

# Pelagic Autopilot User Manual

version 0.989J June 2019



# Revisions

- Ver 0.5: Added wind mode description of operation.
- Ver 0.6: Added Tiller Actuator mounting dimensions.
- Ver .91: Enhanced install instructions and photos.
- Ver .92: Added instructions for software update.
- Ver .93: Corrected software reload instructions.
- Ver .94: Updated with new motor control connections.
- Ver .96: Update of button control diagrams, motor drive connections.
- Ver .97: Revised images.
- Ver .98: Standby display revised, compass linearization calibration added. Wind mode improved. NMEA input enhanced to handle early NMEA versions.
- Ver .981: Clarified tiller mount dimensions.
- Ver .982: Updated photos of connections.
- Ver .984: Corrected compass orientation page.
- Ver .985: Corrected standby RED LED sequence to reflect code changes.
- Ver .986: Fixed slide with gain adjust enable error.
- Ver .987: Updated motor drive connection slide.
- Ver .988: Updated calibration, adjustment, orientation slide to show new button control.
  - Added Helm Not Responding section

## Revisions (continued)

Ver .989 Added Monitor windvane slides showing attachment kit.

Ver .989d Corrected rudder sensor slide language.

Ver .989f Added software upgrade documentation.

Ver 989g: Enhanced software upgrade instructions. Added Monitor revised bracket photos and instructions for assembly.

Ver 989h: Description of new Monitor windvane actuator attachment kit.

Ver 989i: Improved description of parameter adjustments.

Ver 989i: Added photo of Monitor gear set attachment. Marked ADAPT mode as obsolete. Added means of returning parameters to default settings.

Ver 989J: Added description of new dimmer control, power on reboot.

# System Overview

Congratulations on the purchase of your Pelagic Autopilot. The Pelagic is a sophisticated nine (9) axis, gyro controlled autopilot designed to deliver top performance in a variety of conditions. Advanced features allow custom tuning for optimum performance whether cruising or on the race course.

The Pelagic Autopilot is comprised of three (3) components; the Control Head, Motor Drive Box and actuator. The modular nature of the Pelagic system allows support for many different applications including:

- Tiller steered boats (large and small)
- Use of Pelagic electronics with below decks RAMs (electrical or hydraulic)
- Use of Pelagic actuators with other manufacturer's obsolete electronics

The Control Head provides the autopilot control functions and is typically mounted in or adjacent to the cockpit. As the Control Head contains the electronic compass and gyro sensor, it needs to be located a minimum of 6" from metal objects. There are two (2) important concepts that need to be understood when installing and using the Pelagic; Orientation and Calibration.

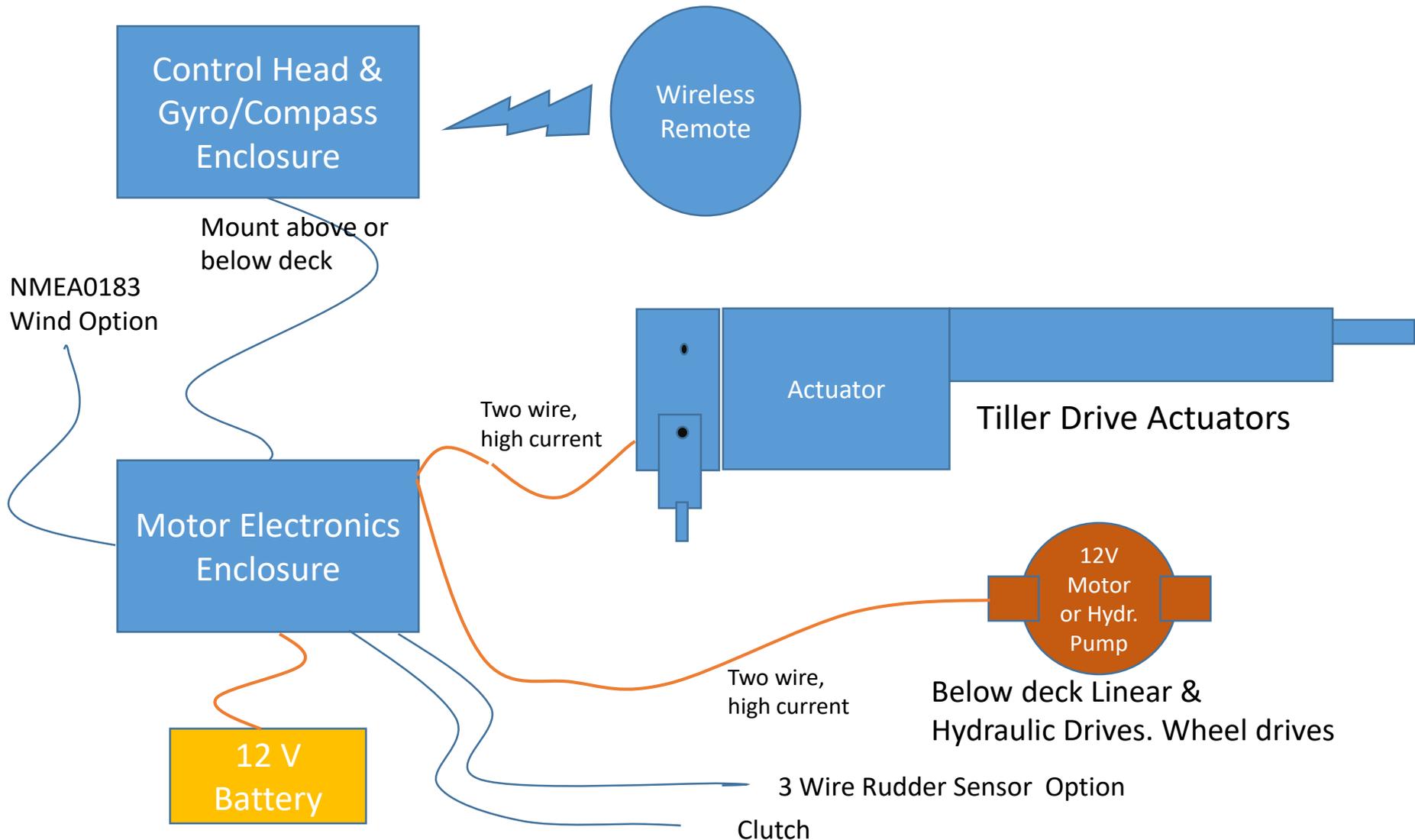
- Orientation – This is the process of orientating the Pelagic sensors. Because the Pelagic uses a gyro sensor(s), it needs to be oriented correctly so that as the boat pitches and rolls the feedback to the rudder is in the appropriate direction. Stern or Bow facing orientation is specified at time of ordering and preset at the factory. While Orientation can be changed in the field by the user, it's important to install the unit as ordered or change the Orientation prior to use.
  - Stern facing example – Control Head is mounted on bulkhead with control buttons facing aft
  - Bow facing example – Control Head is mounted on transom with control buttons facing forward
- Calibration – This is the process of calibrating the compass and is done once the installation is completed. While initial calibration is performed at the factory, it is important to recalibrate prior to use to take into account the boat's unique magnetic field.
- The Motor drive box provides power to the Pelagic system and should be installed below decks out of the elements. Two versions of the Motor drive box are available; a standard version for the Pelagic actuators and a heavy electronics version to meet the demands of large actuators and below decks drives.
- The Pelagic actuators are designed to steer small to mid-displacement vessels, by direct attachment to the tiller or windvane. The actuators are ruggedized to provide longer service life.

# System Features

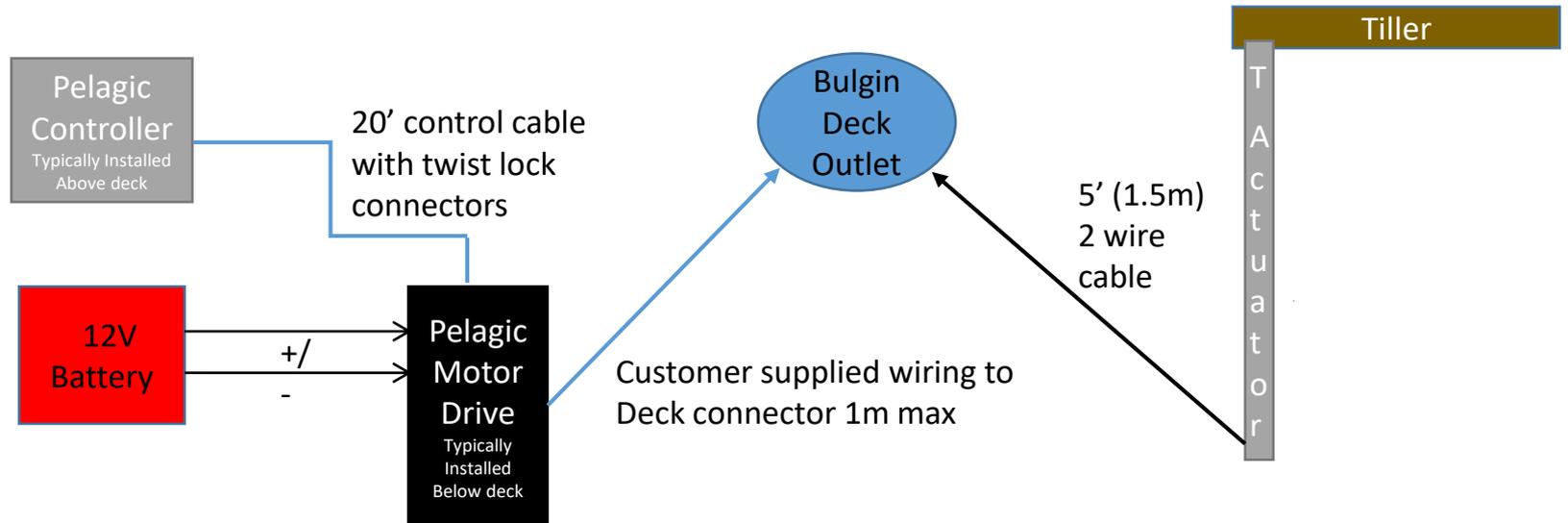
- Controls most 12 volt steering systems
  - Tiller wands & wheel steering systems
  - Windvane steering control (low power)
  - Hydraulic actuators
  - Linear actuators above and below deck.
- Internal electronic tilt compensated compass
  - Quick install, apply power and connect to the boats actuator
- Gyro controlled steering
- Wind following via NMEA0183
- RF (wireless) Remote control
- 9 Sensor feedback sea state and enable internal compass + gyro steering
- Adaptive adjustment for sea state to minimize power
- No rudder sensor required
- Motor stall detection and power reduction
  - Automatic stall retry
- User calibration of key parameters
- Low power in standby: less than 0.1 amps
- No battery voltage boost module necessary, operates as low as 9 volts DC (actuator reduced power)
- Housings are IP67 rated

# The Pelagic System – Tiller, Quadrant, Wheel, or Windvane

Pelagic Components in blue



# Typical Tiller Pilot System Layout



# Tiller Wand Installation on J92 “Rag Time”



# The Pelagic is Capable of Driving Hydraulics and a Variety of Linear Motors for Tiller or Quadrant



Testing of various actuators

# System Components for Tiller Steering



# The Linear Actuator

- Connects to the tiller
- Deck mount 24 7/16" (621mm) from tiller
  - Extensions available
- Attaches to tiller 18" (457mm) forward of rudder axis
- Rudder pin = 1/4" stainless
- Fixed pin = 0.375" into brass socket
- Connects to Bulgin deck socket
- As a precaution, consider placing a Sunbrella sleeve or plastic bag over the unit when at sea or not in use



# The Actuator Mounting Bracket Is Reversible and Rotatable 90°

Allows rotation of motor position, up or down  
Articulates in one dimension to allow tiller motion



# The Controller Front Panel

- White: Standby / Autopilot Mode
- Red: Adjust course  $-2^{\circ}$
- Green: Adjust course  $+2^{\circ}$
- Gain Adjustment (Responsiveness)
  - Go to STBY
  - Push PORT  $>2$  secs and release
  - RED Light flashes LONG-LONG-SHORT.
  - Red: reduce responsiveness
  - Green: increase responsiveness
  - Push White/ STBY for 3 secs to exit and store setting.
  - The setting is retained until the next change.



# Water Resistant Wireless Remote



Buttons Sealed with Polymer Panel under Keys  
Easy Battery Replacement

# Autopilot System Components for Windvane Steering



Actuator shown is for windvane control.

# Small Linear Actuator for Windvane Steering

- Connects to the windvane
- Clamps to the 3" tube and the 1" wind paddle tube.
- Ball and socket joints retain actuator at both ends.
- Ball and socket joints have small retaining springs on outside that swing out to remove or lock the connections.
- Put large end up to help prevent water intrusion when in use.
- **As a precaution, consider placing a Sunbrella sleeve or plastic bag over the unit when at sea or if not in use.**



# System Operation

# Operation

BUTTON	Auto-push	Port-push	Star-push	Auto-3sec hold	Port-3sec hold	Star-3sec hold	Port-6sec hold	Star-6sec hold	
MODE									
Standby mode (red LED slow flash)	Go to Auto Mode	Rudder to PORT	Rudder to STAR	Wind Mode enable/disable	Go to GAIN adjust	----- Reserved For Future Use	DIM Display Flashes at each level	Reserved	
Auto mode (red LED solid )	Go to Standby	Turns 2 degrees to Port	Turns 2 degrees to Starboard	Wind Mode enable/disable	Tack to PORT	Tack to STAR	DIM Display Flashes at each level	Reserved	

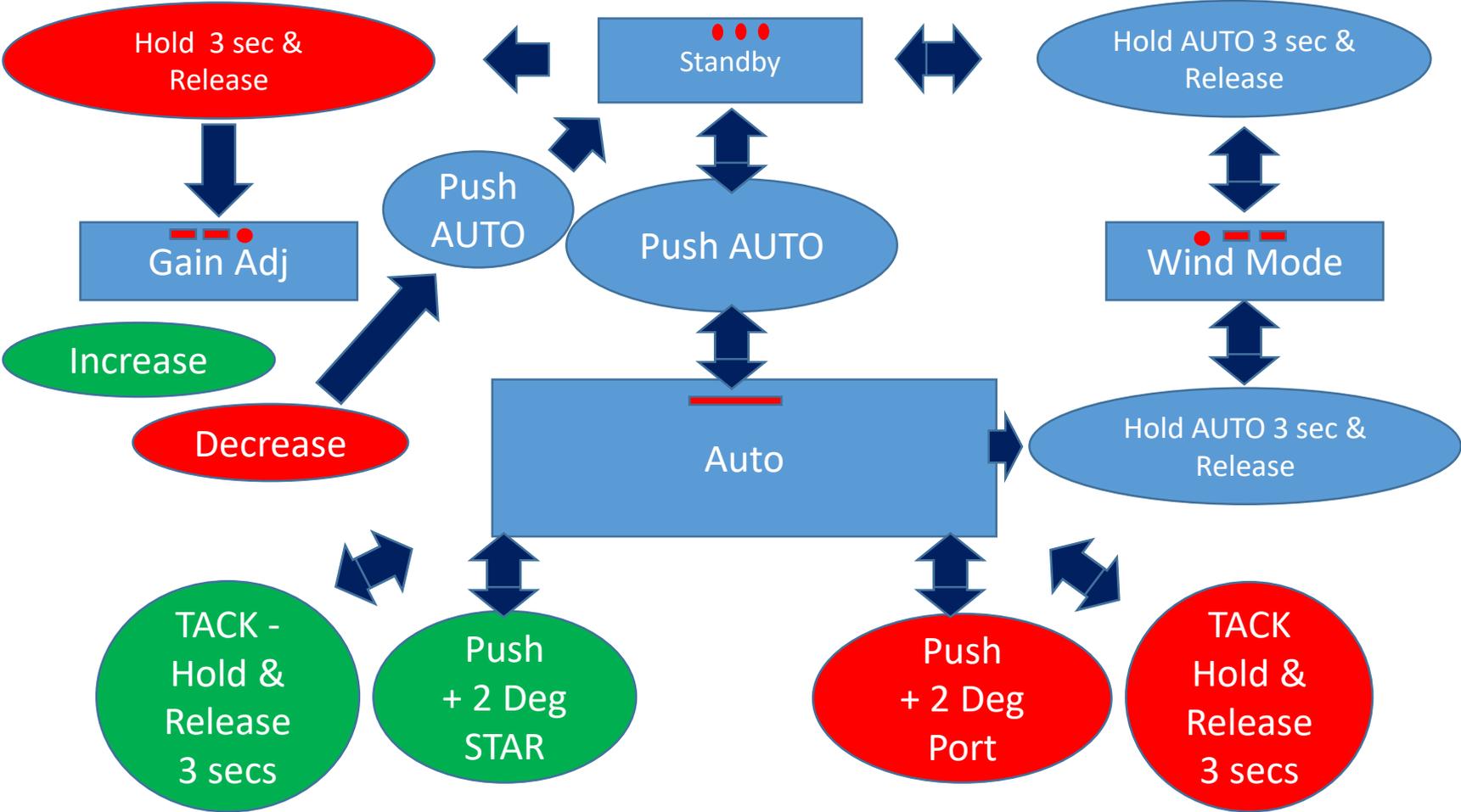
Feedback Adjustments: Hold the AUTO button at power up as the boot sequence completes.

