DIFFERENTIAL,

REAR AXLES,

AND

DRIVESHAFT

NOTICE

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REAR HUBS - PROBABLY THE BIGGEST PROBLEM YOU WILL EVER FACE WITH YOUR TR-6

(Note: Although this job may be beyond the level of your skills and equipment, make sure you give this information to the person doing the work).

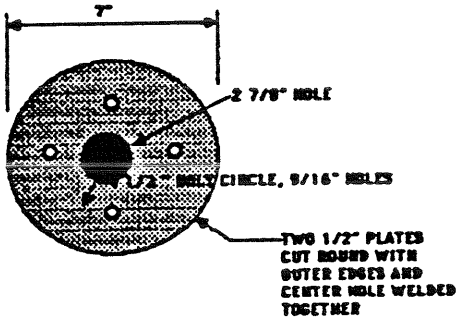
I don't wish to start off on a negative note, but I will tell you that as sure as Dolly Parton stands out in a crowd, the rear wheel bearings on your TR 6 will go dry and need replacing. I'll also tell you right off that the longer you ignore this problem the less chance you will have of successfully rebuilding your hubs. The importance of doing this job at an early date can not be overstated. The inner bearing has a relatively small contact area with the stub shaft. Unfortunately, it goes dry and the inner bearing race begins spinning on the stub shaft. If this happens the odds of saving the stub shaft become 50/50 at best.

If you look at a better cross sectional view of the hub assembly than the one below you will see that the hub has a tapered inner bore which is held in place on the stub shaft by a woodruff key and a nyloc nut. It looks like you could just loosen the nut and disassemble the whole mess. Ain't so Charley. I have put 30 tons of pressure on these things in a press and not been able to separate them. With the tool described below and shown in the illustration you have a chance (my average to date for rebuilds is about 60% success). Without it you've got a better chance of hitting the numbers. The "tool" is made from 3/4 inch or thicker plate steel (mine is two 1/2 inch plates liberally welded together). Its purpose is to stiffen the hub flange. Without it, the force required to separate the hub from the stub shaft will bend and destroy the hub - GUARANTEED.

You will also need a hub puller with 4 legs (most have 3, make sure you can get extra legs before you buy). Mine is a New Britain P99 purchased from a NAPA dealer. Again a negative

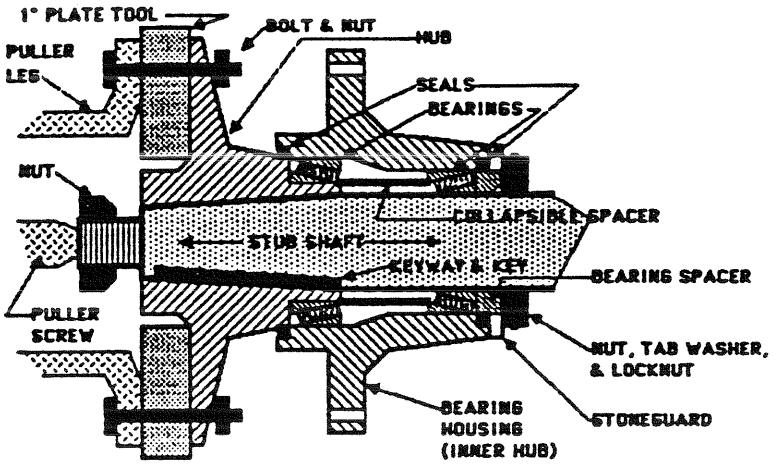
note - the puller may not be able to exert the force required, and you may need a press. The problem with a press is getting sufficient support under the hub due to its proximity to the bearing housing and the extreme pressure required.

TR 6 REAR HUB REMOVAL TOOL

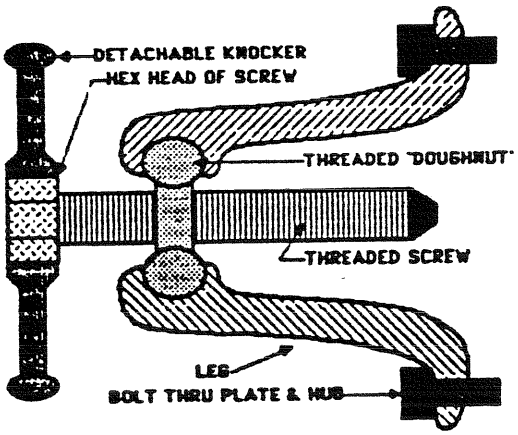


ADDITIONAL TOOLS REQUIRED ARE A 4 LEG HUB PULLER AND GRADE 8 BOLTS AND NUTS LONG ENOUGH TO GO THRU THE HUB FLANGE, THIS TOOL, AND THE HUB PULLER LEGS.

