Vehicle: Specifications

Automatic Transmission/Transaxle

Specifications

Temperature °F	Temperature °C	Minimum Resistance Ω	Nominal Resistance Ω	Maximum Resistance Ω	Signal Volts
–40	–40	90636	100707	110778	5.00
–22	–30	47416	52684	57952	4.78
–4	–20	25809	28677	31545	4.34
14	–10	14558	16176	17794	3.89
32	0	8481	9423	10365	3.45
50	10	5104	5671	6238	3.01
68	20	3164	3515	3867	2.56
86	30	2013	2237	2461	1.80
104	40	1313	1459	1605	1.10
122	50	876	973	1070	3.25
140	60	600	667	734	2.88
158	70	420	467	514	2.56
176	80	299	332	365	2.24
194	90	217	241	265	1.70
212	100	159	177	195	1.42
230	110	119	132	145	1.15
248	120	89.9	99.9	109.9	0.87
266	130	69.1	76.8	84.5	0.60
284	140	53.8	59.8	65.8	0.32
302	150	42.5	47.2	51.9	0.00

Transmission Fluid Temperature (TFP) Sensor Specifications

Range Signal	A	B	C
Park/Neutral	LOW	HI	HI
Reverse	LOW	HI	LOW
D4	LOW	LOW	HI
D3	HI	LOW	HI
D2	HI	LOW	LOW
D1	LOW	LOW	LOW
Invalid	HI	HI	HI
Invalid	HI	HI	LOW
LOW = 0 volts HI = Ignition voltage			

Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic

Gear Selector Position	Signal A	Signal B	Signal C	Signal P
Park (P)	LOW	HI	HI	LOW
Reverse (R)	LOW	LOW	HI	HI
Neutral (N)	HI	LOW	HI	LOW
Drive 4 (OD)	HI	LOW	LOW	HI
Drive 3 (3)	LOW	LOW	LOW	LOW
Drive 2 (2)	LOW	HI	LOW	HI
Drive 1 (1)	HI	HI	LOW	LOW
HI = Ignition voltage LOW = 0 volts				

Transmission Range Switch Logic

Component	Pass Through Pins	Resistance 20°C (68°F)	Resistance 100°C (212°F)	Resistance to Ground (Case)
1-2 Shift Solenoid Valve	A, E	19–24 Ω	24–31 Ω	Greater than 250 K Ω
2-3 Shift Solenoid Valve	B, E	19–24 Ω	24–31 Ω	Greater than 250 K Ω
Torque Converter Clutch Pulse Width Modulation Solenoid Valve	T, E	10–11 Ω	13–15 Ω	Greater than 250 K Ω
Pressure Control Solenoid Valve	C, D	3–5 Ω	4–7 Ω	Greater than 250 K Ω
*Transmission Fluid Temperature (TFT) Sensor	L, M	3106–3923 Ω	164–190 Ω	Greater than 20 M Ω
Automatic Transmission Input (Shaft) Speed Sensor	S, V	625–725 Ω	750–835 Ω	Greater than 10 M Ω
Automatic Transmission Output (Shaft) Speed Sensor	A, B	1500–1750 Ω	1750–1900 Ω	Greater than 10 M Ω
***Important:** The resistance of this device is necessarily dependent on the temperature. Therefore the resistance will vary far more than any other device.				

Component Resistance

Battery Usage

Application	Specification
2.2L 4cyl (L61)	
Cold Cranking Amperage (CCA)	525
Reserve Capacity	90 min.
Replacement Model Number	75-5YR

Battery Usage

Parasitic Draw

Generator Rated Output ..... 105 A
Load Test Output ..... 73 A

System Specifications

Generator Rated Output ..... 105 A
Load Test Output ..... 73 A

Generator Usage

Application	Specification
L61	
Generator Model	Valeo SG 10
Rated Output	105 A
Load Test Output	73 A

Generator Usage

Voltage and Amperage

Generator Rated Output ..... 105 A
Load Test Output ..... 73 A

Temperature vs Resistance

°C	°F	OHMS
Temperature vs Resistance Values (Approximate)		
150	302	47
140	284	60
130	266	77
120	248	100
110	230	132
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238

Temperature Vs Resistance Part 1

°C	°F	OHMS
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
−5	23	12300
−10	14	16180
−15	5	21450
−20	−4	28680
−30	−22	52700
−40	−40	100700

Temperature Vs Resistance Part 2

Fuel Level Specifications

The values in the table are approximate values based on information obtained from properly operating vehicles. Actual results may vary slightly.

Fuel Gauge Display	Resistance (Ω)	Fuel Level (%)	Fuel Remaining
E	40–45	2–4	2–4 L (0.5–1 gal)
1/4	90	21	16.6 L (4.4 gal)
1/2	129	40	29.3 L (7.8 gal)
3/4	164	60	40.3 L (10.6 gal)
F	207–250	79–100	52.4–54.1 L (13.8–14.3 gal)
CHECK GAGES Indicator On	47	5	4.9 L (1.3 gal)

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Inflatable Restraint Front End Discriminating Sensor Bolt	10 N.m	89 lb in
Inflatable Restraint I/P Module Bolt	5 N.m	44 lb in
Inflatable Restraint Seat Module Bolt	9 N.m	80 lb in
Inflatable Restraint Side Impact Discriminating Sensor Bolt	10 N.m	89 lb in
Sensing and Diagnostic Module Bolt		
GM P/N 10156138	14 N.m	124 lb in
GM P/N 10267482	15 N.m	11 lb ft

Fastener Tightening Specifications

Trim Height Specifications

Model	Suspension	Tire Size	Engine	Z	D	J	K
2 Door	FE1	P 195/70R 14	L61	3 mm (.18 in)	37 mm (1.45 in)	233 mm (9 11/64 in)	240 mm (9 7/16 in)
2/4 Door	FE1	P 195/65R 15	L61	−1 mm (−3/64 in)	−42 (−1 21/32 in)	233 mm (9 11/64 in)	240 mm (9 7/16 in)
2 Door	FE2	P 205/55R 16	L61	−4 mm (.15 in)	−43 (1 11/16 in)	233 mm (9 11/64 in)	240 mm (9 7/16 in)
All measurements taken with a full tank of gas. Measurements for J, K and Z have +/− 9.5 mm (3/8 in).							

Trim Height

Wheel Alignment Specifications

Angle	Alignment Specifications	Tolerance
Front Caster	4.3 Degrees	+/- 1.00 Degrees
Front Camber	0.00 Degrees	+/- 1.00 Degrees
Individual Toe	0.00 Degrees	+/- 0.12 Degrees
Measure the above toe angles with the steering wheel at level position, visually aligned with the column.		
Sum Toe	0.00 Degrees	+/- 0.25 Degrees
Cross Camber	0.00 Degrees	+/- 1.00 Degrees
Slight cross camber specification differences can be made when servicing the vehicle for steering pull.		
Cross Caster	0.00 Degrees	+/- 1.00 Degrees
Rear Camber	-0.40 Degrees	+/- 0.75 Degrees
Rear Sum Toe	0.20 Degrees	+/- 0.30 Degrees
Rear Thrust Angle	0.00 Degrees	+/- 0.25 Degrees

Wheel Alignment

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Strut to Knuckle Nuts	180 N.m	133 lb ft
Tie Rod Jam Nut	68 N.m	50 lb ft

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Bottom Pan to Case — M6 x 1.0 x 19.0 (Qty 12)	12 N·m	106 lb in
Case Cover	24 N·m	18 lb ft
Case Side Cover	20 N·m	15 lb ft
Channel Plate to Case — M6 x 1.0 x 28.0 (Qty 6)	12 N·m	106 lb in
Channel Plate to Case — M6 x 1.0 x 63.0 (Qty 2)	12 N·m	106 lb in
Channel Plate to Driven Sprocket Support — M6 x 1.0 x 28.0 (Qty 2)	14 N·m	124 lb in
Clip, Wiring Harness — M6 x 1.0 x 15.0 (Qty 1)	12 N·m	106 lb in
Converter Shield	10 N·m	18 lb ft
Cooler Pipes at Case	8 N·m	71 lb in
Cooler Pipes at Radiator	20–40 N·m	15–30 lb ft
Cover Assembly, Intermediate 4th Servo to Case — M6 x 1.0 x 28.0 (Qty 3)	12 N·m	106 lb in
Cover, Lo/Reverse Servo to Case — M6 x 1.0 x 28.0 (Qty 3)	12 N·m	106 lb in
Cover, Side to Case — M8 x 1.25 x 28.0 (Qty 10)	20 N·m	15 lb ft
Cover, Side to Case (Stud) — M8 x 1.25 x 28.0 (Qty 1)	20 N·m	15 lb ft
Flywheel to Torque Converter	62 N·m	46 lb ft
Oil Check Plug	14 N·m	124 lb in
Oil Feed Tube Bolts	14 N·m	124 lb in

Application	Specification	
	Metric	English
Oil Pan to Case	10 N·m	89 lb in
Park/Neutral Position Switch to Case	24 N·m	18 lb ft
Plug, Pipe — 1/8–27 NPTF (Qty 2)	12 N·m	106 lb in
Pressure Switch Assembly Bolts	12 N·m	106 lb in
Pump, Valve Body, Channel Plate to Case — M6 x 1.0 x 103.0 (Qty 1)	12 N·m	106 lb in
Pump, Valve Body to Channel Plate — M6 x 1.0 x 63.0 (Qty 1)	12 N·m	106 lb in
Pump, Valve Body to Channel Plate — M6 x 1.0 x 90.0 (Qty 6)	12 N·m	106 lb in
Sensor, Input Speed — M6 x 1.0 x 15.0 (Qty 1)	12 N·m	106 lb in
Sensor, Output Speed (Stud) — M6 x 1.0 x 15.0 (Qty 1)	12 N·m	106 lb in
Shift Lever to Transmission Nut	20 N·m	15 lb ft
Spacer, Channel Plate to Driven Sprocket Support — M6 x 1.0 x 70.0 (Qty 2)	14 N·m	124 lb in
Speed Sensor Housing to Case	11 N·m	97 lb in
Spring and Roller Assembly, Detent to Channel Plate — M6 x 1.0 x 19.0 (Qty 1)	12 N·m	106 lb in
Support Assembly, Drive Sprocket to Case — M6 x 1.0 x 17.2 (Qty 6)	12 N·m	106 lb in
TFP Switch, Valve Body, Channel Plate —M6 x 1.0 x 51.0 (Qty 3)	12 N·m	106 lb in
TFP Switch, Valve Body, Channel Plate — M6 x 1.0 x 63.0 (Qty 1)	12 N·m	106 lb in
TFP Switch, Valve Body, Channel Plate to Case — M6 x 1.0 x 90.0 (Qty 2)	12 N·m	106 lb in
Transmission to Engine Mount Bolts	90 N·m	66 lb ft
Tube Assembly, Transmission Oil to Case — M6 x 1.0 x 19.0 (Qty 2)	12 N·m	106 lb in
Tube Assembly, Transmission Oil to Forward Clutch Support — M6 x 1.0 x 19.0 (Qty 1)	12 N·m	106 lb in
Tube Assembly, Transmission Oil to Lo/Reverse Servo Cover — M6 x 1.0 x 19.0 (Qty 1)	12 N·m	106 lb in
TV Cable to Case	9 N·m	80 lb in
Valve Body, Channel Plate to Case — M6 x 1.0 x 90.0 (Qty 5)	12 N·m	106 lb in
Valve Body, Channel Plate to Case — M6 x 1.0 x 103.0 (Qty 2)	12 N·m	106 lb in
Valve Body to Channel Plate — M6 x 1.0 x 51.0 (Qty 5)	12 N·m	106 lb in

Part 2 Of 2

Range	Park/ Neutral	Reverse	D				3			2			1	
Gear	N	R	1st	2nd	3rd	4th	1st	2nd	3rd	1st	2nd	3rd **	1st	2nd ***
1-2 Shift Solenoid	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
2-3 Shift Solenoid	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
2nd Clutch	—	—	—	A	A*	A*	—	A	A*	—	A	A*	—	A
2nd Roller Clutch	—	—	—	H	O	—	—	H	O	—	H	O	—	H
Int./4th Band	—	—	—	—	—	A	—	—	—	—	A	—	—	A
Reverse Clutch	—	A	—	—	—	—	—	—	—	—	—	—	—	—
Coast Clutch	—	—	—	—	—	—	A	A	A	A	A	A	A	A

Part 1 Of 2

Range	Park/ Neutral	Reverse	D				3			2			1	
Gear	N	R	1st	2nd	3rd	4th	1st	2nd	3rd	1st	2nd	3rd **	1st	2nd ***
Input Sprag	—	—	H	H	H	O	H	H	H	H	H	H	H	H
Direct Clutch	—	—	—	—	A	A	—	—	A	—	—	A	—	—
Forward Clutch	—	—	A	A	A	A*	A	A	A	A	A	A	A	A
Lo/Rev Band	A	A	—	—	—	—	—	—	—	—	—	—	A	—
Lo Roller Clutch	—	—	H	O	O	O	H	O	O	H	O	O	H	O

A = Applied
H = Holding
O = Overrunning
ON = The solenoid is energized
OFF = The solenoid is de-energized
* = Applied with no load
** = Manual SECOND-THIRD gear is only available above approximately 100 km/h (62 mph)
*** = Manual FIRST-SECOND gear is only available above approximately 60 km/h (37 mph)
Manual FIRST-THIRD gear is also possible at high vehicle speed as a safety feature

Part 2 Of 2

Gear	1-2 SS Valve	2-3 SS Valve	Gear Ratio
1	ON	OFF	2.96:1
2	OFF	OFF	1.62:1
3	OFF	ON	1.00:1
4	ON	ON	0.68:1
P, R, N	ON	OFF	2.14:1

		1-2 Shift @ +/– 3 mph			2-3 Shift @ +/– 4 mph			3-4 Shift @ +/– 5 mph			Downshifts @ +/– 4 mph			TCC Apply 3rd Gear
% of TPS		12.5	25	50	12.5	25	50	12.5	25	50	4-3 Coast	3-2 Coast	2-1 Coast	10%
Model	Engine RPO													
PCR	L61	11	15	29	17	28	52	38	45	N/A	30	13	6.5	26

Name	Hydra-Matic® 4T40-E
RPO Codes	MN4
Production Location	Windsor, Ontario, Canada
Vehicle Platform Engine/Transmission Usage	J
Transmission Drive	Transverse Mounted Front Wheel Drive
Maximum Engine Torque	270 N-m (200 lb ft)
Maximum Shift Speed	1-2 6,500 RPM 2-3 6,500 RPM 3-4 6,500 RPM
1st Gear Ratio	2.960:1
2nd Gear Ratio	1.626:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.681:1
Reverse	2.143:1
Torque Converter Size – Diameter of Torque Converter Turbine	245 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON®III
Transmission Fluid Capacity – Approximate	Bottom Pan Removal: 6.5 L (6.9 qts) Complete Overhaul: 9.0 L (9.5 qts) Dry: 12.2 L (12.9 qts)

Part 1 Of 2

Name		Hydra-Matic® 4T40-E
Transmission Type: 4		Four Forward Gears
Transmission Type: T		Transverse Mount
Transmission Type: 40		Product Series
Transmission Type: E		Electronic Controls
Position Quadrant		P, R, N, Ⓓ, 3, 2, 1
Case Material		Die Cast Aluminum
Transmission Weight Dry		74.7 kg (164 lbs)
Transmission Weight Wet		85.0 kg (187 lbs)
Maximum Trailer Towing Capacity		487 kg (1,000 lbs)
Maximum Gross Vehicle Weight (GVW)		1,826 kg (4,100 lbs)
Ratios		
Chain	Final Drive	Effective – Overall
32/38	3.29	3.91
32/38	3.05	3.63
35/35	3.29	3.29
35/35	3.05	3.42
33/37	3.29	3.69
33/37	3.05	3.42

Part 2 Of 2

Fastener Tightening Specifications

P/N 24200093 - Sensor, Input Speed - M6 x 1.0 x 15.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200093 - Clip, Wiring Harness - M6 x 1.0 x 15.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200209 - Channel Plate to Case - M6 x 1.0 x 63.0 (Qty 2) ..... 12 Nm (106 lb in)
P/N 24200207 - Channel Plate to Case - M6 x 1.0 x 28.0 (Qty 6) ..... 12 Nm (106 lb in)
P/N 24200207 - Channel Plate to Driven Sprocket Support M6 x 1.0 x 28.0 (Qty 1) ..... 14 Nm (124 lb in)
P/N 24200092 - Spring and Roller Assembly, Detent to Channel Plate - M6 x 1.0 x 19.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200214 - Spacer, Channel Plate to Driven Sprocket Support M6 x 1.0 x 70.0 (Qty 2) ..... 14 Nm 124 lb in)
P/N 24200208 - Valve Body, Channel Plate to Case M6 x 1.0 x 103.0 (Qty 2) ..... 12 Nm (106 lb in)
P/N 24200205 - Valve Body, Channel Plate to Case M6 x 1.0 x 90.0 (Qty 5) ..... 12 Nm (106 lb in)
P/N 24200208 - Pump, Valve Body, Channel Plate to Case M6 x 1.0 x 103.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200205 - TFP Switch, Valve Body, Channel Plate to Case M6 x 1.0 x 90.0 (Qty 2) ..... 12 Nm (106 lb in)
P/N 24200206 - TFP Switch, Valve Body, Channel Plate M6 x 1.0 x 51.0 (Qty 3) ..... 12 Nm (106 lb in)
P/N 24200209 - TFP Switch, Valve Body, Channel Plate M6 x 1.0 x 63.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200206 - Valve Body to Channel Plate M6 x 1.0 x 51.0 (Qty 5) ..... 12 Nm (106 lb in)
P/N 24200209 - Pump, Valve Body to Channel Plate M6 x 1.0 x 63.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200205 - Pump, Valve Body to Channel Plate M6 x 1.0 x 90.0 (Qty 6) ..... 12 Nm (106 lb in)
P/N 24200207 - Cover Assembly, Intermediate 4th Servo to Case M6 x 1.0 x 28.0 (Qty 3) ..... 12 Nm (106 lb in)
P/N 24200207 - Cover, Lo/Reverse Servo to Case M6 x 1.0 x 28.0 (Qty 3) ..... 12 Nm (106 lb in)
P/N 24200092 - Tube Assembly, Transmission Oil to Case M6 x 1.0 x 19.0 (Qty 2) ..... 12 Nm (106 lb in)
P/N 24200092 - Tube Assembly, Transmission Oil to Lo/Reverse Servo Cover - M6 x 1.0 x 19.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200092 - Tube Assembly, Transmission Oil to Forward Clutch Support - M6 x 1.0 x 19.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24200091 - Sensor, Output Speed (Stud)M6 x 1.0 x 15.0 (Qty 1) ..... 12 Nm (106 lb in)
P/N 24203911 - Bottom Pan to Case - M6 x 1.0 x 19.0 (Qty 12) ..... 12 Nm (106 lb in)
P/N 24208309 - Cover, Side to Case (Stud) M8 x 1.25 x 28.0 (Qty 1) ..... 20 Nm (15 lb ft)
P/N 24203912 - Cover, Side to Case - M8 x 1.25 x 28.0 (Qty 10) ..... 20 Nm (15 lb ft)
P/N 8685658 - Support Assembly, Drive Sprocket to Case M6 x 1.0 x 17.2 (Qty 6) ..... 12 Nm (106 lb in)
P/N 8654382 - Plug, Pipe - 1/8-27 NPTF (Qty 2) ..... 12 Nm (106 lb in)

Recorded Measurement (mm)	Washer Selection	Washer Dimension
100.41–100.70 mm (3.952–3.964″)	Brown	1.50–1.60 mm (.059–.062″)
100.71–100.99 mm (3.965–3.975″)	Grey	1.80–1.90 mm (.070–.075″)
101.00–101.29 mm (3.976–3.987″)	Natural	2.09–2.19 mm (.082–.086″)
101.30–101.59 mm	[illegible]	2.39–2.49 mm

Reverse Clutch Backing Plate Specifications

8.970-9.433 mm (0.353-0.371 inch) ..... A
9.434-10.007 mm (0.372-0.393 inch) ..... B
10.008-10.470 mm (0.394-0.412 inch) C

Fluid Pan, A/T

Oil Pan to Case ..... 10 N-m (89 in.lb)

Application	Specification	
	Metric	English

Application	Specification	
	Metric	English
Drive Axle Nut	200 N·m	148 lb ft

(4.023–4.034″)	[illegible]	(.129–.133″)
102.49–102.77 mm (4.035–4.046″)	Red	3.57–3.67 mm (.140–.144″)
102.78–103.07 mm mm	Green	3.87–3.97 mm (.152–.156″)

Frame and Underbody

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Engine Frame to Body Fasteners	191 N.m	141 lb ft

Body Front End

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Screen Screw	2 N.m	18 lb in
Fender Bolt	7 N.m	62 lb in
Fender Center Bracket Bolt to Body	3 N.m	27 lb in
Fender Center Bracket Bolt to Fender	3 N.m	27 lb in
Fender Liner Bolts	2 N.m	18 lb in
Fender Lower Bracket Bolt to Fender	8 N.m	71 lb in
Fender Lower Bracket Bolt to Radiator Side Support	3 N.m	27 lb in
Hood Headlamp Seal Screw-Pontiac Only	1 N.m	9 lb in
Hood Hinge Bolts	20 N.m	15 lb ft
Hood Hinge Pivot Bolt	20 N.m	15 lb ft
Hood Latch Bolts	10 N.m	89 lb in
Hood Latch Release Cable Handle Screw	3 N.m	27 lb in
Hood Latch Striker Bolt	21 N.m	15 lb ft
Hood Latch Support Lower Bolts	27 N.m	20 lb ft
Hood Latch Support Upper Bolts	9 N.m	80 lb in
Lower Tie Bar Bolt	25 N.m	18 lb ft
Splash Shield Screws	2 N.m	18 lb in

Body Rear End

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Filler Panel Nut	5 N.m	44 lb in
Fuel Tank Filler Door Nuts	2.8 N.m	24.8 lb in
Fuel Tank Filler Pocket Bolts	2 N.m	518 lb in
Rear Compartment Lid Applique	3 N.m	27 lb in
Rear Compartment Lid Applique Nut - Pontiac Coupe	5 N.m	44 lb in
Rear Compartment Hinge to Lid Bolts	7 N.m	62 lb in
Rear Compartment Hinge to Rear Window Panel Bolts	10 N.m	89 lb in
Rear Compartment Lid Latch Assembly Bolt	6 N.m	53 lb in
Rear Compartment Lid Lock Striker Nut	10 N.m	89 lb in
Rear Compartment Lid Remote Release Handle Screw	1 N.m	9 lb in
Rear Compartment Lid Spoiler Bolt - Chevrolet	5 N.m	44 lb in
Rear Compartment Lid Spoiler Nut	5 N.m	5 lb in
Rear Speaker Screw	12 N.m	106 lb in
Release Handle cover bolt	1 N.m	12 lb in
Release Handle screws	2 N.m	18 lb in
Spare Tire Cover Retainer	1.5 N.m	13 lb in
Tail Lamp Filler Nut	6 N.m	53 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
BCM Bracket Nut	5 N.m	44 lb in

Bumper

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Fascia Extension Screws	3 N.m	27 lb in
Front Bumper Energy Absorber Nuts	27 N.m	20 lb ft
Front Bumper Guard Bolts	12 N.m	108 lb ft
Front Bumper Impact Bar Nuts	150 N.m	111 lb ft
Front Fascia Center Lower Screw	3 N.m	27 lb in
Front Fascia Lower Screw	3 N.m	27 lb in
Front Fascia Retainer Screws	10 N.m	89 lb in
Front Fascia-to-Fender Screws	3 N.m	27 lb in
Rear Bumper Energy Absorber Nuts	27 N.m	20 lb ft
Rear Bumper Impact Bar Nuts	20 N.m	15 lb ft
Rear Fascia Retainer Screws	10 N.m	89 lb in
Rear Fascia-to-Body Screws	3 N.m	27 lb in
Windshield Washer Fluid Reservoir Nuts	3 N.m	27 lb in

Doors

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Auxiliary Weatherstrip Retainer Bolt	2 N.m	18 lb in
Door Arm Rest Screw	5.7 N.m	51 lb in
Door Glass Front Upstop-to-Door Glass Nut	6 N.m	53 lb in
Door Glass Rear Guide Retainer	6 N.m	53 lb in
Door Guide Pin Locator Screw	11 N.m	97 lb ft
Door Guide Pin Screw	11 N.m	97 lb ft
Door Hinge Bolt	26 N.m	19 lb ft
Door Hinge Nut	26 N.m	19 lb ft
Door Lock Screws	10 N.m	89 lb in
Door Rear View Mirror Nut	6 N.m	53 lb in
Door Sealing Strip Screw	2 N.m	18 lb in
Door Trim Panel Lower Screw	1.5 N.m	13 lb in
Door Window Frame Applique Screw	2 N.m	20 lb in
Front and Rear Channel Adjustment Nutwasher	10 N.m	88 lb in
Front Channel-to-Door Stud Nuts	6 N.m	53 lb in
Front Door Upper Trim Finish Panel Screw	1.3 N.m	12 lb in
Lower Window Channel Bolt	6 N.m	53 lb in
Mirror Motor Retaining Screw	10 N.m	89 lb in
Mirror Set Screw	1.4 N.m	12 lb in
Rear Door Energy Absorber Bolt	2 N.m	18 lb in
Rear Door Lower Sealing Strip Screw	2 N.m	18 lb in
Rear Upper Extension-to-Door Nutwasher	6 N.m	53 lb in
Rear Upper Extension-to-Rear Channel Nutwasher	6 N.m	53 lb in
Rear Upstop Bracket Bolt	6 N.m	53 lb in
Regulator Bolts	10 N.m	89 lb in
Regulator Nuts	10 N.m	89 lb in
Reveal Molding Screw	6 N.m	53 lb in
Stabilizer Lock Nut	6 N.m	53 lb in
Stationary Window Channel Bolt	10 N.m	89 lb in
Striker Bolt	25 N.m	18 lb ft
Upper Window Channel Retainer Upper Bolt	2 N.m	18 lb in
Window Regulator-to-Door Screw	6 N.m	53 lb in
Window Sash Nuts	10 N.m	89 lb in

Exterior Moulding / Trim

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Grille Retaining Screw	2 N.m	18 lb in
Rocker Panel Molding Screws	2 N.m	18 lb in

System Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Coat Hook Screw	1.9 N.m	17 lb in
Front Seat Belt Retractor Anchor Bolt	41 N.m	30 lb ft
Front Seat Belt Shoulder Belt Guide Bolt	41 N.m	30 lb ft
Sunshade Screws	1.9 N.m	17 lb in

Console

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Defroster Grille Screw	2.3 N.m	20 lb in
Floor Console Armrest Hinge Screw	2.3 N.m	20 lb in
Floor Console Bolt	6 N.m	53 lb in
HVAC Temperature Control Cable Screw	2 N.m	18 lb in
Instrument Compartment Door Latch Screw	2.3 N.m	20 lb in
Instrument Compartment Door Latch Striker Screw	2.3 N.m	20 lb in
Instrument Panel Accessory Trim Plate Screw (Pontiac)	2 N.m	18 lb in
Instrument Panel Accessory Trim Plate Screw (Cavalier)	2.3 N.m	20 lb in
Instrument Panel Carrier Screw	2.3 N.m	20 lb in
Instrument Panel Cluster Screw	2 N.m	18 lb in
Instrument Panel Compartment Door Screw	2.3 N.m	20 lb in
Instrument Panel Compartment Hinge Screw	2.3 N.m	20 lb in
Instrument Panel Trim Panel Screw - Right	2.3 N.m	20 lb in
Outer I/P Trim Cover Screw	2 N.m	18 lb in
Trim Pad to Instrument Panel Screw	2.3 N.m	20 lb in

Dashboard / Instrument Panel

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Defroster Grille Screw	2.3 N.m	20 lb in
Floor Console Armrest Hinge Screw	2.3 N.m	20 lb in
Floor Console Bolt	6 N.m	53 lb in
HVAC Temperature Control Cable Screw	2 N.m	18 lb in
Instrument Compartment Door Latch Screw	2.3 N.m	20 lb in
Instrument Compartment Door Latch Striker Screw	2.3 N.m	20 lb in
Instrument Panel Accessory Trim Plate Screw (Pontiac)	2 N.m	18 lb in
Instrument Panel Accessory Trim Plate Screw (Cavalier)	2.3 N.m	20 lb in
Instrument Panel Carrier Screw	2.3 N.m	20 lb in
Instrument Panel Cluster Screw	2 N.m	18 lb in
Instrument Panel Compartment Door Screw	2.3 N.m	20 lb in
Instrument Panel Compartment Hinge Screw	2.3 N.m	20 lb in
Instrument Panel Trim Panel Screw - Right	2.3 N.m	20 lb in
Outer I/P Trim Cover Screw	2 N.m	18 lb in
Trim Pad to Instrument Panel Screw	2.3 N.m	20 lb in

System Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Sunroof Actuator bolt	3 N.m	27 lb in
Sunroof Glass Panel Adjustment Screw	4 N.m	35 lb in
Sunroof Glass Panel Screw	4 N.m	35 lb in
Sunroof Module Bolt	11 N.m	97 lb in
Sunroof Track Screw	4 N.m	35 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Sunroof Actuator bolt	3 N.m	27 lb in
Sunroof Glass Panel Adjustment Screw	4 N.m	35 lb in
Sunroof Glass Panel Screw	4 N.m	35 lb in
Sunroof Module Bolt	11 N.m	97 lb in
Sunroof Track Screw	4 N.m	35 lb in

Seats

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Seat Back Pivot Bolt	20 N.m	15 lb ft
Front Seat Front Adjuster Nut	28 N.m	21 lb ft
Front Seat Rear Adjuster Nut	28 N.m	21 lb ft
Front Seat Recliner Bolt	20 N.m	15 lb ft
Front Seat Recliner Finish Cover Screw	1.9 N.m	17 lb in
Lumbar Actuator Screw	1.2 N.m	10 lb in
Rear Folding Seat Back Pinion Bolts	6 N.m	53 lb in
Rear Seat Back Latch Bolt	10 N.m	89 lb in
Seat Adjuster to Cushion Frame Bolt	20 N.m	15 lb ft
Seat Belt Buckle Bolt - Driver Side	34 N.m	25 lb ft
Tie Bar Bolt	10 N.m	89 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Filler Panel Nut	5 N.m	44 lb in
Fuel Tank Filler Door Nuts	2.8 N.m	24.8 lb in
Fuel Tank Filler Pocket Bolts	2 N.m	518 lb in
Rear Compartment Lid Applique	3 N.m	27 lb in
Rear Compartment Lid Applique Nut – Pontiac Coupe	5 N.m	44 lb in
Rear Compartment Hinge to Lid Bolts	7 N.m	62 lb in
Rear Compartment Hinge to Rear Window Panel Bolts	10 N.m	89 lb in
Rear Compartment Lid Latch Assembly Bolt	6 N.m	53 lb in
Rear Compartment Lid Lock Striker Nut	10 N.m	89 lb in
Rear Compartment Lid Remote Release Handle Screw	1 N.m	9 lb in
Rear Compartment Lid Spoiler Bolt – Chevrolet	5 N.m	44 lb in
Rear Compartment Lid Spoiler Nut	5 N.m	5 lb in
Rear Speaker Screw	12 N.m	106 lb in
Release Handle cover bolt	1 N.m	12 lb in
Release Handle screws	2 N.m	18 lb in
Spare Tire Cover Retainer	1.5 N.m	13 lb in
Tail Lamp Filler Nut	6 N.m	53 lb in

Brake Rotor/Disc

Application	Specification	
	Metric	English
Brake Rotor Diameter	259.0 mm	10.197 in
Brake Rotor Discard Thickness*	18.70 mm	0.736 in
Brake Rotor Maximum Allowable Assembled Lateral Runout	0.06 mm	0.002 in
Brake Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
Brake Rotor Maximum Allowable Thickness Variation	0.025 mm	0.001 in
Brake Rotor Minimum Allowable Thickness after Refinish	18.776 mm	0.739 in
Brake Rotor Thickness - New**	20.48 mm - 20.22 mm	0.806 in - 0.796 in
*All brake rotors have a discard dimension cast into them. Replace any rotor that does not meet this specification. After refinishing the rotor, replace any rotor that does not meet the minimum thickness specification. **New rotors could range to 19.96 mm (0.786 in) due to thickness tolerances.		

