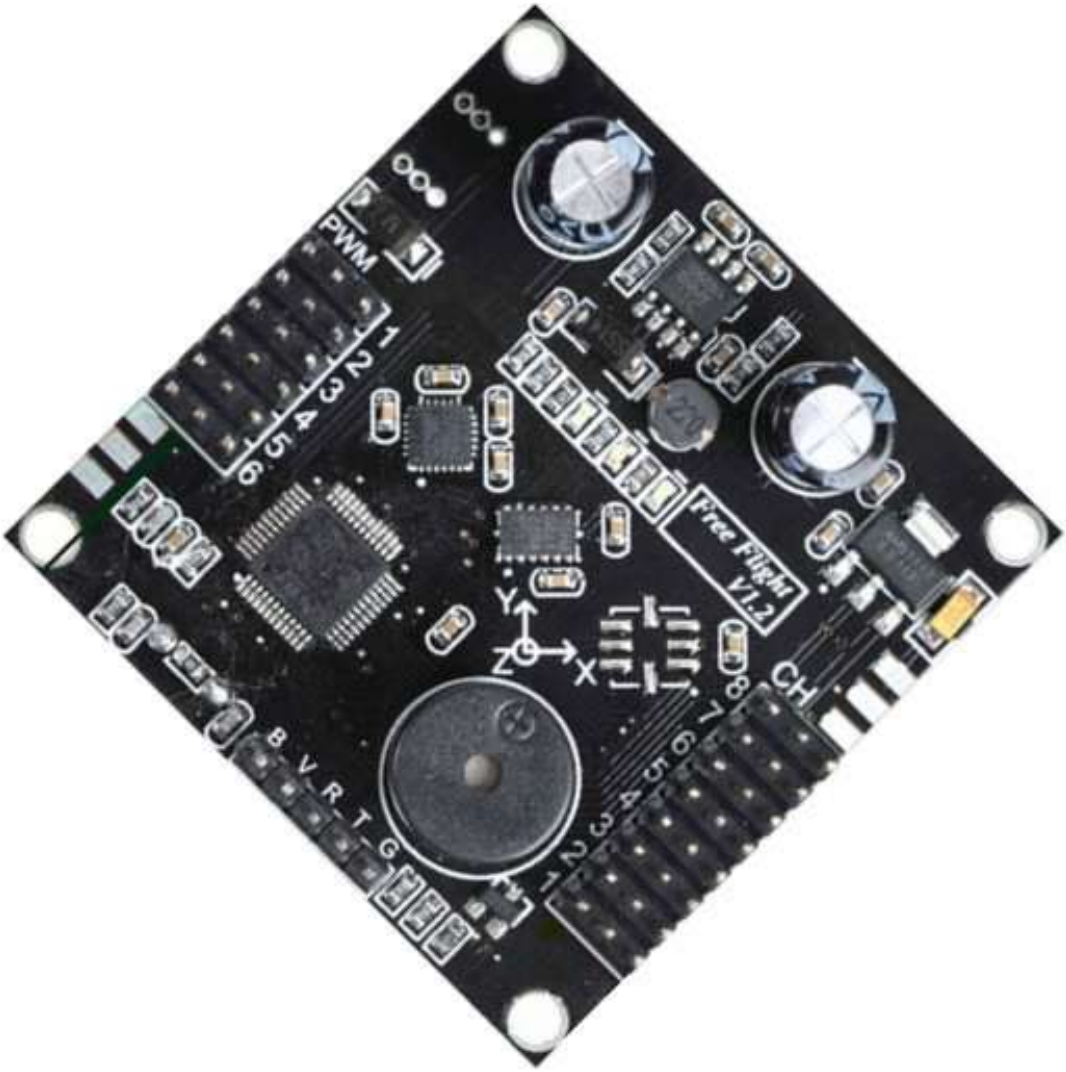
FREE FLIGHT CONTROLLER V1.2

THIS IS THE CURRENT FF USER GUIDE AS OF 02-26-2012

PLEASE DO NOT USE ANY PREVIOUSLY DATED VERSIONS



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UPDATED ON 2/26/2012
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FREE FLIGHT CONTROLLER V1.2

INTRODUCTION:

I compiled this guide from information posted on RCGroups.COM and from GoodLuckBuy.COM where the board is sold. At the time of creation:

- The Free Flight Controller is at V1.2
- The application program ZNS1002 a.k.a. “Upper Machine Software” is at V1.07
- The STMicroelectronics Boot Loader application is at V2.4
- The PID application is at V1.24 and updated on 2/10/2012
- The firmware is at V1.24
- Pictures of the Free Flight Controller are from RCGroups.COM and GoodLuckBuy.COM
- All application screenshots were taken while the application was being used on my pc

HARDWARE CONTENTS OF PACKAGE FROM GOODLUCKBUY.COM:

- 1 Free Flight Controller
- 1 JST adapter cable for batteries using JST connectors
- 1 USB Boot Loader
- 4 ESC cables
- 1 Free Flight Controller to Boot Loader Cable (cable with 5 wires)
- 1 USB to Mini USB Boot Loader to PC Adapter Cable
- Shrink tubing

SOFTWARE DOWNLOADS AVAILABLE FROM GOODLUCKBUY.COM AND RCGROUPS.COM:

- ZNS1002 V1.07, a.k.a “Upper Machine Software” for setting up the quadcopter
- STMicroelectronics Flash Loader Demonstrator for flashing the firmware
- PID Debug for changing the PID settings of the Quadcopter
- Quadcopter firmware
- Device drivers needed for the USB Boot Loader when using Windows XP

FREE FLIGHT CONTROLLER DIMENSIONS:

- 1.93” x 1.93” or 49 mm x 49 mm side to side
- 0.75” or 19.05 mm mounting hole center to mounting hole center
- 0.125” or 3.175 mm hole diameter

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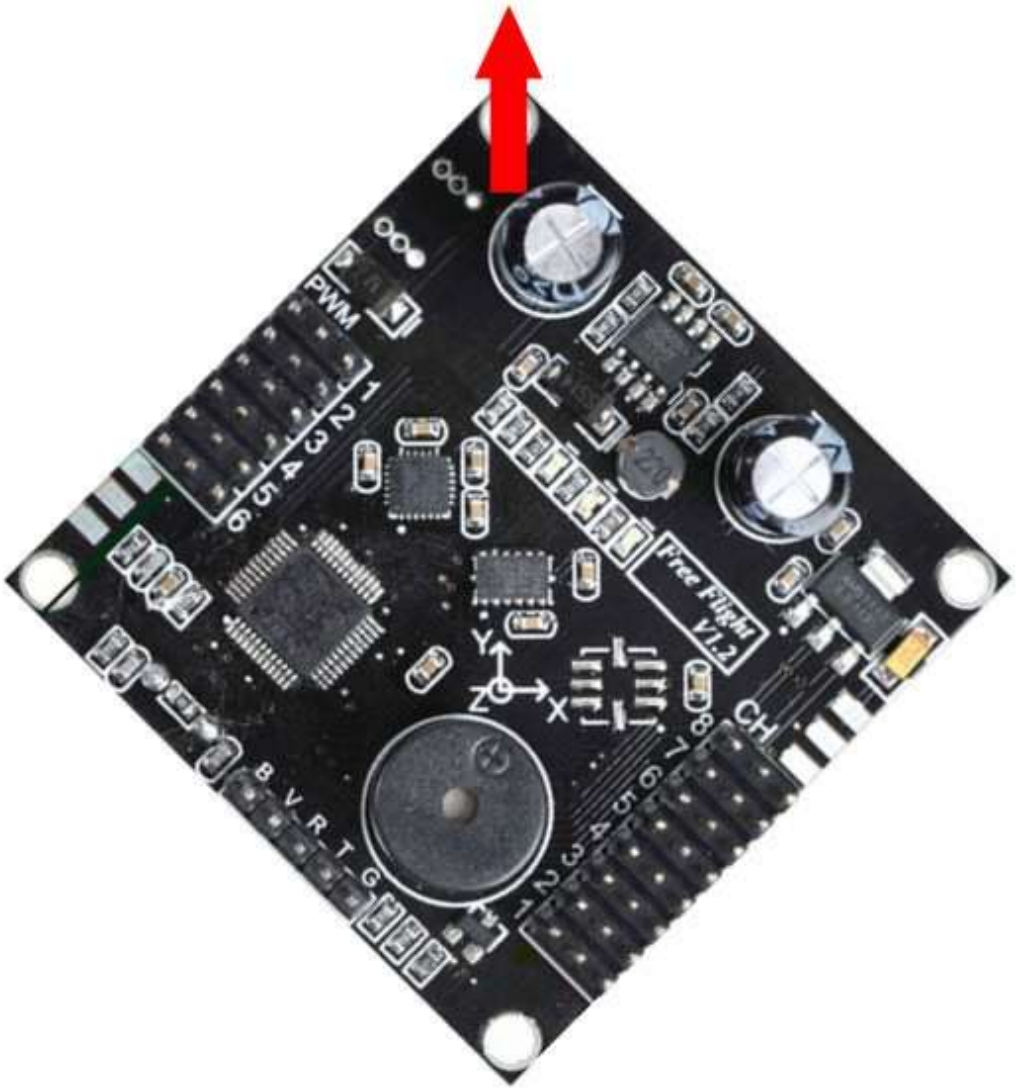
FREE FLIGHT CONTROLLER CONFIGURATION AND ORIENTATION:

- Regardless of configuration, X or +, the Free Flight Controller orientation is the same
- The red arrow points to the forward direction



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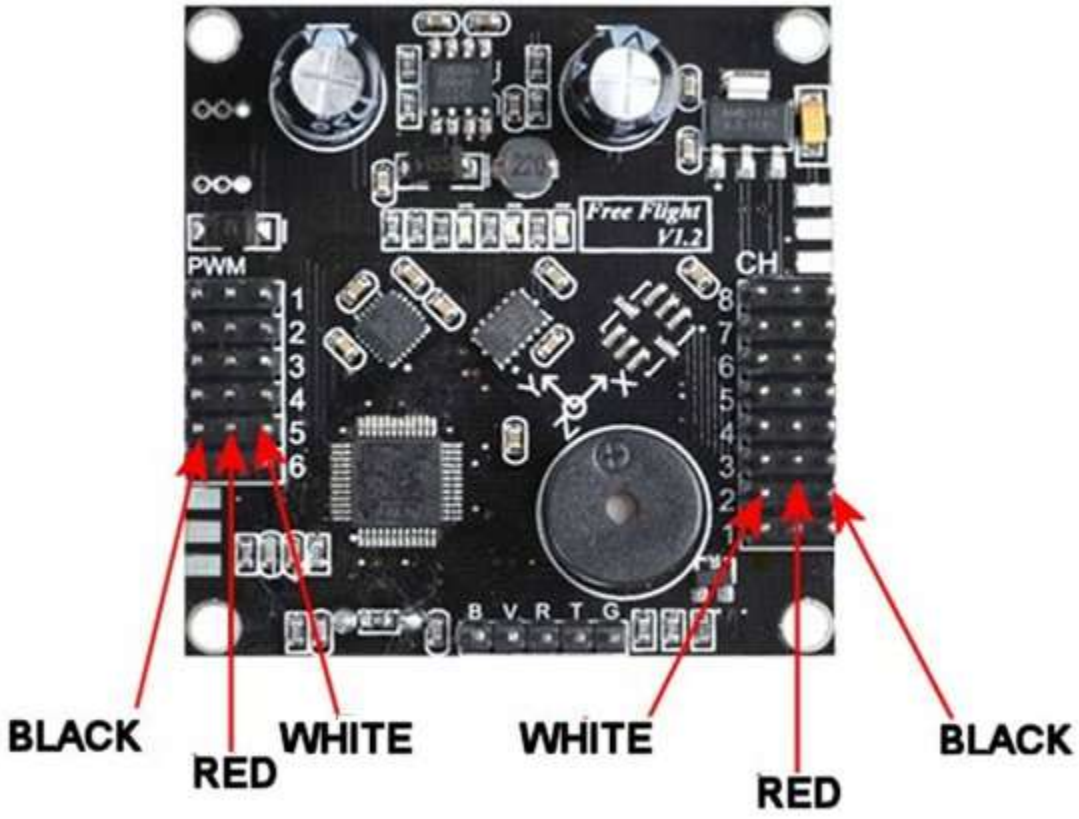
FREE FLIGHT CONTROLLER CONNECTIONS:

PWM 1	Camera tilt servo	**CH 8**	Reserved for future use
PWM 2	Camera pan servo	**CH 7**	Transmitter channel used to adjust the camera's pitch servo Please note PTZ has to be enabled and Pitch Lock disabled via the ZNS application first
PWM 3	ESC for motor #1	**CH 6**	Transmitter channel used to enable/disable 3D mode Please note 3D mode has to be enabled via the ZNS application first
PWM 4	ESC for motor #2	**CH 5**	Transmitter channel used for calibration
PWM 5	ESC for motor #3	**CH 4**	Rudder channel on receiver
PWM 6	ESC for motor #4	**CH 3**	Throttle channel on receiver
		CH 2	Elevator channel on receiver
		CH 1	Aileron channel on receiver

PIN HEADER LAYOUTS:

PLEASE NOTE THAT PREVIOUS VERSIONS OF THE GUIDE HAD THE INCORRECT INFORMATION

	LEFT PIN	MIDDLE PIN	RIGHT PIN		LEFT PIN	MIDDLE PIN	RIGHT PIN
PWM	BLACK	RED	WHITE				
CH	ORANGE	RED	BROWN	**OR**	WHITE	RED	BLACK



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FREE FLIGHT CONTROLLER POWER:

- The Free Flight Controller can be powered up by a 3S or 4S LIPO
- Supplied JST cable can be used when setting up a Free Flight Controller that is not physically connected to the quadcopter's main LIPO flight battery
- When physically connected to a quadcopter, the Free Flight Controller can be powered up by one of the ESC's that is connected to the main LIPO flight battery

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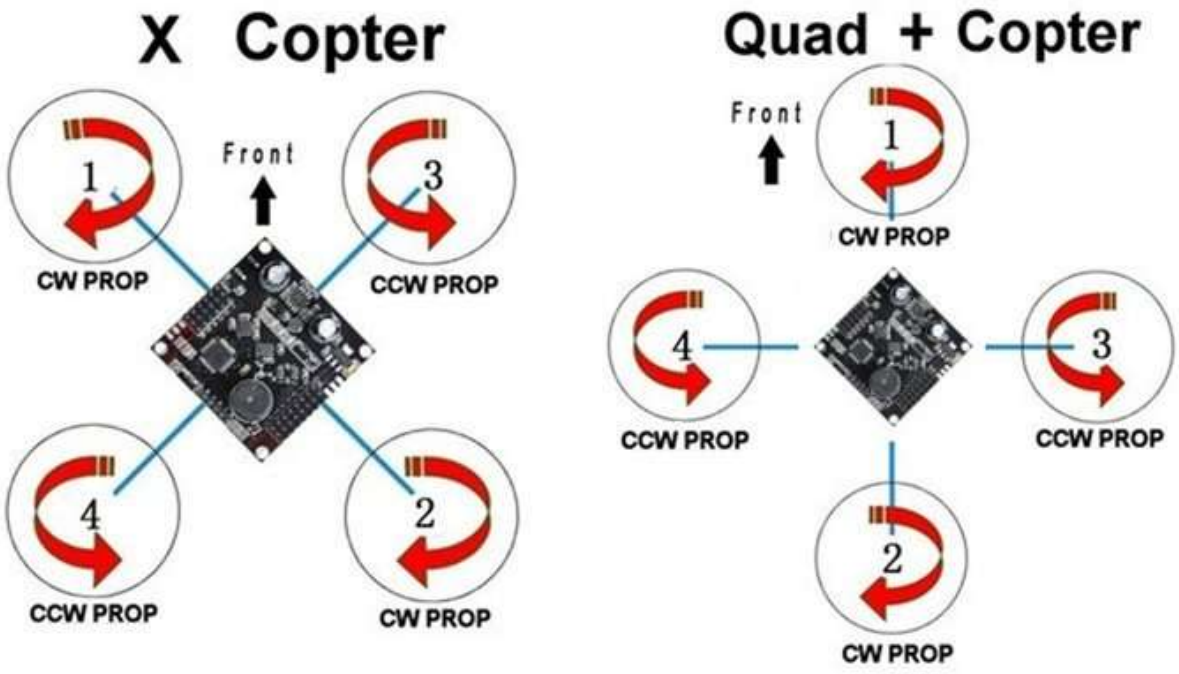
PROPELLER TYPES:

PLEASE NOTE THAT PREVIOUS VERSIONS OF THE GUIDE HAD THE INCORRECT INFORMATION

MOTOR AND PROPELLER ORIENTATIONS:

PLEASE NOTE THAT PREVIOUS VERSIONS OF THE GUIDE HAD THE INCORRECT INFORMATION

VIEWED FROM ABOVE THE QUADCOPTER - RED ARROW INDICATES MOTOR DIRECTION



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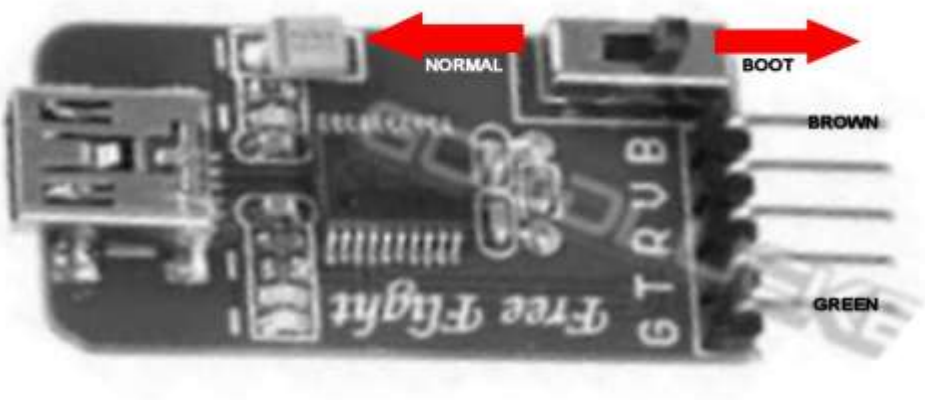
USB BOOT LOADER:

- Blue colored USB Boot Loader indicates pre V1.22 firmware
- Black colored USB Boot Loader indicates V1.22 and later firmware
- 5 pin header marked G T R V B with G indicating GREEN and B indicating BROWN is for connecting the USB Boot Loader cable
- 2 position switch to select modes:

  BOOT mode is used to apply firmware updates to the Free Flight Controller and is enabled when the switch is moved towards to the 5 pin header

  NORMAL mode is used to make configuration changes to the Free Flight Controller and is enabled when switch is moved towards to the USB port



FREE FLIGHT CONTROLLER V1.2

CONNECTING THE FREE FLIGHT CONTROLLER TO YOUR PC IN BOOT MODE:

1. If running Windows XP, install the necessary drivers for the USB Boot Loader
2. Set the switch on the USB Boot Loader to the BOOT position
3. Connect one end of the USB Boot Loader cable to the USB Boot Loader with the GREEN wire to G and the BROWN wire to B on the USB Boot Loader
4. Connect the other end of the USB Boot Loader cable to the Free Flight Controller with the GREEN wire to G and the BROWN wire to B on the Free Flight Controller
5. Connect the mini USB connector on the USB to mini USB adapter cable to the USB Boot Loader's mini USB port
6. Connect the other end of the USB to mini USB adapter cable to your pc
7. The USB Boot Loader's BLUE led turns ON
8. Power ON the Free Flight Controller by connecting a 3S battery using the supplied JST cable
9. The Free Flight Controller's BLUE led turns ON

CONNECTING THE FREE FLIGHT CONTROLLER TO YOUR PC IN NORMAL MODE:

1. If running Windows XP, install the necessary drivers for the USB Boot Loader
2. Set the switch on the USB Boot Loader to the NORMAL position
3. Connect one end of the USB Boot Loader cable to the USB Boot Loader with the GREEN wire to G and the BROWN wire to B on the USB Boot Loader
4. Connect the other end of the USB Boot Loader cable to the Free Flight Controller with the GREEN wire to G and the BROWN wire to B on the Free Flight Controller
5. Connect the mini USB connector on the USB to mini USB adapter cable to the USB Boot Loader's mini USB port
6. Connect the other end of the USB to mini USB adapter cable to your pc
7. The USB Boot Loader's BLUE led turns ON
8. Power ON the Free Flight Controller by connecting a 3S battery using the supplied JST cable
9. The Free Flight Controller's BLUE led turns ON
10. The Free Flight Controller buzzer BEEPS once
11. The Free Flight Controller's RED led turns ON and BLINKS three times
12. The Free Flight Controller's RED led turns OFF
13. The USB Boot Loader's YELLOW led BLINKS rapidly

