2013 ENGINE

Engine Mechanical - 1.8L LUW and LWE - Cruze

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
AC Compressor Bolt	22	16 lb ft
AC Compressor and Condenser Hose Nut	19	14 lb ft
AC Evaporator Hose Assembly Nut	19	14 lb ft
Air Intake Hose Clamps	3.5	31 lb in
Automatic Transmission Flex Plate Bolt (2)	60	44 lb ft
Camshaft Adjuster Bolt (1)		
• First Pass	50	37 lb ft
• Second Pass	150 degrees	
• Final Pass	15 degrees	
Camshaft Adjuster Closure Plug	30	22 lb ft
Camshaft Bearing Cap Bolt	8	71 lb in
Camshaft Closure Bolt	30	22 lb ft
Camshaft Cover Bolt	8	71 lb in
Camshaft Position Actuator Solenoid Valve Bolt	6	53 lb in
Camshaft Position Sensor Bolt	6	53 lb in
Cold Start Rail Bolt	4	35 lb in
Connecting Rod Bearing Cap Bolt (1)		
• First Pass	35	26 lb ft
• Second Pass	45 degrees	
• Final Pass	15 degrees	
Coolant Pipe Pump Module Bolt	8	71 lb in
Coolant Pipe Thermostat Housing Bolt	8	71 lb in
Crankshaft Balancer Bolt (1)		
• First Pass	95	70 lb ft
• Second Pass	45 degrees	
• Final Pass	15 degrees	
Crankshaft Bearing Cap Bolt (1)		
• First Pass	50	37 lb ft

• Valves Norm Longitude - Intake		
• Valves Norm Longitude - Exhaust	100.40-100.60 mm	3.953-3.961 in
• Valves Oversize Longitude 0.075 - Intake	100.70-100.90 mm	3.965-3.972 in
• Valves Oversize Longitude 0.075 - Exhaust	100.00-100.20 mm	3.937-3.945 in
• Valves - Valve Stem Norm Diameter - Intake	4.965-4.980 mm	0.1955-0.1961 in
• Valves - Valve Stem Norm Diameter - Exhaust	4.950-4.965 mm	0.1949-0.1955 in
• Valves - Valve Stem Oversize Diameter 0.075 - Intake	5.040-5.055 mm	0.1985-0.1991 in
• Valves - Valve Stem Oversize Diameter 0.075 - Exhaust	5.025-5.050 mm	0.1979-0.1989 in
• Valves - Valve Stem to Guide Clearance - Intake	0.020-0.051 mm	0.0008-0.0021 in
• Valves - Valve Stem to Guide Clearance - Exhaust	0.035-0.066 mm	0.0014-0.0026 in
• Valves - Valve Stem allowable Run-Out	0.05 mm	0.0019 in
• Valves - Valve Disk Diameter - Intake	31.1-31.3 mm	1.225-1.233 in
• Valves - Valve Disk Diameter - Exhaust	27.4-27.6 mm	1.079-1.087 in
• Valves - Valve Seat Angle on Valve Disk	90°40' (+/-15')	
• Valve Springs Longitude	42 mm	1.65 in
• Valve Springs Longitude Under Load - Open	35.0 mm	1.38 in
• Valve Springs Longitude Under Load - Close	25.0 mm	0.98 in
Engine Oil		
• Viscosity	SAE 0-W30, 0-W40, 5-W30 and 5-W40	
• Quality	Dexos 1	
Quantity		
• Oil Change Incl. Filter	4.5 l	4.76 quarts
• Oil Consumption Liter/1 000 km (1.057 quarts/621 miles)	max. 0.6 l	max. 0.634 quarts
Cooling System		
• Coolant Specification	Refer to Electronic Parts Catalog	
• Water Pump Design	Rotary Pump	
• Cooling System Capacity	5, 6 l	5.92 quarts
• Flow (Engine Outlet 6000 min $^{-1}$, Thermostat Fully Open)	160 l/min	42.27 US gal/min
• Flow (Radiator 6000 min $^{-1}$, Thermostat Fully	165 l/min	174.4 quarts/min

