

MALIBU UNIVERSITY

Service School Curriculum



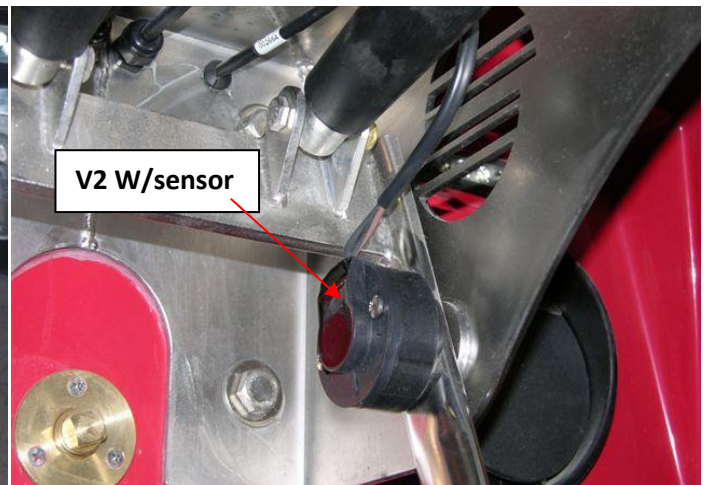
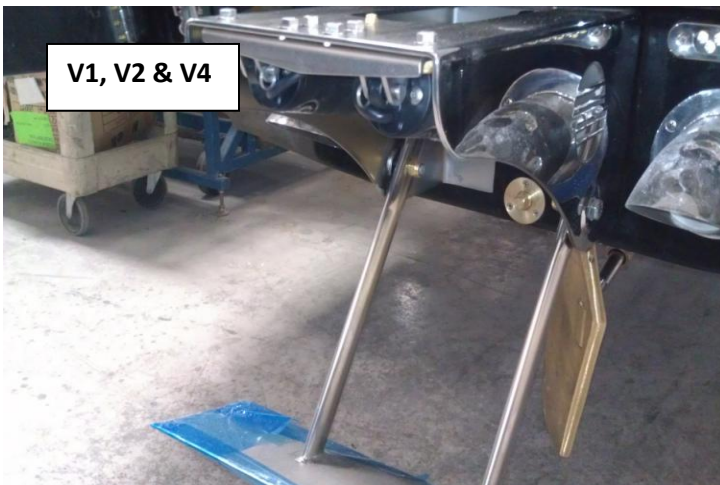
Component Power Wedge 2008-2013

OVERVIEW:

The Power Wedge is an adjustable wake enlargement device designed specifically for wakeboarding. The Power Wedge is intended to be deployed “down” prior to pulling up the rider, it will not deploy above 10 MPH and it is not intended to be used over 25 MPH.

The Power Wedge was first introduced in 2006 and has experienced various upgrades since that time. The “versions” include:

- **V1:** 2006-2007 (manual switch operation w/Lenco Box, 3 Lobe)
- **V2:** 2008-2010.5 (manual or MUX switch operation w/sensor, w/o Lenco Box, 3 Lobe)
- **V3:** 2010.5-2011 (manual or MUX switch operation w/Lenco Box and a MUX Power Module, 3 Lobe)
- **V4:** 2011-2013 (manual or MTC switch operation w/Lenco Box, 3 Lobe, or 5 Lobe in 2012)



Version 2 Overview:

The **MUX Switch** operates the Power Wedge by CAN signal to the MUX Power Module, through a 15 amp resettable fuse in the MUX Power Module, then to the Power Wedge. Some models controlled by a manual **momentary DP/DT switch**.



V2 ISSUES:

Issue 1: Calibration of the Power Wedge> Must be calibrated for system to operate correctly

- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- Start by lowering the wedge all the way down. Hit the button a few times to make sure it's all the way down.
- Now enter the set up screen, then into the Wedge Calibration screen. With the wedge all the way down, the top number (A-D) must be in the correct range of 10-30. With a higher number here, the Mali-view system will not accept the calibration. (Note: this value will lower as the voltage increases when the engine is running).
- As long as the top number (A-D) is within the range of 10-30 counts when the wedge is all the way down position, you are OK to press enter to calibrate the down position. If the top number (A-D) is not within this range, you will need to loosen the screws on the sensor and rotate it to get the A-D in the correct range. You may need to remove the sensor and rotate the hex axle a bit in order to get the hex axle to line up in the proper range.
- Once you have the sensor in the correct position and tightened down with the AD in the 10-30 counts range with the wedge all the way down, you can now push the enter button to calibrate the down position.
- Once you have calibrated the down position the system will tell you to raise the wedge to the up position, you will need to simulate a boat speed between 1-9.9 MPH. you must spin the paddle wheel first, and then push the "up" button.
- Once you have the wedge all the way up, push the enter button to calibrate the up position.
- Now would be a good time to test and verify that the sensor is operating as it should and to verify that the bolt that the sensor is connected to can't rock or move. Drop the wedge all the way down; is the A-D value the same as it was before you cycled it up & down? As long as the A-D value is within 5 counts of the original value, the system is working as it should. If the value is very different, you could have a bolt that is too loose or you have a defective sensor.

