Supply provides temporary backup for system power.

The BIOS is loaded on a flash device for easy updates. It is fully compatible with most popular operating systems. The BIOS supports I/O APIC for advanced interrupt control.

| |
|------------------------------------------------------------------------------|
| The BIOS is preset for normal operation. Changes may not be required. |
|------------------------------------------------------------------------------|

CAUTION - Environmental

In rare cases where continual high humidity environments are coupled with wide temperature swings, Octagon strongly recommends you specify your RMB computer have a Moisture Venting Kit installed. Without hermetic sealing, all enclosures “breathe”. When the temperature drops, the air inside contracts, pulling in moisture-laden outside air. The moisture can condense on the electronic components causing long term reliability problems. The kit contains a venting device made from PTFE that passes air and blocks moisture from entering the enclosure. The PTFE barrier is made using an emulsion polymerization process that utilizes the fluorosurfactant PFOA. The extrusion seams are sealed using Dow Corning 5 Compound.

CAUTION - Display

Connecting or disconnecting the RMB-C2 from the display (hot-swapping) while the RMB-C2 is under power may cause serious damage to the system. The RMB-C2 must be shut down completely before making this change.

NOTE: Turning off the display with its own power button is NOT sufficient as it does not disconnect the power circuit between the RMB-C2 and the display.

To power down the RMB-C2, turn the ignition switch off. Allow two minutes for the automatic shut-down sequence to complete. The LED on the display will go off signaling the completion.

Configuring and Ordering Your System

Octagon can build your RMB-C2B with your accessories so that the system is sealed at the factory. Contact your Octagon sales representative for assistance in ordering an internal UPS, CompactFlash upgrades, Mini-PCI cards, PC/104 or PC/104-*Plus* cards, wireless I/O and GPS options, SATA drives or a drive carrier board, or other options so that your system is fully configured from the factory.

Hard Drive Options

The RMB-C2B comes standard with a 4 GB CompactFlash. Additional options for storage include an upgraded CompactFlash drive, the Octagon Hard Drive Carrier Board which includes a ruggedized SATA hard drive. The RMB-C2B also supports USB drives, which can be connected without opening the case.

CompactFlash socket

The RMB-C2B comes standard with a 4 GB, industrial grade, error-correcting CompactFlash. The internal CompactFlash socket looks like a hard drive to the system. This socket accepts Type I or Type II CompactFlash devices. The CompactFlash feature is CF 3.0 compliant, DMA capable, and supports true IDE mode. Octagon only recommends industrial grade, error-correcting CompactFlash.

Hard Drive Carrier Board

An optional Hard Drive Carrier Board is available.

SATA drive capability

A SATA drive can be used in place of an IDE drive, using the internal SATA connectors. The internal wiring harness provides power for one SATA drive.

Expansion Options

The RMB-C2B can be used in a stand-alone mode or expanded through the Mini PCI, PC/104 and PC/104-*Plus* interfaces. Up to three PC/104 and PC/104-*Plus* cards can be added. An Option connector accommodates 18 user defined signals. See page 27 for additional information on options that can be ordered with your RMB-C2B.

Operating Systems

Octagon can preinstall some operating systems, including drivers for the standard features such as digital I/O and COM ports. Octagon has drivers for Windows XP/XPe and Linux for the standard RMB-C2B features, as well as for Octagon expansion cards.

UPS Option

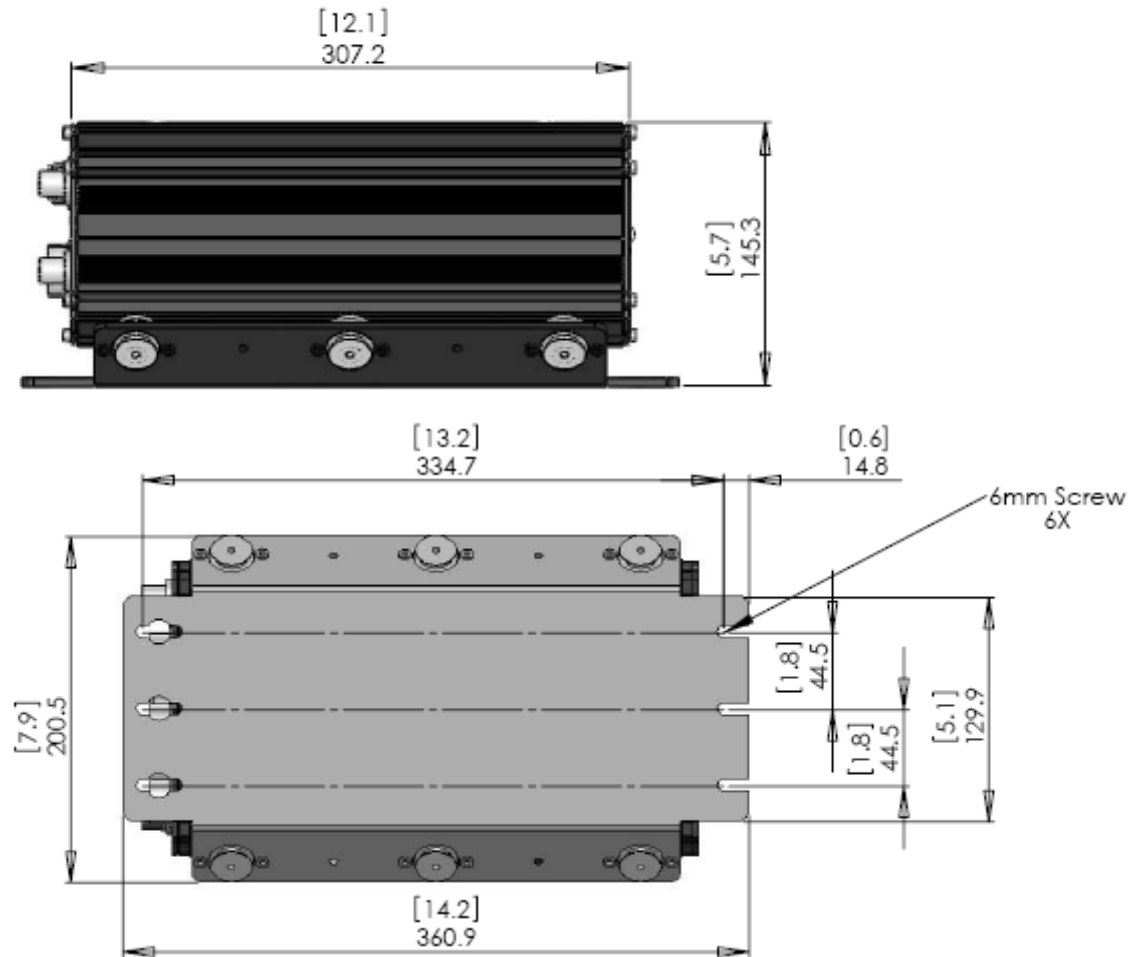
The RMB-C2B can be ordered with the optional internal UPS (see page 15 for information.) If this option is required it must be specified at the time of ordering. It can not be field-installed.

Installation

Orientation of RMB-C2B

The RMB-C2-B comes standard with a pre-installed vibration-damping plate. The RMB-C2B can be oriented in any direction horizontally or vertically. To ensure adequate air flow for convection cooling, mount the unit so that there is a 50 mm (2 in.) air space on five of six sides. The vibration-damping plate accommodates four, 0.25" or 6 mm mounting bolts.

Figure 1 RMB-C2B dimensions mm (in)



Using the RMB-C2B

Installing an operating system

You can install an operating system onto the CompactFlash or a SATA drive.

The preferred method of installing an OS is using a USB installation media, such as a USB CD ROM, USB hard drive, or USB flash drive. This avoids having to open the case. The two installation methods below assume a USB media.

The RMB-C2-B can be ordered with Windows Embedded Standard™ or Linux pre-install.

Installing an OS onto a CompactFlash

If you have not made any changes to the RMB-C2B BIOS Setup, you can install the OS onto the CompactFlash by connecting the USB installation media and powering on the system. The RMB-C2B will first look for the USB device for booting, and will automatically start the installation process.

Note: Some operating systems may require a mouse. For best results, connect a USB mouse before starting the installation. A USB hub is needed to install any operating system, as the two provided will be used for keyboard and mouse.

Installing an OS onto the #7051 hard drive carrier or other hard drive

To install the OS onto a hard drive, you will have to change some of the parameters in BIOS Setup. Use the following procedure:

1. Ensure that the hard drive is configured as a master device. See BIOS Setup.
2. Attach the USB CD-ROM drive, keyboard and mouse to the USB connectors, and a monitor to Display.
3. Apply power to the RMB-C2B. If Graphical POST is disabled in Setup a logon message similar to the one below will appear on your PC monitor:

```
General Software Power Class Embedded BIOS(R) 2000 Revision 5.3
Copyright (C) 2005 General Software, Inc. All rights reserved.
Octagon Systems 5266
```

```
00000589K Low Memory Passed
00117632K Ext Memory Passed
Wait.....
```

Note: Your Display message may be slightly different.

