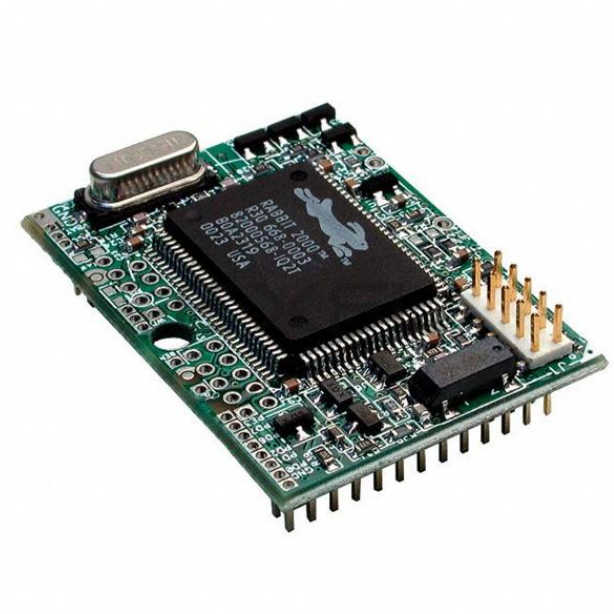
Digi - 20-101-0453 Datasheet



Welcome to E-XFL.COM

Understanding Embedded - Microcontroller, Microprocessor, FPGA Modules

Embedded - Microcontroller, Microprocessor, and FPGA Modules are fundamental components in modern electronic systems, offering a wide range of functionalities and capabilities. Microcontrollers are compact integrated circuits designed to execute specific control tasks within an embedded system. They typically include a processor, memory, and input/output peripherals on a single chip. Microprocessors, on the other hand, are more powerful processing units used in complex computing tasks, often requiring external memory and peripherals. FPGAs (Field Programmable Gate Arrays) are highly flexible devices that can be configured by the user to perform specific logic functions, making them invaluable in applications requiring customization and adaptability.

Applications of Embedded - Microcontroller,

Details	
Product Status	Not For New Designs
Module/Board Type	MPU Core
Core Processor	Rabbit 2000
Co-Processor	-
Speed	22.1MHz
Flash Size	256KB
RAM Size	128KB
Connector Type	2 IDC Headers 2x26
Size / Dimension	1.15" x 1.6" (29mm x 41mm)
Operating Temperature	-40°C ~ 85°C
Purchase URL	https://www.e-xfl.com/product-detail/digi-international/20-101-0453

RabbitCore RCM2300 Getting Started Manual

Part Number 019-0101 • 040515–C • Printed in U.S.A.

Trademarks

Rabbit and Rabbit 2000 are registered trademarks of Rabbit Semiconductor.

RabbitCore is a trademark of Rabbit Semiconductor.

Dynamic C is a registered trademark of Z-World Inc.

Z-World, Inc.

2900 Spafford Street
Davis, California 95616-6800
USA

Telephone: (530) 757-3737
Fax: (530) 757-3792

www.zworld.com

Rabbit Semiconductor

2932 Spafford Street
Davis, California 95616-6800
USA

Telephone: (530) 757-8400
Fax: (530) 757-8402

www.rabbitsemiconductor.com

TABLE OF CONTENTS

1.1.1 Other Factory Versions

To accommodate developers with specific needs, alternate versions of the RCM2300 module can be obtained in production quantities on special order.

Low-power variants of the RCM2300 running at 3.686 MHz and 3.3 V can be custom made in quantity. The clock can be changed dynamically to any one of five frequencies as low as 32 kHz to reduce power consumption even further.

1.1.2 Physical & Electrical Specifications

Table 1 lists the basic specifications for the RCM2300.

Table 1. Basic RCM2300 Specifications

Specification	Data
Power Supply	4.75 – 5.25 VDC (108 mA at 22.1 MHz clock speed)
Size	1.15" × 1.60" × 0.55" (29 mm × 41 mm × 14 mm)
Environmental	–40°C to 85°C, 5–95% humidity, noncondensing

NOTE: For complete product specifications, see Appendix A in the ***RabbitCore RCM2300 User's Manual***.