Issue 2: Wedge will not move at all

- Verify battery has 12+ volts.
- Verify battery lugs are tight on battery and cables are tight on lugs.
- Verify Power Wedge is turned on to "present" in the dash gauge info center. **Make sure "Auto Wedge" is turned off when diagnosing wedge issues.**
- Reset the Viper to "Factory Settings" if applicable.
- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- Verify the wedge is calibrated correctly. See issue 1 above if you need to calibrate.
- Verify correct Viper software.
- Verify that the red LED is blinking in the Power Module. **If it's blinking it's thinking!**
- Verify that the resettable circuit breaker or fuse in the power module is not tripped or blown. Push the black button in on the resettable breaker if necessary or replace fuse.
- Older 2008 models have a 30 amp thermal breaker in place of the 15 amp resettable breaker which is correct; do not replace it with a 15 amp resettable breaker.
- Move Power Wedge button location in MUX Switch to check the switch operation. Replace the MUX switch if necessary.
- Verify the MUX Power Module has 12 volts on Red and Black power wires.

- Check wedge and wire operations by hot wiring actuators from under the dash. Disconnect the actuator wires from the MUX Power Module, using a battery connect 12 volts power and ground in order to move the wedge in one direction. Reverse connections to move the wedge back in the other direction. Replace actuators if necessary. **Replace both actuators even if only 1 is bad!**
- If needed, test wedge actuators separately by disconnecting the wedge wires at the transom of the boat, by using a battery connect 12 volts power and ground to the wires in order to move the wedge in one direction. Reverse the connections to move the wedge back in the other direction.
- Verify the dash is receiving a speed signal on the speedometer. Should get 12 volts on green wire, at the 16 pin connector under the dash, pin location N. Refer to paddle wheel troubleshooting, if necessary.
- Verify 12 volts coming out of MUX Power Module on the Power Wedge wires to the actuators. Replace MUX Power Module if necessary.

Issue 3: Power Wedge fuse keeps popping

- The seal on 1 or both actuators may have failed and leaked, a water logged ram will pull over 15 amps by itself.
- Reset the Viper if applicable to “Factory Settings”.
- Verify correct Viper software.
- If the fuse pops at the end of each ram stroke up or down, look for rams binding or out of sync. In a bind they pull 25-42 amps and will pop the fuse or circuit breaker right now at the end of each stroke.
- Disconnect the ram bolts that attach the actuators to the wing. Verify the wing moves smoothly without binding. Adjust bolts that attach wing if necessary.
- Operate wedge with actuators disconnected from the wing, do not let the end of the actuators spin. Cycle actuators all the way up and down a few times. Monitor speed and length of each actuators stroke, they must operate at the same speed and length. If one actuator is longer than the other, simply turn the longer one in the housing until it matches the length of the other actuator. If one is faster than the other, order a new actuator and use the 2 good actuators. **Must spin paddle wheel 1-9.9 MPH to operate actuators in the up position.**
- If the Power Wedge is still popping the fuse or breaker, look for a direct short in the boat harness. Hotwire Power Wedge at the transom to verify if necessary.

Issue 4: Power Wedge stays on> constant load

- If a Power Wedge is stuck in the on or powered position, unplug the connector to that switch to see if the switch has failed causing the wedge to stay on. If unplugging the switch controlling that load does not stop the operation of that load, replace the MUX Power Module. If the load does stop by unplugging the MUX switch, replace the MUX switch.

Issue 5: Power Wedge trim gauge does not correlate with the wedge

- Reset the Viper to “Factory Settings”.
- Verify gauge signal from brain and gauge operation by performing a “gauge sweep function”.
- Verify correct 3 lobe actuators and Lenco Box are installed.

