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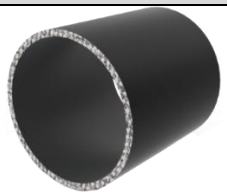
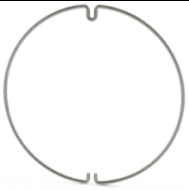
Positive Air Shutoff

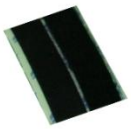
Emergency Engine Shutdown Kit with Test Mode

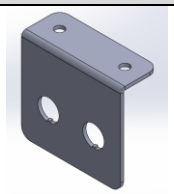
1036739	**4” PAS with Automatic Overspeed Electronics (12 Volt Systems Only)**

Kit Contents

1302400-A	1302356	1306740
		
Air Shutoff Valve	Wiring Harness	Control Module
Qty:1	**Qty: 1**	**Qty: 1**

1405222	1405207	1302284
		
4” Silicone Boot	Clamp 4.12”-4.44”	Bead Lock Wire
Qty: 2 @ 4” L	**Qty: 4**	**Qty: 2**

FT-10910-03116	1302279	1006701	1300131
			
Velcro Strip	Drill Template	Window Decal	Cable Tie
Qty: 2	**Qty: 1**	**Qty: 1**	**Qty: 12**

1301381	1302285	2000110	1330052
			
Heat Shrink	Solder	Switch Bracket	Bracket Screws
Qty: 3”	**Qty: 5”**	**Qty: 2**	**Qty: 2**

1302252	1302250-RG	1306790
		
Switch Panel Decal	Switch Guard	Guard Decal
Qty: 1	**Qty: 1**	**Qty: 1**

Introduction

The BD Positive Air Shutoff (PAS) is a device installed in the intake air system on a diesel engine to shut off the air supply in an engine runaway situation. Engine runaway can occur when external hydrocarbons are drawn into the intake (i.e. propane, natural gas, gasoline vapor) or when a turbocharger failure occurs and engine oil is burned in the cylinders. When this happens the engine RPM may increase until the point of engine explosion.

A PAS unit is often required by state/provincial law or by individual company policy on all diesel engines that will operate in or around oil extraction, refineries, refueling stations and natural gas fields.

The BD PAS is supplied with an information decal that may be applied to the windshield to allow safety personnel to quickly identify that your vehicle is equipped with a positive air shutdown device.

Operation

This PAS unit is supplied with electronics which automatically trigger the shutoff valve in the event of engine RPM exceeding the set point. (See installation instructions regarding settings). The automatic module is only active when the ignition switch is ON and the module is powered.

The PAS can also be triggered manually at any time, even with the ignition turned off. This is the SHUT DOWN toggle switch, it is a momentary switch and once tripped the valve will shut and remain shut until it is manually reset.

This PAS system is equipped with a new module that also has a test mode that may be controlled from in the vehicle cabin. This switch is the TEST MODE switch. When turned on it changes the maximum allowable RPM to half of the normal value. Turn this switch on and rev the engine up. Once it exceeds half of the set point it will trigger. Some safety inspectors require this feature to be able to demonstrate that the automatic overspeed electronic module is functional.

Once the valve has been tripped it must be reset manually. Open the hood and rotate the lever on the top of the shaft until it latches back into position.

Maintenance

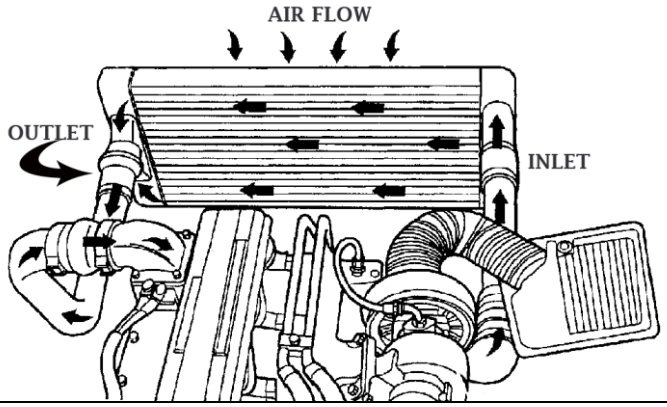
The BD PAS requires no maintenance except to periodically check operation. This may be done with the manual shutdown switch provided. To confirm the automatic shutdown functionality of the module, use the TEST MODE as described in the operation section.

