2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

REPAIR INSTRUCTIONS

DRIVE BELT REPLACEMENT

Removal Procedure

- 1. Install 3/8 inch breaker bar on the drivebelt tensioner arm and turn the breaker bar clockwise enough to relieve the tension on the drivebelt.
- 2. Remove the drivebelt.
- 3. Release the tension on the tensioner arm.



G02128437

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Installation Procedure

- 1. Route the drivebelt over all the pulleys except the drivebelt tensioner pulley.
- 2. Install the 3/8 inch breaker bar on the drivebelt tensioner arm and turn the breaker bar clockwise.
- 3. Install the drivebelt over the drivebelt tensioner pulley.
- 4. Slowly release the tension to the drivebelt tensioner arm.
- 5. Inspect for proper installation of the drivebelt on the pulleys.

DRIVE BELT TENSIONER REPLACEMENT

Removal Procedure

- 1. Remove the drivebelt. Refer to DRIVE BELT REPLACEMENT.
- 2. Inspect the drivebelt. Change the drivebelt as necessary.
- 3. Using a wrench loosen and remove the drivebelt tensioner bolt.
- 4. Remove the drivebelt tensioner.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128438

Fig. 84: Removing Drivebelt Tensioner Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the drive belt tensioner.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the drive belt tensioner bolt.

Tighten

Tighten the drive belt tensioner bolt to 50 N.m (37 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

3. Install the drive belt <u>DRIVE BELT REPLACEMENT</u>.



G02128439

Fig. 85: Installing Drive Belt Tensioner Courtesy of GENERAL MOTORS CORP.

DRIVE BELT IDLER PULLEY REPLACEMENT

Removal Procedure

- 1. Remove the drive belt. Refer to **DRIVE BELT REPLACEMENT**.
- 2. Remove the idler pulley bolt from the idler pulley bracket.
- 3. Remove idler pulley.

Installation Procedure

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

1. Install the idler pulley and secure the pulley with the bolt.

Tighten

Tighten the idler pulley bolt to 50 N.m (37 lb ft).

2. Install the drive belt. Refer to <u>DRIVE BELT REPLACEMENT</u>.

ENGINE MOUNT INSPECTION

Front Engine Mount

NOTE: Broken or deteriorated mounts can cause misalignment and destruction of certain drive train components. When a single mount breaks, the remaining mounts are subjected to abnormally high stresses.

- 1. Install a pole jack underneath the oil pan.
- 2. Insert a block of wood between the engine oil pan and the pole jack.
- 3. Raise the jack until the wooden block contacts the engine oil pan.
- 4. Raise the engine in order to place a slight tension on the rubber cushion. Observe both mounts while raising the engine.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada





Fig. 86: Installing Pole Jack Underneath Oil Pan Courtesy of GENERAL MOTORS CORP.

- 5. Replace the mounts if any of the following conditions exist:
 - Hard rubber surface covered with heat check cracks
 - The rubber cushion separated from the metal plate of the mount
 - The rubber cushion is split through the center
 - The mount is leaking
- 6. If there is movement between a metal plate of the mount and its attaching points, lower the engine and tighten the bolts or nuts attaching the mount to the engine, the frame or the bracket.

ENGINE MOUNT AND BRACKET REPLACEMENT - LEFT

Removal Procedure

1. Disconnect the negative battery cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2. Remove the cooling fan. Refer to COOLING FAN AND SHROUD REPLACEMENT in Engine Cooling.



G02128441

Fig. 87: Removing Cooling Fan (Left) Courtesy of GENERAL MOTORS CORP.

- 3. Remove the MAP sensor electrical connector and the retainer (1).
- 4. Remove the MAP sensor (2).
- 5. Remove the left shock module (if frame mount is being removed). Refer to *SHOCK MODULE REPLACEMENT* in Front Suspension.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128442

Fig. 88: Removing MAP Sensor, Electrical Connector & Retainer (Left) Courtesy of GENERAL MOTORS CORP.

- 6. Remove the right and the left upper engine mount nuts.
- 7. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 8. Remove the right and the left lower engine mount nuts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128443

Fig. 89: Removing Right And Left Engine Mount Nuts (Left) Courtesy of GENERAL MOTORS CORP.

- 9. Remove the engine protection shield mount bolts.
- 10. Remove the engine protection shield.

IMPORTANT: When placing jack onto the oil pan, pay close attention to not damage the oil level sender.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 11. Lower the vehicle and place a floor jack under the oil pan with a block of wood.
- 12. Raise the engine with the jack just enough to clear the engine mount studs.



G02128444

Fig. 90: Removing Engine Protection Shield (Left) Courtesy of GENERAL MOTORS CORP.

13. Remove the left engine mount from the bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128445

Fig. 91: Removing Left Engine Mount From Bracket Courtesy of GENERAL MOTORS CORP.

- 14. Remove the left engine mount bracket bolts.
- 15. Remove the left engine mount bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128446

Fig. 92: Removing Left Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

- 16. Remove the left frame engine mount bracket bolts, if required.
- 17. Remove the left frame engine mount bracket, if required.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128447

Fig. 93: Removing Left Frame Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the left frame engine mount bracket, if removed.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the left frame engine mount bracket bolts, if removed.

Tighten

Tighten the mount bracket bolts to 110 N.m (81 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128448

Fig. 94: Installing Left Frame Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

3. Install the left engine mount bracket and secure the bracket with the bolts (1).

Tighten

Tighten the engine mount bracket bolts to 50 N.m (37 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128449

Fig. 95: Installing Left Engine Mount Bracket And Securing Bracket With Bolts Courtesy of GENERAL MOTORS CORP.

- 4. Install the left engine mount onto the bracket.
- 5. Lower the engine onto the engine mounts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128450

Fig. 96: Installing Left Engine Mount Onto Bracket Courtesy of GENERAL MOTORS CORP.

6. Install the right and the left upper engine mount nuts.

Tighten

Tighten the upper engine mount nuts to 70 N.m (52 lb ft).

7 Raise the vehicle and remove the jack from under the vehicle.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128451

Fig. 97: Installing Right And Left Engine Mount Courtesy of GENERAL MOTORS CORP.

8. Install the engine protection shield and secure the shield with the bolts.

Tighten

Tighten the engine protection shield bolts to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128452

Fig. 98: Installing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

9. Install the right and the left lower engine mount nuts.

Tighten

Torque the lower engine mount nuts to 70 N.m (52 lb ft).

- 10. Lower the vehicle.
- 11. Install the left shock module. Refer to SHOCK MODULE REPLACEMENT in Front Suspension.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128453

Fig. 99: Installing Right And Left Lower Engine Mount Nuts Courtesy of GENERAL MOTORS CORP.

- 12. Install the MAP sensor (2).
- 13. Install the MAP sensor retainer (1) and the electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128454

Fig. 100: Installing MAP Sensor, MAP Sensor Retainer And Electrical Connector Courtesy of GENERAL MOTORS CORP.

- 14. Connect the cooling fan hub nut to the water pump shaft.
- 15. Install the cooling fan. Refer to COOLING FAN AND SHROUD REPLACEMENT in Engine Cooling.
- 16. Connect the battery negative cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128455

<u>Fig. 101: Installing Cooling Fan</u> Courtesy of GENERAL MOTORS CORP.

ENGINE MOUNT AND BRACKET REPLACEMENT - RIGHT

Removal Procedure

- 1. Disconnect the battery negative cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.
- 2. Remove the cooling fan. Refer to COOLING FAN AND SHROUD REPLACEMENT in Engine Cooling.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128456

<u>Fig. 102: Removing Cooling Fan</u> Courtesy of GENERAL MOTORS CORP.

- 3. Remove the MAP sensor electrical connector and retainer (1).
- 4. Remove the MAP sensor (2).
- 5. Remove the right shock module, if frame engine mount is being removed. Refer to *SHOCK MODULE REPLACEMENT* in Front Suspension.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128457

Fig. 103: Removing MAP Sensor, Electrical Connector & Retainer Courtesy of GENERAL MOTORS CORP.

- 6. Remove the right and the left upper engine mount nuts.
- 7. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 8. Remove the right and the left lower engine mount nuts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128458

Fig. 104: Removing Engine Mount Nuts Courtesy of GENERAL MOTORS CORP.

- 9. Remove the engine protection shield mounting bolts.
- 10. Remove the engine protection shield.

IMPORTANT: When placing jack onto the oil pan, pay close attention to not damaging the oil level sender.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 11. Lower the vehicle and place a floor jack under the oil pan with a block of wood.
- 12. Raise the engine with the jack just enough to clear the engine mount studs.



G02128459

Fig. 105: Removing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

13. Remove the right engine mount from the bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128460

Fig. 106: Removing Right Engine Mount From Bracket Courtesy of GENERAL MOTORS CORP.

NOTE: Graphic shows left, right is similar.

- 14. Remove the right engine mount bracket bolts.
- 15. Remove the right engine mount bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128461

Fig. 107: Removing Right Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

NOTE: Graphic shows left, right is similar.

- 16. Remove the right frame engine mount bracket bolts, if required.
- 17. Remove the right frame engine mount bracket, if required.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128462

Fig. 108: Removing Right Frame Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Graphic shows left, right is similar.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

- 1. Install the right frame engine mount bracket, if removed.
- 2. Install the right frame engine mount bracket bolts, if removed.

Tighten

Tighten the mount bracket bolts to 110 N.m (81 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128463

Fig. 109: Installing Right Frame Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

NOTE: Graphic shows left, right is similar.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128464

Fig. 110: Installing Right Engine Mount Bracket Courtesy of GENERAL MOTORS CORP.

3. Install the right engine mount bracket and secure with the bolts (1).

Tighten

Tighten the engine mount bracket bolts to 50 N.m (37 lb ft).

- 4. Install the right engine mount.
- 5. Lower the engine onto the engine mounts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128465

Fig. 111: Installing Right Engine Mount Courtesy of GENERAL MOTORS CORP.

6. Install the right and the left upper engine mount nuts.

Tighten

Tighten the upper engine mount nuts to 70 N.m (52 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

7. Raise the vehicle and remove the floor jack from under the vehicle.



G02128466

Fig. 112: Installing Engine Mount Nuts Courtesy of GENERAL MOTORS CORP.

8. Install the engine protection shield and secure with the bolts.

Tighten

Tighten the engine protection shield bolts to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128467

Fig. 113: Installing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

9. Install the right and the left lower engine mount nuts.

Tighten

Tighten the lower engine mount nuts to 70 N.m (52 lb ft).

- 10. Lower the vehicle.
- 11. Install the right shock module. Refer to SHOCK MODULE REPLACEMENT in Front Suspension.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128468

Fig. 114: Installing Lower Engine Mount Nuts Courtesy of GENERAL MOTORS CORP.

- 12. Install the MAP sensor (2).
- 13. Install the MAP sensor retainer (1) and the electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128469

Fig. 115: Install the MAP Sensor, MAP Sensor Retainer And Electrical Connector Courtesy of GENERAL MOTORS CORP.

- 14. Connect the cooling fan hub nut to the water pump shaft.
- 15. Install the cooling fan. Refer to COOLING FAN AND SHROUD REPLACEMENT in Engine Cooling.
- 16. Connect the battery negative cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128470

<u>Fig. 116: Installing Cooling Fan</u> Courtesy of GENERAL MOTORS CORP.

CRANKCASE VENTILATION HOSES/PIPES REPLACEMENT

Removal Procedure

- 1. Disconnect the crankcase dirty air hose from the intake manifold.
- 2. Disconnect the crankcase dirty air hose from the PCV orifice tube.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128471

Fig. 117: Disconnecting Crankcase Dirty Air Hose Courtesy of GENERAL MOTORS CORP.

- 3. Loosen the throttle body clamps (2).
- 4. Disconnect the fuel pressure regulator vacuum supply hose from the air cleaner outlet resonator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128472

Fig. 118: Loosening Throttle Body Clamps Courtesy of GENERAL MOTORS CORP.

5. Remove the 2 resonator to engine bolts (4) from the air cleaner outlet resonator (5).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128473

Fig. 119: Removing Resonator To Engine Bolts From Air Cleaner Outlet Resonator Courtesy of GENERAL MOTORS CORP.

- 6. Lift up the front of the air cleaner outlet resonator (2).
- 7. Disconnect the crankcase clean air hose from the valve cover port.
- 8. Disconnect the crankcase clean air hose from the air cleaner outlet resonator (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128474

Fig. 120: Disconnecting Crankcase Clean Air Hose Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Connect the crankcase clean air hose to the air cleaner outlet resonator (2).
- 2. Connect the crankcase clean air hose to the valve cover port.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128475

Fig. 121: Connecting Crankcase Clean Air Hose Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

3. Install the 2 resonator to engine bolts (4) to the air cleaner outlet resonator (5).

Tighten

Tighten the bolts to 6 N.m (53 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128476

Fig. 122: Installing Resonator To Engine Bolts To Air Cleaner Outlet Resonator Courtesy of GENERAL MOTORS CORP.

4. Tighten the throttle body clamps (2).

Tighten

Tighten the clamps to 4 N.m (35 lb in).

5. Connect the fuel pressure regulator vacuum supply hose to the air cleaner outlet resonator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128477

Fig. 123: Tightening Throttle Body Clamps Courtesy of GENERAL MOTORS CORP.

- 6. Connect the crankcase dirty air hose to the intake manifold.
- 7. Connect the crankcase dirty air hose to the PCV orifice tube.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128478

Fig. 124: Connecting Crankcase Dirty Air Hose Courtesy of GENERAL MOTORS CORP.

INTAKE MANIFOLD REPLACEMENT

Removal Procedure

- 1. Remove the throttle body. Refer to THROTTLE BODY.
- 2. Remove the PCM. Refer to **<u>POWERTRAIN CONTROL MODULE</u>**.
- 3. Disconnect all harnesses from the engine harness bracket.
- 4. Remove the front differential vent hose from the bracket clip.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128479

Fig. 125: Disconnecting All Harnesses From Engine Harness Bracket Courtesy of GENERAL MOTORS CORP.

- 5. Remove the engine harness bracket bolt and remove the bracket.
- 6. Disconnect the MAP sensor electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128480

Fig. 126: Disconnecting MAP Sensor Electrical Connector Courtesy of GENERAL MOTORS CORP.

- 7. Disconnect the crankcase ventilation hose.
- 8. Disconnect the brake hose at the booster.
- 9. Remove the generator. Refer to *GENERATOR REPLACEMENT (4.2L ENGINE)* or *GENERATOR REPLACEMENT (5.3L ENGINE)* in Engine Electrical.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128481

Fig. 127: Disconnecting Crankcase Ventilation Hose & Brake Hose Courtesy of GENERAL MOTORS CORP.

- 10. Loosen and remove the intake manifold bolts.
- 11. Remove the intake manifold.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128482

<u>Fig. 128: Removing Intake Manifold</u> Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install a new intake manifold gasket.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the intake manifold onto the engine and secure the manifold with the bolts.

Tighten

Tighten the intake manifold bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 3. Install the generator. Refer to *GENERATOR REPLACEMENT (4.2L ENGINE)* or *GENERATOR REPLACEMENT (5.3L ENGINE)* in Engine Electrical.
- 4. Install the brake hose to the booster.
- 5. Lubricate the inner diameter of the crankcase ventilation hose with GM P/N 12345884 (Canadian P/N 5728223) or equivalent.



G02128483

Fig. 129: Installing Intake Manifold Courtesy of GENERAL MOTORS CORP.

- 6. Install the crankcase ventilation hose.
- 7. Install the MAP sensor electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128484

Fig. 130: Installing Crankcase Ventilation Hose Courtesy of GENERAL MOTORS CORP.

8. Install the engine harness bracket. Secure the bracket with the bolt.

Tighten

Tighten the engine harness bracket bolt to 50 N.m (37 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128485

Fig. 131: Installing Engine Harness Bracket Courtesy of GENERAL MOTORS CORP.

- 9. Install the front differential vent hose to the engine harness bracket clip.
- 10. Install all harnesses to the original location onto the engine harness bracket.
- 11. Install the PCM. Refer to **POWERTRAIN CONTROL MODULE**.
- 12. Install the throttle body. Refer to **<u>THROTTLE BODY</u>**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128486

Fig. 132: Installing Harnesses Onto Engine Harness Bracket Courtesy of GENERAL MOTORS CORP.

CAMSHAFT COVER REPLACEMENT

Removal Procedure

- 1. Remove the intake manifold. Refer to *INTAKE MANIFOLD REPLACEMENT*.
- 2. Discharge the A/C. Refer to *REFRIGERANT RECOVERY AND RECHARGING* in Heating, Ventilation and Air Conditioning.
- 3. Remove the A/C line at the oil level indicator tube bracket nut.
- 4. Remove the A/C line from the accumulator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128487

Fig. 133: Removing A/C Line From Accumulator Courtesy of GENERAL MOTORS CORP.

5. Remove the A/C bracket bolt from the engine lift hook.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128488

Fig. 134: Removing A/C Bracket Bolt From Engine Lift Hook Courtesy of GENERAL MOTORS CORP.

- 6. Remove the engine lift bracket.
- 7. Disconnect the ignition control module electrical connectors.
- 8. Loosen and remove the ignition control module bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128489

Fig. 135: Removing Ignition Control Module Bolts Courtesy of GENERAL MOTORS CORP.

9. Remove the ignition control module.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128490

Fig. 136: Removing Ignition Control Module Courtesy of GENERAL MOTORS CORP.

- 10. Disconnect the engine electrical harness housing from the camshaft cover (1) taking care not to damage the clips that hold the housing in place.
- 11. Disconnect the fuel injection harness electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128491

Fig. 137: Disconnecting Engine Electrical Harness Housing From Camshaft Cover Courtesy of GENERAL MOTORS CORP.

12. Loosen and remove the camshaft cover bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128492

Fig. 138: Removing Camshaft Cover Bolts Courtesy of GENERAL MOTORS CORP.

- 13. Remove the camshaft cover.
- 14. Clean and inspect the camshaft cover. Refer to Camshaft Cover Cleaning and Inspection.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128493

Fig. 139: Removing Camshaft Cover Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Install a new camshaft cover seal.
- 2. Install new rubber ignition control module seals.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

3. Install the camshaft cover and secure with the cam cover bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the camshaft cover bolts to 10 N.m (89 lb in).



G02128494

Fig. 140: Installing Camshaft Cover Courtesy of GENERAL MOTORS CORP.

4. Install the ignition control modules and secure the modules with bolts.

Tighten

Tighten the ignition coil bolts to 10 N.m (89 lb in).

- 5. Connect the ignition control module electrical connectors.
- 6. Install the fuel injector electrical connectors.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128495

Fig. 141: Installing Fuel Injector Electrical Connectors Courtesy of GENERAL MOTORS CORP.

7. Install the engine electrical harness housing (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128496

Fig. 142: Installing Engine Electrical Harness Housing Courtesy of GENERAL MOTORS CORP.

8. Install the A/C line bracket to the oil level indicator tube stud and secure the bracket with the nut.

Tighten

Tighten the A/C line bracket nut to 7 N.m (62 lb in).

9. Install the engine lift bracket and secure the lift hook with the bolts.

Tighten

Tighten the lift bracket bolts to 50 N.m (37 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128497

Fig. 143: Installing A/C Line Bracket Courtesy of GENERAL MOTORS CORP.

10. Install the A/C line bracket to the engine lift bracket and secure the A/C bracket with the bolt.

Tighten

Tighten the A/C bracket bolt to 10 N.m (89 lb in).

- 11. Install the intake manifold. Refer to *INTAKE MANIFOLD REPLACEMENT*.
- 12. Recharge the A/C system. Refer to *REFRIGERANT RECOVERY AND RECHARGING* in Heating, Ventilation and Air Conditioning.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128498

<u>Fig. 144: Installing Intake Manifold</u> Courtesy of GENERAL MOTORS CORP.

VALVE ROCKER ARM AND VALVE LASH ADJUSTER REPLACEMENT

Tools Required

- J 36660-A Torque Angle Meter
- J 44222 Camshaft Sprocket Holding Tool

Removal Procedure

- 1. Remove the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Remove the exhaust and the intake sprocket bolts.
- 3. Install the J 44222 onto the cylinder head and adjust the horizontal bolts into the camshaft sprockets in order to maintain chain tension and keep from disturbing the timing chain components.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128499

Fig. 145: Removing Exhaust And Intake Sprocket Bolts Courtesy of GENERAL MOTORS CORP.

4. Carefully move the sprockets with the timing chain off of the camshafts.

IMPORTANT: Place the camshaft caps in a rack to ensure the caps are installed in the same location from which they were removed.

- 5. Remove the camshaft cap bolts.
- 6. Remove the camshaft caps.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128500

<u>Fig. 146: Removing Camshaft Caps</u> Courtesy of GENERAL MOTORS CORP.

7. Remove the camshafts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128501

Fig. 147: Removing Camshafts Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Once removed, place the valve rocker arms and valve lash adjusters in an organized order so the components can be installed into the original locations.

8. Remove the valve rocker arms.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128502

Fig. 148: Removing Valve Rocker Arms Courtesy of GENERAL MOTORS CORP.

9. Remove the valve lash adjusters.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128503

Fig. 149: Removing Valve Lash Adjusters Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Lubricate and fill the valve lash adjusters with engine oil.
- 2. Install the valve lash adjusters in their original locations.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128504

Fig. 150: Installing Valve Lash Adjusters Courtesy of GENERAL MOTORS CORP.

- 3. Lubricate the valve rocker arm roller.
- 4. Install the valve rocker arms in their original locations.
- 5. Coat the camshaft journals with engine oil.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128505

<u>Fig. 151: Installing Valve Rocker Arms</u> Courtesy of GENERAL MOTORS CORP.

6. Install the camshafts to their original position

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128506

<u>Fig. 152: Installing Camshafts</u> Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

7. Install the camshaft caps onto their original journal.

Tighten

Tighten the camshaft cap bolts to 12 N.m (106 lb in).
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128507

Fig. 153: Installing Camshaft Caps Courtesy of GENERAL MOTORS CORP.

- 8. Carefully move the camshaft sprockets back onto the camshafts and remove the J 44222.
- 9. Install the intake camshaft sprocket washer, and the bolt, and the exhaust camshaft actuator bolt.

Tighten

- Tighten the intake camshaft sprocket bolt the first pass 20 N.m (15 lb ft).
- Use the *J 36660-A* to tighten the intake camshaft sprocket bolt the final pass and additional 100 degrees.
- Tighten the exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).
- Use the *J 36660-A* to tighten the exhaust camshaft actuator bolt a final pass an additional 135 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

10. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.



G02128508

Fig. 154: Installing Intake Camshaft Sprocket Washer And Bolt Courtesy of GENERAL MOTORS CORP.

VALVE STEM OIL SEAL AND VALVE SPRING REPLACEMENT

Tools Required

- J 38820 Valve Stem Seal Remover and Installer
- J 44222 Camshaft Sprocket Holding Tool
- J 44228 Valve Spring Compressor

Removal Procedure

IMPORTANT: Organize the valve train components when disassembling so they can be reassembled in the same location and matched up with the same components,

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

as previously installed.

- 1. Remove the cam cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Remove the spark plugs. Refer to SPARK PLUGS .
- 3. Remove the exhaust and the intake sprocket bolts.



