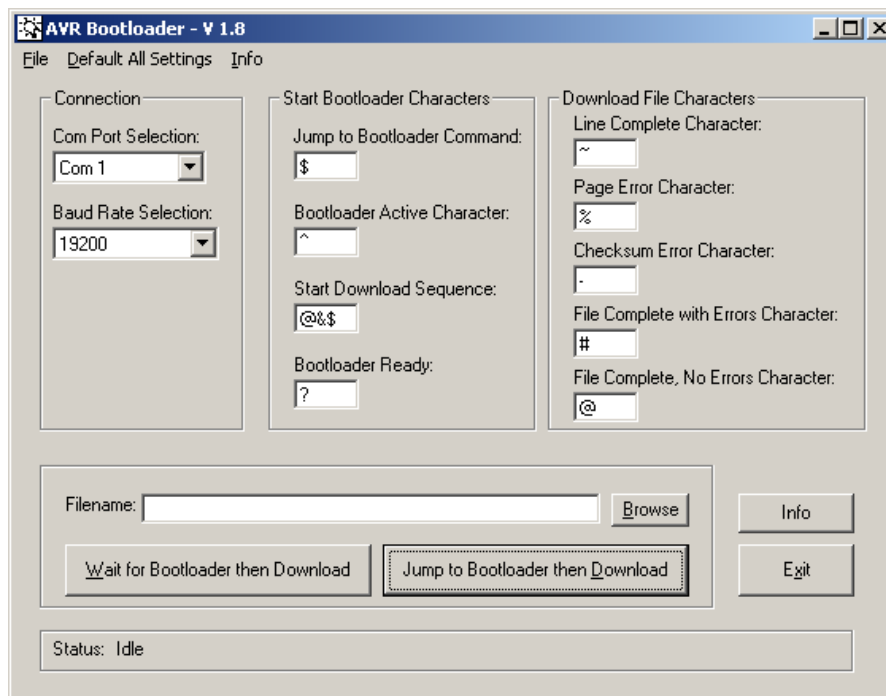
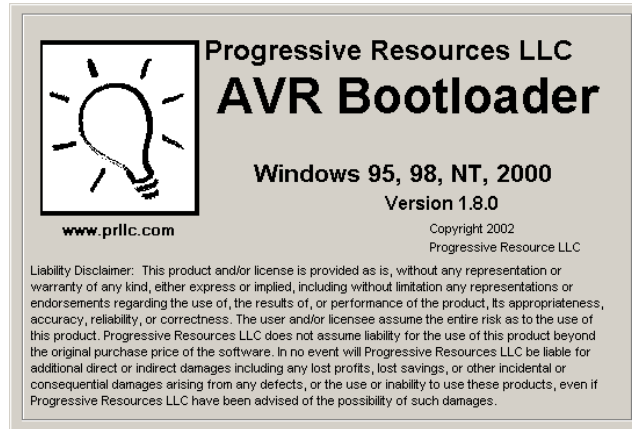


The AVR Bootloader



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Introduction

The AVR Bootloader is a program that allows the programming or re-programming of the target AVR microcontroller using the PC serial port instead of a traditional programmer. Once the AVR Bootloader is programmed into the microcontroller, it remains until the chip is erased. The Bootloader allows a simple Windows application to download an Intel hex file into the microcontroller from the PC serial port through the microcontroller's UART.

This document is intended to provide the reader the necessary information to utilize the AVR Bootloader without going into great detail on how this is accomplished. Detailed information about the AVR Bootloader is available from Progressive Resources LLC at the following URL <http://www.prlc.com/AVRBL-16.pdf>

Getting Started

The MegaDEV boards used for the laboratory portion of EET 209 / 309 come with the AVR Bootstrap loader programmed in the chips from the factory.

If the chip has been erased and or reprogrammed, the Bootloader will have to be replaced into the chip. The hex source file for the Bootloader is located in the EET 309 directory on the TCN G: drive (\Eet309\Atmel Stuff\Boot Loader 163\boot16_32.hex). For assistance in re-programming the Bootloader, consult the available documentation on programming the AVR family of microcontrollers using a chip programmer like the CableAVR. Specific information is available online at the following address: http://web.ics.purdue.edu/~jricha14/Programming_Stuff/programming.htm. Regardless of the programmer used to replace the Bootloader, ensure that the following special options are selected: the Boot Size Selection must be set for 1024 Words, and the Boot Loader Reset Vector must be enabled (see figure 1 below).

