Replacement of the Hall Sender on a 7A, 3B, early AAN and some VW product distributors

By Dave Forgie with contributions from Jorge R (Pulga1952) and Bill Z.

A Hall Effects Sensor is a transducer that varies its output voltage in response to changes in a magnetic field. Hall sensors are used for proximity switching, positioning, speed detection, and current sensing applications. In Audi and Volkswagen's case, Hall Effects Sensors (or Hall senders) are used in distributors or distributor-like devices to help tell the engine control unit (ECU) (aka "computer") what the position of the cylinders are so the ECU can decide when to provide spark to the sparkplugs via the coil(s) and how long and when to open the injectors. My focus is the Audi AAN, ABY and ADU 5-cylinder 20 valve turbo-charged engines but this procedure will apply to the Audi 7A and 3B distributors, some VW distributors, e.g. on the ABA, and a very few AAN engines.

In the case of the five cylinder 20 valve turbo engines, only the early AAN engines, i.e. those engines built before January 31st, 1992 in cars assembled prior to about mid-February, 1992 (to VIN NN100000), had their Hall effects sender in a vestigial distributor (aka "the tuna can") distributor, as discussed here: http://forums.quattroworld.com/s4s6/msgs/22580.phtml and shown here at the back of the intake side of the AAN head (the "distributor" has a gear that is driven off a gear on the back end of the intake cam):

Source of Photo Unknown – please let me know if it is yours so I can give credit.

The problem is that when the Hall sender dies, the engine will never start again until the Hall sender is replaced because the ECU needs it to know where the cylinders are in the Intake-Compression-Combustion-Exhaust cycle. If you have diagnosed the problem as the Hall sender, e.g. via a "2113" blink code for the Audi AAN engine, you need to replace the Hall Sender, either with a factory part or with an aftermarket part.

The first thing to do is to remove the “Distributor” (“tuna can”) from the engine by removing the electrical connector(a), removing the cover on the distributor/Hall sender noting the position of the rotor or slotted-wheel inside (mark with felt pen), and then removing the hold-down bolt and sliding the unit out of the head. It should look like this (but maybe without the cover, note the cover hold-down clips):

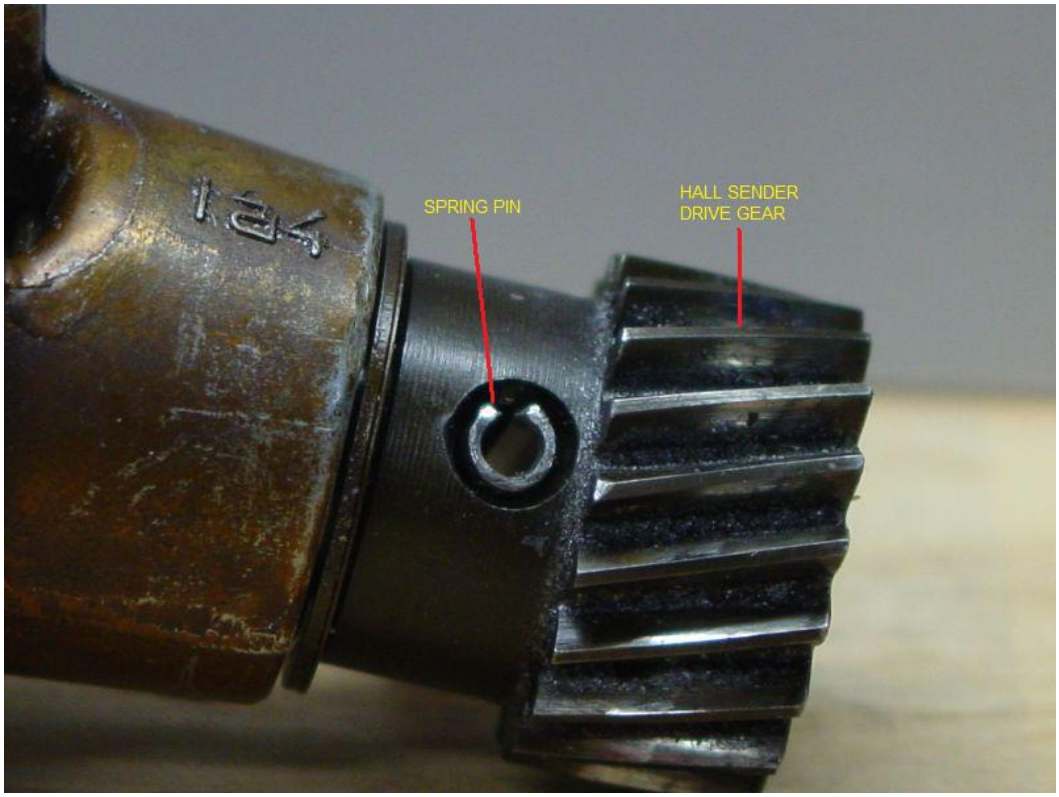
Standard Motor Products PC312 photo courtesy of RockAuto.com

