

RabbitLink (EG2100)

Network Programming Gateway



User's Manual

019-0090 • 020222-B

RabbitLink (EG2100) User's Manual

Part Number 019-0090 • 020222-B • Printed in U.S.A.

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1. INTRODUCTION

This chapter introduces the RabbitLink Network Programming Gateway and describes its features. Rabbit-based embedded systems are normally programmed using a direct connection between a PC and the programming port of a Rabbit-based embedded system. The RabbitLink provides an indirect connection between the two for remote downloading and debugging.

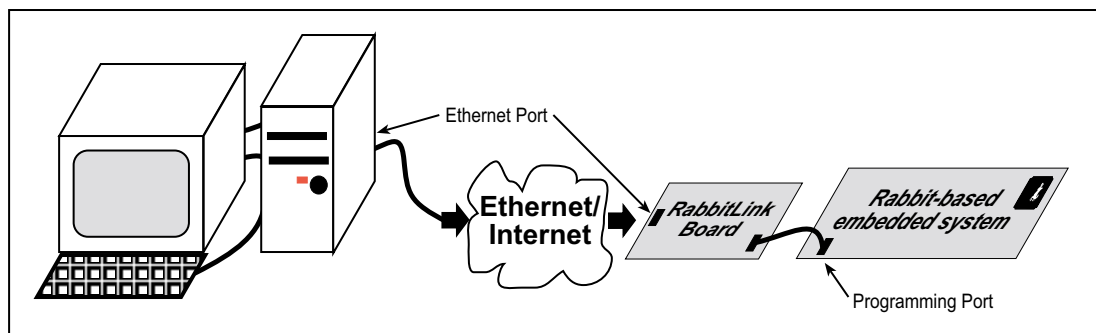


Figure 1. Remote Network Access via RabbitLink Network Gateway

1.1 RabbitLink Features

- Rabbit 2000™ microprocessor operating at 22.1 MHz.
- One RJ-45 Ethernet port compliant with IEEE 802.3 standard for 10Base-T Ethernet protocol.
- Two serial ports.
- Three status LEDs—download, link, and active.
- Optional plastic enclosure and LED light pipes (enclosure and light pipes are included with the tool kit, and are also sold separately).
- 128K static RAM and 512K flash memory (two 256K flash chips).
- Firmware already installed ready to run, easy setup with DHCP or simple console commands.
- Password protection—password prompt each time a new Dynamic C session is initiated with the RabbitLink.
- Remote program downloading and debugging.

1.2 Development and Evaluation Tools

The RabbitLink board comes with a *program download cable*. This cable connects a Rabbit-based controller to the RabbitLink board. The RabbitLink tool kit (sold separately from the RabbitLink board) contains other hardware that may be used with the RabbitLink.

The tool kit contents are:

- *RabbitLink (EG2100) User's Manual* with schematics (this document).
- The programming cable connects a PC serial port to the RabbitLink to set up the network parameters and to download firmware.
- AC adapter, supplies power to the RabbitLink. An AC adapter is supplied with tool kits sold in the North American market. If you are using another power supply, a minimum of 9-24 V at 120 mA is recommended.
- Plastic enclosure with four customer-installable light pipes.
- Screwdriver.
- The Companion CD contains RabbitLink firmware and the RFU.

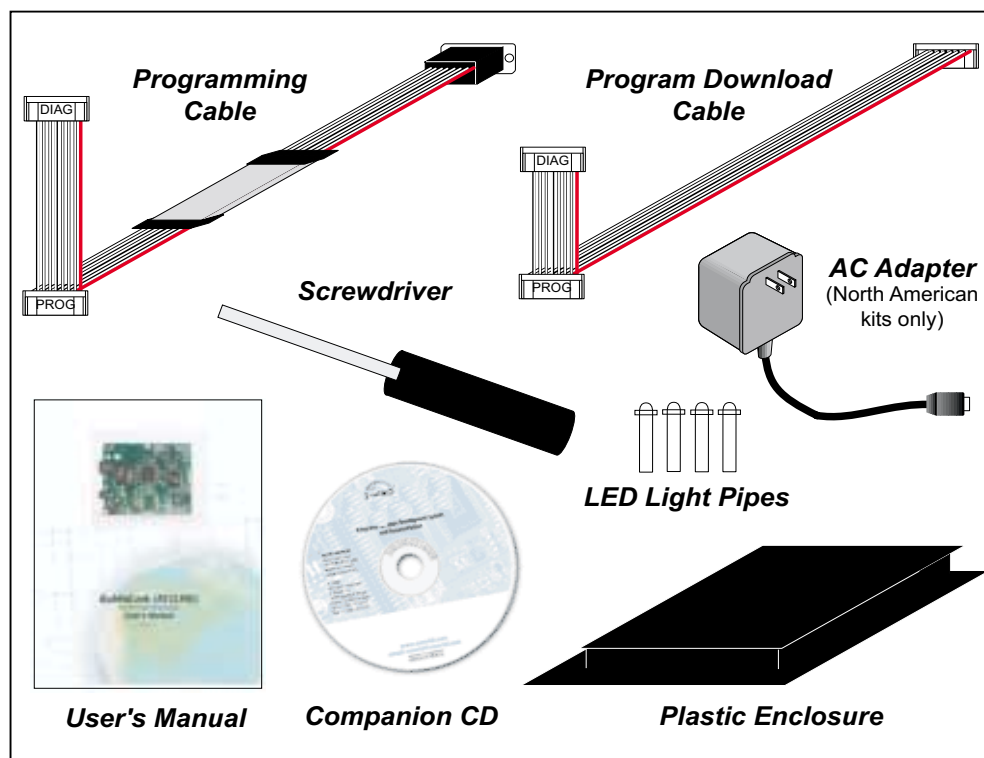
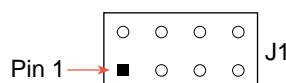


Figure 2. RabbitLink Development Tools

1.2.1 Manual Conventions

A black square indicates pin 1 of all headers.



1.3 Software

The RabbitLink board is shipped with firmware already installed in the flash memory. The rows in the following table show which versions of Dynamic C and the RFU are compatible with which versions of the RabbitLink firmware. The firmware version is the same as its serial console; the version number is displayed in the console's startup message.

Table 1. Compatibility Between Dynamic C and the RabbitLink Firmware

RabbitLink Firmware	Dynamic C	Rabbit Field Utility
Version 1.00	Versions 7.03 thru 7.06	Version 2.0
Version 2.00	Versions 7.20 and later	Version 2.20

1.3.1 Upgrading to Dynamic C 7.20

Z-World recommends upgrading to Dynamic C 7.20 as soon as possible. This requires upgrading the firmware for older RabbitLink boards (boards shipped in the 2nd quarter of 2002 have version 2.00 firmware). The simplified structure of the new RabbitLink firmware is more flexible and is also more stable and robust.

Please see Section 3.2.1, “Downloading Firmware to the RabbitLink,” on page 13 for complete instructions for downloading the firmware.

1.3.2 Remote Downloading and Debugging

Attaching the RabbitLink to the Ethernet and a Rabbit-based target allows a user to compile, run, and debug programs on the remote board from a network-connected PC running Dynamic C 7.03 or later. All the standard features of Dynamic C are available over the remote interface, including the Dynamic C **STDIO** window, watch expressions, and the ability to step through C and assembly code. Dynamic C can be used exactly the same way as it is for a board connected to the PC's serial port.

1.3.3 Passphrase Protection

Every time Dynamic C initiates a new RabbitLink session, the RabbitLink requests a passphrase from the user to ensure the security of the programs and data on the remote boards. This passphrase is stored by Dynamic C during that session so it only needs to be entered the first time Dynamic C contacts the RabbitLink gateway. For security reasons, Dynamic C does not store the passphrase on the hard disk of the PC.

2. GETTING STARTED

This chapter shows how to make the necessary hardware connections and how to configure the network parameters for the RabbitLink.

2.1 RabbitLink Connections

1. Attach the RabbitLink board to the plastic enclosure base.

Position the RabbitLink board over the plastic enclosure base as shown below in Figure 3. Attach the RabbitLink board to the base at the top left and bottom right positions using the two 4-40 \times $\frac{1}{4}$ screws supplied.

