Butler II Program and Test

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Butler II Program & Test

Items Needed:

PC (XP or Vista)
USB type A to mini-B cable
Atmel FLIP software
LRS ButlerII USB Configuration Program
Power Supply
Spectrum Analyzer

Initial SETUP:

The ButlerII USB uses the DFU (Device Firmware Update) USB feature to load firmware. This feature is accessed in the boot-loader of the unit and must be entered during a reset of the device. New un-programmed units automatically run the DFU boot-loader. Step 2 describes how to enter the DFU boot-loader if needed.

If the PC has previously been setup to run FLIP including the DFU driver has been installed proceed to the section "Programming the Unit".

1) **ONLY IF NEEDED:** Install ATMEL FLIP 3.X Software, You can get the software by following this link:
   http://www.atmel.com/dyn/products/tools_card.asp?tool_id=3886

   Select either the version with or without Java depending on whether you computer already has the Java runtime installed. (suggestion, remove any previous installation of java runtime and install complete programming system (java+FLIP)

   Follow the directions for installing FLIP as provided

2) **ONLY IF NEEDED:** Install the Windows DFU driver. Plug in an un-programmed unit to the PC via the USB cable. This will force the DFU boot-loader firmware to run, Windows will detect the new device and prompt for the installation of the appropriate driver. Follow Appendix A to install the appropriate driver. FLIP cannot operate until this driver is installed. This operation will be performed only once for each type of MCU to be programmed or if using a different USB hub on the same PC.

Programming and Test

1) Connect the USB cable to an un-programmed unit. (If this is the first time to do this on the PC you will need to install the DFU driver, see appendix A for instructions)

2)Using FLIP, load the required firmware hex file from
"Mfg/Firmware/ButlerIIUSB/release " directory and program the unit (see appendix B)

3)The units will begin transmitting a test signal immediately upon initialization allowing adjustment.

Power Adjustment

Remove the USB connection and connect a DC power supply (minus at J3, plus at J2), note the LED should turn on continuously indicating the unit is transmitting
3.6V, monitor the Power Supply current meter, make sure the voltage does not drop below 3.6V at the PCB terminals, if so increase the DC supply (maximum applied voltage 4.5VDC)

a) Adjust R28 potentiometer for current draw of **160-180mA** maximum.
Corresponds to an RF output power of 75mW and is considered the optimal value.

Note: Exceeding this range or going under can drastically affect the battery life and output transmitter power/performance.

Frequency Adjustment

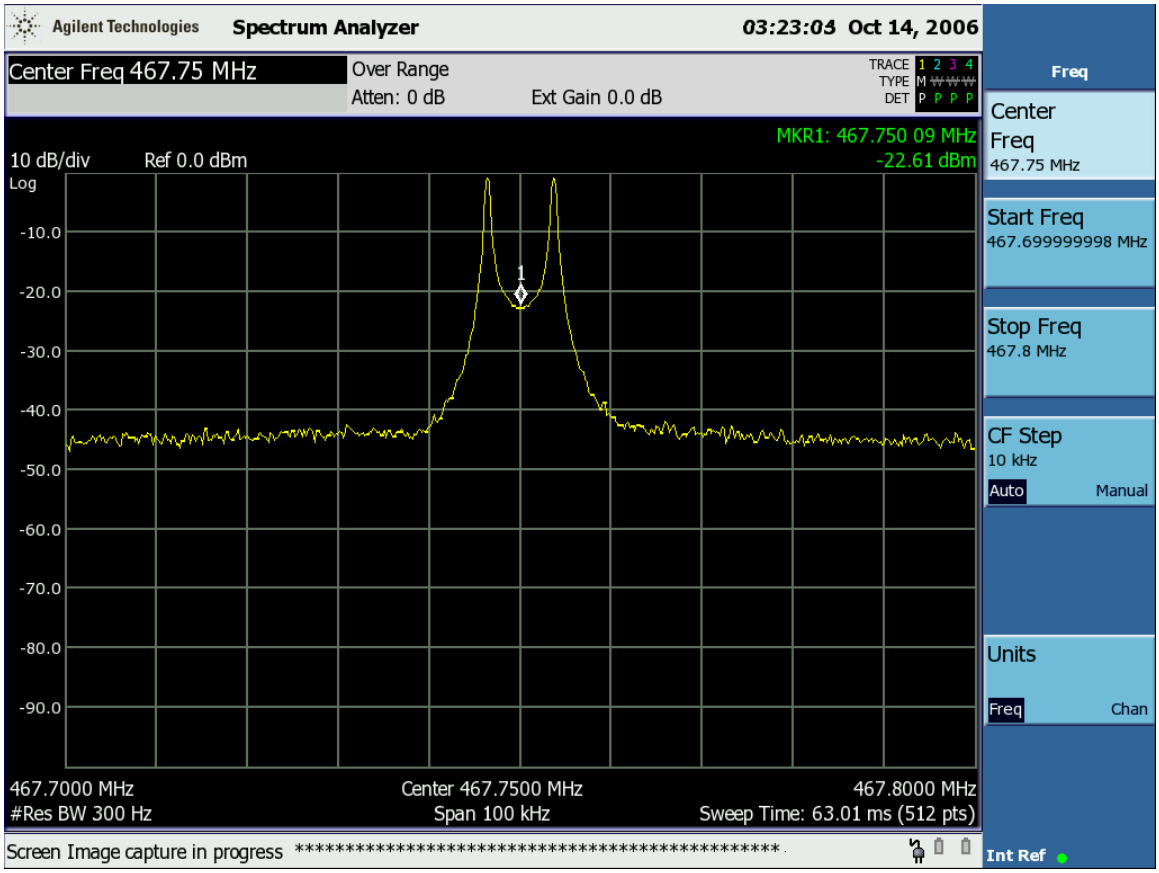
Setup spectrum analyzer for

- 400MHz Antenna Input
- 467.75Mhz center frequency
- 100KHz span
- 300Hz Resolution Bandwidth
- 0 dBm Reference
- 10 db/div

