

## SECTION : 1C

# DOHC ENGINE MECHANICAL

**CAUTION :** *Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless otherwise noted.*

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# SPECIFICATIONS

## ENGINE SPECIFICATIONS

Application	Description (Manual and Automatic)
<b>General Data:</b>	
Engine Type	4-Cylinder (in-line)
Displacement	1,998 cm <sup>3</sup> (121.92 in <sup>3</sup> )
Bore Stroke	86 x 86 mm (3.38 in. x 3.38 in.)
Compression Ratio	9.6 0.2 :1
Firing Order	1-3-4-2
<b>Cylinder Bore:</b>	
Diameter	85.995-86.485 mm (3.3856-3.4049 in.)
Out of Round (Maximum)	0.013 mm (0.0005 in.)
Taper (Maximum)	0.013 mm (0.0005 in.)
<b>Piston:</b>	
Diameter	85.955-86.485 mm (3.384-3.404 in.)
Clearance to Bore	0.0100-0.0300 mm (0.00039-0.00110 in.)
Piston Protrusion	0.5 mm (0.019 in.) Maximum
Piston Taper	0.013 mm (0.0005 in.)
<b>Piston Rings:</b>	
Ring, End Gap, Top Compression	0.3-0.5 mm (0.011-0.019 in.)
Ring, End Gap, Second Compression	0.3-0.5 mm (0.011-0.019 in.)
<b>Piston Pin:</b>	
Diameter	20.9970-20.9985 mm (0.82665-0.82671 in.)
Pin Offset	0.8 mm (0.03 in.) Toward Thrust Side
Clearance: In Piston	0.0035-0.0140 mm (0.00013-0.00055 in.)
Clearance: In Rod	Interference Fit in Rod
Length	61.5 mm (2.42 in.)
<b>Camshaft:</b>	
Lift – Intake	10.0 mm (0.39 in.)
Lift – Exhaust	10.0 mm (0.39 in.)
End Play	0.040-0.144 mm (0.0015-0.0056 in.)
Bearing Journal OD	42.455-43.470 mm (1.6714-1.7114 in.)
<b>Crankshaft:</b>	
Main Journal Diameter (All)	57.974-57.995 mm (2.2824-2.2832 in.)
Out of Round (Maximum)	0.003 mm (0.0001 in.)
Main Bearing Clearance (All)	0.015-0.061 mm (0.00059-0.00239 in.)
Crankshaft End Play	0.070-0.302 mm (0.0027-0.0118 in.)
Service Oversize	Available in 2 sizes 0.25 mm and 9.50 mm (0.0098-0.0196 in.)

<b>Application</b>	<b>Description (Manual and Automatic)</b>
Connecting Rod Journal: Diameter (All)	48.981~ 48.987 mm (1.9283~1.9286 in.)
Out of Round (Maximum)	0.004 mm (0.00015 in.)
Rod Bearing Play	0.006~0.031 mm (0.00023~0.00122 in.)
<b>Cylinder Head:</b>	
Valve Stem Protrusion	39.2~39.8 mm (1.54~1.56 in.)
Valve Guide Height	13.7~14.0 mm (0.54~0.57 in.)
Overall Height	134~0.025 mm (5.2755~0.0009 in.)
Minimum Overall Height After Machining	133.9 mm (5.27 in.)
<b>Valve System:</b>	
Valve Lash Compensators	Hydraulic
Seat Runout (Maximum, All)	0.03 mm (0.00118 in.)
Face Runout (Maximum, All)	0.03 mm (0.00118 in.)
Valve Stem Diameter Intake	6.998~7.012 mm (0.2755~0.2760 in.)
Exhaust	6.078~6.992 mm (0.2747~0.2752 in.)
Valve Diameter Intake	32 0.1 mm (1.2598 0.0039 in.)
Exhaust	29 0.1 mm (1.1417 0.0039 in.)
Valve Seat Width Intake	1.0~1.5 mm (0.039~0.059 in.)
Exhaust	1.7~2.2 mm (0.066~0.086 in.)
Valve Face Angle	44° ~40°
Valve Guide Inside Diameter	6.000~6.012 mm (0.236~0.237 in.)
<b>Oil Pump:</b>	
Gear Lash	0.10~0.20 mm (0.003~0.007 in.)
Outer Gear to Body	0.11~0.19 mm (0.004~0.007 in.)
Outer Gear to Crescent	0.40~0.50 mm (0.015~0.019 in.)
Inner Gear to Crescent	0.35~0.40 mm (0.013~0.015 in.)
End Clearance	0.030~0.10 mm (0.001~0.003 in.)
<b>Sealants and Adhesives:</b>	
Rear Main Bearing Cap	GE p/n RTV 159
Camshaft Carrier to Cylinder Head	HN 1581 (Loctite® 515)
Oil Pan Bolts	HN 1256 (Loctite® 242)
Oil Pump Bolts	HN 1256 (Loctite® 242)
Oil Pan Pickup Tube Bolts	HN 1256 (Loctite® 242)
Oil Gallery Plug	HN 1256 (Loctite® 242)
Coolant Jacket Caps and Plugs (Freeze Plugs)	HN 1756 (Loctite® 176)
Exhaust Manifold Studs/Nuts	Anti-seize Compound (HMC Spec HN1325)