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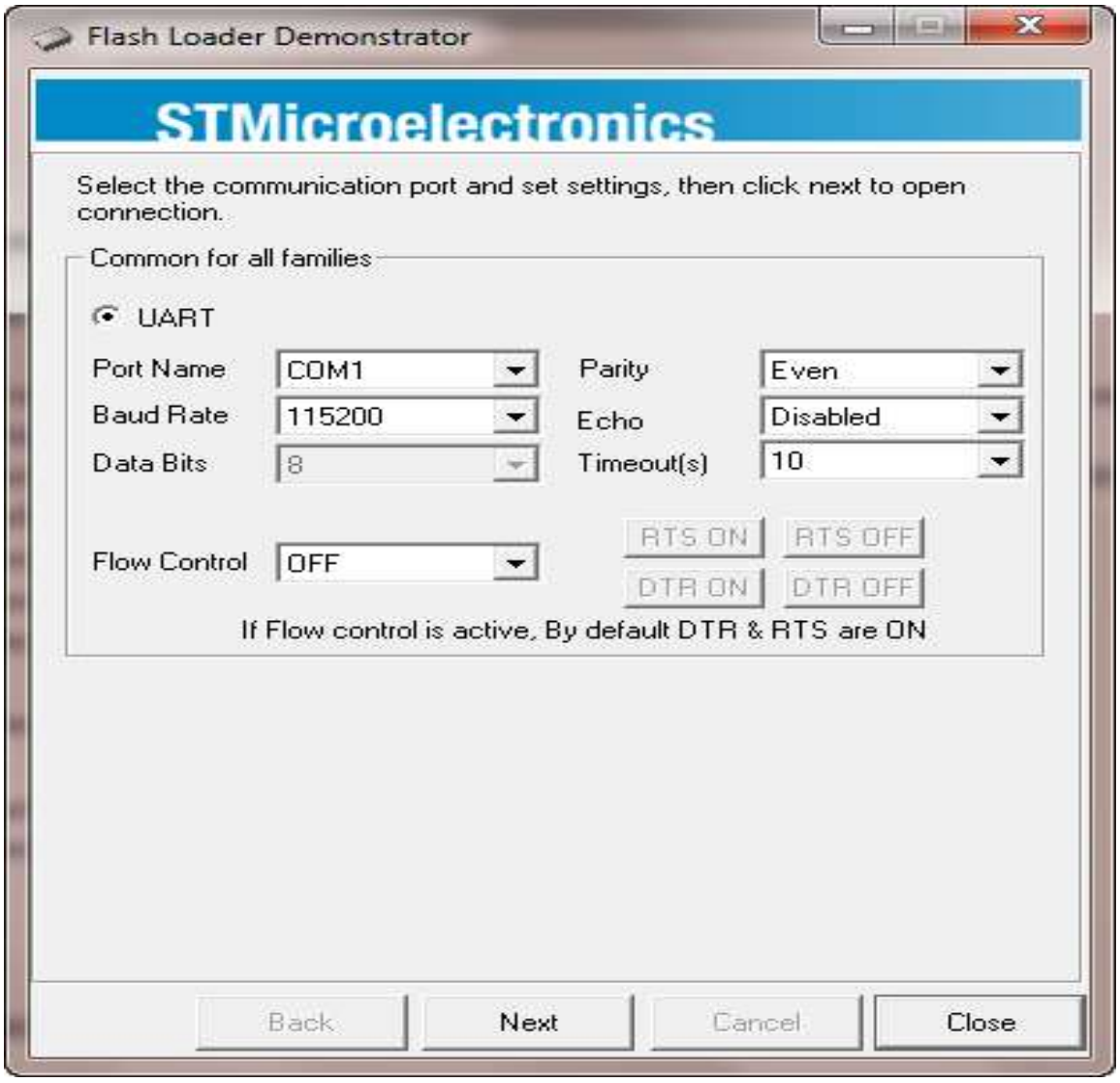
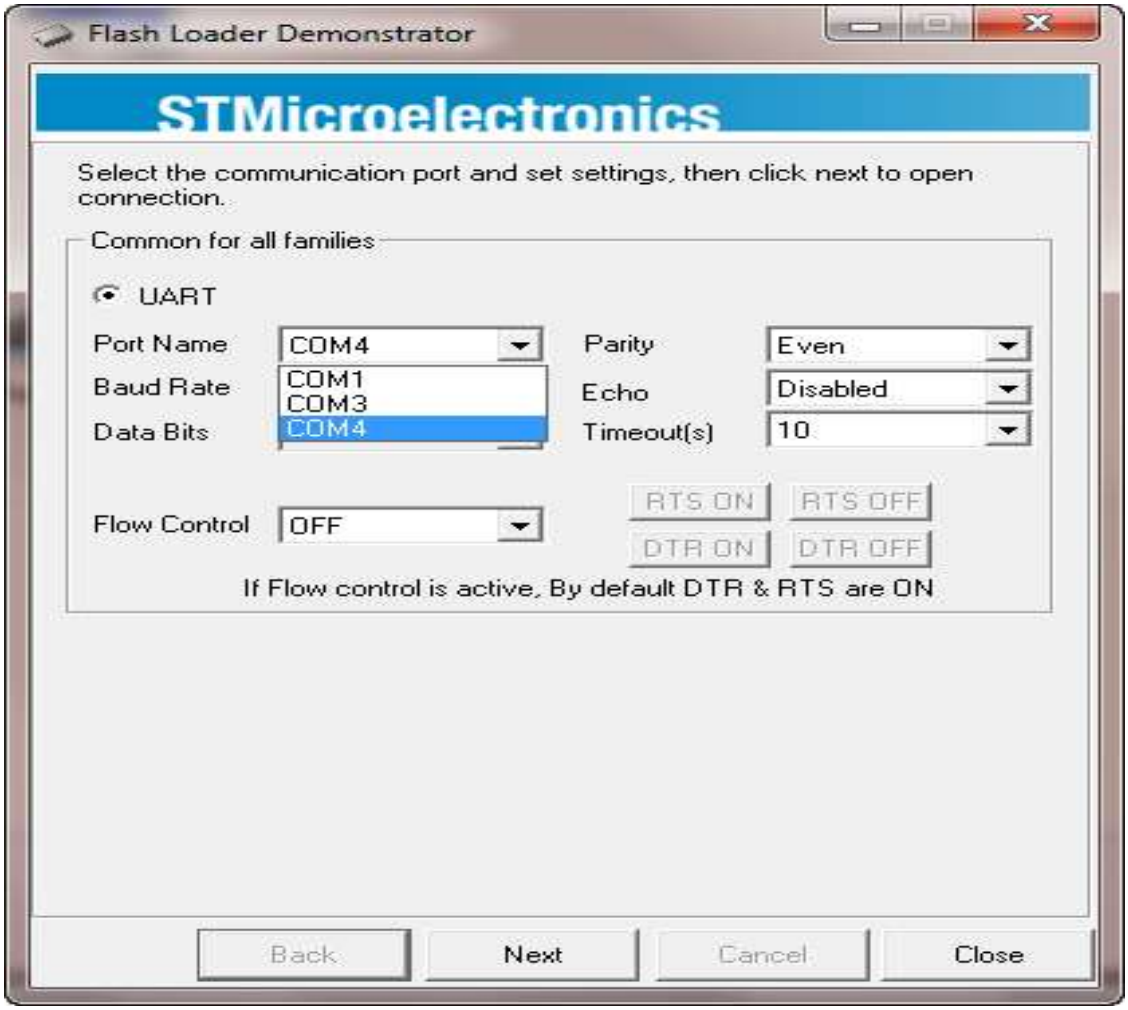
COPYING THE FIRMWARE FROM THE FREE FLIGHT CONTROLLER TO YOUR PC:

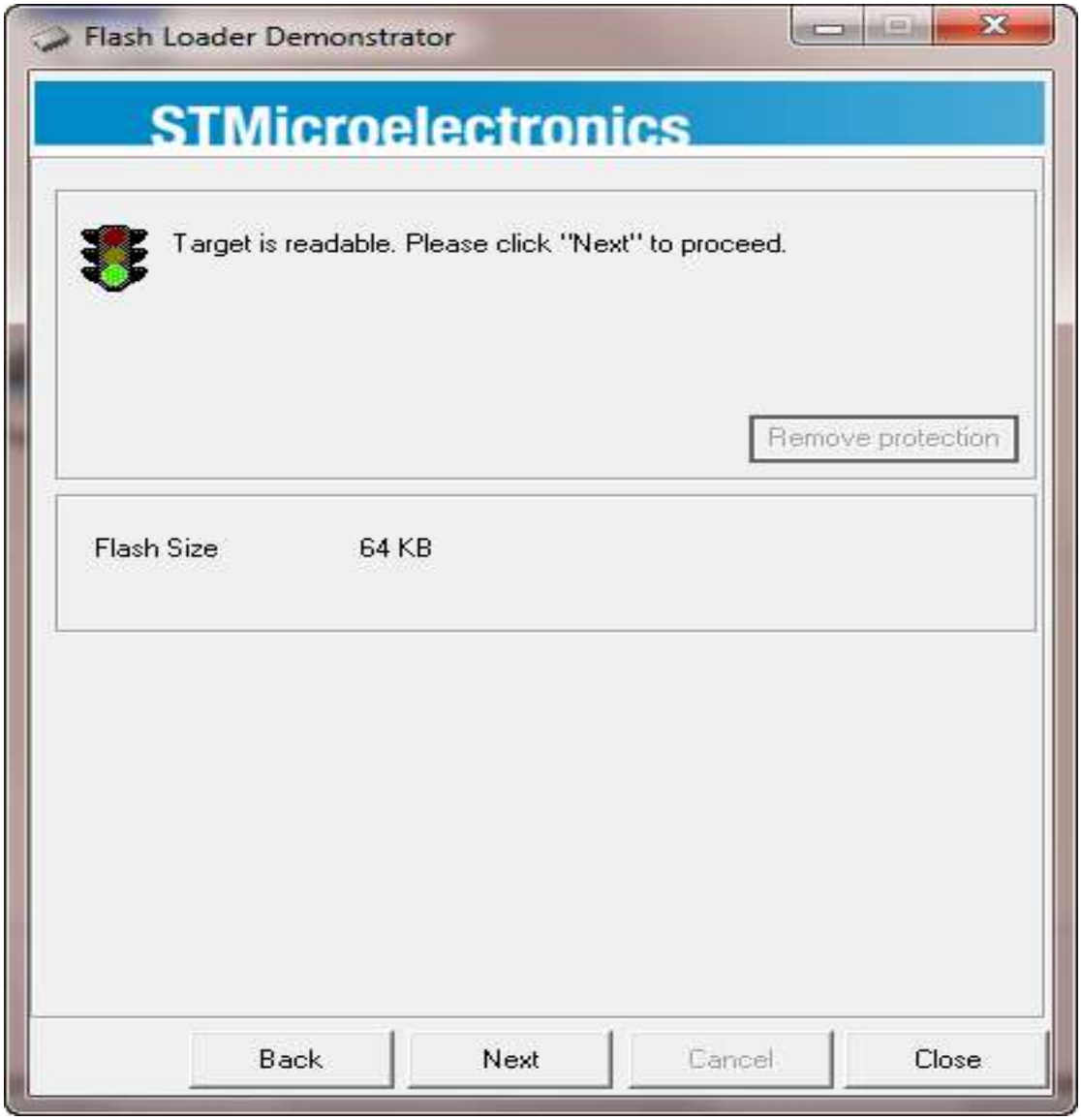
1. Connect the Free Flight Controller to your PC in BOOT mode
2. Determine the COM port being used by the USB Boot Loader on your PC
3. Start the STMicroelectronics Flash Loader Demonstrator
4. The following screen appears



5. Click on the down arrow next to the Port name and select the COM port

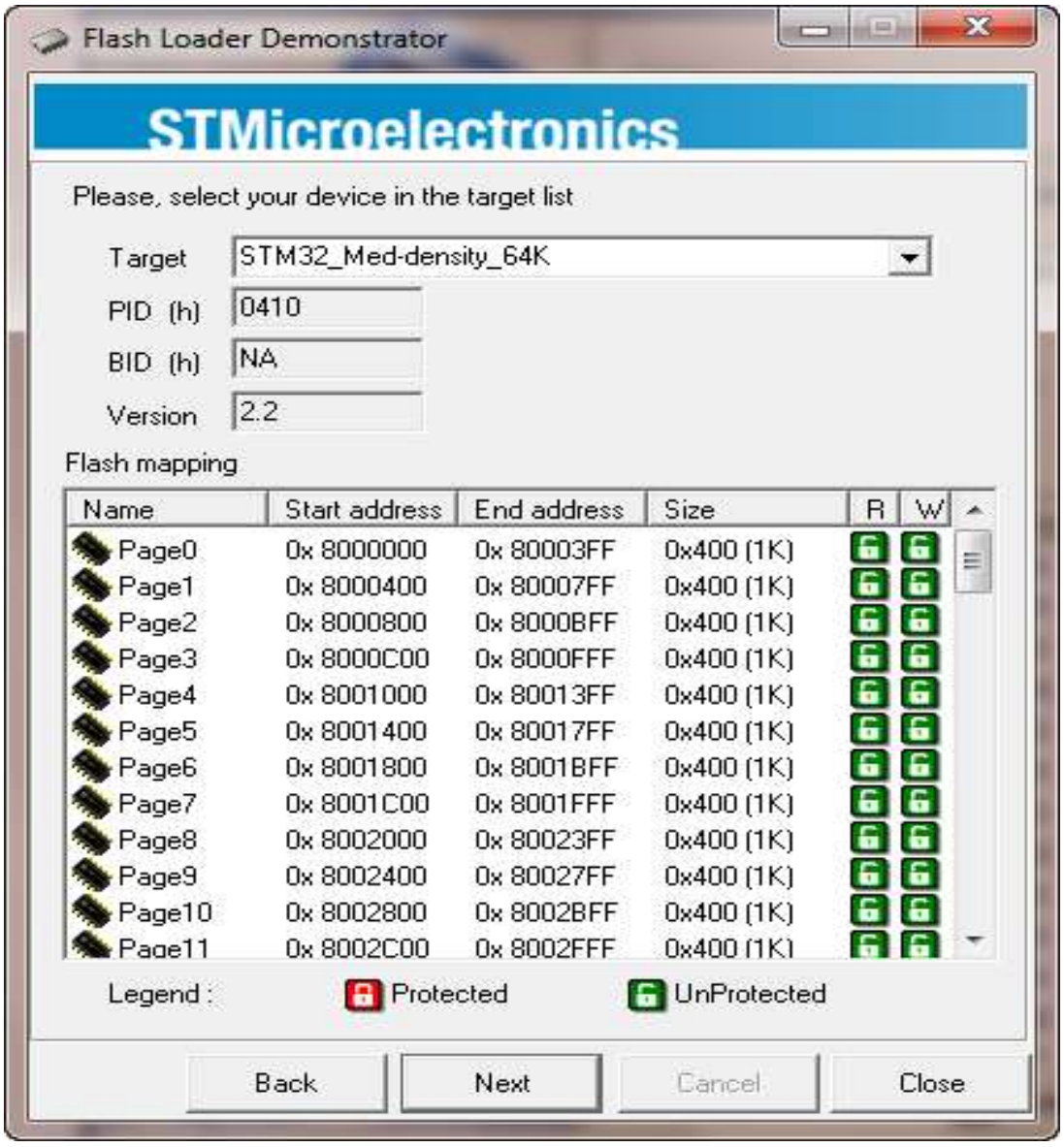


6. Once the COM port is selected, click on the Next button

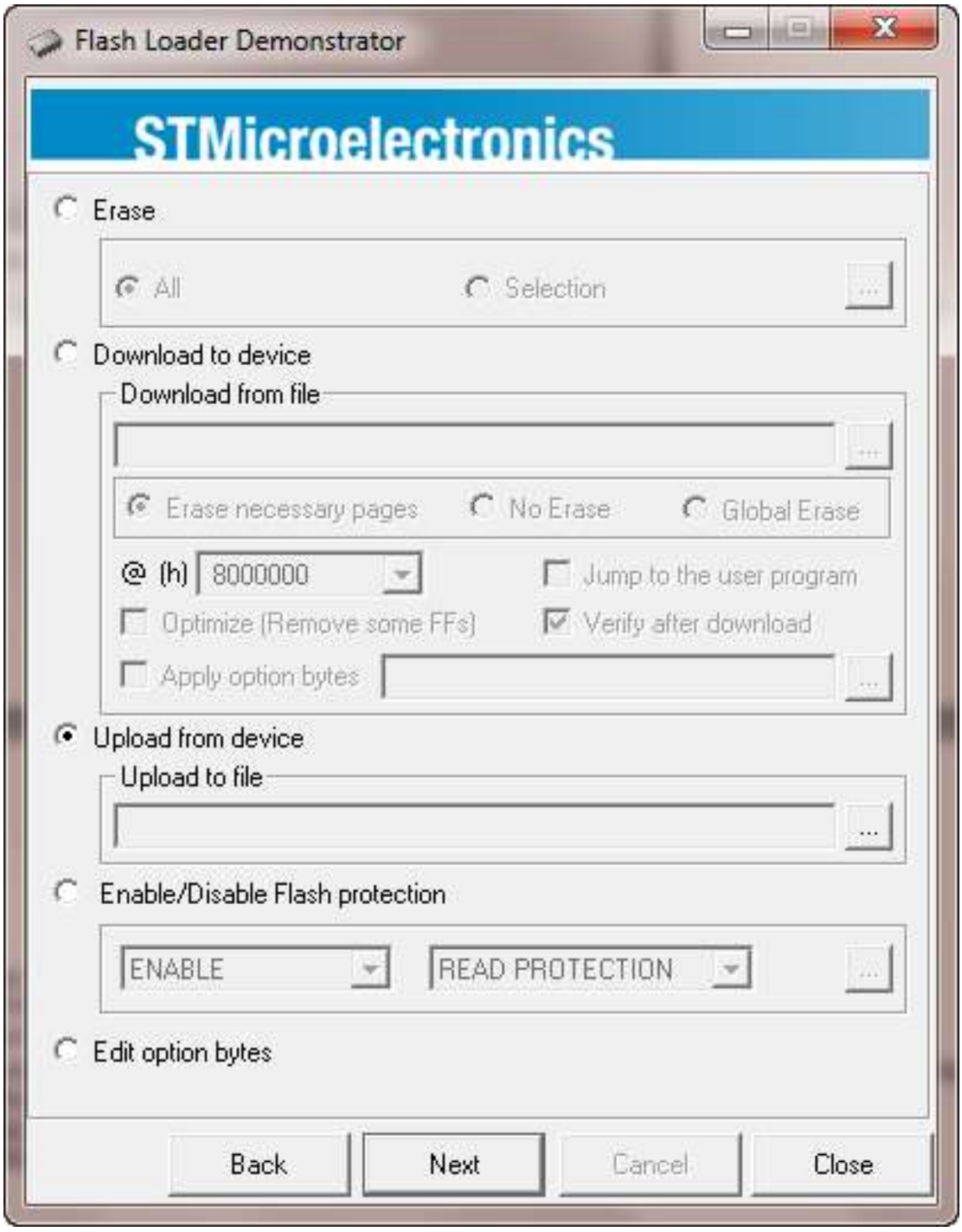


7. If you selected the correct COM, click on the Next button
8. If you selected the incorrect COM port, click on the Back button to retry

