Ultrex

LIFT-ASSIST WARNING

WARNING: The gas assist lift mechanism in this unit is under high spring pressure when the motor is in the deployed position. Do not remove the Steering Module assembly from the mount without disconnecting one end of the gas spring. Failure to do this can create a condition where accidental pulling of the Pull Grip and Cable may cause the mount to spring open rapidly, striking anyone or anything in the direct path.

Note: Ultrex motors communicate with any connected accessory via a microprocessor-based network. The failure of any installed network accessory can result in motor malfunction. Disconnect all accessories including the i-Pilot Link or i-Pilot controller when diagnosing the motor.

Note: i-Pilot and i-Pilot Link controllers compatible with Ultrex have a tilt sensor that locks out steering and prop functions when the motor is not in a deployed/vertical position!

Click on blue Case to jump to the linked discussion/resolution:

Case VIII. Motor does not turn off when the switch is moved to the “OFF” position. (Blue “Power” light remains lit.)

Case IX. Ultrex has a Cracked Coil Cord Cover or Damaged Cable Jacket.

Case X. Customer complains that Ultrex is in Spot-Lock and the Spot-Lock keeps turning off.

Evaluating Ultrex Limit Sensors

Ultrex Sensor Board Replacement Instructions

Ultrex

LIFT-ASSIST WARNING

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Case I. Motor will not steer using Footpedal.

A. Motor will not steer with Footpedal (footpedal firm), Remote functions are normal.

Corrective Action: Control Board is not acknowledging the signals from the Footpedal Steering Sensor Board. Verify the Sensor Board is properly plugged into the Control Board, if plug connection was secure replace the Steering Sensor Board (see instructions included with Sensor Board and also on **page 7**, below).

Note: This has been an intermittent issue, if a failure has been verified do not assume repair is not needed just because the motor starts working again.
Note: Installation of an aftermarket accessory that contacts any Steering Sensor Board components will cause this failure and does void warranty on the motor. Charge the customer for the repair and inform them of the cause of failure.

B. Motor will not steer with Footpedal or Remote, motor locks at either "toe all the way down" or "heel all the way down", turning the motor by hand away from the limit restores steering, until it is back at either extreme.

Cause: This indicates that the Steering Limit Sensors in the Footpedal base are reversed.
With the Limit Switches reversed when you've steered all the way left (heel down) the magnet in the upper Footpedal activates the sensor at the heel of the pedal, which incorrectly signals the Control Board that it cannot steer any farther right, so it will not steer right, the pedal has also physically travelled as far as it can to the left steer position, so the motor will not allow steering either direction.
Note: Continued attempts to steer in this condition may stress and break Steering Cables.

Corrective Action: Remove the End of Limit Sensors from the Footpedal base and reinstall them in their correct positions. Test the motor for proper operation.

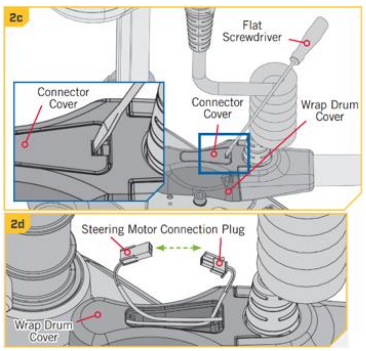
C. Motor will not steer with Footpedal or Remote, and the Footpedal isn't at either extreme ("toe all the way down" or "heel all the way down").

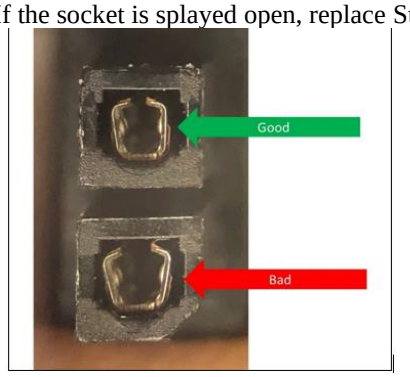
Cause: This indicates either a Steering Module failure, a lost connection between the Control Board and the Steering Module, or no output from the Control Board.

Corrective Action:

Step 1. Remove the Wrap Drum Cover, disconnect the plug to the steering motor.

