



# Ulterra Repair Manual



**BT Ulterra & BT Riptide Ulterra 2017-2023**

**Ulterra 2015-2017**

**Riptide Ulterra 2016-2017**

Revised 10/2022

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## Specifications:

### BT Ulterra/BT Riptide Ulterra 2017-2023

i-Pilot BT or i-Pilot Link BT installed

24 Volts, 80 Pounds of Thrust, or  
36 Volts, 112 Pounds of Thrust

45" (FW only), 54"(RT only), 60", 72" Shafts

Lift Belt length:

45" – 54.6"

54" – 62.4"

60" – 68.25"

72" – 80.25"

Control Boards and Trim Modules for United States, Canada, and Australia (US/CA/AU) and Europe (EURO), if mismatched the trim module and main board will not communicate.



### Riptide Ulterra 2016-2017/Ulterra 2015-2017

i-Pilot or i-Pilot Link installed (pre-BT systems)

24 Volts, 80 Pounds of Thrust, or  
36 Volts, 112 Pounds of Thrust

45" (FW only), 54"(RT only), 60", 72" Shafts

Lift Belt length:

45" – 54.6"

54" – 62.4"

60" – 68.25"

72" – 80.25"

Control Boards and Trim Modules for United States, Canada, and Australia (US/CA/AU) and Europe (EURO), if mismatched the trim module and main board will not communicate.



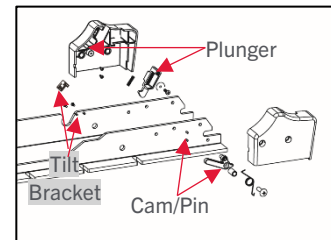
**Notice:** i-Pilot/i-Pilot Link control system is the identifying difference between Ulterra and Ulterra BT. For i-Pilot or i-Pilot Link trouble shooting see the appropriate i-Pilot or i-Pilot Link Repair Manual Chapter

**Ulterra Anatomy:**  
**External Anatomy:**



## Sensor Locations and Functions:

3 External Hall Effect Sensors aid in position awareness. Hall Effect Sensors only register the South pole of a magnet. Early versions of the actuators the magnets were glued in, and could become dislodged, if working on one of these replace all three actuators before doing diagnosis and repair. The Plunger and Cam/Pin Sensors have some different configurations.



### Plunger Sensor:

- Longest Wire Set, Black Jacket on the Wires
- Located in the Left Motor Ramp
- Actuated by the Plunger, indicates when the Motor/Lower Unit is fully on the Motor Ramps
- 2 Versions of the Plunger Exist
  - Early Version is a Linear Spring and actuator with relatively tight tolerances
  - Current version is a Rotary Spring with more open space around the actuator

### Cam/Pin Sensor:

- Gray Jacket, Second Longest Wire Set
- Mounted to the Base Extrusion under the Right Motor Ramp
- Actuated by the Cam which is drive by the Latch Pin, indicates when the motor has tilted fully to the deployed position.
- 3 Versions of the Cam exist
  - Earliest had a Roll Pin for sensing the latch pin
  - Intermediate had a threaded collar held in place by a screw
  - Current the detail that the latch pin actuates is integrated into the shape of the cam, the cam is all one piece.
- 2 Distinct versions of the screw/collar that retain the cam
  - First is a screw with a spacer bushing
    - There was a material change to the bushing in an effort to limit corrosion, but any that use a bushing are subject to failure
  - Current is a plastic shoulder bolt.
    - The torque is listed on the bolt head, do not overtighten
    - Make sure the threads in the extrusion are clean prior to installation
    - The Threads of the bolt will form to the extrusion locking it in place, do not use Loctite or any other retaining compound on the bolt.
    - Do not reuse the plastic bolt.

### Tilt Bracket Sensor:

- Shortest wire set, Black Jacket
- Mounted to the base Extrusion, Half way down the left side.
- Actuator is an L shaped piece pushed onto the end of the Tilt Bracket that wraps around the steering housing.
- Indicates when the motor has Tilted to the Horizontal position during Stowing

## Tilt Motor/Tilt Bracket

The Tilt motor is a motor driving a jack screw. The jack screw engages the Motor Tilt Bracket Via the Tilt Nut, the action of the Tilt Motor Driving the Tilt Brackets is how the motor tilts from horizontal/stowed to vertical/deployed and vice versa.

**Notice:** The Tilt Motor and Tilt Brackets are the weight bearing point of the motor during stow/deploy; damage to the Tilt Motor or Tilt Brackets is the result of stowing/deploying the motor into impacts or during moments of excess stress. Assume warranty, but, advise the consumer that stowing/deploying should be completed when the boat is stable whenever possible.

The Tilt Motor and the Motor Tilt Bracket were modified at the beginning of 2020 to reinforce the tilt motor to the point that damage during stow/deploy typically only affects the Tilt Nut or Tilt Knob. This change moves the damage away from the more expensive Tilt Motor to less expensive plastic parts, but probably does not change the potential to damage the Tilt System.

## Trim Housing

The Trim Housing drives the Lift Belt to trim the motor vertically; the Trim Housing is also responsible for moving the Motor Lower Unit off of the Motor Ramps as the first move in the deploy sequence and pulling the Motor Lower Unit onto the Motor Ramps as the last step in the deploy sequence.

The Trim Housing is powered by brushes that extend from the top of the steering housing and make contact with slip rings on the bottom of the Trim Housing. This is the only wired connection and it only carries power. The commands to operate are sent wirelessly from the Main Control Board to the Trim Housing. The wireless communication is at a different frequency for United States, Australia, and Canada (US/AU/CAN) motors than for motors sent to the rest of the world (EURO); it is critical that the Main Control Board and Trim Module match with regard to this setting, a US/AU/CAN Control Board will not communicate with a Euro Trim Module and vice versa.

Changes to the trim module include replacing the upper O-rings with a shaped silicon gasket, adding sealant between the halves of the housing, changing the screws that secure the trim housing halve to each other and retain the cover, and changing the slip rings on RT (White) units from a copper alloy to Monel. All of these changes are backwards compatible and none affect the Trim Belt or replacing the Lift Belt which are the only two serviceable components of the trim housing.

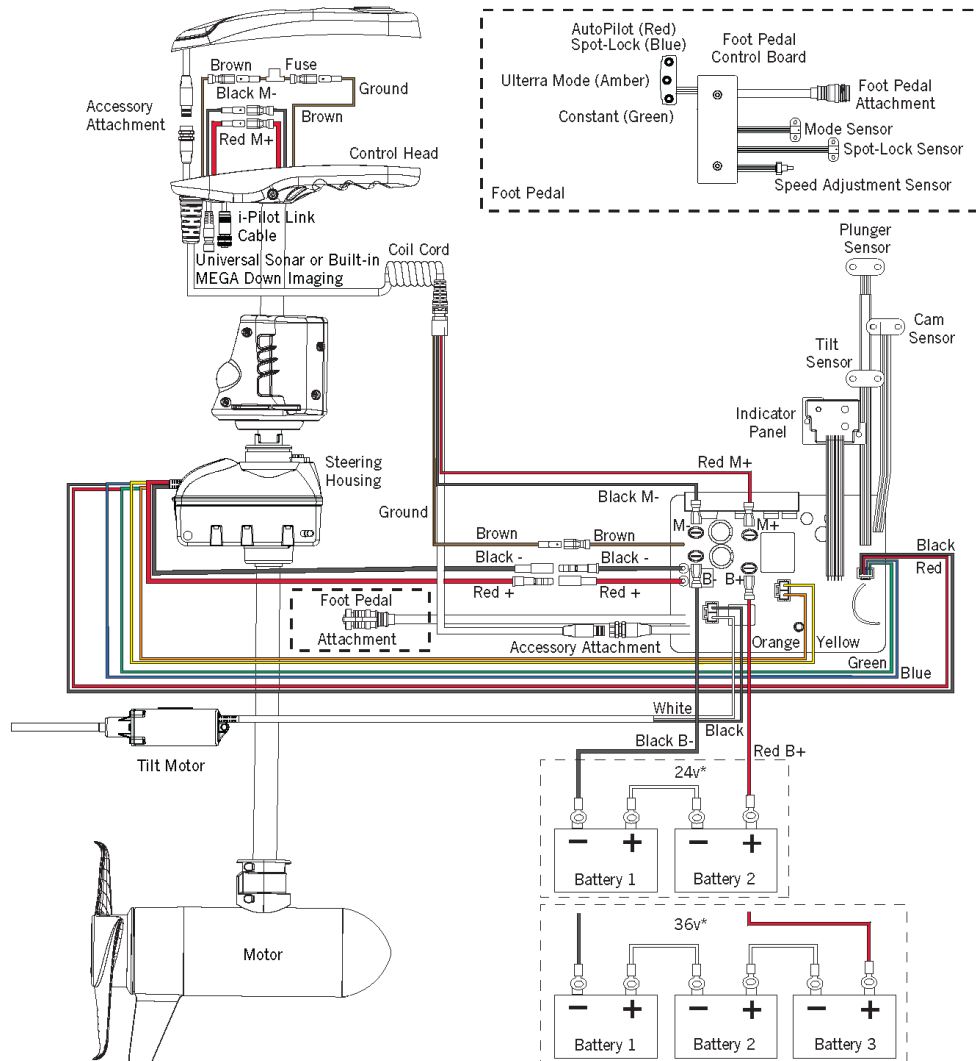
## Control Board/Wiring Diagram

Control board part number 2204000 is used on all Ulterra Models; it is programmed on the production line to voltage, shaft length, and region (US/AU/CAN or EURO). There is no good way to



Trim Housing Example

determine a control boards programming, keep replacement control boards with their labelled packaging until you are ready to install them.



