

DRIVELINE/AXLE

Propeller Shaft - Corvette

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Bearing Housing Assembly-to-Coupling Bolts - Automatic Transmission	70 N.m	52 lb ft
Bearing Housing Assembly-to-Coupling Bolts - Manual Transmission	90 N.m	66 lb ft
Clutch Actuator Cylinder Mounting Bolts - Manual Transmission	12 N.m	106 lb in
Coupling-to-Propeller Shaft Bolts - Automatic Transmission	90 N.m	66 lb ft
Coupling-to-Propeller Shaft Bolts - Manual Transmission	90 N.m	66 lb ft
Driveline Tunnel Closeout Panel Bolts	10 N.m	89 lb in
EBTCM LH Mounting Bracket Mounting Bolts	50 N.m	37 lb ft
Flexplate Spindle Nut - Automatic Transmission	90 N.m	66 lb ft
Flexplate-to-Flexplate Spindle Bolts - Automatic Transmission	50 N.m	37 lb ft
Input Shaft Bearing Positioning Bolts	35 N.m	26 lb ft
Input Shaft-to-Coupling Bolts - Automatic Transmission	70 N.m	52 lb ft
Input Shaft-to-Coupling Bolts - Manual Transmission	90 N.m	66 lb ft
Negative Battery Cable Bolt	15 N.m	11 lb ft
Propeller Shaft Balance Specification @ 3, 500 RPM	6.0 G-CM Maximum	-
Propeller Shaft Hub Clamp Bolt - Automatic Transmission	125 N.m	93 lb ft
Rear Exhaust Hanger Mounting Bolts	50 N.m	37 lb ft
Rear Suspension Crossmember Mounting Nuts	110 N.m	81 lb ft
Shift Control Closeout Boot Retaining Nuts - Manual Transmission	12 N.m	106 lb in
Shift Control Mounting Bolts	30 N.m	22 lb ft
Transaxle Mount Bracket-to-Differential Bolts	50 N.m	37 lb ft
Transaxle Mount-to-Rear Suspension Crossmember Nuts	50 N.m	37 lb ft

Transmission Oil Cooler Rear Pipe Front Fittings-to-Junction Fittings at Engine Flywheel Housing	27 N.m	20 lb ft
Transmission Oil Cooler Rear Pipe Rear Fittings-to-Transmission Fittings	40 N.m	30 lb ft
Transmission Oil Cooler Rear Pipe Retaining Clamp Bolts	12 N.m	106 lb in
Transmission Shift Control Cable Bracket Retaining Nuts	20 N.m	15 lb ft
Transmission Shift Rod Clamp Bolt	30 N.m	22 lb ft
Transmission-to-Driveline Support Assembly Bolts/Studs	50 N.m	37 lb ft
Transmission Wiring Harness-to-LH Transmission Case Retaining Bolt	2.5 N.m	22 lb in

COMPONENT LOCATOR

DRIVELINE DISASSEMBLED VIEWS

Driveline Support Assembly- Manual Transmission

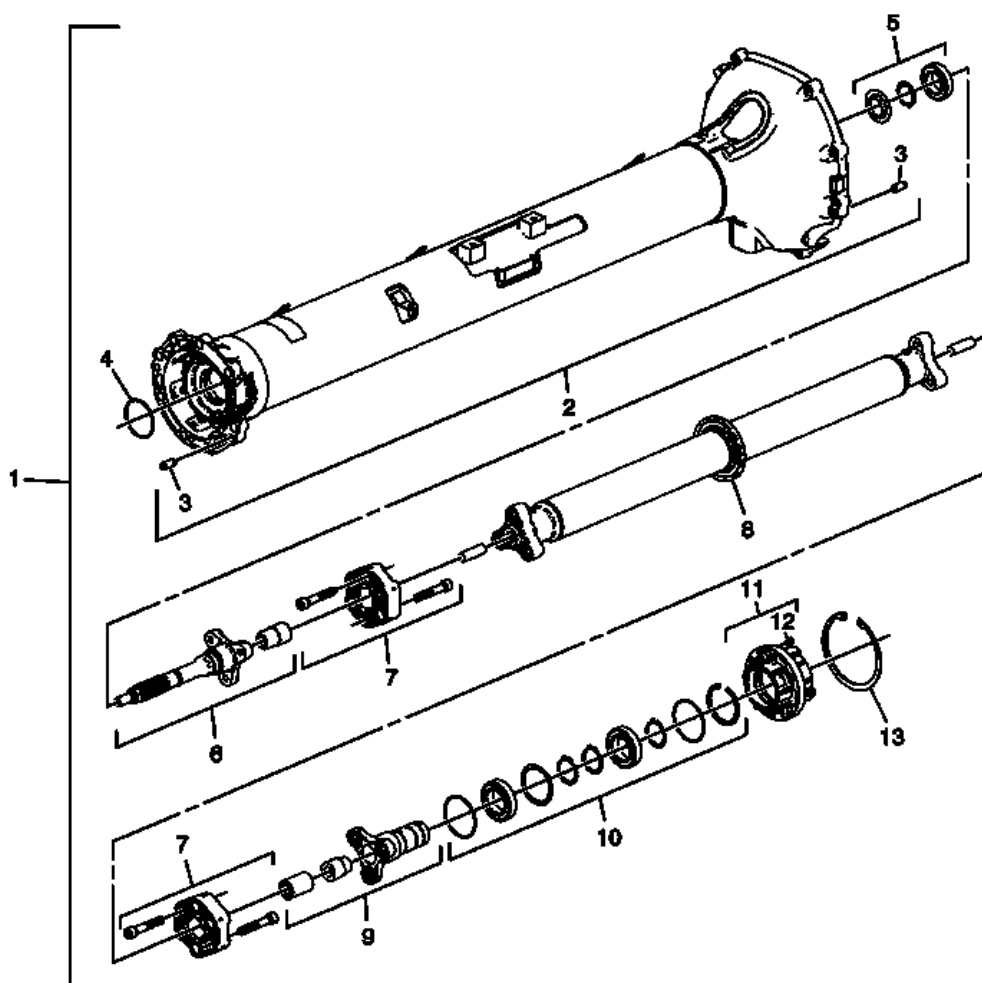


Fig. 1: Driveline Support Assembly- Manual Transmission
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Driveline Support Assembly
2	Driveline Torque Tube Assembly
3	Torque Tube Front Housing Locating Pin
4	Propeller Shaft Input Shaft Bearing Retainer (O-Ring)
5	Front Propeller Shaft Bearing Assembly
6	Propeller Shaft Spline Shaft
7	Propeller Shaft Coupling
8	Propeller Shaft Assembly
9	Propeller Shaft Hub
10	Rear Propeller Shaft Bearing Assembly
11	Propeller Shaft Transmission Flange Bearing Housing
12	Rear Propeller Shaft Yoke Lubricant Hole Plug
13	Propeller Shaft Transmission Flange Rear Bearing Retaining Ring

Driveline Support Assembly- Automatic Transmission

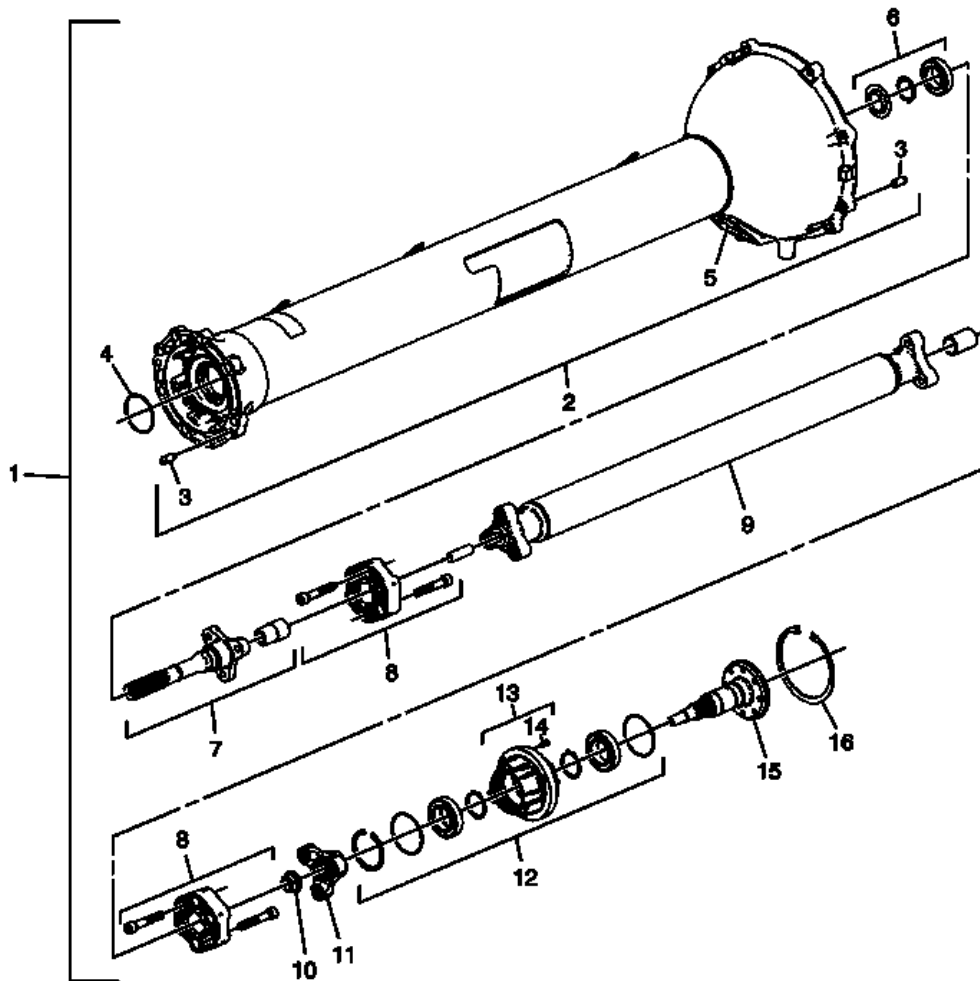


Fig. 2: Driveline Support Assembly- Automatic Transmission
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Driveline Support Assembly
2	Driveline Torque Tube Assembly
3	Torque Tube Front Housing Locating Pin
4	Propeller Shaft Input Shaft Bearing Retainer (O-Ring)
5	Access Hole Cover
6	Front Propeller Shaft Bearing Assembly
7	Propeller Shaft Spline Shaft
8	Propeller Shaft Coupling
9	Propeller Shaft Assembly
10	Propeller Shaft Flange Nut
11	Propeller Shaft Hub

12	Rear Propeller Shaft Bearing Assembly
13	Propeller Shaft Transmission Flange Bearing Housing
14	Rear Propeller Shaft Yoke Lubricant Hole Plug
15	Rear Propeller Shaft Splined Shaft
16	Propeller Shaft Transmission Flange Rear Bearing Retaining Ring

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - PROPELLER SHAFT

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Driveline Disassembled Views** and **Driveline Support Assembly Description**. All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow should always be used in order to resolve a system condition. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to **Strategy Based Diagnosis**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the vehicle. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Verify the exact operating conditions under which the concern exists. Note factors such as vehicle speed, road conditions, ambient temperature and other specifics.
- Compare driving characteristics or sounds, if applicable, to a known good vehicle and ensure you are not trying to correct a normal condition.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Wheel Drive Shafts Description and Operation**
- **Diagnostic System Check - Vehicle**
- **Rattle Noise**
- **Scraping Noise**
- **Moaning Noise**

- Whirring or Squealing Noise
- Squeak Noise
- Knock or Clunk Noise
- Shudder on Acceleration at Low Speed

KNOCK OR CLUNK NOISE

Knock or Clunk Noise

Cause	Correction
DEFINITION: Knocking or clunking noise occurs when operating the vehicle in high gear or coasting in NEUTRAL at 16 km/h (10 mph).	
Loose flex plate bolts or a damaged flex plate	A flex plate that is cracked or has loose retaining bolts may create a clicking, clanking or snapping type noise in the transmission housing.

RATTLE NOISE

Rattle Noise

Cause	Correction
DEFINITION: A rattle noise occurs when driving the vehicle at various speeds.	
Loose propeller shaft hub clamp bolt- automatic transmission applications only	A loose propeller shaft hub clamp bolt may create a rattle type noise mainly at idle in the flywheel area of the transmission housing. Repair, as necessary.

SCRAPING NOISE

Scraping Noise

Cause	Correction
DEFINITION: A scraping noise occurs when driving the vehicle at various speeds.	
Balance weight detached from the propeller shaft	A detached balance weight may create a sliding, scraping or ticking type noise during acceleration or deceleration. 1. Inspect the propeller shaft and tube for a detached balance weight. 2. Replace components, as required. Do not attempt to reattach the balance weight to the propeller shaft.

MOANING NOISE

Moaning Noise

Cause	Correction
DEFINITION: A moaning noise occurs when driving the vehicle at various speeds.	
Propeller shaft rev limiter/snubber contacting the driveline tube- manual transmission applications only	A rev limiter/snubber that is contacting the driveline tube may create a moaning type noise and/or vibration that is felt through the shift lever. Slight noise and vibration is to be considered normal during an over-speed condition but should not be present when the over-speed condition has ceased. Replace components, as required.
Rear Axle Gear Noise	Gear noise can transfer from the rear axle through the driveline tube. Refer to Symptoms - Rear Drive Axle .

WHIRRING OR SQUEALING NOISE

Whirring or Squealing Noise

Cause	Correction
DEFINITION: A whirring or squealing noise occurs when driving the vehicle at various speeds.	
Bearing noise within the driveline assembly	A whirring or squealing type noise increases or decreases relative to the vehicle speed and may be caused by a worn bearing. A MINOR whirring type noise should be considered normal. Replace the bearings, as required.

SQUEAK NOISE

Squeak Noise

Cause	Correction
DEFINITION: When driving the vehicle at various speeds, a squeaking sound occurs.	
A broken or missing snap ring on the rear bearing housing assembly	1. Remove the driveline tube. Refer to <u>Driveline Support Assembly Replacement (with Manual Transmission)</u>, <u>Driveline Support Assembly Replacement (with Automatic Transmission)</u> or <u>Driveline Support Overhaul</u>. 2. Inspect and repair, as necessary.

SHUDDER ON ACCELERATION AT LOW SPEED

Shudder on Acceleration at Low Speed

Cause	Correction
DEFINITION: When the vehicle is accelerating at low speed, a shudder occurs.	

Propeller shaft rev limiter/snubber contacting the driveline tube- manual transmission applications only	A rev limiter/snubber that is contacting the driveline tube may create a moaning type noise and/or vibration that is felt through the shift lever. Slight noise and vibration is to be considered normal during an over-speed condition but should not be present when the over-speed condition has ceased. Replace components, as required.
Propeller shaft out-of-balance condition	A propeller shaft out-of-balance condition may create a vibration and be caused by: • Worn rev limiter/snubber- manual transmission applications only • Bent propeller shaft • Loose or missing parts • Worn or broken coupling Replace components, as necessary.

REPAIR INSTRUCTIONS

DRIVELINE SUPPORT ASSEMBLY REPLACEMENT (WITH MANUAL TRANSMISSION)

Special Tools

J 42055 Transmission Support Fixture

Removal Procedure

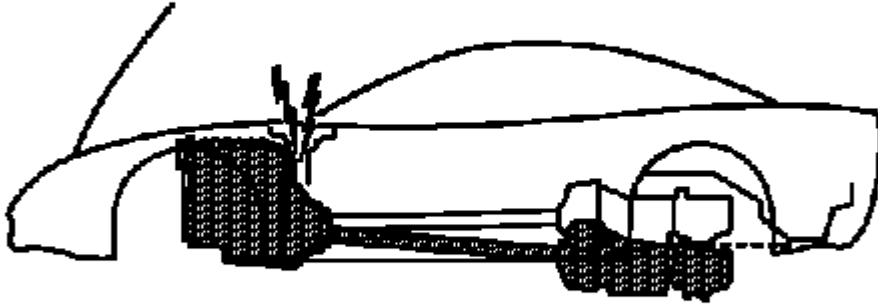


Fig. 3: Tilting Down Rear Of Driveline
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Battery Disconnect Warning .

CAUTION: When tilting down the rear of the driveline, observe the clearance between the rear of the engine and the composite dash panel. Do not allow the engine to rest unsupported against the composite dash panel or vehicle damage may result.

CAUTION: When lowering and removing the rear of the driveline, observe the clearance between the rear of the transaxle assembly and the underbody to prevent damage.

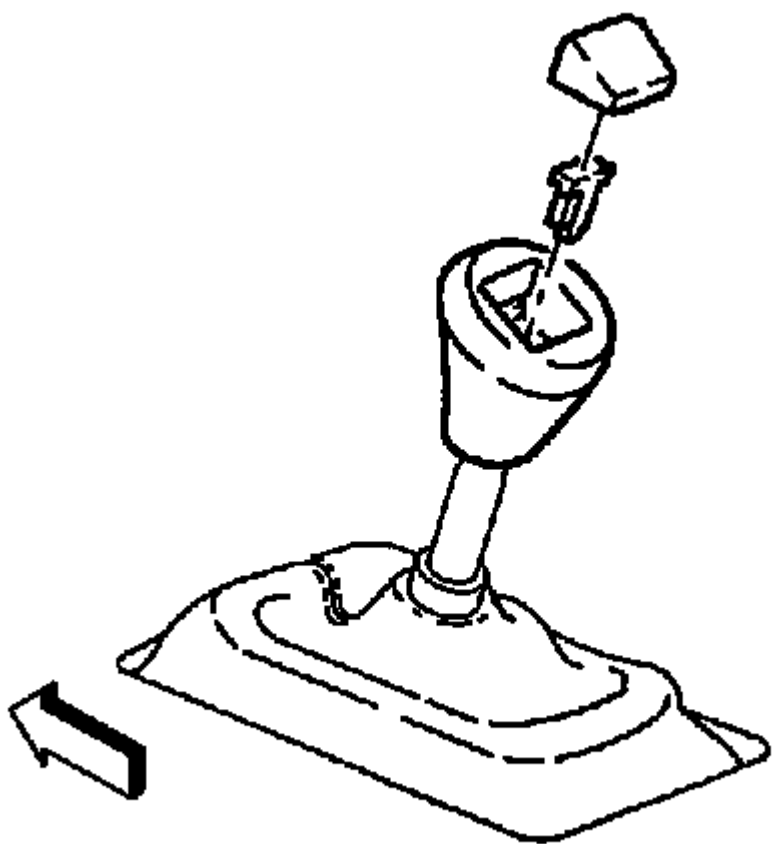


Fig. 4: Shift Control Knob Retainer To Slots & Retainer
Courtesy of GENERAL MOTORS COMPANY

1. Disconnect the negative battery cable.
2. Remove the console. Refer to .
3. Carefully pry off the shift control knob button.
4. Pry the shift control knob retainer out of the slots and remove the retainer.

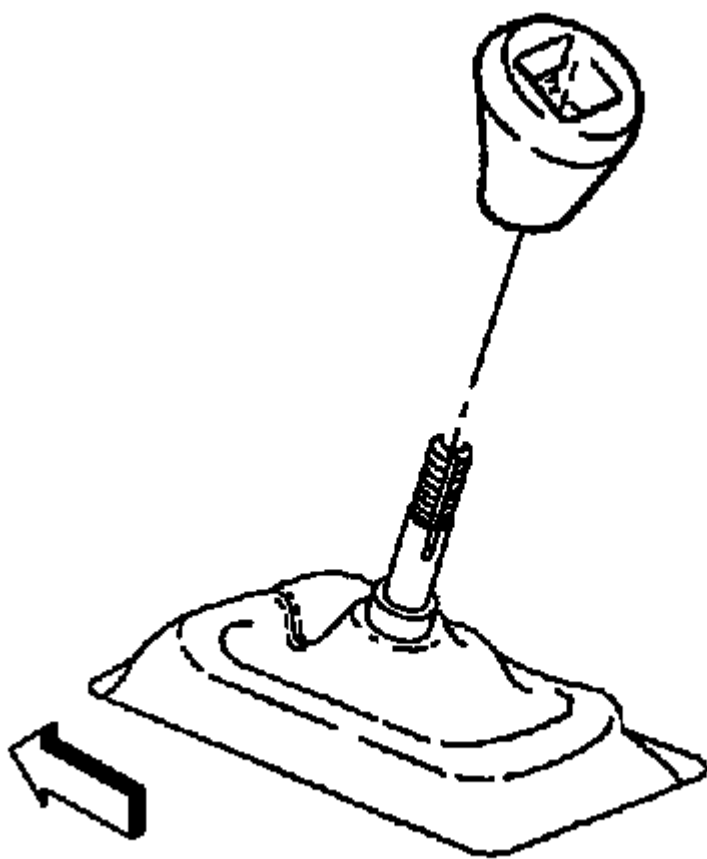


Fig. 5: Removing Gear Shift Knob
Courtesy of GENERAL MOTORS COMPANY

5. Unscrew the shift control knob.

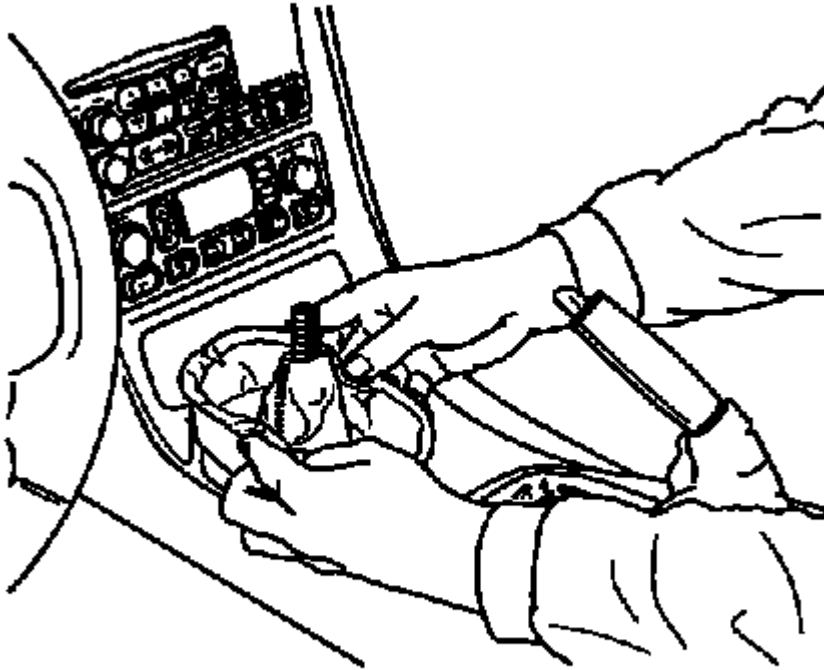


Fig. 6: Sides Of Shift Control Boot To I/P Accessory Trim Plate
Courtesy of GENERAL MOTORS COMPANY

6. Grasp the sides of the shift control boot and apply light pressure in toward the shift control lever to begin to release the shift boot retaining tabs from the instrument panel (I/P) accessory trim plate.
7. Using light pressure, continue to release the remaining boot retaining tabs.

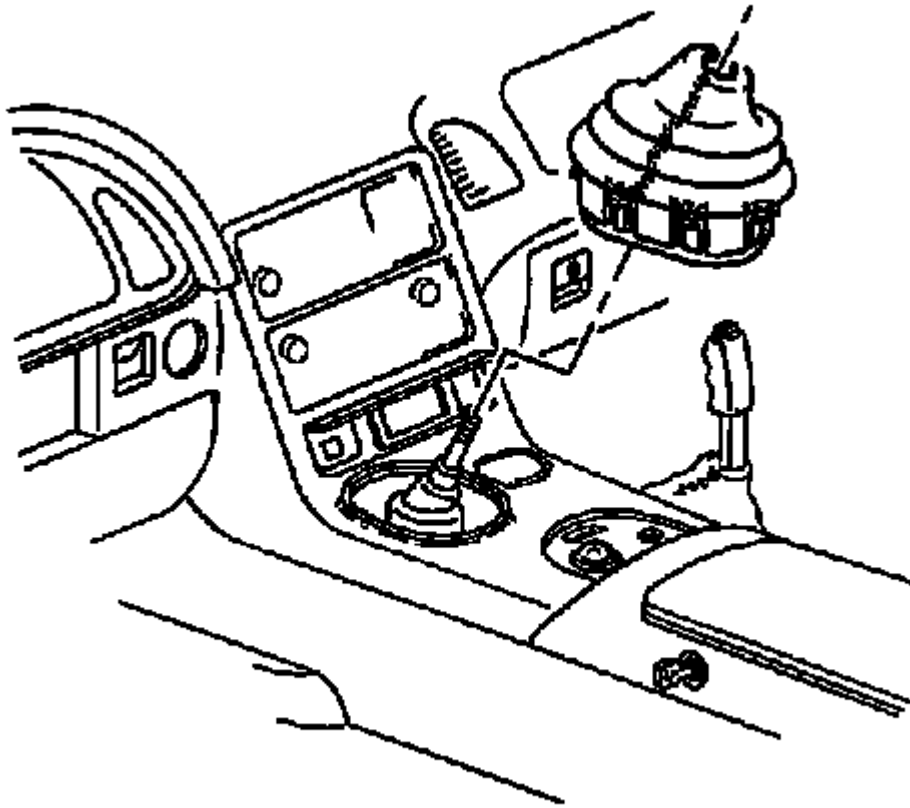


Fig. 7: Shift Control Boot To Shift Control Lever
Courtesy of GENERAL MOTORS COMPANY

8. Lift the boot away from the trim plate and remove the boot.
9. Remove the I/P accessory trim plate. Refer to .

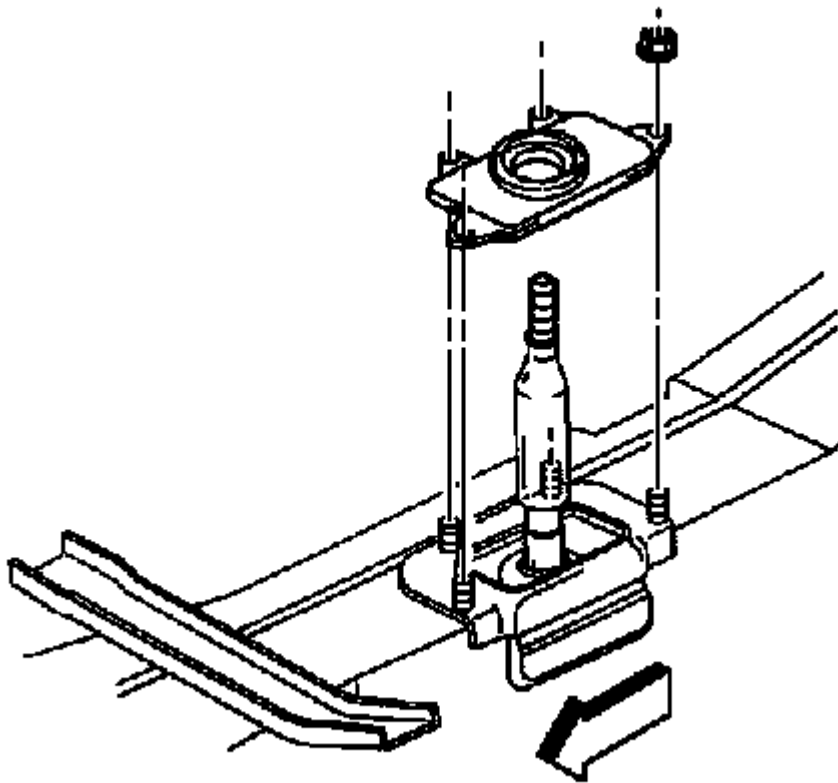


Fig. 8: Left I/P Lower Insulator Panel
Courtesy of GENERAL MOTORS COMPANY

10. Remove the shift control closeout boot retaining nuts.
11. Remove the shift control closeout boot.
12. Remove the shift control assembly. Refer to .
13. Remove the left I/P lower insulator panel. Refer to .

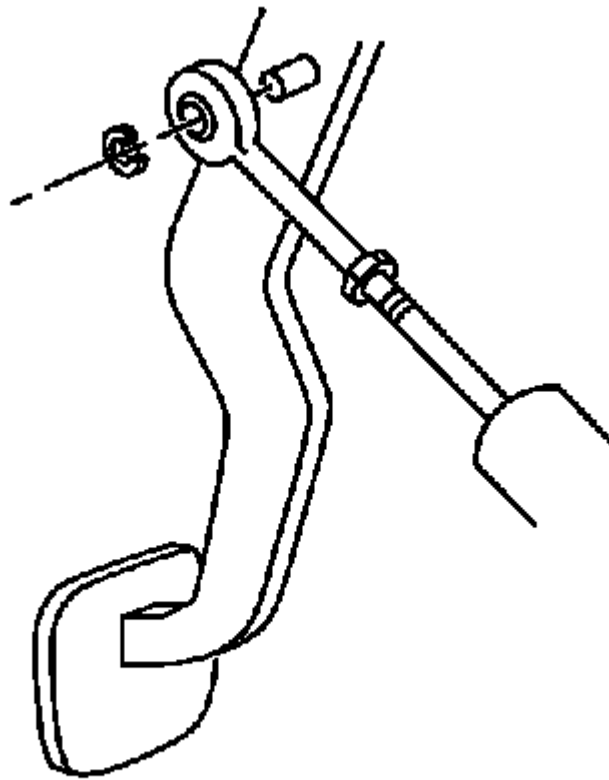


Fig. 9: View Of Master Cylinder Push Rod To Clutch Pedal
Courtesy of GENERAL MOTORS COMPANY

14. Remove the clutch master cylinder pushrod retainer.
15. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
16. Remove the clutch actuator cylinder assembly. Refer to **Clutch Actuator Cylinder Replacement**

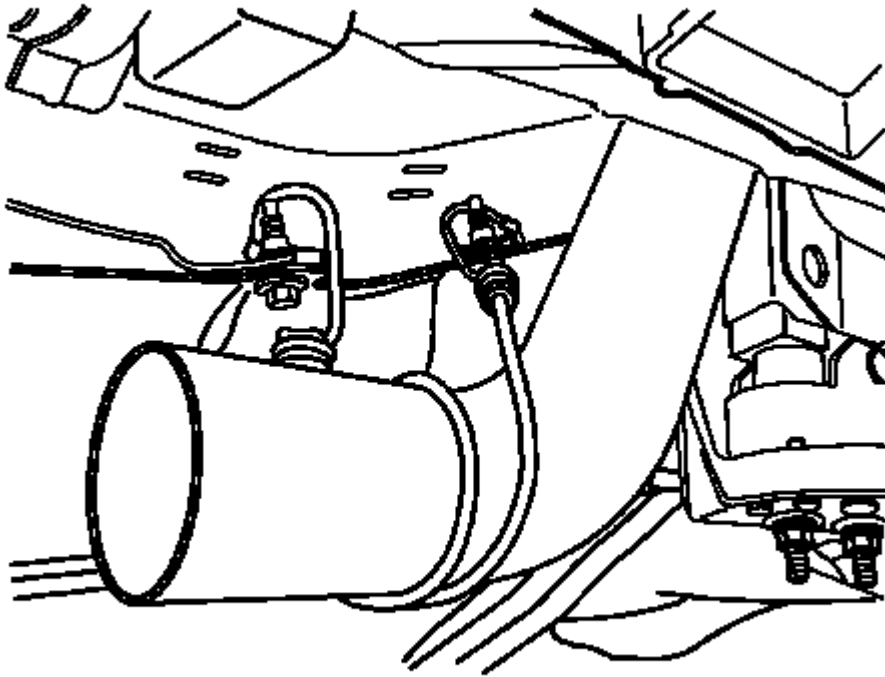


Fig. 10: View Of Tied Off Muffler Assembly
Courtesy of GENERAL MOTORS COMPANY

17. Remove the rear tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
18. Remove the catalytic converters. Refer to **Catalytic Converter Replacement - Left Side** and **Catalytic Converter Replacement - Right Side** .
19. Tie off the muffler assemblies to the underbody to support out of the way.
20. Remove the rear brake line crossover pipe.
21. Remove the floor panel tunnel reinforcement. Refer to **Floor Panel Tunnel Panel Reinforcement Replacement** .

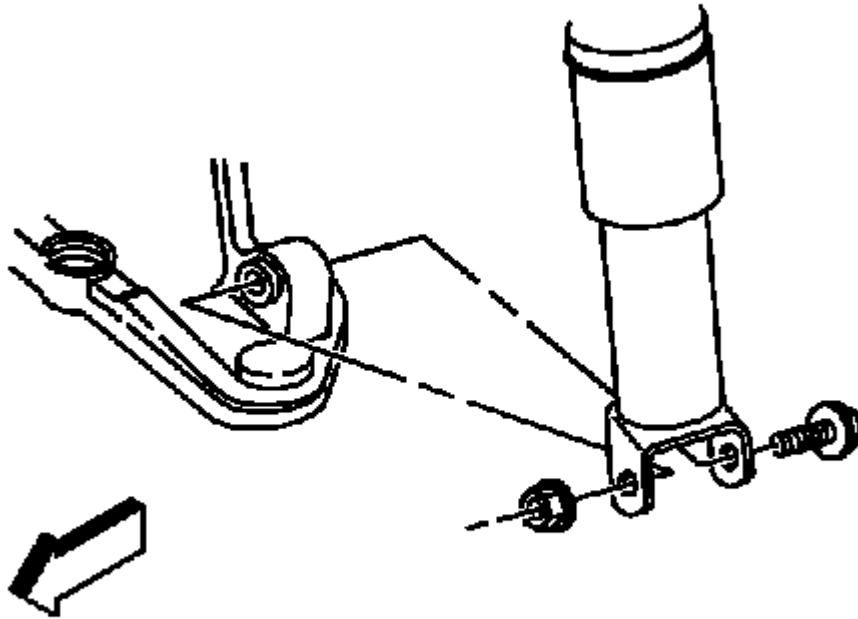


Fig. 11: View Of Shock Absorber Mounting To Control Arm
Courtesy of GENERAL MOTORS COMPANY

22. Remove the rear transverse spring. Refer to .
23. Support the lower control arm with a straight jack.
24. Disconnect the outer tie rod end from the suspension knuckle. Refer to .
25. Remove the shock absorber lower mounting bolt and nut. Refer to **Shock Absorber Replacement (without FE2, FE4)** , **Shock Absorber Replacement (with FE2, FE4)** .
26. Disconnect the lower ball joint from the suspension knuckle. Refer to **Knuckle Replacement (without J55)** , **Knuckle Replacement (with J55)** .
27. Remove the straight jack from the control arm.
28. Repeat steps 25 through 29 for the other side of the vehicle.

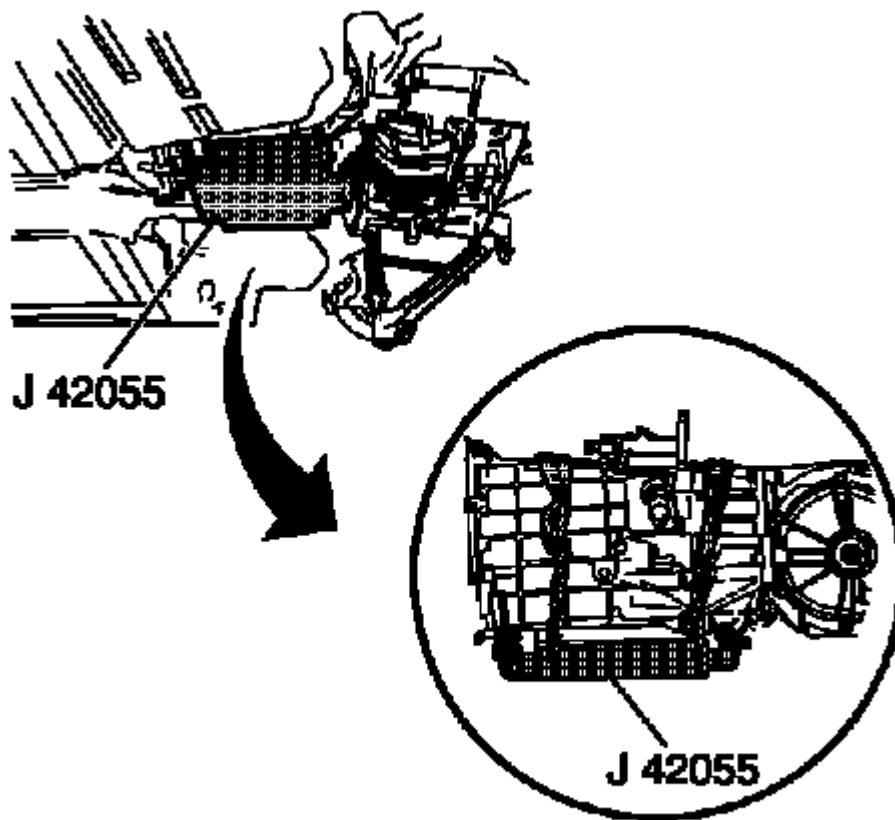


Fig. 12: Transmission Jack To Transmission
Courtesy of GENERAL MOTORS COMPANY

29. Assemble the **J 42055** Transmission Support Fixture.
30. Install the **J 42055** Transmission Support Fixture to a transmission jack.
31. Position and firmly secure the **J 42055** Transmission Support Fixture with the transmission jack to the transmission.
32. Disconnect the wiring harness and brake pipe clip retainers from the rear suspension crossmember.

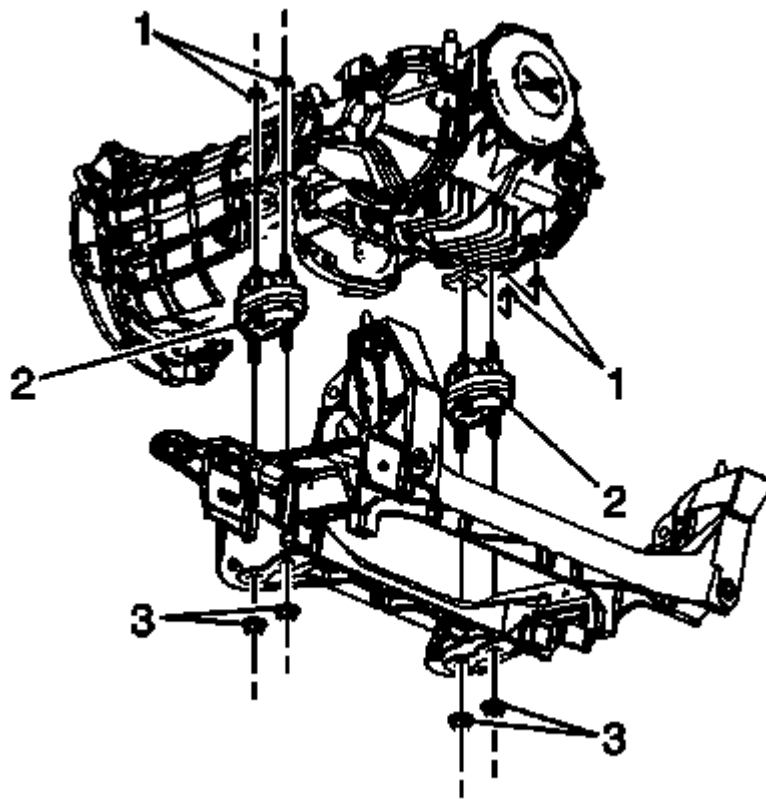


Fig. 13: View Of Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

33. Remove the transaxle mount (2) to rear crossmember nuts (3).

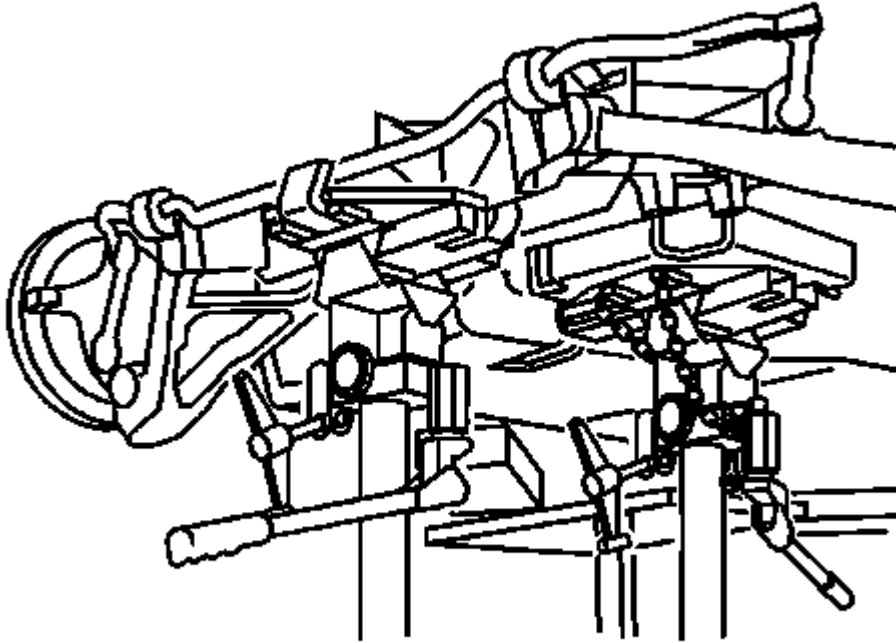


Fig. 14: View Of Correct Transmission Jack Placement
Courtesy of GENERAL MOTORS COMPANY

34. Position a transmission jack under the rear suspension crossmember and firmly secure the crossmember to the jack.
35. Using ONLY HAND TOOLS, remove the rear suspension crossmember retaining nuts.

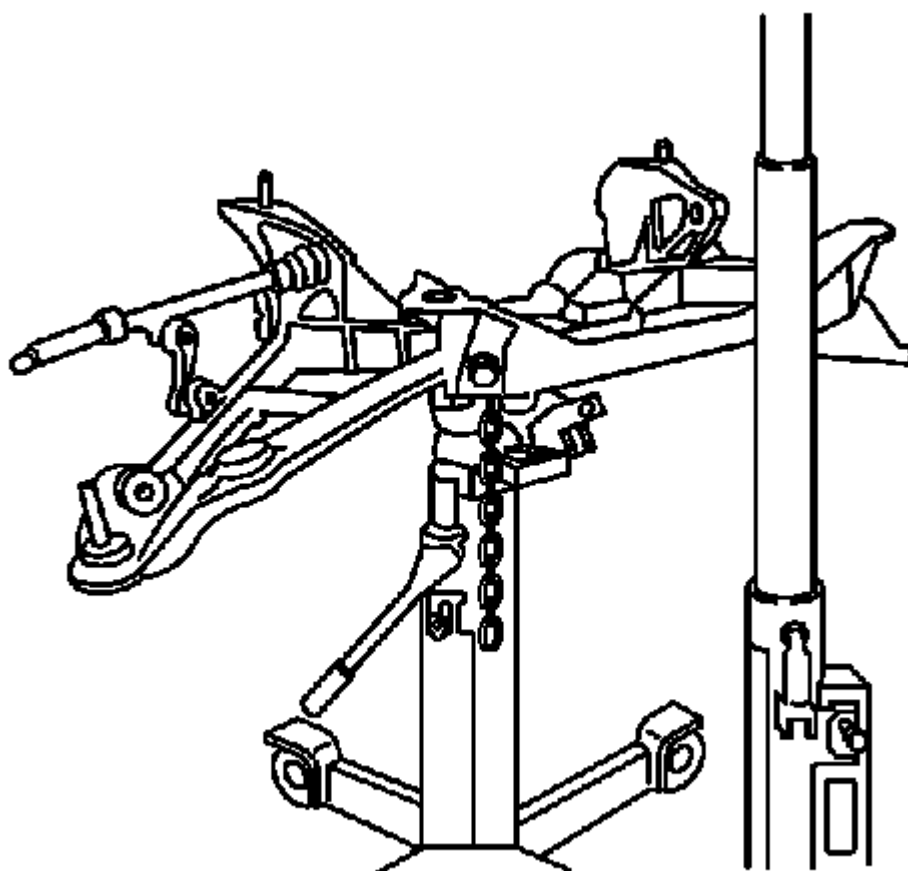


Fig. 15: View Of Rear Suspension Crossmember
Courtesy of GENERAL MOTORS COMPANY

36. With the aid of an assistant, slowly lower the rear suspension crossmember away from the vehicle frame rails and remove the crossmember.

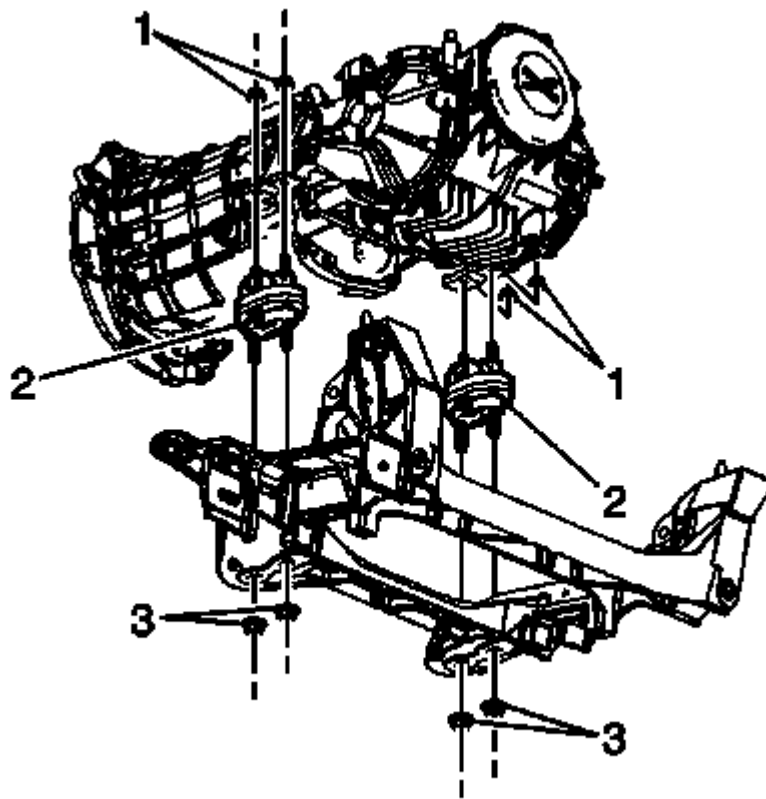


Fig. 16: View Of Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

37. Remove the transaxle mount (2) to differential nuts (1).

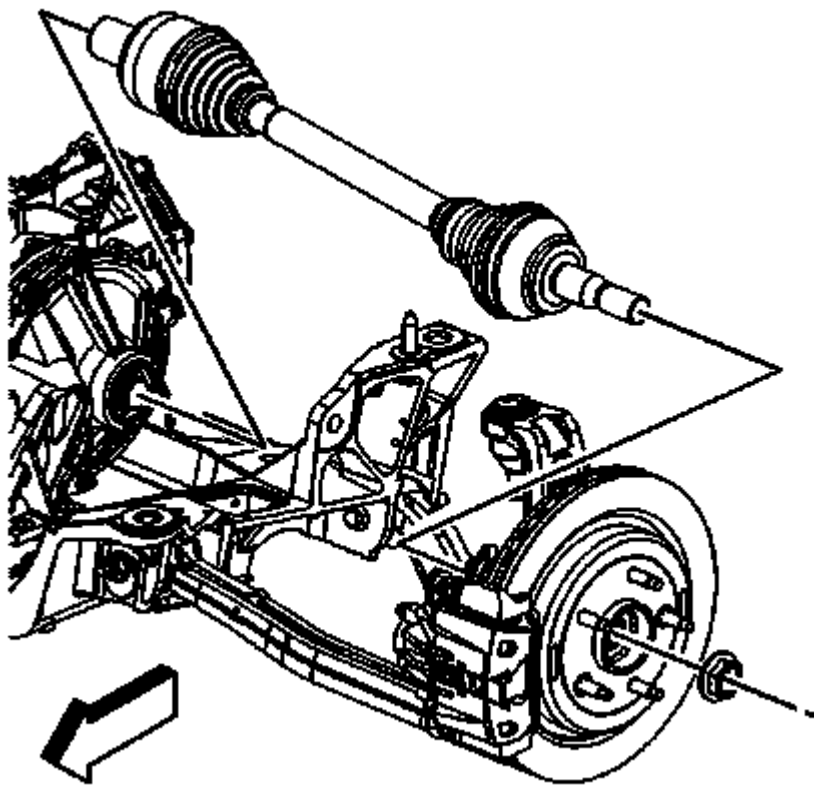


Fig. 17: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

38. Using a pry bar, CAREFULLY release the wheel drive shafts from the differential.
39. Tie off the wheel drive shafts to the underbody to support out of the way.

The muffler assembly pipes toward the rear offer a good location to help support the wheel drive shafts.

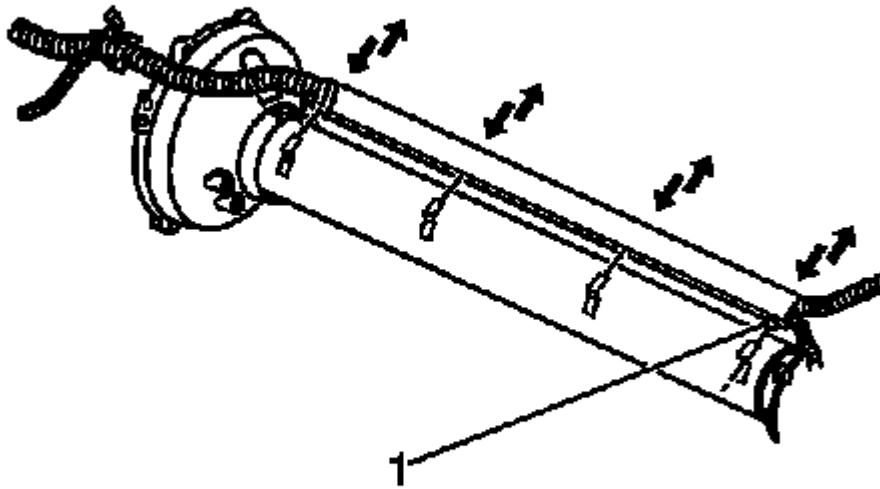


Fig. 18: Wiring Harness To L-Shaped Brackets At Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

40. Release the retainer (1) securing (and positioning) the wiring harness to the L-shaped brackets along the driveline support assembly, then slide the harness up out of the brackets and position out of the way.

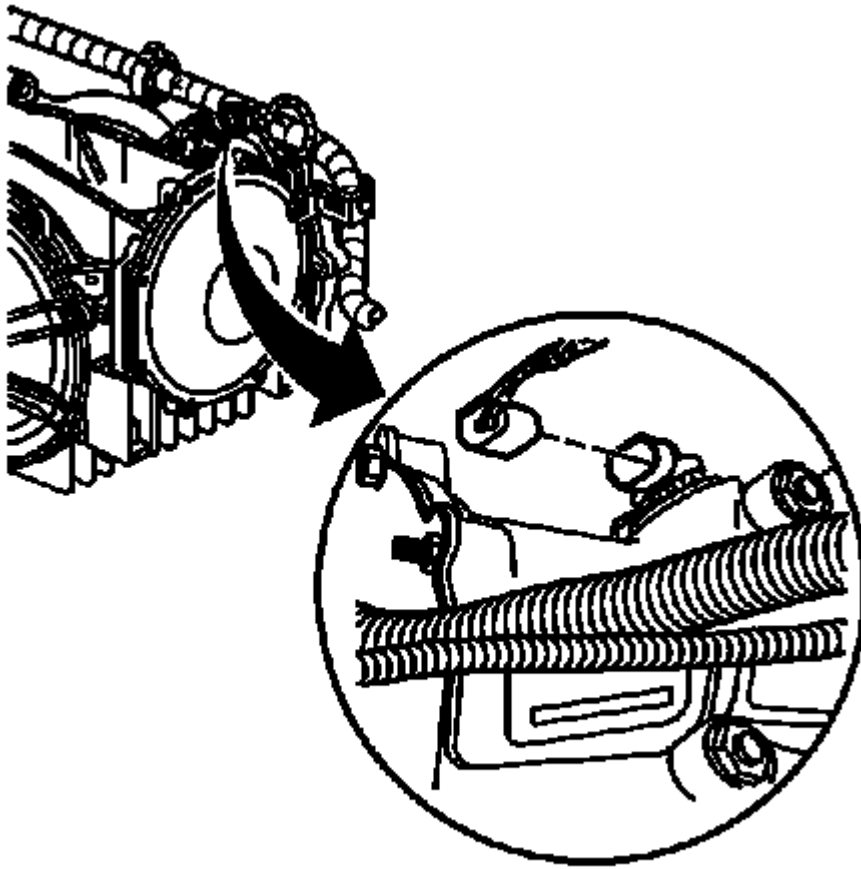


Fig. 19: Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

41. SLOWLY lower the driveline approximately 51 mm (2 in), while simultaneously adjusting the angle of tilt, in order to access the electrical connectors.
42. Disconnect the vehicle speed sensor (VSS) electrical connector.

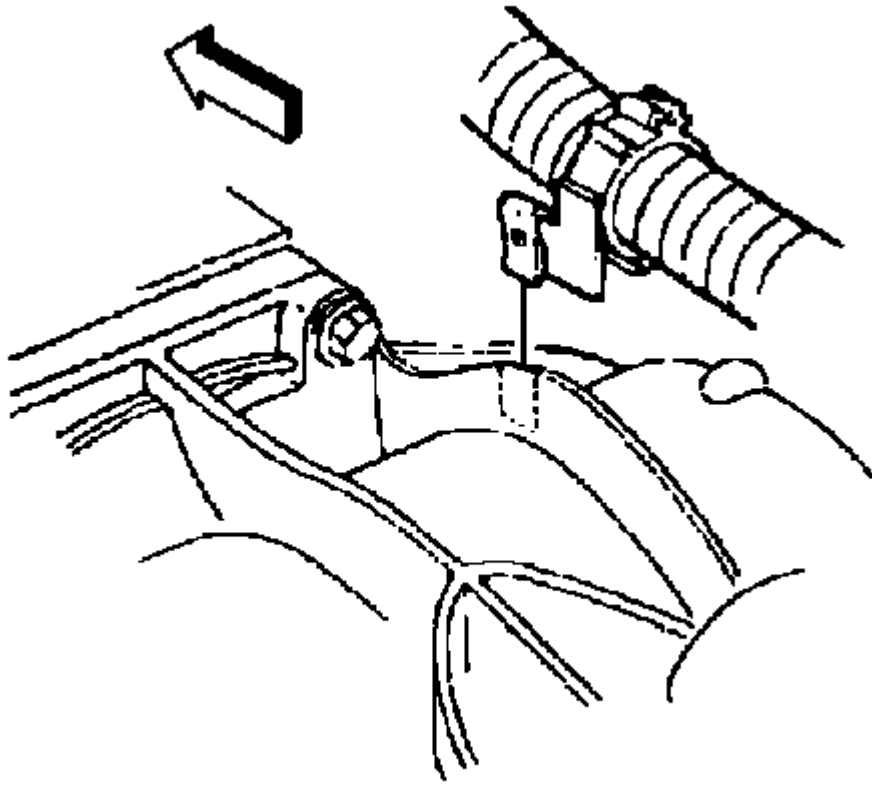


Fig. 20: Wiring Harness Retainer To Stud At Differential Rear Cover
Courtesy of GENERAL MOTORS COMPANY

43. Disconnect the wiring harness retainer from the stud at the differential rear cover.
44. Disconnect the wiring harness retainer clip from the top of the differential.

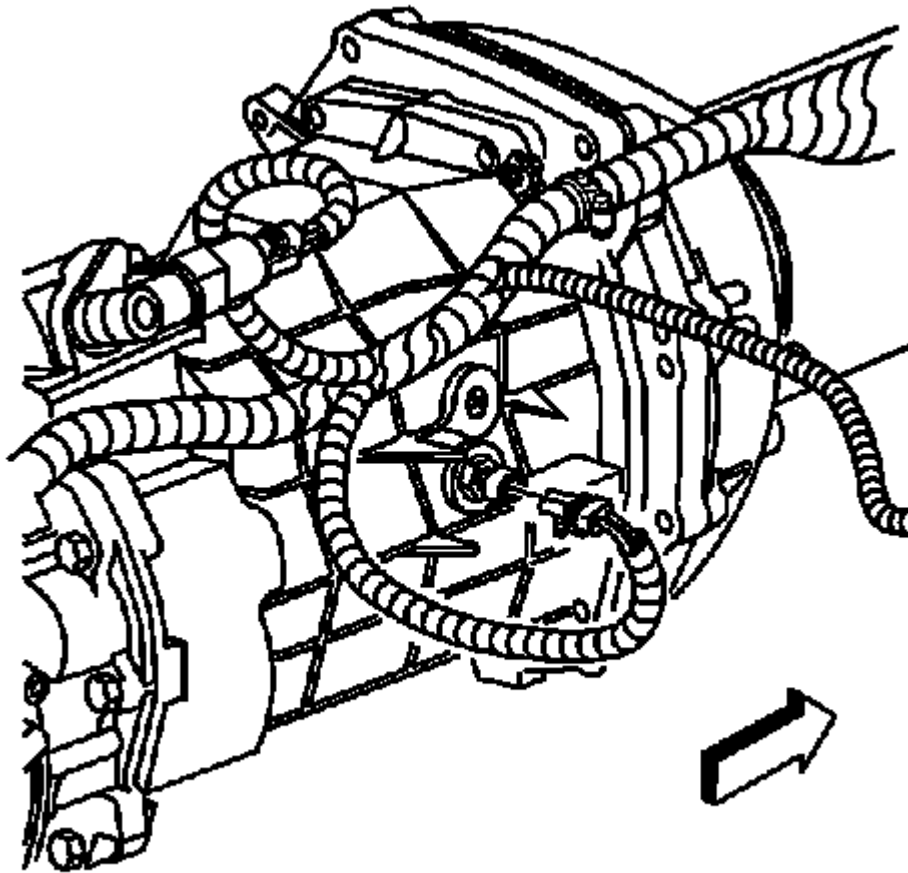


Fig. 21: Backup Lamp Switch Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

45. Disconnect the backup lamp switch electrical connector.

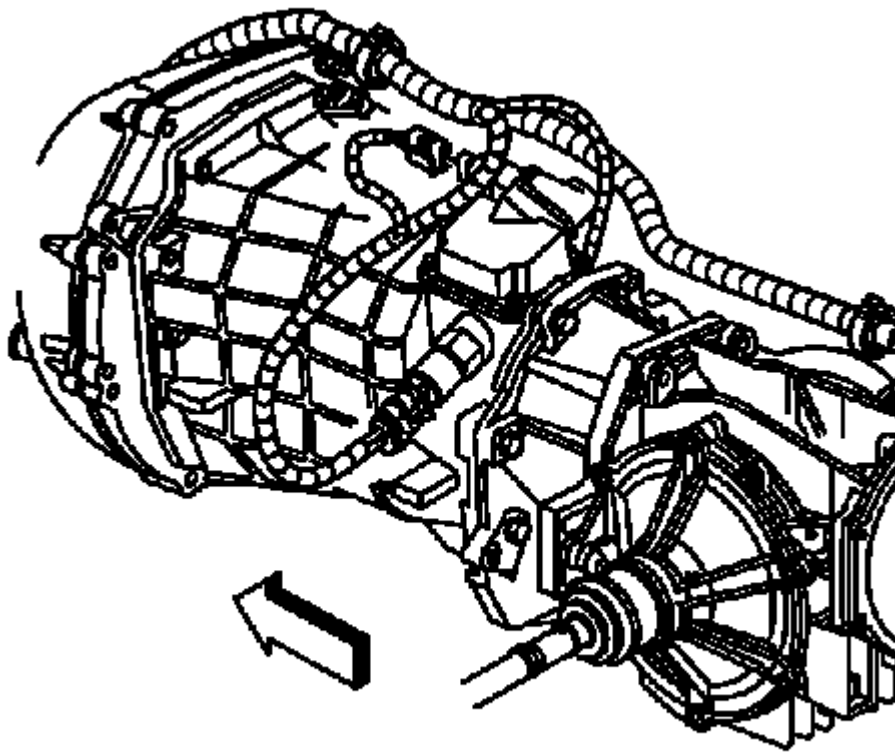


Fig. 22: Reverse Lockout Solenoid Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

46. Disconnect the reverse lockout solenoid electrical connector.

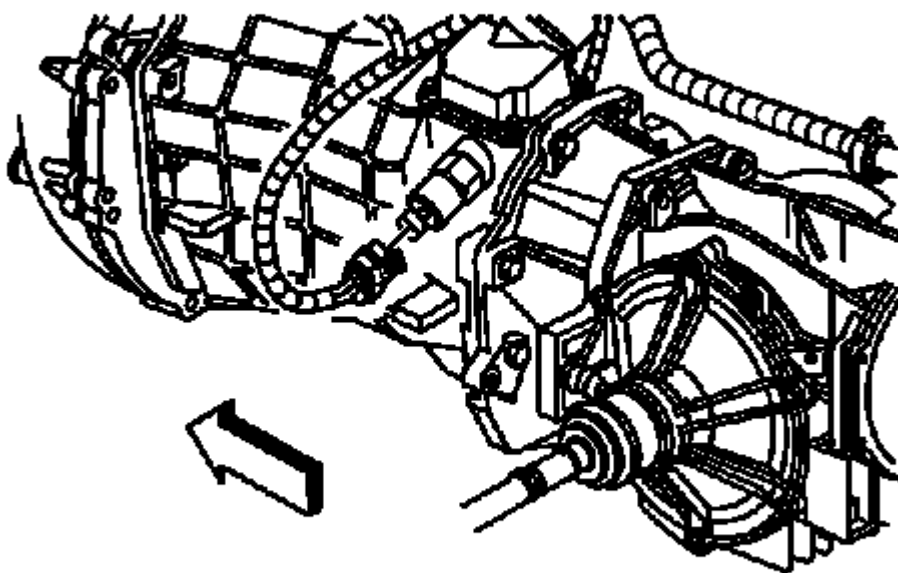


Fig. 23: Gear Select (Skip Shift) Solenoid Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

47. Disconnect the gear select (skip shift) solenoid electrical connector.

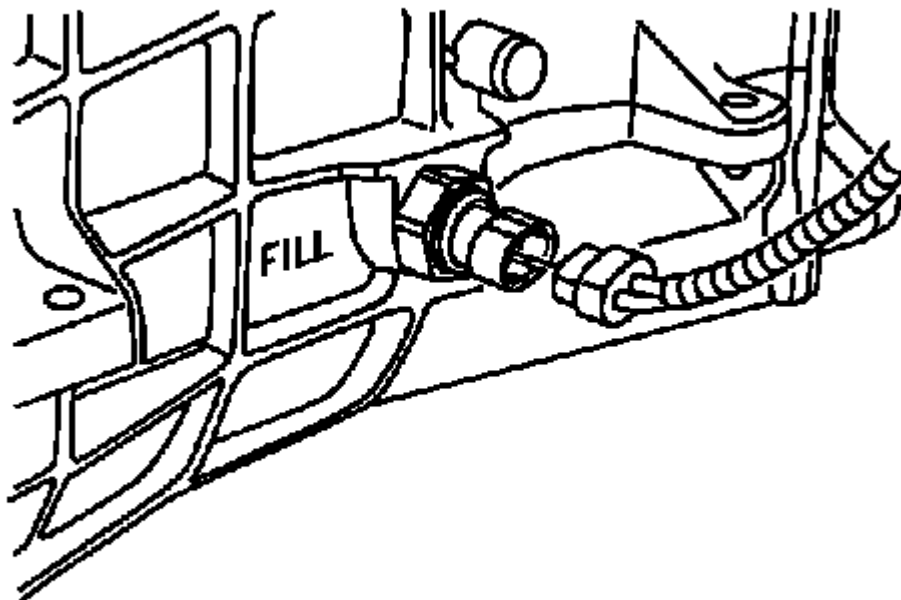


Fig. 24: Transmission Fluid Temperature Sensor Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

48. Disconnect the transmission fluid temperature sensor electrical connector, if equipped.

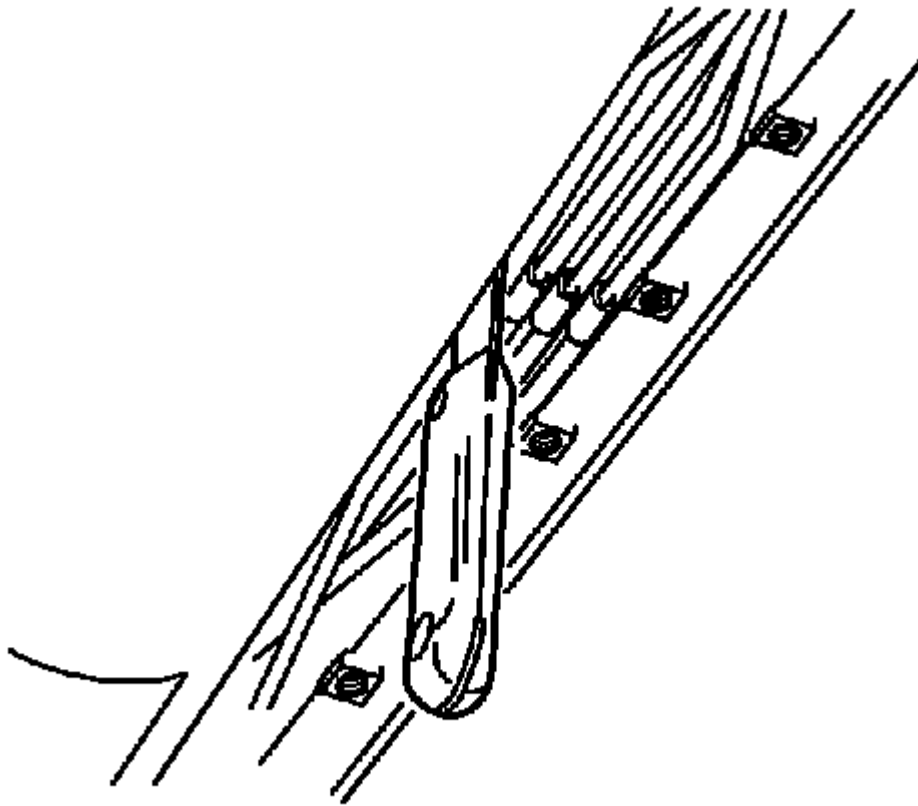


Fig. 25: Edge Of Shifter Bracket On Side Of Driveline Support Assembly & Brake Pipe Retainer

Courtesy of GENERAL MOTORS COMPANY

49. Insert a putty knife or similar tool, between the edge of the shifter bracket on the side of the driveline support assembly and the brake pipe retainer on the wall of the driveline tunnel.

