

## 1. The difference between a Vortech V-1, V-2, V-3 Trim

Vortech superchargers label their compressors in names such as V-1 Si-Trim, V-3 Si-Trim, V-2 Si-trim, or V-1 T-Trim. The first half in which Vortech labels their compressors tells you the type of gear case or transmission Vortech is using. The second half tells you more about the size of the supercharger and type of impeller Vortech is using.

### Componentry

Vortech componentry has garnered a reputation for its "best in class" execution. Blower casing components are cast from A356 aircraft-spec aluminum alloy treated to T-6 condition. Modern CNC production cells ensure that part tolerances are held into the "tenths" (of a thousandth of an inch) - to, and in many cases beyond aircraft tolerances.

### Impeller

The heart of any centrifugal supercharger is the impeller. We make impellers from both investment cast and billet materials. Our investment castings are from an extremely strong but light-weight proprietary aluminum alloy (similar to that used in turbochargers). This special heat treated material is used because of its stability and enhanced properties at high operating temperatures - which may reach 400 degrees F under extreme conditions. At this temperature, the Vortech impeller is up to 36% stronger than even 7075, a common structural aluminum material used by others. The investment cast process secures close dimensional tolerance and excellent surface finish. Beyond this, our billet racing impellers are second to none. These are made from custom forged blanks of a proprietary metallurgical blend, that ensures exact tolerances. And finally, multi-plane dynamic balancing to better than ISO G0.4 tolerances delivers smooth operation. The historical use of these same procedures in building aircraft turbomachinery components for the most demanding applications proves its durability.

### Drive Gear

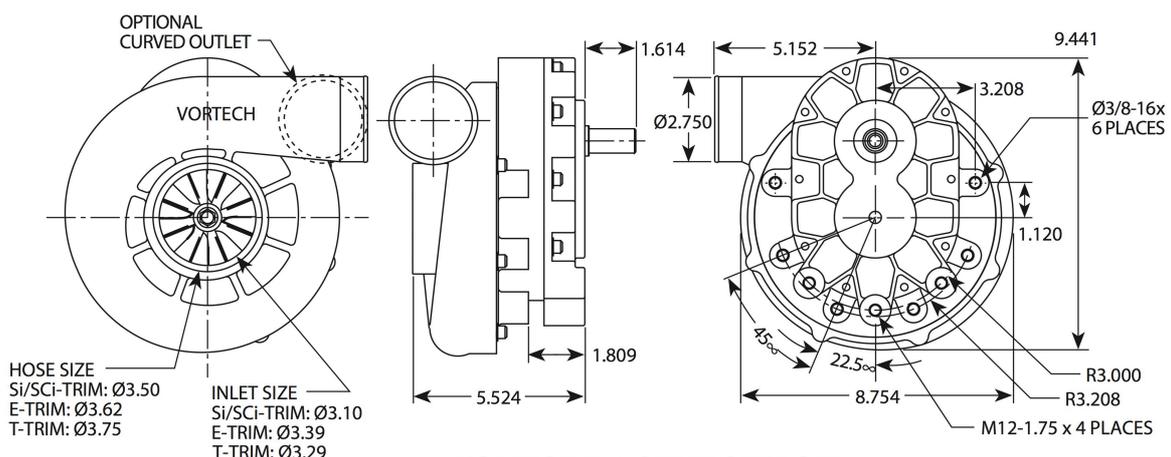
Drive gears are manufactured from 8620 and 9310 carburized billet alloy steels. These premium grade materials possess exceptional strength and durability, with enhanced core toughness properties. The gear teeth are CNC precision ground. The internal step-up drive system is engineered to reliably support impeller speeds exceeding 70,000 rpm.

### Bearings

Vortech bearings are ultra-high precision (ABEC 7/ABEC 9) pieces that originate from the best precision bearing manufacturers in the world. Most are custom manufactured to our specifications. Aircraft quality is truly an understatement here, since these bearings experience speeds as much as twice that of a jet engine.

