

# **STRATIFIED**

## **GUARDIAN ANGEL V<sub>2</sub>**

**Electronic Over-Boost Protection System  
With Vent-to-Atmosphere Valve Control  
And Optional 4 Bar MAP Sensor Output**

## **Installation and User Guide**





**Thank you and congratulations on the purchase of your new Stratified Guardian Angel over-boost protection system. Follow this document to ensure safe and proper installation and operation of your new device.**

### **WARNINGS AND WARRANTY – PLEASE READ CAREFULLY**

ALL parts are sold for OFF ROAD RACE-ONLY ground vehicle use only.  
Aftermarket systems interacting with engine function are not for use on pollution controlled vehicles.  
Alteration of emission related components constitutes tampering under most local emission regulation guidelines and can lead to fines and penalties.

#### **Limited Warranty**

This Stratified product is warranted against defects in materials and workmanship for ninety (90) days from date of purchase. During the warranty period, Stratified will repair, or at its option replace at no charge, components that prove to be defective. The product must be returned, shipping prepaid, to a Stratified facility. This limited warranty does not apply if the product is damaged by accident or misuse. The foregoing warranty is in lieu of all other warranties expressed or implied including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. Stratified Automotive Controls Ltd. is not responsible for any fines, injuries, or damages incurred as a result of the installation or use or misuse of our products. It is the complete responsibility of the purchaser of such products to ensure that they are used in a legal, safe, and appropriate manner.

**DISCONNECT THE NEGATIVE BATTERY TERMINAL BEFORE PERFORMING ANY ELECTRICAL WORK ON YOUR VEHICLE. IF YOU DO NOT FEEL COMFORTABLE MAKING THESE MODIFICATIONS, HAVE THEM PERFORMED BY A PROFESSIONAL.**



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## 1. Features and Benefits



### **Over-Boost Engine Protection:**

The Guardian Angel protects your engine from over-boost situations that are very real dangers that can result in serious engine damage. Over-boost pressure can result from wastegate or boost controller failure, blown or cracked hoses, poor engine tunes or calibrations, or a simple boost spike. The GA protects you and your engine from all of these, and more!



### **Over-Boost Pressure Release:**

The Guardian Angel protects by using a non-intrusive boost pressure release, which is much less abrupt and is barely noticeable compared with conventional fuel or ignition cuts. The Guardian Angel provides a safer means to protect your engine, without any harshness.



### **4 Bar MAP Sensor Output:**

Retrofitted Guardian Angel V2 units provide you with a 4 bar MAP sensor output to replace your OEM sensor. The same MAP sensor which is used to detect any overboost conditions is crimped into your vehicles harness eliminating the need to buy an aftermarket sensor.



### **Vent-To-Atmosphere Valve Control:**

For MAF based cars with re-circulating bypass valves, the Guardian Angel allows you to change your BPV to a BOV, and discharge to atmosphere, without causing any idling problems or over-rich fueling. Now you can enjoy the sounds of your blow-off when shifting!



### **Vent-To-Atmosphere Adjustment:**

The Guardian Angel allows compensations for different BPV or BOV spring stiffness or response speeds. Find the perfect setting your BPV or BOV to eliminate turbo surge during shifts and to maintain higher turbo spool.



### **External Trigger Control:**

The Guardian Angel has a simple 1-wire connection that allows other devices, such as WMI systems or ECUs, to trigger the GA. Being compatible with many aftermarket failsafes, the external trigger allows you to maximize the capabilities of your entire engine control and monitoring system.



### **Driver LED Warning Light Display:**

The Guardian Angel provides a driver warning light, to notify you with warning information when the GA is triggered, or if there is any malfunction in the system. You will always know when your protection system has triggered, so you can quickly attend to the issues that caused your over-boost.



### **Easy Installation:**

The Guardian Angel has minimal wiring, requiring only battery 12V and GND/Chassis connections for operation. The GA has simple hose connections and fits conveniently in the vacuum line between the intake manifold and BPV or BOV. Installation couldn't be any simpler!



### **Internal Self-Check:**

The Guardian Angel verifies its internal valve control and pressure monitoring systems every power-up to ensure your failsafe system is always tested and ready to perform. You can rest assured that your GA is always fully operational and monitoring your engine for maximum safety.



### **Safe and Simple Adjustments:**

The Guardian Angel has two turn-dials for controlling your protection. The dials have easy-to-understand labels, which prevent confusion when making changes. The adjustment dials are recessed to prevent un-wanted or accidental changes, ensuring all adjustments are made safely.



### **Compact Design with Mounting Flanges:**

Having a compact design with mounting flanges, the Guardian Angel allows seamless installation within the vehicle engine bay area. It gives you the option to screw-down mount the GA on any flat surface.

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## 2. Introduction and Precautions

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The Guardian Angel (GA) is an over-boost failsafe device that controls the Bypass Valve (BPV) or Blow Off Valve (BOV) on turbocharged vehicles. The BPV or BOV is controlled to release excess air pressure when the GA measures boost pressure exceeding the user-preset limit OR when the GA is triggered with a secondary device (such as an engine controller, water-methanol injection system, etc). Furthermore, the Guardian Angel provides you with a 4 bar MAP sensor which can replace your vehicles OEM MAP sensor (usually 2.5 or 3 bar) as well as controlling Vent-to-Atmosphere (VTA) BOVs.

The Guardian Angel will immediately release excess boost in the event of an over-boost or trigger event. The process of relieving boost pressure through the BPV or BOV is much gentler than a fuel or ignition cut, which, in many cases is very abrupt. The GA failsafe process is easier on the vehicles drivetrain and allows the driver to continue driving, which makes it safer than an ECU fuel or ignition cut.