The first task is to remove the drive gear at the end of the distributor unit. It is held to the main shaft by rivet or spring pin, as shown here:

Standard Motor Products PC312 photo courtesy of RockAuto.com

Bill Z said “I had to drill the rivet head off and then tap it through. It had a solid pin in it which I replaced the rivet with the spring pin. I drilled off the pin and used a punch and a small ball peen hammer to tap it out. I measured the OD of the shaft and cut the spring pin to size.”

If you have a spring pin holding the drive gear to the shaft, it will look like this one on an AAN Hall sender, photo taken by Bill Z :

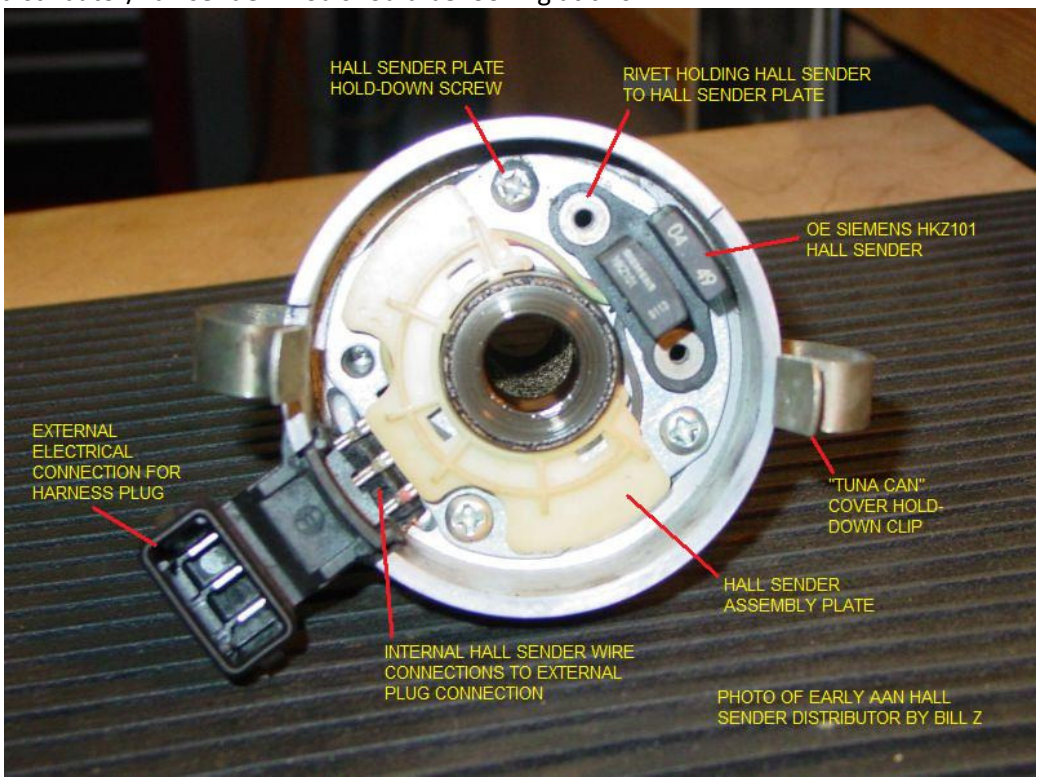


If are looking at a rivet and not the end of a spring pin, you will need to Dremel off the end of the rivet, as shown here in Jorge R's photo of a VW ABA distributor:

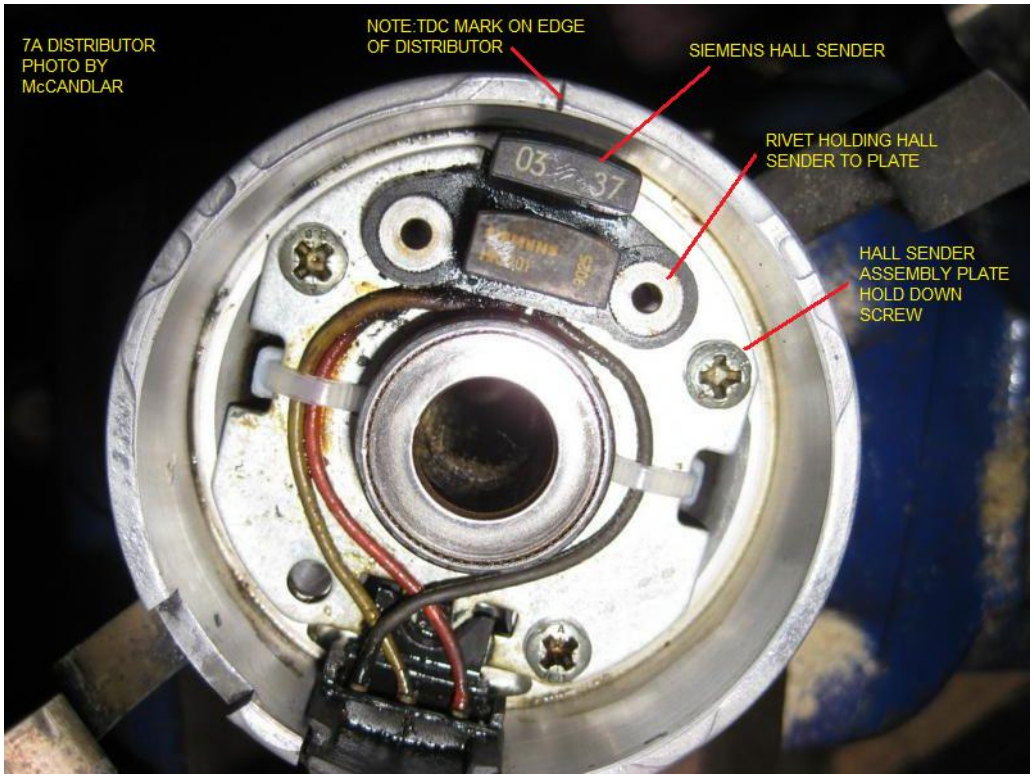
Cradle the distributor/Hall sender unit in vice or firm location and use a pin punch to remove the spring pin, as shown here in Jorge R's ABA distributor photo:

This should leave you with the drive gear off and the ability to pull the drive shaft completely out of the top of the distributor/Hall sender unit, as shown here in Jorge R's photo:

Now we can get down to business. First thing is to slide the center shaft up and out of the distributor/hall sender. You should be looking at this:

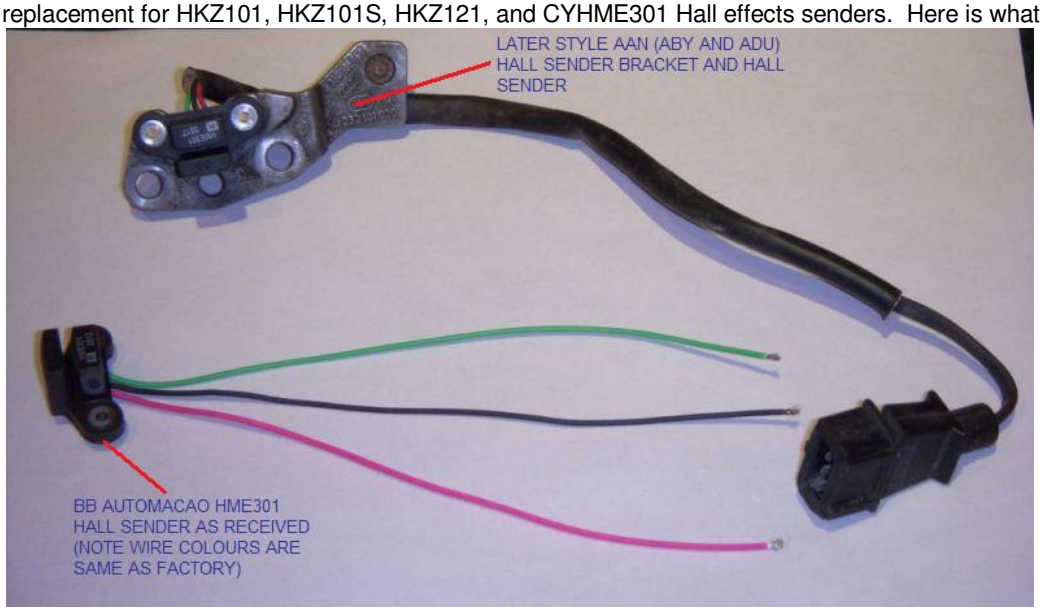


Or this, for a 7A distributor:

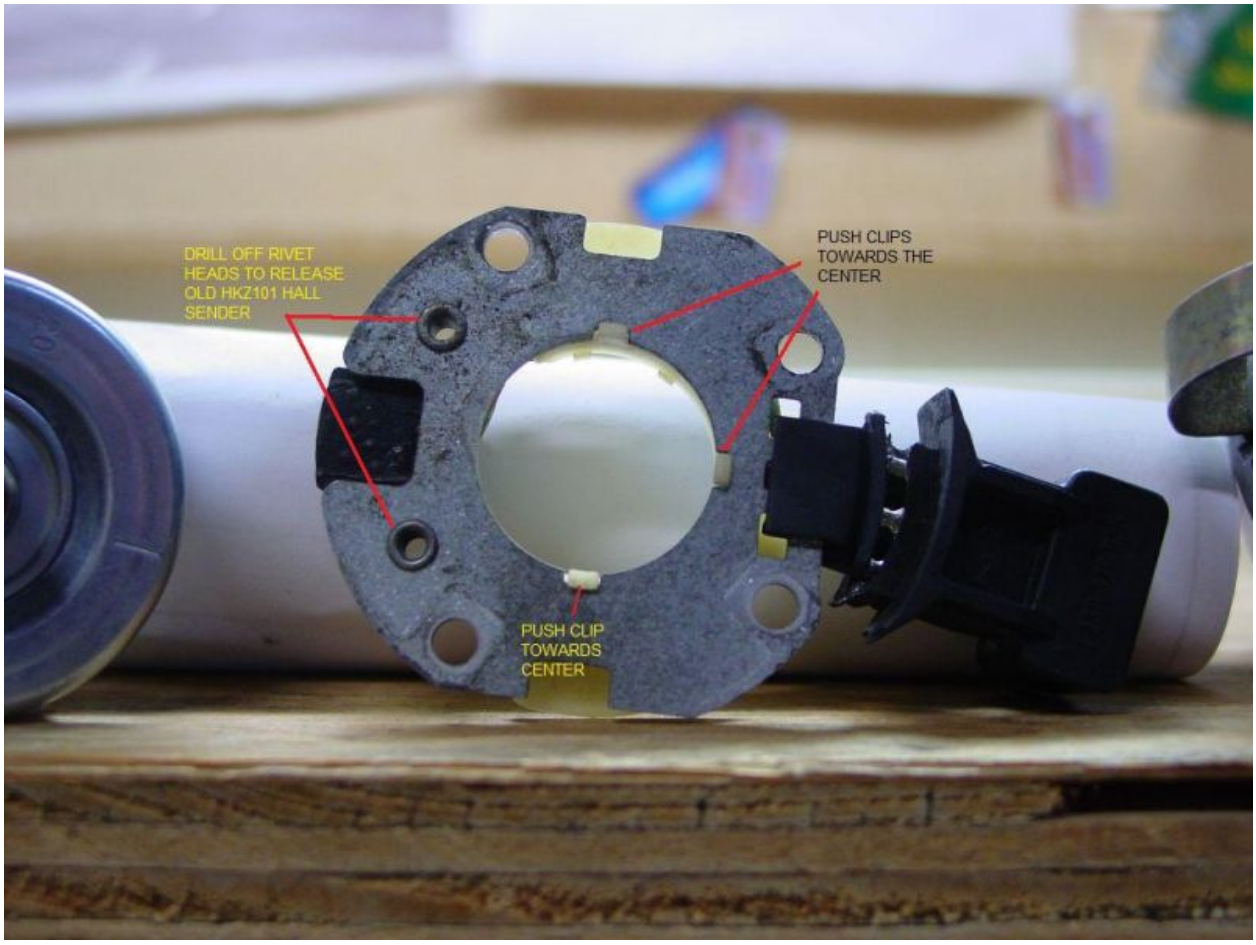


Now remove those Hall Sender Assembly plate hold down (Phillips) screws and gently remove the assembly plate and the integral black electrical connection. Should look like this:

Now you need to remove either replace the entire Hall sender assembly plate with the factory part and reverse the disassembly process or replace the Hall sender with an aftermarket or known to be good Hall sender with the same specifications as the factory sender. If you decide to go aftermarket, one source of replacement Hall effects senders that many Audi AAN/ABY/ADU people have used is BB AutoMacao: http://www.bbautomacao.com/products.asp?cat=14. Their BBHME301 is a straight replacement for HKZ101, HKZ101S, HKZ121, and CYHME301 Hall effects senders. Here is what they look like:

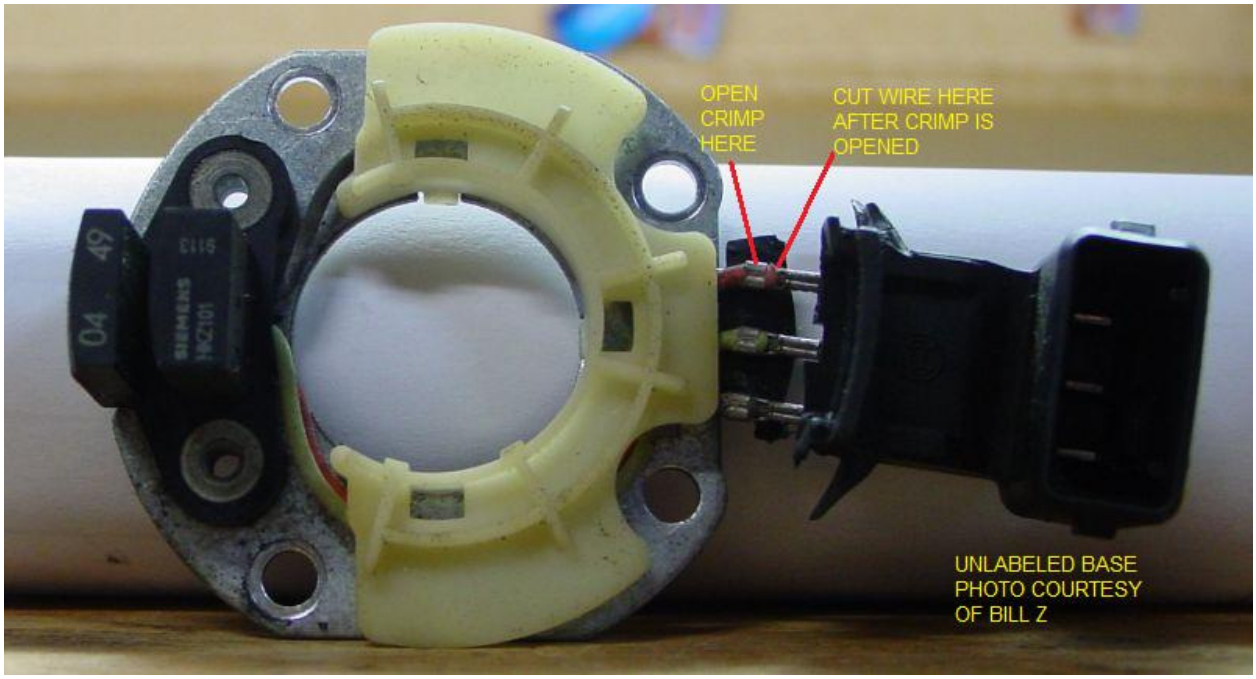


To start the Hall sender replacement, you need to first remove the plastic cover (or clip away 7A tie-wraps to expose and free the wiring). Then you need to drill out the back of the rivets that hold the OE Hall sender to the assembly plate:

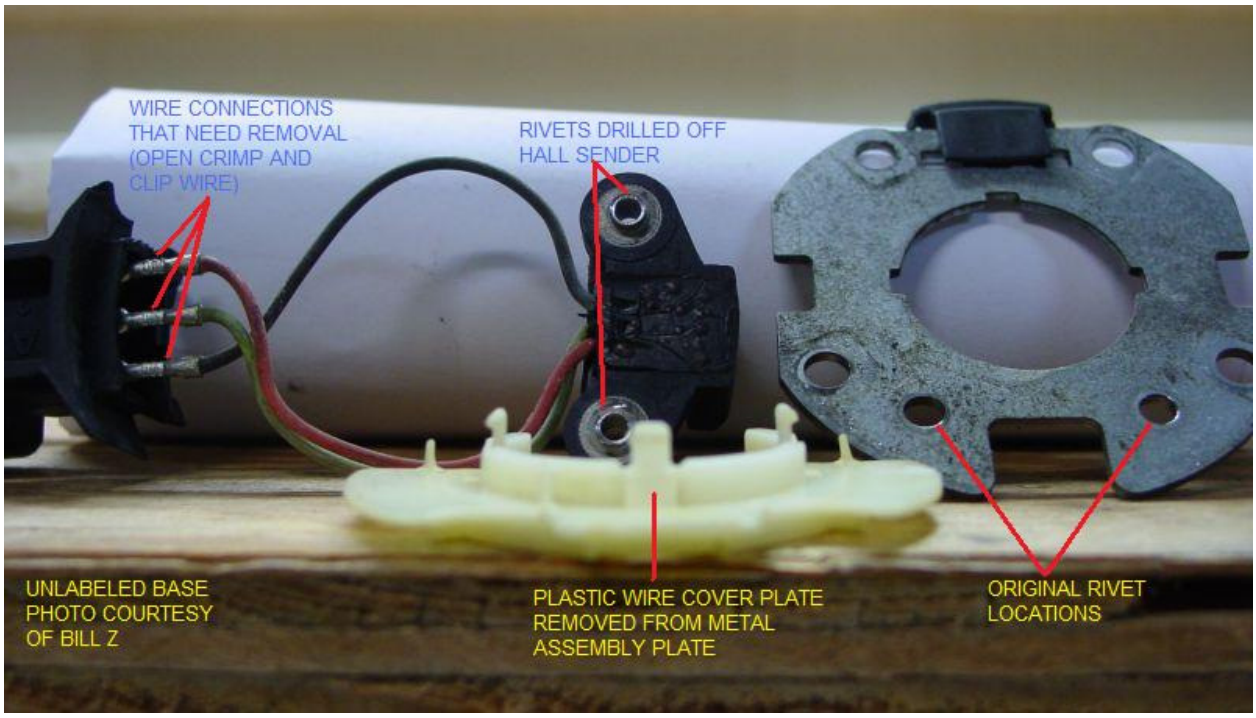


(Unlabeled base photo courtesy of Bill Z)

Once you have the rivet heads drilled off, the Hall sender will still be attached to the assembly plate at the electrical connections to the external plug. Open up the first crimp on the connection and clip carefully clip away the wires, as suggested in the next photo (NOTE: photo shows Hall sender and plastic cover plate still in place – wires could be handled before or after removal of these items):

