

Oil pump and balance shaft repair with gear driven pump on BHW engine Passat TDI - part 1

This article shows replacement of the chain driven balance shaft / oil pump module removal on B5 VW Passat TDI with the gear driven module or delete kit. Also shown is oil pan removal and front subframe alignment for all 4 cylinder B5 Passat.

[difficulty: 4/5](#)

Introduction

For background information on why some oil pump sprocket/chain/tensioners are failing on BHW engine Passat TDI (2004-2005 sold in North America), [see 1000q: Passat TDI engine oil pump FAQ](#). This article focuses on the procedure. Part 1 shows parts, general notes, and prep. Part 2 shows oil pan/balance shaft removal and assembly. This procedure can also be used for installing a chain driven assembly. The difference is that the single use only stretch bolts for the chain driven assembly are different. A similar engine was sold in VW and Audi engines in Europe.

UPDATE: The most reliable and cheapest repair for this problem is a total balance shaft delete and installation of an oil pump from the ALH TDI engine (BEW uses same pump). Adding the optional BRM engine sprocket/chain/tensioner will boost the oil pressure. You MUST plug the balance shaft oil feed hole or else there will be low oil pressure. The 1.8T engine oil pickup tube is also used. Additional notes for this mod instead of the geared module mod are shown at the appropriate step and at the very end of part2. There is a very small increase in vibration but nobody has yet found it objectionable. Because of the lower cost, greater simplicity and reliability, and greater availability, I recommend the delete kit instead of the geared balance shaft kit.

Crankshaft oil pump sprocket - 06a 105 209 b

ALH oil pump: 06a 115 105 b (31 teeth, must use ALH tensioner and chain with this sprocket)

ALH oil pump chain: 038 115 230 (25 links)

ALH [chain tensioner](#): 06a 115 130 b

ALH oil pump bolt, 3 needed - n 907 040 07 (m7x55)

1.8T Oil pump pickup tube - 06b 115 251

ALH Windage Tray - 06b 103 623 p

(optional, remove chain tensioner and chain from above part list if adding these)

BRM sprocket - 038 115 121 a (23 teeth, must use BRM chain tensioner and BRM chain with this sprocket, use threadlocker on bolts if removing the ALH pump sprocket)

BRM chain tensioner - 038 115 130

BRM chain - 038 115 230 a (23 links)

[Balance shaft delete kit can be purchased from KermaTDI](#)

[The same kit but with the BRM oil pump](#)

While the technical difficulty is only moderate, overall difficulty is rated 4/5 because you need a few special tools and because the job is comprised of two 3/5 difficulty jobs in a row - [timing belt](#) and oil pump/balance shaft removal. Just break it down into sections, take your time, carefully read your service manual and any additional tips here, and it's very possible for the average person with basic mechanical experience and the correct tools to do this job in their driveway. It's also a good time to [check the motor mount for leaks or change them](#), [change the sway bar bushings](#), and [change the transmission ATF fluid or engine oil/filter](#).

Some mechanics experienced with this job can do the balance shaft job plus side projects in 1 day but unless you have a car lift and have done this job before, I estimate it'll take the average person with basic mechanical experience 2 days and an evening the first time including side projects + prep/clean up. VW's shop rate is about 13 hours for the balance shaft job. Make sure you read the instructions thoroughly and double check all tools/parts before taking the car apart. DO NOT SKIM the instructions because not following the tips here or VW's instructions can result in engine failure.

Since the [timing belt](#) is removed during this procedure, it's suggested that you also replace the timing belt along with the timing belt tensioner/water pump/rollers, depending on mileage. See [1000q: BHW VW Passat TDI timing belt part 1](#) for the procedure. Feel free to ask a question or post a comment about this procedure in the forums for support.

Original procedure and discovery of the replacement module by MOGolf and [Oilhammer](#) (located in MO), this article adds links to relevant articles, parts links, a timing belt writeup, bolt/screw sizes, individual bolt torque specs, and more detail on some pics. Please also refer to the original .pdf writeup.

How do you know if your car has the chain vs. geared assembly? All 2004-2005 Passat TDI came from the factory with chain modules. If someone swapped to a geared assembly they would know due to the cost of the modification and the change in sound. All new replacement short block engines should come with the gear module as well. As a final test, according to MOGolf, the dipstick on a chained assembly will have a little resistance at the very end of dipstick insertion. A geared assembly does not. See the first link for the background FAQ article with pictures showing the difference.

Parts for oil pump or balance shaft replacement

(click links to compare current pricing)

Note: some people were sent the old chain driven balance shaft assembly when they had ordered the new one. Make sure you have the gear driven assembly before starting!

timing belt kit and timing belt tools (see the timing belt DIY for more details)
gasketmaker for the oil pan/front main seal flange - proper surface preparation is also important in making a good seal!
green scotch brite and razor blade for cleaning the oil pan and gasket surfaces
G12 coolant (suggested to also change the water pump during the timing belt service)
4.0L of engine oil and filter (see the oil change DIY for more details)
carb cleaner spray to clean off parts
heat resistant glove for ovens/barbeques like the "ove" glove
temperature sensor for measuring about 400oF in an oven

Subframe bolts

Note - the long 18m subframe bolts are single use stretch bolts! Some reuse the subframe bolts and their cars haven't fallen apart and I would not reuse them more than once. My car got all new bolts.