- Verify wedge sensor connections at the 16 pin connector under the dash, pin location “H” for main instrument harness ground, and pin location “F” for wedge gauge ground.
- Test sensor operation with an OHM Meter by removing sensor on wedge and turning sensor hex manually. Check for OHMs at 16 pin connector under the dash, pin locations H+F to test sensor and wiring in the boat.

Version 3 Overview:

The Power Wedge is controlled by 2 different types of switches depending on boat model:

- The **MUX Switch** operates the Power Wedge by CAN signal to the MUX Power Module, through a 15 amp resettable fuse in the MUX Power Module, to the Lenco Box, then to the Power Wedge.
- Some models are controlled by a manual **momentary DP/DT switch** w/only a Lenco Box and no MUX Power Module.



V2 & V3



V1, V2, V3, V4

V3 Issues:

Issue 1: Wedge will not move at all

- Verify battery has 12+ volts.
- Verify battery lugs are tight on battery and cables are tight on lugs.
- Reset the Viper to “Factory Settings”.
- Verify Power Wedge is turned on to “present” in the dash gauge info center, or verify Power Wedge is “enabled” in the Viper Set-up screen. **Make sure “Auto Wedge” is turned off when diagnosing wedge issues.**
- Verify correct software is installed in the Viper if applicable.
- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- Verify that the red LED is blinking in the MUX Power Module. **If it’s blinking it’s thinking!**
- Check the 20 amp in-line fuse on the red power wire going into the Lenco Power Wedge Box under the dash. Replace fuse if necessary.
- Check wedge and wire operations from dash to the wedge by hot wiring actuators from under the dash. Disconnect actuator wires from the MUX Power Module, using a battery connect 12 volts power and ground to the wires in order to move the wedge in one direction. Reverse connections to move the wedge back in the other direction. If only a Lenco Box is installed, hot wire wedge wires at the Lenco plug. Replace actuators if necessary. **Replace both actuators even if only 1 is bad!**
- If needed, test wedge actuators separately by disconnecting the wedge wires at the transom of the boat, using a battery connect 12 volts power and ground to the wires in order to move the wedge in one direction. Reverse the connections to move the wedge back in the other direction.

Issue 2: Power Wedge fuse keeps popping

- The seal on 1 or both actuators may have failed and leaked, a water logged ram will pull over 15 amps by itself.
- Reset the Viper if applicable to “Factory Settings”.
- Verify correct Viper software.
- If the fuse pops at the end of each ram stroke up or down, look for rams binding or out of sync. In a bind they pull 25-42 amps and will pop the fuse or circuit breaker right now at the end of each stroke.
- Disconnect the ram bolts that attach the actuators to the wing. Verify the wing moves smoothly without binding. Adjust bolts that attach wing if necessary.
- Operate wedge with actuators disconnected from wing, do not let the end of the actuators spin. Cycle actuators all the way up and down a few times. Monitor speed and length of each actuators stroke, they must operate at the same speed and length. If one actuator is longer than the other, simply turn the longer one in the housing until it matches the length of the other actuator. If one is faster than the other, order 2 new actuators. **Must spin paddle wheel 1-9.9 MPH to operate actuators in the up position.**
- If the Power Wedge is still popping the fuse or breaker, look for a direct short in the boat harness. Hotwire Power Wedge at the transom to verify if necessary.

Issue 3: Power Wedge stays on> constant load

- If a Power Wedge is stuck in the on or powered position, unplug the connector to that switch to see if the switch has failed causing the wedge to stay on. If unplugging the switch controlling that load does not stop the operation of that load, replace the MUX Power Module. If the load does stop by unplugging the MUX switch, replace the MUX switch.
- Check for water inside Lenco Module plug.

Issue 4: Power Wedge over-current alarms

- Reset the Viper to “Factory Settings”.
 - On the 2010.5-2013 MY systems, we are using a control box from Lenco that is constantly monitoring the Amperage draw from each Ram as well as insuring each ram is properly connected and operational.
- There are 5 different alarm banners that can pop up to alert the operator of a problem between the Lenco control box and the rams.
- These alarms can be triggered for several different reasons.
 - Foil out of Adjustment.
 - Foil hinge bolts too tight.
 - Ram attachment bolts too tight.
 - One ram is longer then the other.
 - One ram is faster than the other.
 - One or both rams filled with water.
 - One ram is pulling 4 times the amperage of the other.

- The 0.5V-2.5V values next to the Actuator Alarms are the voltages sent to the Viper from the Lenco control box on the pink/white alarm circuit to signal the Viper to display a particular Alarm.

