

ENGINE

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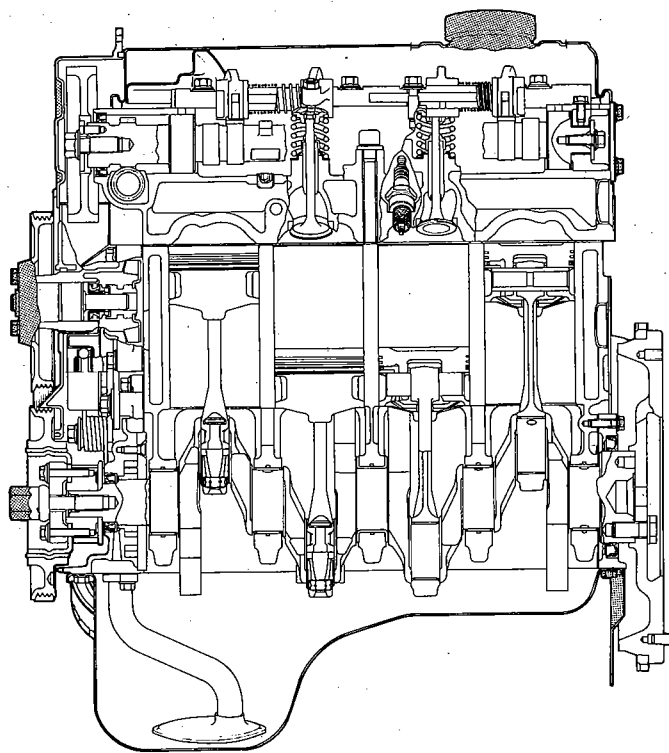
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GENERAL INFORMATION

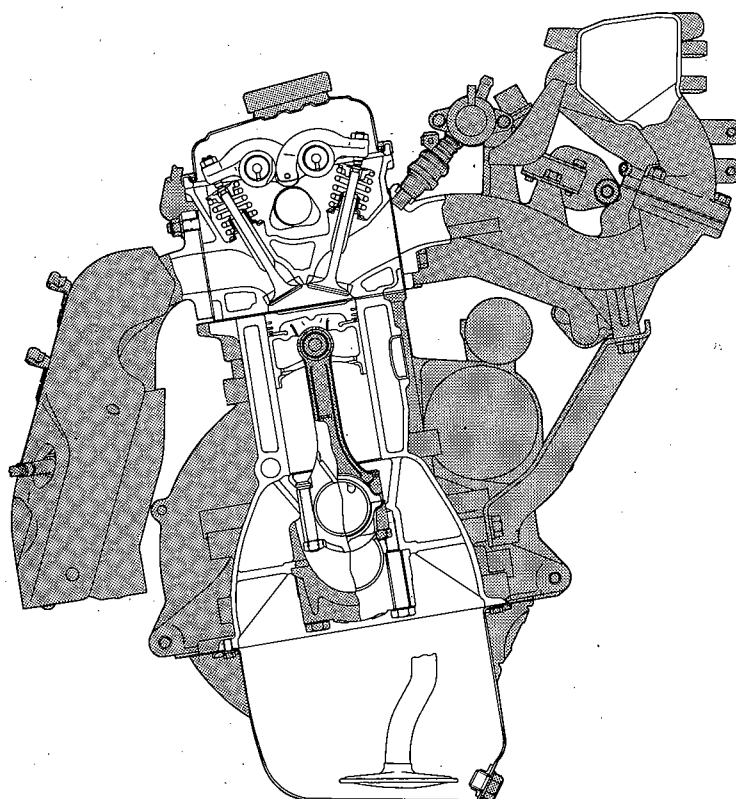
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<1.5L Engine>

SECTIONAL VIEW

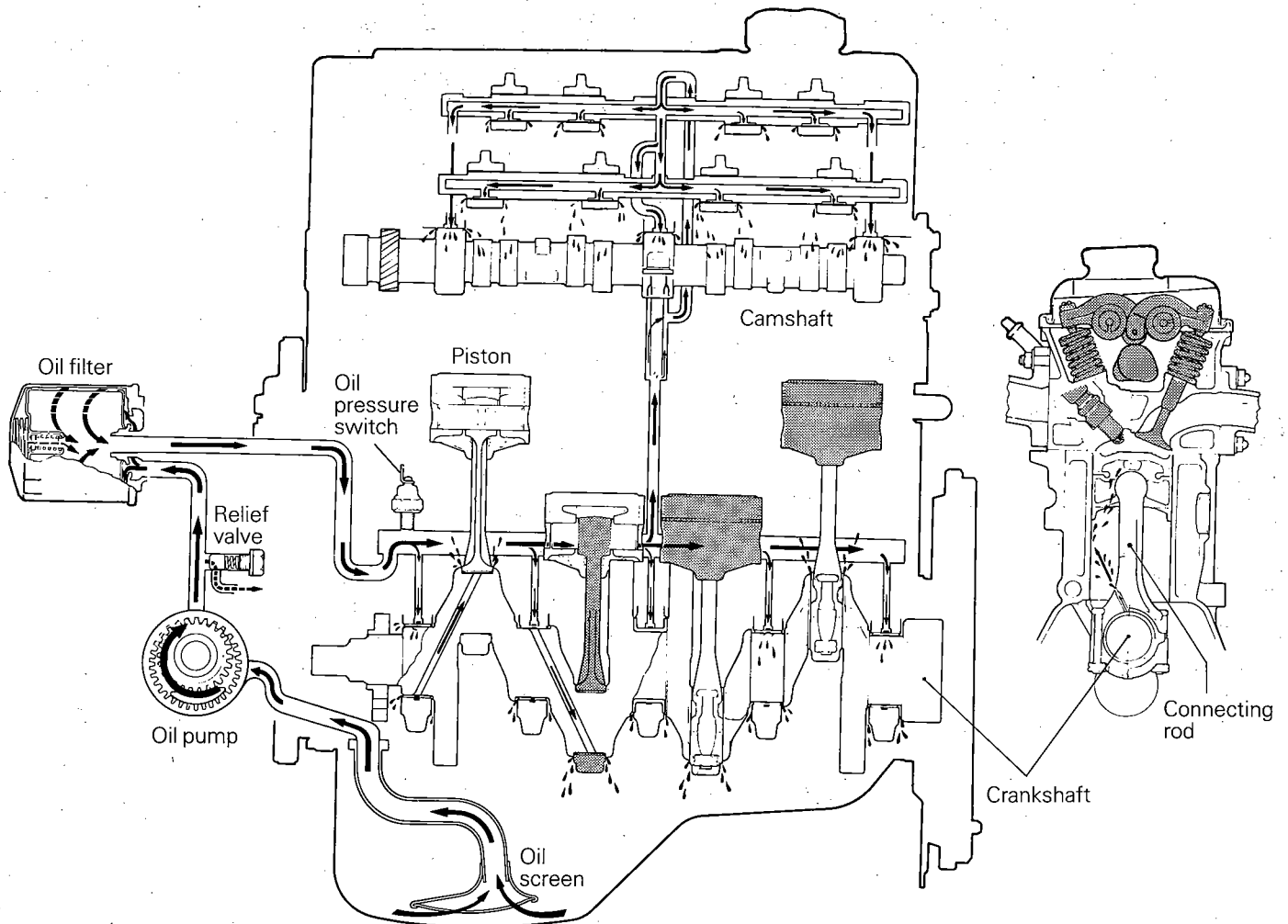


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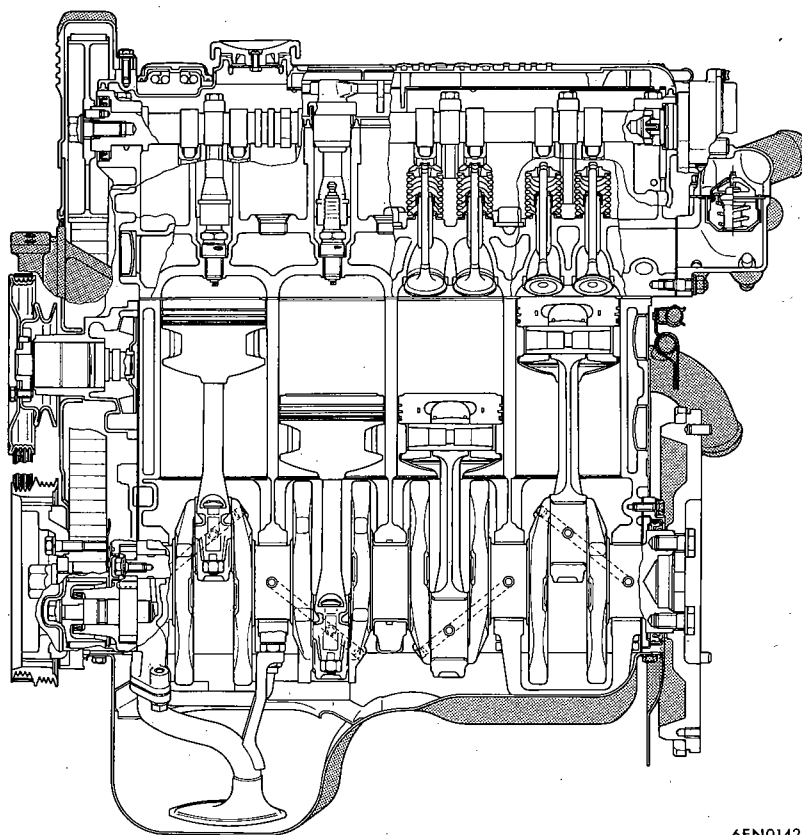


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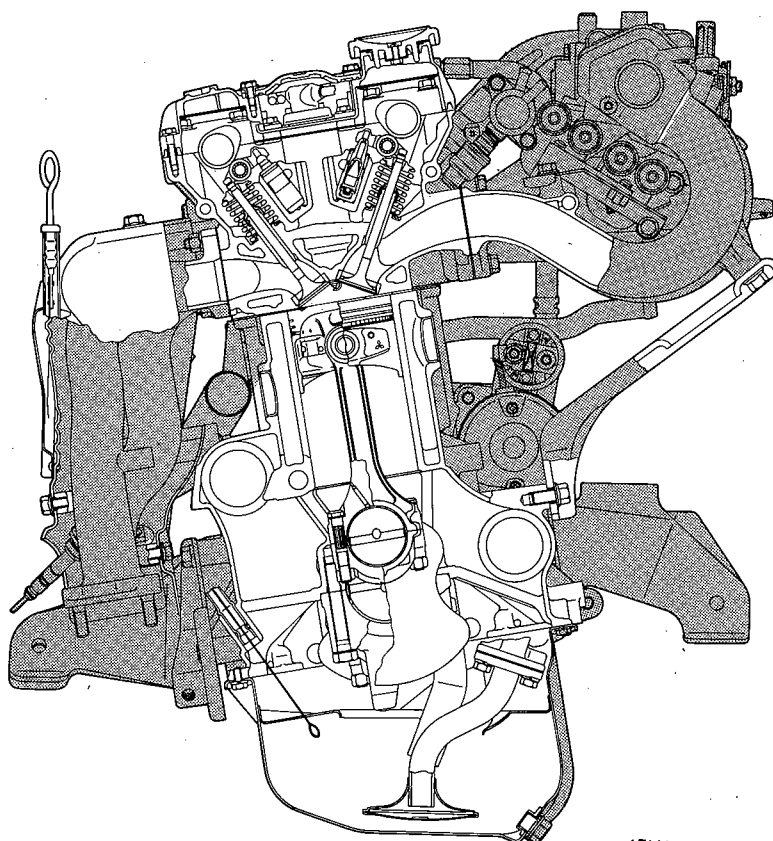
LUBRICATION SYSTEM



<1.6L Engine>
SECTIONAL VIEW

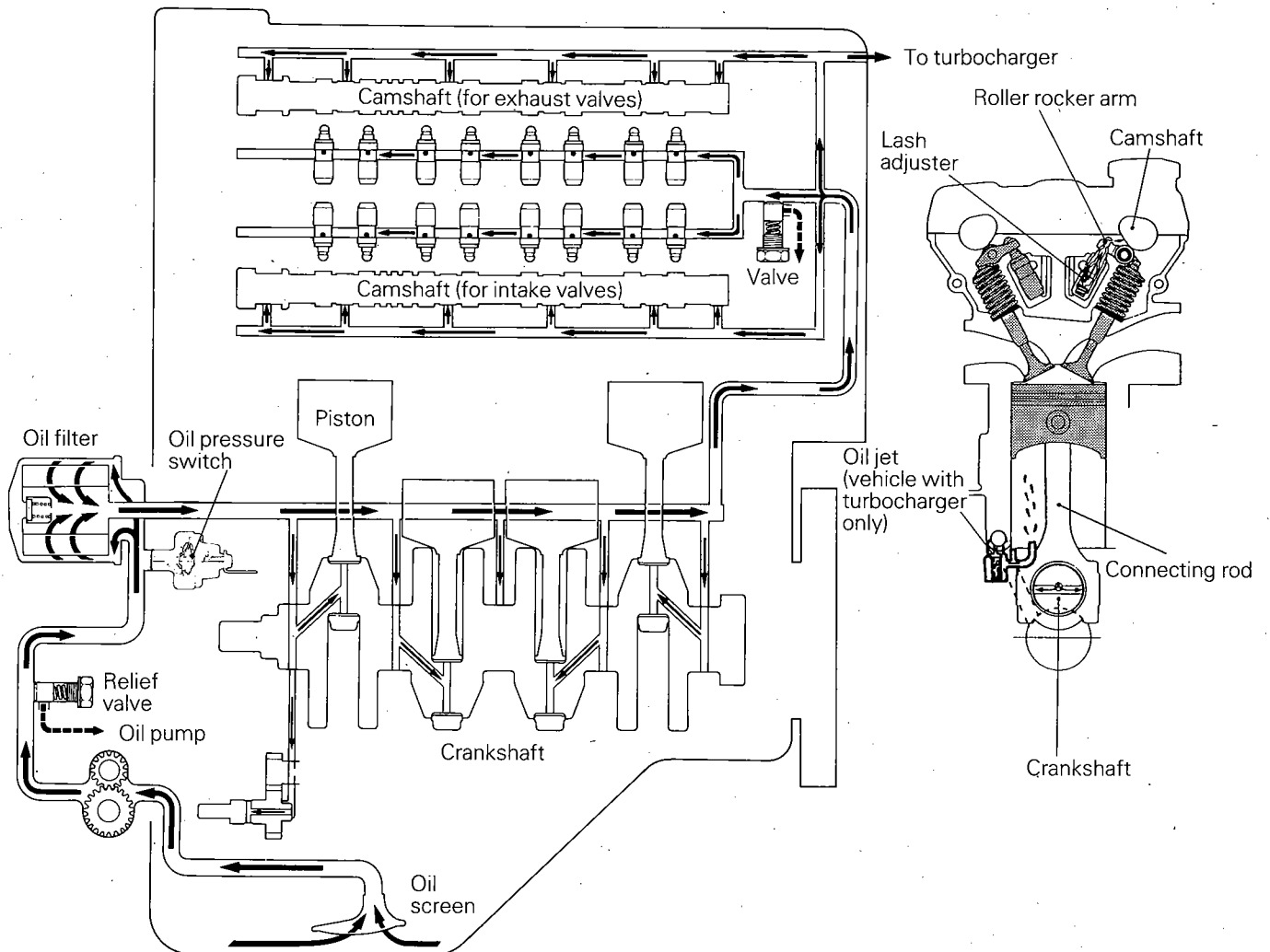


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6EN0143

LUBRICATION SYSTEM



6LU0018

SPECIFICATIONS

N09CA--

GENERAL SPECIFICATIONS

Items	1.5L Engine	1.6L Engine
Type	In-line, Over Head Camshaft	In-line, Double Over Head Camshaft
Number of cylinders	4	4
Bore mm (in.)	75.5 (2.972)	82.3 (3.24)
Stroke mm (in.)	82.0 (3.228)	75 (2.95)
Piston displacement cc (cu.in.)	1,468 (89.6)	1,595 (97)
Compression ratio	9.4	<N/A>: 9.2, <T/C>: 8.0
Firing order	1-3-4-2	1-3-4-2
Valve timing		
Intake valve		
Opens (BTDC)	18.5°	21°
Closes (ABDC)	51.5°	43°
Exhaust valve		
Opens (BTDC)	51.5°	48°
Closes (ABDC)	18.5°	12°
Valve overlap	37°	33°
Intake valve duration	250°	244°
Exhaust valve duration	250°	240°

SERVICE SPECIFICATIONS

N09CB--

<1.5L Engine>

Items	Standard	Limit
Engine adjustment Engine compression pressure kPa (psi) Engine compression pressure difference between each cylinder kPa (psi) Intake manifold vacuum – at idle kPa (in.Hg)	 67 (20)	960 (137) Less than 100 (14)
Drive belt For alternator Deflection mm (in.) Inspection New belt Used belt Tension N (lbs.) Inspection New belt Used belt For air conditioner compressor Deflection mm (in.) Inspection New belt Used belt Tension N (lbs.) Inspection New belt Used belt For power steering oil pump Deflection mm (in.) Inspection	 7.0 – 9.0 (.276 – .354) 5.5 – 7.0 (.217 – .276) 8 (.315) 250 – 500 (55 – 110) 500 – 700 (110 – 154) 400 (88) 6.0 – 7.0 (.236 – .276) 5.0 – 6.0 (.197 – .236) 6.0 – 7.0 (.236 – .276) 250 – 310 (55 – 68) 370 – 435 (82 – 96) 250 – 310 (55 – 68) 6.0 – 9.0 (.236 – .354)	
Cylinder head Overall height mm (in.) Flatness of gasket surface mm (in.) Flatness of manifold mounting surface mm (in.)	106.9 – 107.1 (4.209 – 4.217) Less than 0.05 (.0020) Less than 0.15 (.0059)	* –0.2 (* –.008) * Limit must be –0.2 (–.008) combined with amount of grinding of cylinder block gasket surface. 0.2 (.008) 0.3 (.012)

Items	Standard	Limit
Oversize rework dimensions of valve seat hole mm (in.) Intake 0.3 (.012) O.S. 0.6 (.024) O.S. Exhaust 0.3 (.012) O.S. 0.6 (.024) O.S. Camshaft bearing to camshaft clearance mm (in.) Oversize rework dimensions of valve guide hole (both intake and exhaust) mm (in.) 0.05 (.002) O.S. 0.25 (.010) O.S. 0.50 (.020) O.S.	36.300 – 36.325 (1.4291 – 1.4301) 36.600 – 36.625 (1.4409 – 1.4419) 32.300 – 32.325 (1.2717 – 1.2726) 32.600 – 32.625 (1.2835 – 1.2844) 0.04 – 0.08 (.0016 – .0031) 12.050 – 12.068 (.4744 – .4751) 12.250 – 12.268 (.4823 – .4830) 12.500 – 12.518 (.4921 – .4928)	
Camshaft Cam height mm (in.) Intake Exhaust Journal O.D. mm (in.) Bearing oil clearance mm (in.) End play mm (in.)	38.909 (1.5318) 38.974 (1.5344) 46 (1.8110) 0.04 – 0.08 (.0015 – .0031) 0.05 – 0.20 (.0020 – .0079)	38.409 (1.5122) 38.474 (1.5147) 0.12 (.0047) 0.4 (.016)
Rocker arm I.D. mm (in.) Rocker arm-to-shaft clearance mm (in.)	18.9 (.744) 0.01 – 0.04 (.0004 – .0016)	0.1 (.004)
Rocker arm shaft O.D. mm (in.)	18.9 (.744)	
Rocker arm shaft spring Free length mm (in.) Intake Exhaust	76.9 (3.028) 44.2 (1.740)	

Items	Standard	Limit
Valve Valve length mm (in.) Intake Exhaust Stem O.D. mm (in.) Face angle Thickness of valve head (margin) mm (in.) Intake Exhaust Valve stem to valve guide clearance mm (in.) Intake Exhaust Valve clearance – Hot engine mm (in.) Intake Exhaust Valve clearance – Cold engine mm (in.) Intake Exhaust	 102.1 (4.020) 100.9 (3.932) 6.6 (.260) 45 – 45.5° 1.0 (.039) 1.5 (.059) 0.02 – 0.05 (.0008 – .0020) 0.05 – 0.09 (.0020 – .0035) 0.15 (.0059) 0.25 (.0098) 0.07 (.0028) 0.17 (.0067)	 0.5 (.020) 1.0 (.039) 0.10 (.0039) 0.15 (.0059)
Valve guide Length mm (in.) Intake Exhaust Service sizes mm (in.)	 44.0 (1.732) 49.5 (1.949) 0.05, 0.25, 0.50 (.002, .010, .020) oversize	
Valve seat Valve contact width mm (in.) Seat angle Oversize valve seat height mm (in.) Intake 0.3 (.012) O.S. 0.6 (.024) O.S. Exhaust 0.3 (.012) O.S. 0.6 (.024) O.S.	 0.9 – 1.3 (.035 – .051) 44 – 44.5° 7.0 – 7.2 (.276 – .283) 7.3 – 7.5 (.287 – .295) 7.4 – 7.6 (.291 – .299) 7.7 – 7.9 (.303 – .311)	
Valve spring Free length mm (in.) Load N (lbs.) Out of square	 44.6 (1.756) 242 (53) Less than 2°	 43.6 (1.717) 4°

Items	Standard	Limit
Cylinder block Cylinder bore mm (in.) Out-of-round and taper of cylinder bore mm (in.) Overall height mm (in.) Flatness of gasket surface mm (in.)	75.50 – 75.53 (2.9724 – 2.9736) Less than 0.02 (.0008) 255.9 – 256.1 (10.075 – 10.083) Less than 0.05 (.0020)	 * –0.2 (* –.008) * Limit must be –0.2 (–.008) combined with amount of grinding of cylinder head gasket surface. 0.1 (.004)
Piston O.D mm (in.) Piston-to-cylinder clearance mm (in.) Ring groove width mm (in.) No. 1 No. 2 Oil Service sizes mm (in.)	75.47 – 75.50 (2.9713 – 2.9724) 0.02 – 0.04 (.0008 – .0016) 1.52 – 1.54 (.0598 – .0606) 1.51 – 1.53 (.0594 – .0602) 4.015 – 4.045 (.1581 – .1593) 0.25, 0.50, 0.75, 1.00 (.010, .020, .030, .039) oversize	
Piston ring Side clearance mm (in.) No. 1 No. 2 End gap mm (in.) No. 1 & No. 2 Oil ring side rail Oversize mm (in.)	 0.03 – 0.07 (.0012 – .0028) 0.02 – 0.06 (.0008 – .0024) 0.20 – 0.35 (.0079 – .0138) 0.20 – 0.70 (.0079 – .0276) 0.25, 0.50, 0.75, 1.00 (.010, .020, .030, .039)	 0.1 (.004) 0.1 (.004) 0.8 (.031) 1.0 (.039)
Connecting rod Bend mm (in.) Twist mm (in.) Connecting rod big end side clearance mm (in.) Piston pin press-in load N (lbs.)	0.05 (.0020) less 0.10 (.0039) less 0.10 – 0.25 (.0039 – .0098) 5,000 – 15,000 (1,100 – 3,300)	 0.4 (.016)
Connecting rod bearing Oil clearance mm (in.) Service size mm (in.)	0.014 – 0.044 (.0006 – .0017) 0.25, 0.50, 0.75 (.010, .020, .030) undersize	0.1 (.004)

Items	Standard	Limit
Crankshaft main bearing Oil clearance mm (in.) Service size mm (in.)	0.021 – 0.045 (.0008 – .0018) 0.25, 0.50, 0.75 (.010, .020, .030) undersize	0.1 (.0039)
Crankshaft Pin O.D. mm (in.) Journal O.D. mm (in.) Out-of-round and taper of journal & pin mm (in.) End play mm (in.) Undersize rework dimensions of pin mm (in.) 0.25 (.010) U.S. 0.50 (.020) U.S. 0.75 (.030) U.S. Undersize rework dimensions of journal mm (in.) 0.25 (.010) U.S. 0.50 (.020) U.S. 0.75 (.030) U.S.	42 (1.65) 48 (1.89) Less than 0.015 (.0006) 0.05 – 0.18 (.0020 – .0071) 41.735 – 41.750 (1.6431 – 1.6437) 41.485 – 41.500 (1.6333 – 1.6339) 41.235 – 41.250 (1.6234 – 1.6240) 47.735 – 47.750 (1.8793 – 1.8799) 47.485 – 47.500 (1.8695 – 1.8701) 47.235 – 47.250 (1.8596 – 1.8602)	0.25 (.0098)
Flywheel Runout mm (in.)		Less than 0.13 (.0051)
Oil pressure at curb idle speed kPa (psi) [Oil temperature is 75 to 90°C (167 to 194°F)]	80 (11.4) or more	
Oil pump Outer gear mm (in.) Clearance between outer circumference and front case mm (in.) Clearance between addendum and crescent mm (in.) End play mm (in.) Inner gear Clearance between addendum and crescent mm (in.) End play	 0.10 – 0.20 (.0039 – .0079) 0.22 – 0.44 (.0087 – .0173) 0.04 – 0.10 (.0016 – .0039) 0.21 – 0.34 (.0083 – .0134) 0.04 – 0.10 (.0016 – .0039)	 0.4 (.016) 0.8 (.031) 0.2 (.008) 0.7 (.028) 0.2 (.008)
Relief spring Free length mm (in.) Load N (lbs.)	46.6 (1.835) 61 (13) at 40.1 mm (1.579 in.)	

