LINGENFELTER

PERFORMANCE ENGINEERING

Lingenfelter 2010-2013 Camaro 9.5" Differential Installation

PN: L380xx1410

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Revision - 1.9
Release date 4-June-2013

Parts List

LPE 9.5 Camaro SS Differential

#	Description	Part number
1	LPE 9.5 Camaro SS Differential Assembly	See below
1	Differential bushing, #1, RH top mount	B70111
1	Differential bushing, #2, LH top mount	B70112
1	Differential bushing, #3, cover top	B70110
12	M10-1.5X65 mm SHCS, grade 12.9	91290A540
12	10 mm NordLock, stainless locking washer	NOR-10.7-1051
2	Prop shaft retainer for 7/8 bearing cap	03920486
4	Bolt, 5/16-24x1.3, hex	15734903
46	1/2” I.D. hose	5283K13
1	3/4” hose clamp- retaining	9386
1	M6x20 sheet metal screw w/ 17mm washer	1278
1	Zip tie	23925-X
1	1/4” NPT breather vent - porous bronze	9833K22
2	19.8mm Oetiker hose clamp	52545K71

Part #	Ratio	Pre-Load	Usage
L380061410	3.42	Yes	Street/Drag Race
L380071410	3.42	No	Road Racing
L380081410	3.73	Yes	Street/ Drag Race
L380091410	3.73	No	Road Racing
L380101410	4.10	Yes	Street/Drag Race
L380111410	4.10	No	Road Racing
L380121410	4.56	Yes	Street/Drag Race
L380131410	4.56	No	Road Racing

Tools & Materials Required

- Torque wrench
- Torque angle gauge
- Bushing install tool
- Pressure tester/ fuel bleed off tool
- Kent-Moore siphon (part # J 45004) or equivalent
- 10mm-32mm socket and wrench set
- Ratchet and extensions
- Pry tool
- Breaker bar
- Jack
- Jack stands
- Flat head screwdriver
- Sunnen B-200 lubricant or equivalent
- Drill
- Oetiker clamp pliers (or equivalent)
- Axle seal protector for 195mm axle (PN# J44394)
- Axle seal protector for 218mm axle (PN# DT48877)

Additional Required Components

Part number	Description
L390111410	HD halfshafts for 9.5” differential, set
L390031410	HD LPE driveshaft, MT, 9.5” differential
L390041410	HD LPE driveshaft, AT, 9.5” differential
9986226	GM 75W90 synthetic differential fluid

Optional Items

Part number	Description
L500101410	Gen 5 Camaro rear suspension, adjustable trailing arm, pair
L500111410	Gen 5 Camaro rear suspension link, adjustable forward tie rod, pair
L500121410	Gen 5 Camaro rear suspension adjustable stabilizer bar end link, pair
L500151410	LPE Camaro drag race suspension
PDEP1167	Pedders high durometer urethane differential mounts Camaro SS 2010-12
BMRBK026-C	BMR Camaro SS differential mount bushings Derlin Race 2010-2012
TBD	Differential cooler kit
40039752	M20 x 1.5 differential drain/fill plug with internal magnet

The LPE 9.5” (241mm) Camaro differential is a custom designed differential assembly made to fit the 2010-2013 5th Generation Camaro. This heavy duty 356 cast aluminum differential housing is designed to use 9.5” diameter 14 bolt ring and pinions normally used in GM OEM full size trucks. This allows the use of high strength proven OEM type ring and pinions that also provide low gear noise. The differential mounts using the OEM mounting locations and accepts the OEM or aftermarket bushings made for the stock differential. The larger design of the 9.5” differential assembly does require the use of new half shafts and driveshaft (not included). The 9.5” differential assembly weighs 108 lbs with no fluids. This is roughly 33 lbs heavier than the OEM 218 mm Camaro SS differential which weighs 75 lbs with no fluids.

The LPE cast aluminum 9.5” Camaro SS differential assemblies include American Axle TracRite® GT Helical Gear Limited Slip Carrier Assembly, ring and pinion set all built at American Axle. This gives long life and quiet operation to the differential.

Features of the American Axle TracRite® GT - Helical Gear Limited Slip Carrier
- Smooth, quiet operation
- Torque sensitive design instantaneously biases torque before differentiation begins
- Tunable bias ratio
- Can be used with or without a pre-load feature

Ring and pinion ratio options are 3.42, 3.73, 4.10, and 4.56. The LPE 9.5” differential is available with or without pre-load on the limited slip differential. Most street and drag racing applications will want a differential setup with pre-load for a better reaction on initial launch. Having pre-load does add some handling understeer, or “push”, so road racing applications will likely want a differential with no pre-load.

LPE recommends the use of the OEM GM 75W90 synthetic differential fluid (PN: 9986226) in the LPE 9.5” differential. The fluid volume varies slightly depending on the gear ratio. A 3.73 ring and pinion requires roughly 4 quarts of fluid.

The recommended break in period is light duty usage for the first 500 miles. If this is not possible then use a break-in schedule of ten (10) acceleration runs from 25-65 MPH with a cool down time between each run. The reasoning for this is to ensure slight wear on the differential gear without overheating the unit. Be sure to avoid extended runs at high power and load, as well as high sustained vehicle speed during the break in period of 500 miles.

The installation of the LPE 9.5" differential requires removal of the fuel tank, exhaust and numerous other vehicle components. This installation should only be performed by someone experienced in working on vehicles. It is highly recommended that you have access to the GM service information. Service manuals are available from Helm Inc (www.helminc.com).

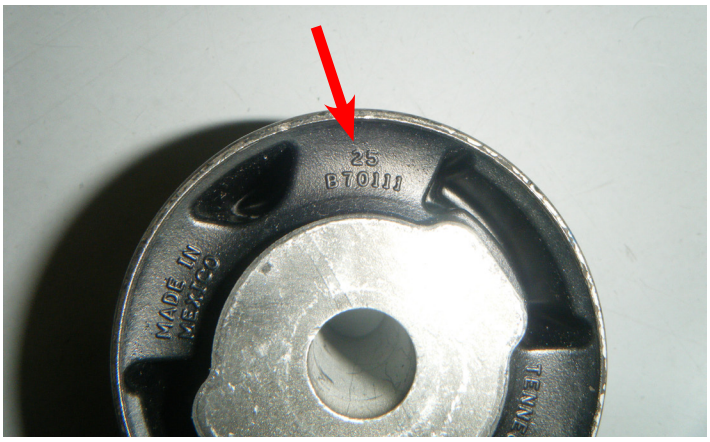
When referencing the side of the vehicle, the driver side of the vehicle is considered the left side and the passenger side of the vehicle is considered the right side of the vehicle.

We recommend that you read the entire instructions before beginning the process. We also recommend that you allow the vehicle to cool before beginning the installation process.

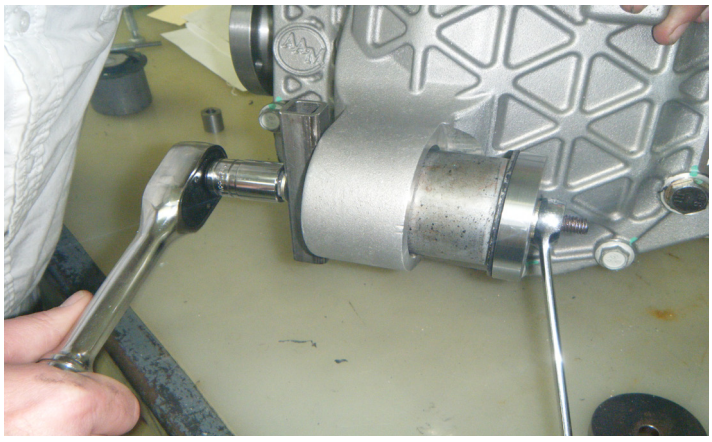
1. Bushing installation

The Lingenfelter 9.5" Camaro differential is designed to accept the OEM production type differential bushings. These bushings are fairly difficult to remove without damaging so we have included them as part of the differential assembly kit. The OEM bushings are LOCATION SPECIFIC. They must be put in the correct location and at the correct angle of rotation (clocking). Failure to put the bushings in the correct locations could increase the chances of axle hop or in vehicle noise and vibration. See diagram 1 on page 23 for bushing position information.

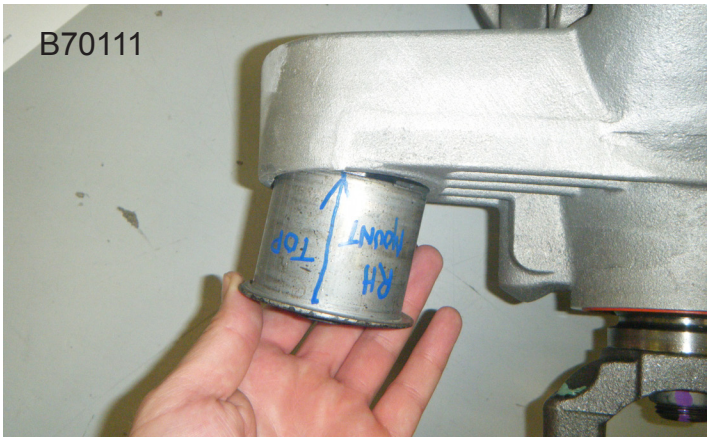
The LPE 9.5" differential can also accept aftermarket differential bushings designed to fit the stock differential. Most of these aftermarket bushings are not location specific but we recommend following the manufacturer's installation instructions.



2. The part number can be found on the underside of each bushing in the location shown. These part numbers indicate where it should be installed on the differential.