4. Enter Setup by pressing the Del key or Ctrl-C during BIOS POST sequence (this occurs between the memory test and boot-up). Select the Basic CMOS Configuration menu.

| System BIOS Setup - Basic CMOS Configuration | | | |
|-------------------------------------------------------------------------------------------|----------------------------|-------------------|------------|
| (C) 2004 General Software, Inc. All rights reserved | | | |
| DRIVE ASSIGNMENT ORDER | Date: | Typematic Delay | : 250 ms |
| Drive A: (None) | Time: | Typematic Rate | : 30 cps |
| Drive B: (None) | Numlock: Disabled | Seek at Boot | : None |
| Drive C: USB Drive | | Show "Hit Del" | : Enabled |
| Drive D: Ide 0/Pri Master | BOOT ORDER | Config Box | : Enabled |
| Drive E: (None) | Boot 1st: CD ROM: | F1 Error Wait | : Enabled |
| Drive F: (None) | Boot 2nd: Drive C: | Parity Checking | : (Unused) |
| Drive G: (None) | Boot 3rd: Drive D: | Memory Test Tick | : Enabled |
| Drive H: (None) | Boot 4th: Power Off | Debug Breakpoints | : (Unused) |
| Drive I: (None) | Boot 5th: None | Debugger Hex Case | : Upper |
| Drive J: (None) | Boot 6th: None | Memory Test | : StdLo |
| Drive K: (None) | | FastHi | |
| Loader: Unused | ATA DRV ASSIGNMENT: | Sect Hds Cyls | Memory |
| FLOPPY DRIVE TYPES: | Ide 0: 3 = AUTOCONFIG, LBA | | Base: |
| Floppy 0: Not installed | Ide 1: Not installed | | 632KB |
| Floppy 1: Not installed | Ide 2: Not installed | | Ext: |
| | Ide 3: Not installed | | 251MB |
| ↑/↓/←/→/CR/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu | | | |

1. Under DRIVE ASSIGNMENT ORDER change Drive D: to Ide 2/Sec Master. The CompactFlash is always a Primary Master. Change Drive E: to Ide 0/Pri Master.
2. Save the BIOS changes and exit. When you reboot, the RMB-C2B will boot from the USB device. Follow the on-screen dialog to load the operating system. Refer to the OS documentation for further information.

Boot sequence

The RMB-C2B can be configured to boot from CompactFlash, a hard disk, or a CD-ROM; or from a USB device such as a floppy drive, hard drive, flash device, or a CD-ROM. A USB boot allows software installation externally.

Configuring your operating system

The operating system must be configured for the CompactFlash, IO/APIC and Power Management.

CompactFlash configuration

Using swap files or swap partitions with a CompactFlash drive will cause extra wear on the drive and premature failure. Use the following procedure to configure your operating system to avoid swap files on a CompactFlash.

Windows - The menus vary slightly according to which version of Windows you are using. In the Control Panel, select System, select Advanced, under Performance select Settings, under Advanced in Virtual Memory select Change. Ensure that the drive for the CompactFlash is shown (drive D: by default in the RMB-C2B, although Windows will consider it as Drive C:). Click No Paging File, then Set.

Linux - For Linux, do not set up a swap partition for the CompactFlash.

IO/APIC configuration

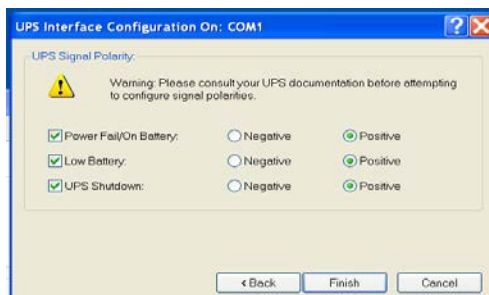
The configuration of your system's IO/APIC must match the operating system you are using. Failure to do so may cause installation problems and/or improper system operation. The RMB-C2B default configuration expects an operating system which supports an IO/APIC, such as Windows XP/XPe or modern Linux kernels. If your operating system does not support the IO/APIC, ensure that the APIC is disabled (see section on BIOS Setup) before installing your operating systems.

Power management configuration

The RMB-C2B does not have a Power switch to power the system On and Off. If the optional internal UPS is installed, then removing external power will not turn the system off. You must configure your operating system to respond to the Power Fail signal or the Low UPS signal. Power Fail is asserted positive whenever the system goes on UPS power, or the Ignition signal goes low. Low UPS is asserted whenever the input voltage and the UPS are below 8.5V.

The following example shows how to configure Windows.

1. Select the Start icon.
2. Select Control Panel from the menu.
3. In Control Panel, select Performance and Maintenance.
4. In Performance and Maintenance, select Power Options. A Power Options Properties popup will appear.
5. In the popup select UPS. Under Details select Select.
6. In the UPS Selection popup, select the following three: under Select manufacturer pick Generic; under Select model pick Custom; under On port pick COM2. When finished, select Next. The following screen will appear:



7. Ensure that Power Fail/On UPS and Low UPS are checked, as well as Positive transition, and UPS Shutdown is unchecked. Refer to ACPI state S5 documentation for additional information on configuration parameters.

LEDs

The RMB-C2B has two dual color LEDs on the front panel. The PWR LED will display different colors to indicate whether the unit is running or in standby mode. The Lnk/Act provide the link and activity status of the Ethernet port.

VGA

The VGA uses the same signals found on a standard DB-15 video connector. The RMB-C2B supports up to 1920 x 1440 x 24 bpp resolution. Video is available through the Display connector.

Keyboard/Mouse

The RMB-C2B supports a USB keyboard and mouse. See USB below. Wake-on keyboard and Wake-on mouse are supported for power management.

USB

Two external USB 2.0 ports are available. USB0 & USB1 are available through the LAN & Display connectors respectively. The RMB-C2B will automatically detect USB peripherals such as keyboards, flash drives, and CD ROMs; however, USB floppy drives and USB hard drives must be designated in BIOS Setup. See page 25 for information on BIOS Setup.

Ethernet

The Ethernet ports use PCI interrupts as assigned by the operating system or I/O APIC. Note that you must have the Ethernet drivers installed to be able to use the Ethernet port.

Serial communication

The RMB–C2B has two COM ports with 4-wire RS–232 interfaces. They are accessed through the MULTI I/O connector. See the *Prototype Development* section. COM drivers for Windows XP and Linux are available through Octagon Technical Support.

The serial ports share IRQs. Refer to *Serial port IRQ sharing* for configuration information.

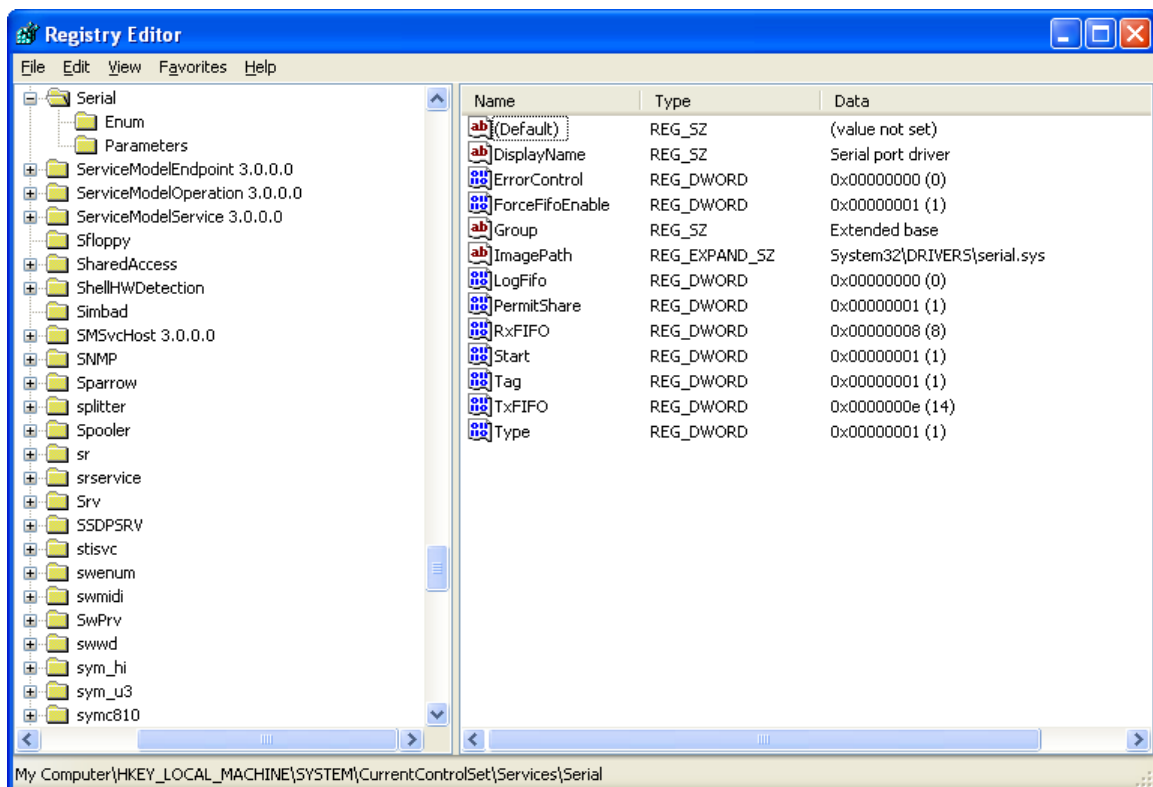
RS–232 on COM1

COM1 is a dedicated 4-wire RS–232 interfaces. COM1 can also be used as a serial console for communication with a host computer. For information on configuring COM1 as a serial console contact Octagon Technical Support.

Serial port IRQ sharing

This section shows how to configure the RMB–C2B COM ports to support IRQ sharing and concurrent access using Windows XP.

There is one entry in the registry that needs to be modified. This is the **PermitShare** entry under the serial ports. This value must be changed to a one in order to allow the COM ports to share interrupts.



The article below is the MSDN document describing this feature.

<http://msdn.microsoft.com/en-us/library/ms800561.aspx>

Windows Driver Kit: Serial Devices

Registry Settings for the Serial Service

This topic describes the registry settings that Serial applies to all serial devices for which Serial is the function driver or a lower-level device filter driver.

Serial queries the service entry values after it is loaded. If an entry value is not present, Serial adds the service entry value. Serial sets the entry value to the default value that is statically defined in *serial.sys*. If a service entry value is changed after Serial is loaded, the new value is used the next time Serial is loaded.