Application	Specification	
	Metric	English
Brake Drum Discard Inside Diameter	231.0 mm	9.094 in
Brake Drum Diameter – New	230.125 mm ± 0.125 mm	9.06 in ± 0.005 in
Brake Drum Maximum Allowable Radial Runout	0.104 mm	0.004 in
Brake Drum Maximum Allowable Scoring	1.5 mm	0.059 in
Brake Drum Maximum Diameter After Refinish	230.50 mm	9.075 in
Brake Shoe-to-Drum Clearance	0.635 mm	0.025 in

System Specifications

Minimum thickness of friction material ..... 0.76 mm (0.030 inch)

Brake Rotor/Disc

DISC BRAKE COMPONENT SPECIFICATIONS

Brake Rotor Diameter ..... 10.197 in (259.0 mm)

Brake Rotor Discard Thickness* ..... 0.736 in (18.70 mm)

Brake Rotor Maximum Allowable Assembled Lateral Runout ..... 0.002 in (0.06 mm)

Brake Rotor Maximum Allowable Scoring ..... 0.059 in (1.50 mm)

Brake Rotor Maximum Allowable Thickness Variation ..... 0.001 in (0.025 mm)

Brake Rotor Minimum Allowable Thickness after Refinish ..... 0.739 in (18.776 mm)

Brake Rotor Thickness - New** ..... 0.806 in - 0.796 in (20.48 mm - 20.22 mm)

***** All brake rotors have a discard dimension cast into them. Replace any rotor that does not meet this specification. After refinishing the rotor, replace any rotor that does not meet the minimum thickness specification.

****** New rotors could range to 0.786 in (19.96 mm) due to thickness tolerances.

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Fitting at the Wheel Cylinder	18 N·m	13 lb ft
Wheel Cylinder Bleeder Valve	8 N·m	71 lb in
Wheel Cylinder Mounting Bolts	16 N·m	12 lb ft

Drum Brake Component Specifications

Application	Specification	
	Metric	English
Brake Drum Discard Inside Diameter	231.00 mm	9.094 in
Brake Drum Inside Diameter – New	230.25 mm	9.065 in
Brake Drum Maximum Allowable Radial Runout	0.15 mm	0.006 in
Brake Drum Maximum Allowable Scoring	1.5 mm	0.059 in
Brake Drum Maximum Inside Diameter After Refinish	230.50 mm	9.075 in
Brake Shoe-to-Drum Clearance	0.635 mm	0.025 in

Application	Specification	
	Metric	English
Brake Drum Discard Diameter	201.4 mm	7.929 in
Brake Drum Inside Diameter - New	200.25 mm	7.884 in
Brake Drum Maximum Allowable Radial Runout	0.15 mm	0.006 in
Brake Drum Maximum Diameter After Refinish	201.019 mm	7.914 in
Brake Drum Maximum Allowable Scoring	1.5 mm	0.059 in

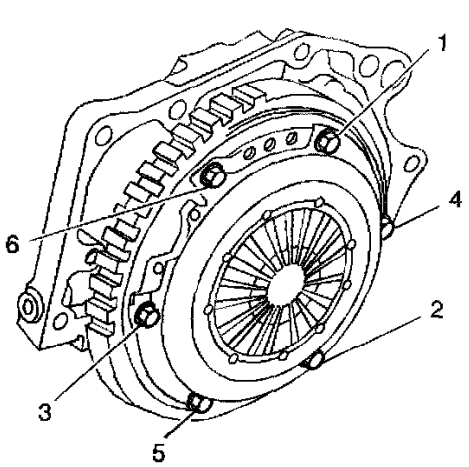
Drum Brake Component Specifications

Park Brake Warning Lamp Switch Mounting Screw	26 ft. lbs.
Parking Brake Cable Guide Mounting Nuts	81 inch lbs.
Parking Brake Level Mounting Nuts	18 ft. lbs.

Application	Specification	
	Metric	English
Clutch Actuator Bleed Screw	2 N·m	18 lb in
Clutch Cover to Flywheel	24 N·m	18 lb ft
Clutch Master Cylinder and Clutch Pedal Bracket Nut	21 N·m	15 lb ft

Fastener Tightening Specifications

Pressure Plate



clutch cover to flywheel bolts ..... 24 Nm (18 ft. lbs.)

Fastener Tightening Specifications

Fastener Tightening Specifications Part 1

Application	Specification	
	Metric	English
Fuel Pipe Mounting Bolts	6 N.m	53 lb in
Fuel Pipe Retainer Bolts	10 N.m	89 lb in
Fuel Pressure Regulator Retaining Bolt	10 N.m	89 lb in
Fuel Rail Attaching Studs	10 N.m	89 lb in
Fuel Return Line Fitting	10 N.m	89 lb in
Fuel Tank Retaining Strap Bolt	35 N.m	26 lb ft
Heated Oxygen Sensor (HO2S) 1	30 N.m	22 lb ft
Heated Oxygen Sensor (HO2S) 2	41 N.m	30 lb ft
Idle Air Control (IAC) Valve Screw	3 N.m	27 lb in
Ignition Coil Housing Retaining Bolts	10 N.m	89 lb in
Ignition Control Module (ICM) Screws	1.5 N.m	13 lb in
Knock Sensor (KS)	25 N.m	18 lb ft
Spark Plugs	20 N.m	15 lb in
Throttle Body Attaching Bolts and Studs	10 N.m	89 lb in
Throttle Body Clamp	5 N.m	44 lb in
Throttle Position (TP) Sensor Mounting Screw	2 N.m	18 lb in
Upper Air Cleaner Cover Screws	3 N.m	27 lb in

Fastener Tightening Specifications Part 2

Application	Specification	
	Metric	English
Cooling Fan Bolt	6 N·m	53 lb in
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Surge Tank Bolt	10 N·m	89 lb in
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Transmission Oil Cooler Line Fitting	36 N·m	27 lb ft
Upper Radiator Mount Bolt	10 N·m	89 lb in
Water Pump Access Cover Bolts	7 N·m	62 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolts	10 N·m	89 lb in

ENGINE COOLING / Fastener Tightening Specifications

Engine - Coolant Temperature Sensor/Switch

Engine Coolant Temperature Sensor ..... 22 Nm (16 ft. lbs.)

Radiator

Upper Radiator Mount Bolt ..... 10 Nm (89 inch lbs.)

Radiator Cooling Fan Motor

Cooling Fan Bolt ..... 6 Nm (53 inch lbs.)

Thermostat Housing, Engine Cooling

Thermostat Housing to Block Bolts ..... 10 Nm (89 inch lbs.)

Water Pump

Water Pump Access Cover Bolts ..... 7 Nm (62 inch lbs.)
Water Pump Bolts ..... 25 Nm (18 ft. lbs.)
Water Pump Sprocket Bolts ..... 10 Nm (89 inch lbs.)

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Cruise Control Module Bolts	10 N.m	89 lb in
Cruise Control Module Nuts	10 N.m	89 lb in

General Engine Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Adjustable Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Fixed Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	80 N·m	59 lb ft
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft
Flexplate (AMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flywheel (SMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	10 N·m	89 lb in
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft

Application	Specification	
	Metric	English
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	10 N·m	89 lb in
Oil Pump Cover Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Adjustable Chain Guide Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Timing Fixed Chain Guide Bolt	10 N·m	89 lb in
Timing Upper Chain Guide Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

General

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Block Heater Bolt	10 N·m	89 lb in
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	90 N·m	66 lb ft
Connecting Rod Bolt		
First Pass	25 N·m	18 lb ft
Final Pass	100 degrees	
Crankshaft Bearing – Lower Crankcase to Block		
First Pass	20 N·m	15 lb ft
Final Pass	70 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
E.G.R. Cover Bolt	25 N·m	18 lb in
Elek. ICM Cover Bolt	10 N·m	89 lb in
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
EVAP Emission Canister Valve Nut	22 N·m	16 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft

Application	Specification	
	Metric	English
Flywheel – SMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flexplate – AMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	23 N·m	17 lb ft
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Lower Crankcase to Block Peripheral Bolt	25 N·m	18 lb ft
Oil Gallery Plug	35 N·m	26 lb ft
Oil Gallery Plug – Rear	60 N·m	44 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	22 N·m	16 lb ft
Oil Pump Gerotor Cover – Rear – Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Timing Chain Guide – Fixed – Bolt	10 N·m	89 lb in
Timing Chain Guide – Upper – Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pipe Support Bracket	10 N·m	89 lb in
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

Overhaul

Engine Mechanical Specifications

Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
RPO	L61	
Oil Pressure @ 1,000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi

General

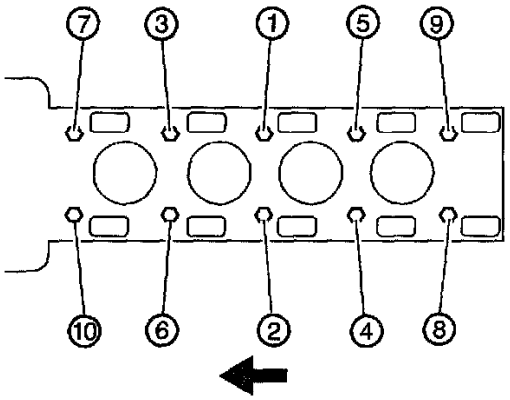
Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
VIN Code	F	
RPO	L61	
Crankshaft Sensor Gap	0.60–1.65 mm	0.0236–0.065 in
Spark Plug Gap	—	
Total Engine Balance	No Spec. Check and Record Only	
Oil Pressure @ 1000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi
Balance Shafts		
Balance Shaft Bearing Carrier Bore in Block I.D.	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bearing Carrier O.D.	41.975–41.995 mm	1.6526–1.6534 in
Balance Shaft Housing to Block Clearance	0.005–0.041 mm	0.0002–0.0016 in
Balance Shaft Bearing I.D. #1	20.050–20.063 mm	0.7894–0.7899 in
Balance Shaft Bearing I.D. #2	36.776–36.825 mm	1.4479–1.4498 in
Balance Shaft Journal O.D. #1	20.000–20.020 mm	0.7874–0.7882 in
Balance Shaft Journal O.D. #2	36.723–36.743 mm	1.4458–1.4466 in
Balance Shaft Bearing Clearance #1	0.030–0.063 mm	0.0012–0.0025 in
Balance Shaft Bearing Clearance #2	0.033–0.102 mm	0.0013–0.0040 in
Balance Shaft End Play	0.100–0.300 mm	0.0020–0.0118 in
Balance Shaft Chain Length	368.622–369.032 mm	14.5127–14.5288 in
Balance of Shafts	4.05 Kg/mm per shaft, +/–6 %	
Crankshaft		
Main Journal O.D.	55.994–56.008 mm	2.2045–2.2050 in
Main Bearing Clearance	0.031–0.067 mm	0.0012–0.0026 in
Rod Pin O.D.	49.000–49.014 mm	1.9291–1.9297 in
Rear Crankshaft Seal O.D.	89.78–90.00 mm	3.535–3.543 in
Crankshaft Endplay	0.050–0.380 mm	0.0012–0.0150 in
Balance of Crankshaft	10 g/cm max	
Balance of Flywheel	10 g/cm max	
Balance of Crankshaft Damper	0.09 kg/mm max	
Cylinder Block		
Cylinder Bore I.D.	85.992–86.008 mm	3.3855–3.3861 in
Cylinder Bore Taper	0.010 mm max.	0.0004 in max.
Cylinder Bore Out of Round	0.010 mm max.	0.0004 in max.
Deck Face Flatness – Transverse	0.030 mm	0.0012 in
Deck Face Flatness – Longitudinal	0.050 mm	0.002 in
Deck Face Flatness – Overall	0.08 mm	0.0031 in
Main Bearing Bore I.D.	64.068–64.082 mm	2.5224–2.5229 in
Main Bearing Shell Thickness	4.030–4.037 mm	0.1587–0.1589 in

Application	Specification	
	Metric	English
Main Bearing I.D.	56.035–56.065 mm	2.2061–2.2073 in
Bedplate to Block Flatness	0.50 in 100 mm 0.10 overall	
Balance Shaft Bore in Block Front	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bore in Block Rear	40.763–40.776 mm	1.6048–1.6054 in
Cylinder Head and Valve Train		
Cylinder Head Flatness	0.020 in 50 mm, 1 mm over all - Eng Spec	
Valve Guide I.D., Intake	6.000–6.012 mm	0.2362–0.2367 in
Valve Guide I.D., Exhaust	6.000–6.012 mm	0.2362–0.2367 in
Valve Stem O.D., Intake	5.955–5.970 mm	0.2344–0.2355 in
Valve Stem O.D., Exhaust	5.935–5.950 mm	0.2337–0.2343 in
Stem to Guide Clearance, Intake	0.030–0.057 mm	0.0012–0.0022 in
Stem to Guide Clearance, Exhaust	0.050–0.077 mm	0.0020–0.0026 in
Valve Spring Load @ 32.5 mm, Closed	245.0–271.0 N. - Eng Spec	
Valve Spring Load @ 32.5 mm, Open	525.0–575.0 N. - Eng Spec	
Valve Stem Installed Heights	Check and Record	
Valve Seat Run-out	0.05 mm max.	0.0020 in max.
Valve Face Run-out	0.04 mm max.	0.0016 in max.
Combustion Chamber Volume	52.7 +/– 2.5 cc	
Engine Clearance Volume	65.26 +/– 2.5 cc	
Compression Ratio	10:1	
Cam Bearing I.D.	27.000–27.021 mm	1.0630–1.0638 in
Cam Journal O.D.	26.935–26.960 mm	1.0604–1.0614 in
Camshaft Bearing Clearance	0.040–0.086 mm	0.0016–0.0034 in
Camshaft Thrust Width-Cylinder Head	20.868–20.920 mm	0.8215–0.8236 in
Camshaft Thrust Width-Camshaft	21.000–21.052 mm	0.8268–0.8252 in
Camshaft Endplay	0.040–0.144 mm	0.0016–0.0057 in
Stationary Lash Adjuster Bore I.D.	12.013–12.037 mm	0.4730–0.4739 in
Stationary Lash Adjuster O.D.	11.986–12.000 mm	0.0005–0.0020 in
Stationary Lash Adjuster Clearance	0.013–0.051 mm	3.2210–3.2299 in
Timing Chain Length	477.367–477.817 mm	18.7940–18.8117 in
Cam Timing, Intake	114–120° ATDC	
Cam Timing, Exhaust	111.5–117.5° BTDC	
Oil Pump and Components		
Gerotor Pocket I.D.	—	—
Outer Element O.D.	41.8 mm	1.65 In
Outer Element Clearance	0.035 mm	0.012 in
Gerotor Pocket Depth	—	—
Outer Element Thickness	14.0 mm	0.5512 in
Inner Element Thickness	13.98 mm	0.5504 in
Pocket Depth Clearance, Outer	—	—
Pocket Depth Clearance, Inner	—	—

Application	Specification	
	Metric	English
Pressure Relief Valve I.D.	—	—
Pressure Relief Valve O.D.	—	—
Pressure Relief Valve Clearance	—	—
Pressure Relief Valve Spring Working Length	56.5 mm	2.2244 in
Pressure Relief Valve Tension – Length	—	—
Pistons and Connecting Rods		
Piston Diameter @ 14.5 mm up	85.967–85.982 mm	3.3845–3.3851 in
Piston to Bore Clearance	0.010–0.041 mm	0.0004–0.0016 in
Piston Weight	—	—
Piston Height	Max. –0.9 mm below deck	
Piston Pin Bore I.D.	20.002–20.007 mm	0.7875–0.7877 in
Ring Groove Width, Top	1.23–1.25 mm	0.0484–0.0492 in
Ring Groove Width, Second	1.52–1.54 mm	0.0598–0.0606 in
Ring Groove Width, Oil Control	2.52–2.54 mm	0.0992–0.1000 in
Piston Ring Thickness, Top	1.170–1.190 mm	0.0461–0.0469 in
Piston Ring Thickness, Second	1.471–1.490 mm	0.0579–0.0587 in
Piston Ring Thickness, Oil Control Rail	0.43 mm max.	0.0169 in max.
Piston Ring Thickness, Oil Control Spacer	1.574–1.651 mm	0.0620–0.0650 in
Ring to Groove Clearance, Top	0.04–0.08 mm	0.0015–0.0031 in
Ring to Groove Clearance, Second	0.030–0.069 mm	0.0012–0.0027 in
Ring to Groove Clearance, Oil Control	0.090–0.106 mm	0.0035–0.0042 in
Ring Gap, Top	0.20–0.40 mm	0.008–0.016 in
Ring Gap, Second	0.35–0.55 mm	0.014–0.022 in
Ring Gap, Oil Rails	0.25–0.76 mm	0.010–0.030 in
Rod Bearing Bore I.D.	52.118–52.134 mm	2.0519–2.0525 in
Rod Bearing Shell Thickness	1.539–1.545 mm	0.0606–0.608 in
Rod Bearing I.D., 90 degree	49.043–49.073 mm	1.9308–1.9320 in
Rod Bearing I.D., 45 degree	With-in +0.009 / –0.004 of 90 degree spec.	
Rod Bearing to Crankpin Clearance	0.029–0.069 mm	0.0011–0.0027 in
Rod Small End I.D.	20.007–20.021 mm	—
Piston Pin O.D.	19.995–20.000 mm	0.7872–0.7874 in
Piston to Pin Clearance	0.002–0.012 mm	0.0001–0.0005 in
Pin to Rod Clearance	0.007–0.026 mm	—
Rod Side Clearance	0.070–0.370 mm	0.0028–0.0146 in
Rod Twist	0.040 max.	
Rod Bend	0.021 max.	
Rod Large End Micro	2.0 Ra max.	
Rod Small End Micro	0.3 Ra max.	
Piston Pin Endplay	0.19–1.16 mm	0.007 5–0.0461 in

Overhaul

Tightening Sequence

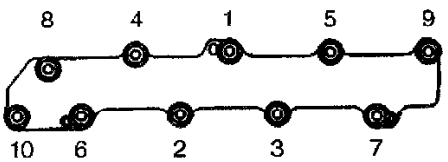


Cylinder Head

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Cylinder Head Assembly/Service and Repair

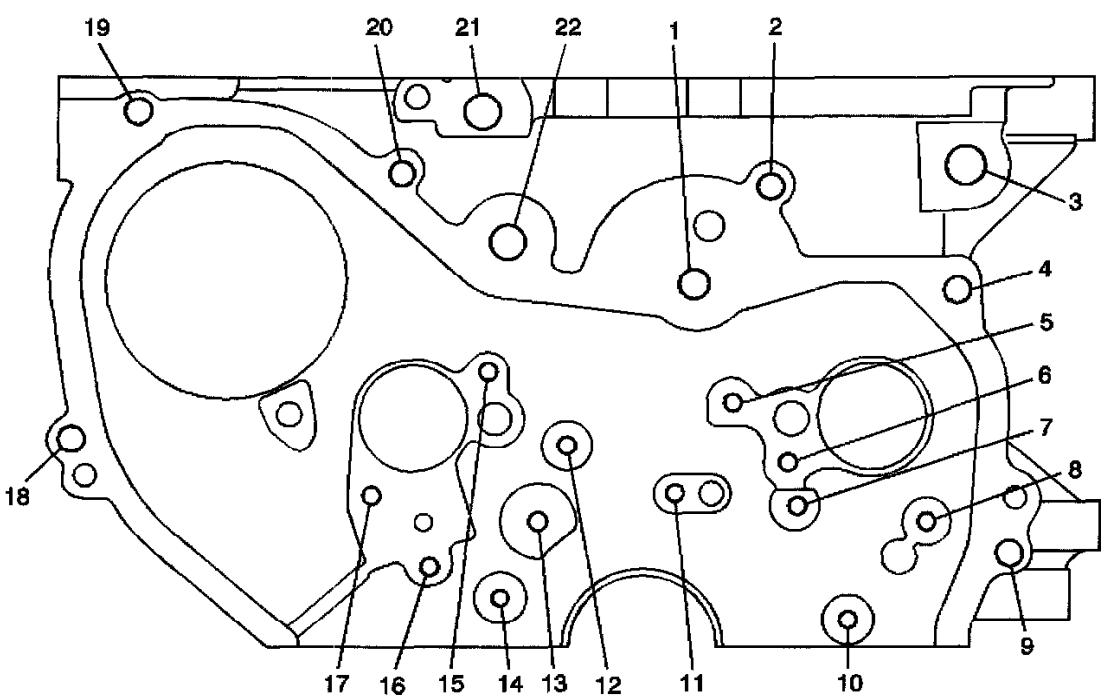
Camshaft Bearing Caps

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Camshaft, Lifters and Push Rods/Camshaft/Service and Repair



Exhaust Manifold

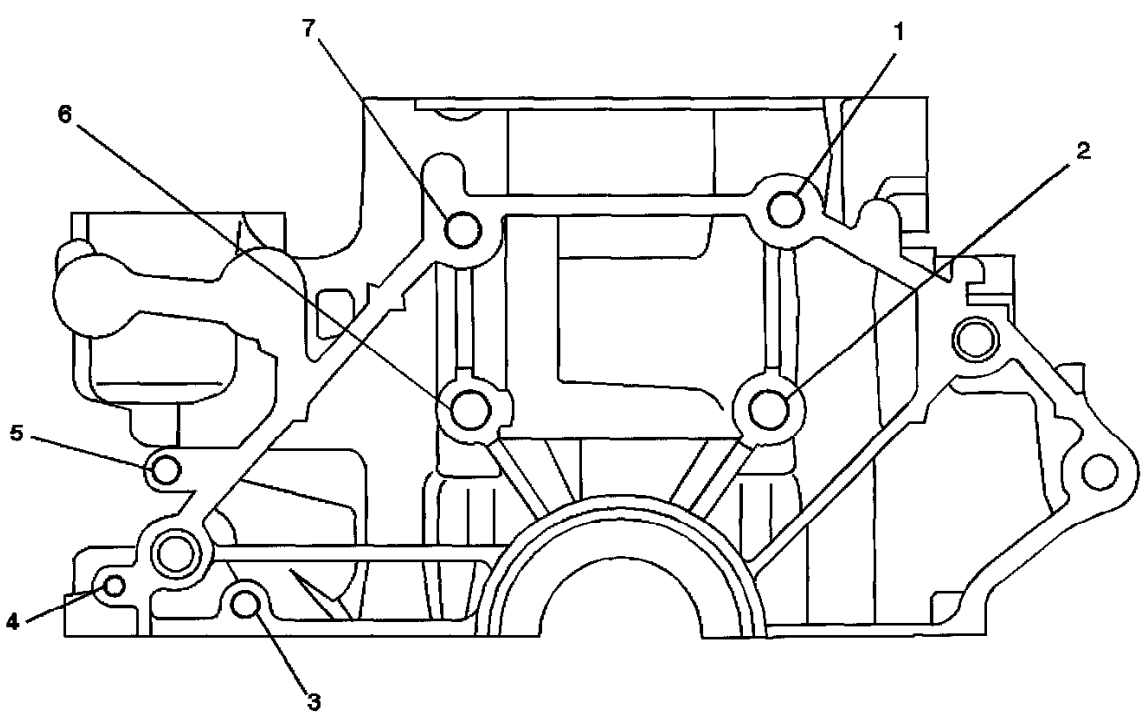
Thread Repair Specifications



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	24.5	0.96	19.5	0.77	117
2	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	109
3	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	114
4	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	110
5	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	129
6	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	130
7	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	125
8	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	126
9	M8 x 1.25	210	206	207	208	209	25.5	1.00	THRU		111
10	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	127
11	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	122
12	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	128
13	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	124
14	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	123
15	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	131
16	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	119
17	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	120
18	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	106
19	M8 x 1.25	210	206	207	208	209	55	2.17	THRU		112

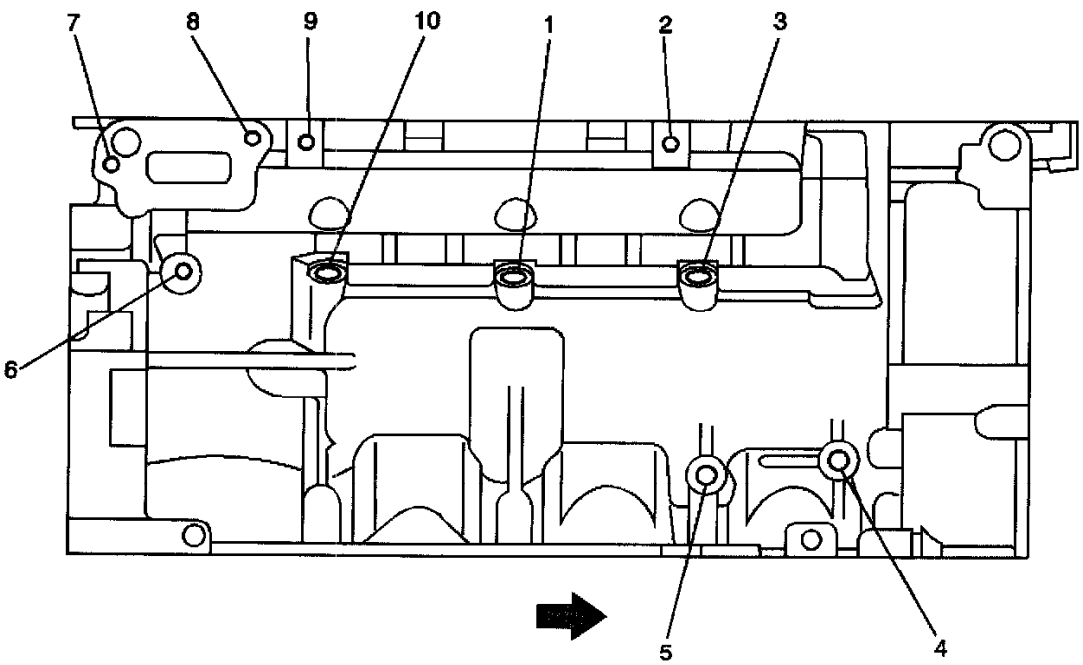
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
20	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	108
21	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	116
22	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	115

Engine Block-Front View



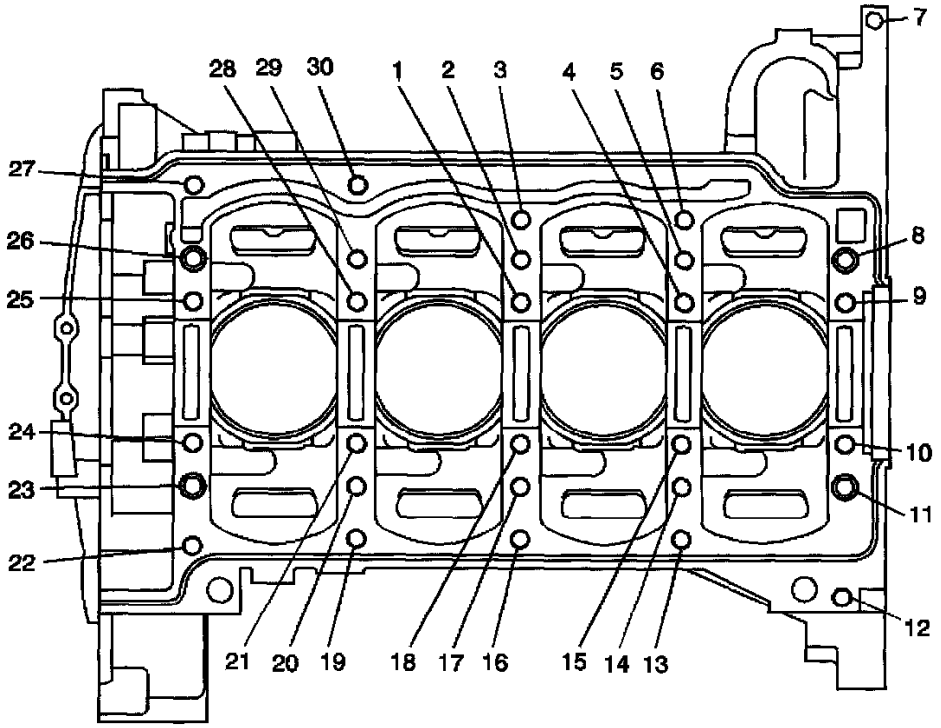
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	204
2	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	214
3	M10 x 1.5	215	211	212	213	214	29	1.161	THRU		206
4	M8 x 1.25	210	206	207	208	209	18	0.709	THRU		209
5	M8 x 1.25	854 No Flange	206	207	208	209	18	0.709	THRU		208
6	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	213
7	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	203

Engine Block-Back View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	515
2	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
3	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	514
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	521
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	519
6	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	513
7	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	512
8	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	511
9	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
10	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	516