HUB ASSEMBLY WITH REMOVAL TOOLS



TYPICAL PULLER USED WITH PLATE



After all that, let's get on a positive note and start making the tool and disassembling the hub unit. The plate can be made from 1/2 " base plates for steel building columns at a much lower cost than having it fabricated from sheet steel (look under structural steel in the yellow pages). The holes for the hub bolts must be drilled with a drill press. The center hole is most easily made by drilling 1/4 inch holes nearly edge to edge on a circle slightly smaller than the finish diameter. The hole is then finished by <u>carefully</u> cutting the metal between holes away with a torch and then finishing and smoothing the edge by cutting with the torch or grinding with a heavy grinder.

Remove the axle assembly from the car. Remove the wire from one end of the rubber boot on the axle assembly and carefully separate the halves of the axle. Keep the splines covered and clean. Knock out the wheel studs. Remove the nyloc nut from the stub shaft and reverse the nut, turning the outer end down until flush with the end of the stub shaft. This will keep the tremendous pressure on the end of the spindle from mushrooming it (yes, there IS that much pressure). Using four 1/2 inch x 2 1/2 inch (or 3 inch) bolts with washers, attach the tool and hub puller to the hub assembly as shown. These bolts and nuts must be grade 8. Hardware store bolts are usually grade 2. Grade 5 can be found at most auto supplies and grade 8 at bolt and fastener suppliers or aircraft suppliers (again to the yellow pages). Lightly grease the washers. Snug down the bolts evenly so that the puller screw is centered on the stub shaft and then torque them to about 65 - 70 foot pounds (ft. lbs.). Tighten the wheel puller until you think it is ready to break (unless you are lucky enough to have the hub separate first). Keep watching the bolts. Should they elongate appreciably or the washers get deformed due to the high pressure, release some of the pressure on the puller and torque the bolts down again. It is very hard to hold the hub assembly while you are hammering with all your might to tighten the puller. It helps to place a tire iron transversely between two legs of the puller and to have a friend help by standing on it, etc. Heat the back side of the hub with the torch (adjacent to the bearing housing) as much and rapidly as possible. Quickly tighten the hub puller even more if possible. If still not free, hit the hub with a few hard hammer blows in the area behind the flange (about where the arrow of the 'hub' note is pointing in the illustration). Again a negative note - some assemblies won't come and must be pressed, some hubs will actually shear at the outer face of the outer bearing from the force, and some won't come regardless. Let me say in advance that this part is going to be a very traumatic experience. But look at it this way - you've nothing to lose since a bad hub is of no value.

After removing the hub and bearing housing from the stub shaft, remove the seals and bearing inner races (or cups) from the bearing housing. Clean everything thoroughly. Look for a worn stub shaft at the inner bearing and for a worn bearing spacer, especially the face which is against the bearing.

Clean all grease from the outer races of your new bearings. Put them back in the box and seal the box. Put the boxed races in the freezer for at least an hour and preferably a day. This shrinks them and makes them easier to install. Install quickly and make sure they are both all the way in and pointed in the right direction. Install the seals making sure the open side faces toward the center of the housing. Clean the inner races of the bearings. Heating them slightly (too much heat will ruin them) in an oven or the sun will help in installation. Pack the bearings with grease, but not the races. Install the outer bearing on the hub. Back off the lock nut and adjusting nut on the stub shaft all the way. Place some grease in the bearing housing. Install the inner bearing cone in the bearing housing. Install the bearing spacer on the stub shaft with a liberal amount of fast setting Permatex behind it to keep it from spinning later and scoring the stub shaft. Check that grease will not be able to get on the stub shaft or inner race of the inner bearing during assembly. A little Loctite Bolt Lock (not Bearing Lock) should be used to insure the inner race can't spin on the stub shaft. Lightly coat the tapered portion of the stub shaft with anti-seize compound (you may want to take it apart someday). Install the bearing housing, a new collapsible spacer, and the hub on the stub shaft and tighten the new nyloc nut to 100 - 110 ft. lbs. (it must be very tight). Incidentally, you do not need the collapsible spacer if you use elementary care in adjustment and have the bearing spacer on which the inner seal rides on secured from turning with Permatex.