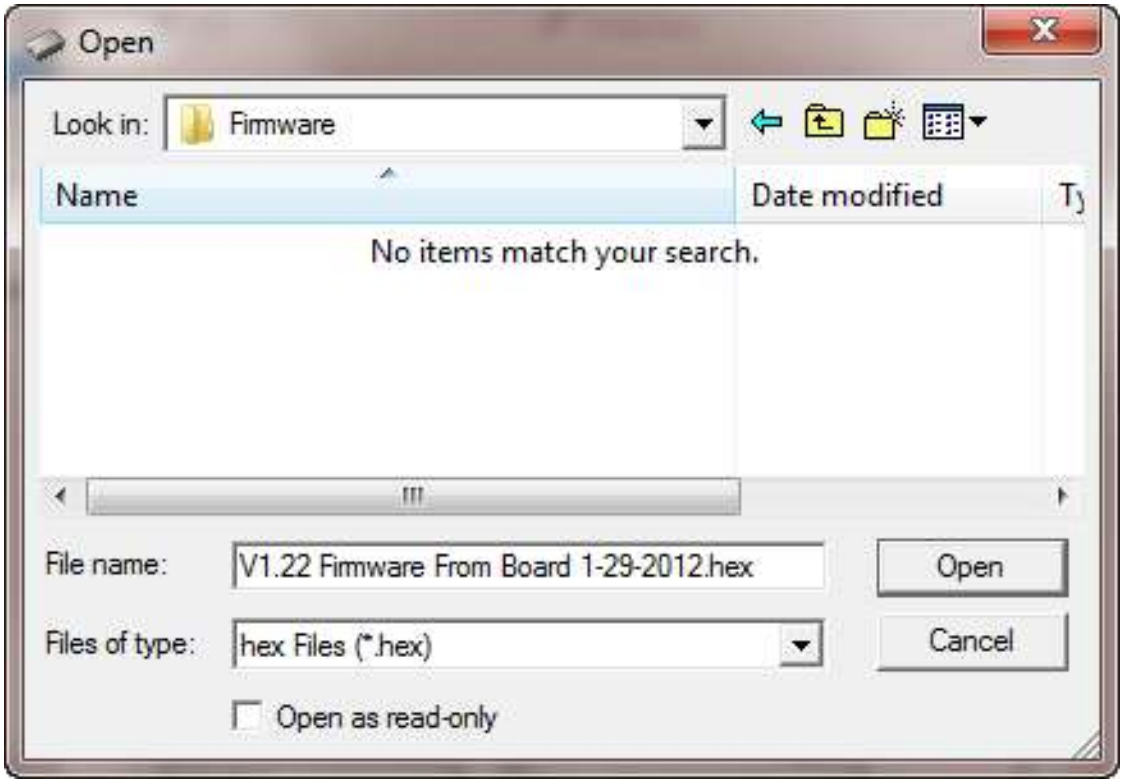
9. Ensure that the Target indicates STM32_Med-density_64
10. Click on the Next button



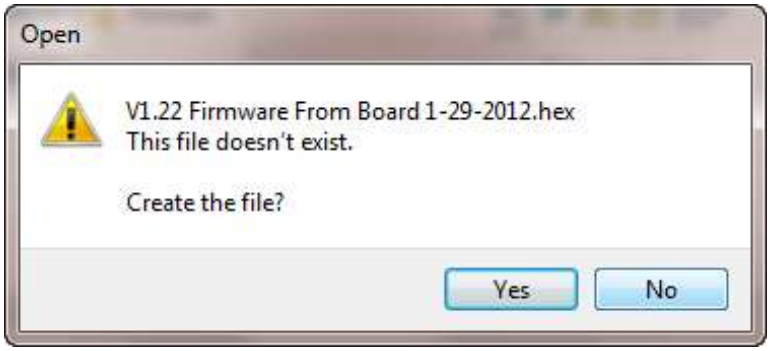
11. Click on the Upload From Device radio button
12. Click on the … button next to Upload to File



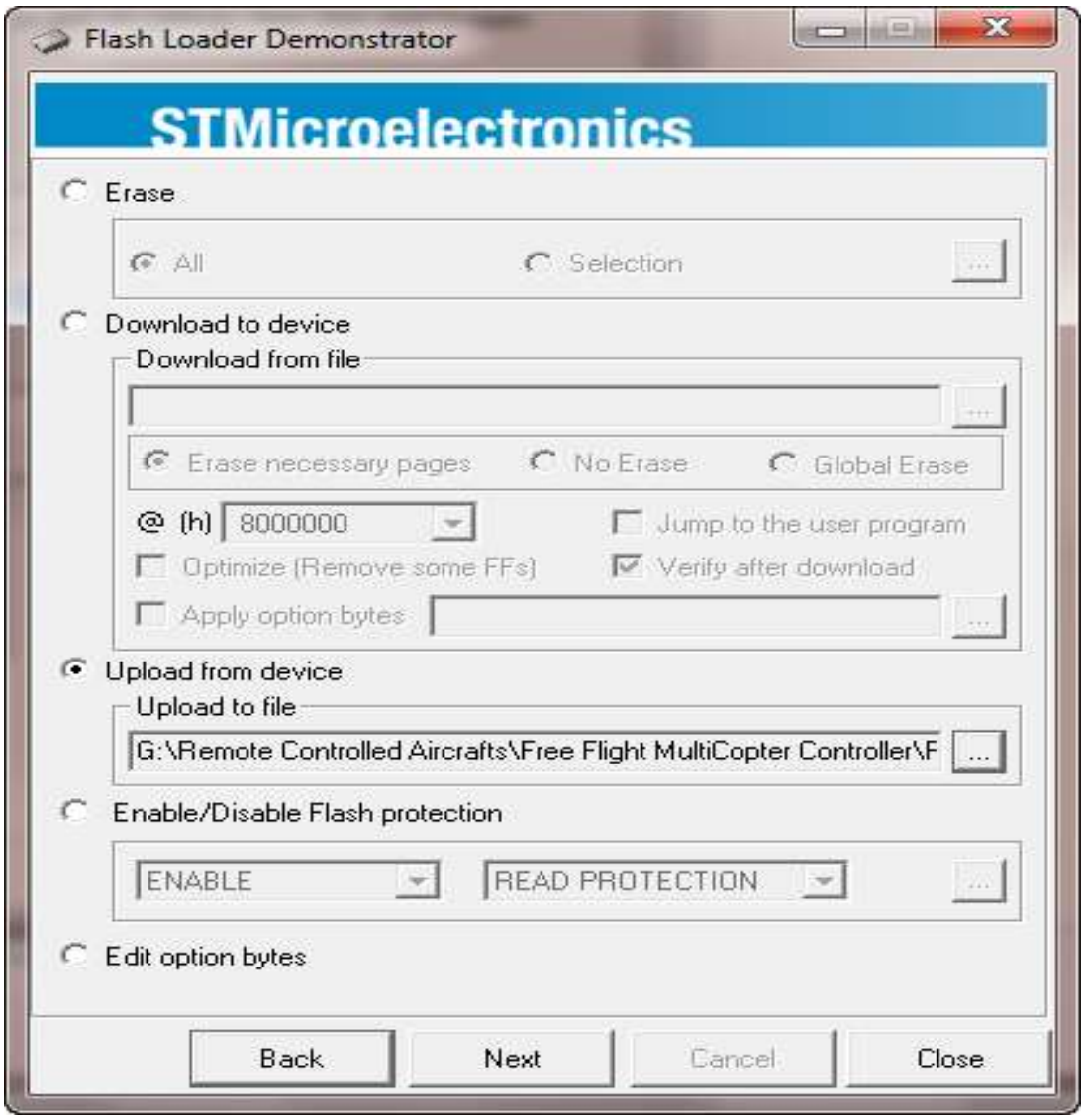
13. Use the file browser to select the location of file to save the firmware to
14. Enter the name of the hex file to save the firmware to
15. Click on the Open button



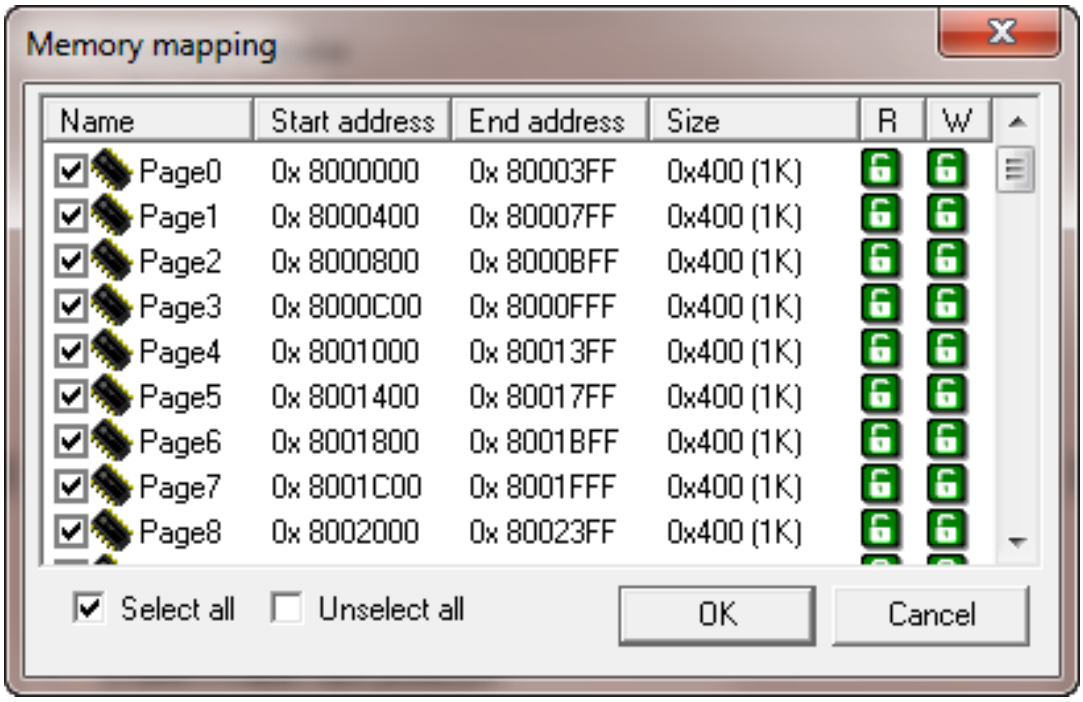
16. If the file does not already exist, this message appears, click on the Yes button



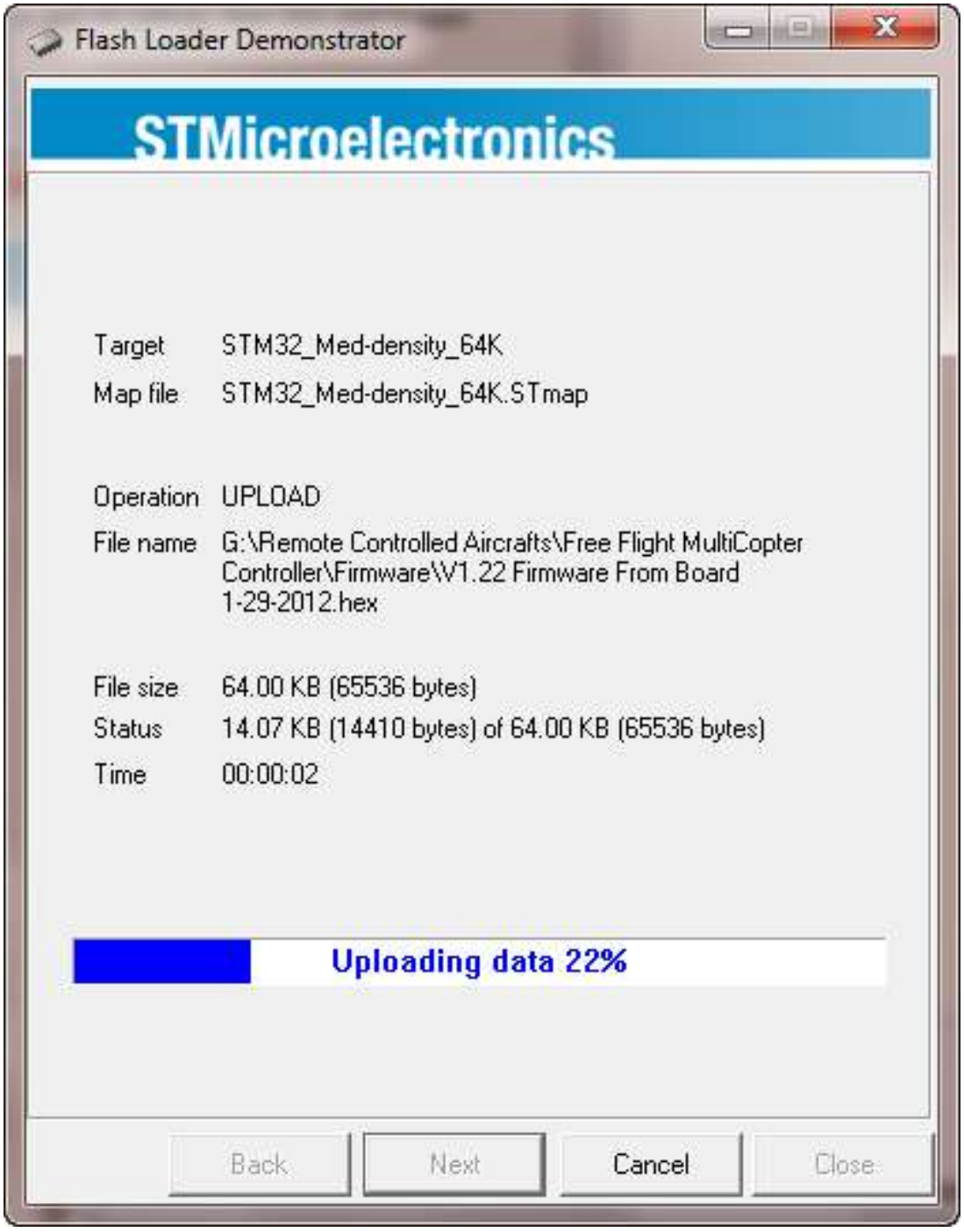
17. The location and name of the hex file appear under Upload to File
18. Click on the Next button



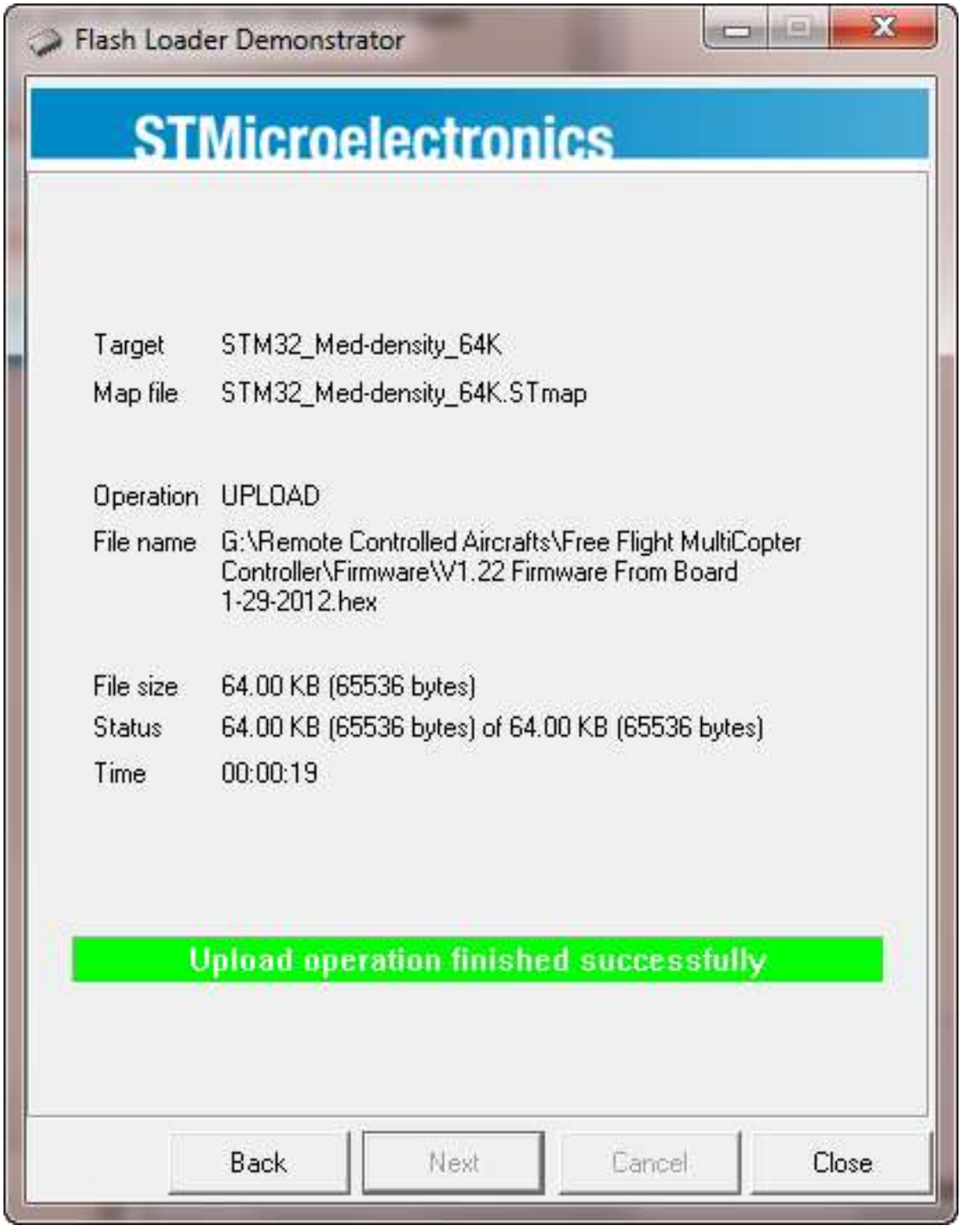
19. Ensure that the Select All checkbox is checked
20. Click on the OK button



21. The status screen appears, indicating the progress



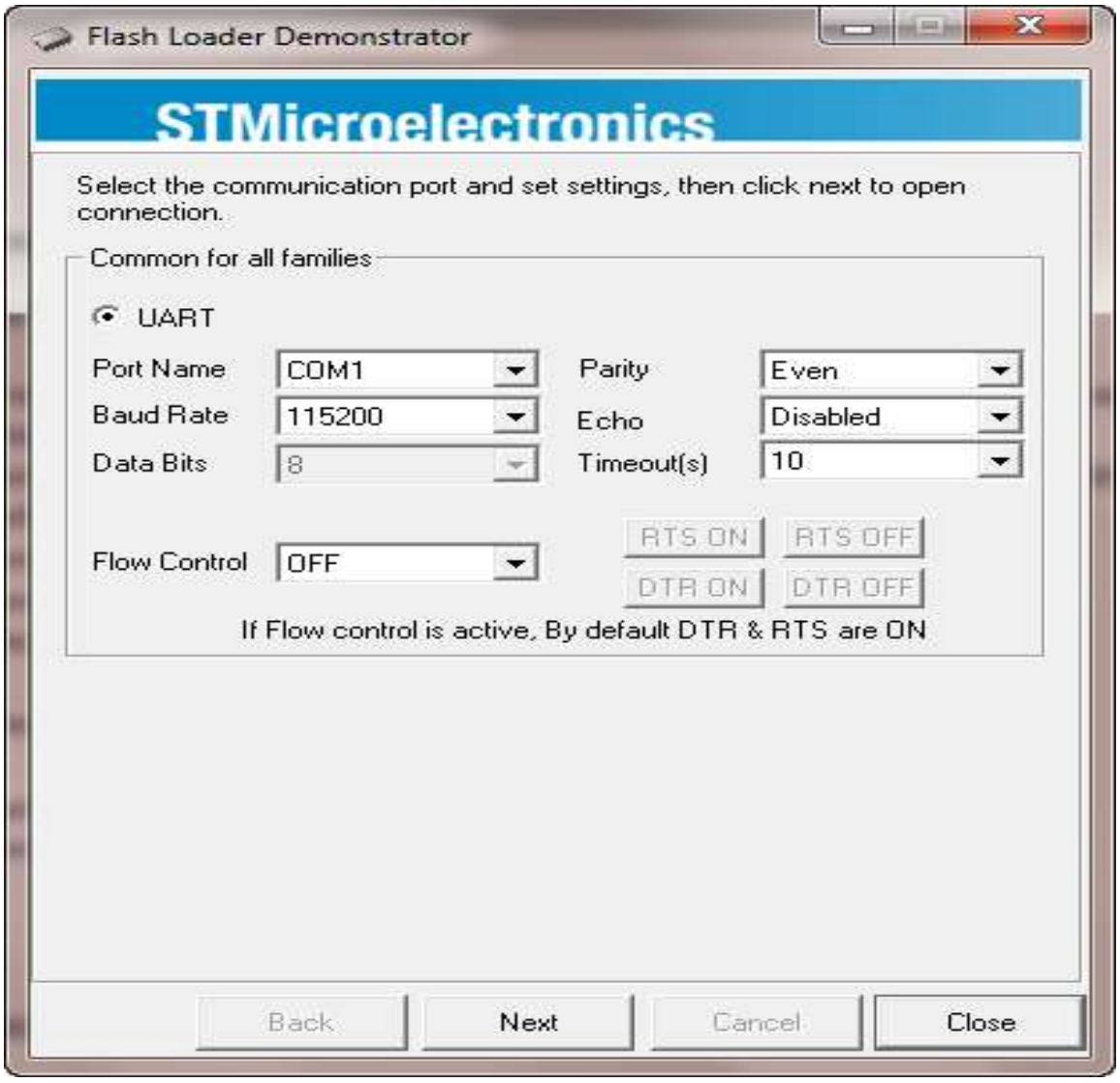
22. The status screen displays a message when the process is complete
23. Click on the Close button to end the process
24. Power OFF the Free Flight Controller



FREE FLIGHT CONTROLLER V1.2

UPDATING THE FIRMWARE ON THE FREE FLIGHT CONTROLLER:

