



Recovering an OpenIMU

Application Note

Recovering an OpenIMU

REVISION HISTORY

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Initial Revision

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INTRODUCTION

The OpenIMU product line from Aceinna (see <https://www.aceinna.com/inertial-systems>) consists of high performance and highly configurable IMUs. They are open source and can be configured via downloadable apps as well as by editing the source code that is available on GitHub. IMU, tilt sensor, AHRS and INS applications are all available.

The purpose of this application note is to describe the different methods by which an Aceinna OpenIMU device may be recovered in the event of a firmware issue where the device is not responding as desired. The cause of such an issue may include a coding error or too low a supply voltage when writing a binary image to the part.

SAVING A DEFAULT IMAGE

The first thing a user should do after receiving an OpenIMU they intend to reprogram is to backup a full image of the device. This step should be performed for any evaluation platform with a JTAG connector. The backed-up image will include the default application, the calibration data and the bootloader and saving this backup will greatly simplify device recovery.

- Install the ST-Link Programming Utility [STSW-LINK004](#)

- Connect ST-Link debugger to OpenIMU Eval Kit. and to the PC
- Ensure Evaluation Kit is turned on
- Start ST-Link utility on your PC.
- Click Device->Connect.
- Ensure Start Address is 0x08000000
- Enter Size value and click enter
 - 0x80000 for OpenIMU300
 - 0x20000 for OpenIMU330
- Click File -> Save As and save the .bin image to a desired location

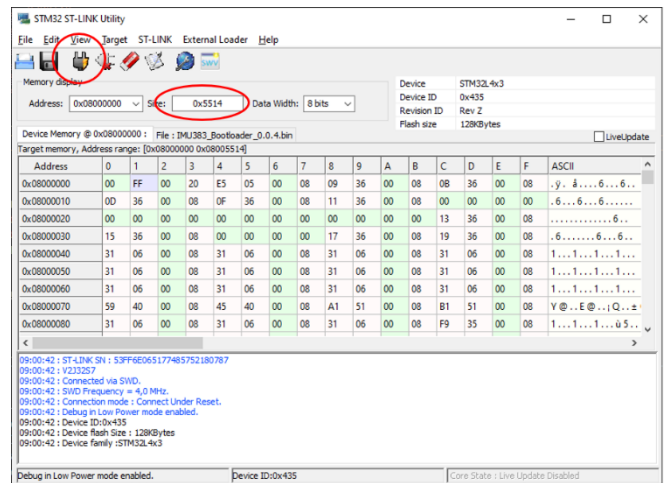


Figure 1. Saving a Backup Image

RECOVERING AN OPENIMU WITH AN EVALUATION KIT THAT HAS A JTAG CONNECTOR

Writing a Full Image to the Part

The following procedure allows the user to write a .bin image to the OpenIMU and is illustrated in Figure 2.

- Connect ST-Link debugger to OpenIMU Eval Kit and to PC
- Power On Evaluation Kit
- Start ST-Link utility on your PC
- Click Device -> Connect
- Click File -> open to select the desired .bin image
- Click Target -> Program & Verify.
- Make sure that Start address is 0x08000000 for a full image (or 0x08010000 for an App) and click Start

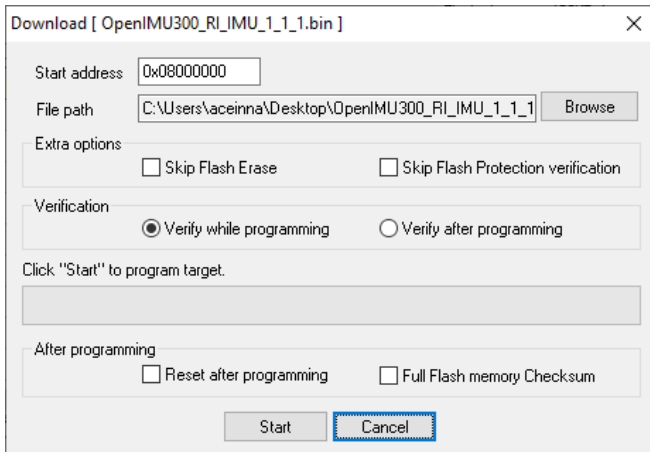


Figure 2. Writing a Backup Image

After writing an image you should follow this procedure to write protect the below memory locations:

- Target -> Option Bytes
- After reprogramming of OpenIMU300RI or OpenIMU300ZI
 - perform write protection of pages 0 and 2
- After reprogramming of OpenIMU330BI
 - perform write protection of last 6 pages (58 to 63)