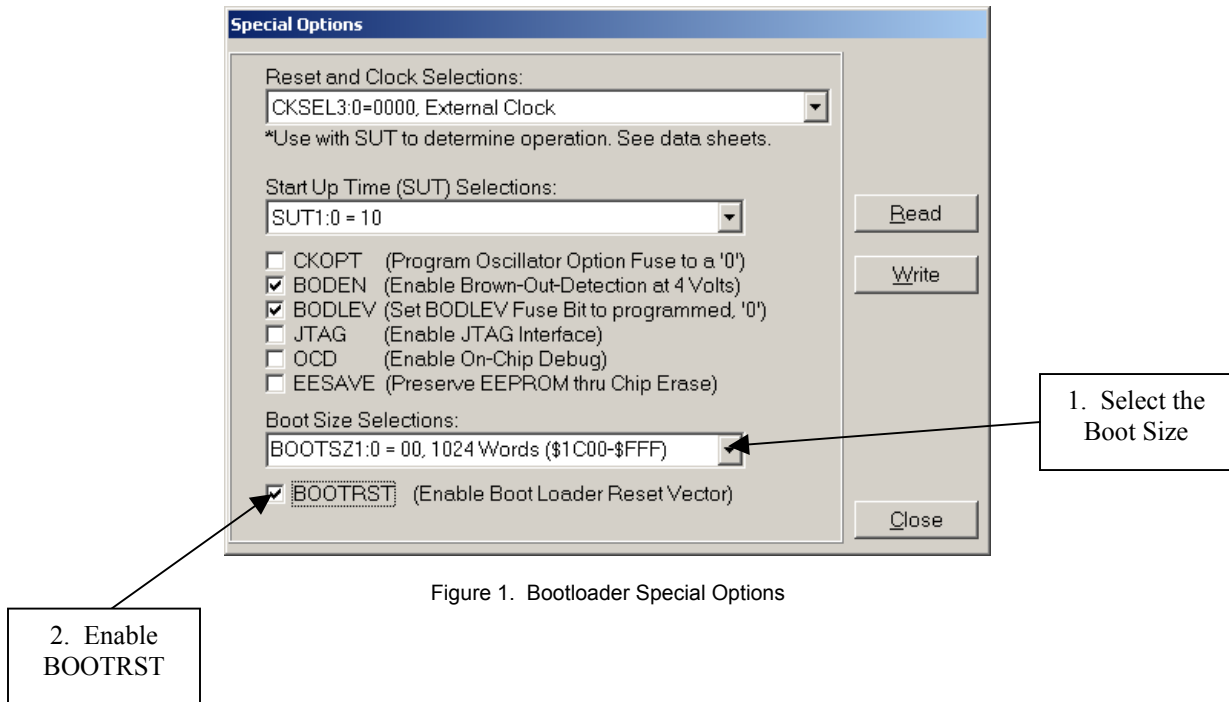


Figure 1. Bootloader Special Options

The PC Application

The PC application is also located in the EET 309 directory (full path above). These files, which constitute all the files except the hex file (located on the G: Drive), should be copied and placed inside a directory on the host PC. The name and location of the target directory are not important. It is not a necessity but creating a shortcut to the executable may prove helpful.

Programming the Target AVR

After creating the Intel hex formatted program for the target AVR with a compiler like CodeVisionAVR, the Bootloader PC application must be launched. Figure 2 illustrates the GUI (Graphical User Interface) for the Bootloader. Load the desired hex file by selecting the appropriate filename through the Browse button. Standard Windows navigation allows the desired file to be located in a familiar fashion. Once the file has been located, it may be opened by double-clicking on the file or by selecting the file and then clicking on the Open button.

