

HOW TO UPDATE AND /OR INSTALL TO V.3 PCV UPGRADE. April 2017

NOTE: THE TOP FITTING ON SEPERATOR MUST BE FULL LENGTH ON SEPERATOR TO PROVIDE CLEARANCE FOR RUN T LOWER FITTING/ INTERNAL CHECK VALVE REQUIRED. WE NEED TO BE SURE IT DOES NOT THEN CAUSE INTERFERENCE BETWEEN THE LOWER FITTING AND THE PASSENGER SIDE ENGINE MOUNT. UPGRADES OF V.2 TO V.3 WILL REQUIRE AN EXCHANGE UPGRADED SEPERATOR PLUS ONE ADDITIONAL LINE AND FITTINGS.

PCV UPGRADE v.3

PLEASE NOTE: When ordering a kit, please specify what engine configuration you have. This includes if you have an LHU OR LDK replacement engine. *The dipstick tubes are different length from LNF.* ALSO Kappa (Solstice/Sky) engines cannot use an LDK OR LHU oil pan they must use an LNF pan due to lack of clearance to the welded in under engine cross member; the LDK/LHU oil pan is deeper than the LNF. The turbo configuration is important as well. We supply modified adaptors for K04 turbo, and a different, appropriate fitting for the ZZP modified ZFR BW turbo. Some other turbo's must use a fitting tapped into the turbo inlet housing or flexible hose coupler. We supply fittings to suit these turbo's as well, but you must specify when ordering.

LDK manifolds are different diameter for the map sensor; also when installed with an LDK engine the Inf turbo support brackets are not a direct fit. Those brackets are important so mix and match the LDK and LNF parts to make sure you have the turbo supported. Unsupported turbo manifolds will crack. Internally all OEM manifolds crack in the wave partition at the turbo exhaust outlet; that's normal; the wave is cast in to deal with massive turbo heat expansion issues. That's also why exhaust manifold flanges are slotted between ports. We currently have developed a support bracket for the ZZP cast turbo manifold, and an FAI (Fresh Air Intake) fitting for the rocker cover, as the ZZP manifold has an external wastegate port which hits/blocks the FAI port in the LNF valve cover if the OEM fitting is in place.

Folk ask " why FAI?" and "why not VTA?". The answer is , to avoid sludge build up and maintain OEM PCV operation which is required in some jurisdictions. Like catalyst exhausts. Vent to Atmosphere maybe okay for race cars, but apart from emission control systems, the cabin smell of blow-by oil from a VTA screen is hard to deal with.

When we first started this five years ago or so, I said we would see how it worked and learn from it. Its clear to me that our v.1/2 upgrade worked well. We were simply taking the pcv vent line from the rocker cover and bifurcating the line, inserting a purpose designed Mann Hummell Diesel separator and draining back seperated oil to the engine.

GM powertrain intended the LNF GDI engine to have crankcase always in vacuum even in boost. Sadly this appears not to be the case, especially as the cars get older and the tuners go wild generating more and more torque from the robust Ecotec engine. But you get nothing for nothing, and the rings have a tough time and as a result there is positive crankcase pressure. Sometimes its a lot. And a lot of oil as a result.

Our v.1 did not have a check valve in the oil drain back; we believed that as the engine was in vacuum that would not be needed. That proved not to be the case and we provided a check valve for the drain back in v2 and also eliminated the

separator check valve, as PCV reverse flows would cause the inlet manifold PCV valve (I believe to stay closed) and cause a “ turkey call “ noise, that could be relieved by removing the oil fill cap. So V 2 has worked well.

But still I was finding some oil in the inlet manifold. Clearly it was coming from the inlet manifold PCV valve which is open in vacuum and off boost, and then closes in boost.



I found when I removed the inlet manifold on the GDI LNF to clean the valves (a regular walnut blast service every 30,000 km or so with standard PCV systems) I would find lots of oil even in the inlet manifold blind ports cast into the head.

