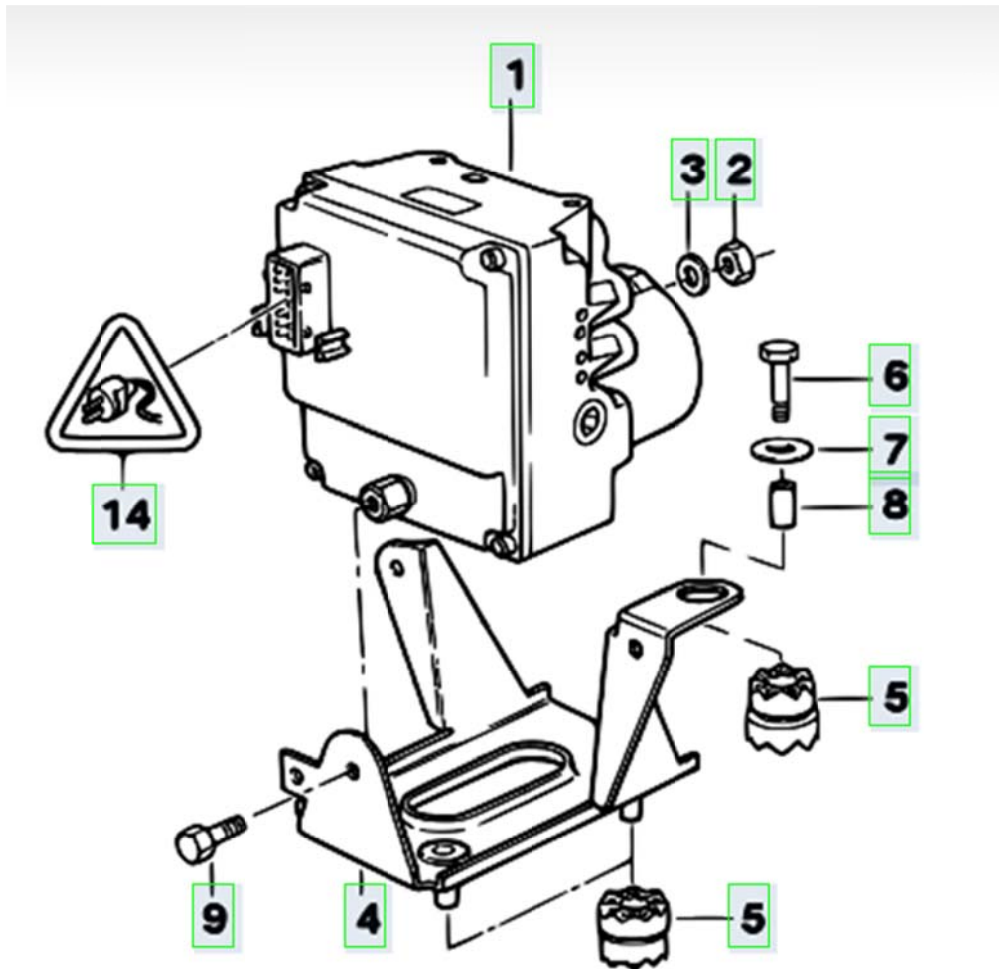


ABS/ASC-T Pump Block Overhaul

Applicable to: 840ci (M60 & M62), 850ci (M73)

Oct 2011

Location



The ABS pump unit (1) resides under the left-hand side wheel-arch plastic cover. As such, and particularly if the said cover is damaged or loose, a lot of dirt will accumulate on the unit. This is not helped by the fact that it is also more or less directly under the bonnet opening for the headlight unit, thereby being exposed to rain and water.

The unit consists of an aluminium valve-block, containing 10 solenoid valves and a motor to actuate a small internal pump. The valves are pressed into the aluminium block and are visible under the black plastic cover. The unit contains no electronic circuits.

This document explains how to dismantle and clean the unit and how to service the motor. If there is a fault in any of the valves themselves, then a new (replacement) unit will likely be required, as the valves do not appear to be serviceable items.



Picture-1: Before Cleaning. (The wheel arch liner does not offer good enough protection and the unit is also exposed to water and dirt from above, from the headlight openings.)

Part-1: Disassembly.

Removal and Disassembly Procedure

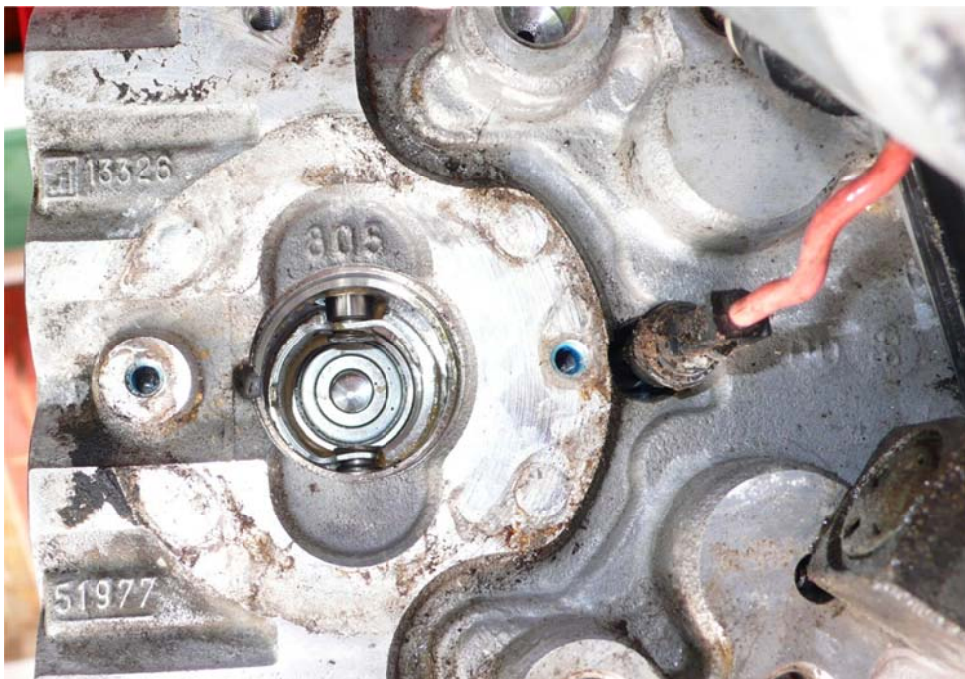
1. Clean the unit as much as possible, while still mounted on the vehicle. (Pic-2)
2. Disconnect the ground wire on the rear of the motor.
3. Disconnect the main cable connector from the front of the unit (slide-up locking mechanism).
4. (This is probably the hardest part.) Clean the two Torx screws on the rear of the motor and apply WD40 or similar to the heads to help with any corrosion between the screw head and motor body. Using the correct Torx bit on the end of a small ratchet, carefully loosen but do not completely undo the two screws. They are also held in by Loctite and may require considerable effort. If this fails, use a Dremel with cutting disc (or similar) to cut a slot across the screw head and then undo using a large flat-blade screw-driver. This step could be carried out later, but doing it now takes advantage of the unit being secured.
5. Then, with a large syringe or similar, remove as much brake-fluid as possible from the reservoir on the master cylinder.
6. Using an 11mm brake-pipe spanner, remove hydraulic brake connections (6 of them) but first take a picture to ensure correct replacement later. A small aluminium tin foil tray is useful to catch the remaining brake-fluid may be useful.
7. Unscrew the unit from its carrier support bracket and then remove.