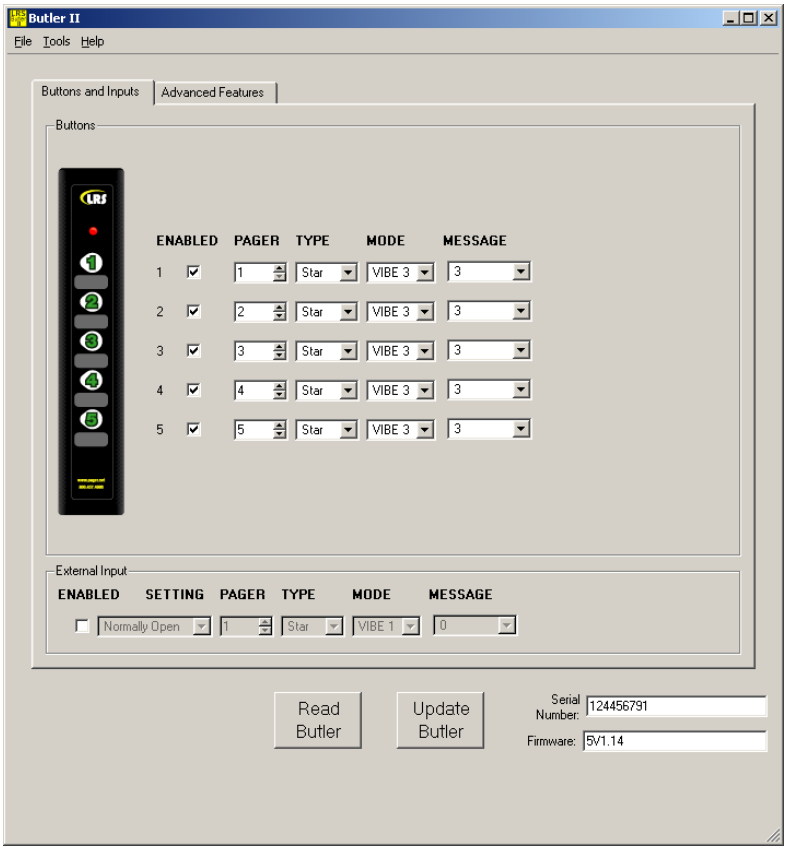
Transmitter output at an approximate distance of 3 feet is shown in diagram below.
FSK signal shape of a saddle with peaks around 0dBm and center down 20 dBm from peaks.
Signal should be clean with little noise or spikes.
*Signal Amplitude is relative to distance to measuring antenna.

Tuning center frequency

a) Adjust the center frequency with C21 variable cap, monitor with a spectrum analyzer
Center Frequency Tolerance +/- 500 Hz
Frequency Deviation peaks +/- 4500Hz

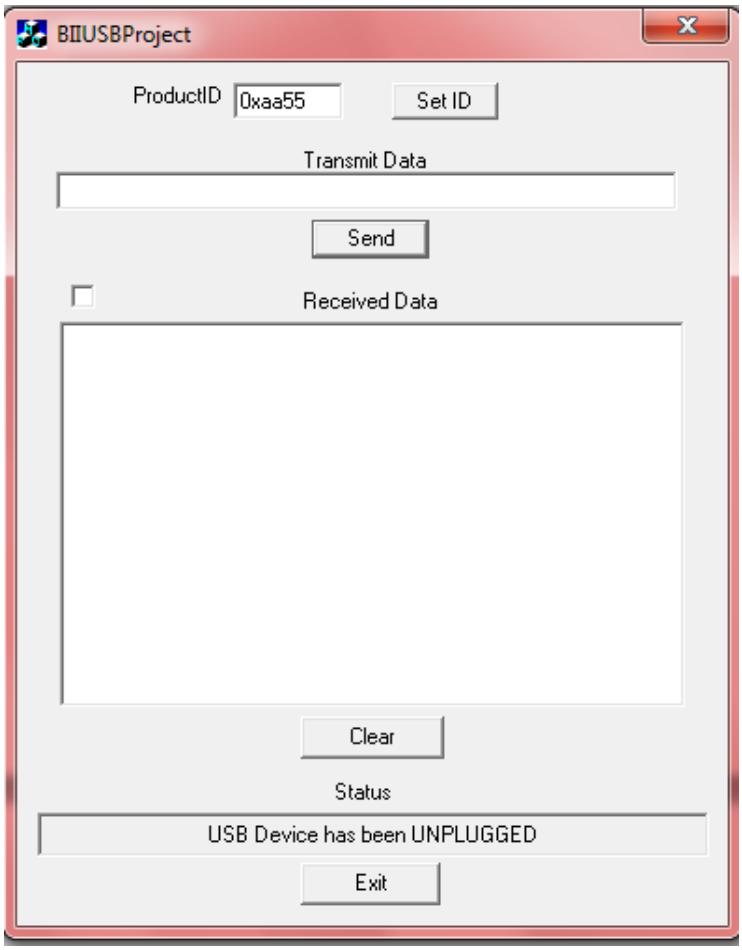


4) Once the unit is ready to be shipped connect the unit to a PC via the USB cable and run the configuration utility, press “Read Butler” to verify communication and permanently disable the transmitter test feature. Below is the correct settings as read.

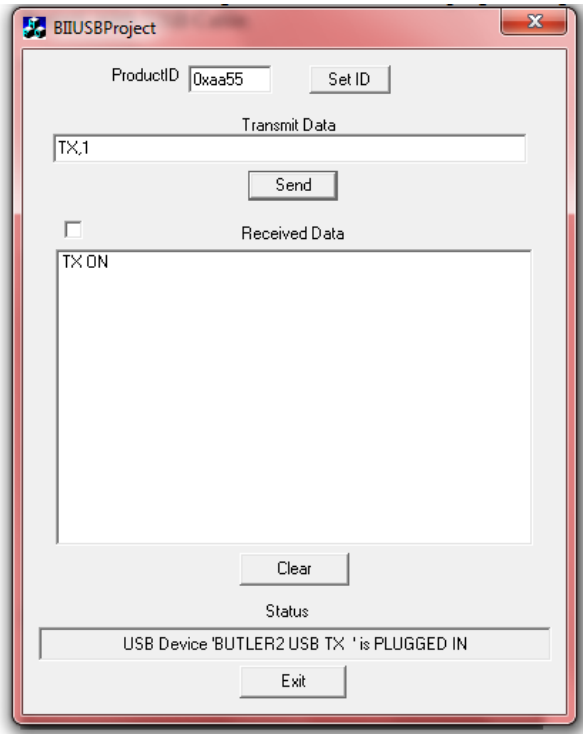

Butler II
File Tools Help
Buttons and Inputs
Advanced Features
Buttons
ENABLED PAGER TYPE MODE MESSAGE
1 1 Star VIBE 3 3
2 2 Star VIBE 3 3
3 3 Star VIBE 3 3
4 4 Star VIBE 3 3
5 5 Star VIBE 3 3
External Input
ENABLED SETTING PAGER TYPE MODE MESSAGE
Normally Open 1 Star VIBE 1 0
Read Butler
Update Butler
Serial Number: 124456791
Firmware: 5V1.14

Retuning

In the event of needing to retune a Butler after programming, use the Butler 2 USB Project, with USB Cable.