1. Connect the Free Flight Controller to your PC in BOOT mode
2. Determine the COM port being used by the USB Boot Loader on your PC
3. Start the STMicroelectronics Flash Loader Demonstrator
4. The following screen appears



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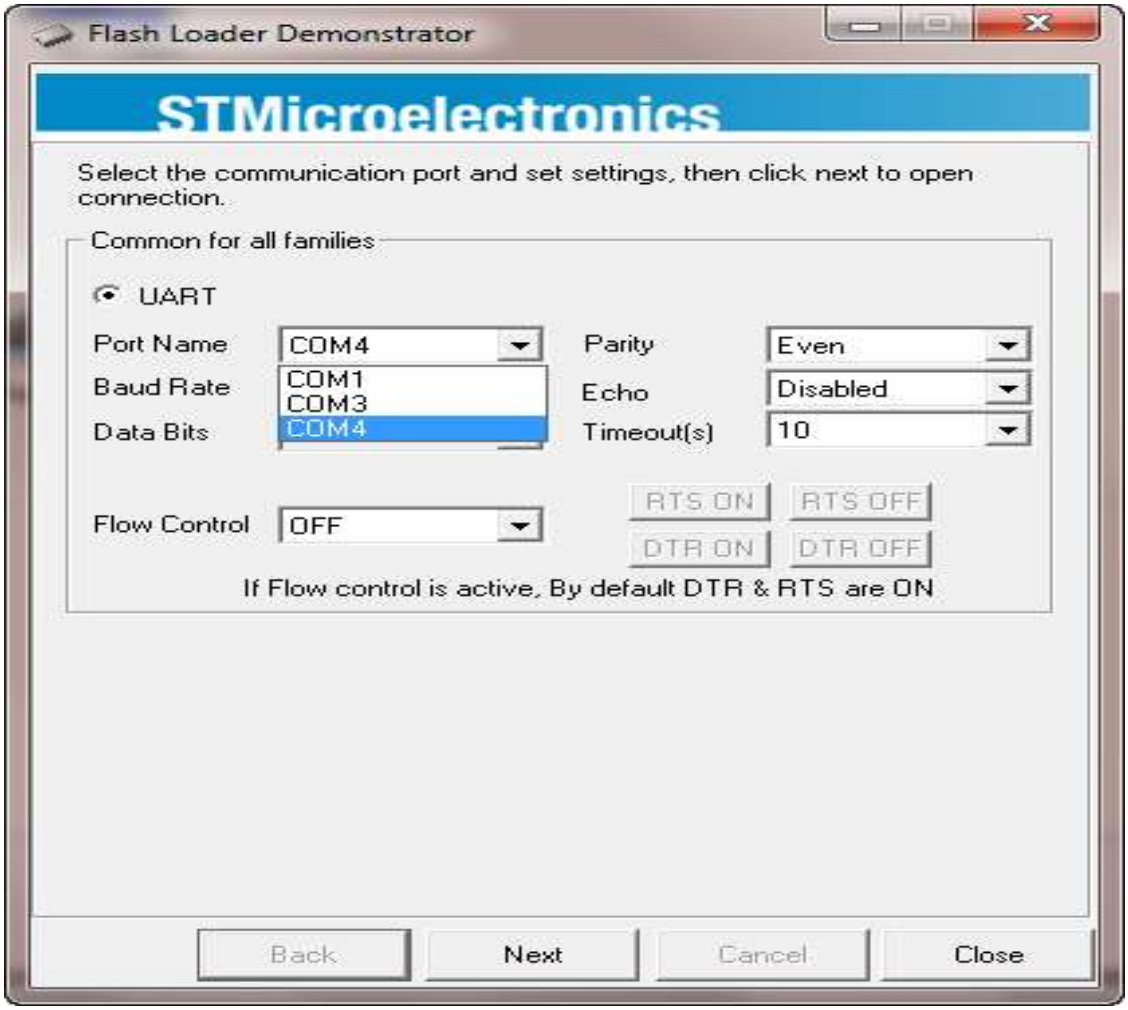
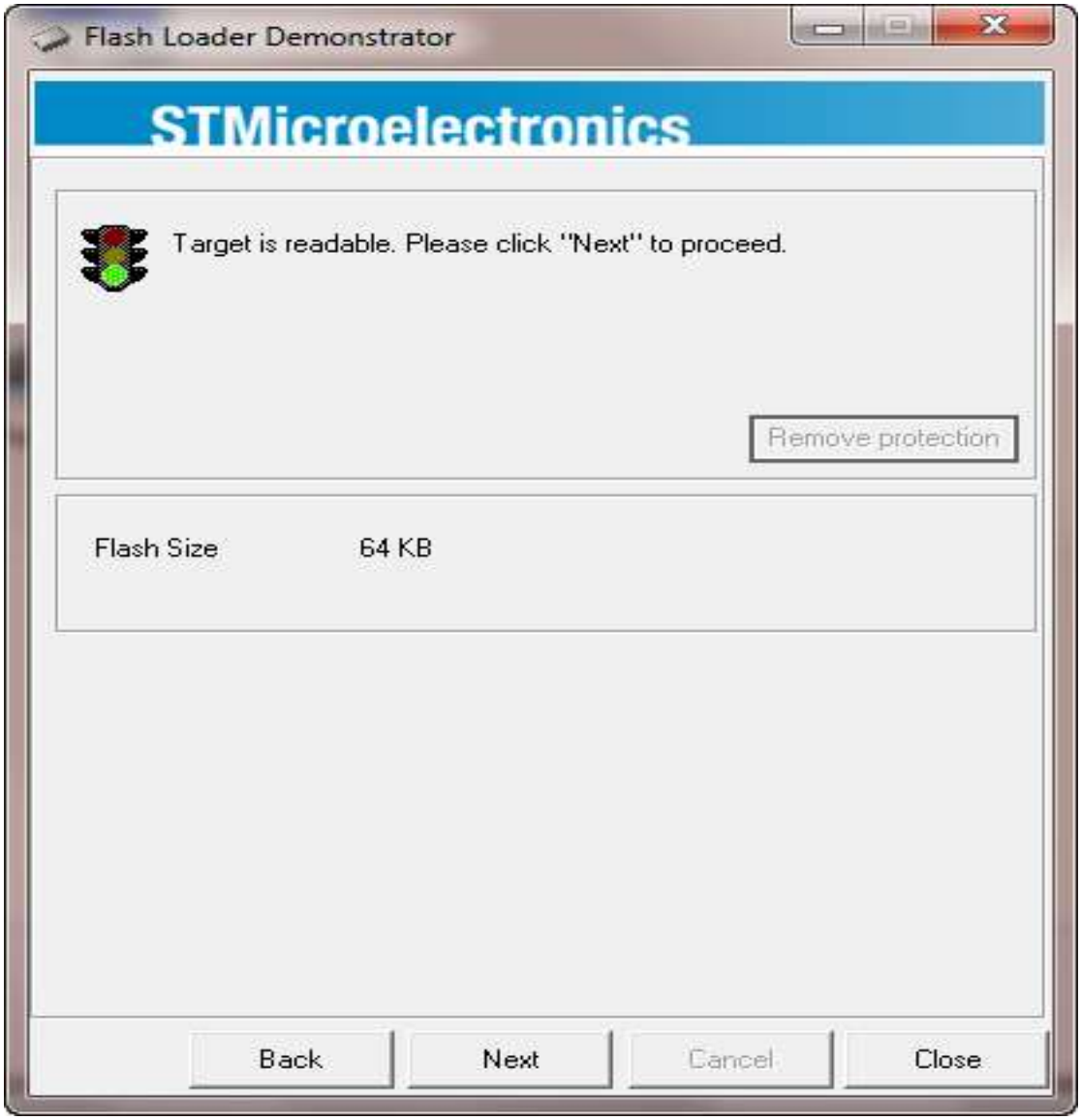
5. Click on the down arrow next to the Port name and select the COM port

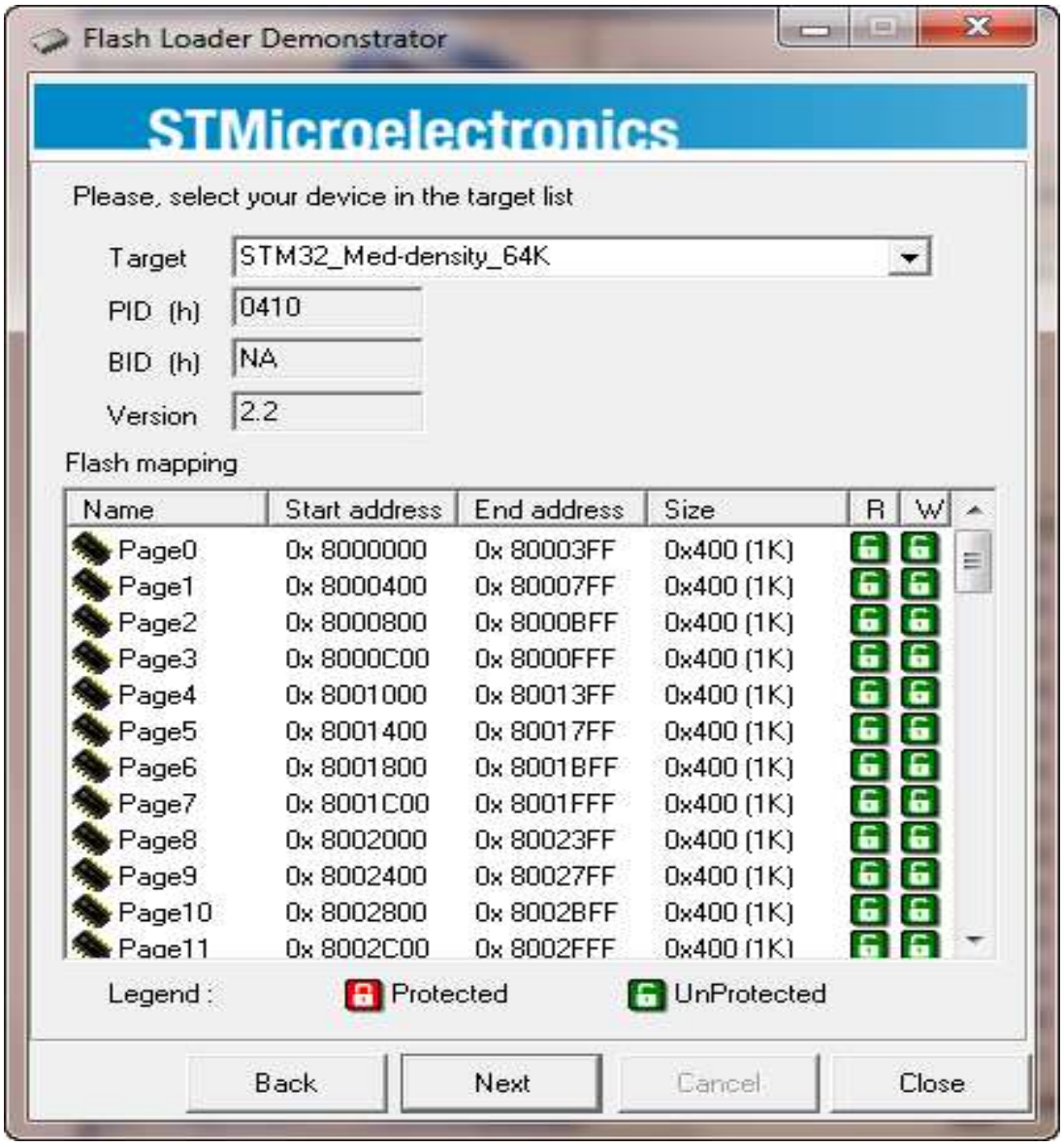


6. Once the COM port is selected, click on the Next button

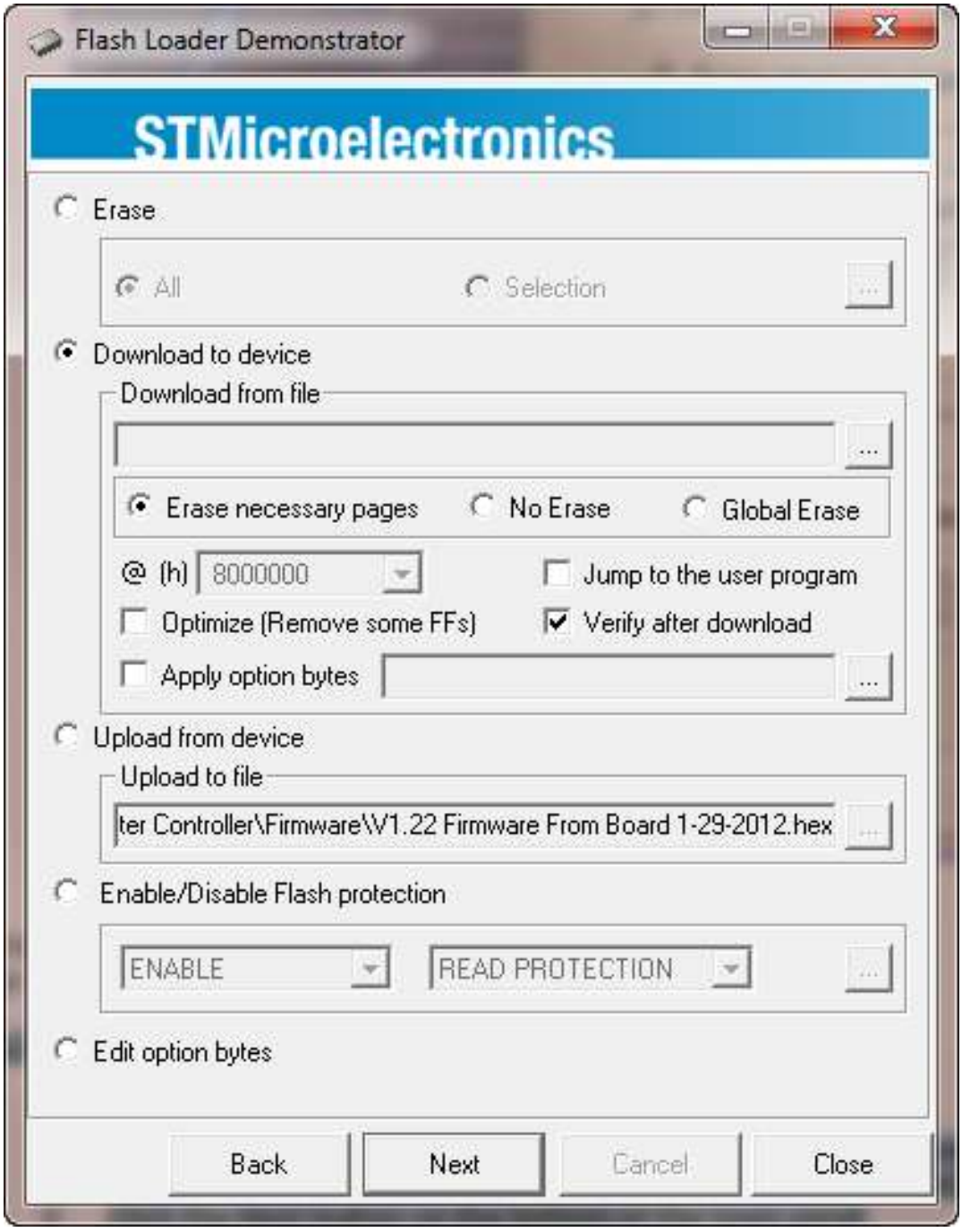


7. If you selected the correct COM, click on the Next button
8. If you selected the incorrect COM port, click on the Back button to retry

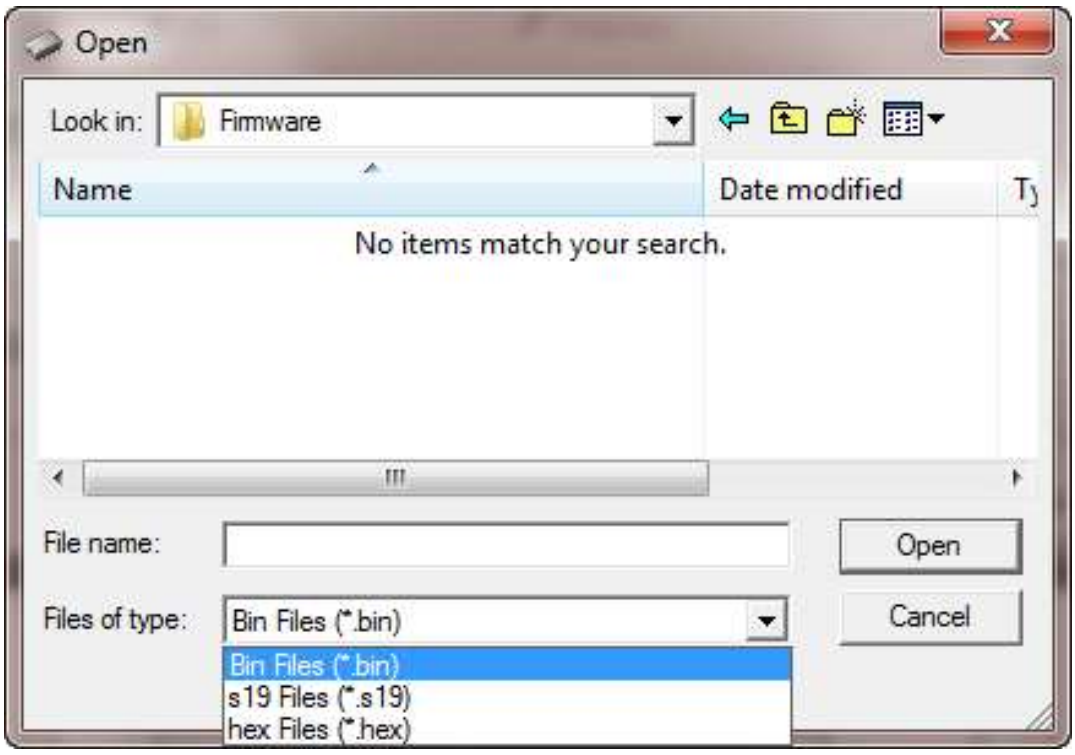
9. Ensure that the Target indicates STM32_Med-density_64
10. Click on the Next button



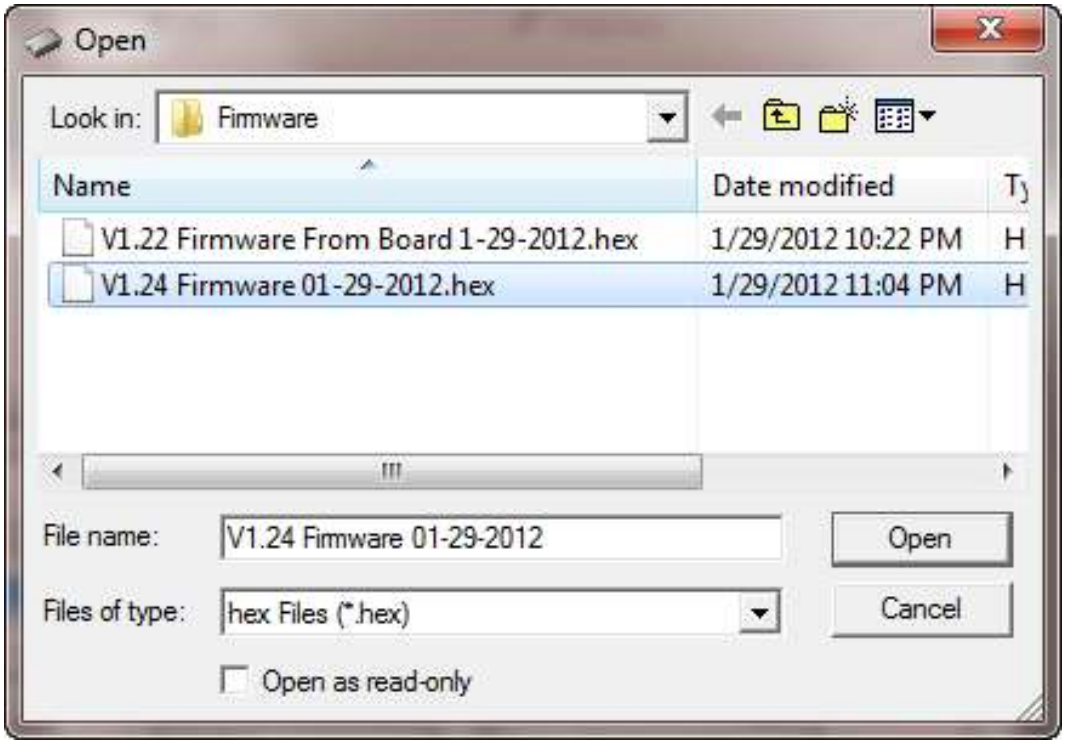
11. Click on the Download to Device radio button
12. Click on the … button next to Download from file