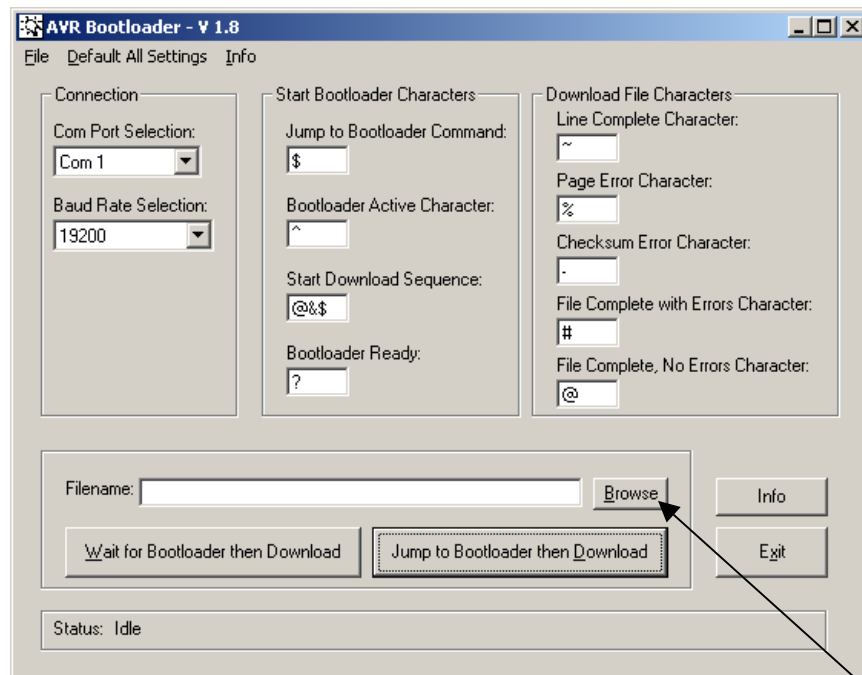


Figure 2. Using the Browse Button

1. Use the Browse Button to Locate the Desired File

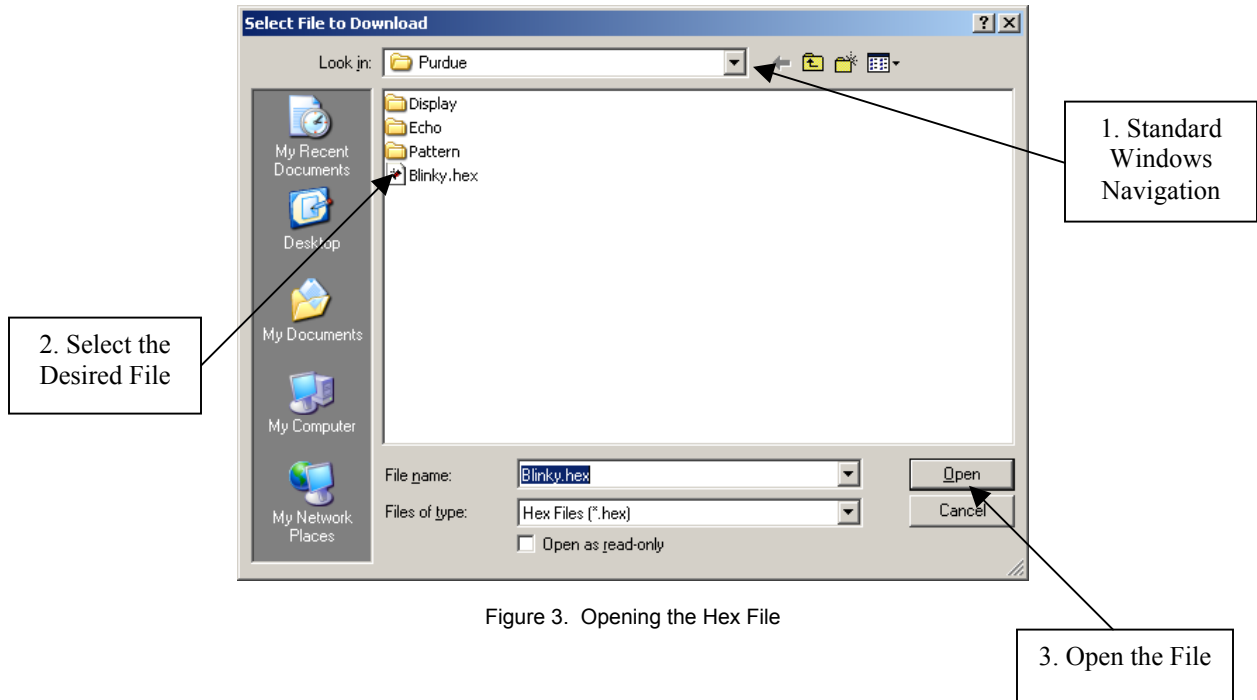


Figure 3. Opening the Hex File

Opening the file loads it into the bootloader application. Once the file has been loaded, the file is ready to be transferred to the target AVR microcontroller.

Caution: The Bootloader application must be able to use the serial connection to the AVR device being programmed. In the event that the serial connection is normally used as a terminal display in