

Classic Chevy Front Suspension Rebuild

by Aaron O'Brien

November, 2017

Version 1.1

Applies to:

1949, 1950, 1951, 1952, 1953, 1954 Chevy Passenger Cars and
1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962 Corvettes



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Version History

Version	Change History
1.0	Initial Release
1.1	Updated the suspension drawing Changed recommended method of lifting the nose of the vehicle Changed kingpin lock pin removal method Corrected typos Corrected bias ply toe-in spec

Introduction

My '58 Vette is a driver car which I purchased in 2001. I am interested in keeping the car period correct. I am not interested in keeping the car numbers matching. I do all the work on my car, however, I am not a mechanic. I was able to rebuild the front suspension on my '58 with help from Corvette Forum members (<https://www.corvetteforum.com/>). I have done my best to make sure that all of the information in this document is correct. **However, if you have any questions or doubts about any of the information in this document, or if you are unsure about the safety of any of the instructions, then ask a professional for advice and do not continue until you are sure that the situation is safe.**

When this document was written, there were two documents available on the internet that described how to perform the suspension rebuild:

1953 – 1962 Corvette Servicing Guide ST-12
<http://chevy.oldcarmanualproject.com/shop/5362csg/index.html>

Tom Parsons post on Chevy Talk “Complete rebuild of front cross member and suspension“
<http://www.chevytalk.org/fusionbb/showtopic.php?tid/218134/tp/1/>
<https://www.corvetteforum.com/forums/c1-and-c2-corvettes/3428952-tom-parsons-dzauto-complete-rebuild-of-front-cross-member-and-suspension-pdf-ver.html>

Alignment Reference Materials

Wheel alignment Basics C-1 Joe Fisher 7-18-16 Final.pdf by Joe Fisher.
<https://www.corvetteforum.com/forums/c1-and-c2-corvettes/3852901-some-basic-education-about-wheel-alignment-on-c1-and-c2-corvettes-by-joe-fisher.html>

C1 alignment tips from John Hinckley and Tom Parsons + ST12 Sect 3 mod.pdf
<https://www.corvetteforum.com/forums/c1-and-c2-corvettes/3404668-c1-alignment-for-the-street.html>

In this document, I will attempt to:

- show you how to remove, rebuild, and reinstall the front suspension on your classic Chevy.
- piece together all the relevant information from the sources above
- answer many questions that I had during the suspension rebuild of my 1958 Corvette
- put the information into an easy-to-read step-by-step format

General Hints/Tips

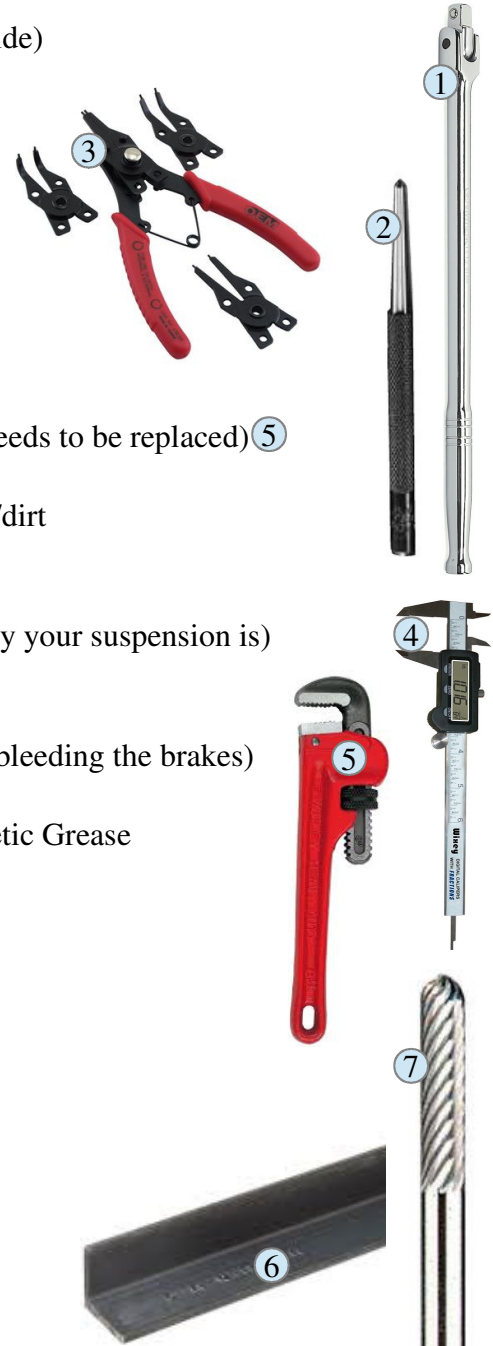
- Print out this manual in full color and read it through once.
- Save ALL your parts even if they are bent/broken/unusable!!! You will want to compare them against the new parts and perhaps even use one in the rebuild.
- Make sure you have the following items:

Generic

- Engine Stand
- 4 Jack Stands (6 Ton) (C1 Corvette frame rail is 3" wide)
- 2 Scissor Jacks (2 Ton)
- 1 Hydraulic Jack (2 Ton)
- Two Sets of SAE Box Wrenches
- Torque Wrench (150 ft-lbs minimum)
- Breaker Bar ①
- Sockets (1", 1 1/16", 1 1/8", 1 1/4")
- Punch (to remove kingpin) ②
- Lock Ring Pliers ③
- Calipers (for measuring things) ④
- Large (2ft+) Pipe Wrench (if your upper inner shaft needs to be replaced) ⑤
- Bench Vice
- Large cardboard boxes to cover the floor from grease/dirt
- Zip Ties
- Foam Ear Plugs (to plug the brake line)
- Brake Cleaner (10 cans depending on how dirty/greasy your suspension is)
- Brushes / Gun Barrel Brushes
- Large tray/tub to catch radiator fluid
- 1/4" (Inside Diameter) x 24" Long Clear Tubing (for bleeding the brakes)
- 3 Quarts Brake Fluid
- 4 Tubes of Valvoline (W985) SYN Power Full Synthetic Grease
- 4 Gallons Antifreeze

Hub/Drum Lug Bolt Press (Optional)

- 2 sections of 2 ft angle iron ⑥
- 11/16" socket
- Dremel grinding bit for steel. ⑦
- 1/4"-20" bolts + washers+ nuts (see Hardware table)



Third Arm Tools

- 2.5 inch wheel/hub puller (to separate the third arm from the mount) ⑧
- All Thread/Coupler/Washers/Nuts (see Hardware table for details)
- 2" x 4" x 6ft+ Plank of Wood
- Drill
- Drill Bit (2.5" hole saw) ⑨
- Drill Bit (assorted over sized wood drill bits up to 1 1/4") ⑩
- Duct Tape
- 2 C-Clamps



Alignment

- Gallon size Ziploc bags
- String
- 2 sections of 7ft PVC pipe
- Alignment Tool (FasTrax or similar) ⑪
- 1/4" hex wrench socket ⑫

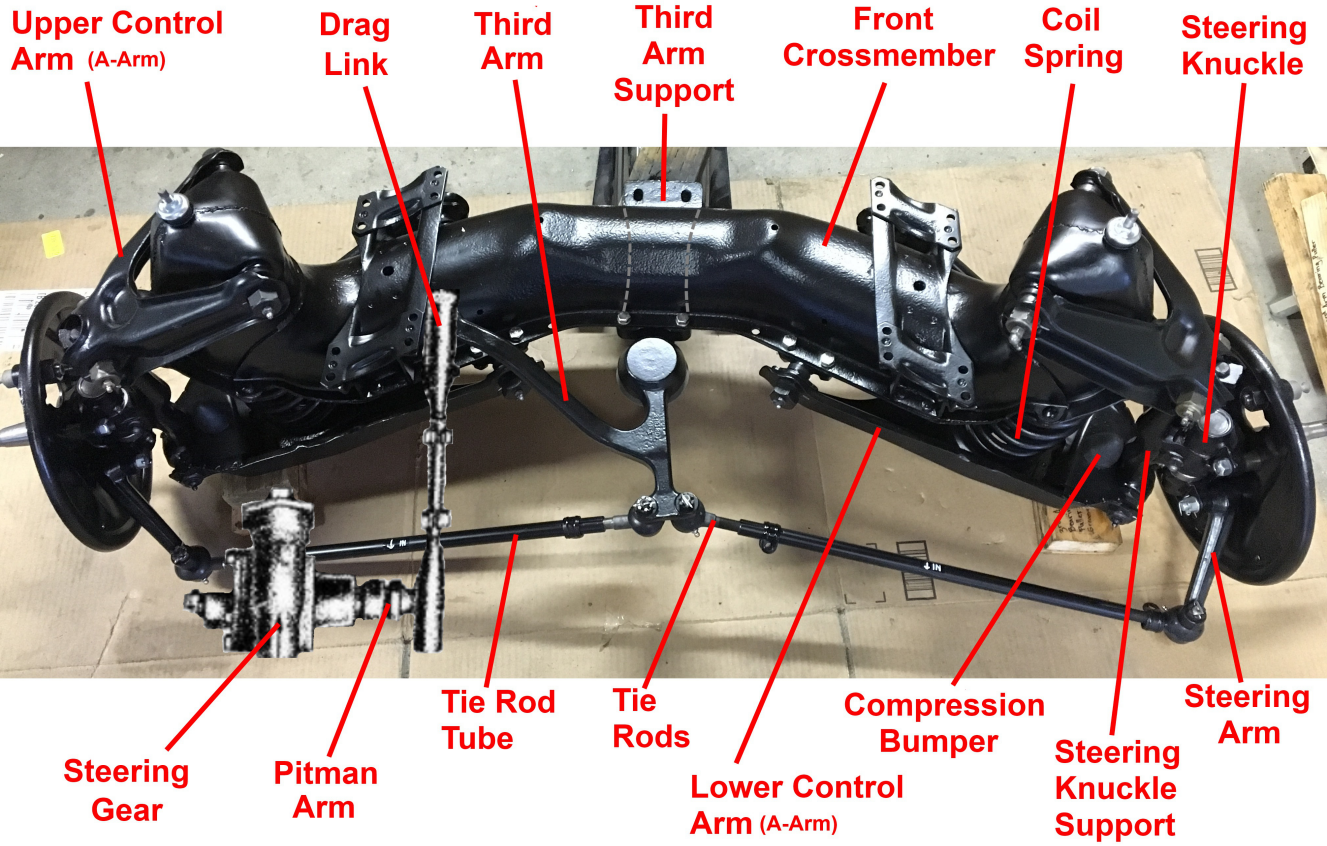


Hardware – (not generally provided in the Suspension Rebuild Kit)

Use anti-seize on stainless steel nuts/bolts. If you don't then they will gall and the only way to remove it will be to break the bolt in half.

Qty	Size	Type	Material	Description
1	N/A	N/A	Grade 8	Brake back plate mount hardware (order from one of the vendors)
1	N/A	N/A	Grade 8	Lower inner shaft mount bolts/nuts (order from one of the vendors)
2	1/4"-20 x 6	Bolt		Hub/Drum Lug Bolt Press (Optional)
1	1/4"-20 x 2	Bolt		Hub/Drum Lug Bolt Press (Optional)
3	1/4"-20	Nut		Hub/Drum Lug Bolt Press (Optional)
6	1/4"	Washer		Hub/Drum Lug Bolt Press (Optional)
2	3/8"-24 x 1"	Bolt		Brake line plug.
8	3/8"-16 x 1 1/2"	Bolt	Stainless	Crossmember to frame (back half is larger due to the alignment shim)
8	3/8"-16 x 1 1/4"	Bolt	Stainless	Crossmember to frame
2	3/8"-16 x 2"	Bolt	Stainless	Crossmember to radiator
20	3/8"-16	Nut	Stainless	
20	3/8"	Lock Washer	Stainless	
20	3/8"	Washer	Stainless	
4	5/16"-24 x 1 1/4"	Bolt	Stainless	Crossmember to bumper bracket
4	5/16"-24	Nut	Stainless	
4	5/16"	Lock Washer	Stainless	
4	5/16"	Washer	Stainless	
14	7/16"-14 x 2"	Bolt	Stainless	Frame to bumper bracket
14	7/16"-14	Nut	Stainless	
14	7/16"	Lock Washer	Stainless	
14	7/16"	Washer	Stainless	
1	3/4"-16 x 1ft	All-thread		Third arm bearing puller (only need about a 1ft, but longer is ok)
1	3/4"-16	Coupler		Third arm bearing puller
3	3/4"-16	Nut		Third arm bearing puller
4	3/4"	Washer		Third arm bearing puller
1	1/2"-13 x 2ft	All-thread		Spring compressor (24 inches minimum larger is OK.)
3	1/2"-13	Nut		
4	1/2"	Washer		

Suspension and steering part names



ST12 front suspension specifications

SECTION 14 SPECIFICATIONS

FRONT SUSPENSION (Section 3)

Front Springs

Make and Type Chevrolet, Coil

Shock Absorbers

Make and Type Delco, Direct Double-Acting
Location Mounted vertically from lower control
arm through coil spring into front suspension
crossmember

Stabilizer Bar Type, Link Mounted

Front End Alignment

Curb Height—1953-1962

Caster $2^{\circ} \pm \frac{1}{2}^{\circ}$

Camber $\frac{1}{2}^{\circ} \pm \frac{1}{2}^{\circ}$

King Pin Inclination $3\frac{1}{2}^{\circ}$ - $4\frac{1}{2}^{\circ}$

Toe-In (Per Wheel) $\frac{1}{16}$ "- $\frac{1}{8}$ "

Toe-Out on Turns

Inner Wheel $20^{\circ} \pm 2^{\circ}$

Outer Wheel $24^{\circ} \pm 2^{\circ}$

Vehicle Height

1953-1962—Std. Springs $11'' \pm \frac{1}{2}''$

1957-1959—H.D. Springs $8\frac{3}{4}'' \pm \frac{1}{2}''$

Torque Specifications—Ft.-Lbs.

Tie Rod Clamp Bolt Nut 3-12

Spindle Nut .. See Front Wheel Bearings—Adjust

Lower Control Arm Pivot Bolt 100-200

Lower Control Arm Shaft Bushing 85-100

Lower Control Arm Pivot Bolt Lock Nut .. 90-120

Lower Control Arm Pivot Bolt Bushing .. 150-170

Upper Control Arm Pivot Pin Lock Bolt Nut 30-35

Upper Control Arm Pivot Pin Bushings .. 30-40

Upper Control Arm Shaft Bushings 30-40

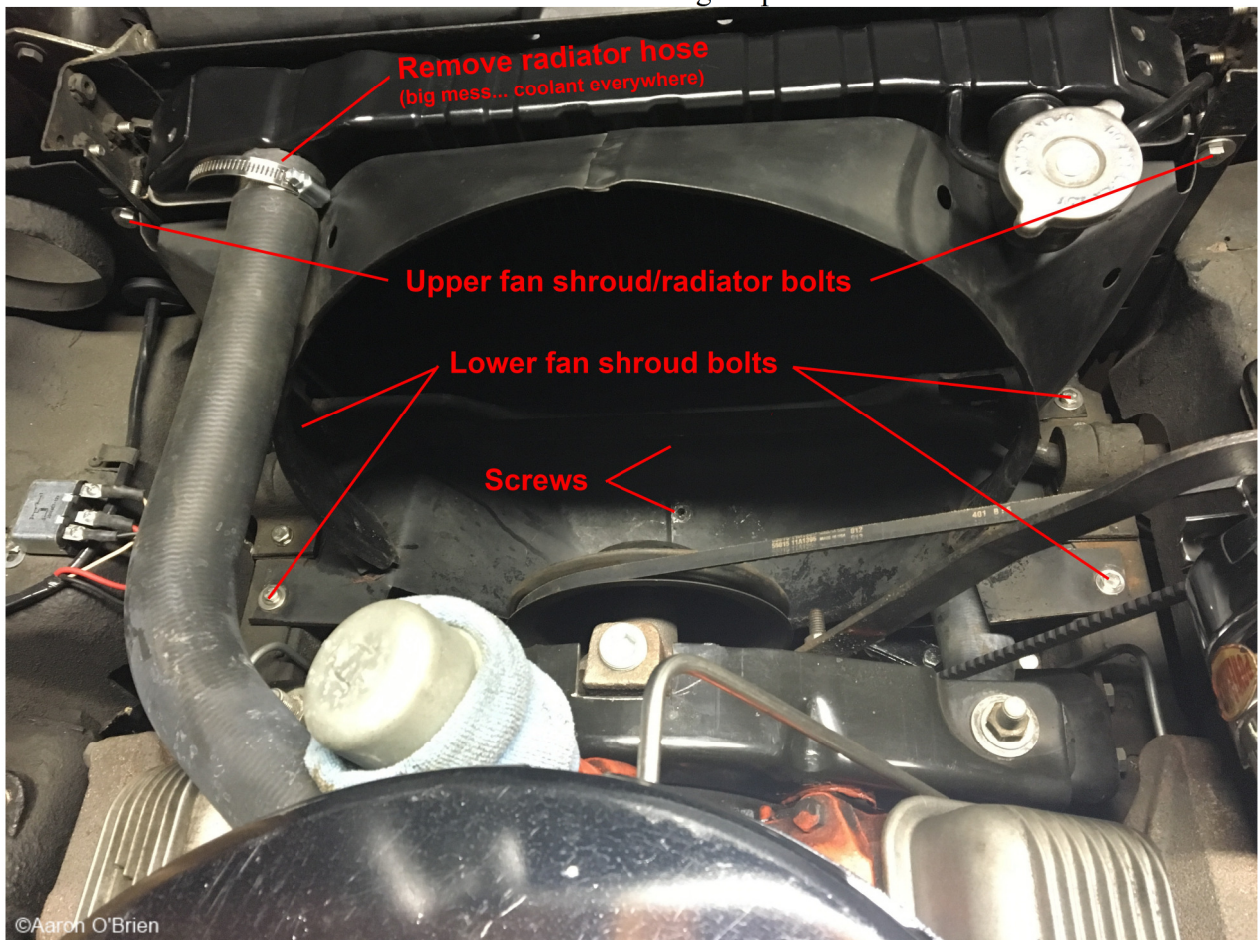
Stabilizer Bracket 17-22

Shock Absorber 4-6

Drop the Crossmember

Remove the fan/shroud/radiator

- Remove the 4 fan bolts and take out the fan
- Place a large tray/bin/bucket under the crossmember to catch all the coolant
- Remove the upper radiator hose. Make sure to have a lot of rags and small bucket to catch the fluid.
- Remove the fan shroud/radiator mount bolts (I only have 2 you probably have 4)
- Remove the upper part of the fan shroud
- Remove the lower fan shroud bolts and the screws that hold the two pieces together and remove the lower fan shroud
- Remove lower radiator hose and let all the coolant drain out.
- Remove the radiator. The radiator should lift straight up... no need to remove the hood.