Orientation mode: Hold the PORT button at power up as the boot sequence completes.

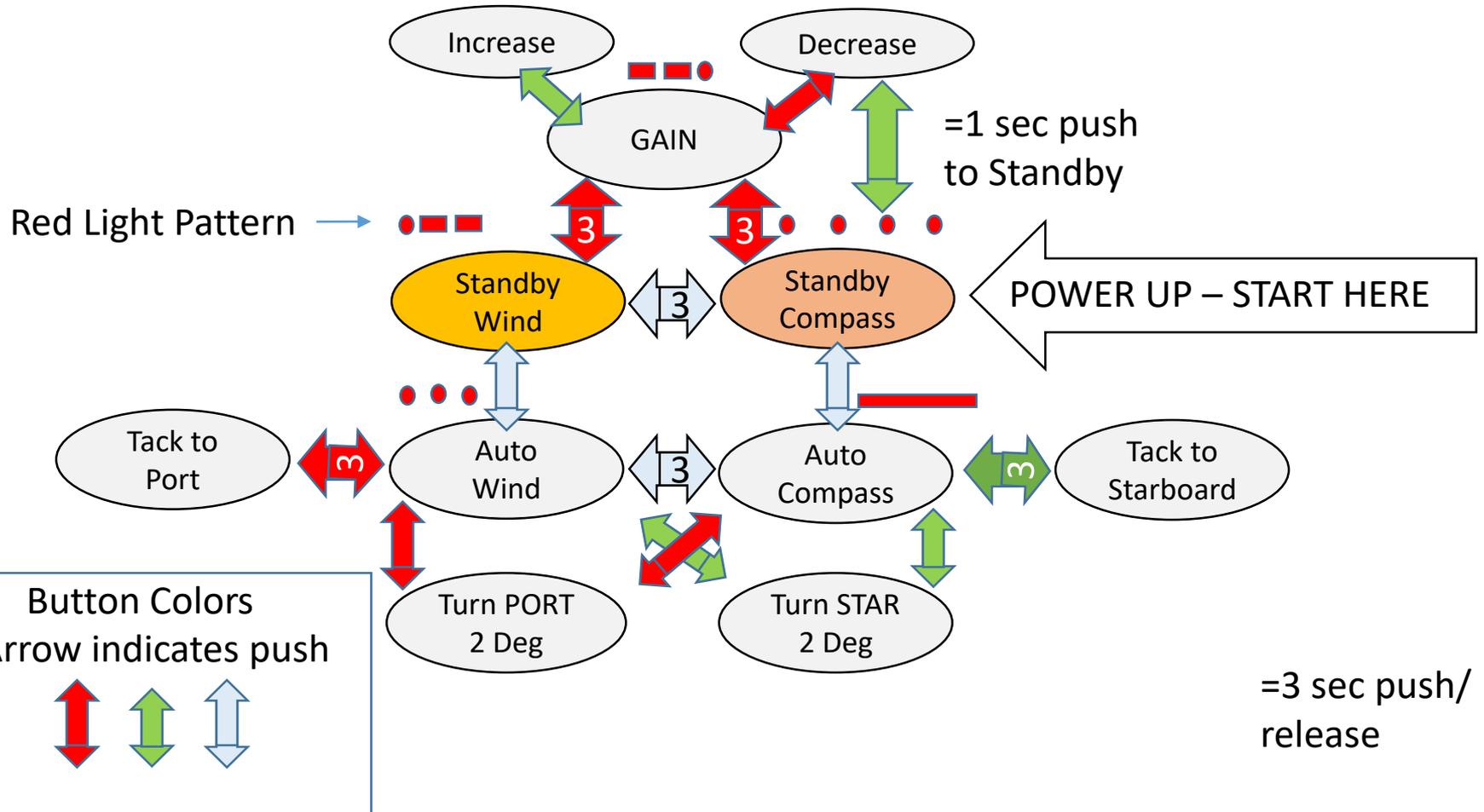
Compass Calibration: Hold the STAR button at power up. (see main manual for detail).

Alternatively, these modes can be entered by holding the PORT button for 12 seconds.

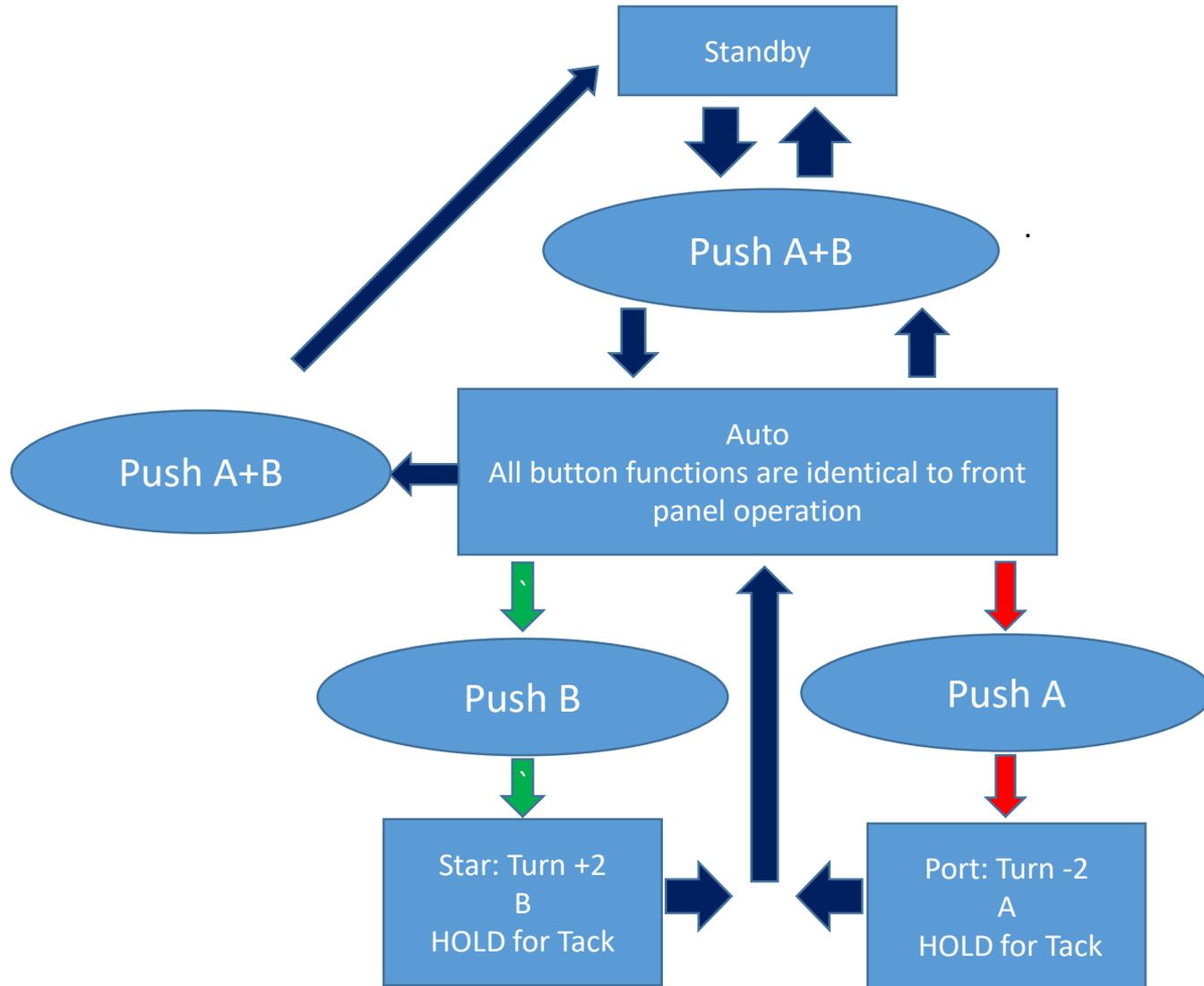
# Quick Reference Guide



# Controller Front Panel Operation



# RF Remote Operation Summary



# Summary of RF Remote Operation

BUTTON	Push A & B	Port push (A)	Star push (B)	Hold A & B 3 sec	Port 3sec Hold	Star 3sec Hold	Port 6sec Hold	Star 6sec Hold	RF Remote PORT & STAR Simultaneously
MODE									
Standby mode (red LED slow flash)	Go To Auto mode	Rudder to PORT	Rudder to STAR	Wind mode enable/disable	Go to GAIN adjust	Reserved	DIM Display It will each DIM level		Go To Auto mode (same as pushing AUTO button)
Auto mode (red LED solid )	Go To Standby	Turn 2 degrees to Port	Turn 2 degrees to Starboard	Wind mode enable/disable	Tack to PORT	Tack to STAR	DIM Display It will flash at each DIM level		Go to Standby



# Gain Adjustment

The gain is displayed whenever the Pelagic is placed into Auto mode, with the gain setting equal to the number of green LEDs illuminated. These can be shown in both solid and flashing states. For example, a gain of 3 is displayed as 3 solid green lights, whereas a gain of 3-1/2 is displayed as 3 solids and a flashing green.

The Pelagic is preset at the factory with a gain setting of 3. In general, a gain setting of 3 is suggested for boats with fin keels and spade rudders. A gain setting of 2 is suggested for full keel cruising boats.

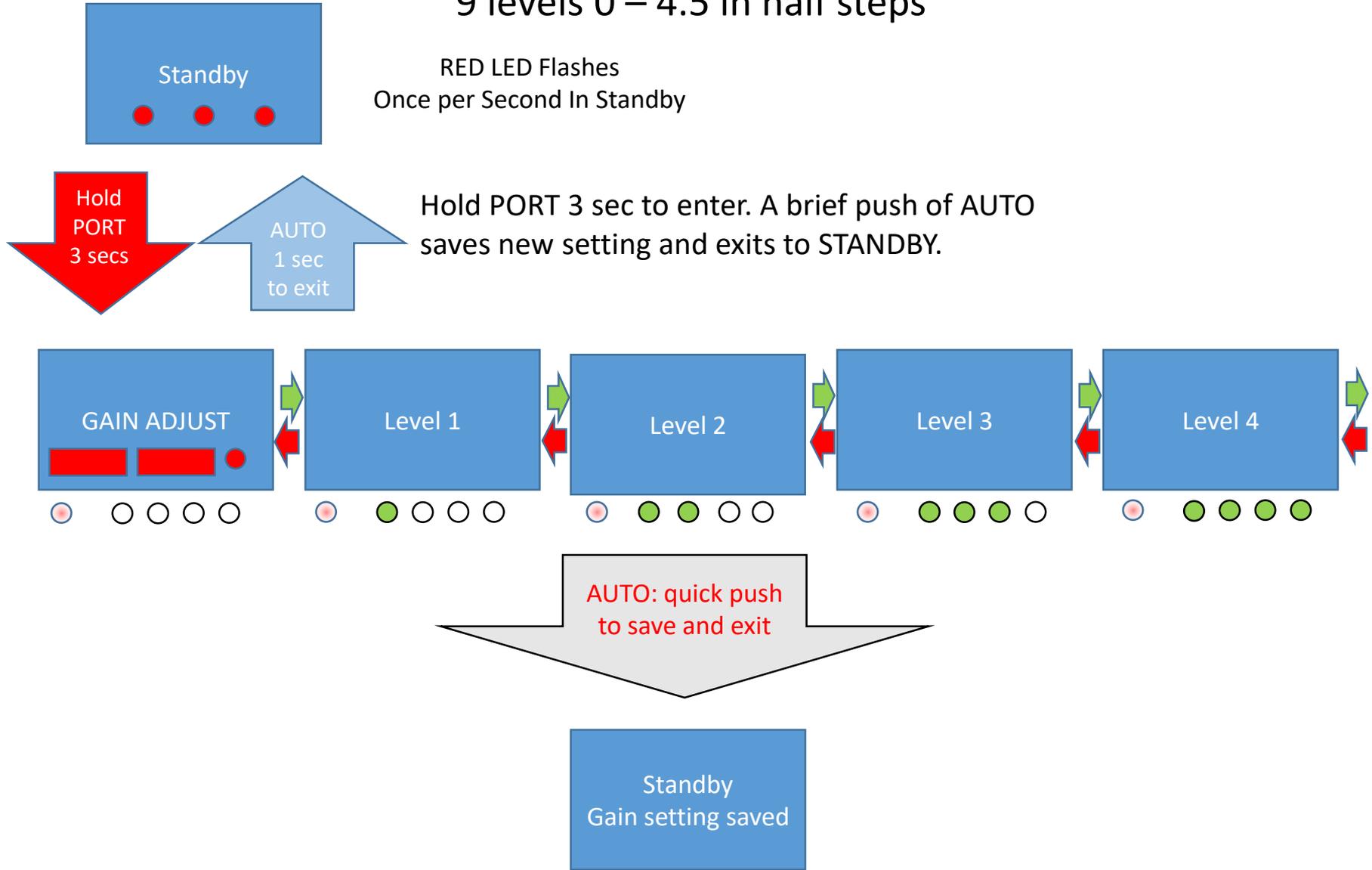
Set the gain as follows:

1. Power up the Pelagic system
2. When in standby mode, press and hold the red PORT button for approximately 3 seconds. The red light will flash and the current gain setting will be displayed.
3. To increase gain, press the green STBD button repeatedly until the desired level is reached.
4. To decrease gain, press the red PORT button repeatedly until the desired level is reached.
5. To save the setting, press the AUTO button for 1 second.
6. The new gain setting will be displayed the next time the Pelagic is placed in Auto mode.

# GAIN ADJUSTMENT

## 9 levels 0 – 4.5 in half steps

RED LED Flashes  
Once per Second In Standby



# Connecting Wind Steer Feature (apparent wind angle)

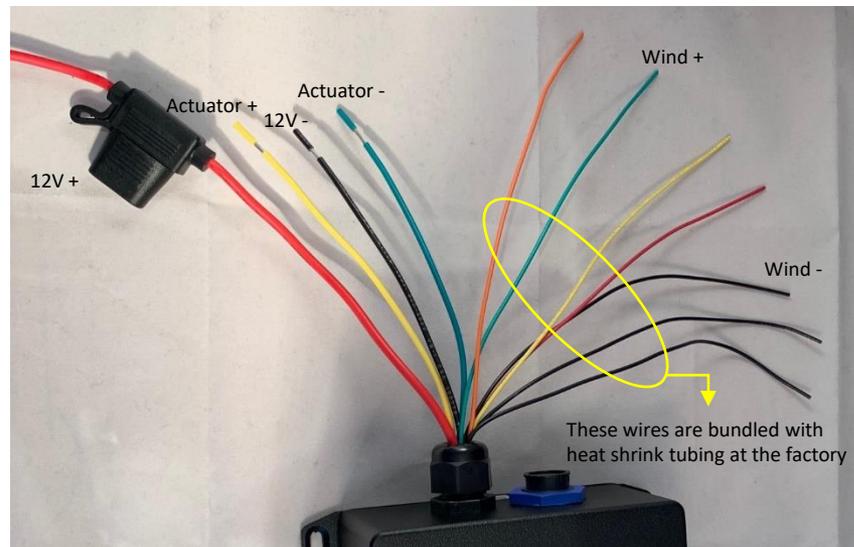
The Pelagic can adjust steering angle based on the apparent wind direction

To enable the Wind Steer feature, the Pelagic needs to receive wind input directly from the NMEA 0183 network or from an NMEA 2000 network via a gateway

In NMEA terms, the Pelagic will be looking for the sentence “xxVWR” to receive its wind input

Connect the small Green (+) and Black (-) wires from the Drive box to your NMEA output, using OUT+ and OUT- on your NMEA output port. Note various manufactures may use slightly different terms for the NMEA0183 inputs and outputs. These wires are located in the unused bundle of wires coming out of the back of the Drive box, with the ends wrapped in heat shrink tubing.

