

Fuel Pump Testing and Replacement Procedures (aka Follow this now and NEVER post a failure "Whine")

by Dave Forgie – 3rd Revision - Jan. 31, 2013 NOTE: This version has some hyperlinks to More info, where appropriate.

This DIY contains two parts: 1) Fuel pump testing and 2) Fuel pump replacement

NOTE: The author takes **NO** responsibility for the safety of these procedures. The user should take all necessary precautions to prevent explosions or contact of unprotected skin with gasoline. Wear suitable protective gear up to and including vapour canister face masks and elbow length fuel resistant gloves and use non-sparking tools and lights. If you are not comfortable with these precautions, the job is best done by a professional.

The C4 UrS cars (sedans and avants) have a single stage high pressure fuel pump located in the fuel tank ([More info HERE](#)).

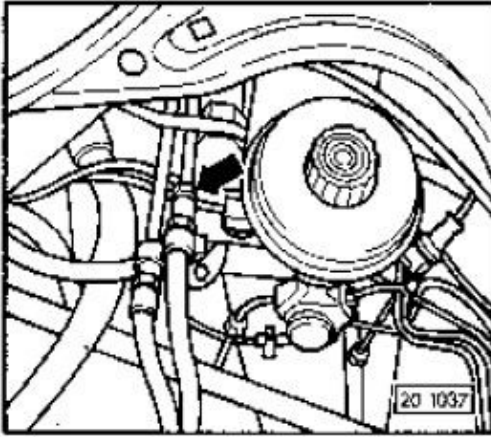
1) Fuel Pump Testing:

Quick fuel pump function test - for those that might be needing one. Posted by: UrS4boy on 2005-10-27 08:16:03

If you have starting problems and don't know whether its the cam position sensor or the fuel pump, you can at least confirm that it is or isn't the fuel pump. Sean Douglas (quattro20v) and I used this technique to test our fuel pumps for delivery rates before we developed the fuel pump relay procedure in July/Aug 2004.

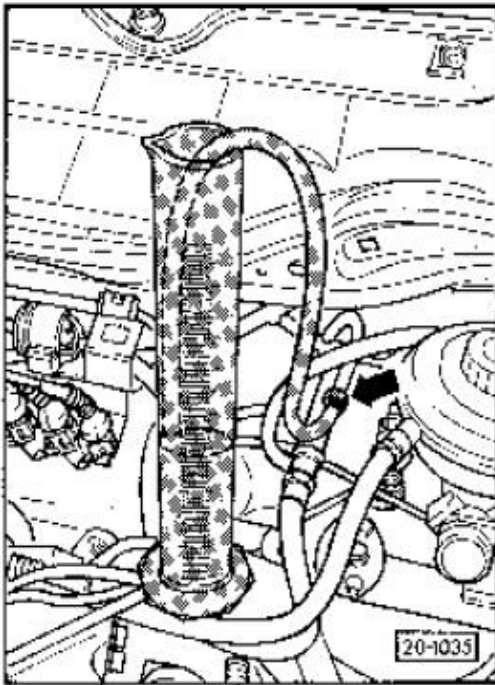
To test the fuel pump, you need a long length of wire with a spade connector at one end, an alligator clip on the other end and switch somewhere in the middle - but closer to the spade connector end. Once you have that, you need to open up (break) the inlet connection to the fuel rail (hard piping and braided hose on the driver's side (left hand drive cars)). There may be some residual pressure so only do this when the engine is cold (not a problem if you can't get it started). You need to get a four foot long hose over the connection from the fuel pump. Sean had kept a connector from an old fuel filter so we attached that to the fuel line and then put a hose on that fitting. Either way, you need to get a hose on the connection and be able to run the hose OUTSIDE OF THE CAR to, say, by the front wheel. Place the hose in a gas-compatible container. A 2 L measure cup or graduated cylinder works well.

With the test fuel line in place, pull the fuel pump fuse, No. 17, from the left hand side dash end fuse panel. Stick the spade end of the wire in the right hand side (rear-most) female fuse connector. With the switch in the off position, connect the alligator clip end of the wire to the + post on the right hand cowl side of the engine compartment. With the hose firmly in place in the measuring receptacle, turn the switch on for 15 seconds. Then turn it off. At 12v, the fuel pump should have delivered about 675 mL of fuel in that time (Reference - Pg C20-18 in the Bentley). If you got less, or none, your fuel pump is bad or weak and you need to replace the pump. SEE DIAGRAM ON NEXT PAGE



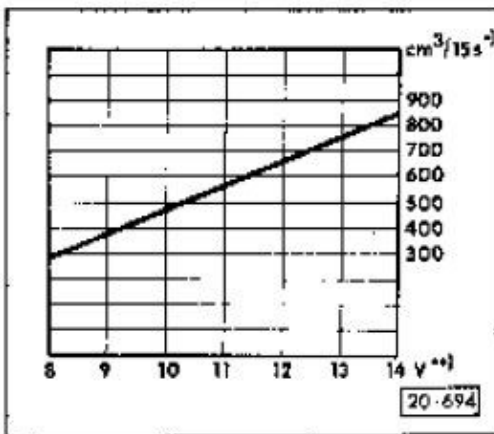
Checking feed rate

- ◀ - unscrew supply pipe (upper pipe) -arrow-



- ◀ - Attach hose to supply pipe and hold in measuring glass.

20-16



- Operate remote control V.A.G 1348/3 A *or 15 seconds (hold down button).
- ◀ - Compare measured quantity with specified values for minimum feed rate in graph.
 - * Minimum feed rate measured at return pipe is cm³/15 sec.
 - ** Voltage at fuel pump with engine stopped and pump running (approx. 2 V below battery voltage).

2) Fuel Pump Replacement

Basic UrS fuel pump info is available [\(HERE\)](#).

This is a photo of the 8A0906091G 43 mm diameter fuel pump in its home, a plastic basket in the trunk/boot/cargo area. Getting there and getting it out requires a few steps.