8. After removing the two motor Torx screws, and pulling off the black plastic cover along the top of the motor, the motor can be carefully extracted from the valve block. (Pic-3). Note that the motor is still attached via the red wire.
9. Carefully open the black plastic cover on the front of the valve block (4 screws and one mount bolt) taking care with the internal flexible printed wiring. (Pic-4)
10. It will now be possible to pull the motor wire through and to remove the motor.
11. Now, temporarily reclose the plastic cover to avoid damage to the insides of the valve block.
12. To remove the rear cover of the motor, it is necessary to remove the remaining nut from the rear ground stud and to open-up four peened-over crimps. These crimps can be opened up with a small chisel or similar. (Pic-6)
13. The rear cover can then be removed (Pic-7), revealing the white plastic brush-carrier assembly. This can be simply pulled out (Pic-8)
14. The overhaul of the motor will be covered in more detail separately, but briefly:
 - a. Clean the windings with some alcohol
 - b. Clean the commutator ring with fine emery or wet-n-dry paper.
 - c. Check that the front bearing rotates freely. Try clean with alcohol and oil if gritty.
 - d. Clean and grease the rear plain bearing
 - e. Clean the brush assembly with alcohol and apply a tiny amount of copper anti-seize grease to the brass brush holders.
 - f. For a full overhaul, the front motor plate can be removed in the same way as the rear one, which will give full access to the rotor and to the magnets for removal.
 - g. Otherwise, reassemble the motor.
 - h. Lightly grease the front eccentric cam- ring ready to replace into the valve-block.
15. The valve-block can then be carefully cleaned using alcohol (Pic-11), or for more severe cases a solution such as POR-15 Metal Prep works well, but try to keep this away from the pump mechanism and bearings (Pic-12).
16. Check that the pump bearing is not seized (Pic-13)
17. Re-grease the pump bearing and mechanism with general-purpose (light) lithium grease.
18. Replace parts in reverse order to removal.

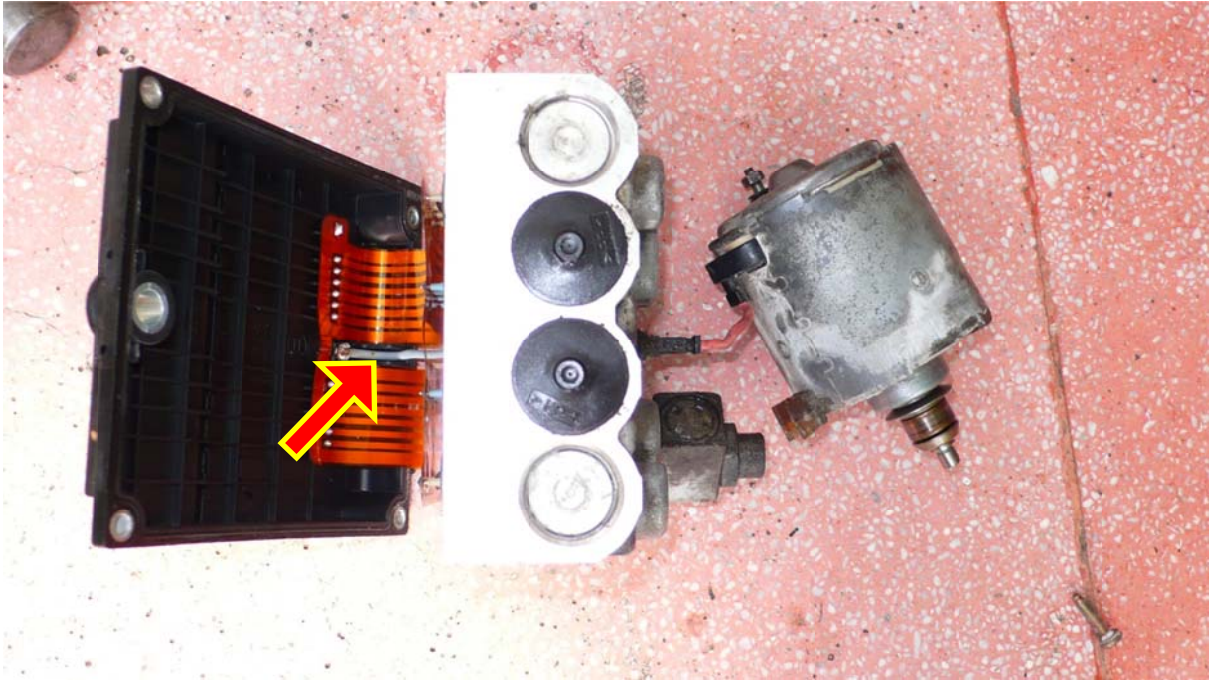
See Part-2 for full details on how to service and overhaul the motor.