- Carefully cutaway the heat shrink tubing and identify the Green and black wires
  - Note that there may be 3 black wires, in which either can be used as NMEA ground



# Notes on Steering with the Wind Steer Feature

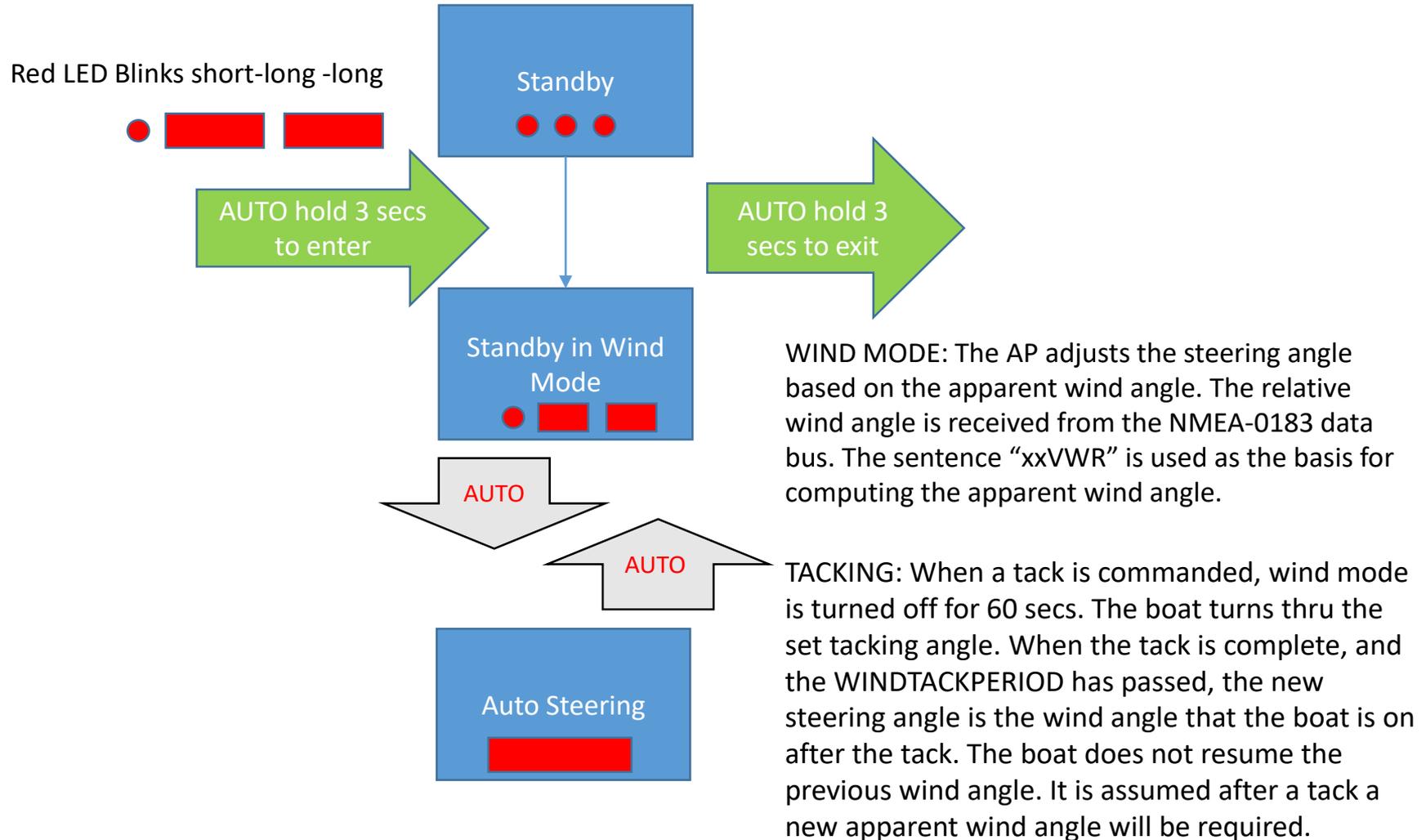
If wind data is not present on the NMEA network the Pelagic will not go into Wind Mode. Lack of wind mode data can be the result of several things including:

1. NMEA network is not creating/sending “xxVWR” sentences
  - Make sure that instruments are generating and sending xxVWR sentences over the network
2. The NMEA network is overloaded with extraneous data (clutter) and the Pelagic’s search is timing out
  - Filter out data not required on the network
3. The Pelagic input wires are improperly connected to the NMEA network
4. Not entering Wind Mode correctly on the Pelagic Control head
  - Press and hold the Auto button for 3 seconds
  - When done correctly, the Standby light will go from flashing red in Standby mode to a short flash followed by 2 longer flashes

Important notes on tacking with Wind Steer engaged:

1. When a tack command is entered, wind mode is turned off for 60 secs and the boat turns thru the set tacking angle.
2. When the tack is complete, and the WINDTACKPERIOD has passed, the new steering angle is the wind angle that the boat is on after the tack.
3. The boat does not resume the previous wind angle. It is assumed after a tack a new apparent wind angle will be required.

# WIND STEER MODE (apparent wind angle)



# Calibrating the Compass

- Compass Linearization – Swinging the Compass
  - Initial calibration of the Pelagic is performed at the factory. However, the Pelagic needs to be recalibrated following installation to compensate for the boats unique magnetic signature.
  - Best done in calm conditions
  - Can be performed under motor or sail
  - If you fail to save the calibration prior to powering down the unit, calibration will not be saved and will revert to a pre-calibration state. It is then necessary to recalibrate the unit prior to use.
- If the calibration process is not successful, when the system reboots, the far right GREEN LED will turn solid and the port RED LED will flash rapidly, indicating a poor calibration.
- To remedy, reboot holding the STBD button through the entire boot process (approx. 12 sec) until the green light disappears and the system comes up in calibration mode.
  - Repeat calibration process until successful.

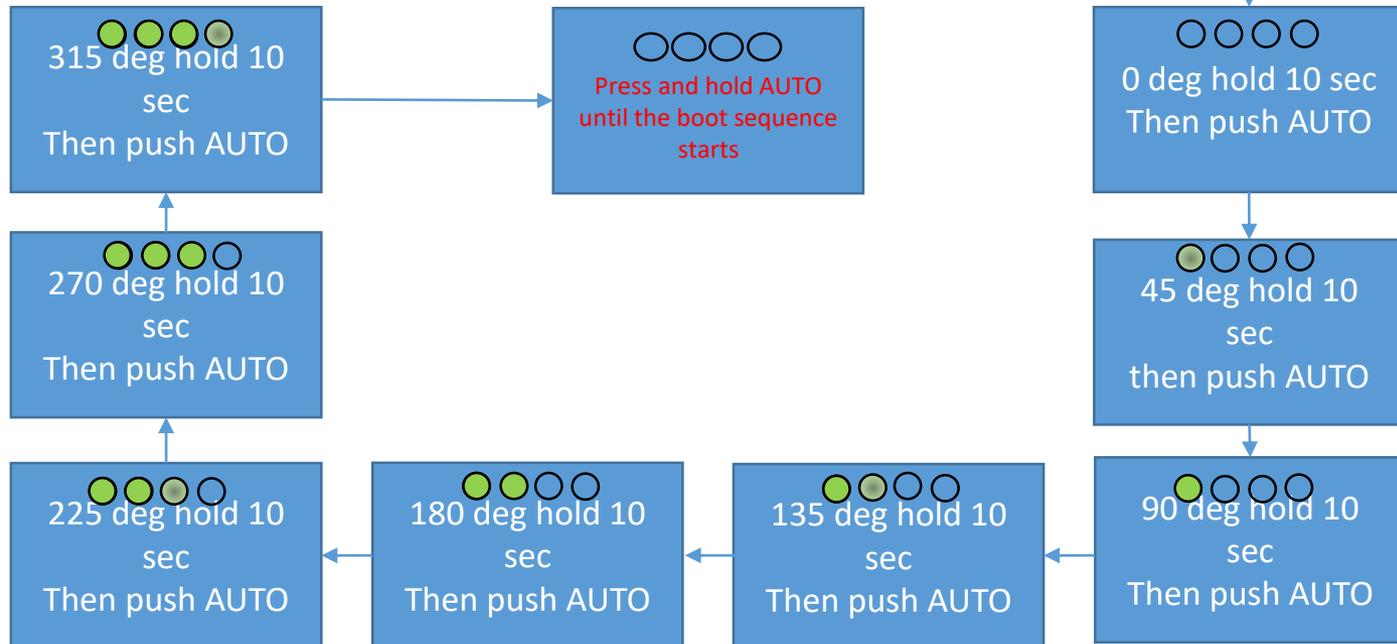
# Compass Calibration Linearization – Swinging the Compass

NOTE: If calibration process is not successful, the right GREEN LED will turn solid and the port RED LED will flash rapidly the next time the system reboots, indicating a poor calibration.

Red LED flashes this sequence



**RESET:** If you exit this process by powering down prior to the last step, the compass calibration values are reset to factory settings and are not saved.

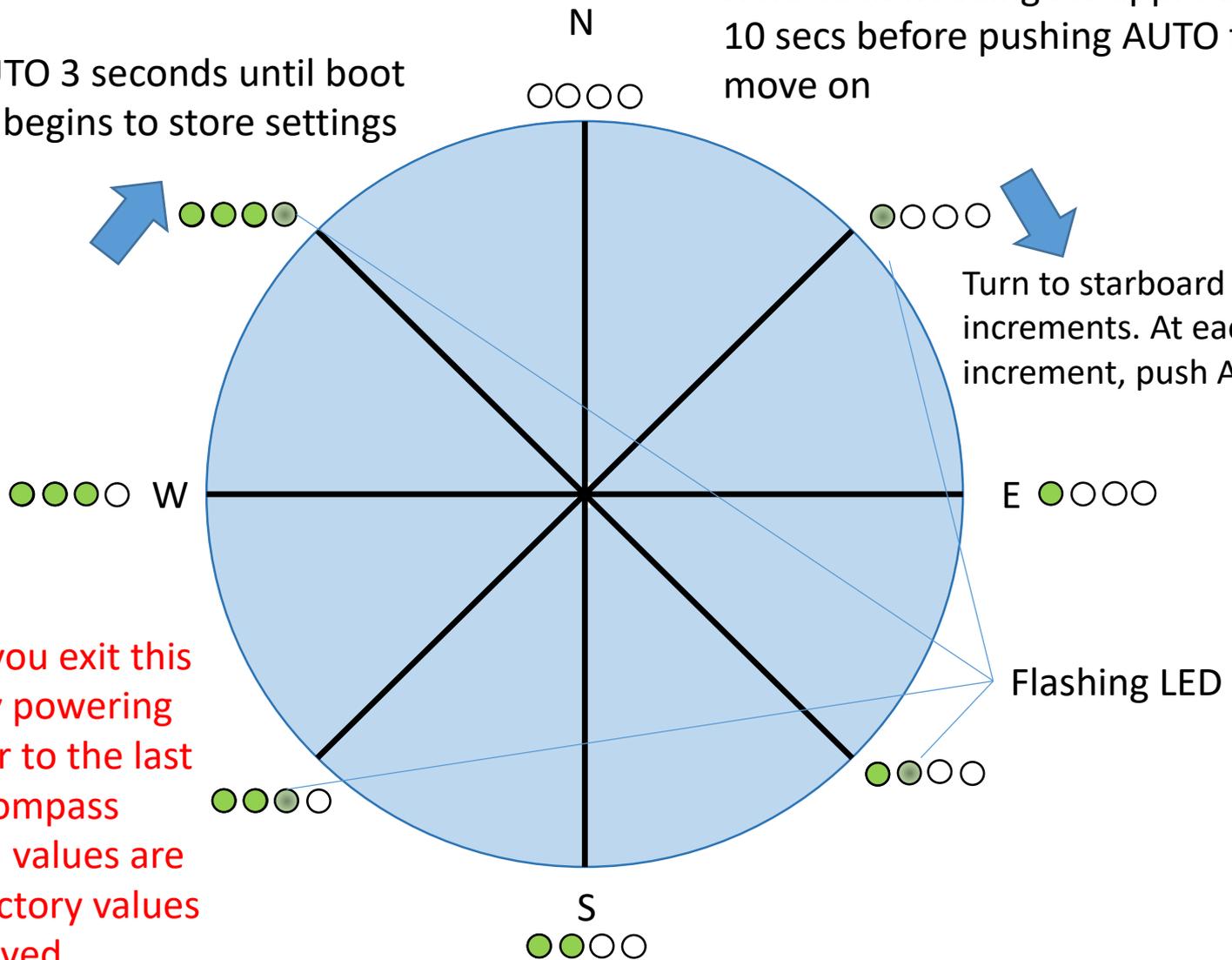


# Compass Linearization

Lights shown as each calibration point is entered.

Hold AUTO 3 seconds until boot process begins to store settings

Hold each heading for approximately 10 secs before pushing AUTO to move on

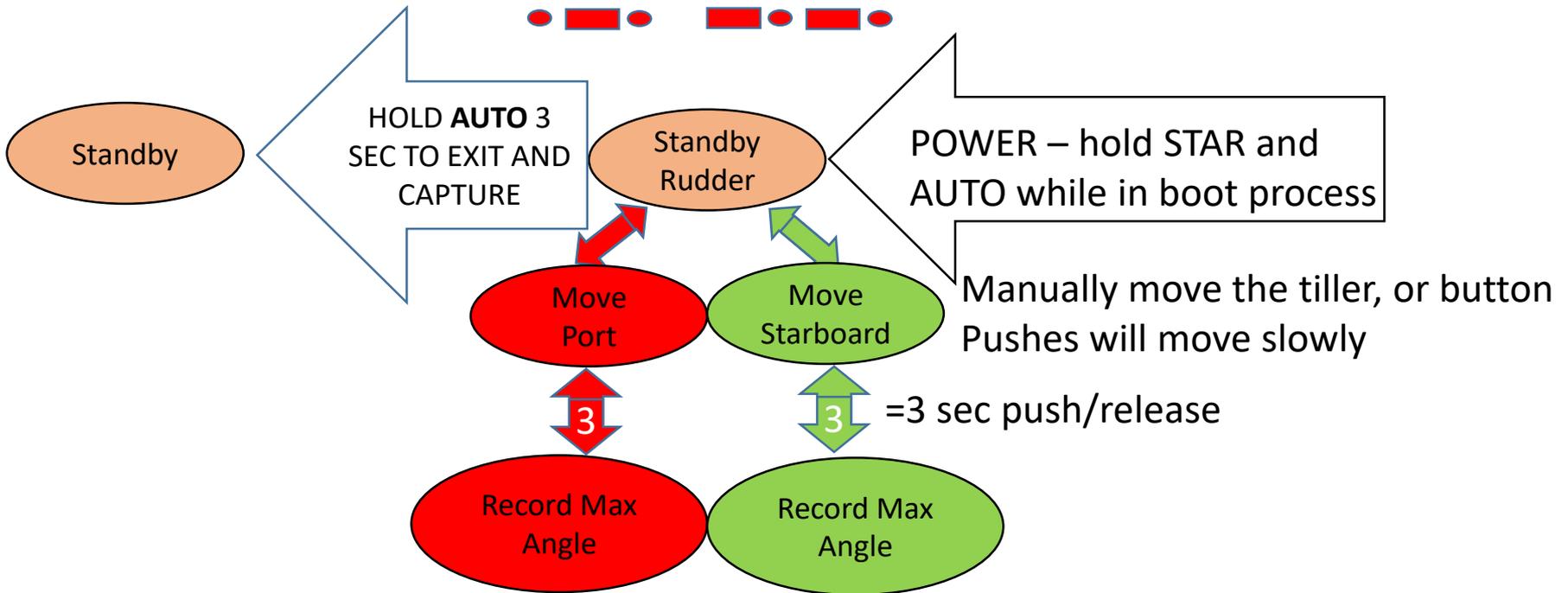


Turn to starboard in 45° increments. At each increment, push AUTO 1 sec.

**RESET:** If you exit this process by powering down prior to the last step the compass calibration values are reset to factory values and not saved.

# Rudder Sensor Limit Setting

Push and hold STAR and AUTO during power up boot



Raymarine Rudder Sensor Connection Example:

Pelagic Raymarine M81105 Rotary Sensor – mount to starboard

Blk	Grn
Red	Red
Org	Blu

# Advanced Features

The Pelagic Autopilot is preconfigured from the factory to perform well on most boats in a variety of conditions, with the only adjustment required being compass calibration.

Nevertheless, there may be situations where additional tuning is required, particularly with high performance boats.

The Pelagic system can be enhanced to accommodate the demands of high performance boats through a series of advanced features called Dynamic Parameters.

Given the number of options available and complexity of the system, it is strongly recommended that you familiarize yourself with the operational characteristics of your Pelagic autopilot before attempting to change the Dynamic Parameters.