G02128509

Fig. 155: Removing Exhaust And Intake Sprocket Bolts Courtesy of GENERAL MOTORS CORP.

- 4. Install the J 44222 onto the cylinder head in order to keep from disturbing the timing chain components.
- 5. Adjust the 2 horizontal bolts into the camshaft sprockets to maintain chain tension.
- 6. Carefully move the sprockets with the timing chain, off of the camshafts.
- 7. Remove the camshaft cap bolts.

IMPORTANT: Place the camshaft caps in a rack to ensure the caps are installed in the same location from which they were removed.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

8. Remove the camshaft caps.



G02128510

<u>Fig. 156: Removing Camshaft Caps</u> Courtesy of GENERAL MOTORS CORP.

- 9. Remove the camshafts.
- 10. Using a suitable adapter, apply air pressure to the cylinder.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128511

<u>Fig. 157: Removing Camshafts</u> Courtesy of GENERAL MOTORS CORP.

11. Install the J 44228 and compress the valve springs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128512

Fig. 158: Compressing Valve Springs Courtesy of GENERAL MOTORS CORP.

- 12. Remove the valve keys.
- 13. Remove the *J* 44228.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128513

<u>Fig. 159: Removing Valve Keys</u> Courtesy of GENERAL MOTORS CORP.

14. Remove the valve spring retainer and the valve spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128514

Fig. 160: Removing Valve Spring Retainer And Valve Spring Courtesy of GENERAL MOTORS CORP.

- 15. Use the *J* 38820 and remove the seals.
- 16. Clean and inspect the cylinder head. Refer to **Cylinder Head Cleaning and Inspection**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128515

Fig. 161: Removing Seals Courtesy of GENERAL MOTORS CORP.

Installation Procedure

IMPORTANT: Lubricate the valve stems with clean engine oil before installing.

1. Use the J 38820 to install the valve seals. There is only one size seal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128516

Fig. 162: Installing Valve Seals Courtesy of GENERAL MOTORS CORP.

2. Install the valve spring and the valve spring retainer.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128517

Fig. 163: Installing Valve Spring And Valve Spring Retainer Courtesy of GENERAL MOTORS CORP.

3. Use the *J* 44228 and compress the valve springs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128518

Fig. 164: Compressing Valve Springs Courtesy of GENERAL MOTORS CORP.

- 4. Install the valve keys.
- 5. Remove the *J* 44228.
- 6. Remove the air pressure to the cylinder.
- 7. Coat the camshaft journals, the camshaft journal thrust face, and the camshaft lobes with clean engine oil.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128519

Fig. 165: Installing Valve Keys Courtesy of GENERAL MOTORS CORP.

8. Install the camshafts to their original position.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128520

<u>Fig. 166: Installing Camshafts</u> Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

9. Install the camshaft caps onto their original journal.

Tighten

Tighten the camshaft cap bolts to 12 N.m (106 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128521

Fig. 167: Installing Camshaft Caps Courtesy of GENERAL MOTORS CORP.

- 10. Carefully move the camshaft sprockets back onto the camshafts and remove the J 44222.
- 11. Install the intake camshaft sprocket washer and the bolt, and the exhaust camshaft actuator bolt.

Tighten

- Tighten the intake camshaft sprocket bolt the first pass to 20 N.m (15 lb ft).
- Use the *J 36660-A* to tighten the intake camshaft sprocket bolt the final pass and additional 100 degrees.
- Tighten the exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).
- Use the *J 36660-A* to tighten the exhaust camshaft actuator bolt a final pass an additional 135 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 12. Install the spark plugs. Refer to SPARK PLUGS .
- 13. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.



G02128522

Fig. 168: Installing Intake Camshaft Sprocket Washer And Bolt Courtesy of GENERAL MOTORS CORP.

OIL LEVEL INDICATOR AND TUBE REPLACEMENT

Removal Procedure

- 1. Remove the A/C line bracket nut.
- 2. Remove the A/C line bracket from the oil level indicator tube stud.
- 3. Disconnect the O2 sensor electrical connector from the oil level indicator bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128523

Fig. 169: Disconnecting O2 Sensor Electrical Connector From Oil Level Indicator Bracket Courtesy of GENERAL MOTORS CORP.

- 4. Remove the oil level indicator tube stud.
- 5. Pull the indicator out of the tube.
- 6. Pull the tube out of the block.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128524

Fig. 170: Removing Oil Level Indicator Tube Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Install the oil level indicator tube into the engine block.
- 2. Add sealant GM P/N 12346004 (Canadian P/N 10953480) to the oil level indicator tube stud threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

3. Install the oil level indicator tube stud.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten

Tighten the oil level indicator tube stud to 10 N.m (89 lb in).

4. Install the A/C line bracket to oil level indicator tube and secure with the nut.

Tighten

Tighten the A/C line bracket nut to 7 N.m (6 lb in).

- 5. Connect the O2 sensor electrical connector.
- 6. Install the oil level indicator into the tube.



G02128525

Fig. 171: Installing Oil Level Indicator Tube Courtesy of GENERAL MOTORS CORP.

CYLINDER HEAD REPLACEMENT

NOTE: General Motors has developed a procedure for removing the cylinder head without the removal of of the front cover. The new procedure can be done in vehicle with the aid of a new special service tool. See <u>INFORMATION ON NEW</u> <u>IN-VEHICLE SERVICE PROCEDURE FOR REMOVAL/INSTALLATION OF LK5 OR</u> <u>L52 CYLINDER HEAD</u>.

Tools Required

J 36660-A Torque Angle Meter

Removal Procedure

- 1. Remove the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Remove the exhaust manifold. Refer to EXHAUST MANIFOLD REPLACEMENT (4.2L ENGINE) .
- 3. Remove the front cover. Refer to *ENGINE FRONT COVER REPLACEMENT*.
- 4. Remove the cylinder head access hole plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128526

Fig. 172: Removing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

- 5. Remove the timing chain tensioner shoe bolt.
- 6. Remove the timing chain tensioner shoe.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128527

Fig. 173: Removing Timing Chain Tensioner Shoe Courtesy of GENERAL MOTORS CORP.

- 7. Remove the timing chain tensioner guide bolts.
- 8. Remove the timing chain tensioner guide.
- 9. Remove the timing chain and the sprockets. Refer to <u>*TIMING CHAIN, SPROCKETS, AND/OR*</u> <u>*TENSIONER REPLACEMENT*</u>.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128528

Fig. 174: Removing Timing Chain Tensioner Guide Courtesy of GENERAL MOTORS CORP.

10. Loosen and remove the cylinder head bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128529

Fig. 175: Removing Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

11. Remove the cylinder head.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128530

Fig. 176: Removing Cylinder Head Courtesy of GENERAL MOTORS CORP.

- 12. Remove the cylinder head gasket.
- 13. Place the cylinder head on a flat, clean surface with the combustion chambers face up, in order to prevent damage to the deck face.
- 14. If replacing cylinder head refer to **Cylinder Head Disassemble**.
- 15. Clean and inspect the cylinder head. Refer to **Cylinder Head Cleaning and Inspection**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128531

Fig. 177: Removing Cylinder Head Gasket Courtesy of GENERAL MOTORS CORP.

Installation Procedure

IMPORTANT: Ensure number 1 cylinder is at top dead center.

- 1. If installing new cylinder head, refer to Cylinder Head Assemble.
- 2. Install the dowel pins, cylinder head locator, if necessary.
- 3. Install a new cylinder head gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128532

Fig. 178: Installing New Cylinder Head Gasket Courtesy of GENERAL MOTORS CORP.

4. Install the cylinder head.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128533

<u>Fig. 179: Installing Cylinder Head</u> Courtesy of GENERAL MOTORS CORP.

5. Install new cylinder head bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128534

Fig. 180: Installing Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

6. Tighten the new cylinder head bolts in the following sequence:

Tighten

- 6.1. Tighten the cylinder head bolts (1-14) in sequence to 30 N.m (22 lb ft).
- 6.2. Use J 36660-A to tighten the cylinder head bolts in sequence an additional 155 degrees.
- 6.3. Tighten the (2 Short) end bolts to 7 N.m (62 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Use J 36660-A to tighten the short cylinder head end bolts an additional 60 degrees.

6.4. Tighten the (1 Long) end bolt to 7 N.m (62 lb in).

Use J 36660-A to tighten the long cylinder head end bolt an additional 120 degrees.





Fig. 181: Tightening Sequence Of Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

7. Install the cylinder head access hole plugs.

Tighten

Tighten the plugs to 5 N.m (44 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 8. Install the timing chain and sprockets. Refer to <u>*TIMING CHAIN, SPROCKETS, AND/OR</u></u> <u><i>TENSIONER REPLACEMENT*</u>.</u>
- 9. Install the front cover. Refer to *ENGINE FRONT COVER REPLACEMENT*.
- 10. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 11. Install the exhaust manifold. Refer to EXHAUST MANIFOLD REPLACEMENT (4.2L ENGINE).



G02128536

Fig. 182: Installing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT BALANCER REPLACEMENT

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tools Required

- J 36660-A Torque Angle Meter
- J 41478 Crankshaft Front Oil Seal Replacement
- J 41816-2 Crankshaft End Protector
- J 44226 Crankshaft Balancer Remover/Holder

Removal Procedure

- 1. Remove the radiator intake baffle. Refer to *AIR INTAKE BAFFLE REPLACEMENT RADIATOR* in Body Front End.
- 2. Remove the grill. Refer to *GRILLE REPLACEMENT (GMC)* or *GRILLE REPLACEMENT (OLDSMOBILE)* or *GRILLE REPLACEMENT (CHEVROLET)* in Exterior Trim.

IMPORTANT: When removing the diagonal brace, only remove the one bolt from the battery tray brace that is bolted to the radiator brace.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128537

Fig. 183: Removing Balancer Bolt Courtesy of GENERAL MOTORS CORP.

3. Remove the radiator support diagonal brace.

Refer to BRACE REPLACEMENT - RADIATOR SUPPORT DIAGONAL in Body Front End.

- 4. Remove the hood latch support. Refer to HOOD LATCH SUPPORT REPLACEMENT in Body Front End.
- 5. Remove the cooling fan and shroud. Refer to *COOLING FAN AND SHROUD REPLACEMENT* in Engine Cooling.
- 6. Remove the drive belt. Refer to **DRIVE BELT REPLACEMENT**.
- 7. Carefully loosen and remove the balancer bolt.
- 8. Install J 41816-2 into the end of the crankshaft.

IMPORTANT: Do not pull on outer edge of the crankshaft balancer.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 9. Using the J 44226 remove the balancer.
- 10. Remove J 44226 and J 41816-2.
- 11. Remove the crankshaft balancer shim from the crankshaft snout.
- 12. Clean and inspect the crankshaft balancer. Refer to Crankshaft Balancer Cleaning and Inspection.



G02128538

Fig. 184: Removing Crankshaft Balancer Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: The crankshaft balancer does not have a key-way; so the crankshaft could turn when tightening, causing an improper torque. Make sure to follow the installation procedure to prevent damage.

- 1. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 2. Remove the torque converter access plug in the dry part of the oil pan.
- 3. Use the torque converter holding tool from the J 44226 kit and secure the torque converter while tightening the crankshaft balancer.
- 4. Install a new crankshaft balancer shim GM P/N 12573950 over the crankshaft snout, against the crankshaft gear.
- 5. Using the J 41478 install and seat the crankshaft balancer.
- 6. Remove the *J* 41478.



G02128539

Fig. 185: Installing Crankshaft Balancer Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

7. While still holding the flywheel, install the balancer washer and the bolt.

Tighten

Tighten the crankshaft balancer bolt to 150 N.m (110 lb ft). Use the *J* 36660-A in order to tighten the balancer bolt an additional 180 degrees.

- 8. Remove the torque converter holding tool.
- 9. Install the torque converter access plug into the oil pan.
- 10. Lower the vehicle.
- 11. Install the drive belt. Refer to DRIVE BELT REPLACEMENT.
- 12. Install the cooling fan and shroud. Refer to *COOLING FAN AND SHROUD REPLACEMENT* in Engine Cooling.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128540

Fig. 186: Installing Balancer Bolt Courtesy of GENERAL MOTORS CORP.

- 13. Install the hood latch support. Refer to HOOD LATCH SUPPORT REPLACEMENT in Body Front End.
- 14. Install the radiator diagonal brace. Refer to *BRACE REPLACEMENT RADIATOR SUPPORT DIAGONAL* in Body Front End.
- 15. Install the grill. Refer to *GRILLE REPLACEMENT (GMC)* or *GRILLE REPLACEMENT (OLDSMOBILE)* or *GRILLE REPLACEMENT (CHEVROLET)* in Exterior Trim.
- 16. Install the radiator air intake baffle. Refer to *AIR INTAKE BAFFLE REPLACEMENT RADIATOR* in Body Front End.

CRANKSHAFT FRONT OIL SEAL REPLACEMENT

Tools Required

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

J 44218 Seal Installer

Removal Procedure

IMPORTANT: Do not damage the engine front cover or the crankshaft.

- 1. Remove the crankshaft balancer. Refer to <u>CRANKSHAFT BALANCER REPLACEMENT</u>.
- 2. Pry out the crankshaft front oil seal using a suitable tool. Use the provided slots for prying out the seal.



G02128541

Fig. 187: Prying Out Crankshaft Front Oil Seal Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Installation Procedure

1. Apply the engine oil to the outside diameter of the crankshaft front oil seal.



G02128542

Fig. 188: Installing Front Oil Seal Courtesy of GENERAL MOTORS CORP.

- 2. Use the *J* 44218 to install the front oil seal.
- 3. Remove the *J* 44218.
- 4. Install the crank balancer shaft. Refer to <u>CRANKSHAFT BALANCER REPLACEMENT</u>.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128543

Fig. 189: Installing Crank Balancer Shaft Courtesy of GENERAL MOTORS CORP.

ENGINE FRONT COVER REPLACEMENT

Tools Required

J 44219 Cover Alignment Pins

Removal Procedure

- 1. Drain the engine coolant. Refer to *DRAINING AND FILLING COOLING SYSTEM* (*BODY VIN CODE 6*) or *DRAINING AND FILLING COOLING SYSTEM* (*BODY VIN CODE 3*) in Engine Cooling.
- 2. Remove the cooling fan and the shroud. Refer to COOLING FAN AND SHROUD REPLACEMENT in

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Engine Cooling.

- 3. Remove the drivebelt. Refer to <u>DRIVE BELT REPLACEMENT</u>.
- 4. Remove the water pump. Refer to *WATER PUMP REPLACEMENT (4.2L ENGINE)* or *WATER PUMP REPLACEMENT (5.3L ENGINE)* in Engine Cooling.
- 5. Remove the crankshaft balancer. Refer to <u>CRANKSHAFT BALANCER REPLACEMENT</u>.
- 6. Remove the power steering pump. Refer to *POWER STEERING PUMP REPLACEMENT (4.2L)* or *POWER STEERING PUMP REPLACEMENT (5.3L)* in Power Steering.
- 7. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 8. Remove the oil pan. Refer to OIL PAN REPLACEMENT.
- 9. Lower the vehicle.
- 10. Remove the 7 mm center bolt (1).
- 11. Loosen and remove the remaining engine front cover bolts.
- 12. Place two of the front cover bolts in the jack screw holes on the front cover and tighten the bolts evenly to release the front cover from the engine.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128544

Fig. 190: Removing Center Bolt, Engine Front Cover Bolts And Engine Front Cover Courtesy of GENERAL MOTORS CORP.

- 13. Remove the two bolts from the front cover.
- 14. Remove the oil pump. Refer to **<u>Oil Pump Replacement</u>**.
- 15. Clean and Inspect the front cover. Refer to Engine Front Cover Cleaning and Inspection.

Installation Procedure

1. Install the J 44219, onto the engine.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128545

Fig. 191: Installing Cover Alignment Pins Onto Engine Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The engine front cover must be installed within 10 minutes from when the sealer was applied.

- 2. Apply a 3 mm (0.12 in) bead of sealer GM P/N 12378521 to the trace grooves on back side of the engine front cover (1).
- 3. Also apply sealant on the inside three bolt hole bosses on the cover.
- 4. Align the oil pump to the crankshaft sprocket splines.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128546

Fig. 192: Applying Bead Of Sealer To Trace Grooves Courtesy of GENERAL MOTORS CORP.

5. Install the front cover.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

6. Install the front cover bolts, tightening the center bolt last (1).

Tighten

Tighten the front cover bolts to 10 N.m (89 lb in).

7. Remove the *J* 44219.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 8. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 9. Install the oil pan. Refer to OIL PAN REPLACEMENT.
- 10. Lower the vehicle.
- 11. Install the power steering pump. Refer to *POWER STEERING PUMP REPLACEMENT (4.2L)* or *POWER STEERING PUMP REPLACEMENT (5.3L)* in Power Steering System.



G02128547

Fig. 193: Installing Front Cover & Front Cover Bolts Courtesy of GENERAL MOTORS CORP.

- 12. Install the crankshaft balancer. Refer to <u>CRANKSHAFT BALANCER REPLACEMENT</u>.
- 13. Install the water pump. Refer to *WATER PUMP REPLACEMENT (4.2L ENGINE)* or *WATER PUMP REPLACEMENT (5.3L ENGINE)* in Engine Cooling.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 14. Install the drivebelt. Refer to <u>DRIVE BELT REPLACEMENT</u>.
- 15. Install the cooling fan and shroud. Refer to *COOLING FAN AND SHROUD REPLACEMENT* in Engine Cooling.
- 16. Fill the engine with coolant. Refer to *DRAINING AND FILLING COOLING SYSTEM (BODY VIN CODE* 6) or *DRAINING AND FILLING COOLING SYSTEM (BODY VIN CODE 3)* in Engine Cooling.

EXHAUST CAMSHAFT POSITION ACTUATOR REPLACEMENT

Tools Required

- J 36660-A Torque Angle Meter
- *J* 44217 Timing Chain Retention Tool

Removal Procedure

- 1. Remove the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Rotate the engine until the word Delphi on the exhaust camshaft position actuator is lined up parallel with the cylinder head to cam cover mating surface.
- 3. Remove the top chain guide bolts.
- 4. Remove the top chain guide.
- 5. Using the timing mark on the exhaust camshaft position actuator sprocket as a reference, make a mark on the timing chain link across from it.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128548

Fig. 194: Removing Top Chain Guide Bolts And Top Chain Guide Courtesy of GENERAL MOTORS CORP.

6. Install the *J*-44217.

6.1. Install the hook portion of the timing chain retention tools into one of the timing chain links near the timing chain shoe on both sides of the engine.

6.2. Tighten the wingnuts.

6.3. Ensure the hooks are still in one of the links and the gage blocks of the tool are firmly in place on the edge of the head.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 195: Installing Hook Portion Of Timing Chain Retention Tools Courtesy of GENERAL MOTORS CORP.

- 7. Remove the exhaust camshaft position actuator bolt.
- 8. Remove the exhaust camshaft position actuator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128550

Fig. 196: Removing Exhaust Camshaft Position Actuator Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Install the exhaust camshaft actuator into the timing chain.
- 2. Align the marked link of the timing chain with the timing mark on the exhaust camshaft position actuator sprocket (1).

IMPORTANT: Ensure the alignment pin is engaged between the camshaft and the exhaust camshaft position actuator.

3. Install the exhaust camshaft actuator onto the exhaust camshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128551

Fig. 197: Installing Exhaust Camshaft Actuator Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Insure the camshaft actuator is rotated clockwise relative to the camshaft prior to tightening the bolt. Do not force the camshaft actuator to rotate clockwise. If it doesn't move easily, it is already fully advanced. New camshaft actuators are already packaged in the fully advanced (clockwise) position.

4. Use the 25 mm (1 in) hex between the cam lobes to rotate the exhaust camshaft counter-clockwise until it stops (as seen from the front of the vehicle), this will place the camshaft actuator in the fully advanced (clockwise) position.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: The camshaft actuator must be fully advanced during installation. Engine damage may occur if the camshaft actuator is not fully advanced.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

5. Install the exhaust camshaft actuator bolt.

Tighten

- Tighten the exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).
- Use the *J 36660-A* to tighten the exhaust camshaft actuator bolt the final pass an additional 135 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128552

Fig. 198: Rotating Exhaust Camshaft Counter-Clockwise Until It Stops Courtesy of GENERAL MOTORS CORP.

- 6. Remove the *J*-44217.
- 7. Install the top chain guide.
- 8. Add threadlock GM P/N 12345493 (Canadian P/N 10953488) to the top chain guide bolt threads.
- 9. Install the top chain guide bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the top chain guide bolts to 10 N.m (89 lb in).

10. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.



G02128553

Fig. 199: Installing Top Chain Guide Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN, SPROCKETS, AND/OR TENSIONER REPLACEMENT

Tools Required

- *J 36660-A* Torque Angle Meter
- *J 44221* Camshaft Holding Tool

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Removal Procedure

- 1. Remove the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Remove the engine front cover. Refer to ENGINE FRONT COVER REPLACEMENT.
- 3. Release the tension on the timing chain by moving the tensioner shoe in.



G02128554

Fig. 200: Releasing Tension On Timing Chain By Moving Tensioner Shoe In Courtesy of GENERAL MOTORS CORP.

4. Place the tee into the tensioner to hold the shoe in place.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128555

<u>Fig. 201: Placing Tee Into Tensioner</u> Courtesy of GENERAL MOTORS CORP.

- 5. Remove the top chain guide bolts.
- 6. Remove the top chain guide.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128556

Fig. 202: Removing Top Chain Guide Courtesy of GENERAL MOTORS CORP.

- 7. Remove the exhaust camshaft position actuator bolt.
- 8. Remove the exhaust camshaft position actuator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128557

Fig. 203: Removing Exhaust Camshaft Position Actuator Courtesy of GENERAL MOTORS CORP.

- 9. Remove the intake camshaft sprocket bolt.
- 10. Remove the intake camshaft sprocket.
- 11. Remove the timing chain.
- 12. Remove the crankshaft sprocket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128558

<u>Fig. 204: Removing Intake Camshaft Sprocket And Timing Chain</u> Courtesy of GENERAL MOTORS CORP.

13. Remove the cylinder head access hole plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128559

Fig. 205: Removing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

- 14. Remove the timing chain tensioner shoe bolt.
- 15. Remove the timing chain tensioner shoe.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128560

Fig. 206: Removing Timing Chain Tensioner Shoe Courtesy of GENERAL MOTORS CORP.

- 16. Remove the timing chain tensioner guide bolts.
- 17. Remove the timing chain tensioner guide.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128561

Fig. 207: Removing Timing Chain Tensioner Guide Courtesy of GENERAL MOTORS CORP.

- 18. Remove the timing chain tensioner bolts.
- 19. Remove the timing chain tensioner.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128562

Fig. 208: Removing Timing Chain Tensioner Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

IMPORTANT: Every seventh link of the timing chain is darkened to aid in aligning the timing marks.

1. Install the timing chain tensioner and secure the tensioner with the bolts.

Tighten

Tighten the timing chain tensioner bolts to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128563

Fig. 209: Installing Timing Chain Tensioner Courtesy of GENERAL MOTORS CORP.