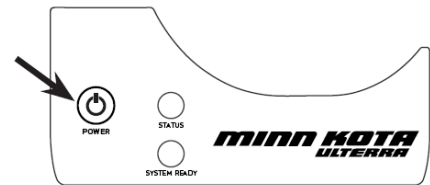


## Service Operations

### Trim “Learn”

The trim learn process establishes communication from the Main Control Board to the Trim Housing.

With the motor off, and connected to power, press and hold the power button for 5 seconds. The motor will turn on normally, the Status and Power LEDs will turn off, then one will blink. Often the Red “Status” LED will blink once prior to the Green “Power” LED blinking until the motor is turned off. The Green “Power” LED blinking is the indication that the Trim Module was successfully “Learned” to the Main Control Board.



If the motor will not “learn” the trim housing, the Red “Status” light will continue to blink. Verify the Main Control Board and the Trim Housing are properly matched (US/AU/CAN v. Euro); verify power delivery from the Main Control Board, through the Steering Housing, to the Trim Module.

**Notice:** Trim learn is a good diagnostic tool to check for communication to the trim housing. Trim Learn, sends power to the trim module as long as the Red “Status” Light is blinking, no other operation mode continuously sends power to the Trim Module.

### Trim Count Reset

Zeros the trim count so the Ulterra tilts at the correct time during Stow/Deploy.

With the motor on and deployed for at least 5 seconds press the power button 3 times in less than 2 seconds. Both the Red “Status” LED and the Green “Power” LED will blink; The Ulterra will steer to the park position then trim up until the Motor Lower Unit contacts the Steering Housing, once the amp limit is reached the Ulterra will trim back down about 6”.

If you press the power button 3 times within 2 seconds and the LEDs do not begin blinking the Ulterra does not know it is fully deployed, the Cam/Pin sensor does not have the magnet from the Cam centered on it.

If you do get blinking LEDs but no other action the most likely issue is that the motor cannot steer to the park position.

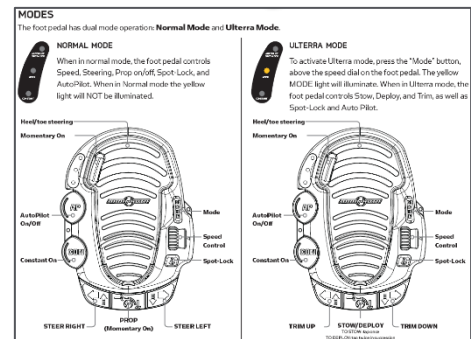
### Stowing from the Ulterra (without Remote or Foot Pedal)

If the Ulterra is powered on and you press and hold the power button for 10 seconds the motor will begin the stow procedure. The motor does shut off normally at about 2 seconds, you must continue to hold it through that process.

## Horizontal Trim Up

If the Ulterra's shaft is horizontal, but the Motor Lower Unit is not fully stowed on the Motor Ramps, the Ulterra will accept a trim up command. The Ulterra is considered horizontal when the Tilt Bracket Sensor is activated by the Magnet Holder attached to the Tilt Bracket. A connected Foot Pedal in Ulterra Mode is the only reliable way to send a Trim Up command.

Once the Ulterra has trimmed up to the point in actuates the Plunger it will not allow any further trimming, and the Trim Count will be zeroed, this is an alternative Trim Count Reset.



## Steering Housing Testing

Prior to replacing the Main Control Board, especially if the reason for replacement is loss of steering function, test the steering housing for function and amp draw. Provided 12 volts across the yellow and orange wire of the plug connection in the middle of the control board the steering motor should steer, and draw less than 1 amp. After the initial inrush of current the amp draw should not fluctuate more than 0.05 amps.

The 4 wire connector goes to the two position sensors in the steering housing, there is no practical test for the position sensors.

The large Red and Black Wires on Bullet Connectors are the power supply to the brushes on the top of the steering housing. The Red Wire should have continuity to the brushes/track closest to the motor shaft, the Black Wire should have continuity to the brushes/track farthest from the motor shaft.

## Repair Cases

### **Case I. Ulterra motor does not turn on when the Power button on the control panel is pressed and released. The green “System Ready” and red “Status” LEDs do not light up.**

**Cause:** Inadequate voltage, reversed polarity, or the switch/LED circuit board has come loose from the backside of the control panel.

**Corrective Action:** Verify that the correct voltage is being supplied to the Ulterra motor (24-volts for Ulterra 80 and 36-volts for Ulterra 112) and that polarity has not been inadvertently reversed. If no problems are found with the voltage and power delivery/wiring system, then the Power switch/LED circuit board may have come loose from the control panel during shipment. To check for this: remove the ¼-20 x ½” Phillips head screws that hold the motor sideplates in place (two screws each in the left and right sideplates). With the sideplates removed loosen the two small 10-32 x 3/8” Phillips head screws that hold the control panel cover in place. Lift up the cover as much as possible (due to the motor being stowed there is not much room for this) and look along the backside inner surface of the control panel cover to see if the Power switch/LED display is in place. If it has come loose, connect the motor to the appropriate voltage. The power can be switched ON by reaching in with a small object (a blade screwdriver, for example) and pressing down on the actuator of the Power switch. The green and red LEDs should light up and the Ulterra can then be deployed via the corded footpedal or the remote in the normal manner. (Note: if deploying the motor on the boat or benchtop the deploy sequence can be stopped by pressing the Stow/Deploy button.)

With the motor deployed (or partially deployed), the control panel cover assembly can be lifted up to expose the main control board assembly. Note the switch/LED circuit board is attached to the main control board by means of the ribbon lead. This switch/LED board snaps into place on the inside surface of the control panel cover. When re-installing the switch align the actuator pin with the openings in the cover and push the board into position with the two catches, one on each side of the board. Starting in early 2017, we added an additional clip for better retention of the switch/LED circuit board. (If this board was loose, then this is probably an earlier production model and you will need to install Power Button Clip, p/n 2880823, following the instructions included with this part.) Re-install the control panel cover and sideplates to complete the repair. Test the Power switch

**Notice:** To turn the motor off with the Power switch hold the switch button down for three seconds, the green and red LEDs should go out when this is done. Release the Power button, wait about 3 seconds, and press and release the Power button. The green and red LEDs should come back on

ON/OFF function several times to insure proper switch retention. Test stow/deploy of the motor as you are able to on the boat or bench to confirm proper functionality.

## Case II. Ulterra motor green “System Ready” and red “Status” LEDs come on when the Power button is pressed but immediately go off when the Power button is released.

**Cause:** Inadequate voltage is being supplied to the Ulterra motor. The Ulterra 80 is designed to operate on 24-volts, the Ulterra 112 is designed to operate on 36-volts. With low voltage the Ulterra motors will not stay on when the Power button is pressed and released or, if the green and red LEDs do stay on, they will go out when the command is sent to deploy or stow the motor.

**Corrective Action:** The only option when this occurs is to provide adequate voltage to the motor. Check batteries for individual voltage values as well as the combined voltage across all the batteries in the series connected battery system. Then check the voltage at the motor battery positive (B+) and battery negative (B-) wires directly at the Ulterra motor to check for a voltage drop. Correct any wiring issues and/or recharge batteries, as required.

## Case III. A. Ulterra motor will not deploy when the Stow/Deploy command is sent with No Error Tone.

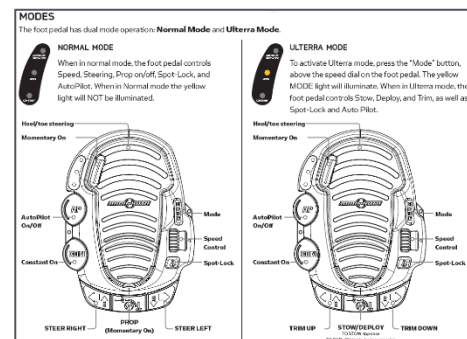
(4 Possible Causes listed below):

**Notice:** A customer report that Motor will not deploy, the remote displays “Motor Deploying”, but the motor does not respond (the Red Status light on the control panel does not blink), even if this symptom is not reproduceable at your repair bench, the indication is there is a faulty connection between the control board and the trim control board. The trim module should be replaced on first complaint as that is more prone to failure; if the problem persists replace the steering housing next.