The RCM2300 modules have two 26-pin headers to which cables can be connected, or which can be plugged into matching sockets on a production device. The pinouts for these connectors are shown in Figure 1 below.

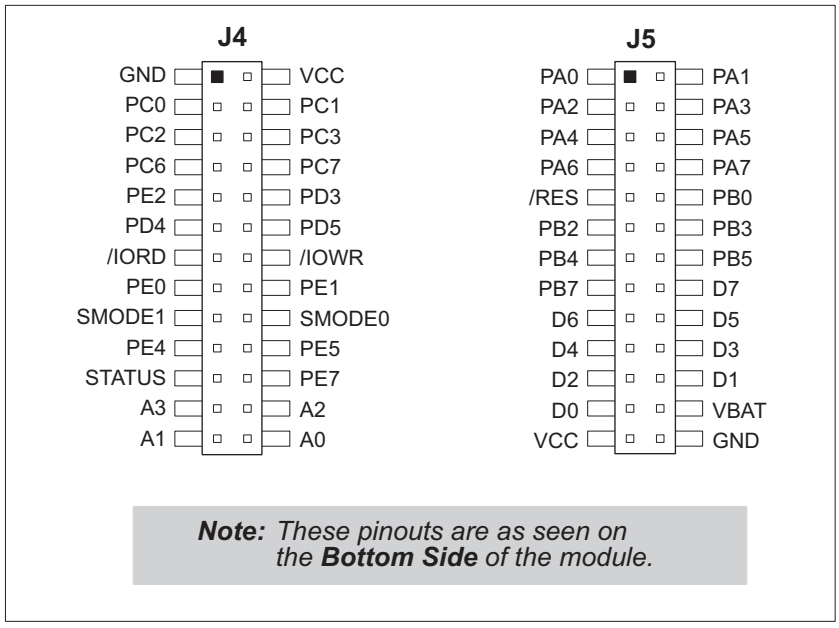


Figure 1. RCM2300 Pinout

1.3.3 Using Online Documentation

We provide the bulk of our user and reference documentation in two electronic formats, HTML and Adobe PDF. We do this for several reasons.

We believe that providing all users with our complete library of product and reference manuals is a useful convenience. However, printed manuals are expensive to print, stock and ship. Rather than include and charge for manuals that every user may not want, or provide only product-specific manuals, we choose to provide our complete documentation and reference library in electronic form with every development kit and with our Dynamic C development environment.

> **NOTE:** The most current version of Adobe Acrobat Reader can always be downloaded from Adobe's web site at **http://www.adobe.com**. We recommend that you use version 4.0 or later.

Providing this documentation in electronic form saves an enormous amount of paper by not printing copies of manuals that users don't need.

Finding Online Documents

The online documentation is installed along with Dynamic C, and an icon for the documentation menu is placed on the workstation's desktop. Double-click this icon to reach the menu. If the icon is missing, create a new desktop icon that points to **default.htm** in the **docs** folder, found in the Dynamic C installation folder.

The latest versions of all documents are always available for free, unregistered download from our Web site as well.

Printing Electronic Manuals

We recognize that many users prefer printed manuals for some uses. Users can easily print all or parts of those manuals provided in electronic form. The following guidelines may be helpful:

- Print from the Adobe PDF versions of the files, not the HTML versions.
- If your printer supports duplex printing, print pages double-sided.
- If you do not have a suitable printer or do not want to print the manual yourself, most retail copy shops (e.g. Kinkos, CopyMax, AlphaGraphics, etc.) will print the manual from the PDF file and bind it for a reasonable charge—about what we would have to charge for a printed and bound manual.

2. HARDWARE SETUP

This chapter describes the RCM2300 hardware in more detail, and explains how to set up and use the accompanying Prototyping Board.

NOTE: This chapter (and this manual) assume that you have the RabbitCore RCM2300 Development Kit. If you purchased an RCM2300 module by itself, you will have to adapt the information in this chapter and elsewhere to your test and development setup.