1) Set Product ID to '0xaa55' for Butler 2 and press Set ID (only needs to be done at start of session once)
2) Connect USB Cable to Butler 2
3) Type TX,1, and Send. Butler will now go into TX mode.



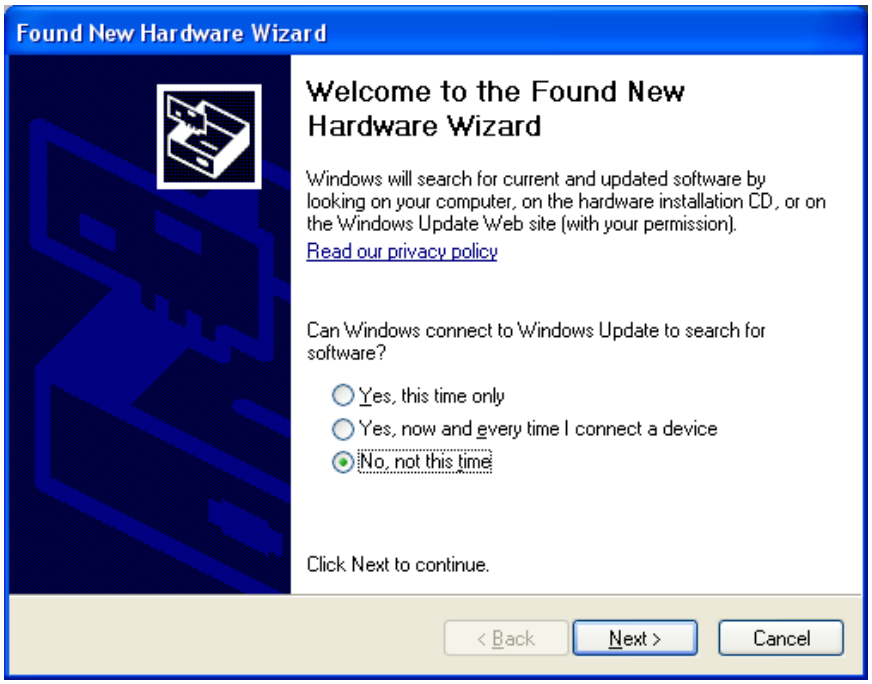
4) Adjust C21 until output is at frequency.
5) Either disconnect USB cable or type TX,0 and Send.

Appendix A - Installing the DFU Windows Driver

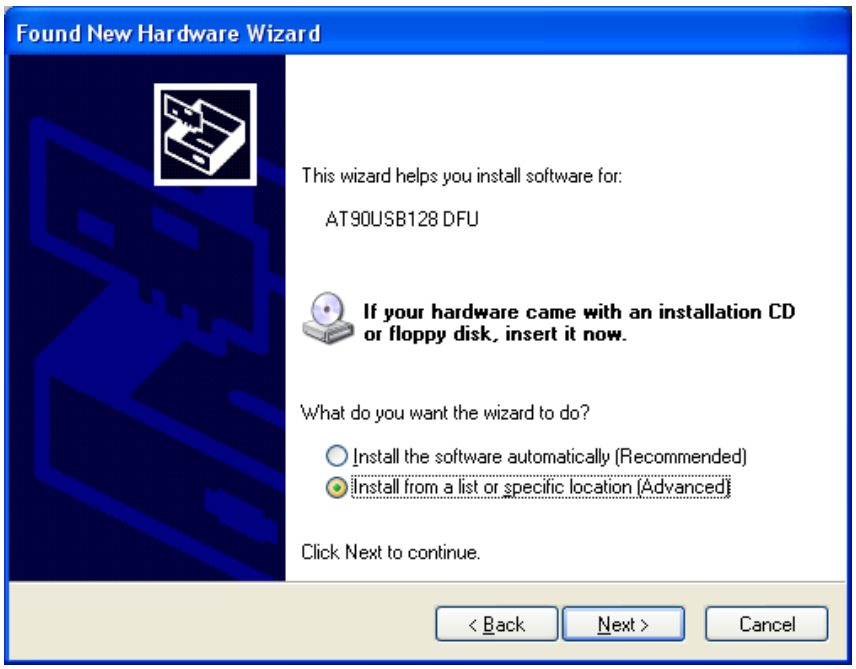
If the PC has never before programmed a ButlerIIUSB you will need to load the ATMEL DFU device driver, the PC should already be prompting you for this driver, it is located in the Atmel install directory of the FLIP software under the '**usb**' directory. Just select the '**usb**' directory and allow Windows to install that driver.

On this page and those following, are screen shots of the steps involved in setting up the USB DFU driver after the software is first installed. This must be done for FLIP to communicate with the ButlerIIUSB

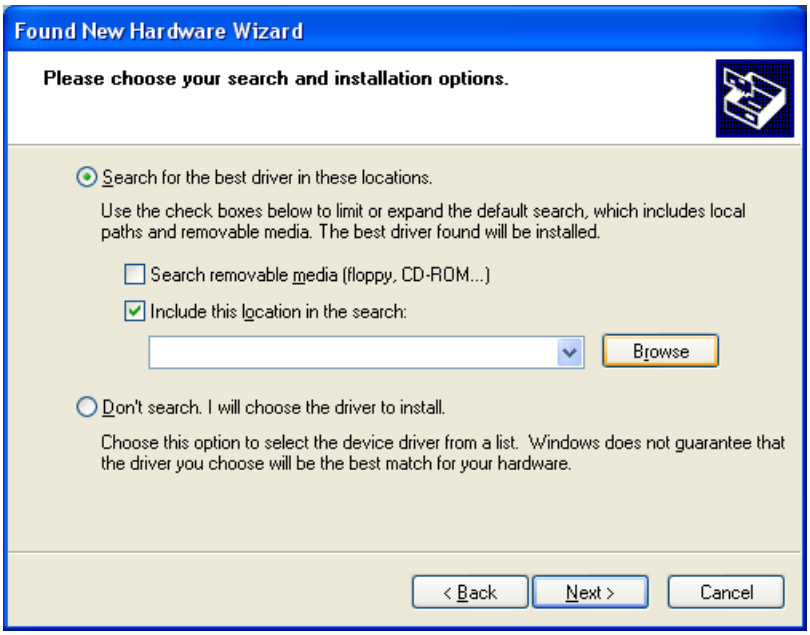
This is the prompt shown for a new unit (never programmed). If the unit has been programmed you will need to manually start the DFU boot-loader. While holding SW1 in, reset the unit by momentarily shorting the middle two pins (across the connector pins 5&6) on J4. Do not let Windows search for the driver, you need to specify the location as shown below.