13. Use the file browser to select the location of the firmware to be loaded
14. Click on the down arrow to select the correct file type

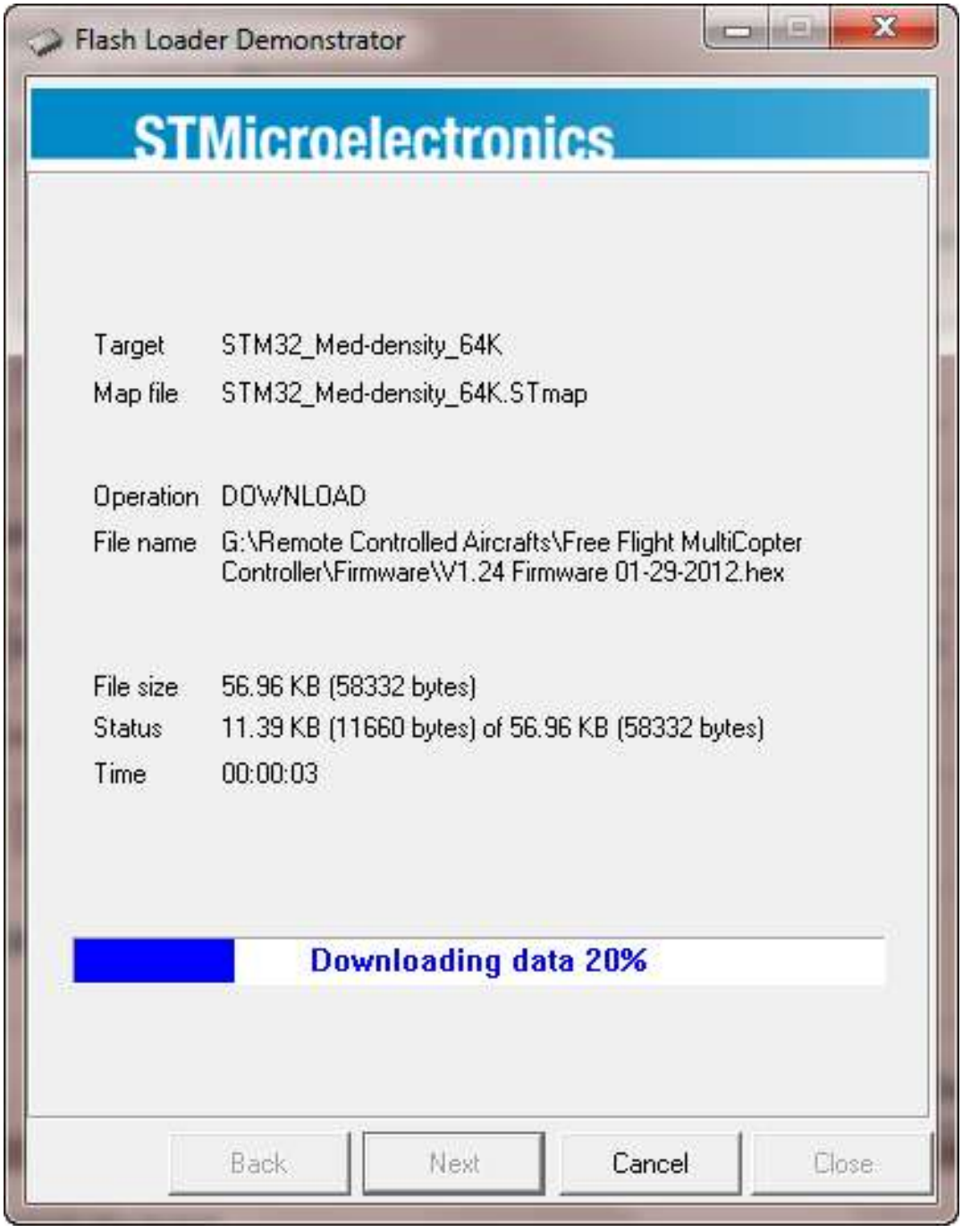


15. Click on the file containing the firmware
16. Click on the Open button

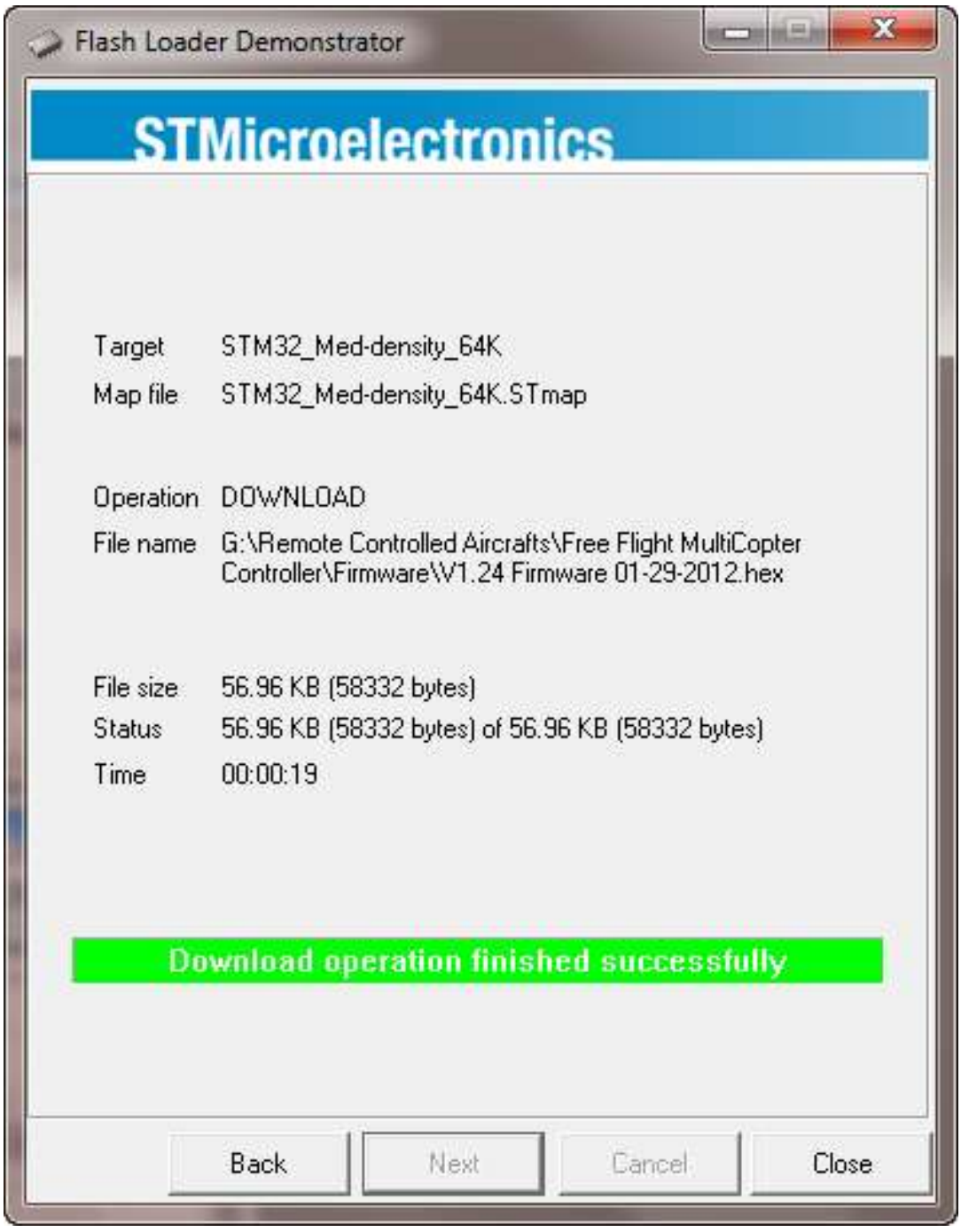


17. Ensure the Erase Necessary Pages radio button is selected
18. Ensure that the Verify After Download checkbox is checked
19. Click on the Next button

20. The status screen appears, indicating the progress of downloading and verifying



21. The status screen displays a message when the process is complete
22. Click on the Close button to end the process
23. Power OFF the Free Flight Controller



FREE FLIGHT CONTROLLER V1.2

PTZ CONNECTIONS:

The Free Flight Controller can control your onboard camera's pan/tilt mount (gimbal) automatically while also giving you the flexibility to manually adjust the tilt when desired via a POT controlled channel on your transmitter.

If you are going to use a camera with a pan/tilt mount, connect the:

- Camera mount's (gimbal) tilt servo to the Free Flight Controller's PWM header #1
- Camera mount's (gimbal) pan servo to the Free Flight Controller's PWM header #2

If you are going to manually adjust the camera's tilt as well, connect:

- Channel 7 on your receiver to the Free Flight Controller's Channel 7 header
- Setup a POT on your transmitter to control channel 7

PTZ SPECIAL NOTE:

In order for the manual adjustment of the tilt servo to work, the POT controlled channel on your transmitter must be calibrated. This can be performed during the calibration process of your transmitter's sticks and involves moving the POT to its minimum and maximum values.

I have a DX6i transmitter with only six channels so in order to test the manual control of the pitch servo I did the following:

1. Connected my receiver's GEAR channel to channel 7 on the Free Flight Controller
2. Placed my DX6i transmitter at the Travel Adjustment screen which lets me adjust each of the channel's travel values from 0 to 100 percent
3. Performed an RC calibration on my sticks AND adjusted the travel values of the GEAR channel on my DX6i transmitter all the way down to 0 and then all the way back up to 100 so the Free Flight Controller could record the values of the GEAR channel

When powered up, the camera's tilt servo, I do not have a pan servo, was automatically adjusted with the quadcopter's movements. To then manually control the pitch, I placed the DX6i transmitter at the Travel Adjustment screen and adjusted the GEAR channel value up and down. The camera's pitch changed accordingly. It's a sneaky way of using the Travel Adjustment transmitter function as a POT for any channel if your transmitter does not have a dedicated POT channel.

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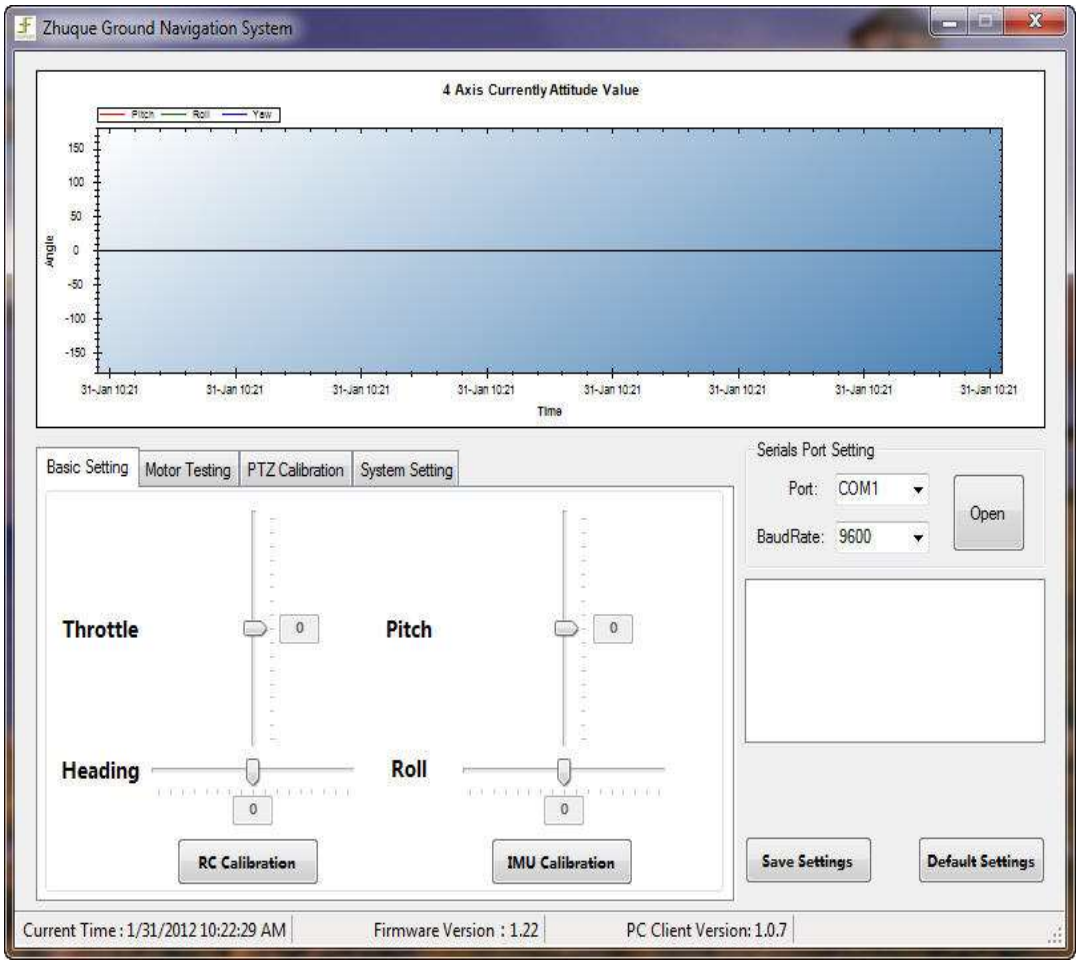
PTZ ZETUP USING THE ZNS1002 V1.07 APPLICATION A.K.A. THE "UPPER MACHINE SOFTWARE":

1. Connect the Free Flight Controller to your PC in NORMAL mode
2. Power ON your transmitter
3. Power ON your receiver if connected via an ESC and a separate LIPO
4. Determine the COM port being used by the USB Boot Loader on your PC
5. Start the ZNS1002 application
6. The following screen appears



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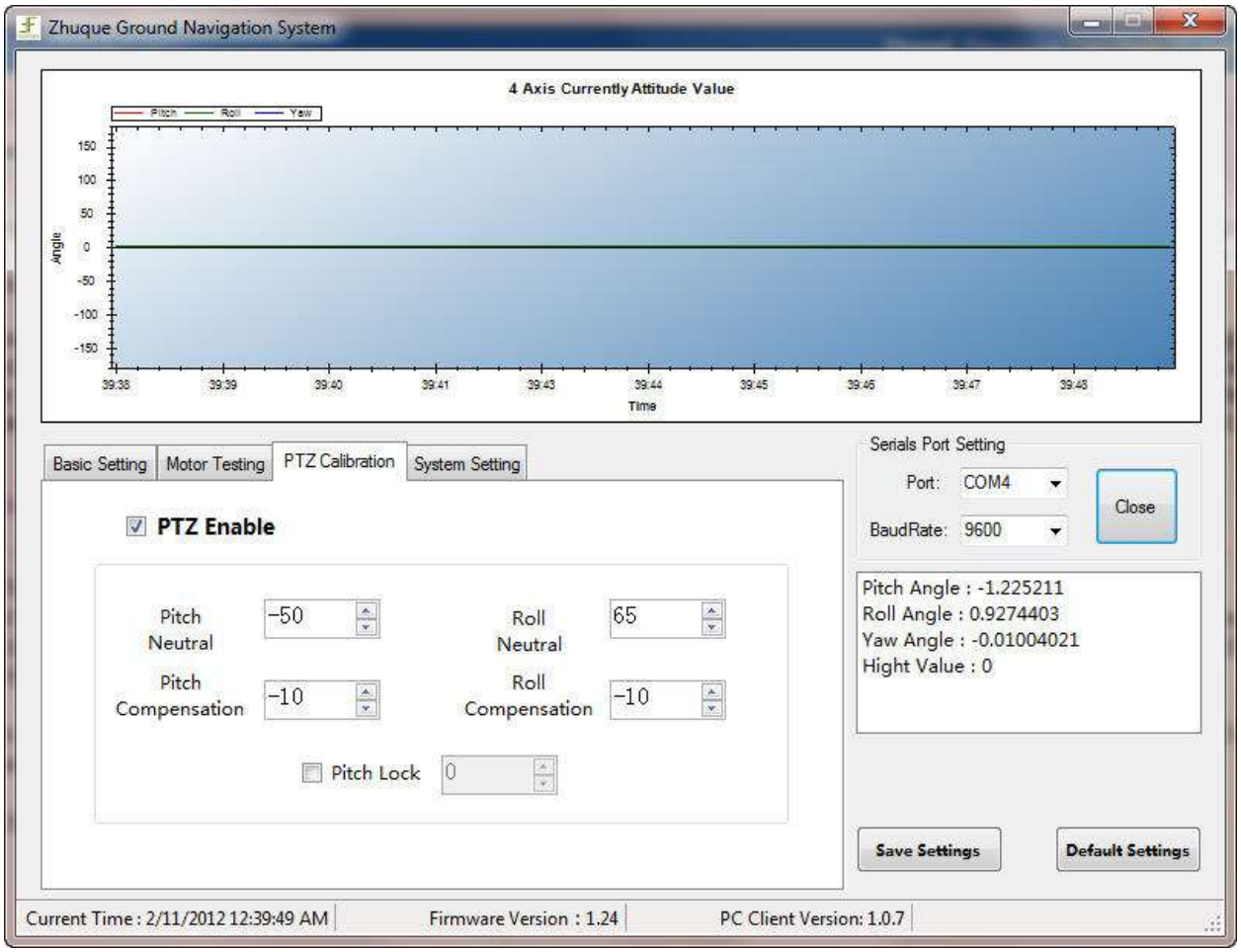
7. Click on the PTZ Calibration Tab
8. Ensure that the PTZ Enable checkbox is checked
9. Ensure that the Pitch Lock checkbox is unchecked
10. The pitch and roll values will be changed according to your requirements so your setup will have to be tested and the values changed accordingly
11. Click on the Save Settings button



RC CALIBRATION:

This process is used to set the minimum and maximum values for your transmitter on the Free Flight Controller. The Free Flight Controller will not ARM (enable) if this process has not been done.

