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RabbitCore RCM3305/RCM3315

C-Programmable Core Module
with Serial Flash Mass Storage and Ethernet

User's Manual

019-0151 • 080528-E

RabbitCore RCM3305/RCM3315 User's Manual

Part Number 019-0151 • 080528-E • Printed in U.S.A.

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1. INTRODUCTION

The RCM3305 and RCM3315 RabbitCore modules feature a compact module that incorporates the latest revision of the powerful Rabbit® 3000 microprocessor, flash memory, mass storage (serial flash), static RAM, and digital I/O ports. The RCM3305 and RCM3315 feature an integrated 10/100Base-T Ethernet port, and provide for LAN and Internet-enabled systems to be built as easily as serial-communication systems.

In addition to the features already mentioned above, the RCM3305 and RCM3315 have two clocks (main oscillator and real-time clock), reset circuitry, and the circuitry necessary for management of battery backup of the Rabbit 3000's internal real-time clock and the static RAM. Two 34-pin headers bring out the Rabbit 3000 I/O bus lines, parallel ports, and serial ports.

The RCM3305's and the RCM3315's mass-storage capabilities make them suited to running the optional Dynamic C FAT file system module and the featured remote application update where data are stored and handled using the same directory file structure commonly used on PCs.

The RCM3305 or RCM3315 receives +3.3 V power from the customer-supplied motherboard on which it is mounted. The RCM3305 and RCM3315 can interface with all kinds of CMOS-compatible digital devices through the motherboard.

The Development Kit has what you need to design your own microprocessor-based system: a complete Dynamic C software development system and a Prototyping Board that allows you to evaluate the RCM3305 or RCM3315, and to prototype circuits that interface to the RCM3305 or RCM3315 module.

1.1 RCM3305/RCM3315 Features

- Small size: 1.85" x 2.73" x 0.86"
(47 mm x 69 mm x 22 mm)
- Microprocessor: Rabbit 3000 running at 44.2 MHz
- 49 parallel 5 V tolerant I/O lines: 43 configurable for I/O, 3 fixed inputs, 3 fixed outputs
- Three additional digital inputs, two additional digital outputs
- External reset
- Alternate I/O bus can be configured for 8 data lines and 6 address lines (shared with parallel I/O lines), plus I/O read/write
- Ten 8-bit timers (six cascadable) and one 10-bit timer with two match registers
- 512K flash memory, 512K program execution SRAM, 512K data SRAM
- Serial-flash mass-storage memory options, which are required to run the optional Dynamic C FAT file system module and the featured remote application update.
- Real-time clock
- Watchdog supervisor
- Provision for customer-supplied backup battery via connections on header J4
- 10-bit free-running PWM counter and four pulse-width registers
- Two-channel Input Capture (shared with parallel I/O ports) can be used to time input signals from various port pins
- Two-channel Quadrature Decoder accepts inputs from external incremental encoder modules
- Five or six 3.3 V CMOS-compatible serial ports with a maximum asynchronous baud rate of 5.525 Mbps. Three ports are configurable as a clocked serial port (SPI), and two ports are configurable as SDLC/HDLC serial ports (shared with parallel I/O ports).
- Supports 1.15 Mbps IrDA transceiver

The RCM3900/RCM3910 and RCM3365/RCM3375 RabbitCore modules are similar to the RCM3305/RCM3315 and RCM3309/RCM3319, but they use fixed NAND or removable media for their mass-storage memories instead of the fixed serial flash options of the RCM3305/RCM3315 and the RCM3309/RCM3319.

Table 1 below summarizes the main features of the RCM3305 and the RCM3315 modules.

Table 1. RCM3305/RCM3315 Features

Feature	RCM3305	RCM3315
Microprocessor	Rabbit 3000 running at 44.2 MHz	
SRAM	512K program (fast SRAM) + 512K data	
Flash Memory (program)	512K	
Flash Memory (mass data storage)	8 Mbytes (serial flash)	4 Mbytes (serial flash)
Serial Ports	5 shared high-speed, 3.3 V CMOS-compatible ports: all 5 are configurable as asynchronous serial ports; 3 are configurable as a clocked serial port (SPI) and 1 is configurable as an HDLC serial port; option for second HDLC serial port at the expense of 2 clocked serial ports (SPI)	

The RCM3305 and RCM3315 are programmed over a standard PC serial port through a programming cable supplied with the Development Kit, and can also be programmed through a USB port with an RS-232/USB converter, or directly over an Ethernet link using the featured remote application update or the Dynamic C download manager with or without a RabbitLink.

Appendix A provides detailed specifications for the RCM3305 and the RCM3315.