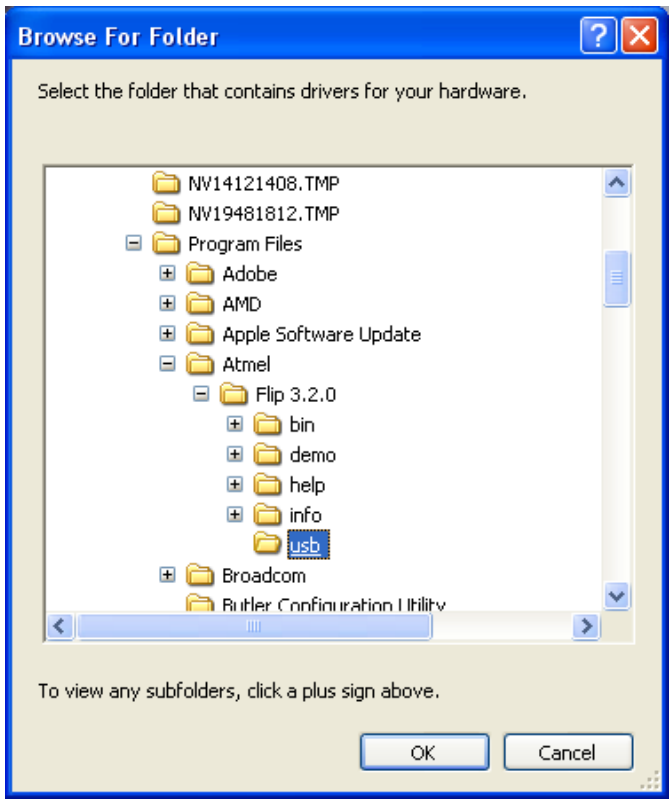
Note that the driver is for the DFU (device firmware update), select install from a specific location (ButlerII uses AT90USB64 DFU)

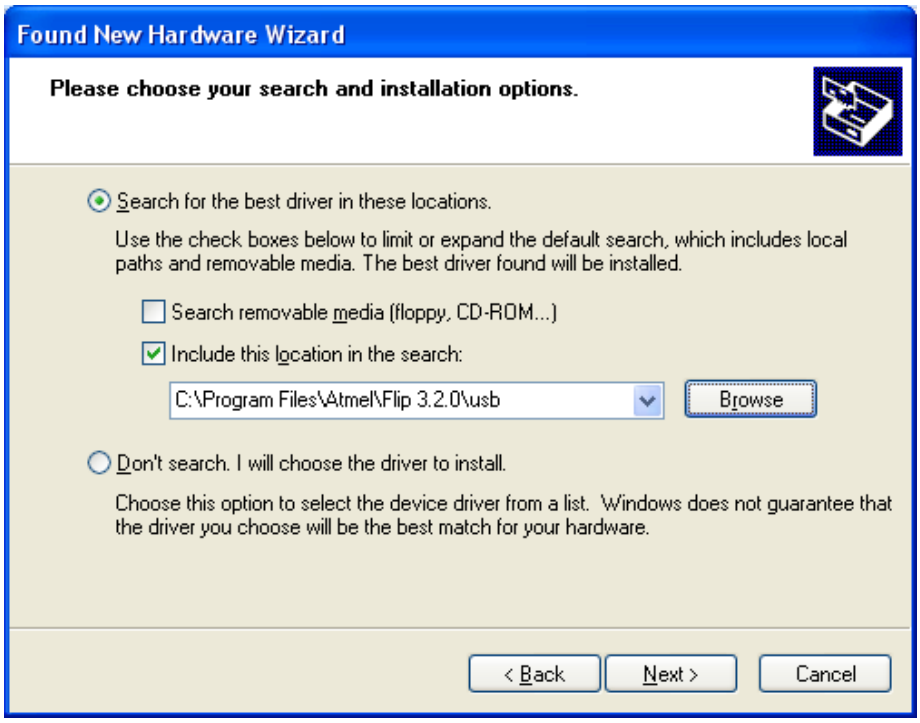


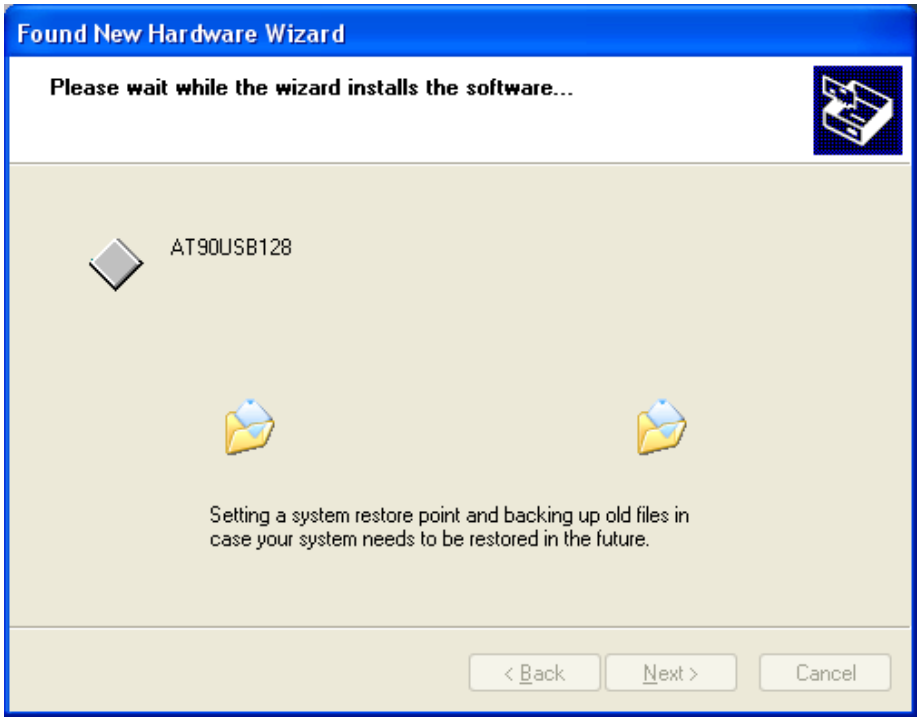
Select the location to search for the driver, match this screen and press the Browse button



The appropriate driver will be found in the installation directory of the FLIP software in the '**usb**' directory, the typical installation is shown below