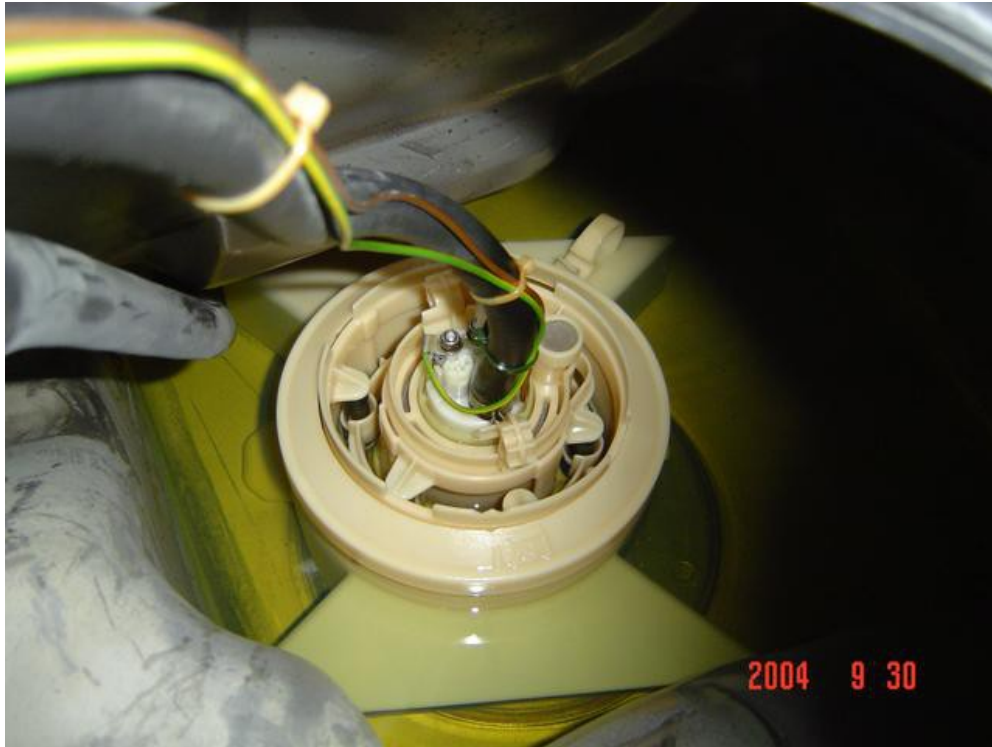
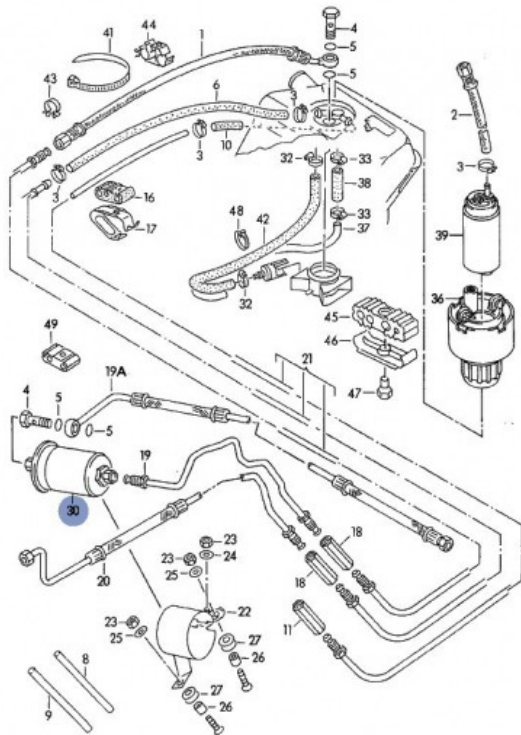


Photo courtesy of Bob Myers of Chips-Ur-S.com

If you don't heed my advice and replace your fuel pump if it is the original and you have over 100,000 miles (160,000 km) on your UrS-car, PLEASE don't post to the forum that your fuel pump failed. Of course it did. There was no doubt that it would fail. The only question was "When?" and you didn't take matters into your own hands. You let the Audi Gods win. Please don't whine about it to the forum/list.

Here is the procedure (Note: all the usual YMMV, caveats, no responsibility for errors or omissions, etc. Use your head. Don't smoke, Wear sunscreen. Floss your teeth, wear protection, etc.):

1. Obtain a new fuel pump (PN 8A0906091G), two new N 0138128 crush washers and a new 893133511 fuel filter (complete with two more new N 0138128 copper crush washers). The replacement fuel pumps are either Siemens-VDO (typical OEM supplier), Bosch (sometimes the OEM supplier) or Pierburg (a reasonably reputable aftermarket supplier). Sources of these fuel pumps include, S-cars.org, SJM Autotechnik, Blaufuernuegen, the Parts Connection, FAP99, Arizona Autohaus, Bimmerparts, VM Autohaus, etc. and the dealerships.
2. If the car is still running, get the fuel level down until the 15 L "Reserve" warning light comes on, and then some. Otherwise, siphon the tank as dry as possible (save the fuel in an approved gas can (e.g. 25 L red plastic "Gerry" can) or use the fuel pump testing technique to run the pump and draw down the fuel level (be careful, use proper container, don't smoke, etc)
3. Run the engine and pull Fuse No. 17 (in the drivers side [End of Dash Fuse Panel](#)) while it is running. That should help to empty the fuel lines and relieve the pressure in the lines.
4. Open the hood and find the fuel filter. Crack open the non-banjo fitting connection (Item 19 in the diagram below) - slowly. Drain whatever fuel comes out into something safe (I used a small plastic margarine container). Later, you will install a new fuel filter but not now. (Use two of the new copper crush washers when installing the new filter). More fuel filter info [\(HERE\)](#).