1.2 Comparing the RCM3309/RCM3319 and RCM3305/RCM3315

We can no longer obtain certain components for the RCM3305/RCM3315 RabbitCore modules that support the originally specified -40°C to $+70^{\circ}\text{C}$ temperature range. Instead of changing the design of the RCM3305/RCM3315 RabbitCore modules to handle available components specified for the original temperature range, we decided to develop a new product line — the RCM3309/RCM3319 — based on the RCM3900 RabbitCore modules that were released for the same reason.

The RCM3309/RCM3319 modules are similar in form, dimensions, and function to the RCM3305/RCM3315 modules. We strongly recommend that existing RCM3305/3315 customers and designers of new systems consider using the new RCM3309/RCM3319 RabbitCore modules.

This section compares the two lines of RabbitCore modules.

- **Temperature Specifications** — RCM3305/RCM3315 RabbitCore modules manufactured after May, 2008, are specified to operate at 0°C to $+70^{\circ}\text{C}$. The RCM3309/RCM3319, rated for -40°C to $+85^{\circ}\text{C}$, are offered to customers requiring a larger temperature range after May, 2008.
- **Maximum Current** — The RCM3305/RCM3315 draws 250 mA vs. the 325 mA required by the RCM3309/RCM3319.
- **LEDs** — The **SPEED** and user (**USR/BSY**)LED locations have been swapped between the RCM3305/RCM3315 and the RCM3309/RCM3319, the **LNK/ACT** LEDs have been combined to one LED on the RCM3309/RCM3319, and the RCM3309/RCM3319 has an **FDX/COL** LED instead of the **SF** LED on the RCM3305/RCM3315. The **SF** LED on the RCM3305/RCM3315 blinks when data are being written to or read from the serial flash. The **FDX/COL** LED on the RCM3309/RCM3319 indicates whether the Ethernet connection is in full-duplex mode (steady on) or that a half-duplex connection is experiencing collisions (blinks).

NOTE: The change in LED indicators means that there is no indication on the RCM3309/RCM3319 when data are being written to or read from the serial flash.

- **Ethernet chip.** A different Ethernet controller chip is used on the RCM3309/RCM3319. The Ethernet chip is able to detect automatically whether a crossover cable or a straight-through cable is being used in a particular setup, and will configure the signals on the Ethernet jack interface.
- **Dynamic C** — As long as no low-level FAT file system calls were used in your application developed for the RCM3305/RCM3315, you may run that application on the RCM3309/RCM3319 after you recompile it using Dynamic C v. 9.60.

1.3 Advantages of the RCM3305 and RCM3315

- Fast time to market using a fully engineered, “ready-to-run/ready-to-program” micro-processor core.
- Competitive pricing when compared with the alternative of purchasing and assembling individual components.
- Easy C-language program development and debugging
- Program download utility (Rabbit Field Utility) and cloning board options for rapid production loading of programs.
- Generous memory size allows large programs with tens of thousands of lines of code, and substantial data storage.
- Integrated Ethernet port for network connectivity, with royalty-free TCP/IP software.
- Ideal for network-enabling security and access systems, home automation, HVAC systems, and industrial controls

1.4 Development and Evaluation Tools

1.4.1 RCM3305 Series Development Kit

The RCM3305 Series Development Kit contains the hardware you need to use your RCM3305 or RCM3315 module.

- RCM3309 module.
- Prototyping Board.
- Universal AC adapter, 12 V DC, 1 A (includes Canada/Japan/U.S., Australia/N.Z., U.K., and European style plugs).
- USB programming cable with 10-pin header.
- *Dynamic C* CD-ROM, with complete product documentation on disk.
- *Getting Started* instructions.
- Accessory parts for use on the Prototyping Board.
- Screwdriver and Cat. 5 Ethernet cables.
- *Rabbit 3000 Processor Easy Reference* poster.
- Registration card.

