RbHOST User's Guide

Version 1

November 11, 1999

Rigel Corporation
P.O. Box 90040
Gainesville, Florida
(352) 373-4629
FAX (352) 373-1786
www.rigelcorp.com
tech@rigelcorp.com

Warranty

RIGEL CORPORATION - CUSTOMER AGREEMENT

1. Return Policy. This policy applies only when product purchased directly from Rigel Corporation. If you are not satisfied with the items purchased, prior to usage, you may return them to Rigel Corporation within thirty (30) days of your receipt of same and receive a full refund from Rigel Corporation. You will be responsible for shipping costs. Please call (352) 373-4629 prior to shipping. <u>A refund will not be given if the READS package has been opened</u>.

2. READS and RROS License. The READS and RROS being purchased is hereby licensed to you on a non-exclusive basis for use in only one computer system and shall remain the property of Rigel Corporation for purposes of utilization and resale. <u>You acknowledge you may not duplicate the READS or RROS for use in additional computers, nor may you modify, disassemble, translate, sub-license, rent or transfer electronically READS or RROS from one computer to another, or make it available through a timesharing service or network of computers.</u> Rigel Corporation maintains all proprietary rights in and to READS and RROS for purposes of sale and resale or license and re-license. BY BREAKING THE SEAL AND OTHERWISE OPENING THE READS PACKAGE, YOU INDICATE YOUR ACCEPTANCE OF THIS LICENSE AGREEMENT, AS WELL AS ALL OTHER PROVISIONS CONTAINED HEREIN.

3. Limited Warranty. Rigel Corporation warrants, for a period of sixty (60) days from your receipt, that READS disk(s), RROS, hardware assembled boards and hardware unassembled components shall be free of substantial errors or defects in material and workmanship which will materially interfere with the proper operation of the items purchased. If you believe such an error or defect exists, please call Rigel Corporation at (352) 373-4629 to see whether such error or defect may be corrected, prior to returning items to Rigel Corporation. Rigel Corporation will repair or replace, at its sole discretion, any defective items, at no cost to you, and the foregoing shall constitute your sole and exclusive remedy in the event of any defects in material or workmanship.

    THE LIMITED WARRANTIES SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

    YOU ASSUME ALL RISKS AND LIABILITY FROM OPERATION OF ITEMS PURCHASED AND RIGEL CORPORATION SHALL IN NO EVENT BE LIABLE FOR DAMAGES CAUSED BY USE OR PERFORMANCE, FOR LOSS PROFITS, PERSONAL INJURY OR FOR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. RIGEL CORPORATION'S LIABILITY SHALL NOT EXCEED THE COST OF REPAIR OR REPLACEMENT OF DEFECTIVE ITEMS.

    IF THE FOREGOING LIMITATIONS ON LIABILITY ARE UNACCEPTABLE TO YOU, YOU SHOULD RETURN ALL ITEMS PURCHASED TO RIGEL CORPORATION.

4. Board Kit. If you are purchasing a board kit, <u>you are assumed to have the skill and knowledge necessary to properly assemble same</u>. Please inspect all components and review accompanying instructions. If instructions are unclear, please return the kit unassembled for a full refund or, if you prefer, Rigel Corporation will assemble the kit for a fee of $30.00. You shall be responsible for shipping costs. The foregoing shall apply only where the kit is unassembled. In the event the kit is partially assembled, a refund will not be available, however, Rigel Corporation can, upon request, complete assembly for a fee based on an hourly rate of $50.00. <u>Although Rigel Corporation will replace any defective parts, it shall not be responsible for malfunctions due to errors in assembly</u>. If you encounter problems with assembly, please call Rigel Corporation at (352) 373-4629 for advice and instruction. In the event a problem cannot be resolved by telephone, Rigel Corporation will perform repair work, upon request, at the foregoing rate of $50.00 per hour.

5. Governing Law. This agreement and all rights of the respective parties shall be governed by the laws of the State of Florida.

Table of Contents

1   RbHost

RbHost is a 32-bit Windows(TM) application, which combines an editor and a terminal emulator. The editor comprises the main window, allowing multiple source files to be viewed and edited. The terminal emulator, referred to, as the TTY (Teletype) is associated with dockable child window, referred to as the TTY window.

1.1   Overview

The RbHost combines a terminal emulator and an editor with BASIC language syntax highlighting. It facilitates writing BASIC programs and downloading them to Rigel's embedded control boards. The BASIC interpreter may be in internal ROM, external ROM, or in RAM.