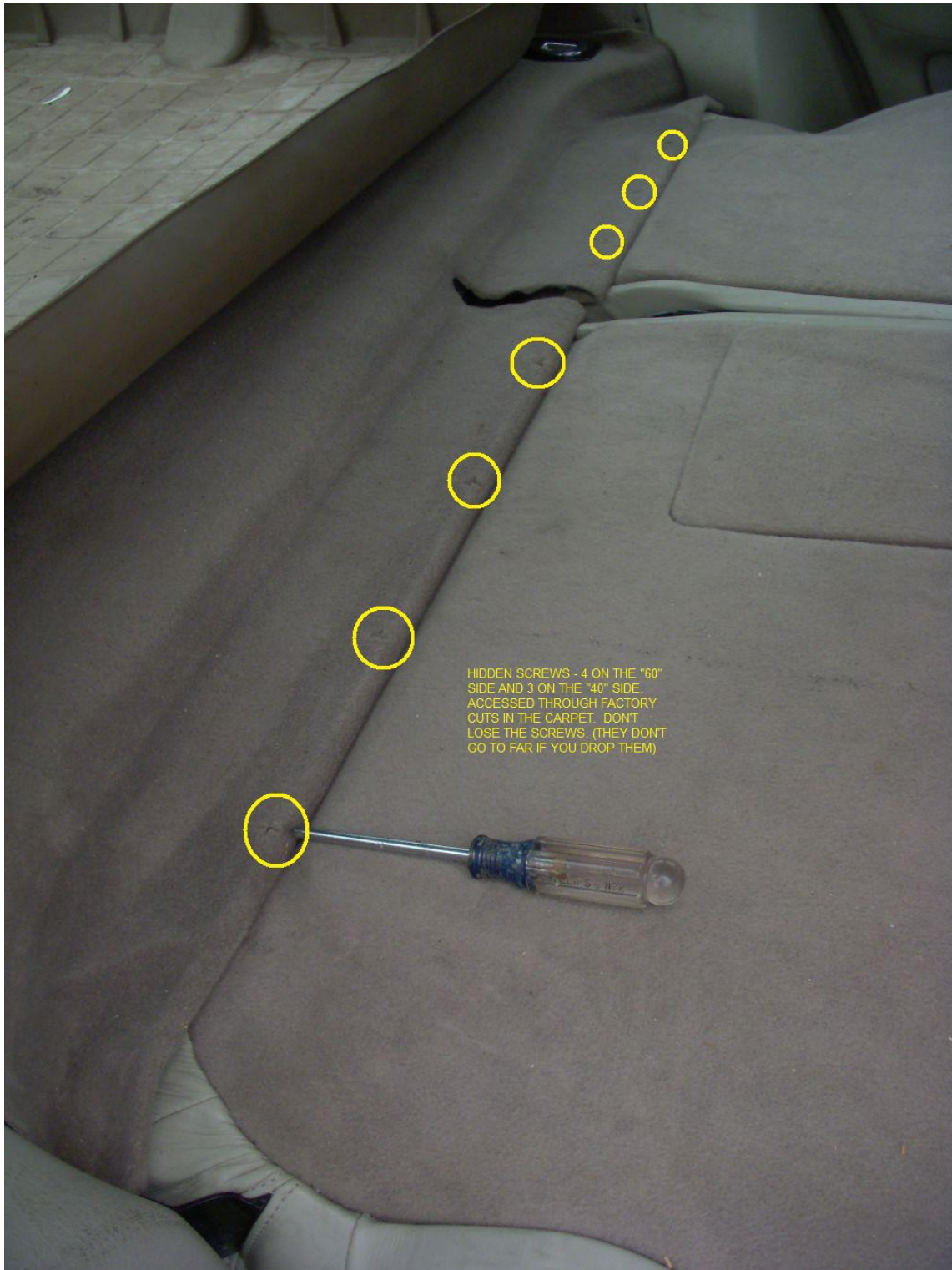


POS	PART NUMBER	NAME	REMARKS	QTY	MODEL
▶ 30	b 893 133 511	fuel filter	also use: 810 133 525 A N 013 814 2	1 1 1	
-	810 133 525 A	adapter	M14X1,5/14X1,5	1	
-	+ N 013 814 2	sealing washer	A14X18	1	
32	+ N 102 582 01	clamp	AL12.22	X	
33	+ N 024 528 1	clamp	LC8-12	2	
36	895 201 779 J	reservoir, upper part	43MM	1	
37	443 261 229	fuel line	shorten to: 650MM for vehicles with auxiliary heater	1	
-	N 020 282 1	hose in coils of 5m	5X3 'order qty. 5'	*	
38			shorten to: 70MM for vehicles with auxiliary heater	1	
39	8A0 906 091 G	fuel pump			
41	+ 811 971 850	tie wrap		1	
-	N 102 218 01	hose in coils of 5m	9X3 'order qty. 5'	*	
42			shorten to: 800MM	1	
-	895 201 759	valve		1	
(43)	+ N 906 661 01	tie wrap	5X6,5	X	
44	443 201 449 C	clamp		X	
45	4A0 201 245 A	protective cover		X	

5. For a sedan, empty your trunk, including the carpet on the hump (leave the main bottom carpet in - you will be living in here for a few hours). OR, if you want, remove the bottom carpet and the panel above the spare. Then remove the spare. This creates a space for you to sit right in the trunk. Either way, with the carpet off the hump, you will then be looking at this:



For an avant, get the junk out the cargo area and put both rear seats down. Find the seven (+) cuts in the carpet, as shown in the photo below. Remove the small Phillips head screws (don't lose them) and peel back the carpet (fold it back into the cargo area).



With the avant carpet pushed back into the cargo area, you will have this view (without the labels):



6. Remove the three screws in the cover plate and remove the cover plate (sedan and avants have the same cover plate)



NOTE: The above photo shows two red shielded female spade connectors not normally found. I added those to check voltages under load prior to and after relaying the fuel pump directly to the battery (as in this ["Turbo-charging" your fuel pump DIY](#) post).

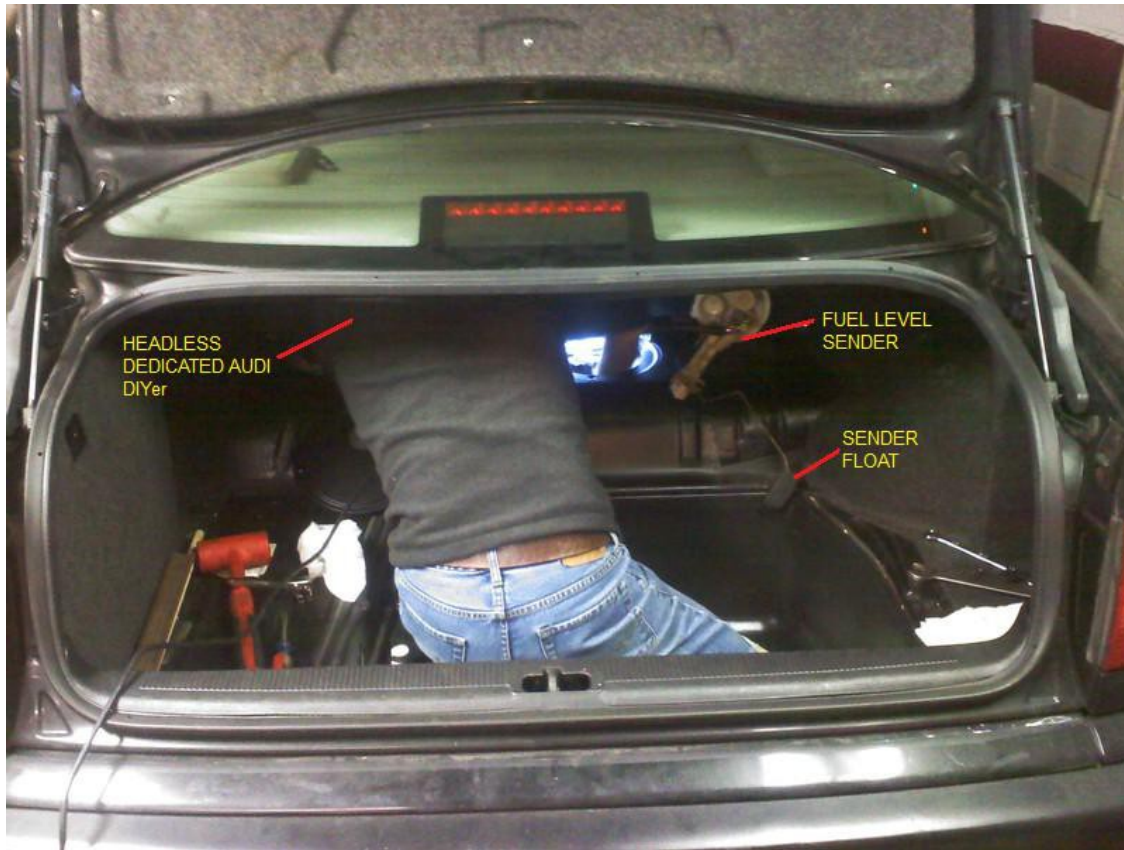
7. Now that you can see the top of the white plastic fuel sender mounting plate, get in there with the shop vac and vacuum up as much crud (dust and dirt) as possible. Use a small piece of wood or plastic (like a chop stick) to loosen the dirt as you use the shop vac. Wipe up the remaining crud with a dampened rag or moist paper towels.
8. Disconnect the wire connections (NOTE: FUSE 17 should still be out of the fuse panel throughout this process, until the restart). Move the connector away from the fuel pump access hole.
9. Disconnect the fuel banjo line. You need two wrenches/sockets to do this: one to hold the fitting and one (e.g. 17 mm socket) to turn the banjo nut (anti-clockwise). IF you HAVEN'T followed the procedures above, the lines will still be pressurized and you will get fuel in your face. IF you have followed the above procedures, you still might get some dripping. Blot these up ASAP and get the cloths or papertowels out of the car ASAP.
10. Disconnect the two rubber hoses on the top white plastic plate (one is the fuel return line, one goes to the [Evaporative Emissions Control System](#)). Push them away from the top of the fuel pump access hole.
11. Remove the metal retaining ring. Either use the correct VAG tool or a piece of wood and a rubber or plastic mallet. DO NOT USE METAL things. They may cause a spark and you may burn yourself to death (not pretty). If this scares you, stop and let a trained mechanic do the job. Remember to clean the retaining ring before you reinstall.
12. PAY CAREFUL ATTENTION as to the orientation of everything: The upper plastic plate, the pins that hold the retaining ring, the hoses, the wires, etc. You need to be able to get this back in without hanging the fuel level float up in either the fuel hoses or the wires to the fuel pump. Pull the fuel level sender assembly out. Here is the sender coming out (note the banjo fitting tucked out of the way):