CodeVision, the terminal connection must be "Disconnected" temporarily. Click on the Disconnect button on the CVAVR terminal window before proceeding. If the terminal window in CVAVR is not being used, this step is not required.

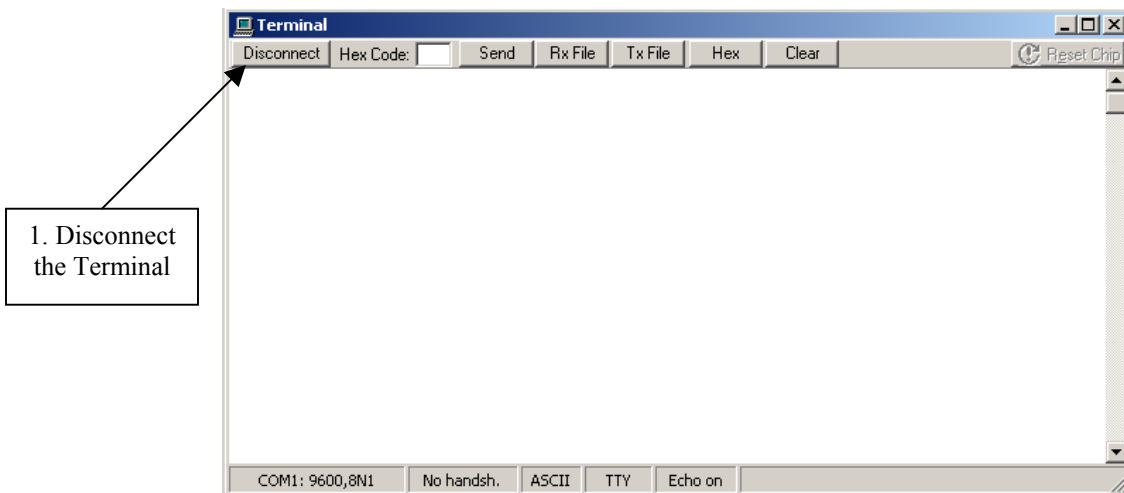


Figure 4. Disconnect the Terminal Prior to Programming

On the Bootloader application, select the proper Com Port from the pull-down list. The default Baud Rate Selection is 19200 and should not be changed because the speed must match the communication speed of the bootloader program in the AVR device.

