

2013 ENGINE

Engine Mechanical - 2.0L (LTG) or 2.5L (LCV) - Specifications - Malibu

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS (LCV)

Fastener Tightening Specifications (LCV)

Application	Specification	
	Metric	English
Automatic Transmission Flexplate Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	40 Degrees ¹	
Balancer Chain Guide Bolt	10 N.m	89 lb in
Balancer Chain Tensioner Bolt	10 N.m	89 lb in
Balancer Shaft Driven Sprocket Bolt ¹		
• First Pass	40 N.m ¹	30 lb ft ¹
• Final Pass	50 Degrees ¹	
Balancer Shaft Housing Bolt	58 N.m	43 lb ft
Camshaft Bearing Cap Bolt	10 N.m	89 lb in
Camshaft Cover Bolt	10 N.m	89 lb in
Camshaft Cover Heat Shield Bolt	10 N.m	89 lb in
Camshaft Cover Opening Plug	35 N.m	26 lb ft
Camshaft Position Actuator Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	100 Degrees ¹	
Camshaft Position Actuator Solenoid Valve Bolt	10 N.m	89 lb in
Camshaft Position Sensor Bolt	10 N.m	89 lb in
Catalytic Converter Brace Bolt - Small	22 N.m	16 lb ft
Catalytic Converter Brace Bolt - Large	50 N.m	37 lb ft
Catalytic Converter Nut - Exhaust Manifold ¹	58 N.m	43 lb ft
Connecting Rod Bolt ¹		
• First Pass	25 N.m ¹	18 lb ft ¹
• Final Pass	110 Degrees ¹	
Crankshaft Position Sensor Reluctor Ring Bolt	15 N.m	11 lb ft
Crankshaft Balancer Bolt ¹		
• First Pass	150 N.m ¹	111 lb ft ¹

• Final Pass	180 Degrees ¹	
Crankshaft Position Sensor Bolt	10 N.m	89 lb in
Cylinder Head Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	190 Degrees ¹	
Cylinder Head Core Hole Plug	50 N.m	37 lb ft
Cylinder Head Oil Gallery Plug	40 N.m	30 lb ft
Drive Belt Tensioner Bolt	58 N.m	43 lb ft
Engine Block Oil Gallery Plug - Large, Left Side and Rear Engine Block	65 N.m	48 lb ft
Engine Block Oil Gallery Plug - Large, Left Side Lower Crankcase	65 N.m	48 lb ft
Engine Block Oil Gallery Plug - Small, Rear Engine Block	40 N.m	30 lb ft
Engine Coolant Air Bleed Pipe Bolt	10 N.m	89 lb in
Engine Coolant Heater Hole Plug	60 N.m	44 lb ft
Engine Coolant Thermostat Housing Bolt	10 N.m	89 lb in
Engine Front Cover Bolt - M6	10 N.m	89 lb in
Engine Front Cover Bolt - M10	58 N.m	43 lb ft
Engine Front Cover Bolt - M8	25 N.m	18 lb ft
Engine Lift Bracket Bolt - Front	25 N.m	18 lb ft
Engine Lift Bracket Bolt - Rear	25 N.m	18 lb ft
Engine Oil Cooler Bolt	10 N.m	89 lb in
Engine Oil Cooler Connector	50 N.m	37 lb ft
Engine Oil Level Indicator Switch Bolt	10 N.m	89 lb in
Engine Oil Pressure Sensor	27 N.m	20 lb ft
Exhaust Manifold Bolt ¹	20 N.m ¹	21 lb ft ¹
Exhaust Manifold Heat Shield Bolt	14 N.m	124 lb in
Exhaust Manifold Stud	20 N.m	21 lb ft
Flywheel Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	80 Degrees ¹	
Fuel Feed Intermediate Pipe Nut		
• First Pass - Fuel Feed Intermediate Pipe Nut to Fuel Rail	15 N.m	11 lb ft
• Second Pass - Fuel Feed Intermediate Pipe Nut to Fuel Pump	15 N.m	11 lb ft
• Third Pass - Fuel Feed Intermediate Pipe Nut to Fuel Rail	30 N.m	22 lb ft

• Final Pass - Fuel Feed Intermediate Pipe Nut to Fuel Pump	30 N.m	22 lb ft
Fuel Feed Pipe	30 N.m	22 lb ft
Fuel Feed Pipe Clip Stud	10 N.m	89 lb in
Fuel Injection Fuel Rail Bolt	25 N.m	18 lb ft
Fuel Injection Fuel Rail Fuel Pressure Sensor	33 N.m	24 lb ft
Fuel Pump Bolt	15 N.m	11 lb ft
Fuel Pump Shield Bolt	10 N.m	89 lb in
Ignition Coil Bolt	10 N.m	89 lb in
Intake Manifold Bolt	12 N.m	106 lb in
Intake Manifold Cover Bolt	9 N.m	80 lb in
Knock Sensor Bolt	25 N.m	18 lb ft
Lower Crankcase Bolt - Crankshaft Bearing ¹		
• First Pass	20 N.m ¹	15 lb ft ¹
• Final Pass	140 Degrees ¹	
Lower Crankcase Bolt - Perimeter ¹	25 N.m ¹	18 lb ft ¹
Manifold Absolute Pressure (MAP) Sensor Bolt	5 N.m	44 lb in
Oil Pan Baffle Bolt	10 N.m	89 lb in
Oil Pan Bolt, Long	10 N.m	89 lb in
Oil Pan Bolt, Perimeter	25 N.m	18 lb ft
Oil Pan Bolt, Lower	10 N.m	89 lb in
Oil Pan Drain Plug	25 N.m	18 lb ft
Oil Pump Suction Pipe Bolt	10 N.m	89 lb in
Oil Pump Flow Control Valve Bolt	10 N.m	89 lb in
Oil Filter Fitting	50 N.m	37 lb ft
Oil Filter	30 N.m	22 lb ft
Oxygen Sensor	42 N.m	31 lb ft
PCV Valve Bolt	10 N.m	89 lb in
Piston Oil Nozzle Bolt	10 N.m	89 lb in
Secondary Air Injection Check Valve Bolt	25 N.m	18 lb ft
Spark Plug	20 N.m	15 lb ft
Thermal Bypass Pipe Bolt	10 N.m	89 lb in
Throttle Body Bolt	10 N.m	89 lb in
Timing Chain Cover Bolt - Engine Front Cover	5 N.m	44 lb in
Timing Chain Guide Bolt	25 N.m	18 lb ft
Timing Chain Tensioner Pivot Arm Bolt	25 N.m	18 lb ft
Timing Chain Tensioner Shoe Bolt	25 N.m	18 lb ft
Vacuum Pump Bolt	10 N.m	89 lb in
Water Outlet Bolt	12 N.m	106 lb in
Water Pump Bolt	25 N.m	18 lb ft

Water Pump Housing Bolt	10 N.m	89 lb in
¹ Use NEW fastener.		

FASTENER TIGHTENING SPECIFICATIONS (LTG)

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	Metric	English
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Balancer Chain Tensioner Bolt	10 N.m	89 lb in
Balancer Shaft Driven Sprocket Bolt ¹		
• First Pass	40 N.m ¹	30 lb ft ¹
• Final Pass	50 Degrees ¹	
Balancer Shaft Housing Bolt	58 N.m	43 lb ft
Camshaft Bearing Cap Bolt	10 N.m	89 lb in
Camshaft Cover Bolt	10 N.m	89 lb in
Camshaft Cover Heat Shield Bolt	10 N.m	89 lb in
Camshaft Cover Opening Plug	35 N.m	26 lb ft
Camshaft Position Actuator Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	100 Degrees ¹	
Camshaft Position Actuator Solenoid Valve Bolt	10 N.m	89 lb in
Camshaft Position Sensor Bolt	10 N.m	89 lb in
Catalytic Converter Brace Bolt	22 N.m	16 lb ft
Catalytic Converter Brace Bracket Bolt	22 N.m	16 lb ft
Catalytic Converter Nut - Exhaust Manifold ¹	50 N.m ¹	37 lb ft ¹
Connecting Rod Bolt ¹		
• First Pass	25 N.m ¹	18 lb ft ¹
• Final Pass	110 Degrees ¹	
Crankshaft Position Sensor Reluctor Ring Bolt	15 N.m	11 lb ft
Crankshaft Balancer Bolt ¹		
• First Pass	150 N.m ¹	111 lb ft ¹
• Final Pass	180 Degrees ¹	
Crankshaft Position Sensor Bolt	10 N.m	89 lb in
Cylinder Head Bolt ¹		

• First Pass	30 N.m ¹	22 lb ft ¹
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Cylinder Head Core Hole Plug	50 N.m	37 lb ft
Cylinder Head Oil Gallery Plug	40 N.m	30 lb ft
Drive Belt Tensioner Bolt	58 N.m	43 lb ft
Engine Block Oil Gallery Plug - Large, Left Side and Rear Engine Block	65 N.m	48 lb ft
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Engine Block Oil Gallery Plug - Small, Rear Engine Block	40 N.m	30 lb ft
Engine Coolant Air Bleed Pipe Bolt	10 N.m	89 lb in
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Engine Front Cover Bolt - M8	25 N.m	18 lb ft
Engine Lift Bracket Bolt - Front	25 N.m	18 lb ft
Engine Lift Bracket Bolt - Rear	25 N.m	18 lb ft
Engine Oil Cooler Bolt	10 N.m	89 lb in
Engine Oil Cooler Connector	50 N.m	37 lb ft
Engine Oil Level Indicator Switch Bolt	10 N.m	89 lb in
Engine Oil Pressure Sensor	27 N.m	20 lb ft
Exhaust Manifold Bolt ¹	20 N.m ¹	21 lb ft ¹
Exhaust Manifold Brace Bolt	25 N.m	18 lb ft
Exhaust Manifold Brace Nut ¹	25 N.m ¹	18 lb ft ¹
Exhaust Manifold Heat Shield Bolt	14 N.m	124 lb in
Exhaust Manifold Stud	20 N.m	21 lb ft
Flywheel Bolt ¹		
• First Pass	30 N.m ¹	22 lb ft ¹
• Final Pass	80 Degrees ¹	
Fuel Feed Intermediate Pipe Nut		
• First Pass - Fuel Feed Intermediate Pipe Nut to Fuel Rail	15 N.m	11 lb ft
• Second Pass - Fuel Feed Intermediate Pipe Nut to Fuel Pump	15 N.m	11 lb ft
• Third Pass - Fuel Feed Intermediate Pipe Nut to Fuel Rail	30 N.m	22 lb ft
• Final Pass - Fuel Feed Intermediate Pipe Nut to Fuel Pump	30 N.m	22 lb ft