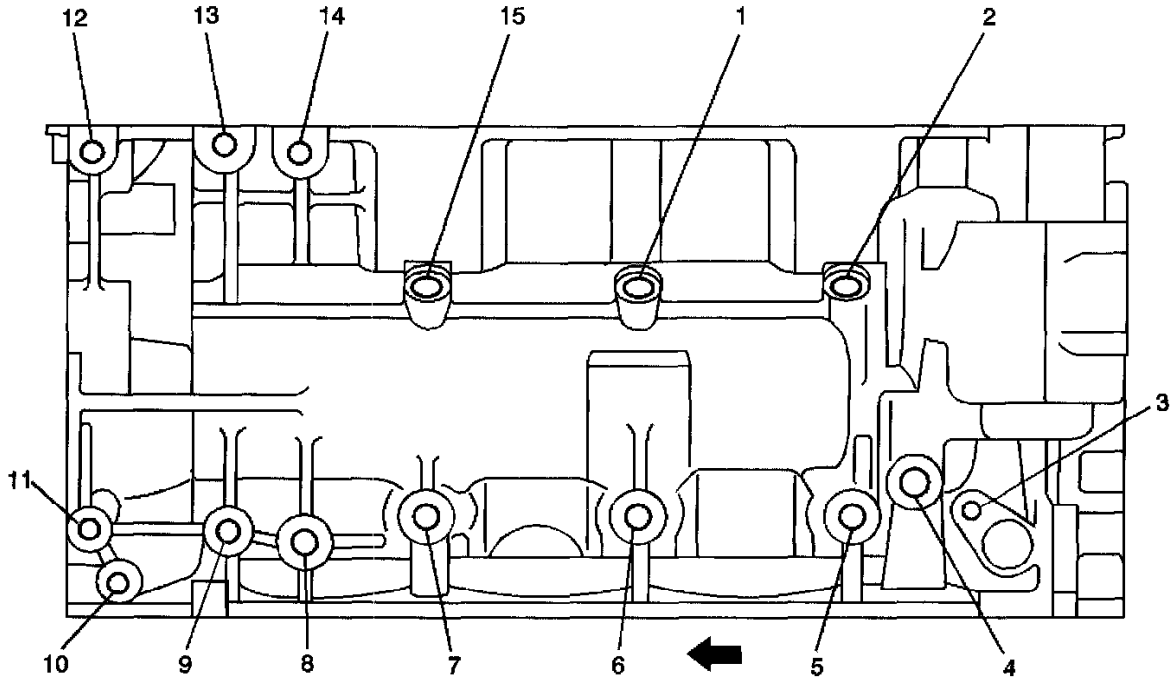
Engine Block-Left Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1415
2	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1408
3	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1425
4	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1416
5	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1409
6	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1426
7	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1432
8	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1404
9	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1417
10	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1422
11	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1406
12	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1431
13	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1430
14	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1412
15	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1421
16	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1429
17	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1411
18	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1420
19	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1428
20	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1410

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
21	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1419
22	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1427
23	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1405
24	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1418
25	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1413
26	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1403
27	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1423
28	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1414
29	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1407
30	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1424

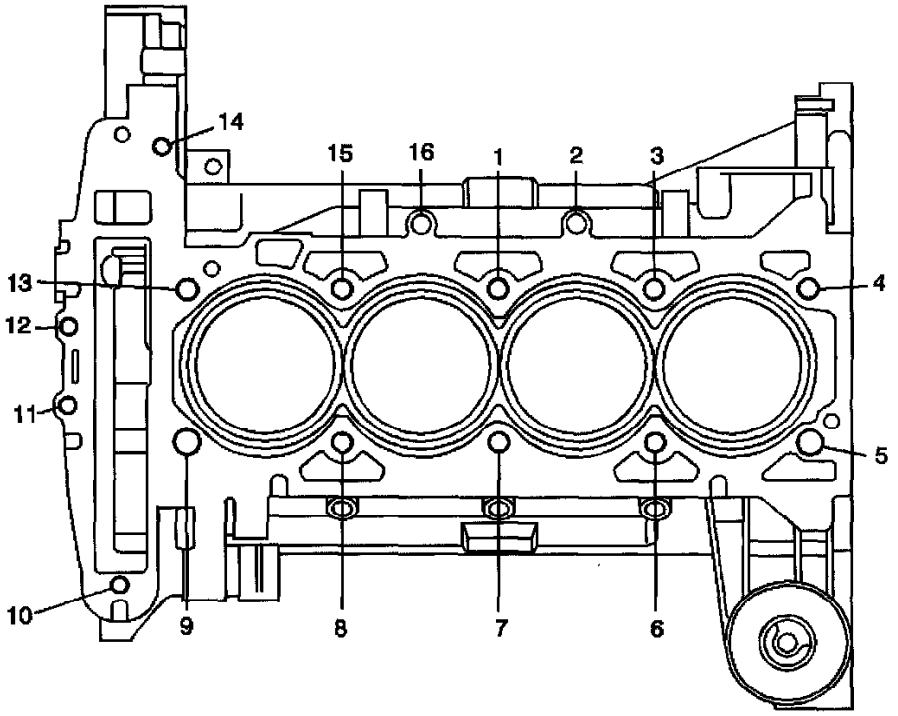
Engine Block-Bottom View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	613
2	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	612
3	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.5	.065	610
4	M12 x 1.75	865	856	857	858	859	15.50	0.610	12.5	0.49	606
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	609
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	608

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	607
8	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	617
9	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	604
10	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	605
11	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	603
12	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	601
13	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	602
14	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	616
15	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	614

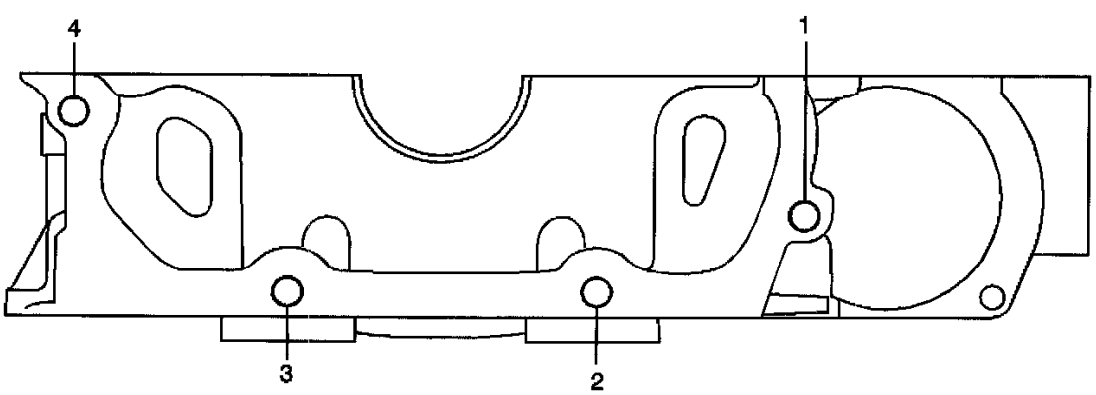
Engine Block-Right Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	308
2	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	317
3	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	309
4	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	310
5	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	302
6	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	305

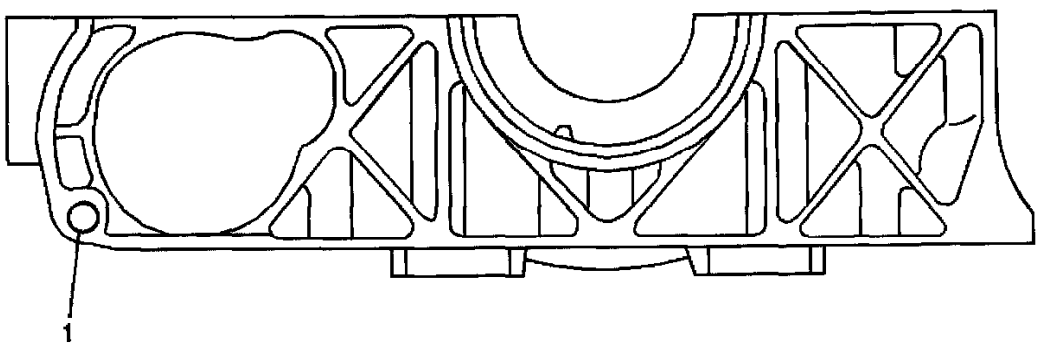
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	304
8	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	303
9	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	301
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	313
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	311
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	312
13	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	306
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	314
15	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	307
16	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	316

Engine Block-Top View



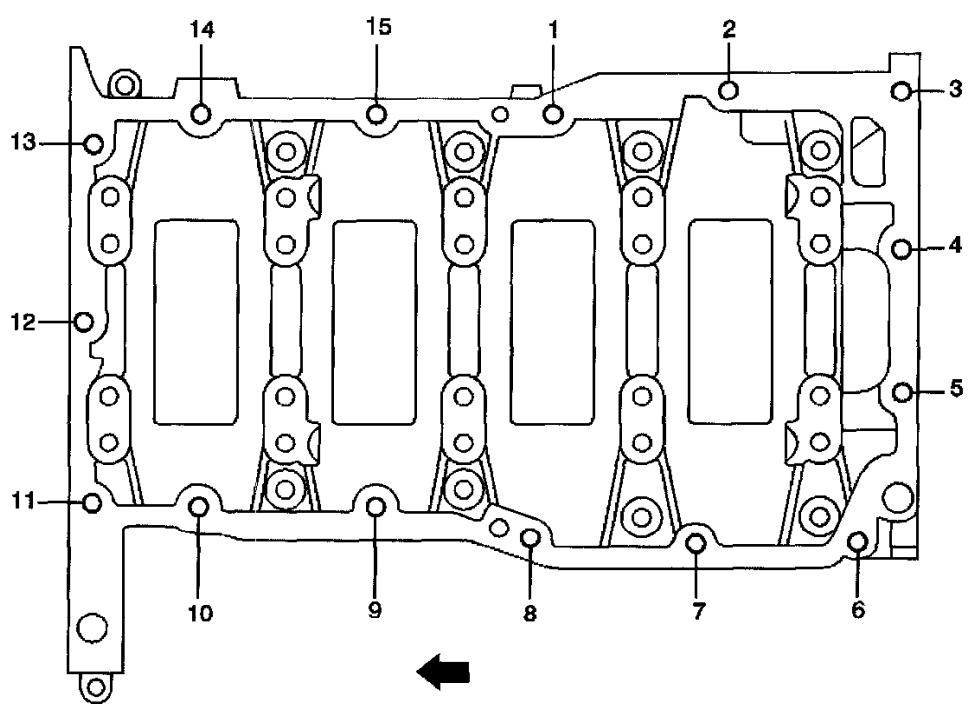
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	138
2	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	139
3	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	140
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	141

Lower Crankcase - Front View



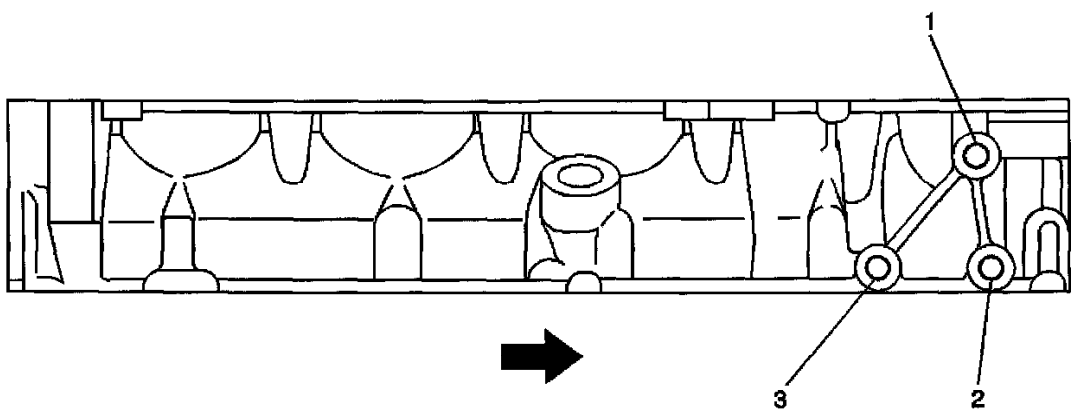
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	29.50	1.161	THRU		207

Lower Crankcase-Back View



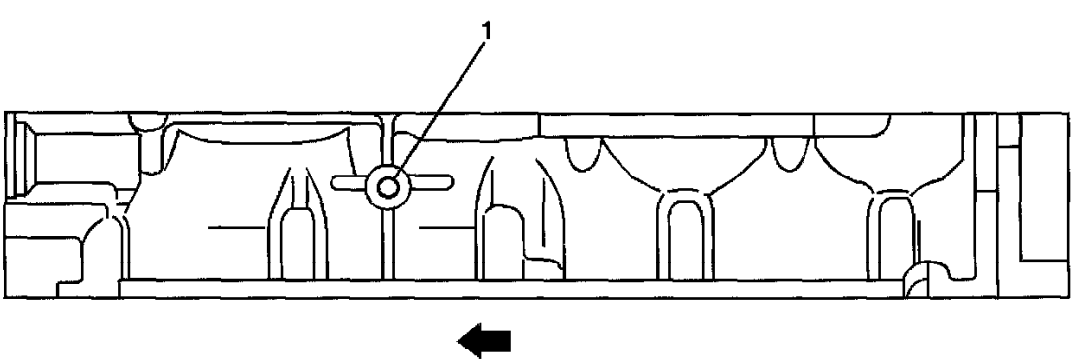
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	415
2	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	416
3	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	417
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	418
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	419
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	405
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	406
8	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	407
9	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	408
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	409
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	410
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	411
13	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	412
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	413
15	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	414

Lower Crankcase - Bottom View



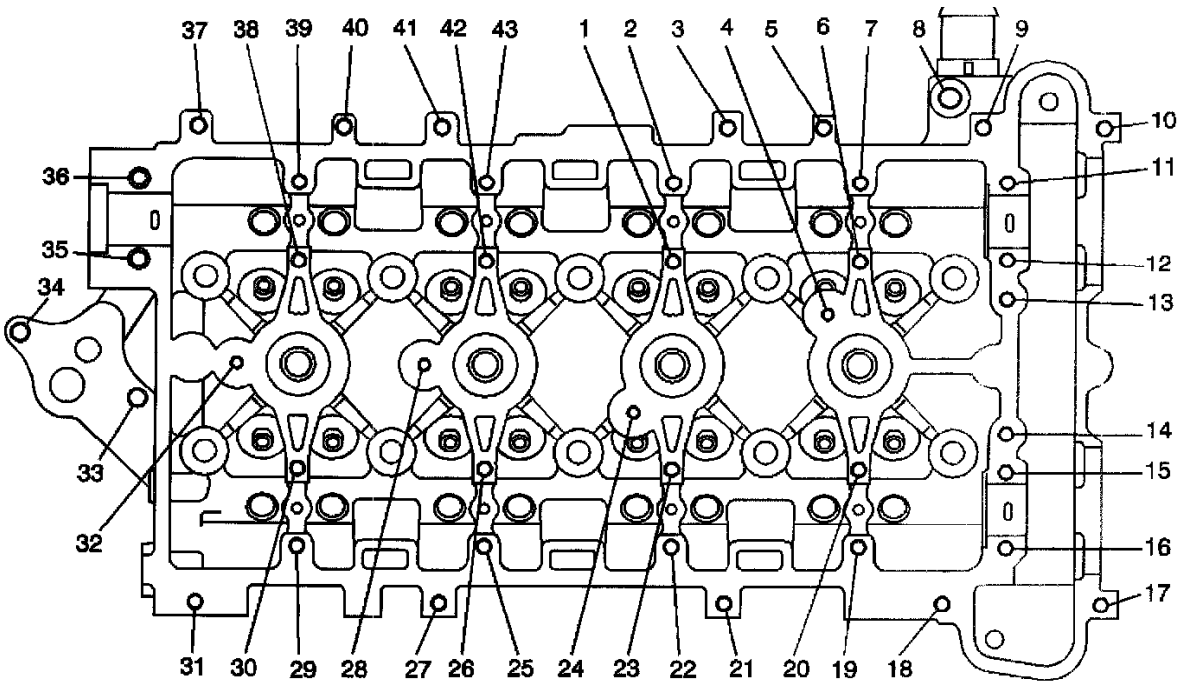
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	518
2	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	517
3	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	520

Lower Crankcase - Left View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	211	212	213	214	30.50	1.201	22.5	0.886	615

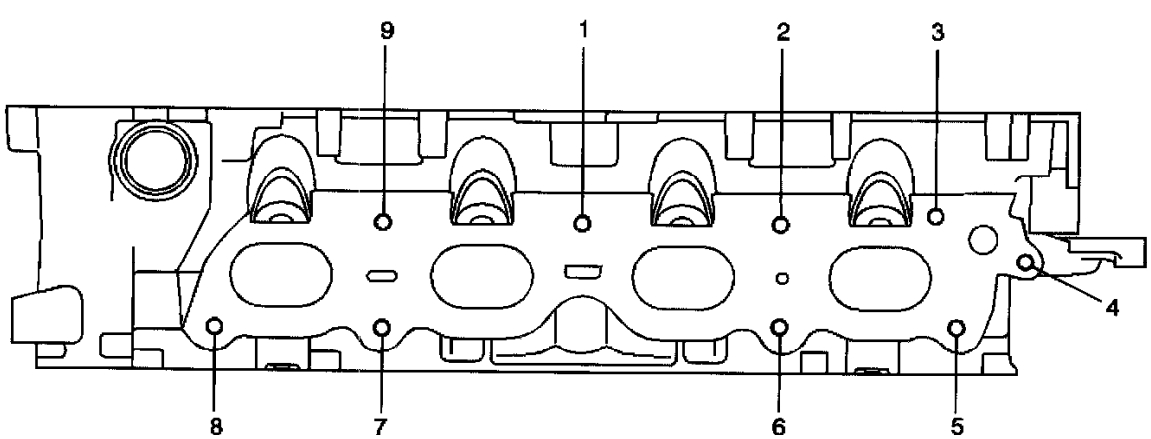
Lower Crankcase-Right View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2515
2	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2514
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2812
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2820
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2710
6	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2513
7	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2512
8	M8 x 1.25	854 No Flange	206	207	208	209	THRU		THRU		2980
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2811
10	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2810
11	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2510
12	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2511
13	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2910
14	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2911
15	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2520
16	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2521
17	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2815

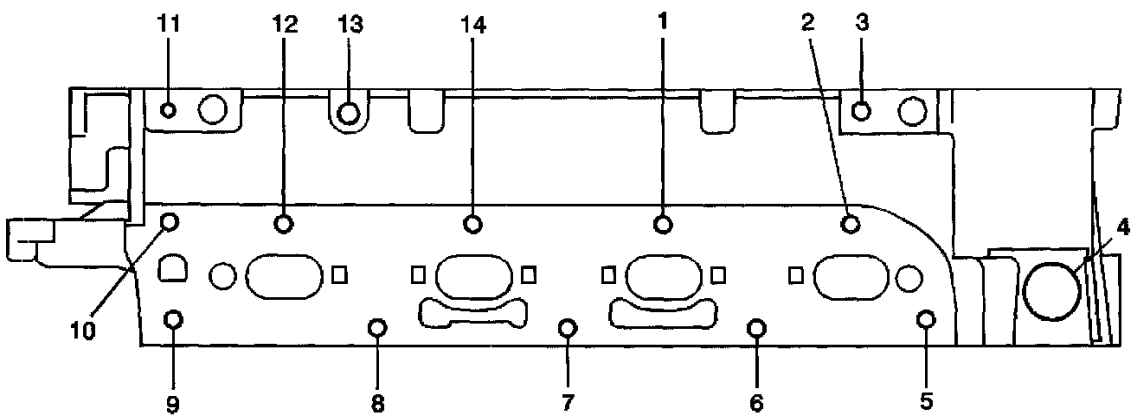
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
18	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2816
19	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2523
20	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2522
21	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2817
22	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2525
23	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2524
24	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2821
25	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2527
26	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2526
27	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2818
28	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2822
29	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2529
30	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2528
31	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2819
32	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2823
33	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2621
34	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2622
35	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2541
36	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2540
37	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2814
38	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2519
39	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2518
40	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2711
41	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2813
42	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2517
43	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2516

Cylinder Head-Top View



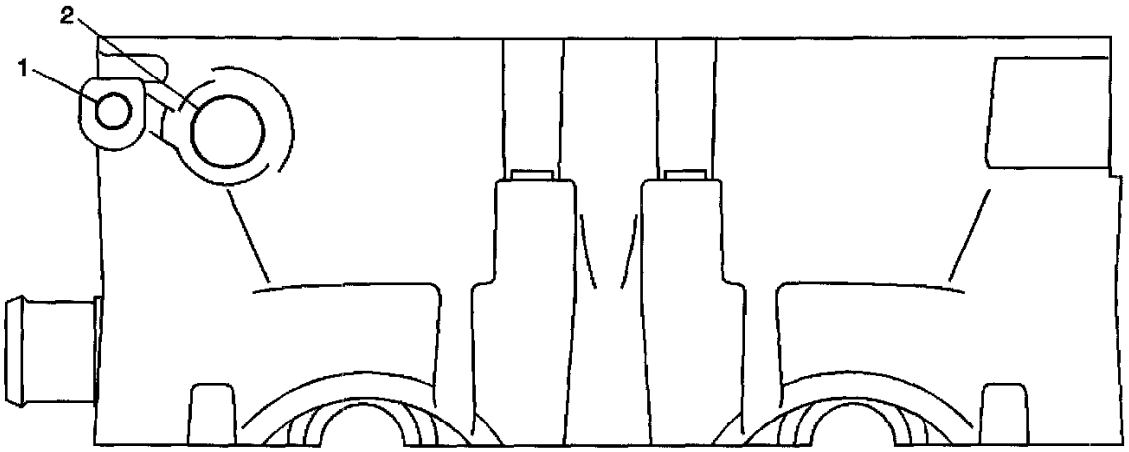
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4117
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4116
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4115
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4114
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4113
6	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4112
7	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4111
8	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4110
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4118

Cylinder Head-Intake Manifold Deck View



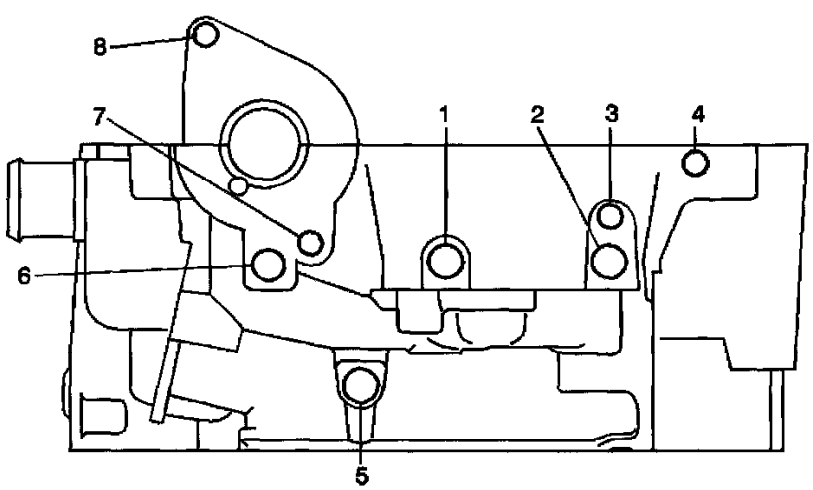
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3118
2	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3119
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3210
4	M27 x 2.0	N/A	N/A	N/A	N/A	N/A	THRU		12	0.78	3810
5	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3110
6	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3111
7	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3112
8	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3113
9	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3114
10	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3115
11	M6 x 1.0	205	201	202	203	204	20	0.78	16	0.630	3310
12	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3116
13	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3610
14	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3117

Cylinder Head-Exhaust Manifold Deck View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	6310
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	6210

Cylinder Head-Front View

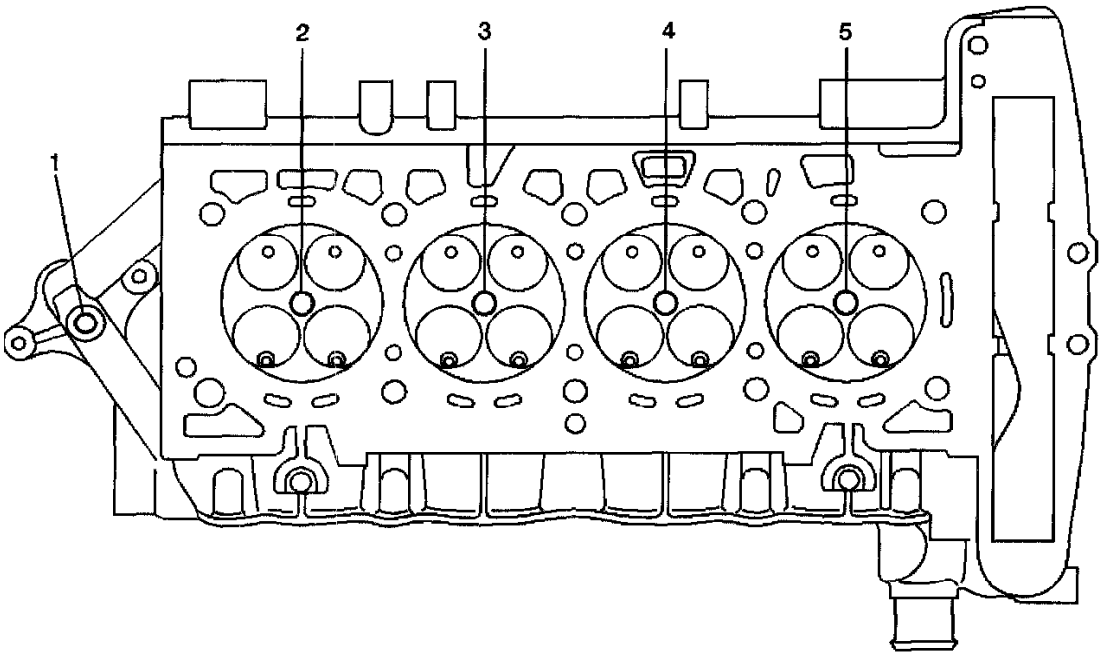


Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5011
2	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5010
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5031
4	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5030
5	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5310
6	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5020
7	M8 x 1.25	210	206	207	208	209	25	0.984	THRU		5111
8	M8 x 1.25	854 No Flange	206	207	208	209	25	0.984	THRU		5110

Note: 1, 2, 5, 6 holes are oil passages.

Cylinder Head-Back View

Note: 1, 2, 5, 6 holes are oil passages.



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	1510
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1213
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1212
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1211
5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1210

Cylinder Head-Bottom View

Metric-English Conversion Factors

CONVERSION FACTORS

Length-Distance				
Inches (in.)	x 25.4	= Millimeters (mm)	x .0394	= Inches
Feet (ft.)	x .305	= Meters (m)	x 3.281	= Feet
Miles	x 1.609	= Kilometers (km)	x .0621	= Miles
Volume				
Cubic Inches (in3)	x 16.387	= Cubic Centimeters	x .061	= in3
IMP Pints (IMP pt.)	x .568	= Liters (L)	x 1.76	= IMP pt.
IMP Quarts (IMP qt.)	x 1.137	= Liters (L)	x .88	= IMP qt.
IMP Gallons (IMP gal.)	x 4.546	= Liters (L)	x .22	= IMP gal.
IMP Quarts (IMP qt.)	x 1.201	= US Quarts (US qt.)	x .833	= IMP qt.
IMP Gallons (IMP gal.)	x 1.201	= US Gallons (US gal.)	x .833	= IMP gal.
Fl. Ounces	x 29.573	= Milliliters	x .034	= Ounces
US Pints (US pt.)	x .473	= Liters (L)	x 2.113	= Pints
US Quarts (US qt.)	x .946	= Liters (L)	x 1.057	= Quarts
US Gallons (US gal.)	x 3.785	= Liters (L)	x .264	= Gallons
Mass-Weight				
Ounces (oz.)	x 28.35	= Grams (g)	x .035	= Ounces
Pounds (lb.)	x .454	= Kilograms (kg)	x 2.205	= Pounds
Pressure				
Pounds Per Sq. In. (psi)	x 6.895	= Kilopascals (kPa)	x .145	= psi
Inches of Mercury (Hg)	x .4912	= psi	x 2.036	= Hg
Inches of Mercury (Hg)	x 3.377	= Kilopascals (kPa)	x .2961	= Hg
Inches of Water (H2O)	x .07355	= Inches of Mercury	x 13.783	= H2O
Inches of Water (H2O)	x .03613	= psi	x 27.684	= H2O
Inches of Water (H2O)	x .248	= Kilopascals (kPa)	x 4.026	= H2O
Torque				
Pounds-Force Inches (in-lb)	x .113	= Newton Meters (N•m)	x 8.85	= in-lb
Pounds-Force Feet (ft-lb)	x 1.356	= Newton Meters (N•m)	x .738	= ft-lb
Velocity				
Miles Per Hour (mph)	x 1.609	= Kilometers Per Hour (KPH)	x .621	= MPH
Power				
Horsepower (Hp)	x .745	= Kilowatts	x 1.34	= Horsepower

Miles Per Gallon IMP (MPG)	x .354	= Kilometers Per Liter (Km/L)
Kilometers Per Liter (Km/L)	x 2.352	= IMP MPG
Miles Per Gallon US (MPG)	x .425	= Kilometers Per Liter (Km/L)
Kilometers Per Liter (Km/L)	x 2.352	= US MPG

*It is common to convert from miles per gallon (mpg) to liters/100 kilometers (1/100 km), where mpg (IMP) x 1/100 km = 282 and mpg (US) x 1/100 km = 235.

