

## 1969 Triumph GT6+ (MKII) Rotoflex suspension rebuild

This is by no means a factory tutorial and you will likely have different ideas on how to accomplish these tasks based on your own skills, knowledge and access to various tools. It is an attempt to illustrate the main steps to doing this in your home garage.

### Kit – Things you will need

1. Courage to tear your precious baby apart
2. Persistence to carry on when you should quit
3. Camera
4. Full set of spanners (aka wrenches of all types)
5. 20 ton press or know someone with one
6. Bearing pullers, possible hub or claw puller
7. Full set of sockets
8. Torque wrench
9. Work bench and vice
10. Machinist distance gauge
11. Wire wheel bench grinder and/or hand grinder
12. Safety glasses/shield and work gloves
13. Nitrile or rubber gloves are handy
14. Box of wrags
15. Possibly blocks of wood for cribbing in your press
16. Axle grease
17. Possibly a heat torch
18. Ball peen or small sledge hammer
19. Wheel chocks
20. Floor Jack
21. Axle stands
22. Bottle jack
23. Degreaser
24. Primer and black spray paint
25. Possibly a rust inhibitor
26. Retaining ring pliers for snap rings (for u-joints)
27. Drift or punch
28. Work light
29. Drum sander
30. Power drill
31. Sawzall
32. Vacuum hose plug
33. Quart Ziploc or other storage bags and marker
34. Breaker bar
35. Penetrating fluid

Jack, jack stands, bottle jack, wrenches, hammers, wrags, light, pad, bench grinder with wire wheels, work gloves, face shield, bearing drivers



Angle grinder with wire & cutoff wheels, Universal bearing puller, 20 ton press



Parts bits – These will depend on your needs and what is worn out

1. Rotoflex
2. Inner and outer wheel bearings, cups and seals
3. Bushings/trunnion kit for Wishbone (also may need them for radius arm)
4. U-joints
5. Shock absorbers (Dampers)
6. High temp bearing/axle grease
7. Possibly replacement hardware

The easy part

You will need good level space around the vehicle to work and preferably indoors. A lift would be nice but since that is a luxury very few have working on jack stands is perfectly functional. I use a foam pad for the knees and back. I also would recommend doing one side at a time so that you always have the other side to reference.

1. Place wheel chocks in front of the front wheels.
2. Break your lug(s) loose on the side you are starting with
3. Using a hydraulic jack raise the back end high enough to place jack stands under the frame on both sides to support the entire back end of the car.
4. I lower the hydraulic jack to put the weight on the jack stands but leave the jack engaged with the frame as a safety backup.
5. Remove your wheel and place it well out of your work area.
6. Engage a work light under the car but out of your way.
7. **VERY IMPORTANT, THIS IS THE ONE STEP YOU CAN'T AFFORD TO SKIP! PHOTOGRAPH EVERYTHING IN PLACE FROM MULTIPLE ANGLES, YOU CAN NEVER HAVE TOO MANY PHOTOS BEFORE YOU START DISSASSEMBLY.**

Deep breath, time to begin this journey

1. Remove the drum by undoing the lugs you loosened before jacking up the car.
  - a. If you have a wire wheel center hub adapter this will be a little harder as the lugs are still torque tight and the wheels are off the ground
  - b. Put car in gear and set the emergency brake
  - c. Back the lugs off. If they don't budge you may have to temporarily back track by lifting the car again, remove the jack stand from the other side and lower the car enough so the tire engages the floor and helps lock the transmission. Now loosen your lugs on the adapter. Once loose raise the car back up and re-insert the opposite side jack stand.
2. Now is a good time to release the emergency brake
3. Using a small box wrench back off the brake adjuster so that the brake pads create clearance from the drum.
4. Remove the two flathead phillips screws.
5. Using your hands pull the drum straight off. Count your blessings if it is this easy.
  - a. If drum does not move start with a light hammer tapping around the edges and near the hub.
  - b. A little pry bar around the back might help but you have to do it evenly around so the drum moves straight forward.
  - c. Finally a little torch action on the center of the drum where it is in contact with the hub might help followed by light hammer tapping and prying.

Wire wheel adaptor and lugs, Phillips flat heads screws that hold drum in place, drum removed



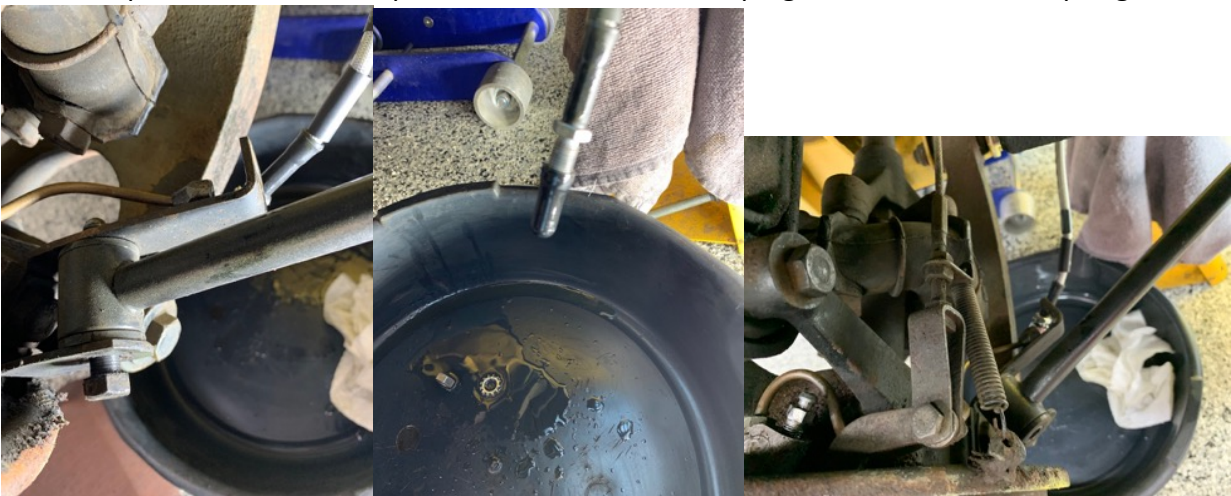


## Take a “brake”

This is where you take stock in what is in front of you.

1. Inspect the brakes and determine if this task will be added to your project list or can be by-passed which is what we will do here.
2. The suspension and driveline is now well exposed so take a lot of pictures from all angles and make sure there is sufficient lighting. These are your reference photos for re-assembly. If you can't remember what you had for breakfast this morning you are going to need these!
3. Remove the brake line
  - a. Get an oil drain pan or something to catch some brake fluid and some nitrile gloves and have a rubber vacuum plug ready.
  - b. Disconnect the brake line from the brake hose
  - c. Disconnect the brake hose from the bracket
  - d. Quickly slide the vacuum plug over the end of the brake hose to cap the fluid from leaking and sealing it from more air entering the line
  - e. Place the nut and washer in a bag and label it (do this for all future fasteners if you plan on re-using them).
4. Slide the drain pan out of your work area and clean off any brake fluid that dripped onto parts or the floor.
5. Push the brake hose off to the side, lay it over the radius rod to keep it out of the way.
6. Remove the E-brake cable
  - a. First use a pliers and un-hook the spring from the backing plate and let it dangle off the cables bracket.
  - b. Now remove the small bolt that holds the e-brake cable to the brakes and drape it out of the way. Either bag and tag the fastener or place it back in the e-brake cable bracket hole so you know where it belongs.