(4 total) front and rear subframe long 18mm bolts VW# n 908 235 01

(2 per side, 4 total) front [motor mount](#) bracket shorter 18mm bolts VW# n 906 630 02

19mm or 3/4" 12 point 1/2" drive socket (cannot use 3/8" drive socket)

lock carrier tools (see [1000q: lock carrier removal](#) for details and pics)

metric sockets and wrenches

[torque wrench](#)

engine support (shown below, can buy at harbor freight, sears, or northern tools)

VW special tools

(can be purchased from [snap on VW dealer parts](#) or [samstagsales](#))

5mm wobble head/ball head allen wrench, (can also use extensions)

14mm triple square bolt

balance shaft index lock VW T10255

front oil seal driver tool VW T10053

crankshaft gear puller VW T10392 (requires modification: grind it for clearance as pictured below)

subframe alignment pin VW 3393

VW tool 3415 (I suggest the metalnerd crank yank equivalent tool) metalnerd

MNYANK-4CYL

Balance shaft - geared oil pump kit parts (I recommend delete kit)

Note: the balance shaft bolts are all stretch bolts. If installing a chain driven assembly the bolts are different lengths than the gear driven assembly.

Note: Some kits include 2 bearing cap bolts VW# n 908 897 01 for main bearing cap #1 - you shouldn't have to remove the cap and use them but the bolts are single use only stretch bolts.

balance shaft - oil pump assembly VW# 03g 103 295 q (03g103295q) or (newer part number 03g 103 295 aq but I'm not sure exactly what it is)

balance shaft bolts (qty 5) VW# n 106 014 02 (n10601402)
balance shaft bolt VW# n 910 512 01 (n91051201)
balance shaft front bolt VW# n 909 775 02 (n90977502)
balance shaft front bolt VW# n 911 234 01 (n91123401)
balance shaft drive gear VW# 03g 103 305 c (03g103305c)
balance shaft drive gear bolts (qty 4) VW# n 911 213 01 (n91121301)
crankshaft gear VW# 03g 105 212 d (03g105212d)
crankshaft front seal VW# 038 103 085 e (038103085e)
crankshaft sprocket 19mm bolt VW# 045 105 229 (045105229)

optional parts (I would buy genuine VW/Audi [motor mounts](#) - although they're expensive these are hydraulic filled and the revised design should last longer)

right [motor mount](#) VW# 8d0 199 382 ar

left motor mount VW# 8d0 199 379 ar

Motor mount kit left and right

sway bar bushings (quantity 2)

timing belt kit - refer to [1000q: 2004 2005 VW Passat TDI timing belt part 1](#)

Oil pump and balance shaft replacement procedure

Procedure overview/summary: move the front bumper/radiator assembly (lock carrier) to the service position to get access to the [timing belt](#). Remove the timing belt and crankshaft sprocket. Lower the subframe a little to get clearance to remove the oil pan. Remove the oil pan and unbolt the old balance shaft/oil pump module. Bolt the new one on and put the car back together.

Step by step procedure:

Move the lock carrier to the service position, see [1000q: lock carrier-service position for details](#). This will give you about 4 inches of room in front of the engine to work. It's helpful to completely remove it because it gives you lots of room. Move it to the service position and see if that's enough - you can remove it later if you choose. You could also just pivot it to one side. Depending on which side you remove you also have to drain the [radiator](#) (required for water pump change anyways) and replace some lost ATF fluid or remove the [AC condenser](#).

Drain the engine oil.

Remove the serpentine belt (19mm wrench on tensioner) and AC compressor belt (release tension by loosening the 2x 6mm allen bolts). See [1000q: serpentine belt removal](#) for pics and more details.

Support the engine from above. Use an engine brace from above to hold the lifting points on the cylinder head. (technique shown on another VW below) The Passat has a longitudinal engine so it should get the engine support that has the extension support arms that can move front-rear. Don't use a wood support because you're supporting the engine and

transmission and both are quite heavy - someone learned the hard way when their wood support cracked from the weight!



The car body should be supported by [jack stands or lift at the factory lift points](#) and not supported by the subframe because you have to lower the subframe later. It can be resting on the tires if you are using wood blocks since the struts will hold the car up.

Remove the upper [timing belt](#) cover (2 clips) and lower/middle timing belt cover (5x 10mm bolts) and put the engine at TDC. Refer to the [timing belt](#) DIY for details and pictures of TDC. Do not remove the timing belt or insert the timing belt locks yet, just set it to TDC so that it's set for later. Also remove the 2x 8mm allen bolts holding down the vacuum reservoir bracket (arrows below)



Loosen the 19mm 12 point crankshaft sprocket bolt a few turns but don't remove it yet. You just want to break it loose with the timing belt still on the engine. Do not use an impact wrench because there is a small chance the crankshaft could be damaged. It's very tight so use a 1/2" drive socket (I sheared the tip off a 3/8" wrench so forget about using a 3/8-1/2" adapter) and breaker bar while securely counterholding the sprocket. If you don't have a 19mm 12 point socket, 3/4" is the same size.