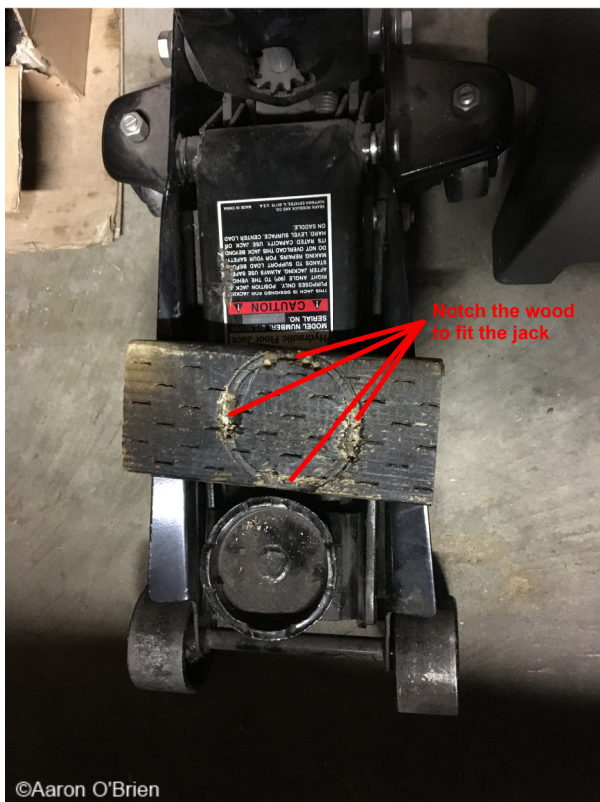
Loosen the front wheel lugnuts

- Remove the hubcaps
- Loosen the lug nuts... don't remove them... just loosen them



Lift the rear of the car

- Place the hydraulic jack under the differential to lift the rear of the car.
- Place the jack stands under the solid axle.



Lift the front of the car

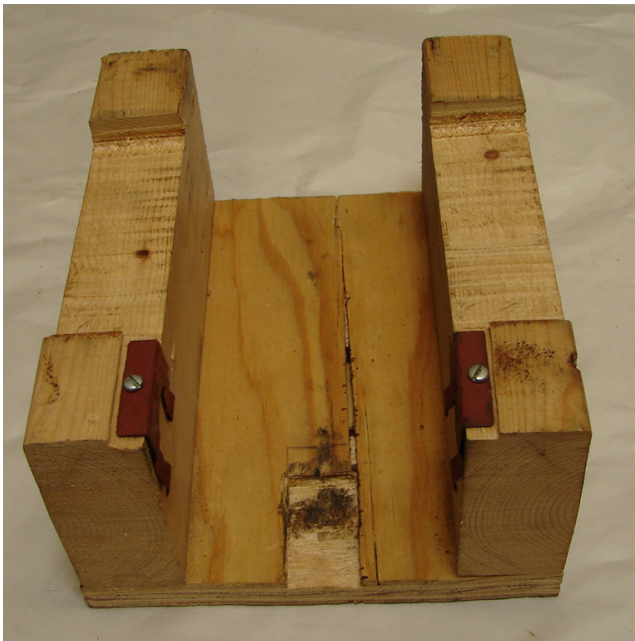
- Use the hydraulic jack to lift the front of the car at the 3rd arm mount.
- The 3rd arm has been known to break off. So it is recommended to use a cradle as shown below.
- Third arm cradle dimensions are shown on the next page.



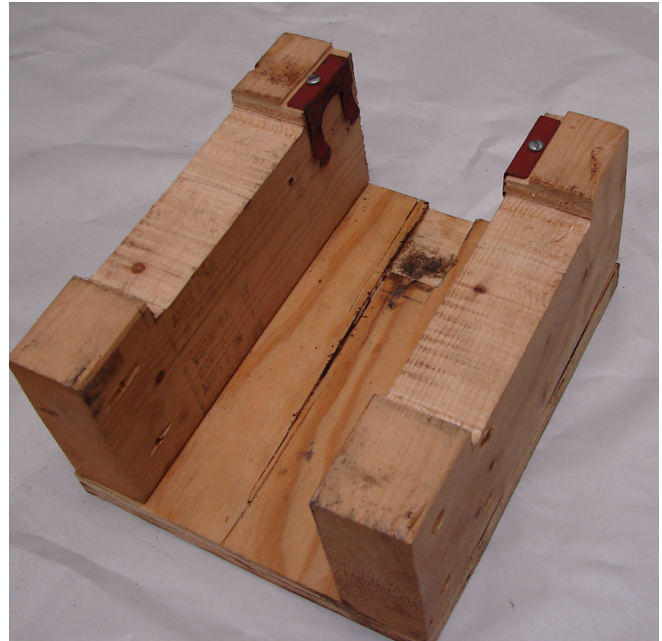
(Picture courtesy of Plasticman)



(Picture courtesy of Plasticman)



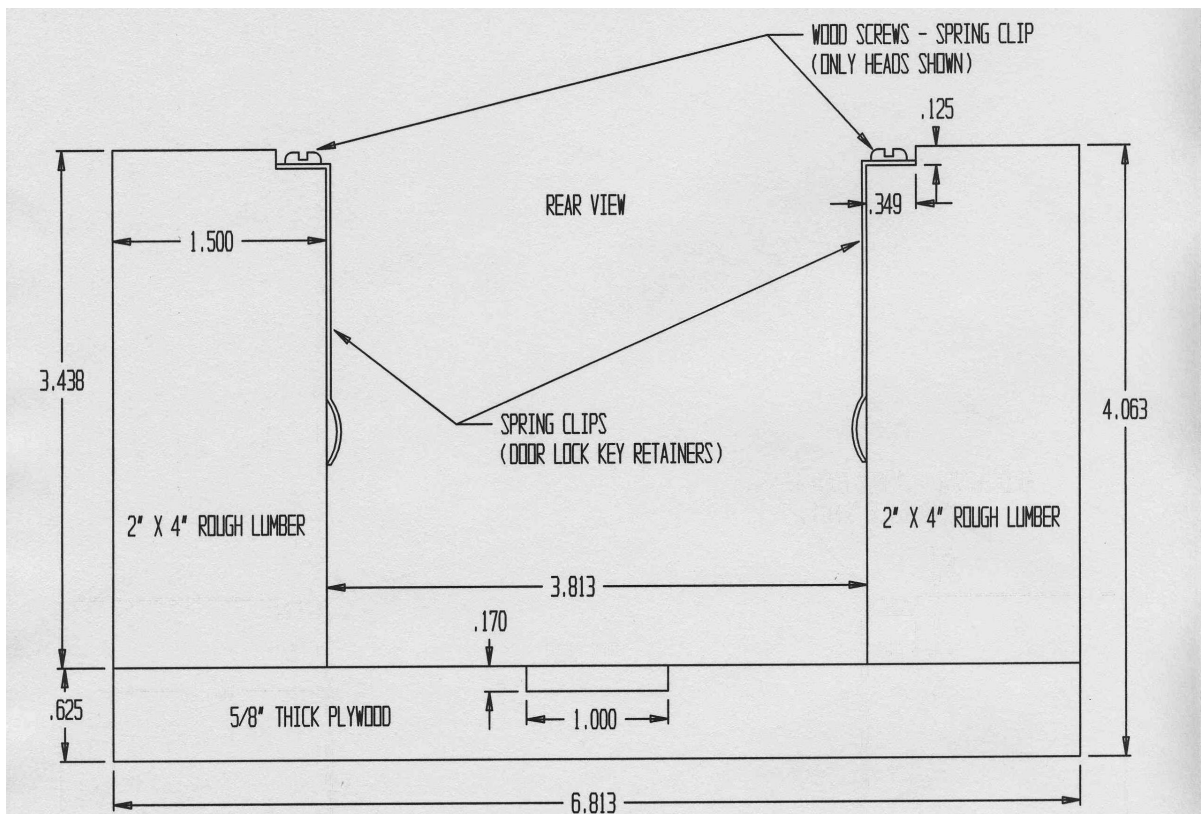
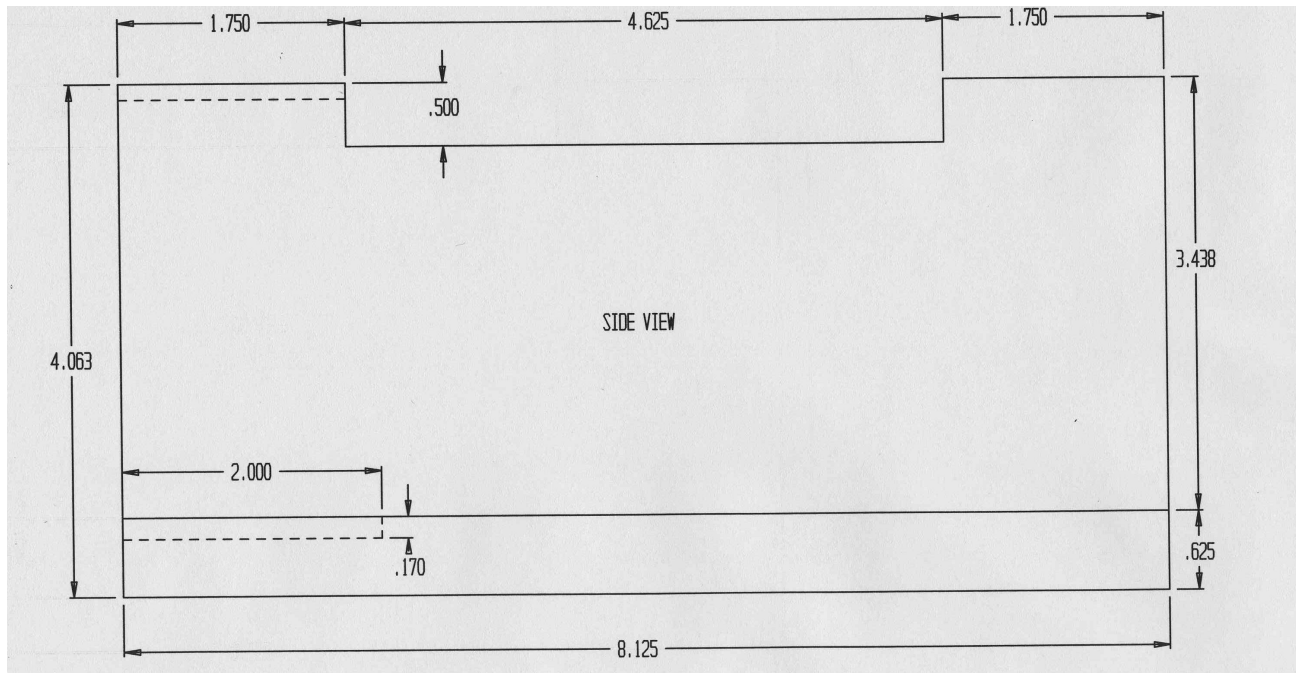
(Picture courtesy of Plasticman)



(Picture courtesy of Plasticman)

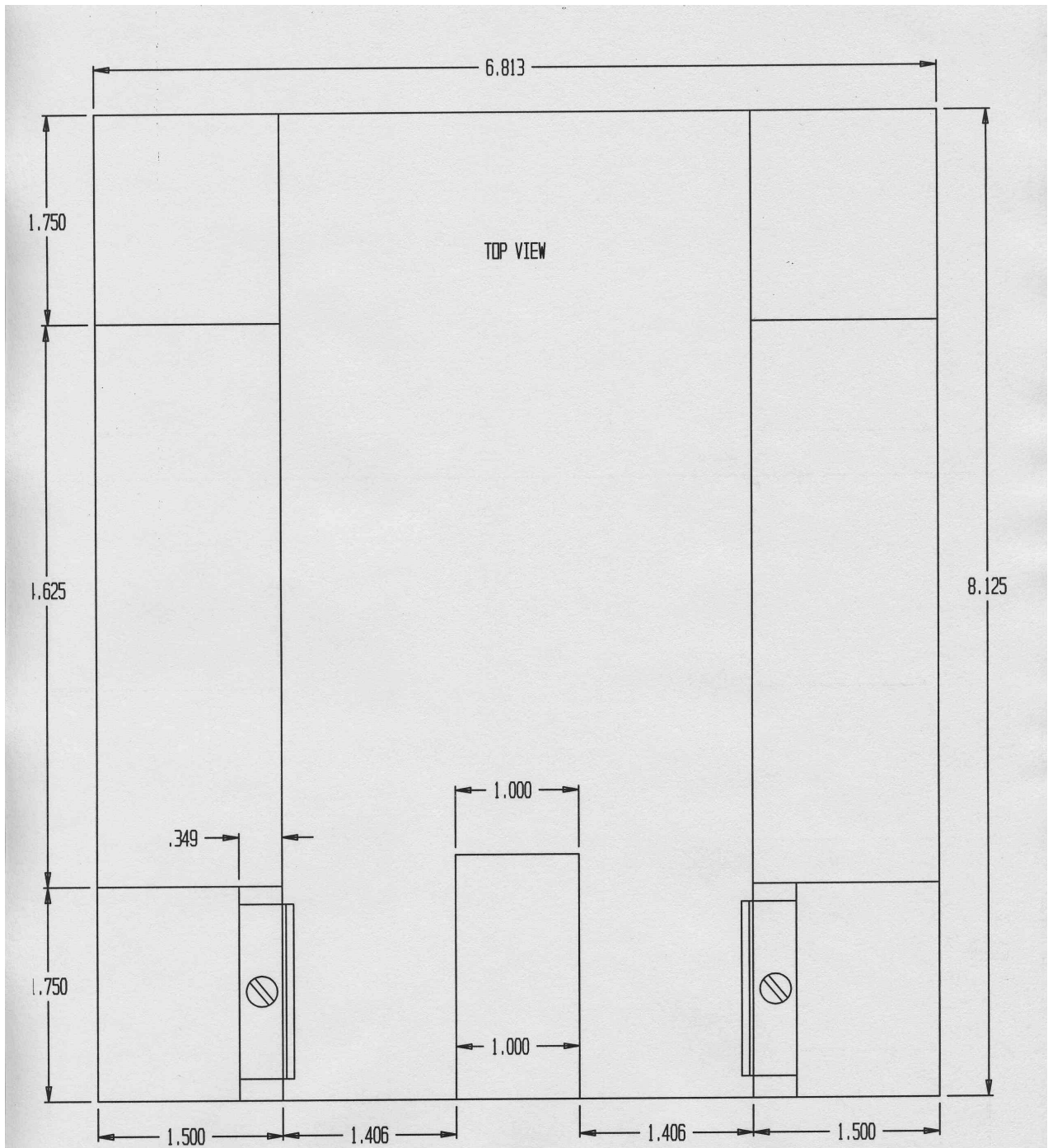
Third arm cradle dimensions

- Third arm cradle pictures and dimensions courtesy of Plasticman.



(Third arm cradle dimensions courtesy of Plasticman)

(continued on next page)



(Third arm cradle dimensions courtesy of Plasticman)

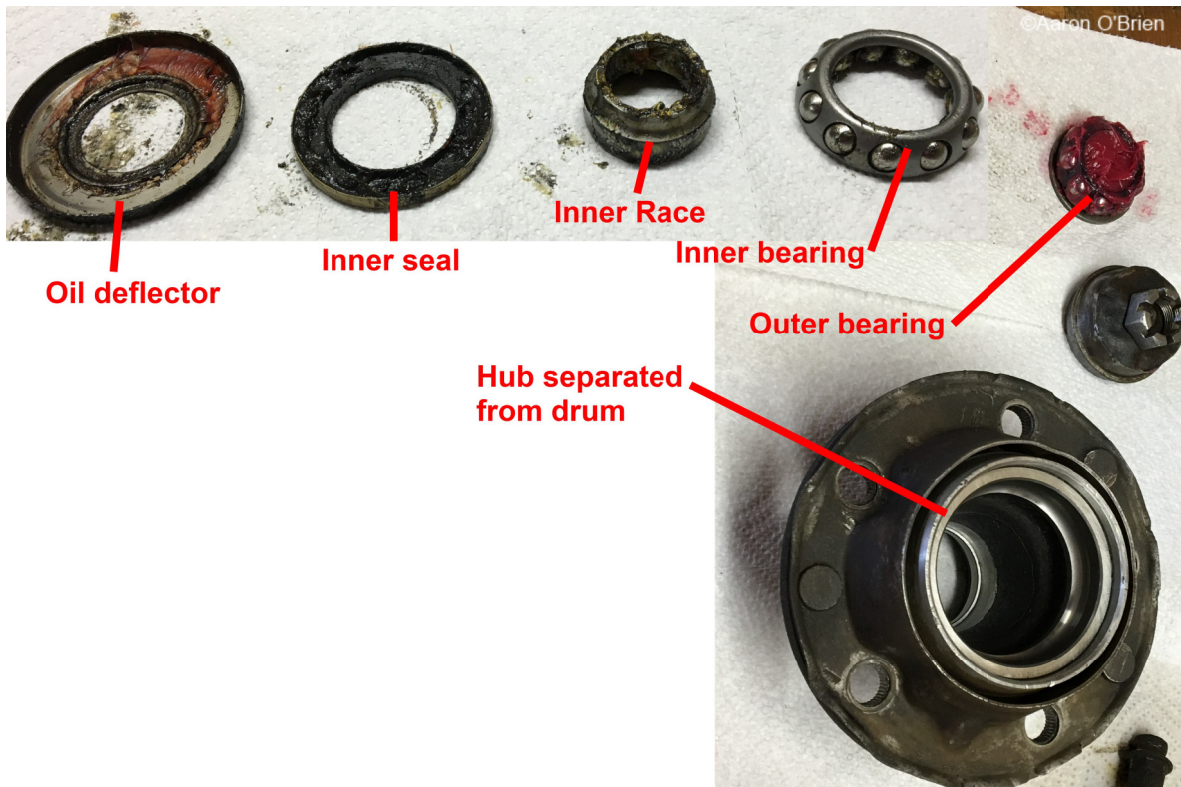
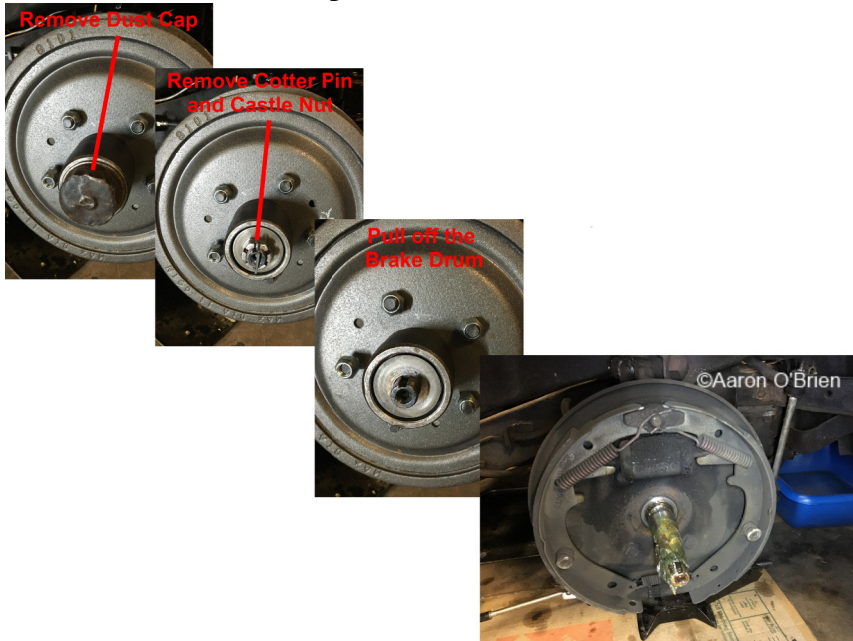
Put the car on jack stands and remove the wheels

- The frame needs to be 16" above the ground
- Put some extra weight (tires work good) in the trunk of the car.
- **The jack stand you see in the picture below is the center of gravity of the car!**
- Leave the jack under the 3rd arm to make sure the car doesn't tip forward.
- **Be careful!** Hydraulic jacks tend to loose height over time. My hydraulic jack will go flat overnight.