**Possible Cause 1:** The Ulterra owner/operator may not be pressing the Stow/Deploy button on the remote twice in quick succession, or if using the corded foot pedal, may not have the pedal in the Ulterra mode and/or may not pressing the Stow/Deploy button on the foot pedal twice in quick succession.

**Corrective Action:** This is not a problem with the motor. It is designed to require two quick presses of the Stow/Deploy button to avoid accidental deployment of the motor. The only corrective action required is to advise the customer that two button presses in quick succession are required to deploy the motor when using the i-Pilot remote or the corded foot pedal (foot pedal must be in “Ulterra” mode).

**Possible Cause 2:** This malfunction is often found to be a result of unintentional/accidental damage to one or more of the three wires that connect each of the three Hall Effect Ulterra motor sensors to the main control board. The red, blue, and black wires going to each sensor are enclosed in black or gray mesh tubing running along both sides of the motor base extrusion. These wires can be accidentally damaged, pinched, or cut if care is not used to make certain that the



motor (or Quick Release Plate) mounting bolts do not damage the wires when the bolts are tightened. The cutting of any of the sensor wires will cause the motor to be inoperative.

**Corrective Action:** Examine the mesh covering on the wires for any signs of damage. If damage is found, pull back the mesh covering to expose the individual red, blue, and black sensor wires. Any wires found to be cut can be stripped, spliced, soldered, and sealed with small diameter heat shrink tubing to return the motor to proper function. Test stow, deploy, trim, steer, and operate the motor lower unit to ensure proper operation. When the motor is returned to the customer advise the customer that they use care to avoid pinching or cutting the sensor wires inside the mesh tubing.



Actual photo supplied by a service provider showing damage caused by improper rigging.

**Possible Cause 3:** This malfunction could be due to the cam sensor arm (located on the right/starboard side of the base extrusion behind the motor ramp) not rotating and holding the cam sensor magnet away from the cam sensor when the motor is in the stowed position.

**Corrective Action:** Examine the cam sensor arm to ensure the torsion spring is in place and is able to rotate the arm freely. Ensure that the pin spacer/bearing (p/n 2201702) is in place and free of corrosion. Service Bulletin MSB20190501 discussed an automatic update to the cam arm and spacer for Ulterra motors with a Serial Number older than **T113MK#####**.

**Possible Cause 4:** This malfunction could be a result of lack of voltage to the Trim Module Assembly.

**Corrective Action:** Test to determine if power is getting through to the Trim Module, and if not, which part is defective, follow the following procedure:

**Step 1.** Connect the motor to the appropriate voltage, then, starting with the Power Button OFF press and hold the Power Button in for 5-6 seconds. The red Status LED should blink once or twice and then the green Power LED should blink ON/OFF continuously until the motor is powered down.

**A.** If the red Status LED continues to blink, the Main Control Board may not be supplying power to the Trim Module Assembly. As a result, the Ulterra motor will not function.

**Step 2.** To test for this separate the Trim Module Assembly from the Steering Housing to allow access to the Main Control Board. Begin by disconnecting the Ulterra Lift Belt from the Lower Belt Clamp Collar assembly. Remove the Clamp Collar screws to split the collar and disengage the belt from the collar/belt rack assembly.

**Step 3.** Next, pull out on the Trim Module release handle while sliding the Trim Module up the shaft and away from the Steering Housing assembly. When doing this the motor lower unit will be able to slip off the motor ramps. Use care to support the motor in some way when this occurs.

**Step 4.** If not already removed, remove both motor sideplates and loosen the screws that hold the Control Housing/control board cover in place. Lift up the Control Housing cover and locate

the red and black wires with the male and female bullet connectors. Disconnect and separate the wires. Then, starting with the motor connected to the appropriate voltage and with the Power button OFF, press and hold the Power button down for 5-6 seconds. The red LED on the Control Housing cover should begin to blink ON and OFF. With the red LED blinking use a VOM (multi-meter) to measure the voltage at the red and black wires coming from the Main Control Board. The voltage should be 24 volts on 24-volt motors (80# thrust) and 36 volts on 36-volt motors (112# thrust).

- A. If no voltage is found, the Main Control Board is at fault and will need to be replaced.
- B. If the correct voltage is found, reconnect the red and black wires coming from the Main Control Board to the red and black wires going to the Steering Housing. Using the VOM, measure the voltage from one of the inner slip ring brushes to one of the outer slip ring brushes located on the Steering Housing. The voltage reading at the slip ring brushes should match the voltage reading seen at the red and black wires coming from the Main Control Board.
  - B-1. If the voltage values do not match, the problem is in the Steering Housing, and it will need to be replaced.
  - B-2. If the voltage values at the slip ring brushes and the red and black wires match, then the Trim Module assembly is faulty and will need to be replaced.

### **Case III B. Ulterra motor will not deploy when the Stow/Deploy command is sent with an error tone.**

If an Error tone is noted when sending the deploy command this indicates a current limit issue.

**Cause:** The audible error tone when attempting to deploy the motor is an indication that something is restricting or preventing movement of the motor unit and shaft.

**Corrective Action:** To verify that the deploy issue is caused by something that is restricting or binding the motor shaft, we suggest removing the right, front motor ramp.

#### **If the motor does not deploy properly with the ramp removed:**

- Suspect that a trim housing issue: either the servo motor is corroded/locked or the internal trim housing components may be shifted or bent. Take the top cover plate off the trim housing, remove the trim belt, and try turning the lift motor pulley to see if it is locked up. Visual confirmation of components being shifted or bent requires removing the tube and lower unit assembly to view down/inside the trim housing to inspect the drive tube block and pins. The most visible external indicator of this will be wear on the motor shaft to the left and right of the belt channel. The internal damage is the result of a severe impact that rapidly turned the motor. Repair requires replacement of the Trim Housing Assembly. (See **Case IV. Motor will not stow/deploy or trim up/down. Lift belt seems to be stuck inside the trim housing. (An error tone is noted when the command is sent.)** on **Page 15.**) If the composite shaft is heavily worn in the belt channel then the composite shaft and center section/lower unit may also need to be replaced.

If the motor deploys properly with the ramp removed this confirms the binding issue. The next step is to identify the cause. Possible causes include:

- If the motor is a freshwater 112 pound thrust, replace the ramps with the Riptide 112 pound ramps that have more clearance (p/n 2203912 and p/n 2203917). The freshwater ramps were replaced with the saltwater ramps starting with serial number R187MK00447. Test motor for proper operation.
- A foreign object may be pinched between the steering housing and the aluminum mounting base extrusion (see picture). Also, check to make certain that the power cable to the steering housing is not getting pinched between the housing and base.
- Low or inadequate voltage to the motor/trim housing. Verify that the wiring, connections, plug connections, and battery series connections are all clean and secure. Test the voltage at battery leadwires to ensure correct/adequate voltage is being supplied to the motor.
- Dirt or other contaminants may be built up on the composite shaft causing the shaft to stick or bind rather than slide smoothly through the steering housing. To correct this, thoroughly clean and wipe down the shaft with a silicone-rich, water-based spray such as Armor All® or similar product. (Note: you may need to assist the motor deploy sequence by pushing out on the head of the motor while sending a deploy command prior to cleaning.)
- Inspect the tilt bracket that surrounds the steering housing, ensure that it is not bent and that the latch pin bushings are properly located.
- Verify the damper is installed correctly (leg down/toward the control board) and provides resistance to movement (you will need to remove to test this).
- Inspect the tilt nut bracket, verify that it is not bent and that the tilt nut does not show signs of damage.
- Watch the tilt motor when it is running, look for any wobble in the screw shaft as an indication it is bent.
- A bent steering housing pivot pin. (Note: the pin may need to be removed to ensure straightness.)
- Although unlikely, it may be possible that the shaft or shaft bung is not perpendicular to the motor assembly/lower unit. To verify this switch the motor lower unit as indicated below so that the motor stows in the opposite direction (prop is pointed the other way). If this corrects the binding issue then the shaft/center section or shaft/motor assembly will need to be replaced.



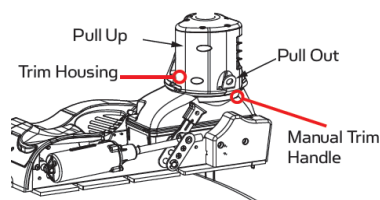
### **Case IV. Motor will not stow/deploy or trim up/down. Lift belt seems to be stuck inside the trim housing. [An error tone is noted when the command is sent.]**

To verify this the top cover of the trim housing can be removed, the trim drive belt removed, and the aluminum drive pulley can be turned manually. If the pulley cannot be turned the lift belt may be jammed.

**Cause:** While in use the motor lower unit has struck an underwater object with enough force to damage the internal workings of the trim housing and the lift belt is jammed or locked to the point that it cannot be removed or replaced. As a result the complete trim housing assembly with belt must be replaced.

