

FireFly-II/IIA Firmware 0.915 and later Description and Upgrade Instructions rev. 1.1

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The following is a short tutorial on how to upgrade the FireFly-II/IIA GPSDO firmware to revision 0.915 or later. Please follow the instructions in-order to prevent corrupting the FireFly-II/IIA Flash, which may require reflashing at the factory.

I. Introduction

FireFly-II/IIA Firmware revision 0.915 and later have significant feature updates that require some user interaction to work properly when updating from firmware 0.914 or earlier. This document describes how to update the firmware, and how to properly configure the unit post-update.

With some practice, the entire Flash upgrade can be done in less than one minute, even though the following seems like a fairly long list of instructions.

II. New Firmware Features

Firmware 0.915 and later bring a host of new features to the FireFly-II/IIA boards. One firmware executable file supports both versions of the board. Among the improvements are the following:

- 1) Firmware 0.915 works on both FireFly-II and FireFly-IIA. On FireFly-IIA, there is full support for a 3D attitude/Tilt/Acceleration Gyro and related calibration commands. On FireFly-II there is no gyro support due to the lack of a Gyro sensor, even though the Gyro commands themselves are supported
- 2) Added a Fast-Lock mode to significantly improve the initial lock time (to below 30 minutes typically) after power-on
- 3) Added a 1PPS Soft-Recovery feature that will shift the 1PPS pulse slowly back to be synchronous to UTC in 10 steps after long holdover drifts
- 4) Added a NMEA \$GPZDA output command
- 5) Added a NMEA \$PASHR output command - this makes the unit compatible to DAGR GPS receivers
- 6) Added an indicator of accrued Leapseconds to the XYZSpeed output command

7) Fixed superfluous \r (carriage return) characters on NMEA output strings

III. Step 1.: ISP Flash Loader Utility installation

Please download and install the Philips LPC2000 firmware upgrade utility version 2.2.3 from the following website:

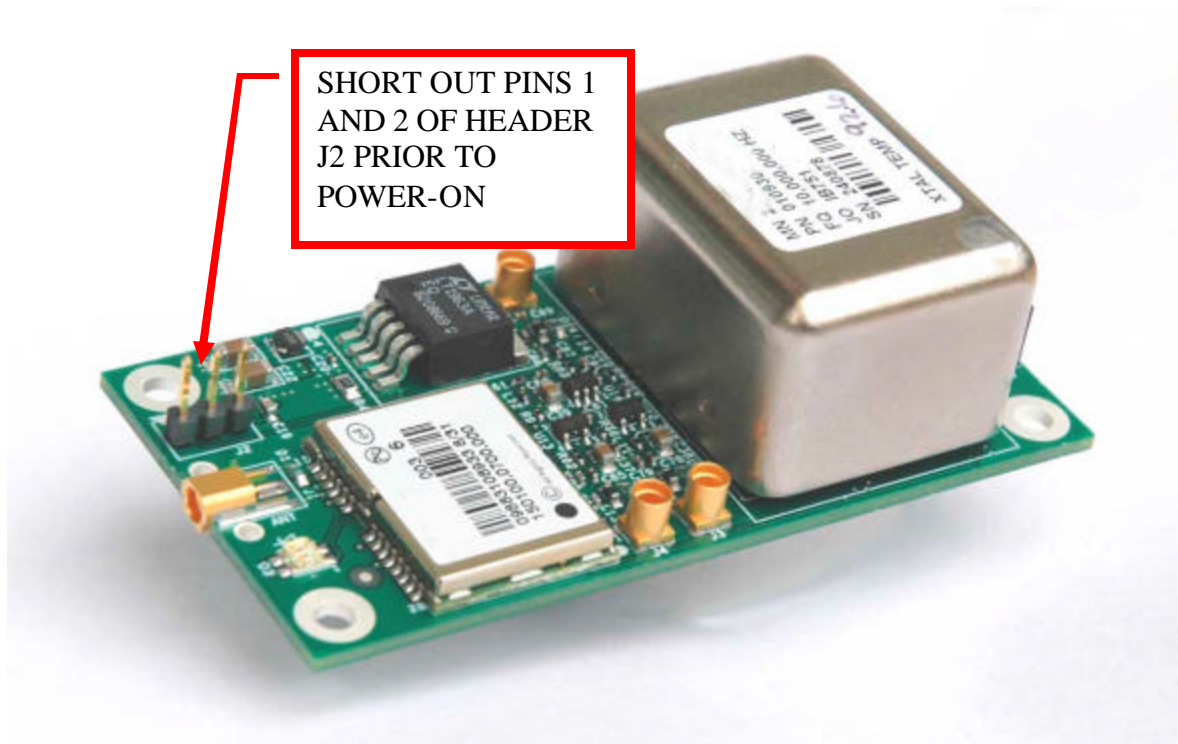
<http://www.jackson-labs.com/support.html>

Please ensure that you have at least version 2.2.3 of the LPC2100 flash utility installed. Earlier versions may not recognize the LPC2136 processor used on the FireFly boards.