2.1 Development Kit Contents

The RCM2300 Development Kit contains the following items:

- RCM2300 module with 256K flash memory and 128K SRAM.
- RCM2200/RCM2300 Prototyping Board.
- Wall transformer power supply, 12 V DC, 500 mA. The power supply is included only with Development Kits sold for the North American market. Overseas users should use a locally available power supply capable of delivering 7.5 V to 25 V DC to the Prototyping Board.
- Programming cable with integrated level-matching circuitry.
- ***Dynamic C*** CD-ROM, with complete product documentation on CD.
- This ***Getting Started*** manual.
- ***Rabbit 2000 Processor Easy Reference*** poster.
- Registration card.

2.2.1 Prototyping Board Features

- **Power Connection**—A 3-pin header is provided at J5 for the power supply connection. Note that both outer pins are connected to ground and the center pin is connected to the raw V+ input. The cable from the wall transformer provided with the North American version of the Development Kit ends in a connector that may be connected in either orientation.

  Users providing their own power supply should ensure that it delivers 7.5–25 V DC at not less than 500 mA. The voltage regulator will get warm in use. (Lower supply voltages will reduce thermal dissipation from the device.)

- **Regulated Power Supply**—The raw DC voltage provided to the **POWER** header at J5 is routed to a 5 V linear voltage regulator, which provides stable power to the RCM2300 and the Prototyping Board. A Shottky diode protects the power supply against damage from reversed raw power connections.

- **Power LED**—The power LED lights whenever power is connected to the Prototyping Board.

- **Reset Switch**—A momentary-contact, normally open switch is connected directly to the master RCM2300's **/RES** pin. Pressing the switch forces a hardware reset of the system.

- **I/O Switches and LEDs**—Two momentary-contact, normally open switches are connected to the PB2 and PB3 pins of the master RCM2300, and may be read as inputs by sample applications.

  Two LEDs are connected to the PE1 and PE7 pins of the master RCM2300, and may be driven as output indicators by sample applications.

  The LEDs and switches are connected through JP1, which has traces shorting adjacent pads together. These traces may be cut to disconnect the LEDs, and an 8-pin header may then be soldered into JP1 to permit their selective reconnection with jumpers. See Figure 3 for details.

- **Expansion Areas**—The Prototyping Board is provided with several unpopulated areas for expansion of I/O and interfacing capabilities. See the next section for details.

- **Prototyping Area**—A generous prototyping area has been provided for the installation of through-hole components. Vcc (5 V DC) and Ground buses run around the edge of this area. An area for surface-mount devices is provided to the right of the through-hole area. Note that there are SMT device pads on both top and bottom of the Prototyping Board. Each SMT pad is connected to a hole designed to accept a 30 AWG solid wire, which must be soldered once it is in the hole.

- **Slave Module Connectors**—A second set of connectors is pre-wired to permit installation of a second, slave RCM2200 or RCM2300.

2.3 Development Hardware Connections

There are three steps to connecting the Prototyping Board for use with Dynamic C and the sample programs:

1. Attach the RCM2300 to the Prototyping Board.
2. Connect the programming cable between the RCM2300 and the PC.
3. Connect the power supply to the Prototyping Board.

2.3.1 Attach RCM2300 to Prototyping Board

Turn the RCM2300 module so that the header pins and the mounting hole of the RCM2300 line up with the sockets and mounting hole on the Prototyping Board as shown in Figure 4. Align the module headers J4 and J5 into sockets J1 and J2 on the Prototyping Board.