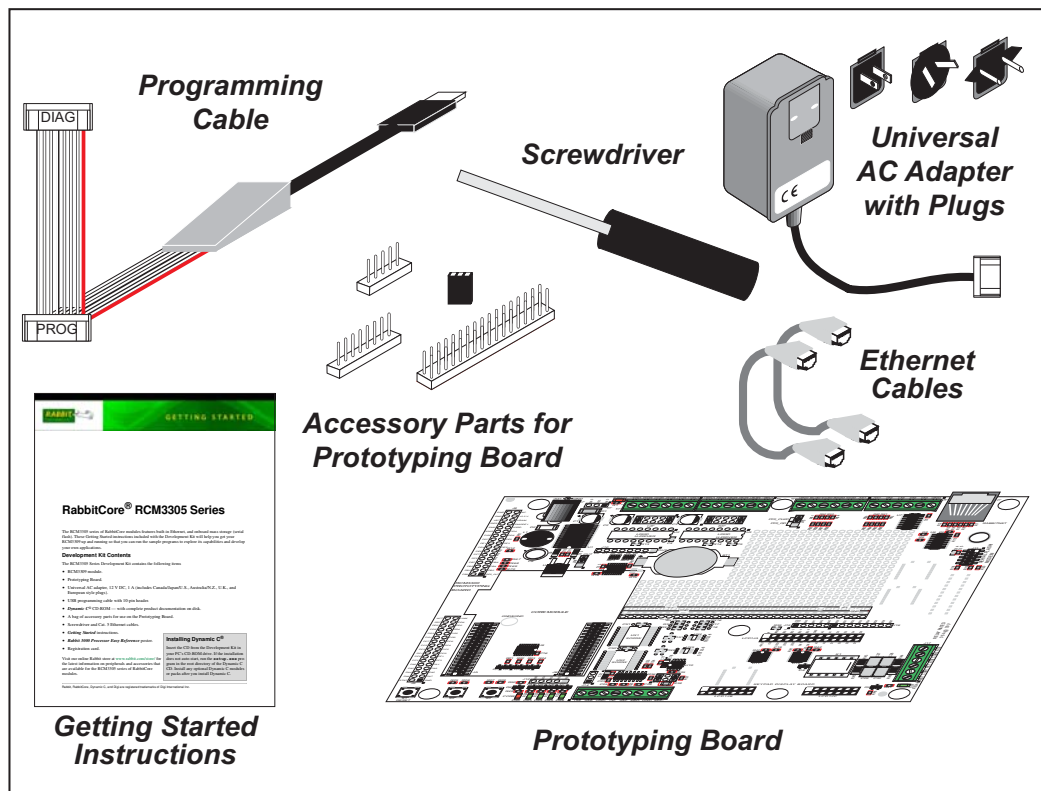


Figure 1. RCM3305 Series Development Kit

1.4.2 Software

The RCM3305 and the RCM3315 are programmed using version 9.25 or later of Rabbit's Dynamic C. A compatible version is included on the Development Kit CD-ROM.

Dynamic C v. 9.60, which is required for the related RCM3309 and RCM3319 RabbitCore modules, includes the popular μ C/OS-II real-time operating system, point-to-point protocol (PPP), FAT file system, RabbitWeb, and other select libraries that were previously sold as individual Dynamic C modules.

Rabbit also offers for purchase the Rabbit Embedded Security Pack featuring the Secure Sockets Layer (SSL) and a specific Advanced Encryption Standard (AES) library. In addition to the Web-based technical support included at no extra charge, a one-year telephone-based technical support subscription is also available for purchase. Visit our Web site at www.rabbit.com for further information and complete documentation, or contact your Rabbit sales representative or authorized distributor.

1.4.3 Connectivity Interface Kits

Rabbit has available a Connector Adapter Board.

- Connector Adapter Board (Part No. 151-0114)—allows you to plug the RCM3305/RCM3315 whose headers have a 2 mm pitch into header sockets with a 0.1" pitch.

Visit our Web site at www.rabbit.com or contact your Rabbit sales representative or authorized distributor for further information.

1.4.4 Online Documentation

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, use your browser to find and load **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 sites as well.

2. GETTING STARTED

This chapter describes how to set up and use an RCM3305 series module and the Prototyping Board included in the Development Kit.

NOTE: It is assumed that you have a Development Kit. If you purchased an RCM3305 series module by itself, you will have to adapt the information in this chapter and elsewhere to your test and development setup.

2.1 Install Dynamic C

To develop and debug programs for an RCM3305 series module (and for all other Rabbit hardware), you must install and use Dynamic C.

If you have not yet installed Dynamic C version 9.25 (or a later version), do so now by inserting the Dynamic C CD from the Development Kit in your PC's CD-ROM drive. 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 Disk 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.

Dynamic C uses a COM (serial) port to communicate with the target development system. The installation allows you to choose the COM port that will be used. The default selection is COM1. You may select any available port for Dynamic C's use. If you are not certain which port is available, select COM1. This selection can be changed later within Dynamic C.

NOTE: The installation utility does not check the selected COM port in any way. Specifying a port in use by another device (mouse, modem, etc.) may lead to a message such as "could not open serial port" when Dynamic C is started.

Once your installation is complete, you will have up to three icons on your PC desktop. One icon is for Dynamic C, one opens the documentation menu, and the third is for the Rabbit Field Utility, a tool used to download precompiled software to a target system.

If you have purchased the optional Dynamic C Rabbit Embedded Security Pack, install it after installing Dynamic C. You must install the Rabbit Embedded Security Pack in the same directory where Dynamic C was installed.

2.2 Hardware Connections

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

1. Attach the RCM3305 series RabbitCore module to the Prototyping Board.
2. Connect the programming cable between the RCM3305 series RabbitCore module and the workstation PC.
3. Connect the power supply to the Prototyping Board.