Required Tools

- Frequency/Voltmeter (Optional)
- Drill
- 1/8”, 11/32” Drill Bit
- 1/2” Unibit
- Soldering Iron
- Ratchet, socket set
- Wire cutter, stripper
- Heat gun
- Round File

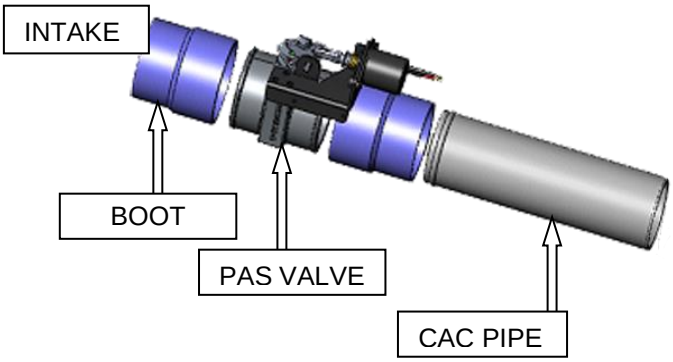
Installation

Remove the charge air cooler pipe from the outlet side of the cooler.



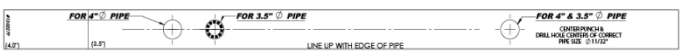
Locate a straight section in this pipe, suitable to install the valve in. If there is a straight section at one end, the valve may be installed at the end of the pipe to reduce installation complexity. Otherwise it can be installed in the middle of the pipe.

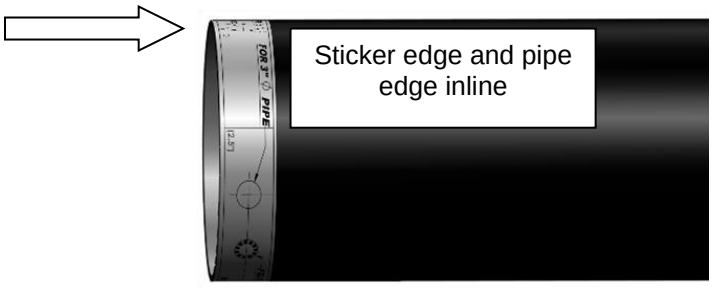
Cut the pipe to provide room for the PAS to be installed.



Wrap the drill template sticker around the cut end(s) of the pipe with the side labelled “LINE UP WITH EDGE OF PIPE” against the cut edge.

NOTE For 4” pipe the sticker should just fully wrap around the pipe. For 3.5” pipe the sticker will overlap at the mark on the sticker.

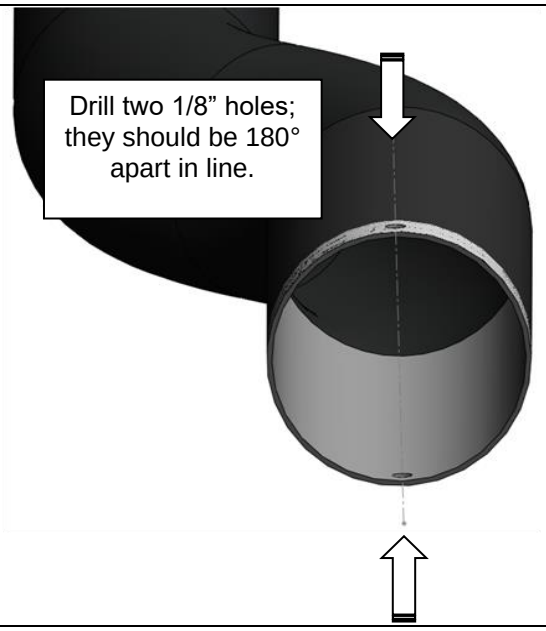




Use a center punch and then a 1/8” drill bit to make a pilot hole at the location shown on the sticker for your pipe size.

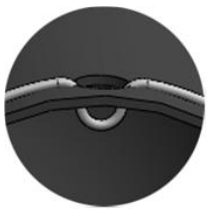
Then drill the pilot hole out to 11/32”. Repeat for the other side of the pipe. Ensure these are 180 degrees out from each other. Deburr the holes to ensure no metal shavings enter the engine and to remove sharp edges.

NOTE Do not drill through the pipe to the other side, drill from the outside in to ensure correct alignment.

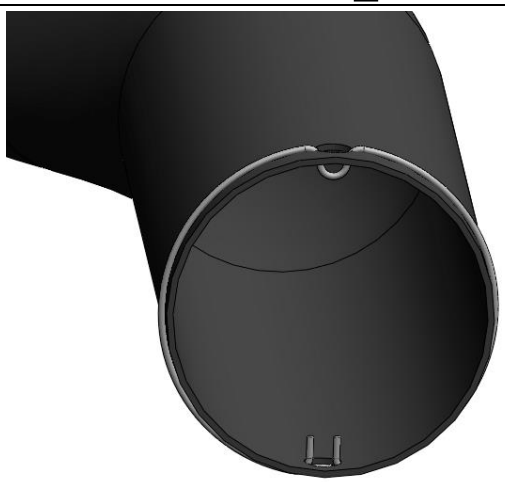


Install the bead ring around the pipe. Ensure the tabs lock in the holes. Use needle nose pliers to adjust it to fit snugly if needed.