I recommend the metalnerd crank yank tool (pictured below) since it uses all 4 allen bolt holes to counterhold and comes with hardened allen bolts. VW tool 3415 uses only 2

pins/bolts to counterhold. There are generic VW 3415 tools available but they are similar to the VW tool. Insert a long breaker bar (I used a pipe) through the base of the tool to hold it.

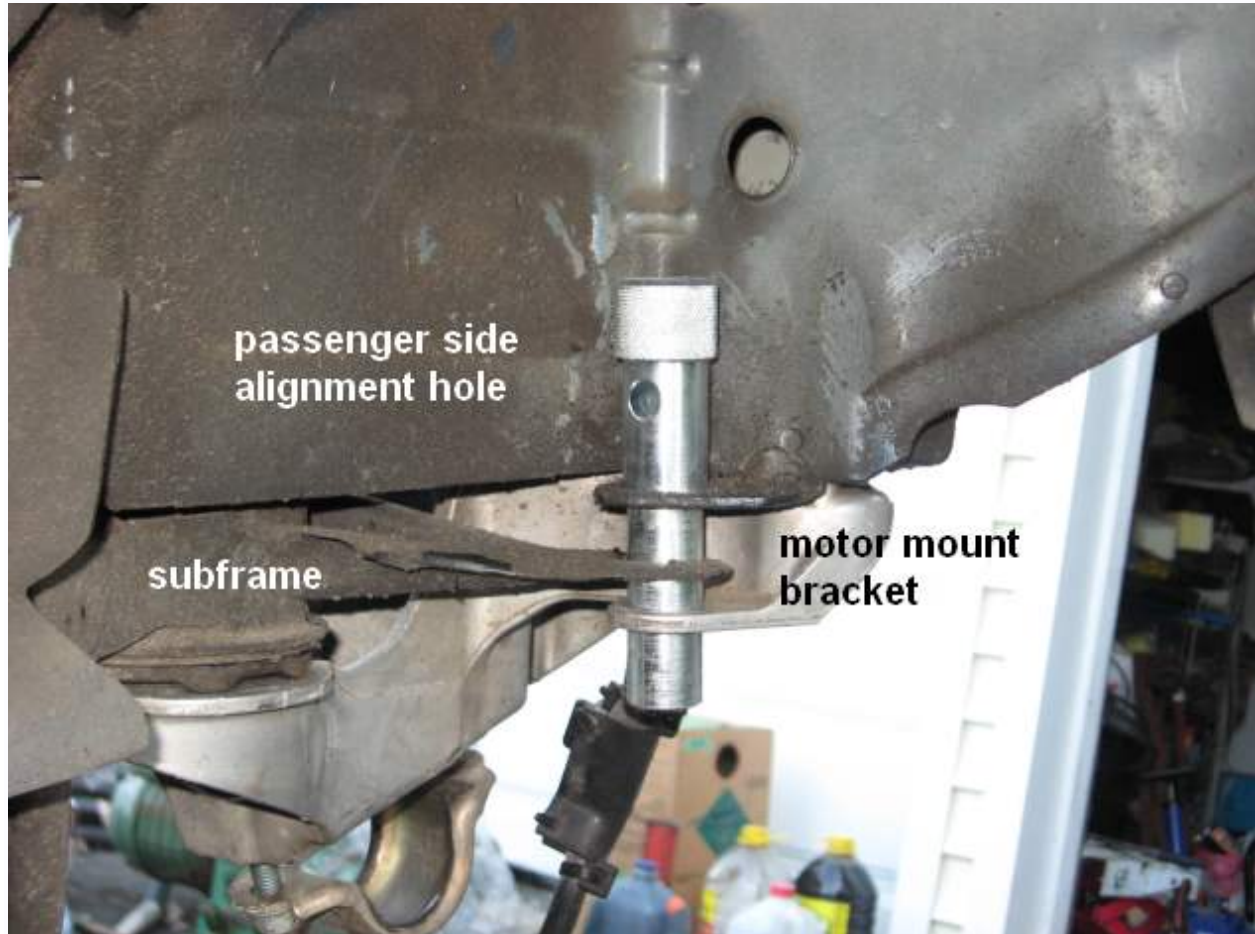


Once the crankshaft sprocket bolt is loose a few turns, check that the engine is still at TDC and now insert the crankshaft lock and camshaft lock pin as shown in the timing belt DIY. Remove the timing belt. The reason I suggest waiting until after the crankshaft bolt is removed is so there's no chance of valve-piston contact. Do not use the timing belt locks to counterhold against the crankshaft bolt because you'll break them.