2.2.1 Step 1 — Attach Module to Prototyping Board

Turn the RCM3305 series module so that the Ethernet jack is facing the direction shown in Figure 2 below. Align the pins from the headers on the bottom side of the module into header sockets JA and JB on the Prototyping Board.

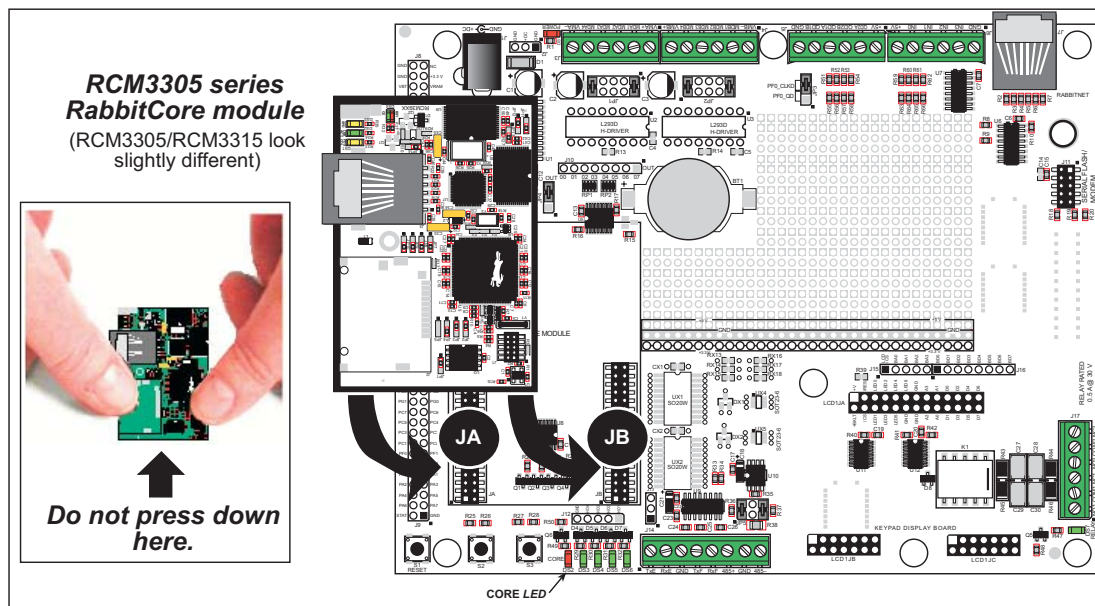


Figure 2. Install the RCM3305/ Series Module on the Prototyping Board

NOTE: It is important that you line up the pins from the headers on the bottom side of the RCM3305 series module exactly with the corresponding pins of header sockets JA and JB on the Prototyping Board. The header pins may become bent or damaged if the pin alignment is offset, and the module will not work. Permanent electrical damage to the module may also result if a misaligned module is powered up.

Press the module's pins firmly into the Prototyping Board header sockets—press down in the area above the header pins using your thumbs or fingers over the connectors as shown in Figure 2. Do **not** press down on the middle of the RCM3305 series module to avoid flexing the module, which could damage the module or the components on the module.

Should you need to remove the RCM3305 series module, grasp it with your fingers along the sides by the connectors and gently work the module up to pull the pins away from the sockets where they are installed. Do **not** remove the module by grasping it at the top and bottom.

2.2.2 Step 2 — Connect Programming Cable

The programming cable connects the RCM3305 series module to the PC running Dynamic C to download programs and to monitor the module during debugging.

2.2.2.1 RCM3309 and RCM3319

Connect the 10-pin connector of the programming cable labeled **PROG** to header J1 on the RCM3309/RCM3319 as shown in Figure 3(a). There is a small dot on the circuit board next to pin 1 of header J1. Be sure to orient the marked (usually red) edge of the cable towards pin 1 of the connector. (Do not use the **DIAG** connector, which is used for a non-programming serial connection.)