Drive Belt Rumbling and Vibration Diagnosis

Step	Action	Yes	No
CAUTION: **Refer to Belt Dressing Caution .** DEFINITION: The following items are indications of drive belt rumbling: • A low pitch tapping, knocking, or thumping noise heard at or just above idle. • Heard once per revolution of the drive belt or a pulley. • Rumbling may be caused from: o Pilling, the accumulation of rubber dust that forms small balls (pills) or strings in the drive belt pulley groove o The separation of the drive belt o A damaged drive belt o A worn drive belt idler pulley DEFINITION: The following items are indications of drive belt vibration: • The vibration is engine-speed related. • The vibration may be sensitive to accessory load.			
1	Did you review the Drive Belt Symptom operation and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Engine Mechanical**
2	Verify that there is a rumbling noise or that the vibration is engine related. Does the engine make the rumbling noise or vibration?	Go to **Step 3**	Go to Diagnostic Aids
3	1. Remove the drive belt. If the engine has multiple drive belts, remove the belts one at a time and perform the test below each time a belt is removed. 2. Operate the engine for no longer than 30-40 seconds. 3. Repeat this test if necessary by removing the remaining belt(s). Does the rumbling or vibration still exist?	Go to **Symptoms - Engine Mechanical**	Go to **Step 4**
4	Inspect the drive belts for wear, damage, separation, sections of missing ribs, and debris build-up. Did you find any of these conditions?	Go to **Step 7**	Go to **Step 5**

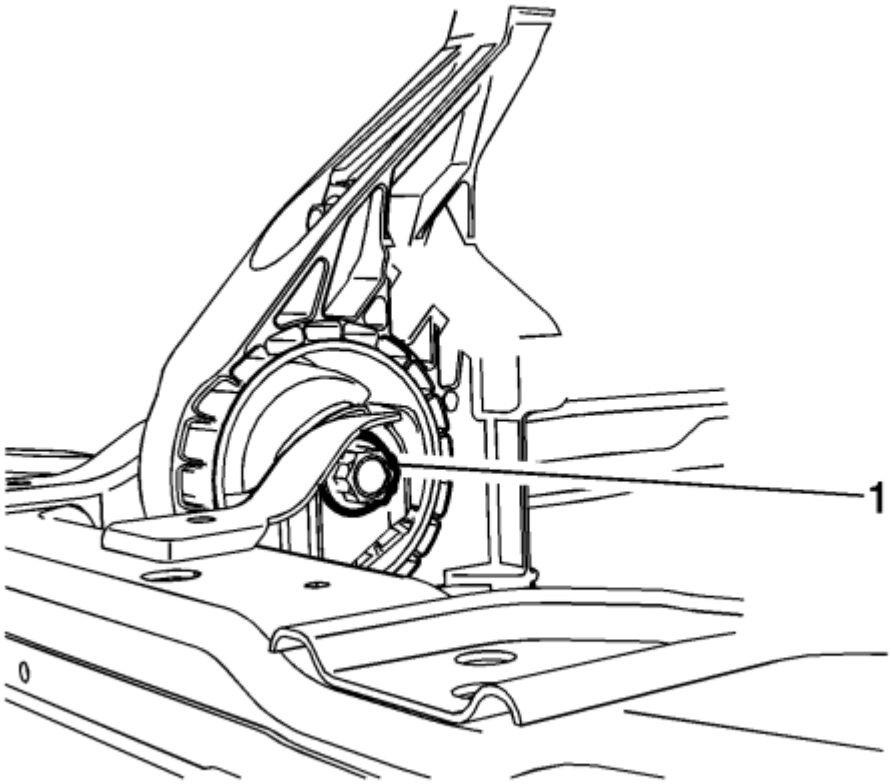

Fig. 35: Front Transaxle Mount Through Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Loosen the front transaxle mount through bolt (1).