# Dynamic Parameter Adjustment – Enable at Power Up

(when in this mode the GAIN is preset to 3)

- Power up and hold the AUTO button until boot process completes.
- The RED led will flash a long-short, long-short pattern.
- The STAR/PORT buttons are pressed to select the parameter to adjust as indicated by which green LED is lit
- The AUTO button switches to autopilot steering and then allows adjustment of the selected parameter while in auto mode.
  - Pressing AUTO again takes you back to parameter selection.
- Pressing and HOLDING AUTO for 3 seconds will save the new settings and reboot the autopilot.

# Dynamics Parameter Suggested Settings

- Modern fin keel boats, with blade rudders, will likely do well with the default setting of 3.0
- Full keel boats (starting settings):
  - Low Speed Course Correction (KISub) = 0
  - Course Correction (KI) = 1.5
  - Yaw Suppression (KP) = 3
  - Yaw Damping (KDI) = 0
  - Yaw Acceleration Rate (KYDD) = 3.5
- Wind Vane control
  - Low Speed Course Correction (KISub) = 0
  - Course Correction (KI) = 1.5
  - Yaw Suppression (KP) = 3.5
  - Yaw Damping (KDI) = 0
  - Yaw Acceleration Rate (KYDD) = 3.5

# Adjustment of Dynamic Parameters

Light OFF: Reserved for future use

Light 1: Course correction

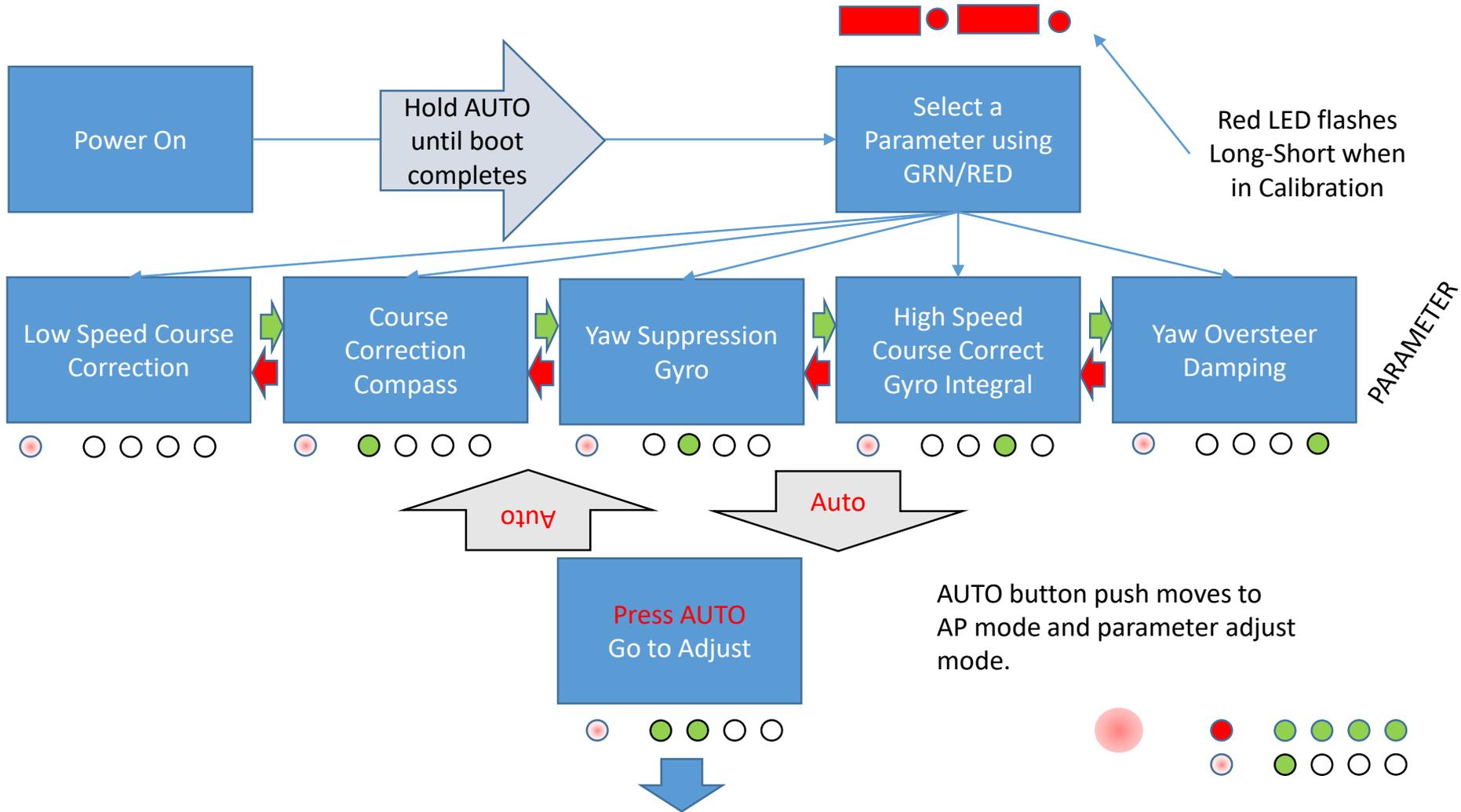
Light 2: Yaw suppression

Light 3: Yaw damping (similar to Continuous course correction but uses Rate Gyro)

Light 4: Yaw rate of change damping adjustment (helps with gusting winds/seas) (KYDD)

Green lights from left to right

# Dynamics: Parameter Selection Method



# Parameter Adjustment

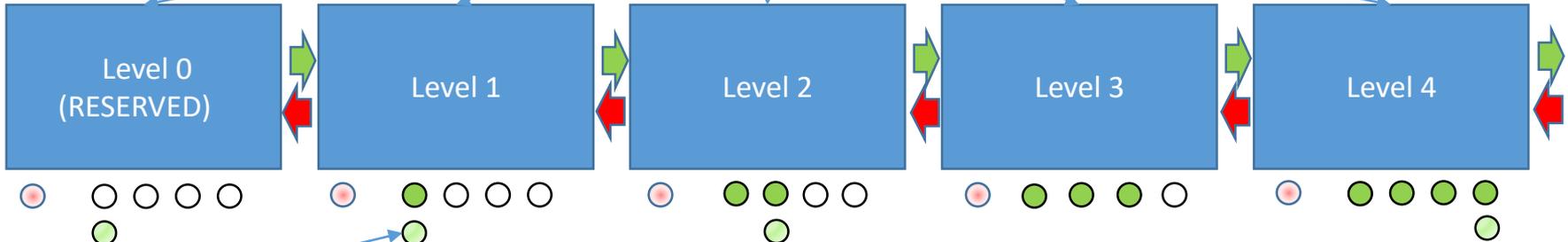


Red LED flashes  
FAST when  
in ADJUST mode



Adjust Selected  
Parameter for  
Best Performance

WHEN IN THIS MODE THE AP IS IN CONTROL  
ADJUST the SELECTED SETTING:  
Each has 9 levels  
Odd levels flash one green LED



Flashing Green = ½ Level



Write to memory causes a counting sequence  
to appear on the green LEDs.

Writes Settings to  
Memory –  
Returns to Normal  
Operation

# Optimization Adjustment Method

## Listed in order of green LED, left to right

	Parameter Selection
Adjust settings in mild conditions, flat water.	
Low speed course correction ( <b>DONT CHANGE</b> )	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Course correction: (3rd) if the boat reacts too slowly in light conditions try increasing. If it starts getting snake-ie reduce or go up 1 step	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Yaw Rate Suppression: ( <b>1st Start here</b> ) if your boat is snaking around try increasing this.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>
High speed course correction: (4th) Adjust this up or down to enhance yaw reaction, decrease if you find yaw reaction causes course overshoot, i.e. too much rudder for the amount of yaw.	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
Yaw Rate Damping: (2nd) this could refine the snaking if it is an issue. Try increasing or decreasing.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>

***In rough conditions, the 2nd and 4th parameters are likely all you can adjust and make sense of the results, as the other settings might get lost in the sea state noise.***

# Parameter Adjustment

(when in this mode the GAIN is preset to 3)

- 5 settings exist for calibration
- They are accessed at power up by entering Calibration mode.  
(Hold the AUTO BUTTON during power up/boot until the display stops counting. The RED LED with flash LONG-SHORT LONG-SHORT)
- Calibration mode has two states:
  - Parameter selection
  - Adjust parameter
- Selection:
  - Green LEDs are on one at a time.
  - No LEDs = parameter 1
  - 4 LEDs = parameter 5
- Setting Adjustment
  - Red flashes fast when in AP mode.
    - Boat is in autopilot mode.
  - 9 levels are available for each parameter.
  - Green LEDs are parameter indicators
  - Red button lowers setting.
  - Green button increases setting.
  - Adjust for best boat response.
  - When finished holding the AUTO button locks the settings in memory.

# Dynamics Parameter Adjustment

The 4 green LED's display the parameter value.

0 = no green LEDs lit.

1/2 = LED 1 flashing

1 = LED 1 solid

1 1/2 = LED 2 flashing

2 = LED 2 solid

2 1/2 = LED 3 flashing

3 = LED 3 solid

3 1/2 = LED 4 flashing

4 = LED 4 Solid

4 1/2 = All LEDs flashing

# Typical Parameter Settings

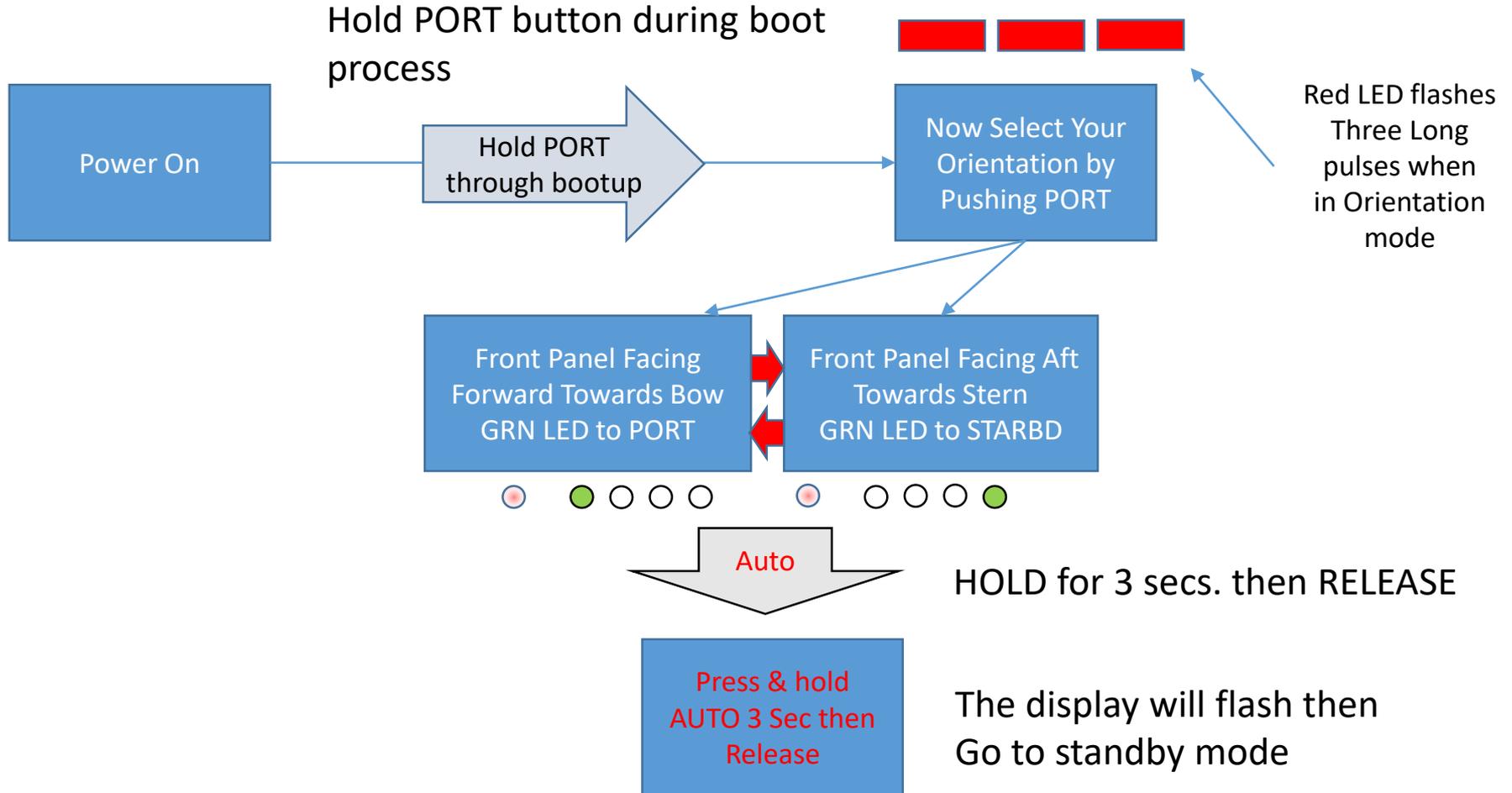
Parameter	Wind Vane/Full Keel	Fin Keel/Spade Rudder
Low speed course correction	0 = O O O O	0= O O O O
Course Correction	1.5 = @ X O O	2= @ @ O O
Yaw Rate Suppression	2 .5 = @ @ X O	3.5= @ @ @ X
High Speed Course Correction	0 = O O O O	0= O O O O
Yaw Rate Damping	3.5 = @ @ @ X	3.5= @ @ @ X

@ = ON, X = FLASHING, O = OFF

# Compass and Gyro Orientation

- Orientation is the process of orienting the compass and gyros correctly, so that as the boat pitches and rolls, the feedback to the rudder is in the appropriate direction.
- Initial orientation of the Pelagic is specified by the customer when ordering and is preconfigured at the factory.
  - Stern facing example – Control box is mounted on bulkhead with buttons facing aft
  - Bow facing example – Control box is mounted on transom with buttons facing forward
- Should the installation require a change in the orientation, it can be changed with the following procedure. **Note that reorientation of the system requires recalibration of the compass.**
  - Power up, press and hold the PORT (red) button until the bootup process completes.
  - The RED LED will flash three long flashes when in Orientation Mode and one of the 4 GREEN LEDs will be lit on either the far left side or far right side, indicating current orientation.
    - A GREEN LED lit on the far right side indicates Stern facing orientation
    - A GREEN LED lit on the far left side indicates Bow facing orientation
  - Pushing the PORT button will move the lit GREEN LED to the port or starboard side.
    - The 4 GREEN lights will flash 3 times during the transition
  - Once orientation setting is correct, push AUTO for approximately 3 seconds to store setting and return to standby mode
  - Recalibrate the system before using

# ORIENTATION SELECTION (Orienting the control head)

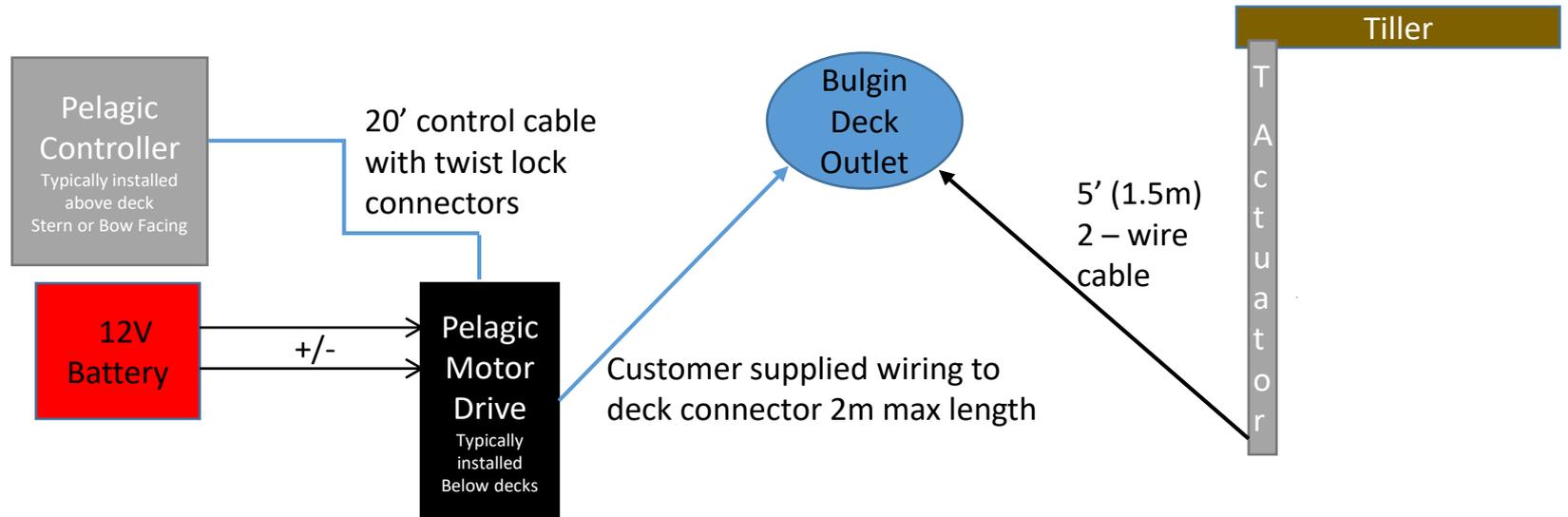


Note: At the end of the calibration process, one GREEN LED will end up being displayed nearest starboard rail of the boat.