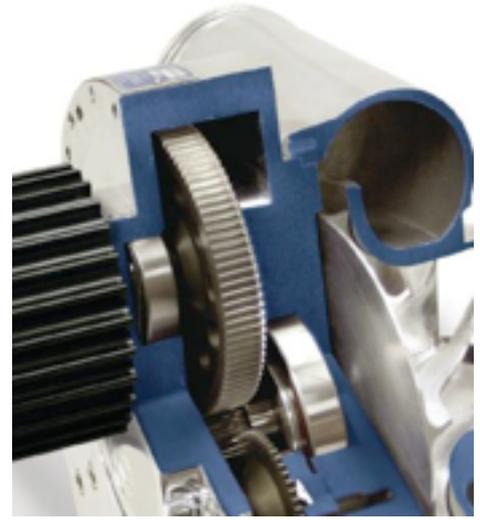
### Lubrication System

Vortech offers both engine-oil-fed and internally lubricated superchargers. Our V-3 units are factory prefilled with our special synthetic fluid - so, no oil supply or drain lines are necessary. Our traditional oil-fed units make use of the host engine lubrication circuit, which may optionally be fine-filtered before introducing to the supercharger.



## Vortech V-1

The Vortech V-1 supercharger means Vortech is using straight cut gears inside of the superchargers gear casing. These straight cut gears make the supercharger louder than normal where you normally can hear a lot of the gear noise and whining noise from the supercharger. The Vortech V-1 also requires oil lines to be fed into the supercharger to supply a fresh supply of oil. It also will require an oil drain line to drain the oil from the supercharger to the oil pan. The Vortech V-1 will come in standard duty gears and some come with Heavy Duty gears for those who want to run a cog pulley setup.



Utilizing precision ground gears to drive its impeller, the V-1 incorporates the strength of superior design with the quality and testing that make Vortech famous. As a result of our precise drive system, the impeller requires minimum clearance which contributes to Vortech's superior efficiency and durability. The heavy duty (H/D) V-1 configurations include high-speed ball bearings, ideal for race applications, i.e. cog pulley/Gilmer drive. From the race ready T-Trim to the high-efficiency Si-Trim, the V-1 is a versatile supercharger for the most demanding enthusiast.



### Vortech V-1 Si Supercharger

Ideal for latest generation of improved breathing, high-power street and strip engines. Vastly improved flow and efficiency at high boost levels, providing completely new levels of power gain.

Max Speed:	55000 RPM
Max Boost:	26 PSI
Max Flow:	1150 CFM
Max Power:	775 HP
Peak Efficiency:	78%



### Vortech V-1 SCi Supercharger

Straight cut spur gear. Available with straight or curved discharge.

Max Speed:	58000 RPM
Max Boost:	21 PSI
Max Flow:	1050 CFM
Max Power:	725 HP
Peak Efficiency:	75%



### Vortech V-1 T Supercharger

The supercharger of choice for street/strip vehicles with modified engines. Fits engines up to 825 horsepower. Available with straight or curved discharge and clockwise or counterclockwise rotation.

Max Speed:	55000 RPM
Max Boost:	26 PSI
Max Flow:	1200 CFM
Max Power:	825 HP
Peak Efficiency:	73%

## Vortech's V-2

Vortech V-2 head units are similar to the V-1 superchargers where the supercharger will require an oil feed line and oil drain line. The major difference is they are using helical gears inside of the gear casing. What are helical gears? Helical gears are gears that are cut diagonally instead of straight. These Helical gears help eliminate a lot of the gear noise that is common in the Vortech V-1 superchargers. You will still hear the whining sound, but the chattering sound caused by the gears is significantly quieter. This is why Vortech names their V-2 compressors SQ, which stands for, "Super Quiet."



The V-2 SQ model is considered the new generation among superchargers. Highly advanced computer designed gears feature an optimized helical profile which allows for near silent operation while providing superior performance. All V-2 SQ units feature a 3.6:1 internal step-up ratio and are direct bolt-on replacements for our V-1 units.



### **Vortech V-2 SQ Si Supercharger**

Ideal for latest generation of improved breathing, high-power street and strip engines. Vastly improved flow and efficiency at high boost levels, providing completely new levels of power gain.

