

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Engine

Engine Mechanical - 7.0L

Specifications

1709073

Fastener Tightening Specifications

Fastener Tightening Specifications:Engine Mechanical

Application	Specification	
	Metric	English
Camshaft Position (CMP) Sensor Bolt	12 N·m	106 lb in
Camshaft Retainer Bolts – Hex Head	25 N·m	18 lb ft
Camshaft Retainer Bolts – TORX® Head	15 N·m	11 lb ft
Camshaft Sprocket Bolts	25 N·m	18 lb ft
Clutch Pressure Plate Bolts	70 N·m	52 lb ft
Connecting Rod Bolts – First Pass	20 N·m	15 lb ft
Connecting Rod Bolts – Final Pass	75 degrees	
Coolant Air Bleed Pipe and Cover Bolts	12 N·m	106 lb in
Coolant Temperature Sensor	20 N·m	15 lb ft
Crankshaft Balancer Bolt – Installation Pass to Ensure the Balancer is Completely Installed	330 N·m	240 lb ft
Crankshaft Balancer Bolt – First Pass – Install a NEW Bolt After the Installation Pass and Tighten as Described in the First and Final Passes	50 N·m	37 lb ft
Crankshaft Balancer Bolt – Final Pass	140 degrees	
Crankshaft Bearing Cap M8 Bolts	25 N·m	18 lb ft
Crankshaft Bearing Cap M10 Bolts – First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap M10 Bolts – Final Pass in Sequence	80 degrees	
Crankshaft Bearing Cap M10 Studs – First Pass in Sequence	20 N·m	15 lb ft
Crankshaft Bearing Cap M10 Studs – Final Pass in Sequence	51 degrees	
Crankshaft Oil Deflector Nuts	25 N·m	18 lb ft
Crankshaft Position (CKP) Sensor Bolt	25 N·m	18 lb ft
Crankshaft Rear Oil Seal Housing Bolts	30 N·m	22 lb ft
Cylinder Head Coolant Plug	20 N·m	15 lb ft

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Cylinder Head M8 Bolts – in Sequence	30 N·m	22 lb ft
Cylinder Head M11 Bolts – First Pass in Sequence	30 N·m	22 lb ft
Cylinder Head M11 Bolts – Second Pass in Sequence	90 degrees	
Cylinder Head M11 Bolts – Final Pass in Sequence	70 degrees	
Engine Block Coolant Drain Hole Plug	60 N·m	44 lb ft
Engine Block Coolant Heater	60 N·m	44 lb ft
Engine Block Oil Gallery Plugs	60 N·m	44 lb ft
Engine Mount Bracket Bolts	50 N·m	37 lb ft
Engine Oil Tank Baffle Bolts	10 N·m	89 lb in
Engine Oil Tank Bolts	25 N·m	18 lb ft
Evaporative (EVAP) Emission Canister Purge Solenoid Valve Bracket Bolt	50 N·m	37 lb ft
Exhaust Manifold Bolts – First Pass	15 N·m	11 lb ft
Exhaust Manifold Bolts – Final Pass	20 N·m	15 lb ft
Exhaust Manifold Heat Shield Bolts	9 N·m	80 lb in
Exhaust Manifold Studs	20 N·m	15 lb ft
Flywheel Bolts – First Pass	30 N·m	22 lb ft
Flywheel Bolts – Final Pass	40 degrees	
Front Cover Bolts	25 N·m	18 lb ft
Fuel Injection Fuel Rail Bolts	10 N·m	89 lb in
Hood Stop Bracket-to-Oil Tank	10 N·m	89 lb in
Ignition Coil Bracket-to-Valve Rocker Arm Cover Studs	12 N·m	106 lb in
Ignition Coil-to-Bracket Bolts	10 N·m	89 lb in
Intake Manifold Bolts – First Pass in Sequence	5 N·m	44 lb in
Intake Manifold Bolts – Final Pass in Sequence	10 N·m	89 lb in
J41798 M8 Bolt	25 N·m	18 lb ft
J41798 M10 Bolts	50 N·m	37 lb ft
Knock Sensor Bolts	25 N·m	18 lb ft

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Oil Cooler Bolts	12 N·m	106 lb in
Oil Filter	30 N·m	22 lb ft
Oil Filter Fitting	55 N·m	40 lb ft
Oil Inlet/Outlet Hose Bracket Bolt	22 N·m	16 lb ft
Oil Inlet/Outlet Hose-to-Oil Pan Bolts	22 N·m	16 lb ft
Oil Inlet/Outlet Hose-to-Oil Tank Bolts	22 N·m	16 lb ft
Oil Pan Closeout Cover Bolt – Left Side	9 N·m	80 lb in
Oil Pan Closeout Cover Bolt – Right Side	9 N·m	80 lb in
Oil Pan Drain Plugs	25 N·m	18 lb ft
Oil Pan M6 Bolts – Oil Pan-to-Rear Oil Seal Housing	12 N·m	106 lb in
Oil Pan M8 Bolts – Oil Pan-to-Engine Block and Oil Pan-to-Front Cover	25 N·m	18 lb ft
Oil Pressure Sensor	35 N·m	26 lb ft
Oil Pump Cover Bolts	12 N·m	106 lb in
Oil Pump Relief Valve Plug	12 N·m	106 lb in
Oil Pump Suction Pipe Bolts	12 N·m	106 lb in
Oil Pump-to-Engine Block Bolts	25 N·m	18 lb ft
Oil Tank Middle Bracket Nut	10 N·m	89 lb in
Oil Tank-to-Frame Bolts	36 N·m	27 lb ft
Oil Temperature Sensor	20 N·m	15 lb ft
Spark Plugs	15 N·m	11 lb ft
Throttle Body Bolts	10 N·m	89 lb in
Timing Chain Dampener Bolts	25 N·m	18 lb ft
Valley Cover Bolts	25 N·m	18 lb ft
Valve Lifter Guide Bolts	12 N·m	106 lb in
Valve Rocker Arm Bolts	30 N·m	22 lb ft
Valve Rocker Arm Cover Bolts	12 N·m	106 lb in
Water Inlet Housing Bolts	15 N·m	11 lb ft

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Water Pump Bolts – First Pass	15 N·m	11 lb ft
Water Pump Bolts – Final Pass	30 N·m	22 lb ft

Specifications

1554984

Engine Mechanical Specifications

Engine Mechanical Specifications: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Application	Specification	
	Metric	English
General		
Engine Type	V8	
Displacement	7.0L	427 CID
RPO	LS7	
VIN	Y/E	
Bore	104.766–104.784 mm	4.125–4.125 in
Stroke	101.6 mm	4.0 in
Compression Ratio	11.0:1	
Firing Order	1–8–7–2–6–5–4–3	
Spark Plug Gap	1.02 mm	0.04 in
Block		
Camshaft Bearing Bore 1 and 5 Diameter	59.58–59.63 mm	2.345–2.347 in
Camshaft Bearing Bore 2 and 4 Diameter	59.08–59.13 mm	2.325–2.327 in
Camshaft Bearing Bore 3 Diameter	58.58–58.63 mm	2.306–2.308 in
Crankshaft Main Bearing Bore Diameter	69.871–69.889 mm	2.75–2.751 in
Crankshaft Main Bearing Bore Out-of-Round	0.006 mm	0.0002 in
Cylinder Bore Diameter	104.766–104.784 mm	4.125–4.125 in
Cylinder Head Deck Height – Measuring from the Centerline of Crankshaft to the Deck Face	234.57–234.82 mm	9.235–9.245 in

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Cylinder Head Deck Surface Flatness – Measured within a 152.4 mm (6.0 in) Area	0.11 mm	0.004 in
Cylinder Head Deck Surface Flatness – Measuring the Overall Length of the Block Deck	0.22 mm	0.008 in
Valve Lifter Bore Diameter	21.417–21.443 mm	0.843–0.844 in
Camshaft		
Camshaft End Play	0.025–0.305 mm	0.001–0.012 in
Camshaft Journal Diameter	54.99–55.04 mm	2.164–2.166 in
Camshaft Journal Out-of-Round	0.008 mm	0.0003 in
Camshaft Lobe Lift – Intake	8.4 mm	0.331 in
Camshaft Lobe Lift – Exhaust	8.34 mm	0.328 in
Camshaft Runout – Measured at the Intermediate Journals	0.05 mm	0.002 in
Connecting Rod		
Connecting Rod Bearing Clearance – Production	0.023–0.065 mm	0.0009–0.0025 in
Connecting Rod Bearing Clearance – Service	0.023–0.076 mm	0.0009–0.003 in
Connecting Rod Bore Diameter – Bearing End	56.505–56.525 mm	2.224–2.225 in
Connecting Rod Bore Diameter – Pin End	23.511–23.519 mm	0.926–0.926 in
Connecting Rod Bore Out-of-Round – Bearing End – Production	0.004–0.008 mm	0.00015–0.0003 in
Connecting Rod Bore Out-of-Round – Bearing End – Service	0.004–0.008 mm	0.00015–0.0003 in
Connecting Rod Side Clearance	0.11–0.51 mm	0.00433–0.02 in
Crankshaft		
Connecting Rod Journal Diameter – Production	53.318–53.338 mm	2.0991–2.0999 in
Connecting Rod Journal Diameter – Service	53.308 mm	2.0987 in
Connecting Rod Journal Out-of-Round – Production	0.005 mm	0.0002 in
Connecting Rod Journal Out-of-Round – Service	0.01 mm	0.0004 in
Connecting Rod Journal Taper – Maximum for 1/2 of Journal Length – Production	0.005 mm	0.0002 in

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Connecting Rod Journal Taper – Maximum for 1/2 of Journal Length – Service	0.02 mm	0.00078 in
Crankshaft End Play	0.04–0.2 mm	0.0015–0.0078 in
Crankshaft Main Bearing Clearance – Production	0.02–0.052 mm	0.0008–0.0021 in
Crankshaft Main Bearing Clearance – Service	0.02–0.065 mm	0.0008–0.0025 in
Crankshaft Main Journal Diameter – Production	64.992–65.008 mm	2.558–2.559 in
Crankshaft Main Journal Diameter – Service	64.992 mm	2.558 in
Crankshaft Main Journal Out-of-Round – Production	0.003 mm	0.000118 in
Crankshaft Main Journal Out-of-Round – Service	0.008 mm	0.0003 in
Crankshaft Main Journal Taper – Production	0.01 mm	0.0004 in
Crankshaft Main Journal Taper – Service	0.02 mm	0.00078 in
Crankshaft Rear Flange Runout	0.05 mm	0.002 in
Crankshaft Reluctor Ring Runout – Measured 1.0 mm (0.04 in) Below Tooth Diameter	0.7 mm	0.028 in
Crankshaft Thrust Surface – Production	26.14–26.22 mm	1.029–1.0315 in
Crankshaft Thrust Surface – Service	26.22 mm	1.0315 in
Crankshaft Thrust Surface Runout	0.025 mm	0.001 in
Cylinder Head		
Cylinder Head Height/Thickness – Measured from the Cylinder Head Deck to the Valve Rocker Arm Cover Seal Surface	127.9 mm	5.035 in
Surface Flatness – Block Deck – Measured within a 152.4 mm (6.0 in) Area	0.08 mm	0.003 in
Surface Flatness – Block Deck – Measuring the Overall Length of the Cylinder Head	0.1 mm	0.004 in
Surface Flatness – Exhaust Manifold Deck	0.13 mm	0.005 in
Surface Flatness – Intake Manifold Deck	0.08 mm	0.0031 in
Valve Guide Installed Height – Measured from the Spring Seat Surface to the Top of the Guide	17.32 mm	0.682 in
Intake Manifold		

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Surface Flatness – Measured at Gasket Sealing Surfaces and Measured Within a 200 mm (7.87 in) Area that Includes 2 Runner Port Openings	0.3 mm	0.118 in
Lubrication System		
Oil Capacity – with Filter	7.57 liters	8.0 quarts
Oil Capacity – without Filter	7.10 liters	7.5 quarts
Oil Pressure – Minimum at 100°C (212°F)	41 kPa at 1,000 engine RPM 124 kPa at 2,000 engine RPM 165 kPa at 4,000 engine RPM	6 psig at 1,000 engine RPM 18 psig at 2,000 engine RPM 24 psig at 4,000 engine RPM
Oil Pan		
Front Cover Alignment – at Oil Pan Surface	0.0–0.5 mm	0.0–0.02 in
Oil Pan Alignment – to Rear of Engine Block at Transmission Bell Housing Mounting Surface	0.0–0.1 mm	0.0–0.004 in
Oil Pump Alignment – at Oil Pan Surface	0.0–0.1 mm	0.0–0.004 in
Crankshaft Rear Oil Seal Housing Alignment – at Oil Pan Surface	0.0–0.5 mm	0.0–0.02 in
Piston Rings		
Piston Ring End Gap – First Compression Ring – Measured in Cylinder Bore – Production	0.22–0.47 mm	0.0087–0.0185 in
Piston Ring End Gap – First Compression Ring – Measured in Cylinder Bore – Service	0.22–0.47 mm	0.0087–0.0185 in
Piston Ring End Gap – Second Compression Ring – Measured in Cylinder Bore – Production	0.40–0.66 mm	0.0157–0.0259 in
Piston Ring End Gap – Second Compression Ring – Measured in Cylinder Bore – Service	0.40–0.66 mm	0.0157–0.0259 in
Piston Ring End Gap – Oil Control Ring – Measured in Cylinder Bore – Production	0.25–0.76 mm	0.0098–0.0299 in
Piston Ring End Gap – Oil Control Ring – Measured in Cylinder Bore – Service	0.25–0.76 mm	0.0098–0.0299 in
Piston Ring to Groove Clearance – First Compression Ring – Production	0.030–0.10 mm	0.0012–0.0040 in
Piston Ring to Groove Clearance – First Compression Ring – Service	0.030–0.10 mm	0.0012–0.0040 in

2006 Y Car GMX245 Corvette
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Application	Specification	
	Metric	English
Piston Ring to Groove Clearance – Second Compression Ring – Production	0.035–0.078 mm	0.0014–0.0031 in
Piston Ring to Groove Clearance – Second Compression Ring – Service	0.035–0.078 mm	0.0014–0.0031 in
Piston Ring to Groove Clearance – Oil Control Ring – Production	0.013–0.201 mm	0.0005–0.0079 in
Piston Ring to Groove Clearance – Oil Control Ring – Service	0.013–0.201 mm	0.0005–0.0079 in
Pistons and Pins		
Pin – Piston Pin Clearance to Piston Pin Bore – Production	0.008–0.023 mm	0.0003–0.0009 in
Pin – Piston Pin Clearance to Piston Pin Bore – Service	0.008–0.023 mm	0.0003–0.0009 in
Pin – Piston Pin Diameter	23.497–23.503 mm	0.925–0.925 in
Pin – Piston Pin Fit in Connecting Rod Bore – Production	0.007–0.02 mm	0.00027–0.00078 in
Pin – Piston Pin Fit in Connecting Rod Bore – Service	0.007–0.0022 mm	0.00027–0.00086 in
Piston – Piston Diameter – Measured Over Skirt Coating	104.758–104.792 mm	4.124–4.126 in
Piston – Piston to Bore Clearance	–0.026 to +0.026 mm	–0.001 to +0.001 in
Valve System		
Valves – Face Angle	45 degrees	
Valves – Face Width	1.754–2.254 mm	0.069–0.089 in
Valves – Lash	Net Lash – No Adjustment	
Valves – Lift – Intake	15.11 mm	0.595 in
Valves – Lift – Exhaust	15.01 mm	0.590 in
Valve Seat – Angle	45 degrees	
Valve Seat – Runout	0.05 mm	0.002 in
Valve Seat – Width – Exhaust	1.7–2.0 mm	0.067–0.079 in
Valve Seat – Width – Intake	1.25–1.55 mm	0.049–0.061 in
Valves – Stem Diameter – Intake	7.958–7.9735 mm	0.313–0.314 in
Valves – Stem Diameter – Exhaust	7.956–7.976 mm	0.313–0.314 in

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Application	Specification	
	Metric	English
Valves – Stem-to-Guide Clearance – Production – Intake	0.028–0.063 mm	0.001–0.0024 in
Valves – Stem-to-Guide Clearance – Service – Intake	0.093 mm	0.0037 in
Valves – Stem-to-Guide Clearance – Production – Exhaust	0.025–0.066 mm	0.001–0.0026 in
Valves – Stem-to-Guide Clearance – Service – Exhaust	0.093 mm	0.0037 in
Rocker Arms – Rocker Arm Ratio	1.80:1	
Valve Springs – Free Length	58.8 mm	2.313 in
Valve Springs – Installed Height	49.75 mm	1.959 in
Valve Springs – Load – Closed	450 N at 49.75 mm	101 lb at 1.96 in
Valve Springs – Load – Open	1380 N at 34.75 mm	310 lb at 1.37 in

Specifications

1554988

Sealers, Adhesives, and Lubricants

Sealers, Adhesives, and Lubricants:Engine Mechanical

Application	Type of Material	GM Part Number	
		United States	Canada
All Purpose Parts Cleaner	Cleaner	12378553	88900920
Coolant Temperature Sensor Threads	Sealant	12346004	10953480
Cylinder Head Plug	Threadlock	12345382	10953489
Engine Block Coolant Drain Hole Plug	Sealant	12346004	10953480
Engine Block Oil Gallery Plug – Front	Threadlock	12345382	10953489
Engine Block Oil Gallery Plug – Side	Sealant	12346004	10953480
Engine Degreaser	Cleaner	12378482	992878
Engine Oil	5W-30 Oil – Synthetic	12345610	993193
Engine Oil Pressure Sensor Threads	Sealant	12346004	10953480
Engine Oil Supplement	Fluorescent Dye	12345795	10953470
Exhaust Manifold Bolts	Threadlock	12345493	10953488
Flywheel Bolts	Threadlock	12345382	10953489

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

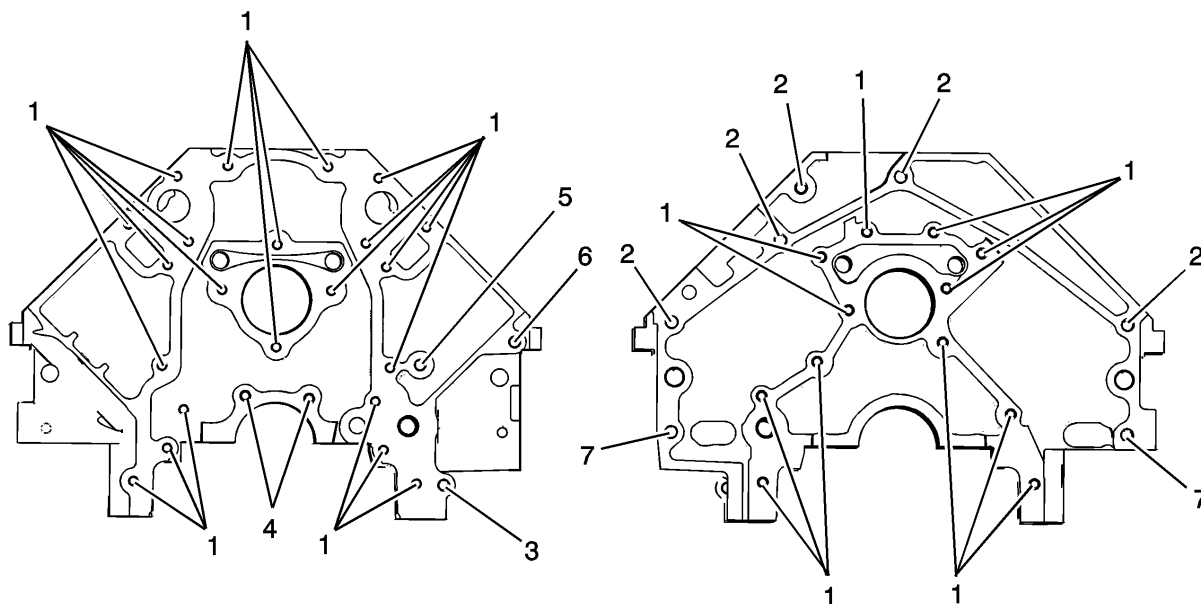
Application	Type of Material	GM Part Number	
		United States	Canada
Fuel Injection Fuel Rail Bolts	Threadlock	12345382	10953489
Ignition Coil Bracket-to-Valve Cover Studs	Threadlock	12345382	10953489
Ignition Coil-to-Bracket Bolts	Threadlock	12345382	10953489
Intake Manifold Bolts	Threadlock	12345382	10953489
Oil Pan Surface at Front Cover and Rear Housing	Sealant	12378521	88901148
Thread Repair Component Cleaner	Cleaner	12346139	10953463
Thread Repair Component Cleaner	Cleaner	12377981	10953463
Thread Repair Cutting Oil	Lubricant	1052864	992881

Specifications

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Thread Repair Specifications

Engine Block – Front/Rear Views



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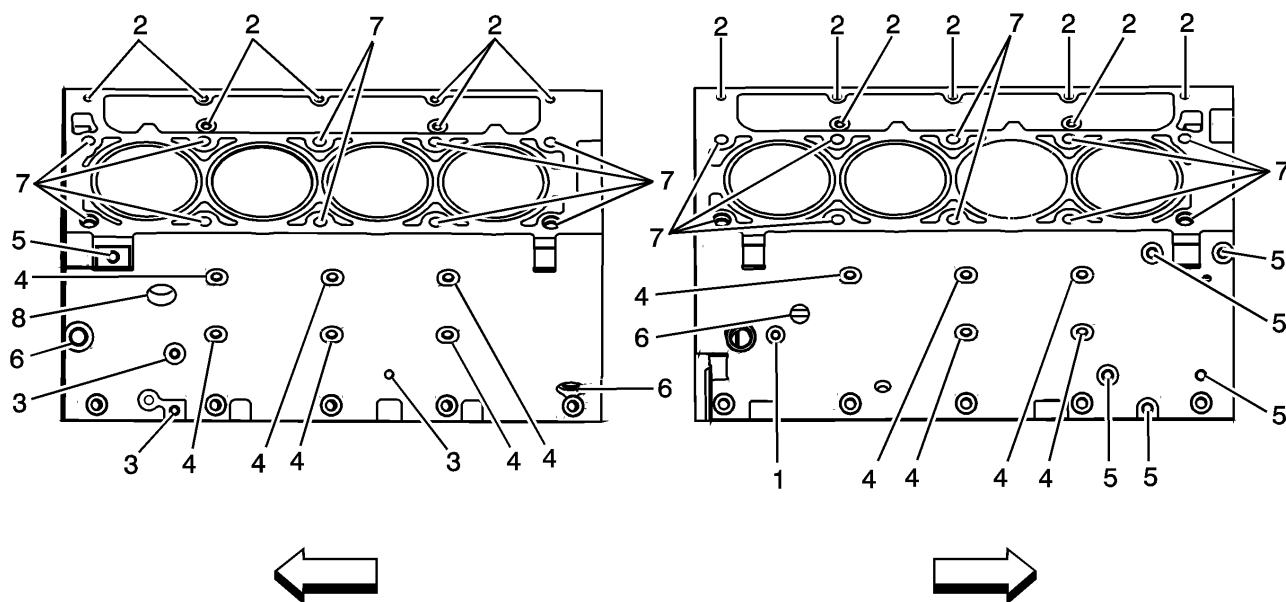
Engine Block – Front/Rear Views

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Hole	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth - Maximum mm (in)	Tap Depth - Maximum mm (in)
J 42385-								
1	M8 x 1.25	210	206	207	208	209	22.5 (0.885)	17.5 (0.688)
2	M10 x 1.5	215	211	212	213	214	27.5 (1.08)	22.0 (0.866)
3	M10 x 1.5	215	211	212	213	214	Thru	Thru
4	M8 x 1.25	210	206	207	208	209	Thru	Thru
5	M10 x 1.5	215	211	212	213	214	25.0 (0.984)	19.5 (0.767)
6	M10 x 1.5	215	211	212	213	214	32.5 (1.279)	25.0 (0.984)
7	M10 x 1.5	215	211	212	213	214	Thru	Thru

Bolt hole 6 is drilled and tapped for aluminum block applications only.

Engine Block – Left/Right Side Views



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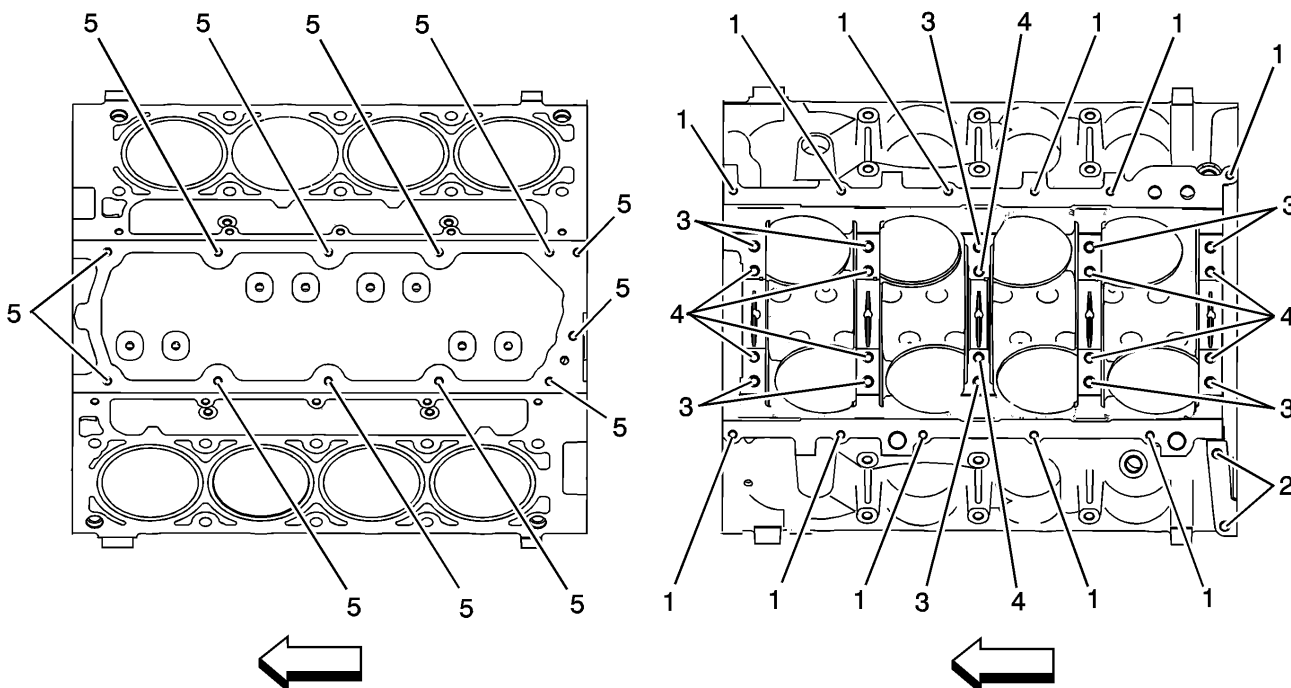
Engine Block – Left/Right Side Views

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Hole	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth – Maximum mm (in)	Tap Depth – Maximum mm (in)
J 42385-								
1	M8 _{1.25} x	210	206	207	208	209	22.5 (0.885)	17.5 (0.688)
2	M8 _{1.25} x	210	206	207	208	209	28.5 (1.122)	23.0 (0.905)
3	M8 _{1.25} x	210	206	207	208	209	21.5 (0.846)	16.0 (0.629)
4	M10 _{1.25} x	215	211	212	213	214	29.0 (1.141)	23.0 (0.905)
5	M10 _{1.5} x	215	211	212	213	214	27.0 (1.062)	21.5 (0.846)
6	M16 _{1.5} x	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	M11 _{2.0} x	108	105	N/A	106	107	69.0 (2.72)	60.0 (2.36)
8	M28 _{1.25} x	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bolt hole 7 has a 30 mm (1.18 in) counterbore included in the 69.0 mm (2.72 in) drill depth. Use sleeve J 42385-315 with the drill and tap.								

Engine Block – Top/Bottom Views

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



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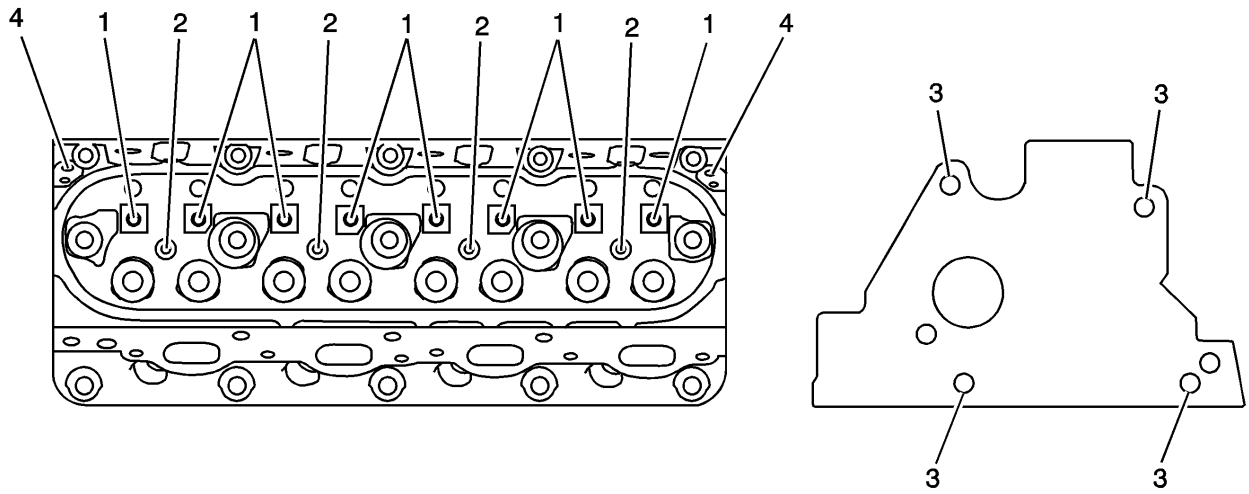
Engine Block – Top/Bottom Views

Hole	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth – Maximum mm (in)	Tap Depth – Maximum mm (in)
J 42385-								
1	M8 x 1.25	210	206	207	208	209	22.5 (0.885)	17.5 (0.688)
2	M10 x 1.5	215	211	212	213	214	42.5 (1.67)	37.0 (1.45)
3	M10 x 2.0	104	101	N/A	102	103	31.0 (1.22)	25.5 (1.0)
4	M10 x 2.0	104	101	N/A	102	103	53.5 (2.10)	44.0 (1.73)
5	M8 x 1.25	210	206	207	208	209	26.5 (1.043)	19.0 (0.748)

- Bolt hole 2 has an 11.5 mm (0.452 in) counterbore included in the 42.5 mm (1.67 in) drill depth. Use sleeve J 42385-311 with the drill and tap.
- Bolt hole 3 has a 1.5 mm (0.059 in) counterbore included in the 31.0 mm (1.22 in) drill depth. Use sleeve J 42385-316 with the drill and tap.
- Bolt hole 4 has a 20.5 mm (0.807 in) counterbore included in the 53.5 mm (2.10 in) drill depth.

Cylinder Head – Top/End Views

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



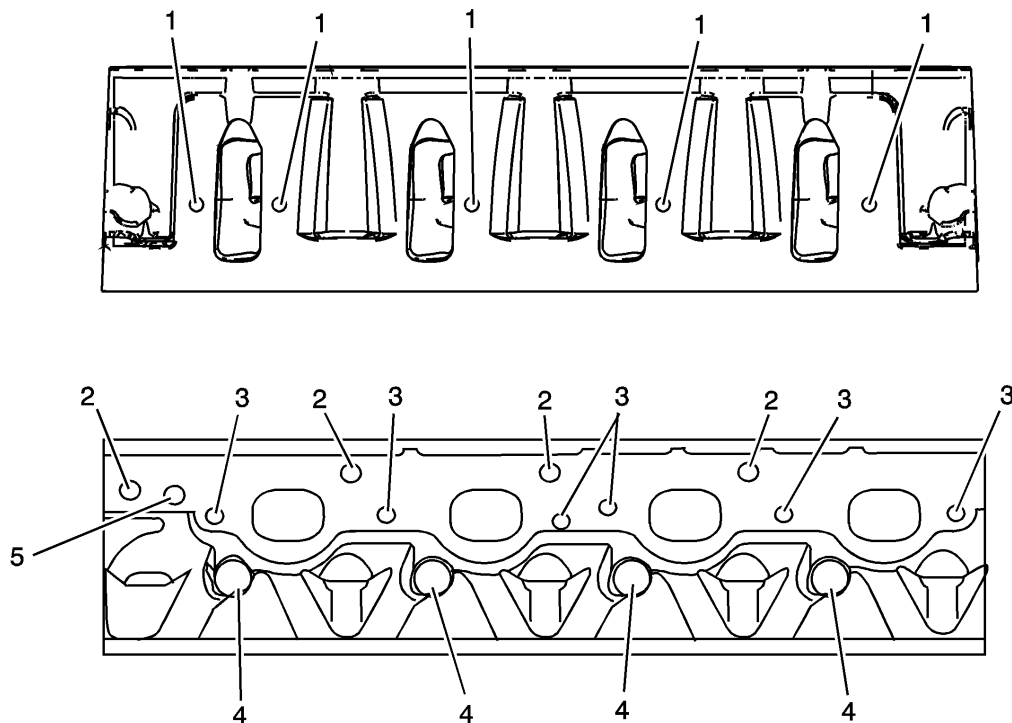
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Cylinder Head – Top/End Views

Hole	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth – Maximum mm (in)	Tap Depth – Maximum mm (in)
J 42385-								
1	M8 x 1.25	210	206	207	208	209	26.5 (1.04)	19.0 (0.784)
2	M6 x 1.0	205	201	202	203	204	20.05 (0.789)	16.05 (0.632)
3	M10 x 1.5	215	211	212	213	214	28.0 (1.10)	20.0 (0.787)
4	M6 x 1.0	205	201	202	203	204	22.5 (0.885)	15.0 (0.688)

Cylinder Head – Intake/Exhaust Side Views

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1402171

Cylinder Head – Intake/Exhaust Side Views

Hole	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth – Maximum mm (in)	Tap Depth – Maximum mm (in)
J 42385-								
1	M6 x 1.0	205	201	202	203	204	Thru	Thru
2	M10 x 1.5	215	211	212	213	214	28.0 (1.10)	20.0 (0.787)
3	M8 x 1.25	210	206	207	208	209	21.0 (0.826)	16.0 (0.629)
4	M14 x 1.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	M12 x 1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A

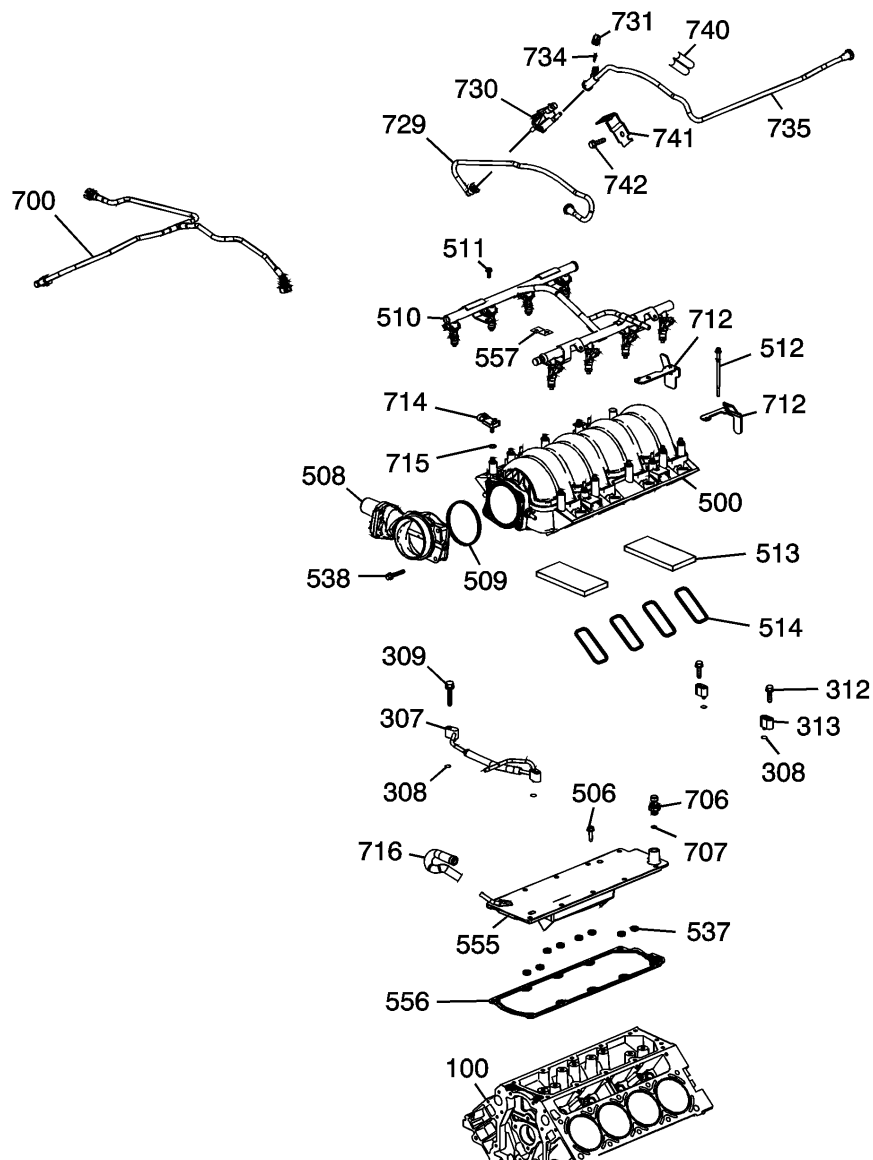
Component Locator

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Disassembled Views

Figure 1556644 Intake Manifold/Upper Engine

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



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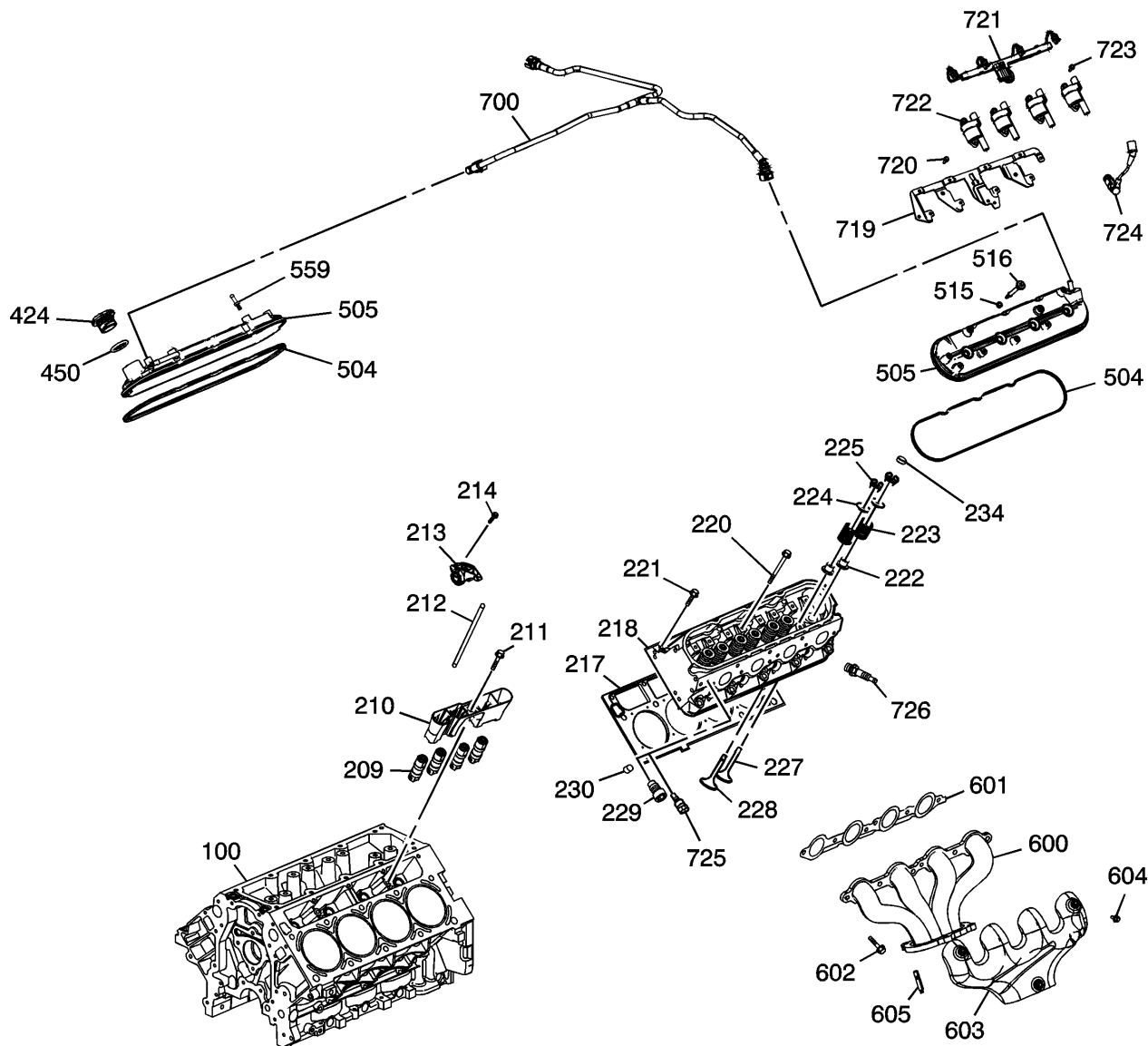
- 100. Engine Block
- 307. Engine Coolant Air Bleed Pipe
- 308. Engine Coolant Air Bleed Pipe Seal
- 308. Engine Coolant Air Bleed Pipe Seal
- 309. Bolt
- 312. Bolt
- 313. Engine Coolant Air Bleed Pipe Hole Cover
- 500. Intake Manifold
- 506. Bolt
- 508. Throttle Body
- 509. Throttle Body Seal
- 510. Fuel Rail Assembly – Multi-Port
- 511. Bolt
- 512. Bolt
- 513. Intake Manifold Seal
- 514. Intake Manifold Gasket
- 537. Engine Block Valley Cover High Pressure Port Seal
- 538. Bolt
- 555. Engine Block Valley Cover

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 556. *Engine Block Valley Cover Gasket*
- 557. *Fuel Injection Fuel Rail Bracket*
- 700. *Positive Crankcase Ventilation (PCV) Tube – Fresh Air*
- 706. *Engine Oil Pressure Sensor*
- 707. *Engine Oil Pressure Sensor Seal*
- 712. *Fuel Injection Fuel Rail Stop*
- 712. *Fuel Injection Fuel Rail Stop*
- 714. *Manifold Absolute Pressure (MAP) Sensor*
- 715. *MAP Sensor Seal*
- 716. *PCV Hose – Dirty Air*
- 729. *Evaporative (EVAP) Emission Canister Purge Tube*
- 730. *EVAP Canister Purge Solenoid Valve*
- 731. *EVAP Service Valve Cap*
- 734. *EVAP Service Valve*
- 735. *EVAP Canister Purge Tube*
- 740. *EVAP Canister Purge Tube Clip*
- 741. *EVAP Canister Purge Solenoid Valve Bracket*
- 742. *Bolt*

Figure 1556646 **Cylinder Head/Upper Engine**

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



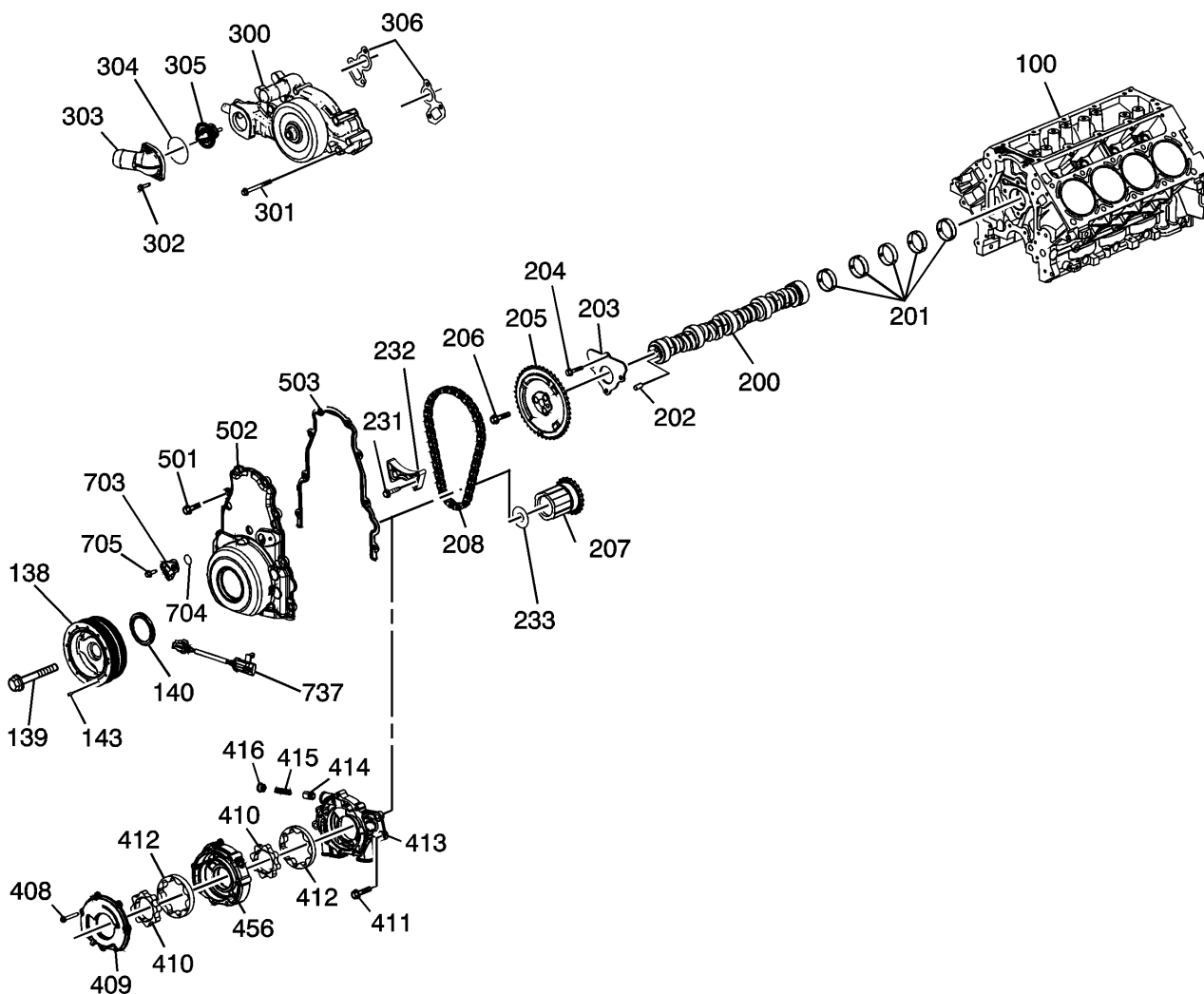
- 1552418
- 100. Engine Block
 - 209. Valve Lifter
 - 210. Valve Lifter Guide
 - 211. Bolt
 - 212. Valve Pushrod
 - 213. Valve Rocker Arm
 - 214. Bolt
 - 217. Cylinder Head Gasket
 - 218. Cylinder Head
 - 220. Cylinder Head Bolt – M11
 - 221. Cylinder Head Bolt – M8
 - 222. Valve Stem Oil Seal
 - 223. Valve Spring
 - 224. Valve Spring Cap
 - 225. Valve Stem Key
 - 227. Intake Valve
 - 228. Exhaust Valve
 - 229. Cylinder Head Plug
 - 230. Cylinder Head Locating Pin

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 234. *Valve Rocker Arm Wear Pad – Intake Valve*
- 424. *Oil Cap*
- 450. *Oil Cap O-Ring Seal*
- 504. *Valve Rocker Arm Cover Gasket*
- 504. *Valve Rocker Arm Cover Gasket*
- 505. *Valve Rocker Arm Cover*
- 505. *Valve Rocker Arm Cover*
- 515. *Bolt Grommet*
- 516. *Bolt*
- 559. *Engine Cover Stud*
- 600. *Exhaust Manifold*
- 601. *Exhaust Manifold Gasket*
- 602. *Bolt*
- 603. *Exhaust Manifold Heat Shield*
- 604. *Bolt*
- 605. *Stud*
- 700. *Positive Crankcase Ventilation (PCV) Tube – Fresh Air*
- 719. *Ignition Coil Bracket*
- 720. *Stud*
- 721. *Ignition Coil Wire Harness Assembly*
- 722. *Ignition Coil*
- 723. *Bolt*
- 724. *Spark Plug Wire*
- 725. *Coolant Temperature Sensor*
- 726. *Spark Plug*

Figure 1556647 **Front of Engine**

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

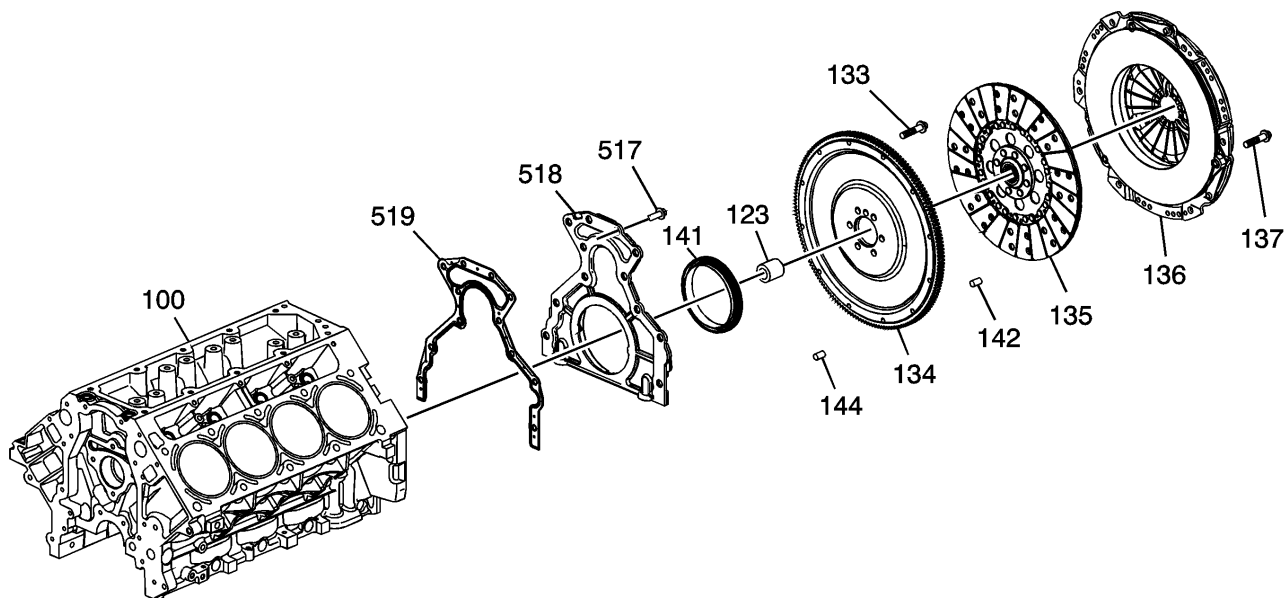


- 1552419
- 100. Engine Block
 - 138. Crankshaft Balancer
 - 139. Bolt
 - 140. Crankshaft Front Oil Seal
 - 143. Balancer Weight – Crankshaft Balancer
 - 200. Camshaft
 - 201. Camshaft Bearings
 - 202. Camshaft Sprocket Locating Pin
 - 203. Camshaft Retainer
 - 204. Bolt
 - 205. Camshaft Sprocket
 - 206. Bolt
 - 207. Crankshaft Sprocket
 - 208. Timing Chain
 - 231. Bolt
 - 232. Timing Chain Dampener
 - 233. Crankshaft Balancer Washer
 - 300. Water Pump
 - 301. Bolt

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 302. Bolt
- 303. Water Inlet Housing
- 304. Water Inlet Seal
- 305. Engine Coolant Thermostat
- 306. Water Pump Gasket
- 408. Bolt
- 409. Oil Pump Cover
- 410. Oil Pump Gear – Drive
- 410. Oil Pump Gear – Drive
- 411. Bolt
- 412. Oil Pump Gear – Driven
- 412. Oil Pump Gear – Driven
- 413. Oil Pump Housing – Primary
- 414. Oil Pressure Relief Valve
- 415. Oil Pressure Relief Valve Spring
- 416. Oil Pressure Relief Valve Plug
- 456. Oil Pump Housing – Secondary
- 501. Bolt
- 502. Engine Front Cover
- 503. Engine Front Cover Gasket
- 703. Camshaft Position (CMP) Sensor
- 704. CMP Sensor Seal
- 705. CMP Sensor Bolt
- 737. CMP Sensor Wire Harness

Figure 1556648 **Rear of Engine**

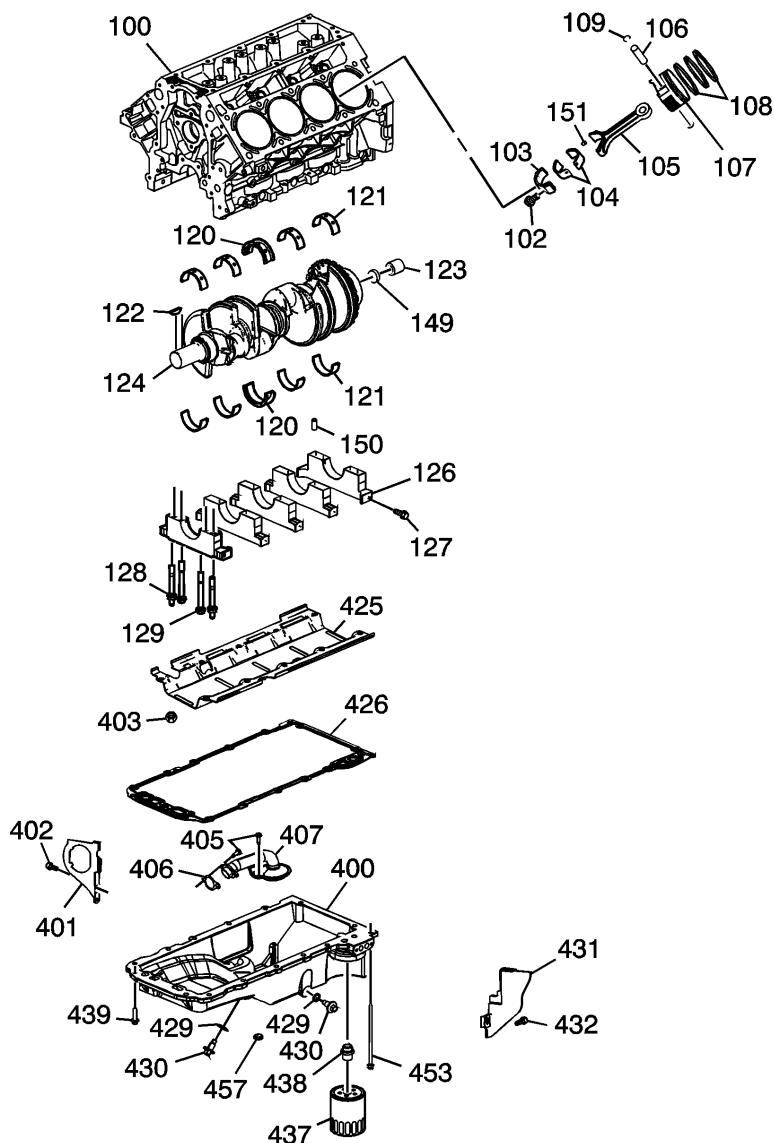


- 1552421
- 100. Engine Block
 - 123. Transmission Pilot Bearing
 - 133. Bolt

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 134. Flywheel – Manual Transmission
- 135. Clutch Drive Plate – Manual Transmission
- 136. Clutch Pressure Plate – Manual Transmission
- 137. Bolt
- 141. Crankshaft Rear Oil Seal
- 142. Clutch Pressure Plate Locating Pin – Manual Transmission
- 144. Balance Weight – Flywheel
- 517. Bolt
- 518. Crankshaft Rear Oil Seal Housing
- 519. Crankshaft Rear Oil Seal Housing Gasket

Figure 1556651 **Lower Engine Assembly**



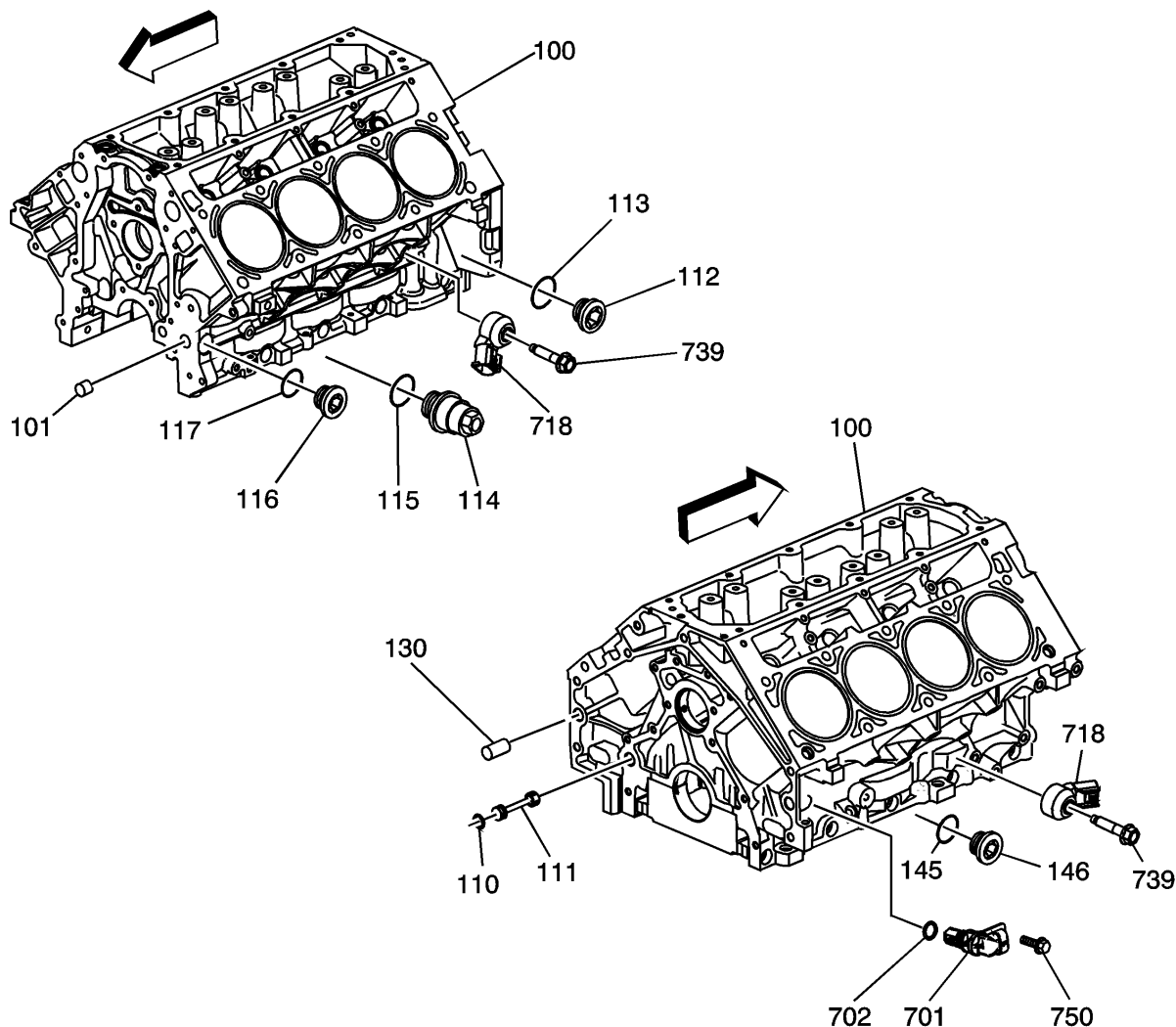
- 1552424
- 100. Engine Block
 - 102. Bolt
 - 103. Connecting Rod Cap
 - 104. Connecting Rod Bearing
 - 105. Connecting Rod
 - 106. Piston Pin
 - 107. Piston
 - 108. Piston Ring Set

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 109. *Piston Pin Retainer*
- 120. *Crankshaft Bearing – Thrust*
- 120. *Crankshaft Bearing – Thrust*
- 121. *Crankshaft Bearing*
- 121. *Crankshaft Bearing*
- 122. *Crankshaft Sprocket Key*
- 123. *Transmission Pilot Bearing*
- 124. *Crankshaft*
- 126. *Crankshaft Bearing Cap*
- 127. *Bolt – M8*
- 128. *Stud – M10*
- 129. *Bolt – M10*
- 149. *Crankshaft Hole Plug*
- 150. *Crankshaft Bearing Cap Locating Pin*
- 151. *Connecting Rod Cap Locating Pin*
- 400. *Oil Pan*
- 401. *Engine Cover – Right*
- 402. *Bolt*
- 403. *Crankshaft Oil Deflector Nut*
- 405. *Bolt*
- 406. *Oil Pump Suction Pipe Gasket*
- 407. *Oil Pump Screen*
- 425. *Crankshaft Oil Deflector*
- 426. *Oil Pan Gasket*
- 429. *Oil Pan Drain Plug Seal – O-Ring*
- 429. *Oil Pan Drain Plug Seal – O-Ring*
- 430. *Oil Pan Drain Plug*
- 430. *Oil Pan Drain Plug*
- 431. *Oil Pan Cover – Left*
- 432. *Bolt*
- 437. *Oil Filter*
- 438. *Oil Filter Fitting*
- 439. *Bolt – M8*
- 453. *Bolt – M6*
- 457. *Oil Pan Hole Plug*

Figure 1556652 **Engine Block Plugs/Sensors**

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



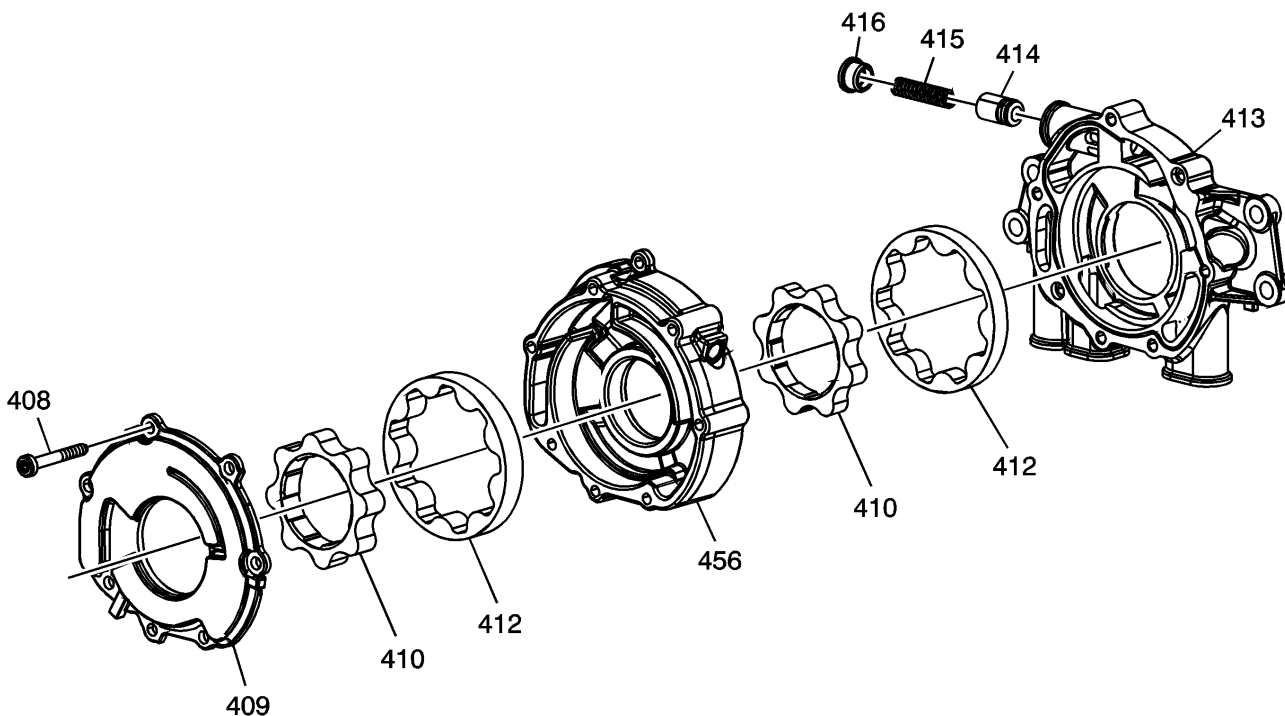
1401949

- 100. Engine Block
- 100. Engine Block
- 101. Engine Block Oil Gallery Plug – Front
- 110. Engine Block Oil Gallery Plug Seal
- 111. Engine Block Oil Gallery Plug – Rear
- 112. Engine Block Oil Gallery Plug – Side
- 113. Engine Block Oil Gallery Plug Seal
- 114. Engine Block Coolant Heater
- 115. Engine Block Coolant Heater Seal
- 116. Engine Block Oil Gallery Plug – Side
- 117. Engine Block Oil Gallery Plug Seal
- 130. Transmission Locating Pin
- 145. Engine Block Coolant Drain Hole Plug Seal
- 146. Engine Block Coolant Drain Hole Plug – Side
- 701. Crankshaft Position (CKP) Sensor
- 702. CKP Sensor Seal
- 718. Knock Sensor
- 718. Knock Sensor

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 739. Bolt
- 739. Bolt
- 750. CKP Sensor Bolt

Figure 1556654 **Oil Pump Assembly**

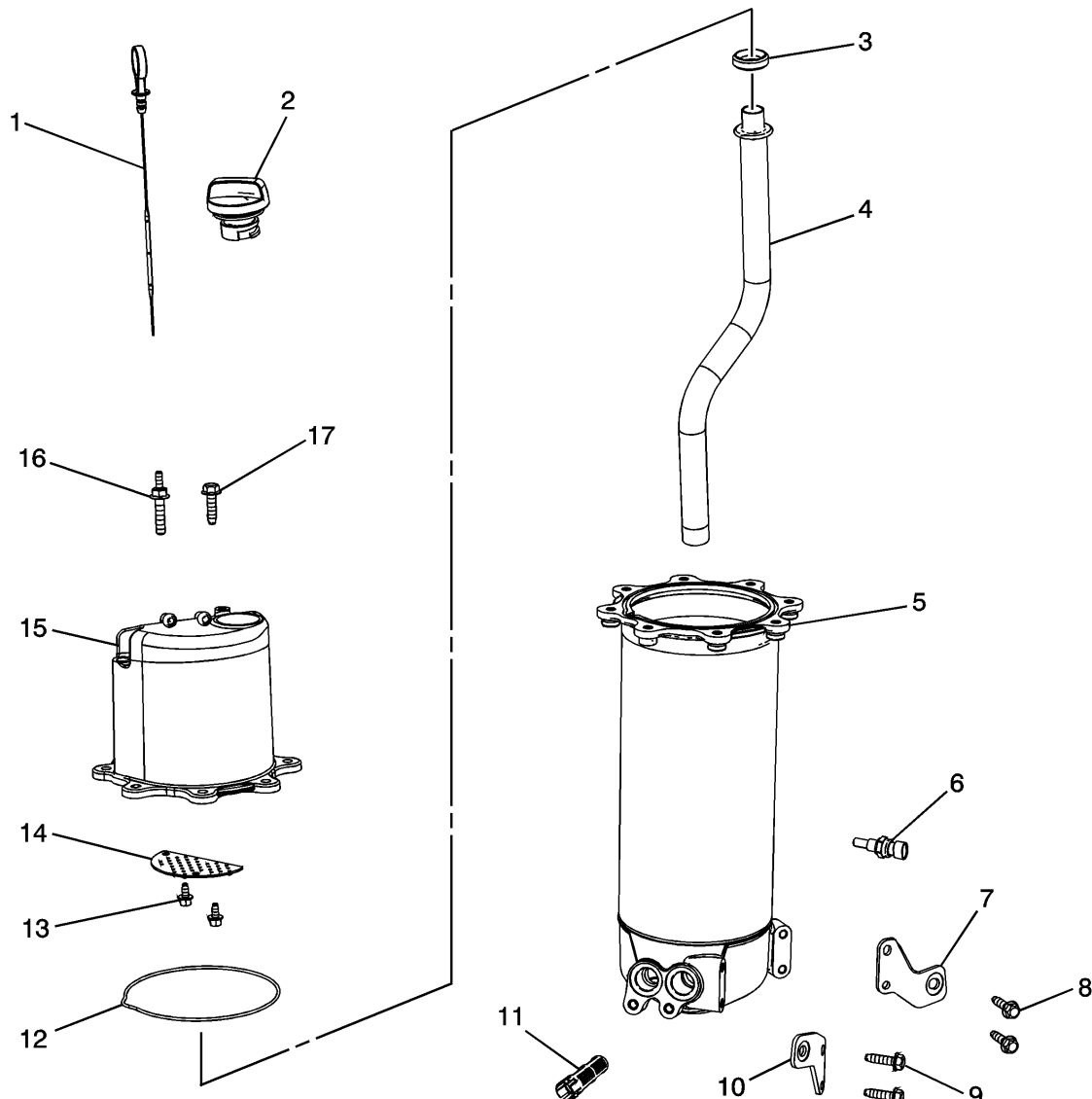


1552425

- 408. Bolt
- 409. Oil Pump Cover
- 410. Oil Pump Gear – Drive
- 410. Oil Pump Gear – Drive
- 412. Oil Pump Gear – Driven
- 412. Oil Pump Gear – Driven
- 413. Oil Pump Housing – Primary
- 414. Oil Pressure Relief Valve
- 415. Oil Pressure Relief Valve Spring
- 416. Oil Pressure Relief Valve Plug
- 456. Oil Pump Housing – Secondary

Figure 1831010 **Engine Oil Tank Assembly**

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830422

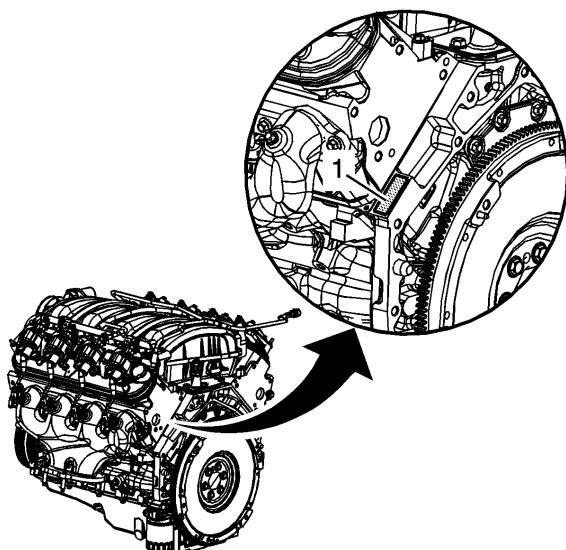
- 1. Oil Level Indicator
- 2. Oil Fill Cap
- 3. O-ring
- 4. Tube
- 5. Engine Oil Tank – Bottom
- 6. Engine Oil Temperature Sensor
- 7. Bracket
- 8. Bolt
- 9. Bolt
- 10. Bracket
- 11. Screen
- 12. O-ring
- 13. Bolt
- 14. Baffle
- 15. Engine Oil Tank – Top
- 16. Bolt/Stud
- 17. Bolt

Component Locator

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1554991

Engine Identification



1552521

The vehicle identification number (VIN) is located on the left side rear of the engine block (1) and is typically a 9 digit number stamped or laser-etched onto the engine at the vehicle assembly plant.

- The first digit identifies the division.
- The second digit identifies the model year.
- The third digit identifies the assembly plant.
- The fourth through ninth digits are the last 6 digits of the VIN.

Diagnostic Information and Procedures

1554993

Diagnostic Starting Point - Engine Mechanical

Diagnostic Starting Point: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Begin the system diagnosis by reviewing the [Disassembled Views](#), [Engine Component Description](#), [Lubrication Description](#), and [Drive Belt System Description](#). Reviewing the description and operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the description and operation information will also help you determine if the condition described by the customer is normal operation. Refer to [Symptoms - Engine Mechanical](#) in order to identify the correct procedure for diagnosing the system and where the procedure is located.

Diagnostic Information and Procedures

1554995

Symptoms - Engine Mechanical

Symptoms: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Strategy Based Diagnostics

1. Perform the [Diagnostic System Check - Vehicle](#) before using the symptom tables, if applicable.
2. Review the system operations in order to familiarize yourself with the system functions. Refer to [Disassembled Views](#), [Engine Component Description](#), [Lubrication Description](#), and [Drive Belt System Description](#).

All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system condition. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to [Strategy Based Diagnosis](#).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the engine. Refer to *Checking Aftermarket Accessories*.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
 - Inspect for the correct oil level, proper oil viscosity, and correct oil filter.
 - Verify the exact operating conditions under which the concern exists. Note factors such as engine RPM, ambient temperature, engine temperature, amount of engine warm-up time, and other specifics.
 - Compare the engine sounds, if applicable, to a known good engine and make sure you are not trying to correct a normal condition.