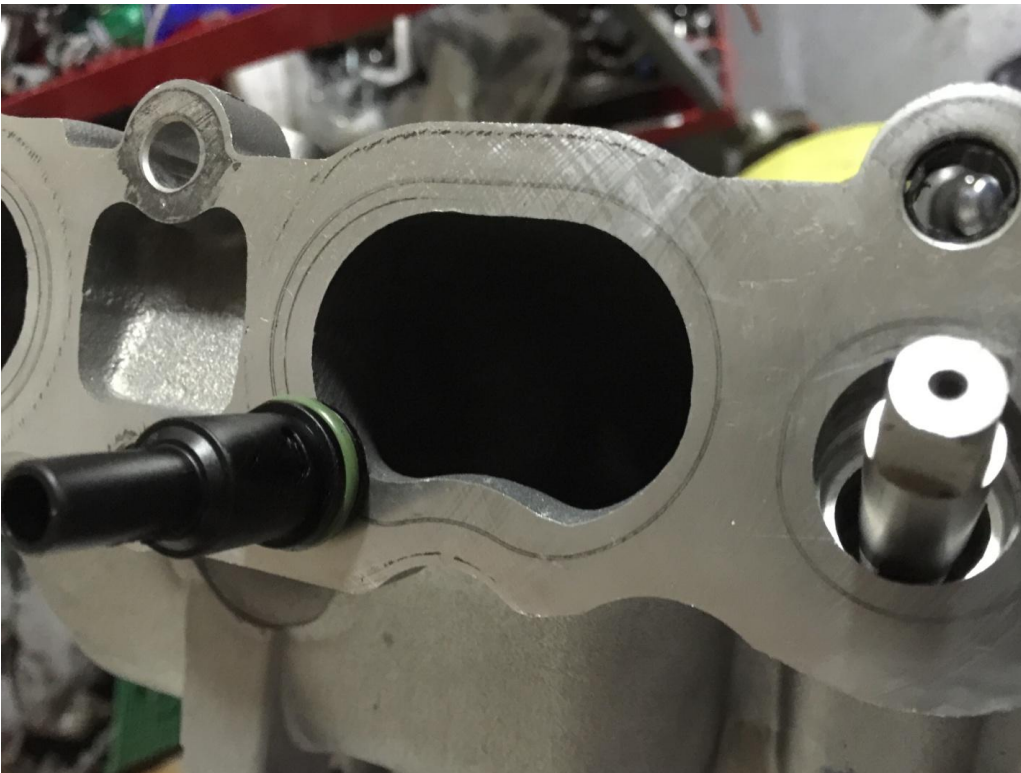


DIRTY COKED VALVES @ 90,000 KM

The only way oil can get there, is if it wicks past the inlet manifold gasket. ALWAYS use a new inlet manifold gasket when removing and replacing the inlet manifold.



CENTER SMALL PORT IS THE PCV VENT PATHWAY. THE BLIND CASTING CAVITIES ARE COVERED BY THE INLET GASKET



THIS PICTURE SHOWS THE PCV VALVE REMOVED, A TAP IN PLACE THREADING THE PCV PORT IN THE MANIFOLD FOR A PLUG, AND TO THE LEFT OF THE PCV VALVE, THE BLIND CAVITY IN THE MANIFOLD WHICH FILLS WITH OIL, WICKING PAST THE GASKET.

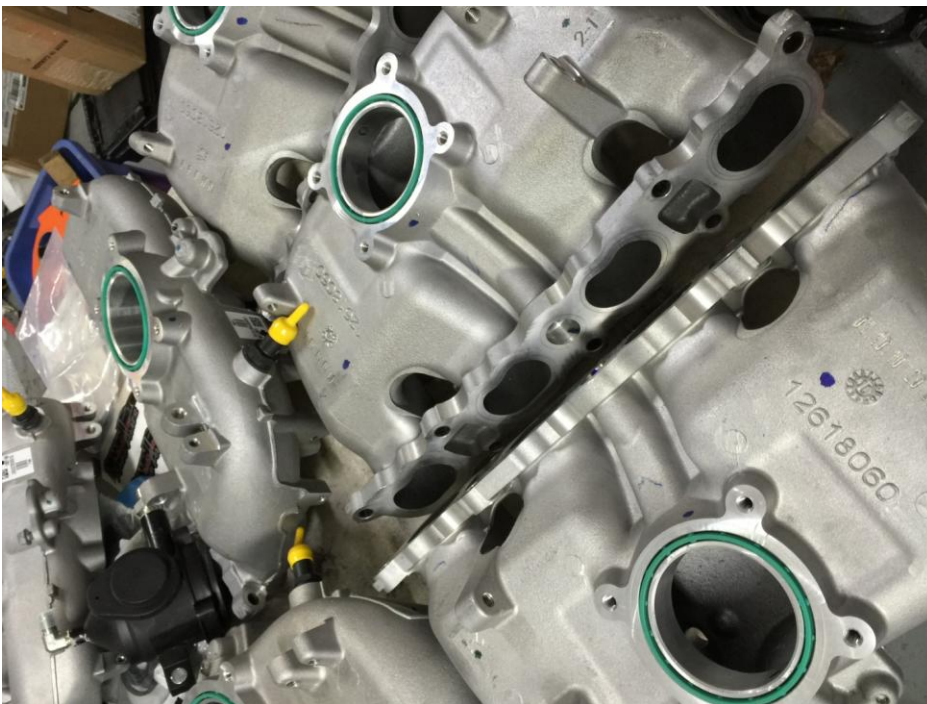
That means there is a lot of blow by oil getting in the inlet tract.

