Powell race shop ; the next mod.Advanced PCV control.
Its a PCV revision to attempt fixing the DI coking problem There will be three versions; one for LNF Cobalts. One for LNF Sky/Solstive, and one for LSJ. The mounting brackets and hose lengths are different between LNF and LSJ; the HHR SS is the same as the Cobalt SS and the Kappa Sky Solstice is different again. The install procedure has a choice of tapping into the existing OEM PCV hose, or removing it and installing a different fitting in the rocker cover. The LSJ DOES NOT HAVE A VALVE COKING ISSUE its not a DI engine, but the LSJ PCV is a two way system and is not very effective and some S/C cars pop dipsticks out as the crank case pressure builds up at high revs, and the LSJ tends to gum up the Laminova cores with oil residue from blow by which reduces aftercooling effectiveness of the intake charge,

BUY IT BUT DONT FORGET US...
One thing about this, the way we sell it will be different from the way most vendors sell things. Not to drive everyone crazy about it, simply understand that I want you to keep track and feedback to us, how your car is now, and how it is after time with the PCV upgrade you got from Powell raceshop. It kinda makes our customers a sort of a development test fleet. The engineering in this mod is sound, the ideas have good science, logically it should work, and the execution is well made, not cheap.

And for sure here we are over a year later and a major step in our upgrades, based largely from on track experience and larger aftermarket turbo installs.

We needed to see how it works, as we have only limited experience that says "yup it looks like its working." Normally if I were working for a manufacturer, it would go in a durability test fleet that works 24/7 on a specific driving cycle routine , to get

long term view of what is going on in a field test. And BITD not long ago, the Performance Division would have track tested this system. It has been up to us you and me = our customers and my on track and on road experience with my LSJ.

SO HOW WILL THIS UPGRADE WORK FOR YOU?

Please understand that for the LNF group, there is a WORLD WIDE issue with most every direct injection gasoline engine with inlet valve coking. Basically, excess oil in the PCV system ends up being deposited on the inlet valves, and with DI unlike port injection, there is no “washing” of the inlet valves with a fuel air charge.

There is no one single solution, although we have found good gains with the PCV upgrade so far. There are other important things to consider. The suggested changes for your car include:

- using low ash engine oil
- change in your driving routine, avoiding low rev/high boost driving.
- always use tier one gasoline
- always use 93 octane or better

- Some of our customers and friends have fresh clean valves in their cars thanks to warranty, and if not, a borescope snapshot of what they look like

For the record, proper installation of any catch can or PCV upgrade is important. A catchcan on the fresh air side is silly.

For the LNF, the OEM system has:

- On the fresh air side running post filter and pre turbo impeller; a check valve in the hose (thats the orifice) and it lets air in to the engine. This inlet air path goes directly to the base of the engine and is sealed from the upper cylinder head.

- There is another vent route out through the head into the inlet manifold. There is a check valve in the inlet manifold vent path, so the engine on vacuum (off boost) can breathe fumes into the inlet manifold. The check valve there closes the moment the inlet is not pulling vacuum.

- There is a vent tube with an internal orifice on the dirty side, it vents to the turbo on the intake side.

- There is a “floor” in the dirty side route in the rocker cover with horizontal seperators

  Catch cans without a seperator in two chambers really just become an accumulator of oil.
  The idea is for the oil laden air on the dirty side to pass through the media (or spill plates) so the air can leave the oil behind and then be sent on to the original routing.

  Then the question is, what to do with the accumulated oil? it needs a place to go, and draining it after every track session or every week on the street onto your driveway or into a plastic bottle is not a good way to do it.

- I have a way and it makes the system better, while preserving the stock PCV operation which is very important.

If you vent the pcv to atmosphere with a filter like a hot rod vent cap, all bets are off and the pcv system will not work at all as intended

PCV FUNCTION

The pcv orifice sizes (there is more than one) are chosen to keep the crankcase pressure negative by a small amount under all operating conditions.

Under light load, the turbo inlet venturi effect is just enough to cause a depression and pull air through the crankcase from the fresh clean air duct tube. The check valve becomes an “orifice” to control depression.

Under high load where the piston blow-by becomes significant, the fresh passage is stopped with a check valve. This is to prevent back flow. The venturi effect of the turbocharger inlet is sufficient to pull in 100% of the piston blow by, plus pull the crankcase pressure 2 to 3 kPa . negative as calibrated in balance with the fresh air check valve.

Crankcase pressure should be reasonably uniform. Draining the separated oil back into the crankcase in a similar manner to the turbo oil drain was required. We took care to make a return to avoid crank oil whip and place the drain back oil in a relatively undisturbed location. This was not easy, as we are only talking a few kPa delta to keep flows going in the right direction.

COKING
Where it starts to fall apart , is when the gradual build up of coked oil on the inlet valves starts to inhibit proper engine operation, and it becomes a circle jerk; the more build up the more oil gets kicked through the pcv, the more oil, the more build up etc.

Also if there is an aftermarket tune,(few are very good in my opinion) and there is a lot more fuel, timing and combustion pressure being thrown at the motor, it is possible that the piston rings and ring lands and skirts will wear really fast and then blowby (pressure in the crankcase) becomes so great the pcv system just cant deal with it. AND THIS IS FOR SURE: on track the turbo motors are simply not able to maintain any vaccum at extended WOT and continued high boost over many laps on a road racing track. Not like a 1320 drag strip where the duty cycle is about 10-14 seconds at a time.

No one thing will fix this issue entirely: driving cycles, fuel quality and octane, low ash engine oil are all important additional factors to consider.

The driving cycle.

The driving cycle I refer to, is to avoid low rev high boost situations , extended low rev cruising and short 1-3 mile start /stop / park driving. Add long idling time in winter as well; the driving cycles may contribute to low inlet valve temperature.