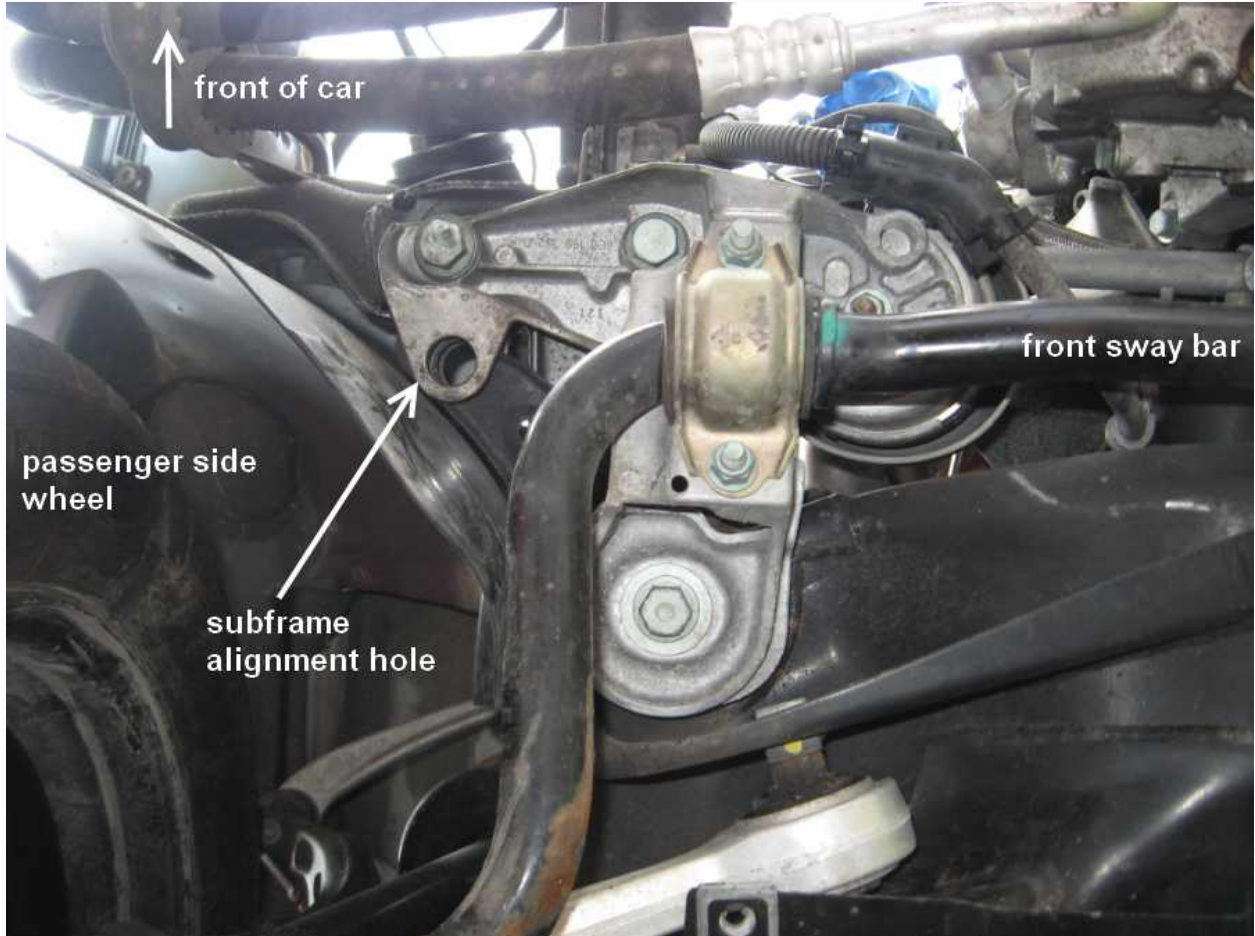
Remove the 19mm crankshaft sprocket bolt and the sprocket. Leave the sprocket counterholding tool attached to the sprocket, you will use it again. Now that the tight crankshaft bolt is loose, you can lower the subframe.