#### **Corrective Action:**

- Step 1.** Remove the control box cover by unscrewing the four (4) Philips head screws that hold the cover in place. Disconnect the red, black, and brown motor wires and transducer cable in the control box and remove the control box locating screw and nut that hold the control box on to the motor tube.
- Step 2.** Unscrew the belt tensioning Allen head cap screw on the underside of the control box to free the belt tensioning block and lift belt from the control box. Remove the belt from the tensioning block and lift the control box off the motor tube and belt.
- Step 3.** Disconnect the bottom end of the lift belt from the clamp collar and belt rack attached to the motor at the bottom of the motor tube. Remove the four (4) screws from the clamp collar halves to split the collar and to free the bottom end of the lift belt and aluminum belt rack. Set the collar halves, screws, and rack aside for reassembly.
- Step 4.** With the belt ends free of the top and bottom, the trim housing can be disengaged from the steering housing by pulling out on the trim handle and sliding the trim housing and belt up and off the motor tube.



**Notice:** Trim housings assemblies include the belt cut to length and installed. Be sure to order the trim housing with belt assembly for the shaft length of the motor being repaired. Also check the Product Code number found on the serial number decal. If the seven (7) digit number has the letter "M" printed after the number the motor is intended for use outside of North America and Australia. If so, order the "Euro" trim housing/module with belt. Trim housing intended for use on motors built for use in North America and Australia will not communicate with motors built for use outside North America/Australia and trim housing intended for use on motors built for use outside North America/Australia will not communicate with North American/Australian models



**Step 5.** Slide the appropriate new trim housing with belt on to the motor tube. Insert the lower belt end into the belt channel of the motor tube then into the top and out the bottom side of the steering housing. Slide the new trim housing down to the steering housing while pulling the belt out the underside of the steering housing. Align the tabs of the steering housing output shaft with the slots in the trim housing and pull out on the trim handle to lock the trim housing in place atop the steering housing.

**Step 6.** Attach the lower end portion of the lift belt to the lower shaft/motor bung using the aluminum belt rack, collar halves, and screws in the same position and manner they were attached prior to disassembly.

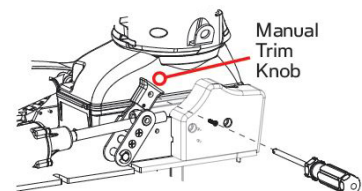
**Step 7.** Place the control box back on the shaft and secure it with the locating screw and nut removed in **Step 1**. Reconnect the motor wires and transducer cable in the control box. Place the upper end of the lift belt into the belt channel and then into the underside and out into the control box.

**Step 8.** Attach the lift belt to the belt tensioning block, being sure to engage no less than four (4) full belt teeth. Fold the belt over the belt pulley in the control box and insert the belt and block into place in the control box. Insert the Allen head belt tensioning screw from the underside of the control box and then insert the screw into the tensioning block. As you tighten this screw the lift belt will be pulled down and tensioned to remove belt slack.

**Step 9.** Reconnect the motor to the appropriate voltage. Press and hold the Power button down for about 5-6 seconds. The green LED on the motor control panel should light, then the red LED should blink ON/OFF at least once. The green LED should then blink on and off continuously. This indicates that the new trim housing has been “learned” to the main control board and that the two (2) components are now communicating with each other. Switch power OFF by pressing and holding the Power button down for about three (3) seconds. The blinking green LED should go off. Place the control box cover back on to the control box and secure it with the four (4) or (5) cover screws. Note, if the cover has five (5) screws make certain that the brass screw is used in the front screw hole.

- A. If the “learn” procedure cannot be completed or the red LED blinks ON/OFF continuously, see **Case XX. After replacing either the Main Control Board or the Trim Module the Board and Module will not Pair/Learn to each other.** on **page 29**.

**Step 10.** For this next step, the motor **MUST** be deployed. If necessary, the manual tilt knob can be removed to allow the motor to rotate into the deployed position with the motor tube vertical. Be sure that the latch pin in the steering housing is engaging the aluminum base extrusion so that the cam sensor arm is in position over the cam sensor. (See **Trim Count Reset** on **page 8** and **Sensor Locations and Functions:** on **page 5**.)



Now, with the appropriate voltage supplied to the motor, press and release the Power button, wait three (3) seconds then press and release the Power button three (3) times in quick succession within two a (2) second period. The motor tube and lower unit should come straight up until the lift belt collar

contacts the underside of the steering housing, pause, and then go back down about five (5) inches.

**Step 11.** Switch the power back off by pressing and holding the Power button for three (3) seconds. Release the latch pin from the aluminum base extrusion and rotate the motor to realign the tilt bracket arm with the tilt actuator arm. Re-install the manual tilt knob on the two (2) arms and secure it with the #6-32 x ½” Phillips flathead screws. Switch the power back ON and test stow/deploy the motor to verify proper function. If necessary, reset motor “park” position if it is not positioning the motor properly when stowing (see **Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.** on [page 24](#)). If motor stows/deploys, runs, steers, trims up/down properly this trim housing with belt replacement procedure is completed.

### **Case V. When deploying, the Ulterra motor is jerky or struggles.**

**Cause:** There are a few things that may be happening: the composite shaft may be “gummed up” and binding as the shaft slides through the steering housing when deploying, the tilt bracket under the steering housing may be damaged or bent, the tilt actuator may have a bent worm shaft, the tilt nut bracket may be bent, the steering housing pivot pin may be bent, or the damper is broken or disconnected on the left side of the extrusion.

**Corrective Action:** See **Case III B. Ulterra motor will not deploy when the Stow/Deploy command is sent with an error tone.** Page 13 The same corrective action items listed in that case apply here.

### **Case VI. When deploying, the motor lower unit comes off the ramps, the shaft extends all the way out until the control box contacts the top of the trim housing, but the motor and shaft do not rotate into the vertical position.**

When this occurs the motor will emit an “error” tone and both the red status and green power LEDs will be lit.

**Cause:** The motor ramp plunger located in the left front motor ramp is not coming up out of the motor ramp. This can be due to the plunger binding or sticking down, or if fishing in open water when the air temperature is below 32 degrees Fahrenheit, the plunger may be stuck down due to water freezing on the plunger preventing its release.

**Notice:** The Rotary Style Plunger increases the space around the plunger making this occurrence much less likely. Consider replacing the Left Motor Ramp Assembly.

**Corrective Action:** The first step in correcting this malfunction is to address the problem with the ramp plunger. If it is stuck due to freezing temperatures you will need to warm the left front ramp to melt the ice. If it is not due to ice, remove the left sideplate and motor ramp. Remove the plunger retaining screw and washer and examine the plunger to verify that it is the current type (see *Service Bulletin SB02192016*). Replace it and other magnet holders, if needed. Check that the plunger ramp spring is properly in place. Remove any foreign material, dirt, or mud that could be

restricting the ramp plunger. Reassemble the plunger in the ramp and verify that it moves freely in and out.

If the motor is now in the deployed The second step is to reset the Trim Housing counter by doing the Trim Count Reset procedure. (See [Trim Count Reset](#) on [Page 8](#).)

If the motor is not in the vertical position, (motor has not been manually stowed/deployed), the cam sensor magnet must be manually positioned over the cam sensor to enable the Trim Count Reset Procedure. This is done by removing the right front motor ramp and rotating the cam sensor arm magnet so that it is over the cam sensor. Then follow the Trim Count Reset Procedure instructions while holding the cam arm in place over the sensor. The motor and shaft will then pull up until the motor lower unit contacts the underside of the steering housing and then extend back out about six (6) inches. Turn the motor off by pressing and holding the Power button down for three (3) seconds. Reinstall the motor ramps and reverse the Manual/Emergency Stow Procedure, if required. Turn the power back on by pressing and releasing the Power button. Test deploy/stow the motor with the remote or foot pedal. Reset the Park Position, if necessary (see [Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.](#) on [page 24](#)). This completes this service procedure.

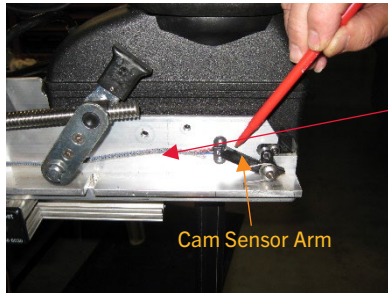
**Case VII. When deploying, the motor lower unit comes off the motor ramps, the shaft rotates to the vertical position, but the motor will not trim down to allow use of the propeller or steering functions.**

**Cause:** The cam arm Hall Effect sensor, which enables the trim down function when the motor is deployed, is not sending a signal to the main control board. This can be due to loss of the magnet in the cam sensor arm, damage to the three wires that go to the cam sensor, or a failure of the Cam Arm to rotate appropriately due to lost or corroded components. (Beginning with s/n P224MK01075 and later all magnet holders are using a mechanically staked-in process to prevent magnet loss, see Service Bulletin Ulterra SB07192017 for more information. Beginning with serial number V036MK##### Cam Arm and its installation hardware have been changed to better prevent damage due to corrosion, see Service Bulletin MSB20190501 for more information. Beginning with serial number).