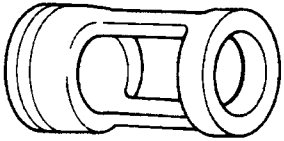
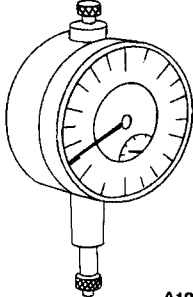
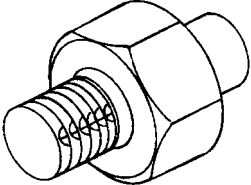
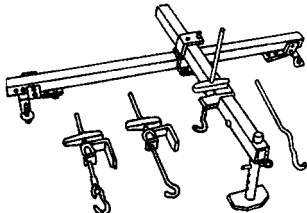

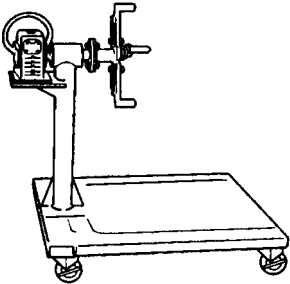
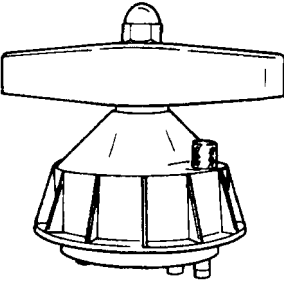
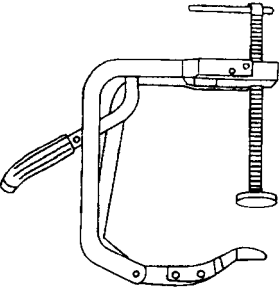
**FASTENER TIGHTENING SPECIFICATIONS**

