



928 Motorsports Supercharger Installation

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Ferrari 16v 308, 328 Mondial Supercharger Installation





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Toll-Free Tech Hot Line:

877-FOR-928M

877-367-9286

Please do not copy this manual and give copies to your friends. Our ability to bring you this supercharger kit at this price relies on our customers coming to us for our knowledge and experience in supercharging these cars. Much of this information is hard fought and the product of multiple trials and errors. Please do not give any section of this manual to your friends, but rather, encourage them to contact 928 Motorsports, LLC for their own kit. THANK YOU!

Thank you for your purchase. We have included an entire set of silicone vacuum hoses at no charge for you.



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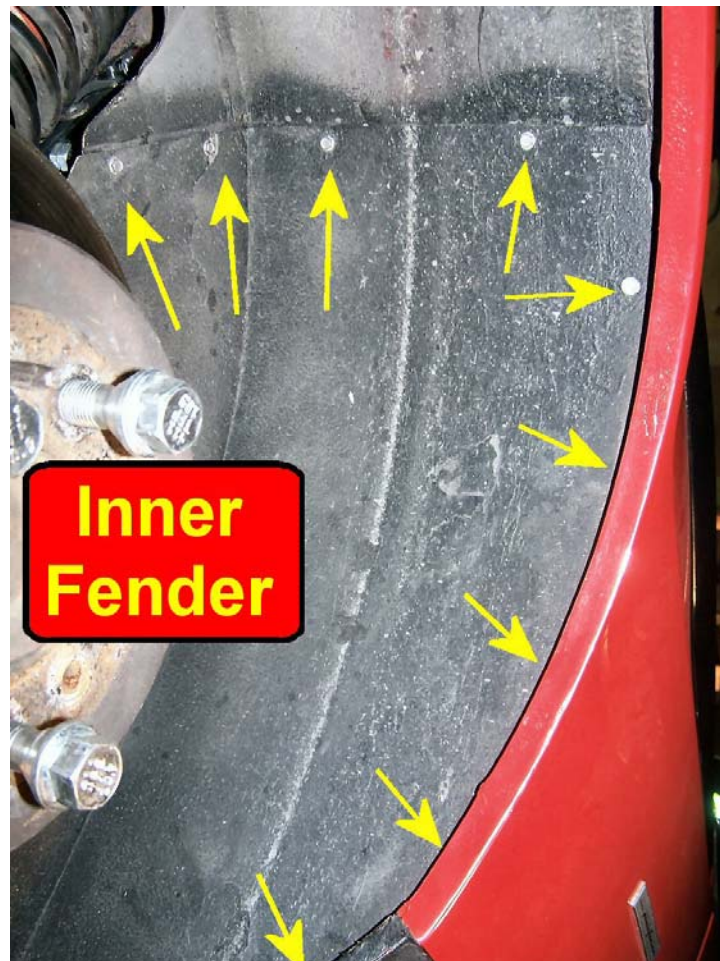
For 16v KE-Jetronic Ferrari Motors

NOTE: “Left” and “Right” are used in this manual frequently. Left and Right are always as seen from the driver’s seat-as you sit in the car. Because the engine in the Ferrari is transverse, “Left” and “Right” will be as the engine is viewed from the front of the motor.

Phase 1: Preparation of your Motor

We recommend that you steam clean or power wash your motor before beginning the supercharger installation. It's more fun to work on a clean motor than a greasy one.

Put the rear of the car up on jack stands and remove the Right Rear wheel, and the RR inner fender liner.





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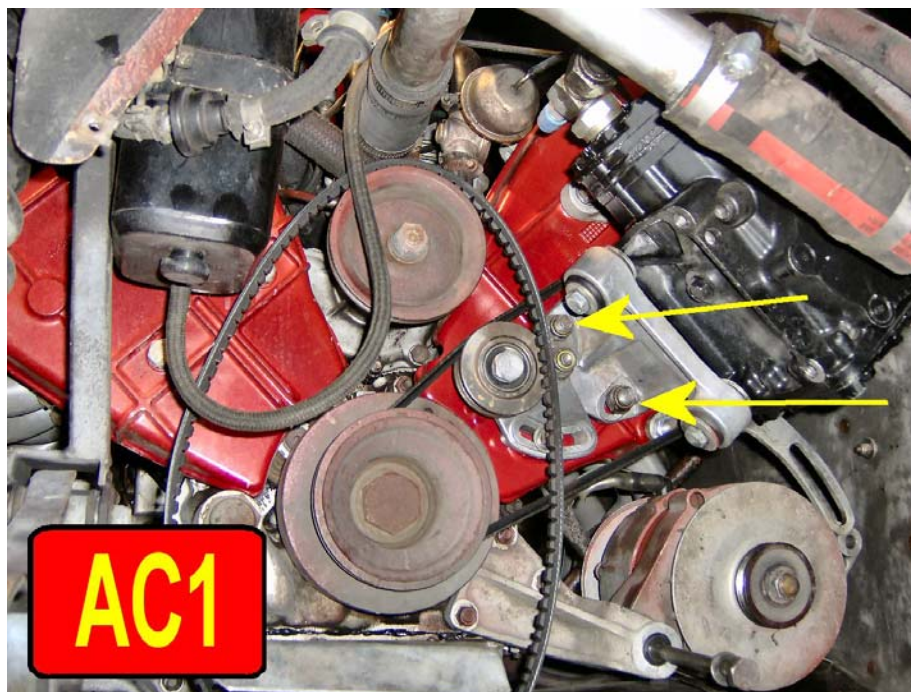
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Identify whether you have a 2-belt system or a 3-belt system for the alternator, water pump, and air conditioner. This will become important later, so identify yours now.



Belt Removal

Loosen and remove the alternator, water pump and air conditioner belts. The alternator belt is self-explanatory, but the AC belt is not. For the AC belt, you loosen the slide screws shown in picture AC1 and then lower the air conditioning compressor by backing out the screws located on top of the compressor.





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Crankshaft Pulley Removal

Now confirm that the vehicle is in Neutral. Hold the flywheel still by inserting a straight-bladed screwdriver into the edge of the clutch pressure plate through the inspection slot as shown in picture CP1 and have an Assistant break torque on the Crank shaft pulley bolt. You'll need a 36mm socket and a breaker bar.

Slide the crankshaft harmonic damper/pulley assembly off of the nose of the crankshaft. Box it up, insure it, and ship it to us for modification. Take care not to lose the key. It should stay in the crankshaft, but check it anyway.

We will be putting two keyholes in it to precisely align with the pins that you see if you look at the supercharger drive pulley that is in your kit.

Picture CP3



Ship it to:

928 Motorsports, LLC
604 E. Maple Street
Horicon, WI 53032

While the harmonic balancer travels, we can keep going.....



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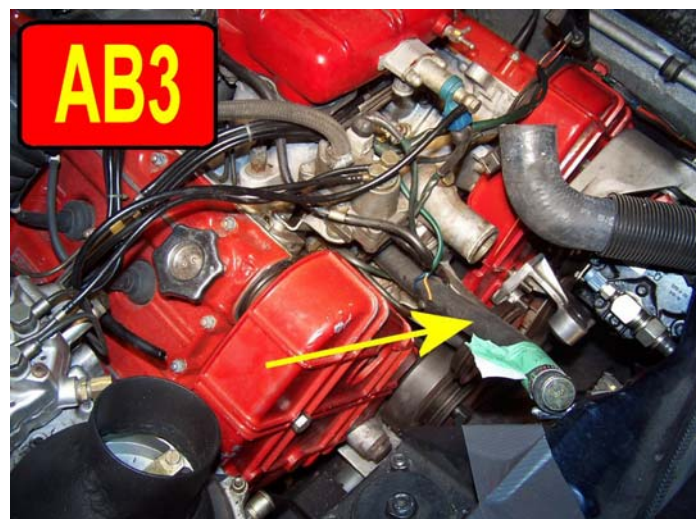
Air Filter Box Removal

Remove the air filter box and air hose with hump hose as shown in Picture AB1.