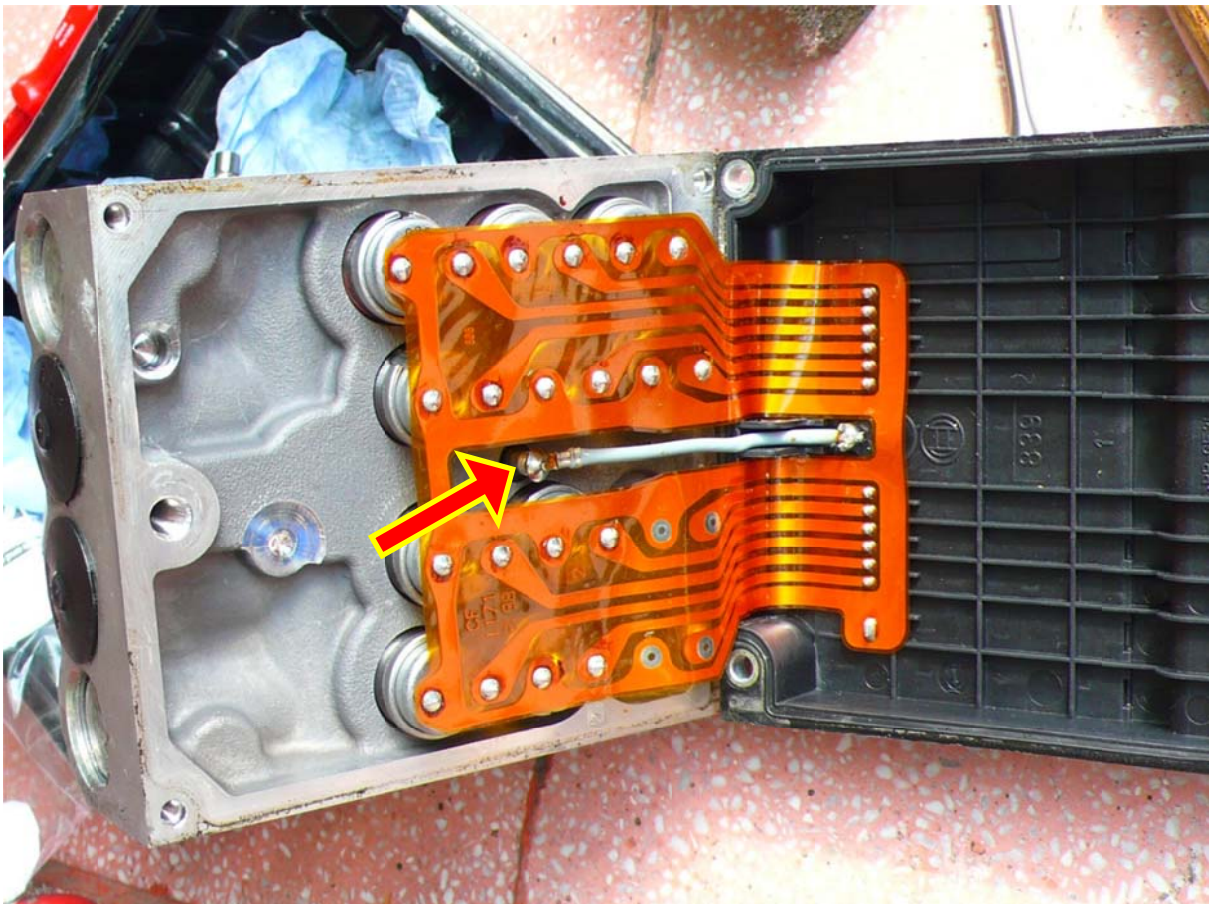
Picture-2: After initial cleaning (one Torx screw removed)



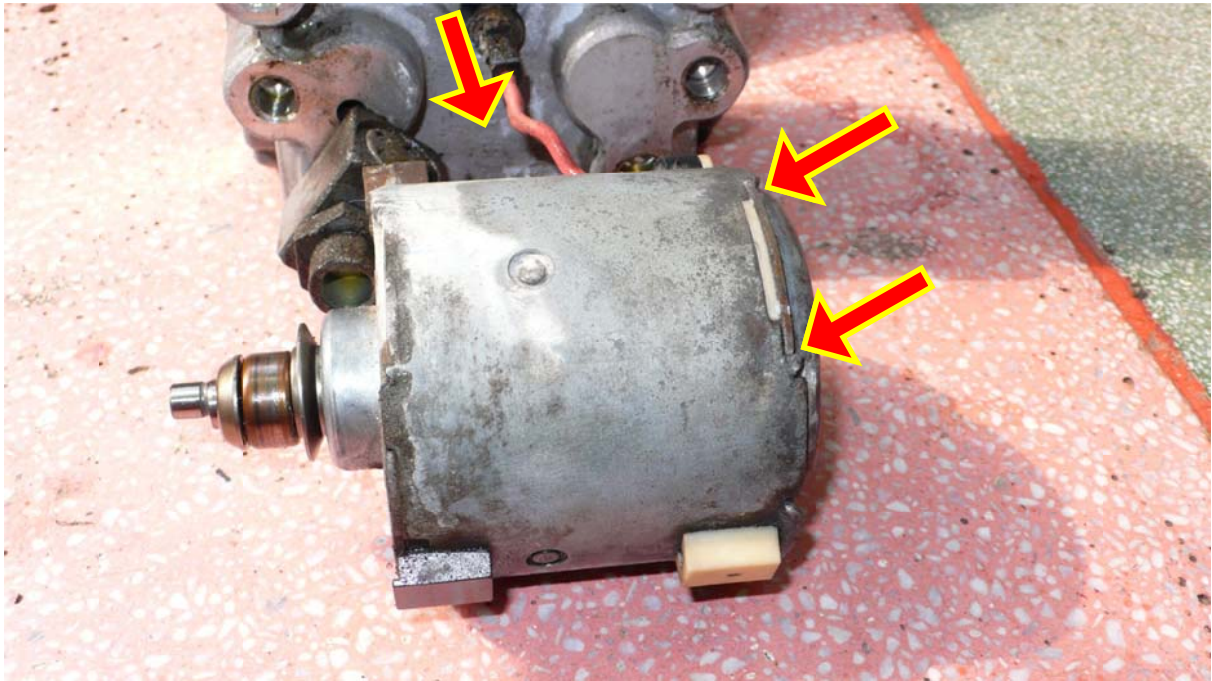
Picture-3: After removing the two motor Torx screws, and pulling off the black plastic cover along the top of the motor, the motor can be carefully extracted from the valve block.



Picture-4: Carefully open the plastic cover. Note the grey wire.