Most BASIC interpreters, such as the Intel 8052-BASIC, are complete development systems placed in internal ROM of the microcontroller. However, most interpreters do not have powerful edit functions. Thus, it is much more convenient to write source programs in RbHost and then download them to the interpreter. Similarly, RbHost provides a convenient way to store the source programs on the host PC.

1.2   RbHost Menu Commands

The File, Edit, View, Windows, and Help menus implement the customary interface functions. The View menu contains check marks beside each window component. These check marks are toggled when clicked to display or hide the corresponding window component.
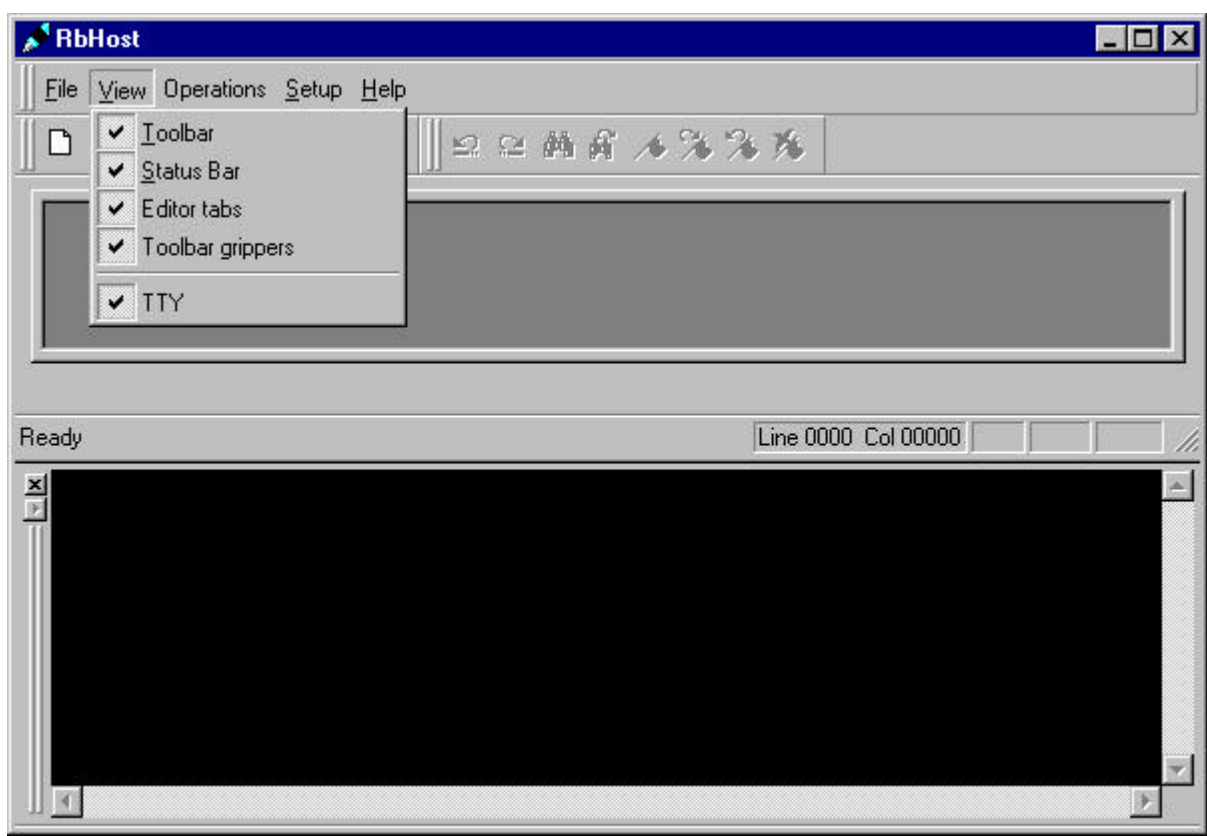
The Operations command is used for downloading BASIC source files to the interpreter on the target board. Communication with the interpreter is achieved through the TTY window, whose settings are determined by the "Setup | TTY | Connection" dialog.

1.3 Downloading BASIC Files to the Interpreter

Most BASIC interpreters allow source code to directly be entered. This phase is usually done in the so-called "Console Mode." Once a program is loaded onto the interpreter, the program may be executed by switching the interpreter to the "Run Mode."