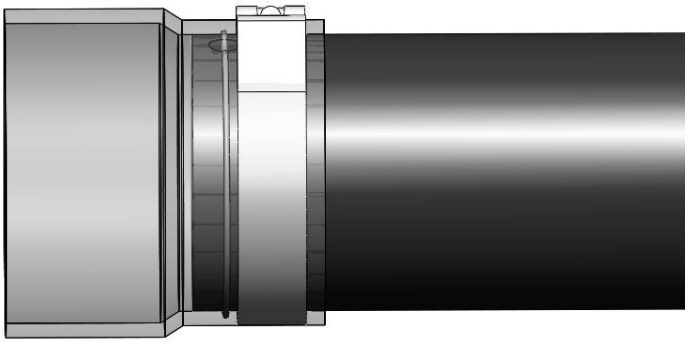




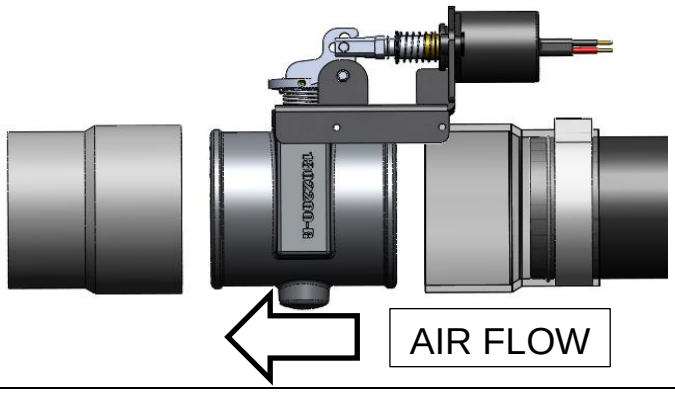
The ring does not need to be tight yet, it will be held by the silicone boot and clamp.



Slide the supplied clamp onto the pipe. Then slide the boot over the bead ring. Ensure the boot extends past the ring by 3/4"-1” so that the clamp will be positioned behind the ring. Failure to do this could cause the boot to come apart at high boost pressure. Tighten the clamp until the spring bottoms out.



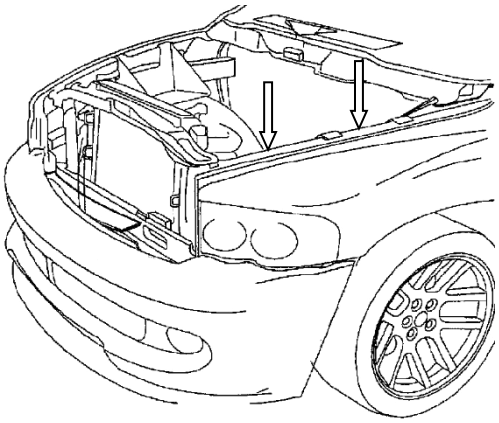
Install the valve onto the boot using the supplied clamp.
Install the second boot onto the other side of the valve with a clamp.
Tighten clamp until spring bottoms out.



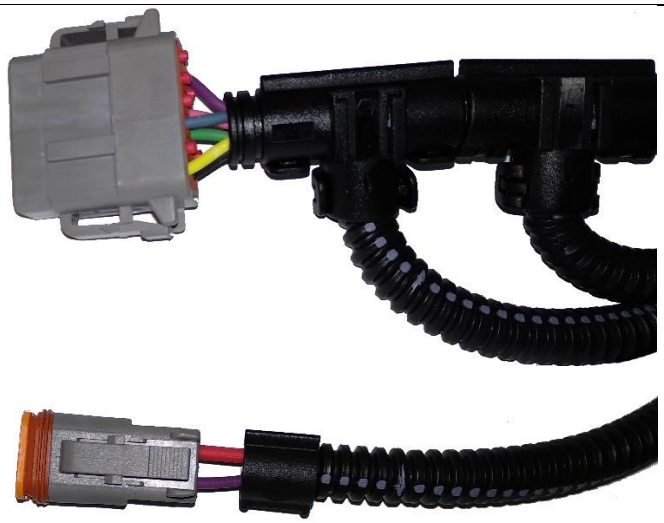
Reinstall the assembly back into the truck. Use the newly supplied clamps on the boots supplied with the BD PAS and re-use factory clamps on the stock boots.