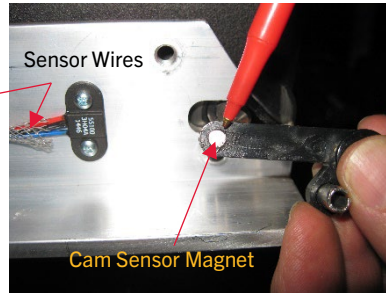
**Notice:** When installing the plastic shoulder bolt make sure the threads in the extrusion are clean and observe the recommended torque printed on the head of the bolt. Do Not use thread-locker Do NOT overtighten and NEVER reuse the bolt. The threads of the bolt deform during installation effectively acting how a nyloc nut does.

**Corrective Action:** Remove the Ulterra right side plate, held in place with two (2) ¼-20 x ½” Phillips panhead screws, then use a 3/16” Allen wrench to remove the two (2) ¼-20 x 1” socket head cap screws that hold the right motor ramp in place. With the ramp removed the cam sensor arm can be seen along with the cam sensor. (Picture 1) Examine the back surface of the cam sensor arm. At the end of the arm, opposite the pivot point, a chrome-plated, 3/16” diameter magnet should be visible (Picture 2), or you can slip a thin blade screwdriver behind the arm to verify the presence of the magnet based on the magnetic pull of the magnet. If there is no

magnetic pull, then it is missing. If the magnet is missing then the cam sensor arm (p/n 2777903) should be replaced.



Picture 1



Picture 2



Picture 3

If the magnet is not missing, examine the small red, black, and blue wires that connect the cam Hall Effect sensor to the main control board. If any of these wires have been cut, pinched, or damaged by a mounting bolt/nut, or the lift arm assembly then the sensor will not function properly and the trim down will not be enabled. To repair a damaged sensor wire(s), strip the insulation at each cut end approximately 3/8", slip a length of small diameter heat shrink tubing over one end of the cut wire(s), twist the stripped wires around each other, and solder the wires using a small soldering iron and solder appropriate for use on electrical connections, slip the heat shrink tubing over the soldered wire splice and apply heat to shrink the tubing in place. If sensor wire damage is too close to the sensor, or if damage to the sensor itself is evident, the sensor and a section of the wires to the sensor can be replaced using kit p/n 2880350. Visually inspect the cam arm to confirm that the stainless steel pin is in place (Picture 3). If the pin is missing the cam arm will not be rotated and held over the sensor when the motor is fully deployed in the vertical position. This prevents the trim function. Actuate the Cam Arm to verify it rotates freely, remove the Cam Arm assembly and inspect the Spacer that the Cam Arm rotates on for any corrosion. If corrosion is present, or if the pin is missing, replace the cam arm assembly (p/n 2777903). (Note: Any Riptide Ulterra with a metal pin in the Cam Arm assembly should have the Cam Arm assembly and spacer replaced per Service Bulletin MSB20190501.) Reassemble the motor, connect it to the voltage appropriate for the motor being serviced, turn the motor on by pressing the Power button, and then test it for proper trim up/down and stow/deploy function.

## Case VIII. Motor paused midway through Stow/Deploy, now the motor will not respond to any commands.

**Cause:** When turned OFF then back ON in an in-between position the motor can lose its reference points and will not respond to commands.

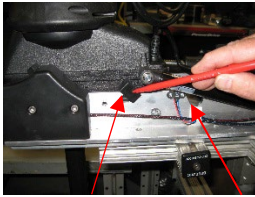
**Resolution:** Put the motor in to a position it can reference or "trick" it into believing it is either fully deployed or stowed.

**Notice:** If the motor "Paused" due to a malfunctioning part you may not be able to complete

**Notice:** Verify that all three sensor magnets are correctly installed prior to proceeding. Motors with serial numbers prior to P224MK must have the updated magnet assemblies installed prior to attempting repair.

**Option 1:** Trick the motor into believing that it is fully deployed:

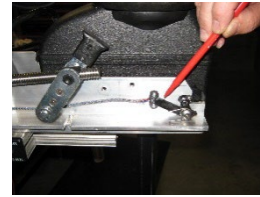
**Step 1.** With the motor OFF, verify that the Tilt Bracket Magnet is not near the Tilt Bracket Sensor (midway back on the frame, left side of the motor), and the Plunger Magnet is not near the Plunger Sensor (left motor ramp, if the plunger is sticking up it is safe to assume that the magnet is not near the sensor).



Tilt Bracket Magnet Tilt Bracket Sensor



Motor Ramp/Plunger



Cam/Pin Sensor

**Step 2.** Position the cam magnet over the cam sensor; the cam is under the right motor rest so it is necessary to remove the right sideplate and motor rest to access the cam/cam sensor. Manually position the Cam Sensor Arm so it is centered over the sensor and hold it there prior to turning the motor ON.

With the magnets in these positions the motor should trim up and down when the Trim Buttons are pressed, if trimmed down more than 14"-15" the motor should steer. When you press the Stow/Deploy button the motor should steer to the park position, trim up to about 10"-12" below the steering housing, then start tilting. As soon as it reaches this point allow the cam to return to its resting position, once the motor is horizontal (the tilt bracket magnet aligns with the tilt bracket sensor) the trim housing should pull the motor back onto the motor rests. See other "**Cases**" if this fails to correct the issue.

**Option 2:** Trick the motor into believing it is full stowed.

If the tilt bracket magnet is directly over the tilt bracket sensor it is more practical to trick the motor into believing it is stowed.

**Step 1.** With the motor OFF, verify the tilt bracket magnet is centered over the tilt bracket sensor, that the cam magnet is not near the cam sensor (verify that the roll pin extending from the cam into the latch slot moves freely).

**Step 2.** Push and hold the Plunger (left motor ramp) down to the point it is flush with the rest of the left motor rest.

When you turn the motor on with the magnets in these positions the green power light and red status light should both be displayed. If you send a deploy command the motor should start trimming out, as soon as it starts trimming release the plunger. The motor should deploy normally and all commands should function. Test the motor to verify proper park, trim up, rotation into the horizontal position, and stow with the motor lower unit pulled up onto the motor ramps. See other "**Cases**" if the motor fails to deploy/stow/function properly.

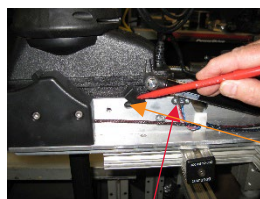
### **Case IX. When stowing the motor, the lower unit stops about six inches short of being pulled up on to the motor ramps.**

**Cause:** The magnet in the tilt bracket magnet holder has come loose (beginning with s/n P224MK01075 and later all magnet holders are using a mechanically staked-in process to prevent magnet loss); one or more of the red, blue, or black tilt bracket Hall Effect sensor wires has been damaged; or the control board is malfunctioning.

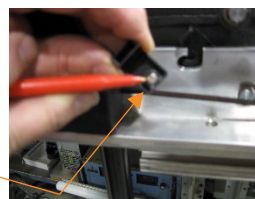
**Corrective Action:** Remove the Ulterra motor left sideplate by removing the two ¼-20 x ½: Phillips head screws that attach the sideplate to the aluminum mounting base extrusion. The tilt bracket Hall Effect sensor is located along the upper left edge of the mounting base extrusion at about the mid-point. (see **Pictures Below**) The magnet holder (p/n 2208600) is a black plastic “L-shaped” piece that is attached to the tilt bracket and rotates along with the Ulterra steering housing when the Ulterra stows and deploys. It is the magnet in this holder that “triggers” the final trim action / pulling of the motor lower unit up on to the motor ramps during the stow sequence. To check for the magnet, a small blade screwdriver can be used to check for magnetic attraction when the blade is slipped along the back side of the magnet holder or the holder can be pulled straight off from the tilt bracket and visually examined.

If no magnet is found replace the p/n 2208600 holder with magnet assembly. If the magnet is in place, examine the three wires that connect the sensor to the main control board. Repair any cut wires by splicing, soldering, and applying shrink tubing to the splice. (Note: 3M Scotchlok UY2 PIC filled connectors, p/n 2040340, can also be used to repair cut sensor wires.) If there is no damage to the wires then replace main control board.

After replacing the holder with magnet, repairing the damaged wires, or replacing the control board connect the Ulterra motor to the appropriate voltage and bench test the motor for proper stowing and deploying. If necessary, reset motor lower unit “park” position (see **Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.** on page 24).