2. Install the timing chain tensioner guide and secure the guide with the bolts.

Tighten

Tighten the timing chain tensioner guide to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128564

Fig. 210: Installing Timing Chain Tensioner Guide Courtesy of GENERAL MOTORS CORP.

3. Install the timing chain tensioner shoe and secure the shoe with the bolt.

Tighten

Tighten the timing chain tensioner shoe bolt to 26 N.m (19 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128565

Fig. 211: Installing Timing Chain Tensioner Shoe Courtesy of GENERAL MOTORS CORP.

4. Install the cylinder head access hole plugs.

Tighten

Tighten the cylinder head access hole plugs to 5 N.m (44 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128566

Fig. 212: Installing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

5. Install the *J* 44221 with the camshaft flats up and the number 1 cylinder at top dead center.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128567

Fig. 213: Installing Camshaft Holding Tool Courtesy of GENERAL MOTORS CORP.

- 6. Install the crankshaft sprocket (1).
- 7. Install the intake camshaft sprocket into the timing chain.
- 8. Align the dark link of the timing chain with the timing mark on the intake camshaft sprocket (1).
- 9. Feed the timing chain down through the opening in the head.
- 10. Install the timing chain on the crankshaft sprocket. Align the dark link of the timing chain with the timing mark on to the crankshaft sprocket.

IMPORTANT: It may be necessary to remove *J* 44221 to rotate and hold the camshaft (hex) to align the pin to the camshaft sprocket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 11. Install the intake camshaft sprocket onto the intake camshaft.
- 12. Install the intake camshaft sprocket washer and bolt.



G02128568

Fig. 214: Installing Crankshaft Sprocket And Timing Chain Courtesy of GENERAL MOTORS CORP.

- 13. Install the exhaust camshaft actuator into the timing chain.
- 14. Align the dark link of the timing chain with the timing mark on the exhaust camshaft actuator (1).

IMPORTANT: It may be necessary to remove the *J* 44221 to rotate and hold the camshaft hex to align the pin to the camshaft sprocket.

15. Install the exhaust camshaft actuator onto the exhaust camshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128569

Fig. 215: Aligning Dark Link Of Timing Chain With Timing Mark On Exhaust Camshaft Actuator Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Rotate the camshaft actuator clockwise relative to the camshaft prior to tightening the bolt.

- 16. Rotate the camshaft actuator clockwise until it stops (as seen from the front of the vehicle).
 - NOTE: The camshaft actuator must be fully advanced during installation. Engine damage may occur if the camshaft actuator is not fully advanced.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128570

Fig. 216: Rotating Camshaft Actuator Clockwise Until It Stops Courtesy of GENERAL MOTORS CORP.

17. Install the exhaust camshaft actuator bolt.

Tighten

- Tighten the exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).
- Use *J 36660-A* to tighten the exhaust camshaft actuator bolt the final pass an additional 135 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

18. Install the intake camshaft sprocket bolt.

Tighten

- Tighten the intake camshaft sprocket bolt the first pass to 20 N.m (15 ft lb).
- Use *J 36660-A* to tighten the intake camshaft sprocket bolt the final pass an additional 100 degrees.
- 19. Remove the tee in the timing chain tensioner to regain tension on the timing chain.
- 20. Remove the *J* 44221.



G02128571

Fig. 217: Removing Tee In Timing Chain Tensioner Courtesy of GENERAL MOTORS CORP.

21. The dark lines (1) on the chain should be aligned with the marks on the sprockets as shown.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128572

Fig. 218: Aligning Dark Lines On Chain With Marks On Sprockets Courtesy of GENERAL MOTORS CORP.

22. Install the top chain guide.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 23. Add threadlock GM P/N 12345496 on the top chain guide bolt threads.
- 24. Install the top chain guide bolts.

Tighten

Tighten the top chain guide bolts to 10 N.m (89 lb ft).

- 25. Install the engine front cover. Refer to ENGINE FRONT COVER REPLACEMENT.
- 26. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.



G02128573

<u>Fig. 219: Installing Top Chain Guide</u> Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

CAMSHAFT REPLACEMENT

Tools Required

- J 44221 Camshaft Holding Tool
- J 44222 Camshaft Sprocket Holding Tool
- J 36660-A Torque/Angle Meter

Removal Procedure

- 1. Remove the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.
- 2. Remove the intake and the exhaust camshaft sprocket bolts.
- 3. Install the J 44222 onto the cylinder head and adjust the horizontal bolts into the camshaft sprockets in order to maintain chain tension and keep from disturbing the timing chain components.
- 4. Carefully move the sprockets with the timing chain, off of the camshafts.
- 5. Remove the camshaft cap bolts.



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 220: Installing Camshaft Sprocket Holding Tool Onto Cylinder Head Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Place the camshaft caps in a rack to ensure the caps are installed in the same location from which they were removed.

6. Remove the camshaft caps and store.



G02128575

Fig. 221: Removing Camshaft Caps Courtesy of GENERAL MOTORS CORP.

7. Remove the camshafts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128576

Fig. 222: Removing Camshafts Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Coat the camshaft journals, camshaft journal thrust face, and camshaft lobes with clean engine oil.
- 2. Install the intake and exhaust camshafts to their original positions.
- 3. Install the *J* 44221 with the camshaft flats up and the number 1 cylinder at top dead center.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128577

<u>Fig. 223: Installing Camshafts</u> Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

IMPORTANT: Install the camshaft caps onto their original locations. The camshaft caps are pin stamped for direction and numerical order.

4. Install the camshaft caps and bolts.

Tighten

Tighten the camshaft cap bolts to 12 N.m (106 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

5. Remove the *J* 44221



G02128578

Fig. 224: Installing Camshaft Caps And Bolts Courtesy of GENERAL MOTORS CORP.

- 6. Carefully move the sprockets back onto the camshafts and remove the J 44222.
- 7. Install the intake camshaft sprocket washer and bolt, and the exhaust camshaft actuator bolt.

Tighten

- Tighten the intake camshaft sprocket bolt the first pass to 20 N.m (15 lb ft).
- Use the *J* 36660-A to tighten the intake camshaft sprocket bolt the final pass an additional 100 degrees.
- Tighten the exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- Use the *J 36660-A* to tighten the exhaust camshaft actuator bolt a final pass an additional 135 degrees.
- 8. Install the camshaft cover. Refer to <u>CAMSHAFT COVER REPLACEMENT</u>.



G02128579

Fig. 225: Removing Camshaft Sprocket Holding Tool Courtesy of GENERAL MOTORS CORP.

OIL FILTER ADAPTER AND BYPASS VALVE ASSEMBLY REPLACEMENT

Removal Procedure

- 1. Remove the oil filter. Refer to **Engine Oil and Oil Filter Replacement**.
- 2. Remove the oil filter adapter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128580

Fig. 226: Removing Oil Filter Adapter Courtesy of GENERAL MOTORS CORP.

3. Remove the oil filter bypass valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128581

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 227: Removing Oil Filter Bypass Valve Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the oil filter bypass valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128582

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 228: Installing Oil Filter Bypass Valve Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the oil filter adapter.

Tighten

Tighten the oil filter adapter to 30 N.m (22 lb ft).

3. Install the oil filter. Refer to **Engine Oil and Oil Filter Replacement**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128583

Fig. 229: Installing Oil Filter Adapter Courtesy of GENERAL MOTORS CORP.

OIL PAN REPLACEMENT

Removal Procedure

- 1. Remove the A/C compressor bottom bolts (4) and loosen the top bolts (2, 3).
- 2. Remove the oil level indicator and tube. Refer to <u>OIL LEVEL INDICATOR AND TUBE</u> <u>REPLACEMENT</u>.
- 3. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

4. Remove left and right front tire and wheel assemblies. Refer to *TIRE AND WHEEL REMOVAL AND INSTALLATION* in Tires and Wheels.



G02128584

Fig. 230: Removing A/C Compressor Bottom Bolts And Loosening Top Bolts Courtesy of GENERAL MOTORS CORP.

- 5. Remove the engine protection shield mounting bolts.
- 6. Remove the engine protection shield.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128585

Fig. 231: Removing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

- 7. Remove the steering gear crossmember, front.
- 8. Remove the left and right wheel drive shaft. Refer to AXLE SHAFTS.
- 9. Remove the front drive axle clutch fork assembly. Refer to *INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT - FRONT DRIVE AXLE (S4WD) or INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT - FRONT DRIVE AXLE (A4WD)* in Front Drive Axle.
- 10. Disconnect the prop shaft from the front axle pinion yoke. Refer to *PROPELLER SHAFT REPLACEMENT FRONT* in Prop Shaft.
- 11. Remove the oil pan drain plug and drain the oil.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128586

Fig. 232: Removing Steering Gear Crossmember Courtesy of GENERAL MOTORS CORP.

- 12. Unclip the transmission cooler lines from the engine block.
- 13. Remove the front differential bolts and set aside the front differential.
- 14. Remove 4 transmission bell housing bolts that are attached to the oil pan.
- 15. Remove the remaining oil pan bolts.
- 16. Place 2 oil pan bolts in the jack screws on the oil pan and tighten evenly to release the oil pan from the engine.
- 17. Clean and inspect the oil pan. Refer to **<u>Oil Pan Cleaning and Inspection</u>**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128587

Fig. 233: Unclipping Transmission Cooler Lines From Engine Block Courtesy of GENERAL MOTORS CORP.

Installation Procedure

IMPORTANT: The oil pan must be installed within 10 minutes from when sealer was applied

1. Apply a 3 mm (0.12 in) bead of sealer GM PN 12378521 to the block, rather than the oil pan.

IMPORTANT: When you install the oil pan, it could be shifted front or back a little which could cause a transmission alignment problem. The back of the oil pan needs to be flush with the block.

- 2. Install the oil pan, maneuvering the oil pan to clear the oil pump and screen assembly.
- 3. Install the oil pan bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128588

<u>Fig. 234: Installing Oil Pan</u> Courtesy of GENERAL MOTORS CORP.

4. Inspect the oil pan alignment. Use a straight edge on the back of the block and the oil pan transmission

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

mounting surface.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

5. Install the oil pan bolts.

Tighten

- Tighten the oil pan side bolts to 25 N.m (18 lb ft).
- Tighten the oil pan end bolts to 10 N.m (89 lb in).
- 6. Install the 4 transmission bell housing bolts that attach to the oil pan.

Tighten

Tighten bolts to 47 N.m (35 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128589

Fig. 235: Inspecting Oil Pan Alignment Courtesy of GENERAL MOTORS CORP.

7. Install the A/C compressor 2 bottom bolts (4).

Tighten

Tighten all 4 bolts to 50 N.m (37 lb ft).

8. Install the front differential bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the front differential bolts to 85 N.m (63 lb ft.)

9. Install the front drive axle, clutch fork assembly. Refer to *INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT - FRONT DRIVE AXLE (S4WD) or INTERMEDIATE SHAFT BEARING ASSEMBLY REPLACEMENT - FRONT DRIVE AXLE (A4WD)* in Front Drive Axle.





Fig. 236: Installing A/C Compressor Bottom Bolts Courtesy of GENERAL MOTORS CORP.

- 10. Clip transmission cooler lines to block.
- 11. Connect prop shaft to front differential.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128591

Fig. 237: Clipping Transmission Cooler Lines To Block Courtesy of GENERAL MOTORS CORP.

- 12. Install the steering gear crossmember.
- 13. Install the left and right wheel drive shaft. Refer to $\underline{AXLE SHAFTS}$.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128592

Fig. 238: Installing Steering Gear Crossmember Courtesy of GENERAL MOTORS CORP.

14. Install the oil pan drain plug.

Tighten

Torque the oil pan drain plug to 26 N.m (19 lb ft).

15. Install the engine protection shield and secure with the bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the engine protection shield bolts to 25 N.m (18 lb ft).

- 16. Install the left and the right front tires. Refer to *TIRE AND WHEEL REMOVAL AND INSTALLATION* in Tires and Wheels.
- 17. Lower the vehicle.

IMPORTANT: Inspect the engine for oil leaks in order to ensure all sealing surfaces are sealed.

18. Service the engine with oil.



G02128593

Fig. 239: Installing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

ENGINE OIL PRESSURE SENSOR AND/OR SWITCH REPLACEMENT

Removal Procedure

- 1. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 2. Remove the engine shield.
- 3. Remove the electrical connector from the oil pressure switch.
- 4. Remove the oil pressure switch.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128594

Fig. 240: Removing Oil Pressure Switch Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

1. Install the oil pressure switch.

Tighten

Tighten the oil pressure switch to 20 N.m (15 lb ft).

- 2. Install the electrical connector to the oil pressure switch.
- 3. Install the engine shield.
- 4. Lower the vehicle.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 241: Installing Oil Pressure Switch Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

ENGINE OIL LEVEL SENSOR AND/OR SWITCH REPLACEMENT

Removal Procedure

- 1. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 2. Remove the engine oil pan drain plug and drain the engine oil.



G02128596

Fig. 242: Removing Engine Oil Pan Drain Plug Courtesy of GENERAL MOTORS CORP.

- 3. Remove the engine protection shield mounting bolts.
- 4. Remove the engine protection shield.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128597

Fig. 243: Removing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

- 5. Disconnect the electrical connector from the engine oil level sensor.
- 6. Remove the engine oil level sensor mounting bolt.
- 7. Remove the engine oil level sensor.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G021	28598
------	-------

Fig. 244: Removing Engine Oil Level Sensor Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the engine oil level sensor.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

- 2. Install the engine oil level sensor mounting bolt.
 - Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the engine oil level sensor mounting bolt to 10 N.m (89 lb in).

3. Connect the electrical connector to the engine oil level sensor.



G02128599

Fig. 245: Installing Engine Oil Level Sensor Courtesy of GENERAL MOTORS CORP.

- 4. Install the engine protection shield.
- 5. Install the engine protection shield mounting bolts.

Tighten

Tighten the engine protection shield mounting bolts to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128600

Fig. 246: Installing Engine Protection Shield Courtesy of GENERAL MOTORS CORP.

6. Install the engine oil drain plug.

Tighten

Tighten the engine oil drain plug bolt to 26 N.m (19 lb ft).

- 7. Lower the vehicle.
- 8. Fill the crankcase with the proper quantity of engine oil.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128601

Fig. 247: Installing Engine Oil Drain Plug Courtesy of GENERAL MOTORS CORP.

OIL PUMP REPLACEMENT

Removal Procedure

- 1. Remove the engine front cover. Refer to ENGINE FRONT COVER REPLACEMENT .
- 2. Remove the oil pump cover bolts.
- 3. Remove the oil pump cover.
- 4. Mark the inner and the outer gears in relation to the oil pump housing.
- 5. Remove the inner and the outer oil pump gears.
- 6. Remove the oil pump pressure relief valve plug.
- 7. Remove the oil pump pressure relief valve and the spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128602

Fig. 248: Removing Oil Pump Cover, Oil Pump Gears And Pressure Relief Valve Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the oil pump pressure relief valve and the spring.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the oil pump pressure relief valve plug.

Tighten

Tighten the oil pump pressure relief valve to 14 N.m (124 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 3. Install the oil pump outer and inner gears as removed.
- 4. Install the oil pump cover.
- 5. Install the oil pump cover bolts.

Tighten

Tighten the oil pump cover bolts to 10 N.m (89 lb in).

6. Install the front cover. Refer to *ENGINE FRONT COVER REPLACEMENT*.



G02128603

Fig. 249: Installing Oil Pump Cover, Oil Pump Gears And Pressure Relief Valve Courtesy of GENERAL MOTORS CORP.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

CRANKSHAFT REAR OIL SEAL AND HOUSING REPLACEMENT

Tools Required

- J 36660-A Torque Angle Meter
- J 44219 Cover Alignment Pins
- J 44227 Rear Seal Installer

Removal Procedure

- 1. Remove the transmission. Refer to TRANSMISSION .
- 2. Remove the fly wheel bolts and remove the fly wheel.



G02128604

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

- 3. Remove the crankshaft rear oil seal housing bolts.
- 4. Install two bolts into the jackscrew holes (1) to release the cover from the block.
- 5. Remove the crankshaft and rear oil seal housing.
- 6. Remove the oil seal from the crankshaft snout.



G02128605

Fig. 251: Removing Crankshaft And Rear Oil Seal Housing Courtesy of GENERAL MOTORS CORP.

Installation Procedure

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 1. Use the *J* 44227 to install the crankshaft rear oil seal.
- 2. Remove the J 44227.
- 3. Apply a 3 mm (0.12 in) bead of GM P/N 12378521 to the rear oil seal housing (1).



G02128606

Fig. 252: Applying Bead Of GM P/N 12378521 To Rear Oil Seal Housing Courtesy of GENERAL MOTORS CORP.

4. Install the *J* 44219 guide pins into the block.

IMPORTANT: • When installing a new seal, use the plastic installation sleeve supplied with the new seal.

- The seal installation sleeve should come off after the seal is installed. Disregard the sleeve.
- 5. Slide the crankshaft rear oil seal housing over the alignment pins J 44219 and crankshaft.
- 6. Install the crankshaft rear oil seal housing bolts, except the two in place of the guide pins.
- 7. Remove the *J* 44219 guide pins.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

8. Install the remaining two crankshaft rear oil seal housing bolts.

Tighten

Tighten all the oil seal housing bolts to 10 N.m (89 lb in).



G02128607

Fig. 253: Installing Crankshaft Seal Housing Courtesy of GENERAL MOTORS CORP.

9. Wipe off any excess material from the bottom of the oil pan sealing area (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128608

Fig. 254: Wiping Off Any Excess Material From Bottom Of Oil Pan Sealing Area Courtesy of GENERAL MOTORS CORP.

10. Install the fly wheel and secure with the bolts.

Tighten

Tighten the fly wheel bolts in sequence to 25 N.m (18 lb ft).

- 11. Use the *J* 36660-A to tighten the bolts an additional 50 degrees.
- 12. Install the transmission. Refer to TRANSMISSION .

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128609

Fig. 255: Installing Fly Wheel & Tightening Bolts In Sequence Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL REPLACEMENT

Tools Required

J 44227 Rear Seal Installer

Removal Procedure

- 1. Remove the transmission. Refer to TRANSMISSION .
- 2. Remove the flywheel. Refer to ENGINE FLYWHEEL REPLACEMENT.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: Do not damage the crankshaft or seal bore.

3. Pry the crankshaft rear oil seal out of the rear oil seal housing using a suitable tool.





G02128610

Fig. 256: Prying Crankshaft Rear Oil Seal Out Of Housing Courtesy of GENERAL MOTORS CORP.

Installation Procedure

IMPORTANT: Use the plastic installation sleeve supplied with the new seal when installing a new seal.

1. Use J 44227 install the crankshaft rear oil seal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 2. Remove the *J* 44227.
- 3. Remove the seal installation sleeve after the seal is installed. Discard the sleeve.
- 4. Install the flywheel. Refer to <u>ENGINE FLYWHEEL REPLACEMENT</u>.
- 5. Install the transmission. Refer to TRANSMISSION .

ENGINE FLYWHEEL REPLACEMENT

Tools Required

J 36660-A Torque Angle Meter

Removal Procedure

1. Remove the transmission. Refer to TRANSMISSION .

IMPORTANT: Note the position and the direction of the engine flywheel before removal.

- 2. Remove the flywheel bolts.
- 3. Remove the flywheel.
- 4. Clean and Inspect the flywheel. Refer to <u>ENGINE FLYWHEEL CLEANING AND INSPECTION</u>.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128611

<u>Fig. 257: Removing Flywheel</u> Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Add threadlock GM P/N 12345493 (Canadian P/N 10953488) to the new flywheel bolts.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the flywheel and secure the flywheel with the new bolts.

Tighten

2.1. Tighten the bolts in sequence to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2.2. Use the *J* 36660-A in order to tighten the bolts an additional 50 degrees.

3. Install the transmission. Refer to $\underline{\mathbf{TRANSMISSION}}$.



G02128612

Fig. 258: Installing Flywheel & Tightening Bolts In Sequence Courtesy of GENERAL MOTORS CORP.

ENGINE REPLACEMENT

Tools Required

J 44220 Engine Lift Bracket

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Removal Procedure

- 1. Remove the hood. Refer to *HOOD REPLACEMENT* in Body Front End.
- 2. Disconnect the negative battery cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.
- 3. Drain engine coolant. Refer to *DRAINING AND FILLING COOLING SYSTEM (BODY VIN CODE 6)* or *DRAINING AND FILLING COOLING SYSTEM (BODY VIN CODE 3)* in Engine Cooling.
- 4. Recover the refrigerant. Refer to *REFRIGERANT RECOVERY AND RECHARGING* in Heating, Ventilation and Air Conditioning.



G02128613

Fig. 259: Removing Oil Pan Drain Plug Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Keep drain plug removed during engine removal and installation.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 5. Remove the oil pan drain plug and drain the oil.
- 6. Install a suitable plug into the oil pan after draining to prevent any oil leakage during the rest of the procedure.
- 7. Remove the air cleaner assembly. Refer to <u>AIR CLEANER ASSEMBLY</u>.
- 8. Remove the throttle body. Refer to $\underline{\text{THROTTLE BODY}}$.
- 9. Remove the map sensor. Refer to MANIFOLD ABSOLUTE PRESSURE SENSOR.
- 10. Remove the washer solvent container. Refer to <u>WASHER SOLVENT CONTAINER</u> <u>REPLACEMENT</u> in Wipers/Washer Systems.
- 11. Remove the air intake baffle. Refer to *AIR INTAKE BAFFLE REPLACEMENT RADIATOR* in Body Front End.
- 12. Remove the grill. Refer to *GRILLE REPLACEMENT (GMC)* or *GRILLE REPLACEMENT (OLDSMOBILE)* or *GRILLE REPLACEMENT (CHEVROLET)* in Body Exterior.
- 13. Remove the headlamp housing. Refer to *HEADLAMP HOUSING PANEL REPLACEMENT* (*OLDSMOBILE*) or *HEADLAMP HOUSING PANEL REPLACEMENT* (*CHEVROLET, GMC*) in Body Front End.
- 14. Remove the radiator support brace. Refer to *BRACE REPLACEMENT RADIATOR SUPPORT DIAGONAL* in Body Front End.
- 15. Remove the hood latch. Refer to HOOD LATCH SUPPORT REPLACEMENT in Body Front End.
- 16. Disconnect A/C lines at the condenser.
- 17. Disconnect the transmission cooler lines at the engine, not the radiator.
- 18. Remove the cooling fan and the shroud tilting the radiator forward, and the cooling fan and the shroud rearward for clearance. Refer to *COOLING FAN AND SHROUD REPLACEMENT* in Engine Cooling.
- 19. Remove the radiator with condenser and transmission cooler lines. Refer to *RADIATOR REPLACEMENT* (*BODY VIN CODE 6*) or *RADIATOR REPLACEMENT* (*BODY VIN TYPE 3*) in Engine Cooling.
- 20. Remove the drive belt. Refer to <u>DRIVE BELT REPLACEMENT</u>.
- 21. Remove the power steering pump bolts and lay the pump aside.
- 22. Ensure the heater hoses at the heater core are disconnected.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128614

Fig. 260: Disconnecting Heater Hoses At Heater Core Courtesy of GENERAL MOTORS CORP.

