GFB VTA

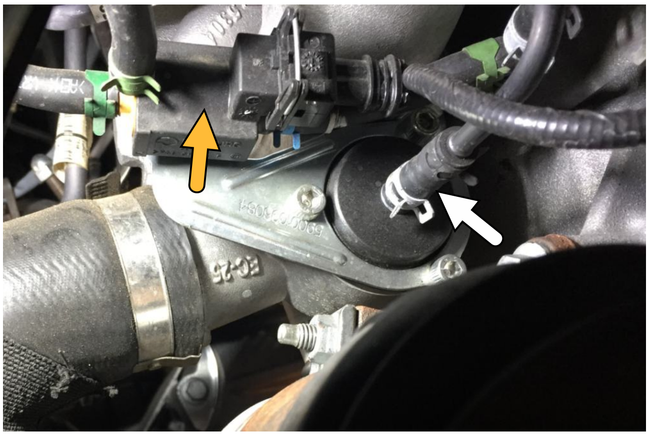
Installation Instructions

Part # T9454

INSTALLATION

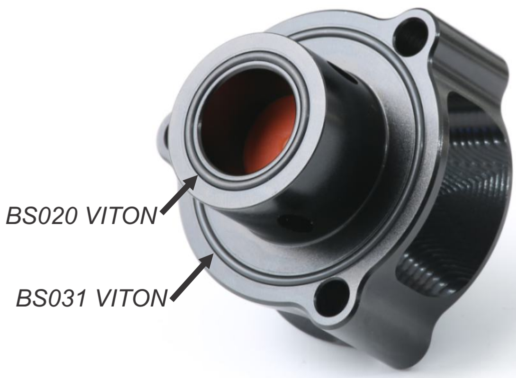
On Ford and Volvo engines, the factory diverter valve is found on the turbo compressor cover. Access to the diverter is tight, requiring the vehicle to be raised and the front right wheel to be removed for access. NEVER WORK UNDER A VEHICLE SUPORTED ONLY BY A JACK - AXLE STANDS OR A VEHICLE HOIST ARE ABSOLUTELY NECESSARY!

Once you have access to the factory diverter valve, begin by removing the vacuum hose (), and on the Focus ST it is helpful to push the boost control solenoid upwards () to pop it off the mounting bracket. This step is not absolutely necessary, it just makes it easier to get the VTA onto the turbo.

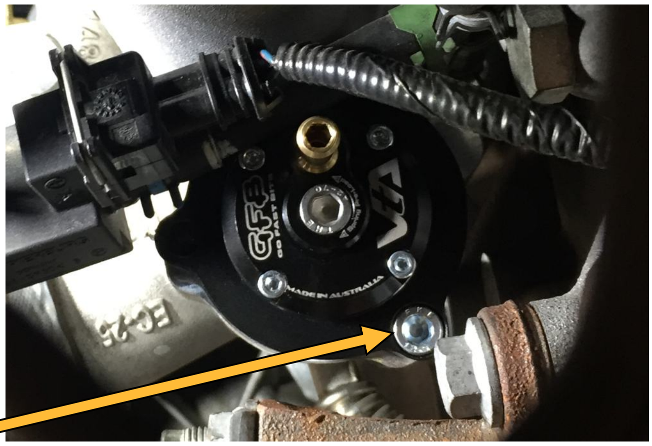


Remove the 3 screws holding the diverter onto the turbo, then remove the solenoid mounting bracket, diverter valve, spring, and diaphragm.

Before installing the VTA, check that the sealing o-rings are installed in the grooves on the VTA body as shown opposite.



One of the three mounting holes in the VTA body has a counterbore to allow the screw head to sit under the solenoid mounting bracket, ensuring the head of that particular screw clears the driveshaft mount.



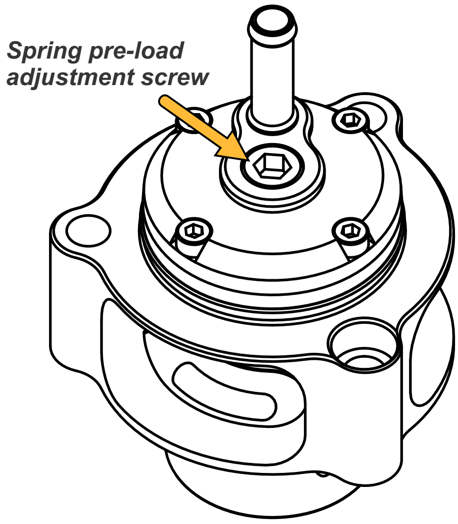
Insert the shorter of the three supplied screws into this hole, then position the VTA onto the turbo with the screw in the orientation shown, and tighten only gently at this stage.

Position the solenoid mounting bracket over the VTA, then insert the remaining two longer mounting screws into the bracket and VTA. All three screws can now be tightened.

Push the vacuum hose onto the VTA hose barb and secure with the factory clamp, then clip the boost control solenoid back onto the mounting bracket.