Save the clamp that holds the air filter box around the CIS air inlet as we will be using that again shortly. Take care not to allow anything to drop into the CIS assembly - in fact, it's always a good idea to cover the CIS intake with a towel anytime it is uncovered. Picture AB2.

Mark with hose that was attached to the bottom of the air box as shown in Picture AB3.





928 Motorsports Supercharger Installation

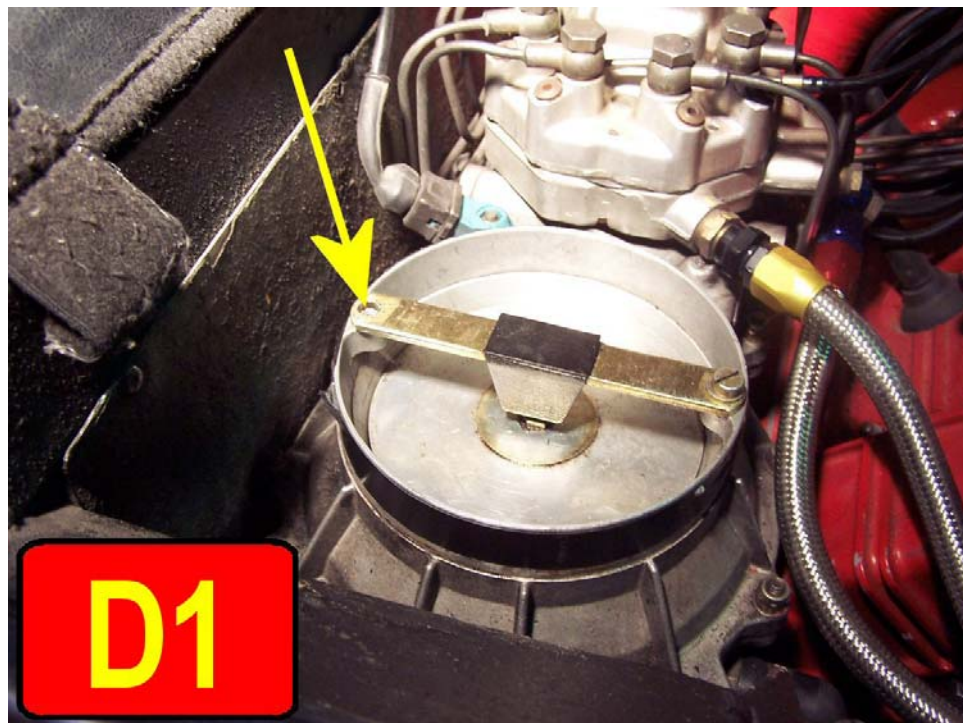
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Take a rubber cap as shown in Picture AB4 and install it on the nipple shown in Picture AB5.



Air Diffuser and Blow-Off Valve Installation

Now remove the mounting screw for the bump-stop inside the CIS assembly as shown in Picture D1. Clean the CIS paddle and surrounding volute with carb spray to remove old dirt and oil deposits, if any.

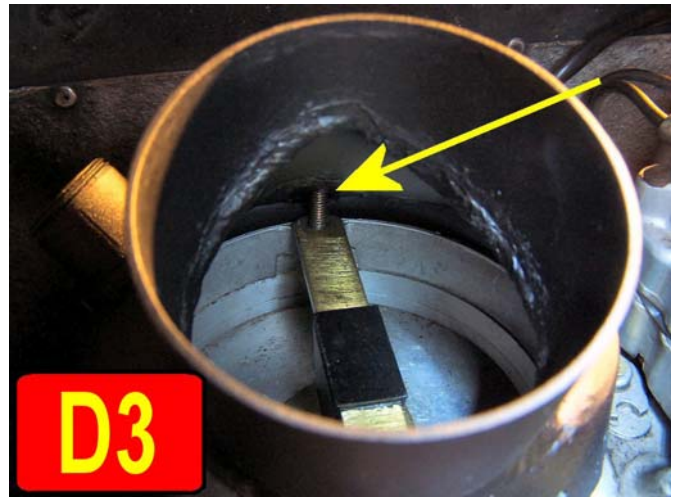
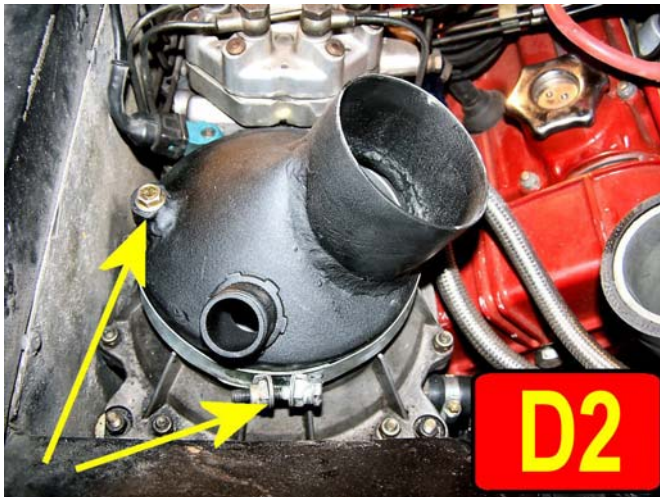




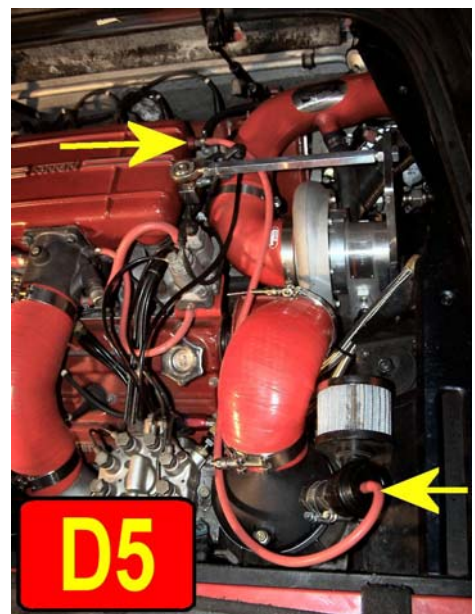
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Mount the CIS diffuser from your kit and secure it in place with the screw and outer clamp as shown in Picture D2. Re-use the same clamp you removed from the air box. If you look down the intake tube as shown in Picture D3, it's much easier to get the bolt started into the hole.



Don't be surprised that the Diffuser is a snug fit on the CIS intake. That is by design. You may sand off a little of the paint on the inside of the Diffuser and apply a light coat of grease to help you press it in place. Use a rubber mallet to knock it down gently. Then tighten the thru-bolt and finally the band clamp around the Locate the blow-off valve assembly, the short section of $\frac{3}{4}$ " hose and two clamps as shown in Picture D4, and mount them to the Diffuser you just installed. In a few minutes, we will be removing the Aux Air Valve and that will expose a vacuum nipple that we will use for our Blow-off valve. Route a vacuum line from the blow off valve to the vacuum nipple as shown in Picture D5. bottom.



