



## MORE ENGINE RESULTS

Recently, Herb Hirsch from Kendall Park, New Jersey, e-mailed me about the 2000 9-5 Aero that he purchased brand new. He has used Saab semisynthetic oil with oil and filter changes every 5,000 miles for 250,000 miles. These miles were primarily interstate travel with daily trips of 80 to 250 miles at 60-70 mph lasting 1.2 to 4 hours each. Herb's last 6,000 miles on the 9-5 are more local. He is now using Mobil 10w40 oil with 3,600 mile changes. Most of his trips are only 30-40 minutes in length. When Herb removed the oil pan at 250,000 miles, he found NO sludge! He reports oil pressure of 17-21 psi at idle and 37-42 psi at 2,000 rpm, depending upon outside air temperature. The readings are with a gauge set that he installed and verified to be accurate. These oil pressure readings are okay because the Saab specification is 36 psi at 2,000 rpm. Herb's results confirm our belief that these are good strong engines that can go the distance. Let's look at why Herb's 9-5 has done so well and then look at an example of a failure.

First of all, Herb's Saab has a manual transmission. The emissions system works more efficiently with a manual transmission because of the pulsing engine vacuum. Each time the car is accelerated, the low-friction engine has a surge of blow-by into the crankcase. This surge is countered when the transmission is

shifted and the throttle is closed allowing the engine to have full vacuum. This vacuum then pulls the contaminants to the air/oil separator and the separated oil returns to the oil pan. The gases are directed to the engine to be re-burned. In an automatic transmission car where the acceleration is steady, the blow-by is created but low vacuum does not allow as much to be processed, thus, the oil can be contaminated more readily. Consider that if you were to accelerate from 0 to 65 mph It might take 10 seconds. This would all be low vacuum time. This does not mean that all manual transmission cars escape the oil dilution problem. They are just less prone.

The second issue is that Herb chose an oil that oxidized at a rate that fit his maintenance schedule, driving style, environment and engine. In the very first NINES article I wrote about sludging, I included a chart showing that oils oxidize at different rates. So what works for one may not work for another. For instance, a month ago one of our local 9-5 customers who lives in a rural area of MN had a turbo failure at 71,000 miles. This customer uses Saab semisynthetic motor oil with 6,000 mile changes. When we took the oil supply line to the turbo off to clean it, the inside of the line was coated with sludge and the banjo bolt that the oil supply comes through at the oil filter adapter was almost plugged (see picture). This car has an automatic transmission and is driven mostly 5-10 miles per trip with occasional longer trips. What a difference! The oil in Herb's car was run longer distances so the heat could boil out the moisture and some other contaminants. It also had fewer hot shutdowns that contributed to the oxidization of the oil. The Minnesota car generated lots of blow-by from



**Banjo bolt that supplies the oil and holds the turbo oil line to the oil filter adapter on the MN 99 9-5 with 71,000 miles. The oil flows through the middle of the bolt to the smaller holes (4) near the bolt head (you can see only one hole in the photo) which feed the oil line to the turbo. You may be able to see the sludge in the bolt and the hole at the base is almost fully plugged.** *Photographs by the author.*

multiple accelerations on the short trips. Those short trips also mean many shutdowns and start-ups. We



**Two air oil separator boxes showing on the left ports the holes that regulate how much can pass through the box. The left port in the left box is one of the original sized holes that is too small. The box on the right of the left port is drilled to the correct size. At least for now! The difference in the size of this hole is closely tied to the performance of the system.**

believe much of the oil oxidation occurs at shutdown in the turbo.

This brings me to the emissions system. I would like to point out the picture that shows the hole in air oil separator port. It makes a huge difference in having the correct hole in the air/oil separator. The small hole pictured just would not do the job. The larger hole is the current, correct size but Saab did have a modification to drill them out to a larger size in one of the modifications. Stephen Goldberger had the drilled-out version (larger than shown in the picture) and reported that there was some oil consumption. This was corrected when Saab went back to an earlier version of the air/oil separator with the shown larger-sized hole.