Fuel Feed Pipe	30 N.m	22 lb ft
Fuel Feed Pipe Clip Stud	10 N.m	89 lb in
Fuel Injection Fuel Rail Bolt	25 N.m	18 lb ft
Fuel Injection Fuel Rail Fuel Pressure Sensor	33 N.m	24 lb ft
Fuel Pump Bolt	15 N.m	11 lb ft
Fuel Pump Shield Bolt	10 N.m	89 lb in
Ignition Coil Bolt	10 N.m	89 lb in
Intake Manifold Bolt	12 N.m	106 lb in
Intake Manifold Cover Bolt	9 N.m	80 lb in
Knock Sensor Bolt	25 N.m	18 lb ft
Lower Crankcase Bolt - Crankshaft Bearing ¹		
• First Pass	20 N.m ¹	15 lb ft ¹
• Final Pass	140 Degrees ¹	
Lower Crankcase Bolt - Perimeter ¹	25 N.m ¹	18 lb ft ¹
Manifold Absolute Pressure (MAP) Sensor Bolt	5 N.m	44 lb in
Oil Pan Baffle Bolt	10 N.m	89 lb in
Oil Pan Bolt, Long	10 N.m	89 lb in
Oil Pan Bolt, Perimeter	25 N.m	18 lb ft
Oil Pan Bolt, Lower	10 N.m	89 lb in
Oil Pan Drain Plug	25 N.m	18 lb ft
Oil Pump Suction Pipe Bolt	10 N.m	89 lb in
Oil Pump Flow Control Valve Bolt	10 N.m	89 lb in
Oil Filter	30 N.m	22 lb ft
Oxygen Sensor	42 N.m	31 lb ft
PCV Valve Bolt	10 N.m	89 lb in
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Throttle Body Bolt	10 N.m	89 lb in
Timing Chain Cover Bolt - Engine Front Cover	5 N.m	44 lb in
Timing Chain Guide Bolt	25 N.m	18 lb ft
Timing Chain Tensioner Pivot Arm Bolt	25 N.m	18 lb ft
Timing Chain Tensioner Shoe Bolt	25 N.m	18 lb ft
Turbocharger Coolant Feed and Return Pipe Bolt	35 N.m	26 lb ft
Turbocharger Coolant Feed Pipe Bolt	10 N.m	89 lb in
Turbocharger Coolant Return Pipe to Camshaft Cover Heat Shield Bolt	14 N.m	124 lb in
Turbocharger Exhaust Pipe Stud	25 N.m	18 lb ft
Turbocharger Nut ¹		
• First Pass	30 N.m ¹	22 lb ft ¹

• Final Pass	90 Degrees ¹	
Turbocharger Oil Feed Pipe Bolt	35 N.m	26 lb ft
Turbocharger Oil Feed and Return Pipe Bolt	10 N.m	89 lb in
Vacuum Pump Bolt	10 N.m	89 lb in
Water Outlet Bolt	10 N.m	89 lb in
Water Pump Bolt	25 N.m	18 lb ft
Water Pump Housing Bolt	10 N.m	89 lb in
¹ Use NEW fastener.		

ENGINE MECHANICAL SPECIFICATIONS (LCV)

Engine Mechanical Specifications (LCV)

Application	Specification	
	Metric	English
General Data		
• Engine Type	Inline 4 Cylinder	
• Displacement	2.5 L	152 CID
• RPO	LCV	
• Liter (VIN)	-	
• Bore	87.992-88.008 mm	3.4642-3.4649 in
• Stroke	101 mm	3.976 in
• Compression Ratio	11.20	
• Spark Plug Gap	0.95-1.10 mm	0.037-0.043 in
Block		
• Crankshaft Main Bearing Bore Diameter	60.862-60.876 mm	2.3961-2.3967 in
• Cylinder Bore Diameter	87.992-88.008 mm	3.4642-3.4649 in
• Cylinder Bore Out-of-Round - Maximum	0.013 mm	0.0005 in
• Cylinder Head Deck Surface Flatness - over 25 mm length	0.025 mm	0.001 in
• Cylinder Head Deck Surface Flatness - over 150 mm length	0.050 mm	0.002 in
Engine Block to Bedplate Flatness - overall	0.1 mm	0.0039 in
Engine Block to Bedplate Flatness - straightness	0.050 mm in 100 mm	0.002 in in 3.937 in
Piston Deck Height - Below Deck	1.105-1.675 mm	0.0435-0.0659 in
Camshaft		
• Camshaft End Play	0.040-0.307 mm	0.0016-0.0121 in
• Camshaft Journal Diameter - Journal 1	34.935-34.960 mm	1.3754-1.3764 in
	26.935-26.960 mm	1.0604-1.0614 in

• Camshaft Journal Diameter - Journal 2 thru 5		
• Camshaft Thrust Width - Camshaft with Phaser installed	30.025-30.175 mm	1.1821-1.1880 in
• Camshaft Thrust Width - Cylinder Head	29.868-29.890 mm	1.1759-1.1768 in
Connecting Rod		
• Connecting Rod Bearing to Crankpin Clearance	0.030-0.065 mm	0.0012-0.0026 in
• Connecting Rod Bore Diameter - Bearing End	52.118-52.134 mm	2.0519-2.05252 in
• Connecting Rod Bore Diameter - Pin End	20.007-20.017 mm	0.7877-0.7881 in
• Connecting Rod Side Clearance	0.070-0.370 mm	0.0028-0.0146 in
• Connecting Rod Straightness - Bend - Maximum	0.017 mm	0.0007 in
• Connecting Rod Straightness - Twist - Maximum	0.040 mm	0.0016 in
Crankshaft		
• Connecting Rod Pin Diameter	48.999-49.015 mm	1.9291-1.9297 in
• Crankshaft End Play	0.040-0.270 mm	0.0016-0.0106 in
• Crankshaft Main Bearing Clearance	0.020-0.048 mm	0.0008-0.0019 in
• Crankshaft Main Journal Diameter	55.993-56.009 mm	2.2044-2.2051 in
Cylinder Head		
• Surface Flatness - Block Deck - in 25 mm	0.025 mm	0.0001 in
• Surface Flatness - Block Deck - in 150 mm	0.050 mm	0.0019 in
• Surface Flatness - Block Deck - between bolts	0.030 mm	0.0012 in
• Surface Flatness - Block Deck - Overall	0.100 mm	0.0039 in
• Valve Guide Bore - Exhaust	6.000-6.020 mm	0.2362-0.2370 in
• Valve Guide Bore - Intake	6.000-6.020 mm	0.2362-0.2370 in
• Valve Lifter Bore Diameter - Stationary Lash Adjusters	12.008-12.030 mm	0.4728-0.4736 in
• Valve Seat Angle - Relief Surface	30 Degrees	
• Valve Seat Angle - Seating Surface	45 Degrees	
• Valve Seat Angle - Undercut Surface	60 Degrees	
• Valve Seat Runout - Maximum	0.080 mm	0.0031 in
Lubrication System		
• Oil Pressure - @700 RPM 100°C	154-220 kPa	22-32 psi
• Oil Capacity	4.7L	5.0 quarts
Piston Rings		
• Piston Ring End Gap - Top	0.15-0.30 mm	0.006-0.012 in
• Piston Ring End Gap - Second	0.20-0.45 mm	0.008-0.018 in

• Piston Ring End Gap - Oil Control	0.15-0.65 mm	0.006-0.026 in
• Piston Ring to Groove Clearance - Top	0.04-0.08 mm	0.0015-0.0031 in
• Piston Ring to Groove Clearance - Second	0.030-0.070 mm	0.0012-0.0030 in
• Piston Ring to Groove Clearance - Oil Control	0.058-0.207 mm	0.0023-0.0081 in
• Piston Ring Thickness - Top	1.170-1.190 mm	0.0461-0.0469 in
• Piston Ring Thickness - Second	1.470-1.490 mm	0.0579-0.0587 in
• Piston Ring Thickness - Oil Control - Maximum	0.490 mm	0.0193 in
• Piston Ring Thickness - Oil Control - Spacer	0.929-1.006 mm	0.0366-0.0396 in
Pistons and Pins		
• Pin - Piston Pin Clearance to Connecting Rod Bore	0.007-0.020 mm	0.0003-0.0008 in
• Pin - Piston Pin Clearance to Piston Pin Bore	0.002-0.010 mm	0.0001-0.0004 in
• Pin - Piston Pin Diameter	21.997-22.000 mm	0.8660-0.8661 in
• Pin - Piston Pin End Play	0.413-1.269 mm	0.0163-0.0500 in
• Piston - Piston Diameter - @14.8 mm up	87.968-87.982 mm	3.4633-3.4638 in
• Piston - Piston Pin Bore Diameter	22.002-22.007 mm	0.8662-0.8664 in
• Piston - Piston Ring Groove Width - Top	1.23-1.25 mm	0.0484-0.0492 in
• Piston - Piston Ring Groove Width - Second	1.52-1.54 mm	0.0598-0.0606 in
• Piston - Piston Ring Groove Width - Oil Control	2.01-2.03 mm	0.0791-0.0799 in
• Piston - Piston to Bore Clearance - w/polymer	-0.022-+0.024 mm	-0.0009-+0.0009 in
Valve System		
• Valves - Valve Face Angle	45 Degrees	
• Valves - Valve Face Runout - Maximum	0.040 mm	0.0016 in
• Valves - Valve Seat Runout - Maximum	0.080 mm	0.0031 in
• Valves - Valve Seat Gauge Ball Height - Exhaust	10.885-11.115 mm	0.4285-0.4376 in
• Valves - Valve Seat Gauge Ball Height - Intake	9.086-9.314 mm	0.3577-0.3667 in
• Valves - Valve Stem Diameter - Exhaust	5.945-5.965	0.2341-0.2348 in
• Valves - Valve Stem Diameter - Intake	5.955-5.975 mm	0.2344-0.2352 in
• Valves - Valve Stem Installed Height	Check and Record	
• Valves - Valve Stem to Guide Clearance - Exhaust	0.035-0.075 mm	0.0013-0.0030 in
• Valves - Valve Stem to Guide Clearance - Intake	0.025-0.065 mm	0.0010-0.0026 in
• Valve Lash Adjusters - Valve Lash Adjuster Diameter - Stationary Lash Adjuster	11.986-12.000 mm	0.0005-0.0020 in
• Valve Lash Adjusters - Valve Lash-Adjuster-to-Bore Clearance - Stationary Lash Adjuster	0.013-0.051 mm	3.2210-3.2299 in