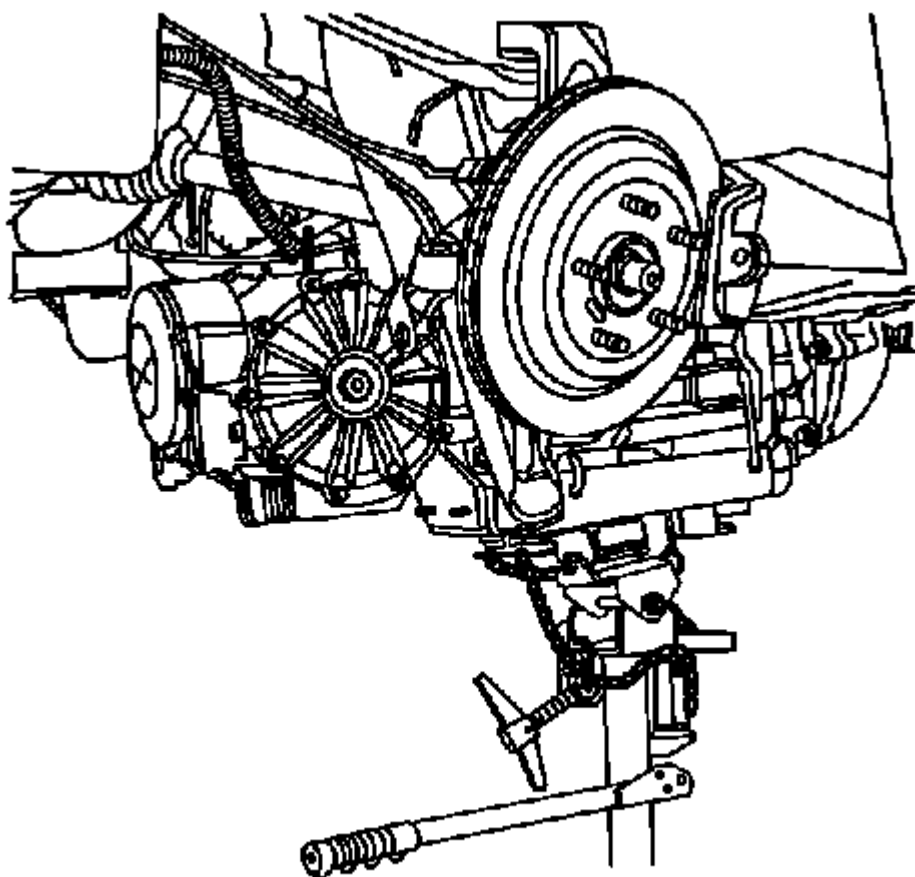


Fig. 26: Wiring Harness To Harness Retainer At Top Of Transmission
Courtesy of GENERAL MOTORS COMPANY

50. SLOWLY lower the driveline, while simultaneously adjusting the angle of tilt and observe the relationship between the top rear of the differential and the lowest part of the rear compartment panel floor (the center storage compartment between the frame rails). The differential should not be lowered more than approximately EVEN with the specified body point of reference.

The engine positive crankcase ventilation (PCV) pipes which route along the rear of the engine intake manifold (LS1 only) will likely contact the dash panel.

51. Release the wiring harness from the harness retainer along the top of the transmission.
52. Ensure the wiring harness is free from the driveline being removed.

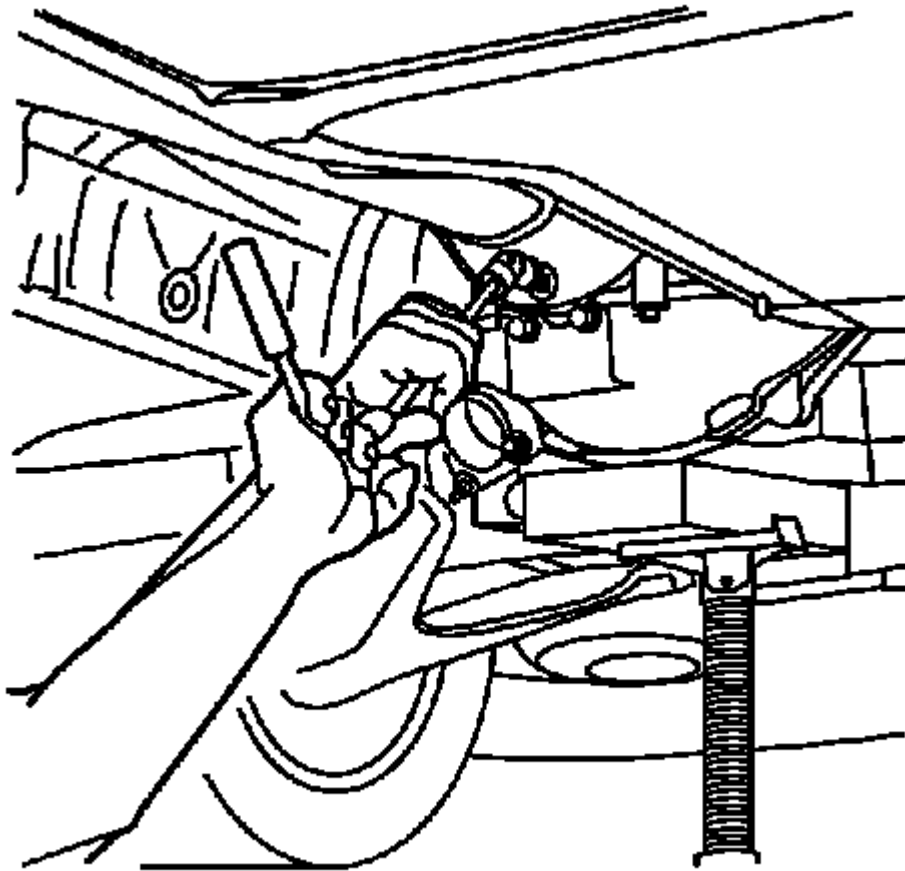


Fig. 27: Driveline Support Assembly To Engine Flywheel Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

53. Using a block of wood to protect the engine oil pan, place a straight jack under the rear of the engine oil pan to support the engine from stressing the composite dash panel.
54. Remove the 5 driveline support assembly to engine flywheel housing bolts.
55. Carefully bend the wiring harness bracket away from the driveline toward the driveline tunnel wall in order to make a clear removal path for the driveline.

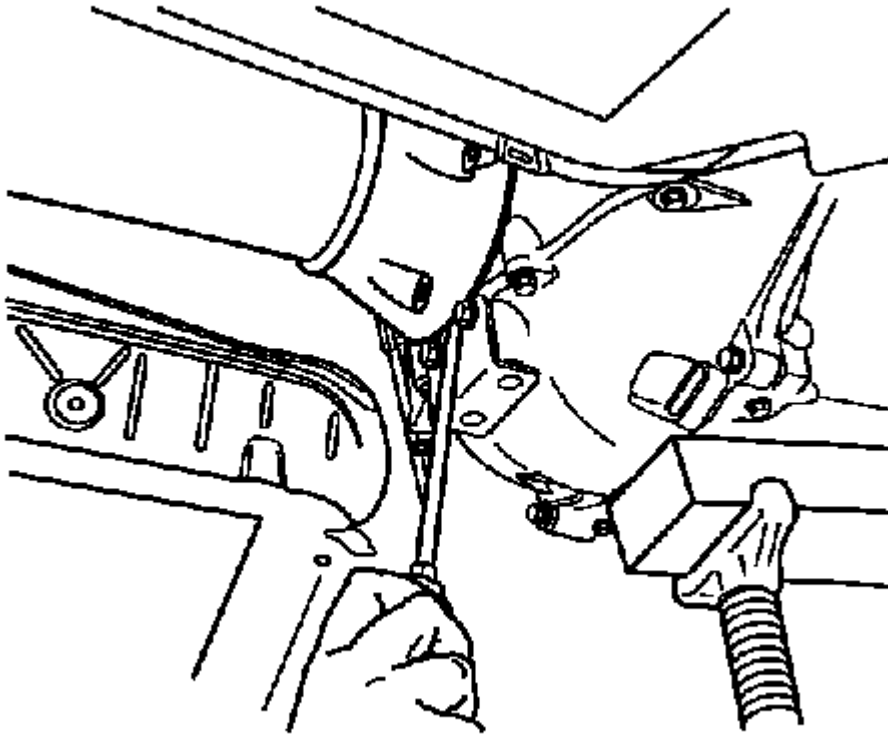


Fig. 28: Edge Of Driveline Support Assembly & Engine Flywheel Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: The aid of an assistant will be necessary for the remaining steps.

56. Have an assistant insert a flat-bladed screwdriver or similar tool, between the edge of the driveline support assembly and the engine flywheel housing, then begin to pry the driveline loose from the engine.

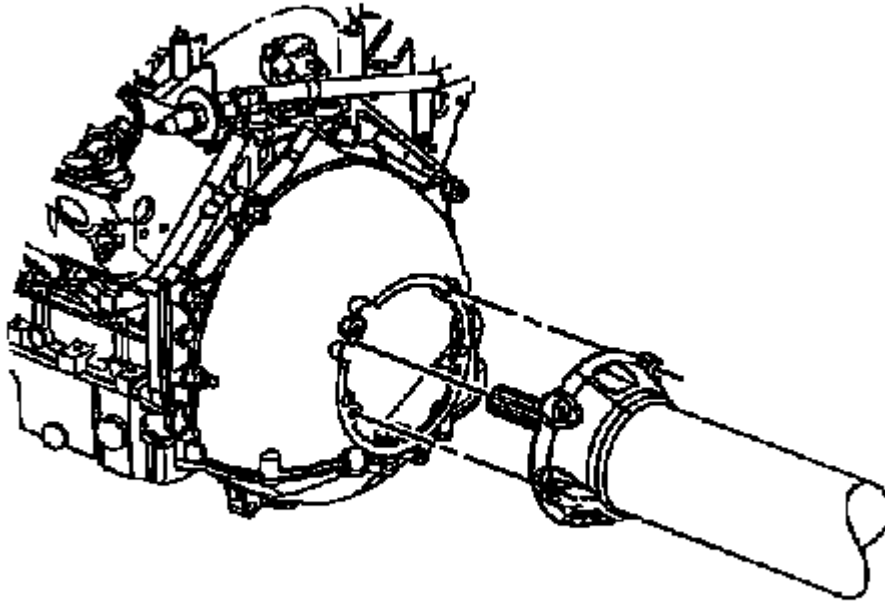


Fig. 29: Propeller Input Shaft At Rear Of Engine Flywheel Housing
Courtesy of GENERAL MOTORS COMPANY

57. Have an assistant guide the front of the driveline during the removal of the driveline from the vehicle.
58. SLOWLY lower the driveline, while simultaneously adjusting the angle of tilt and pulling the driveline away from the engine UNTIL the propeller input shaft at the front of the driveline support assembly just clears the engine flywheel housing.
59. SLOWLY lower the driveline completely out of the vehicle.

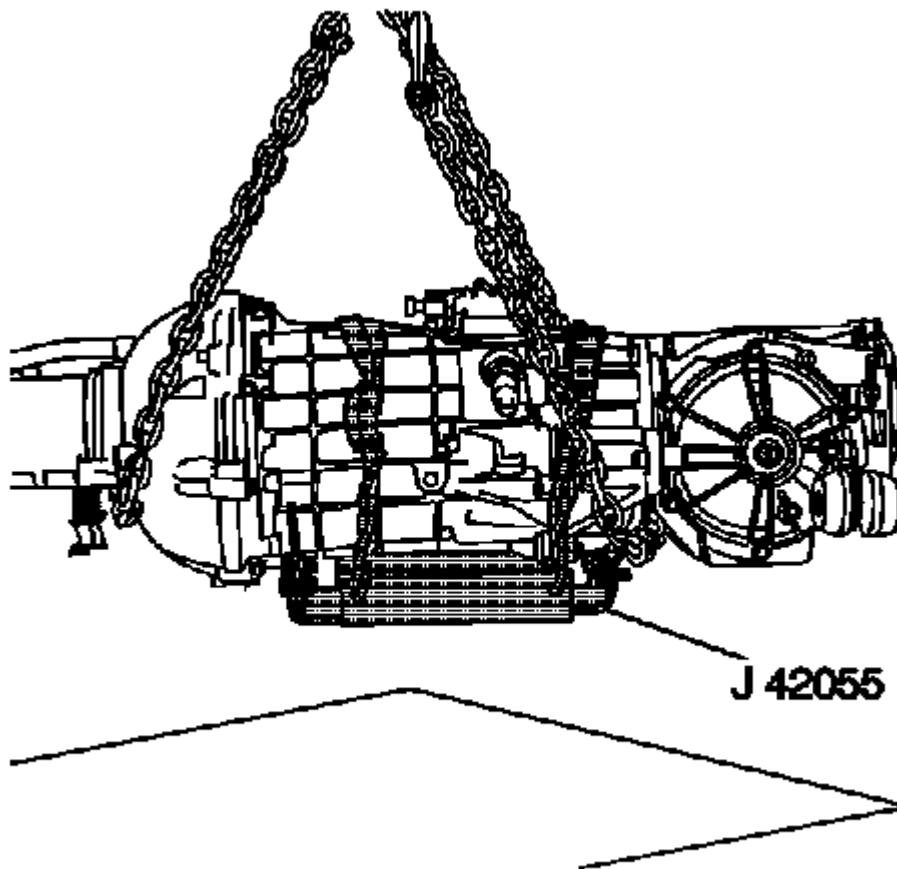


Fig. 30: Rear Exhaust Hangers At Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

60. Position the chainfall or equivalent lifting device, in a way which will protect the rear exhaust hangers located on the driveline support assembly.
61. Using the lifting device, raise the driveline to relieve the weight from the transmission jack.
62. Disconnect the **J 42055** Transmission Support Fixture from the transmission jack ONLY; the **J 42055** Transmission Support Fixture will provide stability to the driveline components while working on a bench.
63. Position the driveline on a workbench with the lifting device still attached.
64. Support the driveline support assembly and the differential for additional balance.
65. Remove the lifting device from the driveline.

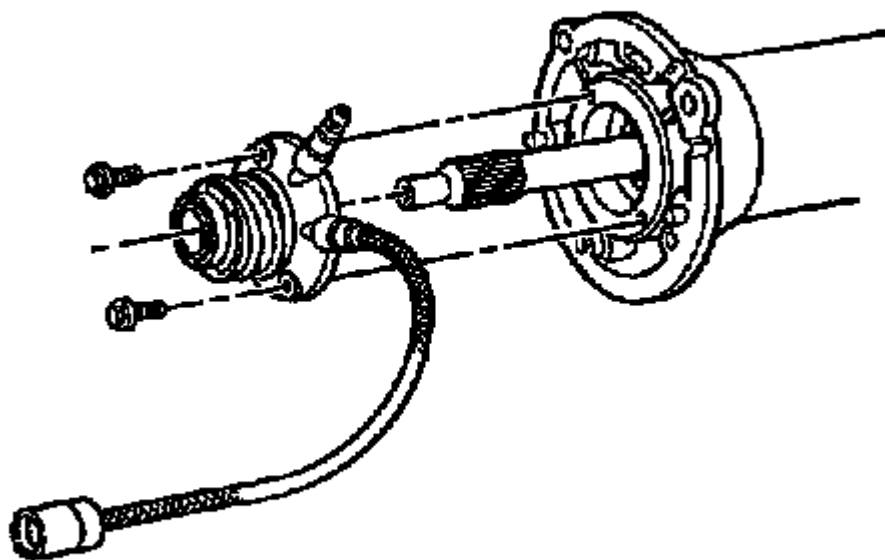


Fig. 31: Clutch Actuator Cylinder Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

66. Remove the clutch actuator cylinder mounting bolts.
67. Remove the clutch actuator cylinder from the driveline support assembly.

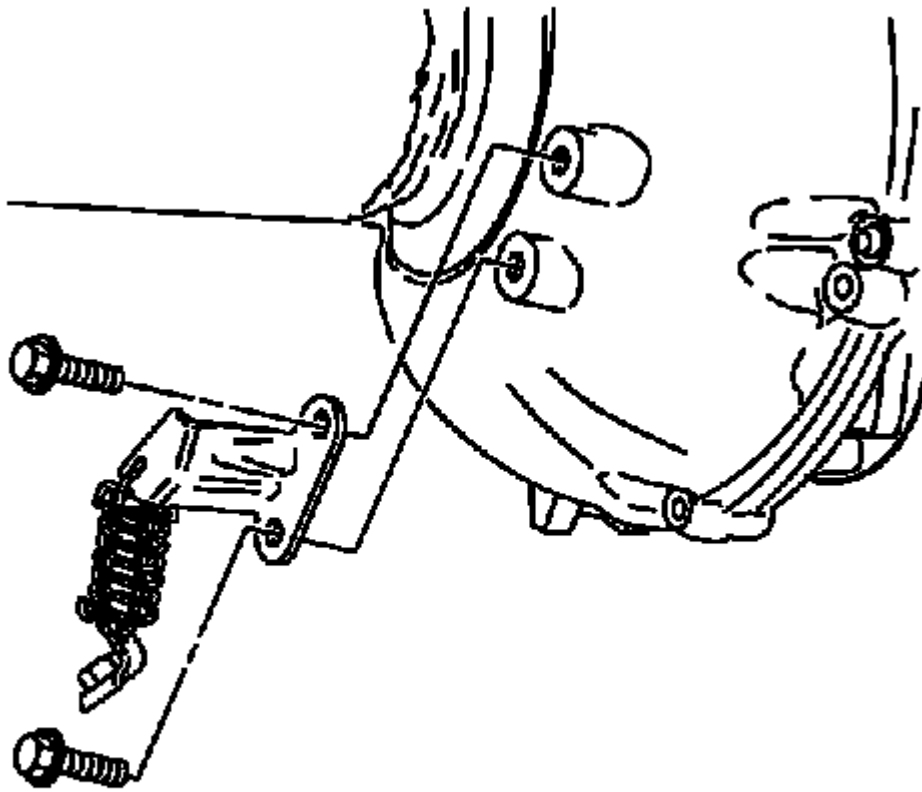


Fig. 32: View Of Rear Exhaust Hangers & Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

68. Remove the rear exhaust hanger mounting bolts.
69. Remove the rear exhaust hangers from the driveline support assembly.

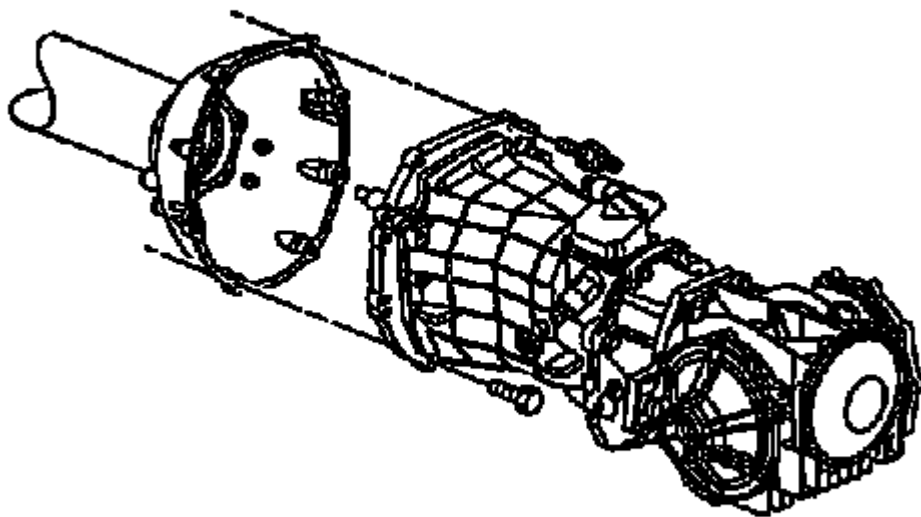


Fig. 33: Transmission To Driveline Support Assembly Bolts/Studs
Courtesy of GENERAL MOTORS COMPANY

70. Remove the transmission to driveline support assembly bolts/studs.
71. Insert a flat-bladed screwdriver or similar tool, between the edge of the driveline support assembly and the transmission, then begin to pry the driveline support assembly loose from the transmission.

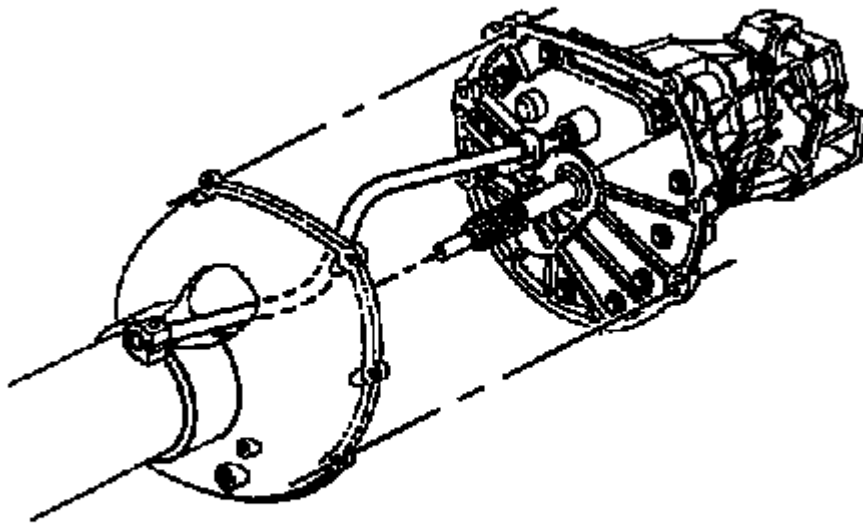


Fig. 34: Driveline Support Assembly To Transmission Shift Rod
Courtesy of GENERAL MOTORS COMPANY

72. Slowly slide the driveline support assembly away from the transmission while guiding the transmission shift rod through the opening in the driveline support assembly.

Installation Procedure

CAUTION: When tilting down the rear of the driveline, insert a putty knife or similar tool between the shift control bracket on the driveline support assembly and the brake pipe retainer on the driveline tunnel wall to prevent damage.

CAUTION: Ensure that the clutch hydraulic hoses are positioned away from nearby vehicle components or vehicle damage may result.

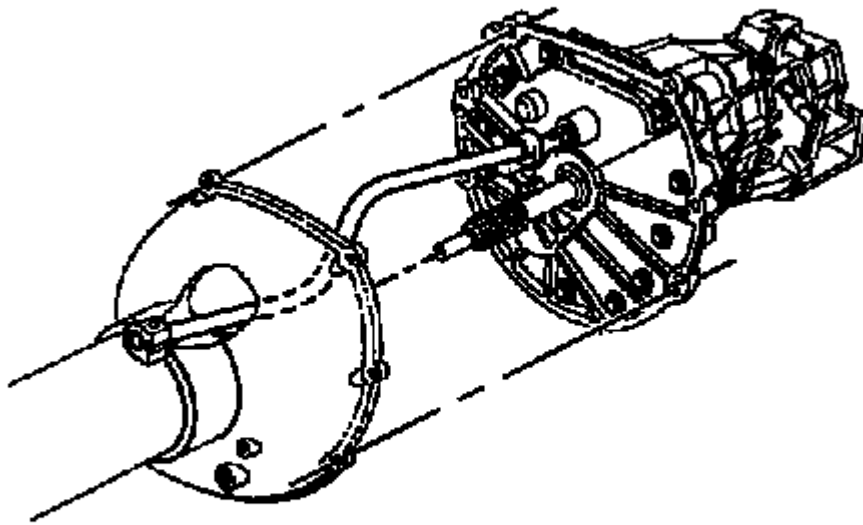


Fig. 35: Driveline Support Assembly To Transmission Shift Rod
Courtesy of GENERAL MOTORS COMPANY

1. Slowly slide the driveline support assembly to the transmission, while guiding the shift rod through the opening in the driveline support assembly.

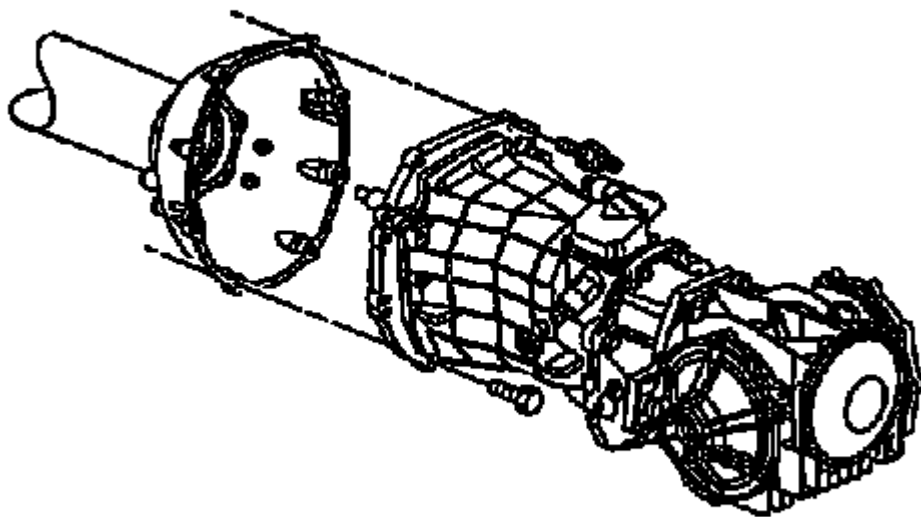


Fig. 36: Transmission To Driveline Support Assembly Bolts/Studs
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the transmission to driveline support assembly bolts/studs.

Tighten

Tighten the transmission to driveline support assembly bolts/studs to 50 N.m (37 lb ft).

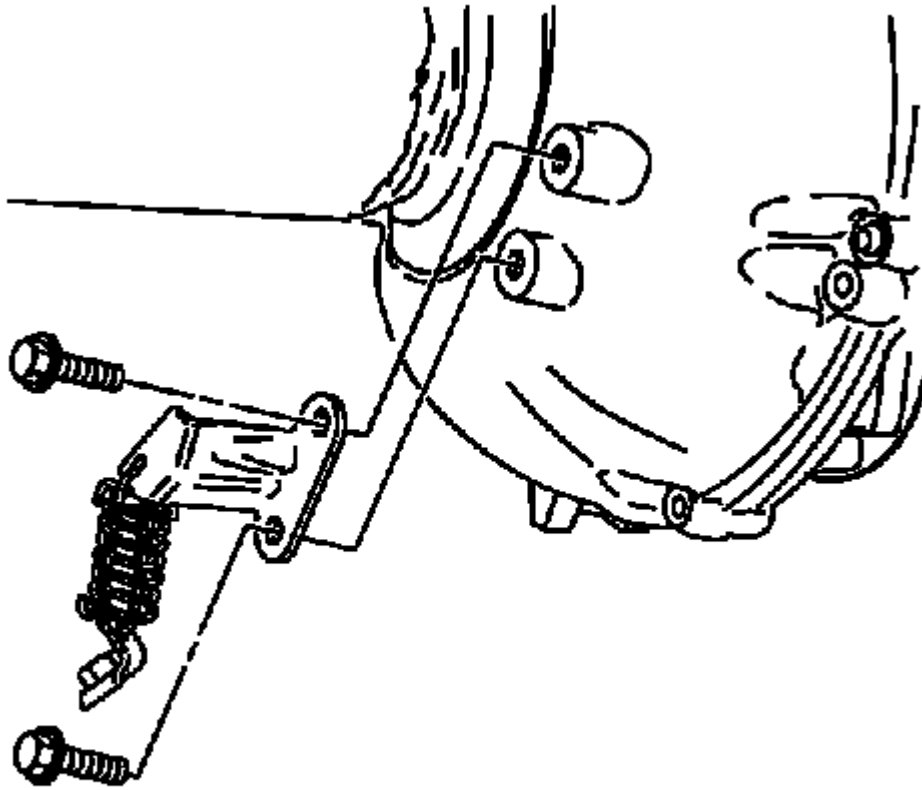


Fig. 37: View Of Rear Exhaust Hangers & Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Install the rear exhaust hangers to the driveline support assembly.
4. Install the rear exhaust hanger mounting bolts.

Tighten

Tighten the rear exhaust hanger mounting bolts to 50 N.m (37 lb ft).

5. Install the clutch actuator cylinder assembly. Refer to **Clutch Actuator Cylinder Replacement**

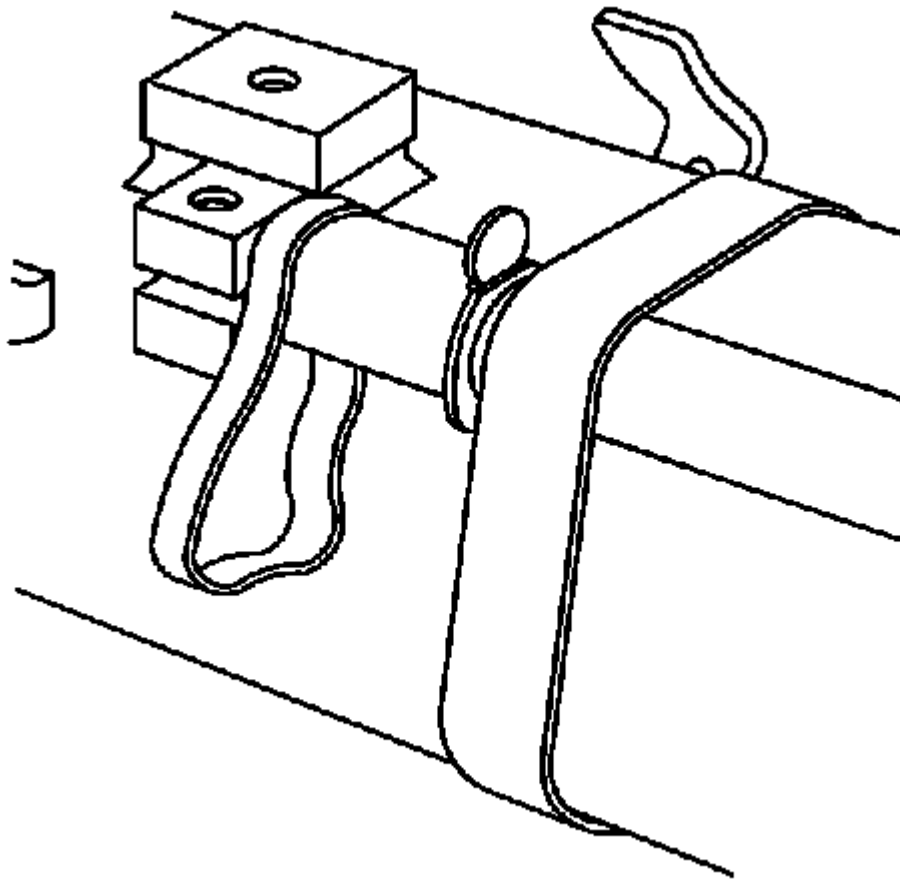


Fig. 38: Rubber Band To Transmission Shift Rod
Courtesy of GENERAL MOTORS COMPANY

6. Loosely install a rubber band onto the transmission shift rod and position just behind the shift rod clamp.

The rubber band will be used to aid in installing the shift control rod after the driveline has been installed.

7. Using a piece of masking tape or similar tape which can be easily broken, affix the transmission shift rod to the driveline support assembly and position the rod just to the outside of the mounting boss used for the shift control.

The tape is intended to keep the shift control rod in position and to aid in shift control rod installation.

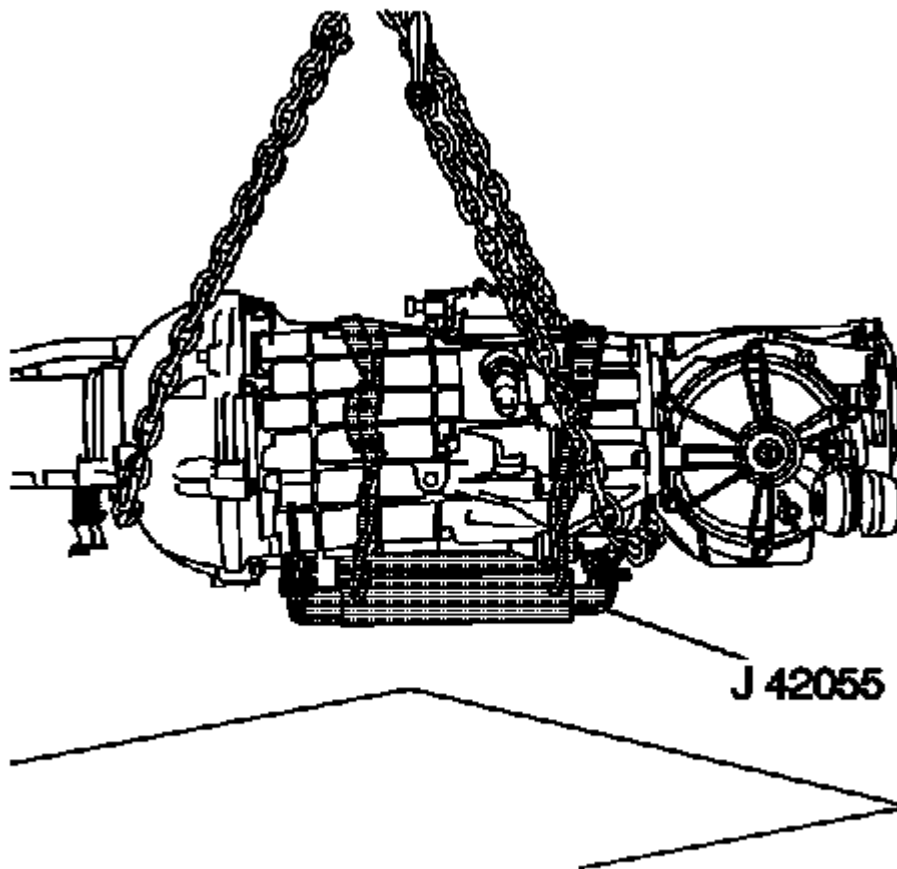


Fig. 39: Rear Exhaust Hangers At Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

8. Position the chainfall or equivalent lifting device, in a way which will protect the rear exhaust hangers located on the driveline support assembly.

NOTE: **The aid of an assistant will be necessary for the following steps until the driveline is installed into the vehicle.**

9. Using the lifting device, raise the driveline off the workbench and position the driveline with the **J 42055** Transmission Support Fixture onto a transmission jack.
10. Connect the **J 42055** Transmission Support Fixture to the transmission jack.

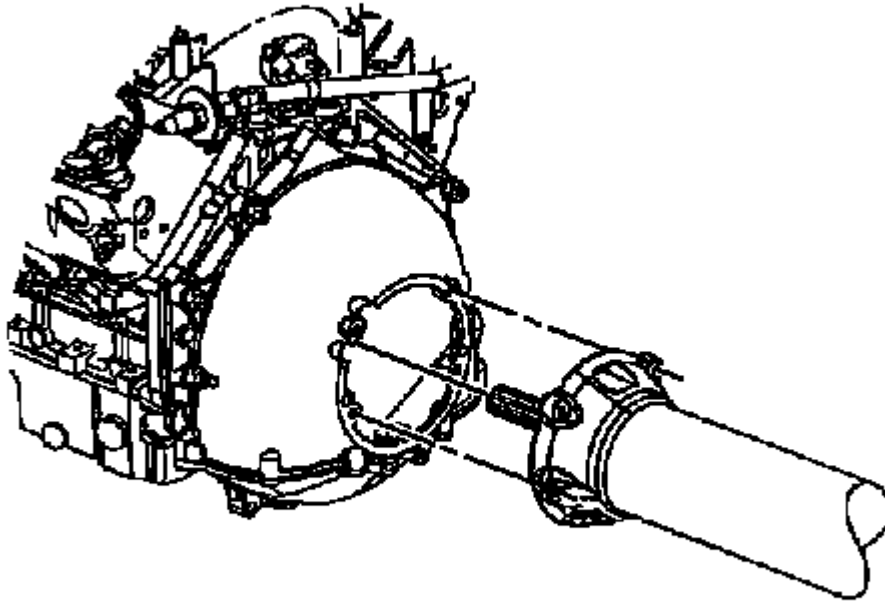


Fig. 40: Propeller Input Shaft At Rear Of Engine Flywheel Housing
Courtesy of GENERAL MOTORS COMPANY

11. Remove the lifting device from the driveline.
12. Position the driveline under the vehicle.
13. Begin to raise the driveline at the approximate angle used during removal.
14. Position the wiring harness along the driveline support assembly and LOOSELY install the harness into the harness retaining slots.
15. Have an assistant guide the front of the driveline so the propeller input shaft is just to the rear of the engine flywheel housing, then raise the driveline to the PROPER HEIGHT and the PROPER ANGLE to install to the engine.
16. Have an assistant begin to insert the propeller input shaft into the clutch driven plate hub while maintaining the proper angle of the driveline; if necessary, use a screwdriver to rotate the shaft slightly to bring the splines into alignment.

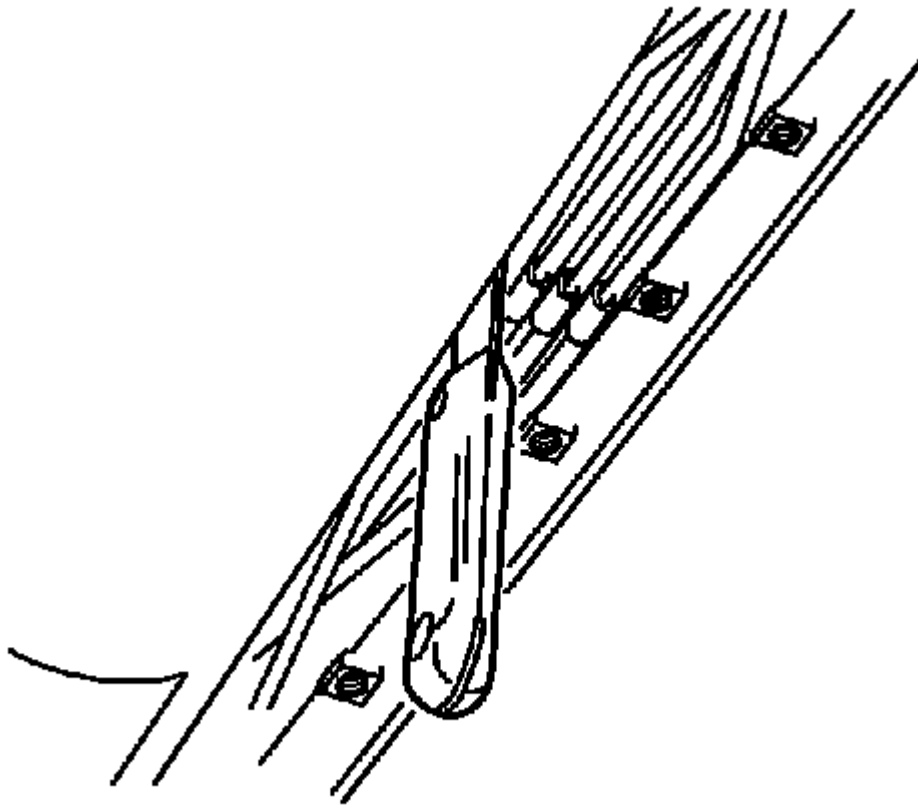


Fig. 41: Edge Of Shifter Bracket On Side Of Driveline Support Assembly & Brake Pipe Retainer

Courtesy of GENERAL MOTORS COMPANY

17. Insert a putty knife or similar tool, between the edge of the shifter bracket on the side of the driveline support assembly and the brake pipe retainer on the wall of the driveline tunnel.

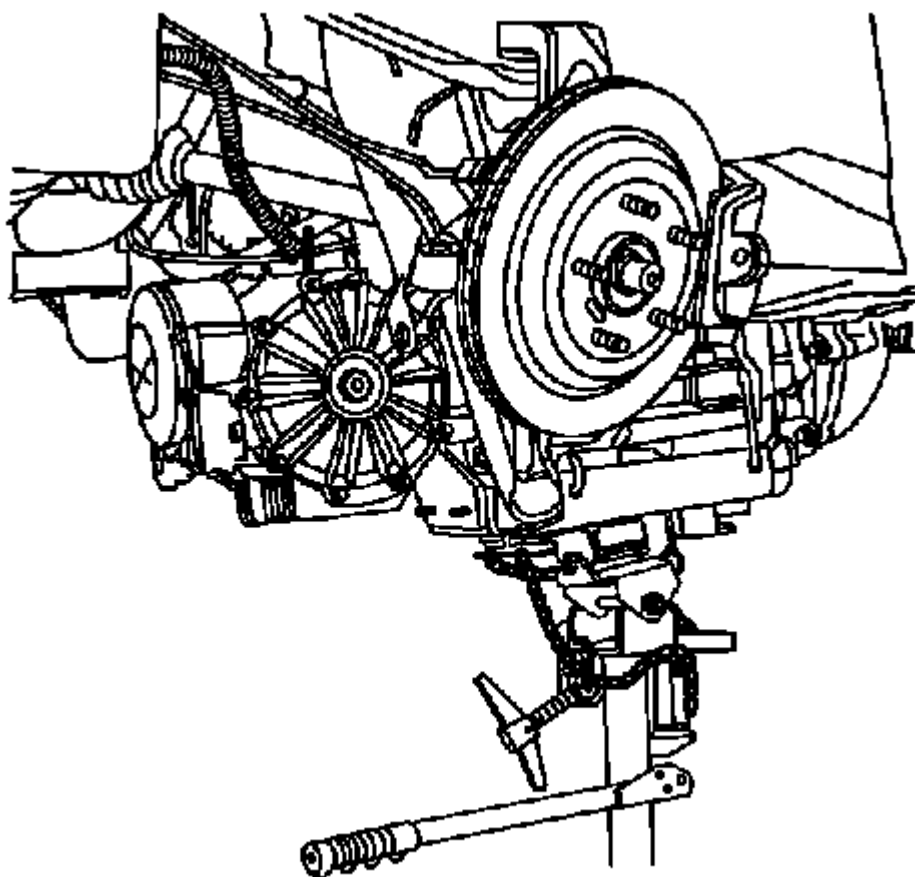


Fig. 42: Wiring Harness To Harness Retainer At Top Of Transmission
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Make sure that the torque tube is flush against the bell housing before installing the bolts. DO NOT use the bolts to draw the parts together, if they are not aligned properly the force of the bolts may push the crankshaft forward and lock the block. This will result in damage to the engine block and the crankshaft as well as damage to the clutch disc.

18. SLOWLY seat the driveline to the engine flywheel housing while maintaining the proper angle of the driveline.
19. Reposition the wiring harness bracket from near the driveline tunnel wall to align with the appropriate driveline support assembly bolt hole.

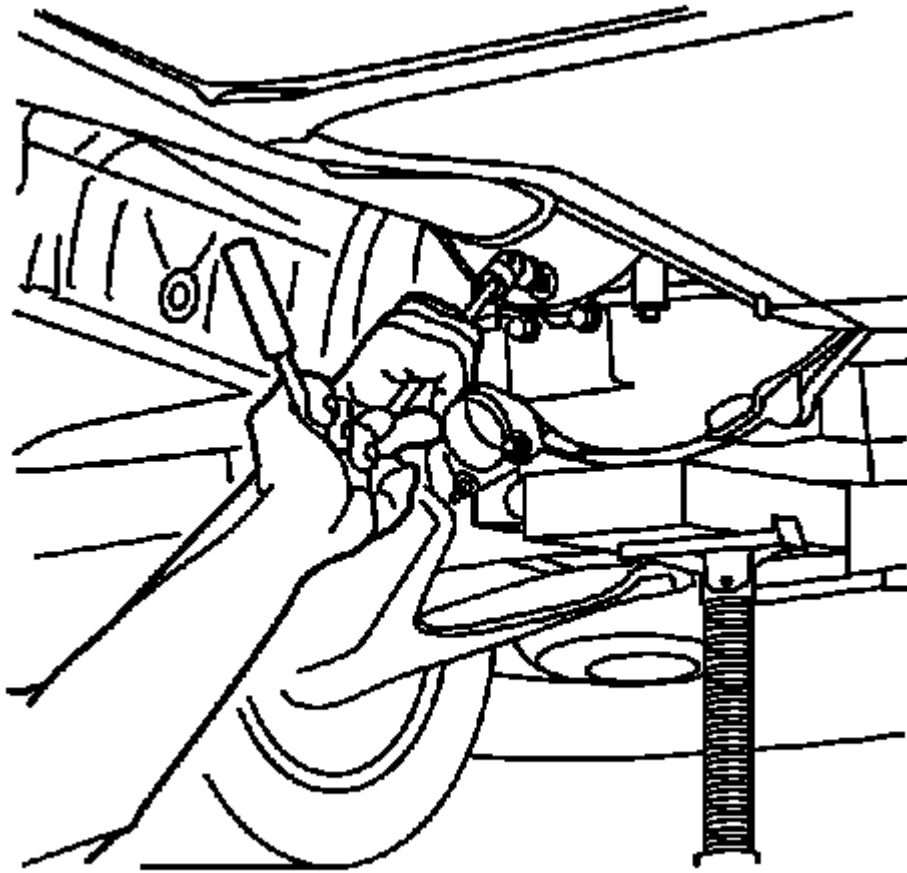


Fig. 43: Driveline Support Assembly To Engine Flywheel Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

20. Install the 5 driveline support assembly to engine flywheel housing bolts.

Tighten

Tighten the driveline support assembly to engine flywheel housing bolts to 65 N.m (48 lb ft).

21. Install the wiring harness to the wiring harness retainer along the top of the transmission.
22. SLOWLY raise the driveline to approximately 51 mm (2 in) BELOW the final installed height.

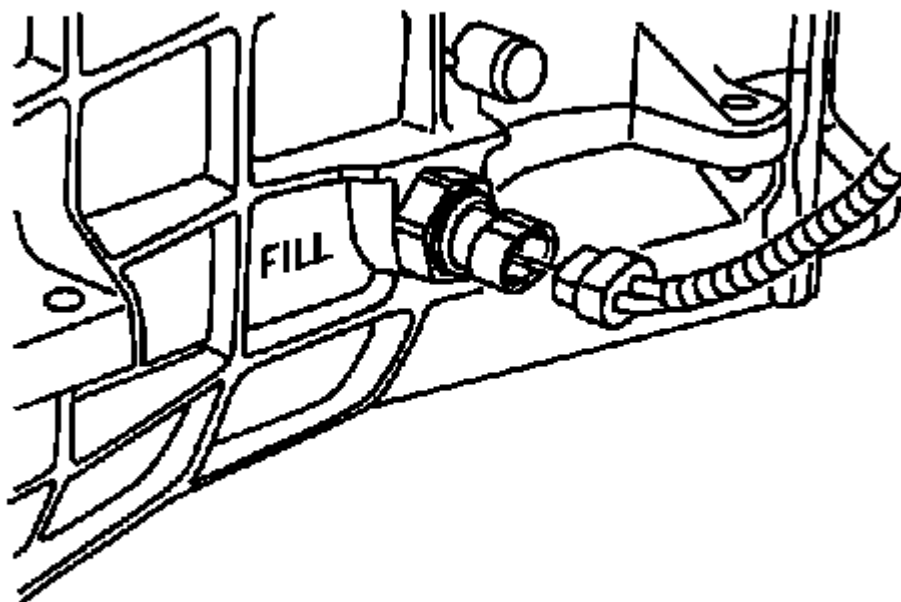


Fig. 44: Transmission Fluid Temperature Sensor Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

23. Connect the transmission fluid temperature sensor electrical connector, if equipped.

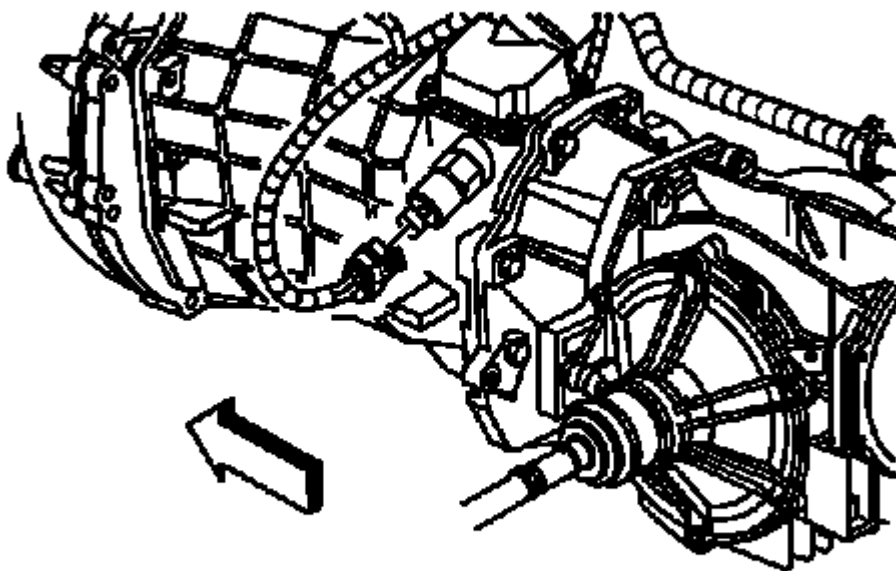


Fig. 45: Gear Select (Skip Shift) Solenoid Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

24. Connect the gear select (skip shift) solenoid electrical connector.

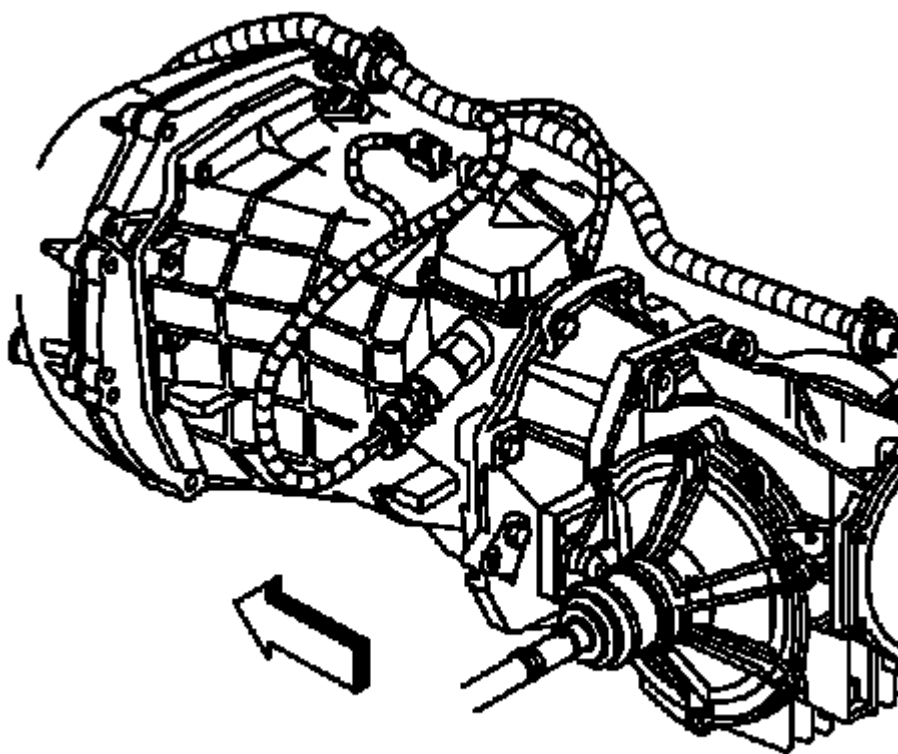


Fig. 46: Reverse Lockout Solenoid Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

25. Connect the reverse lockout solenoid electrical connector.

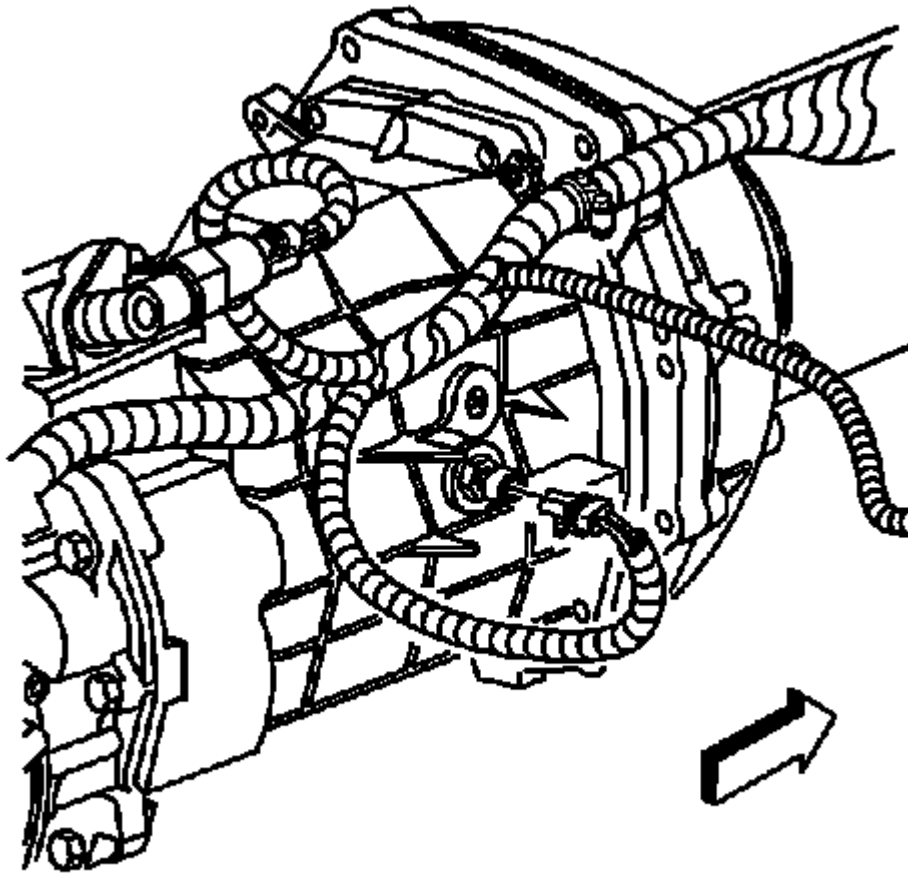


Fig. 47: Backup Lamp Switch Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

26. Connect the backup lamp switch electrical connector.

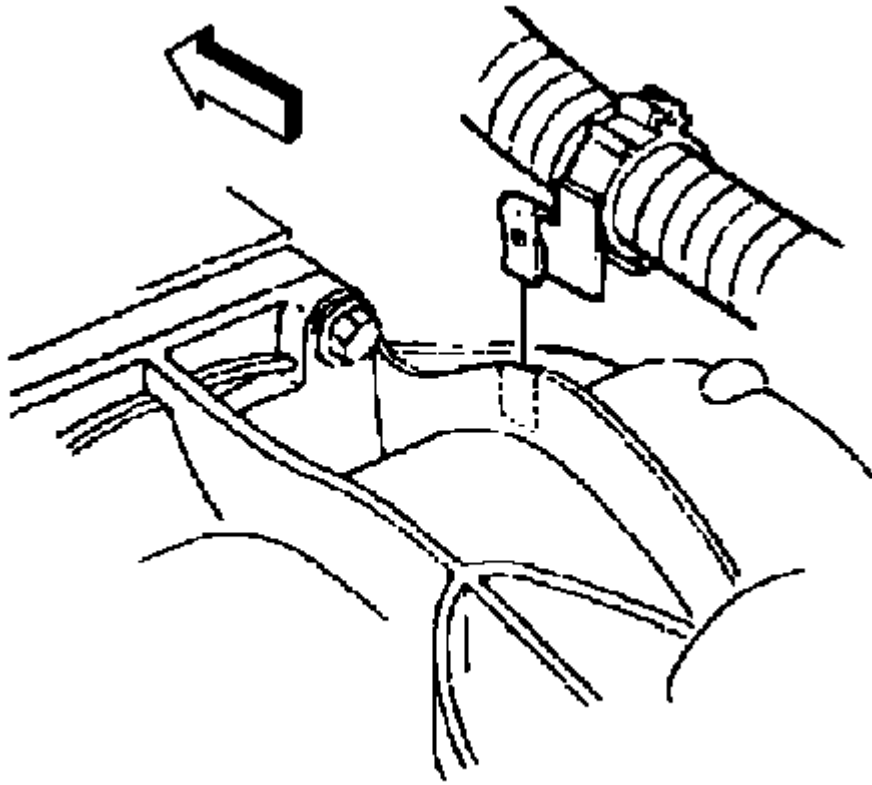


Fig. 48: Wiring Harness Retainer To Stud At Differential Rear Cover
Courtesy of GENERAL MOTORS COMPANY

27. Connect the wiring harness clip to the top of the differential.
28. Connect the wiring harness retainer to the stud at the differential rear cover.

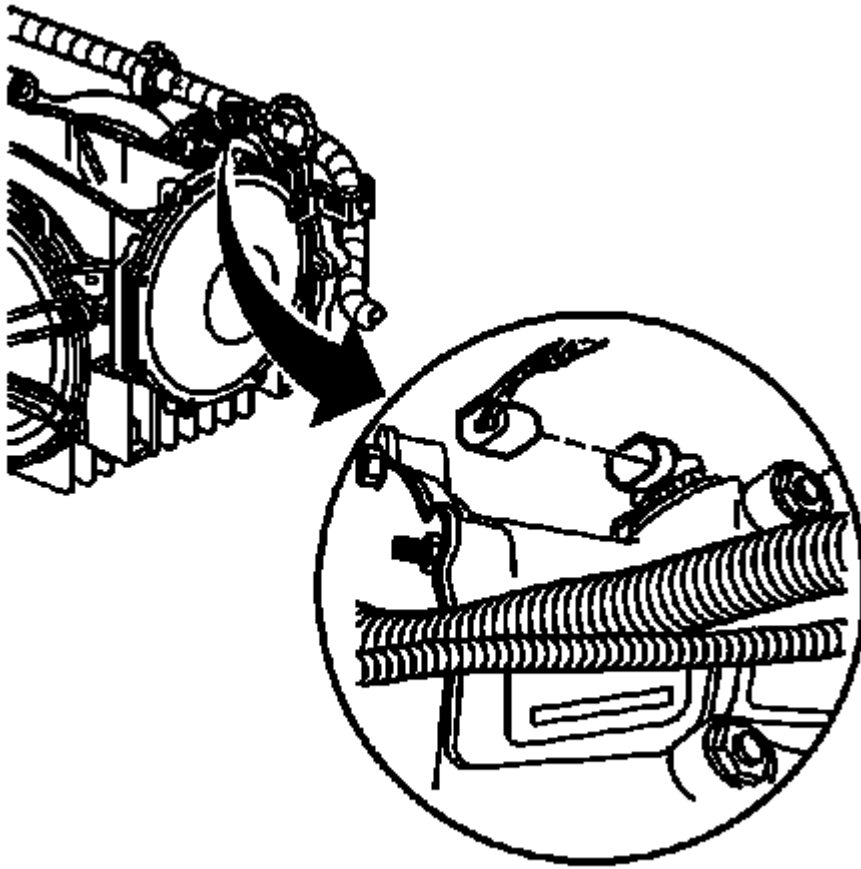


Fig. 49: Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

29. Connect the VSS electrical connector.
30. Slowly raise the driveline to final installation height.
31. Remove the putty knife, if still in position.
32. Remove the jack which supported the rear of the engine.
33. Remove the tie-off retainers from the axle shafts.
34. CAREFULLY align and seat the wheel drive shafts to the differential.