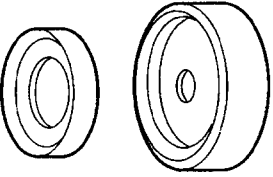
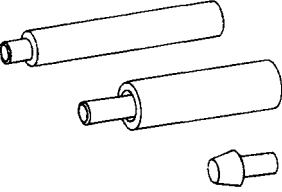
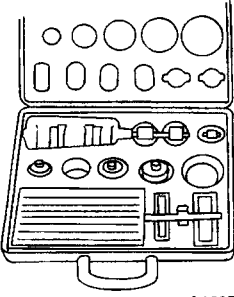
<b>Application</b>	<b>N•m</b>	<b>Lb–Ft</b>	<b>Lb–In</b>
A/C Compressor Hose Assembly Bolt	33	24	–
Air Filter Housing Bolts	10	–	89
Automatic Tensioner Bolt	25	18	–
Auxiliary Catalytic Converter–to–Exhaust Manifold Nuts	40	30	–
Camshaft Bearing Cap Bolts, Intake and Exhaust	8	–	71
Camshaft Gear Bolt, Intake and Exhaust	50 + 60° + 15°	37 + 60° + 15°	–
Camshaft Position Sensor Bolts	12	–	106
Connecting Rod Cap Bolts	36 + 45° + 15°	26 + 45° + 15°	–
Coolant Bypass Housing and Mounting Bolts	15	11	–
Coolant Pump Retaining Bolts	25	18	–
Coolant Temperature Sensor	25	18	–
Crankshaft Bearing Cap Bolts	50 + 45° + 15°	37 + 45° + 15°	–
Crankshaft Position Sensor Retaining Bolt	8	–	71
Crankshaft Pulley Bolts	20	15	–
Crankshaft Timing Belt Drive Gear Bolt	135+ 30° +10°	100+ 30° +10°	–
Cylinder Head Bolts	25 + 90° +90° + 90°	18 + 90° +90° + 90°	–
EI System Ignition Coil and EGR Mounting Bracket Bolts	25	18	–
Engine Block Lower Support Bracket/Splash Shield Bolts	35	26	–
Engine Mount Bracket Retaining Bolts and Nuts	55	41	–
Engine Mount Bracket–to–Engine Mount Retaining Bolts	60	44	–
Engine Mount Retaining Bolts	60	44	–
Engine–to–Intake Manifold Support Bracket Bolts	20	15	–
Evaporative Emission Canister Purge Solenoid Bracket Bolt	5	–	44
Exhaust Gas Recirculation Valve Bolts	20	15	–
Exhaust Manifold Heat Shield Bolts	8	–	71
Exhaust Manifold Retaining Nuts	15	11	–
Exhaust Pipe Support Bracket Bolts	40	30	–
Flexible Plate Bolts	65	48	–
Flywheel Bolts	65 + 30° + 15°	48 + 30° + 15°	–
Front Muffler Pipe–to–Main Catalytic Converter Nuts	30	22	–
Fuel Rail Retaining Bolts	25	18	–
Front Timing Belt Cover Bolts, Upper and Lower	6	–	53
Generator–to–Intake Manifold and Cylinder Head Support Bracket Bolts	37	27	–
Generator–to–Intake Manifold Strap Bracket Bolt, Upper and Lower	22	16	–
Generator–to–Intake Manifold Support Bracket Bolts	35	26	–
Ignition Coil Mounting Bolts	10	–	89
Intake Manifold Retaining Nuts and Bolts	18	13	–
Intake Manifold Support Bracket Bolts	20	15	–

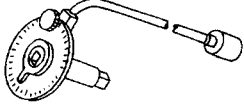
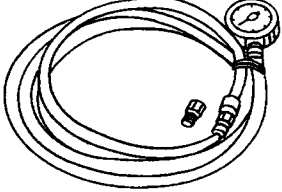
<b>Application</b>	<b>N•m</b>	<b>Lb-Ft</b>	<b>Lb-In</b>
Lower Block Support Bracket Bolts	35	26	–
Oil Pan Drain Plug	35	26	–
Oil Pan Flange-to-Transaxle Retaining Bolts	40	30	–
Oil Pan Retaining Bolts	10	–	89
Oil Pressure Switch	40	30	–
Oil Pump Bolts	10	–	89
Oil Pump Rear Cover Bolts	6	–	53
Oil Pump/Pick-up Tube Bolts	10	–	89
Oil Pump Retaining Bolts	10	–	89
Pulse Pick-up Sensor Disc	13	–	115
Rear Timing Belt Cover Bolts	7	–	62
Safety Relief Valve Bolt	30	22	–
Spark Plug Cover Bolts	8	–	71
Spark Plugs	20	15	–
Support Bracket Bolts	40	30	–
Thermostat Housing Mounting Bolts	15	11	–
Throttle Cable Bracket Bolts	8	–	71
Timing Belt Automatic Tensioner Bolt	25	18	–
Timing Belt Idler Pulley Bolt	25	18	–
Timing Belt Idler Pulley Nut	25	18	–
Transmission/Transaxle Bell Housing Bolts	75	55	–
Transmission/Transaxle Torque Converter Bolts	60	44	–
Valve Cover Bolts	8	–	71