Locate a suitable location to install the control module. This should be away from heat sources. Near the vehicle fuse box is usually a good location.

The module can be secured with the supplied Velcro. The mounting surfaces must first be cleaned with rubbing alcohol or brake parts cleaner to remove any residue.



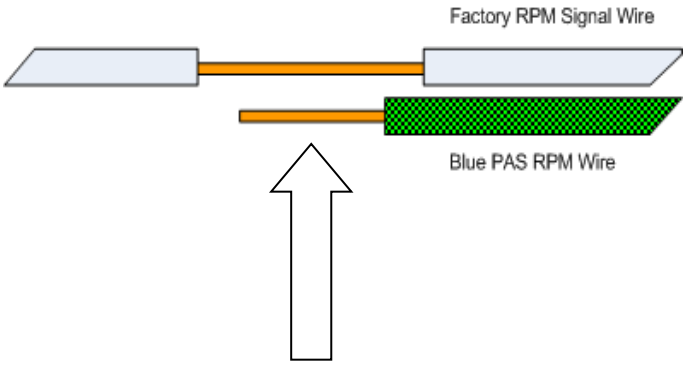
Layout the wiring harness to assess the desired routing. Connect the wiring harness to the PAS valve and to the control module. Do not connect to the battery until installation is complete.



Route the crankshaft position sensor wire (BLUE) to either the ECM or the crankshaft position sensor and trim to length.

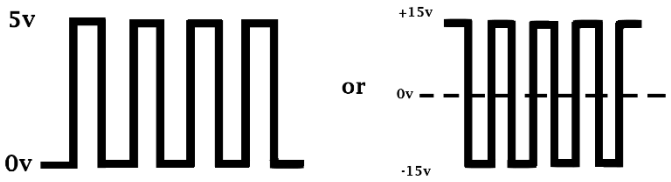
Unwrap the factory wiring harness loom/tape to locate the signal wire. Strip about 1” of insulation from the factory wire. Then strip about 1” off the end of the BLUE wire and wrap it on the sensor wire. Solder this connection and wrap with electrical tape. You may optionally cut the wire and rejoin it, then cover it with heat shrink tube.

NOTE Because this is a critical connection it must be soldered.



Solder the connection and then wrap and seal with electrical tape

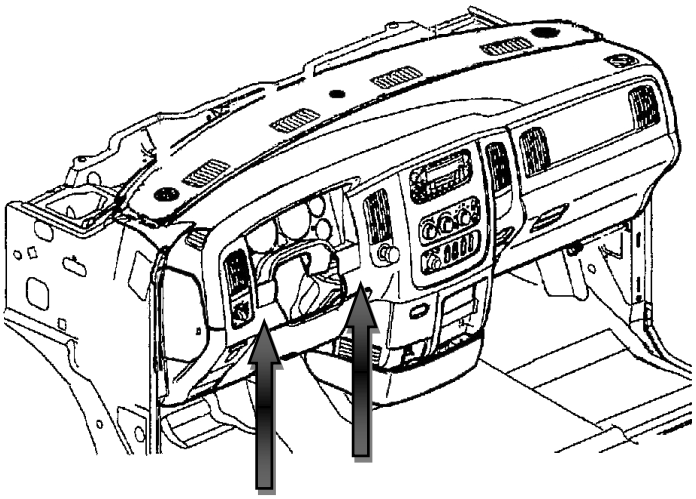
If you do not know which wire to tap for the crank signal you may check the wires at the crank sensor to determine which is the signal wire. The sensor will put out an alternating signal as shown. The signal frequency will increase and decrease according to RPM.
A multi meter which is capable of measuring AC hertz (frequency) or an oscilloscope will be required to measure the signal frequency.



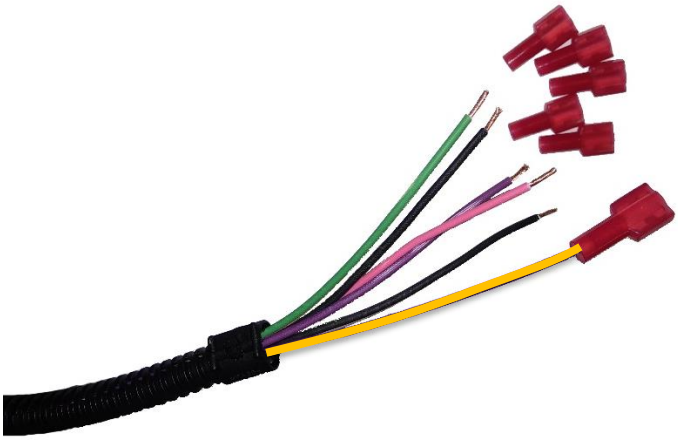
Route the switch wiring harness through the firewall into the cab. Locate a highly visible location so the switch is easily accessible by the driver. Cut the wiring harness to length.