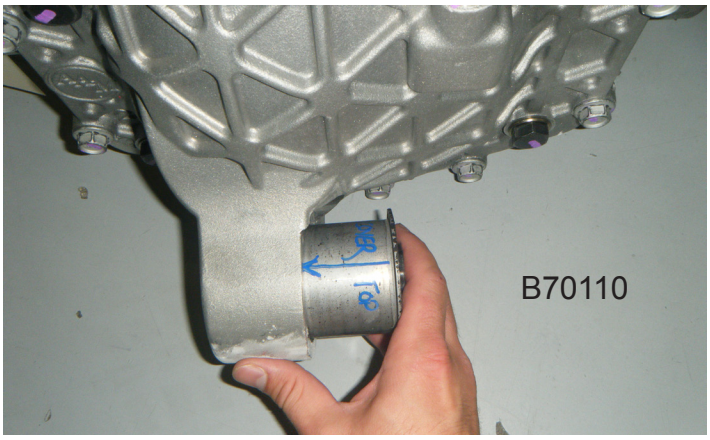


3. The following three (3) steps will install the differential bushings into their respective mounting locations. LPE uses a bushing installation tool, wrench, and socket wrench to safely install the bushings, such as the one shown in the adjacent illustration. Make sure to apply lubricant, such as Sunnen B-200, to the bearing and the inside of the bearing housing.



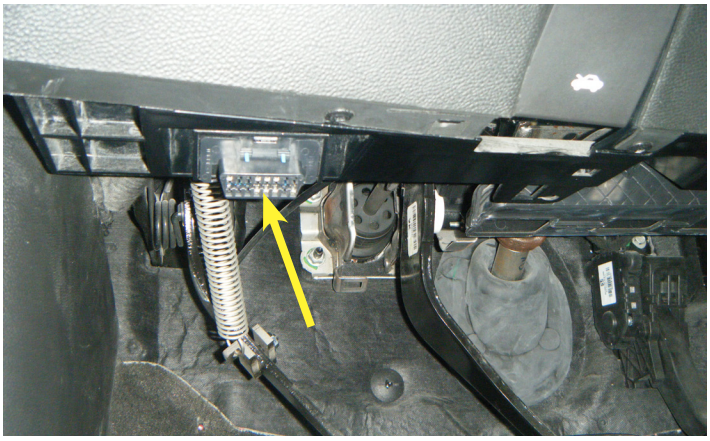
4. After applying lubricant (Sunnen B-200 or equivalent) to the bushing and its mounting location, press the right hand (passenger side) differential bushing (PN: B70111) into the right side differential mount as shown here. Diagram 1 on page 23 shows the clocking of the bushing.

5. After applying lubricant (Sunnen B-200 or equivalent) to the bushing and its mounting location, install the left hand (driver side) bushing (PN: B70112) into the left side differential mount as shown. This bushing needs pressed in as well. Diagram 1 on page 23 shows the clocking of the bushing.



6. This is the top cover differential bushing (PN: B70110) and its mount location on the differential. This bushing needs to be lubricated (with Sunnen B-200 or equivalent) and pressed into the casing as well. Diagram 1 on page 23 shows the clocking of the bushing.

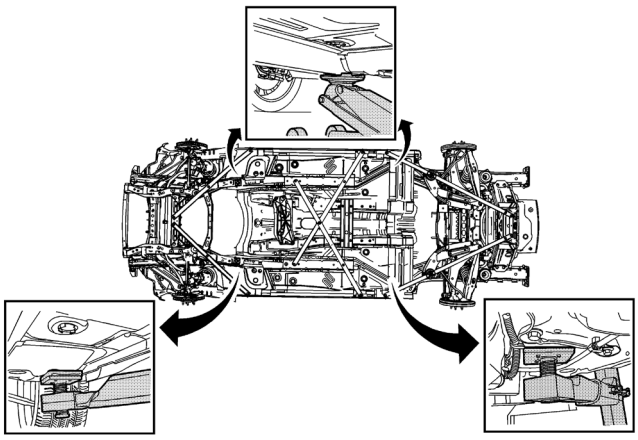
This concludes the bushing installation



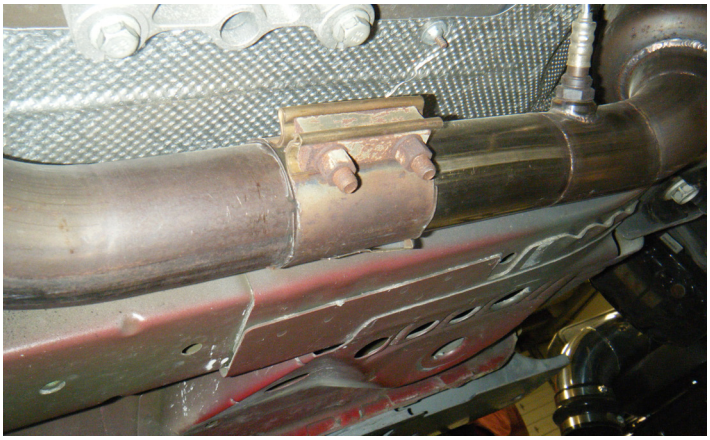
7. You are now going to relieve your fuel pressure. The GM recommended way to bleed the pressure is by installing a scan tool onto your engine diagnostics port and commanding your fuel pump relay off. If you do not have a scan tool, refer to step 7. After turning your relay off, start your vehicle and let it idle until the engine shuts off (usually around 20-30 seconds). Turn the key to the off position and check for little to no fuel pressure. If fuel pressure remains in the system, repeat this step.

8. You may also relieve the pressure by the fuel pressure test port on your fuel rail located on the driver side of the engine. Remove the cap that is on the test port and bleed the pressure using a pressure tester/bleed off tool. **WARNING**: Be sure to have a device to catch the excess fuel in the fuel rail. Do not allow any fuel to get onto any hot spots. Fuel system will be under pressure. Avoid open flames or any source of ignition. Wait 2-3 hours after turning the vehicle off to allow for the pressure in the rails to partially bleed off.

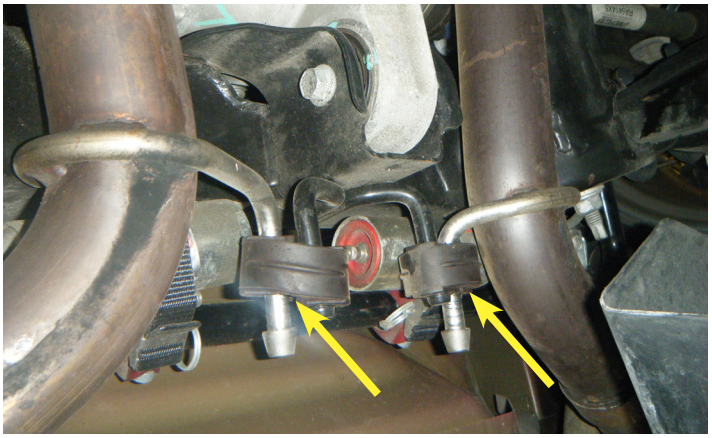
9. Remove the fuel filler cap to reduce the pressure build up in the tank.



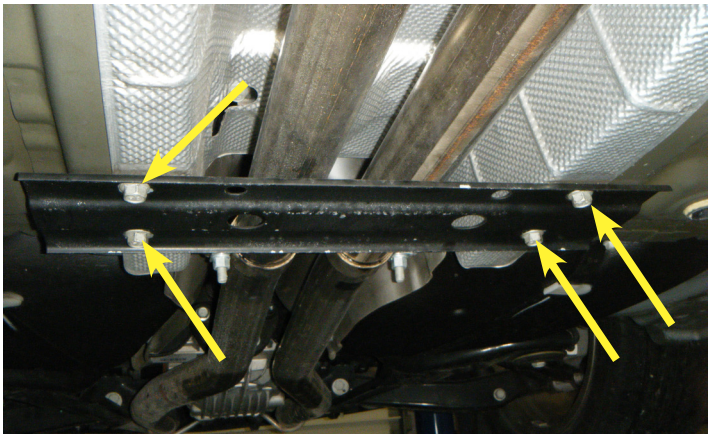
10. Raise the vehicle with a vehicle hoist or a jack and jackstands. Be careful to follow the GM lifting procedures on the 2010-2013 Camaro due to the aerodynamic components being easily damaged and the low ride height of the vehicle. Refer to your owner's manual for correct vehicle lifting procedures.



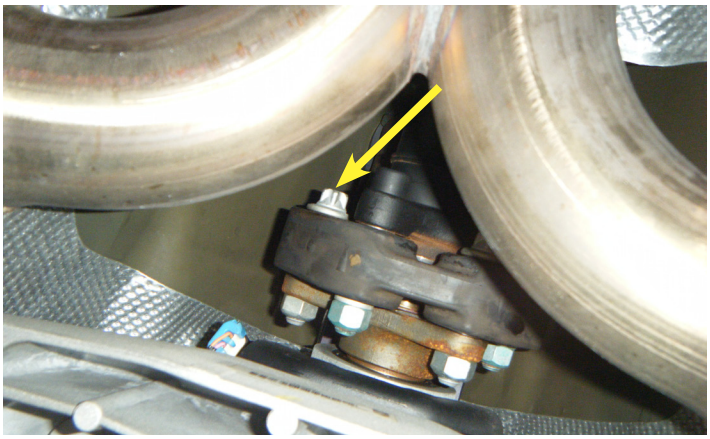
11. Remove the exhaust from the rear of the vehicle to allow access to the tank. This illustration shows the passenger side exhaust pipe clamp. The driver side exhaust bracket needs to be removed as well.