• Valve Springs - Valve Spring Installed Height	35.0 mm	1.3779 in
• Valve Springs - Valve Spring Load - Closed - @35 mm	247-273 N	56-61 lb
• Valve Springs - Valve Spring Load - Open - @24 mm	598-662 N	134-149 lb

ENGINE MECHANICAL SPECIFICATIONS (LTG)

Engine Mechanical Specifications (LTG)

Application	Specification	
	Metric	English
General Data		
• Engine Type	Inline 4 Cylinder	
• Displacement	2.0 L	122 CID
• RPO	LTG	
• Liter (VIN)	-	
• Bore	85.992-86.008 mm	3.3855-3.3861 in
• Stroke	86 mm	3.386 in
• Compression Ratio	9.50	
• Spark Plug Gap	0.95-1.10 mm	0.037-0.043 in
Block		
• Crankshaft Main Bearing Bore Diameter	60.862-60.876 mm	2.3961-2.3967 in
• Cylinder Bore Diameter	85.992-86.008 mm	3.3855-3.3861 in
• Cylinder Bore Out-of-Round - Maximum	0.013 mm	0.0005 in
• Cylinder Head Deck Surface Flatness - over 25 mm length	0.025 mm	0.001 in
• Cylinder Head Deck Surface Flatness - over 150 mm length	0.050 mm	0.002 in
Engine Block to Bedplate Flatness - overall	0.1 mm	0.0039 in
Engine Block to Bedplate Flatness - straightness	0.050 mm in 100 mm	0.002 in in 3.937 in
Piston Deck Height - Below Deck	1.155-1.725 mm	0.0455-0.0679 in
Camshaft		
• Camshaft End Play	0.040-0.307 mm	0.0016-0.0121 in
• Camshaft Journal Diameter - Journal 1	34.935-34.960 mm	1.3754-1.3764 in
• Camshaft Journal Diameter - Journal 2 thru 5	26.935-26.960 mm	1.0604-1.0614 in
• Camshaft Thrust Width - Camshaft with Phaser installed	30.025-30.175 mm	1.1821-1.1880 in

• Camshaft Thrust Width - Cylinder Head	29.868-29.890 mm	1.1759-1.1768 in
Connecting Rod		
• Connecting Rod Bearing to Crankpin Clearance	0.030-0.073 mm	0.0012-0.0029 in
• Connecting Rod Bore Diameter - Bearing End	52.118-52.134 mm	2.0519-2.05252 in
• Connecting Rod Bore Diameter - Pin End	24.007-24.017 mm	0.9452-0.9455 in
• Connecting Rod Side Clearance	0.070-0.370 mm	0.0028-0.0146 in
• Connecting Rod Straightness - Bend - Maximum	0.017 mm	0.0007 in
• Connecting Rod Straightness - Twist - Maximum	0.040 mm	0.0016 in
Crankshaft		
• Connecting Rod Pin Diameter	48.999-49.015 mm	1.9291-1.9297 in
• Crankshaft End Play	0.040-0.270 mm	0.0016-0.0106 in
• Crankshaft Main Bearing Clearance	0.020-0.048 mm	0.0008-0.0019 in
• Crankshaft Main Journal Diameter	55.993-56.009 mm	2.2044-2.2051 in
Cylinder Head		
• Surface Flatness - Block Deck - in 25 mm	0.025 mm	0.0001 in
• Surface Flatness - Block Deck - in 150 mm	0.050 mm	0.0019 in
• Surface Flatness - Block Deck - between bolts	0.030 mm	0.0012 in
• Surface Flatness - Block Deck - Overall	0.100 mm	0.0039 in
• Valve Guide Bore - Exhaust	6.000-6.020 mm	0.2362-0.2370 in
• Valve Guide Bore - Intake	6.000-6.020 mm	0.2362-0.2370 in
• Valve Lifter Bore Diameter - Stationary Lash Adjusters	12.008-12.030 mm	0.4728-0.4736 in
• Valve Seat Angle - Relief Surface	30 Degrees	
• Valve Seat Angle - Seating Surface	45 Degrees	
• Valve Seat Angle - Undercut Surface	60 Degrees	
• Valve Seat Runout - Maximum	0.080 mm	0.0031 in
Lubrication System		
• Oil Pressure - @700 RPM 100°C	140-200 kPa	20-29 psi
• Oil Capacity - 2WD	4.7L	5.0 quarts
• Oil Capacity - 4WD/AWD	5.7L	6.0 quarts
Piston Rings		
• Piston Ring End Gap - Top	0.20-0.35 mm	0.008-0.014 in
• Piston Ring End Gap - Second	0.35-0.55 mm	0.014-0.022 in
• Piston Ring End Gap - Oil Control	0.25-0.75 mm	0.010-0.030 in

• Piston Ring to Groove Clearance - Top	0.04-0.08 mm	0.0015-0.0031 in
• Piston Ring to Groove Clearance - Second	0.030-0.070 mm	0.0012-0.0030 in
• Piston Ring to Groove Clearance - Oil Control	0.024-0.176 mm	0.0009-0.0069 in
• Piston Ring Thickness - Top	1.170-1.190 mm	0.0461-0.0469 in
• Piston Ring Thickness - Second	1.470-1.490 mm	0.0579-0.0587 in
• Piston Ring Thickness - Oil Control - Rail	0.447-0.473 mm	0.0176-0.0186 in
• Piston Ring Thickness - Oil Control - Spacer	0.960-1.040 mm	0.0378-0.0409 in
Pistons and Pins		
• Pin - Piston Pin Clearance to Connecting Rod Bore	0.007-0.020 mm	0.0003-0.0008 in
• Pin - Piston Pin Clearance to Piston Pin Bore	0.005-0.013 mm	0.0002-0.0005 in
• Pin - Piston Pin Diameter	23.997-24.000 mm	0.9448-0.9449 in
• Pin - Piston Pin End Play	0.263-1.164 mm	0.0104-0.0458 in
• Piston - Piston Diameter - @14.8 mm up	85.968-85.982 mm	3.3846-3.3851 in
• Piston - Piston Pin Bore Diameter	24.005-24.010 mm	0.9451-0.9453 in
• Piston - Piston Ring Groove Width - Top	1.23-1.25 mm	0.0484-0.0492 in
• Piston - Piston Ring Groove Width - Second	1.52-1.54 mm	0.0598-0.0606 in
• Piston - Piston Ring Groove Width - Oil Control	2.01-2.03 mm	0.0791-0.0799 in
• Piston - Piston to Bore Clearance - w/polymer	-0.022 to +0.024 mm	-0.0009 to +0.0009 in
Valve System		
• Valves - Valve Face Angle	45 Degrees	
• Valves - Valve Face Runout - Maximum	0.040 mm	0.0016 in
• Valves - Valve Seat Runout - Maximum	0.080 mm	0.0031 in
• Valves - Valve Seat Gauge Ball Height - Exhaust	12.746-12.976 mm	0.4912-0.5038 in
• Valves - Valve Seat Gauge Ball Height - Intake	12.425-12.653 mm	0.4892-0.4981 in
• Valves - Valve Stem Diameter - Exhaust	5.945-5.965 mm	0.2341-0.2348 in
• Valves - Valve Stem Diameter - Intake	5.955-5.975 mm	0.2344-0.2352 in
• Valves - Valve Stem Installed Height	Check and Record	
• Valves - Valve Stem to Guide Clearance - Exhaust	0.038-0.082 mm	0.0015-0.0032 in
• Valves - Valve Stem to Guide Clearance - Intake	0.030-0.057 mm	0.0012-0.0022 in
• Valve Lash Adjusters - Valve Lash Adjuster Diameter - Stationary Lash Adjuster	11.986-12.000 mm	0.0005-0.0020 in
• Valve Lash Adjusters - Valve Lash-Adjuster-to-Bore Clearance - Stationary Lash Adjuster	0.013-0.051 mm	3.2210-3.2299 in
• Valve Springs - Valve Spring Installed Height	35.0 mm	1.3779 in

• Valve Springs - Valve Spring Load - Closed - @35 mm	247-273 N	56-61 lb
• Valve Springs - Valve Spring Load - Open - @24 mm	598-662 N	134-149 lb

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS (LCV)

Adhesives, Fluids, Lubricants, and Sealers (LCV)