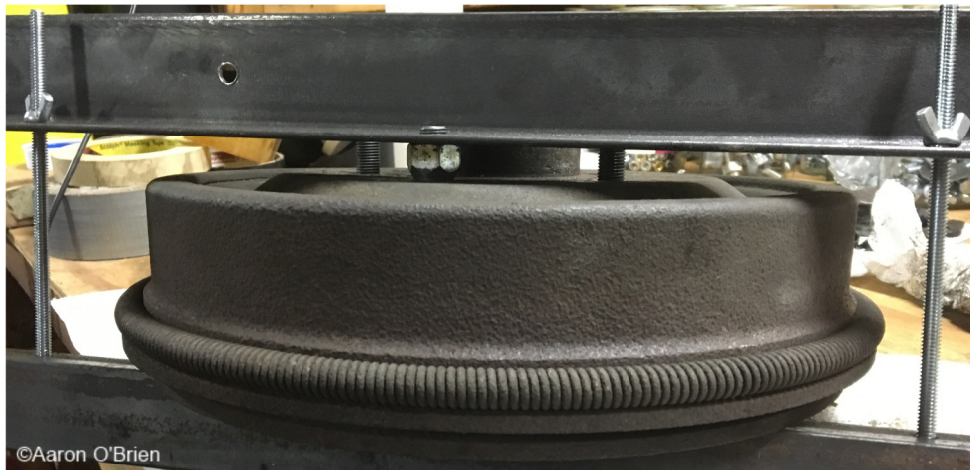
Remove the front brake drum/hub

- Remove the dust cap, cotter pin, and castle nut
- Pull off the brake drum/hub. Be careful not to drop the bearings
- Check the spindle/hub/bearings/race for wear. If any piece is does not have a smooth machined surface, then it needs to be replaced.



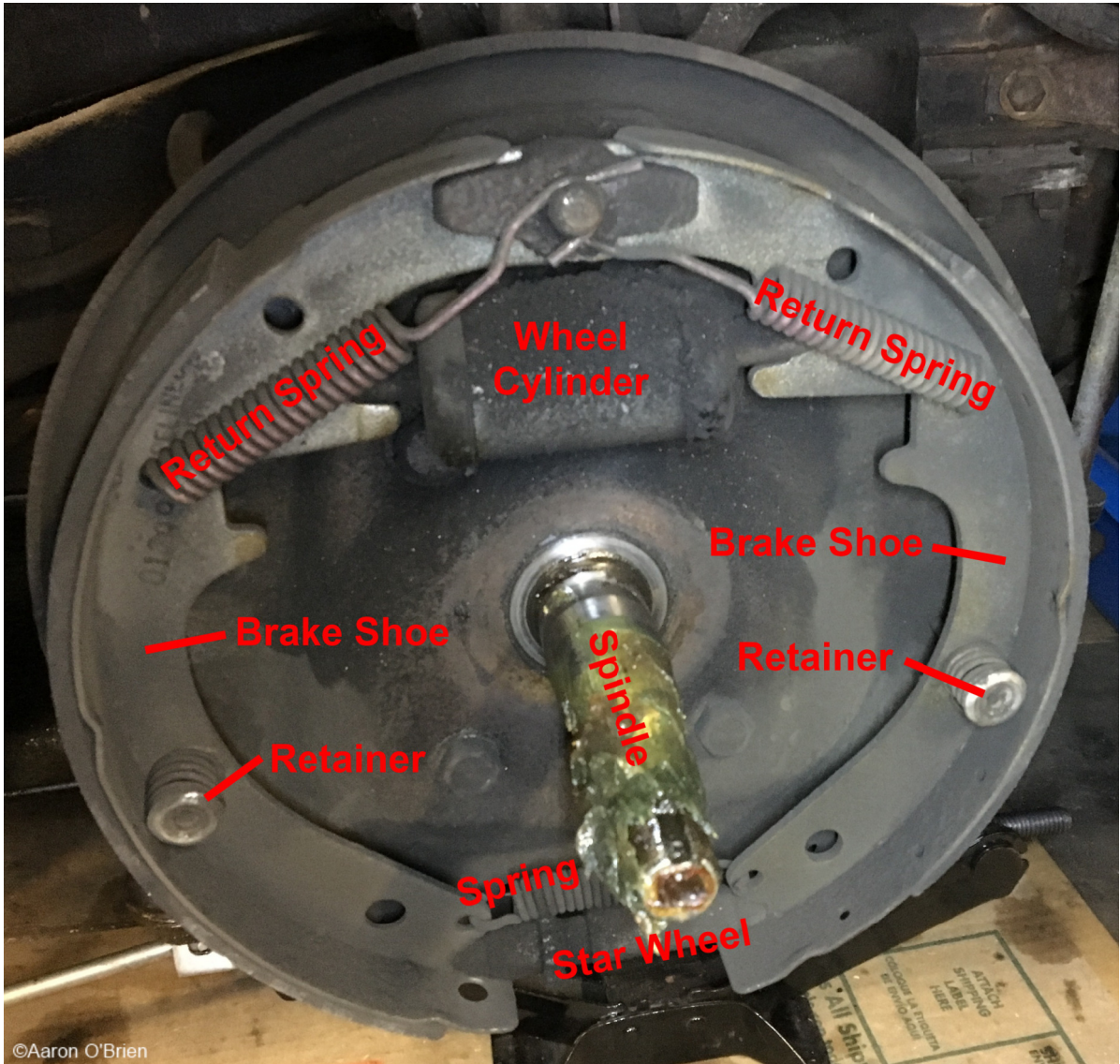
Hub/drum lug bolt press (optional)

- In case you want to replace the brake drum... this is how I managed it
- Hopefully, the construction of the press is mostly obvious.
- Used a drill and a Dremel grinding bit to round out and open up the inside of a 1 1/16" socket.
- Used 1/4"-20 x 2" to fix the socket to the angle iron.
- The lugnut is screwed onto the bolt
- The socket is placed over the back side of the lug bolt.
- The lugnut/bolt are sandwiched between the angle iron/socket.
- Unscrew the lugnut, it will push the bolt down and out of the hub/drum
- A couple of taps with a hammer may be necessary to finish the job.



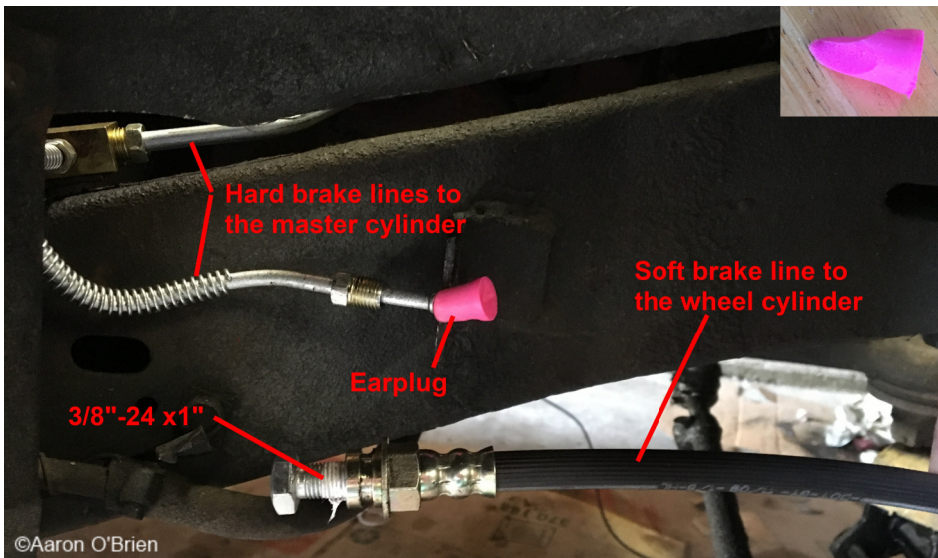
Remove the brakes

- Remove the star wheel brake adjuster and spring
- Remove the retainers (push and twist)
- Remove the brake return springs
- Remove the brake shoes



Disconnect the brake lines

- Unscrew the hard and soft brake lines. Remove the clip to free the soft line from the bracket
- Trim the tip of the earplug so that it will fit into the brake line



- Remove the two bolts that attach the wheel cylinder to the brake backing plate.



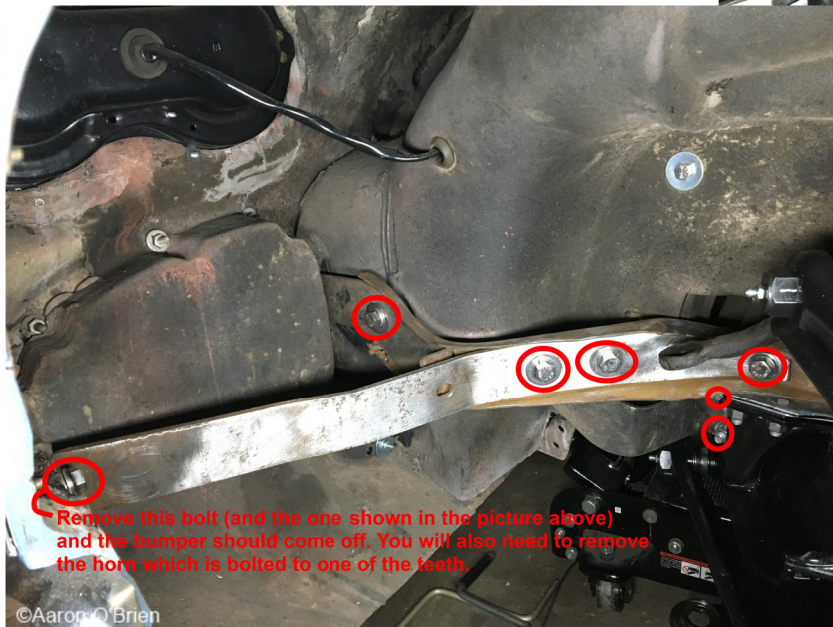
Disconnect the draglink

- Loosen the two collar clamps and unscrew the shaft.



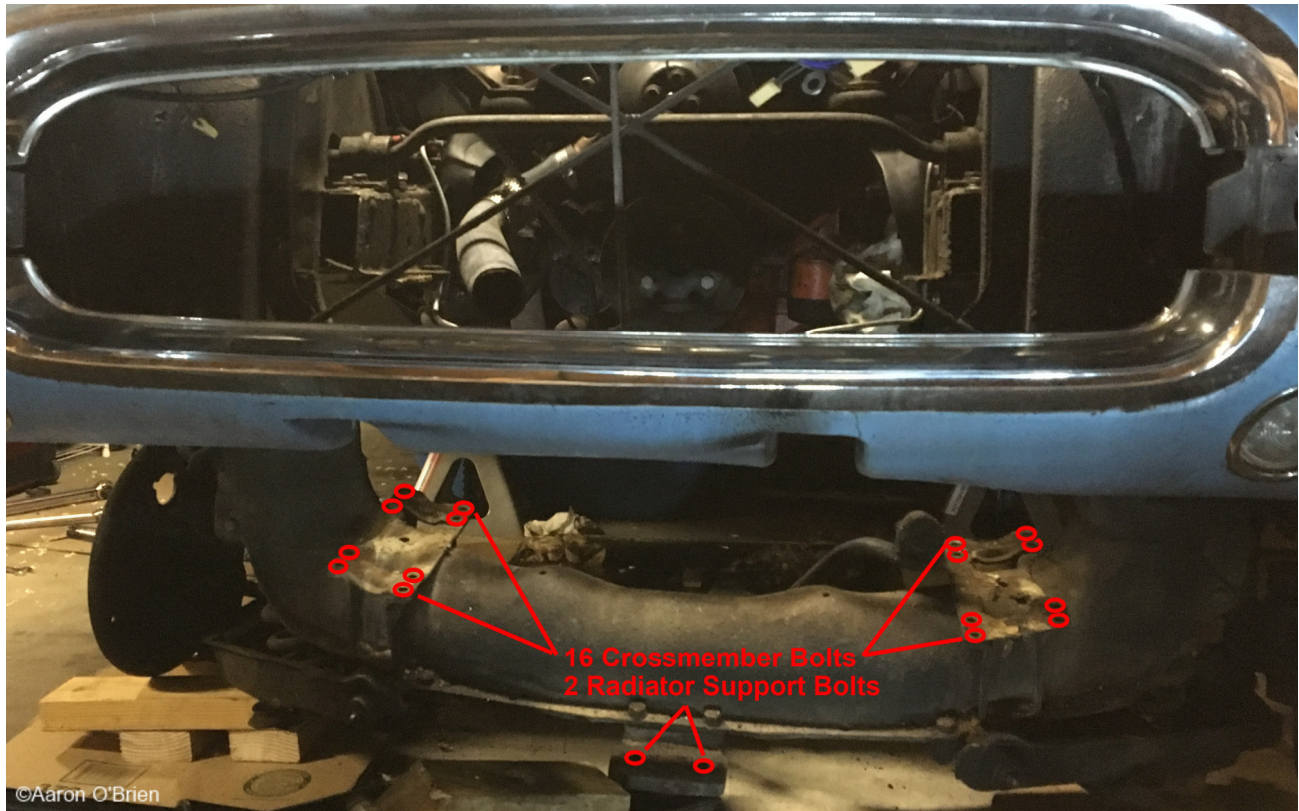
Remove the front bumper

- Remove the bumper bolts shown below.
- Remove the horn (it is bolted to one of the bumper teeth)



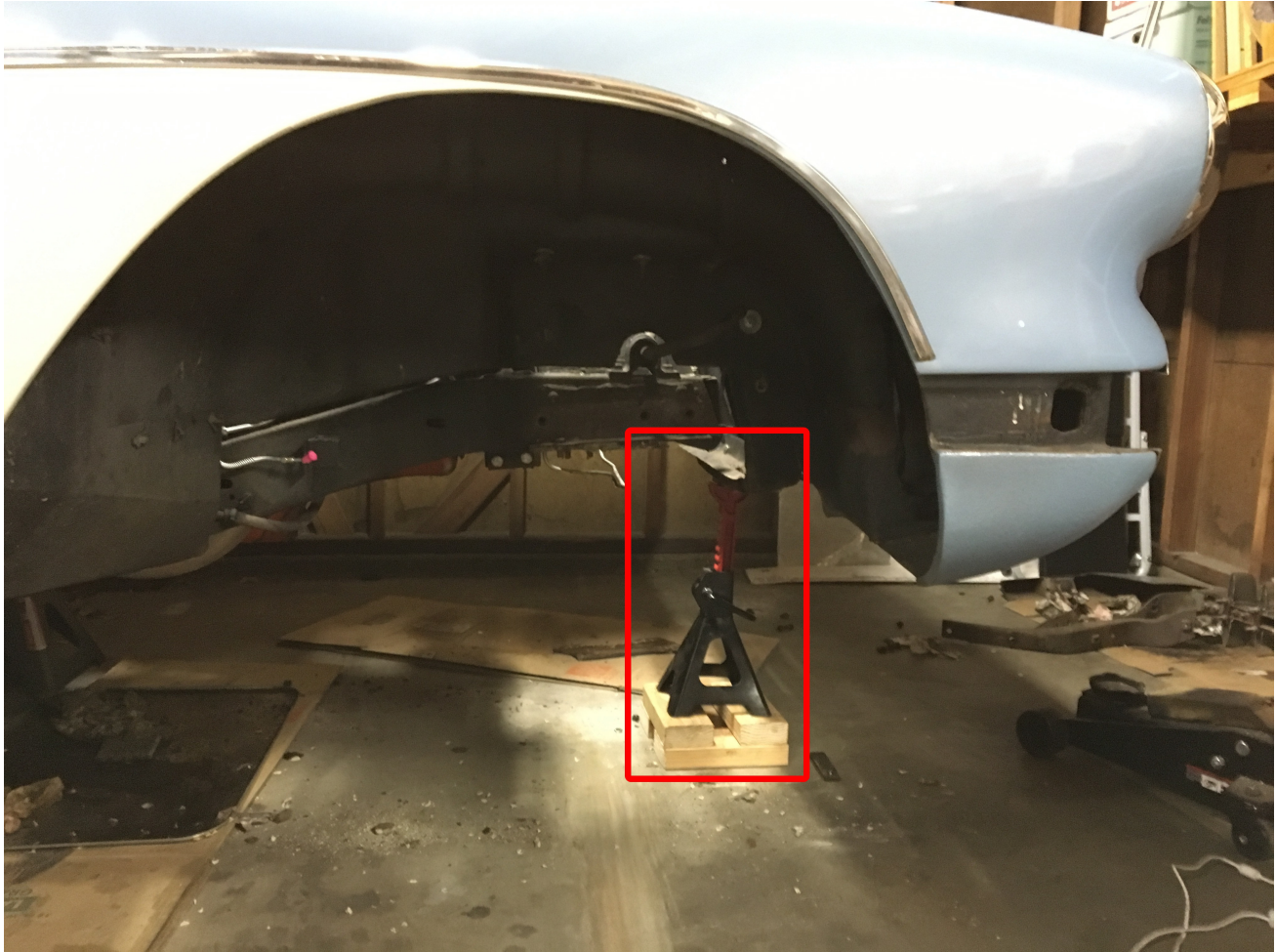
Remove the crossmember

- Use scissor jacks under each lower control arm (A-arm) and one under the third arm support
- Remove the 2 radiator support bolts
- Remove the 16 crossmember/frame bolts
- Lower it slowly and carefully. Be careful of the brake lines.
- The front suspension (as shown here) weighs about 150 lbs.



