

Supercharge! Chapter 2

Supercharging Your Volvo Chapter Two - Will it Fit?

by Greg Sievert

As I promised in Chapter One, this chapter will describe some of the work involved in deciding where to position the supercharger in the engine bay. For those who didn't read Chapter One, here's a brief introduction. In December, I purchased a used Toyota roots-type supercharger, called the SC-14, from a local wrecking yard. I'm now in the process of installing and testing it on our 1988 240 GL. Apologies if anyone tried to e-mail me using the address in Chapter One. I stuffed up on the address - it has been corrected at the end of this installment.

Originally, I thought fitting a supercharger in the Volvo's engine bay would be quite simple. After all, Volvo fitted engines ranging from a turbocharged 4-cylinder to a V-6 to an in-line 6 diesel into the 240's body. Many people have shoe-horned V8's and even a turbocharged V-6 Supra engine in to 240's, so simply adding a smallish supercharger should be no great task, right? Well, it's never that easy. First, I considered placing the supercharger on the right side of the engine (exhaust side). My thought was that it would be the easiest place to put it because I wouldn't have to move any of the existing accessories (alternator, A/C compressor, power steering pump, etc.) It also occurred to me that if I wanted to use an intercooler, it would be good to have the supercharger on the opposite side of the engine bay from the intake so the intercooler plumbing would be more direct. Well, I set the SC-14 into position above the exhaust manifold, and immediately became clear that this was no place for a supercharger. Due to the mounting lug positions on the SC-14, I would have to mount it upside down in order to place the lugs close to the engine's structure. Also, the body of the supercharger is long enough that it interfered with the brake master cylinder - not something that you want to mess around with. Finally, would the supercharger withstand being placed so close to the heat of the exhaust manifold without extensive heat shielding? On to Plan B.

The second option I considered was mounting the supercharger high on the left side of the engine (the intake side). This option would involve either moving or eliminating the power steering pump. I had driven 240's without power steering, and felt that it would be acceptable to go to a manual rack, but not desirable. I temporarily unbolted the power steering pump and placed the supercharger in position about where the PS pump was. **BIG PROBLEMS!** (See Figure 1) In this location, the supercharger was hanging out in space, and it looked nearly impossible to come up with a strong supporting bracket to hold it in place. Also, the plumbing for the intake and outlet of the supercharger were up quite high in the engine bay, meaning some awkward hose routing would be necessary to get the air from the air filter into the SC, then from the SC into the engine inlet manifold. Is there a Plan C?



Figure 1: Supercharger sitting in place of PS pump

The third and final option appeared to be mounting the supercharger low down along the engine block, basically below and forward of the inlet manifold. Well, if you have air conditioning on your 240, you know what resides in this space. It's the big thing that puts the "C" in A/C! I considered for a minute the de-commissioning of the A/C system and removing the A/C compressor all together, but reality set in and I decided that in Australian conditions A/C is a must if you want to drive the car in summer. What to do? Well, I temporarily removed the A/C compressor from the bracket and hung it out of the way (still connected to the hoses, mind you, so I didn't have to de-gas the system). This made room to set the supercharger in place next to the engine block and distributor. I began to get worried when I saw the one side of the supercharger touching the engine block, and the other resting on the frame rail and wheelhouse. It looked like there wouldn't be much clearance to allow for engine rocking during normal (and spirited) driving. This is when I thought I should check and replace the engine mounts. They looked a little tired, and probably were sagging a bit.

With the engine mounts replaced, I started juggling (literally) the supercharger around in the space I had created by removing the PS pump and A/C compressor. I found a position up slightly higher that put the SC-14's air inlet chamber just above the chassis frame rail, giving about 25 mm static clearance to the body. The air outlet chamber, on the engine side of the SC-14, was nearly touching the bolt holding the engine mount bracket to the block, but I figured I could live with this. (See Figure 2) With the supercharger being rigidly mounted to the soon-to-be-fabricated mounting bracket, there would be very little relative motion between the supercharger and the engine.

It was now getting close to the Volv-Saab open house. I thought that would be a good opportunity to pick up some bits and pieces for the project, so I figured I should see what it would take to mount the power steering pump in its new location on the right side of the engine, then pick up some hoses, fittings, etc. at Volv-Saab. The first step in mounting the pump in the new location was deciding on a bracket design. I started with a wood mock-up of my proposed bracket. I made up a small mounting plate out of 10 mm thick MDF