1. 0.5V - Port Actuator – Max Current Draw Failure



“WEDGE FAULT PORT ACTUATOR MAXED” is a signal from the Lenco box indicating a port actuator failure or fault.

2. 1.0V - Stbd Actuator - Max Current Draw Failure



The “WEDGE FAULT STARBOARD ACTUATOR MAXED” is a signal from the Lenco box indicating a starboard actuator failure or fault.

3. 1.5V - Port Actuator - Average Current Failure (Tends to catch binding actuators or reverse polarity failure)



“WEDGE FAULT PORT ACTUATOR AVERAGE” is a signal from the Lenco box indicating a port actuator failure or fault.

4. 2.0V - Stbd Actuator – Average Current Failure – (Tends to catch binding actuator or reverse polarity failure)



The “WEDGE FAULT STARBOARD ACTUATOR AVERAGE” is a signal from the Lenco box indicating a starboard actuator failure or fault.

5. 2.5V - Unbalanced Current Failure (Tends to catch open or poor connections)



“WEDGE FAULT UNBALANCED” is a signal from the Lenco box indicating an actuator failure, alignment or fault.

Shown below are 2 more Power Wedge banners that will appear under normal operation of the boat:



A warning for the “WEDGE MOVING” only appears when the wedge is moving up past the wake zones.



“HIGH SPEED WEDGE DOWN” is shown when the boat is going above 25 MPH with the wedge down.

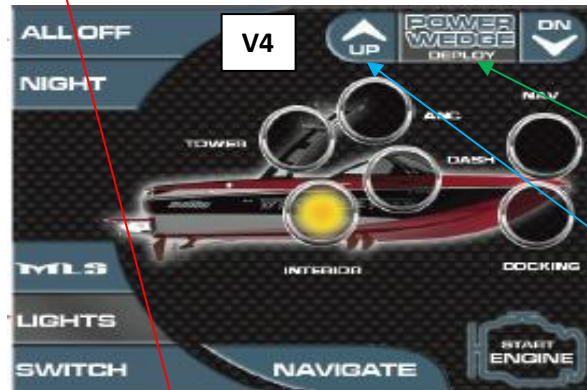
Issue 5: Power Wedge trim gauge does not correlate with the wedge

- Reset the Viper to “Factory Settings”.
- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- If an Information Gauge is installed in the dash, verify gauge operation and signal from brain by performing a “gauge sweep function”.
- Operate Power Wedge up and down a few cycles to see if gauge and wedge will link up.
- Verify correct 3 lobe actuators and Lenco Box are installed

Version 4 Overview:

The Power Wedge is controlled by 2 different types of switches depending on the boat model:

- The MTC operates the Power Wedge by a CAN signal to the Primary Power Module, to the Lenco Box then to the Power Wedge.
- A manual **momentary DP/DT switch** operates the Power Wedge with the Lenco Box.



Wedge Down: Moves wedge down

Power Wedge Deploy: Auto Deploy wedge all the way down.

Wedge Up: Button must be pushed and held while moving 1-13MPH to move wedge up or all the way up.



V4 ISSUES:

Issue 1: Wedge will not move at all

- Verify battery has 12+ volts.
- Verify battery lugs are tight on battery and cables are tight on lugs.
- Reset the Viper and MTC to "Factory Settings".
- Verify Power Wedge is turned on to "present" in the dash gauge info center, or verify Power Wedge is "enabled" in the Viper Set-up screen. **Make sure "Auto Wedge" is turned off when diagnosing wedge issues.**
- Verify correct software is installed in the MTC Screen and the Viper if applicable.
- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- Check wedge and wire operations by hot wiring actuators from under dash. Disconnect actuator wires from Power Module, using a battery connect 12 volts power to white wire, and ground to black wire to move wedge in one direction. Reverse connections to move wedge back in other direction. Replace actuators if necessary. **Replace both actuators even if only 1 is bad!**
- If needed, test wedge actuators separately by disconnecting the wedge wires at transom of boat, using a battery connect 12 volts power to white wires, and ground to black wires to move wedge in one direction. Reverse connections to move wedge back in other direction.
- Verify that the red LED is blinking in the Primary Power Module. **If it's blinking it's thinking!**

- Check both 5 amp fuses for “wedge up” and “wedge down” in the Primary Power Module.
- Check the 20 amp in-line fuse on the red power wire going into the Lenco Power Wedge Box under the dash. Replace fuse if necessary.
- Verify Primary Power Module and Power Wedge operation by moving both fuses one at a time to the “wedge up” or “wedge down” to the by-pass position.