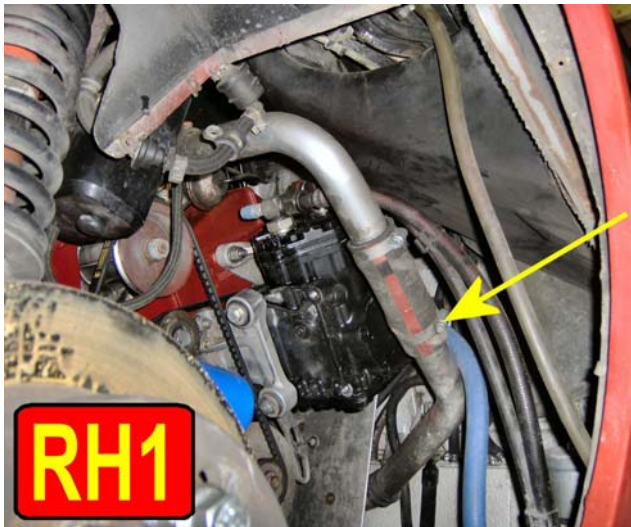


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Upper Radiator Hose

Now we are going to replace the upper radiator hose to make some room for our Supercharger. Get a pan beneath the car to catch the coolant, and loosen the radiator hose clamps where shown in Pictures RH1 and RH2.



Remove the complete hose and the metal elbow it attaches to. Slide two radiator hose clamps over the radiator hose that came with your kit and install the hose as shown in Pictures RH3 and RH4.





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Place the abrasion-resistant cover where the radiator hose runs over the top of the air conditioning compressor, and secure it in place with two cable ties as shown in Picture RH5.



Pour the coolant back into the coolant reservoir until it's full, and keep the rest for when we restart the engine.

Charcoal Canister Assembly

Time to move the charcoal canister assembly and replace it with a smaller, newer, in-line unit. Locate the charcoal canister assembly as in Pictures CC1 and CC2. Remove the complete assembly. The last plastic device in the line (with the arrow pointing to it in Picture CC1) will be going back onto the car. It is directional, so pay attention to which way it was mounted.





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Attach the black fuel line from your kit to this, and route it safely over the inner fender well and to the location shown in Picture CC3. Attach it to the metal fuel lines with cable ties every 10 inches or so. Install the new canister here and secure it with a cable tie as shown in Picture CC4. The vent hose connects to the central intake plenum as shown in Picture CC3.



Do NOT substitute the silicone hose in your kit for the black rubber fuel line provided. Gasoline destroys silicone – never use silicone hoses for fuel or fuel vents.

Air Duct Removal

We need to remove the air duct on some cars that runs up from the outside louvers in order to make room for our own cold air intake for the supercharger. See Picture AD1. It can be done carefully and without damage to the car so that it can be re-installed at a later date if desired. Picture AD2 shows what it looks like out of the car.





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Start by removing the outer body molding that cover the air inlet grille (Picture AD3) by removing the single screw shown in Picture AD4 and sliding the molding forward about ¼". Then it comes off as shown in Picture AD5.



Start working around the air duct on the engine-side of the fender - you may find as many as 6 Phillips screws and two small hex-headed bolts that hold the air inlet ducting in its location. Remove them.

Finally, carefully remove the rivets that hold the air inlet ducting to the expanded wire mesh grille. The metal used in the grille is very soft and easily damaged. A Dremel-type tool is a good choice to carefully trim off the heads of the rivets to remove them without damage to the grille.

Re-install the outer body molding (Picture AD3) now.



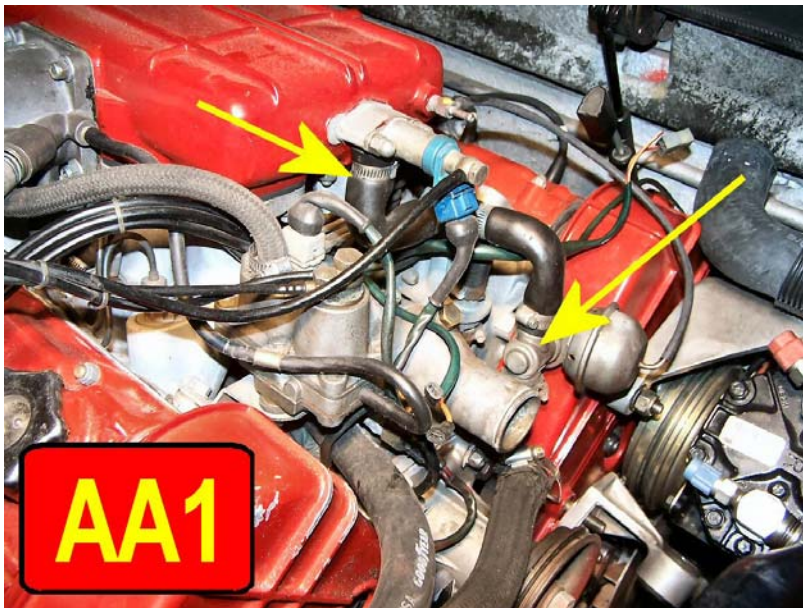


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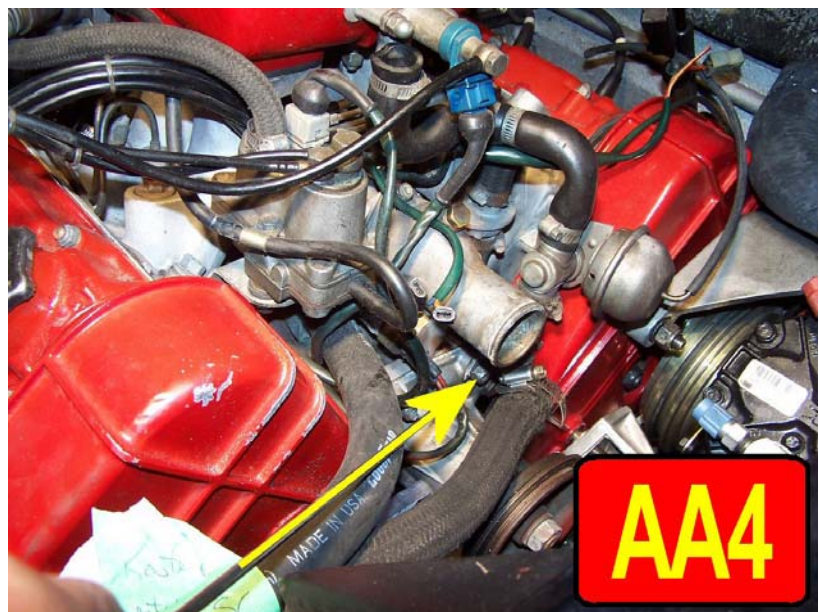
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Auxiliary Air Valve

Remove the aux air valve assembly. See Pictures AA1 and AA2. If you are curious, you can read about what this device used to do for you in the last section of this installation guide under "Driving your Supercharged Ferrari". We don't need it anymore, and they often fail and cause trouble as they get older, anyway.



Find and remove the two 13 mm nuts hold it down to the right front intake runner where the intake meets the engine block as shown in Picture AA3. There is also a nut to remove where shown in Picture AA4. Put the nuts back on that you just removed and torque them down.



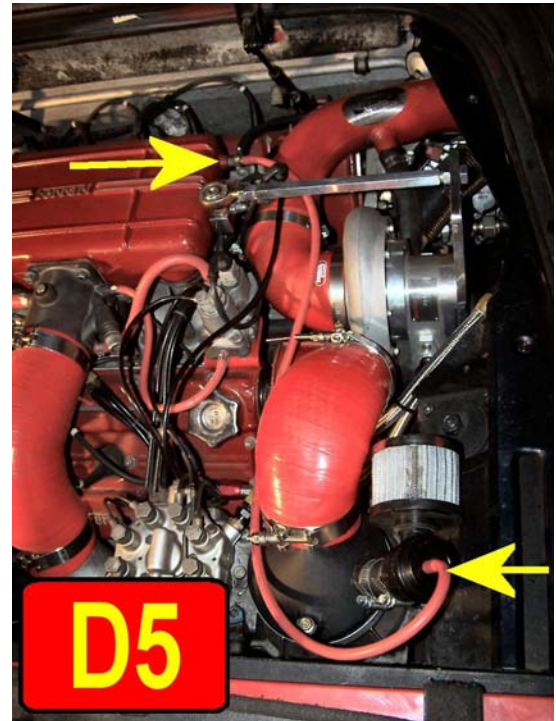


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Take a cable tie from your kit and tie down the wires that used to run to the aux air valve.