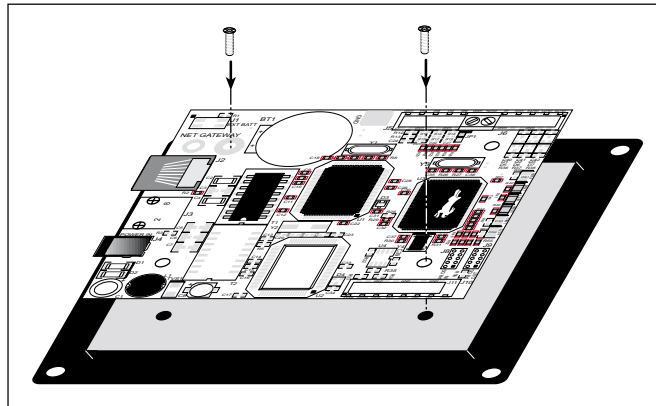


Figure 3. Attach RabbitLink Board to Plastic Enclosure Base

The plastic enclosure base facilitates handling the RabbitLink during development. The plastic enclosure is offered as a separate option when individual RabbitLink boards are purchased.

NOTE: Appendix B, “Plastic Enclosure,” provides additional information and specifications for the plastic enclosure.

Connect the 10-pin **DIAG** connector of the programming cable to header J8, which is labeled **PROG IN**, on the RabbitLink. Ensure that the colored edge lines up with pin 1 as shown. Connect the other end of the programming cable to a COM port on your PC.



3. Connect the power supply.

Two options are available for powering the RabbitLink—via an AC adapter to power supply jack J4, or through a screw terminal header at J5/J6. Option 1 is most convenient in a desktop environment, and Option 2 can be used to connect the RabbitLink to an existing power supply in a field installation. The red **USER** LED comes on once power is applied successfully.

Option 1 - Via AC Adapter

Plug the DC end of the power supply into jack J4, which is labeled **POWER IN**, as shown in Figure 5.

Option 2 - Via Screw Terminal Header J5/J6



Do not do this hookup if you have already connected the AC adapter (Option 1).

Connect the **+** lead (red) to **DCIN** on header J5/J6, and connect the **–** lead (black) to **GND** on header J4/J5 as shown in Figure 5.

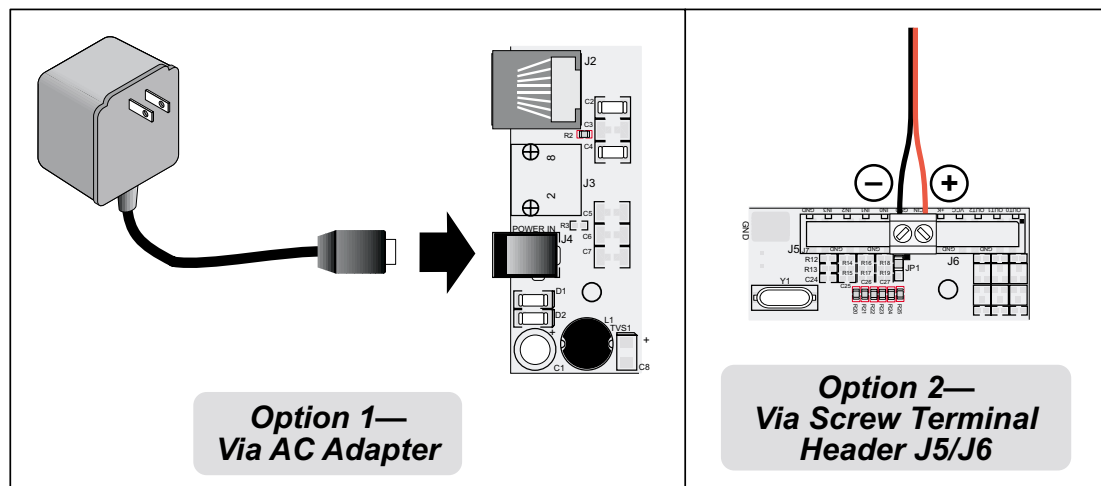


Figure 5. Alternative Power Supply Connections



It is important that you hook up the positive and negative power leads *exactly* as described. There is no reverse polarity protection through header J5/J6.

4. Apply power.

Once the RabbitLink is powered up and connected to your PC, you are ready to configure the network parameters.

2.2 Configuring RabbitLink Network Parameters from Your PC

There are two ways to set the basic network parameters for the RabbitLink. The basic network parameters are:

- the IP address of the RabbitLink
- the IP address of the gateway
- the netmask

2.2.1 Dynamically Assigned Network Parameters

The first, and easiest, way to set network parameters is to use a DHCP server. This method is available starting with RabbitLink firmware version 2.00. It removes the need to connect to a PC to configure the RabbitLink, which may be desirable on PCs without a COM port.

The RabbitLink tries to use the services of a DHCP server by default. If there is not a DHCP server on the network, or it is desired to set the parameters by hand, the second method may be used.

2.2.2 Statically Assigned Network Parameters

This method is required for setting anything beyond the basic network parameters. A terminal emulator is used to communicate with the RabbitLink serial console.

1. Open a terminal emulator such as Tera Term or Windows Hyperterminal on your PC. Configure the terminal emulator as follows.

Parameter	Setting
COM	port (COM1 or COM2) to which programming cable is connected
Baud Rate	57,600 bps
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

TIP: If no characters appear when you type, press return, then type **echo on** to turn on the echoing of characters.

2. Configure the RabbitLink network parameters. This is done using the serial console commands. Please refer to Appendix E, “Serial Console Commands,” for a description of all the commands. If a DHCP server was not used, the following serial console commands are required:

```
set ip x.x.x.x          // factory default is 10.10.1.100
set gateway x.x.x.x      // factory default is 10.10.6.1
set netmask x.x.x.x      // factory default is 255.255.255.255
```

If you are using RabbitLink firmware version 2.00, you must first type **set dhcp off** before setting the netmask or the IP address of either the RabbitLink or its gateway. Ask your network administrator for assistance, if necessary.

The RabbitLink boots up whenever the power cycles, and then displays the message,

RabbitLink Serial Console Version X.XX

The RabbitLink serial console will respond **OK** after each command, or,

"ERROR <errnum>"

if something went wrong.

2.3 Target System Connections to the RabbitLink

After network addresses have been set, put aside the programming cable and connect the program download cable as shown in Figure 6. The **PROG** connector on the program download cable connects to the programming header of the Rabbit-based target system. The unmarked connector connects to the **PROG OUT** header of the RabbitLink board.

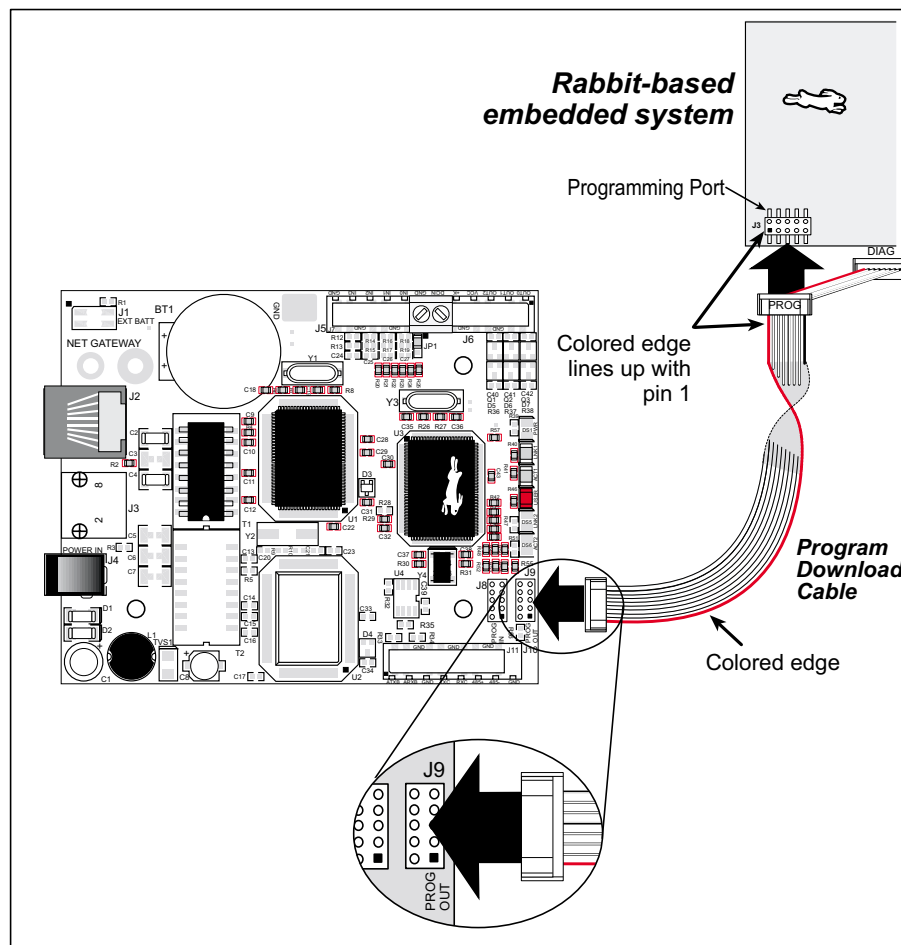


Figure 6. Connect Rabbit-Based Target System to RabbitLink

2.4 Ethernet Connections

Before proceeding, you will need to have either two straight-through Ethernet cables and an Ethernet hub or one Ethernet crossover cable. The Ethernet cables and Ethernet hub are available from Rabbit Semiconductor or Z-World in a TCP/IP tool kit. More information is available at

www.rabbitsemiconductor.com

or at

www.zworld.com

Your PC must have an RJ-45 Ethernet jack. You can identify the RJ-45 Ethernet jack by looking for an 8-connector (as opposed to a 6-connector RJ-11 phone jack) jack labeled **ETHERNET** or **<...>** that usually has an LED or two on it. If your PC does not have Ethernet access, you will need to install a 10BaseT Ethernet card (available from your favorite computer supplier).