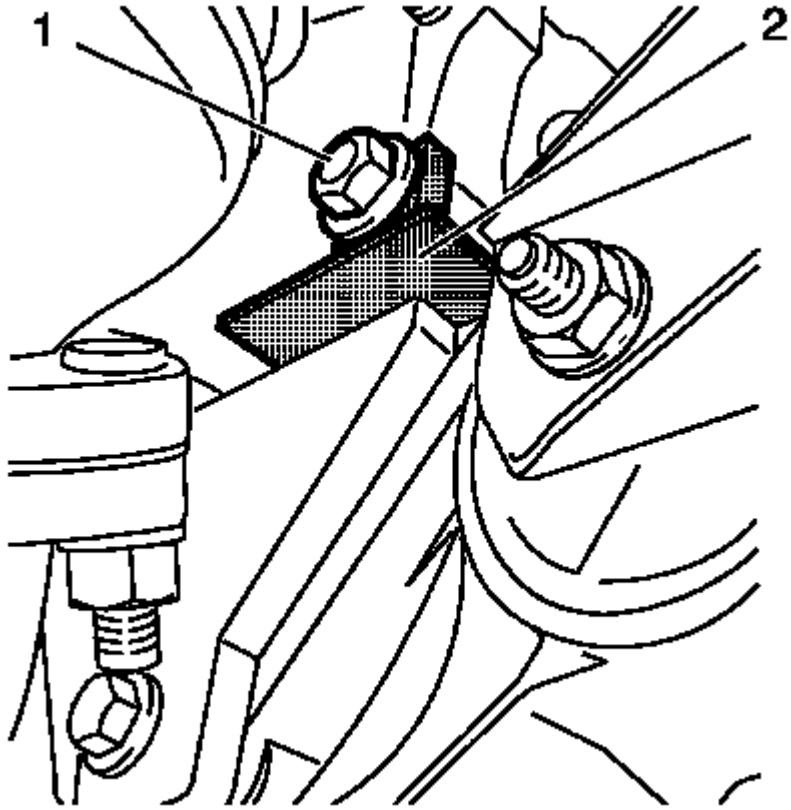

Fig. 75: Locking Device And Bolt
Courtesy of GENERAL MOTORS COMPANY

20. Install **EN-6625** locking device (2) to block the crankshaft.
21. Install the bolt or bolted connection (1).

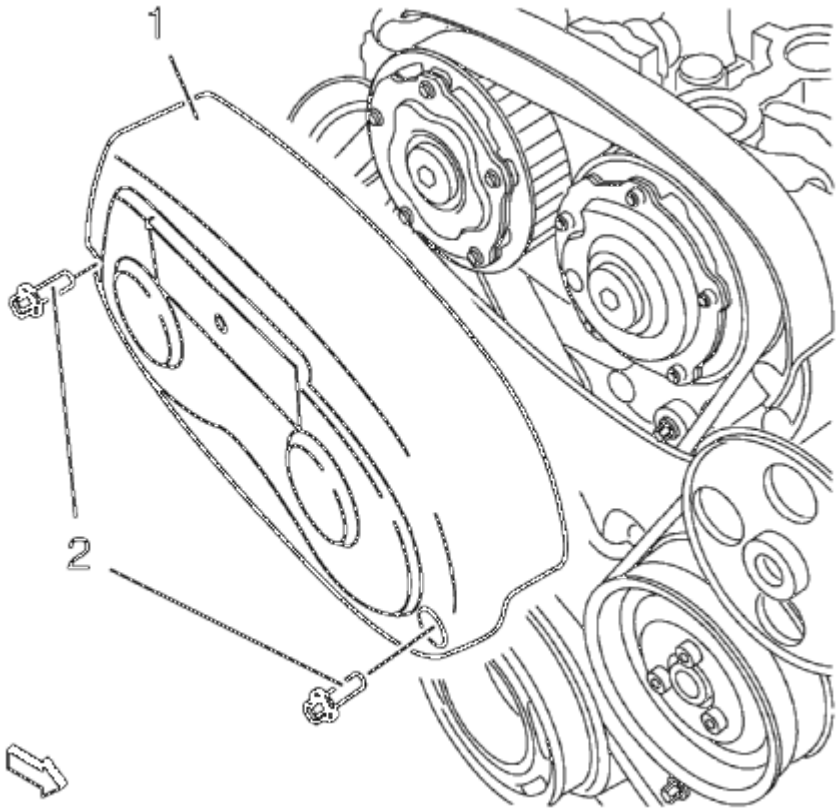

Fig. 116: Timing Belt Upper Front Cover
Courtesy of GENERAL MOTORS COMPANY

15. Remove the 2 timing belt upper front cover bolts (2).
16. Remove the timing belt upper front cover (1).
17. Remove the camshaft cover. Refer to **Camshaft Cover Replacement**.
18. Remove the 2 camshaft position sensor. Refer to **Camshaft Position Sensor Replacement** .
19. Remove the 2 camshaft position actuator solenoid valve. Refer to **Camshaft Position Actuator Solenoid Valve Replacement**.
20. Remove the drive belt tensioner. Refer to **Drive Belt Tensioner Replacement**.