Application	Type of Material	GM Part Number	
		United States	Canada
Balance Shaft Bearings	5W-20*	19259486	88863951
Cam Lobes	5W-20*	19259486	88863951
Camshaft Cover	Sealant	12378521	88901148
Crank Sensor O-ring	5W-20*	19259486	88863951
Cylinder Bores	5W-20*	19259486	88863951
Cylinder Head Plugs	Threadlocker	12345382	10953489
Engine Block Threaded Plugs	Sealant	12346004	10953480
Engine Block to Bedplate	Sealant	12378521	88901148
Engine Front Cover	Sealant	12378521	88901148
Engine Oil	5W-20*	19259486	88863951
Engine Oil - Alternate	0W-20	19259487	19259784
Fuel Injector O-rings	5W-20*	19259486	88863951
Fuel Injector Tip Insulators, for Multiple Port Injection Only	5W-20*	19259486	88863951
Hydraulic Lash Adjusters	5W-20*	19259486	88863951
Ignition Coils	Lubricant	19260901	19260902
Intake and Exhaust Valve Stems	5W-20*	19259486	88863951
Lower Oil Pan	Sealant	12378521	88901148
Main Bearings	5W-20*	19259486	88863951
Oil Filter - Threads and O-ring Lead-in Chamfers	5W-20*	19259486	88863951
Oil Level Indicator Tube O-ring	Lubricant	88862586	88862827
Oil Pan to Bedplate Joint	Sealant	12378521	88901148
Oil Pump- Pump Elements	5W-20*	19259486	88863951
Oxygen Sensor Threads	Anti-seize	88862477	88862478
Piston Pin to Piston/Rod- Pin Bores of Piston and Rod	5W-20*	19259486	88863951
Rod Bearings- Rod Pins of Crankshaft	5W-20*	19259486	88863951
Thread Repair Cutting Oil	Lubricant	1052864	992881
Thread Repair	Cleaner	88862650	88901247
Timing Chain Tensioner Cover	Sealant	12378521	88901148

Valves	Parts Immersion Solvent	12345368	10953514
Valve Rocker Arm/Valve Tip	5W-20*	19259486	88863951
Water Feed Tube O-rings	Lubricant	19260901	19260902
*0W-20 is an approved alternate engine oil for 5W-20, see Engine Oil - Alternate			

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS (LTG)

Adhesives, Fluids, Lubricants, and Sealers (LTG)

Application	Type of Material	GM Part Number	
		United States	Canada
Balance Shaft Bearings	5W-30	19293000	19286321
Cam Lobes	5W-30	19293000	19286321
Camshaft Cover	Sealant	12378521	88901148
Crank Sensor O-ring	5W-30	19293000	19286321
Cylinder Bores	5W-30	19293000	19286321
Cylinder Head Plugs	Threadlocker	12345382	10953489
Engine Block Threaded Plugs	Sealant	12346004	10953480
Engine Block to Bedplate	Sealant	12378521	88901148
Engine Front Cover	Sealant	12378521	88901148
Engine Oil	5W-30	19293000	19286321
Fuel Injector O-rings	5W-30	19293000	19286321
Fuel Injector Tip Insulators, for Multiple Port Injection Only	5W-30	19293000	19286321
Hydraulic Lash Adjusters	5W-30	19293000	19286321
Ignition Coils	Lubricant	19260901	19260902
Intake and Exhaust Valve Stems	5W-30	19293000	19286321
Lower Oil Pan	Sealant	12378521	88901148
Main Bearings	5W-30	19293000	19286321
Oil Filter - Threads and O-ring Lead-in Chamfers	5W-30	19293000	19286321
Oil Level Indicator Tube O-ring	Lubricant	88862586	88862827
Oil Pan to Bedplate Joint	Sealant	12378521	88901148
Oil Pump- Pump Elements	5W-30	19293000	19286321
Oxygen Sensor Threads	Anti-seize	88862477	88862478
Piston Pin to Piston/Rod- Pin Bores of Piston and Rod	5W-30	19293000	19286321
Rod Bearings- Rod Pins of Crankshaft	5W-30	19293000	19286321
Thread Repair Cutting Oil	Lubricant	1052864	992881
Thread Repair	Cleaner	88862650	88901247
Timing Chain Tensioner Cover	Sealant	12378521	88901148
Valves	Parts Immersion Solvent	12345368	10953514

Valve Rocker Arm/Valve Tip	5W-30	19293000	19286321
Water Feed Tube O-rings	Lubricant	19260901	19260902

THREAD REPAIR SPECIFICATIONS

Engine Block - Front View

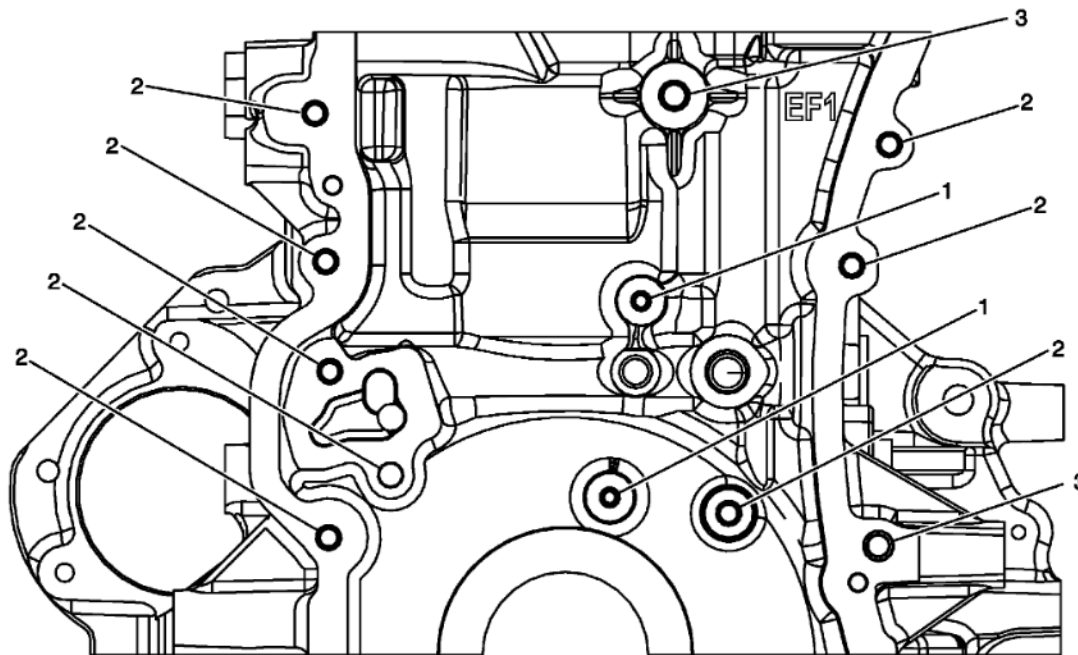


Fig. 1: Engine Block - Front View
Courtesy of GENERAL MOTORS COMPANY

Engine Block - Front View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35

Engine Block - Back View

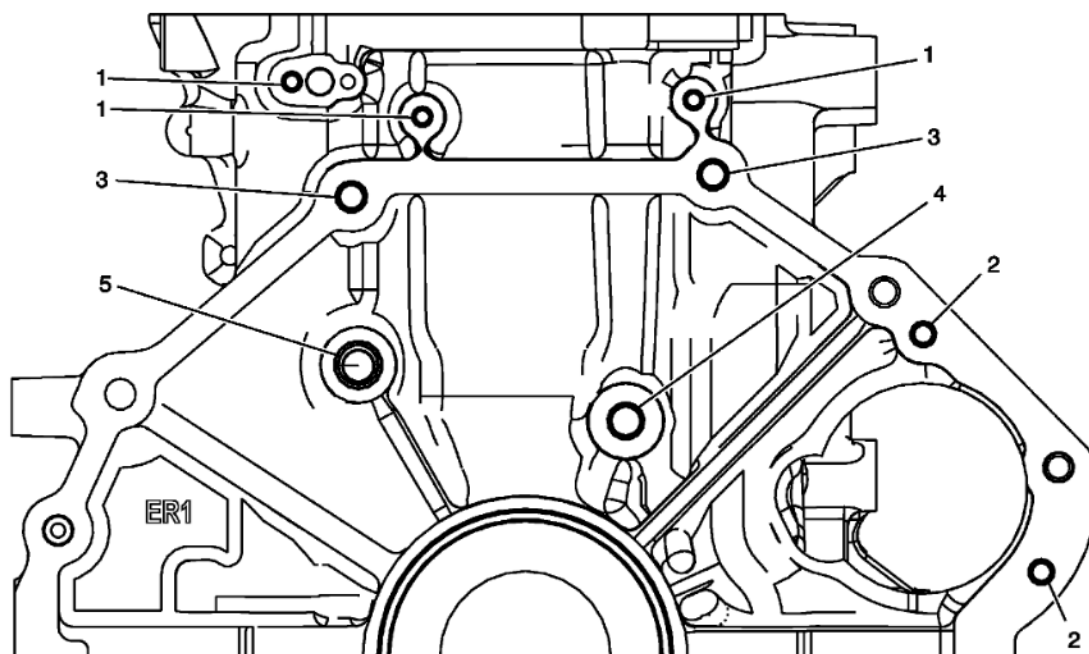


Fig. 2: Engine Block - Back View
Courtesy of GENERAL MOTORS COMPANY

Engine Block - Back View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	M10x1.5	420	211	212	213	214	34.0	1.35	24.0	1.35
4	M12x1.75	865	856	857	858	859	27.5	1.08	27.5	1.08
5	M16x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35