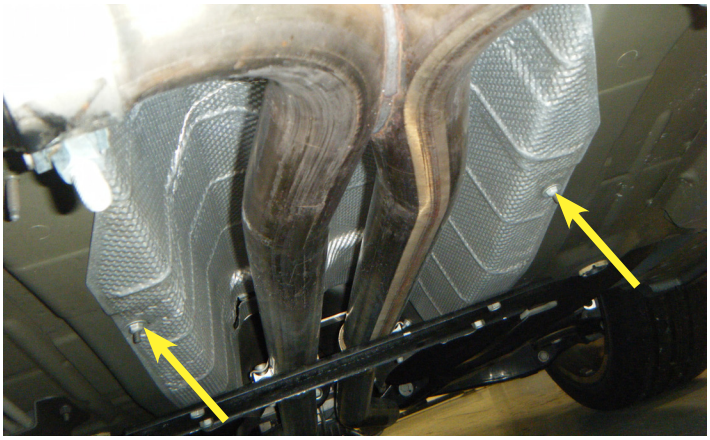
12. The pull the exhaust barbs from the rubber exhaust holders shown. You may need a pry tool to do this but be careful not to damage the rubber holders. There are two (2) more rubber holders on the top side of the mufflers, one on each side of the vehicle. Use the same process to free the exhaust from them.



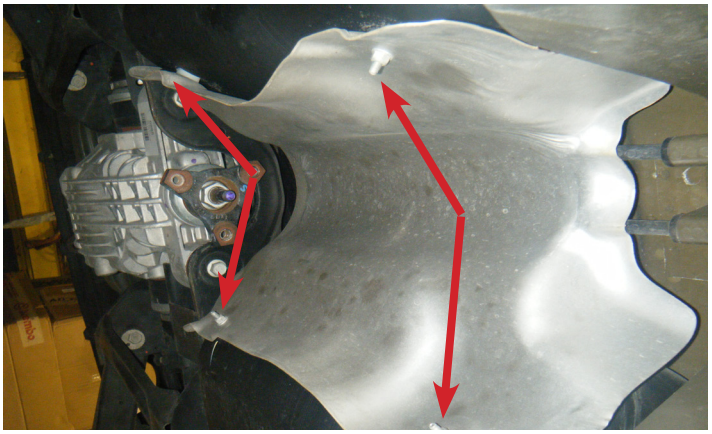
13. Remove the chassis stiffening bracket by removing the four (4) bolts shown. Convertibles will require you to remove the forward chassis stiffening bracket as well (8 bolts).



14. Remove the propeller shaft (a.k.a. driveshaft). This is done using an E18 inverted Torx socket and a 18mm socket for the front mounting bolts. The front and rear of the propeller shaft are removed using the same process and the same tools. You will also need to unbolt the center carrier bearing bracket that supports the driveshaft in the middle.

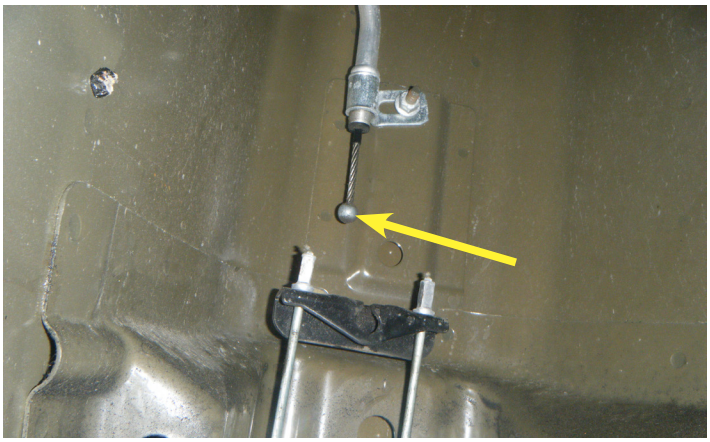


15. Remove the two (2) 10 mm mounting nuts holding the front heat shield in place.

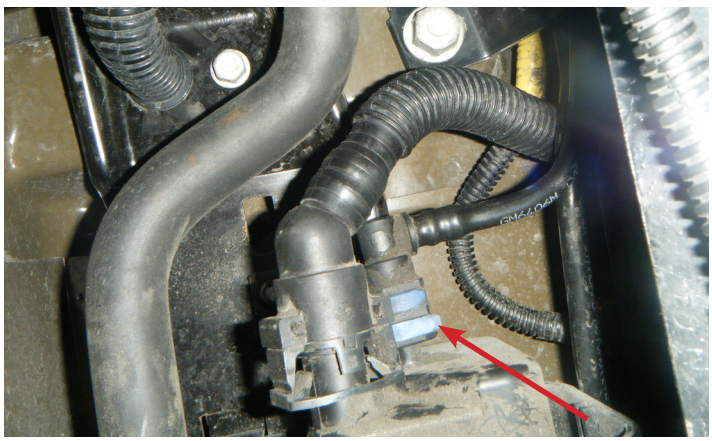


16. Remove the four (4) 10 mm bolts holding the heat shield closest to the gas tank.

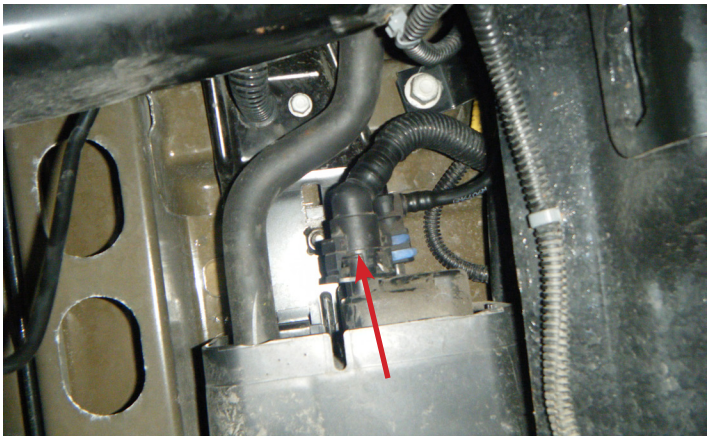
17. Remove the two (2) front mounting 24 mm bolts of the rear sub frame. You may want to use a jack to slowly lower the front of the sub frame. This step provides clearance to remove the tank from the vehicle.



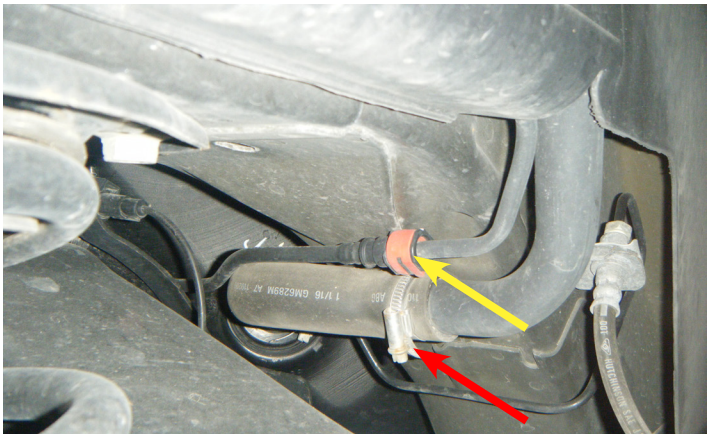
18. Remove the parking brake cables. The cable shown simply pops off of the black bracket.



19. Disconnect the evaporative emission lines. This is located just above the fuel tank.



20. Disconnect the vent solenoid electrical connector.



21. Loosen the hose clamp (red arrow) and remove the fuel filler tube, also un-clip and disconnect the vent tube (yellow arrow).

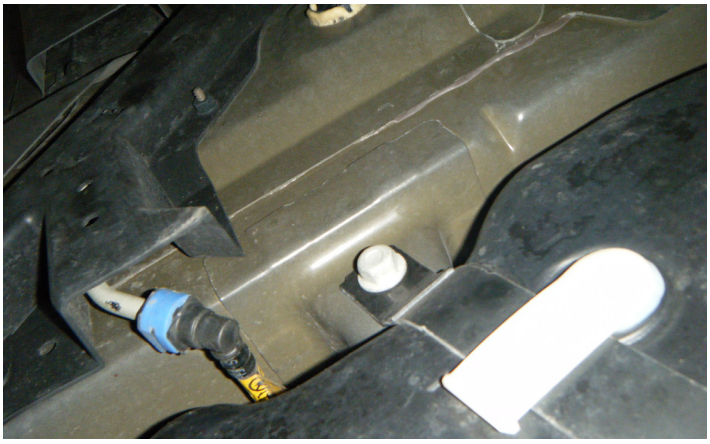
22. Disconnect the evaporative emission line.

23. Disconnect the fuel tank electrical connector.

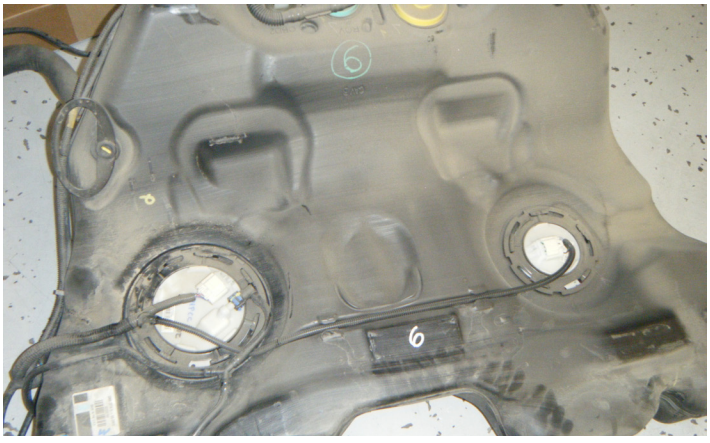
24. Using a Kent-Moore siphon (part # J 45004) or equivalent siphon tool, drain the fuel tank with an air operated device.

WARNING: Up to 7 gallons of residual fuel may still remain in the secondary side of the tank. Do not allow any fuel to get onto any hot spots. Avoid open flames or any source of ignition.