Place a jack stand (or block of wood) under the radiator support.

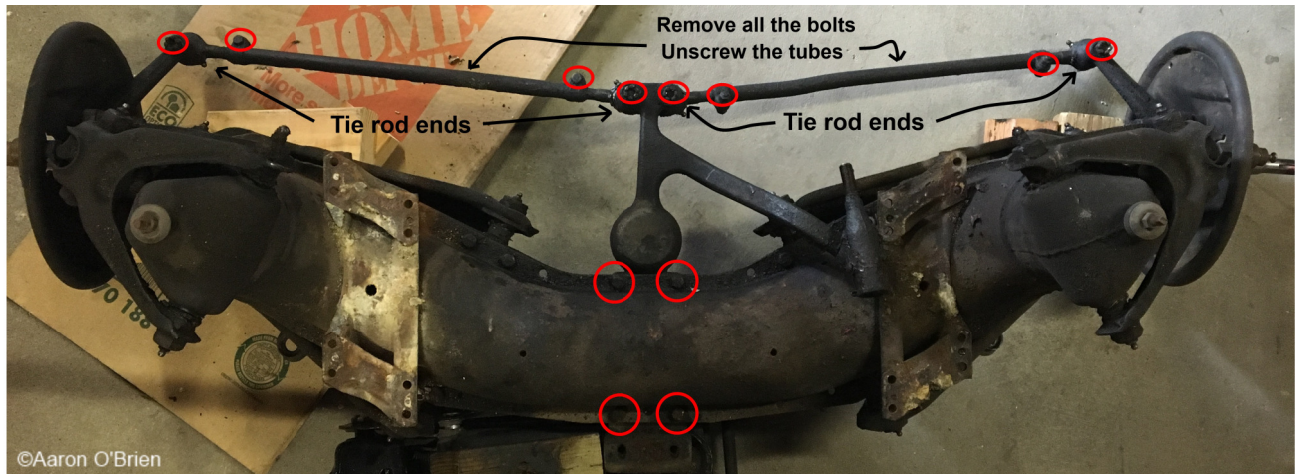
- The crossmember bolts to the radiator support which supports the entire nose of the corvette.



Disassembly

Remove the steering linkages.

- If you can remove the tie-rod ends by pressing them out, then more power to you... I spent several weeks trying to press them out, and finally ended up drilling them out in one afternoon.



Mount the suspension on an engine stand



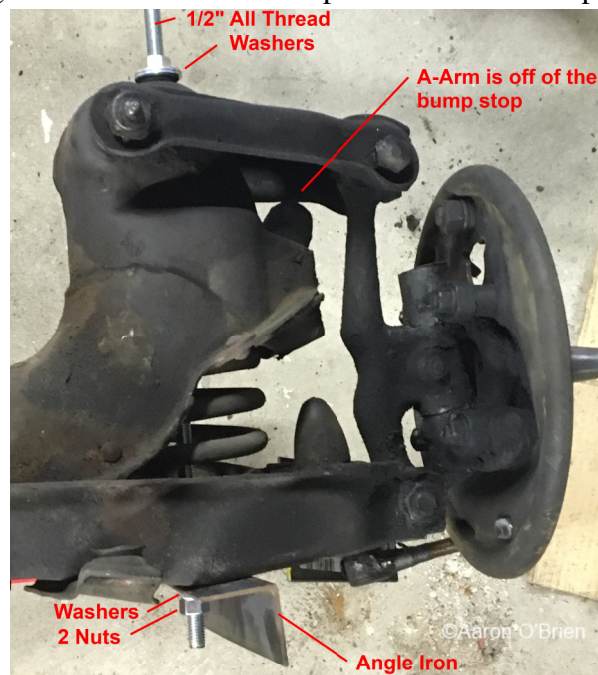
Remove the shocks

- Remove the bolt at the top of the tower and under the a-arm.



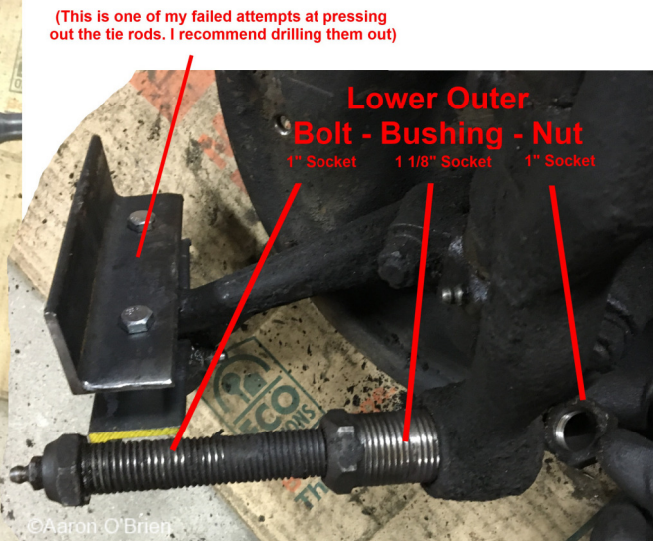
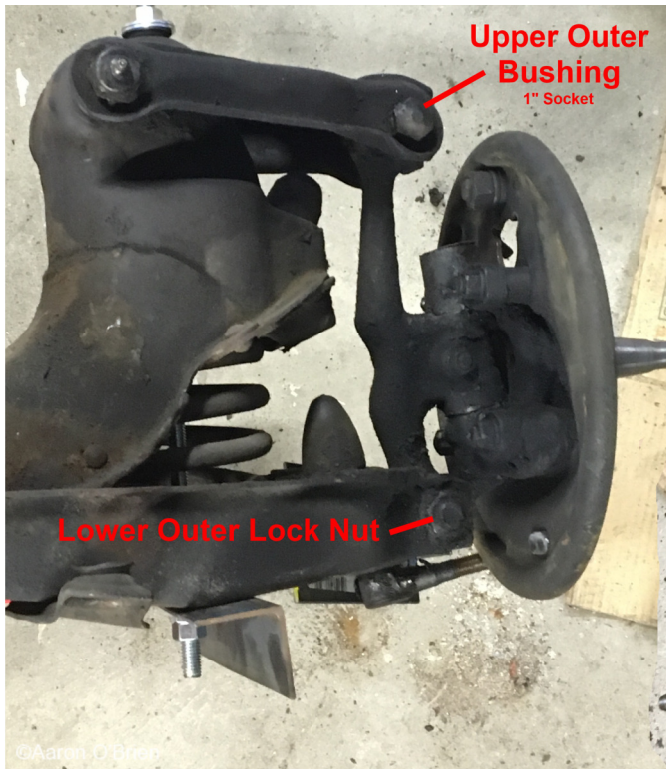
Install the spring compressor

- You just need to compress the spring to the point where the upper control arm (A-arm) is not touching the rebound bumper.
- The All-Thread needs to be at least 24 inches long
- Two nuts tightened together on the short end to prevent them from spinning off.



Loosen the lower outer nut and bolt

- Just loosen them. Don't remove them yet.



Remove the upper outer bushings



Remove the upper outer clamp bolt and remove the pivot pin

- The clamp bolt prevents the pin from sliding out. With the clamp bolt removed the pivot pin should slide right out with out any trouble.



Pivot Pin

Remove the lower outer nut/bolt/bushing

- The steering knuckle is now free from the suspension



Remove the spring compressor and take out the spring

- My springs were 13 11/16" tall when removed.



Remove the lower inner bushings and remove the A-arm



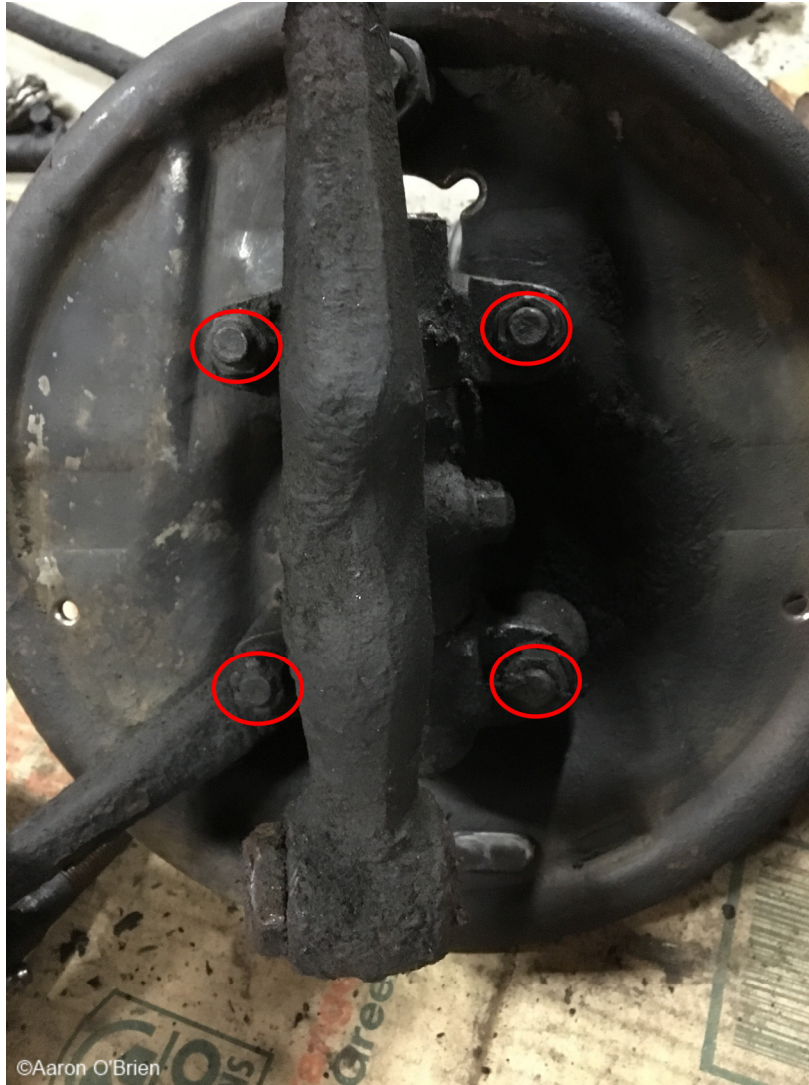
Remove the lower inner shaft.

- Four bolts to remove the shaft



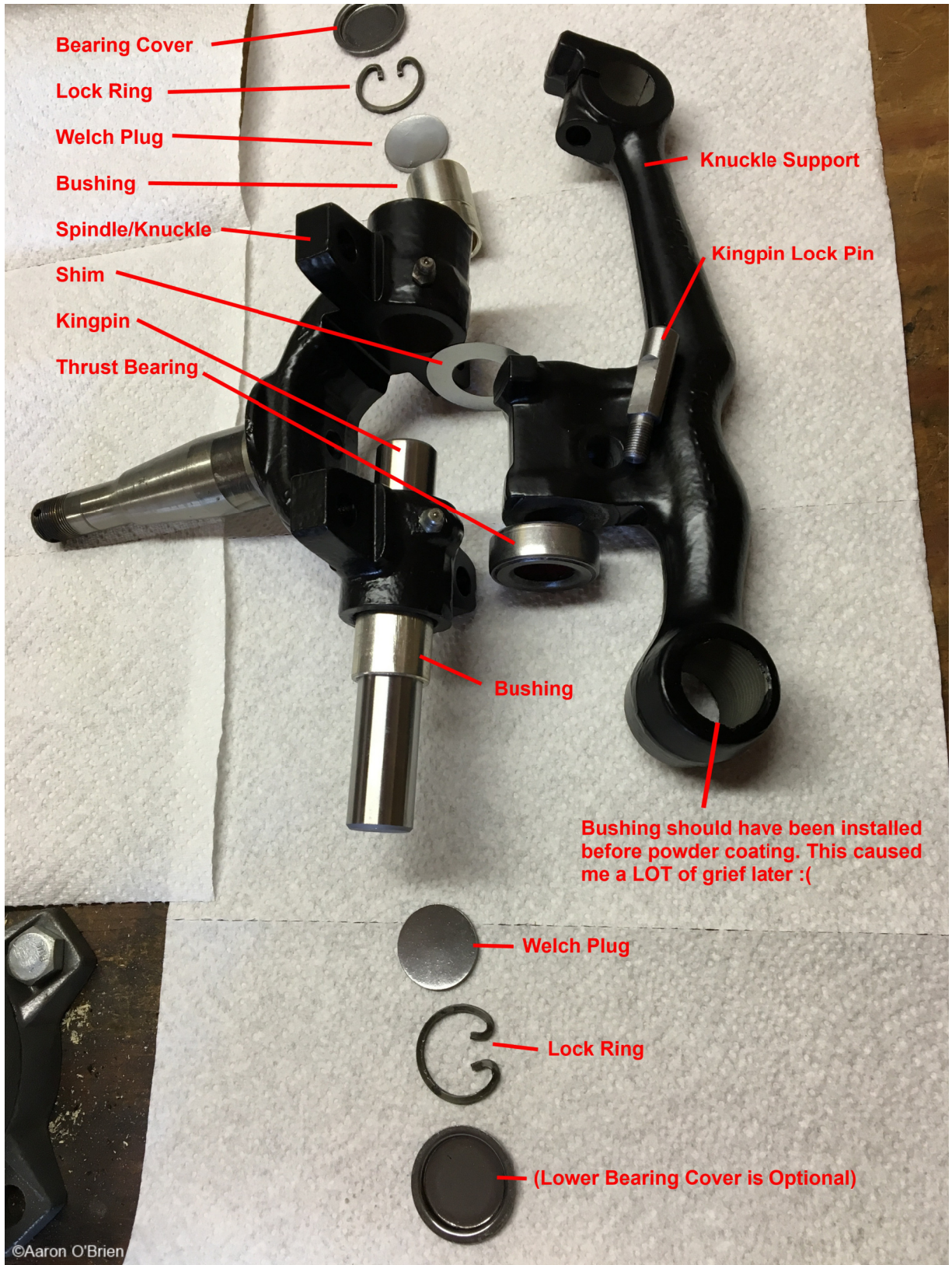
Disassemble the spindle support/kingpin

Remove the brake back plate



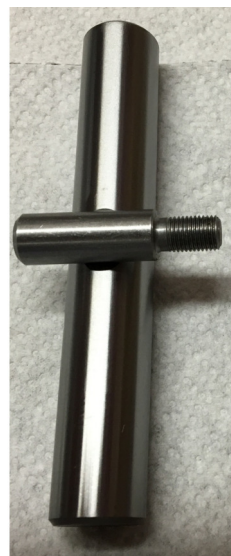
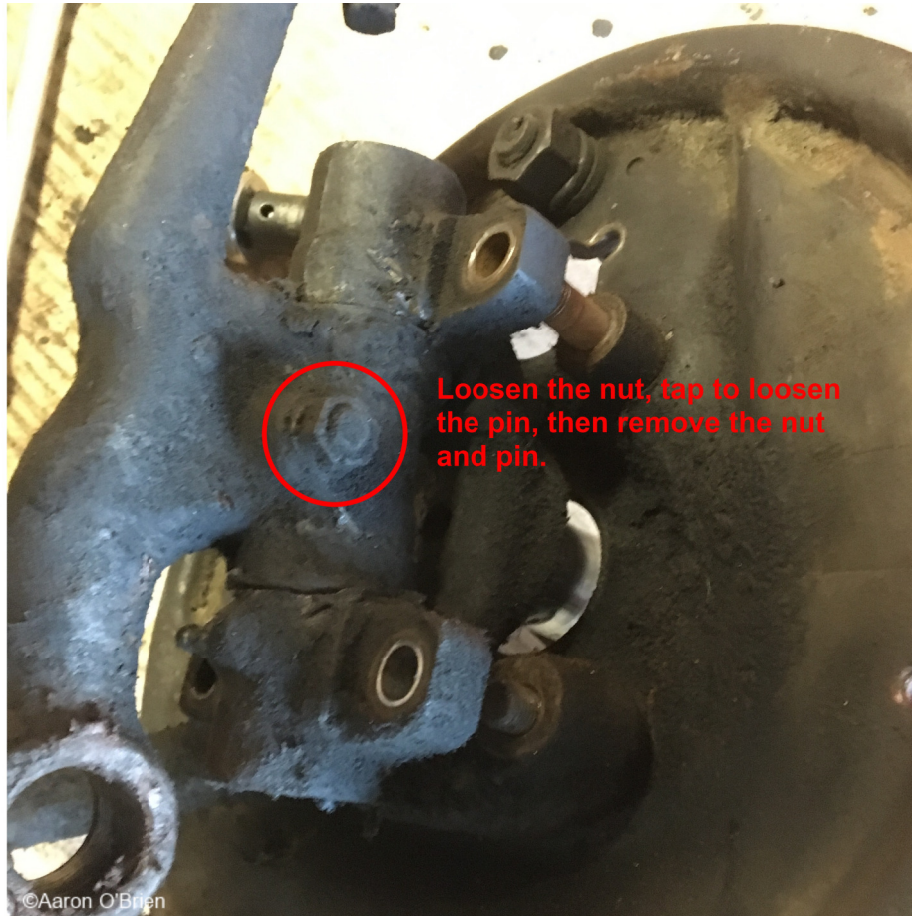
©Aaron O'Brien

Remove the bearing covers and lock rings



Remove the kingpin lock pin

- To preserve the threads, loosen the nut and then tap on the nut to loosen the lock pin, then remove the nut and lockpin.