The Guardian Angel protects against any type of over-boost condition, whether it is caused by a poor tune, boost spike, blown hose, or mechanical failure of the wastegate or other boost control devices.

The Guardian Angel only works with **push-type** BPVs. Most factory and aftermarket BPVs are push type valves. If you are unsure if your valve is push-type or pull-type, contact the manufacturer.

**NOTE:** The Guardian Angel **DOES NOT** work with **pull-type** or reversed valves. The HKS SSQV and all imitations are pull type valves and do not work with the GA.

When the Guardian Angel is triggered, the amount of boost pressure released depends on the flow capacity of your BPV/BOV and your turbocharger. In normal circumstances there will be a large enough drop in pressure in order to prevent damage. However, depending on your BPV/BOV and turbocharger selection, the boost pressure may rise slightly above the Guardian Angel trigger point. The slight increase is based on how quickly your BPV/BOV is able to vent the extra boost.

**IMPORTANT:** The Guardian Angel is a safety device and should never be used as a boost controller device.

The 4 bar MAP sensor which the Guardian Angel uses to monitor your vehicles boost may also be used to replace your OEM 2.5 or 3 bar MAP sensor. No need to buy a costly aftermarket (Bosch) MAP sensor for high boost applications. Installation of the map sensor output takes less than five minutes, however, you must upgrade your tune for it the vehicle to run properly.



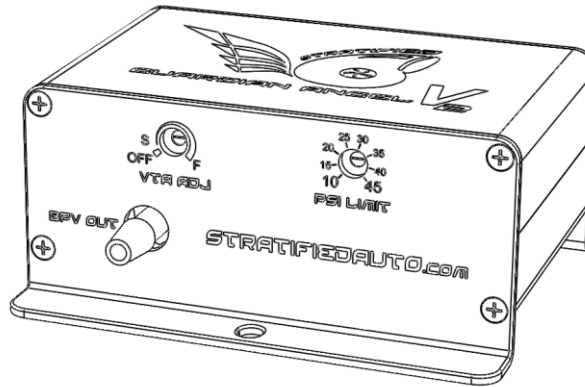
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Another feature of the Guardian Angel is that it allows the use of vent-to-atmosphere BOV valves within Mass Air Flow (MAF) and Vane Air Flow (VAF) based vehicles. In these vehicles, where the air meter is prior to the turbocharger, releasing a BPV (or BOV) to atmosphere normally causes very rich fueling at idle and during shifts. With the GA Vent-to-Atmosphere (VTA) feature enabled, the Guardian Angel will stop the BPV from leaking at idle and during shifts, allowing you to vent to atmosphere without a loss of driveability.

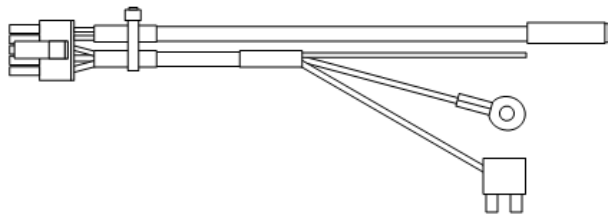
The Guardian Angel should be mounted within the vehicle's engine bay, but it is **NOT water resistant**. The GA should not be mounted directly on the engine. Do not spray or pressure wash the Guardian Angel with water or any other liquids. Mount the Guardian Angel in an area that is not in contact with the engine - preferably close to other vehicle electronics such as the fuse box.