Max Speed:	52000 RPM
Max Boost:	22 PSI
Max Flow:	1150 CFM
Max Power:	775 HP
Peak Efficiency:	78%



### **Vortech V-2 SQ SCi Supercharger**

Helical cut gear profile with SQ technology. Available with straight or curved discharge.

Max Speed:	53000 RPM
Max Boost:	17 PSI
Max Flow:	1050 CFM
Max Power:	725 HP
Peak Efficiency:	75%



### **Vortech V-2 SQ E Supercharger**

Ultra-high impeller speed and efficiency. Low-friction impeller seal allows for "upstream" throttle draw-through applications.

Max Speed:	52000 RPM
Max Boost:	17 PSI
Max Flow:	1150 CFM
Max Power:	775 HP
Peak Efficiency:	76%

## Vortech V-3

The Vortech V-3 supercharger is the latest release in superchargers from Vortech. Unlike the Vortech V-1 and V-2 supercharger, the Vortech V-3 does NOT require any oil lines to feed the supercharger gears with oil. The Vortech V-3 supercharger has an internally lubricated transmission. This internal lubricated gear case requires for the supercharger oil to be changed with Vortech's special supercharger oil. The Vortech V-3 supercharger also comes with helical gears to make the overall gear noise quiet, but still allows you to hear the sweet whine sound that we all love about superchargers.

The V-3 supercharger features an internally lubricated transmission, allowing for supercharger installation and operation without oil lines.

- Helical gear design with 3.6:1 step-up
- The V-3 supercharger can be installed into any existing Vortech V-1, V-2, V-4, V-5 or V-7 bracketry
- Includes remote fluid drain hose (attached to supercharger) that allows for simple fluid changes without removing the supercharger from the vehicle
- A ventilated gear case assembly eliminates any potential internal pressure issues that are currently associated with non-vented competitive designs
- Integrated gear case baffling for proper oil control
- Simple oil slinger design does not require separate shaft or bearing set. This provides proper fluid delivery to gears and bearings
- Superchargers are factory pre-filled with our special synthetic fluid.
- Integrated dipstick for simple fluid checks



### V-3 Si Supercharger

Extraordinary 78% peak efficiency. Ideal for latest generation of improved breathing, high-power street and strip engines. Internally lubricated.

Max Speed:	52000 RPM
Max Boost:	22 PSI
Max Flow:	1150 CFM
Max Power:	775 HP
Peak Efficiency:	78%



### V-3 SCi Supercharger

Impeller speed and efficiency slightly higher than S. Low-friction impeller seal allows for "upstream" throttle draw-through applications. Internally lubricated.

Max Speed:	53000 RPM
Max Boost:	17 PSI
Max Flow:	1050 CFM
Max Power:	725 HP
Peak Efficiency:	75%



### V-3 Lubricant

Synthetic lubricant for V-3 superchargers. This special fluid is required for proper maintenance of the V-3 supercharger.

## Vortech SCi-Trim

The SCi-Trim is one of Vortech's smaller type superchargers. These are commonly found in smaller displacement engines and some entry-level supercharger kits. The SCi-Trim does come in a V-1, V-2, and V-3 transmission.

## Vortech Si-Trim

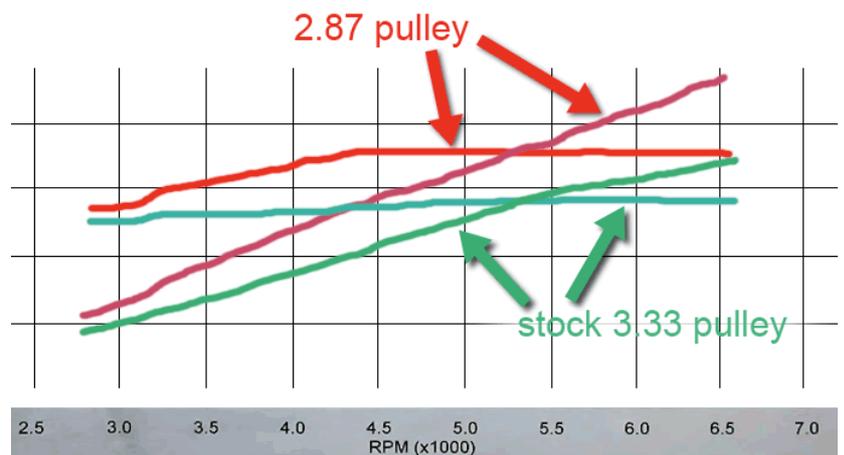
The Vortech Si-Trim is by far Vortech's most commonly used supercharger. These superchargers are great for both street and strip use. You will find these in their Mustang 4.6L & 5.0L supercharger kit, Vortech's 5.7L & 6.1L Dodge and Chrysler Hemi kits, and Vortech's Hummer H2 supercharger systems. The Si-Trim also comes in a V-1, V-2, and V-3 transmission.