Remove the kingpin

- Drill most of the way through the lower Welch plug and then use a punch to drive the kingpin up and force out the upper Welch plug.
- Then force the kingpin out of the bottom.
- Then remove the upper and lower bushings.
- The steering knuckle should now be completely disassembled.



Remove the steering connecting rod assembly from the third arm

- Remove the cotter pin and unscrew the cap.
- Wiggle the assembly until you are able to free it from the ball joint.



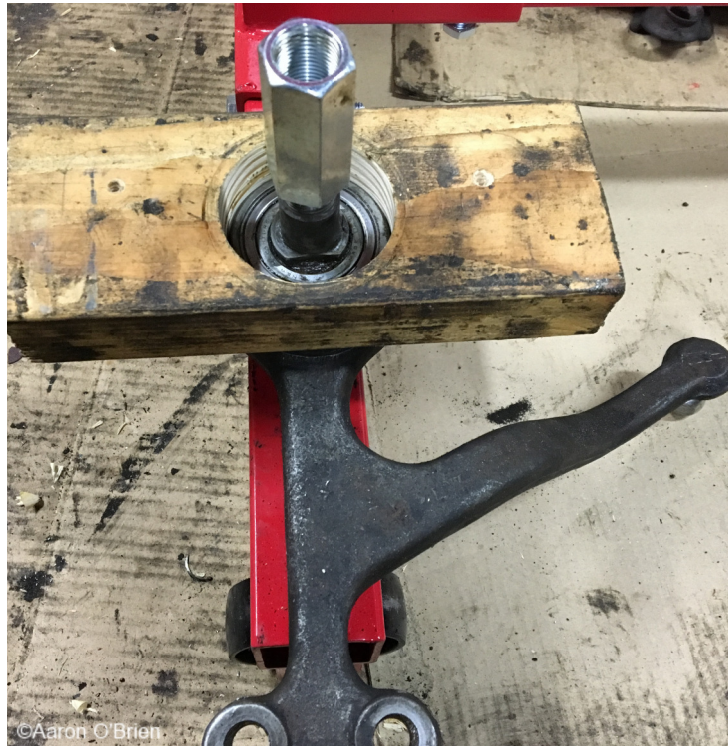
Remove the third arm from the third arm mount

- Remove the cotter pin and nut
- Then use wheel/hub puller to separate the third arm from the mount
- Check the 3rd arm support bracket for cracks. Replace it if you find any.

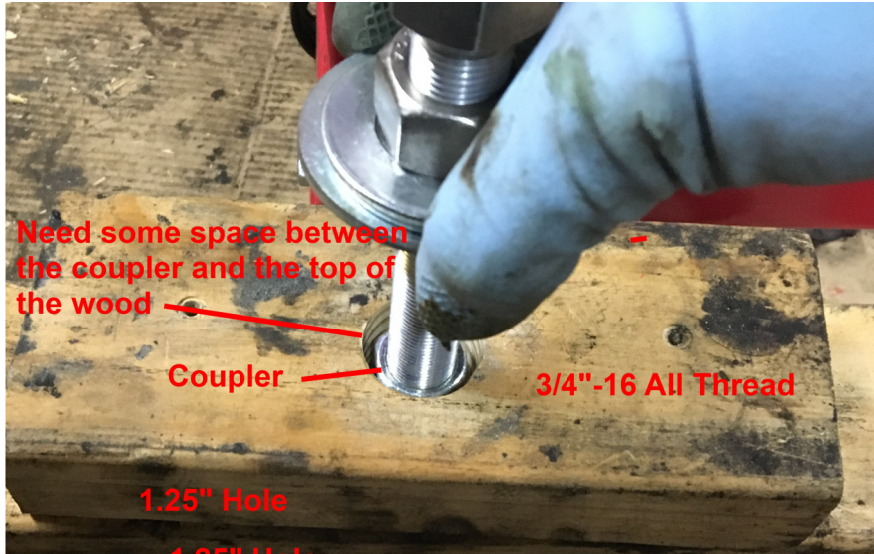


Remove the third arm bearing.

- Remove the lock ring
- Use a 2.5 inch hole saw to drill a hole in a 2x4 piece of wood
- Screw the 3/4"-16 coupler onto the third arm bearing

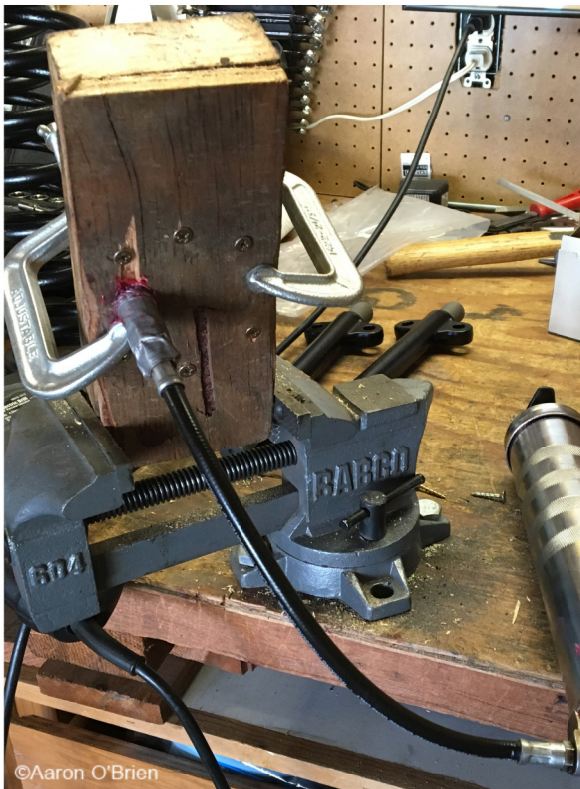


- Screw the 3/4"-16 all thread into the coupler
- Drill a 1 1/4" inch hole through two more pieces of 2x4 wood and stack them as shown below
- Add a washer and 3 nuts
- 2 nuts on the top are tightened together and a wrench on the lower one will hold the all-thread.
- Tightening the lowest nut will pull the bearing out of the third arm



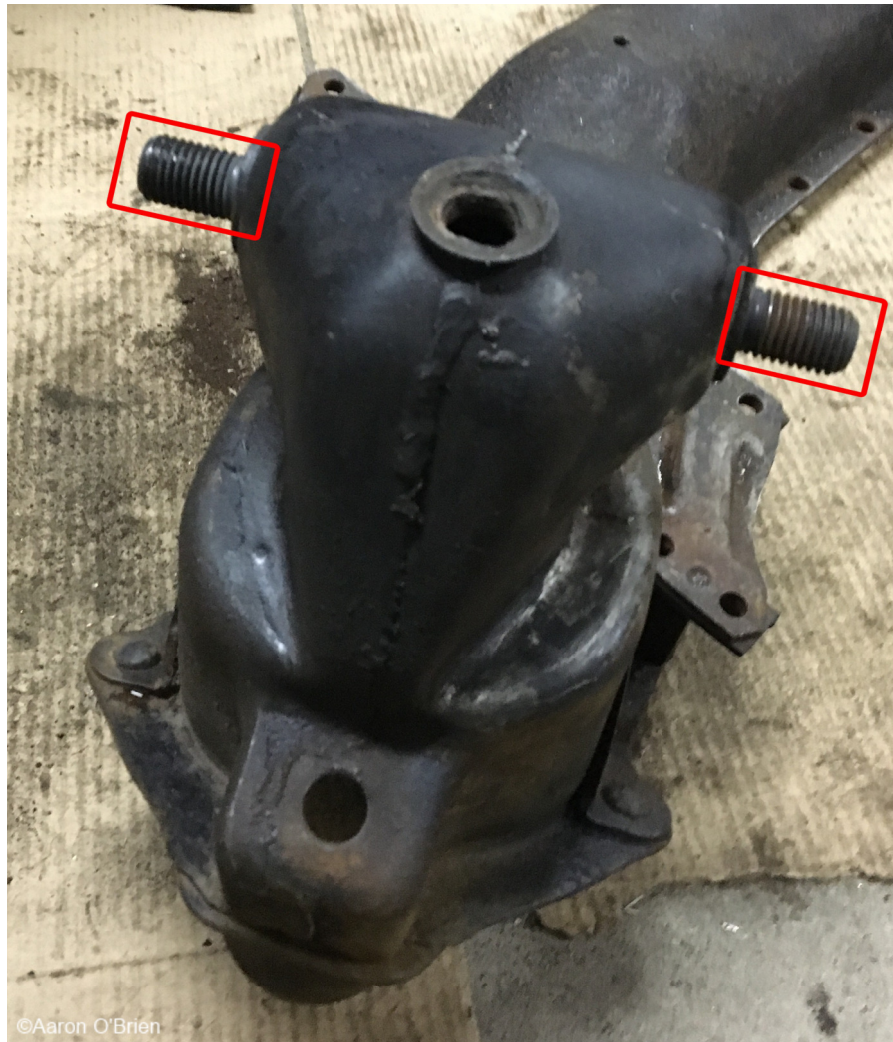
Grease the third arm bearing

- Use the 2x4 piece of wood with the 2.5” hole that you used to remove the bearing.
- Get another piece of wood and drill a hole the just big enough for you grease gun to fit into.
- Screw the two pieces of wood together.
- Use duct tape to make the bearing and grease gun fit snugly into the holes.
- Use C-clamps to hold the bearing in the hole.
- Pump grease into your new fixture.



Check the upper inner shaft threads and bushings.

- You don't want to replace this shaft if at all possible.
- If the shaft threads are acceptable, then check to make sure that the new bushings are compatible with the shaft. If the old bushings are in good shape then you could re-use them.
- If the shaft threads are worn then you will need to replace the shaft.(see below for instructions)
- The shaft needs to be very tightly fitting into the crossmember. If it is not, then you will need to replace the shaft and/or shaft bushings.



Upper inner shaft removal

- The place where the shaft screws into the crossmember is larger in the front and smaller at the back
- To remove the old shaft, you need to use a large pipe wrench on the rear side of the shaft and twist it clockwise to get it out. When it is loose then it will push out the front.



(Picture courtesy of Tom Parsons)

Upper inner shaft bushings replacement (instructions courtesy of Tom Parsons)

- The place where the shaft screws into the crossmember is larger in the front and smaller at the back
- Drill out the spot welds (arrow). Be careful not to drill through the crossmember.
- Weld in new bushings per the instructions that come with the new bushings



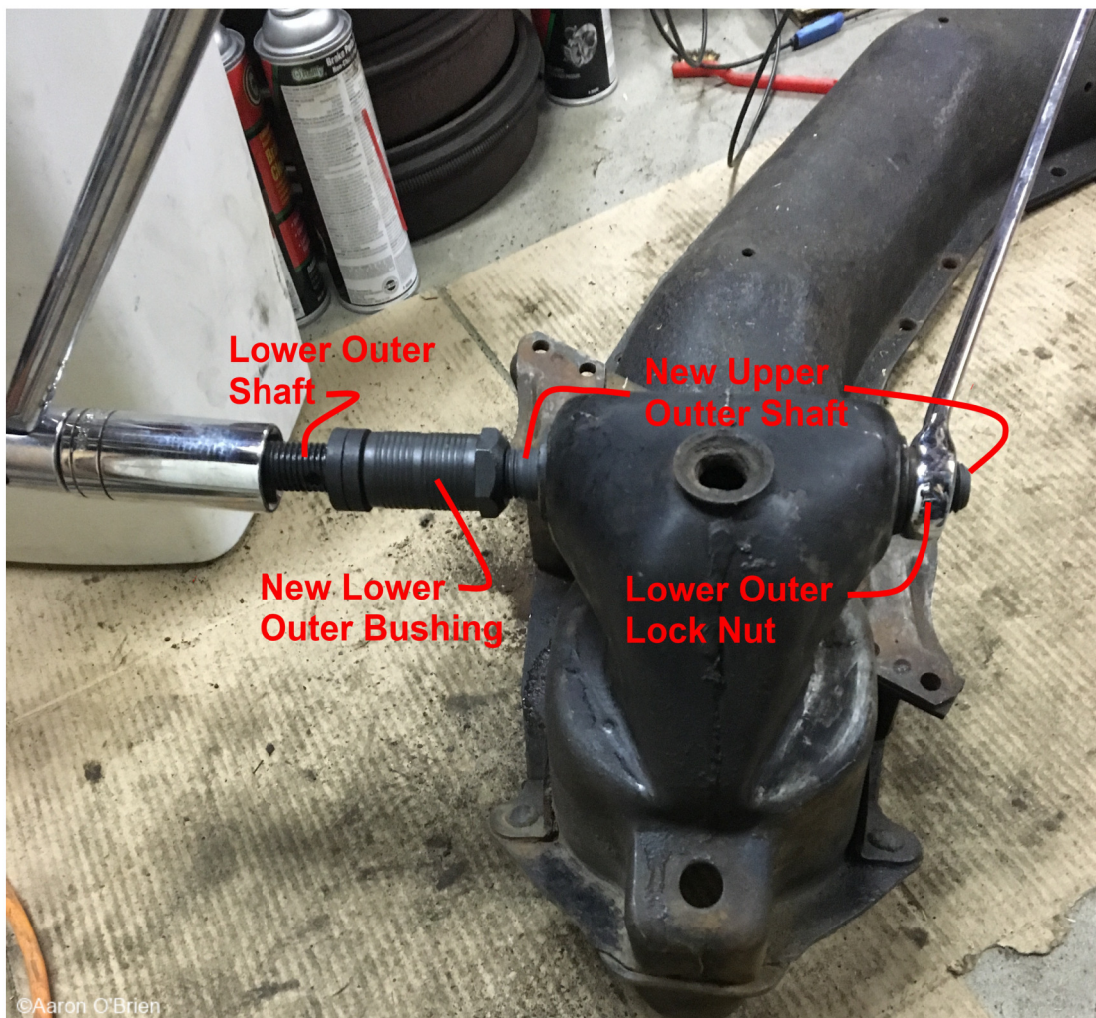
(Picture courtesy of Tom Parsons)



(Picture courtesy of Tom Parsons)

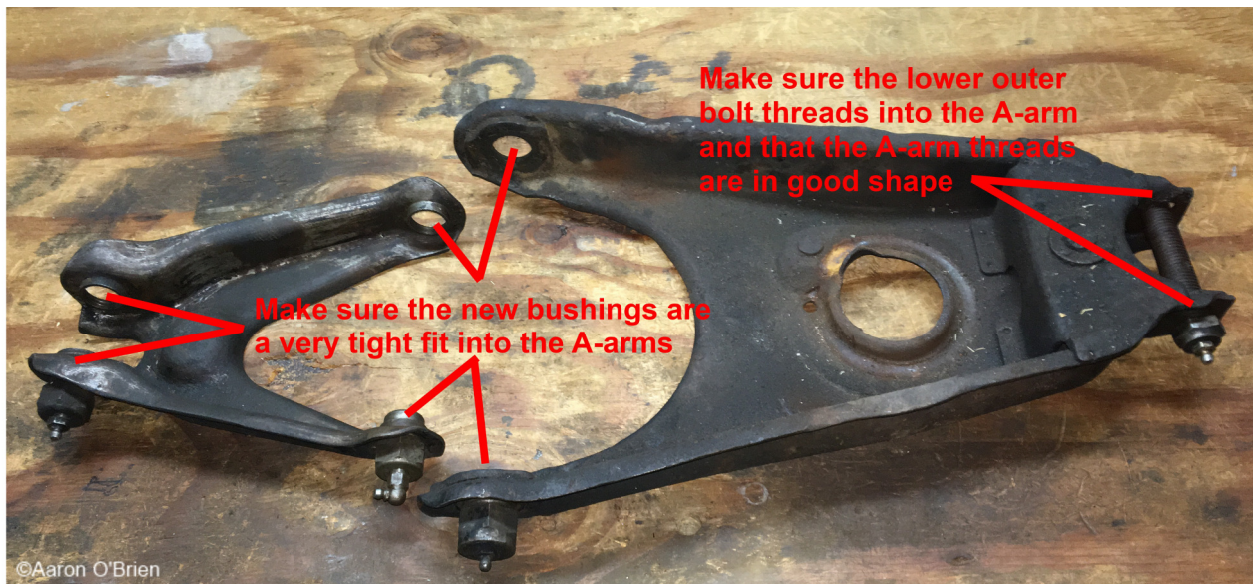
Upper inner shaft installation

- The place where the shaft screws into the crossmember is larger in the front and smaller at the back
- The shaft is interference fit into the crossmember. The shaft should be about 0.008" larger than the hole in the crossmember. (my crossmember holes were: rear 0.745" / front 0.765")
- If your new shaft is more than 0.012" over sized, then you might want to think about ways to reduce the difference. (my shaft diameter was: rear 0.760" / front 0.785")
- My shaft was way too large for the holes in the crossmember. It took sooo much force to get it in there (estimated 400 ft-lbs) that I fucked up the threads on the shaft. I had to use a Dremel to shave them down so the bushing would fit again.
- **Do not allow any lubrication between the crossmember and the shaft. The shafts need to be so tight that there isn't any chance that they will come loose.**
- Install the new shaft in through the front of the corssmember.
- Use your new lower outer bushing/bolt on the front side of the shaft and the lock nut on the rear. (Tom Parson's trick)
- Tighten both sides until the shaft is started then remove the lock nut and continue screwing the shaft in from the front until there is an equal amount of shaft on both sides.