# SPECIAL TOOLS

## SPECIAL TOOLS TABLE

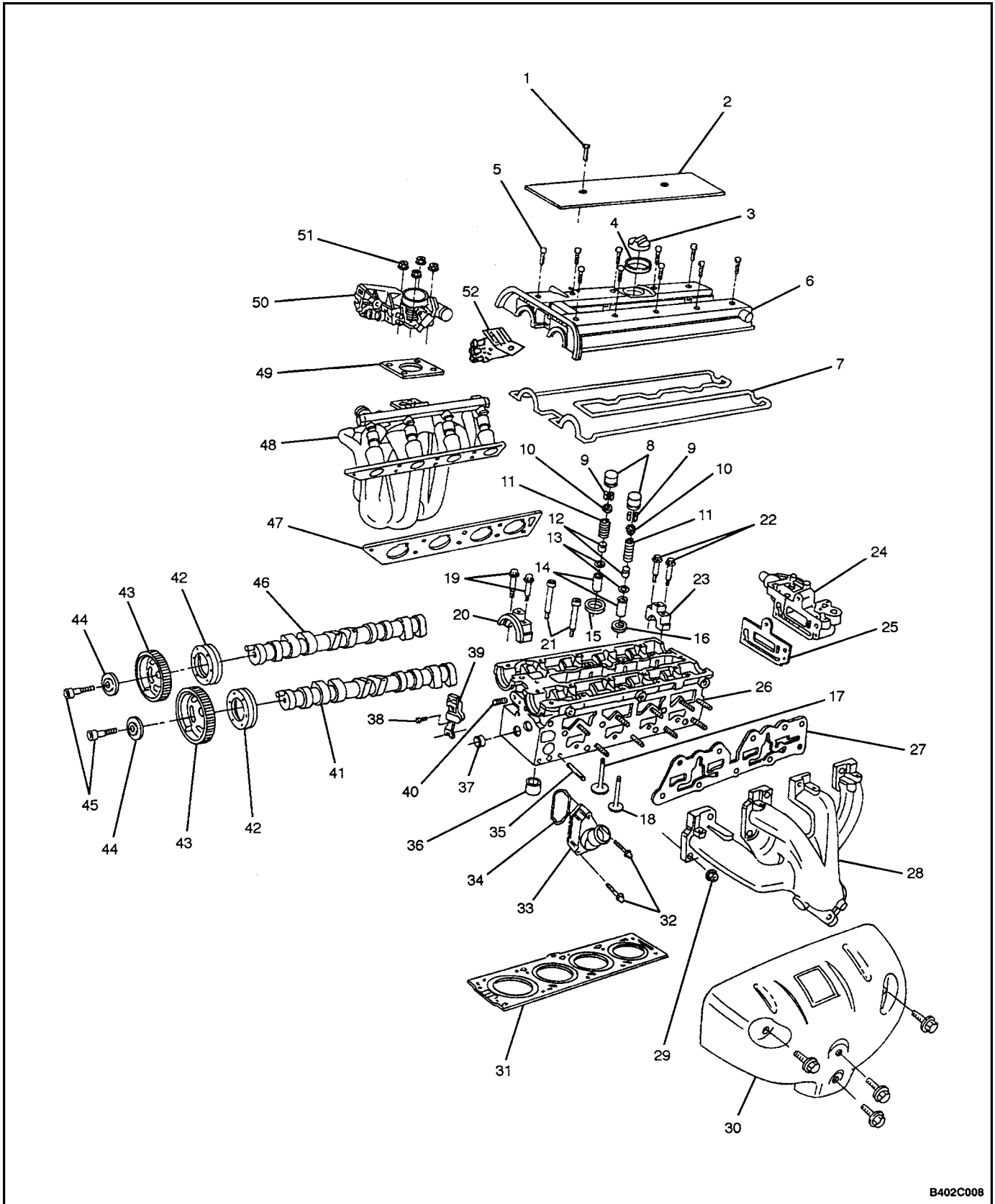
 <p style="text-align: center;">A102C153</p>	<p style="text-align: center;">KM-653 Adapter</p>	 <p style="text-align: center;">A102B154</p>	<p style="text-align: center;">MKM-571-B Gauge</p>
 <p style="text-align: center;">B102C044</p>	<p style="text-align: center;">KM-135 Adapter</p>	 <p style="text-align: center;">A102B152</p>	<p style="text-align: center;">J-28467-B Engine Assembly Lift Support</p>
 <p style="text-align: center;">A102C154</p>	<p style="text-align: center;">KM-805 Valve Guide Reamer</p>	 <p style="text-align: center;">A102B159</p>	<p style="text-align: center;">KM-412 Engine Overhaul Stand</p>
 <p style="text-align: center;">A102C155</p>	<p style="text-align: center;">J-36792 Crankshaft Rear Oil Seal Installer</p>	 <p style="text-align: center;">A102B157</p>	<p style="text-align: center;">KM-348 Spring Compressor</p>

