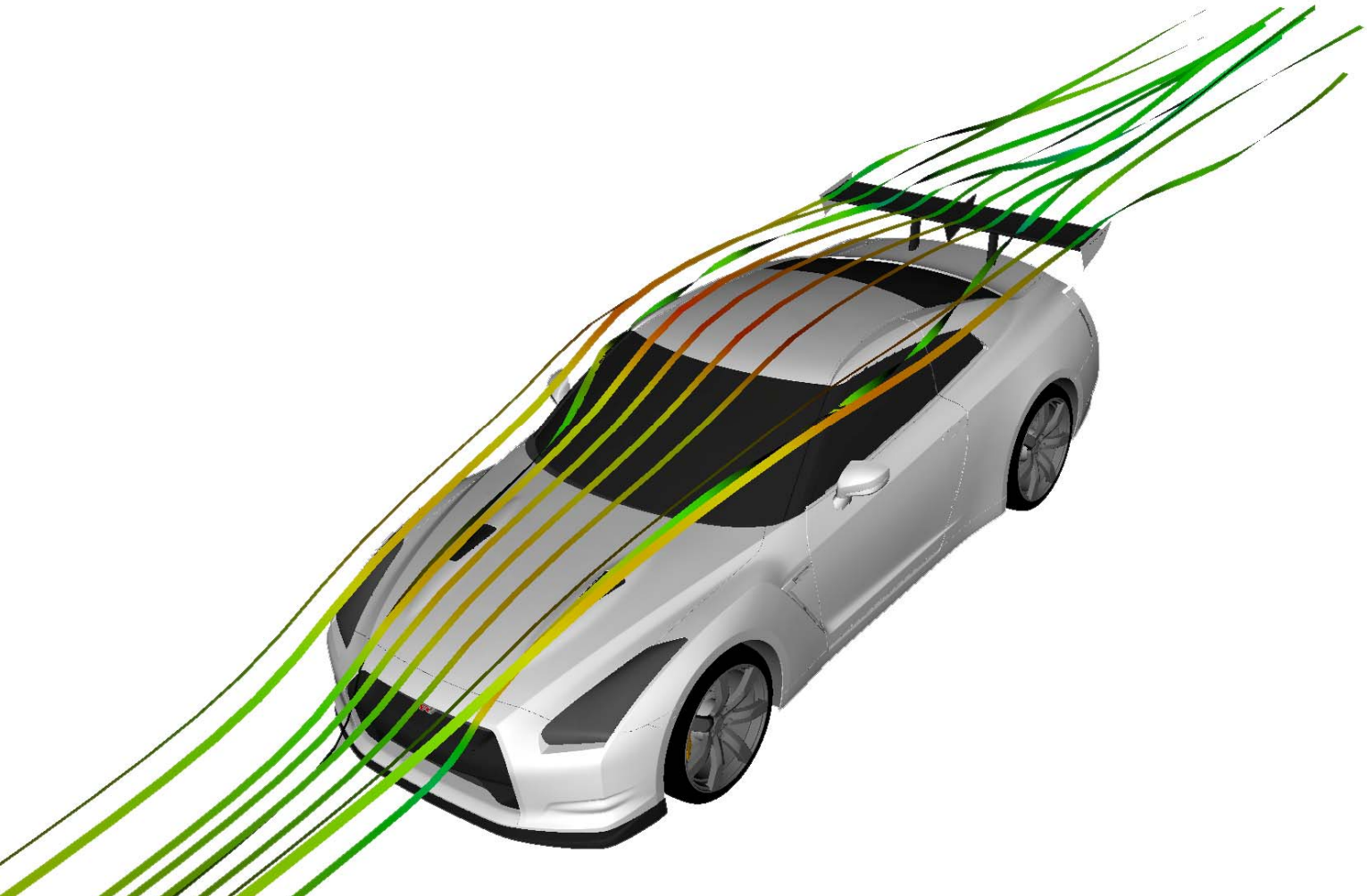
aeromotions | AERODYNAMICS WITHOUT COMPROMISE