- If bow facing, the illuminated GREEN LED should be nearest the flashing RED LED
- If aft facing, the illuminated GREEN LED should be furthest from the RED LED.

# Installation Procedure

# Typical System Layout



# Electrical Connections

- Power should come from a breaker/fuse panel
- A 10amp inline fuse is provided
- Maximum current is 15 amps. This can be increased for larger drive motors.
- A 20' control cable connects the Controller/Front Panel with the Motor Drive Board.
- The actuator motor has a two wire connection. If mounting the actuator on the starboard side, the green goes to black and yellow to red on the Motor Drive box.
  - For a Port side installation the wires reversed.
- The clutch has a two wire connection, Clutch Out and Ground. Note, this is not used in the standard Pelagic tiller system.
- There is a NMEA0183 input for wind steering. A gateway can be used to interface with NMEA2000. See page on Wind Steer Mode.

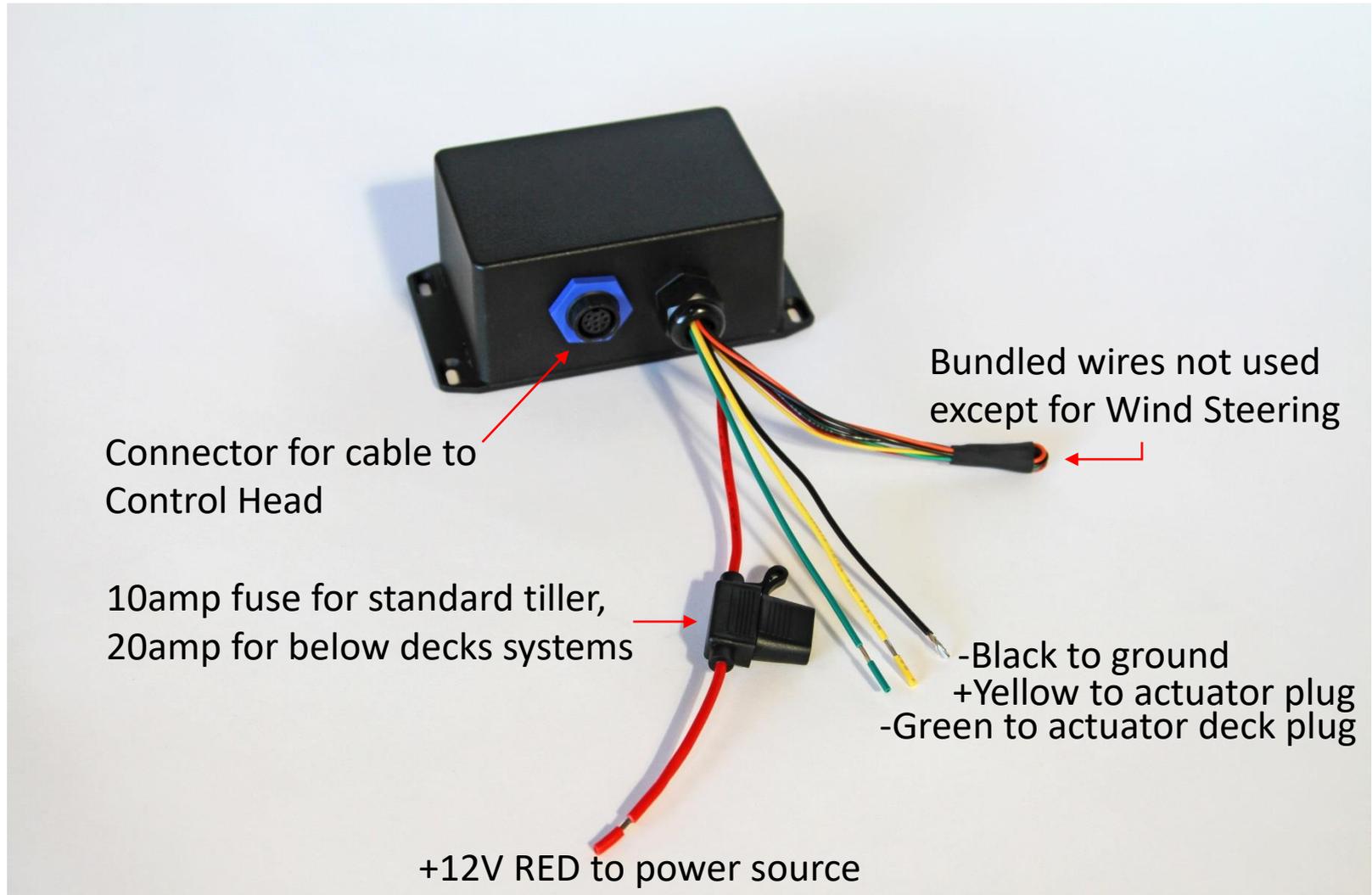
# Installation Steps

- Spend a few minutes to determine suitable locations for the Pelagic's major components prior to beginning the installation. Take into account the following when planning the installation
  - Keep the Control box a minimum of 6" away from metal objects, including wiring carrying charge loads
  - Keep the harness from the Motor Drive box (black) to the deck plug less than 2 meters to avoid interference
  - Cable lengths:
    - Cable between the Control and Motor boxes is 20'
    - Cable off of standard Pelagic actuator is 5'
    - Cable off of small Pelagic actuator (for windvane installations) is approximately 30"
- Position and mount control head such that it is aligned with the display pointing to the bow or the stern as specified at time of order. This initial orientation is preconfigured at the factory.
  - Stern facing example – Control box is mounted on bulkhead with buttons facing aft
  - Bow facing example – Control box is mounted on transom with buttons facing forward
  - Should the installation require a change in the orientation, it can be changed by following the procedure described in "Changing Orientation"
- Position and mount the Motor Drive enclosure below deck.
- Route the 20' control cable through the vessel and connect control box to motor drive box.
  - If necessary to pass through a bulkhead, the cable can be cut and respliced.
- Route the control cable into the boat from the control box via a water tight deck sealing device.
- Provide 12v power to the motor drive box via red (+) and black (-) wires
- Extend yellow and green wires below decks to Bulgin deck socket connector and secure (see next page).
  - These are customer supplied
  - Keeping length to 2m maximum
- Other coming out of Motor box wires are tied off and not used in a typical above deck tiller application

# Installation Steps (cont.)

- Install bronze deck fitting for actuator 24-7/16" (621 mm) from the tiller, with tiller centered
  - Depending on configuration of boat, an actuator extension may be necessary to provide necessary reach
- Install tiller pin in tiller located 18 inches (457 mm) from the axis of the rudder.
- Check connections and power up.
- Once powered up and through the boot process, the Control box will flash a Red LED at the rate of one flash per second
- Successful installation of the unit can be confirmed at this time by pressing the Green button. If installed correctly, this will result in the actuator moving outward, which if attached to the rudder, would result in the vessel turning to starboard. The actuator arm can then be retracted by pressing the Red button.
  - If the direction of the actuator arm results in the rudder being turned in the wrong direction, then the actuator wires need to be reversed.
- Refer to System Operation for operational guidelines
- Though the Pelagic Autopilot is calibrated at the factory, it is recommended that the compass be recalibrated for your boat after installation. Refer to Calibration for additional information.
  - Prior to recalibrating the compass, it's recommended that you engage the autopilot in a controlled situation (calm conditions, open waters) to confirm basic operation including:
    - Engage/disengage the autopilot
    - Holding a course
    - Small course corrections
- For those concerned with optimal performance, a set of sophisticated Dynamic Parameters are available to fine tune the Pelagic system. These are typically used by racers and beyond the scope of the typical user. They can be found in Advanced Features Settings.

# Drive Box Connections



# Deck Connections

Mount the 3-pin deck socket within 4' of the actuator mounting bracket

- You will need to provide screws or nuts/bolts
- Thread one of the mounting screws through the dust cap provided

Connect yellow and green wires from the Drive Box to the back of the deck socket (see below)

- You may need to extend the wires to provide sufficient length

The 3-pin male connector on the actuator connects to the deck socket providing power to the actuator

- Note that on new, complete actuators, the connector is factory installed



3-pin male connector

Deck Socket



When mounting the actuator on Starboard:

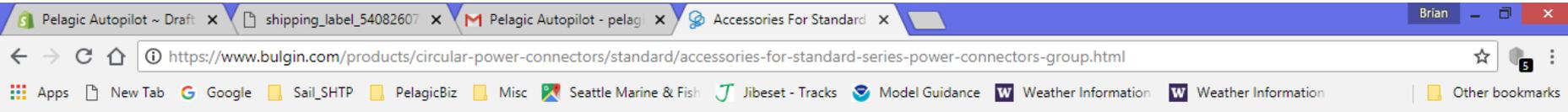
+ Yellow from Motor box connects to terminal "N"

+ Green from Motor box connects to terminal "L"

**Note that these wires are reversed when mounting the actuator on Port**

# The Bulgin Dust Cap/Moisture Cover

Serves as a tool to open up the 3 pin plug attached to the tiller actuator



This end is a tool that unscrews a retaining ring within the male plug on the cable.



## Accessories For Standard Series Power Connectors

Standard Buccaneer Connector

### DESCRIPTION

### Technical Data

Accessories For Standard Series Power Connectors

12237 fits Standard Power Flex/In-Line Flex Cable Connectors to provide extra support for 5mm-7mm and 7mm-9mm cable diameters

12855 PVC Insulation Boot provides shock protection for the rear of Standard Series Front Panel Mounting Connectors (PX0799 Rear Of Panel Back Shell also available to provide an environmental seal to rear of panel)

PX0734 Sealing Cap can be used to maintain IP rating of unmated connectors and to remove coloured inserts from Standard Power Flex Cable Connectors

The plug, when viewing the pins, has a threaded retaining ring that can be unscrewed with the dust cap.



Code	Description	EAU
12237	Cable Support Accessory For Standard Series Power Connectors	0
12855	PVC Insulation Boot For Standard Series Front Panel Mounting Power Connectors	0
PX0734	Sealing Cap For Standard Series Rear Panel Mounting and PCB Mounting Power Connectors	0



# Tiller drive or Below Deck drive Installation **CHANGED**

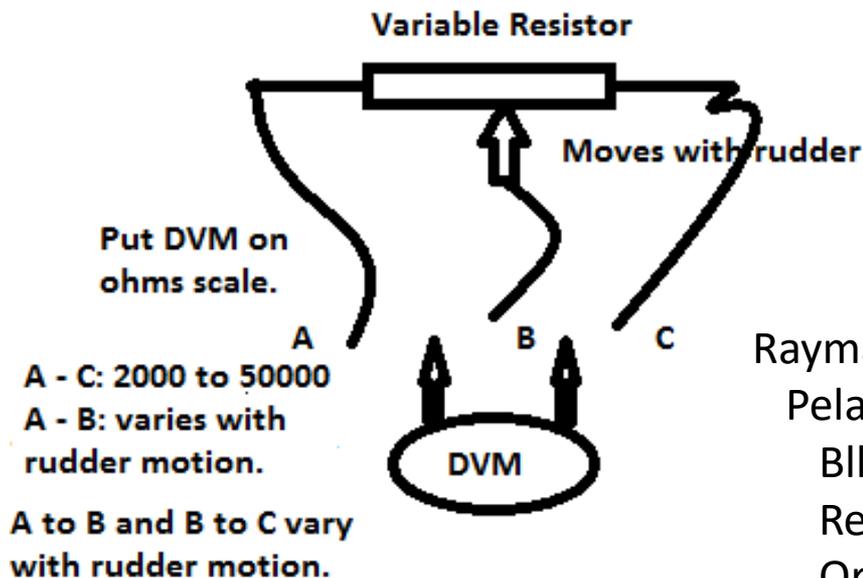
- Motor Control Unit
  - Connections are for 12 volt and the motorized tiller driver.
  - The power cable has RED (+) and BLK (-) wire connections.
  - The Yellow (star), Green (port), connect to the RED and BLK wires on the **drive motor**, respectively.
  - **Motor drive** connections should be kept short and wire should be #14 or larger.
  - There is a **10 to 25 amp fuse inline** with the + power connection. It is a automotive type blade fuse. Suggest that the unit be mounted allowing easy access to the fuse.
  - For the Tiller wand a 10 amp breaker circuit should be sufficient. For Type 1 or Type 2 installations a 15 amp breaker is suggested.
  - Mounting screws, #8 in size, are intended to be placed in the provided holes on **the flanges of the cover**.
- Control Head/Compass Unit
  - Contains 9 attitude sensors.
  - Implements a compass.
  - Must be level to the boats lines both forward and astern and port to starboard.
  - The front panel must face either forward or aft. If facing aft the ORIENTATION calibration procedure must be followed.
  - Must place away from magnetic sources, compasses, engines, and speakers.
  - Connected via 8 wire cable and connectors. If the cable is too long it is best to coil up the remainder.

# Rudder Sensors for the Pelagic

## Use a resistive sensor only

The Raymarine **M81105** is an example of a resistive unit that can be used.

### Rudder Sensor Operation

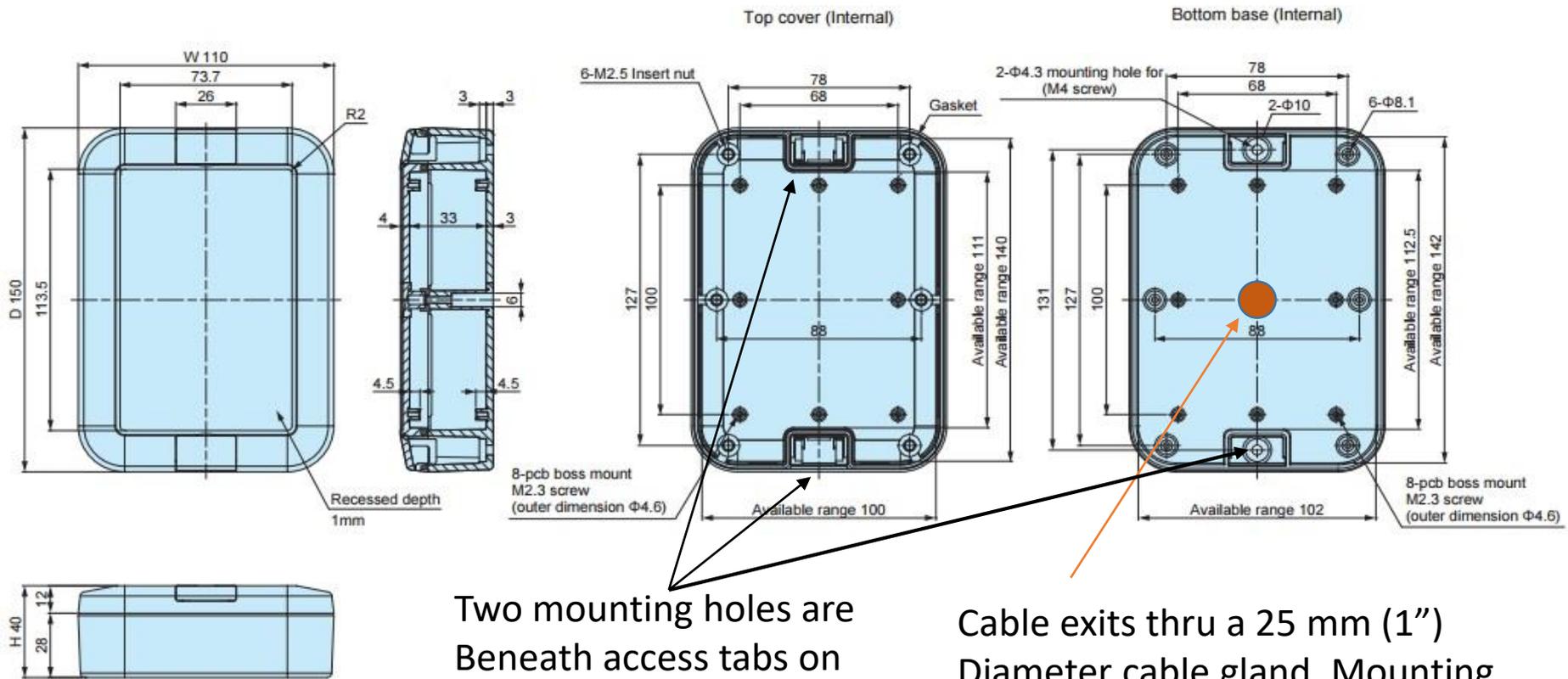


Raymarine Rudder Sensor Connection Example:

Pelagic	Raymarine	M81105 Rotary Sensor
Blk	Grn	
Red	Red	
Org	Blu	

Assumes starboard mounting, reverse BLK & RED for Port mounted sensor.