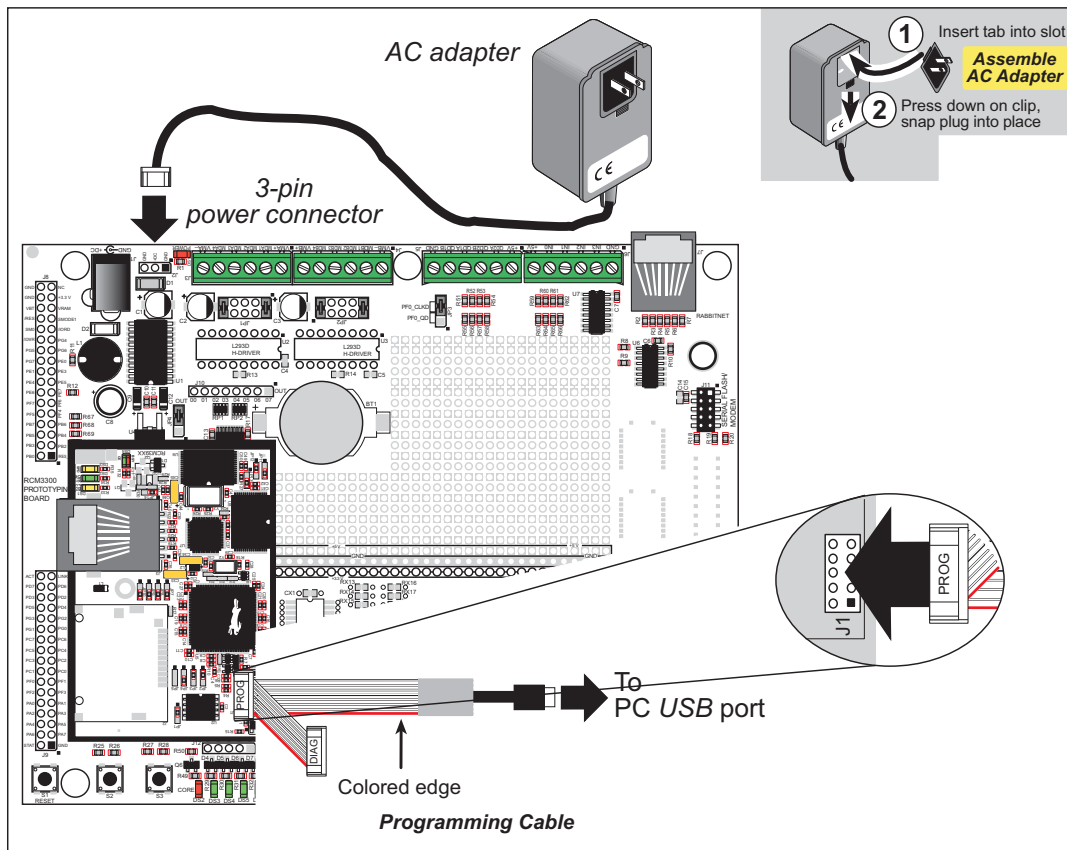


Figure 3(a). Connect Programming Cable and Power Supply

Connect the other end of the programming cable to an available USB port on your PC or workstation. Your PC should recognize the new USB hardware, and the LEDs in the shrink-wrapped area of the USB programming cable will flash.

2.2.2.2 RCM3305 and RCM3315

Connect the 10-pin connector of the programming cable labeled **PROG** to header J1 on the RCM3305/RCM3315 as shown in Figure 3(b). There is a small dot on the circuit board next to pin 1 of header J1. Be sure to orient the marked (usually red) edge of the cable towards pin 1 of the connector. (Do not use the **DIAG** connector, which is used for a nonprogramming serial connection.)