# R2.TWO R35 GT-R Install Guide
# OE Fit



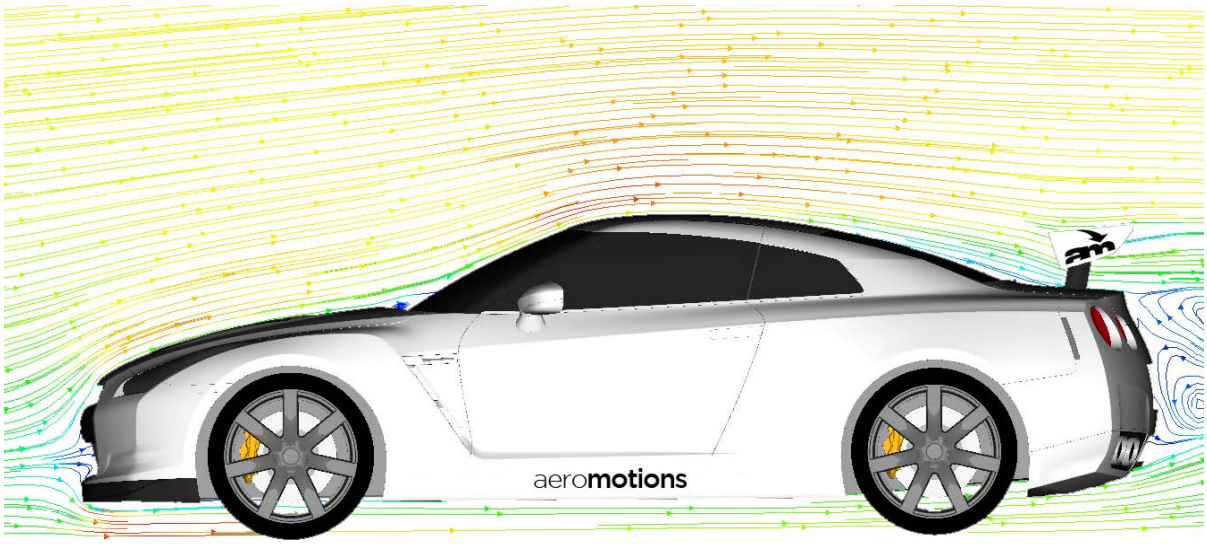
# 1. Quick Start Guide

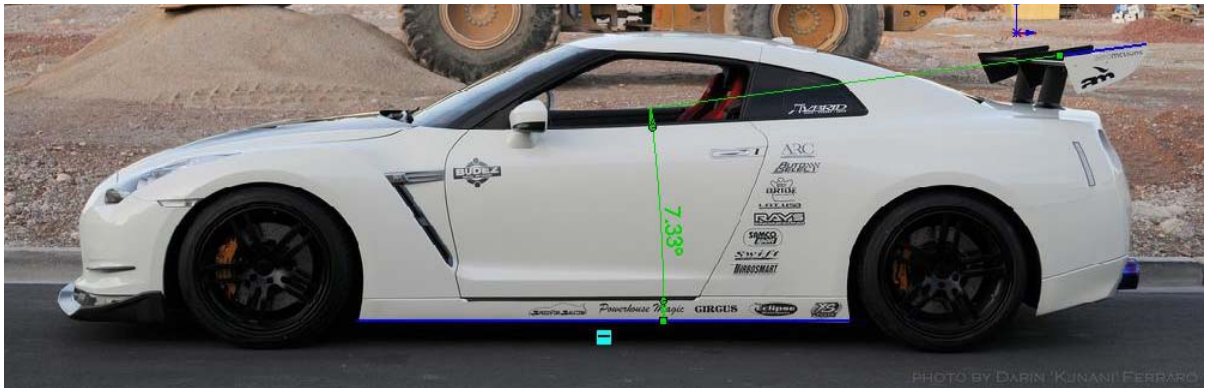
AeroMotions recommends professional installation of the R2.TWO Dynamic Wing. If the wing was professionally installed, here's what you need to know to use it. The wing has three angles: Braking, cornering, and straightaway.

1. The Braking angle is high downforce and high drag for maximum stopping power.
2. The Cornering angle should be set to provide the level of downforce needed to balance the car at the traction limit in a turn. The correct angle is dependent on car setup, and should be adjusted using the toggle switch on the Dynamic Module. Toggle the switch up to increase downforce in a corner, or down to reduce downforce.
3. Straightaway is set for low drag. You can increase this angle if you want more stability at high speed.

# 2. Tuned for your GT-R

The Computational Fluid Dynamic (CFD) model of the GT-R, shown below, will let you see how the air flows around the GT-R. It's worth noting that the air follows the rear window of the car, approaching the wing at a downward angle. This "apparent angle of attack" means the wing is actually operating at a higher angle of attack than you would measure with a level (which assumes the air is coming straight on). This is why your wing has a maximum stall angle of 7.4 degrees when mounted on the GTR (instead of the 14.2 degrees of the wing by itself).



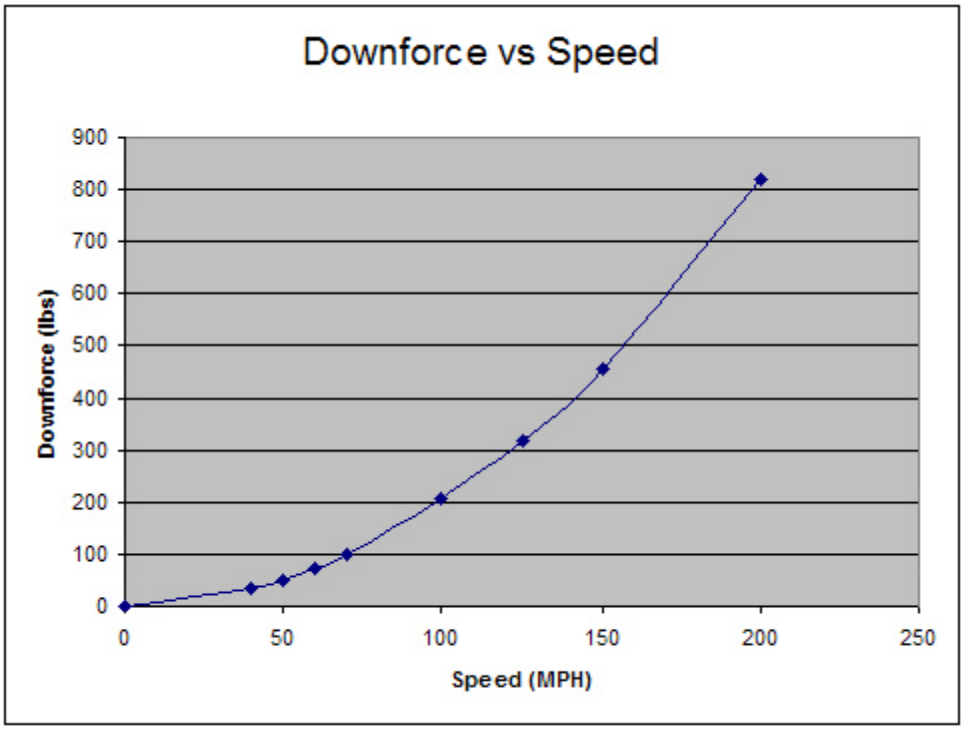



## Tuning Cornering Angle

This graph gives the maximum downforce as a function of speed for the Nissan GT-R at 7.4 degrees

**The cornering angle should be adjusted based on the front aero on your GT-R.** The Aeromotions wing features a high performance airfoil. With an Aeromotions wing, small wing angles produce much more downforce than standard wings at the same angle. When tuning on a new car, the goal is to get the rear aero (wing, diffuser, etc) to balance the front aero (splitter, canards, etc). As a rule of thumb, a 30-60mm front splitter should start with 2-3 degrees of wing angle, and increase 1 degree at a time.

As the below graph shows, the effect of the wing will increase with the square of speed. Low speed handling is dominated by tires and suspension, high speed handling is dominated by aero. The crossover point is somewhat unique to each car and setup.



# 3. Wiring

## Connections on the Dynamic Module

### Power Cable

- The Dynamic Module requires 10Amp switched power.
- +12V should be applied to the red wire.
- The Black wire is ground.

### Data Cable ( 3 wire connector)

- VSS
  - The Blue wire connects to the vehicle VSS wire.
  - Connect the VSS wire from the GTR Navigation as described below..
  - For a stand alone ECU, the output signal should be:
    - A square wave (OC)
    - 0-5V or 0-12V
    - Default pulses per mile is 3,600
  - **A sine-wave output from a hall effect sensor will not work.**

- Data Logging
  - The Brown wire can be connected to a Data Logger. The wing position is output as an analog voltage from 0-5V.

- Ground
  - The black wire is an extra ground wire. It can be left disconnected.