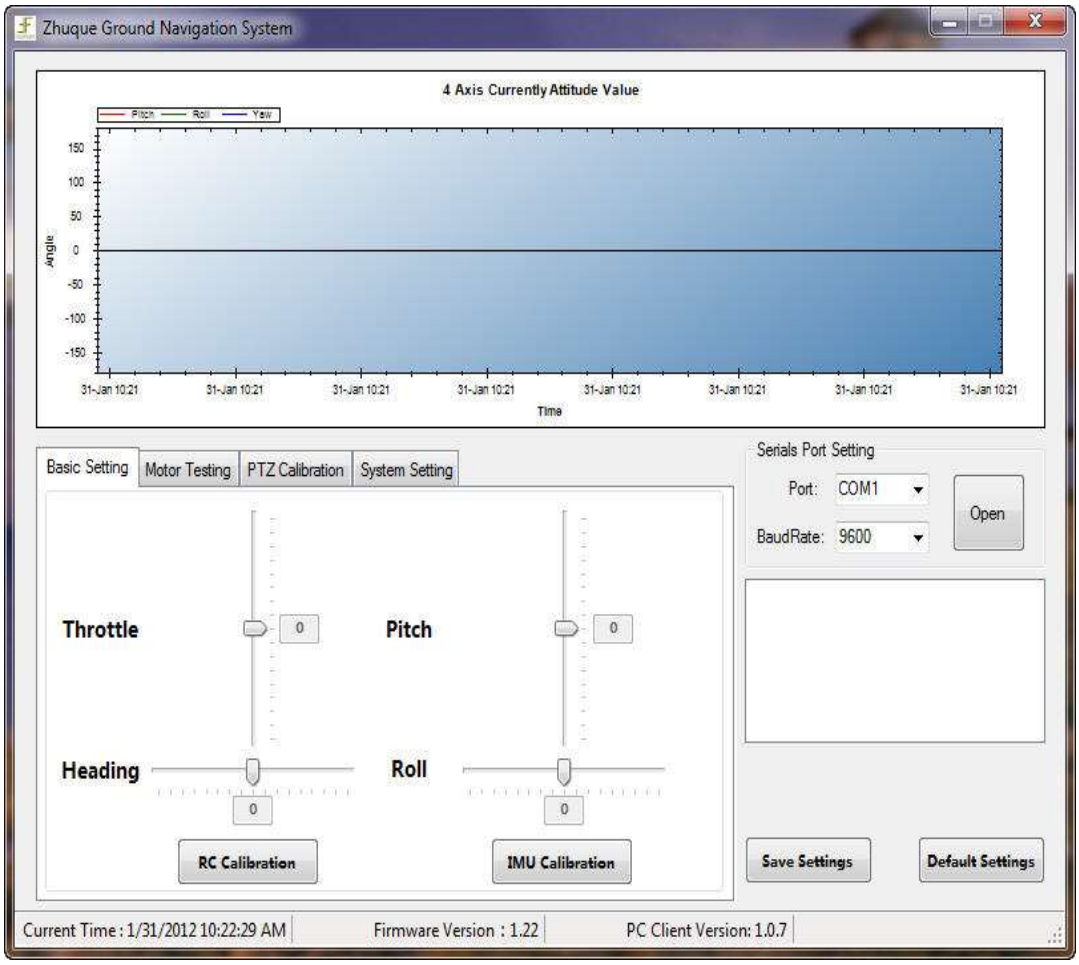
There are two ways to calibrate your transmitter to the Free Flight Controller:

- Using the ZNS1002 V1.07 application a.k.a. the "Upper Machine Software"
- Using a switch activated channel (#5) on your transmitter to start/stop the calibration process

FREE FLIGHT CONTROLLER V1.2

RC CALIBRATION USING THE ZNS1002 V1.07 APPLICATION A.K.A. THE "UPPER MACHINE SOFTWARE":

12. Connect the Free Flight Controller to your PC in NORMAL mode
13. Power ON your transmitter
14. Power ON your receiver if connected via an ESC and a separate LIPO
15. Determine the COM port being used by the USB Boot Loader on your PC
16. Start the ZNS1002 application
17. The following screen appears



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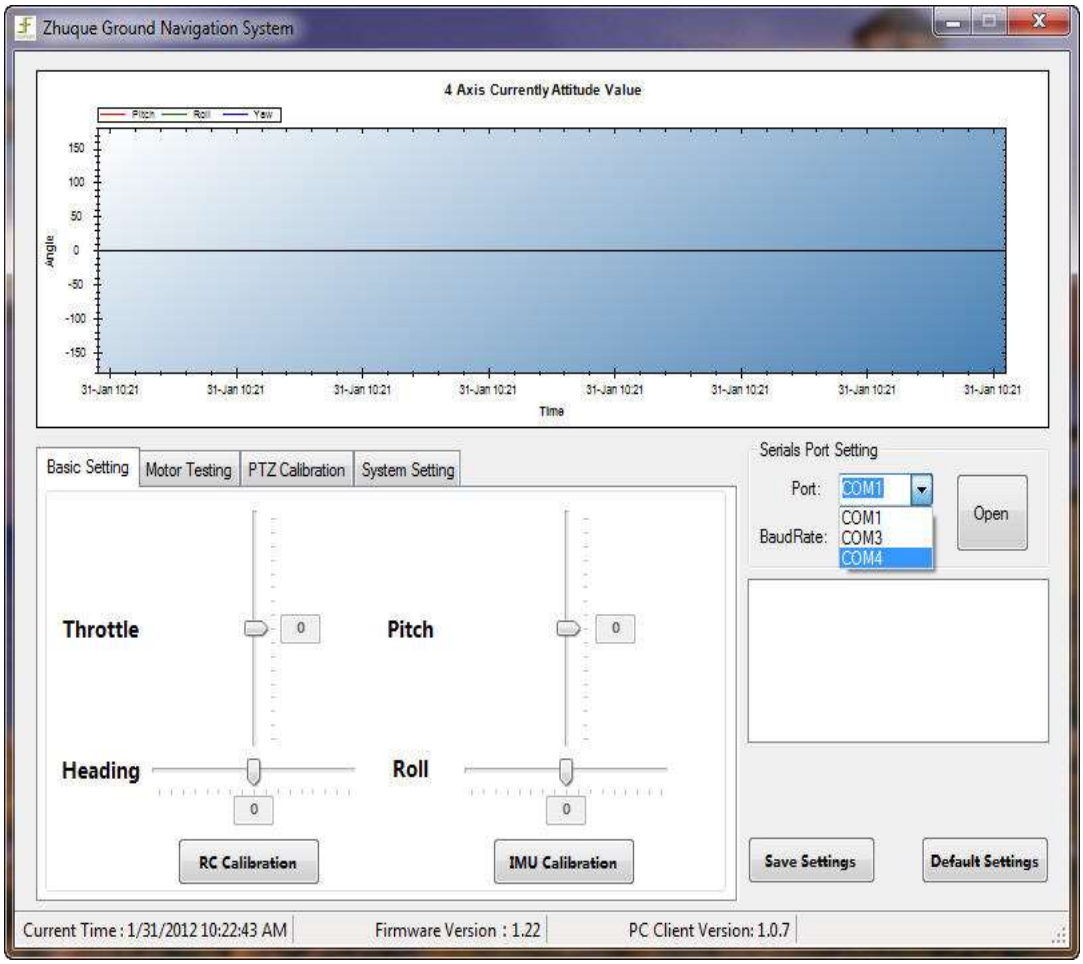
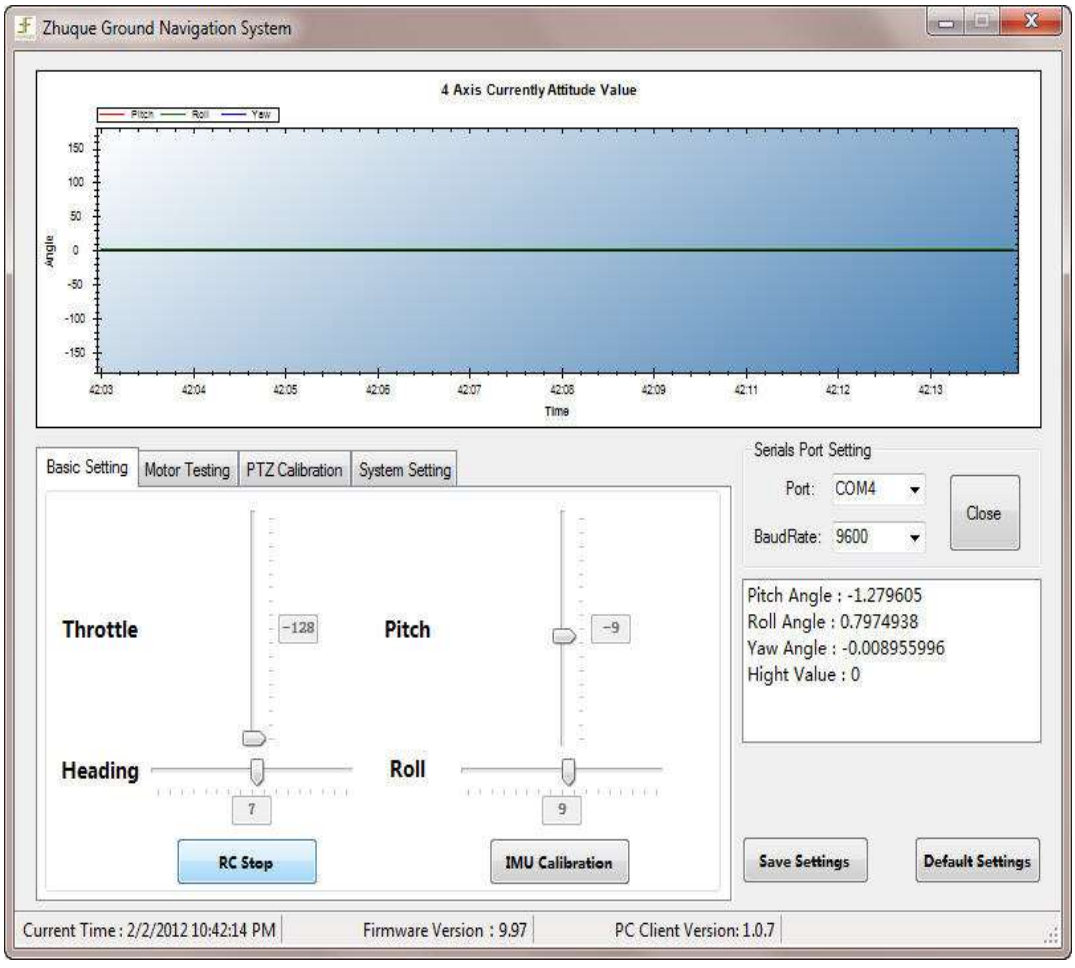
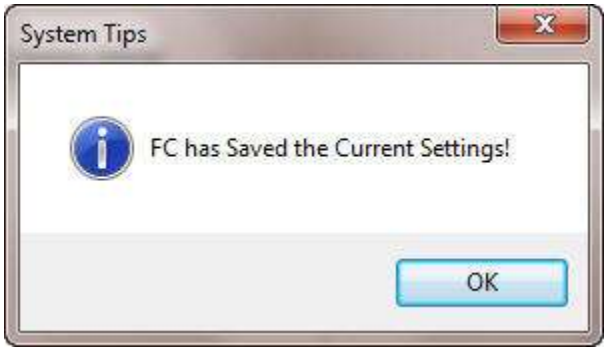
18. Click on the down arrow next to port
19. Select the COM port that is being used by the USB Boot Loader
20. Click on the Open button



21. The screen sliders will adjust to their default positions and the angle values will change
22. Move the sticks on your transmitter
23. Observe the movement of the sliders in relation to the movement of your sticks
24. Reverse any channels on your transmitter if the sliders move in the opposite direction of your sticks
25. Click on the RC Calibration button
26. The Free Flight Controller's GREEN led turns ON
27. Move your transmitter sticks to their minimum and maximum positions in all directions for a few seconds
28. Move your throttle stick to its highest position and center the other stick
29. Move all channel switches and POTS through their ranges
30. Click on the RC Stop button
31. The Free Flight Controller's GREEN led turns OIFF
32. Click on the Save Settings button



33. Click on the OK button



34. Click on the Close button
35. Power OFF the Free Flight Controller

FREE FLIGHT CONTROLLER V1.2

RC CALIBRATION USING CHANNEL 5 ON YOUR TRANSMITTER:

1. Power ON your transmitter
2. Do not connect the USB Boot Loader to the Free Flight Controller
3. Connect your receiver to the Free Flight Controller
4. Ensure that the channel 5 header on the Free Flight Controller is connected to the channel on the receiver that will be used to start/stop the calibration process.
5. Power ON the Free Flight controller
6. The Free Flight Controller's BUE led turns ON
7. The Free Flight Controller's buzzer BEEPS once
8. The Free Flight Controller's RED led turns ON and BLINKS three times
9. The Free Flight Controller's RED led turns OFF
10. Power ON your receiver if connected via an ESC and a separate LIPO
11. Move your transmitter's throttle stick to its maximum position
12. Activate channel 5 on the transmitter
13. The Free Flight Controller's GREEN led turns ON
14. Move your transmitter sticks to their minimum and maximum positions in all directions for a few seconds
15. Move your throttle stick back to its maximum position and center the other stick
16. Move all channel switches and POTS through their ranges
17. De-activate channel 5 on the transmitter
18. The Free Flight Controller's GREEN led turns OFF
19. Power OFF the Free Flight Controller

ESC THROTTLE RANGE:

The ESC throttle range can be set:

- Individually for each ESC like you would do so for an airplane
- Simultaneously by using the ZNS1002 V1.07 application a.k.a. the "Upper Machine Software"

This guide will explain how to set them via the latter method.

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UPDATED ON 2/26/2012
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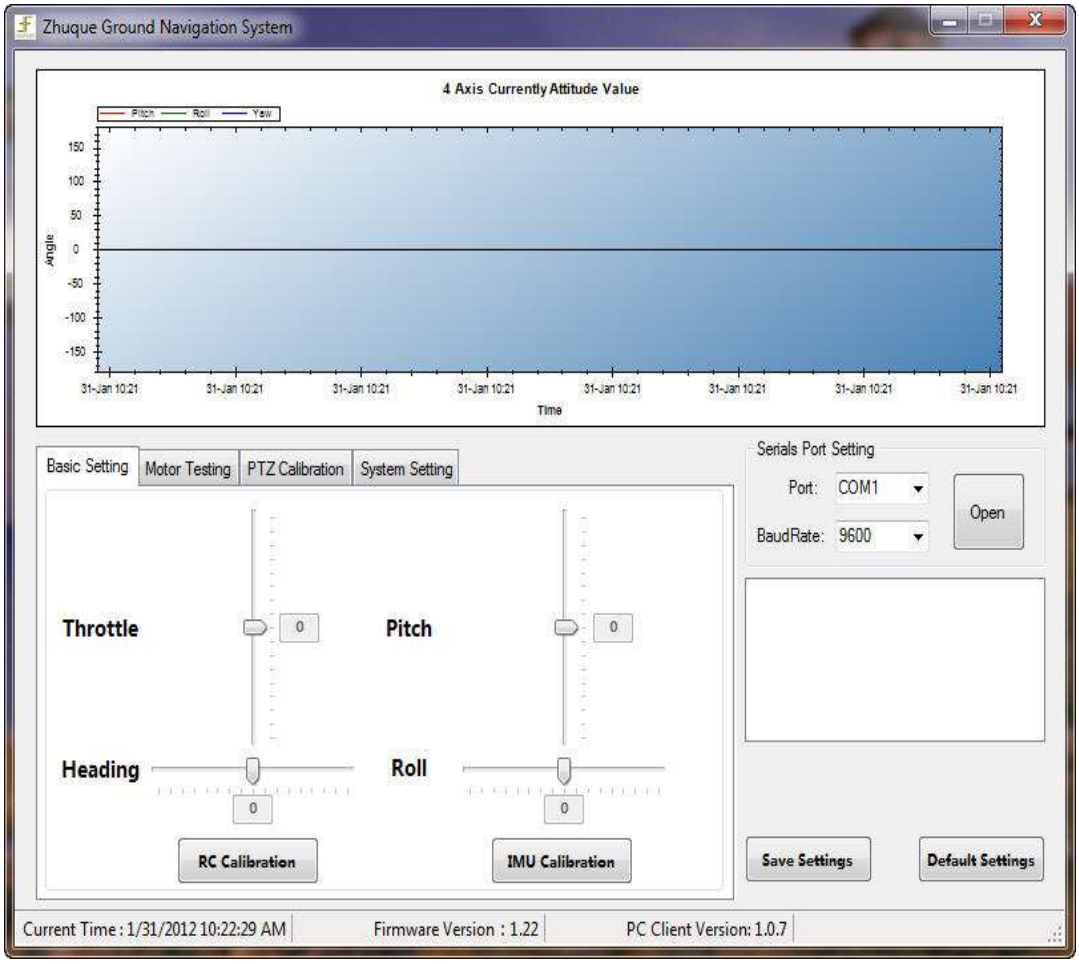
FREE FLIGHT CONTROLLER V1.2

SETTING THE ESC THROTTLE RANGE USING THE ZNS1002 V1.07 APPLICATION

1. Connect the Free Flight Controller to your PC in NORMAL mode
2. Determine the COM port being used by the USB Boot Loader on your PC
3. Start the ZNS1002 application
4. The following screen appears



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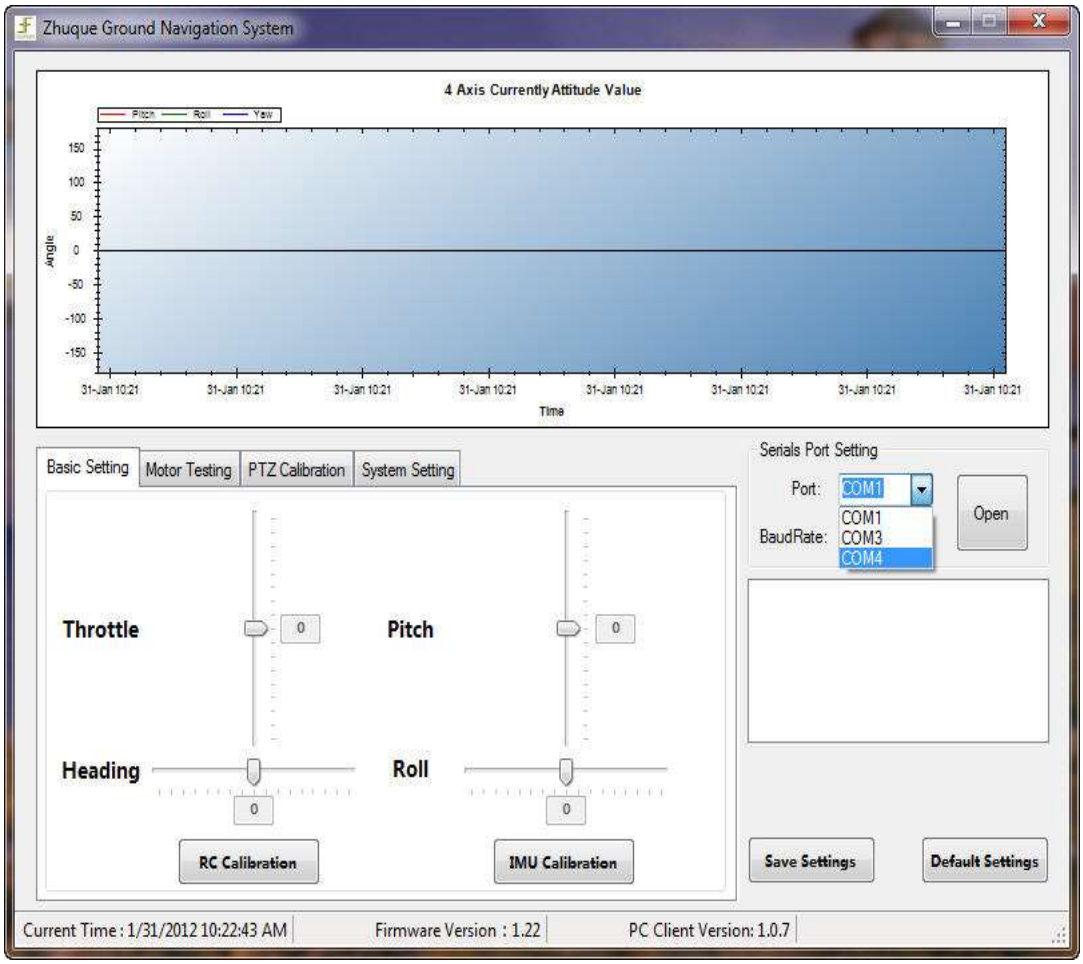
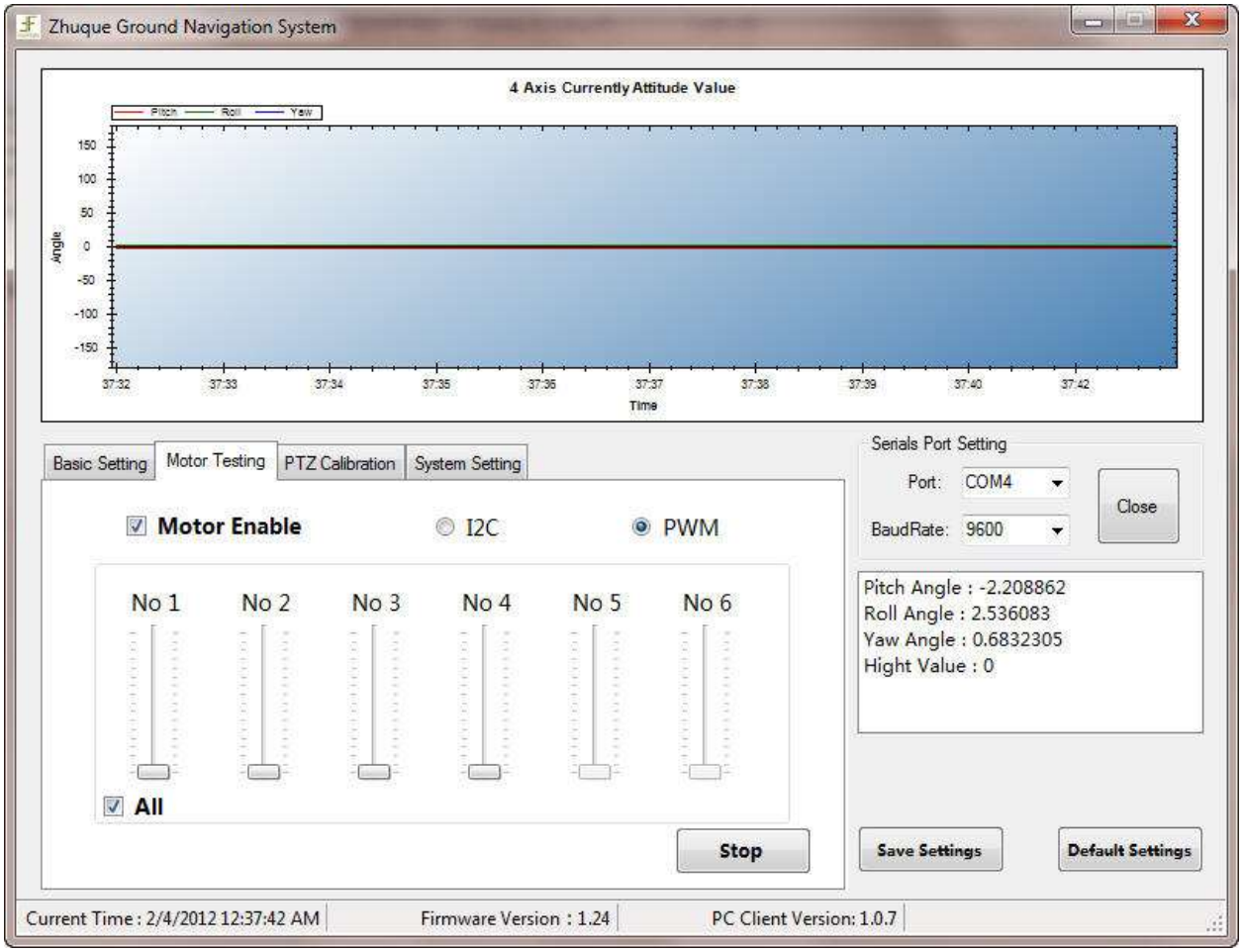
5. Click on the down arrow next to port
6. Select the COM port that is being used by the USB Boot Loader
7. Click on the Open button