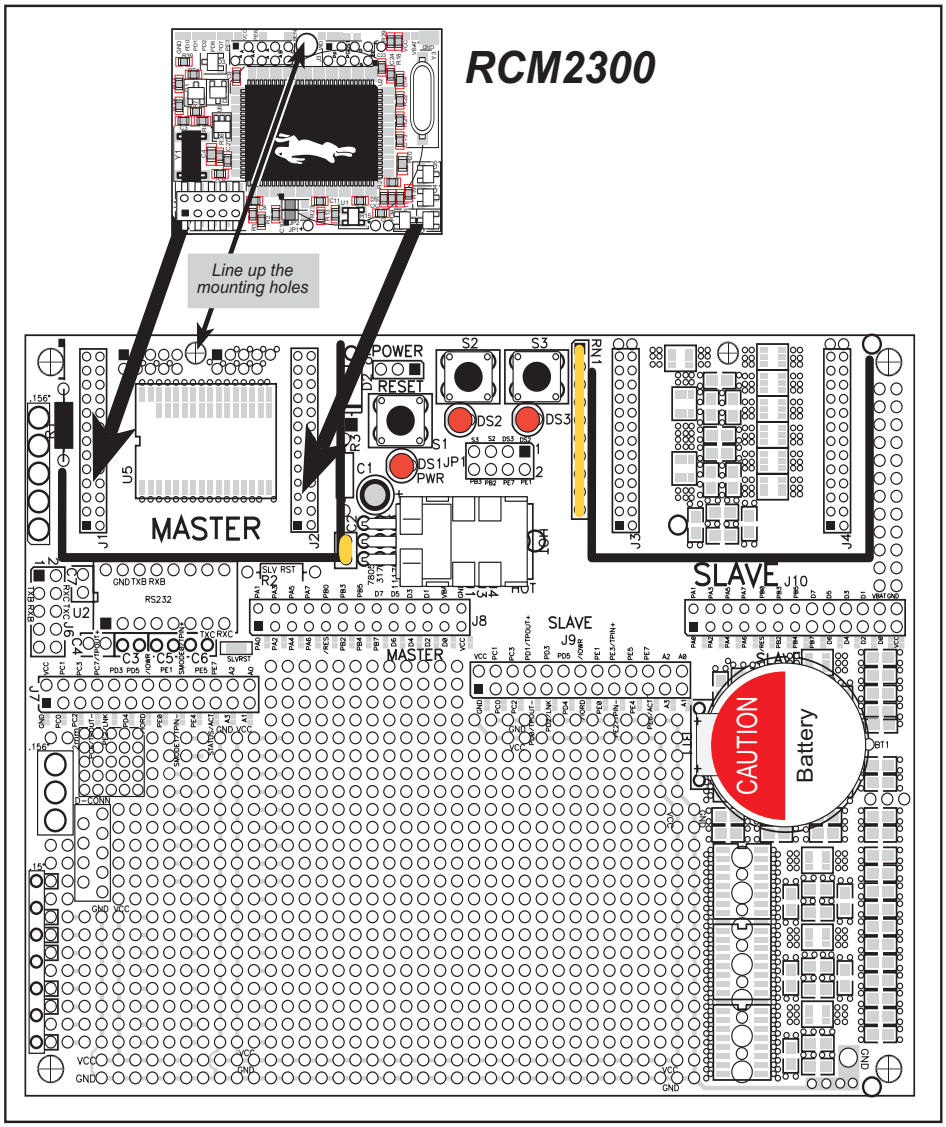


Figure 4. Install the RCM2300 on the Prototyping Board

2.3.3 Connect Power Supply

When the above connections have been made, you can connect power to the RabbitCore Prototyping Board.

Hook the connector from the wall transformer to header J5 on the Prototyping Board as shown in Figure 6. The connector may be attached either way as long as it is not offset to one side.