You'll find that removing the Aux Air valve opens up a vacuum nipple on the central intake plenum – this is where you hook up the vacuum hose to the blow-off valve as shown in picture D5.



Warm-Up Regulator

We need to re-position the Warm-Up Regulator – the item shown in Picture WUR1. We will be removing the mounting bracket it is on with the custom mounting bracket provided as shown in Picture WUR2.

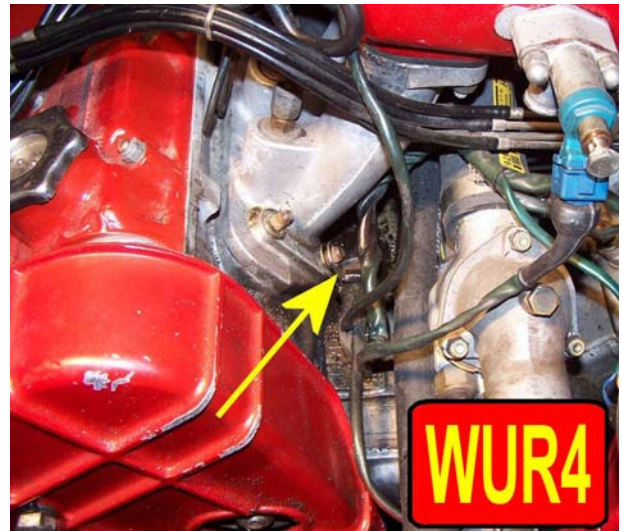
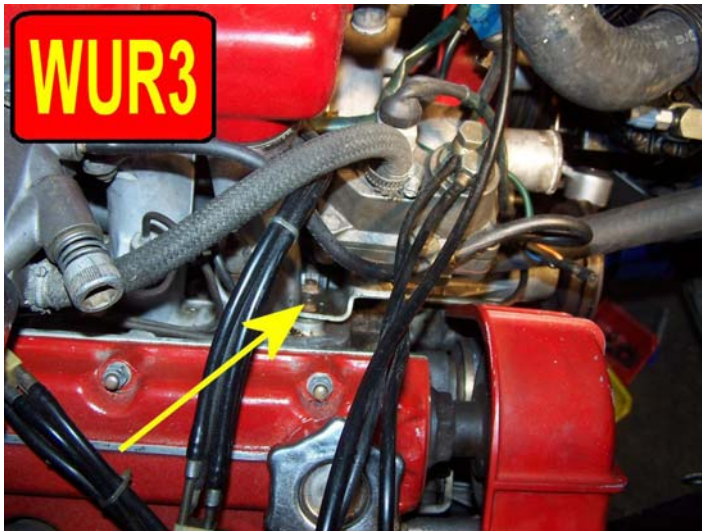




928 Motorsports Supercharger Installation

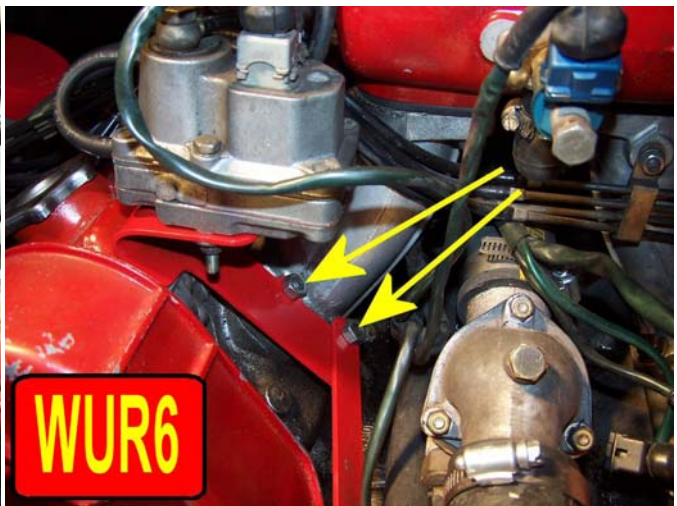
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Remove the two 10mm nuts that hold the WUR down to its mounting bracket, and swing it out of the way. It is not necessary to loosen the fuel lines from it. Now remove the 13 mm nuts that hold it down to the left front intake runner where the intake meets the engine block as in Picture WUR3. You will find a cable clamp under the lower bolt (as shown in Picture WUR4), please remove that clamp and leave it off the car.



Now slide the new bolts (they are shorter) provided in your kit through the WUR and the new mounting bracket and secure them there with the 10mm Nylock nuts provided. See picture WUR5.

Mount the assembly back onto the intake manifold and put the 13mm nuts back on, as shown in WUR6. Leave the lower nut loose for the moment – we need to get under that again soon.





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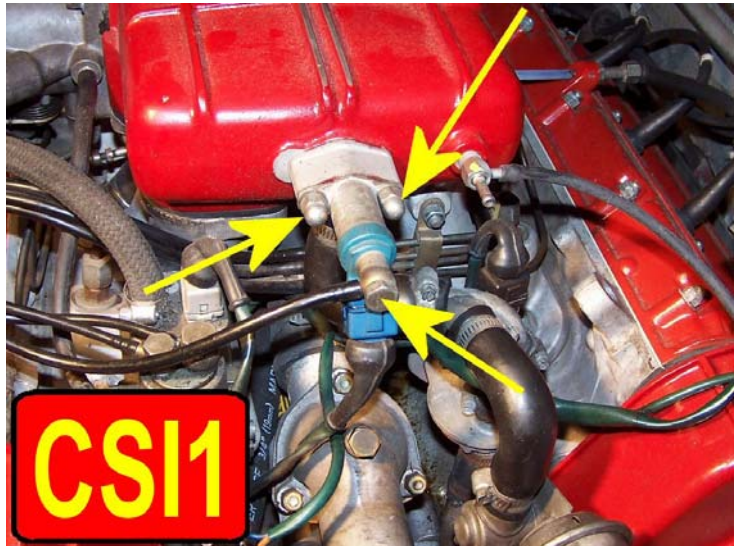
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Cold Start Injector

Refer to Picture CSI1. Unplug the electrical connector from the Cold Start Injector. Loosen (you do not have to remove) the banjo bolt at the end that captures the fuel line.

Then remove the two 10mm nuts that hold the CSI to the intake manifold center plenum as shown.

Remove the adapter plate underneath the injector too – that used to have a hose from the aux air valve go to it and we do not need it anymore. Clean the mounting surfaces on the intake manifold and the CSI now.



Locate the Cold Start Injector adapter bracket from your kit as shown in picture CSI2. Note that one side is flat, the other has a chamfered hole as shown. The flat side goes against the intake manifold, the side with chamfer faces out toward the cold start injector.

The large threaded hole should be on the left when you look at the engine from the RR fender.





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Coat the sealing surface of the intake manifold with a film of silicone gasket make and slide the adapter bracket on to the mounting studs. It should look like Picture CSI3. Put a ring of the same silicone around the base of the CSI where the o-ring is, and slide it onto the studs **WITH THE ELECTRICAL CONNECTION FACING UP**. Install the two mounting nuts and tighten. It should look like Picture CSI4. Finish by attaching the electrical connector and tightening the fuel line banjo bolt.