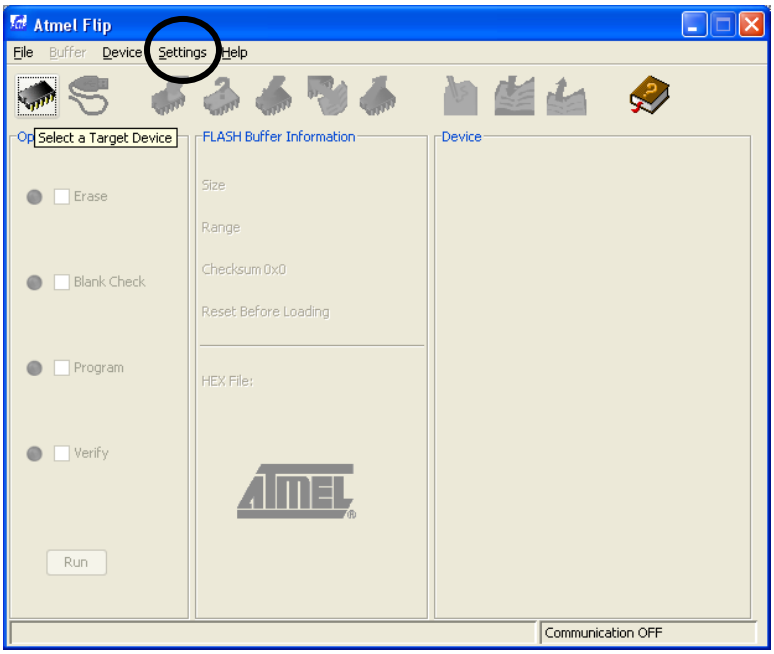
Final loading of the USB DFU device driver by Windows.
ButlerII will show AT90USB64

After this step, FLIP can be run and configured to program the AT90USB device, see appendix B.

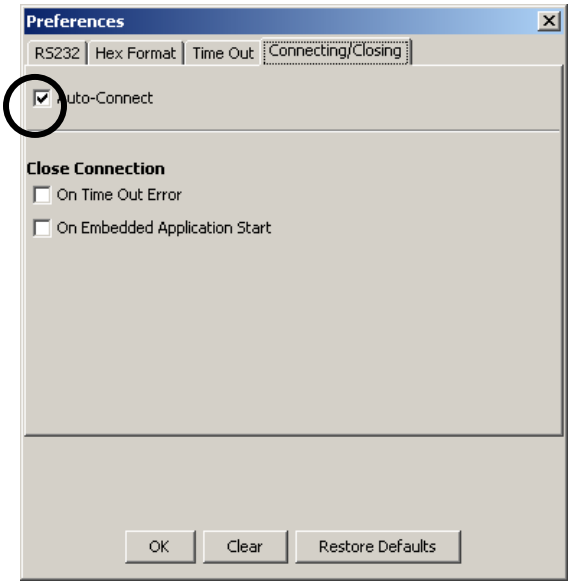
Appendix B – Configuring FLIP for Programming

Before launching the FLIP program ensure a ButlerIIUSB is connected to the PC. If the unit was previously programmed you will need to manually start the DFU boot-loader. With a USB cable attached, press and hold the switch SW1 and momentarily short the center pins (pins 5 and 6) of J4, then release SW1. The unit should automatically start the boot-loader.

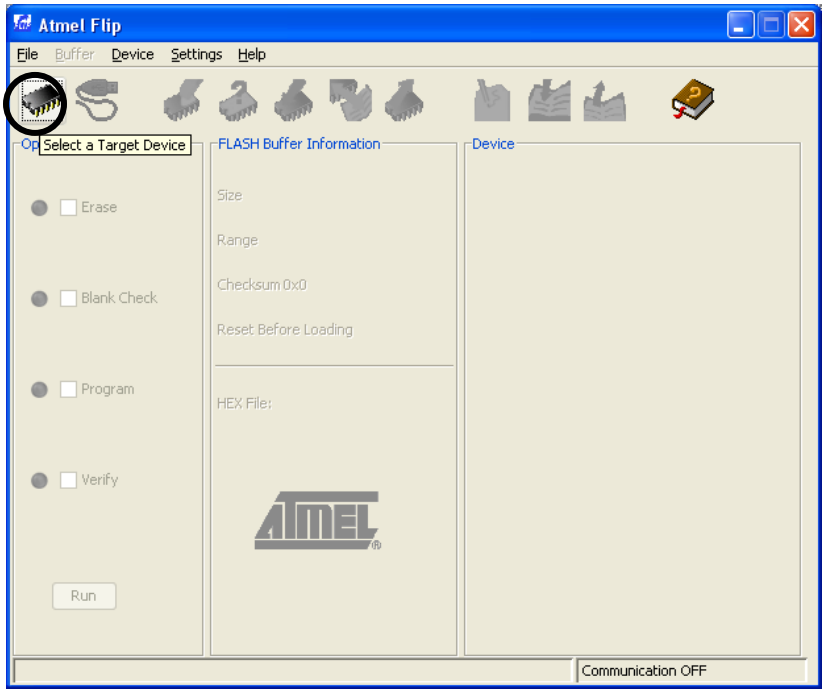
1) Launch the FLIP program and select the 'Settings' tab from the top menu bar.



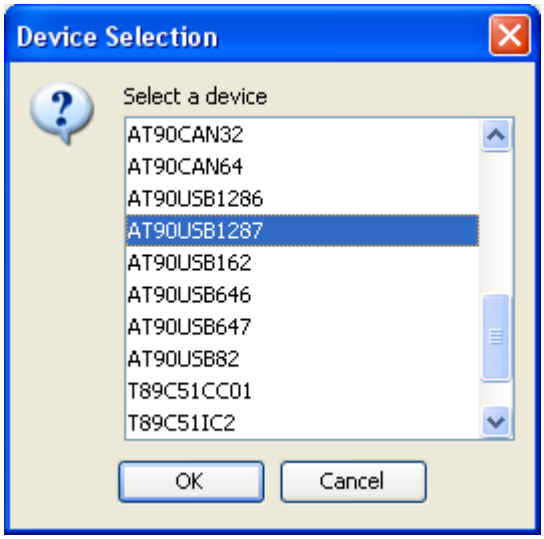
Select the 'Preferences' item from the Settings tab and turn on 'Auto-Connect'


Preferences
RS232
Hex Format
Time Out
Connecting/Closing
Auto-Connect
Close Connection
On Time Out Error
On Embedded Application Start
OK
Clear
Restore Defaults