Use a stepped drill bit to drill a 1/2” round hole to mount the switch or use the supplied switch bracket and two self-tapping screws.

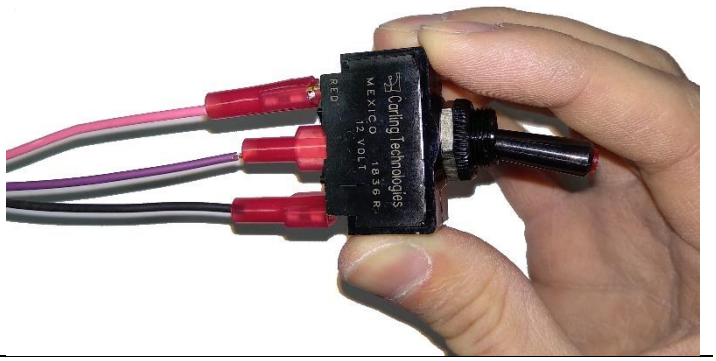
If the TEST MODE switch is going to be installed, two holes are needed.



Strip the ends of all six wires in the switch harness and crimp the supplied red spade terminals on the ends.



Connect the wires to the switches as shown in the wiring diagram at the end of the manual. If the TEST MODE switch is not desired then the spade terminals may be left disconnected and that switch not installed.



Mount the shutdown switch through a hole in the dash or use the included bracket. The shutdown switch can be installed with or without the red guard.

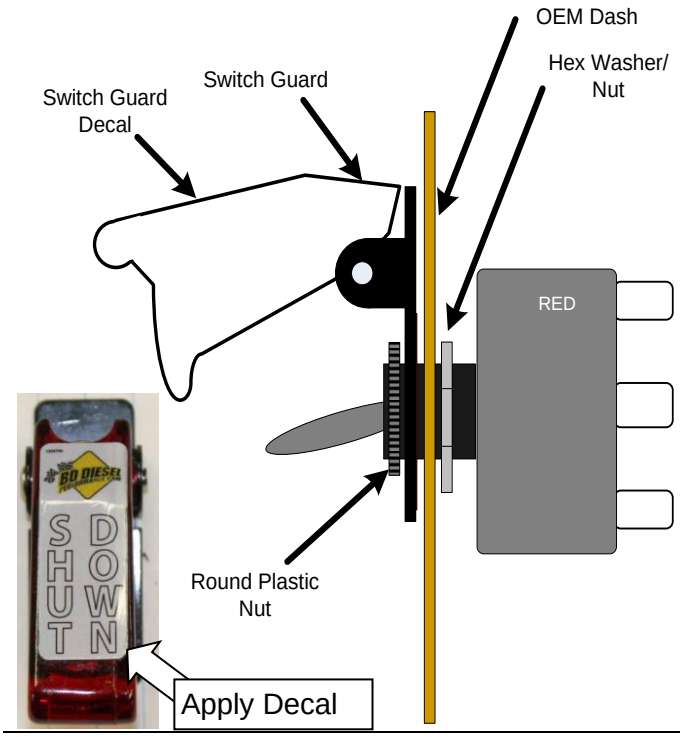
Refer to image below for details.

If installing the test mode switch, install this in the same manner.