## Setting the VSS

**Set the DIP switches 6,7,8 on the Dynamic Module to calibrate the VSS for your car and engine management system. 0 is off, 1 is on. The Pulse Per Mile (PPM) can also be programmed into a standalone engine management system to provide speed information to the wing.**

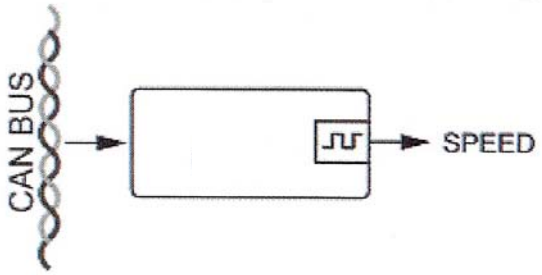
| DIP 6 | DIP 7 | DIP 8 | PPM | Application |
|---|---|---|---|---|
| 0 | 0 | 0 | 3,600 | Can Adapter (2012 GTR) |
| 0 | 1 | 0 | 8,000 | R35 GTR 2007 - 2011 |

# 2012 GTR Vehicle Speed Sensor (VSS) CAN Adapter

| Color | I/O | Function |
|---|---|---|
| Black | I | Ground |
| Red | I | Power +12V regulated ignition controlled supply |
| Yellow | I | CAN High |
| Blue | I | CAN Low |
| Orange | O | Speed Pulse Output 12V |

Connecting the CAN Adapter

- CAN wires are behind the speedometer in the EVO X.
  - Pink is CAN low
  - Green is CAN High
- Connect the Orange output wire to the Blue VSS wire in the Aeromotions Wing.




The CAN Adapter has built-in diagnostic LEDs to indicate CAN Bus status and speed pulse output to aid the installation process. After power-up:

- Stage 1: Both LEDs light for approx 1 second
- Stage 2: Green LED on while the CB-1 listens for CAN Bus data
- Stage 3: Red LED indicates CAN has been detected. CB-1 now detecting vehicle type
- Stage 4: Once vehicle type is determined the Green LED should pulse when vehicle is driven. Red LED should stay on.

*Please note: If LEDs do not follow the above sequence it is still advisable to drive the vehicle to see if a speed pulse signal is still actually being produced by the CB-1. It is possible that some vehicles will perform in a different manner.*

## General Installation Notes

The CAN Bus uses two wires for data transmission. One is called CAN_HIGH and the other called CAN_LOW (sometimes marked as CAN+ and CAN- respectively). All connections should be made with an **insulated solder joint**. Do not cut the CAN Bus wires.

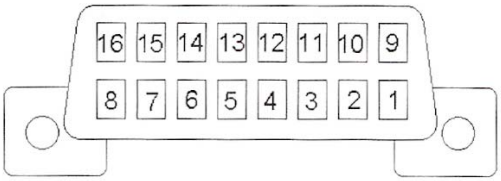
IMPORTANT NOTICE: All connections are for guidance only and to the best of our knowledge. We cannot be held responsible for changes made by the vehicle manufacturer. The CAN Bus system is growing in use by American and European vehicle manufacturers. Unfortunately, they do not conform to anyone standard or wiring concept. Colors can vary as well as location and layout of ECU's. In addition, a vehicle can have more than one CAN Bus system, with potentially only one set carrying the speed pulse data. It is also advisable to disconnect the CAN I SCP interface before any diagnostic work is carried out on the vehicle. This will prevent any possible damage to the interface and also allow any diagnostic work to be carried out successfully.

1. Since manufacturers continually change the pin configuration of the plugs, it is advisable to pick up Pos and Neg for powering the interface from an alternative supply, preferably a good ignition controlled regulated supply. A good earth is essential.

2. The CAN Bus interface has such high internal impedance that it cannot affect the vehicle operation.

3. Connect the CAN High and CAN Low wires before powering up the CB1 interface, so removing any possibility of shorting. While the power wires can be extended, it is *not* advisable to extend the CAN High and Low leads. If there is a need to extend the signal lead (Orange), please ensure that it is run to its destination *avoiding* being close to equipment that might give off pulses which could be picked up by this wire, such as ignition or heater fans, etc.