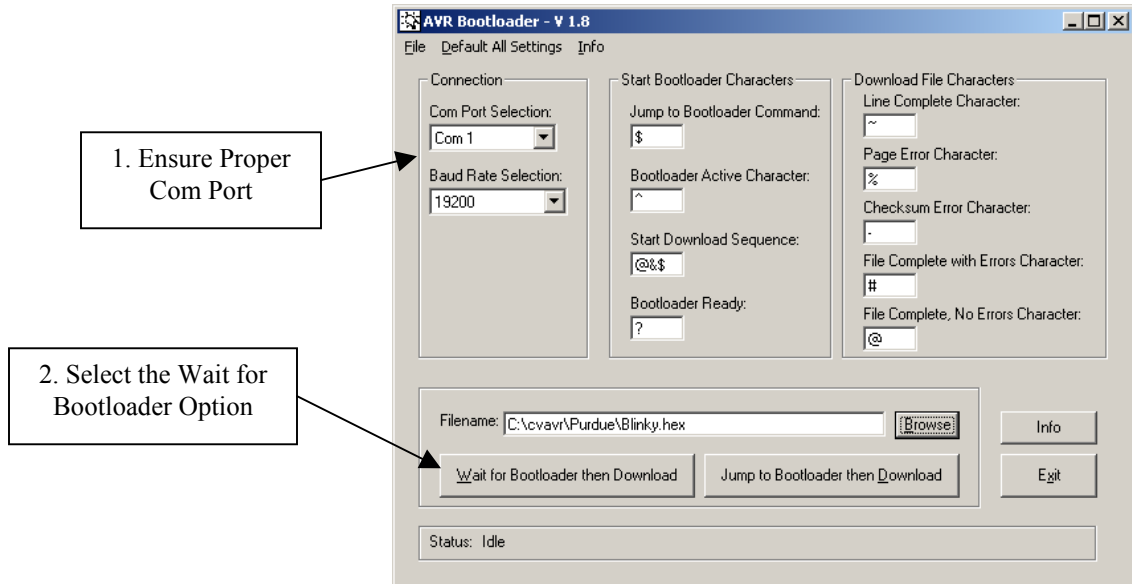


Figure 5. Com Port Setup and Program Selection

To start the download process, click on the “Wait for Bootloader” option and press the “Reset” button on the Mega Development board. This will synchronize the Bootloader program in the microcontroller device to the Bootloader application and the program will be downloaded into the Flash memory of the microcontroller.

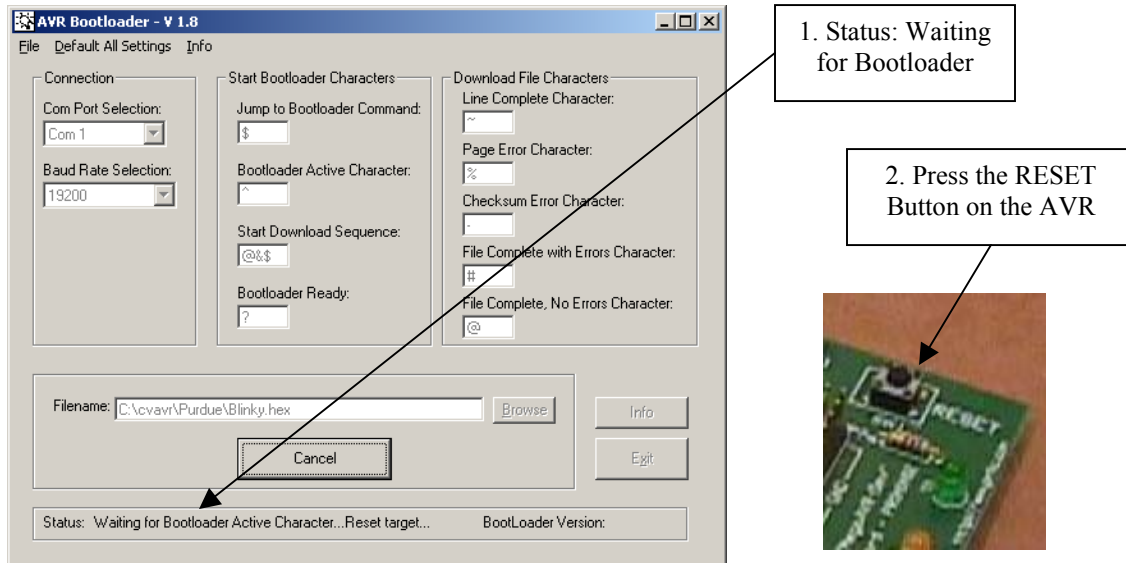


Figure 6. Reset the Target AVR

The status window of the GUI informs the user about the progress of the download.

Upon successful completion of the file transfer process, the application displays a 'Success' prompt and the target AVR is running the new firmware.