Intermittent

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

Symptom List

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

- *Base Engine Misfire without Internal Engine Noises*
- *Base Engine Misfire with Abnormal Internal Lower Engine Noises*
- *Base Engine Misfire with Abnormal Valve Train Noise*
- *Base Engine Misfire with Coolant Consumption*
- *Base Engine Misfire with Excessive Oil Consumption*
- *Engine Noise on Start-Up, but Only Lasting a Few Seconds*
- *Upper Engine Noise, Regardless of Engine Speed*
- *Lower Engine Noise, Regardless of Engine Speed*
- *Engine Noise Under Load*
- *Engine Will Not Crank - Crankshaft Will Not Rotate*
- *Coolant in Combustion Chamber*
- *Coolant in Engine Oil*
- *Engine Compression Test*
- *Cylinder Leakage Test*
- *Oil Consumption Diagnosis*
- *Oil Pressure Diagnosis and Testing*
- *Oil Leak Diagnosis*
- *Crankcase Ventilation System Inspection/Diagnosis*
- *Drive Belt Chirping Diagnosis*
- *Drive Belt Squeal Diagnosis*
- *Drive Belt Whine Diagnosis*
- *Drive Belt Rumbling Diagnosis*
- *Drive Belt Vibration Diagnosis*
- *Drive Belt Falls Off Diagnosis*
- *Drive Belt Excessive Wear Diagnosis*
- *Drive Belt Tensioner Diagnosis*

Diagnostic Information and Procedures

1555001

Base Engine Misfire without Internal Engine Noises

Base Engine Misfire without Internal Engine Noises: Engine Mechanical - 4.8L, 5.3L, and 6.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
Fuel injector harness connectors are connected to the incorrect fuel injectors/cylinders.	Relocate the fuel injector harness connectors, as necessary.
Abnormalities, such as severe cracking, bumps, or missing areas in the accessory drive belt Abnormalities in the accessory drive system and/or components may cause engine RPM variations and lead to a misfire DTC. A misfire code may be present without an actual misfire condition.	Replace the drive belt. Refer to Drive Belt Replacement - Accessory .
Worn, damaged, or mis-aligned accessory drive components or excessive pulley runout May lead to a misfire DTC. A misfire code may be present without an actual misfire condition.	Inspect the components and repair or replace, as required.
Loose or improperly installed flywheel or crankshaft balancer A misfire code may be present without an actual misfire condition.	Repair or replace the flywheel and/or balancer, as required. Refer to Engine Flywheel Replacement or Crankshaft Balancer Replacement .
Restricted exhaust system A severe restriction in the exhaust flow can cause significant loss of engine performance and may set a DTC. Possible causes of restrictions include collapsed or dented pipes or plugged mufflers and/or catalytic converters.	Repair or replace, as required.
Improperly installed or damaged vacuum hoses	Repair or replace, as required.
Improper sealing between the intake manifold and cylinder heads or throttle body	Replace the intake manifold, gaskets, cylinder heads, and/or throttle body, as required.
Improperly installed or damaged MAP sensor The seal of the MAP sensor should not be torn or damaged.	Repair or replace the MAP sensor, as required.
Worn or loose rocker arms The rocker arm bearing end caps and/or needle bearings should be intact and the rocker arm in the proper position.	Replace the valve rocker arms, as required.
Worn or bent valve pushrods	<ul style="list-style-type: none"> • Replace the pushrods. • Inspect the top of the pistons for valve contact. If the top of the piston shows valve contact, replace the piston and pin assembly.
Stuck valves Carbon buildup on the valve stem can cause the valve not to close properly.	Repair or replace, as required.
Excessively worn or mis-aligned timing chain	Replace the timing chain and sprockets, as required.
Worn camshaft lobes	Replace the camshaft and valve lifters.
Excessive oil pressure A lubrication system with excessive oil pressure may lead to excessive valve lifter pump-up and loss of compression.	<ol style="list-style-type: none"> 1. Perform an oil pressure test. Refer to Oil Pressure Diagnosis and Testing . 2. Repair or replace the oil pump, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
<p>Faulty cylinder head gaskets and/or cracking or other damage to the cylinder heads and engine block cooling system passages</p> <p>Coolant consumption may or may not cause the engine to overheat.</p>	<ul style="list-style-type: none"> • Inspect for spark plugs saturated by coolant. Refer to Spark Plug Inspection . • Inspect the cylinder heads, engine block, and/or head gaskets. Refer to Coolant in Combustion Chamber . • Repair or replace, as required.
<p>Worn piston rings</p> <p>Oil consumption may or may not cause the engine to misfire.</p>	<ul style="list-style-type: none"> • Inspect the spark plugs for oil deposits. Refer to Spark Plug Inspection . • Inspect the cylinders for a loss of compression. Refer to Engine Compression Test . • Perform cylinder leak down and compression testing to identify the cause. Refer to Cylinder Leakage Test . • Repair or replace, as required.
<p>A damaged crankshaft reluctor wheel</p> <p>A damaged crankshaft reluctor wheel can result in different symptoms depending on the severity and location of the damage.</p> <ul style="list-style-type: none"> • Systems with electronic communications, DIS, or coil per cylinder, and severe reluctor ring damage may exhibit periodic loss of crankshaft position, stop delivering a signal, and then sync the crankshaft position. • Systems with electronic communication, DIS, or coil per cylinder, and slight reluctor ring damage may exhibit no loss of crankshaft position and no misfire may occur. However, a P0300 DTC may be set. • Systems with mechanical communications, high voltage switch, and severe reluctor ring damage may cause additional pulses and effect fuel and spark delivery to the point of generating a DTC P0300 or P0336. 	<p>Replace the sensor and/or crankshaft, as required.</p>

Diagnostic Information and Procedures

1555002

Base Engine Misfire with Abnormal Internal Lower Engine Noises

Base Engine Misfire with:Abnormal Internal Lower Engine Noises:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Cause	Correction
<p>Abnormalities, such as severe cracking, bumps or missing areas in the accessory drive belt</p> <p>Abnormalities in the accessory drive system and/or components may cause engine RPM variations, noises similar to a faulty lower engine and also lead to a misfire condition. A misfire code may be present without an actual misfire condition.</p>	<p>Replace the drive belt. Refer to Drive Belt Replacement - Accessory .</p>
<p>Worn, damaged, or mis-aligned accessory drive components or excessive pulley runout</p> <p>A misfire code may be present without an actual misfire condition.</p>	<ol style="list-style-type: none"> 1. Inspect the components. 2. Repair or replace, as required.
<p>Loose or improperly installed flywheel or crankshaft balancer</p> <p>A misfire code may be present without an actual misfire condition.</p>	<p>Repair or replace the flywheel and/or balancer, as required. Refer to Engine Flywheel Replacement or Crankshaft Balancer Replacement .</p>

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
Worn piston rings Oil consumption may or may not cause the engine to misfire.	<ul style="list-style-type: none"> • Inspect the spark plugs for oil deposits. Refer to Spark Plug Inspection . • Inspect the cylinders for a loss of compression. Refer to Engine Compression Test . • Perform cylinder leak down and compression testing to determine the cause. Refer to Cylinder Leakage Test . • Repair or replace, as required.
Worn crankshaft thrust bearings Severely worn thrust surfaces on the crankshaft and/or thrust bearing may permit fore and aft movement of the crankshaft and create a DTC without an actual misfire condition.	Replace the crankshaft and bearings, as required.

Diagnostic Information and Procedures

1555011

Base Engine Misfire with Abnormal Valve Train Noise

Base Engine Misfire with:Abnormal Valve Train Noise:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Cause	Correction
Worn or loose rocker arms The rocker arm bearing end caps and/or needle bearings should be intact within the rocker arm assembly.	Replace the valve rocker arms, as required.
Worn or bent valve pushrods	<ul style="list-style-type: none"> • Replace the pushrods. • Inspect the top of the pistons for valve contact. If the top of the piston shows valve contact, replace the piston and pin assembly.
Stuck valves Carbon buildup on the valve stem can cause the valve not to close properly.	Repair or replace, as required.
Excessively worn or mis-aligned timing chain	Replace the timing chain and sprockets, as required.
Worn camshaft lobes	Replace the camshaft and valve lifters.
Sticking lifters	Replace, as required.

Diagnostic Information and Procedures

1555012

Base Engine Misfire with Coolant Consumption

Base Engine Misfire with:Coolant Consumption:Engine Mechanical - 4.8L, 5.3L, and 6.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
<p>Faulty cylinder head gaskets and/or cracking or other damage to the cylinder heads and engine block cooling system passages</p> <p>Coolant consumption may or may not cause the engine to overheat.</p>	<ul style="list-style-type: none"> • Inspect for spark plugs saturated by coolant. Refer to Spark Plug Inspection . • Perform a cylinder leak down test. Refer to Cylinder Leakage Test . • Inspect the cylinder heads and engine block for damage to the coolant passages and/or a faulty head gasket. Refer to Coolant in Combustion Chamber . • Repair or replace, as required.

Diagnostic Information and Procedures

1555013

Base Engine Misfire with Excessive Oil Consumption

Base Engine Misfire with:Excessive Oil Consumption:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Cause	Correction
<p>Worn valves, valve guides and/or valve stem oil seals</p>	<ol style="list-style-type: none"> 1. Inspect the spark plugs for oil deposits. Refer to Spark Plug Inspection . 2. Repair or replace, as required.
<p>Worn piston rings</p> <p>Oil consumption may or may not cause the engine to misfire.</p>	<ol style="list-style-type: none"> 1. Inspect the spark plugs for oil deposits. Refer to Spark Plug Inspection . 2. Inspect the cylinders for a loss of compression. Refer to Engine Compression Test . 3. Perform cylinder leak down and compression testing to determine the cause. Refer to Cylinder Leakage Test . 4. Repair or replace, as required.

Diagnostic Information and Procedures

1555014

Engine Noise on Start-Up, but Only Lasting a Few Seconds

Engine Noise:On Start-Up, but Only Lasting a Few Seconds:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Cause	Correction
<p>Incorrect oil filter without anti-drainback feature</p>	<p>Install the correct oil filter.</p>
<p>Incorrect oil viscosity</p>	<ol style="list-style-type: none"> 1. Drain the oil. 2. Install the correct viscosity oil.
<p>High valve lifter leak down rate</p>	<p>Replace the lifters, as required.</p>
<p>Worn crankshaft thrust bearing</p>	<ol style="list-style-type: none"> 1. Check the crankshaft end play. 2. Inspect the thrust bearing and crankshaft. 3. Repair or replace, as required.
<p>Faulty oil filter bypass valve</p> <p>The bypass valve is now internal to the oil filter assembly.</p>	<p>Replace the oil filter, as required.</p>

Diagnostic Information and Procedures

1555016

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Upper Engine Noise, Regardless of Engine Speed

Upper Engine Noise, Regardless of Engine Speed:Engine Mechanical - 4.8L, 5.3L, and 6.0L @Engine Noise:Upper Engine Noise, Regardless of Engine Speed:Engine Mechanical - 4.8L, 5.3L, 6.0L

Cause	Correction
Low oil pressure	<ol style="list-style-type: none"> 1. Perform an oil pressure test. Refer to <i>Oil Pressure Diagnosis and Testing</i>. 2. Repair or replace, as required.
Loose and/or worn valve rocker arm attachments	<ol style="list-style-type: none"> 1. Inspect the valve rocker arms and retaining bolts. 2. Repair or replace, as required.
Worn or damaged valve rocker arm	<ol style="list-style-type: none"> 1. Inspect the rocker arm for wear or missing needle bearings 2. Replace the valve rocker arms, as required.
Bent or damaged valve push rod	<p>Inspect the following components and replace, as required:</p> <ul style="list-style-type: none"> • The valve rocker arm • The valve push rod • The valve lifter • The valve lifter guide • The piston <p>Inspect the top of the pistons for valve contact. If the top of the piston shows valve contact, replace the piston and pin assembly.</p>
Improper lubrication to the valve rocker arms	<p>Inspect the following components and repair or replace, as required:</p> <ul style="list-style-type: none"> • A restricted oil filter • The oil pump for a sticking relief valve causing low oil pressure • The crankshaft and connecting rod bearings for excessive wear
Broken valve spring	Replace the valve spring and spring shim.
Worn or dirty valve lifters	Replace the valve lifters.
Stretched or broken timing chain and/or damaged sprocket teeth	Replace the timing chain and sprockets.
Worn engine camshaft lobes	<ol style="list-style-type: none"> 1. Inspect the engine camshaft lobes. 2. Replace the camshaft and valve lifters, as required.
Worn valve guides or valve stems	<p>Inspect the following components and repair, as required:</p> <ul style="list-style-type: none"> • The valves • The valve guides
Stuck valves Carbon on the valve stem or valve seat may cause the valve to stay open.	<p>Inspect the following components and repair, as required:</p> <ul style="list-style-type: none"> • The valves • The valve guides

Diagnostic Information and Procedures

1555019

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Lower Engine Noise, Regardless of Engine Speed

Lower Engine Noise, Regardless of Engine Speed:Engine Mechanical - 4.8L, 5.3L, and 6.0L @Engine Noise:Lower Engine Noise, Regardless of Engine Speed:Engine Mechanical - 4.8L,5.3L, and 6.0L

Cause	Correction
Low oil pressure	<ol style="list-style-type: none"> 1. Perform an oil pressure test. Refer to <i>Oil Pressure Diagnosis and Testing</i> . 2. Repair or replace damaged components, as required.
Worn accessory drive components Abnormalities such as severe cracking, bumps or missing areas in the accessory drive belt and/or misalignment of system components.	<ol style="list-style-type: none"> 1. Inspect the accessory drive system. 2. Repair or replace, as required.
Loose or damaged crankshaft balancer	<ol style="list-style-type: none"> 1. Inspect the crankshaft balancer. 2. Repair or replace, as required.
Detonation or spark knock	Verify the correct operation of the ignition controls system. Refer to <i>Symptoms - Engine Controls</i> .
Loose or damaged flywheel	Repair or replace the flywheel.
Restricted oil pump screen, restricted or collapsed oil hoses, or faulty oil tank-to-hose and/or oil pan-to-hose oil seals	<ol style="list-style-type: none"> 1. Inspect the oil pump screen, hoses, and hose seals. 2. Repair or replace, as required.
Excessive piston-to-cylinder bore clearance	<ol style="list-style-type: none"> 1. Inspect the piston and cylinder bore. 2. Repair, as required.
Excessive piston pin-to-bore clearance	<ol style="list-style-type: none"> 1. Inspect the piston, pin, and connecting rod. 2. Replace the piston and pin as an assembly, as required.
Excessive connecting rod bearing clearance	Inspect the following components and repair, as required: <ul style="list-style-type: none"> • The connecting rod bearings • The connecting rods • The crankshaft • The crankshaft journals
Excessive crankshaft bearing clearance	Inspect the following components and repair, as required: <ul style="list-style-type: none"> • The crankshaft bearings • The crankshaft journals
Incorrect piston, piston pin, and connecting rod installation Pistons must be installed with the mark or dimple on the top of the piston facing the front of the engine. Piston pins must be centered in the connecting rod pin bore.	<ol style="list-style-type: none"> 1. Verify the pistons, piston pins and connecting rods are installed correctly. Refer to <i>Piston, Connecting Rod, and Bearing Installation</i> . 2. Repair, as required.

Diagnostic Information and Procedures

1555021

Engine Noise Under Load

Engine Noise:Under Load:Engine Mechanical - 4.8L, 5.3L, and 6.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
Low oil pressure	<ol style="list-style-type: none"> 1. Perform an oil pressure test. Refer to <i>Oil Pressure Diagnosis and Testing</i>. 2. Repair or replace, as required.
Detonation or spark knock	Verify the correct operation of the ignition controls. Refer to <i>Symptoms - Engine Controls</i> .
Excessive connecting rod bearing clearance	Inspect the following components and repair, as required: <ul style="list-style-type: none"> • The connecting rod bearings • The connecting rods • The crankshaft
Excessive crankshaft bearing clearance	Inspect the following components and repair, as required: <ul style="list-style-type: none"> • The crankshaft bearings • The crankshaft journals • The cylinder block crankshaft bearing bore

Diagnostic Information and Procedures

1555022

Engine Will Not Crank - Crankshaft Will Not Rotate

Engine Will Not Crank - Crankshaft: Will Not Rotate: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Cause	Correction
Seized accessory drive system component	<ol style="list-style-type: none"> 1. Remove the accessory drive belts. 2. Confirm that the engine will rotate. Rotate the crankshaft by hand at the crankshaft balancer or flywheel location. 3. Repair or replace the components, as required.
Broken timing chain	<ol style="list-style-type: none"> 1. Inspect the timing chain and gears. 2. Repair or replace the components, as required.
Seized timing chain or timing sprockets	<ol style="list-style-type: none"> 1. Inspect the timing chain and sprockets for foreign material or a seized chain. 2. Repair or replace the components, as required.
Seized or broken camshaft	<ol style="list-style-type: none"> 1. Inspect the camshaft and the camshaft bearings. 2. Repair or replace the components, as required.
Bent valve in the cylinder head	<ol style="list-style-type: none"> 1. Inspect the valves and the cylinder heads. 2. Repair or replace the components, as required.
Seized oil pump	<ol style="list-style-type: none"> 1. Inspect the oil pump assembly. 2. Repair or replace, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
Hydraulically locked cylinder <ul style="list-style-type: none"> • Coolant/antifreeze in the cylinder • Oil in the cylinder • Fuel in the cylinder 	<ol style="list-style-type: none"> 1. Remove spark plugs and inspect for fluid in the cylinder. When rotating the engine with the spark plugs removed, the piston, on compression stroke, will push fluid from the combustion chamber. Refer to Coolant in Combustion Chamber. 2. Inspect for failed/broken head gaskets. 3. Inspect for a cracked engine block or cylinder head. 4. Inspect for a sticking fuel injector. 5. Repair or replace the components, as required.
Material in the cylinder <ul style="list-style-type: none"> • Broken valve • Broken piston rings • Piston material • Foreign material 	<ol style="list-style-type: none"> 1. Inspect the cylinder for damaged components and/or foreign materials. 2. Repair or replace the components, as required.
Seized crankshaft or connecting rod bearings	<ol style="list-style-type: none"> 1. Inspect crankshaft and connecting rod bearings. 2. Repair or replace the components, as required.
Bent or broken connecting rod	<ol style="list-style-type: none"> 1. Inspect the connecting rods. 2. Replace the components, as required.
Broken crankshaft	<ol style="list-style-type: none"> 1. Inspect the crankshaft. 2. Repair or replace the components, as required.

Diagnostic Information and Procedures

1555023

Coolant in Combustion Chamber

Cause	Correction
<p>DEFINITION: Excessive white smoke and/or coolant type odor coming from the exhaust pipe may indicate coolant in the combustion chamber. Low coolant levels, an inoperative cooling fan, or a faulty thermostat may lead to an overtemperature condition which may cause engine component damage.</p> <ol style="list-style-type: none"> 1. A slower than normal cranking speed may indicate coolant entering the combustion chamber. Refer to Engine Will Not Crank - Crankshaft Will Not Rotate. 2. Remove the spark plugs and inspect for spark plugs saturated by coolant or coolant in the cylinder bore. 3. Inspect by performing a cylinder leak-down test. During this test, excessive air bubbles within the coolant may indicate a faulty gasket or damaged component. 4. Inspect by performing a cylinder compression test. 2 cylinders side-by-side on the engine block, with low compression, may indicate a failed cylinder head gasket. Refer to Engine Compression Test. 	
Cracked intake manifold or failed gasket	Replace the components, as required.
Faulty cylinder head gasket	Replace the head gasket and components, as required. Refer to Cylinder Head Cleaning and Inspection and Cylinder Head Replacement - Left Side or Cylinder Head Replacement - Right Side .
Warped cylinder head	Machine the cylinder head to the proper flatness, if applicable, and replace the cylinder head gasket. Refer to Cylinder Head Cleaning and Inspection .
Cracked cylinder head	Replace the cylinder head and gasket.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cause	Correction
Cracked cylinder liner or engine block	Replace the components, as required.
Cylinder head or engine block porosity	Replace the components, as required.

Diagnostic Information and Procedures

1555024

Coolant in Engine Oil

Cause	Correction
<p>DEFINITION: Foamy or discolored oil may indicate coolant entering the engine crankcase. Low coolant levels, an inoperative cooling fan, or a faulty thermostat may lead to an overtemperature condition which may cause engine component damage. Contaminated engine oil and oil filter should be changed.</p> <ol style="list-style-type: none"> Inspect the oil for excessive foaming. Oil diluted by coolant may not properly lubricate the crankshaft bearings and may lead to component damage. Refer to <i>Lower Engine Noise, Regardless of Engine Speed</i>. Inspect by performing a cylinder leak-down test. During this test, excessive air bubbles within the cooling system may indicate a faulty cylinder head gasket or damaged component. Inspect by performing a cylinder compression test. 2 cylinders side-by-side on the engine block with low compression may indicate a failed cylinder head gasket. Refer to <i>Engine Compression Test</i>. 	
Faulty cylinder head gasket	Replace the head gasket and components, as required. Refer to <i>Cylinder Head Cleaning and Inspection</i> and <i>Cylinder Head Replacement - Left Side</i> or <i>Cylinder Head Replacement - Right Side</i> .
Warped cylinder head	Machine the cylinder head to proper flatness, if applicable, and replace the cylinder head gasket. Refer to <i>Cylinder Head Cleaning and Inspection</i> .
Cracked cylinder head	Replace the cylinder head and gasket.
Cracked cylinder liner or engine block	Replace the components, as required.
Cylinder head, block, or manifold porosity	Replace the components, as required.

Diagnostic Information and Procedures

1406807

Engine Compression Test

Engine Compression Test: Engine Mechanical - 4.8L, 5.3L, and 6.0L

- Charge the battery if the battery is not fully charged.
- Disable the ignition system.
- Disable the fuel injection system.
- Remove all spark plugs.
- Turn the ignition to the ON position.
- Depress the accelerator pedal to position the throttle plate wide open.
- Start with the compression gage at zero and crank the engine through 4 compression strokes, 4 puffs.
- Measure the compression for each cylinder. Record the readings.
- If a cylinder has low compression, inject approximately 15 ml (1 tablespoon) of engine oil into the combustion chamber through the spark plug hole. Measure the compression again and record the reading.
- The minimum compression in any 1 cylinder should not be less than 70 percent of the highest cylinder. No cylinder should read less than 690 kPa (100 psi). For example, if the highest pressure in any 1 cylinder is 1 035 kPa (150 psi), the lowest allowable pressure for any other cylinder would be 725 kPa (105 psi). (1 035 x 70% = 725) (150 x 70% = 105).
 - Normal — Compression builds up quickly and evenly to the specified compression for each cylinder.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

- Piston Rings Leaking — Compression is low on the first stroke. Compression builds up with the following strokes, but does not reach normal. Compression improves considerably when you add oil.
- Valves Leaking — Compression is low on the first stroke. Compression usually does not build up on the following strokes. Compression does not improve much when you add oil.
- If 2 adjacent cylinders have lower than normal compression, and injecting oil into the cylinders does not increase the compression, the cause may be a head gasket leaking between the cylinders.

Diagnostic Information and Procedures

1555730

Engine Balancing

The LS7 engine, with crankshaft balancer, is a balanced assembly. During the powertrain build process, balance weights may be added to the crankshaft balancer and/or flywheel, as required.

In order to maintain engine/clutch assembly balance, it may be necessary to install or remove balance weights as detailed below:

Crankshaft Balancer

- Existing balancer onto existing engine: The balancer position must be marked prior to removal and installed to the original position. Refer to [Crankshaft Balancer Removal](#).
- New balancer onto an existing engine: Install the same size balance weights into the new balancer in the same location as the old balancer. Refer to [Crankshaft Balancer Cleaning and Inspection](#).

Engine Flywheel

Important: The flywheel, clutch, and pressure plate are each individually balanced components and are available separately. The pressure plate mounts, or locates, onto the flywheel dowel pins in the flywheel. If the pressure plate is not aligned properly onto the dowel pins and tightened down, the pins may bend and the plate may be incorrectly positioned, which will affect component balance. Refer to [Clutch Assembly Replacement](#).

- Existing flywheel, clutch, and pressure plate assembly onto the existing engine: Pressure plate position to flywheel must be marked prior to removal and installed to the original position. Flywheel position to crankshaft must be marked prior to removal and installed to the original position. Refer to [Engine Flywheel Removal](#).
- Existing flywheel, clutch, and pressure plate onto a new engine: Pressure plate position to flywheel must be marked prior to removal and installed to the original position. Flywheel position to crankshaft must be marked prior to removal and installed to the similar position on the new engine. Do not remove balance weights from flywheel, if applicable.
- New flywheel onto an existing engine: Install the same size balance weights into the new flywheel in the same location as the old flywheel. Install the new flywheel to a similar position on the new engine.
- New flywheel, clutch, and pressure plate onto a new engine: Do not install balance weights.

Diagnostic Information and Procedures

1613661

Cylinder Leakage Test

Tools Required

[J 35667-A](#) Cylinder Head Leakdown Tester, or equivalent

Important: A leakage test may be performed in order to measure cylinder/combustion chamber leakage. High cylinder leakage may indicate 1 or more of the following conditions:

- Worn or burnt valves
- Broken valve springs
- Stuck valve lifters
- Incorrect valve lash
- Damaged piston
- Worn piston rings
- Worn or scored cylinder bore
- Damaged cylinder head gasket
- Cracked or damaged cylinder head

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Cracked or damaged engine block

Caution: Refer to *Battery Disconnect Caution* .

1. Disconnect the battery ground negative cable.
2. Remove the spark plugs. Refer to *Spark Plug Replacement* .
3. Rotate the crankshaft to place the piston in the cylinder being tested at top dead center (TDC) of the compression stroke.
4. Install the *J 35667-A* , or equivalent.

Important: It may be necessary to hold the crankshaft balancer bolt to prevent the crankshaft from rotating.

5. Apply shop air pressure to the *J 35667-A* and adjust according to the manufacturers instructions.
6. Record the cylinder leakage value. Cylinder leakage that exceeds 25 percent is considered excessive and may require component service. In excessive leakage situations, inspect for the following conditions:
 - Air leakage noise at the throttle body or air inlet hose that may indicate a worn or burnt intake valve or a broken valve spring.
 - Air leakage noise at the exhaust system tailpipe that may indicate a worn or burnt exhaust valve or a broken valve spring.
 - Air leakage noise from the crankcase, oil level indicator tube, or oil fill tube that may indicate worn piston rings, a damaged piston, a worn or scored cylinder bore, a damaged engine block or a damaged cylinder head.
 - Air bubbles in the cooling system may indicate a damaged cylinder head or a damaged cylinder head gasket.
7. Perform the leakage test on the remaining cylinders and record the values.

Diagnostic Information and Procedures

1409149

Oil Consumption Diagnosis

Oil Consumption Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Checks	Causes
Excessive oil consumption, not due to leaks, is the use of 1 L (1 qt) or more of engine oil within 3 200 kilometers (2,000 miles).	
Preliminary	The causes of excessive oil consumption may include the following conditions: <ul style="list-style-type: none"> ● External oil leaks Refer to <i>Oil Leak Diagnosis</i> . ● Incorrect oil level or improper reading of the oil level indicator With the vehicle on a level surface, run the engine for a few minutes, allow adequate drain down time, 2–3 minutes, and check for the correct engine oil level. ● Improper oil viscosity Refer to the vehicle owners manual and use the recommended SAE grade and viscosity for the prevailing temperatures. ● Continuous high speed driving and/or severe usage ● Crankcase ventilation system restrictions or malfunctioning components ● Worn valve guides and/or valve stems ● Worn or improperly installed valve stem oil seals ● Piston rings broken, worn, or not seated properly Allow adequate time for the rings to seat. Replace worn piston rings as necessary. ● Piston and rings improperly installed or not fitted to the cylinder bore

Diagnostic Information and Procedures

1555026

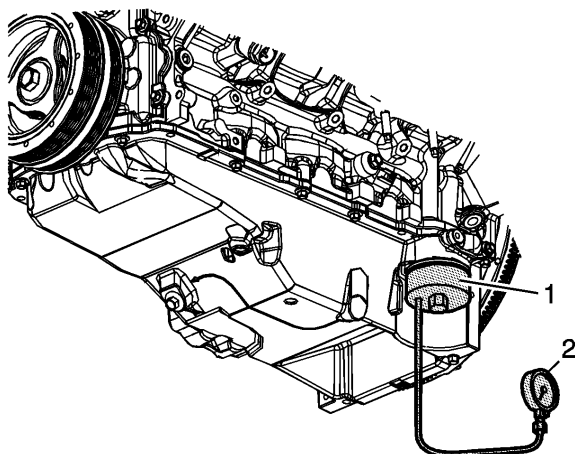
Oil Pressure Diagnosis and Testing

Oil Pressure:Diagnosis and Testing:Engine Mechanical - 4.8L, 5.3L, and 6.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Tools Required

- [EN-47971](#) Oil Pressure Gage Adapter
- [J 21867](#) Pressure Gage



1552522

1. With the vehicle on a level surface, run the vehicle for a few minutes. Allow adequate drain down time, 2–3 minutes, and measure the oil level.
2. If required, add the recommended grade engine oil and fill the oil tank until the oil level measures full on the oil level indicator.
3. Run the engine briefly, 10–15 seconds, and verify low or no oil pressure on the vehicle gage or light.
4. Listen for a noisy valve train or a knocking noise.
5. Inspect for the following conditions:
 - Oil diluted by water or glycol antifreeze
 - Foamy oil
6. Remove the oil filter and install the [EN-47971](#) (1).
7. Install the [J 21867](#) (2), or equivalent to the [EN-47971](#) (1).
8. Run the engine and measure the engine oil pressure.
9. Compare the readings to [Engine Mechanical Specifications](#) .
10. If the engine oil pressure is below specifications, inspect the engine for 1 or more of the following conditions:
 - Restricted engine oil tank screen
 - Collapsed or restricted oil hoses
 - Loose oil hose connections at the oil tank or oil pan
 - Damaged oil tank-to-hose or oil pan-to-hose seals
 - Oil pump worn or dirty
 - Refer to [Oil Pump Cleaning and Inspection](#) .
 - Oil pump-to-engine block bolts loose or oil pump mis-aligned to the oil pan rail
 - Refer to [Oil Pump and Crankshaft Oil Deflector Installation](#) .
 - Oil pan gasket at oil pump sealing surface damaged
 - Malfunctioning oil pump pressure relief valve
 - Excessive bearing clearance
 - Cracked, porous, or restricted oil galleries
 - Oil gallery plugs missing or incorrectly installed
 - Refer to [Engine Block Plug Installation](#) .
 - Broken valve lifters

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Repair, as necessary.

11. If the oil pressure reading on the *J 21867*, or equivalent, is within specifications, inspect for the following conditions:

- Plugged or incorrect oil filter
- Malfunctioning vehicle oil pressure gage or engine oil pressure sensor

Repair, as necessary.

Diagnostic Information and Procedures

1406822

Oil Leak Diagnosis

Oil Leak Diagnosis: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Step	Action	Yes	No
<p>Important: You can repair most fluid leaks by first visually locating the leak, repairing or replacing the component, or by resealing the gasket surface. Once the leak is identified, determine the cause of the leak. Repair the cause of the leak as well as the leak itself.</p>			
1	<ol style="list-style-type: none"> 1. Operate the vehicle until it reaches normal operating temperature. 2. Park the vehicle on a level surface, over a large sheet of paper or other clean surface. 3. Wait 15 minutes. 4. Inspect for drippings. <p>Are drippings present?</p>	Go to Step 2	System OK
2	Can you identify the type of fluid and the approximate location of the leak?	Go to Step 10	Go to Step 3
3	<ol style="list-style-type: none"> 1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: <ul style="list-style-type: none"> • Sealing surfaces • Fittings • Cracked or damaged components <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 4
4	<ol style="list-style-type: none"> 1. Completely clean the entire engine and surrounding components. 2. Operate the vehicle for several kilometers, miles, at normal operating temperature and at varying speeds. 3. Park the vehicle on a level surface, over a large sheet of paper or other clean surface. 4. Wait 15 minutes. 5. Identify the type of fluid, and the approximate location of the leak. <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 5

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
5	<ol style="list-style-type: none"> 1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: <ul style="list-style-type: none"> • Sealing surfaces • Fittings • Cracked or damaged components <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 6
6	<ol style="list-style-type: none"> 1. Completely clean the entire engine and surrounding components. 2. Apply an aerosol-type powder, baby powder, foot powder, etc., to the suspected area. 3. Operate the vehicle for several kilometers, miles, at normal operating temperature and at varying speeds. 4. Identify the type of fluid, and the approximate location of the leak, from the discolorations in the powder surface. <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 7
7	<ol style="list-style-type: none"> 1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: <ul style="list-style-type: none"> • Sealing surfaces • Fittings • Cracked or damaged components <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 8
8	<p>Use the J 28428-E high-intensity black light kit in order to identify the type of fluid, and the approximate location of the leak. Refer to the manufacturer's instructions when using the tool.</p> <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	Go to Step 9
9	<ol style="list-style-type: none"> 1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: <ul style="list-style-type: none"> • Sealing surfaces • Fittings • Cracked or damaged components <p>Can you identify the type of fluid and the approximate location of the leak?</p>	Go to Step 10	System OK

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
10	<p>1. Inspect the engine for mechanical damage. Special attention should be shown to the following areas:</p> <ul style="list-style-type: none"> • Higher than recommended fluid levels • Higher than recommended fluid pressures • Plugged or malfunctioning fluid filters or pressure bypass valves • Plugged or malfunctioning engine ventilation system • Improperly tightened or damaged fasteners • Cracked or porous components • Improper sealants or gaskets, where required • Improper sealant or gasket installation • Damaged or worn gaskets or seals • Damaged or worn sealing surfaces <p>2. Inspect the engine for customer modifications.</p> <p>Is there mechanical damage, or customer modifications to the engine?</p>	Go to Step 11	System OK
11	<p>Repair or replace all damaged or modified components.</p> <p>Does the engine still leak oil?</p>	Go to Step 1	System OK

Diagnostic Information and Procedures

954724

Crankcase Ventilation System Inspection/Diagnosis

Crankcase Ventilation: System: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Concern	Action
External oil leak	<p>Inspect for any of the following conditions:</p> <ul style="list-style-type: none"> • Plugged positive crankcase ventilation (PCV) • Plugged or kinked PCV hose(s) • Damaged or incorrectly installed PCV or hose(s) • Excessive crankcase pressure
Rough Idle	<p>Inspect for any of the following conditions:</p> <ul style="list-style-type: none"> • Plugged PCV • Plugged or kinked PCV hose(s) • Leaking (damaged) PCV or hose(s)
Stalling or slow idle speed	<p>Inspect for any of the following conditions:</p> <ul style="list-style-type: none"> • Plugged PCV • Plugged or kinked PCV hose(s) • Leaking (damaged) PCV or hose(s)
High idle speed	Inspect for a leaking (damaged) PCV or hose(s)
Sludge in the engine	<p>Inspect for any of the following conditions:</p> <ul style="list-style-type: none"> • Plugged PCV • Plugged or kinked PCV hose(s)

Diagnostic Information and Procedures

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1399775

Drive Belt Chirping Diagnosis

Drive Belt:Chirping Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Diagnostic Aids

The chirping noise may be intermittent due to moisture on the drive belts or the accessory drive pulleys. In order to duplicate the customer concern, it may be necessary to spray a small amount of water onto the drive belts. If spraying water on the drive belts duplicates the symptom, cleaning the accessory drive pulleys may be the most probable solution.

A loose or improper installation of a body or suspension component, or other items on the vehicle may cause the chirping noise.

Test Description

The numbers below refer to the steps in the diagnostic table.

2. The chirping noise may not be engine related. This step is to verify that the engine is making the noise. If the engine is not making the noise do not proceed further in this table.
3. The noise may be an internal engine noise. Remove the drive belts and operate the engine for a few seconds, this will verify if the chirping noise is related to the drive belts or not. With the drive belts removed the water pump will not operate and the engine may overheat. Also diagnostic trouble codes (DTCs) may set when the engine is operated with the drive belts removed.
4. Inspect the drive belts for signs of pilling. Pilling is the small balls, pills, or strings in the drive belt grooves caused by the accumulation of rubber dust.
6. Misalignment of the accessory drive pulleys may be caused from improper mounting or incorrect installation of an accessory drive component, or the pulley may be bent inward or outward from a previous repair. Test for a misaligned pulley using a straight edge in the pulley grooves across 2 or 3 pulleys. If a misaligned pulley is found refer to that accessory drive component for the proper removal and installation procedure for that pulley.
10. Inspection of the fasteners can eliminate the possibility that a incorrect bolt, nut, spacer, or washer was installed.
12. Inspection the accessory drive pulleys should include inspecting for bends, dents or other damage to the pulleys that would prevent the drive belts from seating properly in the pulley grooves or on the smooth surface of a pulley when the back side of the drive belt is used to drive the pulley.
14. Replacing the drive belts when it is not damaged or there is not excessive pilling will only be a temporary repair.

Step	Action	Yes	No
<p>Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices.</p> <p>DEFINITION: The following items are indications of chirping:</p> <ul style="list-style-type: none"> • A high pitched noise that is heard once per revolution of the drive belts or an accessory drive pulley. • Chirping may occur on cold damp startup conditions and will subside once the vehicle reaches normal operating temperature. 			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to <i>Symptoms - Engine Mechanical</i>
2	Verify that there is a chirping noise. Does the engine make the chirping noise?	Go to Step 3	Go to Diagnostic Aids
3	<ol style="list-style-type: none"> 1. Remove the drive belt. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i>. 2. Operate the engine for no longer than 30–40 seconds. Does the chirping noise still exist?	Go to <i>Engine Noise on Start-Up, but Only Lasting a Few Seconds Upper Engine Noise, Regardless of Engine Speed or Lower Engine Noise, Regardless of Engine Speed</i>	Go to Step 4

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
4	Inspect for severe drive belt pilling exceeding 1/3 of the drive belt groove depth. Do the drive belt grooves have pilling?	Go to Step 5	Go to Step 6
5	Clean the accessory drive pulleys with a suitable wire brush. Were the accessory drive pulleys cleaned?	Go to Step 14	—
6	Inspect for a misaligned accessory drive pulleys. Is there a misaligned accessory drive pulleys?	Go to Step 7	Go to Step 8
7	Replace and/or repair the misaligned accessory drive pulleys. Were the misaligned accessory drive pulleys replaced and/or repaired?	Go to Step 15	—
8	Inspect for a bent or cracked accessory drive brackets. Did you find any bent or cracked accessory drive brackets?	Go to Step 9	Go to Step 10
9	Replace the bent and/or cracked accessory drive brackets. Was the bent and/or cracked accessory drive brackets replaced?	Go to Step 15	—
10	Inspect for incorrect, loose, and/or missing fasteners. Were there any incorrect, loose, and/or missing fasteners found?	Go to Step 11	Go to Step 12
11	1. Replace any incorrect and/or missing fasteners. 2. Tighten any loose fasteners. Refer to <i>Fastener Tightening Specifications</i> . Were the fasteners replaced and/or tightened?	Go to Step 15	—
12	Inspect for a bent accessory drive pulleys. Was a bent accessory drive pulleys found?	Go to Step 13	Go to Step 14
13	Replace the bent accessory drive pulleys. Was the bent accessory drive pulleys replaced?	Go to Step 15	—
14	Replace the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Was the drive belts replaced?	Go to Step 15	—
15	1. Clear any codes. 2. Run the engine in order to verify the repair. Does the chirping noise still exist?	Go to Step 3	System OK

Diagnostic Information and Procedures

1399794

Drive Belt Squeal Diagnosis

Drive Belt:Squeal Diagnosis:Engine Mechanical - 4.8L, 5.3L and 6.0L

Diagnostic Aids

A loose or improper installation of a body, or suspension component, or other items on the vehicle may cause the squeal noise.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

If the noise is intermittent, verify that the accessory drive components by varying their loads, making sure they are operating to their maximum capacity. An overcharged air conditioning (A/C) system, a power steering system restriction, or the incorrect fluid, or a failing generator are suggested items to inspect.

Test Description

The numbers below refer to the steps in the diagnostic table.

2. The squeal may not be engine related. This step is to verify that the engine is making the noise. If the engine is not making the noise do not proceed further in this table.
3. The noise may be an internal engine noise. Remove the drive belts and operate the engine for a few seconds, this will verify if the squealing noise is related to the drive belts or an accessory drive component. With the drive belts removed the water pump will not operate and the engine may overheat. Also diagnostic trouble codes (DTCs) may set when the engine is operated with the drive belts removed.
4. This test is to verify that an accessory drive components does not have a seized bearing. With the belts removed, test the bearings in the accessory drive components for smooth operation. Also test the accessory drive components with the engine operating by varying the load on the accessory drive components to verify that the components is operating properly.
5. This test is to verify that the drive belts tensioners is operating properly. If the drive belts tensioners is not operating properly, proper belt tension may not be achieved to keep the drive belt from slipping which could cause a belt squeal noise.
6. This test is to verify that the drive belts is not too long, which would prevent the drive belts tensioners from operating properly. Also if the incorrect length drive belts was installed, it may not be routed correctly and may be turning an accessory drive component in the incorrect direction.
7. Misalignment of the accessory drive pulleys may be caused from improper mounting or incorrect installation of a accessory drive component, or the pulley is bent inward or outward from a previous repair. Test for a misaligned pulley using a straight edge in the pulley grooves across 2 or 3 pulleys. If a misaligned pulley is found, refer to that accessory drive component for the proper removal and installation procedure for that pulley.
8. Inspect the accessory drive pulleys to verify that they are the correct diameter or width. Using a known good vehicle, compare the pulley sizes.

Step	Action	Yes	No
<p>Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices.</p> <p>DEFINITION: The following items are indications of drive belt squeal:</p> <ul style="list-style-type: none"> • A loud screeching noise that is caused by a slipping drive belts; this is unusual for a drive belt with multiple ribs. • The noise occurs when a heavy load is applied to the drive belts, such as an air conditioning (A/C) compressor engagement, snapping the throttle, or slipping on a seized pulley, or a faulty accessory drive component. 			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to <i>Symptoms - Engine Mechanical</i>
2	Verify that there is a squealing noise. Does the engine make the squeal noise?	Go to Step 3	Go to Diagnostic Aids
3	<ol style="list-style-type: none"> 1. Remove the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i>. 2. Operate the engine for no longer than 30–40 seconds. Does the squealing noise still exist?	Go to <i>Engine Noise on Start-Up, but Only Lasting a Few Seconds Upper Engine Noise, Regardless of Engine Speed or Lower Engine Noise, Regardless of Engine Speed</i>	Go to Step 4
4	Inspect for a seized accessory drive component bearing or a faulty accessory drive component. Did you find and correct the condition?	Go to Step 9	Go to Step 5

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
5	Inspect the drive belt tensioner for proper operation. Refer to <i>Drive Belt Tensioner Diagnosis</i> . Did you find and correct the condition?	Go to Step 9	Go to Step 6
6	Check for the correct length drive belt. Did you find and correct the condition?	Go to Step 9	Go to Step 7
7	Inspect for misaligned pulley. Did you find and correct the condition?	Go to Step 9	Go to Step 8
8	Inspect for an incorrect size pulley. Did you find and correct the condition?	Go to Step 9	—
9	<ol style="list-style-type: none"> 1. Install the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . 2. Clear any codes. 3. Run the engine in order to verify the repair. Does the squealing noise still exist?	—	System OK

Diagnostic Information and Procedures

1399804

Drive Belt Whine Diagnosis

Drive Belt:Whine Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Diagnostic Aids

The drive belts will not cause the whine.

If the whine is intermittent, verify that it is not the accessory drive components by varying their loads, making sure they are operating to their maximum capacity. An overcharged air conditioning (A/C) system, a power steering system restriction, or the incorrect fluid, or a failing generator are suggested items to inspect.

Test Description

The numbers below refer to the steps in the diagnostic table.

3. This test is to verify that the whine is being caused by the accessory drive components. Remove the drive belts and operate the engine for a few second, this will verify if the whining noise is related to the accessory drive component. With the drive belts removed the water pump will not operate and the engine may overheat. Also diagnostic trouble codes (DTCs) may set when the engine is operated with the drive belts removed.

4. The inspection should include checking the drive belt tensioner and the drive belt idler pulley bearings. The drive belts may have to be installed and the accessory drive components operated separately by varying their loads. Refer to the suspected accessory drive component for the proper removal and installation procedure.

Step	Action	Yes	No
Notice: Refer to <i>Belt Dressing Notice in Cautions and Notices</i> . DEFINITION: A high pitched continuous noise that may be caused by an accessory drive component failed bearing.			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to <i>Symptoms - Engine Mechanical</i>
2	Verify that there is a whining noise. Does the engine make the whining noise?	Go to Step 3	Go to Diagnostic Aids

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
3	<ol style="list-style-type: none"> 1. Remove the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i>. 2. Operate the engine for no longer than 30–40 seconds. Does the whining noise still exist?	Go to <i>Engine Noise on Start-Up, but Only Lasting a Few Seconds, Upper Engine Noise, Regardless of Engine Speed, or Lower Engine Noise, Regardless of Engine Speed</i>	Go to Step 4
4	<ol style="list-style-type: none"> 1. Inspect for a failed accessory drive component bearing. 2. Install the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i>. Did you find and correct the condition?	Go to Step 5	—
5	<ol style="list-style-type: none"> 1. Clear any codes. 2. Run the engine in order to verify the repair. Does the whining still exist?	—	System OK

Diagnostic Information and Procedures

1399808

Drive Belt Rumbling Diagnosis

Drive Belt:Rumbling Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Diagnostic Aids

Vibration from the engine operating may cause a body component or another part of the vehicle to produce a rumbling noise.

The drive belts may have a condition that can not be seen or felt. Sometimes replacing the drive belts may be the only repair for the symptom.

If after replacing the drive belts and completing the diagnostic table, the noise is only heard with the drive belts installed, there might be an accessory drive component failure. Varying the load on the accessory drive components may aid in identifying which accessory drive component is causing the rumbling noise.

Test Description

The numbers below refer to the steps in the diagnostic table.

2. This test is to verify that the symptom is present during diagnosing. Other vehicle components may cause a similar symptom.

3. This test is to verify that the drive belts is causing the rumbling. Rumbling may be confused with an internal engine noise due to the similarity in the description. Remove only one drive belt at a time if the vehicle has multiple drive belts. Operate the engine for a few seconds, this will verify if the rumbling noise is related to the drive belts or not. With the drive belts removed the water pump will not operate and the engine may overheat. Also diagnostic trouble codes (DTCs) may set when the engine is operated with the drive belts removed.

4. Inspect the drive belts to ensure that the drive belts is not the cause of the noise. Small cracks across the ribs of the drive belts will not cause the noise. Belt separation is identified by the plys of the belt separating, this may be seen at the edge of the belt or felt as a lump in the belt.

5. Small amounts of pilling is a normal condition and acceptable. When the pilling is severe the drive belts does not have a smooth surface for proper operation.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
<p>Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices.</p> <p>DEFINITION:</p> <ul style="list-style-type: none"> • A low pitch tapping, knocking, or thumping noise heard at or just above idle • Heard once per revolution of the drive belts or a pulleys • Rumbling may be caused from: <ul style="list-style-type: none"> – Pilling, the accumulation of rubber dust that forms small balls (pills) or strings in the drive belts pulley groove – The separation of the drive belts – A damaged drive belts 			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Engine Mechanical
2	Verify that there is a rumbling noise. Does the engine make the rumbling noise?	Go to Step 3	Go to Diagnostic Aids
3	<ol style="list-style-type: none"> 1. Remove the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . 2. Operate the engine for no longer than 30–40 seconds. Does the rumbling noise still exist?	Go to <i>Engine Noise on Start-Up, but Only Lasting a Few Seconds Upper Engine Noise, Regardless of Engine Speed, or Lower Engine Noise, Regardless of Engine Speed</i>	Go to Step 4
4	Inspect the drive belts for damage, separation, or sections of missing ribs. Were any of these conditions found?	Go to Step 7	Go to Step 5
5	Inspect for severe pilling of more than 1/3 of the drive belt groove depth. Do the drive belt grooves have pilling?	Go to Step 6	Go to Step 7
6	<ol style="list-style-type: none"> 1. Clean the drive belt pulleys using a suitable wire brush. 2. Reinstall the drive belt. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Did you complete the repair?	Go to Step 8	Go to Step 7
7	Install a new drive belt. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Did you complete the replacement?	Go to Step 8	—
8	<ol style="list-style-type: none"> 1. Clear any codes. 2. Run the engine in order to verify the repair. Does the rumbling noise still exist?	—	System OK

Diagnostic Information and Procedures

1399818

Drive Belt Vibration Diagnosis

Drive Belt:Vibration Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Diagnostic Aids

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

The accessory drive components may have an affect on engine vibration. An overcharged air conditioning (A/C) system, a power steering system restriction, or the incorrect fluid, or an extra load placed on the generator are suggested items to inspect. To help identify an intermittent or an improper condition, vary the loads on the accessory drive components.

Test Description

The numbers below refer to the steps in the diagnostic table.

2. This test is to verify that the vibration is present during diagnosing. Other vehicle components may cause a similar symptom such as the exhaust system, or the drivetrain.

3. This test is to verify that the drive belts or accessory drive components may be causing the vibration. Remove the drive belts and operate the engine for a few seconds, this will verify if the vibration is related to the drive belts or not. With the drive belts removed the water pump will not operate and the engine may overheat. Also diagnostic trouble codes (DTCs) may set when the engine is operated with the drive belts removed.

4. The drive belts may cause a vibration. While the drive belts is removed this is the best time to inspect the condition of the drive belts.

6. Inspection of the fasteners can eliminate the possibility that a incorrect bolt, nut, spacer, or washer was installed.

8. This step should only be performed if the fan is driven by the drive belt. Inspect the engine cooling fan for bent, twisted, loose, or cracked blades. Inspect the fan clutch for smooth operation. Inspect for a bent fan shaft or a bent mounting flange.

9. Inspect the water pump drive shaft for being bent. Also inspect the water pump bearings for smooth operation and excessive play. Compare the water pump with a known, good water pump.

10. Accessory drive component brackets that are bent, cracked, or loose may put an extra strain on that accessory component causing it to vibrate.

Step	Action	Yes	No
<p>Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices.</p> <p>DEFINITION: The following items are indications of drive belt vibration:</p> <ul style="list-style-type: none"> The vibration is engine-speed related. The vibration may be sensitive to accessory load. 			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to <i>Symptoms - Engine Mechanical</i>
2	Verify that the vibration is engine related. Does the engine make the vibration?	Go to Step 3	Go to Diagnostic Aids
3	<ol style="list-style-type: none"> Remove the drive belts. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i>. Operate the engine for no longer than 30–40 seconds. Does the engine still make the vibration?	Go to <i>Vibration Analysis - Engine</i> in Vibration Diagnosis and Correction	Go to Step 4
4	Inspect the drive belts for wear, damage, debris build-up and missing drive belt ribs. Were any of these conditions found?	Go to Step 5	Go to Step 6
5	Install a new drive belt. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Did you complete the replacement?	Go to Step 11	—
6	Inspect for incorrect, loose or missing fasteners. Were any of these conditions found?	Go to Step 7	Go to Step 8

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
7	<ol style="list-style-type: none"> 1. Replace the incorrect or missing fasteners. 2. Tighten any loose fasteners. Refer to <i>Fastener Tightening Specifications</i>. Were the fasteners replaced and/or tightened?	Go to Step 11	—
8	Inspect for damaged fan blades or a bent fan clutch shaft. Did you find and correct the condition?	Go to Step 11	Go to Step 9
9	Inspect for a bent water pump drive shaft. Did you find and correct the condition?	Go to Step 11	Go to Step 10
10	Inspect for a bent or cracked accessory drive brackets. Did you find and correct the condition?	Go to Step 11	—
11	<ol style="list-style-type: none"> 1. Clear any codes. 2. Run the engine in order to verify the repair. Does the vibration still exist?	—	System OK

Diagnostic Information and Procedures

1399829

Drive Belt Falls Off Diagnosis

Drive Belt:Falls Off Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Diagnostic Aids

If the drive belts repeatedly fall off the accessory drive pulleys, this may be caused by pulley misalignment.

An extra load that is quickly applied or released by an accessory drive component may also cause the drive belts to fall off. Verify that the accessory drive components are operating properly.

If the drive belts are the incorrect length, the drive belt tensioners may not maintain the proper tension on the drive belts.

Test Description

The numbers below refer to the steps in the diagnostic table.

2. This inspection is to verify the condition of the drive belts. Damage may have occurred to the drive belts when the drive belts fell off the pulley. Inspect the drive belts for cuts, tears, sections of ribs missing, or damaged belt plies.

4. Misalignment of the accessory drive pulleys may be caused from improper mounting or incorrect installation of an accessory drive component, or the pulley may be bent inward or outward from a previous repair. Test for a misaligned pulley using a straight edge in the pulley grooves across 2 or 3 pulleys. If a misaligned pulley is found, refer to that accessory drive component for the proper removal and installation procedure of that pulley.

5. Inspection of the accessory drive pulleys should include inspecting for bends, dents or other damage that would prevent the drive belt from seating properly in the pulley grooves or on the smooth surface of a pulley when the back side of the drive belts are used to drive the pulley.

6. Accessory drive component brackets that are bent or cracked will also cause the drive belts to fall off.

7. Inspection of the fasteners can eliminate the possibility that an incorrect bolt, nut, spacer, or washer was installed. Missing, loose, or incorrect fasteners may cause pulley misalignment from the accessory drive brackets moving under load. Overtightening the fasteners may cause misalignment of the accessory component brackets.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Step	Action	Yes	No
Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices.			
DEFINITION: The drive belts fall off the pulleys or may not ride correctly on the pulleys.			
1	Did you review the Symptoms – Engine Mechanical diagnostic information, and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Engine Mechanical
2	Inspect for a damaged drive belt. Was a damaged drive belt found?	Go to Step 3	Go to Step 4
3	Install a new drive belt. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Do the drive belts continue to fall off?	Go to Step 4	System OK
4	Inspect for a misaligned accessory drive pulley. Did you find and correct the condition?	Go to Step 12	Go to Step 5
5	Inspect for a bent or dented accessory drive pulley. Did you find and correct the condition?	Go to Step 12	Go to Step 6
6	Inspect for a bent or a cracked accessory drive bracket. Did you find and correct the condition?	Go to Step 12	Go to Step 7
7	Inspect for incorrect, loose or missing fasteners. Were there any incorrect, loose and/or missing fasteners?	Go to Step 8	Go to Step 9
8	1. Replace any incorrect and/or missing fasteners. 2. Tighten any loose fasteners. Refer to <i>Fastener Tightening Specifications</i> . Does the drive belt continue to fall off?	Go to Step 9	System OK
9	Test the drive belt tensioner for correction operation. Refer to <i>Drive Belt Tensioner Diagnosis</i> . Does the drive belt tensioner operate correctly?	Go to Step 11	Go to Step 10
10	Replace the drive belt tensioner. Refer to <i>Drive Belt Replacement - Accessory</i> or <i>Drive Belt Replacement - Air Conditioning</i> . Does the drive belt continue to fall off?	Go to Step 11	System OK
11	Inspect for a failed drive belt idler and drive belt tensioner pulley bearing. Did you find and repair the condition?	Go to Step 12	—
12	Run the engine in order to verify the repair. Does the drive belt still fall off?	—	System OK

Diagnostic Information and Procedures

1399838

Drive Belt Excessive Wear Diagnosis

Drive Belt:Excessive Wear Diagnosis:Engine Mechanical - 4.8L, 5.3L, and 6.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Diagnostic Aids

Excessive wear on a drive belts is usually caused by incorrect installation or the wrong drive belts for the application.

Minor misalignment of the drive belt pulleys will not cause excessive wear, but will probably cause the drive belts to make a noise or to fall off the pulleys.

Excessive misalignment of the drive belt pulleys will cause excessive wear and may also make the drive belts fall off the pulleys.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. The inspection is to verify that the drive belts is correctly installed over all of the drive belt pulleys. Wear on the drive belts may be caused by mis-positioning the drive belts by one groove on a pulley.

3. The installation of a drive belt that is too wide or too narrow will cause wear on the drive belts. The drive belt ribs should match all of the grooves on the pulleys.

4. This inspection is to verify the drive belts is not contacting any parts of the engine or body while the engine is operating. There should be sufficient clearance when the drive belt accessory drive components load varies. The drive belts should not come in contact with an engine or a body component when snapping the throttle.

Step	Action	Yes	No
Notice: Refer to <i>Belt Dressing Notice</i> in Cautions and Notices. DEFINITION: Wear at the outside ribs of the drive belts due to an incorrectly installed drive belts			
1	Did you review the Symptoms – Engine Mechanical diagnostic information and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Engine Mechanical
2	Inspect the drive belts for the proper installation. Refer to Drive Belt Replacement - Accessory or Drive Belt Replacement - Air Conditioning . Did you find this condition?	Go to Step 5	Go to Step 3
3	Inspect for the proper drive belt. Did you find this condition?	Go to Step 5	Go to Step 4
4	Inspect for the drive belt rubbing against a bracket, hose, or wiring harness. Did you find and repair the condition?	Go to Step 6	Go to Diagnostic Aids
5	Replace the drive belt. Refer to Drive Belt Replacement - Accessory or Drive Belt Replacement - Air Conditioning . Did you complete the replacement?	Go to Step 6	—
6	Run the engine in order to verify the repair. Is there still excessive drive belt wear?	—	System OK

Diagnostic Information and Procedures

1399855

Drive Belt Tensioner Diagnosis

Drive Belt:Tensioner:Engine Mechanical - 4.8L, 5.3L, and 6.0L

Notice: Allowing the drive belt tensioner to snap into the free position may result in damage to the tensioner.

Important: When the engine is operating, the belt tensioner arm will move. Do not replace the belt tensioner because of movement in the belt tensioner arm.

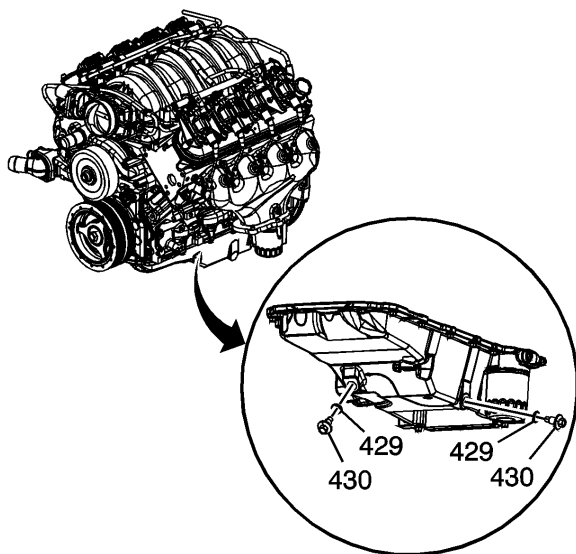
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1. Remove the drive belt. Refer to [Drive Belt Replacement - Accessory](#) or [Drive Belt Replacement - Air Conditioning](#).
2. Position a hex-head socket on the belt tensioner pulley bolt.
3. Move the belt tensioner through its full travel.
 - The movement should feel smooth.
 - There should be no binding.
 - The belt tensioner should return freely.
4. If any binding is observed, replace the drive belt tensioner. Refer to [Drive Belt Tensioner Replacement - Accessory](#) or [Drive Belt Tensioner Replacement - Air Conditioning](#).
5. Install the drive belt. Refer to [Drive Belt Replacement - Accessory](#) or [Drive Belt Replacement - Air Conditioning](#).

Repair Instructions

1555028

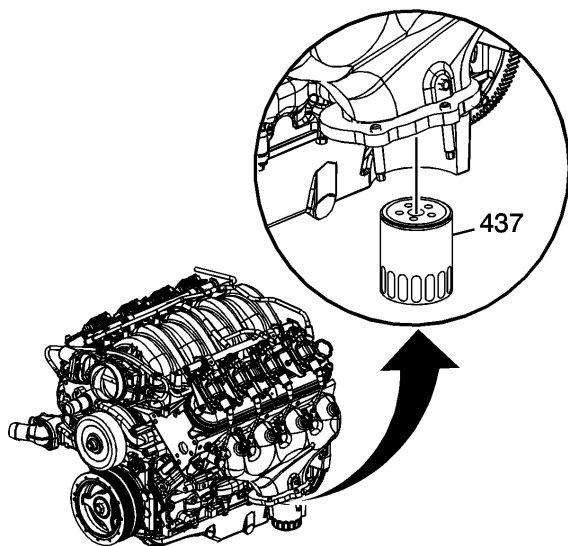
Draining Fluids and Oil Filter Removal



1552577

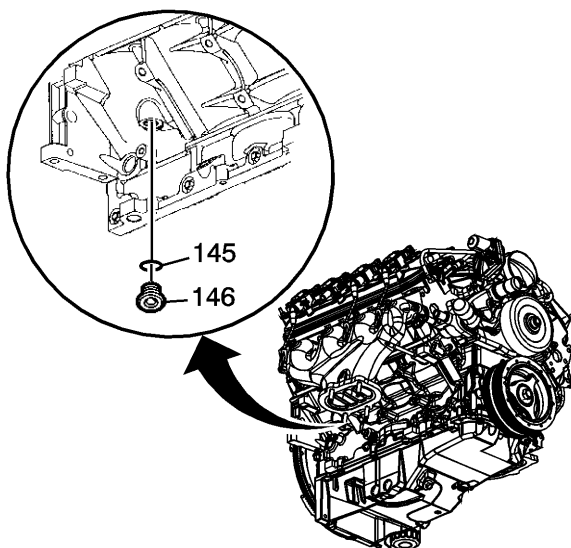
1. Remove the oil pan drain plugs (430).
 - The front bottom drain plug will drain approximately 6.5 L (6.9 qts) oil from the engine oil tank and hoses.
 - The left side drain plug will drain approximately 0.95 L (1.0 qt) oil from the engine oil pan.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552426

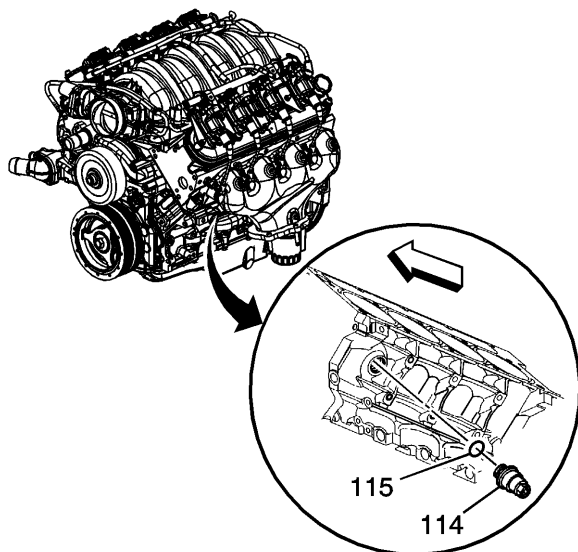
2. Remove the engine oil filter (437).



1552523

3. Remove the right side engine block coolant drain hole plug (146) and seal (145).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552524

4. Remove the engine block coolant heater (114) and seal (115).

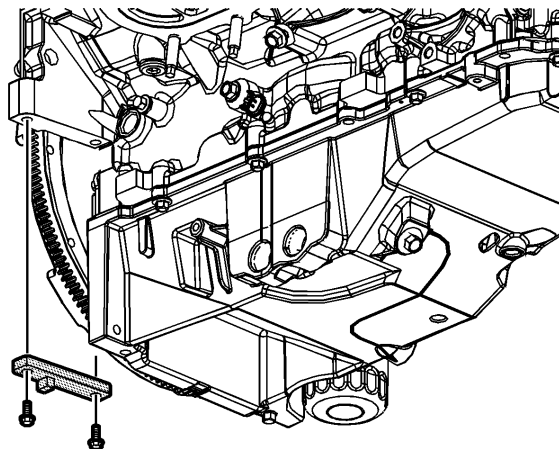
Repair Instructions

1555029

Crankshaft Balancer Removal

Tools Required

- [J 41816-A](#) Crankshaft Balancer Remover
- [J 41816-2](#) Crankshaft End Protector
- [J 42386-A](#) Flywheel Holding Tool



1552525

Notice: Refer to [Fastener Notice](#) .

Important:

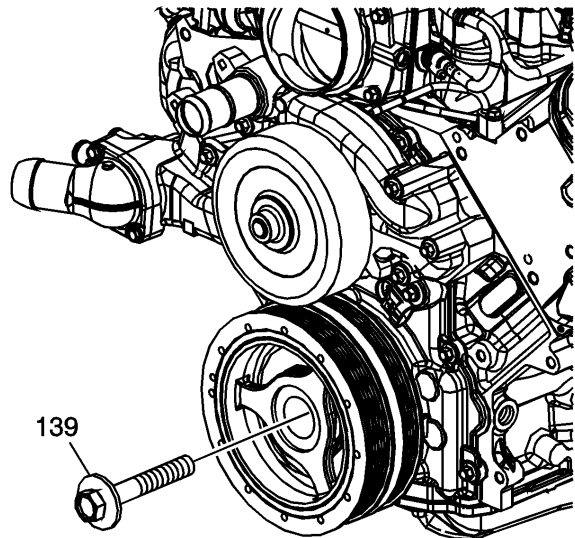
- Note the position of the crankshaft balancer before removal. The balancer does not use a key or keyway for positioning. Mark or scribe the end of the crankshaft and the balancer before component removal. Refer to [Engine Balancing](#) .

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Do not use the crankshaft balancer bolt during final assembly. Install a NEW crankshaft balancer bolt during final assembly.

1. Install the *J 42386-A* and bolts.
Use 1 M10 – 1.5x 120 mm and 1 M10 – 1.5x 45 mm bolt for proper tool operation.

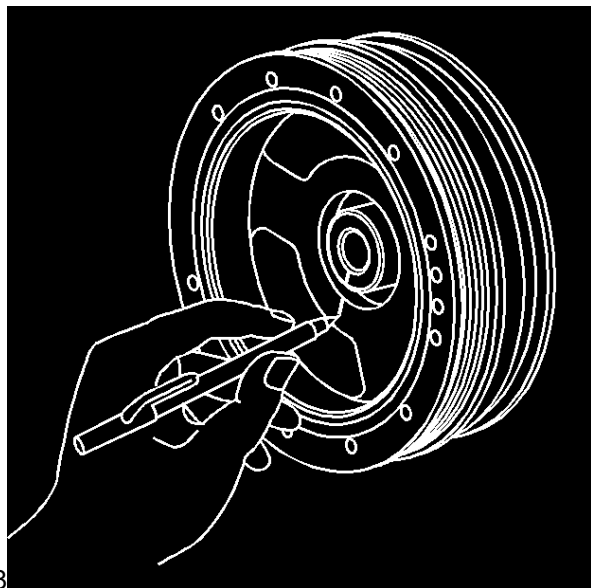
Tighten: Tighten the *J 42386-A* bolts to 50 N·m (37 lb ft).



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2. Remove the crankshaft balancer bolt (139).

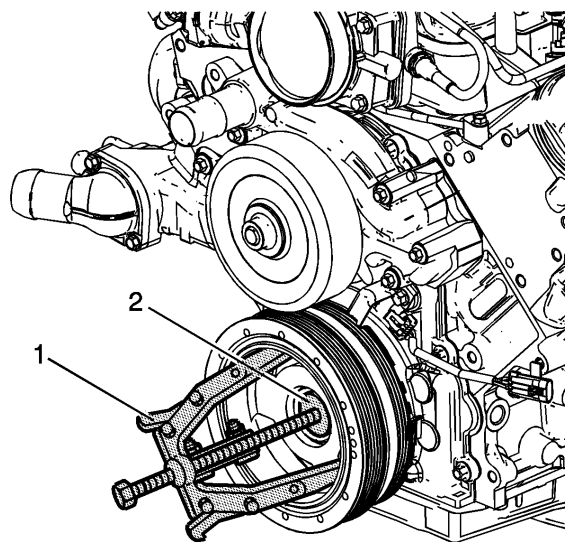
Do not discard the crankshaft balancer bolt. The balancer bolt will be used during the balancer installation procedure.



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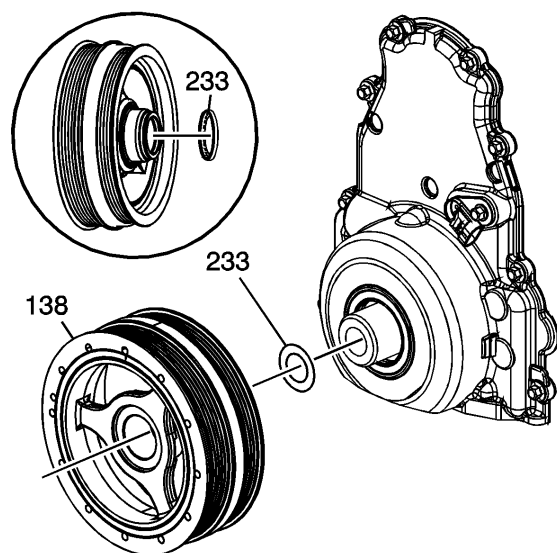
3. Mark or scribe the crankshaft balancer and the end of the crankshaft.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



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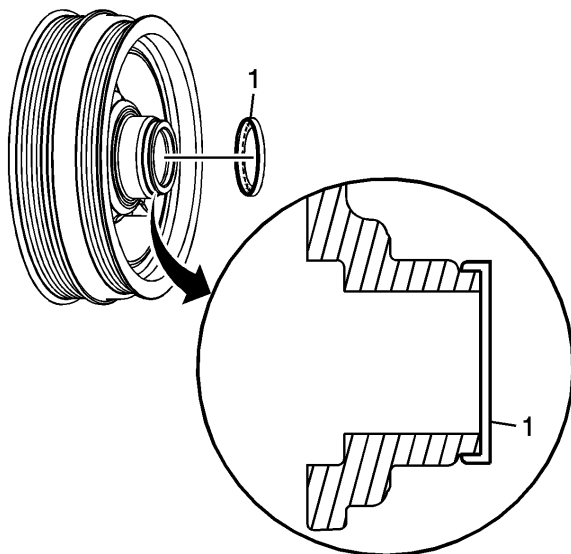
4. Use the [J 41816-A](#) (1) and the [J 41816-2](#) (2) in order to remove the crankshaft balancer.



1552474

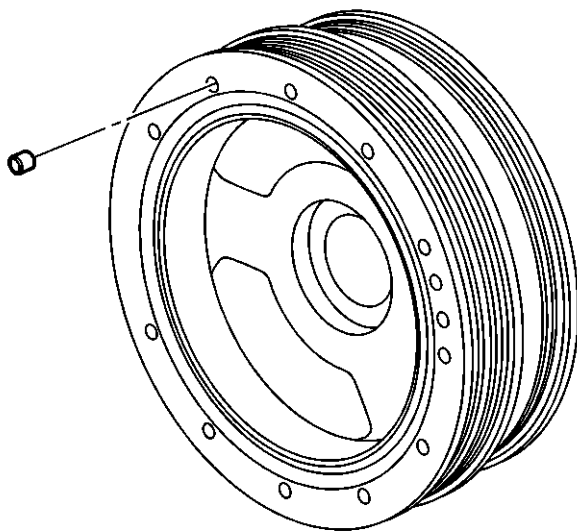
5. Remove the crankshaft balancer (138).
6. Remove the crankshaft balancer washer (233), as required. First design washers do not lock onto the balancer.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1759519

7. Remove the crankshaft balancer washer (1) from the balancer, as required.



63153

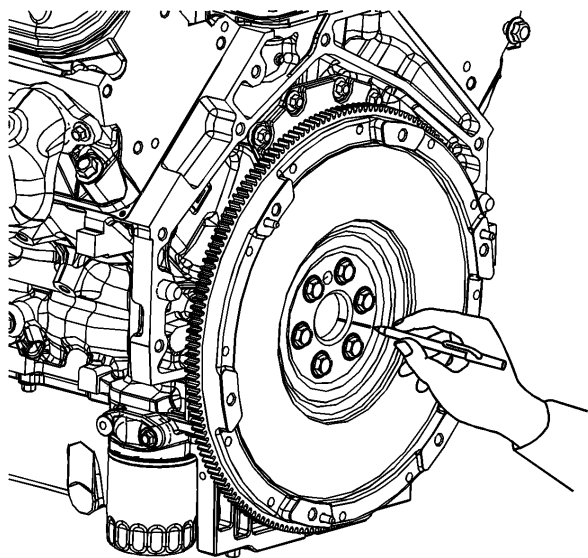
8. Note the position of the crankshaft balance weights, if applicable. Refer to *Engine Balancing* and *Crankshaft Balancer Cleaning and Inspection*.

Repair Instructions

1555030

Engine Flywheel Removal

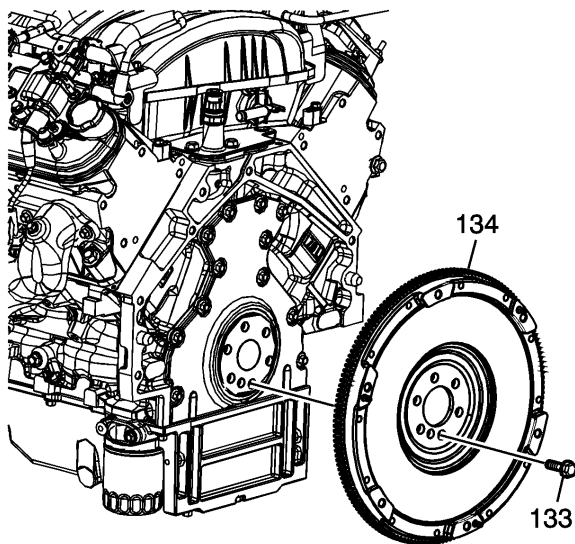
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552526

Important: Note the position and direction of the engine flywheel before removal. The flywheel does not use a locating pin for alignment. Mark or scribe the end of the crankshaft and the flywheel before component removal. Refer to [Engine Balancing](#).

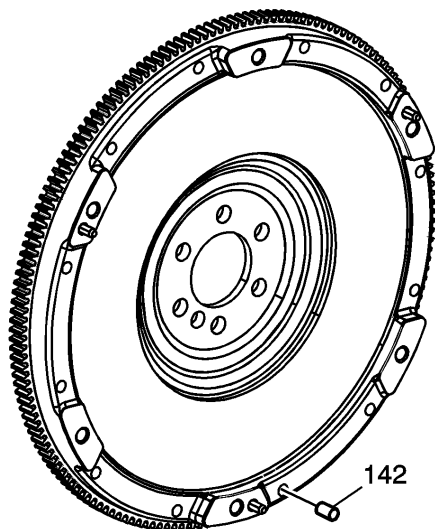
1. Mark or scribe the end of the crankshaft and the flywheel.



1552527

2. Remove the flywheel bolts (133).
3. Remove the flywheel (134).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552475

4. Note the location of the flywheel balance weights (142), if applicable.

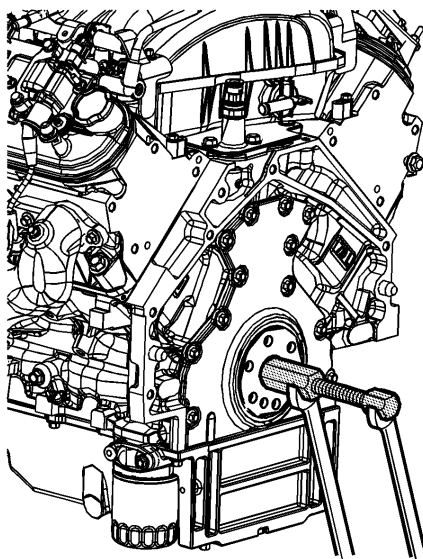
Repair Instructions

1555031

Clutch Pilot Bearing Removal

Tools Required

J 43276 Clutch Pilot Bearing Remover



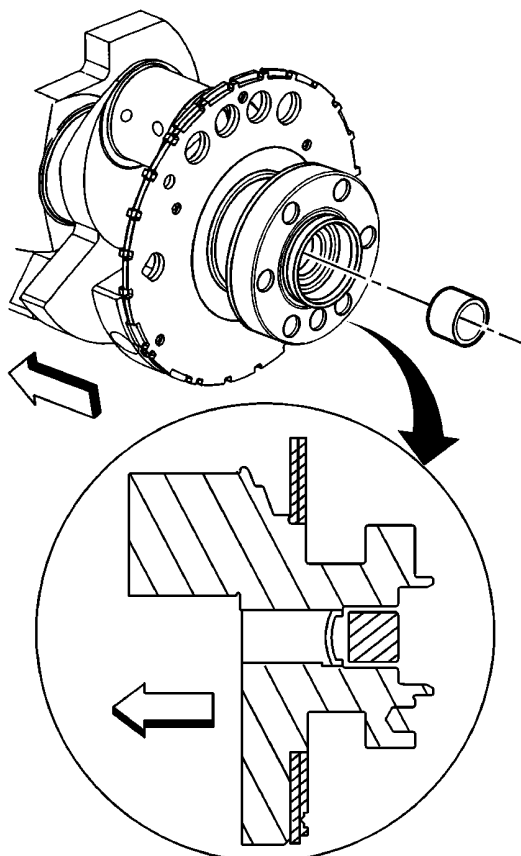
1552528

Notice: When using the *J 43276* Clutch Pilot Bearing Remover, always secure the *J 43276-1* Clutch Pilot Bearing Remover tool body using a wrench. Do not allow the *J 43276-1* tool body to rotate. Failing to do so causes damage to the *J 43276-1* tool body.

1. Remove the clutch pilot bearing using the *J 43276* .
 - 1.1. Install the *J 43276-1* into the clutch pilot bearing.
 - 1.2. Using a wrench, secure the *J 43276-1*.
 - 1.3. Insert the *J 43276-2* into the *J 43276-1*.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- 1.4. Rotate the J 43276-2 clockwise into the J 43276-1 until the clutch pilot bearing is completely removed from the crankshaft.
- 1.5. Rotate the J 43276-2 counterclockwise to remove the J 43276-2 from the J 43276-1.
- 1.6. Remove the J 43276-1 from the tool body.



63195

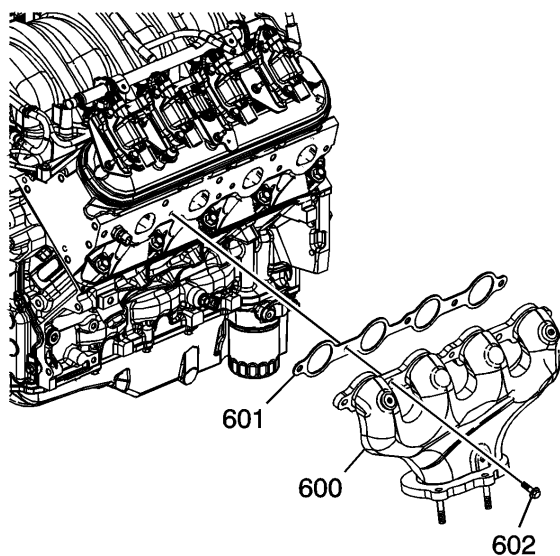
2. Discard the pilot bearing.

Repair Instructions

1555032

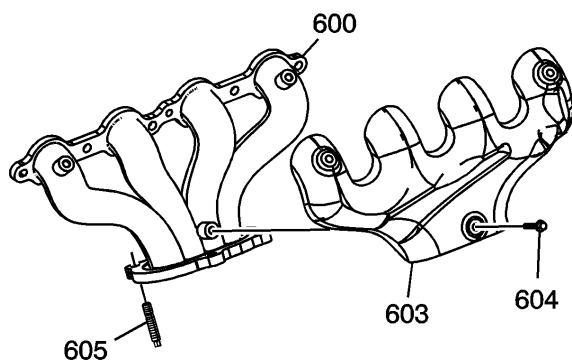
Exhaust Manifold Removal - Left Side

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552529

1. Remove the spark plug wires from the spark plugs.
2. Remove the exhaust manifold (600), bolts (602), and gasket (601).
3. Discard the gasket.