Pictures CSI4, CSI5, and CSI6 show the Tracking Turnbuckle attached to this CSI mount.

Do not install the Tracking Turnbuckle at this time, we will do that after the supercharger is mounted.



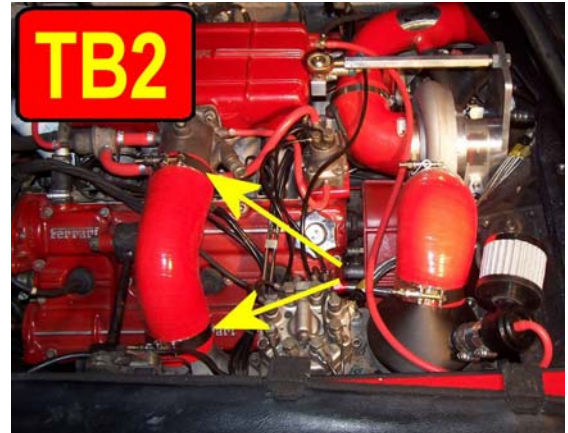


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Throttle Body Intake Hose

Remove the black flex-hose that goes from the CIS assembly to throttle body as shown in picture TB1 and replace it with a new silicone hose and 2 T-bolt clamps from your kit as in picture TB2. The hose will elongate slightly as you force it into place, this is normal.



Fuel Lines

Locate the two new braided stainless steel fuel lines in your kit (Picture FL1) and the two small plastic fuel lines on the car that run from the RR fender to the CIS control system.

One is a fuel supply line, the other is a fuel return line. Using two wrenches in opposition, remove only one of them at this time, and replace it with the matching line from your kit.

Now repeat this process to the other fuel line. If you do this one-at-a-time as instructed, you will not mix the supply with the return line at the fender fittings- as they are identical and indistinguishable from each other. Refer to Pictures FL2 and FL3.



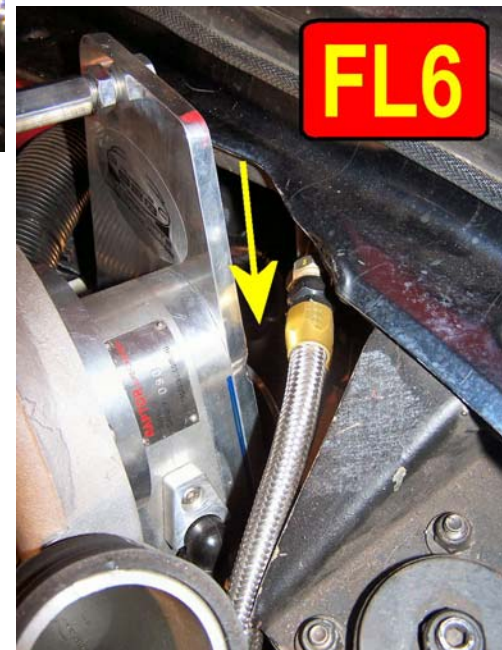


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In their original configuration, the two fuel lines are side-by-side as seen in Picture FL4. You will need to take the inner-most one and bend it so that it stacks straight below the other one. Picture FL4 shows what will happen if you do NOT do this, you will have a pinch point between the supercharger bracket and the Fuel Line, and one would eventually rub thru the other.

Picture FL5 shows the fuel lines after bending so that they are one-above-the-other, and you can see in Picture FL6 that now we have a lot of room between the supercharger bracket and the fuel lines.



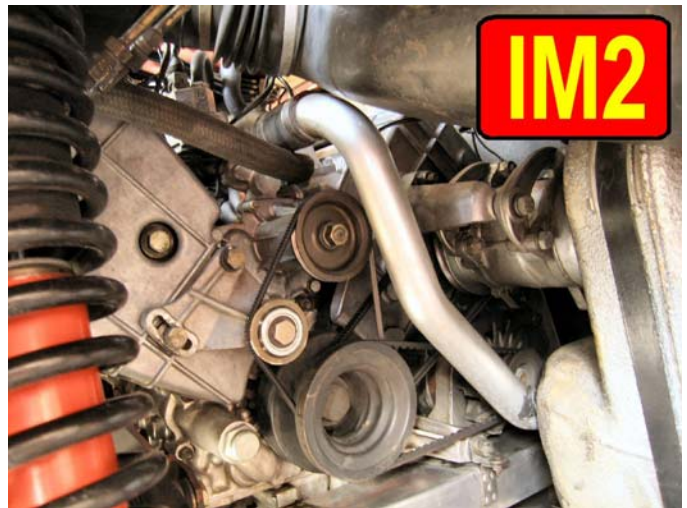
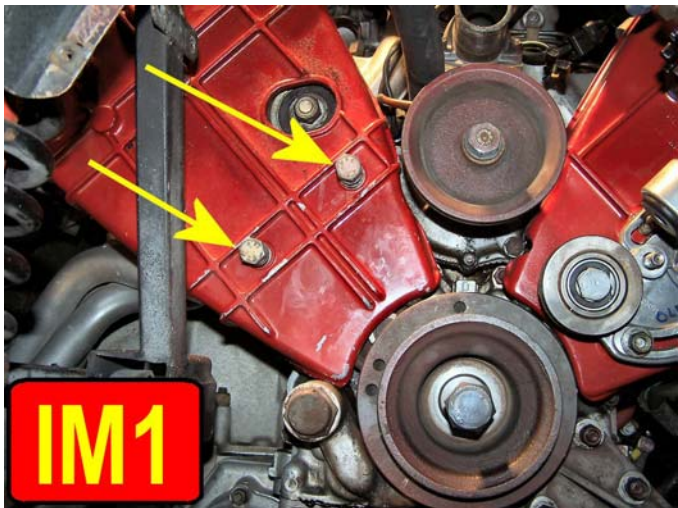


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Supercharger Inner Mount

As you look at the front of the motor, remove the two bolts that hold on the left timing belt cover as shown in Picture IM1. They *might* be running through a belt tensioner assembly for the water pump belt as shown in Picture IM2. If so, remove that belt tensioner with the two bolts. There is a 3rd timing belt cover bolt at the top, that one does not have to be removed.



We can now install the steel inner supercharger mount. Locate the inner supercharger mount, spacers, and the two longer mounting bolts from your kit and mount them according to the belt system you have on your vehicle as follows:



Instructions for vehicles with a 2-belt system:

Refer to Picture IM3 and IM4 and slide the mounting bolts through the inner mount and slip the 20mm tall spacers onto the bolts. Place a drop of Loctite Blue onto the threads of each bolt and mount to the motor as shown in Picture IM5. You can put a final torque on those bolts now.





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Instructions for vehicles with a 3-belt system:

Refer to Picture IM6 and slide the mounting bolts through the inner mount, through the belt tensioner for the water pump belt as shown, and then slip the 6mm tall spacers from your kit onto the bolts. Mount to the motor, but do not install any Loctite or apply a final torque to those bolts at this time. Check operation of the belt tensioner as shown in Pictures IM7 and IM8. We will not be tightening the bolts until after the crankshaft pulley is installed.