Preparing the subframe for lowering

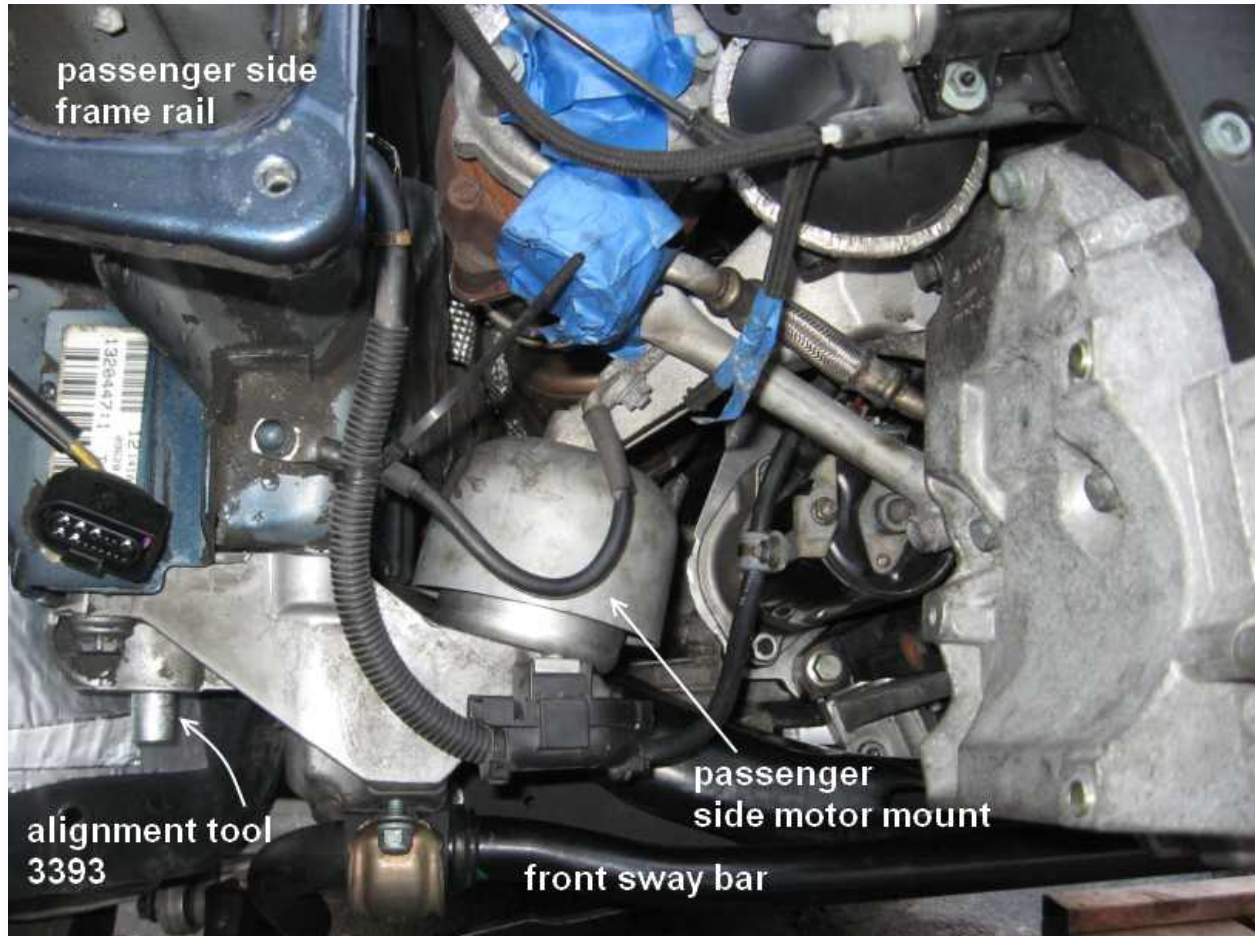
Insert subframe alignment pin VW tool# 3393 on the left and right [motor mount](#) brackets to give you an idea of the original position. They easily should move in and out. Note the vertical position of the pins as shown below (plastic wheel well liner removed for illustration).



Here is a view underneath the car, looking up at the [motor mount](#) bracket. The pins will be inserted during installation to align the subframe. If they're off then the subframe will be crooked. Below is the empty hole on the passenger side.