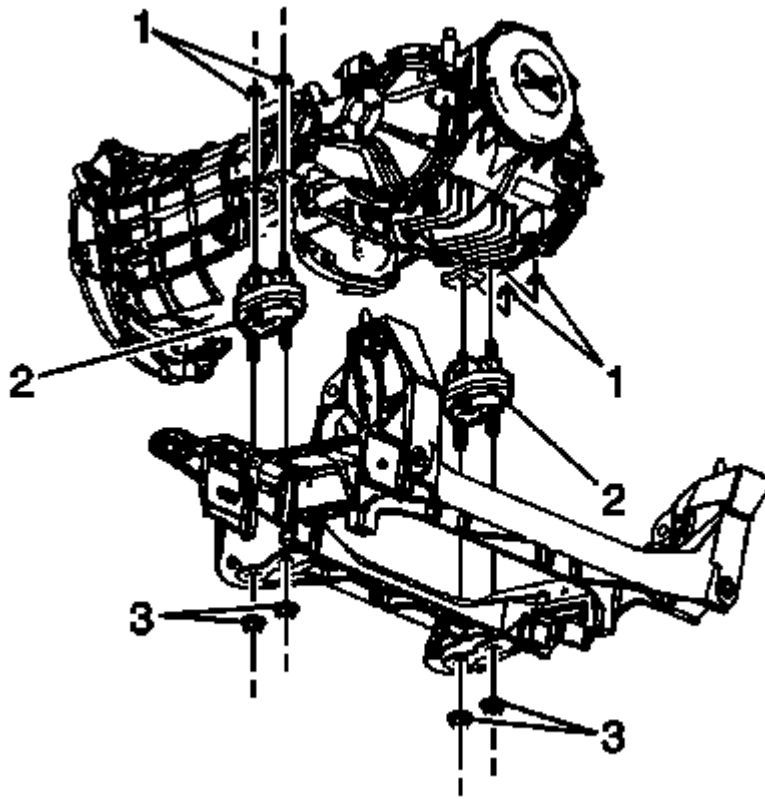


Fig. 50: View Of Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

35. Install the transaxle mount (2) to the differential.
36. Install the transaxle mount nuts (1).

Tighten

Tighten the transaxle mount nuts to 50 N.m (37 lb ft).

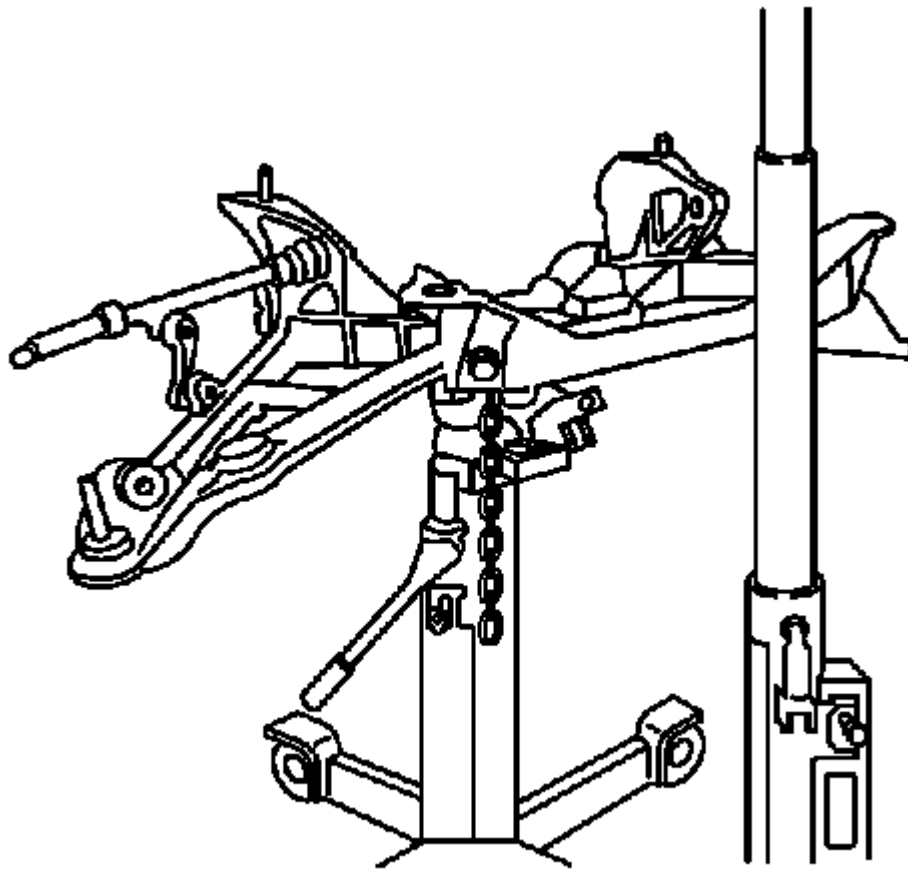


Fig. 51: View Of Rear Suspension Crossmember
Courtesy of GENERAL MOTORS COMPANY

37. With the aid of an assistant, begin to raise the rear suspension crossmember (still firmly attached to a transmission jack), until it contacts the vehicle frame rails.
38. Guide the rear suspension crossmember alignment pins into the alignment holes in the vehicle frame rails and guide the transaxle mount studs into the mounting holes in the crossmember, then raise the crossmember until it contacts the vehicle frame rails.

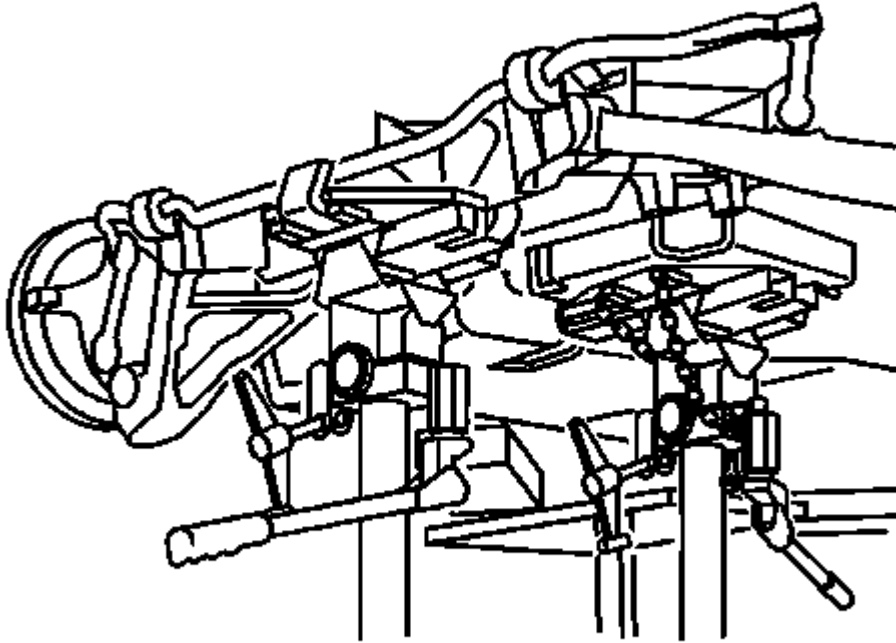


Fig. 52: View Of Correct Transmission Jack Placement
Courtesy of GENERAL MOTORS COMPANY

39. Using ONLY HAND TOOLS, install NEW rear suspension crossmember mounting nuts.

Tighten

Tighten the rear suspension crossmember mounting nuts to 110 N.m (81 lb ft).

40. Remove the transmission jack from the rear suspension crossmember.
41. Release the **J 42055** Transmission Support Fixture from the transmission, then remove the **J 42055** Transmission Support Fixture and transmission jack.

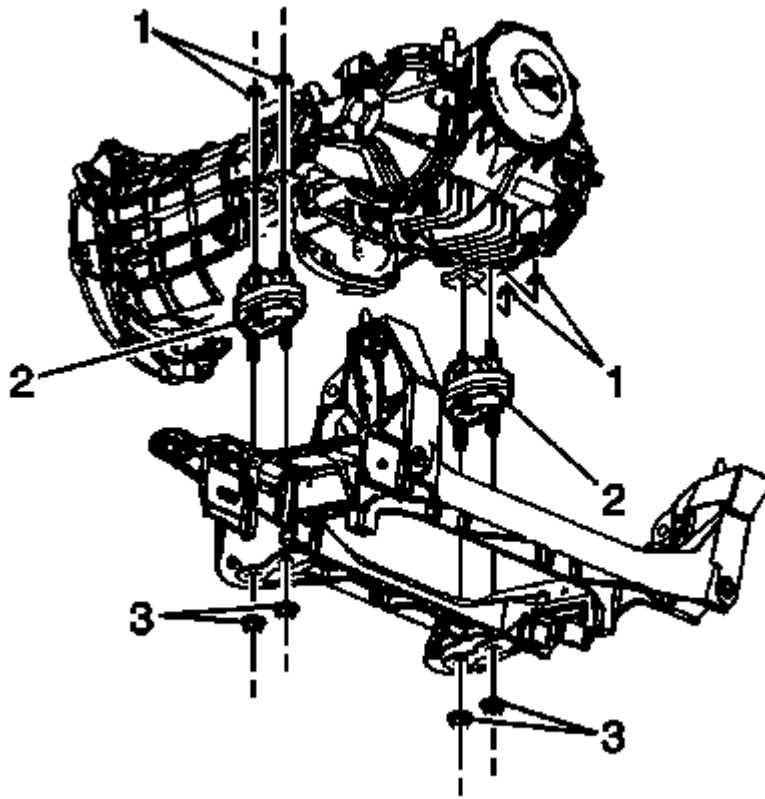


Fig. 53: View Of Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

42. Install the transaxle mount (2) to rear suspension crossmember nuts (3).

Tighten

Tighten the transaxle mount to rear suspension crossmember nuts to 50 N.m (37 lb ft).

43. Connect the wiring harness and brake pipe clip retainers to the rear suspension crossmember.

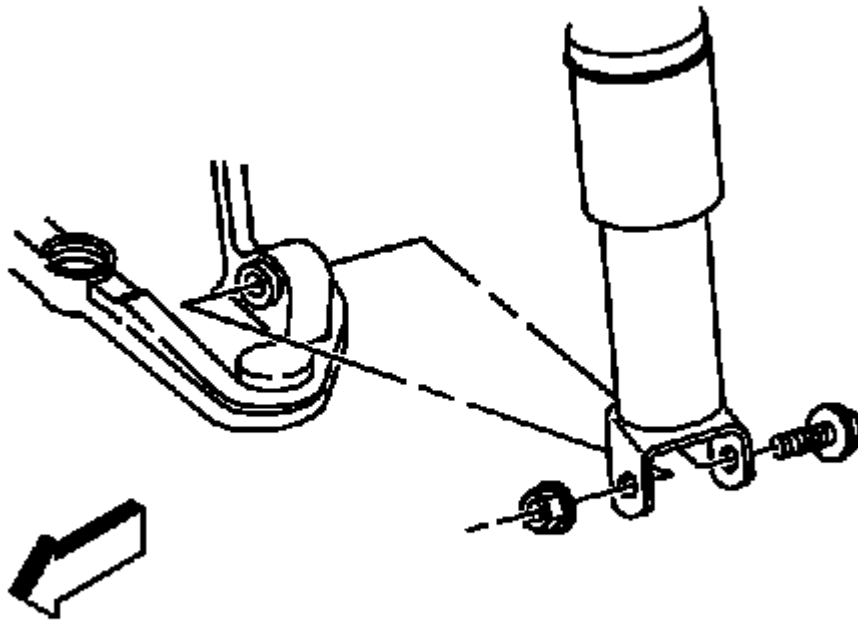


Fig. 54: View Of Shock Absorber Mounting To Control Arm
Courtesy of GENERAL MOTORS COMPANY

44. Support the lower control arm with a straight jack.
45. Connect the lower ball joint to the suspension knuckle. Refer to **Knuckle Replacement (without J55)** , **Knuckle Replacement (with J55)** .
46. Install the shock absorber lower mounting bolt and nut. Refer to **Shock Absorber Replacement (without FE2, FE4)** , **Shock Absorber Replacement (with FE2, FE4)** .
47. Connect the outer tie rod end to the suspension knuckle. Refer to .
48. Remove the straight jack from the suspension control arm.
49. Repeat steps 45 through 49 for the other side of the vehicle.
50. Install the rear transverse spring. Refer to .

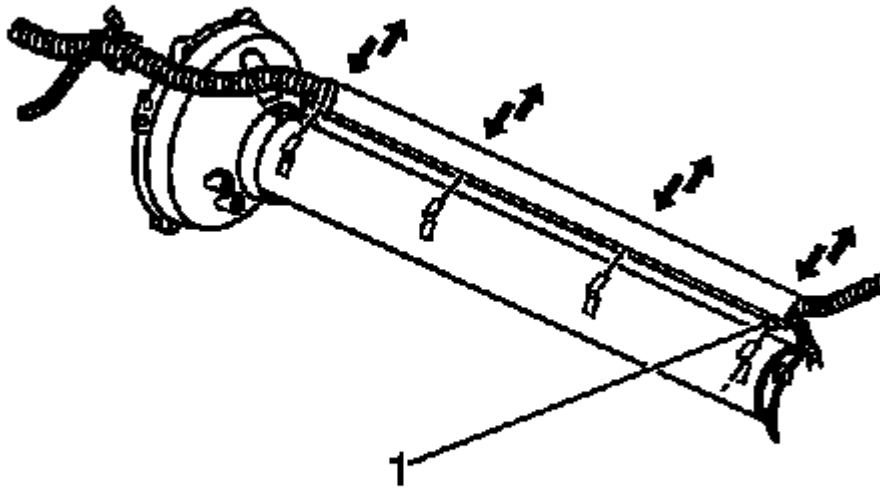


Fig. 55: Wiring Harness To L-Shaped Brackets At Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

51. Carefully pull the wiring harness down into the L-shaped brackets along the driveline support assembly, align the harness retainer (locator) (1) to the hole in the forward bracket, then secure in place.

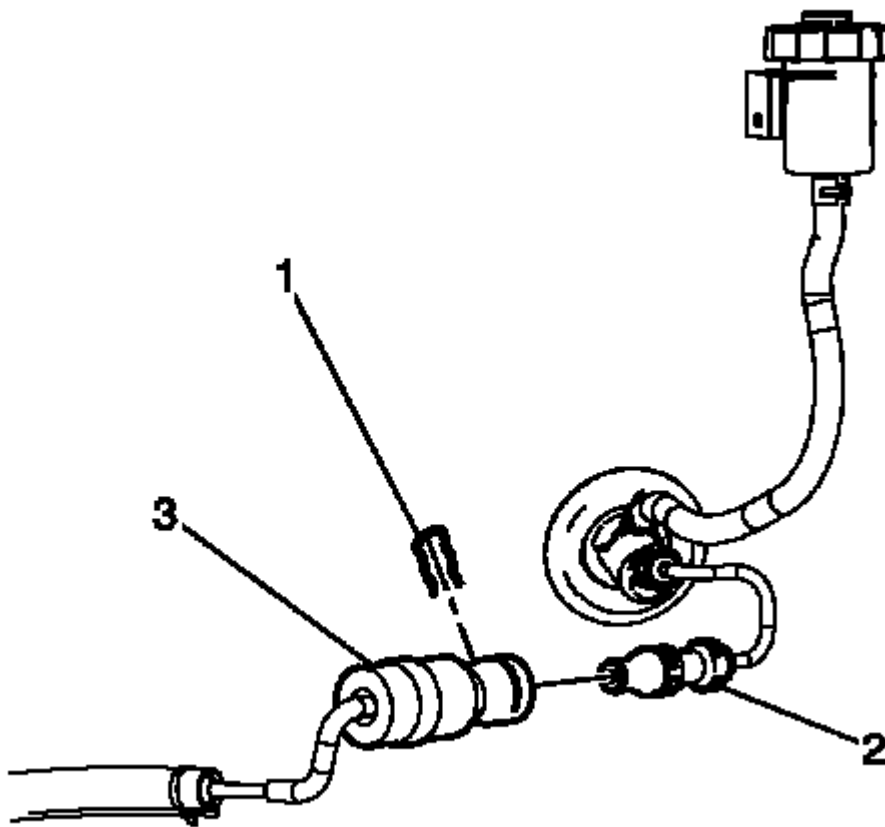


Fig. 56: View Of Clutch Hose, Retaining Clip & Master Cylinder Connection
Courtesy of GENERAL MOTORS COMPANY

52. Install the hose retaining clip (1).

NOTE: DO NOT rely on an audible click or a visual verification of the clutch hydraulic hose quick connect fitting connection.

53. Connect the clutch actuator cylinder hose (3) to the clutch master cylinder hose (2).

Push together the clutch hydraulic hose quick connect fittings, then pull back on the fittings to verify engagement.

54. Inspect the clutch hydraulic hoses for twists or kinks.
55. Install the clutch actuator cylinder hose to the hose retaining clip, below the power brake booster.
56. Install the floor panel tunnel reinforcement. Refer to **Floor Panel Tunnel Panel Reinforcement Replacement** .
57. Install the rear brake line crossover pipe and tighten to 18 N.m (13 lb ft).
58. Bleed the brakes. Refer to **Hydraulic Brake System Bleeding (Manual)** , **Hydraulic Brake**

System Bleeding (Pressure) .

59. Remove the tie-off retainers from the muffler assemblies.
60. Install the catalytic converters. Refer to **Catalytic Converter Replacement - Left Side** and **Catalytic Converter Replacement - Right Side** .
61. Install the rear tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .

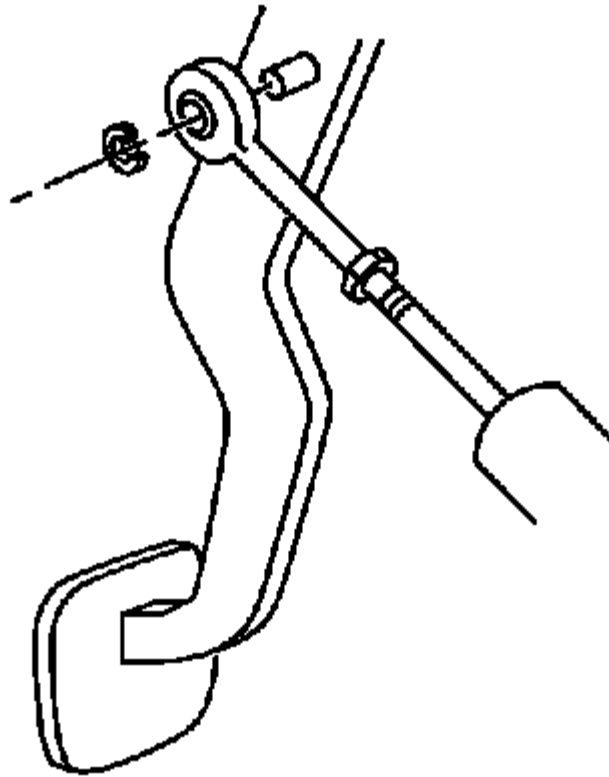


Fig. 57: View Of Master Cylinder Push Rod To Clutch Pedal
Courtesy of GENERAL MOTORS COMPANY

62. Lower the vehicle.
63. Connect the clutch master cylinder pushrod to the clutch pedal.
64. Install the clutch master cylinder pushrod retainer.
65. Install the left I/P lower insulator panel. Refer to .

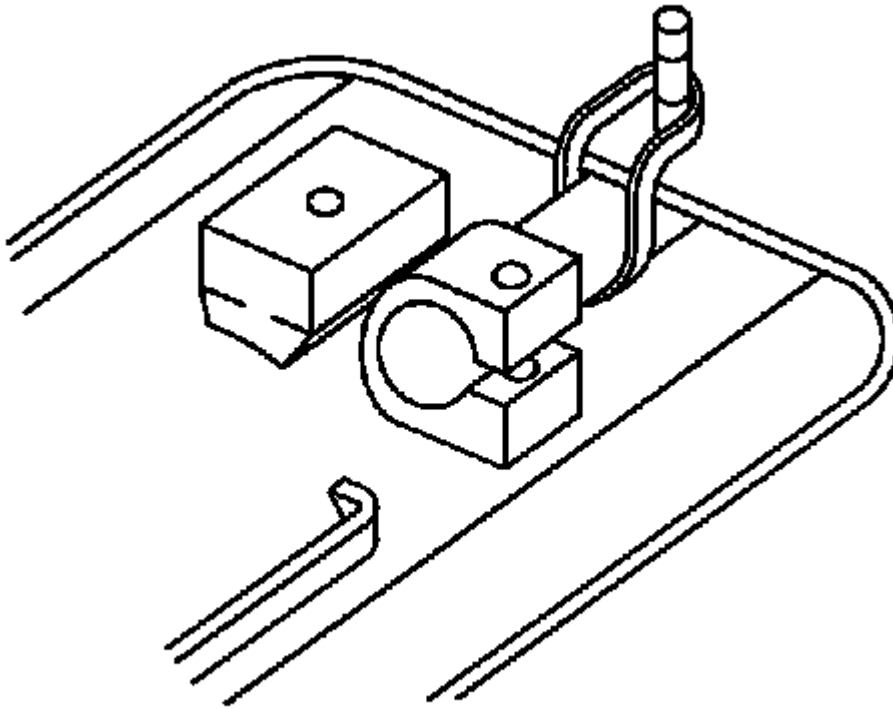


Fig. 58: Transmission Shift Rod At Rear Stud On Top Of Driveline Tunnel To Shift Control
Courtesy of GENERAL MOTORS COMPANY

66. Grasp the transmission shift rod and pull up to break the masking tape installed earlier to maintain position during installation.
67. Stretch the rubber band, while still installed onto the transmission shift rod, over the rear stud on top of the driveline tunnel to aid in shift control installation.
68. Install the shift control assembly. Refer to .
69. Break and remove the rubber band.

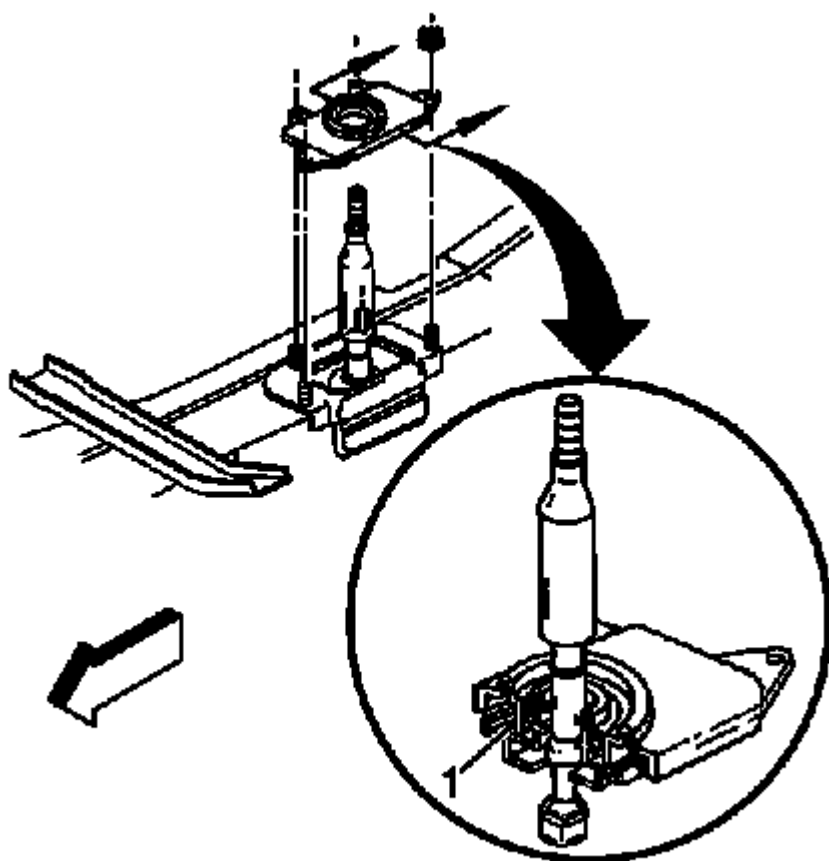


Fig. 59: Shift Control Closeout Boot & Nuts
Courtesy of GENERAL MOTORS COMPANY

70. Install the shift control closeout boot.

Ensure the closeout boot fully seats to the shift control lever seal and the base of the shift control assembly (1).

71. Install the shift control closeout boot retaining nuts.

Tighten

Tighten the shift control closeout boot retaining nuts to 12 N.m (106 lb in).

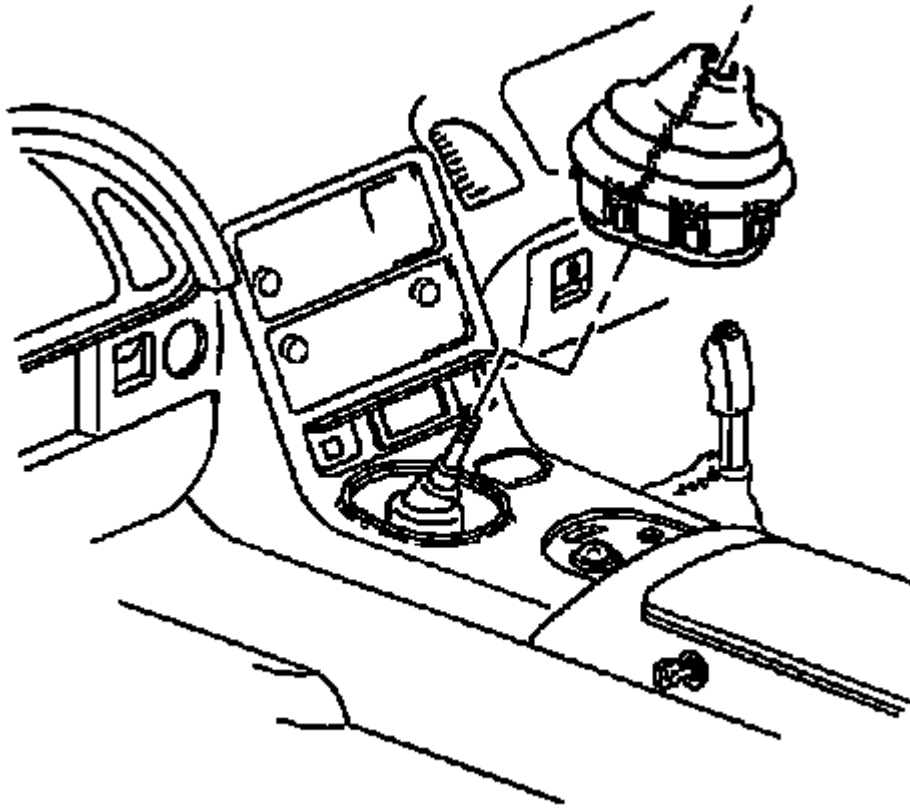


Fig. 60: Shift Control Boot To Shift Control Lever
Courtesy of GENERAL MOTORS COMPANY

72. Install the I/P accessory trim plate. Refer to .
73. Install the shift control boot over the shift control lever.

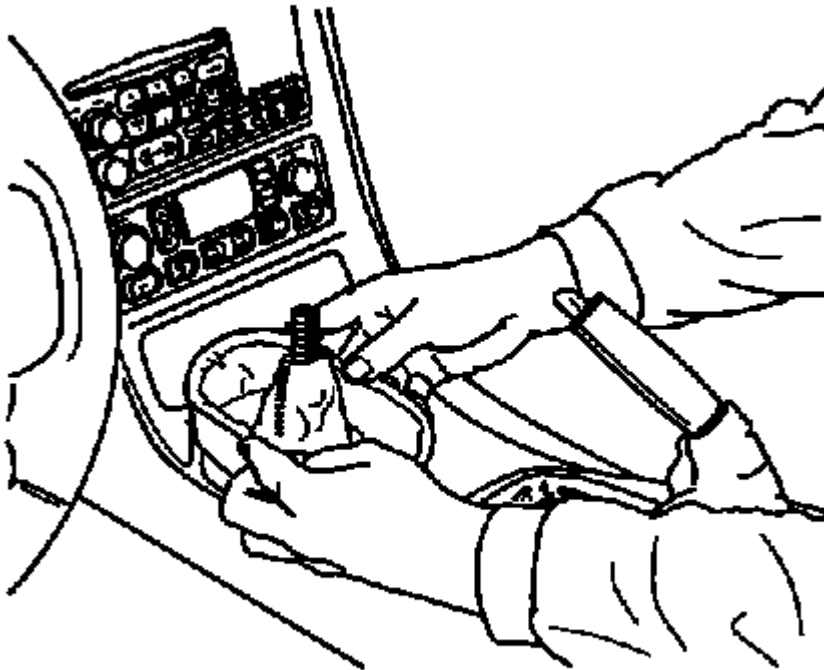


Fig. 61: Shift Control Boot To I/P Accessory Trim Plate
Courtesy of GENERAL MOTORS COMPANY

74. Align the shift control boot to the I/P accessory trim plate opening, then press to lock the boot retaining tabs.
75. Adjust the shape of the boot for appearance, if necessary.

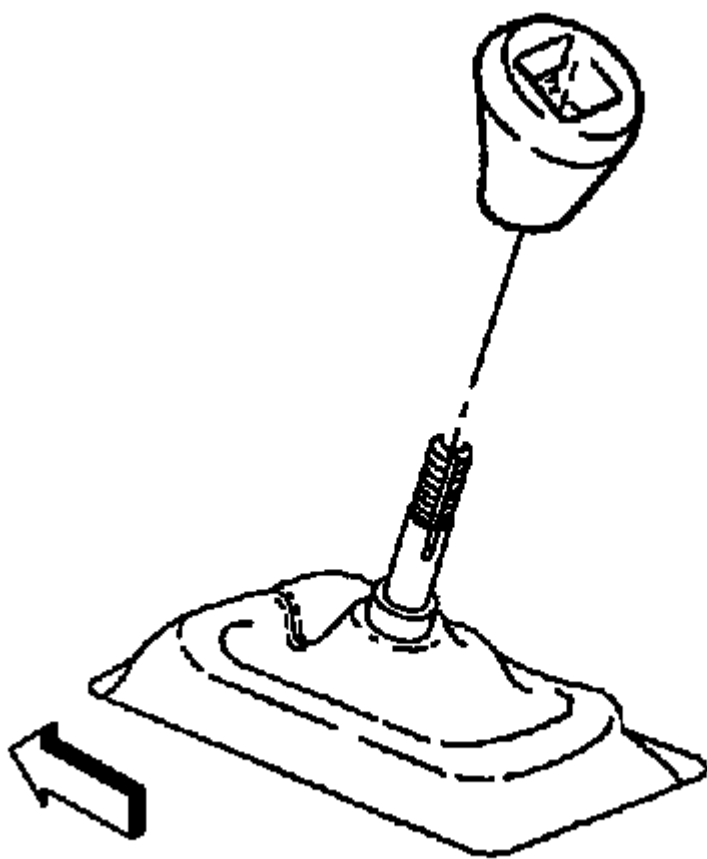


Fig. 62: Removing Gear Shift Knob
Courtesy of GENERAL MOTORS COMPANY

76. Screw the shift control knob onto the shift control lever until the knob bottoms out.

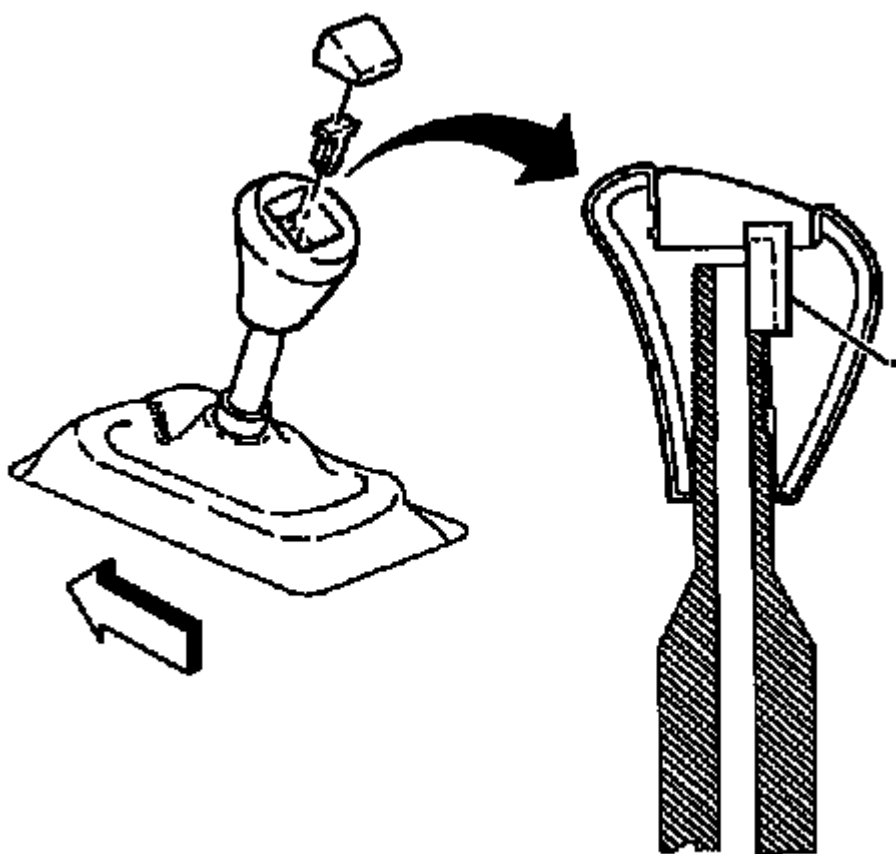


Fig. 63: Shift Control Knob At Shift Control Lever
Courtesy of GENERAL MOTORS COMPANY

77. Unscrew the shift control knob just enough to align the retainer slot with the slot on the shift control lever.
78. Install the shift control knob retainer (1) into the slots and seat fully.
79. Install the shift control knob button.
80. Install the console. Refer to .
81. Connect the negative battery cable.

Tighten

Tighten the negative battery cable bolt to 15 N.m (11 lb ft).

82. Program the transmitters. Refer to **Remote Control Door Lock and Theft Deterrent Transmitter Programming** .
83. Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch System Bleeding** .

DRIVELINE SUPPORT ASSEMBLY REPLACEMENT (WITH AUTOMATIC TRANSMISSION)

Special Tools

- J-42055 Drivetrain Support Fixture
- J-42386-A Flywheel Holding Tool

Removal Procedure

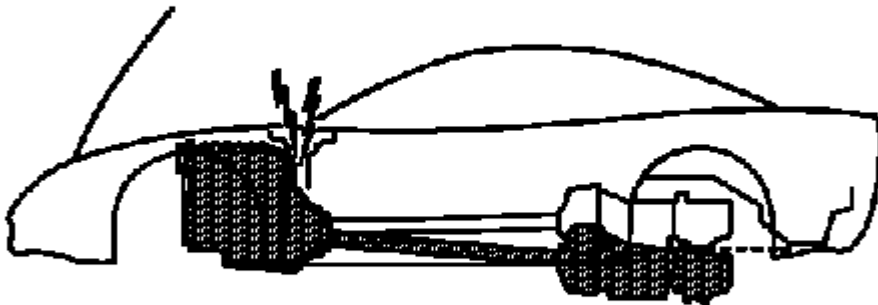


Fig. 64: Tilting Down Rear Of Driveline
Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Battery Disconnect Warning .

CAUTION: Failure to follow the proper removal and installation procedures may result in damage to the engine crankshaft thrust bearing.

CAUTION: When tilting down the rear of the driveline, observe the clearance between the rear of the engine and the composite dash panel. Do not allow the

damage may result.

CAUTION: When lowering and removing the rear of the driveline, observe the clearance between the rear of the transaxle assembly and the underbody to prevent damage.

1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnection and Connection** .
2. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the rear tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
4. Remove the intermediate pipe assembly. Refer to **Intermediate Pipe Replacement** .

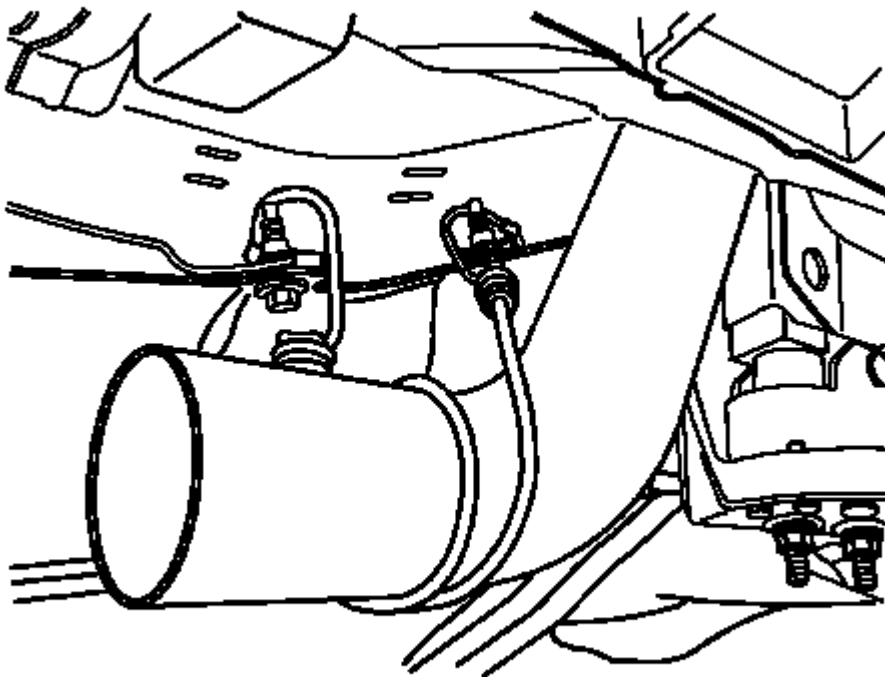


Fig. 65: View Of Tied Off Muffler Assembly
Courtesy of GENERAL MOTORS COMPANY

5. Tie off the left hand muffler assembly to the underbody to support the muffler out of the way.
6. Remove the right hand muffler assembly. Refer to **Exhaust Muffler Replacement - Right Side** .

Reinforcement Replacement

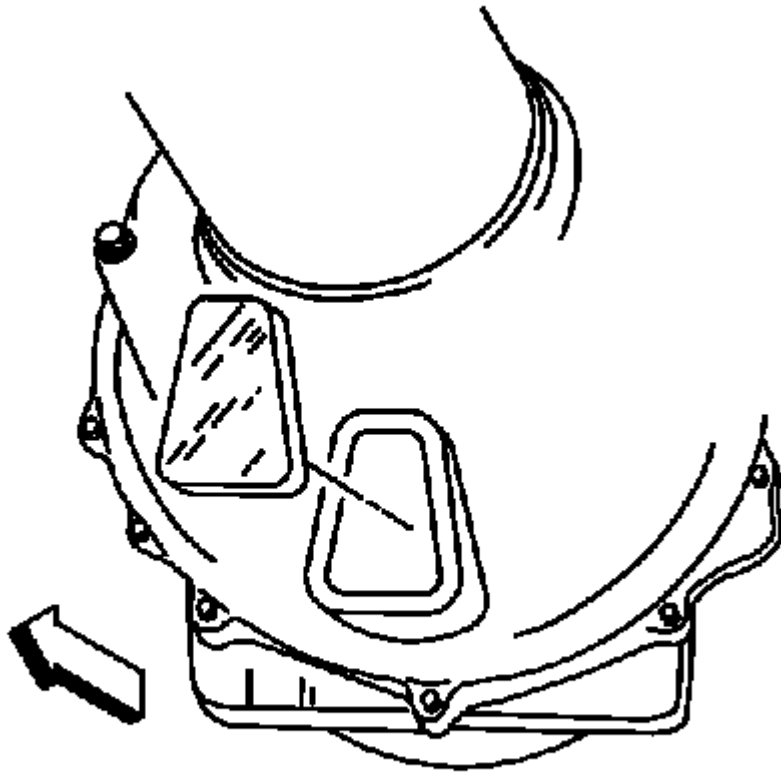


Fig. 66: Rear Bellhousing Access Plug
Courtesy of GENERAL MOTORS COMPANY

8. Using a flat-bladed screwdriver, remove the rear bell housing access plug.

NOTE: The following step must be performed to assure proper torque converter balance during installation.

9. Matchmark the transmission flexplate to the transmission torque converter through the access hole in the rear bellhousing.

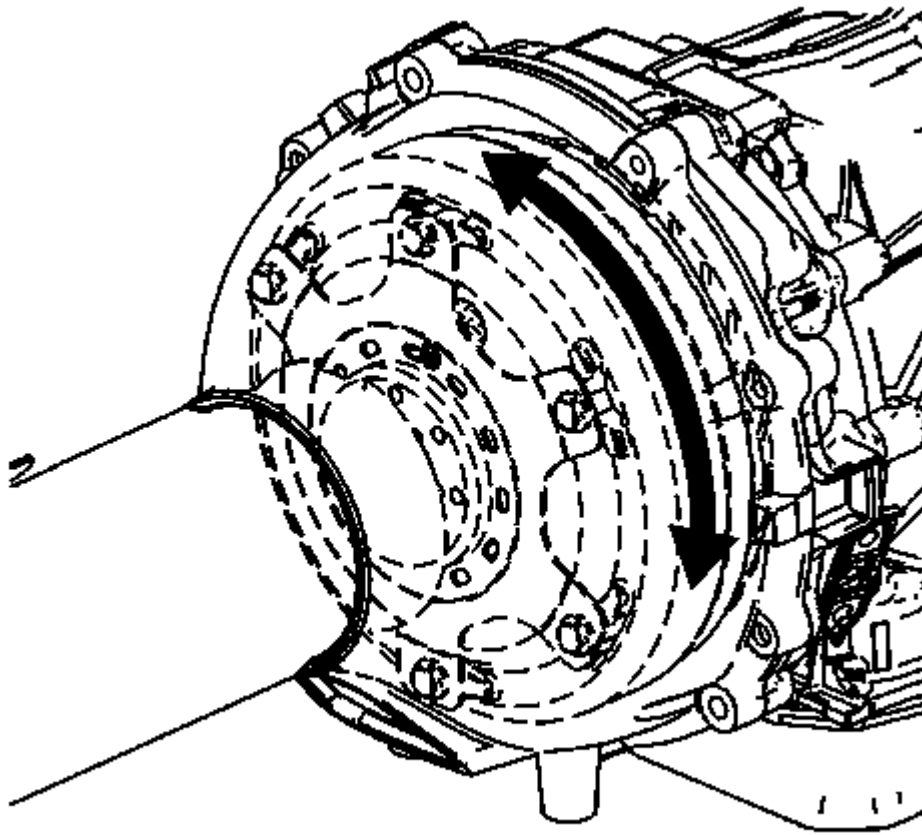


Fig. 67: Turning Engine Flywheel Through Starter Motor Opening
Courtesy of GENERAL MOTORS COMPANY

10. Turn the engine flywheel through the starter motor opening until one of the flexplate to torque converter bolts lines up with the access hole.

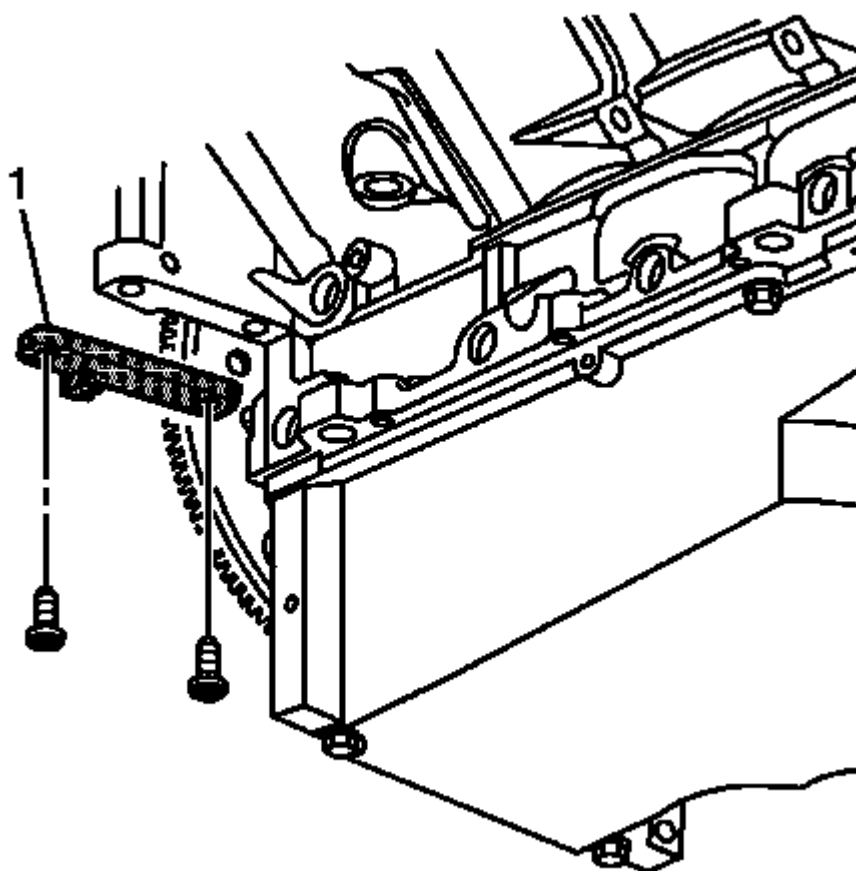


Fig. 68: View Of J 42386-A & Flywheel
Courtesy of GENERAL MOTORS COMPANY

11. Install the **J-42386-A** flywheel holding tool (1) to the engine flywheel, in order to keep the flywheel from turning.

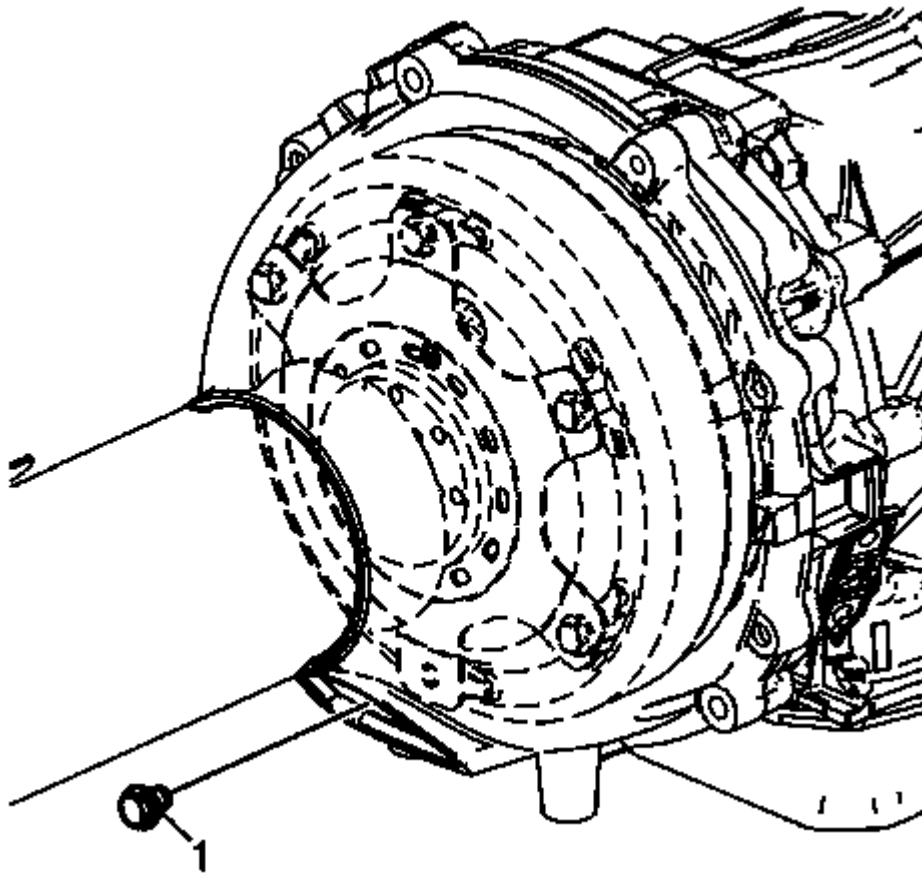


Fig. 69: Flexplate To Torque Converter Bolt
Courtesy of GENERAL MOTORS COMPANY

12. Remove the flexplate to torque converter bolt (1).
13. Remove the **J-42386-A** flywheel holding tool.
14. Repeat steps 7-10 to remove the 5 remaining bolts.

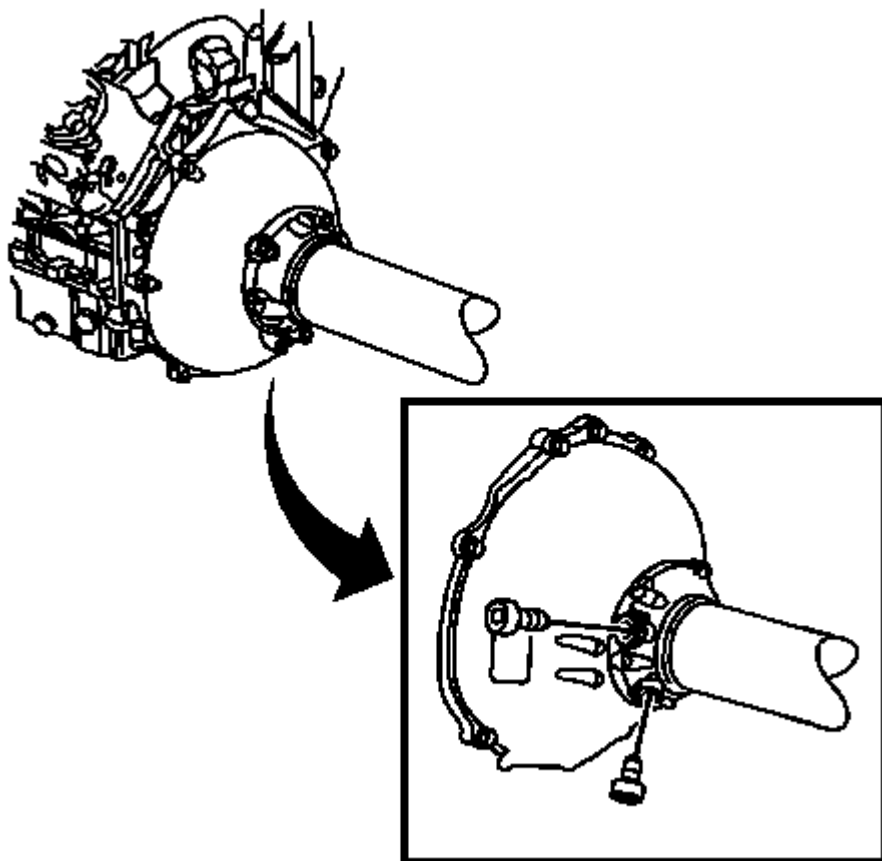


Fig. 70: Identifying Plug Bolts On Front Of Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

15. Remove the two plug bolts from the front of driveline support assembly.

CAUTION: Refer to Fastener Caution .

NOTE:

- The propeller input shaft front bearing positioning bolts are intended to remain torqued to specification and in place UNTIL INSTRUCTED in the installation procedure.
- Failure to use the minimum length fastener specified will prevent proper retention of the propeller input shaft front bearing during disassembly or installation.

16. Install two bolts, M10 - 1.5 X 55 mm or longer, in place of the plug bolts.

The long bolts are located to maintain the propeller input shaft front bearing in original position during removal and installation.

Tighten

Tighten the propeller input shaft front bearing positioning bolts to 35 (26 lb ft).

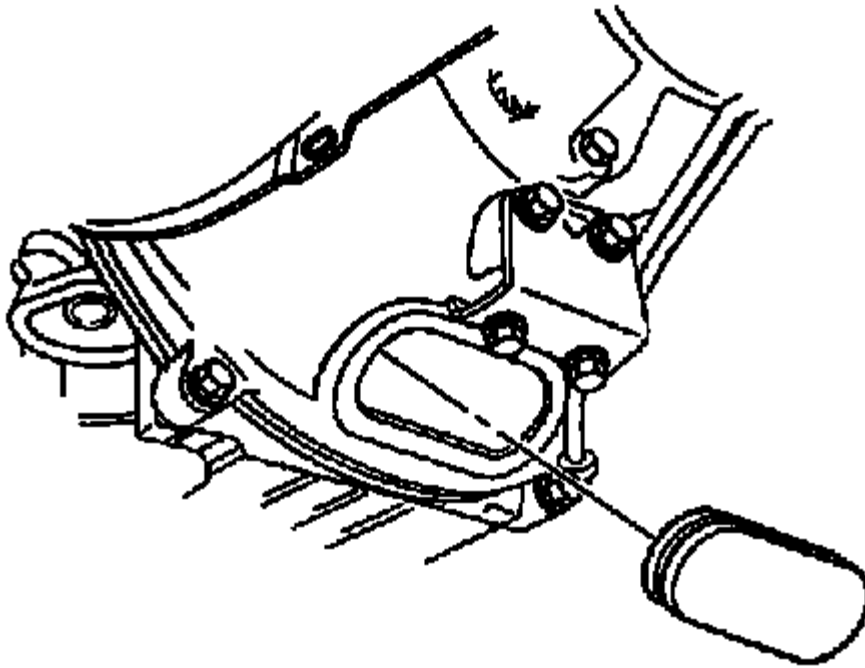


Fig. 71: View Of Engine Flywheel Housing Access Plug
Courtesy of GENERAL MOTORS COMPANY

17. Using a flat-bladed screwdriver, remove the engine flywheel housing access plug.

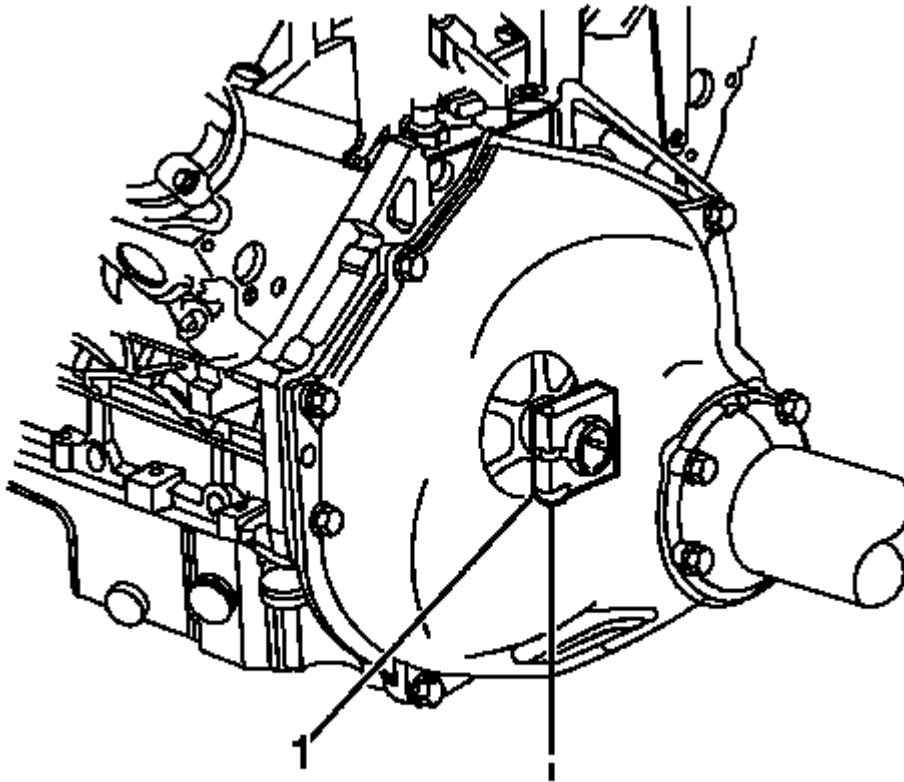


Fig. 72: View Of Propeller Shaft Hub Clamp Bolt
Courtesy of GENERAL MOTORS COMPANY

18. Loosen the propeller shaft hub clamp bolt (1).

Rotate the engine at the flywheel, if necessary for alignment.

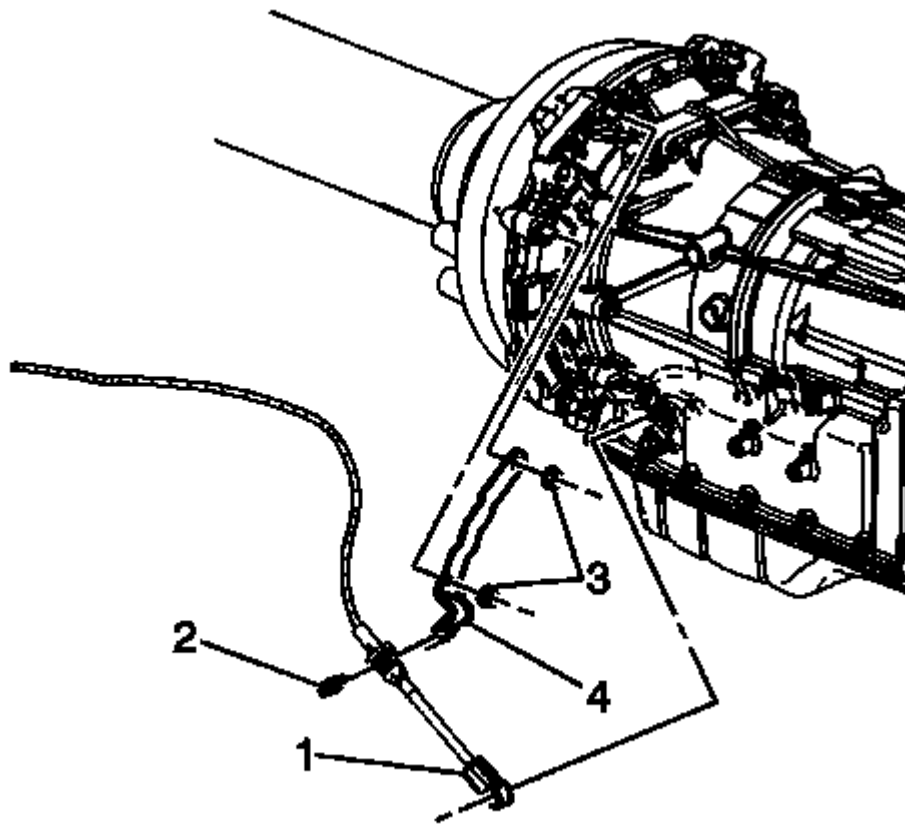


Fig. 73: View Of Transmission Shift Cable Bracket & Retaining Nuts
Courtesy of GENERAL MOTORS COMPANY

19. Remove the nuts (3) retaining the transmission shift cable bracket (4) to the transmission.
20. Disconnect the transmission shift control cable from the transmission shift lever.

Unsnap to release the cable.

21. Position the transmission shift cable (1) and bracket aside.

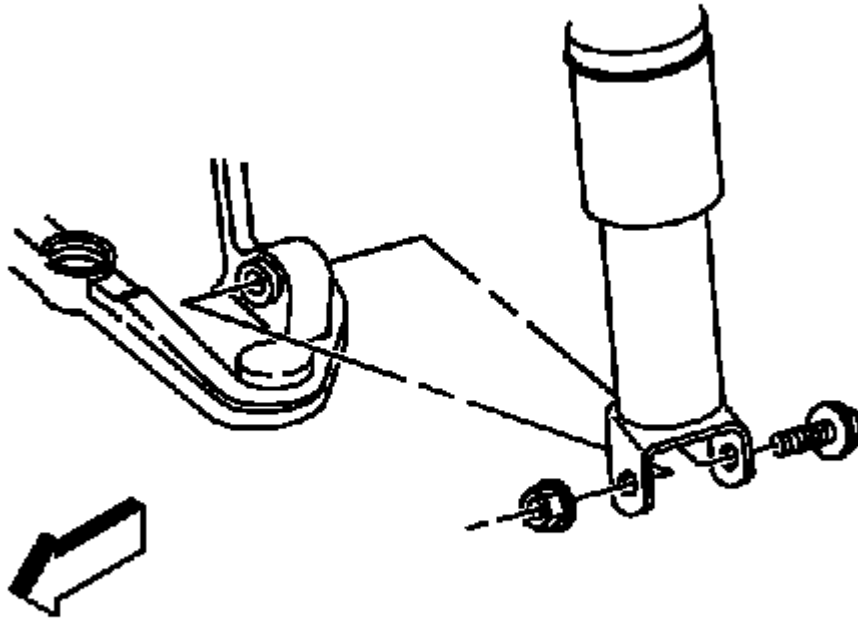


Fig. 74: View Of Shock Absorber Mounting To Control Arm
Courtesy of GENERAL MOTORS COMPANY

22. Remove the rear transverse spring. Refer to **Rear Spring Replacement** .
23. Support the lower control arm with a straight jack.
24. Disconnect the outer tie rod end from the suspension knuckle. Refer to **Adjust Link Replacement** .
25. Remove the shock absorber lower mounting bolt.
26. Disconnect the lower ball joint from the suspension knuckle. Refer to **Knuckle Replacement (without J55)** , **Knuckle Replacement (with J55)** .
27. Remove the straight jack from the control arm.
28. Repeat steps 21-25 for the other side of the vehicle.