Use Operation menu command "Download Basic file" lets you select an existing file and sends its contents to the interpreter. Similarly, the menu command "Download current editor file" sends the source code contained in the currently active editor window.
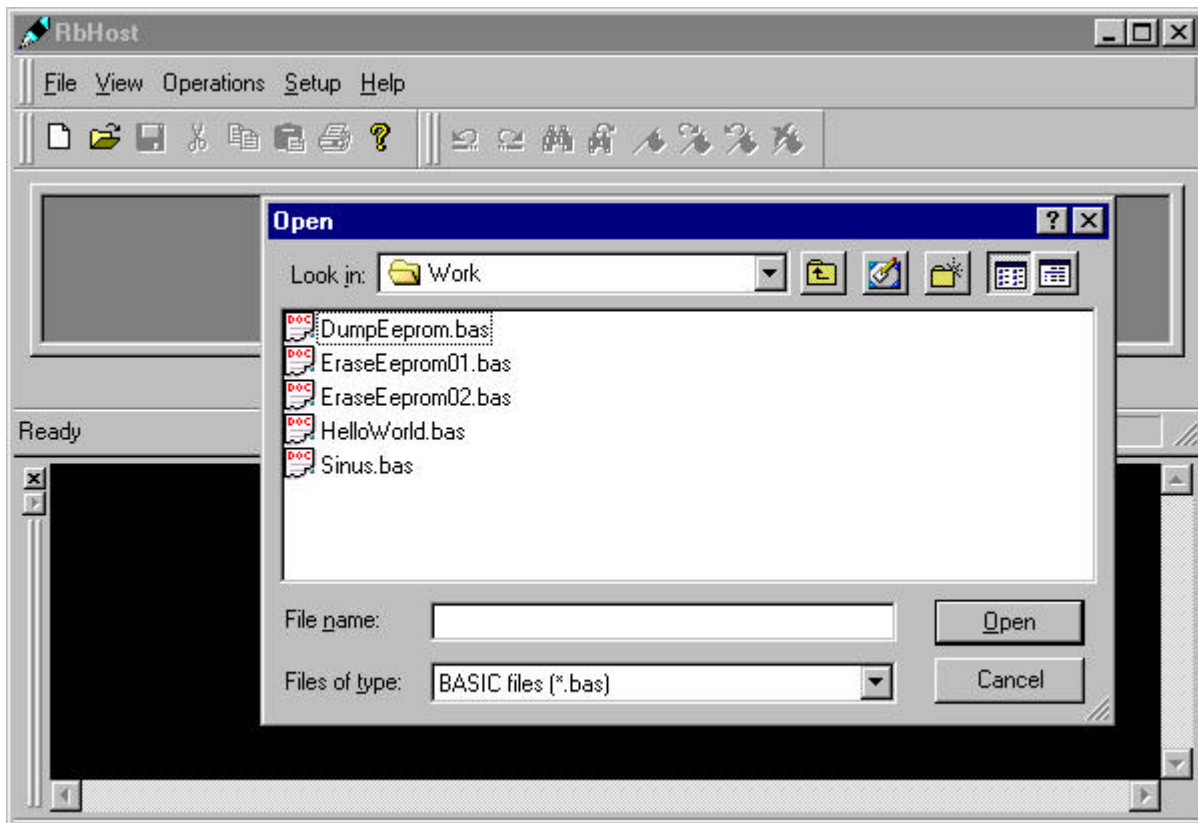
For a successful download, the interpreter must be in the console mode, and the TTY parameters must be valid. Use the View menu to show the TTY window and the Setup | TTY menu to set the TTY parameters.

1.4 Setting TTY Parameters

The TTY window captures and exclusively uses a serial port. For RbHost to communicate with a BASIC interpreter, the serial port must be available and correctly initialized.

The menu command "Setup | TTY" allows you to select the TTY window font and the background color. The "Connection" submenu item allows you to select the serial communications port (COMM Port) and the Baud rate. The Baud rate depends on the BASIC

interpreter and the crystal frequency of the target board. The R31JP with the BASIC interpreter in internal ROM requires a Baud rate of 19200 or lower.