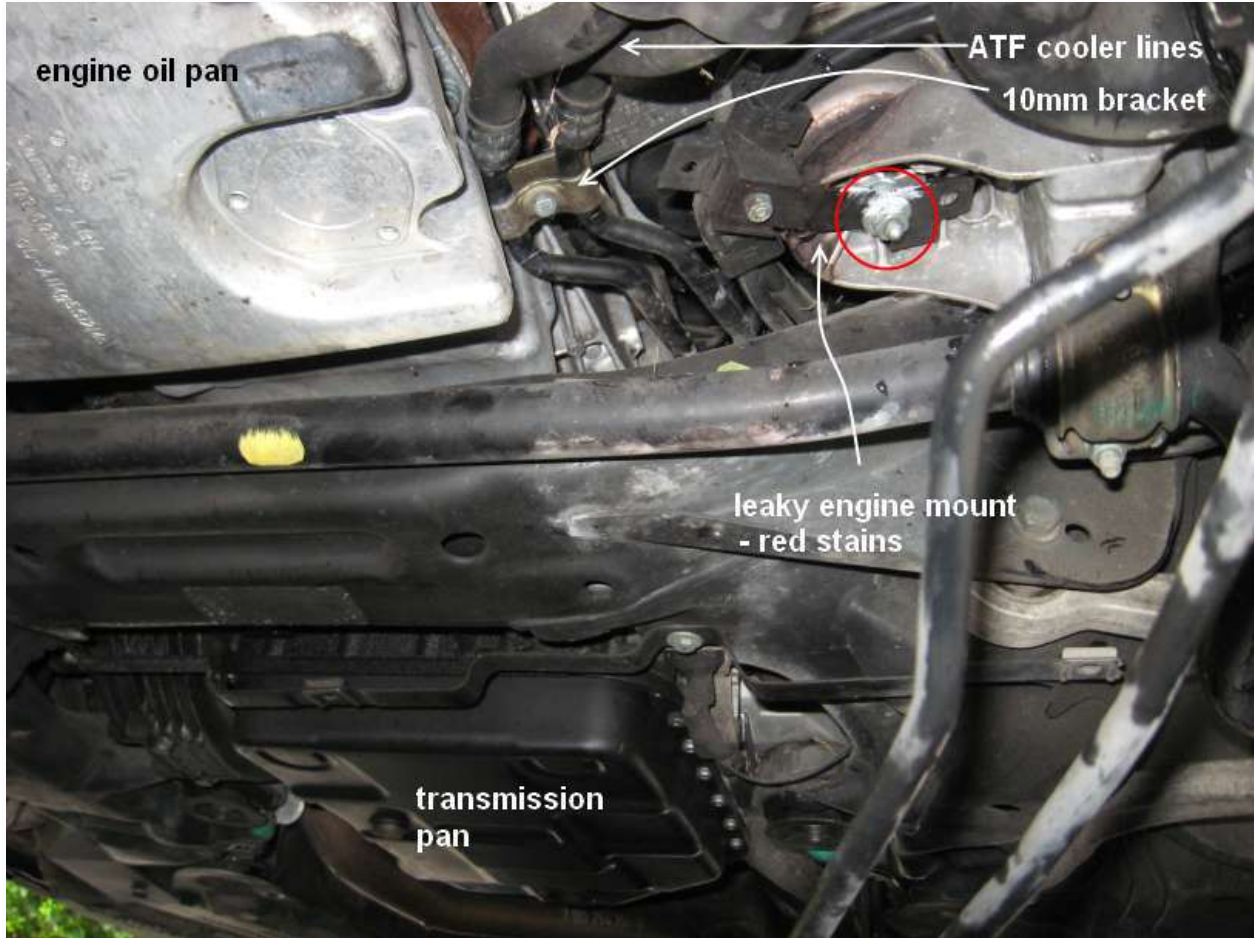


Shown below is the alignment tool on the passenger side after insertion (left side of pic, some items removed for illustration). The silver stuff on the wheel well plastic is some sticky mat soundproofing. Also remove the [battery](#) cable (the thick cable going to the starter) from its plastic bracket. You need some play on the wiring to lower the subframe.



Remove the 1x 10mm bolt holding the ATF cooler line bracket and move the aside. Also remove the 13mm nut holding the cable bracket to the engine mount bracket, circled in red below. You want some play on the wiring to lower the subframe.

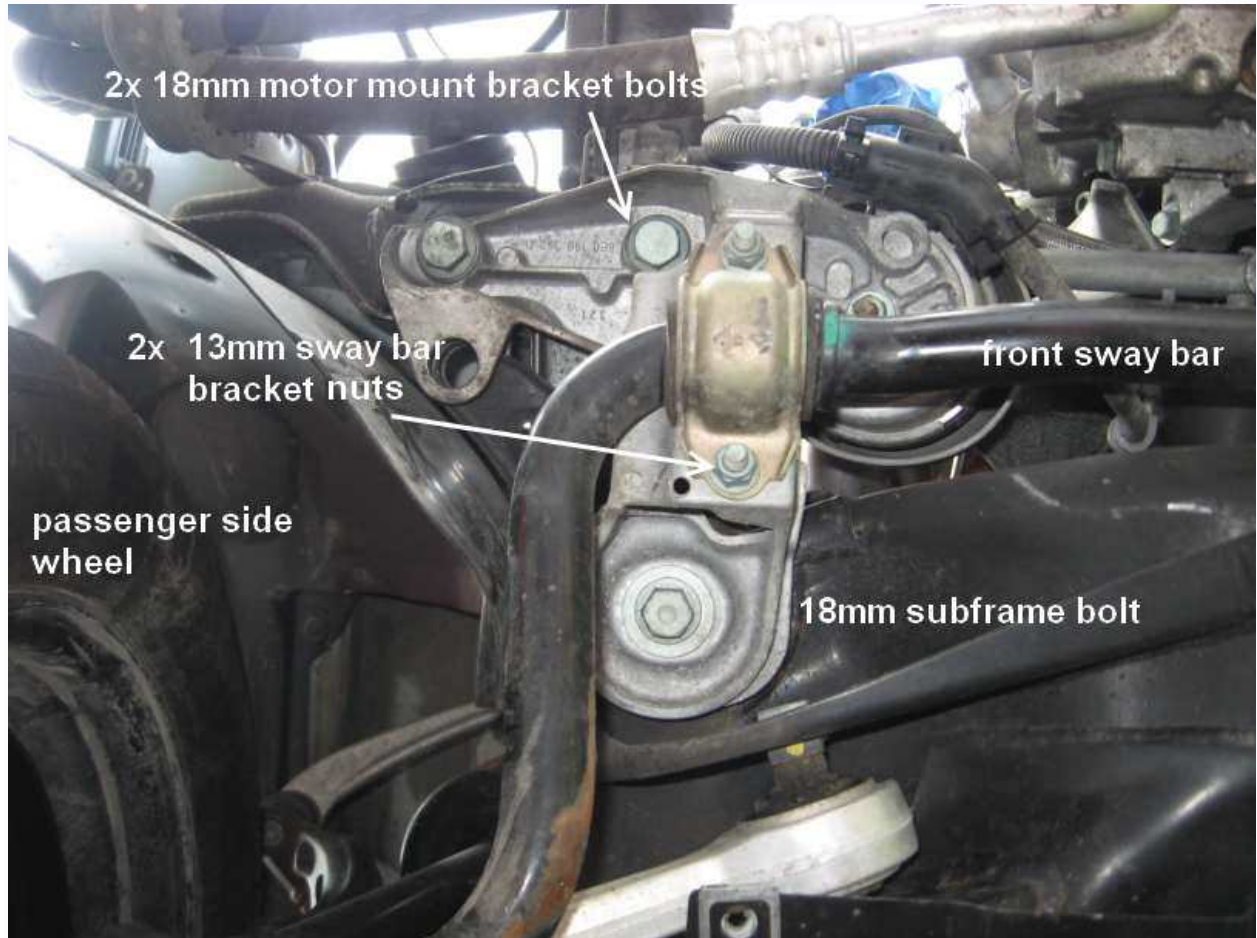
While you're here, inspect the [motor mounts](#) for red stains - leaking dampening fluid. The [motor mount](#) design was revised and should not be as prone to leaks. A leaking driver's side engine mount is shown below. See the motor mount DIY for more details.



