

## Capital Area Tech Session March 16

The Capital Area section attended a Tech Session hosted by Healey Surgeons in Takoma Park, Md on Saturday March 16. Run by Bruce and Inan Phillips, Healey Surgeons is well known to Healey enthusiasts in the Mid Atlantic. They supply a wide range of Healey parts and Bruce performs comprehensive service work on Healeys. The subject of the tech session was how to service the front wheel bearings on Big Healeys.

Bruce demonstrated the correct way to disassemble the front hubs, re grease the bearings, set them up properly with the correct shims and put everything back together. Here is a summary of Bruce's demonstration.

After safely placing the car on jack stands, remove the wheel. The first step would be to remove the brake caliper. Picture #1 shows the hub ready for disassembly. Note the caliper assembly is hanging behind the disc supported by a copper wire. To do this, remove the hydraulic hose clamp and the two nuts that secure the dust shield (present on BJ8s, not on earlier cars). An alternate approach is to disconnect the hydraulic line, but that would require bleeding the system after reassembly. It is probably easier to remove the caliper with the hydraulic line attached. Remove the clevis pins holding the caliper securing pins and withdraw the pins. Pull the pads half out, then use them as a lever to push the caliper pistons in. This makes the caliper removal easier. NOTE if you start with a full hydraulic reservoir, pushing in the pistons may cause the reservoir to overflow. Then remove the caliper securing bolts with a 5/8 wrench. Carefully remove the caliper and support it with a wire support, do not let it hang on the hose.

Now we are ready to remove the grease cup in the center of the hub. There is a special tool for this pictured in picture #2. However most of us do not have access to this, so a simple extractor tool can be made with a 5/16 bolt and nut, a 5/16 fine thread nut and a couple of fender washers. The fine thread nut needs to be welded on to the head of the bold and flats ground on the other end of the bolt. This homemade extractor is shown in picture 3. Attach the fine thread nut on to the stud on the grease cup and turn the nut on the extractor to pull the grease cup out of the hub. Hold the bolt using the flats on the extractor bolt end if required.

There is a castle nut in the hub secured in place with a cotter pin. The pin needs to be removed using long nose pliers or side cutters if required. This can be a little difficult due to the tight space, but persevere. While it may be tempting to just shear the pin off using brute force on the 1 1/8" castle nut, this could damage the stub axle or threads. When the pin is removed, remove the castle nut. The entire hub assembly can be removed from the stub axle.

Most modern cars have two tapered roller bearings, an inner and outer and the correct setting involves merely tightening the axle nut until a slight bind is felt while rotating the wheel, then backing the nut off until the wheel is free with no end play. The Healey wheel bearing set up is not like that, even though it has two taper roller bearings. Instead it has two tubular distance pieces and selected shims that are torqued up while allowing the wheel to turn freely. Bruce

pointed out that this configuration does two things. 1/. It strengthens the stub axle assembly by transferring the bending moment from just the root of the stub axle to a wider area being the contact patch of the inner distance piece. (see picture 4). Second it prevents the inner bearing races from spinning on the stub axle as they are held in place by the castle nut being tightened.

When the hub assembly is removed, collect carefully the tab washer, the distance pieces and the shims. If the axle was NOT noisy and spun freely, it may just be necessary to re grease the bearings and reassemble. If new bearings and races are installed, a new shim set up will be required.

Note the stub axle has horizontal and vertical holes for the cotter pin to pass through.

Now clean everything thoroughly with solvent, blow them out with air but do NOT allow the bearing to spin dry. From here on cleanliness is very important. Examine the cleaned bearing rollers and races for any pits, spalls, rust, damage or discoloration. If discoloration such as bronze or blueing is present then it is likely the bearing has been overheated. If any of these are present, renew the bearings and races. The outer one is more likely to be compromised. The old races can be removed with a drift. Look down the hub center and you will see where you can apply the drift. (See Picture 5). Tap each side sequentially and avoid getting the race cocked sideways. Then make sure the race seats are clean, apply a little oil or WD-40 and tap the new races into position. (Authors note – I have always had good luck by heating the hub [wrap in aluminum foil and put it on the BBQ grill for a few minutes] and putting the races in the freezer. They go together more easily in my experience.) Again it is important to make sure the races are fitted squarely and that they are fully seated. A small inspection mirror can be used to make sure the races are seated. Bruce has a seating tool just for this purpose and he installs the races by tapping them in with the service tool on his anvil. When the races are seated the hammer blow on the seating tool changes its sound. It is good practice to replace the inner grease lip seal in the hub even if the bearings were not replaced.