25. Disconnect the fuel feed line.



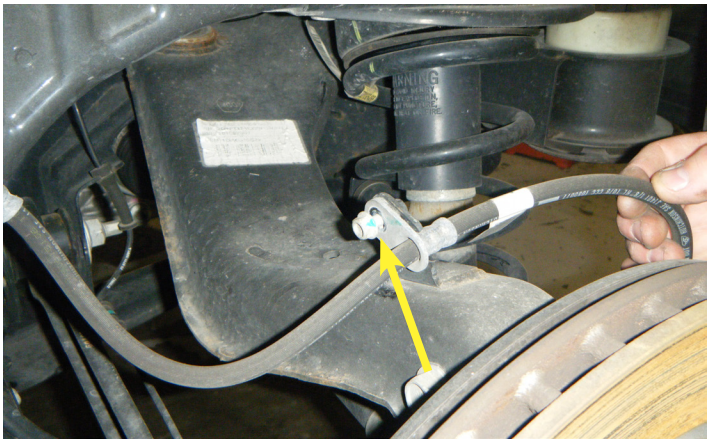
26. With an assistant or a jack supporting the tank, remove the four (4) 15mm fuel tank support strap bolts.



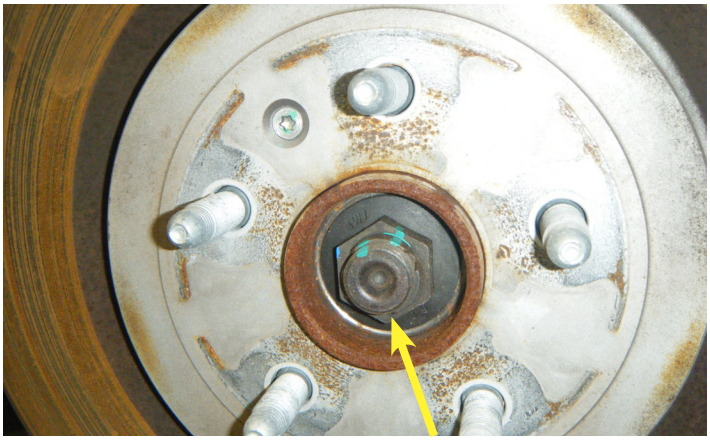
27. Remove the tank from the vehicle and set it aside.

28. Remove the rear wheels.

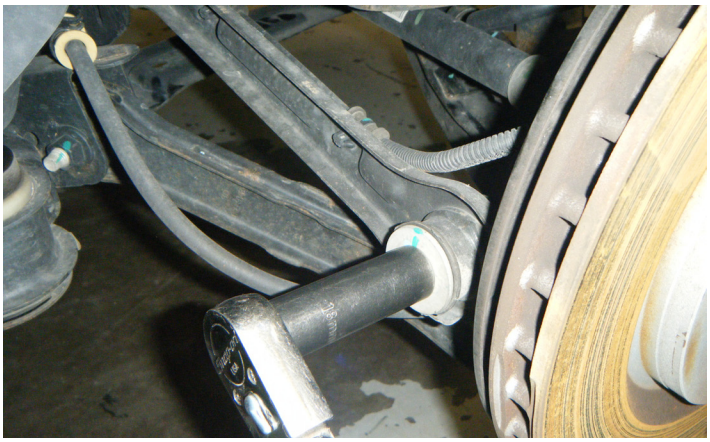
29. Using a 10mm socket and ratchet, remove the Antilock Brake System (ABS) sensors on each side of the vehicle.



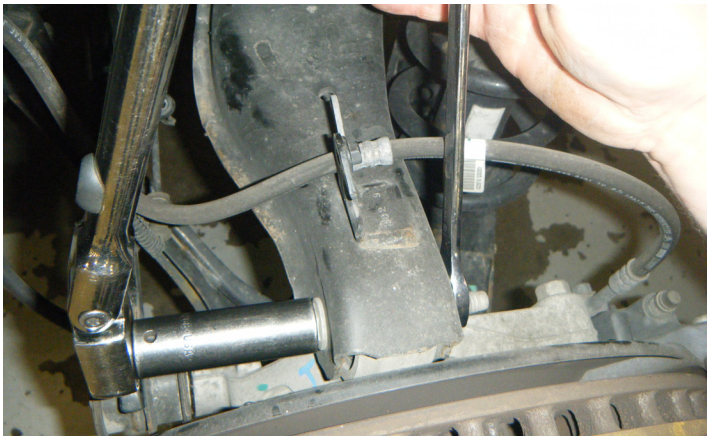
30. Using a 10mm socket and ratchet, remove the break line brackets on each side of the vehicle.



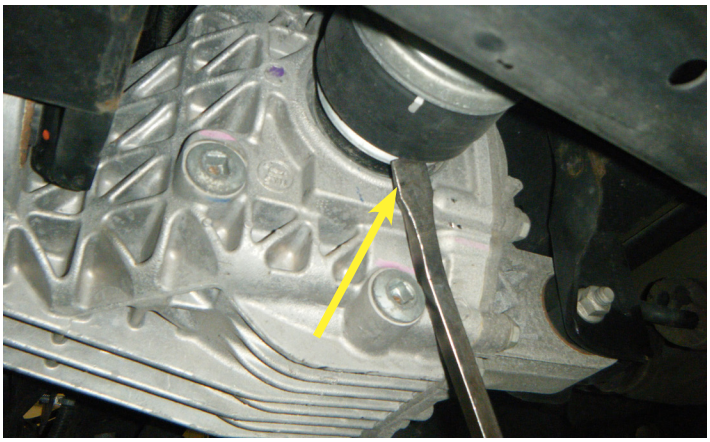
31. Using a 32mm socket and ratchet, remove the axle nuts on each side of the vehicle.



32. Using a 18mm deep well socket and ratchet, remove the bolts holding the stabilizer bars in place on each side.

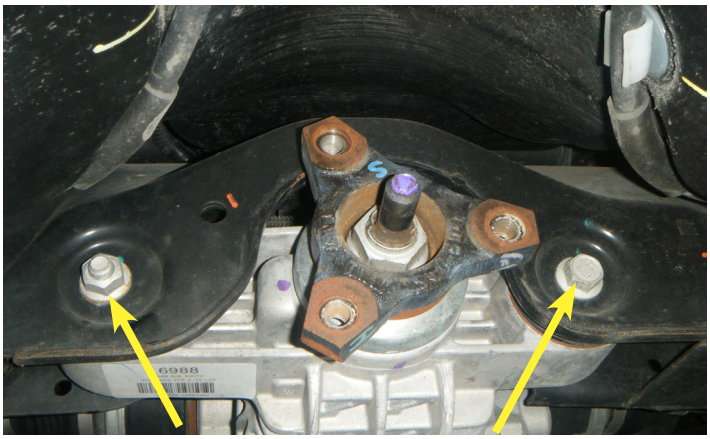


33. Using a 18mm socket, ratchet and wrench, remove the upper control arm bolt and nut on each side of the vehicle.



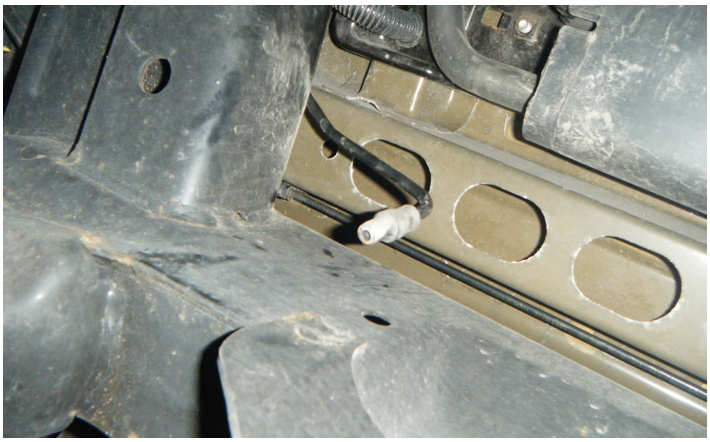
34. Use the axle protection tools (PN's J-44394, DT-48877) to separate the axle from the differential. Tool J-44394 is used for the passenger side axle while tool DT-48877 is used for the driver side axle. If these tools are not available, gently pry the axle away from the OEM differential. If using the prying method, take caution not to damage the shaft, shield, or seals. Do this to both the driver and passenger side of the vehicle.

35. Pull the axle away from the differential and remove it as shown. Do this to each side of the vehicle.

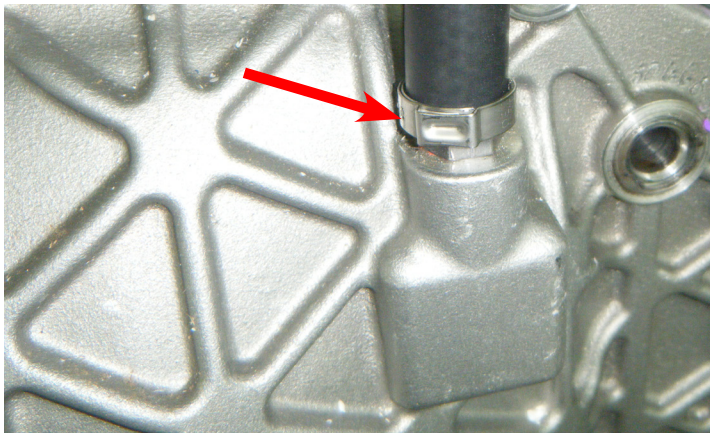


36. Using a 18mm socket and ratchet, remove the three (3) mounting bolts (the two front bolts shown by the arrows and the rear bolt not pictured) then remove the differential.

NOTE: Support the differential with a jack to relieve weight from the bolts so they can easily slide out.