### 3. Parts Included

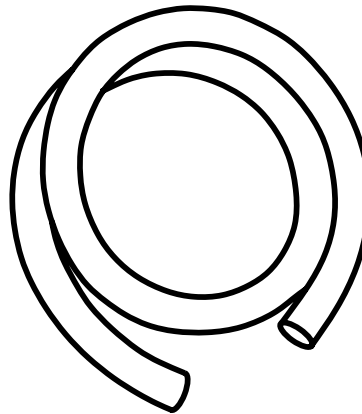
1. Guardian Angel Controller



2. Wire Harness



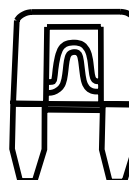
3. Vacuum Hose  
5/16" or 4mm ID



4. Hose Clamps  
4-pcs



5. 5-Amp Fuse  
pre-installed

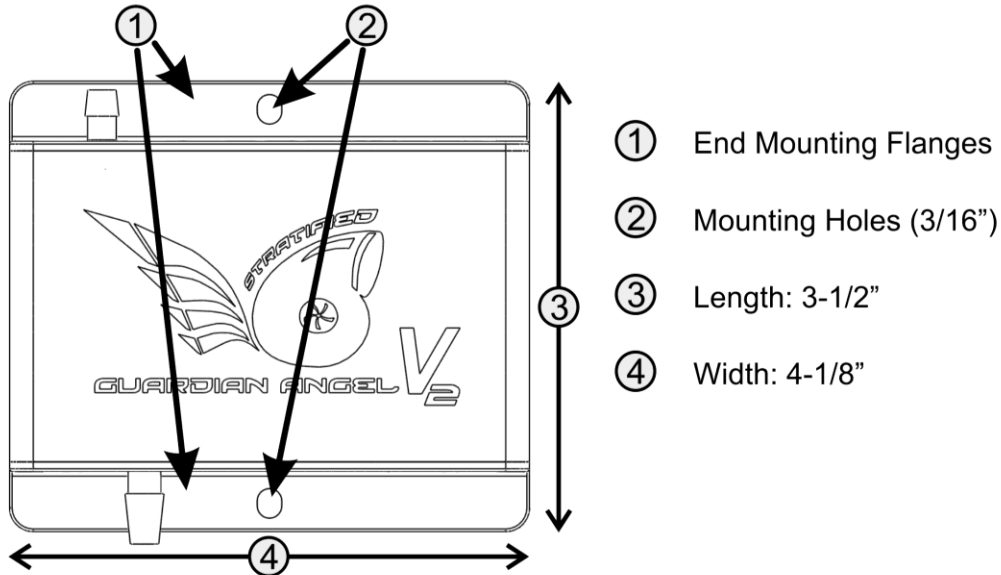




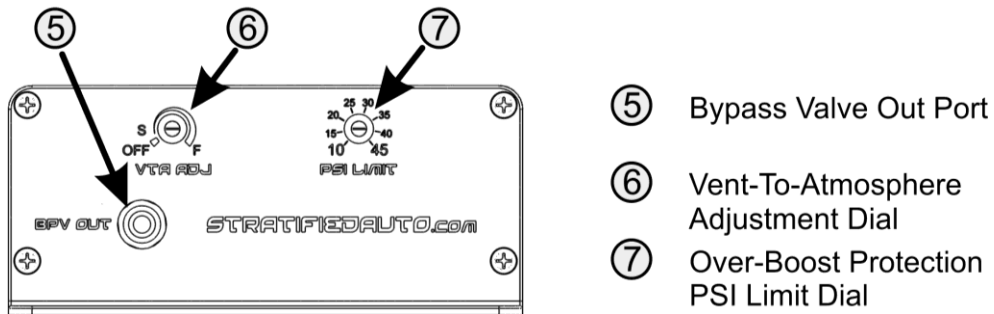
## 4. Component Identification

### GUARDIAN ANGEL:

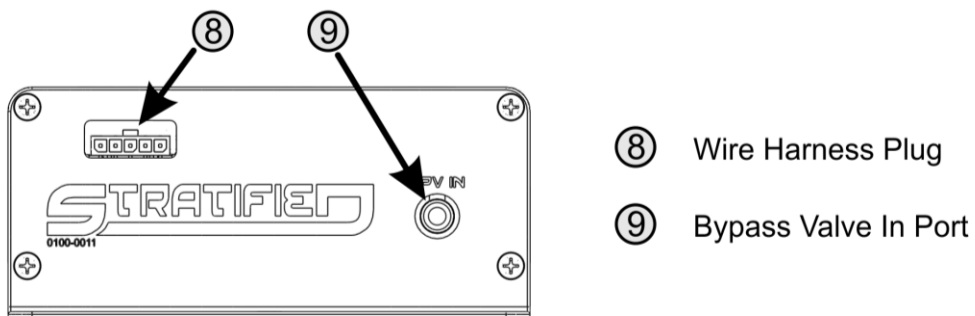
#### Top View:



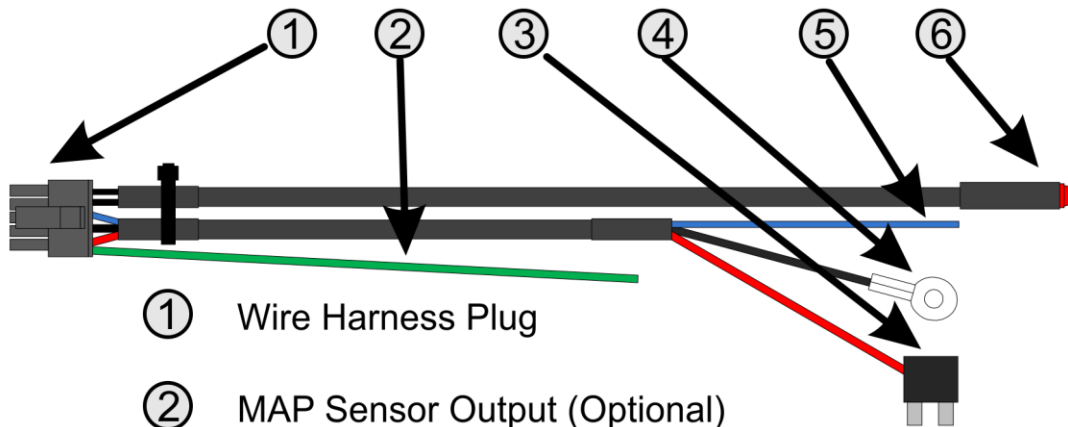
#### Front View:



#### Rear View:

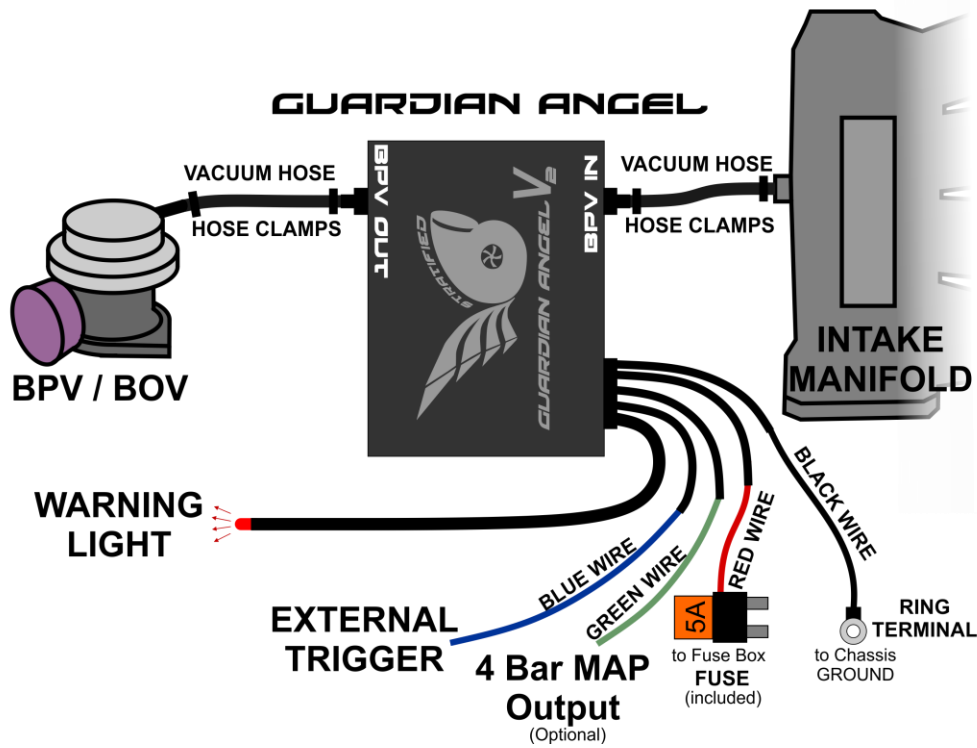


## WIRE HARNESS:



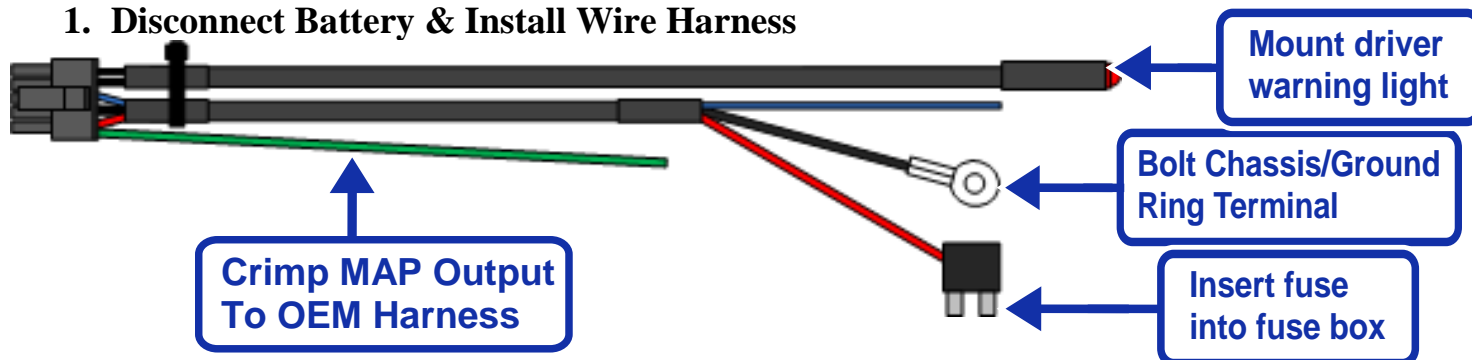
- ① Wire Harness Plug
- ② MAP Sensor Output (Optional)
- ③ Chassis/Ground Ring Terminal
- ④ Chassis/Ground Ring Terminal
- ⑤ External Trigger Input
- ⑥ Driver LED Warning Light