1552472

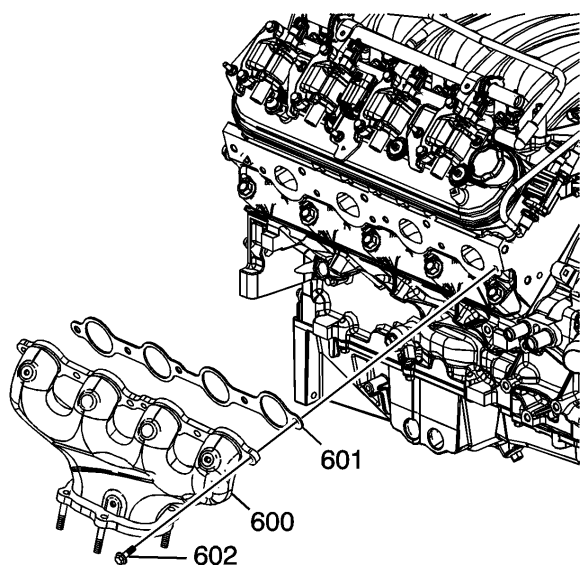
4. Remove the heat shield (603) and bolts (604) from the manifold (600), as required.
5. Remove the studs (605), as required.

Repair Instructions

1555034

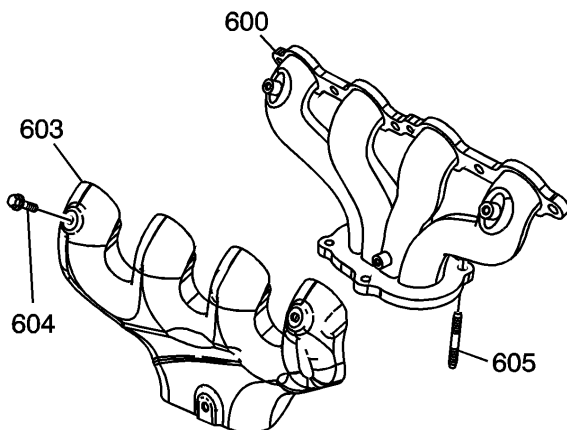
Exhaust Manifold Removal - Right Side

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552530

1. Remove the spark plug wires from the spark plugs.
2. Remove the exhaust manifold (600), bolts (602), and gasket (601).
3. Discard the gasket.



1552477

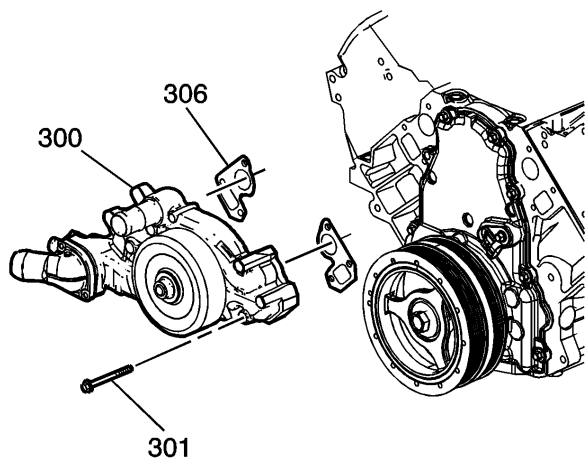
4. Remove the heat shield (603) and bolts (604) from the manifold (600), as required.
5. Remove the studs (605), as required.

Repair Instructions

1555035

Water Pump Removal

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



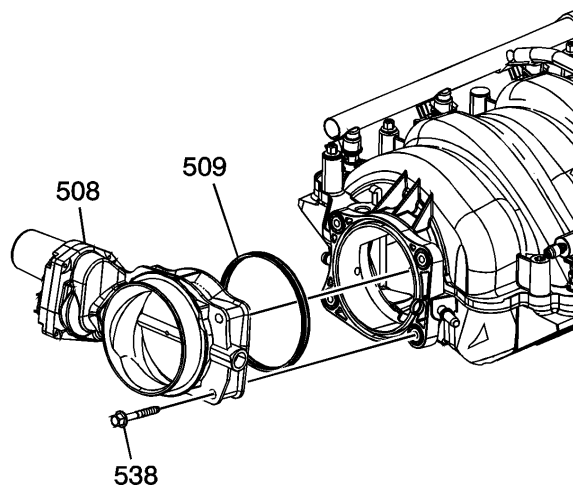
1552531

1. Remove the water pump bolts (301).
2. Remove the water pump (300) and gaskets (306).
3. Discard the water pump gaskets.

Repair Instructions

1555037

Throttle Body Removal



1552478

Notice: Handle the electronic throttle control components carefully. Use cleanliness in order to prevent damage. Do not drop the electronic throttle control components. Do not roughly handle the electronic throttle control components. Do not immerse the electronic throttle control components in cleaning solvents of any type.

Important: The intake manifold, throttle body, fuel injection rail, and fuel injectors may be removed as an assembly. If not servicing the individual components, remove the manifold as a complete assembly.

1. Remove the throttle body bolts (538).
2. Remove the throttle body (508).
3. Remove the throttle body gasket (509).

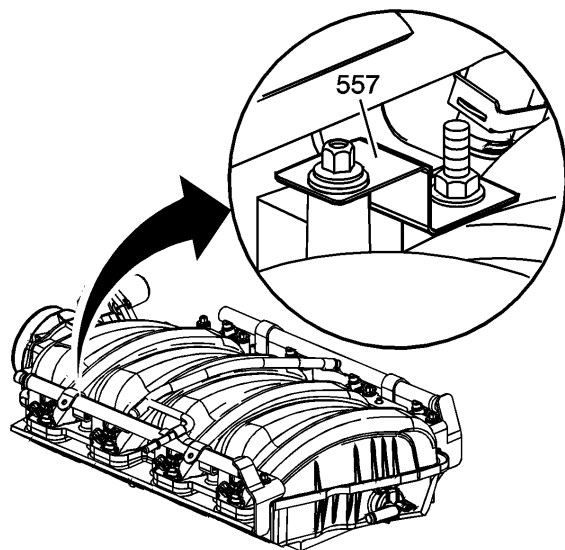
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

4. Discard the gasket.

Repair Instructions

1555038

Fuel Rail and Injectors Removal



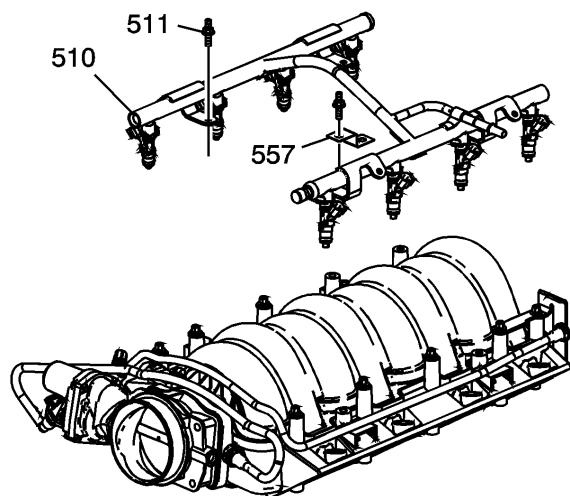
1552479

Caution: Refer to *Fuel Rail Stop Bracket Installation Caution* .

Important:

- The intake manifold, throttle body, fuel injection rail and fuel injectors may be removed as an assembly. If not servicing the individual components, remove the intake manifold as a complete assembly.
- Do not separate the fuel injectors from the fuel rail, unless component service is required.
- Use cleanliness and care when handling the fuel system components. Do not allow dirt or debris to enter the fuel injectors or fuel rail components. Cap ends as necessary.

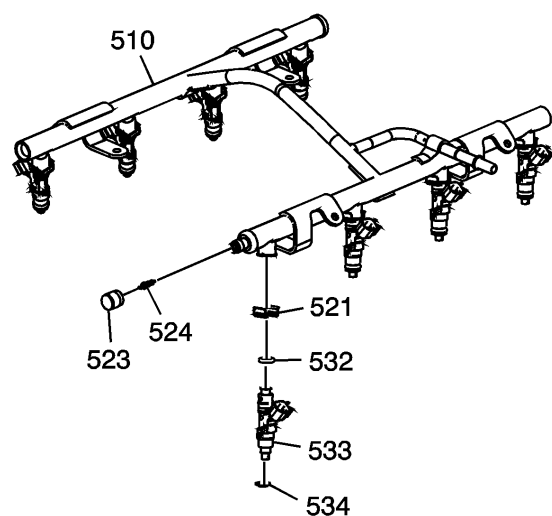
1. Note the location of the fuel rail ground strap (557).



1552480

2. Remove the bolts (511), ground strap (557), and fuel rail with injectors (510). Lift evenly on both sides of the fuel rail until all injectors have left their bores.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



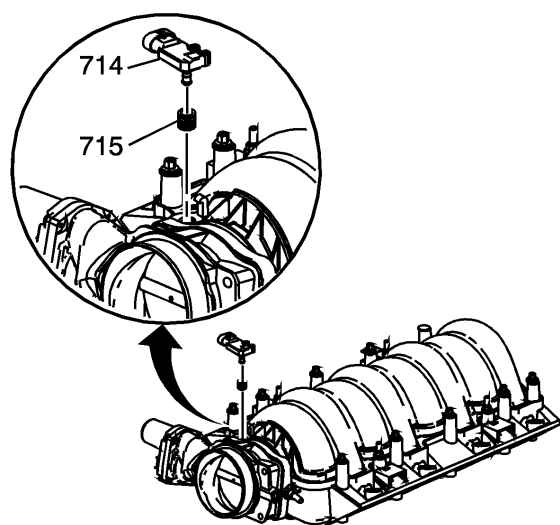
1552482

3. Remove the retainers (521) and fuel injectors (533).
4. Remove the O-rings (532, 534), as required.
5. Remove the cap (523) and service valve (524), as required.

Repair Instructions

1555039

Intake Manifold Removal

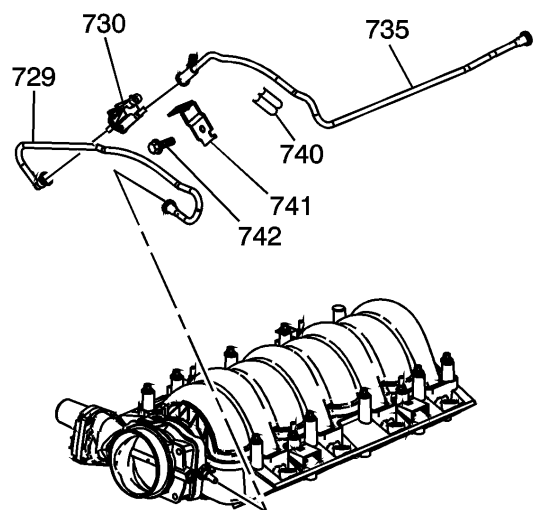


1408858

Important: The intake manifold, throttle body, fuel injection rail, and fuel injectors may be removed as an assembly. If not servicing the individual components, remove the manifold as a complete assembly.

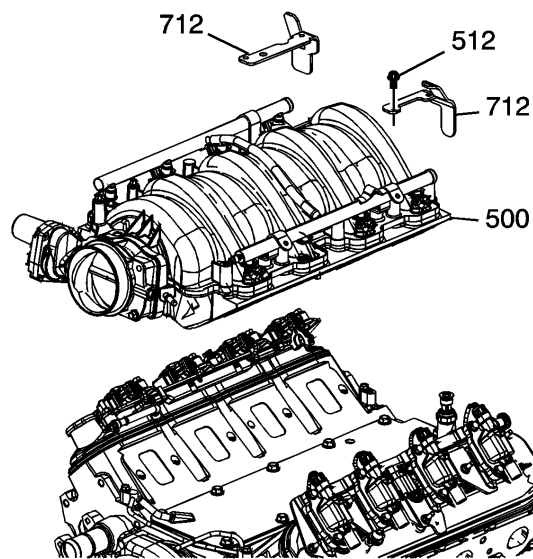
1. Remove the manifold absolute pressure (MAP) sensor (714).
2. Remove the seal (715) from the sensor, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408859

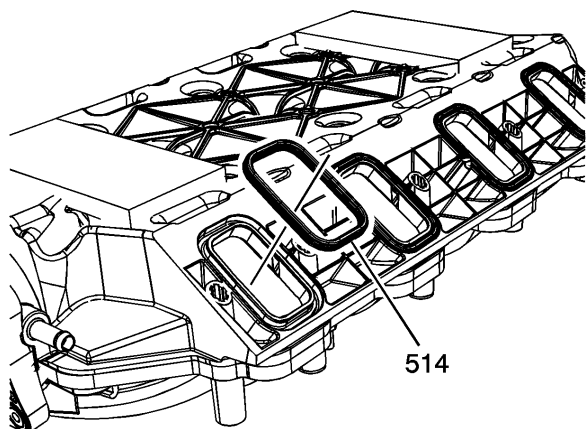
3. Remove the evaporative (EVAP) emission clip (740), bolt (742), bracket (741), canister purge solenoid valve (730), and tubes (729, 735).



1552532

4. Remove the intake manifold bolts (512) and fuel rail stop brackets (712).
5. Remove the intake manifold (500).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



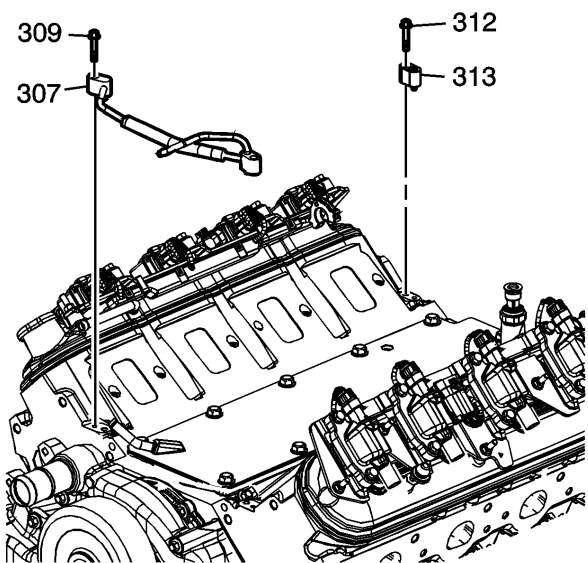
1552471

6. Remove the intake manifold gaskets (514).
7. Discard the intake manifold gaskets.

Repair Instructions

1555040

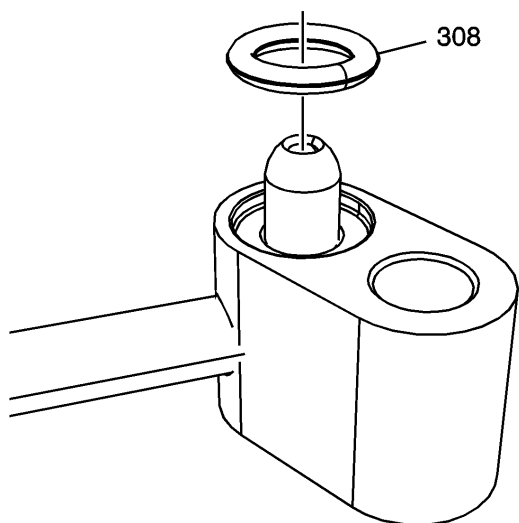
Coolant Air Bleed Pipe Removal



1552533

1. Remove the engine coolant air bleed pipe and cover bolts (309, 312).
2. Remove the pipe (307) and covers (313).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



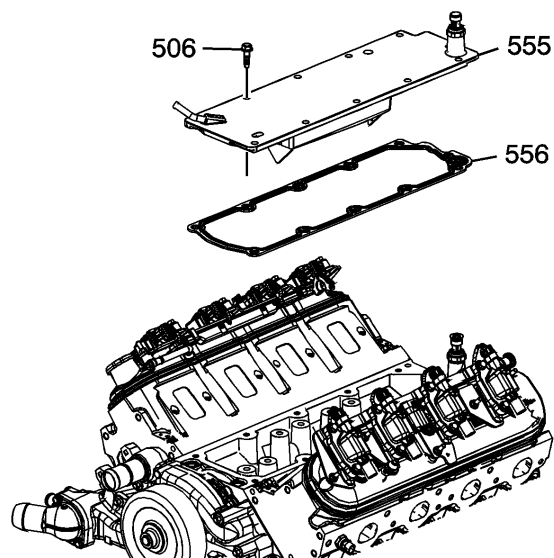
1552485

3. Remove the seals (308) from the pipe and covers.
4. Discard the seals.

Repair Instructions

1555041

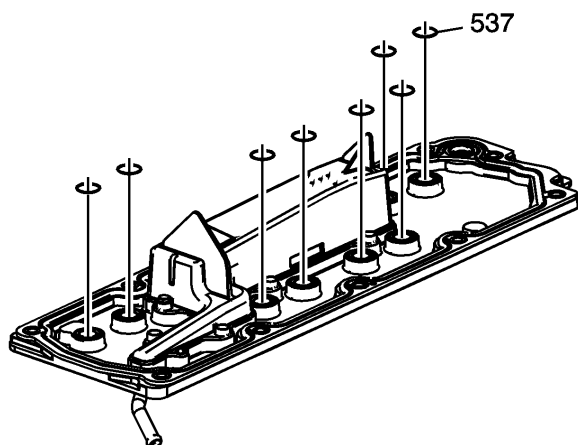
Engine Valley Cover Removal



1552535

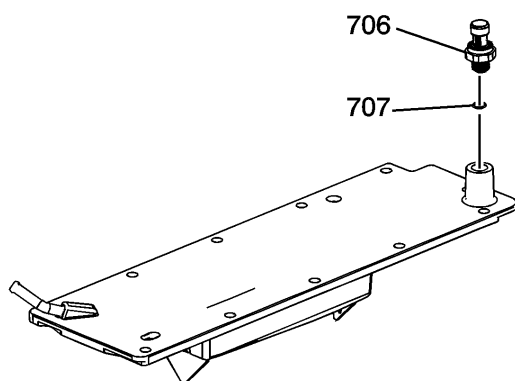
1. Remove the engine block valley cover bolts (506).
2. Remove the valley cover (555) and gasket (556).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552536

3. Remove the seals (537) from the cover.



1408864

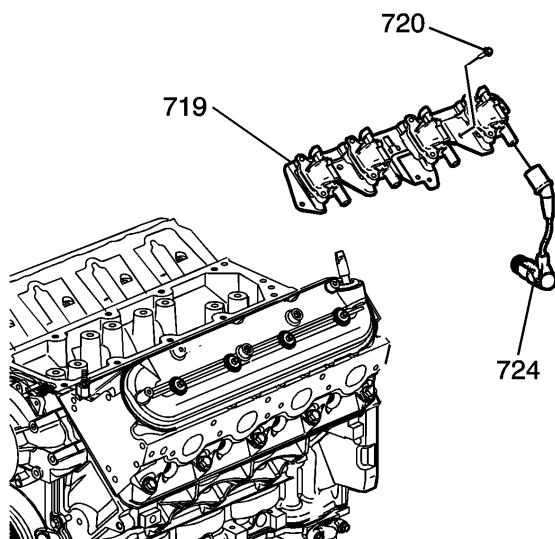
4. Remove the engine oil pressure sensor (706) and seal (707), as required.

Repair Instructions

1555042

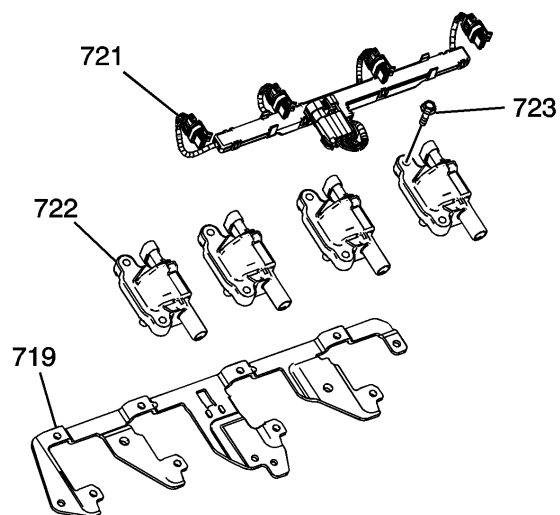
Valve Rocker Arm Cover Removal - Left Side

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408865

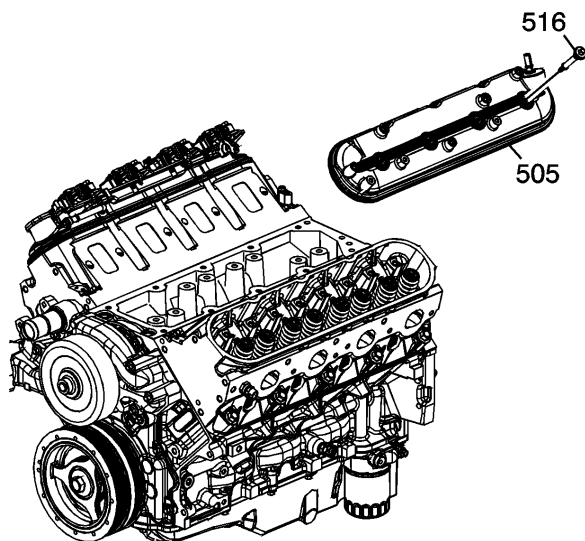
1. Remove the spark plug wires (724), as required.
2. Remove the ignition coil bracket studs (720).
3. Remove the ignition coil and bracket assembly (719).



1402020

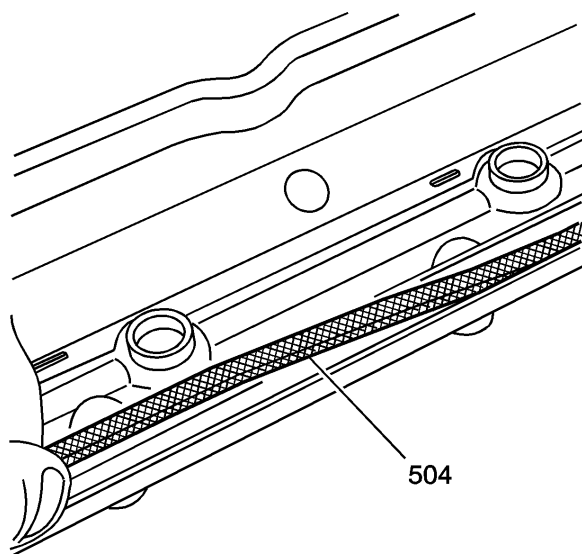
4. Disconnect the ignition coil electrical connectors.
5. Remove the bolts (723), coils (722), and wire harness (721) from the bracket, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552537

6. Remove the valve rocker arm cover bolts (516) and cover (505).



1272820

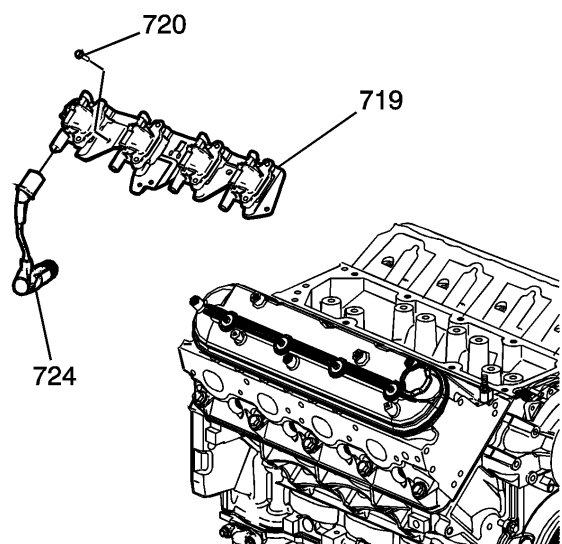
7. Remove the gasket (504) from the cover.

Repair Instructions

1555043

Valve Rocker Arm Cover Removal - Right Side

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

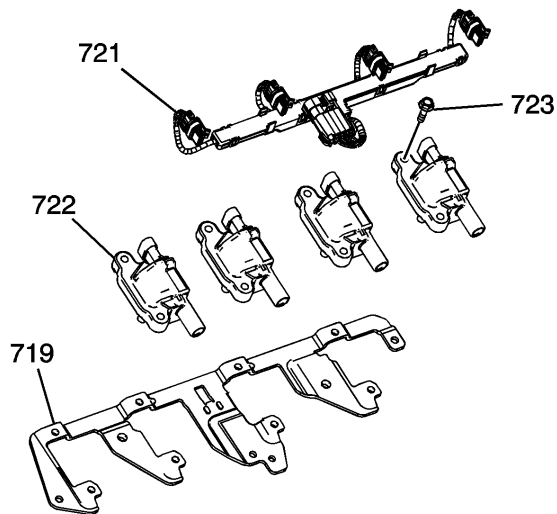


1552538

Important: Do not remove the oil cap from the cover, unless service is required. If the oil cap has been removed from the cover, the locking features of the cap will be damaged and no longer functional.

If the cap has been removed, install a NEW cap during assembly.

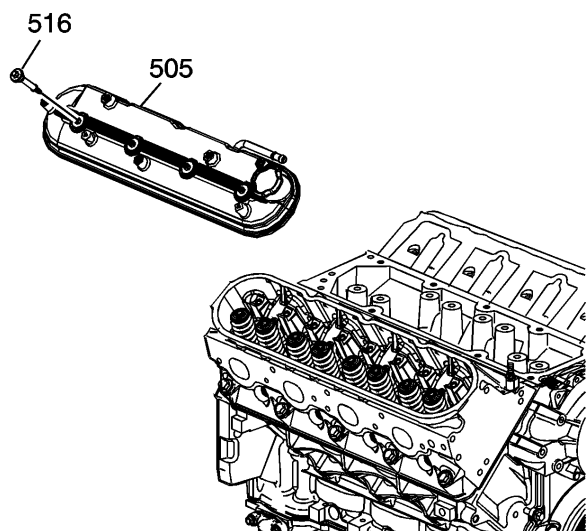
1. Remove the spark plug wires (724).
2. Remove the ignition coil bracket studs (720).
3. Remove the ignition coil and bracket assembly (719).



1402020

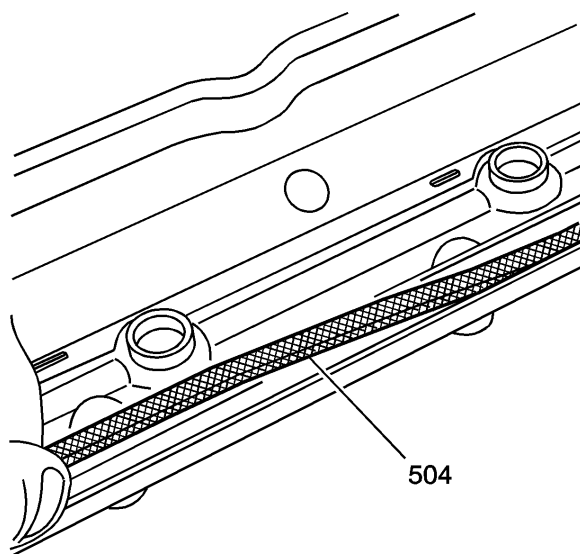
4. Disconnect the ignition coil electrical connectors.
5. Remove the bolts (723), coils (722), and wire harness (721) from the bracket, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552539

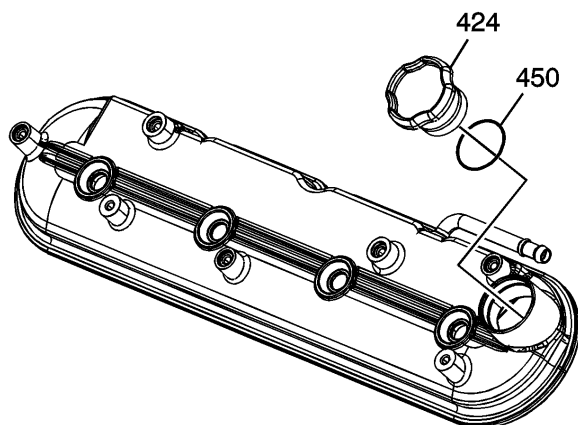
6. Remove the valve rocker arm cover bolts (516) and cover (505).



1272820

7. Remove the gasket (504) from the cover.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552540

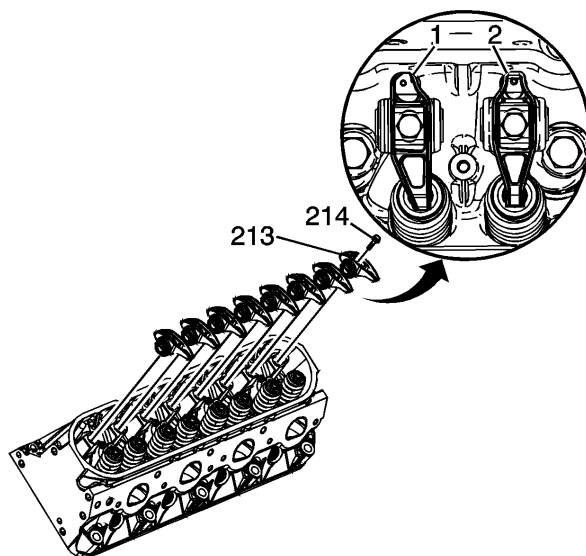
Important: If the oil cap is removed from the cover, install a NEW cap during assembly.

8. Remove the oil cap (424) and seal (450) from the cover, only if replacement is required.
9. Discard the oil cap.

Repair Instructions

1555044

Valve Rocker Arm and Push Rod Removal



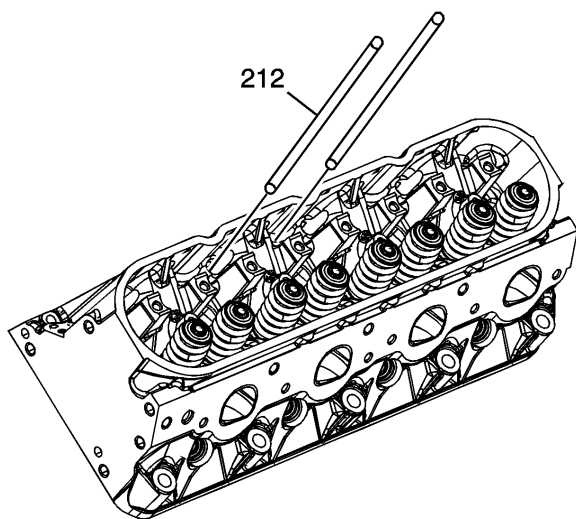
1552511

Important:

- Place the valve rocker arms and valve pushrods in a rack so they can be installed in the same location from which they were removed.
- Note the locations of the intake (1) and exhaust (2) valve rocker arms.

1. Remove the valve rocker arm bolts (214).
2. Remove the valve rocker arms (213).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



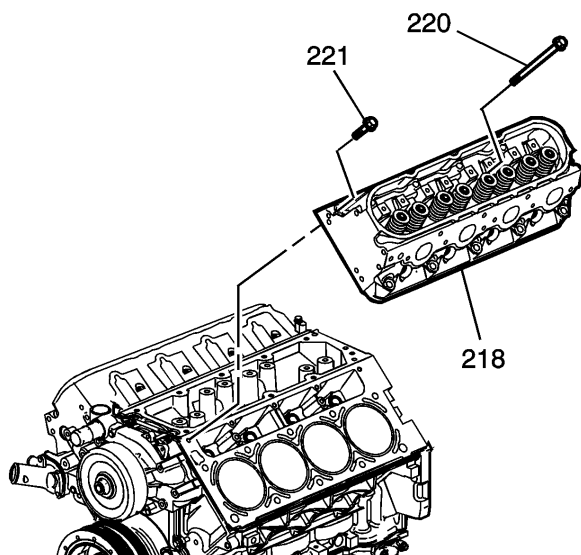
1552510

3. Remove the valve pushrods (212).

Repair Instructions

1555045

Cylinder Head Removal - Left Side



1408868

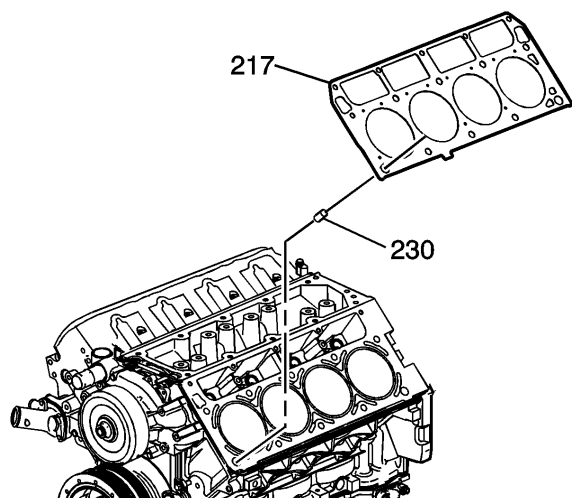
Important: The cylinder head bolts are of a torque-to-yield design and are NOT to be used again. Install NEW cylinder head bolts during assembly.

1. Remove the M8 and M11 cylinder head bolts (220, 221).

Notice: After removal, place the cylinder head on 2 wood blocks in order to prevent damage to the sealing surfaces.

2. Remove the cylinder head (218).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



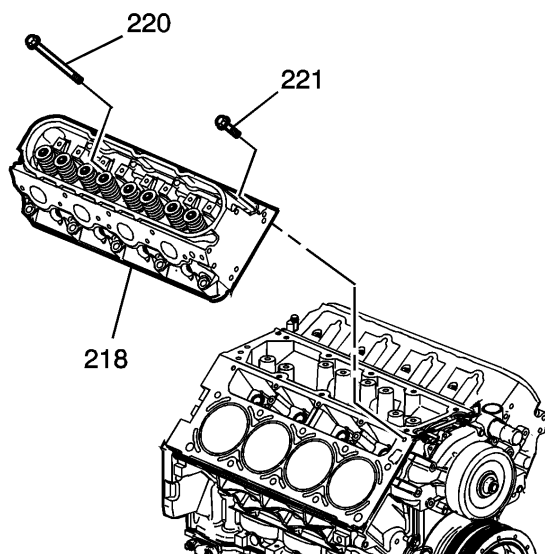
1408869

3. Remove the gasket (217) and locating pins (230).
4. Discard the gasket and cylinder head bolts.

Repair Instructions

1555046

Cylinder Head Removal - Right Side



1408870

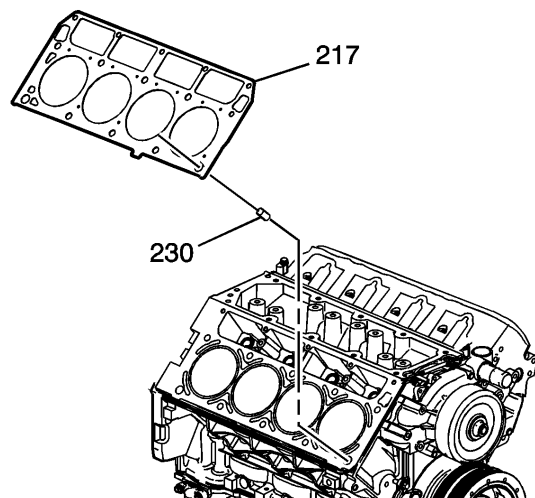
Important: The cylinder head bolts are of a torque-to-yield design and are NOT to be used again. Install NEW cylinder head bolts during assembly.

1. Remove the cylinder head bolts (220, 221).

Notice: After removal, place the cylinder head on 2 wood blocks in order to prevent damage to the sealing surfaces.

2. Remove the cylinder head (218).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



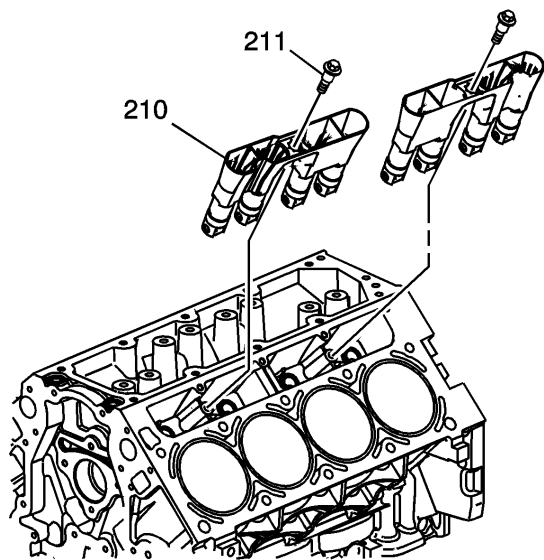
1408871

3. Remove the gasket (217) and locating pins (230).
4. Discard the gasket and cylinder head bolts.

Repair Instructions

1555047

Valve Lifter Removal

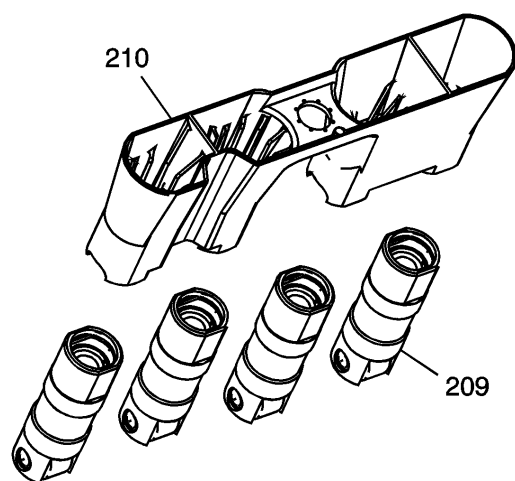


1403318

1. Remove the guide bolts (211).
2. Remove the guides (210) with lifters.

Note the installed position of the guides. The notched area of the guide is to align with the locating tab on the block.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



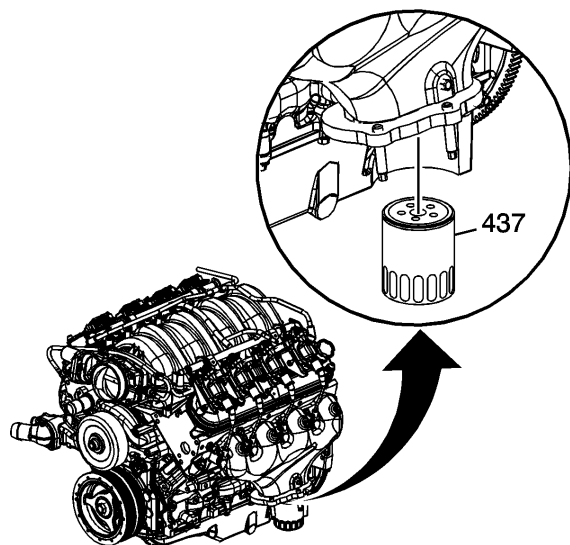
1403319

3. Remove the valve lifters (209) from the guide (210).
4. Organize or mark the components so they can be installed in the same location from which they were removed. Refer to [Separating Parts](#) .

Repair Instructions

1555609

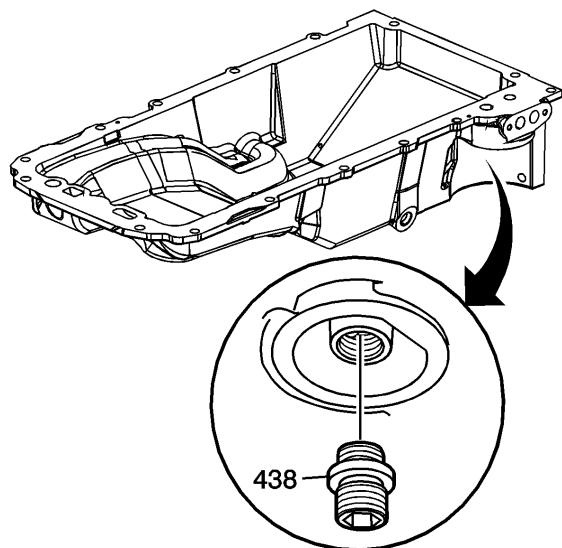
Oil Filter and Adapter Removal



1552426

1. Remove the oil filter (437).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



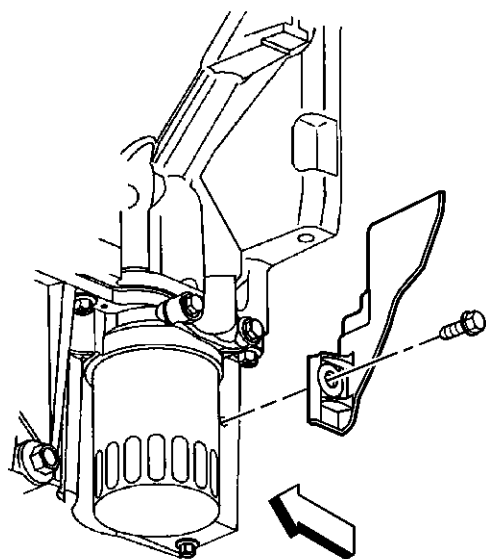
1552464

2. Remove the oil filter fitting (438), as required.

Repair Instructions

1555638

Oil Pan Removal

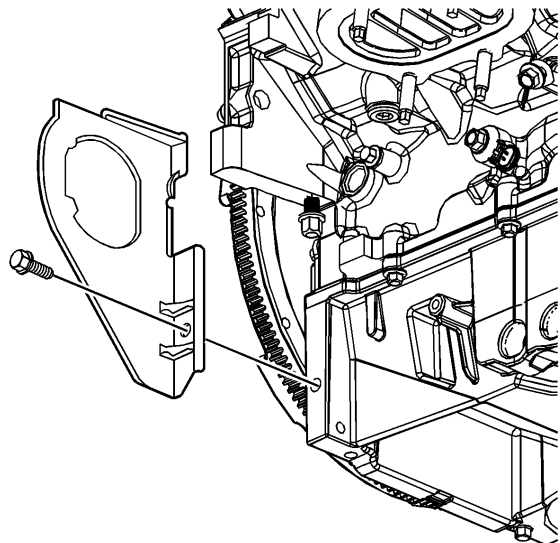


178477

Important:

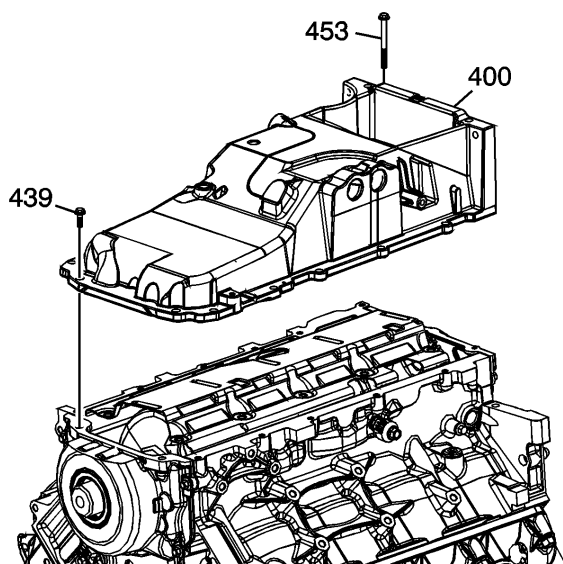
- The original oil pan gasket is retained and aligned to the oil pan by rivets. When installing a new gasket, it is not necessary to install new oil pan gasket rivets.
 - DO NOT use the oil pan gasket again. When installing the oil pan, install a NEW oil pan gasket.
1. Remove the left closeout cover and bolt.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552541

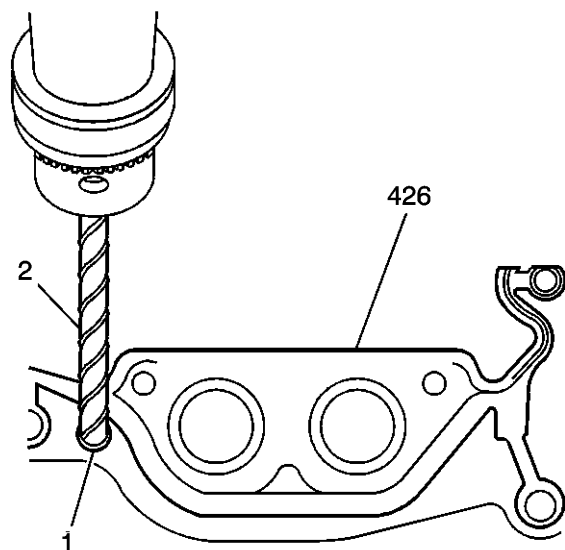
2. Remove the right closeout cover and bolt.



1552542

3. Remove the oil pan bolts (439, 453).
4. Remove the oil pan (400).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1272840

Important:

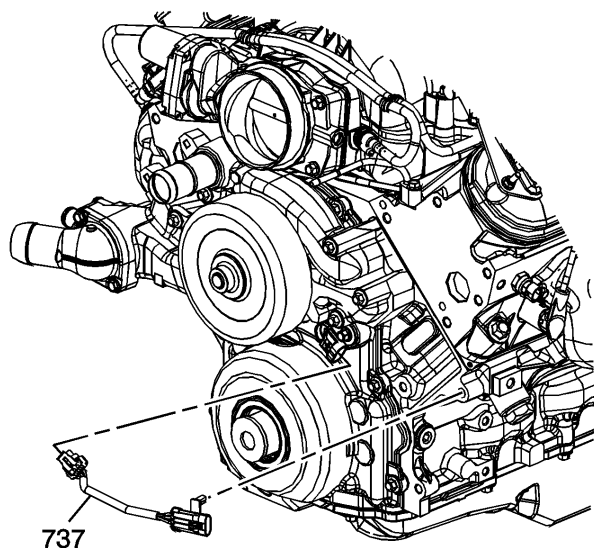
- DO NOT allow foreign material to enter the oil passages of the oil pan. Cap or cover the openings, as required.
- Use care not to gouge, score, or damage the oil pan sealing surface.

5. Drill (2) out the oil pan gasket retaining rivets (1), if required.
6. Remove the gasket (426) from the pan.
7. Discard the gasket and rivets.

Repair Instructions

1555645

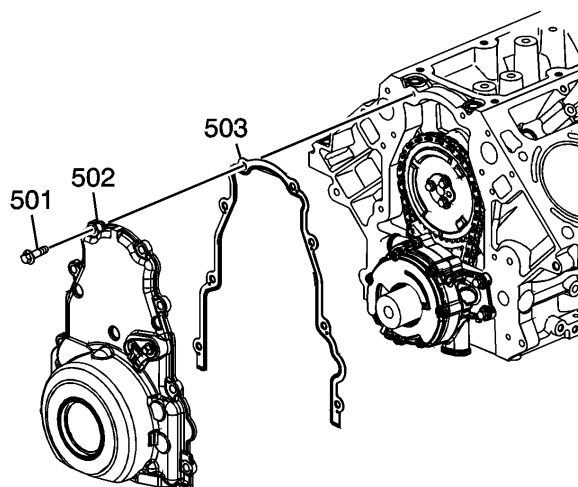
Engine Front Cover Removal



1669841

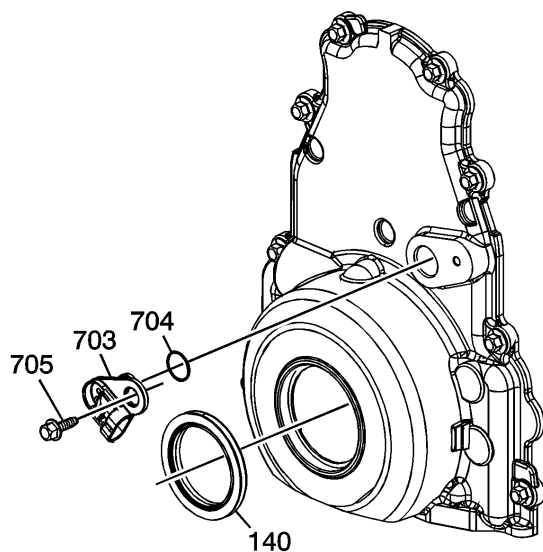
1. Remove the camshaft position (CMP) sensor wire harness (737).

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552543

2. Remove the front cover bolts (501).
3. Remove the front cover (502) and gasket (503).



1552506

4. Remove the oil seal (140).
5. Remove the bolt (705) and CMP sensor (703).
6. Remove the seal (704) from the sensor, as required.

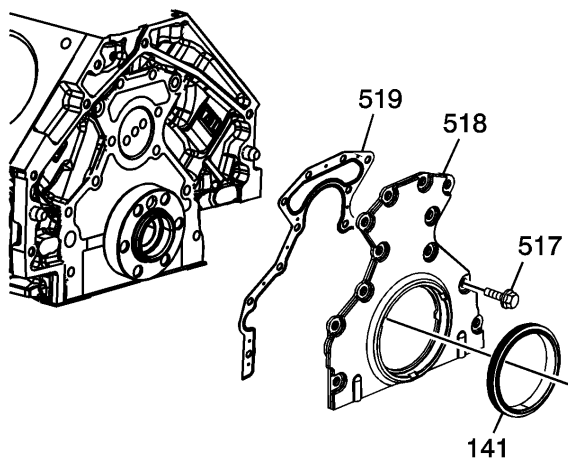
Repair Instructions

1555651

Crankshaft Rear Oil Seal Housing Removal

Crankshaft Rear Oil Seal Housing:Removal:Engine Mechanical - 7.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552544

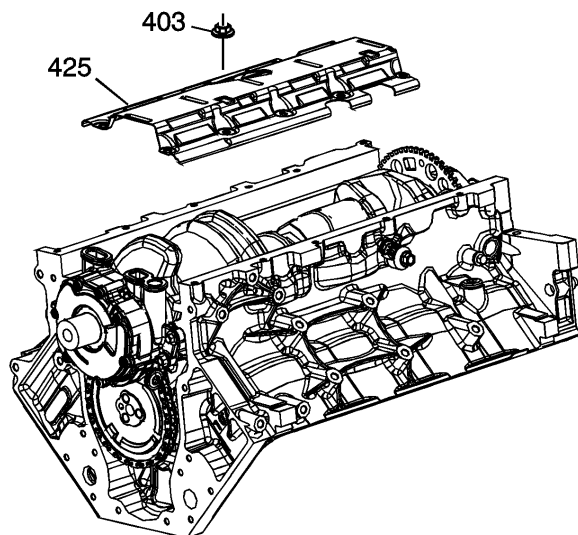
1. Remove the rear oil seal housing bolts (517).
2. Remove the housing (518) and gasket (519).
3. Remove the rear oil seal (141).

Repair Instructions

1555656

Oil Pump and Crankshaft Oil Deflector Removal

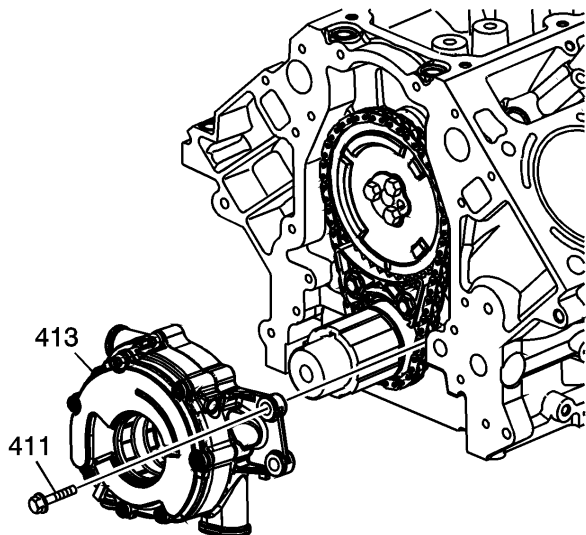
Oil Pump and Oil Deflector:Removal:Engine Mechanical - 7.0L



1552545

1. Remove the crankshaft oil deflector nuts (403).
2. Remove the crankshaft oil deflector (425).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552488

3. Remove the oil pump bolts (411).

Important: Do not allow dirt or debris to enter the oil pump assembly. Cap ends, as necessary.

4. Remove the oil pump (413).

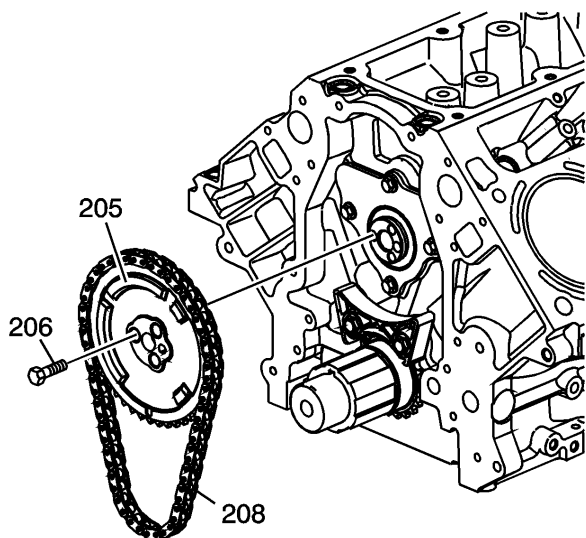
Repair Instructions

1555662

Timing Chain and Sprockets Removal

Tools Required

- *J 8433-1* Puller Bar
- *J 41558* Crankshaft Sprocket Remover
- *J-41558-10* Crankshaft Sprocket Remover Bolts
- *J 41816-2* Crankshaft End Protector

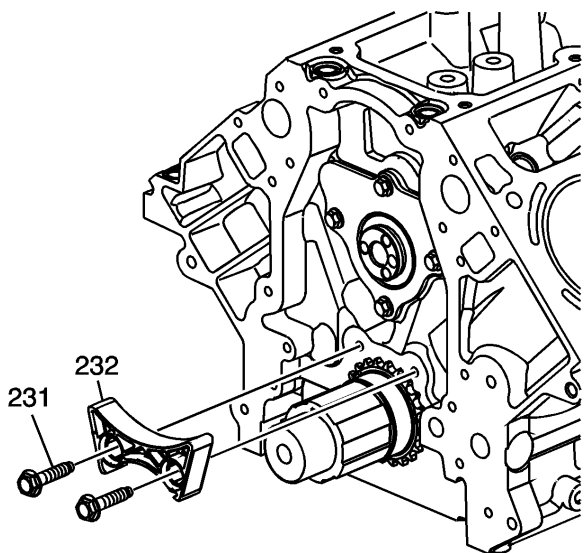


1552489

Notice: Do not turn the crankshaft assembly after the timing chain has been removed in order to prevent damage to the piston assemblies or the valves.

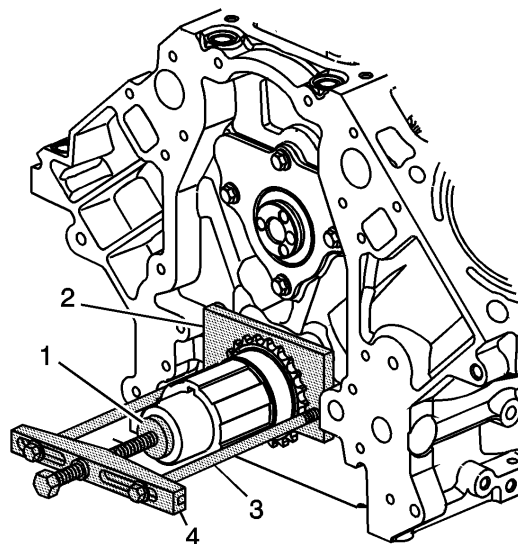
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1. Remove the camshaft sprocket bolts (206).
2. Remove the camshaft sprocket (205) and timing chain (208).



1552490

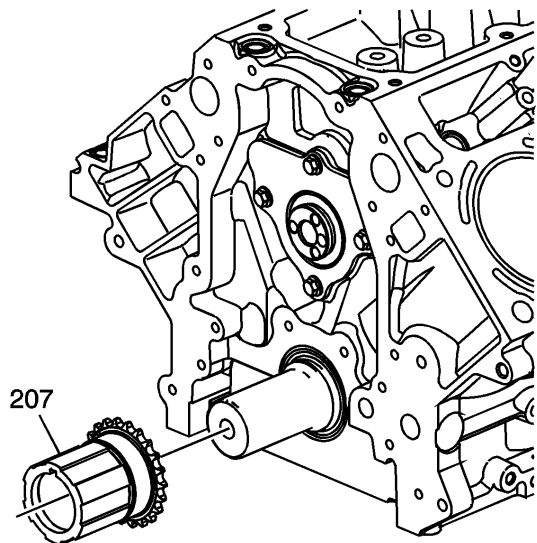
3. Remove the bolts (231) and chain dampener (232).



1552486

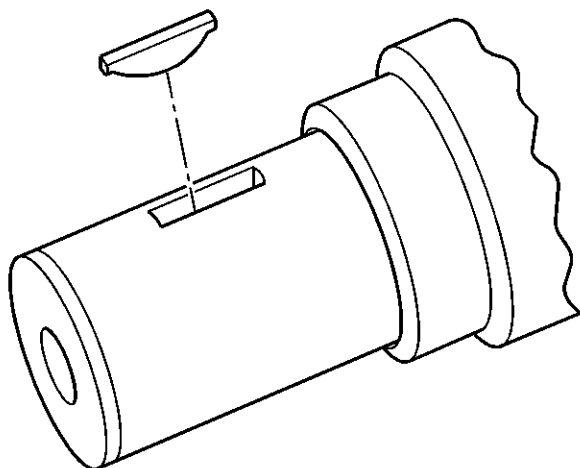
4. Use the *J 41816-2* (1), the *J 41558* (2), the *J-41558-10* (3) and the *J 8433-1* (4) in order to remove the crankshaft sprocket.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552487

5. Remove the crankshaft sprocket (207).



156149

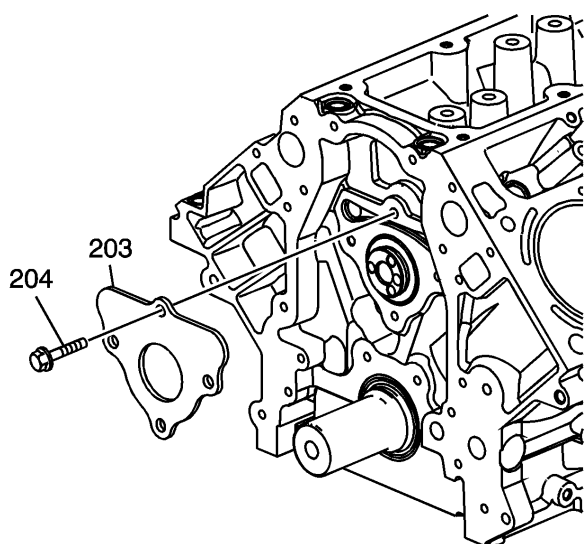
6. Remove the crankshaft sprocket key, as required.

Repair Instructions

1555667

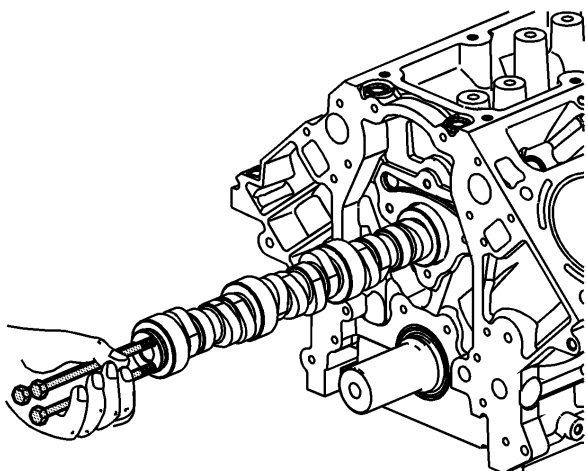
Camshaft Removal

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552492

1. Remove the camshaft retainer bolts (204) and retainer (203).



1552493

Notice: All camshaft journals are the same diameter, so care must be used in removing or installing the camshaft to avoid damage to the camshaft bearings.

2. Remove the camshaft.
 - 2.1. Install the 3 M8–1.25 x 100 mm bolts into the camshaft front bolt holes.
 - 2.2. Using the bolts as a handle, carefully rotate and pull the camshaft out of the engine block.
 - 2.3. Remove the bolts from the front of the camshaft.

Repair Instructions

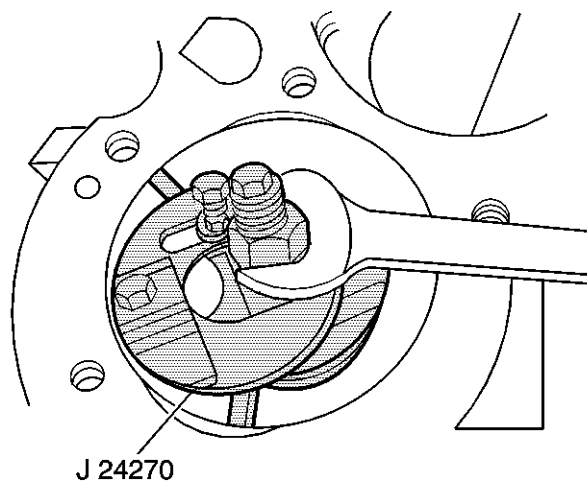
1555677

Piston, Connecting Rod, and Bearing Removal

Tools Required

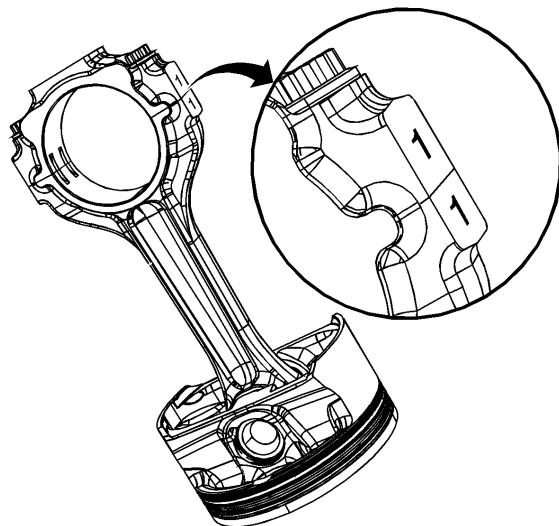
- *J 24270* Cylinder Bore Ridge Reamer
- *J 41556* Connecting Rod Guide

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



11497

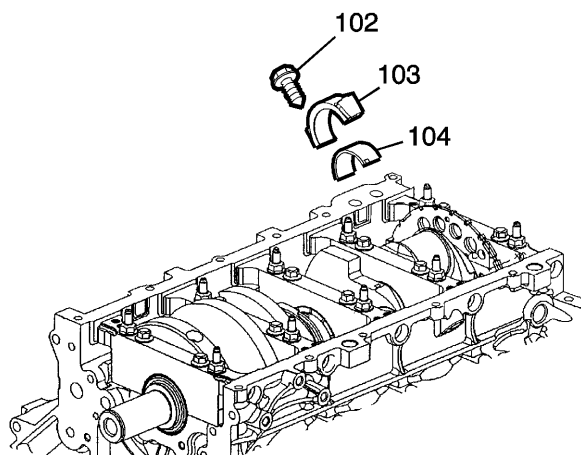
1. Use the [J 24270](#) in order to remove the cylinder bore ring ridge, if required.
 - 1.1. Turn the crankshaft until the piston is at the bottom of the stroke.
 - 1.2. Place a cloth on top of the piston.
 - 1.3. Use the [J 24270](#) , or equivalent, in order to remove a cylinder ring ridge.
 - 1.4. Turn the crankshaft so the piston is at the top of the stroke.
 - 1.5. Remove the cloth.
 - 1.6. Remove the cutting debris from the cylinder and piston.



1552546

2. Using a paint stick or etching tool, place matchmarks or numbers on the connecting rods and the connecting rod caps. The connecting rods and caps **MUST** be assembled to their original position and direction.
 - A stamping mark on the side of the connecting rod, at the crankshaft journal, may affect component geometry.
 - Mark the top of the piston to the specific cylinder bore.

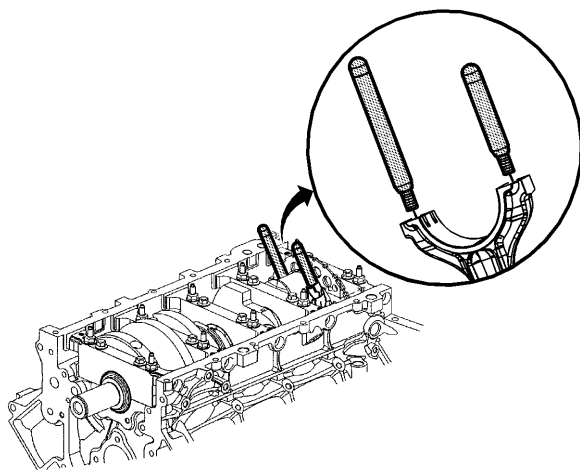
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552547

Important: Mark, sort, or organize the connecting rod bearings so they may be installed to their original position and location. The connecting rods and the bearing caps are NOT interchangeable. Refer to [Separating Parts](#).

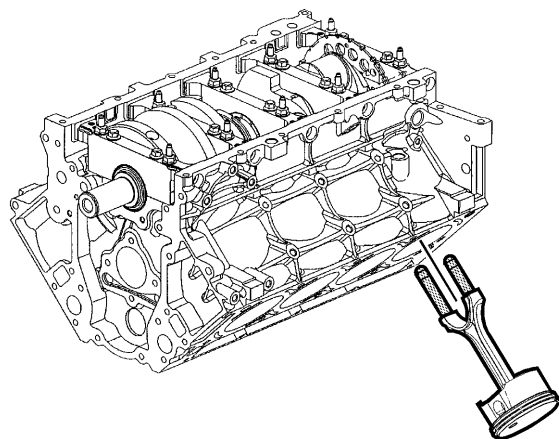
3. Remove the connecting rod bolts (102), cap (103) and bearing (104).



1552499

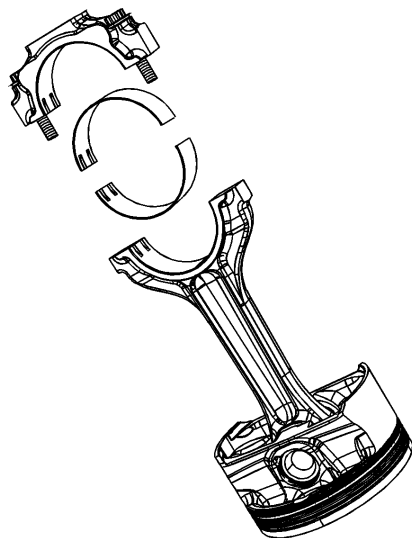
4. Install the [J 41556](#) to the connecting rod.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552548

5. Using a hammer, tap lightly on the end of the [J 41556](#) in order to remove the piston and connecting rod assembly from the cylinder bore.
6. Remove the [J 41556](#).



1552501

7. Upon removal of the piston and connecting rod assembly, assemble the connecting rod cap and bolts onto the matching connecting rod.

Repair Instructions

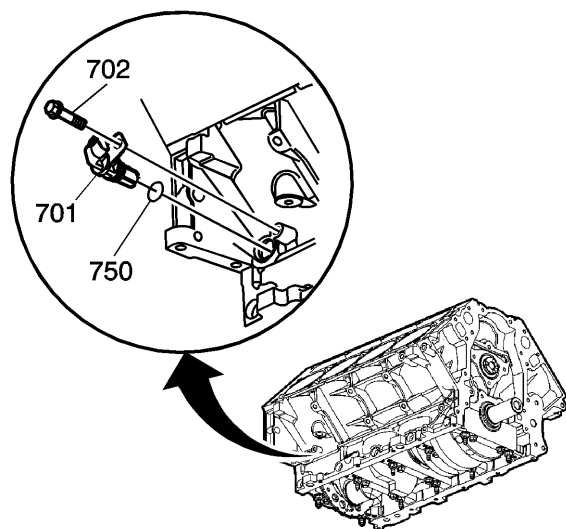
1555679

Crankshaft and Bearings Removal

Tools Required

- [J 6125-1B](#) Slide Hammer
- [J 41818](#) Crankshaft Bearing Cap Remover

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

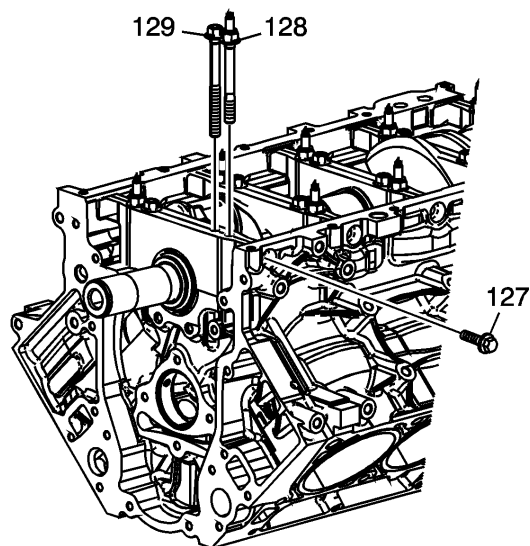


1402083

Important:

- The crankshaft bearing caps are machined with the engine block, for the proper clearances. Mark or identify each crankshaft bearing cap location and direction before removal. The crankshaft bearing caps **MUST** be installed to their original position and direction.
- Do not use the bearing cap M8 side bolt again.

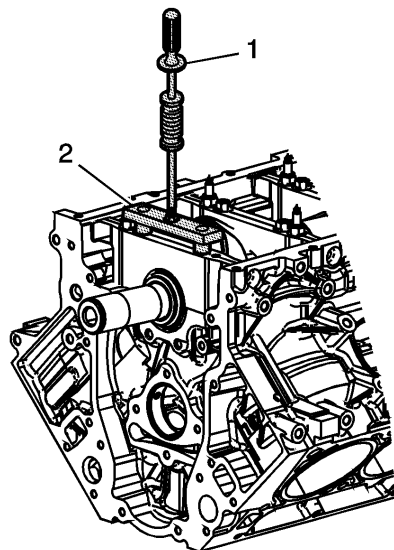
1. Remove the crankshaft position (CKP) sensor bolt (702).
2. Remove the CKP sensor (701).
3. Remove the O-ring (750) from the sensor, as required.



1552494

4. Remove the crankshaft bearing cap M8 side bolts (127).
5. Remove the bearing cap M10 bolts (129) and studs (128).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



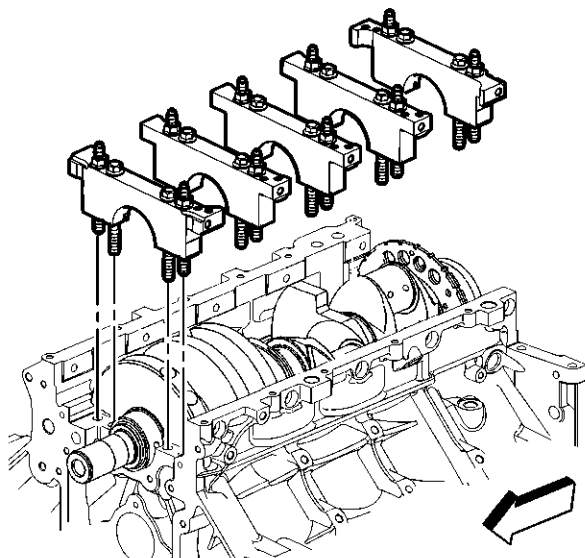
1552495

Notice: Refer to *Fastener Notice* .

6. Install the *J 41818* (2).

Tighten: Tighten the *J 41818* (2) bolts to 11 N·m (100 lb in).

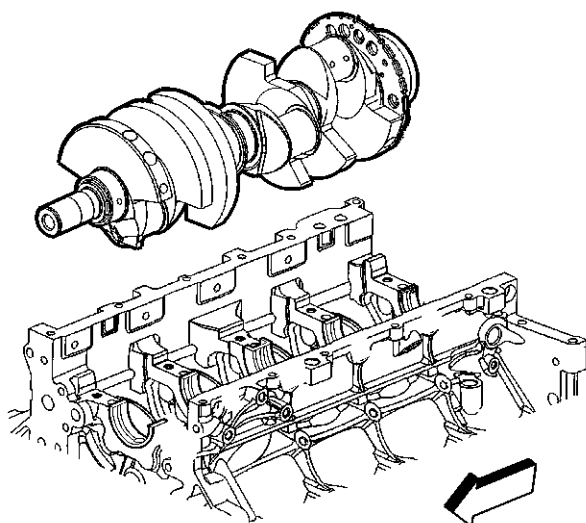
7. Install the *J 6125-1B* (1) to the *J 41818* (2) in order to remove the crankshaft bearing caps.



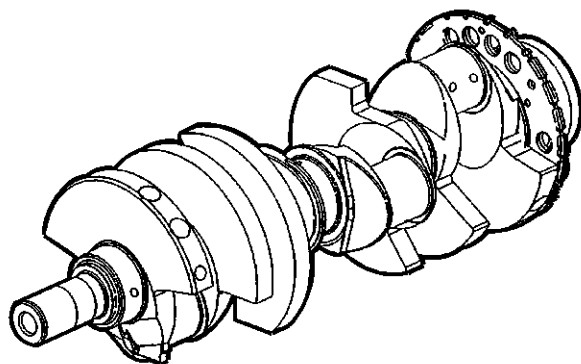
156152

8. Remove the bearing caps.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

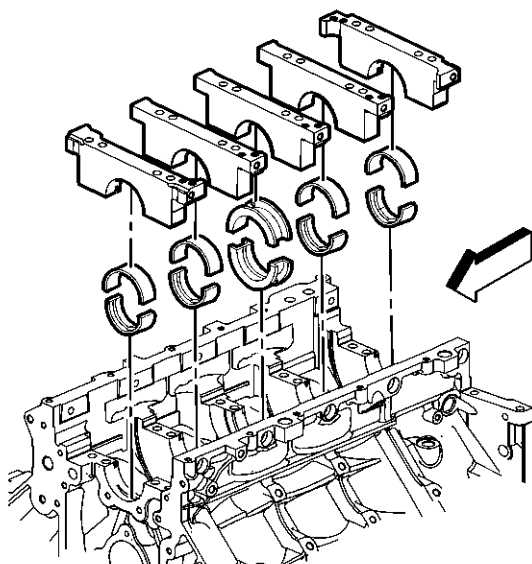


- 156151
9. Remove the crankshaft.



- 156153
- Important:** Use care when handling the crankshaft. Avoid damage to the crankshaft position sensor reluctor ring teeth. Nicks, burrs or other damage to the teeth may effect on-board diagnostics (OBD) II system performance.
10. Lay the crankshaft onto 2 wooden V-blocks or other protective surface.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



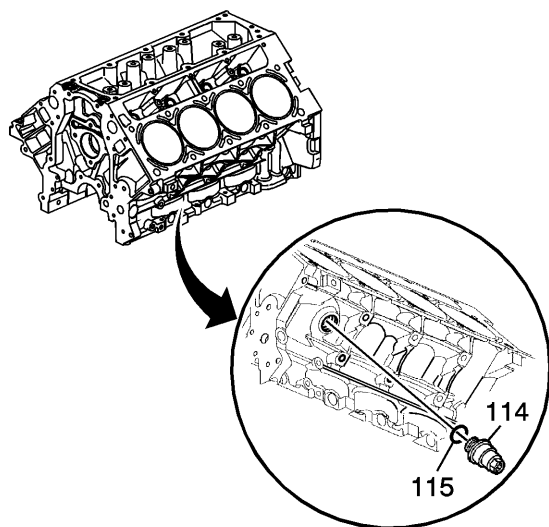
64293

11. Remove the crankshaft bearings from the bearing caps and the engine block.
12. Mark, sort, or organize the crankshaft bearings so they may be installed to their original position and location. Refer to [Separating Parts](#).

Repair Instructions

1555682

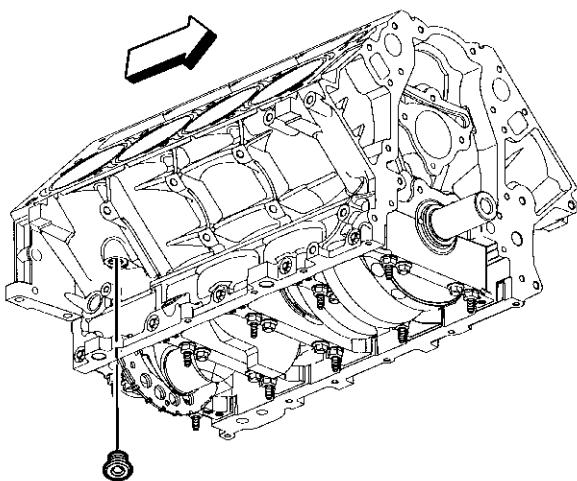
Engine Block Plug Removal



1552549

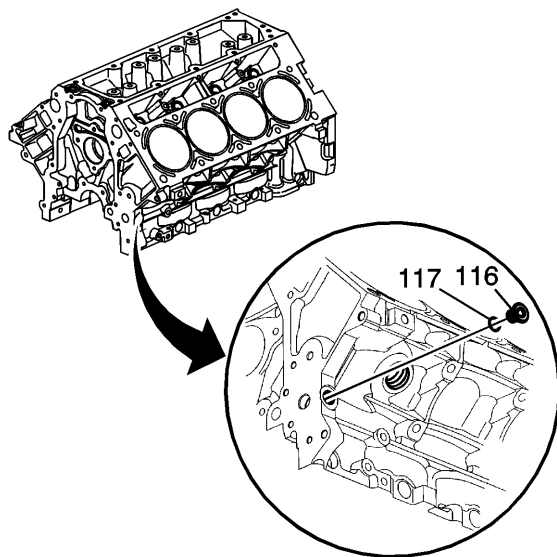
1. Remove the engine block coolant heater (114) and seal (115).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



63164

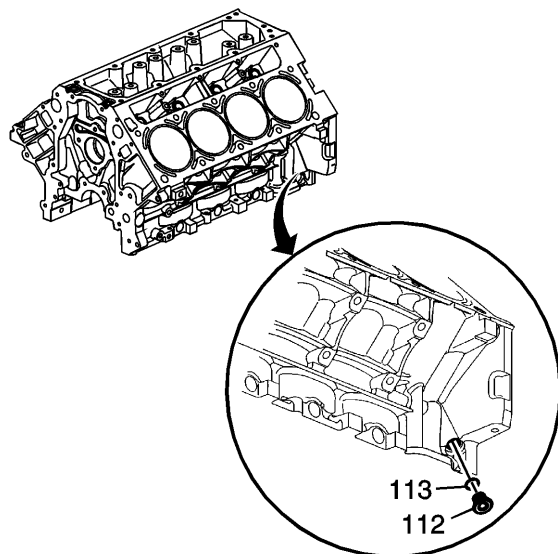
2. Remove the engine block right rear coolant drain hole plug and seal.



