

***Reflashing Accel- RF  
Peripheral Interface Controller  
(PIC) Code***

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*Accel-RF Corporation specializes in the design, development, manufacture, and sales of accelerated life-test/burn-in test systems for RF and Microwave semiconductor devices. This manual describes the performance of the AARTS LifeTest software code. For more information contact:*

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## 1 Description

Accel-RF (ARF) has designed a number of custom boards within its AARTS product line that employ a Peripheral Interface Controller (PIC) microcomputer chip. These chips support USB operation. The firmware on these chips may be upgraded over the USB bus. This document describes how to upgrade the firmware on those devices.

All devices can be operated in “User” mode or “Boot” mode. User-mode is the normal operational mode for a peripheral. Boot-mode is only used when upgrading the PIC firmware. Almost all ARF peripherals also contain FPGAs for implementing complex digital logic. PIC firmware versions require compatible FPGA versions; hence, upgrading the firmware should only be performed under the direction of ARF.

### 1.1 Installing the Proper Drivers

Two ARF applications are required to properly update a peripheral device: 1) “USBControl” which is used to control the peripheral; and 2) “Bootloader” which is used to flash upgrade the code. Both programs are installed in the USBControl Setup program, which is available on the ARF website in the download area.

USBControl is a Visual Basic (VB) application. All drivers and controls are automatically installed in Windows when the installation program is run. This program provides a means to force the PIC to enter Boot- and User-modes.

The Bootloader is a Microsoft .Net C# application that supports pushing of the new code into the PIC. The updated PIC code “xxx.HEX” file will be loaded and transferred to the peripheral device using this program.

The following sections describe how to set up these two applications.

#### 1.1.1 USBControl Installation

The USBControl application is a program that supports low-level stand-alone control of all peripheral devices developed by ARF. Further, it is required for flash updating the peripheral device. The following describes how to install the latest version of USBControl:

**Step 1)** Run the USBControl setup installation (note: if an older version of the USBControl is already installed, use the Windows Control Panel “Add/Remove Programs” feature to remove the older version before installing the new code).

Using a browser, open the [www.accelrf.com](http://www.accelrf.com) home page, and navigate to the Accel-RF download area (left side menu structure). Download the “USB Control Installation Software” and install that on the local machine. Running this application installs all of the required controls and drivers. An icon should automatically be created on the desktop for launching the application.

Direct link to download page:

[http://www.accelrf.com/www/index.php?option=com\\_content&view=article&id=26&Itemid=29](http://www.accelrf.com/www/index.php?option=com_content&view=article&id=26&Itemid=29)

**Step 2)** Download the latest executable version of the USBControl program, labeled “USB Control Software” on the download page. This zip file contains a single file called USBControl.EXE. Unzip that file over the file of the same name in the installation folder determined in Step 1 (note: this is only required if the latest executable code has a later date code than the installation file).

### 1.1.2 Bootloader Installation

The Bootloader application is a program that supports downloading new firmware to the ARF peripheral. This application is developed in Microsoft C# .Net; hence, the .Net framework must be resident on the machine running the application. The .Net framework is a free download from Microsoft. Note, newer machines running Vista may already have the framework installed. If you are unsure you can skip to Step 2 below and try to run the application. If it works, the framework is already resident.

The following describes how to install the latest version of Bootloader:

**Step 1)** Install the Microsoft .Net framework. This is a free download from Microsoft for installation on x86 platforms (see link below). Download and Install the .Net framework following the Microsoft installation instructions.

Direct link to download page:

<http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en>

**Step 2)** Download the latest executable version of the Bootloader program, labeled “USB Bootloader” on the ARF download page. This zip file contains a single file called USB\_Bootloader.EXE. Unzip that file over the file of the same name in the folder where the USBControl application was installed.