Speaking of oil consumption, this reminds me of a column I wrote several years ago about how few people check their oil. Do you still go to a self-serve gasoline station? When is the last time you checked your oil? When is the last time you



**The bottom of the dipstick that you should be able to read is black! It is hard to see the oil level on it to start with and there is no clear indication as to where the safe levels are on the reading. Never assume that your car has enough oil. Check it!**

saw anyone at the station checking their oil? Here is a picture of an oil dipstick for you from a 9-5. Since the oil and dipstick are both black, it is hard to see where the oil level is. Unless you put a drop of oil on another surface, you can't tell how black it really is! Open your owner's manual and learn how to determine if you have oil and how much!

Now, back to the emissions system. Arnie van Belle (9-3 owner from the Netherlands and an engineer by trade) e-mailed me about some testing he is doing. He had his 9-3 at a Saab dealer who checked the emissions system and decided they needed to enlarge the hole in the air/oil separator and inspected the PCV hoses and check-valve. When Arnie got home, he installed the flow-gauge (shown in the picture). The gauge is calibrated for oxygen so it reads about 11% low. At idle, he only has 0.5 liter/minute flow. At higher RPM, the flow went up to 1 liter per minute. In contrast, Arnie has tested his 1994 9000 CS and it measures 4 liters/minute at idle. Arnie measured the cam shaft cover vacuum nipple and found that it had a 2mm port for the low load PCV. He drilled this port out to 3mm and was then able to get 2.5 liter/minute flow at idle, 3.5 liter at 2,000 RPM, and 5 liter/minute at 3,000 RPM. He has gone over 3,000 miles with no discernible oil consumption. He is working on a more accurate gauge that can test the flow on any engine. I will keep you posted as he perfects this system and proves his modifications.

Another Saab owner, Tom



**The airflow meter that Arne van Belle is using to measure flow through the emissions system.**

Nelson, shared the oil analysis results for two 9-5s that he has in his family. He sent the oil report information to both Stephen G. and me. Before I even had time to look at the results, Stephen had pointed out by e-mail that the 1999 9-5 needed better oil and why. With only 2,700 miles on the oil change, it was not pretty! Tom's 2003 Aero was better but would benefit from better oil (his test was at 4,900 miles). It is certain that only oil analysis can really determine some of these issues. It can be a valid diagnostic tool if used properly!

Thanks for all the e-mails and information that all of you owners have provided! The bottom line for all of this research and testing is "**oil analysis.**" All the modifications you do or don't do need to be proven. I don't think oil analysis lies.

My last story for this column is about Bobby Bright. Bobby bought a 2002 9-3 CV that had flood damage and a salvage title. He took the car to an authorized Saab dealer to have the flood damage repaired. On his way home from the dealership, the oil light came on. He called from his cell phone and was assured that it was okay to "just drive home." As you can guess, the engine was sludged. This problem had nothing to do with the flood, but since the convertible had a salvage title, Saab wouldn't warranty the engine. Bobby went on the Internet to find information about the problem car he had purchased. Among the articles he found was our NINES article on sludge. He called and asked for some pointers as to how to repair his low oil pressure. Bobby was able to save his engine with an oil pump and a good cleaning. He continued to consult with me as he repaired his car. Bobby is an inventor of sorts and holds several

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**Prototype 9-5 oil pan that Bobby Bright sent us to test. Notice the extra distance between the pick up screen and the bottom of the pan to allow room for the sediment to settle. Also note that the cover can be removed to clean the sediment from the screen and pan.**



**9-5 Aero with the modified oil pan installed. The lower plastic air shield is not installed for the picture but fits ok.**

patents. He invented a modification to the oil pan that would allow whatever sediment that was in the pan to be settled out and removed when the oil was changed. Bobby

sent me one of his prototype oil pans for my Aero. I have to tell you, it works pretty slick! If you want access to the pickup screen to clean it out, this is the ticket! Bobby does have a patent pending on his design and hopes to market them soon.

In the meantime, my oil testing in winter temps has suffered a setback – no winter! We are having a January without a below zero temperature. It's good for everybody but not my testing. More next time.

*For 31 years Chuck has owned and operated a sales, service, autobody and parts facility specializing in Saabs.*