Connect your PC and the RabbitLink board to an Ethernet hub as shown in Figure 7. The Ethernet hub may also be connected to your network.

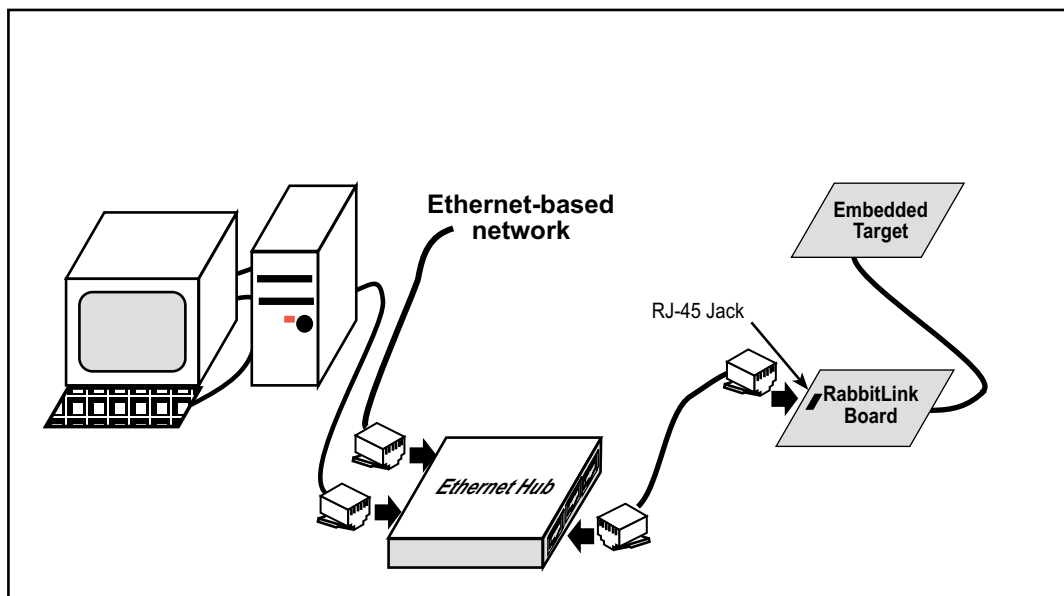


Figure 7. Overview of physical connections.

Alternatively, you may use the crossover Ethernet cable to connect the RabbitLink directly to a PC RJ-45 Ethernet jack. This is useful when using RabbitLink as a high speed local programming interface.

2.5 Ready to Go

The green LED, labeled **LINK**, should light up once all the connections have been made correctly. Dynamic C (version 7.03 or later) or the Rabbit Field Utility (version 2.0 or later) on your PC may now be used to download a program to the Rabbit-based target system. The red LED labeled **USER** on the RabbitLink blinks while the download or a debug session is in progress.

3. RABBITLINK SOFTWARE

This chapter describes the software functionality available when using a RabbitLink.

3.1 Downloading and Debugging via the RabbitLink

Downloading a program to an embedded target via the RabbitLink is done using Dynamic C or the Rabbit Field Utility (RFU). The rows in the following table show which versions of Dynamic C and the RFU are compatible with which versions of the RabbitLink firmware. The firmware version is the same as its serial console; the version number is displayed in the console's startup message.

Table 2. Compatibility Between Dynamic C and the RabbitLink Firmware

RabbitLink Firmware	Dynamic C	Rabbit Field Utility
Version 1.00	Versions 7.03 thru 7.06	Version 2.0
Version 2.00	Versions 7.20 and later	Version 2.20

Before a program can be downloaded to a Rabbit-based target, the RabbitLink must be visible on the network. It must also be visible to Dynamic C or the Rabbit Field Utility (RFU). This is accomplished by setting the network parameters on the RabbitLink board and giving this information to Dynamic C or the RFU.

3.1.1 RabbitLink Network Parameters

Follow the steps in Section 2.2, “Configuring RabbitLink Network Parameters from Your PC,” on page 8 if you have not already done so. The RabbitLink requires an IP address, a gateway address, a netmask and a port number to communicate across an network.

3.1.2 More RabbitLink Network Parameters

From Dynamic C, enter the RabbitLink addresses from the **Communications** dialog box found on the **Options** menu. From the RFU, the **Communications** dialog box is accessed from the **Setup** menu.

- The **Network Address** field should contain the IP address of the RabbitLink.
- The **Control Port** field should be set to the TCP port number that the RabbitLink uses to accept control commands from Dynamic C—the default value is 4244. If the RabbitLink is behind a firewall, the **Control Port** field should be set to the port on the firewall that is being forwarded to the RabbitLink.

If a RabbitLink or multiple RabbitLinks are attached to a local network, press the **Discover** button in the **Communications** dialog box to have Dynamic C or the RFU send a broadcast message to each RabbitLink attached to the network. The default UDP port for discovery is 4242. Each RabbitLink will respond with its IP address, name, control port, current status, and MAC address. Selecting any line in the **Discover** window will cause the information for that RabbitLink to be placed into the appropriate fields in the **Communications** dialog box.

3.1.3 Password Protect the Embedded Target

Though not required, it is highly recommended that the passphrase security feature be activated before the RabbitLink is deployed. This gives some protection to the embedded target system from unauthorized communication. The passphrase may be up to 256 characters long. The serial console command “**set passphrase**” will prompt twice for a passphrase and will store the hashed value of it on the RabbitLink. When a session starts, the RabbitLink will ask for the passphrase, allowing access to the embedded system only after receiving the correct value. If no passphrase is set, just press **<ENTER>** when asked for it. If you forget the passphrase, the only way to recover is to use the RabbitLink serial console to set a new passphrase. This will require the hardware connections shown in Figure 4 on page 6 and the software setup described in “Statically Assigned Network Parameters” on page 8.

3.1.4 Using Dynamic C or the RFU to Download

Regardless of whether you use the RFU or Dynamic C, downloading across an Ethernet connection is essentially the same as across a serial connection.

The RFU downloads bin files that were previously created using Dynamic C. Dynamic C starts with a source code file and compiles it down to the target.

3.1.5 Remote Debugging with Dynamic C

Once a program is successfully downloaded to the target controller attached to the RabbitLink, Dynamic C may be used to debug the program precisely as if the PC running Dynamic C was directly connected to the target. Refer to the *Dynamic C User's Manual* for detailed information on downloading and debugging.

3.1.6 Troubleshooting Tips

- If Dynamic C is unable to establish communication with the RabbitLink, make sure that the RabbitLink is powered on, and make sure that the Ethernet cable is firmly connected to the RabbitLink and that the **USER** and **ACTIVE** LEDs are on.
- If Dynamic C is still unable to establish communication with the RabbitLink, make sure that Dynamic C has the correct IP address and control port information. Look in the **Communications** dialog box accessed from the **Options** menu.
- If Dynamic C is able to establish communication with the RabbitLink, but midway through the download process displays either “**Error receiving Flash ID from target**” or “**Target Communication Error**,” check to make sure that the program download cable is plugged in correctly from the RabbitLink to the controller being programmed, and that the controller is powered on.

3.2 RabbitLink Firmware

The firmware necessary to operate the RabbitLink with a Rabbit-based target system is loaded at the factory. This means that after the hardware connections have been made and the network parameters configured, the RabbitLink may be used immediately to download a program to the local or remote Rabbit-based system.

In case it is necessary to reload or replace the firmware, the following bin files are available for download from the RabbitLink directory that was created when Dynamic C installed. The corresponding source code files are in the same directory.