## 1.2 Flashing the PIC Firmware

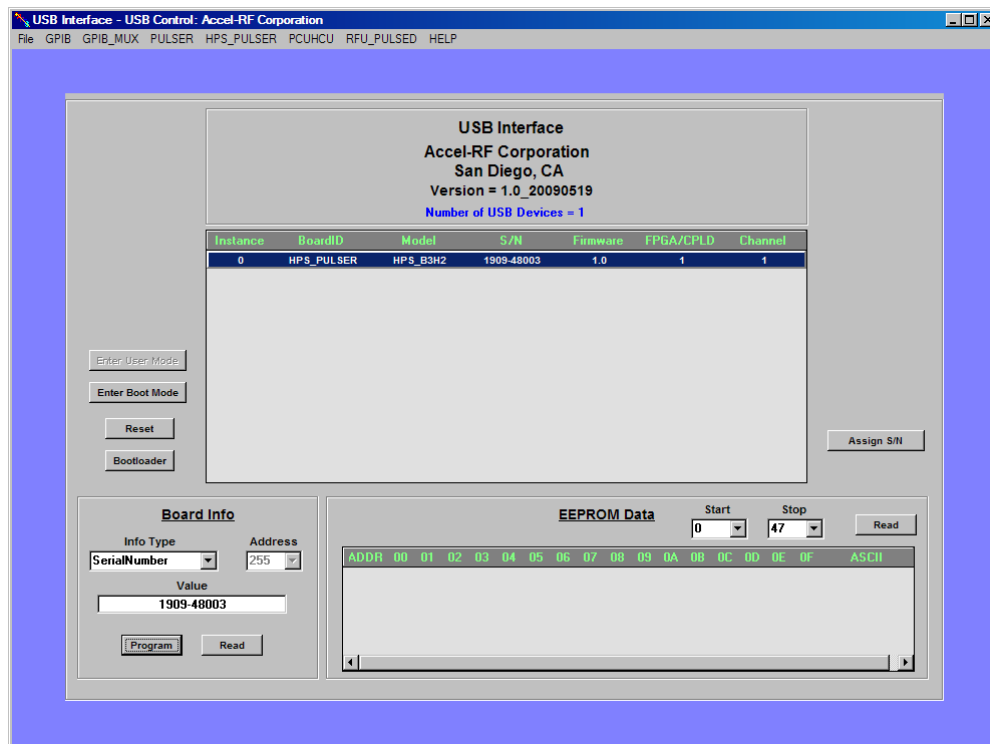
The flash upgrade of the firmware is a multi-step process and requires following these instructions explicitly! First, be sure there is one and only one device connected to the computer being used to do the upgrade (this is required because the Bootloader application cannot distinguish between devices via instance number like the USBControl program can). The system machine will work fine, but only one peripheral should be in the system at any one time during the process. A second computer, such as a laptop, will work as well. All ARF PIC peripheral devices are design to operate on the USB power supply resident in the computer and does not require external supplies to perform the flash upgrade.

The following steps must be followed exactly as specified:

**Step 1)** Launch the USBControl program and connect a USB cable to the peripheral device. A window similar to Figure 1-1 will be displayed.

**Step 2)** Click on the single line entry in the table. In the Board Info area (lower left), select the “SerialNumber” Info Type and click on “Read” to capture the current serial number (write that down as well - the flash upgrade wipes out the S/N, so we need to remember it for later programming).

