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1989 928 S4 Stone Grey Metallic Auto  
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## Windscreen Wiper Motor Repair

My 928 windscreen wipers developed an unhealthy grinding noise when operated a few weeks ago, then they completely stopped working, so I needed to find out what was wrong and how I could fix them.

I removed the plastic weather cover above the bulkhead with the bonnet up. This showed the “concentrated washer bottle in the way, so that got its locating bolt unscrewed and then a “slide the right” & “hey presto” off that came – sliding the washer motor out of the centre of the bottle as it came. I removed the but holding the wiper linkage to the shaft of the motor as I wanted to isolate the problem – trapped linkage or seized motor? With the linkage split from the motor, the wipers could move freely but the motor spindle was locked solid! The motor is the problem!



So, to the task of removing the wiper motor from the 928. I removed the wipers, wiper cover trim which bolts across both wipers and across the wings to the small screw at either outer edge under the glass vertical cover strips. All removed & placed carefully on the floor for fear of damage. I then removed the 3 x 10mm bolts holding the motor to the linkage frame and undid the double plug on the left side of the linkage so the motor could be free to remove. The motor was stuck, trapped by the linkage – See the photo. I had to remove the single 10mm bolt at the base of the linkage that also holds the earth wire to the motor to facilitate the motor removal. [See Photo]



As can be seen in the above photo's, there is some debris, leaves & much under the concentrated washer bottle. This seems to be held on top of the bulkhead by the wires for the wiper motor & others which have sagged or moved with the age of the car & now are sitting on the bulkhead causing a "Dam" effect for anything that may fall in past the plastic weather tray. I took this opportunity to clear all the rubbish in that area and Hoover any residue so the area was spotless.



With a wiggle the motor comes free & out on the wing – with suitable wing covers to work on the car! Wired her back up to the double plugs, the armature tried to turn but the motor just gave a jolt! - The Motor is completely jammed up!

Time to strip the motor assembly:-

Here is a top view of the motor assembly. [see photo] All outside parts were cleaned and all the debris removed.





The underside of the motor assembly looks like below. [see photo] I removed the 5 screws and took off the back of the drive housing to reveal the drive mechanism showing the worm drive spindle and concentric circular plastic discs which provide the oscillating motion for the Wiper. These were all nicely still greased up so I left these in situ as they looked like a bitch to put back together & get right.



Next, need to remove the field magnet housing. There are two large Phillips screws that hold the Field coil housing to the Alloy cast Drive Mechanism. These need to be removed and the retaining lugs they screw in to, pulled out from either side to allow the housing to be removed. This requires quite a bit of force as the field magnets are strong & hold on to the armature. Once the housing is removed you are left with the stripped motor shown below – [see photo].



Next, remove the armature assembly by pulling on the bottom of the Armature windings whilst rotating anti-clockwise simultaneously. The Bearing will move out of the housing and then get stopped by the 4 carbon brushes. Stop at this point and find a small electrical screwdriver and some small fingers. I was able to push each carbon brush in & hold it with my fingers all at the same time....bit fiddly but possible then pulled on the armature shaft to pull the bearing over the brushes. Once at this point it's easy to gently extract the armature & bearing away from the bushes...but slowly does it otherwise the brushes will shoot out & you will loose the springs.

Here you can see the old bearing still on the shaft and the new bearing by the side. This is a very common bearing & very easily available and very cheap at around £3.00. The bearing number is 6000Z