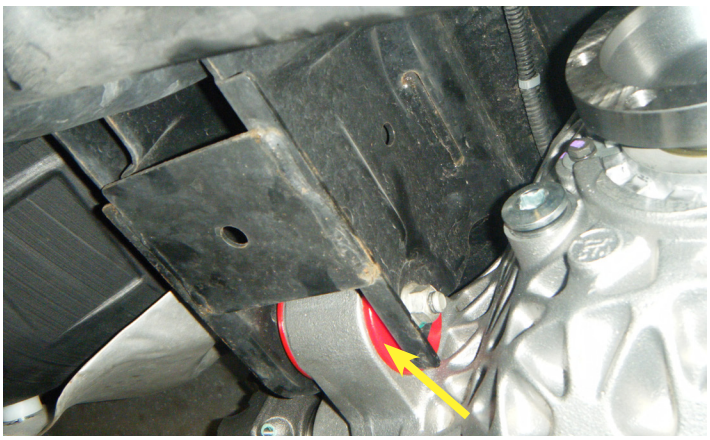


37. Remove the OEM vent hose from the top of the OEM differential.



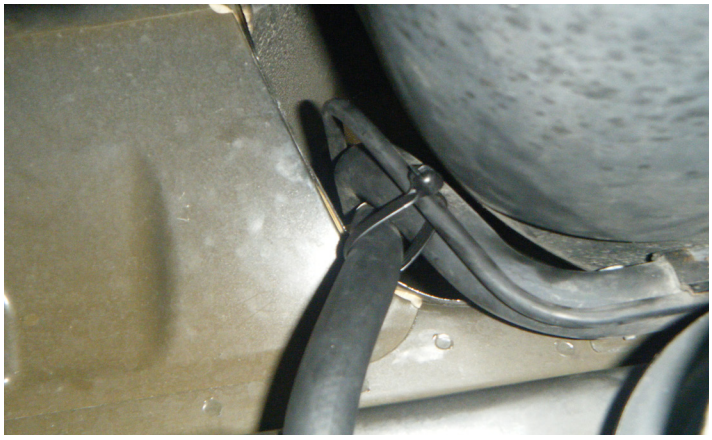
38. Install the supplied vent hose (PN: 5283K13) and Oetiker clamp (PN: 52545K71) onto the vent fitting of the LPE differential.

NOTE: The adjacent picture is for illustration purposes only.



39. Lift the new differential into place with the jack. Be sure all bushings are set and secure in the casing.

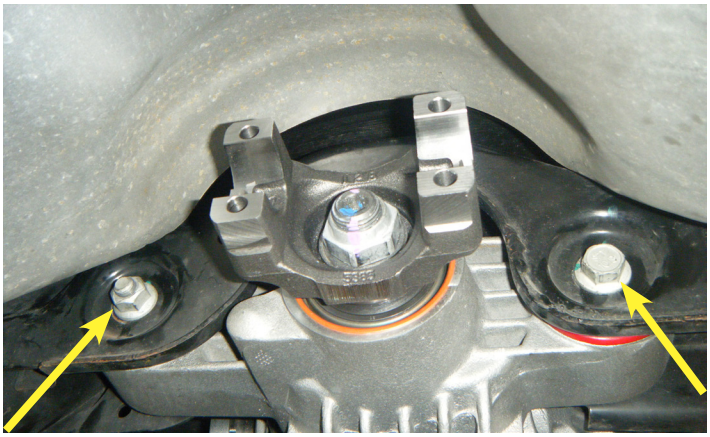
40. After routing the hose into the passenger side wheel well to check hose length and cutting the hose down if desired, install the 1/4” breather vent (PN: 9833K22) onto the other end of the hose installed in the previous step. Then using a pair of Oetiker clamp pliers (or equivalent), install the Oetiker clamp (PN: 52545K71) on the end of the hose to secure the hose to the breather vent.



41. If you are routing the vent hose up into the passenger side wheel well (which LPE recommends), use the supplied zip tie (PN: 23925-X) to secure the hose to the passenger side rear brake line.

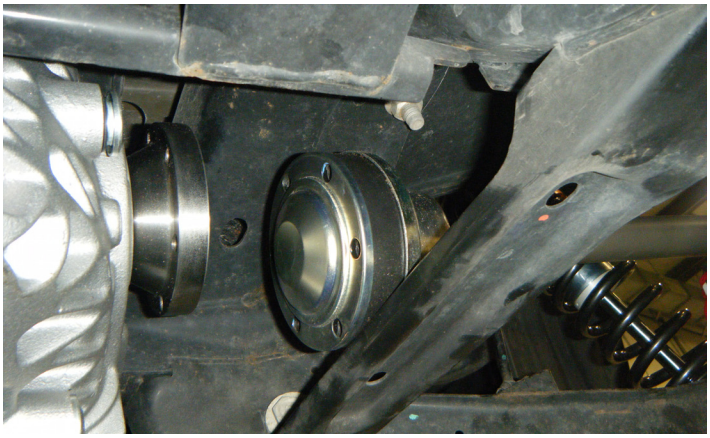
42. In the following step, the differential vent hose will be secured to the vehicle using the supplied M6x20 sheet metal screw with 17mm washer (PN: 1278) and 3/4” hose clamp (PN: 9386).

43. After inserting the vent tube into the hose clamp, use an electric drill with a 10mm socket and the sheet metal screw to secure the clamp to the vehicle where desired.

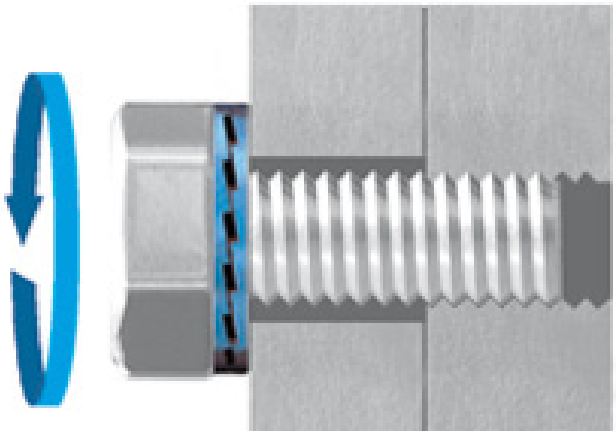


44. Once the differential is set in place, use an 18mm socket, wrench and ratchet to install the three (3) mounting bolts and nuts (the two front bolts shown by the arrows and the rear bolt not pictured). Tighten these bolts to 59 ft-lbs.

45. The shorter axle is the passenger side axle and the longer axle is for the driver side.

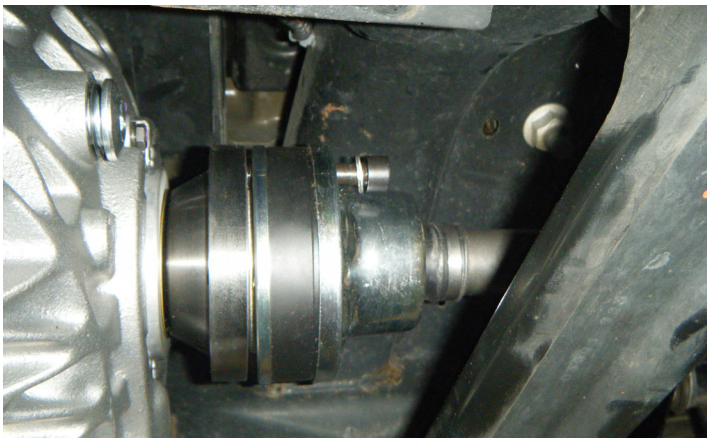


46. Install the new axles into position. It may require the help of an assistant.

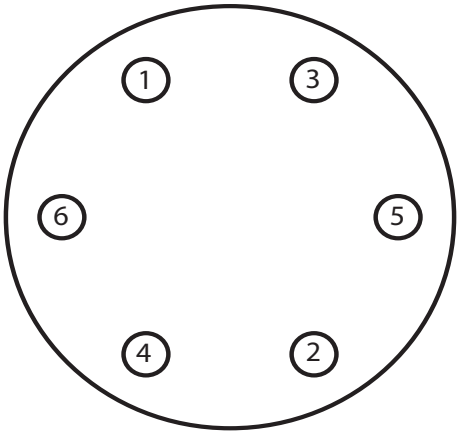


47. The supplied Nord-lock washers are a special type of locking washer. This washer is used on the axle bolts for its ability to keep bolts tight and secure. The illustration shows how the Nord-lock washers lock the bolts in place.

NOTE: The bolts and washers supplied in the LPE kit are intended for use with the LPE half-shafts. Other half-shafts may require different bolt lengths.

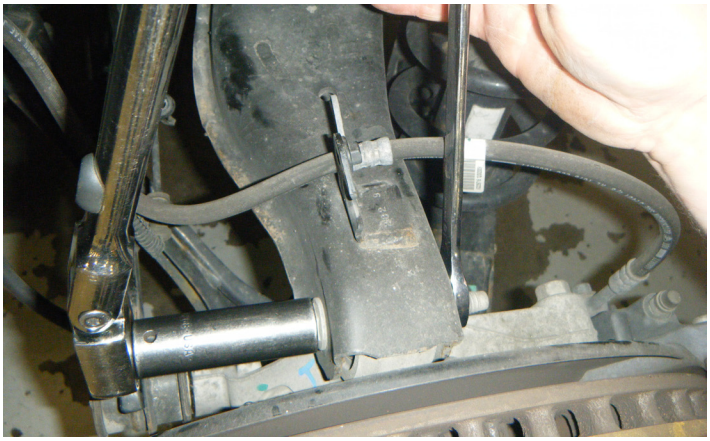


48. Lightly lubricate the threads of the M10-1.5x55mm socket head cap screws (PN:91290A534) with oil and then install the Nord-Lock washers on the cap screws. Be sure that you are installing a mated pair of the locking washers as shown in step 47. Check to make sure that there is sufficient thread engagement between the axle and the differential.