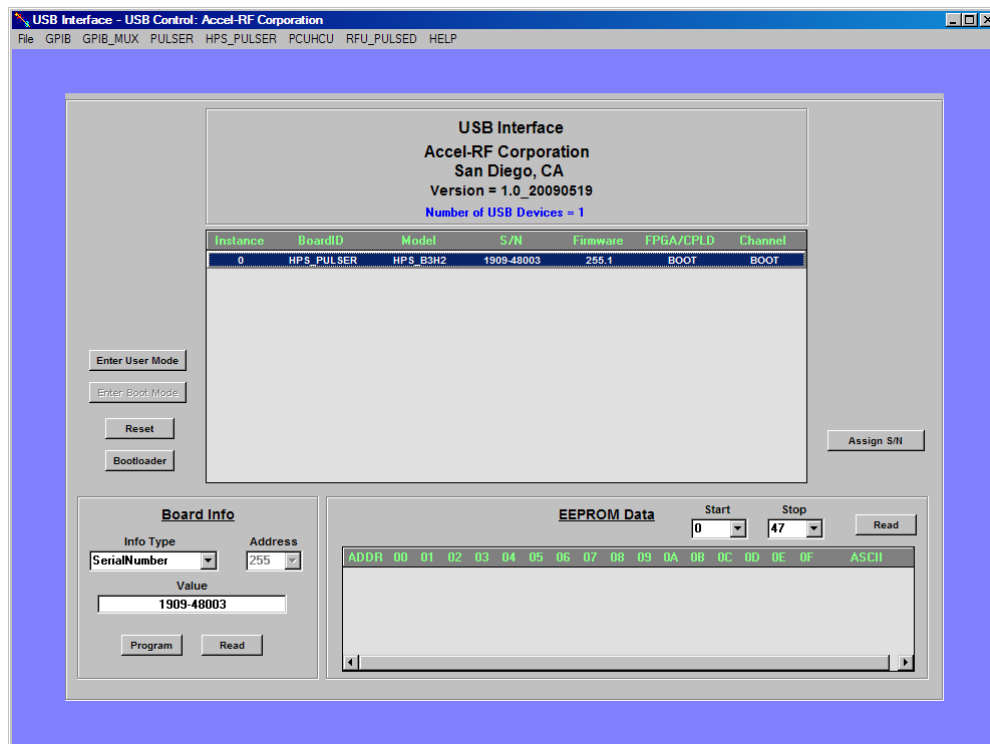
**Figure 1-1: USBControl Main Control Form**



**Step 3)** Click on the “Enter Boot Mode” command button. The table line will change to look something like Figure 1-2. Note: if you get an error message stating the system was unable to open data pipes, simply unplug the USB cable to the peripheral and reconnect it. Once it is redetected the table line should indicate FPGA/CPLD and Channel as “BOOT”. The peripheral is now ready to be updated.

Leave the USBControl Program running.

Figure 1-2: Boot-Mode Screen (before reflashing)



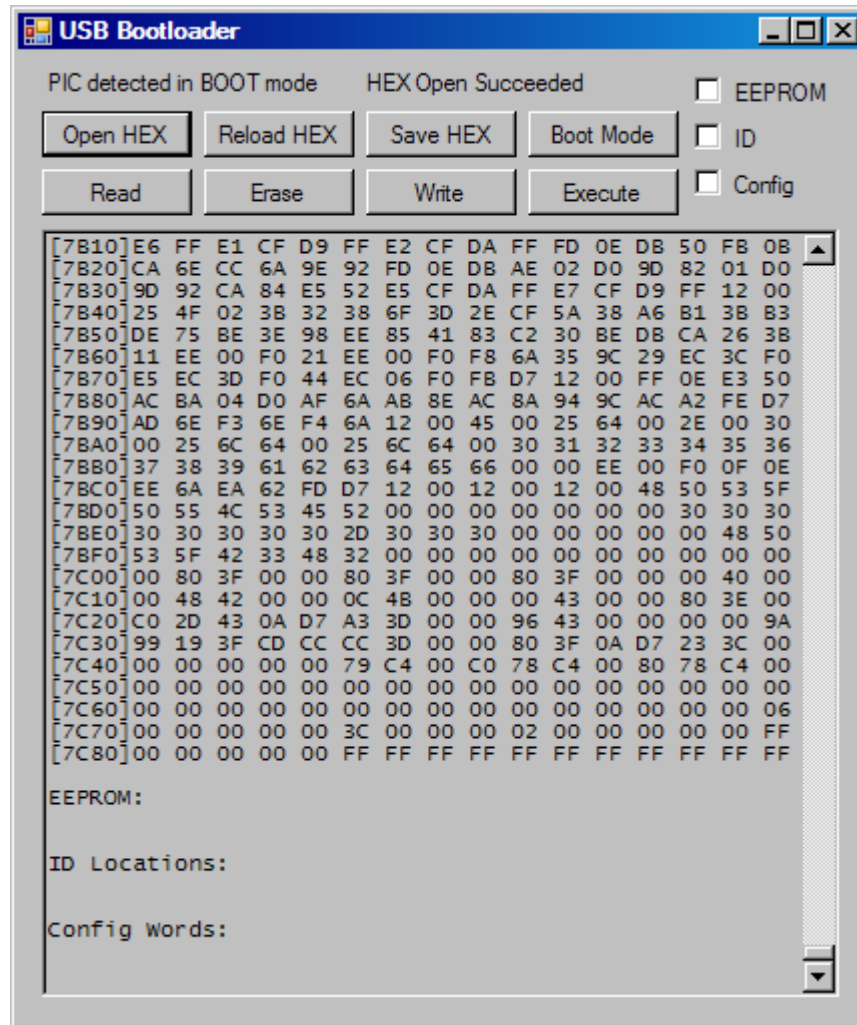
**Step 4)** Launch the Bootloader program. A screen similar to Figure 1-3 will appear. The info text at the top left should state “PIC detected in BOOT mode”. Initially the lower window will be clear – Click on “Open HEX” and use the navigator box to locate the “xxx.HEX” file that was sent by ARF (i.e. the updated firmware). The “Hex Open Succeeded” text will appear in the upper right area and the Table will then contain Hex values.