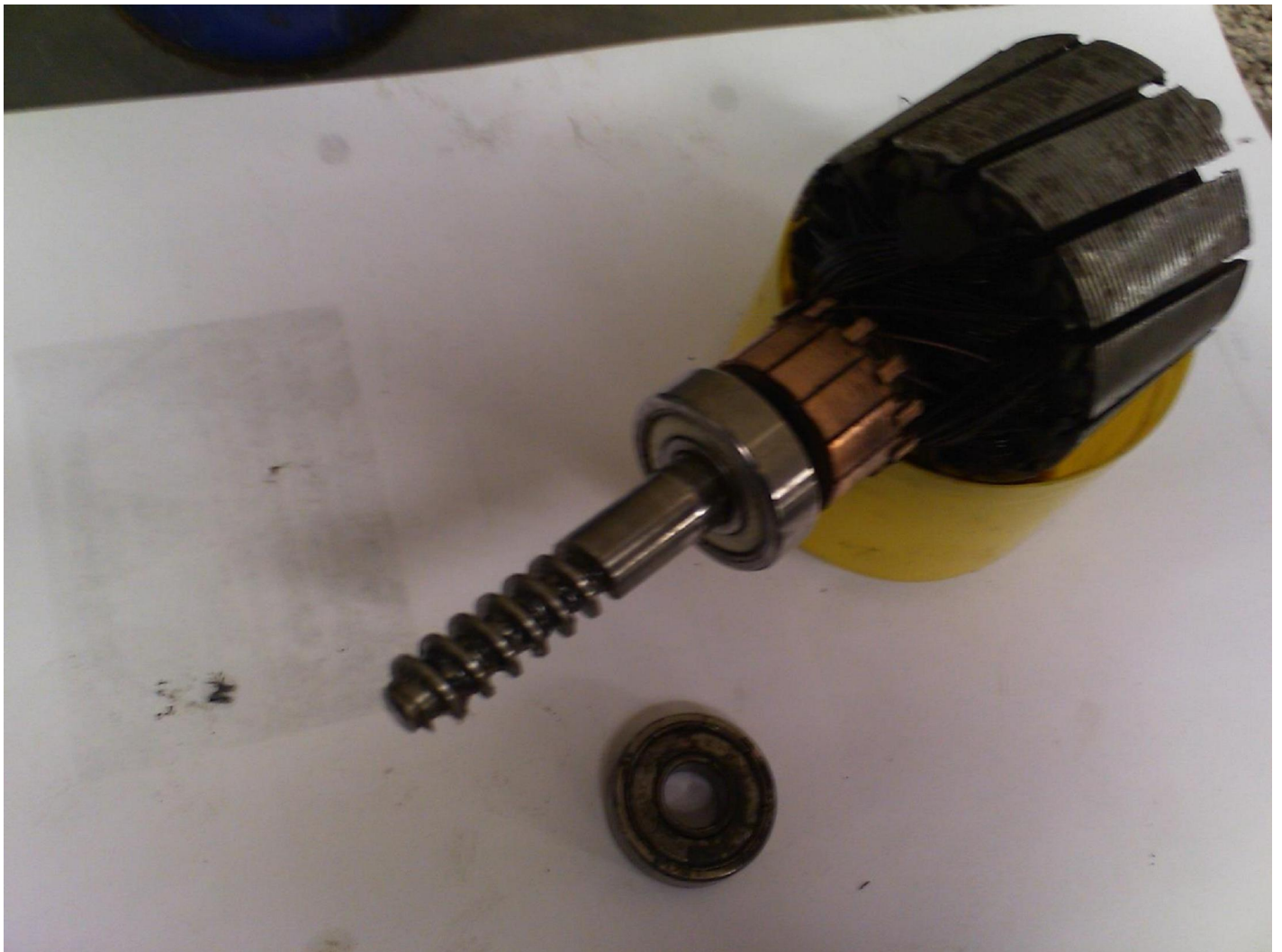


The Bearing now needs to be removed. First remove the circlip from the shaft and get 2 pieces of thin bar which will go in the small 5mm gap in between the bearing and the copper comm. Set these bars across the open jaws of a vice so you can effect a sharp blow with a hammer down on the end of the shaft – being very careful not to damage the end of the spiral worm gear. A few sharp blows & the old bearing is free showing the lower circlip as seen below.



With the armature removed you can clean up the copper comm Stator with a small wire brush or similar being careful not to damage any of the wiring. I chose a wire brush rather than emery cloth or similar as I didn't want any deposits to be left around the copper comm. Stator. You should also run a Stanley knife down the sides of each copper section to ensure no smearing or wearing of the copper. The armature body can be cleaned with a wire brush as this is steel so you can be a little more aggressive with this.