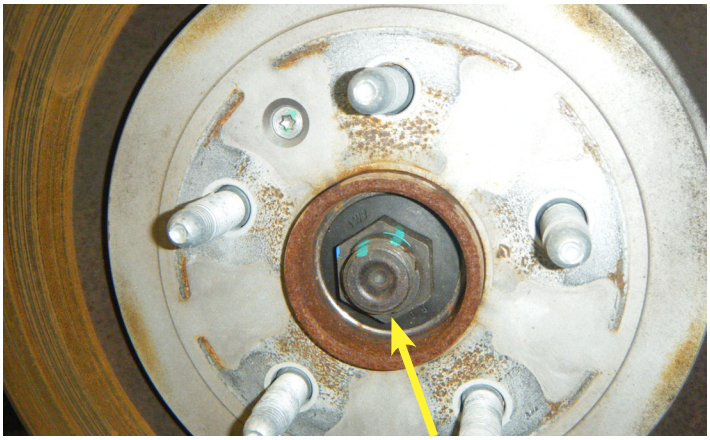


49. Mount the axles to the differential output flange and secure with the cap screw/lock washer combination. Torque the six fasteners per side to 55 lb-ft using the tightening pattern shown in the adjacent illustration.

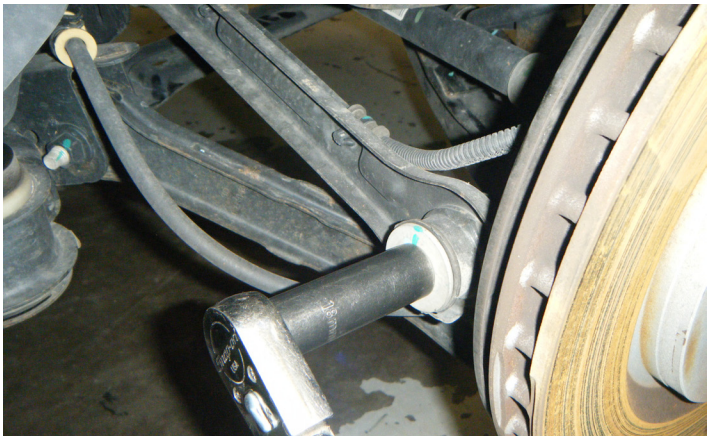
50. Re-install the axle shaft into the wheel hub assembly.



51. Using a 18mm socket, ratchet, and wrench, install the bolt to the upper control arm. Torque the bolt to 44 ft-lbs and then rotate an additional 90 degrees.

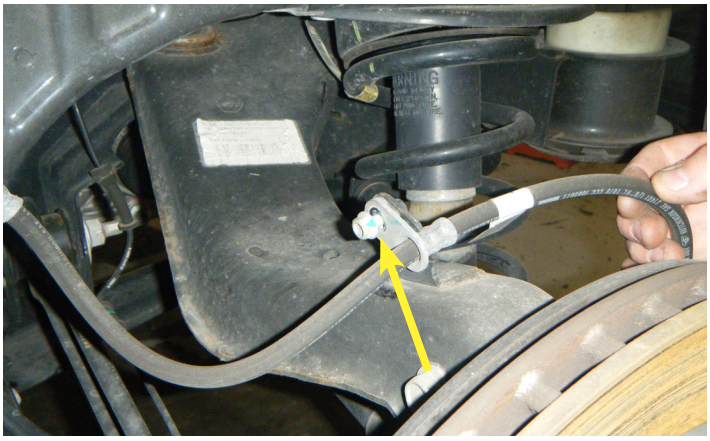


52. Using a 32mm socket and ratchet, install the axle nuts. Torque the nut to 199 ft-lbs.

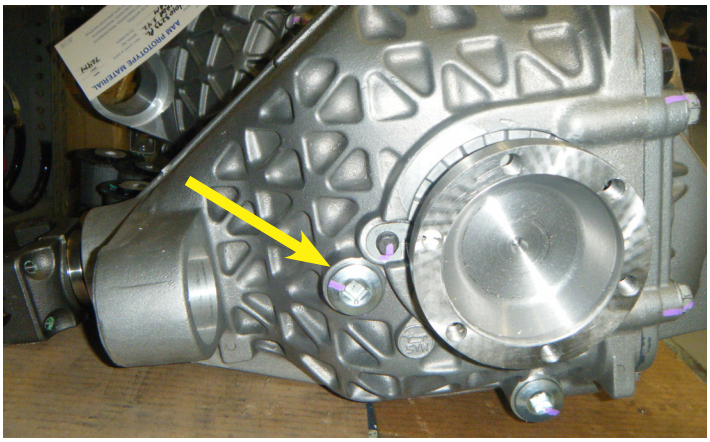


53. Using a 18mm socket and ratchet, install the stabilizer arm bolt. Torque the bolt to 103 ft-lbs.

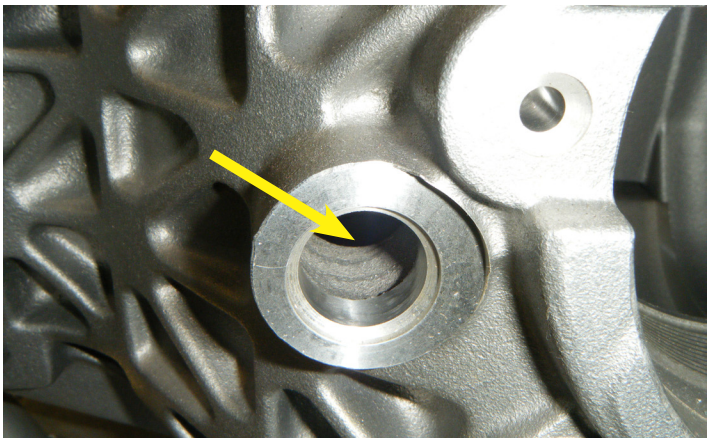
54. Using a 10mm socket, ratchet and extension, install the ABS sensor. Torque the bolt to 80 in-lbs.



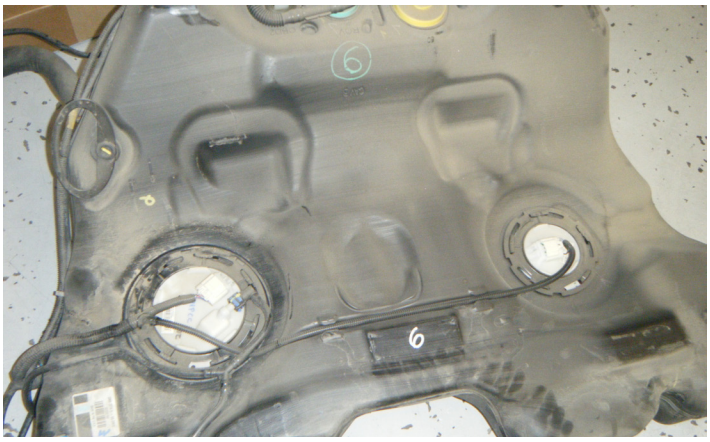
55. Using a 10mm socket and ratchet, install the brake line bracket bolt. Torque the bolt to 80 in-lbs.



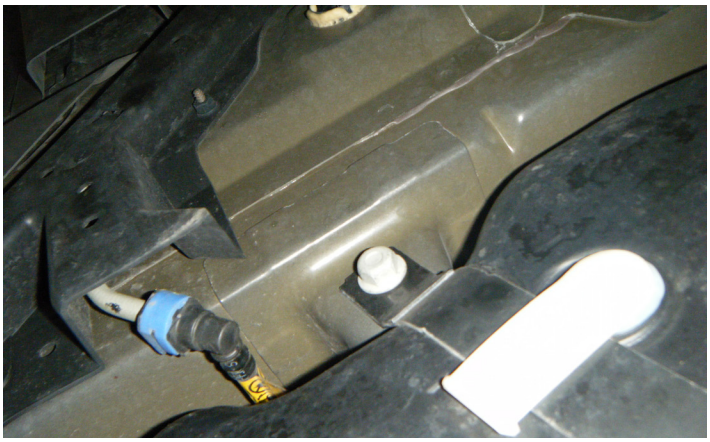
56. Fill the differential with differential oil. Recommended fluid is the GM factory 75W90 synthetic differential fluid (PN: 9986226).



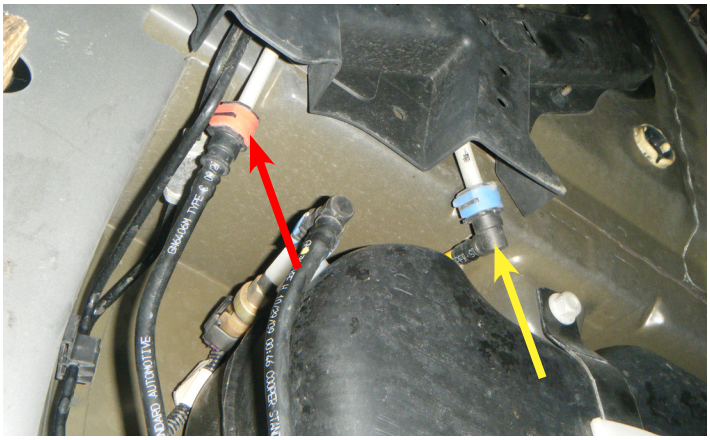
57. The differential oil should be filled to the drain plug hole. When oil starts to come out of this plug hole, the casing is full. Install the fill hole plug bolt (PN: 40039752). This plug is torqued to 24 ft-lbs (33 N-m).



58. Install the tank back into its original location. You will need someone to help you with this step in order to hold the tank in the correct position.