NOTE

O.D. = Outer Diameter

I.D. = Inner Diameter

O.S. = Oversize Diameter

U.S. = Undersize Diameter

Items	Standard	Limit
Engine adjustment		
Engine compression pressure kPa (psi)		
<N/A>		960 (171)
<T/C>		840 (149)
Engine compression pressure difference between each cylinder kPa (psi)		Less than 100 (14)
Intake manifold vacuum – at idle kPa (in.Hg)	64 (19)	
Drive belt		
For alternator		
Deflection mm (in.)		
Inspection	9.0 – 11.5 (.354 – .453)	
New belt	7.5 – 9.0 (.295 – .354)	
Used belt	10 (.394)	
Tension N (lbs.)		
Inspection	250 – 500 (55 – 110)	
New belt	500 – 700 (110 – 154)	
Used belt	400 (88)	
For air conditioner compressor		
Deflection mm (in.)		
Inspection	Approx. 8 (.315)	
New belt	5.0 – 5.5 (.197 – .217)	
Used belt	6.0 – 7.0 (.236 – .276)	
Tension N (lbs.)		
Inspection	250 – 500 (55 – 110)	
New belt	470 – 570 (104 – 126)	
Used belt	320 – 400 (71 – 88)	
For power steering oil pump		
Deflection mm (in.)		
Inspection	6.0 – 9.0 (.236 – .354)	
Timing belt		
Projection of auto tensioner rod mm (in.)	12 (.47)	
Projection of auto tensioner rod (distance between the tensioner arm and auto tensioner body) mm (in.)	3.8 – 4.5 (.15 – .18)	
Reverse speed of auto tensioner rod	2.5 – 3	

Items	Standard	Limit
Cylinder head Overall height mm (in.) Flatness of gasket surface mm (in.) Flatness of manifold mounting surface mm (in.) Oversize rework dimensions of valve seat hole mm (in.) Intake 0.3 (.012) O.S. 0.6 (.024) O.S. Exhaust 0.3 (.012) O.S. 0.6 (.024) O.S. Oversize rework dimensions of valve guide hole (both intake and exhaust) mm (in.) 0.05 (.002) O.S. 0.25 (.010) O.S. 0.50 (.020) O.S.	131.9 – 132.1 (5.193 – 5.201) Less than 0.05 (.0020) 0.15 (.0059) 35.300 – 35.325 (1.3898 – 1.3907) 35.600 – 35.625 (1.4016 – 1.4026) 33.300 – 33.325 (1.3110 – 1.3120) 33.600 – 33.625 (1.3228 – 1.3238) 12.050 – 12.068 (.4744 – .4751) 12.250 – 12.268 (.4823 – .4830) 12.500 – 12.518 (.4921 – .4928)	* –0.2 (* –.008) * Limit must be –0.2 (–.008) combined with amount of grinding of cylinder block gasket surface. 0.2 (.008) 0.3 (.012)
Camshaft Cam height mm (in.) Intake Exhaust Journal O.D. mm (in.) Bearing oil clearance mm (in.) End play mm (in.)	35.200 (1.3858) 34.907 (1.3743) 26 (1.02) 0.05 – 0.09 (.0020 – .0035) 0.1 – 0.2 (.004 – .008)	34.700 (1.3661) 34.407 (1.3546)
Valve Valve length mm (in.) Intake Exhaust Stem O.D. mm (in.) Intake Exhaust Face angle Thickness of valve head (margin) mm (in.) Intake Exhaust Valve stem to valve guide clearance mm (in.) Intake Exhaust	109.5 (4.311) 109.7 (4.319) 6.565 – 6.568 (.2585 – .2586) 6.530 – 6.550 (.2571 – .2579) 45 – 45.5° 1.0 (.039) 1.5 (.059) 0.020 – 0.047 (.0008 – .0019) 0.050 – 0.085 (.0020 – .0033)	0.7 (.028) 1.0 (.039) 0.10 (.0039) 0.15 (.0059)

Items	Standard	Limit
Valve guide Length mm (in.) Intake Exhaust Service size mm (in.)	45.5 (1.791) 50.5 (1.988) 0.05, 0.25, 0.50 (.002, .010, .020) oversize	
Valve seat Width of seat contact mm (in.) Seat angle Service size mm (in.)	0.9 – 1.3 (.035 – .051) 44 – 44.5° 0.3 (.012), 0.6 (.024) oversize	
Valve spring Free length mm (in.) Load N (lbs.) Out of squareness	45.8 (1.803) 240 (53) at installed height Less than 1.5°	44.9 (1.768) 4°
Cylinder block Cylinder bore mm (in.) Out-of-roundness and taper of cylinder bore mm (in.) Flatness of gasket surface mm (in.)	82.30 – 82.33 (3.2402 – 3.2413) Less than 0.01 (.0004) Less than 0.05 (.0020)	0.1 (.0039)
Piston O.D mm (in.) N/A T/C Piston-to-cylinder clearance mm (in.) N/A T/C Ring groove width mm (in.) No. 1 No. 2 Oil Service size mm (in.)	82.27 – 82.30 (3.2390 – 3.2402) 82.26 – 82.29 (3.2386 – 3.2398) 0.02 – 0.04 (.0008 – .0016) 0.03 – 0.05 (.0012 – .0020) 1.22 – 1.24 (.0480 – .0488) 1.52 – 1.54 (.0598 – .0606) 3.01 – 3.03 (.1185 – .1193) 0.25, 0.50, 0.75, 1.00 (.010, .020, .030, .039) oversize	
Piston ring Side clearance mm (in.) No. 1, No. 2 End gap mm (in.) No. 1 No. 2 Oil ring side rail mm (in.) Service size mm (in.)	0.03 – 0.07 (.0012 – .0028) 0.25 – 0.40 (.0098 – .0157) 0.35 – 0.50 (.0138 – .0197) 0.20 – 0.70 (.0079 – .0276) 0.25, 0.50, 0.75, 1.00 (.010, .020, .030, .039) oversize	0.1 (.004) 0.8 (.031) 0.8 (.031) 1.0 (.039)

Items	Standard	Limit
Connecting rod Bend mm (in.) Twist mm (in.) Connecting rod big end to crankshaft side clearance mm (in.) Piston pin press-in load N (lbs.)	0.05 (.0020) 0.1 (0.004) 0.10 – 0.25 (.0039 – .0098) 75,000 – 175,000 (1,653 – 3,858)	0.4 (.0157)
Connecting rod bearing Oil clearance mm (in.)	0.02 – 0.05 (.0008 – .0020)	0.1 (.004)
Crankshaft main bearing Oil clearance mm (in.)	0.02 – 0.05 (.0008 – .0020)	0.1 (.004)
Crankshaft Pin O.D. mm (in.) Journal O.D. mm (in.) Out-of-roundness of journal and pin mm (in.) Taper of journal and pin mm (in.) End play mm (in.)	45 (1.77) 57 (2.24) Less than 0.015 (.0006) Less than 0.005 (.0002) 0.05 – 0.18 (.0020 – .0071)	0.25 (.0098)
Flywheel Runout mm (in.)		Less than 0.13 (.0051)
Oil pressure at curb idle speed kPa (psi) [Oil temperature is 75 to 90°C (167 to 194°F)]	80 (11.4) or more	
Oil pump Tip clearance mm (in.) Drive gear Driven gear Side clearance mm (in.) Drive gear Driven gear	 0.16 – 0.21 (.0063 – .0083) 0.13 – 0.18 (.0051 – .0071) 0.08 – 0.14 (.0031 – .0055) 0.06 – 0.12 (.0024 – .0047)	 0.25 (.0098) 0.25 (.0098) 0.25 (.0098) 0.25 (.0098)
Relief spring Free length mm (in.) Load [61 N at 13.4 lbs.] mm (in.)	46.6 (1.835) 40.1 (1.579)	

NOTE

O.D. = Outer Diameter

I.D. = Inner Diameter

O.S. = Oversize Diameter

U.S. = Undersize Diameter

TORQUE SPECIFICATIONS

N09CC-

Items	Nm	ft.lbs.
Engine mount bracket nut and bolt	50 – 65	36 – 47
Engine mount insulator nut (large)	90 – 110	65 – 80
Engine mount insulator nut (small)	45 – 60	33 – 43
Transaxle mount insulator nut	90 – 110	65 – 80
Transaxle mount bracket to body	30 – 40	22 – 29
Front roll stopper insulator nut	45 – 60	33 – 43
Front roll stopper bracket to center member	30 – 40	22 – 29
Rear roll stopper insulator nut	45 – 60	33 – 43
Rear roll stopper bracket to center member	45 – 60	33 – 43
Damper to center member	30 – 45	22 – 33
Center member to body	60 – 80	43 – 58
Fuel high pressure hose to delivery pipe	4 – 6	3 – 4
Accelerator cable adjusting bolt	4 – 6	3 – 4
Control wiring harness protector to air intake plenum	4 – 6	3 – 4
Air conditioner compressor to bracket	23 – 27	17 – 20
Front exhaust pipe clamp bolt	20 – 30	14 – 22
Oil pan	6 – 8	4 – 6
Oil pan drain plug	35 – 45	25 – 33
Oil screen	15 – 22	11 – 16
Water pump pulley bolt	8 – 10	6 – 7
Timing belt upper cover	10 – 12	7 – 9
Timing belt lower cover	10 – 12	7 – 9
Relief plug	40 – 50	29 – 36
Flywheel	130 – 140	94 – 101
Drive plate	130 – 140	94 – 101
Front engine support bracket bolt	50 – 70	36 – 51
Front exhaust pipe support bracket bolt	30 – 42	22 – 30
Left engine support bracket bolt	30 – 42	22 – 30
Front roll stopper bracket bolt	55 – 75	40 – 54
Rear roll stopper bracket bolt	110 – 130	80 – 94
<1.5L Engine>		
Power steering oil pump to bracket	45 – 55	33 – 40
Front exhaust pipe to exhaust manifold	30 – 40	22 – 29
Rocker cover bolt	1.5 – 2.0	1.1 – 1.4
Rocker arm shaft bolt	20 – 27	14 – 20
Camshaft sprocket bolt	65 – 75	47 – 54
Adjusting screw nut	12 – 18	9 – 13
Distributor mounting nut	10 – 13	7 – 9
Crankshaft sprocket bolt	70 – 100	51 – 72
Crankshaft pulley to crankshaft sprocket	12 – 15	9 – 11
Cylinder head bolt (cold engine)	70 – 75	51 – 54
(hot engine)	80 – 85	58 – 61
Intake manifold stay	18 – 25	13 – 18

Items	Nm	ft.lbs.
Timing belt tensioner	20 – 27	14 – 20
Oil pump cover bolt	8 – 10	6 – 7
Front case bolt	12 – 15	7 – 11
Connecting rod cap	32 – 35	23 – 25
Bearing cap	50 – 55	36 – 40
Oil pressure switch	15 – 22	11 – 16
<1.6L Engine>		
Engine mount bracket to bracket	17 – 26	12 – 19
Front engine support bracket to bracket	17 – 26	12 – 19
Control wiring harness clamp bolt	10 – 12	7 – 9
Power steering oil pump to bracket	35 – 45	25 – 33
Front exhaust pipe to exhaust manifold <N/A>	30 – 40	22 – 29
Front exhaust pipe to exhaust fitting <T/C>	30 – 40	22 – 29
Rocker cover bolt	2.5 – 3.5	2 – 3
Center cover bolt	2.5 – 3.5	2 – 3
Camshaft sprocket bolt	80 – 100	58 – 72
Camshaft bearing cap bolt	19 – 21	14 – 15
Crankshaft angle sensor nut	10 – 13	7 – 9
Throttle body stay	15 – 22	11 – 16
Oil return pipe bolt <T/C>	8 – 10	6 – 7
Air cleaner body installation bolt	8 – 10	6 – 7
Crankshaft sprocket bolt	110 – 130	80 – 94
Crankshaft pulley to crankshaft sprocket	20 – 30	14 – 22
Cylinder head bolt (cold engine)	90 – 100	65 – 72
(hot engine)	100 – 110	72 – 80
Intake manifold stay	25 – 30	18 – 22
Tension rod to bracket	35 – 55	25 – 40
Water pipe B eye bolt	28 – 34	20 – 25
Heat protector B bolt	12 – 15	9 – 11
Tension pulley bracket bolt	23 – 27	17 – 20
Auto tensioner bolt	20 – 27	14 – 20
Tensioner pulley bolt	43 – 55	31 – 40
Idle pulley bolt	34 – 42	25 – 30
Oil pump sprocket bolt	50 – 60	36 – 43
Timing belt rear right cover	10 – 12	7 – 9
Timing belt rear left cover (lower) – bolt also securing left engine support bracket	30 – 42	22 – 30
Timing belt rear left cover (upper)	10 – 12	7 – 9
Valve body bolt	10 – 12	7 – 9
Oil pressure switch	8 – 12	6 – 8
Oil filter bracket bolt	15 – 22	11 – 16
Plug cap	20 – 27	14 – 20

Items	Nm	ft.lbs.
Front case bolt		
M8 x 30	27 – 34	20 – 26
except M8 x 30	20 – 27	14 – 20
Drive gear bolt	34 – 40	25 – 29
Oil pump cover bolt	15 – 18	11 – 13
Connecting rod cap bolt	50 – 53	36 – 38
Oil seal case bolt	10 – 12	7 – 9
Crankshaft bearing cap bolt	65 – 70	47 – 51

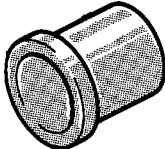
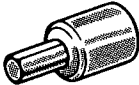
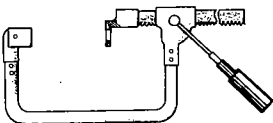

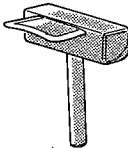



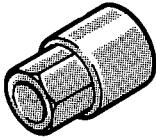
SEALANTS AND ADHESIVES


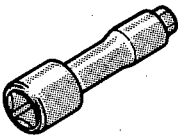
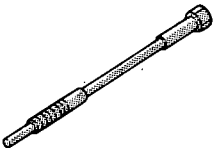
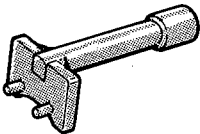
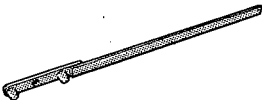
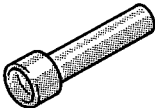
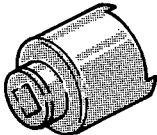


N09CE--

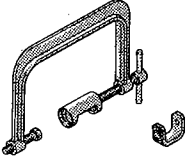
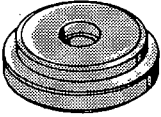
Items	Specified sealant	Quantity
Semi-circular packing	MOPAR Part No. 4318034 or equivalent	As required
Rocker cover	MOPAR Part No. 4318034 or equivalent	As required
Oil pan	MITSUBISHI GENUINE Part No. MZ100168 or equivalent	As required
Oil pressure switch	MOPAR Part No. 4318034 or equivalent	As required

SPECIAL TOOLS

N09DA--

Tool	Number	Name	Use
	MD998306	Camshaft oil seal installer [Used with MD998307]	Installation of camshaft oil seal
	TW-10B	Cylinder head bolt wrench	Tightening and removal of cylinder head bolts <1.5L Engine>
	C-3422-B	Valve spring compressor [Used with C-3422-B1]	Installation and removal of valve and allied parts <1.5L Engine>
	C-3422-B1	Adapter [Used with C-3422-B]	Installation and removal of valve and allied parts <1.5L Engine>
	MD998727	Oil pan gasket cutter	Removal of oil pan
	MD998304	Crankshaft front oil seal installer	Installation of oil seal <1.5L Engine>
	MD998305	Crankshaft front oil seal guide	Installation of oil seal <1.5L Engine>
	MD998011	Crankshaft rear oil seal installer	Installation of oil seal <1.5L Engine>
	MD998054	Oil pressure switch wrench	Removal and installation of oil pressure switch

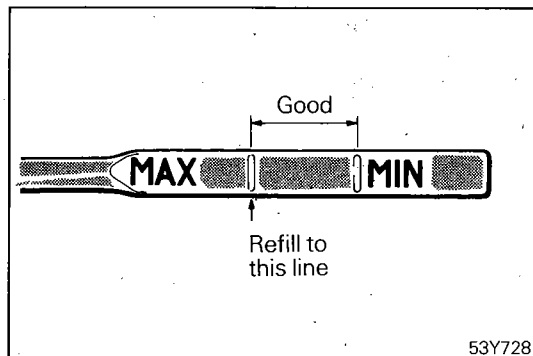
Tool	Number	Name	Use
	MD998307	Camshaft oil seal guide [Used with MD998306]	Installation of camshaft oil seal
	MD998051	Cylinder head bolt wrench	Loosening and tightening the cylinder head bolt <1.6L Engine>
	MD998738	Set screw	Removal and installation of auto tensioner <1.6L Engine>
	MD998752	Socket wrench	Installation of auto tensioner <1.6L Engine>
	MD998747	Crankshaft pulley holder	Removal and installation of crankshaft sprocket <1.6L Engine>
	MD998737	Valve stem seal installer	Installation of valve stem seal <1.6L Engine>
	MD998162	Plug cap wrench	Removal and installation of front case plug cap <1.6L Engine>
	MD998375	Crankshaft front oil seal installer	Installation of oil seal <1.6L Engine>
	MD998285	Crankshaft front oil seal installer	Installation of oil seal and front case <1.6L Engine>

Tool	Number	Name	Use
	MD998735	Valve spring compressor	Removal and installation of valve and related parts <1.6L Engine>
	MD998376	Crankshaft rear oil seal installer	Installation of oil seal <1.6L Engine>

TROUBLESHOOTING

N09EAAL

Symptom	Probable cause	Remedy
Compression too low	Cylinder head gasket blown	Replace gasket
	Piston ring worn or damage	Replace rings
	Piston or cylinder worn	Repair or replace piston and/or cylinder block
	Valve seat worn or damage	Repair or replace valve and/or seat ring
Oil pressure drop	Engine oil level too low	Check engine oil level
	Oil pressure switch faulty	Replace oil pressure switch
	Oil filter clogged	Install new filter
	Oil pump gears, case or cover worn	Replace gears and/or cover
	Thin or diluted engine oil	Change engine oil to correct viscosity
	Oil relief valve stuck (opened)	Repair relief valve
	Excessive bearing clearance	Replace bearings
Oil pressure too high	Oil relief valve stuck (closed)	Repair relief valve
Noisy valves	Incorrect lash adjuster <1.6L Engine>	Replace lash adjuster
	Thin or diluted engine oil (low oil pressure)	Change engine oil
	Valve stem or valve guide worn or damage	Replace valve and/or guide
Connecting rod noise/ main bearing noise	Insufficient oil supply	Check engine oil level
	Low oil pressure	Refer to "Oil pressure drop"
	Thin or diluted engine oil	Change engine oil
	Excessive bearing clearance	Replace bearings
Timing belt noise	Incorrect belt tension	Adjust belt tension
Excessive engine rolling and vibration	Loose engine roll stopper (Front, Rear)	Retighten
	Loose transaxle mount bracket	Retighten
	Loose engine mount bracket	Retighten
	Loose center member	Retighten
	Broken transaxle mount insulator	Replace
	Broken engine mount insulator	Replace
	Broken engine roll stopper insulator	Replace



ENGINE <1.5L Engine>

ENGINE ADJUSTMENT

N09FAAA0

ENGINE OIL INSPECTION

- (1) Check that the engine oil level is within the range shown on the dipstick.
- (2) Check that the engine oil is not excessively contaminated and is free from engine coolant or gasoline. Also check that it has appropriate viscosity.

ENGINE OIL REPLACEMENT

N09FBAA0

Refer to GROUP 0 – Maintenance Service.

ENGINE OIL FILTER REPLACEMENT

N09FCAA0

Refer to GROUP 0 – Maintenance Service.

VALVE CLEARANCE INSPECTION AND ADJUSTMENT

N09FEAA

Refer to GROUP 0 – Maintenance Service.

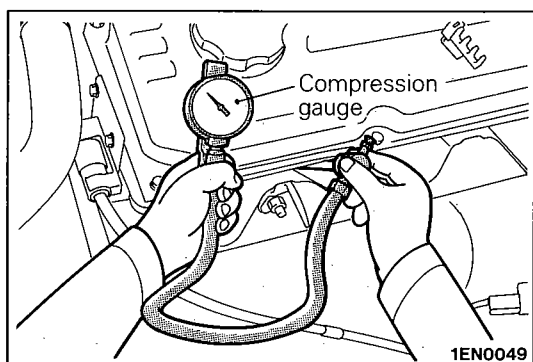
CHECKING COMPRESSION PRESSURE

N09FFAC0

- (1) Before checking compression, ensure that engine oil, the starter motor, and battery are all in good condition.
- (2) Start the engine and wait until engine coolant temperature has risen to 85 – 95°C (185 – 205°F).
- (3) Stop the engine and pull the spark plug cables.
- (4) Remove the spark plugs.
- (5) Crank the engine to remove any foreign objects in the cylinders.

Caution

Cover the spark plug holes with shop towel, etc., in order to keep expelled foreign objects from flying out, and keep away from the holes. When measuring compression with water, oil, or fuel having entered the cylinder through a crack, etc., these will come flying out of the spark plug hole hot and fast, so be sure to take the proper precautions.



- (6) Set a compression gauge to the spark plug hole.
- (7) Holding the throttle valve full open, crank the engine and measure compression.

Limit: 960 kPa (137 psi) [250 – 400 rpm]

- (8) Perform 6 and 7 above for all the cylinders, ensuring that compression pressure differential for each of the cylinders is within the specified limit.

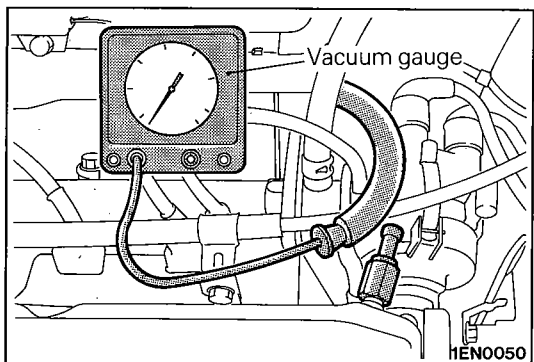
Differential limit: Less than 100 kPa (14 psi)

- (9) If a cylinder's compression or pressure differential exceeds the limit, add a small amount of oil through the spark plug hole and repeat steps (6) – (8).
- ① If the addition of oil brings compression up, it is possible that there is poor contact between the piston ring and cylinder wall.
 - ② If not compression does not come up, valve seizure, poor valve seating, or a compression leak from the gasket are all possible.

MANIFOLD VACUUM INSPECTION

N09FNAE

- (1) Before inspection and adjustment, put the vehicle into the following state.
- Engine coolant temperature: 85 – 95°C (185 – 205°F)
 - Lights, electric, cooling fan, and accessories: OFF
 - Transaxle: Neutral <N or P for A/T>
 - Steering wheel: Neutral position

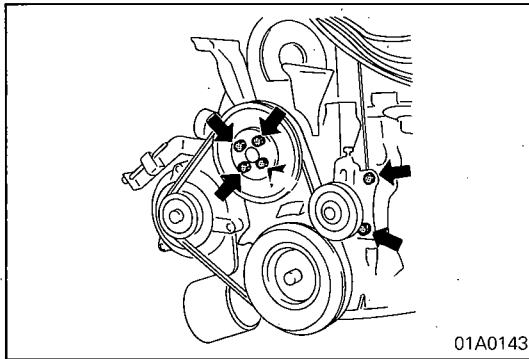


- (2) Check that the idling revolution speed is normal.
 (3) Remove the PCV hose from the PCV valve and attach a vacuum gauge.
 (4) Check that the vacuum at the intake manifold during idle revolution is normal.

Standard value: 67 kPa (20 in.Hg)

- (5) If outside the standard value, isolate the cause by referring to the following table and repair the fault.

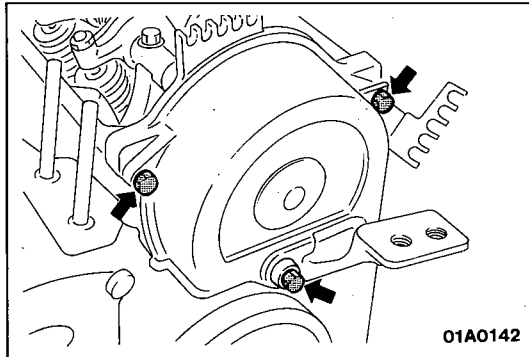
Symptom	Cause	Remedy
<ul style="list-style-type: none"> The vacuum gauge reading is less than standard value, but the pointer is stable. 	<ul style="list-style-type: none"> Ignition timing is retarded. 	<ul style="list-style-type: none"> Adjust the ignition timing. Adjust the valve clearance.
<ul style="list-style-type: none"> The vacuum gauge pointer swings slowly. 	<ul style="list-style-type: none"> The gas mixture is excessively rich. 	<ul style="list-style-type: none"> Check ECI-MULTI system.
<ul style="list-style-type: none"> The vacuum gauge pointer drops irregularly. 	<ul style="list-style-type: none"> The gas mixture is excessively lean. 	<ul style="list-style-type: none"> Check ECI-MULTI system.
<ul style="list-style-type: none"> The vacuum gauge pointer drops intermittently to 4.0 – 21.3 kPa (1.2 – 6.3 in.Hg). 	<ul style="list-style-type: none"> The valve is too tight. 	<ul style="list-style-type: none"> Check and repair the valve.
<ul style="list-style-type: none"> The vacuum gauge pointer drops suddenly from the normal reading to 33.3 kPa (9.8 in.Hg), then returns to normal. 	<ul style="list-style-type: none"> Malfunction of cylinder head gasket 	<ul style="list-style-type: none"> Replace cylinder head gasket.