## 5. Installation Diagram

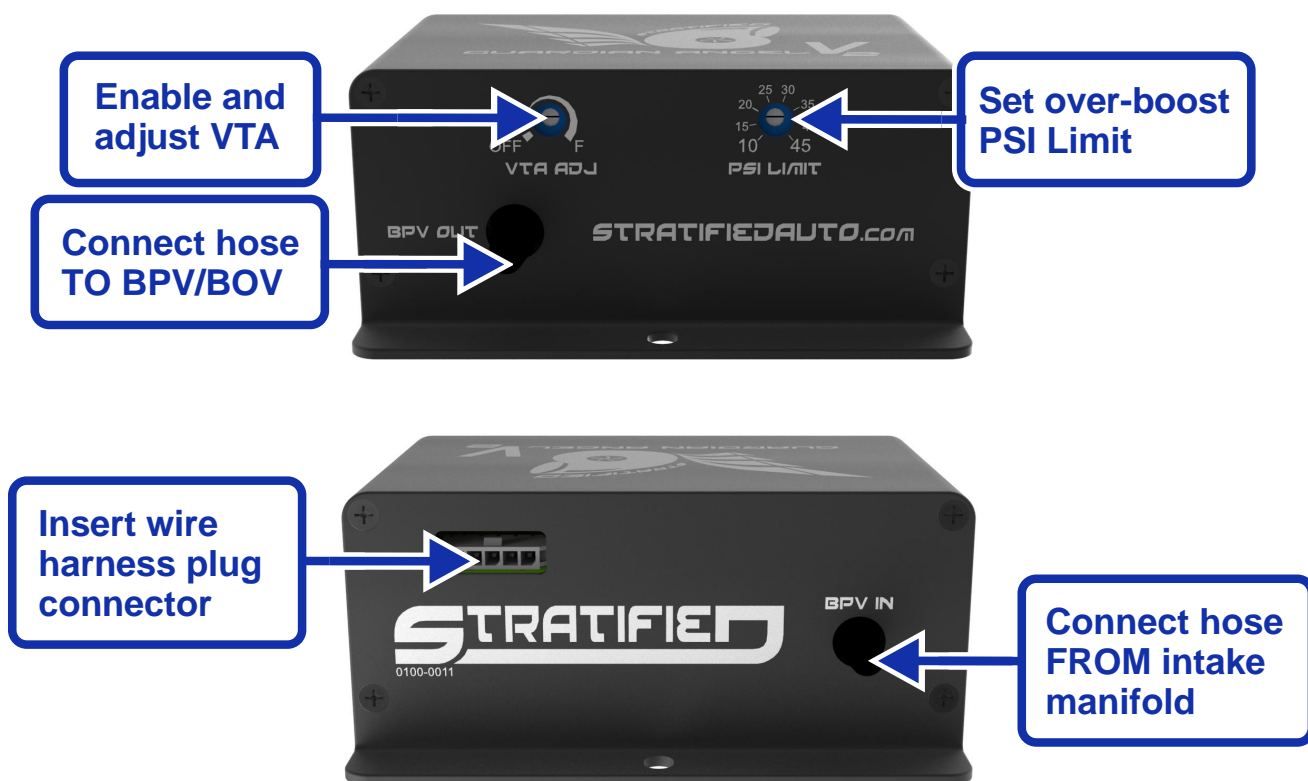


## 6. 3-Step Quick Install Guide

### 1. Disconnect Battery & Install Wire Harness



### 2. Mount & Setup Guardian Angel



### 3. Re-Connect Battery & Test Drive

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## 7. Installation Instructions

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1. Park the vehicle safely and remove the negative battery cable.
2. Within the engine-bay, find a suitable flat-surface location to mount the Guardian Angel (GA).

**NOTE:** The GA should be placed away from direct heat sources such as the exhaust manifold or a turbocharger.

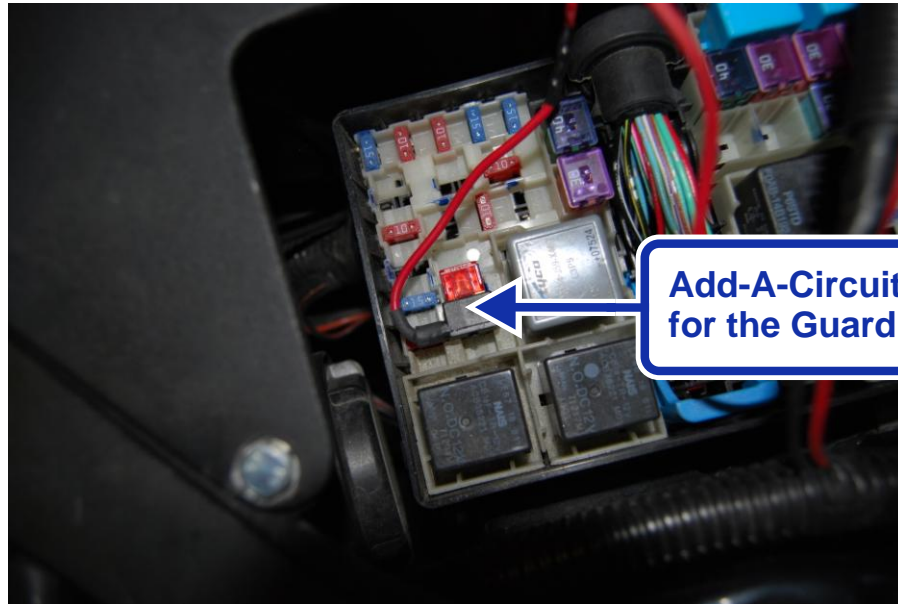
**NOTE:** The GA should be placed away from water and water drains.

A suitable location: the vehicle's engine-bay fuse box cover.

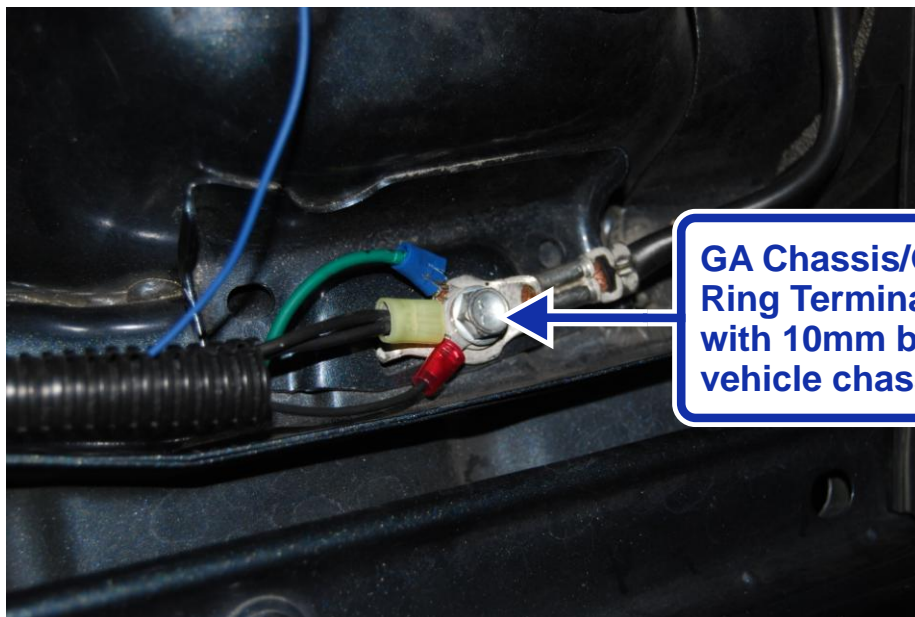


3. Secure the Guardian Angel using double sided automotive tape or similar, or screws through the flange mounting holes.
4. Use the provided Add-A-Circuit fuse holder to connect the **RED** power wire of the GA to a switched 12V power source within the vehicle's engine-bay fuse box. Ensure the 5-amp fuse (provided) is fully inserted into the fuse holder TOP position. **If you removed a fuse from the fuse box to insert the Add-A-Circuit, make sure to put this fuse back in the Add-A-Circuit BOTTOM position (position closest to the metal legs of the Add-A-Circuit).**

**NOTE:** The 12V source must only be powered while the vehicle ignition is ON. If you are unsure, test this circuit with a voltmeter.