Temperature	
Degree Fahrenheit (^{O}F)	= (^{O}C x 1.8) + 32
Degree Celsius (^{O}C)	= (^{O}F - 32) x .56

Camshaft Bearing

For Camshaft Bearing cap Tightening Sequence: Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Camshaft, Lifters and Push Rods/

Camshaft Bearing Cap Bolt	10 Nm (89 inch lbs.)
Intake Camshaft Rear Cap Bolt	25 Nm (18 ft. lbs.)
Cam Bearing I.D.	27.000-27.021 mm (1.0630-1.0638 inch)
Camshaft Bearing Clearance	0.040-0.086 mm (0.0016-0.0034 inch)

Camshaft Gear/Sprocket

Camshaft Sprocket Bolt
- First Pass ..... 85 Nm (63 ft. lbs.)
- Final Pass ..... 30 degrees

Camshaft, Engine

Camshaft Bearing Cap Bolt ..... 10 Nm (89 inch lbs.)
Intake Camshaft Rear Cap Bolt ..... 25 Nm (18 ft. lbs.)
Cam Bearing I.D. ..... 27.000-27.021 mm (1.0630-1.0638 inch)
Cam Journal O.D. ..... 26.935-26.960 mm (1.0604-1.0614 inch)
Camshaft Bearing Clearance ..... 0.040-0.086 mm (0.0016-0.0034 inch)
Camshaft Thrust Width-Cylinder Head ..... 20.868-20.920 mm (0.8215-0.8236 inch)
Camshaft Thrust Width-Camshaft ..... 21.000-21.052 mm (0.8268-0.8252 inch)
Camshaft Endplay ..... 0.040-0.144 mm (0.0016-0.0057 inch)
Cam Timing, Intake ..... 114-120° ATDC
Cam Timing, Exhaust ..... 111.5-117.5° BTDC

System Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Adjustable Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Fixed Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	80 N·m	59 lb ft
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft
Flexplate (AMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flywheel (SMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	10 N·m	89 lb in
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft

Application	Specification	
	Metric	English
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	10 N·m	89 lb in
Oil Pump Cover Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Adjustable Chain Guide Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Timing Fixed Chain Guide Bolt	10 N·m	89 lb in
Timing Upper Chain Guide Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

General

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Block Heater Bolt	10 N·m	89 lb in
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	90 N·m	66 lb ft
Connecting Rod Bolt		
First Pass	25 N·m	18 lb ft
Final Pass	100 degrees	
Crankshaft Bearing – Lower Crankcase to Block		
First Pass	20 N·m	15 lb ft
Final Pass	70 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
E.G.R. Cover Bolt	25 N·m	18 lb in
Elek. ICM Cover Bolt	10 N·m	89 lb in
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
EVAP Emission Canister Valve Nut	22 N·m	16 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft

Application	Specification	
	Metric	English
Flywheel – SMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flexplate – AMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	23 N·m	17 lb ft
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Lower Crankcase to Block Peripheral Bolt	25 N·m	18 lb ft
Oil Gallery Plug	35 N·m	26 lb ft
Oil Gallery Plug – Rear	60 N·m	44 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	22 N·m	16 lb ft
Oil Pump Gerotor Cover – Rear – Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Timing Chain Guide – Fixed – Bolt	10 N·m	89 lb in
Timing Chain Guide – Upper – Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pipe Support Bracket	10 N·m	89 lb in
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

Overhaul

Engine Mechanical Specifications

Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
RPO	L61	
Oil Pressure @ 1,000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi

General

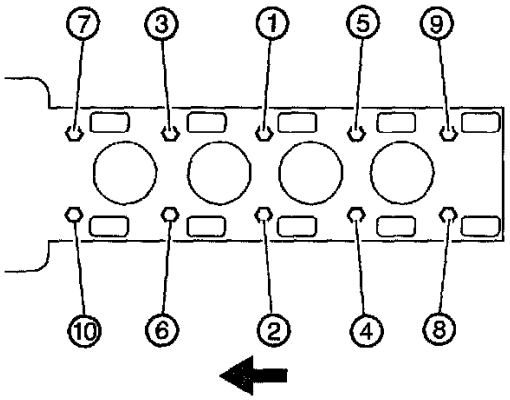
Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
VIN Code	F	
RPO	L61	
Crankshaft Sensor Gap	0.60–1.65 mm	0.0236–0.065 in
Spark Plug Gap	—	
Total Engine Balance	No Spec. Check and Record Only	
Oil Pressure @ 1000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi
Balance Shafts		
Balance Shaft Bearing Carrier Bore in Block I.D.	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bearing Carrier O.D.	41.975–41.995 mm	1.6526–1.6534 in
Balance Shaft Housing to Block Clearance	0.005–0.041 mm	0.0002–0.0016 in
Balance Shaft Bearing I.D. #1	20.050–20.063 mm	0.7894–0.7899 in
Balance Shaft Bearing I.D. #2	36.776–36.825 mm	1.4479–1.4498 in
Balance Shaft Journal O.D. #1	20.000–20.020 mm	0.7874–0.7882 in
Balance Shaft Journal O.D. #2	36.723–36.743 mm	1.4458–1.4466 in
Balance Shaft Bearing Clearance #1	0.030–0.063 mm	0.0012–0.0025 in
Balance Shaft Bearing Clearance #2	0.033–0.102 mm	0.0013–0.0040 in
Balance Shaft End Play	0.100–0.300 mm	0.0020–0.0118 in
Balance Shaft Chain Length	368.622–369.032 mm	14.5127–14.5288 in
Balance of Shafts	4.05 Kg/mm per shaft, +/–6 %	
Crankshaft		
Main Journal O.D.	55.994–56.008 mm	2.2045–2.2050 in
Main Bearing Clearance	0.031–0.067 mm	0.0012–0.0026 in
Rod Pin O.D.	49.000–49.014 mm	1.9291–1.9297 in
Rear Crankshaft Seal O.D.	89.78–90.00 mm	3.535–3.543 in
Crankshaft Endplay	0.050–0.380 mm	0.0012–0.0150 in
Balance of Crankshaft	10 g/cm max	
Balance of Flywheel	10 g/cm max	
Balance of Crankshaft Damper	0.09 kg/mm max	
Cylinder Block		
Cylinder Bore I.D.	85.992–86.008 mm	3.3855–3.3861 in
Cylinder Bore Taper	0.010 mm max.	0.0004 in max.
Cylinder Bore Out of Round	0.010 mm max.	0.0004 in max.
Deck Face Flatness – Transverse	0.030 mm	0.0012 in
Deck Face Flatness – Longitudinal	0.050 mm	0.002 in
Deck Face Flatness – Overall	0.08 mm	0.0031 in
Main Bearing Bore I.D.	64.068–64.082 mm	2.5224–2.5229 in
Main Bearing Shell Thickness	4.030–4.037 mm	0.1587–0.1589 in

Application	Specification	
	Metric	English
Main Bearing I.D.	56.035–56.065 mm	2.2061–2.2073 in
Bedplate to Block Flatness	0.50 in 100 mm 0.10 overall	
Balance Shaft Bore in Block Front	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bore in Block Rear	40.763–40.776 mm	1.6048–1.6054 in
Cylinder Head and Valve Train		
Cylinder Head Flatness	0.020 in 50 mm, 1 mm over all - Eng Spec	
Valve Guide I.D., Intake	6.000–6.012 mm	0.2362–0.2367 in
Valve Guide I.D., Exhaust	6.000–6.012 mm	0.2362–0.2367 in
Valve Stem O.D., Intake	5.955–5.970 mm	0.2344–0.2355 in
Valve Stem O.D., Exhaust	5.935–5.950 mm	0.2337–0.2343 in
Stem to Guide Clearance, Intake	0.030–0.057 mm	0.0012–0.0022 in
Stem to Guide Clearance, Exhaust	0.050–0.077 mm	0.0020–0.0026 in
Valve Spring Load @ 32.5 mm, Closed	245.0–271.0 N. - Eng Spec	
Valve Spring Load @ 32.5 mm, Open	525.0–575.0 N. - Eng Spec	
Valve Stem Installed Heights	Check and Record	
Valve Seat Run-out	0.05 mm max.	0.0020 in max.
Valve Face Run-out	0.04 mm max.	0.0016 in max.
Combustion Chamber Volume	52.7 +/– 2.5 cc	
Engine Clearance Volume	65.26 +/– 2.5 cc	
Compression Ratio	10:1	
Cam Bearing I.D.	27.000–27.021 mm	1.0630–1.0638 in
Cam Journal O.D.	26.935–26.960 mm	1.0604–1.0614 in
Camshaft Bearing Clearance	0.040–0.086 mm	0.0016–0.0034 in
Camshaft Thrust Width-Cylinder Head	20.868–20.920 mm	0.8215–0.8236 in
Camshaft Thrust Width-Camshaft	21.000–21.052 mm	0.8268–0.8252 in
Camshaft Endplay	0.040–0.144 mm	0.0016–0.0057 in
Stationary Lash Adjuster Bore I.D.	12.013–12.037 mm	0.4730–0.4739 in
Stationary Lash Adjuster O.D.	11.986–12.000 mm	0.0005–0.0020 in
Stationary Lash Adjuster Clearance	0.013–0.051 mm	3.2210–3.2299 in
Timing Chain Length	477.367–477.817 mm	18.7940–18.8117 in
Cam Timing, Intake	114–120° ATDC	
Cam Timing, Exhaust	111.5–117.5° BTDC	
Oil Pump and Components		
Gerotor Pocket I.D.	—	—
Outer Element O.D.	41.8 mm	1.65 In
Outer Element Clearance	0.035 mm	0.012 in
Gerotor Pocket Depth	—	—
Outer Element Thickness	14.0 mm	0.5512 in
Inner Element Thickness	13.98 mm	0.5504 in
Pocket Depth Clearance, Outer	—	—
Pocket Depth Clearance, Inner	—	—

Application	Specification	
	Metric	English
Pressure Relief Valve I.D.	—	—
Pressure Relief Valve O.D.	—	—
Pressure Relief Valve Clearance	—	—
Pressure Relief Valve Spring Working Length	56.5 mm	2.2244 in
Pressure Relief Valve Tension – Length	—	—
Pistons and Connecting Rods		
Piston Diameter @ 14.5 mm up	85.967–85.982 mm	3.3845–3.3851 in
Piston to Bore Clearance	0.010–0.041 mm	0.0004–0.0016 in
Piston Weight	—	—
Piston Height	Max. –0.9 mm below deck	
Piston Pin Bore I.D.	20.002–20.007 mm	0.7875–0.7877 in
Ring Groove Width, Top	1.23–1.25 mm	0.0484–0.0492 in
Ring Groove Width, Second	1.52–1.54 mm	0.0598–0.0606 in
Ring Groove Width, Oil Control	2.52–2.54 mm	0.0992–0.1000 in
Piston Ring Thickness, Top	1.170–1.190 mm	0.0461–0.0469 in
Piston Ring Thickness, Second	1.471–1.490 mm	0.0579–0.0587 in
Piston Ring Thickness, Oil Control Rail	0.43 mm max.	0.0169 in max.
Piston Ring Thickness, Oil Control Spacer	1.574–1.651 mm	0.0620–0.0650 in
Ring to Groove Clearance, Top	0.04–0.08 mm	0.0015–0.0031 in
Ring to Groove Clearance, Second	0.030–0.069 mm	0.0012–0.0027 in
Ring to Groove Clearance, Oil Control	0.090–0.106 mm	0.0035–0.0042 in
Ring Gap, Top	0.20–0.40 mm	0.008–0.016 in
Ring Gap, Second	0.35–0.55 mm	0.014–0.022 in
Ring Gap, Oil Rails	0.25–0.76 mm	0.010–0.030 in
Rod Bearing Bore I.D.	52.118–52.134 mm	2.0519–2.0525 in
Rod Bearing Shell Thickness	1.539–1.545 mm	0.0606–0.608 in
Rod Bearing I.D., 90 degree	49.043–49.073 mm	1.9308–1.9320 in
Rod Bearing I.D., 45 degree	With-in +0.009 / –0.004 of 90 degree spec.	
Rod Bearing to Crankpin Clearance	0.029–0.069 mm	0.0011–0.0027 in
Rod Small End I.D.	20.007–20.021 mm	—
Piston Pin O.D.	19.995–20.000 mm	0.7872–0.7874 in
Piston to Pin Clearance	0.002–0.012 mm	0.0001–0.0005 in
Pin to Rod Clearance	0.007–0.026 mm	—
Rod Side Clearance	0.070–0.370 mm	0.0028–0.0146 in
Rod Twist	0.040 max.	
Rod Bend	0.021 max.	
Rod Large End Micro	2.0 Ra max.	
Rod Small End Micro	0.3 Ra max.	
Piston Pin Endplay	0.19–1.16 mm	0.007 5–0.0461 in

Overhaul

Tightening Sequence

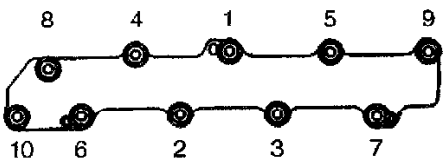


Cylinder Head

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Cylinder Head Assembly/Service and Repair

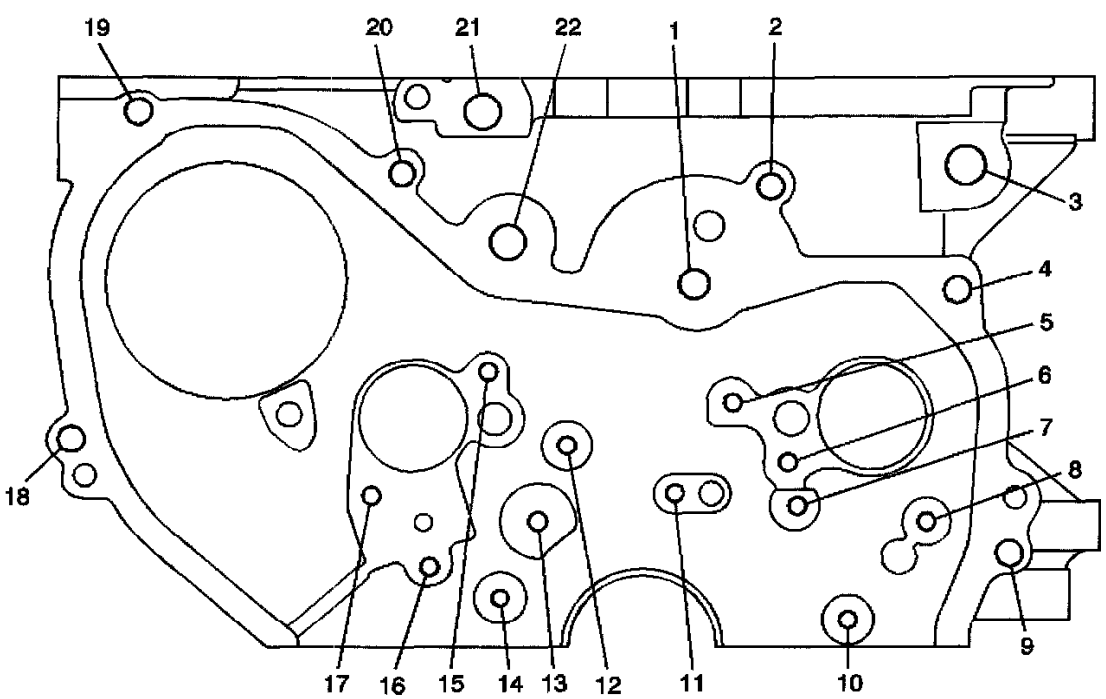
Camshaft Bearing Caps

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Camshaft, Lifters and Push Rods/Camshaft/Service and Repair



Exhaust Manifold

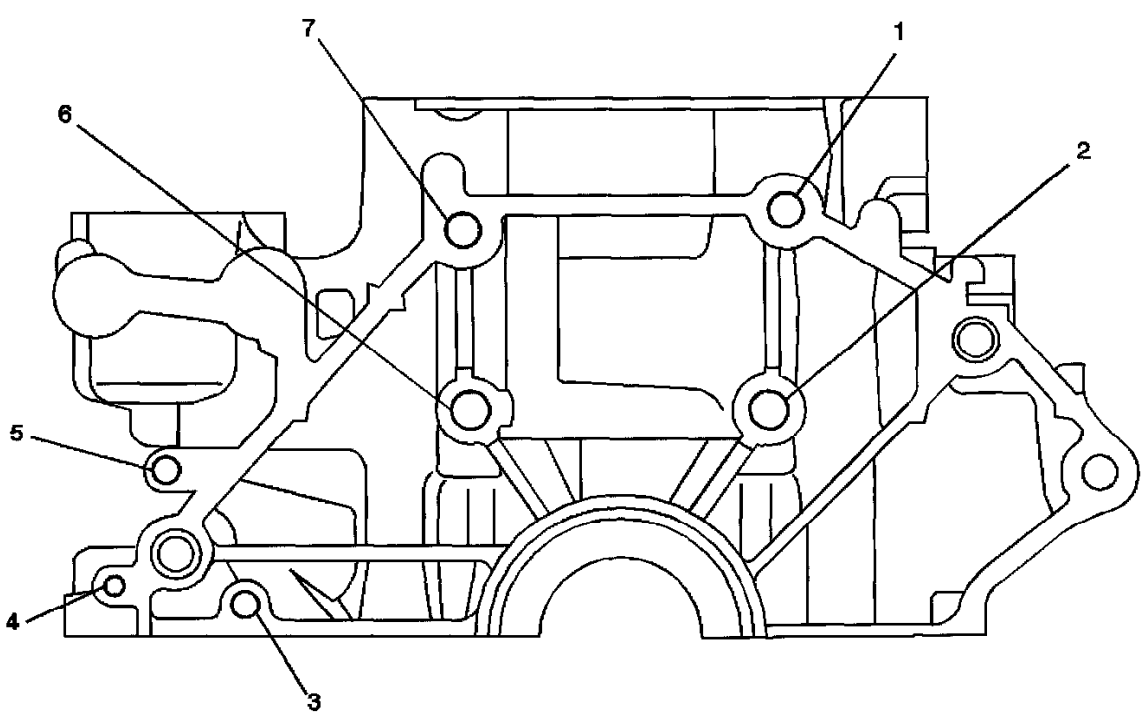
Thread Repair Specifications



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	24.5	0.96	19.5	0.77	117
2	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	109
3	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	114
4	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	110
5	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	129
6	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	130
7	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	125
8	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	126
9	M8 x 1.25	210	206	207	208	209	25.5	1.00	THRU		111
10	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	127
11	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	122
12	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	128
13	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	124
14	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	123
15	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	131
16	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	119
17	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	120
18	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	106
19	M8 x 1.25	210	206	207	208	209	55	2.17	THRU		112

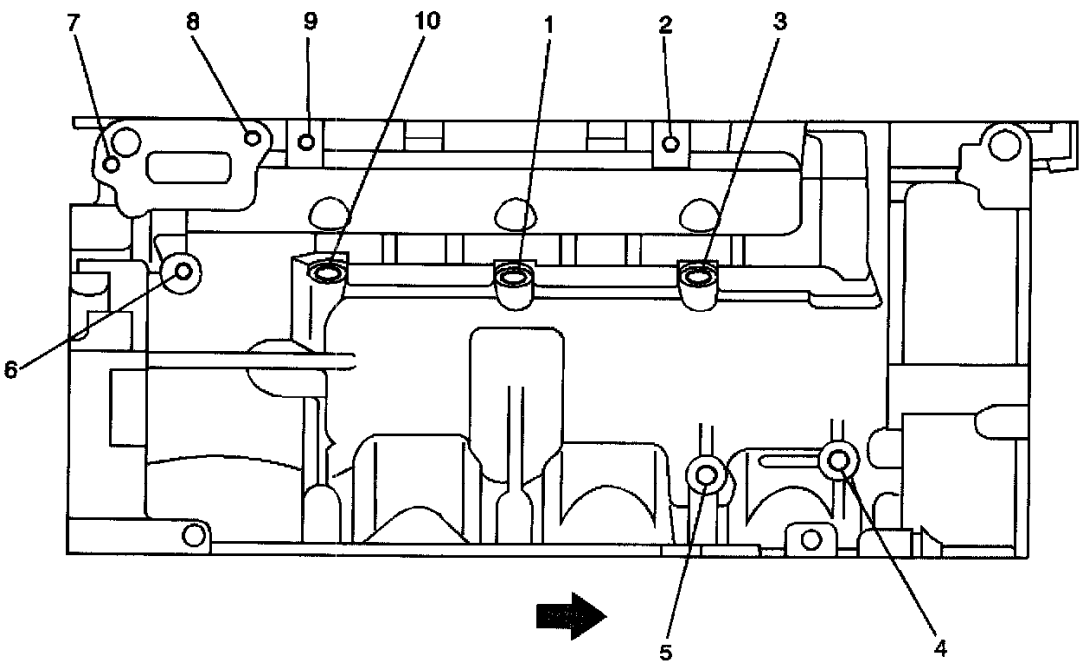
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
20	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	108
21	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	116
22	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	115

Engine Block-Front View



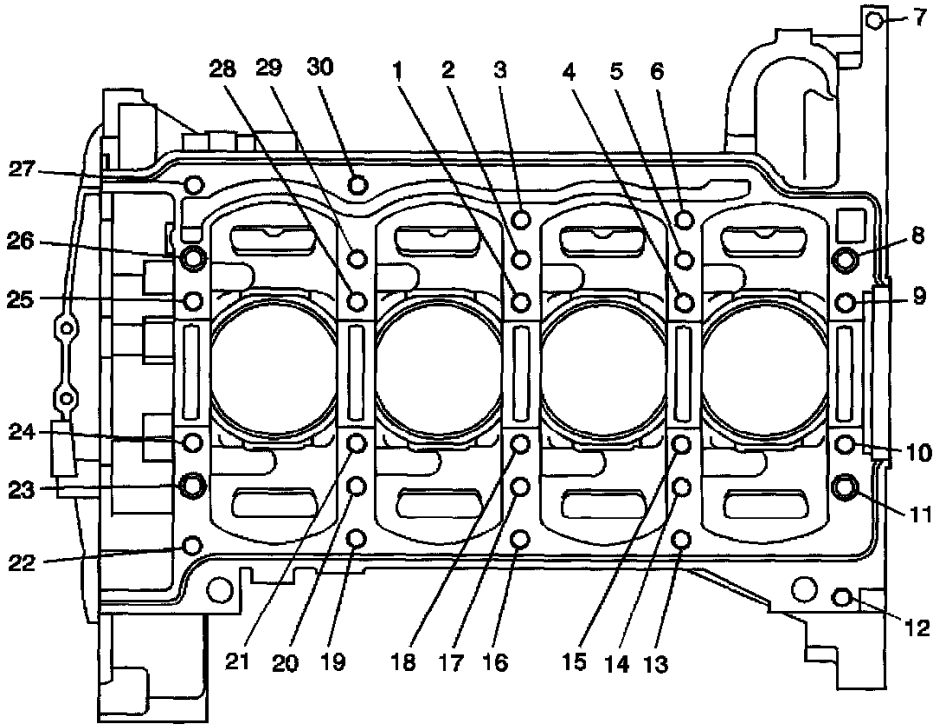
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	204
2	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	214
3	M10 x 1.5	215	211	212	213	214	29	1.161	THRU		206
4	M8 x 1.25	210	206	207	208	209	18	0.709	THRU		209
5	M8 x 1.25	854 No Flange	206	207	208	209	18	0.709	THRU		208
6	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	213
7	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	203

Engine Block-Back View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	515
2	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
3	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	514
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	521
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	519
6	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	513
7	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	512
8	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	511
9	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
10	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	516

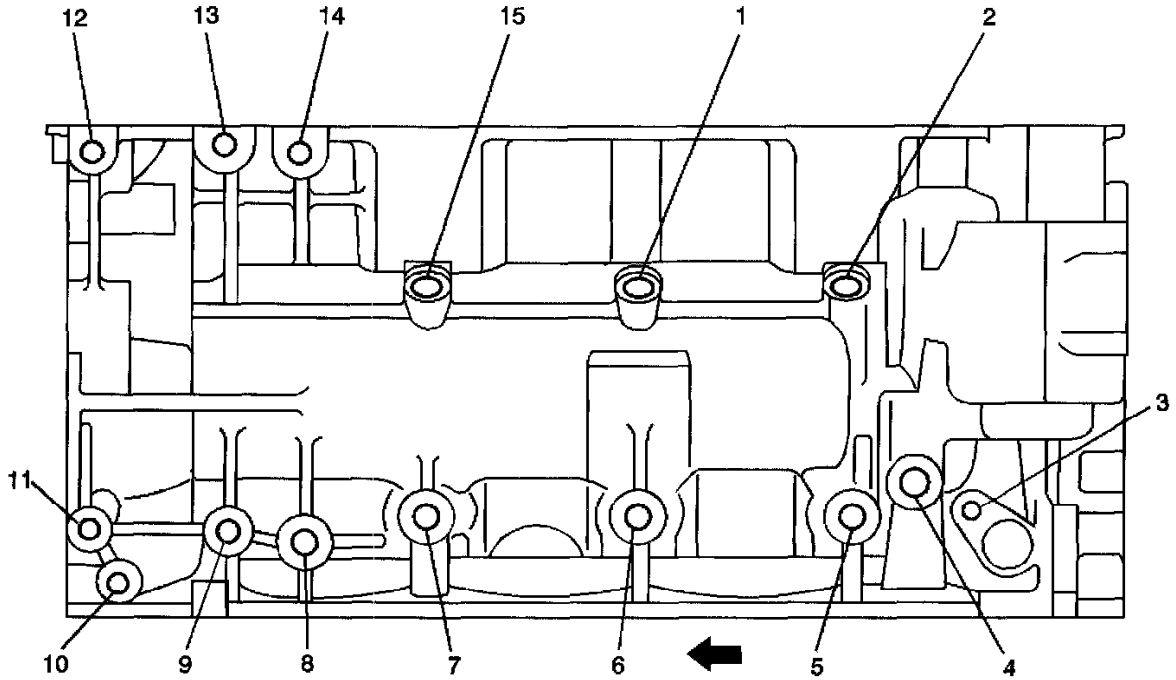
Engine Block-Left Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1415
2	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1408
3	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1425
4	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1416
5	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1409
6	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1426
7	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1432
8	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1404
9	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1417
10	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1422
11	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1406
12	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1431
13	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1430
14	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1412
15	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1421
16	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1429
17	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1411
18	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1420
19	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1428
20	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1410

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
21	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1419
22	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1427
23	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1405
24	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1418
25	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1413
26	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1403
27	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1423
28	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1414
29	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1407
30	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1424

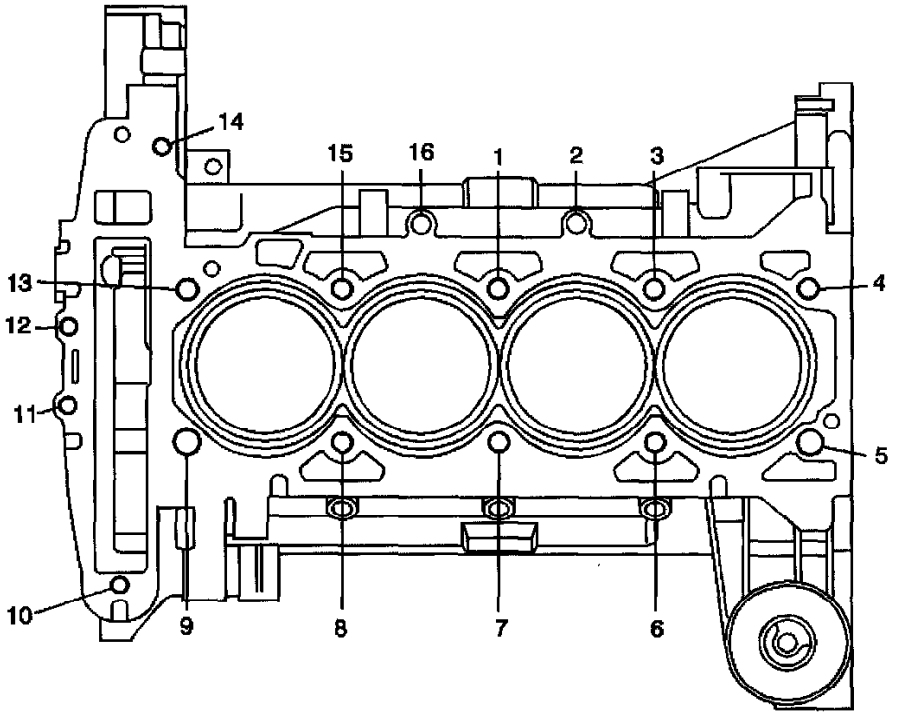
Engine Block-Bottom View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	613
2	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	612
3	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.5	.065	610
4	M12 x 1.75	865	856	857	858	859	15.50	0.610	12.5	0.49	606
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	609
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	608

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	607
8	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	617
9	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	604
10	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	605
11	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	603
12	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	601
13	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	602
14	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	616
15	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	614

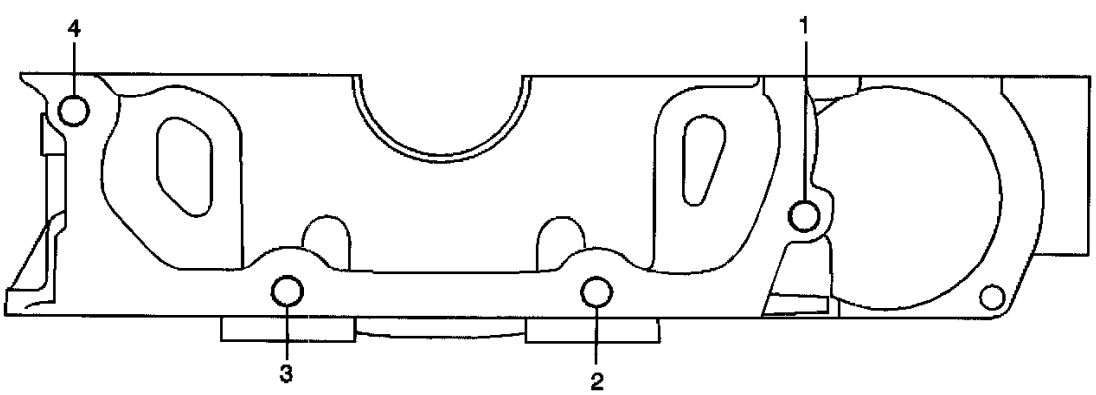
Engine Block-Right Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	308
2	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	317
3	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	309
4	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	310
5	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	302
6	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	305

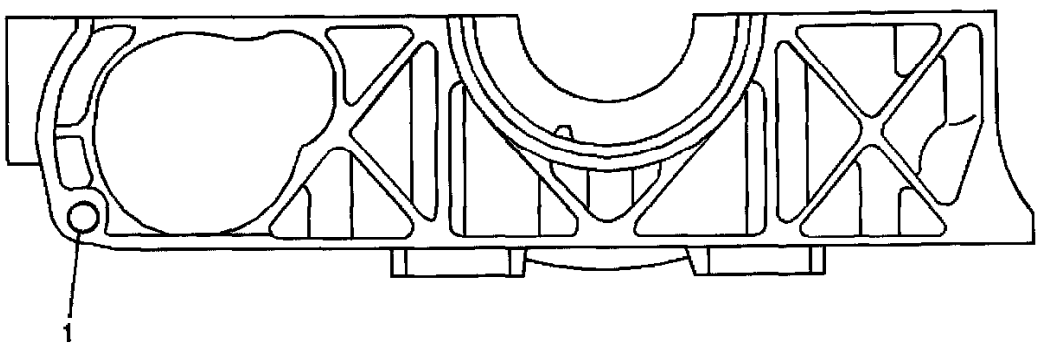
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	304
8	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	303
9	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	301
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	313
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	311
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	312
13	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	306
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	314
15	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	307
16	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	316

Engine Block-Top View



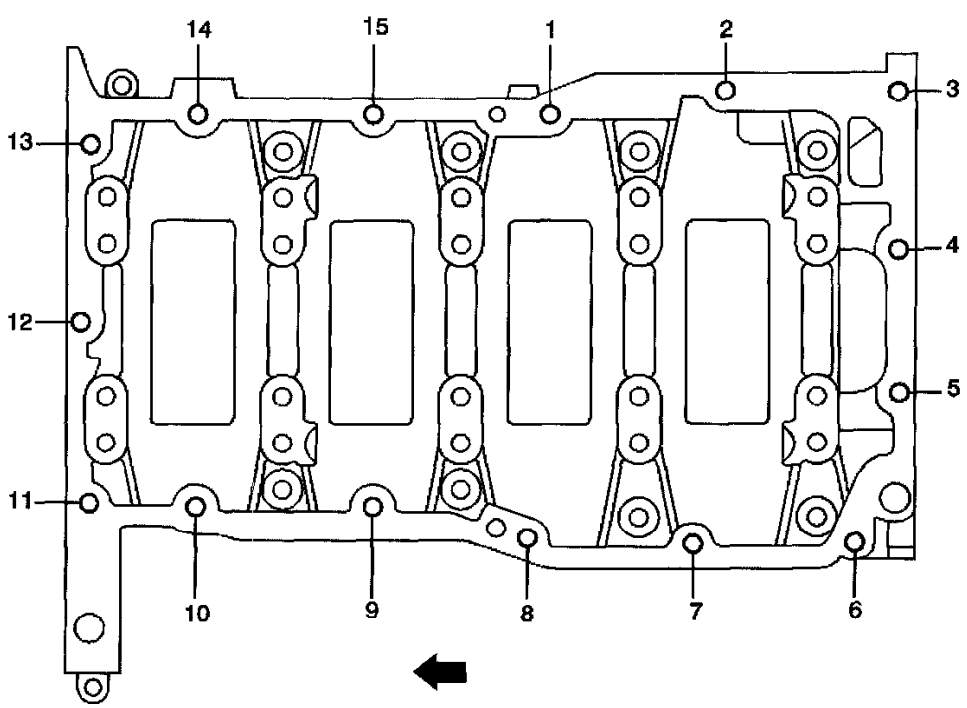
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	138
2	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	139
3	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	140
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	141