- **CLEAR_PARAM.BIN**—Binary image to reset the network configuration parameters of the RabbitLink board (stored on the second flash) to default values. This binary file is used to reset the serial port if its operation has become undefined.
- **DOWNLOAD.BIN**—RabbitLink firmware binary image.

The RabbitLink firmware version must be compatible with the version of Dynamic C that is used to download applications to the target that is connected to the RabbitLink (see Table 2). The companion CD in the RabbitLink Tool Kit contains versions 1.00 and 2.00 of the firmware.

3.2.1 Downloading Firmware to the RabbitLink

Follow these steps to reload the firmware or to reset the RabbitLink serial port.

1. Connect the RabbitLink board to your PC as shown in Figure 8 with the **PROG** connector on the programming cable connected to the **PROG IN** header of the RabbitLink board.

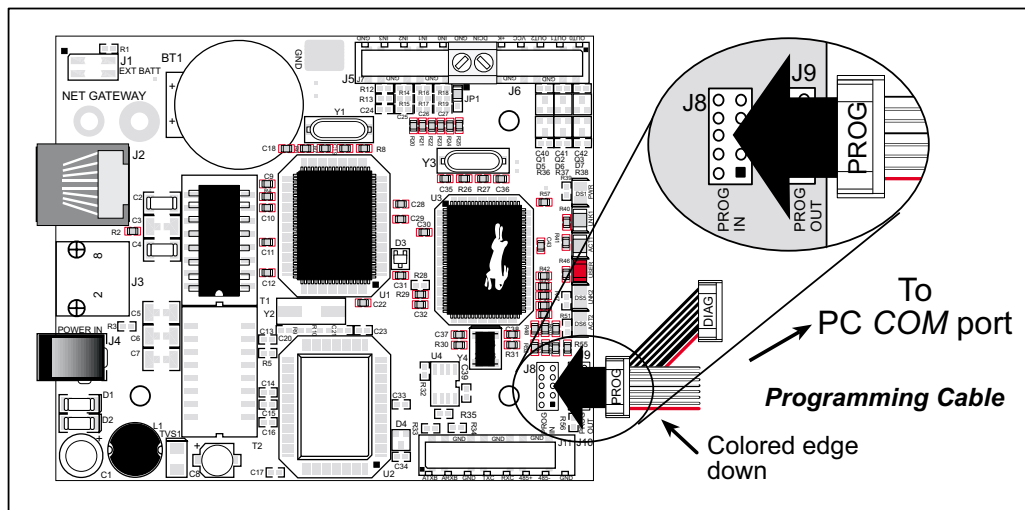


Figure 8. RabbitLink Connections for Downloading Firmware

2. Use the Rabbit Field Utility version 2.0 or later to load the **DOWNLOAD.BIN** firmware or the **CLEAR_PARAM.BIN** binary image onto the RabbitLink board.
3. Disconnect the programming cable.
4. Unplug the power supply, then plug the power supply back in. This resets the RabbitLink from Program Mode to Run Mode.

3.2.2 Firmware Upgrades

Follow the above steps to install a firmware upgrade. Just substitute the name of the firmware upgrade for the firmware binary image file (**DOWNLOAD.BIN**). Firmware upgrades will be available at

www.rabbitsemiconductor.com

or at

www.zworld.com

3.3 Serving Web Pages and Sending E-Mail

The RabbitLink is primarily intended for downloading and debugging across an Ethernet-based network with a Rabbit-based target.

3.3.1 Using DeviceMate Features

Z-World offers DeviceMate as a better-fit solution for those who wish to use Internet services. The DeviceMate feature set has more options, such as watchdogs and message logging, and also an interface that is easier to use than what is available on the RabbitLink. For more information about DeviceMate, please refer to the *DeviceMate Software User's Manual* available at:

<http://www.zworld.com>

The DeviceMate software may be downloaded to the RabbitLink to replace the RabbitLink firmware.

3.3.2 Using RabbitLink Features

RabbitLink console commands may be used to send e-mail and serve web pages. A complete list of the available commands are in Appendix E, "Serial Console Commands."

Prior to Dynamic C 7.20, a console API existed for target applications to send console commands to the RabbitLink. Please see Appendix E.6, starting on page 38 for API function descriptions.

Starting with Dynamic C 7.20, the console commands are sent to the RabbitLink through the serial port interface.

APPENDIX A. SPECIFICATIONS

Appendix A provides the specifications for the RabbitLink and describes the conformal coating.

A.1 Electrical and Mechanical Specifications

Figure A-1 shows the mechanical dimensions for the RabbitLink.

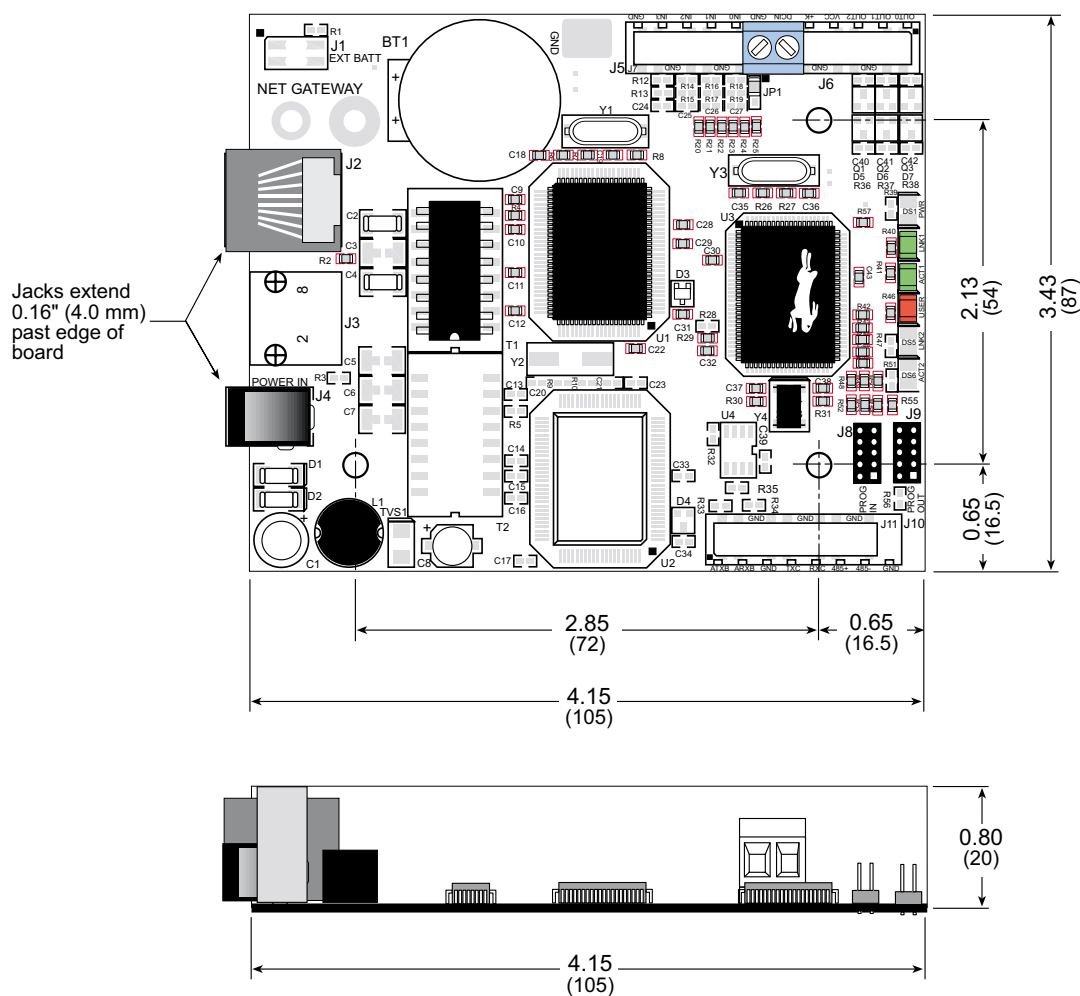


Figure A-1. RabbitLink Dimensions



All measurements are in inches followed by millimeters enclosed in parentheses.

Table A-1 lists the electrical, mechanical, and environmental specifications for the RabbitLink.