LSJ engines show the same issue with oil wicking past the gasket. It doesn't make for any issues, in either case, but its an indication how much blow by oil from the PCV is getting onto the valves.

In the LSJ with port fuel EFI there is clear evidence of how the air fuel mixture is washing the ports and the inlet valve stems.

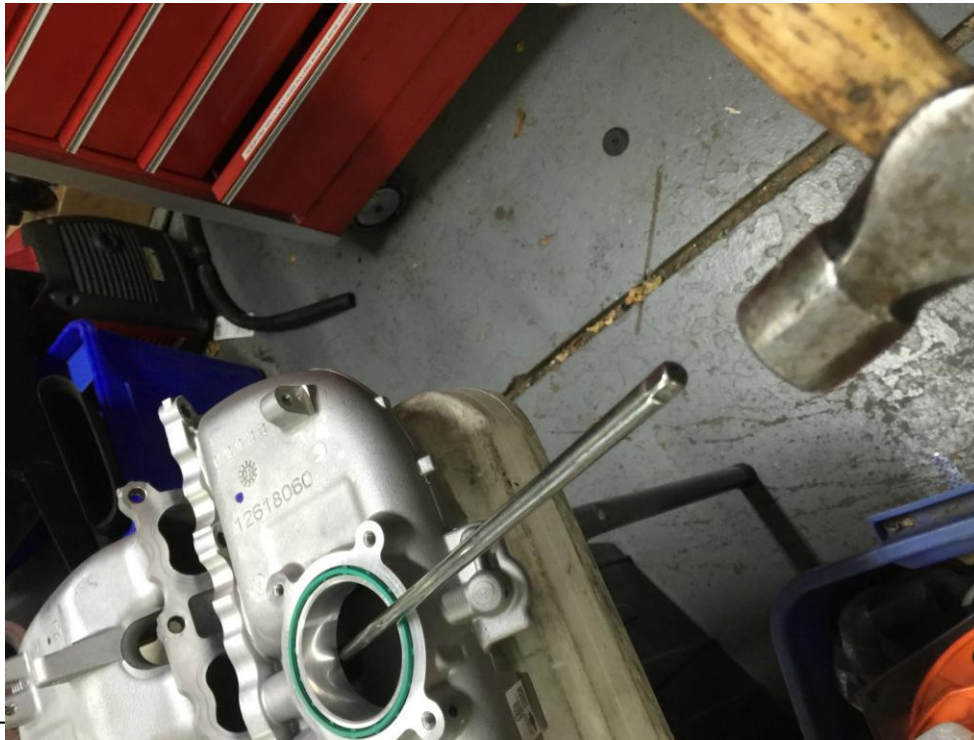
The GDI LNF has no such opportunity , of course, as fuel is injected directing into the combustion chamber, not into the inlet port.

So as you can guess from the pictures above, v.3 removes the PCV valve and redirects blow by gasses to the separator, reducing the risk of contamination of the valves from PCV blow by oil.



