TR3 Rear Axle and Hub Separator

This tool is used to separate the rear hub and axle for a TR3 and also to allow removal of the bearing from the axle. In reading several written accounts of hub and axle separation events it struck me as odd that the separation was so violent. I thought this must be due to the flexing of the hub while the puller was being used. My goal was to design a puller that provided a backing plate for the hub to minimize the distortion of the hub. I can do simple machining in my garage but my welding skills are very poor. This steered me to a design with no welding. Here is my design

This is the backing plate. This item is slid over the axle and supports the inboard surface of the hub. It started out life as a 3 inch 300 pound raised face-piping flange. The center hole is machined slightly larger than the hub bearing housing outside diameter adjacent to the hub. This provides the maximum support for the hub during pulling. The slots machined into the bore of the backing plate allow the backing plate to be slipped over the “ears” of the hub bearing housing. Eliminating the slots would require the inside bore of the backing plate to be much larger (to clear the “ears”) and the support of the hub would be compromised. On one side of the backing plate I machined in cutouts in the flange face. These cutouts accommodate the peened areas of the wheel studs on the back of the hub. This allows the backing plate to fit tight to the hub.

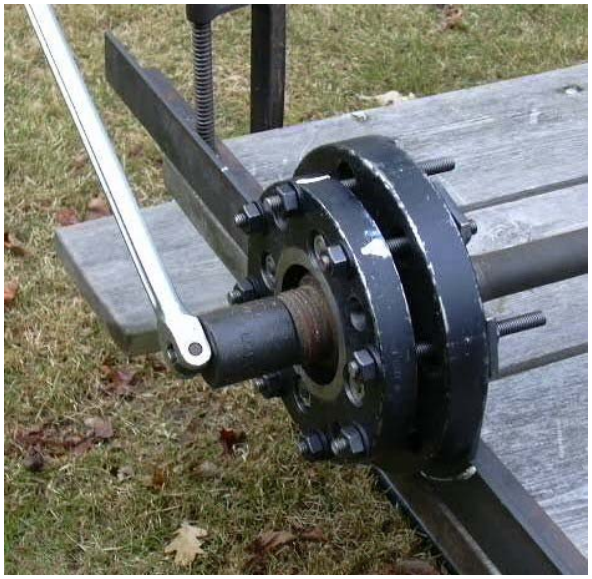
A shot of the pulling plate. This piece started life as a 2-1/2” 150 pound raised face flange. Shown is the surface that is bolted to the outboard surface of the hub using the axle bolts. A good bit of work needs to be done to this piece. The 4 holes for the axle studs need to be counterbored so that the plate sits flat on the hub. There are four pulling bolt holes that are drilled and counterbored also. These are the holes with the threaded rod installed. The remaining eight smaller holes are used to bolt the backing plate and the pulling plate together to create the sandwich effect for the hub.

Now we are ready to assemble the pulling plate to the hub/axle assembly. Place the shortened 5/8” grade 8 nuts into the counterbored holes of the pulling plate. These are grade 8 nuts that were slightly faced down on the lathe to fit the counterbore depth of the pulling plate. The plate is then bolted to the hub wheel studs using grade 8 nuts and tightened to 55 ft-lbs torque (11/16” socket)

Fit the backing plate over the axle and past the ears of the hub bearing housing. Make sure the cutouts on the backing plate are positioned over the hub wheel stud peened areas so that the backing plate is tight to the hub surface. Install the angle iron to the backing plate. The angle iron is just used as a handle for the tool. The studs bolting the backing plate to the pulling plate are grade B7 3/8” diameter using grade 2 nuts. Torque these bolts to 50 ft-lbs (11/16” socket) using a star sequence and gradual steps.

This shows a rear view of the assembly. The steel plates are used under the nuts to help spread the nut loading out over a wide surface on the flange.

Use the angle iron to bolt the assembly to the nearest picnic table. Remove the axle cotter pin and loosen the axle nut (1-1/4” socket).



Arrange the assembly on the nearest picnic table as shown. Back the nut off so that it is flush with the end of the axle.

Here is a shot of the remainder of the items that comprise the puller.

Place a piece of ¼” thick copper over the nut to act as a softener.

Set square tubing over assembly.

Set the 1-1/2” Acme threaded nut into the square tubing

Install the stop for the Acme nut over the top of the square tubing. Note that the hole bored in the square plate is 1.765” diameter, which is useful later in the project.

Screw the 5/8” grade B7 threaded rods into the shortened nuts that were place into the counterbores of the puller plate at the beginning of the puller assembly.

Place the round strongback onto the nut stop. This strongback is a 2-1/2” 150 pound raised face flange.

Put the nuts on the 4 threaded rods and check that the rod is fully threaded into the nuts in the counterbores. Don't tighten at this time. Install the 1-1/2" Acme pressure screw with the double nuts into the nut captured within the square tubing. Make sure the 4 threaded rods are fully engaged in lower nuts and then tighten the 4 nuts to 120 ft-lbs (15/16" socket) progressively in a star pattern

Using your standard 60mm or 2-3/8" open-end wrench, turn the top double nut to tighten the pressure screw. Once there is resistance a few raps with a hammer on top of the screw should pop the axle out of the hub. The only indication that the hub is free from the axle is when the Acme screw looses tension. No loud noises or assembly jumping off the picnic table

So now we need to get the bearing off of the axle shaft. Rearrange the pulling plate, and the Acme nut stop to the pictured arrangement. Now we see why the hole in the Acme nut stop was bored to a diameter of 1.765". This is the diameter needed to just clear the shoulder on the axle and allows contact with the bearing. It is assumed that the bearing will not be reused.

With the nut flush with the end of the axle shaft place the copper softener on the nut.

Place a steel plate strongback on top of the softener.

Place the round strongback on top of the plate strongback, install the nuts and tighten the nuts a couple turns at a time progressively until the bearing is free of the axle.

Editor note:

This article was originally written by Gene Wellenstein in 2004 and is posted by permission. He reports having done many TR3 and TR4 hubs since then without damage to tool or hub (although some hubs were already damaged by previous removal attempts).

He has offered to pull hubs for anyone, for the cost of shipping. Contact him for more information:

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