Tilt Bracket Sensor

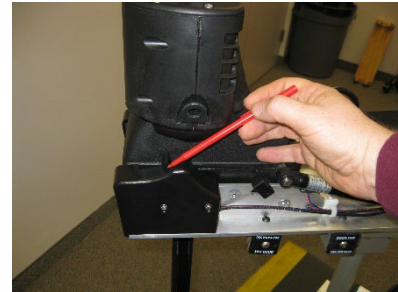


Tilt Bracket Magnet

### **Case X. When stowing, the motor lower unit is pulled on to the motor ramps, but the trim housing does not turn off.**

(The trim system tries to pull the motor further up on the motor ramps even through the motor lower unit is fully stowed.) The red status LED will continue to blink and an error tone/beeping sound will be heard. If power is switched OFF and back ON the green LED light will be on, but the red LED will not be on. Subsequent attempts to deploy the motor may result in the motor pulling even farther up on to the motor ramps.

**Cause:** The magnet in the plunger assembly within the left front motor ramp is missing or the wires going to the plunger sensor are damaged. (See Picture) As a result, the plunger sensor does not signal that the motor is stowed and the trim housing keeps trying to pull the motor up on to the ramps when it is already stowed. (Beginning with s/n **P224MK01075** and later all magnet holders are using a mechanically staked-in process to prevent magnet loss.) To reduce the opportunity for the plunger to become stuck down the linear plunger was replaced by a rotary plunger in early 2020.



Left Motor Ramp/Plunger

**Corrective Action:** Remove the Ulterra left sideplate by unscrewing the two ¼-20 x ½ inch Phillip head screws that hold the sideplate in place. Then use a 3/16 inch Allen wrench to remove the two ¼-20 x 1 inch socket head cap screws that hold the left front motor ramp on to the aluminum base extrusion. On the back side of this ramp you will find a spring plunger that is held in place by a single Phillip's head screw and washer. Remove this screw and washer then remove the plunger and spring. Examine the back side of the plunger. A small chrome plated 3/16" diameter magnet should be seen at the lower end of the plunger. When it is missing the Ulterra motor will malfunction as described above. Replace the left motor ramp assembly that includes the plunger (112 Motor: p/n 2773947; 80 Freshwater: p/n 2773946; 80 Saltwater: p/n 2773948) to correct the issue. Reassemble the motor in reverse order of disassembly.

### **Case XI. When stowing, the motor lower unit does not attempt to steer to the “park” position or rotates non-stop, and, as a result, it does not stow.**

**Cause:** The main control board is not receiving or recognizing the steering position coming from the Steering Housing.

#### **Corrective Action:**

- Step 1.** Verify that the sensor lead from the Steering Housing is securely plugged into the control board. This lead is the smaller of the three plug connections and has 4 wires coming from it. If the plug was not securely engaged, reinstall and retest the motor. If the plug is securely connected and the motor continues to malfunction continue to Step 2.
- Step 2.** Replace the Steering Housing. The sensors, magnets and wires that provide “park” position information are all inside the Steering Housing and are not individually serviceable. Test motor for proper stowing. If the motor continues to malfunction go to Step 3.
- Step 3.** Replace the main Control Board.

### **Case XII. When stowing, the motor does not properly position the motor lower unit in the “park” position.**

(Lower unit is not turned to orient it at 90 degrees relative to the motor mounting base so that it lays horizontally when pulled on to the motor ramps.)

**Cause:** The Ulterra motor has been deployed, power switched OFF or disconnected, and the motor lower unit manually turned by hand, or rotated as a result of hitting an obstruction. When this occurs the Ulterra motor's "park" position is lost and the motor lower unit will no longer be oriented properly when stowing.

**Notice:** If motor was stowed with the prop pointing up or down, you may need to depress the button on the left front motor ramp to deploy the motor. Release that button when the motor starts to deploy.

**Corrective Action:** To correct this issue the Ulterra motor must be deployed in the usual manner. Send a command to stow the motor via the remote or corded foot pedal. Allow the Ulterra motor to steer the lower unit, raise straight up, rotate the shaft and motor assembly into the horizontal/stow position, then you must Pause the stow sequence by pressing the Stow/Deploy button before the Ulterra starts to pull the lower unit on to the motor ramps. At this point, turn the Ulterra OFF by pressing and holding the Power button on the control panel about three seconds until the green System Ready LED turns off. Wait about five seconds, then manually rotate the motor lower unit into the "park" position by grasping and turning either the lower unit or the control box head. The motor should be positioned so that it is laying horizontally at 90 degrees to the mounting base with the prop to the left or right (per customer preference). Turn the power back on at the control panel and stow/deploy the motor to test and confirm that the "park" position has been reset correctly. Repeat this procedure, if necessary, to tweak the "park" position. This completes the procedure for resetting the "park position".

### **Case XIII. The Ulterra motor does not rotate into the horizontal position when stowing, or the vertical position when deploying, at the appropriate time.**

During the stow sequence the motor lower unit should come straight up and begin to rotate into the horizontal position when the lower unit is about twelve (12) to thirteen (13) inches below the aluminum base extrusion. During the deploy sequence the motor lower unit should extend about five (5) to six (6) inches out from the steering housing and then begin to rotate into the vertical position.

**Cause:** The trim housing has lost its position count and needs to be reset.

**Corrective Action:** The Reset Procedure must be performed. (Also see [Trim Count Reset](#) on Page 8.) To do this the motor MUST be in the deployed position, with the motor and shaft assembly vertical and the latch pin in the steering housing engaged into the aluminum base extrusion catches. Then, with the voltage appropriate for the motor being serviced supplied to the motor, press and release the Power button. The green system ready LED should be displayed, wait three (3) seconds then press and release the Power button three (3) times in quick succession within a two (2) second time period. The motor lower unit and shaft assembly should then come straight up until the motor belt collar contacts the underside of the steering housing, pause, and then extend back out about six (6) inches from the steering housing. This resets the trim housing counter and completes this procedure.



**Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.**

In addition to this the motor lower unit stops coming up about eight (8) inches below the steering housing.

**Cause:** The Ulterra tilt actuator is not functioning as it should due to a problem with the actuator motor or there is no output to the actuator from the main control board.

**Corrective Action:** To verify that the malfunction is not due to a faulty shaft position/trim housing count error, perform the **Trim Count Reset** outlined on [page 8](#). Re-test the trim function.

If the stow function is still not functional, remove the control board housing cover to access the main control board, locate the wire lead coming from the actuator and disconnect the plug end of the actuator lead from the main control board. Remove the actuator from the Ulterra motor by removing the e-ring from the actuator pin and pushing the actuator pin out towards the opposite side of the Ulterra base plate. Then manually rotate the actuator to unscrew the actuator’s coarse-threaded shaft from the tilt bracket/actuator arm. The actuator is now ready for direct testing.

**Step 1.** Insert two (2) small pins or wires into the actuator wire lead plug end and carefully connect 12 volts to the actuator. (NOTE: although the actuator normally operates on 24 volts from the main control board it will operate on 12 volts for this test.)

**Step 2.** Reverse the polarity to the actuator to test for both clockwise and counter-clockwise rotation.

- A. If the actuator turns in both directions it is good and can be reinstalled. Proceed to Step 3.
- B. If it does not run, it will need to be replaced. Then test stow and deploy the motor to check for proper operation.

**Step 3.** The next step in this procedure is to check the main control board for output to the actuator. Start by turning the motor power switch OFF and then back ON. Trim the motor lower unit down at least 24-30 inches below the steering housing. With your V.O.M. (multi-meter) set to check voltage, connect or make contact from the V.O.M. probes to the two (2) small pins on the main control board plug connection where the actuator wire lead plug end would normally be connected. Send a command to stow the Ulterra while observing the V.O.M. display. When the Ulterra motor lower unit is about twelve (12) inches below the steering housing voltage should be noted on the V.O.M. (24 volts for the Ulterra 80, and 36 volts for the Ulterra 112 - at a reduced duty cycle so that the effective voltage to the actuator is 24 volts).

- A. If no voltage is noted when doing this test, the main control board is faulty and will need to be replaced. NOTE, due to the small size of the plug pins you might want to perform this test procedure motor than once to verify that there is no voltage output to the tilt actuator.

**Case XV. Motor is deployed, but it will not steer in either direction.**

**Cause:** If the motor lower unit is less than 14-15 inches below the aluminum base extrusion it is in the “lockout region”. This feature is used to prevent the motor lower unit or prop contacting the boat

hull. If the motor is trimmed down further than 15 inches and will not steer, then there could be an issue with the pedal, remote, steering housing, main control board, or i-Pilot controller.

**Step 1.** Trim the motor down further than 15 inches to move the motor lower unit out of the lockout region and try to steer the motor with a corded footpedal and with a remote. (If the motor will not trim down see **Case VII. When deploying, the motor lower unit comes off the motor ramps, the shaft rotates to the vertical position, but the motor will not trim down to allow use of the propeller or steering functions.** on page 18.)