 <p style="text-align: center;">A102B160</p>	<p style="text-align: center;">KM-635 Crankshaft Rear Oil Seal Installer</p>
 <p style="text-align: center;">A102B153</p>	<p style="text-align: center;">KM-427 Piston Pin Service Set</p>
 <p style="text-align: center;">A102B156</p>	<p style="text-align: center;">KM-340-0 Cutter Set Includes: KM-340-7 Guide Drift KM-340-13 Cutters KM-340-26 Cutters</p>

 <p style="text-align: center;">A102B161</p>	<p style="text-align: center;">KM-470-B Angular Torque Gauge</p>
 <p style="text-align: center;">A202B005</p>	<p style="text-align: center;">KM-498-B Pressure Gauge</p>

# COMPONENT LOCATOR

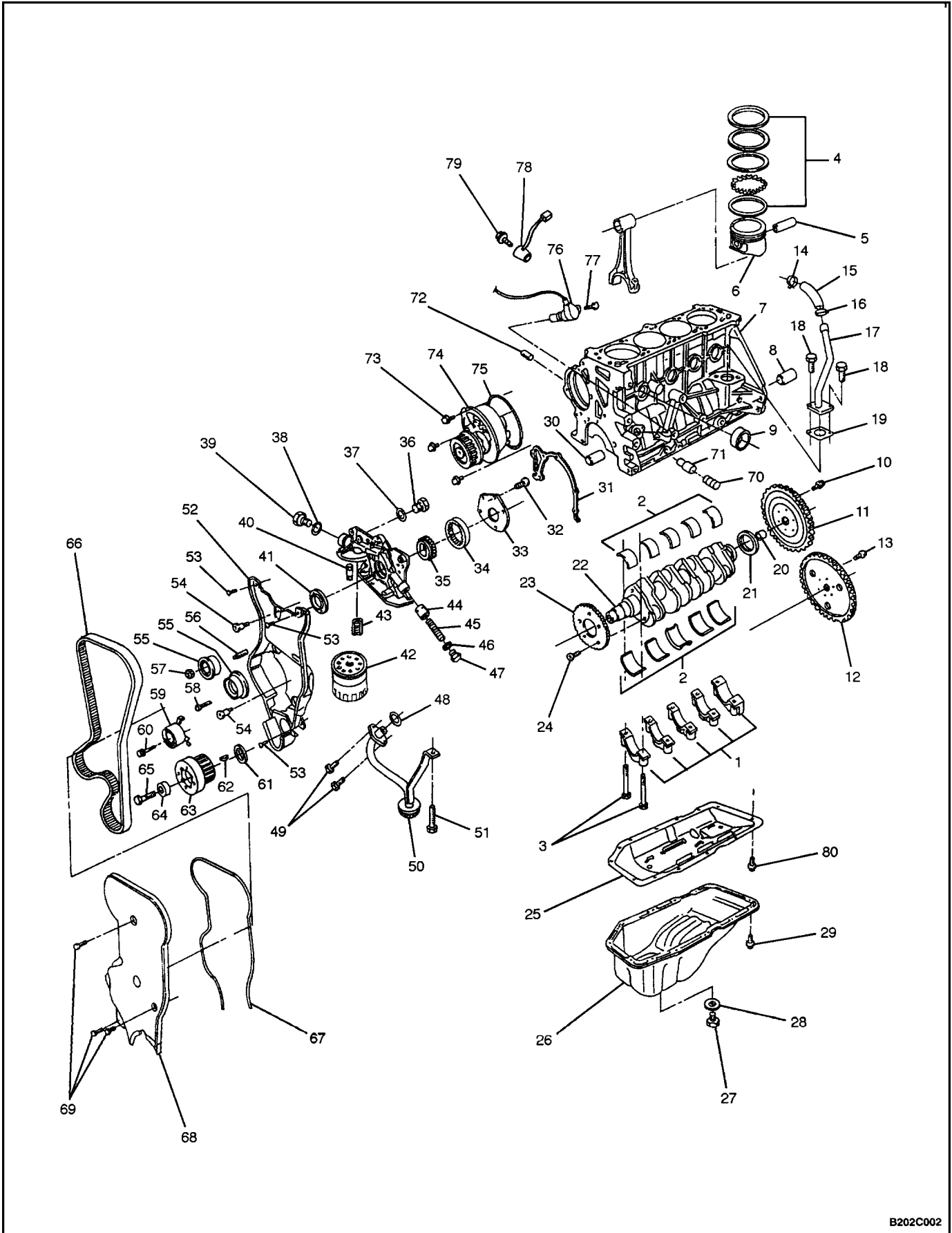
## UPPER END





1. Bolt
2. Spark Plug Cover
3. Oil Cap
4. Oil Cap Seal
5. Bolt
6. Valve Cover
7. Valve Cover Gasket
8. Value Lash Adjuster
9. Retainer
10. Valve Cab
11. Valve Spring
12. Valve Stem Seal
13. Valve Spring Seat
14. Valve Guide
15. Valve Spring Seat
16. Exhaust Seat
17. Intake Valve
18. Exhaust Valve
19. Bolt
20. Front Bearing Cap
21. Head Bolt
22. Bolt
23. Bearing Cap
24. EGR Adapter
25. EGR Adapter Gasket
26. Cylinder Head
27. Exhaust Manifold Gasket
28. Exhaust Manifold
29. Nut
30. Exhaust Manifold Heat Shield
31. Cylinder Head Gasket
32. Bolt
33. Thermostat Housing
34. Thermostat Housing Gasket
35. Stud
36. Sleeve
37. Plug
38. Bolt
39. Camshaft Position Sensor
40. Oil Gallery Plug
41. Exhaust Camshaft
42. Oil Seal Ring
43. Camshaft Gear
44. Washer
45. Camshaft Gear Bolt