It is now time to reassemble the stub axle bearings. Put the inner distance piece on the axle first with the concave face away from the bearing. Fit the inner bearing with the smaller taper facing outward. Bruce's technique is to oil the bearings with SAE 80W/90 gear oil, get it shimmed up correctly and then disassemble everything, pack the bearings with grease and then reassemble. Accordingly, if following this process, oil the inner bearing. Then slide the cylindrical distance piece over the stub axle followed by the shims. If the bearings were not replaced and the bearings were rotating freely without end play, then using the existing shims may work fine. If, however new bearings were fitted then new shims will have to be selected. This process calls for a little trial and error. Bruce's suggestion was to start with a 30 thou, a 10 thou, a 5 thou and a 3 thou shim as the first shot. Make sure you record the thickness and sequence of each shim. Then fit the wheel hub on to the stub axle and then insert the oiled outer bearing with the taper facing inward. Fit the tab washer and make note of the witness marks on the tab washer so it faces the same direction as when it was previously installed.

Tighten up the castle nut and torque it to 40 to 70 Ft Lbs. (latitude is provided here to allow the castle nut to be aligned with the hole in the stub axle to fit the split pin per the shop manual). Check for free rotation and end float in the hub assembly. It may be possible to use a dial indicator to measure end float, Bruce felt this was not easy to do accurately. If the wheel spins freely and has no end float - great ! but that is not too likely. If there is end float it is necessary to use LESS shim thickness. Remove the castle nut and the tab washer and the outer bearing followed by the hub assembly. Carefully remove the 3 thou shim and see if that fixes the problem and allows free rotation without end float. If there is still end float then remove the 5 thou shim and reinstall the 3 thou shim. Trial and error will allow you to arrive at the correct configuration.

Once the hub assembly is correctly shimmed, disassemble the whole thing and pack the bearing assembly with new grease. Make sure the grease has the NLGI (National Lubricating Grease Institute) certification mark "GC-LB" on the container. This indicates the grease is suitable for the high temperatures experienced by disc brake wheel bearings.

Reassemble the hub and add a little extra grease in the hub, but do not cram the entire cavity full of grease. Torque the castle nut between 40 to 70 Ft Lbs so that one of the slots in the castle nut is either vertical or horizontal to align with the holes in the stub axle. Insert the split pin through the hole on the hub assembly using split pin approximately 1.25 inches long. Bend the split pin tab to lock the castle nut in place and reinstall the grease cap. The completed entire assembly is shown in picture

This process is not required too frequently, perhaps every 25,000 miles or whenever excessive end float is noticed in the wheel bearings.

Re attach the caliper, torquing the caliper bolts to 45 to 50 ft lbs. Then attach the nuts holding the dust shield in place. (BJ8 only). Grease the wheel splines and refit the wire wheel. Tighten the knock off when the wheel is on the ground.

As an additional resource, Healey Surgeons has a Tech Tips section on their website at <http://www.healeysurgeons.com/faq.php> that includes several topics including front wheel bearing servicing.

PICTURE 1 Ready for Hub Dissassembly



Picture 2 The authentic grease cup extractor tool



Picture 3 A homemade grease cup extractor tool



**Picture 4** The inner wheel bearing with the inner distance piece behind it and the cylindrical distance piece fitted on the stub axle.



**Picture 5** Looking inside the hub showing where a drift can be used to drive out the old races (at 3 and 9 o'clock)



**Picture 6** The finished hub and disc assembly. (A new hub and disc was used in this install).

