

Replacement of the Hall Sender on a 7A, 3B, early AAN and some VW product distributors June 2010

By Dave Forgie (UrS4boy) 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") the position of the cylinders 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 31<sup>st</sup>, 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 in this G40 Cam Position Sender (Hall Sensor) post: <http://forums.quattrroworld.com/s4s6/messages/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. Without a good G40 Cam Position Hall Sender signal the ECU will not fire the coils or injectors. 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

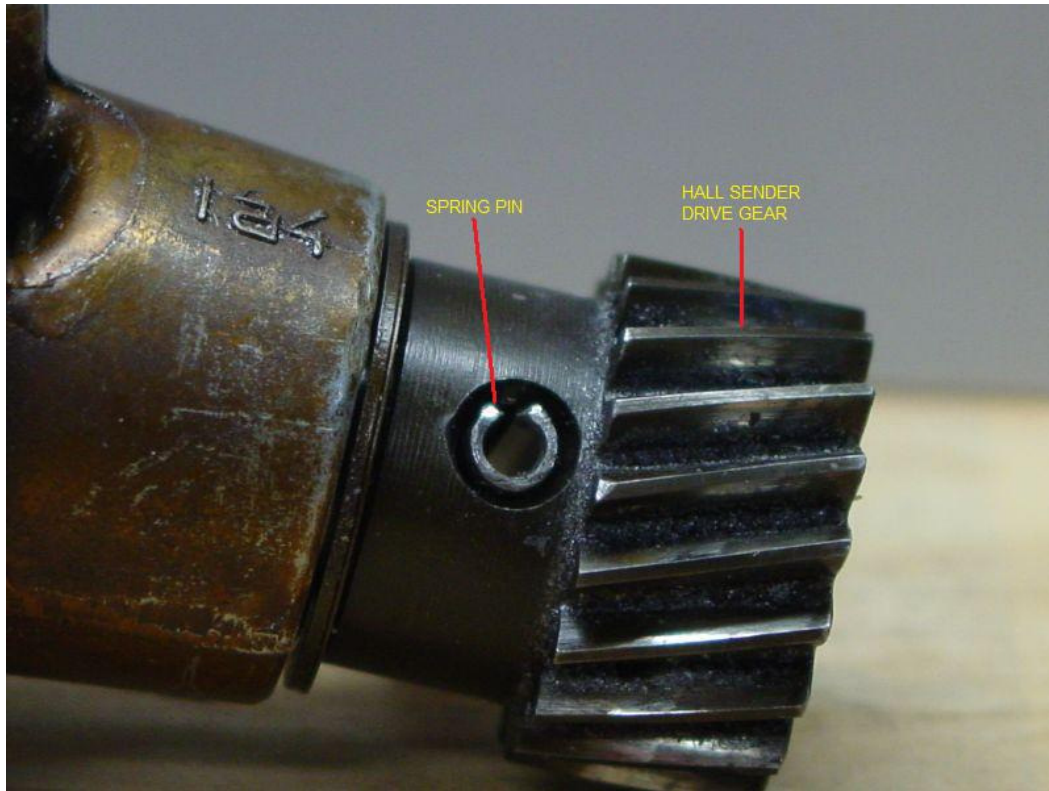
The first task is to remove the drive gear at the end of the distributor unit. It is held to the main shaft by rivet or spring pin, as shown here:



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 at the end of the reassembly process:



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:





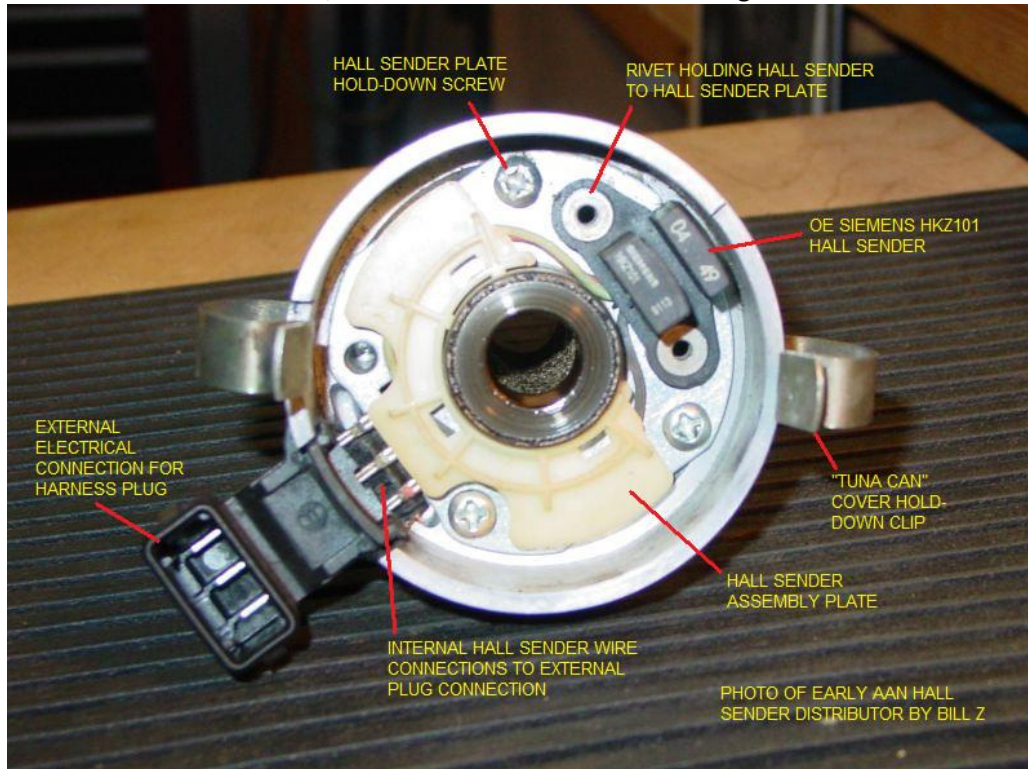
Cradle the distributor/Hall sender unit in vice or firm location and use a pin punch to remove the spring pin, as shown here in Jorge R's ABA distributor photo:



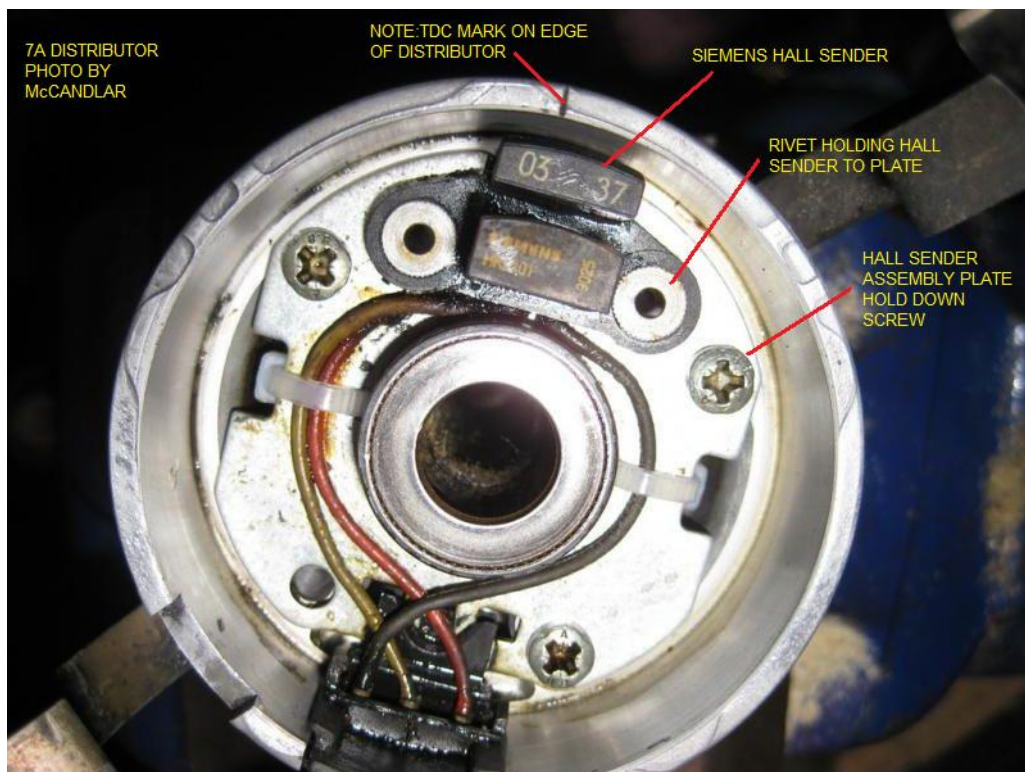
This should leave you with the drive gear off and the ability to pull the drive shaft completely out of the top of the distributor/Hall sender unit, as shown here in Jorge R's photo:



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 (note: this one is missing its plastic wire cover):





The reason that the 7A Distributor above has no plastic cover is because it might have been damaged like this one:



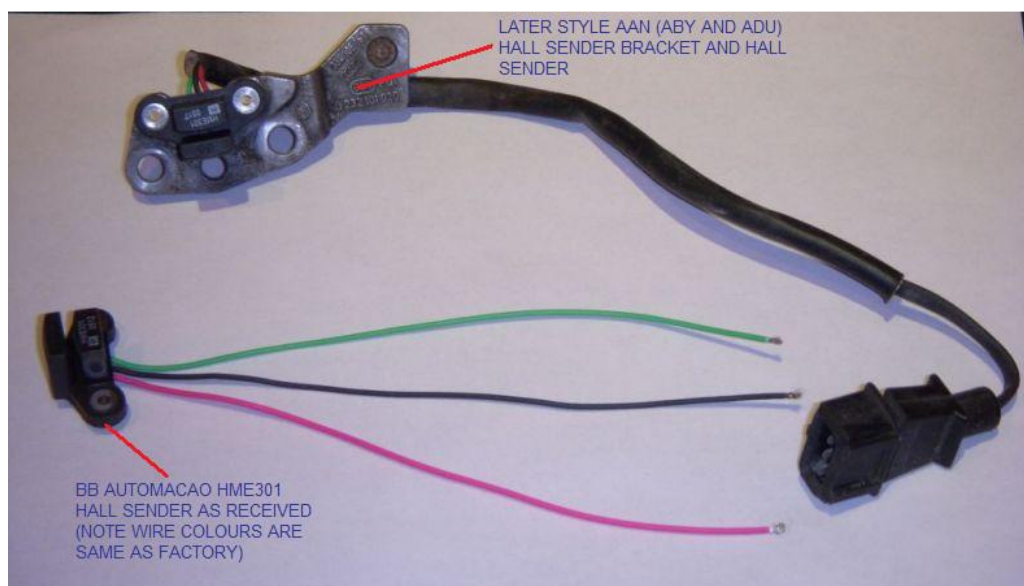
Photo Courtesy of Mcandmar on the S2 forum.

You can see why the owner of the 7A distributor would have removed the broken wire cover. The 7A owner did the correct thing by tie-wrapping the wires to the distributor housing so they would not contact the Hall sender shutter disc and get cut. If you find yourself with a broken plastic wire cover, either fix the cover or discard and use the tie-wrap trick during reassembly.