1552550

3. Remove the engine block left front oil gallery plug (116) and seal (117).

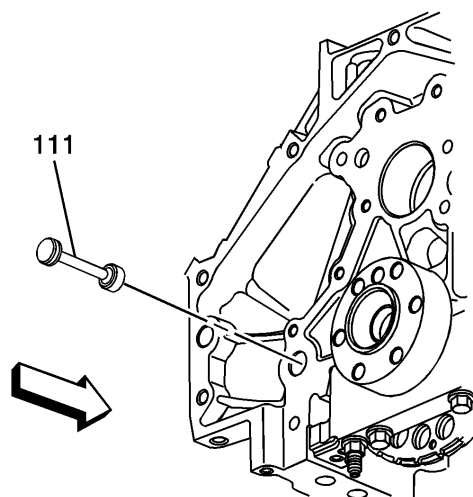
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552551

4. Remove the engine block left rear oil gallery plug (112) and seal (113).

If the block plug and coolant heater sealing washers are not damaged, they may be used during assembly.



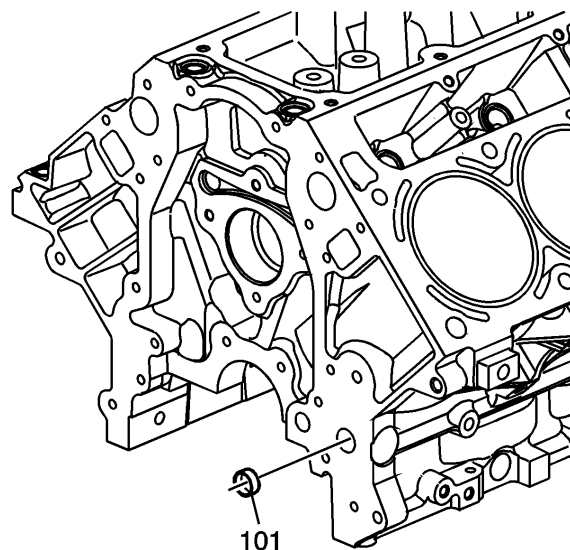
1669843

5. Remove the engine block rear oil gallery plug (111) and seal.

6. Inspect the O-ring seal of the rear oil gallery plug.

If the O-ring seal is not cut or damaged, the plug and O-ring seal may be used during assembly.

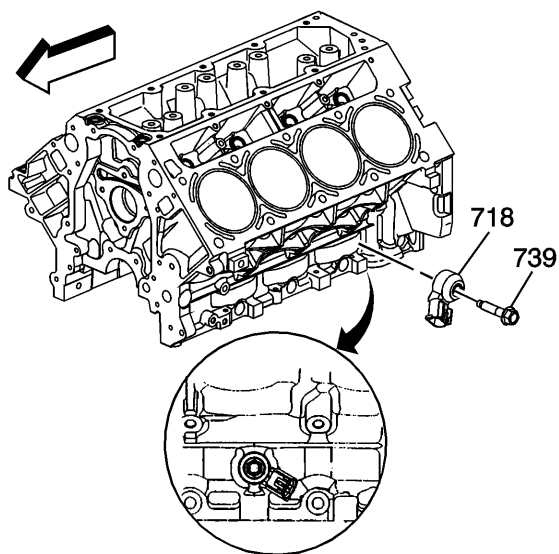
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552553

Important: Remove the front oil gallery plug, only if service is required. If the front oil gallery plug is removed, a NEW oil gallery plug must be installed.

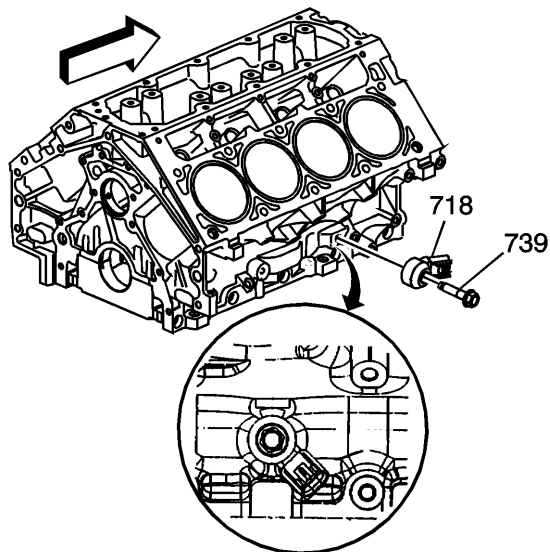
7. Remove the engine block front oil gallery plug (101).



1402136

8. Remove the left side knock sensor (718) and bolt (739).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1402140

9. Remove the right side knock sensor (718) and bolt (739).

Repair Instructions

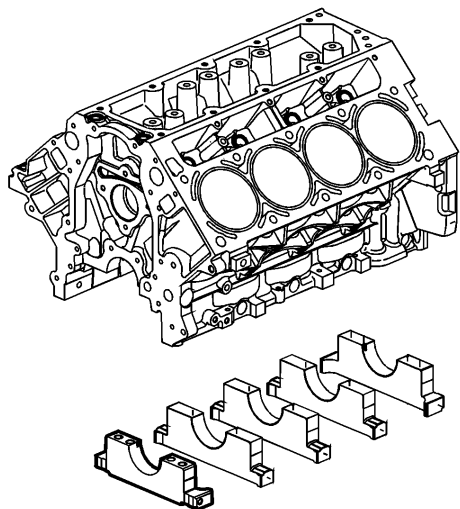
1555683

Engine Block Cleaning and Inspection

Tools Required

- J 8087 Cylinder Bore Gage
- J 42385-100 Head/Main Bolt Thread Repair Kit

Cleaning Procedure



1402142

Notice: Do not use a caustic solution to clean the aluminum engine block.

Important: When cleaning the engine block in a thermal type oven, do not exceed 232°C (450°F).

Clean the following components:

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

- Remove all sludge, dirt, or debris using a cleaning solvent or thermal type oven. Refer to [Cleanliness and Care](#) .
- Gasket surfaces

Refer to [Replacing Engine Gaskets](#) .

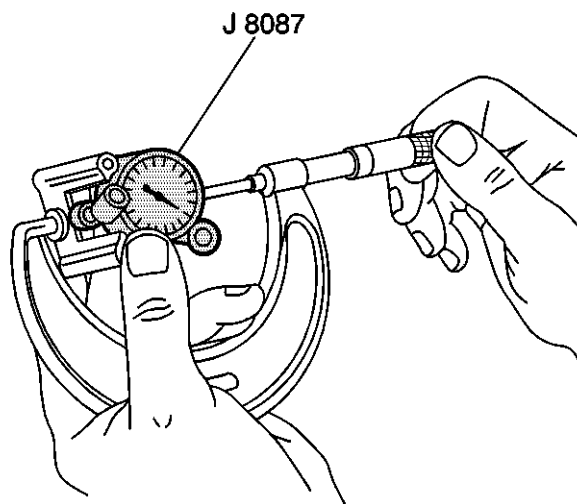
- Coolant passages
- Oil galleries
- Main bearing caps
- Cylinder head bolt holes to remove threadlocking material

Thread repair tool J 42385-107 may be used to clean the threads of any residual threadlocking material.

Inspection Procedure

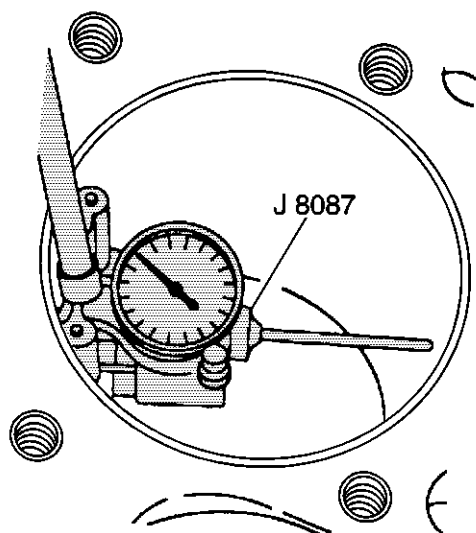
1. Inspect the following components:
 - Cylinder walls for excessive scratches, gouging, or ring ridge
 - Cylinder bores for excessive ring ridge at the top of the cylinder
 - Coolant jacket for cracks
 - Valve lifter bores for excessive scoring or wear
 - Crankshaft bearing webs for cracks
 - Gasket sealing surfaces for excessive scratches or gouging
Refer to [Replacing Engine Gaskets](#) .
 - Oil galleries for restrictions
 - Threaded bolt holes for damaged threads
 - Cylinder bores for excessive ring ridge at the top of the cylinder
2. Measure the cylinder bores for an oversize condition:

Measuring the Cylinder for Oversize



- 4974
1. Adjust the micrometer to a dimension slightly smaller than the bore size. Refer to [Engine Mechanical Specifications](#)
 2. Insert the [J 8087](#) into the micrometer and zero the bore gage dial.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



4972

3. Use the *J 8087* and measure the cylinder bore for oversize.

Slide the bore gage up and down throughout the length of the cylinder bore. Measure the bore, both parallel and perpendicular to the centerline of the crankshaft, at the top, center, and bottom of the bore. A cylinder bore that exceeds the maximum diameter must be serviced with an oversized piston. Refer to *Engine Mechanical Specifications*.

Repair Instructions

1555684

Cylinder Boring and Honing

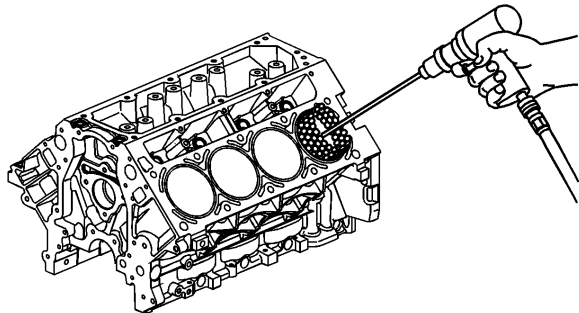
Boring Procedure

Important: A 0.50 mm (0.02 in) oversize service piston and a piston ring set are available.

1. Measure all pistons with a micrometer in order to determine the required cylinder bore diameter.
2. Before you use any type of boring bar, use a fine file and clean the top of the cylinder block, removing any dirt or burrs. If you do not inspect the cylinder block, the boring bar may be improperly positioned or tilted and the cylinder bore could be bored at an incorrect angle.
3. Carefully follow the instructions furnished by the manufacturer regarding use of the equipment.
4. When you bore the cylinders, ensure all the crankshaft bearing caps are in place. Tighten the crankshaft bearing caps to the proper torque in order to avoid distortion of the cylinder bores during final assembly.
5. When you take the final cut with a boring bar, leave 0.03 mm (0.001 in) on the cylinder bore diameter for the finish honing and fit of the piston.

Honing Procedure

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552445

1. When honing the cylinders, 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 you remove. Dull, dirty stones cut unevenly and generate excessive heat. Do not hone to final clearance with a coarse or medium-grade stone. Leave sufficient metal so that all stone marks may be removed with fine-grade stones. Perform final honing with a fine-grade stone, honing the cylinder to the proper clearance.

2. During the honing operation, thoroughly clean the cylinder bore. Repeatedly inspect the cylinder bore for 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 a cylinder for fit to an oversize piston, first perform the preliminary honing with a 100-grit stone.

4. Perform final cylinder honing with a 240-grit stone and obtain a 45 degree cross hatch pattern.

A 240-grit stone is preferred for final honing. If a 240-grit stone is not available, a 220-grit stone may be used as a substitute.

5. The finish marks should be clean, but not sharp. The finish marks should also be free from imbedded particles and torn or folded metal.

6. By measuring the selected piston at the sizing point and by adding the average of the clearance specification, you can determine the final cylinder honing dimension required.

7. After final honing and before the piston is inspected for fit, clean the cylinder bores with hot water and detergent. Scrub the bores with a stiff bristle brush and rinse the bores thoroughly with hot water. Do not allow any abrasive material to remain in the cylinder bores. This abrasive material may cause premature wear of the new piston rings and the cylinder bores. Abrasive material will also contaminate the engine oil and may cause premature wear of the bearings. After washing the cylinder bore, dry the bore with a clean rag.

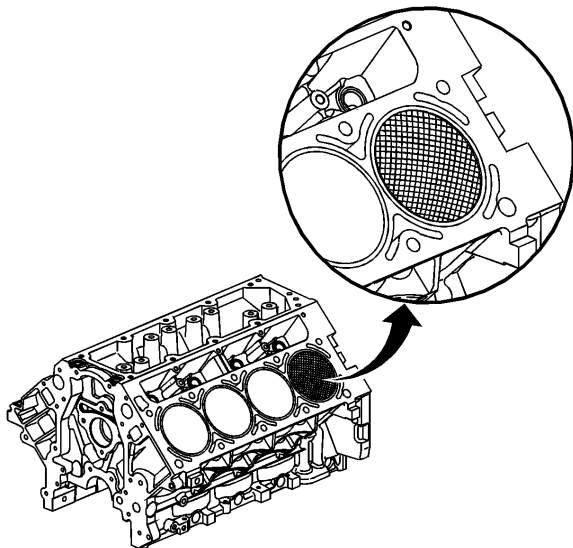
8. Perform final measurements of the piston and the cylinder bore.

9. Permanently mark the top of the piston for the specific cylinder to which it has been fitted.

10. Apply clean engine oil to each cylinder bore in order to prevent rusting.

Deglazing Procedure

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552443

Using a ball type or self centering honing tool, deglaze the cylinder bore lightly. Deglazing should be done only to remove any deposits that may have formed. Use a 240-grit stone of silicone carbide, or equivalent material, when performing the deglazing procedure.

A 240-grit stone is preferred for final honing. If a 240-grit stone is not available, a 220-grit stone may be used as a substitute.

Repair Instructions

1555685

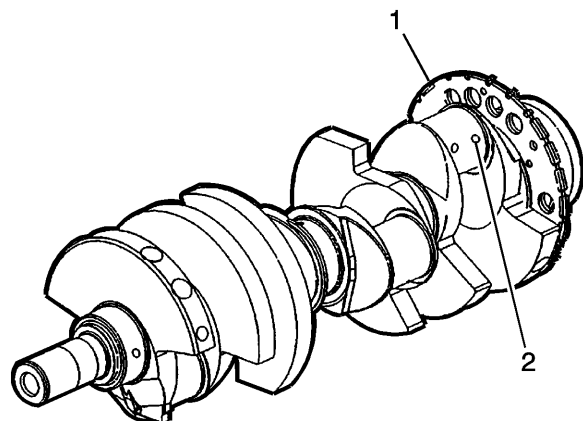
Crankshaft and Bearings Cleaning and Inspection

Tools Required

- *J 7872* Magnetic Base Dial Indicator Set
- *J 43690* Rod Bearing Checking Tool
- *J 43690-100* Rod Bearing Checking Tool – Adapter Kit

Cleaning Procedure

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1402145

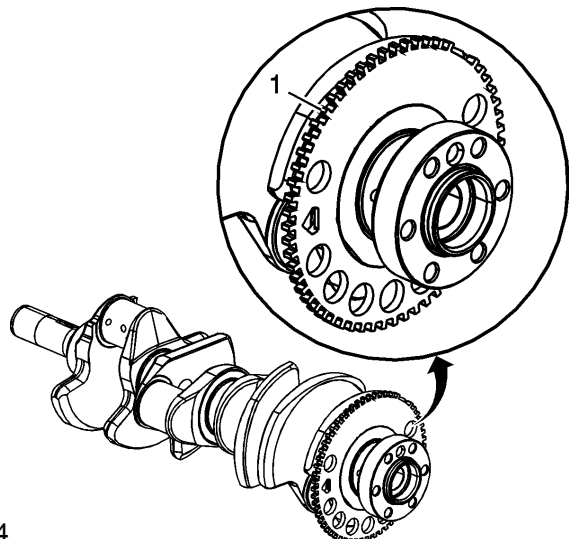
Important: Use care when handling the crankshaft. Avoid damage to the bearing surfaces or the lobes of the crankshaft position (CKP) reluctor ring. Damage to the teeth of the CKP reluctor ring may effect on-board diagnostics (OBD) II system performance.

1. Clean the crankshaft with solvent.
2. Thoroughly clean all oil passages (2) and inspect for restrictions or burrs.

Caution: Refer to *Safety Glasses Caution* .

3. Dry the crankshaft with compressed air.

Inspection Procedure

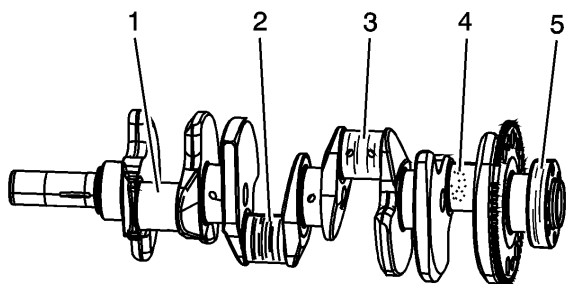


1552554

Important: The reluctor ring teeth should not have imperfections on the rising or falling edges. Imperfections of the reluctor ring teeth may effect OBD II system performance.

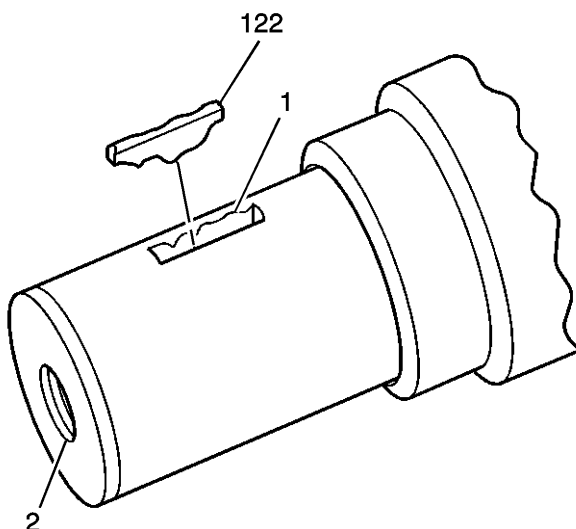
1. Inspect the CKP reluctor ring teeth (1) for damage.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552446

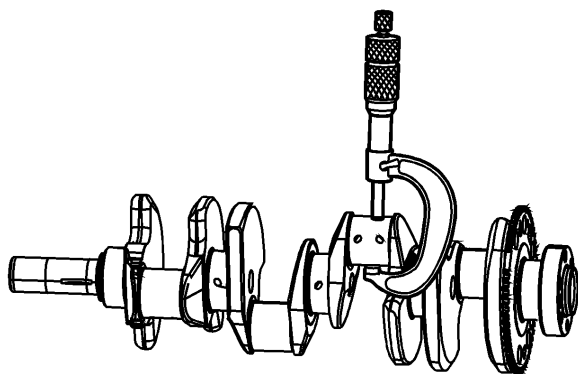
2. Inspect the crankshaft journals for wear.
Journals should be smooth (1) with no signs of scoring, wear, or damage.
3. Inspect the crankshaft journals for grooves or scoring (2).
4. Inspect the crankshaft journals for scratches or wear (3).
5. Inspect the crankshaft journals for pitting or imbedded bearing material (4).
6. Inspect the crankshaft rear oil seal surface (5) for grooves or scoring.



1272849

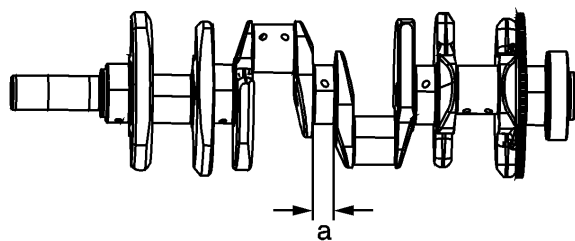
7. Inspect the crankshaft key (122), keyway (1), and threaded hole (2) for damage.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552447

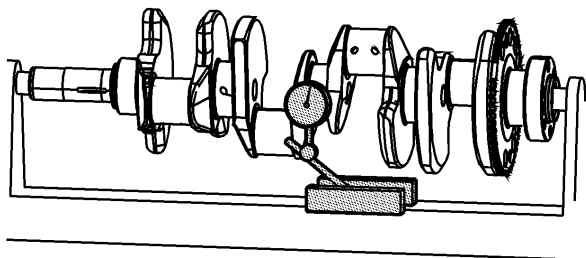
8. Measure the connecting rod journals for out-of-round and taper.



1552449

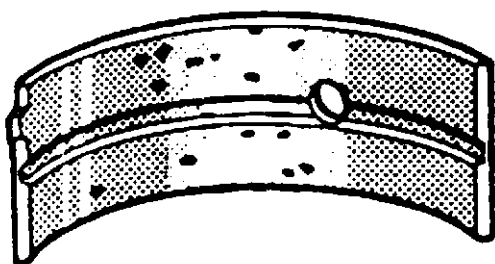
9. Measure the crankshaft thrust wall width.
A crankshaft with a thrust wall width in excess of 26.2 mm (1.0315 in) (a) must be replaced.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552450

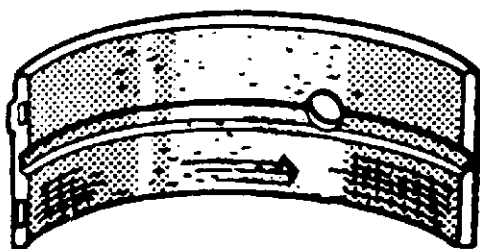
10. Measure the crankshaft runout.
Use wooden V-blocks or a fixture to support the crankshaft on the front and rear journals.
11. Use the [J 7872](#) in order to measure the crankshaft runout at the front and rear intermediate journals.
12. Use the [J 7872](#) in order to measure the runout of the crankshaft rear flange.
13. Use the [J 7872](#) in order to measure the runout of the crankshaft position reluctor ring. Reluctor ring runout should be measured 1.0 mm (0.04 in) below the ring teeth.
If the reluctor ring has runout in excess of 0.7 mm (0.028 in), replace the crankshaft.



52051

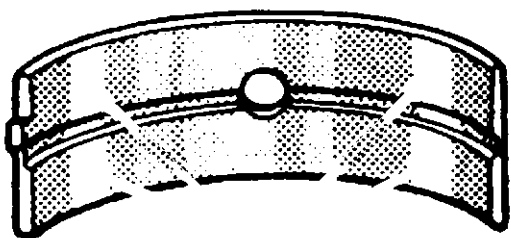
14. Inspect crankshaft bearings for craters or pockets. Flattened sections on the bearing halves also indicate fatigue.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



52053

15. Inspect the crankshaft bearings for excessive scoring or discoloration.
16. Inspect the crankshaft bearings for dirt or debris imbedded into the bearing material.

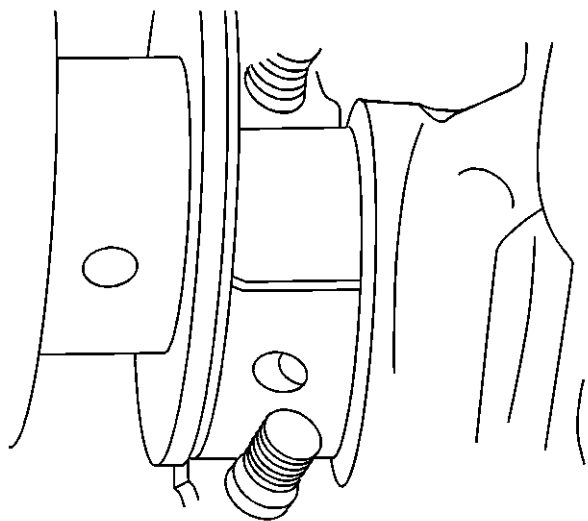


52056

17. Inspect the crankshaft bearings for improper seating, indicated by bright, polished sections of the bearing. If the lower half of the bearing is worn or damaged, both upper and lower halves should be replaced. Generally, if the lower half is suitable for use, the upper half should also be suitable for use.

Measuring Main Bearing Clearance – Gaging Plastic Method

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

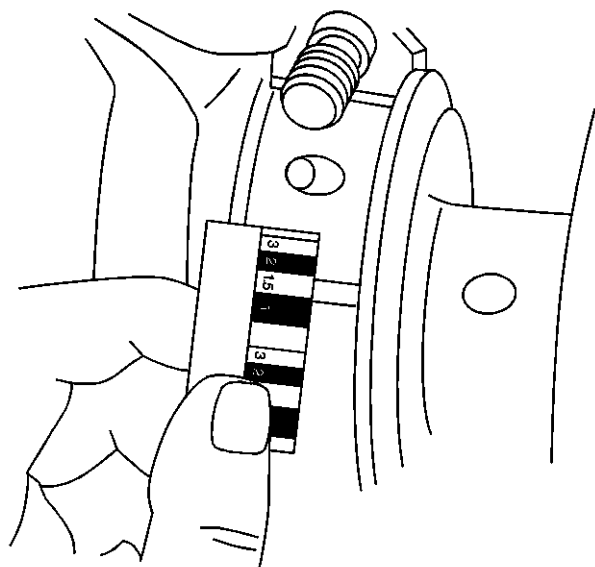


4980

Important:

- The crankshaft main bearings are a precision insert type. Main bearing caps are machined with the engine block, for proper clearance, and cannot be shimmed or filed for bearing fit. If the clearances are found to be excessive, new bearings and/or engine block and cap repair or replacement may be required.
- Do not rotate the crankshaft while gaging plastic is between the crankshaft journal and the bearing surface.
- The crankshaft bearing clearances are critical. Excessive bearing clearance may effect crankshaft position sensor signals and may effect OBD II system operation.
- Remove the bearing cap side bolts prior to cap removal.

1. Remove the bearing caps, bearing half, and bolts. Refer to [Crankshaft and Bearings Removal](#) .
2. Install gaging plastic onto the crankshaft journal. Install the gaging plastic the full width of the crankshaft bearing journal.
3. Install the bearing caps, bearing half, and bolts. Refer to [Crankshaft and Bearings Installation](#) .
4. Remove the bearing caps, bearing half, and bolts. Refer to [Crankshaft and Bearings Removal](#) .



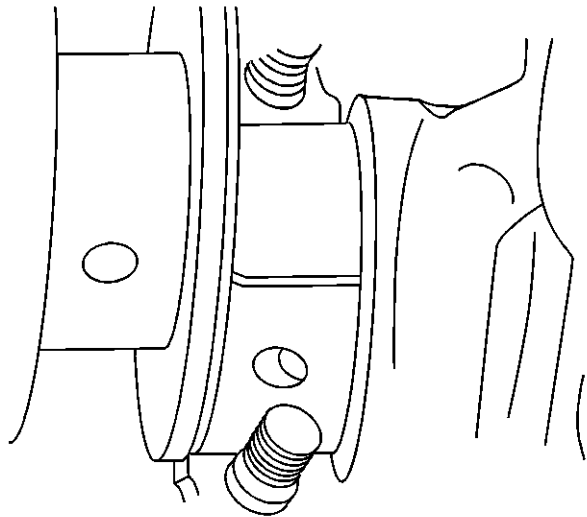
4981

5. Using the scale supplied with the plastic gaging kit, measure the gaging plastic at its widest area.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- If the gaging plastic shows irregularity in the journal, exceeding 0.025 mm (0.001 in), remove the crankshaft and measure the journal with a micrometer.
- If clearance cannot be brought to specifications, replace the crankshaft or engine block, as required. Refer to *Engine Mechanical Specifications* .

Measuring Connecting Rod Bearing Clearance – Gaging Plastic Method

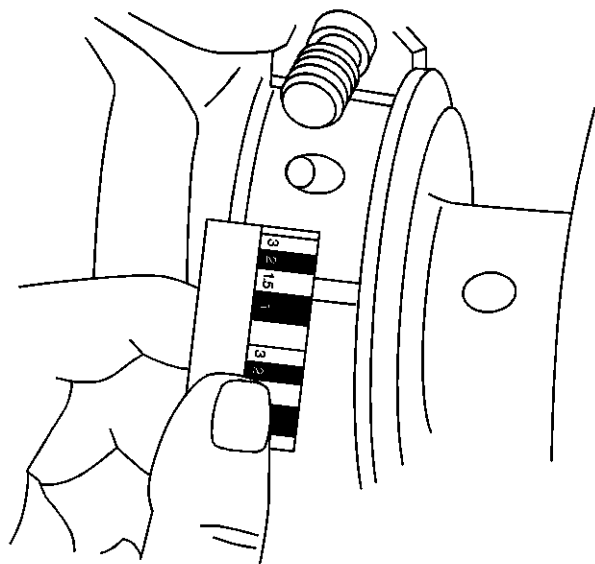


4980

Important:

- Connecting rod bearings are a precision insert type. Connecting rods are of a powdered metal design and cannot be shimmed or filed for bearing fit. If clearances are found to be excessive, a new bearing and/or connecting rod is required.
 - Do not rotate the crankshaft while gaging plastic is between the crankshaft journal and the bearing surface.
1. Remove the bearing cap, bearing half, and bolts. Refer to *Piston, Connecting Rod, and Bearing Removal* .
 2. Install the gaging plastic onto the connecting rod bearing journal. Install the gaging plastic the full width of the journal.
 3. Install the bearing cap, bearing half, and bolts. Refer to *Piston, Connecting Rod, and Bearing Installation* .
 4. Remove the bearing cap, bearing half, and bolts. Refer to *Piston, Connecting Rod, and Bearing Removal* .

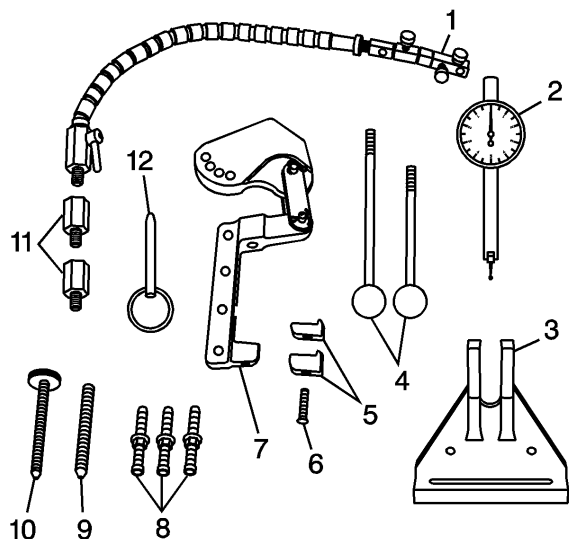
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



4981
5. Using the scale supplied with the plastic gaging kit, measure the gaging plastic at its widest area. Refer to *Engine Mechanical Specifications*.

Measuring Connecting Rod Bearing Clearance – Using J 43690/J 43690-100

J 43690 and J 43690-100 have been developed as a more accurate method to measure connecting rod bearing clearances. The instructions below provide an overview of tool set-up and usage. For more detailed information, refer to the tool instruction sheets supplied by the tool manufacturer.



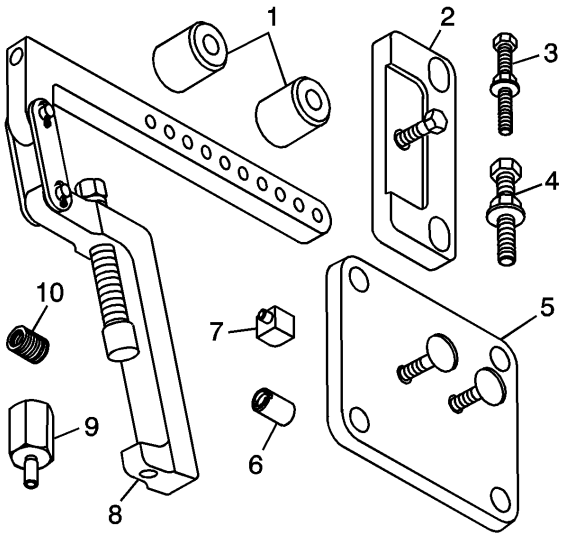
627091

J 43690 Rod Bearing Checking Tool

- J 43690-20 Swivel Base (1)
- J 43690-19 Dial Indicator (2)
- J 43690-2 Base (3)
- J 43690-5, -6 Handle (4)
- J 43690-10, J 43690-11 Foot (5)
- 280307 Screw (6)
- J 43690-1 Pivot Arm Assembly (7)

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

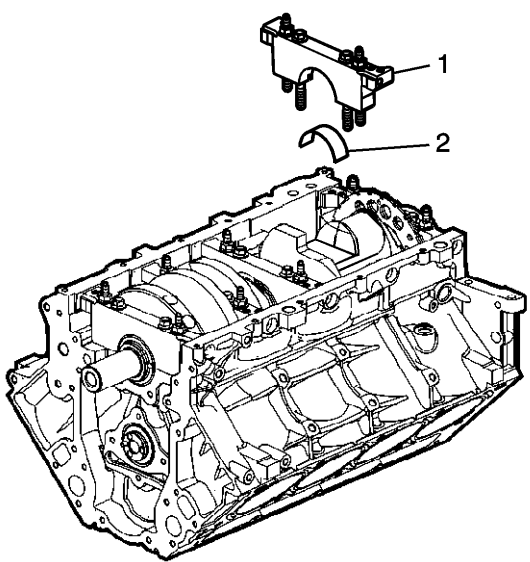
- J 43690-3, J 43690-7, J 43690-8 Screws (8)
- 280319 Screw (9)
- 280311 Screw (10)
- J 43690-17, J 43690-18 Adapter (11)
- 280310 Pin (12)



836375

J 43690-100 Rod Bearing Checking Tool – Adapter Kit

- J 43690-104 Spacer (1)
- J 43690-105 Retainer Plate (2)
- 505478 Bolt (3)
- 511341 Bolt (4)
- J 43690-106 Retainer Plate (5)
- J 43690-107 Cap (6)
- J 43690-102 Foot (7)
- J 43690-101 Pivot Arm Assembly (8)
- J 43690-103 Adapter (9)
- 505439 Adapter (10)

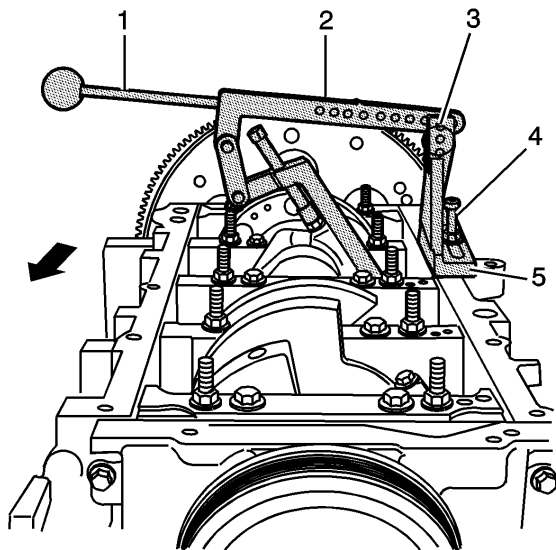


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2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Important: The crankshaft must be secure, with no movement or rotation, in order to obtain an accurate reading.

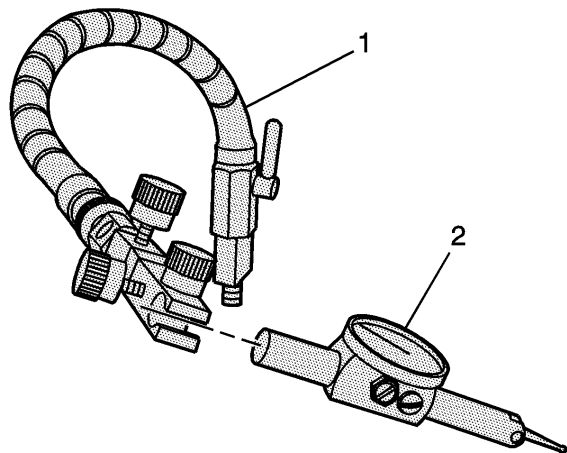
1. Rotate the crankshaft until the journal/connecting rod to be measured is in the 12 o'clock position.
2. Remove a bearing cap and bolts (1).
3. Remove the bearing half (2).
4. Insert a piece of paper card stock onto the crankshaft journal.
5. Install the bearing half (2) and cap and bolts (1). Refer to *Fastener Tightening Specifications* .



828697

6. Install the following:

- 6.1. J 43690-2 (5)
- 6.2. J 43690-3 (4)
- 6.3. J 43690-101 (2)
- 6.4. 280310 (3)
- 6.5. J 43690-5 (1)



627122

7. Install the swivel base (1) and dial indicator (2).
8. Adjust per the manufacturers instructions and measure the connecting rod bearing clearance.

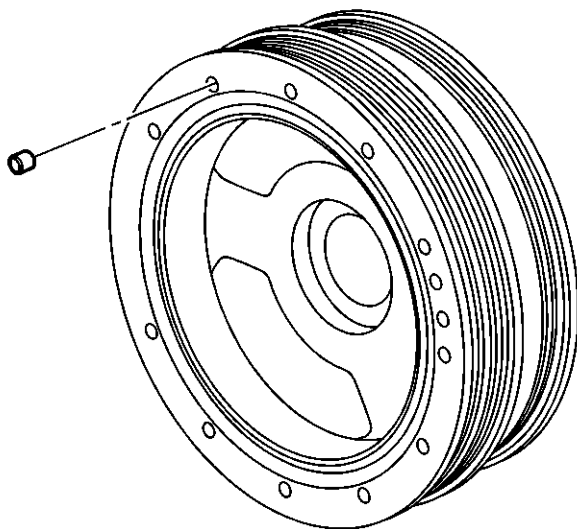
A connecting rod with a clearance in excess of 0.076 mm (0.003 in) is considered excessive. Service components, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Repair Instructions

1555687

Crankshaft Balancer Cleaning and Inspection

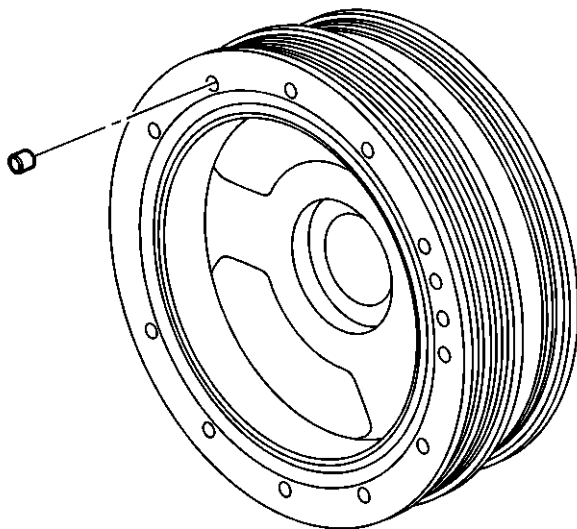


63153

1. Clean the crankshaft balancer in solvent.
 2. Using a wire brush, clean the belt grooves of all dirt and debris.
 3. Dry the crankshaft balancer with compressed air.
 4. Inspect the crankshaft balancer for the following conditions:
 - Loose or improperly installed balance weights
A properly installed balance weight should be installed flush or below flush with the face of the balancer.
 - Worn, grooved, or damaged hub seal surface
A crankshaft balancer hub seal surface with excessive scoring, grooves, rust or other damage must be replaced.
Minor imperfections on the hub seal surface may be removed with polishing compound or fine grade emery cloth.
- Important:** In order for the belt to track properly, the belt grooves should be free of all dirt and debris.
- Dirty or damaged belt grooves
The balancer belt grooves should be free of any nicks, gouges, or other damage that may not allow the belt to track properly.
Minor imperfections may be removed with a fine file.
 - Worn, chunking or deteriorated rubber between the hub and pulley

Replacing the Crankshaft Balancer and Balance Weights

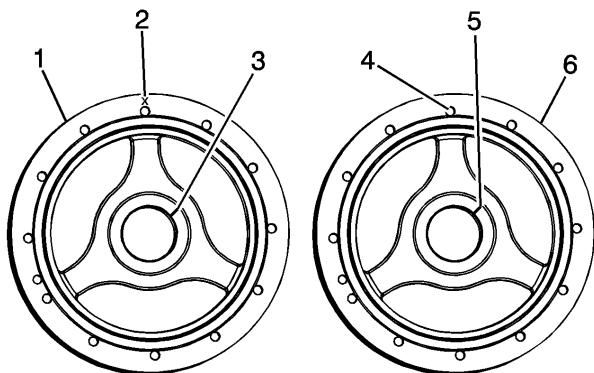
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



63153

Important: The position of the crankshaft balancer must be marked before removal, relative to the crankshaft. The balancer does not use a key or keyway for positioning. Mark or scribe the end of the crankshaft and the balancer before removal. The crankshaft balancer must be installed to the original position. If replacing the crankshaft balancer, note the location of any existing balance weights, if applicable. Crankshaft balancer weights must be installed into the new balancer in the same location as the old balancer. A properly installed balance weight is flush or below flush with the face of the balancer.

1. Inspect the crankshaft balancer weight holes for any existing balance weights.



1669848

Caution: Refer to Safety Glasses Caution .

2. Using a punch, position the balance weights in the old balancer (1) to the bottom of the weight holes.
3. With a marking crayon, note the weight holes (2) containing balance weights, if applicable.
4. Lay the old crankshaft balancer (1) on a bench or flat table.
Rotate the old balancer until 1 of the marked balance weight holes (2) is in the 12 o'clock position.
5. Lay the new crankshaft balancer (6) on the bench next to the old balancer.
Rotate the new balancer until 1 of the balance weight holes (4) is in the 12 o'clock position.
6. With a marking crayon, mark the new balancer weight hole (4) located in the 12 o'clock position.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

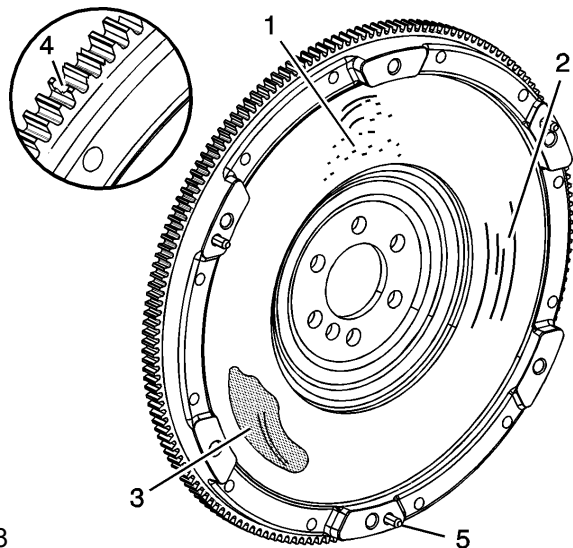
7. Viewing the old balancer, note the position of the crankshaft-to-balancer alignment mark (3).
8. Mark the new balancer in the same location (5).
9. Measure the distance from the top of the balance weights to the face of the old crankshaft balancer.
10. Record the readings.
11. Determine the proper balance weight size for the new balancer. Balance weights are available in 3 different sizes.
 - A balance weight hole depth that measures 13.0 mm (0.512 in), has a short balance weight in the hole. A short balance weight measures 12.7 mm (0.5 in) in length.
 - A balance weight hole depth that measures 6.69 mm (0.263 in), has a medium balance weight in the hole. A medium balance weight measures 19.0 mm (0.75 in) in length.
 - A balance weight hole depth that measures 0.29 mm (0.011 in), has a long balance weight in the hole. A long balance weight measures 25.4 mm (1.0 in) in length.
12. Insert new crankshaft balance weights of the proper size into the new balancer in the same location as the old balancer.

A properly installed balance weight is flush or below flush with the face of the balancer.

Repair Instructions

1555688

Engine Flywheel Cleaning and Inspection



1552438

1. Clean the flywheel in solvent.
- Caution: Refer to Safety Glasses Caution .**
2. Dry the flywheel with compressed air.
 3. Inspect the flywheel for the following conditions:
 - Pitted surface (1)
 - Grooved or scored surface (2)
 - Rusted surface (3)
 - Damaged ring gear teeth (4)
 - Loose or improperly positioned ring gear

The ring gear has an interference fit onto the flywheel and should be positioned completely against the flange of the flywheel.

- Missing, bent or damaged pressure plate locating pins (5)

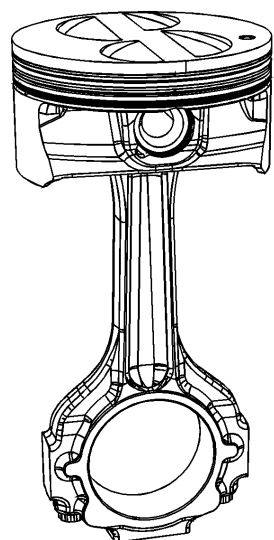
The 3 locating pins are installed into the flywheel and spaced 120 degrees apart in order to ensure proper orientation of the clutch pressure plate to the flywheel during assembly.

Repair Instructions

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1555689

Piston and Connecting Rod Disassemble



1777116

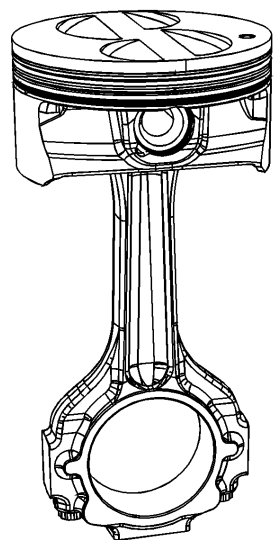
Important: Do not attempt to disassemble or assemble the piston, pin, and connecting rod. The piston, pin, and connecting rod should be serviced as an assembly.

Repair Instructions

1555690

Piston, Connecting Rod, and Bearings Cleaning and Inspection

Piston, Pin, and Piston Rings



1777116

Important:

- Replace pistons, pins, and connecting rods that are damaged or show signs of excessive wear.
- The piston, pin, and connecting rod are to be serviced as an assembly.
- Do not wire brush any part of the piston.

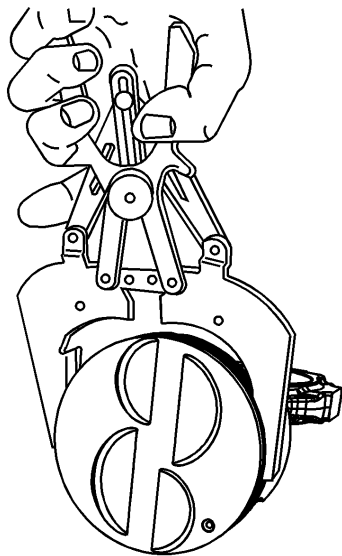
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Measurement of the components should be taken with the components at normal room temperature.

1. Using cleaning solvent, clean the varnish and carbon from the piston and rod assembly.

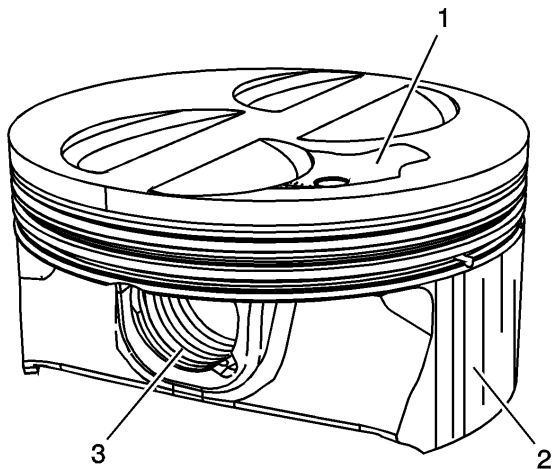
Caution: Refer to Safety Glasses Caution .

2. Dry the components with compressed air.



1552430

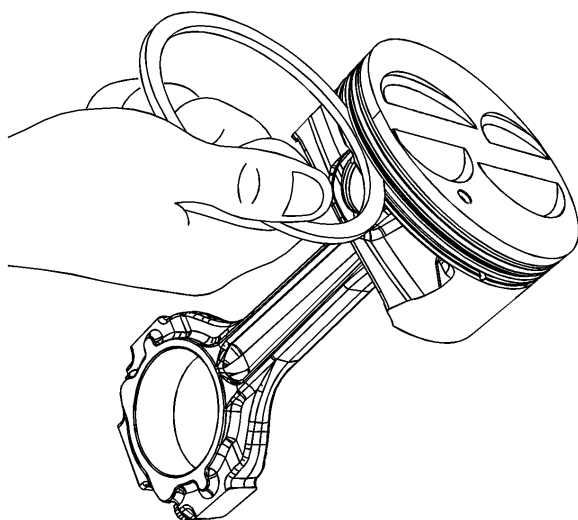
3. Clean the piston ring grooves with a suitable ring groove cleaning tool.
4. Clean the oil lubrication holes and slots.



1552427

5. Inspect the piston for the following conditions:
- Cracks in the piston ring lands, the piston skirt, or pin bosses
 - Piston ring grooves for nicks, burrs, or warpage which may cause the piston ring to bind
MINOR imperfections may be removed from the piston with a fine file.
 - Eroded areas at the top of the piston (1)
 - Scuffed or damaged skirts (2)
 - Scoring to the piston pin bore (3) or piston pin

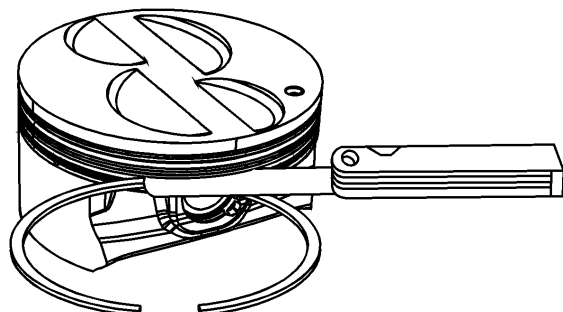
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552439

6. Insert the edge of the piston ring into the piston ring groove.

Roll the piston ring completely around the piston. If binding is caused by a distorted ring groove, MINOR imperfections may be removed with a fine file. If binding is caused by a distorted piston ring, replace the rings, as required.

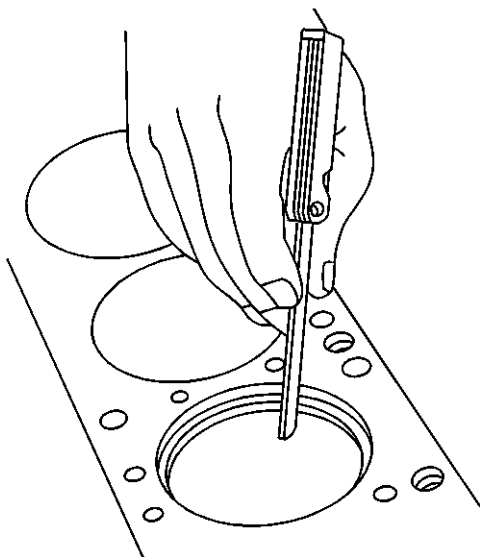


1552440

7. Measure the piston ring side clearance with a feeler gage. If side clearance is not within specifications, try another piston ring. If the proper ring-to-groove clearance cannot be obtained, replace the piston, pin, and connecting rod assembly. Refer to *Engine Mechanical Specifications* .

Measuring Piston Ring End Gap

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

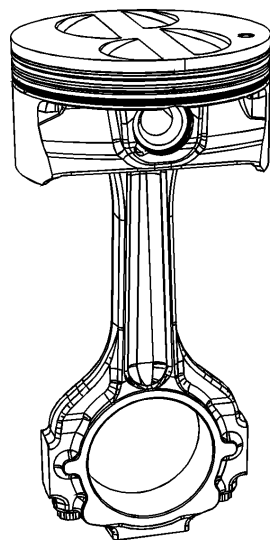


4968

Important:

- Do not attempt to file the end of the piston ring to achieve the proper end gap clearance.
 - Measure the piston ring in the cylinder in which it will be used.
1. Place the piston ring into the cylinder bore 6.5 mm (0.25 in) below the top of the ring travel area. Both compression rings should be installed with the piston ring orientation mark facing the top of the cylinder bore.
 2. Insert a feeler gage and measure the piston ring end gap. Refer to *Engine Mechanical Specifications* .

Connecting Rod and Bearings



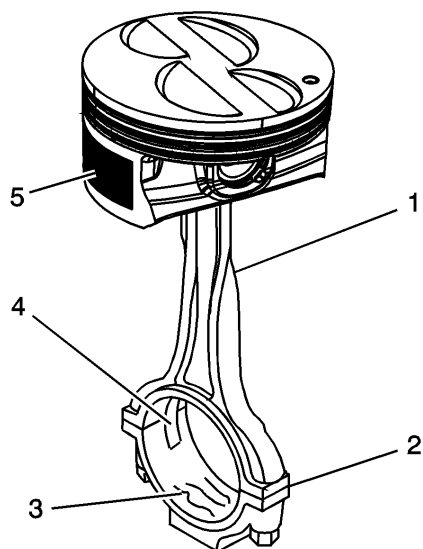
1777116

Notice: Do not clean titanium components with chlorinated solvents. Brake parts, and similar cleaning solvents, safety solvents, or refrigerant that contains chlorofluorocarbons (CFCs) should not be used. Using chlorinated solvents to clean titanium components can result in component damage, leading to stress corrosion cracking that may be undetected with normal visual inspection. Acceptable materials for cleaning titanium components include non-chlorinated solvents, alcohol, acetone, and methanol.

Important:

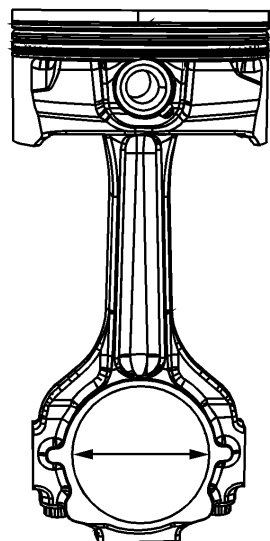
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- The connecting rod and cap must be used as an assembly with no repair or modifications to either mating surface. Do not attempt to repair the rod or cap. If service is required, replace the piston, pin, and connecting rod as an assembly.
- Do not attempt to repair the bolt hole threads of the connecting rod.



1552441

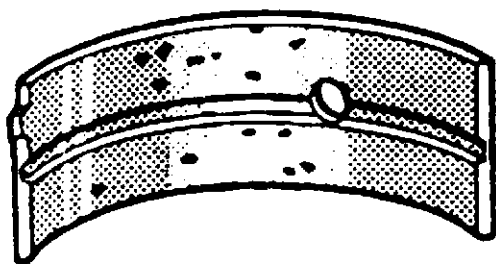
1. Inspect the connecting rod for the following conditions:
 - Twisting (1)
 - Proper fit of the connecting rod and cap mating surfaces (2)
 - Nicks or gouges in the bearing bore (3)
 - Damage to the bearing locating slots (4)



1552442

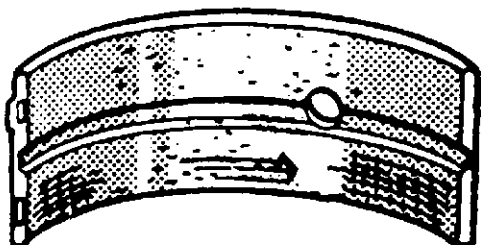
2. Measure the connecting rod bearing bore for an out-of-round condition. Refer to [Engine Mechanical Specifications](#) .

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



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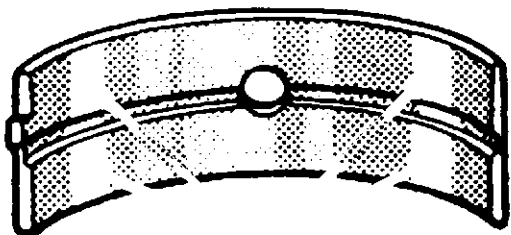
3. Inspect the connecting rod bearings for craters or pockets. Flattened sections on the bearing halves indicate fatigue.



52053

4. Inspect the connecting rod bearings for excessive scoring or discoloration.
5. Inspect the connecting rod bearings for dirt or debris imbedded into the bearing material.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



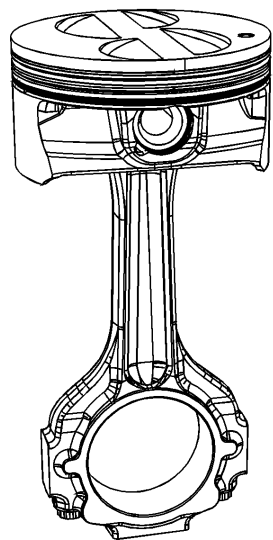
52056

6. Inspect the connecting rod bearings for improper seating, indicated by bright, polished sections of the bearing surface.

Repair Instructions

1555692

Piston and Connecting Rod Assemble



1777116

Important: Do not attempt to disassemble or assemble the piston, pin, and connecting rod. The piston, pin, and connecting rod should be serviced as an assembly.

Repair Instructions

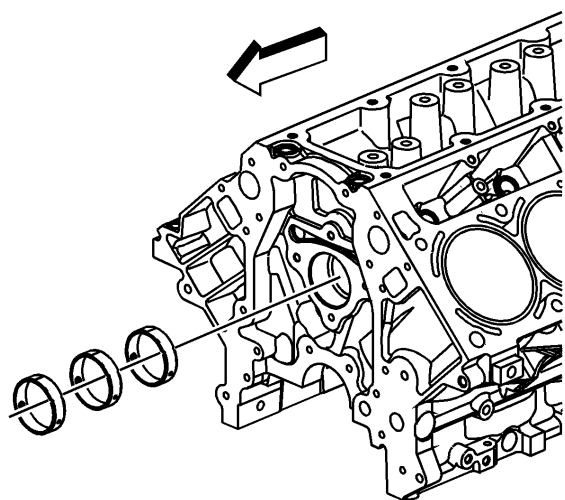
1555694

Camshaft Bearing Removal

Tools Required

[J 33049](#) Camshaft Bearing Service Set

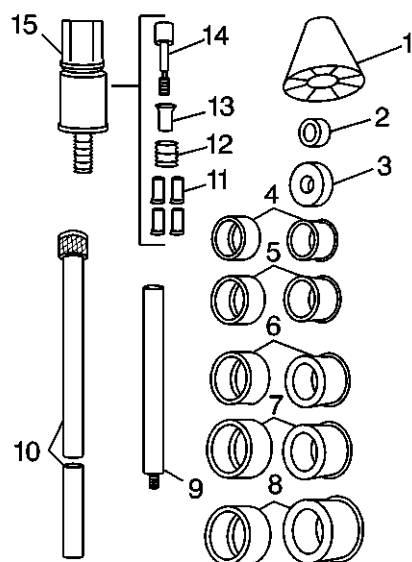
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552451

Important: A loose camshaft bearing may be caused by an enlarged, out of round, or damaged engine block bearing bore.

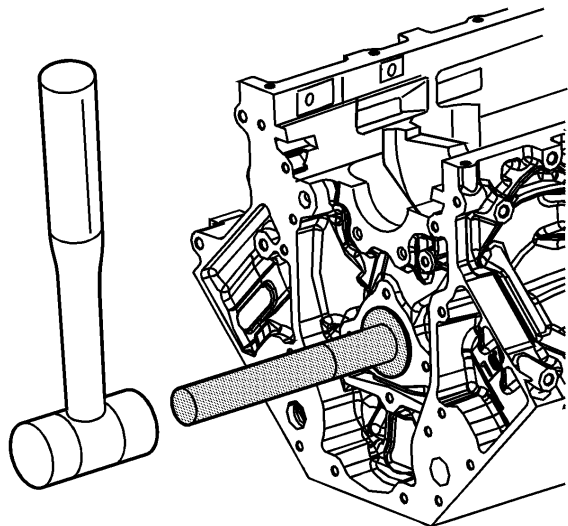
1. Prior to bearing removal, inspect the camshaft bearings for loose fit in the engine block bearing bores.
Refer to [Camshaft and Bearings Cleaning and Inspection](#) .
2. Repair or replace the components, as required.



66100

3. Select the expanding driver (4–8) and washer (2 or 3) from the [J 33049](#) .
4. Assemble the tool.
5. Insert the tool through the front of the engine block and into the bearing.
6. Tighten the expander assembly (15) nut until snug.
7. Push the guide cone (1) into the front camshaft bearing in order to align the tool.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552556

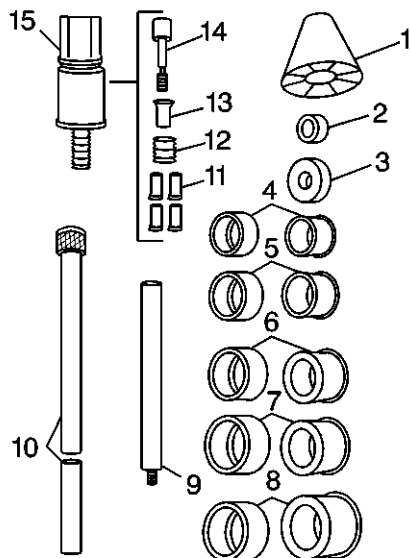
8. Drive the bearing from the block bore.

Important: In order to remove the front camshaft bearing, operate the tool from the rear of the block, using the guide cone in the rear camshaft bearing bore.

9. Repeat the above procedures in order to remove the remaining bearings.

Tool Usage Information

Bearing, Expander, and Expander Driver Information



66100

- The tool consists of a guide cone (1), driving washers (2 or 3), expander bearing drivers (4–8), driver bars (9 or 10), expander jaws (11), expander sleeve (12), expander cone (13), expander shaft (14), and expander assembly (15).
- Expander bearing driver number 1 inside diameter is 28.575–37.465 mm (1.125–1.475 in) and is used with the expander assembly and the small washer.
- Expander bearing driver number 2 inside diameter is 37.465–43.18 mm (1.475–1.7 in) and is used with number 1 expanding driver and the small washer.
- Expander bearing driver number 3 inside diameter is 43.18–48.895 mm (1.7–1.925 in) and is used with number 2 expanding driver and the large washer.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

- Expander bearing driver number 4 inside diameter is 48.895–54.61 mm (1.925–2.15 in) and is used with number 3 expanding driver and the large washer.
- Expander bearing driver number 5 inside diameter is 54.61–60.325 mm (2.150–2.375 in) and is used with number 4 expanding driver and the large washer.
- Expander bearing driver number 6 inside diameter is 60.325–68.326 mm (2.375–2.69 in) and is used with number 5 expanding driver and the large washer.

Tool Assembly and Operation

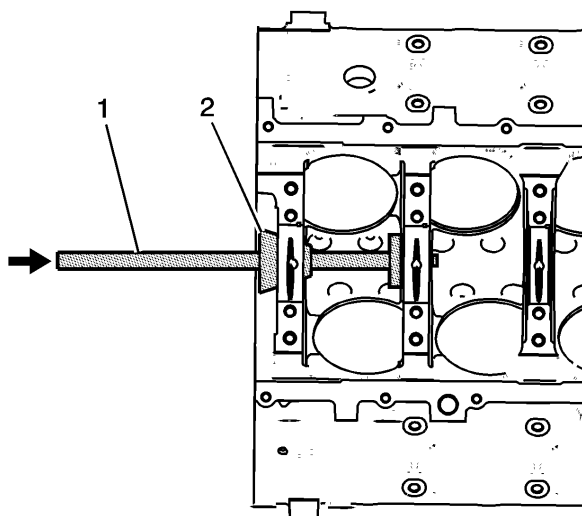
1. Select the proper expanding driver and washer from the expanding driver and washer information.

Important: To install or remove the expanding driver, always push on or pull from the ends.

Pressure on the outside diameter may cause a bind against the rubber expanding sleeve.

2. Place the expanding driver onto the expander assembly.
3. Ensure the separation lines between the segments of the expanding driver align with the separation lines of the expander assembly.
4. With the small end of the cone facing the driver assembly, place the guide cone over the driving bar.
5. Place the driving washer over the threaded portion of the expander assembly.
6. Screw the expander assembly, with driving washer, onto the driving bar.

For removal of the inner bearings, it may be necessary to install the driver bar extension.



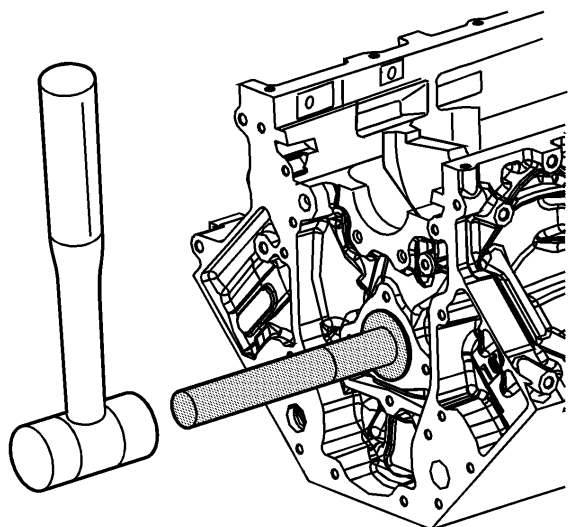
1552557

7. Insert the tool into an inner camshaft bearing and tighten until snug.
Operate the tool from the front or rear of the engine block.

On some engine blocks, the nut on the expander assembly is inaccessible, except from either end. In this case, you must use a socket and extension to enlarge and reduce the expander assembly.

8. Slide the nylon cone (2) into the front or rear camshaft bearing. This will properly align the tool.
9. Drive the bearing out of the engine block.
10. Repeat the procedure for the additional inner bearings.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552556

11. For the front and rear bearings, remove the nylon cone and driver bar extension.
12. Drive the bearings out of the engine block.

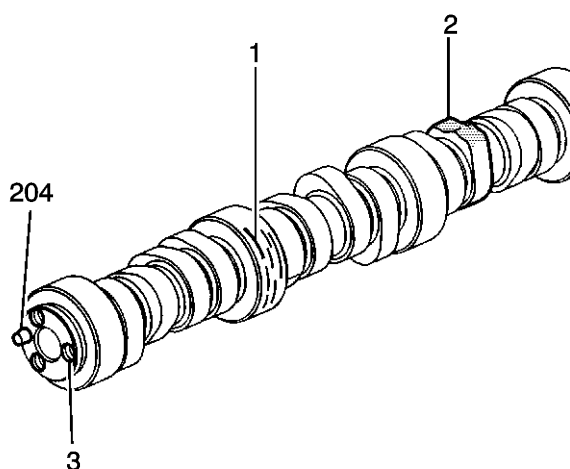
Repair Instructions

1555698

Camshaft and Bearings Cleaning and Inspection

Tools Required

- [J 7872](#) Magnetic Base Dial Indicator Set
- [J 8520](#) Cam Lobe Lift Indicator



1272851

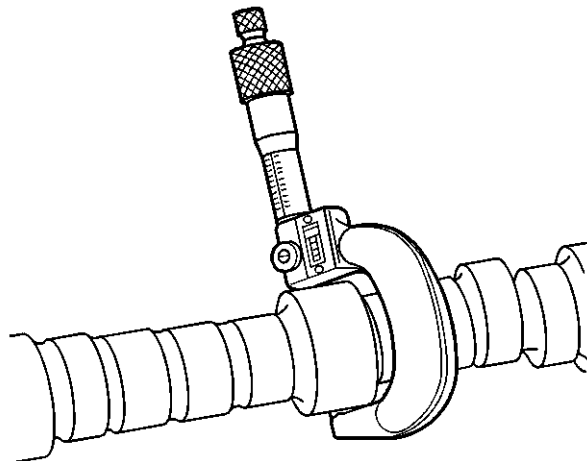
1. Clean the components in solvent.

Caution: Refer to Safety Glasses Caution .

2. Dry the components with compressed air.

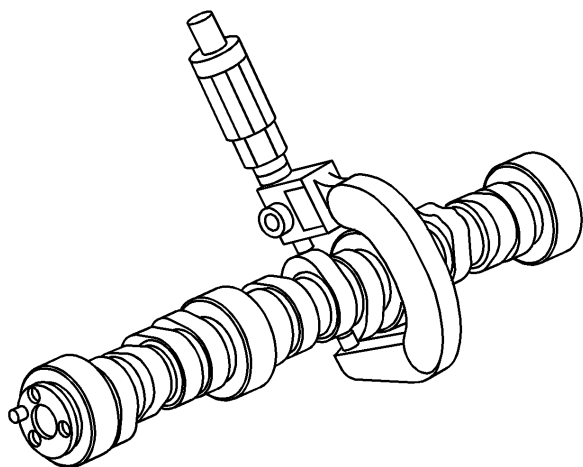
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

3. Inspect the camshaft bearing journals (1) for scoring or excessive wear.
4. Inspect the camshaft lobes (2) for scoring or excessive wear.
5. Inspect the threaded bolt holes (3) in the front of the camshaft for damaged threads or debris.
6. Inspect the camshaft sprocket pin (204) for damage.



35212

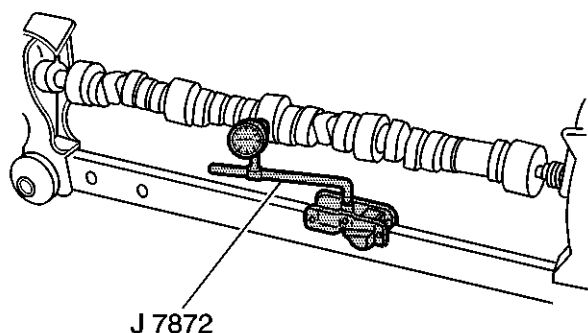
7. Using a micrometer, measure the camshaft journals for wear and out-of-round.
 - If the camshaft bearing journals are greater than 0.025 mm (0.001 in) out-of-round, replace the camshaft.
 - If the camshaft bearing journal diameter is less than 54.99 mm (2.164 in), replace the camshaft.



260130

8. Using a micrometer, measure the camshaft lobes for wear. Refer to [Engine Mechanical Specifications](#).

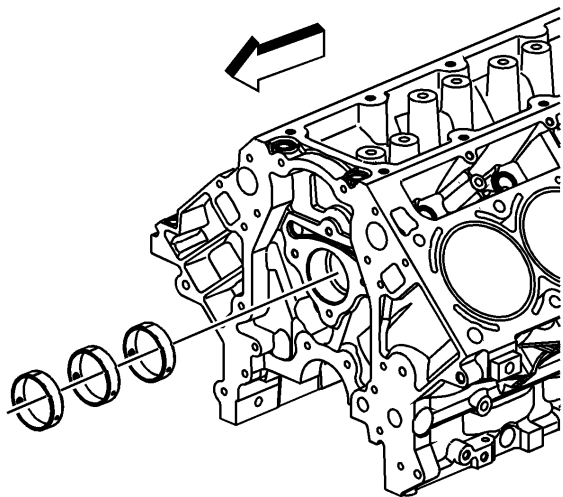
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



64297

9. Measure the camshaft runout.

- 9.1. Mount the camshaft in wooden V-blocks or between centers on a fixture.
- 9.2. Using the *J 7872*, measure the runout of the intermediate camshaft bearing journals.
- 9.3. If camshaft runout exceeds 0.05 mm (0.002 in), the camshaft is bent and should be replaced.



1552451

10. Inspect the camshaft retainer plate for wear or a damaged sealing gasket.

If the camshaft retainer plate sealing gasket is not cut or damaged, it may be used again.

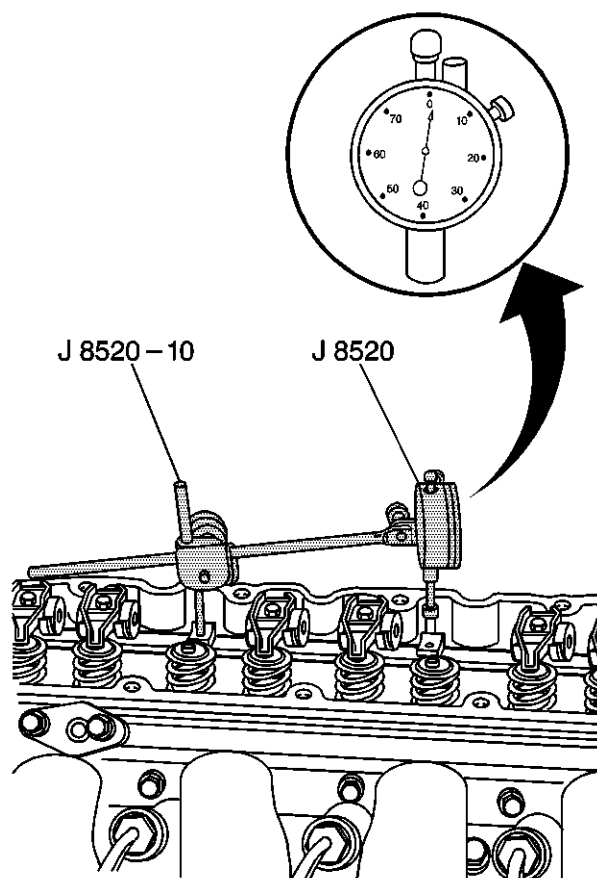
11. Inspect the camshaft bearings for proper fit in the engine block. Camshaft bearings have an interference fit to the engine block and should not be loose in the engine block bearing bores.

12. Inspect the camshaft bearings for excessive wear or scoring.

Bearings with excessive scoring or wear must be replaced.

Measuring Camshaft Lobe Lift

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



64967

Important: Measuring camshaft lobe lift is a procedure used to determine if the camshaft lobes have worn. This test is to be performed prior to engine disassembly and with the camshaft and valve train components installed in the engine.

1. Using the *J 8520* , measure camshaft lobe lift.
2. Remove the valve rocker arms and bolts.
3. Install the dial indicator mounting stud into the valve rocker arm bolt hole.
4. Assemble the components of the *J 8520* and position onto the stud.
5. Position the shaft of the dial indicator onto the end of the pushrod.
6. Rotate the face of the dial indicator to zero.
7. Slowly rotate the crankshaft clockwise, until the dial indicator obtains its highest and lowest readings.
8. Compare the total to specifications. Refer to *Engine Mechanical Specifications* .

Repair Instructions

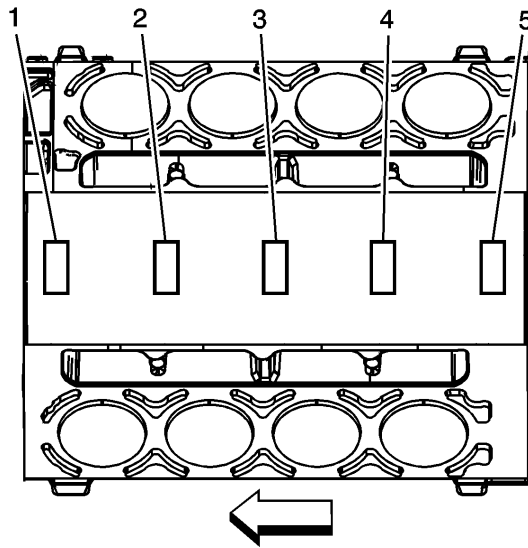
1555699

Camshaft Bearing Installation

Tools Required

J 33049 Camshaft Bearing Service Set

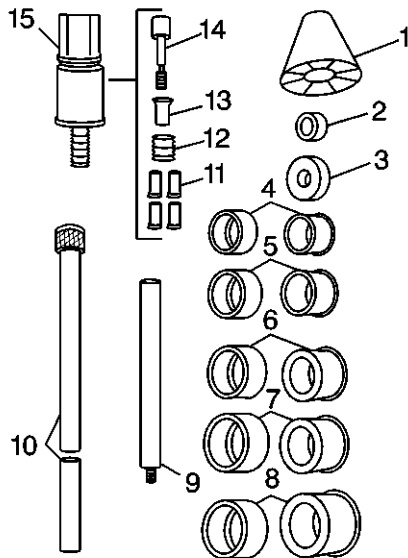
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1332955

Important: The engine block camshaft bearing bores are machined for 3 different outside diameter (OD) size bearings. Position 1 and 5 are the largest diameter bores. Position 3 is the smallest diameter bore. Position 2 and 4 are the intermediate size bores. The inside diameter (ID) for all camshaft bearings is the same size.