## Vortech T-Trim

For those seeking more power for street and strip, Vortech makes a T-Trim for these power seekers. The T-Trim really shines for those who have a modified engine that flows good and are seeking to run boost levels in the 12-18 psi range. The Vortech T-Trim is normally the next blower size up from the Si-Trim once people max it the Si-Trim. The T-Trim only comes in two types of transmissions, which is V-1 heavy-duty, or V-2 also known as a "TSQ". The V-2 version is a non heavy-duty transmission, which means it is not ideal for cog pulleys.

## 2. PULLEY UPGRADE

For the non-REVUP kits, the 3.12 pulley adds about 25whp more than the stock 3.33 pulley while the 2.87 pulley adds about 30whp more than the 3.12. There's also another step up you can do with changing the cog pulley that drives the 2nd smaller belt attached to the vortech. Changing it to a 34 tooth pulley can possibly give you more power too, however some people experienced a power loss with the 2.87+34/28 cog setup. IMO the stock 3.33 pulley isn't very impressive. The stock pulley for most people feels like it's doing too little, too late. Upgrading the pulley(s) brings the boost on sooner and gives you more of it, making the car much more exciting to drive.



Arbitrary dyno chart shows the difference between the stock 3.33 pulley and 2.87 pulley. The 3.12 would be somewhere in between them. Mainly pay attention to the shape of the torque curves. The torque curve should be reasonably flat from mid to high RPMs. I'm not including actual dyno numbers for the sake of avoiding debates on dynos and mods. Generally there's a 50-55whp and 50 tq difference between the 3.33 and 2.87 pulley.

- the stock 3.33 vortech pulley generally creates around 7 or 8 psi of boost, the 3.12 does usually around 8-10 psi, and the 2.87 creates 10-12 psi of boost. The psi number will vary though depending on your overall exhaust breathing mods. What's most important is the power the car makes, *not* the boost pressure.

## 3. COG PULLEY

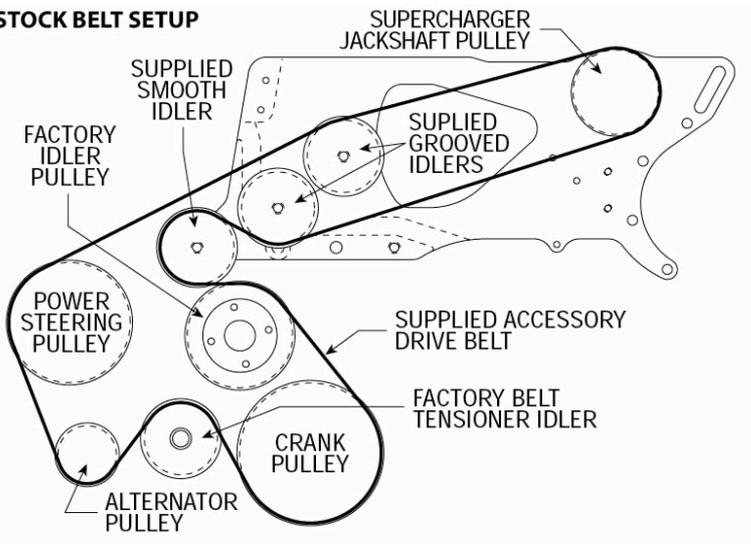
Picture shows where the upper cog Pulley is. It has teeth just like a traditional gear

The non-REVUP kit has two cog pulleys. The top has 32 teeth and the bottom has 28 teeth. Often, people