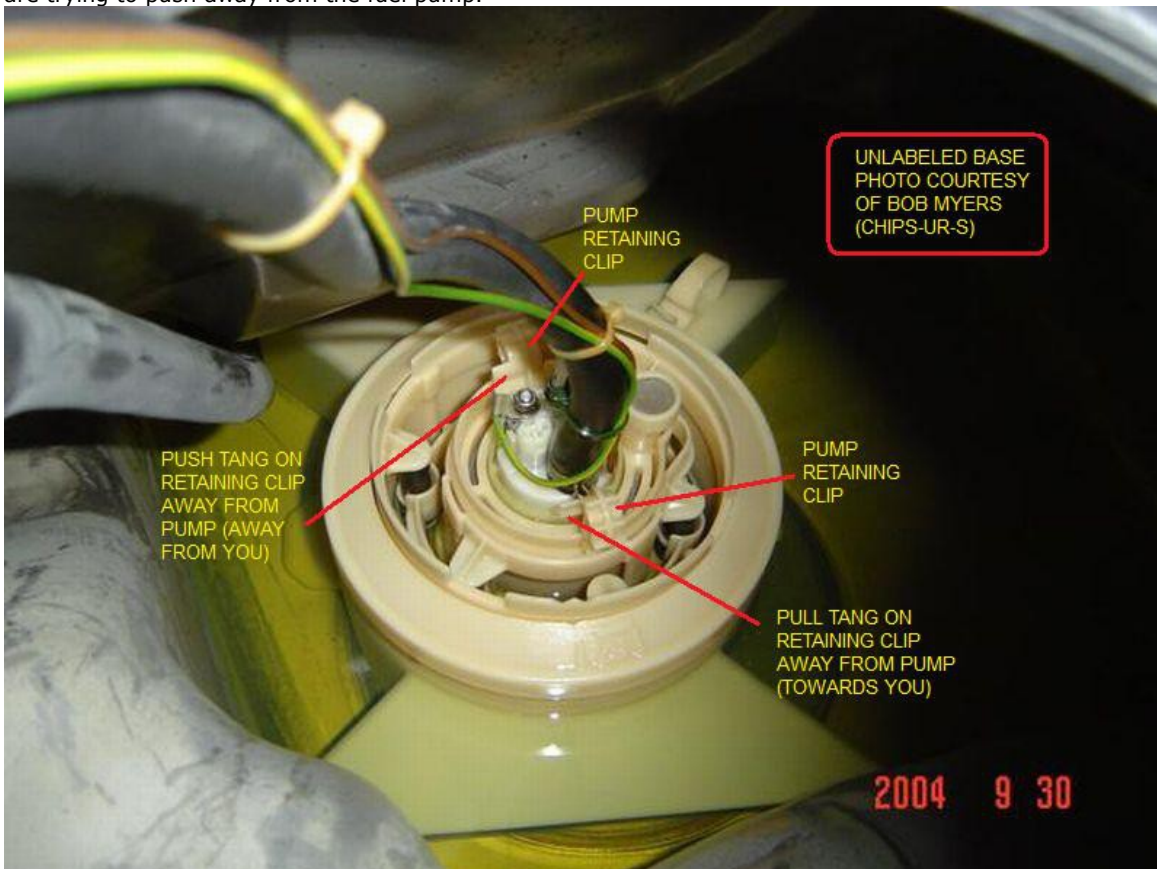
NOTE: There is no reason to remove any of the hoses or wires connected to the fuel level sender at this point. Just be careful with the sender as you pull it out. Remember to check the orientation of everything so you don't re-install it incorrectly later.

That said, I recently replaced the fuel pump on my 98 C4 avant and I found it much easier to disconnect the two hoses and the electrical connector from the plastic sender housing/fuel pump access plate. One hose goes to the fuel pump and has compression fittings (needs wrenches to hold and turn things). The other hose is the fuel return line is just a clamped on. Once removed, it can be laid inside the fuel tank. With everything disconnected, the fuel sender is much easier to get out (and back in - this, later).

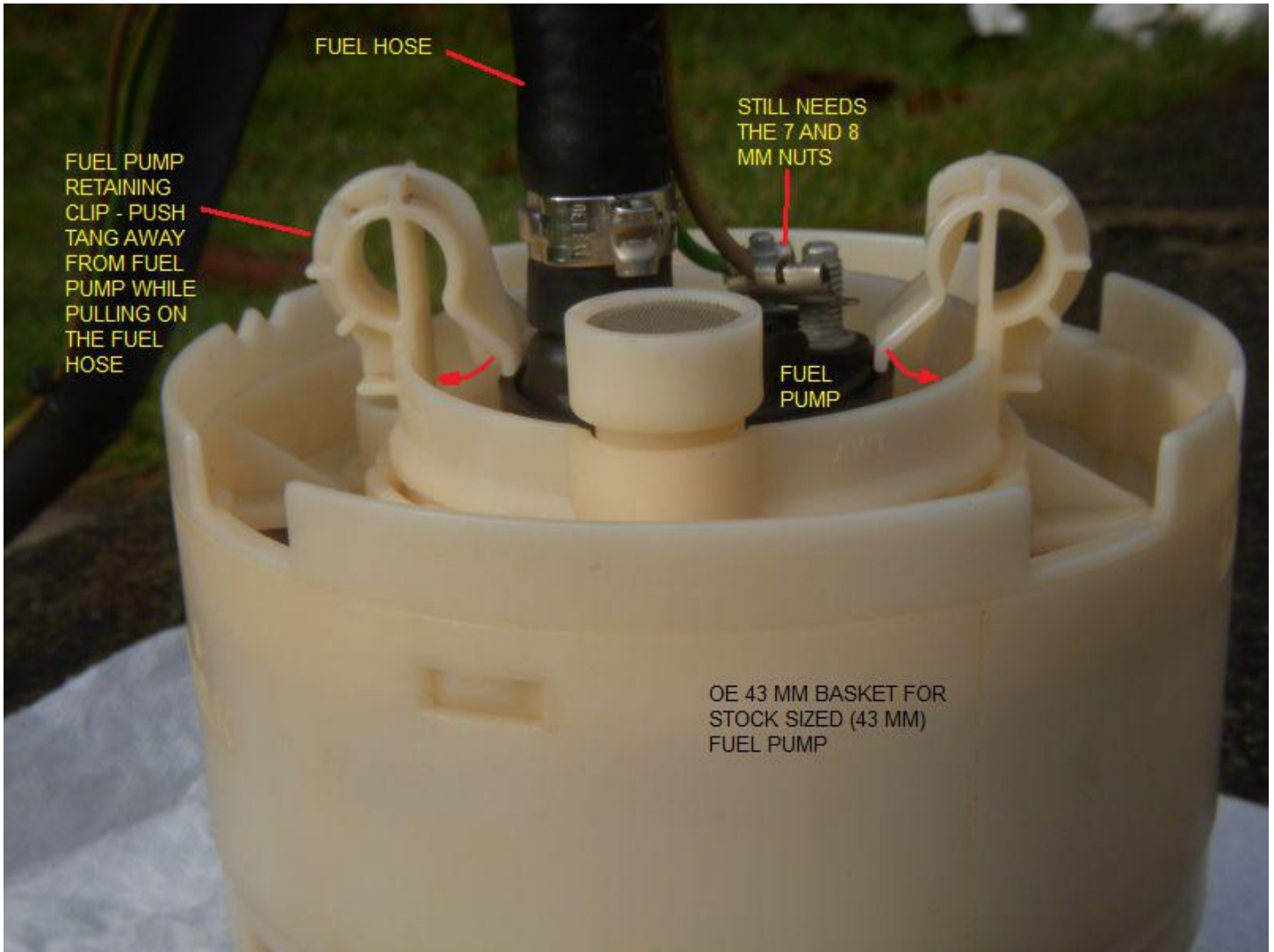
13. Lay the sender assembly down, carefully (don't bend the float arm) close by. This could be on the hump, either side of the opening. In the avant, you have lots of options (I ended up with the sender laid on the avant roof on paper towels). This photo shows it to the right of the opening. Note that the dedicated DIYer is working in the empty spare tire well (as noted as an option in Point 5):