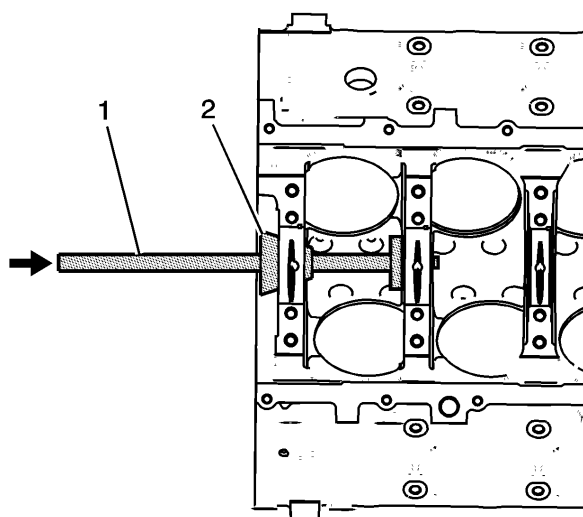
1. Measure the engine block camshaft bearing bores (1–5) in order to identify the correct OD size bearing for each position. Refer to [Engine Mechanical Specifications](#).



66100

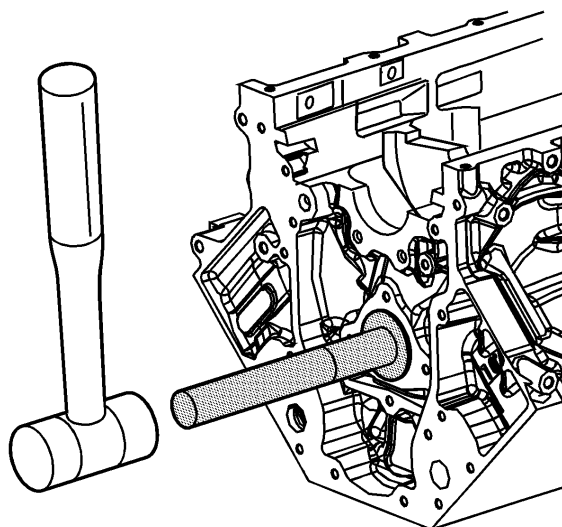
2. Select the expanding driver (4–8) and washer (2 or 3) from the [J 33049](#). Refer to [Piston and Connecting Rod Assemble](#).
3. Assemble the tool.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552557

4. Insert the tool through the front of the engine block and into the bearing.
5. Tighten the expander assembly nut until snug.
6. Push the guide cone (2) into the front camshaft bearing in order to align the tool.
7. Drive the bearing into the block bore.



1552556

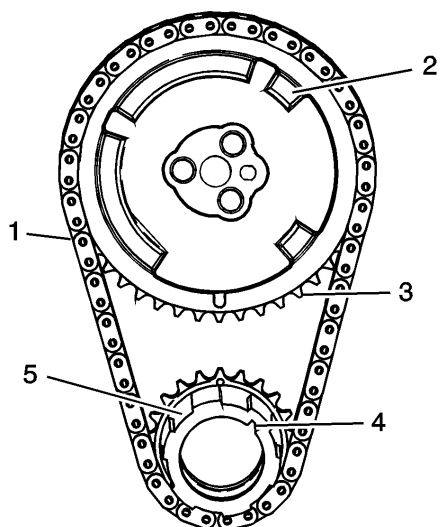
8. Install the front and rear bearings to the block.

Repair Instructions

1555701

Timing Chain and Sprockets Cleaning and Inspection

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552452

1. Clean the components with cleaning solvent.

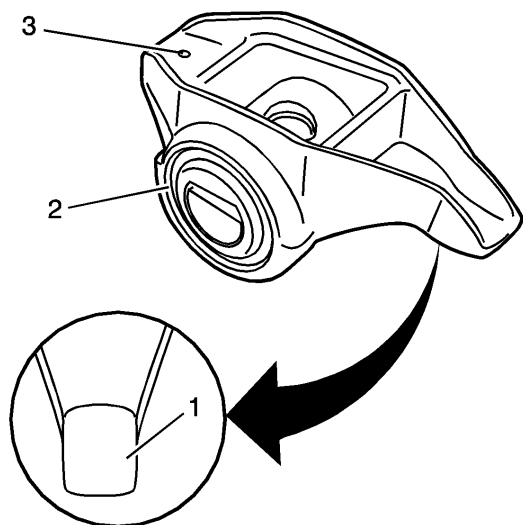
Caution: Refer to *Safety Glasses Caution* .

2. Dry the components with compressed air.
3. Inspect the timing chain (1) for binding or wear.
4. Inspect the camshaft position (CMP) sensor raised areas (2) for nicks or damage.
5. Inspect for worn, damaged, or chipped teeth (3).
6. Inspect for a damaged keyway (4).
7. Inspect for worn oil pump drive splines (5).

Repair Instructions

1555702

Valve Rocker Arm and Push Rods Cleaning and Inspection



490772

Important: Parts that are to be used again must be marked, sorted or organized for assembly.

1. Mark, sort, or organize the components for assembly. Refer to *Separating Parts* .

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Clean the components with cleaning solvent.

Caution: Refer to Safety Glasses Caution .

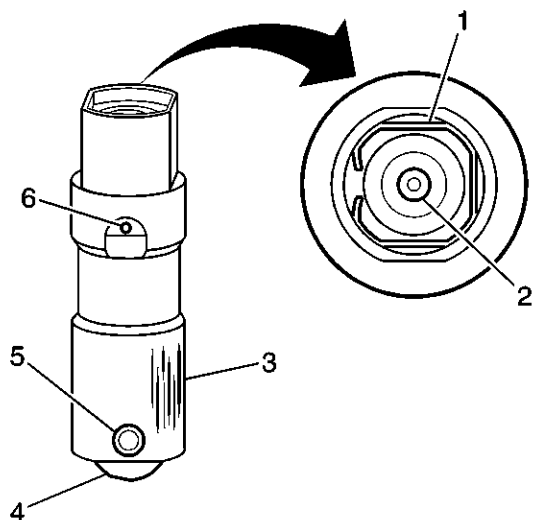
- Dry the components with compressed air.
- Inspect the valve rocker arm bearings (2) for binding or roughness.
- Inspect the valve rocker arm pushrod sockets (3) and valve stem mating surfaces (1). These surfaces should be smooth with no scoring or exceptional wear.
- Inspect the pushrods for worn or scored ends. These surfaces should be smooth with no scoring or exceptional wear.
- Inspect the pushrods for bends. Roll the pushrod on a flat surface in order to determine if the pushrod is bent.
- Inspect the pushrod oil passages for restrictions.

Repair Instructions

1555703

Valve Lifters and Guides Cleaning and Inspection

Valve Lifters



178485

Important: Components that are to be used again must be marked, sorted or organized for assembly.

- Clean the components in cleaning solvent.

Caution: Refer to Safety Glasses Caution .

- Dry the components with compressed air.
- Inspect the valve lifters for the following conditions:

- Bent or broken clip (1)
- Worn pushrod socket (2)
- Scuffed or worn sides (3)

If the valve lifter shows wear, inspect the engine block lifter bores for wear or damage.

- Flat spots on the roller (4)
- Loose or damaged pin (5)
- Plugged oil hole (6)
- Worn or damaged roller bearing

The roller should rotate freely with no binding or roughness.

Valve Guides

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Inspect the valve lifter guides for the following conditions:

- Cracks or damage
- Excessive wear in the lifter mounting bores

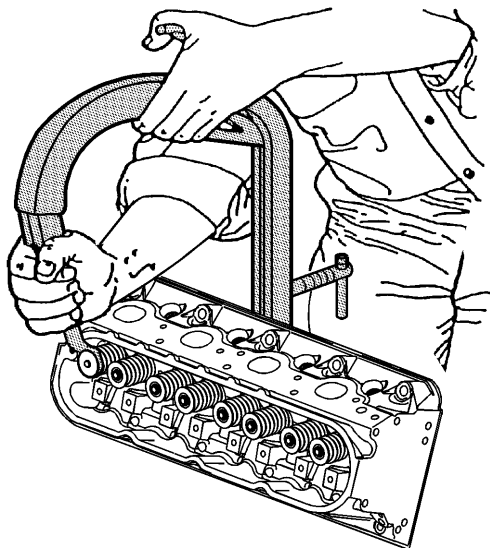
Repair Instructions

1555704

Cylinder Head Disassemble

Tools Required

J 8062 Valve Spring Compressor – Head Off

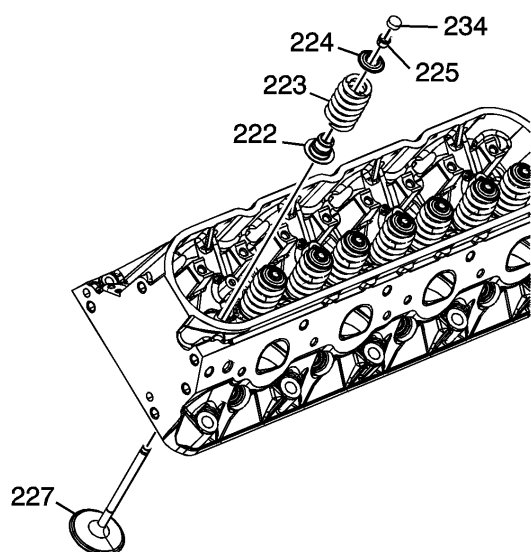


260151

Important:

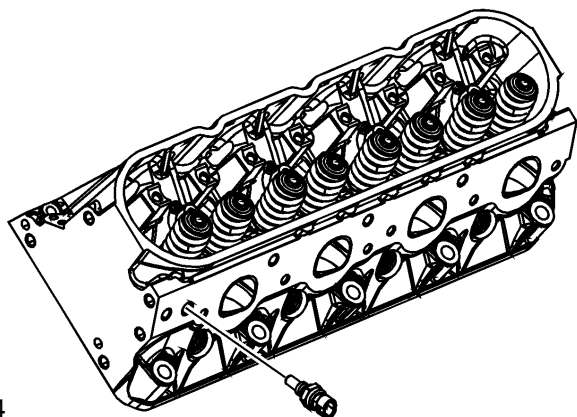
- With the components at room temperature, remove the spark plugs from the cylinder head.
 - Mark, organize, or sort the cylinder head components for assembly. Return the components to their original location during assembly.
1. Remove the spark plugs from the cylinder heads.
 2. Use the *J 8062* in order to compress the valve spring.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552463

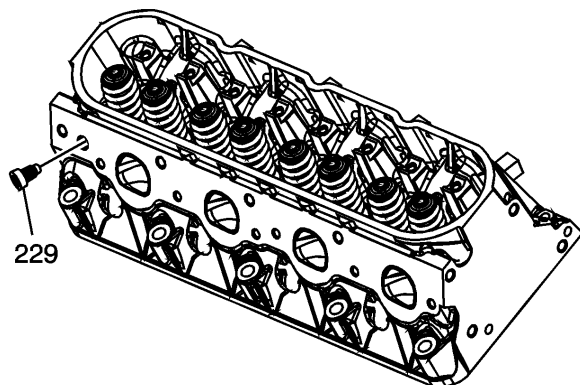
3. Remove the intake valve rocker arm wear pads (234).
4. Remove the valve stem keys (225).
5. Remove the valve spring cap (224).
6. Remove the valve spring (223).
7. Remove the valves (227).
8. Remove the valve stem oil seal (222). Refer to [Separating Parts](#) .



1552454

9. Remove the coolant temperature sensor from the left cylinder head.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552455

10. Remove the cylinder head plug (229) from the right cylinder head.

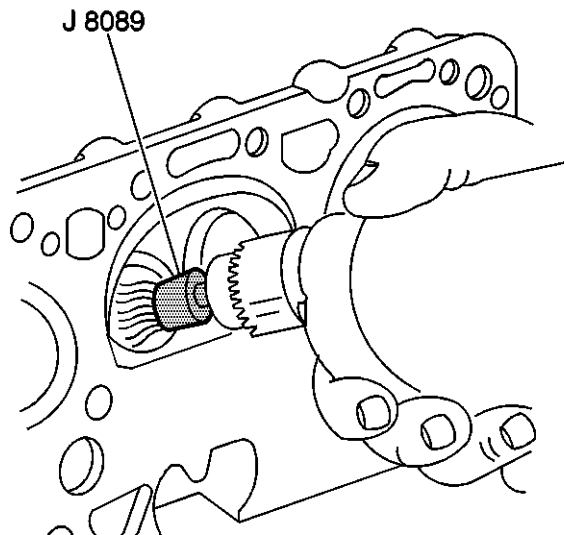
Repair Instructions

1555705

Cylinder Head Cleaning and Inspection

Tools Required

- [J 8089](#) Carbon Removal Brush
- [J 9666](#) Valve Spring Tester



4957

Caution: Refer to *Safety Glasses Caution* .

Notice: Do not clean titanium components with chlorinated solvents. Brake parts, and similar cleaning solvents, safety solvents, or refrigerant that contains chlorofluorocarbons (CFCs) should not be used. Using chlorinated solvents to clean titanium components can result in component damage, leading to stress corrosion cracking that may be undetected with normal visual inspection. Acceptable materials for cleaning titanium components include non-chlorinated solvents, alcohol, acetone, and methanol.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Important:

- When cleaning a cylinder head in a thermal type oven, do not exceed 204°C (400°F).
- Be careful not to scuff the chamber.

1. Clean the following components:

- Use the *J 8089* in order to remove the carbon from the combustion chambers.
- Gasket surfaces
Refer to *Replacing Engine Gaskets* .
- Valve stems and heads
Refer to *Sealers, Adhesives, and Lubricants* .
- Bolt hole threads
Remove all dirt, debris, or threadlocking material from the bolt holes.

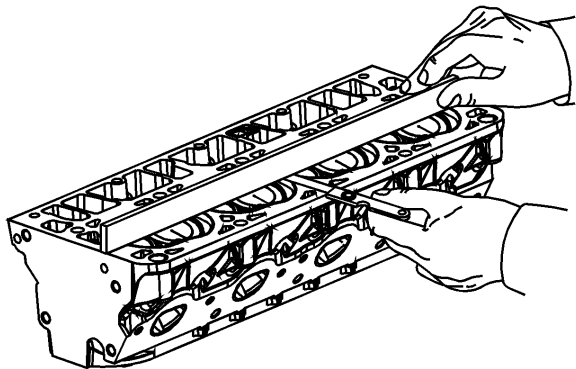
2. Inspect the cylinder head for the following conditions:

- 2.1. Cracks in the exhaust ports and combustion chambers
- 2.2. External cracks in the water chambers
- 2.3. Gasket surfaces for excessive scratches or gouging

Refer to *Replacing Engine Gaskets* .

- 2.4. Bolt hole threads for debris or damaged threads

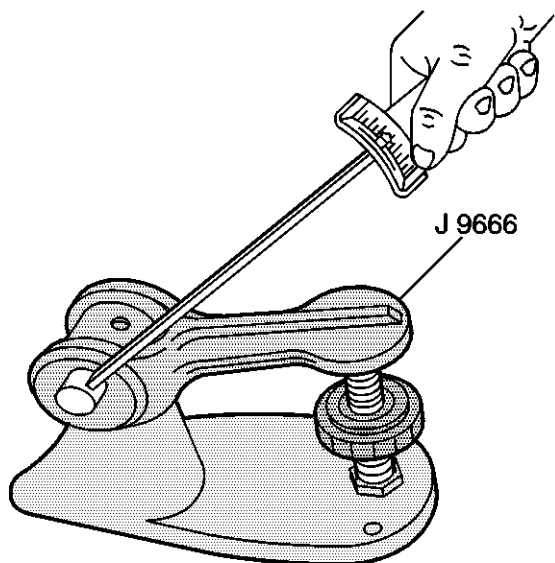
Refer to *Thread Repair* or *Thread Repair Specifications* .



1552456

3. Inspect the cylinder head for warpage. Refer to *Engine Mechanical Specifications* .

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



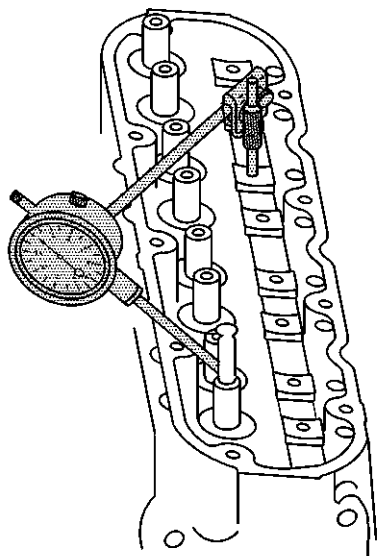
4960
4. Use the *J 9666* in order to measure the valve spring tension. Refer to *Engine Mechanical Specifications* .

Repair Instructions

1555706

Valve Guide Reaming/Valve and Seat Grinding

Valve Guide Reaming



65822

Notice: Do not clean titanium components with chlorinated solvents. Brake parts, and similar cleaning solvents, safety solvents, or refrigerant that contains chlorofluorocarbons (CFCs) should not be used. Using chlorinated solvents to clean titanium components can result in component damage, leading to stress corrosion cracking that may be undetected with normal visual inspection. Acceptable materials for cleaning titanium components include non-chlorinated solvents, alcohol, acetone, and methanol.

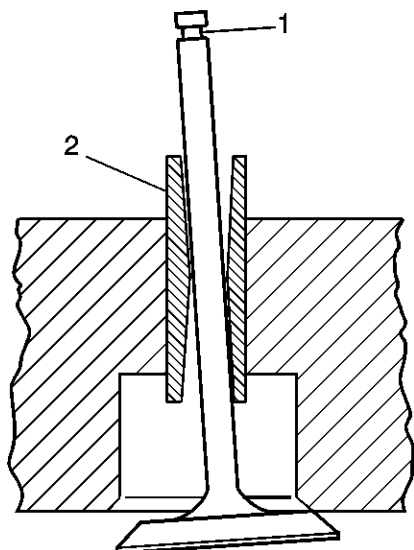
Important:

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Excessive valve stem-to-guide clearance may cause a noisy valve train, premature valve stem oil seal wear, component damage, and/or excessive engine oil consumption.
- Insufficient valve stem-to-guide clearance will result in noisy or sticking valves. Valves that are too tight may disturb engine smoothness or lead to component damage.

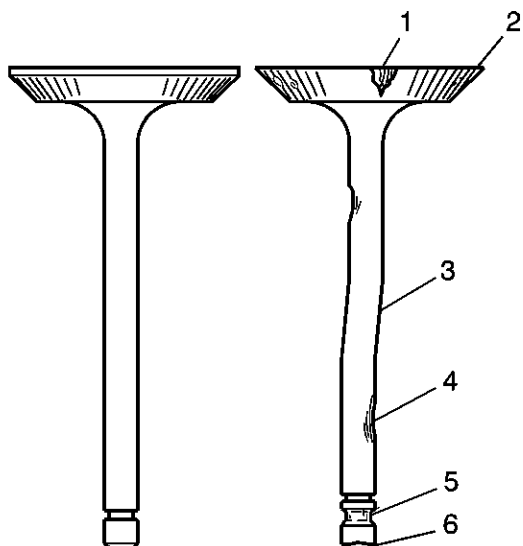
1. Measure the valve stem-to-guide clearance using a dial indicator. Position the tip of the dial indicator at the top of the valve guide.

Valve stem-to-guide clearance may also be obtained by using a micrometer to measure the valve stem diameter and a ball type measuring gage to measure the guide bore.



156172

2. If the stem (1) to guide (2) clearance exceeds specifications, replace the cylinder head. Refer to *Engine Mechanical Specifications*.



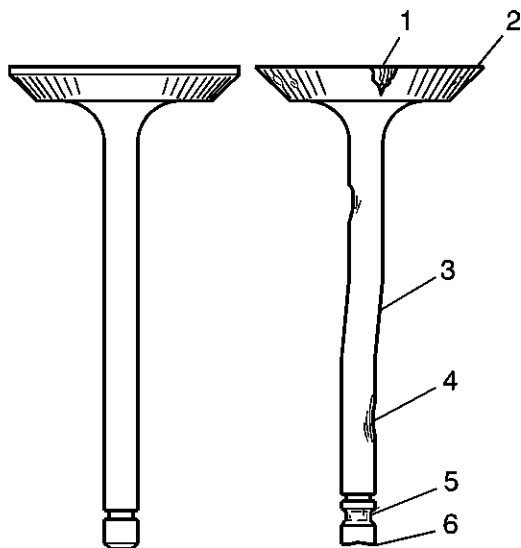
156174

3. Inspect the valve stems for excessive scoring, wear, or warpage.
- A valve stem that has excessive scoring (3 or 4) or wear (4 or 6) must be replaced.
 - A valve guide that is worn and has excessive stem-to-guide clearance should be reamed and valves with oversize stems installed.
4. Measure the valve stem diameter. A valve stem with a diameter less than 7.95 mm (0.313 in) must be replaced.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

If the valve stem diameter is within specifications, and the stem-to-guide clearance is excessive, the cylinder head must be replaced.

Valve and Seat Grinding



156174

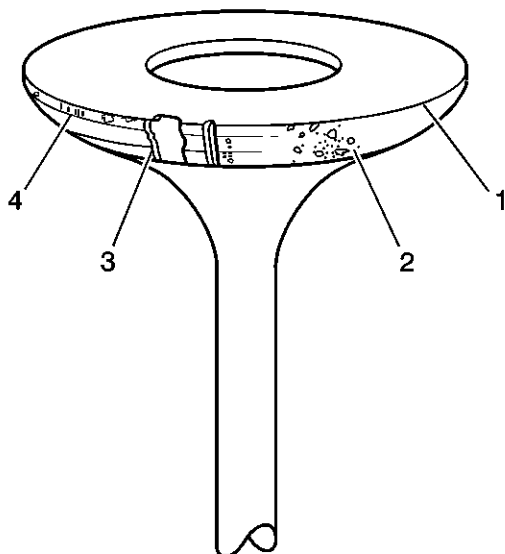
Important:

- The titanium intake valves are not to be resurfaced.
- Reconditioning the valve seats is very important. The seating of the valves must be perfect for the engine to deliver optimum power and performance. Several different types of equipment are available for grinding valve seats.
- Another important factor is the cooling of the valve head. Good contact between the valve and the seat will ensure that heat will be properly dissipated.
- The recommendations of the equipment manufacturer should be followed carefully in order to obtain the proper results. Regardless of the type of equipment used, it is essential that valve guide bores be free from carbon or dirt to ensure proper centering of the tool pilot in the guide.
- Exhaust valves that are pitted may be refaced to the proper angle. Valve stems that show excessive wear, or valves that are warped excessively must be replaced. When an excessively warped exhaust valve head is refaced, a knife edge may be ground on part or all of the valve head, due to the amount of metal that must be removed. Knife edges lead to breakage, burning or pre-ignition due to heat localizing on this knife edge. If the edge of the valve head is less than 1.25 mm (0.05 in) after grinding, replace the valve.
- Several different types of equipment are available for refacing valves. The manufacturer recommendation of the equipment should be carefully followed in order to obtain the proper results.
- **DO NOT** reface intake valves. Intake valves with excessive wear or damage **MUST** be replaced.

1. Inspect the valve for the following conditions:

- Burnt or eroded areas (1)
- A worn margin (2)
- A bent stem (3)
- A worn or scored stem (4)
- A worn key groove (5)
- A worn stem tip (6)

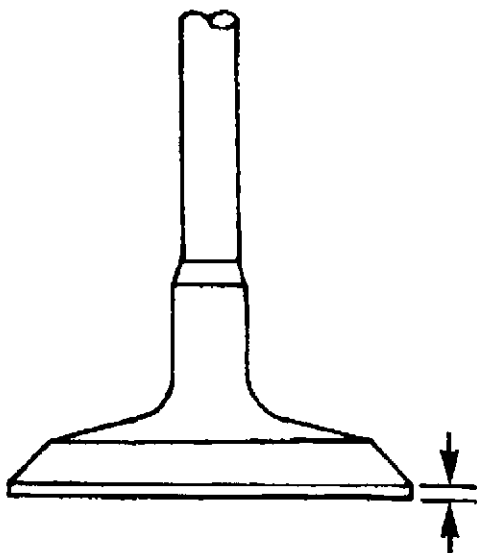
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



156173

2. Inspect the valve face for the following conditions:

- Worn or no margin (1 or 4)
- Pitted surfaces (2)
- Burnt or eroded areas (3)



4955

3. Inspect the valve margin.

The exhaust valve may be refaced if the margin is greater than 1.25 mm (0.05 in) thick before grinding.

4. Reface pitted exhaust valves on a suitable valve refacing machine.

5. Replace the valve if the margin is less than 1.25 mm (0.05 in) thick after grinding.

6. If the valve face has been ground, it may be necessary to shim the valve spring in order to obtain the proper spring installed height. Refer to *Cylinder Head Disassemble*.

7. Inspect for a loose valve seat in the cylinder head. The valve seat has an interference fit to the cylinder head.

8. Clean the valve guide bores with a suitable tool. Remove all carbon or dirt from the bores.

The valve guide must be clean for the seat grinding tool to obtain proper results.

9. Grind the valve seat.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

The manufacturer recommendations of the equipment should be followed carefully in order to obtain the proper results. Regardless of the type of equipment used, it is essential that valve guide bores be free from carbon or dirt to ensure proper centering of the tool pilot in the guide.

10. Inspect the valve seats.
 - The valve seats should be concentric to within 0.05 mm (0.0021 in) total indicator reading.
 - If the valve seat has been ground, it may be necessary to shim the valve spring in order to attain the proper spring installed height. Refer to [Cylinder Head Disassemble](#).

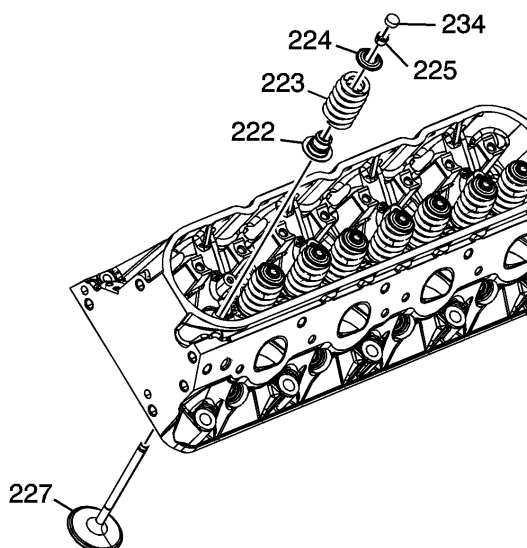
Repair Instructions

1555707

Cylinder Head Assemble

Tools Required

[J 8062](#) Valve Spring Compressor – Head Off



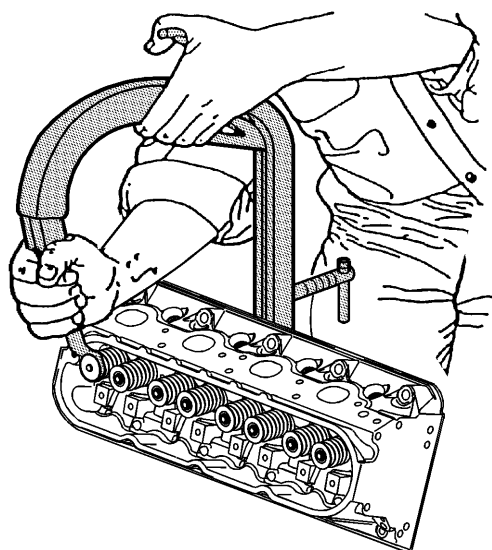
1552463

1. Clean the cylinder head valve spring shim area.

Important: When using the valves and related components again, install the parts to their original location.

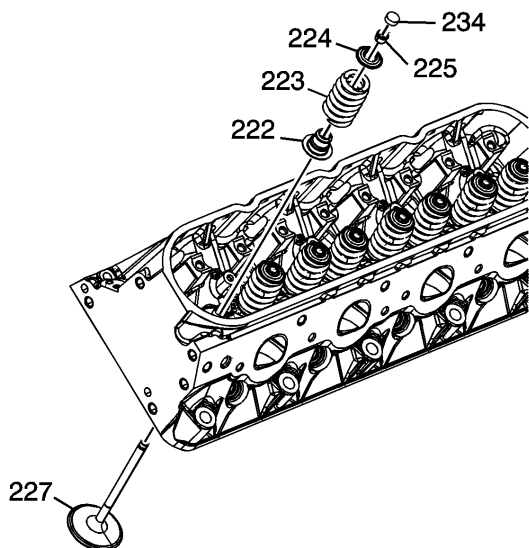
2. Install the valves (227). Refer to [Separating Parts](#).
3. Install the valve stem oil seal (222).
4. Install the valve spring (223).
5. Install the valve spring cap (224).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



260151

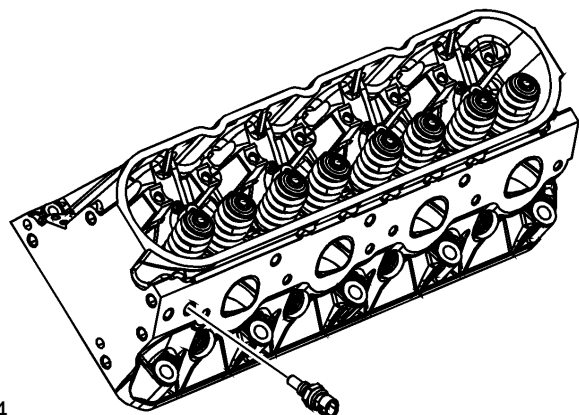
6. Using the *J 8062* , compress the valve spring.
7. Install the valve stem keys.
 - 7.1. Use grease in order to hold the keys in place.
 - 7.2. Remove the *J 8062* .
 - 7.3. Ensure the keys seat properly in the groove of the valve stem.
 - 7.4. Using a plastic face hammer, tap the end of the valve stem in order to seat the keys, if necessary.



1552463

8. Install the intake valve rocker arm wear pads (234).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



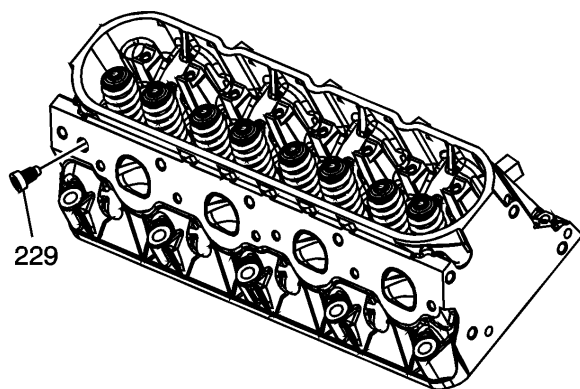
1552454

9. Install sealant GM P/N 12346004 (Canadian P/N 10953480), or equivalent, to the threads of the coolant temperature sensor.

Notice: Refer to *Fastener Notice* .

10. Install the coolant temperature sensor into the left cylinder head.

Tighten: Tighten the coolant temperature sensor to 20 N·m (15 lb ft).



1552455

11. Install sealant GM P/N 12346004 (Canadian P/N 10953480), or equivalent, to the threads of the cylinder head plug (229).

12. Install the cylinder head plug to the right cylinder head.

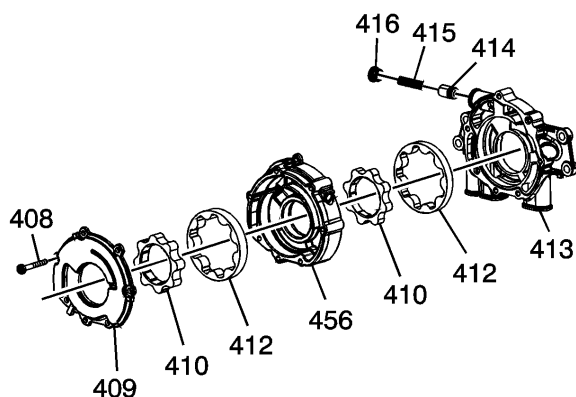
Tighten: Tighten the cylinder head plug to 20 N·m (15 lb ft).

Repair Instructions

1555709

Oil Pump Disassemble

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552458

Important:

- The internal parts of the oil pump assembly are not serviced separately. If the oil pump components are worn or damaged, replace the oil pump as an assembly.
- Mark or identify the gears for assembly. Refer to [Separating Parts](#) .

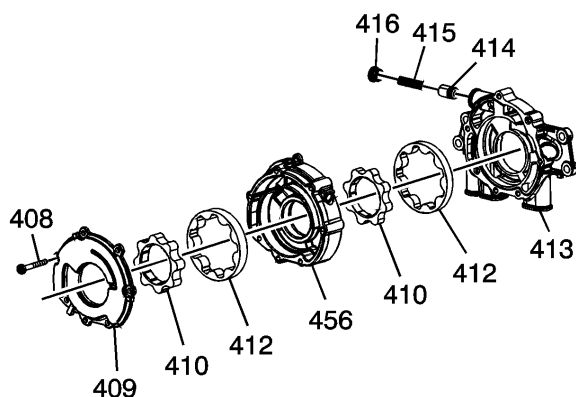
1. Remove the oil pump cover bolts (408).
2. Remove the oil pump cover (409).
3. Remove the secondary pump drive gear (410) and driven gear (412).
4. Separate the secondary pump housing (456) from the primary pump housing (413).
5. Remove the primary pump drive gear (410) and driven gear (412).
6. Remove the pressure relief valve plug (416).
7. Remove the pressure relief valve spring (415).
8. Remove the pressure relief valve (414).
9. Inspect the oil pump components. Refer to [Oil Pump Cleaning and Inspection](#) .

Repair Instructions

1555710

Oil Pump Cleaning and Inspection

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552458

Important: The internal parts of the oil pump assembly are not serviced separately. If the oil pump components are worn or damaged, replace the oil pump as an assembly.

1. Clean the parts in solvent.

Caution: Refer to **Safety Glasses Caution** .

2. Dry the parts with compressed air.
3. Inspect the oil pump housings (413, 456) and the cover (409) for cracks, excessive wear, scoring, or casting imperfections.
4. Inspect the primary pump housing-to-engine block oil gallery surface for scratches or gouging.
5. Inspect the primary pump housing (413) for damaged bolt hole threads.
6. Inspect the relief valve plug (416) and plug bore for damaged threads.
7. Inspect the oil pump internal oil passages for restrictions.
8. Inspect the drive gears (410) and driven gears (412) for chipping, galling or wear.
Minor burrs or imperfections on the gears may be removed with a fine oil stone.
9. Inspect the drive gear splines for excessive wear.
10. Inspect the pressure relief valve (414) and bore for scoring or wear.

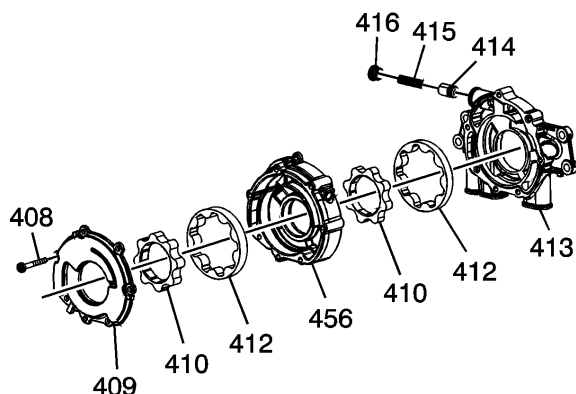
The valve must move freely in the bore, with no restrictions.

Repair Instructions

1555711

Oil Pump Assemble

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552458

Important: Prior to assembling the oil pump, coat all wear or internal surfaces with clean engine oil.

1. Install the primary pump driven gear (412) and drive gear (410) into the primary pump housing (413).
2. Assemble the secondary pump housing (456) to the primary pump housing (413).
3. Install the secondary pump driven gear (412) and drive gear (410) into the secondary pump housing (456).
4. Install the oil pump cover (409).

Notice: Refer to *Fastener Notice*.

5. Install the pump cover bolts (408).

Tighten: Tighten the oil pump cover bolts to 12 N·m (106 lb in).

6. Install the relief valve (414).
7. Install the relief valve spring (415).
8. Install the relief valve plug (416).

Tighten: Tighten the relief valve plug to 12 N·m (106 lb in).

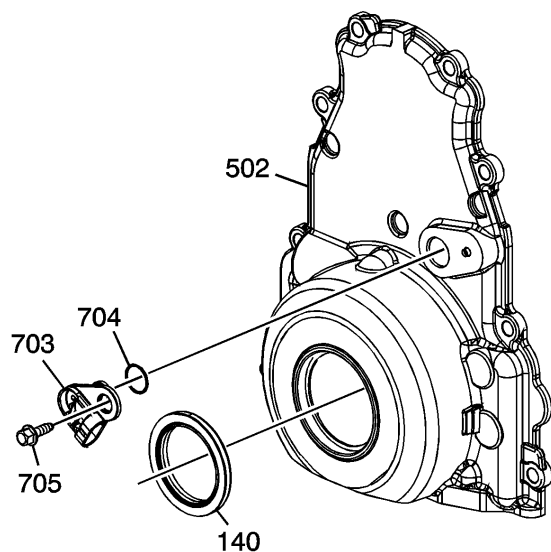
9. Inspect the oil pump for smooth operation by rotating the drive gears.

Repair Instructions

1555712

Engine Front Cover Cleaning and Inspection

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552459

Important:

- Do not use the crankshaft oil seal again. Install a NEW crankshaft oil seal during assembly.
- Do not use the front cover-to-engine block gasket again. Install a NEW gasket during assembly.

1. Remove the crankshaft oil seal (140) from the front cover.
2. Remove the camshaft position (CMP) sensor (703) and bolt (705).
3. Remove the seal (704) from the sensor, if required.
4. Clean the cover in solvent. Remove the sealant from the cover oil pan surface. Refer to [Replacing Engine Gaskets](#) .

Caution: Refer to Safety Glasses Caution .

5. Dry the cover with compressed air.
6. Inspect the gasket sealing surfaces for excessive scratches or gouging.
7. Inspect the threaded bolt holes for damaged threads or debris.
8. Inspect the crankshaft oil seal and CMP sensor bore for damage.

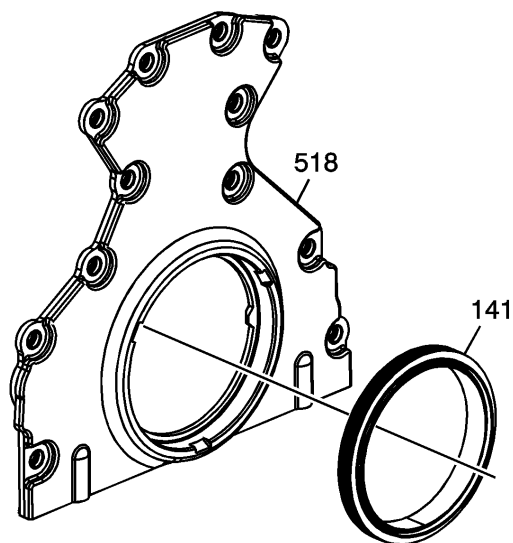
Repair Instructions

1555714

Crankshaft Rear Oil Seal Housing Cleaning and Inspection

Crankshaft Rear Oil Seal Housing:Cleaning and Inspection:Engine Mechanical - 7.0L

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552461

Important:

- Do not use the crankshaft rear oil seal again. Install a NEW crankshaft oil seal during assembly.
- Do not use the rear housing-to-engine block gasket again. Install a NEW gasket during assembly.

1. Remove the crankshaft oil seal (141) from the rear housing.
2. Clean the housing in solvent. Remove the sealant from the housing oil pan surface. Refer to [Replacing Engine Gaskets](#) .

Caution: Refer to [Safety Glasses Caution](#) .

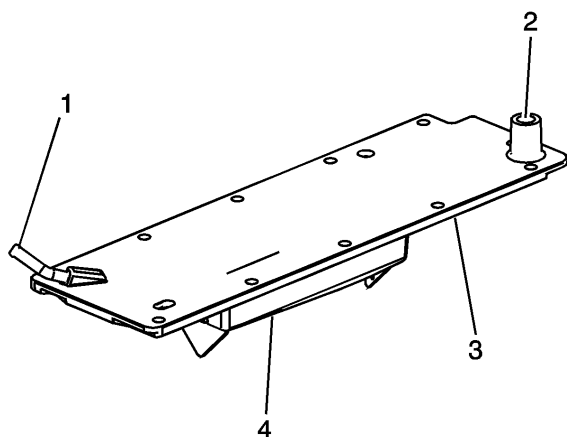
3. Dry the housing with compressed air.
4. Inspect the gasket sealing surfaces for excessive scratches or gouging.
5. Inspect the housing-to-oil pan threaded bolt holes for damaged threads or debris.
6. Inspect the crankshaft oil seal mounting bore for damage.

Repair Instructions

1555716

Engine Valley Cover Cleaning and Inspection

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408874

1. Clean the valley cover in solvent.

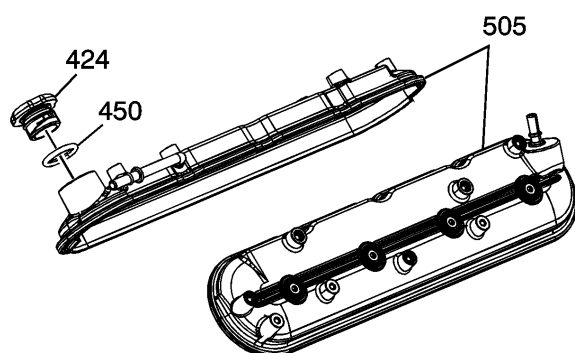
Caution: Refer to *Safety Glasses Caution* .

2. Dry with compressed air.
3. Inspect for restrictions within the positive crankcase ventilation (PCV) passages (1, 4).
4. Inspect for damaged threads (2) and damaged sealing surfaces (3).

Repair Instructions

1555717

Valve Rocker Arm Cover Cleaning and Inspection



1552462

Important:

- Do not use the valve rocker arm cover gasket again. Install a NEW gasket during assembly.
- Remove the ignition coils before cleaning the cover in solvent. Do not submerge the ignition coils in solvent.

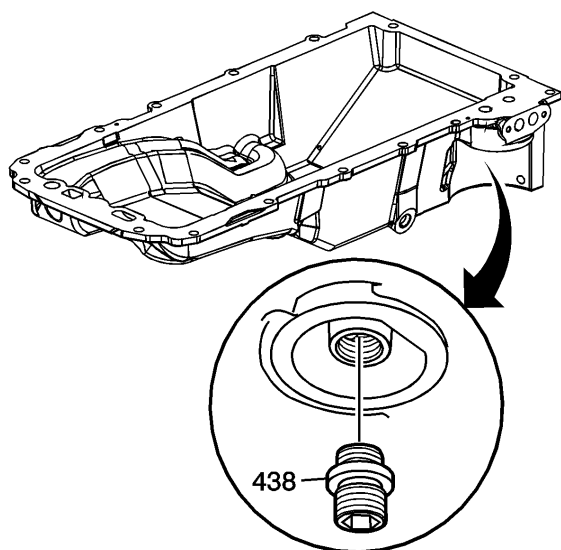
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Do not remove the oil cap from the right valve rocker arm cover, unless service is required. If the cap is removed, install a NEW cap during assembly.
1. Inspect the oil cap (424) for a loose fit, leakage, or damage.
 2. Inspect the covers (505) for the following conditions:
 - Scoring or damage to the gasket surfaces
 - Ventilation system passages for restrictions
 - Threaded bolt holes for damage or debris
 - Leakage at the oil cap seal (450)

Repair Instructions

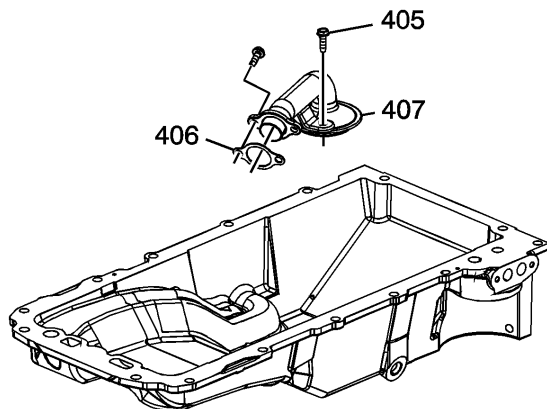
1555719

Oil Pan Cleaning and Inspection



1552464

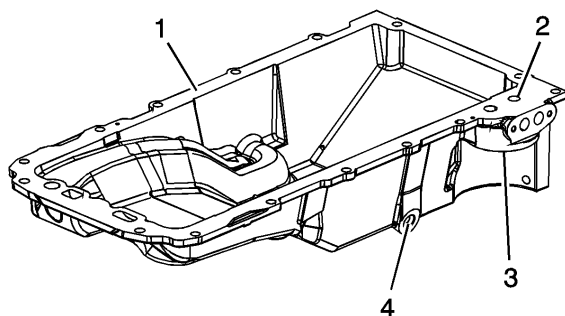
1. Remove the oil filter fitting (438), as required.



1552466

2. Remove the oil pump suction pipe (407), bolts (405), and gasket (406).
3. Clean the suction pipe and inspect for debris, restrictions, or other damage.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552467

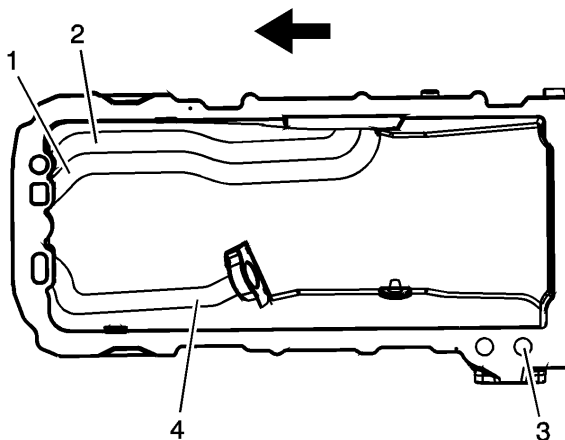
4. Clean the oil pan in solvent.

Caution: Refer to Safety Glasses Caution .

5. Dry the oil pan with compressed air.

6. Inspect the oil pan for the following conditions:

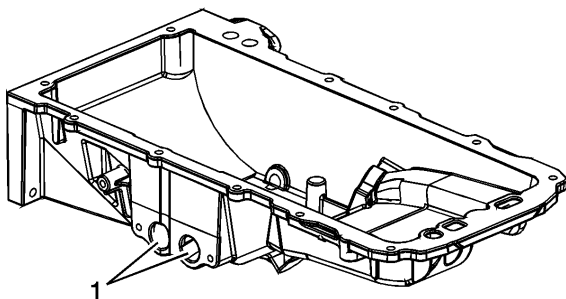
- Damaged gasket surfaces (1)
- Restrictions within the oil passages (2) of the pan
- Damaged oil filter seal surface (3)
- Threaded bolt holes (4) for damage



1552469

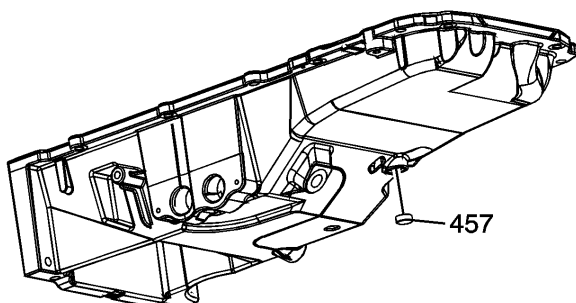
7. Inspect the oil pan internal oil passages (1–4) for restrictions.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552470

8. Inspect the oil hose mating surfaces (1) for scoring or other damage.



1552468

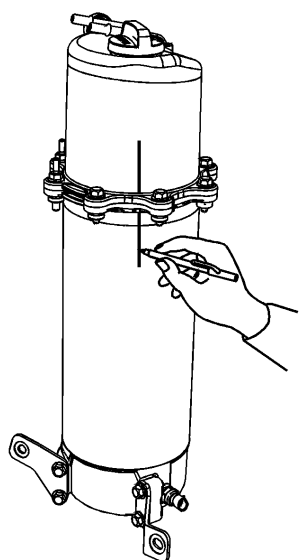
9. Inspect the oil pan plug (457) for a loose fit or leakage.

Repair Instructions

1830961

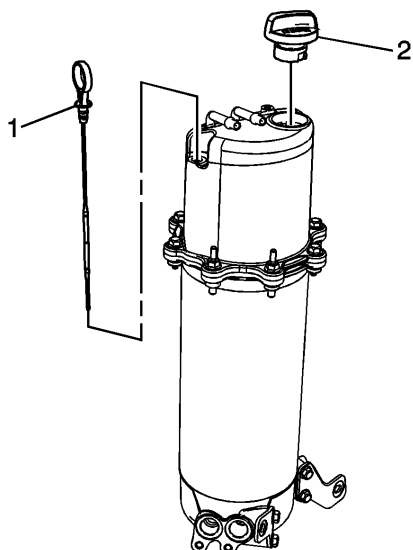
Engine Oil Tank Disassemble

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830396

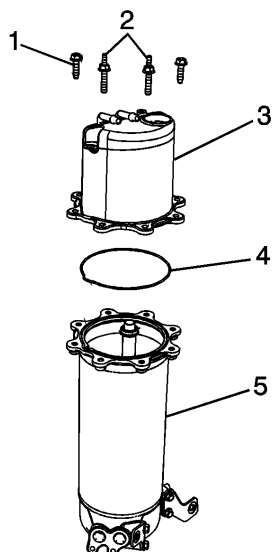
1. Prior to disassembly, mark the upper and lower portions of the tank for proper reassembly. Mark the tank on the area below the oil fill cap.



1830404

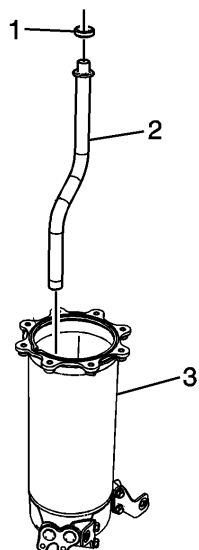
2. Remove the oil level indicator (1) and oil fill cap (2).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830405

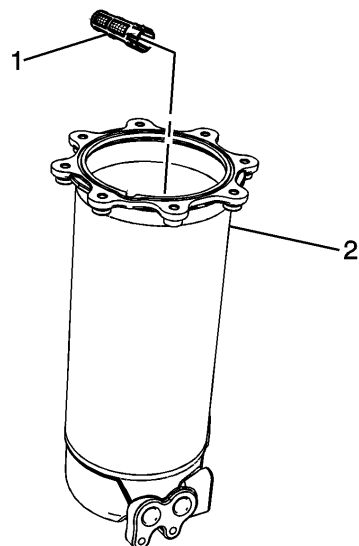
3. Remove the bolts (1) and bolt/studs (2) from the tank. Note the locations of the bolt/studs for reassembly.
4. Separate the upper (3) and lower (5) portions of the tank.
5. Remove the O-ring seal (4).



1830407

6. Remove the tube (2) from the tank (3).
7. Remove the O-ring (1) from the tube.

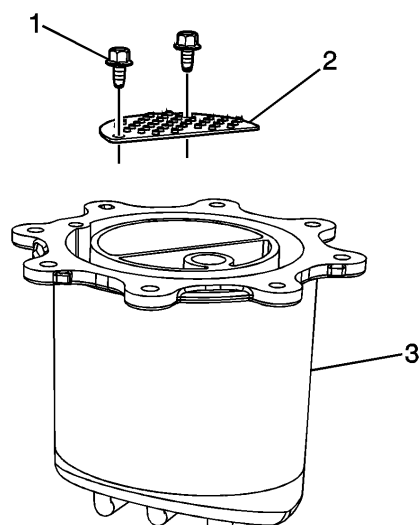
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830411

8. Remove the screen (1) from the tank (2). Reaching inside and into the bottom of the tank, pull the screen into the tank in order to remove.

The screen locking tabs may break upon removal from the oil tank. If the screen cannot be properly cleaned or has a broken locking tab, replace with a new screen.



1830412

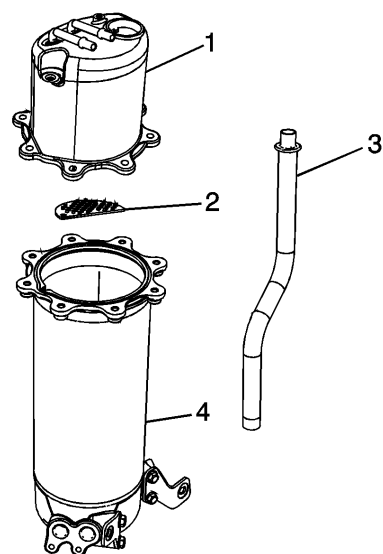
9. Remove the bolts (1) and baffle (2) from the upper portion of the tank (3).

Repair Instructions

1830968

Engine Oil Tank Cleaning and Inspection

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

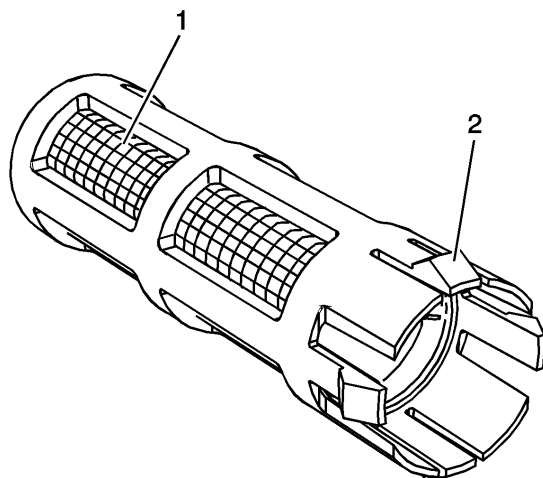


1830418

1. Clean the upper (1) and lower (4) portions of the tank, baffle (2), and tube (3).

Inspect for the following:

- Dirt or debris
- Damaged seal surfaces
- Inspect O-rings for damage, replace as required
- Restrictions within the positive crankcase ventilation (PCV) tubes of the upper tank (1)
- A dirty or restricted baffle (2)
- A dirty or restricted tube (3)



1830415

2. Clean the screen and inspect for the following:

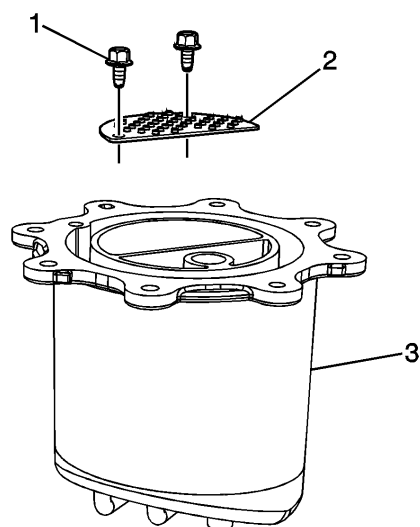
- Plugged or damaged screen (1)
- Broken locking tabs (2)

Repair Instructions

1830984

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Engine Oil Tank Assemble

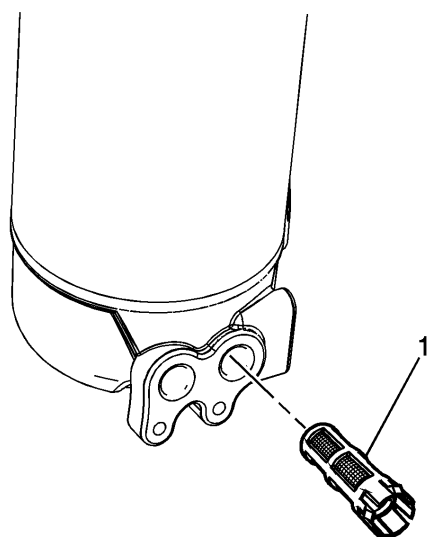


1830412

Notice: Refer to Fastener Notice .

1. Install the bolts (1) and baffle (2) to the upper portion of the tank (3).

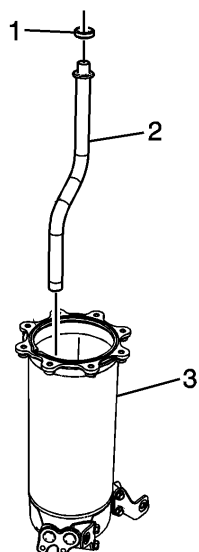
Tighten: Tighten the bolts to 10 N·m (88 lb in).



1830419

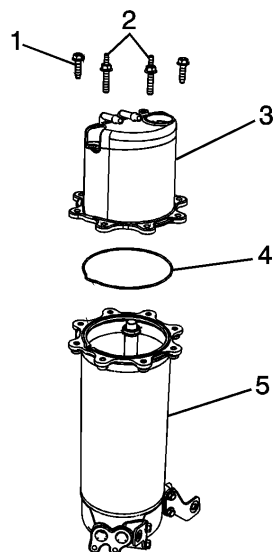
2. Install the screen (1) into the tank. Push the screen into the bore until the locking tabs locate in the groove of the bore. The screen locking tabs may have broken upon removal. If the screen has a broken locking tab, replace with a new screen.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830407

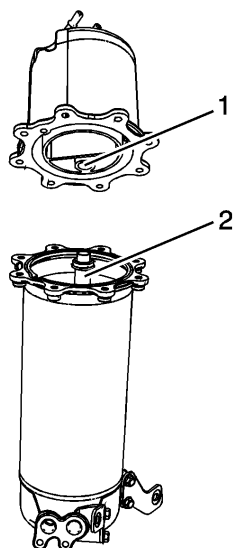
3. Install the O-ring (1) to the tube.
4. Install the tube (2) to the tank (3).



1830405

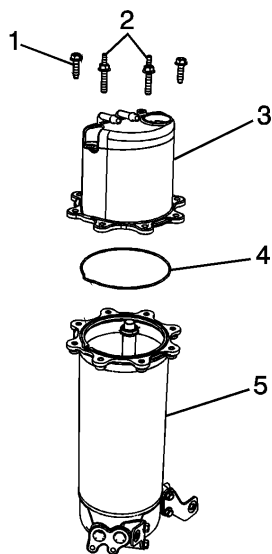
5. Install the O-ring seal (4).
6. Assemble the upper (3) and lower (5) portions of the tank. Aligning the markings made prior to disassembly.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830421

7. Inspect for proper installation of the tube to top tank. The top of the tube (2) should locate into the opening (1) in the top portion of the tank.

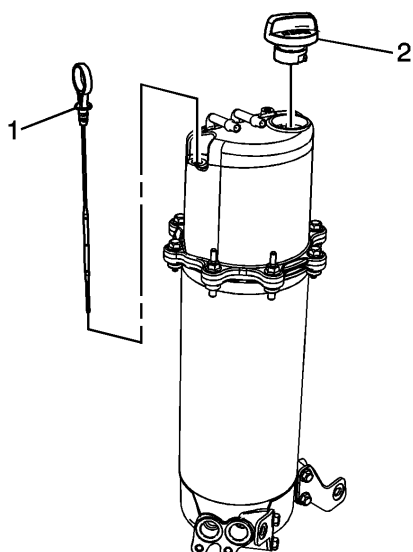


1830405

8. Install the bolts (1) and bolt/studs (2) to the tank. Note the locations of the bolt/studs during reassembly.

Tighten: Tighten the bolt and bolt/studs to 25 N·m (18 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1830404

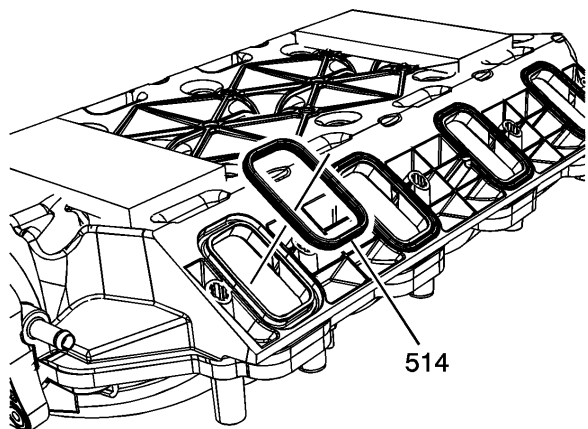
9. Install the oil level indicator (1) and oil fill cap (2).

Repair Instructions

1555722

Intake Manifold Cleaning and Inspection

Cleaning Procedure



1552471

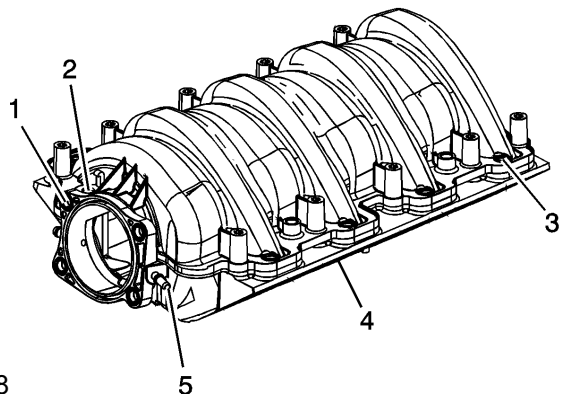
1. Remove and discard the intake manifold-to-cylinder head gaskets (514).
2. Remove the manifold absolute pressure (MAP) sensor. Refer to [Intake Manifold Removal](#).
3. Remove the evaporative (EVAP) emission canister purge solenoid valve, EVAP tubes, and fuel rail with injectors. Refer to [Fuel Rail and Injectors Removal](#).
4. Remove the throttle body and gasket. Refer to [Throttle Body Removal](#).
5. Clean the intake manifold in solvent.

Caution: Refer to [Safety Glasses Caution](#).

6. Dry the intake manifold with compressed air.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Inspection Procedure



1552558

1. Inspect the manifold for the following conditions:

- Lose threaded inserts (1)
- Damaged MAP sensor bore (2)
- Damaged fuel injector bore (3)
- Damaged gasket or sealing surfaces (4)
- Damaged or broken vacuum fittings (5)
- Debris or restrictions within the passages of the manifold
- Inspect the composite intake manifold assembly for cracks or other damage.

2. Inspect the intake manifold cylinder head deck for warpage.

2.1. Locate a straight edge across the intake manifold cylinder head deck surface.

Position the straight edge across a minimum of 2 runner port openings.

2.2. Insert a feeler gage between the intake manifold and the straight edge.

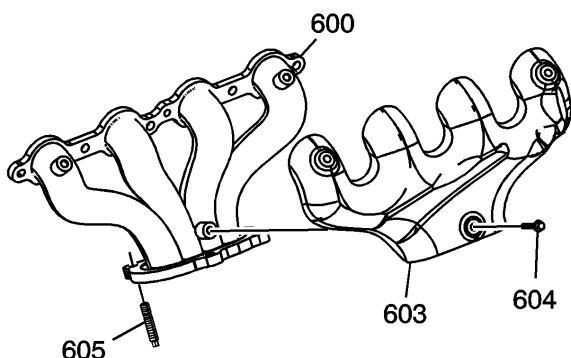
An intake manifold with warpage in excess of 3 mm (0.118 in) over a 200 mm (7.87 in) area is warped and should be replaced.

Repair Instructions

1555723

Exhaust Manifold Cleaning and Inspection

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



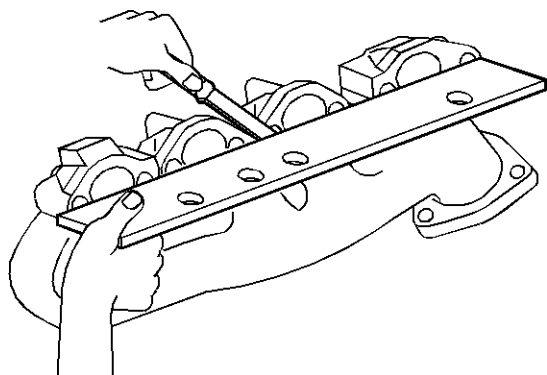
1552472

Important: Do not use the exhaust manifold-to-cylinder head gaskets again. Upon installation of the exhaust manifold, install a NEW gasket. An improperly installed gasket or leaking exhaust system may effect on-board diagnostics (OBD) II system performance.

1. Clean the exhaust manifold (600) and heat shield (603) in solvent.

Caution: Refer to *Safety Glasses Caution* .

2. Dry the exhaust manifold with compressed air.
3. Inspect the exhaust manifold-to-cylinder head gasket surface for excessive scratches or gouging.
4. Inspect for a loose, damaged, or cracked heat shield (603).
5. Inspect the exhaust pipe studs (605) for damaged threads.



66607

6. Use a straight edge and a feeler gage to measure the exhaust manifold cylinder head deck for warpage.

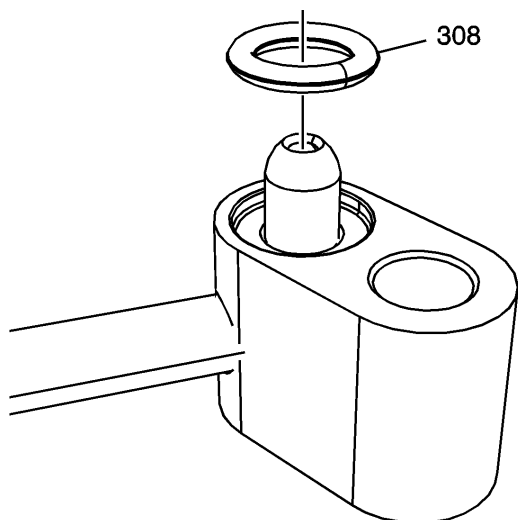
An exhaust manifold deck with warpage in excess of 0.25 mm (0.01 in) within the 2 front or 2 rear runners or 0.5 mm (0.02 in) overall, may cause an exhaust leak and may effect OBD II system performance. Exhaust manifolds not within specifications must be replaced.

Repair Instructions

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1555725

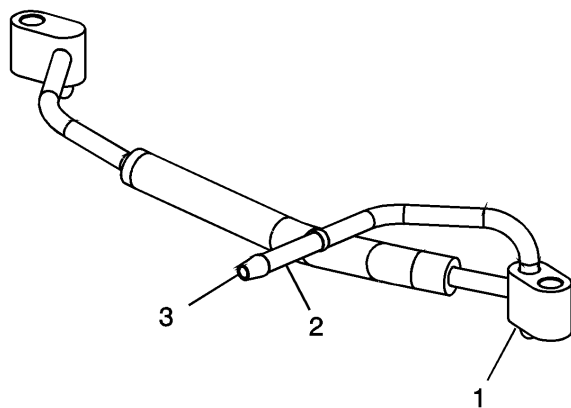
Coolant Air Bleed Pipe Cleaning and Inspection



1552485

Important: Do not use the engine coolant air bleed pipe and cover seals again. Upon installation of the pipe and covers, install NEW seals.

1. Remove the seals (308) from the pipe and covers.



1552473

2. Clean the pipe and covers in solvent.

Caution: Refer to **Safety Glasses Caution** .

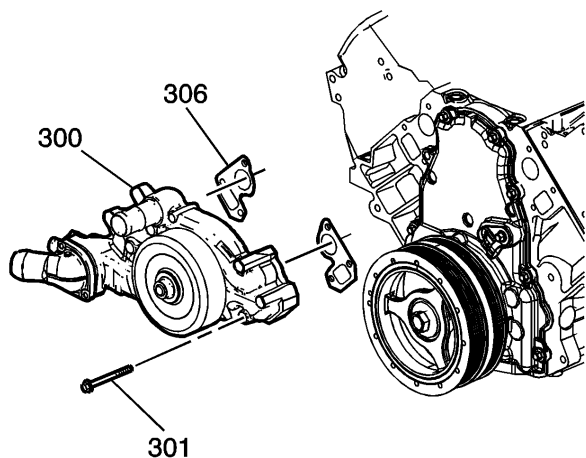
3. Dry the pipe and covers with compressed air.
4. Inspect the pipe and covers for damaged sealing surfaces (1, 2) or restrictions within the pipe (3).

Repair Instructions

1555726

Water Pump Cleaning and Inspection

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552531

1. Remove the old gasket (306) from the water pump sealing surfaces. Refer to [Replacing Engine Gaskets](#) .
2. Clean all excess dirt and debris from the water pump housing.
3. Inspect the water pump (300) for the following conditions:
 - Gasket and hose sealing surfaces for excessive scratches or gouging
 - Restrictions within the internal coolant passages
 - Excessive side-to-side play in the pulley shaft
 - Leakage at the water outlet housing or rear cover
 - Leakage at the water pump vent hole

A stain around the vent hole is acceptable. If leakage, dripping, occurs with the engine running and the cooling system pressurized, replace the water pump.

 - Wear or damage in the belt tracking area of the pulley

Repair Instructions

1407174

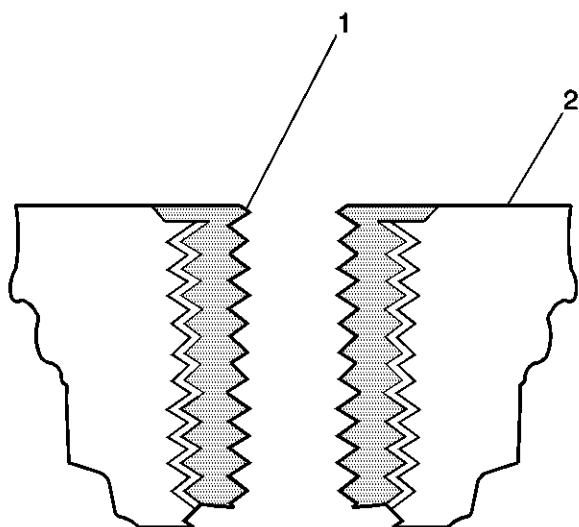
Thread Repair

Tools Required

- [J 42385-100](#) Head/Main Bolt Thread Repair Kit
- [J 42385-200](#) Common Thread Repair Kit
- [J 42385-300](#) Fixtures and Hardware Kit

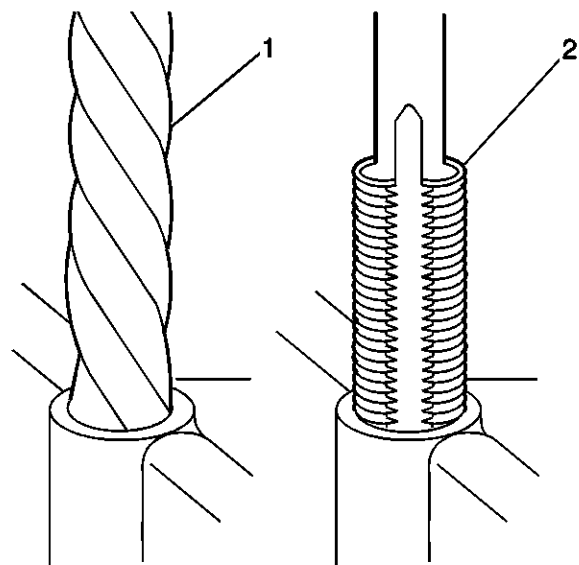
General Thread Repair

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



320675

The thread repair process involves a solid, thin walled, self-locking, carbon steel, bushing type insert (1). During the bushing installation process, the driver tool expands the bottom external threads of the insert into the base material (2). This action mechanically locks the insert in place. Also, when installed to the proper depth, the flange of the insert will be seated against the counterbore of the repaired hole.



320670

Caution: Refer to Safety Glasses Caution in Cautions and Notices.

Important:

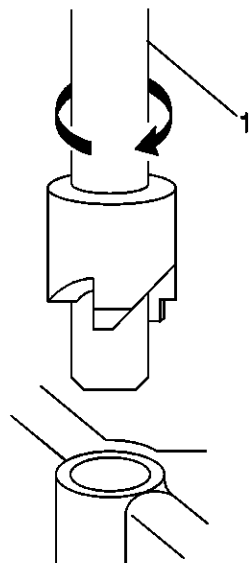
- The use of a cutting type fluid GMP/N 1052864 (Canadian P/N 992881), WD 40[®], or equivalent, is recommended when performing the drilling, counterboring, and tapping procedures.
- Driver oil **MUST** be used on the installer driver tool.
- The tool kits are designed for use with either a suitable tap wrench or drill motor.

1. Drill out the threads of the damaged hole (1).

- 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).

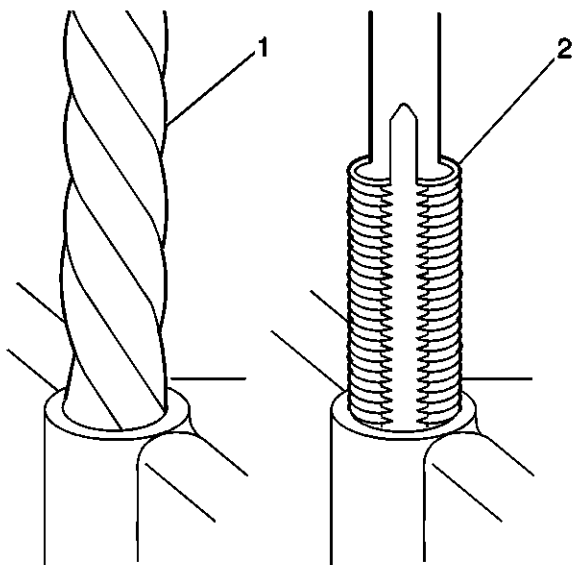
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- M10 inserts require a minimum drill depth of 23.5 mm (0.93 in).
2. Using compressed air, clean out any chips.



320672

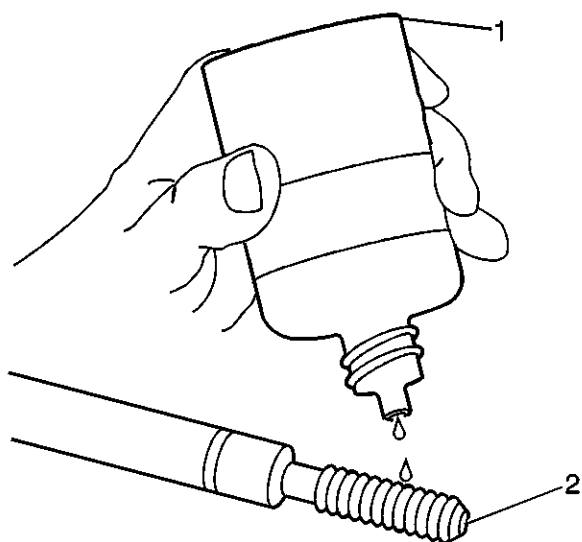
3. Counterbore the hole to the full depth permitted by the tool (1).
4. Using compressed air, clean out any chips.



320670

5. Using a tap wrench (2), 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).
6. Using compressed air, clean out any chips.
7. Spray cleaner GM P/N 12346139, GM P/N 12377981 (Canadian P/N 10953463), or equivalent, into the hole.
8. Using compressed air, clean any cutting oil and chips out of the hole.

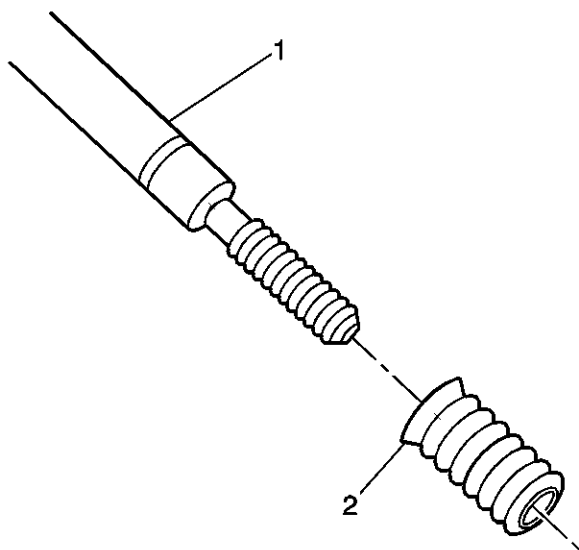
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



313562

Important: Do not allow oil or other foreign material to contact the outside diameter (OD) of the insert.

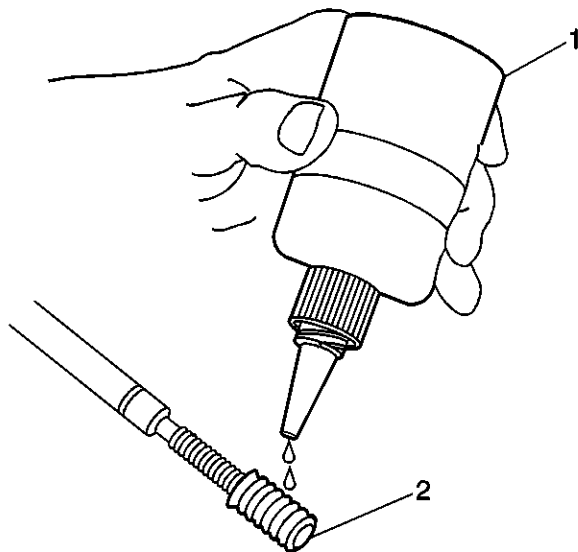
9. Lubricate the threads of the installer tool (2) with the driver oil (1).