Separate brake line, cap brake hose with vacuum plug, E-brake cable and spring





Post liquid mess and stress test (penetrating oil is your friend)

Before removing any more parts you will need to break loose as many fasteners as you can. Depending on the age you may need penetrating fluid and a breaker bar to help.

1. Break loose the following nuts but do not disassemble yet (if you do you will regret it)
  - a. Radius arm to vertical link
  - b. Top and bottom of shock absorber
  - c. Wishbone to frame
  - d. Wishbone to vertical link, you may only be able to loosen the nut as the bolt was frozen on mine
  - e. Leaf spring to vertical link

Two nuts on wishbone & two on shock, one on radius arm to vertical link, one on leaf spring



Small hands matter

At this stage you are ready to unbolt the inner axle with u-joints from the differential flange. This is the only time you really need to get under the car and will be wishing you had been born with tiny hands.

2. Using a little paint or white out make a mark on both flanges at one of the bolt holes. This is noted in the manual and I assume it is designed to keep the driveline in balance by putting the two flanges back in the same orientation however if you are replacing the axle flange this becomes mute.
  - a. If you are going to clean up and repaint the flange I recommend putting a small bolt & nut in the hole to preserve that location as any marking you did will be cleaned off in your refurbishment.
3. Put the car in neutral so you can easily spin the axle so you can access each bolt

4. Remove all four bolts and expect knuckle skin to be expendable
  - a. Note: you may want to spray each with penetrating oil if they don't come free easily.

Make a paint mark at one of the bolts on both flanges  
Rotate axle to access each of the four bolts



#### Driveline freedom

In this step we will be releasing the driveline from the car, good work gloves will be helpful

1. Undo the bolt from the radius rod to the vertical link and lift the rod out of the bracket, bag and tag the bolt or slide it back into the radius rod bushing for safe keeping.
  - a. Options: If you are replacing both radius rod bushings then separate the rod from the body as well and set it aside out of the work area to refurbish later.
2. Undo the nut on the lower wishbone and try to remove the long bolt separating the wishbone from the vertical link. Good on ya' if it is really that easy.
  - a. You may need a hammer to push it out so I recommend you place an old nut back on the threads stopping just before the bolt is exposed. You can now use a hammer to try and pound the bolt out while protecting the end and the nut. You especially don't want to mushroom the end of the bolt as it will not be able to pass through the wishbone and you will have to start cutting.
  - b. If the bolt won't move like mine then just leave it. You will have to separate the wishbone and vertical link on the bench.

3. If the lower wishbone separated then swing it down and remove it from the frame.
  - a. If it did not separate then remove it from the frame as it will have to come along with the entire assembly.
4. Place the bottle jack under the vertical link to support it and then remove the shock.
  - a. You may have to tap the shock with a hammer alternating from top to bottom to move it off evenly.
5. Lower and remove the bottle jack to reduce pressure on the leaf spring
6. The only thing holding you up now is the one bolt through the leaf spring
7. Remove the leaf spring nut and then using a ratchet keep turning the bolt until it works its way out of the bushing.
  - a. Be prepared as this is the only thing holding the driveline to the car.
  - b. Place some card board or folded bath towels or padding along with using one hand to let the drive line down to the floor easily.
8. The inner axle flange may get hung up so once the assembly is free of the leaf spring use two hand to wrestle the entire assembly out and onto the floor
9. **Congratulations, you have successfully labored to extract your driveline!**
10. Celebrate with a Pint of your favorite libation!

Upper wishbone support, Bottle Jack used to support driveline during shock removal





Rotating assembly to floor, delivery of driveline



## Dismemberment

If you thought you were having too much fun up to this point, it gets even more entertaining!

Now that you are off the floor after making multiple sound effects while forcing yourself vertical and had a pint to numb the pain you can finally work at waist level.

1. Place the assembly in a bench vice locking in one of the tripod legs of the outer axle
  - a. This is easier if you were able to free the wishbone but mine was not so
2. Spray a little penetrating oil under the head of each bolt and wait a few minutes
3. Using a ratchet or breaker bar if necessary break free all of the bolts holding the Rotoflex donut on.
  - a. You may need to rotate the assembly in the vice to another leg to access all six bolts.
4. Now that they are all loose remove the three long bolts that are attached to the inner axle and separate the inner axle.
5. High five! One piece off!

Assembly in vice, inner axle separated



### Pressing matters

At this stage it is time to put that press you purchased years ago (because it was cool but never used) to work. Alternatively, you may be calling in that favor from a friend who has one.

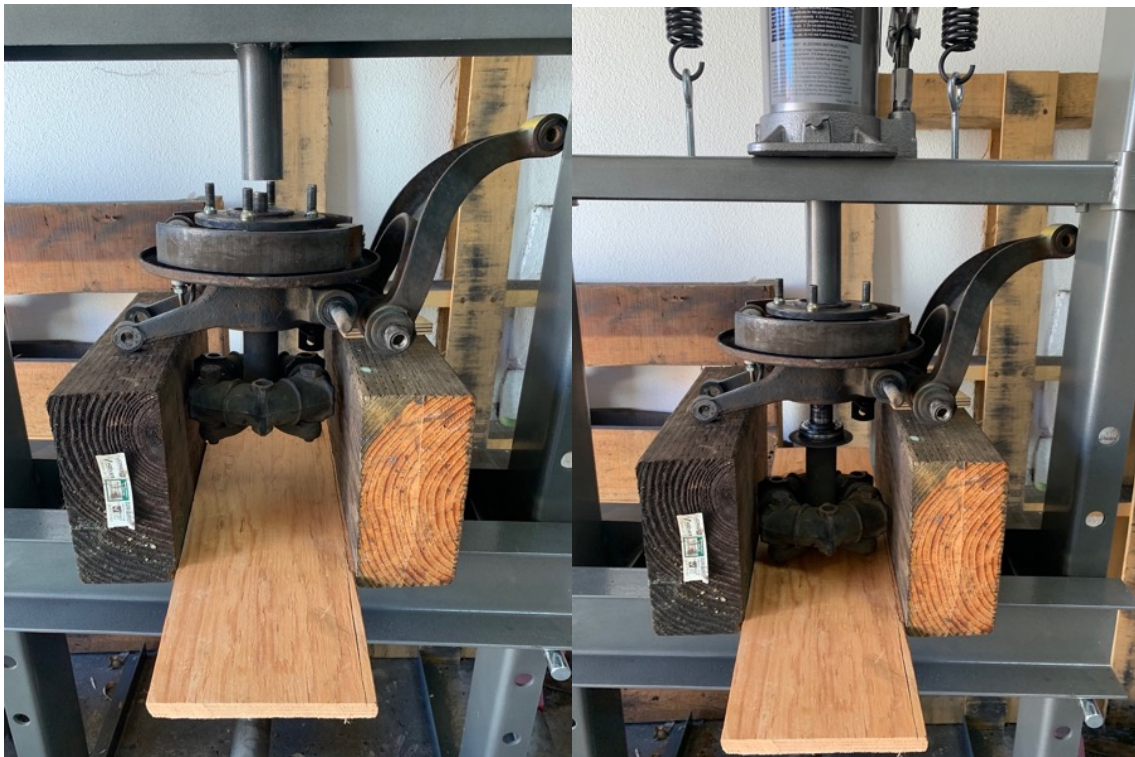
You can try a hub puller with the assembly in the vice if things have gone smoothly but if it has been a crusty journey to this point (which is most likely or you wouldn't be doing this job), a 20 Ton press will be the only way to go.