A. Inspect the sockets on the Steering Motor side of the connector to look for a faulty/loose socket which may result in an intermittent connection. If the socket is splayed open, replace Steering Module:





B. Apply 12 volts directly to the steering motor. If the steering motor does not run direct, replace the Steering Module. If the motor does steer direct, observe the amp draw; testing at 12 volts on a bench amp draw should be steady and roughly 1 amp, if the amp draw is high or fluctuating replace the steering housing. If steering motor operates and has consistent amp draw continue to **Step 2.**
Note: Steering Module operates at a maximum of 24 volts; 12 volts is adequate for testing and is the effective voltage for steering by i-Pilot or i-Pilot Link.

Step 2. Remove the bottom plate from the Footpedal, disconnect the bullet connectors on the black and white wires coming from the Control Board. Set your VOM to check voltage, connect the VOM leads to the black and white wires coming from the Control Board, turn the motor on and send a steering command. Voltage should be present when sending a steering command from the Footpedal or the Remote. If no voltage is present, replace the Control Board.
Note: Steering output from the Control Board has a built in 8-amp fuse, if the steering circuit draws in excess of 8 amps the Control Board will be ruined. If no steering output is found at the Control Board the likely cause is either the Steering Module is drawing high amps or there is a direct short in the wiring to the Steering Module.

Step 3. If the Control Board has output and the steering motor functions when direct tested the wire harness from the Footpedal to the Steering Module is damaged. Test continuity from the black bullet connector at the steering module to the black wire side of the plug connection and from the white bullet connector to the white wire side of the plug connection to verify that the harness is in fact damaged. Replace the Footpedal Cable Wire Harness Assembly.

D. Motor steers all the way to the toe or heel as soon as power is turned ON, then will not respond with Remote or Footpedal signals.

Cause: The motor is receiving a steering signal, probably from the Steering Sensor Board.

Corrective Action:

Step 1. Disconnect the Steering Sensor Board from the Control Board (small white plug entering the Control Board), test for normal steering functions using the i-Pilot/i-Pilot Link Remote (or Smart Phone App).

A. If normal steering functions exist with Steering Sensor disconnected then replace Steering Sensor Board (see instructions included with Sensor Board and also on **page 7**, below). Test motor for proper operation.

B. If normal functions are not restored with the Steering Sensor disconnected, then proceed to **Step 2**.

Step 2. Disconnect the i-Pilot/i-Pilot Link system (black plug with yellow dots) either at the Control Board in the Footpedal or in the control box.

A. If motor steers all the way to the toe or heel as power is turned ON, replace the Control Board. Test motor for proper operation.

B. If motor does not steer on its own all the way to the toe or heel as power is turned ON, reconnect Steering Sensor Board, leave the i-Pilot/i-Pilot Link system disconnected, and cycle power to the Ultrex motor. Proceed to **Step 3**.

Step 3. If the above Footpedal sensor action results in normal steering functions with the i-Pilot/i-Pilot Link system disconnected then the i-Pilot/i-Pilot Link system is incorrectly sending a continuous steering signal. Verify all remotes are powered OFF (a paired Micro Remote will need the battery removed), reconnect the i-Pilot/i-Pilot Link system, and then power Ultrex ON.

A. If motor does not steer on its own all the way to the toe or heel as power is turned ON, replace the i-Pilot/i-Pilot Link Controller (head assembly).

B. If the motor does not steer on it own when immediately when powered ON, then one of the remotes is sending a continuous steer signal. Turn remotes on one-by-one until the faulty remote is discovered. It will need to be replaced. Test motor for proper operation.

E. Footpedal is loose/moves freely, might still steer with remote.

Cause: This indicates a broken Steering Cable(s).

Corrective Action:

Step 1. Remove the Wrap Drum Cover and examine the Steering Cables.

- **A.** As long as black and white wires running to the Steering Module are undamaged, replace Steering Cables). **Note:** Unlike other cable remote motors, the Steering Cables on Ultrex models cross between the Footpedal and the motor, so at the Steering Module end the cable on the right is the left cable at the Footpedal base and the cable on the left is the right cable at the Footpedal base.
- **B.** If the black and white wires were damaged between the Plug and the Steering Module, replace the Steering Module in addition to the Steering Cable.
- **C.** If the black and white wires going to the steering module have been damaged on the Footpedal side of the plug replace the FootPedal Cable Wire Harness Assembly.