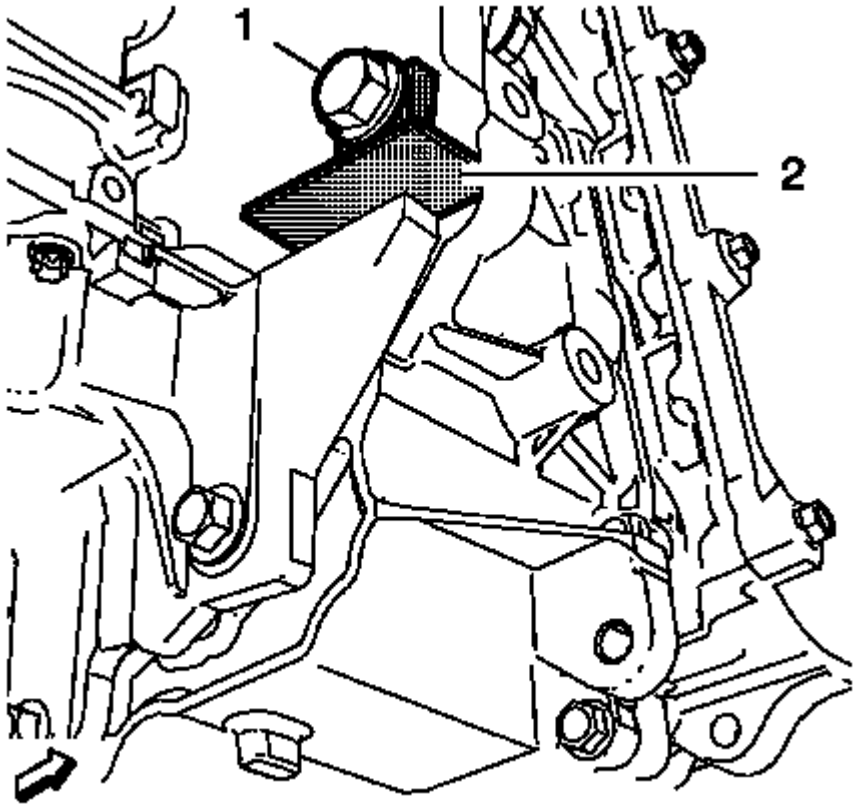

Fig. 181: Locking Device
Courtesy of GENERAL MOTORS COMPANY

5. Remove the bolted connection (1).
6. Remove **EN-6625** locking device (2) to unlock the crankshaft.

suspension frame are free from wiring, hoses and other engine compartment components.

CAUTION: Refer to Fastener Caution .

4. Install the four front drivetrain and front suspension frame retaining bolts, then tighten to the fasteners to 160 N.m (118 lb ft).
5. Install the drivetrain and front suspension frame reinforcements to the rear of the frame, then tighten the reinforcement fasteners to 22 N.m (16 lb ft).

NOTE: Use the engine support fixture to slightly raise the powertrain assembly to aid in the installation of the engine and transmission mount bolts.

6. Install the engine support fixture. Refer to **Engine Support Fixture** .

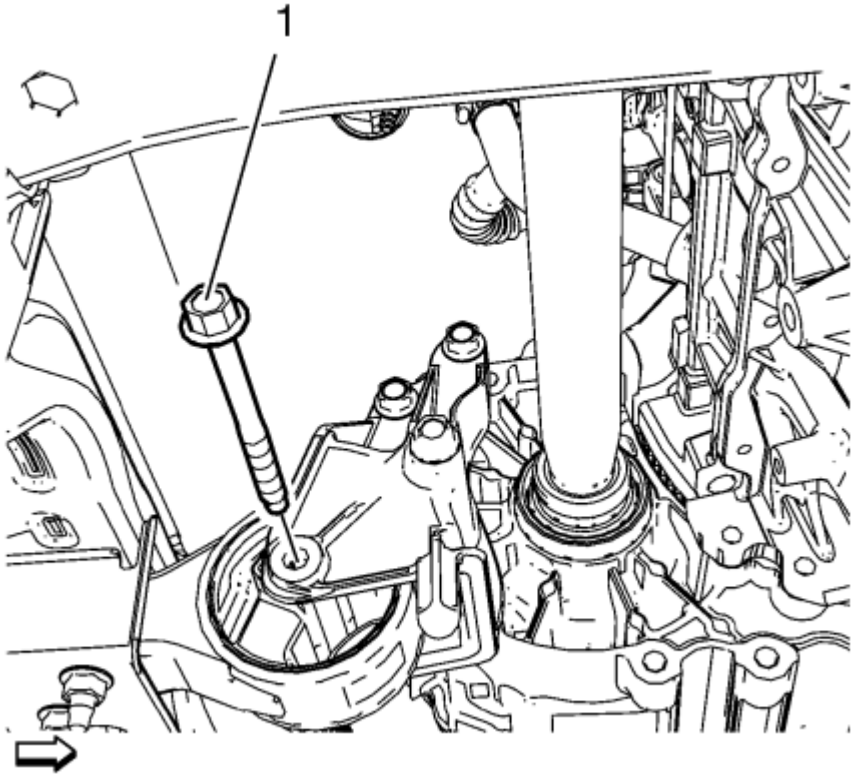

Fig. 233: Transmission Bracket Mount To Mount Through Bolt
Courtesy of GENERAL MOTORS COMPANY