1. Because the assembly is a multi-dimensional object at this point, especially if your wishbone is stuck, the flat press plates will be useless to support the driveline.
2. Using some stout lumber create some cribbing to support the assembly. The axle **MUST** be vertical and the assembly well supported and level so all press motion is exactly vertical.
3. Place a piece of wood underneath the axle to catch it upon release so it doesn't go bouncing all over.
  - a. **SPECIAL NOTE:** There is a shim on this piece of the axle that you must not lose! They are no longer available and absolutely needed to give the bearing movement. If your axle falls and bounces you could cause damage and possibly lose the shim. Nothing good will come of either event.



4. Once you have the press centered over the axle step to one side and begin the process
  - a. Smooth scenario – axle begins to move with mild pressure and slowly pushes out lightly settling onto catch shelf.
  - b. Not so smooth scenario – Lots of pressure is being applied and little is happening, you grow concerned as pressure builds. Go slow between cranks on the press and make sure cribbing remains solid and assembly is not tilting or sliding. Press on. A sudden pop and bang occurs and axle clangs down onto the catch shelf. You wet yourself.

Cribbed assembly in press with catch shelf, released outer axle and Rotoflex



Great, the assembly is getting smaller and easier to handle, wishbone is still painfully in the way.

Arriving at the hub

Time to flip it over and get that pesky hub out to access the wheel bearings.

1. Flip the assembly over and use the same cribbing (no shims needed this time) and place the edges of the backing plate on the wood.
  - a. This is obviously easier if you are doing the brakes and removed all the brake bits
  - b. Get a large socket (I used a 22 mm because I hardly ever use my metric set) and place it so that it matches the hub.



- c. You only want the press to be pushing on the hub, not the bearings or vertical link.
- d. Press down watching that you are not bending the backing plate and nothing is shifting.
- e. You will have either a smooth or a not so smooth scenario again but hopefully your hub is now resting on the catch shelf.
- f. Another success in the books!

22 MM socket over hub, not touching backing plate, hub free on catch shelf



Time for a break and something easy

Now that the hub is out you can finally get the brake backing plate separated

1. If there are factory metal clips still on the backing plate bolts you will have to bend the tabs back to vertical.
2. Remove the four bolts that hold the backing plate to the vertical link and lift straight up and set it aside.
3. Nice to deal with something easy wasn't it?

Four brass colored bolts hold plate on (Factory locking tabs were missing), Separated backing plate now removed from vertical link.



### Overcoming the stubborn

This next section is for those of us who were unfortunate enough to have the lower wishbone bolt frozen in the vertical member.

There are two options here: 1. Expend effort to release the bolt by trying to press it out or 2. Get violent right away and go for the jugular by cutting and drilling it out. I did option one on the left-hand side and spent endless hours arriving at option two anyway so the right-hand side went straight to option two. If the bolt wouldn't turn with a breaker bar it not likely to release itself under other means.

#### Option 1

1. Spray penetrating oil into the recesses between the wishbone and the vertical member if there is space to do so.
2. While this is soaking set up cribbing in the press to give you a stable vertical alignment like you did with the hub.
3. Once set up get your torch out and heat the section of the vertical member that the bolt is stuck in.

4. Use the press to try and move the bolt. Be careful as these two pieces swivel and if you are not well supported in a vertical orientation, things will move. If you see the two parts starting to sag from the pressure STOP. You don't want to bend or damage these parts and if the bolt is going to move it should give first.

Use caution here, if it doesn't start moving early in the process stop.



5. Likely you are now done cursing and ready to move onto option two.

#### Option 2 (Time to get violent)

1. Place the wishbone in your bench vise
2. Get out your Sawzall (best tool ever made). You probably don't want to use a cutoff wheel in your grinder because it will indiscriminately cut into the wishbone or vertical link which you don't want.
3. The bushing washers and dust seals will likely be in the way but don't worry about damaging those with the saw as they will be replaced.
4. You will have to cut on the vertical link side of the washers because the trunnion is on the wishbone side and is hardened steel which will destroy your blade in seconds. You want to cut through just the bolt.
5. Congratulations, you have just successfully cut your prized possession into pieces!



Washer destroyed by wishbone protected, Note hardened steel trunnions, no bueno on saw blades.



6. There is one last protruding piece to remove which is optional and that is the radius arm bracket bolt. The bracket is welded to the bolt head so your only option is to pull or push it out.
7. Cribbing and press made quick progress. Again, if bolt refuses to move just leave it and refurbish it with the vertical link.

Pressing radius rod bracket bolt out



Just when you thought all the hard stuff was done!

Again, this section is only for those still trying to relieve the lower wishbone bolt from the vertical link.

Again, there are two options at this point: 1. Search online and find a good used replacement vertical link; 2. Attempt to drill the bolt out.

#### Option 1

1. It is worth researching the web to see if a replacement is available just in case you are unable to successfully execute option 2. I was successful on the right side but not on the left side and ended up buying a used replacement vertical link.

#### Option 2

2. This step can be tricky as you must drill out the bolt exactly inside the  $\frac{1}{2}$ ' hole. If you deviate from the bolt you will create a hole that is off center or eccentric which will misalign when you try to put all this together.
  - a. If you have a large enough drill press try clamping the vertical section so it won't move during drilling and align it perfectly vertical under the drill bit.
  - b. Alternatively clamp the link into your bench vice and use a small level to make sure your bolt hole is vertical.
3. Carbide drill bits are the best and most aggressive but will risk drilling off into the vertical link. Titanium bits tend to stay in the bolt hole as the bolt is softer than the link but you may go through a lot of bits.

4. Start with a  $\frac{1}{4}$ " bit and some 3 in 1 oil to keep the bit cool
5. Start your drill very slowly and make sure you stay exactly in the center of the cutoff bolt.
6. Once you have established your hole you can increase your speed.
7. Drill very small lengths as a time to both clear the hole of shavings and let the bit cool.
8. Each time you re-enter the hole fill it with 3 in 1 oil.
9. Drill about  $\frac{3}{4}$  way down with the  $\frac{1}{4}$ " bit.
10. Repeat this process with a  $\frac{3}{8}$ " bit to about half way down
11. Repeat this process with a  $\frac{15}{32}$ " bit again only half way
12. Now take your  $\frac{1}{2}$ " bit and lightly clean the hole of any remaining bolt parts to the half way point.
13. Using a  $\frac{3}{8}$ " bolt, insert it into the hole and use a hammer to see if you can now pound the remaining section of bolt out. You can also try the press.
  - a. This worked for me on the left-hand side, it did not on the right hand side and I had to keep drilling.
14. If you bolt still will not move repeat the above process a little further keeping the  $\frac{1}{4}$ " hole deeper than the larger holes to keep a center point for re-entry.
  - a. Here is where the danger comes in. On the right-hand side I was forced to drill the entire bolt out. Unfortunately, it required using carbide bits and when I finally broke through the other side I was off center. After two hours and numerous drill bits I was back to Option One and had to order a replacement vertical link.

Getting the start hole centered with a  $\frac{1}{4}$ " bit.





I hope the Gods were with you and you were successful in saving your vertical link!

We have now returned to the rest of you who were lucky enough to just pull your lower wishbone bolt (Us less fortunate types curse you!).

### Removing the last pieces

You are almost fully disassembled, you just have the inner bearing, bearing race (or cup), grease seal and the outer bearing race (or cup) left inside the vertical link. The outer bearing and grease seal are still on the bearing.