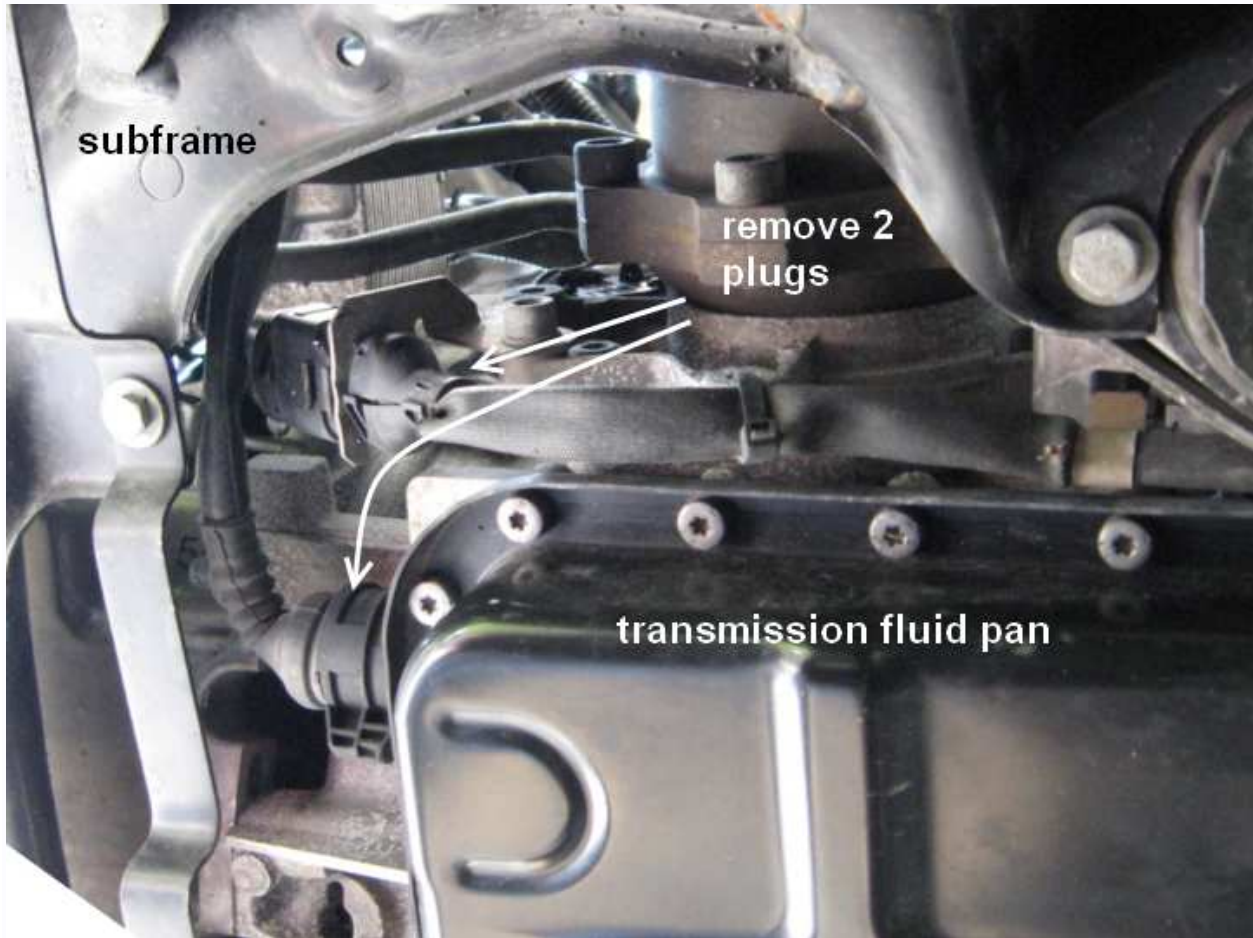
Here is another example of a leaking motor mount.



Remove the sway bar bushing brackets (2x 13mm nuts) to let the sway bar move down. Remove either the upper or lower motor mount nuts (13mm) to let the engine move free - remember, it's being supported by a brace from above. Note the 18mm subframe bolt and 2x 18mm motor mount bracket bolts for later, do not remove them yet.