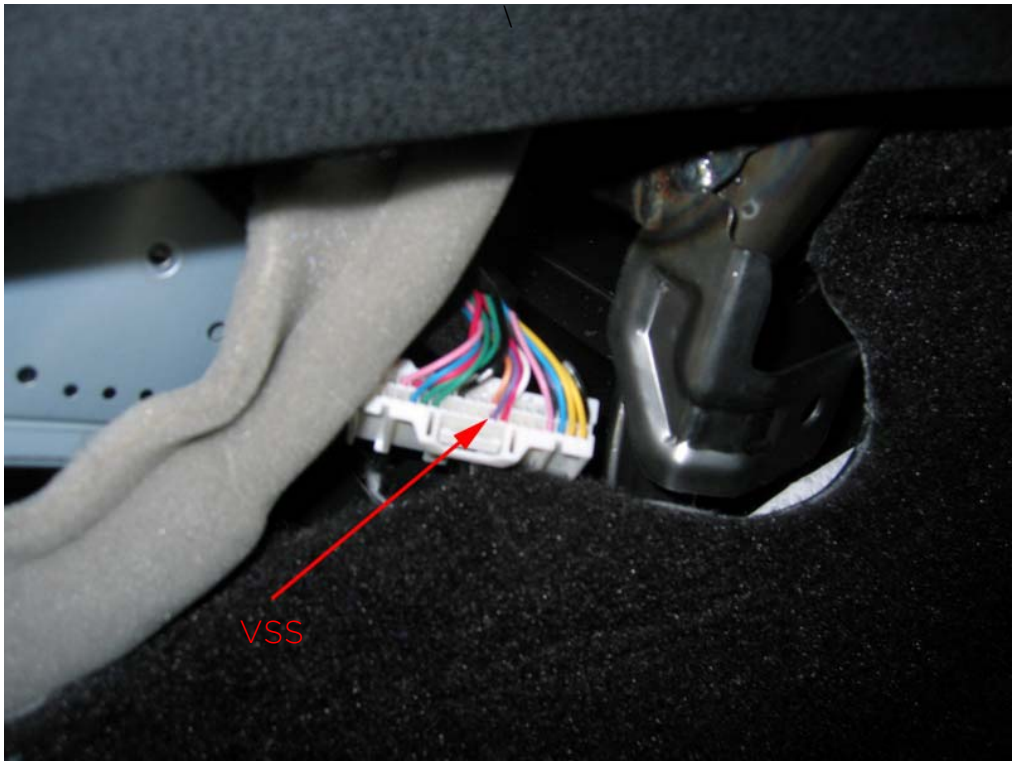
### OBD II Plug

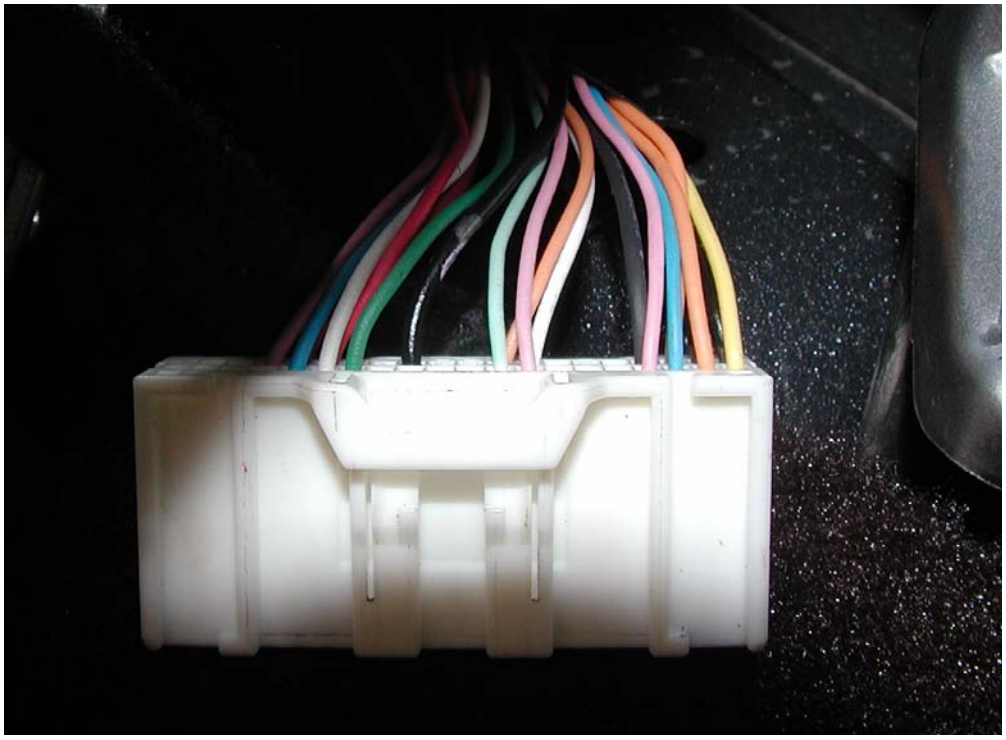



## 2007-2011 GTR Vehicle Speed Sensor (VSS)

The VSS provides the vehicle speed to the computer. The VSS is tapped from the dash behind the navigation console. First remove the center console near the passenger seat. It pulls straight out near the center and slides back near the front.

Behind the DVD head unit, there is a WHITE plug with 20+ positions. From the rear of the unit, it would be on the top left corner. From your passenger side view, it's the closest to you on top. Near the center of the TOP of the plug, is a red power line, right next to that is a VIOLET line. The violet line is the VSS wire. *Note, Australian, and British GT-R's have a light green VSS wire.*





Australian VSS wire, Light Green, in the same location as the USDM VSS.

# GT-R Power

Power can be tapped off an existing 10A switched line, or run as a switched relay from the battery.

## Tapping into the switched power.

There is a 10 amp switched cigarette receptacle toward the back of the center arm rest. This can be tapped to supply the power for the wing. This circuit is already switched and fused. At track speeds, the wing will require all 10 amps, in which case, you should not use the cigarette lighter to power any other accessories. Unplug phone chargers or any additional power draws for track use.

The cigarette lighter can be pulled forward through the console in which it is mounted. Doing so will prevent substantial disassembly of the consosole. The power can be tapped here, and run back through the hole the cigarette lighter came out of.

## Running power from the battery.

The battery is on the right side of the engine compartment. There is a small rubber stopper behind the battery that goes directly into the cabin. Pull the side panel (lower right passenger side, one plastic thumb screw, then pull panel in towards car evenly - it pops out). Behind that and UP is the ECU and wiring harnesses. Looking farther up and toward the front firewall you will see the hole from the removed stopper.

# 4. Mounting The R2.TWO

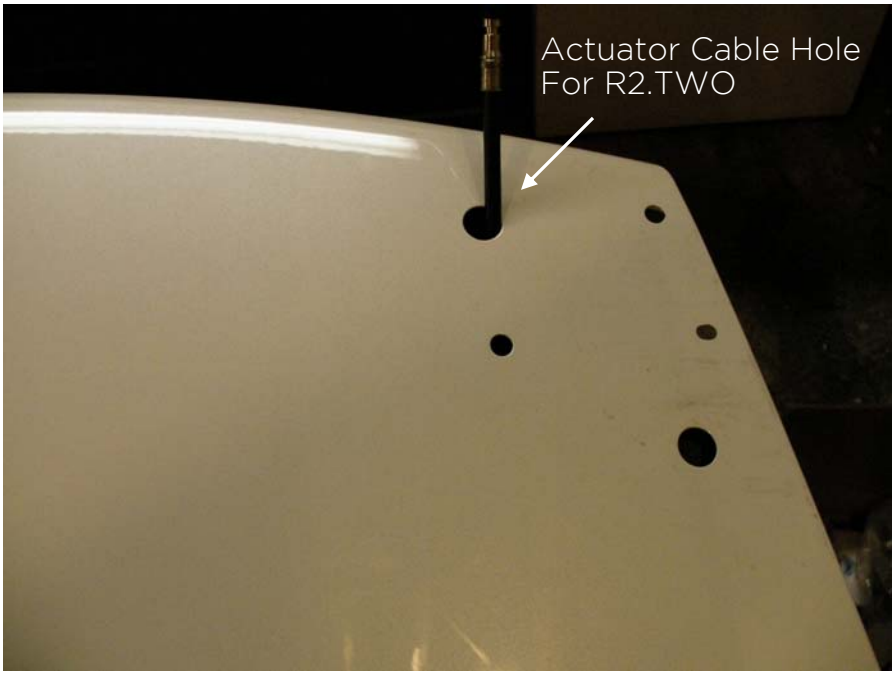
## Mounting the Dynamic Module

The Dynamic Module should be fit to the center of the deck lid as shown below. **Fastening the Dynamic Module to the lid is the LAST step in the install process. The Module should be fastened to the lid AFTER the wing is completely bolted down.** Use zip ties to loosely hold the module in place during installation (Do not let it hang by the actuator cables). Part of the mounting process requires over-extending the actuator cables through the deck lid. This is only possible with the short cable if the Dynamic Module is free to move toward the Driver Side of the car.