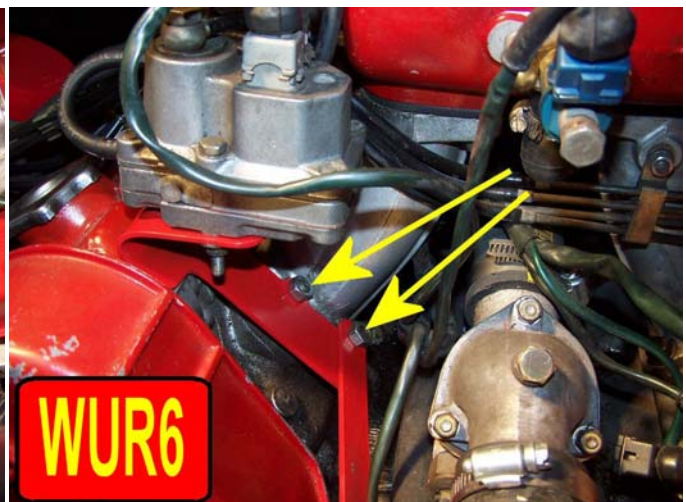


The inner mount on a 3-belt system, Open



The inner mount on a 3-belt system, Closed

Finally, install the top strap onto your Inner Mount. See Pictures IM9 and WUR6. It goes over the stud on the inner mount and to the intake manifold stud as shown. Put Loctite Blue on the threads of the nuts, and tighten.





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After the modified Harmonic Damper has arrived:

When your harmonic damper comes back from us, it will have two key holes as shown in Picture CP2. Clean the nose of crankshaft and coat it with a thin film of light oil. Make sure that the Woodruff key is in place. Locate the large crankshaft pulley bolt and washer from your kit and have it ready at the front of the motor. Put a couple drops of Loctite Blue on the threads of the bolt now. Also get a 27mm socket (or 1 1/16") and a 6-inch extension handy.



Place your modified harmonic balancer upright on the floor, and seat your new 928 Motorsports supercharger pulley into it. Refer to Picture CP3. You may have to push down slightly as it is a snug fit. Now slide this assembly back onto the nose of the crankshaft, and over the crankshaft key. Secure it in place with the long M18 bolt and hardened washer as shown in Picture CP4. DO NOT LET GO of the supercharger pulley until the bolt has been started into the crankshaft.



Have your assistant lock the engine again with the screwdriver in the clutch inspection slot as before, (Picture CP1) and tighten the crankshaft pulley bolt to 218 ft lbs of torque.





928 Motorsports Supercharger Installation

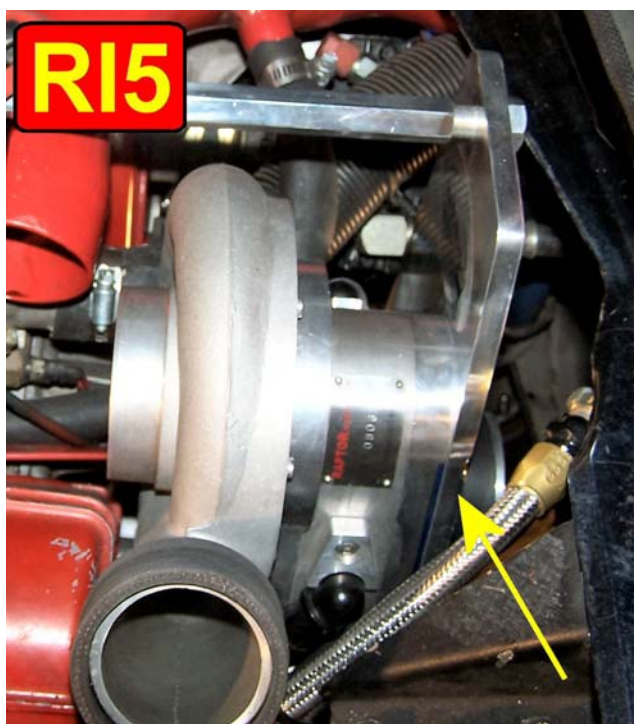
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Mounting the Raptor Supercharger

Lay the Raptor on the workbench as shown in Picture R1. The pulley should not be mounted on it, and you will want to have the 8 bracket-to-supercharger mounting screws as shown in Picture R2.



Loosen the allen-head screws around the supercharger as shown in R3. Lay the aluminum out supercharger bracket on top of the Raptor blower and secure it in place with the 8 counter-sunk mounting screws provided. A drop of Loctite Blue on the threads will prevent them from vibrating loose in the future. The bracket is properly positioned on the Raptor when the two left two edges match up as shown in Picture R15.

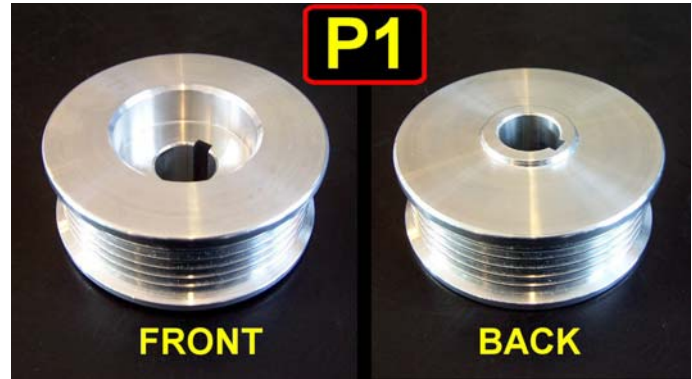




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Now install the SC pulley provided, with the 2mm offset toward the back. Refer to Picture P1. If the pulley is reluctant to slide onto the shaft, try heating it on a stove top or with a torch for a moment. Secure it in place with the washer and nut provided.

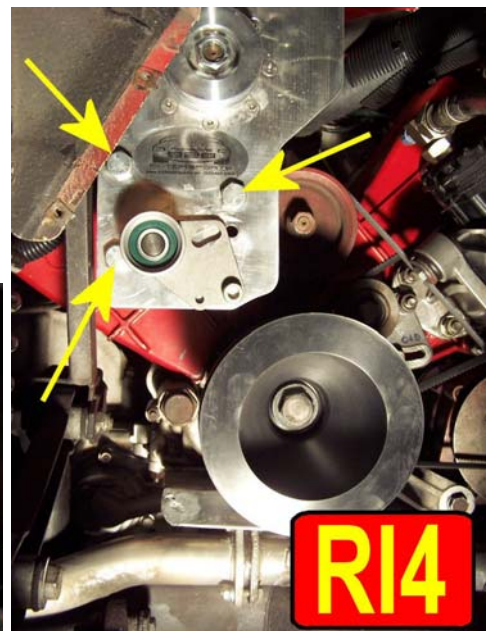


Locate the long bolts with 98mm long spacers as shown in picture RI1. Slide the bolts through the supercharger mounting plate and place the spacers on the other side as shown in Picture RI2. Place a drop of Loctite blue on the threads of each of these bolts now.



Mount this assembly to the inner supercharger bracket now. It is easiest to pass this assembly up into position from the bottom, but you may find it helpful to have an assistant hold the assembly from the top to take the weight off of it a bit while you start the mounting bolts in their holes. When assembled, it looks like Pictures RI3 and RI4.

You can put a final torque on these mounting bolts now.





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The last part of the Raptor Supercharger mount is the Tracking Turnbuckle. Refer back to the Cold Start Injector work we did previously, and install the Tracking Turnbuckle as shown in Pictures CSI4, 5, and 6. Jam nuts have been provided in L-hand and R-hand threads for your turnbuckle. Install as shown. Leave the turnbuckle in place, but un-tightened at this time.





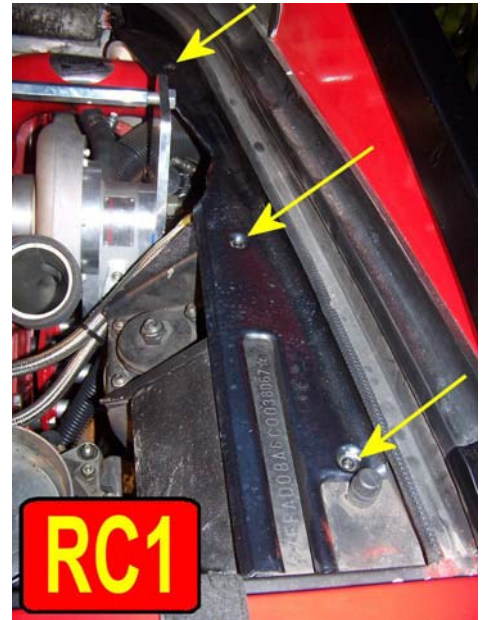
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Cooling the Raptor

The cooling fan assembly blows air across the bearings inside the supercharger to help them stay cool and last a long time.