1. Place the link on a bench with the inner bearing facing down. Using a bearing race and seal driver and a 44.5 mm driver tap the bearing and seal out.
2. Use a 50 mm driver to tap the bearing race (or cup) out. You can also use a screw driver or drift moving around the edges to evenly tap these out.
3. Turn the link over. Since you can't pass a large enough driver through the inner bearing seat to reach the outer bearing race you will have to use a screw driver or drift, again working around the edges to evenly push it out.

50 MM driver to tap out the inner bearing race, screw driver to tap out the outer race



AWESOME! You have just turned your perfectly useable ride into a parts car! Have faith, you are halfway there. From here on out you will be cleaning, refurbishing and rebuilding with clean and shiny new parts!

I know, you are saying wait, we still have not removed the Rotoflex or u-joints. Don't worry, we will get to that in those respective rebuild sections.

The end of the beginning and the beginning of the end

Let's start with something easy for a little while and start by cleaning up the wishbone.

1. Push out or clean out the old bushings. If they are completely disintegrated then a screw driver or wire bottle brush will scrape the remnants out.
2. If the bushing is intact the press is the easiest way.
  - a. I recommend using a box knife and cut away one side of the rubber so that it is easier to push out.
  - b. Stabilize the wishbone on the press allow the bushing to drop down. Either place the wishbone on the edge of the plate or use a large receiving socket underneath when doing the upper bushing.
  - c. Use a socket that is smaller than the wishbone trunnion space (again, use a metric one that you don't use very often) and press down pushing the bushing out.
3. Once the bushings are out use a barrel sander and drill to clean up the inside trunnion spaces to get rid of all rust, paint, debris or damaged surface.
4. Now you can use a media blaster or wire wheel to clean the wishbone removing rust, paint, grease and dirt.
5. Clean the wishbone for paint, prime and paint
6. Once the paint is dry, insert the new upper wishbone bushing.
  - a. You can push it in most of the way by hand then just squeeze it in a bench vice.
7. If you like you can hang it back on the frame mount with a refurbished or new bolt but you won't tighten it until later.

Cut the rubber flange off of one side of the bushing, Using a small socket press the bushing out



Use a drum sander to clean out the trunnion holes, wire brush or media blast the wishbone





Prep, prime and paint



Insert the upper bushing and mount wishbone to Frame but do not tighten yet.



Super! Your first refurbished part is back on the car, there is still hope!

Let's do another easy one:

Depending on your brake situation you can do the same to your brake backing plate.

1. If you are redoing your brakes as well, remove the brake bits, media blast or wire brush the backing plate, prep, prime, paint and re-install any new or refurbished parts
2. If you are not re-doing the brakes just tape off the front, clean up the back and paint it to freshen it up. Make sure you don't get any paint on the brake shoes.

There is a rubber dust cover that goes over the cylinder that is likely missing.



Let's step it up a notch now that you have the refurbishment process down pat and doing a simple bearing removal from the hub.

1. Place the hub on your work bench with the studs supporting it.
2. Place the bearing puller around the bearing with the lift edges between the bearing and the grease seal then hand tighten the puller in place.
3. Assemble the rest of the puller. You are going to need a piece of steel for the puller to push against since the hub has the obvious axle hole in the middle. I used one of my plates from the press.
  - a. This may take minimal or maximum effort depending on the condition of your bearing and hub.
4. Once the bearing is removed you can clean up the hub
  - a. First use rags and a degreaser to clean off the old bearing greast.
  - b. I then used a brass wire wheel on my bench grinder to clean the hub of any light corrosion and dirt so as not to damage the smooth hub surface.

- c. Any wire wheel can be used to clean the rest of the hub.
- d. As long as you are all the way hear I recommend all new bearings rather than simply replacing the old ones.
- e. Inspect your studs too, if they are rusted or threads are bad this is the time to use the press to push out the old ones and push in new ones.
- f. Tape off the axle bearing shaft and studs, then prep, prime and paint the hub

Hub and outer bearing, Puller assembled for removal



You are really on a roll now, making progress left and right.

Since the bearing puller is out let's tackle the outer axle and swap the Rotoflex for something nice and new.

1. Set the outer axle on your work bench pointed up.
2. There are three parts you are removing
  - a. The dirt flange
  - b. A spacer
  - c. A bearing shim
3. Make sure you don't fling that little bearing shim onto the floor and loose it. This is a critical piece that is not reproduced.
4. Once again assemble the bearing puller underneath the dirt flange and hand tighten.
5. You will probably need the extenders on the puller to clear the axle.
6. Start pulling making sure the dirt flange is cupped within the puller so you don't damage it.
7. Slowly pull until all pieces are clear of the lower part of the axle.



8. Once clear you can lift the three pieces off individually put in a safe place.
9. Remove the remaining three bolts holding the Rotoflex onto the axle and add them to the bag that has the inner axle Rotoflex bolts.
10. Now you can simply lift the Rotoflex off

Outer axle (Rotoflex, dust shield, spacer, shim), assembled puller, Dirt shield cupped in puller



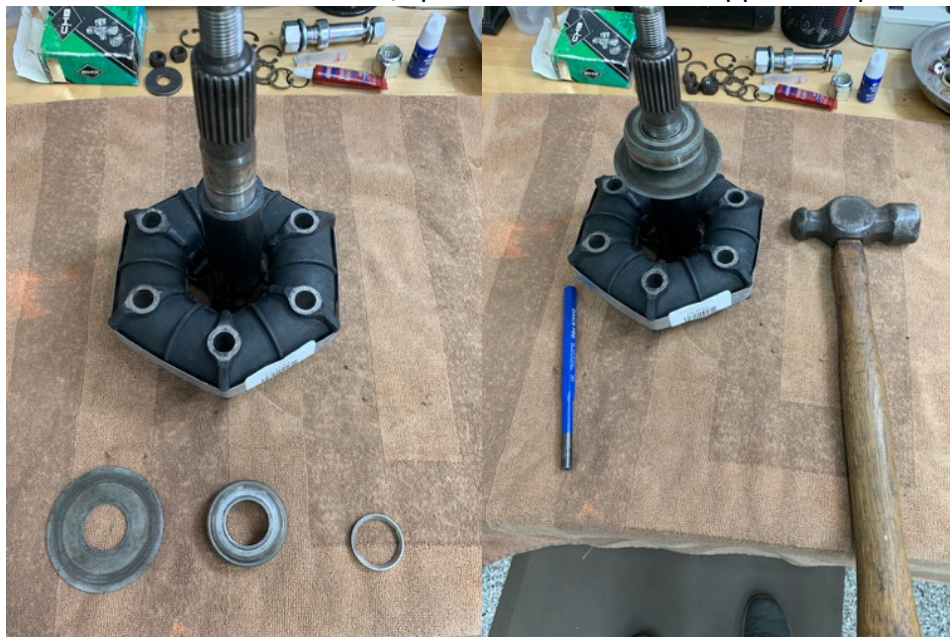
Rotoflex finally exposed for replacement, Dirt shield, spacer and bearing shim, note the shim has a chamfer that faces toward the bearing



11. Just like the hub, clean of grease and contaminants from the bearing section then tape it off and clean, prep, prime and paint.