**TIMING BELT TENSION ADJUSTMENT**

N09FGAB

The timing belt has an automatic tension adjusting mechanism. Adjustment can be made by the following procedure:

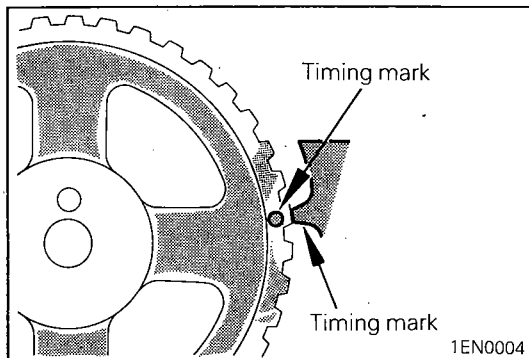
- (1) Remove the water pump pulley.
- (2) Remove the air conditioner pulley bracket.



- (3) Remove the timing belt upper cover.
- (4) Remove the timing belt lower cover.
- (5) Remove the spark plugs.
- (6) Turn the crankshaft clockwise to check that the timing belt is okay over its entire length.

Caution

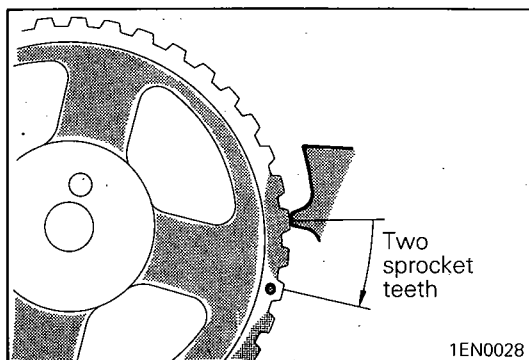
Always turn the crankshaft clockwise.



- (7) Turn the crankshaft clockwise to bring No. 1 cylinder piston to top dead center on compression stroke.

Caution

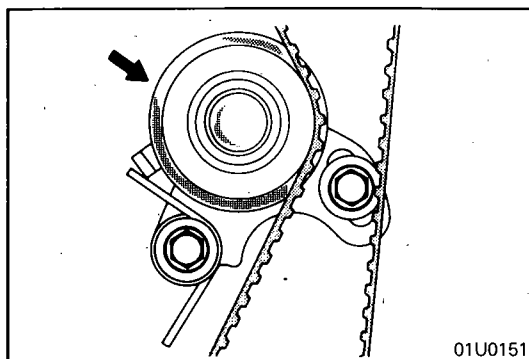
For aligning the timing marks, never turn the crankshaft counter-clockwise as it could cause inadequate belt tensioning.



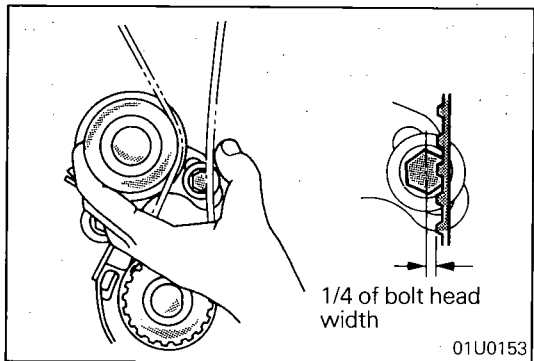
- (8) Loosen both pivot side and slot side tensioner bolts and tension the belt making use of tensioner spring force.
- (9) Turn the crankshaft clockwise by two sprocket teeth (18°).

Caution

This operation is to cause the No. 2 cylinder exhaust valve rocker arm to ride on the cam so as to give a specific tension to the tension side of belt. Observe closely, therefore, specified rotation amount.



- (10) Push the timing belt tensioner in the direction of arrow to check that each sprocket is kept in firm and complete engagement with belt cogs. After this check, release hand pressure so that only the tensioner spring acts on belt and tighten the slot side bolt and then the pivot side bolt to fix the tensioner in position.



(11) Check timing belt tension.

Hold the timing belt tensioner and timing belt together by hand and give the belt a slight thumb pressure at a point level with tensioner center. Make sure that the belt cog crest comes as deep as about 1/4 of the tensioner attaching bolt head width.

(12) Install the spark plugs.

(13) Install the timing belt lower cover.

(14) Install the timing belt upper cover.

(15) Install the air conditioner pulley bracket.

(16) Install the water pump pulley and adjust the drive belt deflection.

IGNITION TIMING INSPECTION AND ADJUSTMENT

N09FLAB0

Refer to GROUP 8 – Ignition System.

DRIVE BELTS TENSION ADJUSTMENT

N09FMBC0

(1) Check that the belts are not damaged and are properly fitted into the pulley grooves.

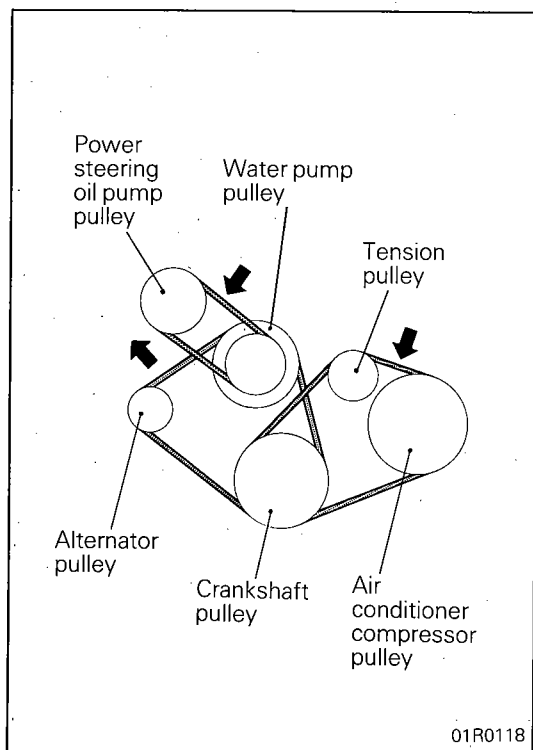
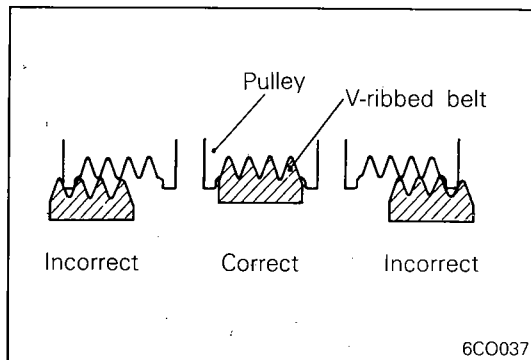
Caution

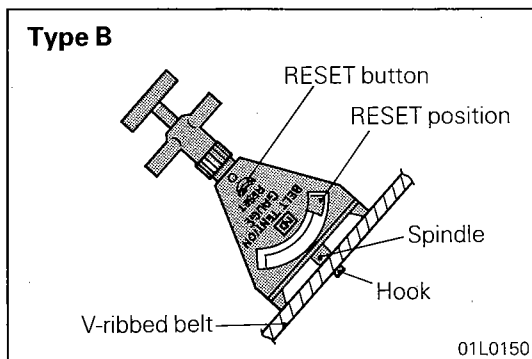
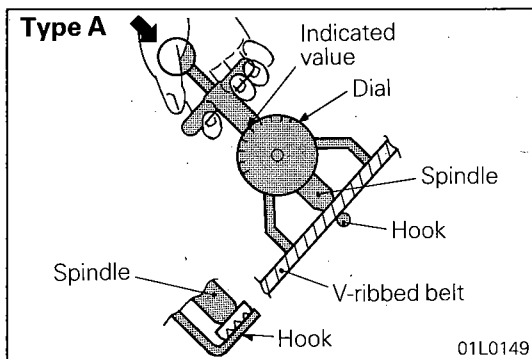
1. When installing the V-ribbed belt, check that the V-ribs are properly fitted without misalignment.
2. If creaking or slippage is observed, check the belt for wear, damage, or breakage on the pulley contact surface, check the pulley for scoring, in addition to deflection inspection.

(2) Measure the tension of the belt by applying a force of 100 N (22 lbs.) to the belt back midway between the pulleys as shown in the illustration and observe the degree of deflection. Alternatively, a belt tension gauge can be used.

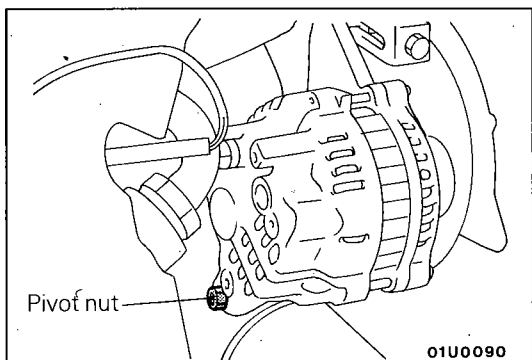
Standard value:

Items		Inspection value	Adjustment value	
			New belt	Used belt
For alternator	Deflection mm (in.)	7.0 – 9.0 (.276 – .354)	5.5 – 7.0 (.217 – .276)	8.0 (.315)
	Gauge N (lbs.)	250 – 500 (55 – 110)	500 – 700 (110 – 154)	400 (88)
For air conditioner compressor	Deflection mm (in.)	6.0 – 7.0 (.236 – .276)	5.0 – 6.0 (.197 – .236)	6.0 – 7.0 (.236 – .276)
	Gauge N (lbs.)	250 – 310 (55 – 68)	370 – 435 (82 – 96)	250 – 310 (55 – 68)
For power steering pump	Deflection mm (in.)	6.0 – 9.0 (.236 – .354)	–	–



**NOTE**

Different types of belt tension gauges are available, such as Type A and Type B. All types of gauges should be used according to the manufacturer's instructions.

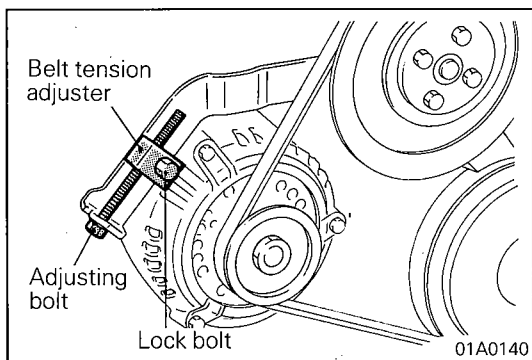
**TENSION ADJUSTMENT OF THE ALTERNATOR DRIVE BELT****Caution**

1. Before checking, rotate the engine one or more revolutions.
2. If the belt is too tight, the alternator or water pump bearing can get damaged. Conversely, if the belt is too loose, it will slip, producing noise and causing premature wear.

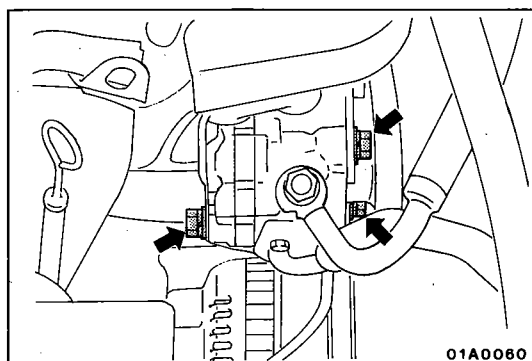
- (1) Loosen the nut of the alternator pivot nut.
- (2) Loosen the lock bolt of the belt tension adjuster.
- (3) Using the adjustment bolt, adjust the belt tension to specified value.
- (4) Tighten the lock bolt.
- (5) Tighten the alternator pivot nut.
- (6) Check the deflection or the tension of belt; readjust if necessary.

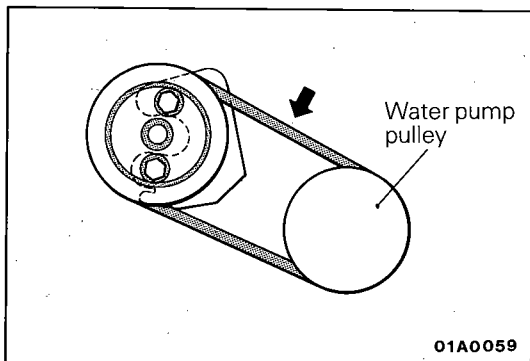
NOTE

The tension of a new belt which has been used for more than five minutes must be adjusted using the value for used belts.

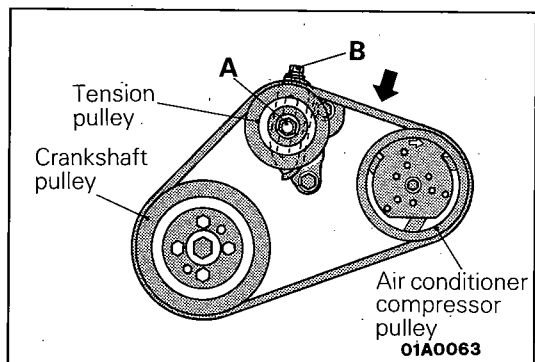
**TENSION ADJUSTMENT OF POWER STEERING OIL PUMP DRIVE BELT**

- (1) Loosen power steering oil pump fixing bolt.





- (2) Move power steering pump, tension belt moderately and adjust deflection.
- (3) Tighten fixing bolt.
- (4) Run the engine one time or more.
- (5) Check the belt deflection. Readjust, if necessary.



TENSION ADJUSTMENT OF THE AIR CONDITIONER COMPRESSOR DRIVE BELT

- (1) Loosen tension pulley fixing bolt A.
- (2) Adjust belt deflection with adjusting bolt B.
- (3) Tighten fixing bolt A.
- (4) Run the engine one time or more.
- (5) Check the belt tension. Readjust, if necessary.

NOTE

The tension of a new belt which has been used for more than five minutes must be adjusted using the value for used belts.

ENGINE MOUNTING

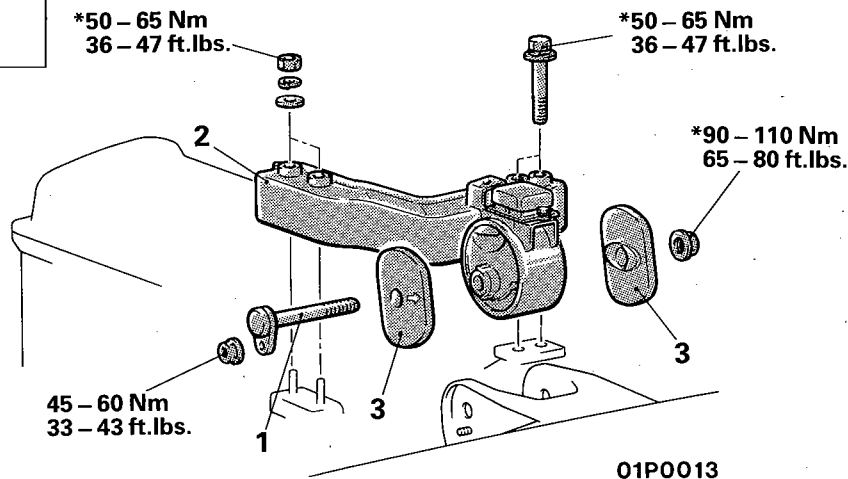
REMOVAL AND INSTALLATION

Pre-removal Operation

- Raise and suspend the engine so that the engine is no longer resting on the engine mount.

Post-installation Operation

- Lower the engine.

**Removal steps**

1. Engine mount bracket and body connection bolt
2. Engine mount bracket
- ◆◆ 3. Mounting stopper

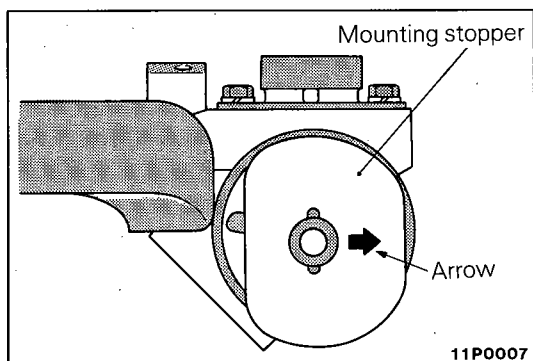
NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

INSPECTION

N09GCAH0

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

**SERVICE POINT OF INSTALLATION**

N09GDAN

3. INSTALLATION OF MOUNTING STOPPER

When the mounting stopper of an A/T vehicle is installed, make sure that the arrow is oriented in the direction shown in the illustration.

TRANSAXLE MOUNTING

REMOVAL AND INSTALLATION

N09GE-A

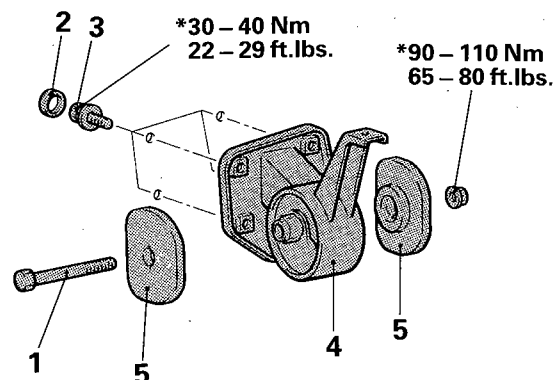
<M/T>

Pre-removal Operation

- Raise and suspend the transaxle so that the transaxle is no longer resting on the transaxle mount
- Removal of the Air Cleaner (Refer to GROUP 11 – Air Cleaner.)

Post-installation Operation

- Lower the transaxle.
- Installation of Air Cleaner (Refer to GROUP 11 – Air Cleaner.)

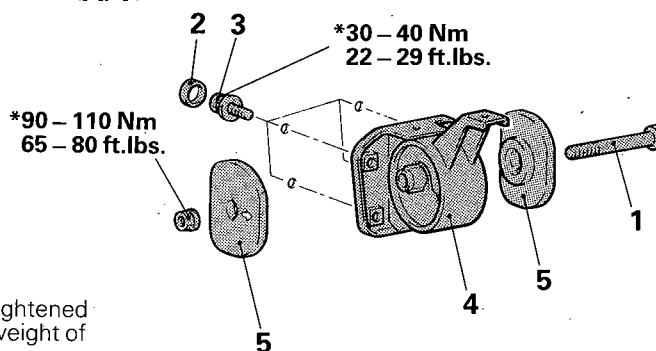
**Removal steps**

1. Transaxle mount bracket and transaxle connection bolt
2. Caps
3. Transaxle mount bracket installation bolt
4. Transaxle mount bracket
- ◆◆ 5. Mounting stopper

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

<A/T>



01P0014

INSPECTION

N09GCAH1

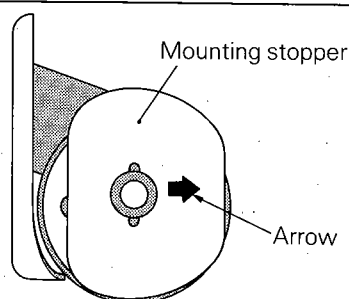
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINT OF INSTALLATION

N09GDA00

5. INSTALLATION OF MOUNTING STOPPER

When the mounting stopper of an A/T vehicle is installed, make sure that the arrow is oriented in the direction shown in the illustration.



11P0008

ENGINE ROLL STOPPER, CENTER MEMBER

N09GF-A

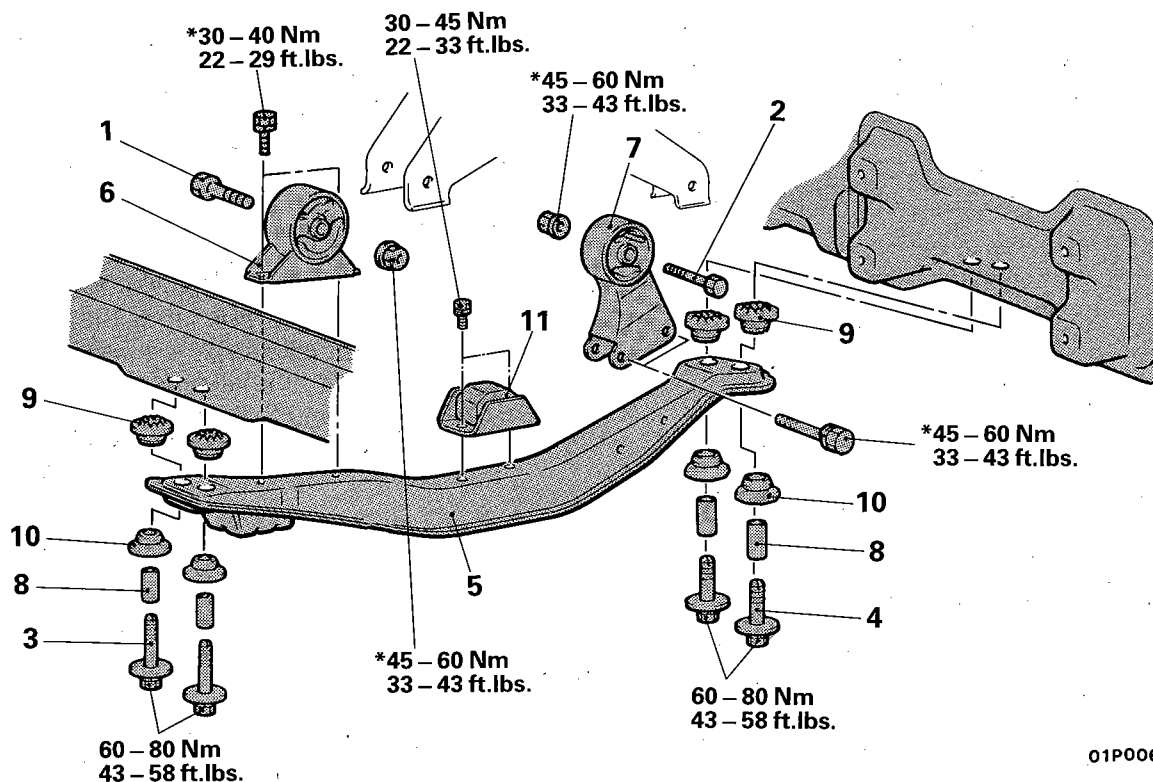
REMOVAL AND INSTALLATION

Pre-removal Operation

- Raise and suspend the engine so that the engine is no longer resting on the engine mount.

Post-installation Operation

- Lower the engine.



01P0067

Removal steps

1. Front roll stopper bracket and engine connection bolt
2. Rear roll stopper bracket and engine connection bolt
3. Center member installation bolts (front side)
4. Center member installation bolts (rear side)
5. Center member
- ♦♦ 6. Front roll stopper bracket
7. Rear roll stopper bracket
8. Collar
9. Bushing (upper side)
10. Bushing (lower side)
11. Damper <Sedan-Some models>

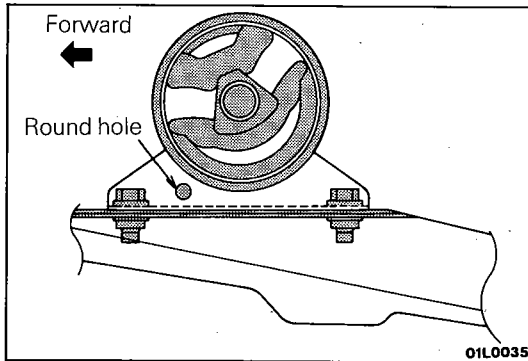
NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ♦♦: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

INSPECTION

N09GCAH2

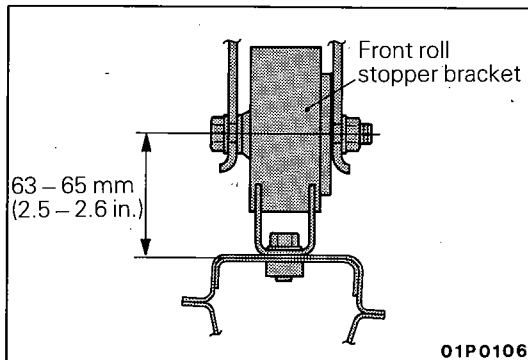
- Check each insulator and bushing for cracks or damage.
- Check each bracket for deformation or damage.

**SERVICE POINT OF INSTALLATION**

N09GDAPO

6. INSTALLATION OF FRONT ROLL STOPPER BRACKET

- (1) Install the front roll stopper bracket so that the part where the round hole is made is facing the front of the vehicle.
- (2) On an M/T vehicle, temporarily tighten the front roll stopper bracket bolt nut. Then, after the total weight of the engine has been placed on the vehicle body, finish tightening the nut with the distance between the lower edge of the bracket and the center hole of the insulator set as specified.