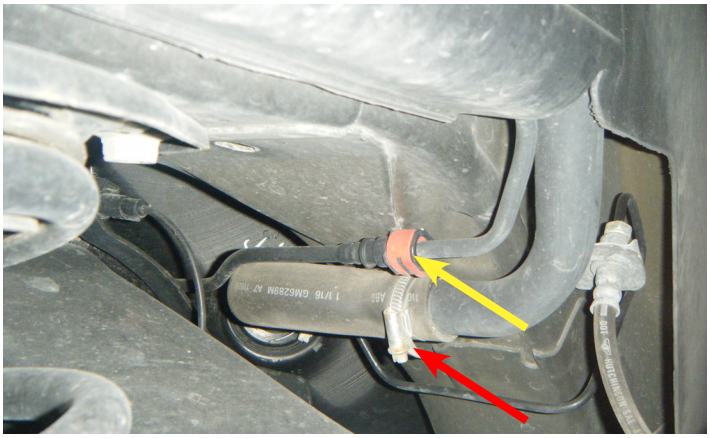


59. Re-install the OEM brackets around the gas tank holding it in position. It is supported by the four (4) 15mm gas tank strap bolts. Torque the bolts to 37 ft-lbs.

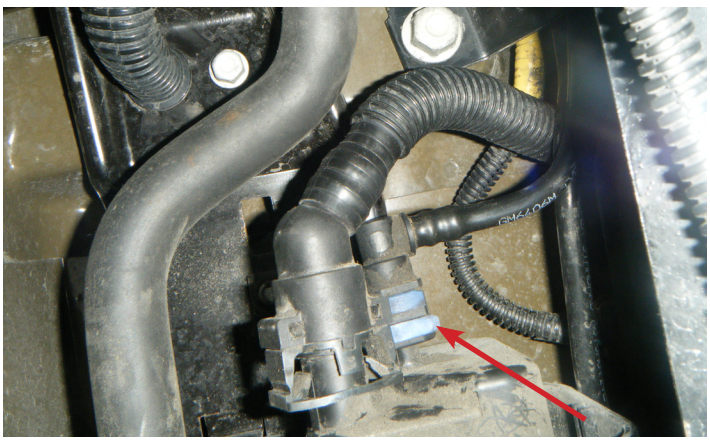


60. Reconnect the fuel feed line (yellow arrow) and the evaporative emissions line (red arrow).

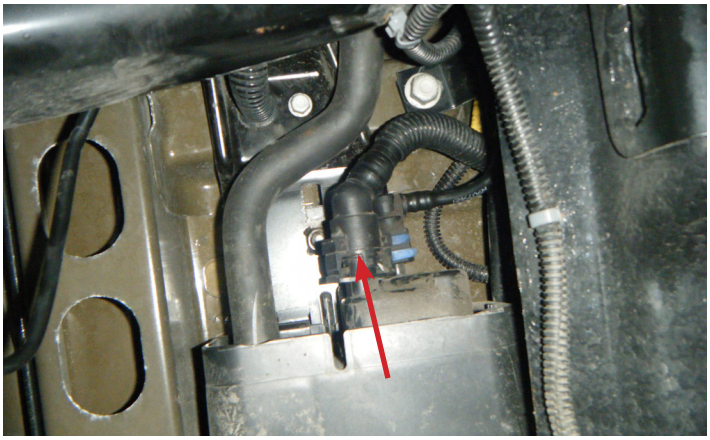
61. Reconnect the fuel tank electrical connector.



62. Reconnect the fuel vent line (yellow arrow) and the fuel filler hose (red arrow). Be sure the hose clamp is tightened down and securing the fuel filler hose.



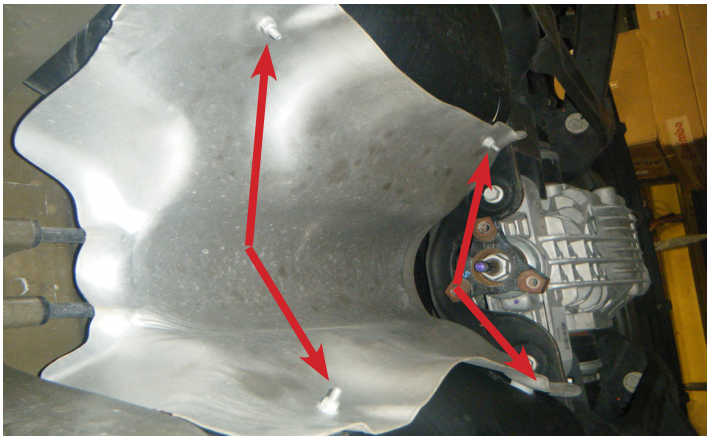
63. Reconnect the evaporative emission lines. This is located just above the fuel tank.



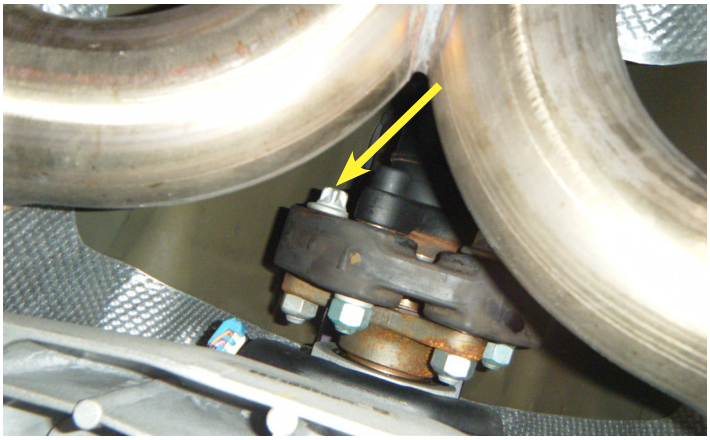
64. Reconnect the vent solenoid electrical connector.

65. Re-attach the emergency brake line wire.

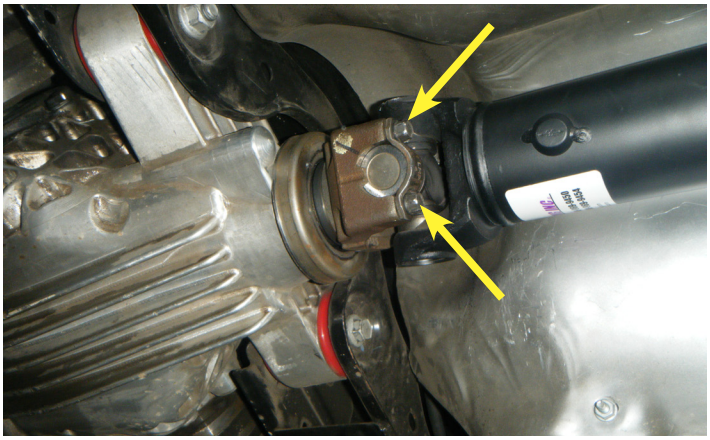
66. Using a 24mm socket and breaker bar, re-install the sub frame bolts. These are torqued to 48 ft-lbs on the first pass. Then tighten them another 120 degrees on the second pass.



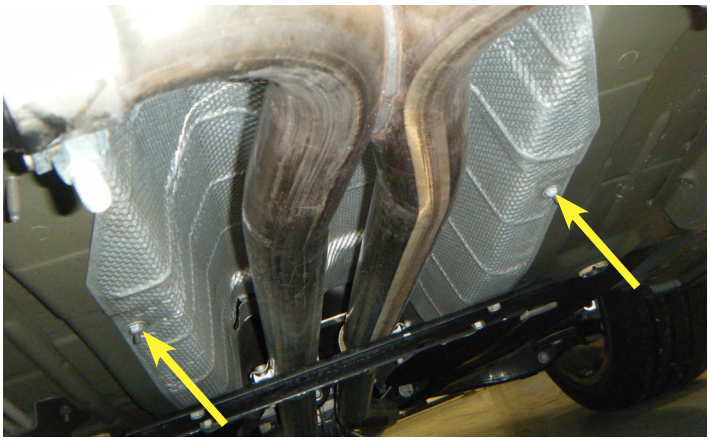
67. Using a 10 mm socket and ratchet, reinstall the four (4) bolts holding the rear heat shield in place.



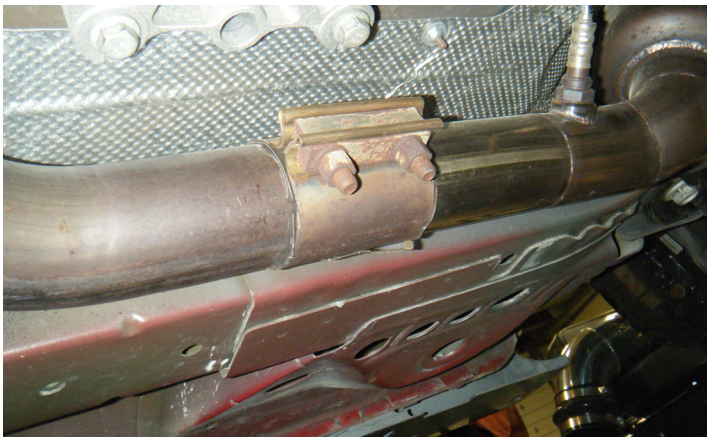
68. Using an inverted E18 Torx socket, ratchet and a 21mm wrench, install the front mounts to the driveshaft with the stock mounting bolts and nuts. Be sure the driveshaft coupler is in place as well. These bolts and nuts are torqued to 67 ft-lbs.



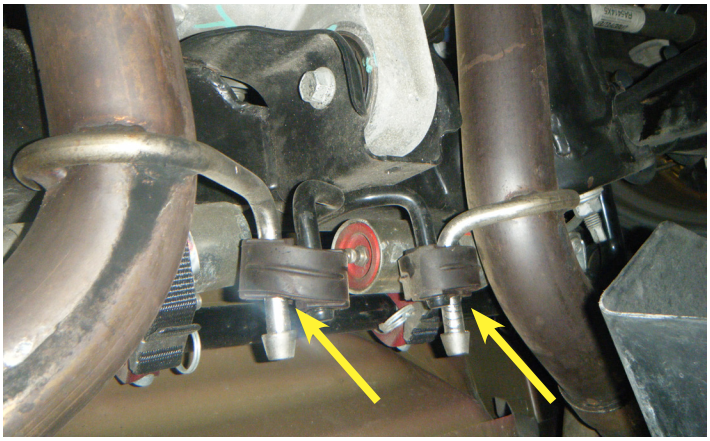
69. Using an 18mm socket and ratchet, install the driveshaft to the differential using the supplied 5/16-24X1.3 bolts and U-joint straps. The bolts should be torqued to 18 ft-lbs.