12. Once the paint is dry put the outer axle back on the work bench
13. Slide your new Rotoflex onto the shaft.
  - a. Note: Leave the metal band on the Rotoflex as the donut is preloaded so the retaining bolts for both axles will line up. You will remove this band once everything is installed.
14. After cleaning the dirt shield (you may want to paint the back side), spacer and shim slide them back on.
  - a. The dirt shield will fall into place
  - b. The spacer will need to be tapped into place, I used a drift and just kept tapping around in a circle to move it evenly down the axle. My first one went on fairly easily, the second one took a long slow time. Stay patient, you will get there. It is in place when the dirt shield can no longer be moved by hand.
  - c. The bearing shim will slide on easily as well, remember chamfer facing up.
    - i. Note some replacement shims did not have the chamfer so this may not apply to your situation.

Refurbished axle and new Rotoflex, spacer will need to be tapped into place evenly





Dirt shield, spacer and shim installed, Note chamfer in shim facing up, insert bolts part way



15. Insert the three shorter Rotoflex bolts but do not turn them past the base as this will have to go back on the press to insert the hub and it will be more stable in the press with a flat bottom.

How about that! Another piece of the puzzle back together.

As long as we are talking axles, lets clean up and replace the u-joints in the inner axle.

1. If you only made a mark on the axle to differential flange now is a good time to put a small bolt in that hole as your mark will likely disappear during refurbishment.
2. Lay the axle on your bench and use your retaining ring plier to remove all four snap rings.
  - a. Note: These may be crusty so a little penetrating fluid and a small tipped screw driver may be helpful in prying these out. You want them out in one piece but don't worry about bending them. Your new u-joints should come with new snap rings.

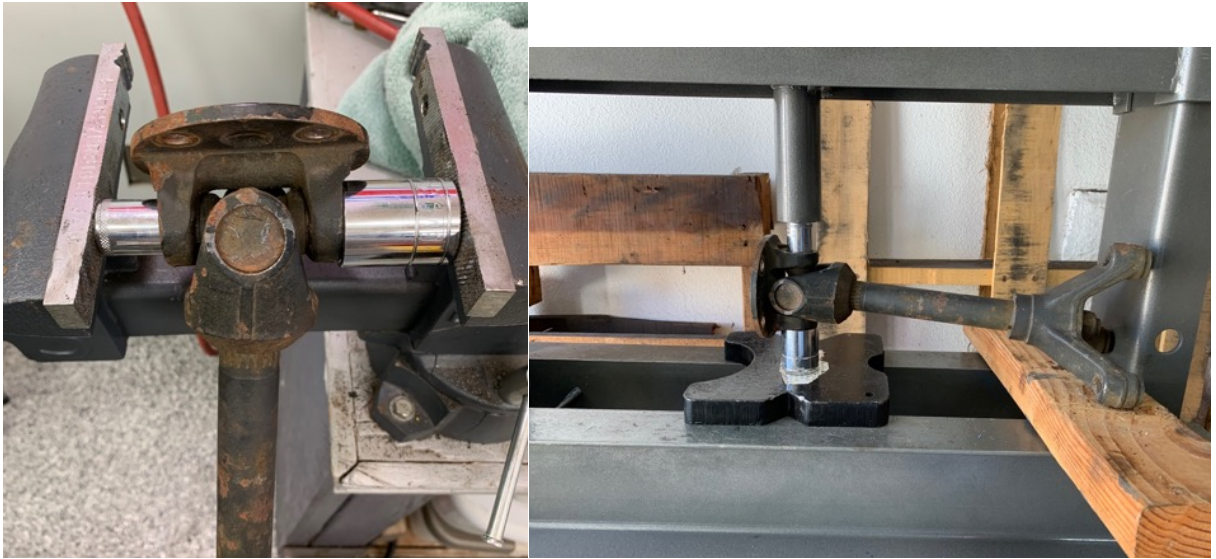


Retaining ring pliers for squeezing & removing the snap rings on all four cups



3. U-joints need to be pushed one side at a time so start with the flange.
  - a. Use a large socket bigger than the bearing cup as a receiver and a smaller socket as a pusher.
  - b. This takes some dexterity for one person but place in a vice and close the vice. This should push the bearing (and flange to one side into the receiver socket. You can only push until the flange hits the axle.
  - c. If this moves you are in great shape. If nothing moves and you run out of strength to close the vice then it is back to the mighty press.
  - d. Set the receiver socket on the press plate, line up the bearing over it, put the pusher socket on top and start pressing. Be cautious as the press can destroy things.
4. Once the bearing is pushed out about 1/4" or so the idea is that you can take a pliers and pull the bearing cap straight off. You may have to try and clamp the edges of the cap in the vice and use the leverage of the axle to help extract it.
5. Once the cap is off flip the axle over and repeat the process pushing the u-joint back in the other direction exposing the opposite cap.
6. Remove the opposing cap and you will now have created enough clearance to remove the flange.
7. Repeat this process on the axle.
8. For any of you who are having my experience where the bearings and caps are frozen in there is one option left and yes, it is resorting to violence again?
  - a. Get out your cutting wheel on the angle grinder
  - b. If you can at least push the bearing to one side this will help with clearance
  - c. Clamp the axle in the vice
  - d. Being careful not to cut the flange or axle, slice off the bearing cups and free your parts.

Pusher and receiver socket vice method, Press method



Exposed bearing cup to pull off, cutting wheel destructive method



9. Clean your flange and axle as before with either a media blaster or wire wheel
10. Use a drum sander to clean any corrosion inside the bearing rings of the axle and flange
11. Prep, prime and paint
12. Once your paint is dry you will need to use your drum sander again to clean the any paint out of the bearing rings. If you don't do this you will have a tougher time putting the new bearing caps in. Use a small screw driver to clean out the snap rings seats as well.

Using a drum sander to remove paint from bearing seats, Ready to re-assemble



13. Carefully pull the bearing caps off of two opposing sides of the new u-joint.
  - a. Do this smoothly and gently set them open side up on your workspace
  - b. These have tiny needle bearings inside stacked against the wall of the cap. The needle bearings are held against the wall by grease. If any move out of alignment into the cup you must put them back into place. I use a small screw driver to basically mash them back up against the wall of the cap.
14. Carefully insert the u-joint into the axle positioning the shafts into the receiving holes.
  - a. Note: the grease fitting should face the axle side so that it can be accessed in the future for greasing.
15. Move the u-joint to one side so the shaft sticks out of the receiver hole and slide a bearing cap back on making sure you are pushing equally into the bearing ring. If you are at an angle it will not go in.
  - a. Note: make sure the cap goes straight onto the shaft so you don't displace any of those needle bearings.
16. Push the cap and u-joint with your thumb or finger into the receiver moving the u-joint back to the opposite side so you can place the second bearing cap back on.
17. With your thumb and index finger you should be able to squeeze the bearing caps on the rest of the way while centering the u-joint inside of the snap clip receiving grooves.
18. Using the retaining ring pliers insert a clip on one side, you may need to use a small tipped screw driver to help seat the clip in its groove all the way around.



19. Insert the snap ring on the other side.
  - a. If the snap ring groove is not cleared and you can't push with your finger any more, place the assembly in a vice and use a small socket to push the bearing cap in just enough to clear the snap ring groove. Pushing any further will cause damage to the u-joint.
20. Repeat the same process for the flange.
21. Use light hammer taps around the axle and flange (not on the u-joint) to help settle the bearings and u-joints in.
22. Using a grease gun, add grease through the grease valve until you see grease come out all four bearing caps. Wipe off the excess grease.
23. Move the flange and axle to work the u-joint so it operates smoothly.

Grease fitting on axle side



Insert U-joint without caps



Insert cap on one side



Insert cap on other side



Install snap ring on one side.