23. Disconnect the transmission filler tube bracket nut from the AIR adapter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128615

Fig. 261: Disconnecting Transmission Filler Tube Bracket Nut From AIR Adapter Courtesy of GENERAL MOTORS CORP.

24. Remove the AIR adapter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128616

Fig. 262: Removing AIR Adapter Courtesy of GENERAL MOTORS CORP.

- 25. Install the lift hook J 44220 to the AIR adapter.
- 26. Disconnect the oxygen sensor electrical connector.
- 27. Disconnect the A/C line at the accumulator.
- 28. Disconnect the front axle actuator electrical connector.
- 29. Disconnect the camshaft phaser actuator valve electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128617

Fig. 263: Installing Lift Hook To AIR Adapter Courtesy of GENERAL MOTORS CORP.

- 30. Unclip the transmission cooler lines from right side of the engine block.
- 31. Disconnect the ignition coil harness connectors.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128618

Fig. 264: Unclipping Transmission Cooler Lines From Right Side Of Engine Block Courtesy of GENERAL MOTORS CORP.

- 32. Carefully disconnect harness retainer at clips (1) and remove.
- 33. Remove power brake hose at booster.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128619

Fig. 265: Disconnecting Harness Retainer At Clips Courtesy of GENERAL MOTORS CORP.

- 34. Remove the PCM. Refer to **POWERTRAIN CONTROL MODULE**.
- 35. Disconnect the fuel lines at the fuel pressure regulator and cap lines. Refer to <u>FUEL PRESSURE</u> <u>REGULATOR</u>.
- 36. Remove all harnesses from the engine harness bracket.
- 37. Disconnect the front differential vent hose from the engine harness bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128620

Fig. 266: Removing All Harnesses From Engine Harness Bracket Courtesy of GENERAL MOTORS CORP.

38. Remove the engine harness bracket bolt and remove bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada





Fig. 267: Removing Engine Harness Bracket Bolt And Removing Bracket Courtesy of GENERAL MOTORS CORP.

- 39. Disconnect starter electrical connections (1).
- 40. Disconnect the A/C pressure sensor and clutch electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128622

Fig. 268: Disconnecting Starter Electrical Connections Courtesy of GENERAL MOTORS CORP.

- 41. Disconnect generator electrical connector and battery lead.
- 42. Disconnect the knock sensor electrical connector.
- 43. Disconnect the crankshaft sensor electrical connector.
- 44. Disconnect the camshaft sensor electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128623

Fig. 269: Disconnecting Generator Electrical Connector And Battery Lead Courtesy of GENERAL MOTORS CORP.

- 45. Remove 4 grounds on the left side of the block (1).
- 46. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 47. Remove the wheel drive shafts, left and right. Refer to <u>AXLE SHAFTS</u>.
- 48. Remove the propeller shaft from the front axle pinion yoke. Refer to *PROPELLER SHAFT REPLACEMENT FRONT* in Propeller Shaft.
- 49. Remove the engine protection shield.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128624

Fig. 270: Removing Grounds On Left Side Of Block Courtesy of GENERAL MOTORS CORP.

- 50. Disconnect the exhaust pipe from the exhaust manifold and slide the exhaust pipe backward slightly.
- 51. Remove the fuel tank shield, if equipped.
- 52. Remove the torque converter bolt access cover.
- 53. Remove the torque converter bolts.
- 54. Place a jack on the transmission oil pan for support.
- 55. Remove the transmission support. Refer to TRANSMISSION SUPPORT .
- 56. Lower the transmission enough to reach the top bell housing bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128625

Fig. 271: Disconnecting Exhaust Pipe From Exhaust Manifold Courtesy of GENERAL MOTORS CORP.

- 57. Remove the top 4 bell housing bolts, there may be 2 harness clips that will need to be removed in order to have access to 2 of the top bolts.
- 58. Raise the transmission.
- 59. Reinstall the transmission support using only 2 through bolts.
- 60. Remove the remaining bell housing bolts, for a total of 11 bolts.
- 61. Remove the left and right engine lower mount nuts.
- 62. Disconnect the oil lever sensor electrical connector.
- 63. Disconnect the oil pressure switch electrical connector.
- 64. Lower the vehicle.
- 65. Remove the left upper engine mount nut.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128626

Fig. 272: Removing Left Upper Engine Mount Nut Courtesy of GENERAL MOTORS CORP.

- 66. Remove the right upper engine mount nut.
- 67. Install the engine hoist.
- 68. Raise the engine out of the compartment slowly keeping the transmission supported.
- 69. Remove both engine mount for clearance.
- 70. Continue raising the engine out of the vehicle.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

71. Install the engine to the engine stand.



G02128627

Fig. 273: Removing Right Upper Engine Mount Nut Courtesy of GENERAL MOTORS CORP.

Installation Procedure

- 1. Remove the engine from the engine stand.
- 2. Slowly install the engine into the engine compartment aligning the engine mounts with the brackets.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

3. When the engine mounts are aligned, install the engine mounts, putting the mount up through the engine mount brackets before inserting into the chassis mount brackets.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

4. Lower the engine onto the mounts and install the upper engine mount nuts.

Tighten

Tighten the nuts to 70 N.m (51 lb ft).

- 5. Remove the engine hoist.
- 6. Lay the radiator into the radiator support, but do not install the radiator completely.



G02128628

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 7. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 8. Install all of the lower bell housing bolts, excluding the top four.
- 9. Remove the two through bolts securing the transmission support.
- 10. Lower the transmission.
- 11. Install the top four bell housing bolts.

Tighten

Tighten all eleven bell housing bolts to 50 N.m (37 lb ft).

- 12. Raise the transmission.
- 13. Install the transmission support. Refer to TRANSMISSION SUPPORT.
- 14. Install the 3 torque converter bolts.

Tighten

Tighten the torque converter bolts to 60 N.m (44 lb ft).

- 15. Install the torque converter bolt cover.
- 16. Install the fuel tank shield, if removed.
- 17. Install the engine protection shield. .
- 18. Install the propeller shaft to the front axle pinion yoke. Refer to *PROPELLER SHAFT REPLACEMENT FRONT* in Propeller Shaft.
- 19. Connect the exhaust pipe to the manifold and secure the pipe with the bolts.

Tighten

Tighten the exhaust pipe bolts to 50 N.m (37 lb ft).

- 20. Connect the oil level switch electrical connector.
- 21. Connect the oil pressure sensor electrical connector.
- 22. Install the oil pan drain plug.

Tighten

Tighten the plug to 26 N.m (19 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128629

Fig. 275: Installing Oil Pan Drain Plug Courtesy of GENERAL MOTORS CORP.

- 23. Install the lower radiator hose (1).
- 24. Install the left and right wheel drive shafts. Refer to $\underline{AXLE SHAFTS}$.
- 25. Lower the vehicle.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128630

Fig. 276: Installing Lower Radiator Hose Courtesy of GENERAL MOTORS CORP.

- 26. Install the 4 grounds on the left side of the block (1).
- 27. Install the camshaft sensor electrical connectors.
- 28. Install the crankshaft sensor electrical connector.
- 29. Install the knock sensor electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128631

Fig. 277: Installing Grounds On Left Side Of Block Courtesy of GENERAL MOTORS CORP.

30. Install the generator electrical connector and battery lead (1).

Tighten

Tighten the generator battery lead nut to 9 N.m (80 lb in).

31. Install the A/C pressure sensor and clutch electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128632

Fig. 278: Installing Generator Electrical Connector And Battery Lead Courtesy of GENERAL MOTORS CORP.

32. Install starter electrical connectors and battery lead (1).

Tighten

Tighten the starter battery lead to 9 N.m (80 lb in).

33. Install the fuel lines at the fuel pressure regulator. Refer to **<u>FUEL PRESSURE REGULATOR</u>**.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128633

Fig. 279: Installing Starter Electrical Connectors And Battery Lead Courtesy of GENERAL MOTORS CORP.

34. Install the engine harness bracket and bolt.

Tighten

Tighten the engine harness bracket bolt to 50 N.m (37 lb ft).

- 35. Install the front differential vent hose, to the engine harness bracket.
- 36. Install all the harnesses to the engine harness bracket.
- 37. Install the PCM. Refer to **POWERTRAIN CONTROL MODULE**.
- 38. Install the power brake hose at booster

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128634

Fig. 280: Installing All Harnesses To Engine Harness Bracket Courtesy of GENERAL MOTORS CORP.

- 39. Install the harness retainer to the original location.
- 40. Install the ignition coil harness electrical connectors.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128635

Fig. 281: Installing Harness Retainer Courtesy of GENERAL MOTORS CORP.

- 41. Clip the transmission cooler lines to the right side of the engine block.
- 42. Connect the camshaft phaser actuator valve electrical connector.
- 43. Connect the front axle actuator electrical connector.
- 44. Connect the A/C line at the accumulator.
- 45. Install the oxygen sensor electrical connector.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128636

Fig. 282: Clipping Transmission Cooler Lines To Right Side Of Engine Block Courtesy of GENERAL MOTORS CORP.

46. Remove the lift hook J 44220.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128637

<u>Fig. 283: Removing Lift Hook</u> Courtesy of GENERAL MOTORS CORP.

47. Install the AIR adapter and secure the adapter with the studs.

Tighten

Tighten the AIR adapter studs to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128638

Fig. 284: Installing AIR Adapter And Securing With Studs Courtesy of GENERAL MOTORS CORP.

48. Install the transmission filler tube bracket to AIR adapter stud and secure the bracket with the nut.

Tighten

Tighten the nut to 10 N.m (89 lb in).

- 49. Install the heater hoses to the heater core. Refer to HEATER HOSE REPLACEMENT INLET (BODY TYPE VIN 3) or *HEATER HOSE REPLACEMENT INLET (BODY TYPE VIN 6)* and HEATER HOSE REPLACEMENT OUTLET (LL8) or HEATER HOSE REPLACEMENT OUTLET (LM4) in Heating, Ventilation, and Air Conditioning.
- 50. Install the power steering pump.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128639

Fig. 285: Installing Transmission Filler Tube Bracket To AIR Adapter Stud Courtesy of GENERAL MOTORS CORP.

51. Install the power steering pump bolts.

Tighten

Tighten the bolts to 25 N.m (18 lb ft).

- 52. Install the drive belt. Refer to <u>DRIVE BELT REPLACEMENT</u>.
- 53. Install cooling fan and shroud, tilting the radiator forward for clearance.
- 54. Finish installing the radiator. Refer to *RADIATOR REPLACEMENT* (*BODY VIN CODE 6*) or *RADIATOR REPLACEMENT* (*BODY VIN TYPE 3*) in Engine Cooling.
- 55. Install transmission cooler lines together.
- 56. Install map Sensor. Refer to MANIFOLD ABSOLUTE PRESSURE SENSOR .
- 57. Install the throttle body. Refer to THROTTLE BODY.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128640

Fig. 286: Installing Power Steering Pump Bolts Courtesy of GENERAL MOTORS CORP.

- 58. Install the hood latch. Refer to HOOD LATCH SUPPORT REPLACEMENT in Body Front End.
- 59. Install the head lamp housing. Refer to *HEADLAMP HOUSING PANEL REPLACEMENT* (*OLDSMOBILE*) or *HEADLAMP HOUSING PANEL REPLACEMENT* (*CHEVROLET*, *GMC*) in Body Front End.
- 60. Install the grill. Refer to *GRILLE REPLACEMENT (GMC)* or *GRILLE REPLACEMENT (OLDSMOBILE)* or *GRILLE REPLACEMENT (CHEVROLET)* in Exterior Trim.
- 61. Install the air intake baffle. Refer to *AIR INTAKE BAFFLE REPLACEMENT RADIATOR* in Engine Controls 4.2L.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 62. Install the washer solvent container. Refer to <u>WASHER SOLVENT CONTAINER REPLACEMENT</u> in Wipers/Washer Systems.
- 63. Install the air cleaner assembly. Refer to AIR CLEANER ASSEMBLY.
- 64. Connect the negative battery cable. Refer to *BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE* in Engine Electrical.
- 65. Install the hood. Refer to HOOD REPLACEMENT in Body Front End.
- 66. Service the engine oil.
- 67. Fill the cooling system. Refer to *DRAINING AND FILLING COOLING SYSTEM* (*BODY VIN CODE 6*) or *DRAINING AND FILLING COOLING SYSTEM* (*BODY VIN CODE 3*) in Engine Cooling.
- 68. Recharge the refrigerant. Refer to *REFRIGERANT RECOVERY AND RECHARGING* in Heating, Ventilation and Air Conditioning.
- 69. Perform the CKP system variation learn procedure. Refer to <u>CKP SYSTEM VARIATION LEARN</u> <u>PROCEDURE</u>.

IMPORTANT: After an overhaul, the engine should be tested. Use the following procedure after the engine is installed in the vehicle.

- Disable the ignition system.
- Crank the engine several times. Listen for unusual noises or evidence that parts are binding.
- Enable the ignition system.
- Start the engine and listen for unusual noises.
- Check the vehicle oil pressure gage or light and confirm that the engine has acceptable oil pressure.
- Run the engine speed at about 1000 RPM until the engine has reached normal operating temperature.
- Listen for a sticking lifter and other unusual noises.
- Inspect for fuel, oil and/or coolant leaks while the engine is running.
- Perform a final inspection for the proper engine oil and coolant levels.
- 70. Install the hood. Refer to HOOD REPLACEMENT in Body Front End.

ENGINE OIL AND OIL FILTER REPLACEMENT

Removal Procedure

- 1. Remove the oil fill cap.
- 2. Raise the vehicle. Refer to **LIFTING AND JACKING THE VEHICLE** in General Information.
- 3. Remove the oil pan drain plug and drain the oil into a suitable container.

IMPORTANT: Check the old oil filter to ensure the filter seal is not left on the engine block.

4. Remove the oil filter using a suitable wrench.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

5. Wipe the excess oil from the oil filter housing.



G02128641

<u>Fig. 287: Removing Oil Filter</u> Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Installation Procedure

1. Lubricate the oil filter seal with clean engine oil.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the new oil filter.

Tighten

Tighten the oil filter to 17 N.m (22 lb ft) plus 150 degrees.

3. Install the oil pan drain plug.

Tighten

Tighten the oil pan drain plug to 26 N.m (19 lb ft).

- 4. Lower the vehicle.
- 5. Fill the crankcase with the proper quantity of engine oil.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128642

Fig. 288: Installing Oil Filter Courtesy of GENERAL MOTORS CORP.

6. Remove the oil level indicator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 7. Wipe the indicator with a clean cloth.
- 8. Install the oil level indicator.
- 9. Remove the oil level indicator and check the oil level.
- 10. Add oil if necessary.
- 11. Check for any oil leaks.

ENGINE FLYWHEEL REMOVAL

- 1. Remove the flywheel bolts.
- 2. Remove the flywheel.



G02128643

Fig. 289: Removing Flywheel Courtesv of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

DRAINING FLUIDS AND OIL FILTER REMOVAL

- 1. Remove the oil pan drain plug.
- 2. Drain the engine oil.



G02128644

Fig. 290: Removing Oil Pan Drain Plug Courtesy of GENERAL MOTORS CORP.

3. Remove the oil filter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128645

Fig. 291: Removing Oil Filter Courtesy of GENERAL MOTORS CORP.

DRIVE BELT TENSIONER REMOVAL

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 1. Remove the drive belt tensioner bolt.
- 2. Remove the drive belt tensioner.



G02128646

<u>Fig. 292: Removing Drive Belt Tensioner</u> Courtesy of GENERAL MOTORS CORP.

POWER STEERING PUMP BRACKET REMOVAL

- 1. Remove the power steering pump bracket bolts.
- 2. Remove the power steering pump bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128647

Fig. 293: Removing Power Steering Pump Bracket Courtesy of GENERAL MOTORS CORP.

DRIVE BELT IDLER PULLEY REMOVAL

- 1. Remove the drive belt idler pulley bolts.
- 2. Remove the drive belt idler pulley.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128648

Fig. 294: Removing Drive Belt Idler Pulley Courtesy of GENERAL MOTORS CORP.

OIL LEVEL INDICATOR AND TUBE REMOVAL

- 1. Remove the oil level indicator.
- 2. Remove the oil level indicator tube stud.
- 3. Remove the oil level indicator tube.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128649

Fig. 295: Removing Oil Level Indicator & Tube Courtesy of GENERAL MOTORS CORP.

EXHAUST MANIFOLD REMOVAL

- 1. Remove the exhaust manifold heat shield nuts.
- 2. Remove the exhaust manifold heat shield.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128650

Fig. 296: Removing Exhaust Manifold Heat Shield Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust manifold studs. (if needed)

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128651

Fig. 297: Removing Exhaust Manifold Studs Courtesy of GENERAL MOTORS CORP.

- 4. Remove the exhaust manifold bolts.
- 5. Remove the exhaust manifold.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128652

<u>Fig. 298: Removing Exhaust Manifold</u> Courtesy of GENERAL MOTORS CORP.

6. Remove the exhaust manifold gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128653

Fig. 299: Removing Exhaust Manifold Gasket Courtesy of GENERAL MOTORS CORP.

OIL FILTER ADAPTER REMOVAL

1. Remove the oil filter adapter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128654

Fig. 300: Removing Oil Filter Adapter Courtesy of GENERAL MOTORS CORP.

2. Remove the oil filter bypass valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128655

Fig. 301: Removing Oil Filter Bypass Valve Courtesy of GENERAL MOTORS CORP.

HEATER INLET HOSE FITTING REMOVAL

Remove the heater inlet hose fitting.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128656

Fig. 302: Removing Heater Inlet Hose Fitting Courtesy of GENERAL MOTORS CORP.

HEATER OUTLET HOSE FITTING REMOVAL

Remove the heater outlet hose fitting.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128657

Fig. 303: Removing Heater Outlet Hose Fitting Courtesy of GENERAL MOTORS CORP.

WATER OUTLET REMOVAL

- 1. Remove the water outlet bolts.
- 2. Remove the water outlet.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128658

Fig. 304: Removing Water Outlet Courtesy of GENERAL MOTORS CORP.

WATER PUMP REMOVAL

Tool Required

J 41240 Fan Clutch Remover and Installer

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 1. Install *J* 41240 to hold the pulley.
- 2. Remove the water pump pulley bolts.
- 3. Remove J 41240.
- 4. Remove the water pump pulley



G02128659

Fig. 305: Removing Water Pump Pulley Courtesy of GENERAL MOTORS CORP.

- 5. Remove the water pump bolts.
- 6. Remove the water pump.
- 7. Remove the water pump gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128660

Fig. 306: Removing Water Pump Courtesy of GENERAL MOTORS CORP.

THERMOSTAT HOUSING REMOVAL

- 1. Remove the thermostat housing bolts.
- 2. Remove the thermostat housing.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128661

Fig. 307: Removing Thermostat Housing Courtesy of GENERAL MOTORS CORP.

INTAKE MANIFOLD REMOVAL

- 1. Remove the throttle control module bolts.
- 2. Remove the throttle control module.
- 3. Remove the throttle control module gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128662

Fig. 308: Removing Throttle Control Module Courtesy of GENERAL MOTORS CORP.

4. Remove the crankcase ventilation hose.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128663

Fig. 309: Removing Crankcase Ventilation Hose Courtesy of GENERAL MOTORS CORP.

5. Remove the intake manifold and bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128664

<u>Fig. 310: Removing Intake Manifold</u> Courtesy of GENERAL MOTORS CORP.

FUEL RAIL AND INJECTORS REMOVAL

- 1. Remove the fuel injector rail bolts.
- 2. Remove the fuel injector rail.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128665

Fig. 311: Removing Fuel Injector Rail Courtesy of GENERAL MOTORS CORP.

CAMSHAFT POSITION ACTUATOR VALVE REMOVAL

- 1. Remove the camshaft position actuator valve bolt.
- 2. Remove the camshaft position actuator valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128666

Fig. 312: Removing Camshaft Position Actuator Valve Courtesy of GENERAL MOTORS CORP.

CAMSHAFT COVER REMOVAL

1. Remove the ignition control modules and bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128667

Fig. 313: Removing Ignition Control Modules Courtesy of GENERAL MOTORS CORP.

2. Remove the camshaft cover and bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128668

Fig. 314: Removing Camshaft Cover Courtesy of GENERAL MOTORS CORP.

OIL PAN REMOVAL

NOTE: Remove the oil level sensor, located in the oil pan, before the oil pan is removed. The sensor may be damaged if the oil pan is removed first.

- 1. Remove the oil level sensor.
- 2. Remove the oil pan bolts and nuts.
- 3. Install two of the oil pan bolts into the threaded holes (jack bolts) to break the seal of oil pan (1).
- 4. Remove the oil pan.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128669

Fig. 315: Removing Oil Pan, Bolts And Nuts Courtesy of GENERAL MOTORS CORP.

OIL PUMP PIPE AND SCREEN ASSEMBLY REMOVAL

- 1. Remove the oil pump pipe bolts.
- 2. Remove the oil pump pipe.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128670

<u>Fig. 316: Removing Oil Pump Pipe</u> Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT BALANCER REMOVAL

Tools Required:

J 41816-2 Crankshaft End Protector

1. Remove the crankshaft balancer bolt.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128671

Fig. 317: Removing Crankshaft Balancer Bolt Courtesy of GENERAL MOTORS CORP.

2. Install *J* 41816-2 into the end of the crankshaft.

IMPORTANT: Do not pull on outer edge of the crankshaft balancer.

- 3. Use a three jaw puller to remove the crankshaft balancer.
- 4. Remove *J* 41816-2.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128672

Fig. 318: Removing Crankshaft Balancer Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT FRONT OIL SEAL REMOVAL

IMPORTANT: Do not damage the engine front cover or the crankshaft.

Pry out the crankshaft front oil seal using a suitable tool.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128673

Fig. 319: Prying Out Crankshaft Front Oil Seal Courtesy of GENERAL MOTORS CORP.

ENGINE FRONT COVER REMOVAL

- 1. Remove the 7 mm center bolt (1) first.
- 2. Remove the engine front cover bolts.
- 3. Remove the engine front cover.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128674

Fig. 320: Removing Engine Front Cover Courtesy of GENERAL MOTORS CORP.

- 4. Remove the spacer bolt.
- 5. Remove the crankshaft balancer friction washer from the crankshaft snout.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128675

Fig. 321: Removing Spacer Bolt And Crankshaft Balancer Friction Washer Courtesy of GENERAL MOTORS CORP.

OIL PUMP REMOVAL

- 1. Remove the oil pump cover bolts.
- 2. Remove the oil pump cover.
- 3. Mark the inner and outer gears in relation to the oil pump housing.
- 4. Remove the inner and outer oil pump gears.
- 5. Remove the oil pump pressure relief valve plug.
- 6. Remove the oil pump pressure relief valve and spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128676

Fig. 322: Removing Oil Pump Cover, Oil Pump Gears And Oil Pump Pressure Relief Valve And Spring Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN AND SPROCKETS REMOVAL

- 1. Remove the top chain guide bolts.
- 2. Remove the top chain guide.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128677

Fig. 323: Removing Top Chain Guide Courtesy of GENERAL MOTORS CORP.