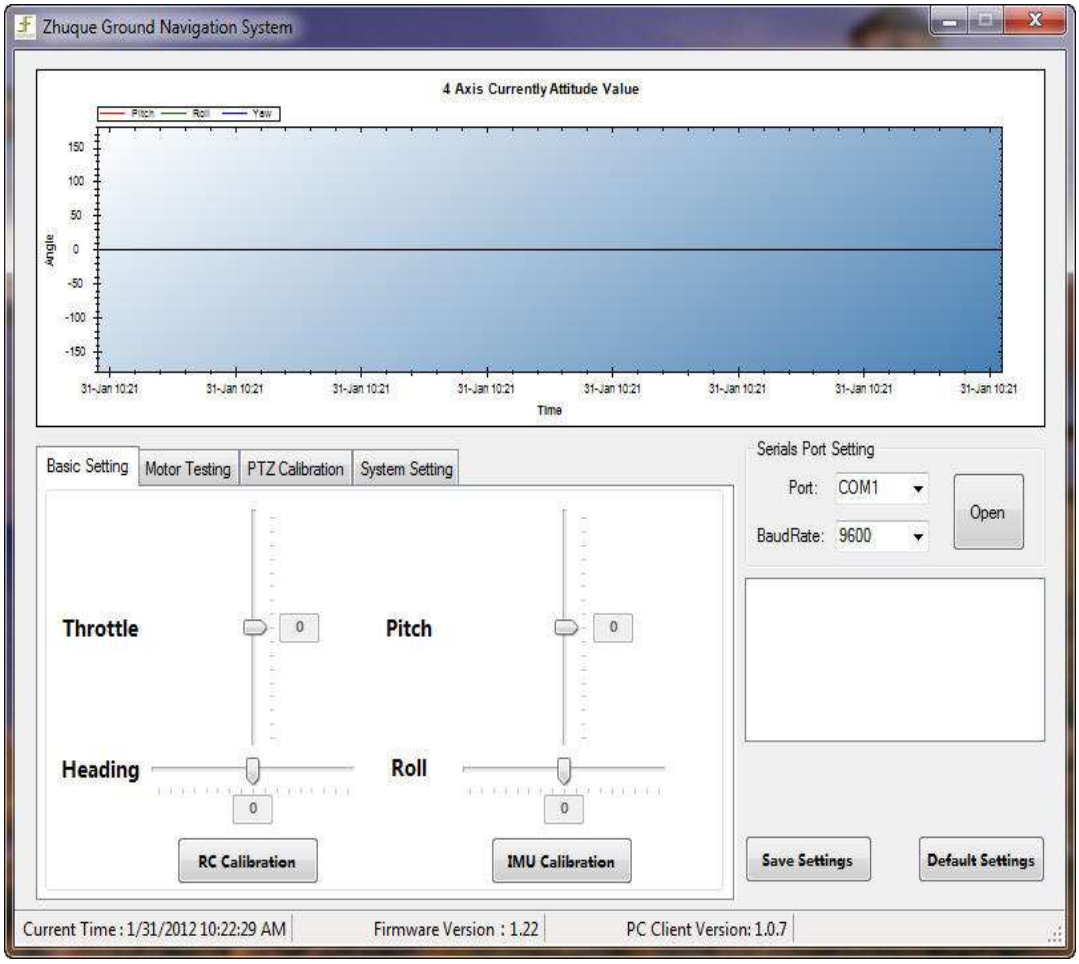
8. Click on the Motor Testing Tab
9. Click on the All checkbox
10. Move one of the motor sliders to its max position
11. Since the All checkbox is checked, all of the sliders move at the same time
12. Power ON all four of your quadcopter's ESC's at the same time
13. Listen for the motor beeps indicating the throttle range is being set
14. Move one of the motor sliders to its minimum position
15. Since the All checkbox is checked, all of the sliders move at the same time
16. Listen for the motor beeps indicating the throttle range has been set
17. Click on the Close button
18. Power OFF the Free Flight Controller



FREE FLIGHT CONTROLLER V1.2

SETTING THE FLIGHT CONFIGURATION AND MOTOR START OPTIONS:

1. Connect the Free Flight Controller to your PC in NORMAL mode
2. Determine the COM port being used by the USB Boot Loader on your PC
3. Start the ZNS1002 application
4. The following screen appears



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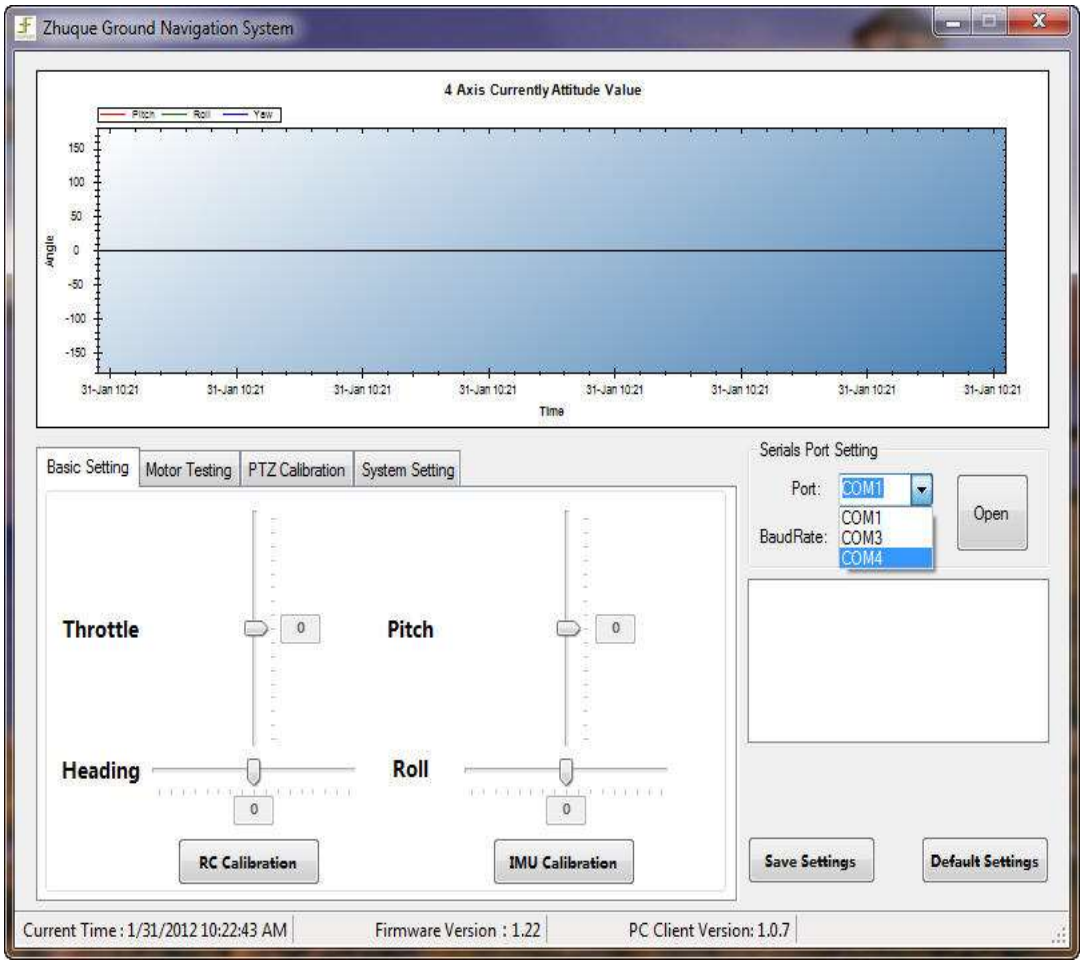
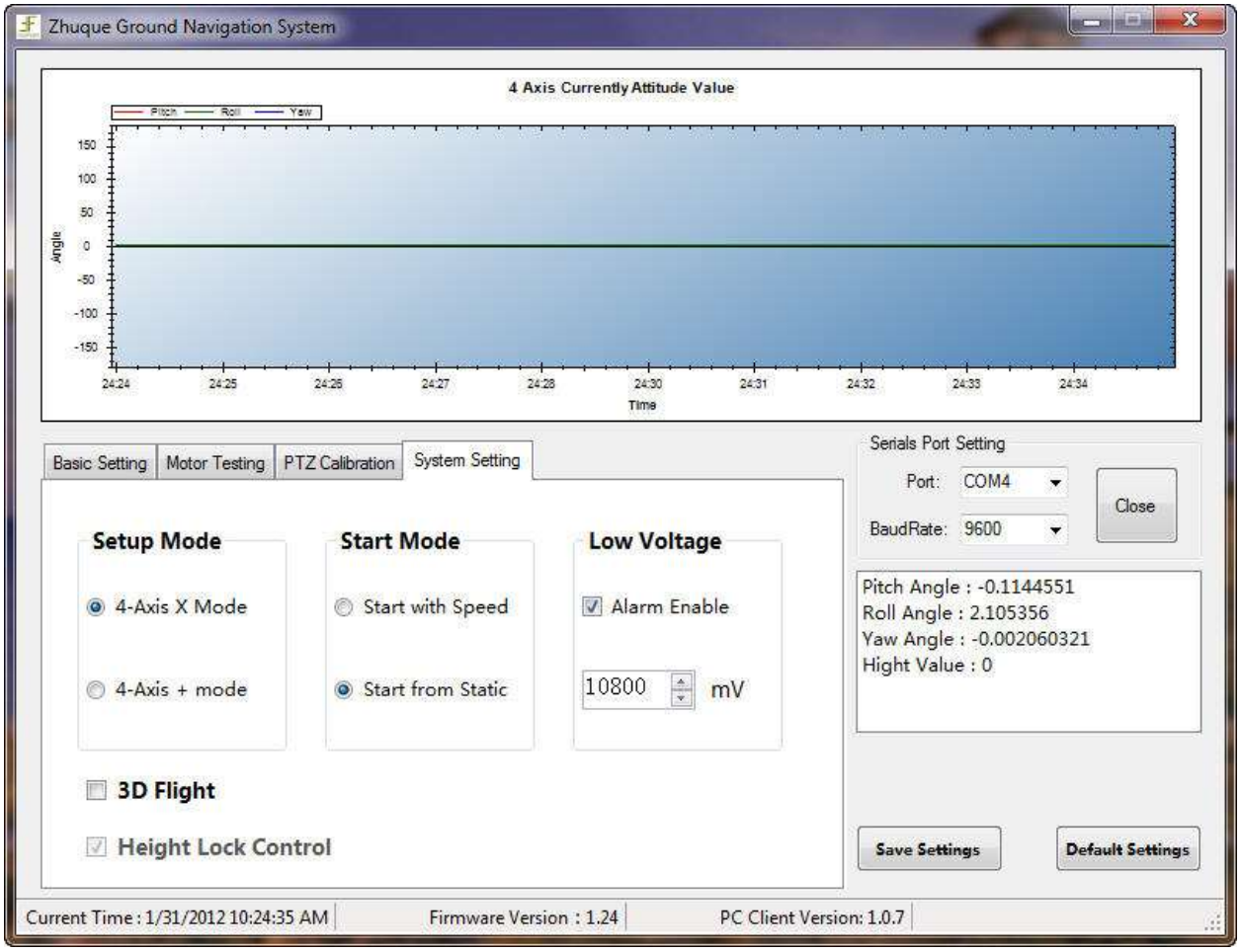
5. Click on the down arrow next to port
6. Select the COM port that is being used by the USB Boot Loader
7. Click on the Open button
8. Click on the System Setting Tab



9. The following screen appears:



10. Under SETUP Mode, click on the X or + mode
11. Under START Mode, click on:
    a. Start with Speed to start up when the Free Flight Controller is armed
    b. Start from Static to keep the motors idle when the Free Flight Controller is armed
12. Under Low Voltage:
    a. Enable or dis-able the low voltage alarm
    b. Set the voltage at which the low voltage alarm will sound
13. Click on the Save Settings button
14. Click on the Close button
15. Power OFF the Free Flight Controller

FREE FLIGHT CONTROLLER V1.2

ARMING THE FREE FLIGHT CONTROLLER USING V1.22 OF THE FIRMWARE:

1. Power on the Free Flight Controller
2. Power on your transmitter
3. Power on your receiver
4. Move the throttle stick to its maximum position and then to the right
5. The Free Flight Controller's GREEN led turns ON
6. Move the throttle stick to its minimum position and then to the right
7. The Free Flight Controller's GREEN led turns OFF
8. The Free Flight Controller is now armed

ARMING THE FREE FLIGHT CONTROLLER USING V1.24 OF THE FIRMWARE:

1. Power on the Free Flight Controller
2. Power on your transmitter
3. Power on your receiver
4. Move the throttle stick to its minimum position and then to the left or right
5. Move the other stick to its minimum position and then in the opposite direction of the throttle
6. The Free Flight Controller's GREEN led turns ON
7. The Free Flight Controller's GREEN led turns OFF
8. The Free Flight Controller's buzzer produces a short BEEP once
9. The Free Flight Controller is now armed

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FREE FLIGHT CONTROLLER V1.2

DIS-ARMING THE FREE FLIGHT CONTROLLER USING V1.22 OF THE FIRMWARE:

1. Move the throttle stick to its minimum position and then to the left
2. The Free Flight Controller's GREEN BLINKS once
3. The Free Flight Controller is now dis-armed
4. You can re-arm the Free Flight Controller again by moving the throttle stick to its minimum position and then to the right

DIS-ARMING THE FREE FLIGHT CONTROLLER USING V1.24 OF THE FIRMWARE:

1. Move the throttle stick to its minimum position and then to the left or right
2. Move the other stick to its minimum position and then in the opposite direction of the throttle
3. The Free Flight Controller's GREEN BLINKS once
4. The Free Flight Controller's buzzer produces a long BEEP once
5. The Free Flight Controller is now dis-armed
6. You can re-arm the Free Flight Controller by repeating the steps above

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IMU (INERTIAL MEASUREMENT UNIT) CALIBRATION:

In order for the Free Flight Controller to level out the quadcopter along the roll and pitch axis, it needs to know what "level" is. This process tells the Free Flight Controller that.

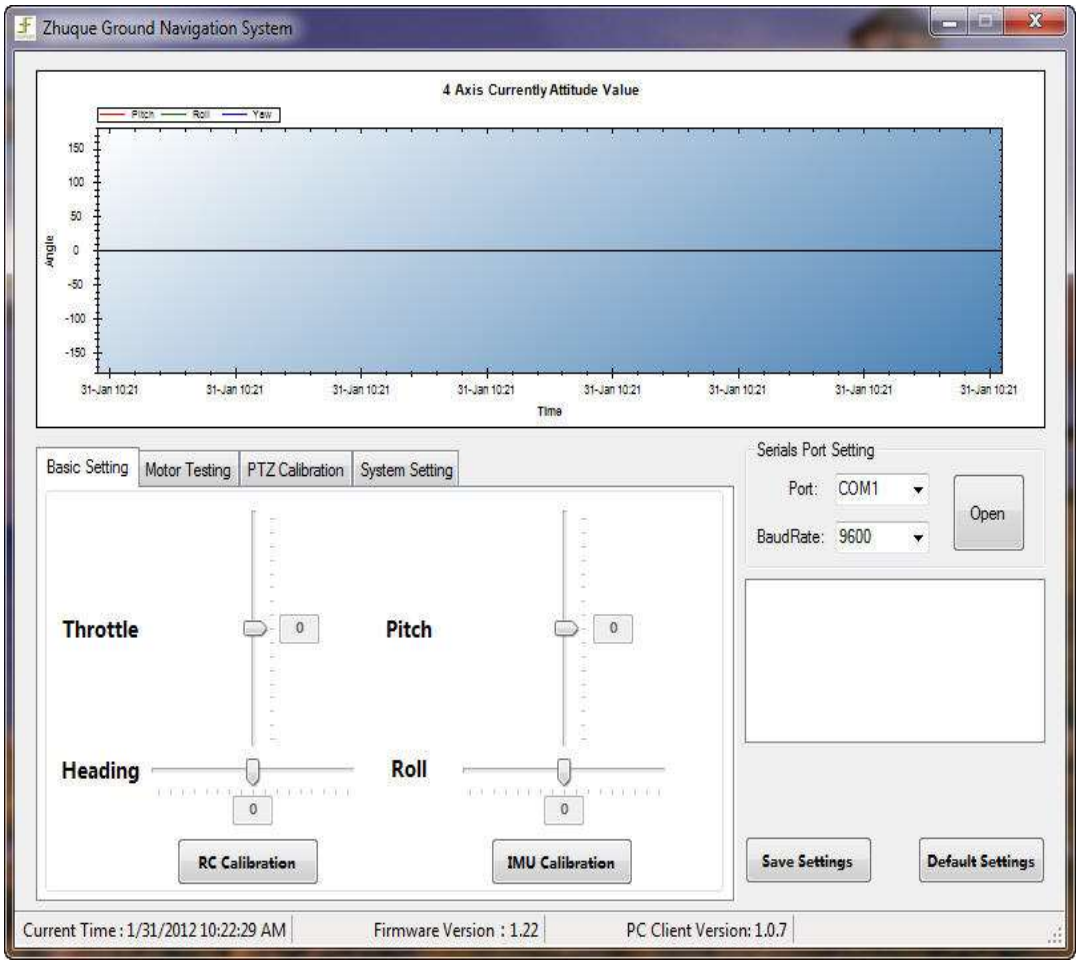
There are two ways to perform the IMU calibration on the Free Flight Controller:

- Using the ZNS1002 V1.07 application a.k.a. the "Upper Machine Software"
- Using your transmitter

FREE FLIGHT CONTROLLER V1.2

IMU (INERTIAL MEASUREMENT UNIT) CALIBRATION VIA THE ZNS1002 V1.07 APPLICATION:

1. Connect the Free Flight Controller to your PC in NORMAL mode
2. Ensure that your quadcopter and the Free Flight Controller are completely level
3. Do not touch or move the quadcopter
4. Determine the COM port being used by the USB Boot Loader on your PC
5. Start the ZNS1002 application
6. The following screen appears