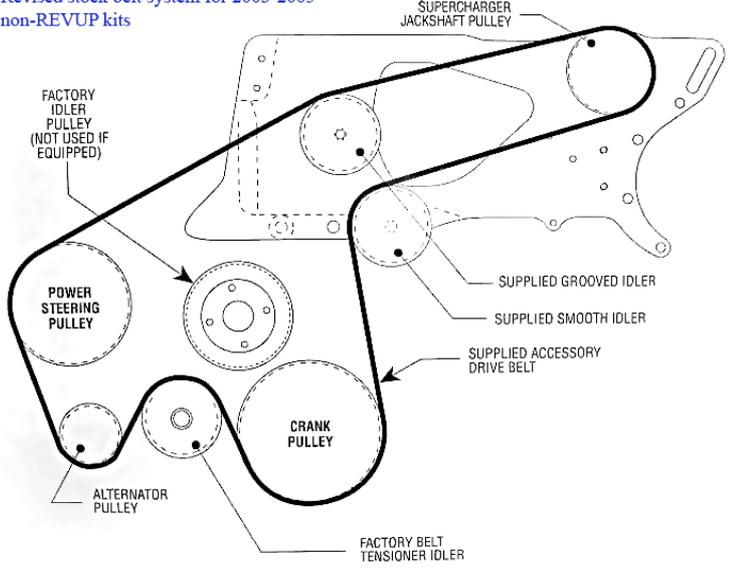


will switch to a 34/28 cog setup for more boost. The REVUP kit comes with 34 and 32 tooth cog pulleys. For this kit, people often switch to a 32/28 cog setup for more boost.