Lower Crankcase - Front View



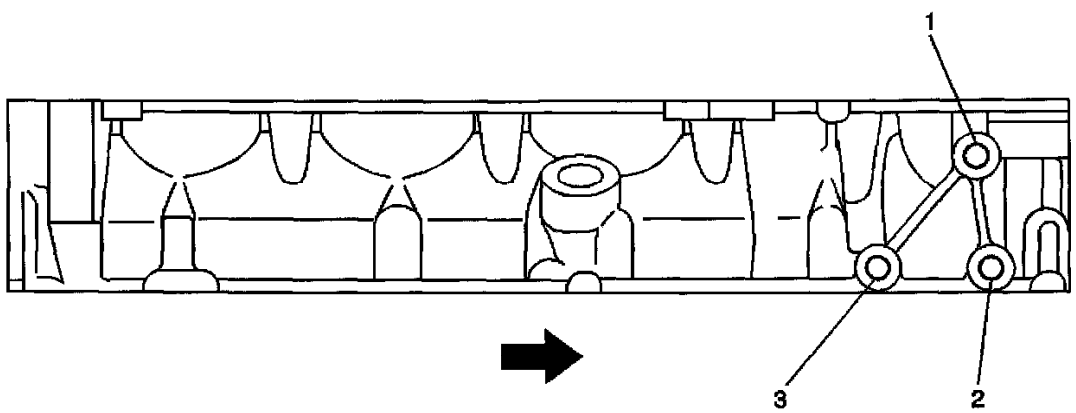
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	29.50	1.161	THRU		207

Lower Crankcase-Back View



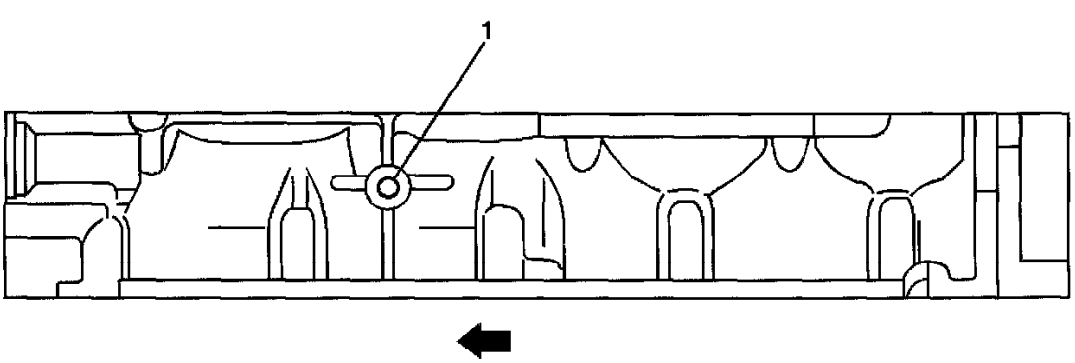
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	415
2	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	416
3	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	417
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	418
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	419
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	405
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	406
8	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	407
9	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	408
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	409
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	410
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	411
13	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	412
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	413
15	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	414

Lower Crankcase - Bottom View



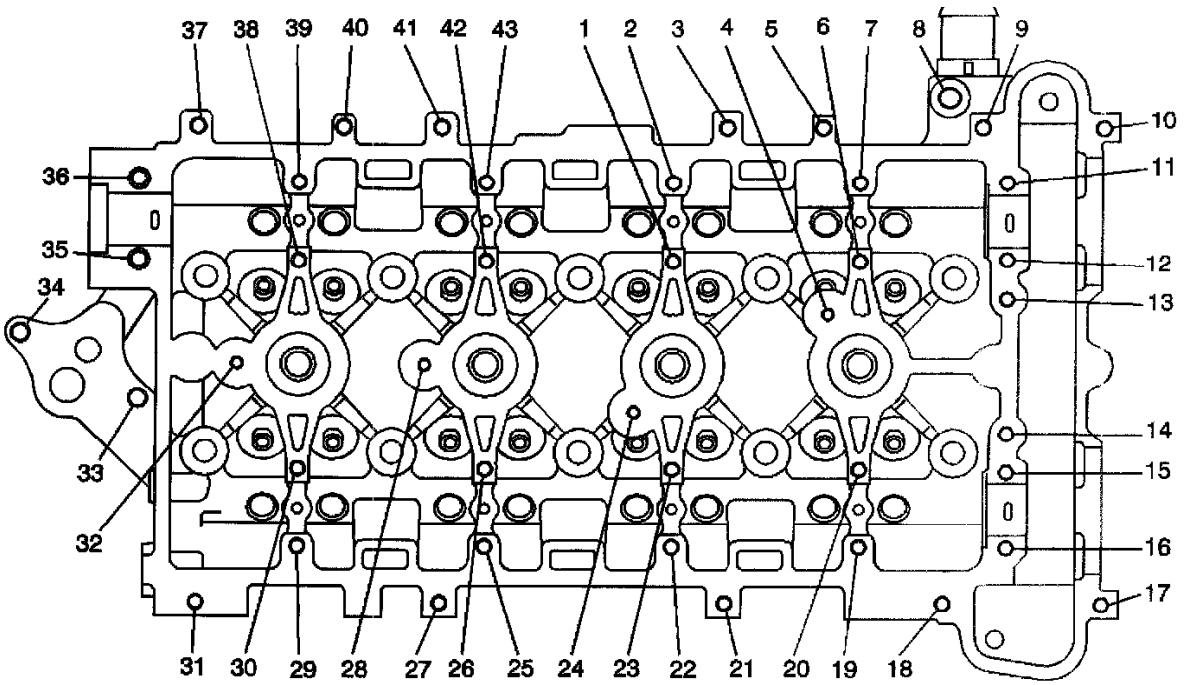
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	518
2	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	517
3	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	520

Lower Crankcase - Left View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	211	212	213	214	30.50	1.201	22.5	0.886	615

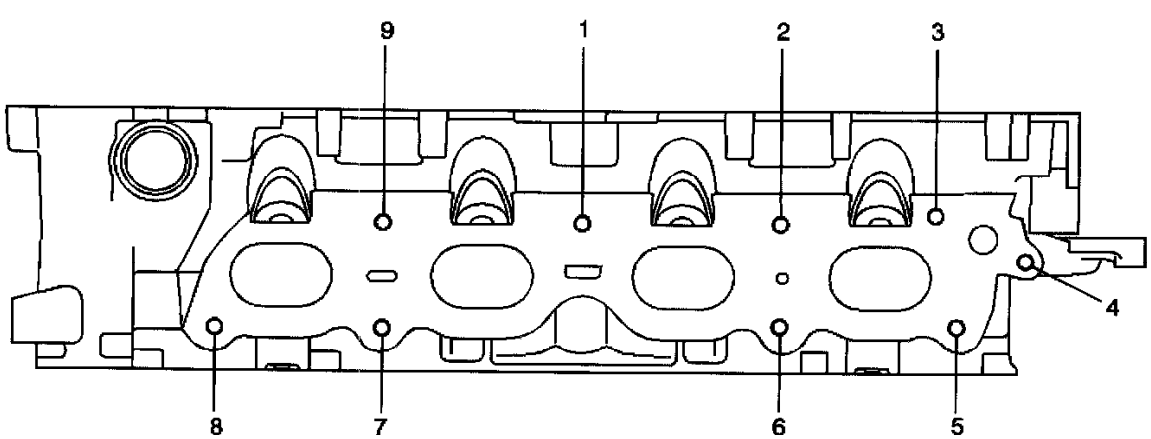
Lower Crankcase-Right View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2515
2	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2514
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2812
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2820
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2710
6	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2513
7	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2512
8	M8 x 1.25	854 No Flange	206	207	208	209	THRU		THRU		2980
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2811
10	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2810
11	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2510
12	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2511
13	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2910
14	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2911
15	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2520
16	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2521
17	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2815

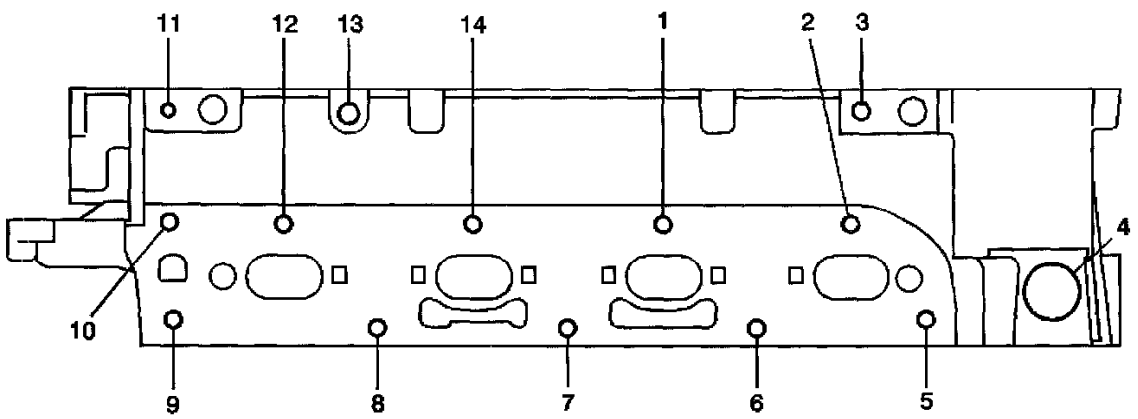
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
18	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2816
19	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2523
20	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2522
21	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2817
22	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2525
23	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2524
24	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2821
25	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2527
26	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2526
27	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2818
28	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2822
29	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2529
30	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2528
31	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2819
32	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2823
33	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2621
34	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2622
35	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2541
36	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2540
37	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2814
38	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2519
39	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2518
40	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2711
41	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2813
42	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2517
43	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2516

Cylinder Head-Top View



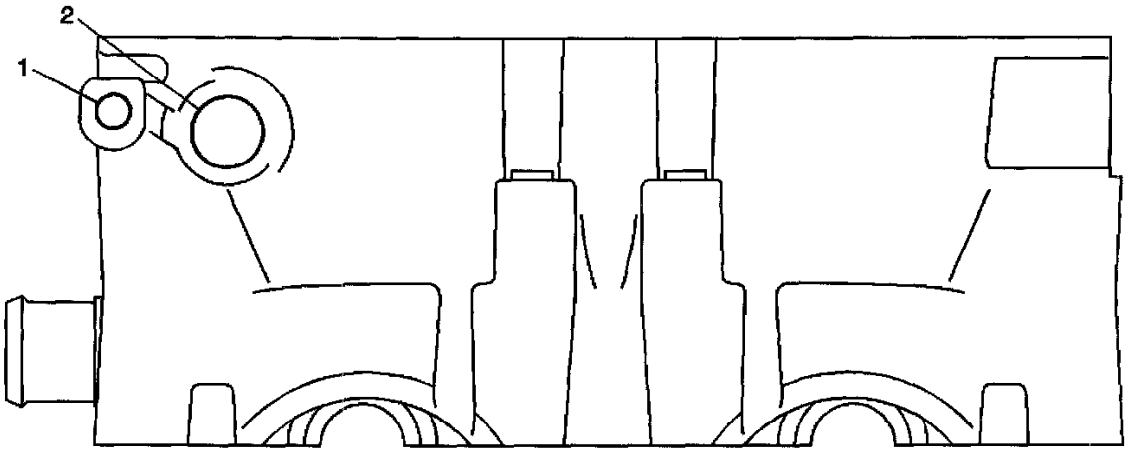
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4117
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4116
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4115
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4114
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4113
6	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4112
7	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4111
8	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4110
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4118

Cylinder Head-Intake Manifold Deck View



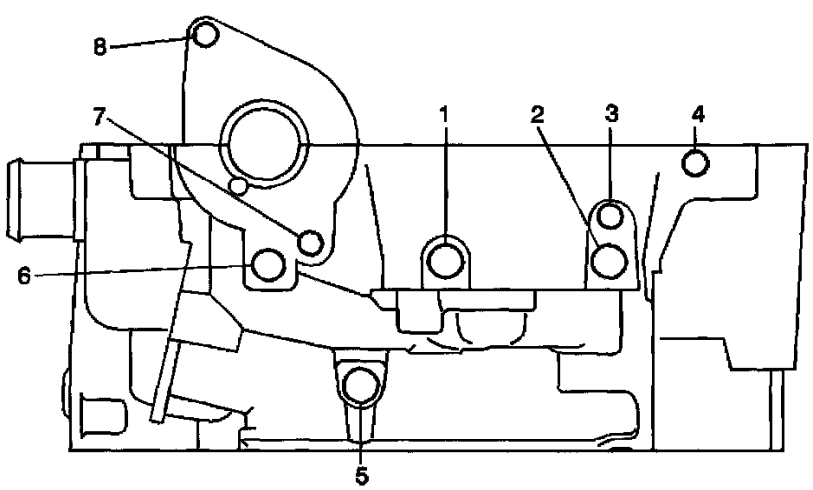
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3118
2	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3119
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3210
4	M27 x 2.0	N/A	N/A	N/A	N/A	N/A	THRU		12	0.78	3810
5	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3110
6	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3111
7	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3112
8	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3113
9	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3114
10	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3115
11	M6 x 1.0	205	201	202	203	204	20	0.78	16	0.630	3310
12	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3116
13	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3610
14	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3117

Cylinder Head-Exhaust Manifold Deck View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	6310
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	6210

Cylinder Head-Front View

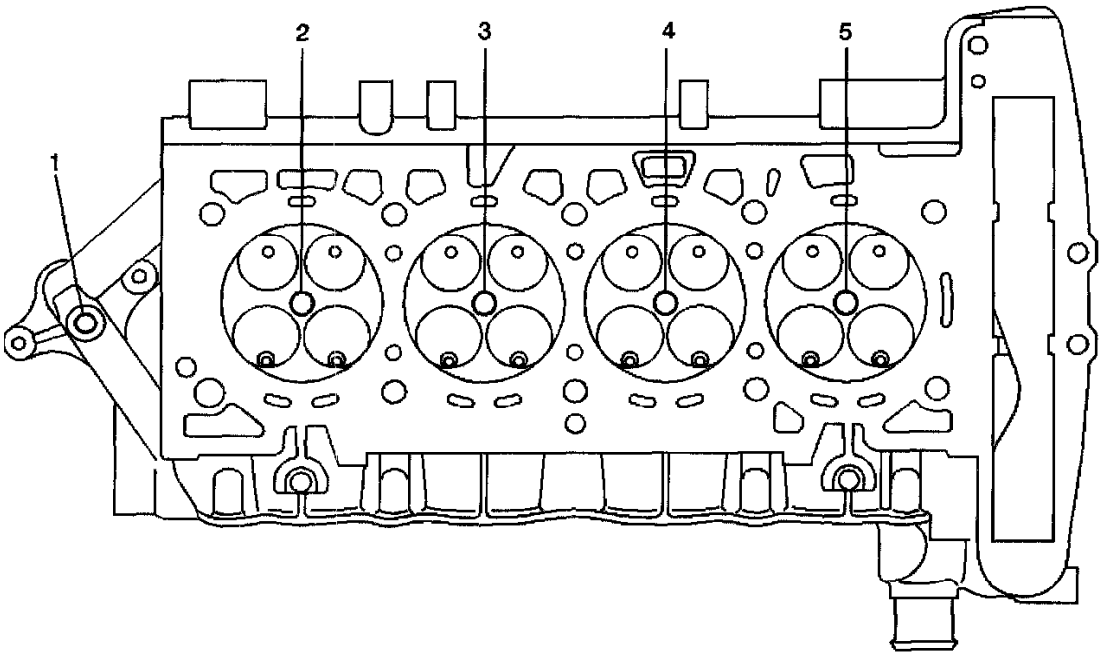


Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5011
2	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5010
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5031
4	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5030
5	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5310
6	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5020
7	M8 x 1.25	210	206	207	208	209	25	0.984	THRU		5111
8	M8 x 1.25	854 No Flange	206	207	208	209	25	0.984	THRU		5110

Note: 1, 2, 5, 6 holes are oil passages.

Cylinder Head-Back View

Note: 1, 2, 5, 6 holes are oil passages.



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	1510
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1213
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1212
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1211
5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1210

Cylinder Head-Bottom View

Balance Shaft

Balance Shaft Bearing Carrier Bore in Block I.D. ..... 42.000-42.016 mm (1.6535-1.6542 in)
Balance Shaft Bearing Carrier O.D. ..... 41.975-41.995 mm (1.6526-1.6534 in)
Balance Shaft Housing to Block Clearance ..... 0.005-0.041 mm (0.0002-0.0016 in)
Balance Shaft Bearing I.D. #1 ..... 20.050-20.063 mm (0.7894-0.7899 in)
Balance Shaft Bearing I.D. #2 ..... 36.776-36.825 mm (1.4479-1.4498 in)
Balance Shaft Journal O.D. #1 ..... 20.000-20.020 mm (0.7874-0.7882 in)
Balance Shaft Journal O.D. #2 ..... 36.723-36.743 mm (1.4458-1.4466 in)
Balance Shaft Bearing Clearance #1 ..... 0.030-0.063 mm (0.0012-0.0025 in)
Balance Shaft Bearing Clearance #2 ..... 0.033-0.102 mm (0.0013-0.0040 in)
Balance Shaft End Play ..... 0.100-0.300 mm (0.0020-0.0118 in)
Balance Shaft Chain Length ..... 368.622-369.032 mm (14.5127-14.5288 in)
Balance of Shafts ..... 4.05 Kg/mm per shaft, +/-6 %

Balance Shaft Bearing

Balance Shaft Bearing Carrier to Block Bolt ..... 10 Nm (89 inch lbs.)
Balance Shaft Bearing Carrier Bore in Block I.D. ..... 42.000-42.016 mm (1.6535-1.6542 inch)
Balance Shaft Bearing Carrier O.D. ..... 41.975-41.995 mm (1.6526-1.6534 inch)
Balance Shaft Bearing I.D. #1 ..... 20.050-20.063 mm (0.7894-0.7899 inch)
Balance Shaft Bearing I.D. #2 ..... 36.776-36.825 mm (1.4479-1.4498 inch)
Balance Shaft Bearing Clearance #1 ..... 0.030-0.063 mm (0.0012-0.0025 inch)
Balance Shaft Bearing Clearance #2 ..... 0.033-0.102 mm (0.0013-0.0040 inch)

Balance Shaft Chain Guide

Balance Shaft Adjustable Chain Guide Bolt ..... 10 Nm (89 inch lbs.)
Balance Shaft Fixed Chain Guide Bolt ..... 10 Nm (89 inch lbs.)

Balance Shaft Gear

Balance Shaft Sprocket Bolt ..... 50 Nm (37 ft. lbs.)

Connecting Rod Bearing

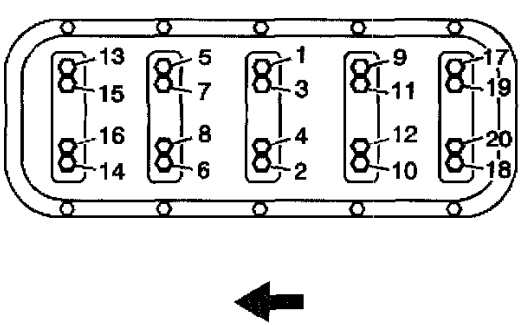
Rod Bearing Bore I.D. ..... 52.118-52.134 mm (2.0519-2.0525 inch)

Rod Bearing Shell Thickness ..... 1.539-1.545 mm (0.0606-0.608 inch)
Rod Bearing I.D., 90 degree ..... 49.043-49.073 mm (1.9308-1.9320 inch)
Rod Bearing I.D., 45 degree ..... With-in +0.009/-0.004 of 90 degree spec.
Rod Bearing to Crankpin Clearance ..... 0.029-0.069 mm (0.0011-0.0027 inch)
Rod Small End I.D. ..... 20.007-20.021 mm
Rod Side Clearance ..... 0.070-0.370 mm (0.0028-0.0146 inch)
Rod Twist ..... 0.040 max.
Rod Bend ..... 0.021 max.
Rod Large End Micro ..... 2.0 Ra max.
Rod Small End Micro ..... 0.3 Ra max.
Piston Pin Endplay ..... 0.19-1.16 mm (0.007 5-0.0461 inch)
Connecting Rod Bolt
  First Pass ..... 18 ft.lbs.
  Final Pass ..... 100°

Connecting Rod, Engine

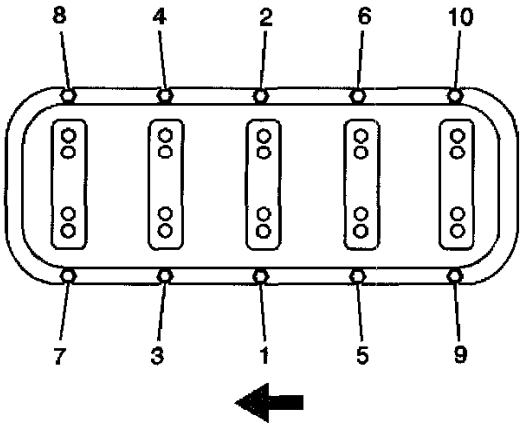
Rod Bearing Bore I.D. ..... 52.118-52.134 mm (2.0519-2.0525 inch)
Rod Bearing Shell Thickness ..... 1.539-1.545 mm (0.0606-0.608 inch)
Rod Bearing I.D., 90 degree ..... 49.043-49.073 mm (1.9308-1.9320 inch)
Rod Bearing I.D., 45 degree ..... With-in +0.009/-0.004 of 90 degree spec.
Rod Bearing to Crankpin Clearance ..... 0.029-0.069 mm (0.0011-0.0027 inch)
Rod Small End I.D. ..... 20.007-20.021 mm
Rod Side Clearance ..... 0.070-0.370 mm (0.0028-0.0146 inch)
Rod Twist ..... 0.040 max.
Rod Bend ..... 0.021 max.
Rod Large End Micro ..... 2.0 Ra max.
Rod Small End Micro ..... 0.3 Ra max.
Piston Pin Endplay ..... 0.19-1.16 mm (0.007 5-0.0461 inch)
Connecting Rod Bolt
  First Pass ..... 18 ft.lbs.
  Final Pass ..... 100°

Crankshaft Main Bearing



Crankshaft Bearing Bolt Tightening Sequence

Install the NEW crankshaft bearing bolts in sequence finger tight.
- Tighten the crankshaft bearing bolts in sequence.
- Tighten the crankshaft bearing bolts to **20 Nm (15 ft. lbs.)**.
- Tighten the crankshaft bearing bolts in sequence.
- Tighten the crankshaft bearing bolts **70 degrees** using the torque angle meter.

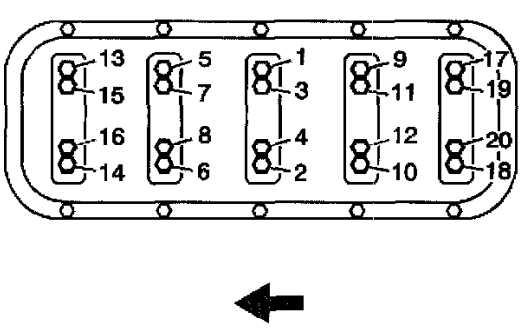


Lower Crankcase Perimeter Tightening Sequence

-Tighten the lower crankcase to block peripheral bolts to 25 N-m (18 ft.lbs.)

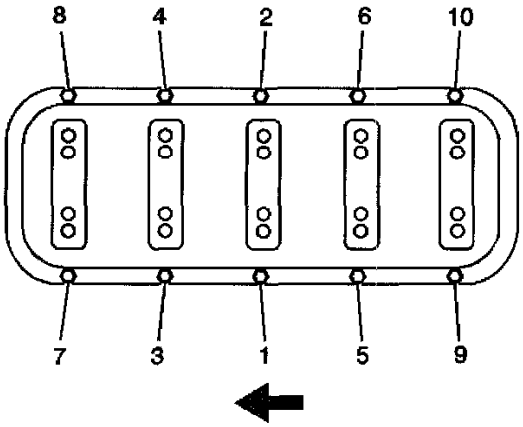
Main Journal O.D. ..... 55.994-56.008 mm (2.2045-2.2050 inch)
Main Bearing Clearance ..... 0.031-0.067 mm (0.0012-0.0026 inch)
Rod Pin O.D. ..... 49.000-49 014 mm (1.9291-1.9297 inch)
Rear Crankshaft Seal O.D. ..... 89.78-90.00 mm (3.535-3.543 inch)
Crankshaft Endplay ..... 0.050-0.380 mm (0.0012-0.0150 inch)
Balance of Crankshaft ..... 10 g/cm max.
Balance of Flywheel ..... 10 g/cm max.
Balance of Crankshaft Damper ..... 0.09 kg/mm max.
Main Bearing Shell Thickness ..... 4.030-4.037 mm (0.1587-0.1589 inch)
Main Bearing I.D. ..... 56.035-56.065 mm (2.2061-2.2073 inch)
Crankshaft Bearing - Lower Crankcase to Block
First Pass ..... 15 ft.lbs.
Final Pass ..... 70°

Crankshaft, Engine



Crankshaft Bearing Bolt Tightening Sequence

Install the NEW crankshaft bearing bolts in sequence finger tight.
- Tighten the crankshaft bearing bolts in sequence.
- Tighten the crankshaft bearing bolts to **20 Nm (15 ft. lbs.)**.
- Tighten the crankshaft bearing bolts in sequence.
- Tighten the crankshaft bearing bolts **70 degrees** using the torque angle meter.



Lower Crankcase Perimeter Tightening Sequence

-Tighten the lower crankcase to block peripheral bolts to 25 N-m (18 ft.lbs.)

Main Journal O.D. ..... 55.994-56.008 mm (2.2045-2.2050 inch)
Main Bearing Clearance ..... 0.031-0.067 mm (0.0012-0.0026 inch)
Rod Pin O.D. ..... 49.000-49 014 mm (1.9291-1.9297 inch)
Rear Crankshaft Seal O.D. ..... 89.78-90.00 mm (3.535-3.543 inch)
Crankshaft Endplay ..... 0.050-0.380 mm (0.0012-0.0150 inch)
Balance of Crankshaft ..... 10 g/cm max.
Balance of Flywheel ..... 10 g/cm max.
Balance of Crankshaft Damper ..... 0.09 kg/mm max.
Main Bearing Shell Thickness ..... 4.030-4.037 mm (0.1587-0.1589 inch)
Main Bearing I.D. ..... 56.035-56.065 mm (2.2061-2.2073 inch)
Crankshaft Bearing - Lower Crankcase to Block
  First Pass ..... 15 ft.lbs.
  Final Pass ..... 70°

Harmonic Balancer - Crankshaft Pulley

Crankshaft Pulley Bolt
  First Pass ..... 100 Nm (74 ft. lbs.)
  Final Pass ..... 75 degrees

Piston Pin, Engine

Piston Pin O.D. ..... 19.995-20.000 mm (0.7872-0.7874 inch)
Piston to Pin Clearance ..... 0.002-0.012 mm (0.0001-0.0005 inch)
Pin to Rod Clearance ..... 0.007-0.026 mm

Piston Ring, Engine

Piston Diameter @ 14.5 mm up ..... 85.967-85.982 mm (13.3845-3.3851 inch)
Piston to Bore Clearance ..... 0.010-0.041 mm (0.0004-0.0016 inch)
Piston Weight .....
Piston Height ..... Max. 0.9 mm-below deck
Piston Pin Bore I.D. ..... 20.002-20.007 mm (0.7875-0.7877 inch)
Ring Groove Width, Top ..... 1.23-1.25 mm (0.0484-0.0492 inch)
Ring Groove Width, Second ..... 1.52-1.54 mm (0.0598-0.0606 inch)
Ring Groove Width, Oil Control ..... 2.52-2.54 mm (0.0992-0.1000 inch)
Piston Ring Thickness, Top ..... 1.170-1.190 mm (0.0461-0.0469 inch)
Piston Ring Thickness, Second ..... 1.471-1.490 mm (0.0579-0.0587 inch)
Piston Ring Thickness, Oil Control Rail ..... 0.43 mm max. (0.0169 in max.)
Piston Ring Thickness, Oil Control Spacer ..... 1.574-1.651 mm (0.0620-0.0650 inch)
Ring to Groove Clearance, Top ..... 0.04-0.08 mm (0.0015-0.0031 inch)
Ring to Groove Clearance, Second ..... 0.030-0.069 mm (0.0012-0.0027 inch)
Ring to Groove Clearance, Oil Control ..... 0.090-0.106 mm (0.0035-0.0042 inch)
Ring Gap, Top ..... 0.20-0.40 mm (0.008-0.016 inch)
Ring Gap, Second ..... 0.35-0 55 mm (0.014-0.022 inch)
Ring Gap, Oil Rails ..... 0.25-0.76 mm (0.010-0.030 inch)

Piston, Engine

Piston Diameter @ 14.5 mm up ..... 85.967-85.982 mm (13.3845-3.3851 inch)
Piston to Bore Clearance ..... 0.010-0.041 mm (0.0004-0.0016 inch)
Piston Weight .....