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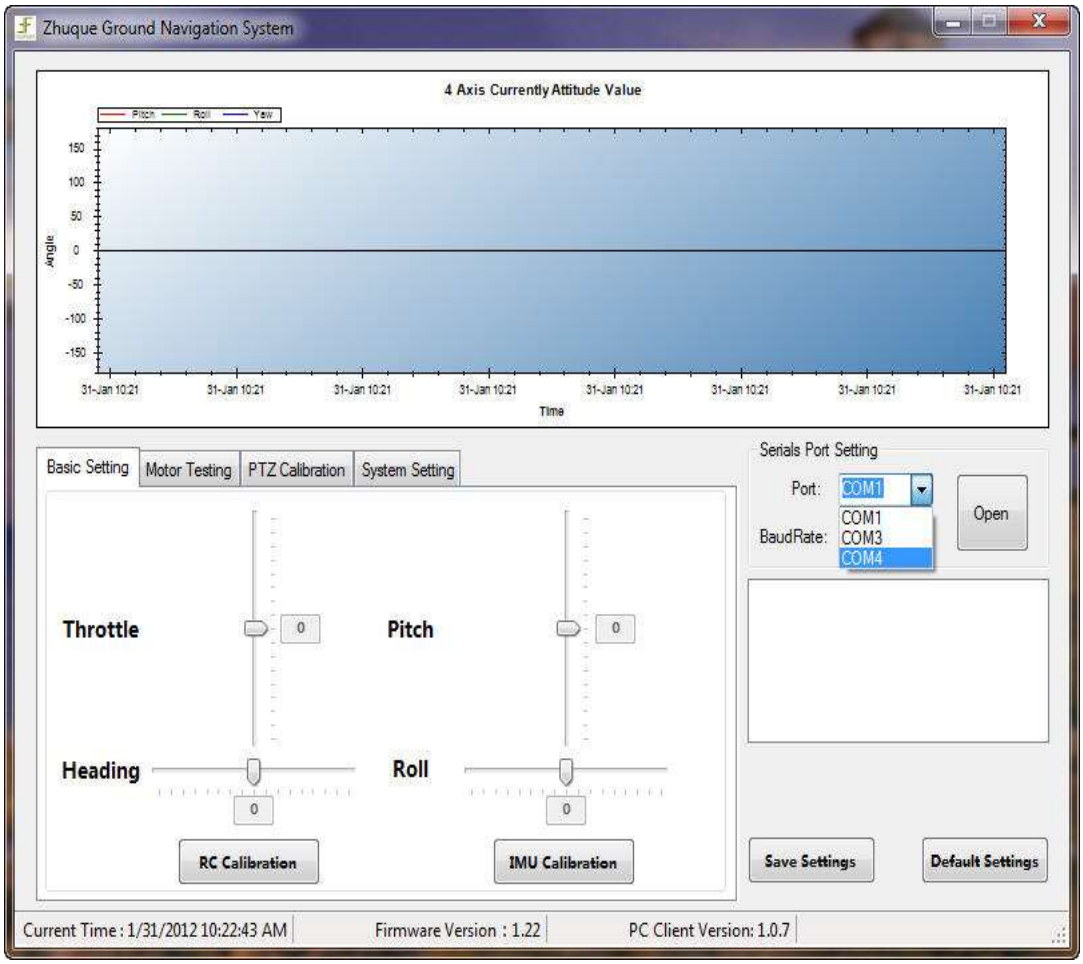
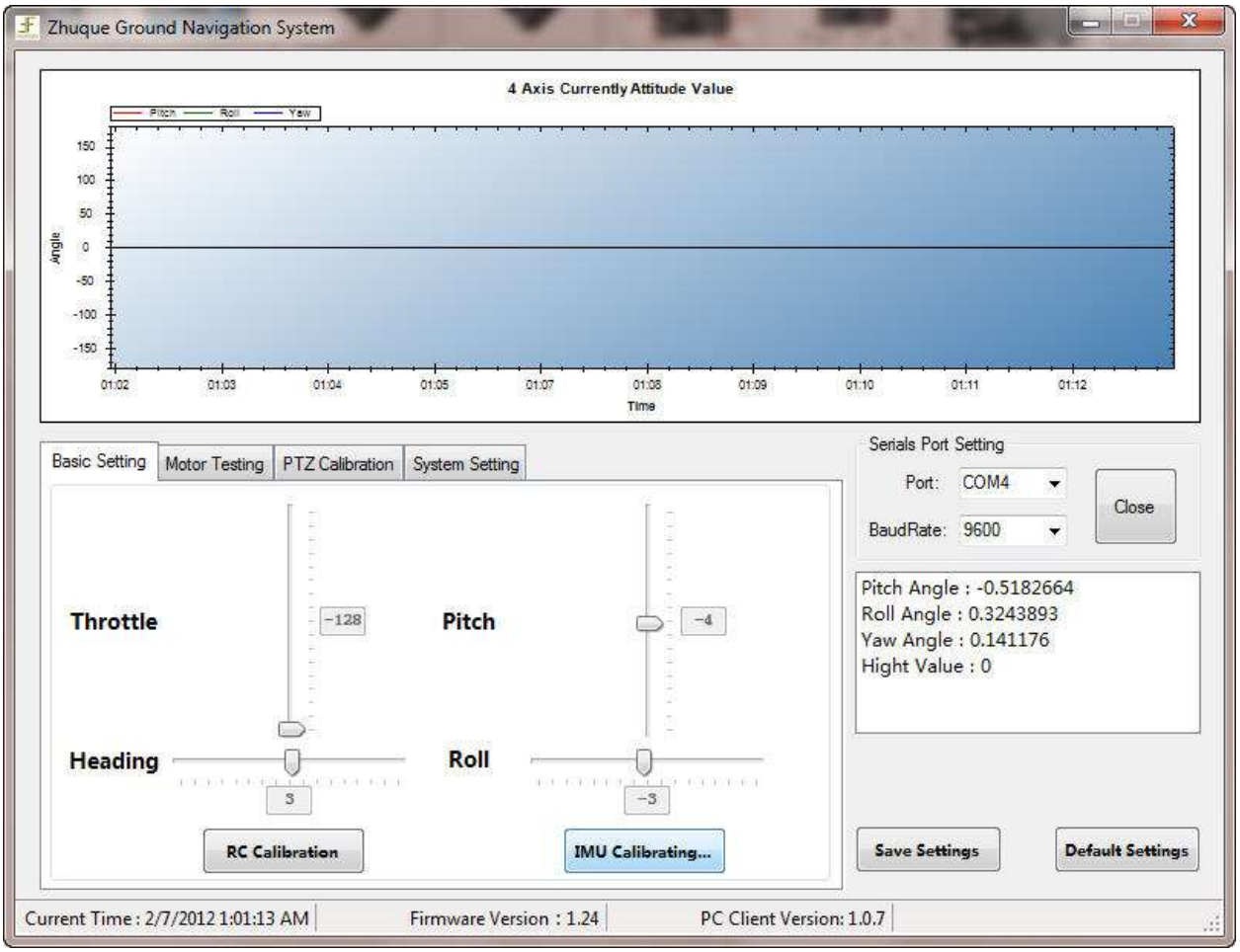
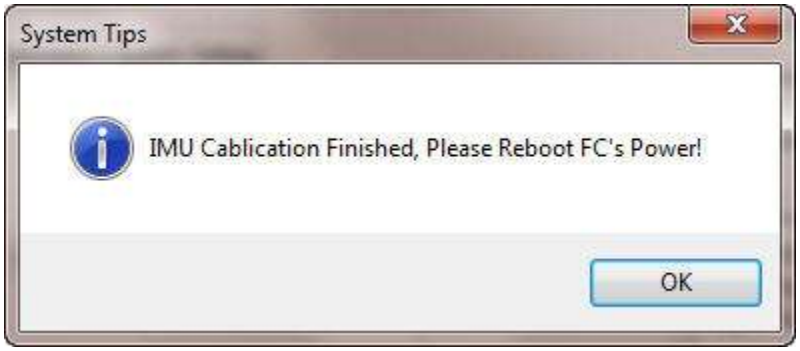
7. Click on the down arrow next to port
8. Select the COM port that is being used by the USB Boot Loader
9. Click on the Open button
10. Do not touch or move the quadcopter



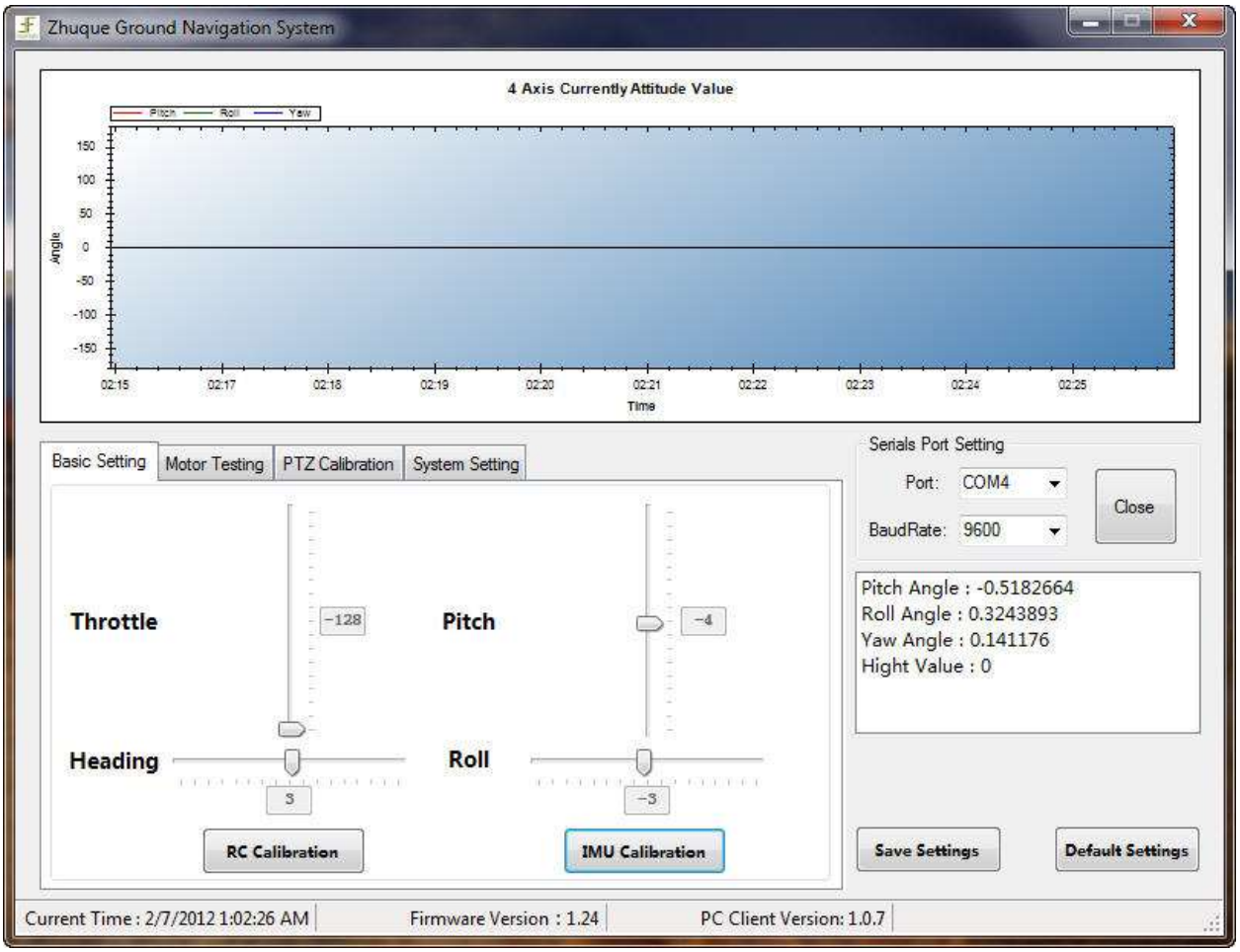
11. Click on the IMU Calibration button
12. The button text will indicate IMU Calibrating
13. The calibration process takes at least 30 seconds to complete
14. Do not touch or move the quadcopter



15. Click on the OK button



16. Click on the Save Settings button
17. Click on the Close button
18. Power OFF the Free Flight Controller



FREE FLIGHT CONTROLLER V1.2

IMU (INERTIAL MEASUREMENT UNIT) CALIBRATION VIA THE TRANSMITTER:

1. Do not connect the USB Boot Loader to the Free Flight Controller
2. Connect your receiver to the Free Flight Controller
3. Ensure that your quadcopter and the Free Flight Controller are completely level
4. Power ON your transmitter
5. Power ON your receiver if connected via an ESC and a separate LIPO
6. Power ON the Free Flight controller
7. The Free Flight Controller's BUE led turns ON
8. The Free Flight Controller's buzzer BEEPS once
9. The Free Flight Controller's RED led turns ON and BLINKS three times
10. The Free Flight Controller's RED led turns OFF
11. Move the transmitter sticks as shown in the picture below

12. The Free Flight Controller's GREEN led turns ON
13. The Free Flight Controller's buzzer beeps twice
14. Release the transmitter sticks
15. Wait for the Free Flight Controller to finish the calibration
16. The calibration process takes at least 30 seconds to complete
17. Do not touch or move the quadcopter
18. The Free Flight Controller's buzzer beeps one
19. The Free Flight Controller's GREEN led turns OFF
20. Power OFF the Free Flight Controller

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FREE FLIGHT CONTROLLER V1.2

PID:

This application is used to adjust the PID settings of the Free Flight Controller in order to achieve the most level flight possible while still maintaining the proper amount of control when corrections are needed. Please note that the PID application was updated on 2/10/2012 and can be found in post #1407 on RCGroups.COM

1. Connect the Free Flight Controller to your PC in NORMAL mode
2. Ensure that your quadcopter and the Free Flight Controller are completely level
3. Do not touch or move the quadcopter
4. Determine the COM port being used by the USB Boot Loader on your PC
5. Start the PID application
6. The following screen appears

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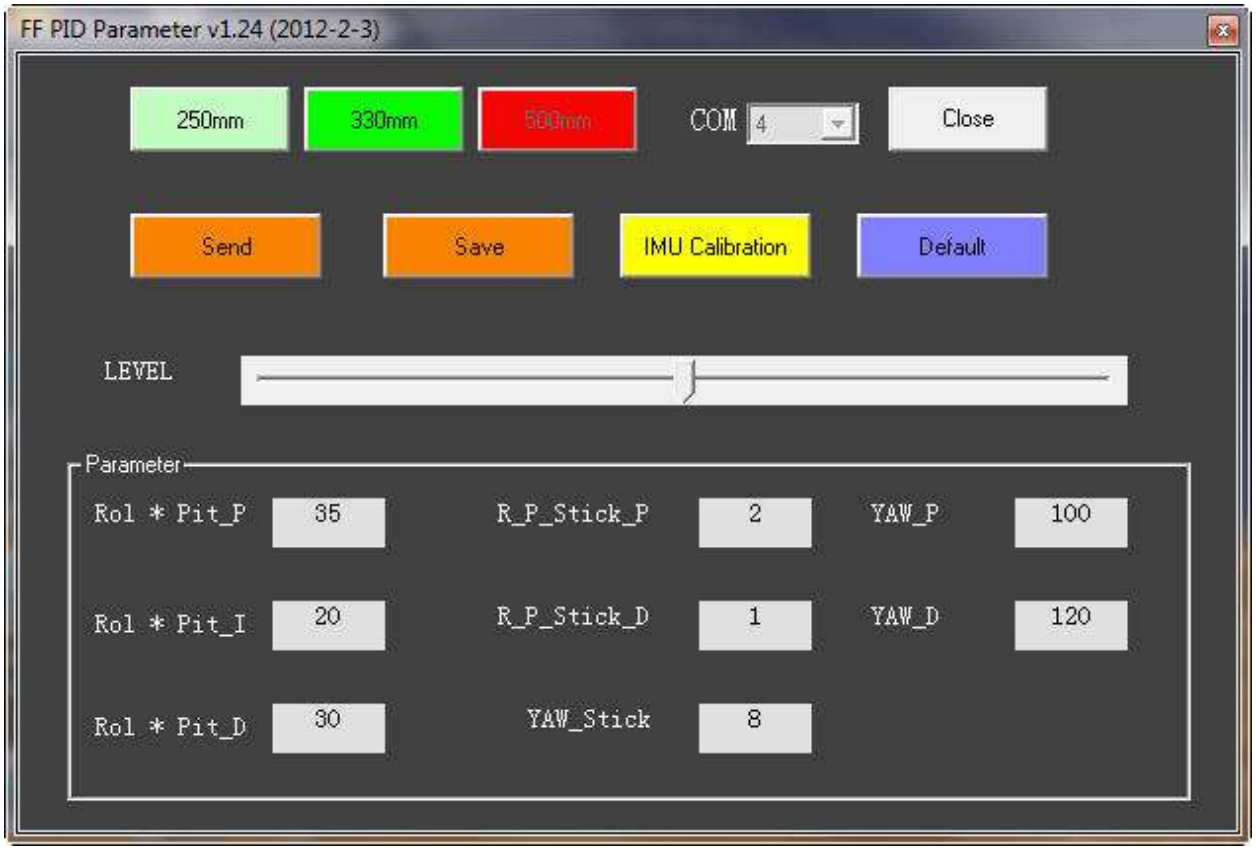
7. Click on the down arrow next to port
8. Select the COM port that is being used by the USB Boot Loader
9. Click on the Open button
10. Click on the button that represents your quadcopter's minimum size
11. The default PID values for the quadcopter size selected appear

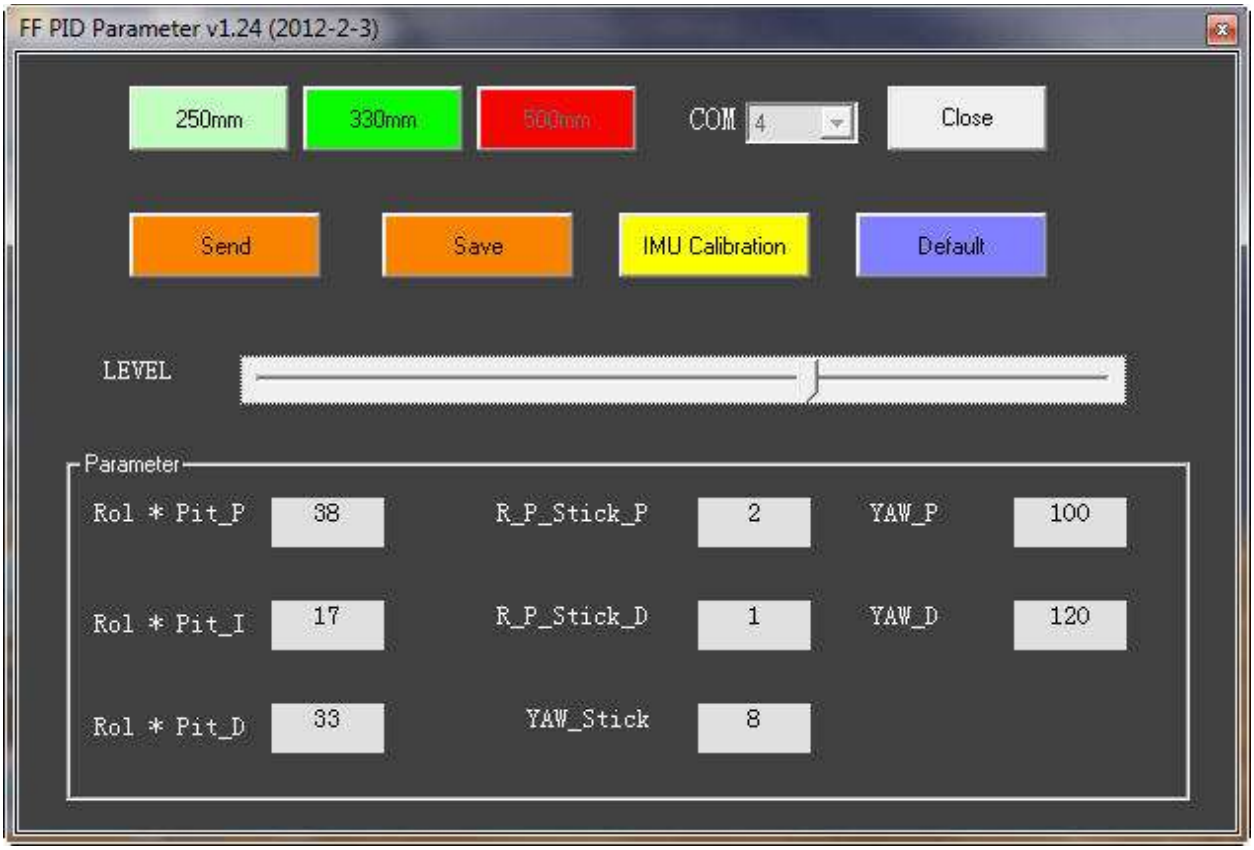


12. Manually change the PID values as desired:

SETTING	DEFINITION
Rol*Pit_P:	Increase one point at a time until you get the pitch and roll axis resistance and only one bounce to recover when the arm is test struck/upset. If you are seeing oscillations, then back off until they are gone.
Rol*Pit_I:	Increase until amount and strength of self-leveling is achieved. You might have to lower P if you have this set too high. It is a balance decision between the two.
Rol*Pit_D:	Adjust after the "P & I" to decrease repeat bounce or oscillations after a test strike/upset.
R_P_Stick_P:	Increase value for more pitch and roll stick speed/sensitivity
R_P_Stick_D:	Like exponential. Decrease value for less pitch and roll stick sensitivity around the center.
Yaw_Stick:	Increase 1-2 points at a time for more yaw stick speed/sensitivity
Yaw_P:	Increase 1-2 points at a time for more yaw authority/hold.
Yaw_D:	Increase or decrease 1-2 points at a time to eliminate heading lock searching.

OR

13. Use the slider to change the slider, which automatically calculates and changes the values for Rol*Pit_P, Rol*Pit_I and Rol*Pit_D



14. Click on the Send button
15. Click on the Save Data button
16. Click on the Close button
17. Power OFF the Free Flight Controller
18. Click on the OK button as these windows appear

FREE FLIGHT CONTROLLER V1.2

LINKS:

1. Quadcopter/Tricopter Mega Link Index: (http://www.rcgroups.com/forums/showthread.php?t=1097355)
2. Free Flight Controller thread: http://www.rcgroups.com/forums/showthread.php?t=1548820
3. My YouTube Channel http://www.youtube.com/rcjoseb

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