Case II. Ultrex will not steer with Remote.

A. Ultrex will not steer with Remote and also will not steer with Footpedal.

Step 1. Disconnect the i-Pilot/i-Pilot Link accessory, if Footpedal continues to not work refer to **Case I** of this Repair Manual.

B. Ultrex will not steer with Remote, but Ultrex will steer with the Footpedal.

Step 1. Use a known good i-Pilot/i-Pilot Link Remote and pair it to the i-Pilot/i-Pilot Link Controller (head assembly) to determine which component of the i-Pilot/i-Pilot Link system is at fault.

Case III. Motor DOES NOT run in Constant Mode.

Step 1. Does the constant light turn on when the Push Button is pushed?

- **A.** If yes, continue to **Step 2**.
- **B.** If no:
  - **B-1.** Disconnect the motor from the Power Source.
  - **B-2.** Suspect the actuator is failing to signal the Control Board. Remove the bottom plate from the Footpedal.
  - **B-3.** Examine the Constant Button, verify the actuator travels freely from almost touching the Indicator Light Assembly to roughly ¼" away from the Indicator Light Assembly, then back close to the Indicator Light Assembly, when the button is pushed and released.
  - **B-4.** Verify the tip of the actuator is intact and the magnet is present in the tip of the actuator.
  - **B-5.** Replace Control Board, and retest motor for proper operation.

Step 2. Disconnect the Motor from the Power Source. Remove the control box cover, disconnect the motor wire terminals, apply 12 volts direct to the motor wires. Does the motor run direct?

- **A.** If yes, continue to **Step 3**.
- **B.** If no, refer to the Lower Unit Motor Assembly Repair Manual Chapter

Step 3. Connect a Test Light to the leads coming from the coil cord in the control box. Connect the Motor to Power, Turn the Motor on, turn the speed selector to something above "1", and press the constant button. Does the test light illume?

- **A.** If no, continue to **Step 4**.
- **B.** If yes, refer to the Lower Unit Motor Assembly Repair Manual Chapter

Step 4. Disconnect the motor from power, remove the bottom plate from the Footpedal, replace the motor black and motor red wires at the Control Board with your test light leads. Reconnect the motor to power, turn it on, move the Speed Selector to something above "1" and press the constant button. Does the test light illume?

- **A.** If no, replace the Control Board.
- **B.** If yes, replace the Footpedal Cable Wire Harness Assembly.

Case IV. Motor DOES NOT run when the Momentary Button is pressed; Motor does run via remote or when Constant mode is active.

Step 1. Check to ensure the Reed Switch is properly positioned in the Reed Switch Clip. Remove the Push Button/Magnet Assembly, P/N 2993705, to visually check that the Reed Switch is approximately 1/32" below the top of the Reed Switch Clip. (The Reed Switch is a small black plastic cylinder with two wires attached.) Carefully re-position the Reed Switch slightly shallower in the clip so it is closer to the magnet in the underside of the Push Button, if required.

Step 2. Check Push Button/Magnet Assembly to ensure the small magnet rod on the underside of the Push Bbutton is in place.

- **A.** If the magnet is missing from the Push Button Assembly, replace P/N 2993705 push button, and test motor for proper operation.
- **B.** If the Reed Switch and magnet are in place, and the magnet is in close proximity to the Reed Switch when the Push Button is depressed, but the motor still does not run then the Reed Switch is faulty and it requires replacement kit P/N 2884019. (Instructions are included in this kit.)

Case V. With speed selector in the 10-100% setting and the MOM/CON Switch in the MOM position, motor runs when the Momentary Push Button is not depressed.

Step 1. Check to ensure the Reed Switch is properly positioned in the Reed Switch Clip. Remove the Push Button/Magnet Assembly, P/N 2993705, to visually check that the Reed Switch is approximately 1/32" below the top of the Reed Switch Clip. (The Reed Switch is a small black plastic cylinder with two wires attached.) Carefully re-position the Reed Switch slightly deeper into the clip so it is farther away from the magnet in the underside of the Push Button. Test motor for proper operation.

Case VI. If motor runs in MOM and CON modes but customer states that the motor starts, stops, or changes speed as the Footpedal is rocked forward and backward (to steer) the potentiometer leads may be at fault.