Piston Height	Max. 0.9 mm-below deck
Piston Pin Bore I.D.	20.002-20.007 mm (0.7875-0.7877 inch)
Ring Groove Width, Top	1.23-1.25 mm (0.0484-0.0492 inch)
Ring Groove Width, Second	1.52-1.54 mm (0.0598-0.0606 inch)
Ring Groove Width, Oil Control	2.52-2.54 mm (0.0992-0.1000 inch)
Piston Ring Thickness, Top	1.170-1.190 mm (0.0461-0.0469 inch)
Piston Ring Thickness, Second	1.471-1.490 mm (0.0579-0.0587 inch)
Piston Ring Thickness, Oil Control Rail	0.43 mm max. (0.0169 in max.)
Piston Ring Thickness, Oil Control Spacer	1.574-1.651 mm (0.0620-0.0650 inch)
Ring to Groove Clearance, Top	0.04-0.08 mm (0.0015-0.0031 inch)
Ring to Groove Clearance, Second	0.030-0.069 mm (0.0012-0.0027 inch)
Ring to Groove Clearance, Oil Control	0.090-0.106 mm (0.0035-0.0042 inch)
Ring Gap, Top	0.20-0.40 mm (0.008-0.016 inch)
Ring Gap, Second	0.35-0 55 mm (0.014-0.022 inch)
Ring Gap, Oil Rails	0.25-0.76 mm (0.010-0.030 inch)

System Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Adjustable Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Fixed Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	80 N·m	59 lb ft
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft
Flexplate (AMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flywheel (SMT) Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	10 N·m	89 lb in
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft

Application	Specification	
	Metric	English
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	10 N·m	89 lb in
Oil Pump Cover Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Adjustable Chain Guide Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Timing Fixed Chain Guide Bolt	10 N·m	89 lb in
Timing Upper Chain Guide Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

General

Application	Specification	
	Metric	English
A/C Compressor to Block Bolt	20 N·m	15 lb ft
Balance Shaft Bearing Carrier to Block Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide Bolt	10 N·m	89 lb in
Balance Shaft Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Balance Shaft Sprocket Bolt	50 N·m	37 lb ft
Block Heater Bolt	10 N·m	89 lb in
Cam Cover to Cylinder Head Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Bolt	10 N·m	89 lb in
Cam Cover to Ground Cable Stud	10 N·m	89 lb in
Camshaft Bearing Cap Bolt	10 N·m	89 lb in
Camshaft Sprocket Bolt		
First Pass	85 N·m	63 lb ft
Final Pass	30 degrees	
Camshaft Timing Chain Tensioner	75 N·m	55 lb ft
Chain Guide Plug	90 N·m	66 lb ft
Connecting Rod Bolt		
First Pass	25 N·m	18 lb ft
Final Pass	100 degrees	
Crankshaft Bearing – Lower Crankcase to Block		
First Pass	20 N·m	15 lb ft
Final Pass	70 degrees	
Crankshaft Position Sensor Bolt	10 N·m	89 lb in
Crankshaft Pulley Bolt		
First Pass	100 N·m	74 lb ft
Final Pass	75 degrees	
Cylinder Head Bolt		
First Pass	30 N·m	22 lb ft
Final Pass	155 degrees	
Cylinder Head Front Chaincase Bolt	35 N·m	26 lb ft
Cylinder Head Oil Gallery Plug	35 N·m	26 lb ft
Dipstick Guide to Intake Manifold Bolt	10 N·m	89 lb in
Drive Belt Tensioner Bolt	45 N·m	33 lb ft
E.G.R. Cover Bolt	25 N·m	18 lb in
Elek. ICM Cover Bolt	10 N·m	89 lb in
Engine Coolant Temperature Sensor	22 N·m	16 lb ft
Engine Lift Bracket Front Bolt	25 N·m	18 lb ft
Engine Lift Bracket Rear Bolt	25 N·m	18 lb ft
EVAP Emission Canister Valve Nut	22 N·m	16 lb ft
Exhaust Manifold to Cylinder Head Nut	12 N·m	9 lb ft
Exhaust Manifold to Cylinder Head Stud	10 N·m	89 lb in
Exhaust Manifold Pipe Flange Stud	16 N·m	12 lb ft

Application	Specification	
	Metric	English
Flywheel – SMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Flexplate – AMT – Bolt		
First Pass	53 N·m	39 lb ft
Final Pass	25 degrees	
Front Cover to Block Bolt	25 N·m	18 lb ft
Fuel Pipe Bracket Bolt	10 N·m	89 lb in
Fuel Rail Bracket Stud	10 N·m	89 lb in
Generator to Block Bolt	20 N·m	15 lb ft
Heat Shield to Exhaust Manifold Bolt	23 N·m	17 lb ft
Intake Camshaft Rear Cap Bolt	25 N·m	18 lb ft
Intake Manifold to Cylinder Head Bolt	10 N·m	89 lb in
Intake Manifold to Cylinder Head Nut	10 N·m	89 lb in
Intake Manifold to Cylinder Head Stud	6 N·m	53 lb in
Knock Sensor Bolt	25 N·m	18 lb ft
Lower Crankcase to Block Peripheral Bolt	25 N·m	18 lb ft
Oil Gallery Plug	35 N·m	26 lb ft
Oil Gallery Plug – Rear	60 N·m	44 lb ft
Oil Filter Housing Cover	22 N·m	16 lb ft
Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan to Block Bolts	25 N·m	18 lb ft
Oil Pressure Switch	22 N·m	16 lb ft
Oil Pump Gerotor Cover – Rear – Bolt	6 N·m	53 lb in
Oil Pump Pressure Relief Valve Plug	40 N·m	30 lb ft
Oxygen Sensor	42 N·m	31 lb ft
Power Steering Pump Bolt	25 N·m	18 lb ft
Spark plug	20 N·m	15 lb ft
Starter Motor to Block Bolt	40 N·m	30 lb ft
Thermostat Housing to Block Bolts	10 N·m	89 lb in
Throttle Body Bolt	10 N·m	89 lb in
Throttle Body Nut	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Chain Guide – Adjustable – Bolt	10 N·m	89 lb in
Timing Chain Guide – Fixed – Bolt	10 N·m	89 lb in
Timing Chain Guide – Upper – Bolt	10 N·m	89 lb in
Timing Chain Oil Nozzle Bolt	10 N·m	89 lb in
Vent Tube to Cylinder Head	15 N·m	11 lb ft
Water Pipe Support Bracket	10 N·m	89 lb in
Water Pump Access Cover Bolt	7 N·m	62 lb in
Water Pump/Balance Shaft Chain Tensioner Bolt	10 N·m	89 lb in
Water Pump Bolts	25 N·m	18 lb ft
Water Pump Sprocket Bolt	10 N·m	89 lb in

Overhaul

Engine Mechanical Specifications

Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
RPO	L61	
Oil Pressure @ 1,000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi

General

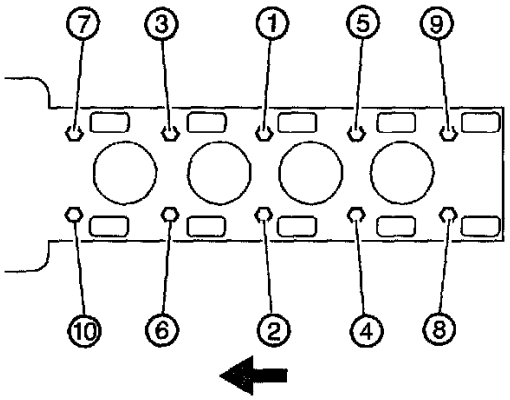
Application	Specification	
	Metric	English
General Data		
Engine Type	Inline 4 Cylinder	
Displacement	2.2 Liter (134 CID)	
VIN Code	F	
RPO	L61	
Crankshaft Sensor Gap	0.60–1.65 mm	0.0236–0.065 in
Spark Plug Gap	—	
Total Engine Balance	No Spec. Check and Record Only	
Oil Pressure @ 1000 RPM	344.75–551.60 kPa	50–80 psi
Engine Cranking Compression Pressure	1275.58–1551.38 kPa	185–225 psi
Balance Shafts		
Balance Shaft Bearing Carrier Bore in Block I.D.	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bearing Carrier O.D.	41.975–41.995 mm	1.6526–1.6534 in
Balance Shaft Housing to Block Clearance	0.005–0.041 mm	0.0002–0.0016 in
Balance Shaft Bearing I.D. #1	20.050–20.063 mm	0.7894–0.7899 in
Balance Shaft Bearing I.D. #2	36.776–36.825 mm	1.4479–1.4498 in
Balance Shaft Journal O.D. #1	20.000–20.020 mm	0.7874–0.7882 in
Balance Shaft Journal O.D. #2	36.723–36.743 mm	1.4458–1.4466 in
Balance Shaft Bearing Clearance #1	0.030–0.063 mm	0.0012–0.0025 in
Balance Shaft Bearing Clearance #2	0.033–0.102 mm	0.0013–0.0040 in
Balance Shaft End Play	0.100–0.300 mm	0.0020–0.0118 in
Balance Shaft Chain Length	368.622–369.032 mm	14.5127–14.5288 in
Balance of Shafts	4.05 Kg/mm per shaft, +/–6 %	
Crankshaft		
Main Journal O.D.	55.994–56.008 mm	2.2045–2.2050 in
Main Bearing Clearance	0.031–0.067 mm	0.0012–0.0026 in
Rod Pin O.D.	49.000–49.014 mm	1.9291–1.9297 in
Rear Crankshaft Seal O.D.	89.78–90.00 mm	3.535–3.543 in
Crankshaft Endplay	0.050–0.380 mm	0.0012–0.0150 in
Balance of Crankshaft	10 g/cm max	
Balance of Flywheel	10 g/cm max	
Balance of Crankshaft Damper	0.09 kg/mm max	
Cylinder Block		
Cylinder Bore I.D.	85.992–86.008 mm	3.3855–3.3861 in
Cylinder Bore Taper	0.010 mm max.	0.0004 in max.
Cylinder Bore Out of Round	0.010 mm max.	0.0004 in max.
Deck Face Flatness – Transverse	0.030 mm	0.0012 in
Deck Face Flatness – Longitudinal	0.050 mm	0.002 in
Deck Face Flatness – Overall	0.08 mm	0.0031 in
Main Bearing Bore I.D.	64.068–64.082 mm	2.5224–2.5229 in
Main Bearing Shell Thickness	4.030–4.037 mm	0.1587–0.1589 in

Application	Specification	
	Metric	English
Main Bearing I.D.	56.035–56.065 mm	2.2061–2.2073 in
Bedplate to Block Flatness	0.50 in 100 mm 0.10 overall	
Balance Shaft Bore in Block Front	42.000–42.016 mm	1.6535–1.6542 in
Balance Shaft Bore in Block Rear	40.763–40.776 mm	1.6048–1.6054 in
Cylinder Head and Valve Train		
Cylinder Head Flatness	0.020 in 50 mm, 1 mm over all - Eng Spec	
Valve Guide I.D., Intake	6.000–6.012 mm	0.2362–0.2367 in
Valve Guide I.D., Exhaust	6.000–6.012 mm	0.2362–0.2367 in
Valve Stem O.D., Intake	5.955–5.970 mm	0.2344–0.2355 in
Valve Stem O.D., Exhaust	5.935–5.950 mm	0.2337–0.2343 in
Stem to Guide Clearance, Intake	0.030–0.057 mm	0.0012–0.0022 in
Stem to Guide Clearance, Exhaust	0.050–0.077 mm	0.0020–0.0026 in
Valve Spring Load @ 32.5 mm, Closed	245.0–271.0 N. - Eng Spec	
Valve Spring Load @ 32.5 mm, Open	525.0–575.0 N. - Eng Spec	
Valve Stem Installed Heights	Check and Record	
Valve Seat Run-out	0.05 mm max.	0.0020 in max.
Valve Face Run-out	0.04 mm max.	0.0016 in max.
Combustion Chamber Volume	52.7 +/– 2.5 cc	
Engine Clearance Volume	65.26 +/– 2.5 cc	
Compression Ratio	10:1	
Cam Bearing I.D.	27.000–27.021 mm	1.0630–1.0638 in
Cam Journal O.D.	26.935–26.960 mm	1.0604–1.0614 in
Camshaft Bearing Clearance	0.040–0.086 mm	0.0016–0.0034 in
Camshaft Thrust Width-Cylinder Head	20.868–20.920 mm	0.8215–0.8236 in
Camshaft Thrust Width-Camshaft	21.000–21.052 mm	0.8268–0.8252 in
Camshaft Endplay	0.040–0.144 mm	0.0016–0.0057 in
Stationary Lash Adjuster Bore I.D.	12.013–12.037 mm	0.4730–0.4739 in
Stationary Lash Adjuster O.D.	11.986–12.000 mm	0.0005–0.0020 in
Stationary Lash Adjuster Clearance	0.013–0.051 mm	3.2210–3.2299 in
Timing Chain Length	477.367–477.817 mm	18.7940–18.8117 in
Cam Timing, Intake	114–120° ATDC	
Cam Timing, Exhaust	111.5–117.5° BTDC	
Oil Pump and Components		
Gerotor Pocket I.D.	—	—
Outer Element O.D.	41.8 mm	1.65 In
Outer Element Clearance	0.035 mm	0.012 in
Gerotor Pocket Depth	—	—
Outer Element Thickness	14.0 mm	0.5512 in
Inner Element Thickness	13.98 mm	0.5504 in
Pocket Depth Clearance, Outer	—	—
Pocket Depth Clearance, Inner	—	—

Application	Specification	
	Metric	English
Pressure Relief Valve I.D.	—	—
Pressure Relief Valve O.D.	—	—
Pressure Relief Valve Clearance	—	—
Pressure Relief Valve Spring Working Length	56.5 mm	2.2244 in
Pressure Relief Valve Tension – Length	—	—
Pistons and Connecting Rods		
Piston Diameter @ 14.5 mm up	85.967–85.982 mm	3.3845–3.3851 in
Piston to Bore Clearance	0.010–0.041 mm	0.0004–0.0016 in
Piston Weight	—	—
Piston Height	Max. –0.9 mm below deck	
Piston Pin Bore I.D.	20.002–20.007 mm	0.7875–0.7877 in
Ring Groove Width, Top	1.23–1.25 mm	0.0484–0.0492 in
Ring Groove Width, Second	1.52–1.54 mm	0.0598–0.0606 in
Ring Groove Width, Oil Control	2.52–2.54 mm	0.0992–0.1000 in
Piston Ring Thickness, Top	1.170–1.190 mm	0.0461–0.0469 in
Piston Ring Thickness, Second	1.471–1.490 mm	0.0579–0.0587 in
Piston Ring Thickness, Oil Control Rail	0.43 mm max.	0.0169 in max.
Piston Ring Thickness, Oil Control Spacer	1.574–1.651 mm	0.0620–0.0650 in
Ring to Groove Clearance, Top	0.04–0.08 mm	0.0015–0.0031 in
Ring to Groove Clearance, Second	0.030–0.069 mm	0.0012–0.0027 in
Ring to Groove Clearance, Oil Control	0.090–0.106 mm	0.0035–0.0042 in
Ring Gap, Top	0.20–0.40 mm	0.008–0.016 in
Ring Gap, Second	0.35–0.55 mm	0.014–0.022 in
Ring Gap, Oil Rails	0.25–0.76 mm	0.010–0.030 in
Rod Bearing Bore I.D.	52.118–52.134 mm	2.0519–2.0525 in
Rod Bearing Shell Thickness	1.539–1.545 mm	0.0606–0.608 in
Rod Bearing I.D., 90 degree	49.043–49.073 mm	1.9308–1.9320 in
Rod Bearing I.D., 45 degree	With-in +0.009 / –0.004 of 90 degree spec.	
Rod Bearing to Crankpin Clearance	0.029–0.069 mm	0.0011–0.0027 in
Rod Small End I.D.	20.007–20.021 mm	—
Piston Pin O.D.	19.995–20.000 mm	0.7872–0.7874 in
Piston to Pin Clearance	0.002–0.012 mm	0.0001–0.0005 in
Pin to Rod Clearance	0.007–0.026 mm	—
Rod Side Clearance	0.070–0.370 mm	0.0028–0.0146 in
Rod Twist	0.040 max.	
Rod Bend	0.021 max.	
Rod Large End Micro	2.0 Ra max.	
Rod Small End Micro	0.3 Ra max.	
Piston Pin Endplay	0.19–1.16 mm	0.007 5–0.0461 in

Overhaul

Tightening Sequence

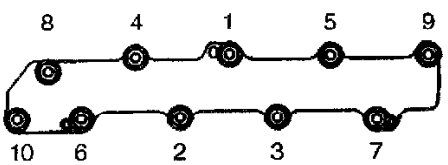


Cylinder Head

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Cylinder Head Assembly/Service and Repair

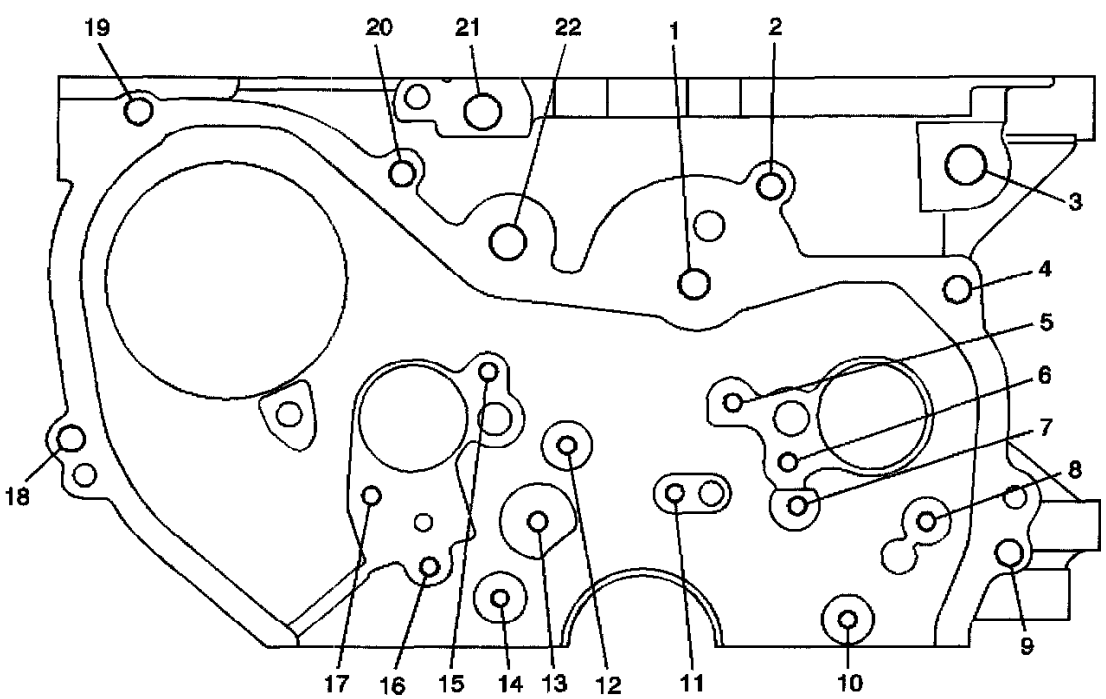
Camshaft Bearing Caps

Refer to the procedure See: Engine, Cooling and Exhaust/Engine/Camshaft, Lifters and Push Rods/Camshaft/Service and Repair



Exhaust Manifold

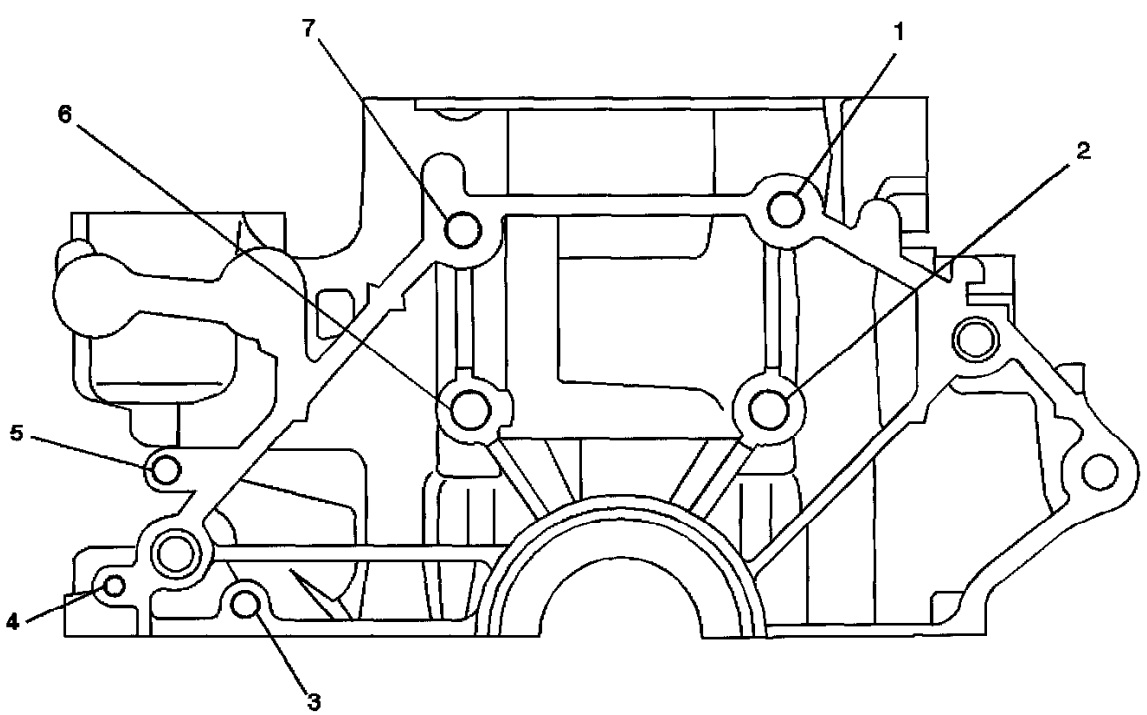
Thread Repair Specifications



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	24.5	0.96	19.5	0.77	117
2	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	109
3	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	114
4	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	110
5	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	129
6	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	130
7	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	125
8	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	126
9	M8 x 1.25	210	206	207	208	209	25.5	1.00	THRU		111
10	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	127
11	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	122
12	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	128
13	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	124
14	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	123
15	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	131
16	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	119
17	M6 x 1	205	201	202	203	204	20	0.787	16	0.63	120
18	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	106
19	M8 x 1.25	210	206	207	208	209	55	2.17	THRU		112

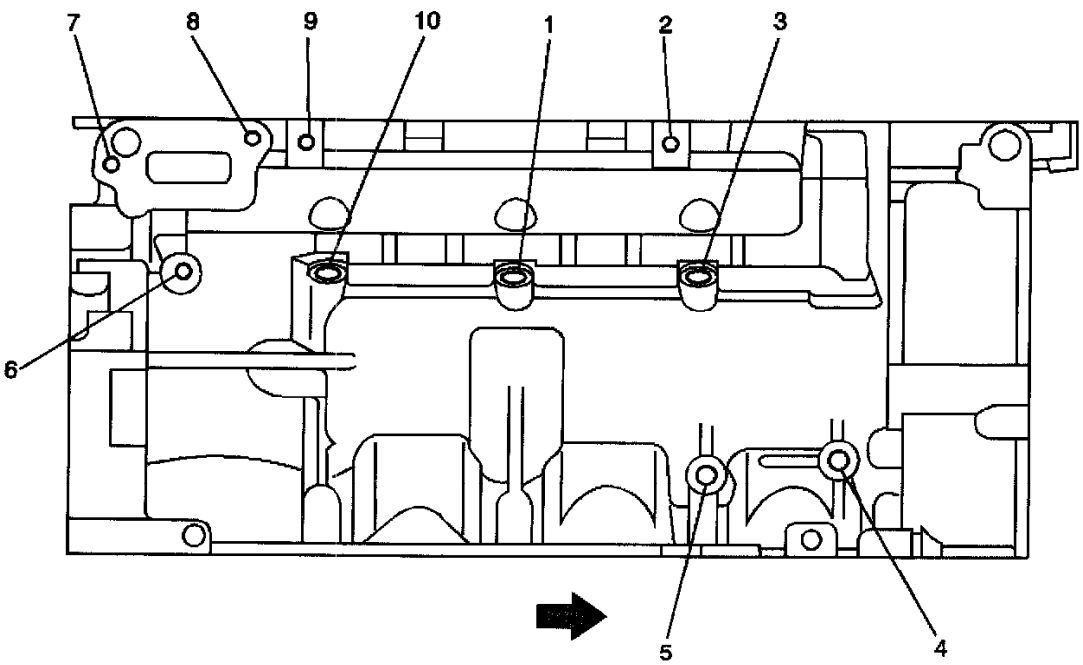
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
20	M8 x 1.25	210	206	207	208	209	23.5	0.93	18.5	0.73	108
21	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	116
22	M12 x 1.75	855	856	857	858	859	33.5	1.32	26.5	1.04	115

Engine Block-Front View



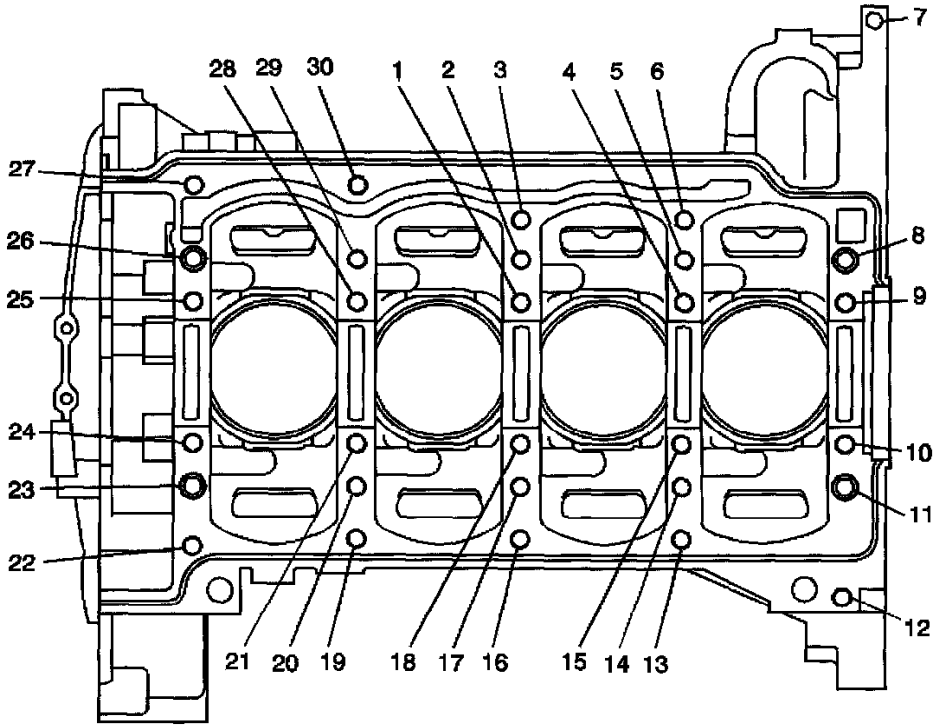
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	204
2	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	214
3	M10 x 1.5	215	211	212	213	214	29	1.161	THRU		206
4	M8 x 1.25	210	206	207	208	209	18	0.709	THRU		209
5	M8 x 1.25	854 No Flange	206	207	208	209	18	0.709	THRU		208
6	M16 x 1.5	860	861	862	863	864	21	0.827	15	0.59	213
7	M12 x 1.75	855	856	857	858	859	39	1.535	33.5	1.32	203

Engine Block-Back View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	515
2	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
3	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	514
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	521
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	519
6	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	513
7	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	512
8	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.0	0.63	511
9	M6 x 1.0	205	201	202	203	204	—	—	—	—	—
10	M12 x 1.75	865	856	857	858	859	19.50	0.768	12.5	0.49	516

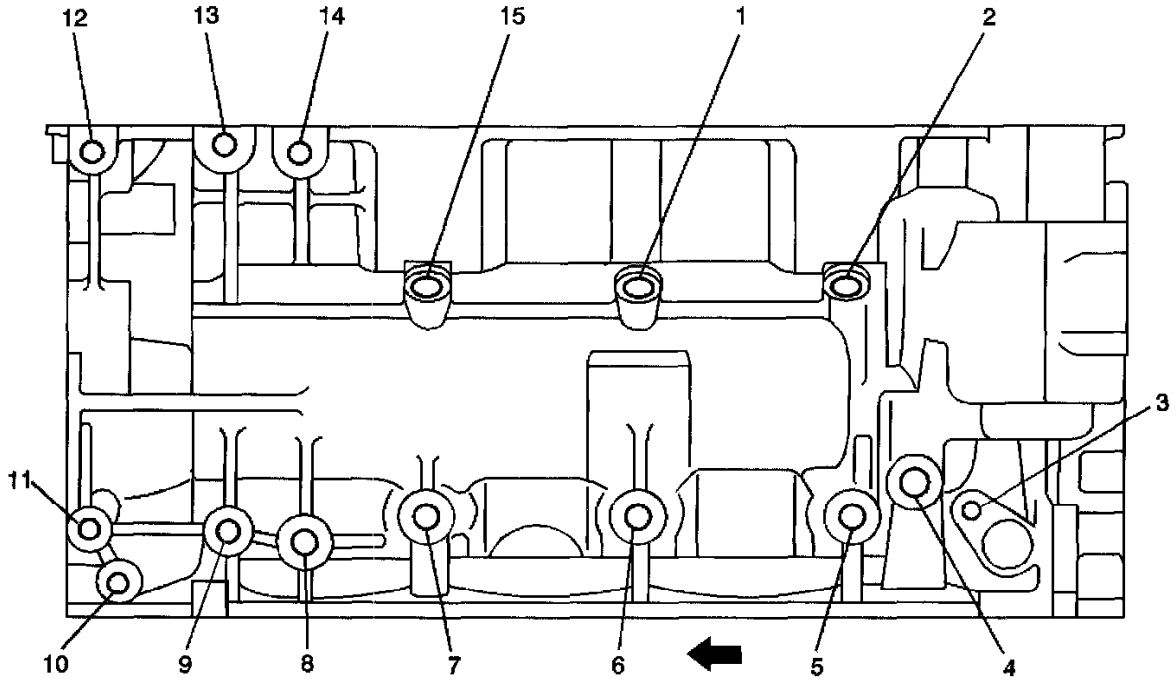
Engine Block-Left Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1415
2	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1408
3	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1425
4	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1416
5	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1409
6	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1426
7	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1432
8	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1404
9	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1417
10	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1422
11	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1406
12	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1431
13	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1430
14	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1412
15	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1421
16	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1429
17	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1411
18	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1420
19	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1428
20	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1410

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
21	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1419
22	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1427
23	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1405
24	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1418
25	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1413
26	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1403
27	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1423
28	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1414
29	M10 x 1.5	514	511	N/A	512	513	60	2.362	53.5	2.11	1407
30	M8 x 1.25	210	206	207	208	209	28	1.102	22	0.87	1424

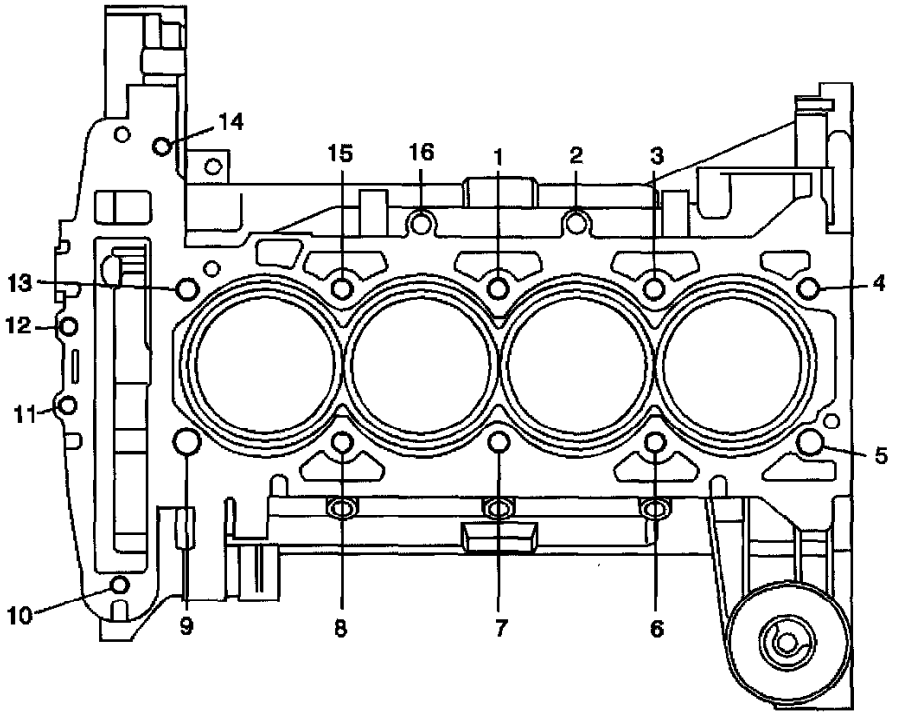
Engine Block-Bottom View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
		J 42385–					MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	613
2	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	612
3	M6 x 1.0	205	201	202	203	204	20.50	0.807	16.5	.065	610
4	M12 x 1.75	865	856	857	858	859	15.50	0.610	12.5	0.49	606
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	609
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	608

Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.0	0.71	607
8	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	617
9	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	604
10	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	605
11	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	603
12	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	601
13	M8 x 1.25	210	206	207	208	209	30.50	1.201	22.5	0.89	602
14	M12 x 1.75	855	856	857	858	859	33.50	1.319	26.5	1.04	616
15	M12 x 1.75	865	856	857	858	859	19.50	0.778	12.5	0.49	614

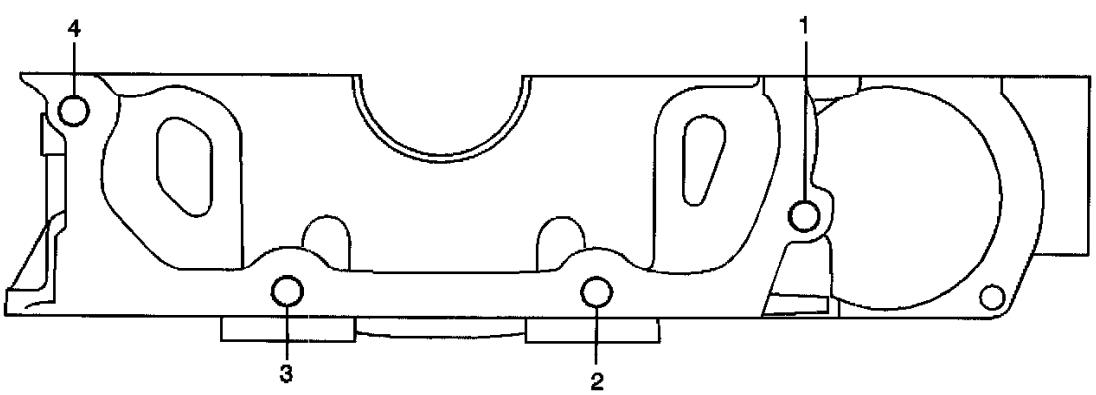
Engine Block-Right Side View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	308
2	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	317
3	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	309
4	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	310
5	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	302
6	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	305

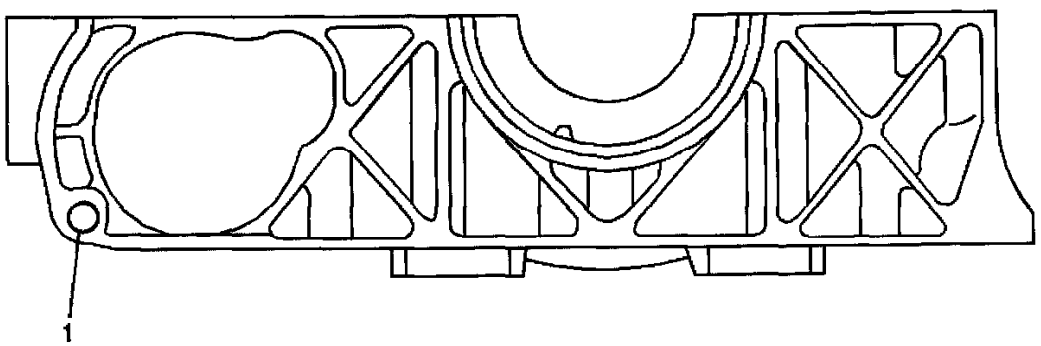
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
7	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	304
8	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	303
9	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	301
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	313
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	311
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	312
13	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	306
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	314
15	M11 x 1.5	507	504	N/A	505	506	113.30	4.461	107.3	4.22	307
16	M12 x 1.75	865	856	857	858	859	13.50	0.531	12.5	0.49	316

Engine Block-Top View



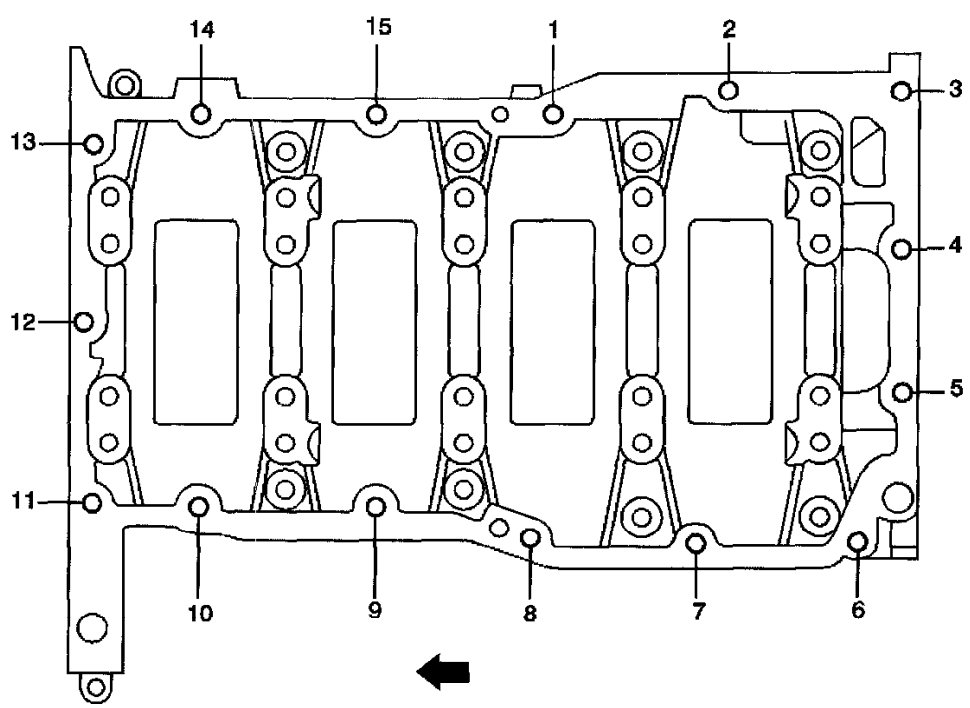
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	138
2	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	139
3	M8 x 1.25	210	206	207	208	209	30.50	1.201	25.5	1.00	140
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	141

Lower Crankcase - Front View



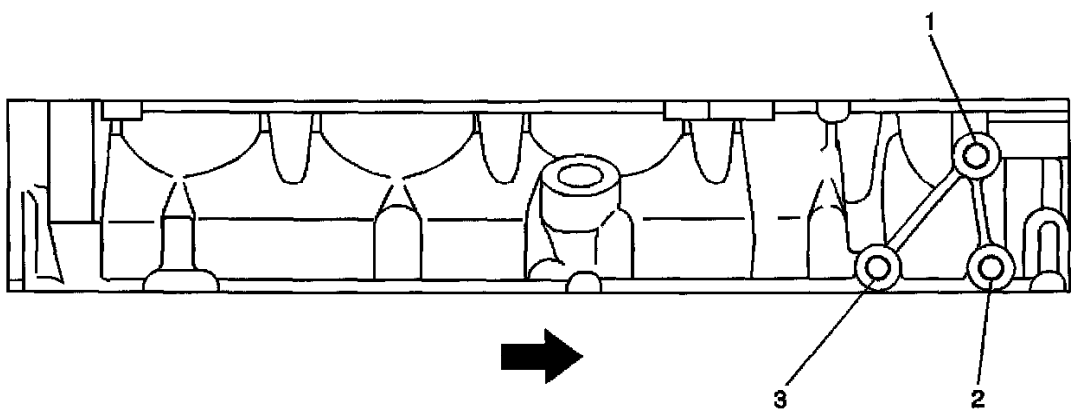
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	29.50	1.161	THRU		207

Lower Crankcase-Back View



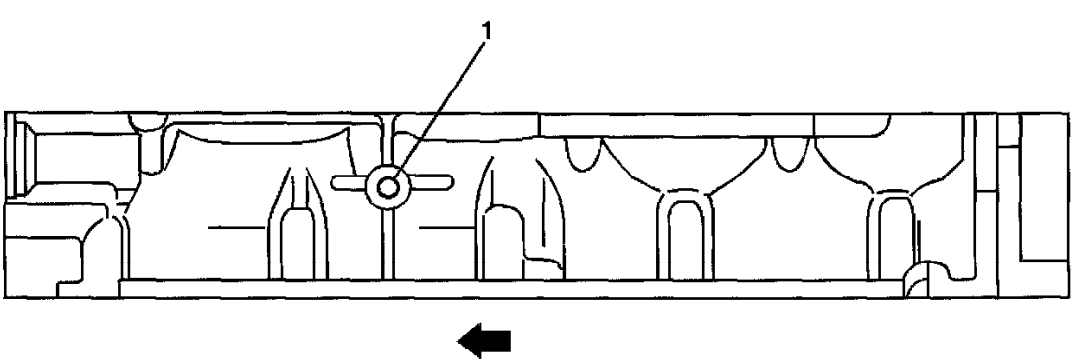
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	415
2	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	416
3	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	417
4	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	418
5	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	419
6	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	405
7	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	406
8	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	407
9	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	408
10	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	409
11	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	410
12	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	411
13	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	412
14	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	413
15	M8 x 1.25	210	206	207	208	209	23.50	0.925	18.5	0.73	414

Lower Crankcase - Bottom View



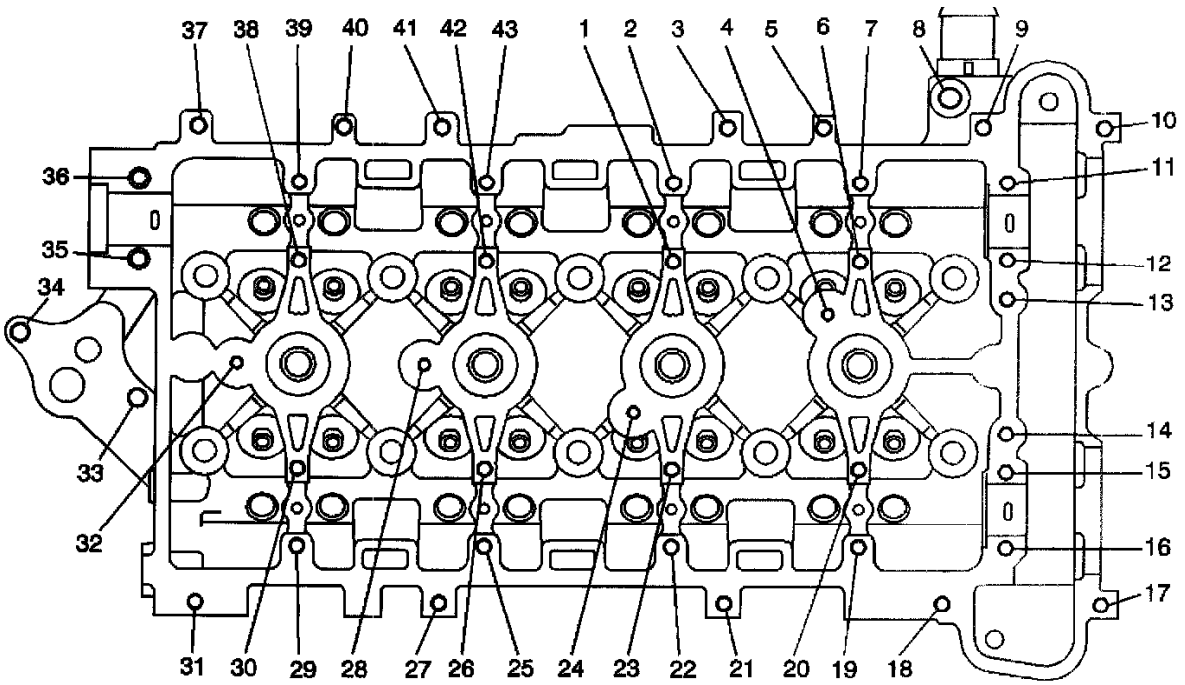
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	518
2	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	517
3	M10 x 1.5	215	211	212	213	214	28.50	1.122	22.5	0.89	520

Lower Crankcase - Left View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	211	212	213	214	30.50	1.201	22.5	0.886	615

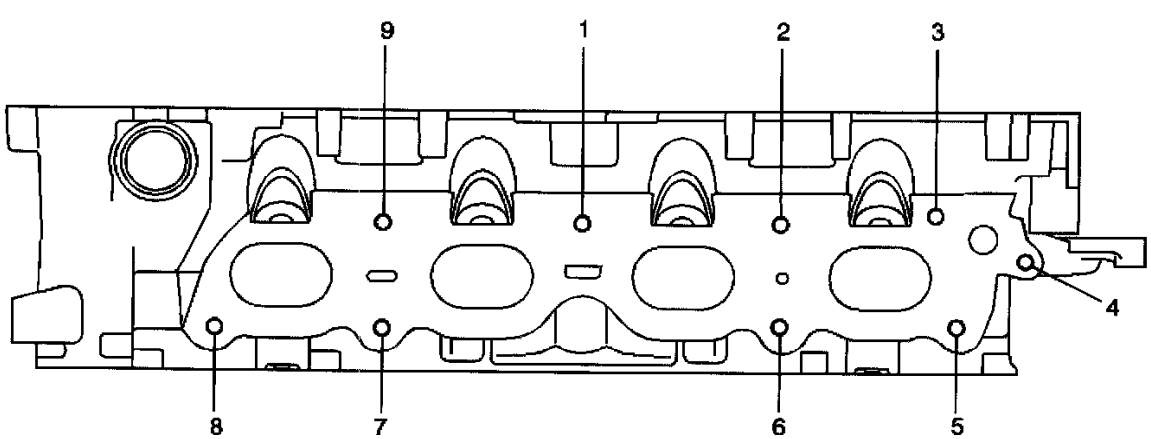
Lower Crankcase-Right View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2515
2	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2514
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2812
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2820
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2710
6	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2513
7	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2512
8	M8 x 1.25	854 No Flange	206	207	208	209	THRU		THRU		2980
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2811
10	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2810
11	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2510
12	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2511
13	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2910
14	M6 x 1.0	205	201	202	203	204	16	0.630	THRU		2911
15	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2520
16	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2521
17	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2815

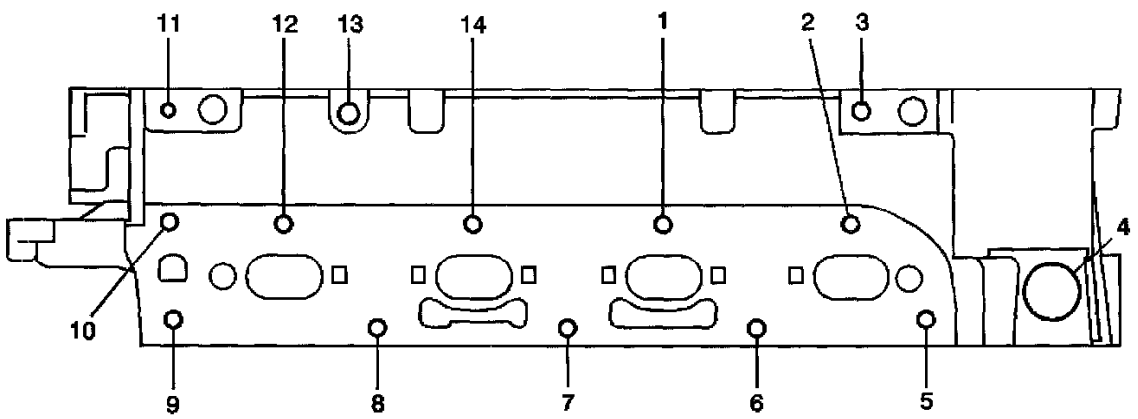
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
18	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2816
19	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2523
20	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2522
21	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2817
22	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2525
23	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2524
24	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2821
25	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2527
26	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2526
27	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2818
28	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2822
29	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2529
30	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2528
31	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2819
32	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	2823
33	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2621
34	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	2622
35	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2541
36	M8 x 1.25	854 No Flange	853	N/A	208	209	25	0.984	20	0.787	2540
37	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2814
38	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2519
39	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2518
40	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2711
41	M6 x 1.0	210	206	207	208	209	20	0.787	16	0.630	2813
42	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2517
43	M6 x 1.0	205	852	N/A	203	204	24	0.945	20	0.787	2516

Cylinder Head-Top View



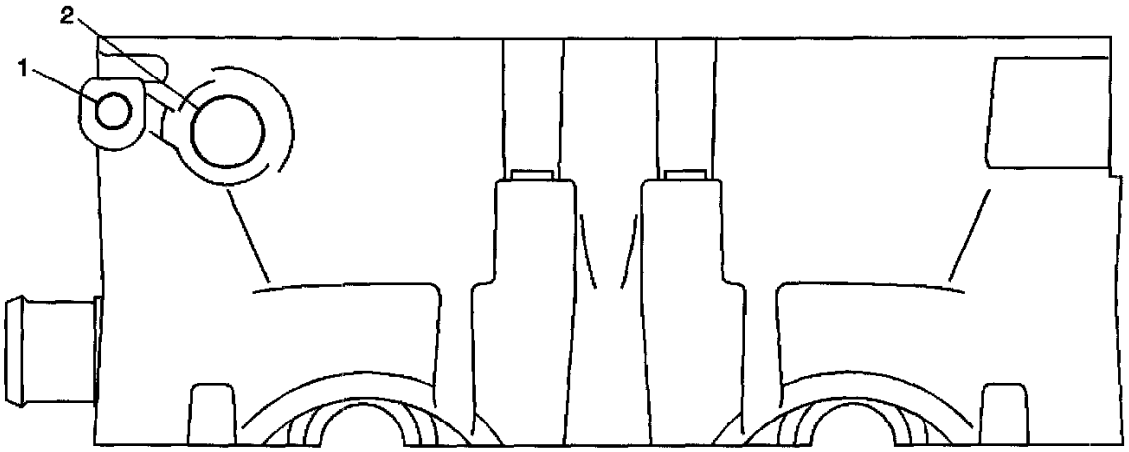
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4117
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4116
3	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4115
4	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4114
5	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4113
6	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4112
7	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4111
8	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4110
9	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	4118

Cylinder Head-Intake Manifold Deck View



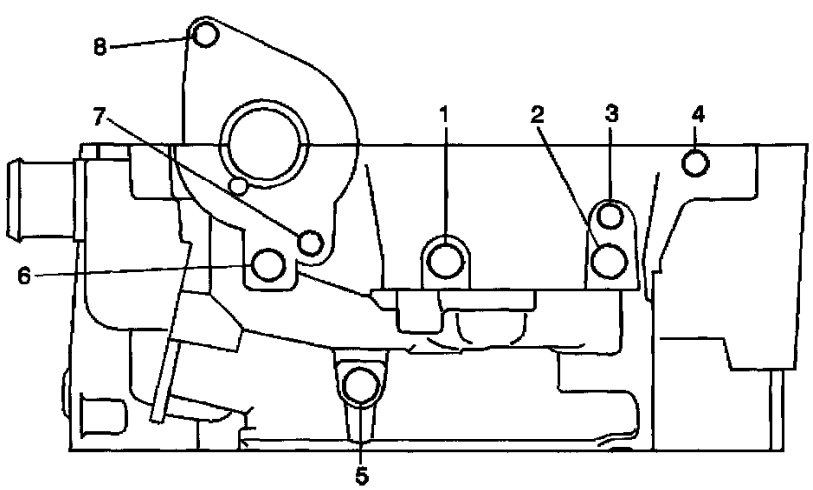
Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3118
2	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3119
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3210
4	M27 x 2.0	N/A	N/A	N/A	N/A	N/A	THRU		12	0.78	3810
5	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3110
6	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3111
7	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3112
8	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3113
9	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3114
10	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3115
11	M6 x 1.0	205	201	202	203	204	20	0.78	16	0.630	3310
12	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3116
13	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3610
14	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.78	3117

Cylinder Head-Exhaust Manifold Deck View



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	6310
2	M6 x 1.0	205	201	202	203	204	20	0.787	16	0.630	6210

Cylinder Head-Front View

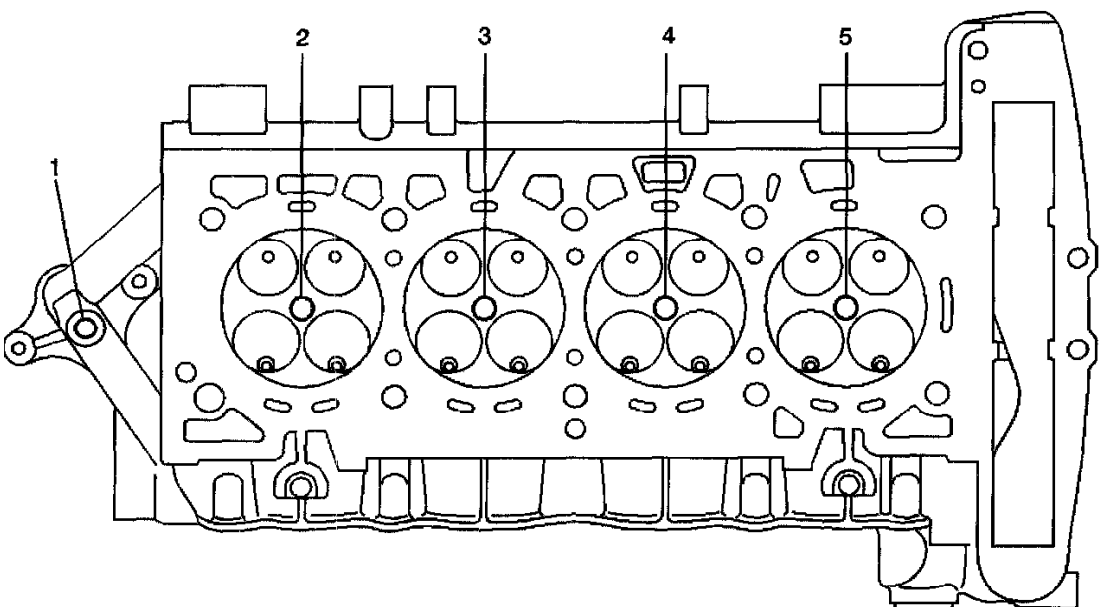


Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
J 42385–							MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5011
2	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5010
3	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5031
4	M8 x 1.25	210	206	207	208	209	25	0.984	20	0.787	5030
5	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5310
6	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	5020
7	M8 x 1.25	210	206	207	208	209	25	0.984	THRU		5111
8	M8 x 1.25	854 No Flange	206	207	208	209	25	0.984	THRU		5110

Note: 1, 2, 5, 6 holes are oil passages.

Cylinder Head-Back View

Note: 1, 2, 5, 6 holes are oil passages.



Service Call Out	Thread Size	Insert	Drill	Counter-bore Tool	Tap	Driver	Drill Depth (Maximum)		Tap Depth (Maximum)		Engineering Hole Number
			J 42385–				MM	(IN)	MM	(IN)	—
1	M12 x 1.75	865	856	857	858	859	17	0.670	14	0.551	1510
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1213
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1212
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1211
5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1210

Cylinder Head-Bottom View

Camshaft Housing

Cam Cover to Cylinder Head Bolt ..... 10 Nm (89 inch lbs.)
Cam Cover to Ground Cable Bolt ..... 10 Nm (89 inch lbs.)
Cam Cover to Ground Cable Stud ..... 10 Nm (89 inch lbs.)

Rocker Arm Assembly

Rocker Arm Bolts ..... 25 Nm (19 ft. lbs.)
Stationary Lash Adjuster Bore I.D. ..... 12.013-12.037 mm (0.4730-0.4739 inch)
Stationary Lash Adjuster O.D. ..... 11.986-12.000 mm (0.0005-0.0020 inch)
Stationary Lash Adjuster Clearance ..... 0.013-0.051 mm (3.2210-3.2299 inch)

Valve Clearance

The manufacturer indicates that this vehicle has hydraulic lifters or adjusters and therefore does not require adjustment.

Valve Cover

Rocker Arm Cover Bolts ..... 10 Nm (89 inch lbs.)

Valve Guide

Valve Guide I.D., Intake ..... 6.000-6.012 mm (0.2362-0.2367 inch)
Valve Guide I.D., Exhaust ..... 6.000-6.012 mm (0.2362-0.2367 inch)

Valve Seat

Valve Seat Run-out ..... 0.05 mm max. 0.0020 in max.

Valve Spring

Valve Spring Load @ 32.5 mm, Closed ..... 245.0-271.0 N. - Eng. Spec.
Valve Spring Load @ 32.5 mm, Open ..... 525.0-575.0 N. - Eng. Spec.

Valve, Intake/Exhaust

Valve Stem O.D., Intake ..... 5.955-5.970 mm (0.2344-0.2355 inch)
Valve Stem O.D., Exhaust ..... 5.935-5.950 mm (0.2337-0.2343 inch)
Stem to Guide Clearance, Intake ..... 0.030-0.057 mm (0.0012-0.0022 inch)
Stem to Guide Clearance, Exhaust ..... 0.050-0.077 mm (0.0020-0.0026 inch)
Valve Stem Installed Heights ..... Check and Record

Valve Face Run-out ..... 0.04 mm max. 0.0016 in max.

Drive Belt Tensioner

Drive Belt Tensioner Bolt ..... 45 Nm (33 ft. lbs.)

Engine Mount

Engine Bracket to Mount Bolt ..... 60 Nm (44 ft. lbs.)
Final Pass 90 degrees
Engine Mount to Body Nut ..... 75 Nm (55 ft. lbs.)
Engine Mount Strut Bolts ..... 100 Nm (74 ft. lbs.)
Final Pass 90 degrees
Engine Mount Strut Bracket Bolts ..... 66 Nm (49 ft. lbs.)

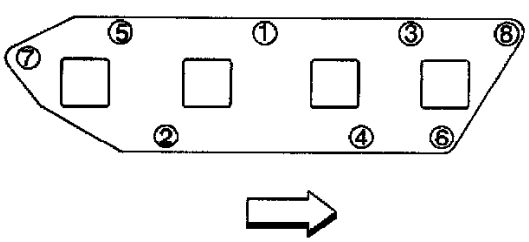
Engine Oil Dip Stick - Dip Stick Tube

Oil Fill Tube ..... 50 Nm (37 ft. lbs.)
Dipstick Guide to Intake Manifold Bolt ..... 10 Nm (89 inch lbs.)

Engine Oil Drain Plug

Oil Pan Drain Bolt ..... **26 Nm (19 ft lbs)**

Intake Manifold



Intake Manifold to Cylinder Head Bolt ..... 10 Nm (89 inch lbs.)
Intake Manifold to Cylinder Head Nut ..... 10 Nm (89 inch lbs.)
Intake Manifold to Cylinder Head Stud ..... 6 Nm (53 inch lbs.)

Lifter / Lash Adjuster, Valve

Lifter Guide ..... 11 Nm (97 inch lbs.)
Stationary Lash Adjuster Bore I.D. ..... 12.013-12.037 mm (0.4730-0.4739 inch)
Stationary Lash Adjuster O.D. ..... 11.986-12.000 mm (0.0005-0.0020 inch)
Stationary Lash Adjuster Clearance ..... 0.013-0.051 mm (3.2210-3.2299 inch)

Oil Filter Adapter

Oil Filter Adapter ..... 35 Nm (26 ft. lbs.)

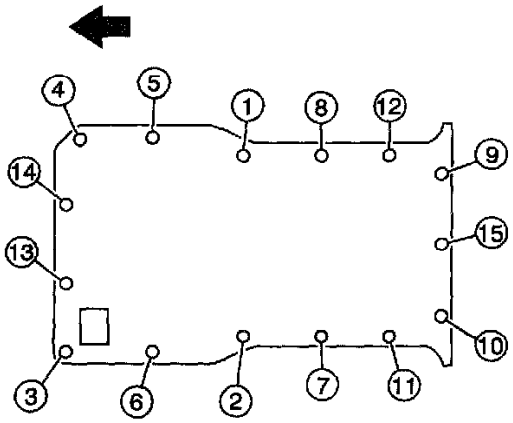
Oil Filter Housing

Oil Filter Housing Cover ..... 22 Nm (16 ft. lbs.)

Oil Filter, Engine

Oil Filter Housing Cover ..... **25 Nm (18 ft lb)**

Oil Pan, Engine



Oil Pan to Block Bolts ..... **25 Nm (18 ft lbs)**

Oil Pressure Sender

Oil Pressure Switch ..... 10 Nm (89 inch lbs.)

Oil Pump Cover

Oil Pump Cover Bolt ..... 6 Nm (53 inch lbs.)

Oil Pump Drive Shaft

Oil Pump Drive Assembly ..... 25 Nm (18 ft. lbs.)

Oil Pump, Engine

Oil Pump Gerotor Cover-Rear-Bolt ..... 6 Nm (53 in.lbs.)
Oil Pump Pressure Relief Valve Plug ..... 40 Nm (80 ft. lbs.)
Oil Pump and Components
Gerotor Pocket I.D. .....
Outer Element O.D. ..... 41.8 mm (1.65 inch)
Outer Element Clearance ..... 0.035 mm (0.012 inch)
Gerotor Pocket Depth .....
Outer Element Thickness ..... 14.0 mm (0.5512 inch)
Inner Element Thickness ..... 13.98 mm (0.5504 inch)
Pocket Depth Clearance, Outer .....
Pocket Depth Clearance, Inner .....
Pressure Relief Valve I.D. .....
Pressure Relief Valve O.D. .....
Pressure Relief Valve Clearance .....
Pressure Relief Valve Spring Working Length ..... 56.5 mm (2.2244 inch)
Pressure Relief Valve Tension - Length .....

System Specifications

Crankshaft Pulley Bolt
First Pass ..... 100 Nm (74 ft. lbs.)
Final Pass ..... 75 degrees
Camshaft Timing Chain Tensioner ..... 75 Nm (55 ft. lbs.)

Timing Chain

Timing Chain Oil Nozzle Bolt ..... 10 Nm (89 inch lbs.)
Timing Chain Length ..... 477.367-477.817 mm (18.7940-18.8117 inch)

Timing Chain Guide

Chain Guide Plug ..... 80 Nm (59 ft. lbs.)
Timing Fixed Chain Guide Bolt ..... 10 Nm (89 inch lbs.)
Timing Upper Chain Guide Bolt ..... 10 Nm (89 inch lbs.)
Timing Adjustable Chain Guide Bolt ..... 10 Nm (89 inch lbs.)

Timing Chain Tensioner

Camshaft Timing Chain Tensioner ..... 75 Nm (55 ft. lbs.)

Timing Cover

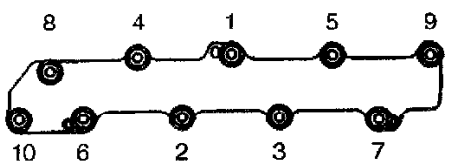
Front Cover to Block Bolt ..... 25 Nm (18 ft. lbs.)