- 3. Remove the exhaust camshaft position actuator bolt.
- 4. Remove the exhaust camshaft position actuator.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128678

Fig. 324: Removing Exhaust Camshaft Position Actuator Courtesy of GENERAL MOTORS CORP.

- 5. Remove the intake camshaft sprocket bolt.
- 6. Remove the intake camshaft sprocket.
- 7. Remove the timing chain.
- 8. Remove the crankshaft sprocket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128679

Fig. 325: Removing Intake Camshaft Sprocket And Timing Chain Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL AND HOUSING REMOVAL

- 1. Remove the crankshaft rear oil seal housing bolts.
- 2. Install two bolts (Jack Screws) into the threaded holes (1) to break the seal of the housing.
- 3. Remove the crankshaft rear oil seal housing.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128680

Fig. 326: Removing Crankshaft Rear Oil Seal Housing Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL REMOVAL

IMPORTANT: Do not damage the crankshaft or seal bore. Pry out the crankshaft rear oil seal out using a suitable tool.

Remove the crankshaft rear oil seal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128681

Fig. 327: Removing Crankshaft Rear Oil Seal Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN TENSIONER REMOVAL

1. Remove the cylinder head access hole plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128682

Fig. 328: Removing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

- 2. Remove the timing chain tensioner shoe bolt.
- 3. Remove the timing chain tensioner shoe.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128683

Fig. 329: Removing Timing Chain Tensioner Shoe Courtesy of GENERAL MOTORS CORP.

- 4. Remove the timing chain tensioner guide bolts.
- 5. Remove the timing chain tensioner guide.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128684

Fig. 330: Removing Timing Chain Tensioner Guide Courtesy of GENERAL MOTORS CORP.

- 6. Remove the timing chain tensioner bolts.
- 7. Remove the timing chain tensioner.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128685

Fig. 331: Removing Timing Chain Tensioner Courtesy of GENERAL MOTORS CORP.

ENGINE LIFT BRACKET REMOVAL

- 1. Remove the engine lift bracket bolts.
- 2. Remove the engine lift bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128686

Fig. 332: Removing Engine Lift Bracket & Bolts Courtesy of GENERAL MOTORS CORP.

CAMSHAFT REMOVAL

1. Remove the camshaft cap bolts.

IMPORTANT: Place the camshaft caps in a rack to ensure the caps are installed in the same location from which they were removed.

2. Remove the camshaft caps.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128687

<u>Fig. 333: Removing Camshaft Caps</u> Courtesy of GENERAL MOTORS CORP.

3. Remove the camshafts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128688

Fig. 334: Removing Camshafts Courtesy of GENERAL MOTORS CORP.

VALVE ROCKER ARM AND VALVE LASH ADJUSTER REMOVAL

IMPORTANT: Once removed, place the valve rocker arms and valve lash adjusters in an organized order so the components can be installed into the original locations.

1. Remove the valve rocker arms.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128689

Fig. 335: Removing Valve Rocker Arms Courtesy of GENERAL MOTORS CORP.

2. Remove the valve lash adjusters.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128690

Fig. 336: Removing Valve Lash Adjusters Courtesy of GENERAL MOTORS CORP.

CYLINDER HEAD REMOVAL

1. Remove the cylinder head bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128691

Fig. 337: Removing Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

2. Remove the cylinder head.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128692

<u>Fig. 338: Removing Cylinder Head</u> Courtesy of GENERAL MOTORS CORP.

3. Remove the cylinder head gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128693

Fig. 339: Removing Cylinder Head Gasket Courtesy of GENERAL MOTORS CORP.

PISTON, CONNECTING ROD, AND BEARING REMOVAL

Tools Required:

J 41556 Connecting Rod Guides

- 1. Mark the piston with the number of the cylinder from which the piston is being removed.
- 2. Mark the connecting rod and the connecting rod cap with the cylinder position. Also mark the orientation. This will ensure the caps and connecting rods are re-assembled properly.
- 3. Remove the connecting rod bolts.
- 4. Remove the connecting rod cap and bearing half.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128694

Fig. 340: Removing Connecting Rod Cap And Bearing Half Courtesy of GENERAL MOTORS CORP.

5. Install *J* 41556 on the connecting rod.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128695

Fig. 341: Installing Connecting Rod Guides On Connecting Rod Courtesy of GENERAL MOTORS CORP.

- 6. Remove the connecting rod and piston assembly. Push out the assembly.
- 7. Remove *J* 41556.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128696

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 342: Removing Connecting Rod And Piston Assembly Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT AND BEARINGS REMOVAL

1. Remove the crankshaft main bearing cap bolts.



G02128697

Fig. 343: Removing Crankshaft Main Bearing Cap Bolts Courtesy of GENERAL MOTORS CORP.

2. Remove the crankshaft main bearing cap stiffener.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128698

Fig. 344: Removing Crankshaft Main Bearing Cap Stiffener Courtesy of GENERAL MOTORS CORP.

3. Remove the crankshaft main bearing caps and lower bearings.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128699

Fig. 345: Removing Crankshaft Main Bearing Caps And Lower Bearings Courtesy of GENERAL MOTORS CORP.

4. Remove the crankshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128700

<u>Fig. 346: Removing Crankshaft</u> Courtesy of GENERAL MOTORS CORP.

5. Remove the upper crankshaft main bearing halves.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128701

Fig. 347: Removing Upper Crankshaft Main Bearing Halves Courtesy of GENERAL MOTORS CORP.

ENGINE BLOCK PLUG REMOVAL

1. Remove the engine block oil gallery plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128702

Fig. 348: Removing Engine Block Oil Gallery Plugs Courtesy of GENERAL MOTORS CORP.

2. Remove the engine block oil gallery plug from rear of block.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128703

Fig. 349: Removing Engine Block Oil Gallery Plug From Rear Of Block Courtesy of GENERAL MOTORS CORP.

3. Remove the crankshaft position sensor.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128704

Fig. 350: Removing Crankshaft Position Sensor Courtesy of GENERAL MOTORS CORP.

4. Remove the knock sensors.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128705

Fig. 351: Removing Knock Sensors Courtesy of GENERAL MOTORS CORP.

5. Remove the EVAP solenoid.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128706

Fig. 352: Removing EVAP Solenoid Courtesy of GENERAL MOTORS CORP.

6. Remove the coolant temperature sensor.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128707

Fig. 353: Removing Coolant Temperature Sensor Courtesy of GENERAL MOTORS CORP.

ENGINE BLOCK CLEANING AND INSPECTION

Tools Required

- J 8001 Dial Indicator Set
- J 8087 Cylinder Bore Gauge
- J 36660-A Torque/Angle Meter
- 1. Clean the sealing material from all gasket mating surfaces.
- 2. Clean the engine block with a cleaning solution.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 3. Flush the engine block with clean water.
- 4. Clean the oil passages.
- 5. Coat the cylinder bores and the machined surfaces with engine oil.
- 6. Inspect the threaded holes. Clean the holes with a tap, if needed.
- 7. Use a straight edge and a feeler gauge to check the deck surface for flatness. Carefully remove any minor irregularities. Replace the block if there is more than 0.08 mm (0.003 in) gap.



G02128708

Fig. 354: Checking Deck Surface For Flatness Courtesy of GENERAL MOTORS CORP.

- 8. Replace the engine block if the bores are out of specification.
- 9. Inspect the cylinder bores. Use *J* 8087 to measure the cylinder bore. Inspect the bores for the following conditions:
 - Wear
 - Taper
 - Runout
 - Ridging

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: If the bore is worn beyond the limits, bore the cylinders and refit with the one oversized piston available.

10. Leave sufficient material to allow finish honing when fitting the pistons.



G02128709

Fig. 355: Measuring Cylinder Bore

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

- 11. Inspect the oil pan rail for nicks. Use a flat file to remove an nicks.
- 12. Inspect the front cover attaching area for nicks. Use a flat file to remove any nicks.
- 13. Inspect the mating surfaces of the transmission case.
- 14. Use the following procedure to measure the engine block flange runout at the mounting bolt hole bosses:

14.1. Temporarily install the crankshaft. Measure the crankshaft flange runout.

14.2. Hold a gauge plate flat against the crankshaft flange.

14.3. Place J 8001 (dial indicator stem) on the transmission mounting bolt hole boss. Set the indicator to zero

14.4. Record the readings obtained from all of the bolt hole bosses. The measurements should not vary more than 0.25 mm (0.010 in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128710

Fig. 356: Measuring Engine Block Flange Runout Courtesy of GENERAL MOTORS CORP.

14.5. Recheck the crankshaft flange runout if the readings vary more than 0.25 mm (0.010 in). If the crankshaft flange runout is within the specification, replace the engine block.

15. Remove the crankshaft.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

16. Re-install the crankshaft bearing caps, stiffener, and bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

16.1. Tighten the crankshaft bearing cap bolts to 25 N.m (18 lb ft).

16.2. Use J 36660-A to tighten the crankshaft bearing cap bolts an additional 180 degrees.

IMPORTANT: Perform the following inspections, and reconditioning (if necessary), with the crankshaft main bearing caps installed and tightened to specification.

- 17. Inspect the crankshaft main bearing bores. Use J 8087 to measure the bearing bore concentricity and alignment.
- 18. Remove the crankshaft main bearing cap stiffener and main bearing caps with bearings.



G02128711

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

CYLINDER BORING AND HONING

Honing Procedure

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> In Cautions and Notices.

- 1. When honing the cylinder bores, follow the manufacturer's recommendations for equipment use, cleaning, and lubrication.
 - Use only clean sharp stones of the proper grade for the amount of material to be removed.
 - Dull, dirty stones cut unevenly and generate excessive heat.
 - DO NOT hone to a final grade with a coarse or medium-grade stone.
 - Leave sufficient metal so that all the stone marks will be removed with the fine grade stones.
 - Perform the final honing with a fine-grade stone and hone the cylinder bore in a cross hatch pattern at 45-65 degrees to obtain the proper clearance.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada





Fig. 358: Inspecting Cylinder Head Courtesy of GENERAL MOTORS CORP.

- 2. During the honing operation, thoroughly check the cylinder bore.
 - Repeatedly check the cylinder bore fit with the selected piston.
 - All measurements of the piston or cylinder bore should be made with the components at normal room temperature.
- 3. When honing to eliminate taper in the cylinder bore, use full strokes the complete length of the cylinder bore.

Repeatedly check the measurement at the top, the middle, and the bottom of the cylinder bore.

- The finish marks should be clean but not sharp.
- The finish marks should be free from imbedded particles or torn or folded metal.
- 4. When finished, the reconditioned cylinder bores should have less than or meet the specified out-of-round and taper requirements.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 5. After the final honing and before the piston is checked for fit, clean the cylinder bore with hot water and detergent.
 - 5.1. Scrub the cylinder bores with a stiff bristle brush.
 - 5.2. Rinse the cylinder bores thoroughly with clean hot water.
 - 5.3. Dry the cylinder bores with a clean rag.
 - 5.4. Do not allow any abrasive material to remain in the cylinder bores.
 - Abrasive material may cause premature wear of the new piston rings and the cylinder bores.
 - Abrasive material will contaminate the engine oil and may cause premature wear of the bearings.
- 6. Perform final measurements of the piston and the cylinder bore.
- 7. Permanently mark the top of the piston for the specified cylinder to which it has been fitted.
- 8. Apply clean engine oil to each cylinder bore in order to prevent rusting.

Boring Procedure

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

- 1. Before starting the honing or reboring operation, measure all the new pistons with the micrometer contacting at points exactly 90 degrees from the piston pin centerline.
- 2. File the top of the cylinder block in order to remove any dirt or burrs before using any type of boring bar.
- 3. Follow the instructions furnished by the manufacturer regarding use of the boring equipment.
- 4. When reboring the cylinders, make sure all the crankshaft bearing caps are installed in the original position and direction.
- 5. Tighten the crankshaft bearing caps to the proper torque specifications in order to avoid distortion of the cylinder bores in the final assembly.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128713

Fig. 359: Measuring New Pistons With Micrometer Contacting At Points Exactly 90 Degrees From Piston Pin Centerline Courtesy of GENERAL MOTORS CORP.

6. When making the final cut with the boring bar, leave 0.03 mm (0.001 in) on the cylinder bore diameter for finish honing. This gives the required position to the cylinder clearance specifications. Carefully perform the honing and boring operation in order to maintain the specified clearances between the pistons, the piston rings, and the cylinder bores.

CRANKSHAFT AND BEARINGS CLEANING AND INSPECTION

Tools Required

- J 36660-A Torque Angle Meter
- *J 8087* Cylinder Bore Gauge

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: Use care when handling the crankshaft. Avoid damaging the crankshaft reluctor wheel. Nicks, burrs or other damage to the teeth may effect the On-Board Diagnostics (OBD) II system performance.

- 1. Clean the crankshaft of all elements.
- 2. Inspect the crankshaft oil passages for obstructions.
- 3. Inspect the crankshaft for the following conditions:
 - Damaged threads (1)
 - Damaged mounting faces
 - Worn crankshaft pin (2)



G02128714

Fig. 360: Inspecting Crankshaft For Damage Courtesy of GENERAL MOTORS CORP.

- Wear without any grooves or scratches (3)
- Grooves or scoring (3)
- Scratches (3)
- Pitting or embedded bearing material (3)
- Overheating (discoloration) (3)
- 4. Inspect the corresponding crankshaft bearing inserts for embedded material and determine the source of the material.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: If cracks, severe gouges or burned spots are found, replace the crankshaft. Remove slight roughness using a fine polishing cloth soaked in clean engine oil. Remove any burrs using a fine oil stone.

- 5. Inspect the outer surfaces of the crankshaft bearings for the following conditions:
 - Wear surface wear indicates either movement of the insert or high spots in the surrounding material (spot wear)
 - Overheating or discoloration
 - Looseness or rotation indicated by flattened tangs and wear grooves

IMPORTANT: Note the location of the crankshaft main bearing high spots. If the spots are not in line, the crankshaft is bent. Replace the crankshaft.



G02128715

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

- 6. Inspect the crankshaft main bearings for craters or pockets. Flattened sections on the crankshaft bearing halves also indicate fatigue.
- 7. Inspect the thrust surfaces of the main thrust bearing for the following conditions:
 - Wear
 - Grooving Grooves are caused by irregularities of the crankshaft thrust surface.
- 8. Inspect the crankshaft bearings for excessive scoring or discoloration.
- 9. Inspect the crankshaft bearings for dirt or imbedded debris.
- 10. Inspect the crankshaft bearings for improper seating indicated by bright, polished sections.
- 11. Inspect the crankshaft bearings for uneven side-to-side wear. This may indicate a bent crankshaft or a tapered bearing journal.

IMPORTANT: If crankshaft bearing failure is due to conditions other than normal wear, investigate the cause of the condition. Inspect the crankshaft or connecting rod bearing bores.

- 12. Inspect the connecting rod bearing bores using the following procedure:
 - 12.1. Tighten the connecting rod bearing cap to specification.
 - 12.2. Use J 8087 to measure the bearing bore for taper and out-of-round. Record the readings.
 - 12.3. No taper or out-of-round should exist.
- 13. Measure the crankshaft bearing journal diameter with a micrometer in several places, 90 degrees apart. Average the measurements.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128716

Fig. 362: Measuring Crankshaft Bearing Journal Diameter With Micrometer Courtesy of GENERAL MOTORS CORP.

14. Measure the crankshaft bearing journal taper and runout.

IMPORTANT: Refer to the pin stamp on the crankshaft main bearing caps for sequence and direction of installation. The pin stamp arrow points to the front of the engine.

- 15. Install the crankshaft bearing caps.
- 16. Install the crankshaft main bearing cap stiffener.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

17. Install the crankshaft bearing cap bolts.

Tighten

- 17.1. Tighten the crankshaft bearing cap bolts to 25 N.m (18 lb ft).
- 17.2. Use J 36660-A to tighten the crankshaft bearing cap bolts an additional 180 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128717

Fig. 363: Installing Crankshaft Bearing Caps Courtesy of GENERAL MOTORS CORP.

- 18. Measure the crankshaft main bearing inside diameter with an inside micrometer.
- 19. Measure the connecting rod inside diameter in the same direction as the length of the rod with an inside micrometer.
- 20. If the specified clearances cannot be met, the crankshaft, connecting rods, or block may need to be replaced.

CRANKSHAFT BALANCER CLEANING AND INSPECTION

- 1. Inspect the crankshaft balancer sealing area for grooves, nicks, or burs (1).
- 2. Inspect the crankshaft balancer belt ribs for dents or damage (2).
- 3. Replace the crankshaft balancer if damage is present.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128718

Fig. 364: Inspecting Crankshaft Balancer For Damage Courtesy of GENERAL MOTORS CORP.

ENGINE FLYWHEEL CLEANING AND INSPECTION

- 1. Inspect the engine flywheel for cracks (1).
- 2. Inspect the engine flywheel teeth for damage (2).
- 3. Replace the engine flywheel if damage is present.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128719

Fig. 365: Inspecting Engine Flywheel For Cracks & Damage Courtesy of GENERAL MOTORS CORP.

PISTON AND CONNECTING ROD DISASSEMBLE

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tools Required

J 43654 Piston Pin Retainer Clip Remover/Installer

CAUTION: Handle the piston carefully. Worn piston rings are sharp and may cause bodily injury.

IMPORTANT: Do not reuse the piston rings.

1. Remove the piston rings using a piston ring expander.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128720

<u>Fig. 366: Removing Piston Rings Using Piston Ring Expander</u> Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Two retainers hold the piston pins in place. Reuse the retainers if they are not damaged during removal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2. Remove the piston pin retaining clips.





Fig. 367: Removing Piston Pin Retaining Clips Courtesy of GENERAL MOTORS CORP.

3. Remove the piston pin.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128722

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

<u>Fig. 368: Removing Piston Pin</u> Courtesy of GENERAL MOTORS CORP.

PISTON, CONNECTING ROD, AND BEARINGS CLEANING AND INSPECTION

Tools Required

J 8087 Cylinder Bore Gauge

- 1. Clean and soak the following components in a carburetor cleaning solution to remove carbon, sludge, and varnish:
 - Piston
 - Piston pin
 - Connecting rod

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 369: Cleaning Piston, Piston Pin & Connecting Rod Courtesy of GENERAL MOTORS CORP.

- 2. Install the connecting rod cap.
- 3. Place the connecting rod assembly on a checking fixture.
- 4. Inspect the connecting rod assembly for bending or twisting.
- 5. Replace any bent or twisted connecting rods.
- 6. If the connecting rod large bore contains minor scratches or abrasions, clean the bore in a circular direction with light emery paper. DO NOT scrape the connecting rod or cap.
- 7. Measure the piston pin to connecting rod bore using the following procedure:
 - Using an outside micrometer, take two measurements of the piston pin in the area of the connecting rod contact.
 - Using an inside micrometer, measure the connecting rod piston pin bore.
 - Subtract the piston pin diameter from the piston pin bore diameter.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128724

Fig. 370: Inspecting Connecting Rod Assembly For Bending Or Twisting Courtesy of GENERAL MOTORS CORP.

• The clearance should not be more than 0.018 mm (0.0007 in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 8. If there is excessive clearance, replace the piston pin.
- 9. If there is still excessive clearance, replace the connecting rod.
- 10. If there is evidence of pin bore or pin scoring, replace the rod and pin assembly.
- 11. Inspect the connecting rod bearings for the following conditions:
 - Craters or pockets
 - Flattened sections
 - Excessive scoring or discoloration.
 - Imbedded debris
 - Bright, polished sections
- 12. Inspect the inside of the connecting rod bearing and outside diameter of the connecting rod bearing journal for wear. This indicates high spots.
- 13. Inspect the connecting rod bearing bore for taper and out-of-round.
- 14. Inspect the connecting rod bolts for stretching (compare to new or known good bolt). (1) is a stretched bolt, (2) is a new or good bolt.
- 15. Clean the piston skirts and the pins with a cleaning solvent. DO NOT wire brush any part of the piston.



Fig. 371: Identifying Stretched Bolt And Good Bolt Courtesy of GENERAL MOTORS CORP.

16. Clean the piston ring grooves. Ensure that the oil ring holes and slots are clean.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 17. Inspect the pistons for the following conditions:
 - Cracked ring lands, skirts, or pin bosses
 - Ring grooves for nicks, burrs that may cause binding
 - Warped or worn ring lands
 - Eroded areas at the top of the piston
 - Scuffed or damaged skirts
 - Worn piston pin bores
- 18. Replace pistons that show any signs or damage or excessive wear.

IMPORTANT: When fitting pistons, consider both the piston and the cylinder bore conditions together. Production and service pistons have the same nominal weight and may be intermixed without affecting engine balance. If necessary, used pistons may be fitted selectively to any cylinder of the engine, providing the pistons are in good condition and the same weight. Do not cut oversize pistons down or the engine balance may be affected. Finish hone when selecting the piston.

19. Measure the piston diameter for size with a micrometer or caliper at a right angle to the pin center line, across the skirts, 38 mm (1.50 in) from the top of the piston.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada





<u>Fig. 372: Measuring Piston Diameter With Micrometer At Right Angle To Pin Center Line</u> Courtesy of GENERAL MOTORS CORP.

- 20. Replace the piston if worn beyond specifications or if damaged. Replace the piston with a standard or oversize piston.
- 21. Use J 8087 to measure the cylinder bore.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128727

<u>Fig. 373: Measuring Cylinder Bore</u> Courtesy of GENERAL MOTORS CORP.

22. Rebore and hone to size if necessary. Use the following procedure to hone the cylinder bore to the correct size.

22.1. Select a piston.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

22.2. Hone the cylinder bore to obtain the recommended clearance.

22.3. Clean the piston and cylinder bore with soap and water. Dry the cylinder bore and piston. Lubricate the cylinder bore with clean engine oil.

23. Use the following procedure to measure the piston-to-cylinder bore clearance.

23.1. Subtract the piston diameter from the cylinder bore diameter to determine the piston-to-bore clearance.

23.2. Compare the piston-to-bore clearance using the specifications to determine if the clearance is in the acceptable range.

23.3. If the used piston is not acceptable, a new service piston may be selected. Only one oversize service piston is available.



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 374: Measuring Ring End Gap With A Feeler Gauge Courtesy of GENERAL MOTORS CORP.

- 24. When a piston has been selected, mark the piston to identify the cylinder for which the piston was fitted.
- 25. Select a set of new piston rings.
- 26. Install each ring, one at a time, into the corresponding cylinder.
- 27. Install the piston for that cylinder, upside down (top of piston pushing on the ring) and push the ring to approximately 25 mm (1 in) down from the deck surface.
- 28. Remove the piston.
- 29. Measure the ring end gap with a feeler gauge.
- 30. If the ring gap is not within the specification range, replace the rings.
- 31. Measure the piston ring side clearance (compression rings).
 - NOTE: The piston ring groove must only be cleaned with a ring groove cleaning tool. Proper engine performance and durability depends on the straightness and smoothness of the ring groove. Cleaning the piston ring groove with an improper tool can damage the piston ring groove and effect the performance and durability of the engine.
- 32. Use the following procedure to measure the compression ring side clearance.