# Control Head Updated after May 2017



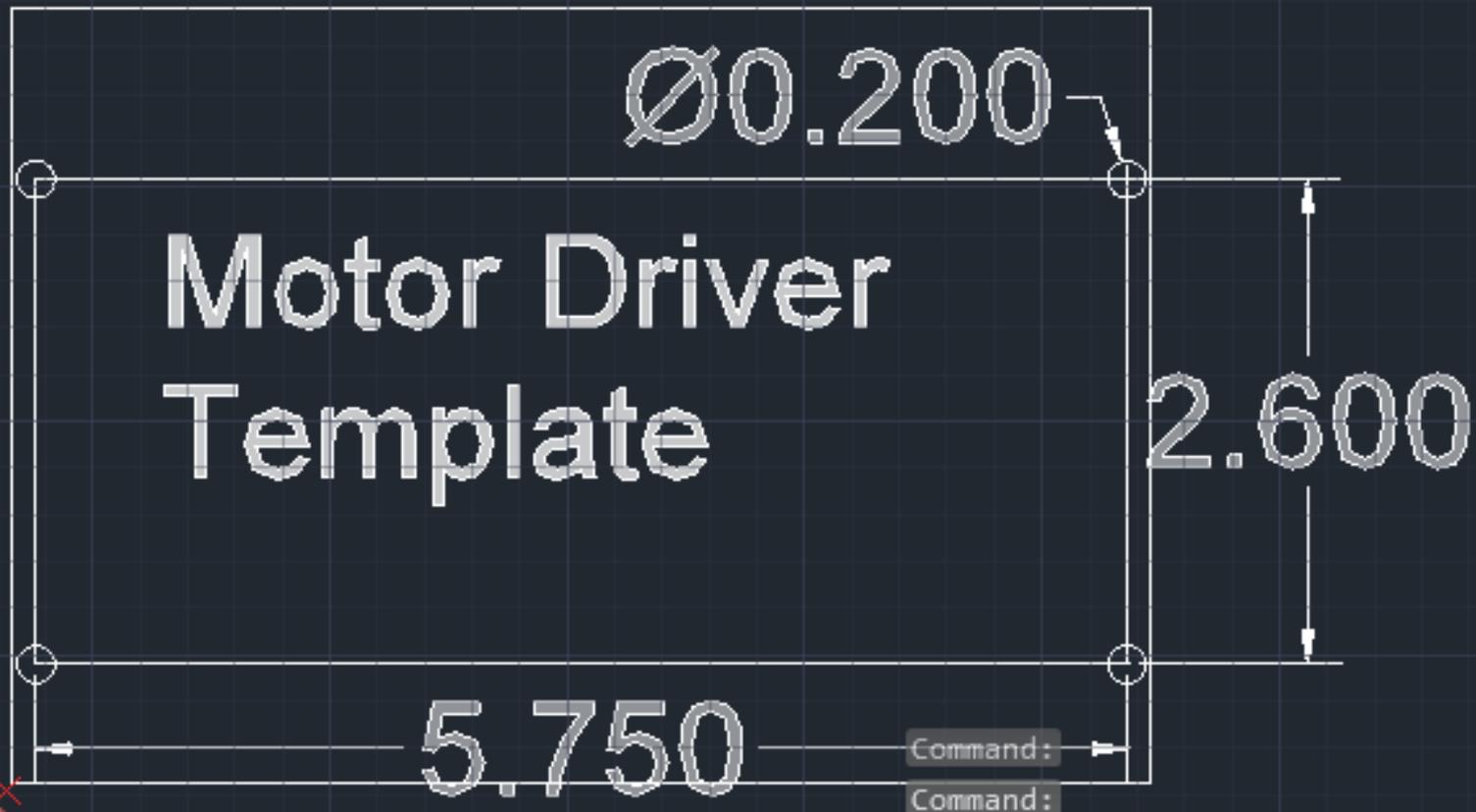
Two mounting holes are  
Beneath access tabs on  
The case face.

Cable exits thru a 25 mm (1")  
Diameter cable gland. Mounting  
Must include a hole to receive.

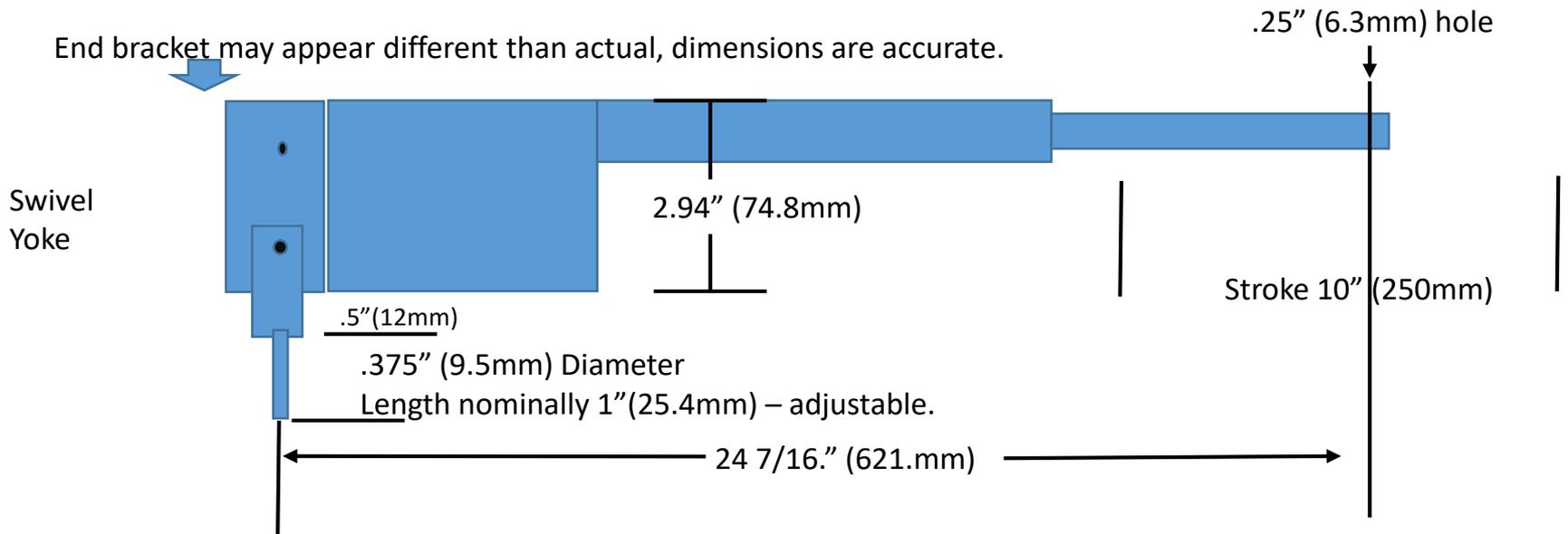
# Motor Drive Box Template

if printed at 8.5x11 dimensions are true  
(inches)

Mounting holes are inside the box, under the lid.  
Hardware is #8 stainless sheet metal screws.

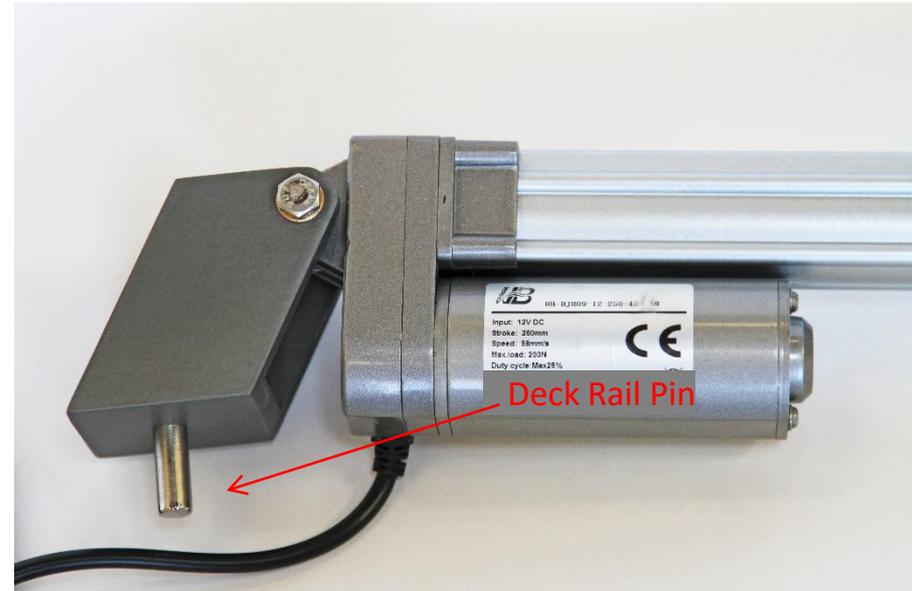
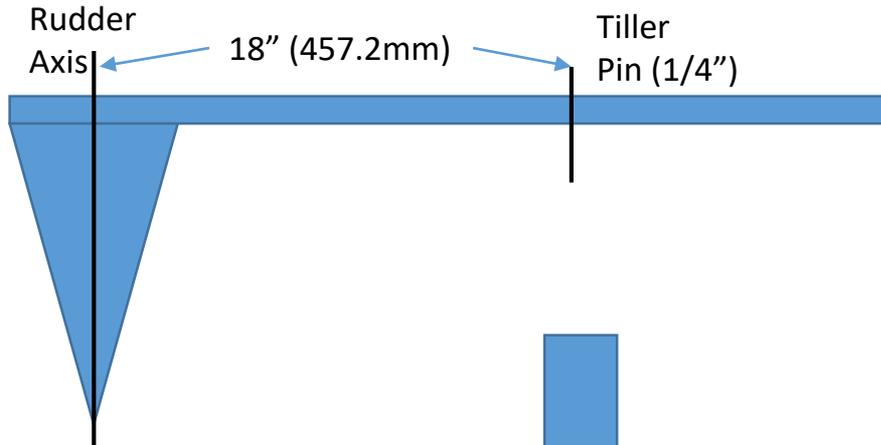


# Tiller Actuator Dimensions



# Tiller Actuator Mounting Spec

- Deck/Rail pin diameter 0.375" (9.53 mm)
- Rudder axis to mounting pin 18" (457mm)
- Tiller mounted pin diameter 0.25" (6.35mm)

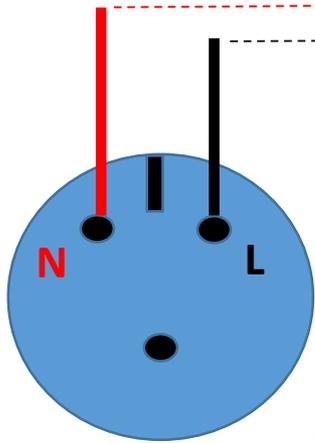


Mounting bracket may vary  
With date of manufacturing.

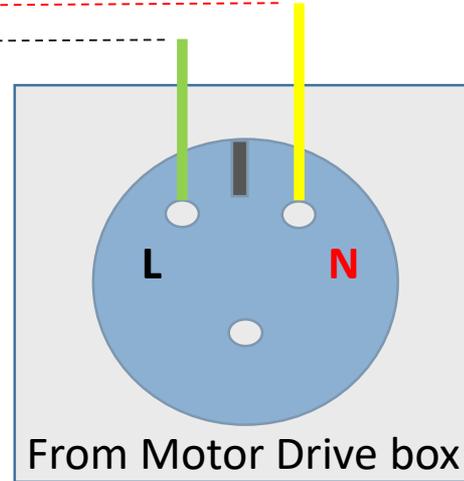
Brass Bearing: ID = 0.375" (9.53mm) to be mounted in deck. Load up to 200lbs  
OD = 0.5" (12.2mm).

# Actuator Connector as Shipped for Starboard Mounted Actuator

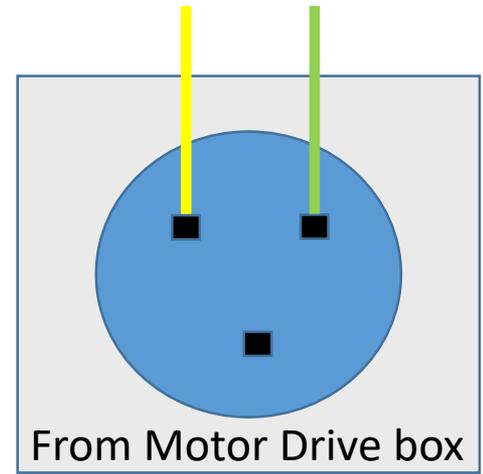
Reverse green and yellow for port side actuator mounting



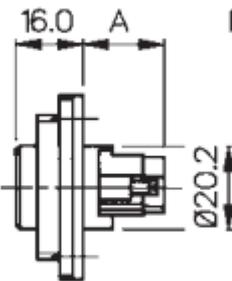
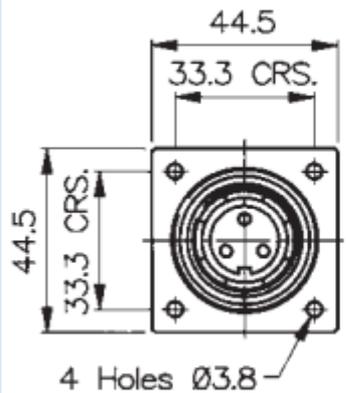
Male Cable Connector Attached to Tiller Actuator  
Internal color code  
**Front view**



Female Deck Flange Connector **front view**.  
Internal color code.  
Reverse for Port mounting of actuator



From Motor Drive box  
**Rear view** of female deck flange with screw terminations.

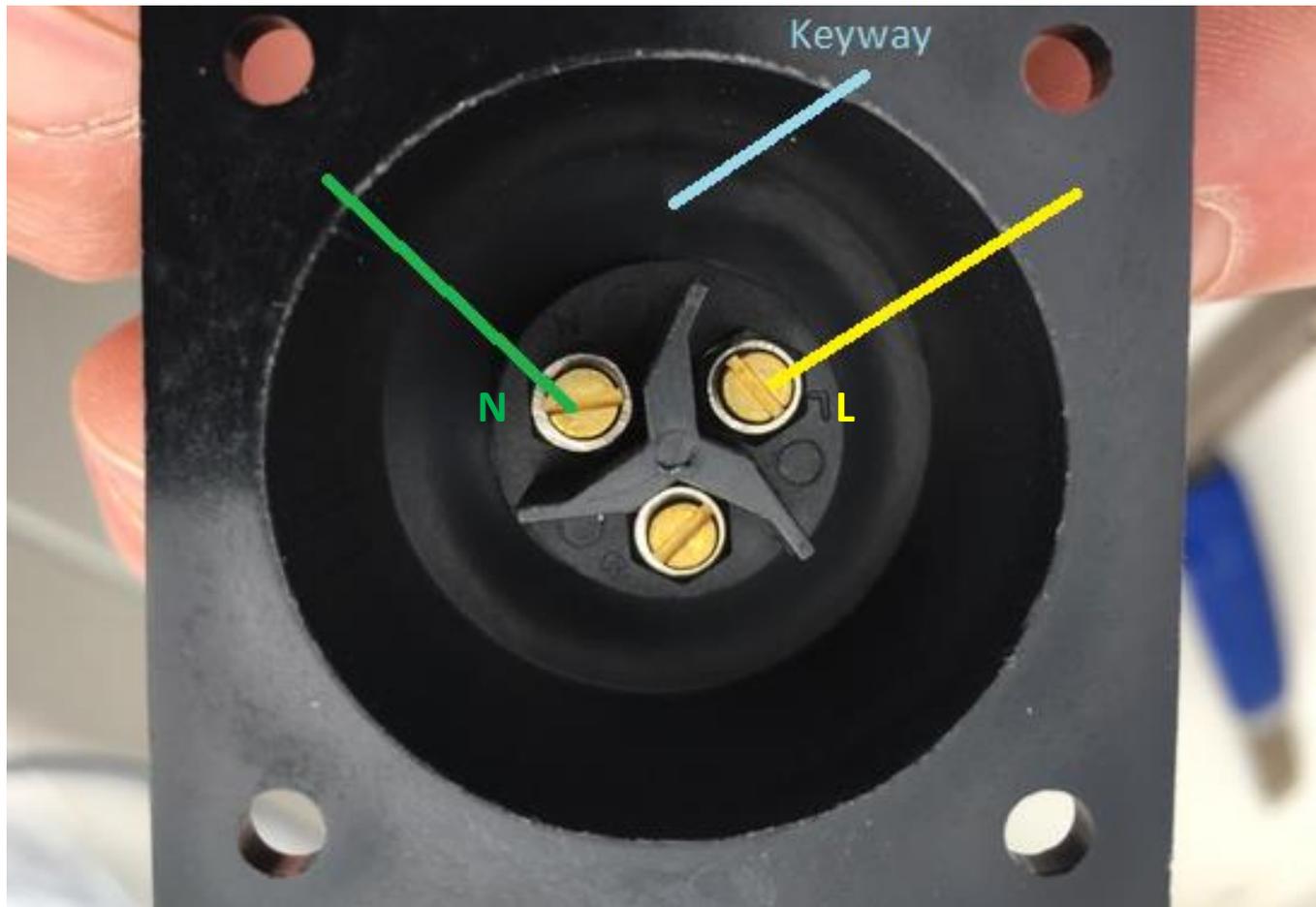


DIMENSION A.		
POLE.	PLUG.	SOCKET.
2	11.0	19.0
3	14.3	21.95
3 CRIMP	9.6	11.4
4	11.8	14.95
6	11.8	14.95
7	20.0	21.65
9	19.8	9.6
12	9.6	11.4
25	9.6	9.6
BNC	10.0	16.0