The Connection dialog contains delay parameters used in downloading BASIC source code to the interpreter. The delay times are in milliseconds. The interpreter may need extra time to
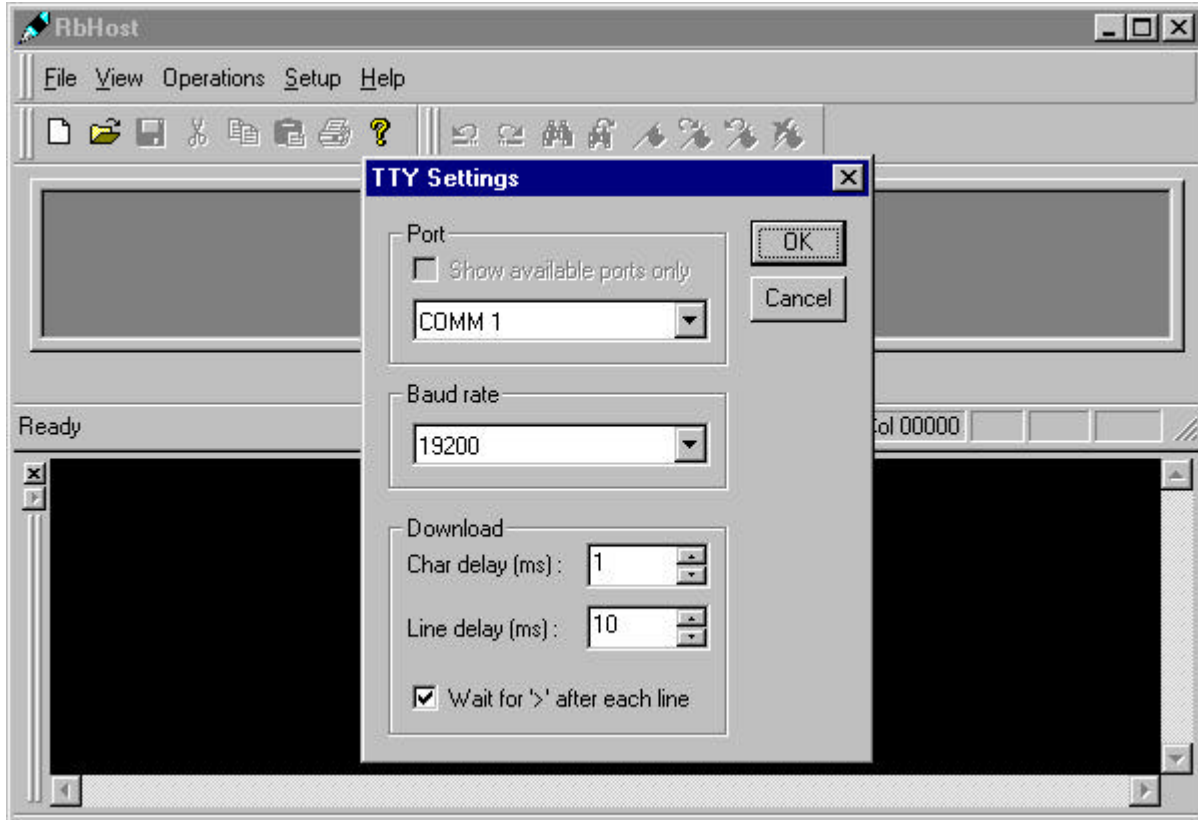
digest the source being downloaded. Thus, there may be a need to place delays between successive source characters, or after each line. RbHost allows millisecond-level delays to be specified after each character, and each line. Most interpreters use the '>' prompt to indicate that they have completed processing the source line and that they are ready for the next source line. Consequently, there is a check box in the Connection dialog, which when checked, pauses until the prompt is received. If you are using the R31JP with the BASIC interpreter in ROM, it is recommended that you enable this option.