Serial uses the following service entry values that are under the `..\Services\Serial` registry key:

ForceFifoEnable (REG_DWORD)

Specifies a Boolean flag that indicates whether to force Serial to use FIFOs. If

ForceFifoEnable is nonzero, FIFOs are used, regardless of whether Serial can detect the presence of FIFOs. Otherwise, FIFOs are used only if Serial can detect them. The default value of **ForceFifoEnable** is nonzero. If the entry value is not present, Serial sets a **ForceFifoEnable** entry value to the default value. For more information about the method of detection, see the sample code in `\src\kernel\serial` in the Windows Driver Kit (WDK).

RxFIFO (REG_DWORD)

Specifies the number of bytes in the receive FIFO that triggers a port interrupt. For valid values, see the constants defined in *serial.h*. The default value of **RxFIFO** is eight bytes. If the entry value is not present, Serial sets an **RxFIFO** entry value to the default value.

TxFIFO (REG_DWORD)

Specifies the number of bytes in the transmit FIFO that triggers a port interrupt. For valid values, see the constants defined in *serial.h*. The default value of **TxFIFO** is 14 bytes. If the entry value is not present, Serial sets a **TxFIFO** entry value to the default value.

PermitShare (REG_DWORD)

Specifies a Boolean flag that indicates whether to permit the system to share the interrupt that a port uses. If **PermitShare** is nonzero, the interrupt can be shared; otherwise, the interrupt cannot be shared. The default value of **PermitShare** is 0x00000000. If the entry value is not present, Serial sets a **PermitShare** entry value to the default value.

BreakOnEntry, DebugLevel, and LogFifo

Specify entry values that are used for debugging. For more information about these entry values, see the Serial sample code that is included in the WDK.

Digital I/O

The digital I/O consists of two dedicated outputs and five dedicated inputs. The I/O lines will interface with any device operating within the system voltage levels. The digital I/O lines are available on the Multi I/O connector. For digital I/O register information refer to the RMB-C2B Read Me file, available through Technical Support.

Base address

The base address for digital I/O is set in the PCS2 field in the BIOS Setup Custom Configuration menu. There are numerous options available in this field; any non-conflicting address ending in 0 can be used. The default address is 0x0140.

Output lines

The output lines, when activated, provide a ground for external devices connected to the vehicle voltage. When inactive they appear as an open. The lines can withstand voltages up to 100V when in the off state. They can sink 100 mA.

The output lines will provide 1A peak repetitive for 50mS for driving incandescent lamps switching on at a rate of one per second, at a 50% duty cycle with a 50mA lamp. The output lines have inductive load protection with 1A, 100V diodes.

Input lines

The input lines provide positive logic for input voltages ranging from 3V to 36V (recommended range) and are tolerant to 42V input. They are surge protected to 200V for 30 ms.

The input lines are current limited to 10mA. They are reverse polarity protected. Each input is Schmitt triggered and de-bounced.

Software drivers and read me file

Software drivers for the RMB-C2B digital I/O are available through Octagon Technical Support. Drivers are available for Linux and Windows XP/XPe.

Audio

The audio is AC 97 Codec compatible, and uses a standard AC 97 Codec driver. The audio has mono line input, line output and speaker functions. Audio is accessed through the Multi I/O and Display connectors.

CAN Bus

The CAN Bus is implemented with a microcontroller that supports all the message types of a Basic CAN controller. Receive Buffer Overruns are possible under high bus utilization. It has the option of an unpowered isolated or powered non-isolated interface. The default configuration of the RMB-C2-B is unpowered and isolated. These options are provided via a DIP switch on the Interface card. The drivers for the RMB-C2B CAN Bus are available through Octagon Technical Support. The CAN Bus signals are available on the MULTI I/O connector. The termination on the CAN BUS is 120 ohms and can be switched in or out via a DIP switch on the Interface card. In isolated mode additional maximum cable length is reduced to 20 meters at 1Mbps.

Temperature sensor

The RMB-C2B has an onboard temperature sensor. Accessing temperature sensor registers is accomplished through operating system drivers. Contact Octagon for driver availability and/or a Board Support Package for your Operating System (OS).

Power

The internal Power Supply Card serves three functions: Provide power to the system from the vehicle input power; Provide voltage-limited (26V max.), partly-filtered vehicle power XPWR to connected accessories; Provide automatic transition to the optional internal UPS during power failures.

The external Power connector provides DC input to the Power Supply Card. The recommended range for external power is 10V to 36V for normal operation; temporary drops to 8V or surges to 42V will not affect operation.

The power supply has advanced brownout protection, ensuring proper restart supply sequencing. This is particularly critical in mobile applications where the engine might be started at low temperatures.

CAUTION

Vehicular wiring typically experiences large voltage drops, especially during engine starting conditions. In 12V systems this is especially important as voltage drops below 8V are common. External wiring to the RMB-C2B should be of appropriate gauge as to mitigate voltage drops on the power input cable. If low voltage operation cannot be avoided, a UPS is the best option.

Octagon recommends that both input power lines, Battery Positive and Battery Negative, be fused by the user with a standard, fast acting fuse with a rating not to exceed 15A.

Power input

The Power Input connector has three pins. Refer to the *External connector pin-outs* section.

Ignition switch

The ignition switch signal comes from the vehicle and is at battery voltage when active. The IGNITION signal (Pin C) is part of the power management subsystem. When the IGNITION signal transitions from high to low it asserts “power fail.” This signal can be used to turn the system On and Off via power management software configuration in your operating system (see page 10.) If the ignition switch is not used in your system, connect this line to the vehicle battery voltage. Refer to Power Management for further information.

XPWR lines

On the Display connector are lines XPWR and XPWR ground. These lines provides voltage-limited (26V max.), partly-filtered vehicle power to external devices, such as, displays. XPWR is the same voltage level as the vehicle power (power input) up to 26V. Above 26V vehicle voltage, the regulator eliminates over voltage and transients that are harmful to external devices. XPWR is also provided to the CAN power pin in powered non-isolated mode. The total power provided by all XPWR lines must not exceed 25 Watts or 1.0A whichever greater.

UPS Option

The RMB-C2-B can be supplied with an optional internal Uninterruptible Power Supply (UPS). It employs ultra-capacitor technology allowing about 500K charge cycles, eliminating the need for periodic battery replacement.

The UPS automatically powers the system when the main power drops below $9.5V \pm 0.5V$, to systematically shut down the operating system and prevent data loss. While it can supply power for much longer, it was designed to operate for up to 90 seconds. The charging circuit will keep the capacitors charged as long as the main power is within the stated limited. Switchover from main power to UPS power is instantaneous and entirely seamless. When operating under UPS power, the power LED light turns blue.

At nominal load and at $65^{\circ}C$, the RMB-C2B system will retain power for approximately 90 Seconds. At nominal load and at $-10^{\circ}C$, this time decreases to approximately 85 seconds. With added cards in the Mini-PCI, PC/104, or PC/104-Plus slots and/or a solid state drive, the backup time will be lower. If the UPS function is critical at low temperatures, the customers should ensure that the additional loads will still allow enough time to shut down the system. A slight decrease will also occur due to the age of the capacitors and the charge/discharge history.

The capacitor is switched in when the main power voltage drops below $9.5V \pm 0.5V$. If the capacitor voltage drops below 8.5V, a “low UPS” warning will be issued to the operating system. The OS must be configured to recognize this signal, or the capacitors will become fully discharged.

Warning

The UPS module is not field-removable or serviceable. An accidental short-circuit of the capacitors may result in very high currents that can damage the module. If the capacitor bank is suspected to have failed, call Octagon Technical Support for instructions.

Powering the system off with the UPS installed

Since power from the UPS keeps the system powered when external power is removed, powering the system off with the UPS installed is accomplished as follows:

The operating system is configured to shut the power off. Windows XP, for instance, configures this through the Power Options icon in Control Panel (see page 10.) When the IGNITION signal transitions from high to low it asserts “power fail”, signaling the operating system to shut the system off.

Power management

The RMB–C2B supports ACPI 2.0 and PCI Power Management Specification 1.2. Refer to the specifications for information on how to use these functions. The RMB–C2B supports Wake-on Keyboard. For additional information refer to the RMB–C2B Read Me file, available through Technical Support.

“Power fail” is asserted positive in three ways: whenever the system goes on UPS power; whenever the UPS voltage and external voltage are below approximately 8.5V; and whenever the Ignition signal transitions from high to low. “Low UPS” is asserted whenever the external voltage and the UPS voltage are below 8.5V.

RMB–C2B Technical Data

Technical specifications

CPU

VIA C7-M, 1.5 GHz. The RMB–C2B uses the VIA CN700 north bridge and the VIA VT8237R+ south bridge for some of the peripherals. The Front Side Bus speed is 400 MHz.

BIOS

General Software, AT compatible with industrial extensions.

DDR2 SDRAM

2 GB of industrial grade, DDR2 SDRAM are installed in two 240-pin DIMM sockets.

On-board flash

512 KB flash, contains system BIOS.

Hard drive

EIDE hard drive support with on-card hard drive controller and BIOS. CompactFlash appears as the primary EIDE device. Secondary EIDE accessed via 40-pin connector, and supports two additional EIDE devices (**NOTE: The IDE connector is not available units manufacturer after June 2009. Use the SATA connector**).

SATA drives

Internal connectors for SATA drives on both the primary and secondary IDE channels.

CompactFlash

4 GB, industrial grade, error-correcting CompactFlash provided. Supports Type I and Type II 3V CompactFlash devices. Octagon only recommends industrial grade, error-correcting CompactFlash.

Serial I/O

COM1 and COM6 are a dedicated 4-wire RS-232 port; COM4 is software configurable for RS-232 or RS-485 interfaces.

IEC1000, level 3, ESD protection specification

— Contact discharge ± 6 kV

— Air-gap discharge ± 8 kV

Up to 115.2K baud

COM2 is an internal port for power management functions.

COM5 is an internal port of Octagon Systems accessory options.