ENGINE ASSEMBLY

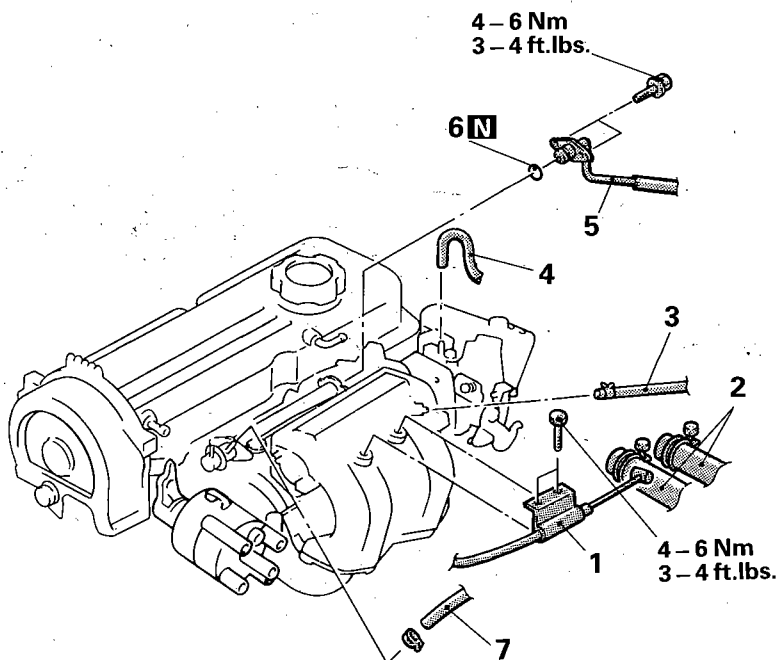
REMOVAL AND INSTALLATION

Pre-removal Operation

- Eliminating Fuel Pressure in Fuel Lines (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Engine Hood
- Draining Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Removal of Transaxle Assembly (Refer to GROUP 21 – Transaxle Assembly.)
- Removal of Radiator Assembly (Refer to GROUP 7 – Radiator.)

Post-installation Operation

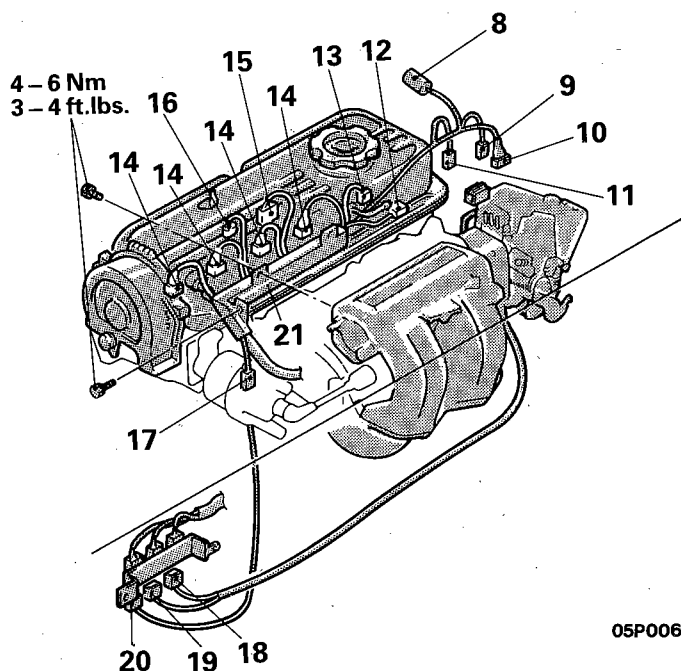
- Installation of Radiator Assembly (Refer to GROUP 7 – Radiator.)
- Installation of Transaxle Assembly (Refer to GROUP 21 – Transaxle Assembly.)
- Refilling Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Installation of Engine Hood



01P0020

Removal steps:

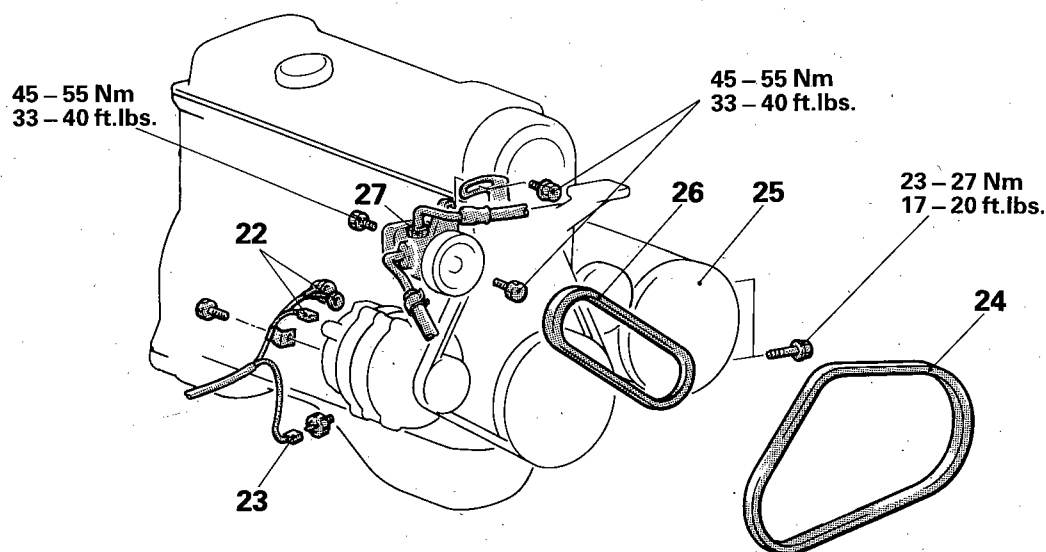
- ◆◆ 1. Connection for accelerator cable
- 2. Connection for heater hose
- 3. Connection for brake booster vacuum hose
- 4. Connection for vacuum hoses
- 5. Connection for fuel high pressure hose
- 6. O-ring
- 7. Connection for fuel return hose
- 8. Connection for oxygen sensor connector
- 9. Connection for engine coolant temperature gauge unit connector
- 10. Connection for engine coolant temperature sensor connector
- 11. Connection for thermo switch connector <A/T>
- 12. Connection for idle speed control connector
- 13. Connection for EGR temperature sensor connector <Vehicles for California>
- 14. Connection for injector connector
- 15. Connection for power transistor connector
- 16. Connection for ignition coil connector
- 17. Connection for condenser connector
- 18. Connection for throttle position sensor
- 19. Connection for motor position sensor connector
- 20. Connection for distributor connector
- 21. Control harness



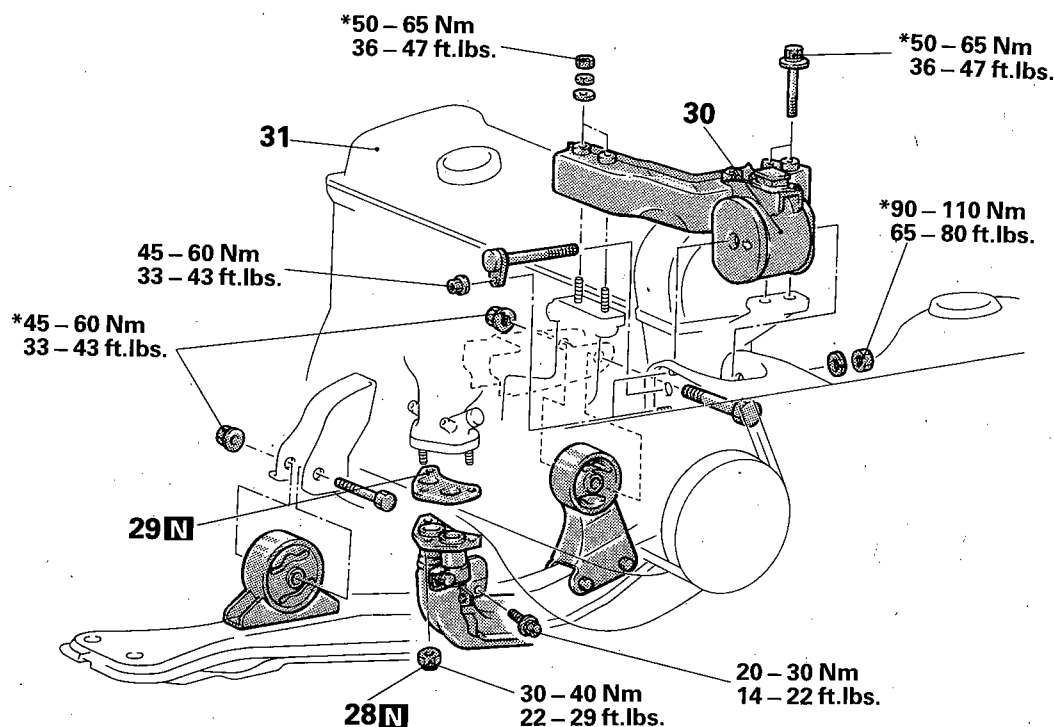
05P0067

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) **N**: Non-reusable parts



01A0089



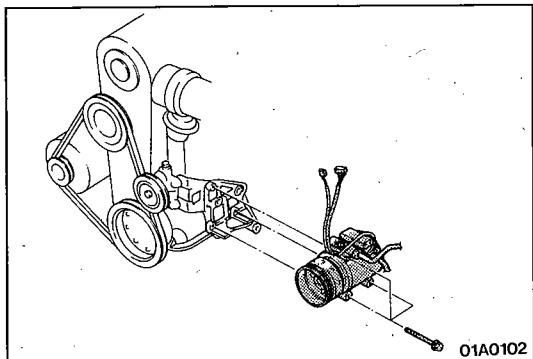
01P0038

Removal steps

- 22. Connection for alternator connector
- 23. Connection for oil pressure switch connector
- ♦♦ 24. Drive belt (Air conditioner)
- ♦♦ 25. Air conditioner compressor
- ♦♦ 26. Drive belt (Power steering)
- ♦♦ 27. Power steering oil pump
- 28. Self-locking nut
- 29. Gasket
- ♦♦ 30. Engine mount bracket
- ♦♦ ♦♦ 31. Engine assembly

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ♦♦: Refer to "Service Points of Removal".
- (3) ♦♦♦: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts
- (5) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

**SERVICE POINTS OF REMOVAL**

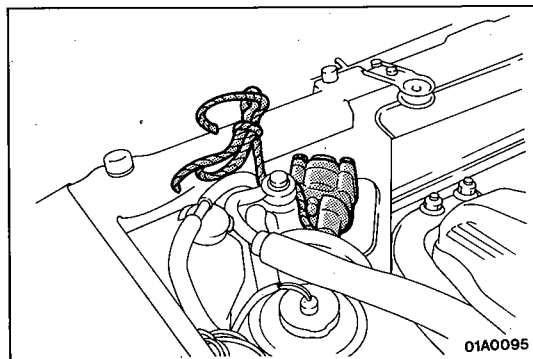
N09SBDE0

25. REMOVAL OF AIR CONDITIONER COMPRESSOR

Disconnect the connection of the air conditioner compressor, and then remove the compressor (with the hose attached) from the compressor bracket.

NOTE

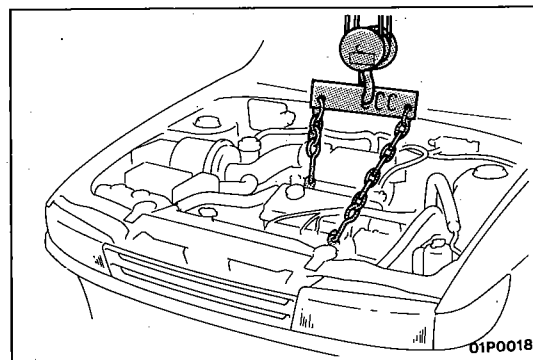
Suspend the removed air conditioner compressor (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

**27. REMOVAL OF POWER STEERING OIL PUMP**

Remove the oil pump (with the hose attached).

NOTE

Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

**30. REMOVAL OF ENGINE MOUNT BRACKET**

- (1) Attach wire or similar material to the engine hook, and then suspend (to the extent that there is no slackness of the wire) by using a chain block or similar arrangement.
- (2) Remove the engine mount bracket.

31. REMOVAL OF ENGINE ASSEMBLY

- (1) Check to be sure that all cables, hoses, harness connectors, etc. are disconnected from the engine.
- (2) Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

SERVICE POINTS OF INSTALLATION

N09SDAO

31. INSTALLATION OF ENGINE ASSEMBLY

Install the engine assembly. When doing so, check carefully to be sure that all pipes and hoses are connected, and that none are twisted, damaged, etc.

26. 24. ADJUSTMENT OF DRIVE BELT TENSION

Refer to P.9-26.

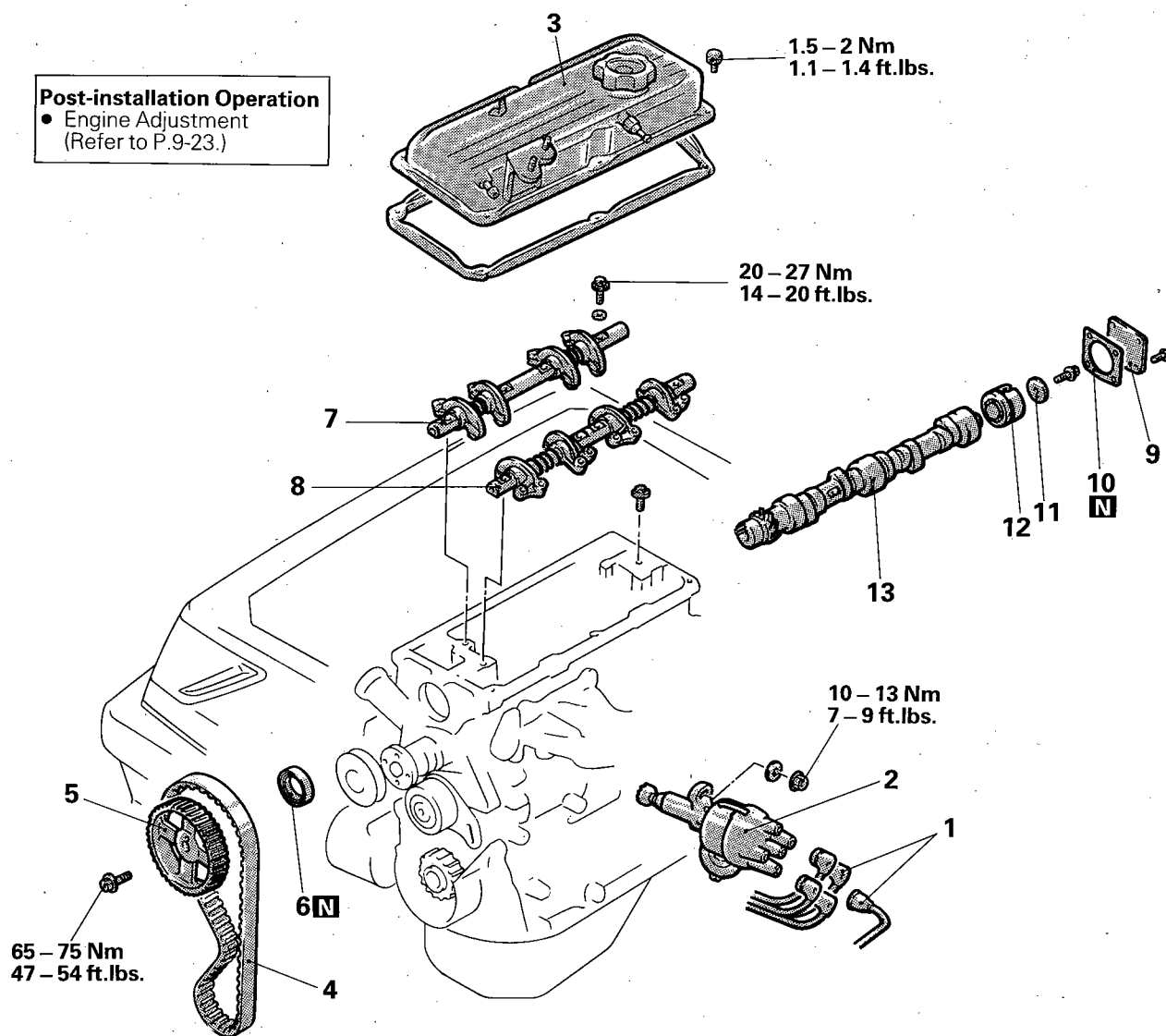
1. ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

N09ZA-A



01P0041

Removal steps

1. Spark plug cable and high tension cable
- ◆◆ 2. Distributor
- ◆◆ 3. Rocker cover
- ◆◆◆◆ 4. Timing belt
- ◆◆ 5. Camshaft sprocket
- ◆◆ 6. Oil seal
- ◆◆◆◆ 7. Rocker arm assembly
- ◆◆◆◆ 8. Rocker arm assembly
9. Rear cover
10. Rear cover gasket
- ◆◆ 11. Thrust plate
- ◆◆ 12. Camshaft thrust case
- ◆◆ 13. Camshaft

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts

SERVICE POINTS OF REMOVAL

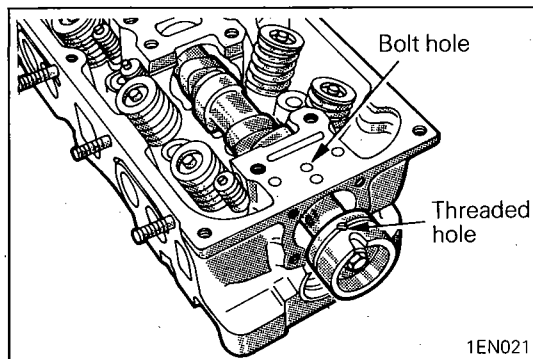
N09ZBAC

4. REMOVAL OF TIMING BELT

Refer to P.9-45.

7. 8. REMOVAL OF ROCKER ARM ASSEMBLY

When removing the flange bolts, loosen little by little and uniformly.

**SERVICE POINTS OF INSTALLATION**

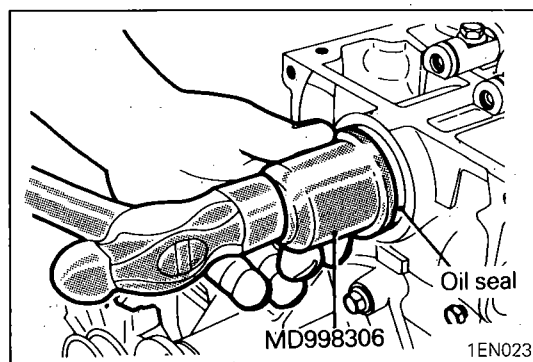
N09ZDAC

13. INSTALLATION OF CAMSHAFT / 12. CAMSHAFT THRUST CASE

Insert the camshaft thrust case in cylinder head with the threaded hole facing up, and align the threaded hole with the bolt hole in the cylinder head. Install and firmly tighten the bolt.

8. 7. INSTALLATION OF ROCKER ARM ASSEMBLY

Tighten the rocker arm attaching bolts little by little and uniformly. Finally tighten to specified torque.

**6. INSTALLATION OF OIL SEAL**

Coat the external surface of oil seal with engine oil. Fit the oil seal on the camshaft end and drive the oil seal in cylinder head using the special tool and a hammer until the seal is fully seated.

4. INSTALLATION OF TIMING BELT

Refer to P.9-45.

2. INSTALLATION OF DISTRIBUTOR

Refer to GROUP 8 – Ignition System.

OIL PAN AND OIL SCREEN REMOVAL AND INSTALLATION

N09HA-A

Pre-removal Operation

- Draining Engine Oil
(Refer to P.9-23.)

Post-installation Operation

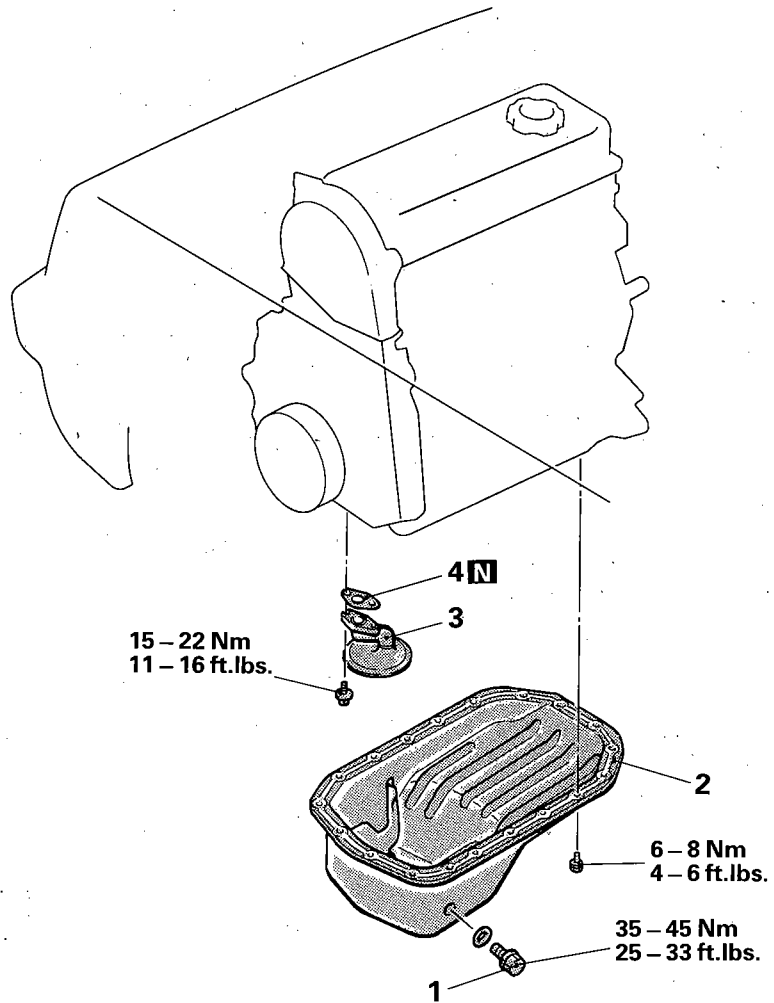
- Refilling Engine Oil
(Refer to P.9-23.)

Removal steps

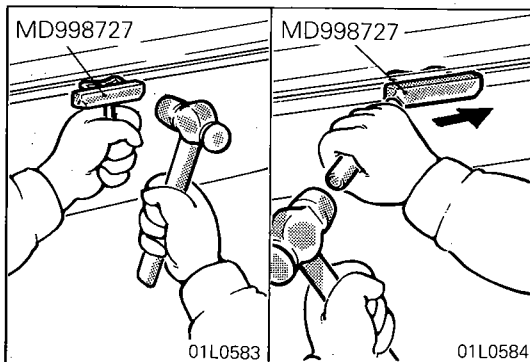
1. Drain plug
2. Oil pan
3. Oil screen
4. Oil screen gasket

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ⇄: Refer to "Service Points of Removal".
- (3) ⇄: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts



01P0032



SERVICE POINT OF REMOVAL

N09HBAF0

2. REMOVAL OF OIL PAN

- (1) Remove the oil pan mounting bolt.
- (2) Drive the special tool into the gap between the cylinder block and oil pan with a hammer.

Caution

Avoid using a screwdriver or punch to remove the oil pan.

- (3) Tap a brass bar applied to the edge of the special tool with a hammer to separate the oil pan from the cylinder block.

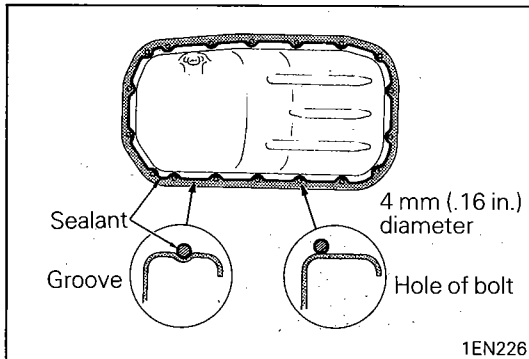
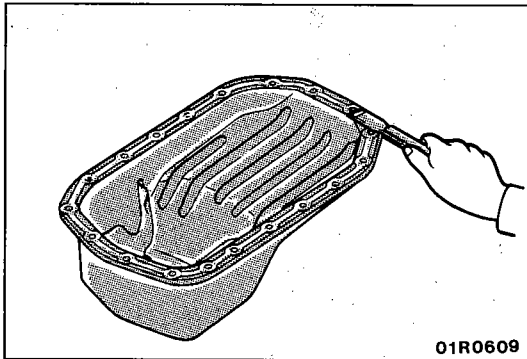
INSPECTION

N09HCAC0

- Check the oil pan for damage and cracks. Replace if faulty.
- Check the oil screen for clogging; damage and cracks. Replace if faulty.

SERVICE POINT OF INSTALLATION**2. INSTALLATION OF OIL PAN**

- (1) Remove all sealant from the oil pan and cylinder block with a scraper, etc.
- (2) Degrease the areas to be coated with sealant and mating surfaces.



- (3) Apply the specified sealant around the surface of oil pan as specified in illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MZ100168 or equivalent

- (4) Assemble oil pan to cylinder block within 15 minutes after applying the sealant.

