TRAILING ARM REFURBISH

SAFE HARBOUR STATEMENT:

This "How I installed it" essay is presented as general information and has been prepared by a Triumph TR6 owner with very limited auto mechanic knowledge. The installation procedures shown in this document are not professional instructions and are not intended to be such. The rear suspension of a 1969 Triumph TR6 was successfully refurbished with these amateur procedures and I was not injured during the process.

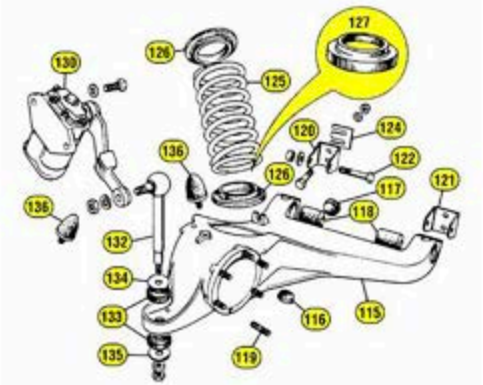
The following essay documents the removal of the passenger side rear suspension and replacement of a broken trailing arm. Therefore these procedures can be used also in refurbishing all or portions of the rear suspension. Specifically, the routine and fairly easy task of changing out the trailing arm bushings is presented. Also presented is installing new coil springs and refurbishing the Armstrong lever shock absorber.

REAR SUSPENSION COMPONENTS:

Triumph TR250/6 Suspension & Steering

Rear Suspension **Moss Motors Reference Sketch**

Rear Suspension



Parts purchased: 116, 118, 119, 125, 126, 132, 133, 134, 135 & 136. Additionally, every bolt, washer and nut I removed was replaced with new, grade #8 equal sizes. New fasteners cost very little $$ and provide peace of mind. I used Loctite Blue on all threads.

TOOLS I USED TO INSTALL PROJECT:

The project requires removing the drive axle and u-joint from the differential. The working space is very confined and I found it was easiest to use a 1/4" and 3/8" flex-head ratchet. Not shown are various length extension shafts. Two each 1/2" by 9/16 box wrenches and one each 1/4" drive with 1/2" and 9/16" sockets are needed to remove the u-joint.

T/A BUSHING INSTALL TOOL:

The two Trailing Arm rubber bushings (part 118) usually require a hydraulic press to remove old and install new ones. I do not own a hydraulic press so I made a tool that functioned pretty well with only "elbow grease" for power.

2 foot length of 5/16" of All-thread, various diameter steel washers, one 1.5" deep socket that the All-thread can pass through, several 5/16" nuts and two wrenches for the 5/16" nuts.

TRAILING ARM REFURBISH

BUSHING TOOL CLOSE-UP PHOTOS:

Bushing tool at initial stage of removing old rubber bushing thru T/A opening.

Bushing tool with socket extention to complete Removal of old rubber bushing.

REAR SUSPENSION REMOVAL:

As an amateur trying to perform auto mechanics, my own safety is always foremost in my mind. Working beneath a car scares me. Particularly with a wheel hub sitting right smack dab on my chest.Therefore, I probably take more safety precautions than are needed.

First, I put chocks at both front wheels and with emergency brake on and car in gear, I loosened all the wheel lug nuts on both rear wheels.

I jacked up the rear of the car, removed one wheel and installed a jack stand. I then placed a hydraulic jack under the frame, forward of the wheel well.

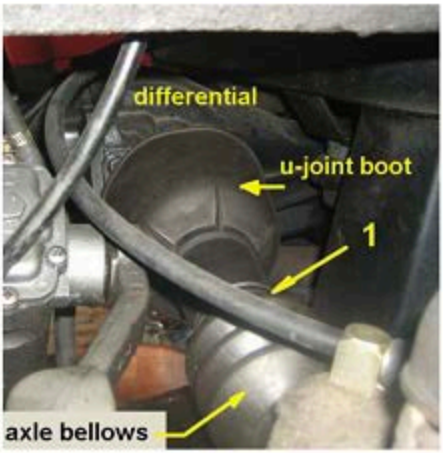
I then jacked up the other side of the car, removed that wheel and set that side of the car on a jack stand.