CAN Bus

BasicCAN Interface

Switch-selectable isolated or non-isolated mode

USB

Two external USB 2.0 ports; two internal USB 2.0 ports.

Digital I/O

Two dedicated output lines and five dedicated input lines. Input is logic high from 3V to 42V.

Output is a ground for devices is the same as the vehicle battery negative.

Keyboard and mouse ports

USB keyboard and mouse supported through USB ports. Wake-on Keyboard supported.

Ethernet

One 10/100BaseT port.

VGA Video

CRTs up to 1920 x 1440 x 24 bpp (bits per pixel) resolution.

Audio

AC 97 Codec compatible; microphone input, line input, line output and 3 Watt audio amp.

Watchdog timer

Time-out is 1 second, 10 seconds or 60 seconds.

Real time clock

AT compatible with backup battery.

Operating systems

Driver support for Windows XP/XPe and Linux.

Power input

The recommended range for external power is 10V to 36V for normal operation; temporary drops to 8V or surges to 42V will not affect operation.

Optional internal UPS

Using ultra-capacitor technology, the UPS ensures orderly OS shutdown.

Expansion

PC/104, PC/104-*Plus*, and Mini PCI.

Size

389 x 170 x 147 mm (15.3 x 6.7 x 5.8 in.)

Weight

5.7 kg (12.6 lbs.) without UPS, 6.0 kg (13.3 lbs.) with UPS, exclusive of other options.

Environmental specifications

- | | |
|-----------------------------|--------------------------------------------------------------------------------------------|
| ■ Operating temperature | RMB-C2B: -40° to +70°C *, ambient with optional UPS: -40° to +65°C * |
| ■ Non-operating temperature | -55° to +95°C (with optional UPS: -40° to +70°C) non-operating |
| ■ Shock | 20g, 3 axis per MIL-STD 810F, Test Method 516.5, Functional shock test (4.5.2) 20g peak |
| ■ Vibration | Per MIL-STD 810F, Test Method 514.5, Annex A Category 20 for ground vehicles |
| ■ Relative Humidity | 5% to 95% non-condensing |

* These specifications are for the standard RMB-C2B system as shipped from the factory. The specifications assume a gap of at least 50 mm on five of the six sides between the unit and any structure. Additional expansion cards might lower the maximum operating temperature. Derate the maximum temperature by at least 2°/watt for additional components. External airflow around the RMB-C2B improves the maximum temperature rating.

Avoid “stale” air areas where natural convection is restricted.

Mating connectors

Table 1 *RMB-C2B mating connectors*

| Connector | Function | Mating Connector |
|----------------------------|-----------------------------------------------------------------|-------------------------------|
| External Connectors | | |
| Multi I/O | COM1-2, CAN Bus, Audio | Amphenol PT06E16-26P |
| Display | USB, VGA, Audio, display power | Amphenol PT06E-16-26PW |
| LAN | Ethernet and USB | Amphenol PT06E-12-10P |
| Power | VDC In, Ignition switch, | Amphenol PT06E-12-3S |
| Option | 18 user defined lines | Amphenol PT06E-14-18P |
| ANT1-3 | "N" female, to female SMA on inside | "N" male antenna connector |
| GPS | TNC female to TNC female on inside | TNC male antenna connector |
| CPU card | | |
| J2_B, J3_B | PC/104 | Standard PC/104 |
| J4_B, J5_B | SATA hard drive | Standard SATA drive connector |
| J8_B | PC/104- <i>Plus</i> | Standard PC/104- <i>Plus</i> |
| J11_B | IDE hard drive (not available on units manufactured after 6/09) | Standard 40-pin IDE |
| Interface Board | | |
| J1_I | Not used | Amp 746288-4 |
| J7_I | USB6-7 – consult factory | Octagon #6288 cable |
| J8_I | Factory use only | Octagon #6392 cable |
| J9_I | 8-pin to PS2 keyboard. "Y" adapter provides PS/2 mouse | Octagon #6837 cable |
| | Keyboard/mouse Y adapter cable | Octagon #4186186 adapter |

Maps

Table 2 RMB-C2B I/O map

| Address Range (hex) | Function | Address Range (hex) | Function |
|---------------------|-------------------|---------------------|------------------------|
| 0000-001f | dma1 | 0810-0815 | ACPI CPU throttle **** |
| 0020-0021 | pic1 | 0820-0823 | GPE0_BLK **** |
| 0022-0022 | PM2_CNT_BLK | 084c-084d | Watchdog **** |
| 0040-0043 | timer0 | 084f-084f | leds **** |
| 0050-0053 | timer1 | 0850-0853 | GPE1_BLK **** |
| 0060-006f | keyboard | 0880-08ff | pnp 00:02 *** |
| 0070-0077 | rtc | 0cf8-0cff | PCI conf1 ** |
| 0080-008f | dma page reg | c820-c827 | 0000:00:0f.0 ** |
| 00a0-00a1 | piC2-B | c828-c82b | 0000:00:0f.0 ** |
| 00c0-00df | dma2 | c830-c837 | 0000:00:0f.0 ** |
| 00f0-00ff | fpu | c838-c83b | 0000:00:0f.0 ** |
| 0140-014f | digital IO* | c860-c86f | 0000:00:0f.0 ** |
| 0170-0177 | ide1 | c870-c87f | 0000:00:0f.1 ** |
| 01a0-01a7 | serial* | c870-c877 | ide0 |
| 01a8-01af | serial* | c878-c87f | ide1 |
| 01c0-01c7 | serial* | c880-c89f | 0000:00:10.0 ** |
| 01c8-01cf | serial* | c880-c89f | uhci_hcd |
| 01f0-01f7 | ide0 | c8a0-c8bf | 0000:00:10.1 ** |
| 02e8-02ef | serial* | c8a0-c8bf | uhci_hcd |
| 02f8-02ff | serial* | c8c0-c8df | 0000:00:10.2 ** |
| 0376-0376 | ide1 | c8c0-c8df | uhci_hcd |
| 03c0-03df | vga+ | c8e0-c8ff | 0000:00:10.3 ** |
| 03e8-03ef | serial* | c8e0-c8ff | uhci_hcd |
| 03f6-03f6 | ide0 | cc00-ccff | 0000:00:0e.0 ** |
| 03f8-03ff | serial* | cc00-ccff | Ethernet |
| 04d0-04d1 | pnp 00:01 | d000-d0ff | 0000:00:0f.0 ** |
| 0500-050f | pnp 00:02 *** | d400-d4ff | 0000:00:11.5 ** |
| 0500-0507 | viapro-smbus | d400-d4ff | VIA8237 |
| 0800-0803 | PM1a_EVT_BLK **** | d800-d8ff | 0000:00:12.0 ** |
| 0804-0805 | PM1a_CNT_BLK **** | d800-d8ff | Ethernet |
| 0808-080b | PM_TMR **** | | |

* Default address, resource is re-locatable in setup.

** Default address, resource assigned by BIOS during PCI configuration; Additional PCI cards, and / or BIOS revision may cause these to be relocated differently. Use PCI subsystem to determine addresses.

*** Default address, resource assigned by BIOS during PnP configuration; Additional PCI cards, PnP ISA cards and / or BIOS revision may cause these to be relocated differently. Use PCI subsystem to determine addresses.

**** Address and resources assigned by BIOS. BIOS revision change may relocate these resources.

Table 3 RMB-C2B interrupt map, APIC disabled / enabled

| APIC disabled | | | |
|---------------|-----------------------------|-----|-------------------------------------|
| IRQ | Device | IRQ | Device |
| 0 | timer | 8 | rtc |
| 1 | i8042 (kbd) | 9 | serial (shared C,D) |
| 2 | cascade | 10 | used by PCI |
| 3 | serial (A) | 11 | used by PCI |
| 4 | serial (B) | 12 | i8042 (mouse) |
| 5 | audio | 13 | fpu |
| 6 | acpi | 14 | ide0 |
| 7 | digital I/O | 15 | ide1 |
| APIC enabled | | | |
| GSI | Device | GSI | Device |
| 0 | APIC OVERRIDE | 12 | i8042 (Mouse) |
| 1 | i8042 (KBD) | 13 | FPU |
| 2 | APIC OVERRIDE | 14 | IDE (PATA Compat mode) or Available |
| 3 | Serial B (COM 2) | 15 | IDE (PATA Compat mode) or Available |
| 4 | Serial A (COM 1) | 16 | VGA and PCI Expansion |
| 5 | Available | 17 | LAN and PCI Expansion |
| 6 | APIC OVERRIDE | 18 | PCI Expansion |
| 7 | Available | 19 | PCI Expansion |
| 8 | RTC | 20 | SATA & PATA IDE Native mode |
| 9 | ACPI | 21 | USB (all built-in functions) |
| 10 | Available | 22 | AC97 Audio |
| 11 | Serial, Shared COM3 – COM 6 | 23 | LAN |

Note: GSI = Global System Interrupt. In APIC mode, the OS may assign IRQ numbers differently than the fixed GSI channel number. Typically, IRQ 0 to IRQ 15 are assigned sequentially with GSI 0 to GSI 15, that is, ISA IRQ 5 will be GSI 5. However, GSI channels above 15 are typically assigned IRQ numbers to an operating system in the order of discovery.