313567

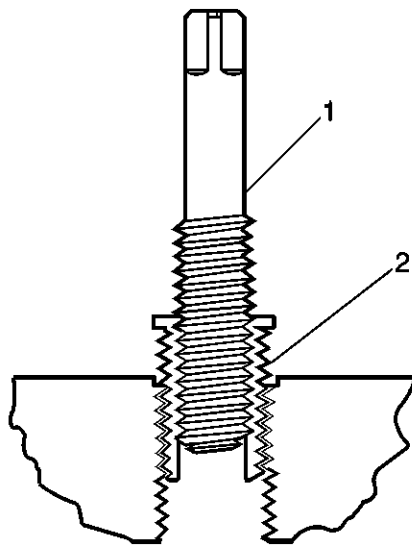
10. Install the insert (2) onto the driver tool (1).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



313572

11. Apply threadlock LOCTITE™ 277, J42385-109 (1), or equivalent, to the insert OD threads (2).



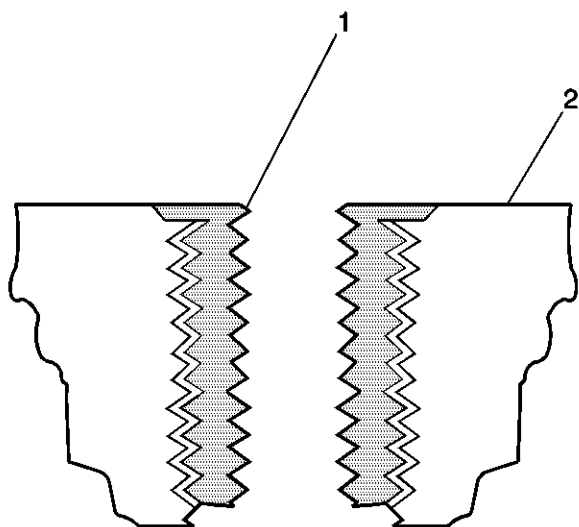
320673

12. Install the insert (2) into the hole.

Install the insert until the flange of the insert contacts the counterbored surface. Continue to rotate the installer tool (1) through the insert.

The installer tool will tighten up before screwing completely through the insert. This is acceptable. You are forming the bottom threads of the insert and mechanically locking the insert to the base material threads.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

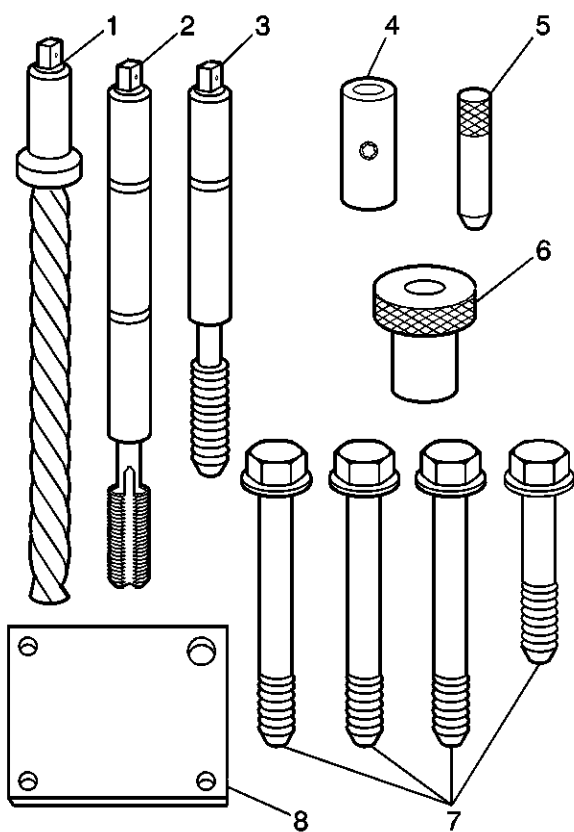


320675

13. Inspect the insert for proper installation into the hole.

A properly installed insert (1) will be either flush or slightly below flush with the surface of the base material (2).

Cylinder Head Bolt Hole Thread Repair

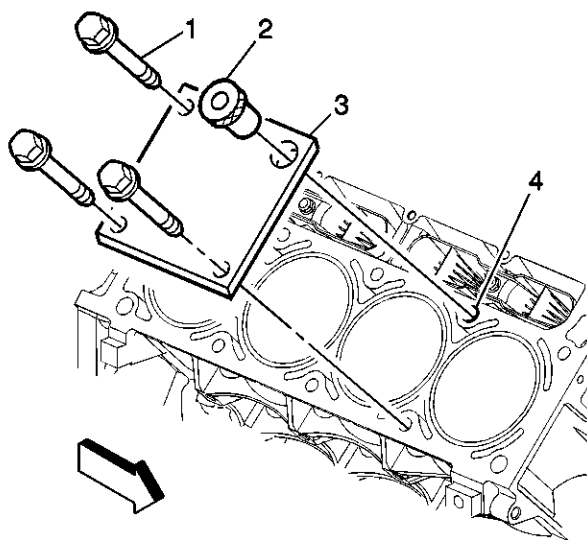


313560

1. The cylinder head bolt hole thread repair kit consists of the following items:

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- The drill (1)
- The tap (2)
- The installer (3)
- The sleeve (4)
- The alignment pin (5)
- The bushing (6)
- The bolts (7)
- The fixture plate (8)



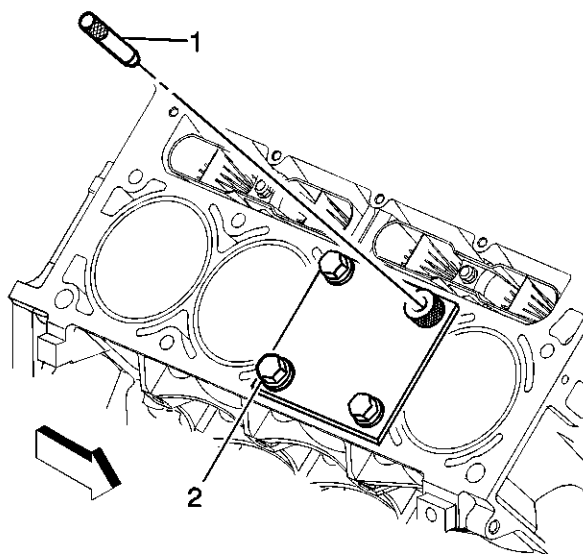
313574

Caution: Refer to Safety Glasses Caution in Cautions and Notices.

Important:

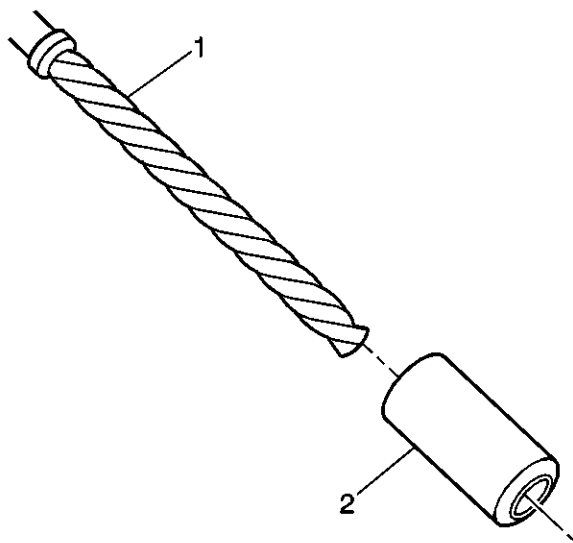
- The use of a cutting type fluid GMP/N 1052864 (Canadian P/N 992881), WD 40[®], or equivalent, is recommended when performing the drilling and tapping procedures.
 - Driver oil **MUST** be used on the installer driver tool.
 - The tool kits are designed for use with either a suitable tap wrench or drill motor.
- 2.** Install the fixture plate (3), bolts (1), and bushing (2) onto the engine block deck. Position the fixture plate and bushing over the hole that is to be repaired (4).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



313577

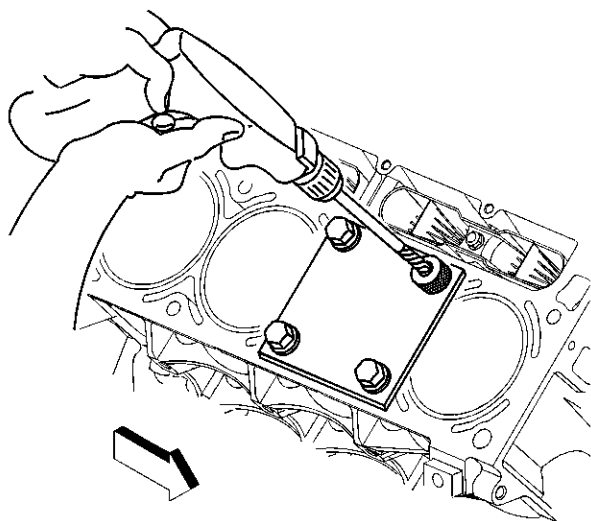
3. Position the alignment pin (1) through the bushing and into the hole.
4. With the alignment pin in the desired hole, tighten the fixture retaining bolts (2).
5. Remove the alignment pin from the hole.



313570

6. Install the sleeve (2) onto the drill (1).

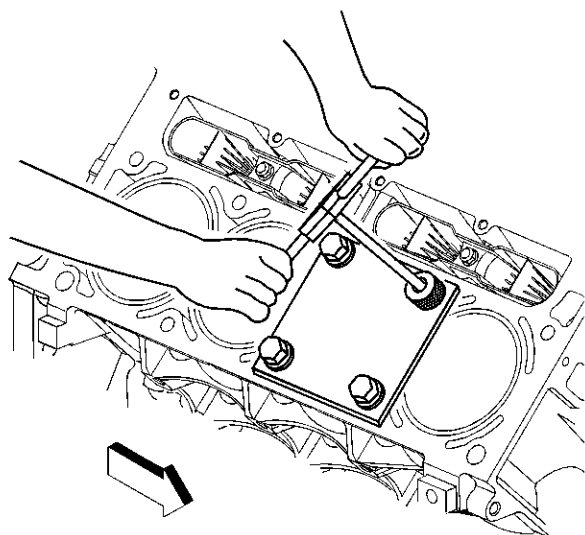
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



309861

Important: During the reaming process, it is necessary to repeatedly remove the drill and clean the chips from the hole.

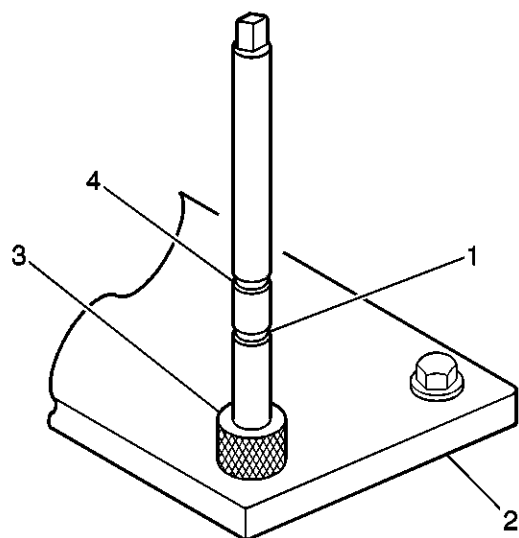
7. Drill out the threads of the damaged hole.
Drill the hole until the stop collar of the drill bit or the sleeve contacts the bushing.
8. Using compressed air, clean out any chips.



320667

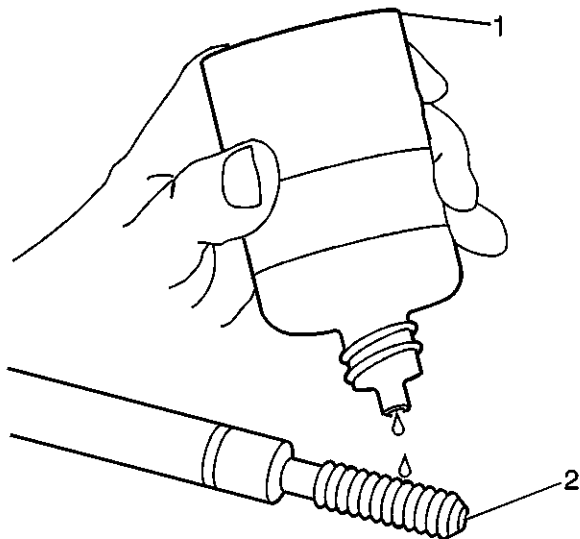
9. Using a tap wrench, tap the threads of the drilled hole.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



377637

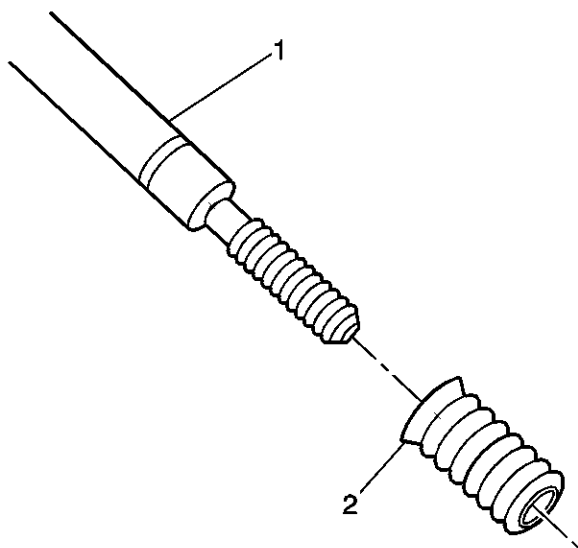
10. In order to tap the new threads to the proper depth, rotate the tap into the hole until the mark (1) on the tap aligns with the top of the drill bushing (3).
11. Remove the fixture plate (2), bushing (3), and bolts.
12. Using compressed air, clean out any chips.
13. Spray cleaner GM P/N 12346139, GM P/N 12377981 (Canadian P/N 10953463), or equivalent, into the hole.
14. Using compressed air, clean any cutting oil and chips out of the hole.



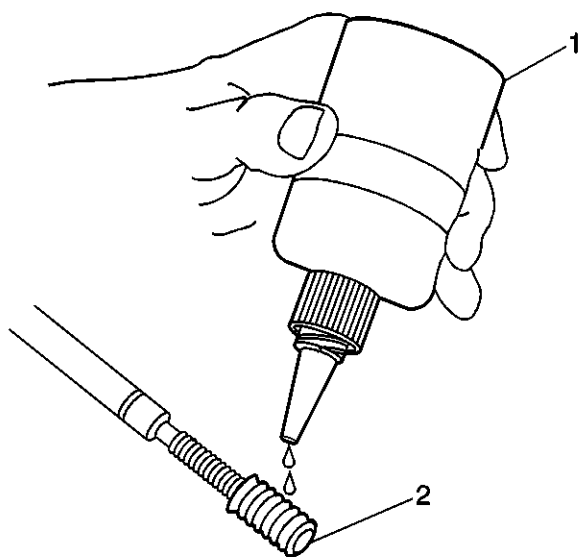
313562

- Important:** Do not allow oil or foreign material to contact the OD of the insert.
15. Lubricate the threads of the installer tool (2) with the driver oil (1).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

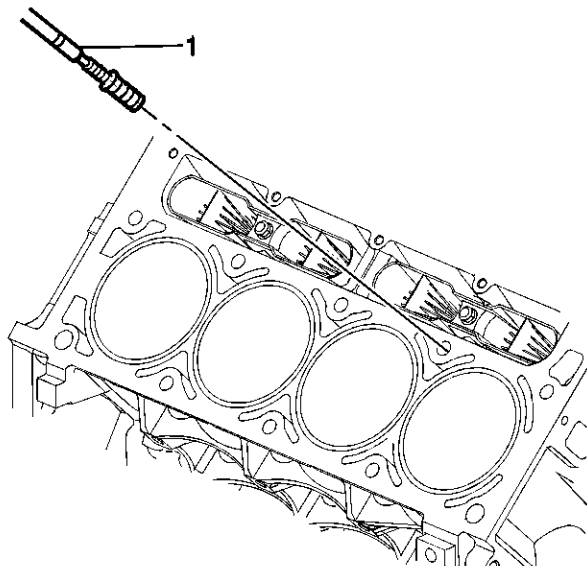


- 313567
16. Install the insert (2) onto the driver tool (1).



- 313572
17. Apply threadlock LOCTITE™ 277, J42385-109 (1), or equivalent, to the insert OD threads (2).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



320669

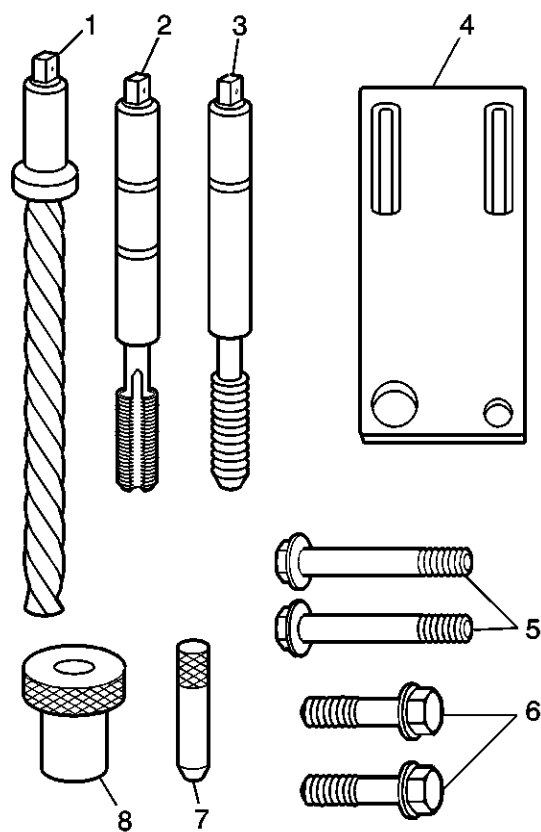
18. Install the insert and driver (1) into the hole.

Rotate the driver tool until the mark on the tool aligns with the deck surface of the engine block.

The installer tool will tighten up before screwing completely through the insert. This is acceptable. You are forming the bottom threads of the insert and mechanically locking the insert to the base material threads.

Main Cap Bolt Hole Thread Repair

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

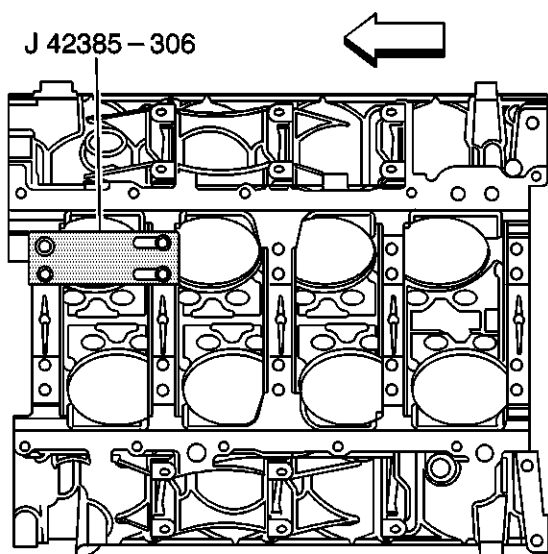


313556

1. The main cap bolt hole thread repair kit consists of the following items:

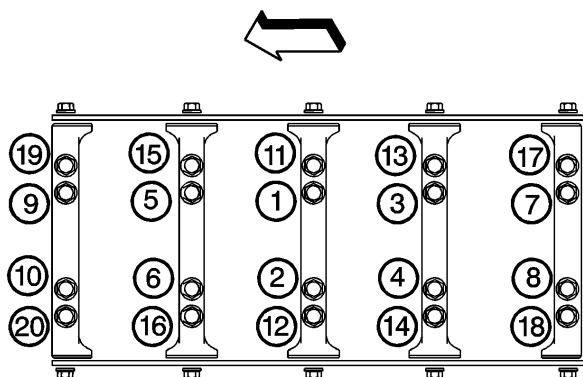
- The drill (1)
- The tap (2)
- The installer (3)
- The fixture plate (4)
- The long bolts (5)
- The short bolts (6)
- The alignment pin (7)
- The bushing (8)

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



377630

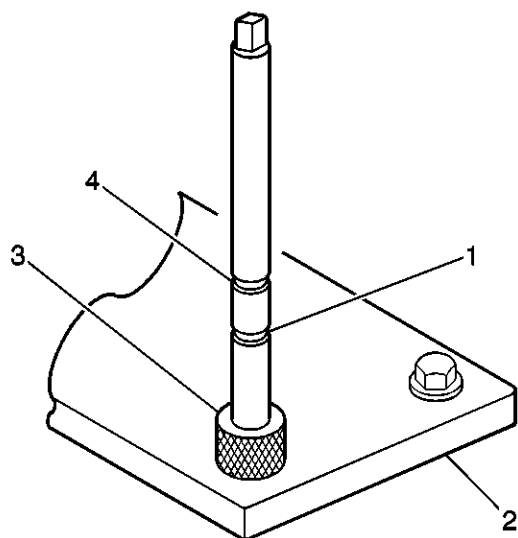
2. Install the fixture plate, bolt, and bushing onto the engine block.
Position the fixture plate and bushing over the hole that is to be repaired.
3. Position the alignment pin in the desired hole and tighten the fixture retaining bolts.



63214

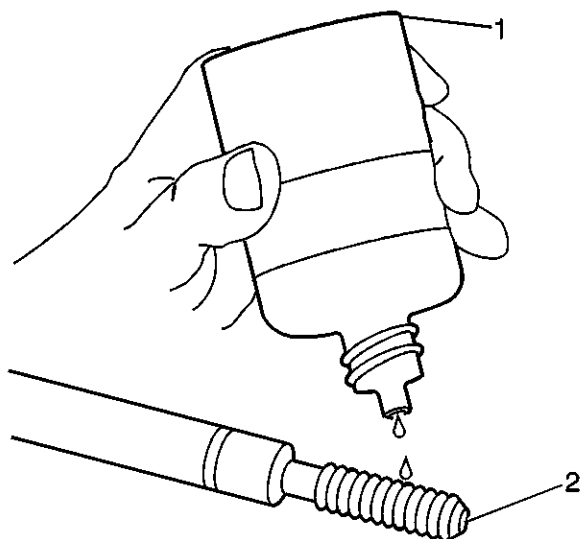
4. Drill out the damaged hole.
The outer bolt hole locations 11–20 have the shallower counterbores. Use sleeve J 42385-316 with the drill.
Drill until the stop collar of the drill bit or the sleeve contacts the bushing.
5. Using compressed air, clean out any chips.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



377637

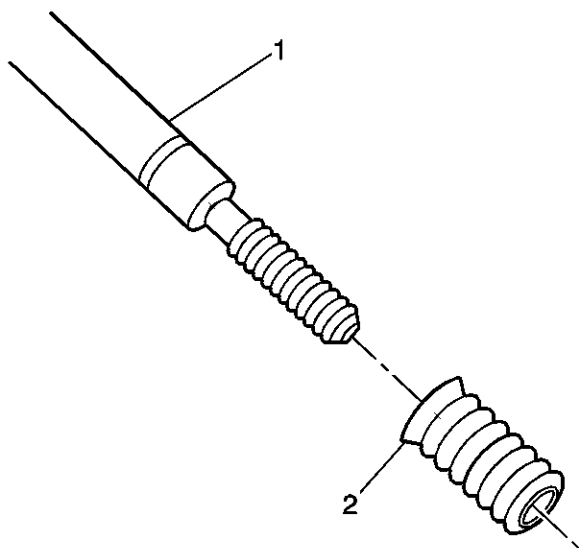
6. Using a tap wrench, tap the threads of the drilled hole.
 In order to tap the new threads to the proper depth, rotate the tap into the hole until the mark on the tap aligns with the top of the bushing.
 For the deeper main cap holes 1–10, rotate the tap until the upper mark (4) on the tap aligns with the top of the bushing (3).
 For the shallower main cap holes 11–20, rotate the tap until the lower mark (1) on the tap aligns with top of the bushing (3).
7. Using compressed air, clean out any chips.
8. Spray cleaner GM P/N 12346139 (Canadian P/N 10953463), or equivalent, into the hole.
9. Using compressed air, clean any cutting oil and chips out of the hole.



313562

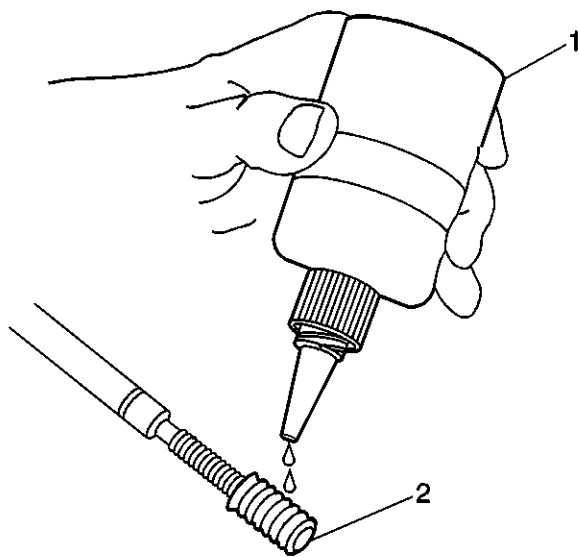
10. **Important:** Do not allow oil or foreign material to contact the OD of the insert.
 Lubricate the threads of the installer tool (2) with the driver oil (1).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



313567

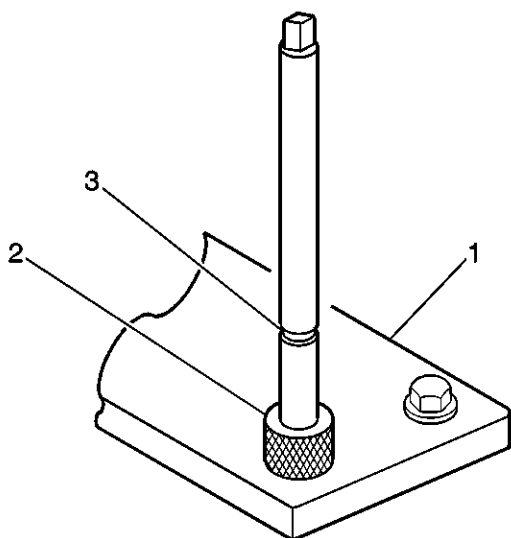
11. Install the insert (2) onto the driver tool (1).



313572

12. Apply threadlock LOCTITE™ 277, J42385-109 (1), or equivalent, to the insert OD threads (2).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



377635

Important: The fixture plate and bushing remains installed onto the engine block during the insert installation procedure.

13. Install the insert and driver (1) through the fixture plate and bushing and into the hole. Rotate the driver tool until the mark on the tool (3) aligns with the top of the bushing (2).

The installer tool will tighten up before screwing completely through the insert. This is acceptable. You are forming the bottom threads of the insert and mechanically locking the insert to the base material threads.

Repair Instructions

1555727

Service Prior to Assembly

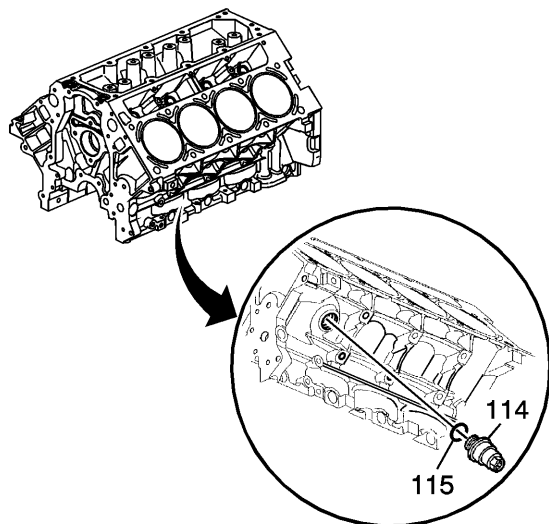
- Dirt or debris will cause premature wear of the rebuilt engine. Clean all components. Refer to [Cleanliness and Care](#).
- Use the proper tools to measure components when inspecting for excessive wear. Components that are not within the manufacturers specifications must be repaired or replaced.
- When the components are installed into an engine, return the components to their original location, position and direction. Refer to [Separating Parts](#).
- During assembly, lubricate all moving parts with clean engine oil. This provides initial lubrication when the engine is first started.

Repair Instructions

1555728

Engine Block Plug Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552549

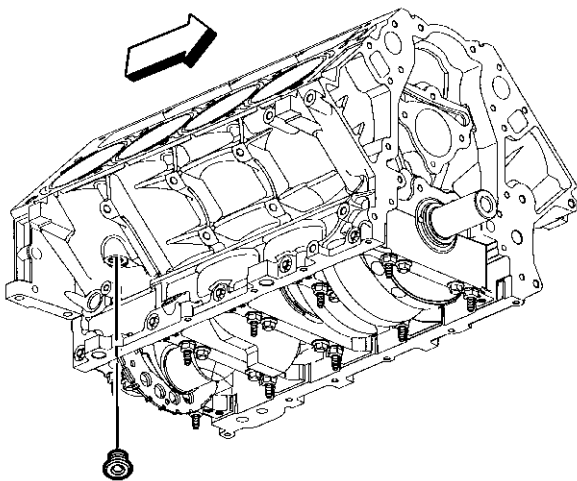
Important: Engine block plug, oil gallery, and coolant sealing washers may be used again if not bent, scored or otherwise damaged.

1. Apply a 3.175 mm (0.125 in) bead of sealant GM P/N 12346004 (Canadian P/N 10953480) to the engine block coolant heater sealing washer (115), if applicable. Refer to *Sealers, Adhesives, and Lubricants*.

Notice: Refer to *Fastener Notice*.

2. Install the engine block coolant heater (114) to the engine block.

Tighten: Tighten the block coolant heater to 50 N·m (37 lb ft).



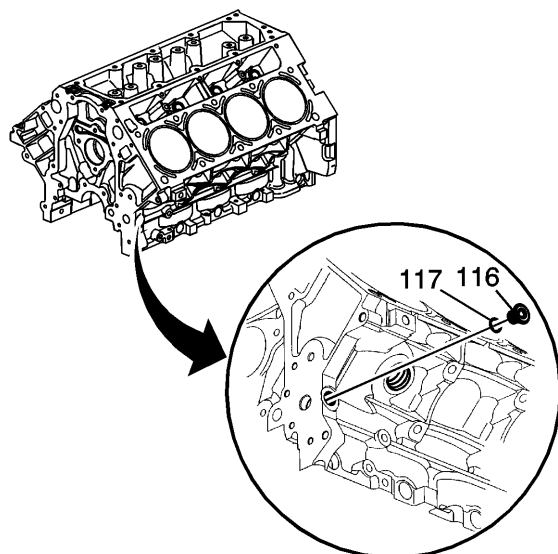
63164

3. Apply a 3.175 mm (0.125 in) bead of sealant GM P/N 12346004 (Canadian P/N 10953480) to the engine block right rear coolant drain hole plug sealing washer.

4. Install the engine block right rear coolant drain hole plug.

Tighten: Tighten the block right rear coolant drain hole plug to 60 N·m (44 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

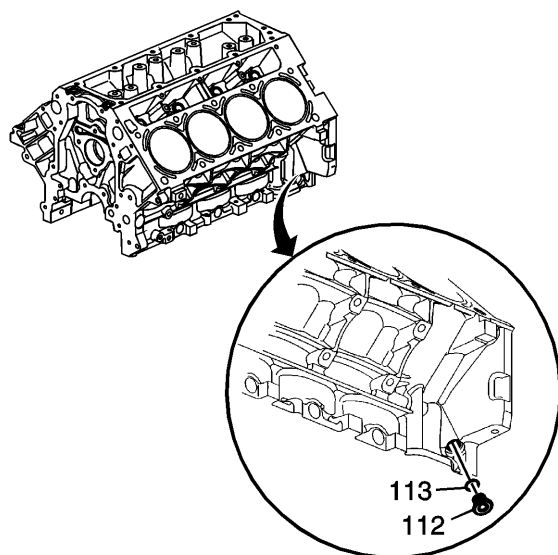


1552550

5. Apply a 3.175 mm (0.125 in) bead of sealant GM P/N 12346004 (Canadian P/N 10953480) to the engine block left front oil gallery plug sealing washer (117).

6. Install the engine block left front oil gallery plug (116).

Tighten: Tighten the block left front oil gallery plug to 60 N·m (44 lb ft).



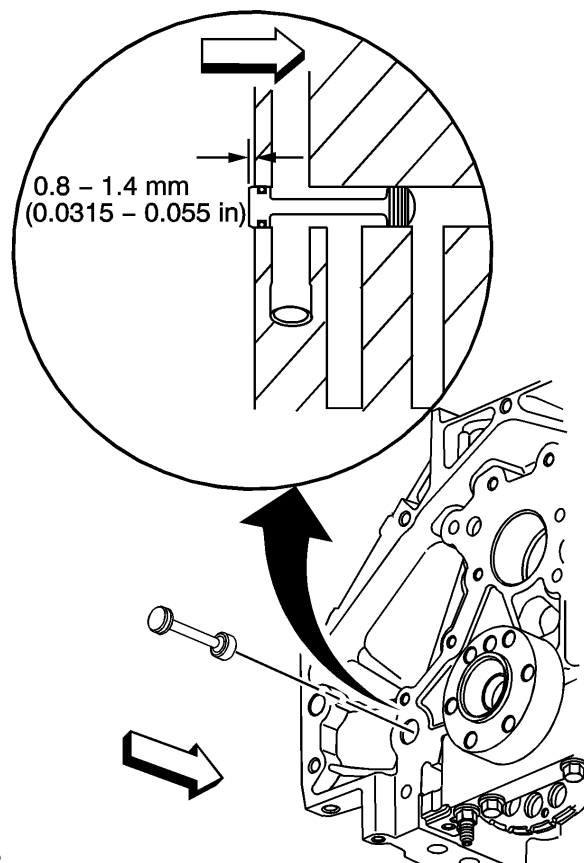
1552551

7. Apply a 3.175 mm (0.125 in) bead of sealant GM P/N 12346004 (Canadian P/N 10953480) to the engine block left rear oil gallery plug sealing washer (113).

8. Install the engine block left rear oil gallery plug (112).

Tighten: Tighten the block left rear oil gallery plug to 60 N·m (44 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



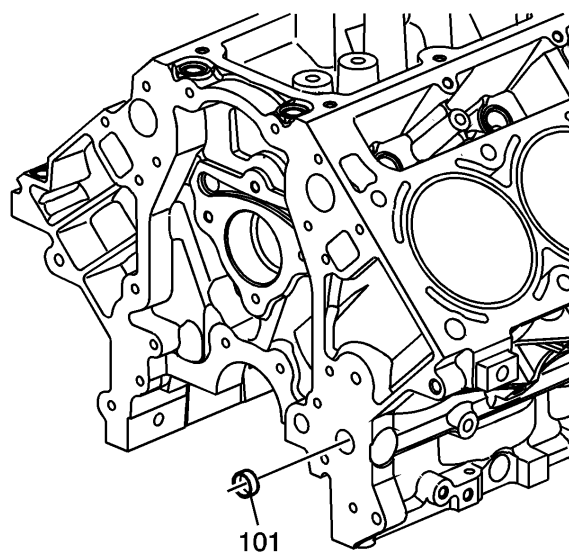
63228

9. Inspect the engine block rear oil gallery plug and O-ring seal. If the O-ring seal on the plug is not cut or damaged, the rear oil gallery plug may be used again.

10. Lubricate the O-ring seal with clean engine oil.

11. Install the O-ring seal onto the plug.

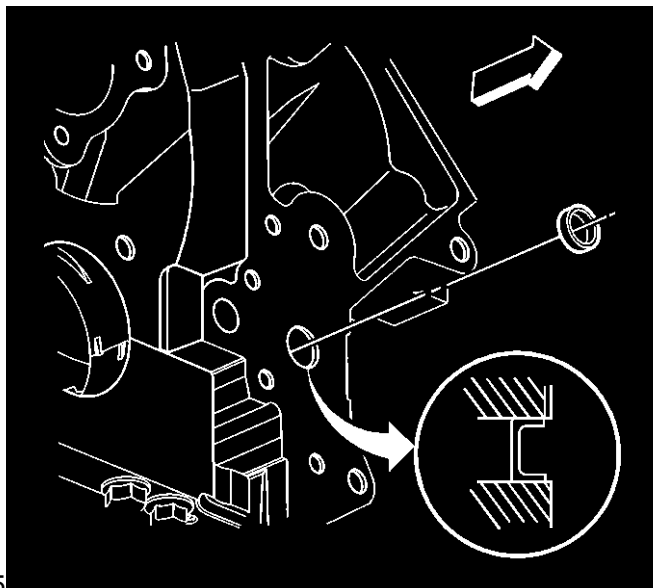
12. Install the engine block rear oil gallery plug into the oil gallery bore. A properly installed block plug will protrude 0.8–1.4 mm (0.0315–0.055 in) beyond the rear face of the block.



1552553

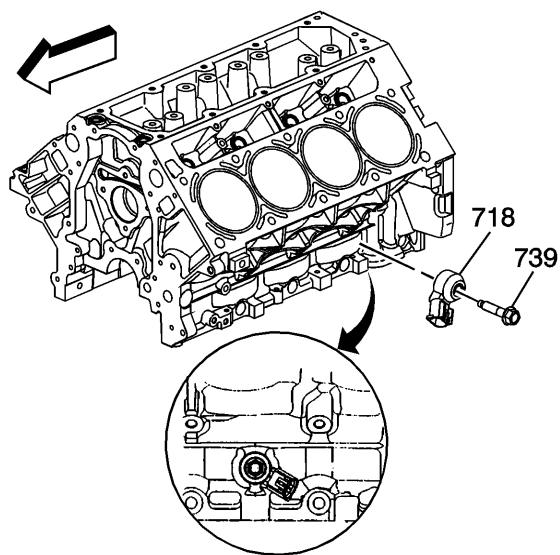
13. Apply threadlock GMP/N 12345382 (Canadian P/N 10953489) to the sides of the NEW front oil gallery plug (101).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



64295

14. Install a NEW engine block front oil gallery plug. Install the plug into the oil gallery bore 2.2–2.8 mm (0.0086–0.011 in) below flush.

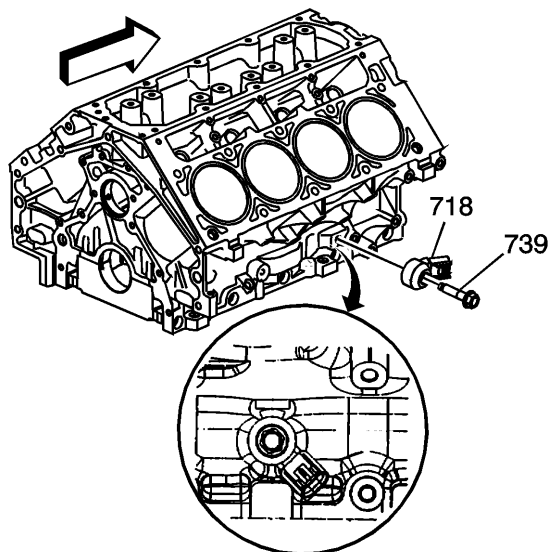


1402136

15. Install the left side knock sensor (718) and bolt (739).

Tighten: Tighten the bolt to 20 N·m (15 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1402140

16. Install the right side knock sensor (718) and bolt (739).

Tighten: Tighten the bolt to 20 N·m (15 lb ft).

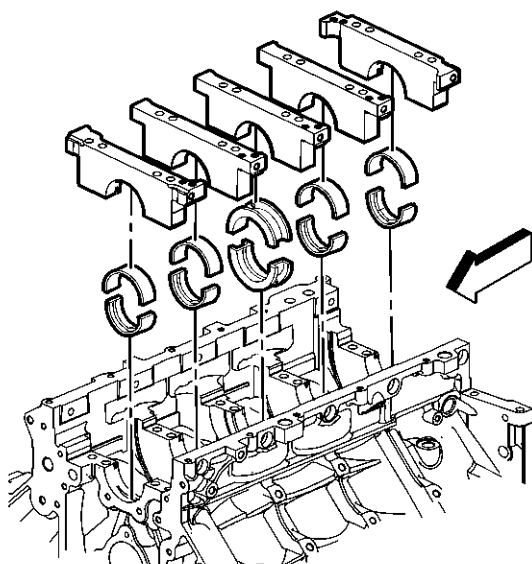
Repair Instructions

1556218

Crankshaft and Bearings Installation

Tools Required

J 45059 Angle Meter



64293

Important:

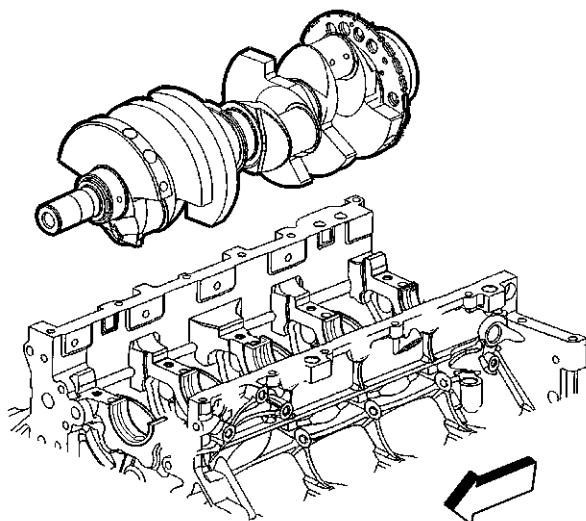
- Crankshaft bearing clearances are critical. Excessive crankshaft bearing clearance may affect crankshaft position (CKP) sensor signals and/or on-board diagnostic (OBD) II system performance.
- Crankshaft bearing caps must be installed to the proper location and direction.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- When installing the crankshaft bearings, align the locating tabs on the bearings with the locating notches in the engine block journal bore and the bearing cap.
- Always install crankshaft bearings with their machined partner. Do not file bearings or mix bearing halves.
- In order to prevent engine block oil leakage, install NEW M8 crankshaft bearing cap side bolts.

The crankshaft bearing cap M8 side bolts have a pre-applied sealant patch applied to the bolt flange.

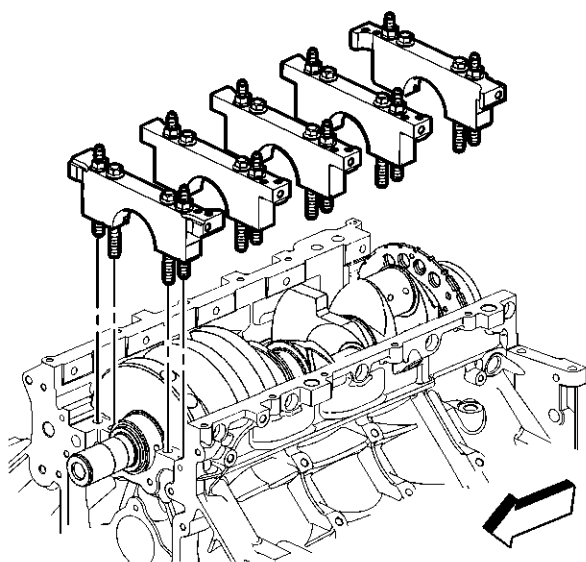
1. Install the crankshaft bearings to the engine block and bearing caps. The thrust bearings are to be installed into center journal.
2. Lubricate the bearing surfaces and crankshaft journals with clean engine oil.



156151

Notice: To maintain proper crankshaft end play, use extreme care during crankshaft installation. Avoid scoring or damaging the thrust bearing.

3. Install the crankshaft.

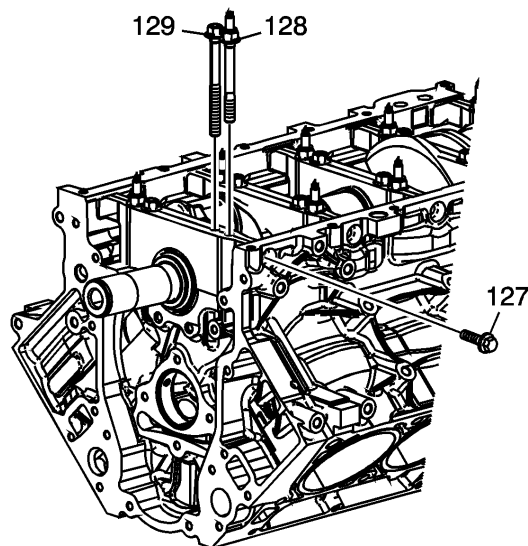


156152

Important: The bearing caps must be installed in the proper location and direction.

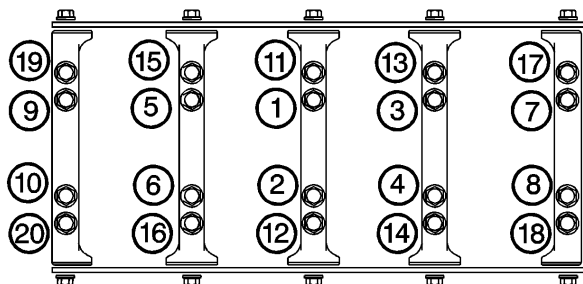
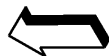
4. Install the crankshaft bearing caps, with bearings, into the engine block.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552494

5. Install the M10 bolts (129) and studs (128).
6. Using a plastic-face hammer, tap the bearing caps into place.
7. Install the NEW M8 bearing cap side bolts (127).



63214

Notice: Refer to Fastener Notice .

8. Tighten the bearing cap M10 bolts (1–10).

Tighten: Tighten the M10 bearing cap bolts (1–10) a first pass in sequence to 20 N·m (15 lb ft).

Important: To properly align the crankshaft thrust bearings, the final thrust of the crankshaft **MUST** be in the forward direction.

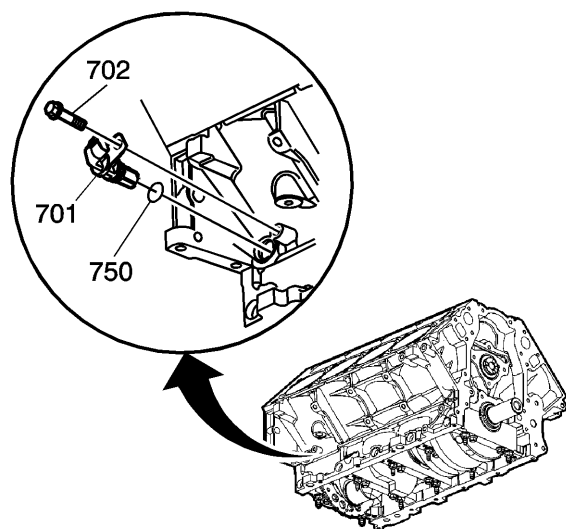
9. Using a plastic-face hammer, tap the crankshaft rearward, then forward in order to align the thrust bearings.

Tighten:

10. Tighten the M10 bolts (1–10) a final pass in sequence 80 degrees using the *J 45059* .
11. Tighten the M10 studs (11–20) a first pass in sequence to 20 N·m (15 lb ft).
12. Tighten the M10 studs (11–20) a final pass in sequence 51 degrees using the *J 45059* .
13. Tighten the bearing cap side M8 bolts to 25 N·m (18 lb ft).

Tighten the bolt on 1 side of the bearing cap and then tighten the bolt on the opposite side of the same bearing cap.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1402083

14. Install the CKP sensor.

14.1. Inspect the CKP sensor O-ring seal (750). If the O-ring seal is not cut or damaged, it may be used again.

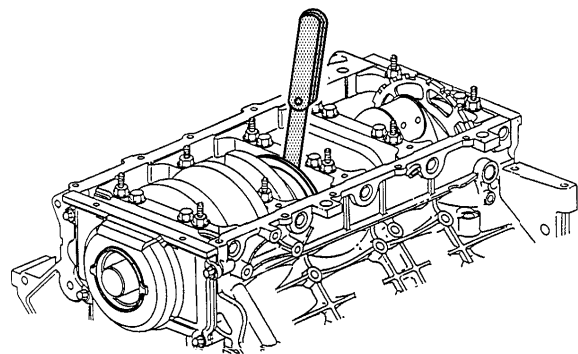
14.2. Coat the O-ring seal with clean engine oil.

14.3. Install the O-ring onto the sensor.

14.4. Install the sensor (701). Rotate the sensor until the locating hole in the bracket aligns with the bolt hole in the block.

14.5. Install the sensor bolt (702).

Tighten: Tighten the CKP sensor bolt to 25 N·m (18 lb ft).



64316

15. Measure the crankshaft end play.

15.1. Thrust the crankshaft forward or rearward.

15.2. Insert a feeler gage between the center crankshaft bearing and the bearing surface of the crankshaft and measure the bearing clearance.

The proper crankshaft end play clearance is 0.04–0.2 mm (0.0015–0.0078 in).

2006 Y Car GMX245 Corvette
 7.0L (LS7) Engine Mechanical

15.3. If the bearing clearance is not within specifications, inspect the thrust surfaces for nicks, gouges or raised metal. Minor imperfections may be removed with a fine stone.

Repair Instructions

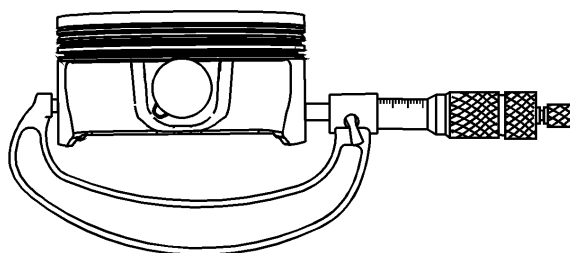
1556220

Piston, Connecting Rod, and Bearing Installation

Tools Required

- *J 8037* Ring Compressor
- *J 8087* Cylinder Bore Gage
- *J 41556* Connecting Rod Guide
- *J 45059* Angle Meter

Piston Selection

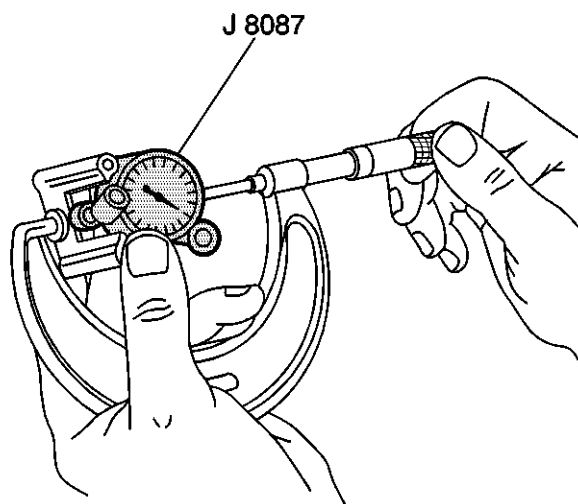


1552496

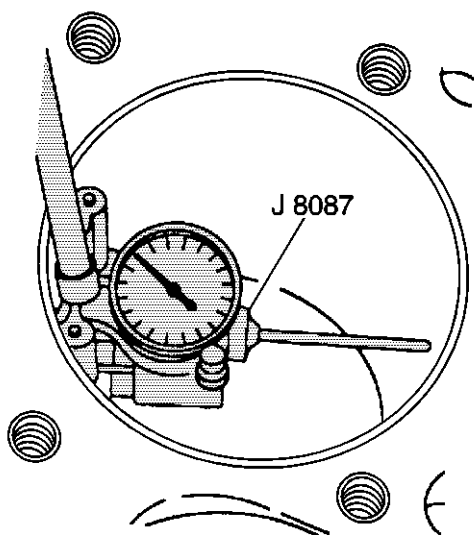
Important: Measurements of all components should be taken with the components at normal room temperature. For proper piston fit, the engine block cylinder bores must not have excessive wear or taper. A used piston, pin, and connecting rod assembly may be installed if, after inspection is within specifications.

1. With a micrometer at a right angle, measure the piston outside diameter (OD). Measure the diameter 43 mm (1.69 in) from the top of the piston. Refer to *Engine Mechanical Specifications*.
2. Record the piston OD.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



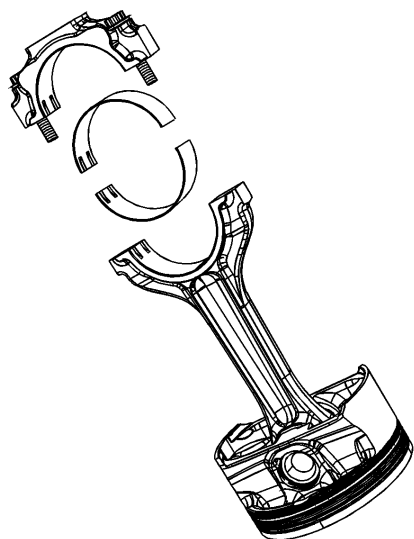
- 4974
3. Adjust the micrometer to the recorded piston OD.
 4. Insert the *J 8087* into the micrometer and zero the gage dial.



- 4972
5. Using the *J 8087*, measure the cylinder bore inside diameter (ID). Measure at a point 64 mm (2.5 in) from the top of the cylinder.
 6. Record the cylinder bore ID.
 7. Subtract the piston OD from the cylinder bore ID in order to determine the piston-to-bore clearance. Refer to *Engine Mechanical Specifications*.
 8. If the proper clearance cannot be obtained, select another piston and pin assembly and measure the clearances again. If the proper fit cannot be obtained, the cylinder bore may require honing for an oversize piston.

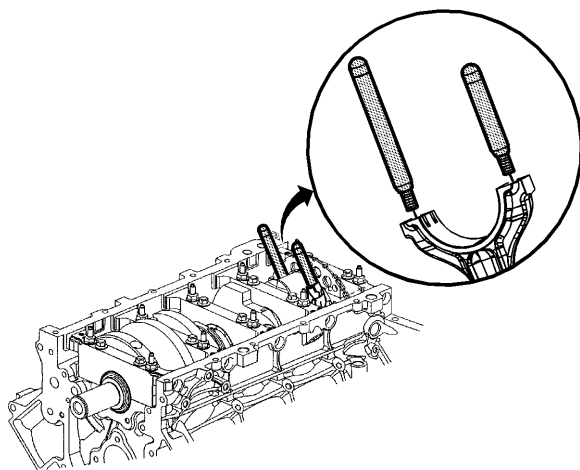
Piston, Pin, and Connecting Rod Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552501

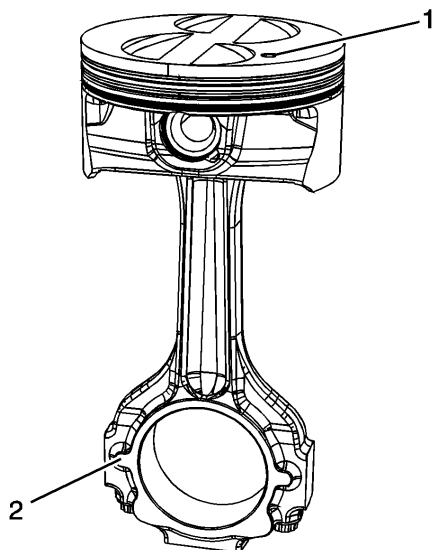
1. Lightly lubricate the following components with clean engine oil:
 - Piston
 - Piston rings
 - Cylinder bore
 - Bearings and bearing surfaces
2. Position the oil control ring end gaps a minimum of 25 mm (1.0 in) from each other.
3. Position the compression ring end gaps 180 degrees opposite each other.



1552499

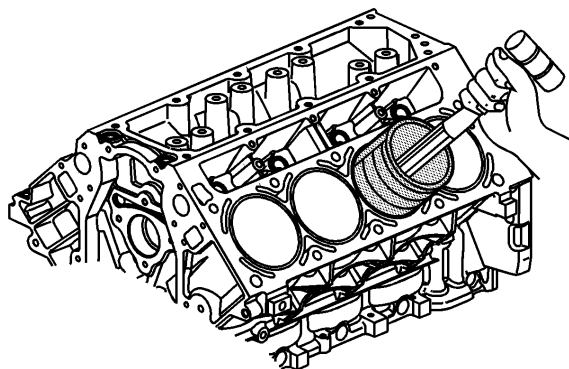
4. Install the *J 41556* to the connecting rod.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552567

5. Identify the proper installation direction of the piston and connecting rod assembly. When installing the piston and connecting rod assembly, the mark (1) on the top of the piston and the tab (2) on the side of the connecting rod should face the front of the engine.



1552497

6. Install the *J 8037* onto the piston and compress the piston rings.

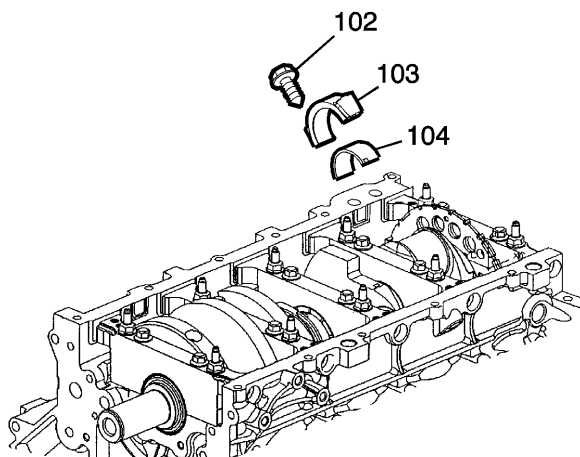
Important: The piston alignment mark **MUST** face the front of the engine block.

7. Install the piston, pin, and connecting rod assembly into the cylinder bore. Hold the piston ring compressor firmly against the engine block. Using a wooden hammer handle, lightly tap the top of the piston until all piston rings have entered the cylinder bore.

8. Use the *J 41556* to guide the connecting rod onto the crankshaft journal.

9. Remove the *J 41556* from the connecting rod.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552547

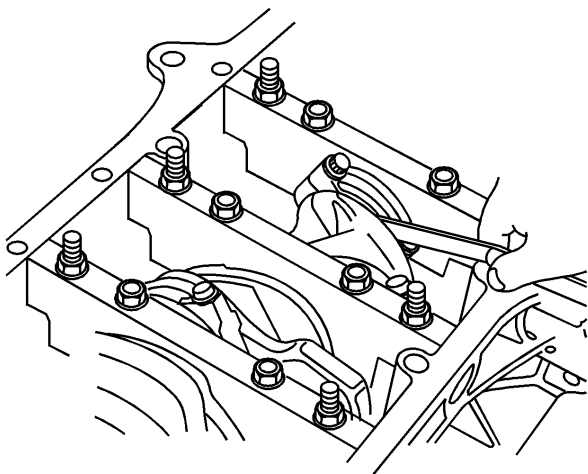
Notice: Refer to *Fastener Notice* .

Important: The connecting rod and cap must be assembled with the mating surfaces properly aligned.

10. Install the bearing cap (103), bearing (104), and bolts (102).

Tighten:

11. Tighten the bolts a first pass to 20 N·m (15 lb ft).
12. Tighten the bolts a final pass to 75 degrees using the *J 45059* .



1366378

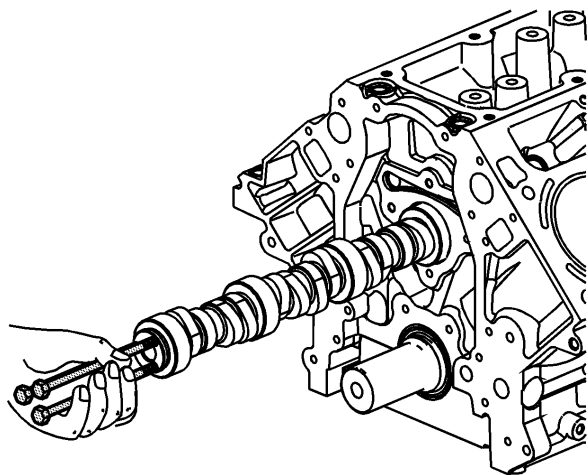
13. Measure the connecting rods for the proper side clearance. Refer to *Engine Mechanical Specifications* .

Repair Instructions

1556227

Camshaft Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



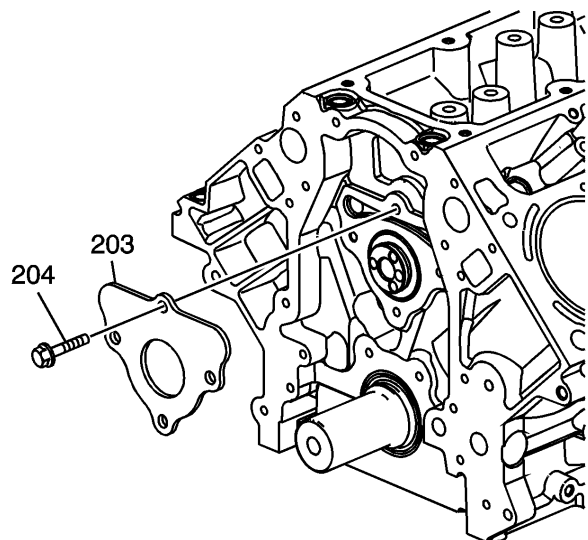
1552493

Important: If camshaft replacement is required, the valve lifters must also be replaced.

1. Lubricate the camshaft journals and the bearings with clean engine oil.
2. Install 3 M8 – 1.25 x 100 mm (M8 – 1.25 x 4.0 in) bolts into the camshaft front bolt holes.

Notice: All camshaft journals are the same diameter, so care must be used in removing or installing the camshaft to avoid damage to the camshaft bearings.

3. Using the bolts as a handle, carefully install the camshaft into the engine block.
4. Remove the 3 bolts from the front of the camshaft.

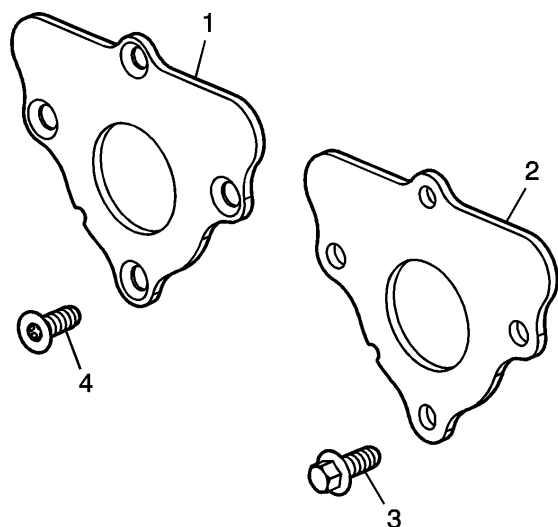


1552492

Important: The gasket surface on the engine block should be clean and free of dirt or debris.

5. Install the camshaft retainer (203) and the bolts (204). Install the retainer with the sealing gasket facing the front of the engine block.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1665445

Notice: Refer to *Fastener Notice* .

6. Tighten the camshaft retainer bolts.

Tighten:

- Tighten the first design hex head bolts (3) to 25 N·m (18 lb ft).
- Tighten the second design TORX® head bolts (4) to 15 N·m (11 lb ft).

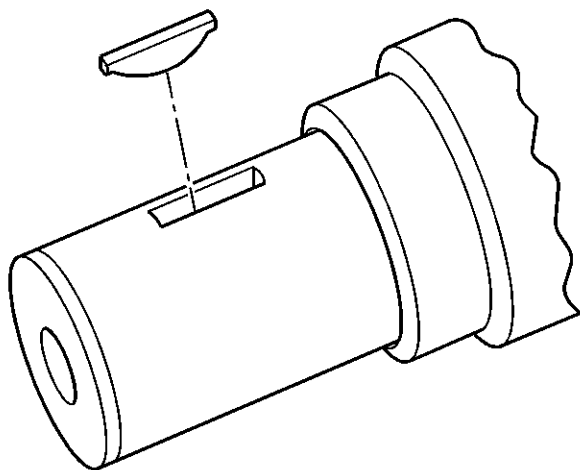
Repair Instructions

1556242

Timing Chain and Sprockets Installation

Tools Required

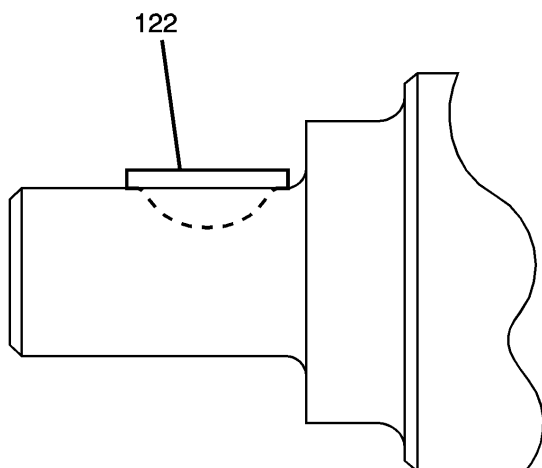
- *EN-47812* Installer Bolt
- *J 41665* Crankshaft Balancer and Sprocket Installer



156149

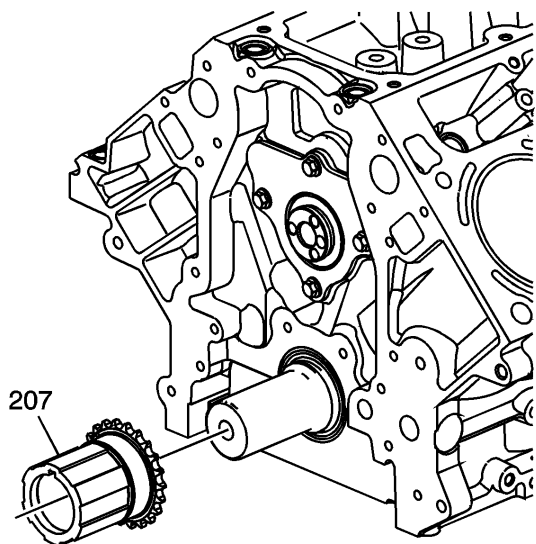
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

1. Install the key into the crankshaft keyway, if previously removed.



1272887

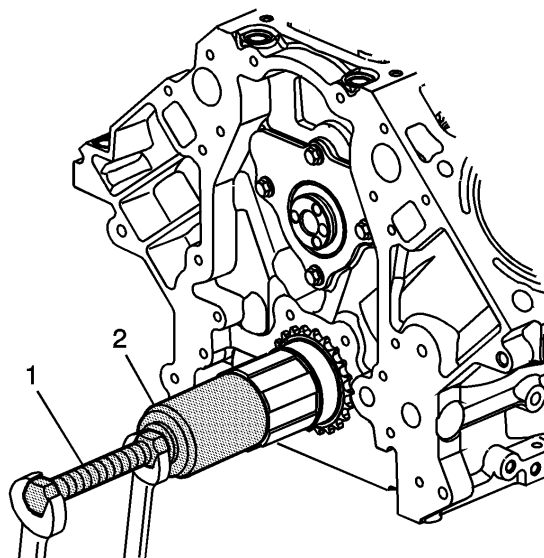
2. Tap the key (122) into the keyway until both ends of the key bottom onto the crankshaft.



1552487

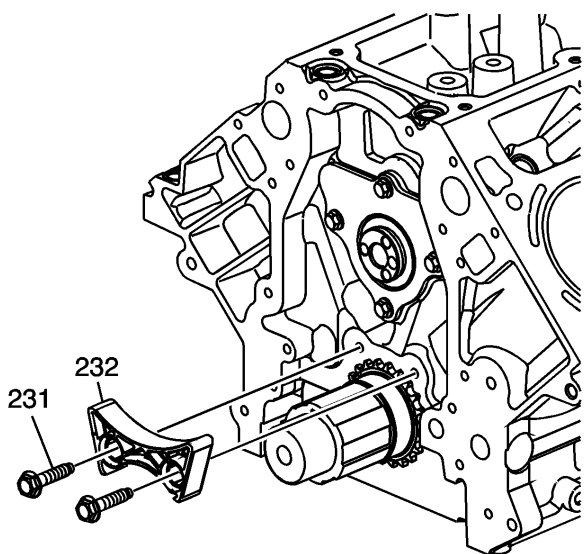
3. Install the crankshaft sprocket (207) onto the front of the crankshaft. Align the crankshaft key with the crankshaft sprocket keyway.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552502

4. Use the [EN-47812](#) (1) and the [J 41665](#) (2) in order to install the crankshaft sprocket. Install the sprocket onto the crankshaft until fully seated against the crankshaft flange.
5. Rotate the crankshaft sprocket until the alignment mark is in the 12 o'clock position.



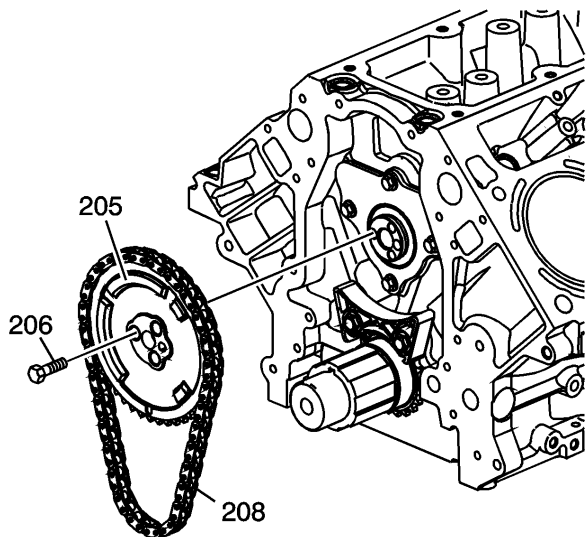
1552490

Notice: Refer to Fastener Notice .

6. Install the timing chain dampener (232) and bolts (231).

Tighten: Tighten the timing chain dampener bolts to 25 N·m (18 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



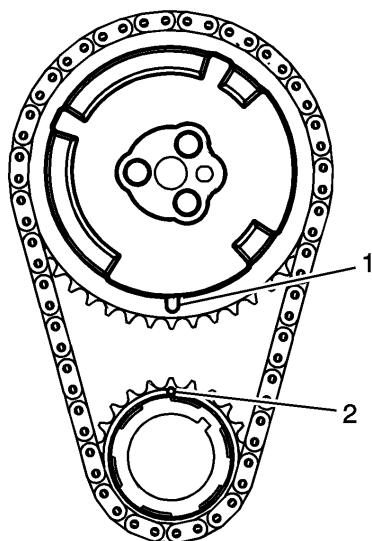
1552489

Important:

- Properly locate the camshaft sprocket onto the locating pin of the camshaft.
- The sprocket teeth and timing chain must mesh.
- The camshaft and the crankshaft sprocket alignment marks **MUST** be aligned properly.

Position the camshaft sprocket alignment mark in the 6 o'clock position.

7. Install the camshaft sprocket (205) and timing chain (208). If necessary, rotate the camshaft or crankshaft sprockets in order to align the timing marks.



1649254

8. Inspect the sprockets for proper alignment. The mark on the camshaft sprocket (1) should be located in the 6 o'clock position and the mark on the crankshaft sprocket (2) should be located in the 12 o'clock position.

Notice: Refer to Fastener Notice .

9. Install the camshaft sprocket bolts.

Tighten: Tighten the camshaft sprocket bolts to 25 N·m (18 lb·ft).

Repair Instructions

1556244

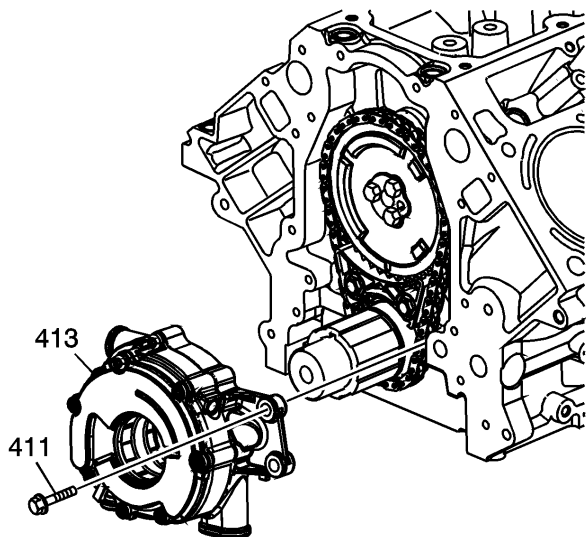
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Oil Pump and Crankshaft Oil Deflector Installation

Oil Pump and Oil Deflector: Installation: Engine Mechanical - 7.0L

Tools Required

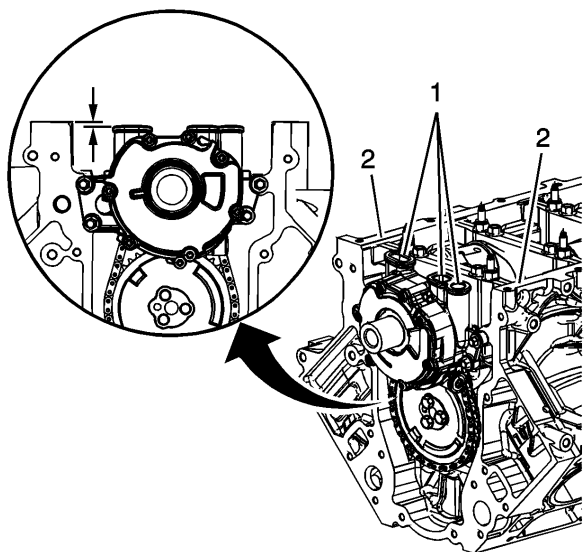
J 41480 Front and Rear Cover Alignment



1552488

Important: Inspect the oil pump and engine block oil gallery passages. These surfaces must be clear and free of debris or restrictions.

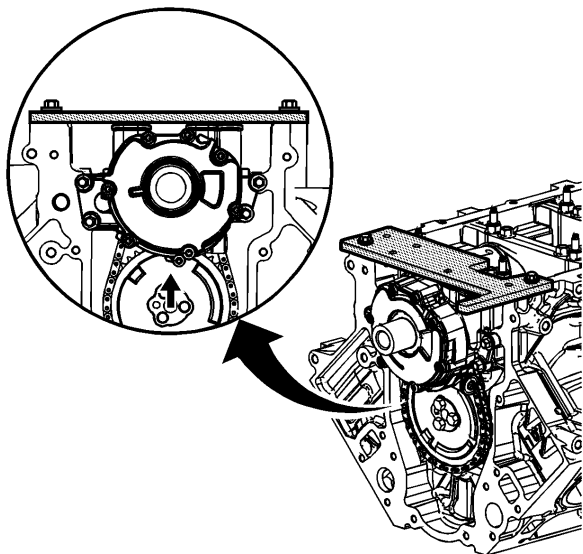
1. Align the splines of the crankshaft sprocket and the oil pump drive gears, and install the oil pump (413).
2. Install the oil pump onto the crankshaft sprocket until the pump housing contacts the face of the engine block.
3. Install the oil pump bolts (411). Do not tighten the bolts at this time.



1552559

4. Align the oil pump surfaces (1) with the engine block surfaces (2). The oil pump must be aligned flush or no greater than 0.1 mm (0.04 in) below the engine block oil pan rail.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552560

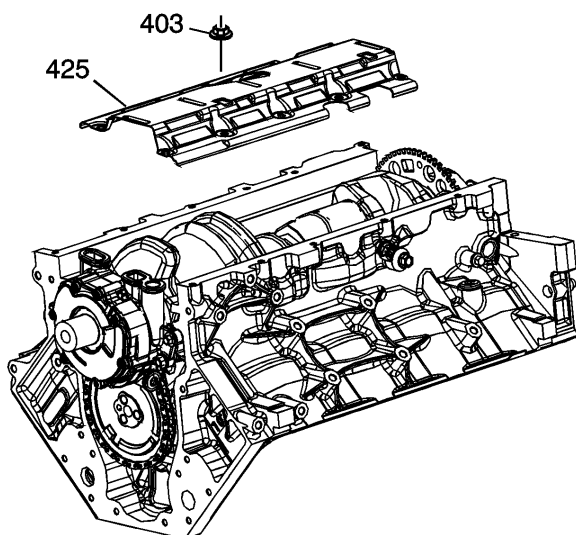
Notice: Refer to *Fastener Notice* .

5. Install the *J 41480* and bolts to the engine block.

Tighten: Tighten the *J 41480* bolts to 25 N·m (18 lb ft).

6. Firmly push the oil pump until the pump surfaces contact the *J 41480* . Continue to retain the pump to the *J 41480* .

Tighten: Tighten the oil pump bolts to 25 N·m (18 lb ft).



1552545

7. Install the crankshaft oil deflector (425) and nuts (403). Install the deflector onto the engine with the word “Rear” at the back of the engine block.

Tighten: Tighten the crankshaft oil deflector nuts to 25 N·m (18 lb ft).