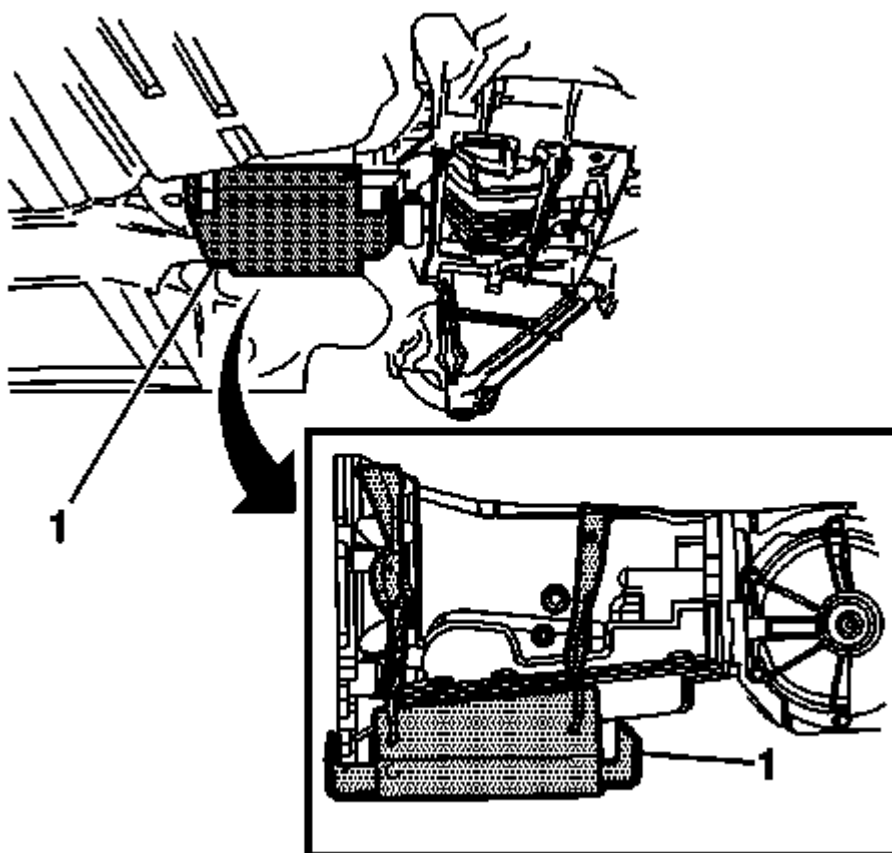


Fig. 75: View Of J 42055 On Transmission
Courtesy of GENERAL MOTORS COMPANY

29. Assemble the **J-42055** drivetrain support fixture.
30. Install the **J-42055** drivetrain support fixture to a transmission jack.
31. Position and firmly secure the **J-42055** drivetrain support fixture (1) with the transmission jack to the transmission.
32. Disconnect the wiring harness and brake pipe clip retainers from the rear suspension crossmember.
33. Remove the differential to transmission lower nut.

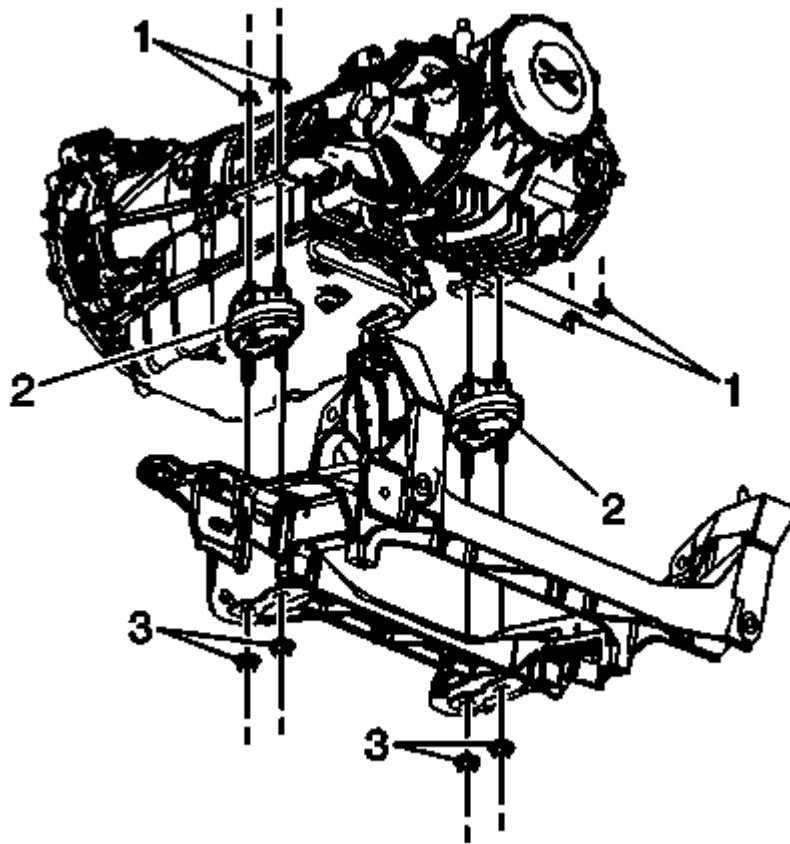


Fig. 76: Locating Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

34. Remove the transaxle mount to rear crossmember nuts (3).

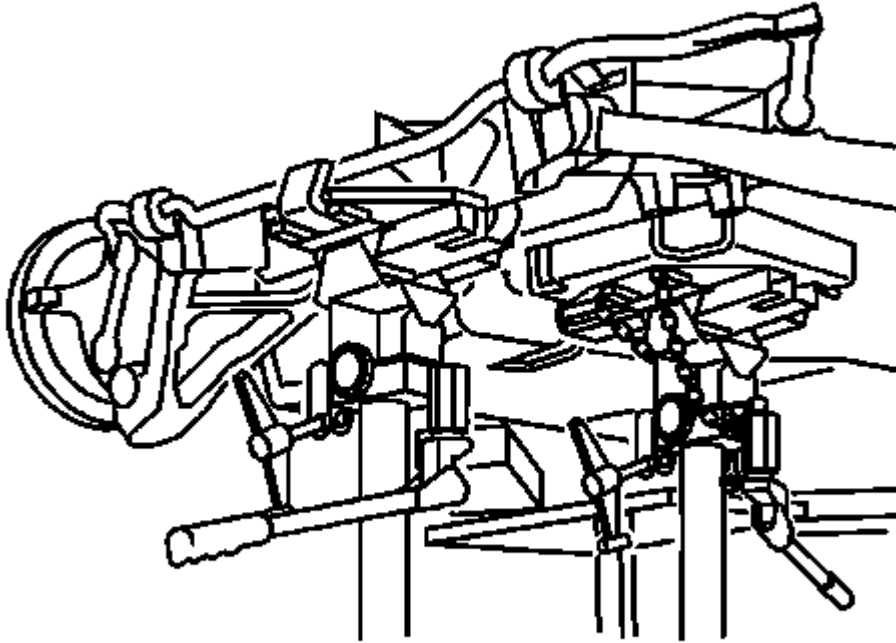


Fig. 77: View Of Correct Transmission Jack Placement
Courtesy of GENERAL MOTORS COMPANY

35. Position a transmission jack under the rear suspension crossmember and firmly secure the crossmember to the jack.
36. Using ONLY HAND TOOLS, remove the rear suspension crossmember retaining nuts.

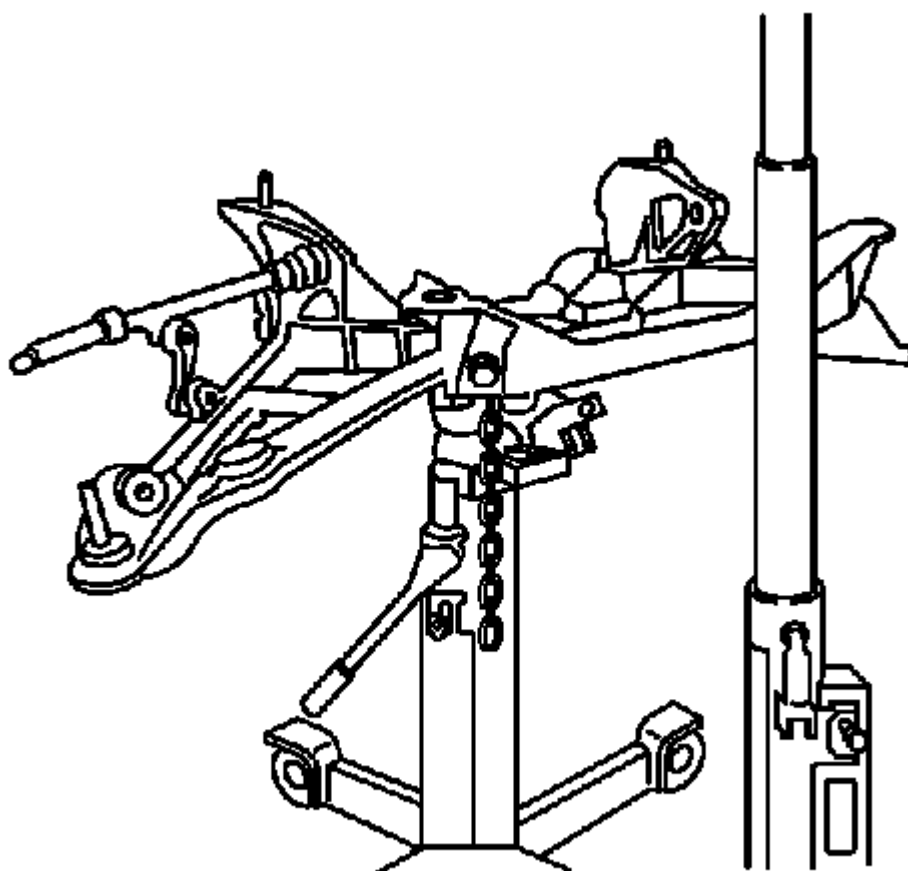


Fig. 78: View Of Rear Suspension Crossmember
Courtesy of GENERAL MOTORS COMPANY

37. With the aid of an assistant, slowly lower the rear suspension crossmember away from the vehicle frame rails and remove the crossmember.

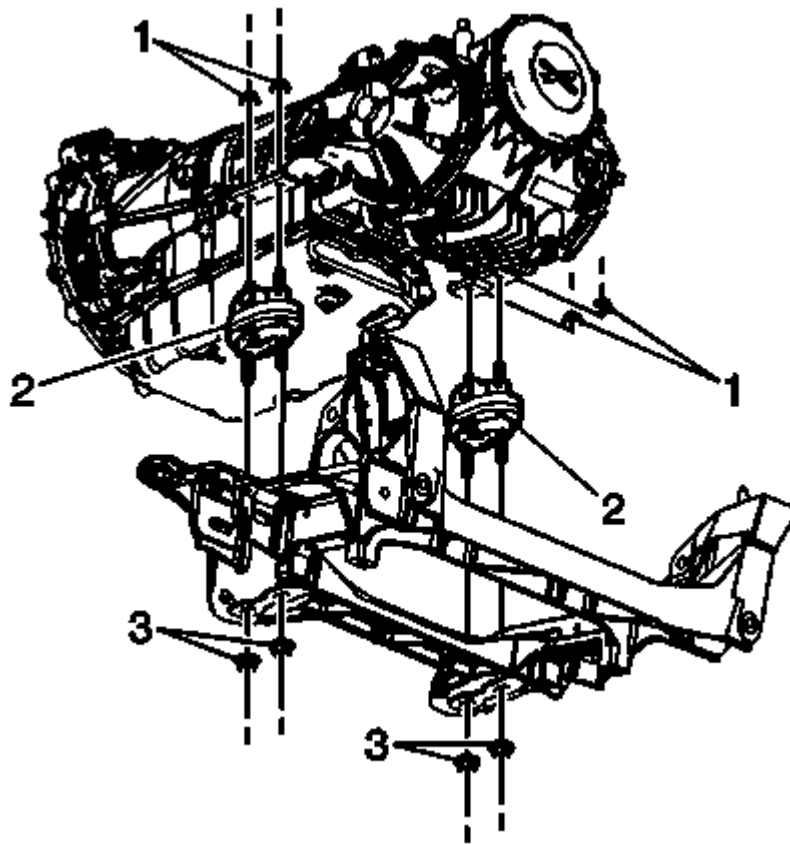


Fig. 79: Locating Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

38. Remove the transaxle mount bracket to differential nuts (1).
39. Remove the transaxle mount (2).
40. Using a pry bar, CAREFULLY release the axle shafts from the differential.
41. Tie off the axle shafts to the underbody to support the shafts out of the way.

The LH muffler assembly pipe toward the rear offers a good location to help support the LH axle shaft.

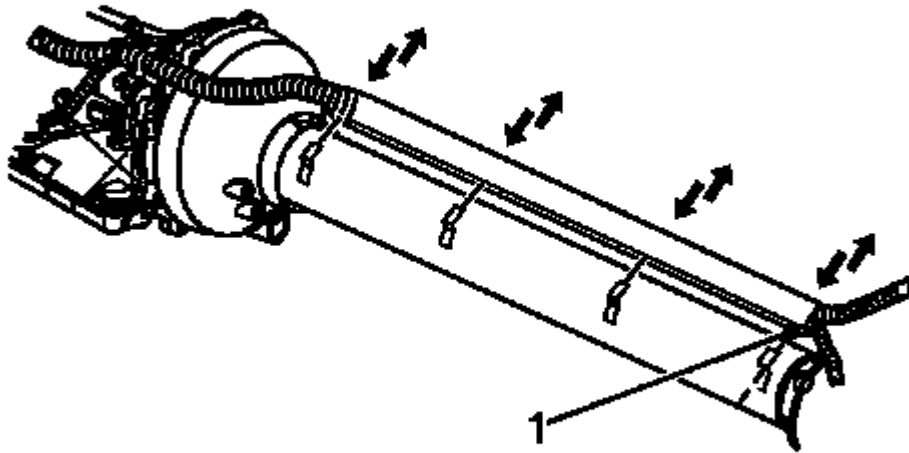


Fig. 80: View Of Wiring Harness Retainer
Courtesy of GENERAL MOTORS COMPANY

42. Release the retainer (1) securing (and positioning) the wiring harness to the L-shaped brackets along the driveline support assembly, then slide the harness up out of the brackets and position out of the way.

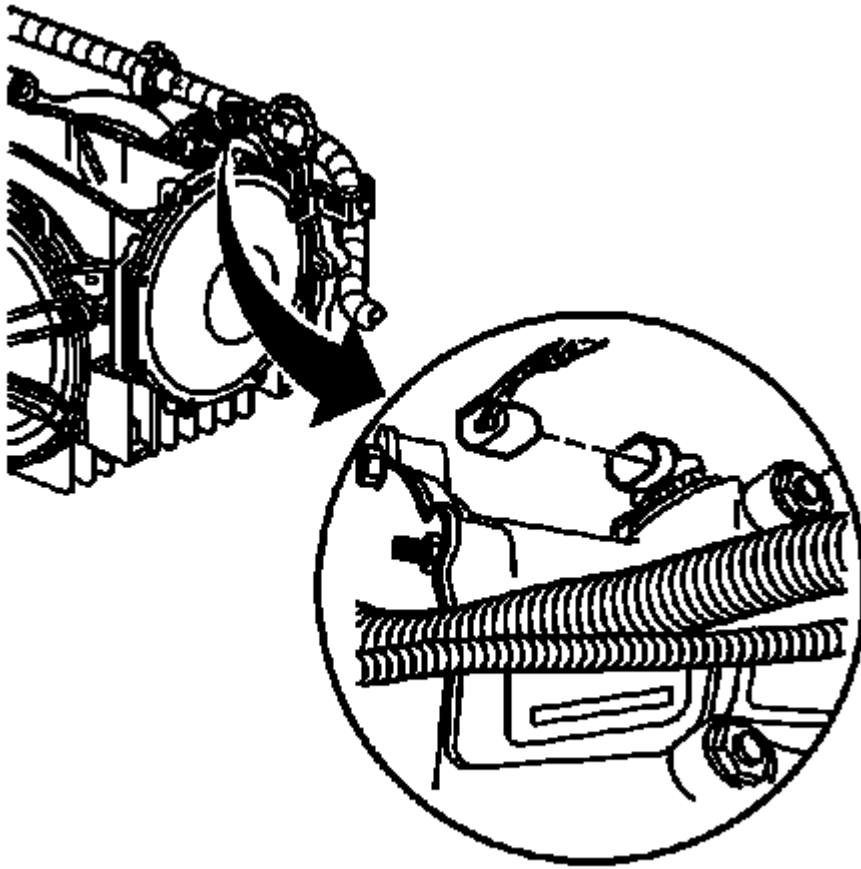


Fig. 81: Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

43. SLOWLY lower the driveline approximately 5 cm (2 in), while simultaneously adjusting the angle of tilt, in order to access the electrical connectors.
44. Disconnect the vehicle speed sensor (VSS) electrical connector.

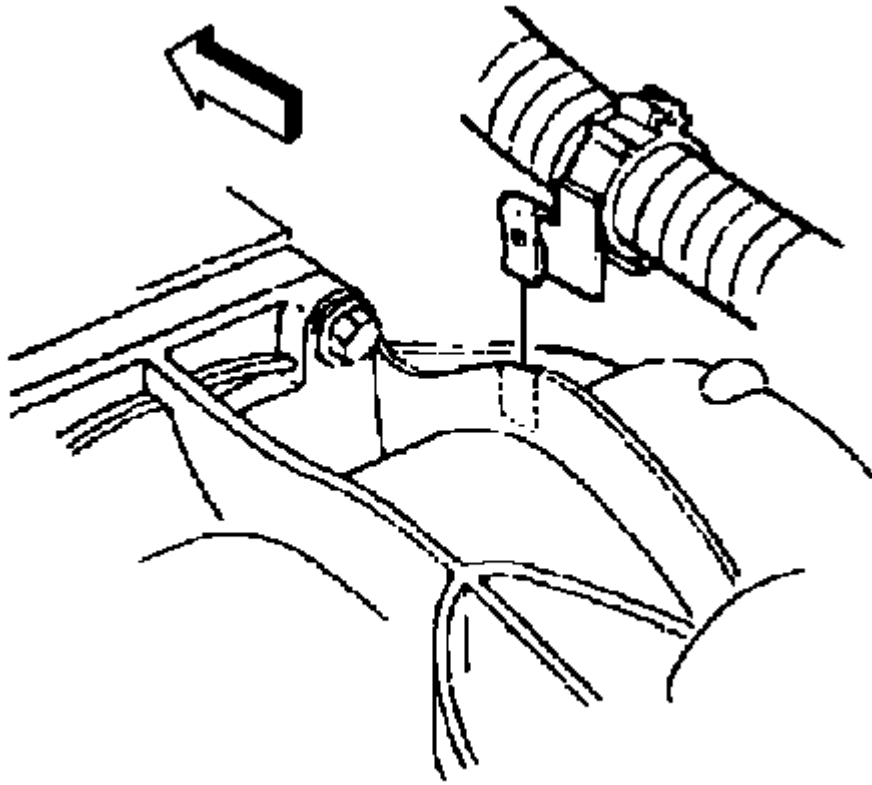


Fig. 82: Wiring Harness Retainer To Stud At Differential Rear Cover
Courtesy of GENERAL MOTORS COMPANY

45. Disconnect the wiring harness retainer from the stud at the differential rear cover.
46. Disconnect the wiring harness retainer clip from the top of the differential.

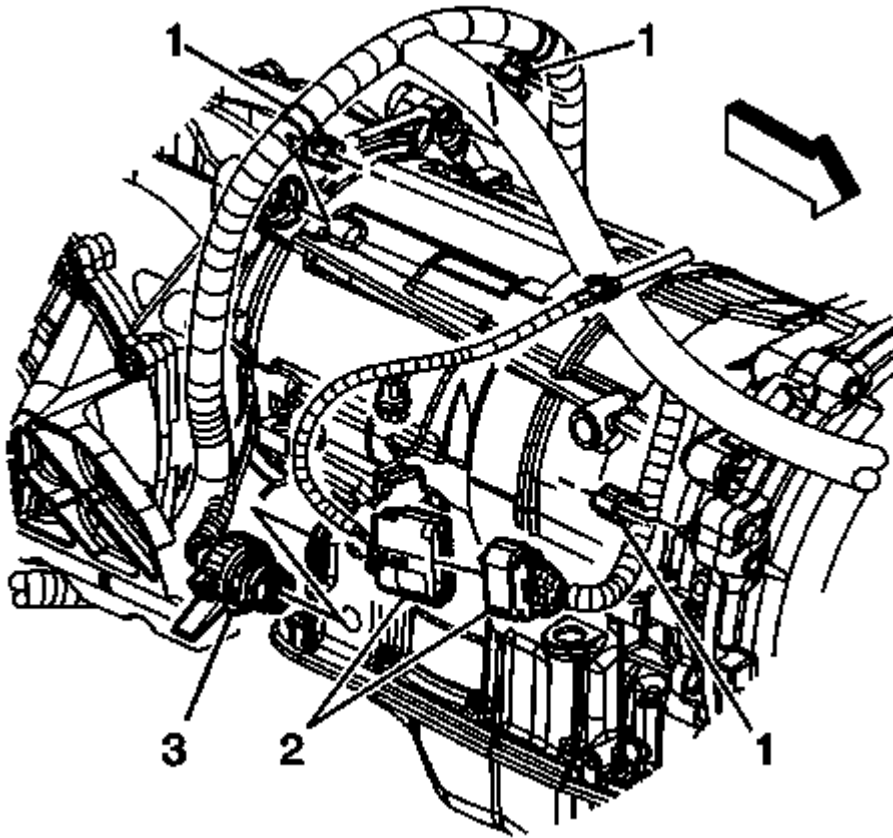


Fig. 83: View Of Transmission Harness 20-Way Connector
Courtesy of GENERAL MOTORS COMPANY

47. Disconnect the transmission harness 20-way connector (3).

Depress both tabs on the connector and pull straight up; do not pry the connector.

48. Remove the bolt retaining the transmission wiring harness to the LH side of the transmission case.

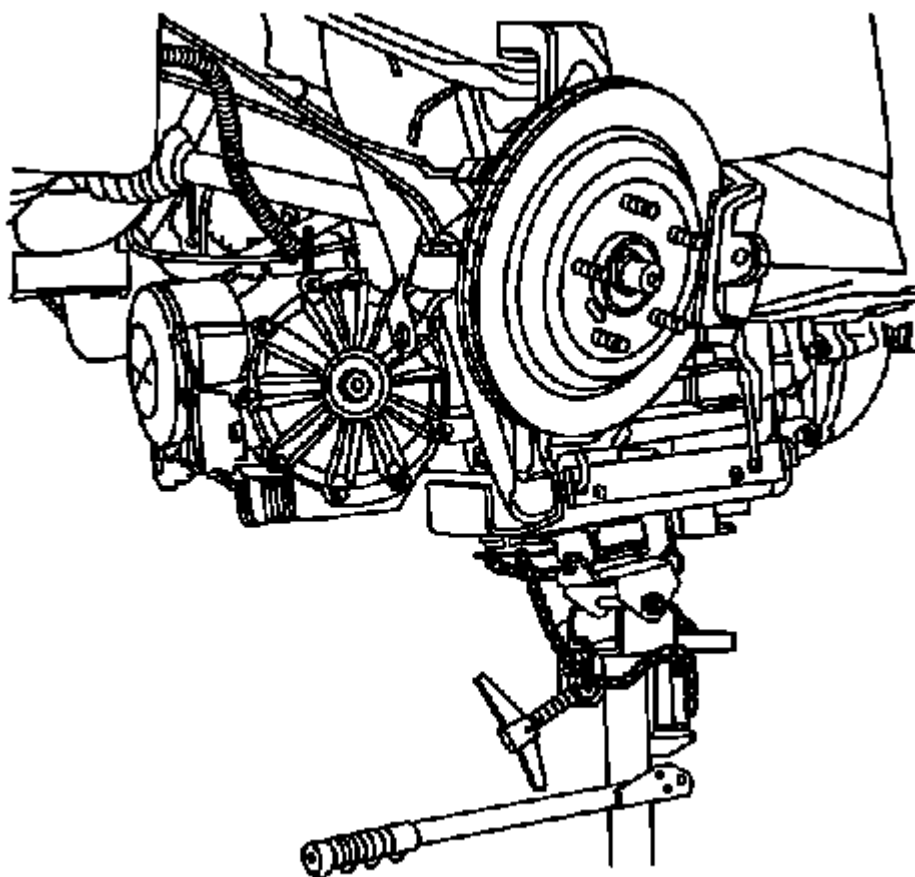


Fig. 84: View Of Wiring Harness & Top Of Transmission
Courtesy of GENERAL MOTORS COMPANY

49. SLOWLY lower the driveline, while simultaneously adjusting the angle of tilt and observe the relationship between the top rear of the differential and the lowest part of the rear compartment panel floor (the center storage compartment between the frame rails). The differential should not be lowered more than approximately EVEN with the specified body point of reference.

The engine positive crankcase ventilation (PCV) pipes which route along the rear of the engine intake manifold will likely contact the dash panel.

50. Release the wiring harness from the harness retainer along the top of the transmission.
51. Check to be sure that the wiring harness is free from the driveline being removed.

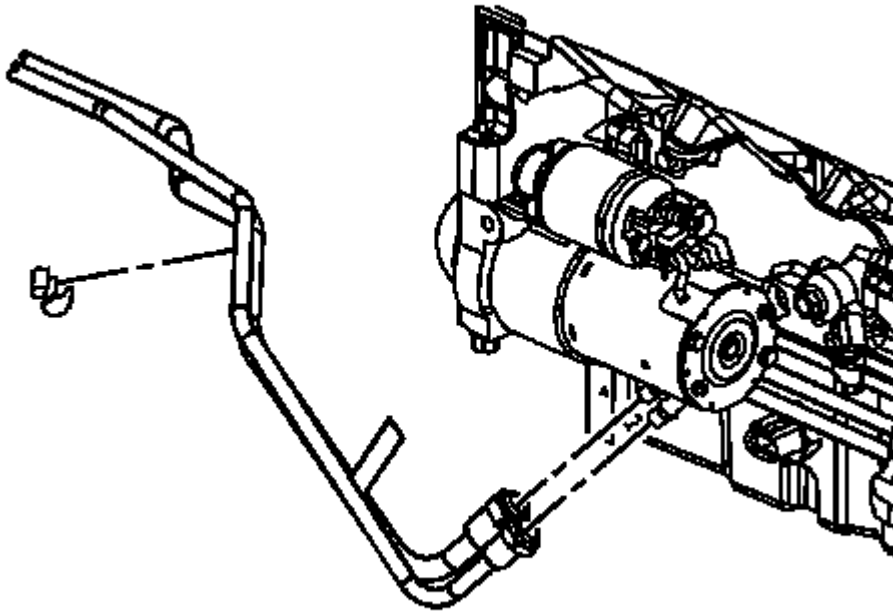


Fig. 85: Upper & Lower Transmission Oil Cooler Lines At Intermediate Lines
Courtesy of GENERAL MOTORS COMPANY

52. Disconnect the transmission oil cooler rear pipes from the junction fittings at the engine flywheel housing, then cap the pipes and plug the junction fittings to prevent contamination. Refer to **Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection** .

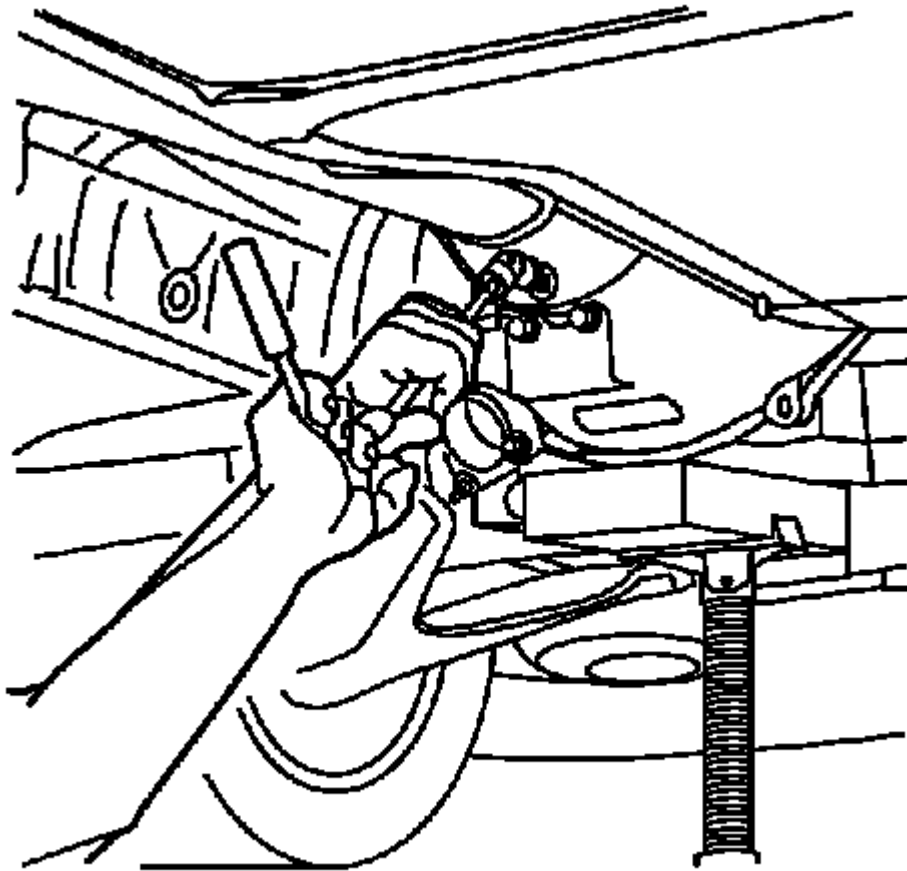


Fig. 86: Removing/Installing Driveline Support Assembly To Engine Flywheel Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

53. Using a block of wood to protect the engine oil pan, place a straight jack under the rear of the engine oil pan to support the engine from stressing the composite dash panel.
54. Remove the five driveline support assembly to engine flywheel housing bolts.

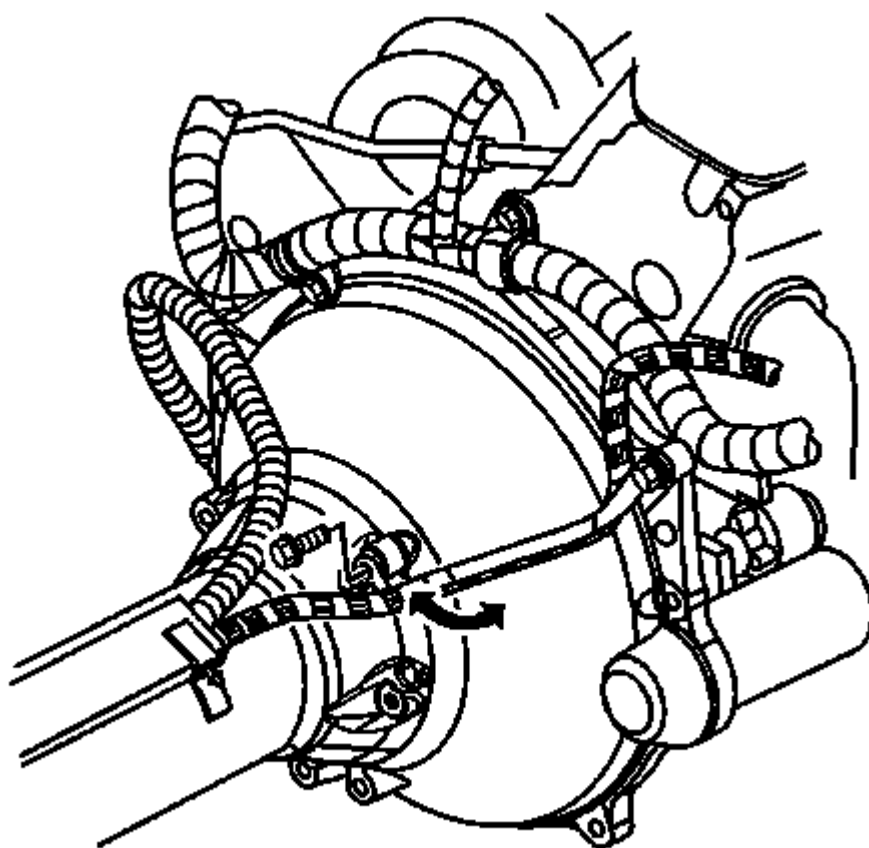


Fig. 87: Repositioning Wiring Harness Bracket
Courtesy of GENERAL MOTORS COMPANY

55. Carefully bend the wiring harness bracket away from the driveline, toward the driveline tunnel wall in order to make a clear removal path for the driveline.

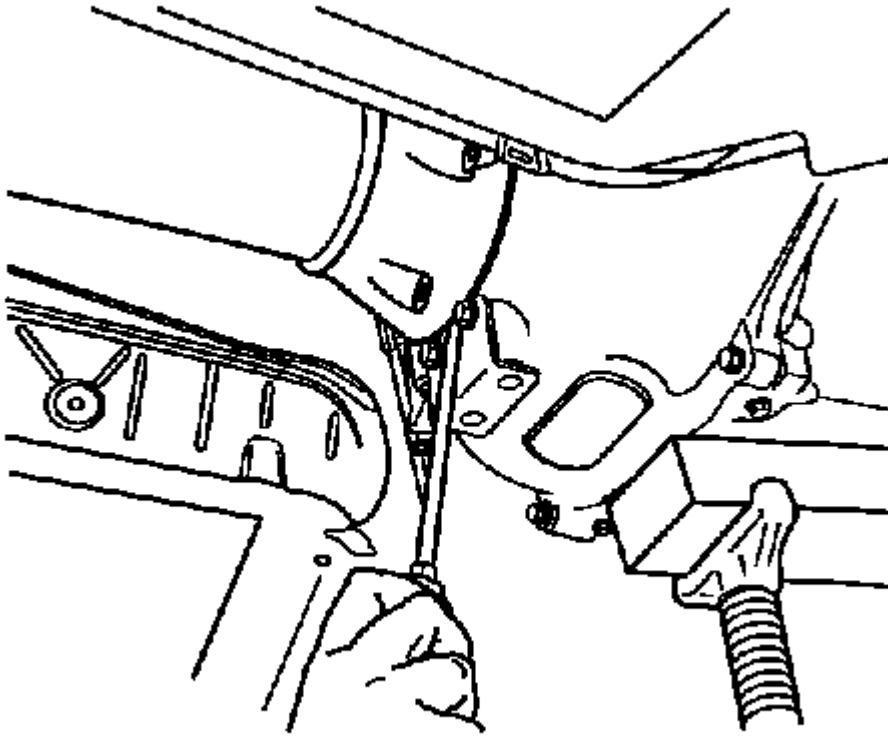


Fig. 88: Separating Driveline From Engine
Courtesy of GENERAL MOTORS COMPANY

NOTE: The aid of an assistant will be necessary for the remaining steps.

56. Have an assistant insert a flat bladed screwdriver or similar tool, between the edge of the driveline support assembly and the engine flywheel housing, then begin to pry the driveline loose from the engine.

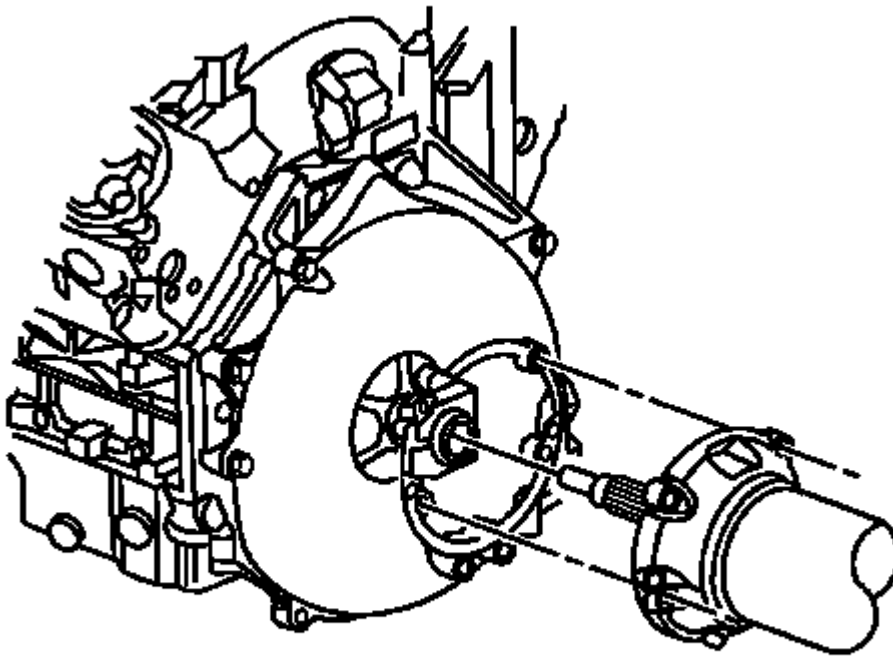


Fig. 89: View Of Driveline From Engine
Courtesy of GENERAL MOTORS COMPANY

57. Have an assistant guide the front of the driveline during the removal of the driveline from the vehicle.
58. SLOWLY lower the driveline, while simultaneously adjusting the angle of tilt and pulling the driveline away from the engine UNTIL the propeller input shaft at the front of the driveline support assembly just clears the engine flywheel housing.
59. SLOWLY lower the driveline completely out of the vehicle.

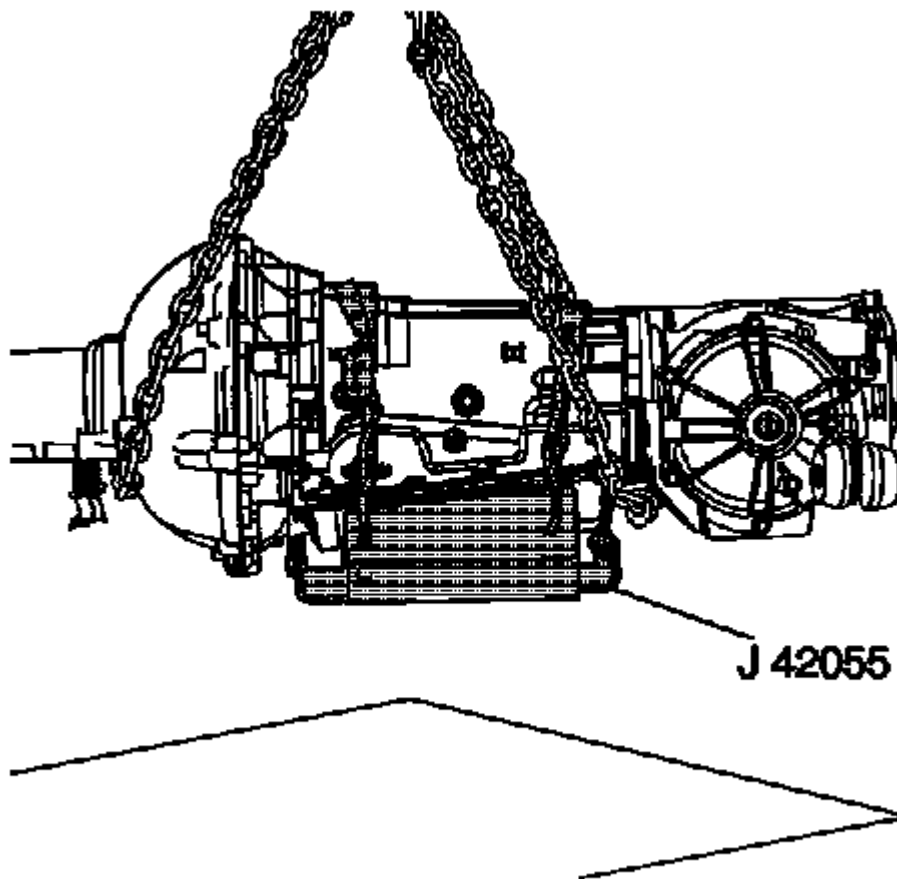


Fig. 90: View Of Transmission & J 42055
Courtesy of GENERAL MOTORS COMPANY

60. Position the chainfall or equivalent, of a lift device in a way which will protect the transmission oil cooler rear pipes and the rear exhaust hangers located on the driveline support assembly.
61. Using the lift device, raise the driveline to relieve the weight from the transmission jack.
62. Disconnect the **J-42055** drivetrain support fixture from the transmission jack ONLY, the **J-42055** drivetrain support fixture will provide stability to the driveline components while working on a bench.
63. Position the driveline on a workbench with the lift device still attached.
64. Support the driveline support assembly and the differential for additional balance.
65. Remove the lift device from the driveline.

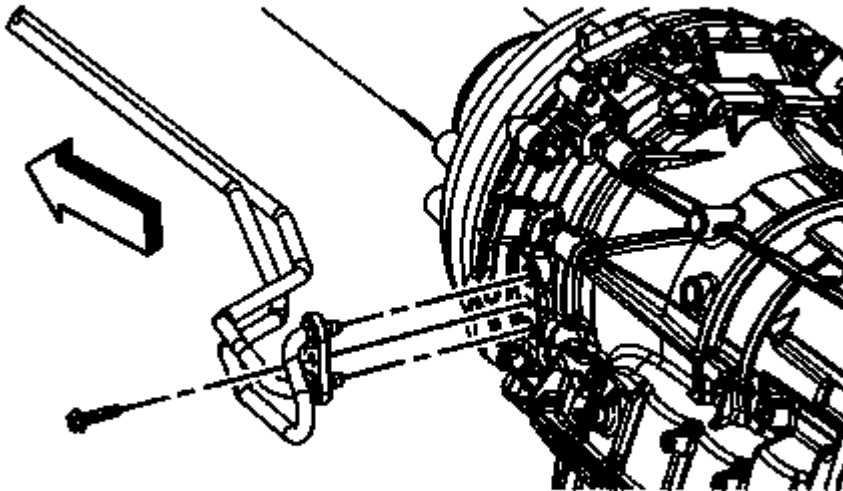


Fig. 91: View Of Transmission Oil Cooler Pipes
Courtesy of GENERAL MOTORS COMPANY

66. Disconnect the transmission oil cooler rear pipes from the fittings on the transmission, then cap the pipes and plug the transmission fittings to prevent contamination. Refer to **Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection** .

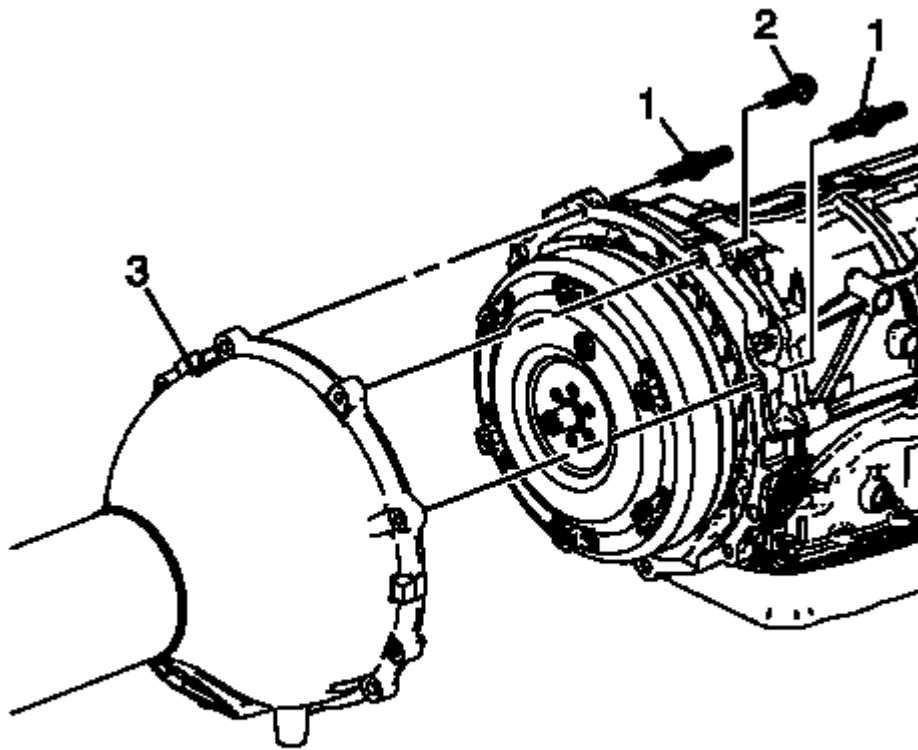


Fig. 92: Edge Of Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

67. Remove the transmission to driveline support assembly bolts/studs (1-2).
68. Insert a flat-bladed screwdriver or similar tool, between the edge of the driveline support assembly (3) and the transmission, then begin to pry the driveline support assembly (3) loose from the transmission.
69. Slowly slide the driveline support assembly (3) away from the transmission while supporting the transmission torque converter.
70. Using a strap positioned from side to side, secure the transmission torque converter to the transmission.
71. Remove the transmission from the **J-42055** drivetrain support fixture, if necessary.
72. Flush and flow test the transmission oil cooler and lines. Refer to **Transmission Fluid Cooler Pipe Seal Replacement** .

Installation Procedure

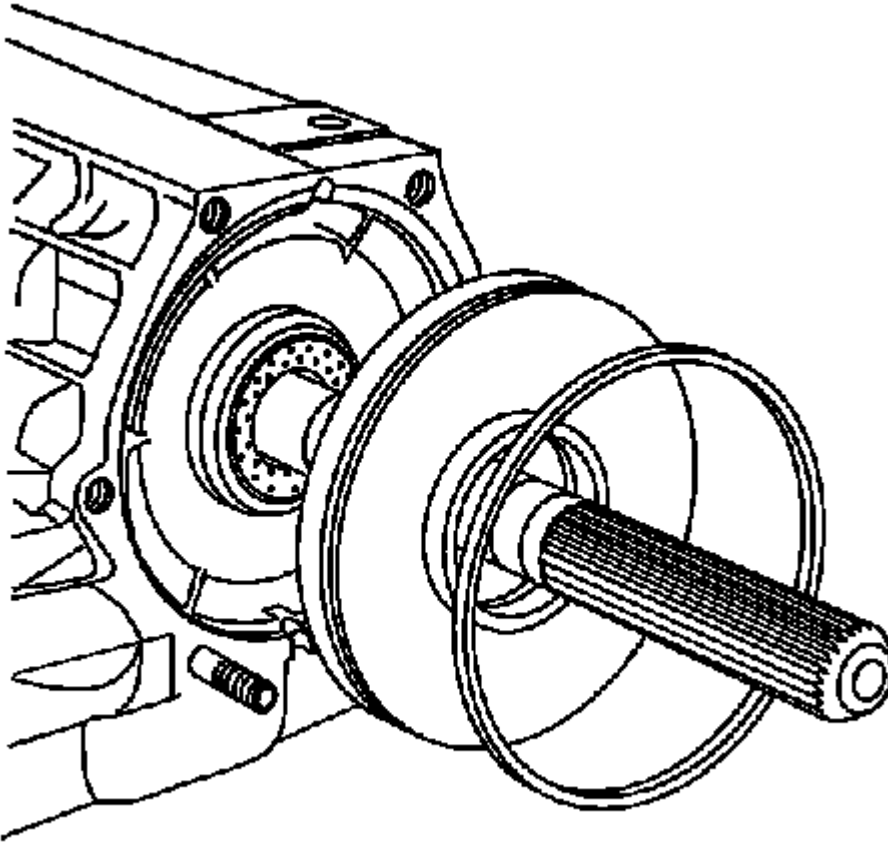


Fig. 93: Installing Differential O-Ring
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Failure to follow the proper removal and installation procedures may result in damage to the engine crankshaft thrust bearing.

1. Install the transmission to the **J-42055** drivetrain support fixture, if removed.

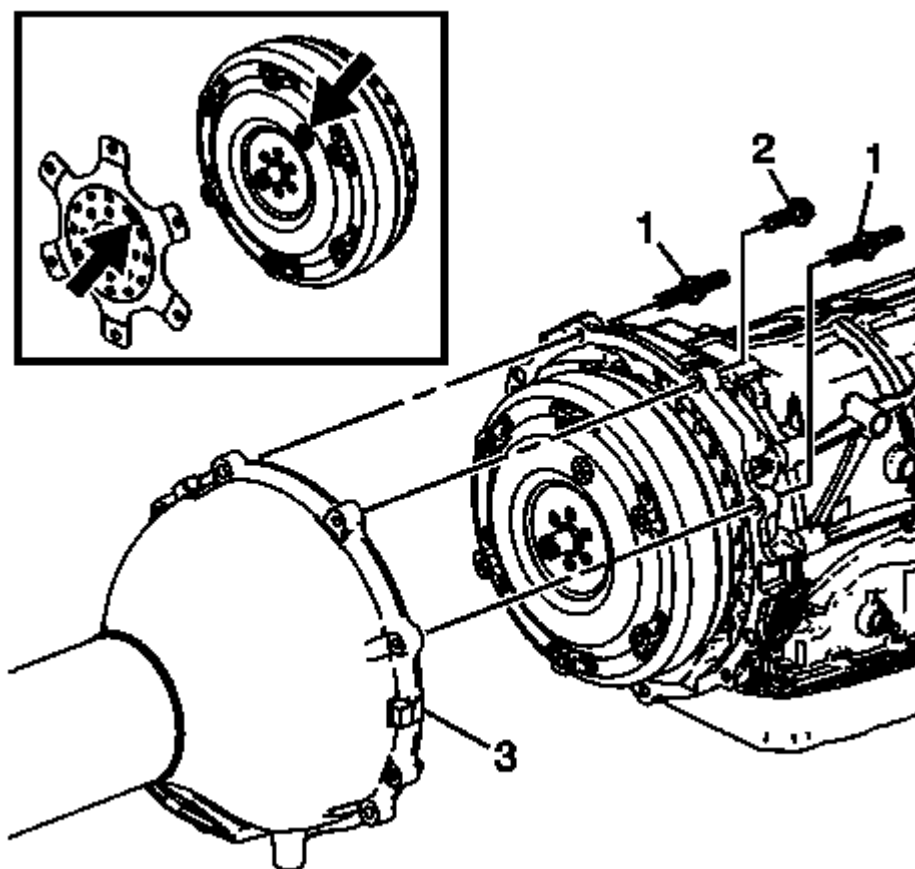


Fig. 94: Driveline Support Assembly Bolts/Studs
 Courtesy of GENERAL MOTORS COMPANY

NOTE: The torque converter has a machined polished area and the flex plate has a "X" or weld spot. The torque converter should be aligned for the balance so the flex plate mark and the polished area on the torque converter are located in the same quadrant.

2. Remove the strap retaining the transmission torque converter.
3. Slowly slide the driveline support assembly to the transmission, while supporting the transmission torque converter.
4. Install the transmission to driveline support assembly bolts/studs.

Tighten

Tighten the transmission to driveline support assembly (3) bolts/studs to (1-2) 50 (37 lb ft).

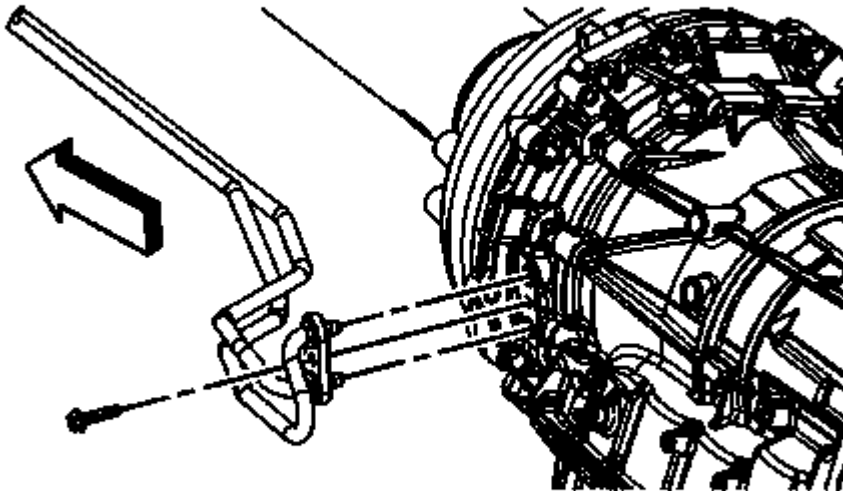


Fig. 95: View Of Transmission Oil Cooler Pipes
Courtesy of GENERAL MOTORS COMPANY

5. Remove the caps from the rear of the transmission oil cooler rear pipes and remove the plugs from the fittings on the transmission. Refer to **Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection** .

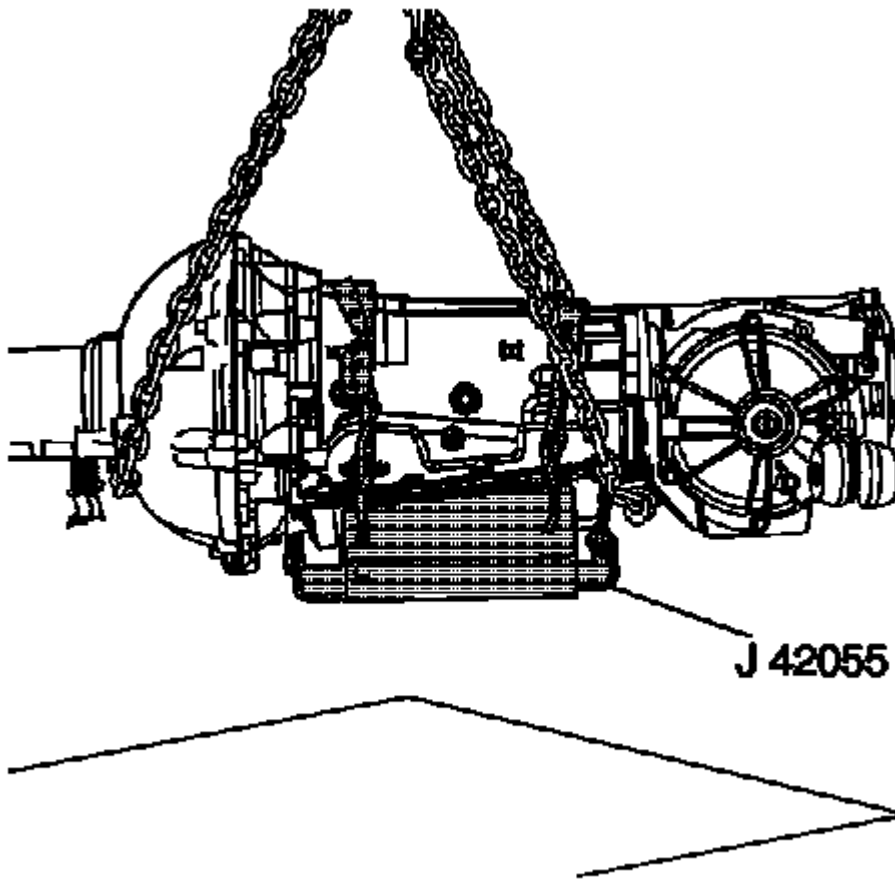


Fig. 96: View Of Transmission & J 42055
Courtesy of GENERAL MOTORS COMPANY

6. Position the chainfall or equivalent, of a lift device in a way which will protect the transmission oil cooler rear pipes and the rear exhaust hangers located on the driveline support assembly.

NOTE: **The aid of an assistant will be necessary for the following steps until the driveline is installed into the vehicle.**

7. Using the lift device, raise the driveline off the workbench and position the driveline with the **J-42055** drivetrain support fixture onto a transmission jack.
8. Connect the **J-42055** drivetrain support fixture to the transmission jack.

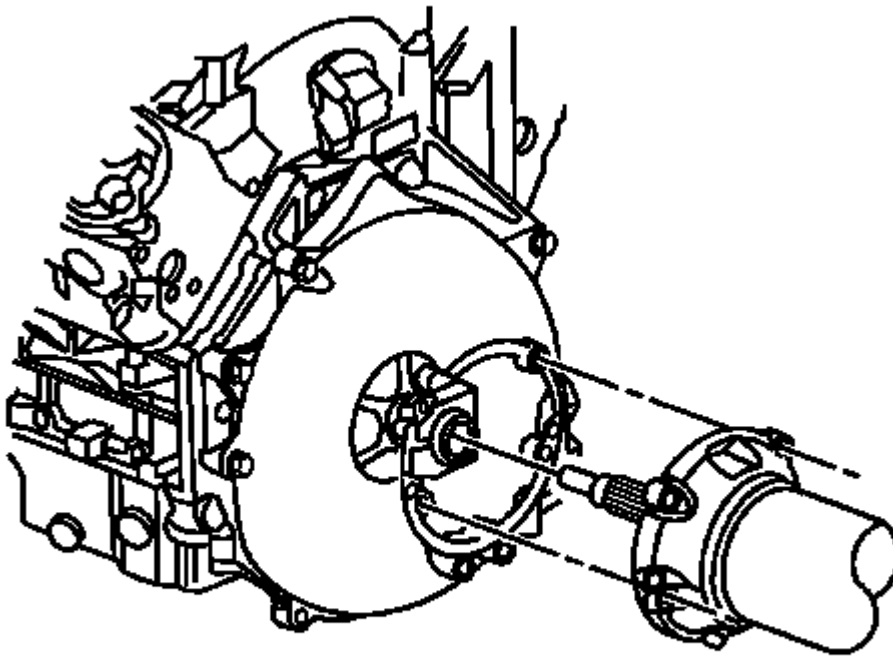


Fig. 97: View Of Driveline From Engine
Courtesy of GENERAL MOTORS COMPANY

9. Remove the lift device from the driveline.
10. Position the driveline under the vehicle.
11. Begin to raise the driveline at the approximate angle used during removal.
12. Position the wiring harness along the driveline support assembly and LOOSELY install the harness into the harness retaining slots.
13. Have an assistant guide the front of the driveline so the propeller input shaft is just to the rear of the engine flywheel housing, then raise the driveline to the PROPER HEIGHT and the PROPER ANGLE to install to the engine.

NOTE: Use care not to use too much force to install the propeller input shaft into the propeller shaft hub. The propeller input shaft front bearing positioning system is designed to withstand an insertion force not greater than 582 (130 lb).

14. Have an assistant begin to insert the propeller input shaft into the propeller shaft hub while maintaining the proper angle of the driveline, if necessary use a screwdriver to rotate the shaft slightly to bring the splines into alignment.

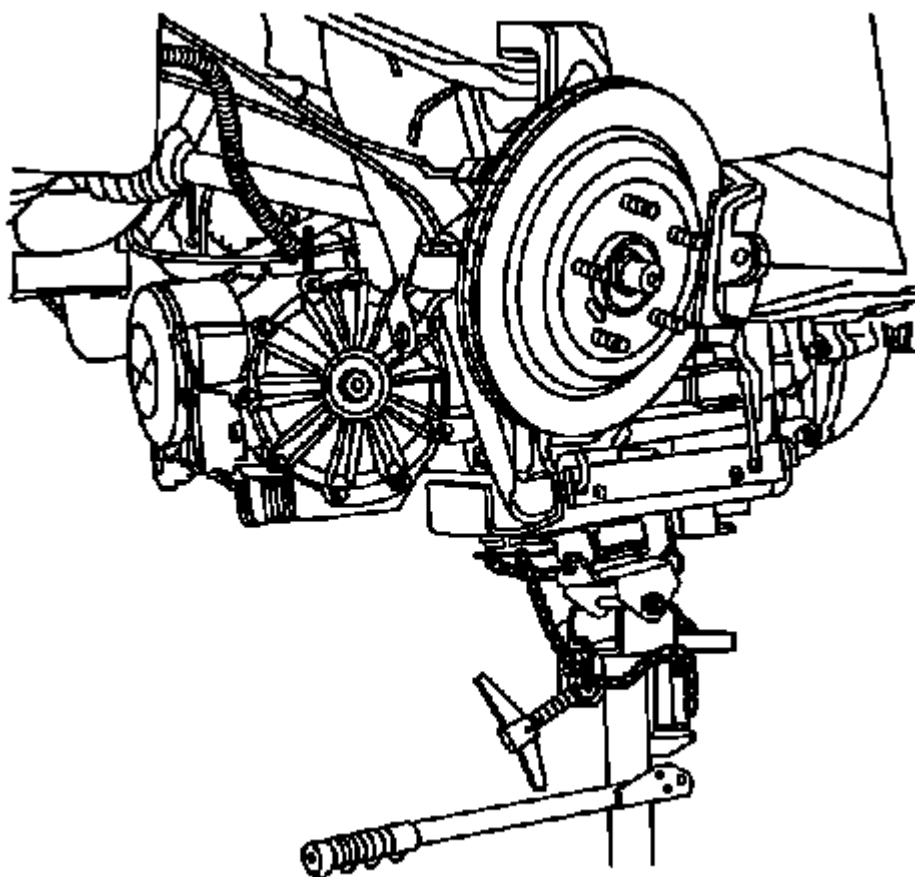


Fig. 98: View Of Wiring Harness & Top Of Transmission
Courtesy of GENERAL MOTORS COMPANY

15. SLOWLY seat the driveline to the engine flywheel housing while maintaining the proper angle of the driveline.

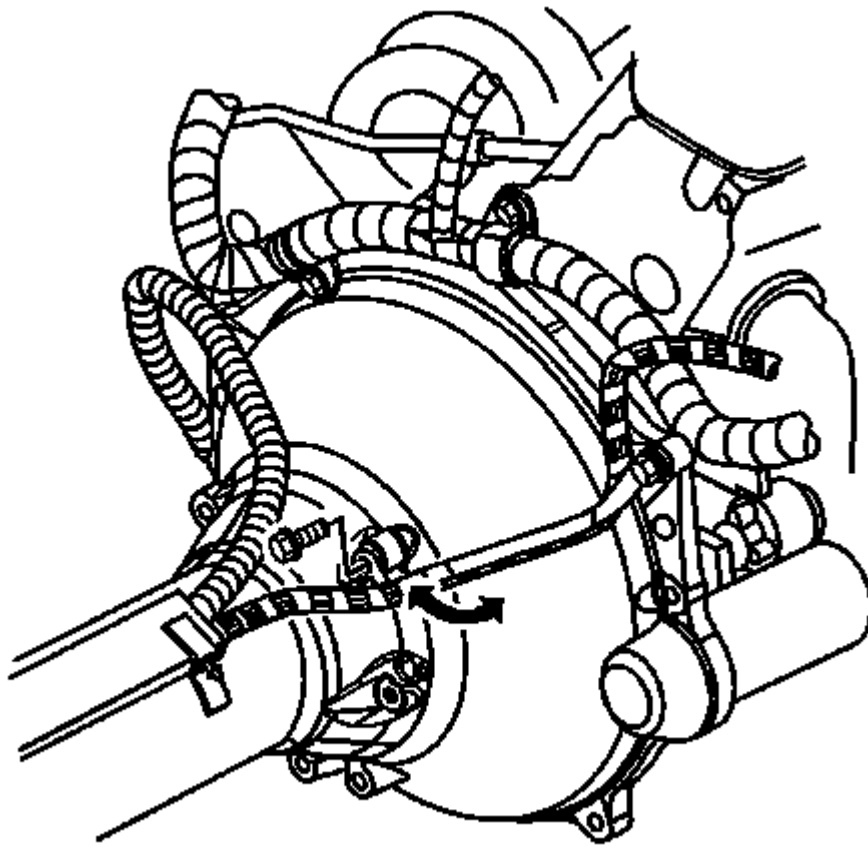


Fig. 99: Repositioning Wiring Harness Bracket
Courtesy of GENERAL MOTORS COMPANY

16. Reposition the wiring harness bracket from near the driveline tunnel wall to align with the appropriate driveline support assembly bolt hole.