Mounting the R2 uses most of the stock holes from the factory wing. Use the drill guide template in this manual to make the additional holes in the correct locations. These holes will be covered if the factory wing is reinstalled.

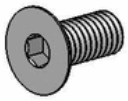
The stock GT-R trunk has two raised holes used to attach the trunk liner as shown in the picture below (one on each side). The rear-most Controller mounting holes should be about .9" from that hole so the feet will sit next to the raised holes, while not being on the raised portion around the stock hole. Mount the R2 Actuator Box to the underside of the deck lid in the orientation shown above. The Aeromotions logo should be upright when viewed with the trunk open. The R2 Actuator Box should be mounted using the included pop-rivets through the inside skin of the trunk **AFTER the wing is completely bolted down**.

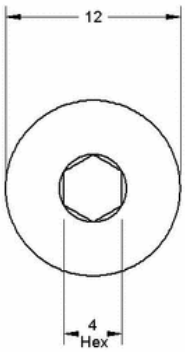

Pass the actuator cables through the existing holes in the trunk as shown in the picture above. The cables should pass through the existing larger holes in the top and bottom skin of the trunk. *Note, the short cable is for the left hand side.*

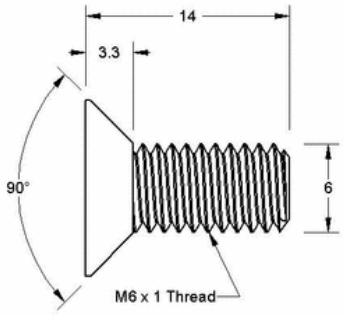


## Mounting Hardware for OE Fit Uprights

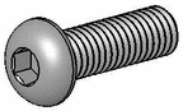
### Flathead M6

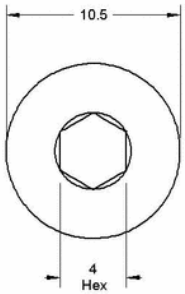


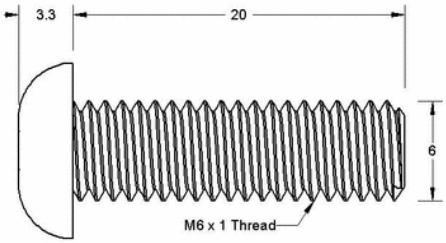


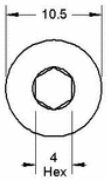

### M6 x 20

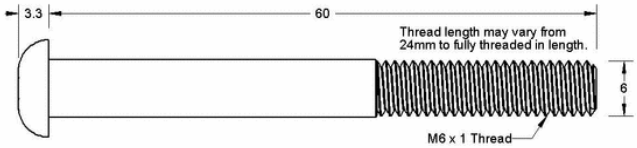




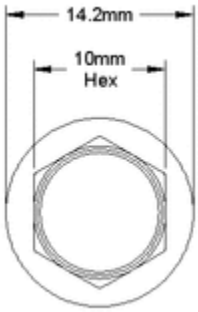



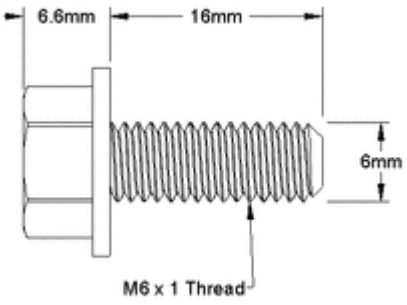