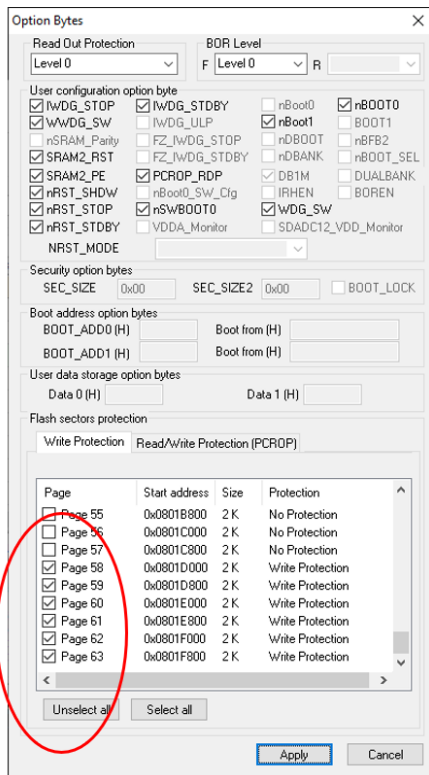


Figure 3. Option Bytes for OpenIMU330

Writing an Application to the Part

If you did not save a full device image you can attempt to recover the part by overwriting the application code. You can download the application image from [Navigation Studio](#) as follows:

- Under Code select the Apps tab
- Click the desired App for your part
- Click Download .bin and save the image to your computer

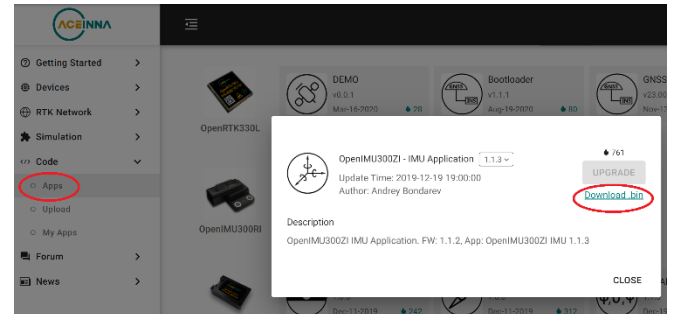


Figure 4. Saving an App Binary

Once saved to your computer follow the procedure given in [Writing a Full Image to the Part](#) but set the Start Address to be 0x08010000.

NOTE: Ensure you use the correct Start Address to avoid overwriting important sections.

RECOVERING AN OPENIMU WITHOUT A JTAG CONNECTOR

While the OpenIMU300RI evaluation board has a JTAG connector brought out, the standard part does not. In this case the user can overwrite the application code using the RS232 interface. It is recommended that all code development be carried out with the evaluation kit however. Save the application binary as described in [Writing an Application to the Part](#).

Using NavView to Overwrite the Application

[NavView](#) is the default evaluation tool for Aceinna's turnkey IMUs (i.e. not the OpenIMU series). It can also be used to write application binaries to the OpenIMU series. You can do this as follows:

- Open NavView and check if the connection status ribbon at the bottom of the page is green.
- If it is not then configure the serial port using Setup -> Configure Serial Port. Ensure that the correct port and baud rate are selected.
- If the ribbon still isn't green switch off and back on the power supply to the OpenIMU300RI.

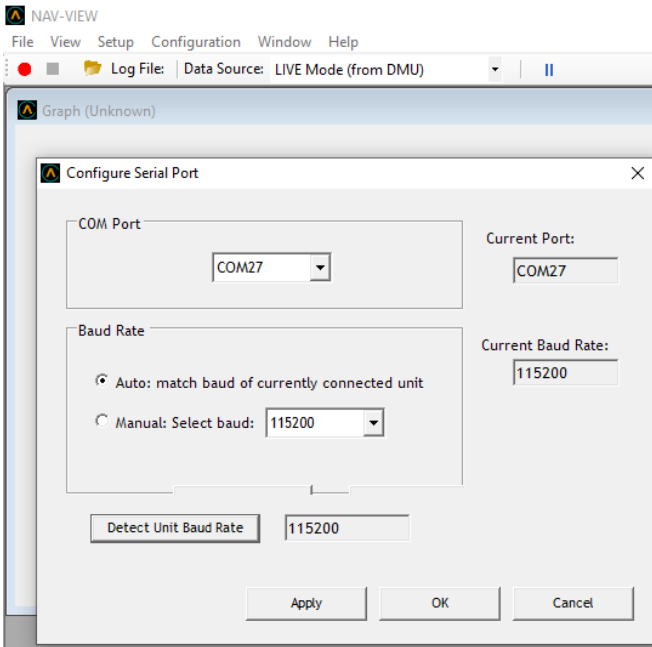


Figure 5. Configuring the Serial Port in NavView

Assuming that NavView is now connected (if not go to the next section):