Please note that some computers are known to be incompatible to the LPC2100 flash utility. Preliminary investigations show Windows Media Center and/or Centrino vPro processor systems to create download difficulties. Please use a different computer if you experience problems such as the download breaking up in the middle of the transfer.

IV. Turning the PCB into In Circuit Programming (ISP) mode

Momentarily short-out pins 1 and 2 of header J2 using a jumper, or other conductive material during power-on. Both LED's should remain off, indicating the unit is properly placed into ISP mode. If the LED's light up after power-on, the unit is not in ISP mode.



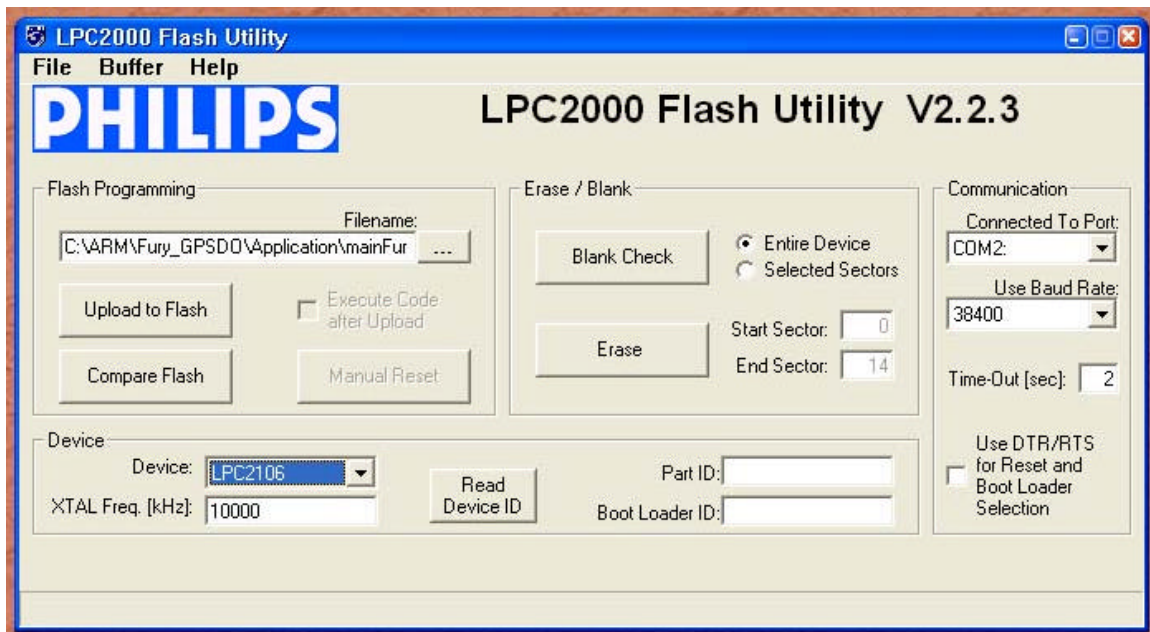
The unit has now been set to ISP mode, and is awaiting the firmware download.

V. Downloading the firmware

The unit needs to be connected to the computers' RS-232 serial port prior to firmware download. Connect a DB-9 serial connector to the FireFly-II/IIA cable harness U18. Connect the PC's RS-232 Transmit signal to pin 10 of connector harness U18. Connect the PC's RS-232 Receive signal to pin 9 of connector harness U18. Connect the PC's RS-232 Ground signal to pin 6 of connector harness U18.

- A) Open the LPC2000 utility. Set the COM port in the LPC2000 application as needed on your PC.
- B) Select the Baud Rate of the LPC2000 utility to be 38400 or slower. Faster Baud rates will not work properly.
- C) Press the "READ DEVICE ID" button, this should then show "LPC2136" in the DEVICE window if the unit is communicating correctly to the application.

Make sure NOT(!) to press the "erase" button under any circumstances, this may erase factory calibration data, and the unit will not operate and will have to be returned to the factory. Pressing the "erase" button on the ISP utility will thus void the warranty.