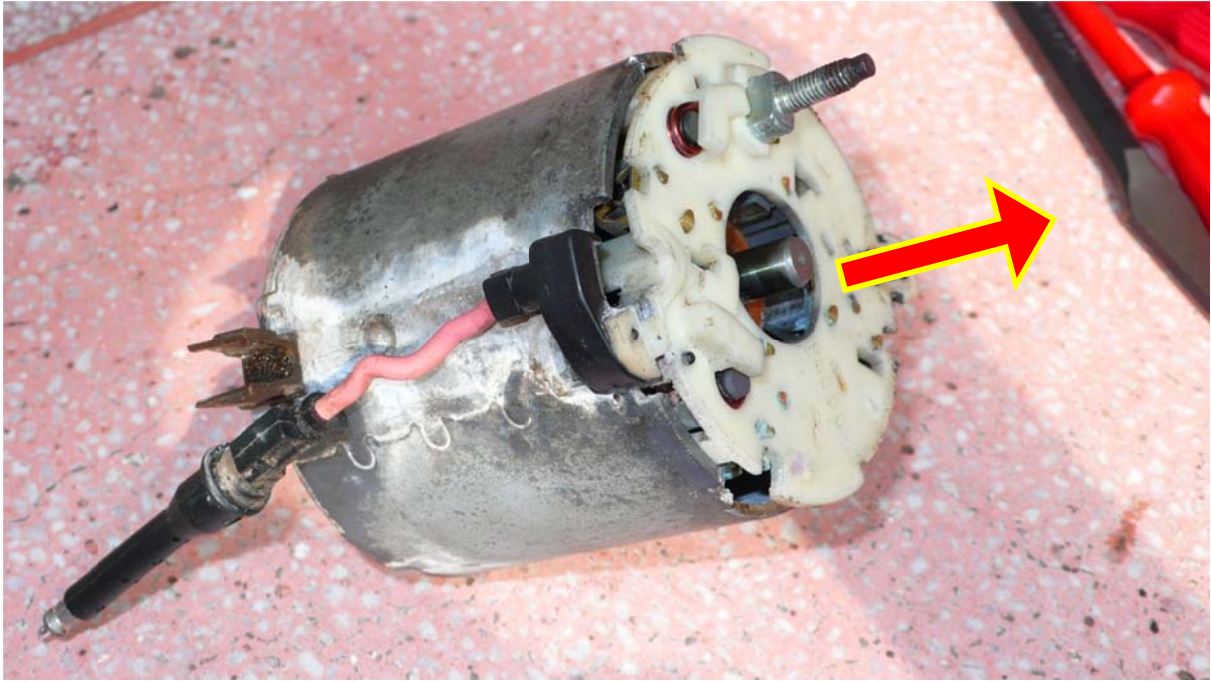
Picture-5: With a soldering Iron, disconnect the grey wire from the stud connector *on the aluminium block* (marked with arrow).



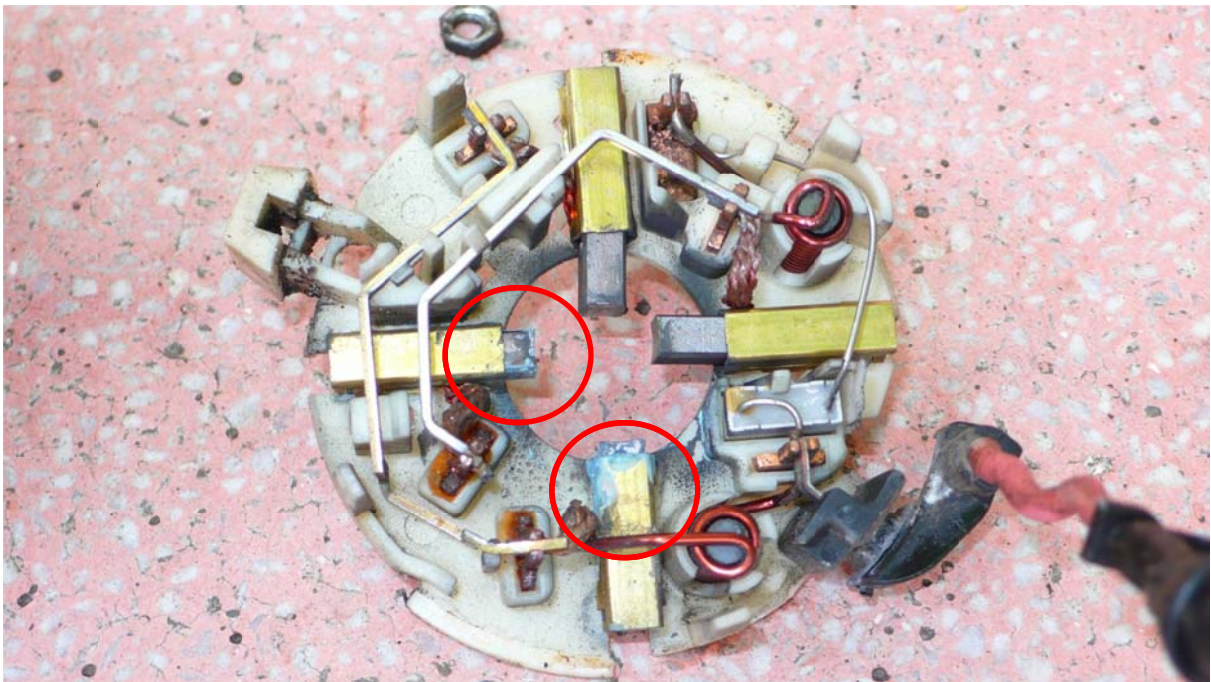
Picture-6: It is now possible to remove the motor from the valve block by extracting the connector terminal pin together with the red wire. To remove the rear cover of the motor, it is necessary to open up the peened-over crimps on the casing, in 4 places (two shown).