I then installed a 4th jack in the middle of the rear frame and pounded the front wheel chocks tight with a large hammer. I set the hydraulic jack as an emergency stop that would not let the car fall any further than the depth of my chest.

You will see a scissor jack in several photos. I used it as a working tool and not as a car support device.

I let the car sit overnight to make sure it did not fall down of it's own accord. It did not fall.

TRAILING ARM REFURBISH

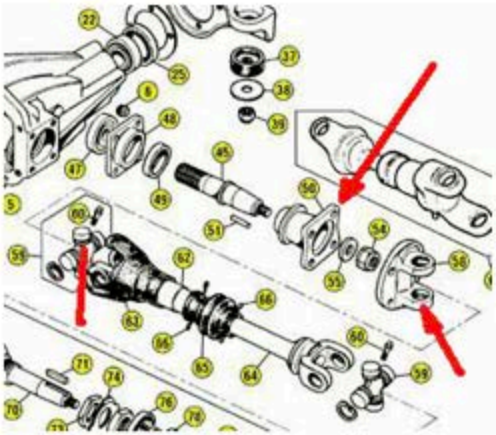


The axle yoke (58) is connected to the differential driving flange (50) by four (4) bolts and nuts. The axle yoke is connected to the axle by a u-joint like (59). The axle yoke and four (4) bolts are found inside the u-joint rubber boot shown in the upper left photo. The axle bellows boot is (65) .

The rubber u-joint boot easily peels back upon itself to expose the four axle yoke bolts. You can access the four bolts with a 1/4" flex head ratchet and extension piece with socket. Put the car in 3rd or 4th gear and you can loosen one bolt. Back to neutral, rotate the axle 90 degrees, back into gear and loosen another bolt, etc., until all four (4) bolts are loosened.

In the photo below, it looks like you can get the drive flange bolts off without going under the car. In my case it was not possible because the socket jammed tight against the u-joint, after the bolts were loosened.

A whole lot of suspension pieces must be removed in order to get to the rubber Trailing Arm bushings themselves. Everything connected to the Trailing Arm must be removed.



The first order of business to disconnect the axle from the differential housing. All in all, this is the single most difficult aspect of changing out the Trailing Arm rubber bushings. It is also the most dangerous.

Now comes the scary part. You must lie on your back, under the car, with the wheel hub on your chest to remove the four (4) bolts and nuts completely. I needed two (2) identical box wrenches to accomplish this task. The diffy is in neutral for this job since you must rotate the axle for each bolt and you have the two (2) wrenches to counter torque each other for resistance.

Be sure to wear safety goggles as a lot of crud falls down in your face.

TRAILING ARM REFURBISH

Take a rest break after you have the four (4) bolts out. The worst task has now been accomplished. WHEW!

Wow, that icy cold coca cola hit the spot. Now back to the Trailing Arm bushing change out.

The next step is to disconnect the wheel hub from the Trailing Arm. The wheel hub is fastened to the Trailing Arm with six (6) nuts onto threaded studs. There are two access holes to permit removal of the nuts. The studs might come out with the nuts and that's OK also. New ones will be installed.

The top nut (indicated) is a bit difficult to get onto with a socket because of the brake spring. Keep at it and you can get a 1/4" drive ratchet and socket onto it.

Remove a nut, rotate 60 degrees, remove another, etc. until all six (6) are removed. Keep one nut, label it and put it in the box with the axle yoke fastener.

Now, disconnect the emergency brake cable from the wheel hub (4 above right) and from the trailing arm. Push the cable out of the way.

Now disconnect the brake pipe at the first connection away from the wheel hub- (3 above right) on my car that was about six (6) inches away. Put a bowl or something under the car to catch the brake fluid that flows out.