Issue 2: Power Wedge fuse keeps popping

- Reset the Viper and MTC to “Factory Settings”.
- The seal on 1 or both actuators could have failed and leaked, a water logged ram will pull over 15 amps by itself.
- Verify correct Viper software for 2009 models, V14.
- If the fuse pops at the end of each ram stroke up or down, look for rams binding or out of sync. In a bind they pull 25-42 amps and will pop the fuse or circuit breaker right now at the end of each stroke.
- Disconnect the ram bolts that attach the actuators to the wing. Verify the wing moves smoothly without binding. Adjust bolts that attach wing if necessary.
- Operate wedge with actuators disconnected from wing, do not let the end of the actuators spin. Cycle actuators all the way up and down a few times. Monitor speed and length of each actuators stroke, they must operate at the same speed and length. If one actuator is longer than other, simply turn longer one in housing until it matches the length of the other actuator. If one is faster than the other, order a new actuator and use the 2 good actuators. **Must spin paddle wheel 1-9.9 MPH to operate actuators in the up position.**
- If the Power Wedge is still popping the fuse or breaker, look for a direct short in the boat harness. Hotwire Power Wedge at the transom to verify if necessary.

Issue 3: Power Wedge stays on> constant load

- Reset the Viper and MTC to “Factory Settings”.
- If a Power Wedge is stuck in the on or powered position, unplug the connector to that switch to see if the switch has failed causing the wedge to stay on. If unplugging the switch controlling that load does not stop the operation of that load, replace the MUX Power Module. If the load does stop by unplugging the MUX switch, replace the MUX switch.
- Check for water inside Lenco Module plug.

Issue 4: Power Wedge over-current alarms

- Reset the Viper and MTC to “Factory Settings”.
- On the 2010.5-2013 MY systems, we are using a control box from Lenco that is constantly monitoring the Amperage draw from each Ram as well as insuring each ram is properly connected and operational.

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2. 1.0V - Stbd Actuator - Max Current Draw Failure



The “WEDGE FAULT STARBOARD ACTUATOR MAXED” is a signal from the Lenco box indicating a starboard actuator failure or fault.

3. 1.5V - Port Actuator - Average Current Failure (Tends to catch binding actuators or reverse polarity failure)



“WEDGE FAULT PORT ACTUATOR AVERAGE” is a signal from the Lenco box indicating a port actuator failure or fault.

4. 2.0V - Stbd Actuator – Average Current Failure – (Tends to catch binding actuator or reverse polarity failure)



The “WEDGE FAULT STARBOARD ACTUATOR AVERAGE” is a signal from the Lenco box indicating a starboard actuator failure or fault.

5. 2.5V - Unbalanced Current Failure (Tends to catch open or poor connections)



“WEDGE FAULT UNBALANCED” is a signal from the Lenco box indicating an actuator failure, alignment or fault.

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A warning for the “WEDGE MOVING” only appears when the wedge is moving up past the wake zones.



“HIGH SPEED WEDGE DOWN” is shown when the boat is going above 25 MPH with the wedge down.

Issue 5: Power Wedge trim gauge does not correlate with the wedge

- Reset the Viper and MTC to “Factory Settings”.
- Verify the wedge foil is adjusted correctly so that the tips of the wedge foil are level with the top of the transom bracket.
- With an Information Gauge installed in the dash, verify gauge operation and signal from brain by performing a “gauge sweep function”.
- Operate Power Wedge up and down a few cycles to see if gauge and wedge will link up.
- Verify the correct Lenco actuators and the Lenco Brain Box is installed, 3 lobe or 5 lobe.

Issue 6: Power Wedge deploys on its own when the dash is turned on

- Reset the Viper and MTC to “Factory Settings”.
- Remove the 5 amp fuse for “wedge down” in the Primary Power Module.
- Turn on the dash, if the wedge did not go down; perform an ohms test on the MTC, possibly a bad MTC.
- If the wedge did go down when dash was turned on, possibly a bad Lenco Brain Box.

Issue 7: Power Wedge “leaks” down more than 1” when motor is started

- Remove the 5 amp fuse for “wedge down” in the Primary Power Module.
- Start the motor and monitor the wedge movement, if the wedge did not move, replace the Primary Power Module.
- If the wedge did move, check for drilled wires on the boat starter circuit yellow wire and Power Wedge actuator wires.