CYLINDER HEAD GASKET REMOVAL AND INSTALLATION

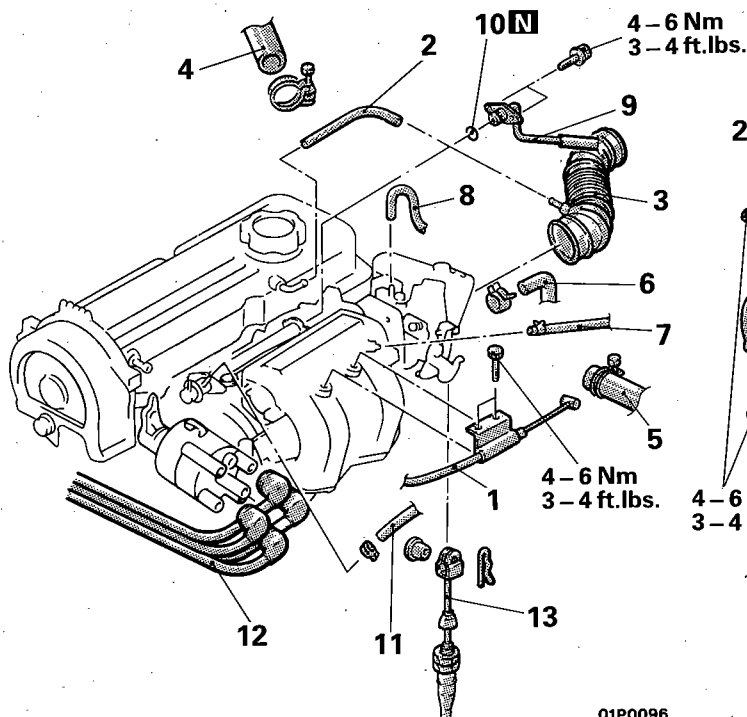
N09JA-A

Pre-removal Operation

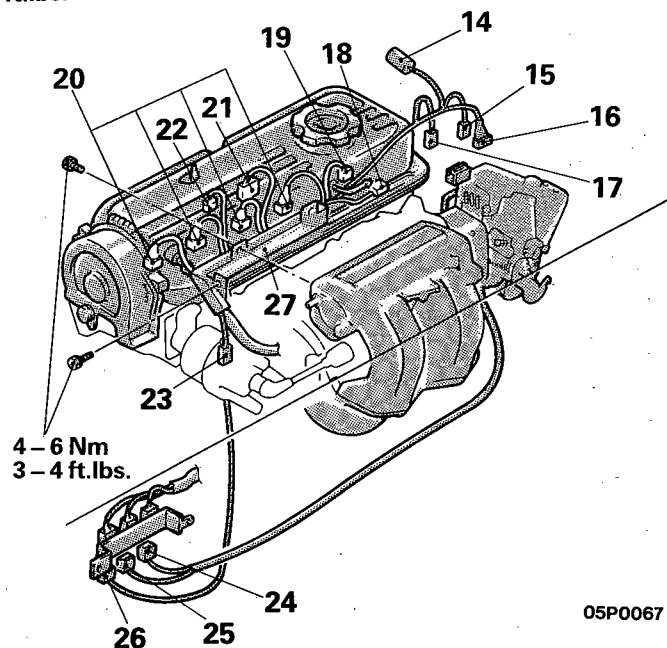
- Draining of Engine Coolant
(Refer to GROUP 7 – Service Adjustment Procedures.)

Post-installation Operation

- Filling of Engine Coolant
(Refer to GROUP 7 – Service Adjustment Procedures.)
- Engine Adjustment
(Refer to P.9-23.)



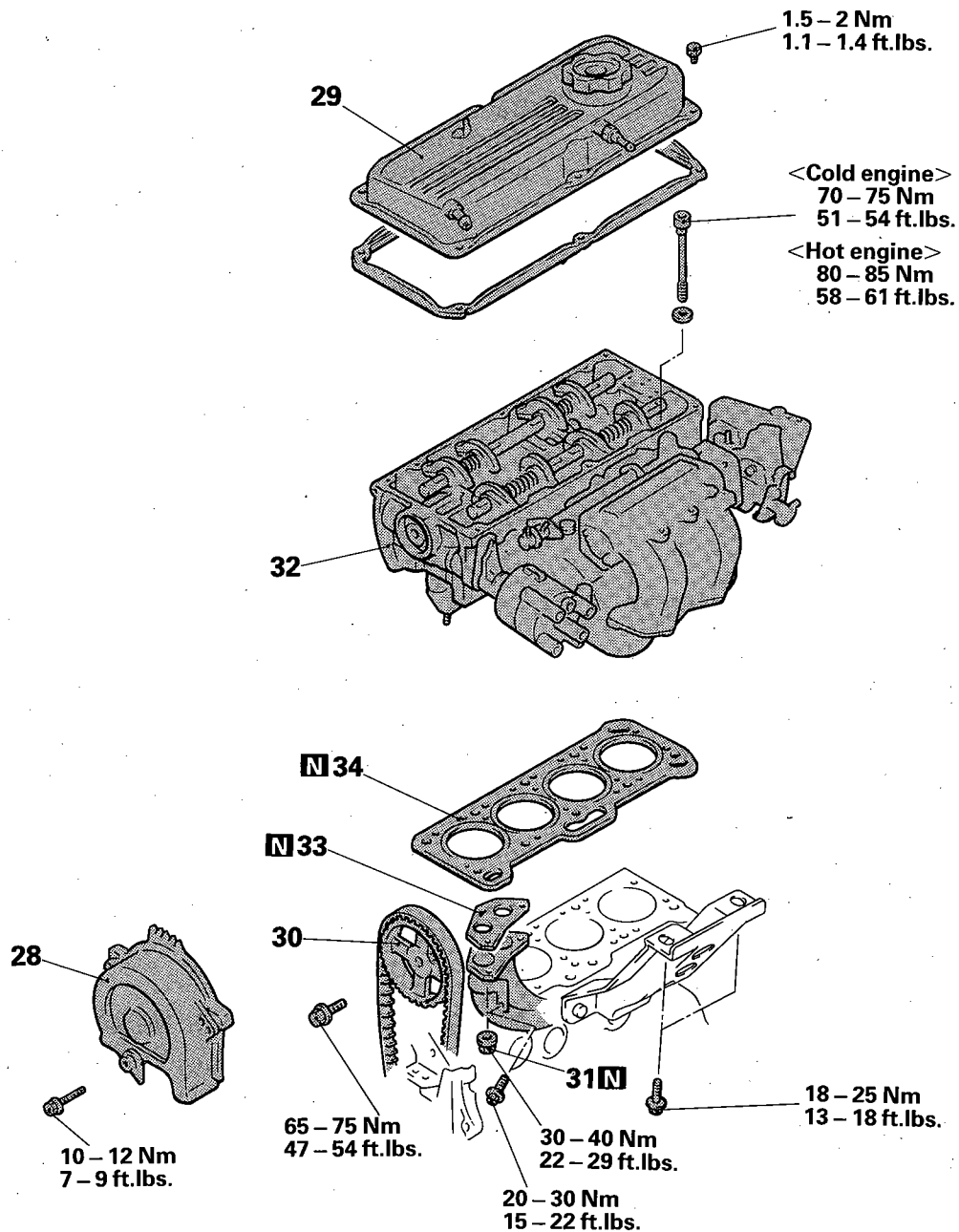
01P0096



05P0067

Removal steps

- | | | |
|----|--|---|
| ◆◆ | 1. Connection for accelerator cable | 17. Connection for thermo switch connector <A/T> |
| | 2. Breather hose | 18. Connection for idle speed control connector |
| | 3. Air intake hose | 19. Connection for EGR temperature sensor connector <Vehicles for California> |
| | 4. Connection for radiator upper hose | 20. Connection for injector connector |
| | 5. Connection for heater hose | 21. Connection for power transistor connector |
| | 6. Connection for water by-pass hose | 22. Connection for ignition coil connector |
| | 7. Connection for brake booster vacuum hose | 23. Connection for condenser connector |
| ↔ | 8. Connection for vacuum hoses | 24. Connection for throttle position sensor connector |
| | 9. Connection for high pressure hose | 25. Connection for motor position sensor connector |
| | 10. O-ring | 26. Connection for distributor connector |
| | 11. Connection for fuel return hose | 27. Control harness |
| ◆◆ | 12. Spark plug cable | |
| | 13. Connection for throttle control cable <A/T> | |
| | 14. Connection for oxygen sensor connector | |
| | 15. Connection for engine coolant temperature gauge unit connector | |
| | 16. Connection for engine coolant temperature sensor connector | |



01P0099

- 28. Timing belt upper cover
- 29. Rocker cover
- ↔ 30. Camshaft sprocket
- ↔ 31. Self-locking nut
- ↔ ↔ 32. Cylinder head assembly
- ↔ 33. Gasket
- ↔ 34. Cylinder head gasket

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ↔: Refer to "Service Points of Removal".
- (3) ↔↔: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts

SERVICE POINTS OF REMOVAL

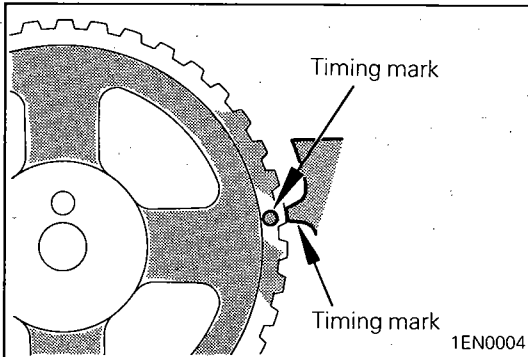
N09JBAK

9. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Relieve pressure in the fuel pipe line to prevent fuel outflow. (Refer to GROUP 14 – Service Adjustment Procedures.)

Caution

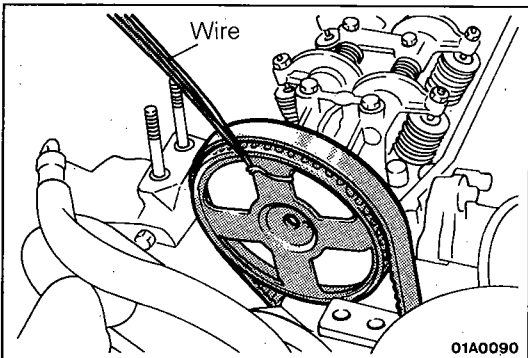
Cover fuel pipe line with rag after relieving pressure as certain pressure may still remain.

**30. REMOVAL OF CAMSHAFT SPROCKET**

- (1) Rotate the crankshaft clockwise and align the timing marks.

Caution

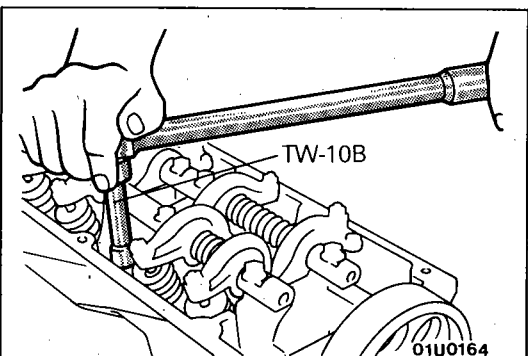
The crankshaft must always be rotated in the forward direction only.



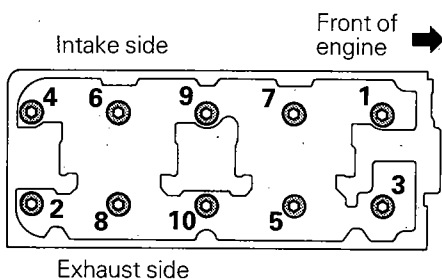
- (2) Remove the camshaft sprocket (together with the timing belt), and secure it with wire.

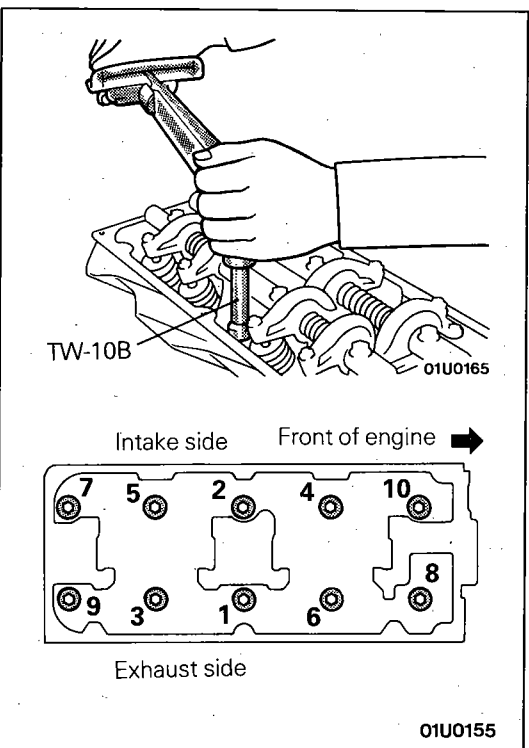
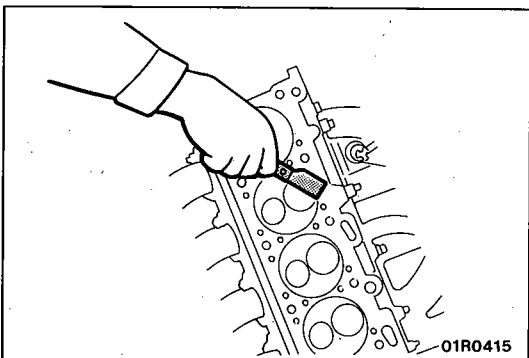
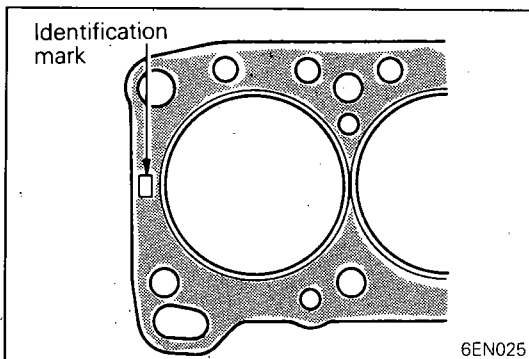
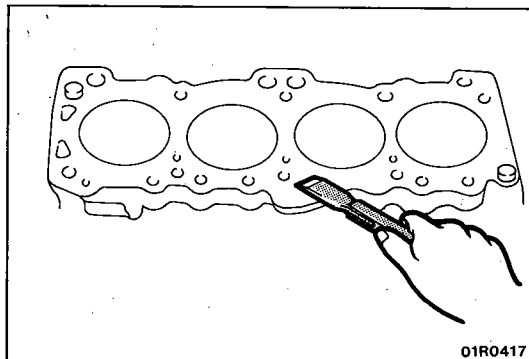
Caution

After removing the camshaft sprocket, be sure not to rotate the crankshaft.

**32. REMOVAL OF CYLINDER HEAD ASSEMBLY**

Using the special tool, loosen the bolts in the order shown in the illustration (in 2 or 3 cycles); and remove the cylinder head assembly.





SERVICE POINTS OF INSTALLATION

N09JDAB

34. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Use a scraper to remove the cylinder head gasket from the cylinder block.

Caution

Take care that no foreign material gets into the cylinder, or into coolant or oil passages.

- (2) Place the cylinder head gasket on the cylinder block with the marks facing upward.

32. INSTALLATION OF CYLINDER HEAD ASSEMBLY

- (1) Use a scraper to remove the cylinder head gasket from the cylinder head assembly.

Caution

Take care that no foreign material gets into the coolant or oil passages.

- (2) Using the special tool, tighten the bolts in the order shown in two or three steps.

13. ADJUSTMENT OF THROTTLE CONTROL CABLE <A/T>

Refer to GROUP 21 – Service Adjustment Procedures.

1. ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

N09ZE-A

Pre-removal Operation

- Removal of Under Cover

Post-installation Operation

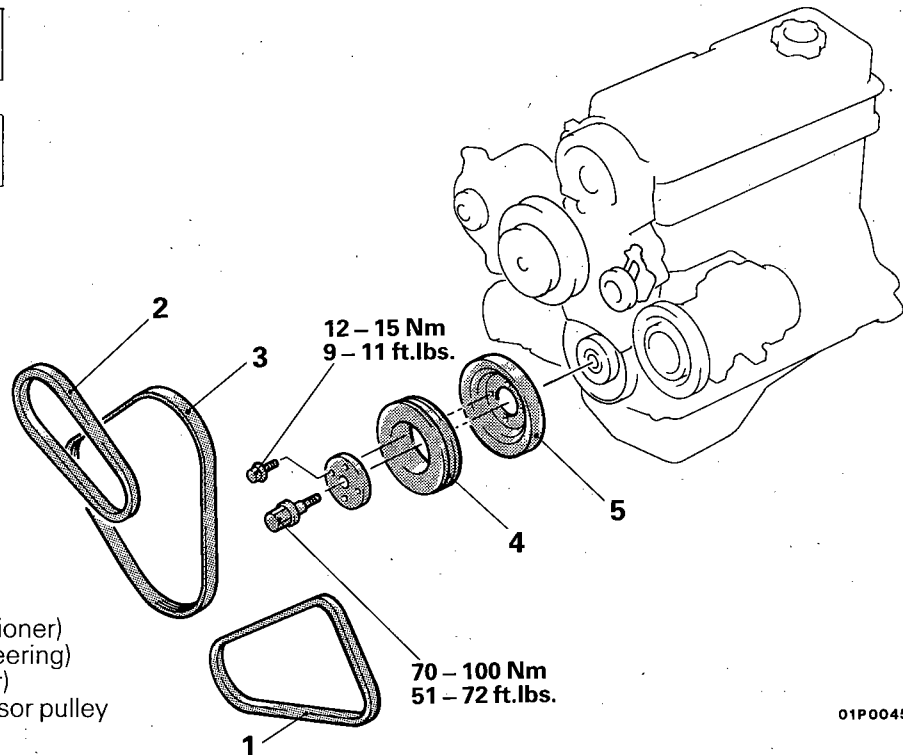
- Installation of Under Cover

Removal steps

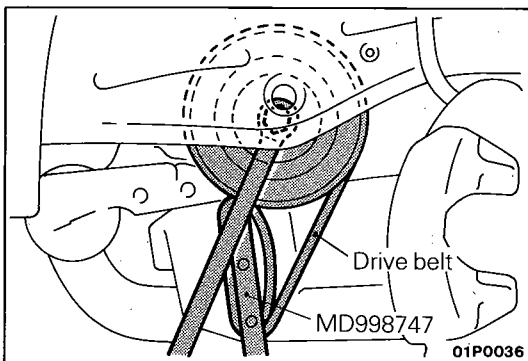
- ◆◆ 1. Drive belt (Air conditioner)
- ◆◆ 2. Drive belt (Power steering)
- ◆◆ 3. Drive belt (Alternator)
- ◆◆◆◆ 4. Crankshaft compressor pulley
- ◆◆◆◆ 5. Crankshaft pulley.

NOTE

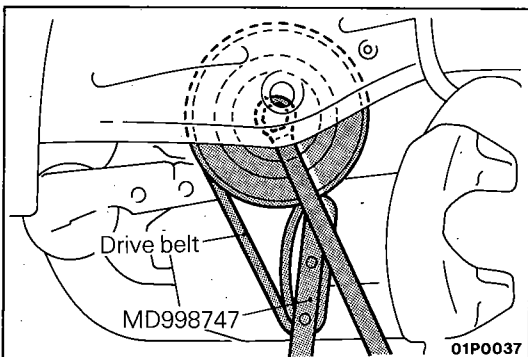
- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".



01P0045



01P0036



01P0037

SERVICE POINTS OF REMOVAL

N09ZFAB

4. REMOVAL OF CRANKSHAFT COMPRESSOR PULLEY / 5. CRANKSHAFT PULLEY

- (1) Using the special tool and a disused drive belt, stop the rotation of the crankshaft pulley.

Caution

- 1. This drive belt will be damaged. Do Not use the engine's drive belt.

- 2. Never use a damaged drive belt.

- (2) Remove the crankshaft sprocket bolts.
- (3) Remove the crankshaft pulley bolts, and remove the crankshaft pulley and crankshaft compressor pulley.

SERVICE POINTS OF INSTALLATION

N09ZHAB

5. INSTALLATION OF CRANKSHAFT PULLEY / 4. CRANKSHAFT COMPRESSOR PULLEY

- (1) Using the special tool and a discarded drive belt, stop the rotation of the crankshaft pulley.
- (2) Tighten the crankshaft sprocket bolt to the specified torque.

3. 2. 1. ADJUSTMENT OF DRIVE BELTS TENSION

Refer to P.9-26.

TIMING BELT

REMOVAL AND INSTALLATION

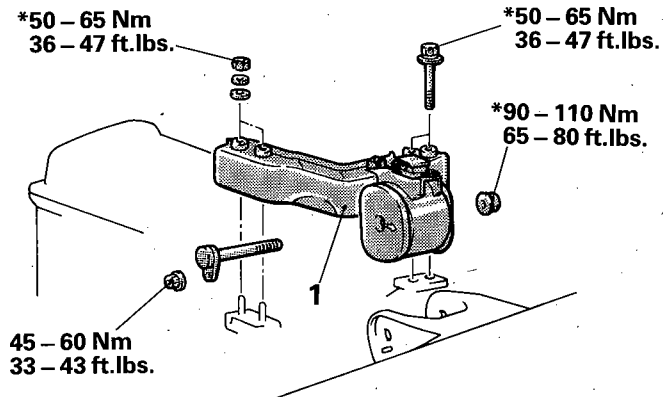
N09KA-A

Pre-removal Operation

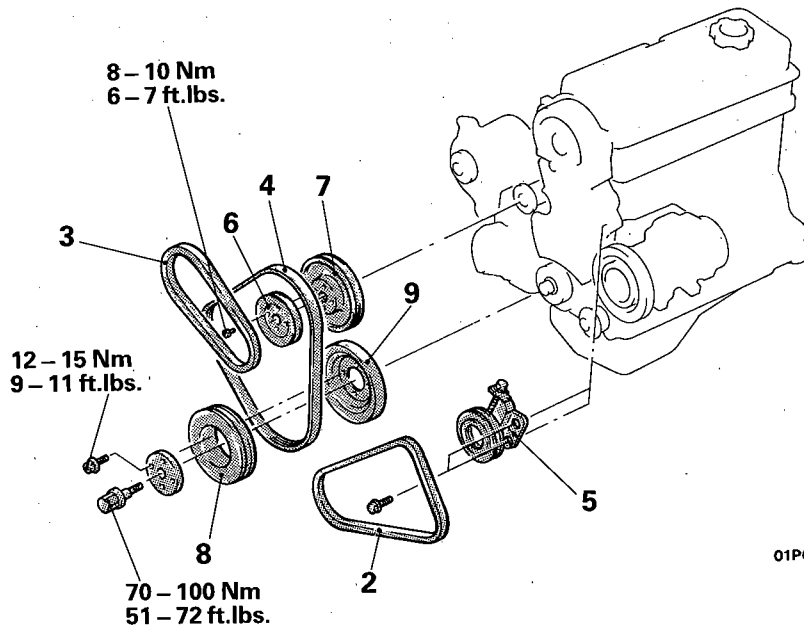
- Removal of Under Cover

Post-installation Operation

- Installation of Under Cover
- Engine Adjustment (Refer to P.9-23.)



01P0017



01P0026

Removal steps

- | | | |
|---|---------------------------------------|-------------------------|
| ↔ | 1. Engine mount bracket | 12. Tensioner spacer |
| | 2. Drive belt (Air conditioner) | 13. Tensioner spring |
| | 3. Drive belt (Power steering) | 14. Tensioner |
| | 4. Drive belt (Alternator) | ↔ |
| | 5. Tension pulley bracket | 15. Timing belt |
| | 6. Water pump pulley (Power steering) | 16. Camshaft sprocket |
| | 7. Water pump pulley | 17. Crankshaft sprocket |
| ↔ | 8. Crankshaft compressor pulley | 18. Flange |
| ↔ | 9. Crankshaft pulley | |
| | 10. Timing belt upper cover | |
| | 11. Timing belt lower cover | |

NOTE

- (1) ↔: Refer to "Service Points of Removal".
- (2) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

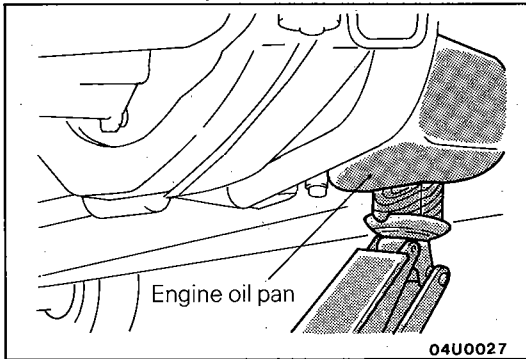


- 18. Flange
- 17. Crankshaft sprocket
- 16. Camshaft sprocket
- 14. Tensioner
- 13. Tensioner spring
- 12. Tensioner spacer
- 15. Timing belt
- Adjustment of timing belt tension
- 11. Timing belt lower cover
- 10. Timing belt upper cover
- 9. Crankshaft pulley
- 8. Crankshaft compressor pulley
- 7. Water pump pulley

6. Water pump pulley (Power steering)
5. Tension pulley bracket
4. Drive belt (Alternator)
3. Drive belt (Power steering)
2. Drive belt (Air conditioner)
1. Engine mount bracket

NOTE

- (1) ♦♦: Refer to "Service Points of Installation".
- (2) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

**SERVICE POINTS OF REMOVAL**

N09KBAB

1. REMOVAL OF ENGINE MOUNT BRACKET

- (1) Jack up the vehicle after placing a wooden block between the jack and the engine's oil pan.

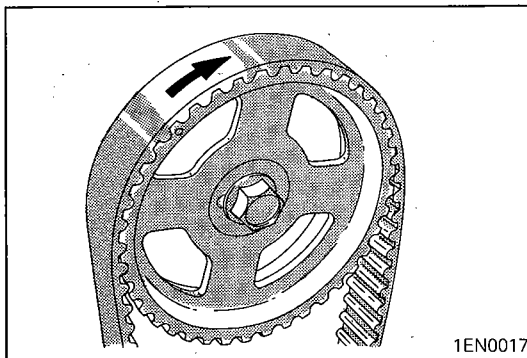
Caution

Jack up carefully, so as not to apply an excessive load to the various parts.