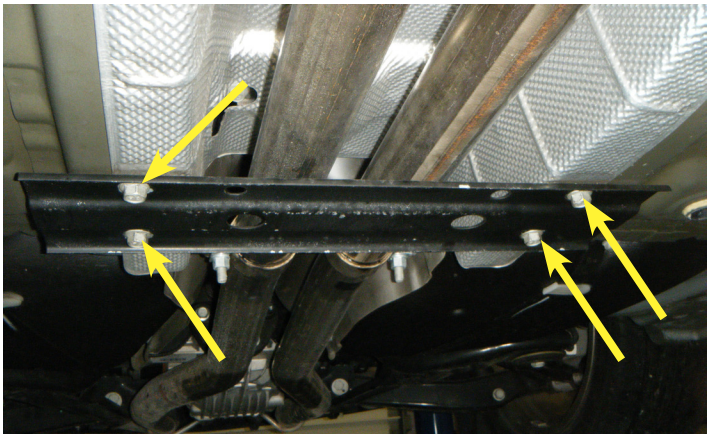
70. Using a 10mm socket and ratchet, re-install the front heat shield.



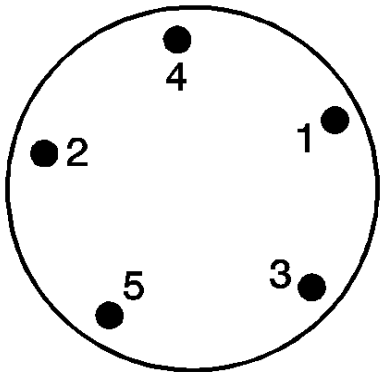
71. Re-install the exhaust front pipe clamps. Be sure the clamps are secure and sealed.



72. Re-install the rubber exhaust holders onto the barbs as shown.



73. Re-install the chassis stiffening bracket by re-installing the four (4) bolts shown. Torque the bolts to 18 ft-lbs (for a Camaro coupe) or 43 ft-lbs (for a Camaro convertible).



74. Re-install the rear wheels. Torque these bolts to 122 ft-lbs in a 5 point star pattern.

75. On manual transmission equipped vehicles, recalibration of the ECM is only needed on ratios higher than 3.73:1. On automatic transmission equipped vehicles recalibration of the ECM and the TCM is required for all ring and pinion ratio changes.

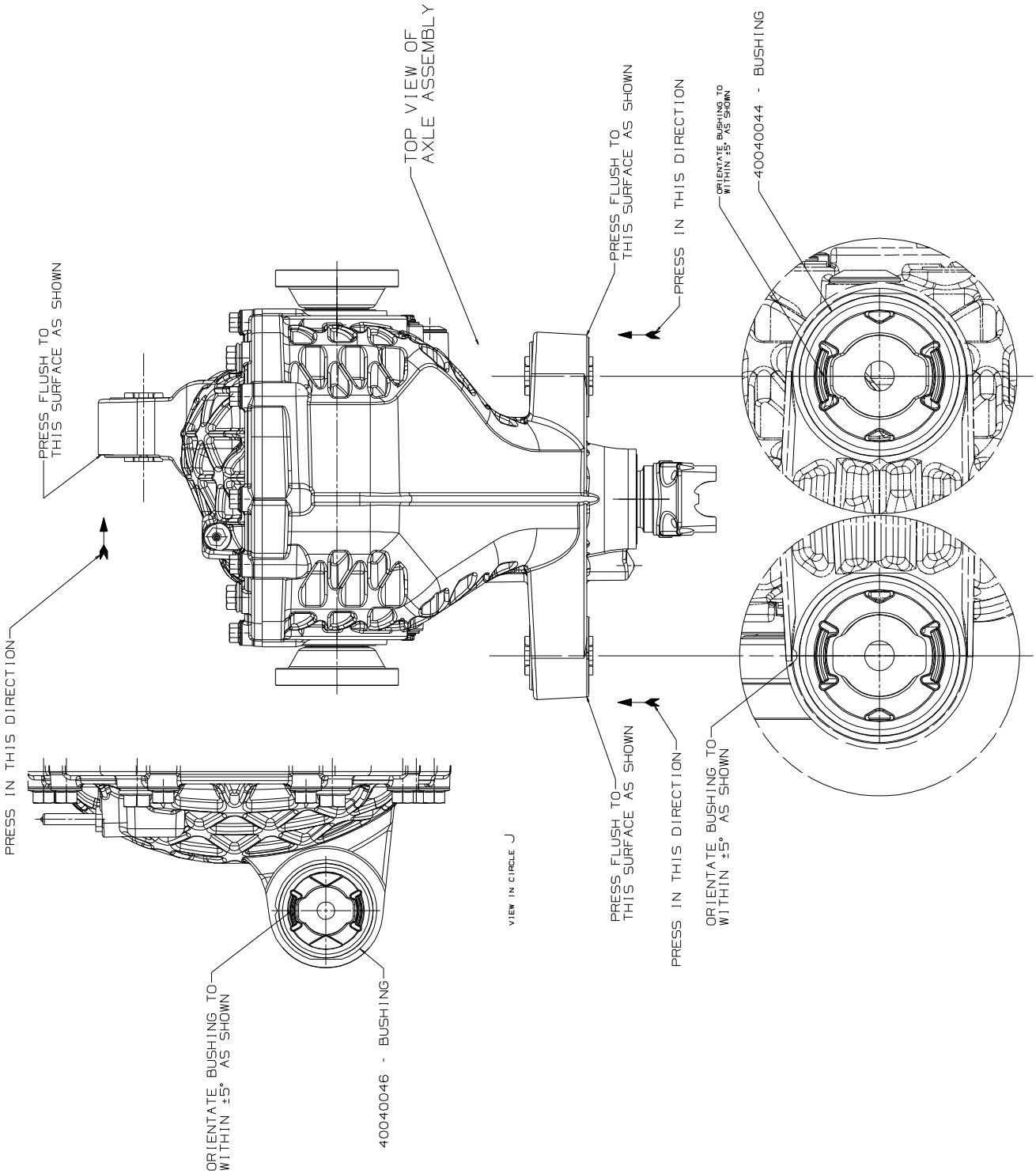
76. The recommended break in period is light duty usage for the first 500 miles. If this is not possible then use a break-in schedule of ten (10) acceleration runs from 25-65 MPH with a cool down time between each run. The reasoning for this is to ensure slight wear on the differential gear without overheating the unit. Be sure to avoid extended runs at high power and load, as well as high sustained vehicle speed during the break in period of 500 miles.

77. The installation of your 9.5” differential is complete.

GM Torque Specifications			
QTY	**Fastener Description**	**Torque (ft-lb or in-lb)**	**Torque (N·m)**
3	Differential mounting Bolt	59 ft-lbs	80 N·m
1 (on each side)	Upper control arm bolt	44 ft-lbs plus 90°	60 N·m plus 90°
1 (on each side)	Wheel driveshaft nut	199 ft-lbs	270 N·m
1 (on each side)	Stabilizer arm bolt	103 ft-lbs	140 N·m
1 (on each side)	ABS sensor bolt	80 in-lbs	9 N·m
1 (on each side)	Brake line bracket bolt	80 in-lbs	9 N·m
4	Fuel tank strap bolt	37 ft-lbs	50 N·m
3	Driveshaft coupling bolt	67 ft-lbs	91 N·m
4	U-joint strap bolt	18 ft-lbs	24 N·m
4	Chassis stiffening bracket (Camaro convertible)	43 ft-lbs	58 N·m
4	Chassis stiffening bracket (Camaro coupe)	18 ft-lbs	25 N·m
5 (on each side)	Rear wheel lug nut	122 ft-lbs	165 N·m

Torque Specifications specific to the LPE Camaro 9.5” Differential			
QTY	**Fastener Description**	**Torque (ft-lb or in-lb)**	**Torque (N·m)**
10	Cover plate bolts	55 ft-lbs	74 N·m
4	Differential bearing bolts	74 ft-lbs	100 N·m
1	Fill hole plug	18-29 ft-lbs	25-40 N·m
1	Drain hole plug	18-29 ft-lbs	25-40 N·m
6 (on each side)	Halfshaft flange screw	55 ft-lbs	74 N·m

Diagram 1


LINGENFELTER 9.5 RDM
BUSHING INSTALLATION GUIDE
TOP VIEW OF
AXLE ASSEMBLY
PRESS FLUSH TO
THIS SURFACE AS SHOWN
PRESS IN THIS DIRECTION
ORIENTATE BUSHING TO
WITHIN ±5° AS SHOWN
40040044 - BUSHING
PRESS IN THIS DIRECTION
PRESS FLUSH TO
THIS SURFACE AS SHOWN
VIEW IN CIRCLE J
ORIENTATE BUSHING TO
WITHIN ±5° AS SHOWN
40040046 - BUSHING
PRESS FLUSH TO
THIS SURFACE AS SHOWN
PRESS IN THIS DIRECTION
ORIENTATE BUSHING TO
WITHIN ±5° AS SHOWN

For additional product installation information and technical support, contact LPE or your LPE products distributor. You can also find technical support and usage discussions regarding this product and many other LPE products in our Internet forums:

http://www.lingenfelter.com/LPEforumfiles

Photo by SDW Photography

The Lingenfelter 9.5” Camaro differential has been tested and proven in one of LPE’s own in house development vehicles. The above vehicle is powered by a 1250 rwhp 427 CID LSX engine with LS9 supercharger and two stages of nitrous and weighs over 4200 lbs. This manual transmission equipped vehicle has had a best ET to date of 8.99 at 158 mph and a best 60’ of 1.304 seconds.

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