### M6 x 60

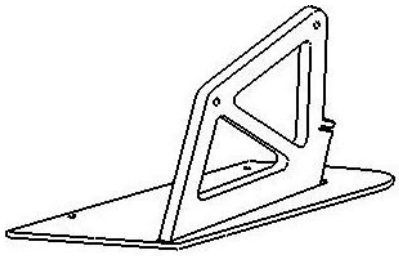


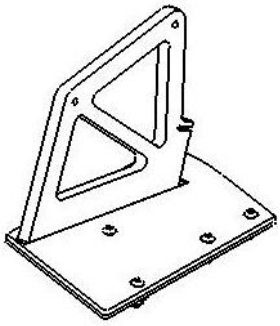




### M6 x 16MM Hex Bolt



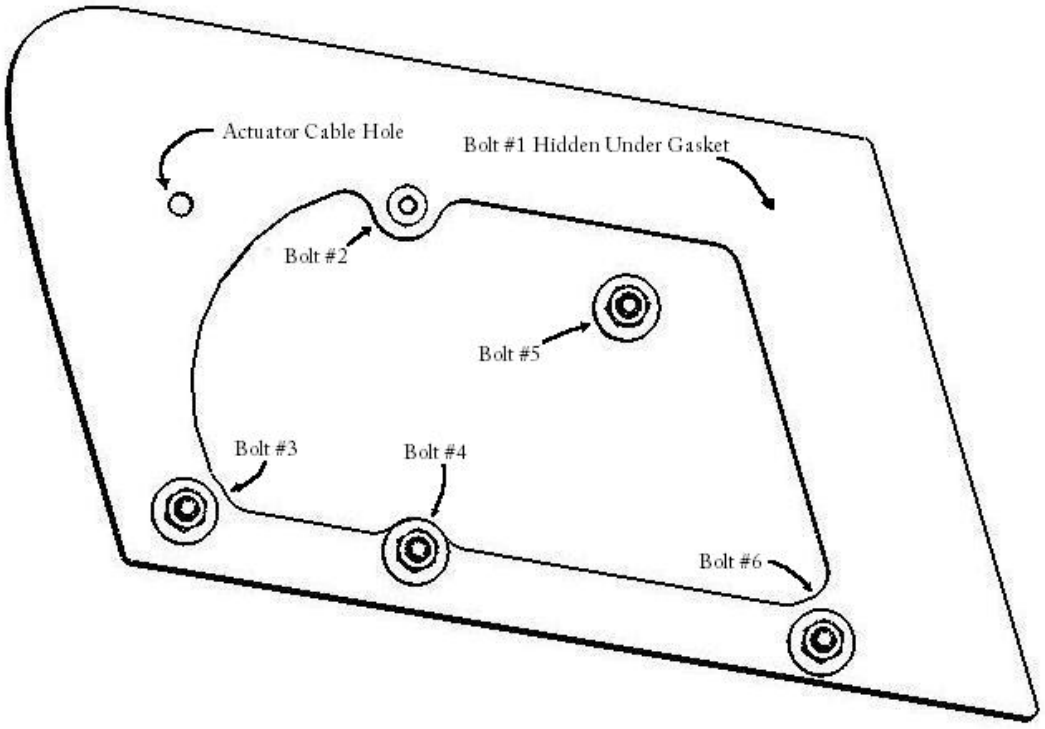







OE Mounting Plates and Uprights

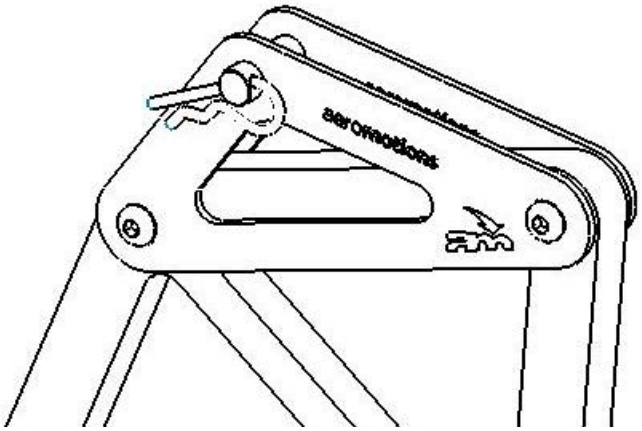
Place the two gaskets on top of the trunk so they will line up with the left and right feet as shown above. The actuator cables should pass through the hole shown in the picture below. Note that it is a tight fit to provide a seal around the cable.




Top View of the passenger side gasket.

## Trunk Mounting

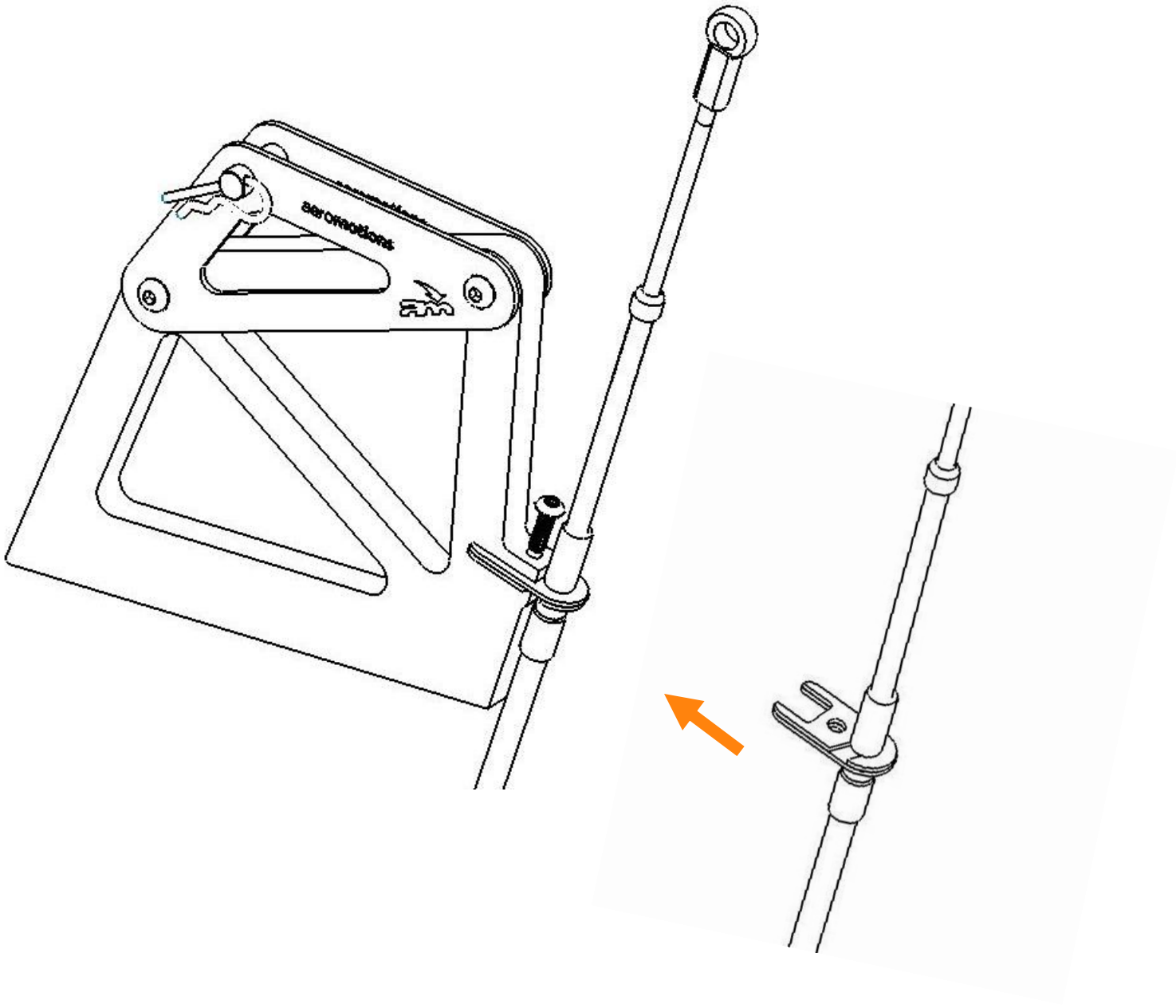
- Attach one stainless steel triangle on each side of the wing with M6 bolts. The outside surface of each plate ships with a PVC coating to protect the finish. Peel off the coating, and wash with mild soap and water.



- Bolt each upright to a foot (plate) using the M6 Flathead screw, Bolt #1 (McMaster number 91294A237). *Note that this screw does not pass through the gasket.*

## Attach Actuator cables to Wing

- Make sure rubber seals and boots stay in place when routing the actuator cables through the deck lid.
- Place two of the Stainless Steel Cable Anchors in the mounting groove of each cable. The two pieces are overlapped in opposite direction to fully wrap around the actuator cable.



- Slide the forked end of the two cable anchors into the slot on the upright and anchor with the 10-32 bolt.
- Screw a rod end onto the end of each push-pull cable.
- **The rod ends must be fully screwed in to function properly.**
- Never operate the wing without having both rod ends attached to the wing.