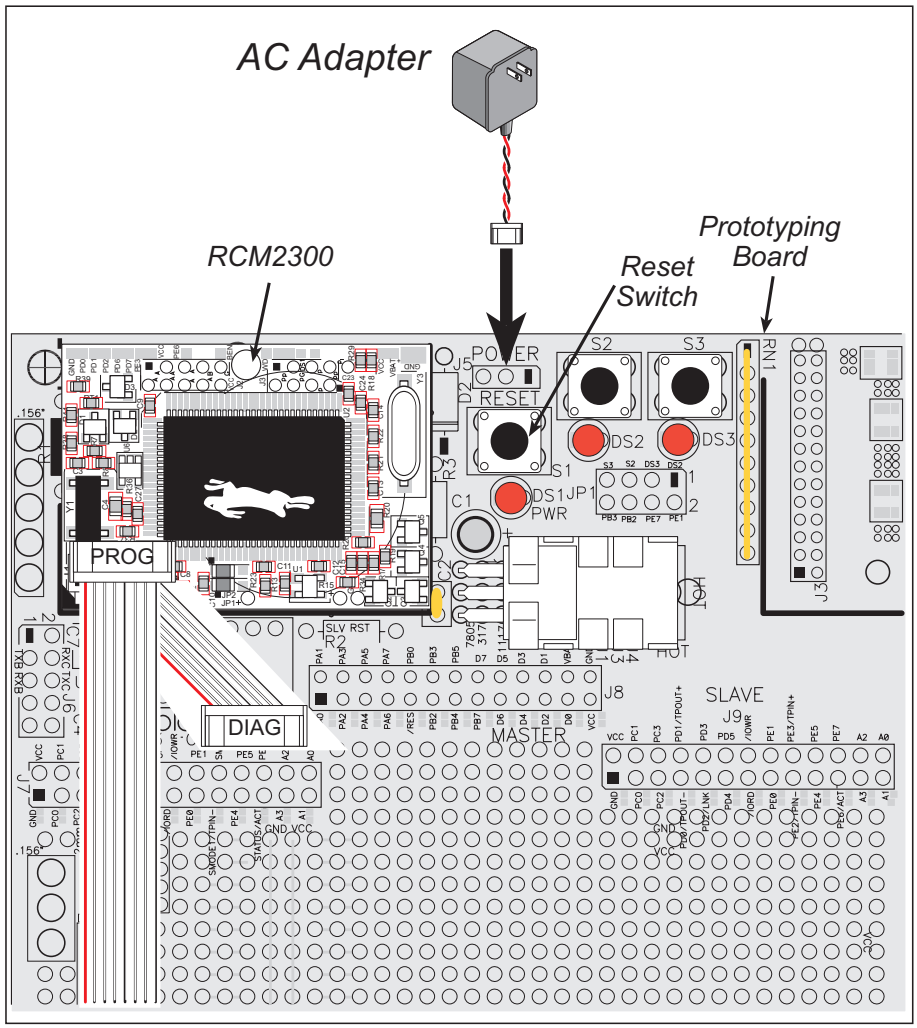


Figure 6. Power Supply Connections

Plug in the wall transformer. The power LED (DS1) on the Prototyping Board should light up. The RCM2300 and the Prototyping Board are now ready to be used.

> **NOTE:** A **RESET** button is provided on the Prototyping Board to allow hardware reset without disconnecting power.

To power down the Prototyping Board, unplug the power connector from J5. You should disconnect power before making any circuit adjustments in the prototyping area, changing any connections to the board, or removing the RCM2300 from the board.

3. SOFTWARE INSTALLATION & OVERVIEW

To develop and debug programs for the RCM2300 (and for all other Z-World and Rabbit Semiconductor hardware), you must install and use Dynamic C. This chapter takes you through the installation of Dynamic C, and then provides a tour of its major features with respect to the RabbitCore RCM2300 module.

3.1 An Overview of Dynamic C

Dynamic C integrates the following development functions into one program:

- Editing
- Compiling
- Linking
- Loading
- In-Circuit Debugging

In fact, compiling, linking and loading are one function. Dynamic C does not use an In-Circuit Emulator; programs being developed are downloaded to and executed from the "target" system via an enhanced serial-port connection. Program development and debugging take place seamlessly across this connection, greatly speeding system development.

Other features of Dynamic C include:

- Dynamic C has an easy-to-use built-in text editor. Programs can be executed and debugged interactively at the source-code or machine-code level. Pull-down menus and keyboard shortcuts for most commands make Dynamic C easy to use.
- Dynamic C also supports assembly language programming. It is not necessary to leave C or the development system to write assembly language code. C and assembly language may be mixed together.
- Debugging under Dynamic C includes the ability to use **`printf`** commands, watch expressions, breakpoints and other advanced debugging features. Watch expressions can be used to compute C expressions involving the target's program variables or functions. Watch expressions can be evaluated while stopped at a breakpoint or while the target is running its program.