- Use Configuration -> Update Firmware as shown in Figure 6 to write the application image previously downloaded to the part

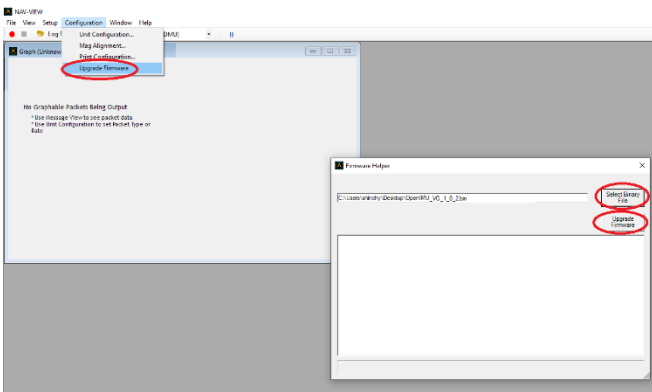


Figure 6. Firmware Update using NavView

Jump to Bootloader Command

If you cannot connect with NavView then it is worth issuing the Jump to Bootloader Command and attempting to do so again. To do this:

- Close NavView
- Open a terminal application that supports sending hex data such as [RealTerm](#).
- Configure the serial port for the appropriate baud rate as shown in Figure 6 (for the default applications this is 115200 bps).

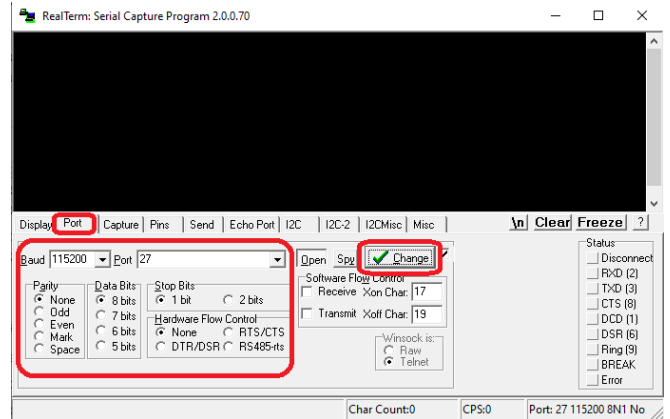


Figure 7. Port Configuration in RealTerm

- Issue the Jump to Bootloader command (0x4A49) as shown in Figure 8 sending:
 - 0x55 0x55 0x4A 0x49 0x00 0x7C 0x34
- where
 - Preamble = 0x5555
 - Command = 0x4A49
 - Length Byte = 0x00
 - CRC = 0x7C34

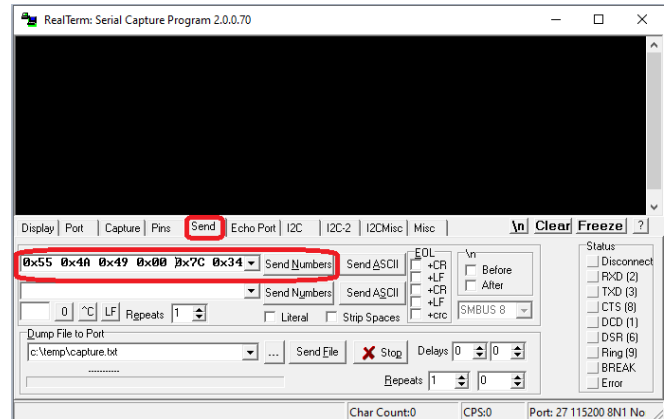


Figure 8. Sending the Jump to Bootloader Command

- Close the terminal, restart NavView and try to update the firmware again. Do not power cycle the part during this process.

If this fails you are unable to force the part into bootloader mode there is additional device recovery option immediately after powering up. Every OpenIMU will enter a recovery window of 100 ms prior to application start. During this 100 ms window, the user can send the jump to bootloader command at 57600 bps to the part in order to force the unit to remain in Bootloader mode. To use this method:

- Close NavView and open a terminal
- Configure the serial port to 57600 bps
- Turn off the power supply to the IMU

- Start repeatedly sending the Jump to Bootloader command
- Turn on the power supply to the OpenIMU and ensure it receives the Jump to Bootloader command within 100ms.
- Close the terminal, open NavView and update the firmware as previously described