## Bolt 2

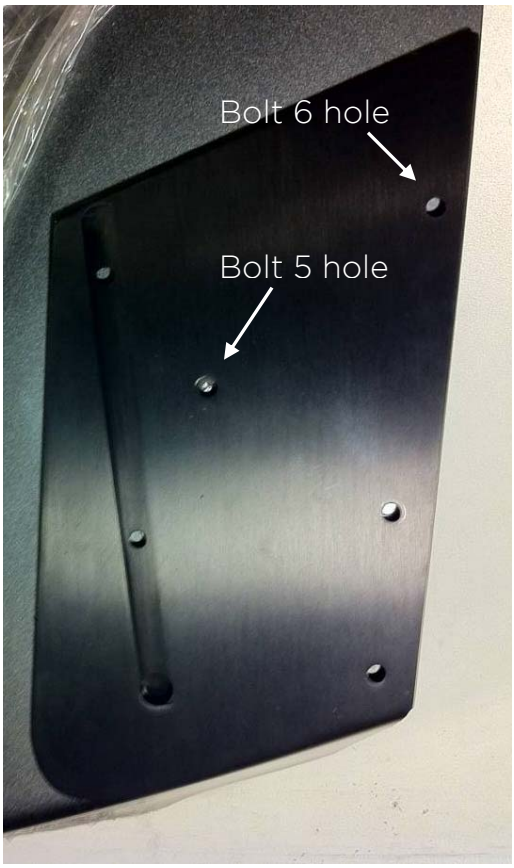
From the bottom side of the trunk lid, screw Bolt #2 (M6 x 16mm Flange Hex Head Screw, McM 98093A436) into the upright. *Note: The bolt passes through an existing hole in the top skin of the deck lid, through the gasket, through the foot, and screws into the upright. No washer is used. The bolt head is on the under side of the deck lid.*

## Bolts 3 and 4

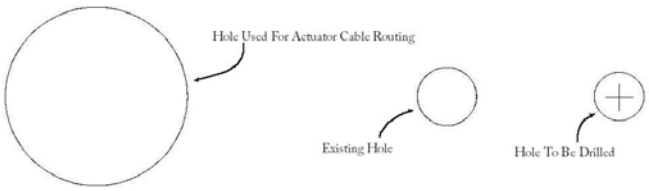
From the top of the trunk lid, bolts #3 and #4 (M6 x 1 x 20 MM long, McM 92095A240) pass through the foot, the gasket, and existing holes in the deck lid. The bolts can be secured using the included washers and nyloc nuts, or, for a more finished look, the stock nuts that held the stock wing on can be used. *Note, the bolt head is in the top of the mounting plate.*

## Bolt 5

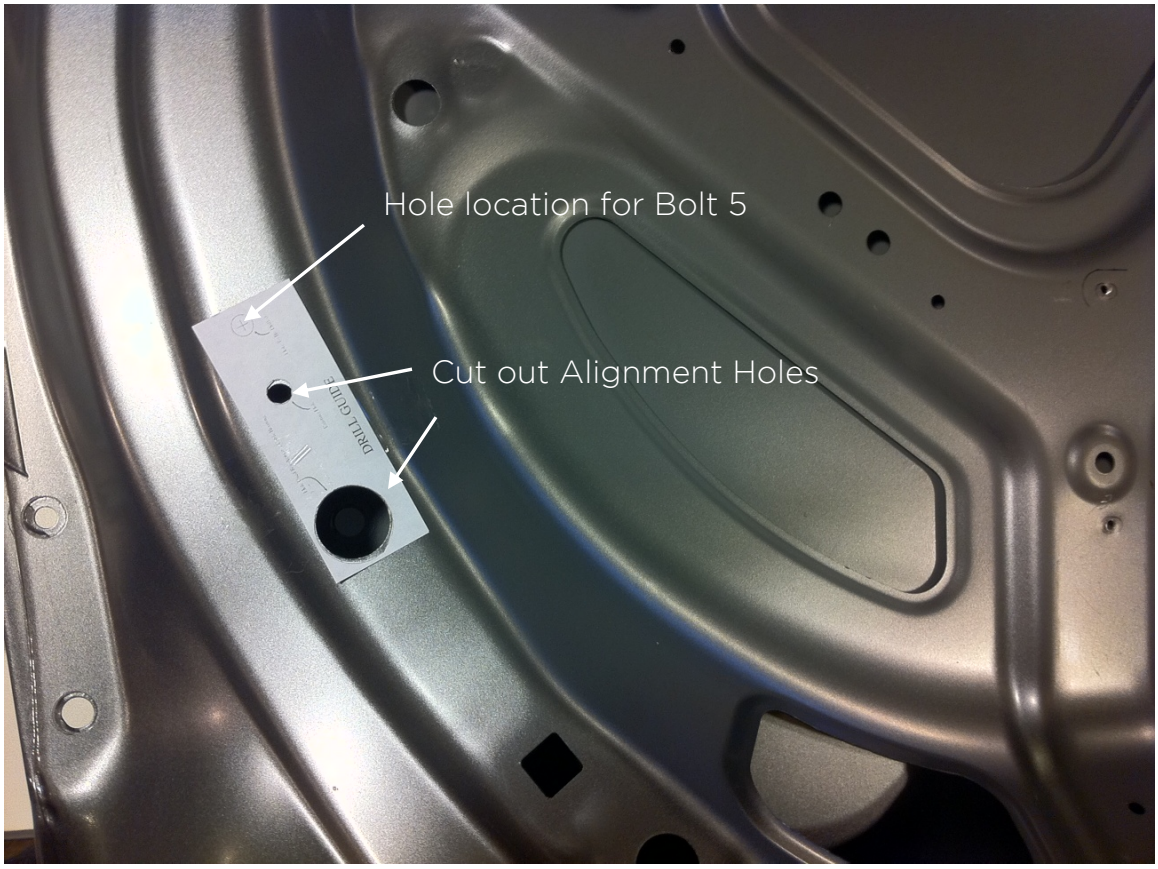
Bolt 5 holds the front end of the plates securely on the deck lid. A ¼" hole should be drilled through the deck lid top skin using the foot as a drill guide for Bolt #5. Only drill through the top skin of the deck lid. The bottom hole will be drilled from below, using the provided template. This ensures accurate alignment.