5. Connect and secure the **BLACK** Ground/Chassis wire to a solid chassis ground using the attached ring-terminal connector.



6. Route the “Driver LED Warning Light” inside the vehicle cabin and place it in a location easily visible by the driver.

**OPTIONAL WIRING – External Trigger Input**

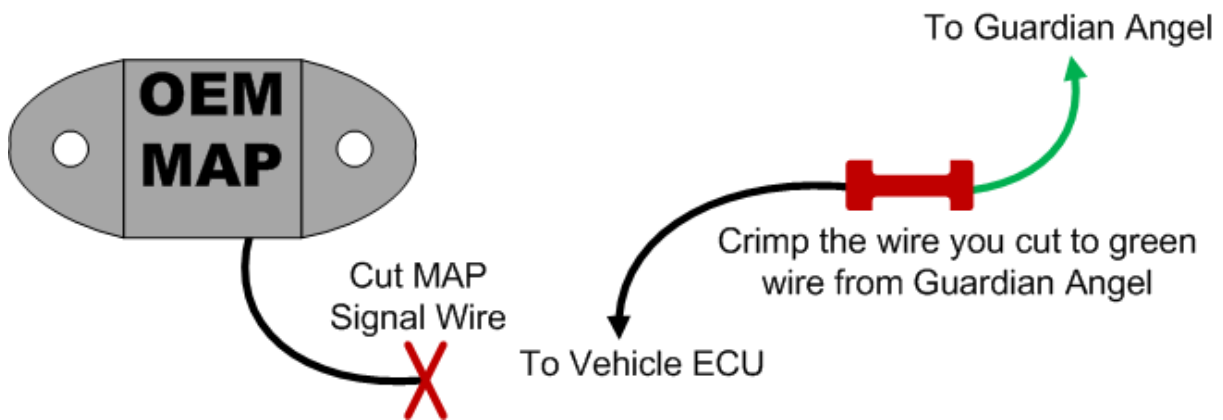
7. Connect the **BLUE** “External Trigger Input” wire to an output from a secondary device (such as a water-methanol injection controller or standalone ECU) in order to trigger the GA separately with that device.

**NOTE:** The GA is triggered with either a High Voltage signal (5V-12V) or a Low Voltage signal (Chassis/Ground).

**IMPORTANT:** If the “External Trigger Input” is not used, tape and secure this wire with the others to prevent accidental triggering.

**OPTIONAL WIRING – 4 Bar MAP Sensor Output**

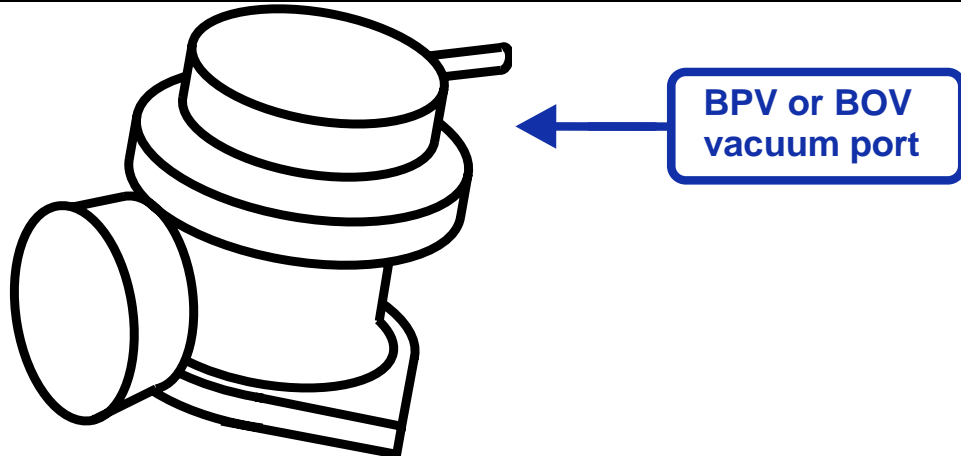
8. Connect the **GREEN** “External Trigger Input” wire to the MAP signal wire on the OEM vehicle harness.



9. Once all electrical connections are made within the vehicle, plug the Wire Harness Plug into the Guardian Angel.
10. The next step involves connecting your Bypass Valve (BPV) vacuum line to the GA. One end of this hose is connected to your vehicle's intake manifold and the other end is connected to the BPV.
11. Locate your **push-type** BPV or BOV and disconnect the vacuum hose attached to the BPV or BOV vacuum port.

**NOTE:** The Guardian Angel only works with push-type BPVs or BOVs. If you are unsure if your BPV or BOV is push-type, contact the manufacturer.





12. Gently connect and secure this hose to the BPV IN port on the GA using the provided hose clamps.

**NOTE:** The GA hose barbs are suitable for use with 5/32" or 3/16" ID (4mm or 5mm ID) hose.

**IMPORTANT:** DO NOT force the hose onto the GA's barbs. If required, lubricate the inside of the hose with soapy water.