**STOCK BELT SETUP**



**Revised stock belt system for 2003-2005 non-REVUP kits**



**TIMROD Belt layout non-revup**

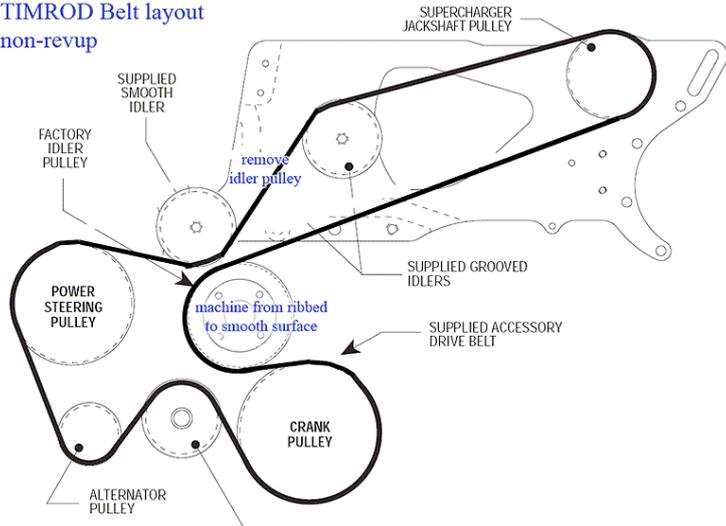


Fig. 5-e / Accessory Drive Belt Routing

**TIMROD Belt layout non-revup engine with GTM pulley**

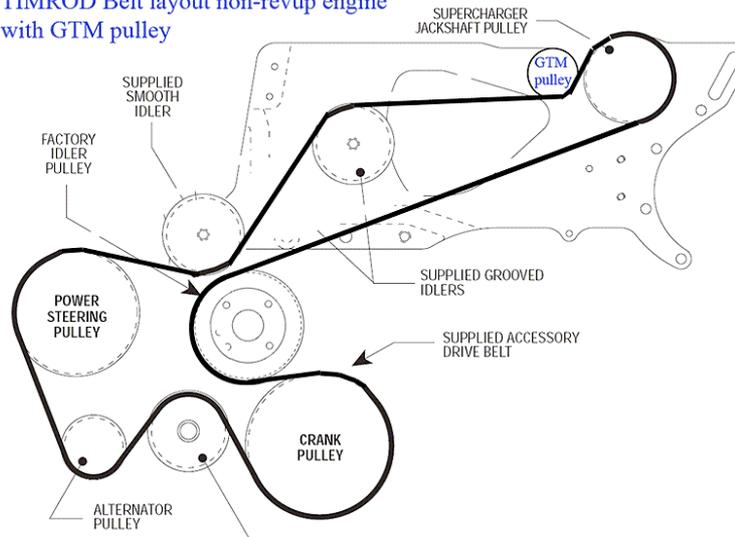


Fig. 5-e / Accessory Drive Belt Routing

**TIMROD Belt layout non-revup engine with GTM and lower pulleys**

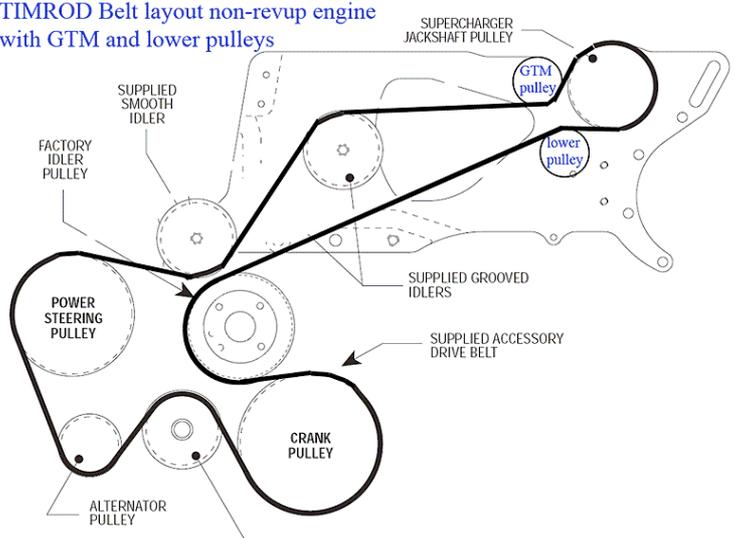
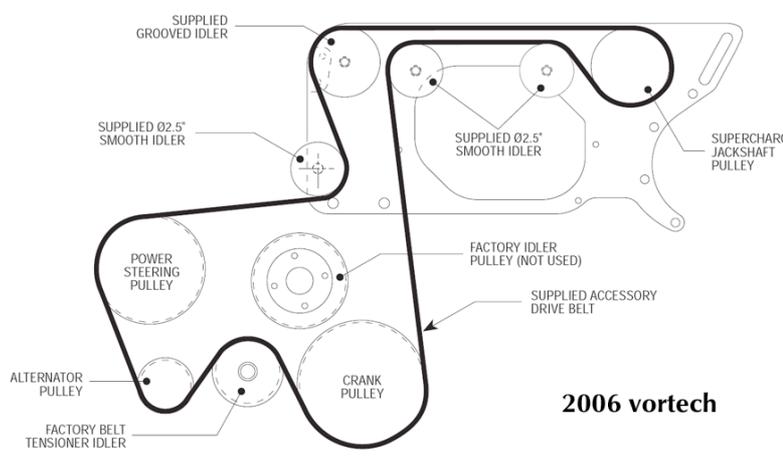