**The ¼" hole through the deck lid bottom skin should be drilled from the bottom side using the drill guide in the image below. Cut out the image, which prints to scale, and use it as a drill guide. The head of Bolt #5 (M6 x 1 x 60 MM long, Mcmaster number 92095A254) will sit on top of the mounting plate. The nut sits on the bottom side of the trunk lid. The bolts can be secured using the included washers and nyloc nuts, or one of the stock nuts that held the stock wing in place.**




DRILL GUIDE



## Bolt 6

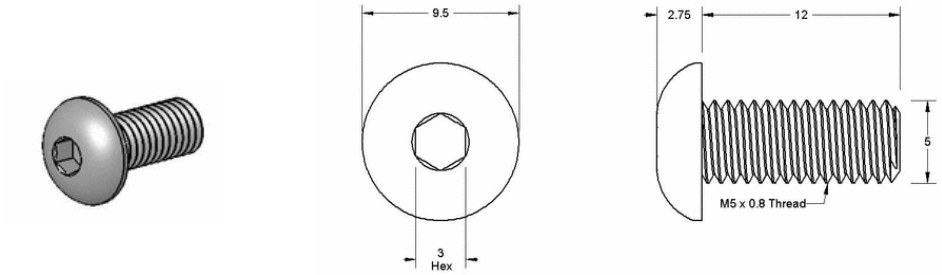
Bolt #6 (M6 x 1 x 20 MM long, Mcmaster number 92095A240) passes through the foot, the gasket, and a drilled hole in the deck lid.  This hole can be drilled using the foot as a guide.  The bolts can be secured using the included washers and nyloc nuts, or the stock nuts that held the stock wing on can be used.

## Center Hole from OE Wing

The OE GT-R wing has color matched vinyl discs that cover the bolt holes between the top and bottom wing parts.  Use one of these dots to cover the center hole left in the deck lid after removing the stock wing.

# Mounting Hardware for End Plates

## M5 x 12




# 5. Using the R2

## Pre-Flight Check

When the power is turned ON, the wing performs a startup check. The wing will move to each of the programmed angles, Braking, Cornering, Straightaway. Watch to ensure the wing moves smoothly, and freely. The green light flashes during the startup check. If you start to drive, the wing will skip this check.

The green light will remain ON in normal operation

## Setting Wing Angles

Use the toggle switch and dip switches to set the wing angles.

- **B**raking Angle
  - The wing moves to this high downforce, high drag angle during braking.
- **C**ornering Angle
  - This is the default wing angle. The wing at this position when the car is standing still, or cornering. Increasing or decreasing this angle will change the car's balance in corners.
- **S**traightaway Angle
  - The wing moves to this low drag angle when it detects the car is on a straightaway.

The most common adjustment is to change the Cornering Angle. **To adjust the Cornering Angle**, use the toggle switch. One click Up or Down gives ½ Degree of wing adjustment. The computer will store this new angle. See below "Advanced Tuning" if you want to adjust the other angles.

# 6. Advanced Tuning

The Type R2 wing controller has eight DIP switches on the end of the Actuator Box. These DIP switches can be used to tune the controller.

## FACTORY DEFAULT: All switches OFF

All switches are set to OFF (*the OFF position is UP)*, as shown in the picture below. This is the setting for the VSS with CAN adapter. *Note: when the deck lid is closed, these switches will be upside down compared to this picture.*


## MANEUVERING LOCK MODE: Switch 1 ON

The wing will stay at the Cornering (Maneuvering) Angle. Red light is ON solid in Lock Mode (Solid Green light will also be ON).

## SPEED SETUP MODE: Switch 2 ON

When the vehicle is moving slowly, the red LED will flash to indicate each Vehicle Speed Sensor (VSS) pulse is being received. This is best seen at very low speeds, less than 5 mph. Use this to ensure the wing is receiving the VSS signal.

The green LED flashes to indicate the Speed Threshold setting. The Speed Threshold is the speed at which the wing will move from Cornering to Straightaway angle. Each flash represents 10 mph. For example, a Speed Threshold of 120 mph would be indicated by 12 flashes.

When Switch 2 is ON, the toggle switch adjusts the Speed Threshold Up and Down in 10 mph increments.

## BRAKING ANGLE LOCK MODE / ANGLE ADJUST: Switch 3 ON

With Switch 3 ON, the toggle switch adjusts the Braking Angle. In Braking Adjust Mode, the wing is locked at the Braking Angle.

## STRAIGHTAWAY ANGLE ADJUST: Switch 4 ON

With Switch 4 ON, the toggle switch adjusts the Straightaway Angle. In Straightaway Adjust Mode, the wing is locked at the Straightaway Angle.

DEMO MODE causes the wing to run through the Pre-Flight routine until power is cycled, or until the car starts moving. Demo Mode is entered by holding Down the toggle switch while powering up the wing.

# 7. Trouble Shooting

**Motor Fault Code**

Four (4) flashes of the red light on the Dynamic Module indicate a motor fault code.

If the motor experiences an overload condition or the wing is not able to move to it's commanded angle, it will throw a Motor Fault Code and will enter a Safe Mode. In Safe Mode, the wing will move to the maximum angle of attack (full downforce angle). The toggle switch can still be used to move the wing angle UP and DOWN so the wing can be run in static mode.

**Clearing the Fault Code**

Check for causes of the overload

- Check that the actuator cables are not kinked. The minimum bend radius is 3"
- Check that nothing is obstructing the movement of the wing, such as ice.

1. To clear the Motor Fault Code, Turn SWITCH 1 and SWITCH 2 ON. The wing will enter Lock Mode (the Green and Red Lights will both be solidly lit) and the Motor Fault will clear.
2. To enter normal operation, Turn SWITCH 1 and 2 back to OFF.
3. Turn the wing off and then back on after clearing a Motor Fault Code so the wing will run the self check routine.
4. If the Motor Fault Code is immediately thrown following the reset, contact Aeromotions for support.

**Resetting Factory Defaults**

Attention: A Hard Reset will clear all fault codes and reset wing angles and speed setting to Factory Default. It will also re-calibrate the accelerometer, so it should be done with the vehicle on a level surface and the Actuator Module in the flat position (deck lid should be closed if the Actuator Module is mounted to the deck lid).

Initiating a Hard Reset

1. Park the car on a level surface and close the deck lid
2. Turn OFF power to the wing
3. Place all DIP SWITCHES in the ON position.
4. Turn ON power to the wing
5. Wait at least 30 Seconds
6. Turn OFF power to the wing
7. Turn all DIP SWITCHES OFF

## Legal Notice

PROFESSIONAL INSTALLATION IS HIGHLY RECOMMENDED and products are understood by consumer to be OFF-ROAD USE ONLY upon purchase. RACING IS INHERENTLY DANGEROUS. The consumer assumes responsibility and all liability associated with operating an Aeromotions wing upon purchase. CHECK ALL EQUIPMENT before racing. Car setup is unique. The consumer is responsible for ensuring the correct setup, tuning, and working of the Dynamic Wing with their vehicle setup.