Repair Instructions

1556251

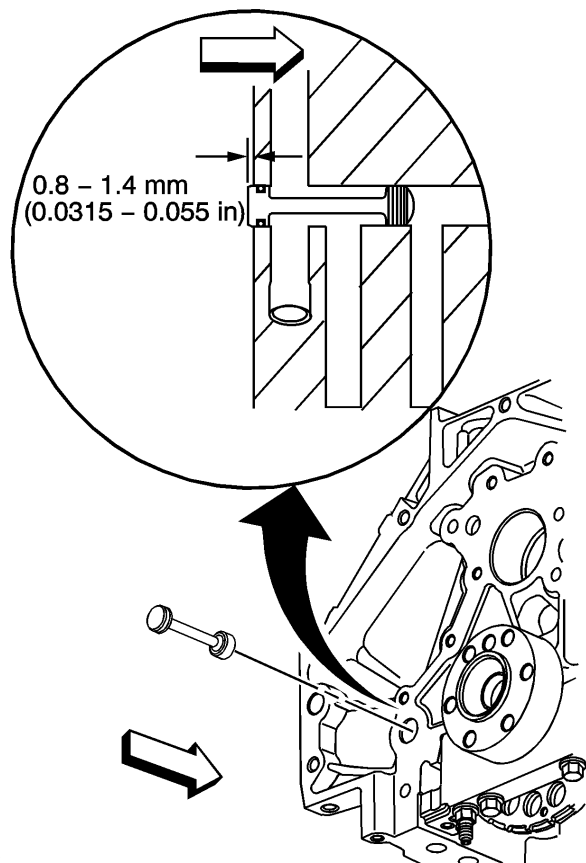
Crankshaft Rear Oil Seal Housing Installation

Crankshaft Rear Oil Seal Housing:Installation:Engine Mechanical - 7.0L

Tools Required

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- [J 41476](#) Front and Rear Cover Alignment Tool
- [J 41480](#) Front and Rear Cover Alignment

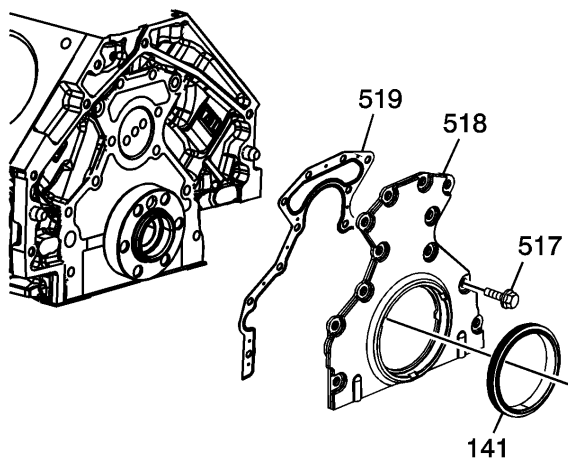


63228

Important:

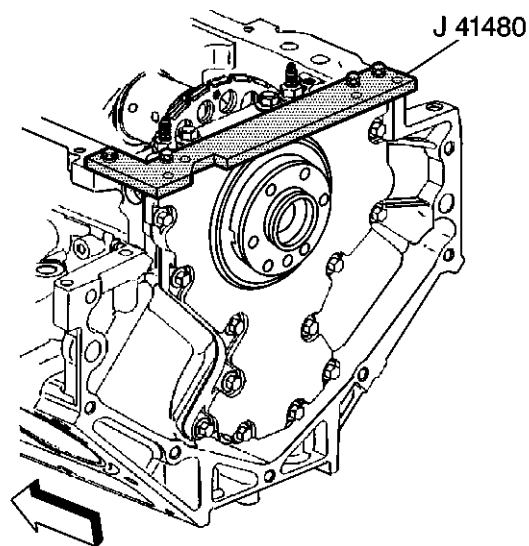
- Do not use the crankshaft rear oil seal or the engine rear housing gasket again.
 - Do not apply any type of sealant to the rear housing gasket, unless specified.
 - The special tools in this procedure are used to properly align the engine rear housing at the oil pan surface and to center the crankshaft rear oil seal.
 - The crankshaft rear oil seal will be installed after the rear housing has been installed and aligned. Install the rear housing without the crankshaft oil seal.
- The crankshaft rear oil seal **MUST** be centered in relation to the crankshaft.
 - The oil pan sealing surface at the rear housing, and the engine block, **MUST** be aligned within specifications.
 - An improperly aligned rear housing may cause premature rear oil seal wear and/or engine assembly oil leaks.
1. Inspect the rear oil gallery plug for proper installation.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552544

2. Install the rear housing gasket (519), rear housing (518), and bolts (517).
3. Tighten the bolts finger tight. Do not overtighten.

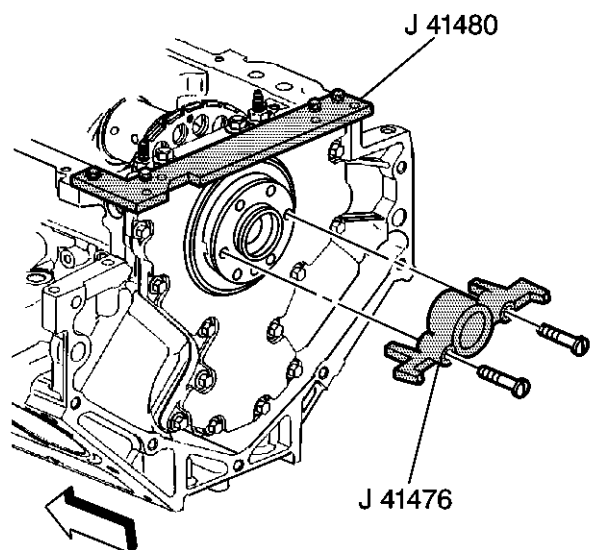


64204

Notice: Refer to *Fastener Notice* .

4. **Important:** Start the *J 41480* tool-to-rear housing bolts. Do not tighten the bolts at this time.
Install the *J 41480* and bolts.
Tighten: Tighten the tool-to-engine block bolts to 25 N·m (18 lb ft).

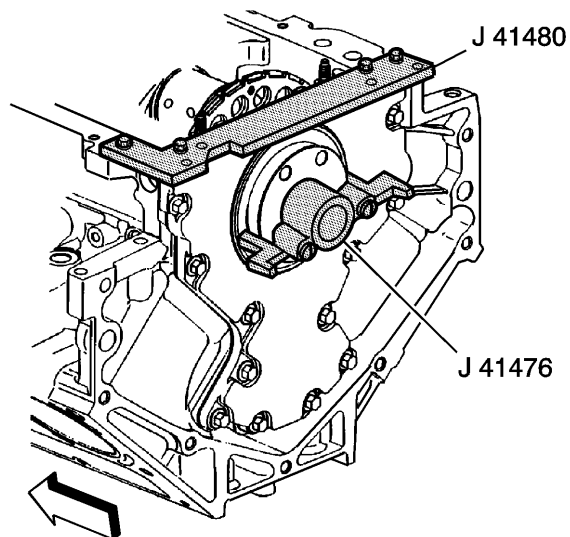
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



63243

Important: To properly align the rear housing, the *J 41476* must be installed onto the rear of the crankshaft with the tool mounting bolts parallel to the oil pan surface.

5. Rotate the crankshaft until 2 opposing flywheel bolt holes are parallel to the oil pan surface.



65286

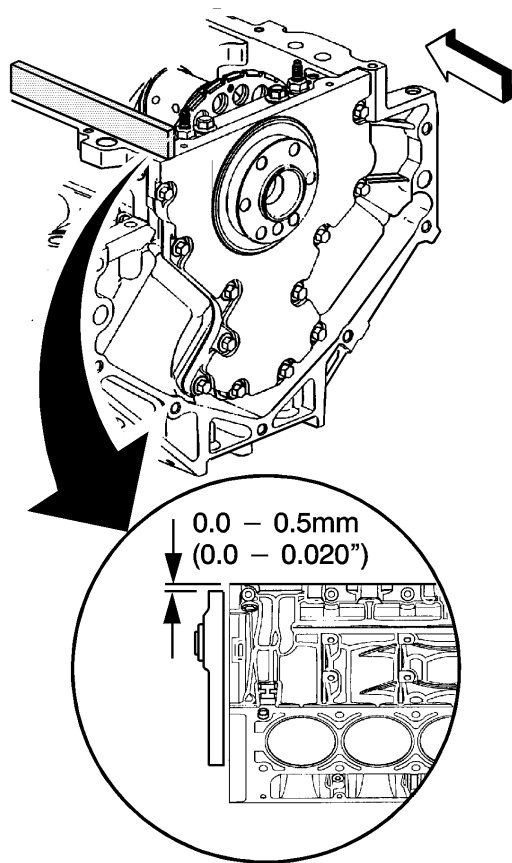
Important: The tapered legs of the alignment tool must enter the rear housing oil seal bore.

6. Install the *J 41476* and bolts onto the rear of the crankshaft.

Tighten:

7. Tighten the tool mounting bolts until snug. Do not overtighten.
 8. Tighten the *J 41480* tool-to-rear housing bolts evenly to 12 N·m (106 lb in).
 9. Tighten the rear housing bolts to 30 N·m (22 lb ft).
10. Remove the tools.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



63240

11. Measure the rear housing-to-engine block oil pan surface for flatness.
 - 11.1. Place a straight edge onto the engine block and rear housing oil pan sealing surfaces.
Avoid contact with the portion of the gasket that protrudes into the oil pan surface.
 - 11.2. Insert a feeler gage between the rear housing and the straight edge. The housing must be flush with the oil pan or no greater than 0.5 mm (0.02 in) below flush.
12. If the rear housing-to-engine block oil pan surface alignment is not within specifications, repeat the housing alignment procedure.
13. If the correct rear housing-to-engine block alignment at the oil pan surface cannot be obtained, replace the rear housing.

Repair Instructions

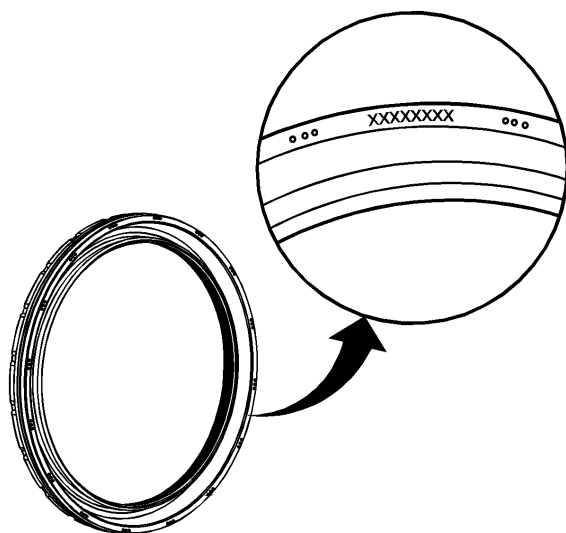
1765631

Crankshaft Rear Oil Seal Installation

Tools Required

- [J 41479](#) Crankshaft Rear Oil Seal Installer
- [J 41479-2A](#) Crankshaft Rear Oil Seal Installation Guide

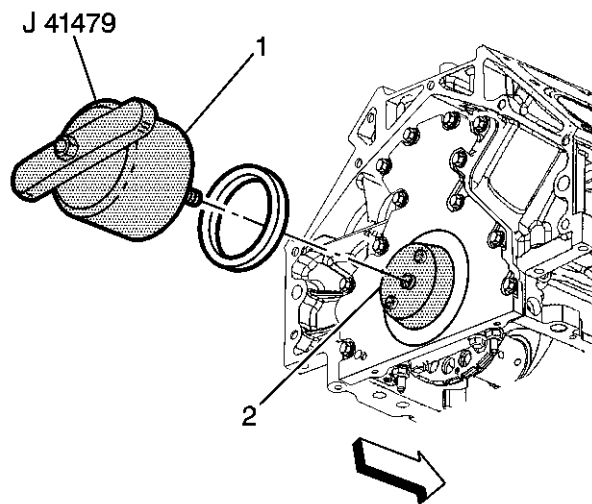
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1699207

Important: For proper orientation, note the installation direction of the oil seal. The oil seal is a reverse-lip design. The part number is applied to the outside face of the seal, as shown.

1. Inspect the seal and identify the part number markings for proper orientation.



63200

2. Install the *J 41479* or *J 41479-2A* cone (2) and bolts onto the rear of the crankshaft. *J 41479-2A* may be required for manual transmission applications.
3. Tighten the bolts until snug. Do not overtighten.
4. Install the rear oil seal onto the tapered cone (2) and push the seal to the rear seal bore. Install the oil seal with the part number markings facing away from the engine.
5. Thread the *J 41479* threaded rod into the tapered cone until the tool (1) contacts the oil seal.
6. Align the oil seal onto the tool (1).
7. Rotate the handle of the tool (1) clockwise until the seal enters the rear housing and bottoms into the seal bore.
8. Remove the tool.

Repair Instructions

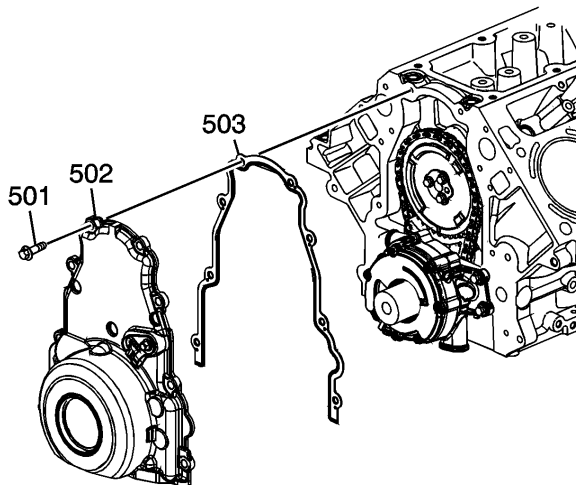
1556262

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Engine Front Cover Installation

Tools Required

- [EN-47812](#) Installer Bolt
- [EN-47813](#) Front Cover Alignment
- [J 41480](#) Front and Rear Cover Alignment

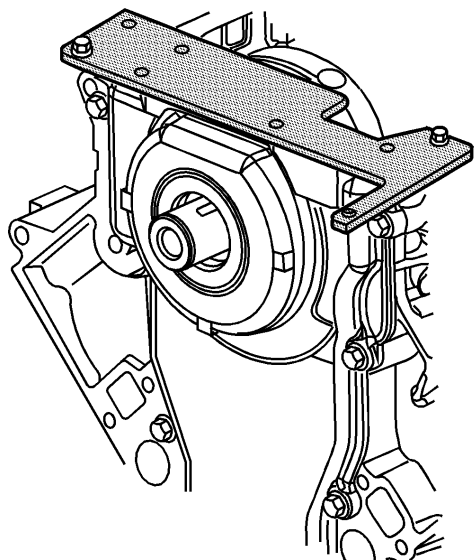


1552543

Important:

- Do not use the crankshaft oil seal or the engine front cover gasket again.
 - Do not apply any type of sealant to the front cover gasket, unless specified.
 - The special tools in this procedure are used to properly align the engine front cover at the oil pan surface and to center the crankshaft front oil seal.
- All gasket surfaces should be free of oil or other foreign material during assembly.
The crankshaft front oil seal **MUST** be centered in relation to the crankshaft.
 - The oil pan sealing surface at the front cover, and the engine block, **MUST** be aligned within specifications.
 - An improperly aligned front cover may cause premature front oil seal wear and/or engine assembly oil leaks.
1. Install the front cover gasket (503), front cover (502), and bolts (501).
 2. Tighten the cover bolts finger tight. Do not overtighten.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

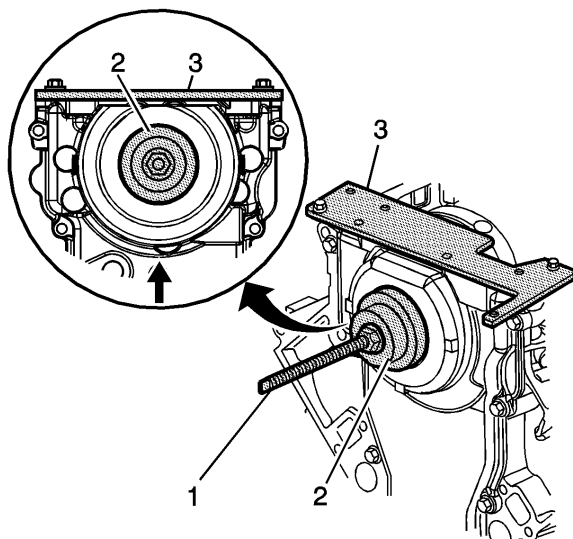


1552561

Notice: Refer to *Fastener Notice* .

3. Install the *J 41480* and tool-to-engine block bolts.

Tighten: Tighten the tool-to-engine block bolts to 25 N·m (18 lb ft).



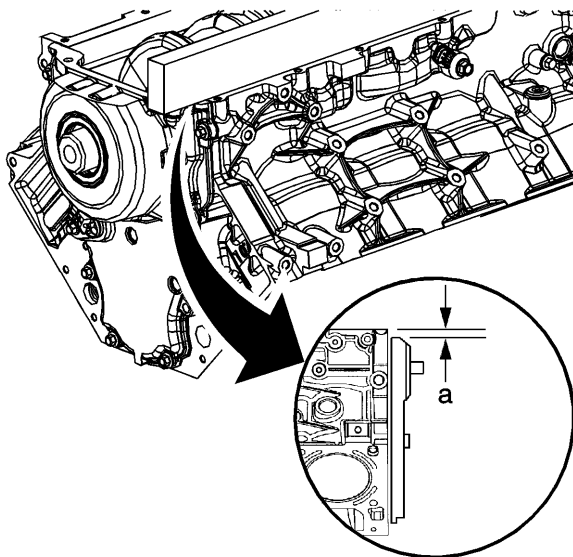
1552562

4. Install the *EN-47812* (1) to the crankshaft.
5. Install the *EN-47813* (2) over the bolt. Insert the tapered surface of the tool into the oil seal bore of the cover.
6. Install the *EN-47812* (1) washer and nut. Tighten the nut by hand until snug. Do not over tighten.
7. Firmly push the front cover until the cover surface contacts the *J 41480* (3). Continue to retain the cover to the *J 41480* (3).

Tighten: Tighten the front cover bolts to 25 N·m (18 lb ft).

8. Remove the tools.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552563

9. Measure the oil pan surface flatness, front cover-to-engine block.

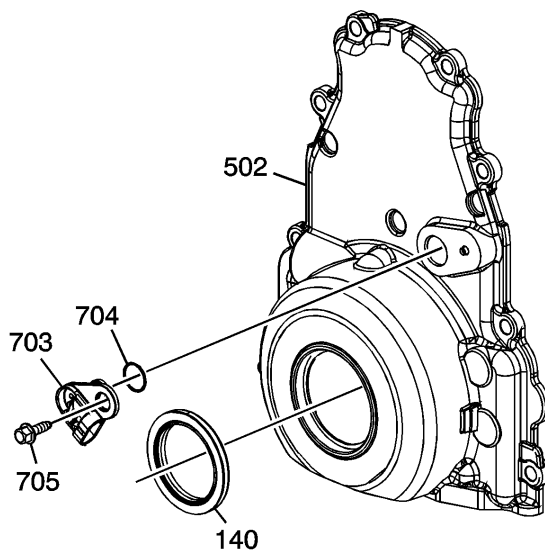
9.1. Place a straight edge across the engine block and front cover oil pan sealing surfaces.

Avoid contact with the portion of the gasket that protrudes into the oil pan surface.

9.2. Insert a feeler gage between the front cover and the straight edge tool. The cover must be flush with the oil pan surface, or no greater than 0.5 mm (0.02 in) (a) below flush.

10. If the front cover-to-engine block oil pan surface alignment is not within specifications, repeat the cover alignment procedure.

11. If the correct front cover-to-engine block alignment cannot be obtained, replace the front cover.



1552459

12. Inspect the camshaft position (CMP) sensor O-ring seal (704) for cuts or damage. If the seal is not cut or damaged, it may be used again.

13. Lubricate the O-ring seal with clean engine oil.

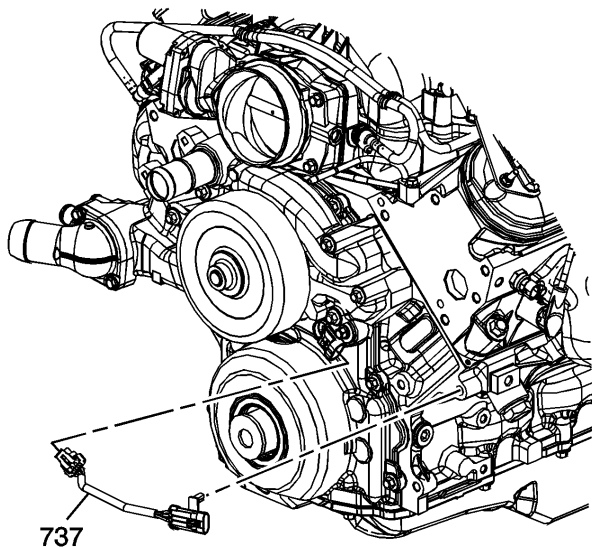
14. Install the O-ring seal onto the sensor (703).

15. Install the sensor to the cover.

16. Install the CMP bolt (705).

Tighten: Tighten the bolt to 12 N·m (106 lb in).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1669841

17. Install the CMP sensor wire harness (737).

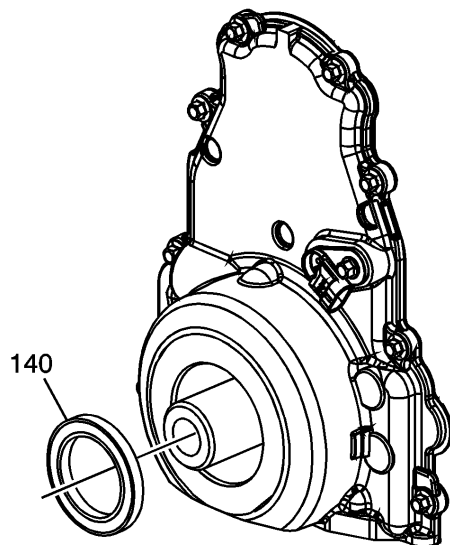
Repair Instructions

1556264

Crankshaft Front Oil Seal Installation

Tools Required

- [EN-47812](#) Installer Bolt
- [J 41478](#) Crankshaft Front Oil Seal Installer

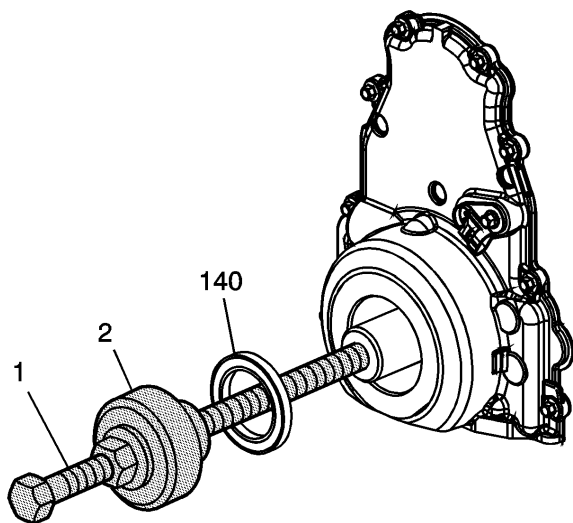


1552504

Important:

- Do not lubricate the oil seal sealing surface.
 - Do not use the crankshaft front oil seal again.
1. Lubricate the outer edge of the oil seal (140) with clean engine oil.
 2. Lubricate the front cover oil seal bore with clean engine oil.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



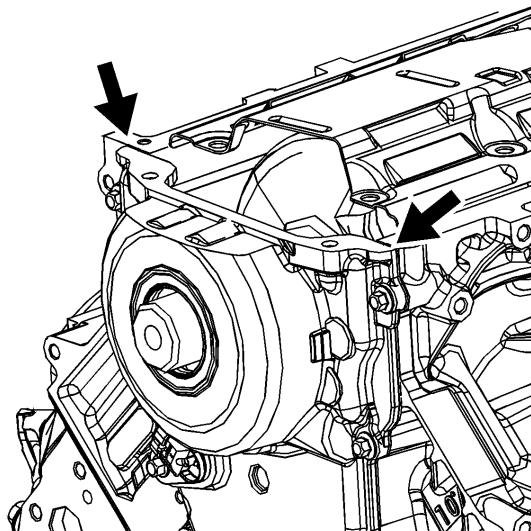
1552505

3. Using the [EN-47812](#) and the [J 41478](#) , install the crankshaft front oil seal (140).
4. Install the [EN-47812](#) threaded rod (1), nut, washer, the [J 41478](#) guide (2), and oil seal into the end of the crankshaft.
5. Use the [J 41478](#) in order to install the oil seal into the cover bore.
 - 5.1. Use a wrench and hold the hex on the installer bolt.
 - 5.2. Use a second wrench and rotate the installer nut clockwise until the seal bottoms in the cover bore.
 - 5.3. Remove the tool.
 - 5.4. Inspect the oil seal for proper installation. The oil seal should be installed evenly and completely into the front cover bore.

Repair Instructions

1556265

Oil Pan Installation



1669850

Important:

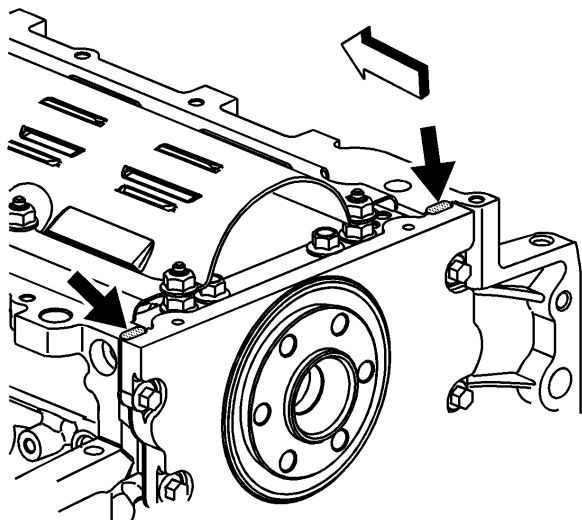
- The alignment of the structural oil pan is critical. The rear bolt hole locations of the oil pan provide mounting points for the transmission housing. To ensure the rigidity of the powertrain and correct transmission alignment, it is

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

important that the rear of the block and the rear of the oil pan are flush, or even. The rear of the oil pan must NEVER protrude beyond the engine block and transmission housing plane.

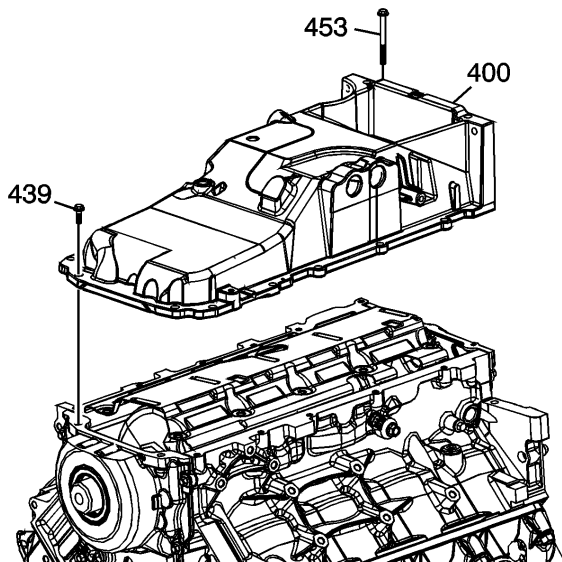
- Do not use the oil pan gasket again.
- It is not necessary to rivet the NEW gasket to the oil pan.

1. Apply a 5 mm (0.2 in) bead of sealant GM P/N 12378521 (Canadian P/N 88901148), or equivalent, 20 mm (0.8 in) long to the engine block. Apply the sealant directly onto the tabs of the front cover gasket that protrude into the oil pan surface. Refer to *Sealers, Adhesives, and Lubricants* .



63175

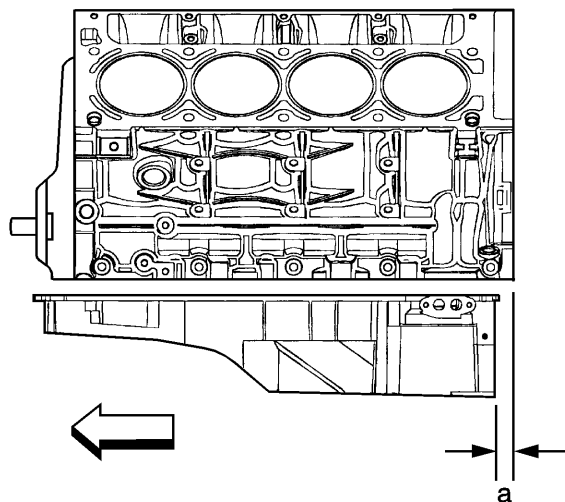
2. Apply a 5 mm (0.2 in) bead of sealant GM P/N 12378521 (Canadian P/N 88901148), or equivalent, 20 mm (0.8 in) long to the engine block. Apply the sealant directly onto the tabs of the rear housing gasket that protrude into the oil pan surface.



1552542

3. Pre-assemble the oil pan gasket to the pan.
 - 3.1. Install the gasket onto the oil pan.
 - 3.2. Install the oil pan bolts (439, 453) to the pan and through the gasket.
4. Install the oil pan (400), gasket and bolt to the engine block.
5. Tighten the bolts finger tight. Do not overtighten.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552565

6. Place a straight edge across the rear of the engine block and the rear of the oil pan at the transmission housing mounting surfaces.

Notice: Refer to *Fastener Notice* .

7. Align the oil pan until the rear of the engine block and the rear of the oil pan are flush, or even.

Tighten:

8. Tighten the oil pan-to-block and oil pan-to-front cover bolts to 25 N·m (18 lb ft).

9. Tighten the oil pan-to-rear cover bolts to 12 N·m (106 lb in).

10. Measure the oil pan-to-engine block alignment.

10.1. Place a straight edge across the rear of the engine block and rear of oil pan at the transmission housing mounting surfaces.

Important: The rear of the oil pan must NEVER protrude beyond the engine block and transmission housing mounting surfaces.

10.2. Insert a feeler gage between the straight edge and the oil pan transmission housing mounting surface, and inspect to ensure there is no greater than a 0.1 mm (0.004 in) gap (a) between the pan and straight edge.

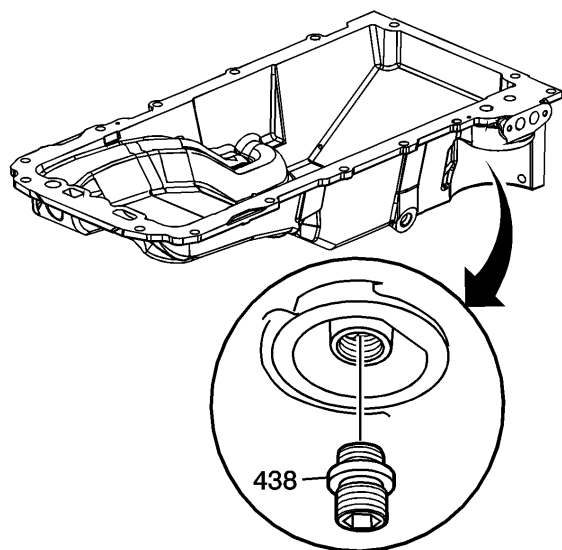
10.3. If the oil pan alignment is not within specifications, remove the oil pan and repeat the above procedure.

Repair Instructions

1556267

Oil Filter and Adapter Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

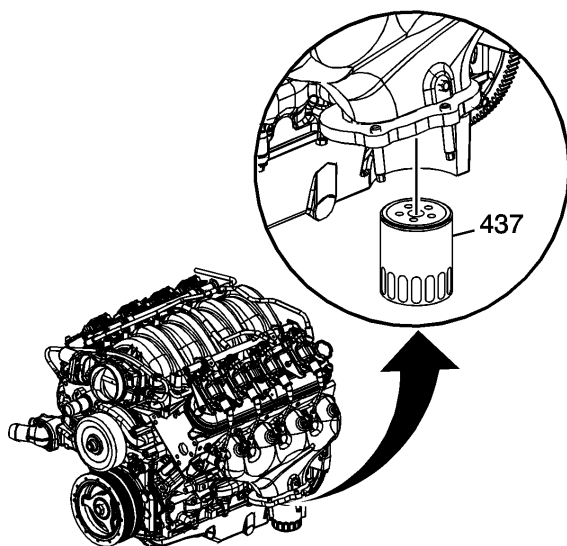


1552464

Notice: Refer to *Fastener Notice* .

1. Install the oil filter fitting (438).

Tighten: Tighten the oil filter fitting to 55 N·m (40 lb ft).



1552426

2. Lubricate the oil filter seal with clean engine oil.
3. Install the oil filter (437).

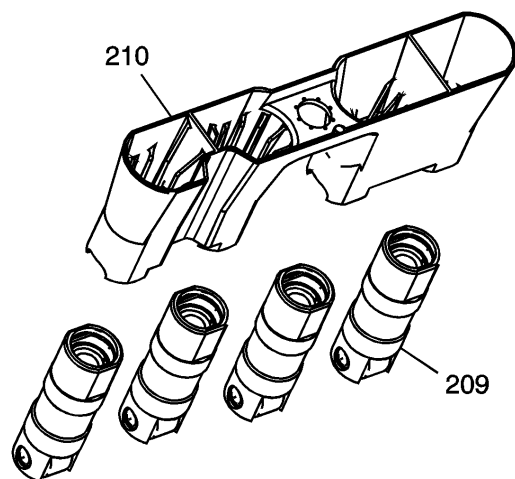
Tighten: Tighten the oil filter to 30 N·m (22 lb ft).

Repair Instructions

1556268

Valve Lifter Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



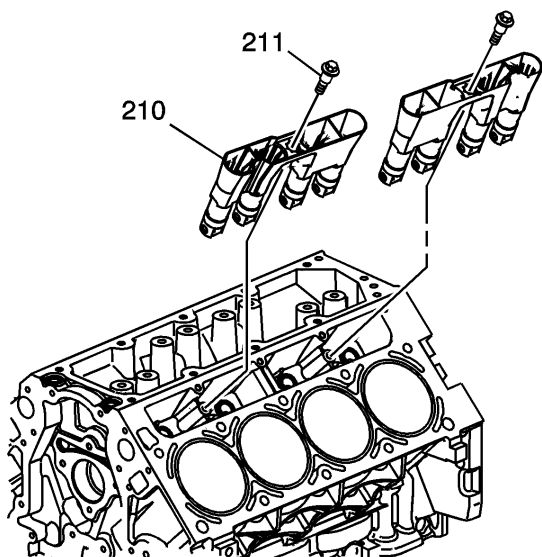
1403319

Important:

- When using the valve lifters again, install the lifters to their original locations.
- If camshaft replacement is required, the valve lifters must also be replaced.

1. Lubricate the valve lifters (209) and engine block valve lifter bores with clean engine oil.
2. Insert the valve lifters into the lifter guides (210).

Align the flat area on the top of the lifter with the flat area in the lifter guide bore. Push the lifter completely into the guide bore.



1403318

3. Install the valve lifters and guide assembly (210) to the engine block.

Notice: Refer to Fastener Notice .

4. Install the valve lifter guide bolts (211).

Tighten: Tighten the valve lifter guide bolts to 12 N·m (106 lb in).

Repair Instructions

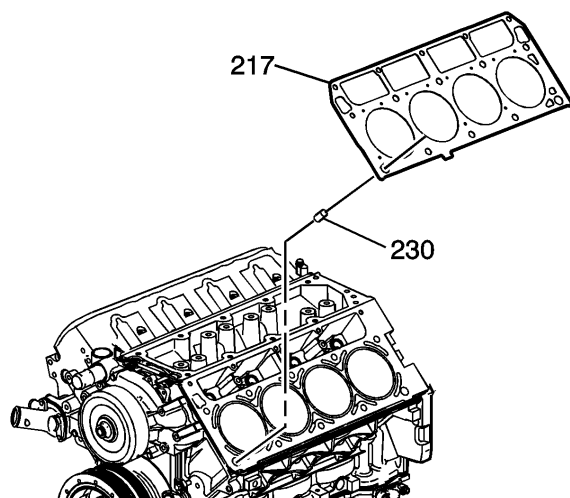
1556270

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Cylinder Head Installation - Left Side

Tools Required

- *J 42385-100* Thread Repair Kit
- *J 45059* Angle Meter



1408869

Caution: Refer to *Safety Glasses Caution* .

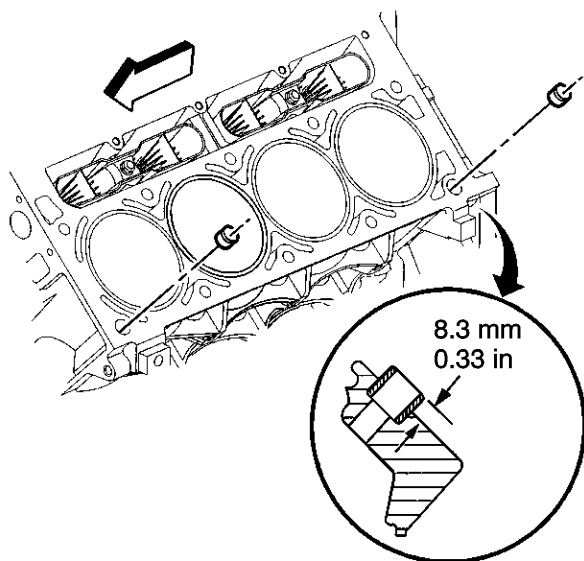
Notice: Clean all dirt, debris, and coolant from the engine block cylinder head bolt holes. Failure to remove all foreign material may result in damaged threads, improperly tightened fasteners or damage to components.

Important:

- Do not use the cylinder head bolts again. Install NEW cylinder head bolts during assembly.
- Do not use any type of sealant on the cylinder head gasket, unless specified.
- The cylinder head gaskets must be installed in the proper direction and position.

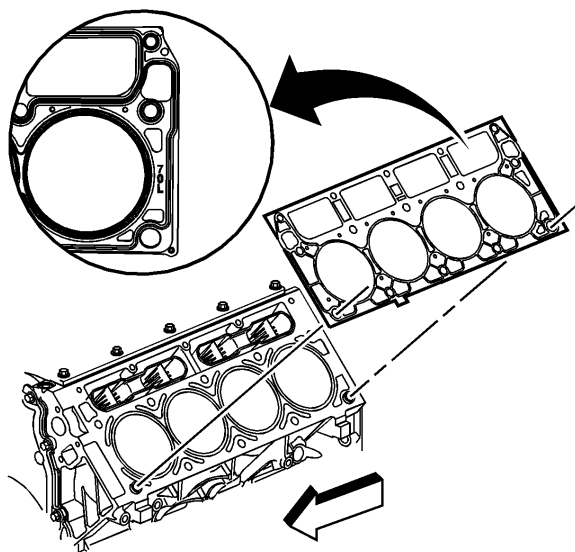
1. Clean the engine block cylinder head bolt holes, if required.
Thread repair tool J 42385-107 may be used to clean the threads of old threadlocking material.
2. Spray cleaner GM P/N 12346139 (Canadian P/N 10953463), GM P/N 12377981 (Canadian P/N 10953463), or equivalent, into the hole.
3. Clean the cylinder head bolt holes with compressed air.
4. Install the cylinder head locating pins (230).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1481465

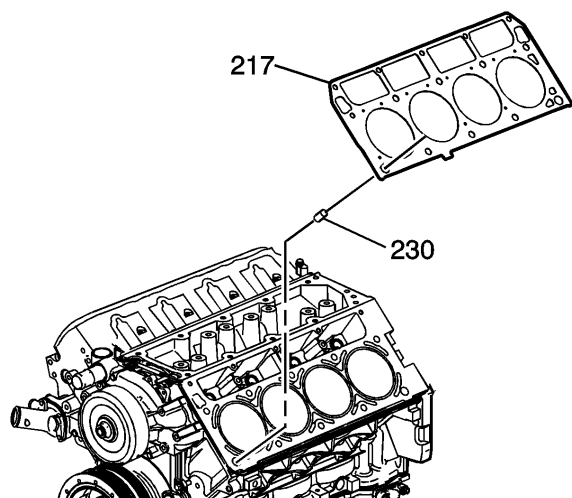
5. Inspect the locating pins for proper installation.



1552508

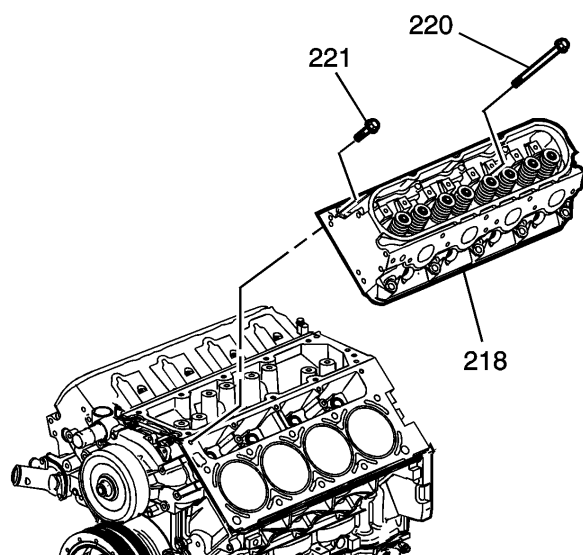
6. Inspect the displacement markings on the gasket for proper usage.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408869

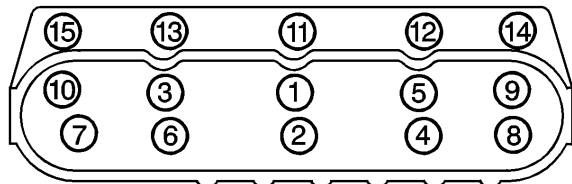
7. Install the NEW cylinder head gasket (217) onto the locating pins.



1408868

8. Install the cylinder head (218) onto the locating pins and the gasket.
9. Install the NEW cylinder head bolts (220, 221).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



260150

Notice: Refer to *Fastener Notice* .

10. Tighten the cylinder head bolts.

Tighten:

11. Tighten the M11 cylinder head bolts (1–10) a first pass in sequence to 30 N·m (22 lb ft).
12. Tighten the M11 cylinder head bolts (1–10) a second pass in sequence to 90 degrees using the *J 45059* .
13. Tighten the M11 cylinder head bolts (1–10) a final pass in sequence to 70 degrees using the *J 45059* .
14. Tighten the M8 cylinder head bolts (11–15) to 30 N·m (22 lb ft). Begin with the center bolt (11) and alternating side-to-side, work outward tightening all of the bolts.

Repair Instructions

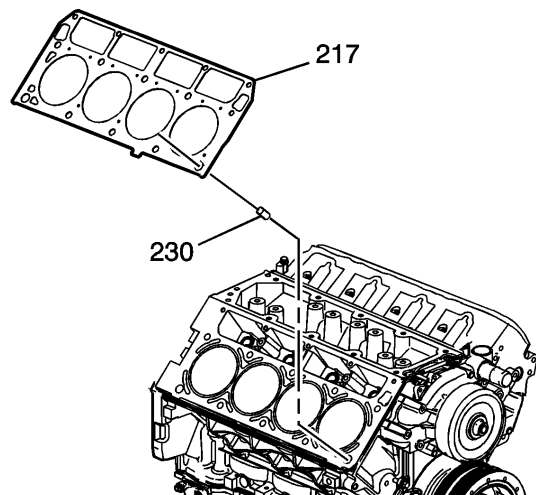
1556273

Cylinder Head Installation - Right Side

Tools Required

- *J 42385-100* Thread Repair Kit
- *J 45059* Angle Meter

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408871

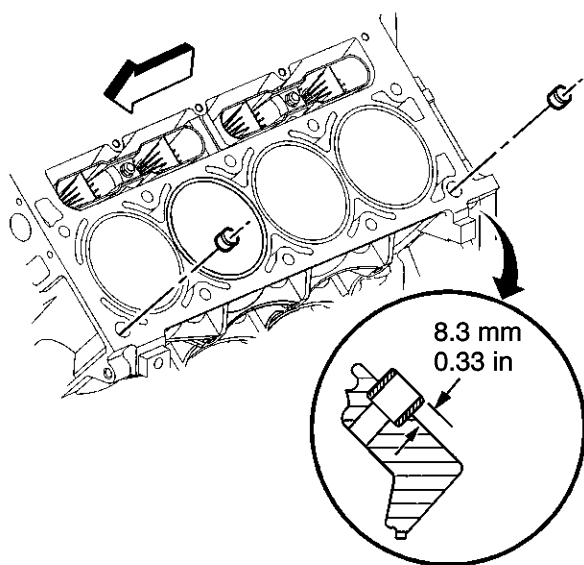
Caution: Refer to *Safety Glasses Caution* .

Notice: Clean all dirt, debris, and coolant from the engine block cylinder head bolt holes. Failure to remove all foreign material may result in damaged threads, improperly tightened fasteners or damage to components.

Important:

- Do not use the cylinder head bolt again. Install NEW cylinder head bolt during assembly.
- Do not use any type of sealant on the cylinder head gasket, unless specified.
- The cylinder head gaskets must be installed in the proper direction and position.

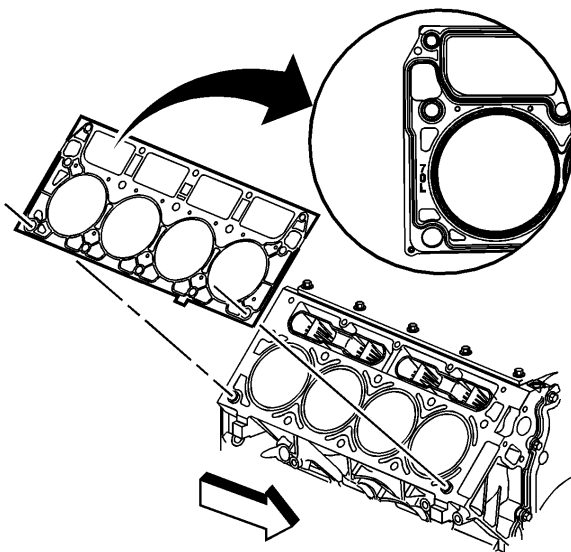
1. Clean the engine block cylinder head bolt holes, if required.
Thread repair tool J 42385-107 may be used to clean the threads of old threadlocking material.
2. Spray cleaner GMP/N 12346139 (Canadian P/N 10953463), GMP/N 12377981 (Canadian P/N 10953463), or equivalent, into the hole.
3. Clean the cylinder head bolt holes with compressed air.
4. Install the cylinder head locating pins (230).



1481465

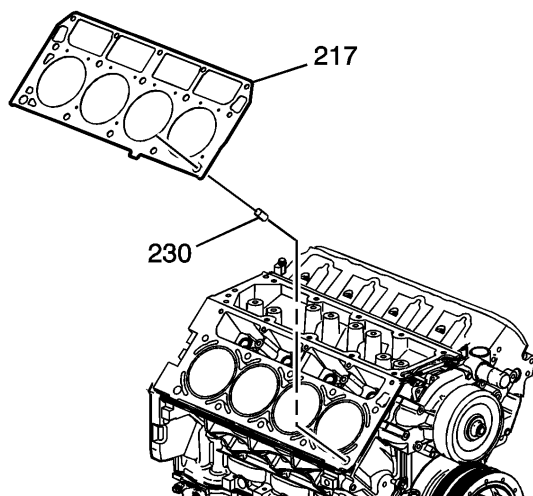
5. Inspect the locating pins for proper installation.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552509

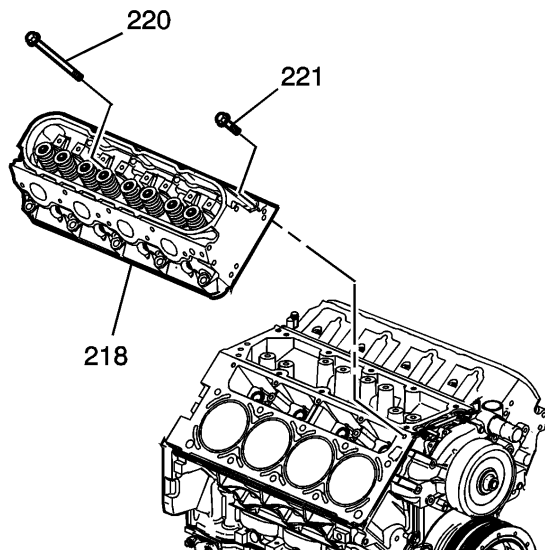
6. Inspect the displacement markings on the gasket for proper usage.



1408871

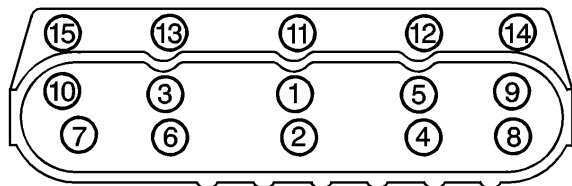
7. Install the NEW cylinder head gasket (217) onto the locating pins.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408870

8. Install the cylinder head (218) onto the locating pins and the gasket.
9. Install the NEW cylinder head bolts (220, 221).



260150

Notice: Refer to *Fastener Notice* .

10. Tighten the cylinder head bolt.

Tighten:

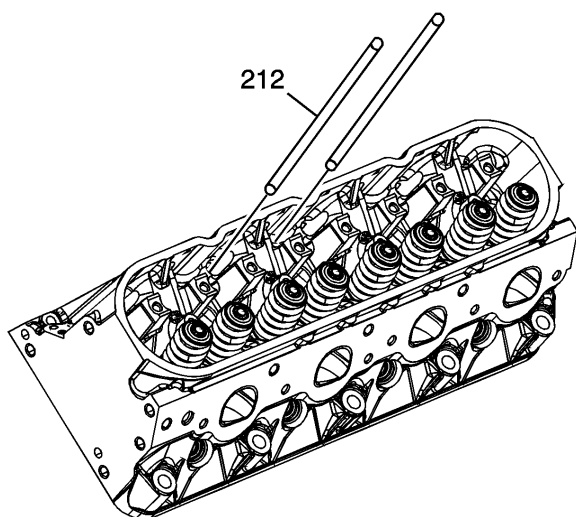
11. Tighten the M11 cylinder head bolts (1–10) a first pass in sequence to 30 N·m (22 lb ft).
12. Tighten the M11 cylinder head bolts (1–10) a second pass in sequence to 90 degrees using the *J 45059* .
13. Tighten the M11 cylinder head bolts (1–10) a final pass in sequence to 70 degrees using the *J 45059* .
14. Tighten the M8 cylinder head bolts (11–15) to 30 N·m (22 lb ft). Begin with the center bolt (11) and alternating side-to-side, work outward tightening all of the bolts.

Repair Instructions

1556274

Valve Rocker Arm and Push Rod Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552510

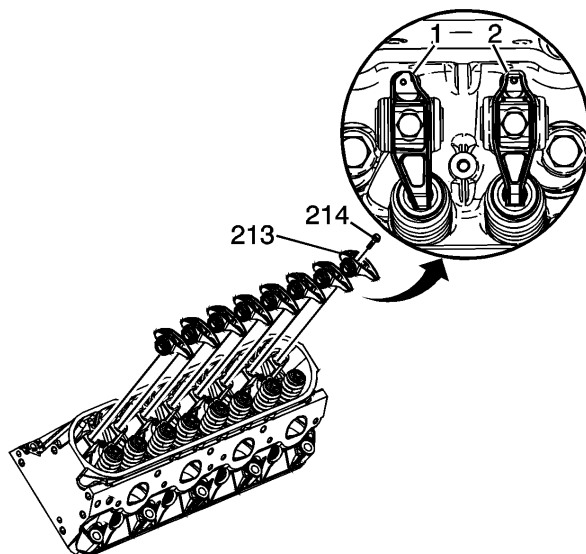
Important:

- When using the valve train components again, always install the components to the original location and position.
- Valve lash is net build, no valve adjustment is required.

1. Lubricate the valve rocker arms and pushrods with clean engine oil.
2. Lubricate the flange of the valve rocker arm bolts with clean engine oil.

Important: Ensure the pushrods seat properly to the valve lifter sockets.

3. Install the pushrods (212).



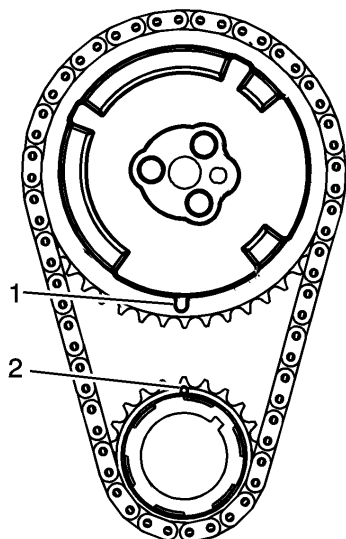
1552511

Important:

- Ensure the pushrods seat properly to the ends of the rocker arms.
- DO NOT tighten the rocker arm bolt at this time.

4. Install the rocker arms (213) and bolts (214). Note the locations of the intake (1) and exhaust (2) valve rocker arms. The intake rocker arms (1) have an offset design.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552503

5. Rotate the crankshaft until number 1 piston is at top dead center of compression stroke.

In this position, cylinder number 1 rocker arms will be off lobe lift, and the crankshaft sprocket key will be at the 1:30 position. The camshaft and crankshaft sprocket alignment marks (1, 2) will be in the 12 o'clock positions. If viewing from the rear of the engine, the additional crankshaft pilot hole, non-threaded, will be in the 10:30 position.

The engine firing order is 1, 8, 7, 2, 6, 5, 4, 3.

Cylinders 1, 3, 5 and 7 are left bank.

Cylinders 2, 4, 6, and 8 are right bank.

Notice: Refer to *Fastener Notice* .

6. With the engine in the number 1 firing position, tighten the following valve rocker arm bolts:

Tighten:

- Tighten exhaust valve rocker arm bolts 1, 2, 7, and 8 to 30 N·m (22 lb ft).
- Tighten intake valve rocker arm bolts 1, 3, 4, and 5 to 30 N·m (22 lb ft).

7. Rotate the crankshaft 360 degrees.

8. Tighten the following valve rocker arm bolts:

Tighten:

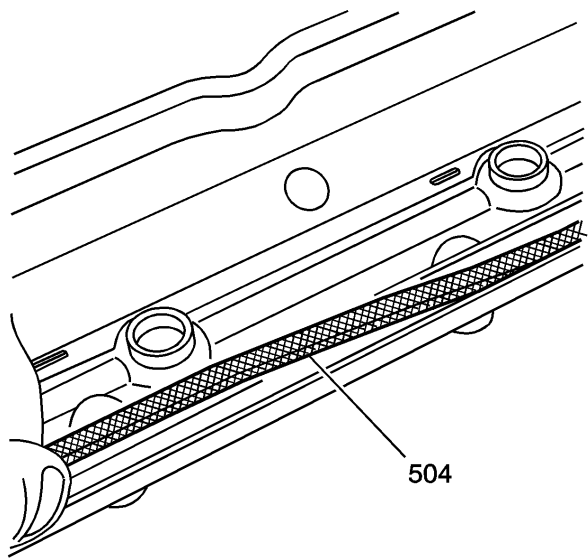
- Tighten exhaust valve rocker arm bolts 3, 4, 5, and 6 to 30 N·m (22 lb ft).
- Tighten intake valve rocker arm bolts 2, 6, 7, and 8 to 30 N·m (22 lb ft).

Repair Instructions

1556283

Valve Rocker Arm Cover Installation - Left Side

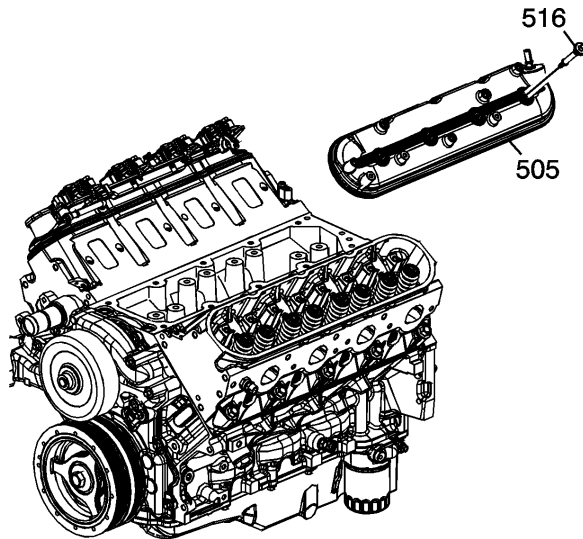
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1272820

Important:

- All gasket surfaces should be free of oil or other foreign material during assembly.
 - DO NOT use the valve rocker arm cover gasket again.
 - The valve rocker arm cover bolt grommets may be used again, if not damaged.
1. Install a NEW gasket (504) into the valve rocker arm cover.



1552537

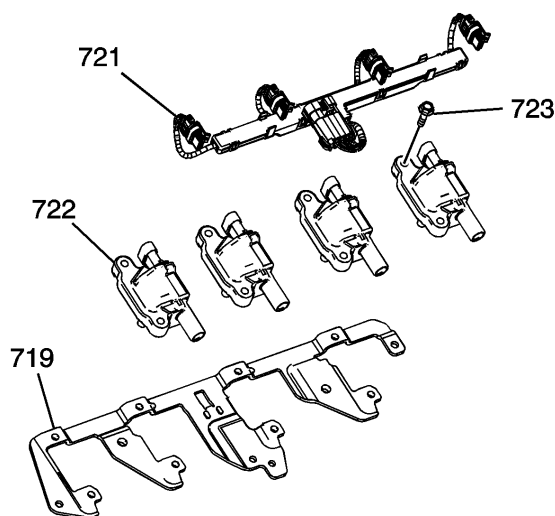
2. Install the valve rocker arm cover (505) onto the cylinder head.

Notice: Refer to Fastener Notice .

3. Install the cover bolts (516) with grommets.

Tighten: Tighten the valve rocker arm cover bolts to 12 N·m (106 lb in).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

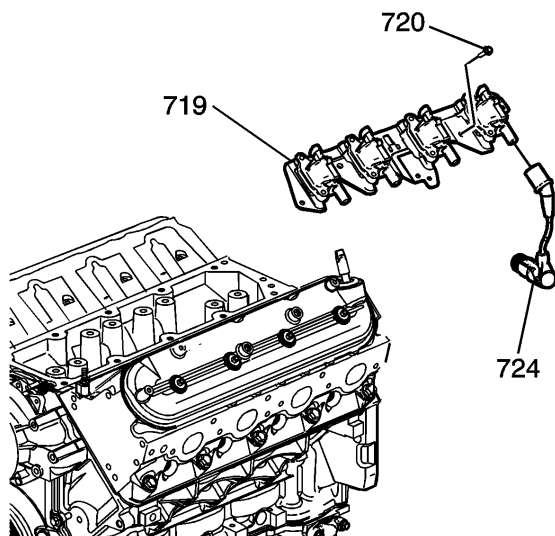


1402020

4. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the ignition coil bolts (723).

5. Install the ignition coils (722), wire harness (721), and bolts (723) to the bracket (719).

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



1408865

6. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the ignition coil bracket studs (720).

7. Install the ignition coil and bracket assembly (719) and studs (720).

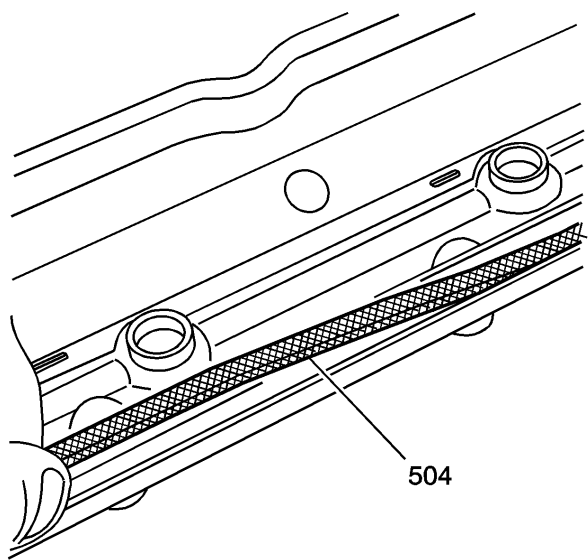
Tighten: Tighten the bracket studs to 12 N·m (106 lb in).

Repair Instructions

1556284

Valve Rocker Arm Cover Installation - Right Side

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

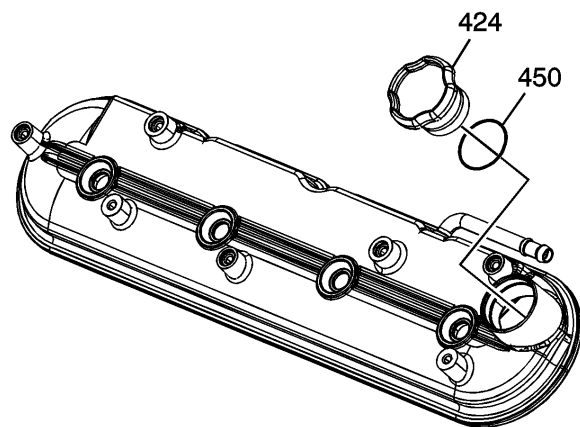


1272820

Important:

- All gasket surfaces should be free of oil or other foreign material during assembly.
- DO NOT use the valve rocker arm cover gasket again.
- The valve rocker arm cover bolt grommets may be used again, if not damaged.

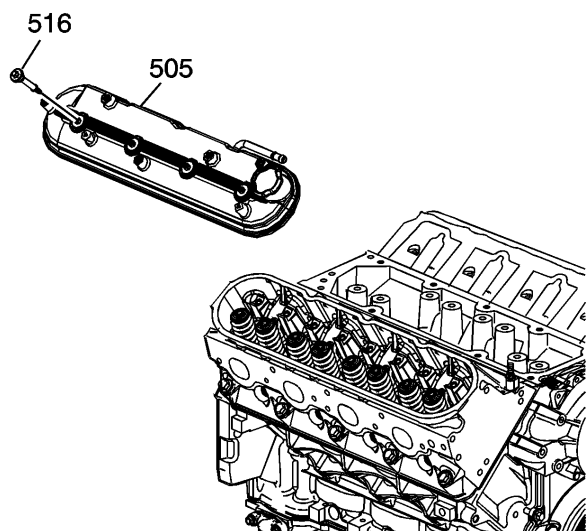
1. Install a NEW gasket (504) into the valve rocker arm cover.



1552540

2. Install a NEW oil cap (424) and seal (450) to the valve rocker arm cover, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



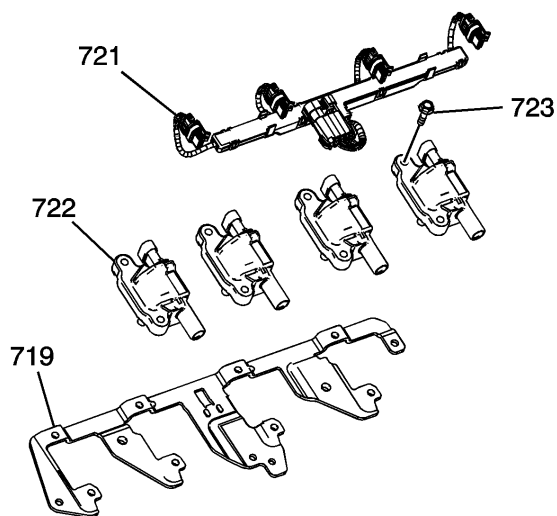
1552539

3. Install the valve rocker arm cover (505) onto the cylinder head.

Notice: Refer to Fastener Notice .

4. Install the cover bolts (516) with grommets.

Tighten: Tighten the valve rocker arm cover bolts to 12 N·m (106 lb in).



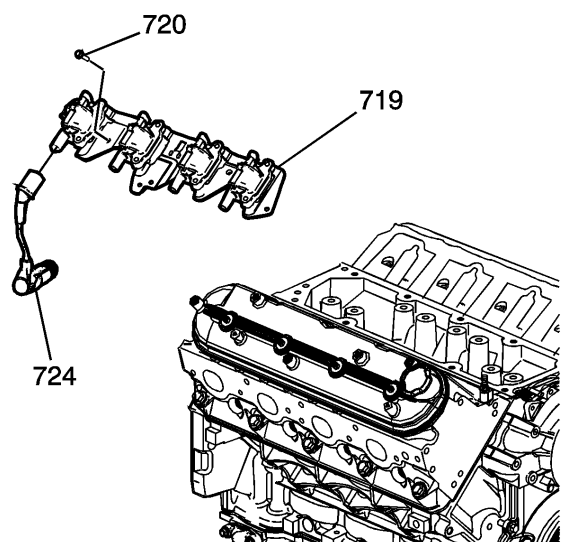
1402020

5. Apply threadlock GMP/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the ignition coil bolts (723).

6. Install the ignition coils (722), wire harness (721), and bolts (723) to the bracket (719).

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

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552538

7. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the ignition coil bracket studs (720).

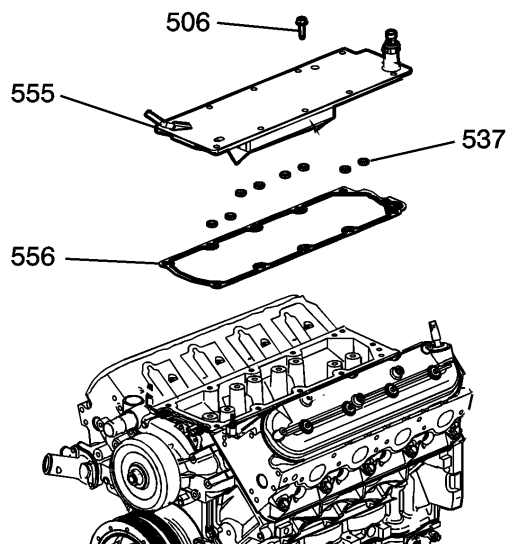
8. Install the ignition coil and bracket assembly (719) and studs (720).

Tighten: Tighten the bracket studs to 12 N·m (106 lb in).

Repair Instructions

1556287

Engine Valley Cover Installation



1408863

Important: All gasket surfaces should be free of oil or other foreign material during assembly.

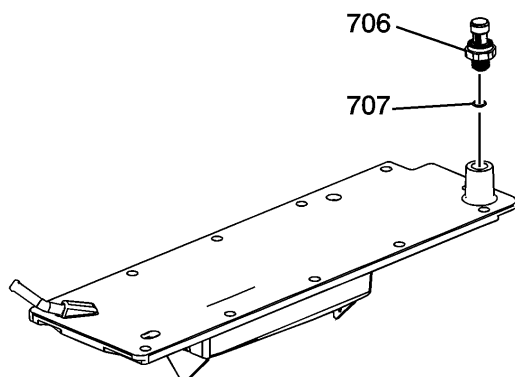
1. Lubricate the O-ring seals (537) with clean engine oil.
2. Install the O-ring seals (537) to the cover (555).

Notice: Refer to *Fastener Notice*.

3. Install the cover (555), gasket (556), and bolts (506).

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

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408864

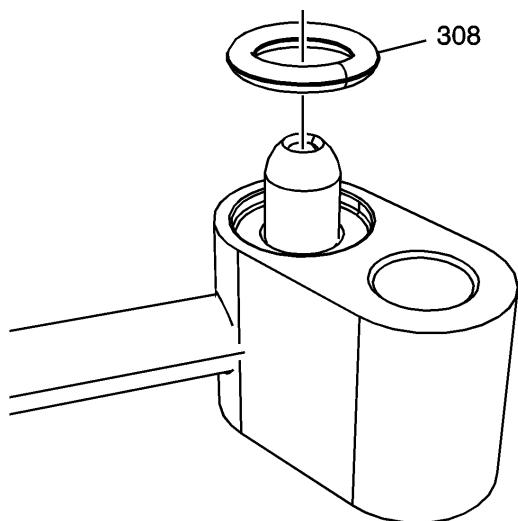
4. Apply sealant GM P/N 12346004 (Canadian P/N 10953480), or equivalent, to the threads of the sensor.
5. Install the oil pressure sensor (706) and sealing washer (707).

Tighten: Tighten the sensor to 35 N·m (26 lb ft).

Repair Instructions

1556288

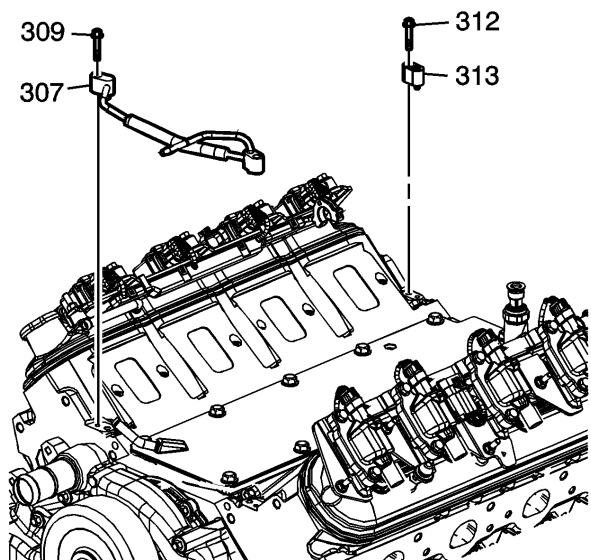
Coolant Air Bleed Pipe Installation



1552485

1. Install the seals (308) onto the engine coolant air bleed pipe and covers.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552533

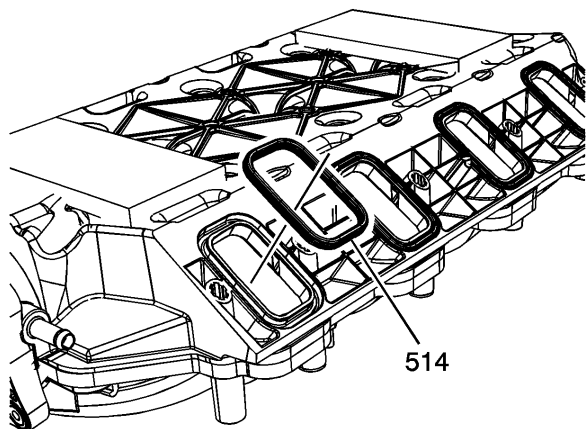
Notice: Refer to Fastener Notice .

2. Install the pipe (307) and bolts (309).
Tighten: Tighten the bolts to 12 N·m (106 lb in).
3. Install the covers (313) and bolts (312).
Tighten: Tighten the cover bolts to 12 N·m (106 lb in).

Repair Instructions

1556289

Intake Manifold Installation

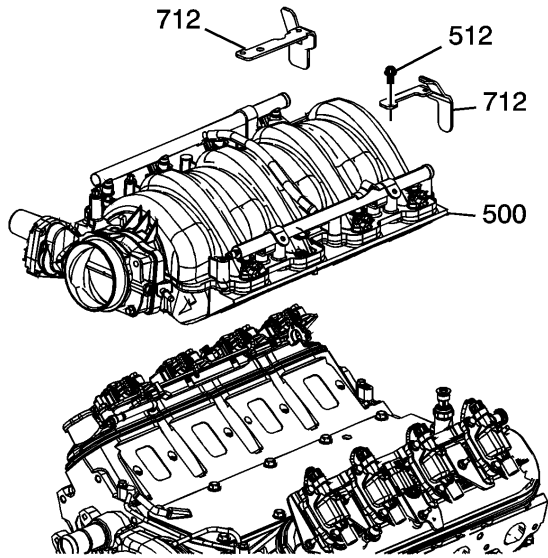


1552471

Important:

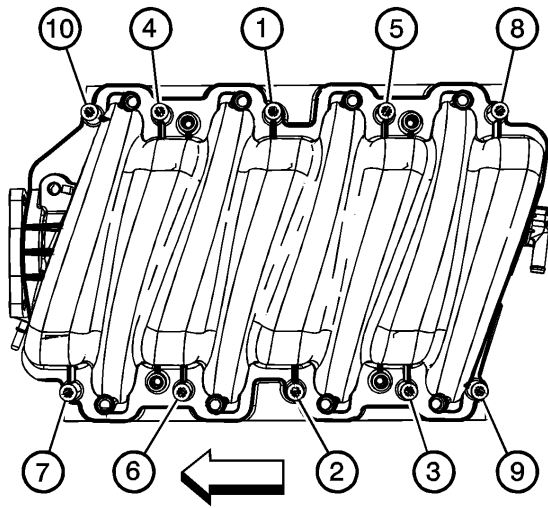
- The intake manifold, throttle body, fuel injection rail and fuel injectors may be removed as an assembly. If not servicing the individual components, install the intake manifold as a complete assembly.
 - DO NOT use the intake manifold gaskets again. Install NEW intake manifold-to-cylinder head gaskets.
1. Install NEW intake manifold-to-cylinder head gaskets (514).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552532

2. Install the intake manifold (500).
3. Apply a 5 mm (0.20 in) band of threadlock GMP/N 12345382 (Canadian P/N 10953489) to the threads of the intake manifold bolts (512). Refer to [Sealers, Adhesives, and Lubricants](#).



1552512

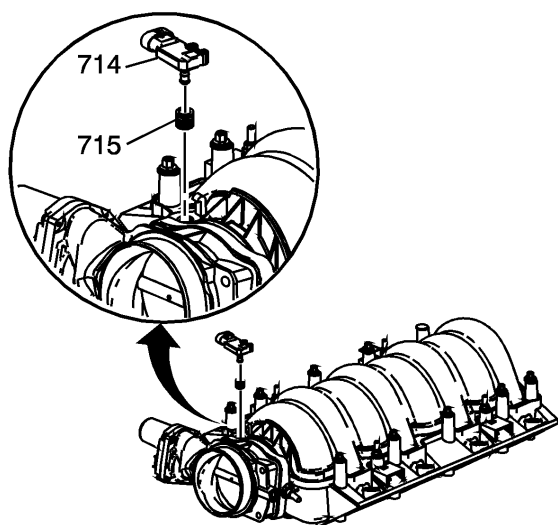
Notice: Refer to [Fastener Notice](#).

4. Install the intake manifold bolts and fuel rail stop brackets.

Tighten:

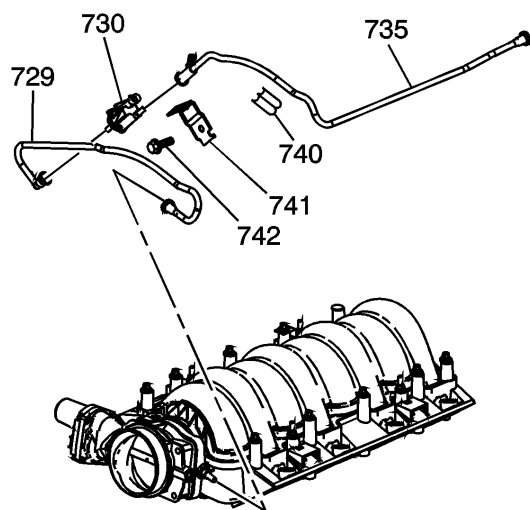
5. Tighten the intake manifold bolts (1–10) a first pass in sequence to 5 N·m (44 lb in).
6. Tighten the intake manifold bolts (1–10) a final pass in sequence to 10 N·m (89 lb in).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1408858

7. Lubricate the manifold absolute pressure (MAP) sensor grommet (715) with clean engine oil.
8. Install the MAP sensor (714) and grommet (715).



1408859

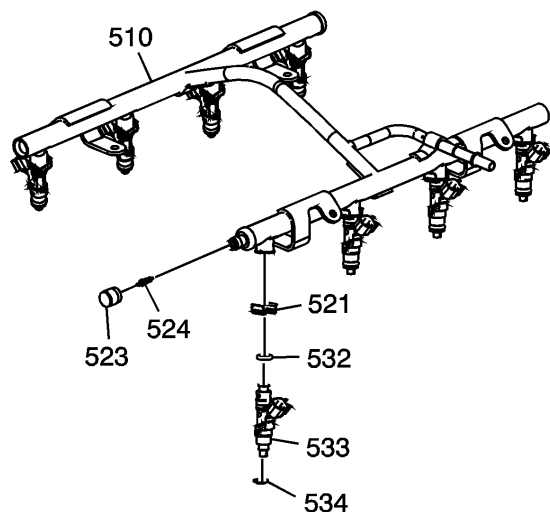
9. Install the evaporative (EVAP) emission canister purge solenoid valve (730), bracket (741), and bolt (742).
Tighten: Tighten the bolt to 50 N·m (37 lb ft).
10. Install the EVAP tubes (729, 735).

Repair Instructions

1556294

Fuel Rail and Injectors Installation

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

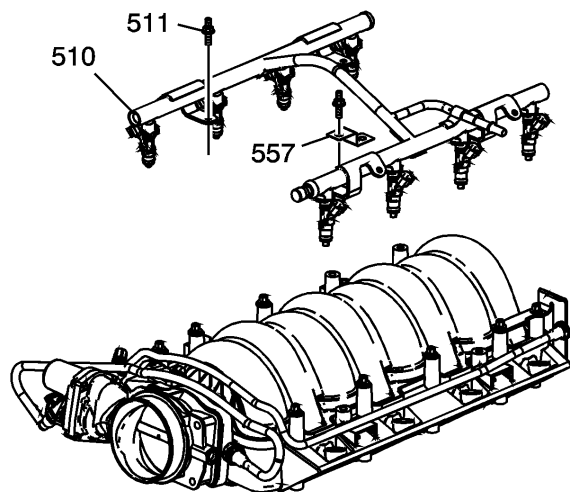


1552482

Caution: Refer to *Fuel Rail Stop Bracket Installation Caution* .

Important: DO NOT use the fuel injector O-ring seals again. Install NEW fuel injector O-ring seals during assembly.

1. Lubricate the NEW fuel injector O-ring seals (532, 534) with clean engine oil.
2. Install the O-ring seals to the fuel injectors.
3. Install the fuel injectors (533) and retainers (521).