Fig. 5-e / Accessory Drive Belt Routing



**2006 vortech**

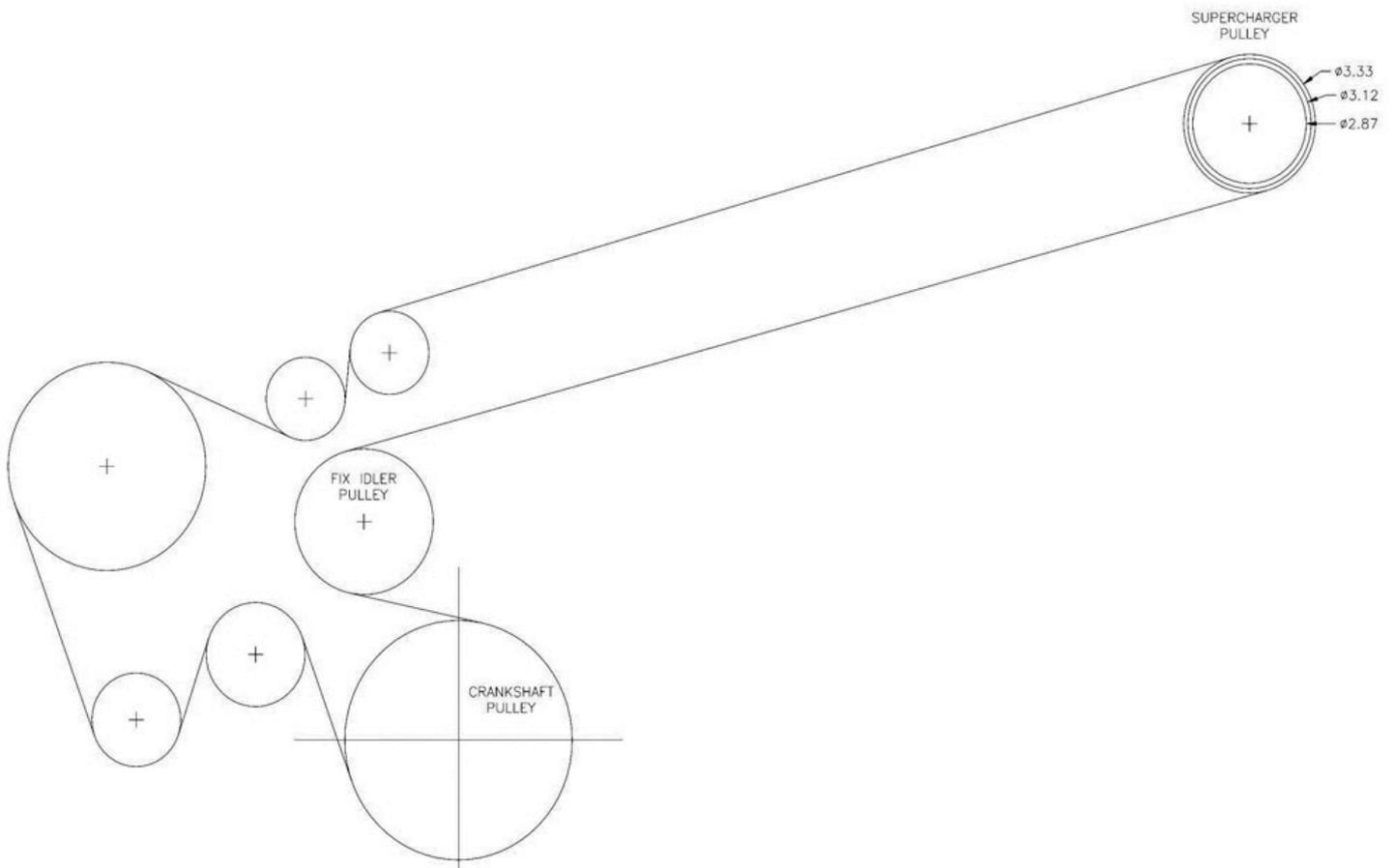


#### 4. Vortech Belt Slip/noise Solution-Fix

Problems with the Vortech Drive Belt and Pulleys?  
With this fix:

No Belt or pulley noise.  
The Belt no longer has to be so tight that it stretches.

1. Machine the Stock Fixed Idler Pulley (for flat side of Belt)
2. Purchase a 12mm x 110mm Hex Head Bolt and machine (or grind) the Head Hight down to about .200



in. Step 2 is for the bolt head to clear the serp belt. the stock bolt will interfere with the belt.

3. Purchase a 92-1/8 long V-Belt Gates # 060915 (for 2.87 Dia Pulley or a Delta 060923 (for 3.31 dia Pulley)

4. Remove the Vortech middle Idler Pulley.

5. Route the Belt around the Crank, under and around the the Fix Idler to the Blower, over the top Idler, under the lower Idler to the power steering pump, around the Alt and over the Adj Idler.