13. Use the provided vacuum hose and hose clamps to connect the Guardian Angel BPV OUT port to your BPV/BOV vacuum port.

**IMPORTANT:** DO NOT force the hose onto the GA's barbs. If required, lubricate the inside of the hose with soapy water.





**NOTE:** Other devices that require a boost pressure source or signal (such as a boost gauge) must be connected directly to the intake manifold, or between the intake manifold and the BPV IN port.

Now that all the hardware is connected, it is time to test and setup the unit. These are very important steps described below.

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## 8. Test and Setup Your Over-Boost Protection

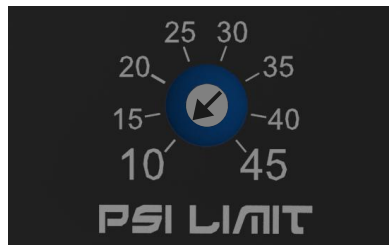
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1. Turn the ignition to the ON position.

**NOTE:** The GA will repeatedly pulse its internal valve and the Driver LED Warning Light until the engine is started. This is normal and is part of the Guardian Angel self test.

2. Locate the Over-Boost Protection PSI LIMIT dial. Use a small slotted screwdriver and rotate the dial fully counter-clockwise, so it points at 10 psi.

**NOTE:** The dial has a small arrow to indicate its position.



3. Start the engine, and drive your car. Raise the boost pressure above 10psi to trigger the Guardian Angel on purpose.

**NOTE:** You will feel a gentle reduction in power, not a sharp cut in power.  
The Driver LED Warning Light will light up to indicate it has triggered.

**IMPORTANT:** Notice your boost pressure settles below your normal full boost level.

4. Take your foot off the accelerator and the Driver LED Warning Light will turn off.

**NOTE:** The GA will ONLY reset once the engine is out of boost and in vacuum.

5. Now it is time to set the GA to a reasonable boost trigger level which is above your normal operating peak boost level. Turn the PSI LIMIT dial slightly below your normal expected boost level.

**NOTE:** The case markings from 10-45psi serve as guidelines only and should be used in conjunction with other pressure gauges or monitoring devices to establish the exact pressure trigger level.

6. Test drive your vehicle to see if the GA triggers under full boost.

7. If the GA did not trigger, adjust the PSI LIMIT lower, and re-test.
8. If the GA did trigger, adjust the PSI LIMIT slightly higher by 1-2 psi, and re-test.
9. Select the final PSI LIMIT which is 1-2 psi above your normal full boost pressure.  
**IMPORTANT:** Ensure the PSI LIMIT is at least 2-3psi **below** the ECU fuel cut.

## REGULAR INTERVAL TESTING

10. Since the Guardian Angel is a safety device that is only used at critical failsafe times, it is strongly suggested to test your Guardian Angel periodically. Every couple of months, trigger the GA by lowering the PSI LIMIT, and ensure it triggers as expected. This test should only take a few minutes to complete, and will ensure your protection system is always fully operational.

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## 9. Test and Setup Your Vent-to-Atmosphere

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Normally, when running a Vent-To-Atmosphere BOV in a vehicle that has a MAF or VAF sensor, the valve will vent air that has already been "counted" by the sensor. This situation normally causes very rich fueling during idling and possible bogging or after-fire during shifting.

Furthermore, push-type BPV and BOV valves tend to leak at idle or part throttle and tend to cause very rich fueling when vented to atmosphere. The solution to having your BPV vent to atmosphere in your vehicle with a MAF/VAF air sensor is by using the Guardian Angel's Vent-To-Atmosphere feature.

The GA, with its Vent-To-Atmosphere feature enabled, will close the BPV/BOV at idle and low throttle preventing the leaks that would normally occur. The feature also directly controls the BPV/BOV during shifts, to respond quickly after it releases to atmosphere. After the release to atmosphere is complete, the GA will close your BPV/BOV, so your car will not bog during shifts.

The VTA feature can be enabled or disabled, and its response can also be fine-tuned to compensate for your particular BPV/BOV spring stiffness, valve response speed, and flow capabilities. On the Guardian Angel, the "S" indicates Slow response, and "F" indicates Fast response.

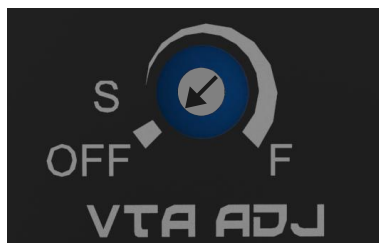
Use the following steps to enable and adjust the Vent-To-Atmosphere feature:

1. Turn the ignition to the ON position.

**NOTE:** The GA will repeatedly pulse its internal valve and the Driver LED Warning Light until the engine is started. This is normal and is part of the Guardian Angel self test.

2. Locate the Vent-To-Atmosphere VTA ADJ dial. Use a small slotted screwdriver and rotate the dial fully counter-clockwise, so it points to "OFF".

**NOTE:** The dial has a small arrow to indicate its position.



3. Start the engine. This will cause the GA to complete its internal self check and allow you to enable the VTA feature.
4. To Enable the VTA Feature, slowly turn the adjustment dial clockwise, until the arrow is pointing past the “S” indicator.

**NOTE:** You will hear the GA pulse its internal valve **twice** to indicate the VTA feature has been **enabled**.

**IMPORTANT:** With the VTA featured enabled, the Guardian Angel is still protecting your engine from over-boost conditions. This is the main function of the GA and over-boost protection can never be disabled.