Figure 2: New home for SC below A/C Compressor

(pressed "wood" product from Bunnings), and came up with the idea to use "rose" spherical end joints bolted to that to attach to the existing pump body. I bought the rose joints at an SKF bearing shop. They weren't cheap, but it meant that I could fabricate the entire mounting system myself. Once I was satisfied that the set-up would work, I made the "real" bracket out of aluminium. It was an off-cut from a local metal supply shop that cost less than \$10. I shaped it pretty much the same as the MDF trial bracket, using various cutting devices including a jigsaw, hacksaw, and files. To drill the holes, I used a drill press, but it could have been done carefully with a regular hand drill as no tapping was required. The holes were just used to put bolts through. The finished product (See Figure 3) bolted in place on the engine was quite rigid, and allowed the use of the standard belt-tensioning set-up as a bonus. I measured the belt run and was able to pick up a

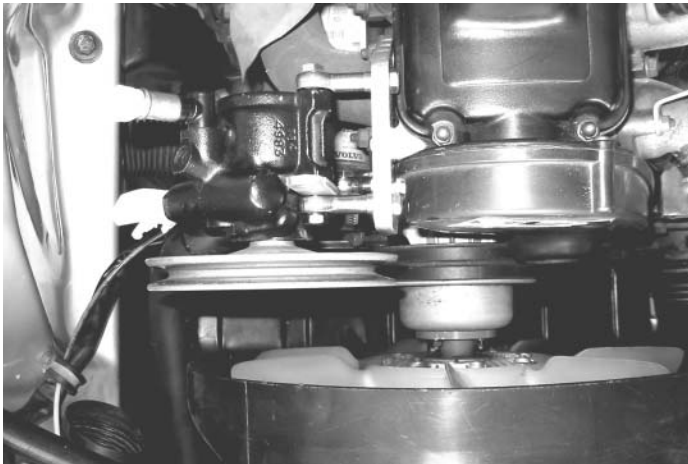


Figure 3: PS Pump relocated to exhaust side of engine

larger belt that runs through the crank pulley, alternator, PS pump and water pump. The redundant belt for the alternator and water pump remains intact, so you still have a fail-safe for the water pump and alternator.

The belt drive and mounting bracket for the PS pump was pretty easy to set up, but the hoses were looking to be more of a problem. The high-pressure hose that originally came with the 240 would work in a pinch, but the angle of the metal fitting at the end was all wrong for the new pump location. I considered having a special hose made up, but I decided to try my luck at Pick-a-Part to see what was available. I got a couple high-pressure hoses, one from an Audi, and another from a Volvo 264. When I got home, I found that the hose from the 264 was just about perfect in every respect, so I used that. The other drama was the low-

pressure hoses and location for the fluid reservoir. I toyed with several locations for the reservoir, and ended up putting it on the right side of the engine bay, back near the hood hinge. This location is slightly higher than the pump (requirement!) and also well protected from the heat of the exhaust. Because of the angle on the power steering pump hose outlet to the reservoir, I needed a hose that had a U-bend in it. Luckily I was able to pick up a set of power steering reservoir hoses from Volv-Saab at the open day. These were from a 1991 vintage 940. I was able to cut them to the correct length and they worked well. Finally, I needed to mount the reservoir in place. For this, I used the original metal clip and made up a small bracket from some other small metal piece I had in the garage from another Volvo part. It came out looking pretty trick, and the reservoir is tucked away nicely. (See Figure 4)

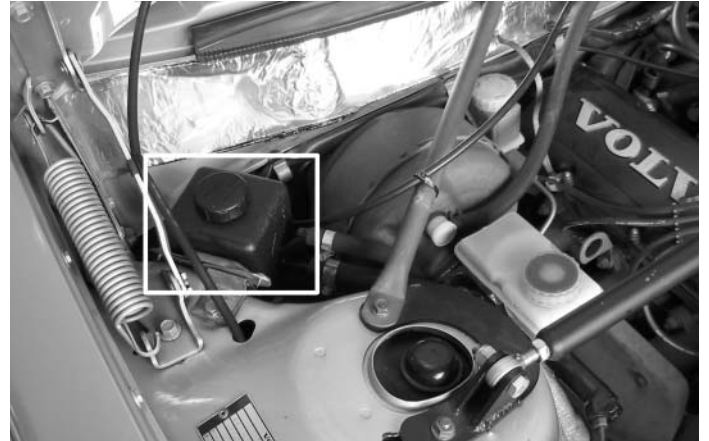


Figure 4: PS Reservoir moved to rear corner of engine bay

Well, I think that's about enough for Chapter 2. In Chapter 3 - Mother Of All Brackets - I'll discuss the process of designing and making the bracket to mount the supercharger to the engine block. Let's just say this was the biggest single challenge of the project, due to my limited home machine shop capabilities. Stay tuned! If anyone's interested in seeing the work in progress, send me an Email at gsievert@tpg.com.au or call (03) 9397-5976 after hours. Regards, Greg

VOLVO WAGON

The Volvo wagon has four wheels and sits in the driveway. A refrigerator has no wheels and hangs out in the kitchen. These points should aid in field identification, but expect some understandable confusion if your Volvo is either white or avocado.

The clip above is from a newspaper in the USA...Greg

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