System Specifications

Application	Specification	
	Metric	English
Exhaust Manifold Heat Shield Bolt–2.2L - L61	25 N·m	18 lb ft
Exhaust Manifold Heat Shield Bolt–2.4L	14 N·m	124 lb in
Exhaust Manifold Nut—2.2L, 2.4L	13 N·m	115 lb in
Exhaust Manifold Pipe Bolt	45 N·m	33 lb ft
Flex Decoupler to Exhaust Manifold Bolt- 2.4L	35 N·m	26 lb ft
Flex Decoupler to Exhaust Manifold Nut-2.2L - L61	35 N·m	26 lb ft
Intermediate Pipe Bolt	30 N·m	22 lb ft
Muffler Hanger Bolt	16 N·m	12 lb ft

Fastener Tightening Specifications

Exhaust Manifold



Exhaust Manifold to Cylinder Head Nut ..... 12 Nm (9 ft. lbs.)
Exhaust Manifold to Cylinder Head Stud ..... 10 Nm (89 inch lbs.)
Exhaust Manifold Pipe Flange Stud ..... 16 Nm (12 ft. lbs.)
Heat Shield to Exhaust Manifold Bolt ..... 10 Nm (89 inch lbs.)

Exhaust Pipe

Exhaust Manifold Pipe Bolt ..... 45 Nm (33 ft. lbs.)
Intermediate Pipe Bolt ..... 30 Nm (22 ft. lbs.)

Muffler

Muffler Hanger Bolt ..... 16 Nm (12 ft. lbs.)

Flex Plate

Flexplate (AMT) Bolt
First Pass ..... 53 Nm (39 lb ft)
Final Pass ..... 25 degrees

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Child Tether Attachment Bolt	28 N.m	21 lb ft
Communication Interface Module Bracket Nut	9.5 N.m	84 lb in
Communication Interface Module Bracket Strap Bolt	4 N.m	35 lb in
Instrument Panel (I/P) Carrier Bolt	2.3 N.m	20 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Rearview Mirror Screw	2 N.m	18 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
HVAC Cable Clip Retaining Screw	2 N.m	18 lb in
HVAC Control Assembly Screws	2 N.m	18 lb in

Fastener Tightening Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Bracket Bolt	5 N.m	44 lb in
Accumulator Bracket Nut	10 N.m	89 lb in
Accumulator Retaining Clamp Bolt	8 N.m	71 lb in
Accumulator Tube to Accumulator Fitting Nut	35 N.m	26 lb ft
Accumulator Tube to Evaporator Fitting Nut	35 N.m	26 lb ft
Air Distribution Duct Screws	2 N.m	18 lb in
Blower Motor Resistor Screws	1 N.m	9 lb in
Blower Motor Screws	5 N.m	44 lb in
Compressor Hose Assembly Manifold Stud	11 N.m	8 lb ft
Compressor Hose Clip Nut	10 N.m	89 lb in
Compressor Hose Fitting Nut to Accumulator	35 N.m	26 lb ft
Compressor Hose to Condenser Block Fitting Nut	16 N.m	12 lb ft
Compressor Mounting Bolts	22 N.m	16 lb ft
Compressor Nut to Compressor Hose Assembly	16 N.m	12 lb ft
Compressor Oil Drain Bolt 2.2L (L61)	15 N.m	10 lb ft

Fastener Tightening Specifications - Part 1

Application	Specification	
	Metric	English
Compressor Pressure Relief Valve	7 N.m	60 lb in
Condenser to Radiator Bolts	4 N.m	36 lb in
Evaporator Tube to Condenser Nut	16 N.m	12 lb ft
Evaporator Tube Fitting Nut to Evaporator Core	24 N.m	18 lb ft
HVAC Control Assembly Screws	2 N.m	18 lb in
HVAC Module Assembly Mounting Bolts	2 N.m	18 lb in
Heater Pipe Bolt	25 N.m	18 lb ft
Heater Pipe Nut	25 N.m	18 lb ft
HVAC Module Assembly Mounting Stud	2 N.m	18 lb in
HVAC Module Assembly Case Cover Heater Outlet Screws	1 N.m	9 lb in
Mode Cable Clip Screw	2 N.m	18 lb in
Refrigerant Filter Nut	15 N.m	11 lb ft
Refrigerant Pressure Sensor	5 N.m	44 lb in
Service Port Fitting	12 N.m	106 lb in
Strut Mounting Bolt	66 N.m	49 lb ft
Surge Tank Mounting Bolt	10 N.m	89 lb in
Temperature Cable Clip Screw	2 N.m	18 lb in
Upper Case Assembly Screws	1 N.m	9 lb in

Fastener Tightening Specifications - Part 2

Compressor Clutch

Air Gap Between The Pulley And The Drive Plate

0.3-0.6 mm (0.012-0.024 in) Air Gap

Ignition System Specifications

Application	Specification	
	Metric	English
Firing Order	1-3-4-2	
Primary Coil Current Output	8.5–9.5 Amps	
Spark Plug Torque	20 N.m	15 lb ft
Spark Plug Gap	1.06 mm	0.042 in
Spark Plug Type	GM P/N 12569190 or 41-981—AC plug type	

Ignition System Specifications

Firing Order

Firing Order 1-3-4-2

For number 1 cylinder location, See: Engine, Cooling and Exhaust/Engine/Tune-up and Engine Performance Checks/Ignition Timing/Number One C

Spark Plug

Spark Plug Gap ..... 1.1-0.95 mm (0.043-0.037 in)
Spark Plug Torque ..... 20 Nm (15 ft. lbs.)

Fastener Tightening Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Backup Lamp Nuts	2 N.m	18 lb in
Fog Lamp Bolts	6 N.m	53 lb in
Fog Lamp Nuts	2 N.m	18 lb in
Headlamp Adjusters Mechanism Bolts	6 N.m	53 lb in
Headlamp Bolts	4.5 N.m	40 lb in
High Mounted Stop Lamp Screws	2 N.m	18 lb in
HVAC Control Screws	2 N.m	18 lb in
License Plate Lamp Screws	2 N.m	18 lb in
Lower I/P Trim Insulator Screw	2.3 N.m	20 lb in
Park Turn Lamp Screws	2 N.m	18 lb in
Side Marker Lamp Screws	2 N.m	18 lb in
Tail Lamp Nuts	5 N.m	44 lb in
Outer I/P Trim Cover Screw	2 N.m	18 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Horn Bracket Bolt	10 N.m	89 lb in

Application	Specification	
	Metric	English
Drain/Fill Plugs	38 N·m	28 lb ft
Intermediate Shaft Bolts	100 N·m	74 lb ft
Front Transmission Mount	75 N·m	55 lb ft
Rear Cover Bolts	25 N·m	18 lb ft
Rear Transmission Mount	75 N·m	55 lb ft
Reverse Switch	18 N·m	13 lb ft
Ring Gear	90 N·m	66 lb ft
Shaft Bolts	100 N·m	74 lb ft
Shifter Guide Bolts	25 N·m	18 lb ft
Shifter Mounting Bolts	25 N·m	18 lb ft
Speed Sensor Bolt	12 N·m	8 lb ft
Transmission Housing Bolts	25 N·m	18 lb ft

Metric	English
Shim Thickness	
0.5	0.0197
0.55	0.0217
0.6	0.0236
0.65	0.0256
0.7	0.0276
0.75	0.0295
0.8	0.0315
0.85	0.0335
0.9	0.0354
0.95	0.0374
1.00	0.0394
1.05	0.0413
1.1	0.0433
1.15	0.0453
1.2	0.0473
1.25	0.0493
1.3	0.0512
1.35	0.0531

Unit Repair

Specifications

Application	Specification	
	Metric	English
Drain Plugs	38 N·m	28 lb ft
Intermediate Shaft Bolt	100 N·m	74 lb ft
Rear Cover Bolts	25 N·m	18 lb ft
Reverse Lockout Bolt	6 N·m	53 lb in
Reverse Switch	18 N·m	13 lb ft
Ring Gear	90 N·m	66 lb ft
Shaft Bolts	100 N·m	74 lb ft
Shifter Guide Bolt	25 N·m	18 lb ft
Shifter Retaining Bolts	25 N·m	18 lb ft
Speed Sensor	12 N·m	8 lb ft
Transmission Housing Bolts	27 N·m	20 lb ft

Fastener Tightening Specifications

Metric	English
Shim Thickness	
0.5	0.0197
0.55	0.0217
0.6	0.0236
0.65	0.0256
0.7	0.0276
0.75	0.0295
0.8	0.0315
0.85	0.0335
0.9	0.0354

Metric	English
Shim Thickness	
0.95	0.0374
1.00	0.0394
1.05	0.0413
1.1	0.0433
1.15	0.0453
1.2	0.0473
1.25	0.0493
1.3	0.0512
1.35	0.0531

Shim Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Amplifier Nut	3.5 N.m	31 lb in
Antenna Base Screw	1.9 N.m	17 lb in
Antenna Mast	1.5 N.m	13 lb in
Child Tether Attachment Bolt	28 N.m	21 lb ft
Digital Radio Antenna Base Nut	6 N.m	53 lb in
Front Door Speaker Screw	1.9 N.m	17 lb in
Radio Screw	2.3 N.m	20 lb in
Rear Speaker Screw	1.5 N.m	13 lb in
Speaker Grille Nut	1 N.m	9 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Center Rear Seat Belt Retractor Bolt	28 N.m	21 lb ft
Child Seat Latch Bracket Bolt	26 N.m	17 lb ft
Child Tether Anchor Bolt	28 N.m	21 lb ft
Front Seat Belt Buckle Bolt – Left	34 N.m	25 lb ft
Front Seat Belt Buckle Bolt – Right	48 N.m	35 lb ft
Front Seat Belt Retractor Anchor Plate Bolt	48 N.m	35 lb ft
Front Shoulder Belt Guide Bolt	41 N.m	30 lb ft
Front Seat Belt Retractor Bolt	48 N.m	35 lb ft
Front Shoulder Belt Guide Track Bolt	28 N.m	21 lb ft
Rear Seat Belt Buckle Nut	50 N.m	37 lb ft
Rear Seat Belt Anchor Plate Bolt	48 N.m	35 lb ft
Rear Seat Belt Retractor Bolt	28 N.m	21 lb ft

Fastener Tightening Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Battery Hold Down Retainer Bolt	18 N.m	13 lb ft
Battery Negative Cable Terminal Bolt	15 N.m	11 lb ft
Battery Positive Cable Terminal Bolt	15 N.m	11 lb ft
Generator Bolts	20 N.m	15 lb ft
Generator Electrical Connector	17 N.m	13 lb ft
Negative Battery Cable Ground Stud	25 N.m	18 lb ft
Positive Battery Cable to Starter Solenoid Nut	17 N.m	13 lb ft
Starter Motor Bolts	40 N.m	30 lb ft
Starter Motor Solenoid S Terminal Nut	3 N.m	27 lb in
Wire Harness Retainer Nut	18 N.m	13 lb ft

Fastener Tightening Specifications

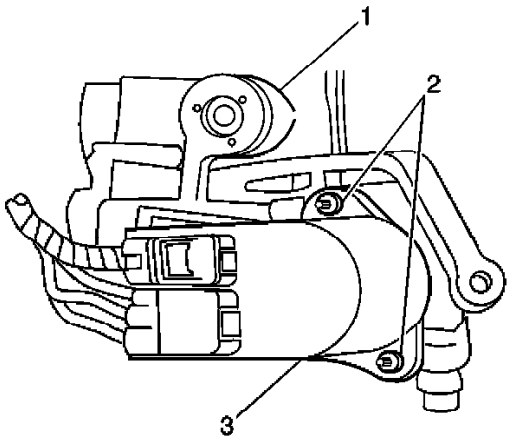
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Adjuster Plug Locknut	68 N.m	50 lb ft
Crossmember Support Bolts	110 N.m	71 lb ft
Inner Tie Rod	100 N.m	74 lb ft
O-Ring Union Fitting	75 N.m	55 lb ft
Power Steering Gear Mounting Bolts	120 N.m	89 lb ft
Power Steering Hose Fitting	27 N.m	20 lb ft
Power Steering Pressure Pipe Bracket Bolt	26 N.m	19 lb ft
Power Steering Pump Mounting Bolt (L61)	26 N.m	19 lb ft
Rack and Pinion Cylinder Line Fittings at Cylinder End	27 N.m	20 lb ft
Rack and Pinion Cylinder Line Fittings at Valve End	17 N.m	13 lb ft
Tie Rod Ball Stud Nut	45 N.m	33 lb ft
Tie Rod Jam Nut	75 N.m	55 lb ft

Steering System - Fastener Tightening Specifications

Ignition Switch

IGNITION SWITCH



Ignition Switch Assembly (3) Retaining Screws (2) Steering Column (1)

Retainer Screws ..... 4 Nm (36 lb in)

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Ignition Switch Assembly Screws	4 N.m	36 lb in
Intermediate Shaft to the Steering Gear Pinch Bolt	40 N.m	30 lb ft
Turn Signal Multifunction Switch Mounting Screws	4 N.m	36 lb in
Steering Column Mounting Bolts	27 N.m	20 lb ft
Steering Column Support Screws	8 N.m	71 lb in
Steering Column Trim Cover Screws Lower	4 N.m	36 lb in
Steering Wheel Nut	41 N.m	30 lb ft
Intermediate Shaft to the Steering Column Pinch Bolt	40 N.m	30 lb ft
Lock Bolt Assembly Screws	1.5 N.m	13 lb in

Front Suspension

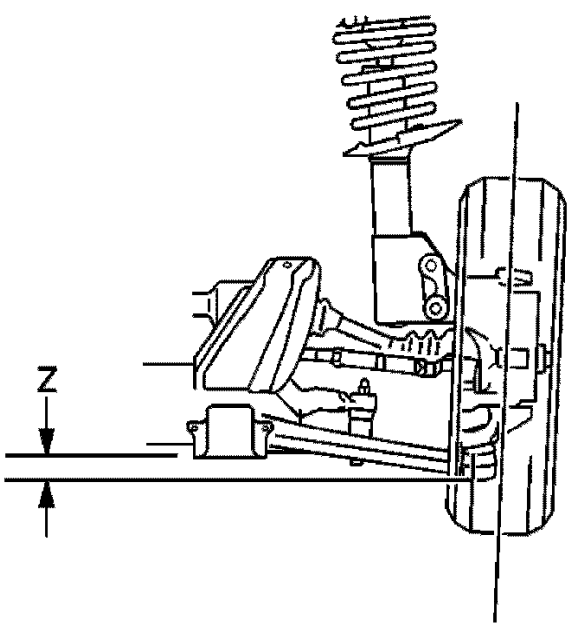
Application	Specification	
	Metric	English
Ball Joint to Steering Knuckle Nut to Install Cotter Pin--Maximum	65 N·m plus 180 degrees rotation	50 lb ft plus 180 degrees rotation
Ball Joint to Steering Knuckle Nut to Install Cotter Pin--Minimum	55 N·m plus 180 degrees rotation	41 lb ft plus 180 degrees rotation
Control Arm to Crossmember Bolts Front Bushing	100 N·m plus 90 degrees rotation	74 lb ft
Control Arm to Crossmember Bolts Rear Vertical Bushing	170 N·m	125 lb ft
Engine Mount Strut Retaining Bolts	100 N·m	74 lb ft
Front Suspension Crossmember Mounting Bolts	110 N·m	71 lb ft
Front Suspension Support Brace Bolts	72 N·m	53 lb ft
Hub and Bearing Assembly to Steering Knuckle Bolts	95 N·m	70 lb ft
Stabilizer Shaft Clamp	66 N·m	49 lb ft
Stabilizer Shaft Link to Control Arm Nuts	17 N·m	13 lb ft
Strut Assembly to Body Bolt	25 N·m	18 lb ft
Strut Assembly to Body Nuts	25 N·m	18 lb ft
Strut Assembly to Steering Knuckle Nuts	180 N·m	133 lb ft
Strut Nut to Strut Rod	75 N·m	55 lb ft

Rear Suspension

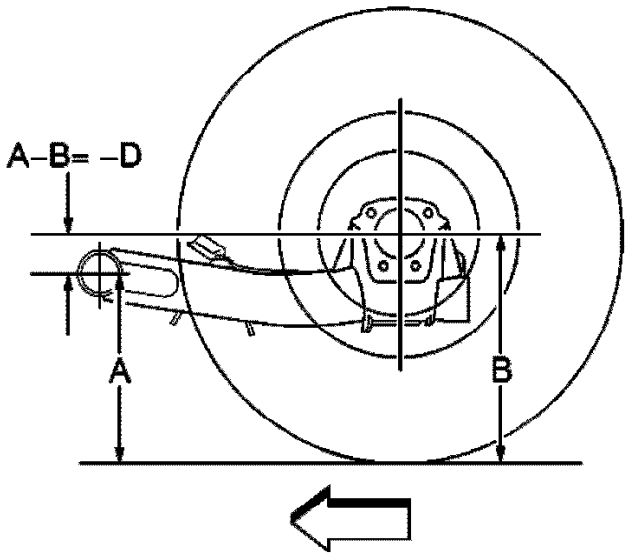
Application	Specification	
	Metric	English
Brake Pipe Fittings	27 N·m	20 lb ft
Brake Pipe Retainer Bolts	6 N·m	50 lb in
Hub and Bearing to Axle Bolt and Nuts	60 N·m	44 lb ft
Rear Axle Mounting Bolts	120 N·m	89 lb ft
Shock Absorber Lower Mounting Bolt	70 N·m	51 lb ft
Shock Absorber Mounting Upper Bolt to Body	25 N·m	18 lb ft
Shock Absorber Upper Mounting Nuts	25 N·m	18 lb ft
Strut Mount To Body Nuts	25 N·m	18 lb ft
Strut To Knuckle Bolts	120 N·m	89 lb ft
Strut Rod Pistion Nut	47 N·m	34 lb ft

Trim Height Specifications

Model	Suspension	Tire Size	Engine	Z	D
2 Door	FE1	P 195/70R14	L61	3 mm (.18 in)	37 mm (1.45 in)
2/4 Door	FE1	P 195/65R15	L61	-1 mm (-3/64 in)	-42 (-1 21/32 in)
2 Door	FE2	P 205/55R16	L61	-4 mm (.15 in)	-43 (1 11/16 in)
All measurements taken with a full tank of gas. Measurements for Z have +/- 9.5 mm (3/8 in).					



Z Height



D Height

Axle Nut

Drive Axle Nut ..... 200 N.m (148 lb ft)

Fastener Tightening Specifications

Wheel Stud / Lug Nut

Wheel Nuts ..... 140 Nm (100 ft. lbs.)

Windows

Fastener Tightening Specifications

Application	Specification	
	Metric	English
All Wheel Nuts	140 N.m	100 lb ft

Application	Specification	
	Metric	English
Rearview Mirror Screw	2 N.m	18 lb in

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Induction Tube Screw	3 N.m	27 lb in
Washer Solvent Container Screws	10 N.m	89 lb in
Windshield Washer/Wiper Switch Screws	4 N.m	36 lb in
Wiper Arm Nut	30 N.m	22 lb ft
Wiper Drive System Module Screws	10 N.m	89 lb in
Wiper Motor Cover Screws	2 N.m	18 lb in
Wiper Motor Screws	10 N.m	89 lb in
Wiper Transmission Screws	9 N.m	79 lb in

Fastener Tightening Specifications

Pressure Control Solenoid Current – Amp	Approximate Line Pressure	
	Metric	English
0.00	1041–1138 kPa	151–165 psi
0.10	1027–1123 kPa	149–163 psi
0.20	1000–1096 kPa	145–159 psi
0.30	965–1061 kPa	140–154 psi
0.40	903–1000 kPa	131–145 psi
0.50	827–923 kPa	120–134 psi

Line Pressure Part (1 Of 2)

Pressure Control Solenoid Current – Amp	Approximate Line Pressure	
	Metric	English
0.60	723–820 kPa	105–119 psi
0.70	606–703 kPa	88–102 psi
0.80	475–572 kPa	69–83 psi
0.90	379–475 kPa	55–69 psi
1.00	317–386 kPa	46–56 psi
1.10	289–330 kPa	42–48 psi

Line Pressure Part (2 Of 2)

Compression Check

Compression Pressure Minimum ..... 689 kPa (100 psi)

The lowest reading cylinder should not be less than 70 percent of the highest

Altitude vs Barometric Pressure

Altitude Measured in Meters (m)	Altitude Measured in Feet (ft)	Barometric Pressure Measured in Kilopascals (kPa)
Determine your altitude by contacting a local weather station or by using another reference source.		
4267	14000	56–64
3962	13000	58–66
3658	12000	61–69
3353	11000	64–72
3048	10000	66–74
2743	9000	69–77
2438	8000	71–79
2134	7000	74–82
1829	6000	77–85
1524	5000	80–88
1219	4000	83–91
914	3000	87–95
610	2000	90–98
305	1000	94–102
0	0 Sea Level	96–104
−305	−1000	101–105

Altitude Vs Barometric Pressure

Engine Oil Pressure

Oil Pressure @ 1,000 RPM ..... 344.75-551.60 Kpa (50-80 Psi)

Fuel Pressure

Fuel Pressure (Key On, Engine Off) ..... 345-414 kPa (50-60 psi)

Fuel Pump

Fuel Pressure (Key On, Engine Off) ..... 345-414 kPa (50-60 psi)

Power Steering Pump Specifications

Engine Code	Engine Size	High Flow (Gallons Per Minute) 1500 RPM	Pressure Relief P.S.I.
L61	L4-2.2L	1.95/2.35	1300/1400

Power Steering Pump

Thermostat, Engine Cooling

Thermostat Open Temperature ..... 82°C (180°F)

Inflation Pressure Conversion (Kilopascals to PSI)

kPa	psi	kPa	psi
140	20	215	31
145	21	220	32
155	22	230	33
160	23	235	34
165	24	240	35
170	25	250	36
180	26	275	40
185	27	310	45
190	28	345	50
200	29	380	55
205	30	415	60
Conversion: 6.9 kPa = 1 psi			

Inflation Pressure Converrsion (Kilopascals To PSI)

Application	Specification	
	Metric	English
Bottom Pan Removal	6.5 liters	6.9 quarts
Complete Overhaul	9.0 liters	9.5 quarts
Dry	12.2 liters	12.9 quarts
Measurements are approximate.		

Fluid Capacity Specifications

Fluid - A/T

Transmission Fluid
Pan Removal ..... 6.5L (6.9 Qt)
Overhaul ..... 9.0L (9.5 Qt)
Dry ..... 12.2L (12.9 Qt)

Cooling System Capacity	8.6 qt (US)

Engine Oil

Engine Oil

With Filter Change ..... 4.7L (5.0 Qt)

NOTE: ALL capacity specifications are approximate. When replacing or adding fluids, fill to the recommended level and recheck fluid level.

Fuel Tank

Fuel Tank Capacity ..... 53.4 L (14.1 gal)

Maintenance

FLUID CAPACITY/LEVELS

Note that ALL capacity specifications are approximate. When replacing or adding fluids, fill to the recommended level and recheck fluid level.

Application	Specification	
	Metric	English
DEXRON®III	1.7 liters	1.8 quarts

Lubrication Specifications

Fluid - M/T

Transmission Fluid ..... 1.7L (1.8 Qt)

Power Steering Fluid

Notice: Refer to Using Proper Power Steering Fluid Notice in Service Precautions.
See: Steering and Suspension/Service Precautions/Vehicle Damage Warnings/Using Proper Power Steering Fluid Notice

NOTE: Fluid capacity specification not supplied by manufacturer.
See: Steering and Suspension/Steering/Service and Repair/Checking and Adding Power Steering Fluid

Refrigerant Capacity

Refrigerant Capacity

Refrigerant Capacity	1.5 lbs.

Refrigerant System Capacities

Application	Specification	
	Metric	English
Use PAG Oil RI897 Low Viscosity, GM P/N 12378526 (Canadian P/N 88900060)		
Accumulator Replacement	45 ml*	1.5 oz*
* Add PAG oil equal to the amount of oil drained from the old accumulator plus the specified additional amount.		
Compressor Replacement	75 ml[1]	2.5 oz[1]
The Delphi CVC6 service compressor is used in this model year vehicle and the replacement compressor is precharged with 148.0 ml (5 oz) of PAG oil		
Condenser Replacement	30 ml[1]	1 oz[1]
Evaporator Replacement	30 ml[1]	1 oz[1]
Total System PAG Oil Capacity	147 ml	5.0 oz
R134a		
Refrigerant Charge	0.68 kg	1.50 lb
[1]If more than the specified amount of PAG oil was drained from a component, add the equal amount of oil drained.		

Refrigerant System Capacities (L61)

Type	Dexron(R)-III Automatic Transmission Fluid or Equivalent

Fluid - A/T

Transmission Fluid Type

Type ..... DEXRON III or Equivalent

System Specifications

BRAKE FLUID

Delco Supreme 11 ..... GM P/N 12377967 (Canadian P/N 992667)

- or equivalent -

DOT-3 brake fluid

CAUTION: The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to

Hydraulic Brake System	Delco Supreme 11 Brake Fluid GM Part No. 12377967 (Canadian P/N 992667) or equivalent DOT-3 brake fluid.

Hydraulic Clutch System	Hydraulic Clutch Fluid (GM Part No. 12345347, in Canada 10953517, or equivalent DOT-3 brake fluid).

Coolant

ENGINE COOLANT

The cooling system in your vehicle is filled with DEX-COOL engine coolant. This coolant is designed to remain in your vehicle for 5 years or 150,0

A 50/50 mixture of clean, drinkable water (if the water in your area is of poor quality, it is recommended you use distilled or de-ionized water) and D
- Give freezing protection down to -34°F (-37°C).
- Give boiling protection up to 265°F (129°C).
- Protect against rust and corrosion.
- Help keep the proper engine temperature.
- Let the warning lights and gages work as they should.

NOTICE: Using coolant other than DEX-COOL may cause premature engine, heater core or radiator corrosion. In addition, the engine coolant m

WHAT TO USE

Use a mixture of one-half clean, drinkable water and one-half DEX-COOL coolant which won't damage aluminum parts. If you use this coolant mix

CAUTION: Adding only plain water to your cooling system can be dangerous. Plain water, or some other liquid such as alcohol, can boil be

NOTICE If you use an improper coolant mixture, your engine could overheat and be badly damaged. The repair cost would not be covered by yo

If you have to add coolant more than four times a year, check your cooling system.

NOTICE: If you use the proper coolant, you do not have to add extra inhibitors or additives which claim to improve the system. These can be har

Engine Oil

Engine Oil

API Classification ..... Look for Starburst Symbol
Grade ..... 5W-30 (preferred)
Above -18° C (0° F) ..... 10W-30, 5W-30 (preferred)
Below -29° C (-20° F) ..... 5W-30 synthetic (preferred) , 0W-30

Fuel

GASOLINE OCTANE

Use regular unleaded gasoline with a posted octane of 87 or higher. If the octane is less than 87, you may get a heavy knocking noise when you dr

ADDITIVES

To provide cleaner air, all gasoline in the United States are now required to contain additives that will help prevent engine and fuel system deposit

NOTICE: Your vehicle was not designed for fuel that contains methanol. Don't use fuel containing methanol. It can corrode metal parts in your f

Some gasoline that are not reformulated for low emissions may contain an octane-enhancing additive called methylcyclopentadienyl manganese tr

CALIFORNIA FUEL

If your vehicle is certified to meet California Emission Standards (see the underhood emission control label), it is designed to operate on fuels that

A Recommended Fluids and Lubricants

RECOMMENDED FLUIDS AND LUBRICANTS

Look for and use ONLY the oils, fluids and fuel that meet GM Specification. Oil or fluid that does not have the correct specification designation c

Floor Shift Linkage

FLOOR SHIFT LINKAGE

Lubriplate lubricant aerosol, GM P/N 12346293 in Canada 992723 or lubricant meeting the requirements of NLGI # 2, category LB or GC-LB.

Hinges and Locks

HINGES AND LOCKS

Multi-Purpose lubricant Superlube(R), GM P/N 12346241 or equivalent.

Key Lock Cylinders

KEY LOCK CYLINDERS

Multi-Purpose lubricant Superlube(R), GM P/N 12346241 (Canadian P/N 10953474) or equivalent.

Misc.. Linkage, Latches, Pivots and Spring Anchors

MISC. LINKAGE, LATCHES, PIVOTS AND SPRING ANCHORS

Lubriplate lubricant aerosol, GM P/N U.S. 12346293, in Canada 992723 or lubricant meeting the requirements of NLGI # 2, category LB or GC-I

Parking Brake Cable Guides

PARKING BRAKE CABLE GUIDES

Chassis lubricant, GM P/N 12377985 or lubricant meeting the requirements of NLGI # 2, category LB or GC-LB.

Weatherstrip Conditioning

WEATHERSTRIP CONDITIONING

Dielectric Silicone Grease, GM P/N U.S. 12345579, in Canada 1974984, or equivalent.

Windshield Washer Solvent

WINDSHIELD WASHER SOLVENT

GM Optikleen(R) washer solvent, GM P/N 1051515 (Canadian P/N 992667) or equivalent.

Type	DEXRON-III (R) Automatic Transmission Fluid or Equivalent

Fluid - M/T

Transmission Fluid ..... Dexron III

Power Steering Fluid

Fluid Type

..... GM Power Steering Fluid GM P/N 1052884 - 1 pint (Canadian P/N 993294), 1050017 - 1 quart, (Canadian P/N 992646) or equivalent.

Refrigerant Type

Refrigerant Type

Air Conditioning Refrigerant	R134a

Refrigerant System Capacities

Application	Specification	
	Metric	English
Use PAG Oil RI897 Low Viscosity, GM P/N 12378526 (Canadian P/N 88900060)		
Accumulator Replacement	45 ml*	1.5 oz*
* Add PAG oil equal to the amount of oil drained from the old accumulator plus the specified additional amount.		
Compressor Replacement	75 ml[1]	2.5 oz[1]
The Delphi CVC6 service compressor is used in this model year vehicle and the replacement compressor is precharged with 148.0 ml (5 oz) of PAG oil		
Condenser Replacement	30 ml[1]	1 oz[1]
Evaporator Replacement	30 ml[1]	1 oz[1]
Total System PAG Oil Capacity	147 ml	5.0 oz
R134a		
Refrigerant Charge	0.68 kg	1.50 lb
[1]If more than the specified amount of PAG oil was drained from a component, add the equal amount of oil drained.		

Refrigerant System Capacities (L61)

Refrigerant Oil

Refrigerant Oil

Refrigerant Oil (R-134a system)	PAG oil

Refrigerant System Capacities

Application	Specification	
	Metric	English
Use PAG Oil RI897 Low Viscosity, GM P/N 12378526 (Canadian P/N 88900060)		
Accumulator Replacement	45 ml*	1.5 oz*
* Add PAG oil equal to the amount of oil drained from the old accumulator plus the specified additional amount.		
Compressor Replacement	75 ml[1]	2.5 oz[1]
The Delphi CVC6 service compressor is used in this model year vehicle and the replacement compressor is precharged with 148.0 ml (5 oz) of PAG oil		
Condenser Replacement	30 ml[1]	1 oz[1]
Evaporator Replacement	30 ml[1]	1 oz[1]
Total System PAG Oil Capacity	147 ml	5.0 oz
R134a		
Refrigerant Charge	0.68 kg	1.50 lb
[1]If more than the specified amount of PAG oil was drained from a component, add the equal amount of oil drained.		

Refrigerant System Capacities (L61)