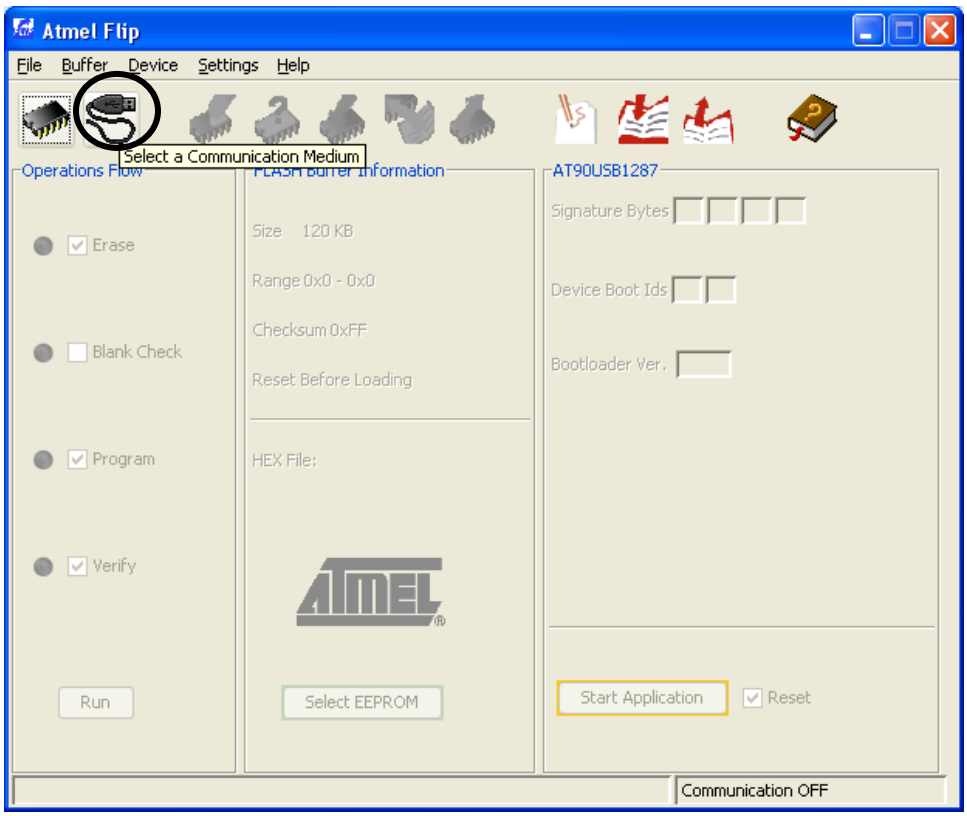
Click on the ‘Target Device’ button to select the appropriate MCU.



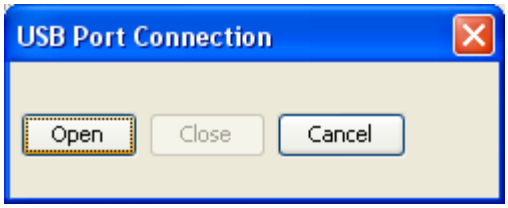
As shown above, click on the ‘Select a Target Device’ button
Select the appropriate device to program, AT90USB647 for ButlerII

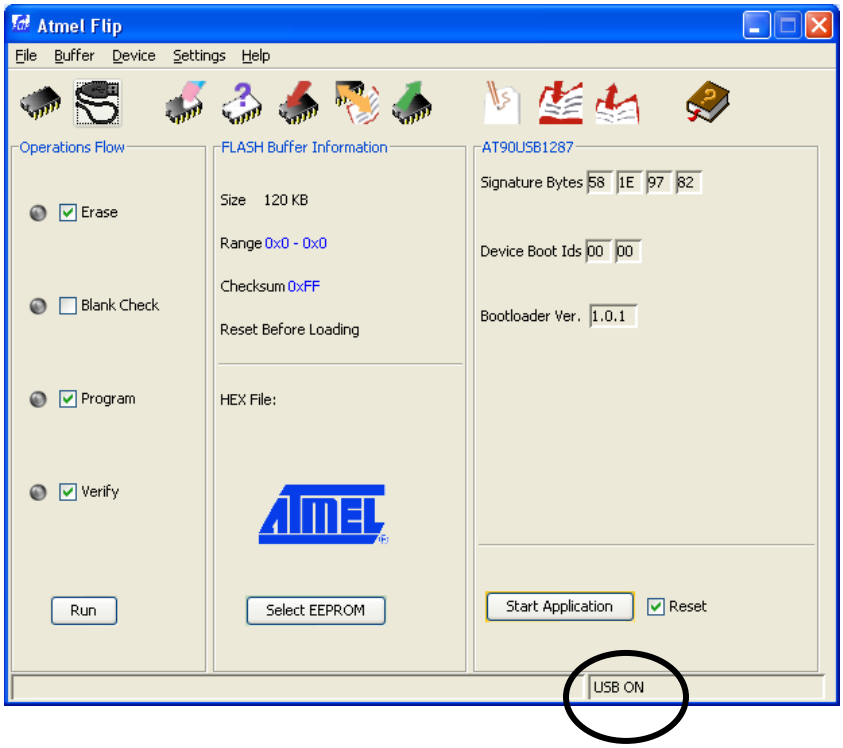


Next click on the ‘Communication Medium’ button
The only option available will be USB