1.5   Environment Settings

The directory in which RbHost is installed is automatically kept and used in saving information from one session to the next. You may override this by manually specifying the program directory using the "Setup | Environment | Program Directory" command.
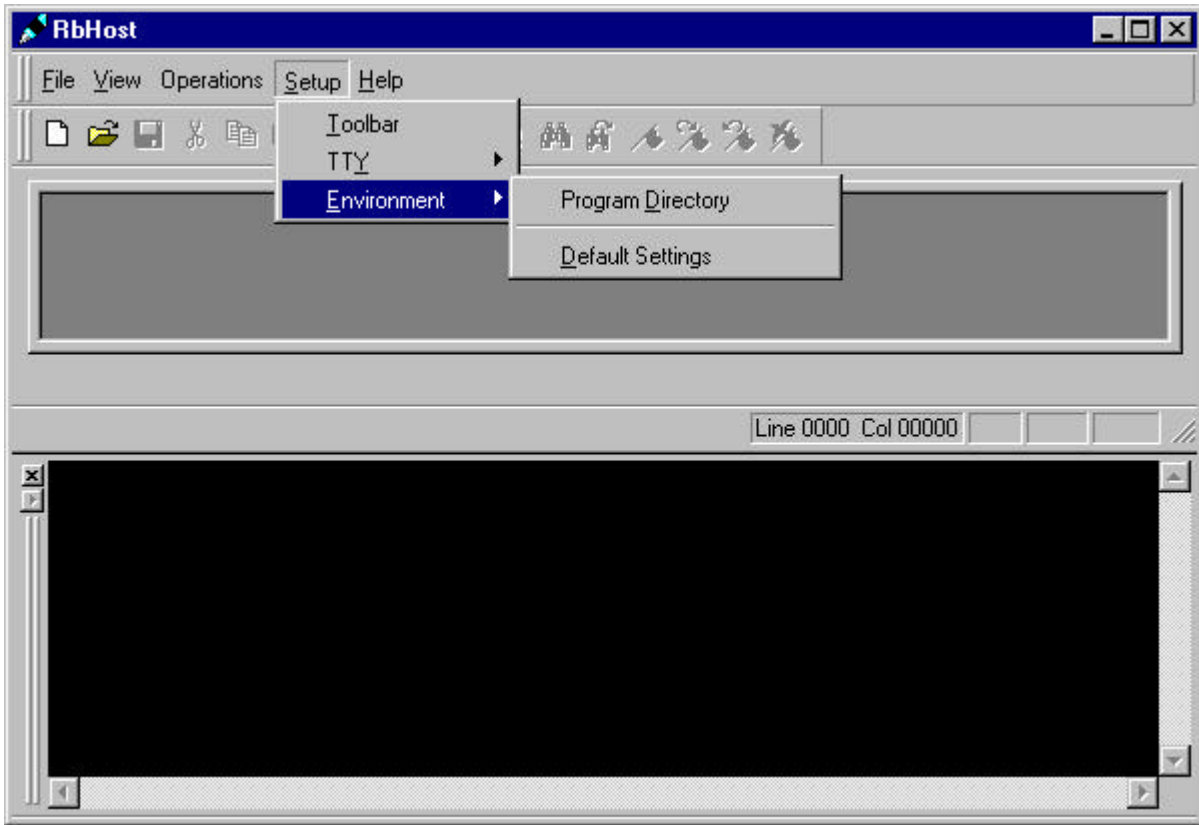
The environment settings are determined during installation. You may revert back to the original settings using the "Setup | Environment | Default Settings" command. This command resets the Windows registry settings to their values at installation. The toolbar, the program directory, the TTY font, background, port, baud rate, and delay parameters are changed to their default values.

2   Using R31JP with the 8052-BASIC Interpreter

As of November 1999, the R31JP board comes standard with an 8052 which contains an 8K ROM with interpreted BASIC. The BASIC interpreter is compiled from Intel's MCS-51 BASIC (version 1.1) source code, which has been released to the public domain as a freeware program.

Please note that Intel no longer supports or warrants this interpreter.

Rigel Corporation includes the BASIC interpreter purely as a convenience to its customers. Note that if the R31JP contain an EEPROM version of the 8052, you may erase the BASIC interpreter and reprogram the CPU with your own code. Also, inserting the EA# jumper disables internal code memory so that the 8052 may be used without the BASIC interpreter.

The BASIC interpreter requires a different memory map than the R31JP default. The BASIC memory map is implemented by the CPLD. The CPLD equations are available on Rigel's website. Moreover, Xilinx, Inc. (www.xilinx.com) has recently made a free version of their CPLD software tools, called the WebPack, available. Unless otherwise requested or states, as of November 1999, the Rigel Corporation will program the CPLDs to support the interpreted BASIC.

2.1   Configuring the R31JP

The memory map expected by the BASIC interpreter is selected by the following steps.

1.   Remove the EA# jumper.
2.   Insert the BASIC jumper.
3.   Remove jumpers AUX0, AUX1, and AUX2.

Please note that when the BASIC jumper is inserted both LEDs light up, and that the MON/RUN slide switch has no effect.

Connect the R31JP to the PC by a straight-through serial cable and run READS51 or READS400. See the R31JP manual for more information. The BASIC interpreter may also be used with a terminal emulator such as the Windows HyperTerminal. Select a Baud rate of 9600 or 19200. Press the RESET pushbutton on the board. Then tap the space bar on the keyboard. The 8052 BASIC determines the Baud rate by the bit pattern timing of the space character (0x20). The BASIC interpreter prompt should appear on screen.

You may now begin writing and executing BASIC programs.