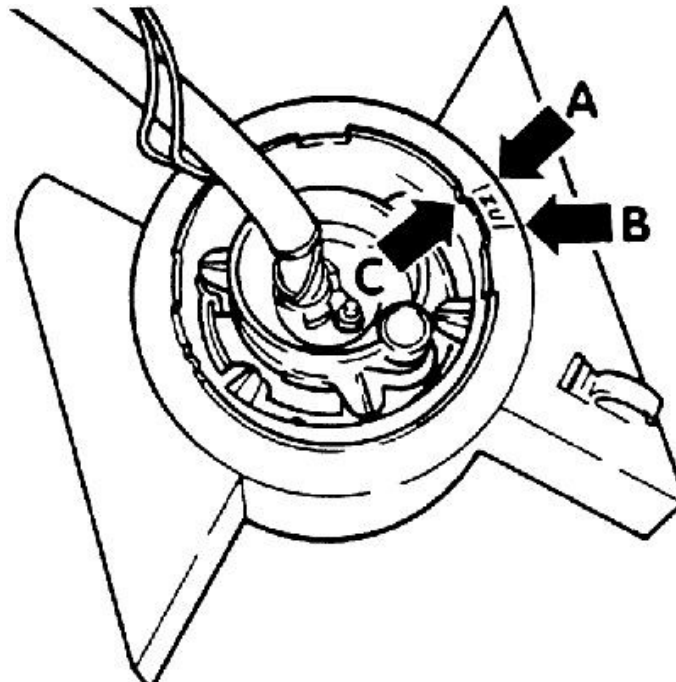
14. Remove the fuel pump or basket from the tank. To remove the fuel pump, wearing appropriate fuel-resistant elbow gloves, reach in, to the fuel tank and either use the VAG tool to loosen (anti-clockwise) the fuel pump retaining basket OR unclip the fuel pump from the basket. Remember how everything is oriented. See photo. There are two clips one at 5 o'clock and one at 11 o'clock. You can only get one arm in the hole so do one clip at a time, eg. back and then front, lifting/twisting the fuel pump a bit, and then the other clip. Here is a photo with hints to remove the pump from the basket. The photo on the next page shows the clips that you are trying to push away from the fuel pump.



This photo (with the basket out) shows the fuel pump retaining clips and the tangs on the clips that you need to rotate (push/pull) out the way so you can pull the fuel pump out of the fuel tank.



If you want to remove the basket (e.g. to clean it out, or to replace it with a 60mm diameter basket during a Bosch 005 or 044 installation) it is a little more involved. To do remove the entire basket, you need to rotate the basket about 15 mm in an anticlockwise direction (i.e. from C at B to C at A) as shown here:



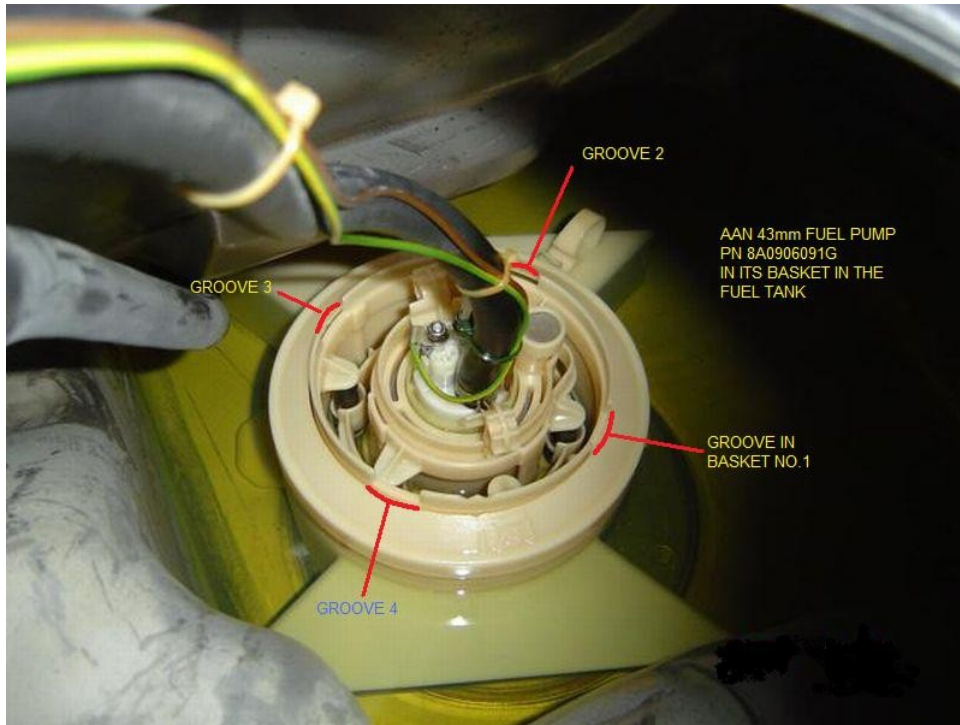
There is a special tool to do this, the 3214. These allowed the pump to remain in the basket while the basket is removed. The only one I have ever seen was made of plastic by Matra (see photo below). However, they were weak and so prone to breakage Samstag Sales seems to have stopped selling them.



This photo from SJM Autotechnik shows how the 3214 fits into the edge of the basket (photo obviously taken AFTER basket removal) (ref: http://www.sjmautotechnik.com/trouble_shooting/fuelump.htm#early200). I found that the tool fit into the basket quite differently.



If you don't have a working 3214 and you need the basket out, you can *try* using the ends of a set of pliers in two of the four grooves in the edge basket to turn it anticlockwise.



(Unlabeled base photo courtesy of Bob Meyers of Chips-Ur-S.com)

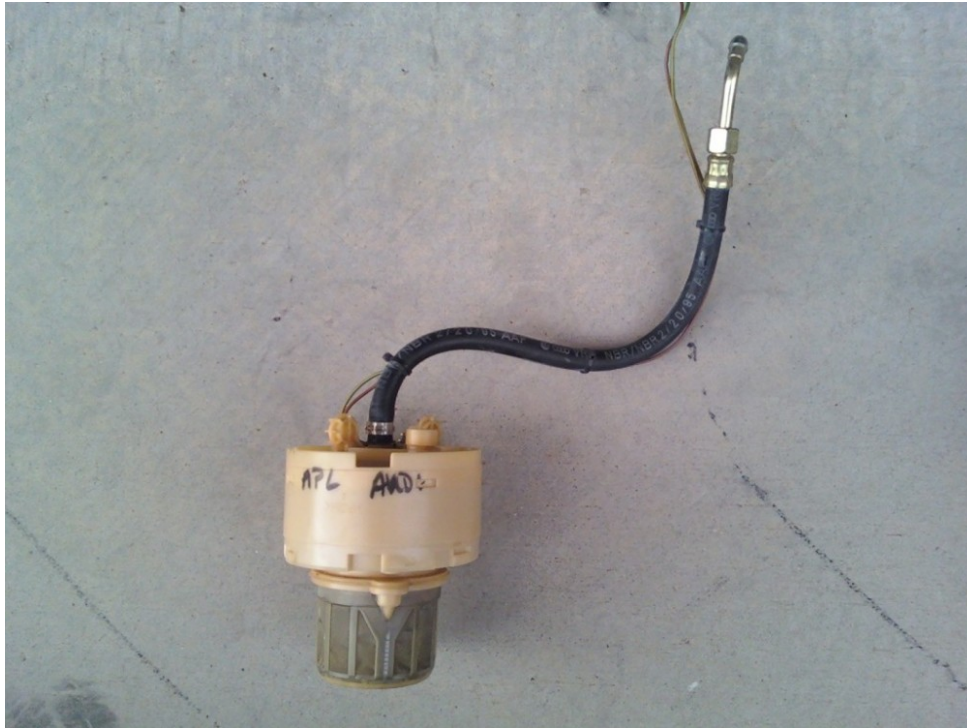
Or you can fabricate something to fit in the grooves and give you enough purchase to turn the basket (they don't want to turn having been there so long). I have seen "tools" made of wood. This morning I saw this one on the S2 forum posted by "Trankelstein": piece of plastic plumbing pipe with enough diameter (4" dia?) to clear the basket (pump out), four bolts to fit into the four grooves and a bolt across the top for a handle so you can twist the tool and the basket. I thought it was very clever. YMMV.