- Dynamic C provides extensions to the C language (such as shared and protected variables, costatements and cofunctions) that support real-world embedded system development. Interrupt service routines may be written in C. Dynamic C supports cooperative and preemptive multitasking.
- Dynamic C comes with many function libraries, all in source code. These libraries support real-time programming, machine level I/O, and provide standard string and math functions.
- Dynamic C compiles directly to memory. Functions and libraries are compiled and linked and downloaded on-the-fly. On a fast PC, Dynamic C can load 30,000 bytes of code in 5 seconds at a baud rate of 115,200 bps.

3.2 System Requirements

To install and run Dynamic C, your system must be running one of the following operating systems:

- Windows 95
- Windows 98
- Windows NT
- Windows Me
- Windows 2000
- Windows XP

3.2.1 Hardware Requirements

The PC on which you install Dynamic C for development of RCM2300-based systems should have the following hardware:

- A Pentium or later microprocessor
- 32 MB of RAM
- At least 50 MB of free hard drive space
- At least one free COM (serial) port for communication with the target systems
- A CD-ROM drive (for software installation)

3.3 Installing Dynamic C

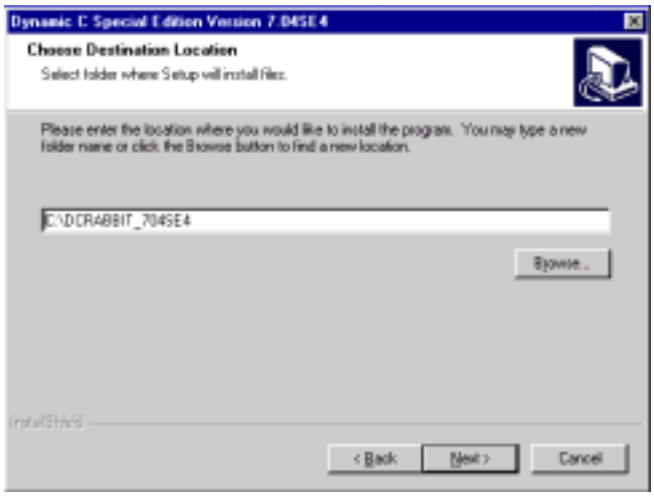
Insert the Dynamic C CD-ROM in the drive on your PC. If autorun is enabled, the CD installation will begin automatically.

If autorun is disabled or the installation otherwise does not start, use the Windows **Start > Run** menu or Windows Explorer to launch **SETUP.EXE** from the root folder of the CD-ROM.

The installation program will guide you through the installation process. Most steps of the process are self-explanatory and not covered in this section. Selected steps that may be confusing to some users are outlined below. (Some of the installation utility screens may vary slightly from those shown.)

3.3.1 Program and Documentation File Location

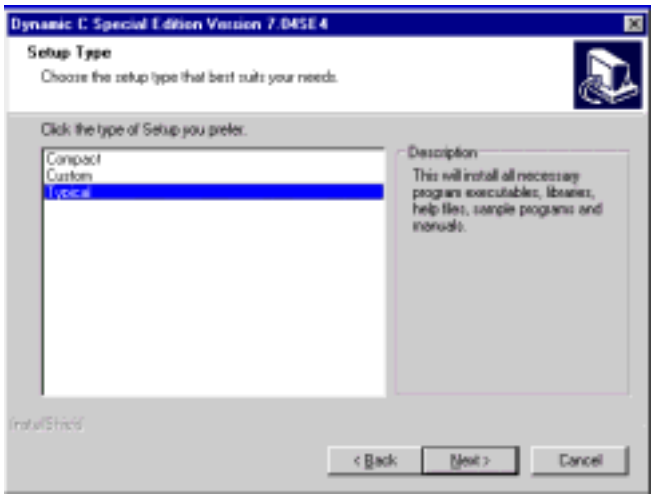
Dynamic C's application, library and documentation files can be installed in any convenient location on your workstation's hard drives.



The default location, as shown in the example above, is in a folder named for the version of Dynamic C, placed in the root folder of the C: drive. If this location is not suitable, enter a different root path before clicking **Next >**. Files are placed in the specified folder, so do not set this location to a drive's root directory.