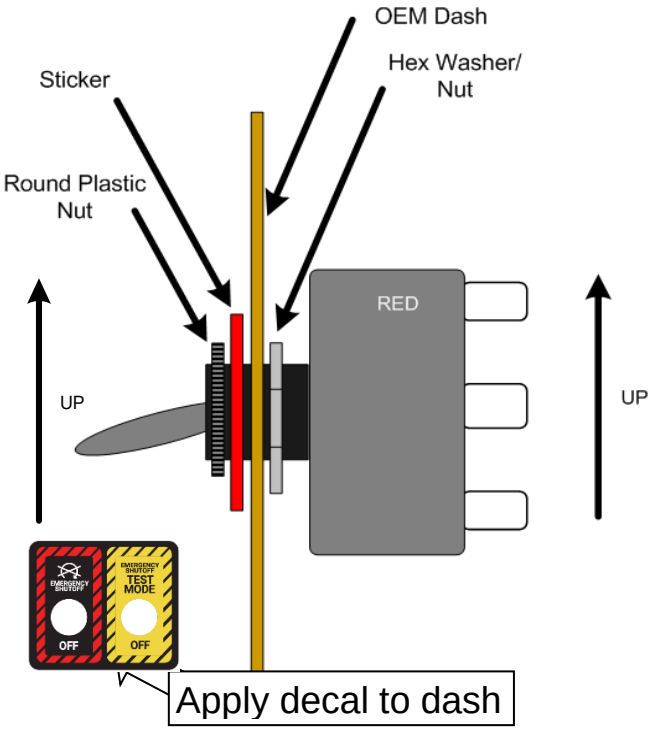




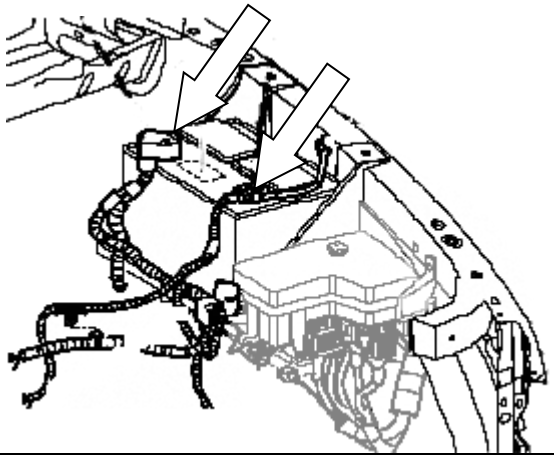
SWITCH INSTALL WITH GUARD



SWITCH INSTALL WITH DECAL



Locate the battery power wire for the PAS. This is the section of the harness with a red and a black wire. Route these to a 12v vehicle battery and trim to length (ensure to retain the fuse). Install ring terminals and connect the red wire to positive and the black wire to negative.



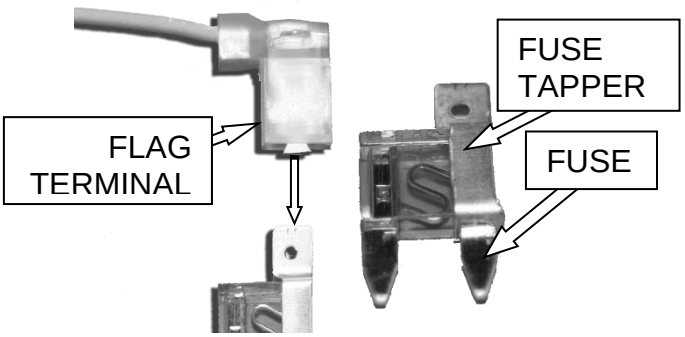
NOTE The black wire may be connected to a body ground.

The remaining wire from the PAS wiring harness is the YELLOW switched ignition source. This is what powers the control module and the light in the switch. (Even without this switched source the valve can still be activated manually).

OPTION 1

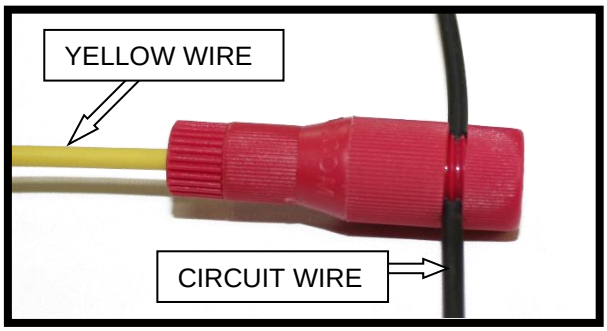
Locate the engine compartment fuse panel. Locate a switched ignition source that is suitable such as ECM power. Do not use other safety critical systems such as air bag.

Trim the yellow wire to length and strip the end. Crimp the supplied flag terminal onto the end of the wire.