Photo Courtesy of "Trankelstein" of Stockholm, Sweden.

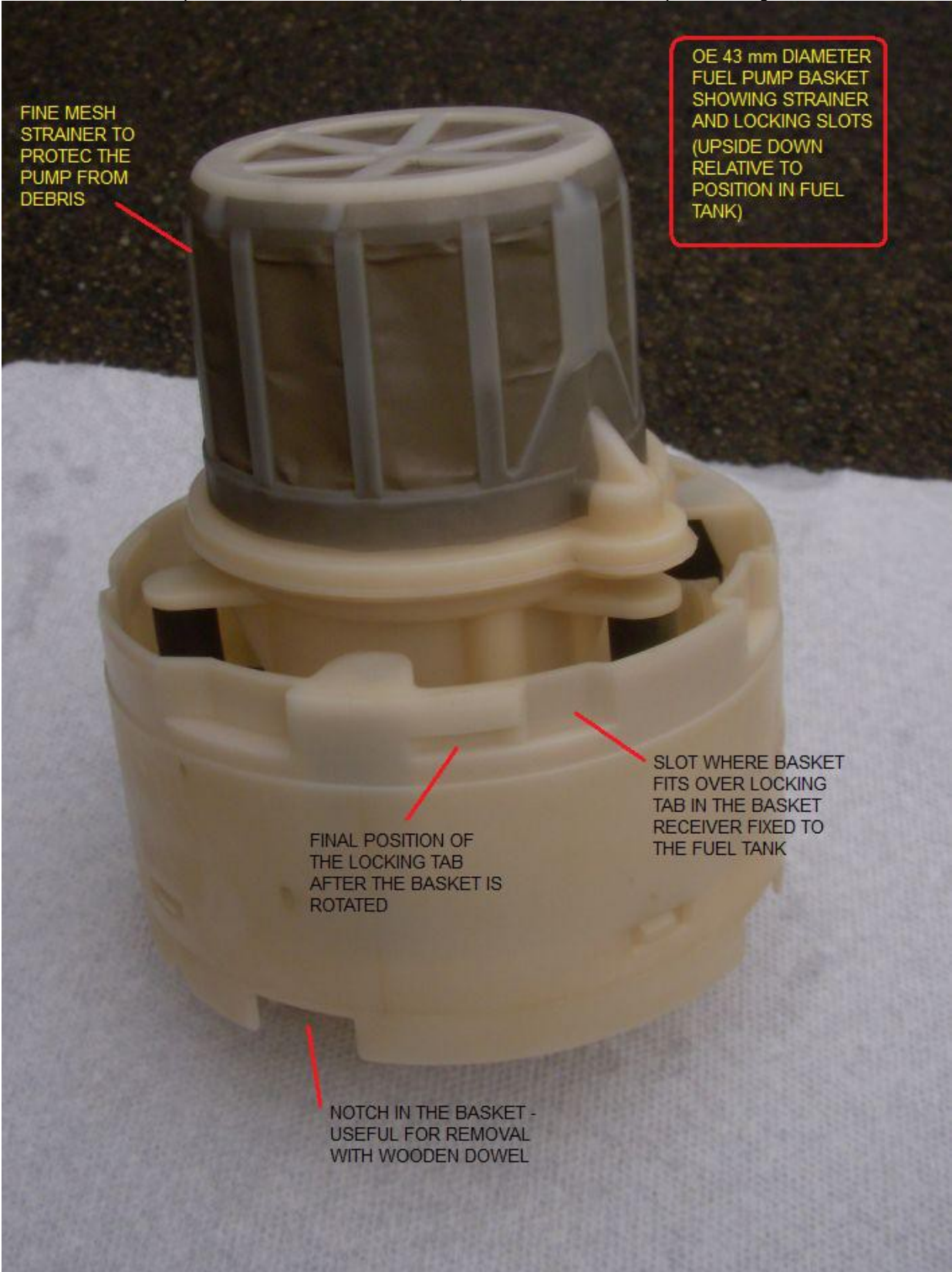
I was successful in getting the basket out after first removing the fuel pump (by moving the clips that hold it into the basket) by using a 2 ft length of 1 x 1 (or 1" dowel) and a rubber mallet with the end of the wood in one of the four upper grooves in the basket and hitting the wood so the basket rotated counter-clockwise. This did not work for me for reinstall (more to follow).

If you did use a 3214 to get the pump and basket out, the assembly would look like this:

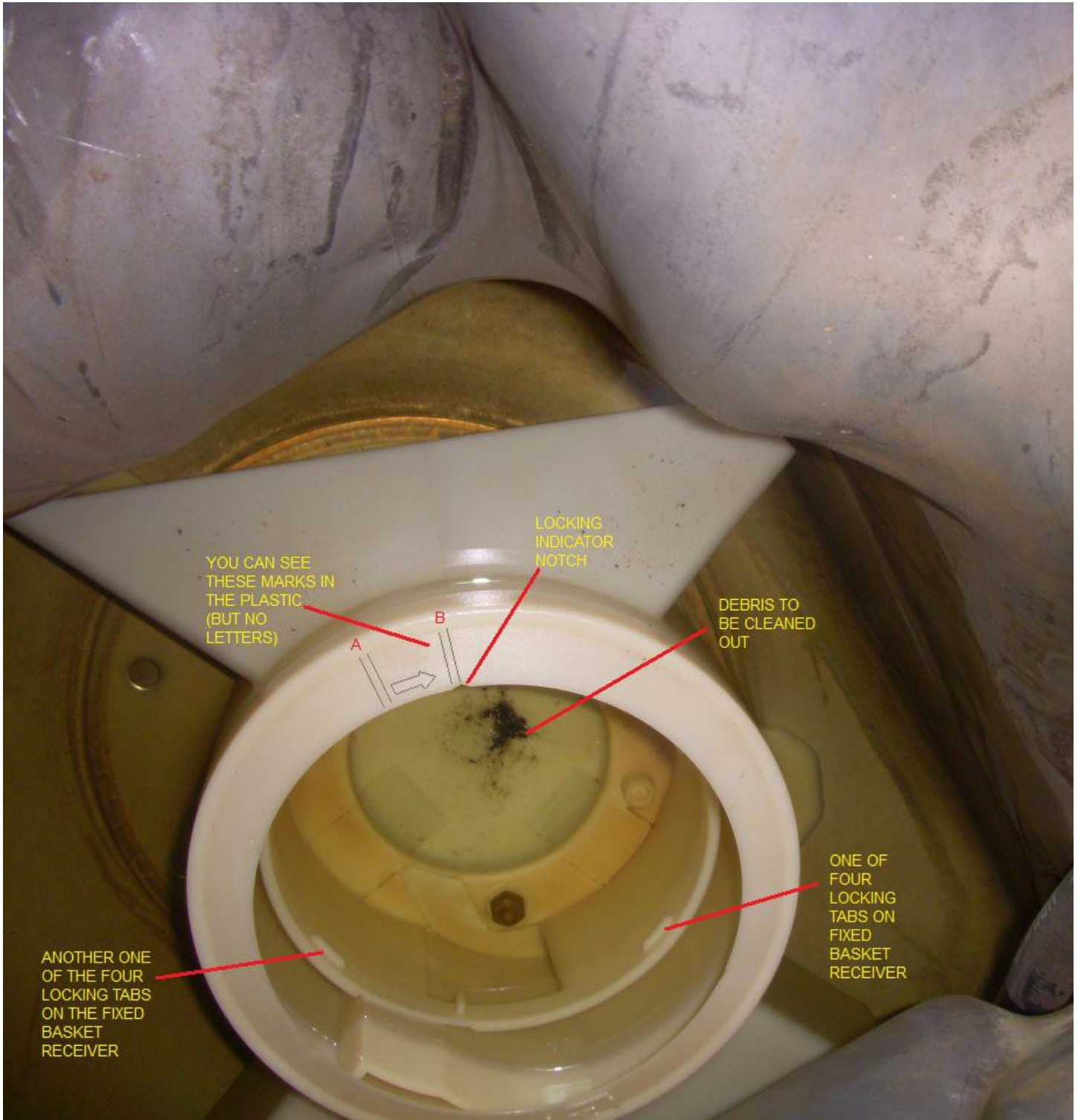


(I am not sure where I got this photo, if you know, tell me and I will give credit)

Once the basket is out you can see some of the features, i.e. the strainer and way the locking tab mechanism works.



With the basket out, now you can look into the bottom of the tank and see the basket receiver that is fixed(bolted) to the bottom of the fuel tank. I found some debris that I removed by addition siphoning of the fuel (like hydraulic vacuuming). Alternatively, you could siphon the tank dry and then mop up the debris with non-shedding shop clothes and/or paper towels.

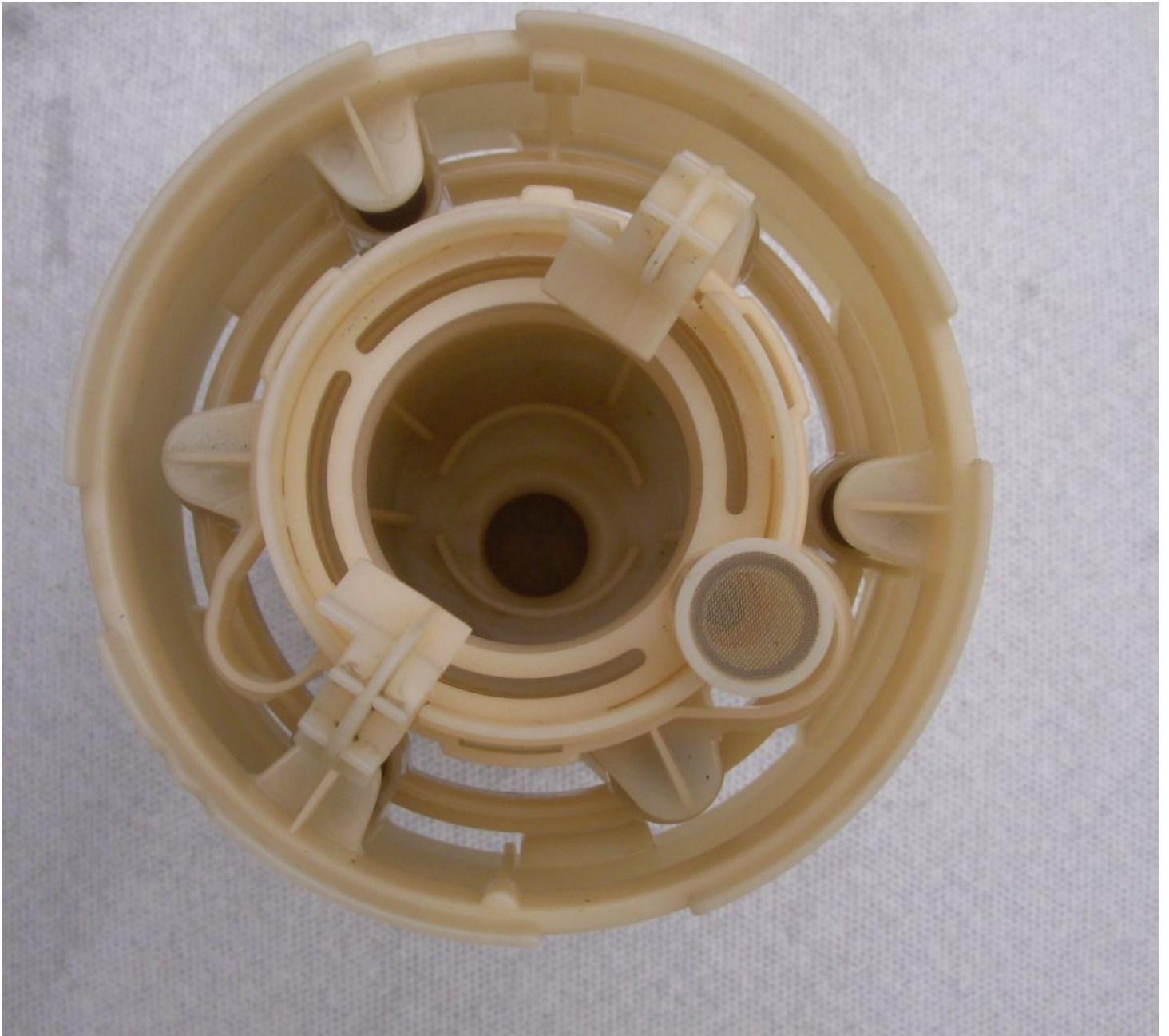


If, when you pulled the fuel pump out, it looks like this one, my condolences. You have a severely rusting fuel tank. No cure except new fuel tank. Bad news there is Audi recently did a clear out of the fuel tanks from the system so finding an NOS one might be difficult.



15. Disconnect all the fuel pump wires and hoses and install them on the new fuel pump. The OE VDO-type pumps have two different diameter posts for the electrical ring terminal connections. One uses a 7 mm hex Nyloc nut, the other an 8 mm hex Nyloc nut. When installing the ring terminal connectors to the posts of the new pump, make sure that you fully bottom the nuts onto the connectors and posts. The resistance of the nylon insert portion of the Nylocs might make you think that the ring terminal connectors are tight when, in fact, they might still be loose. If you switch to the Bosch equivalent because you read this [Anatomy of a fuel pump](#) post and you thought the Bosch was a better pump (it might be – I am running on my RS2'd UrS4), be aware that the Bosch fuel pump will require cutting off the existing ring terminals and crimping on the Bosch clip-in connectors (actually a better system). **If there is a "safety" plug in the pump inlet (to keep it clean before installation), REMOVE IT.**

16. Reinstall the fuel pump in the basket (it should "click" in. Install the basket (clockwise) IF you removed it. Note that the basket has a depression into which the inlet nose of the fuel pump sits. Note the location before you start pushing the new fuel pump into the basket. Until you get the inlet nose of the pump into that depression in the basket, you will not be able to get the pump to sit down into the basket far enough for the plastic retaining clips to click in, over the top of the pump. Rotate the pump as needed. The photo below shows the depression in the basket that the inlet nose of the fuel pump sits.