Step 1. Remove the Control Board and potentiometer from Footpedal base.

Step 2. Connect power leads directly to Control Board (consult appropriate wiring diagram for correct voltage, polarity, and terminal locations). You should hear the relay on the Control Board click when the power leads are connected to the board.

- **A.** Connect a test light (or a known good motor) to the Control Board motor output terminals. With potentiometer shaft turned clockwise to its stop, the test light (or motor) should be off.
- **B.** As the potentiometer shaft is rotated clockwise, the test light (or motor) should start to light (or run) and increase in brightness (or speed) as you continue to turn the potentiometer shaft clockwise to the switch stop.
- **C.** If the test light (or motor) is intermittent as the potentiometer shaft is turned clockwise OR as the 3-conductor lead connected to the potentiometer is flexed near the potentiometer end, the potentiometer leads are broken, and the Control Board needs to be replaced.

Case VII. Motor runs (prop spins) when the motor is in the stowed position.

Cause: When the Ultrex motor is in the stowed position the propeller should be disabled. The prop spinning while the motor is stowed indicates a failure with the i-Pilot/i-Pilot Link Controller (head assembly).

Corrective Action:

Step 1. Replace the i-Pilot/i-Pilot Link Controller (whichever accessory is installed on the Ultrex).

Case VIII. Motor does not turn off when the Switch is moved to the "OFF" position. (Blue "Power" light remains lit.)

Cause: A complete circuit through the white wires that connect to the ON/OFF Switch puts the motor in an OFF condition (turns light off) so this indicates a Switch or Control Board issue.

Corrective Action:

Step 1. One or both of the white wires being disconnected from the Switch would cause this symptom; inspect the wires to verify they are securely connected to the Switch.

Step 2. Remove the white wires from the Switch and connect them directly to each other.

- **A.** If this causes the light to turn off replace the Switch.
- **B.** If connecting the wires direct to each other does not cause the light to turn off replace the Control Board.

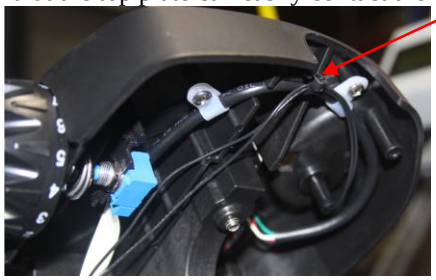
Case IX. Ultrex has a Cracked Coil Cord Cover or Damaged Cable Jacket.

Corrective Action: The Coil Cord Cover and Cable Jacket can only be removed from the Footpedal end. To replace either of these you will need to disconnect the Steering Cables, steering motor wire, network plug, and motor wires from the Footpedal end, remove the conduit adjustment bracket and Footpedal Base Boot to then remove the damaged part and install a replacement part. If damage goes beyond the Coil Cord Cover or Cable Jacket consider replacing the complete Footpedal Cable Wire Harness Assembly.

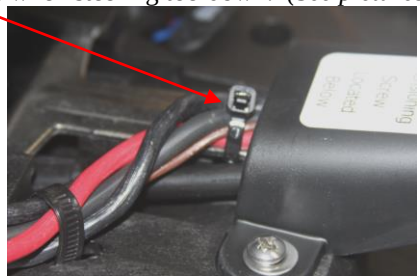
Case X: Customer complains that Ultrex is in Spot-Lock and the Spot-Lock keeps turning off.

NOTE: If the rocker portion of the Footpedal or the touch screen of the i-Pilot Link remote is inadvertently bumped, the motor may view this as a signal to disengage Spot-Lock. Also, if *anything* restricts movement of the rocker portion of the pedal, this may also disengage Spot-Lock.