Dimensions –  
Thru deck  
hole size: 1 5/16”  
(33.3mm)

# Deck Connector

When mounting the actuator on the port side, the green and yellow wires are reversed as shown



# Bulgin Male Plug Assembly



# Windvane Kits

# Installation for Wind Vane

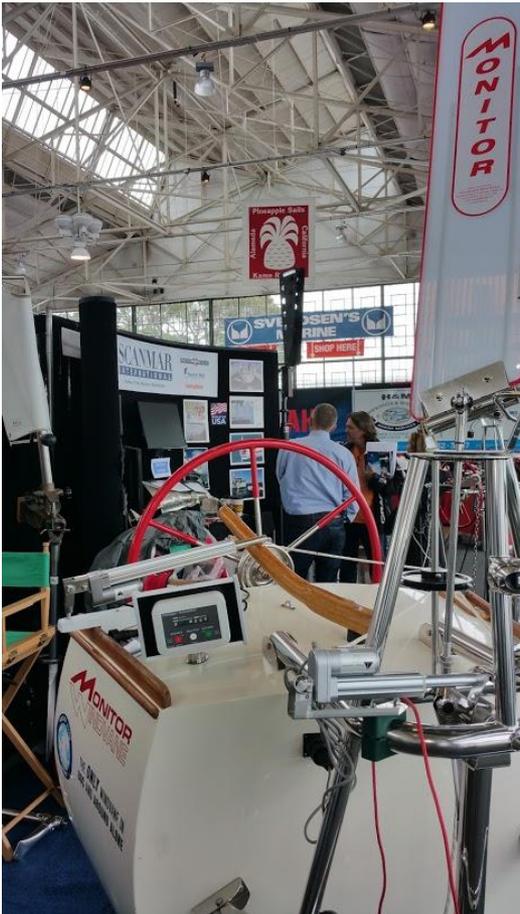
- Controller Must be level with the deck on all axis.
- **Front panel must face the bow or stern.**
  - Orientation option can be factory set or user set on power up.
  - Mount on stern rail near windvane is OK.
- Must be a stable location.
  - A rail mount kit is an option.
  - Stern rail at the boat center is best but off to one side is OK. **Keep it facing the bow.**
- Motor Driver
  - Orientation is not important
- Keep cable exit off to side or pointing down to prevent water intrusion.
  - Add drip loop to cables.
- Power connection should be #18 wire or larger. #14 is overkill.
- The power should be switched at a breaker or switch panel
- Controller contains a fuse inside with 2 spares.

Monitor Wind Vane installation on “Owl”, Pacific Seacraft 37. Shown testing a prototype revision of the wind vane steering.



# Installed Monitor Brackets

Quick pin and ball joint allows quick release



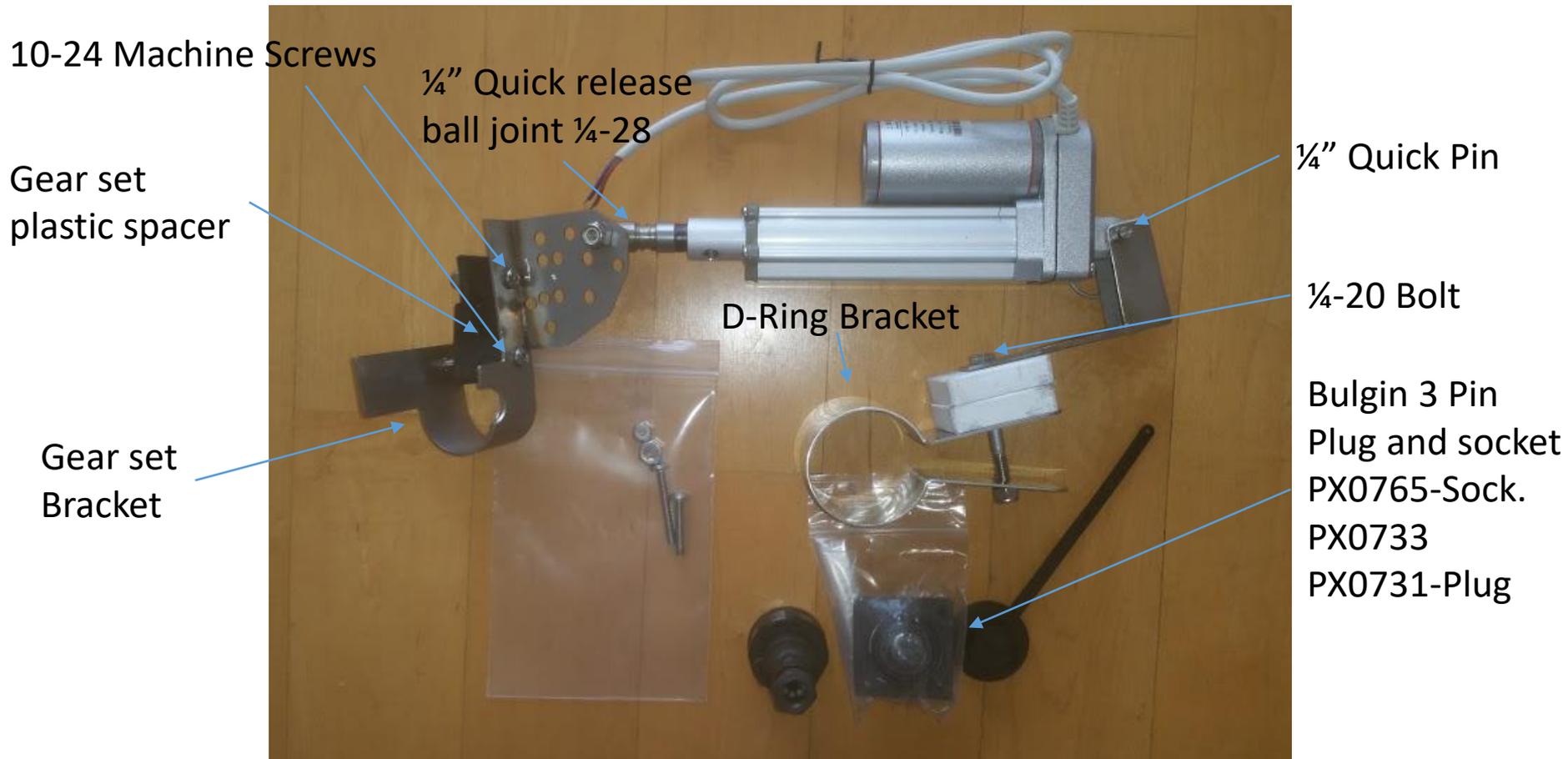
Frame Bracket Installed

Pinion Bracket Ball Joint Connection



# Monitor Updated Attachment Kit

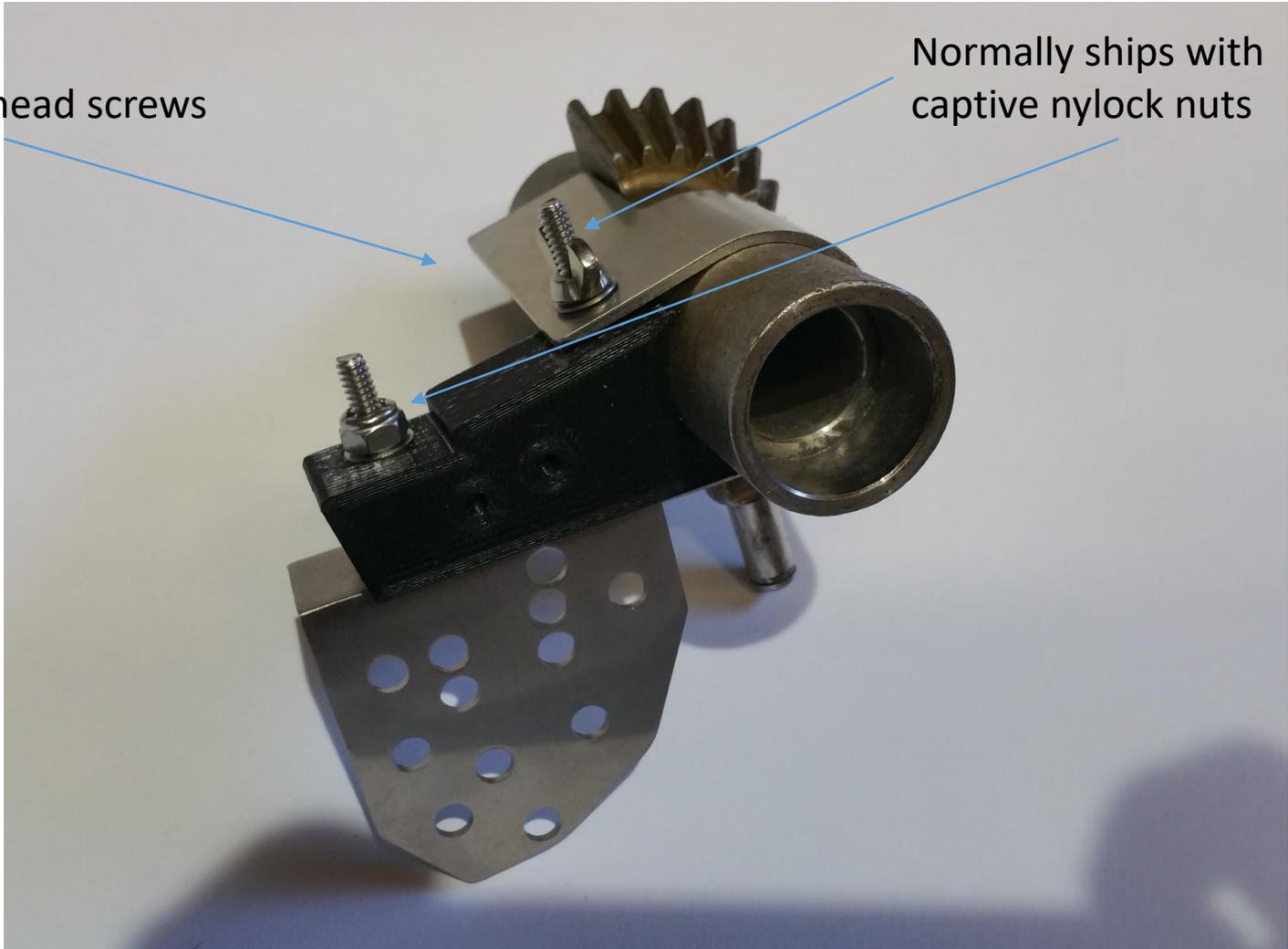
(July, 2018)



# Monitor Gear Clamp Block Inserted

10-24 pan head screws

Normally ships with  
captive nylock nuts



# Monitor Wind Vane Kit Attachment



Attaching the WV pinion bracket. Slide it onto the pinion gear then tighten the bolt and nut combination. The bracket locks onto the pinion gear and the wind link arm.

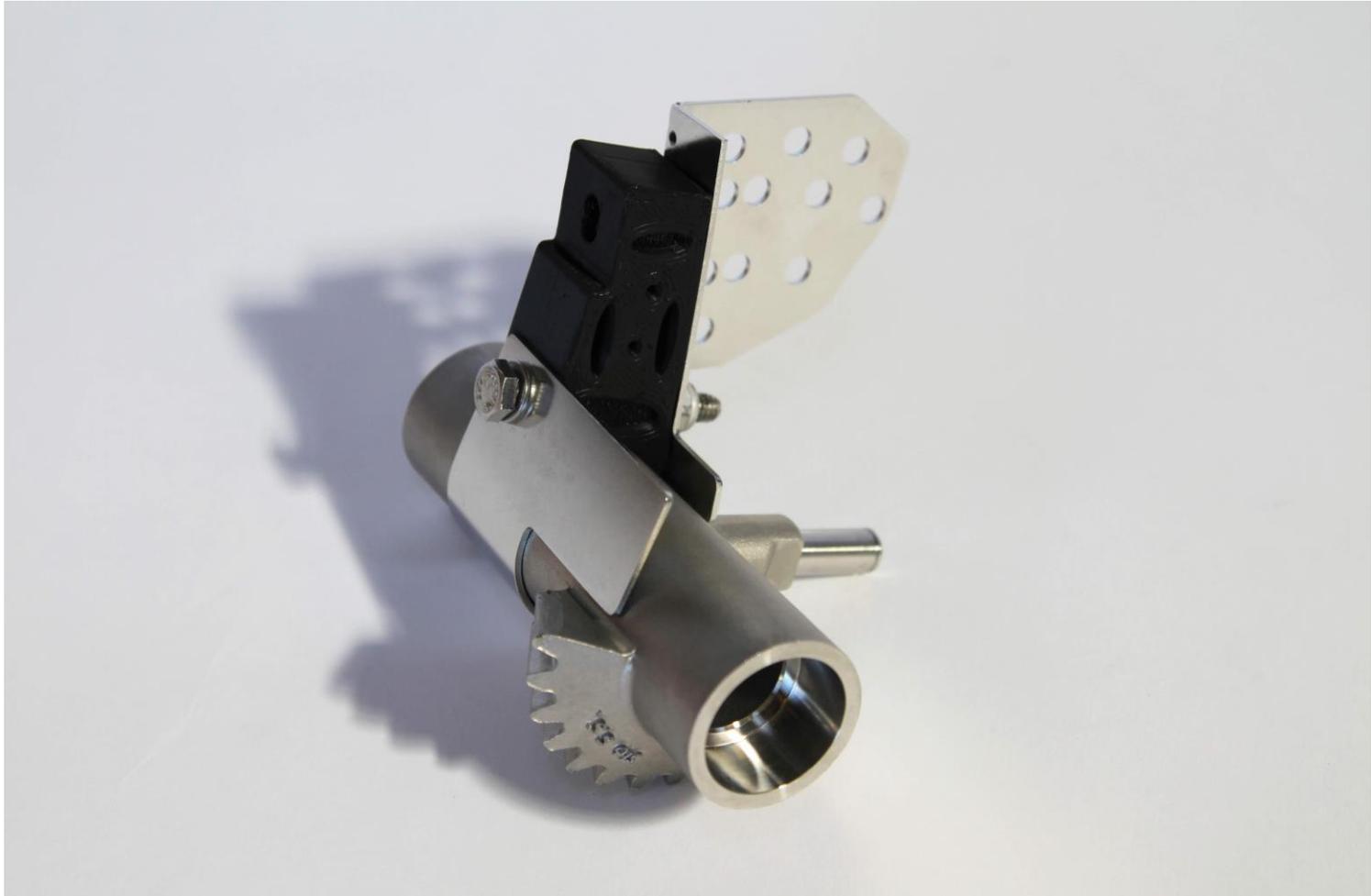


# Monitor Bracket Adjustment

- Adjust the frame bracket so that it aligns with the pinion bracket.
- Move the actuator push rod to the center position of its span by using the AP red and green buttons. The push rod moves 4" (100mm). Center at 2" (50mm) from the shortest position.
- Attach the actuator with the quick pin and the ball joint. Rotate the frame bracket until the wind paddle is vertical. Tighten the bracket in place.

# Monitor Pinion Gear Bracket

sliding onto the pinion gear (the gear does not need to be removed to install the bracket). Turn vertical and slide onto gear and shaft.