Not having the collapsible spacer there enables you to feel adjustment just like you would with a front wheel bearing. The following is only applicable if you do not use the collapsible spacer. Tighten the adjusting nut to an estimated 10-12 ft. lbs.

of torque. Rotate the bearing housing several times to insure the bearings are seated. Loosen the adjusting nut to relieve all preload on the bearings. Tighten the adjusting nut until just snug - no load. Tighten 1/12 (Note: 1/12, not 1/2) turn more (there are six flats on the nut, index the nut and turn 1/2 a flat). Tap the back face of the bearing housing toward the hub with a hammer, then try prying them apart with a screwdriver in the space between them. If the housing moves, the adjusting nut exercise must be repeated. A dial indicator or use of feeler gauges will greatly enhance your ability to accurately determine end play.

With the collapsible spacer, just keep tightening and checking until there is .002" or less play. A no tools method that is more time consuming is to mount the hub assembly (not the complete axle assembly) on the car. Install the wheel, then grasp the wheel at the top and bottom and try to wiggle it. Any play in the bearings will be greatly magnified by wheel movement. Remove the assembly. Tighten a turn or less and try again, repeating until there is no play. If uncertain about getting it too tight, opt for a slight amount of wheel wiggle.

Set the locknut and tab and reassemble the axle halves making sure you have not cut the rubber boot by overtightening the wire. It is desireable to clean and grease the splines while you have the axle apart.

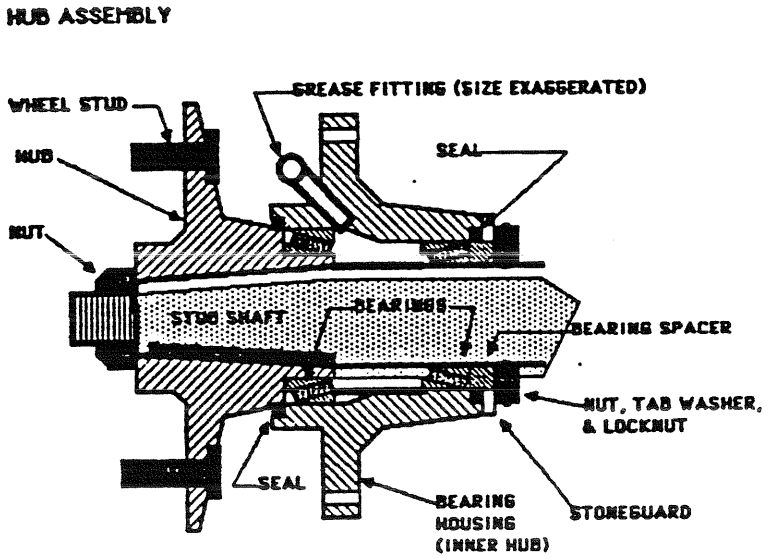
A wrench for the adjusting nut can be rather easily cut from 1/8"sheet steel.

Bearings - SKF or Timken
Inner Cup- L44610
Inner Cone- L44649
Outer Cup- LM29710
Outer Cone- LM29749

Seals - BAP-GEON * NA261 and *NA530

EXTENDING THE LIFE OF REAR HUBS

Skill Level D (Part 1)
Skill Level B/C (Part 2)



Two major problems affect almost every TR 6 sooner or later. They are frame rust and rear hub failure. Fortunately for most cars both come rather late in life. Unfortunately a fair number of cars are needlessly junked because of rust. However, that's another subject. What we have here is a very easy method to greatly extent the life of your hubs and a little more work that will perhaps extend them for the life of the car.