- **A.** Some boats have footpedal trays/wells that may not accommodate the size of the Ultrex Footpedal which may cause the cable jacket to push on the Footpedal and disengage Spot-Lock.
- **B.** This issue could be due to cable tie placement on the Footpedal. On the Footpedal base there is a cable tie holding wires in place just above the conduit bracket and on the underside of the top Footpedal plate there is a cable tie to hold the Reed Switch wires in place. If these two cable ties are lined up with each other or if the "head portion" of the cable tie on the Footpedal base is sticking up where it can interfere with the top plate, it will disengage Spot-Lock. Check the placement of these cable ties and verify that the top plate can easily contact the base when steering toe-down. *(See pictures below)*



Underside of top Footpedal plate



Footpedal base

- **C.** If the Spot-Lock issue is most frequent at either extreme on the Footpedal (Toe Down or Heel Down), it is possible that an issue exists with the Limit Sensors in the Footpedal. See "Evaluating Ultrex Limit Sensors" below.

Evaluating Ultrex Limit Sensors:

In automated steering modes (AP, Spot-Lock, Follow-the-Contour) when the Ultrex reaches the steering limit in one direction the motor should cut the prop off (if it was on) and do a quick 360 degree turn then turn the prop back on and continue steering from there to reach the intended heading.

Since Legacy AutoPilot only uses the compass (no GPS input), Legacy AutoPilot is the best mode to test the Limit Sensors. (Ensure there are no external ferrous materials that could affect the internal compass.)

Step 1. Set the AutoPilot Mode to Legacy in the i-Pilot or i-Pilot Link Options menu of the remote. (If there is no GPS satellite reception (indoors) the system will default to Legacy.)

Step 2. With the motor deployed steer almost to the full heel down position.

Step 3. Engage AutoPilot. Wait 5 seconds to ensure the system has settled on a heading.

Step 4. Note the heading direction, you will need to be able to compare this direction later; placing a piece of masking tape on the floor matching the direction of the lower unit is a good way to make it easy to compare the heading direction later.

Step 5. Rotate the base of the motor/steering housing clockwise as you are looking down on the motor, as you do this the motor should steer left to maintain its heading and reach the heel down limit shortly after you start rotating the base.

- **A.** Once it does reach the steering limit it should quickly steer the opposite direction until the Footpedal is almost fully Toe Down.

Step 6. Rotate the base of the motor/steering housing counter-clockwise as you are looking down on the motor. The motor should reach the toe down limit shortly after you start rotating the base.

- **A.** Once it does reach the toe down steering limit it should quickly steer the opposite direction until the Footpedal is almost fully heel down.

Step 7. Verify the heading has been maintained through this process.

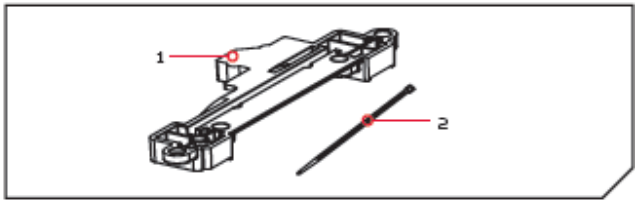
If the motor fails to react as described above in either direction the magnet/sensor combination to that direction is not working properly. If the heading is not maintained through this process it is likely caused by the sensor failing to react prior to physical pressure on the Steering Sensor Board. These cases will cause Spot-Lock and other automatic steering functions to disengage.

If the test does find an error in the limit sensors review **Case 1-B** and verify the sensors are not reversed, check that corresponding magnets are still present in the upper rocker of the Footpedal, and look for other obstructions as described in **Case X**; if none of these identify a cause this would then indicate a defective Control Board.

Ultrex Sensor Board Replacement Instructions:

Ultrex Sensor Board Replacement
2884023

Item / Assembly	Part #	Description	Qty.
1	2294025	CONTROL BRD, SENSOR BOARD	1
2	2256300	TIE WRAP-5.5" BLACK	1



TOOLS AND RESOURCES REQUIRED

- Approximately 30 minutes
- #2 Phillips Screwdriver
- Flat Blade Screwdriver
- 1/2" Open-End Wrench
- Wire Cutter
- Hammer
- 3/16" Pin Punch
- 1/8" Hex Key

⚠ CAUTION

Always wear safety glasses and gloves. Disconnect all power to the trolling motor before beginning any work or maintenance. Johnson Outdoors Inc. is not responsible for any damage due to improper rigging or installation. If you do not have the skills, experience and tools to perform the following maintenance and repairs, we recommend you seek the help of a Minn Kota Authorized Service Center. A list of Authorized Service Centers can be found at http://www.minnkotamotors.com/Authorized-Service-Providers/. Or contact our Technical Service Department by email at service@minnkotamotors.com or, by dialing 800-227-6433.