Engine Block - Right Side View

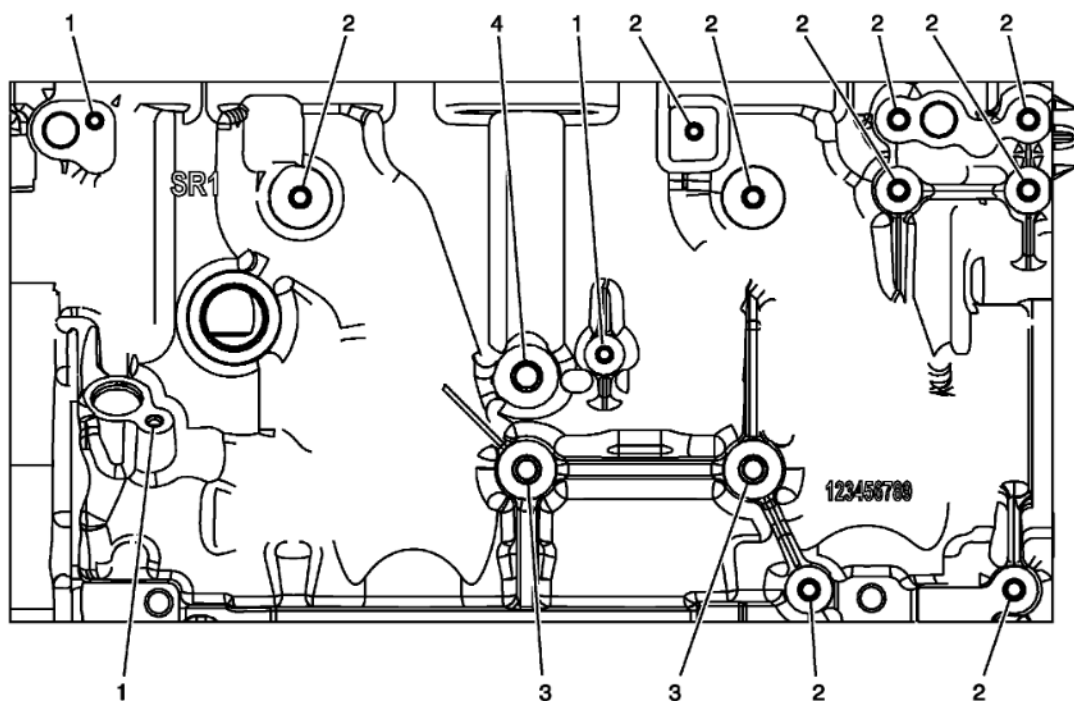


Fig. 3: Engine Block - Right Side View
 Courtesy of GENERAL MOTORS COMPANY

Engine Block - Right Side View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	m10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35
4	M12x1.75	865	856	857	858	859	27.5	1.08	27.5	1.08

Engine Block - Bottom View

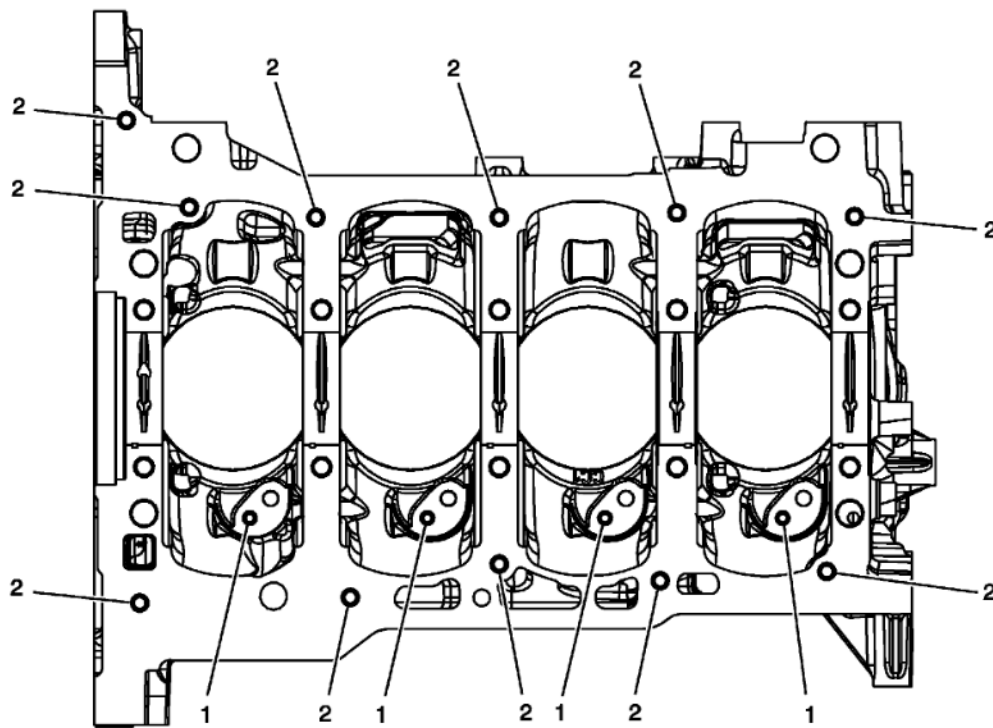


Fig. 4: Engine Block - Bottom View
 Courtesy of GENERAL MOTORS COMPANY

Engine Block - Bottom View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
							MM	(IN)	MM	(IN)
EN 42385										
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14

Engine Block - Left Side View

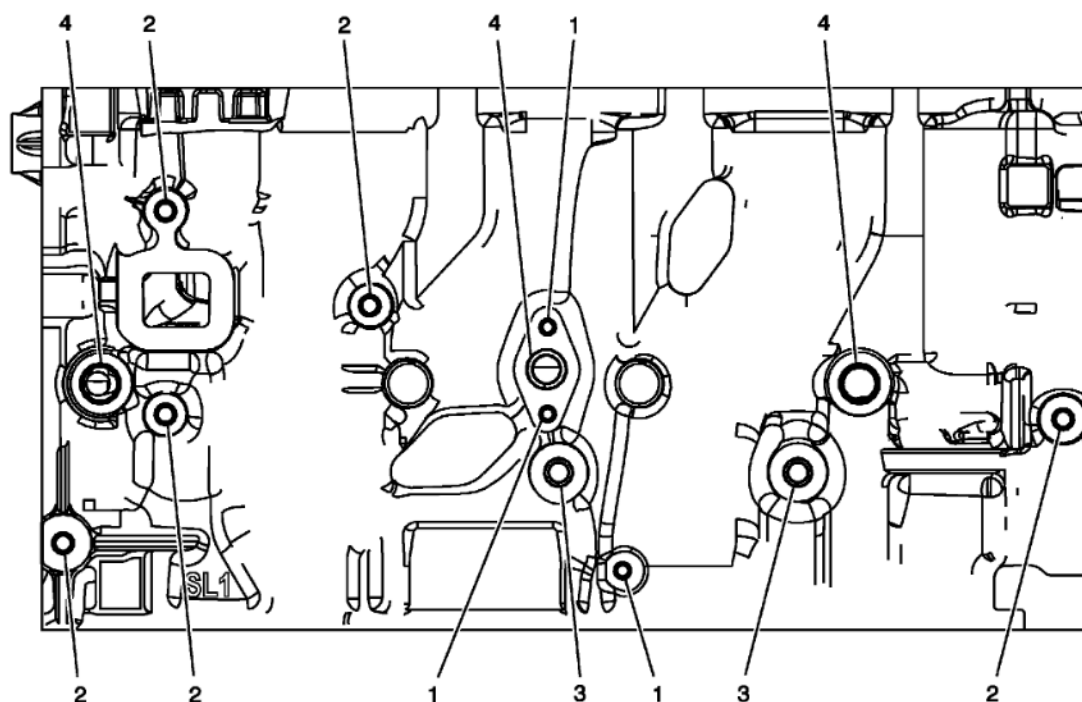


Fig. 5: Engine Block - Left Side View
Courtesy of GENERAL MOTORS COMPANY

Engine Block - Left Side View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35
4	M16x1.5	420	211	212	213	214	22.0	0.866	22.0	0.866

Engine Block - Top View

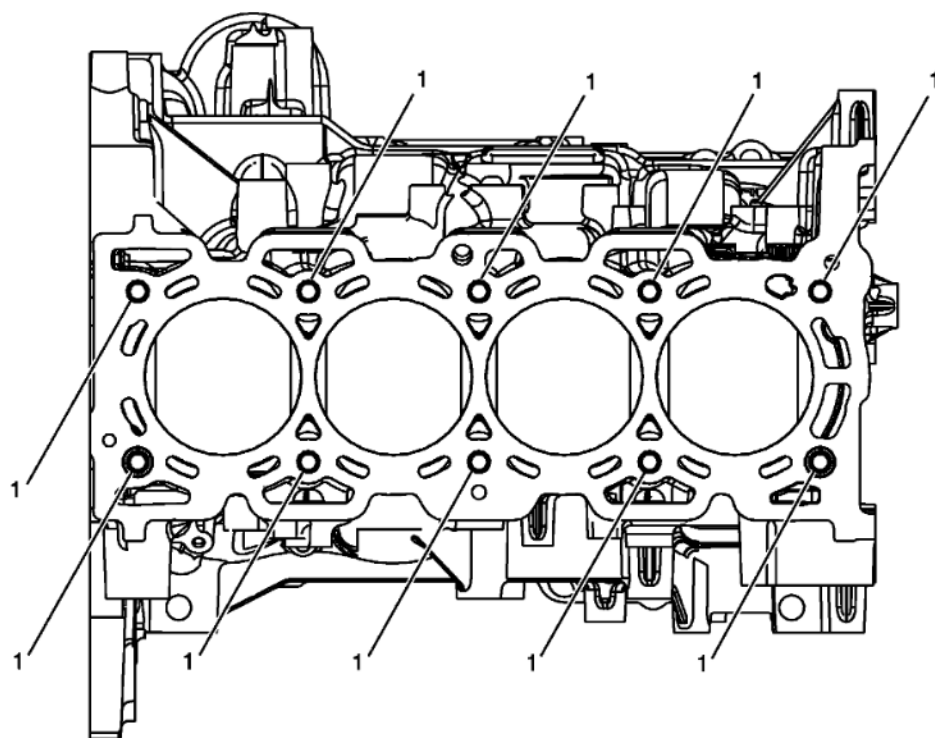


Fig. 6: Engine Block - Top View
 Courtesy of GENERAL MOTORS COMPANY

Engine Block - Top View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M11x2.0	108	723	none	724	725	88.0	3.46	80.0	3.15