- (2) Remove the engine mount bracket.

8. REMOVAL OF CRANKSHAFT COMPRESSOR PULLEY / 9. CRANKSHAFT PULLEY

Refer to P.9-44.

**15. REMOVAL OF TIMING BELT**

Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

Caution

Water or oil on the belt shorten its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.

If there is oil or water on each part check the front case oil seals, camshaft oil seal and water pump for leaks.

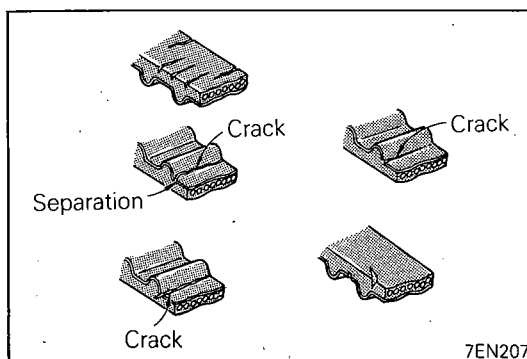
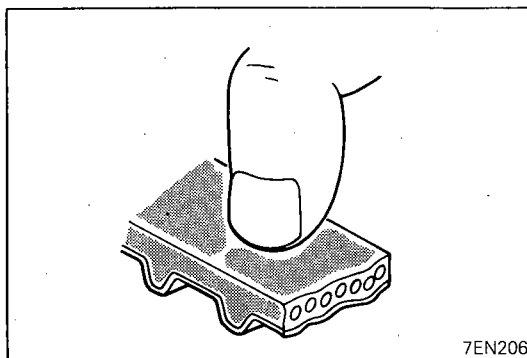
INSPECTION

N09KCAD

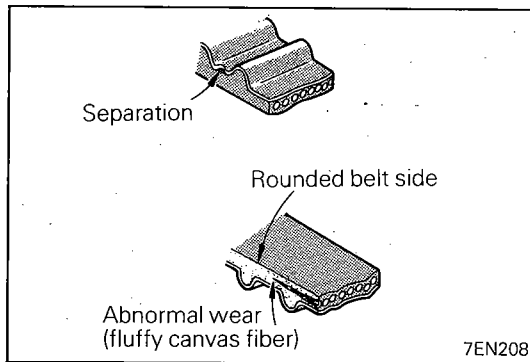
TIMING BELTS

The timing belts must be checked closely. Should the following defects be evident, replace the belt with a new one.

- (1) Hardened back surface rubber
Glossy, non-elastic, and so hard that no mark is produced even when scratched by a fingernail.



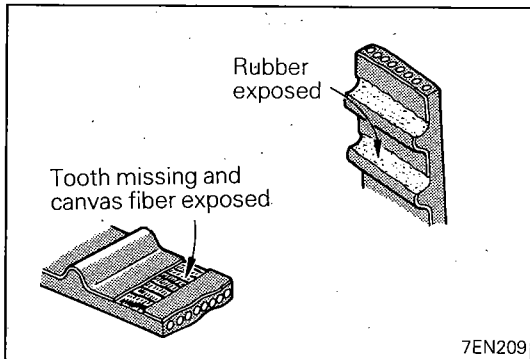
- (2) Cracked back surface rubber
- (3) Cracked or separated canvas
- (4) Cracked tooth bottom
- (5) Cracked side of belt



(6) Abnormal wear on side.

NOTE

A normal belt should have clear-cut sides as if cut with a sharp knife.



(7) Abnormal wear on teeth

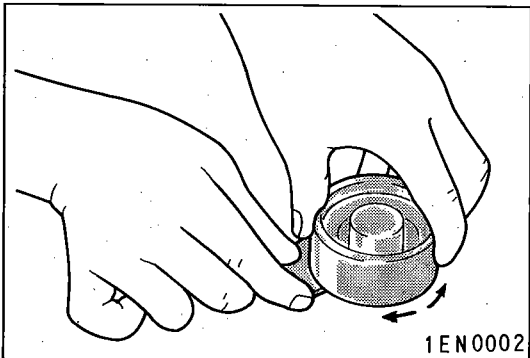
Initial stage:

Canvas on load side tooth flank worn (fluffy canvas fibers, rubber gone and color changed to white, and unclear canvas texture)

Last stage:

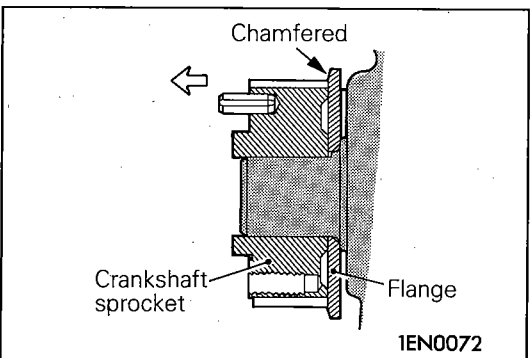
Canvas on load side flank worn down and rubber exposed (tooth width reduced)

(8) Missing tooth



TENSIONER PULLEY

Turn the pulleys to check for possible binding, excessive play, and unusual noise. Replace the pulley if any of these defects is evident.

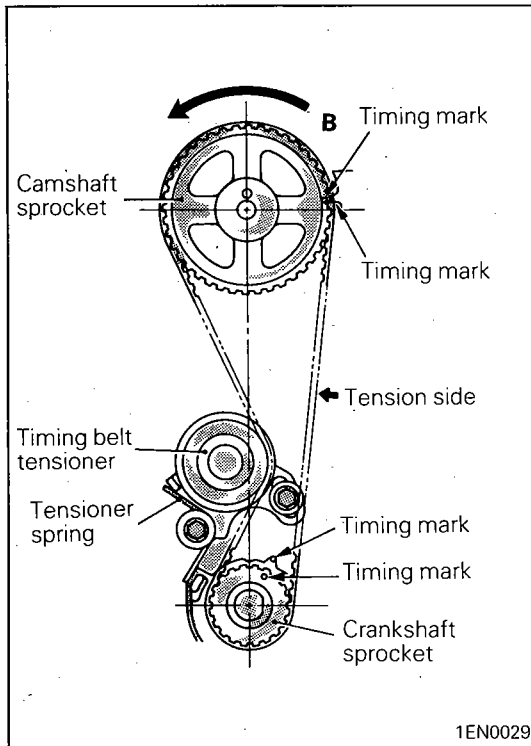


SERVICE POINTS OF INSTALLATION

N09KDAB

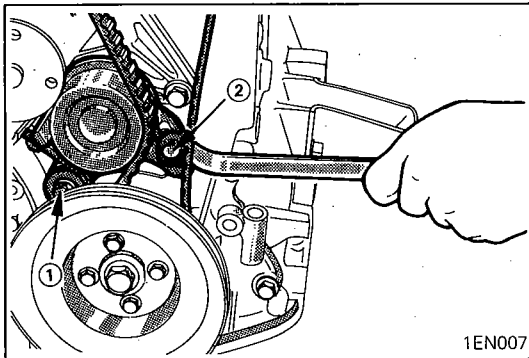
18. INSTALLATION OF FLANGE / 17. CRANKSHAFT SPROCKET

Install in correct directions.



15. INSTALLATION OF TIMING BELT

- (1) Align the timing marks on camshaft sprocket and crankshaft sprocket. (Now the piston in No. 1 cylinder is at top dead center on compression stroke.)
- (2) Set the timing belt first on crankshaft sprocket and then keeping the tension side of belt tight, set on the camshaft sprocket.
- (3) Apply counter-clockwise force (in the direction B) to the camshaft sprocket to give tension to the belt on tension side and make sure that all timing marks are lined up.
- (4) Install the crankshaft pulley temporarily. This is to prevent the belt from coming off when crankshaft is turned.



• ADJUSTMENT OF TIMING BELT TENSION

- (1) Loosen the pivot side tensioner bolt ① and then the slot side bolt ②.
- (2) Tighten the slot side tensioner bolt ② and then the pivot side bolt ①.

Caution

If the pivot side bolt ① is tightened first, the tensioner could turn with bolt, causing overtension.

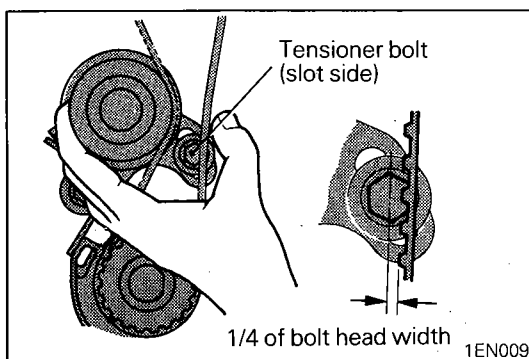
- (3) Turn the crankshaft clockwise.

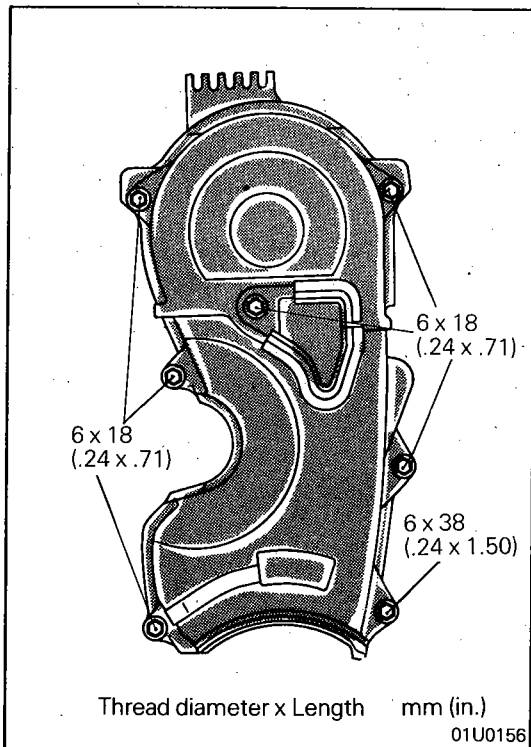
Caution

1. Turn the crankshaft smoothly at constant speed. Do not turn it counter-clockwise.
2. Do not apply any other force than spring force to give tension to the belt.

- (4) Loosen the pivot side tensioner bolt ① and then the slot side bolt ②.
- (5) Tighten the slot side bolt ② and then the pivot side bolt ①.

- (6) Check the belt tension.
Hold the tensioner and timing belt together by hand and give the belt a slight thumb pressure at a point level with tensioner center. Make sure that belt cog crest comes as deep as about 1/4 of the width of the slot side tensioner bolt head.





11. INSTALLATION OF TIMING BELT LOWER COVER / 10. TIMING BELT UPPER COVER

Note that the timing belt lower and upper cover attaching bolts differ in size from one place to another.

9. INSTALLATION OF CRANKSHAFT PULLEY / 8. CRANKSHAFT COMPRESSOR PULLEY

Refer to P.9-44.

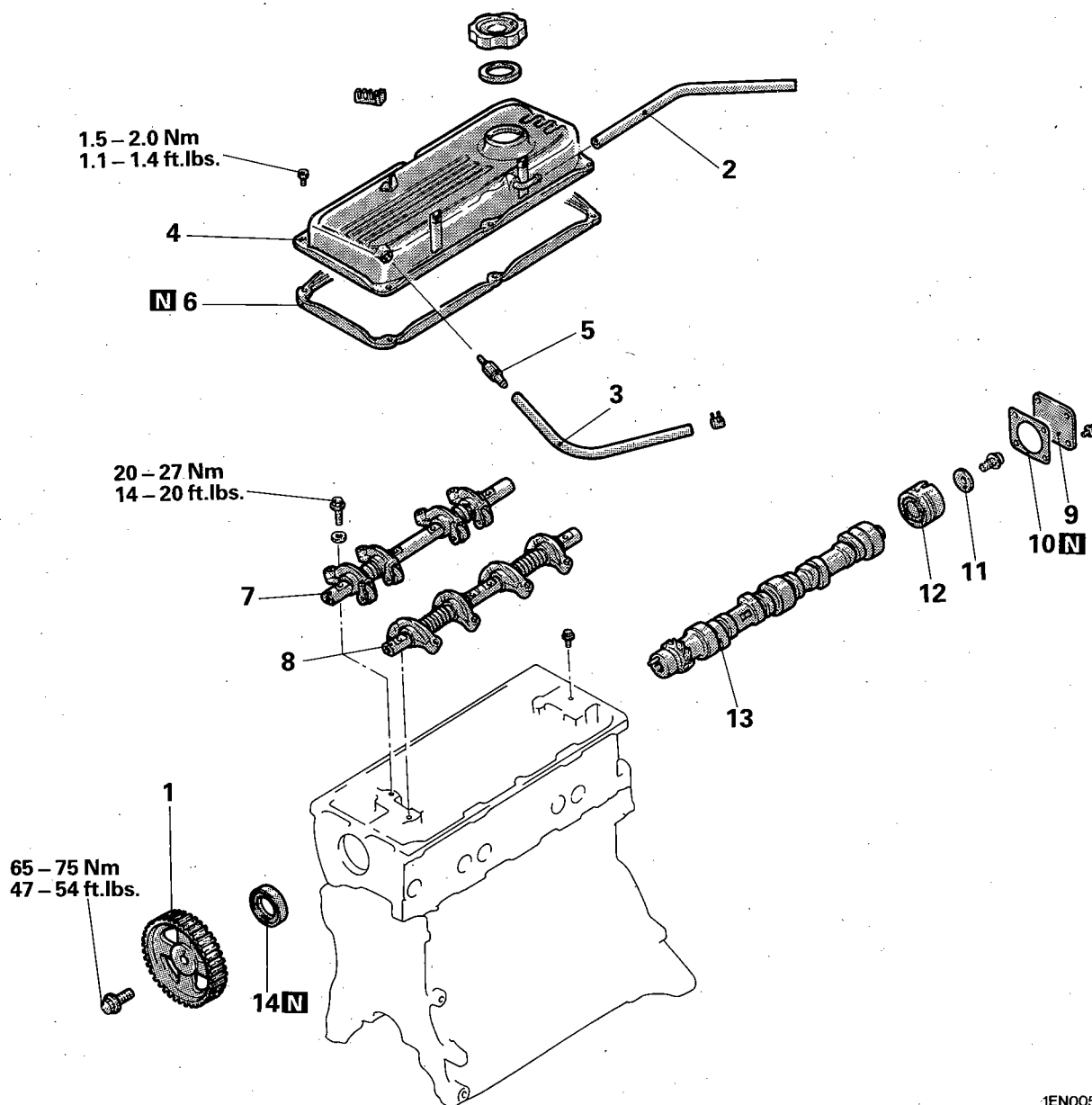
4. 3. 2. ADJUSTMENT OF DRIVE BELT TENSION

Refer to P.9-26.

ROCKER ARMS, ROCKER ARM SHAFTS AND CAMSHAFT

DISASSEMBLY AND REASSEMBLY

N09LE-A



1EN0051

Disassembly steps

1. Camshaft sprocket
2. Breather hose
3. P.C.V. hose
4. Rocker cover
5. P.C.V. valve
6. Rocker cover gasket
7. Rocker arm assembly
8. Rocker arm assembly
9. Rear cover
10. Rear cover gasket

11. Thrust plate
12. Camshaft thrust case
13. Camshaft
14. Oil seal

NOTE

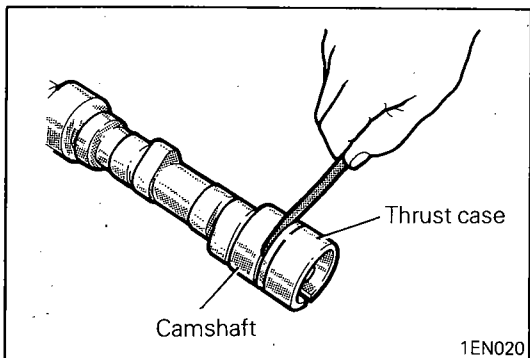
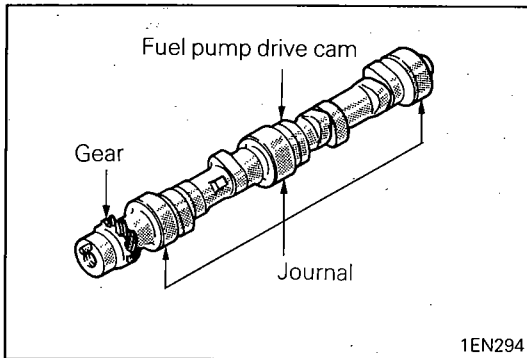
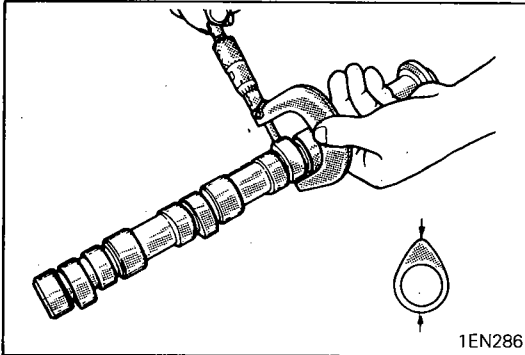
- (1) Reverse the disassembly procedures to reassemble.
- (2) ♦♦: Refer to "Service Points of Disassembly".
- (3) ♦♦: Refer to "Service Points of Reassembly".
- (4) **N**: Non-reusable parts

SERVICE POINTS OF DISASSEMBLY

N09LFBA

7. 8. REMOVAL OF ROCKER ARM ASSEMBLY

When removing the flange bolts, loosen little by little and uniformly.



INSPECTION

N09LCAA

- Check the camshaft journals for wear. If the journals are badly worn, replace the camshaft. If the camshaft journals are seized, check the cylinder head oil hole for clogging.
- Check the cam lobes for damage. If the lobe is damaged or worn excessively, replace the camshaft.

Cam height:

Standard dimension

Intake

38.909 mm (1.5318 in.)

Exhaust

38.974 mm (1.5344 in.)

Limit

Intake

38.409 mm (1.5122 in.)

Exhaust

38.474 mm (1.5147 in.)

- Check the cam surface for abnormal wear or damage, and replace if required. Also check the fuel pump drive eccentric cam.
- Check the distributor drive gear tooth surfaces. If abnormal wear is evident, replace the camshaft.

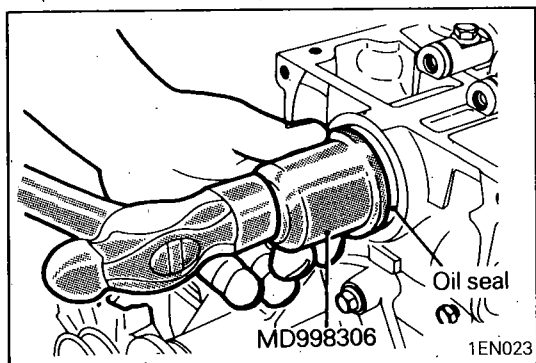
- Install the camshaft thrust case and thrust plate to the camshaft end and firmly tighten the bolt. Check camshaft end play.

If end play is excessive, replace the thrust case with a new one and recheck the end play. If the end play is still excessive, check the rear end of camshaft rear journal for wear. If it is badly worn, replace the camshaft.

End play: 0.05 – 0.20 mm (.0020 – .0080 in.)

Limit: 0.4 mm (.016 in.)

- Check each bearing for damage. If any of the bearing surfaces are excessively damaged, replace the cylinder head assembly.
- Check the camshaft front oil seal as follows:
 - (1) Check the lips for wear. If lip threads are worn, replace.
 - (2) Check the oil seal lip contacting surface of camshaft. If ridge wear is evident, replace the camshaft.

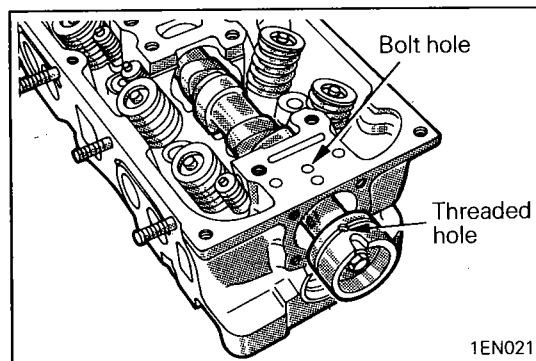


SERVICE POINTS OF REASSEMBLY

N09LGBA

14. INSTALLATION OF OIL SEAL

Coat the external surface of oil seal with engine oil. Fit the oil seal on the camshaft end and drive the oil seal in cylinder head using the special tool and a hammer until the seal is fully seated.



13. INSTALLATION OF CAMSHAFT / 12. CAMSHAFT THRUST CASE

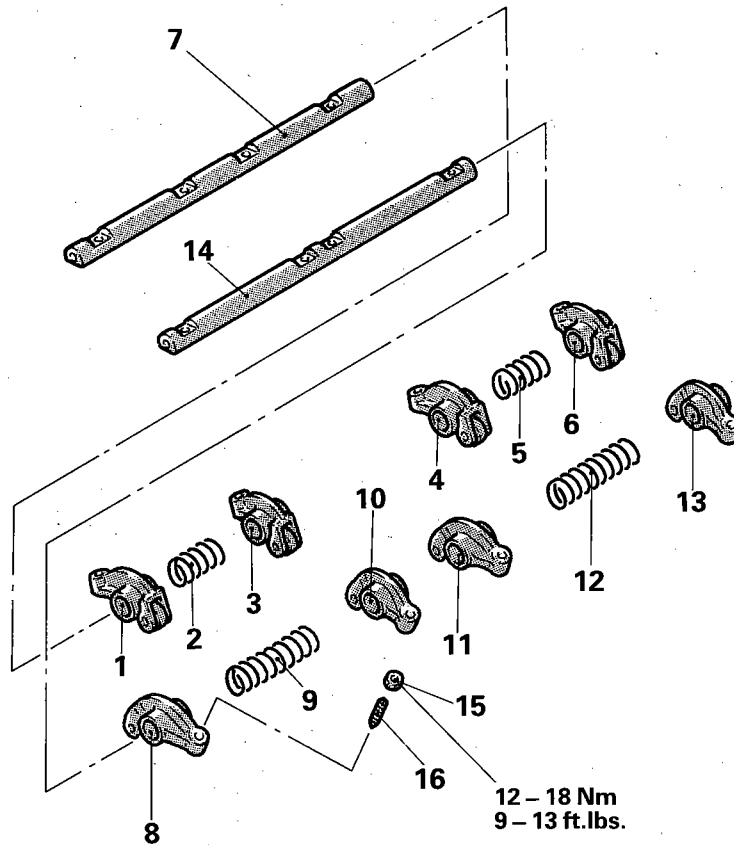
Insert the camshaft thrust case in cylinder head with the threaded hole facing up, and align the threaded hole with the bolt hole in the cylinder head. Install and firmly tighten the bolt.

7. 8. INSTALLATION OF ROCKER ARM ASSEMBLY

Tighten the rocker arm attaching bolts little by little and uniformly. Finally tighten to specified torque.

ROCKER ARM AND ROCKER ARM SHAFT

DISASSEMBLY AND REASSEMBLY



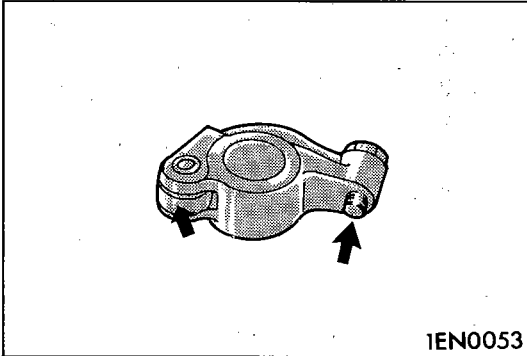
1EN0052

Disassembly steps

- ◆◆ 1. Rocker arm (marked 1-3)
- ◆◆ 2. Rocker shaft spring
- ◆◆ 3. Rocker arm (marked 2-4)
- ◆◆ 4. Rocker arm (marked 1-3)
- ◆◆ 5. Rocker shaft spring
- ◆◆ 6. Rocker arm (marked 2-4)
- 7. Rocker shaft (exhaust)
- ◆◆ 8. Rocker arm (marked 1-3)
- ◆◆ 9. Rocker shaft spring
- ◆◆ 10. Rocker arm (marked 2-4)
- ◆◆ 11. Rocker arm (marked 1-3)
- ◆◆ 12. Rocker shaft spring
- ◆◆ 13. Rocker arm (marked 2-4)
- 14. Rocker shaft (Intake)
- 15. Nut
- 16. Adjusting screw

NOTE

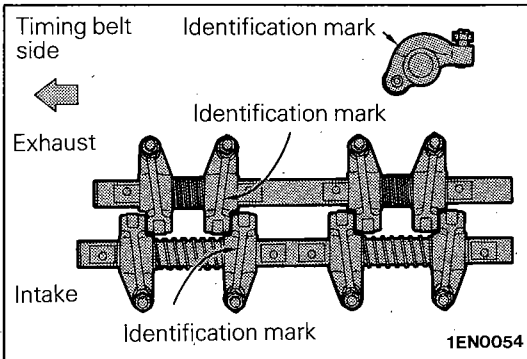
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Reassembly".



INSPECTION

N09NGAF

- Check the roller surface. If any dents, damage or seizure is evident, replace it.
- Check rotation of the roller. If it does not rotate smoothly or if looseness is evident, replace it.
- Check the inside diameter. If damage or seizure is evident, replace the roller.
- Check the areas marked with arrows for wear and damage. If considerable wear or damage is evident, replace the roller.