Remove the sheet metal screws that hold the sheet metal trim piece down to the body as shown in picture RC1.



Locate the cooling fan assembly in your Kit as shown in Picture RC2. The 1" flexible hose pushes into the hole provided as shown in Picture RC3. Strip the ends off the 2-conductor wire provided in your kit and attach one end of the wire to the terminal block on the cooling fan assembly now.

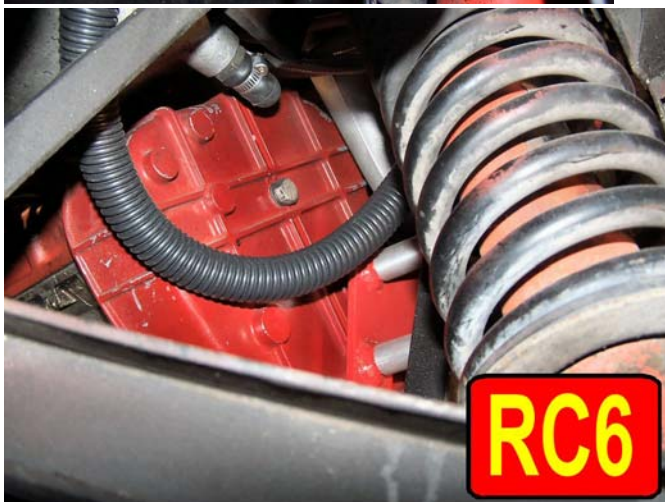
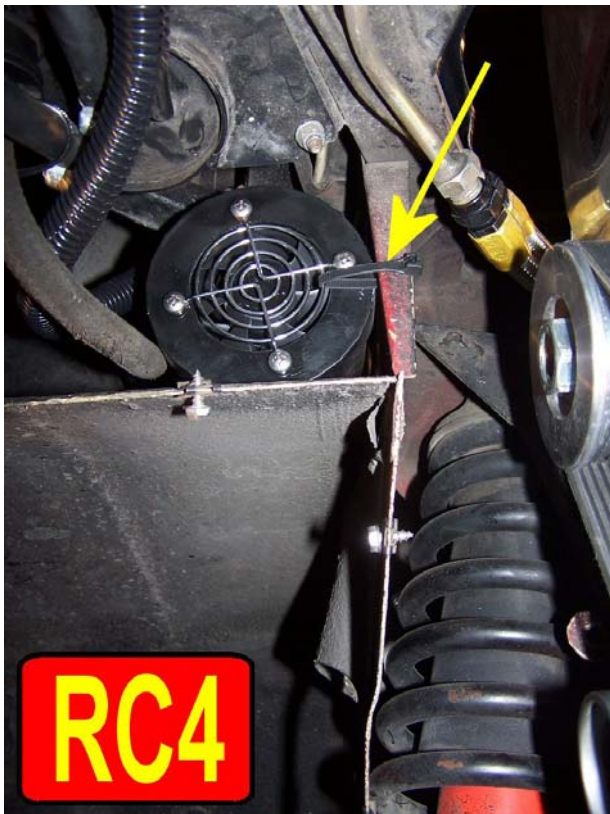




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Slide this assembly above the RR Inner fender liner as shown in Picture RC4 and RC5. Route the 1" flexible cooling hose through the frame rails and attach it to the barbed nipple on the Raptor supercharger as shown in Pictures RC6 and RC7. No clamp is necessary. You will need to cut the hose to length – there is more hose provided than you need. Make sure that you leave enough slack in the hose to allow for engine movement as shown. Secure the fan assembly to the sub frame with cable ties as shown in RC4, and also confirm that the 1" air hose does not interfere with any moving parts along its routing.

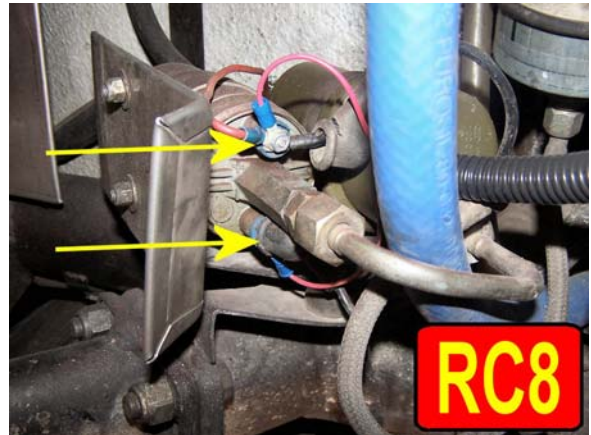




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Now route the 2-conductor wire from the cooling fan over the inner fender well and down to the fuel pump. Secure the wire to the fuel lines as you go with cable ties so it does not drop down. Cut it to length, and attach one of each lead to the terminals on the fuel pump as shown in Picture RC8. The cooling fan will run whenever the fuel pump is running. It draws less than 1 amp.



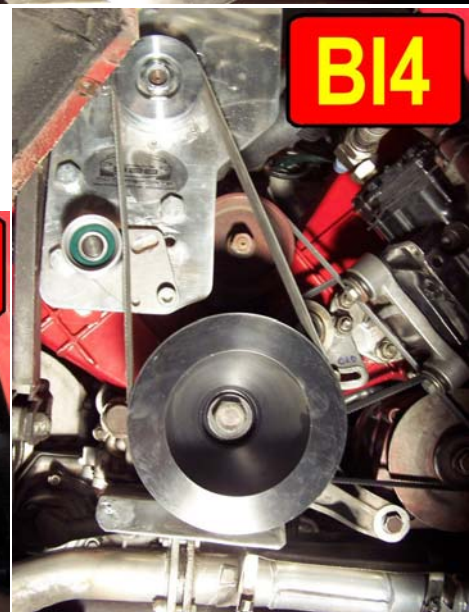
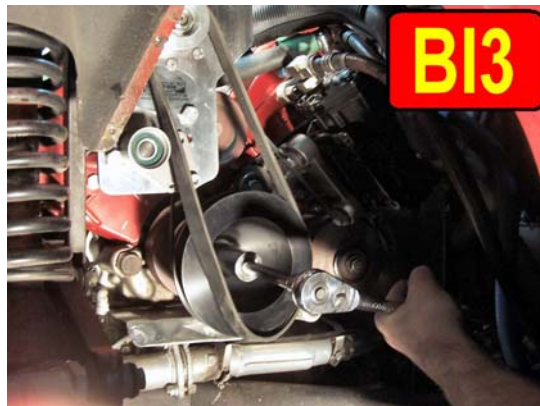
Putting on the Supercharger Belt

Confirm that the tracking turnbuckle is loose before installing the belt. Looking at the front of the supercharger thru the fender well, only one bolt (the pivot) should be in your idler/tensioner pulley. Take out the second bolt as shown by the RED arrow in Picture BI2.

Confirm that the vehicle is in Neutral.



Install the belt over the Supercharger pulley and 2/3rds around the crankshaft pulley. Rotate the engine clockwise with a 27mm socket on the crankshaft pulley bolt to get the belt on the rest of the way as shown in Picture BI3. Installed, it looks like Picture BI4.