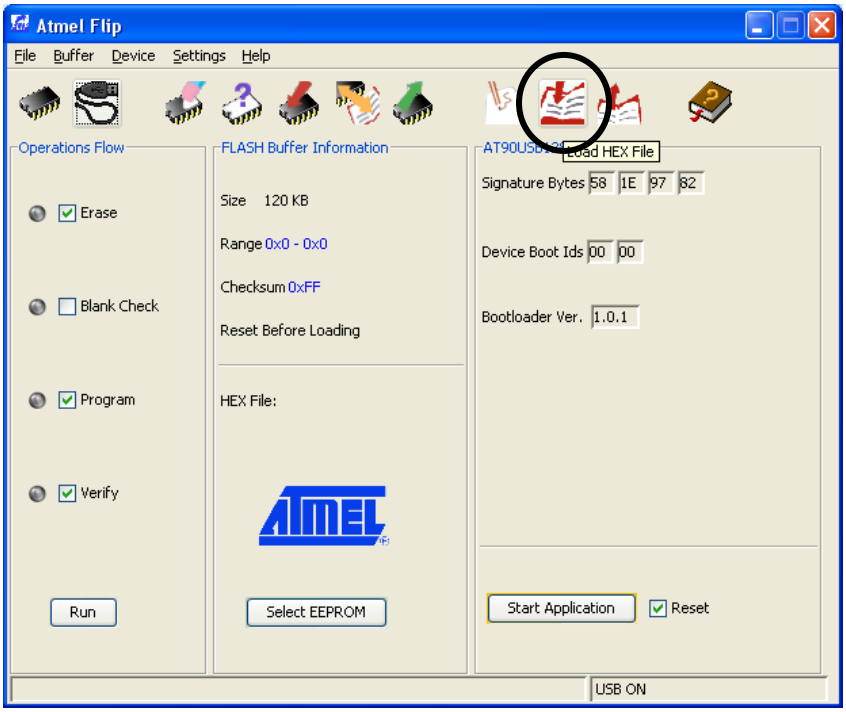


Press the Open button to initiate communication with the ButlerII

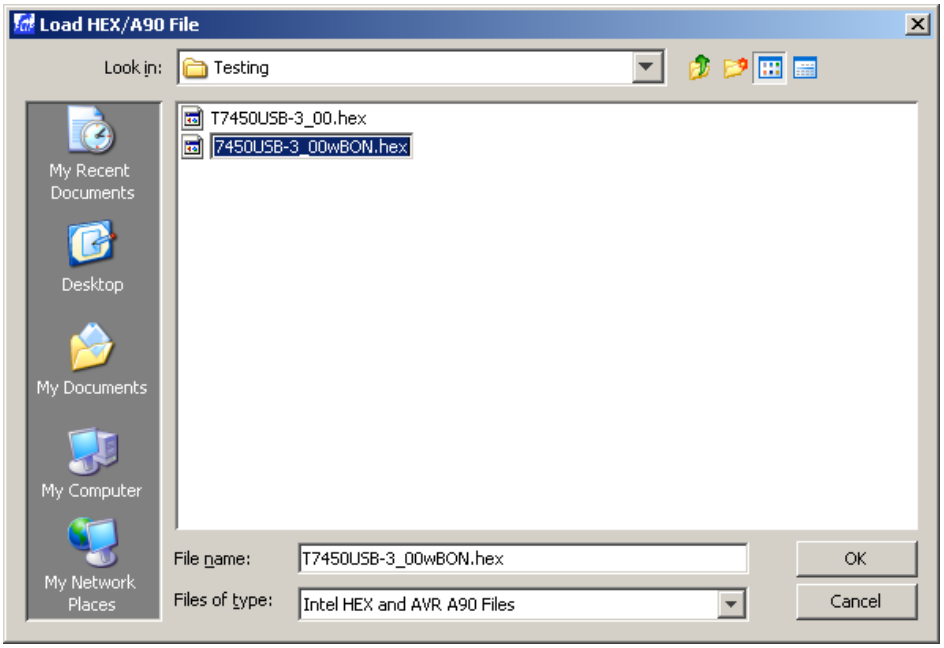




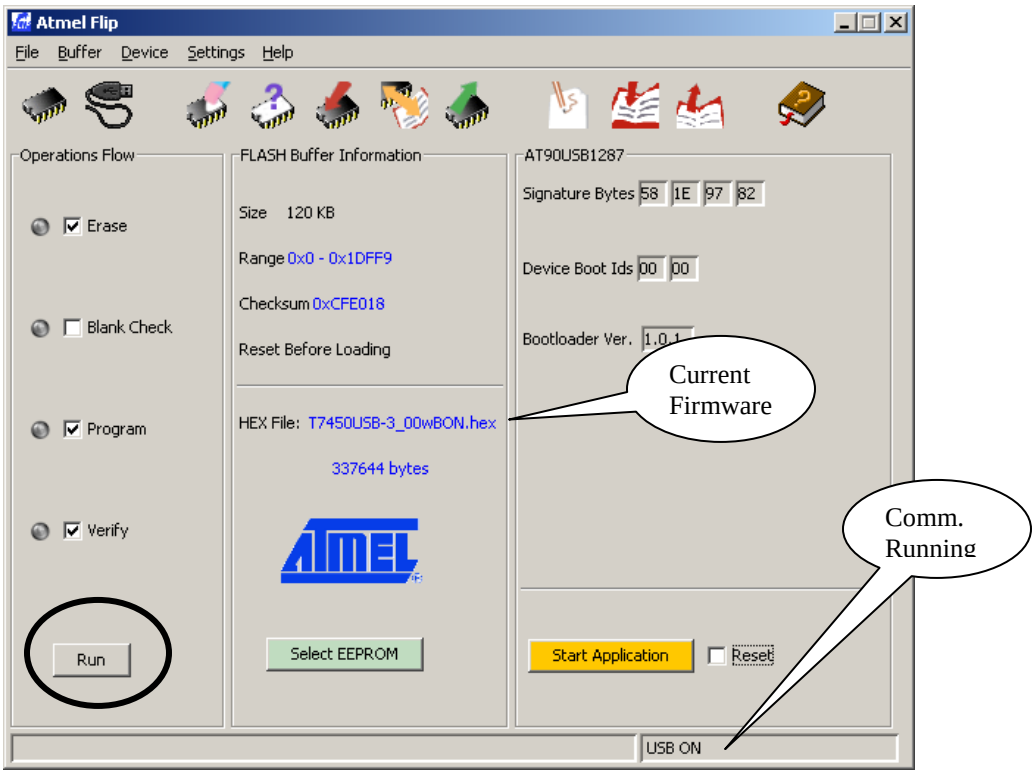
FLIP after properly communicating with the Atmel microcontroller, next load the firmware to program into the microcontroller.



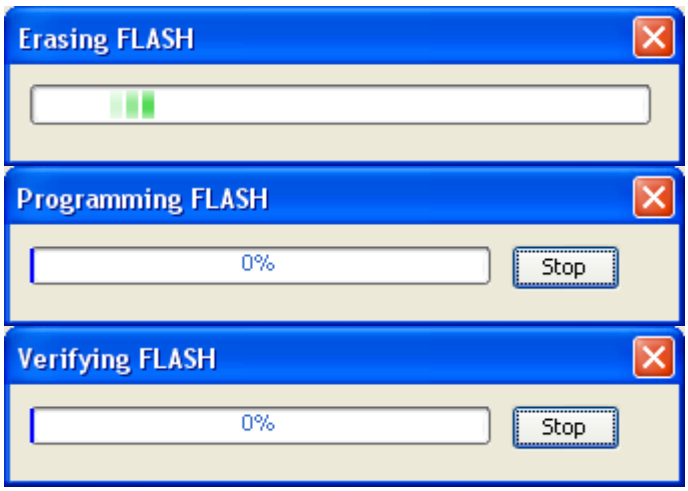
Press the ‘Load Hex File’ button which has an arrow going into the page.