5. Adjust the response by turning the VTA ADJ dial between “S” (SLOW) and “F” (FAST) to compensate for your BPV/BOV spring stiffness or response speed. This adjustment will allow you to achieve the best shifting and throttle transition feel.

**NOTE:** For a faster response, which works well with softer BPV springs, turn the dial clockwise towards the “F” (FAST).

**NOTE:** For a slower response, which works well with stiffer BPV springs, turn the dial counter-clockwise towards the “S” (SLOW).

6. To Disable the VTA Feature, turn the adjustment dial fully counter-clockwise, so the arrow points at the “OFF” indicator.

**NOTE:** You will hear the GA pulse its internal valve **once** to indicate the VTA feature has been **disabled**.

***NOTE ABOUT TURBO COMPRESSOR SURGE:***

Mild turbo compressor flutter during light-throttle conditions can be expected, and is not considered hazardous. If you hear large amounts of turbocharger compressor surge while shifting under heavy loads, this indicates the VTA response is too fast. Turn the VTA ADJ dial counter-clockwise towards the “S”, to make the response slower, which will allow more air pressure to be released during shifting. In addition, you can also reduce your BPV/BOV spring stiffness.

***NOTE ABOUT AFTER-FIRE:***

Some exhaust after-fire ‘popping’ during shifts can be expected on vehicles with large and open exhaust systems. This is due to slightly richer exhaust, and is not considered hazardous to your motor.

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## 10. Test and Setup Your External Trigger

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The Guardian Angel offers the feature of an “External Trigger Input”. This external trigger input allows you to use secondary devices, such as ECUs or Water-Methanol Injection failsafes to trigger the Guardian Angel’s failsafe mechanism independently of the over-boost PSI Limit.

By combining the Guardian Angel’s External Trigger Input with secondary devices, you can maximize the failsafe capabilities of your entire engine monitoring system.

The Guardian Angel has a single wire input that can be connected to battery voltage (12V) or to battery GND (Chassis) in order to be triggered. This will have the same effect as the over-boost trigger, where the GA will cause your BPV/BOV to release excess boost pressure, and the Driver LED Warning Light will illuminate.

Use the following steps to test and setup the Guardian Angel External Trigger control:

1. Ensure the **BLUE** External Trigger Input wire is properly connected to your secondary device or controller.

**NOTE:** The Guardian Angel is triggered by *either* a 5-12V or GND signal.

2. Start the engine.
3. Use your secondary device to trigger the Guardian Angel.

**NOTE:** The Driver LED Warning Light will light up to indicate it has triggered.

4. Release the trigger signal from the “External Trigger Input”.

**NOTE:** The GA will **ONLY** reset once the engine is out of boost and in vacuum.

**NOTE:** When the Guardian Angel resets, the Driver LED Warning Light will turn off.

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## 11. Troubleshooting

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The Driver LED Warning Light is always ON.

1. This indicates the LED wires within the wire harness have been pinched or are touching the vehicle chassis.
2. Locate the pinched wire or wire that is touching the vehicle chassis and repair it.
3. Completely uninstall the Driver LED Warning Light, so you can be sure no wires are contacting any part of the vehicle or chassis. Test Again.
4. If there are no pinched wires, and no wires touching the vehicle chassis, this may indicate an internal failure within the GA. Contact Stratified Automotive Controls immediately.

The Driver LED Warning Light does not pulse when I turn the Ignition ON (engine not running).

1. With only the Ignition on (engine not running), the GA repeatedly pulses its internal valve (about once every 2 seconds).
2. Check that the GA internal valve clicks repeatedly, with the Ignition ON. (Do not start your engine). If the GA is not clicking, this may indicate an internal failure within the Guardian Angel. Contact Stratified Automotive Controls immediately.
3. If the valve is clicking, check that the LED wires within the wire harness are not pinched or are touching the vehicle chassis. If they are, repair the wiring.

The GA internal valve and Driver LED Warning Light does not stop clicking / pulsing after I start my engine.

1. This indicates that the Guardian Angel is not properly measuring your engine vacuum pressure.
2. Check that the BPV IN and BPV OUT ports are properly connected to your intake manifold and BPV/BOV. Ensure these vacuum lines are not reversed.
3. Check that all hoses are properly clamped to the Guardian Angel and intake manifold, with no air leaks.
4. Repair any air leaks in the hoses between the intake manifold and the Guardian Angel BPV IN port.
5. If there are no air leaks, then this may indicate an internal failure within the Guardian Angel. Contact Stratified Automotive Controls immediately.

My turbo surges very loudly during shifting (with VTA feature enabled).

1. Loud turbo surge during shifting indicates the VTA response is too fast. Mild turbo fluttering at low throttle is not considered hazardous. Turn the VTA ADJ dial counter-clockwise towards the “S”, to make the response slower. This will allow more air pressure to be released. In addition, reduce the stiffness of your BPV/BOV spring.

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## 12. Specifications

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The Guardian Angel is designed to be installed in the engine bay; away from direct heat sources and contact with water. Damage caused by exceeding the operating conditions listed below or exposing the Guardian Angel to water will void the warranty.

Power Supply Max Operating Voltage:	16.0 Volt
Power Supply Min Operating Voltage:	9.0 Volt
Maximum Operating Temperature:	125 °C (~250 °F)
Boost Pressure Trigger Range:	10-45psi $\pm$ 1psi (70-310Kpa $\pm$ 7Kpa)
External Trigger Minimum Voltage:	4.5 Volt
Maximum Current Draw:	0.5 Amp