46. Intake Camshaft
47. Intake Manifold Gasket
48. Intake Manifold
49. Throttle Body Gasket
50. Throttle Body
51. Nut
52. Exhaust Gas Recirculation Solenoid

# LOWER END



1. Connecting Rod
2. Bearing
3. Connecting Rod Bolt
4. Piston Ring Set
5. Piston Pin
6. Piston
7. Engine Block
8. Sleeve
9. Water Jacket Cap
10. Bolt (Manual Transaxle)
11. Flywheel (Manual Transaxle)
12. Flexible Plate (Automatic Transaxle)
13. Bolt (Automatic Transaxle)
14. Clamp
15. Hose
16. Clamp
17. Engine Vent Pipe
18. Bolt
19. Gasket
20. Transaxle Input Shaft Bearing
21. Rear Main Seal
22. Crankshaft
23. Ignition Transmitter Disk
24. Bolt
25. Splash Pan
26. Oil Pan
27. Drain Plug
28. Seal Ring
29. Bolt
30. Sleeve
31. Gasket
32. Bolt
33. Oil Pump Cover
34. Ring Gear
35. Gear
36. Plug
37. Washer
38. Washer
39. Bypass Valve Plug
40. Special Screw
41. Seal
42. Oil Filter
43. Bypass Valve
44. Pressure Relief Valve Plunger
45. Pressure Relief Valve Spring
46. Washer
47. Pressure Relief Valve Plug
48. Ring Seal
49. Bolt
50. Oil Suction Pipe
51. Bolt
52. Rear Timing Belt Cover
53. Bolt
54. Special Bolt
55. Idler Pulley
56. Stud
57. Nut
58. Bolt
59. Tensioner
60. Bolt
61. Thrust Inner Washer
62. Woodruff Key
63. Crankshaft Gear
64. Thrust Outer Washer
65. Bolt
66. Camshaft Drive Belt
67. Seal
68. Front Timing Belt Cover
69. Bolt
70. Bushing Plug
71. Bushing
72. Oil Gallery Plug
73. Bolt
74. Water Pump
75. Seal Ring
76. Crankshaft Revolution Sensor
77. Bolt
78. Knock Sensor
79. Bolt
80. Bolt