STARTING NOTES

⚠ WARNING

The motor must be disconnected from power before beginning disassembly.

⚠ CAUTION

To prevent damage to the new board touch a grounded piece of metal prior to handling the control board.

NOTE: Put the motor in the deployed position so that you can turn the motor lower unit in relation to the steering housing. This allows you to change the postion of the foot pedal and better access the components of the pedal. If the motor cannot be in the deployed position and steered as described a second person will probably be necessary to control the motor as the foot pedal and control board are worked on.

DISASSEMBLY

1

a. Disconnect the motor from power and, with the motor deployed rotate the motor lower unit to place the foot pedal rocker in a level position Turn the foot pedal over and use the #2 Phillips screwdriver to remove the twelve #8-18x5/8" screws and the two #10-32x1/2" machine screws from the bottom plate.

b. Using a small flat blade screwdriver, disconnect the steering sensor board plug (with four wires red, white, green, and black) from the main control board.

NOTE: Be careful not to damage the connector or pull on the wires.

c. Using the #2 Phillips screwdriver, remove the two #8-18x1/2" screws from the cable clamps that hold the steering sensor board cable. Use a small wire cutter to remove the cable tie that holds the two black momentary reed switch leads to the steering sensor board cable.

d. Disconnect the control board potentiometer from the speed control knob, loosen the potentiometer nut completely using a 1/2" open-end wrench and slide it out.

e. Turn the foot pedal back over and locate the knurled side of the pivot pin. Use a hammer and a 3/16" punch to drive the pin out towards the knurled end.

NOTE: Place foot pedal on a flat surface to prevent main control board damage when working on the remaining steps.

f. Remove the foot pedal top with magnets and turn over to expose the steering sensor board. Use a #2 Phillips screwdriver to remove the four #6-20x3/8" screws from the steering sensor board and remove the steering sensor board with cable.

ASSEMBLY

2

a. Install the replacement steering sensor board and secure in place with the four #6-20x3/8" screws with a #2 Phillips screwdriver. Attach the two cable clamps to the steering sensor board cable using a #2 Phillips screwdriver and the two #8-18x1/2" screws. Use the supplied Tie Wrap to secure the two black reed switch wires to the steering sensor board cable indicated by the arrow in the image to the right. Route the steering sensor board cable through the small opening where the potentiometer ribbon cable and reed switch wires are located.

b. Place the foot pedal top with magnets in position and align lower rocker, using a #2 Phillips screwdriver as a guide pin. Insert the pivot pin, tapered end first, and tap into place with the hammer and 3/16" punch until the knurled portion is flush with the foot pedal top with magnets.

c. Insert the potentiometer back into the speed selector knob, with the ribbon cable facing the heel side of the foot pedal. Ensure that the lock washer is on the same side as the nut. Tighten the potentiometer nut in place using a 1/2" open-end wrench.

d. Turn the foot pedal back over and connect the steering sensor board connector to the main control board, making sure it clicks into place.

e. Position the bottom plate onto the foot pedal base and install the two #10-32x1/2" machine screws with a #2 Phillips screwdriver to secure the main control board to the bottom plate.

f. Install the remaining twelve #8-18x5/8" screws into the bottom plate with a #2 Phillips screwdriver.

NOTE: Ensure that the wires in the foot pedal are properly routed and will not be pinched or damaged when installing the bottom plate.

ADJUSTMENT

Adjusting the Foot Pedal Free Play

The Ultrex foot pedal assembly comes factory tuned for optimal mechanical and electronic performance. It is possible for these settings to vary slightly over the life of the product. Under normal circumstances, Minn Kota does not recommend making adjustments to factory settings, and would recommend consulting with one of Minn Kota's Authorized Service Providers. For a listing of these, please go to www.minnkotamotors.com.

⚠ CAUTION

Use extreme caution when adjusting the Set Screw. Over tightening this screw may cause significant and irreparable damage to the electrical components of the unit and will severely diminish the expected range of performance.