WE START WITH NEW INLET MANIFOLDS

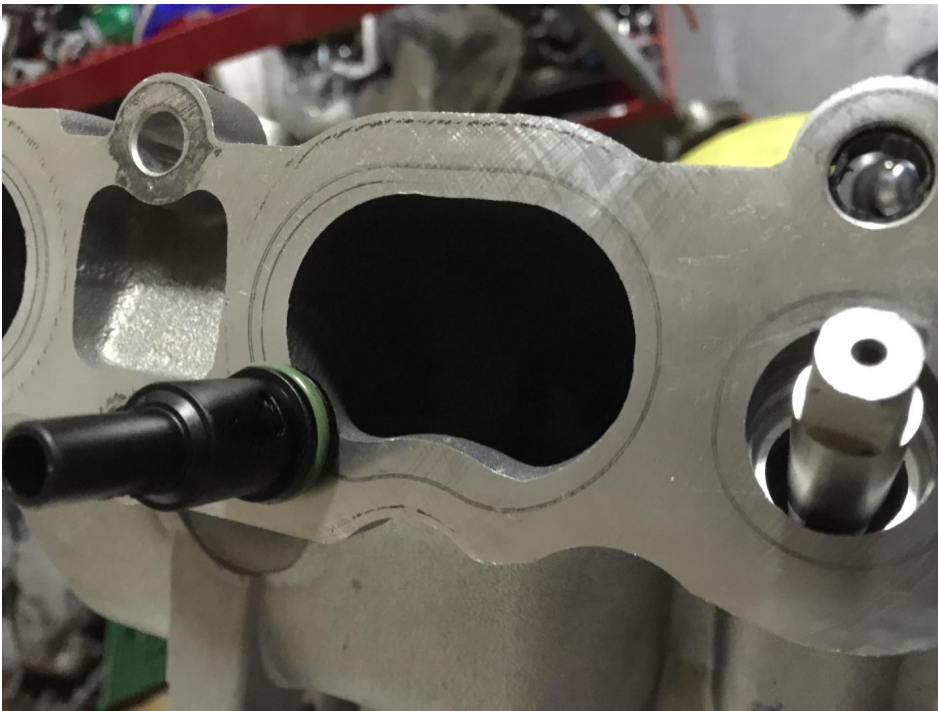
We then remove the pcv valve (I use a long 1/4 drive extension) and knock the valve out) we then tap the port 1/8 NPT27. The port is to size; no need to drill. Then insert a plug with sealant on the threads.



TAP THE PCV VALVE OUT WITH A LIGHT HAMMER BLOW ON THE DRIFT



PCV PORT IS NOW READY TO TAP. IT IS TO SIZE FOR 1/8 NPT27



START THE TAP PROCESS, STRAIGHT, SLOWLY AND CAREFULLY



TAP IN PLACE AT THE END POINT. USE CUTTING FLUID, AND TAKE CARE TO KEEP THE TAP STRAIGHT. CLEAN THOROUGHLY AFTERWARDS



THREADED STAINLESS PLUG IN PLACE. THE NEW PCV ROUTE PORT IS JUST VISIBLE ABOVE THE PLUG

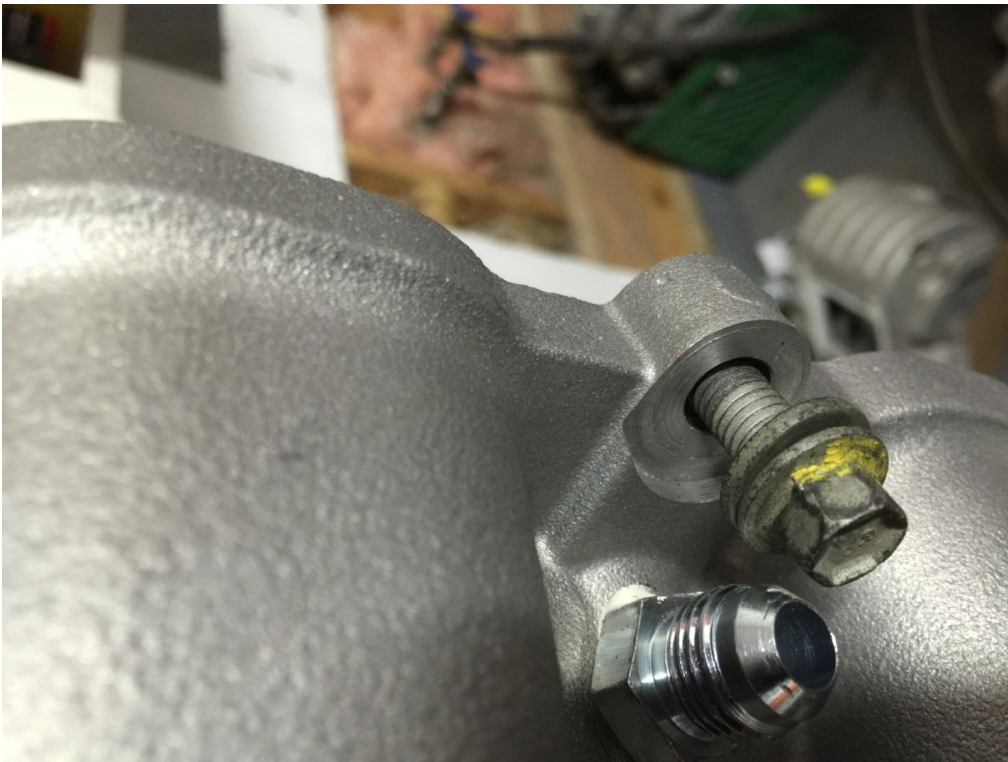
Next step is to drill and tap the inlet manifold so the vent routing can now go to the separator. It is important not to put the port too close to the inlet manifold flange, as that would prevent access to the fastener for the flange. Too far away and the vent fitting will interfere with the plugged port.