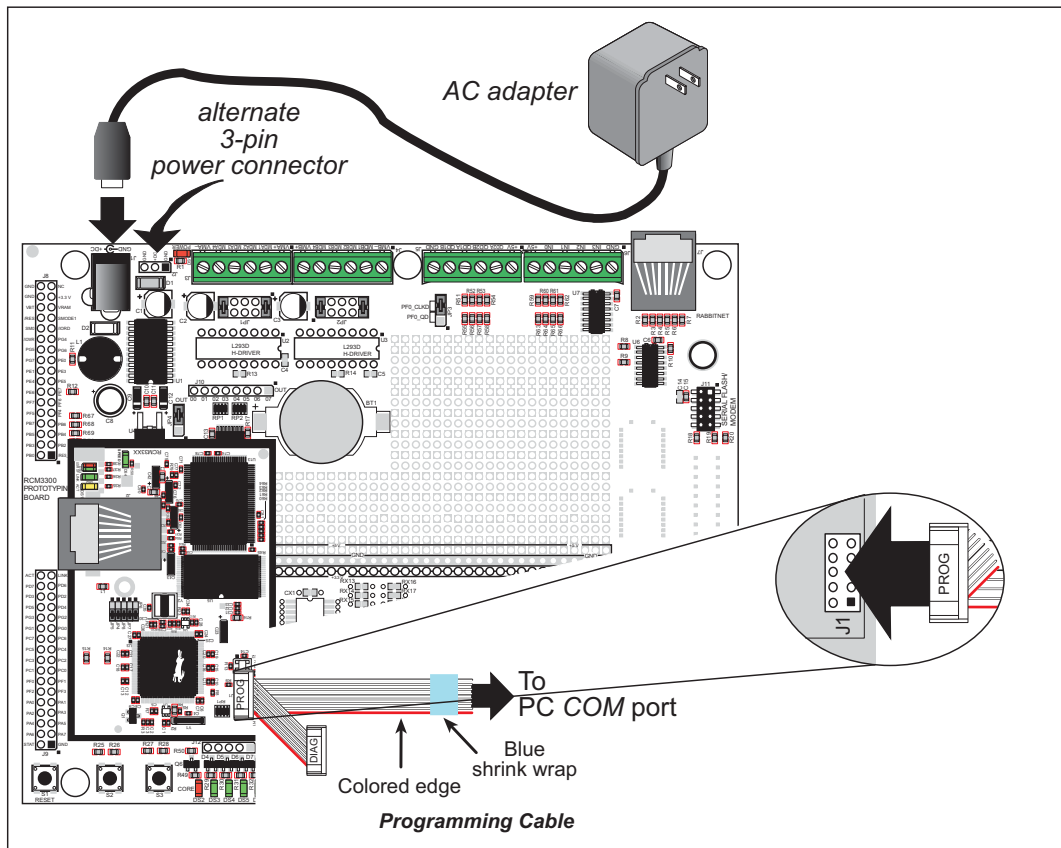


Figure 3(b). Connect Programming Cable and Power Supply

NOTE: Be sure to use the serial programming cable (part number 101-0542)—the programming cable has blue shrink wrap around the RS-232 converter section located in the middle of the cable. The USB programming cable and programming cables with clear or red shrink wrap from other Rabbit kits are not designed to work with RCM3305/RCM3315 modules.

Connect the other end of the programming cable to a COM port on your PC.

NOTE: It may be possible to use an RS-232/USB converter with the serial programming described in this section. An RS-232/USB converter (part number 20-151-0178) is available through the [Web store](#). Note that not all RS-232/USB converters work with Dynamic C.

2.2.3 Step 3 — Connect Power

When all other connections have been made, you can connect power to the Prototyping Board.

If you have the universal power supply, prepare the AC adapter for the country where it will be used by selecting the plug. The RCM3305 Series Development Kit presently includes Canada/Japan/U.S., Australia/N.Z., U.K., and European style plugs. Snap in the top of the plug assembly into the slot at the top of the AC adapter as shown in Figure 3(a), then press down on the spring-loaded clip below the plug assembly to allow the plug assembly to click into place.

Depending on the style of adapter, connect the AC adapter to 3-pin header J2 or jack J1 on the Prototyping Board as shown in Figure 3(a) or Figure 3(b).

Plug in the AC adapter. The red **CORE** LED on the Prototyping Board should light up. The RCM3305 series RabbitCore module and the Prototyping Board are now ready to be used.

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

2.2.3.1 Alternate Power-Supply Connections

All Development Kits sold up to May, 2008, included a header connector that may be used to connect your power supply to 3-pin header J2 on the Prototyping Board. The connector may be attached either way as long as it is not offset to one side—the center pin of J2 is always connected to the positive terminal, and either edge pin is negative. The power supply should deliver 8 V to 30 V DC at 8 W.

2.3 Starting Dynamic C

NOTE: Dynamic C v. 9.60 or a later version is required if you are using an RCM3309 or an RCM3319 RabbitCore module.

Once the RCM3305 series module is connected as described in the preceding pages, start Dynamic C by double-clicking on the Dynamic C icon on your desktop or in your **Start** menu. Select **Code and BIOS in Flash, Run in RAM** on the “Compiler” tab in the Dynamic C **Options > Project Options** menu. Click **OK**.

If you are using a USB port to connect your computer to the RCM3305/RCM3315 module, choose **Options > Project Options** and select “Use USB to Serial Converter” on the **Communications** tab. Click **OK**.

2.4 Run a Sample Program

Use the **File** menu to open the sample program **PONG.C**, which is in the Dynamic C **SAMPLES** folder. Press function key **F9** to compile and run the program. The **STDIO** window will open on your PC and will display a small square bouncing around in a box.

This program shows that the CPU is working. The sample program described in Section 6.5, “Run the PINGME.C Sample Program,” tests the TCP/IP portion of the board.

2.4.1 Troubleshooting

If Dynamic C cannot find the target system (error message "**No Rabbit Processor Detected.** "):

- Check that the RCM3305 series module is powered correctly — the red **CORE** LED on the Prototyping Board should be lit when the module is mounted on the Prototyping Board and the AC adapter is plugged in.
- Check both ends of the programming cable to ensure that they are firmly plugged into the PC and the **PROG** connector, not the **DIAG** connector, is plugged in to the programming port on the RCM3305 series module with the marked (colored) edge of the programming cable towards pin 1 of the programming header.
- Ensure that the RCM3305 series module is firmly and correctly installed in its connectors on the Prototyping Board.
- Dynamic C uses the COM port or USB port specified during installation. Select a different COM port within Dynamic C. From the **Options** menu, select **Project Options**, then select **Communications**. 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 COM port used by the programming cable.
- If you get an error message when you plugged the programming cable into a USB port, you will have to install USB drivers. Drivers for Windows XP are available in the Dynamic C **Drivers\Rabbit USB Programming Cable\WinXP_2K** folder — double-click **DPInst.exe** to install the USB drivers. Drivers for other operating systems are available online at www.ftdichip.com/Drivers/VCP.htm.