The Ultrex foot pedal comes factory set with no Free Play for ideal steering responsiveness in all conditions. Free Play refers to any rocking that may be detected when testing the pedal by hand. Free Play in the foot pedal can affect the quality of the motors responsiveness. An adjustment Set Screw, located under the Toe Free of the Foot Pedal, is factory set to maintain the proper amount of contact pressure between the foot pedal and the steering sensors that control the electric functions of the foot pedal.

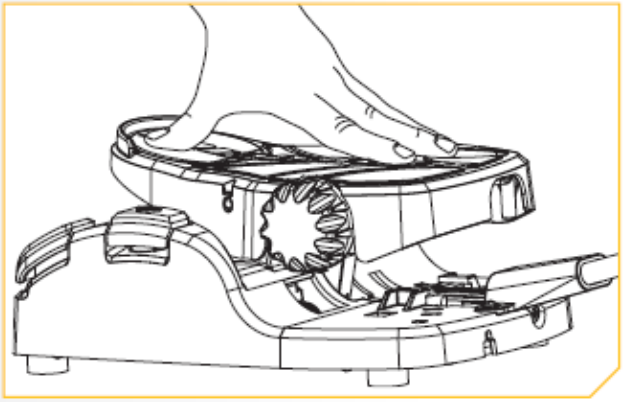
Before determining if the Free Play of the Foot Pedal needs adjusting, make sure that the cables controlling steering are under proper tension. To review how to check cable tension please review the "Adjusting the Steering Cable" portion in the user manual.

3

a. To determine if excessive Free Play has developed in the foot pedal, test the top of the foot pedal by rocking the pedal back and forth (heel-to-toe) by applying minimal pressure using only your fingertips.

NOTE: This test should NOT be performed using your foot, as it will not accurately detect Free Play.

b. In the most severe cases, the foot pedal will rock no more than 1/16 of an inch when tested. If your foot pedal exceeds 1/16" of movement when rocked, please contact a Minn Kota Authorized Service Provider, or contact Minn Kota customer service at www.minnkotamotors.com



⚠ CAUTION

Use extreme caution when adjusting the Set Screw. Over tightening this screw may cause significant and irreparable damage to the electrical components of the unit and will severely diminish the expected range of performance.

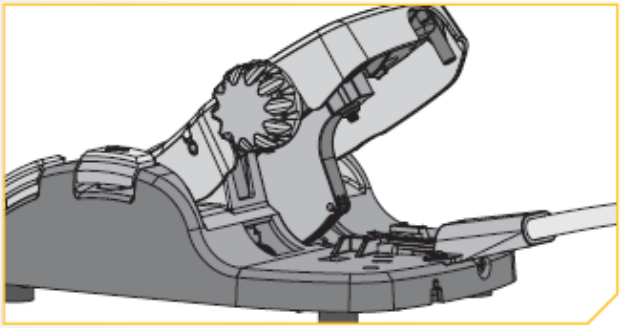
ADJUSTMENT (CONTINUED)

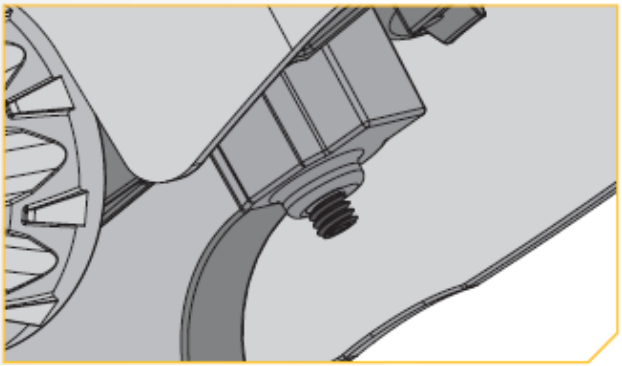
4

d. If Free Play is detected when tested, put the motor in the deployed position. Position the foot pedal so that the toe end is raised.

e. Locate the Set Screw and adjust it using an 1/8" Hex Key. When turning the Set Screw, tighten by turning clockwise using 1/8 turns incrementally. Manually test the Free Play on the top of the Foot Pedal with your fingertips between each 1/8 turn, as described in the test procedure above.

f. Only tighten the Set Screw so that the Free Play of the foot pedal is removed.





⚠ CAUTION

Over tightening the set screw may cause significant and irreparable damage to the electrical components of the unit and will severely diminish the expected range of performance.