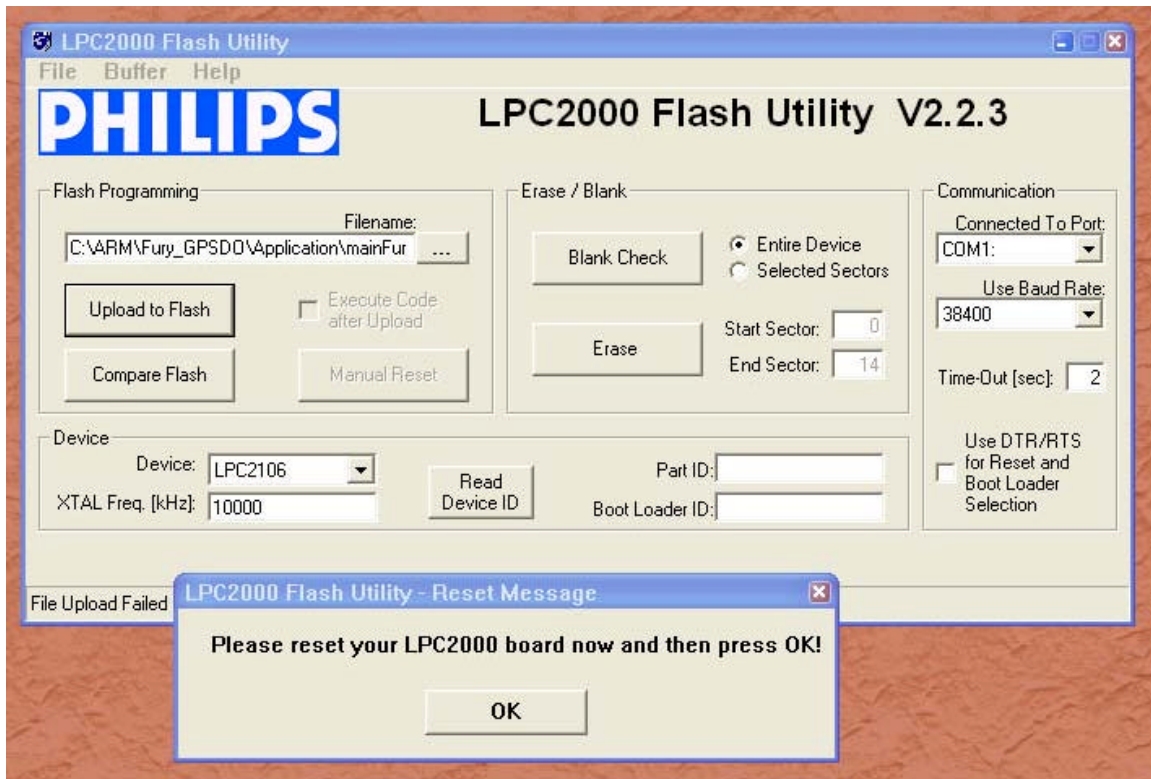


Please note that the "Use Baud Rate" setting needs to be set to 38400 Baud or less, it will not work faster than 38400 Baud.

The "DEVICE" should show up as "LPC2138" after pressing "READ DEVICE ID"

Also, please point the "Filename" to the directory where you have stored the latest **firmware hex file** that is to be downloaded.

B) Start the download by pressing “**Upload to Flash**” button. The following window should appear if the correct COM port has been chosen etc:



Press the “OK” button, and the download should start. Sometimes the utility gets confused and this process (from item V. B)) has to be tried several times.

It is not necessary to press “reset” as the utility is asking. Just press “OK” on the utility windows’ button.

DO NOT PRESS THE “ERASE” BUTTON AT ANY TIME! THIS WILL RENDER THE PCB USELESS AND CAN ONLY BE RECOVERED AT THE FACTORY!

VI. Verifying Firmware Update

Remove the jumper from header J2, and power cycle the unit. Both LED’s should blink.

During power on, the unit sends an ID string out of the serial port at 115200 Baud by default. The firmware version can also be queried by sending the *IDN? command. Verify that the firmware version is version 0.915 or above.

VII. Initializing New Features

Updating the firmware to version 0.915 from prior versions will require the user to enter a few commands to properly initialize the units. Please also refer to the updated FireFly-IIA user manual for a more detailed description of the additional features and commands available on firmware version 0.915 and later.

Firmware version 0.915 adds commands to the unit that require additional, previously unused memory locations in the NVRAM of the FireFly units. These memory locations are used to store information such as the output rate of new commands, and calibration information for the Attitude/Tilt/Acceleration Gyro sensors. By default, these locations are initialized to default values of 0xFF hexadecimal, which in turn is the value of 255 seconds for the period of the added NMEA commands. The unit will thus generate the added commands at this period, until the user resets these values.

A) The following commands should be sent to the unit to disable the added NMEA and Gyro commands:

```
gps:gpzda 0  
gps:pashr 0  
gps:gyro 0
```

B) These commands should be sent to the unit to disable the fast lock feature to prevent errand operation. Please consult the manual for proper setup and use of the fast lock feature:

```
serv:fast 1  
serv:fale 100
```

C) The following command should be sent to the unit to put the Gyro sub-system into a default calibration state:

```
gps:gyro:cal 0,0,0,1,1,1
```

The above commands can be sent to the unit by copying and pasting the following strings into hyperterminal or a similar terminal program:

```
gps:gpzda 0  
gps:pashr 0  
gps:gyro 0  
serv:fast 1  
serv:fale 100  
gps:gyro:cal 0,0,0,1,1,1
```