Lower Crankcase - Bottom View

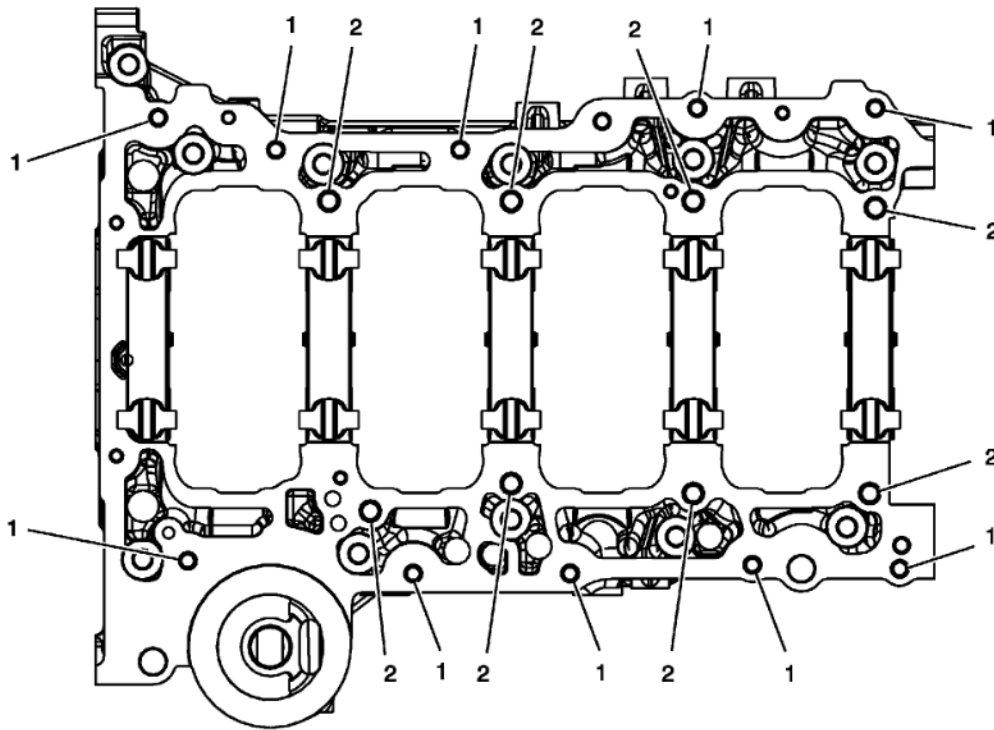


Fig. 7: Lower Crankcase - Bottom View
Courtesy of GENERAL MOTORS COMPANY

Lower Crankcase - Bottom View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
							MM	(IN)	MM	(IN)
EN 42385										
1	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
2	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35

Lower Crankcase - Right Side View

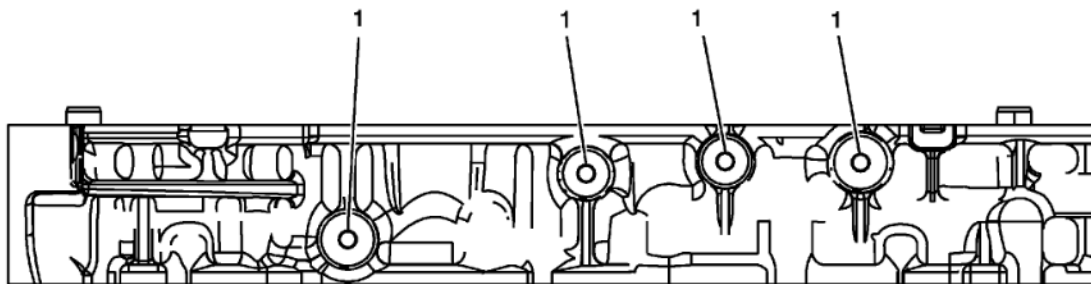


Fig. 8: Lower Crankcase - Right Side View

Courtesy of GENERAL MOTORS COMPANY

Lower Crankcase - Right Side View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35

Lower Crankcase - Left Side View

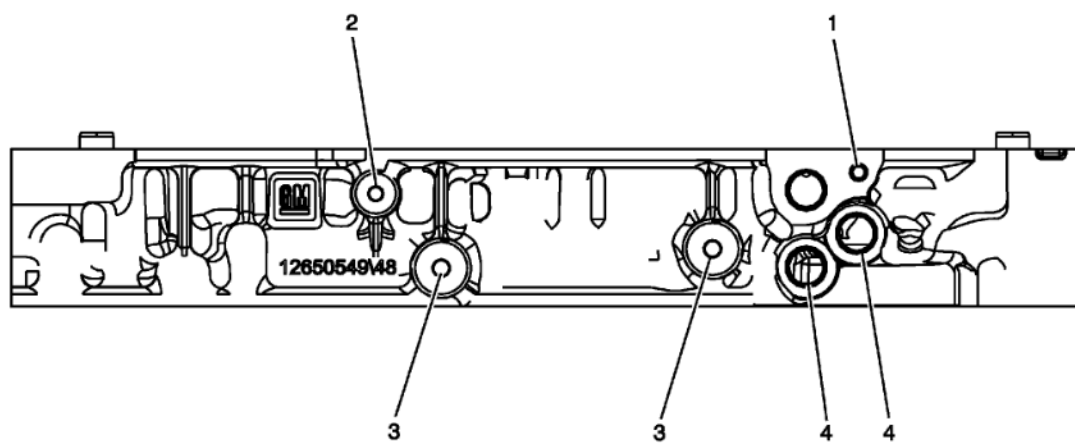


Fig. 9: Lower Crankcase - Left Side View

Courtesy of GENERAL MOTORS COMPANY

Lower Crankcase - Left Side View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35
4	M16x1.5	420	211	212	213	214	22.0	0.866	22.0	0.866

Cylinder Head - Top View

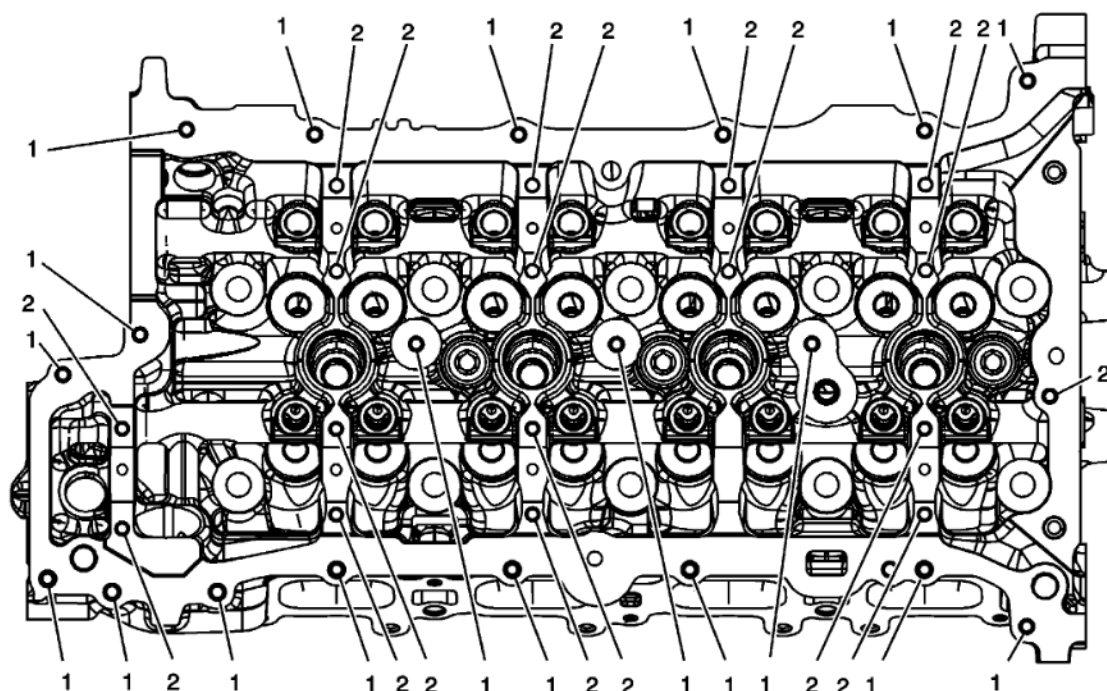


Fig. 10: Cylinder Head - Top View
Courtesy of GENERAL MOTORS COMPANY

Cylinder Head - Top View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
							MM	(IN)	MM	(IN)
EN 42385										
1	M6x1.0	205	201	202	203	204	23.0	0.907	23.0	0.907
2	M6x1.0	205	701	none	203	204	23.0	0.907	23.0	0.907

Cylinder Head Right Side View - Intake Manifold Deck Face

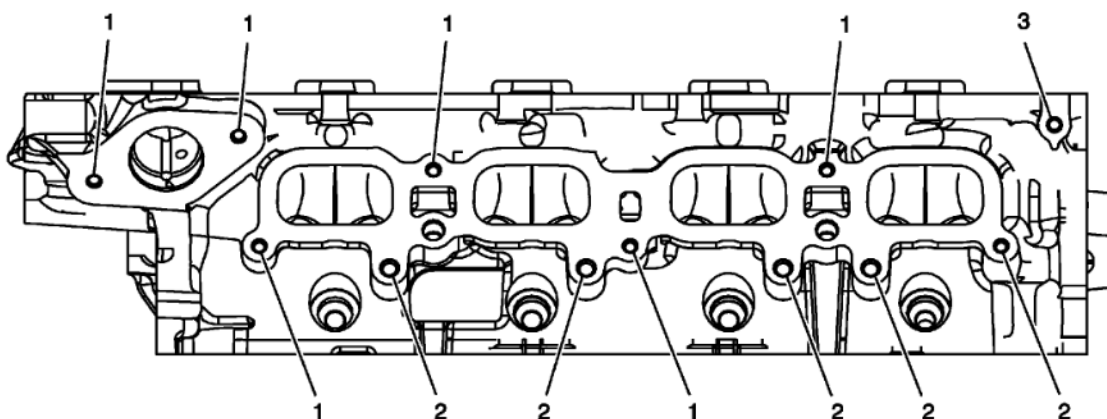


Fig. 11: Cylinder Head Right Side View - Intake Manifold Deck Face

Courtesy of GENERAL MOTORS COMPANY

Cylinder Head Right Side View - Intake Manifold Deck Face

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth Maximum		Tap Depth Maximum	
EN 42385							MM	IN	MM	IN
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M6x1.0	205	201	202	203	204	23.0	0.907	23.0	0.907
3	M6x1.0	205	701	none	203	204	23.0	0.907	23.0	0.907