Table 4 RMB-C2B DMA map

| RMB-C2B DMA map | |
|-----------------|-------------|
| Channel | Description |
| Channel 0 | available |
| Channel 1 | available |
| Channel 2 | available |
| Channel 3 | available |
| Channel 4 | Slave |
| Channel 5 | available |
| Channel 6 | available |
| Channel 7 | available |

Table 5 RMB-C2B memory map

| Address Ranger (hex) | Function |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 00000000-0009dfff | System LOW RAM |
| 0009e000-0009ffff | reserved |
| 000a0000-000bffff | Video RAM area |
| 000c0000-000cfdff | Video ROM |
| 000d0000-000dffff | Option Rom Space |
| 000e0000-000fffff | System ROM |
| 00100000-1bbe43ff | System RAM * |
| 1bbe4400-1bbe8bff | ACPI Tables ** |
| 1bbe8c00-1bbe8fff | ACPI Non-volatile Storage ** |
| 1bbe9000-1dffffff | reserved ** |
| A0000000-efffffff | Assignable to PCI |
| f0000000-f7ffffff | PCI Bus #01 (Internal ACPI) |
| fff00000-ffffff | reserved / system ROM |
| * Top address depends on size of system RAM installed, size of memory allocated to Video, and BIOS revision. ** Relative to and moves with size of system RAM installed, exact size determined by BIOS revision. | |

External connector pin-outs

The following tables show the pin-outs for the external connectors on the RMB-C2B. In order to maintain adequate signal quality, connectors/conductors used in the External cables must support the data-rate of the signals being used.

Table 6 Multi I/O Connector (Audio, CAN Bus, DIO, COM1,6)

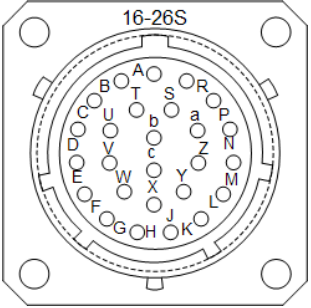
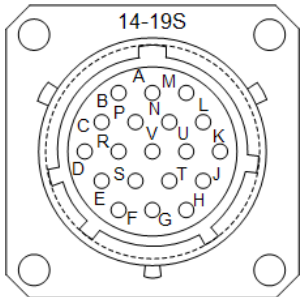
| Signal Name | Pin # | Pin # | Signal Name | PT02E1626S  |
|--------------------------------------------------|-------|-------|-------------|------------------------------------------------------------------------------------------------------------|
| Audio Speaker | A | P | CAN H | |
| Audio Speaker | B | R | CAN L | |
| Audio Ground | C | S | CAN Ground | |
| Audio LINE in | D | T | COM1 RxD | |
| Digital IN 0 | E | U | COM1 TxD | |
| Digital IN 1 | F | V | COM1 RTS | |
| Digital IN 2 | G | W | COM1 CTS | |
| Digital IN 3 | H | X | COM1 Ground | |
| Digital IN 4 | J | Y | COM6 RxD | |
| Digital OUT 0 | K | Z | COM6 TxD | |
| Digital OUT 1 | L | a | COM6 RTS | |
| Digital Ground | M | b | COM6 CTS | |
| CAN Power | N | c | COM6 Ground | |
| Mating Connector - Amphenol PT06E16-26P or equal | | | | |

Table 7 Display Connector (USB, VGA, Audio, Power External)

| Signal Name | Pin # | Pin # | Signal Name |
|--------------|-------|-------|-------------|
| XPWR Ground | A | L | Blue Ground |
| XPWR | B | M | HSync |
| NC | C | N | NC |
| Line OUT | D | P | VSync |
| Audio Ground | E | R | USB0Ground |
| VGA Red | F | S | USB0 Power |
| Red Ground | G | T | USB0 D- |
| VGA Green | H | U | USB0 D+ |
| Green Ground | J | V | USB0 Shield |
| VGA Blue | K | | |

PT02E1419S

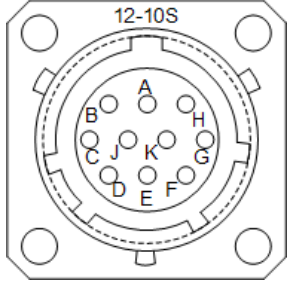


Mating Connector – Amphenol PT06E1419P or equal

Table 8 LAN Connector (LAN and USB)

| Signal Name | Pin # | Pin # | Signal Name |
|-------------|-------|-------|--------------|
| LAN Rx+ | A | F | USB 1 Ground |
| LAN Rx- | B | G | LAN Tx- |
| USB1 Power | C | H | LAN Tx+ |
| USB1 Data+ | D | J | USB1 Ground |
| USB1 Data- | E | K | USB1 Shield |

PT02E1210S

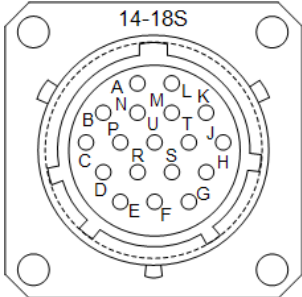


Mating Connector - Amphenol PT06E1210P or equal

Table 9 Option Connector (User defined signals)

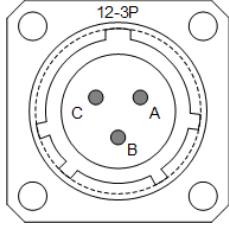
| Signal Name | Pin # | Pin # | Signal Name |
|-------------|-------|-------|-------------|
| | A | K | |
| | B | L | |
| | C | M | |
| | D | N | |
| | E | P | |
| | F | R | |
| | G | S | |
| | H | T | |
| | J | U | |

PT02E1418S



Shaded areas are available for user specific functions Mating Connector PT06E1418PSR

Table 10 **Power Connector**

| Signal Name | Pin # |  <p style="text-align: center;">PT02E1203P</p> <p style="text-align: center;">12-3P</p> |
|-------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Battery Positive | A | |
| Battery negative | B | |
| Ignition switch | C | |
| Mating Connector - Amphenol PT06E1203S or equal | | |

Prototype Development

Opening the case

To remove the cover:

1. Remove the top five screws and lock washers from each end panel of the system.
2. Loosen, but do not remove, the bottom five screws from each end panel. Tilt the end panels away from the cover.
3. Gently remove the top half of the system case.
4. The cover can now be rotated 180° counterclockwise and laid flat on the workbench. **Note - to maintain ESD protection, the cover must be tied electrically to the case. Make a temporary electrical connection from the cover and to the case. Failure to do so may allow ESD to disrupt CPU operation, causing intermittent failures, and potentially damage electrical circuits.**
5. When reassembling the unit, the five screws and lock washers must be replaced to maintain proper ESD protection.

Note: The environmental gaskets are fragile. Please use caution in disassembly and reassembly. If damaged, the environmental seal is compromised. Replacement seals are available from Octagon.

Table 11 **Connectors and switches**

| CPU Card Connectors | | Interface Card Connectors | |
|---------------------|-----------------------|------------------------------|-------------------------------|
| J1_B | Hard disk power | J1_1 | Factory use only |
| J2_B, J3_B | PC/104 | J2_1 | Factory use only |
| J4_B, J5_B | SATA drive connectors | J3_1 | Factory use only |
| J6_B | CompactFlash | J4_I | Factory use only |
| J7_B | Factory use only | J5_I | Factory use only |
| J8_B | PC/104-Plus | J6_I | Factory use only |
| J9_B | Power input | J7_I | Internal USB connector |
| J10_B | AT Battery (supplied) | J8_I | VGA |
| J11_B | IDE hard drive | J9_I | Keyboard/Mouse |
| XU2_B | Mini PCI | Interface Card Switch | |
| | | SW1_I | CAN Bus |
| CPU Card Switches | | Power Supply Card Connectors | |
| SW1_B | Reset | J1_P | Internal power wiring harness |
| SW2_B | System | J2_P | To/from UPS card |
| SW3_B | Factory use only | UPS Connectors | |
| SW4_B | Factory use only | J500 | To/from Power Supply |
| W1_B | Factory use only | J501 | Factory use only |

Keyboard / Mouse

Connector J8_I is an eight-pin connector for keyboard and mouse. The keyboard controller accepts an AT style keyboard. The mouse port is combined with the keyboard port. The PS/2 Keyboard Mouse Cable, 8-Pin Header (Octagon #6837) has a PS/2 connector for keyboard support. A “Y” cable (Octagon #4186186) attaches to the Keyboard Mouse Cable and provides mouse support.

On-board LEDs

Front and Back Panel LEDs

Front Panel

Pwr Green = normal ON, Yellow = standby

Lnk/Act Link =s Green, Activity = Yellow

Back Panel

LEDs are used for factory testing.

Switch settings

The RMB–C2B boards have several switches for configuration. When referring to switches or connectors:

_B refers to the CPU card

_I refers to the interface board

_P refers to the power supply board.

System configuration switches (SW2_B)

The system configuration switches are located on the CPU card. Table 12 shows the functions of these switches.

Table 12 *System Configuration Switches (SW2_B)*

| System configuration switches, Switch SW2_B | | |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------|----------|
| Label | Description | Position |
| S | System parameters option switch: On = enable User Setup options* Off = force BIOS Setup default | 1 |
| V | Video switch: On = enable on-card video* Off = do not set this switch Off | 2 |
| U1 | User switch 1, default On* | 3 |
| U2 | User switch 2, default On* | 4 |
| * = default | | |

The “S” switch selects whether the CPU boots from user defined parameters (entered in the BIOS Setup), or the BIOS defaults. When this switch is On the system boots using the parameters stored in Setup. When this switch is Off the system boots using the factory defaults for all parameters in Setup. Note that if you must set the system switch Off to recover your system, the user-defined parameters in Setup will not be changed unless you enter Setup, make the changes, and exit saving changes.

The “V” switch must remain On.

The “U” user switches are positions 3 and 4. Octagon-supplied drivers provide an easy method to implement software routines according to whether or not a switch is On.

Factory switches (SW3_B and SW4_B, jumper W1)

These switches are for factory use only. Table 15 shows the settings for these switches. Do not change. For jumper block W1, do not install jumpers.

Table 13 *Factory switches (SW3_B and SW4_B)*

| | Position 1 | Position 2 | Position 3 | Position 4 | Position 5 | Position 6 |
|-------|---------------|---------------|---------------|---------------|---------------|---------------|
| SW3_B | Off | Off | On | Off | na | na |
| SW4_B | On | On | On | On | On | On |

Expansion Options

The RMB-C2B can be used in a stand-alone mode or expanded through the Mini PCI, PC/104 and PC/104-Plus interfaces. One TNC and three “N” connectors on the front panel are antenna connectors for wireless communication subsystems.