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

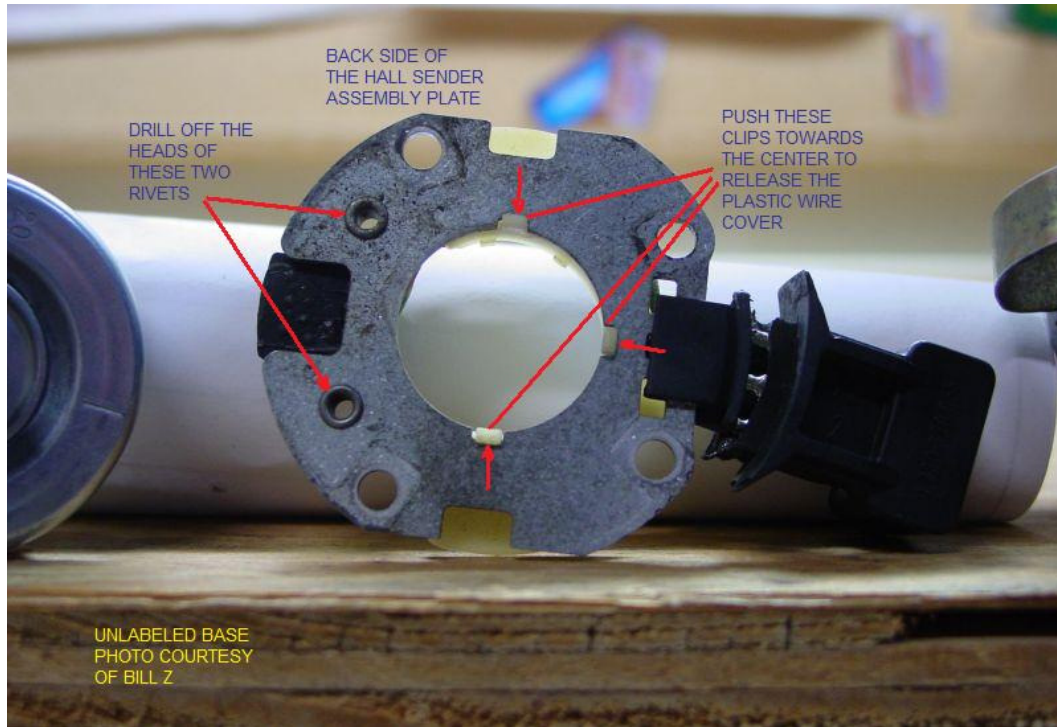


Now you need to remove either replace the entire Hall sender assembly plate with the factory part (e.g. 034 998 065 for the 7A) and reverse the disassembly process or replace the Hall sender with an aftermarket or known to be good Hall sender with the same specifications as the factory sender. If you decide to go aftermarket, one source of replacement Hall effects senders that many Audi AAN/ABY/ADU people have used is from 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:

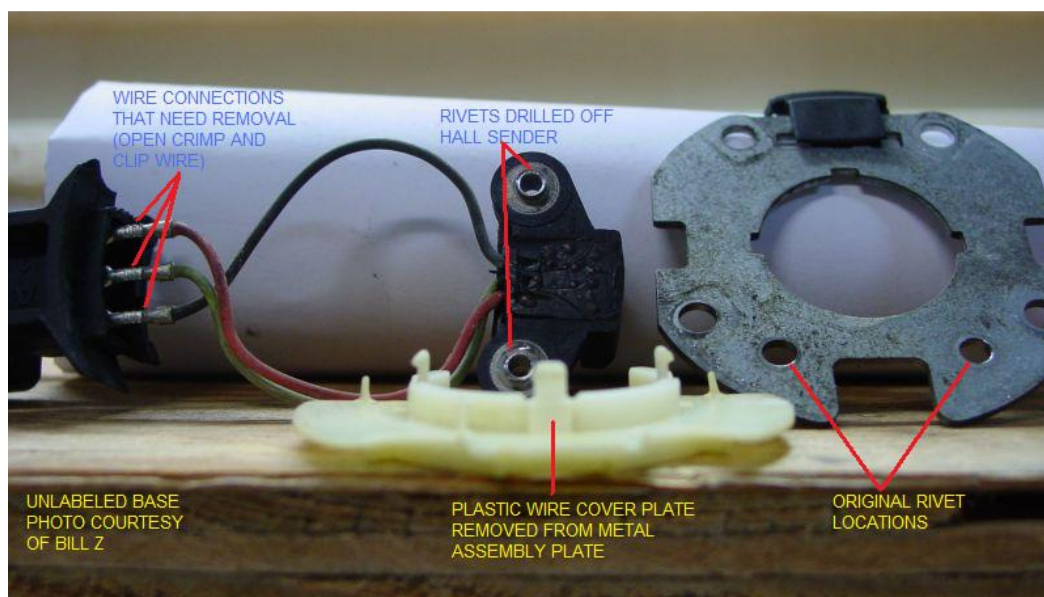




To start the 7A,3B or Early AAN Hall sender replacement, you need to first remove the plastic cover (or clip away any tie-wraps to expose and free the wiring) by pushing on the clips on the back side of the assembly plate. Then you need to drill out the back of the rivets that hold the OE Hall sender to the assembly plate:

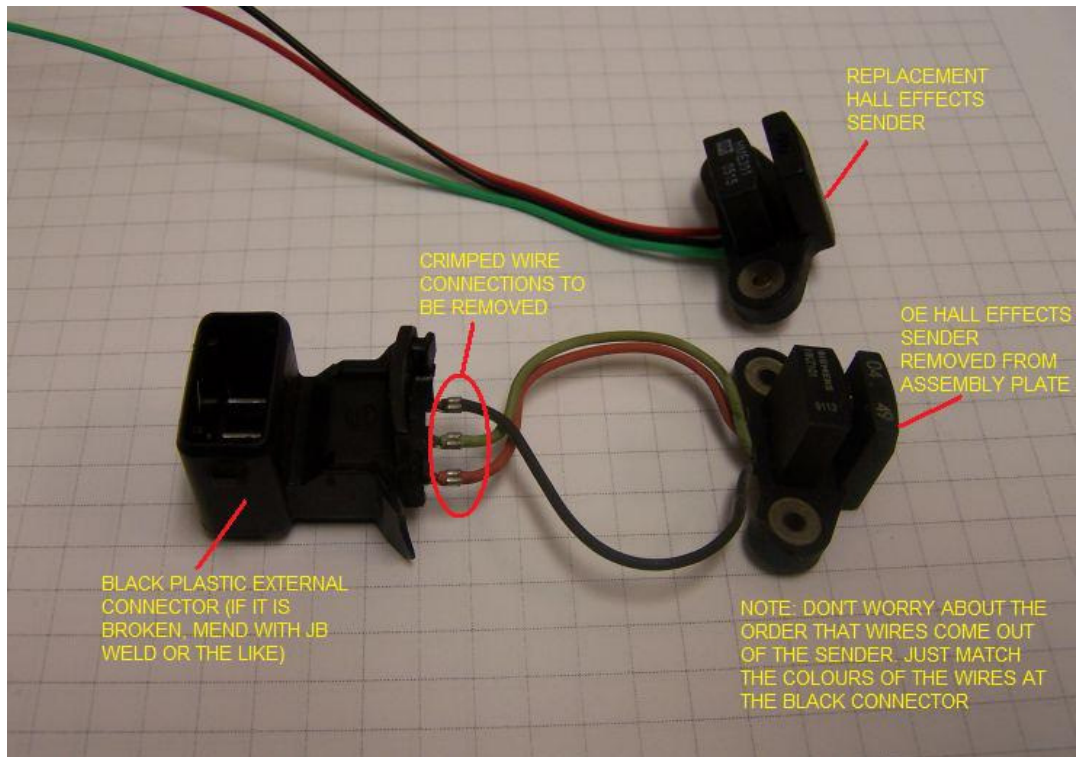


Once you have the rivet heads drilled off, the Hall sender will still be attached to the assembly plate at the electrical connections to the external plug. Depending on how you want to work with the wires at the black external connector, you can either leave the black connector on the assembly plate or remove it, as shown in the next photo:

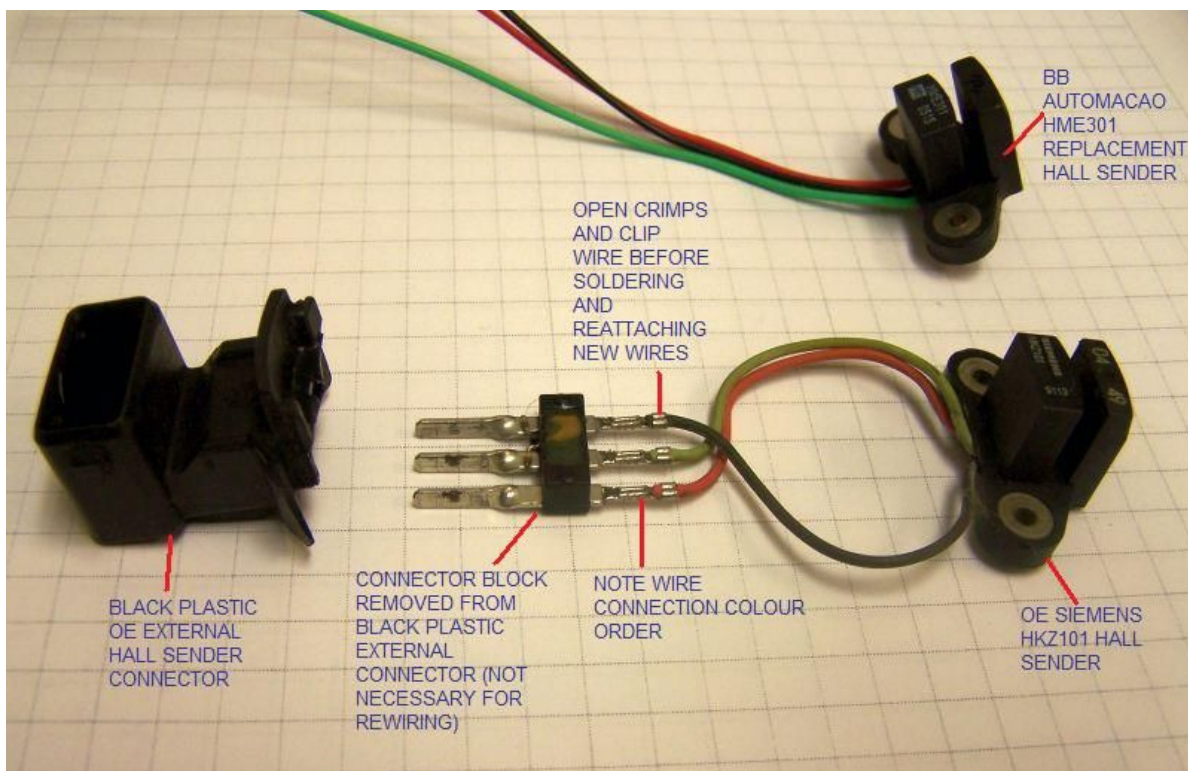




Here is the OE Hall Sender compared to a replacement sender:



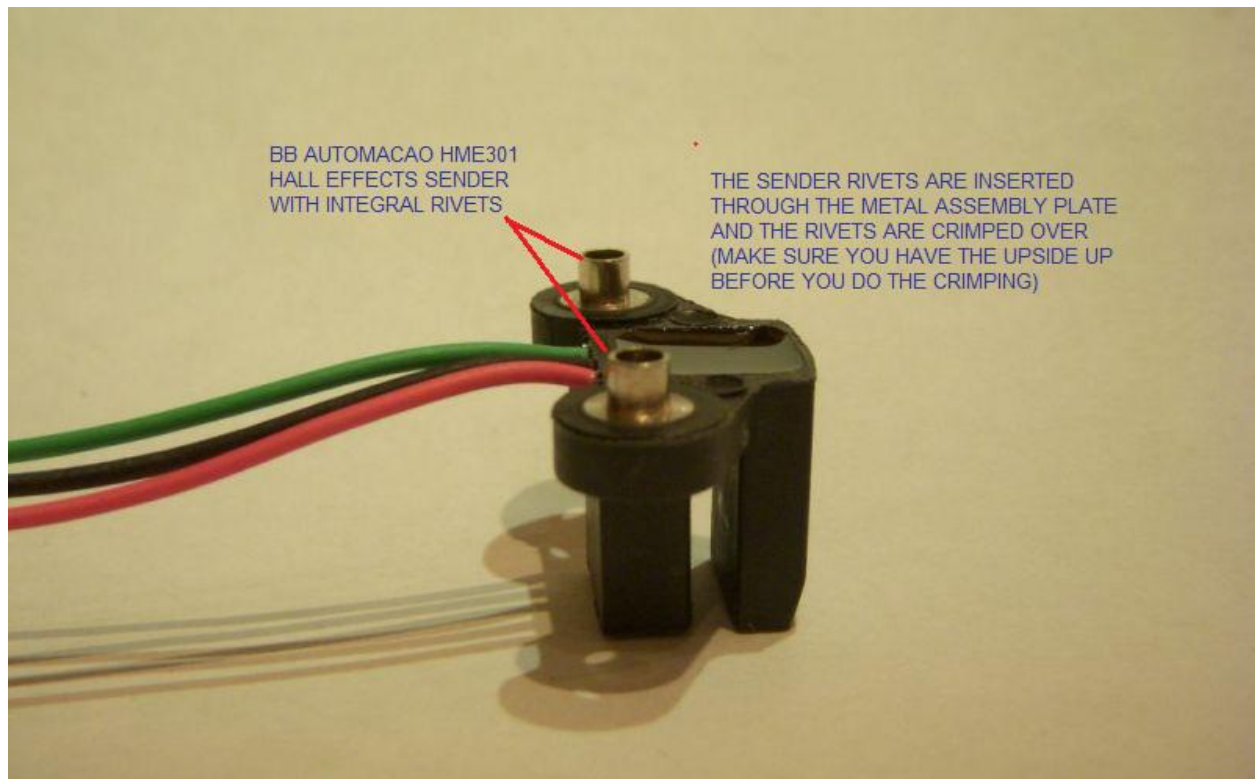
You can also remove the connector plug from the black external Hall sender connector, as shown here:



To remove the Hall sender, open up the first crimp on the connection pin and clip carefully clip away the wires, as suggested in the photos above.

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).

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). Shorten and re-strip the new Hall sender 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, i.e. splicing, soldering and heat wrap, 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>