**Step 5)** Click on the “Write” command button. The info text at the upper right will state “Writing...”. Do not do anything else using the computer until it states “Write Complete”, otherwise, you could corrupt the PIC such that it will have to be sent back to the factory for reinstallation. Once the writing is complete (it should take about 10 to 15 seconds), proceed to the next step.

**Step 6)** If this is the last peripheral to update, close the Bootloader program. Otherwise, it is OK to leave it open.

**Step 7)** Return to the USBControl program. Note: if the program indicates an error, such as “Failed to open data pipes”, unplug the peripheral and reconnect it. After detection, it should be ready to continue.

Figure 1-3: Bootloader Screen



**Step 8)** After reflashing the peripheral, the screen should look like Figure 1-4. Note that the Model and Serial Number will be blank, and it is still in Boot mode. Click on “Enter User Mode”. This causes the peripheral to change states. Again, if a lost data pipes message appears, simply disconnect and reconnect the USB interface.

**Step 9)** The User-Mode screen should look similar to Figure 1-5 after reflashing. Note that the Model Number is now correct, but the Serial Number is not valid. If all has gone smoothly, the original Serial Number should still be in the Board Info “Info Type” box. Click on the “Program” button to reset the S/N into the peripheral. The final updated device should now indicate the new PIC firmware Rev and contain the original S/N.

**Step 10)** The upgrade is now complete. Remove the peripheral and return it to the system, or return to Step 1 for reflashing the next device.

Figure 1-4: Boot-Mode Screen (after reflashing)