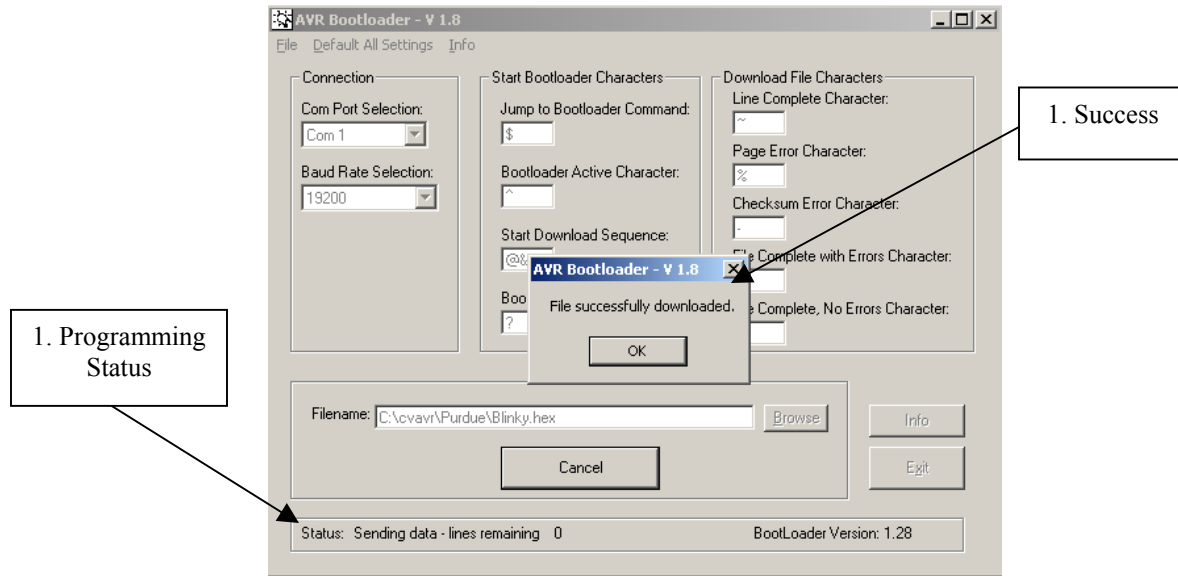


Figure 7. Successful Download

If the user was previously using the terminal display, the connection can be re-established by selecting the "Connect" option in the terminal window after the successfully download has been acknowledged by clicking on the OK button from figure 9. It is not necessary to close the Bootloader application to use the CVAVR terminal window.

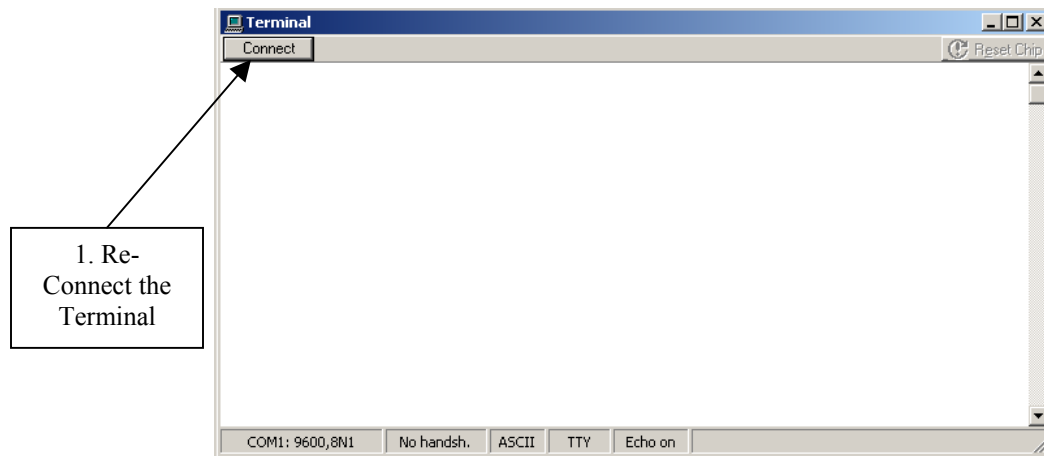


Figure 8. Re-Connecting the Terminal

Acknowledgements:

Portions of this document are taken directly from "Boot Loader Info" by Richard H. Barnett PE, Ph. D, Purdue University, with permission.

The pictures of the application screens are reprinted courtesy of Progressive Resources LLC.