7. Install the transmission bracket mount to mount through bolt (1) and tighten to 100 N.m (74 lb ft).

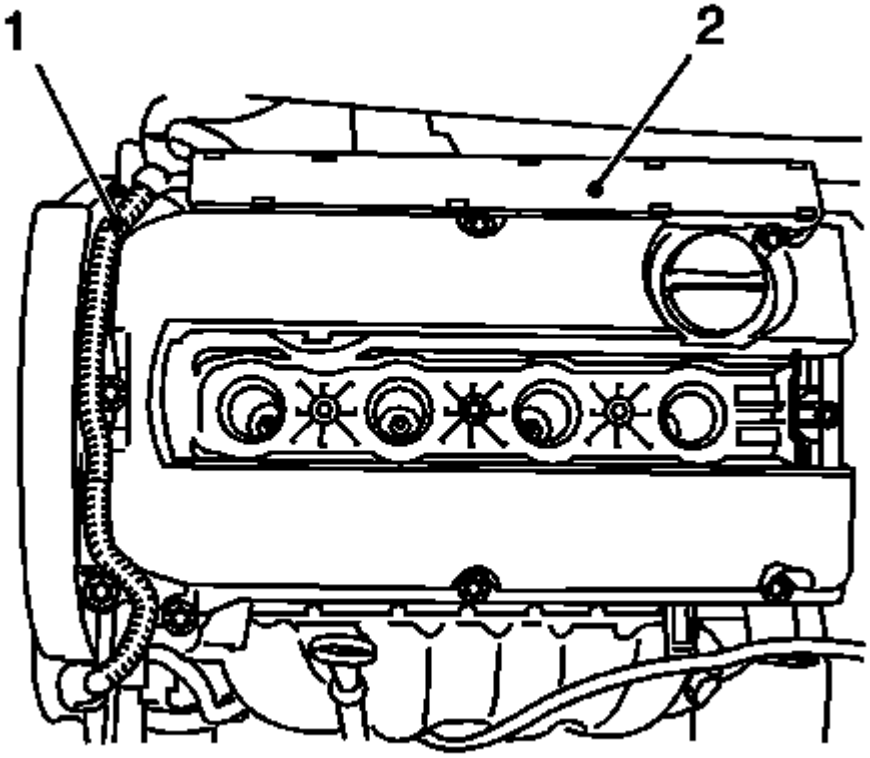

Fig. 263: Wiring Harness Guide And Cylinder Head Cover
Courtesy of GENERAL MOTORS COMPANY

7. Clip in the ECM wiring harness guide (1) to the cylinder head cover.
8. Connect the wiring guide (2).
9. Install the ignition coil. Refer to **Ignition Coil Replacement** .

CAMSHAFT POSITION ACTUATOR ADJUSTER REPLACEMENT

Special Tools

- **EN-6340** Camshaft Adjuster Locking Tool
- **EN-6333** Timing Belt Tensioner Locking Pin
- **EN-6625** Crankshaft Locking Device
- **EN-6628-A** Camshaft Locking Tool
- **EN-45059** Angle Meter

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

Removal Procedure

7. Remove the first camshaft bearing cap (1).

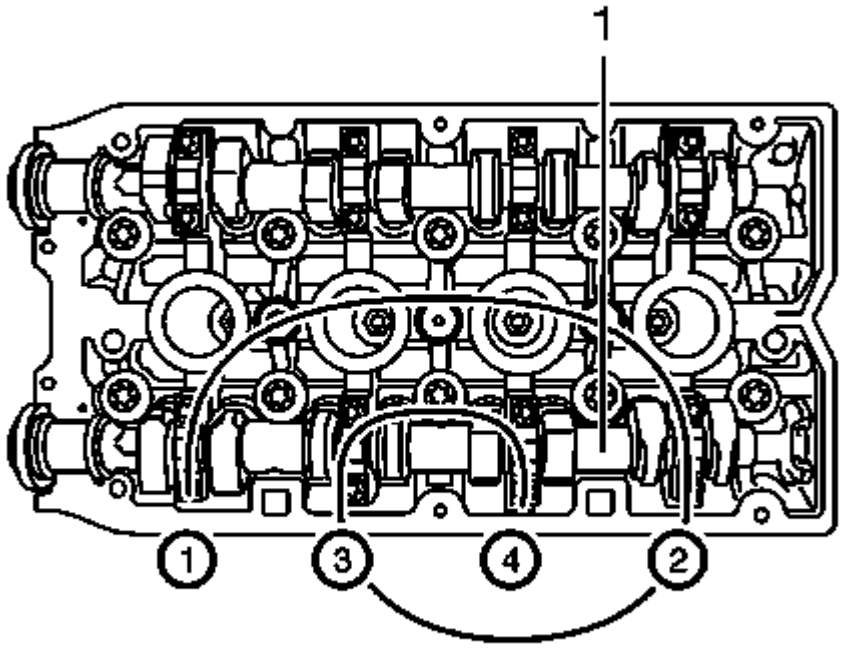

Fig. 292: Exhaust Camshaft Bearing Cap Bolts Loosening Sequence
Courtesy of GENERAL MOTORS COMPANY

8. Loosen the 8 exhaust camshaft bearing cap bolts working from outside to inside in a spiral in steps of 1/2 up to 1 turn.
9. Remove the 8 exhaust camshaft bearing cap bolts.