If Dynamic C appears to compile the BIOS successfully, but you then receive a communication error message when you compile and load the sample program, it is possible that your PC cannot handle the higher program-loading baud rate. Try changing the maximum download rate to a slower baud rate as follows.

- Locate the **Serial Options** dialog in the **Dynamic C Options > Project Options > Communications** menu. Select a slower Max download baud rate.

If a program compiles and loads, but then loses target communication before you can begin debugging, it is possible that your PC cannot handle the default debugging baud rate. Try lowering the debugging baud rate as follows.

- Locate the **Serial Options** dialog in the **Dynamic C Options > Project Options > Communications** menu. Choose a lower debug baud rate.

2.5 Where Do I Go From Here?

If the sample program ran fine, you are now ready to go on to other sample programs and to develop your own applications. The source code for the sample programs is provided to allow you to modify them for your own use. The *RCM3305/RCM3315 User's Manual* also provides complete hardware reference information and describes the software function calls for the RCM3305 and the RCM3315, the Prototyping Board, and the optional LCD/keypad module. The *RCM3309/RCM3319 User's Manual* also provides complete hardware reference information and describes the software function calls for the RCM3309 and the RCM3319, the Prototyping Board, and the optional LCD/keypad module.

For advanced development topics, refer to the *Dynamic C User's Manual* and the *Dynamic C TCP/IP User's Manual*, also in the online documentation set.

2.5.1 Technical Support

NOTE: If you purchased your RCM3305 series module through a distributor or through a Rabbit partner, contact the distributor or partner first for technical support.

If there are any problems at this point:

- Use the Dynamic C **Help** menu to get further assistance with Dynamic C.
- Check the Rabbit Technical Bulletin Board and forums at www.rabbit.com/support/bb/ and at www.rabbit.com/forums/.
- Use the Technical Support e-mail form at www.rabbit.com/support/questionSubmit.shtml.

3. RUNNING SAMPLE PROGRAMS

To develop and debug programs for the RCM3305/RCM3315 (and for all other Rabbit hardware), you must install and use Dynamic C.

3.1 Introduction

To help familiarize you with the RCM3305 and RCM3315 modules, Dynamic C includes several sample programs. Loading, executing and studying these programs will give you a solid hands-on overview of the RCM3305/RCM3315's capabilities, as well as a quick start using Dynamic C as an application development tool.

NOTE: The sample programs assume that you have at least an elementary grasp of the C programming language. If you do not, see the introductory pages of the *Dynamic C User's Manual* for a suggested reading list.

More complete information on Dynamic C is provided in the *Dynamic C User's Manual*.

In order to run the sample programs discussed in this chapter and elsewhere in this manual,

1. Your RCM3305/RCM3315 must be plugged in to the Prototyping Board as described in Chapter 2, "Getting Started."
2. Dynamic C must be installed and running on your PC.
3. The programming cable must connect the programming header on the RCM3305/RCM3315 to your PC.
4. Power must be applied to the RCM3305/RCM3315 through the Prototyping Board.

Refer to Chapter 2, "Getting Started," if you need further information on these steps.

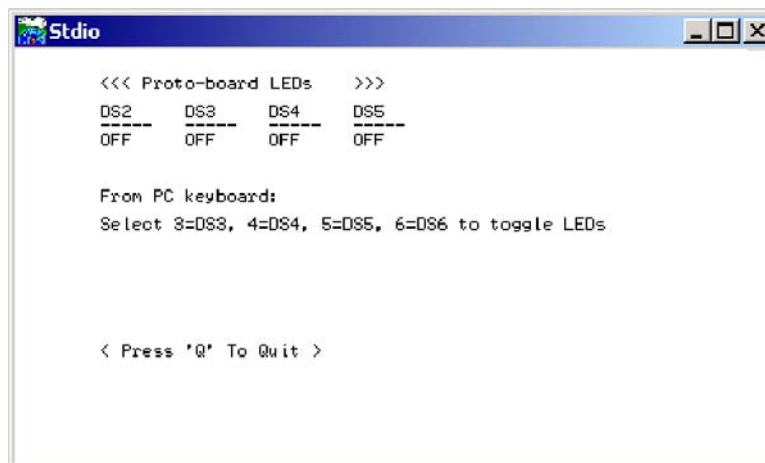
To run a sample program, open it with the **File** menu, then press function key **F9** to compile and run the program. The RCM3305/RCM3315 must be in Program Mode (see Figure 8) and must be connected to a PC using the programming cable.