The new bearing is fitted by finding a piece of copper pipe or hard PVC pipe just a bit bigger than the armature spindle diameter but not too large to miss the centre of the new bearing & thus damage the new bearing. Tap firmly in place and refit the 2<sup>nd</sup> circlip on the top of the bearing to hold it in place. New bearing now fitted with old one at the side. [see photo below]



Only thing left to do is clean the inside of the Field magnets & cover. I did this with a flap wheel to make sure there was nothing fouling the gap between the field magnets and the armature. Pay attention to the bearing at the bottom of the cover. [See photo below]

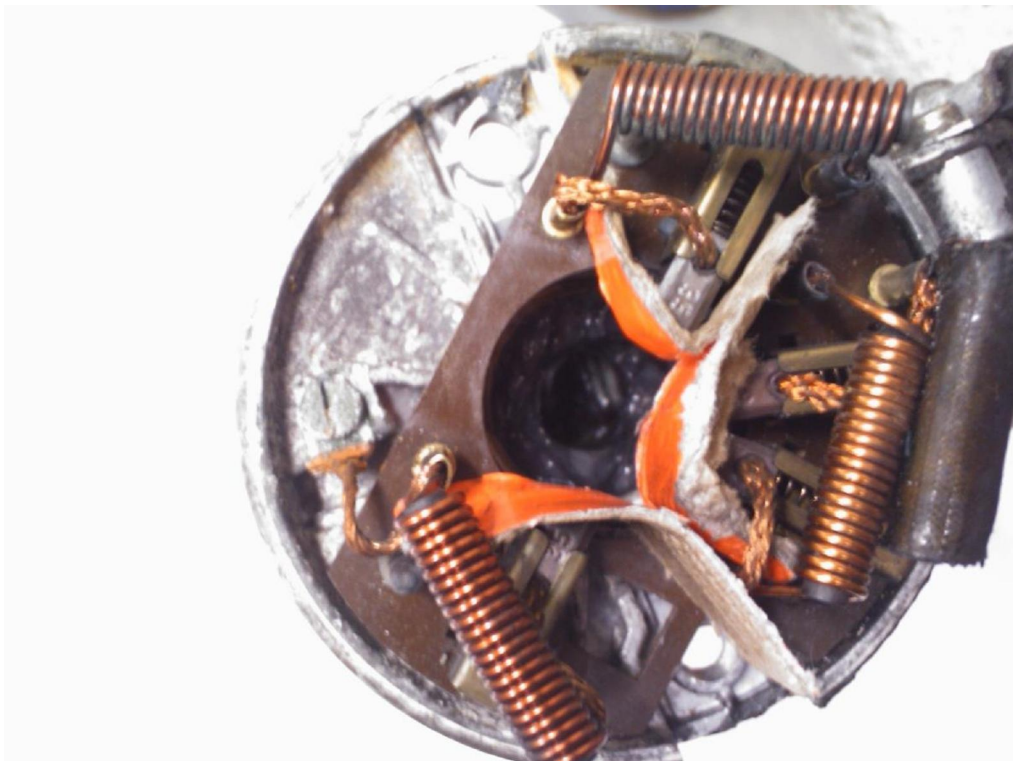




This bearing is a single ball in a clasp. It rotates so once you have cleaned any rubbish from around it you have to make sure it is centred so it will take the shaft at the base of the armature on re-assembly.

Now you need to re-fit the armature and put the motor back together.

First, cut some thin card strips, about 6mm wide and 40mm long, 3 in all. You will need these to trap the bushes back in their sliding guides to keep their springs & the bushes themselves in place. [See photo]