SPRING ADJUSTMENT

The GFB VTA ***DOES NOT*** require spring pre-load adjustment to suit specific boost pressures. The pressure-balancing design of the VTA means that until the ECU decides to open the diverter there is equal boost pressure on both sides of the piston, so it will stay shut under boost REGARDLESS of the spring setting or the boost pressure.



Adjustments to the spring pre-load can often help improve throttle response and reduce lag, so it can pay to experiment.

The screw in the centre of the BOV cap is the spring preload adjustment screw, and the direction of adjustment is engraved on the cap. Please use a **metric** 5mm hex key for this screw.

There are 10 complete turns of adjustment, and the softest setting is achieved when the adjustment screw is flush with the head of the valve as shown. Do not set the screw to a position above the top of the cap or it may come loose and fall out.

Adjusting the spring pre-load changes how easily the valve vents when the ECU triggers. The best throttle response is typically found when the spring is set as firm as possible without causing compressor surge (turbo fluttering) when the throttle is closed on a high boost/high RPM gearshift.

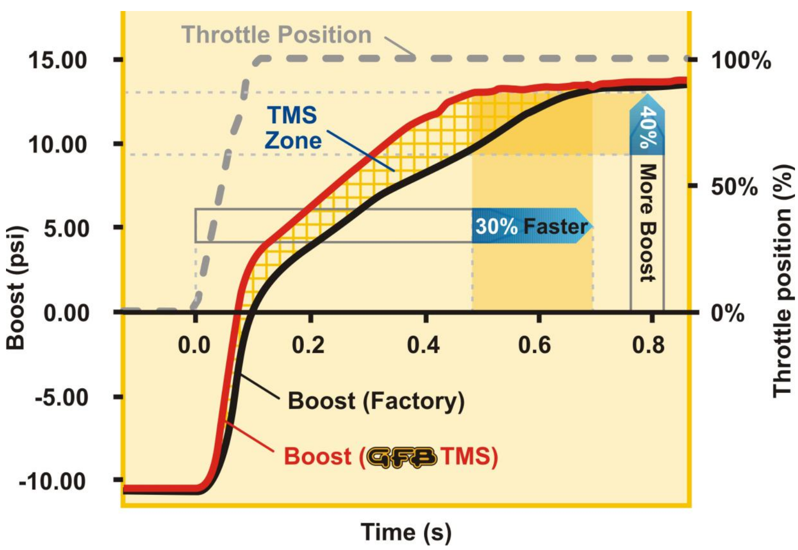
To explain further, contrary to popular belief, venting as much air as possible to "let the turbo freewheel" does not reduce lag. Perhaps 20 years ago it may have been true, but turbos these days spool up very quickly, and the greater benefit comes from setting the valve up to keep as much pressure in the intercooler as possible during a gear-shift or partial throttle lift.

Here's where adjusting the spring pre-load can help. A firmer spring pre-load can help retain a small amount of pressure in the intercooler during a gearshift, which leads to a faster return to peak boost. The limiting factor in how much you can increase the spring pre-load is compressor surge. Once this starts to occur at high boost/RPM, there is no further gain to be had, and for the life expectancy of the turbo it is best avoided.

Note that it is common however for compressor surge to occur at low RPM/boost, even if it doesn't occur at high boost/RPM. This is not really a concern for the turbo because the shaft speed and loads on the turbo at this point are much smaller, and the pressure spikes from compressor surge are much lower than those experienced at peak boost.

This is the basis behind GFB's TMS principle:

Turbo lag is minimised when the valve only vents enough air to prevent compressor surge - the graph opposite illustrates the reduction in lag. To read more about the TMS principle, visit our website: www.gfb.com.au



Notes on VTA Operation

You might hear the VTA vent at seemingly odd times, but this is determined by the ECU and is not a fault with the VTA. The ECU turns on the solenoid to vent the diverter any time the throttle is closing faster than a specific rate. The throttle doesn't even have to be completely closed - as long as the rate of closure meets the ECU's requirements, it will attempt to open the diverter. The ECU turns the solenoid on for approximately 2 seconds, unless the throttle is re-opened sooner, in which case it turns the solenoid off immediately.

The spring inside the factory diverter is so soft that the valve will be sucked open completely by the vacuum when the ECU turns the solenoid on. This means the factory diverter opens fully whenever the solenoid is on, regardless of whether there is boost pressure to vent or not.

The VTA on the other hand balances the opening force from the vacuum when the solenoid turns on, which means the valve uses the existing boost pressure AND the vacuum from the solenoid to determine when and how far to open. So if the ECU turns on the solenoid at low RPM when there is only a small amount of boost pressure, the VTA will only open as far as it needs to vent the existing boost. This effect helps improve throttle response and boost recovery (particularly on gearshift), and also smooths boost transitions when you modulate the throttle, i.e. when balancing the car mid-corner with the throttle.