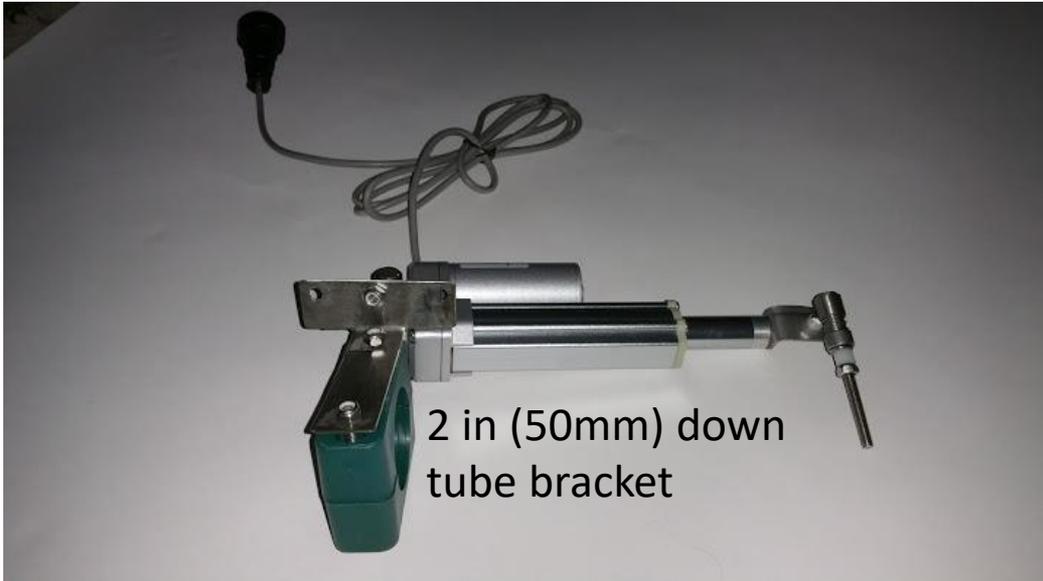
# Ball Joint Attachment



The ball joints are  $\frac{1}{4}$ "-28 threaded on both ends. When securing them it is highly recommended that Loctite thread locker be used. An alternative would be 3M 5200.

These are connected to the end of the actuator and into the pinion gear bracket.

# Windpilot Attachment Kit



- 12 Volt linear motor push rod, 75 mm span.
- 2 – 6mm quick release ball joints
- 50mm Down tube attachment brackets
- Bulgin IP68 rated electrical plug and socket
  - Buccaneer Standard Series 3 pin.
  - Socket cover for deck socket.



# Windpilot Pacific Actuator and Parts



# SailOMat attachment kit & photo of attach points



6 mm allen key required for 6 mm cap screws in 3" bracket



# Specifications

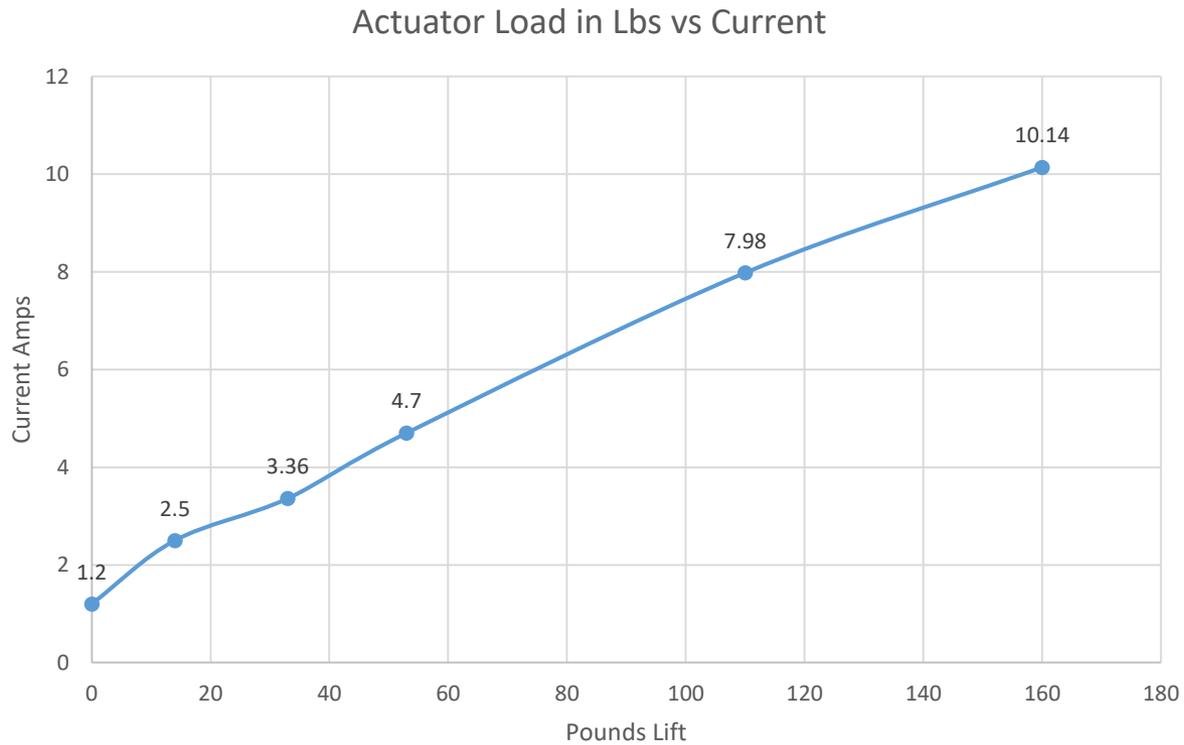
# Specifications

- Power
  - Compatible with 12v systems
  - Standby mode: 0.25 amps, varies with display brightness
  - Auto mode: .5 to 12 amps, dependent on sea state and settings
  - Windvane power: .25 to .75 amps

# Tiller Wand Specification

- 12 Volt operation, driven from the motor controller.
- Permanent Magnet motor driven lead screw with low friction HDPE lead.
- Transmission gearing all metal, no plastic gearing.
- No load speed 53 mm/sec ( 5 secs lock to lock).
- Pushrod travel = 245 mm (~10 in).
- Force: 200 lbs (91 kg) without stalling. See load graph.
- Center to center attach pin spacing at neutral position 600mm (24 in)
- Hull attachment pin = 9.8 mm (.38 in).
- Rudder tiller pin hole diameter = 6.5 mm (.25 in).
- Stainless pushrod uses O ring seals.
- Body of wand is aluminum.
- Motor housing is steel with powder coated weather resistant finish.

# Load Current of Tiller Actuator



Software Updates  
Reloading Software

# Upgrading Software into the AP

## Opening the Controller

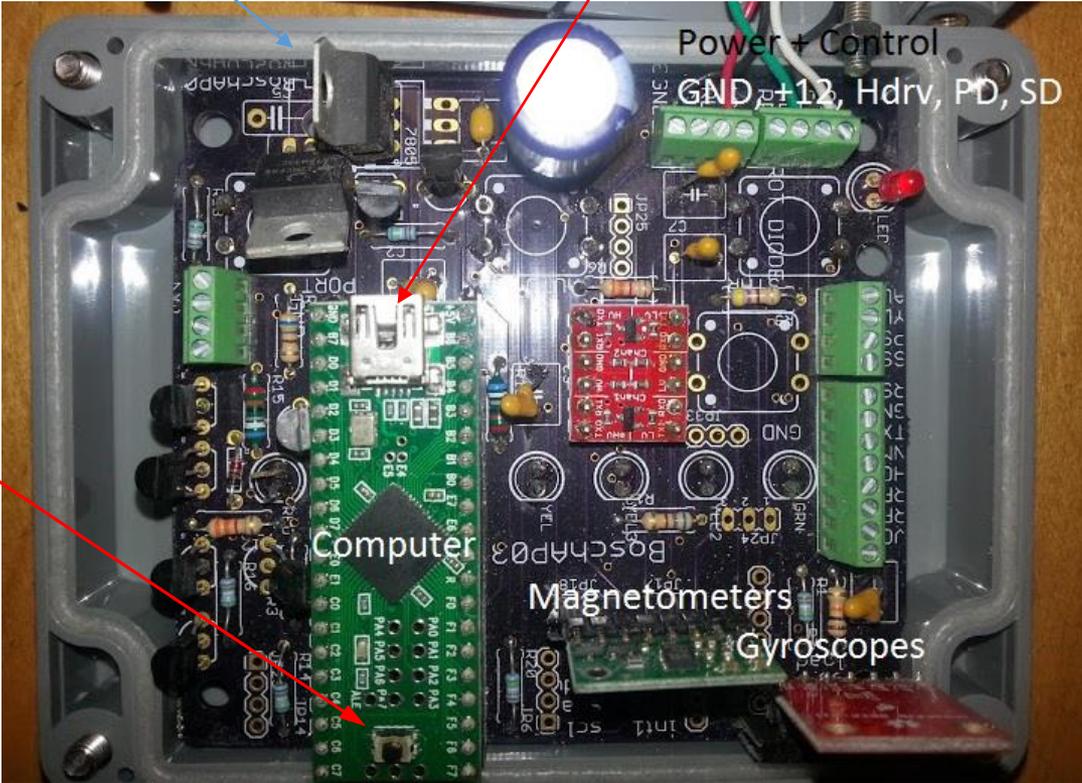
- Turn the power off. Power is not needed to upgrade the software.
- Open the control head. There are four screws recessed on the front panel.
- Carefully remove the front panel and set it aside making sure the screws are retained.
- The photo shows a regulator standing up that should be angled to the side so the USB cable can clear.
- Connect the mini USB cable to the micro computer as shown in the photo.
- Connect the mini USB cable to your computer.

# Controller Interior- Contained within LID

Mini USB Socket, connect to USB cable to PC

Voltage Regulator

Press button after the Controller is connected to PC and Loader is running.



# Software Upgrades

10/10/17

# Upgrade Requirements

- A Windows PC running Windows 7 or later.
  - Or An Apple PC running a recent version of IOS.
- A mini-B USB cable that fits into the computer USB port.
- A small Philips screw driver to open the case of the control head from the Autopilot.
- You don't need to remove the control head from its cable.
- You don't need to power up the Autopilot during the upgrade.

# If Files were Emailed to You

- Create a new folder, “PelagicSW”, or pick a name.
- Download, or move, the ZIP file into the directory created.
- Open the ZIP file with windows explorer. Extract the files with the Extract command. Make sure the .exex, .dmgx, .hex, and .elf files are all inside the folder together. The loader will not work if you try to run it from the .ZIP folder, make sure they are extracted.
- Rename the .exex file to a .exe file, removing the last “x”. Of if using IOS (Apple) remove the last “x” from the .dmgx file. These files are shipped renamed because many spam filters will not allow a .exe file onto a computer, assuming it is a virus.

# Download

- Connect the USB cable, with the MINI-B connector to the computer.
- Power off the autopilot.
- Open the autopilot control head. The original version has 4 screws on the face. The latest model has 6 screws on the back.
- Locate the USB connector on the gum stick sized circuit board. The connector is at one end. At the other end note the push button.
- Insert the USB cable. Make sure power is off to the Pelagic.
- Run the Teensy.exe program (.dmg on IOS). The program will recognize the USB device (the Pelagic micro computer) automatically.

# Control Head Models – Access to the USB connector.



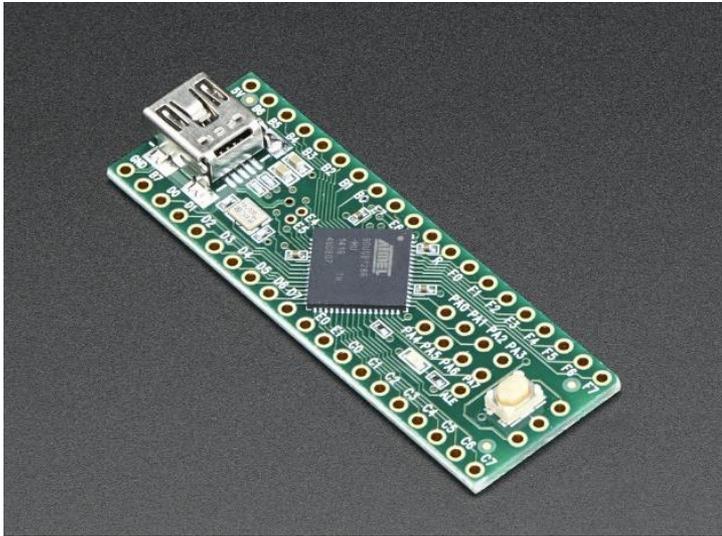
Second Model: USB Connector is exposed by removing 6 screws on the back of the control head.



Original model: The USB connector is Exposed by removing the 4 screws On the front panel and then removing the circuit board with the 3 screws holding it in place.

# Download (continued)

USB  
connector



Push  
Button

- Make sure the small AUTO button on the TEENSY loader is GREEN. Click on it to change the state. If this does not happen go to the file button on the TEENSY screen and click on the .hex file.
- Click on the HELP menu and enable VERBOSE mode. A screen should appear with notes of load progress.
- NOTE THE AP WILL BE POWERED FROM THE USB CABLE DURING THIS PROCESS. BOAT POWER NEED NOT BE APPLIED.
- With the cable connected at the PC and the AP **press the small button on the micro computer**. The TEENSY load progress will show program load data for about 7 secs.
- Once it completes the Pelagic will come up and then operate as normal.
- Close the case, be sure to snug down the case screws as they create the seal. They should be tight but not so tight as to crush the seals. Tighten in a cross case order and then retighten the screws you started with, similar to a head gasket order.
- There is no other action required. All your previous settings will be intact.

# Controller Board Showing USB Cable Attachment

Reset Button



“MINI” USB Cable Attachment

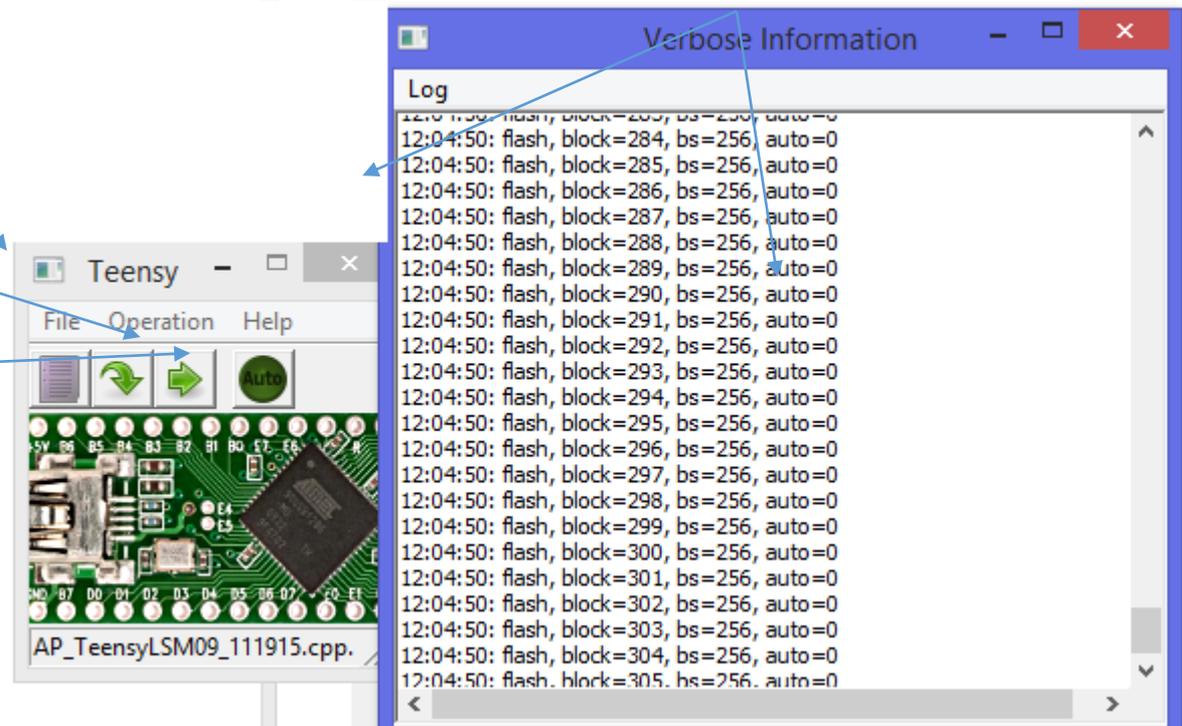
# Teensy Loader for Windows PC

Place all received files in a Single directory on your computer.

Use the Help button to view the Load results. If no errors appear it has Loaded.

Program Load

Reboot



# Helm Not Responding - Conditions

- Straight line and steering: if the course deviates more than 15 degrees for more than 9 secs the motor drive will be decreased. After 18 secs it will be severely decreased.
- Tacking: When tacking motor drive is limited by turn rate. If the target turn rate isn't achieved after 5 secs the turn rate is left at what was achieved in that period. After 42 secs if a tack isn't accomplished the tack is abandoned. The AP resorts to normal steering. 9 secs later motor drive will be reduced, see straight line steering. The target tack angle remains the same.