32.1. Roll the piston ring around the groove.

32.2. Measure the side clearance with a feeler gauge.

32.3. If the ring is to tight, inspect the piston ring groove for nicks, burrs, or damage. Use emery cloth to remove any minor burrs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128729

Fig. 375: Measuring Piston Ring Side Clearance Courtesy of GENERAL MOTORS CORP.

32.4. If the ring side clearance is greater than the specification, replace the piston.

PISTON AND CONNECTING ROD ASSEMBLE

Tools Required

J 43654 Piston Pin Retaining Clip Remover/Installer

- 1. Lubricate the piston pin with clean engine oil.
- 2. Install one of the piston pin retainers into the retainer groove.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128730

Fig. 376: Installing Piston Pin Retainers Into Retainer Groove Courtesy of GENERAL MOTORS CORP.

3. Install the connecting rod and piston pin. Push the piston pin in until it bottoms against the installed piston pin retainer.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 377: Installing Connecting Rod And Piston Pin Courtesy of GENERAL MOTORS CORP.

4. Install the second piston pin retainer.



G02128732

Fig. 378: Installing Second Piston Pin Retainer Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The piston ring end gaps must be staggered 90 degrees apart.

NOTE: Use a piston ring expander to install the piston rings. The rings may be damaged if expanded more than necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 5. Install the following components of the bottom ring assembly (oil control ring).
 - 5.1. The expander
 - 5.2. The lower oil control ring
 - 5.3. The upper oil control ring



G02128733

<u>Fig. 379: Installing Piston Ring</u> Courtesy of GENERAL MOTORS CORP.

- 6. Install the middle ring compression ring with the manufacturers mark facing up.
- 7. Install the top ring.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



<u>Fig. 380: Installing Rings</u> Courtesy of GENERAL MOTORS CORP.

CAMSHAFTS CLEANING AND INSPECTION

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tools Required

J 7872 Magnetic Base Dial Indicator Set

- 1. Clean the camshafts with cleaning solvent.
- 2. Inspect the camshafts for the following conditions:
 - Scored camshaft journals
 - Damaged camshaft lobes
 - Damaged camshaft sprocket locator pin slots
 - Damaged threads
- 3. Measure the camshaft lobes using a micrometer. The intake camshaft lobes should be a minimum of 41.5 mm (1.635 in). The exhaust camshaft lobes should be a minimum of 41 mm (1.615 in).



G02128735

Fig. 381: Measuring Camshaft Lobes Courtesy of GENERAL MOTORS CORP.

- 4. Use J 7872 to measure the camshaft runout.
 - 4.1. Set the camshaft in V-blocks between the centers.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 4.2. Measure the intermediate camshaft journal.
- 5. Use *J* 7872 to measure the camshaft lobe lift.
 - 5.1. Lubricate the camshaft to V-block contact areas with engine oil.
 - 5.2. Set the camshaft on V-blocks.
 - 5.3. Measure the camshaft lobe lift.
- 6. If the runout or camshaft lobe lift is not within specifications, replace the camshaft.



G02128736

<u>Fig. 382: Measuring Camshaft Runout</u> Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN AND SPROCKETS CLEANING AND INSPECTION

- 1. Inspect the timing chain sprockets for cracks or teeth that are worn, broken, or chipped.
- 2. Inspect the timing chain for binding or stretching.
- 3. Inspect the dowel pins for wear or damage
- 4. Inspect the crankshaft sprocket keyway and the locating dowel pins in the crankshaft for damage.
- 5. Inspect the timing chain shoe and guide for excessive wear or cracks.
- 6. Inspect the timing chain tensioner for damage.
- 7. Replace the timing chain and sprockets if damaged.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128737

Fig. 383: Inspecting Timing Chain And Timing Chain Sprockets Courtesy of GENERAL MOTORS CORP.

VALVE ROCKER ARM AND VALVE LASH ADJUSTER CLEANING AND INSPECTION

- 1. Clean the valve rocker arms and valve lash adjusters in cleaning solvent.
- 2. Dry the valve rocker arms and valve lash adjusters with compressed air.
- 3. Inspect the valve rocker arms for the following conditions:
 - Excessive wear at the valve contact or valve lash adjuster socket area
 - A loose or damaged pin
 - A worn or damaged roller. The roller should rotate freely with no binding or roughness.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128738

Fig. 384: Inspecting Valve Rocker Arms Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Keep the valve rocker arms and valve lash adjusters in the order from where they where removed.

- 4. Inspect the valve lash adjusters for the following conditions:
 - Excessive wear
 - Clogging of the oil passage
 - Damage
 - Collapsed or spongy

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 385: Inspecting Valve Lash Adjusters Courtesy of GENERAL MOTORS CORP.

CYLINDER HEAD DISASSEMBLE

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tools Required

- J 8062 Valve Spring Compressor
- J 42037 Valve Spring Compressor Adapter
- J 38820 Valve Stem Seal Remover/Installer
- 1. Remove the spark plugs.



G02128740

Fig. 386: Removing Spark Plugs Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Organize the valve train components when disassembling so they can be reassembled in the same location and matched up with the same components as previously installed.

2. Use J 8062 and J 42037 to compress the valve spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128741

Fig. 387: Compressing Valve Spring Courtesy of GENERAL MOTORS CORP.

3. Remove the valve keys.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128742

Fig. 388: Removing Valve Keys Courtesy of GENERAL MOTORS CORP.

- 4. Remove *J* 8062 and *J* 42037.
- 5. Remove the valve spring retainer and valve spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128743

Fig. 389: Removing Valve Spring Retainer And Valve Spring Courtesy of GENERAL MOTORS CORP.

6. Remove the valves.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128744

<u>Fig. 390: Removing Valves</u> Courtesy of GENERAL MOTORS CORP.

7. Use *J* 38820 to remove the valve seals.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128745

Fig. 391: Removing Valve Seals Courtesy of GENERAL MOTORS CORP.

8. Inspect the water jacket plug, for leakage. Replace if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128746

Fig. 392: Inspecting Water Jacket Plug For Leakage Courtesy of GENERAL MOTORS CORP.

9. Inspect the (inner) oil gallery plug, for leakage. Replace if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128747

Fig. 393: Inspecting (Inner) Oil Gallery Plug For Leakage Courtesy of GENERAL MOTORS CORP.

10. Inspect the (end) oil gallery plugs, for leakage. Replace if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128748

Fig. 394: Inspecting (End) Oil Gallery Plugs For Leakage Courtesy of GENERAL MOTORS CORP.

CYLINDER HEAD CLEANING AND INSPECTION

Tools Required

J 9666 Valve Spring Tester

1. Inspect the cylinder head gasket and the mating surface. Inspect for leaks, corrosion, and blowby.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128749

Fig. 395: Inspecting Cylinder Head Gasket And Mating Surface Courtesy of GENERAL MOTORS CORP.

- 2. If the gasket failed, determine the cause. The following conditions may cause gasket failure:
 - Improper installation
 - Warped cylinder head
 - Missing or not fully seated dowel pins
 - Low torque on the cylinder head bolts
 - Incorrect length cylinder head bolts
 - A warped engine block surface
 - Scratched surfaces
 - Foreign material
 - Cracked engine block threaded holes

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 3. Clean the following components:
 - The gasket surfaces
 - Do not use a motorized brush on the head gasket sealing surface.
 - Valve stems and valve heads
 - The bolt hole threads

Remove all dirt, debris, or threadlocking material from the bolt holes.



G02128750

Fig. 396: Inspecting Cylinder Head Mating Surfaces For Flatness Courtesy of GENERAL MOTORS CORP.

- 4. Inspect the cylinder head mating surfaces for flatness. Use a feeler gauge and a straight edge.
- 5. Replace the cylinder head if warped more than 0.08 mm (0.003 in).
- 6. Inspect the cylinder head for cracks.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: Do not attempt to weld the cylinder head. If the cylinder head is damaged, replace the cylinder head. Minor nicks may be repaired with a fine flat file or emery cloth.

- 7. Inspect the cylinder head deck for corrosion.
- 8. Inspect the valve springs for squareness.
- 9. Use *J* 9666 to measure the valve spring tension. Replace the valve spring if the tension is not within specification.



G02128751

Fig. 397: Measuring Valve Spring Tension

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

- 10. Inspect the valve guides for wear. The valve guides may be reamed oversized 0.075 mm (0.003 in) and oversized stemmed valves may be installed. The same size valve seal should be used.
- 11. Inspect the valve seats for excessive wear, damage, or hot spots.
- 12. Use the following procedure to measure the valve seat concentricity:

12.1. Lift the valve off the valve seat.

12.2. Apply a dab of blue dye to the valve face.

12.3. Seat and rotate the valve. The blue dye traces transferred to the valve seat are an indication of concentricity of the valve seat.

- 13. Use the following procedure to measure the valve runout:
 - 13.1. Clean off the blue dye.
 - 13.2. Apply blue dye to the valve seat.
 - 13.3. Seat and rotate the valve.
 - 13.4. The traces of blue dye transferred to the valve indicates valve runout.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128752

Fig. 398: Inspecting Valves For Damage Courtesy of GENERAL MOTORS CORP.

- 14. Replace the head if the valve seats are damaged.
- 15. Inspect the valves for the following damage:
 - Grooving (1, 2)
 - Bent valve stem (3). Replace any bent valve.
 - Burrs or scratches (4). Minor burrs or scratches may be removed with a fine oil stone.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- Chipped or worn key grooves (5). Replace if damaged.
- Valve tip wear (6). Replace if worn.

CYLINDER HEAD ASSEMBLE

Tools Required

- J 8062 Valve Spring Compressor
- J 42037 Valve Spring Compressor Adapter
- J 38820 Valve Stem Seal Remover/Installer
- 1. Apply sealant GM P/N United States 12346004, GM P/N Canada 10953480 or equivalent to the threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the (end) oil gallery plugs.

Tighten

Tighten the oil gallery plugs to 38 N.m (28 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128753

Fig. 399: Installing (End) Oil Gallery Plugs Courtesy of GENERAL MOTORS CORP.

- 3. Apply sealant GM P/N United States 12346004, GM P/N Canada 10953480 or equivalent to the plugs.
- 4. Install the (inner) oil gallery plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128754

Fig. 400: Installing (Inner) Oil Gallery Plugs Courtesy of GENERAL MOTORS CORP.

- 5. Apply sealant GM P/N United States 12346004, GM P/N Canada 10953480 or equivalent to the plug.
- 6. Install the water jacket plug.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128755

Fig. 401: Installing Water Jacket Plug Courtesy of GENERAL MOTORS CORP.

7. Use *J* 38820 to install the valve seals. There is only one size valve seal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128756

Fig. 402: Installing Valve Seals Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Lubricate the valve stems with clean engine oil before installing.

8. Install the valves. 0.075 mm (0.003 in) oversized valves are available if the valve guides needed to be reamed. Use the same (original size) valve seal.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128757

<u>Fig. 403: Installing Valves</u> Courtesy of GENERAL MOTORS CORP.

9. Install the valve spring and the valve spring retainer.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128758

Fig. 404: Installing Valve Spring And Valve Spring Retainer Courtesy of GENERAL MOTORS CORP.

10. Use J 8062 and J 42037 to compress the valve spring.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128759

Fig. 405: Compressing Valve Spring Courtesy of GENERAL MOTORS CORP.

- 11. Install the valve keys.
- 12. Remove J 8062 and J 42037.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128760

Fig. 406: Installing Valve Keys Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not try to centralize the electrode on the spark plug. The electrode is offset by design.

13. Install the spark plugs.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128761

Fig. 407: Installing Spark Plugs Courtesy of GENERAL MOTORS CORP.

CAMSHAFT COVER CLEANING AND INSPECTION

- 1. Remove and discard the rubber ignition coil seals, and the camshaft cover seal.
- 2. Clean the camshaft cover with a suitable cleaning solvent.
- 3. Inspect the camshaft cover for cracks or damage.
- 4. Inspect the bolt threads for damage.
- 5. Replace the camshaft cover if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128762

Fig. 408: Inspecting Camshaft Cover For Cracks Or Damage Courtesy of GENERAL MOTORS CORP.

OIL PUMP CLEANING AND INSPECTION

- 1. Clean all parts of sludge, oil, and varnish by soaking in carburetor cleaner or cleaning solvent.
- 2. Inspect for foreign material and determine the source of the foreign material.
- 3. Inspect the oil pump housing and engine front cover for the following conditions:
 - Cracks or casting imperfections
 - Scoring
 - Damaged threads
- 4. Do not attempt to repair the oil pump housing. Replace the oil pump housing if damage is found.
- 5. Inspect the oil pump gears for damage.
- 6. Measure the inner oil pump gear tip clearance in several places.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128763

Fig. 409: Measuring Inner Oil Pump Gear Tip Clearance Courtesy of GENERAL MOTORS CORP.

7. Measure the outer oil pump gear tip clearance in several places.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128764

Fig. 410: Measuring Outer Oil Pump Gear Tip Clearance Courtesy of GENERAL MOTORS CORP.

IMPORTANT: When deciding oil pump serviceability based on end clearance, consider depth of the wear pattern in the pump cover.

- 8. Measure the oil pump gear side clearance.
- 9. Inspect the pressure regulator valve for the following conditions:
 - Scoring
 - Sticking

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- Burrs Burrs may be removed using a fine oil stone.
- 10. Inspect the pressure regulator valve spring for loss of tension or bending. Replace the pressure regulator spring if damaged.
- 11. Inspect the oil pump pipe pickup tube and screen assembly for the following conditions:
 - Looseness If the oil pump pipe pickup tube is loose or bent, replace the oil pump pipe pickup tube.
 - Broken wire mesh or screen



G02128765

Fig. 411: Measuring Oil Pump Gear Side Clearance Courtesy of GENERAL MOTORS CORP.

• Inspect the O-ring seal at the base of the oil pump pickup tube for damage.

OIL PAN CLEANING AND INSPECTION

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

1. Clean the oil pan in solvent. Remove all sludge and debris from the oil pan.

IMPORTANT: Do not use a motorized tool or bristle disc to clean this component.

- 2. Remove all sealing material from the oil pan rails.
- 3. Inspect the oil pan sealing surfaces for nicks or damage. Remove any minor nicks with a fine flat file.
- 4. Inspect the threads in the oil drain plug hole.
- 5. Replace the oil pan if necessary.



G02128766

Fig. 412: Inspecting Oil Pan Sealing Surfaces For Nicks Or Damage Courtesy of GENERAL MOTORS CORP.

ENGINE FRONT COVER CLEANING AND INSPECTION

1. Clean the engine front cover with cleaning solvent.

IMPORTANT: Do not use a motorized tool or bristle disc to clean this component.

- 2. Remove all sealing material.
- 3. Inspect the engine front cover sealing surfaces for nicks or damage. Use a fine flat file to remove any minor nicks.
- 4. Inspect the engine front cover threaded holes for damage.
- 5. Repair or replace the engine front cover as necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128767
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 413: Inspecting Engine Front Cover Courtesy of GENERAL MOTORS CORP.

INTAKE MANIFOLD CLEANING AND INSPECTION

- 1. Clean the intake manifold gasket mating surface.
- 2. Inspect the threads on the retaining bolts.
- 3. Inspect the intake manifold for cracks.
- 4. Replace the intake manifold if necessary.



G02128768

Fig. 414: Inspecting Intake Manifold Courtesy of GENERAL MOTORS CORP.

EXHAUST MANIFOLD CLEANING AND INSPECTION

- 1. Clean the exhaust manifold.
- 2. Inspect the exhaust manifold for cracks or damage.
- 3. Inspect the exhaust manifold threads and studs (if necessary).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128769

Fig. 415: Inspecting Exhaust Manifold Courtesy of GENERAL MOTORS CORP.

- 4. Check the exhaust manifold mating surface for flatness. Use a straight edge and a feeler gauge.
- 5. Replace the exhaust manifold if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128770

Fig. 416: Checking Exhaust Manifold Mating Surface For Flatness Courtesy of GENERAL MOTORS CORP.

WATER PUMP CLEANING AND INSPECTION

- 1. Remove all sealing material from the sealing surface.
- 2. Inspect the water pump impeller for damage.
- 3. Inspect the water pump shaft for looseness.
- 4. Inspect the threads for damage.
- 5. Replace the water pump if necessary.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128771

Fig. 417: Inspecting Water Pump Courtesy of GENERAL MOTORS CORP.

THREAD REPAIR

Tools Required

- J 42385-400 Thread Repair Kit
- J 43965 Extension Kit

The thread repair process involves a solid, thin walled, self-locking, carbon steel, bushing type insert. During the insert installation process, the installation driver tool cold-rolls the bottom internal threads and expands the bottom external threads of the insert into the base material. This action mechanically locks the insert into place.

The tool kit J 42385-400 is designed for use with either a suitable tap wrench or drill motor. Limited access and

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

larger hole repair may process better using a tap wrench. An extension J 43965 may also be necessary to drive the thread repair tooling dependent on access to the hole being repaired.



G02128772

Fig. 418: Identifying Tools Required For Thread Repair Courtesy of GENERAL MOTORS CORP.

It is critical that the drilling, counterboring and tapping of the hole to be repaired follows the same centerline as the original hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128773

<u>Fig. 419: Drilling And Tapping Hole</u> Courtesy of GENERAL MOTORS CORP.

During the drilling and tapping of the hole being repaired ensure the tooling is consistently machining perpendicular to the surface of the base material.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128774

Fig. 420: Ensuring Position Of Tool While Drilling Or Tapping Courtesy of GENERAL MOTORS CORP.

Standard Thread Repair - Flush Hole

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

IMPORTANT: The use of a cutting type fluid GM P/N United States 1052864, GM P/N Canada 992881, WD 40® or equivalent is recommended when performing the drilling, counterboring and tapping procedures.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

When installed to the proper depth, the flange (1) of the insert will be seated against the counterbore of the drilled/tapped hole and just below the surface (2) of the base material.



G02128775

Fig. 421: Identifying Flange Seated Against Counterbore Of Drilled/Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- During the drilling process, it is necessary to repeatedly remove the drill and clean chips from the hole and the flutes of the drill.
- Do NOT drill any further than the original hole depth.
- 1. Drill out the threads of the damaged hole.
 - M6 inserts require a minimum drill depth of 15 mm (0.59 in).
 - M8 inserts require a minimum drill depth of 20 mm (0.79 in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

• M10 inserts require a minimum drill depth of 23.5 mm (0.93 in).



G02128776

Fig. 422: Drilling Out Threads Of Damaged Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2. Using compressed air, clean out any chips.



G02128777

Fig. 423: Cleaning Out Any Chips Courtesy of GENERAL MOTORS CORP.

IMPORTANT: A properly counterbored hole will show a slight burnishing on the surface of the base material for 360 degrees around the drilled hole.

3. Counterbore the drilled hole to the full depth permitted by the tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128778

Fig. 424: Counterboring Drilled Hole To Full Depth Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

4. Using compressed air, clean out any chips.



Fig. 425: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- During the tapping process, it is necessary to repeatedly remove the tap and clean chips from the hole and the flutes of the tap.
 - Ensure the tap has created full threads at least to the depth equal to the insert length.
- 5. Using a suitable tapping wrench, tap the threads of the drilled hole.
 - M6 inserts require a minimum tap depth of 15 mm (0.59 in).
 - M8 inserts require a minimum tap depth of 20 mm (0.79 in).
 - M10 inserts require a minimum tap depth of 23.5 mm (0.93 in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

6. Using compressed air, clean out any chips.



Fig. 427: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

7. Spray cleaner GM P/N United States 12377981, GM P/N Canada 10953463 or equivalent into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128782

Fig. 428: Spraying Cleaner Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

8. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 429: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.

9. Lubricate the threads of the driver installation tool (2) with the driver oil (1) J 42385-110.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128784

Fig. 430: Lubricating Threads Of Driver Installation Tool With Driver Oil Courtesy of GENERAL MOTORS CORP.

10. Install the insert (2) onto the driver installation tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128785

Fig. 431: Installing Insert Onto Driver Installation Tool Courtesy of GENERAL MOTORS CORP.

11. Apply threadlock sealant GM P/N United States 12345493, GM P/N Canada 10953488, J 42385-109, LOCTITE 277® or equivalent (1) to the insert OD threads (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128786

Fig. 432: Applying Threadlock Sealant To Insert OD Threads Courtesy of GENERAL MOTORS CORP.

12. Install the insert (2) into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128787

Fig. 433: Installing Insert Into Tapped Hole

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the insert will not thread down until the flange contacts the counterbored surface, remove the insert immediately with a screw extracting tool and inspect the tapped hole for any remaining chips and/or improper tapping.

13. Install the insert until the flange (2) of the insert contacts the counterbored surface.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128788

Fig. 434: Installing Insert Until Flange Of Insert Contacts Counterbored Surface Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: The driver installation tool will tighten up before screwing completely through the insert. This is acceptable. The threads at the bottom of the insert are being formed and the insert is mechanically locking the insert into the base material threads.

14. Continue to rotate the driver installation tool (1) through the insert (2).



G02128789

Fig. 435: Rotating Driver Installation Tool Through Insert Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

15. Inspect the insert for proper installation into the tapped hole. A properly installed insert (1) will be either flush or slightly below flush with the surface of the base material (2).



Fig. 436: Inspecting Insert For Proper Installation Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

16. Any installed insert that restricts or blocks an oil or engine coolant passage (3) will need to have the oil or engine coolant passage drilled out (4) to the original size of the oil or engine coolant passage. After drilling the restriction or blockage, clean out any chips and thread the installation driver tool through the insert again to remove any burrs caused by the drilling of the oil or engine coolant passage.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128791

Fig. 437: Identifying Coolant Passage And Coolant Passage Drilled Out Courtesy of GENERAL MOTORS CORP.

Recessed Thread Repair

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

IMPORTANT: • The use of a cutting type fluid GM P/N United States 1052864, GM P/N Canada 992881, WD 40® or equivalent is recommended when performing the drilling, counterboring and tapping procedures.

• Do NOT remove the original stop collar from a counterbore drill.

When installed to the proper depth, the flange of the insert (1) will be seated against the counterbore (2) of the drilled/tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128792

Fig. 438: Identifying Flange Of Insert Seated Against Counterbore Of Drilled/Tapped Hole Courtesy of GENERAL MOTORS CORP.

1. Install a stop collar (2) on the counterbore drill (1), if required.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128793

Fig. 439: Installing Stop Collar On Counterbore Drill Courtesy of GENERAL MOTORS CORP.

IMPORTANT: • During the drilling process, it is necessary to repeatedly remove the drill and clean chips from the hole and the flutes of the drill.

- Drill the hole until the stop collar contacts the surface of the base material.
- 2. Drill out the threads of the damaged hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128794

Fig. 440: Drilling Out Threads Of Damaged Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

3. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 441: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

- **IMPORTANT:** During the tapping process, it is necessary to repeatedly remove the tap and clean chips from the hole and the flutes of the tap.
 - Ensure the tap has created full threads at least to the depth equal to the insert length.
- 4. Using a suitable tapping wrench, tap the threads of the drilled hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128796

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

5. Using compressed air, clean out any chips.



Fig. 443: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

6. Spray cleaner GM P/N United States 12377981, GM P/N Canada 10953463 or equivalent into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128798

Fig. 444: Spraying Cleaner Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

7. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 445: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.