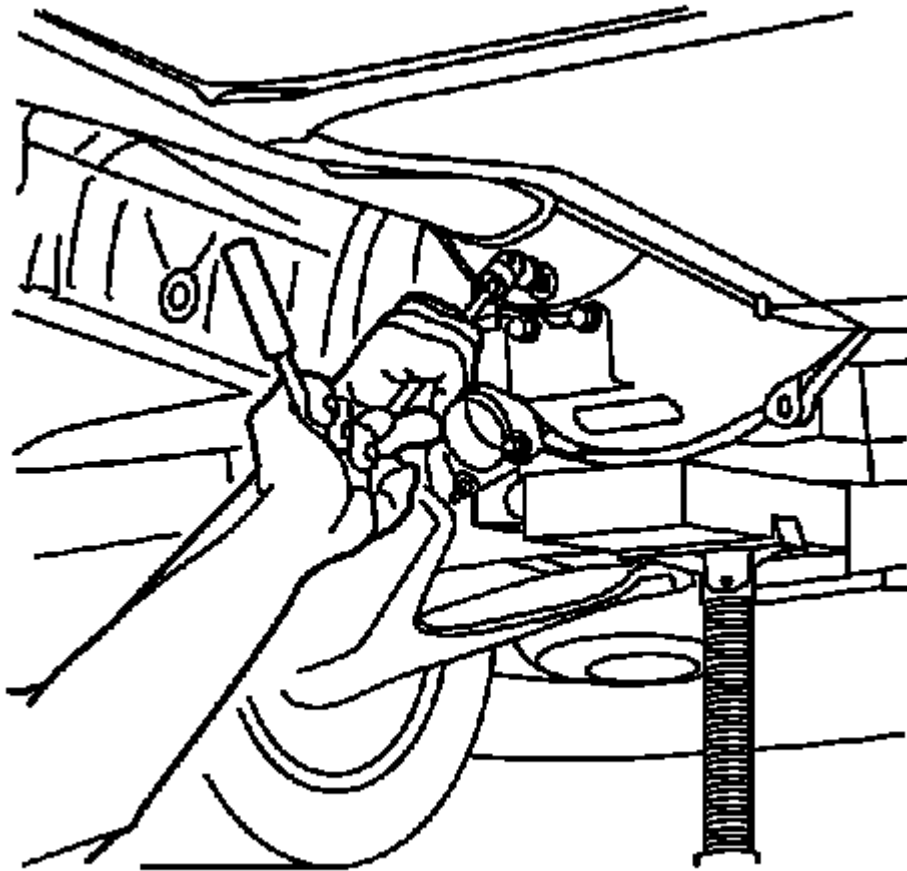


Fig. 100: Removing/Installing Driveline Support Assembly To Engine Flywheel Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

17. Install the five driveline support assembly to engine flywheel housing bolts.

Tighten

Tighten the driveline support assembly to engine flywheel housing bolts to 50 (37 lb ft).

18. Install the wiring harness to the wiring harness retainer along the top of the transmission.
19. SLOWLY raise the driveline to approximately 5 cm (2 in) BELOW the final installed height.

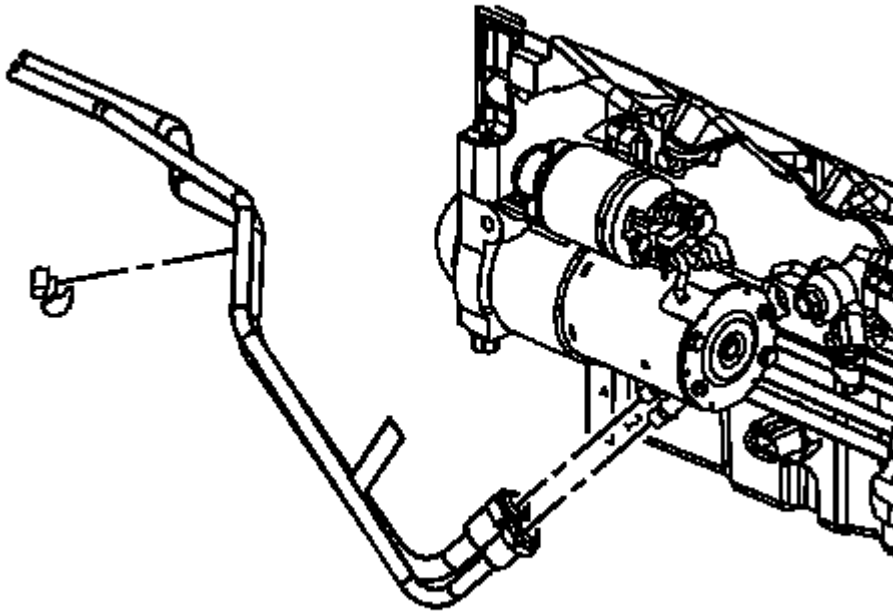


Fig. 101: Upper & Lower Transmission Oil Cooler Lines At Intermediate Lines
Courtesy of GENERAL MOTORS COMPANY

20. Remove the caps from the front of the transmission oil cooler rear pipes and remove the plugs from the junction fittings at the engine flywheel housing. Refer to **Transmission Fluid Cooler Hose/Pipe Quick-Connect Fitting Disconnection and Connection** .

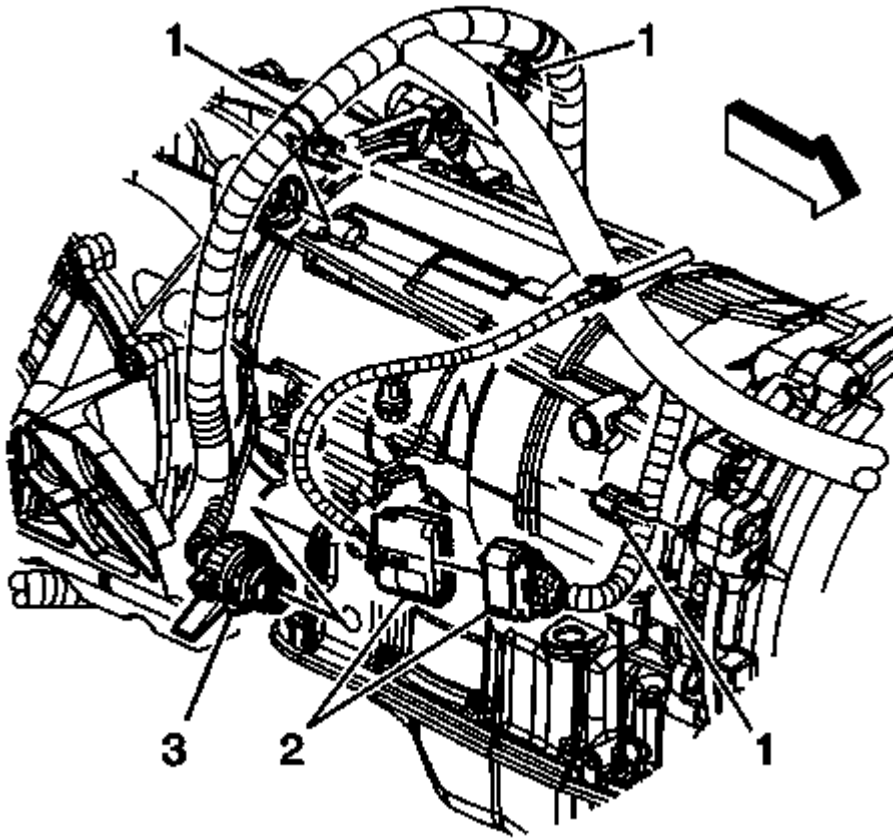


Fig. 102: View Of Transmission Harness 20-Way Connector
Courtesy of GENERAL MOTORS COMPANY

21. Connect the transmission harness 20-way connector (3).

Align the arrows on each half of the connector and insert straight down.

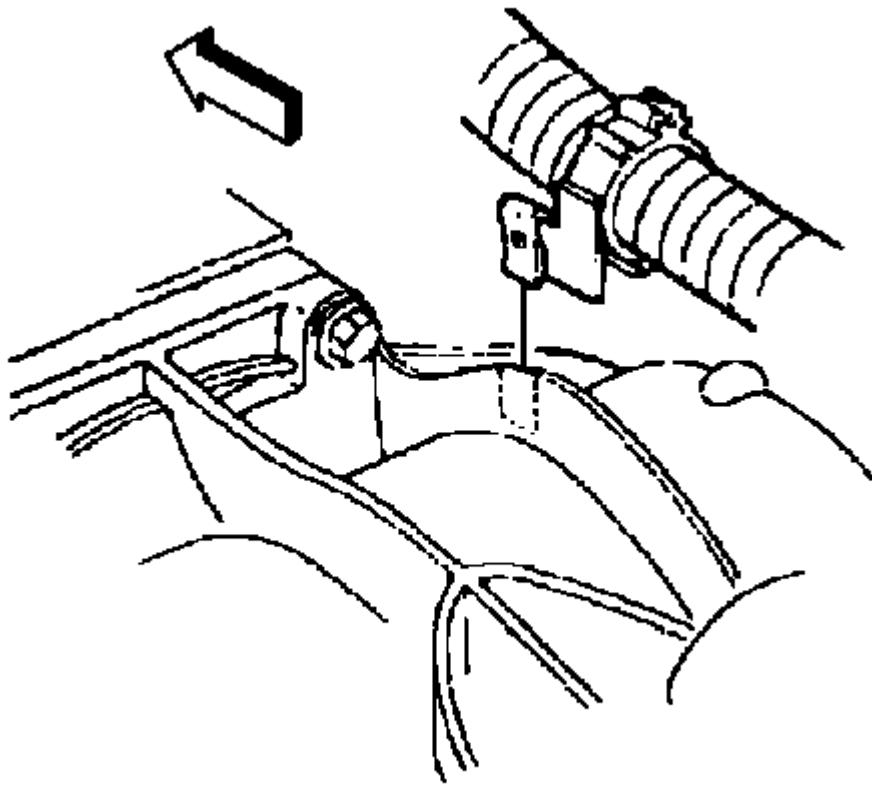


Fig. 103: Wiring Harness Retainer To Stud At Differential Rear Cover
Courtesy of GENERAL MOTORS COMPANY

22. Connect the wiring harness clip to the top of the differential.
23. Connect the wiring harness retainer to the stud at the differential rear cover.

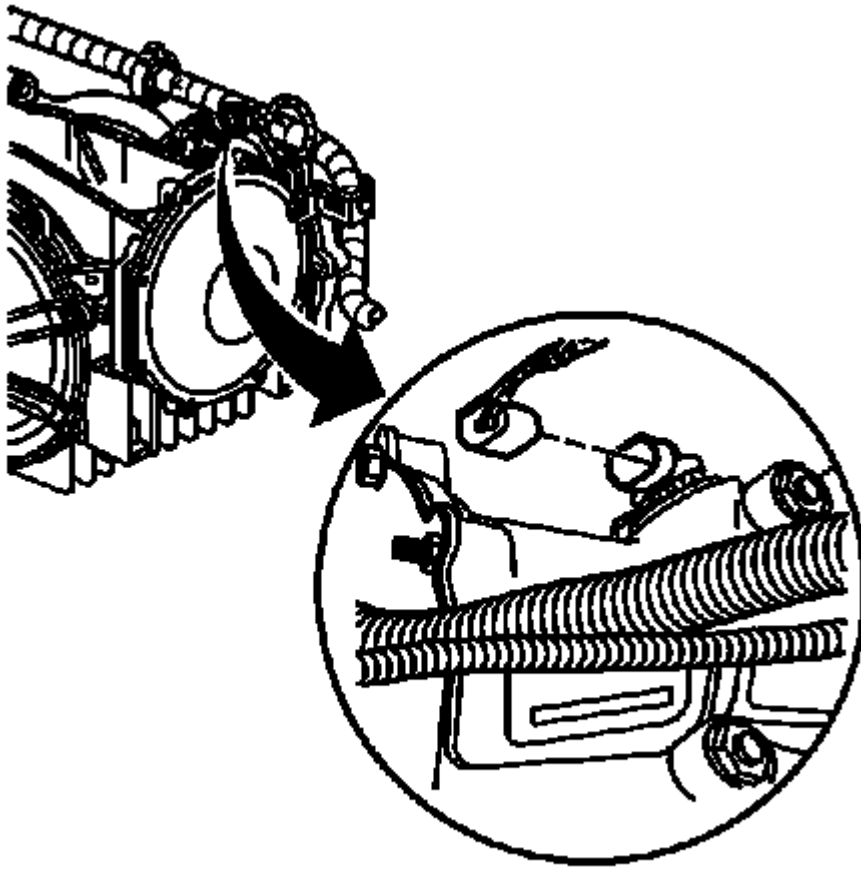


Fig. 104: Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

24. Connect the vehicle speed sensor (VSS) electrical connector.
25. Slowly raise the driveline to final installation height.
26. Remove the jack which supported the engine.
27. Remove the tie-off retainers from the axle shafts.
28. CAREFULLY align and seat the axle shafts to the differential.

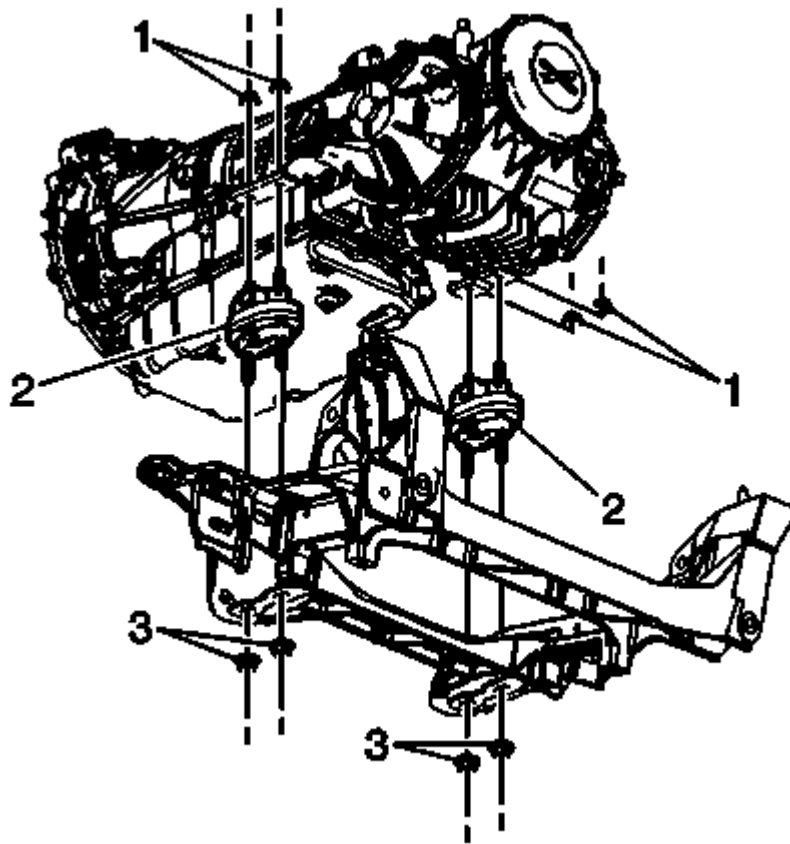


Fig. 105: Locating Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

29. Install the transaxle mount (2) to the differential.
30. Install the transaxle mount nuts (1).

Tighten

Tighten the transaxle mount nuts to 50 (37 lb ft).

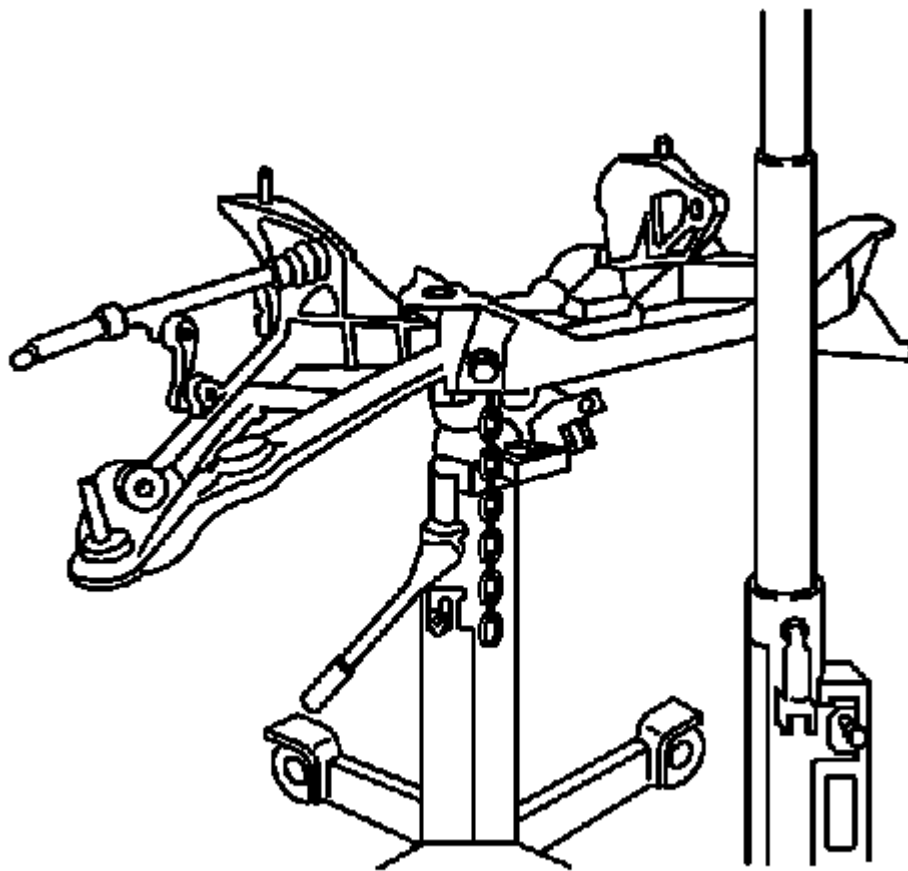


Fig. 106: View Of Rear Suspension Crossmember
Courtesy of GENERAL MOTORS COMPANY

31. With the aid of an assistant, begin to raise the rear suspension crossmember (still firmly attached to a transmission jack), to the vehicle frame rails.
32. Guide the rear suspension crossmember alignment pins into the alignment holes in the vehicle frame rails and guide the transaxle mount studs into the mounting holes in the crossmember, then raise the crossmember to seat to the frame rails.

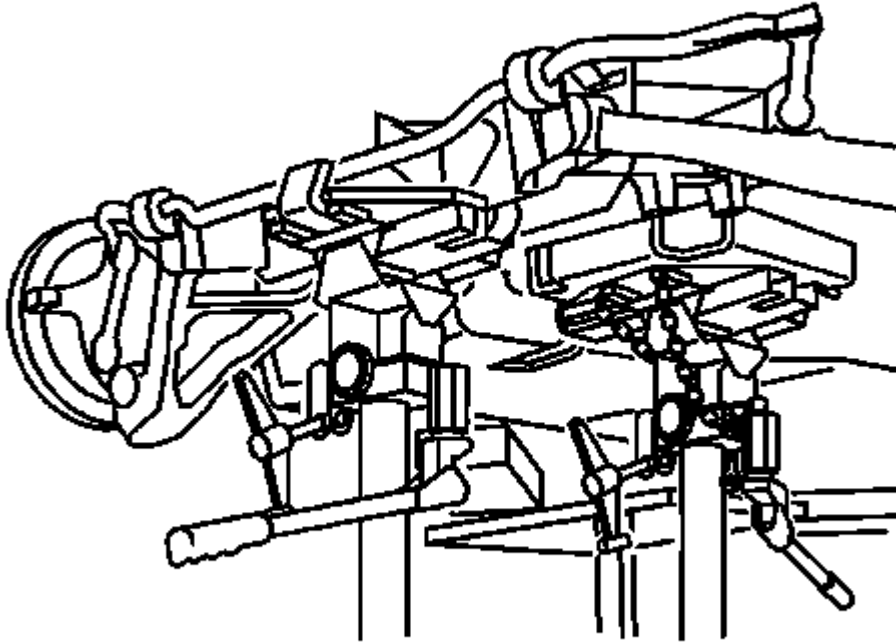


Fig. 107: View Of Correct Transmission Jack Placement
Courtesy of GENERAL MOTORS COMPANY

33. Using ONLY HAND TOOLS, install NEW rear suspension crossmember mounting nuts.

Tighten

Tighten the rear suspension crossmember mounting nuts to 110 (81 lb ft).

34. Remove the transmission jack from the rear suspension crossmember.
35. Release the **J-42055** drivetrain support fixture from the transmission, then remove the **J-42055** drivetrain support fixture and transmission jack.

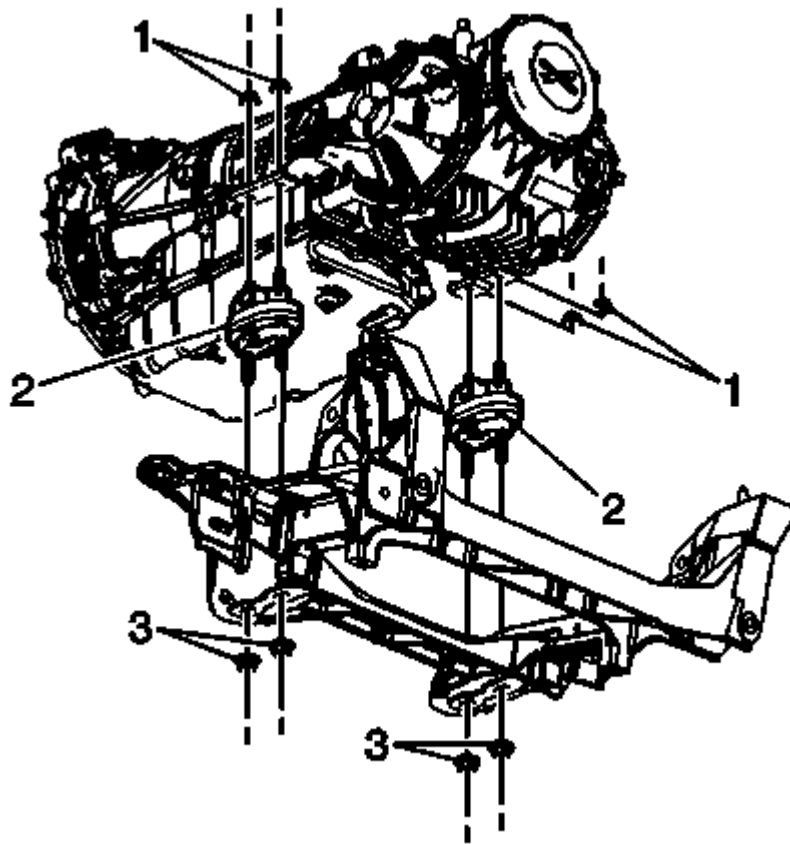


Fig. 108: Locating Transaxle Mounts & Nuts
Courtesy of GENERAL MOTORS COMPANY

36. Install the transaxle mount to rear suspension crossmember nuts (3).

Tighten

Tighten the nuts to 50 (37 lb ft).

37. Install the differential to transmission lower nut.

Tighten

Tighten the differential to transmission lower nut to 50 (37 lb ft).

38. Connect the wiring harness and brake pipe clip retainers to the rear suspension crossmember.

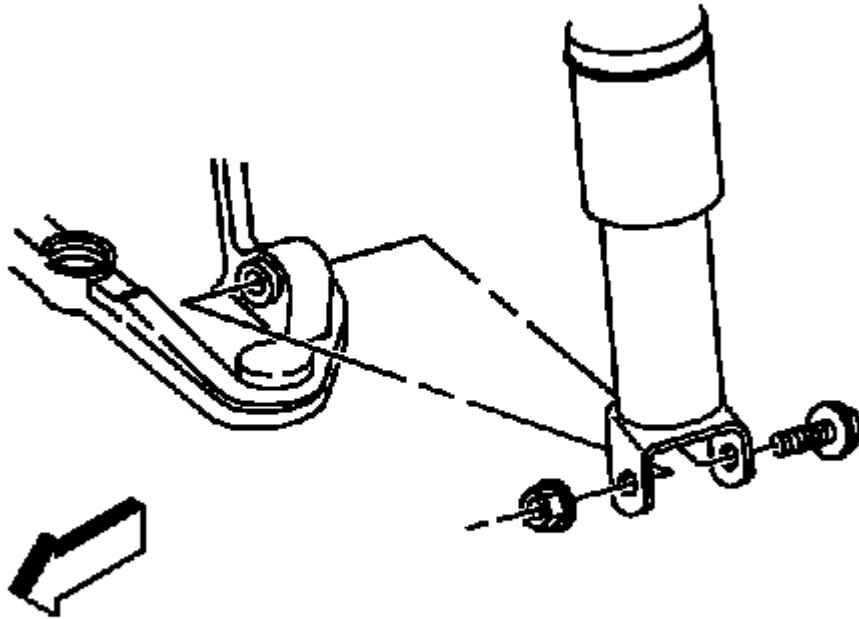


Fig. 109: View Of Shock Absorber Mounting To Control Arm
Courtesy of GENERAL MOTORS COMPANY

39. Support the lower control arm with a straight jack.
40. Connect the lower ball joint to the suspension knuckle. Refer to **Knuckle Replacement (without J55)** , **Knuckle Replacement (with J55)** .
41. Install the shock absorber lower mounting bolt.

Tighten

Tighten the rear shock absorber lower mounting bolt to 220 (162 lb ft).

42. Connect the outer tie rod end to the suspension knuckle. Refer to **Adjust Link Replacement** .
43. Remove the straight jack from the suspension control arm.
44. Repeat steps 45-49 for the other side of the vehicle.
45. Install the rear transverse spring. Refer to **Rear Spring Replacement** .

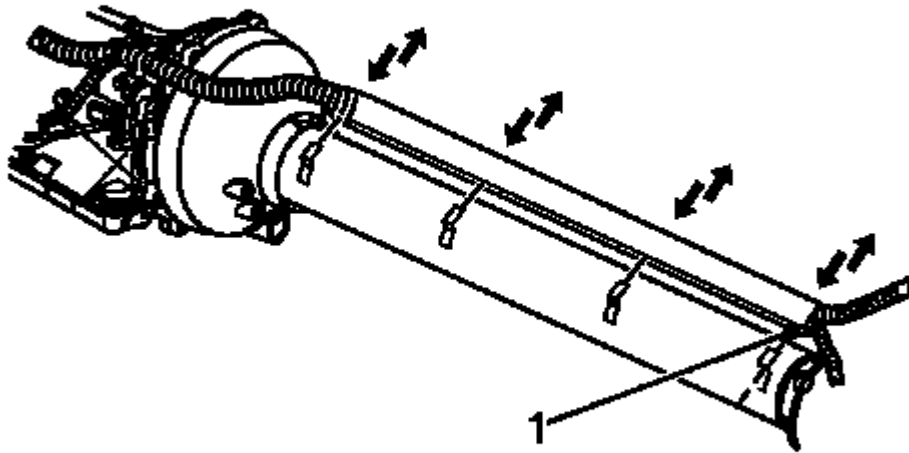


Fig. 110: View Of Wiring Harness Retainer
Courtesy of GENERAL MOTORS COMPANY

46. Carefully pull the wiring harness down into the L-shaped brackets along the driveline support assembly, align the harness retainer (locator) (1) to the hole in the forward bracket, then secure in place.

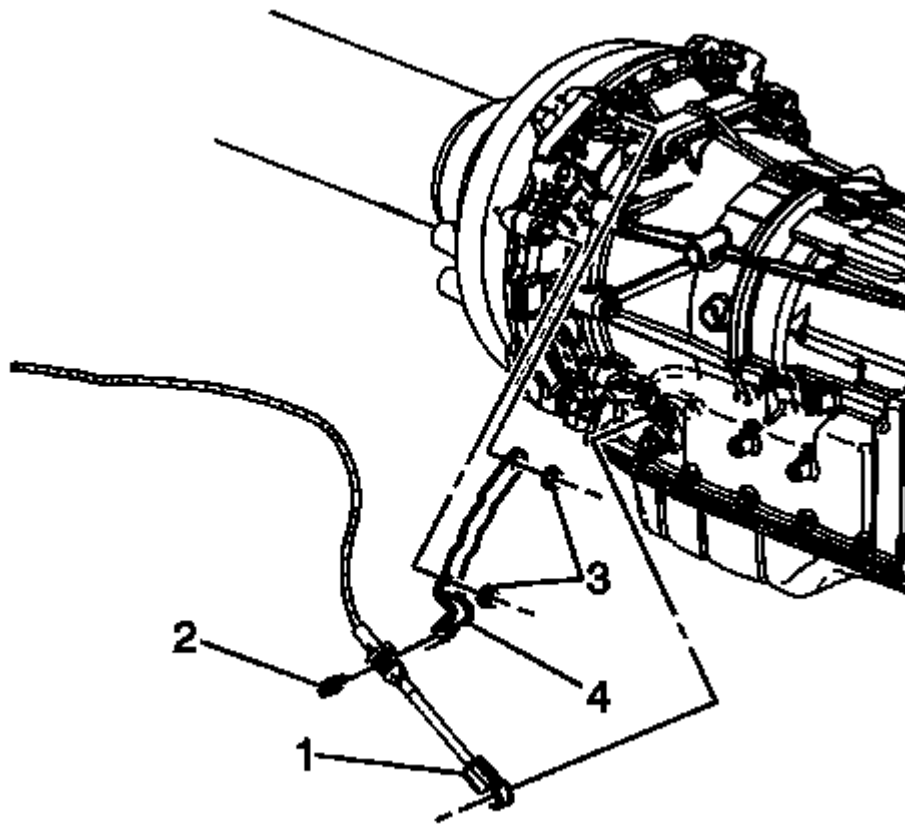


Fig. 111: View Of Transmission Shift Cable Bracket & Retaining Nuts
Courtesy of GENERAL MOTORS COMPANY

47. Install the transmission shift cable and bracket (4) into position.
48. Connect the transmission shift cable (1) to the transmission shift lever.

Press to secure the cable.

49. Install the nuts (3) retaining the transmission shift cable bracket (4) to the transmission.

Tighten

Tighten the transmission shift cable bracket retaining nuts to 20 (15 lb ft).

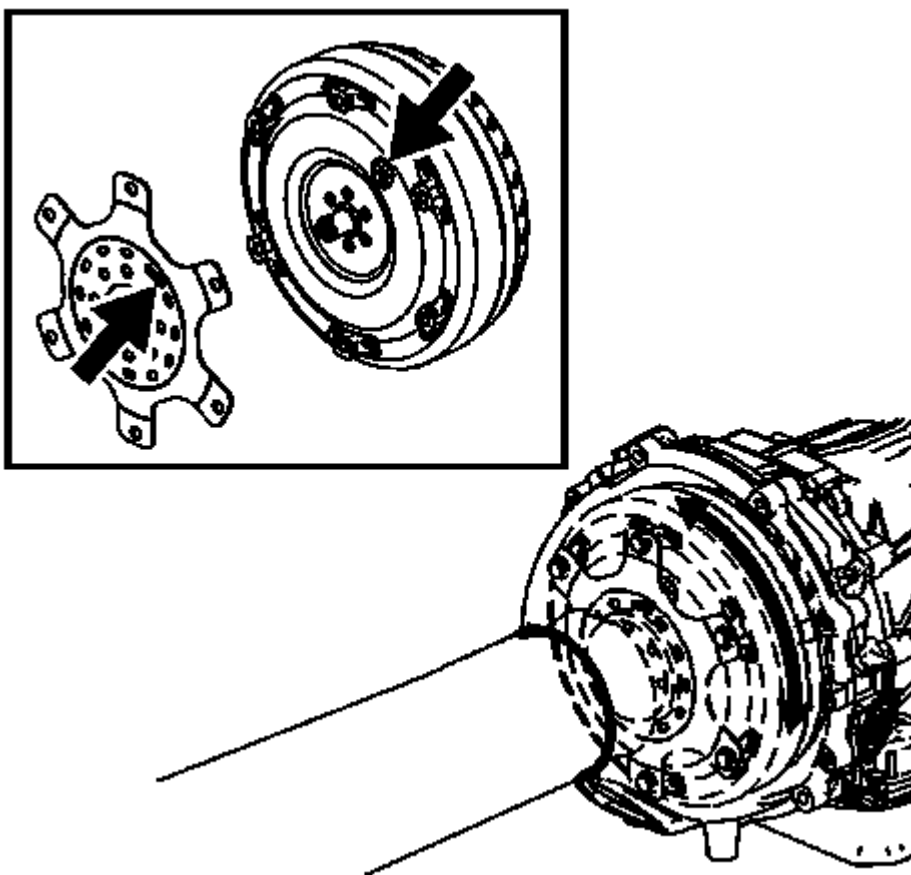


Fig. 112: Carefully Rotate Torque Converter
 Courtesy of GENERAL MOTORS COMPANY

NOTE: The torque converter has a machined polished area and the flex plate has a "X" or weld spot. The torque converter should be aligned for the balance so the flex plate mark and the polished area on the torque converter are located in the same quadrant.

50. Align one of the torque converter bolt holes with the driveline support assembly access hole, if necessary.

Carefully rotate the torque converter, working through the access hole in the rear bellhousing.

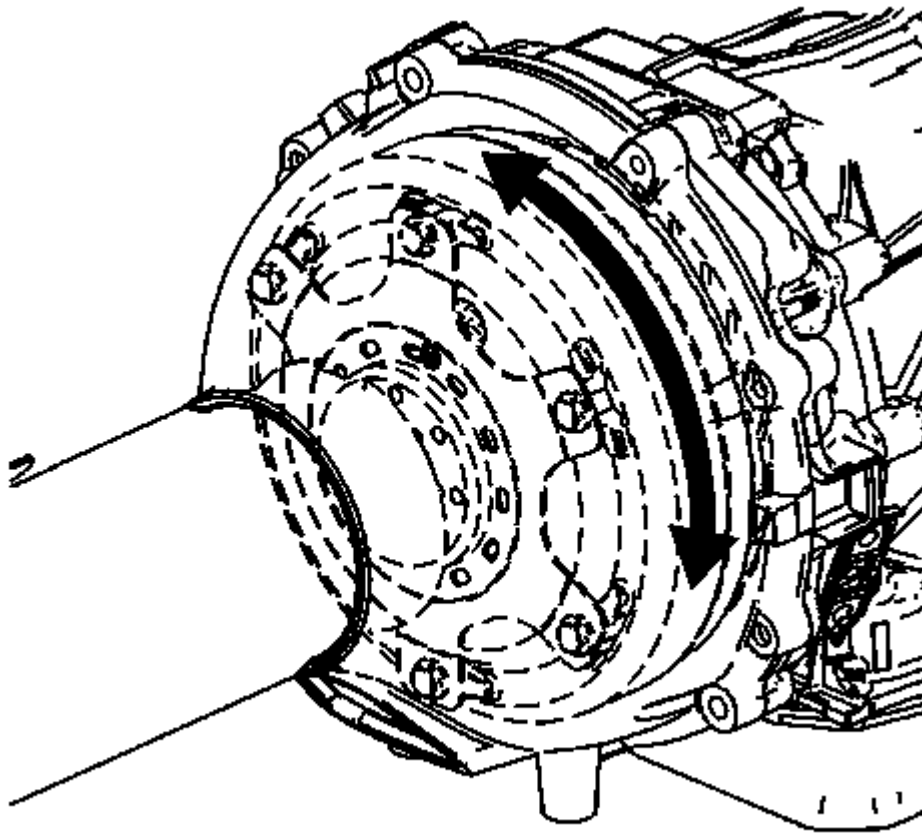


Fig. 113: Turning Engine Flywheel Through Starter Motor Opening
Courtesy of GENERAL MOTORS COMPANY

51. Align one of the flexplate bolt holes with the driveline support assembly access hole, if necessary.
 1. Remove the **J-42386-A** flywheel holding tool from the engine flywheel.
 2. Slowly turn the engine flywheel through the starter motor opening until the desired flexplate bolt hole lines up with the torque converter bolt hole.
 3. Install the **J-42386-A** flywheel holding tool to the engine flywheel, in order to keep the flywheel from turning.

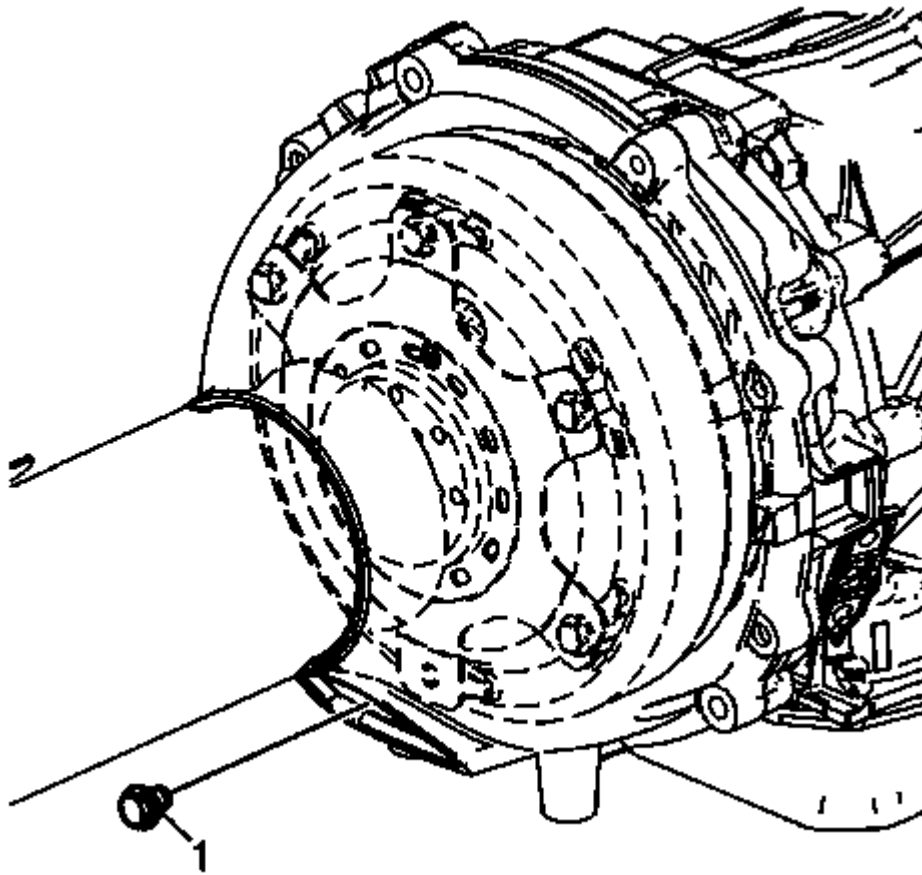


Fig. 114: Flexplate To Torque Converter Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: HAND-START the flexplate to torque converter bolts (1) before torquing to ensure proper alignment and to avoid cross threading.

52. Install the flexplate to torque converter bolt (1) through the driveline support assembly access hole.

HAND-TIGHTEN until FINGER-TIGHT, then torque to specification.

Tighten

Tighten the flexplate to torque converter bolts (1) to 63 (47 lb ft).

53. Remove the **J-42386-A** flywheel holding tool from the engine flywheel.

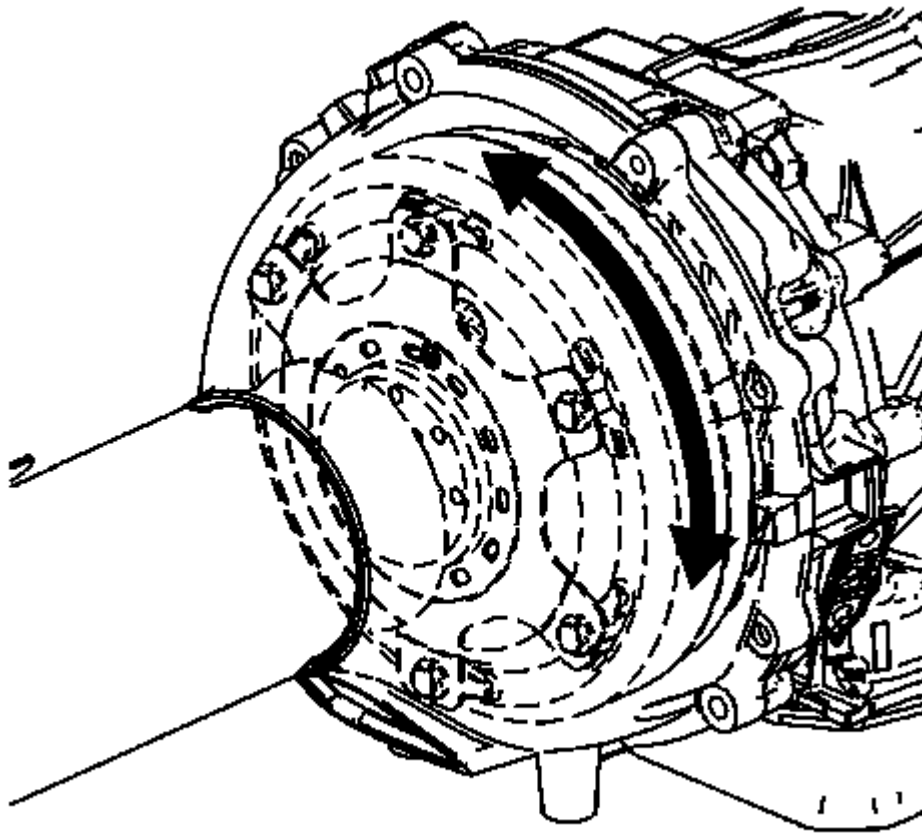


Fig. 115: Turning Engine Flywheel Through Starter Motor Opening
Courtesy of GENERAL MOTORS COMPANY

54. Turn the engine flywheel slowly until the next bolt holes line up with the rear bellhousing access hole.
55. Install the **J-42386-A** flywheel holding tool to the engine flywheel, in order to keep the flywheel from turning.
56. Repeat steps 52-56 to install the remaining bolts.

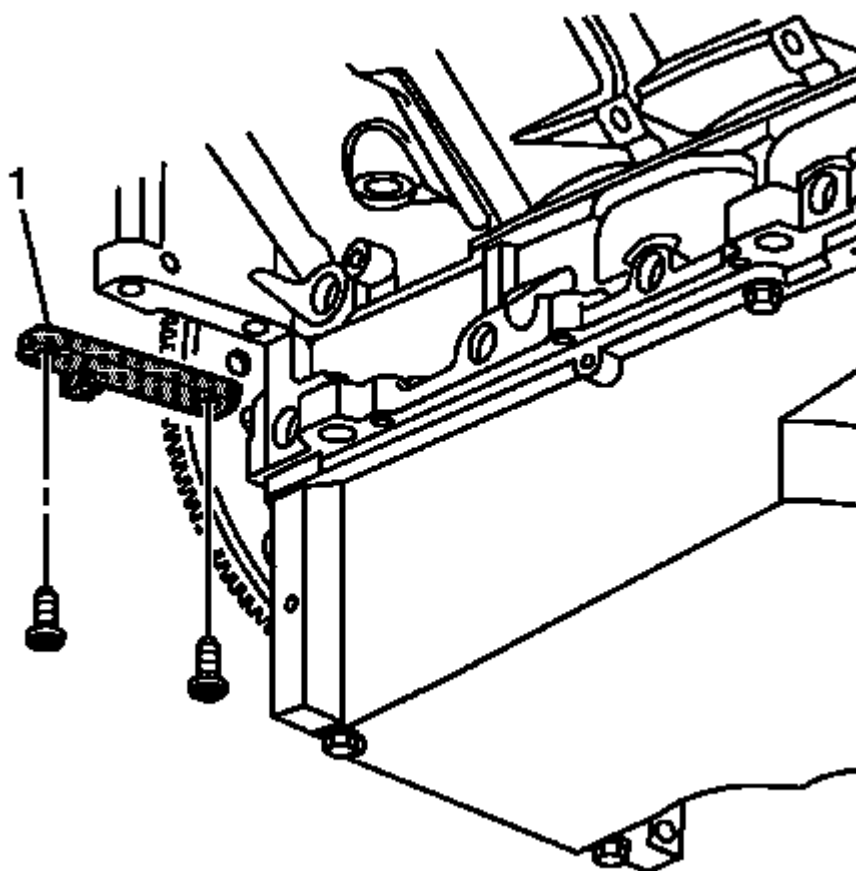


Fig. 116: View Of J 42386-A & Flywheel
Courtesy of GENERAL MOTORS COMPANY

57. Remove the **J-42386-A** flywheel holding tool (1) from the engine flywheel.

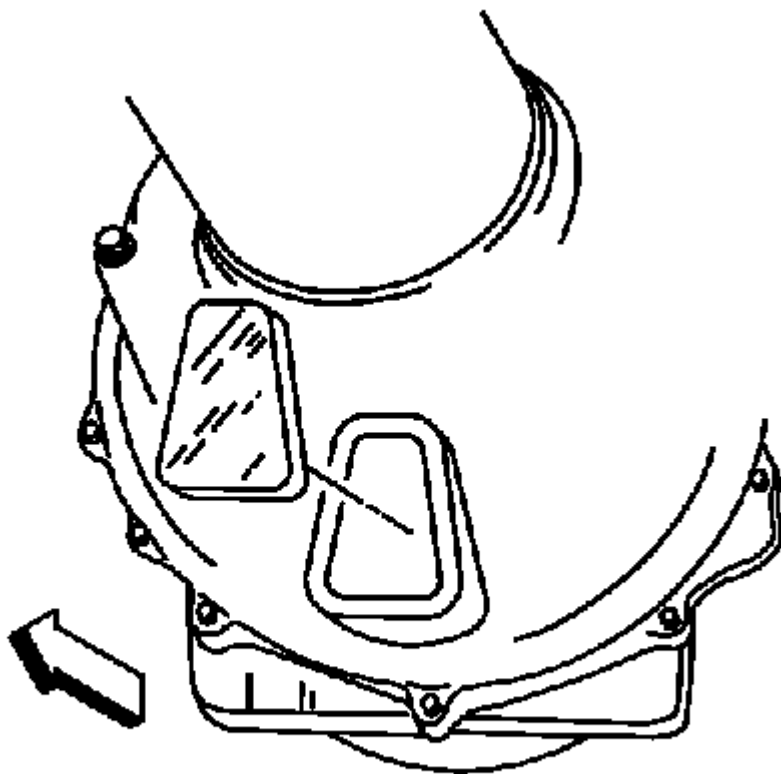


Fig. 117: Rear Bellhousing Access Plug
Courtesy of GENERAL MOTORS COMPANY

58. Install the rear bell housing access plug.

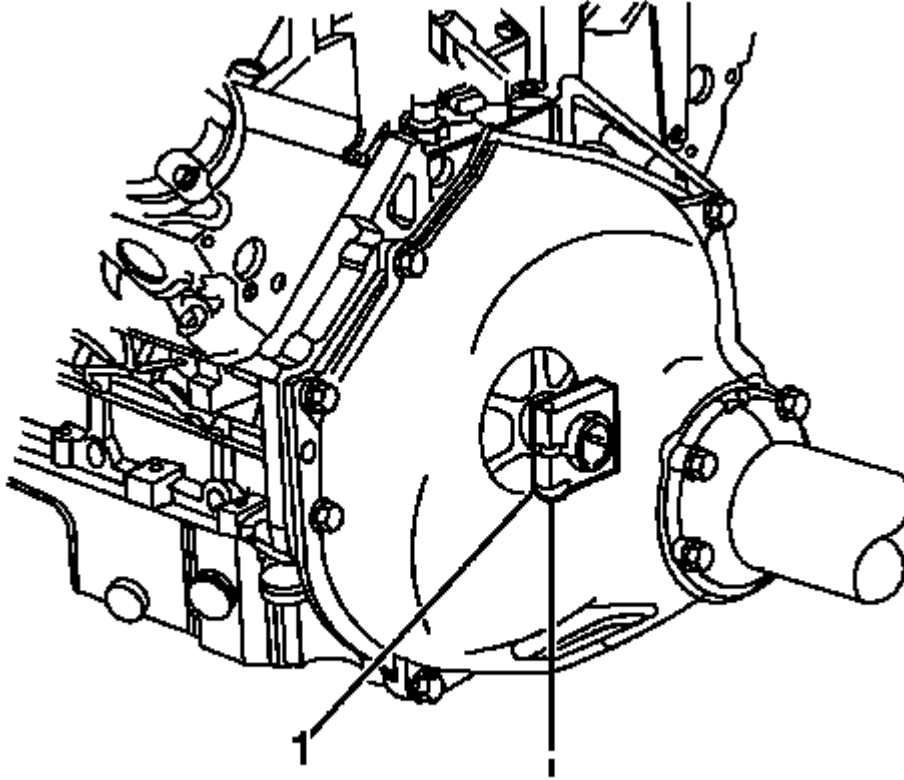


Fig. 118: View Of Propeller Shaft Hub Clamp Bolt
Courtesy of GENERAL MOTORS COMPANY

59. HAND-TIGHTEN the propeller shaft hub clamp bolt (1) until FINGER-TIGHT.

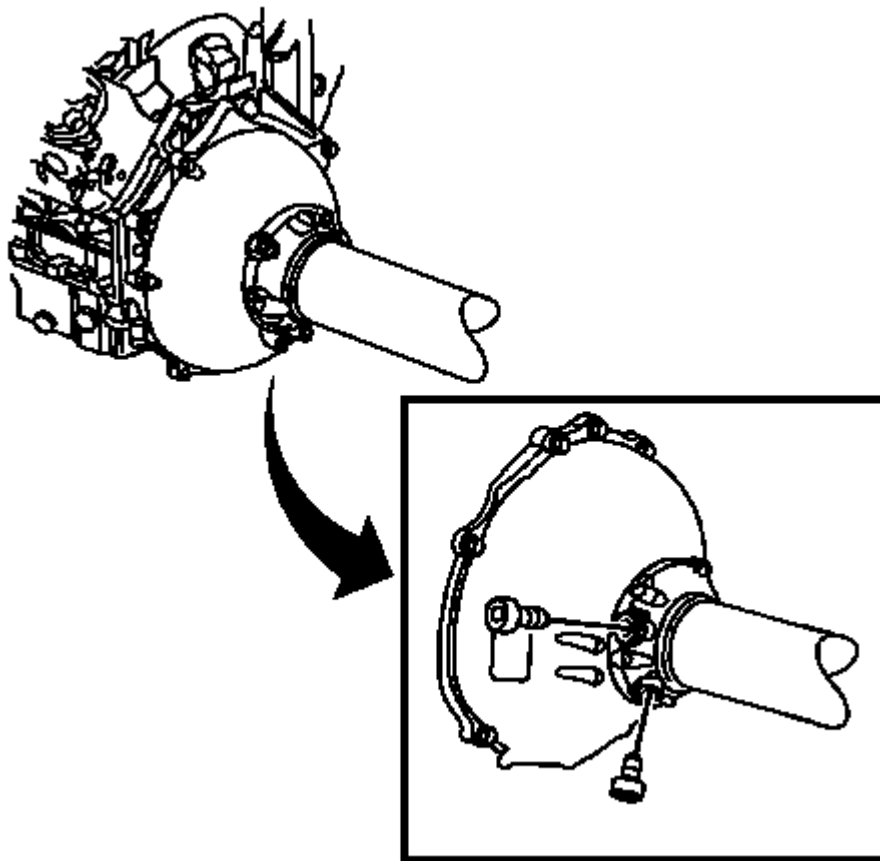


Fig. 119: Identifying Plug Bolts On Front Of Driveline Support Assembly
Courtesy of GENERAL MOTORS COMPANY

60. Remove the propeller input shaft front bearing positioning bolts (M10 - 1.5 X 55 mm) from the driveline support assembly.
61. Install the two plug bolts to the front of the driveline support assembly.

Tighten

Tighten the driveline support assembly front plug bolts to 50 (37 lb ft).

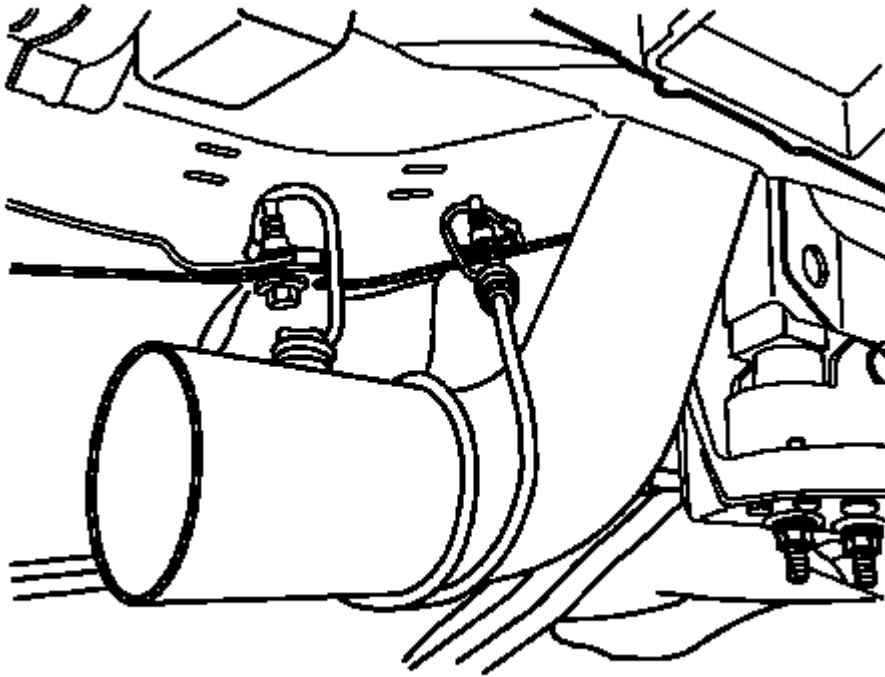


Fig. 120: View Of Tied Off Muffler Assembly
Courtesy of GENERAL MOTORS COMPANY

62. Install the floor panel tunnel reinforcement. Refer to **Floor Panel Tunnel Panel Reinforcement Replacement** .
63. Remove the tie-off retainer from the left hand muffler assembly.
64. Install the right hand muffler assembly. Refer to **Exhaust Muffler Replacement - Right Side** .
65. Install the intermediate pipe assembly. Refer to **Intermediate Pipe Replacement** .
66. Install the rear tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
67. Lower the vehicle.
68. Connect the negative battery cable.

Tighten

Tighten the negative battery cable bolt to 15 (11 lb ft).

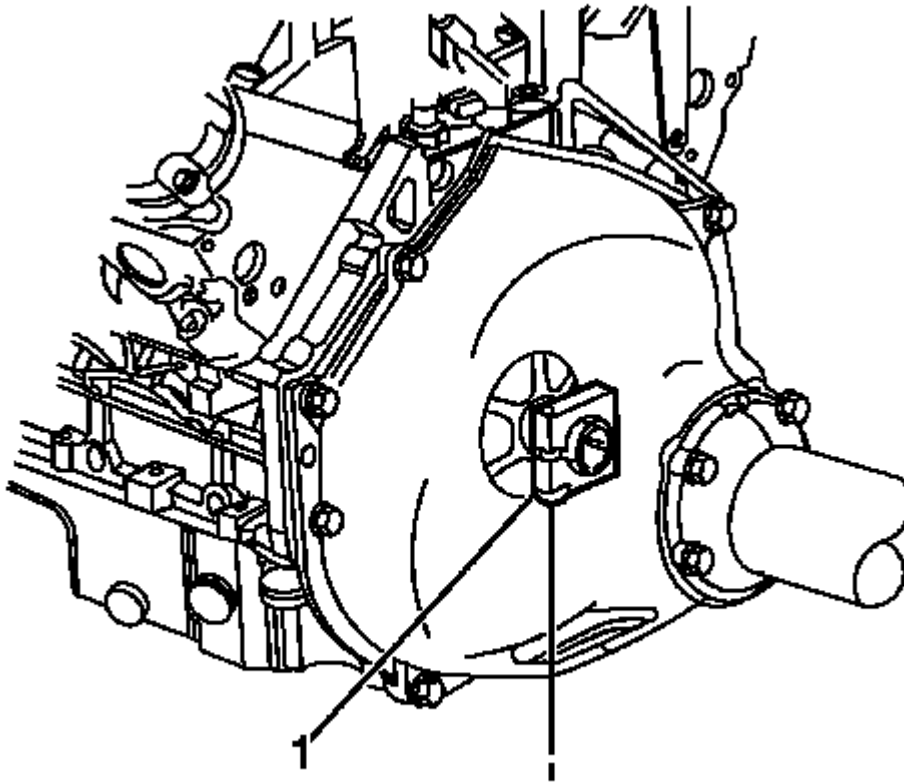


Fig. 121: View Of Propeller Shaft Hub Clamp Bolt
Courtesy of GENERAL MOTORS COMPANY

NOTE: The following steps **MUST** be performed in order to provide proper alignment of the propeller shaft hub, the propeller input shaft and the propeller input shaft front bearing.

69. Start and run the engine at idle until normal operating temperatures are reached.
Idle or drive for at least 10 minutes.
70. Turn off the engine and allow the powertrain to cool to ROOM temperature.
71. Raise the vehicle.
72. Tighten the propeller shaft hub clamp bolt (1).

Tighten

Tighten the propeller shaft hub clamp bolt to 130 (96 lb ft).

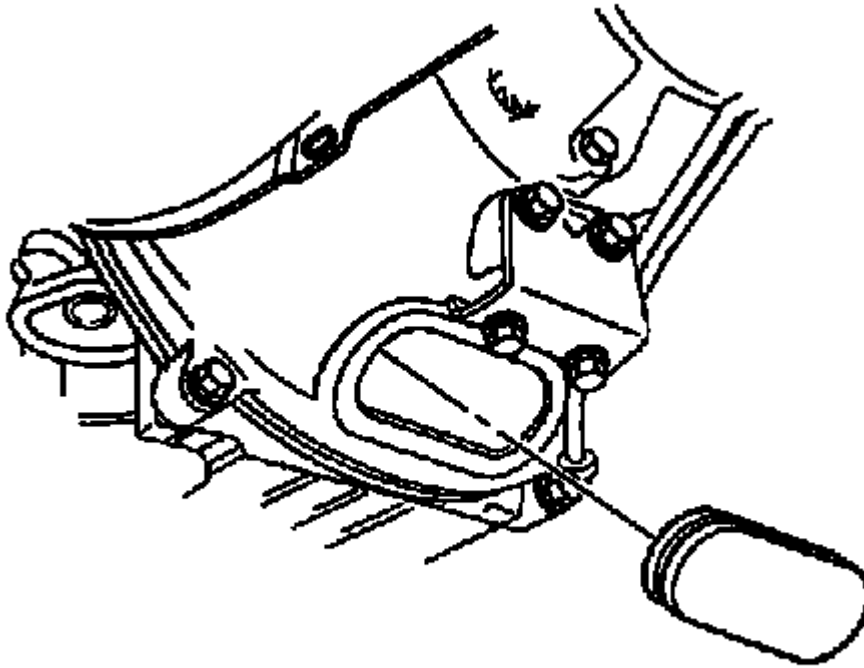


Fig. 122: View Of Engine Flywheel Housing Access Plug
Courtesy of GENERAL MOTORS COMPANY

73. Install the engine flywheel housing access plug.
74. Flush the transmission oil cooler. Refer to **Transmission Fluid Cooler Pipe Seal Replacement** .
75. Lower the vehicle.
76. If a NEW TCM has been installed into the vehicle, the NEW module needs to be reprogrammed. Refer to **Service Programming System (SPS)** .

NOTE: The Service Fast Learn Adapts procedure must be performed when one of the following repairs have been made to the vehicle. Failure to perform the procedure after one of the following repairs may result in poor transmission performance, as well as transmission DTCs being set:

- Transmission internal service/overhaul
- Valve body repair or replacement
- Control solenoid valve assembly replacement
-

- Any service in response to a shift quality concern

77. Perform the Reset Transmission Adapts. Refer to Reset Transmission Adapts .

DRIVELINE SUPPORT OVERHAUL

Special Tools

- J 2619-01 Slide Hammer
- J 24420-C Harmonic Balancer Puller

For equivalent regional tools, refer to Special Tools.

Propeller Shaft Removal

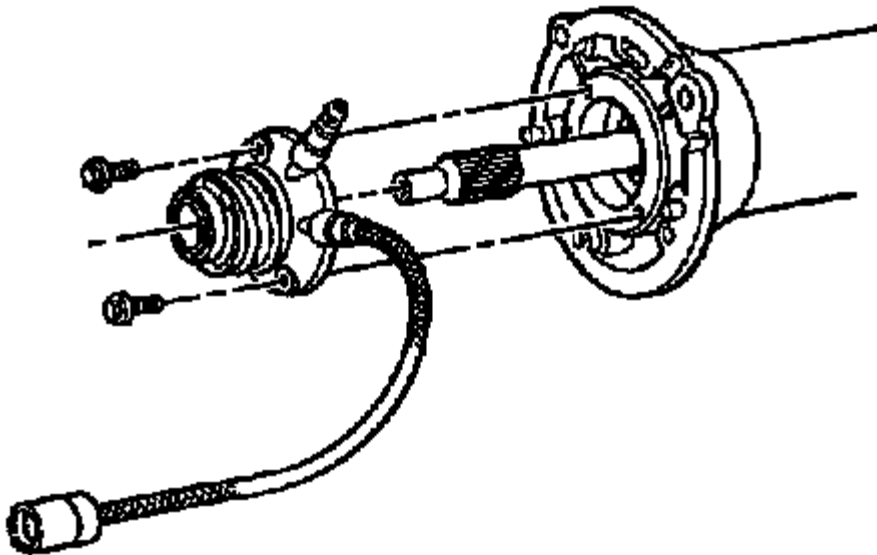


Fig. 123: Clutch Actuator Cylinder Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not separate the input shaft, propeller shaft, couplings or bearing

housing assembly, unless required. These components are balanced as an assembly. Disassembly and improper assembly of the components may cause vehicle driveline vibration.

If the input shaft, couplings, propeller shaft or bearing housing assembly must be separated, the components must be marked prior to disassembly. During assembly, the components must be returned to their original position and location.