CAN Bus configuration switch (SW1_I)

The CAN Bus configuration switch is located on the Interface card. Table 15 shows the functions of these switches.

Table 15 *CAN Bus Configuration Switch (SW1_I)*

| CAN Bus configuration switch, Switch SW1_I | | |
|---------------------------------------------------------------------|----------|--|
| Description | Position | |
| Power: On = enable CAN Bus Power Off = disable CAN Bus Power* | 1 | |
| Ground: On = enable CAN Bus Ground Off = disable CAN Bus Ground* | 2 | |
| Isolation1: On = Non-Isolated Off = Isolated* | 3 | |
| Isolation2: On = Non-Isolated Off = Isolated* | 4 | |
| Termination1: On = enable termination* Off = disable termination | 5 | |
| Termination2: On = enable termination* Off = disable termination | 6 | |
| Isolation3: On = Isolated* Off = Non-Isolated | 7 | |
| Isolation4: On = Isolated* Off = Non-Isolated | 8 | |

* = default

The Power, Ground, and Isolation1 thru Isolation4 positions implement Powered/Non-Isolated or Un-Powered/Isolated modes. The default mode is Un-Powered/Isolated.

The Termination1 and Termination2 positions select a 120Ω, internal termination impedance. Both positions must match and are set to either “On” or “Off”.

Mini PCI

Mini PCI is a standard for integrated peripherals for use in applications such as sealed-case PCs. Mini PCI is a small card that is functionally equivalent to a standard PCI expansion card. See *PCI bus arbitration* on page 28.

PC/104 and PC/104-Plus

The PC/104 and PC/104-*Plus* connectors allow you to interface expansion modules such as A/D converters, CardBus, wireless, serial ports, etc. Modules can be stacked to form a highly integrated control system. The RMB-C2B has room for three PC/104 or PC/104-*Plus* cards (two with UPS installed). The PC/104-*Plus* expansion bus supports mastering devices. See *PCI bus arbitration* on page 28. The deviations from the PC/104 and PC/104-*Plus* connector pinout standards are shown below.

-12V and -5V PC/104 and PC/104-Plus devices

The RMB-C2B CPU card does not supply -12V or -5V.

Table 14 *PC/104 connector, J2_B and J3_B and PC/104-Plus connector, J8_B*

The PC/104 and PC/104-*Plus* standards can be found at <http://www.pc104.org/>. Some RMB-C2B signals and/or signal names do not match the specifications. Those signals are shown below. The PC/104 or PC-104-*Plus* specified signal is listed first, and the RMB-C2B signal follows.

| PC/104 | | |
|---------------------|--------------------------------------|----------------|
| Pin | PC/104 or PC-104- <i>Plus</i> Signal | RMB-C2B Signal |
| B5 | -5V | no connect |
| B7 | -12V | no connect |
| B8 | ENDXFR* | ZWS* |
| PC-104- <i>Plus</i> | | |
| A30 | -12V | no connect |
| B30 | REQ3 | not used |
| C30 | GRNT3 | not used |
| D6 | M66EN | Gnd |
| * active low | | |

PCI bus arbitration

Different PCI slots use different Request/Grant pairs to request bus master operations. The RMB-C2B employs a PCI 2.2 compliant fair arbitration scheme. As with any arbitration, different priorities are given to each pair.

Latency depends on other system activity and assigned priority. Priority is fixed in hardware. Under most cases, the latency is insignificant. Heavily loaded master devices, however, may perform differently depending on the assigned priority. The most critical functions should be assigned PC/104-*Plus* Slot 1 (highest priority.)

The following shows the RMB-C2B expansion port request/grant priorities (0 is highest)

| Resource | Priority |
|----------------------------------|----------|
| PC/104- <i>Plus</i> Slot 1 | 0 |
| PC/104- <i>Plus</i> Slot 2 | 1 |
| PC/104- <i>Plus</i> Slot 3 or 4* | 2 |
| On-board resources | 3 - 4 |
| Mini PCI slot | 5 |

* (Only three masters are allowed in a PC/104-*Plus* stack).

This only affects PCI mastering expansion devices. Bus throughput is the same on all channels (PCI bus speed is 33 MHz).

BIOS setup programs

This chapter discusses running the Setup configuration program on the RMB–C2B. Setup configures devices set up by the BIOS such as serial ports, etc.

Setup

Setup can be entered by pressing the “Delete” key on the system keyboard or Ctrl-C when POST I/O has been redirected to a serial console during the BIOS POST sequence (this occurs between the memory test and boot).

Also, by setting the “S” switch Off (Switch 2 position 1), you will force the Setup to revert to the factory-programmed defaults shown in the following menus. This allows you to boot with a known set of parameters. If you want to use the default settings for future boots, you must enter Setup and “Save” for the default values to be stored in CMOS.

Note: The Setup defaults might vary slightly from those shown in the following menus depending on the BIOS revision on your card.

The system will Display the RMB–C2B General Software System BIOS Setup Utility menu. Select the submenu by using the up/down arrows, then press <ENTER> (when using a monitor connected to the RMB–C2B). For a serial console configuration, CtrlE is up and CtrlI is down.

System BIOS Utility menu

The Utility menu allows you to select the appropriate menus for configuration. The menus shown below are described on the following pages. Default values are shown in the menus.

| |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System BIOS Setup - Utility v5.3 (C) 2005 General Software, Inc. All rights reserved |
| >Basic CMOS Configuration Features Configuration Custom Configuration PnP Configuration Reset CMOS to last known values Reset CMOS to factory defaults Write to CMOS and Exit Exit without changing CMOS |
| ↑/↓/CR/<Tab> to select. <Esc> to continue (no save) www.gensw.com |

Basic CMOS Configuration menu

Default values are shown in the menu.

| | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| System BIOS Setup - Basic CMOS Configuration (C) 2004 General Software, Inc. All rights reserved | | | |
| DRIVE ASSIGNMENT ORDER Drive A: (None) Drive B: (None) Drive C: USB Drive Drive D: Ide 0/Pri Mast Drive E: (None) Drive F: (None) Drive G: (None) Drive H: (None) Drive I: (None) Drive J: (None) Drive K: (None) (Loader): (Unused) | Date: Time: Numlock: Disabled | Typematic Delay : 250 ms Typematic Rate : 30 cps Seek at Boot : None Show "Hit Del" : Enabled Config Box : Enabled F1 Error Wait : Enabled Parity Checking : (Unused) Memory Test Tick : Enabled Debug Breakpoints : (Unused) Debugger Hex Case : Upper Memory Test : StdLo FastHi | |
| FLOPPY DRIVE TYPES: Floppy 0: Not installed Floppy 1: Not installed | BOOT ORDER Boot 1st: CD ROM: Boot 2nd: Drive C: Boot 3rd: Drive D: Boot 4th: Power Off Boot 5th: None Boot 6th: None | ATA DRV ASSIGNMENT: Sect Hds Cyls Ide 0: 3 = AUTOCONFIG, LBA Ide 1: Not installed Ide 2: Not installed Ide 3: Not installed | Memory Base: 632KB Ext: 955MB |
| ↑/↓/←/→/CR/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu | | | |

DRIVE ASSIGNMENT ORDER: These selections allow you to assign the various drives installed to a designated alphabetic drive.

Note: Do not assign the same file system to more than one drive without considering the consequences (such as assigning IDE0 to Drive C and Drive D). This is allowed to enable aliasing of drives; however this may cause corruption of operating system cache and state unless the OS is configured for this as well. Many desktop operating systems cannot be so configured.

Drive A/B: Selections are None, Floppy 0, Floppy 1, or USB Floppy. Select none.

Drive C/D: Selections are None, Floppy 0, Floppy 1, USB Floppy, Ide 0/Pri Master, Ide 1/Pri Slave, Ide 2/Sec Master, Ide 3/Sec Slave, USB Hard Drive. See note above, particularly if using a CD-ROM.

Drive E/F/G/H/I/J/K: Selections are None, Ide 0/Pri Master, Ide 1/Pri Slave, Ide 2/Sec Master, Ide 3/Sec Slave, USB Hard Drive. See note above, particularly if using a CD-ROM.

Loader: Unused.

FLOPPY DRIVE TYPES: Floppy drives are not supported on the RMB-C2-B. This feature should be left Not Installed. This frees up INT6 for other applications.

System Date: Sets the date for the system clock.

System Time: Sets the time for the system clock.

NumLock: Enables or disables NumLock.

BOOT ORDER: The selections are Drive A, Drive B, Drive C, Drive D, Alarm, Browser, Network, PowerOff, Reboot, High ROM, DOS-ROM, Mfg Mode, Debugger, CDROM, Desktop, or None.

Note: Do not select “None” or “Drive A”. These selections will halt the boot process.

ATA DRIVE ASSIGNMENT: These selections allow you to specify the type of devices for IDE 0, 1, 2, and 3. IDE 0 is hardwired to the CompactFlash socket; Ide1 is unavailable. Note that the RMB-C2B only supports three IDE devices total (CompactFlash and two Secondary devices.) The available options are Not Installed; User Type; AUTOCONFIG, PHYSICAL; AUTOCONFIG, LBA; AUTOCONFIG, PHOENIX, and IDE CDROM. User Type allows you to set parameters for Sectors (63 max.), Heads (255 max.) and Cylinders (1023 max.).

Note: The AUTOCONFIG, PHYSICAL; AUTOCONFIG, LBA; and AUTOCONFIG, PHOENIX options refer to the BIOS of the system which was used to format the hard drive or CompactFlash. If you have formatted a hard drive or a CompactFlash on a different system, you might have to change this setting for the RMB-C2B to recognize the drive.