## 5. Vortech vs other SC kits

### **ATI procharger**

The procharger makes more power out of the box. It doesn't reduce timing which is probably a large reason for all the extra power (and danger). The ATI is noisier than the vortech because it uses gears directly turning gears instead of a cog belt turning the gears to drive the actual blower and also spins up to 80k rpms which is much faster than the 45-55k or so the vortech spins at. The ATI has a smaller impeller which is why it can spin higher. The procharger has a full cog belt setup and so it doesn't slip much, but has problems with belts breaking once you start getting over 400whp. Some people claim the bracket assembly on the ATI bends with lots of power. In contrast to the vortech, the ATI has it's own oil that you change seperately from the engine oil. This means you have to change the oil in two places and they way you have to change the ATI's oil isn't fun

### **Stillen**

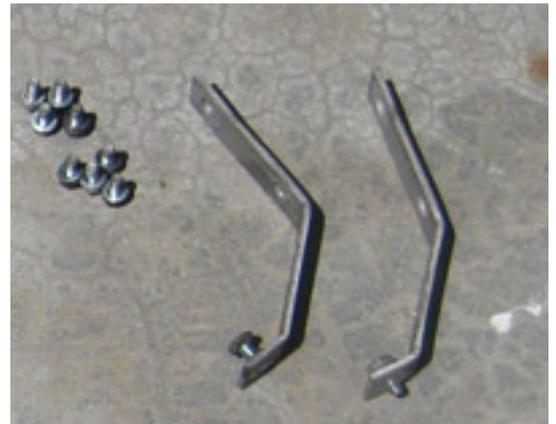
the stillen is a roots blower and is all about low rpm power. IMO a stillen is going to be better than a bone stock vortech, but once you go up to the 2.87 pulley, the stillen's advantage down low really starts shrinking - especially if you went with shorter gearing with the vortech. The stillen's midrange and top end doesn't have near the potential as the vortech, but it will be better under 3000 rpms in most cases except the most severely modded vortech setups.

### **HKS**

Not much is known about HKS's new version of their supercharger kit, but it seems similar to the old version where it's sort of a hybrid between the vortech and stillen. It has better low end response than the vortech at the expense of worse high rpm power.

## 6. Intercooler bracket

When installing your vortech, you might want to take a look at the intercooler bracket and have something fabricated up to keep the intercooler in place better. Get two (2) eight inch long metal straps. Cut, bend, & drill the straps to fit your setup. You can suspend the intercooler from the crash bar or use the two factory bolts through the core support on either side of the opening for the radiator



## 7. PROs & CONs:

### CONS:

- lower torque due to low boost at low/mid rpms
- more parasitic loss
- belt maintenance
- difficult to reach insane high power levels since power is limited by both the belt system, psi, and the displacement/flow of the engine
- mechanical blower noises
- more susceptible to change in ambient temps having an effect on performance

### PRO:

- high power
- no lag, linear throttle response
- low heat
- easy install
- low cost

- no hood modifications
- flat torque curve
- bypass valve sound
- consistency with boost vs gearing or rpms
- generally considered safer for engine

## 8. Ballpark hp numbers for non-REVUP engine on

320-335 whp, stock vortech tune with stock pulley and stock everything else on car (stock exhaust, cats, etc)

340-350 whp tuned

350-370 whp add exhaust, HF cats, plenum, and tuning

370-390 whp add 3.12 pulley and tuning

380-400 whp add headers and/or test pipes, and tuning

390-420 whp add 2.87 pulley and tuning

420-440 whp add cams and tuning

440-475 whp add water/meth injection, more timing, at least half race gas (96 octane or higher) and tuned

470-510 whp switch to Si or T-trim blower, and tuning

500+ whp (in theory) built engine with stroker kit, ported heads, compression ratio somewhat high around

9.5-10:1 raise the redline slightly, full race gas, and tuning torque numbers are generally 70-90 less than

the peak whp numbers

Sources:

<http://www.vortechsuperchargers.com/scspecsheet.php>

[http://www.superchargersonline.com/index.php?main\\_page=page&id=83](http://www.superchargersonline.com/index.php?main_page=page&id=83)

<http://my350z.com/forum/forced-induction/270770-vortech-faq-read-this-before-asking-vortech-questions.html>

<http://my350z.com/forum/forced-induction/540611-vortech-cai-vs-bigger-intercooler.html>