Check the fit of the new bushings

- Clean the A-Arms
- Clean the holes in the A-Arms where the bushings screw in. Use the gun barrel brushes, a drill, and brake cleaner.
- Measure the inside diameter of the A-Arm hole (mine were outer 0.920” / inner 0.960”)
- Measure the outside diameter of the bushing. (mine were outer 0.945 / inner 0.980)
- Record your measurements
- The bushing should be slightly larger.
- Try to finger thread the new bushing into the A-Arm. If you can finger thread the bushing into the A-Arm, then the A-Arm is worn out and you need to get a new A-Arm.



Check the fit of the new bushings into the spindle support arms.

- Clean the spindle support
- Clean the hole in the spindle support where the bushing screws in. Use the gun barrel brushes, a drill, and brake cleaner.
- Clean the new bushing with brake cleaner.
- Install the new bushing into the spindle support from the rear. The rear side of the spindle support has the stop tab. There is a better picture and explanation in the “Reassembly: Assemble the spindle support / kingpin” section. It is OK to install it from the front but most people install it from the rear
- **Do not allow any lubrication between the bushing and the spindle support. The bushing needs to be so tight that there isn't any chance that it will come loose.**
- Torque the bushing to 150-170 ft-lbs.
- The bushing is not necessarily interference fit, but you should be able to torque it to spec.



Clean everything

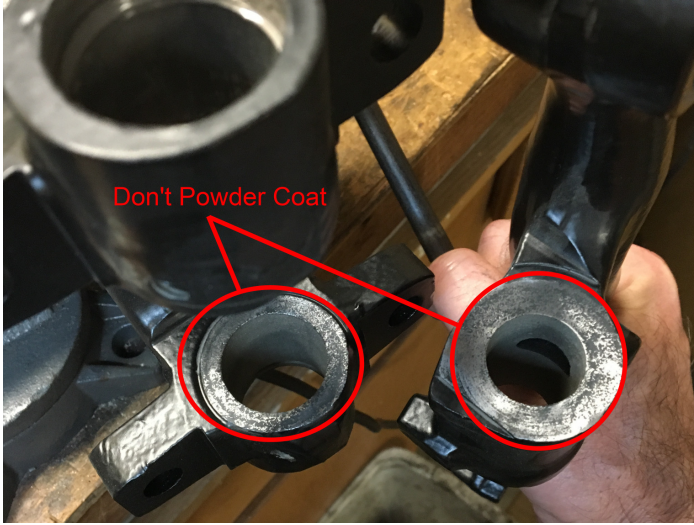
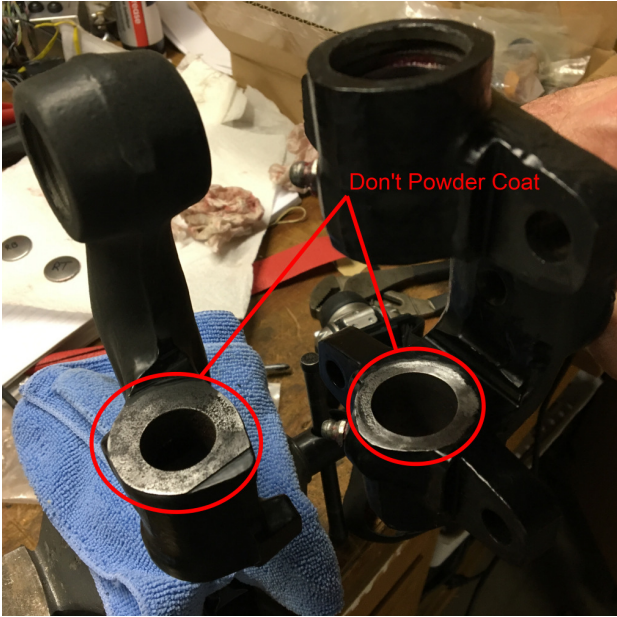
- The powder coating shop wanted all the grease/dirt removed from the old parts before they would sand blast them.



Get everything painted/powder coated.



- Don't powder coat any threads or bearing surfaces. If the shop is any good then they will generally know what to do.
- Don't powder coat the spindle support bearing surfaces because if the powder coat wears off then it will change the clearances.



Reassembly

Assemble the spindle support/kingpin.

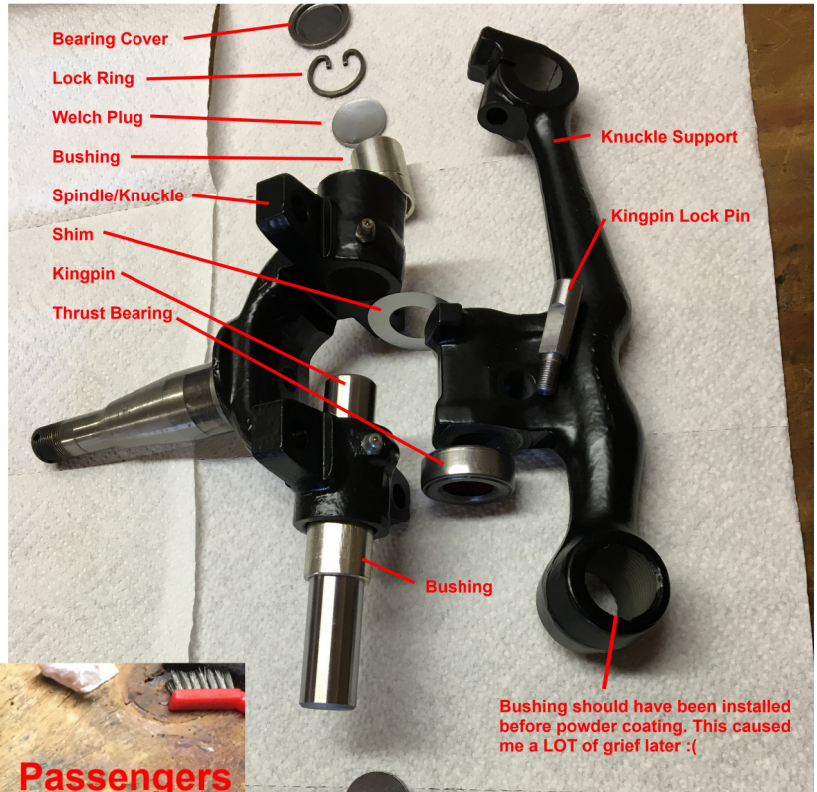
- Install the bushings
 - Lightly grease the inside and outside of the bushings
 - The bushings need to be free floating.
 - The groove is aligned with the grease (zerk) fitting
 - The hole should be opposite the grease fitting



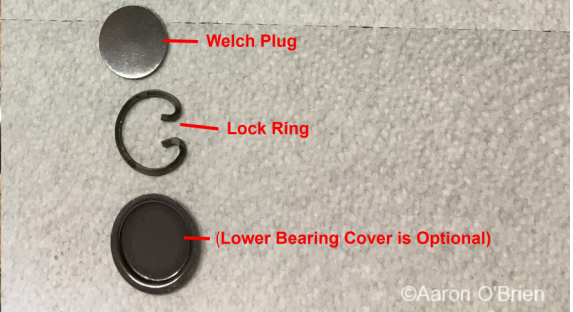
- Install the kingpin from the bottom
- Install the thrust bearing. The gap between inner and outer races facing down.
- Install the spindle support
- Install shims until the spindle support is not “floppy”. The spindle support should be slightly difficult to rotate. You can cut the old kingpin in half and insert it from the top to help align the shims.
- Install the kingpin lock pin
- Install the Welch plugs. Convex side outward.
- Install the lock ring.
- Use a punch to lightly tap the Welch plug to expand it and seal any gaps.
- Install the bearing covers. Be gentle. If they deform then they will never stay in place.



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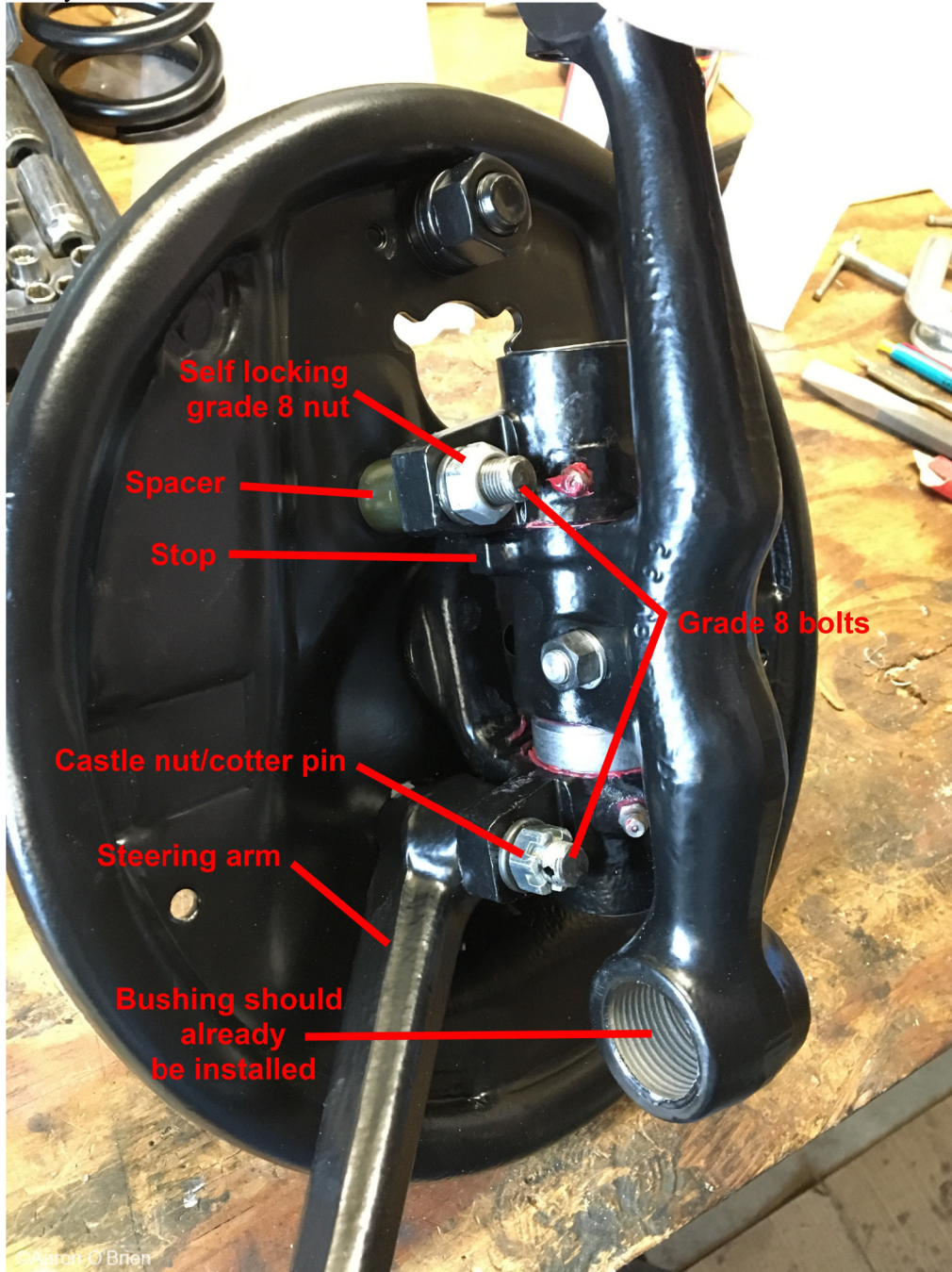
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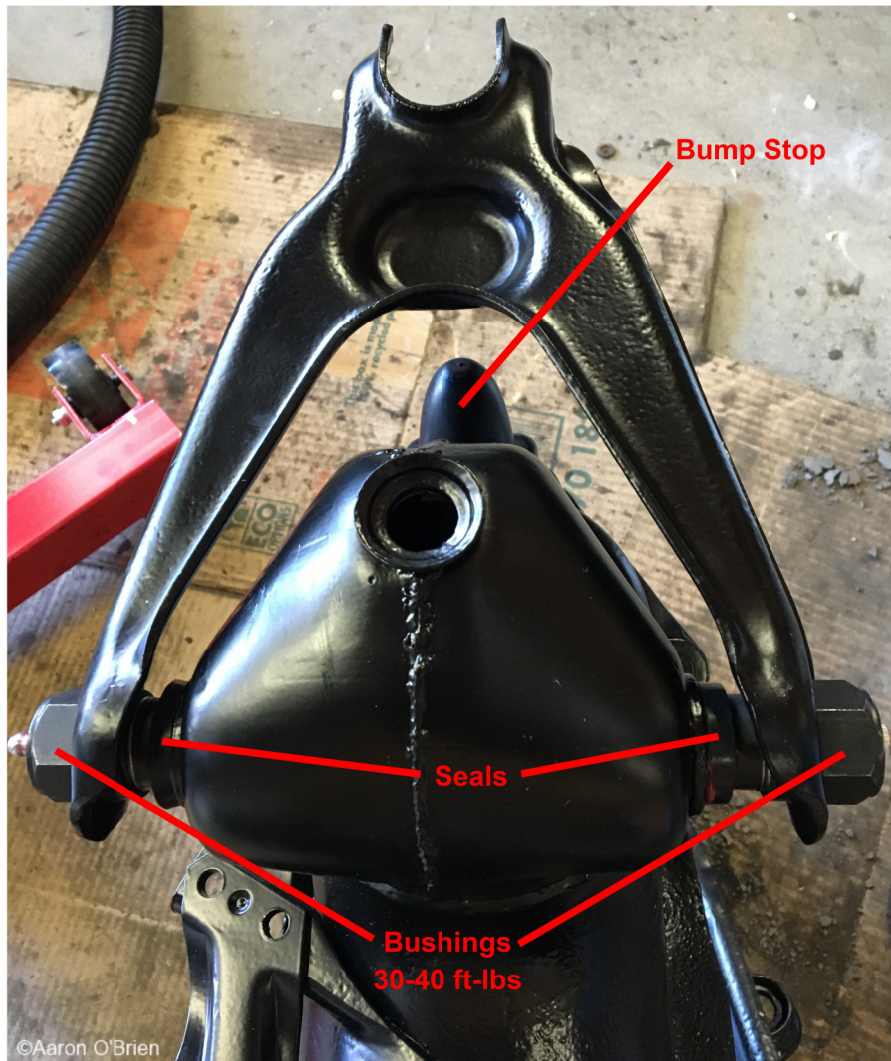
Install the brake back plate

- Make sure to use new grade 8 nuts/bolts.
- The nuts may be self locking
- The lower outer bushing should have already been installed at this point.
- It may be easier to install the back plate after the spindle support has been bolted to the A-arms. Either way works fine.



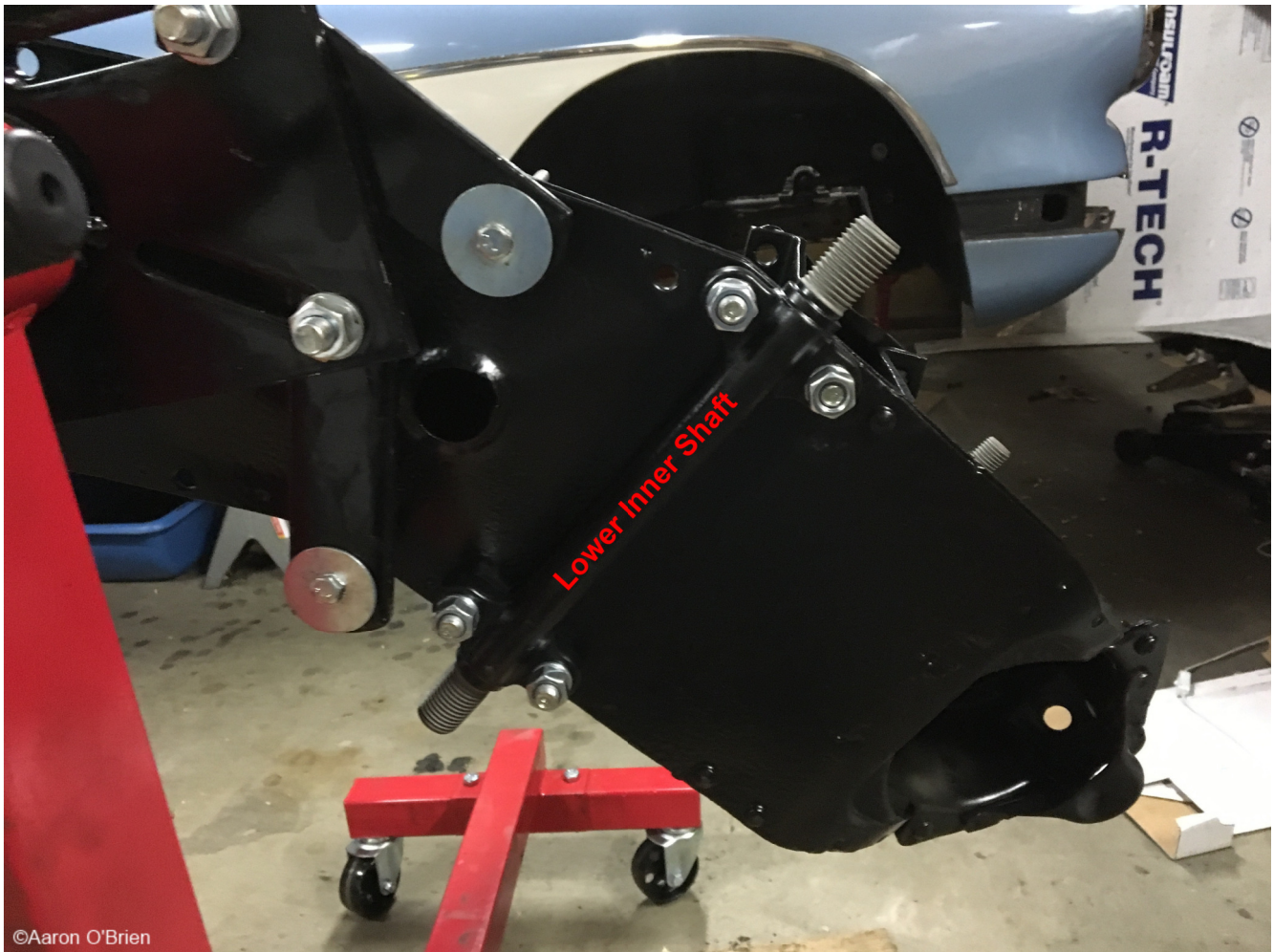
Install the upper A-arm

- Install the bump stop
- Install the seals on the shaft
- **Do not allow any lubrication between the A-arm and the bushing. The bushings need to be so tight that there isn't any chance that they will come loose.**
- Clean the bushing and A-arm.
- Install the A-arm over the shaft. It will be difficult.
- It is very important that the A-arm is centered.
- I installed both bushings simultaneously and alternated tightening $\frac{1}{2}$ a turn each until the torque specification (30-40 ft-lbs) was reached. Mark the bushing with a white paint pen to help keep track of the rotation.
- Grease... rotate the A-arm... grease... rotate the A-arm...
- The A-arm will be tight. Mine required 8 lbs to move one A-arm and 2 lbs to move the other.
- The upper inner bushing should have 45° or 90° zerk (grease) fitting. All the rest of the zerk fittings are straight.