Now very slowly, you are able to pull the wheel hub (5 above right) away from the Trailing Arm and the axle will follow through the Trailing Arm opening.

The axle with separate into two pieces (1 and 2 below) as you withdraw it through the Trailing Arm opening. That's just fine. Remove the inner side (2 below) from over top of the Trailing arm.

TRAILING ARM WITH WHEEL HUB REMOVED

Now the Trailing Arm is starting to be shed of things attached to it. All that remains to remove are the coil spring and shock lever link. Nice Job!!! At this point a sandwich break is needed. Maybe a nice Cubano and a bottle of cold Gatorade blue.

TRAILING ARM REFURBISH

REMOVE COIL SPRING

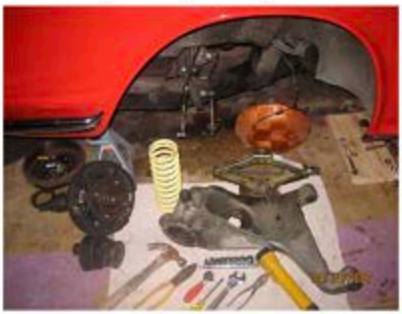
This next step is important that you get it correct. The coil spring is still under compression and loaded. The compressive energy of the coil spring is held in place by the vertical link arm that connects the Trailing Arm with the Armstrong shock lever, as indicated above by the yellow arrow. The coil spring is supported on the bottom end by the main body of the Trailing Arm, as seen above. The coil must be removed in order to remove the Trailing Arm.

The coil spring must first be decompressed in order to remove it. I used a scissors jack supporting the Trailing Arm to slowly lower the coil spring. Raise the jack until it fully supports the Trailing Arm. Now remove the nut, rubber cushion and steel washer from the underside of the vertical link. The coil spring is now free to move downward as you slowly lower the jack.

Lower the Trailing Arm with the jack until you are able to pull the coil spring free and remove it. A circular rubber seat is on the top and bottom of the coil spring. Throw them both away since you will be installing new ones.

Once the coil spring is removed, keep the Trailing Arm on the jack as shown above. It is now time to finally remove the Trailing Arm. You will need an open end wrench and a ratchet and socket to remove the long bolts that attached the Trailing Arm to it's two (2) mounting brackets. The bolts run through the rubber bushings you are going to remove and then replace. These two bolts are very tight so be careful for skinned knuckles. Keep, label and put one set of bolt and nut in your fastener box.

Once both bolts are removed, the Trailing Arm can be pulled free from it's two mounting brackets. You might have to give it a sturdy yank to break it free. You should have a pile of suspension parts like below.



TRAILING ARM REFURBISH

You have now successfully removed almost the entire rear suspension from one wheel well. The only part remaining in place is the Armstrong lever shock absorber. Changing out the Trailing Arm bushings is also an excellent time to perform routine maintenance upon the shocks.

The lever shock is connected to the frame by two large bolts that pass through threaded holes. The vertical piece shown above is the link arm between the shock and the Trailing Arm. Mine was obviously old and deteriorated and I had ordered a new set to install with the T/A bushings. Worth considering. The shock oil add access cap is also shown with the 3rd blue arrow.

Remove both shock attachment bolts, label them and put them both into your fastener box. Your rear suspension area should now look like the photo below.

The foremost shock bolt on my car had a Loknut that needed to be removed. The photo above demonstrates the ratchet and socket combination needed to remove the shock fasteners from the frame- very tight working space.

This is what an Armstrong lever shock looks like removed from the frame. The vertical piece is the shock link arm that connects to the Trailing Arm. The link arm above shows the two (2) new rubber bushings, two (2) new metal washers and new Loknut at the bottom of the arm.

TRAILING ARM REFURBISH

Armstrong lever shock in approx. orientation as when mounted in a TR rear. The bushings and metal washers are newly installed. The vertical piece links the shock to the trailing arm that will ride between the set of bushings. The ride harshness adjusting spring is 2X enlarged for clarity.