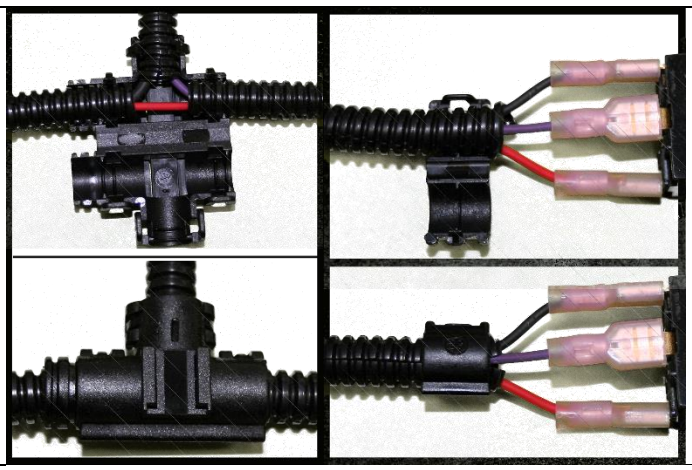


OPTION 2

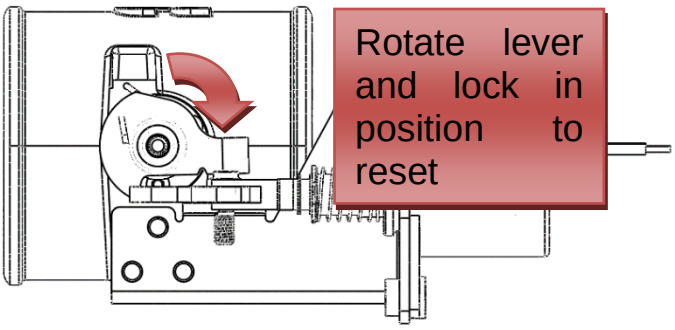
If you are unable to connect to the fuse panel with a fuse tapper, a PosiTap has been provided that will allow connection to a switched power wire instead. To install, slip the black end over the wire. Screw the middle section on so that it pierces the wire. Strip the end of the yellow wire. Then loosen the red end of the PosiTap and push the yellow wire in. Tighten the fitting.



Verify the wiring harness is properly secured and away from moving parts or heat sources. Reinstall any removed wire loom. You may adjust the loom routing by repositioning the loom clips if desired.



Check to make sure the PAS valve is not tripped. If it is then reset it now.



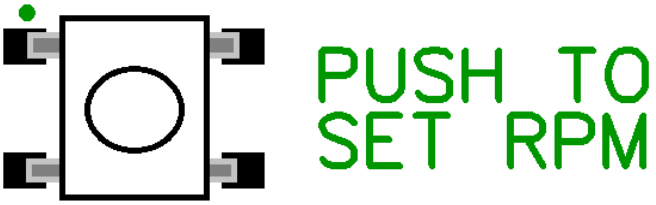
The control module will now need to be configured for your vehicle. This is because the engine RPM frequency will vary between engine models.

Remove the cover from the module to view the circuit board. Keep the PCB away from metal surfaces to prevent accidently shorting it out.

Put the rotary switch in position 3 “MANUAL MODE”. This allows for user configured shutdown RPM.



Start the engine.
Press and **hold** the RPM SET button.
Have a helper rev the engine to 1200RPM.
Release the SET RPM button.
When the button is released the module will store the set RPM + 25%, so 1200PRM + 25% = 1500RPM.
Release allow the engine to return to idle.



Now slowly increase the engine RPM until the unit activates. In this example it should be at 1500RPM.
With the valve activated the engine should die. Reset the valve.

Start the engine.
Press and **hold** the SET RPM button.
Have a helper rev the engine to MAXIMUM RPM.
Release the SET RPM button.
When the button is released the module will store the set RPM + 25%.
For example, if maximum RPM was 3200RPM then 4000RPM will be stored.