1. Remove the clutch actuator and bolts - manual transmission.

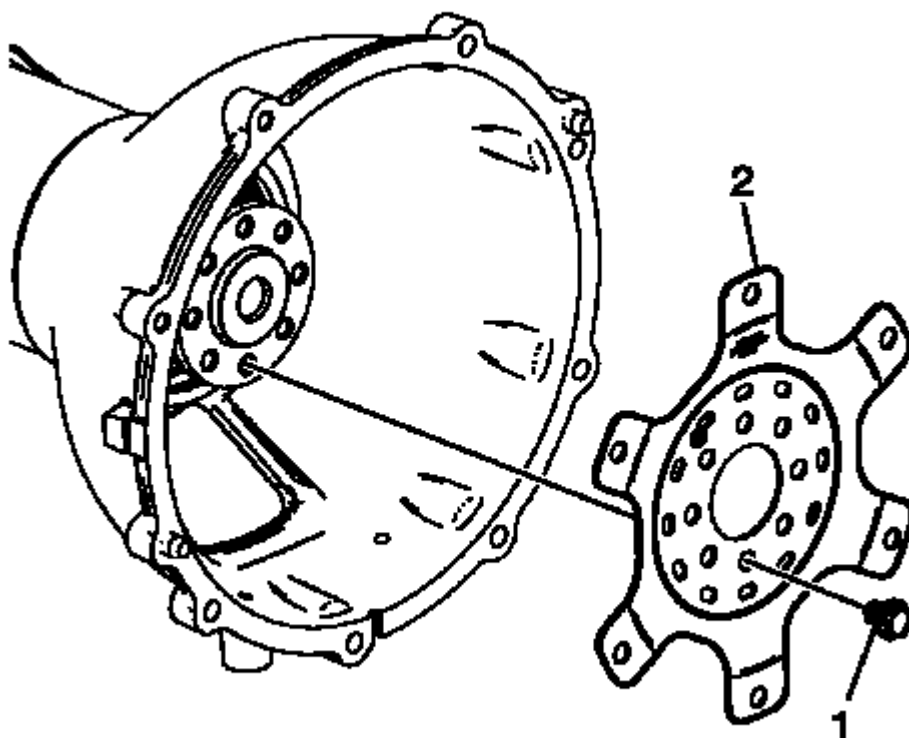


Fig. 124: Flex Plate And Bolts

Courtesy of GENERAL MOTORS COMPANY

2. Remove the flex plate (2) and bolts (1) - automatic transmission.

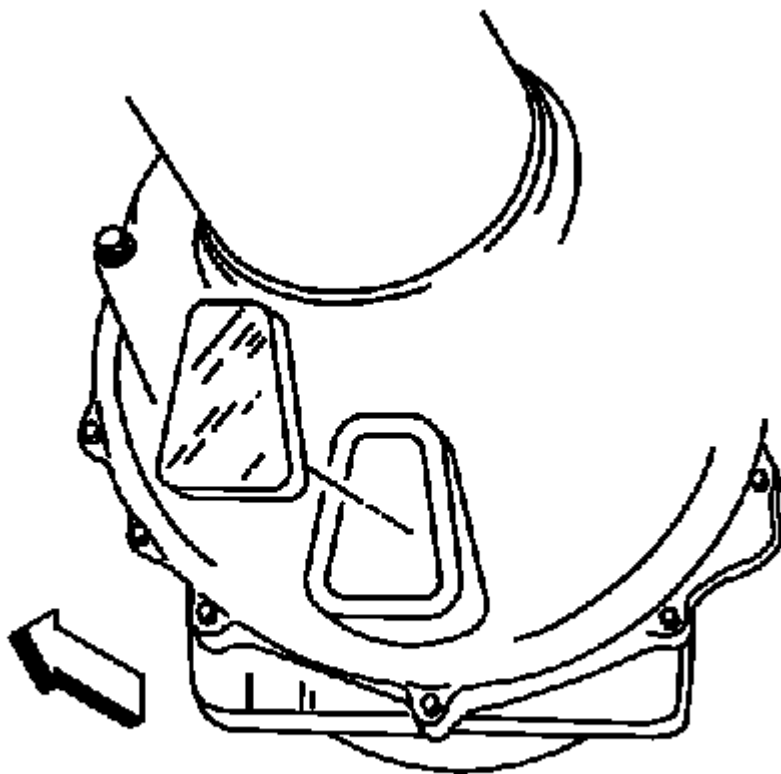


Fig. 125: Rear Bellhousing Access Plug
Courtesy of GENERAL MOTORS COMPANY

3. Remove the access hole plug, if required - automatic transmission.

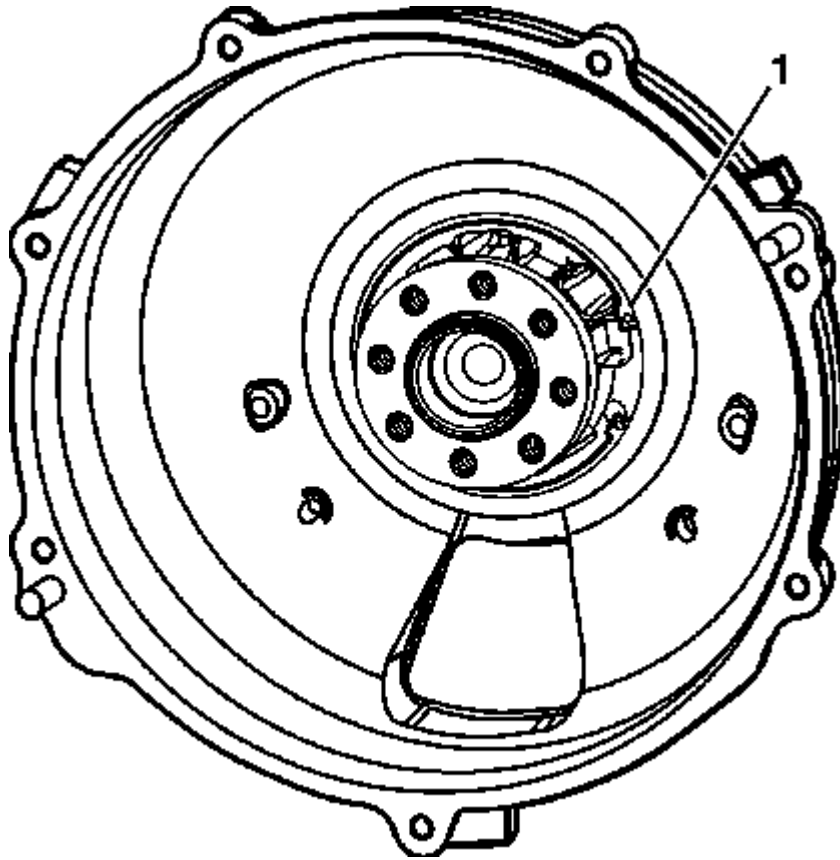


Fig. 126: Snap Ring To Driveline Tube
Courtesy of GENERAL MOTORS COMPANY

4. Remove the snap ring (1) from the driveline tube.

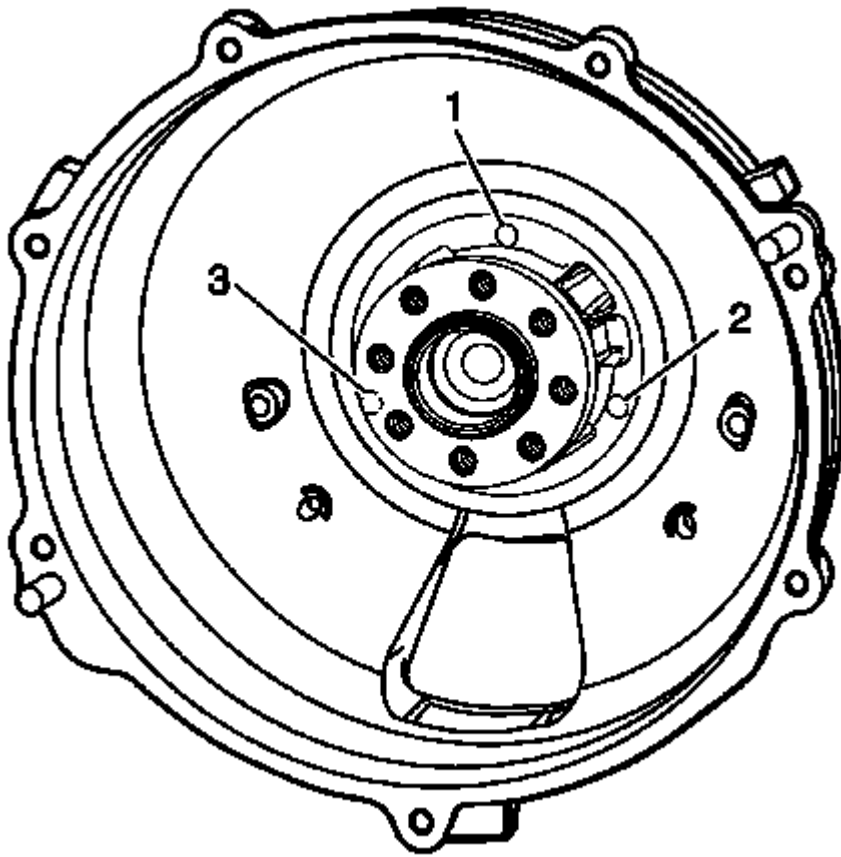


Fig. 127: Rear Bearing Housing Bolt Hole Plugs
Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear bearing housing bolt hole plugs (1-3).

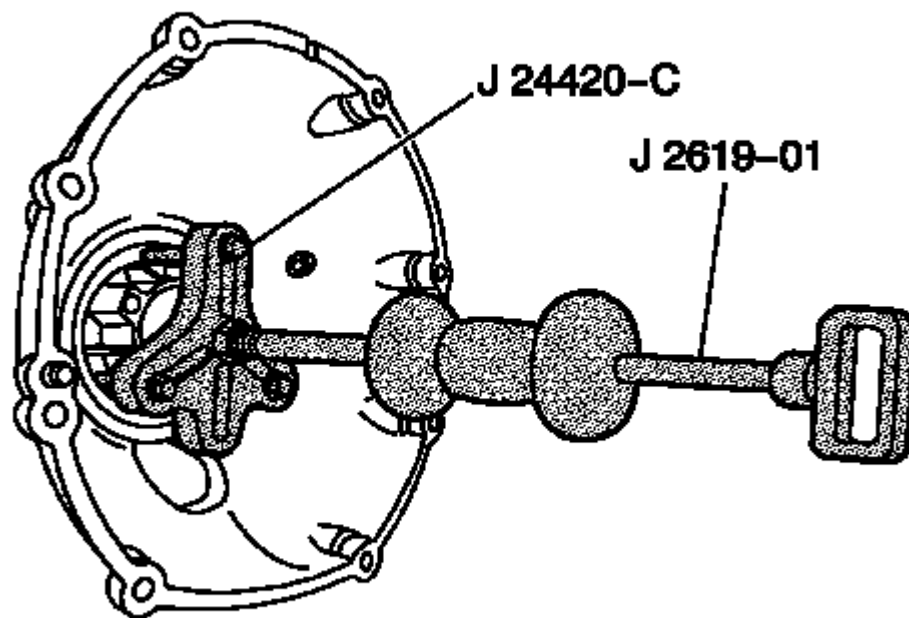


Fig. 128: Bolts To Rear Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

6. Install the **J 24420-C** puller and 3 M10-1.5 x 120 mm bolts to the rear bearing housing.
7. Install the **J 2619-01** slide hammer to the **J 24420-C** puller and separate the propeller shaft assembly from the driveline tube.

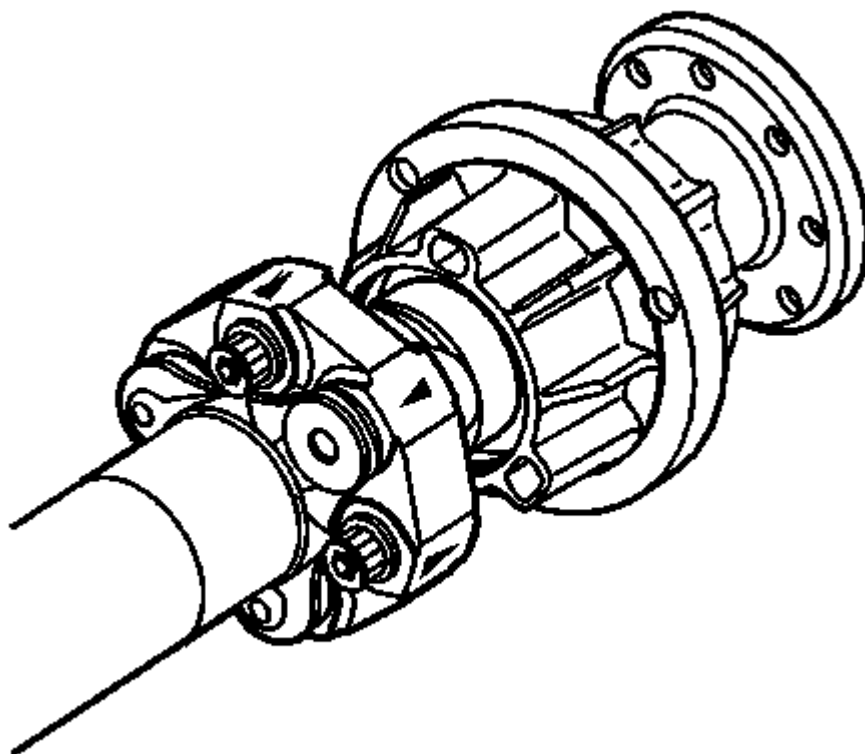


Fig. 129: View Of Propeller Shaft Assembly
Courtesy of GENERAL MOTORS COMPANY

NOTE: In order to prevent binding, the propeller shaft assembly must be withdrawn straight and evenly from the driveline tube.

8. Remove the propeller shaft assembly from the driveline tube.

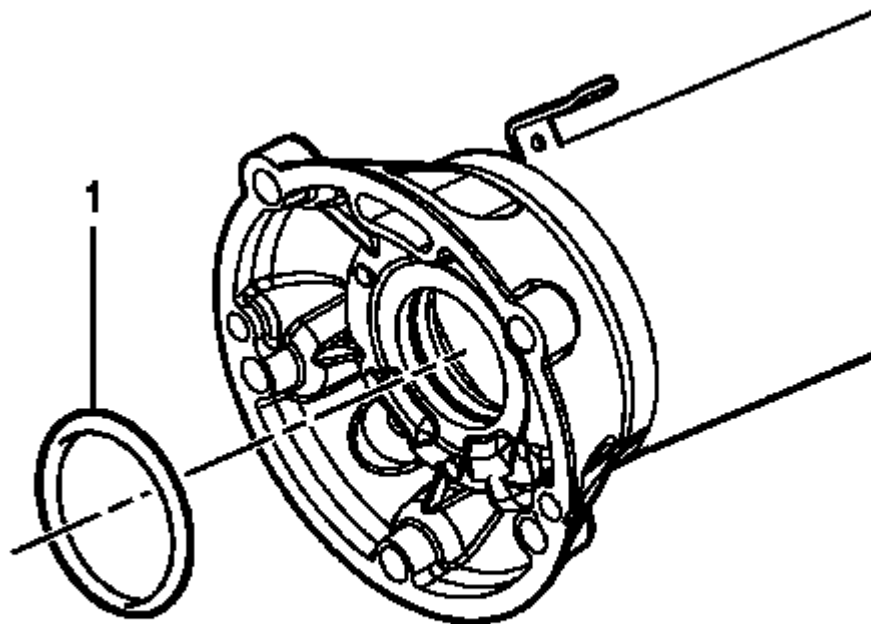


Fig. 130: Removing/Installing O-Ring
Courtesy of GENERAL MOTORS COMPANY

9. Remove the O-ring (1) from the front of the driveline tube.
10. Discard the O-ring.

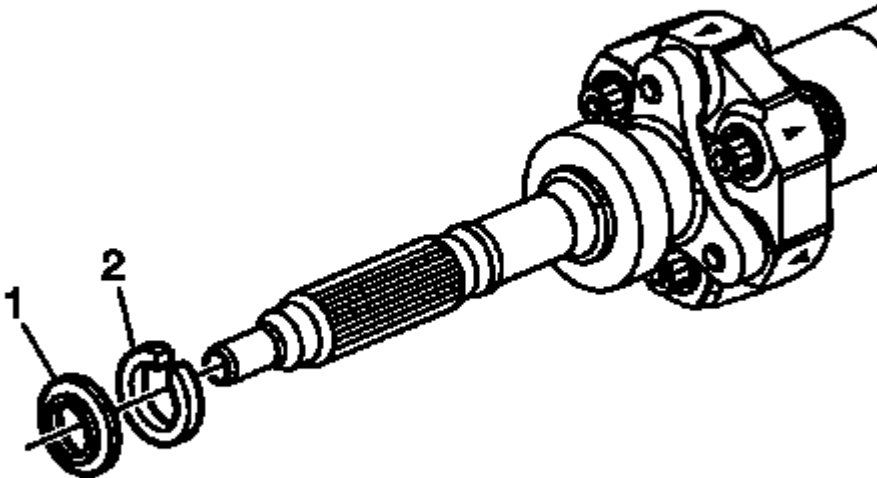


Fig. 131: Slinger Washer To Input Shaft
Courtesy of GENERAL MOTORS COMPANY

11. Remove the slinger washer (1) from the input shaft.
12. Discard the slinger washer.
13. Remove the snap ring (2) from the input shaft.

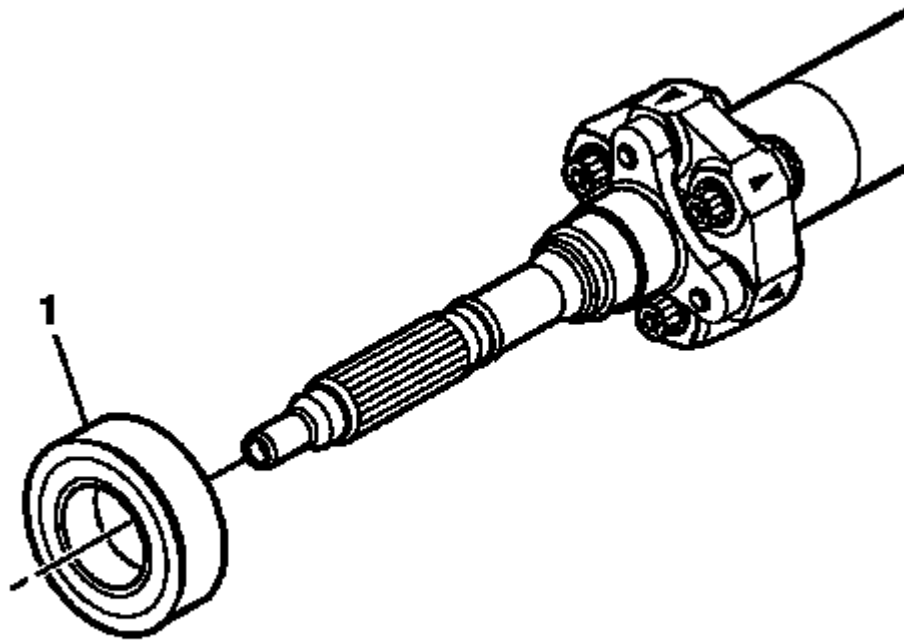


Fig. 132: Bearing To Input Shaft
Courtesy of GENERAL MOTORS COMPANY

14. Remove the bearing (1) from the input shaft.

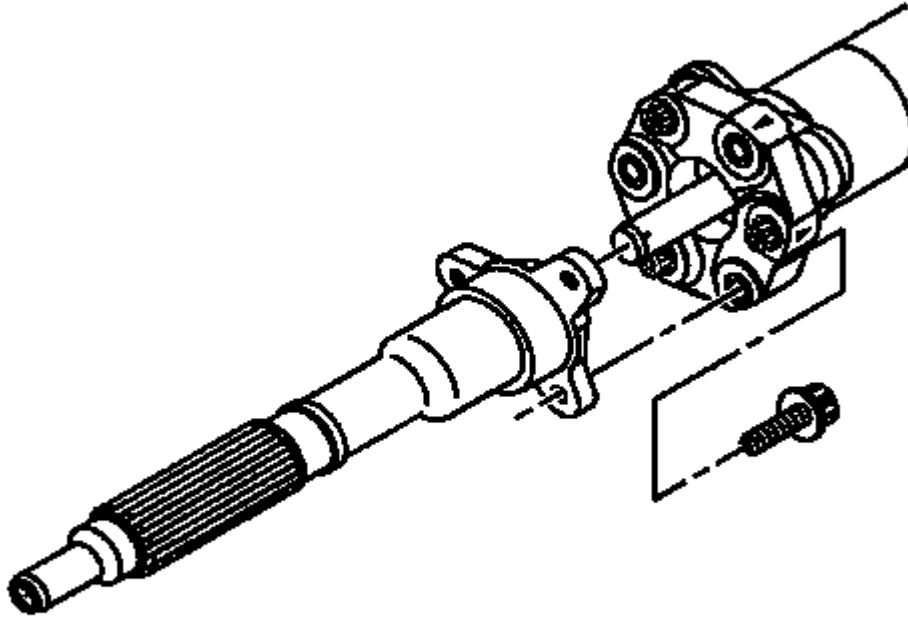


Fig. 133: Input Shaft, Bolts & Washers To Front Coupling
Courtesy of GENERAL MOTORS COMPANY

NOTE: Mark the radial relationship of the input shaft to the coupling and coupling to the propeller shaft. Mark the coupling orientation to prevent reversing. The arrow marks on the coupling refer to bolt direction but may not prevent reversing.

15. Remove the input shaft, bolts and washers from the front coupling.

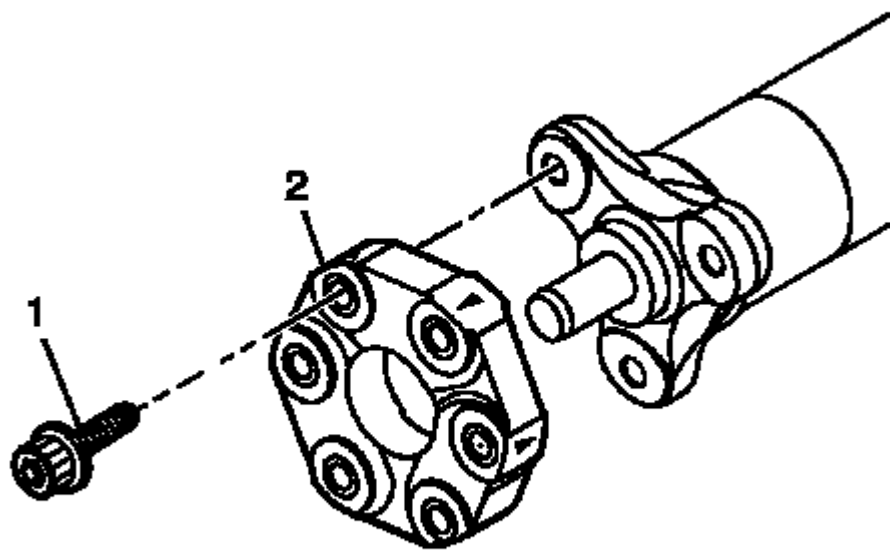


Fig. 134: Front Coupling, Bolts & Washers To Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

16. Remove the front coupling (2), bolts (1) and washers from the propeller shaft.

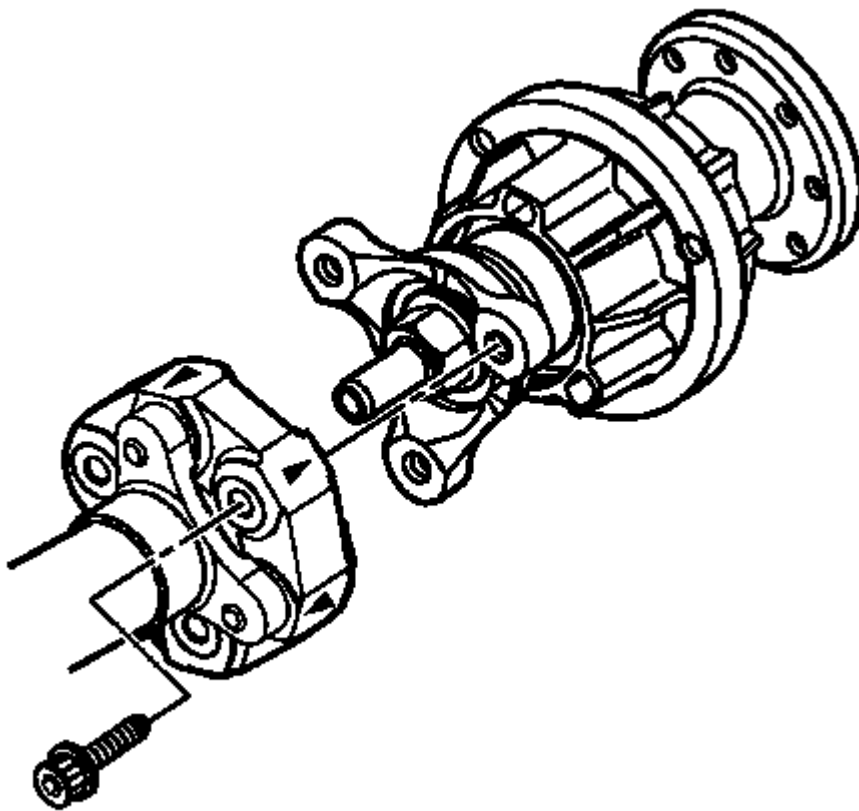


Fig. 135: View Of Bearing Housing Assembly, Bolts & Washers On Rear Coupling
Courtesy of GENERAL MOTORS COMPANY

NOTE: Mark the radial relationship of the bearing housing to the coupling and the coupling to the propeller shaft. Mark the coupling orientation to prevent reversing. The arrow marks on the coupling refer to bolt direction but may not prevent reversing.

17. Remove the bearing housing assembly, bolts and washers from the rear coupling.

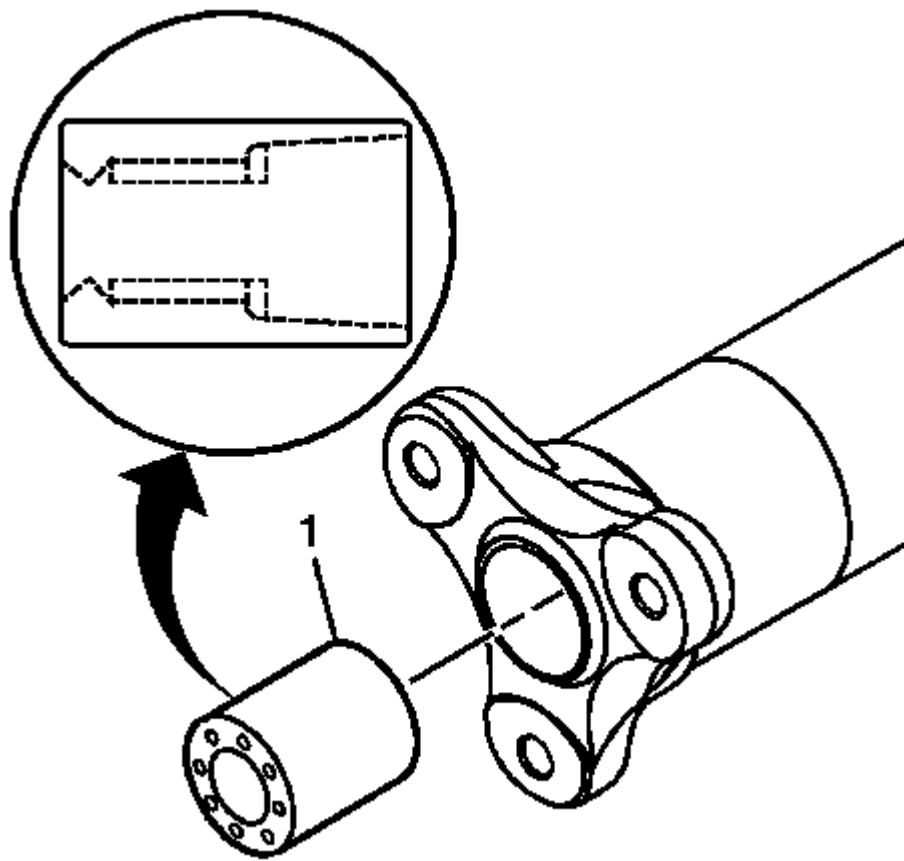


Fig. 136: View Of Propeller Shaft Bushing
Courtesy of GENERAL MOTORS COMPANY

18. Remove the bushing (1) from the propeller shaft, if required - automatic transmission.

Rear Bearing Housing Disassembly - Manual Transmission

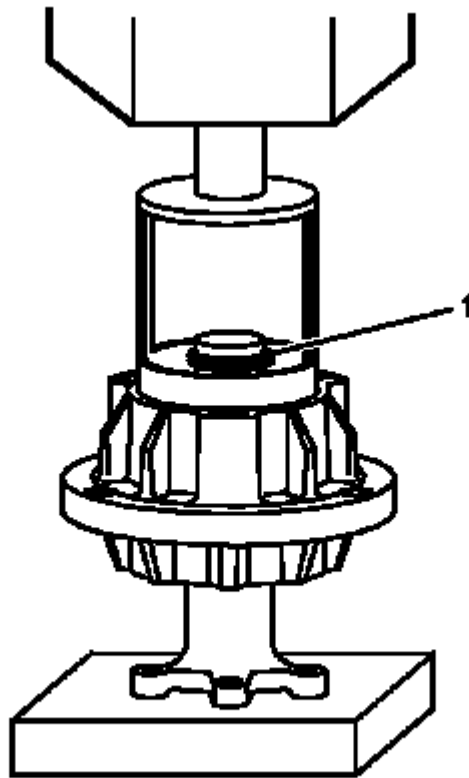


Fig. 137: Rear Bearing Housing Assembly & Snap Ring To Hub
Courtesy of GENERAL MOTORS COMPANY

1. Position the rear bearing housing assembly into a press. Apply pressure to the housing and compress the wave washer in order to remove the snap ring (1) from the hub.

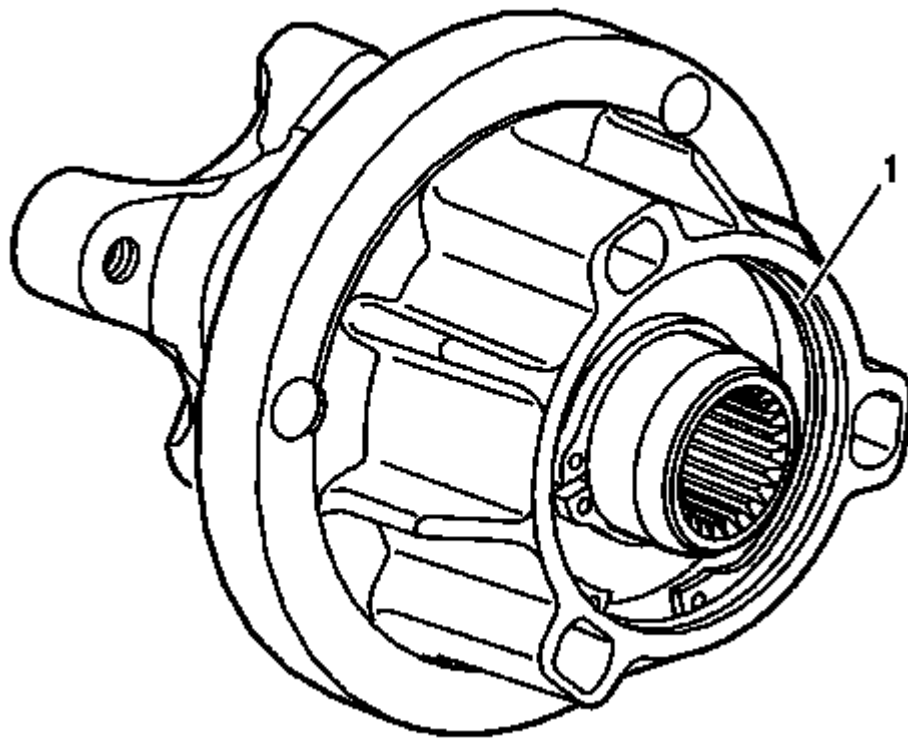


Fig. 138: Snap Ring To Hub
Courtesy of GENERAL MOTORS COMPANY

2. Remove the snap ring (1) from the hub.

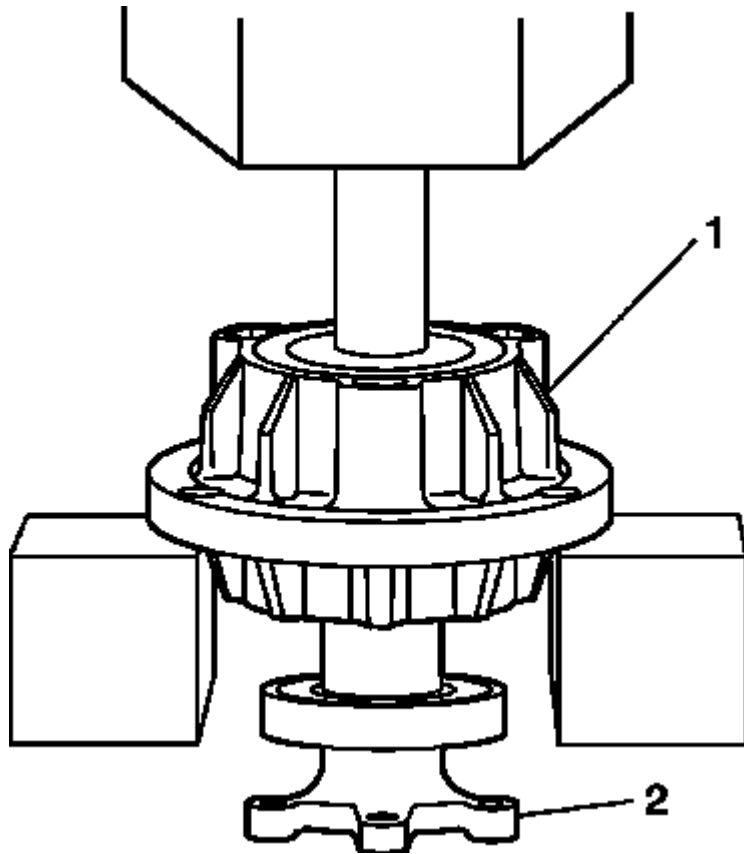


Fig. 139: Bearing Housing Assembly At Hub With Bearing To Housing
Courtesy of GENERAL MOTORS COMPANY

3. Position the bearing housing assembly (1) into a press in order to remove the hub and bearing assembly (2).
4. Remove the hub, with bearing (1) from the housing. The wave washer will remain in the housing.

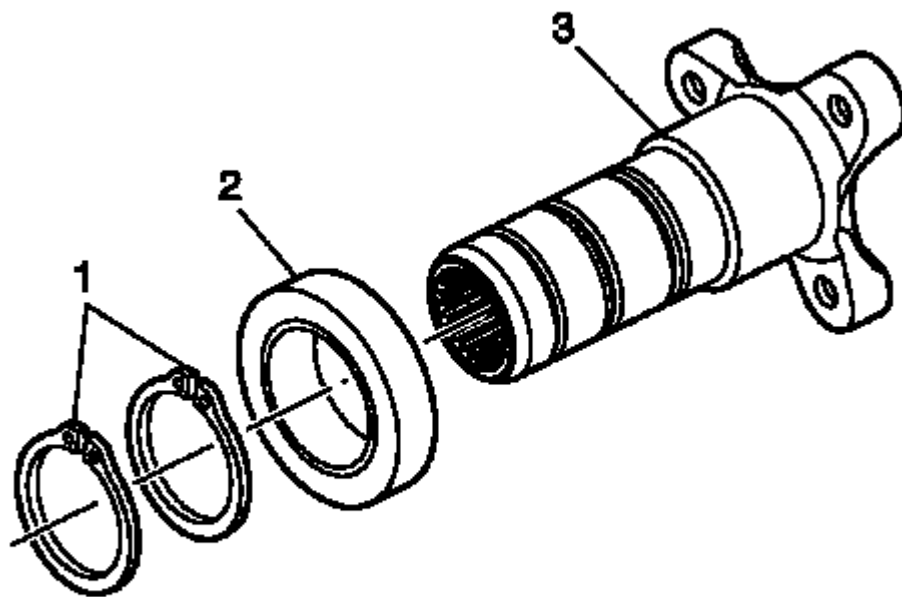


Fig. 140: Snap Rings & Bearing To Hub
Courtesy of GENERAL MOTORS COMPANY

5. Remove the snap rings (1) and bearing (2) from the hub (3).

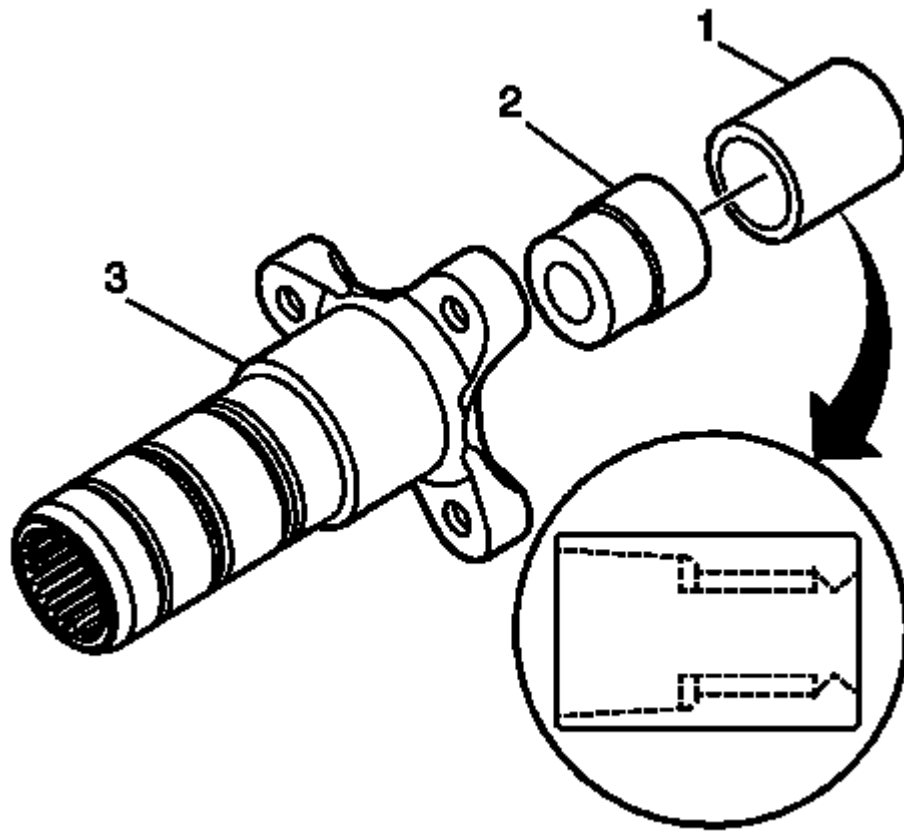


Fig. 141: Propeller Shaft Bushing & Transmission Input Shaft Bushing To Hub
Courtesy of GENERAL MOTORS COMPANY

6. Remove the propeller shaft bushing (1) and transmission input shaft bushing (2) from the hub (3) - manual transmission.

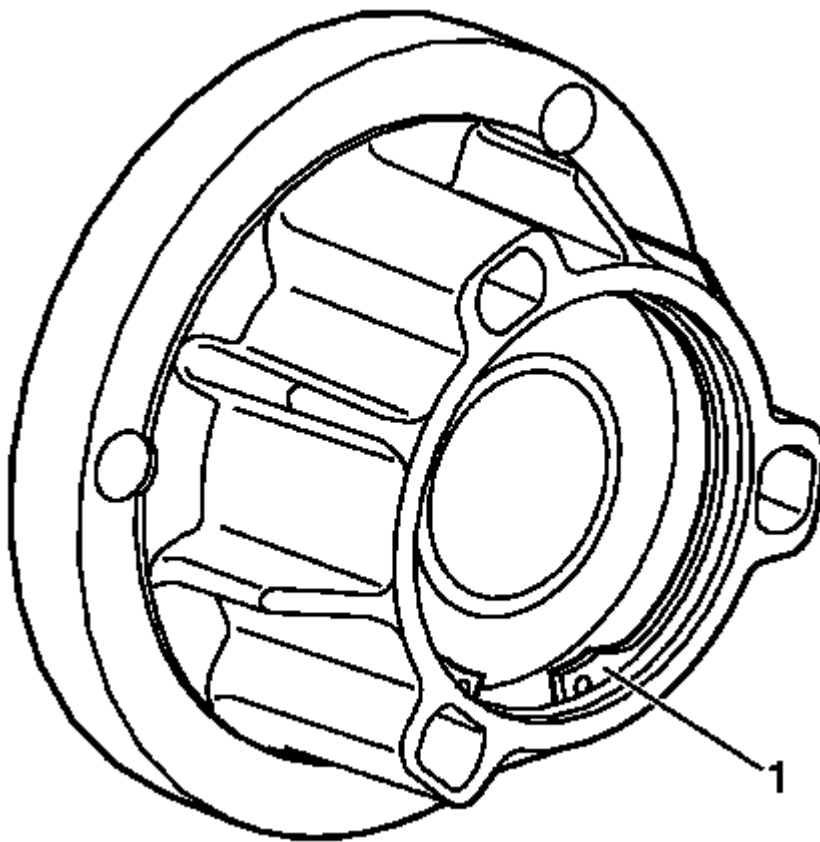


Fig. 142: View Of Rear Bearing Housing Snap Ring
Courtesy of GENERAL MOTORS COMPANY

7. Remove the snap ring (1) from the rear bearing housing.

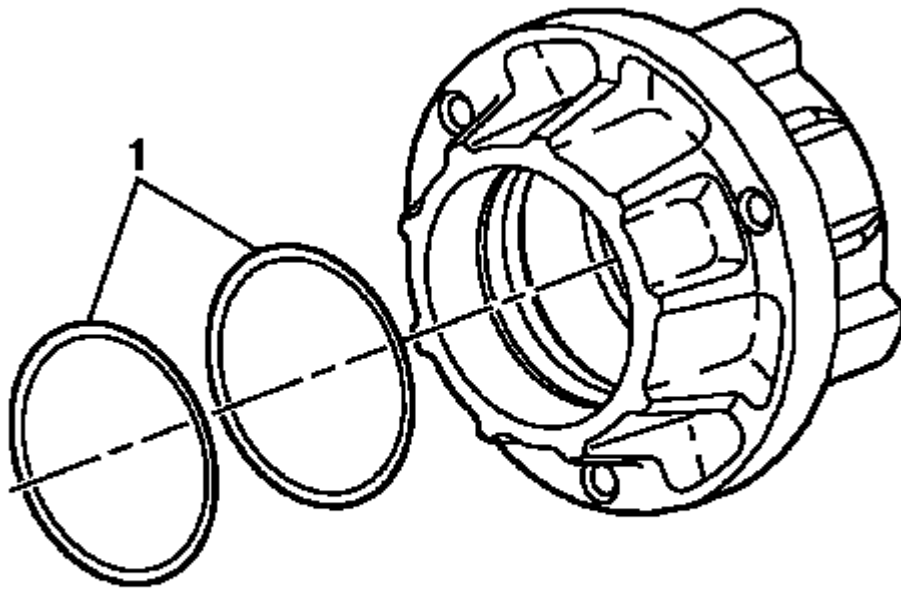


Fig. 143: View Of Rear Bearing Housing O-Rings
Courtesy of GENERAL MOTORS COMPANY

8. Remove the O-rings (1) from the rear bearing housing.
9. Discard the O-rings.

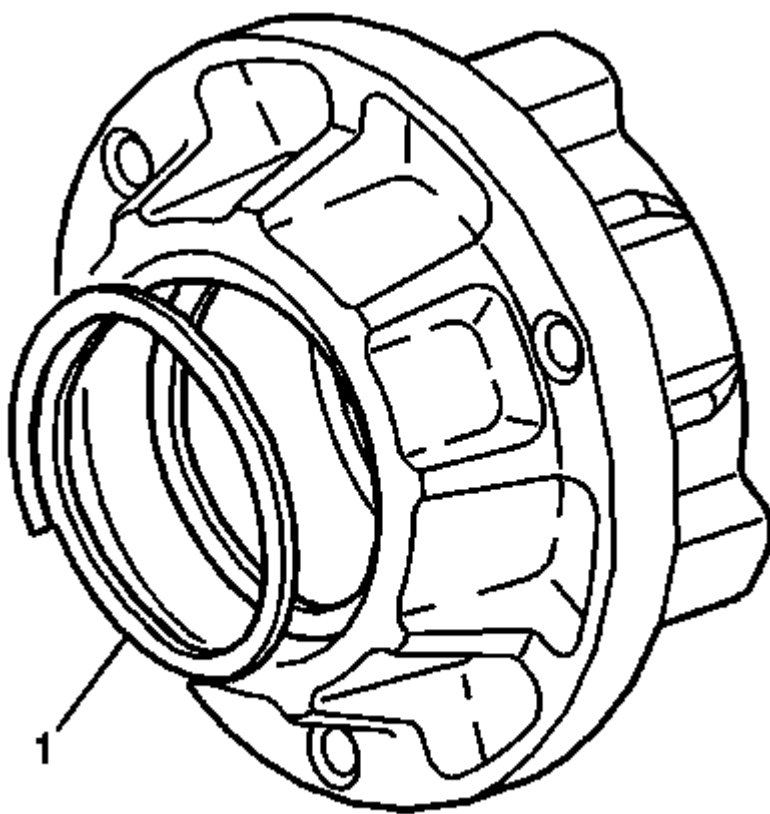


Fig. 144: Wave Washer To Rear Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

10. Remove the wave washer (1) from the rear bearing housing.

Rear Bearing Housing Disassembly - Automatic Transmission

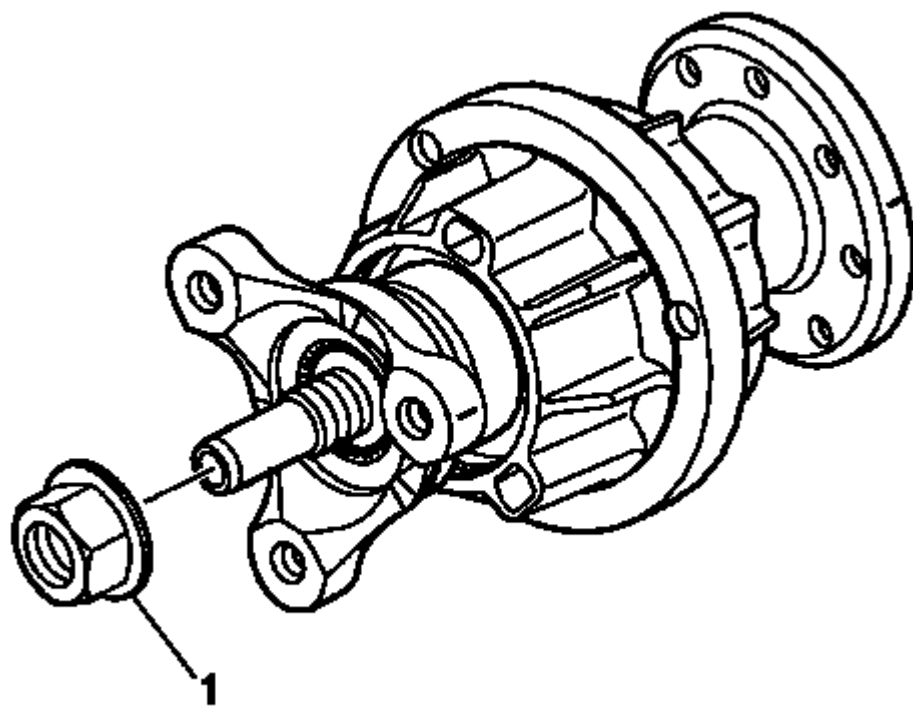


Fig. 145: Installing Flexplate Spindle Nut
Courtesy of GENERAL MOTORS COMPANY

1. Mark the assembled positions of the flange and spindle.
2. Remove the nut (1) from the flex plate spindle.

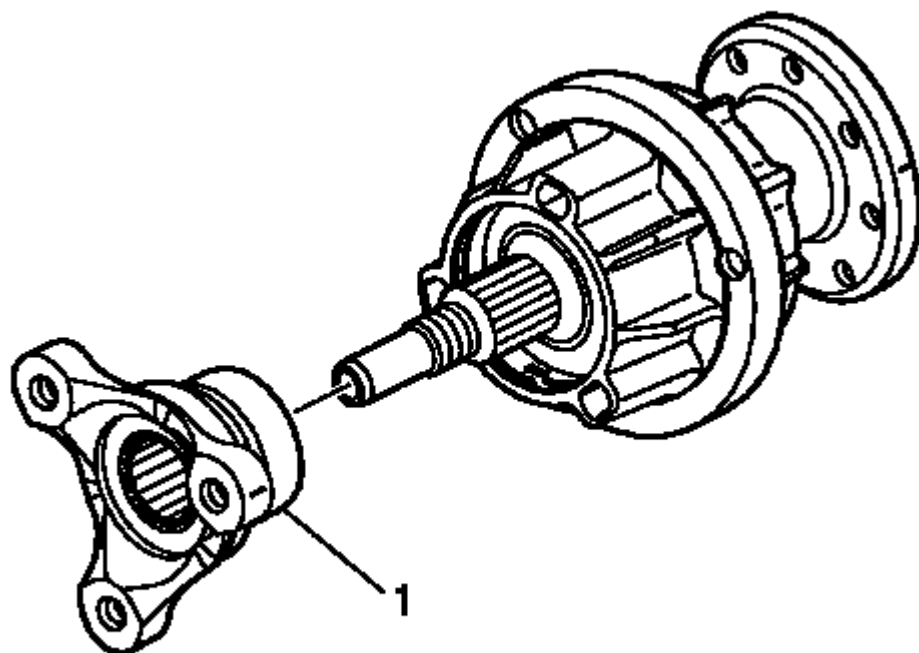


Fig. 146: Removing/Installing Hub To Flexplate Spindle
Courtesy of GENERAL MOTORS COMPANY

3. Remove the hub (1) from the flex plate spindle.

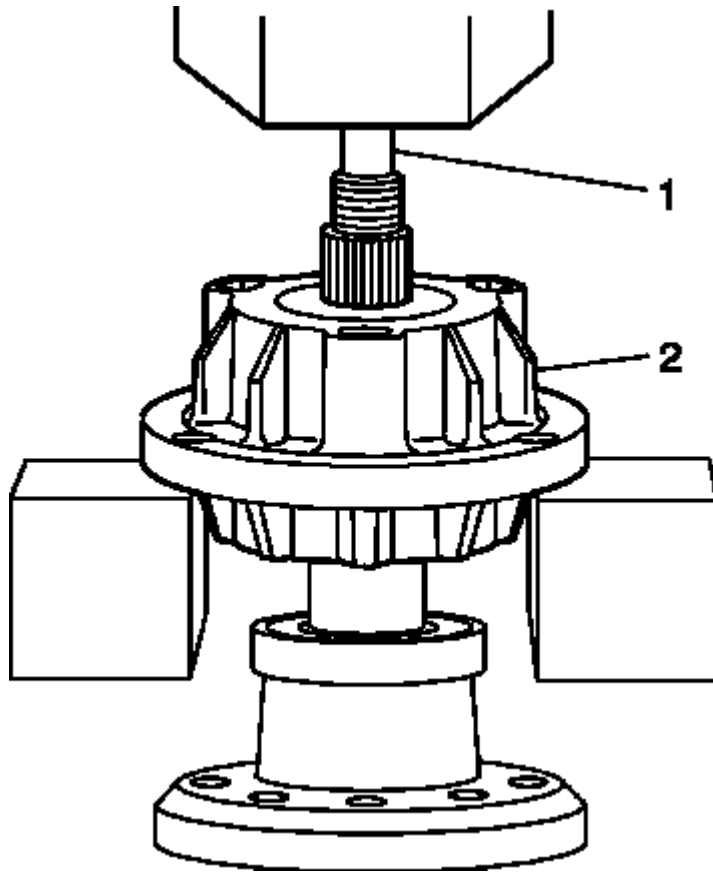


Fig. 147: Bearing Housing Assembly To Flexplate Spindle
Courtesy of GENERAL MOTORS COMPANY

4. Position the bearing housing assembly (2) into a press in order to remove the flex plate spindle (1).

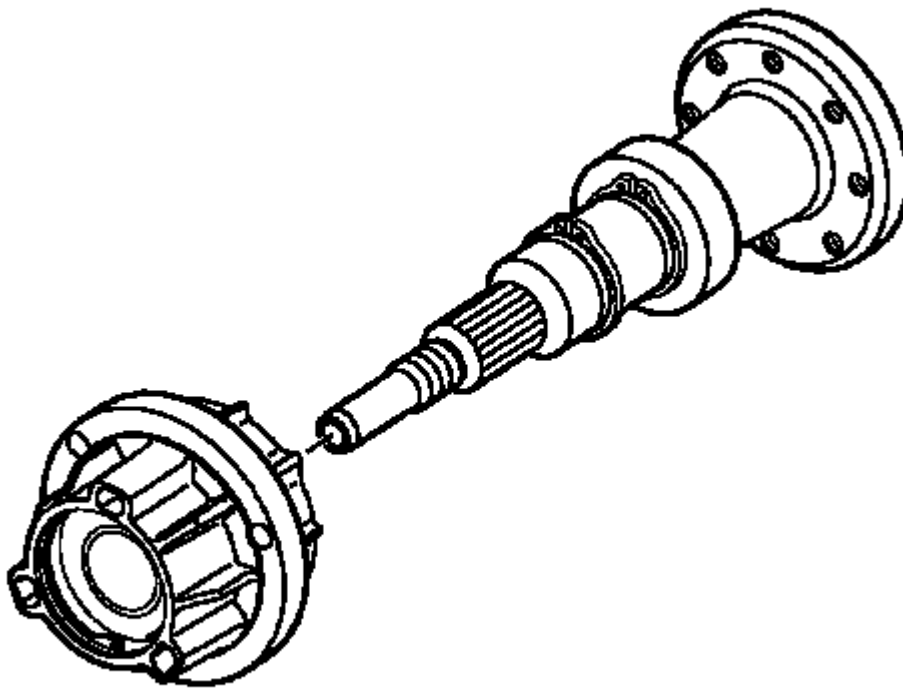


Fig. 148: Flexplate Spindle With Bearing To Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

5. Remove the flex plate spindle, with bearing, from the bearing housing.

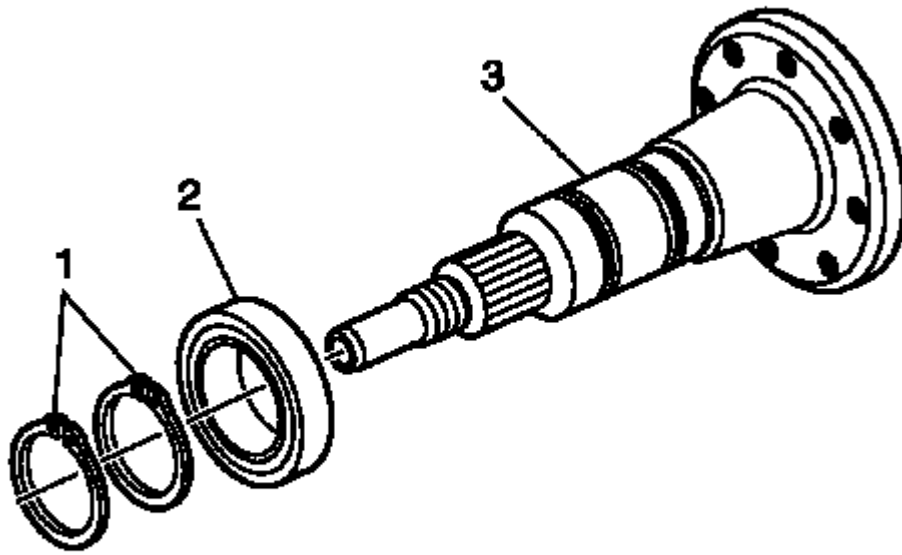


Fig. 149: Snap Rings & Bearing To Flexplate Spindle
Courtesy of GENERAL MOTORS COMPANY

6. Remove the snap rings (1) and bearing (2) from the flex plate spindle (3).

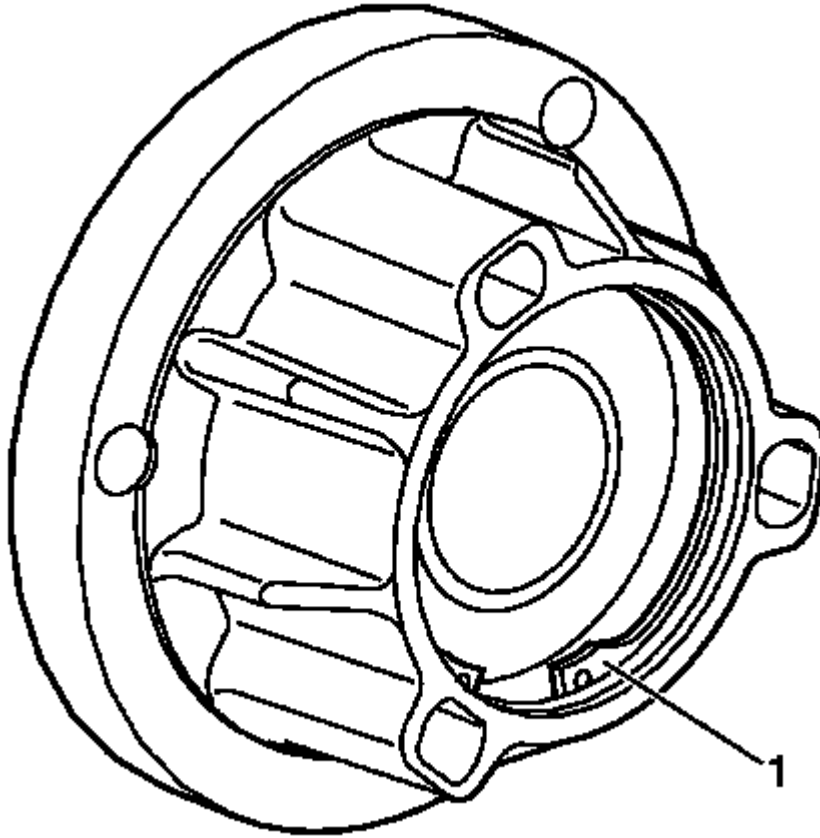


Fig. 150: View Of Rear Bearing Housing Snap Ring
Courtesy of GENERAL MOTORS COMPANY

7. Remove the snap ring (1) from the rear bearing housing.

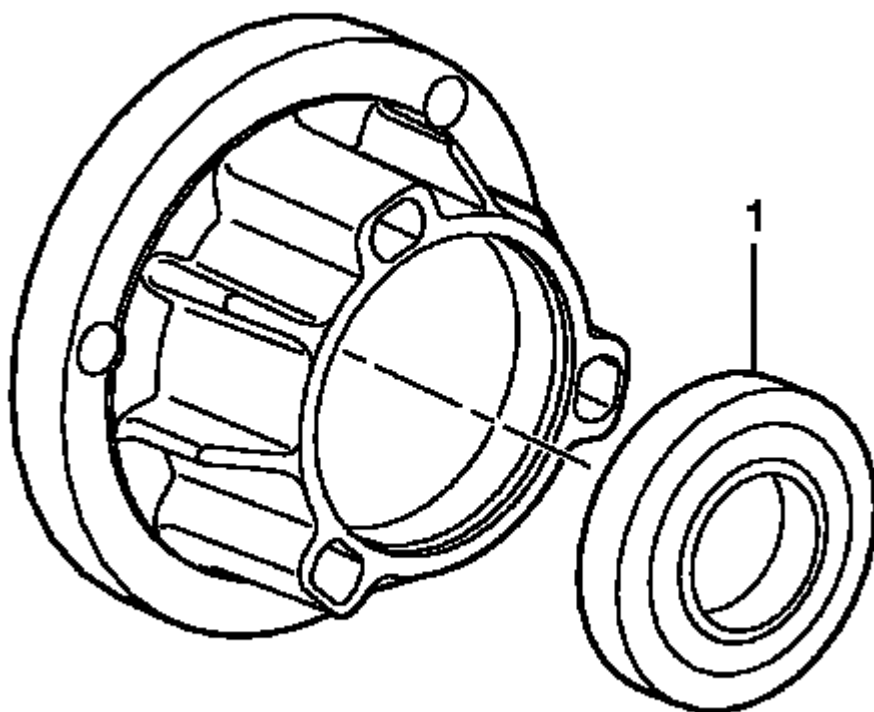


Fig. 151: Removing/Installing Bearing
Courtesy of GENERAL MOTORS COMPANY

8. Position the rear bearing housing into a press and remove the bearing (1).

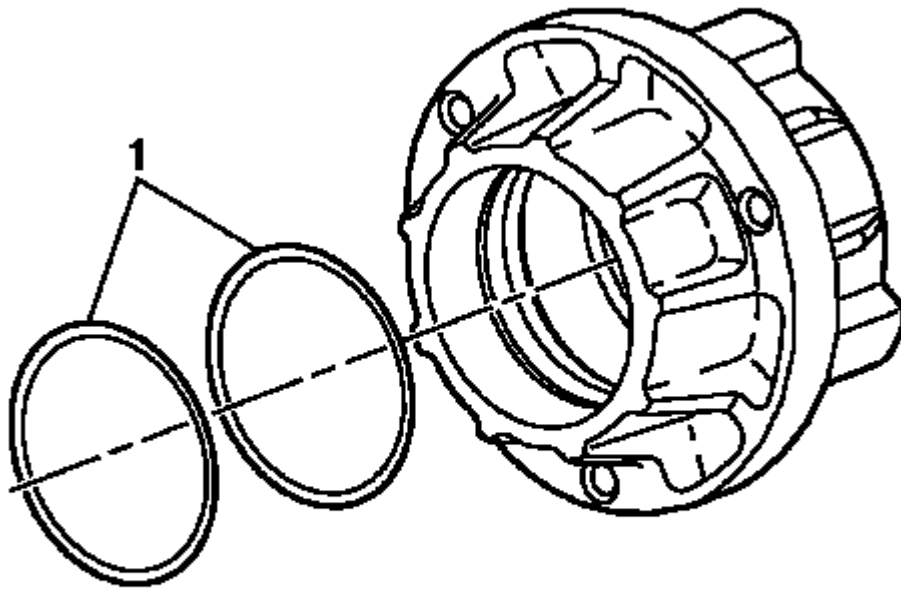


Fig. 152: View Of Rear Bearing Housing O-Rings
Courtesy of GENERAL MOTORS COMPANY

9. Remove the O-rings (1) from the rear bearing housing.
10. Discard the O-rings.

DRIVELINE SUPPORT ASSEMBLY CLEANING AND INSPECTION

Special Tools

J 7872 Magnetic Base Dial Indicator Set

For equivalent regional tools, refer to **Special Tools**.