General interest- refilling the shock after a thorough cleaning. Maybe 150 CC of new oil went in the shock cylinders w/ another 100 CC all over me. Note the color of the oil that I removed by gravity over a 24 hour draining period. Thick/gooey maybe 20 CCs or so.

The Armstrong lever shock has a tiny oil weep hole where the horizontal arm meets the main body. I think this is to permit lubrication of the arm as it rotates on axis and also to wash away road dust and sand. This oil weep is also why new oil needs to be added as routine maintenance.

Loosen the large hex head adjusting spring and remove the assembly. Wipe it clean of any crud with a rag and set it aside.

Now remove the oil filler cap and place the shock main body into a pan of your choice to drain the old oil. The shock body must be placed vertical in order to drain properly.

Work the lever arm up and down a few times to get the "feel" of it and to move some oil downward. The lever arm action should feel smooth and not gritty. If the action feels gritty, stop and go no further. Your shock needs rebuilt by professional or replaced.

Allow the shock to drain oil for 24 hours. The oil in your shock is probably very old and thickened with time. My shock contained almost no oil and it looked burned. See photo above right.

Replace the cleaned ride adjustment assembly in the shock bottom and add new oil through the fill hole on top. I used 15W motorcycle fork oil.

Add some oil, work the lever arm up and down to move oil throught the shock. Stop and let the bubbles rise to the top. Add more oil, stop, etc. until the shock is filled to maybe 3/8" from the top. You need an air space for compression.

"Feel" the lever arm as you move it up and down. The action should require a good bit of pressure on your part. The lever movement should be smooth and not gritty or jerky. If the lever action is gritty or jerky the shock probably needs rebuilt by professionals or replaced.

Repeat the oil drain process for 24 hours to remove any crud inside. Add new oil and tighten oil access cap. Go to a bolt store and purchase new, grade #8 fasteners to replace the ones you took out. Put Loctite blue on the bolt threads and torque to around 60 pounds or so.

Now back to the Trailing Arm bushing change out.....

TRAILING ARM REFURBISH

Well OK, now it's time to refurbish the Trailing Arm in preparation of installing the new rubber bushings. There are four (4) rubber blanking caps that cover holes in the main body of each Trailing Arm. (Moss parts 116 and 117 that you ordered and have on hand), you need 8 total for both Trailing Arms.

Remove the blanking caps and vigorously shake the Trailing Arm to dump out the inside contents. You can see from above, mine had a bunch of white sand in it. Clean the blanking holes with a round file and steel wool. Install the new ones.

Remove and replace the bump stop and clean the coil spring seating area indicated by yellow arrows. I used a wire brush head on the end of my electric drill to clean the coil spring seating area.

Now come the pert everyone seems to fear- The dreaded rubber (or urethane) bushings). Get out the All-thread tool you put together and dry fit the pieces to get a feel for the tool.

Great! Now for practice, I recommend you use the bushing tool to ***remove*** the existing, old Trailing Arm bushings. It will give you a feel for the tool and greatly lessen the frustration factor during installation of the new rubber bushings. You can opt to drill out the old bushings but then you will not fully understand how this tool functions.

The photo below shows the bushing tool, in place, beginning to push the old bushing through the T/A bushing opening. Always use the tool to push, never try to pull a bushing or the All-thread will bend. I tried-it bent- I bought a new piece.

The wrench on the right side is the working end and provides the forward pressure to push the bushing through the opening. The wrench on the left side is static and holds two nuts on the All-thread to stop the counter rotation motion as you torque the right side.

Trim outer edge of exist. bushing to ease movement.

TRAILING ARM REFURBISH

Old Bushing Almost Moved Through Hole

As the old or new bushing moves through the T/A opening, you will have to stop several times to remove some of the larger diameter drive washers. You need the large washers to apply uniform pressure across the face of the trailing edge of the bushing so it does expand in size and make it more difficult to move into the opening.