Install snap ring on other side



Remove remaining cups, Insert into flange, Light pressure may be needed to align u-joint



Gently add fresh grease until it comes out of all four caps, wipe off grease, ALL DONE



Wow, you are knocking it out of the park now! Things are looking brand new!

We can't put it off forever so now it is time to start rebuilding the vertical link and start reconstructing the driveline assembly.

1. You guessed it, step one is more of the same. Degrease, clean, prep, prime and paint the vertical link as well as the radius arm bracket (you may or may not have separated it).
  - a. Note: If you are using a media blaster I might recommend sealing off the bearing and hub receiver area so as not to leave any grit or scoring behind.
  - b. I degreased everything in a parts cleaner then wire wheeled the exterior
  - c. Tape off the bearing and hub receiver to keep any paint from entering
2. Great, now that the paint is dry we can start the re-assembly.



3. Using the bearing and race driver tap in the inner and outer bearing races seating them against their respective ledge inside the vertical link.
  - a. A bearing race driver is much better than a drift or screw driver as it evenly pushes the race and seats it against the ledge without risking damage. The race must be flat against its seat, any angle will be bad.

Refurbished vertical link, Grease seals, races and drivers, bearings



Inner race and driver, inner race seated, outer race ready for driving in



4. Time to pull the brake backing plate out and install it.
  - a. This must go on before the hub
  - b. If you are servicing the brake pads etc... those can wait until the very end.
  - c. The brake cylinder should be at the top (two forks of vertical link)



5. I was unable to source the factory locking tabs to lock the bolts holding the backing plate so I used blue thread lock on the bolts.
  - a. This is a good time to torque these down as you can still place the vertical link in a vice and thread lock is wet (Manual says 15-18 ft-lbs).

Backing plate on link, thread lock, plate bolted and torqued



Well things are starting to look like they used too only a whole lot nicer.

Well the easy parts are done, it is time to install the bearings and hub and establish “bearing float”. This is a very iterative and somewhat frustrating process as the only absolute is a full assembly process. Many web articles give multiple ways to pre-measure yet they all end up disassembling and trying again regardless so I am going to skip those technics and illustrate what I did.

Bearing float is a tiny amount of back and forth movement on the inner and outer bearings. When the hub and axle come together they compress those bearings but you don’t want to compress them too much or you will overheat then and they will fail, that would be bad!

Triumph uses a spacer and shims to manage this. Hopefully you did not lose those items when you separated the axle from the hub. The shims create a standoff gap so the bearings keep a freedom of movement. The factory limits are .0005-.0025 so this is pretty small and shims are pretty thin. If you are re-using all of the same parts except for new bearings the hope is that the same shims will work. I had to replace one of the vertical links and new shimming was required.

The first step is to dry fit and determine how far off your shims are. If they are close then full assembly will follow, if they are way off shims have to be made.

Dry test fit (no grease yet)

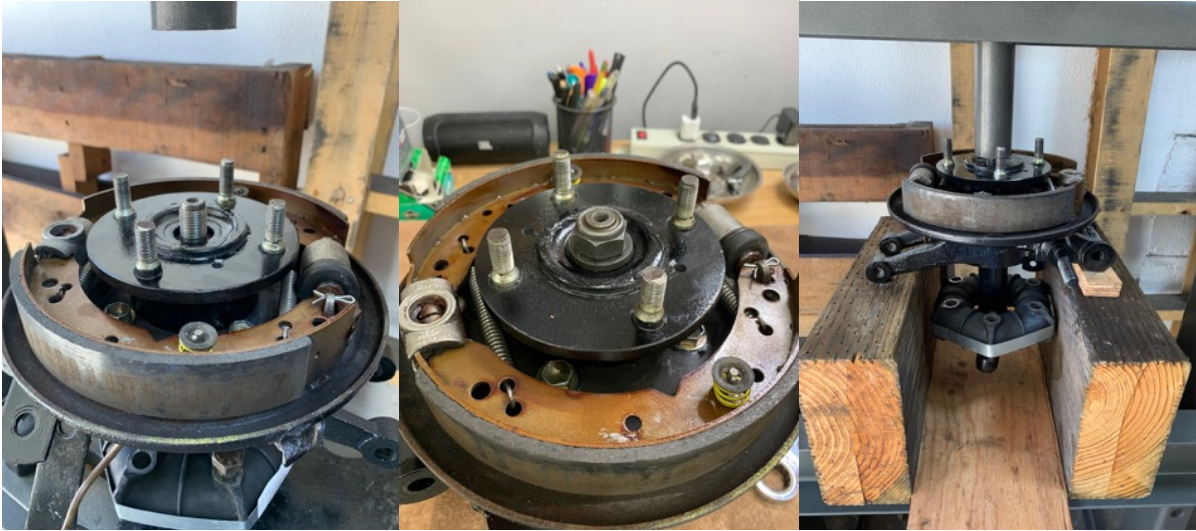
1. Place the grease seal over the hub.
2. Place the outer bearing onto the hub and use a drift rotating around the bearing so that it slides on evenly. This will take a little time and care. You can also place the bearing into its race on the vertical section and press the hub into it but you will take a risk of pressing in at a slight angle and damaging the bearing.
3. Once the bearing is fitted you can place the assembly into the vertical link, turn it over and place it in the press.
4. The inner bearing also has to be pressed onto the hub. Place the assembly into the press and place the bearing onto the hub. Use a 1 ¼" socket to press on the inner ring of the bearing and press in until it seats in firmly. You need to make sure it goes all the way on for an accurate shim measurement but don't crush it down. Stop when the bearing stops moving downward.
5. Now set the outer axle on the press with spacer and shims and slide the hub down onto the splines making sure you line up the splines to prevent damage. The hub will likely onto the splines about a ½" or so.

Grease seal and outer bearing set on hub, Press on inner bearing, press onto axle



6. Press the hub onto the axle about 3/4 of the way down, enough to have the threads accessible to turn on the axle nut. Do not press it on all the way.
7. Take the assembly to your vice and tighten the axle nut to the factory 100-110 ft-lbs. This will snug the assembly up slowly and prevent damage. The assembly is now preloaded which everything is tightened to operating specs.
8. Now it has to be disassembled to check the shim requirements.
9. Remove the axle nut and return to the press and push the axle out like you did during disassembly keeping track of your shim(s) when the axle drops out.

Enough threads showing to apply nut, torque down assembly, press axle back out



10. Place the assembly on the bench with the inner bearing facing up.
11. Take the shim(s) off of the axle and set them in the inner bearing.
12. The shim(s) should sit higher than the edges of the bearing and elevation difference should be the .0005-.0025" float. If the shims sit below the bearing this means the axle and hub will compress the bearings and cause them to fail.
13. Take a flat piece of metal and lay it across the shims and bearing.
14. Use a feeler gauge to check the elevation of the shim above the bearing edge. No gap means more shimming is needed, too much gap less shimming is needed. You want to be in the .0005-.0025 range.