Unplug 2 of the electrical plugs at the front driver's side transmission, near the oil pan. You could also remove the allen bolt/bracket holding one of the cables. When the subframe shifts down it needs some play.



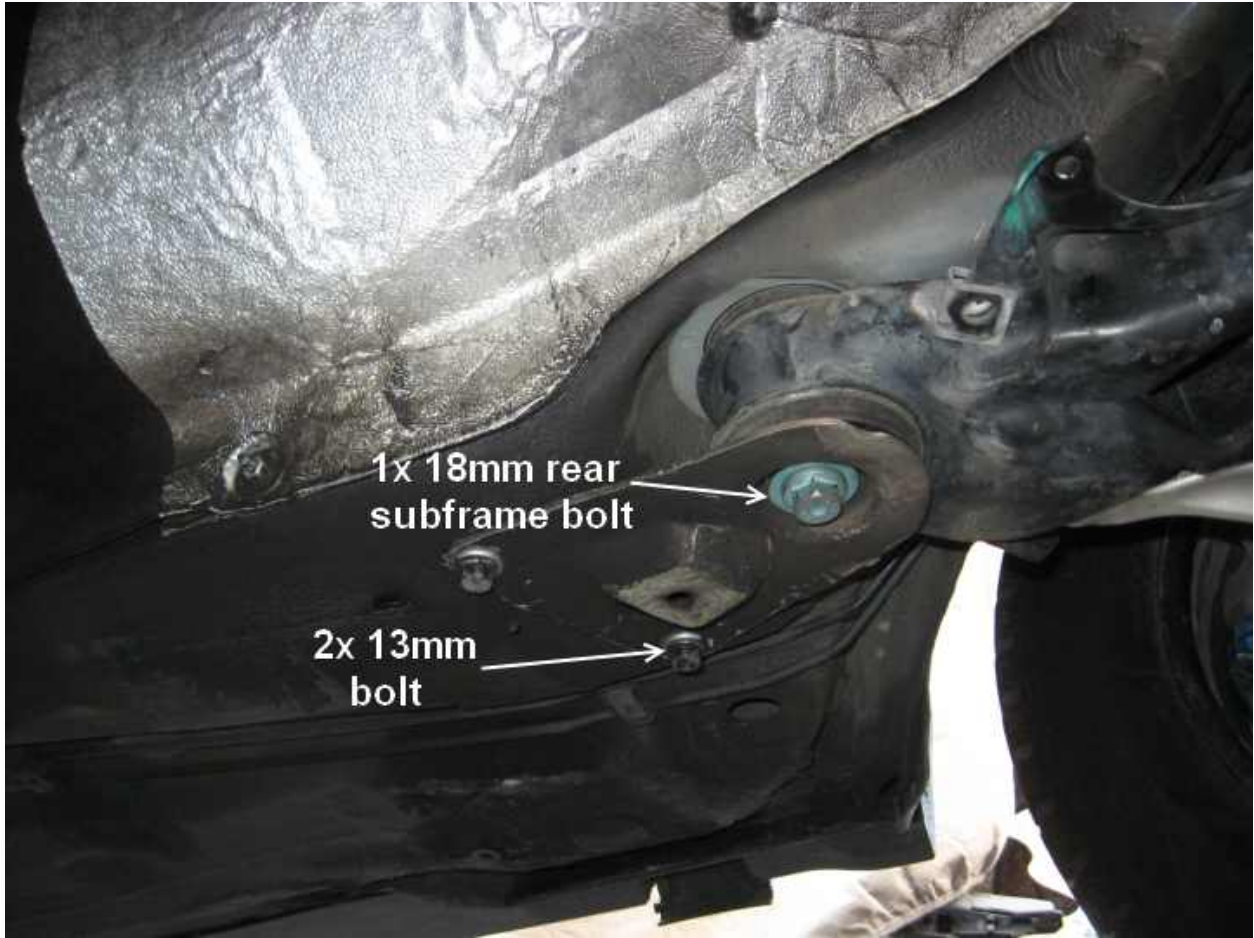
Remove the 2x 13mm transmission mount - subframe bolts. Note - the round lower plate on the mount tends to hang up on the subframe when lowering the subframe - use a pry to shift it as needed.



Lowering the subframe

First raise the engine slightly using the support to get the weight off the subframe.

Caution: Before removing the bolts, first loosen all the bolts by 1/2" just to get them loose. Do not remove them all the way or else the subframe will fall down and probably onto you, causing injury and/or damage! Before loosening the subframe bolts, make sure the subframe is securely supported from below and the engine is supported from above with a brace! In the front, loosen the 2x 18mm aluminum motor mount bracket bolts and the 18mm long subframe bolt as pictured above. Then remove the 2x 13 rear subframe brace bolts. Then loosen the 18mm rear subframe bolt. During replacement of the bolts, install the new bolts one at a time to hold the subframe up.



Stick some wood blocks to keep the subframe down and hold it steady. Lower the subframe just enough to get clearance to remove the oil pan.