Install the lower inner shaft

- **Make sure to use Grade 8 bolts!**



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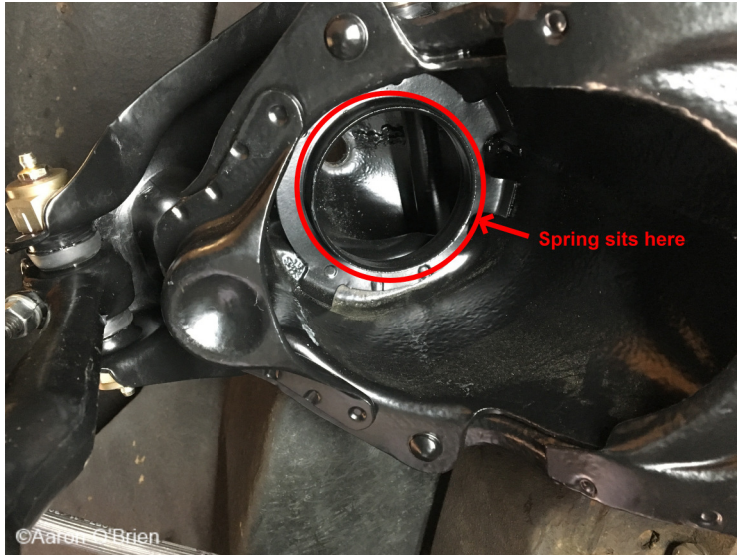
Install the lower A-arm

- Install the bump stop. Don't over tighten or you will pull the bolt right out of the rubber.
- Install one seal on the shaft
- **Do not allow any lubrication between the A-arm and the bushing. The bushings need to be so tight that there isn't any chance that they will come loose.**
- Clean the bushing and A-arm.
- Install the A-arm over the shaft (Hint: start with the shaft that doesn't have the seal)
- Carefully push the second seal on the other shaft and through the hole in the A-arm with a screwdriver.
- It is very important that the A-arm is centered.
- I installed both bushings simultaneously and alternated tightening $\frac{1}{2}$ a turn each until the torque specification (85-100 ft-lbs) was reached. Mark the bushing with a white paint pen to help keep track of the rotation.
- Grease... rotate the A-arm... grease... rotate the A-arm...
- The A-arm will be tight. Mine required 7 lbs to move one A-arm and 10 lbs to move the other.



Install the spring

- Install the flat part of the spring into the shock tower. Make sure that the spring is properly seated in the pocket
- Install the spring properly into the seat on the lower A-arm.



Install the spring compressor

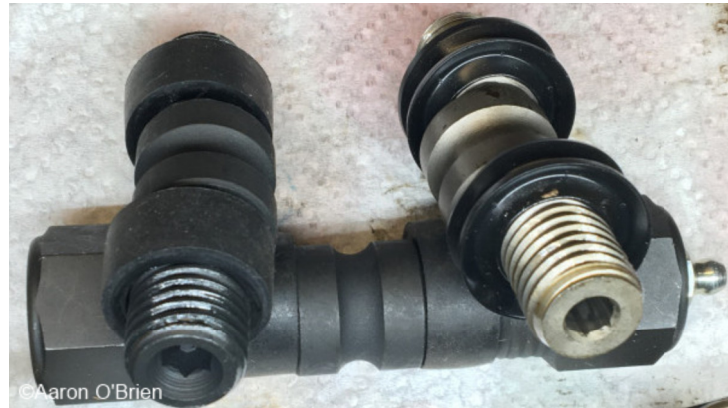
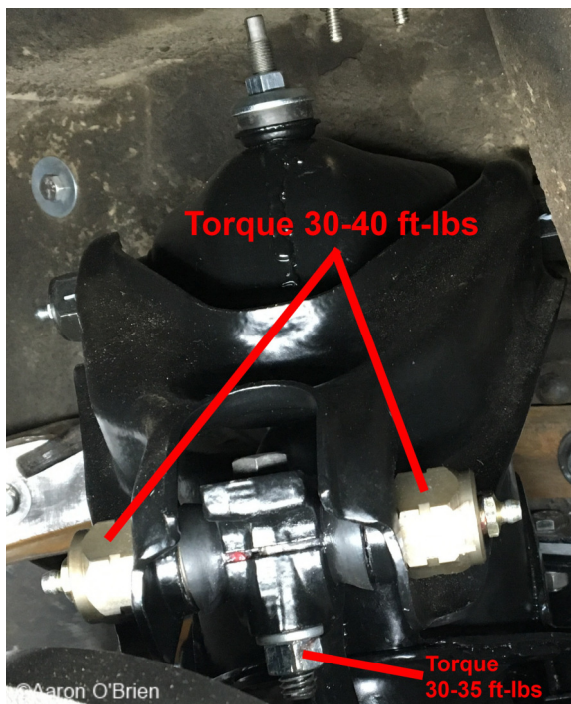
- Use some wood to save the finish on the lower A-arm and shock tower.
- Place a rag inside the spring and around the all thread to protect the finish on the spring.
- Two nuts tightened together on the short end to prevent them from spinning off.
- Compress the spring until the lower A-arm is roughly parallel with the crossmember.



Install the upper outer pivot pin and bushings

- The pivot pin has a hex fitting that faces the rear. The hex fitting is used for wheel alignment.
- The bushing with the grease fitting should also be facing the rear. Remove the grease fitting to access the hex fitting during wheel alignment.
- Install the upper outer pivot pin into the spindle support and place it into the upper A-arm.
- Install the seals
- Insert the lock pin and Torque it 30-35 ft-lbs
- Torque the bushings 30-40 ft-lbs.

Note: The original pivot pin has a hole running through the center of the pin that allows grease to reach the front. Mine was totally clogged with old grease and the front threads weren't getting any grease... all the grease stayed in the rear. Therefore, I prefer to have dedicated grease fitting in the front and rear.

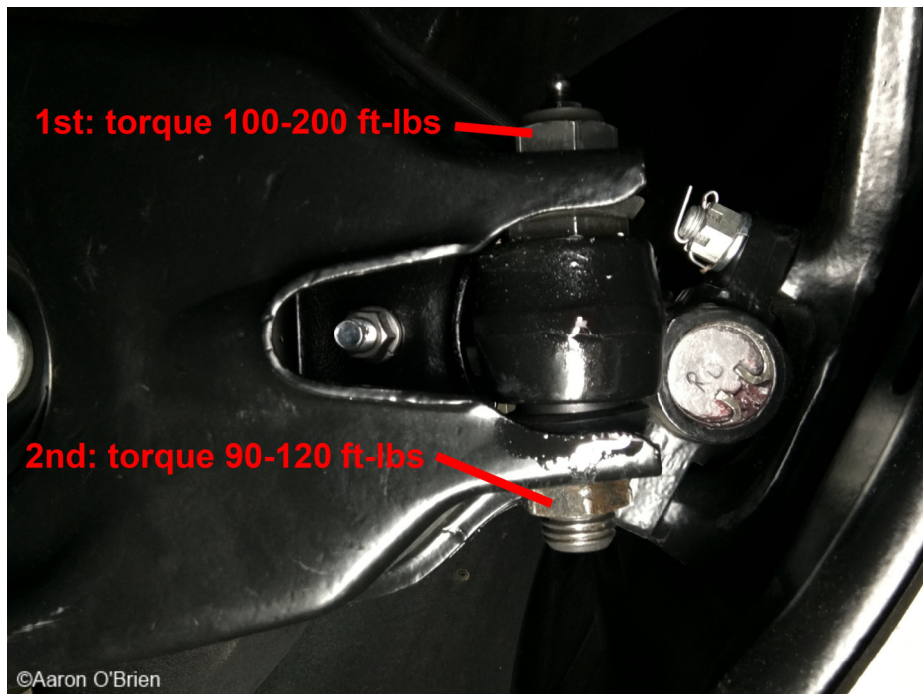


Install the lower outer pivot bolt

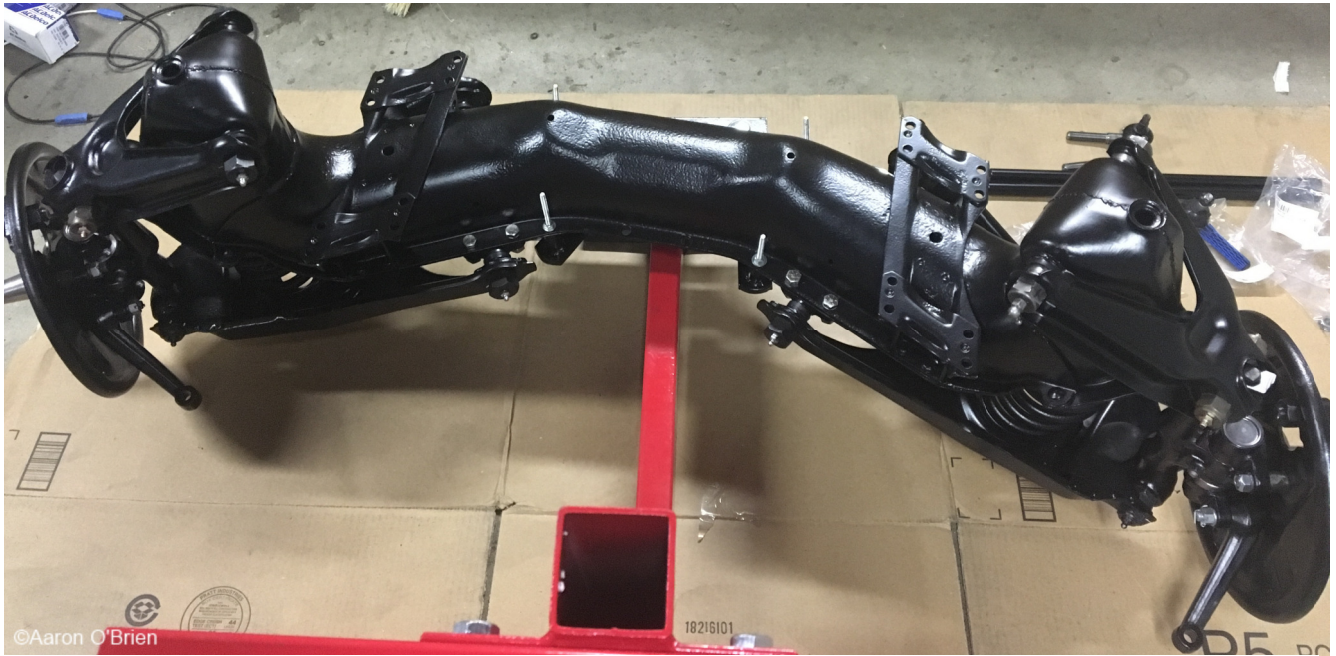
- Place a seal over the lower outer bushing on the front side as shown in the picture. It is very difficult, but not impossible.
- Start threading the bolt from the rear of the lower A-arm and place the rear side seal over the bolt as shown in the picture.
- Then put the two together and begin threading the bolt through.
- If the bolt has trouble indexing the threads in the front of the A-arm, then use a C-clamp to slightly squeeze the front/back together. This should allow the bolt to catch the threads in the front.



- First torque the bolt 100-200 ft-lbs.
- Then torque the lock nut 90-120 ft-lbs



Remove the spring compressor and install the shocks



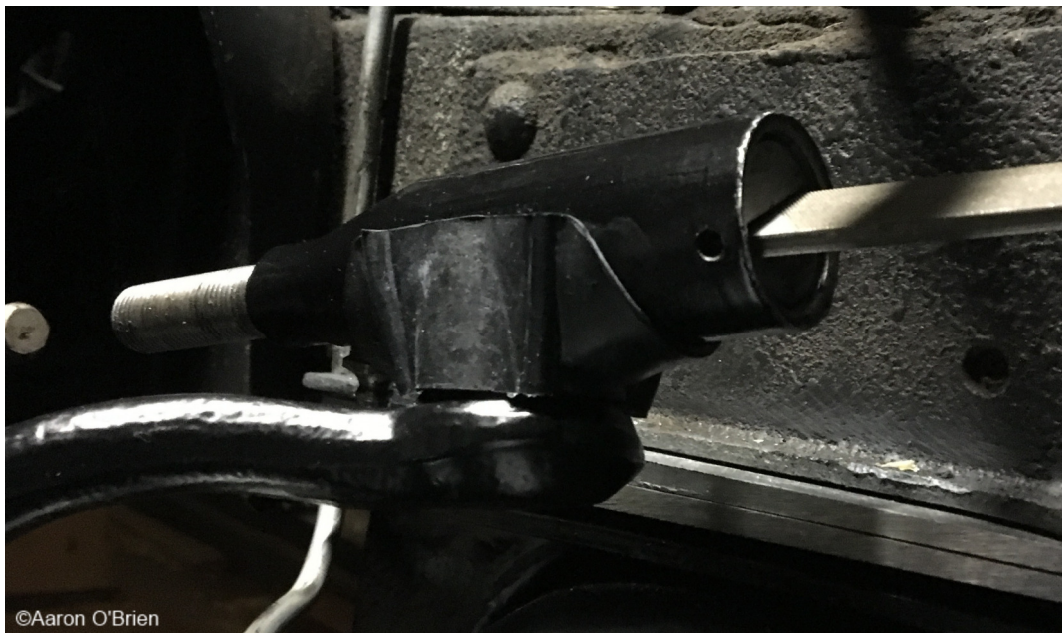
Assemble the third arm

- Slide the bearing onto the shaft.
- Tap the bearing/shaft into the third arm.
- Install the lock ring
- Pack the empty space with grease.
- Install the gasket
- Bolt the third arm to the third arm mount, torque 60-85 ft-lbs, and install the cotter pin.



Install the steering connecting rod assembly onto the third arm

- Assemble the connecting rod as shown below.
- Use a file or some thick piece of metal and pliers to screw the end plug snugly and then back off $\frac{1}{4}$ to $\frac{1}{2}$ turn plus amount necessary to insert cotter pin.



Install the rebuilt suspension back into the car.

- Make sure to use a pair of alignment shims (one on each side) between the frame and the crossmember. Thick side of the shim goes toward the back.
- To lift the suspension I used a pair of scissor jacks (one under each A-arm) and the hydraulic jack under the third arm support bracket.
- Lift slowly. Be careful of the brake line.
- I used stainless steel bolts with lock washers and anti-seize compound.



Install brakes

- Install the wheel cylinder
- Connect the soft/hard brake lines.
- Install the brakes.

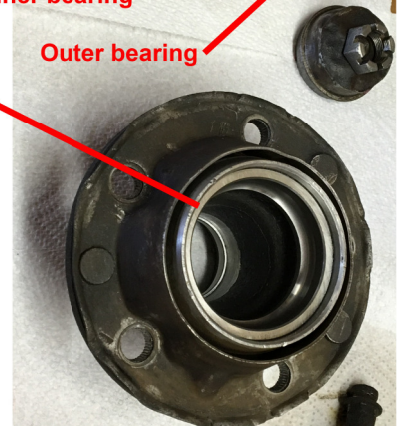


Install the wheel bearings/hub/drum

- Pack the bearings with grease. Put some grease on your hand and scrape the grease into the bearing until all the dirty grease is gone and all the gaps are filled.
- Coat the hub/spindle/race with grease, but don't fill the hub with grease it will just find its way out possibly onto your brakes (very bad if this happens)
- Clean the inside of the brake drum. Use the brake cleaner and clean rags. You don't want any oil or grease on the brake surface.
- Install the inner bearing/race/seal/oil deflector into the hub and place it onto the spindle
- Install the outer bearing/washer/castle nut.
- Torque the castle nut 33 ft-lbs to seat the bearings then back off the castle nut and then...
- Torque the castle nut to 12 ft-lbs then insert cotter pin or back out until you can insert the pin.