Shim in center of bearing over hub, flat piece of metal resting on shim, feeler gauge to measure distance from bearing to shim

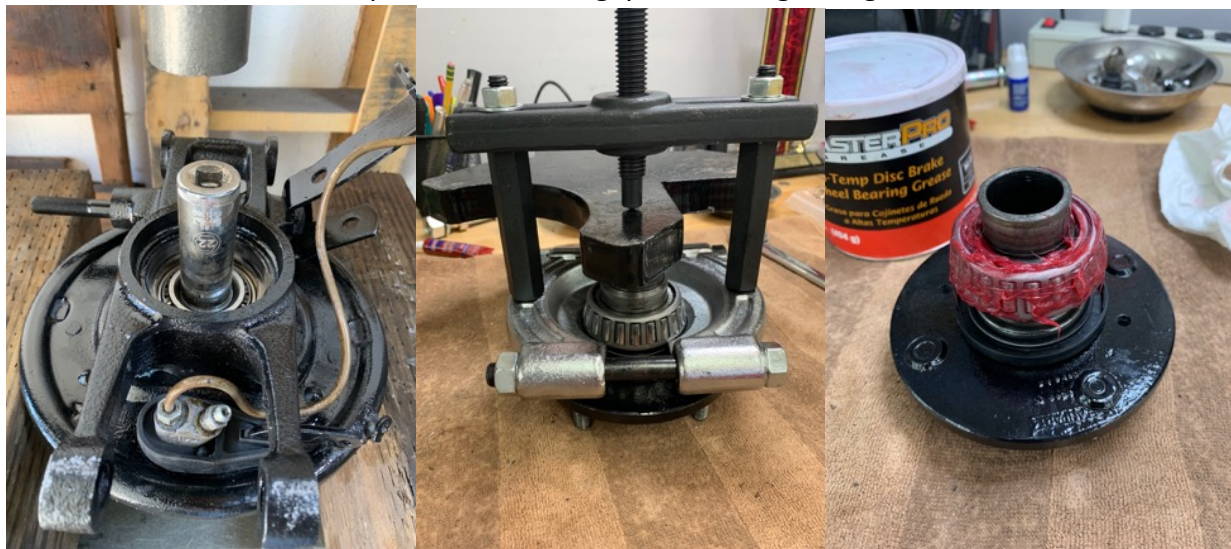




So now you have an idea where you stand on “bearing float” so time to disassemble and begin your assembly.

1. Back to the press and using a 22mm socket, press the hub back out. Make sure whatever socket you use only pushes on the hub and not the bearing.
2. As before pull remove the outer bearing.
3. Pack the bearing with grease, there are plenty of You Tube videos showing how to do this if you are not familiar.
4. Make sure your grease seal is still on the hub and place the bearing on just like the dry fit and drift it on until it is fully seated.

Press out hub, pull wheel bearing, pack bearing with grease and re-fit



5. Place the vertical link onto the hub and bearing.
6. Pack the inner bearing with grease and slide it on to the hub.
7. Using a bearing driver tap the inner bearing into place but don't go all the way, if you do the hub will be locked by the two bearings and you will not have any float. The axle nut will pull things together like you did in the dry fit.
8. Using the appropriate bearing driver tap in the grease seal

Drive in outer bearing about 90% of the way, insert grease seal, assembled inner bearing & seal



9. Before re-inserting the axle place the appropriate shims on the axle, if you are lucky what came off is all you need to place back.
10. If you need less shim, lapping off a thousandth of an inch at a time from the current shim is one way or change out the shims to match what you measured earlier.
11. If you need more shim then adding is necessary. I was unable to source replacement shims so I took a copper washer with the correct shaft size and slowly lapped it down to one thousandth over what I measured knowing copper will compress some. I don't know if this is a good idea or not but it did work, try at your own peril.
12. Re-insert the axle and tighten down to spec. pulling everything into position.
13. Try moving the hub and axle independent of the vertical link, if you feel a lot of play you have too much shim.
14. Using a distance dial lift on the backing while holding the hub with your thumbs. If there is no movement at all there is too little shim.
15. If you nailed it and have between .0005 and .0025 float then you need to immediately go out and buy a lottery ticket because you are the luckiest person on the planet.
16. Disassembly, shim modification and re-assembly are iterative until you nail the float. This is painful but seems to be the only way to get there.



Copper washer lapped to thickness  $+.001$ , hub back on axle and pulled together by torquing axle nut to specification, float measured with a distance dial.



Now that you are intimate with your hub and axle assembly and nailed the bearing float, the rest will seem like a cake walk.

Time to attach the Rotoflex and half shafts

1. Insert the short bolts attaching the Rotoflex to the outer axle, I placed some blue thread locker on these as well. Firm up but don't torque yet.
2. Insert the long bolts and attach the inner axle the same way
3. Now torque all six bolts to factory spec. (manual says 65-70 ft-lb)

Fasten Rotoflex to outer shaft, fasten inner shaft, completed assembly

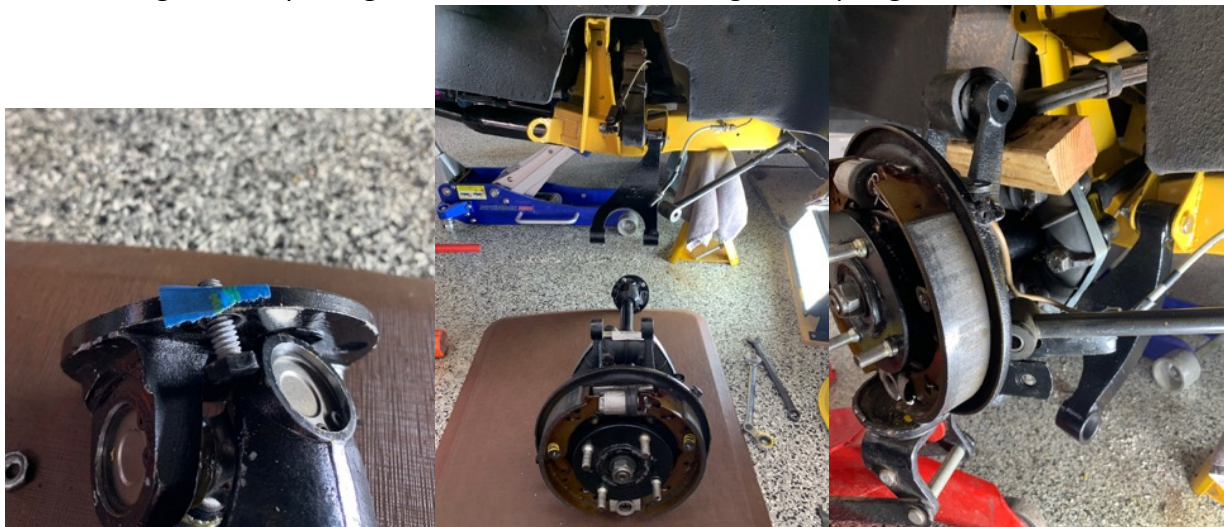




Congratulations, the driveline assembly is complete! Time to make your car whole again.

1. If you did not already install the wishbone to the frame now is a good time but do not tighten the bolt.
2. Use a piece of tape or something to mark the flange as you can no longer leave a bolt in to mark it.
3. Lay out the assembled driveline in the proper orientation and rotate the axles so the marked flange will be close to the mark on the differential.
4. Use a floor jack to support the hub and brake assembly while inserting the axle over the frame and align with the differential flange as reasonable possible.
5. The first step is to attach the vertical link to the spring.
6. This was accomplished by placing a block of wood between the assembly and the spring then jacking up the hub. The wood pushes the spring up as the assembly rises allowing the eyelets to align.
7. Insert the link to spring bolt but do not tighten. This part really helps as the assembly is now supported by the car and not you.
8. Lower the jack and remove the block of wood.