Caution

If you have an unerased or improperly programmed EEPROM in socket U5, the BASIC interpreter prompt may not appear on screen. Refer to the help section on "Erasing the EEPROM" for further information.

Rigel Corporation assumes no responsibility from the use or misuse of the R31JP with the BASIC interpreter. Please refer to the R31JP documentation for full details.

2.2   Saving BASIC Code in an EEPROM

BASIC programs written through the keyboard are saved in RAM. The interpreted BASIC has the capability to write the BASIC code into nonvolatile memory. The R31JP board does not have circuitry to burn EPROMs. However, you may place your code in an EEPROM placed in socket U5. Alternatively, you may use a battery-backed RAM device.

The EEPROM is placed in socket U5. Remove the default RROS EPROM. Also, change jumpers J4 and J5 from the ROM position to the RAM/EEP position. These two jumpers are between U5 and the options jumpers BASIC, AUX2, AUX1, and AUX0.

Start the BASIC interpreter as described above and enter your code. The BASIC interpreter commands PROG, PROG1, PROG6 are used to copy the current code in RAM to EEPROM. Note that BASIC is capable of copying as many such programs to EEPROM as memory permits. BASIC assigns a number to each such program placed in EEPROM.   A program in EEPROM may be selected by the ROMn command, where n is the number assigned to the program. Also, the XFER command copies the currently selected program in EEPROM into RAM, so that you may edit it.

2.3   Erasing the EEPROM

The BASIC interpreter initially expects an erased EEPROM or one which contains valid BASIC programs. An erased EEPROM has all data bits set to 1 (all data bytes = 0xFF).

The R31JP has the capability of erasing the EEPROM in socket U5. Place the jumper AUX0. This allows the EEPROM to be written to with the WR# signal. (Note that BASIC uses Port 1 pins to generate write signals.) You may now selectively modify any EEPROM address by using the BASIC XBY() operator. Alternatively, you may write a simple loop to erase a block of EEPROM. For example, consider the following BASIC program.

```
100    FOR N=8000h TO 81FFH

110    IF XBY(N)=255 THEN GOTO 170

120    PH0. N, XBY(N),

130    XBY(N)=255

140    FOR K=0 TO 10

150    NEXT K

160    PH0. XBY(I)

170    NEXT I
```

```
180     END
```

The FOR loop spans the block 8000h to 81FFh. No action is taken if the data byte is already erased (FFh=255). Otherwise, line 130 writes 255 to the address. Lines 140 and 150 implement a simple delay loop to allow the EEPROM to be written. The remainder of the lines display the address, its value before writing 255, and its value after.

Caution

The AUX0 jumper should be inserted only to erase the EEPROM and removed immediately after erasure.

Upon reset, the BASIC interpreter checks the size of RAM by poking numbers and trying to read them back. If the AUX0 jumper is left when BASIC initializes, it will destroy the first byte in EEPROM. This may prevent BASIC from initializing without the AUX0 jumper. If this happens, simply insert the AUX0 jumper, initialize BASIC and write 255 to 8000h using the XBY(8000h)=255 command.

APPENDIX A

8052-BASIC

The Intel 8052-BASIC interpreter (version 1.1) source code has been released to the public domain as a freeware program. Please note that Intel no longer supports or warrants this interpreter. The source code may be obtained from the Intel website. Currently, the source is found at

ftp://ftp.intel.com/pub/msc51/tools/basic52.zip

Rigel Corporation includes the BASIC interpreter in internal ROM of some of its 8052 embedded control board purely as a convenience to its customers. Note that in most cases the embedded controller board microcontroller contains an EEPROM version of the 8052. In this case, you may erase the BASIC interpreter and reprogram the CPU with your own code. Also, inserting the EA# jumper disables internal code memory so that the 8052 may be used without the BASIC interpreter.

A.1   Information Sources for the 8052 Interpreted BASIC

Intel's 8052 BASIC interpreter has been around for almost two decades. Consequently, there is much information about the interpreter in public domain. The Intel document

MCS BASIC-52 USER"S MANUAL (order number 270010-002)

is out of print and has been for many years. However, similar manuals are published or available from MicroMint, Inc., Systronix, Inc., and Jameco Electronics.

A.2   Other 8052 BASIC Language Products

MicroMint, Inc. manufactures a multitasking version of the 8052 BASIC interpreter, which is also available through Jameco Electronics. Systronix, Inc. offers a BASIC compiler. This results in faster execution times. The MicroMint BASIC interpreter and the Systronix BASIC compiler take the same source code as the BASIC interpreter.