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Now you can put the second bolt back into the belt tensioner (the Red arrow in BI2)



There are several ways to force the tensioner into the belt to tighten it while you tighten the bolt and nuts to lock it there.... We use a $\frac{3}{4}$ " crow-foot wrench as shown in Picture BI5, BI6, and BI7. You will have to loosen the $\frac{3}{4}$ " bolt a little before putting the crow-foot wrench on it. Then rotate the crow-foot wrench to the right, and it will tighten the belt tensioner idler pulley and keep it there while you tighten the bolts as shown. Remove the crow-foot wrench, and re-tighten that $\frac{3}{4}$ " mounting bolt.





928 Motorsports Supercharger Installation

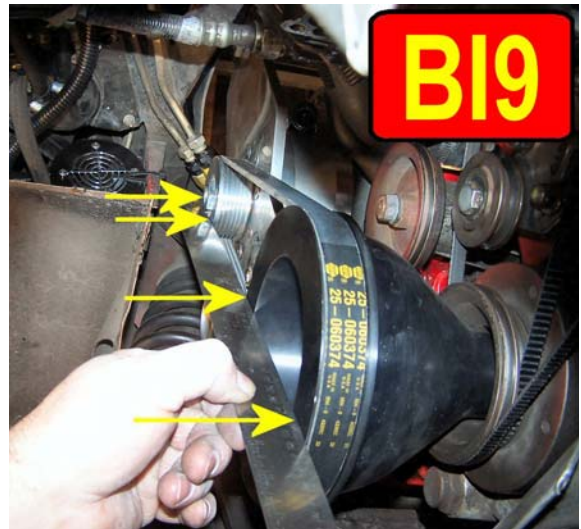
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Adjusting the Tracking of your SC belt

We adjust the tracking of the belt to ensure that the supercharger pulley is directly above the crankshaft pulley. This provides the longest service life for the belt, avoids slippage, and prevents the belt from being thrown at high speeds.

From beneath the vehicle, use a straightedge across the front of the crankshaft pulley as shown in Picture B19. When the tracking is adjusted correctly, the straightedge will touch the supercharger pulley front surface and the crankshaft pulley front surface in 4 places as shown.

Use a 5/8" wrench to turn the tracking turnbuckle, and re-check the alignment with your straightedge. When you have it adjusted correctly, lock the turnbuckle in place with the jam nuts.



Replacing old Vacuum Lines

Your kit came with a set of silicone hoses from us without charge. Check over your vacuum lines now and replace any that look suspicious. The rubber in the factory vacuum lines has been under attack by heat and ozone and they may be cracked and brittle.

The key is to remove only one vacuum hose at a time, compare it to a hose from the kit and cut a length to match. Put the new hose back on to the car, and repeat. Do only one vacuum hose at a time and you will not have any errors.

Do not use silicone hose for fuel or fuel vapor. Vacuum and small water lines only. The silicone is very durable and will never harden or crack.



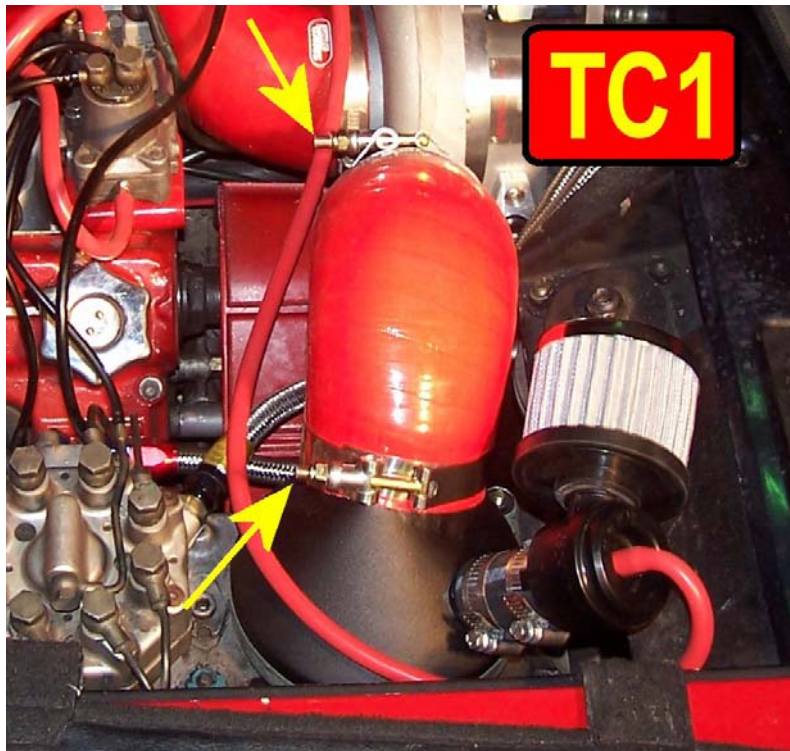
928 Motorsports Supercharger Installation

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Trimming T-Bolt Clamps (optional)

You have installed 4 T-bolt clamps during this build, two on the Diffuser intake and two on the Throttle Body Intake. After these clamps were tightened, you will have long threaded ends sticking out. It is safe to trim these back a bit to improve the appearance of the installation, as shown in Picture TC1.

Place a shop towel or two beneath the bolts and use an air-powered cut-off tool, a hacksaw, or even a bolt cutters to lop off an inch or so. Do not remove too much – you want to be able to remove and re-install these clamps again in the future. Finish the ends of the bolts with a file to remove the burrs.





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Driving your Supercharged Ferrari

A few final notes:

Gasoline: Use Premium gasoline now, 91 Octane or better. Avoid Ethanol mixes if you can as the actual octane rating received before additives is lower.

Octane Booster: Add octane Booster if you are going to go auto crossing or racing just to be safe. A bottle of "Octane Performance Booster" by Solder Seal is about \$1.50 and treats a tank of 20 gallons. It raises 91 octane gas to 110 octane and is cheap insurance.

Accelerator: Roll into the throttle, don't stomp on it. Especially in corners.

Watch the Redline: Pay attention to your dyno results or the dyno charts of others with cars just like yours. Observe where the air/fuel ratio rose above 13.0 to one – and remember to shift at that point for the safety of your motor. If you want a higher shift point contact us – we make pulleys for your kit in several sizes just so we can adjust your shift point to where you want it to be.

Oil Level: Check your oil level more frequently. There is more air passing through your crankcase than before, and more oil is consumed as oil vapor. This is common with supercharged cars. Check your oil more often.

Oil Type: Change to Synthetic Oil if your motor is all broken in (> 7,000 miles on it). The reason: we are employing positive crankcase ventilation on this supercharger kit, and actively evacuating the crankcase pressure by sucking it back into the intake (as before).

So, some oil/crankcase vapor is being ingested by the motor (as it was before the SC kit was installed) Synthetic motor oils do not lower the octane rating of the air/fuel mixture much at all, however traditional motor oils do. That's why switching to synthetic can be another good safety factor to help prevent detonation in your engine.

Cold Starts: Your Ferrari used to have an Auxiliary Air Valve – now it has been removed. The Aux Air valve had two functions on the Ke-Jetronic fuel system: 1) to bleed a little air past the throttle body when you suddenly close the throttle so the engine does not stumble; and 2) increase the idle speed and engine response when the motor is cold.

Now that your system is under boost, problem number (1) above is being taken care of by the addition of the supercharger. And if you warm up the motor a little bit before you drive it, we can be rid of the whole Aux Air Valve and its problems.

Just remember to warm up your motor for a minute or two before pulling into traffic, and you will be fine.

Gas Odor: Depending on where you have the heat/vent settings in your car and whether your windows are open; you may smell some gasoline odor in the cockpit immediately following a hard, redline acceleration. This is normal very short-lived, usually the odor will pass in less than 2 seconds. It's just from the venting of the gas tank under boost.

Enjoy your new car!