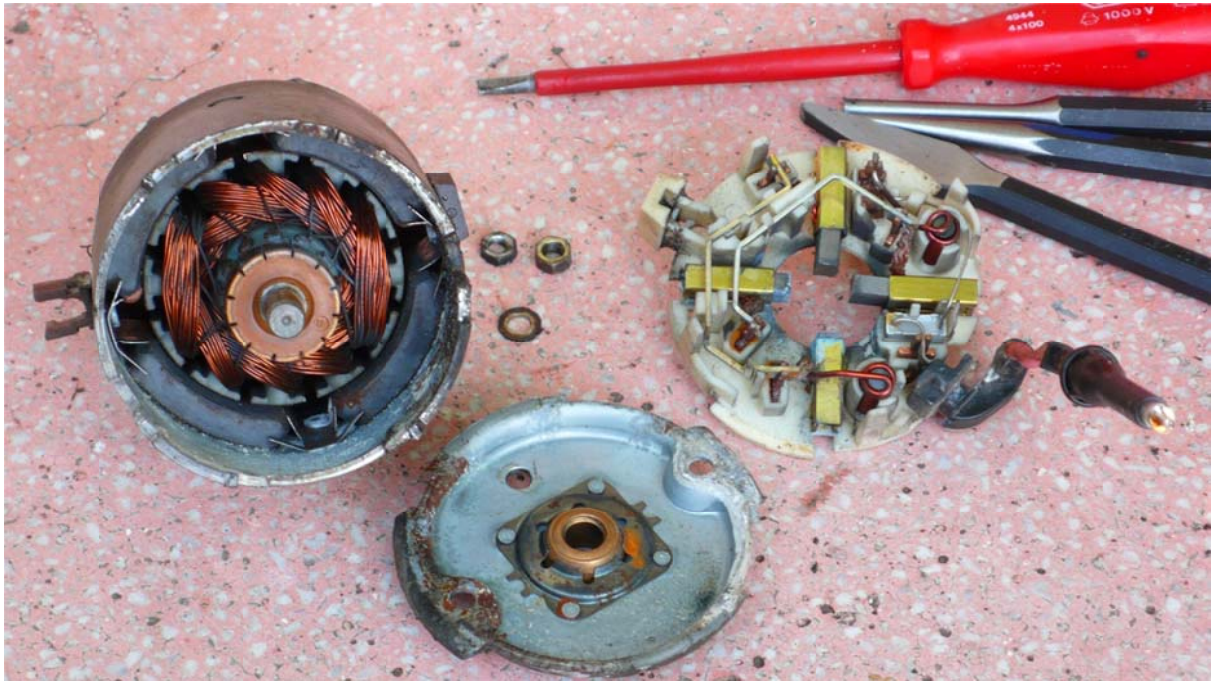
Picture-7: Motor with rear cover removed.



Picture-8: Brush carrier can now be slid out.



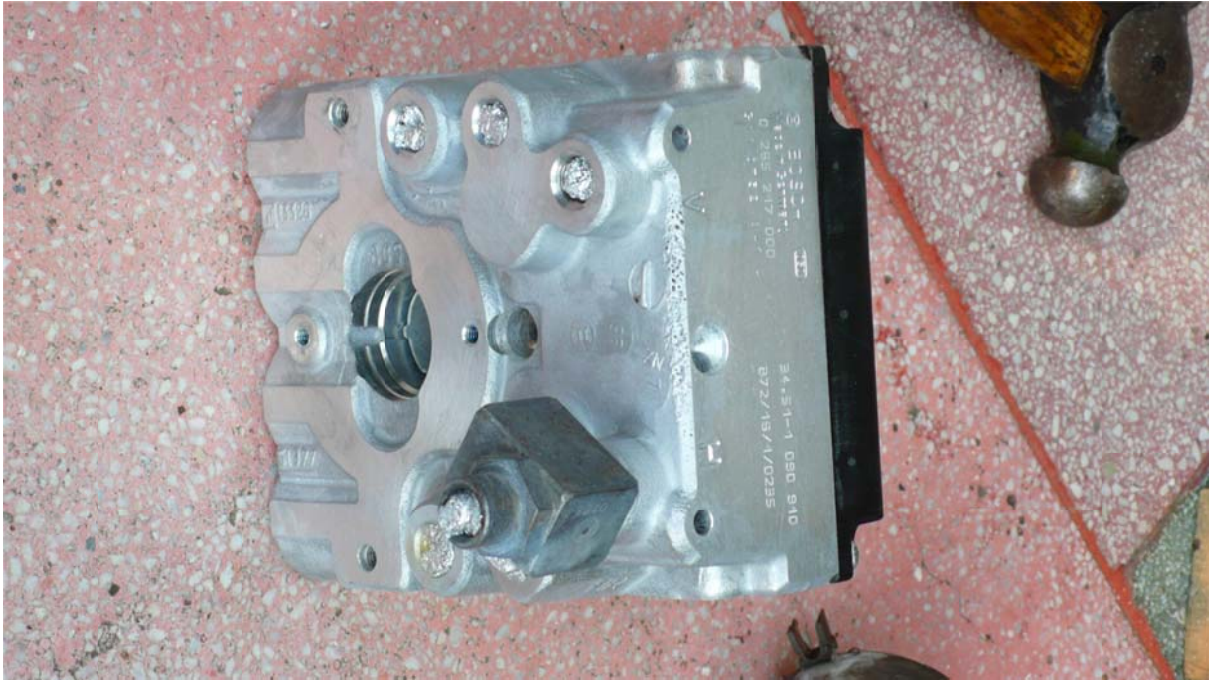
Picture-9: Brush carrier with 4 brushes (4-pole motor). Note that, in this case, at least one brush is stuck (bottom) and the other (left) is not looking too good either.



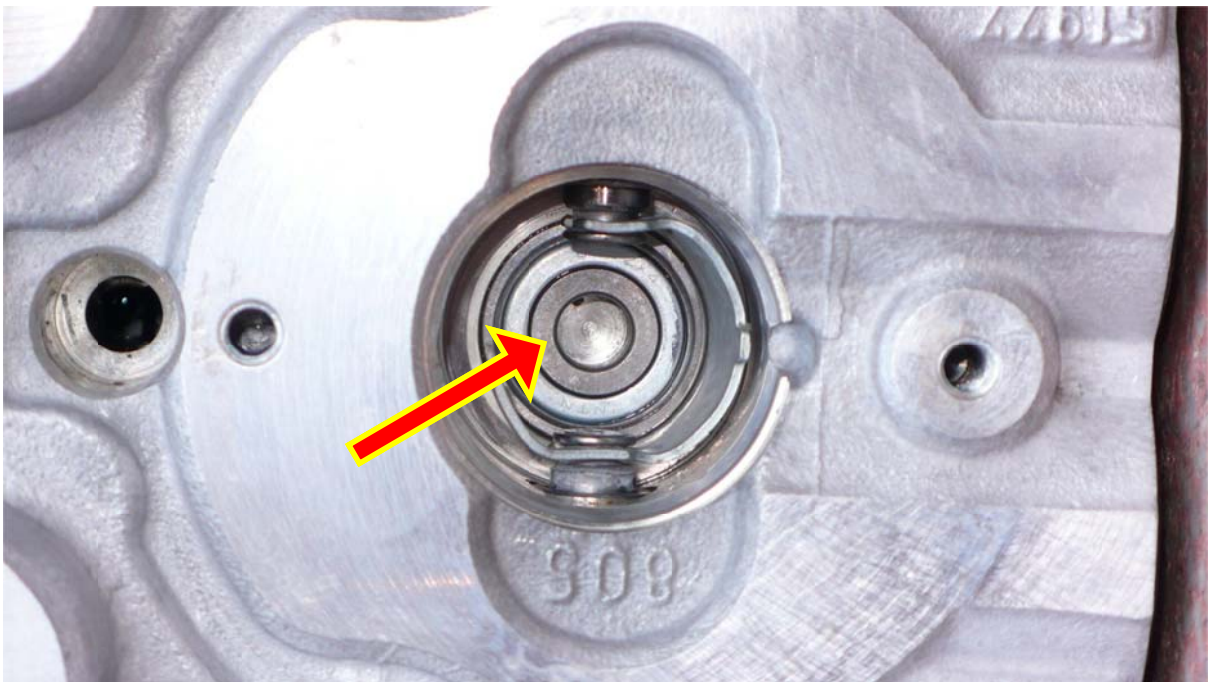
Picture-10: Motor with rear cover and brush assembly removed.