3.3.2 Installation Type

Dynamic C has two components that can be installed together or separately. One component is Dynamic C itself, with the development environment, support files and libraries. The other component is the documentation library in HTML and PDF formats, which may be left uninstalled to save hard drive space or installed elsewhere (on a separate or network drive, for example).



The installation type is selected in the installation menu shown above. The options are:

- **Typical Installation —** Both Dynamic C and the documentation library will be installed in the specified folder (default).
- **Compact Installation —** Only Dynamic C will be installed.
- **Custom Installation —** You will be allowed to choose which components are installed. This choice is useful to install or reinstall just the documentation.

3.4 Starting Dynamic C

Once the RabbitCore module is set up and connected as described in Chapter 2 and Dynamic C has been installed, start Dynamic C by double-clicking on the Dynamic C icon. Dynamic C should start, then look for the target system on the COM port you specified during installation (by default, COM1). Once detected, Dynamic C should go through a sequence of steps to cold-boot the module and compile the BIOS.

If you receive the message beginning **"BIOS successfully compiled and loaded…"** you are ready to continue with the sample programs in the next section.

3.4.1 Communication Error Messages

If you receive the message **"No Rabbit Processor Detected"** the programming cable may be connected to a different **COM** port, a connection may be faulty, or the target system may not be powered up. First, check to see that the power LED on the Prototyping Board is lit. If it is, check both ends of the programming cable to ensure that it is firmly plugged into the PC and the RCM2300's programming port, with the pin-1 edge of the cable matched to the pin-1 mark on the board. If you are using the Prototyping Board, ensure that the module is firmly and correctly installed in its connectors.

If there are no faults with the hardware, select a different COM port within Dynamic C. From the **Options** menu, select **Project Options**, then select **Communications**. The dialog shown should appear.

Select another **COM** port from the list, then click OK. Press **<Ctrl-Y>** to force Dynamic C to recompile the BIOS. If Dynamic C still reports it is unable to locate the target system, repeat the above steps until you locate the active **COM** port.

If you receive the "BIOS successfully compiled …" message after pressing **<Ctrl-Y>** or starting Dynamic C, and this message is followed by a communications error message, it is possible that your PC cannot handle the 115,200 bps baud rate. Try changing the baud rate to 57,600 bps as follows.

- Locate the **Serial Options** dialog in the Dynamic C **Options > Project Options > Communications** menu. Change the baud rate to 57,600 bps. Then press **<Ctrl-Y>** or restart Dynamic C.

NOTICE TO USERS

Z-WORLD PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE-SUPPORT DEVICES OR SYSTEMS UNLESS A SPECIFIC WRITTEN AGREEMENT REGARDING SUCH INTENDED USE IS ENTERED INTO BETWEEN THE CUSTOMER AND Z-WORLD PRIOR TO USE. Life-support devices or systems are devices or systems intended for surgical implantation into the body or to sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling and user's manual, can be reasonably expected to result in significant injury.

No complex software or hardware system is perfect. Bugs are always present in a system of any size. In order to prevent danger to life or property, it is the responsibility of the system designer to incorporate redundant protective mechanisms appropriate to the risk involved.

All Z-World products are 100 percent functionally tested. Additional testing may include visual quality control inspections or mechanical defects analyzer inspections. Specifications are based on characterization of tested sample units rather than testing over temperature and voltage of each unit. Z-World products may qualify components to operate within a range of parameters that is different from the manufacturer's recommended range. This strategy is believed to be more economical and effective. Additional testing or burn-in of an individual unit is available by special arrangement.

INDEX

SCHEMATICS

090-0119 RCM2300 Schematic

www.rabbitsemiconductor.com/documentation/schemat/090-0119.pdf

090-0122 RCM2200/RCM2300 Prototyping Board Schematic

www.rabbitsemiconductor.com/documentation/schemat/090-0122.pdf

090-0128 Programming Cable Schematic

www.rabbitsemiconductor.com/documentation/schemat/090-0128.pdf

The schematics included with the printed manual were the latest revisions available at the time the manual was last revised. The online versions of the manual contain links to the latest revised schematic on the Web site. You may also use the URL information provided above to access the latest schematics directly.