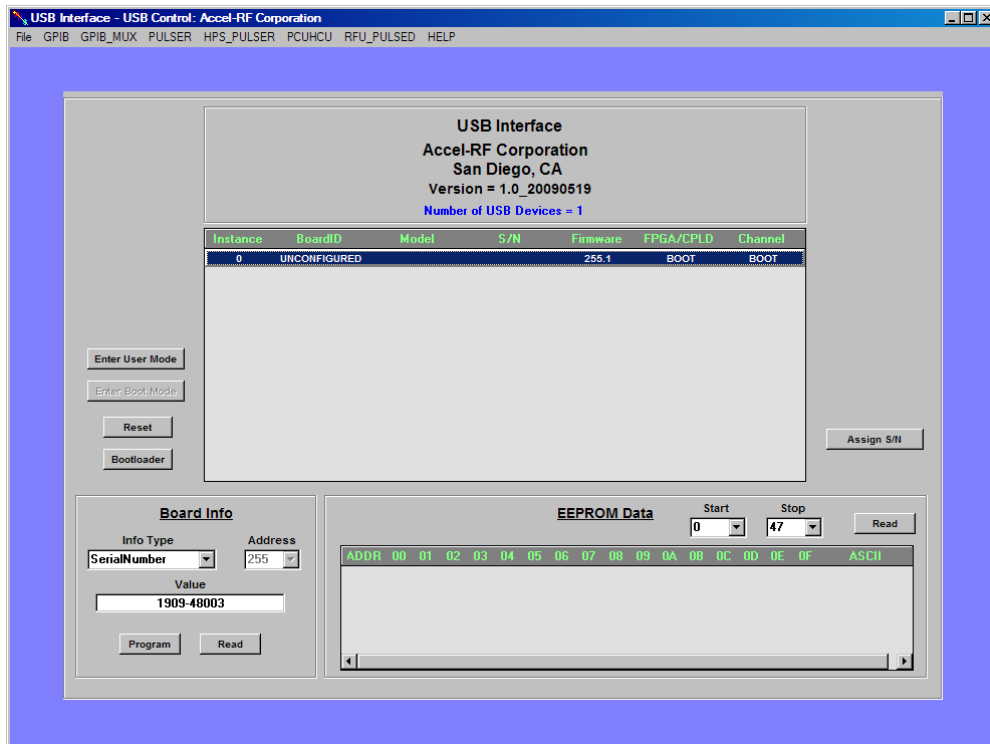


Figure 1-5: User-Mode Screen (after reflashing)

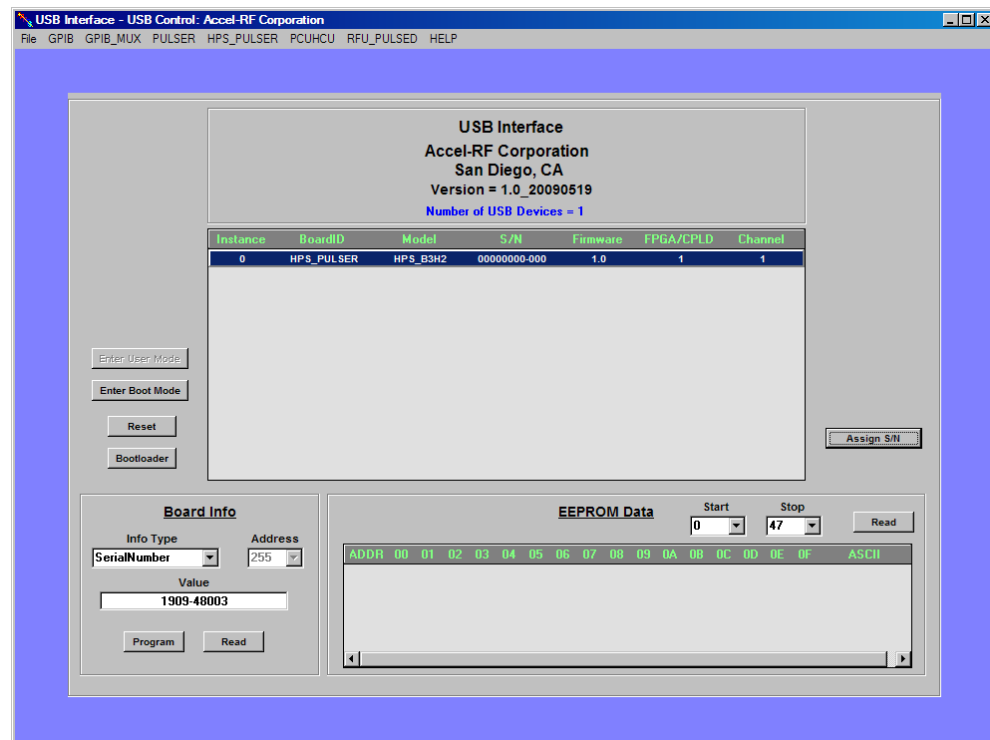


Figure 1-6: Final User-Mode Screen