Picture-10: Motor commutator and windings could do with a clean. Note ceramic magnets are held in by spring-clips



Picture-11: The valve-block is further cleaned with alcohol and/or metal cleaning solution.



Picture-12: it was noticed that the support bearing for the pump mechanism was partly seized.

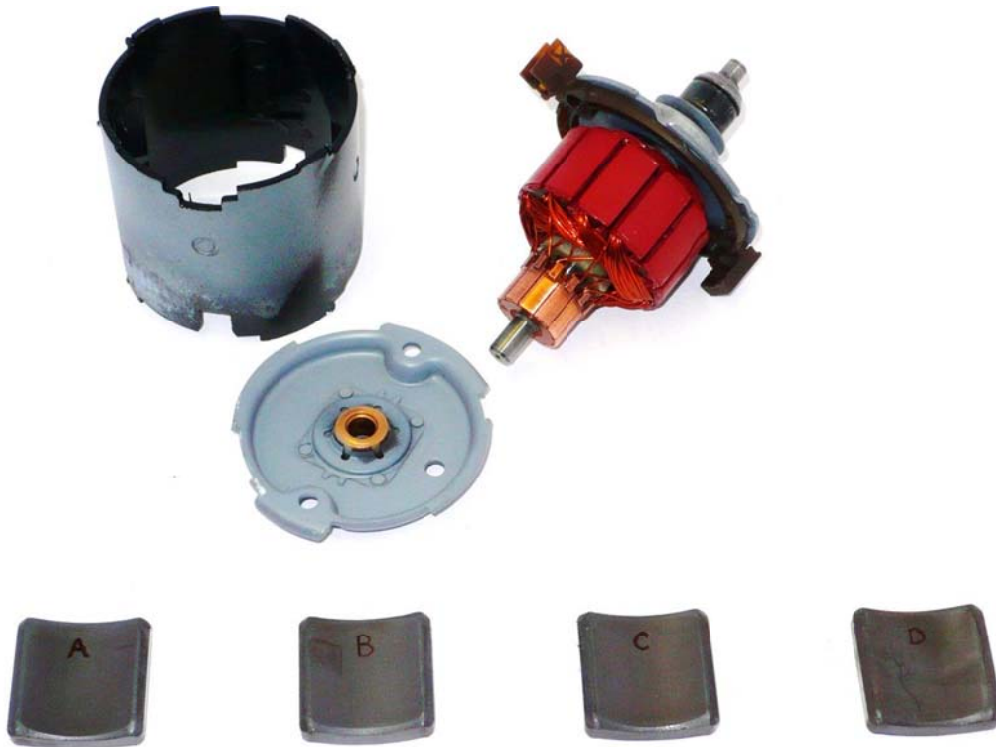


Picture-13: using some WD-40 and the end of a *Bic* biro to rotate it, it was freed-up and some Isopropyl alcohol was then used to clean it.

Part-2: Motor Overhaul



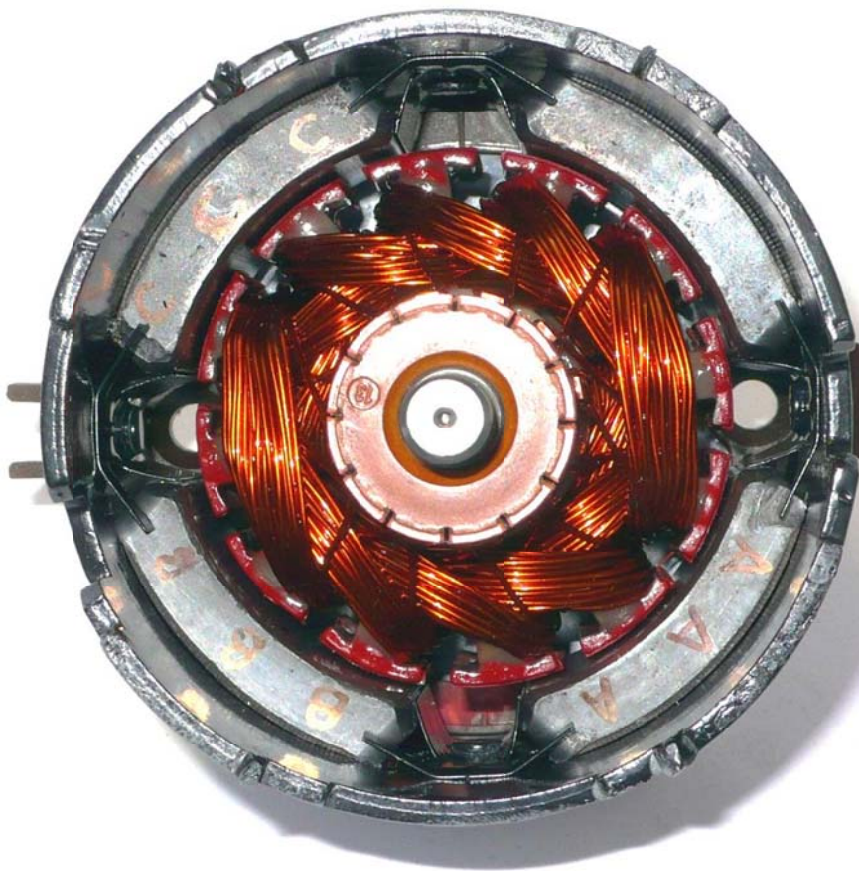
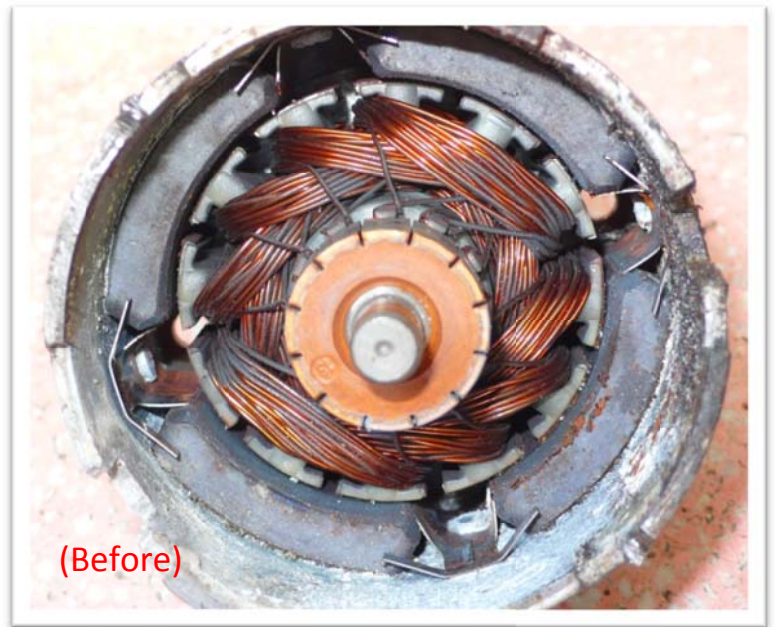
Picture-14: Clean the motor armature with isopropyl alcohol or similar and use fine emery or wet-&-dry paper to clean the copper commutator. Here, the laminations are also painted in red primer and the windings have been re-varnished. Ensure that the front bearing spins freely.