Typematic Delay: Sets the time before a character will repeat when a key is continuously depressed. Selections are Disabled, 250 ms, 500 ms, 750 ms, and 1000 ms.

Typematic Rate: Sets the rate at which a character will repeat when a key is continuously depressed. Selections are 30 cps, 24 cps, 20 cps, 15 cps, 12 cps, 10 cps, 8 cps, and 6 cps.

Seek at Boot: Selections are None, Floppy, IDE, Both. For faster boot, the default setting (None) does not perform floppy or IDE seek operations during POST. In rare cases, some drives may not properly initialize without this seek operation. For this reason, users may select to seek Floppy drives, IDE drives, or both during POST if desired.

Show “Hit Del”: Enabled or Disabled. When enabled, the “Hit Del to access Setup” message is Displayed during boot.

Config Box: Enabled or Disabled. When enabled, the blue Configuration box will appear on screen during boot.

F1 Error Wait: Enabled or Disabled. When enabled, the system will pause at a boot error until the F1 key is pressed.

Parity Checking: This function is not used.

Memory Test Tick: Enabled or Disabled. When enabled the system produces an audible tick during the memory test at boot.

Debug Breakpoints: This function is not used.

Debugger Hex Case: Upper or Lower. Selects the case for debugger output.

Memory Test: This item allows setting the test speed for both the base memory (Lo) and the extended memory (Hi). The options are Fast, Standard, or Full.

System Memory: Displays the amount of system memory on the card.

Extended Memory: Displays the amount of extended memory on the card.

Features Configuration menu

This menu sets some of the system features. Default values are shown in the menu.

| System BIOS Setup - Feature Configuration (C) 2004 General Software, Inc. All rights reserved | | |
|--------------------------------------------------------------------------------------------------|------------|----------------------------------|
| ACPI 2.0 | :>Enabled | System Management Mode : Enabled |
| POST Memory Manager | : Disabled | Graphical/Audio POST : Enabled |
| Firmware Instrumentation | : Disabled | Primary IDE UDMA : Enabled |
| Secondary IDE UDMA | : Enabled | Console Redirection : Auto |
| Firmware Debug Console | : None | UsbHid : Enabled |
| UsbMassStorage | : Enabled | AtaMassStorage : Disabled |
| Usb20 | : Enabled | UserRegistry : Disabled |
| Network | : Disabled | Shell : Disabled |
| Applications | : Disabled | |
| ↑/↓/←/→/CR/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu | | |

ACPI 2.0: Enabled, disabled. When enabled, the BIOS supports the Advanced Control Program Interface, level 2.0. ACPI combines the resource assignment capabilities of PnP and the power management functionality similar to APM.

POST Memory Manager: Enabled / Disabled. When enabled, this subsystem is available to PXE or other POST-time option ROMs to request memory from low or extended memory. (No such option ROMs included on-board, however these may exist in some PC/104-Plus or MiniPCI expansion cards).

Firmware Instrumentation: This option allows the output of status and diagnostic messages from Firmware and Firmware applications to the selected serial port. Firmware provides Legacy USB, USB Boot, and other System Management functions. This feature is intended for diagnostic and monitoring functions, it is not intended for normal use.

Secondary IDE UDMA: Enabled, disabled. When enabled, UDMA is available on the secondary IDE interface.

Firmware Debug Console: This option allows the use of a selected serial port for the Firmware Console (Shell). This console allows diagnostics of the Firmware system and other debug functions. This feature is not intended for normal use.

UsbMassStorage: Enabled, disabled. When Enabled, Firmware support for USB Mass storage devices (i.e. USB flash drives) is enabled. This is required for BIOS support of these devices, including at boot time. This is NOT required for Operating System support for USB storage devices. System Management Mode must be enabled for this feature to function.

Usb20: Enabled, disabled. When Enabled, Firmware support for USB 2.0 (EHCI) devices is enabled. This is required for BIOS support of these devices, including at boot time (if disabled, USB devices will only be supported in USB 1.1 modes.) This is NOT required for Operating System support for USB 2.0 devices. System Management Mode must be enabled for this feature to function.

Network: Enabled, disabled. When Enabled, Firmware support for network devices is enabled. This is not supported in the current BIOS release.

Applications: Enabled, disabled. When Enabled, Firmware loads additional firmware applications. There are no additional applications included in the current BIOS release.

System Management Mode: Enabled, disabled. When enabled, the BIOS's System Management Mode environment is enabled. This allows use of Legacy USB devices, including keyboards, mice, fixed disk drives, flash drives, and CDROM drives, without OS drivers. This also allows USB drives to be used as boot devices.

Graphical/Audio POST: Enabled, disabled. When enabled, the graphical splash screen is shown during POST, along with a short sound played through the PC Speaker. If disabled, the text POST screen is Displayed. This feature is not available with a serial console.

Primary IDE UDMA: Enabled, disabled. When enabled, UDMA is available on the primary IDE interface.

Note: CompactFlash devices do not support UDMA.

Console Redirection: Auto, redirect. When set to Auto, the console will be redirected to the serial port COM1. When set to Redirect the console is forced to redirect to COM1 even if a video console is available.

USBHid: Enabled, disabled. When Enabled, Firmware support for USB Human Interface Devices (HID) (i.e. USB keyboard) is enabled. This is required for BIOS support of these devices, including at boot time. This is NOT required for Operating System support for USB HIDs. System Management Mode must be enabled for this feature to function.

AtaMassStorage: Enabled, disabled. When Enabled, Firmware support for ATA Mass Storage devices is enabled. This is required for BIOS support of these devices, including at boot time. This is NOT required for Operating System support for ATA mass storage devices. System Management Mode must be enabled for this feature to function.

UserRegistry: Enabled, disabled. When Enabled, Firmware will use the user defined registry. The current release BIOS does not support a user defined Firmware registry. System Management Mode must be enabled for this feature to function.

Shell: Enabled / Disabled. When Enabled, Firmware support for the debug console shell is enabled. This is for diagnostic and debug purposes, and is not intended for normal operation. System Management Mode must be enabled, and a debug console must be assigned for this feature to function.

Custom Configuration menu

The Custom Configuration menu allows you to set parameters for COM1-6, digital I/O, video, and DMA channel reserved for system use. Default values are shown in the menu.

| System BIOS Setup - Custom Configuration (C) 2004 General Software, Inc. All rights reserved | | | |
|-------------------------------------------------------------------------------------------------|---------------|-----------------------------|---------------|
| COM A Address (IRQ4) | :>0x03F8 | COM B Address (IRQ3) | : 0x02F8 |
| COM C Address | : 0x03E8 | COM D Address | : 0x02E8 |
| COM E Address | : 0x01C8 | COM F Address | : 0x01C0 |
| PCS0 Address | : 0x0000 | PCS1 Address | : 0x0000 |
| PCS2 Address | : 0x0140 | PCS2 Width (Bytes) | : 16 |
| PCS3 Address | : 0x0000 | PCS3 Width (Bytes) | : 1 |
| On Board Video Output | : CRT | Frame Buffer Size | : 32MB |
| TV Type | : NTSC | AGP Aperture Size | : 4MB |
| ATA Primary Configuration | : PATA Compat | ATA Secondary Configuration | : SATA |
| PATA Primary Cable | : Auto Detect | PATA Secondary Cable | : Auto Detect |
| I/O APIC | : Enabled | DRAM clock rate | : 200Mhz |
| DRAM CAS latency | : Per SPD | | |
| ↑/↓/←/→/CR/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu | | | |

- COM A Address (IRQ4):** 3F8, 2F8, 3E8, 2E8, 1C8, 1C0, 1A8, 1A0, 300, 308, 310, 318, 320, 328, 330, disabled: This allows the assignment of the BASE address for the COM1 port.
- COM C Address:** This field is the COM3 base address. Same options as COM1.
- COM E Address:** This field is for internal Octagon Systems accessories.
- PCS0 Address:** This field is not decoded and has no effect on the system.
- PCS2 Address:** This field is the digital I/O and System Configuration base address.
- PCS3 Address:** This field is not decoded and has no effect on the system.
- On Board Video Output:** CRT, TV, disabled: When set to CRT, on-board video is directed to the analog CRT output. TV is not supported. When Disabled, the CRT output will be disabled.
- TV Type:** This feature is not supported.
- ATA Primary Configuration:** PATA Compat, PATA Native, SATA Native, Force Match, Disabled, Auto Select: This allows the selection of the Primary ATA controller, for PATA (Parallel ATA) or SATA (Serial ATA) modes.
- PATA Primary Cable:** When the Primary ATA controller is configured for PATA mode, this allows the selection of 40 or 80 conductor IDE cables, which affects the maximum UDMA speed used on the Primary PATA Bus. Compact flash is the only device type connected to the Primary PATA Bus, and Compact Flash does not support UDMA. This feature has no effect.
- I/O APIC:** Enabled, disabled. When Enabled, the I/O APIC feature of the CPU / Chipset is enabled (If supported by the operating system). This feature relieves resource constraints by adding additional available