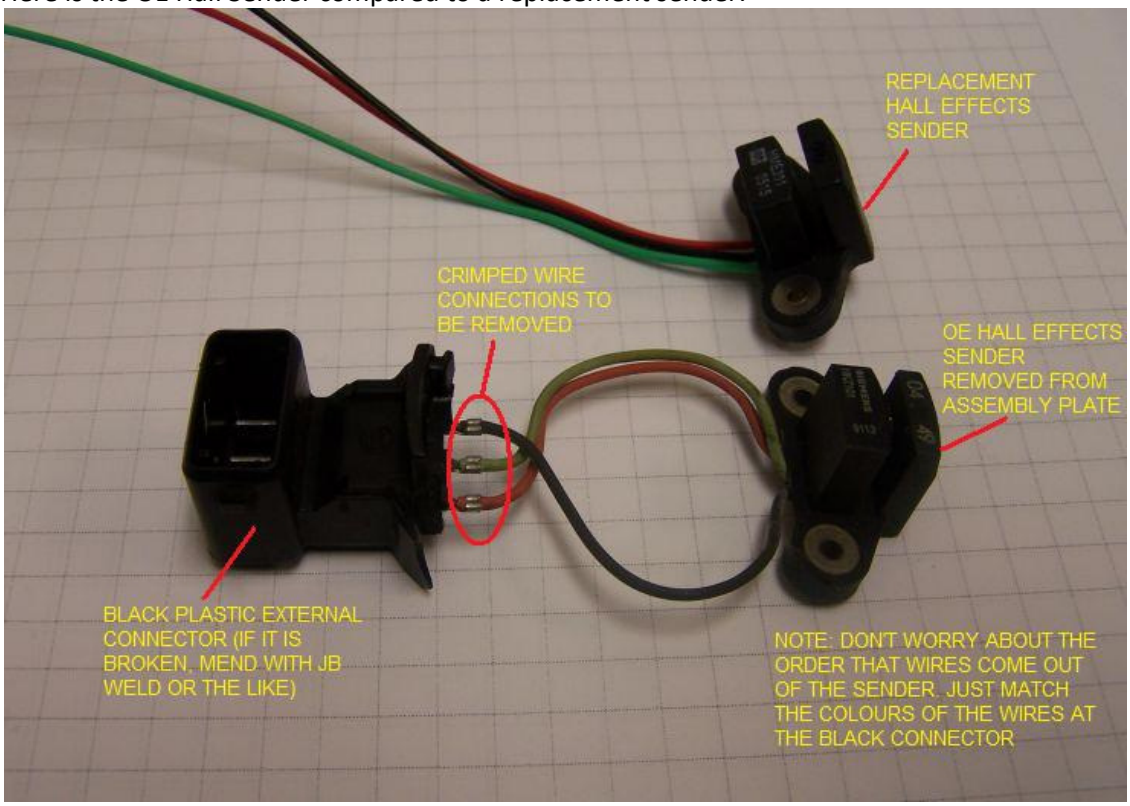


So, by now, the OE Hall Sender is free from the assembly plate and looks like this:

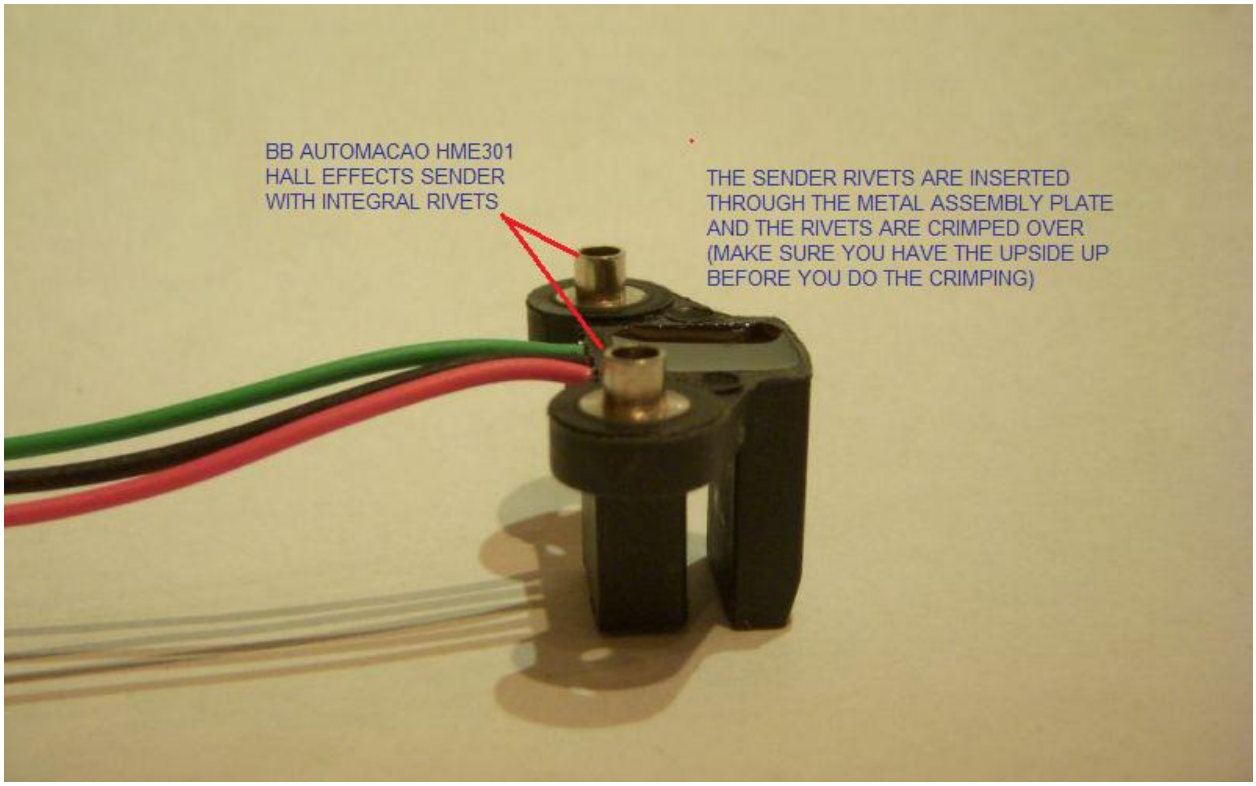


Now you can start thinking about reassembly. The replacement Hall effects sender, e.g. one from BB AutoMacao, needs to be “riveted” to the metal assembly plate and the wire connections re-established (note colours go back in the same order as OE – refer to your notes or these photos).

Here is the OE Hall Sender compared to a replacement sender:



The replacement Hall effects sender comes with integral rivets, as shown here:



To rivet the replacement Hall effects sender to the assembly plate, get the orientation of the sender correct (i.e. on the correct side of the metal plate), insert the sender rivets through the plate and flip the assembly and sender over. Place on firm surface, e.g. work bench and crimp the rivet heads. One simple way to do this is to use a Phillips No.2 screw driver and push the tip down onto the uncrimped rivet head. Push hard and you will distort the rivet head and make a big "+". Now rotate the tip of the screw driver 45 degrees and push down again. The rivet should be firmly attached to the assembly plate. Repeat for the second rivet.

To make the wire connections after removing the original wiring, i.e. opening the first crimp and then clipping the OE wires, first cut the replacement wires to the proper length (if too long). Restrip the wires, as needed. With the correct wire colour to the correct wire location (as per your notes or these photos), solder the wires, one by one to the metal connector pins. Close the opened crimp to physically hold the wires in place. (There are other methods, YMMV).

You are now ready for reassembly, i.e. replacement of the plastic wire cover (AAN), placing the assembly plate back into the distributor housing, screwing the assembly plate to the housing with the screws that you removed at the beginning (and didn't lose), replacement of the main shaft and Hall sender shutter unit (check to see that the shutter sits in the Hall sender nicely), replace the drive gear and replace the OE rivet with the correct diameter and length spring pin.

The end product should look and function as good as OE. Good luck.

Reference for Jorge R's ABA Hall sender assembly replacement:
http://forums.vwvortex.com/showthread.php?5165776-Hall-Sender-Distributor-Disassembly