Mark flange with tape, align driveline for insertion, align leaf spring mount and insert bolt



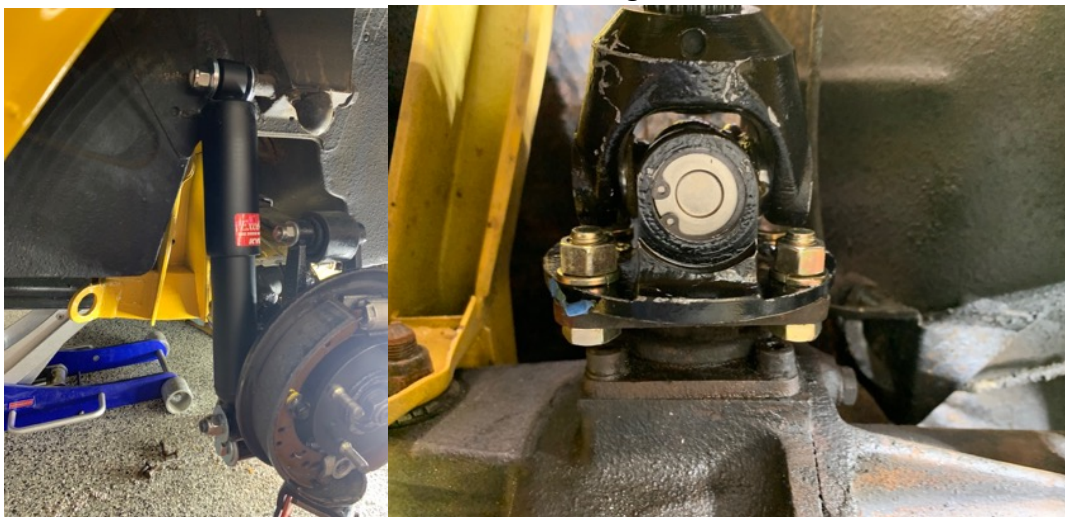
9. Insert the trunnion bushings and dust seals
10. Using the jack to move the hub up and down, align the wishbone with the vertical link holes and start sliding the bolt in adding each of the trunnion bushing parts as you go. The alignment and insertion of all the parts will take some fiddling to get everything lined up.
11. Firm up wishbone bolt but do not tighten
12. Align the radius arm and insert bolt, do not tighten.

Trunnion bushings and seals, wishbone attached, radius arm attached



13. Install the shock but do not tighten.
14. Insert the drive flange bolts and tighten, this will take some fiddling with the floor jack and your hands to align the marked hole and the assembly as a whole. If you are using new bolts make sure they have clearance on the diff side when the driveline is rotated.
15. The manual says to lower the car to the ground and settle the suspension before torquing all of the fasteners. I found it difficult if not impossible on most bolts as once the wheel is installed and the car is on the ground there is limited to no access to the fasteners with a torque wrench.
16. Going against the manual I elected to torque everything down while I had access. You will have to choose what works for you.

Shock installed, drive flange attached



17. If you are redoing your brakes now is a good time to install your new pads, cylinder etc...
18. Re-attach the brake hose and line,



19. Re-attach the emergency brake cable
20. Slide the drum onto the hub and insert the retaining screws.
21. Adjust the brake pads according to the manual with the adjusting screw

Attach brake hose and brake line, attach emergency brake cable, attach brake drum



22. If you have a center locking wire wheel adapter that is your final install, be sure to torque the nuts holding it on (manual says 45 ft-lbs).
23. Don't forget to bleed your brakes.

Wire wheel adapter installed, Final assembly





Awesome, you have just accomplished a major task you thought was impossible!

Be sure to test your brakes in the driveway then go for a short test drive to make sure everything is working. You may want to return to the garage and recheck your torque settings.

I hope you found some of this helpful and perhaps you found better and perhaps smarter ways to accomplish the various tasks.

Happy motoring!

Torque specs

GT6 MK 2 & PLUS		
to vertical link	$\frac{1}{2}$ " U.N.F. $\times$ 7" bolt	55—60
ig eye to vertical link	$\frac{7}{16}$ " U.N.F. $\times$ 4" bolt	42—44
ibone—outer	$\frac{1}{2}$ " U.N.F. $\times$ 7" bolt	55—60
e shaft to rear hub	$\frac{1}{2}$ " U.N.F. on shaft	100—110
te drive shaft to flange	$\frac{1}{2}$ " U.N.F. on shaft	100—110
oupling to flange	$\frac{1}{2}$ " U.N.F. $\times$ 3-19" bolt	65—70
oupling to flange	$\frac{1}{2}$ " U.N.F. $\times$ 2 $\frac{1}{4}$ " bolt	65—70
n to bracket	$\frac{1}{2}$ " U.N.F. $\times$ 1 $\frac{1}{4}$ " bolt	28—30
n mounting bracket to attachment plate	$\frac{1}{2}$ " U.N.F. $\times$ 7" bolt	55—60
n mounting bracket to vertical link	$\frac{7}{16}$ " U.N.F. $\times$ 2 $\frac{1}{4}$ " bolt	42—44
bracket to vertical link	$\frac{1}{2}$ " U.N.F. $\times$ 2 $\frac{1}{4}$ " bolt	55—60
op fixing	$\frac{1}{2}$ " U.N.F. $\times$ 7" bolt	55—60
l to hub	$\frac{1}{4}$ " U.N.F. wheel stud	38—42
g to axle housing	$\frac{1}{4}$ " U.N.F. stud	28—30
n radius rod	$\frac{1}{2}$ " U.N.F. on rod	42—44
<b>EXHAUST SYSTEM</b>		
ont clin to silencer	$\frac{1}{2}$ " U.N.F. $\times$ 2 $\frac{1}{2}$ " bolt	6—8

mm. hub end float).

## REAR SUSPENSION

Brake back plate attachment	GT6 Mk 1 and Vitesse 2 Litre	$\frac{1}{16}$ " U.N.F. bolt	16—18	2.2—2.4
Damper top mounting		$\frac{1}{4}$ " U.N.F. fulcrum pin	42—46	5.8—6.4
Damper bottom mounting		$\frac{1}{16}$ " U.N.F. vertical link	30—32	4.1—4.4
Radius arm pivot brackets to floor		$\frac{1}{8}$ " U.N.F. $\times$ $1\frac{1}{4}$ " setscrew	28—30	3.9—4.1
Radius arm attachment		$\frac{1}{8}$ " U.N.F. $\times$ $2\frac{1}{4}$ " bolt	28—30	3.9—4.1
Radius arm attachment		$\frac{1}{8}$ " U.N.F. $\times$ $2\frac{1}{4}$ " bolt	28—30	3.9—4.1
Vertical link plates to hub and spring ends		$\frac{1}{16}$ " U.N.F. $\times$ $3\frac{1}{8}$ " bolt	42—46	5.8—6.4
Wheel attachment disc		$\frac{1}{8}$ " U.N.F. stud	38—42	5.2—5.5
Wire wheel extension attachment		$\frac{1}{8}$ " U.N.F. stud	45	6.2
Wheel hub to axle shaft		$\frac{1}{4}$ " U.N.F. shaft	100—110	13.8—14.1

## STEERING

Clamp to steering column	$\frac{1}{4}$ " U.N.F. $1\frac{1}{4}$ " bolt	6—8	0.8—1.0
Clamp socket screw	$\frac{1}{16}$ " U.N.F. grub screw	18—20	2.5—2.7
Coupling upper to lower	$\frac{1}{4}$ " U.N.F. bolt	6—8	0.8—1.0