DRILLED



READY TO INSTALL WITH THREAD SEALANT. ONCE INSTALLED, DURING SERVICE REMOVAL, ALWAYS USE TWO WRENCHES , ONE TO HOLD THIS ADAPTOR AND ONE TO REMOVE THE FITTING



CLEARANCE IS ADEQUATE TO INSTALL THE MANIFOLD FASTENER. A SWIVEL SOCKET IS RECOMMENDED



HOSE IN PLACE WITH AN ADEL FASTENER TO PROPERLY LOCATE HOSE. THIS IS A POWDERCOATED MANIFOLD WITH A FIFTH INJECTOR PROVISION WELDED IN.

ASSEMBLING THE REVISED INLET MANIFOLD TO THE CYLINDER HEAD

If you purchased a complete kit with manifold or just the upgrade line kit, a new gasket is supplied along with a 1/8 NPT 27 tap, an extra center bolt and two “throwaway” short head to manifold studs. The studs are installed either side of the center manifold to head bolt, so the gasket can be installed and stay in place, and then the manifold installed. Before you install the manifold, if you removed the connector for the throttle body, install it onto the throttle body along with the grey safety clip, and then install manifold. Once the manifold is installed its much easier to use a ¼ drive long extension and 10 mm wobble socket to install the throttle body, rather than fiddling with the connector and grey safety clip under the manifold. Always use dielectric grease on connectors when reassembling.

Always torque inlet manifold to cylinder head fasteners: 18 ft lbs for the bolts 15 ft lbs for manifold nuts if used. All the 6.0mm x 1.0 mm fasteners are 89 inch pounds. Don't forget the support bracket for the inlet manifold, and if the fuel damper pipe has been removed, replace it with a new one. The fuel pipe adaptor fittings are 22 ft lbs, the mounting fasteners 89 inch pounds (6.0mm x 1.0 mm) .

Once the separator is in, install the hose from the manifold, unless you purchased a manifold with the kit, then it was shipped assembled. Then install the separator hose end fitting. The position of the lower port 45 fitting may have to be adjusted to suit the routing , which is under the upper hose and then over the radiator hose, and then the adel clamp is

positioned; so secure the hose where it wants to run. Its important to let the hose run in the direction it needs to go without kinks etc.

There is the ability to rotate both the run" T" fitting, the 45 deg fitting in the separator, the 45 deg fitting on the hose, and the 90 deg fitting at the other end. As each of the 45 fittings allow the hose to swivel in a elliptical path, it does mean that a little fiddling is need to get it routed to work right.

I assembled these kits onto cars, and on the first one, I very nearly redesigned the fitting requirements, as I was getting frustrated assembling it - it didn't appear to work like the prototype on the head on the bench. ..but what I supply, does work ,it just takes patience to adjust.



If the Fresh Air Inlet nipple and fitting on the OEM plastic inlet tube is damaged ,leaking or the check valve is not working, the result will be severe condensation and sludge build up. Please handle and check these components carefully. A revised and improved FAI hose assembly is available from GM.



Then all is good .

Enjoy your ride and check back in with your experience in use, any time.

Thanks for choosing Powell RaceParts.