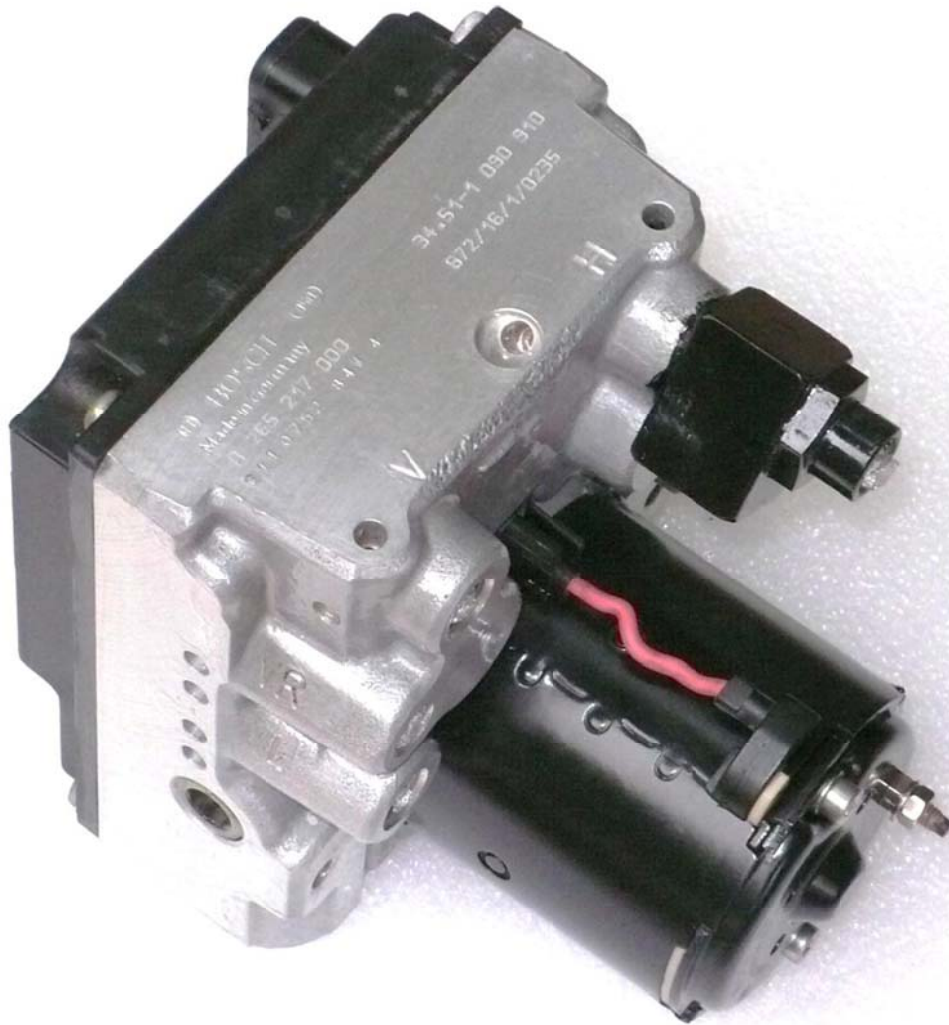
Picture-15: Slide out the magnets from the stator, but as they are alternate N and S poles, label each with a permanent marker and also place a corresponding label on the outside of the stator tube. [!!! Keep magnet apart from each other or they could collide with each other and crack !!!]