Table A-1. RabbitLink Specifications

Parameter	Specification
Board Size	3.43" × 4.15" × 0.80" (87 mm × 105 mm × 20 mm)
Connectors	one RJ-45 (Ethernet) two 2 × 5, 2 mm pitch (serial programming) one contact power jack for AC adapter one 2-terminal screw connector (18 to 26 AWG wire) for wired-in power supply
Ethernet Interface	Direct connection to 10BaseT Ethernet networks via RJ-45 connection
Temperature	–40°C to +70°C
Humidity	5% to 95%, noncondensing
External Input Voltage	9 V to 40 V DC
Current	44 mA at 24 V, 84 mA at 12 V (typical)
Onboard Voltage Regulator	Surface-mount switching regulator sources 5 V at 1 A
Microprocessor	Rabbit 2000™
Clock	22.1 MHz
SRAM	128K, surface mount
Flash EPROM	256K for program plus 256K for data
Serial Ports	2 CMOS-compatible serial programming ports
Serial Rate	Maximum asynchronous 345,600 bps Maximum synchronous 142,700 bps
Watchdog/Supervisor	Yes
Time/Date Clock	Yes
Backup Battery	No

A.2 Conformal Coating

The areas around the crystal oscillator and the battery backup circuit on the RabbitLink have had the Dow Corning silicone-based 1-2620 conformal coating applied. The conformally coated areas are shown in Figure A-2. The conformal coating protects these high-impedance circuits from the effects of moisture and contaminants over time.

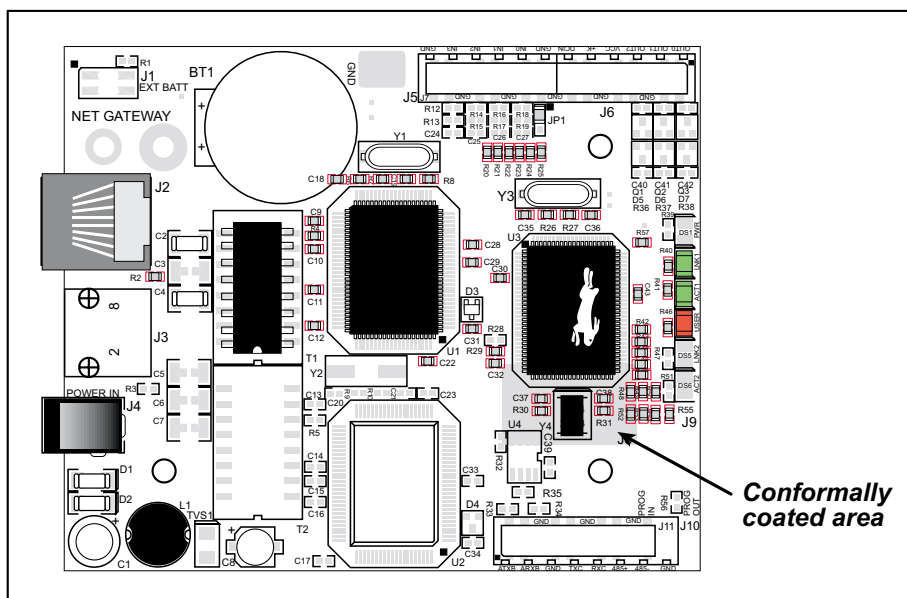


Figure A-2. RabbitLink Areas Receiving Conformal Coating

Any components in the conformally coated area may be replaced using standard soldering procedures for surface-mounted components. A new conformal coating should then be applied to offer continuing protection against the effects of moisture and contaminants.



For more information on conformal coatings, refer to Rabbit Semiconductor Technical Note 303, *Conformal Coatings*.

APPENDIX B. PLASTIC ENCLOSURE

The plastic enclosure provides a secure way to enclose your RabbitLink board. The enclosure itself may be mounted on any flat surface.

Appendix B describes how to mount the RabbitLink board inside the plastic enclosure, how to install the optional light pipes, and provides details on mounting the assembly.

B.1 Assembly

1. Attach the RabbitLink board to the plastic enclosure base.

Position the RabbitLink board over the plastic enclosure base as shown below in Figure B-1. Attach the RabbitLink board to the base using the two 4-40 \times $\frac{1}{4}$ screws supplied.

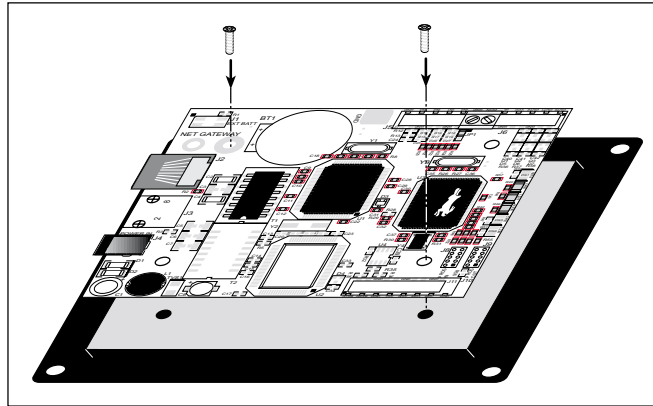


Figure B-1. Attach RabbitLink Board to Plastic Enclosure Base

2. Install light pipes (optional).

Light pipes are included in the tool kit to facilitate seeing the LEDs on the RabbitLink board once the enclosure is assembled.

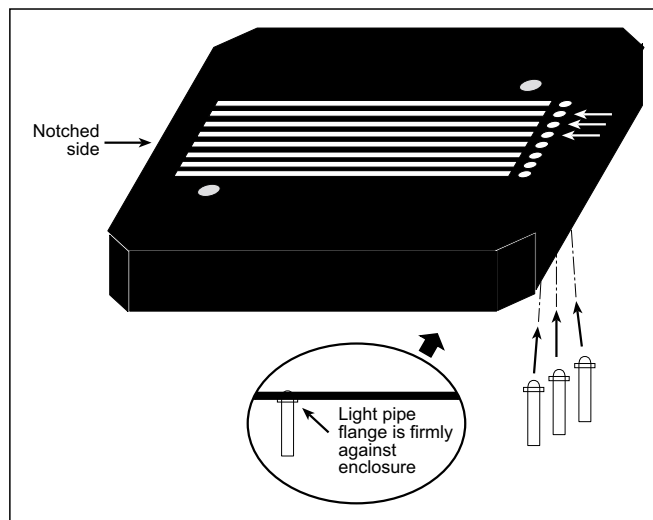


Figure B-2. Install Light Pipes in Enclosure Top

With the enclosure top positioned as shown in Figure B-2, insert three light pipes into the slots identified in Figure B-2. Position the light pipes snugly against the enclosure top since there is little clearance between the light pipes and the LEDs on the RabbitLink board. The light pipes “snap” in place. Verify that the light pipes are aligned over the LEDs, then apply a drop of

cyanoacrylate or contact cement to the inside of the enclosure around each light pipe to hold it in place.

NOTE: Once the glue is applied, it will not be possible to change the alignment of the light pipes without damaging the plastic enclosure.

3. Attach the enclosure top to the base.

Position the enclosure top over the plastic enclosure base as shown below in Figure B-3. Attach the enclosure top to the base using the two 4-40 \times $\frac{1}{2}$ screws supplied. If you installed the light pipes, be sure they are aligned over the LEDs as shown.

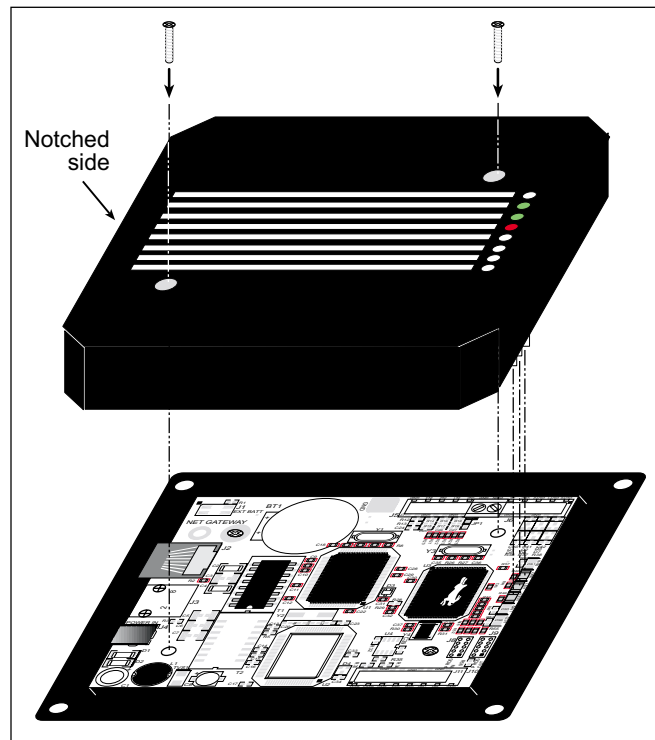


Figure B-3. Attach Enclosure Top

4. Mount plastic enclosure (optional).

Use four #10 screws to attach the assembled plastic enclosure to the surface on which it will be mounted. This step applies to production versions of RabbitLink boards once development has been completed.