If you look at the drawing of the hub above (or better, a good one in a manual) you'll see a resemblance between the rear hub and the front one. Both have tapered bearings and a means of adjusting the distance between them until they are just snug against the bearing cones (commonly called races). But since the front has a much simpler job to do it turns on the stub axle wheras the axle turns the rear hub. What I'm leading up to is this - since you regularly grease (pack is the common term) and adjust the front bearings why shouldn't you pack and adjust the rear? The truth is you should. However, on the TR 6 rear axle that would be a job requiring special disassembly tools which are no longer available and professional mechanic level skills.

The first part of this project, modifying the hub so it can be greased is easy and can be done on the car with the brake drum removed. It helps to remove the brake shoes too but if you have uncertainties about that, work around them. We are simply

going to drill a hole in the hub where shown in the sketch on an angle (about 45 ^{0}) that will take the hole into the cavity between the bearings and then install a grease fitting. It is best to drill this hole from the side or bottom of the hub to prevent cuttings from getting into the hub. Drill slowly, stop often, and put grease on the end of the drill each time to carry away the cuttings. The latter is especially true when breaking through into the cavity. I know this sounds Mickey Mouse, but if you take your time it will work just fine. The initial hole should be with a 1/8" drill. Follow with a 15/64" or 7/32" to a depth of 1/4" to no more than 3/8". Then tap that hole with a 1/4" x 28 fine thread tap. You may only get a turn or two on the tap before it hits bottom. That's OK. Follow with a 1/4" x 28 bottoming tap. Bottoming taps have full threads all the way to the end as opposed to the starting threads of a regular tap. This will give you sufficient threads in the hole to hold the new fitting. A few shots of spray carb cleaner will clean any fine cuttings out the hole.

Now comes the bad news - the grease fitting. Because it is necessary to drill at the intersection of the hub and the hub flange, we need a long grease fitting. All those available at most auto parts stores are too short for the threads to reach the hole. The original fittings for early TR 6 universal joints were about 1" long and are just perfect. However, they are no longer available. I have found fittings like this at a local truck parts supply which are made by Imperial-Eastman. Try that approach first. The next alternative is to use a short piece of tubing threaded inside for the grease fitting on one end and outside on the other end to go in the threaded hole in the hub - a sort of extension. With this set up you should remove the extension and plug the hole with a 1/4" bolt after greasing. The last alternative is a grease injector needle. This is literally a grease fitting adapted to a large hypedermic needle. Just put the needle in the hole in the hub and pump away on your grease gun. The grease injection needle is made by Plews Division of Parker Automotive, Eden Prarie, MN 55344, part 05-037 and

cost $3.50 at my local auto parts store. As above, plug the hole with a 1/4" bolt after. Also consider making the hub hole the size of the needle, .050", although that's a pretty small hole to drill by a hand held drill. Lastly, the grease. Don't completely fill the hub. Grease is an insulator of sorts and too much causes drag on bearings. About 20 to 25 pumps should do and about 5 to 10 thereafter when servicing at about 20,000 to 25,000 miles.

Now for the adjustment. First, test for play in the bearings by installing the wheel if you have removed it for the above job. Grasp the wheel at the top and the bottom and firmly try to wiggle it by pushing with one hand and pulling with the other. If there is any play you'll feel it. Begin by removing the axle assembly as described in the manuals. If you try to turn the stoneguard it may or may not turn but turning is one sign of loseness. If it does not turn make sure it is not bent against the hub or otherwise hung up because turning this guard is one of the ways to tell if your adjustment is right. Bend back the tabs on the nut and locknut and loosen the locknut. Let me digress here long enough to suggest two ways of turning these thin nuts. One is to cut a wrench from 1/8" steel plate and the other, the Fred Flintstone method, is to pound on the corners at an angle with a dull chisel and hammer - driving the nut. You can now either just tighten down on the nut while turning the hub until you have about 25 foot pounds of torque on the nut, back off until it is free of torque, then tighten until just snug - or; you can tighten a little while turning the hub, check for spin on the stoneguard, and repeat until the stoneguard doesn't turn anymore. Tighten the locknut but don't bend the tabs over. Install the axle assembly with only the hub end bolted up. Install the wheel and again check for wobble. If you have any, remove the assembly and tighten the nut and locknut one flat (1/6) turn at a time and again check for wobble until the wobble is gone. You should check that the hub turns with just a little effort each time. If the hub begins to get tight it means the bearing spacer has been badly grooved by the bearing and is tight against the bearing race. This, in turn, means rebuild time.