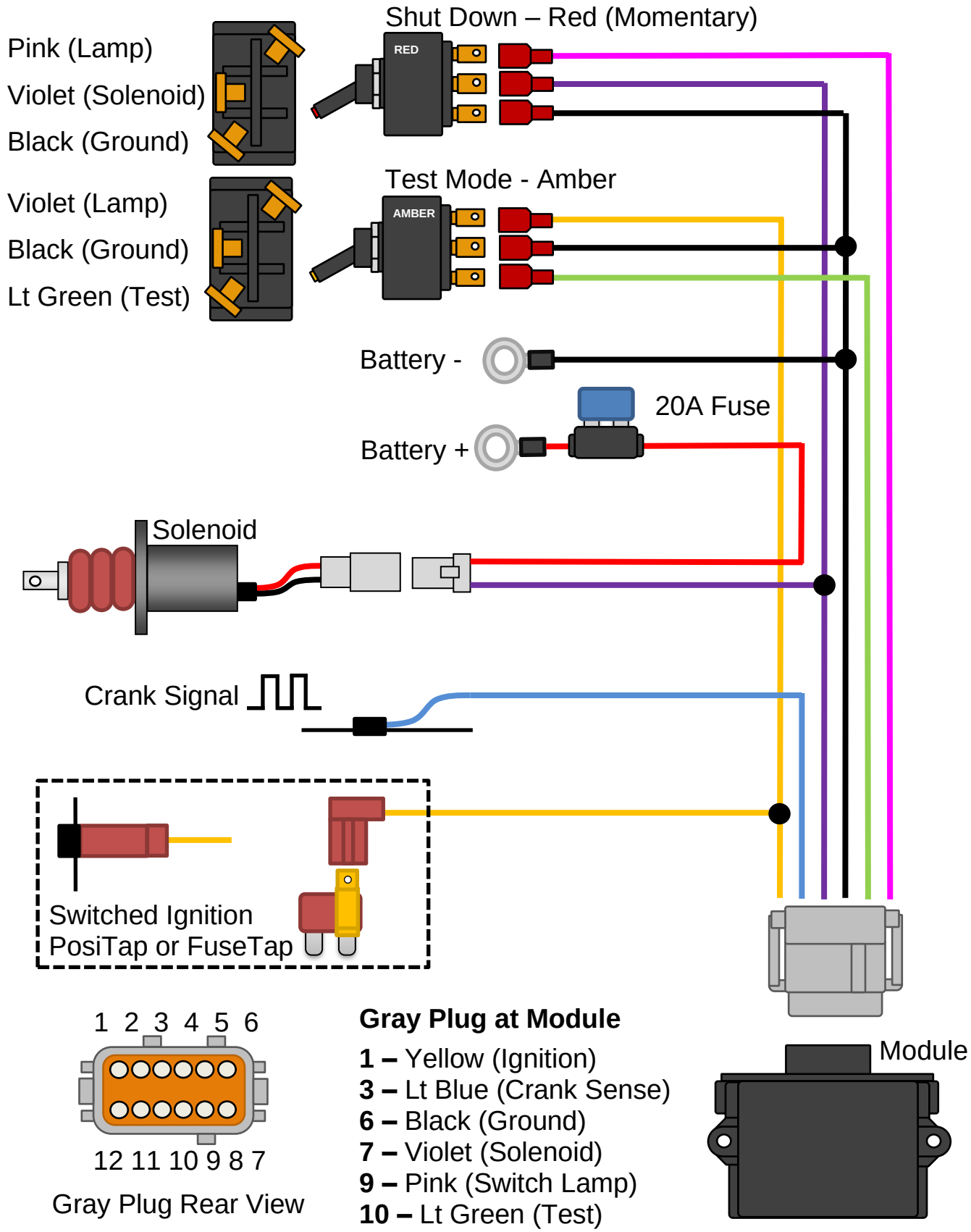
Put the cover back on the module and secure it in the engine bay using the supplied Velcro or tie wraps.

The SHUT DOWN toggle switch must now be tested. Start the engine and momentarily toggle the SHUT DOWN toggle switch.
The engine should shut off.
Reset the valve.

If the TEST MODE toggle switch was installed it must now be tested.
Start the engine and turn on the TEST MODE toggle switch.
Slowly increase the engine RPM until the unit activates and the engine dies. This RPM will be half of the normal setting.
Reset the valve.

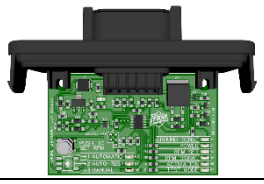
Installation is now complete. If any of the functional tests above do not work correctly, refer to the troubleshooting section at the end of the manual.
Test the valve regularly (at least yearly) to ensure it is functional.

Wiring Diagram



Troubleshooting

PCB LED Operation



GROUND SENSE	Illuminates when PAS solenoid ground wire is grounded (activated). Normally off. Will light when shutdown switch triggered or module triggers the solenoid.
POWER	Illuminated when the module is powered (switched ignition).
RPM SET	Lights up while the SET RPM button is held down.
RPM SIGNAL	Flashes proportional to engine RPM signal.
ACTIVATION	Flashes when the PAS solenoid has been activated.
TEST MODE	Illuminated when the external TEST MODE toggle switch is on. The module will shut down the engine at half of the set speed. The light green wire must be grounded to enable this.
1 AUTOMATIC 2 AUTO TEST 3 MANUAL	These LEDs simply confirm the switch position. For this kit the switch should be in “3 MANUAL”.

Switch Lamp Operation

The toggle switches have lights in them that can help show system operation.
SHUTDOWN (red light) – Off when ignition off. On when module powered and engine RPM is detected. Flashing when the PAS valve has been activated.
TEST MODE (amber light) – Off normally. When switch turned on the light will be lit.

General Troubleshooting

Valve activates but does not shut off engine	Check valve is closing the whole way Check boot clamps are tight Check for an intake system leak
Solenoid does not actuate with manual shut down switch	Check power and ground connection Check wire connections on switch Check solenoid coil continuity
Test mode switch does not shut engine down	Test mode works at half of the shutdown RPM which is 25% above redline Check PCB shows TEST MODE light. If TEST MODE not lit, check green wire is being grounded by the switch Check PCB for RPM light flashing,
Fuse blown	Check for short in red power wire