| | |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | IRQs, allows dynamic interrupt prioritization, and increases interrupt performance. When enabled, an alternative IRQ routing table is used (see IRQ map for more details). This selection also optimizes IRQ routing for on-board resources. Ensure this setting matches the capabilities of your operating system to avoid installation problems and to ensure proper operation of all features. |
| DRAM CAS latency: | This feature is used to override the default memory CAS latency. Normally this should be obtained directly from the memory modules on-board configuration data in the serial presence detect device (SPD). This is the recommended configuration. |
| COM B Address (IRQ3): | 3F8, 2F8, 3E8, 2E8, 1C8, 1C0, 1A8, 1A0, 300, 310, 318, 320, 328, 330: This allows the assignment of the BASE address for the COM2 port (used for power management functions of the RMB-C2B.). COM2 can not be used externally. |
| COM D Address: | This field is the COM4 base address (unused on this system). Same options as COM1. |
| COM F Address: | This field decodes the address for COM6. |
| PCS1 Address: | This field is not decoded and has no effect on the system. |
| PCS2 Width (Bytes): | Set this field to 16 bytes if PCS2 is used to address the Digital I/O. |
| PCS3 Width (Bytes): | This field is not decoded and has no effect on the system. |
| Frame Buffer Size: | This controls how much system memory is reserved for video. |
| AGP Aperture Size: | 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024. Sets the size for the AGP aperture. |
| ATA Secondary Configuration: | PATA Compat, PATA Native, SATA Native, Force Match, Disabled, Auto Select: This allows the selection of the Secondary ATA controller, for PATA (Parallel ATA) or SATA (Serial ATA) modes. |
| PATA Secondary Cable: | 40 conductor, 80 conductor. When the Secondary ATA controller is configured for PATA mode, this allows the selection of 40 or 80 conductor IDE cables, which affects the maximum UDMA speed used on the Primary PATA Bus. Not valid after June 2009. |
| DRAM clock rate: | Per SPD, 100, 133, 166, 200, 233. This feature is used to override the default memory DRAM clock. Note that DDR2 operates at 2x the clock rate (DDR2 at 400 MHz uses a setting of 200 MHz). Normally this can be obtained directly from the memory modules' on-board configuration data in the serial presence detect device (SPD). When using DDR2 533 MHz modules, this should be set to 200 MHz (400 MHz memory operation) if the system is used over extended temperature range. |

Plug-n-Play Configuration menu

The Plug-n-Play Configuration menu allows you to select IRQs and DMA channels for use by plug-n-play devices. Default values are shown in the menu.

| System BIOS Setup - Plug-n-Play Configuration (C) 2004 General Software, Inc. All rights reserved | | | |
|------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
| Enable PnP Support | :>Enabled | Enabled PnP O/S | :Enabled |
| Assign IRQ0 to PnP | :Disabled | Assign IRQ8 to PnP | :Disabled |
| Assign IRQ1 to PnP | :Enabled | Assign IRQ9 to PnP | :Disabled |
| Assign IRQ2 to PnP | :Enabled | Assign IRQ10 to PnP | :Disabled |
| Assign IRQ3 to PnP | :Enabled | Assign IRQ11 to PnP | :Enabled |
| Assign IRQ4 to PnP | :Disabled | Assign IRQ12 to PnP | :Enabled |
| Assign IRQ5 to PnP | :Enabled | Assign IRQ13 to PnP | :Enabled |
| Assign IRQ6 to PnP | :Disabled | Assign IRQ14 to PnP | :Enabled |
| Assign IRQ7 to PnP | :Disabled | Assign IRQ15 to PnP | :Enabled |
| Assign DMA0 to PnP | :Disabled | Assign DMA4 to PnP | :Enabled |
| Assign DMA1 to PnP | :Disabled | Assign DMA5 to PnP | :Enabled |
| Assign DMA2 to PnP | :Disabled | Assign DMA6 to PnP | :Disabled |
| Assign DMA3 to PnP | :Enabled | Assign DMA7 to PnP | :Enabled |
| ↑/↓/←/→/CR/<Tab> to select or <PgUp>/<PgDn>/+/- to modify <Esc> to return to main menu | | | |

Writing to CMOS and exiting

The last four items in the Utility menu give you a Yes or No option when you select them. Selecting “Yes” will implement the item. Selecting No will return you to the Utility menu. Those four selections are:

- Reset CMOS to last known values. This item restores the values that were in CMOS at boot, without exiting Setup.
- Reset CMOS to factory defaults
- Write to CMOS and Exit
- Exit without changing CMOS

Maintenance and Troubleshooting

Maintenance

There are no serviceable parts in the RMB-C2B system. All shock reduction systems are subject to mechanical wear-out. For vehicles like buses, trucks, etc., these systems have very long lifetimes. In severe applications like tracked vehicles, the resilient part of the shock system needs to be checked for obvious signs of stress. It is recommended that the periodic replacement of the shock system be built into the vehicle maintenance schedule.

Troubleshooting – There are no serviceable parts on the RMB-C2-B

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|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feature | Antenna | Audio | UPS |
| Connector | ANT1, ANT2, ANT3 or GPS | Multi I/O | |
| Problem | No receive/transmit | No activity or incorrect activity | Unit will not switch to UPS |
| Action(s) | <ul style="list-style-type: none"> • Check/replace cable • Verify receiving / transmitting antenna functions properly on another unit <ul style="list-style-type: none"> ○ If not, replace antenna | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of audio wiring • Verify proper usage of signal grounds • Verify signal transmission • Verify application program • Check/replace audio device | <ul style="list-style-type: none"> • Consult factory |
| Feature | CAN Bus | Digital I/O | Ethernet |
| Connector | MULTI I/O | Multi I/O | Option |
| Problem | No activity or incorrect activity | No activity or incorrect activity | No activity or incorrect activity |
| Action(s) | <ul style="list-style-type: none"> • Check/replace cable • Verify proper usage of signal grounds • Check/replace CAN Bus device • Reinstall driver • Correct application SW issue • Verify SW1_I settings | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of digital wiring • Verify proper usage of signal grounds • Check/replace digital device • Reinstall driver • Correct application SW issue | <ul style="list-style-type: none"> • Check/replace cable • Reinstall driver • Reinstall OS |
| Feature | Power | Power down | Reset |
| Connector | Display | | Multi I/O |
| Problem | No external power at Display | Unit will switch to UPS but not power down | No activity or incorrect activity |
| Action(s) | <ul style="list-style-type: none"> • Check/replace cable • Verify input voltage at Power connector, pins F and H, is between 10 and 36VDC, with minimal ripple • Measure XPWR at pins Y and b. If no power present, consult factory | <ul style="list-style-type: none"> • Activate power management software within operating system | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of reset wiring • Verify proper usage of signal grounds • Verify signal transmission • Check/replace external reset switch |
| Feature | RS-232 | RS-485 | User interface |
| Connector | MULTI I/O | MULTI I/O | MULTI I/O and Multi I/O |
| Problem | • No activity or incorrect activity | No activity or incorrect activity | No activity or incorrect activity |
| Action(s) | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of RS-232 wiring • Verify proper usage of signal grounds • Verify signal transmission • Verify application programming for RS-232 • Check/replace serial device | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of RS-485 wiring • Verify proper usage of signal grounds • Verify signal transmission • Verify application programming for RS-485 • Check/replace serial device | <ul style="list-style-type: none"> • Check/replace cable • Verify proper hookup of user interface wiring • Verify proper usage of signal grounds • Verify signal transmission • Verify application programming • Check/replace external device |

| | | | |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Feature | System | USB | Video |
| Connector | | USB at Display | Display |
| Problem | <ul style="list-style-type: none"> • Will power up but not load operating system | No activity or incorrect activity | No video, or video problem |
| Action(s) | <ul style="list-style-type: none"> • Verify BIOS settings to boot from device with operating system • Reload operating system to boot device | <ul style="list-style-type: none"> • Check/replace cable • Check/replace USB device | <ul style="list-style-type: none"> • Check/replace cable • Check/replace monitor |

Contact Octagon Technical Support if additional assistance is required.

Accessories

Table 15 **Accessories**

| Product | Octagon p/n |
|-----------------------------------|-------------|
| Multi I/O External Cable | 8022 |
| Display External Cable | 8023 |
| Option External Cable | 8347 |
| Power Cable | 8339 |
| TNC Antenna Connector Dust Cap | 8358 |
| N Antenna Connector Dust Cap | 8417 |
| Option & Power Connector Dust Cap | 8359 |
| LAN Connector Dust Cap | 8360 |
| Multi I/O Connector Dust Cap | 8362 |
| USB Hub 10/100 Ethernet | 6513 |

Warranty

Octagon warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the current established warranty period. Octagon's obligation under this warranty shall not arise until Buyer returns the defective product, freight prepaid to Octagon's facility or another specified location. Octagon's only responsibility under this warranty is, at its option, to replace or repair, free of charge, any defective component part of such products.

Limitations on warranty

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Octagon personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Octagon.
2. Products which have been subject to power supply reversal, misuse, neglect, accident, or improper installation.
3. The design, capability, capacity, or suitability for use of the Software. Software is licensed on an "AS IS" basis without warranty.

The warranty and remedies set forth above are in lieu of all other warranties expressed or implied, oral or written, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for a particular purpose, which Octagon specifically disclaims. Octagon neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Octagon shall have no liability for incidental or consequential damages of any kind arising out of the sale, delay in delivery, installation, or use of its products.

Service policy

1. If a product should fail during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.
2. Customers that return products for repairs, within the warranty period, and the product is found to be free of defect, may be liable for the minimum current repair charge.

Returning a product for repair

1. The customer must call Tech Support at 303-426-4521 to determine if repair service is necessary.
2. If repair service is required, Tech Support will require the customer's name, address, telephone number, email address and a list of problems found.
3. Tech Support will forward this information to the RMA Administrator who will contact the customer to issue the RMA number.
4. The customer must carefully package the product in an antistatic container. Failure to package in antistatic packaging will VOID the warranty. Ship the product back in a non-crushable container.
5. Write the RMA number on the outside of the shipping container.
6. The customer pays for shipping to Octagon. Octagon pays for shipping back to the customer.
7. Other conditions and limitations may apply to international shipments.

Note: Products returned to Octagon freight collect or without an RMA number cannot be accepted and will be returned freight collect.

Returns

There will be a restocking charge on returned product that is unopened and unused, if Octagon accepts such a return. Returns will not be accepted 30 days after purchase. Opened and/or used products, custom and semi-custom products, software and printed materials are not returnable without prior written agreement.

Governing law

This agreement is made in, governed by and shall be construed in accordance with the laws of the State of Colorado.

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