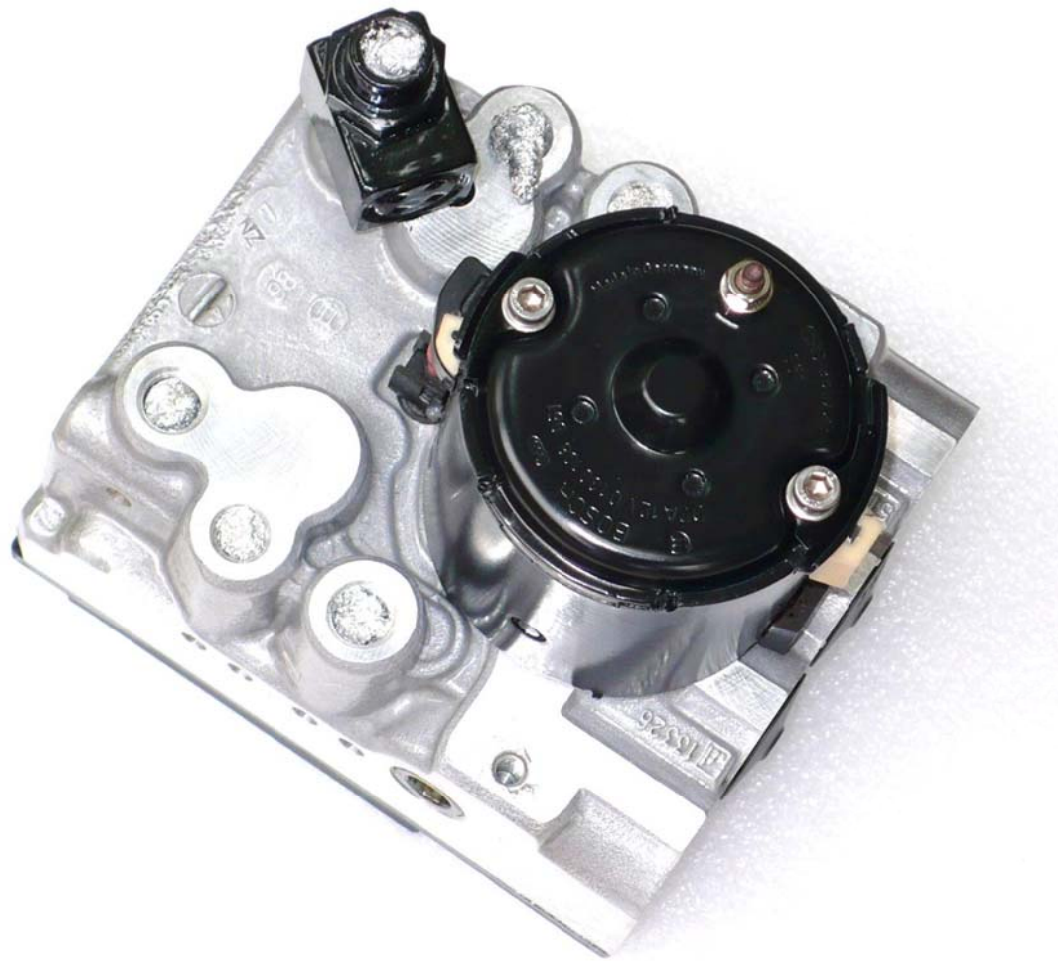
Picture-16: Clean and paint the inside of the stator tube (note the clips which retain the magnets).



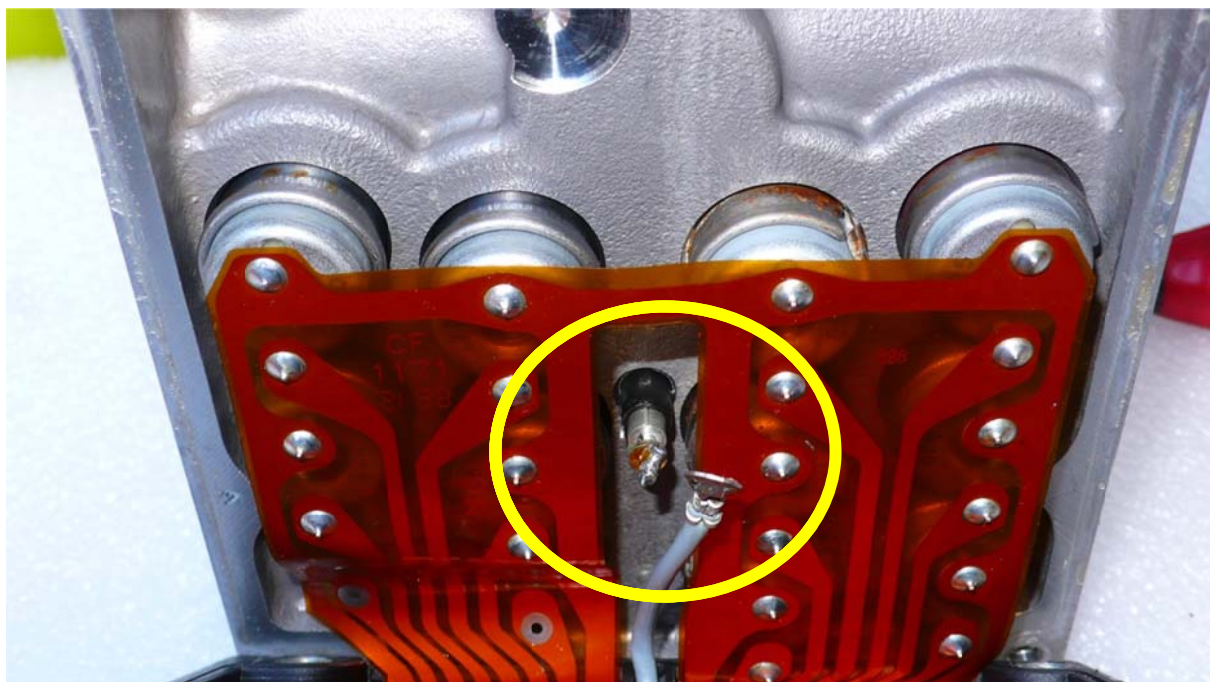
Picture-17: Refit the magnets and refit the rotor armature. Re-assemble the motor with the cleaned brush assembly. The front motor bearing is difficult to access and was lubricated with a few drops of engine oil. The rear bronze bush was lubricated with some lithium grease. Here the motor end-casings were not re-crimped as, when refitted, the tie-bolts are adequate to keep the whole thing together and it permits easier future servicing.



Picture-18: The exterior of the motor is painted with black epoxy paint and then fitted to the valve-block. Before fitting, some grease is applied to the valve-block bearing and mechanism and motor spindle. (The valve-block itself was painted with a clear, 2-part epoxy varnish.)



Picture-19: The original Torx-head screws are replaced by two stainless-steel hex-socket screws.



Picture-20: Don't forget to re-solder the motor wire into the valve-block.

Part-3: Refitting to the Car



Picture-21: The unit is refitted in the same manner that it had been removed.



Picture-22: Clean, lubricate and refit the main wiring connector.



Picture-23: A cover made of thin sheet zinc is added to protect the ABS unit from rain and dirt. The cover is secured to the hydraulic lines on one side and to the chassis on the other using cable-ties.



Picture-24: The cover extends down to the rear.

Final Note

These ABS/ASC+T valve blocks were commonly used in a number of other BMW models from about 1994 up to around 1999. In particular, those from the e39 (1996 – 1998) are likely to be in better (used) condition as they were located in the engine compartment rather than under the wheel arch.

They are available used, for relatively little and represent a good alternative to refurbishing the existing unit.