Cylinder Head Left Side View - Exhaust Manifold Deck Face

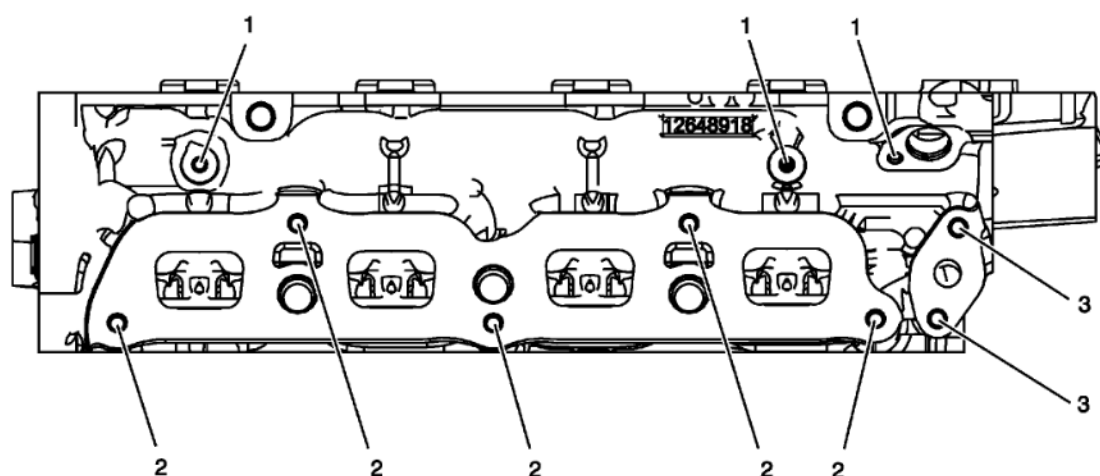


Fig. 12: Cylinder Head Left Side View - Exhaust Manifold Deck Face

Courtesy of GENERAL MOTORS COMPANY

Cylinder Head Left Side View - Exhaust Manifold Deck Face

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385-850							MM	(IN)	MM	(IN)
1	M6x1.0	205	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
3	M8x1.25	210	206	207	208	209	29.0	1.14	29.0	1.14

Cylinder Head - Front View

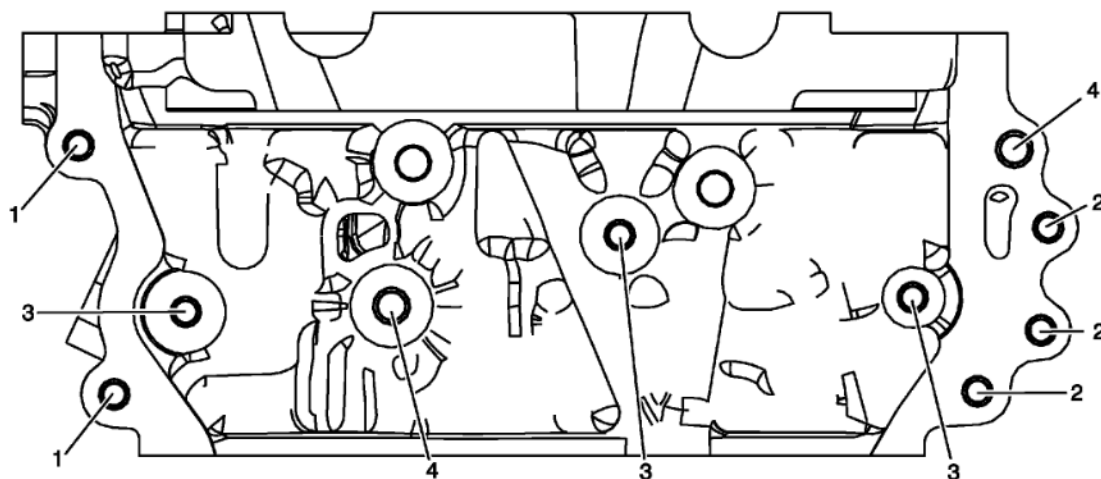


Fig. 13: Cylinder Head - Front View

Courtesy of GENERAL MOTORS COMPANY

Cylinder Head - Front View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M8x1.25	18129	206	207	208	209	29.0	1.14	29.0	1.14
2	M8x1.25	18127	206	207	208	209	29.0	1.14	29.0	1.14
3	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
4	M10x1.5	420	211	212	213	214	34.0	1.35	34.0	1.35

Cylinder Head - Back View

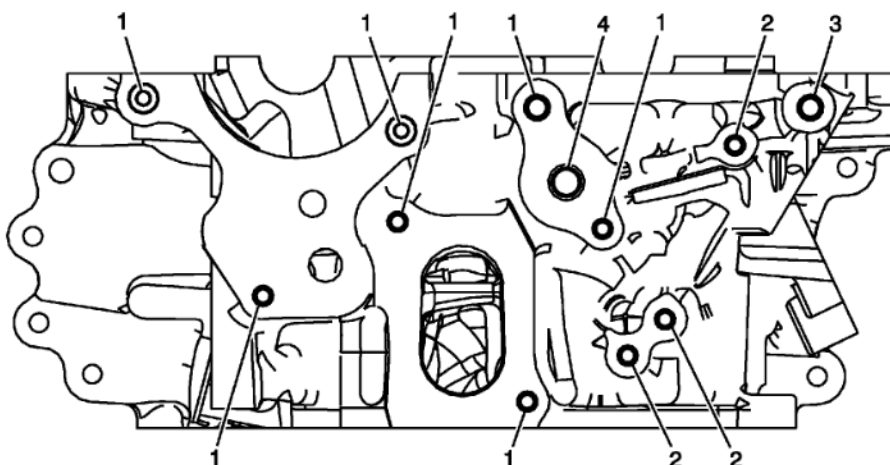


Fig. 14: Cylinder Head - Back View

Courtesy of GENERAL MOTORS COMPANY

Cylinder Head - Back View

Service				Counterbore			Drill Depth	Tap Depth
---------	--	--	--	-------------	--	--	-------------	-----------

Call Out	Thread Size	Insert	Drill	Tool	Tap	Driver	Maximum		Maximum	
EN 42385							MM	IN	MM	IN
1	M6X1	205	201	202	203	204	20	0.787	16	0.63
2	M6X1	205	701	none	203	204	20	0.787	16	0.63
3	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14
4	M12x1.75	865	856	857	858	859	18	0.709	14	0.551

Upper Oil Pan - Top View

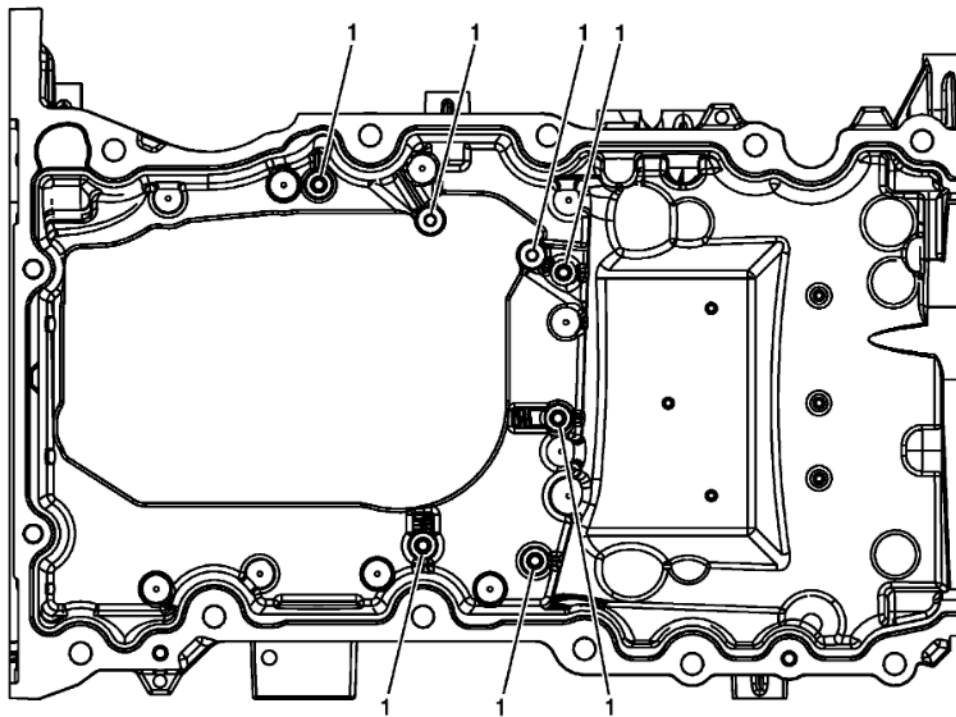


Fig. 15: Upper Oil Pan - Top View
Courtesy of GENERAL MOTORS COMPANY

Upper Oil Pan - Top View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907

Upper Oil Pan - Bottom View

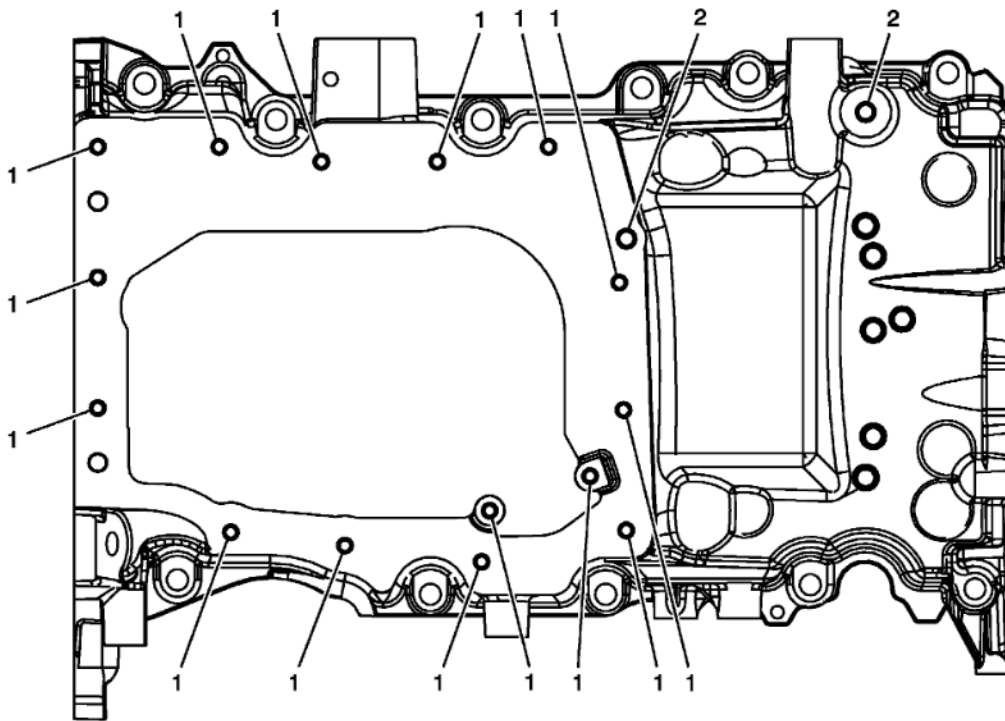


Fig. 16: Upper Oil Pan - Bottom View
Courtesy of GENERAL MOTORS COMPANY

Upper Oil Pan - Bottom View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14