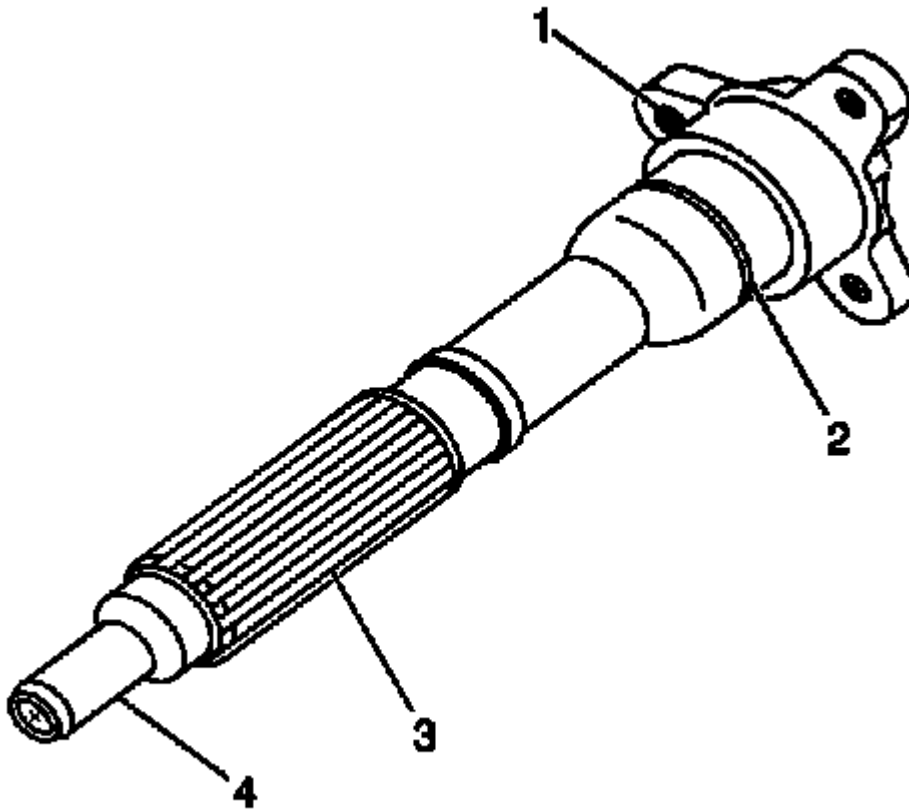


Fig. 153: Bolts & Bolt Holes Of Threadlocking Material
Courtesy of GENERAL MOTORS COMPANY

1. Clean all bolts and bolt holes of threadlocking material.
2. Clean the components in solvent.

WARNING: Wear safety glasses in order to avoid eye damage.

3. Dry the following components with compressed air.
4. Inspect the hub for the following conditions:
 - Damaged bolt hole threads (1)
 - Damaged snap ring grooves (2)
 - Worn splines (3)
 - Worn or scored surface (4)
 - Worn or damaged bushing

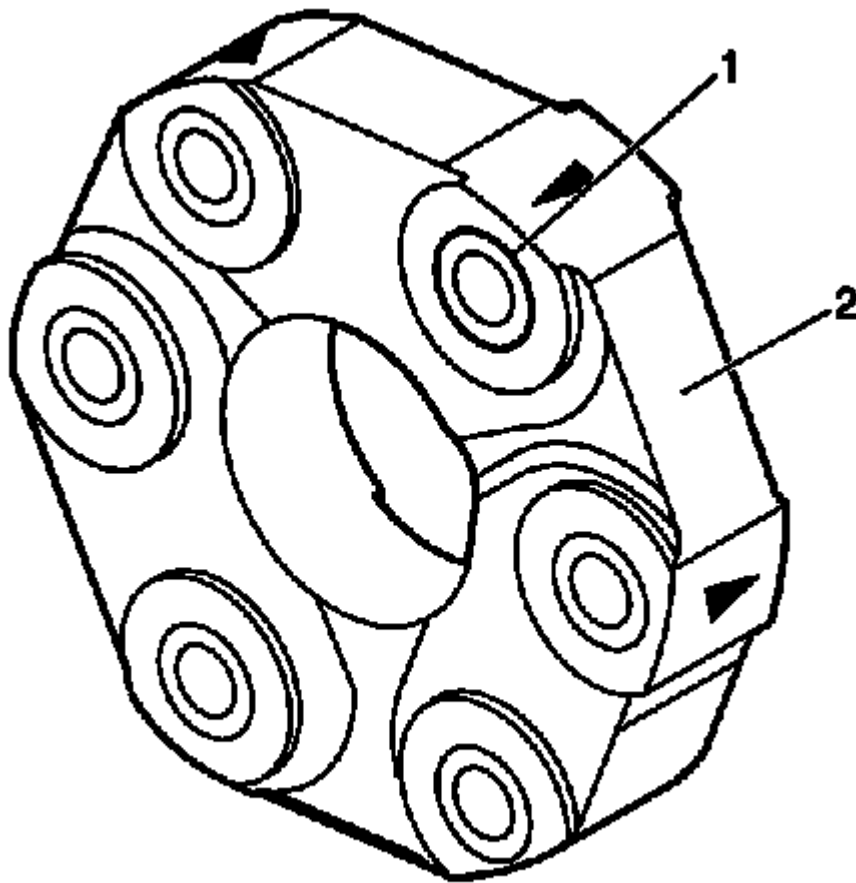


Fig. 154: Inspecting Couplings
Courtesy of GENERAL MOTORS COMPANY

5. Inspect the couplings for the following conditions:
- Loose or damaged inserts (1)
 - Worn, cracking or deteriorated rubber (2)

MINOR cracking of the rubber is normal and acceptable. If the cracks expose any frayed fabric or internal windings, replace the coupling.

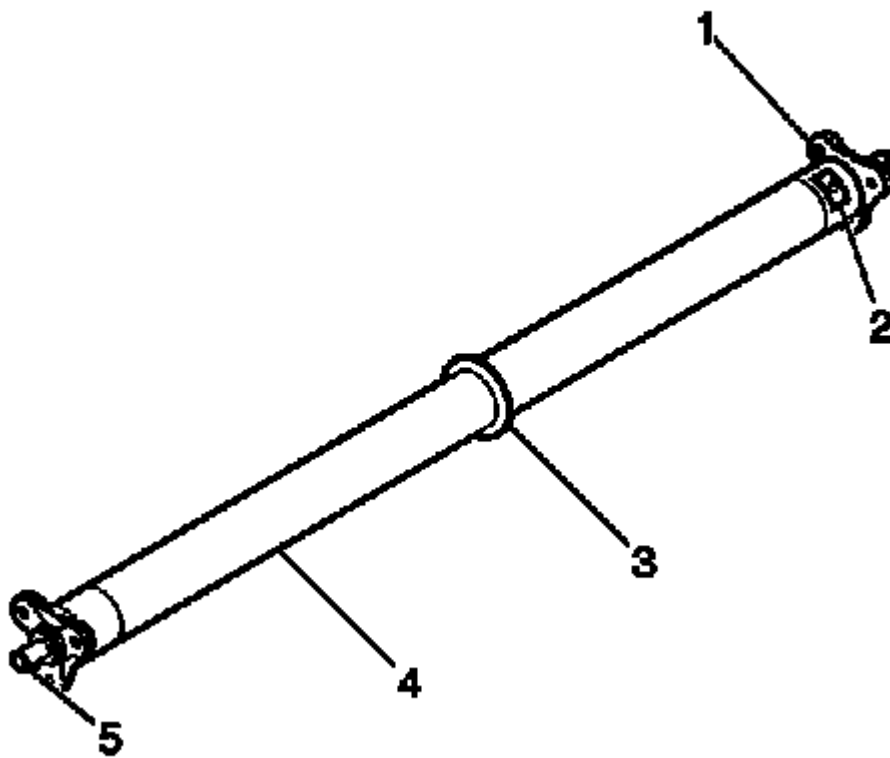


Fig. 155: Propeller Shaft To Driveline Support Tube
Courtesy of GENERAL MOTORS COMPANY

6. Inspect the propeller shaft for the following conditions:
 - Damaged bolt hole threads (1)
 - Loose or missing balance weights (2)
 - Balance weights may have been installed and removed during the balancing process. In those cases, a weld mark will remain on the propeller tube.
 - Inspect the inside of the driveline support tube for a missing balance weight.
 - Loose or damaged snubber (3) - manual transmission
 - Dented or damaged propeller shaft tube (4)
 - Worn, bent, loose or damaged pins (5)

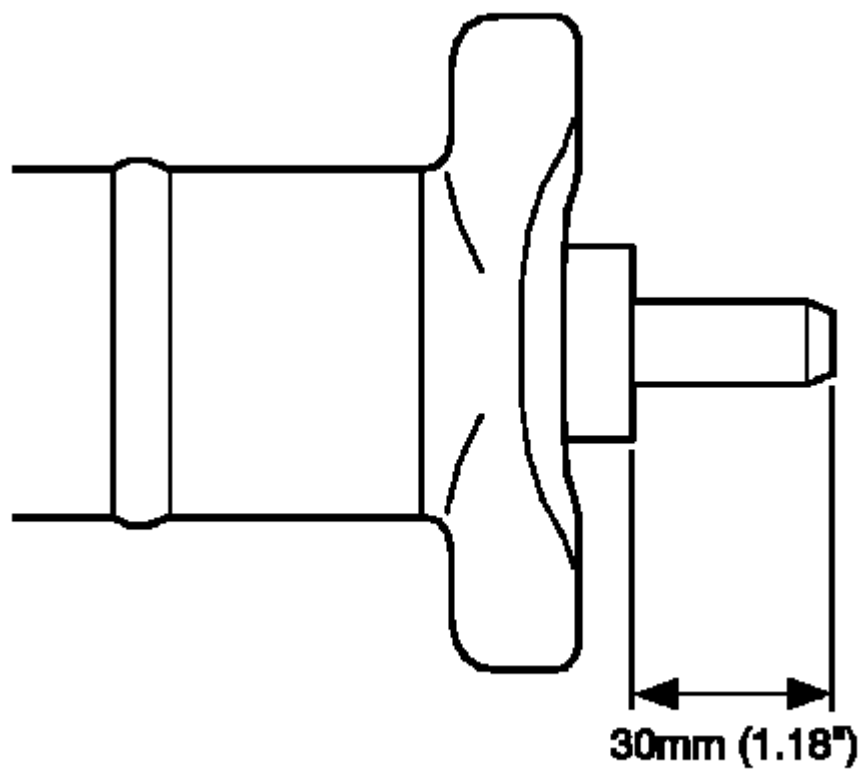


Fig. 156: Inspecting Propeller Shaft Pins For Proper Installation
Courtesy of GENERAL MOTORS COMPANY

7. Inspect the propeller shaft pins for proper installation. The pin should extend beyond the flange 30 mm (1.18 in).

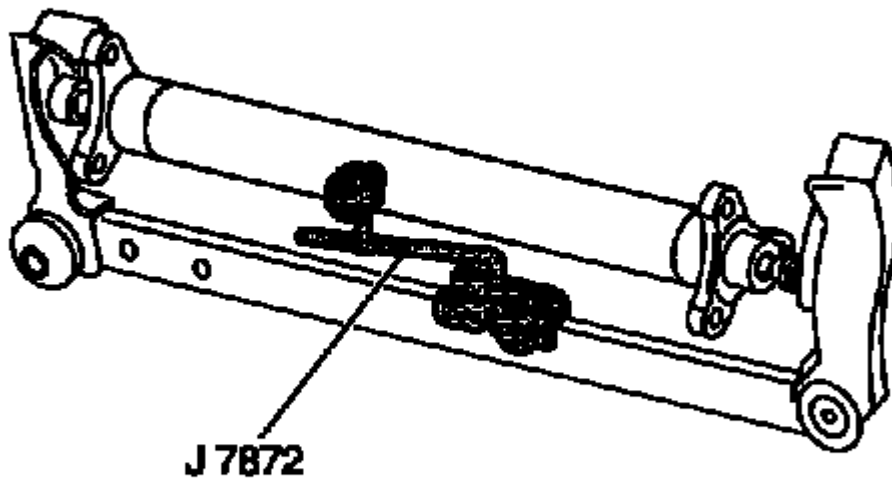


Fig. 157: Measuring Propeller Shaft Runout
Courtesy of GENERAL MOTORS COMPANY

8. Measure the propeller shaft runout.
 1. Mount the propeller shaft in wooden V-blocks or between centers on a fixture.
 2. Using the **J 7872** dial indicator, inspect the propeller shaft for run out in multiple locations, including the barrel ends.
 3. If propeller shaft runout exceeds 0.3 mm (0.118 in), the propeller shaft is bent and should be replaced.
9. Inspect the snubber - manual transmission - for wear or a flat spot on the outer edge.
10. Inspect the runout of the snubber.

If the runout of the outer edge of the snubber exceeds 2 mm (0.79 in), replace the propeller shaft.

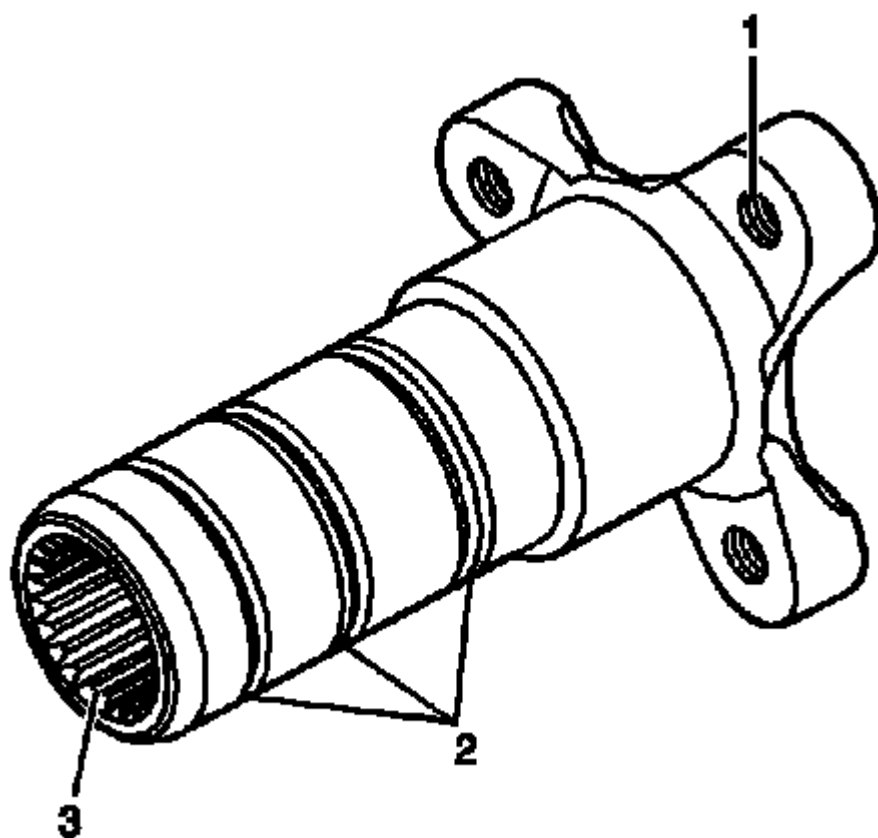


Fig. 158: Bearing Housing Hub At Bolt Hole Threads & Snap Ring Grooves
Courtesy of GENERAL MOTORS COMPANY

11. Inspect the bearing housing hub for the following conditions:

- Damaged bolt hole threads (1)
- Damaged snap ring grooves (2)
- Worn or damaged splines (3)
- Worn or damaged bushings

Bushings that have been removed from the hub will be damaged and should not be reused. Install NEW bushings during assembly.

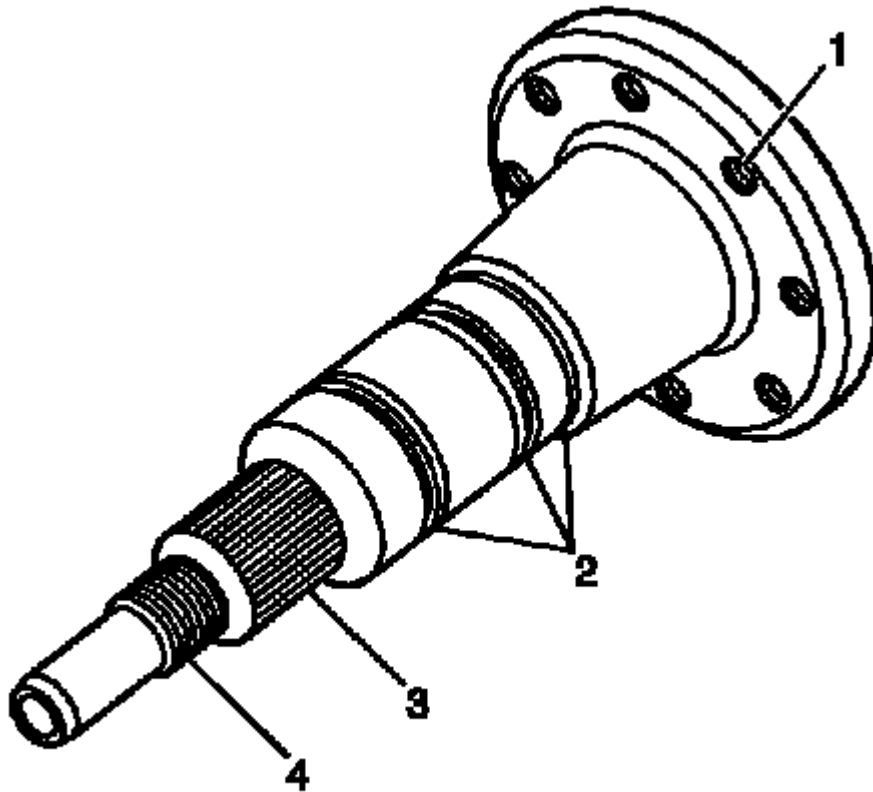


Fig. 159: Flexplate Spindle - Automatic Transmission
Courtesy of GENERAL MOTORS COMPANY

12. Inspect the flex plate spindle - automatic transmission, for the following conditions:
- Damaged bolt hole threads (1)
 - Damaged snap ring grooves (2)
 - Worn or damaged splines (3)
 - Damaged threads (4)

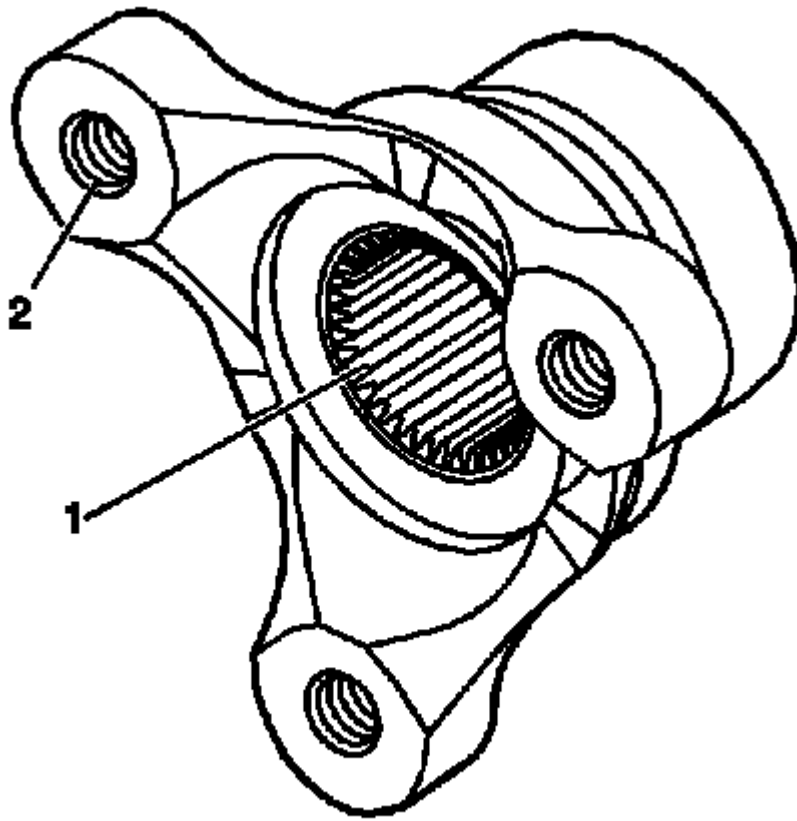


Fig. 160: Inspecting Input Hub
Courtesy of GENERAL MOTORS COMPANY

13. Inspect the input hub - automatic transmission, for the following conditions:
- Worn or damaged splines (1)
 - Damaged bolt hole threads (2)

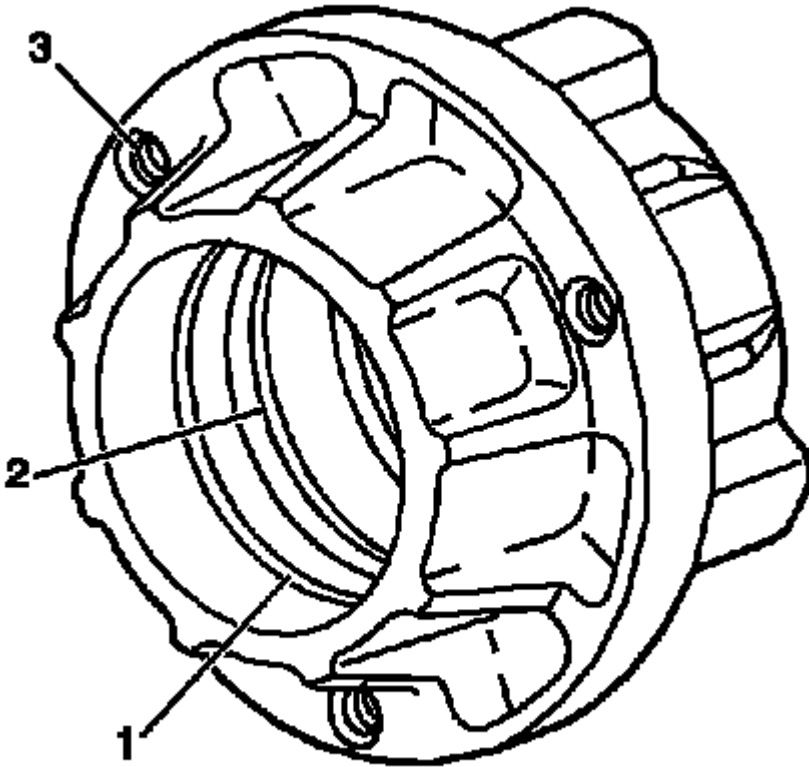


Fig. 161: Inspecting Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

14. Inspect the bearing housing for the following conditions:
- Damaged O-ring or snap ring grooves (1-2)
 - Damaged threads (3)
 - Worn or scored bearing bores

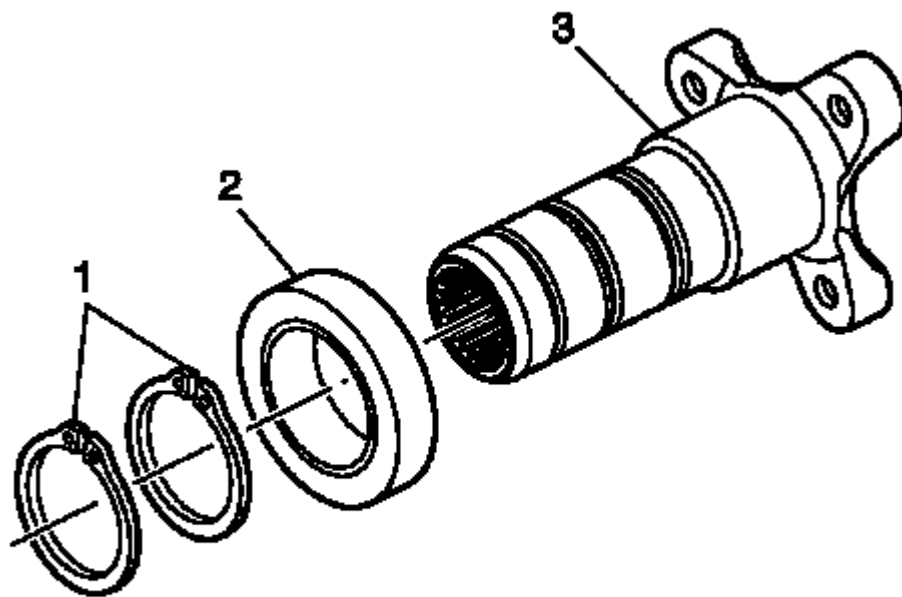


Fig. 162: Snap Rings & Bearing To Hub
Courtesy of GENERAL MOTORS COMPANY

15. Inspect the bearings for the following conditions:
 - Damaged grease seals
 - Excessive wear or roughness of operation

Bearings should rotate freely with no coarseness or rough feel

16. Inspect for bent or broken snap rings (1) and replace, as required.
17. Inspect the driveline tube for the following conditions:
 - Damaged bolt hole threads
 - Damaged front O-ring groove
 - Worn or scored front bearing bore
 - Missing or damaged bellhousing dowel pins
 - Damage to the exterior of the tube
 - Cracked welds

DRIVELINE SUPPORT ASSEMBLY ASSEMBLE

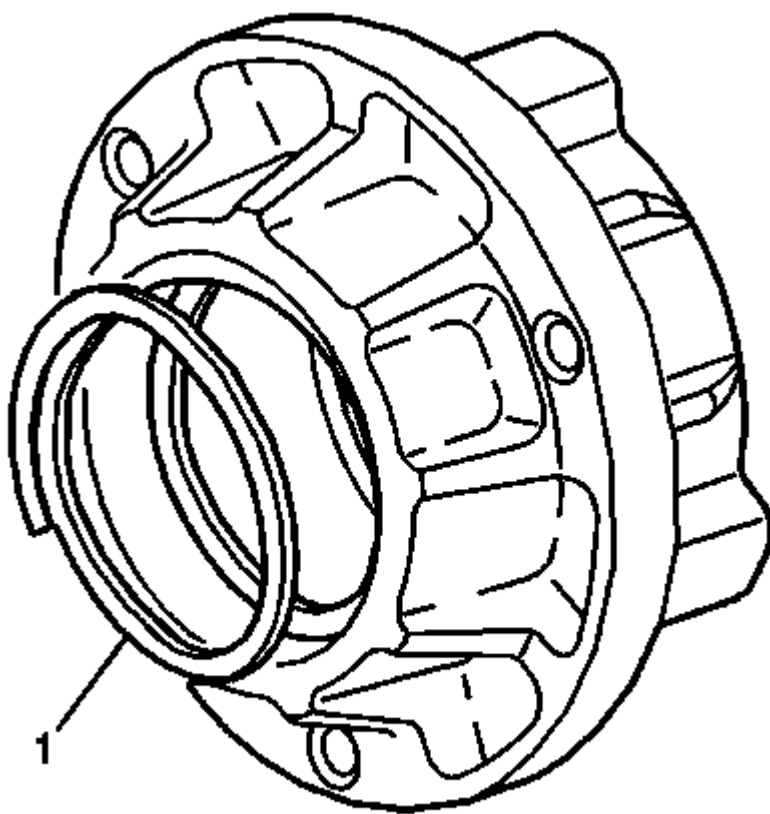


Fig. 163: Wave Washer To Rear Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not separate the input shaft, propeller shaft, couplings or bearing housing assembly, unless required. These components are balanced as an assembly. Disassembly and improper reassembly of the components may cause vehicle driveline vibration.

If the input shaft, couplings, propeller shaft or bearing housing assembly must be separated, the components must be marked prior to disassembly. During assembly, the components must be returned to their original position and location.

1. Install the wave washer (1) into the rear bearing housing.

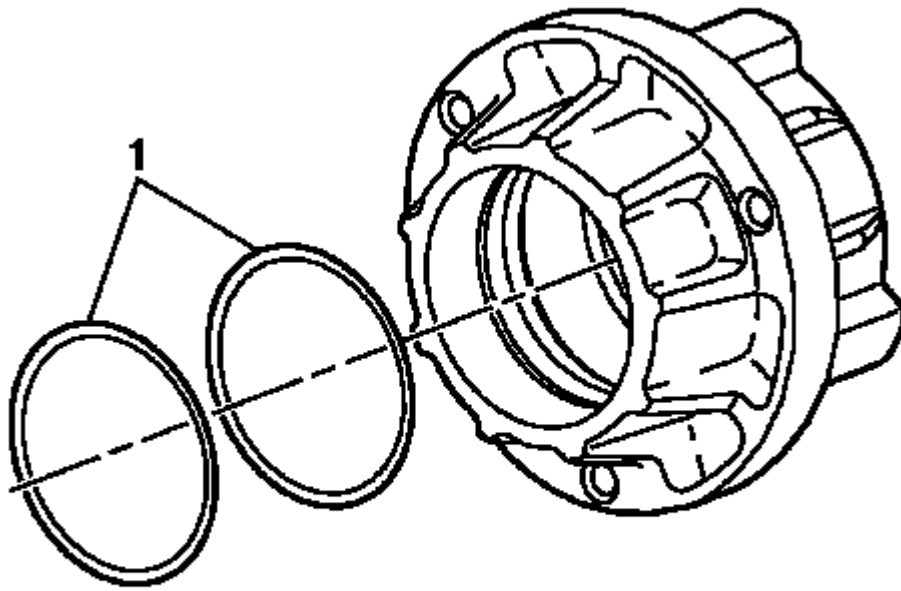


Fig. 164: View Of Rear Bearing Housing O-Rings
Courtesy of GENERAL MOTORS COMPANY

2. Lubricate the NEW rear bearing housing O-rings (1) with clean engine oil.
3. Install the O-rings into the rear bearing housing.

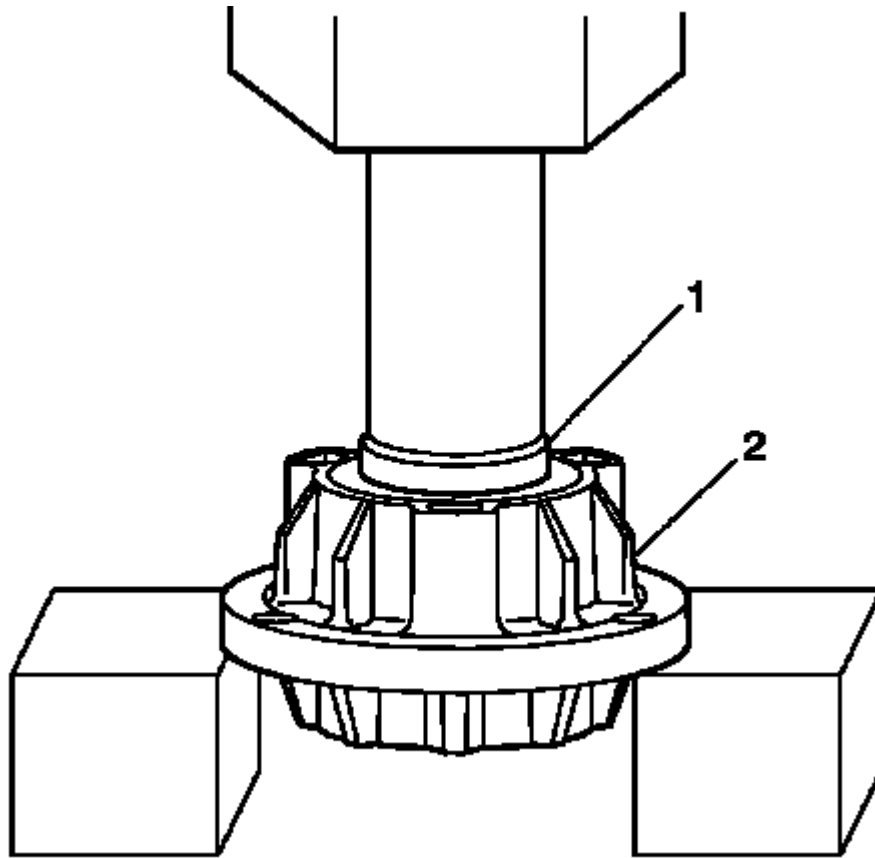


Fig. 165: Positioning Bearing Housing Into Press To Install Bearing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Press only on the outer race of the bearing.

4. Position the rear bearing housing (2) into a press in order to install the bearing (1).

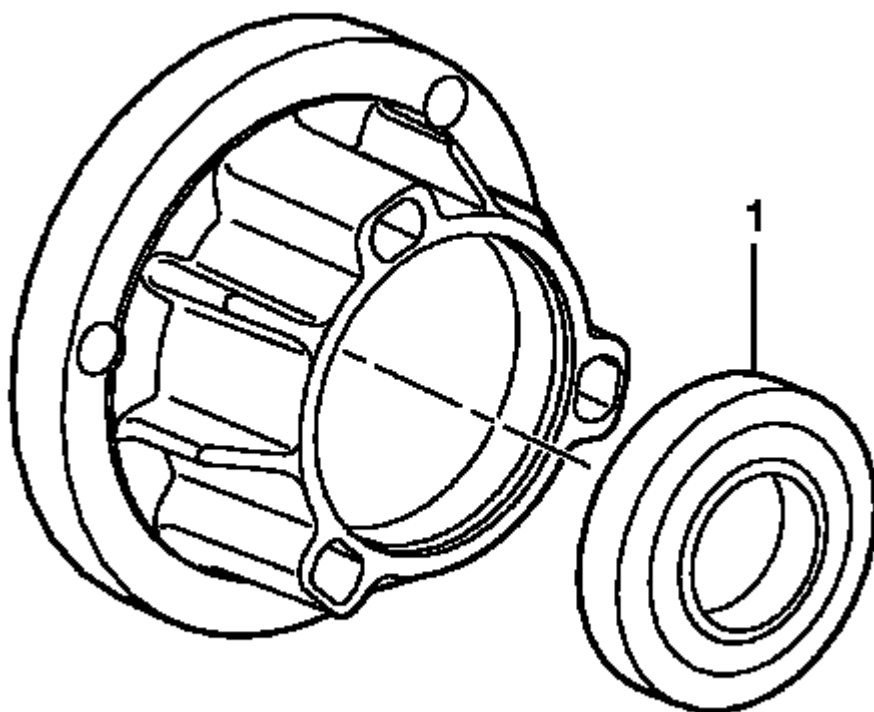


Fig. 166: Removing/Installing Bearing
Courtesy of GENERAL MOTORS COMPANY

5. Install the bearing (1) into the housing.

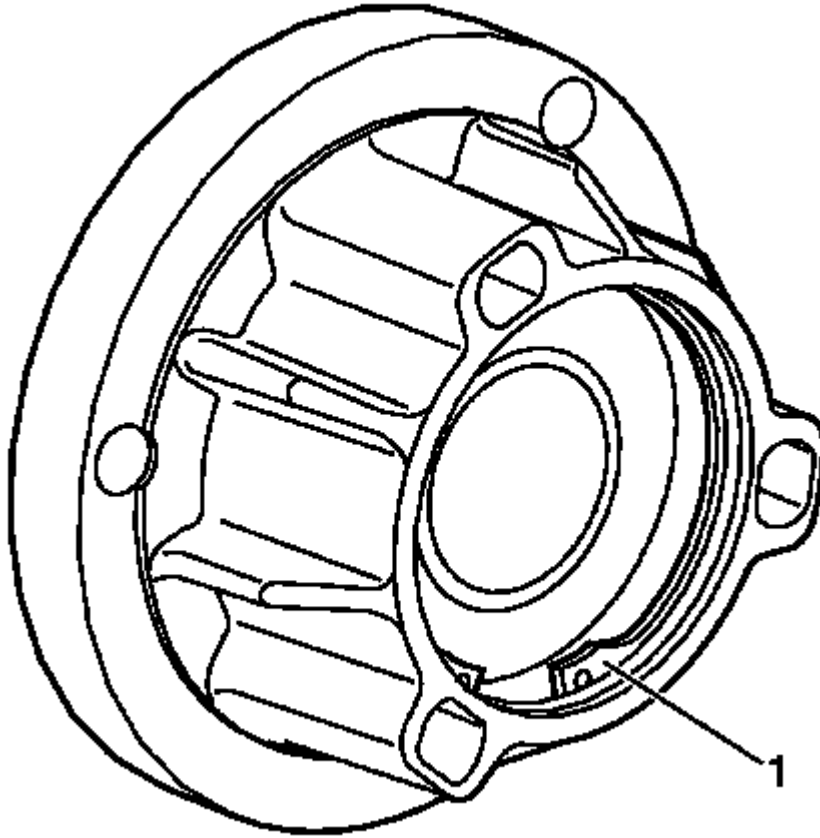


Fig. 167: View Of Rear Bearing Housing Snap Ring
Courtesy of GENERAL MOTORS COMPANY

6. Install the snap ring (1) into the rear bearing housing.

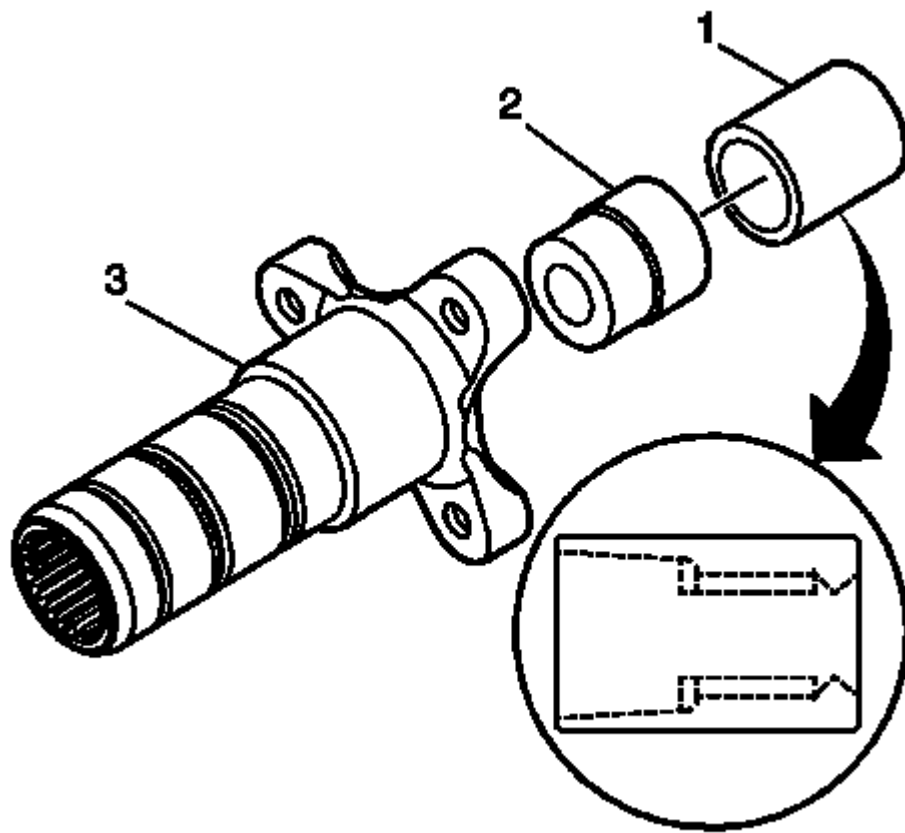


Fig. 168: Propeller Shaft Bushing & Transmission Input Shaft Bushing To Hub
Courtesy of GENERAL MOTORS COMPANY

NOTE: Install the propeller shaft bushing into hub with the smaller opening of the bushing positioned away from the hub.

7. Install the transmission input shaft bushing (2) and propeller shaft bushing (1) into the hub, if required.

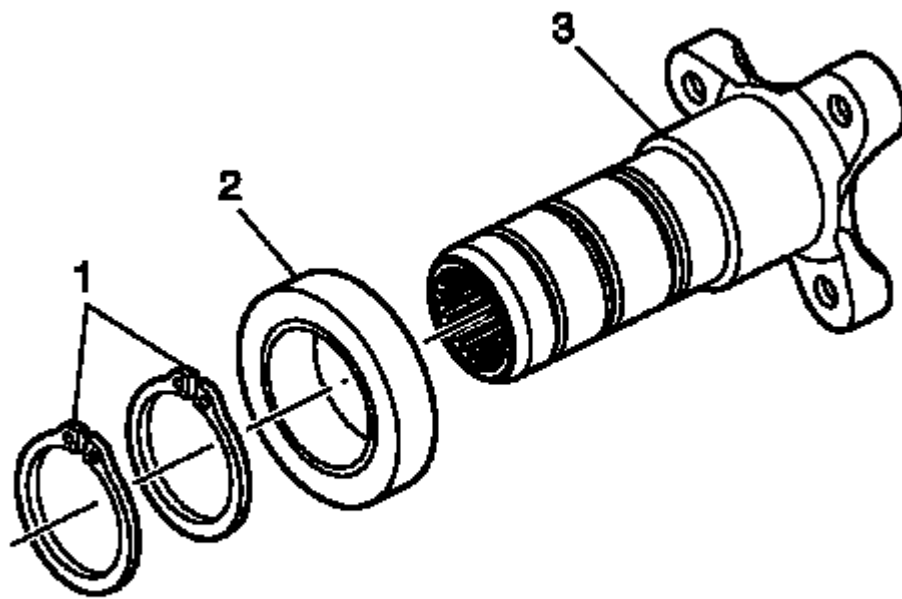


Fig. 169: Snap Rings & Bearing To Hub
Courtesy of GENERAL MOTORS COMPANY

8. Install the bearing (2) and snap rings (1) onto the hub (3).

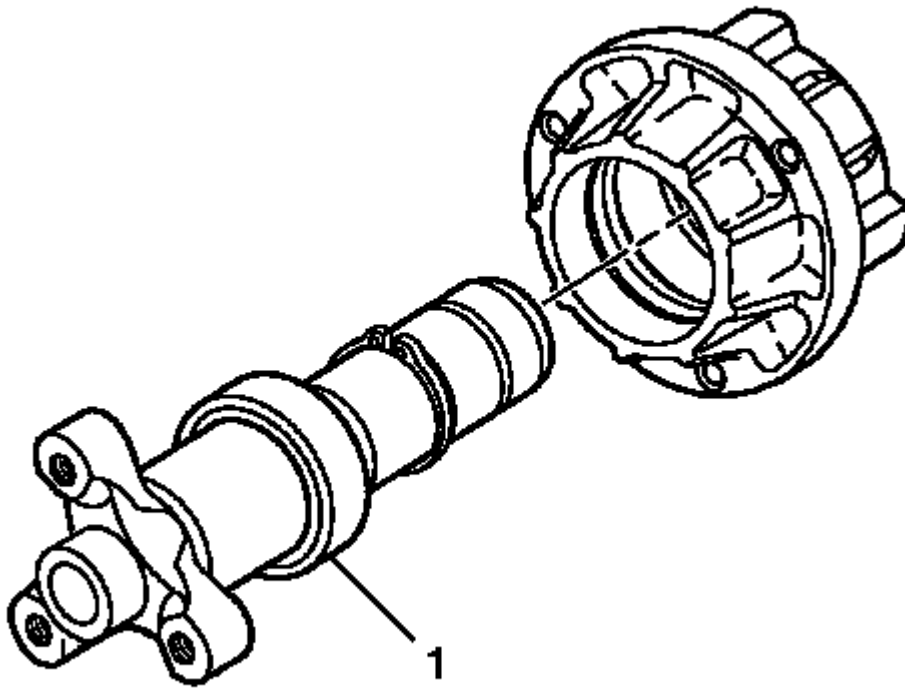


Fig. 170: Hub To Rear Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

9. Install the hub (1) into the rear bearing housing.

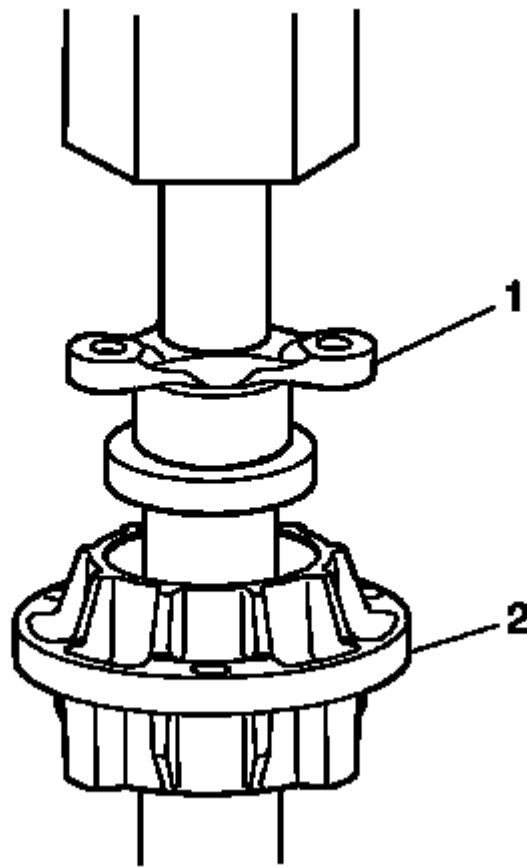


Fig. 171: Hub With Bearing To Housing
Courtesy of GENERAL MOTORS COMPANY

10. Press the hub, with bearing (1), into the housing (2). Support the inner race of the housing bearing when assembling the components.

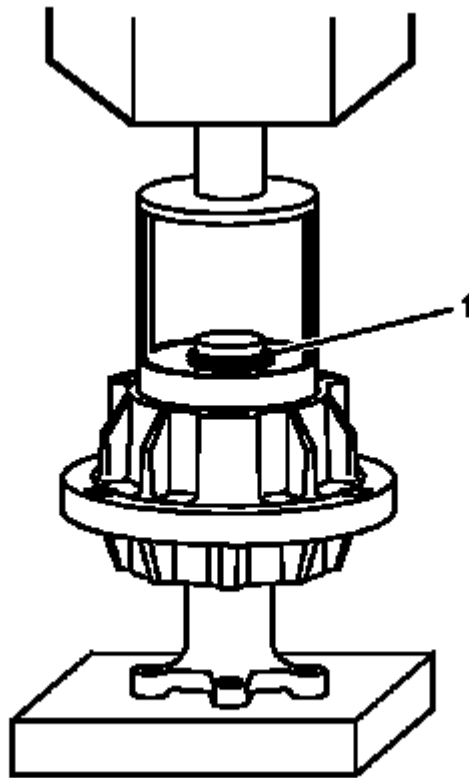


Fig. 172: Rear Bearing Housing Assembly & Snap Ring To Hub
Courtesy of GENERAL MOTORS COMPANY

11. Position the bearing housing into a press. Apply pressure to the housing and compress the wave washer in order to install the snap ring (1).

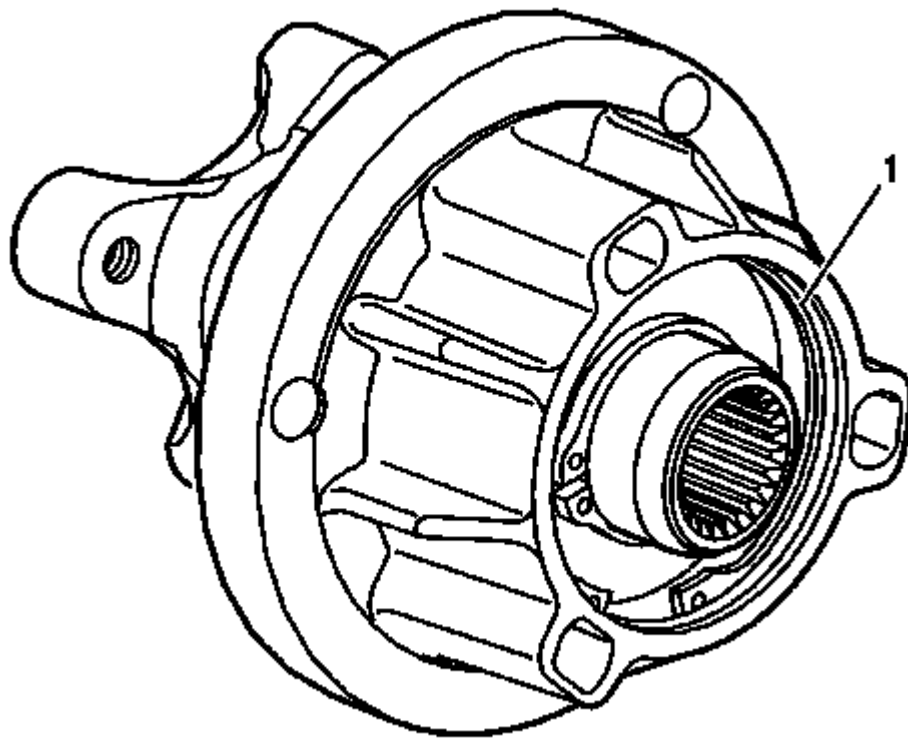


Fig. 173: Snap Ring To Hub
Courtesy of GENERAL MOTORS COMPANY

12. Install the snap ring (1) onto the hub.

Rear Bearing Housing Assembly - Automatic Transmission

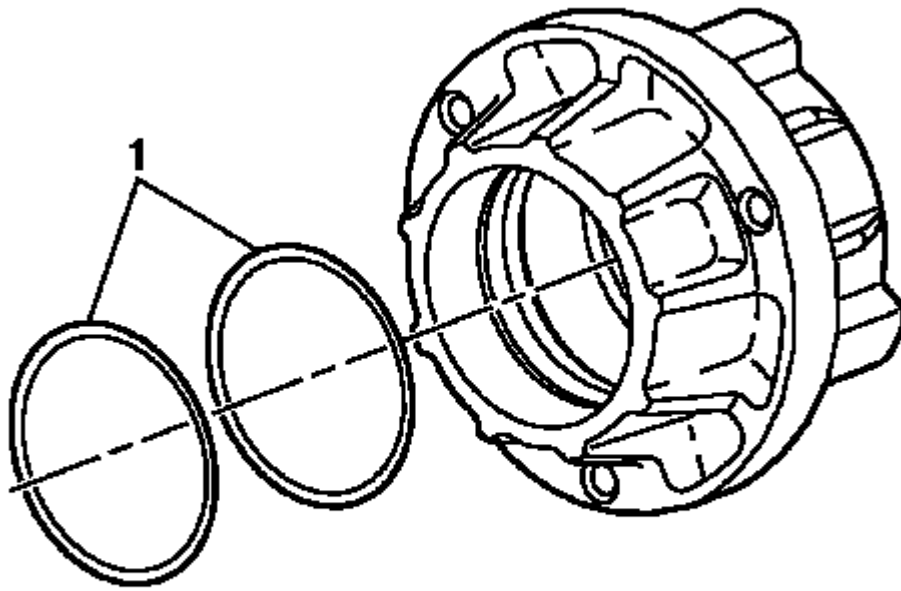


Fig. 174: View Of Rear Bearing Housing O-Rings
Courtesy of GENERAL MOTORS COMPANY

1. Lubricate the NEW rear bearing housing O-rings (1) with clean engine oil.
2. Install the O-rings into the rear bearing housing.

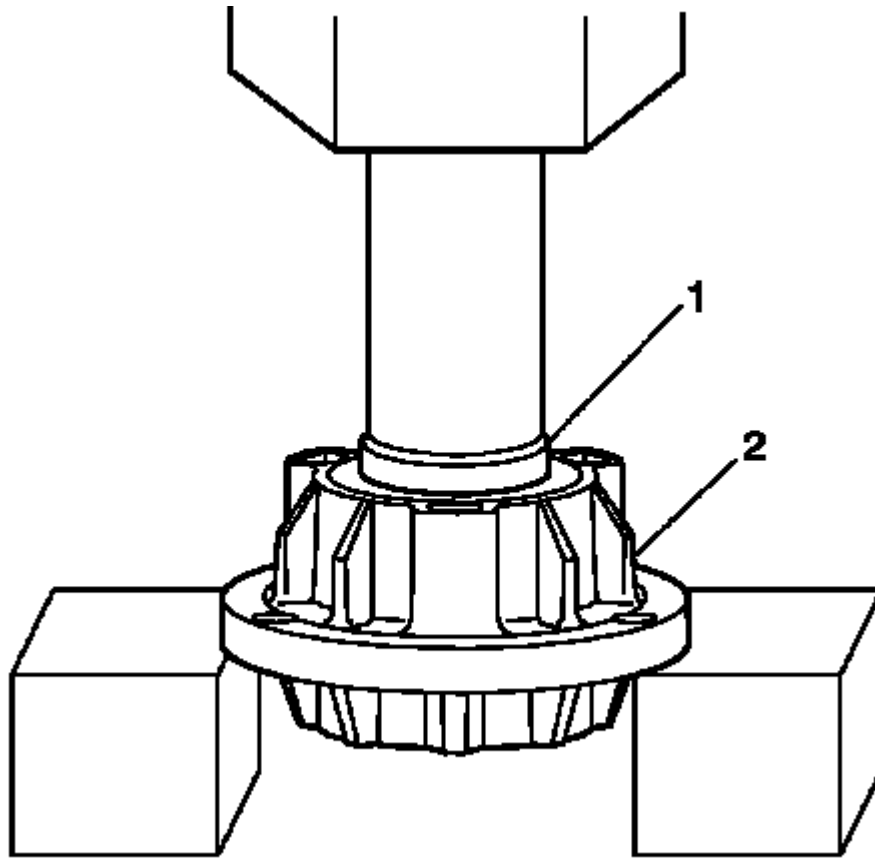


Fig. 175: Positioning Bearing Housing Into Press To Install Bearing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Press only on the outer race of the bearing.

3. Position the rear bearing housing (2) into a press in order to install the bearing (1).

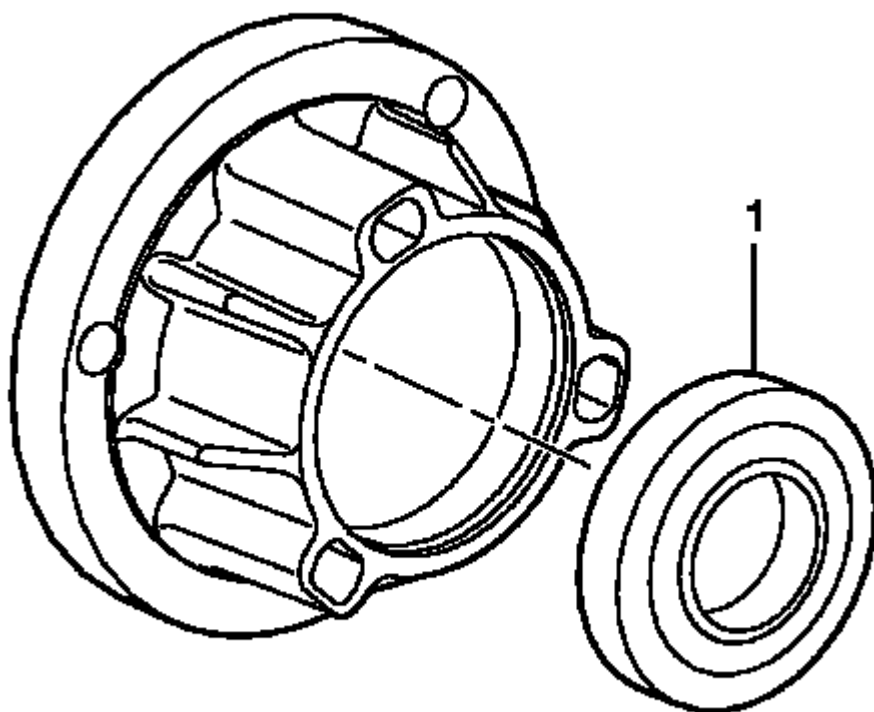


Fig. 176: Removing/Installing Bearing
Courtesy of GENERAL MOTORS COMPANY

4. Install the bearing (1) into the housing.

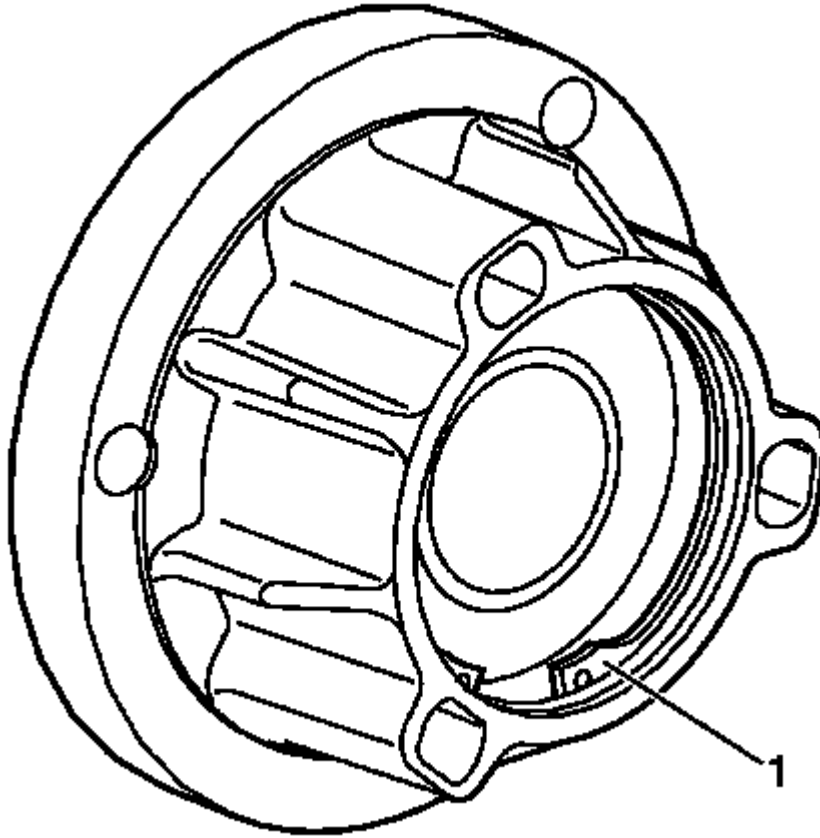


Fig. 177: View Of Rear Bearing Housing Snap Ring
Courtesy of GENERAL MOTORS COMPANY

5. Install the snap ring (1) into the rear bearing housing.

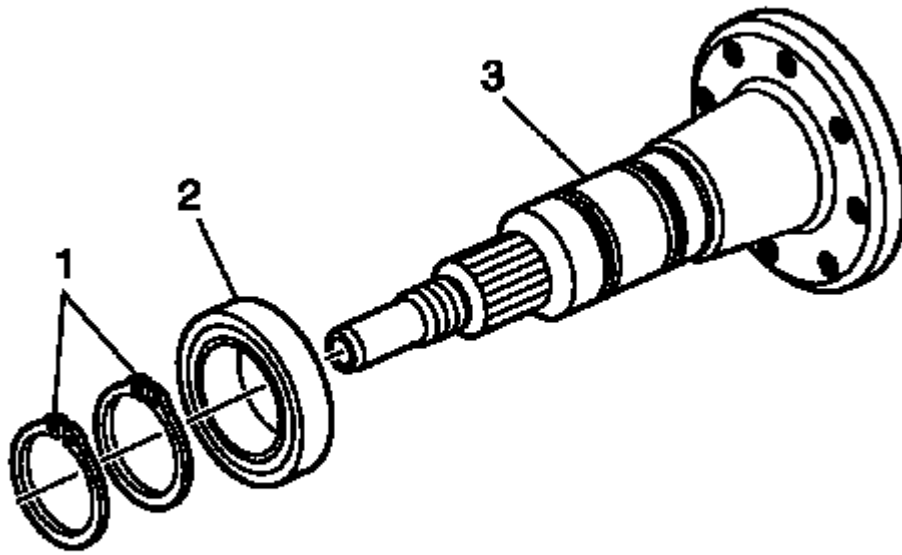


Fig. 178: Snap Rings & Bearing To Flexplate Spindle
Courtesy of GENERAL MOTORS COMPANY

6. Install the bearing (2) and snap rings (1) onto the flex plate spindle (3).

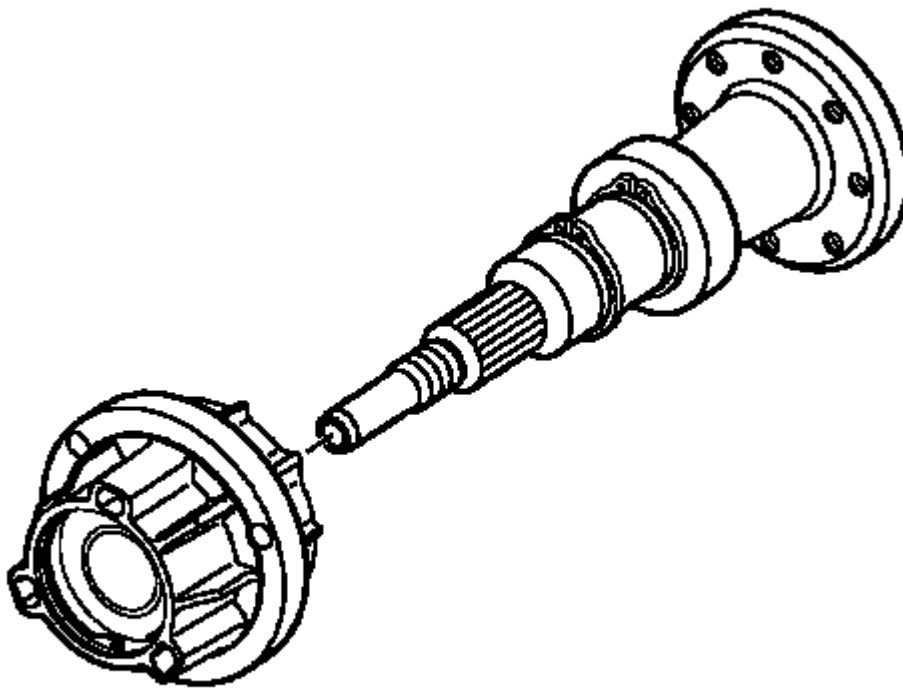


Fig. 179: Flexplate Spindle With Bearing To Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

7. Install the flex plate spindle, with bearing, into the rear bearing housing.

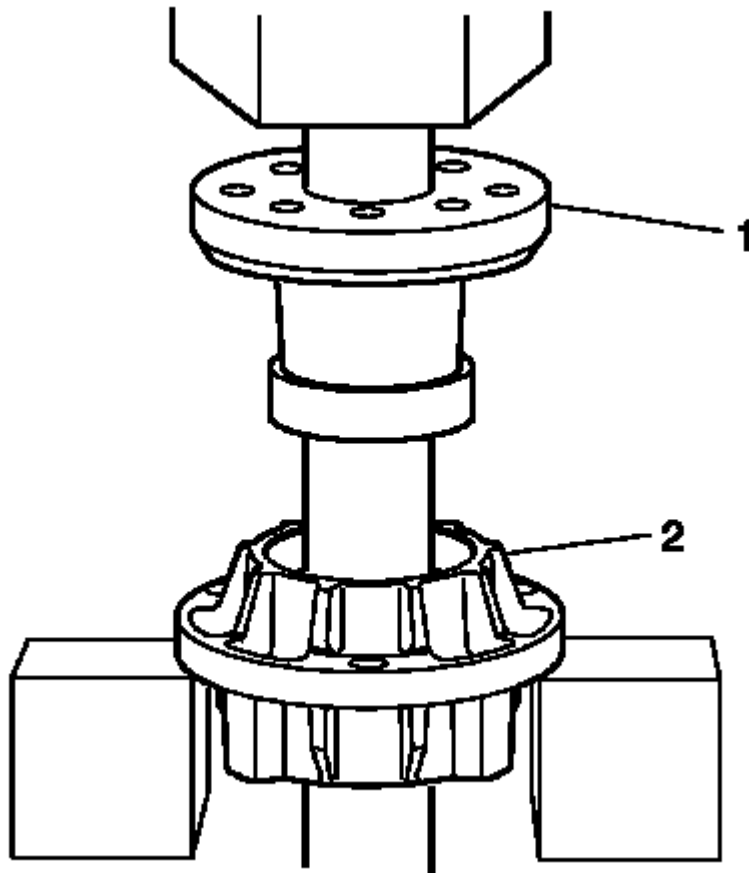


Fig. 180: Pressing Flexplate Spindle Into Housing
Courtesy of GENERAL MOTORS COMPANY

8. Press the flex plate spindle, with bearing (1), into the housing (2). Support the inner race of the housing bearing when assembling the components.