1552480

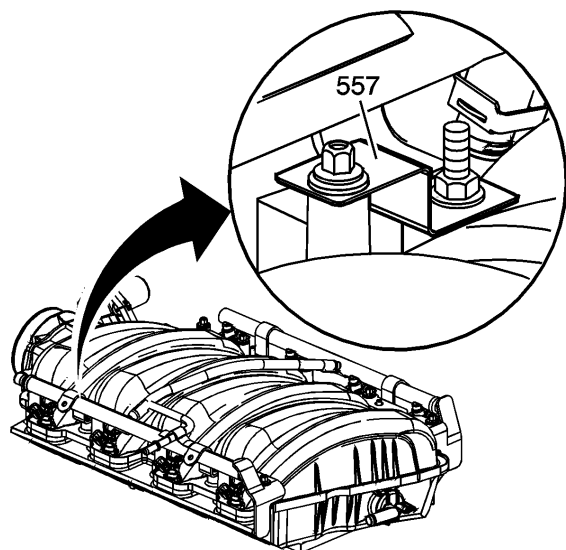
4. Install the fuel rail assembly (510) to the manifold. Push firmly on both sides of the rail until all injectors have entered their bores.
5. Apply a 5 mm (0.2 in) band of threadlock GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the fuel rail bolts. Refer to *Sealers, Adhesives, and Lubricants* .

Notice: Refer to *Fastener Notice* .

6. Install the fuel rail bolts (511, 512) and fuel rail ground strap (557).

Tighten: Tighten the fuel rail bolts to 10 N·m (89 lb in).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

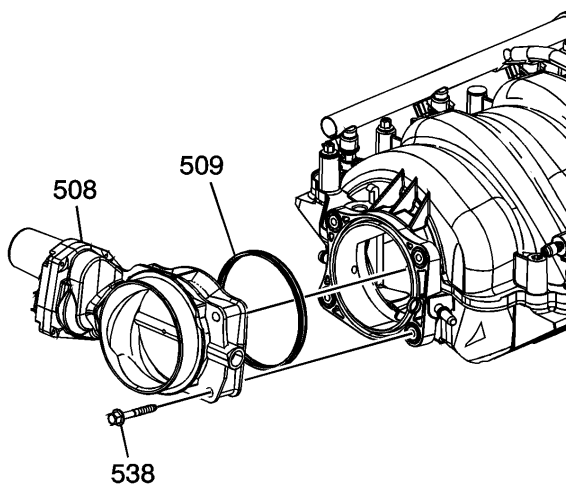


- 1552479
7. Inspect the fuel rail ground strap (557) for proper installation.

Repair Instructions

1556296

Throttle Body Installation



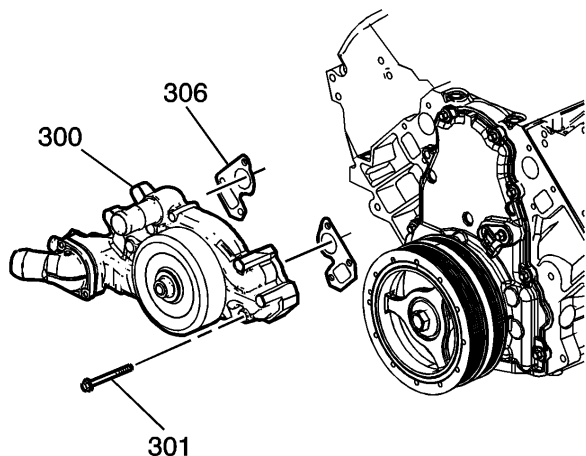
- 1552478
- Important:** DO NOT use the throttle body gasket again. Install a NEW gasket during assembly.
1. Install the throttle body gasket (509) to the intake manifold. Align the locating tab of the gasket with the notch in the manifold.
- Notice:** Refer to *Fastener Notice* .
2. Install the throttle body (508) and bolts (538).
- Tighten:** Tighten the throttle body bolts to 10 N·m (89 lb in).

Repair Instructions

1556297

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Water Pump Installation



1552531

Important: All gasket surfaces are to be free of oil or other foreign material during assembly.

1. Install the water pump (300) and NEW gaskets (306).

Notice: Refer to *Fastener Notice*.

2. Install the water pump bolts (301).

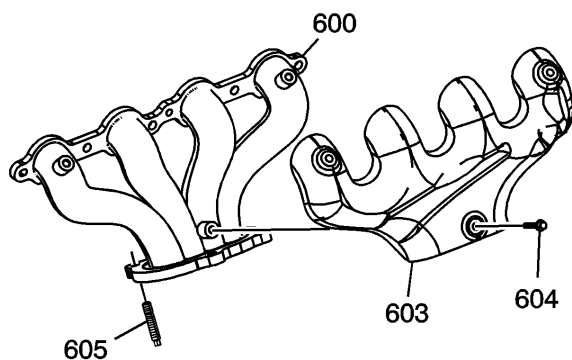
Tighten:

3. Tighten the water pump bolts a first pass to 15 N·m (11 lb ft).
4. Tighten the water pump bolts a final pass to 30 N·m (22 lb ft).

Repair Instructions

1556301

Exhaust Manifold Installation - Left Side



1552472

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Notice: Refer to Fastener Notice .

Important:

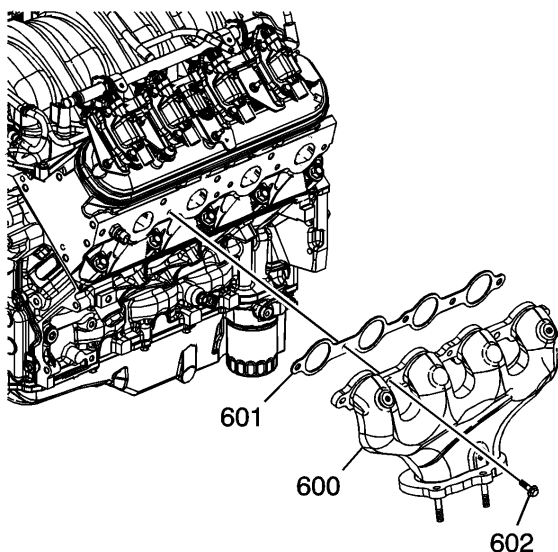
- Tighten the exhaust manifold bolt as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may affect vehicle emissions and/or on-board diagnostic (OBD) II system performance.
- The cylinder head exhaust manifold bolt hole threads must be clean and free of debris or threadlocking material.
- Do not apply sealant to the first 3 threads of the bolts.

1. Install the heat shield (603) and bolts (604).

Tighten: Tighten the bolts to 9 N·m (80 lb in).

2. Install the studs (605).

Tighten: Tighten the studs to 20 N·m (15 lb ft).



1552529

3. Apply a 5 mm (0.2 in) wide band of threadlock GMP/N 12345493 (Canadian P/N 10953488), or equivalent, to the threads of the exhaust manifold bolts. Refer to *Sealers, Adhesives, and Lubricants* .

4. Install the exhaust manifold, NEW gasket, and bolts.

Tighten:

5. Tighten the exhaust manifold bolts a first pass to 15 N·m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, working toward the outside bolts.

6. Tighten the exhaust manifold bolts a final pass to 20 N·m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, working toward the outside bolts.

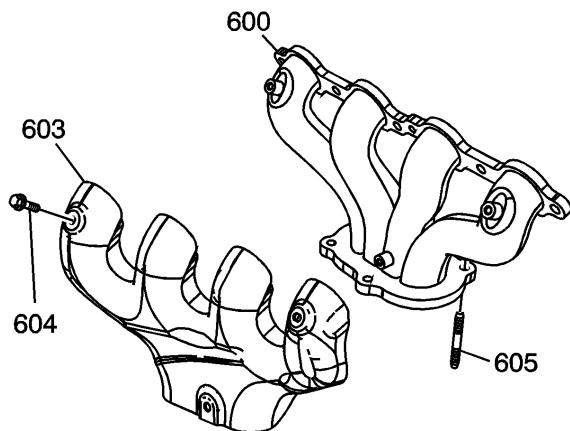
7. Using a flat punch, bend over the exposed edge of the exhaust manifold gasket at the rear of the left cylinder head.

Repair Instructions

1556302

Exhaust Manifold Installation - Right Side

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552477

Notice: Refer to *Fastener Notice* .

Important:

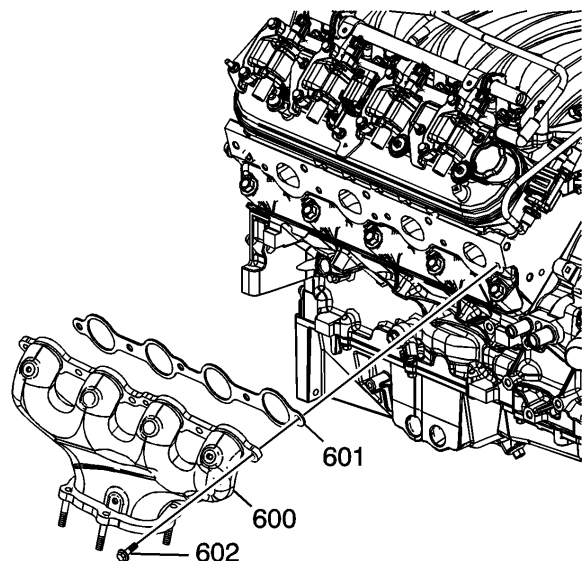
- Tighten the exhaust manifold bolts, as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may affect vehicle emissions and/or on-board diagnostic (OBD) II system performance.
- The cylinder head exhaust manifold bolt hole threads must be clean and free of debris or threadlocking material.
- Do not apply sealant to the first 3 threads of the bolts.

1. Install the heat shield (603) and bolts (604).

Tighten: Tighten the bolts to 9 N·m (80 lb in).

2. Install the studs (605).

Tighten: Tighten the studs to 20 N·m (15 lb ft).



1552530

3. Apply a 5 mm (0.2 in) wide band of threadlock GM P/N 12345493 (Canadian P/N 10953488), or equivalent, to the threads of the exhaust manifold bolts. Refer to *Sealers, Adhesives, and Lubricants* .

4. Install the exhaust manifold, NEW gasket, and bolts.

Tighten:

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

5. Tighten the exhaust manifold bolts a first pass to 15 N·m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, working toward the outside bolts.
6. Tighten the exhaust manifold bolts a final pass to 20 N·m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, working toward the outside bolts.
7. Using a flat punch, bend over the exposed edge of the exhaust manifold gasket at the front of the right cylinder head.

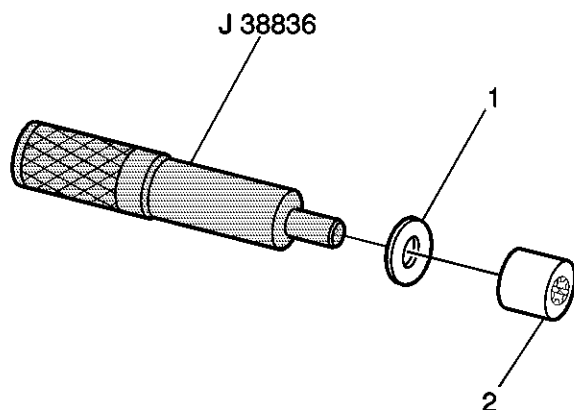
Repair Instructions

1556304

Clutch Pilot Bearing Installation

Tools Required

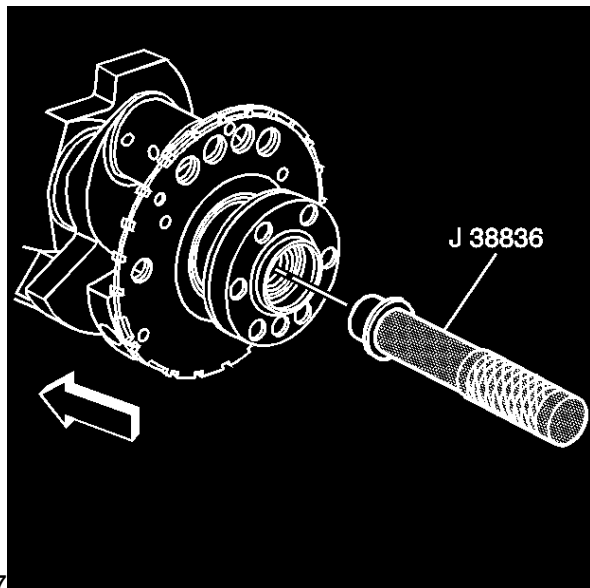
J 38836 Bushing Installer and Clutch Arbor



260131

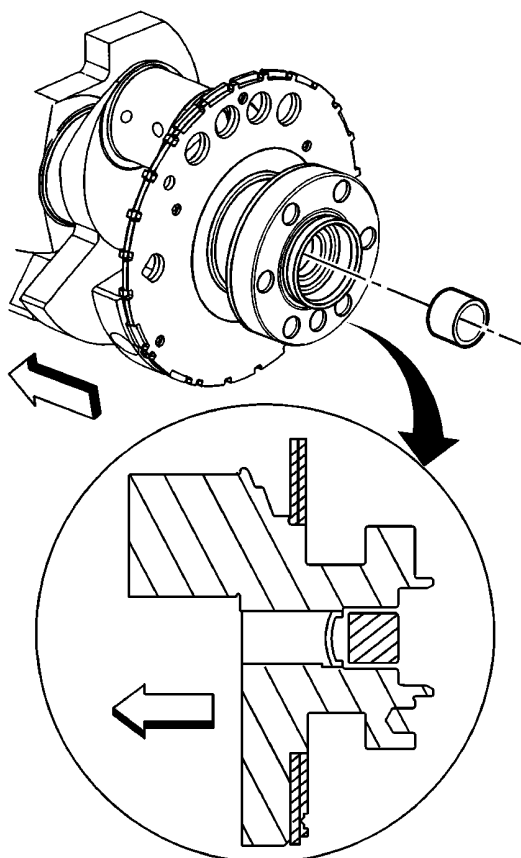
1. Install a 5/8 inch washer (1) onto the *J 38836*, or equivalent.
The washer serves as a stop against the crankshaft face and assists in installing the bearing to the proper depth.
2. Install the new pilot bearing (2) onto the tool.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



490867

3. Install the new pilot bearing into the crankshaft using the [J 38836](#).



63195

4. Inspect the clutch pilot bearing for proper installation.
A properly installed clutch pilot bearing will be installed until flush to the rear face of the crankshaft.

Repair Instructions

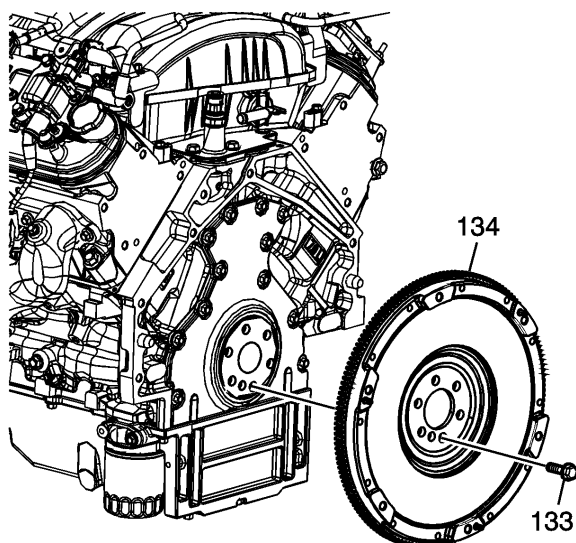
1556308

2006 Y Car GMX245 Corvette
 7.0L (LS7) Engine Mechanical

Engine Flywheel Installation

Tools Required

- *J 42386-A* Flywheel Holding Tool
- *J 45059* Angle Meter

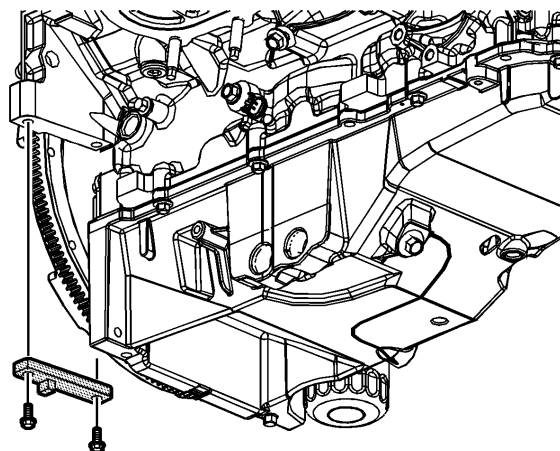


1552527

Important:

- Note the position and direction of the engine flywheel before removal. Mark or scribe the end of the crankshaft and flywheel before component removal. The existing engine flywheel must be installed to the original position and direction. Refer to *Engine Balancing*.
- The flywheel does not use a locating pin for alignment and will not initially seat against the crankshaft flange, but will be pulled onto the crankshaft by the engine flywheel bolts. This procedure requires a 2 stage tightening process.

1. Install the flywheel to the crankshaft (134).
2. Apply threadlock GM P/N 12345382 (Canadian P/N 10953489), or equivalent, to the threads of the flywheel bolts (133).



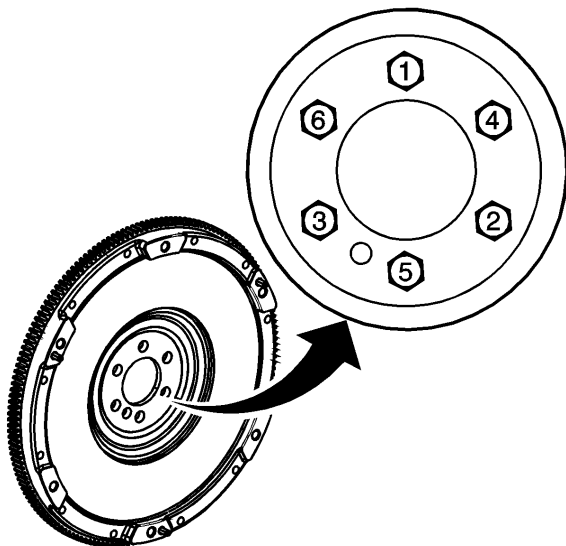
1552525

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Notice: Refer to Fastener Notice .

3. Install the *J 42386-A* and bolts. Use 1 M10–1.5 x 120 mm and 1 M10–1.5 x 45 mm bolt for proper tool operation.

Tighten: Tighten the *J 42386-A* bolts to 50 N·m (37 lb ft).



1552513

4. Install the engine flywheel bolts.

Tighten:

5. Tighten the engine flywheel bolts (1–6) a first pass in sequence to 30 N·m (22 lb ft).
6. Tighten the engine flywheel bolts (1–6) a final pass in sequence to 40 degrees using the *J 45059* .

Repair Instructions

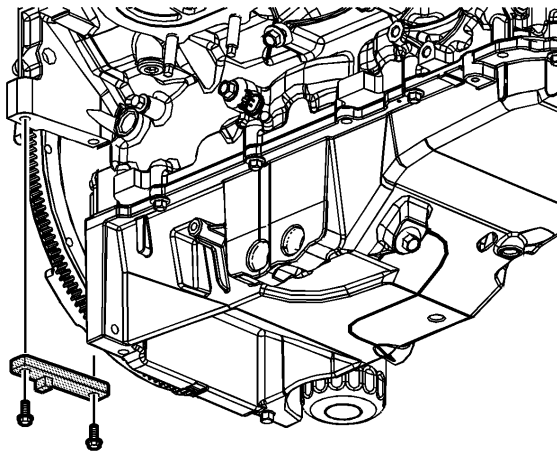
1556310

Crankshaft Balancer Installation

Tools Required

- *EN-47812* Installer Bolt
- *J 41665* Crankshaft Balancer and Sprocket Installer
- *J 42386-A* Flywheel Holding Tool
- *J 45059* Angle Meter

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552525

Notice: Refer to *Fastener Notice* .

Important:

- Note the position of the crankshaft balancer before removal. The balancer does not use a key or keyway for positioning. Mark or scribe the end of the crankshaft and the balancer before removal. The crankshaft balancer must be installed to the original position. If replacing the crankshaft balancer, note the location of any existing balance weights, if applicable. Install new balance weights into the new crankshaft balancer, if applicable. Crankshaft balance weights must be installed into the new balancer in the same location as the old balancer. A properly installed balance weight will be either flush or below flush with the face of the balancer. Refer to *Engine Balancing* and *Crankshaft Balancer Cleaning and Inspection* .

- The crankshaft balancer installation and bolt tightening involves a 4 step tightening process. The first pass ensures that the balancer is installed completely onto the crankshaft. The second, third and fourth passes tighten the NEW bolt to the proper torque.

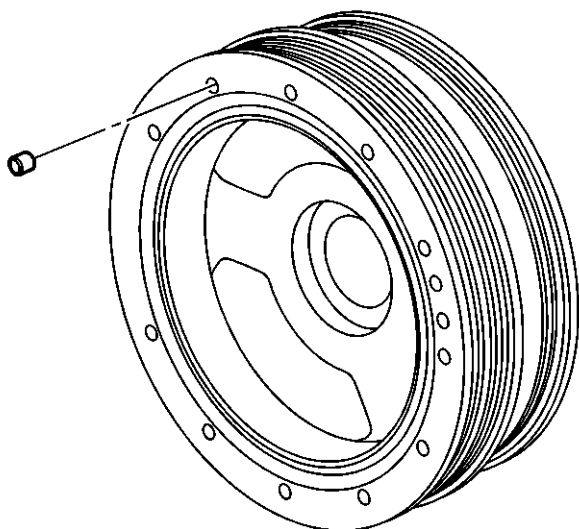
- The used crankshaft balancer bolt is used only during the first pass of the balancer installation procedure. Install a NEW crankshaft balancer bolt and tighten as described in the second, third and fourth passes of the balancer bolt tightening procedure.

1. Install the *J 42386-A* and bolts.

Use 1 M10 – 1.5 x 120 mm and 1 M10 – 1.5 x 45 mm bolt for proper tool operation.

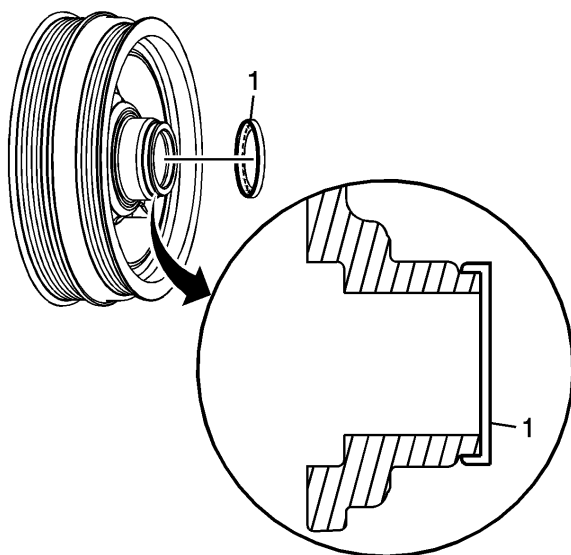
Tighten: Tighten the *J 42386-A* bolts to 50 N·m (37 lb ft).

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



63153

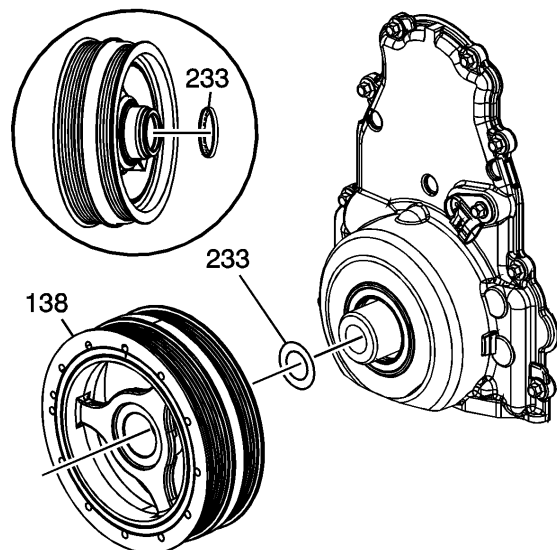
2. Using the old balancer as a reference, mark or scribe the new balancer in the same location, if applicable. Refer to [Crankshaft Balancer Cleaning and Inspection](#).
3. Install balance weights into the new balancer, if applicable.



1759519

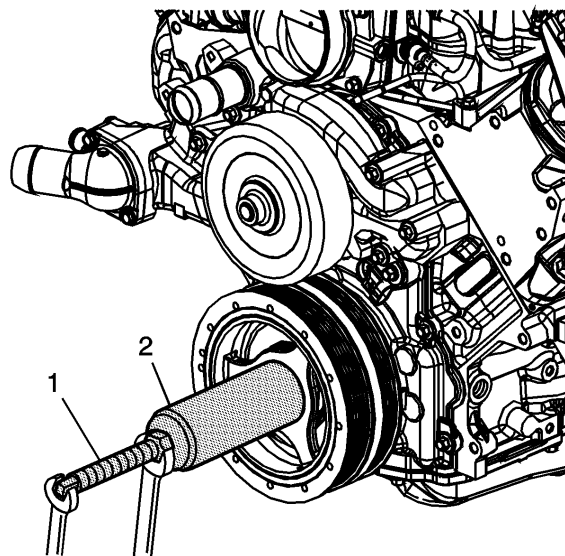
4. Install the crankshaft balancer washer (1) onto the crankshaft balancer, as required.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552474

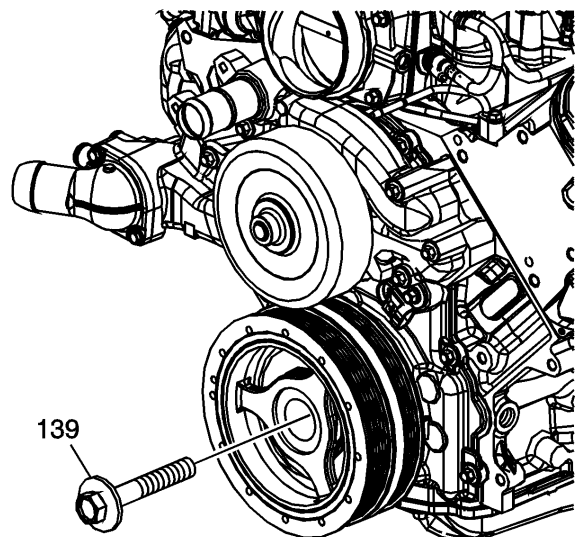
5. Install the washer (233) onto the crankshaft, as required. First design washers do not lock onto the balancer.
- Important:** The balancer should be positioned onto the end of the crankshaft as straight as possible prior to tool installation.
6. Position the balancer (138) onto the end of the crankshaft.



1552514

7. Use the [J 41665](#) (2) and the [EN-47812](#) (1) in order to install the balancer.
 - 7.1. Assemble the [EN-47812](#) (1), nut, washer and the [J 41665](#) (2).
Insert the smaller end of the [J 41665](#) (2) into the front of the balancer.
 - 7.2. Use a wrench and hold the hex end of the [EN-47812](#) (1).
 - 7.3. Use a second wrench and rotate the installation tool nut clockwise until the balancer is started onto the crankshaft.
 - 7.4. Remove the [J 41665](#) (2) and reverse the installation tool.
Position the larger end of the [J 41665](#) (2) against the front of the balancer.
 - 7.5. Use a wrench and hold the end of the [EN-47812](#) (1).
 - 7.6. Use a second wrench and rotate the installation tool nut clockwise until the balancer is installed onto the crankshaft.
 - 7.7. Remove the balancer installation tools.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

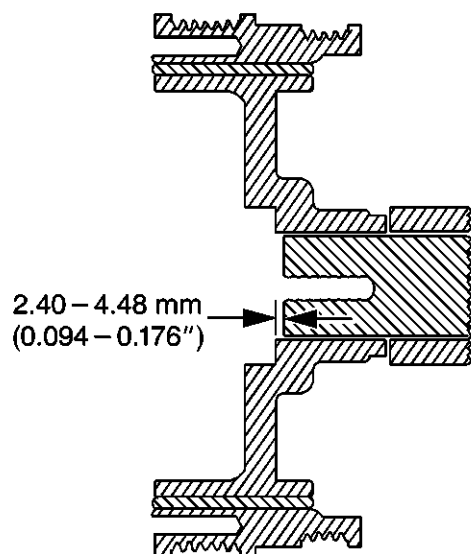


1552516

8. Install the used crankshaft balancer bolt (138).

Tighten: Tighten the crankshaft balancer bolt to 330 N·m (240 lb ft).

9. Remove the used crankshaft balancer bolt.



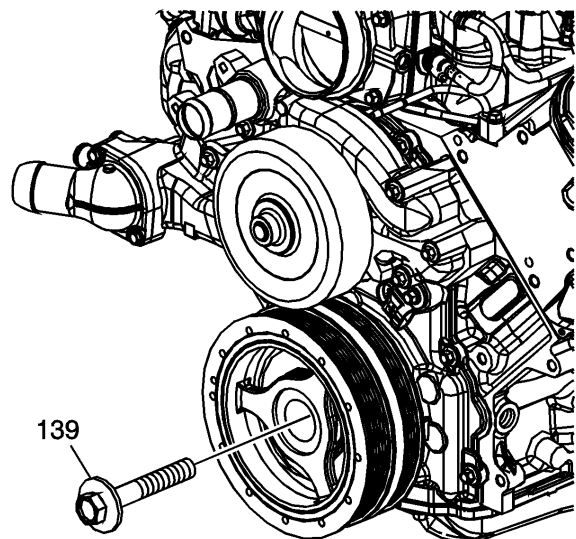
63245

Important: The nose of the crankshaft should be recessed 2.4–4.48 mm (0.094–0.176 in) into the balancer bore.

10. Measure for a correctly installed balancer.

If the balancer is not installed to the proper dimensions, install the [EN-47812](#) and the [J 41665](#) and repeat the installation procedure.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552516

11. Install the NEW crankshaft balancer bolt (138).

Tighten:

12. Tighten the crankshaft balancer bolt a first pass to 50 N·m (37 lb ft).
 13. Tighten the crankshaft balancer bolt a second pass to 140 degrees using the *J 45059*.
14. Remove the *J 42386-A*.

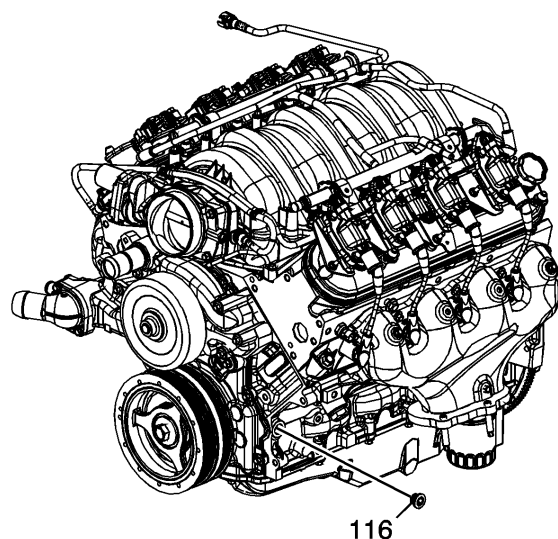
Repair Instructions

1556315

Engine Prelubing

Tools Required

J 45299 Engine Preluber



1552517

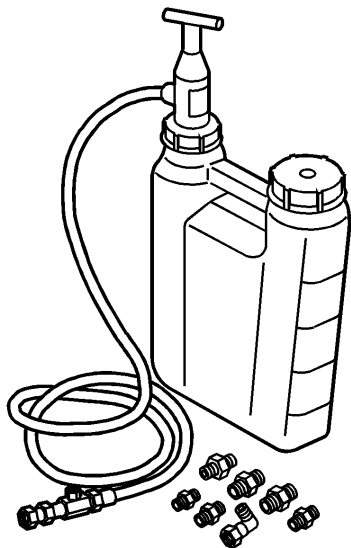
Important: A constant and continuous flow of clean engine oil is required in order to properly prime the engine. Be sure to use an approved engine oil, as specified in the owners manual.

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

1. Remove the engine oil filter, and fill with clean engine oil.

Notice: Refer to *Fastener Notice* .

2. Install the oil filter.
Tighten: Tighten the oil filter to 30 N·m (22 lb ft).
3. Locate the engine block left front oil gallery plug (116).
4. Install the M16 x 1.5 adapter P/N 509375.



863255

5. Install the flexible hose to the adapter and open the valve.
6. Pump the handle on the [J 45299](#) in order to flow a minimum of 1–1.9 liters (1–2 quarts) engine oil. Observe the flow of engine oil through the flexible hose and into the engine assembly.
7. Close the valve and remove the flexible hose and adapter from the engine.
8. Install the oil gallery plug to the engine.
Tighten: Tighten the oil gallery plug to 60 N·m (44 lb ft).
9. Top-off the engine oil to the proper level.

Description and Operation

1538673

Crankcase Ventilation System Description

A closed crankcase ventilation system is used in order to provide a more complete scavenging of crankcase vapors. Filtered air from the air induction system duct is supplied to the crankcase, mixed with blow-by vapors, and passes through a crankcase ventilation metering device before entering the intake manifold. The primary component in the positive crankcase ventilation (PCV) system is the PCV flow metering device (valve or orifice) . Vacuum changes within the intake manifold result in flow variations of the blow-by vapors. If abnormal operating conditions occur, the design of the PCV system permits excessive amounts of blow-by vapors to back flow through the crankcase vent tube and into the engine induction system to be consumed during normal combustion. This engine ventilation system design minimizes oil consumption and significantly reduces the potential for oil ingestion during vehicle limit handling maneuvers.

LS7 Engine

The LS7 engine utilizes an integral positive crankcase ventilation (PCV) system which is located in the engine valley cover beneath the intake manifold. The engine valley cover contains composite oil separating baffles and PCV plumbing. Filtered fresh air is routed from up stream of the throttle plate to the engine oil tank where it mixes with crankcase gasses and is passed to both engine rocker arm covers. The design of the rocker cover shields rocker arm oil spray thereby reducing the potential for oil being drawn back into the tank during backflow of the ventilation system. Blow-by vapors are routed from the valley cover through a fixed orifice (2.5 mm) within a steel PCV tube, then through a formed nylon hose before entering the intake manifold behind the throttle body.

Description and Operation

558948

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Drive Belt System Description

Drive Belt: System Description: Engine Mechanical - 4.8L, 5.3L, and 6.0L

The drive belt system consists of the following components:

- The drive belt
- The drive belt tensioner
- The drive belt idler pulley
- The crankshaft balancer pulley
- The accessory drive component mounting brackets
- The accessory drive components
 - The power steering pump, if belt driven
 - The generator
 - The A/C compressor, if equipped
 - The engine cooling fan, if belt driven
 - The water pump, if belt driven
 - The vacuum pump, if equipped
 - The air compressor, if equipped

The drive belt system may use 1 belt or 2 belts. The drive belt is thin so that it can bend backwards and has several ribs to match the grooves in the pulleys. The drive belts are made of different types of rubbers, chloroprene or EPDM, and have different layers or plys containing either fiber cloth or cords for reinforcement.

Both sides of the drive belt may be used to drive the different accessory drive components. When the back side of the drive belt is used to drive a pulley, the pulley is smooth.

The drive belt is pulled by the crankshaft balancer pulley across the accessory drive component pulleys. The spring loaded drive belt tensioner keeps constant tension on the drive belt to prevent the drive belt from slipping. The drive belt tensioner arm will move when loads are applied to the drive belt by the accessory drive components and the crankshaft.

The drive belt system may have an idler pulley, which is used to add wrap to the adjacent pulleys. Some systems use an idler pulley in place of an accessory drive component when the vehicle is not equipped with the accessory.

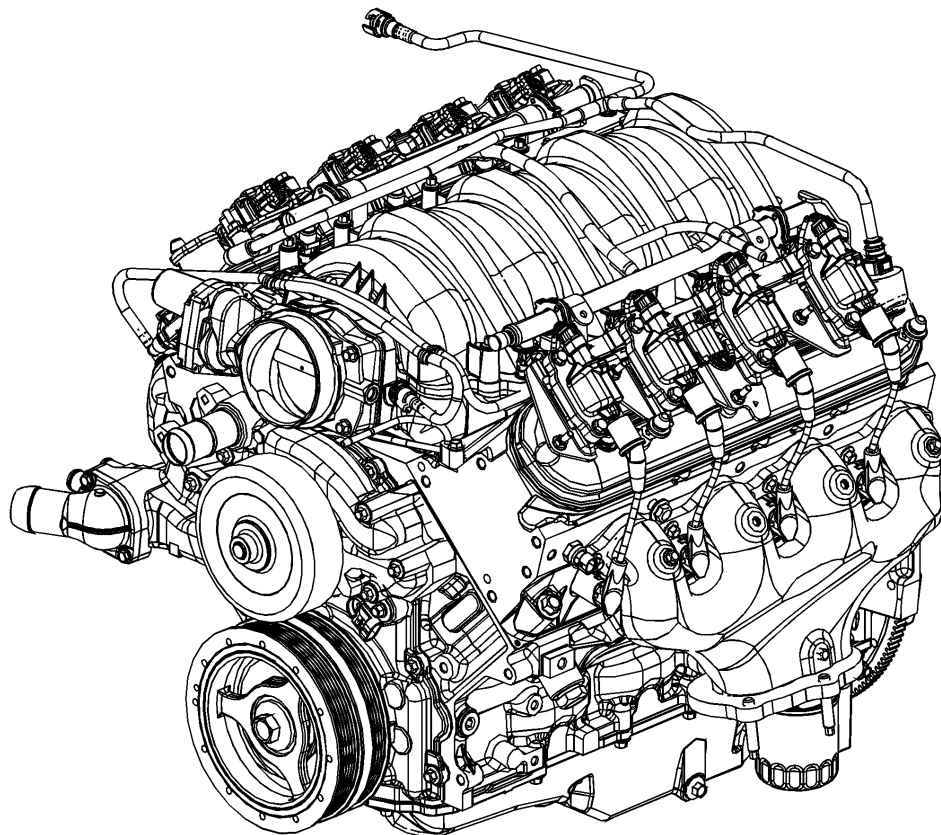
Description and Operation

1556319

Engine Component Description

Figure 1556091 **The 7.0 Liter V8 Engine**

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical



1552519

The 7.0 Liter V8 engine is identified as RPO LS7 VIN Y/E.

Camshaft and Drive System

A billet steel 1 piece camshaft is supported by 5 bearings pressed into the engine block. The camshaft timing sprocket is mounted to the front of the camshaft and is driven by the crankshaft sprocket through the camshaft timing chain. The camshaft position (CMP) sensor lobes are incorporated into the front face of the camshaft sprocket, with the CMP sensor mounted to the engine front cover. A timing chain dampener is mounted to the front of the engine block above the crankshaft sprocket. The externally splined crankshaft sprocket is positioned to the crankshaft by a key and keyway. The crankshaft sprocket external splines drive the oil pump drive gears. A retaining plate mounted to the front of the engine block maintains camshaft location.

Crankshaft

The precision-balanced crankshaft is forged steel and is supported by 5 crankshaft bearings. The bearings are retained by forged steel crankshaft bearing caps, which are machined with the engine block for proper alignment and clearance. The crankshaft journals are undercut and rolled. The center main journal is the thrust journal. A crankshaft position (CKP) reluctor ring is press-fit mounted at the rear of the crankshaft. The reluctor ring is not serviceable separately.

Cylinder Heads

The cylinder heads are cast aluminum and include pressed-in-place powdered metal valve guides, 56 mm (2.20 in) diameter titanium intake valves, 41 mm (1.61 in) diameter sodium filled stem exhaust valves, and 70 cubic centimeter combustion chambers. Passages for the engine coolant air bleed system are at the front of each cylinder head. The valve rocker arm covers are retained to the cylinder heads by 4 center mounted rocker arm cover bolts.

Engine Block

The engine block is a cam-in-block deep skirt 90 degree V configuration with 5 forged steel crankshaft bearing caps. The engine block is cast aluminum with press-in-place iron cylinder liners. The 5 crankshaft bearing caps each have 4 vertical M10 and 2 horizontal M8 mounting bolts. The engine block and bearing caps are aligned by dowel pins retained in the caps. The camshaft is supported by 5 press-in-place camshaft bearings.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Exhaust Manifolds

The hydro-formed stainless steel exhaust headers are a 1 piece steel design with unique quad flow collector flanges. The exhaust manifolds direct exhaust gasses from the combustion chambers to the exhaust system. Each manifold also has an externally mounted heat shield that is retained by bolts.

Intake Manifold

The intake manifold is a friction welded 3 piece composite design that incorporates brass threaded inserts for mounting the fuel rail, throttle body, and wire harness studs. Each side of the intake manifold is sealed to the cylinder head by 4 non-reusable push-in-place silicone sealing gaskets. The 90 mm (3.54 in) electronically actuated throttle body bolts to the front of the intake manifold. The throttle body is sealed by a 1 piece push-in-place silicone gasket. The fuel rail assembly, with 8 separate fuel injectors, is retained to the intake by 4 bolts. The injectors are seated into their individual manifold bores with O-ring seals to provide sealing. 2 fuel rail stop brackets are retained to the rear of the intake manifold by mounting bolts. The manifold absolute pressure (MAP) sensor is installed and retained to the top front of the intake manifold and sealed by an O-ring seal. The evaporative (EVAP) emission canister purge solenoid valve is mounted to the front of the right cylinder head. There are no coolant passages within the intake manifold.

Oil Pan

The structural oil pan is cast aluminum. Incorporated into the design are the oil filter mounting boss, drain plug opening and internal oil passages. The alignment of the structural oil pan to the rear of the engine block and transmission housing is critical.

Piston and Connecting Rod Assembly

The pistons are cast aluminum. The pistons use 2 compression rings and 1 oil control ring assembly. The piston is a low friction, lightweight design with a recessed top and barrel shaped skirt. The piston pins are chromium steel and are a full-floating design. The connecting rods are forged titanium alloy with press-in-place piston pin bushings. The connecting rods and rod cap are aligned by dowel pins retained in the cap. All applications use a piston with a graphite coated skirt. The piston, pin, and connecting rod are to be serviced as an assembly.

Valve Rocker Arm Cover Assemblies

The valve rocker arm covers are cast aluminum and use a pre-molded silicon gasket for sealing. Mounted to each rocker cover is a coil and bracket assembly. Positive crankcase ventilation (PCV) fresh air passages are incorporated into both the left and right side covers. The cap on the right valve cover is not to be used for oil fill.

Valve Train

Motion is transmitted from the camshaft, through the hydraulic roller valve lifters and tubular pushrods, to the roller type rocker arms. The nylon valve lifter guides position and retain the valve lifters. The valve rocker arms for each bank of cylinders are mounted directly to the cylinder heads. Each rocker arm is retained to the cylinder head by a bolt. Valve lash is net build. The exhaust valves have sodium filled valve stems. The intake valves are a titanium design and have a rocker arm wear pad at the top of the stem.

Description and Operation

1674147

New Product Information

The purpose of New Product Information is to highlight, or indicate, important product changes from the previous model year.

Changes may include 1 or more of the following items:

- Torque values and/or fastener tightening strategies
- Changed engine specifications
- New sealants and/or adhesives
- Disassembly and assembly procedure revisions
- Engine mechanical diagnostic procedure revisions
- New special tools required
- A component comparison from the previous year

Torque Values and/or Fastener Tightening Strategies

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

All fasteners and threaded holes on the 7.0 liter engine utilize metric threads.

New Sealants and/or Adhesives

Cleaning chemicals have been identified for the titanium intake valves and connecting rods. Refer to *Sealers, Adhesives, and Lubricants* .

Changed Engine Specifications

Engine specifications for the LS7 application have been added. Refer to *Engine Mechanical Specifications* .

Disassembly and Assembly Procedure Revisions

Oil draining and filling procedures are unique for the LS7 application. Refer to *Engine Oil and Oil Filter Replacement* .

Engine Mechanical Diagnostic Procedure Revisions

All diagnosis on a vehicle should follow a logical process. Strategy based diagnostics is a uniform approach for repairing all systems. The diagnostic flow may always be used in order to resolve a system condition. The diagnostic flow is the place to start when repairs are necessary. For a detailed explanation, refer to *Strategy Based Diagnosis* or *Diagnostic Starting Point - Engine Mechanical* .

New Special Tools Required

- *EN-47812* installer bolt has been developed for use with the *EN-47813* front cover alignment, the *J 41478* crankshaft front oil seal installer, and the *J 41665* crankshaft balancer and sprocket installer. The *EN-47812* installer bolt is required due to the increased length at front of crankshaft.
- *EN-47813* front cover alignment has been developed for alignment of the front cover. The *EN-47813* is required due to the increased size of the front cover.
- *J-41558-10* crankshaft sprocket remover bolts have been developed for use with the *J 8433* two jaw puller and the *J 41816-2* crankshaft end protector for crankshaft sprocket removal. The longer bolts are required due to the increased length at front of crankshaft.
- *EN-47971* oil pressure gage adapter has been developed for use with the new design oil filter with internal bypass valve.
- Refer to *Special Tools* .

A Component Comparison from the Previous Year

- The 7.0 liter V8 engine (RPO LS7) is optional in place of the 6.0 liter V8 engine (RPO LS2).
- The LS7 application has a dry-sump type oiling system with a remote oil tank, a hose assembly from oil tank to oil pan, and a dual rotor oil pump assembly. Refer to *Engine Component Description* and *Lubrication Description* .
- The connecting rods are a titanium alloy design.
- The intake valves are titanium and the exhaust valves have sodium filled valve stems.
- The new design oil filter has an internal oil bypass valve in the event the oil filter becomes restricted.
- A crankshaft balancer washer has been added. The washer installs onto the front of the crankshaft and is positioned between the balancer and crankshaft sprocket. Refer to *Crankshaft Balancer Installation* .

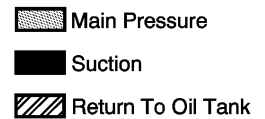
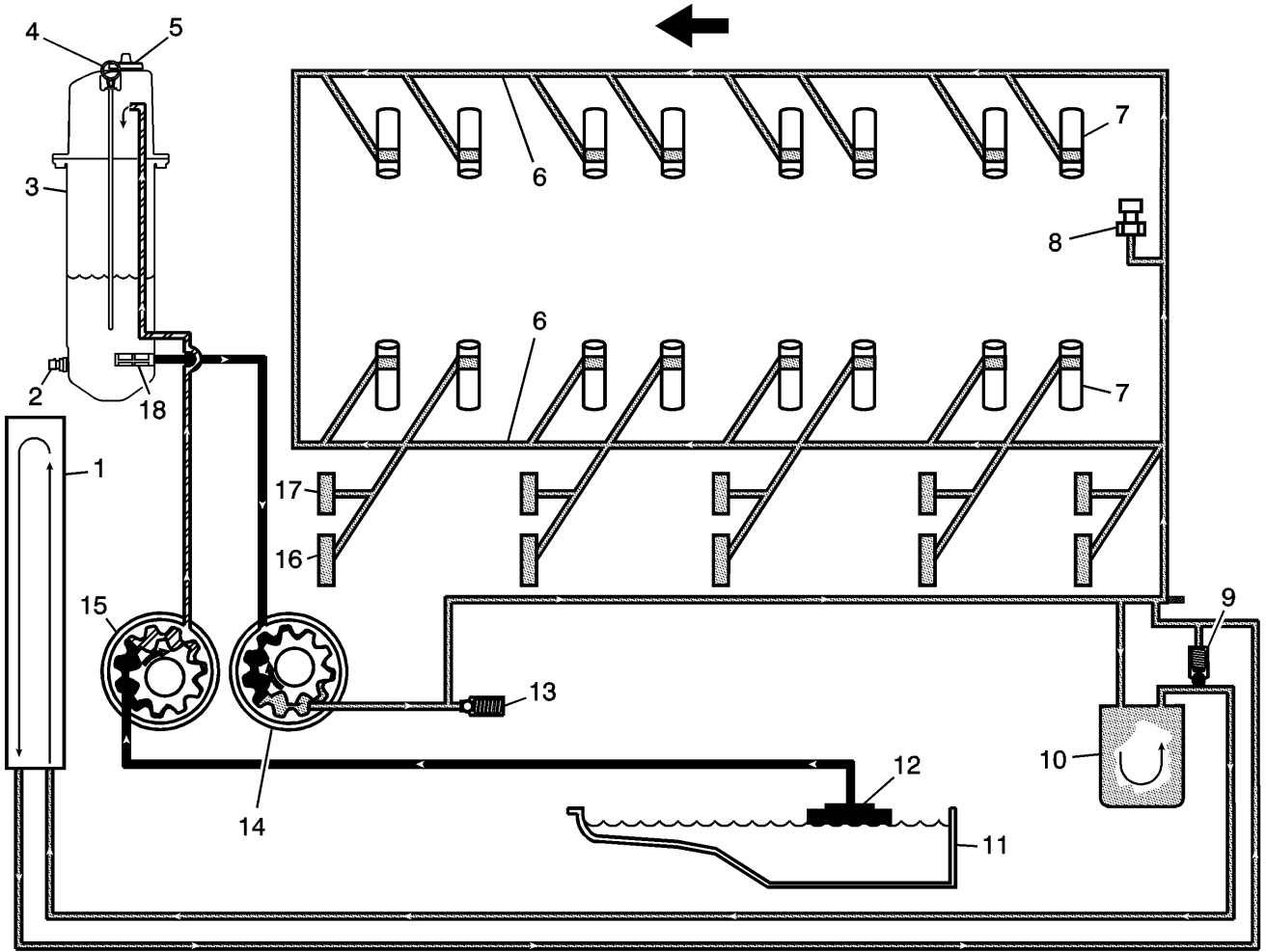
Description and Operation

1557893

Lubrication Description

Figure 1557890 **Engine Lubrication Flow**

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical



1552520

- 1. Engine Oil Cooler
- 2. Oil Temperature Sensor
- 3. Engine Oil Tank
- 4. Oil Level Indicator
- 5. Oil Fill Cap
- 6. Upper Main Oil Galleries
- 6. Upper Main Oil Galleries
- 7. Valve Lifters
- 7. Valve Lifters
- 8. Oil Pressure Sensor
- 9. Bypass Valve – Oil Cooler
- 10. Oil Filter
- 11. Oil Pan Sump
- 12. Oil Pump Screen
- 13. Pressure Relief Valve – Oil Pump
- 14. Oil Pump – Primary
- 15. Oil Pump – Secondary
- 16. Crankshaft Bearings
- 17. Camshaft Bearings

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

18. Oil Pump Screen – Oil Tank

Engine lubrication is supplied by a gerotor type oil pump assembly. The oil pump assembly consists of 2 pump housings, 2 separate gear sets, and 1 pressure relief valve. Refer to Oil Pump Assembly in *Disassembled Views*. The front or forward gear set is the secondary pump (15). The rear or rearward gear set is the primary pump (14). The pump assembly is mounted at the front of the engine and driven directly by the crankshaft sprocket. The primary pump (14) gears rotate and draw oil from the engine oil tank (3) through the oil pump screen (18). The oil is pressurized as it passes through the primary pump and is sent through the engine block lower oil gallery. Contained within the primary pump is a pressure relief valve (13) that maintains oil pressure within a specified range. Pressurized oil is directed through the engine block lower oil gallery to the full flow oil filter (10) where harmful contaminants are removed. A bypass valve is incorporated into the oil filter, which permits oil flow in the event the filter becomes restricted. Oil exits the oil filter and is then directed to the external oil cooler (1). A bypass valve (9) is incorporated into the oil cooler hose assembly in the event oil flow within the cooler is restricted. Oil returns from the oil cooler and is directed to the upper main oil galleries (6). Oil from the left upper oil gallery is directed to the crankshaft bearings (16) and camshaft bearings (17). Oil that has entered both the upper main oil galleries also pressurizes the valve lifter assemblies (7), and is then pumped through the pushrods to lubricate the valve rocker arms and valve stems. Oil returns to the oil pan (11), where the secondary pump (15) draws oil through a pump screen (12). The secondary pump (15) returns oil to the engine oil tank (3). Incorporated within the engine oil tank assembly are the oil level indicator (4), oil fill cap (5), oil temperature sensor (2), positive crankcase ventilation (PCV) fresh air port, and a serviceable oil pump screen (18). The engine oil pressure sensor (8) is located at the top rear of the engine assembly.

Description and Operation

1556322

Cleanliness and Care

- Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.
- When any internal engine parts are serviced, care and cleanliness is important.
- When components are removed for service, they should be marked, organized or retained in a specific order for assembly. Refer to *Separating Parts*.
- At the time of installation, components should be installed in the same location and with the same mating surface as when removed.
- An automobile engine is a combination of many machined, honed, polished and lapped surfaces, with tolerances that are measured in millimeters or thousandths of an inch. These surfaces should be covered or protected to avoid component damage.
- A liberal coating of clean engine oil should be applied to friction areas during assembly.
- Proper lubrication will protect and lubricate friction surfaces during initial operation.

Description and Operation

1407256

Separating Parts

Important:

- Many internal engine components will develop specific wear patterns on their friction surfaces.
- When disassembling the engine, internal components **MUST** be separated, marked, or organized in a way to ensure installation to their original location and position.

Separate, mark, or organize the following components:

- Piston and the piston pin
- Piston to the specific cylinder bore
- Piston rings to the piston
- Connecting rod location and orientation to the crankshaft journal
- Connecting rod to the bearing cap

A paint stick or etching/engraving type tool are recommended. Stamping the connecting rod or cap near the bearing bore may affect component geometry.

- Crankshaft main and connecting rod bearings
- Camshaft and valve lifters
- Valve lifters, lifter guides, pushrods and rocker arm assemblies

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

- Valve to the valve guide
- Valve spring to the cylinder head location
- Engine block main bearing cap location and direction
- Oil pump drive and driven gears

Description and Operation

1407257

Replacing Engine Gaskets

Tools Required

J 28410 Gasket Remover

Gasket Use and Applying Sealants

- Do not use any gasket again unless specified.
- Gaskets that can be used again will be identified in the service procedure.
- Do not apply sealant to any gasket or sealing surface unless called out in the service information.

Separating Components

- Use a rubber mallet to separate components.
- Bump the part sideways to loosen the components.
- Bumping should be done at bends or reinforced areas to prevent distortion of parts.

Cleaning Gasket Surfaces

- Remove all gasket and sealing material from the part using the *J 28410* or equivalent.
- Care must be used to avoid gouging or scraping the sealing surfaces.
- Do not use any other method or technique to remove sealant or gasket material from a part.
- Do not use abrasive pads, sand paper, or power tools to clean the gasket surfaces.
 - These methods of cleaning can cause damage to the component sealing surfaces.
 - Abrasive pads also produce a fine grit that the oil filter cannot remove from the oil.
 - This grit is abrasive and has been known to cause internal engine damage.

Assembling Components

Notice: Refer to *Sealant Notice* .

- When assembling components, use only the sealant specified or equivalent in the service procedure.
- Sealing surfaces should be clean and free of debris or oil.
- Specific components such as crankshaft oil seals or valve stem oil seals may require lubrication during assembly.
- Components requiring lubrication will be identified in the service procedure.
- When applying sealant to a component, apply the amount specified in the service procedure.
- Tighten bolts to specifications. Do not overtighten.

Description and Operation

1556326

Use of Room Temperature Vulcanizing (RTV) and Anaerobic Sealer

Room Temperature Vulcanizing (RTV) and Anaerobic Sealer, Use of:Engine Mechanical - 7.0L

Pipe Joint Compound

Important: Three types of sealer are commonly used in engines. These are room temperature vulcanizing (RTV) sealer, anaerobic gasket eliminator sealer, and pipe joint compound. The correct sealer, and amount, must be used in the

2006 Y Car GMX245 Corvette 7.0L (LS7) Engine Mechanical

proper location in order to prevent oil leaks. **DO NOT interchange the 3 types of sealers. Use only the specific sealer, or the equivalent, as recommended in the service procedure.**

- Pipe joint compound is a pliable sealer that does not completely harden. This type of sealer is used where two non-rigid parts, such as the oil pan and the engine block, are assembled together.
- Do not use pipe joint compound in areas where extreme temperatures are expected. These areas include: exhaust manifold, head gasket, or other surfaces where gasket eliminator is specified.
- Follow all safety recommendations and directions that are on the container.

In order to remove the sealant or the gasket material, refer to [Replacing Engine Gaskets](#) .

Notice: Refer to Sealant Notice .

- Apply the pipe joint compound to a clean surface. Use a bead size or the quantity specified in the procedure. Run the bead to the inside of any bolt holes.
- Apply a continuous bead of pipe joint compound to one sealing surface. Sealing surfaces to be resealed must be clean and dry.
- Tighten the bolts to specifications. Do not overtighten.

RTV Sealer

- RTV sealant hardens when exposed to air. This type of sealer is used where two non-rigid parts, such as the intake manifold and the engine block, are assembled together.
- Do not use RTV sealant in areas where extreme temperatures are expected. These areas include: exhaust manifold, head gasket, or other surfaces where a gasket eliminator is specified.
- Follow all safety recommendations and directions that are on the container.

In order to remove the sealant or the gasket material, refer to [Replacing Engine Gaskets](#) .

Notice: Refer to Sealant Notice .

- Apply RTV sealant to a clean surface. Use a bead size, as specified in the procedure. Run the bead to the inside of any bolt holes.
- Assemble components while the RTV sealant is still wet, within 3 minutes. Do not wait for the RTV sealant to skin over.
- Tighten bolts to specifications. Do not overtighten.

Anaerobic Sealer

- Anaerobic gasket eliminator hardens in the absence of air. This type of sealer is used where two rigid parts, such as castings, are assembled together. When two rigid parts are disassembled and no sealer or gasket is readily noticeable, the parts were probably assembled using a gasket eliminator.
- Follow all safety recommendations and directions that are on the container.

In order to remove the sealant or the gasket material, refer to [Replacing Engine Gaskets](#) .

- Apply a continuous bead of gasket eliminator to one flange. Surfaces to be sealed must be clean and dry.

Notice: Refer to Sealant Notice .

- Spread the sealer evenly with your finger, in order to get a uniform coating on the sealing surface.

Important: Anaerobic sealed joints that are partially torqued and allowed to cure more than five minutes may result in incorrect shimming and sealing of the joint.

- Tighten bolts to specifications. Do not overtighten.
- After properly tightening the fasteners, remove the excess sealer from the outside of the joint.

Description and Operation

1407260

Tools and Equipment

Tools and Equipment: Engine Mechanical - 4.8L, 5.3L, and 6.0L

Special tools are listed and illustrated throughout this section, with a complete listing at the end of the section. These tools, or their equivalents, are specially designed to quickly and safely accomplish the operations for which they are intended. The use of these special tools also minimize possible damage to engine components. Some precision measuring tools are required for inspection of certain critical components. Torque wrenches and a torque angle meter are necessary for the proper tightening of various fasteners.

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

To properly service the engine assembly, the following items should be readily available:

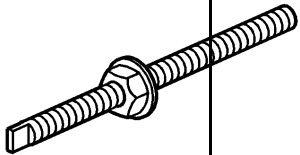
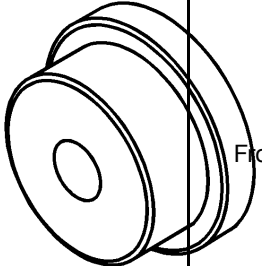
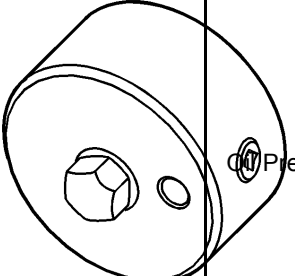
- Approved eye protection and safety gloves
- A clean, well lit, work area
- A suitable parts cleaning tank
- A compressed air supply
- Trays or storage containers to keep parts and fasteners organized
- An adequate set of hand tools
- Approved engine repair stand
- An approved engine lifting device that will adequately support the weight of the components

Special Tools and Equipment

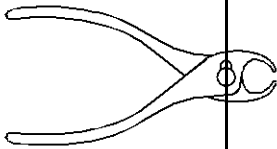
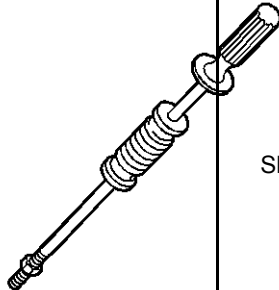
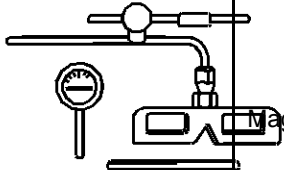
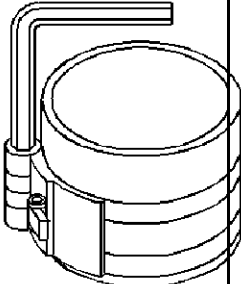
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Special Tools

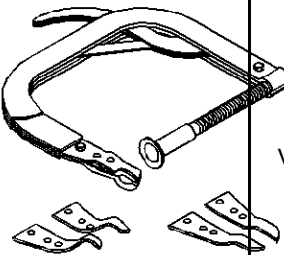
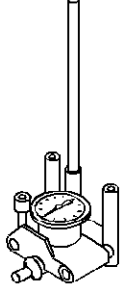
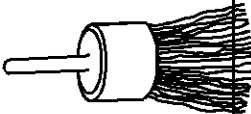
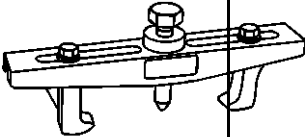
Special Tools:Engine Mechanical

Illustration	Tool Number/Description
 <p>1552657</p>	<p>EN 47812 Installer Bolt</p>
 <p>1552664</p>	<p>EN 47813 Front Cover Alignment</p>
 <p>1651441</p>	<p>EN 47971 Pressure Gage Adapter</p>

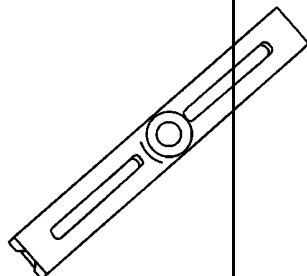
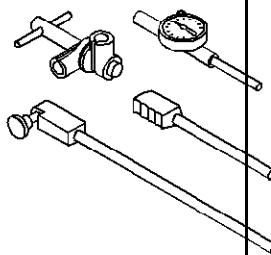
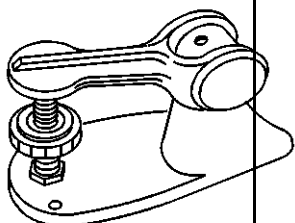
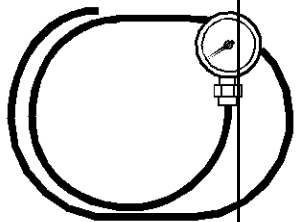
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 181 583">14487</p>	<p data-bbox="537 384 699 447">J 3049-A Valve Lifter Remover</p>
 <p data-bbox="105 905 198 932">177628</p>	<p data-bbox="464 743 711 806">J 6125-1B Slide Hammer Adapter</p>
 <p data-bbox="105 1274 181 1302">35463</p>	<p data-bbox="548 1100 737 1163">J 7872 Magnetic Base Dial Indicator</p>
 <p data-bbox="105 1646 170 1673">3403</p>	<p data-bbox="492 1472 683 1535">J 8037 Ring Compressor</p>

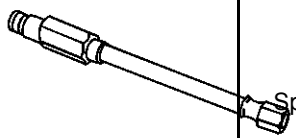
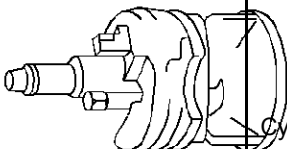
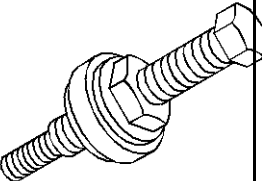
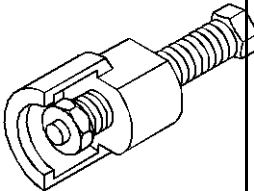
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 170 583">3414</p>	<p data-bbox="548 373 625 401">J8062</p> <p data-bbox="446 411 727 464">Valve Spring Compressor - Head Off</p>
 <p data-bbox="105 928 170 955">5110</p>	<p data-bbox="548 751 625 779">J8087</p> <p data-bbox="479 789 695 816">Cylinder Bore Gage</p>
 <p data-bbox="105 1297 170 1325">4994</p>	<p data-bbox="548 1125 625 1152">J8089</p> <p data-bbox="462 1163 711 1190">Carbon Removal Brush</p>
 <p data-bbox="105 1671 203 1698">216164</p>	<p data-bbox="548 1495 625 1522">J8433</p> <p data-bbox="505 1533 669 1560">Two Jaw Puller</p>


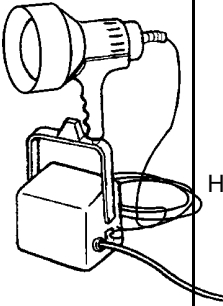
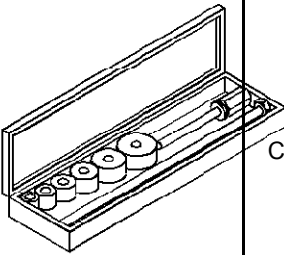

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 194 583">210221</p>	<p data-bbox="527 378 641 451">J8433-1 Puller Bar</p>
 <p data-bbox="105 924 170 951">3408</p>	<p data-bbox="454 745 714 819">J8520 Cam Lobe Lift Indicator</p>
 <p data-bbox="105 1291 170 1318">4997</p>	<p data-bbox="479 1123 690 1197">J9666 Valve Spring Tester</p>
 <p data-bbox="105 1669 186 1696">29339</p>	<p data-bbox="503 1491 673 1564">J21867 Pressure Gage</p>

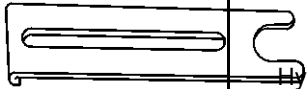
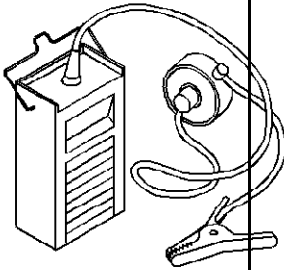
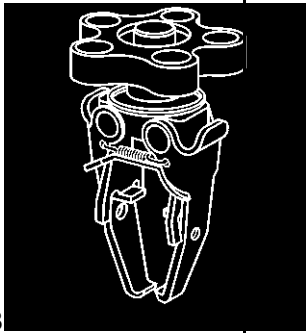
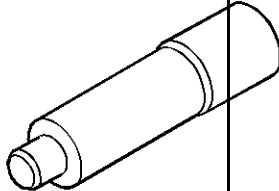
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p>26998</p>	<p>J 22794 Spark Plug Port Adapter</p>
 <p>3412</p>	<p>J 24270 Cylinder Bore Ridge Reamer</p>
 <p>676</p>	<p>J 25033-C Pulley Installer</p>
 <p>675</p>	<p>J 25034-C Pulley Remover</p>

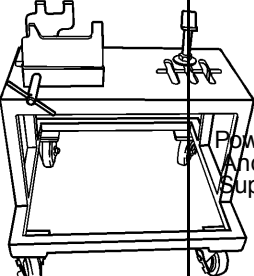
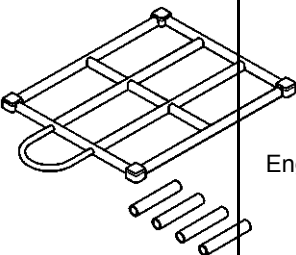
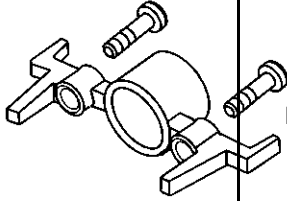
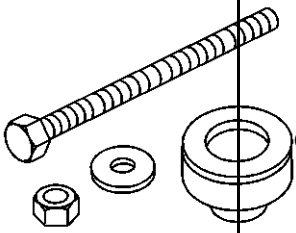
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 186 588">52126</p>	<p data-bbox="495 388 673 451">J 28410 Gasket Remover</p>
 <p data-bbox="105 928 186 959">62292</p>	<p data-bbox="438 756 738 819">J 28428-E High-Intensity Black Light Kit</p>
 <p data-bbox="105 1297 186 1329">5118</p>	<p data-bbox="446 1113 730 1207">J 33049 Camshaft Bearing Service Set</p>
 <p data-bbox="105 1667 186 1698">62295</p>	<p data-bbox="451 1480 722 1575">J 35667-A Cylinder Head Leakdown Tester</p>

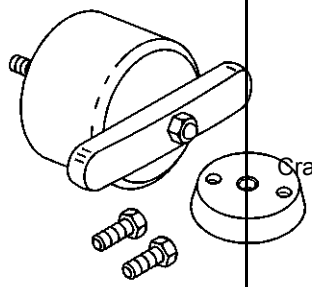
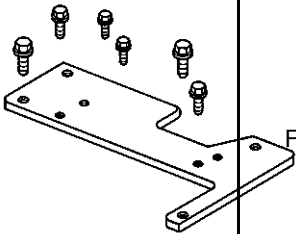
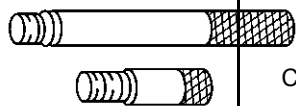
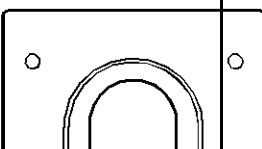
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p>105916</p>	<p>J 36221 Hydraulic Clutch Line Separator</p>
 <p>3413</p>	<p>J 36660-A Torque Angle Meter</p>
 <p>33658</p>	<p>J 38606 Drive Spring Compressor</p>
 <p>18093</p>	<p>J 38836 Bushing Installer and Clutch Arbor</p>

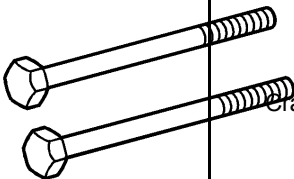
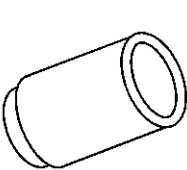
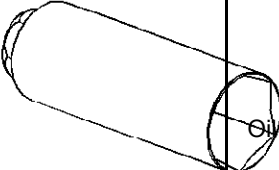
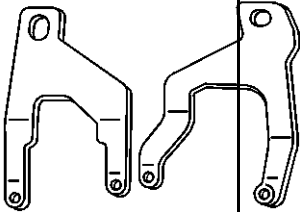
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 529 211 556">1241315</p>	<p data-bbox="544 346 625 373">J 39580</p> <p data-bbox="446 388 722 457">Power Pack Stand Engine And Transaxle Assembly Support Remove/Installer</p>
 <p data-bbox="105 903 186 930">74284</p>	<p data-bbox="511 730 649 758">J 39580-500</p> <p data-bbox="446 766 722 793">Engine Support Table Top</p>
 <p data-bbox="105 1270 186 1297">64207</p>	<p data-bbox="544 1092 625 1119">J 41476</p> <p data-bbox="462 1129 706 1178">Front and Rear Cover Alignment Tool</p>
 <p data-bbox="105 1642 186 1669">64248</p>	<p data-bbox="544 1463 625 1491">J 41478</p> <p data-bbox="479 1501 690 1549">Crankshaft Front Oil Seal Installer</p>

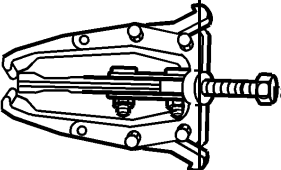
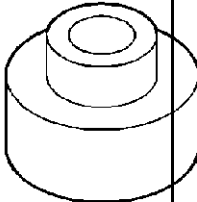
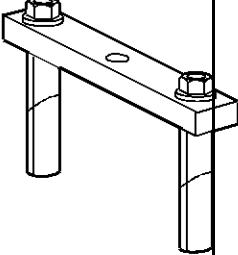
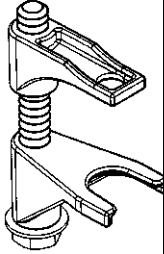
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 186 588">64249</p>	<p data-bbox="544 367 633 399">J41479</p> <p data-bbox="446 409 722 462">Crankshaft Rear Oil Seal Installer</p>
 <p data-bbox="105 924 186 955">64211</p>	<p data-bbox="544 745 633 777">J41480</p> <p data-bbox="462 787 714 840">Front and Rear Cover Alignment</p>
 <p data-bbox="105 1291 186 1323">64260</p>	<p data-bbox="544 1123 633 1155">J41556</p> <p data-bbox="462 1165 714 1197">Connecting Rod Guide</p>
 <p data-bbox="105 1669 186 1701">98060</p>	<p data-bbox="544 1480 633 1512">J41558</p> <p data-bbox="479 1522 706 1575">Crankshaft Sprocket Remover</p>

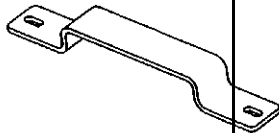
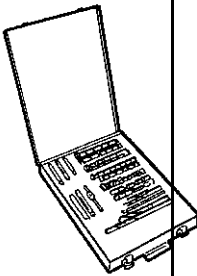
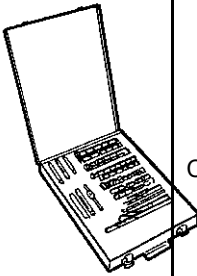
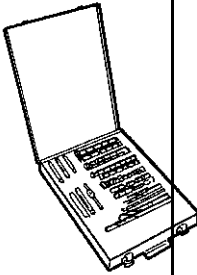
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 529 211 556">1552662</p>	<p data-bbox="527 361 698 445">J 41558-10 Crankshaft Sprocket Remover Bolts</p>
 <p data-bbox="105 898 181 926">64240</p>	<p data-bbox="544 718 722 802">J 41665 Crankshaft Balancer and Sprocket Installer</p>
 <p data-bbox="105 1270 181 1297">67136</p>	<p data-bbox="544 1096 730 1159">J 41712 Oil Pressure Switch Socket</p>
 <p data-bbox="105 1642 181 1669">74283</p>	<p data-bbox="544 1474 690 1537">J 41798 Engine Lift Bracket</p>


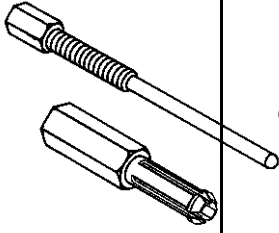
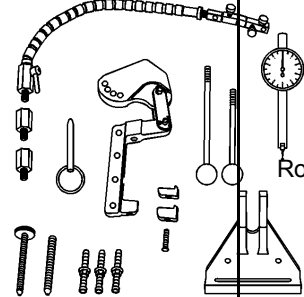
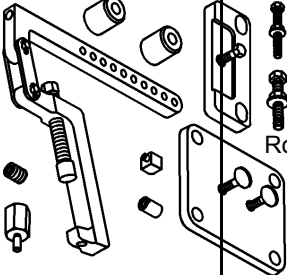
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p>1313753</p>	<p>J41816-A Crankshaft Balancer Remover</p>
 <p>142148</p>	<p>J41816-2 Crankshaft End Protector</p>
 <p>98072</p>	<p>J41818 Crankshaft Bearing Cap Remover</p>
 <p>65362</p>	<p>J42188 Ball Joint Separator</p>

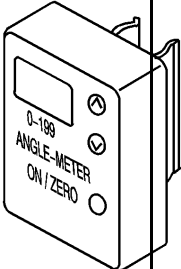
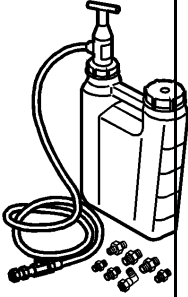
2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 178 583">82327</p>	<p data-bbox="544 373 625 401">J 42203</p> <p data-bbox="479 411 690 464">Driveline Assembly Support Strap</p>
 <p data-bbox="105 928 186 955">340279</p>	<p data-bbox="511 745 657 772">J 42385-100</p> <p data-bbox="462 783 706 835">Head/Main Bolt Thread Repair Kit</p>
 <p data-bbox="105 1299 186 1327">453049</p>	<p data-bbox="511 1123 657 1150">J 42385-200</p> <p data-bbox="430 1161 738 1188">Common Threads Repair Kit</p>
 <p data-bbox="105 1671 186 1698">453073</p>	<p data-bbox="511 1501 657 1528">J 42385-300</p> <p data-bbox="446 1539 722 1566">Fixtures and Hardware Kit</p>

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p data-bbox="105 556 186 583">99089</p>	<p data-bbox="527 384 641 411">J 42386-A</p> <p data-bbox="467 422 704 449">Flywheel Holding Tool</p>
 <p data-bbox="105 928 203 955">355040</p>	<p data-bbox="544 745 625 772">J 43276</p> <p data-bbox="472 783 696 831">Clutch Pilot Bearing Remover</p>
 <p data-bbox="105 1291 203 1318">650651</p>	<p data-bbox="544 1113 625 1140">J 43690</p> <p data-bbox="456 1150 712 1199">Rod Bearing Clearance Checking Tool</p>
 <p data-bbox="105 1638 203 1665">863073</p>	<p data-bbox="519 1470 649 1497">J 43690-100</p> <p data-bbox="462 1507 706 1556">Rod Bearing Checking Tool - Adapter Kit</p>

2006 Y Car GMX245 Corvette
7.0L (LS7) Engine Mechanical

Illustration	Tool Number/Description
 <p>1197696</p>	<p>J 45059 Angle Meter</p>
 <p>852797</p>	<p>J 45299 Engine Preluber</p>