NOTE: Mark camshaft bearing caps before removal.

10. Remove the 4 exhaust camshaft bearing caps Numbers 6-9 from the cylinder head.
11. Remove the exhaust camshaft (1).

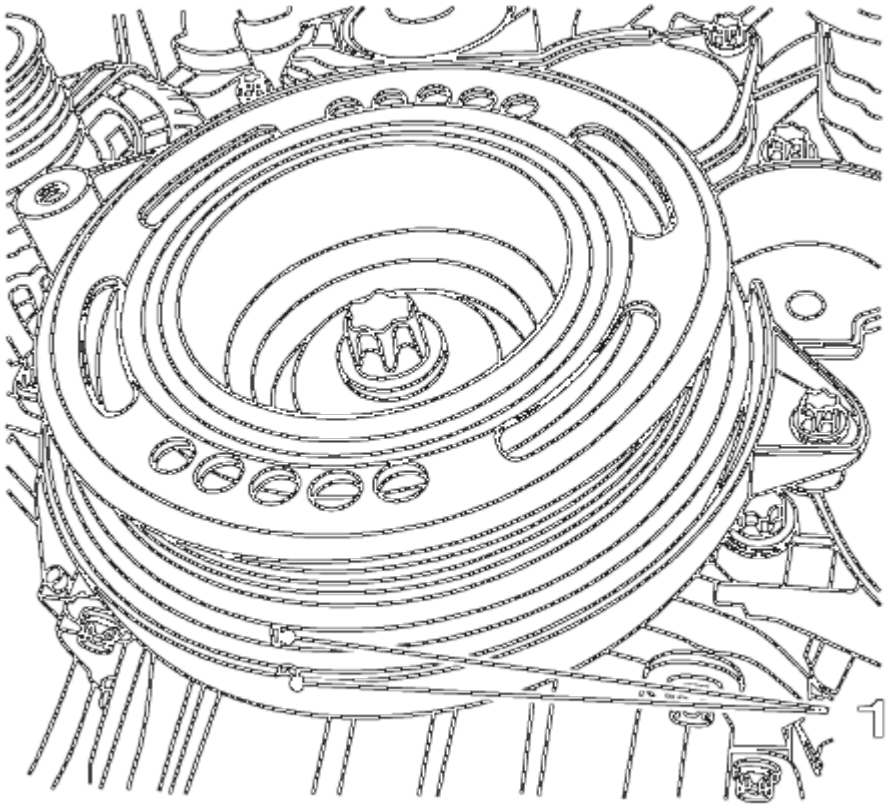

Fig. 315: View Of Crankshaft TDC Position
Courtesy of GENERAL MOTORS COMPANY

2. Set the crankshaft balancer in the direction of the engine rotation to "1st cylinder TDC" (mark 1).
3. Remove the camshaft cover. Refer to **Camshaft Cover Removal**.