SERVICE POINTS OF REASSEMBLY

N09NHAB

2. 5. 9. 12. INSTALLATION OF ROCKER SHAFT SPRING

The rocker shaft springs for intake rocker shaft and those for exhaust rocker shaft differ in their free length.

Standard value:

Intake 76.9 mm (3.028 in.)

Exhaust 44.2 mm (1.740 in.)

1. 3. 4. 6. 8. 10. 11. 13. INSTALLATION OF ROCKER ARM

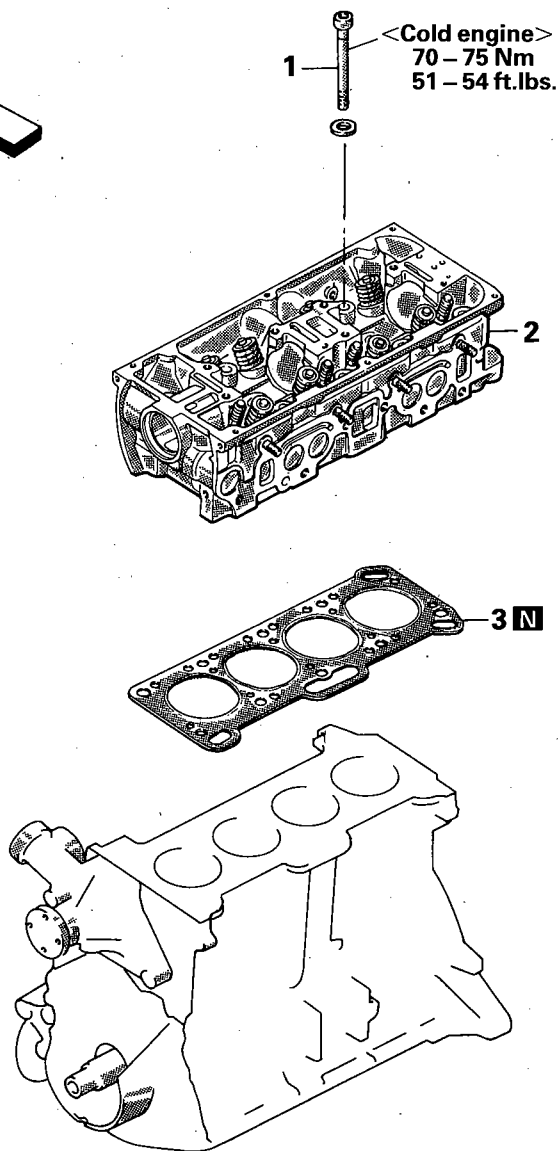
There are rocker arms for odd numbered cylinders (marked 1-3) and for even numbered cylinders (marked 2-4).

Install two types of rocker arms C and D in their correct positions.

CYLINDER HEAD

DISASSEMBLY AND REASSEMBLY

FORWARD



Disassembly steps

- ◆◆ ◆◆ 1. Cylinder head bolt
- ◆◆ ◆◆ 2. Cylinder head
- ◆◆ ◆◆ 3. Cylinder head gasket

NOTE

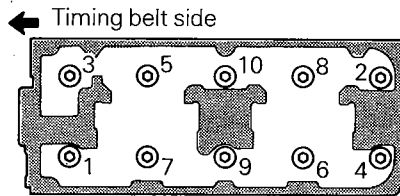
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Disassembly".
- (3) ◆◆: Refer to "Service Points of Reassembly".
- (4) **N**: Non-reusable parts

SERVICE POINT OF DISASSEMBLY

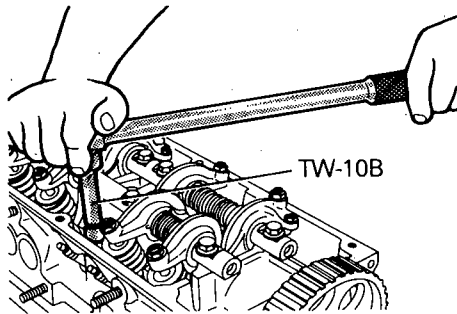
N090FAA

1. REMOVAL OF CYLINDER HEAD BOLTS

Using the special tool, loosen the bolts in the order shown. Loosen them little by little and uniformly.



1EN082



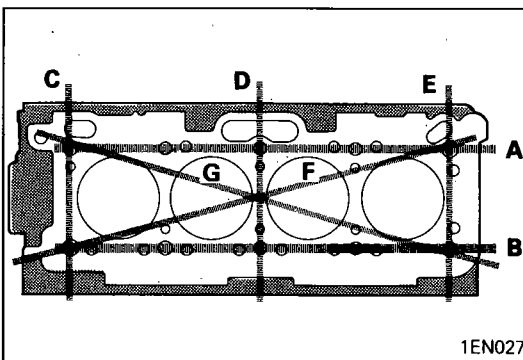
1EN083

INSPECTION

N090CAI

CYLINDER HEAD

- (1) Check the cylinder head for cracks, damage and engine coolant leakage.
- (2) Remove scale, sealing compound and carbon deposits completely. After cleaning oil passages, apply compressed air to make certain that the passages are clear.



1EN027

- (3) Check the cylinder head gasket surface for flatness by using a straight edge in the direction of A, B, ... as shown. If limit is exceeded in any direction, resurface cylinder head.

Flatness of cylinder head gasket surface:

Standard dimension Less than 0.05 mm (.0020 in.)

Limit 0.2 mm (.008 in.)

Overall height: 106.9 – 107.1 mm (4.209 – 4.217 in.)

Caution

The total thickness of stock allowed to be removed from the cylinder head and mating cylinder block is 0.2 mm (.008 in.) at maximum.

SERVICE POINTS OF REASSEMBLY

N09OGAA

3. INSTALLATION OF CYLINDER HEAD GASKET

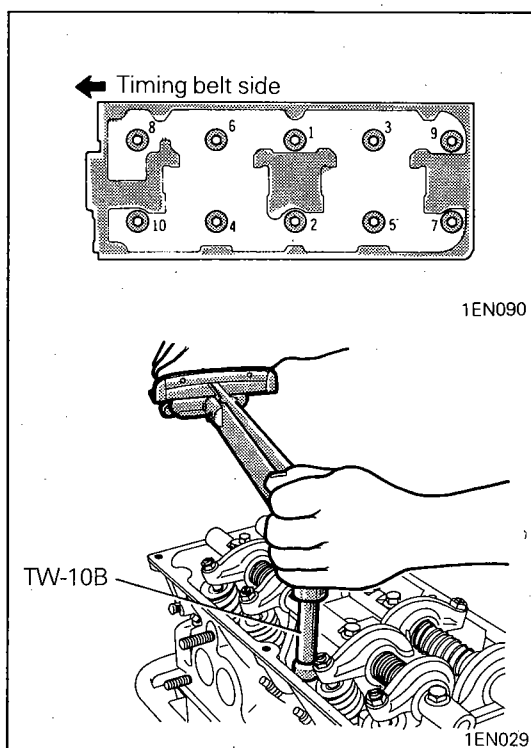
Clean both gasket surfaces of cylinder block and cylinder head.

Caution

Do not apply sealant to the gasket.

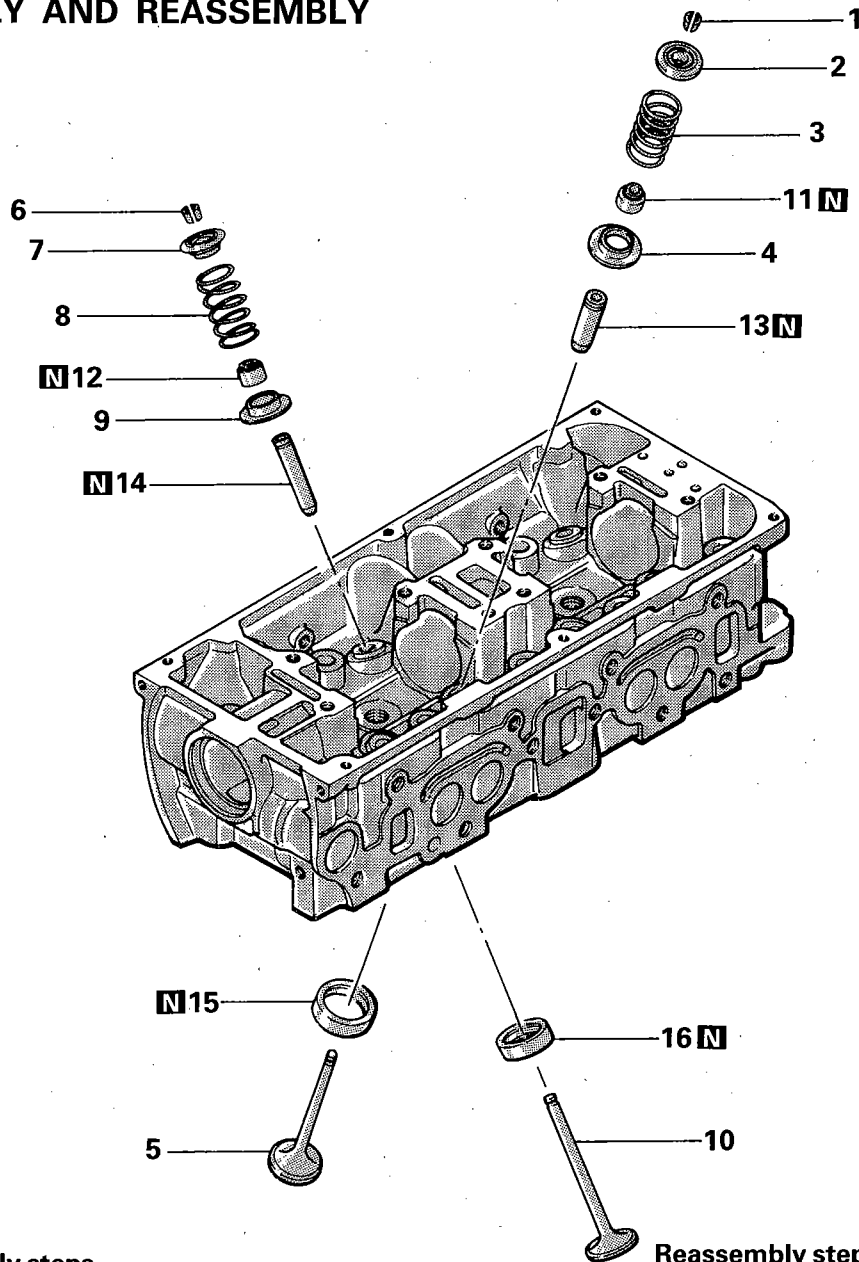
1. INSTALLATION OF CYLINDER HEAD BOLTS

Using the special tool, tighten the bolts in the order shown in two or three steps. Finally tighten to the specified torque.



VALVES AND VALVE SPRINGS

DISASSEMBLY AND REASSEMBLY



1EN0055

Disassembly steps

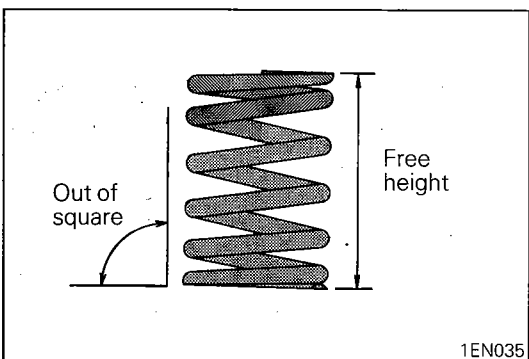
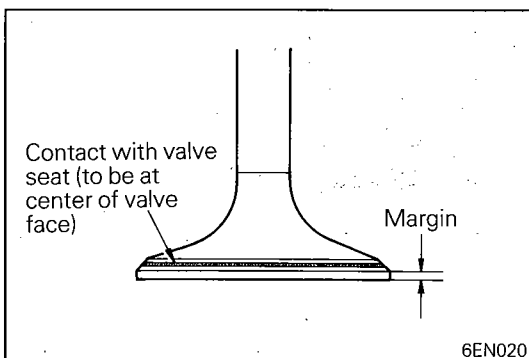
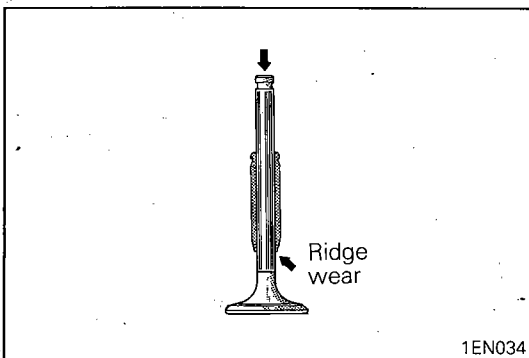
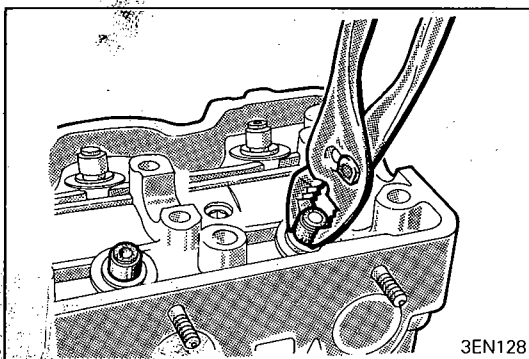
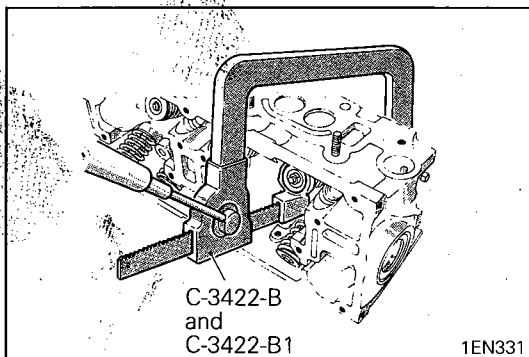
- 1. Retainer lock
- 2. Valve spring retainer
- 3. Valve spring
- 4. Valve spring seat
- ↔ 5. Intake valve
- 6. Retainer lock
- 7. Valve spring retainer
- 8. Valve spring
- 9. Valve spring seat
- ↔ 10. Exhaust valve
- ↔ 11. Valve stem seal
- ↔ 12. Valve stem seal
- 13. Intake valve guide
- 14. Exhaust valve guide
- 15. Intake valve seat
- 16. Exhaust valve seat

Reassembly steps

- 16. Exhaust valve seat
- 15. Intake valve seat
- 14. Exhaust valve guide
- 13. Intake valve guide
- 9. Valve spring seat
- ↔ 12. Valve stem seal
- 4. Valve spring seat
- ↔ 11. Valve stem seal
- ↔ 10. Exhaust valve
- 8. Valve spring
- 7. Valve spring retainer
- 6. Retainer lock
- ↔ 5. Intake valve
- 3. Valve spring
- 2. Valve spring retainer
- 1. Retainer lock

NOTE

- (1) ↔: Refer to "Service Points of Disassembly".
- (2) ↔: Refer to "Service Points of Reassembly".
- (3) N: Non-reusable parts

**SERVICE POINTS OF DISASSEMBLY**

N09PFAI

5. REMOVAL OF INTAKE VALVE / 10. EXHAUST VALVE

- (1) Using the special tool, compress the spring and remove the retainer lock.
- (2) Remove the spring retainer, valve spring, spring seat and valve.
- (3) Keep removed parts in order according to the cylinder number and intake and exhaust.

11. 12. REMOVAL OF VALVE STEM SEALS

To remove the valve stem seal, use pliers.

Caution

Do not reuse the stem seals.

INSPECTION

N09PGAE0

VALVE

- (1) Check the valve stem for wear (ridge wear).
- (2) Check the valve stem end face for wear and dents.

- (3) Check the valve seat for proper contact with the valve set. If it is not concentric, correct the valve seat.
- (4) If the margin is out of the limit, replace the valve.

Standard value:

Intake 1.0 mm (.039 in.)
Exhaust 1.5 mm (.059 in.)

Limit:

Intake 0.5 mm (.020 in.)
Exhaust 1.0 mm (.039 in.)

VALVE SPRINGS

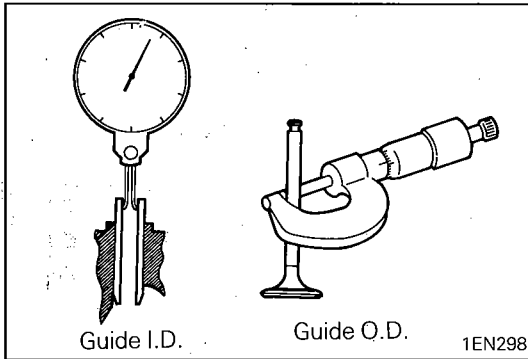
N09PGBC0

- (1) Measure the free height of the spring and replace if it is out of the limit.

Standard value: 44.6 mm (1.756 in.)
Limit: 43.6 mm (1.717 in.)

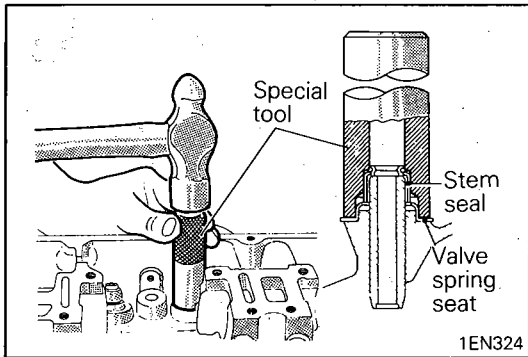
- (2) Check the spring for squareness and replace if the limit is exceeded.

Standard value: Less than 2°
Limit: 4°

**VALVE GUIDES**

N09PGCC0

Measure the clearance between the valve guide and valve stem and, if the clearance exceeds the limit, replace the valve guide or valve, or both.

Standard value:**Intake****0.02 – 0.05 mm (.0008 – .0020 in.)****Exhaust****0.05 – 0.09 mm (.0020 – .0035 in.)****Limit:****Intake****0.10 mm (.0039 in.)****Exhaust****0.15 mm (.0059 in.)****SERVICE POINTS OF REASSEMBLY**

N09PKAC

12. 11. INSTALLATION OF VALVE STEM SEAL

Install the spring seat, then using the special tool, install the valve stem seal by lightly tapping the tool. The valve stem seal is installed in specified position, using the special tool.

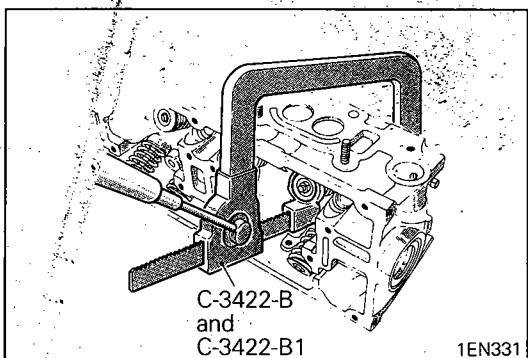
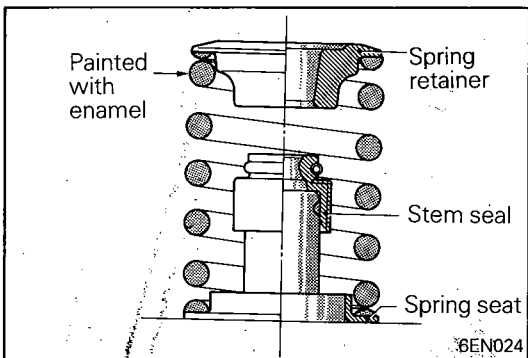
Caution

Incorrect installation of the valve stem seal without using special tool will result in poor sealing and cause oil leakage down valve guide.

Do not reuse the valve stem seal.

10. INSTALLATION OF EXHAUST VALVE / 5. INTAKE VALVE

- (1) Install the valve spring so that its end with identification color is positioned on the rocker arm end.



- (2) Using the special tool, compress the valve spring and insert the retainer lock into position.

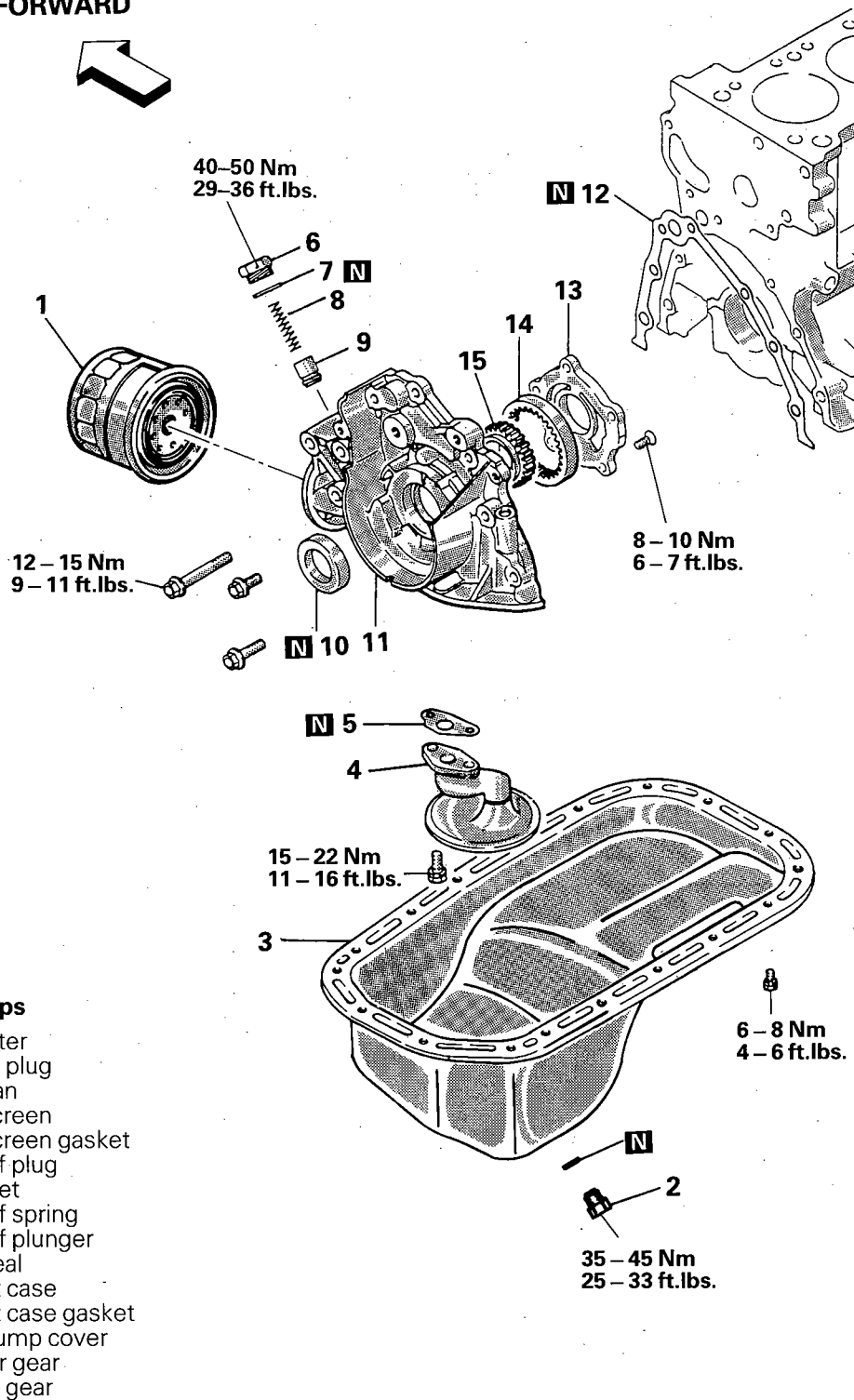
Caution

If the valve spring is compressed excessively, the lower end of the retainer contacts the stem seal, damaging the stem seal.

FRONT CASE AND OIL PUMP

DISASSEMBLY AND REASSEMBLY

FORWARD

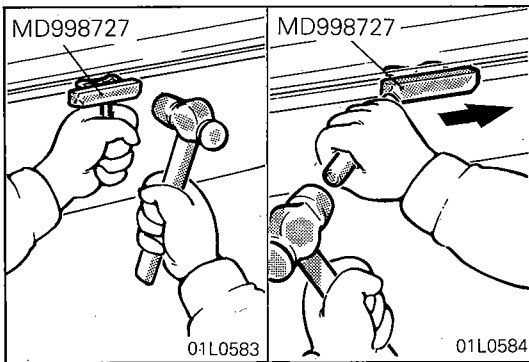


Disassembly steps

- ◆◆ 1. Oil filter
- ◆◆ 2. Drain plug
- ◆◆◆ 3. Oil pan
- ◆◆◆ 4. Oil screen
- ◆◆ 5. Oil screen gasket
- ◆◆ 6. Relief plug
- ◆◆ 7. Gasket
- ◆◆ 8. Relief spring
- ◆◆ 9. Relief plunger
- ◆◆ 10. Oil seal
- ◆◆ 11. Front case
- ◆◆ 12. Front case gasket
- ◆◆◆ 13. Oil pump cover
- ◆◆◆ 14. Outer gear
- ◆◆◆ 15. Inner gear

NOTE

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Disassembly".
- (3) ◆◆◆: Refer to "Service Points of Reassembly".
- (4) **N**: Non-reusable parts

**SERVICE POINTS OF DISASSEMBLY**

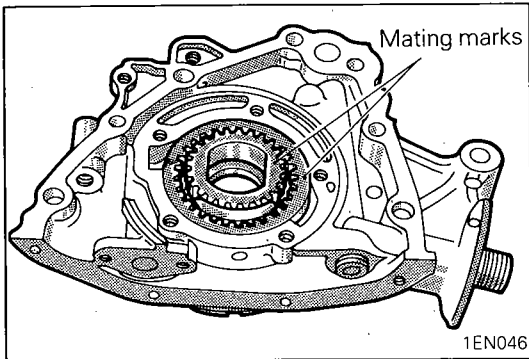
N09RGAC

3. REMOVAL OF OIL PAN

- (1) Drive the special tool deeply in between oil pan and cylinder block.
- (2) Strike the side of the special tool to make it slide to remove the oil pan.