On my UrS4, I didn't remove the basket, just the pump from the basket. On my 98 C4 Avant, I pulled the pump from the basket but then decided to pull the basket as well to check for and clear out debris. That was a good thing to do. However, I could NOT get the basket back in using the tool or the wooden dowel for several hours, no matter what I tried. Finally, I followed these steps:

1. Removed and reset the basket (it was fine - you can feel it slip down into the four locking slots as you rotated to where the "^" notch lines up the "A" mark.
2. Marked the tool where it should be lined up on the four lugs of the outer basket.
3. Loaded a 1/2" drive universal joint (swivel) into the top of the tool.
4. Put the tool into the tank, onto the basket, rotated it until my mark lined up where it was supposed to be.
5. Added a 10" extension to the universal to bring the point where I could add my 1/2" drive ratchet ABOVE the tank.
6. Added the ratchet to the top of the 10" extension.

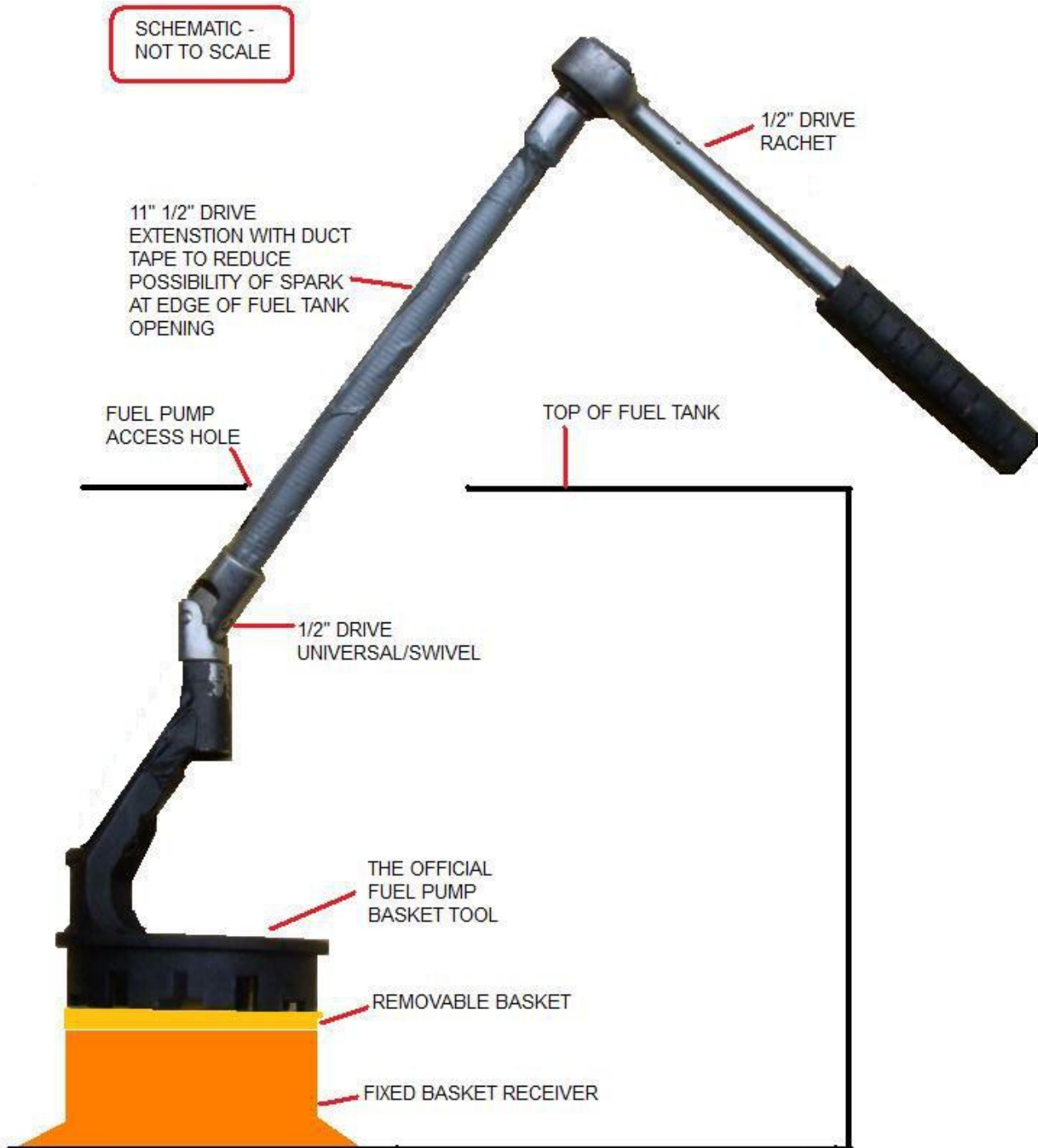
7. Put my left arm down into the tank (wearing black nitrile gloves (FTW BTW)), holding the tool down onto the basket (so it didn't twist out of place).

8. Turned the ratchet clockwise with my right arm.

9. I felt some initial resistance and then a quick rotation. Felt like the tool slipped more than anything. Removed my arm and looked in (with the fluorescent trouble light) and saw that it had indeed rotated into the correct position. Yay. I almost couldn't believe it. What a b*tch.

One of the problems when I was failing was I had pumped/siphoned out too much fuel. The locking lugs on the fixed basket receiver were above the fuel, i.e. not lubricated. I added some fuel back into the tank to cover these lugs, which probably helped. More, the universal and the extension. (And using two arms not just one)

Here is what the tool arrangement looked like as shown in the next diagram:



17. If you haven't already done so, carefully clean, vacuum around the top opening in the fuel pump. Pay attention to the big O-Ring to which the plastic fuel sender/top plate will be sealed. Remove and wipe the O-ring and where it sits in a groove on the top of the tank. Prevent any dirt from falling into your fuel tank. Replace the cleaned O-ring back into its groove on the top of the tank.

18. Reinstall the sender unit making sure that all the wires and hoses are not going to hang up the wire sender arm. With my avant, i.e. my 2nd fuel pump R&R, I left all the hoses and wires off until I had the sender oriented proper and check to see if the sender float was in position and then I attached the two hoses and the wire connector from the fuel pump to the bottom side of the sender plate. Then manoeuvre the plate into proper position, as noted during the disassembly. Make sure that the sealing O-ring is in position.

19. Reinstall the retaining ring (which you cleaned either just after you took it off, or just now, before you put it back on). Use the factory tool or a piece of wood and a rubber mallet to drive the ring back until it is firmly locked.

20. Reinstall the banjo fitting, using two of the new crush washers. Attach the return hose and vapor canister hoses (tightly).

21. Reinstall the wiring connections on the top plate (if removed).

22. Add fuel back into the tank so the pump isn't going to be sucking air.

23. Reconnect the fuel filter fitting(s) that you loosened to bleed pressure back in Step 4. On the avant, I had to loosen the bracket that holds the fuel filter to the body in order to line up the turnable fitting on the fuel line into the fixed fitting on the fuel filter. Make sure that you can start the fitting by hand before you start involving wrenches in order to avoid cross-threading.

24. Reinstall Fuse 17.

25. Start the car (it might take a bit of cranking time to fill the fuel lines again, don't panic).

26. If everything works, then reinstall the pump cover plate, etc. If there are problems, you will need to go back in and re-check your steps.

27. Add the rest of the fuel that you removed from the tank (Filter as needed if you siphoned up debris when you had the basket out).

28. Enjoy some peace of mind for the next 100,000 miles or so. ;>)

Dave Forgie, aka the Librarian – Revised the first time, Sept 19, 2011. Revised the 2nd time, Jan. 31, 2013.
93 CF, RS2'd, MRC Stg 3, TDS-1, ApikoI FMIC, Eibach/Bilstein, Big Blacks, relayed FP, and other stuff.