B.2 Dimensions

Figure B-4 shows the dimensions for the plastic enclosure.

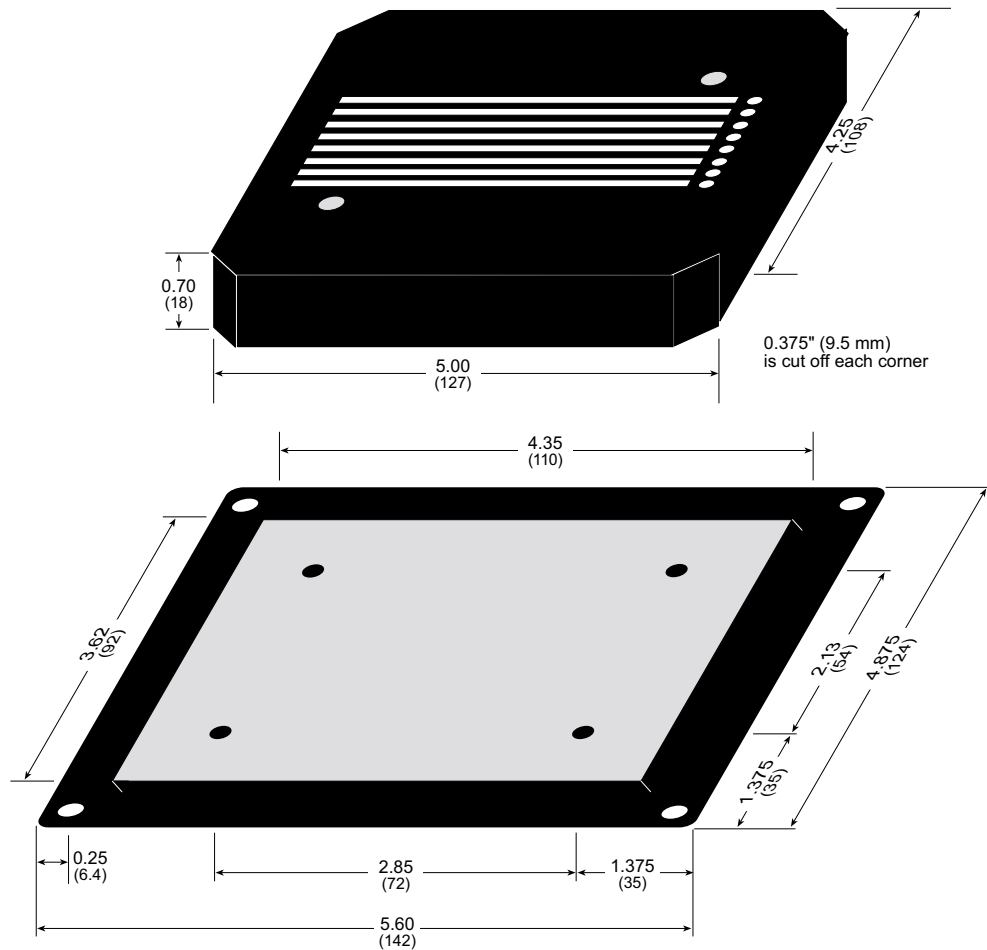


Figure B-4. Plastic Enclosure Dimensions

When fully assembled with the RabbitLink installed, the total height of the plastic enclosure will be 1.1" (28 mm).

APPENDIX C. SUBSYSTEMS

Appendix D describes the principal subsystems for the RabbitLink.

- RabbitLink Subsystems
- Serial Communication
- Memory
- Power Supplies

C.1 RabbitLink Hardware Subsystems

Figure D-1 shows the Rabbit-based subsystems designed into the RabbitLink and shows the parallel ports and signal lines they use on the Rabbit 2000 microprocessor.

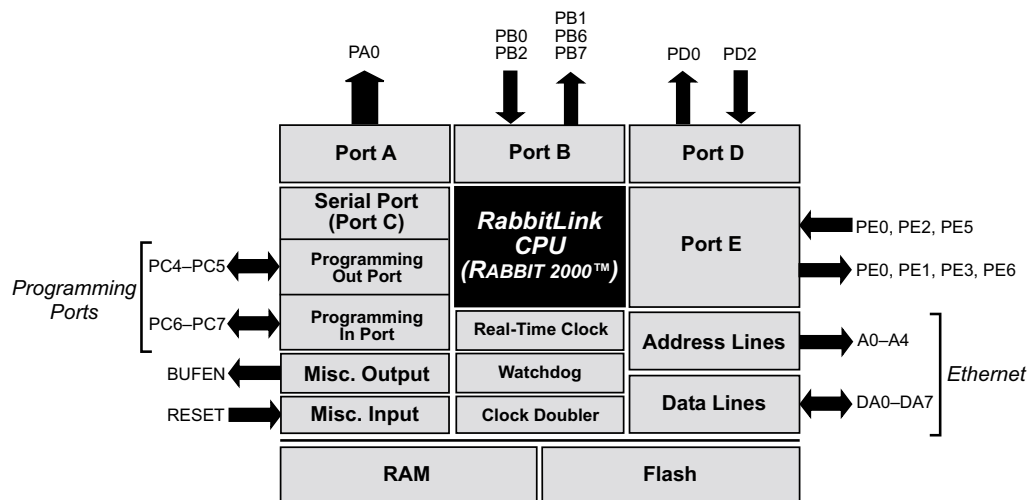


Figure D-1. RabbitLink Subsystems

C.1.1 Pinouts

Figure D-2 shows the pinouts for the RJ-45 Ethernet jack and the two programming headers on the RabbitLink board.

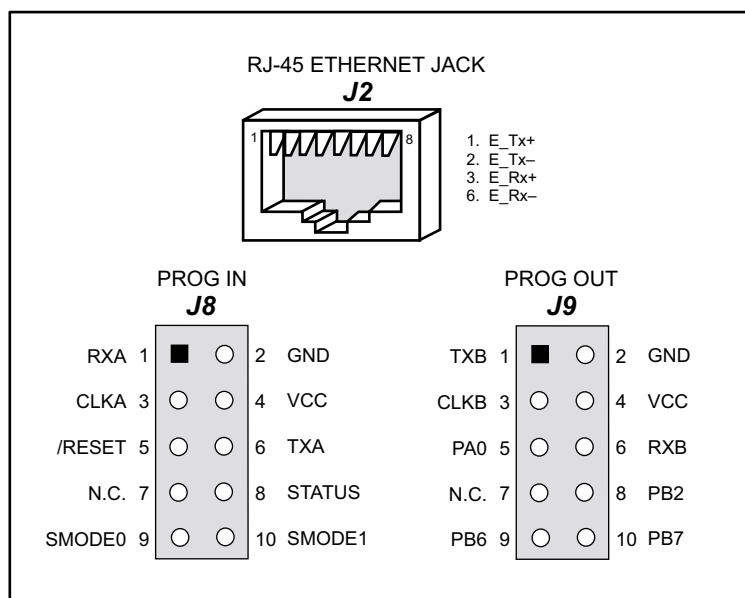


Figure D-2. Pinouts for Ethernet Jack and Programming Headers

C.2 Serial Communication

C.2.1 Serial Programming Ports

The RabbitLink board has two 10-pin programming headers labeled J8 and J9. The **PROG IN** port uses the Rabbit 2000's serial port A for communication, and the **PROG OUT** port uses serial port B. The Rabbit 2000 startup-mode pins (SMODE0, SMODE1) are presented to the **PROG IN** port so that an externally connected device can force a start-up in an external bootstrap mode when the **PROG** connector on either the programming cable or the program download cable is used.

Refer to the *Rabbit 2000 Microprocessor User's Manual* for more information related to the bootstrap mode.

The **PROG IN** port is used with the **DIAG** connector on the programming cable to configure the RabbitLink. The **PROG IN** port transmits information to and from a PC running a terminal emulation program.

The RabbitLink network configuration can be reset through the **PROG IN** port.

The **PROG OUT** port is used (with the **PROG** connector on the program download cable connected to the programming port of the target) to download or to debug a program through an Ethernet-based network or even the Internet to a target Rabbit-based board. The **PROG OUT** port transmits information to and from a PC elsewhere on the Ethernet-based network running Dynamic C Premier (version 7.02 or later) or the Rabbit Field Utility.

See Appendix D, "Programming Cable," for more information.