- A. If neither the footpedal nor the remote steer the motor, go to **Step 2.**
- B. If the steering works with the corded pedal, but does not work with the remote, the remote may be faulty. Retest with a known good “test” remote. (Note: when using the appropriate “test remote” it will need to be “paired” to the Ulterra i-Pilot or i-Pilot Link controller.)
  - B-1. If the motor will not steer with a known good test remote the i-Pilot/i-Pilot Link controller is at fault and will need to be replaced.
  - B-2. If the motor steering works with the known good test remote but does not work with the corded footpedal then the pedal is at fault and needs to be replaced.
- C. If the steering works with the remote but does not work with the corded footpedal, the pedal is at fault and will need to be replaced.

**Step 2.** Direct test the steering housing by disconnecting and applying 12-volts directly to the small 2-pin plug that has the orange and yellow steering housing wires attached. (Direct testing should be done with 12-volts even though the housing is either 24-volt or 36-volt when operating in the motor.)

- A. If the steering housing does not steer when direct testing it needs to be replaced.

**Notice:** While testing with 12-volts the steering housing should draw a consistent value less than 1.0 amps. If the value fluctuates significantly during testing and the control board does not have steering output, replace the steering housing prior to replacing the control board. A bad steering housing will destroy a control board.

- B. If all of the above tests fine then the steering output from the main control board is faulty and the main control board needs to be replaced.

## **Case XVI. Ulterra trim module makes a rapid clicking or whining noise when trimming up/down or when pulling motor up or down during the stow/deploy sequence.**

**Cause:** The small reduction drive belt (p/n 2200810) located inside the trim housing has a few stripped or damaged teeth. This causes the clicking noise that is heard when the trim housing motor is running during the stow/deploy sequence or when trimming the Ulterra motor up or down. To confirm this as the cause remove the six (6) #10 x .75 Hi-Lo screws that secure the trim housing cover to the top of the trim housing, lift the housing cover up and examine the belt. Any visual evidence of damaged or stripped teeth on the belt will require replacement of the belt.



**Corrective Action:** With the housing cover and O-rings slid up the shaft and away from the trim housing locate the three (3) M3-.5 x 10 Phillips panhead screws the secure the trim motor to the motor plate. Locate each screw then use a 5/64" Allen key to loosen the #8-32 x 1/4 set screw that locks the p/n 2058411 belt tensioner in place. With the set screw loosened use a 5/32" Allen key to turn the belt tensioner cam to lessen the belt tension. With the belt tension released the belt can be first lifted off the larger pulley then the smaller flanged motor drive pulley. Examine the teeth of the two (2) pulleys cleaning away any belt teeth residue prior to installing the new p/n 2200810 belt in reverse order of removal. Adjust belt tension with the 5/32" Allen key in the belt tensioner and lock it in place with the 5/64" Allen key in the small p/n 2053420 set screw. To secure the motor plate use a #1 Phillips screwdriver to tighten the three (3) Phillips panhead M3-.5 x 10 screws. Reinstall the trim housing housing cover using care to properly position the two (2) O-rings. Secure the housing cover with the six (6) #10 x .75 Hi-Lo screws. Connect the Ulterra motor to the appropriate voltage for the model being serviced, and test stow/deploy the motor to confirm proper, quiet operation of the trim module system.

### **Case XVII. The lift belt has been cut/broken or has pulled out of the control box and the belt teeth at the end of the lift belt have been stripped off.**

Either of these issues will require replacing the lift belt to restore the motor to proper stow and deploy functions.

**Cause:** Customer may have cut the belt in error thinking that this was necessary to stow the motor in an emergency or the belt broke or pulled loose from the tensioning block in the control box due to excessive tension being applied to the belt when the Ulterra was deployed. For example, if the motor is deployed in shallow water, wave action can cause the boat to rise and fall pushing the motor upward with enough force to pull the belt out of the tensioning block or strip off the belt teeth.

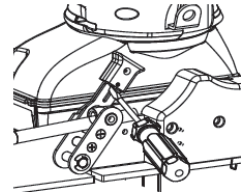
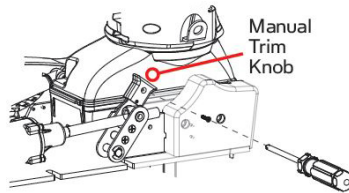
**Corrective Action:** The damaged belt must be removed from the trim housing and a new belt installed and connected to the lower unit and control box tensioning block.

**Step 1.** To do this start by removing the control box cover and then unscrewing the belt tensioning Allen head screw on the underside of the control box to release the belt tensioning block from the control box. (Note: if the belt has pulled out of the block be sure to replace it with a new tensioning block.)

**Step 2.** Disconnect the lift belt from the motor lower unit by removing the four (4) screws from the belt clamp collar located at the bottom end of the motor tube. With the screws removed the collar halves will separate allowing the belt and lower belt rack (small aluminum block that engages the belt teeth) to be released from the motor tube/lower unit.

**Step 3.** With the lift belt disconnected at the clamp collar the motor can be placed in the deployed position for ease of service. Simply remove the flathead Phillips screw from the manual tilt knob then pry the knob up to disengage the tilt actuator lift arm. (See diagrams below.) This

will allow the motor to rotate into the vertical/deployed position with the motor lower unit resting on the floor or supported on a low stand.



**Step 4.** Moving back to the trim housing, remove the six (6) screws, washers, and rubber gasket that hold the top cover on the module. Then lift the cover up to expose the trim housing drive belt.

**Step 5.** Remove the drive belt by loosening the small 8-32 x 1/4" set screw that locks the belt tensioning cam in place then loosen the three (3) small Phillips head screws that secure the trim housing motor to the motor plate. With the set screw and motor screws loosened use a 5/32" Allen key to turn the tensioning cam. This will release tension on the drive belt so that it can be removed.

**Step 6.** The trim housing can then be separated from the steering housing by pulling out of the trim handle and sliding the trim housing and belt about 5-6 inches away from the steering housing. The portion of the belt coming out the bottom of the trim housing can then be pulled up and out of the steering housing to release the belt at that end. Then use your fingertip or thumb to turn the large aluminum drive pulley in the trim housing manually.

**Step 7.** Turn the pulley counter-clockwise to pull the damaged belt through and out the bottom of the trim housing. (Note: to save time the damaged belt can be cut just above the trim housing to shorten the belt being removed.) Examine the ends of the new replacement belt, it should have been cut in the "valley" between the belt teeth so that the last tooth on the belt is a complete/full tooth. If this is not the case, remove the partial belt tooth by cutting the belt with a sharp scissors so that the last tooth on the belt is a full tooth.



Belt cut properly in valley



improperly cut lift belt

**Step 8.** Insert the end of the new belt into the top side of the trim housing. The belt must be inserted into the belt channel with the belt teeth toward the motor tube. While pushing the belt in from the top side, turn the large trim housing drive pulley counter clockwise. As the pulley is turned the belt teeth will catch on the lift belt drive pulley and the belt will be drawn in to the trim housing and out the bottom side of the housing. Keep turning the trim housing drive pulley while pulling down on the portion of the lift belt that is coming out the bottom of the trim housing.

- Step 9.** When about fifteen (15) inches of the belt has come out, insert the end of the portion of the belt into and out the bottom of the steering housing. Slide the trim housing down into place on top of the steering housing aligning the tabs of the steering housing output shaft with the slots of the trim housing and pull out on the trim handle to lock it into place on the steering housing.
- Step 10.** Attach the new belt to the motor lower unit using belt rack and lower clamp assembly in the same manner it was attached prior to disassembly.
- Step 11.** Once the new belt is attached to the clamp collar the weight of the motor will be supported by the lift belt. The next step will be to attach the new belt to the belt tensioner in the control box. Insert the new belt into the belt channel and up/out of the control box. Slide the belt into the tensioning block being sure to engage no less than four (4) full belt teeth. Fold the belt over the control box belt pulley then insert the tensioning block into the opening in the control box so that the Allen head belt tensioning screw can be inserted into the block from the underside of the control box. Tighten the screw as necessary to remove excess slack. A properly tensioned belt will be able to be pulled about 1/2 to 3/4 inch away from the belt channel of the motor tube and go back into place without any slack.
- Step 12.** Install the trim housing drive belt back in to the module, adjusting the belt tension with the tensioning cam and securing the cam with the set screw and the motor with the three (3) small Phillips screws in the motor plate.
- Step 13.** Then place the trim housing cover, O-rings, gaskets, and washers back in place on the top of the trim housing and secure the cover in place with the six (6) Phillips panhead HiLo screws.
- Step 14.** Re-install the control box cover and secure it in place with the four (4) cover screws.
- Step 15.** Reconnect power to the motor and switch it on by pressing and releasing the Power button, wait three (3) seconds, then press and release the Power button three (3) times in quick succession to reset the trim housing counter. (Note: the motor *must* be in the deployed position to do this, and the steering housing latch pin *must* be fully engaging the latch pin slots of the aluminum base extrusion so that the cam sensor arm with the magnet is directly over the sensor.) The motor will come straight up until the clamp collar contacts the steering housing and then go back down about 5-6 inches and stop.
- Step 16.** Now switch power OFF to the motor to re-align the tilt bracket and the tilt actuator arms so that the manual tilt knob can be re-installed and secured in place with the Phillips flathead #6-32 x 1/2" screw.
- Step 17.** Switch power back on and test stow/deploy the motor to verify function. Adjust motor park position, if needed (see **Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.** on [page 24](#)), and re-install sideplates and any other items that might have been removed to replace the lift belt. This completes the lift belt replacement procedure.