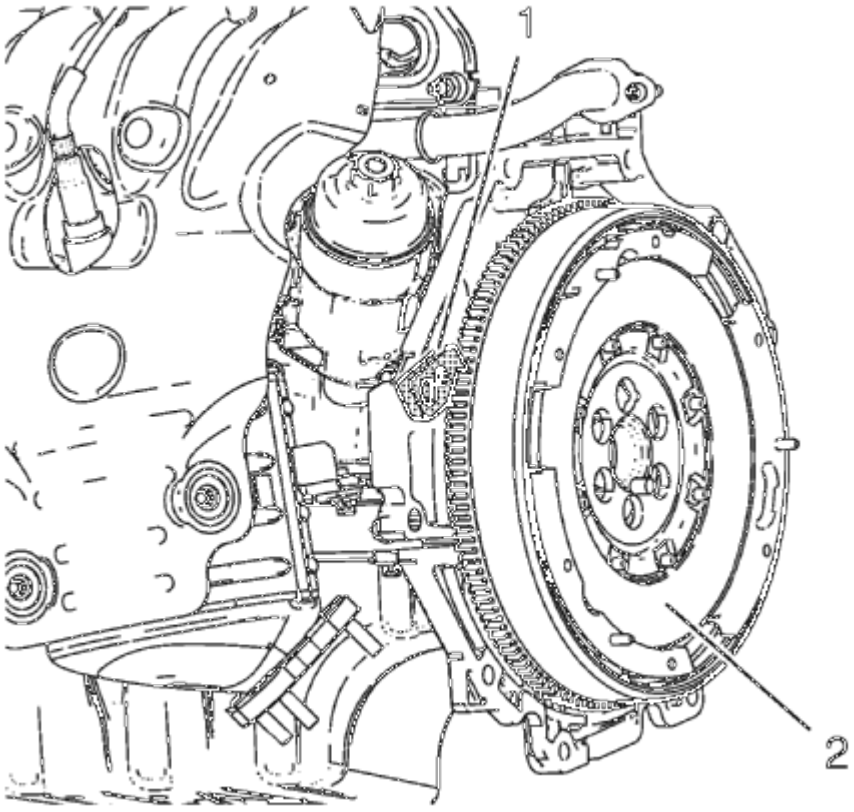

Fig. 347: Flywheel And Flywheel Holder
Courtesy of GENERAL MOTORS COMPANY

1. Install the **EN-652** holder (1), lock the flywheel via the starter ring gear.
2. Loosen the 6 flywheel bolts.
3. Remove the **EN-652** holder (1).

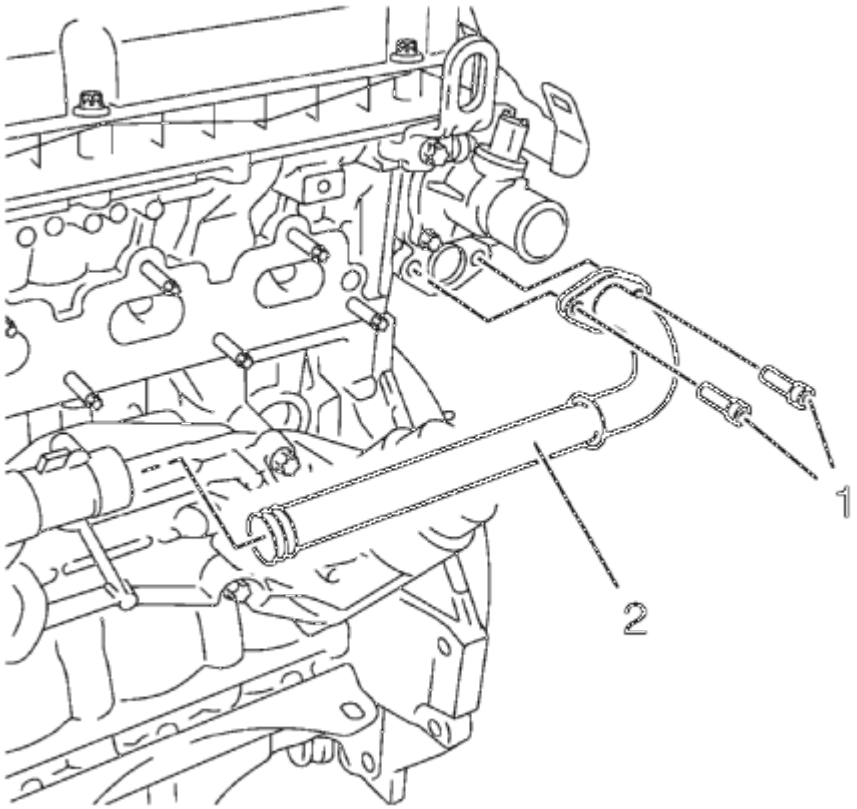

Fig. 391: Identifying Engine Oil Cooler Outlet Pipe And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Remove the 2 engine oil cooler pipe bolts (1).
2. Remove the oil cooler pipe (2).