Find the current release firmware provided and select it, finish with clicking on the OK button.



2) Press the ‘Run’ button to begin the programming operation.

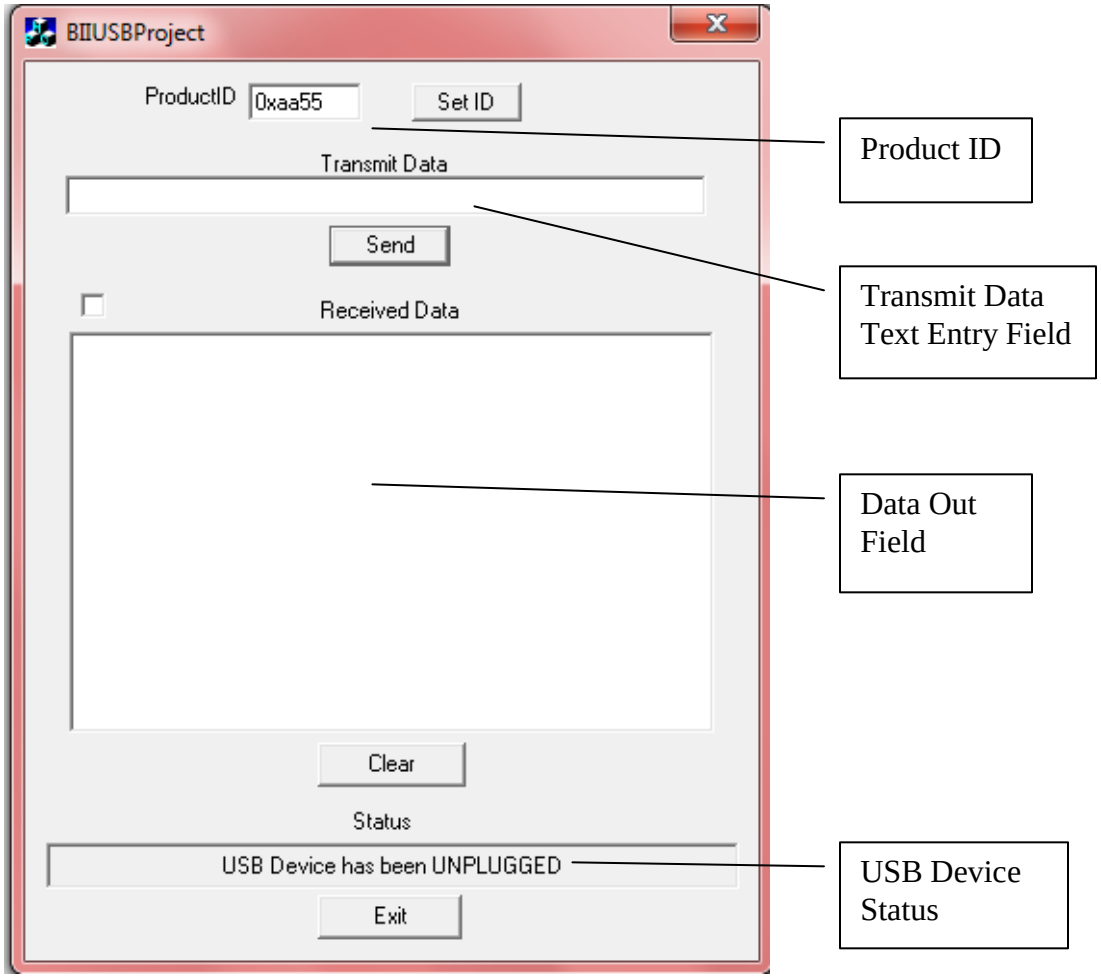


Status bars showing the Erasure, Programming and Verification steps.

Appendix C – Butler2USBProject

Requires

Type A to mini-B USB Cable
PC with Windows XP or Windows 7 OS



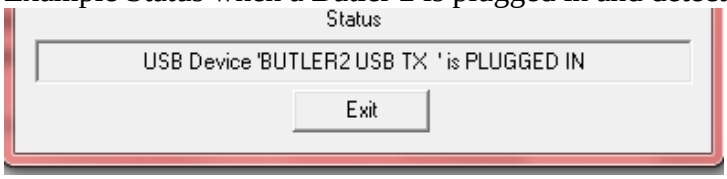
The Butler 2 USB Project is an executable program with associated DLL's.

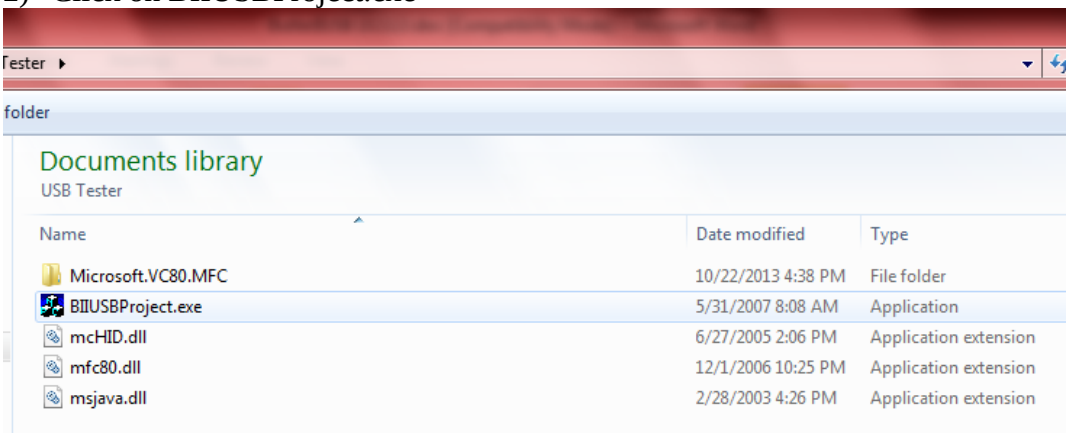
Product ID – Set HEX value based on the USB device in use. For Butler 2, this is 0xaa55
To set the value at any time, press "Set ID" button after typing in field.

Transmit Data Text Entry Field – Used to type in commands to control the device.
Press "Send" button to transfer any entered commands to the device.

Receive Data Output Field – This will show the response from the device.
Press "Clear" button to erase the last outputs.

Status – Shows the current status if USB device is connected or not.
Example Status when a Butler 2 is plugged in and detected.



To Load on to PC:

1) Extract zipped file set onto PC
2) Click on BIIUSBProject.exe