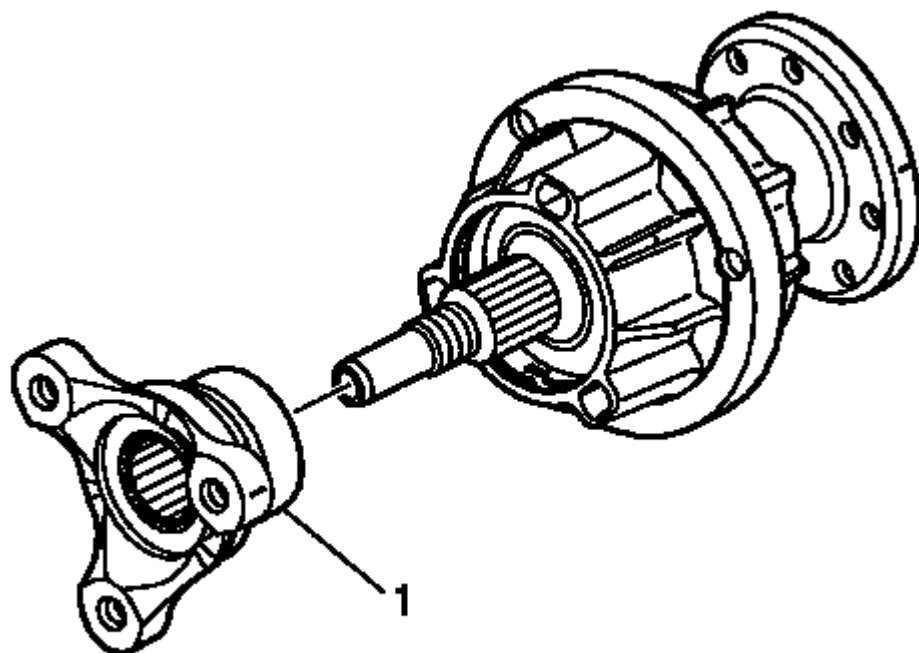


Fig. 181: Removing/Installing Hub To Flexplate Spindle
Courtesy of GENERAL MOTORS COMPANY

9. Install the hub (1) onto the flex plate spindle. Align the marks on the flex plate spindle and hub for proper assembly.
10. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489) or equivalent, to the threads of the spindle.

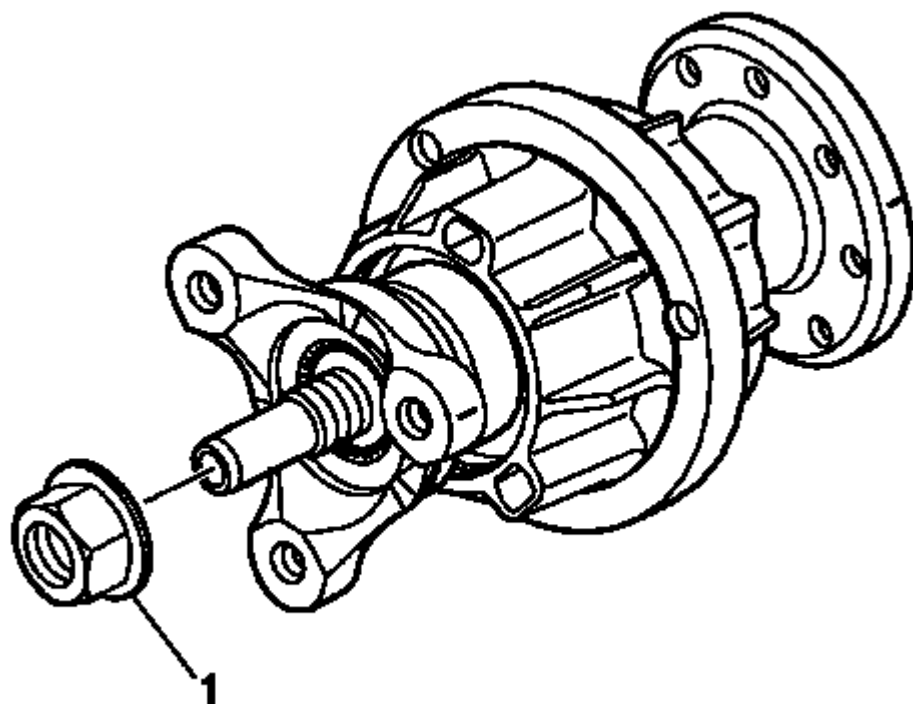


Fig. 182: Installing Flexplate Spindle Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

11. Install the nut (1) to the flex plate spindle. Tighten the spindle nut to 90 N.m (66 lb ft).

Propeller Shaft Installation

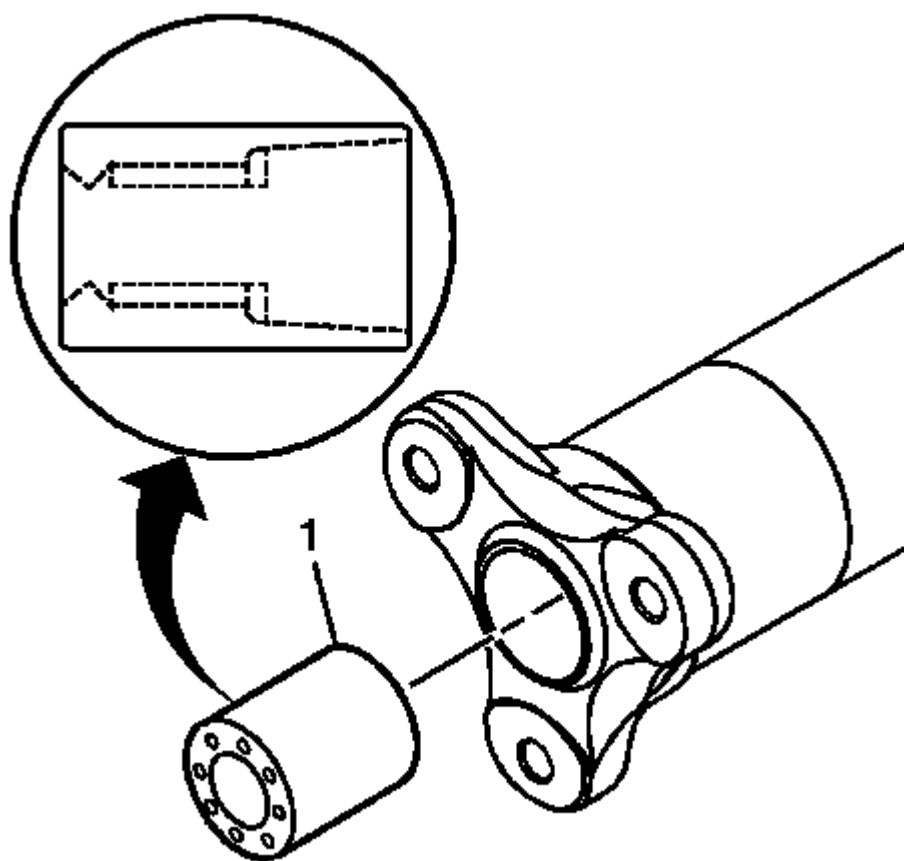


Fig. 183: View Of Propeller Shaft Bushing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Install the propeller shaft bushing into hub with the smaller opening of the bushing positioned away from the flange.

1. Install a NEW bushing (1) into the automatic transmission propeller shaft, if required.

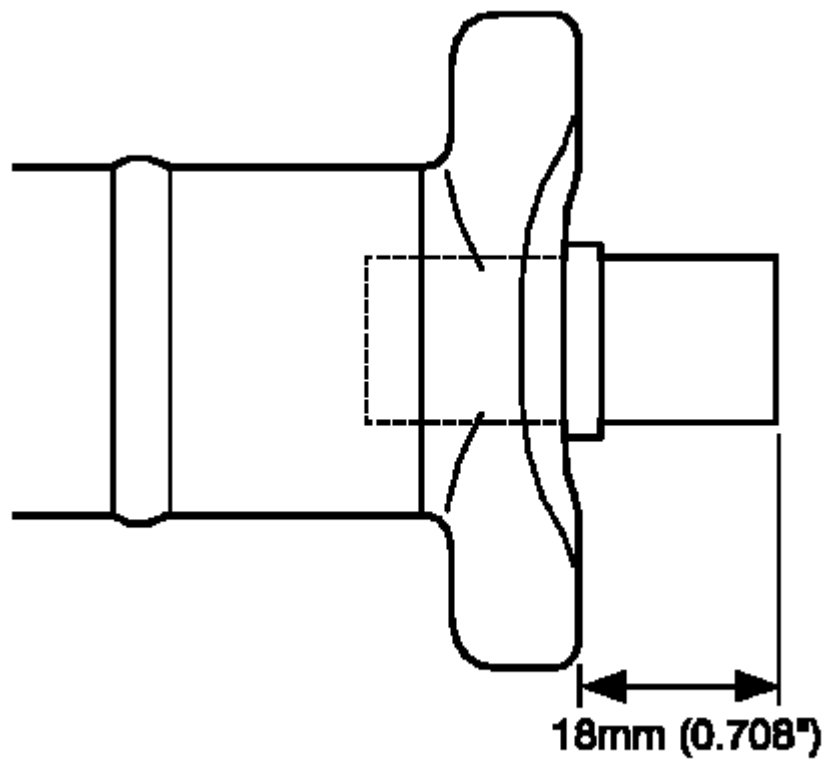


Fig. 184: Inspecting Proper Bushing Installation
Courtesy of GENERAL MOTORS COMPANY

2. Inspect the bushing for proper installation. A properly installed bushing will protrude 18 mm (0.708 in) from the face of the hub.

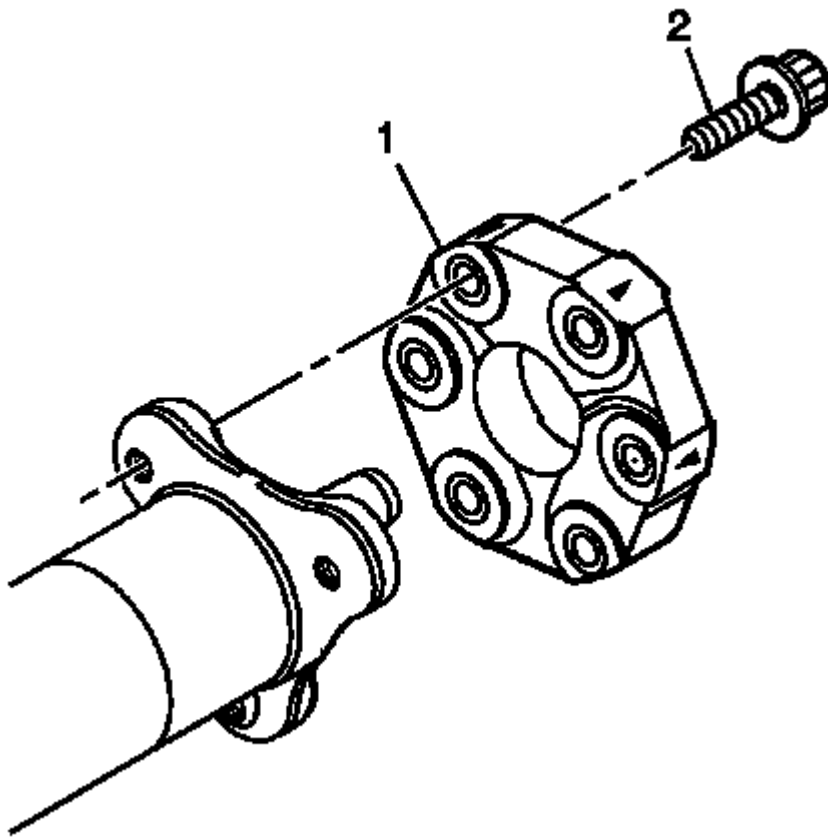


Fig. 185: Rear Coupling, Bolts & Washers To Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

3. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489) or equivalent, to the threads of the coupling bolts.

NOTE: If the coupling orientation mark has been lost during the cleaning or disassembly process, the coupling **MUST** be installed with the directional arrow pointed toward the flange to which it mounts.

4. Install the rear coupling (1), bolts (2) and washers to the propeller shaft. Tighten the coupling bolts to 90 N.m (66 lb ft).

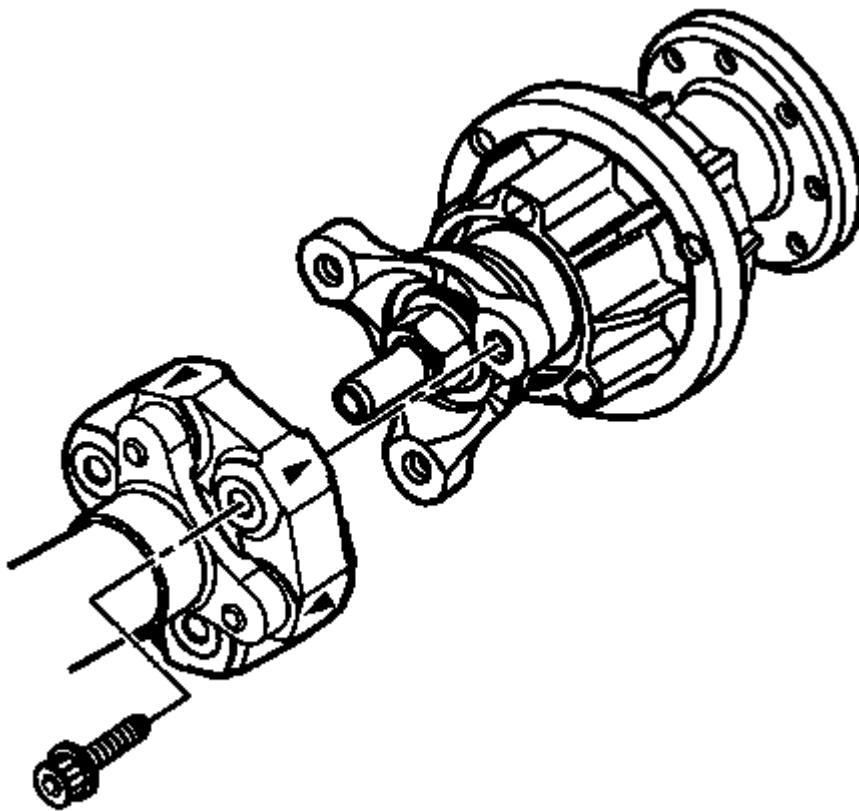


Fig. 186: View Of Bearing Housing Assembly, Bolts & Washers On Rear Coupling
Courtesy of GENERAL MOTORS COMPANY

NOTE: If the coupling orientation mark has been lost during the cleaning or disassembly process, the coupling **MUST** be installed with the directional arrow pointed toward the flange to which it mounts.

5. Install the rear bearing housing assembly, bolts and washers to the rear coupling. Tighten the coupling bolts to 90 N.m (66 lb ft).

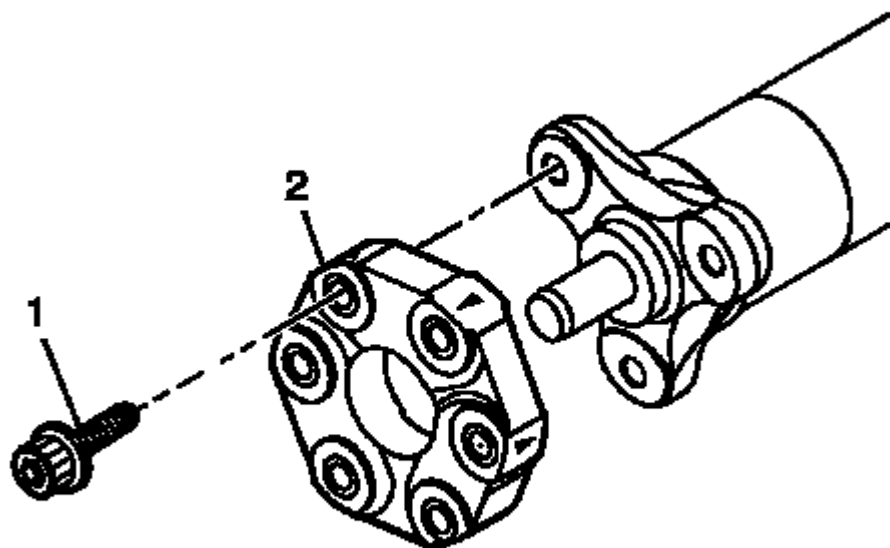


Fig. 187: Front Coupling, Bolts & Washers To Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

6. Install the front coupling (2), bolts (1) and washers to the propeller shaft.

Tighten

Tighten the coupling bolts to 90 N.m (66 lb ft).

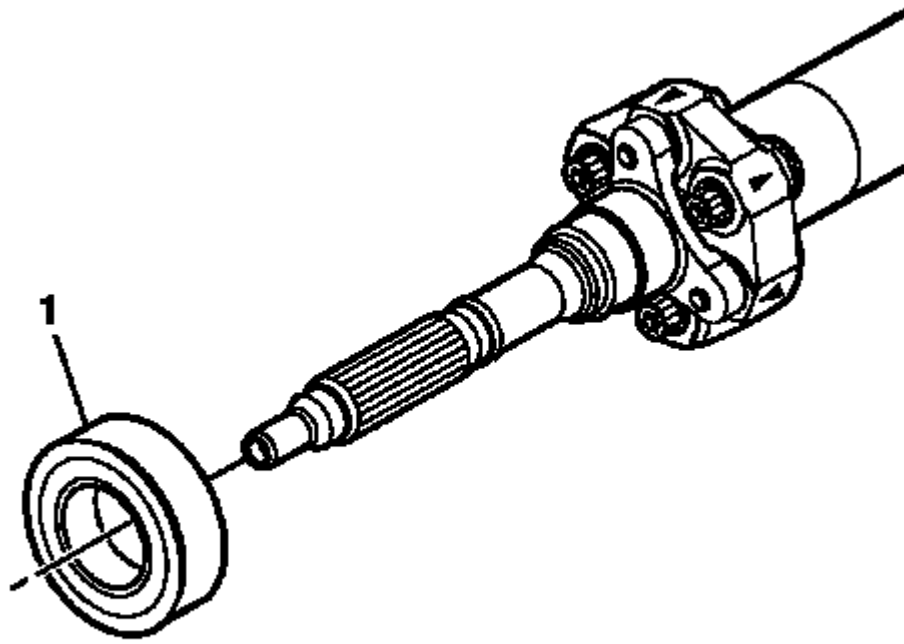


Fig. 188: Bearing To Input Shaft
Courtesy of GENERAL MOTORS COMPANY

7. Install the bearing (1) onto the input shaft.

Install the bearing until completely seated against the flange of the input shaft.

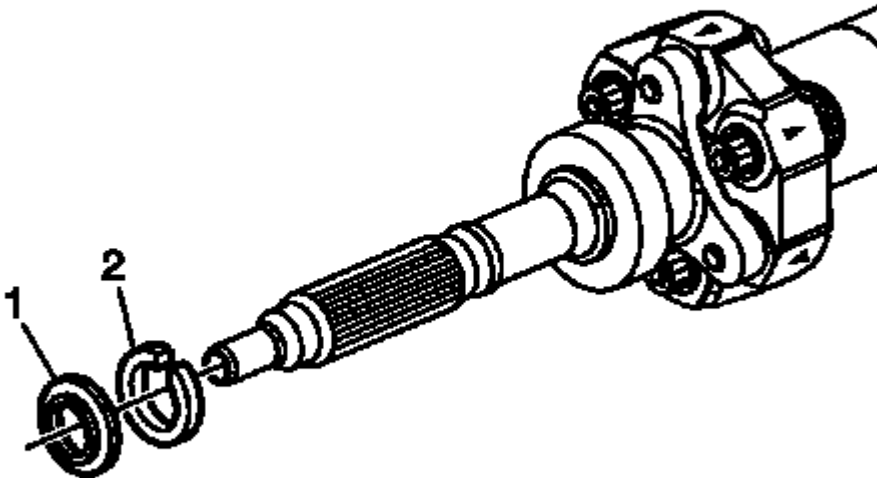


Fig. 189: Slinger Washer To Input Shaft
Courtesy of GENERAL MOTORS COMPANY

8. Install the snap ring (2) into the groove of the input shaft.
9. Install a NEW slinger washer (1) onto the input shaft.

A properly installed slinger washer will have a gap of 1.5-2.5 mm (0.050-0.098 in) between the washer and the bearing face.

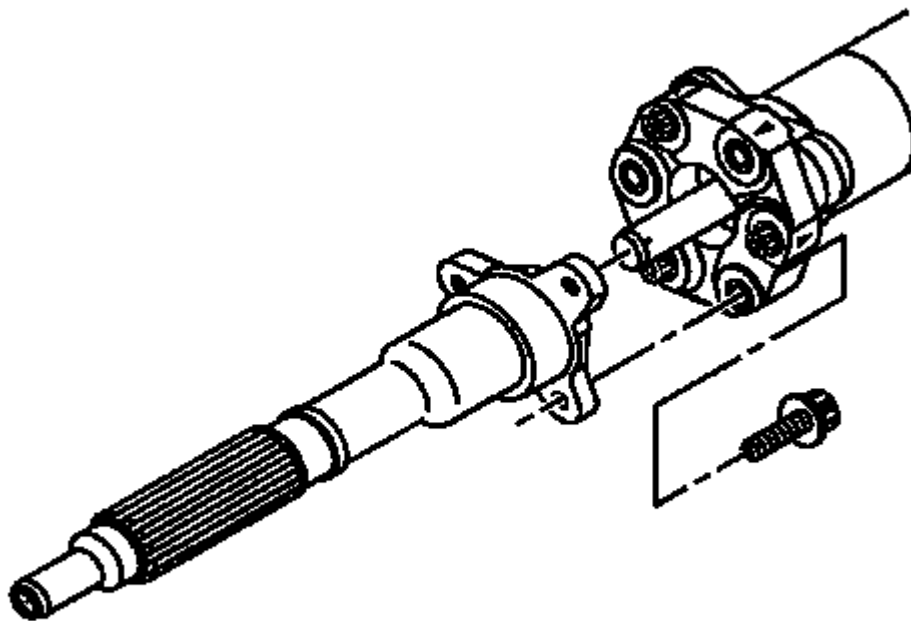


Fig. 190: Input Shaft, Bolts & Washers To Front Coupling
Courtesy of GENERAL MOTORS COMPANY

10. Install the input shaft, bolts and washers to the coupling. Tighten the coupling bolts to 90 N.m (66 lb ft).

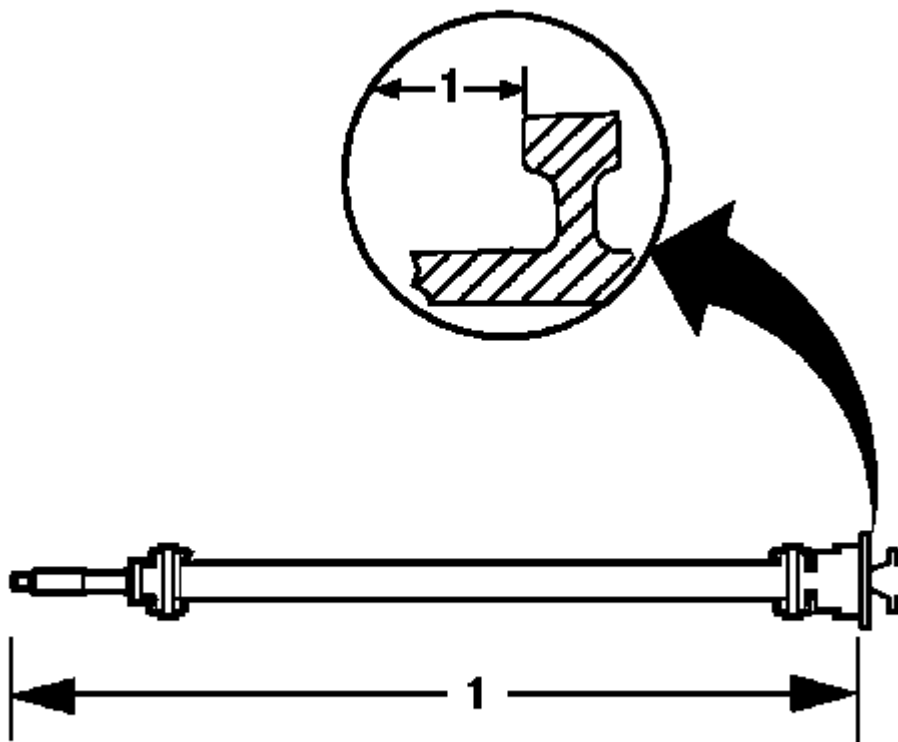


Fig. 191: Measuring Distance From End Of Input Shaft To Flange On Bearing Housing
Courtesy of GENERAL MOTORS COMPANY

11. Measure the distance (1) from the end of the input shaft to the flange on the bearing housing - automatic transmission. Record the amount as distance 1.

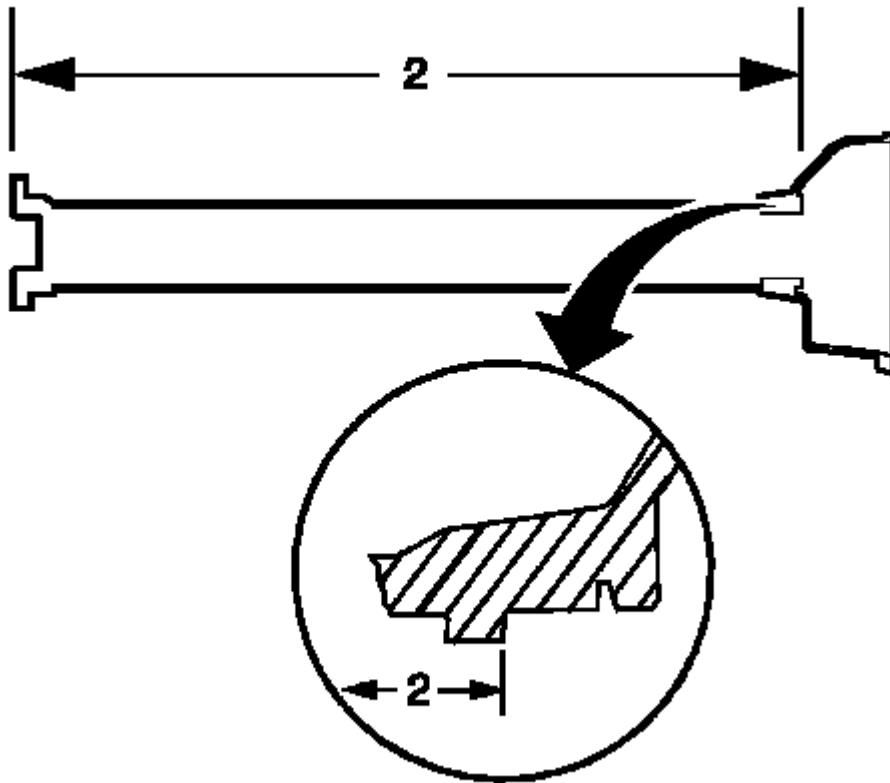


Fig. 192: Measuring Distance From Driveline Tube Front Bellhousing Flange To Bearing Housing Flange

Courtesy of GENERAL MOTORS COMPANY

12. Measure the distance (2) from the driveline tube front bellhousing flange to the bearing housing flange - automatic transmission. Record this as distance 2.
13. Subtract the distance 2 from distance 1.
14. Record the computation as distance 3.

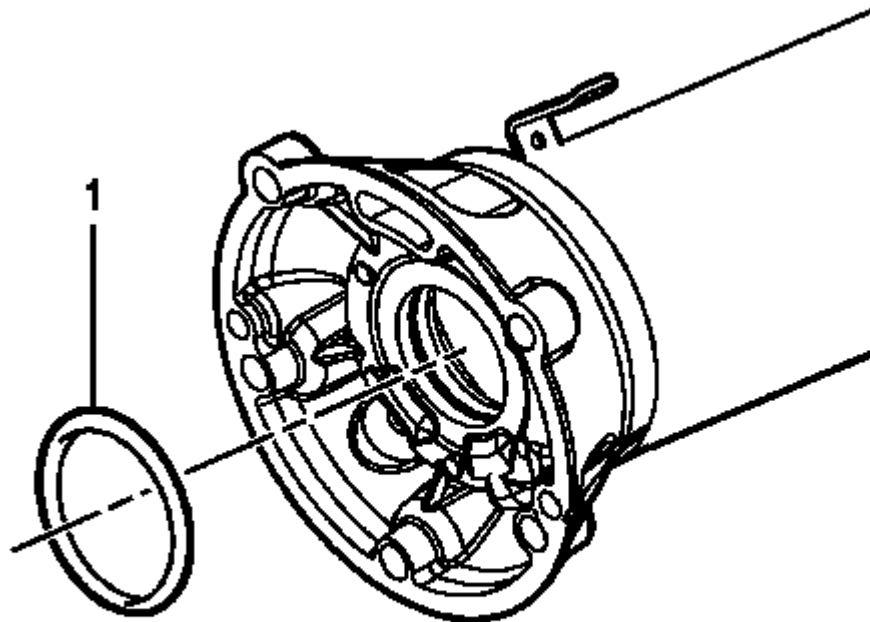


Fig. 193: Removing/Installing O-Ring
Courtesy of GENERAL MOTORS COMPANY

15. Lubricate the NEW driveline tube O-ring (1) with clean engine oil.
16. Install the O-ring into the front of the driveline tube.

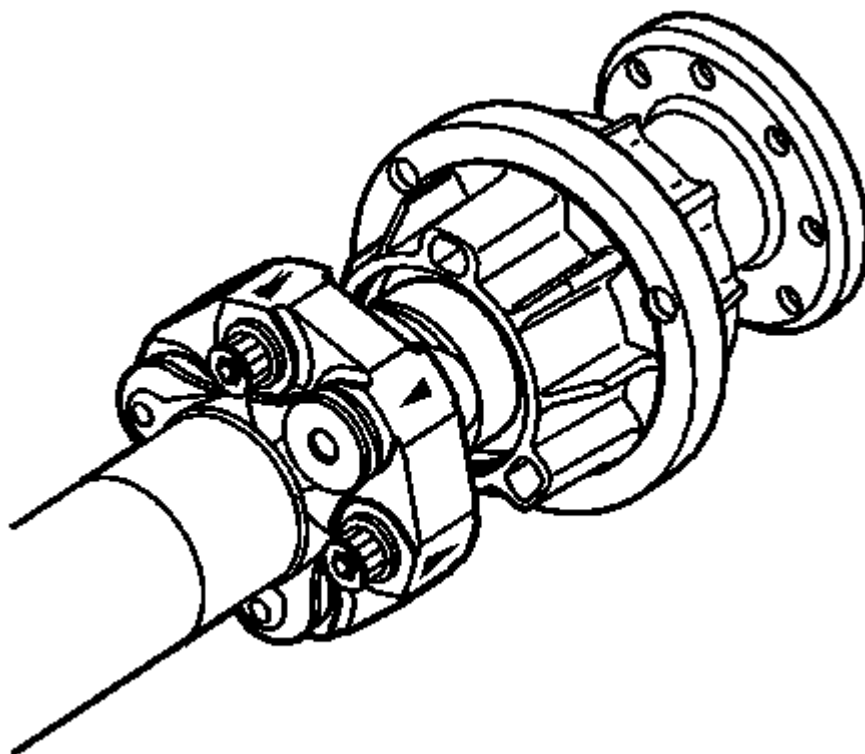


Fig. 194: View Of Propeller Shaft Assembly
Courtesy of GENERAL MOTORS COMPANY

17. Install the propeller shaft assembly into the driveline tube.

During installation, lift the front of the input shaft to avoid damage to the slinger washer. Using a punch, tap evenly on the flat flange area of the rear bearing housing and install the assembly completely into the tube.

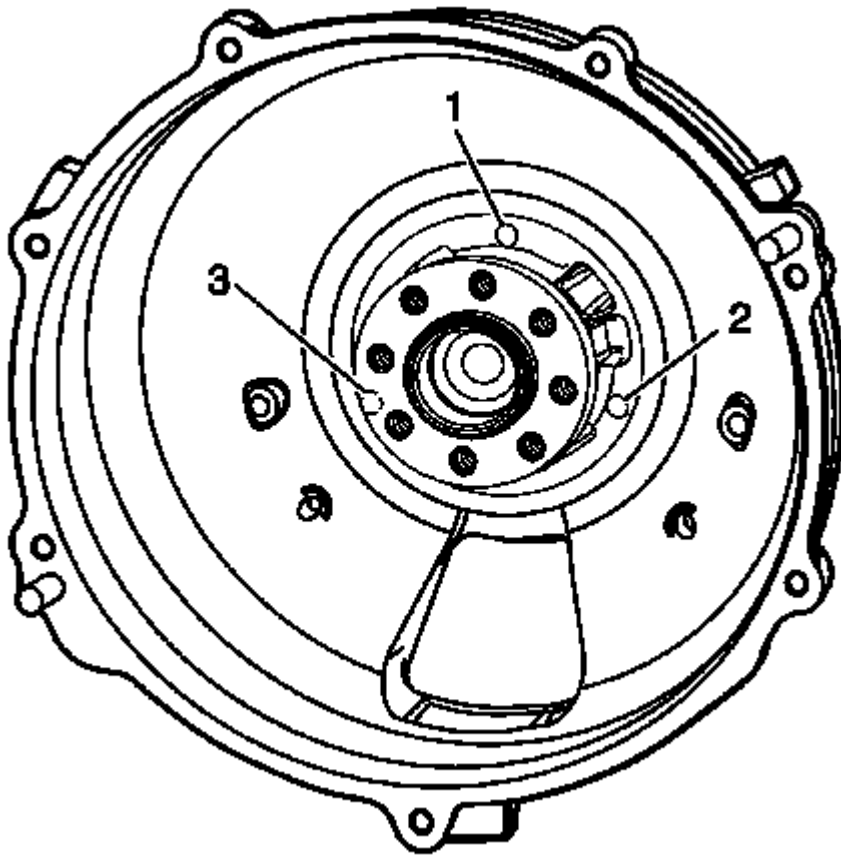


Fig. 195: Rear Bearing Housing Bolt Hole Plugs
Courtesy of GENERAL MOTORS COMPANY

18. Install the rear bearing housing bolt hole plugs (1-3).

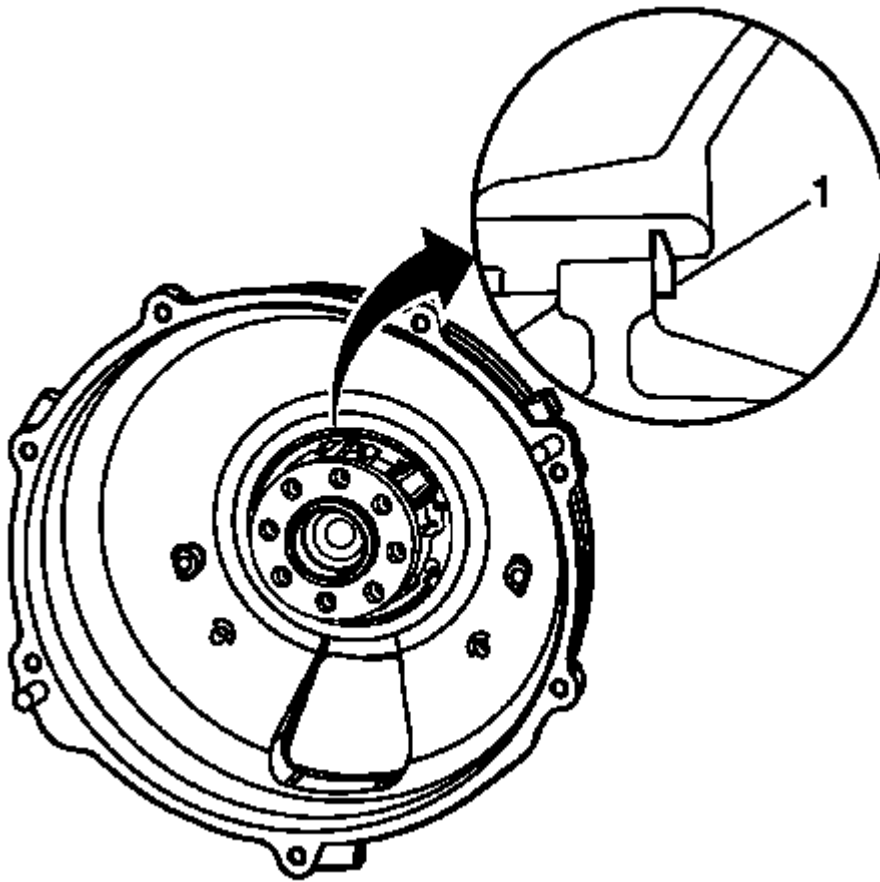


Fig. 196: Snap Ring Faces To Rear Of Driveline Tube Assembly
Courtesy of GENERAL MOTORS COMPANY

19. Install the snap ring (1) into the driveline tube. The beveled edge of the snap ring faces the rear of the driveline tube assembly and will seat completely into the groove of the housing.

NOTE: The propeller shaft assembly must be checked for proper installation into the driveline tube - automatic transmission. When the propeller shaft assembly is installed into the driveline tube, the couplings may compress and not properly position the input shaft.

20. Measure the distance from the end of the input shaft to the driveline tube front bell housing flange - automatic transmission.

The actual distance must be equal to or within 2 mm (0.079 in) of the recorded dimension 3.

1. If the actual distance is not within specifications, use a heat gun and heat the outside of the driveline support tube at the front bearing location.
2. Tap on the rear of the propeller shaft assembly or pull on the input shaft until the shaft has reached the proper position.

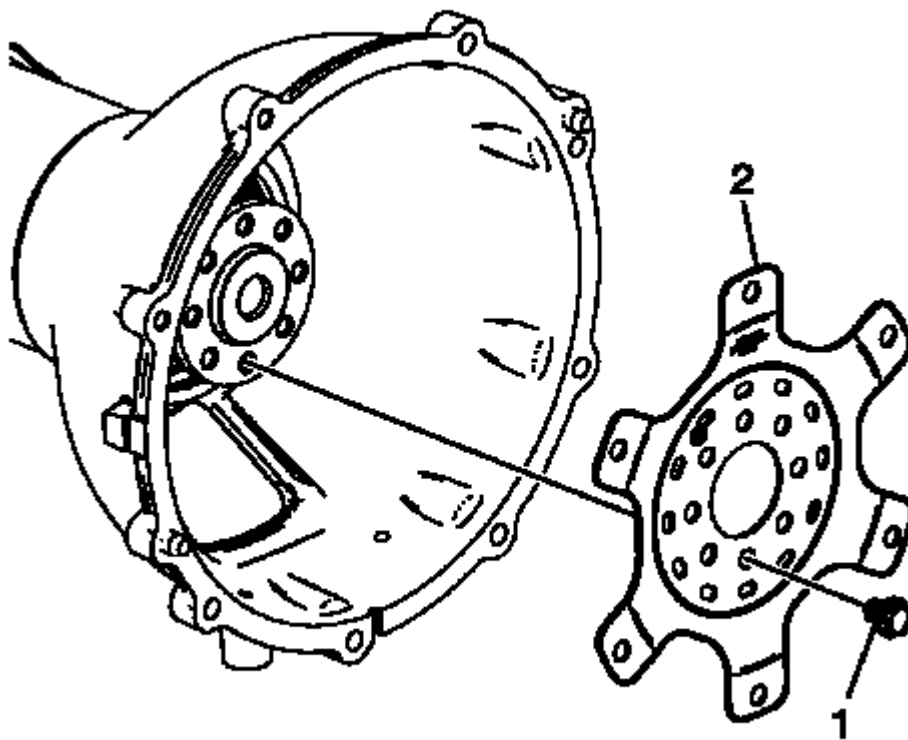


Fig. 197: Flex Plate And Bolts

Courtesy of GENERAL MOTORS COMPANY

21. Install the flex plate (2) and bolts (1) - automatic transmission. Tighten the flex plate bolts to 50 N.m (37 lb ft).

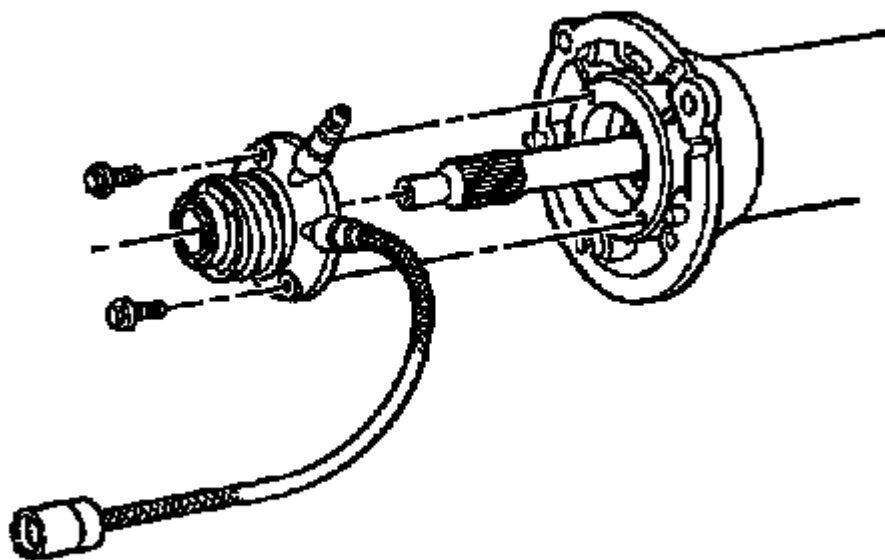


Fig. 198: Clutch Actuator Cylinder Mounting Bolts
Courtesy of GENERAL MOTORS COMPANY

22. Install the clutch actuator and bolts - manual transmission. Tighten the clutch actuator bolts to 12 N.m (106 lb in).

DESCRIPTION AND OPERATION

DRIVELINE SUPPORT ASSEMBLY DESCRIPTION

Driveline Assembly

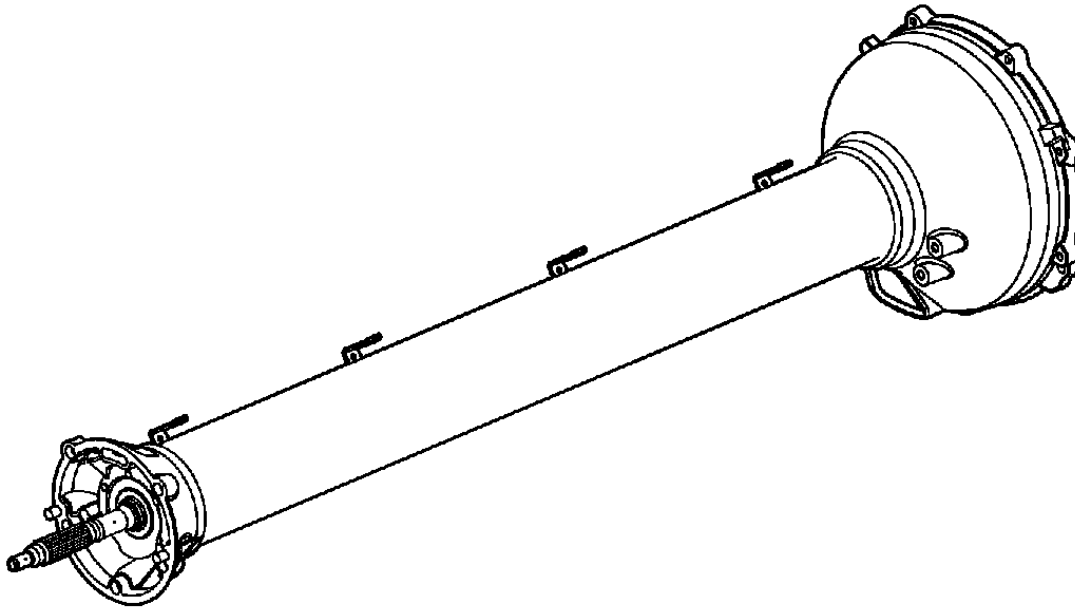


Fig. 199: Driveline Assembly
Courtesy of GENERAL MOTORS COMPANY

Automatic transmission application shown.

The driveline support assembly consists of a driveline support tube, with rear bell housing and an internal propeller shaft assembly. The front of the driveline assembly mounts to the engine bellhousing. In manual transmission applications, the clutch actuator is retained to the front of the tube and the shifter linkage is mounted to brackets at the top center area. The driveline support assembly is specific for each vehicle as equipped, either automatic or manual transmission applications.

Propeller Shaft Assembly (Automatic Transmission)

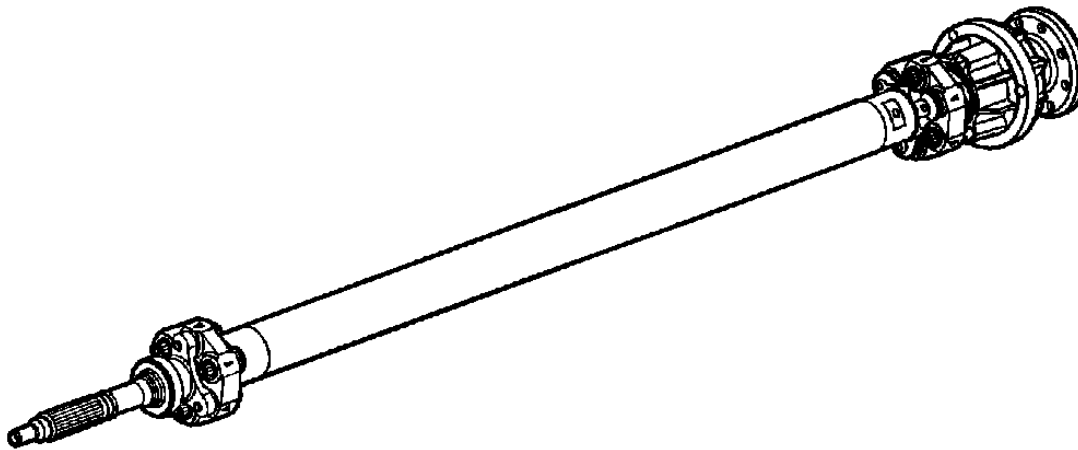


Fig. 200: Propeller Shaft Assembly (Automatic Transmission)
Courtesy of GENERAL MOTORS COMPANY

The automatic transmission propeller shaft assembly consists of a splined front input shaft, front coupling, propeller shaft, rear coupling, bolts and a bearing and housing assembly. The input shaft, propeller shaft, couplings and bearing and housing assembly are balanced as an assembly. The front of the propeller shaft assembly is supported, at the input shaft, by a ball type bearing. An O-ring, located in the front of the driveline support tube, prevents the front bearing outer race from spinning. The rear of the propeller shaft assembly is supported by a bearing and housing assembly. The bearing and housing assembly consists of a housing, internally splined input hub, externally splined flex plate spindle, O-rings, snap rings and two ball type bearings. The propeller shaft assembly is retained in the driveline tube by an internal snap ring. The torque converter flex plate is retained to the flex plate spindle by bolts and is mated to the torque converter.

Propeller Shaft Assembly (Manual Transmission)

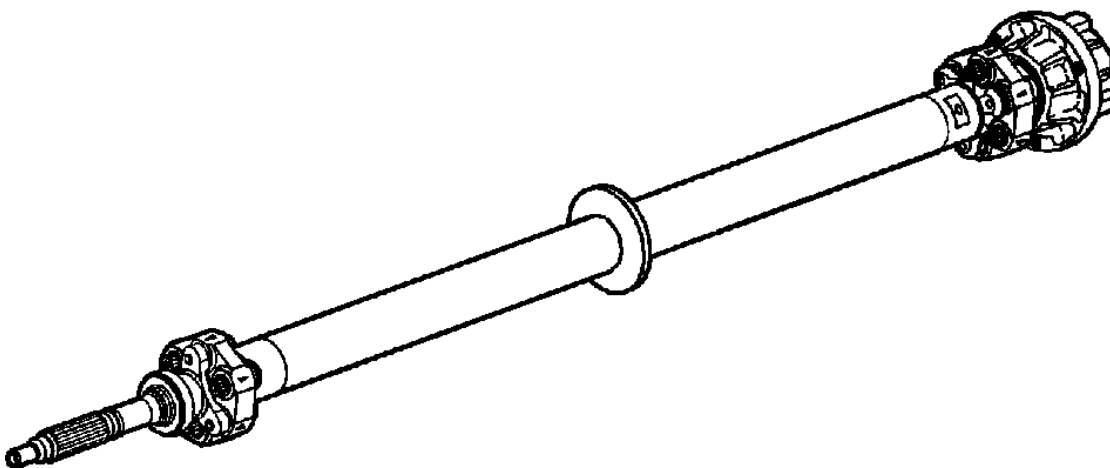


Fig. 201: Propeller Shaft Assembly (Manual Transmission)
Courtesy of GENERAL MOTORS COMPANY

The manual transmission propeller shaft assembly consists of a splined front input shaft, front

coupling, propeller shaft, rear coupling, bolts and a bearing and housing assembly. The input shaft, propeller shaft, couplings and bearing and housing assembly are balanced as an assembly. The front of the propeller shaft assembly is supported, at the input shaft, by a ball type bearing. An O-ring, located in the front of the driveline support tube, prevents the front bearing outer race from spinning. The rear bearing of the propeller shaft assembly is supported by a bearing and housing assembly. The bearing and housing assembly consists of a housing, internally splined hub, pilot bushings, O-rings, snap rings, a wave washer and two ball type bearings. The bearing housing hub internal splines couple to the manual transmission splined input shaft. The propeller shaft assembly is retained in the driveline tube by an internal snap ring. The propeller shaft tube has an overspeed limiter, snubber, that prevents permanent propeller shaft damage as a result of a downshift above recommended speeds.

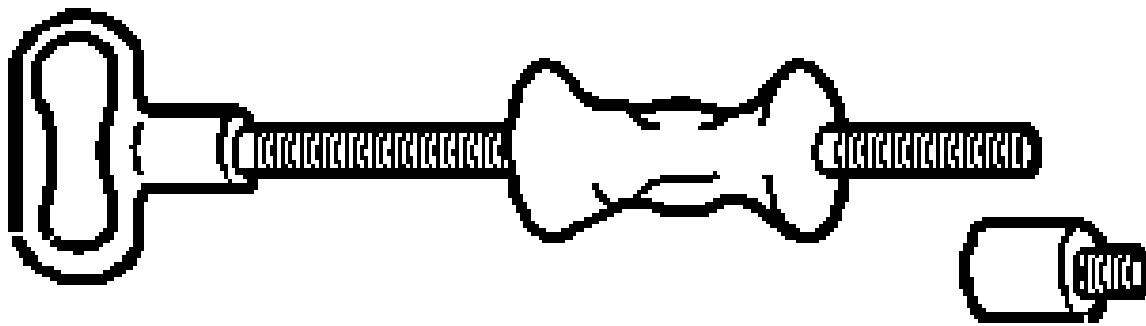
IMPORTANT: Disassembly and improper reassembly of the propeller shaft components may result in driveline vibration. The propeller shaft and components should be kept free of any foreign material which could upset balance and also produce driveline vibration.

When servicing the engine, transaxle or driveline support assembly, the proper installation procedure must be followed. Automatic transmission applications have a specific installation procedure and sequence of installation steps. Failure to follow proper procedures may cause damage to other vehicle driveline components.

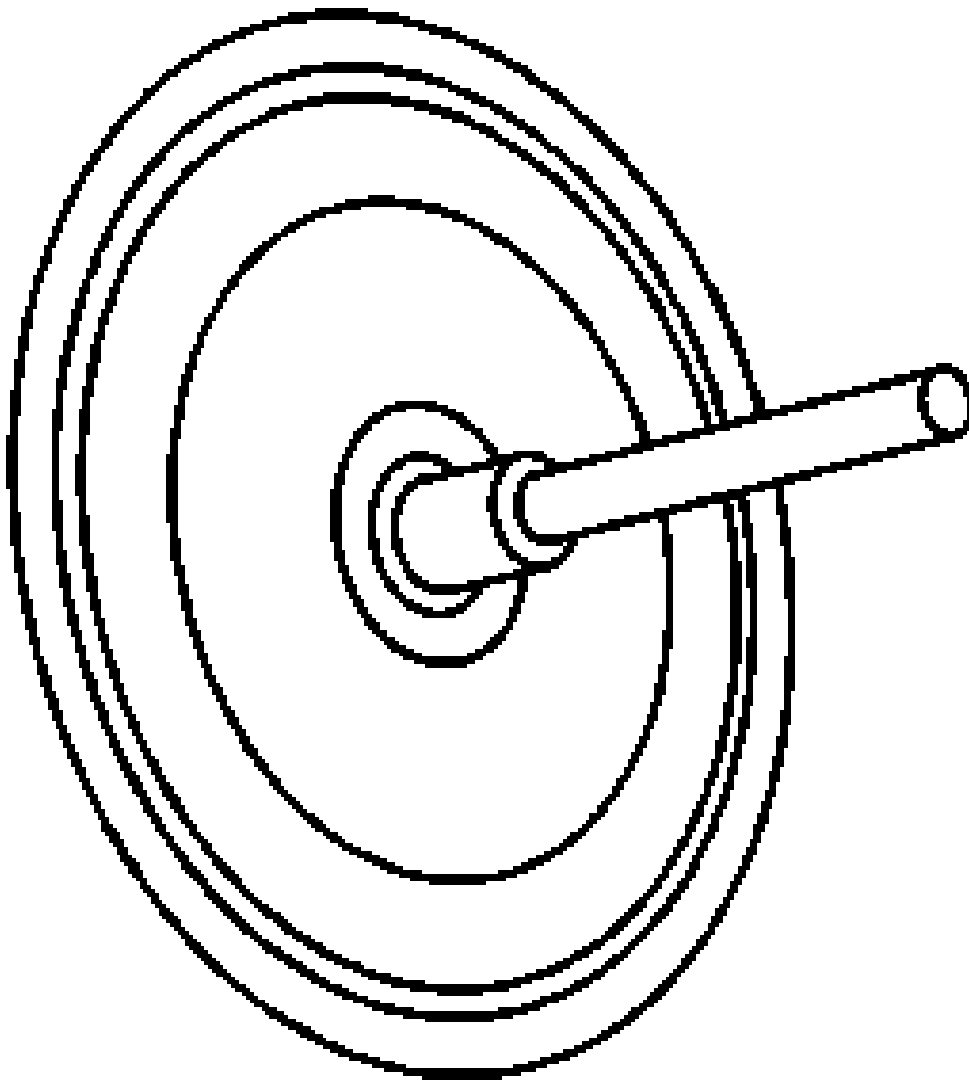
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

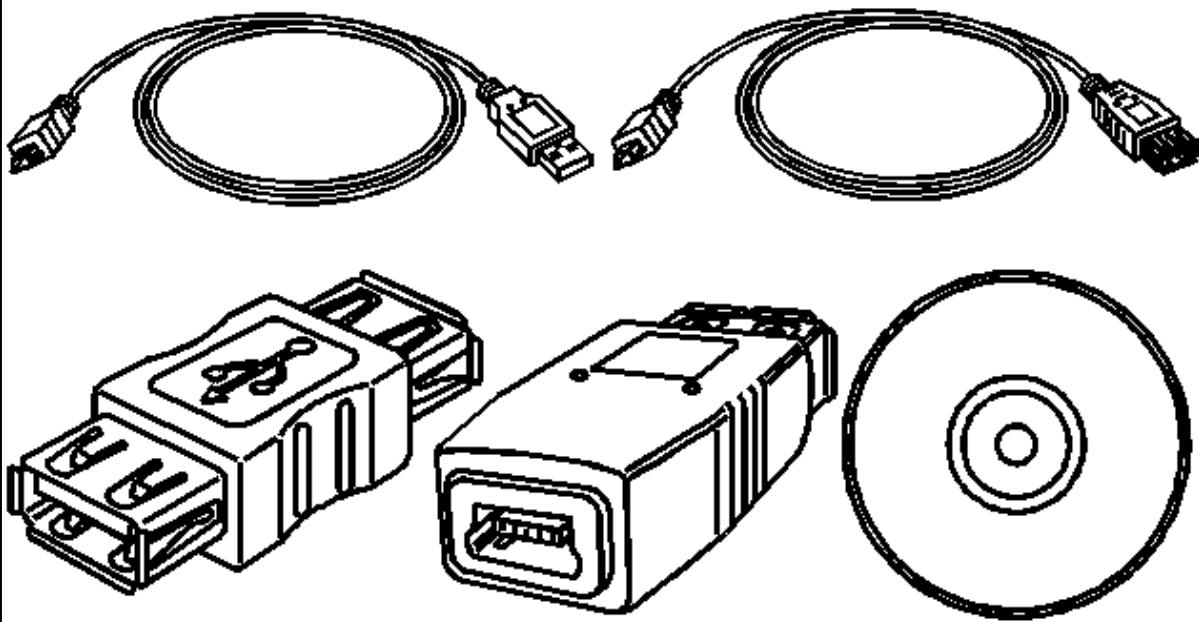
Illustration	Tool Number/ Description



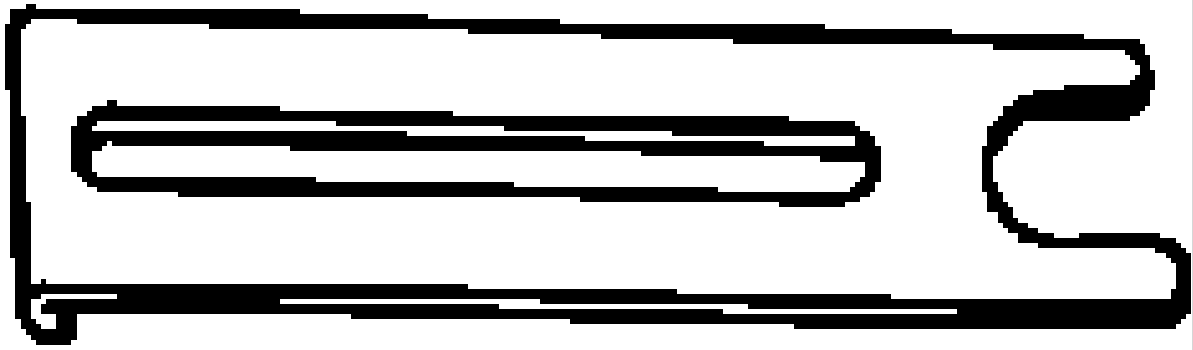
J 2619-01
Slide
Hammer



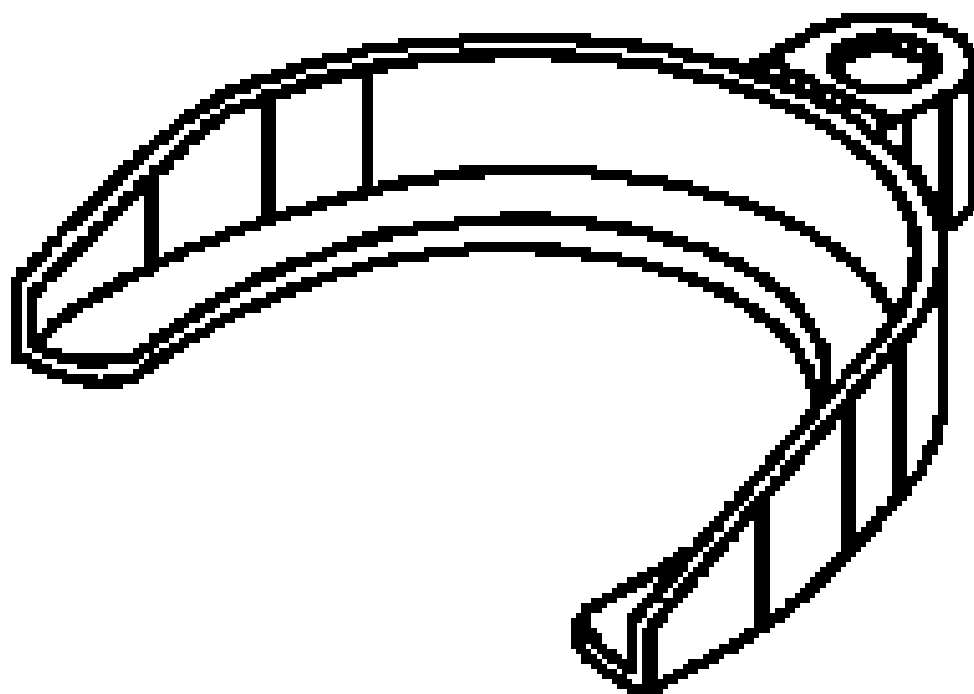
J 7872
Magnetic
Base
Indicator
Set



J 24420-C
Crankshaft
Balancer
Puller



J 36221
Hydraulic
Clutch Line
Separator



J 42055
Drivetrain
Support
Fixture