C.2.2 Ethernet Port

The 10 Mbps twisted-pair Ethernet system allows segment lengths of approximately 100 m for "voice grade" twisted-pair telephone wiring. The maximum segment length may be shorter or longer than this, depending on the quality of the twisted-pair cabling in your system. While the 10Base-T system is designed to use voice-grade telephone cable that may already be installed, higher quality Category 5 cables, connectors, and wire terminating devices provide the best possible signal carrying system for 100 Mbps Ethernet media systems.

The 10Base-T media system uses two pairs of wires, which are terminated in an eight-pin (RJ-45 style) connector. This means that four pins of the eight-pin MDI connector are used as shown in Figure D-2. The transmit and receive data signals on each pair of a 10Base-T segment are polarized, with one wire of each signal pair carrying the positive (+) signal, and the other carrying the negative (-) signal.

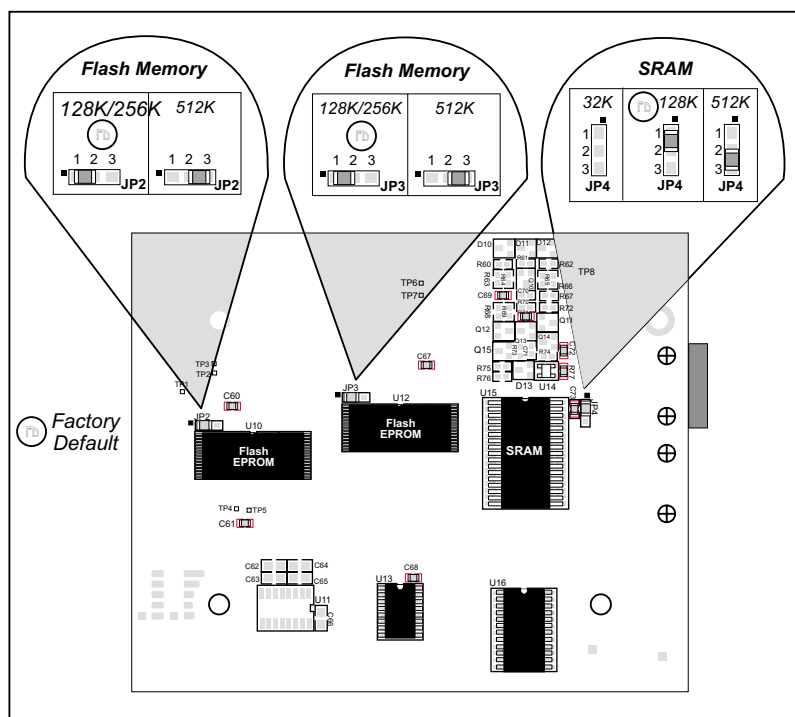
C.3 Memory

C.3.1 SRAM

The RabbitLink is designed to accept 128K or 512K of SRAM packaged in an SOIC case.

The standard models sold by Z-World and by Rabbit Semiconductor come with 128K of SRAM.

Figure D-3 shows the locations and the jumper settings for the jumpers at JP4 used to set the SRAM size. The “jumpers” are 0 Ω surface-mounted resistors.



**Figure D-3. RabbitLink Jumper Settings
for SRAM and Flash EPROM Size**

3.3.2 Flash EPROM

The RabbitLink is also designed to accept 128K to 512K of flash memory packaged in a TSOP case.

The RabbitLink comes with two 256K flash memories, one for the firmware and one for data.

Figure D-3 shows the locations and the jumper settings for the jumpers at JP2 and JP3 used to set the flash memory size. The “jumpers” are 0 Ω surface-mounted resistors.



Z-World recommends that any customer applications should not be constrained by the sector size of the flash EPROM since it may be necessary to change the sector size in the future.

3.3.3 Dynamic C Premier BIOS Source Files

The Dynamic C Premier BIOS source files handle different standard RAM and flash memory sizes automatically.

C.4 Power Supplies

Power is supplied to the RabbitLink board from an external source either through jack J4 or through screw terminal connector J5/J6. The connection through jack J4 is protected against reverse polarity by a Schottky diode at D1 as shown in Figure D-4, but the alternative connection through J5/J6 is *not* protected against reverse polarity.

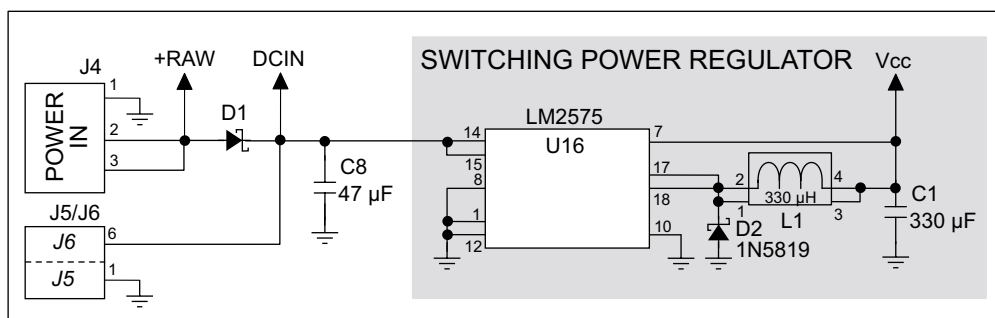


Figure D-4. RabbitLink Power Supply Schematic

The power supply connection through jack J4 is handy for the AC adapter included with the RabbitLink tool kit for desktop demonstration and development. The power supply connection through screw terminal connector J5/J6 enables you to connect the RabbitLink directly to a power supply in the production system.

Capacitor C8 provides noise and ripple stabilization protection for the voltage regulator, and allows the external power supply to be located some distance away from the RabbitLink. A switching power regulator is used. The +RAW or DCIN input voltage may range from 9 V to 40 V.

C.5 Batteries and External Battery Connections

Although the RabbitLink has room for a backup battery on the circuit board, battery backup is not supported at this time.

C.6 Reset Generator

The RabbitLink uses a reset generator, U14, to reset the Rabbit 2000 microprocessor when the voltage drops below the voltage necessary for reliable operation. The reset occurs between 4.50 V and 4.75 V, typically 4.63 V.

APPENDIX D. PROGRAMMING CABLE

Appendix E provides additional information for the Rabbit 2000[™] microprocessor when using the **DIAG** and **PROG** connectors on the programming cable with the RabbitLink board. The **PROG** connector is used only when the programming cable is attached to the **PROG IN** connector (header J8) on the RabbitLink to download new firmware. Otherwise, the **DIAG** connector on the programming cable is used to configure the RabbitLink's network parameters, and also allows the programming cable to be used as an RS-232 to CMOS level converter for serial communication.

The programming port, which is shown in Figure E-1, can serve as a convenient communications port for field setup or other occasional communication need (for example, as a diagnostic port). If the port is simply to perform a setup function, that is, write setup information to flash memory, then the controller can be reset through the programming port and a cold boot performed to start execution of a special program dedicated to this functionality.

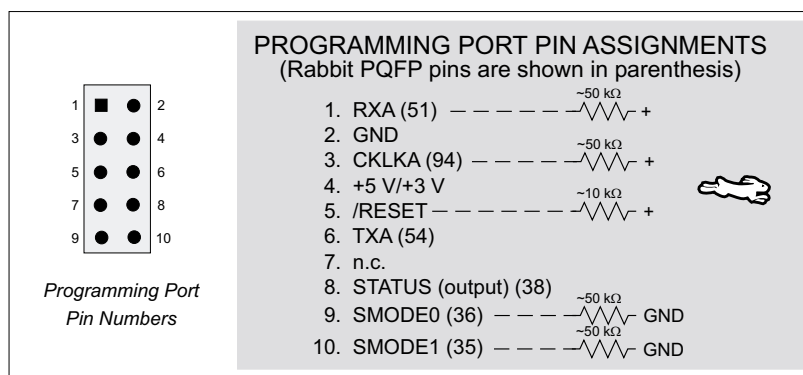


Figure E-1. Programming Port Pin Assignments

When the **PROG** connector is used, the /RESET line can be asserted by manipulating DTR and the STATUS line can be read as DSR on the serial port. The target can be restarted by pulsing reset and then, after a short delay, sending a special character string at 2400 bps. To simply restart the BIOS, the string 80h, 24h, 80h can be sent. When the BIOS is started, it can tell whether the programming cable is connected because the SMODE1 and SMODE0 pins are sensed as being high. This will cause the Rabbit 2000 to enter the bootstrap mode. The Dynamic C programming mode then can have an escape message that will enable the diagnostic serial port function.

Alternatively, the **DIAG** connector can be used to connect the programming port. The /RESET line and the SMODE1 and SMODE0 pins are not connected to this connector. The programming port is then enabled as a diagnostic port by polling the port periodically to see if communication needs to begin or to enable the port and wait for interrupts. The pull-up resistors on RXA and CLKA prevent spurious data reception that might take place if the pins floated.