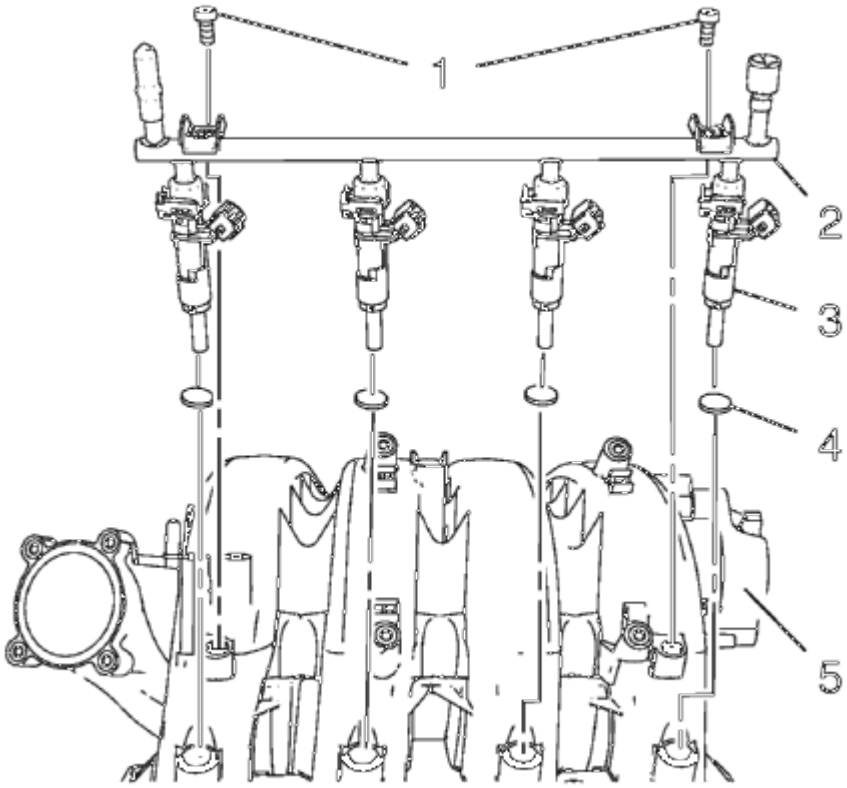

Fig. 422: Intake Manifold, Multiport Fuel Injection Fuel Rail, Fuel Injectors, Seals And Bolts
Courtesy of GENERAL MOTORS COMPANY

8. Remove the 2 multiport fuel injection fuel rail bolts (1).
9. Remove the multiport fuel injection fuel rail (2) and the fuel injectors (3) from the intake manifold (5).
10. Remove the 4 multiport fuel injector seals (4).

CYLINDER HEAD DISASSEMBLE

Special Tools

- **EN-840** Pliers/Remover
- **EN-8062** Valve Spring Compressor
- **EN-8062-5** Adapter
- **EN-50717-2** Compressor Assembly of **EN-50717** Kit

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

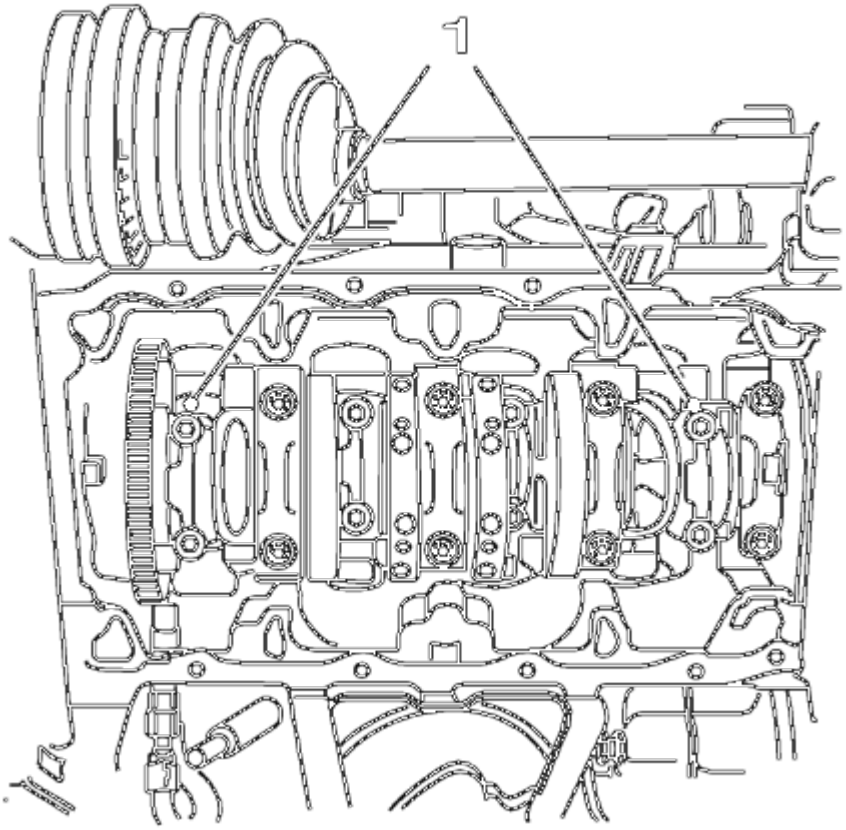

Fig. 481: View Of Con-Rod Bearing Caps
Courtesy of GENERAL MOTORS COMPANY

8. Turn the crankshaft through 180°.

NOTE: Inspect the installation position.

9. Install the connecting rod bearing caps 1 and 4 (1) and oil the bearing clips.
10. Install 4 NEW connecting rod bearing cap bolts and tighten in 3 passes use the **EN-45059** sensor kit:
    - First pass to 35 N.m (26 lb ft)
    - Second pass to 45°
    - Third pass to 15°

PISTON, CONNECTING ROD, AND BEARING INSTALLATION

Special Tools

EN-45059 Angle Meter

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