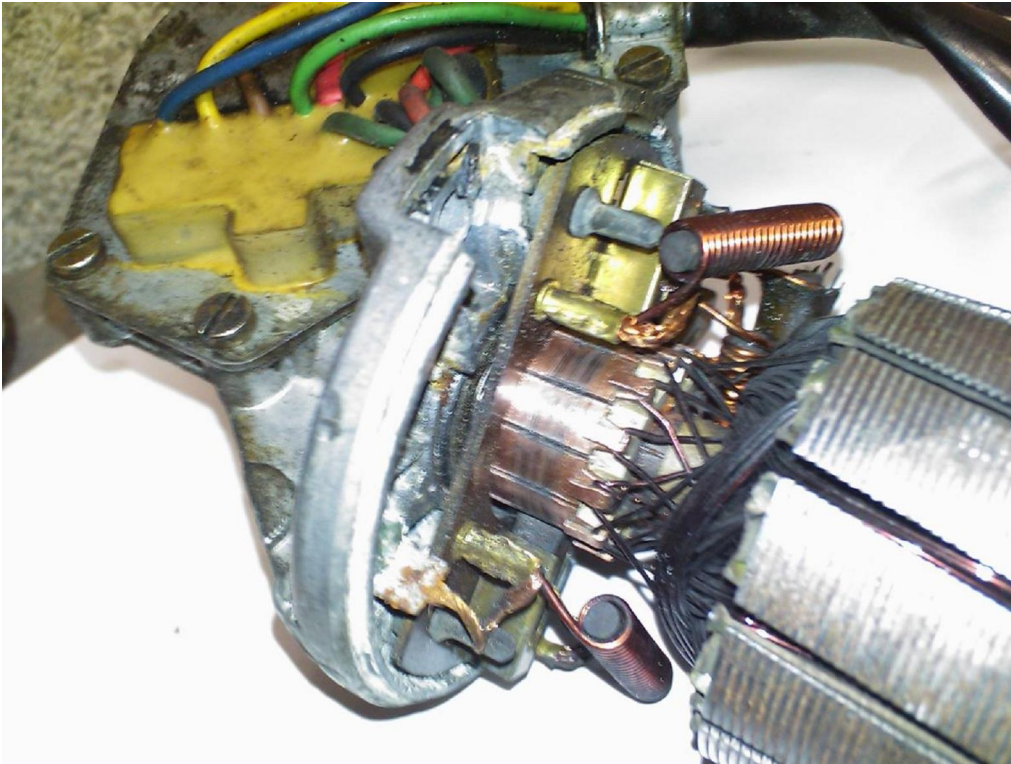


With the cards in place you can then guide the armature back into the drive mechanism assembly until the new bearing is just up to the cards. You will have to turn the armature clockwise as you do this as the worm gear engages with the drive wheels in the housing. Then, Carefully guide the bearing past the carbon brushes pushing the cards outwards to clear the bearing each in turn. Then push the bearing gently into the housing, still rotating clockwise as you go. [See photo below]



Once the bearing is firmly seated and the worm gear is correctly engaged with the drive mechanism assembly. Rotate the armature shaft to ensure good seating & everything feels ok. Then you can carefully remove the pieces of card which are holding back the 4 carbon brushes. Once removed, rotate the armature again to ensure free running movement & worm drive engages correctly with the drive mechanism. [see photo below]





Next, re-fit the armature & drive assembly back into the Field Magnet housing.

**\*\*Tip\*\*** Make sure as you insert the armature & assembly back into the field magnets that you place a suitable screw driver under the casting & all the way to the centre shaft behind the bearing – this is where the locating lugs fit in the to screw the motor housing together – see photo above in 12:00 position - this stops the bearing coming back out & catching the brushes when you place the armature back into the field magnets & housing. The magnets are very strong & “suck/pull” the whole unit in to the housing pulling the armature shaft & bearing back out of the drive linkage housing if you’re not careful!

With the motor back together put the two big Phillips screws & the removable locating lugs back into the top of the motor housing and job done! I plugged the motor in whilst it was out on the wing to check it was running OK before refitting it into the bulkhead. I also took the precaution of putting insulation tape around the join of the motor drive housing and the Field Magnet cover to make it water tight for the future.

Now the motor is done, make sure you clean all the debris & rubbish that had collected at the top of the bulkhead & under the concentrated washer bottle. Cleaning up the bulkhead around the support bracket for the wiper motor and it can be clearly seen why this problem happens - The large wire going to the Central HIVAC box passes underneath the Wiper Motor and effectively causes a dam for all the debris and water. Potential disaster area! [See Photo below]



Note the position of the wiring harness. This is what causes the rubbish to collect in the first place and fills the area under the motor with water when it rains thus flooding your motor & causing this disaster. Once I re-fitted the motor into the bulkhead I put a cable-tie around the motor housing & positioned the wiring harness so it wasn't resting on the bulkhead floor anymore. Now water can run down into the bulkhead freely should it have to and escape via that ominous little rubber flap that is often talked about on the passenger side of the bulkhead & engine compartment

Wiper's work flawlessly today & little or no noise!

Feel free to view the photo's here on my MSN skydrive - <http://cid-70d4844dc8c361fd.skydrive.live.com/browse.aspx/928%20Wiper%20Motor?authkey=!V5D58DFwVU%24&ct=photos>

Steve J  
1989 928 S4 with a set of working wipers!