

## Engine Modification recommendations for 2.0L LSJ Cobalt SS or Ion Redline

First thing, you need to verify that your intercooler pump is even functioning. We have had customers come in with less than 60,000 miles on the Odometer and had a bad IC pump. It is located on the front of the block, right under the lower intake manifold. You could start the car, of course make sure that the car is secured, and then reach under the car and feel if the IC pump is running (if you have our ZZP 1.0 pcm, all you have to do is turn the key to on, without the engine running). Unplug it and then plug it back in to see if the pump shuts off and then restarts. While the plug is off, I would use a multimeter to verify that the polarity is correct. The IC pump will have a (+) and a (-) on it, just make sure that they are correct. Since the pump only efficiently spins one direction, that has a HUGE effect on the IC pumps actual flow! Most 04-05 Ions and some Cobalts came wired backwards right from the factory.

Note: The IC pump is completely separate from the engines water pump that is driven by the timing chain.

Modifications... if you just want to gain about 10hp, you can simply purchase our ZZP 1.0 pcm, which will raise the rev limiter from 6500rpm to 7200rpm, modify fueling/timing tables amongst many other things (listed on the PCM page). Now you must determine what injectors your car has. GM option stage 1 and 2 cars come with 42# injectors. The stock 33# injectors are bright green in color and the 42# injectors are the same shape, but are black in color. The next recommendations are assuming you are running 93 octane. If you cannot get 93 octane, then we recommend running a pulley size .1 larger per octane point under 93. The stock supercharger pulley size is 3.35" and that is the smallest pulley that you can run on the stock (green) fuel injectors because they are already close to maxed from the factory. The first bolt on would be a 3.1" pulley, however it will require at least 42# injectors. It is also a very good idea to replace the spark plugs with a more boost friendly set, like the cooler NGK or Autolite ones that we offer. Lower heat range spark plugs will help to avoid spark knock. If you would like to gain another 5-10hp then you will want to install a cold air intake in which we have 4 options, our ZZP Cobalt CAI, ZZP Redline CAI. We also carry the K&N Typhoon CAI for the Cobalt and Ion, however the gains are roughly half of our true 3" ZZP intake. The GM 42# injectors are maxed with a 3.1" pulley so to be able to safely run a smaller pulley, you will need to purchase larger fuel injectors and we have a few options, 45# or 60# Siemen injectors are preferred for gasoline builds. We do not recommend running anything larger than a 60# injector on gasoline due to potential idle AFR issues. If you are planning on running e85, then we suggest running the Siemens 80# fuel injectors. When you change the injectors, your pcm must be programmed for the new injector size.

The best bang for the buck is our Stage 2 kit, it will give you about 240-250whp and it is the cheapest bolt on kit around. A typical Stage 2 kit would use a 3.1" pulley. If you would like 250-260whp then you would want to skip the Stage 2 and pick up our Stage 3 kit, which is the Stage 2 kit but it adds a ZZP heat exchanger and the

optional dual pass endplate. This will allow you to run the smaller supercharger pulleys and still be completely safe. When you run a smaller supercharger pulley, the belt will get loose, we have a few options to keep the belt nice and tight. We have the shorter GM Belt, an Oversized Tensioner Pulley, and the Adjustable Tensioner. Both of our Stage kits come with one of these options.

Continuing forward will require exhaust modifications, the factory exhaust manifold is extremely restrictive so we would recommend a header. We have 3 options; A Shorty header, which bolts up to the stock downpipe or our 2.5 or 3 inch version, next we have a Midlength header and downpipe package and finally a Long tube header and downpipe package. The addition of one of these packages will allow you to run a 2.8-2.9" pulley (93 octane). This is important because if you want to get more air in to the engine, you will need to make it easier for that air to get back out. When you free up the flow of the exhaust, you increase power safely as the boost pressure will actually go down.

Note: Due to poor efficiency at higher boost levels, we recommend that the factory M62 supercharger never be run past 17 psi. More than 17 psi of boost will just increase the IAT<sub>2</sub> temps which will heat soak the blower/intercooler and then will lower your spark advance(timing) and reduce performance. (IAT<sub>2</sub> temp is the temperature of the air that is flowing into the engine post intercooler, IAT temp is the temperature of the air flowing through the MAF(mass air flow) sensor.)

At this point you should improve your intercooling system with our ZZP dual pass intercooler plate and Intercooler heat exchanger. Stage 3 kit, header/downpipe, dual pass endplate on 93 octane will make about 260whp. If you want to make about 300whp and run below a 2.8" pulley then you will need to look into the swapping the cams, 82# valve springs, and/or ZZP ported head and this is with the stock m62 blower.

To be able to spin the engine safely above 7200rpm, you will need to add 82# valve springs, and when you want to go above 7500rpm and still be safe I would recommend our neutral balance shafts and upgraded ATI balancer. The ATI damper is a very important mod, we have broken many crank keyways using the factory balancer/crank pulley, the ATI unit has cured that problem.

Our ZZP 3" intake will give you about 10whp over stock or the common Injen intake as well. And it works great with the larger LS4 Throttle Body. To run the LS4 throttle body, you will either need our adapter plate or even better, port the inlet of the blower to match the larger throttle body opening. However the LS4 throttle body does make your throttle very sensitive which some people do not like.

Our Phenolic spacer is always a great mod for any level of modified LSJ car. It makes a heat barrier between the head and the intake manifold.

There is always the option of building a forged short block as well. We sell a couple different options for our forged LSJ short block; we have a 2.0L, 2.1L, and a 2.4L version. We have made 320whp with the stock M62 blower using our ported head, cams, 2.4 stroker short block, long tube header/downpipe, LS4 throttle body on 93 octane pump gas.

If your goal is to make 350+whp, you would be more interested in our Turbo only kit. It is available for both the 05-07 Cobalt and the 04-07 Redline. You can bolt this kit onto a totally stock LSJ car along with 60# or 80# injectors and make about 350-380whp with around 18-20psi of boost with perfect drivability! A 3" cat back exhaust is highly recommended but is not required. A set of Ecotec turbo cams, 82# valve springs, and possibly even Ecotec ported head will make power levels of 400-420whp at 20psi of boost on 93 octane and the possibility of well over 450whp at higher boost levels on race gas or e85.

**Boost Reference Fuel System:** This is beneficial for people running 60# or larger fuel injectors. When hooked up for full boost reference fuel pressure it will make the injectors smaller at idle and larger under higher load. This will help with idle AFR (air fuel ratio) when the injector is having a hard time opening for a short enough time to keep the AFR at the commanded 14.7:1 during idle and light cruise.

**Meth injection:** We only really see gains when a high percentage of meth to water is used, and it is mostly beneficial for customers that cannot get 93 octane or e85 fuel.

Don't forget the basic maintenance parts either. It is never a bad idea to replace your Fuel filter or o2 sensor if they have been in there for a while. The fuel filter can clog and reduce your fuel systems capability and the o2 sensor tip is known to get burned off and hurt your MPG's and drivability.