Your final combination will be two(2) heavy gage 3/4" steel washers, one 1 ½ length deep socket , two (2) more heavy gage 3/4" steel washers and a 5/16" drive nut- Photo above. This final combination will drive the bushing completely thru the T/A opening.

Take your bushing tool apart and reverse it to push out the second Trailing Arm bushing. You will need to cover the empty T/A bushing hole with two (2) heavy gage steel washers in order to provide a platform over the hole.

Thinking about, I replaced the 5/16" drive nut a few times to keep a fresh thread surface.

I suggested using the bushing tool to remove the old bushings for a reason. Experience with how the tool operates and the various combinations of washer sizes and socket needed. But also because it is really, really difficult to push out old, dried up rubber bushings. You will cuss and gripe while doing this learning curve chore.

Installing the new T/A bushings will be ever so much easier for you to accomplish. Soft and lubricated.

Bushing Hole- before / After Deep Cleaning

The bushing opening in your Trailing Arm is probably in bad shape and in need of a major cleaning. Mine before and after can be viewed above.

Spend some time with your round metal file, #120 grit sandpaper and #1000 steel wool. The cleaner and smoother you make the T/A bushing opening, the easier the new bushing will slide home. Don't cut corners here or your install will be difficult. I spent about 30-45 minutes prepping each bushing opening.

Ready to Install First New Rubber Bushing

TRAILING ARM REFURBISH

STARTING INSTALL NEW T/A BUSHING

Installing the new rubber T/A bushings employs the same All-thread tool used to remove the old ones but with a slightly different configuration of the washers.

As seen above, the static end of the install tool with washers and double static nuts, has been moved from the distant second arm to directly opposite the new bushing on the same arm.

I found this combination was needed to keep the All-thread very centered in the opening. The new rubber bushing went crooked very quickly with the washers on the other arm- like during the removal process.

I used kitchen sink liquid soap to lubricate the new bushing and the T/A opening. I pushed the static wrench against the Trailing Arm, as shown above, and then sat on it so I had both hands free.

I used one hand to keep the new bushing very straight and the other hand to use the drive wrench to tighten the drive nut and washers.

The bushing must be VERY straight because of the outer rim of both ends is wider in diameter than the main body of the bushing. The bushing hangs up and will not move forward if not VERY straight.

NEW DRIVE CONFIGURATION

Once the new rubber bushing had been driven maybe 75% into the T/A opening, you must back out the static nut and static washers in order to insert channel locks opened wide enough for the new bushing end to fit thru.

Continue to drive the new bushing forward until it hits the channel locks. Remove the channel locks, move the washers to the other end of the T/A and finish driving the bushing home.

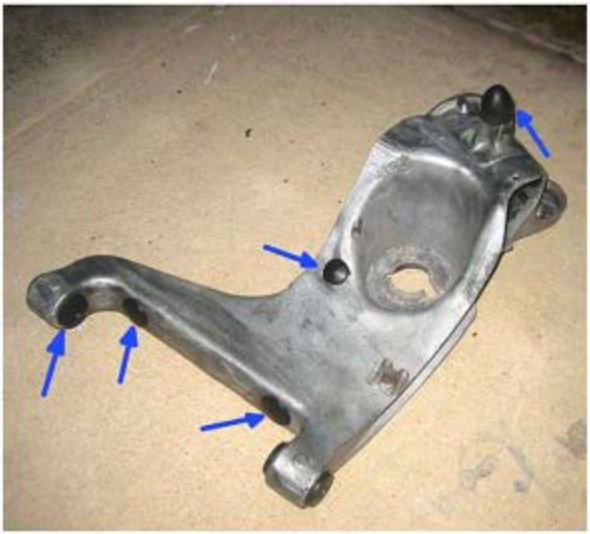
TRAILING ARM REFURBISH

INSTALL 2nd BUSHING:

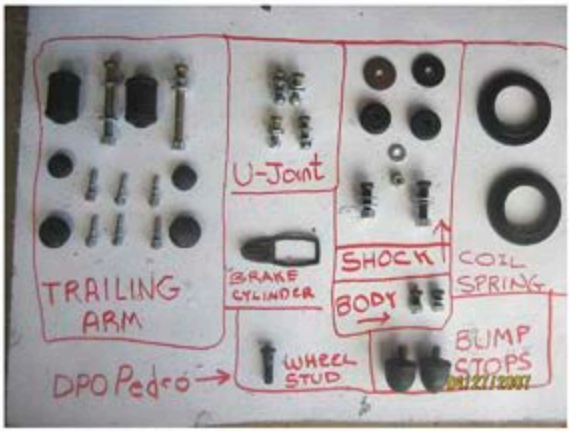
Repeat the same procedure to install the second new rubber bushing into the other arm of the T/A .

The refurbished trailing arm should now have two (2) new rubber (or urethane) bushings, new blanking hole caps and a new bump stop. I kinda like the look of polished aluminum so I spent a little extra time spiffing up the Trailing Arm body with a wire brush wheel and steel wool.

Personally, since I am a non-mechanical TR6 owner, I would not recommend trying to refurbish both sides of the rear end suspension at the same time. Too many parts to keep track of.



REFURBISHED PASSENGER TRAILING ARM



Remember all those fasteners I removed, tagged and I put into a small box for safe keeping?

Take that box down to your nearest specialty fastener store and purchase everything brand new in grade #8 strength. The trailing arm nuts are low torque at 15# and standard strength is OK. (I hope anyway) Retag them all.

I work with a parts board in order to keep myself organized due to a basic lack of knowledge of what I am doing! A piece of drywall painted white with all my parts laid out and named works for me.

As you can see, I put the new fasteners in boxes with the correct suspension components listed. Now everything is new and strong quality. Let's get cracking!!!

PUT IT ALL BACK TOGETHER PROCEDURES:

TRAILING ARM REFURBISH

All my parts laid out and ready to install.

(Yes, I also stripped down the frame and rust proofed it and painted the Armstrong shock and new link arm.)

The refurbished Trailing Arm is the first suspension part to go back into the car. I set a scissor jack to support the T/A level while I installed the two (2) new bolts thru the mounting brackets and new rubber bushings. (photo below) You have to bang on the T/A ends a bit to get them inside the mounting brackets. Tighten the T/A bolts to 40 to 45 pounds.

The photo above right shows the two (2) coil spring circular rubber seats. Place one on the Trailing Arm where the coil spring sits. Now Place the coil spring on rubber seat in the T/A. Place the second rubber seating piece on top of the coil spring. Hold it in place with your fingers while you raise the jack to compress the coil spring. (Photo to direct right)

TASK No. 2: The refurbished Armstrong lever shock absorber will now be installed and connected to the refurbished Trailing Arm.

TRAILING ARM REFURBISH

TASK No. 2: I bolted the refurbished lever shock to the frame using the new grade #8 bolts, washers and lock nuts. I used Loctite blue on the threads. I tightened the bolts to 60 pounds.

TASK #3: Using the jack to raise, install the new link arm, rubber bushings, washers and lock nuts that connect the shock with the Trailing Arm. Tighten link lock nut under T/A to about 40#. The coil spring is once again in compression- don't forget this.

Task #4: Install the six (6) new All-thread studs into the Trailng Arm vertical face as seen in the photo to the left.

I coated the stud threads with Loctite blue and used two nuts to drive the studs into the threaded holes. The holes had previously been cleaned with a 5/16" UNF tap.

I drove the new studs into the holes with a torque wrench set at 14 pounds. This is a real critical stage of the project. Fine steel threads mating into fine aluminum threads is a disaster waiting to happen. If you don't own a torque wrench either buy one or borrow one. DO NOT attempt to tighten these studs by "Feel".

You will mess up- plain and simple. Without a torque wrench you will either under tighten the studs or you will over tighten and strip them out. Even as a non-mechanical TR6 owner, I was able to make this possible disaster call.