3.2 Sample Programs

Of the many sample programs included with Dynamic C, several are specific to the RCM3305 and the RCM3315. Sample programs illustrating the general operation of the RCM3305/RCM3315, serial communication, and the serial flash are provided in the `SAMPLES\RCM3300` folder. Each sample program has comments that describe the purpose and function of the program. Follow the instructions at the beginning of the sample program. Note that the RCM3305/RCM3315 must be installed on the Prototyping Board when using the sample programs described in this chapter.

- **CONTROLLED.c**—Demonstrates use of the digital inputs by having you turn the LEDs on the Prototyping Board on or off from the **STDIO** window on your PC.

Once you compile and run **CONTROLLED.c**, the following display will appear in the Dynamic C **STDIO** window.



```
<<< Proto-board LEDs >>>
DS2   DS3   DS4   DS5
---   ---   ---   ---
OFF   OFF   OFF   OFF

From PC keyboard:
Select 3=DS3, 4=DS4, 5=DS5, 6=DS6 to toggle LEDs

< Press 'Q' To Quit >
```

Press “2” or “3” or “4” or “5” on your keyboard to select LED DS3 or DS4 or DS5 or DS6 on the Prototyping Board. Then follow the prompt in the Dynamic C **STDIO** window to turn the LED on or off.

- **FLASHLED.c**—Demonstrates assembly-language program by flashing the USR LED on the RCM3305/RCM3315 and LEDs DS3, DS4, DS5, and DS6 on the Prototyping Board.
- **SWRELAY.c**—Demonstrates the relay-switching function call using the relay installed on the Prototyping Board through screw-terminal header J17.
- **TOGGLESWITCH.c**—Uses costatements to detect switches S2 and S3 using debouncing. The corresponding LEDs (DS3 and DS4) will turn on or off.

Once you have loaded and executed these five programs and have an understanding of how Dynamic C and the RCM3305/RCM3315 modules interact, you can move on and try the other sample programs, or begin building your own.

3.2.1 Use of Serial Flash

3.2.1.1 Onboard Serial Flash

The following sample programs can be found in the **SAMPLES\RCM3300\SerialFlash** folder.

- **SFLASH_INSPECT.c**—This program is a handy utility for inspecting the contents of a serial flash chip. When the sample program starts running, it attempts to initialize a serial flash chip on Serial Port B. Once a serial flash chip is found, the user can perform two different commands to either print out the contents of a specified page or clear (set to zero) all the bytes in a specified page.
- **SFLASH_LOG.c**—This program runs a simple Web server and stores a log of hits in the serial flash. This log can be viewed and cleared from a browser.

3.2.1.2 SF1000 Serial Flash Card

The following sample program can be found in the **SAMPLES\RCM3300\SF1000** folder.

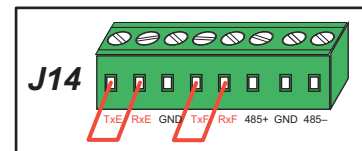
- **SERFLASHTEST.c**—An optional SF1000 Serial Flash card is required to run this demonstration. Install the Serial Flash card into socket J11 on the Prototyping Board. This sample program demonstrates how to read and write from/to the Serial Flash card.

3.2.2 Serial Communication

The following sample programs can be found in the **SAMPLES\RCM3300\SERIAL** folder.

- **FLOWCONTROL.c**—This program demonstrates hardware flow control by configuring Serial Port F for CTS/RTS with serial data coming from TxE (Serial Port E) at 115,200 bps. One character at a time is received and is displayed in the **STDIO** window.

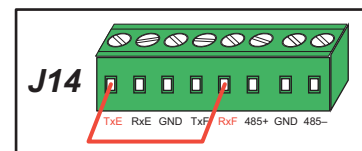
To set up the Prototyping Board, you will need to tie TxE and RxE together on the RS-232 header at J14, and you will also tie TxF and RxF together as shown in the diagram.



A repeating triangular pattern should print out in the **STDIO** window. The program will periodically switch flow control on or off to demonstrate the effect of no flow control.

- **PARITY.c**—This program demonstrates the use of parity modes by repeatedly sending byte values 0–127 from Serial Port E to Serial Port F. The program will switch between generating parity or not on Serial Port E. Serial Port F will always be checking parity, so parity errors should occur during every other sequence.

To set up the Prototyping Board, you will need to tie TxE and RxF together on the RS-232 header at J14 as shown in the diagram.



The Dynamic C **STDIO** window will display the error sequence.