8. Lubricate the threads of the driver installation tool (2) with the driver oil (1) J 42385-110.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128800

Fig. 446: Lubricating Threads Of Driver Installation Tool With Driver Oil Courtesy of GENERAL MOTORS CORP.

9. Install the insert (2) onto the driver installation tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128801

Fig. 447: Installing Insert Onto Driver Installation Tool Courtesy of GENERAL MOTORS CORP.

10. Apply threadlock sealant GM P/N United States 12345493, GM P/N Canada 10953488, J 42385-109, LOCTITE 277® or equivalent (1) to the insert OD threads (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 448: Applying Threadlock Sealant To Insert OD Threads Courtesy of GENERAL MOTORS CORP.

11. Install the insert (2) into the tapped hole.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128803

Fig. 449: Installing Insert Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the insert will not thread down until the flange contacts the

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

counterbored surface remove the insert immediately with a screw extracting tool and inspect the tapped hole for any remaining chips and/or improper tapping.

12. Install the insert until the flange (2) of the insert contacts the counterbored surface.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



<u>Fig. 450: Installing Insert Until Flange Of Insert Contacts Counterbored Surface</u> Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The driver installation tool will tighten up before screwing completely

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

through the insert. This is acceptable. The threads at the bottom of the insert are being formed and the insert is mechanically locking the insert into the base material threads.

13. Continue to rotate the driver installation tool (1) through the insert (2).



Fig. 451: Rotating Driver Installation Tool Through Insert Courtesy of GENERAL MOTORS CORP.

14. Inspect the insert (1) for proper installation (2) into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128806

Fig. 452: Inspecting Insert For Proper Installation Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

15. Any installed insert that restricts or blocks an oil or engine coolant passage (3) will need to have the oil or engine coolant passage drilled out (4) to the original size of the oil or engine coolant passage. After drilling the restriction or blockage, clean out any chips and thread the installation driver tool through the insert again to remove any burrs caused by the drilling of the oil or engine coolant passage.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128807

Fig. 453: Identifying Engine Coolant Passage And Engine Coolant Passage Drilled Out Courtesy of GENERAL MOTORS CORP.

Tapered Pipe Thread Repair

The thread repair insert for tapered pipe threads is coated with a clear silver zinc coating.

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

IMPORTANT: The use of a cutting type fluid GM P/N United States 1052864, GM P/N Canada 992881, WD 40® or equivalent is recommended when performing the drilling, counterboring and tapping procedures.

When installed to the proper depth, the flange (1) of the insert will be seated against surface (2) of the base

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

material of the drilled/tapped hole.



G02128808

Fig. 454: Identifying Flange Of Insert Seated Against Surface Of Base Material Of Drilled/Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- During the drilling process, it is necessary to repeatedly remove the drill and clean chips from the hole and the flutes of the drill.
- Drill the hole until the stop collar contacts the surface of the base material.
- 1. Drill out the threads of the damaged hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128809

Fig. 455: Drilling Out Threads Of Damaged Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

2. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 456: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

- **IMPORTANT:** During the tapping process, it is necessary to repeatedly remove the tap and clean chips from the hole and the flutes of the tap.
 - Ensure the tap has created full threads at least to the depth equal to the insert length.
- 3. Using a suitable tapping wrench, tap the threads of the drilled hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128811

Fig. 457: Tapping Threads Of Drilled Hole Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

4. Tap the drilled hole until the threads at the top of the tap (2) are down to the surface of the base material.



G02128812

<u>Fig. 458: Tapping Drilled Hole Until Threads At Top Of Tap Are Down To Surface Of Base</u> <u>Material</u> Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

5. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 459: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

6. Spray cleaner GM P/N United States 12377981, GM P/N Canada 10953463 or equivalent into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128814

Fig. 460: Spraying Cleaner Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

7. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 461: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.

8. Lubricate the threads of the driver installation tool (2) with the driver oil (1) J 42385-110.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128816

Fig. 462: Lubricating Threads Of Driver Installation Tool With Driver Oil Courtesy of GENERAL MOTORS CORP.

9. Install the insert (2) onto the driver installation tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128817

Fig. 463: Installing Insert Onto Driver Installation Tool Courtesy of GENERAL MOTORS CORP.

10. Apply threadlock sealant GM P/N United States 12345493, GM P/N Canada 10953488, J 42385-109, LOCTITE 277® or equivalent (1) to the insert OD threads (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 464: Applying Threadlock Sealant To Insert OD Threads Courtesy of GENERAL MOTORS CORP.

11. Install the insert (2) into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128819

Fig. 465: Installing Insert Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the insert will not thread down until the flange contacts the surface of

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

the base material remove the insert immediately with a screw extracting tool and inspect the tapped hole for any remaining chips and/or improper tapping.

12. Install the insert until the flange (2) of the insert contacts the surface of the base material.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128820

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 466: Installing Insert Until Flange Of Insert Contacts Surface Of Base Material Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The driver installation tool will tighten up before screwing completely through the insert. This is acceptable. The threads at the bottom of the insert are being formed and the insert is mechanically locking the insert into the base material threads.

13. Continue to rotate the driver installation tool (1) until the top of the threaded section (2) is level with the top of the insert (3).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 467: Rotating Driver Installation Tool Until Top Of Threaded Section Is Level With Top Of

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Insert Courtesy of GENERAL MOTORS CORP.

14. Inspect the insert (1) for proper installation (2) into the tapped hole.



G02128822

Fig. 468: Inspecting Insert For Proper Installation Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

15. Any installed insert that restricts or blocks an oil or engine coolant passage (3) will need to have the oil or engine coolant passage drilled out (4) to the original size of the oil or engine coolant passage. After drilling the restriction or blockage, clean out any chips and thread the installation driver tool through the insert again to remove any burrs caused by the drilling of the oil or engine coolant passage.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128823

Fig. 469: Identifying Engine Coolant Passage And Engine Coolant Passage Drilled Out Courtesy of GENERAL MOTORS CORP.

Cylinder Head Bolt Hole Thread Repair

The cylinder head bolt hole required tools consist of the following:

- Drill (1) J 42385-402
- Tap (2) J 42385-403
- Installation driver (3) J 42385-404
- Alignment pin (4) J 42385-303
- Bushing (5) J 42385-302
- Bolts (6) J 42385-421
- Fixture plate (7) J 42385-401

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128824

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 470: Identifying Tools Required For Cylinder Head Bolt Hole Thread Repair Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- Remove the fixture plate prior to installing the insert with the installer tool.
- The use of a cutting type fluid GM P/N United States 1052864, GM P/N Canada 992881, WD 40® or equivalent is recommended when performing the drilling, counterboring and tapping procedures.

When installed to the proper depth, the flange of the insert will be seated against the counterbore of the drilled/tapped hole.

- 1. Position the fixture plate (3) with the bushing (1) installed over the cylinder head bolt hole to be repaired (4).
- 2. Loosely install the fixture plate bolts (2) into the remaining cylinder head bolt holes.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128825

Fig. 471: Positioning Fixture Plate With Bushing Installed Over Cylinder Head Bolt Hole Courtesy of GENERAL MOTORS CORP.

- 3. Position the alignment pin (1) through the bushing and into the cylinder head bolt hole.
- 4. With the alignment pin in the desired cylinder head bolt hole, tighten the fixture retaining bolts (2).
- 5. Remove the alignment pin (1) from the cylinder head bolt hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128826

Fig. 472: Positioning Alignment Pin Through Bushing And Into Cylinder Head Bolt Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: During the drilling process, it is necessary to repeatedly remove the drill and clean chips from the hole and the flutes of the drill.

6. Drill out the threads of the damaged hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128827

Fig. 473: Drilling Out Threads Of Damaged Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

7. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 474: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

- **IMPORTANT:** During the tapping process, it is necessary to repeatedly remove the tap and clean chips from the hole and the flutes of the tap.
 - Ensure the tap has created full threads at least to the depth equal to the insert length.
- 8. Using a suitable tapping wrench, tap the threads of the drilled hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128829

Fig. 475: Tapping Threads Of Drilled Hole Courtesy of GENERAL MOTORS CORP.

9. In order to tap the new threads for the insert to the proper depth, rotate the tap into the cylinder head bolt hole until the first mark (1) on the tap aligns with the top of the drill bushing (3).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128830

Fig. 476: Aligning First Mark On Tap With Top Of Drill Bushing Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Remove the fixture plate prior to installing the insert with the installer tool.

- 10. Remove the fixture plate bolts (2).
- 11. Remove the fixture plate (3) and bushing (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128831

Fig. 477: Removing Fixture Plate And Bushing Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

12. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 478: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

13. Spray cleaner GM P/N United States 12377981, GM P/N Canada 10953463 or equivalent into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128833

Fig. 479: Spraying Cleaner Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

14. Using compressed air, clean out any chips.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 480: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.

15. Lubricate the threads of the driver installation tool (2) with the driver oil (1) J 42385-110.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128835

Fig. 481: Lubricating Threads Of Driver Installation Tool With Driver Oil Courtesy of GENERAL MOTORS CORP.

16. Install the insert (2) onto the driver installation tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128836

Fig. 482: Installing Insert Onto Driver Installation Tool Courtesy of GENERAL MOTORS CORP.

17. Apply threadlock sealant GM P/N United States 12345493, GM P/N Canada 10953488, J 42385-109, LOCTITE 277®, or equivalent (1) to the insert OD threads (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128837

Fig. 483: Applying Threadlock Sealant To Insert OD Threads Courtesy of GENERAL MOTORS CORP.

- 18. Install the insert and installation driver (1) into the tapped hole.
- 19. Start the insert into the threaded hole.

IMPORTANT: If the insert will not thread down until the flange contacts the counterbored surface remove the insert immediately with a screw extracting tool and inspect the tapped hole for any remaining chips and/or improper tapping.

20. Install the insert until the flange of the insert contacts the counterbored surface.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: The driver installation tool will tighten up before screwing completely through the insert. This is acceptable. The threads at the bottom of the insert are being formed and the insert is mechanically locking the insert into the base material threads.

- 21. Continue to rotate the driver installation tool through the insert.
- 22. Inspect the insert for proper installation into the tapped hole.



G02128838

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Crankshaft Main Bolt Hole Thread Repair

IMPORTANT:

- In order to repair some crankshaft main bolt holes it will be necessary to mount the fixture plate upside down.
 - Do NOT remove the fixture plate prior to installing the insert with the installation driver. The fixture plate remains in position throughout the thread repair process.

The crankshaft main bearing bolt hole required tools consist of the following:

- Drill (1) J 42385-417
- Tap (2) J 42385-418
- Installation driver (3) J 42385-419
- Fixture plate (4) J 42385-401
- Bushing (5) J 42385-307
- Alignment pin (6) J 42385-308
- Bolts (7) J 42385-510

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128839

Fig. 485: Identifying Tools Required For Crankshaft Main Bolt Hole Thread Repair Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to <u>SAFETY GLASSES CAUTION</u> in Cautions and Notices.

IMPORTANT:

- Ensure the fixture plate is installed during the machining and installation processes of the insert.
- The use of a cutting type fluid GM P/N United States 1052864, GM P/N Canada 992881, WD 40® or equivalent is recommended when performing the drilling, counterboring and tapping procedures.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

When installed to the proper depth, the flange of the insert will be seated against the counterbore of the drilled/tapped hole.

- 1. Position the fixture plate (3) with the bushing (2), installed over the crankshaft main cap bolt hole to be repaired.
- 2. Loosely install the fixture plate bolts (1) into the remaining crankshaft main cap bolt holes.



2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 486: Positioning Fixture Plate With Bushing, Installed Over Crankshaft Main Cap Bolt Hole Courtesy of GENERAL MOTORS CORP.

- 3. Position the alignment pin (1) through the bushing and into the crankshaft main cap bolt hole.
- 4. With the alignment pin in the desired crankshaft main cap bolt hole, tighten the fixture retaining bolts (2).
- 5. Remove the alignment pin (1) from the crankshaft main cap bolt hole.



G02128841

Fig. 487: Positioning Alignment Pin Through Bushing And Into Crankshaft Main Cap Bolt Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: • During the drilling process, it is necessary to repeatedly remove the drill and clean chips from the hole and the flutes of the drill.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- Drill the crankshaft main bolt hole until the mark (1) on the drill aligns with the top of the drill bushing (2).
- 6. Drill out the threads of the damaged hole.



G02128842

Fig. 488: Drilling Crankshaft Main Bolt Hole Until Mark On Drill Aligns With Top Of Drill Bushing Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the drilled hole prior to tapping.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

7. Using compressed air, clean out any chips.



Fig. 489: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- Do not remove the fixture plate, ensure the fixture plate is installed during the machining and installation processes of the insert.
 - During the tapping process, it is necessary to repeatedly remove the tap and clean chips from the hole and the flutes of the tap.
 - Ensure the tap has created full threads at least to the depth equal to the insert length.
- 8. Using a suitable tapping wrench, tap the threads of the drilled hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128844

Fig. 490: Tapping Threads Of Drilled Hole Courtesy of GENERAL MOTORS CORP.

9. In order to tap the new threads for the insert to the proper depth, rotate the tap into the crankshaft main cap bolt hole until the mark (3) on the tap aligns with the top of the drill bushing (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128845

Fig. 491: Aligning Mark On Tap And Top Of Drill Bushing Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

10. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 492: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

11. Spray cleaner GM P/N United States 12377981, GM P/N Canada 10953463 or equivalent into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128847

Fig. 493: Spraying Cleaner Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

IMPORTANT: All chips must be removed from the tapped hole prior to insert installation.

12. Using compressed air, clean out any chips.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 494: Cleaning Out Chips From Hole By Using Compressed Air Courtesy of GENERAL MOTORS CORP.

- IMPORTANT: Do not remove the fixture plate, ensure the fixture plate is installed during the installation process of the insert.
 - Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.
- 13. Lubricate the threads of the driver installation tool (2) with the driver oil (1) J 42385-110.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128849

Fig. 495: Lubricating Threads Of Driver Installation Tool With Driver Oil Courtesy of GENERAL MOTORS CORP.

14. Install the insert (2) onto the driver installation tool (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128850

Fig. 496: Installing Insert Onto Driver Installation Tool Courtesy of GENERAL MOTORS CORP.

15. Apply threadlock sealant GM P/N United States 12345493, GM P/N Canada 10953488, J 42385-109, LOCTITE 277® or equivalent (1) to the insert OD threads (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128851

Fig. 497: Applying Threadlock Sealant To Insert OD Threads Courtesy of GENERAL MOTORS CORP.

- 16. Install the insert and installation driver (1) into the tapped hole.
- 17. Start the insert into the threaded hole.

IMPORTANT: If the insert will not thread down until the flange contacts the counterbored surface remove the insert immediately with a screw extracting tool and inspect the tapped hole for any remaining chips and/or improper tapping.

18. Install the insert until the flange of the insert contacts the counterbored surface.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

IMPORTANT: The driver installation tool will tighten up before screwing completely through the insert. This is acceptable. The threads at the bottom of the insert are being formed and the insert is mechanically locking the insert into the base material threads.

19. Continue to rotate the driver installation tool through the insert.



G02128852

Fig. 498: Installing Insert And Installation Driver Into Tapped Hole Courtesy of GENERAL MOTORS CORP.

- 20. Rotate the driver installation tool until the mark (3) on the driver installation tool aligns with the top of the drill bushing (2).
- 21. Inspect the insert for proper installation into the tapped hole.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128853

Fig. 499: Rotating Driver Installation Tool Until Mark On Driver Installation Tool Aligns With Top Of Drill Bushing Courtesy of GENERAL MOTORS CORP.

- 22. Remove the fixture plate bolts (1).
- 23. Remove the fixture plate (3) and bushing (2).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128854

Fig. 500: Removing Fixture Plate, Bolts And Bushing Courtesy of GENERAL MOTORS CORP.

SERVICE PRIOR TO ASSEMBLY

Dirt will cause premature wear of the rebuilt engine. Clean all of the components. Use the proper tools in order to measure components when inspecting for excessive wear. Repair or replace the components that are not within the manufacturers specification. When components are reinstalled into an engine, return the components

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

to their original location, position, and direction. During assembly, lubricate all of the moving parts with clean engine oil or engine assembly lubricant (unless otherwise specified). This will provide initial lubrication when the engine is first started.

ENGINE PRELUBING

Tools Required

- J 45299 Engine Preluber
- IMPORTANT: A constant/continuous flow of clean engine oil is required to properly prime the engine. Be sure to use an approved engine oil as specified in the owners manual.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

1. Remove the engine oil filter, fill with clean engine oil, and reinstall.

Tighten

Tighten the oil filter to 30 N.m (22 lb ft).

- 2. Remove the engine block oil gallery plug (1).
- 3. Install the M16 x 1.5 adapter P/N 509375.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128855

Fig. 501: Removing Engine Block Oil Gallery Plug Courtesy of GENERAL MOTORS CORP.

- 4. Install the flexible hose to the adapter and open the valve.
- 5. Pump the handle on J 45299 to flow a minimum of 1-2 quarts of engine oil. Observe the flow of engine oil through the flexible hose and into the engine assembly.
- 6. Close the valve and remove the flexible hose and adapter from the engine.
- 7. Install the engine block oil gallery plug (1).

Tighten

Tighten the oil pressure sensor to 35 N.m (26 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

8. Top-off the engine oil to the proper level.



G02128856

Fig. 502: Installing Flexible Hose To Adapter Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

ENGINE BLOCK PLUG INSTALLATION

1. Add sealer GM P/N United States 12346004, GM P/N Canada 10953480 to the plug threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the engine block oil gallery plug to rear of block.

Tighten

Tighten the engine block oil gallery plug to 80 N.m (40 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128857

Fig. 503: Installing Engine Block Oil Gallery Plug To Rear Of Block Courtesy of GENERAL MOTORS CORP.

- 3. Add sealer GM P/N United States 12346004, GM P/N Canada 10953480 to the plug threads.
- 4. Install the engine block oil gallery plugs to front and left of block.

Tighten

- Tighten the side engine block oil gallery plugs to 35 N.m (26 lb ft).
- Tighten the front (1) engine block oil gallery plug to 80 N m (40 lb ft)

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



Fig. 504: Installing Engine Block Oil Gallery Plugs To Front And Left Of Block Courtesy of GENERAL MOTORS CORP.

- 5. Add sealer GM P/N United States 12346004, GM P/N Canada 10953480 to the coolant temperature sensor threads.
- 6. Install the coolant temperature sensor.

Tighten

Tighten the coolant temperature sensor to 20 N.m (15 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128859

Fig. 505: Installing Coolant Temperature Sensor Courtesy of GENERAL MOTORS CORP.

7. Add sealer GM P/N United States 12346004, GM P/N Canada 10953480 to the EVAP solenoid bolt threads.

Tighten

Tighten the EVAP solenoid bolt to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128860

Fig. 506: Installing EVAP Solenoid Bolt Courtesy of GENERAL MOTORS CORP.

8. Install the knock sensors.

Tighten

Tighten the knock sensors to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128861

<u>Fig. 507: Installing Knock Sensors</u> Courtesy of GENERAL MOTORS CORP.

- 9. Add sealer GM P/N United States 12346004, GM P/N Canada 10953480 to the crankshaft position sensor bolt.
- 10. Install the crankshaft position sensor and bolt.

Tighten

Tighten the crankshaft position sensor bolt to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128862

Fig. 508: Installing Crankshaft Position Sensor And Bolt Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT AND BEARINGS INSTALLATION

Tools Required

J 36660-A Torque Angle Meter

1. Install the upper crankshaft main bearings into the block.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128863

Fig. 509: Installing Upper Crankshaft Main Bearings Into Block Courtesy of GENERAL MOTORS CORP.

- 2. Lubricate the upper crankshaft main bearing surface with clean engine oil.
- 3. Install the crankshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128864

Fig. 510: Installing Crankshaft Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Refer to the pin stamp on the crankshaft main bearing caps for sequence and direction of installation. The pin stamp arrow points to the front of the engine.

- 4. Install the lower crankshaft main bearings into the main bearing caps.
- 5. Lubricate the lower crankshaft main bearing surface with clean engine oil.
- 6. Install the crankshaft main bearing caps.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128865

Fig. 511: Installing Crankshaft Main Bearing Caps Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The crankshaft main bearing cap stiffener is directional. The end marked front goes to the front.

7. Install the crankshaft main bearing cap stiffener.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128866

Fig. 512: Installing Crankshaft Main Bearing Cap Stiffener Courtesy of GENERAL MOTORS CORP.

8. Install new crankshaft main bearing bolts. Start the crankshaft main bearing cap bolts by hand. Ensure the bottom of the crankshaft main bearing cap is parallel to the block surface.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128867

Fig. 513: Installing Crankshaft Main Bearing Bolts Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

9. Tighten the crankshaft main bearing cap bolts in equal increments.

Tighten

- 9.1. Tighten the crankshaft main bearing cap bolts to 25 N.m (18 lb ft) in sequence.
- 9.2. Use J 36660-A to tighten the crankshaft main bearing cap bolts an additional 180 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128868

Fig. 514: Tightening Sequence Of Crankshaft Main Bearing Cap Bolts Courtesy of GENERAL MOTORS CORP.

PISTON, CONNECTING ROD, AND BEARING INSTALLATION

Tools Required

- *J 36660-A* Torque Angle Meter
- *J 8037* Piston Ring Compressor
- J 41556 Connecting Rod Guide

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 1. Rotate the crankshaft so the connecting rod journal for the piston being installed is at Bottom Dead Center.
- 2. Lubricate the cylinder wall with engine oil.
- 3. Lubricate the piston and rings with engine oil.
- 4. Stagger the ring end gaps 90 degrees apart.
- 5. Install *J* 8037 onto the piston and ring assembly to compress the rings.
- 6. Install the connecting rod bearings into the connecting rods and caps (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128869

Fig. 515: Installing Connecting Rod Bearings Into Connecting Rods And Caps Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 7. Lubricate the connecting rod bearing contact surfaces with engine oil (2).
- 8. Install the J 41556 into the connecting rod.



G02128870

Fig. 516: Installing Connecting Rod Guide Into Connecting Rod Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The piston and cylinder bore have been measured and the bore has been sized for the proper clearance. Install the piston and connecting rod

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

assembly into the proper cylinder bore. The piston alignment mark MUST face the front of the engine block (1) or the flat casting boss (2).

9. Install the connecting rod and piston into the proper cylinder bore.



G02128871

<u>Fig. 517: Identifying Piston Alignment Mark Facing Front Of Engine Block Or Flat Casting Boss</u> Courtesy of GENERAL MOTORS CORP.

10. Hold the *J* 8037 firmly against the engine block. Using a wooden hammer handle, lightly tap the top of

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

the piston until all of the piston rings enter the cylinder bore,



G02128872

Fig. 518: Installing Piston Rings Into Cylinder Bore Courtesy of GENERAL MOTORS CORP.

11. Guide the connecting rod end onto the crankshaft journal.

Use J 41556 to pull the connecting rod into place.

- 12. Install the connecting rod bearing, cap, and bolts.
 - Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

12.1. Tighten the connecting rod bearing cap bolts on the first pass to 25 N.m (18 lb ft). 12.2. Use *J 36660-A* to tighten the connecting rod bearing cap bolts on the second pass an additional 110 degrees.



Fig. 519: Installing Connecting Rod Bearing, Cap, And Bolts Courtesy of GENERAL MOTORS CORP.