**Case XVIII. The motor runs at full speed when connected to power and switched ON, regardless of the speed selection setting; and it runs whether the motor is stowed or deployed.**

**Cause:** The main control board has failed due to numerous prop strikes while running at high speed. This has caused a board component to be damaged in such a way that full power is supplied to the motor lower unit whenever the motor is switched ON.

**Corrective Action:** The only solution to this problem is replacement of the main control board and sensors as a complete assembly. To do this the Ulterra motor must be in the deployed position. This failure usually does not affect the stow/deploy function, so the motor can be deployed in the usual manner with the foot pedal or remote.

**Case XIX: The Ulterra motor does not function normally with the remote or foot pedal when the foot pedal is connected; disconnecting the foot pedal restores normal function with remote.**

**Cause:** This is evidence that the foot pedal is sending a false command due to one of the magnets in the pedal missing or not in its proper position.

**Corrective Action:** From the underside of the foot pedal, remove the two screws that go through the barrel springs and hold the foot pedal upper in place. Verify that each actuator arm moves freely up and then back close to the foot pedal control board and that the magnet is present in each actuator arm. Clean any debris that is preventing normal movement. If a magnet is missing replace that actuator arm assembly. In addition to the actuators in the main body of the foot pedal also check the three magnets on foot pedal upper (one toward the heel, one toward the toe, and one on the end of the momentary actuator arms).

**Case XX. After replacing either the Main Control Board or the Trim Module the Board and Module will not Pair/Learn to each other.**

**Notice:** When either of these components are replaced they must be Paired/Learned to each other. This is done by connecting the motor to the appropriate voltage, then, starting with the Power Button OFF press and hold the Power Button in for 5-6 seconds. The red Status LED should blink once or twice and then the green Power LED should blink ON/OFF continuously until the motor is powered down by holding in the Power Button for 3 seconds and released or when power to the motor is interrupted.

If the red Status LED continues to blink, the Main Control Board and the Trim Module are not Paired/Learned to one another and the Ulterra motor will not function. This issue can be due to:

- Mis-match of components
- Lack of power to the Trim Module

Ulterra Main Control Board and Trim modules communicate wirelessly with each other using a specific radio frequency approved for use in the United States, Australia, and Canada (US/AU/CAN) by the FCC (Federal Communications Commission) or other country's government agencies. The radio frequency used in US/AU/CAN was not acceptable for use in Europe, Brazil, or other regions. This required special Euro/"M" SKU main Control Boards and Trim Modules. Double check the part number of the components you ordered to make certain that the correct components are being used in the repair. US/AU/CAN components will not communicate with Euro/"M" SKU components or vice versa.

**Notice:** Order History and/or shipping bag labels are the only way to verify the part number and description. The part number printed on the board, for example, is a generic or "raw" number used to identify the board prior to programming the board for region, voltage, and shaft length.

If the component parts match, suspect a lack of power getting to the Trim Module Assembly.

**Step 1.** To test for this separate the Trim Module from the Steering Housing to allow access to the Main Control Board. Begin by disconnecting the Ulterra Lift Belt from the Lower Belt Clamp Collar assembly. Remove the Clamp Collar screws to split the collar and disengage the belt from the collar/belt rack assembly.

**Step 2.** Next, pull out on the Trim Module release handle while sliding the Trim Module up the shaft and away from the Steering Housing assembly. When doing this the motor lower unit will be able to slip off the motor ramps. Use care to support the motor in some way when this occurs.

**Step 3.** If not already removed, remove both motor sideplates and loosen the screws that hold the Control Housing/control board cover in place. Lift up the Control Housing cover and locate the red and black wires with the male and female bullet connectors. Disconnect and separate the wires. Then, starting with the motor connected to the appropriate voltage and with the Power button OFF, press and hold the Power button down for 5-6 seconds. The red LED on the Control Housing cover should begin to blink ON and OFF. With the red LED blinking use a VOM (multi-meter) to measure the voltage at the red and black wires coming from the Main Control Board. The voltage should be 24 volts on 24-volt motors (80# thrust) and 36 volts on 36-volt motors (112# thrust).

- A. If no voltage is found, the Main Control Board is at fault and will need to be replaced.
- B. If the correct voltage is found, reconnect the red and black wires coming from the Main Control Board to the red and black wires going to the Steering Housing. Using the VOM, measure the voltage from one of the inner slip ring brushes to one of the outer slip ring brushes located on the Steering Housing. The voltage reading at the slip ring brushes should match the voltage reading seen at the red and black wires coming from the Main Control Board.
  - B-1. If the voltage values do not match, the problem is in the Steering Housing, and it will need to be replaced.
  - B-2. If the voltage values at the slip ring brushes and the red and black wires match, then the Trim Module assembly is faulty and will need to be replaced.

## Case XXI. The Ulterra motor has been stowed by performing the Manual / Emergency Stow Procedure as shown on the customer's Quick Reference Card, and now that procedure must be reversed.

**Cause:** The Ulterra motor would not stow itself due to low battery voltage or motor malfunction, and the owner/operator used the Manual/Emergency Stow Procedure to stow the motor for travel.

**Corrective Action:** To return the motor to functional condition the cause or reason why the Manual Stow Procedure was done must be determined and corrected. If the procedure was done due to low voltage or poor electrical connections the batteries must be recharged/replaced and any marginal wire connections corrected. If the procedure was done due to mechanical failure such as a missing sensor magnet, trim housing issue, or lift belt issue the cause must be identified and corrected prior to the following steps.

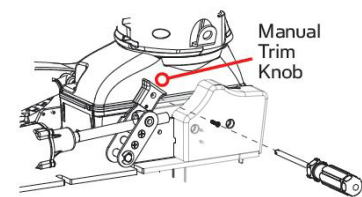
**Step 1.** Place the Ulterra motor on a suitable workbench or stand so that the motor can be manually

**Notice:** If the motor is on the boat and the boat is on a trailer, the motor will need to be removed if it cannot be deployed so that it is in the vertical position with the latch pin fully engaged into the slots of the aluminum base extrusion.

deployed. Remove the emergency stow strap (or whatever the customer has used to temporarily hold the motor up onto the motor ramps). Then push/pull the motor lower unit off the motor ramps. When the motor lower unit is clear of the ramps the motor and shaft assembly can be rotated into the vertical/deployed position while at the same time slide the motor shaft down through the steering housing until the trim housing comes into contact with the steering housing. Align the tabs on the steering housing output shaft with the slots in the trim housing and pull out on the trim handle to allow the trim housing to lock into place on top of the steering housing.

**Step 2.** Check to make sure that the steering housing lock bar is fully engaged into the slots in the aluminum base extrusion. This will position the cam sensor arm magnet directly over cam sensor and allow the Trim Count Reset Procedure to be done. (If the arm is not in place or the magnet is missing, the Trim Count Reset Procedure cannot be completed.) Connect the motor battery leads to the appropriate polarity and voltage then press and release the power button to turn the motor ON. Wait at least three seconds, then press and release the power button three times in quick succession within a two-second period. The motor lower unit will raise straight up until the motor lower unit contacts the underside of the steering housing then it will reverse direction and go back down about six inches below the steering housing and stop. This procedure resets the trim housing position counter for proper stow/deploy functions.

**Step 3.** Turn the motor OFF by pressing and holding the power button for three seconds. Disconnect the motor leads from the power source. The final step is to reverse the Manual/Emergency Stow is to re-align the tilt bracket arm with the tilt motor/actuator arm so that the black plastic tilt knob can be reinstalled.





- A. To align the two arms, the coarse thread actuator output shaft can be manually turned clockwise or counterclockwise to reposition the actuator arm to the tilt bracket arm. Simply grip the actuator output shaft with your fingertips and back-drive the actuator in the required direction. Or, if you are unable to back-drive the actuator output shaft, you can remove the e-ring from the actuator pin, push the pin out toward the left side of the motor to free the actuator motor case from the base extrusion, unplug the actuator leads from the control board, and rotate the entire actuator to move the actuator arm so it aligns with the tilt bracket arm.
- B. When the two arms are aligned the manual tilt knob can be pushed/tapped back into place over the arms and secured with the #6-32 x 1/2" flathead countersunk machine screw.

**Step 4.** Reconnect the Ulterra motor to the appropriate voltage and proper polarity, then press and release the power button to turn the motor ON. Test stow/deploy the motor with the corded footpedal or remote to verify proper operation of all motor functions. If necessary, reset the park position so the lower unit orients correctly while stowing. (See **Case XIV. When stowing, the motor turns to the “park” position, comes straight up, but does not rotate over to the horizontal position.**, on [page 24.](#))