Upper Oil Pan - Front View

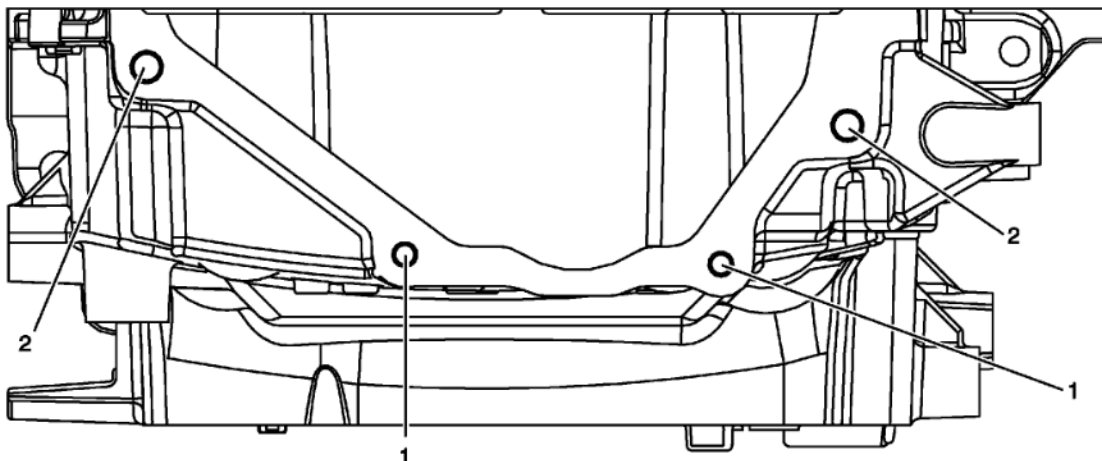


Fig. 17: Upper Oil Pan - Front View

Courtesy of GENERAL MOTORS COMPANY

Upper Oil Pan - Front View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M10x1.5	216	211	212	213	214	34.0	1.35	34.0	1.35
2	M8x1.25	181213	206	207	208	209	29.0	1.14	29.0	1.14

Upper Oil Pan - Back View

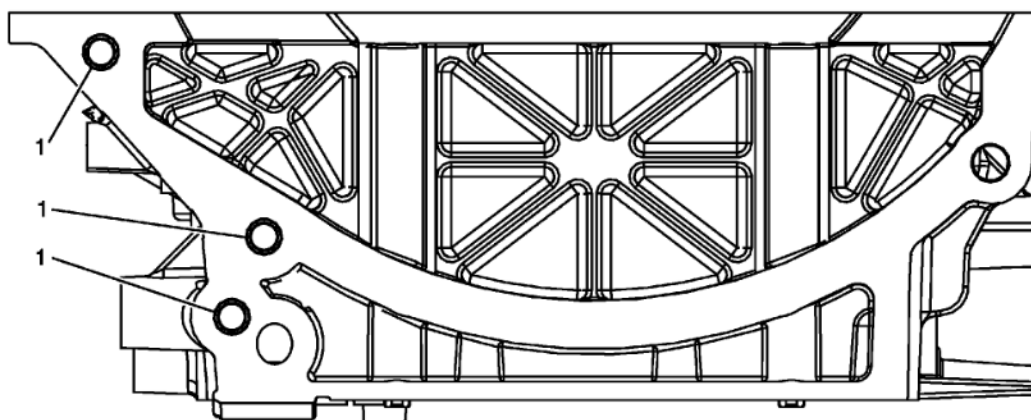


Fig. 18: Upper Oil Pan - Back View

Courtesy of GENERAL MOTORS COMPANY

Upper Oil Pan - Back View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M6x1.0	161031	201	202	203	204	23.0	0.907	23.0	0.907

Engine Front Cover - Top View

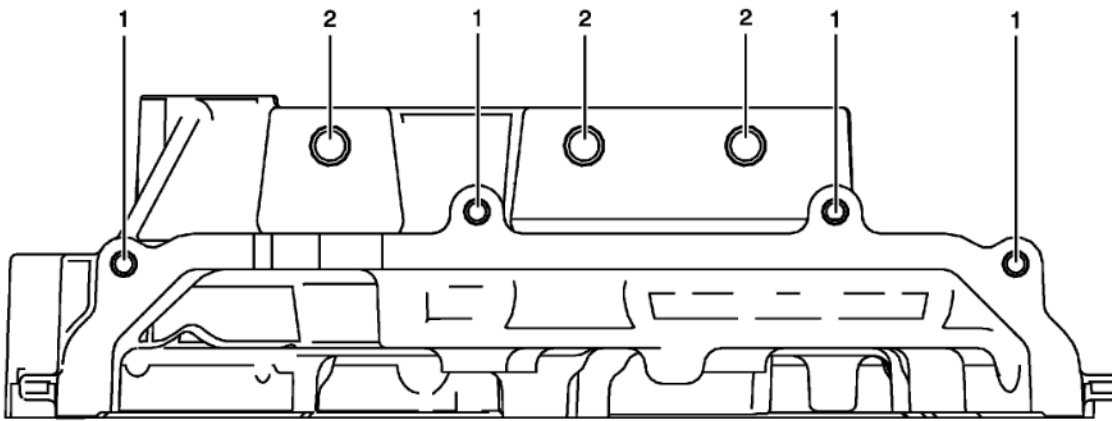


Fig. 19: Engine Front Cover - Top View
 Courtesy of GENERAL MOTORS COMPANY

Engine Front Cover - Top View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385							MM	(IN)	MM	(IN)
1	M5x0.8	3005	3001	3002	3003	3004	23.0	0.907	23.0	0.907
2	M6x1.0	205	201	202	203	204	23.0	0.907	23.0	0.907

Engine Front Cover - Front View

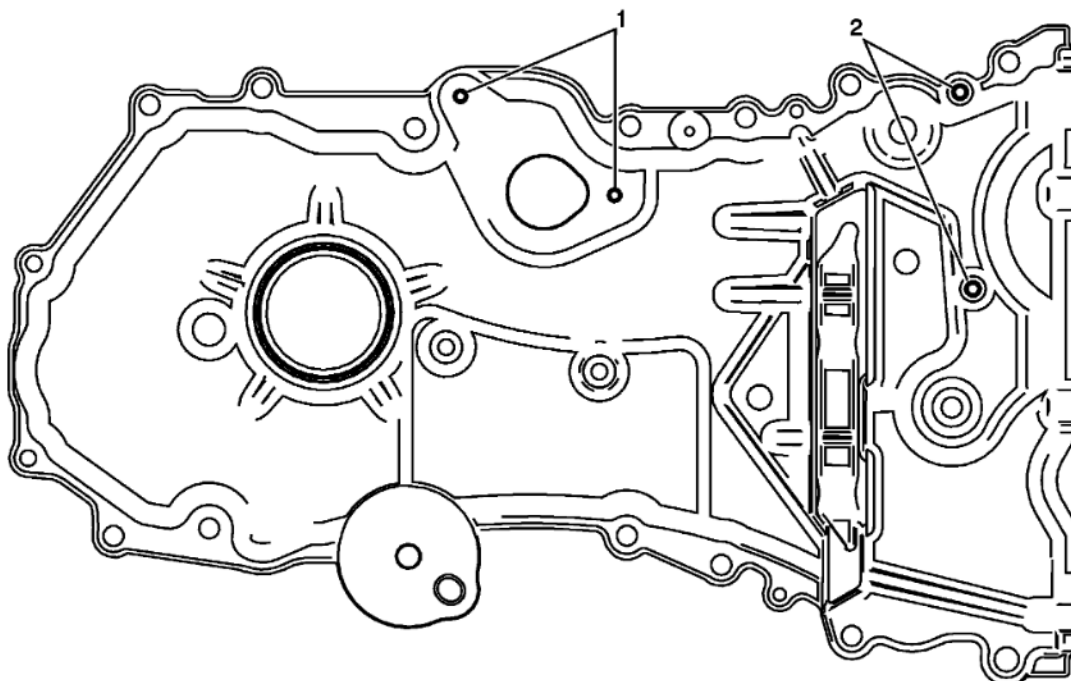


Fig. 20: Engine Front Cover - Front View

Courtesy of GENERAL MOTORS COMPANY

Engine Front Cover - Front View

Service Call Out	Thread Size	Insert	Drill	Counterbore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)	
EN 42385-850							MM	(IN)	MM	(IN)
1	M6x1.0	16105	201	202	203	204	23.0	0.907	23.0	0.907
2	M6x1.0	420	201	202	203	204	23.0	0.907	23.0	0.907

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