13. With the pistons and connecting rods installed, use a soft faced mallet and lightly tap each connecting rod

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

assembly parallel to the crankshaft.

14. Measure the connecting rod side clearance using a feeler gauge. Connecting rod side clearance should be between 0.05-0.35 mm (0.0019-0.0137 in).



G02128874

Fig. 520: Measuring Connecting Rod Side Clearance Courtesy of GENERAL MOTORS CORP.

CYLINDER HEAD INSTALLATION

Tools Required

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

J 36660-A Torque Angle Meter

- 1. Install the dowel pins (cylinder head locator) (if necessary).
- 2. Install a new cylinder head gasket.



G02128875

Fig. 521: Installing New Cylinder Head Gasket Courtesy of GENERAL MOTORS CORP.

3. Install the cylinder head.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128876

Fig. 522: Installing Cylinder Head Courtesy of GENERAL MOTORS CORP.

4. Install new cylinder head bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128877

Fig. 523: Installing New Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

5. Tighten the new cylinder head bolts in the following sequence:

Tighten

- 5.1. Tighten the (14) long cylinder head bolts in sequence to 30 N.m (22 lb ft).
- 5.2. Use J 36660-A to tighten the cylinder head bolts in sequence an additional 155 degrees.
- 5.3. Tighten the (2 Short) end bolts to 7 N.m (62 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Use J 36660-A to tighten the short cylinder head end bolts an additional 60 degrees.

5.4. Tighten the (1 Long) end bolt to 7 N.m (82 lb in).

Use J 36660-A to tighten the long cylinder-head end bolt an additional 120 degrees.



G02128878

Fig. 524: Tightening Sequence Of Cylinder Head Bolts Courtesy of GENERAL MOTORS CORP.

VALVE ROCKER ARM AND VALVE LASH ADJUSTER INSTALLATION

- 1. Lubricate and fill the valve lash adjusters with engine oil.
- 2. Install the valve lash adjusters in their original locations.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128879

Fig. 525: Installing Valve Lash Adjusters Courtesy of GENERAL MOTORS CORP.

- 3. Lubricate the valve rocker arm roller, needle bearings, valve pallet, and lash adjuster pocket.
- 4. Install the valve rocker arms in their original locations.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128880

Fig. 526: Installing Valve Rocker Arms Courtesy of GENERAL MOTORS CORP.

CAMSHAFT INSTALLATION

Tools Required

J 44221 Camshaft Holding Tool

- 1. Coat the camshaft journals, camshaft journal thrust face, and camshaft lobes with clean engine oil.
- 2. Install the exhaust camshaft,
- 3. Install the intake camshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128881

Fig. 527: Installing Exhaust And Intake Camshaft Courtesy of GENERAL MOTORS CORP.

4. Install J 44221 with the camshaft flats up and the number 1 cylinder at top dead center.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128882

Fig. 528: Installing Camshaft Holding Tool Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Install the same camshaft cap onto the same camshaft journal from which it was removed. The camshaft caps are pin stamped for direction and numerical order.

- 5. Install the exhaust camshaft caps.
- 6. Install the intake camshaft caps.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

7. Install the camshaft cap bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten

Tighten the camshaft cap bolts to 12 N.m (106 lb in).

8. Remove J 44221.



G02128883

Fig. 529: Installing Exhaust & Intake Camshaft Caps Courtesy of GENERAL MOTORS CORP.

ENGINE LIFT BRACKET INSTALLATION

1. Install the engine lift bracket.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2. Install the engine lift bracket bolts in sequence.

Tighten

Tighten the engine lift bracket bolts in sequence to 50 N.m (37 lb ft)



G02128884

Fig. 530: Tightening Sequence Of Engine Lift Bracket Bolts Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN TENSIONER INSTALLATION

1. Install the timing chain tensioner.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

2. Install the timing chain tensioner bolts.

Tighten

Tighten the timing chain tensioner bolts to 25 N.m (18 lb ft).



G02128885

Fig. 531: Installing Timing Chain Tensioner & Bolts Courtesy of GENERAL MOTORS CORP.

- 3. Install the timing chain tensioner guide.
- 4. Install the timing chain tensioner guide bolts.

Tighten

Tighten the timing chain tensioner guide bolts to 14 N.m (124 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128886

Fig. 532: Installing Timing Chain Tensioner Guide Courtesy of GENERAL MOTORS CORP.

- 5. Install the timing chain tensioner shoe.
- 6. Install the timing chain tensioner shoe bolt.

Tighten

Tighten the timing chain tension shoe bolt to 25 N.m (18 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128887

Fig. 533: Installing Timing Chain Tensioner Shoe Courtesy of GENERAL MOTORS CORP.

7. Install the cylinder head access hole plugs.

Tighten

Tighten the cylinder head access hole plugs to 5 N.m (44 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128888

Fig. 534: Installing Cylinder Head Access Hole Plugs Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN AND SPROCKETS INSTALLATION

Tools Required

- J 44221 Camshaft Holding Tool
- J 36660-A Torque/Angle Meter
- 1. Install J 44221 with the camshaft flats up and the number 1 cylinder at top dead center.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128889

Fig. 535: Installing Camshaft Holding Tool Courtesy of GENERAL MOTORS CORP.

- 2. Compress the tensioner and lock in place.
- 3. Install the crankshaft sprocket.
- 4. Install the intake camshaft sprocket into the timing chain.
- 5. Align the (dark) link of the timing chain with the timing mark on the intake camshaft sprocket (1).
- 6. Feed the timing chain down through the opening in the head.
- 7. Install the timing chain onto the crankshaft sprocket. Align the (dark) link of the timing chain with the timing mark on the crankshaft sprocket (2).

IMPORTANT: It may be necessary to remove *J* 44221 to rotate and hold the camshaft (hex) to align the pin to the camshaft sprocket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

8. Install the intake camshaft sprocket onto the intake camshaft.



G02128890

Fig. 536: Aligning (Dark) Link Of Timing Chain With Timing Mark On Intake Camshaft Sprocket Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

9. Install the intake camshaft sprocket washer and new bolt.

Tighten

- Tighten the new intake camshaft sprocket bolt the first pass to 20 N.m (15 lb ft).
- Use J 36660-A to tighten the intake camshaft sprocket bolt the final pass an additional 100 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128891

Fig. 537: Installing Intake Camshaft Sprocket Washer And New Bolt Courtesy of GENERAL MOTORS CORP.

- 10. Install the exhaust camshaft actuator into the timing chain.
- 11. Align the (dark) link of the timing chain with the timing mark on the exhaust camshaft actuator (1).

IMPORTANT: It may be necessary to remove *J* 44221 to rotate and hold the camshaft (hex) to align the pin to the camshaft sprocket.

12. Install the exhaust camshaft actuator onto the exhaust camshaft.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128892

Fig. 538: Installing Exhaust Camshaft Actuator Onto Exhaust Camshaft Courtesy of GENERAL MOTORS CORP.

NOTE: The camshaft actuator must be fully advanced during installation. Engine damage may occur if the camshaft actuator is not fully advanced.

13. Install the new exhaust camshaft actuator bolt.

Tighten

- Tighten the new exhaust camshaft actuator bolt the first pass to 25 N.m (18 lb ft).
- Use *J 36660-A* to tighten the exhaust camshaft actuator bolt the final pass an additional 135 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 14. Unlock the tensioner.
- 15. Remove J 44221.

IMPORTANT: Rotate the camshaft actuator clockwise relative to the camshaft prior to tightening the bolt.

16. Rotate the camshaft actuator clockwise (as seen from the front of the vehicle).



G02128893

Fig. 539: Rotating Camshaft Actuator Clockwise Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

17. The dark links (1) on the chain should be aligned with marks on sprockets as shown.



G02128894

Fig. 540: Aligning Dark Links On Chain With Marks On Sprockets Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 18. Install the top chain guide.
- 19. Add threadlock GM P/N United States 12345498, GM P/N Canada 10953488 to the top chain guide bolt threads.
- 20. Install the top chain guide bolts.

Tighten

Tighten the top chain guide bolts to 10 N.m (89 lb in).



G02128895

Fig. 541: Installing Top Chain Guide Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

CAMSHAFT COVER INSTALLATION

1. Install a new camshaft cover seal.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the camshaft cover and bolts.

Tighten

Tighten the camshaft cover bolts to 10 N.m (89 lb in).



G02128896

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

- 3. Install new ignition control module seals.
- 4. Install the ignition control modules and bolts.

Tighten

Tighten the ignition control module bolts to 10 N.m (89 lb in).



G02128897

Fig. 543: Installing New Ignition Control Modules, Seals & Bolts Courtesy of GENERAL MOTORS CORP.

CAMSHAFT POSITION ACTUATOR VALVE INSTALLATION

- 1. Apply clean engine oil to the camshaft position actuator valve hole.
- 2. Install the camshaft position actuator valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

3. Add sealant GM P/N United States 12346004, GM P/N Canada 10953480 to the camshaft position actuator valve bolt threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

4. Install the camshaft position actuator valve bolt.

Tighten

Tighten the camshaft position actuator valve bolt to 10 N.m (89 lb in).



G02128898

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

OIL PUMP INSTALLATION

1. Install the oil pump pressure relief valve and spring.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the oil pump pressure relief valve plug.

Tighten

Tighten the oil pump pressure relief valve plug to 14 N.m (124 lb in).

- 3. Install the oil pump outer and inner gears as removed.
- 4. Install the oil pump cover.
- 5. Install the oil pump cover bolts.

Tighten

Tighten the oil pump cover bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128899

Fig. 545: Installing Oil Pump Outer And Inner Gears Courtesy of GENERAL MOTORS CORP.

ENGINE FRONT COVER INSTALLATION

Tools Required

J 44219 Engine Cover Alignment Pins

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

1. Install the engine front cover spacer bolt.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the engine front cover spacer bolt to 10 N.m (89 lb in).

2. Install the crankshaft balancer friction washer GM P/N 12573950 over the crankshaft snout, up against the crankshaft gear.



G02128900

Fig. 546: Installing Engine Front Cover Spacer Bolt Courtesy of GENERAL MOTORS CORP.

3. Install J 44219.
2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128901

Fig. 547: Installing Engine Cover Alignment Pins Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The engine front cover must be installed within 10 minutes from when the sealer was applied,

4. Apply a 3 mm (0.12 in) bead of sealer GM P/N United States 12378521, GM P/N Canada 88901148 to the back side of the engine front cover (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128902

Fig. 548: Applying Bead Of Sealer To Back Side Of Engine Front Cover Courtesy of GENERAL MOTORS CORP.

- 5. Align the oil pump to the crankshaft sprocket splines.
- 6. Install the engine front cover.
- 7. Remove J 44219.
- 8. Install the engine front cover bolts.

Tighten

- 8.1. Tighten the engine front cover bolts to 10 N.m (89 lb in)
- 8.2. Tighten the small center bolt (1) last to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128903

Fig. 549: Installing Engine Front Cover & Bolts Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT FRONT OIL SEAL INSTALLATION

Tools Required

J 44218 Seal Installer

- 1. Apply engine oil to the outside diameter of the crankshaft front oil seal.
- 2. Use *J* 44218 to install the crankshaft front oil seal.
- 3. Remove J 44218.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128904

Fig. 550: Installing Crankshaft Front Oil Seal Courtesy of GENERAL MOTORS CORP.

WATER PUMP INSTALLATION

Tool Required

J 41240 Fan Clutch Remover and Installer

- 1. Install the water pump gasket.
- 2. Install the water pump.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

3. Install the water pump bolts.

Tighten

Tighten the water pump bolts to 10 N.m (89 lb in).





G02128905

Fig. 551: Installing Water Pump Courtesy of GENERAL MOTORS CORP.

- 4. Install the water pump pulley.
- 5. Install the water pump pulley bolts.
- 6. Install *J* 41240 to hold pulley.
- 7. Tighten the water pump pulley bolts.

Tighten

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten the water pump pulley bolts to 25 N.m (18 lb ft).

8. Remove J 41240.



G02128906

Fig. 552: Installing Water Pump Pulley Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL AND HOUSING INSTALLATION

Tools Required

J 44219 Housing Alignment Pins

1. Apply a 3 mm (0.12 in) bead of GM P/N United States 12378521, GM P/N Canada 88901148 to the rear oil seal housing (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128907

Fig. 553: Applying Bead Of Sealer To Rear Oil Seal Housing Courtesy of GENERAL MOTORS CORP.

2. Install J 44219 into the block.

IMPORTANT: With the help of the plastic installation aid (supplied with the new seal), be sure the lip of the seal faces inward.

3. Slide the crankshaft rear oil seal housing over the alignment pins (J 44219) and crankshaft.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

- 4. Install the crankshaft rear oil seal housing bolts (except the two in place of the guide pins).
- 5. Remove J 44219.
- 6. Install the remaining two crankshaft rear oil seal housing bolts.

Tighten

Tighten the crankshaft rear oil seal housing bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128908

Fig. 554: Installing Seal Housing & Bolts Courtesy of GENERAL MOTORS CORP.

7. Wipe off any excess material from the bottom of the oil pan sealing area (1).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128909

Fig. 555: Wiping Off Excess Material From Bottom Of Oil Pan Sealing Area Courtesy of GENERAL MOTORS CORP.

OIL PUMP PIPE AND SCREEN ASSEMBLY INSTALLATION

- 1. Install a new oil pump pipe O-ring.
- 2. Install the oil pump pipe and screen assembly.
- 3. Add sealant GM P/N United States 12346004, GM P/N Canada 10953480 to the oil pump pipe bolt threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

4. Install the oil pump pipe and screen assembly bolts.

Tighten

Tighten the oil pump pipe and screen assembly bolts to 10 N.m (89 lb in).



G02128910

Fig. 556: Installing New Oil Pump Pipe & Screen Courtesy of GENERAL MOTORS CORP.

OIL PAN INSTALLATION

1. Apply a 3 mm (0.12 in) bead of sealer GM P/N United States 12378521, GM P/N Canada 88901148 to the block.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128911

Fig. 557: Applying Bead Of Sealer To Block Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The oil pan must be installed within 10 minutes from when the sealer was applied.

- 2. Install the oil pan.
- 3. Install the oil pan bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128912

Fig. 558: Installing Oil Pan & Bolts Courtesy of GENERAL MOTORS CORP.

IMPORTANT: When installing the oil pan, it could be shifted front or back a little which could cause a transmission alignment problem. The back of the oil pan needs to be flush with the block.

4. Check the oil pan alignment. Use a straight edge on the back of the block and oil pan (transmission mounting surface).

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

5. Tighten the oil pan bolts.

Tighten

- Tighten the (side) oil pan bolts to 25 N.m (1 lb ft).
- Tighten the (end) oil pan bolts to 10 N.m (89 lb in).
- 6. Install the oil level sensor.



G02128913

Fig. 559: Checking Oil Pan Alignment Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

7. Install the oil level sensor bolt.

Tighten

Tighten the oil level sensor bolt to 10 N.m (89 lb in).

CRANKSHAFT BALANCER INSTALLATION

Tools Required

- *J 36660-A* Torque Angle Meter
- J 41478 Crankshaft Front Oil Seal Installer
- 1. Install the crankshaft balancer using J 41478.
- 2. Remove J 41478.
- 3. Hold the flywheel or back of the crankshaft. The crankshaft balancer does not have a keyway so the crankshaft could turn when tightening, causing an improper torque.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128914

Fig. 560: Installing Crankshaft Balancer Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

IMPORTANT: Be sure the crankshaft balancer friction washer, GM P/N 12573950, was installed prior to the engine front cover installation.

4. Install the crankshaft balancer washer and new bolt.

Tighten

- 4.1. Tighten the new crankshaft balancer bolt while holding the back to 150 N.m (110 lb ft).
- 4.2. Use J 36660-A to tighten the crankshaft balancer bolt an additional 180 degrees.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128915

Fig. 561: Installing Crankshaft Balancer Washer And New Bolt Courtesy of GENERAL MOTORS CORP.

FUEL RAIL AND INJECTORS INSTALLATION

- 1. Lubricate the lower injector O-rings with mineral oil GM P/N 9981704.
- 2. Install the fuel injector rail.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

3. Install the fuel injector rail bolts.

Tighten

Tighten the fuel injector rail bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128916

Fig. 562: Installing Fuel Injector Rail & Bolts Courtesy of GENERAL MOTORS CORP.

INTAKE MANIFOLD INSTALLATION

1. Install a new intake manifold gasket.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the intake manifold and bolts.

Tighten

Tighten the intake manifold bolts from the inside out to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128917

Fig. 563: Installing Intake Manifold And Bolts Courtesy of GENERAL MOTORS CORP.

3. Lubricate the inner diameter of the ends of PCV hose with GM P/N 12345884,

(Canadian P/N 5728223) or equivalent.

4. Install the PCV hose.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128918

<u>Fig. 564: Installing PCV Hose</u> Courtesy of GENERAL MOTORS CORP.

- 5. Install a new throttle control module gasket.
- 6. Install the throttle control module.
- 7. Add sealer GM P/N 12346004,

(Canadian P/N 10953480) to the throttle control module bolt threads.

8. Install the throttle control module bolts.

Tighten

Tighten the throttle control module bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128919

Fig. 565: Installing Throttle Control Module Courtesy of GENERAL MOTORS CORP.

THERMOSTAT HOUSING INSTALLATION

1. Install the thermostat housing.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the thermostat housing bolts.

Tighten

Tighten the thermostat housing bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128920

Fig. 566: Installing Thermostat Housing Courtesy of GENERAL MOTORS CORP.

HEATER INLET HOSE FITTING INSTALLATION

1. Apply sealant GM P/N United States 12346004, GM P/N Canada 10953480 or equivalent to the heater inlet hose fitting threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the heater inlet hose fitting.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten

Tighten the heater inlet hose fitting to 45 N.m (33 lb ft).



G02128921

Fig. 567: Installing Heater Inlet Hose Fitting Courtesy of GENERAL MOTORS CORP.

HEATER OUTLET HOSE FITTING INSTALLATION

1. Apply sealant GM P/N United States 12346004, GM P/N Canada 10953480 or equivalent to the heater outlet hose fitting threads.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the heater outlet hose fitting.

Tighten

Tighten the heater outlet hose fitting to 45 N.m (33 lb ft).



G02128922

Fig. 568: Installing Heater Outlet Hose Fitting Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

WATER OUTLET INSTALLATION

1. Install the water outlet

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the water outlet bolts.

Tighten

Tighten the water outlet bolts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128923

Fig. 569: Installing Water Outlet And Bolts Courtesy of GENERAL MOTORS CORP.

OIL FILTER ADAPTER INSTALLATION

1. Install the oil filter bypass valve.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128924

Fig. 570: Installing Oil Filter Bypass Valve Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the oil filter adapter.

Tighten

Tighten the oil filter adapter to 50 N.m (37 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128925

Fig. 571: Installing Oil Filter Adapter Courtesy of GENERAL MOTORS CORP.

EXHAUST MANIFOLD INSTALLATION

1. Install the exhaust manifold gasket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128926

Fig. 572: Installing Exhaust Manifold Gasket Courtesy of GENERAL MOTORS CORP.

- 2. Install the exhaust manifold.
- 3. Add threadlock GM P/N United States 12345493, GM P/N Canada 10953488 to the exhaust manifold bolt threads.
- 4. Install the exhaust manifold bolts.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128927

Fig. 573: Installing Exhaust Manifold And Bolts Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

5. Tighten the exhaust manifold bolts.

Tighten

- 5.1. Tighten the exhaust manifold bolts a first pass in sequence to 20 N.m (15 lb ft).
- 5.2. Tighten the exhaust manifold bolts a second pass in sequence to 20 N.m (15 lb ft).
- 5.3. Tighten the exhaust manifold bolts a final pass in sequence to 20 N.m (15 lb ft).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128928

Fig. 574: Tightening Sequence Of Exhaust Manifold Bolts Courtesy of GENERAL MOTORS CORP.

6. Install the exhaust manifold heat shield studs (if required).

Tighten

Tighten the exhaust manifold heat shield studs to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128929

Fig. 575: Installing Exhaust Manifold Heat Shield Studs Courtesy of GENERAL MOTORS CORP.

- 7. Install the exhaust manifold heat shield.
- 8. Add anti-seize GM P/N United States 12371386, GM P/N Canada 993128 to the exhaust manifold heat shield nuts.
- 9. Install the exhaust manifold heat shield nuts.

Tighten

Tighten the exhaust manifold heat shield nuts to 10 N.m (89 lb in).

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada



G02128930

Fig. 576: Installing Exhaust Manifold Heat Shield & Nuts Courtesy of GENERAL MOTORS CORP.

OIL LEVEL INDICATOR AND TUBE INSTALLATION

- 1. Install the oil level indicator tube.
- 2. Add sealant GM P/N United States 12346004, GM P/N Canada 10953480 to the oil level indicator tube stud threads.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

3. Install the oil level indicator tube stud.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten

Tighten the oil level indicator tube stud to 10 N.m (89 lb in).

4. Install the oil level indicator.



G02128931

Fig. 577: Installing Oil Level Indicator & Tube Courtesy of GENERAL MOTORS CORP.

POWER STEERING PUMP BRACKET INSTALLATION

1. Install the power steering pump bracket.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the power steering pump bracket bolts.

Tighten

Tighten the power steering pump bracket bolts to 50 N.m (37 lb ft).



G02128932

Fig. 578: Installing Power Steering Pump Bracket & Bolts Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

DRIVE BELT TENSIONER INSTALLATION

1. Install the drive belt tensioner.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the drive belt tensioner bolt.

Tighten

Tighten the drive belt tensioner bolt to 50 N.m (37 lb ft).



G02128933

Fig. 579: Installing Drive Belt Tensioner And Bolt Courtesy of GENERAL MOTORS CORP.

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

DRIVE BELT IDLER PULLEY INSTALLATION

1. Install the drive belt idler pulley.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2. Install the drive belt idler pulley bolts.

Tighten

Tighten the drive belt idler pulley bolts to 50 N.m (37 lb ft).



G02128934
2003 Chevrolet TrailBlazer

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Fig. 580: Installing Drive Belt Idler Pulley And Bolts Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL INSTALLATION

Tools Required

J 44227 Rear Seal Installer

1. Use the plastic installation sleeve supplied with the new seal when installing a new seal.

Use J 44227 to install the crankshaft rear oil seal

2. Remove J 44227.

2003 Chevrolet TrailBlazer

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada





G02128935

Fig. 581: Installing Crankshaft Rear Oil Seal Courtesy of GENERAL MOTORS CORP.

ENGINE FLYWHEEL INSTALLATION

Tools Required

J 36660-A Torque Angle Meter

1. Install the flywheel.

NOTE: Refer to <u>FASTENER NOTICE</u> in Cautions and Notices.

2 Install new flywheel bolts

2003 Chevrolet TrailBlazer

2003 ENGINE Engine Mechanical - 4.2L - TrailBlazer, Envoy & Bravada

Tighten

- 2.1. Tighten the new flywheel bolts to 25 N.m (18 lb ft).
- 2.2. Use J 36660-A to tighten the flywheel bolts an additional 50 degrees.



G02128936

Fig. 582: Installing Engine Flywheel And Bolts Courtesy of GENERAL MOTORS CORP.