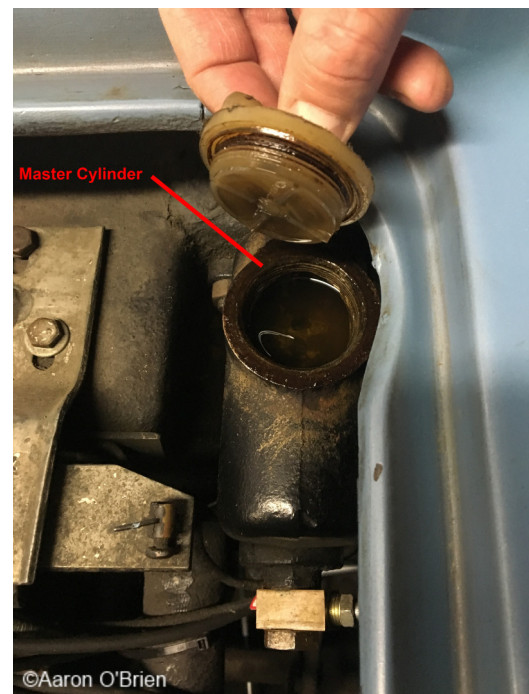
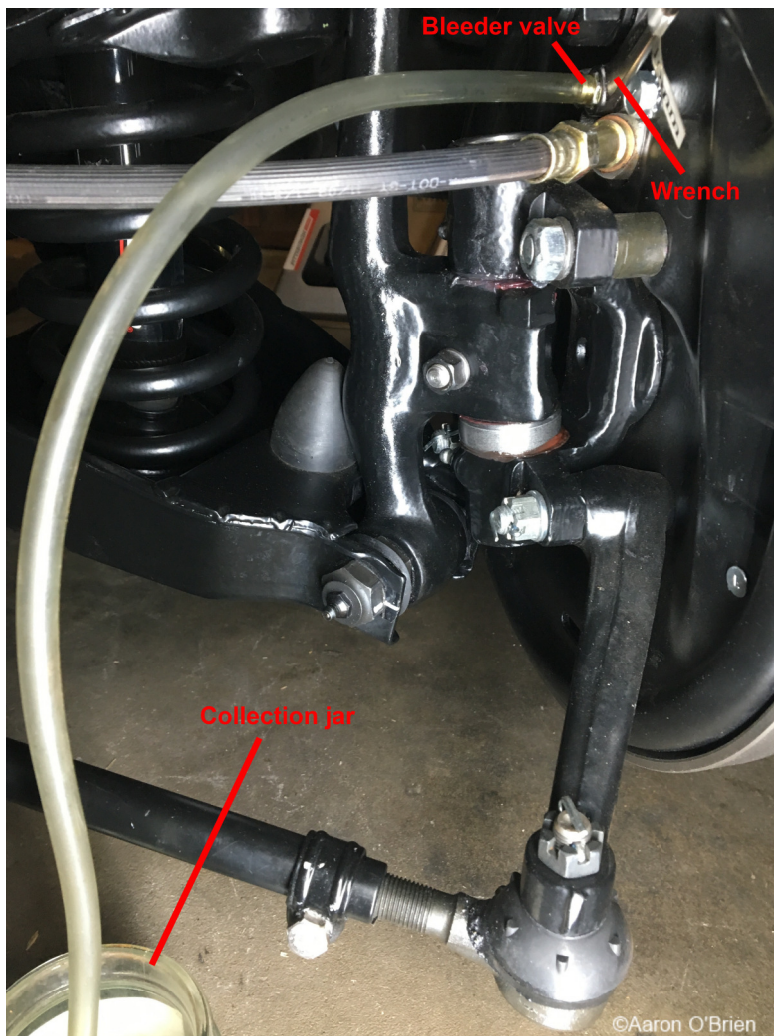


Hub separated from drum



Bleed the brakes

- Check the brake fluid level in the master cylinder. Make sure the fluid level doesn't get too low or you will get air in the lines again. Make sure that you replace the cap.
- Bleed the wheels in this order: rear right, rear left, front right, front left.
- Place a clear tube (¼" inside diameter) over the bleeder valve.
- Loosen the bleeder valve.
- Say "down": Have a helper step on the brake pedal when you say "down"...fluid spews out...
- Tighten the bleeder valve (to prevent air from entering the wheel cylinder)
- Say "up": The helper should take their foot off the brake pedal.
- Repeat until you are confident that there is no air in this part of the brake line.
- Check the fluid level in the master cylinder. Replace the cap.



Adjust the star wheel

- The star wheel adjusts how close/far the brakes are from the drum.
- Looking from behind the wheel there is a little window that gives access to the star wheel.
- Push the star wheel up increase the brake pad/drum distance (loosen)
- Push the star wheel down decrease the brake pad/drum distance (tighten)
- Refer to ST-12 Section 5-3 for adjustment procedure. Basically, tighten it until the brakes start rubbing the drum then back it off.



Install the bumper

- (No pictures) Procedure is the opposite of removal

Install the wheels

- (No pictures) Procedure is the opposite of removal
- Tighten the hell out of the lug nuts (bolts)

Put the car back on the ground

- (No pictures) Procedure is the opposite of lifting

Install the radiator

- (No pictures) Procedure is the opposite of removal
- but don't forget to add the radiator fluid.

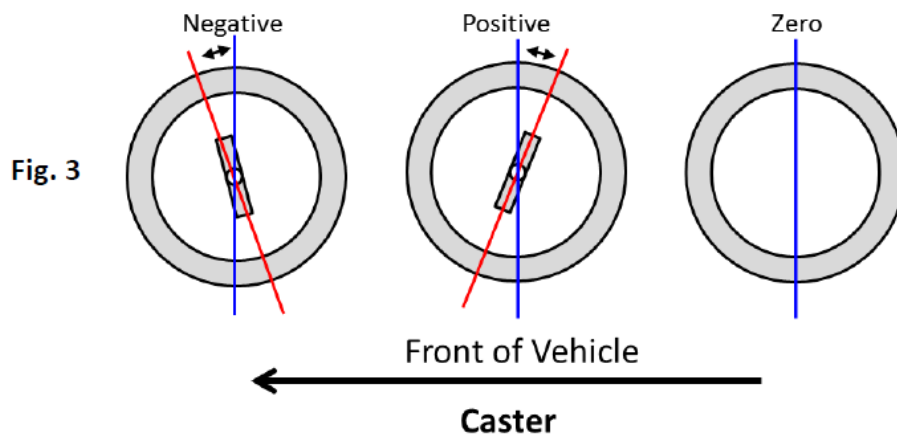
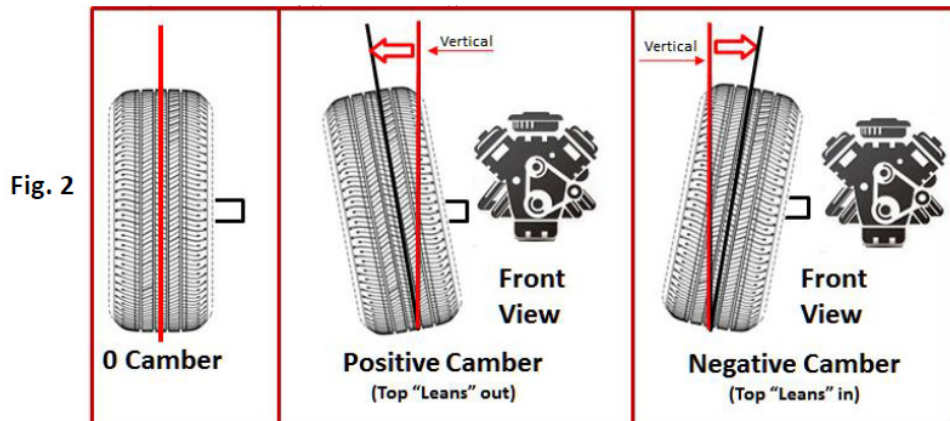
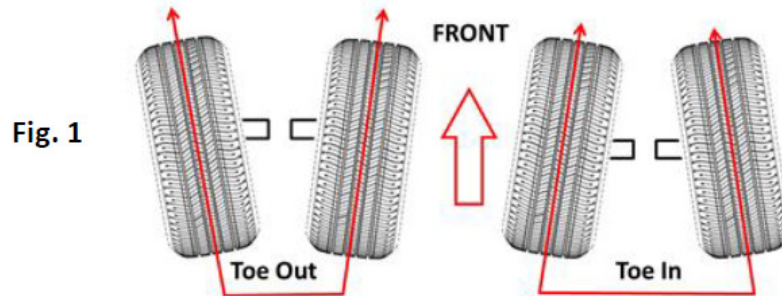
Install the fan shroud and fan

- (No pictures) Procedure is the opposite of removal

Alignment

Basics

- <https://www.corvetteforum.com/forums/c1-and-c2-corvettes/3852901-some-basic-education-about-wheel-alignment-on-c1-and-c2-corvettes-by-joe-fisher.html>
- Read the above post by DZVette on Corvetteforum.com and the files that he posted there.
- The pictures below are copied for from Wheel alignment Basics C-1 Joe Fisher 7-18-16 Final.pdf



Specs

- <https://www.corvetteforum.com/forums/c1-and-c2-corvettes/3579581-front-suspension-alignment.html>
 - Post by Plasticman:

Spec	Bias Ply (ST-12)	Radials
Castor (degrees)	+1.5° to +2.5°	+2.5° to +3°
Camber (degrees)	-0.5° to +0.5°	-0.25° to +.025°
Toe-In (inches)	1/8" to 1/4"	1/8" total
King Pin Inclination (only for reference)	3.5° to 4.5°	3.5° to 4.5°

Center the third arm and steering wheel

- Make sure the steering wheel is at its center
 - With the drag link removed, turn the steering wheel lock to lock.
 - You will feel the most resistance when the steering wheel is centered.
- Wheels should be removed (or off the ground) so that the third arm can move freely.
- Attach the drag link and screw on the tube until the third arm is centered
 - Double check that the steering wheel is centered.
- Install the wheels
- Put 4 gallon sized ziploc bags under each front wheel.
- Put the wheels on the ground on top of the ziploc bags

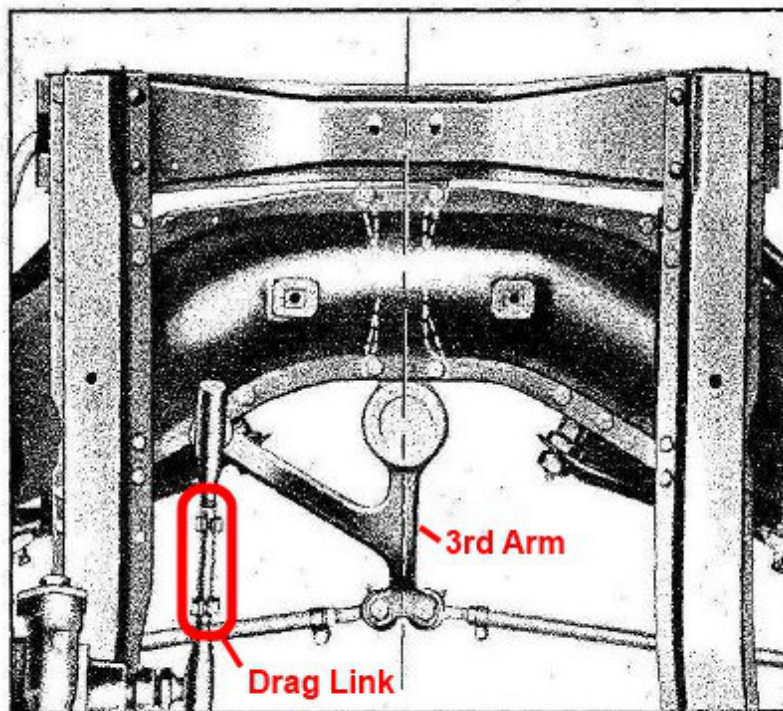


Fig. 6—Checking Third Arm Alignment to Determine Drag Link Adjustment

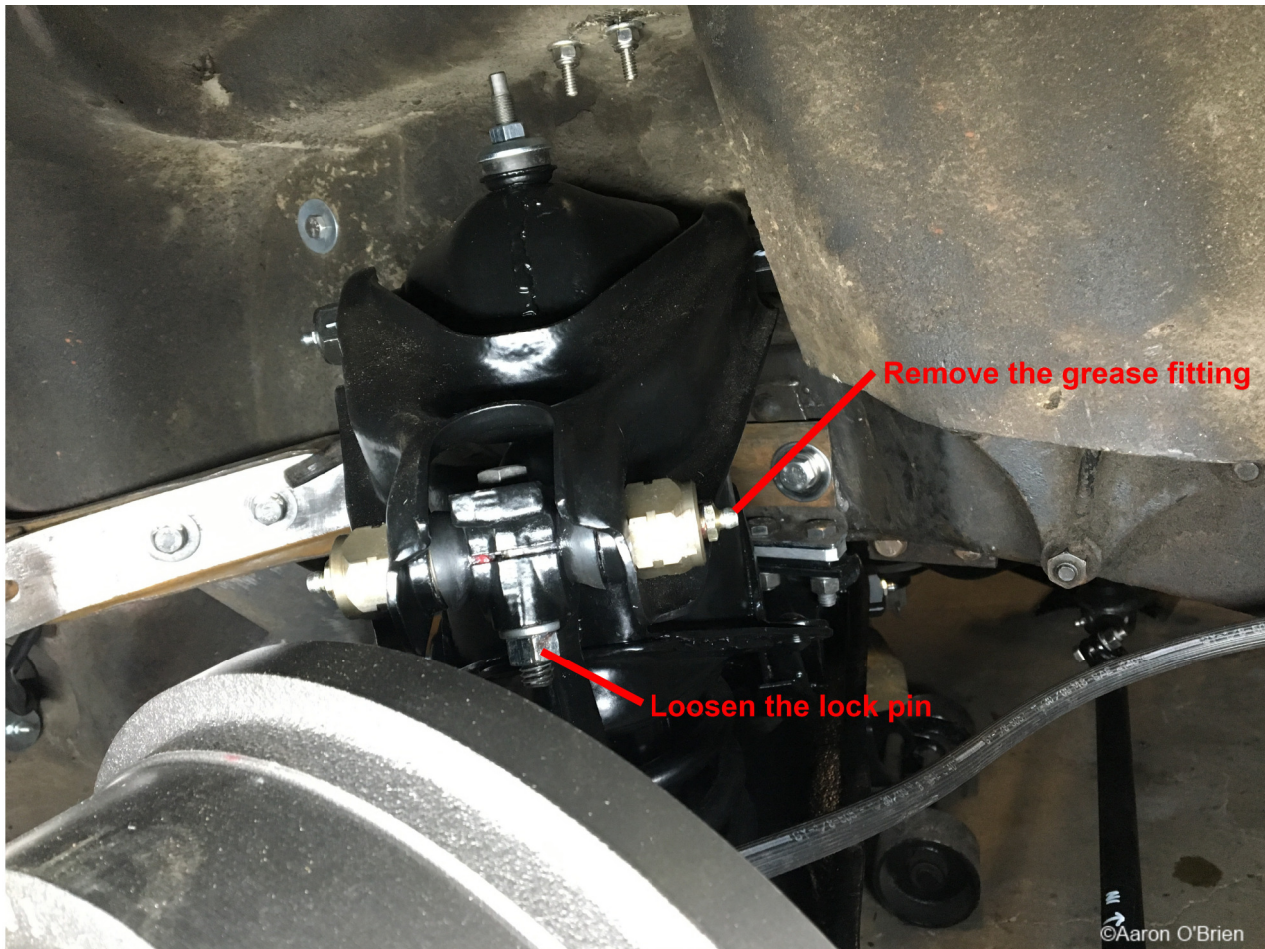
Create your measurement box

- You want to create a perfect parallel line on either side of your car.
- Use a set of 4 jack stands and the PVC tubing as a frame.
- Measure and mark equal sections (70 inches works good) on each of the PVC tubing.
- Place the tubing on the jack stands and then tie some string from the mark on the front to the mark on the back for both sides.
- Make sure the distance from the string to the rear left wheel is the same as the rear right wheel
- On the front left wheel
 - loosen the tie rod tube clamps
 - measure the distance from the string to the front of the wheel rim
 - measure the distance from the string to the back of the wheel rim
 - Adjust the tie rod tube until these measurements are equal
 - Repeat this step for the front right wheel.
- Make sure the distance from the string to the front left wheel (front of the rim) is the same as the front right wheel (front of the rim)
- Repeat the above two steps until you are convinced that the string is the same distance from each front wheel.
- The back wheels should be equal distant from the string and the front wheels should be equal distance from the string.



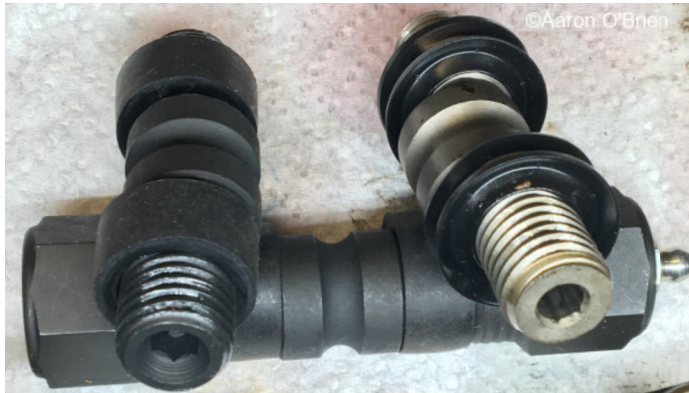
Adjust the caster

- Loosen the lock pin at the upper outer joint.
- Remove the grease fitting on the rear side of the upper outer bushing.
- There is a ¼" hex fitting behind the grease fitting. The hex fitting is supposed to be facing the rear, but if it isn't there, then it will be facing the front.



(continued on next page)

- Turning the pivot pin will push/pull the arm forward/backward adjusting the caster.
- The pivot pin also has a concentric lobe that, when turned, adjusts the camber.
- Install the alignment fixture to your wheel.
- Turn the wheel so that the fixture points toward the back of the car. I turned the steering wheel two full revolutions.
- Zero the level on the fixture.
- Turn the fixture the same amount but toward the front of the car.
- Take the caster reading.
- Turn the upper outer pivot pin (with the 1/4" hex fitting) to the desired caster



These pictures show two different types of pivot pins. Notice the concentric lobe.



Adjust the camber

- Point the wheels straight ahead
- Place the alignment tool on the ground near the wheel
- Zero the tool
- Place the tool on the wheel and read the camber.
- Adjust the upper outer pivot pin to get the desired camber. Half a turn on the pin will give the full range (max to min) of camber.



Adjust the toe-in

- Point the wheels straight ahead. Actually, point the steering wheel slightly to the right. The drag link can be used to center the steering wheel after alignment is finished. If the wheel is too far left, then the draglink may bottom out and you might not be able to pull the steering wheel right without more headaches.
- Measure the distance from the front of the wheel rim to the string and measure the distance from the back of the rim to the string.
- Take the difference between the two measurements Toe-in is when the front of the rim is pointed inward (further from the string)
- Adjust the tie rod tube until each wheel gives half of the desired toe-in. (Half of your toe-in specification will come from the left wheel and the other half will come from the right wheel)
- Tighten the tie rod tube clamps.

Example: I wanted 1/8" total toe-in so I needed 1/16" toe-in on each wheel (1/8 divided by 2 is 1/16). I adjusted the tie rod tube until:

(the distance from the string to the front of the wheel rim) - (the distance from the string to the back wheel rim) = 0.0625"



Finally Done!

Go Spin the Wheels!