If the clocked serial mode is used, the serial port can be driven by having two toggling lines that can be driven and one line that can be sensed. This allows a conversation with a device that does not have an asynchronous serial port but that has two output signal lines and one input signal line.

The line TXA (also called PC6) is zero after reset if the cold-boot mode is not enabled. A possible way to detect the presence of a cable on the programming port is for the cable to connect TXA to one of the SMODE pins and then test for the connection by raising PC6 (by configuring it as a general output bit) and reading the SMODE pin after the cold-boot mode has been disabled.

APPENDIX E. SERIAL CONSOLE COMMANDS

This appendix describes the RabbitLink serial console commands. The serial console was designed to be human-accessible as a convenient way to setup the network configuration. It is possible to use these commands programatically from the target, though it is not recommended. If Internet services are desired, Z-World suggests the DeviceMate software, which may be run on the RabbitLink board.

E.1 Configuration Commands

These commands are used to set network parameters and to password protect the RabbitLink.

set gateway <IP address>

This command sets the IP address for the gateway.

IP address The IP address for the gateway in dotted decimal format. The factory default is **10.10.6.1**.

set hostname <name>

This command allows the RabbitLink to be identified with a unique name, that may be up to 40 characters long.

name User-chosen string. The factory default is **RabbitLink**.

set ip <IP address>

This command sets the IP address for the RabbitLink.

IP address The IP address for the RabbitLink in dotted decimal format. The factory default is **10.10.1.100**.

set netmask x.x.x.x

This command sets the netmask.

x.x.x.x This is the dotted decimal format of the netmask. The factory default is **255.255.255.0**.

set passphrase

This command will prompt for a passphrase twice to confirm that the passphrase was correctly entered. The characters are not echoed back as a security measure. As another security measure, the passphrase is hashed before it is stored on the RabbitLink. Whenever a new session starts with Dynamic C or the RFU, the user will be asked for the passphrase. It should be as long as possible to increase security, up to the maximum length of 255 characters.

set port x

This command sets the TCP port number. If the RabbitLink is being used behind a firewall, it may be necessary to punch a hole in the firewall to allow remote access.

x The port number. The factory default is 4244.

set dhcp <on | off>

This command enables and disables the use of any DHCP server that is available on the network. The default condition is **on**. This command is only available with RabbitLink serial console version 2.00.

E.2 Variables Commands

The RabbitLink serial console has the ability to handle SSI (Server Side Includes) variables. These variables are stored in an xmem buffer. This means that the memory will lose the variables when power is cycled, although the references to the variables will still exist. Remember that any HTML file that includes SSI tags must have the file extension **.shtml**.

createv <varname> <vartype> <format> <value> [strlen]

This command creates a variable and stores it in the flash file system on the RabbitLink. The variable can be referenced in HTML files using SSI; e.g. `<!--#echo var="var1"-->`).

varname	The name of the variable.
vartype	Type of the variable (int8 , int16 , int32 , float32 , or string)
format	The printf -style format specifier (such as %d) for outputting the variable
value	The value to assign to the variable
strlen	This parameter is used if the variable is of type string is used to give the maximum length of the string.

EXAMPLES	createv var1 float32 "%.2f" 3.14
	createv var2 string "%s" "This is a test." 50

getv <varname>

This command gets the value of the specified variable. The value is printed using the format specifier given in the **createv** command.

varname The variable whose value is requested.

putv <varname> <value>

This command assigns the specified value to the specified variable.

varname The variable whose value is being changed.

value The new value for the variable.

list variables

This command lists all the variables by name and type that are stored in the flash file system on the RabbitLink.

reset variables

This command deletes all the variables that are stored in the flash file system on the RabbitLink.

E.3 File Commands

delete <filename>

Deletes the specified file from the flash file system on the RabbitLink.

filename Identifies the file to delete.

get <filename>

This command returns the contents of the specified file.

filename Identifies the file.

list files

This command lists all the files in the flash file system on the RabbitLink.

```
put <filename>  
<body of file>  
<ctrl-D>
```

This command sends an ASCII file to the flash file system on the RabbitLink. There is a time-out for this command: the data transfer begins no later than 60 seconds after the RabbitLink senses there is no activity.

NOTE: It is faster and more efficient to transfer all files, including ASCII files, as binary files.

filename	Identifies the file.
body of file	Everything sent before a <ctrl-D> (or a <ctrl-Z>) is part of the file contents.
ctrl-D (or a ctrl-Z)	This is the end of file marker.

```
put <filename><size>
```

This command sends a binary file to the flash file system on the RabbitLink. There is a time-out for this command: the data transfer begins no later than 60 seconds after the RabbitLink senses there is no activity.

NOTE: It is faster and more efficient to transfer all files, including ASCII files, as binary files.

filename	Identifies the file.
size	The number of bytes in the file being transferred.

E.4 E-Mail Commands

```
mail <e-mail address>  
    <subject>  
    <body>  
    <ctrl-D>
```

The mail command sends an e-mail via the RabbitLink to the specified address.

e-mail address	The address to which the e-mail is sent; e.g. rabbit@warren.com .
subject	After receiving the mail command, the RabbitLink will accept the next string as the subject of the e-mail
body	After receiving the subject of the e-mail, the RabbitLink will accept strings that follow as the body of the e-mail.
ctrl-D	ctrl-D (0x04) is the end of the e-mail.

```
set mail from <e-mail address>
```

This command sets the RabbitLink's e-mail address. The address will be included in the From line of all e-mail messages sent from the RabbitLink. Any error responses from the SMTP server will be sent to this address.

e-mail name	E-mail address of the RabbitLink; e.g. rabbit@warren.com .
--------------------	---

```
set mail server <IP address>
```

This command sets the IP address of the mail server.

IP address	The IP address of the mail server in dotted decimal format.
-------------------	---

E.5 Other Console Commands

echo <on | off>

This command toggles the echoing of characters.

help [filename]

This command displays the online help.

filename This optional parameter limits the help information to that which is associated with the specified file.

reset

This command resets the basic network parameters (the netmask and the IP addresses of the RabbitLink and its gateway) to factory defaults.

show [filename]

This command lists all assignable variables and their settings, except for the passphrase.

filename This optional parameter limits the list of variables to those associated with the specified file.

E.6 RabbitLink Console API (prior to Dynamic C 7.20)

The RabbitLink serial console may be accessed via the serial port using the **PROG IN** connector on the RabbitLink, as was done in Chapter 2 to configure the RabbitLink.

If RabbitLink firmware version 1.00 is being used, the API functions described in this section will be recognized by the RabbitLink. Prior to Dynamic C 7.20 these functions were in **STDIO.LIB**.

PrintToConsole

```
int PrintToConsole(char flag);
```

This function controls whether **STDIO** commands such as **printf** go to the RabbitLink serial console in addition to the Dynamic C **STDIO** window.

PARAMETER

flag	0- printf and related commands work as normal
	1- printf and related commands go to the RabbitLink serial console as well.

RETURN VALUE

0 if successful, -1 if not.

SendToConsole

```
int SendToConsole(char *data, int length);
```

This function writes a binary buffer of a specified length to the serial console on a RabbitLink. Any data are acceptable since the data will not show up in the Dynamic C **STDIO** window.

PARAMETERS

data	A pointer to the data to be sent.
length	The length of the buffer passed in data.

RETURN VALUE

The actual number of bytes written to the console.

```
int ConsoleFinish(long timeout);
```

```
int ConsoleFinish(long timeout);
```

This function finishes receiving data from the RabbitLink serial console by blocking for an optional amount of time to do it. If the timeout is set to 0, the function will not receive any data, but will poll to determine whether there are more data to receive.

PARAMETERS

timeout	The length of time to time out, in milliseconds, and is 0 for ConsoleFinish() to determine whether there are more data to receive.
----------------	---

RETURN VALUE

0 if there are more data on the serial console, non-zero if all the data have been received.

LIBRARY

STDIO.LIB

E.7 Example Using the RabbitLink Console API

```
main() {  
    // first method  
    SendToConsole("set ip 10.10.2.102\n", 19);  
  
    // second method  
    PrintToConsole(1);  
    printf("set gateway 10.10.2.1\n");  
    PrintToConsole(0);  
}
```


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SCHEMATICS

090-0112 RabbitLink (EG2100) Schematic

www.rabbitsemiconductor.com/documentation/schemat/090-0112.pdf

090-0085 Programming Cable Schematic

www.rabbitsemiconductor.com/documentation/schemat/090-0085.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.