TRAILING ARM REFURBISH

TASK #5: Now it's time to clean up the two (2) axle pieces and reinstall the wheel hub and axle. I wiped the axle splines very clean, inspected them for chipping or excessive wear and then installed new axle grease. I dry fit the two pieces to match up the guide notch.

Place the inner axle driving flange inside with the u-joint facing inward and the spline receiver end facing outward. The photo bottom right shows this.

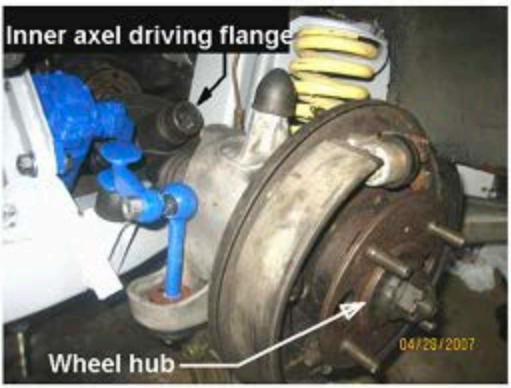
Now slide the axle, boot and u-joint through the opening in the Trailing Arm seen in the photo to the right. As you slide the axle forward, insert it into the inner axle driving flange so the guide notch matches up.

Slide the axle drive flange over to the differential flange seen with the four (4) bolt holes in the photo presented again on this page to the right. Also match up with the six (6) Trailing Arm studs with the wheel hub..

The brakes and wheel hub should now be mostly flush even with the vertical face of the Trailing Arm. There are not yet any stud nuts in place to secure the wheel hub assembly to the Trailing Arm.

TASK #6 Install the four new grade #8 axle yoke bolts and lock nuts throught the differential drive flange seen in the photo above. I tightened to 35 pounds and I used Loctite blue on the threads. Yeah, under the car again! Wear goggles.

Axle to Differential Connection



Install Axle and Wheel Hub Assembly

TRAILING ARM REFURBISH

Well, that spooky under the car effort was certainly worth taking a break for a tall cold one.....

This project is now all but wrapped up and ready to go. So what's left to do?

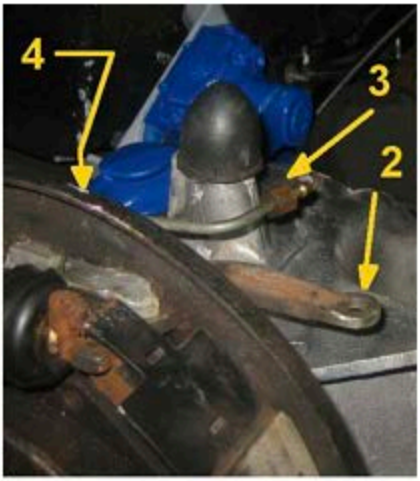
1. Install Trailing Arm nuts
2. Connect emergency brake cable.
3. Install Brake pipe
4. Bleed rear brakes
5. Install rear wheel.
6. Hit the street for test drive .
7. Clean up mess

TRAILING ARM ATTACHMENT NUTS

Notice the access hole used to install the six (6) T/A securement nuts. I purchased all metal lock nuts for this task. Once again, I tightened the new nuts onto the new studs with a torque wrench set at 14 pounds. ***AGAIN!!*** This is a super critical stage of the project. Don't blow it up now or you'll have to kill yourself for stupidity. ***DO NOT*** attempt to tighten these stud nuts by "Feel".

Beg, borrow or buy a torque wrench. 14 pounds!!

Now, connect all the misc. pipes, bleed the brakes and put a socket on every fastener you can reach inside the wheel well, just for safety sake.



Brakes, brakes and brakes

Remove the scissor jack, install the rear wheel, take out the jack stands, lower the car, kick aside the mess and take a spin.

Without the frame rust coating- This T/A bushing replacement took this non-mechanic about 30 hours of my time.

I hope this essay was informative- Tinster June 07