14. REMOVAL OF OUTER GEAR / 15. INNER GEAR

Remove the inner and outer gears from the front case. The outer gear has not mark indicating its installed direction. Make a mark on the reverse side of the outer gear, using a felt pen.

**INSPECTION**

N09RCAA

FRONT CASE

- (1) Check the front case for cracks and damage. Replace as necessary.
- (2) Check the front oil seal for worn or damaged lips. Replace if faulty.

OIL PAN AND OIL SCREEN

N09RCCA

- (1) Check the oil pan for cracks and other damage. Replace if faulty.
- (2) Check the oil screen for clogging, cracks and other damage. Replace if faulty.
- (3) Replace the O-ring of oil screen if faulty.

FRONT CASE AND OIL PUMP COVER

N09RCDA

Check the surfaces that contact gears for wear, especially ridge wear, and other damage.

OIL PUMP GEARS

N09RCEA

- (1) Check gear tooth surface for wear and damage.
- (2) Check the clearance between outer gear and front case.

Outer gear:

Clearance between outer circumference and front case 0.10 – 0.20 mm (.0039 – .0079 in.)

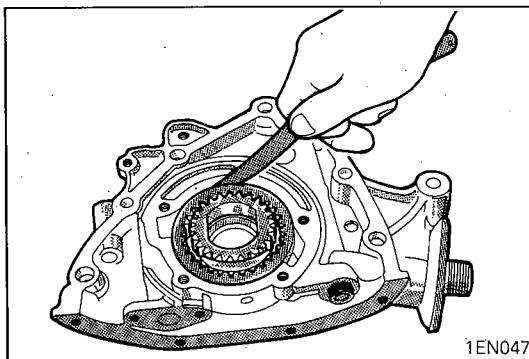
Clearance between addendum and crescent 0.22 – 0.44 mm (.0087 – .0173 in.)

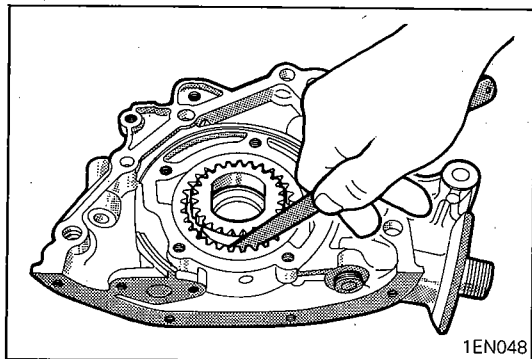
End play 0.04 – 0.10 mm (.0016 – .0039 in.)

Inner gear:

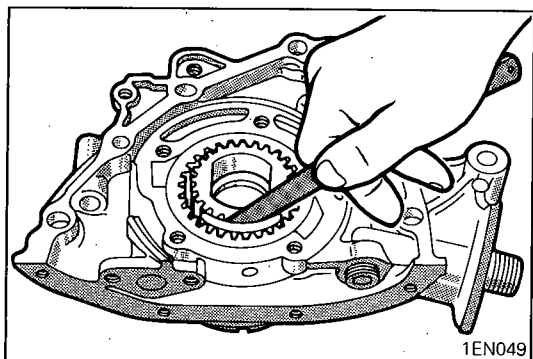
Clearance between addendum and crescent: 0.21 – 0.34 mm (.0083 – .0134 in.)

End play 0.04 – 0.10 mm (.0016 – .0039 in.)





- (3) Check the clearance between the outer gear addendum and crescent.



- (4) Check the clearance between the inner gear addendum and crescent.

RELIEF VALVE AND SPRING

N09RCFA

- (1) Check sliding condition of the relief valve in front case.
- (2) Check the relief spring for deformation and breakage.

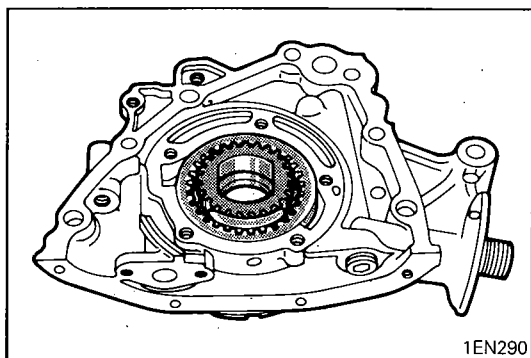
Standard value:

Free length

46.6 mm (1.835 in.)

Load

61 N (13 lbs.)/40.1 mm (1.579 in.)

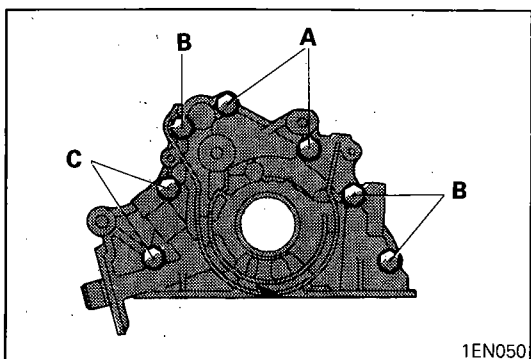


SERVICE POINTS OF REASSEMBLY

N09RHAC

15. INSTALLATION OF INNER GEAR / 14. OUTER GEAR

Make sure that the outer gear is installed in the same direction as before according to the mark made at the time of removal. Apply engine oil to the entire surface of gear.



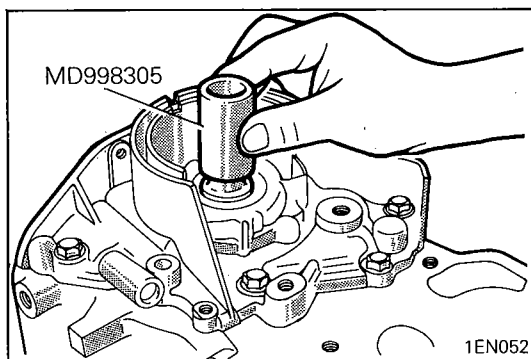
11. INSTALLATION OF FRONT CASE

Use the bolts of correct lengths as shown.

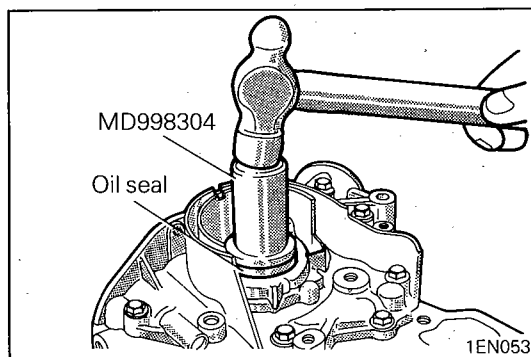
Bolt lengths (A): 30 mm (1.1811 in.)

(B): 20 mm (.7874 in.)

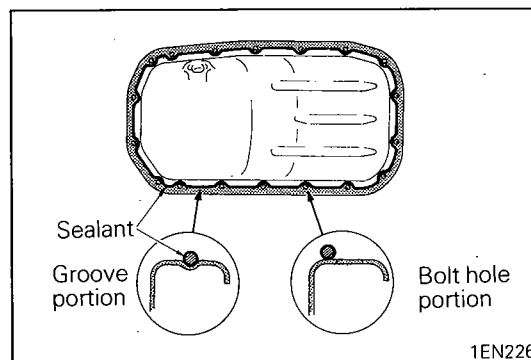
(C): 60 mm (2.3622 in.)

**10. INSTALLATION OF OIL SEAL**

- (1) Install the special tool to the front end of crankshaft.
- (2) Apply engine oil to the outer surface of the special tool, and slide the new oil seal along the special tool by hand until it touches the front case.
- (3) Always use a new oil seal at every installation.



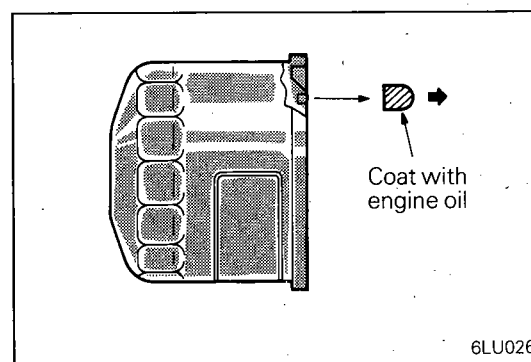
- (4) Install the oil seal in the front case by tapping the special tool until the oil seal is in place.

**3. APPLICATION OF SEALANT TO OIL PAN**

- (1) Clean both mating surfaces of oil pan and cylinder block.
- (2) Apply a 4 mm (.16 in.) wide bead of sealant to the entire circumference of the oil pan flange.

Specified sealant: MITSUBISHI GENUINE Part No. MZ100168 or equivalent

- (3) The oil pan should be installed in 15 minutes after the application of sealant.

**1. APPLICATION OF ENGINE OIL TO OIL FILTER**

Apply a thin coat of engine oil to the packing surface.

Caution

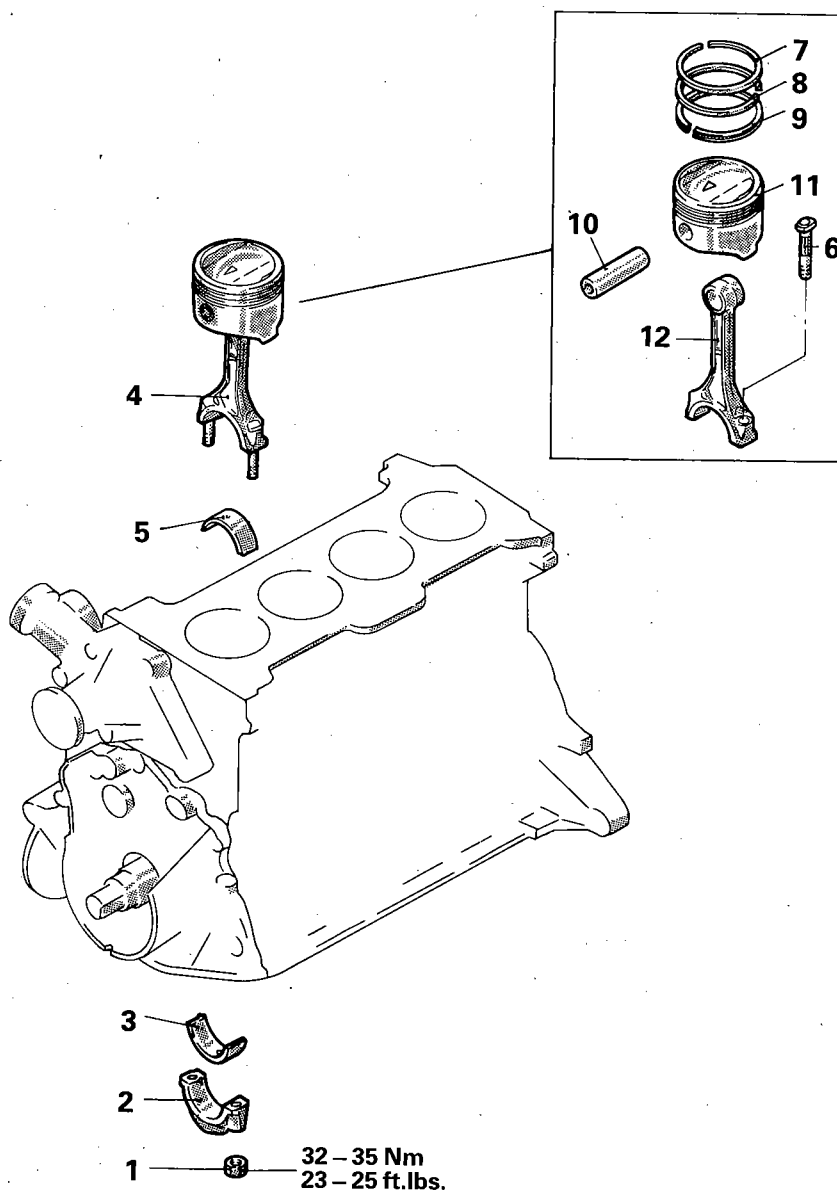
Do not apply too much oil.

PISTON AND CONNECTING ROD

N09TE-A

DISASSEMBLY AND REASSEMBLY

FORWARD

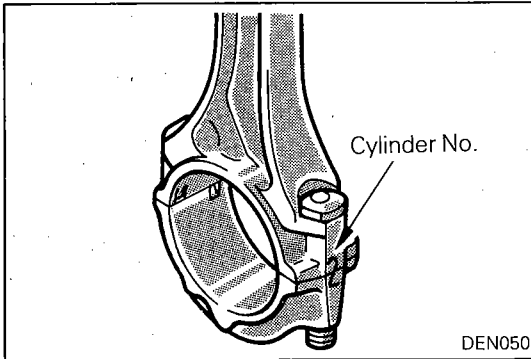


Disassembly steps

- 1. Nut
- ↔ ♦♦ 2. Connecting rod cap
- ♦♦ 3. Connecting rod bearing
- ♦♦ 4. Piston and connecting rod assembly
- 5. Connecting rod bearing
- 6. Bolt
- ↔ ♦♦ 7. No. 1 piston ring
- ↔ ♦♦ 8. No. 2 piston ring
- ♦♦ 9. Oil ring
- 10. Piston pin
- 11. Piston
- 12. Connecting rod

NOTE

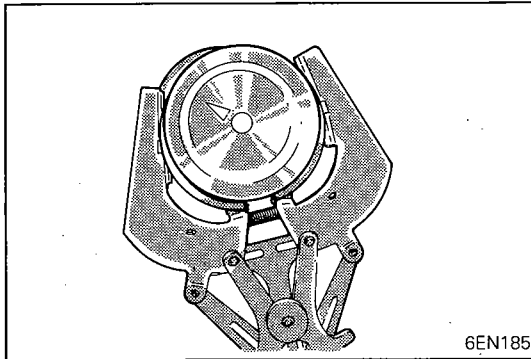
- (1) Reverse the disassembly procedures to reassemble.
- (2) ♦♦: Refer to "Service Points of Disassembly".
- (3) ♦♦: Refer to "Service Points of Reassembly".

**SERVICE POINTS OF DISASSEMBLY**

N09TFBA

2. REMOVAL OF CONNECTING ROD CAP

Mark the large end of the connecting rod with the cylinder number for use during reassembly.

**7. REMOVAL OF NO. 1 PISTON RING / 8. NO. 2 PISTON RING**

Remove the piston rings with a piston ring expander.

INSPECTION

N09TCAF0

PISTON

Replace the piston if scratches or seizure is evident on its surfaces (especially the thrust surface). Replace the piston if it is cracked.

PISTON PIN

- (1) Insert the piston pin into the piston pin hole with a thumb. You should feel a slight resistance. Replace the piston pin if it can be easily inserted or there is an excessive play.
- (2) The piston and piston pin must be replaced as an assembly.

PISTON RING

N09TCBF0

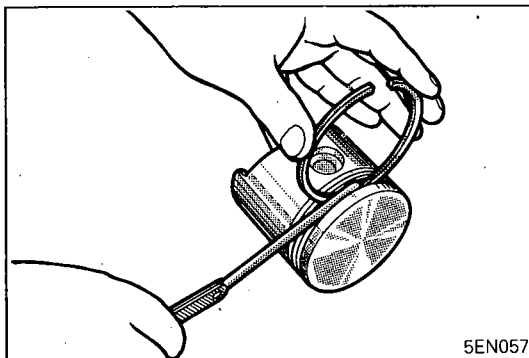
- (1) Check the piston ring for damage, excessive wear, and breakage and replace if defects are evident. If the piston has been replaced with a new one, the piston rings must also be replaced with new ones.
- (2) Check for the clearance between the piston ring and ring groove. If the limit is exceeded, replace the ring or piston, or both.

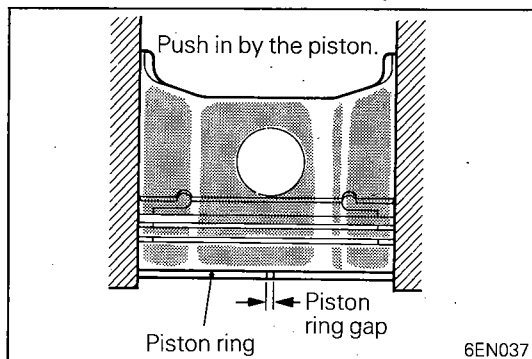
Standard value:

No. 1	0.03 – 0.07 mm (.0012 – .0028 in.)
No. 2	0.02 – 0.06 mm (.0008 – .0024 in.)

Limit:

No. 1	0.1 mm (.004 in.)
No. 2	0.1 mm (.004 in.)





- (3) Install the piston ring into the cylinder bore. Force it down with a piston, its crown being in contact with the ring, to correctly position it at right angles to the cylinder wall. Then, measure the end gap with a feeler gauge. If the ring gap is excessive, replace the piston ring.

Standard value:

No. 1, No. 2 0.20 – 0.35 mm (.0079 – .0138 in.)
Oil 0.20 – 0.70 mm (.0079 – .0276 in.)

Limit:

No. 1, No. 2 0.8 mm (.031 in.)
Oil 1.0 mm (.039 in.)

CONNECTING ROD BEARING

N09TCDD

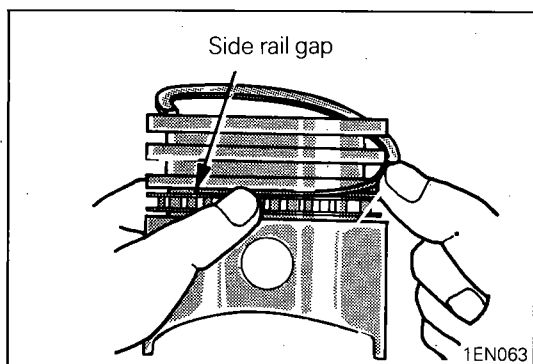
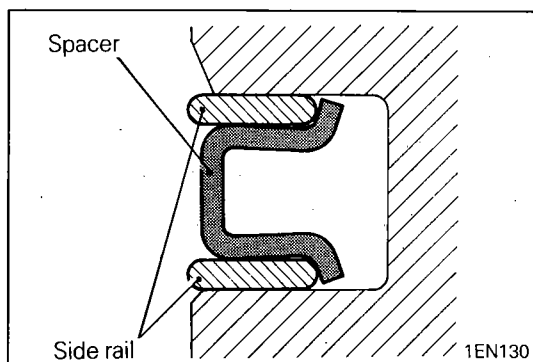
- (1) Visually check the bearing surface for uneven contact, streaks, scratches, and seizure. Replace if defects are evident. If streaks and seizure are excessive, check also the crankshaft. If damage is present on the crankshaft, replace crankshaft or regrind to undersize for reuse.
- (2) Measure the connecting rod bearing I.D. and crankshaft pin O.D. If the oil clearance exceeds the limit, replace bearing, and crankshaft if necessary.
Or, regrind the crankshaft to an undersize and replace bearing with an undersize one.

Standard value: 0.014 – 0.044 mm (.0006 – .0017 in.)

Limit: 0.1 mm (.004 in.)

NOTE

For oil clearance measuring method using the plastic gauge, refer to the section CRANKSHAFT.



SERVICE POINTS OF REASSEMBLY

N09TGBA

9. INSTALLATION OF OIL RING

- (1) Fit the oil ring spacer into the piston ring groove.

NOTE

The side rails and spacer may be installed in either direction.

- (2) Install the upper side rail.

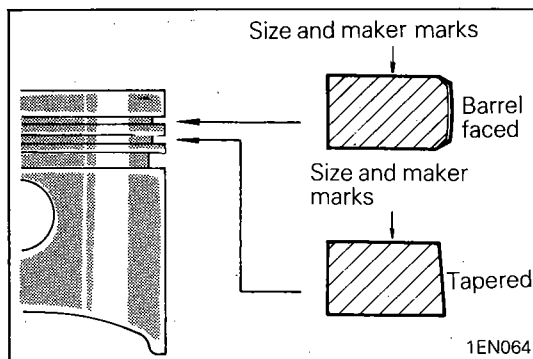
To install the side rail, first fit one end of the rail into the piston groove, then press the remaining portion into position by finger. See illustration.

Use of ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

NOTE

Do not use piston ring expander when installing side rail.

- (3) Install the lower side rail in the same procedure as described in step (2).
- (4) Make sure that the side rails move smoothly in either direction.

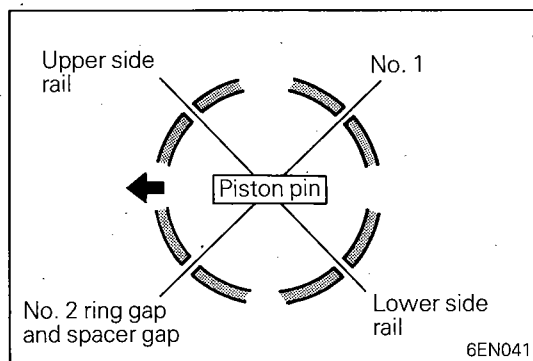


8. INSTALLATION OF NO. 2 PISTON RING / 7. NO. 1 PISTON RING

Install No. 2 and No. 1 piston rings with a piston ring expander.

NOTE

1. The No. 1 and No. 2 piston rings have a different cross section. Be sure to install them in correct positions.
2. Install the No. 1 and No. 2 piston rings with the size mark and maker mark on ring surface toward the piston top.



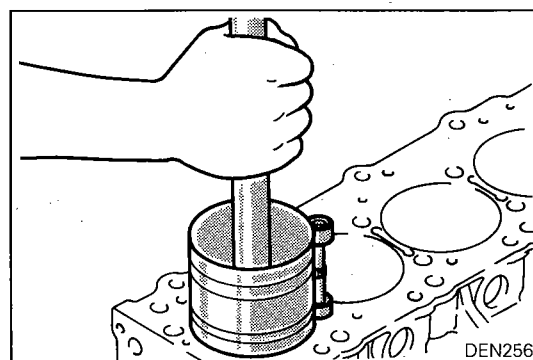
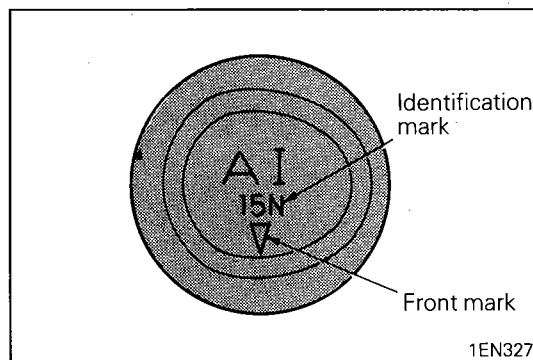
4. INSTALLATION OF PISTON AND CONNECTING ROD

- (1) Apply an ample amount of engine oil to the piston outside surfaces, piston rings, and oil ring.
- (2) Position the piston ring and oil ring (side rail and spacer) end gaps as shown in the illustration.
- (3) Insert the piston and connecting rod assembly into the cylinder, working from the cylinder top surface. Make sure that the front mark stamped on the piston top surface and that (identification mark) on the connecting rod face the front of engine.

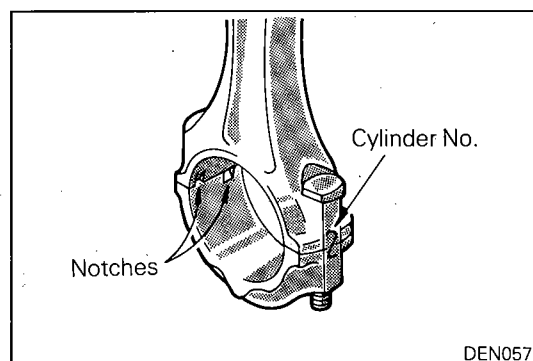
Identification mark:

Piston 15N

Connecting rod 1

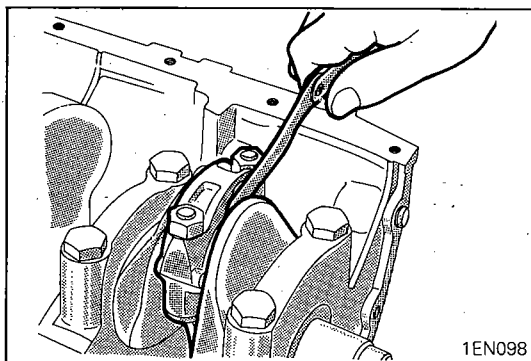


- (4) With the piston rings held in position with the ring band, insert the piston and connecting rod assembly. Hardly driving the assembly into position can result in a damaged piston ring or crankshaft pin.



2. INSTALLATION OF CONNECTING ROD CAP

- (1) Make the correct bearing cap with the correct connecting rod by checking with the alignment marks marked during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.



- (2) Check if the thrust clearance in the connecting rod big end is correct.

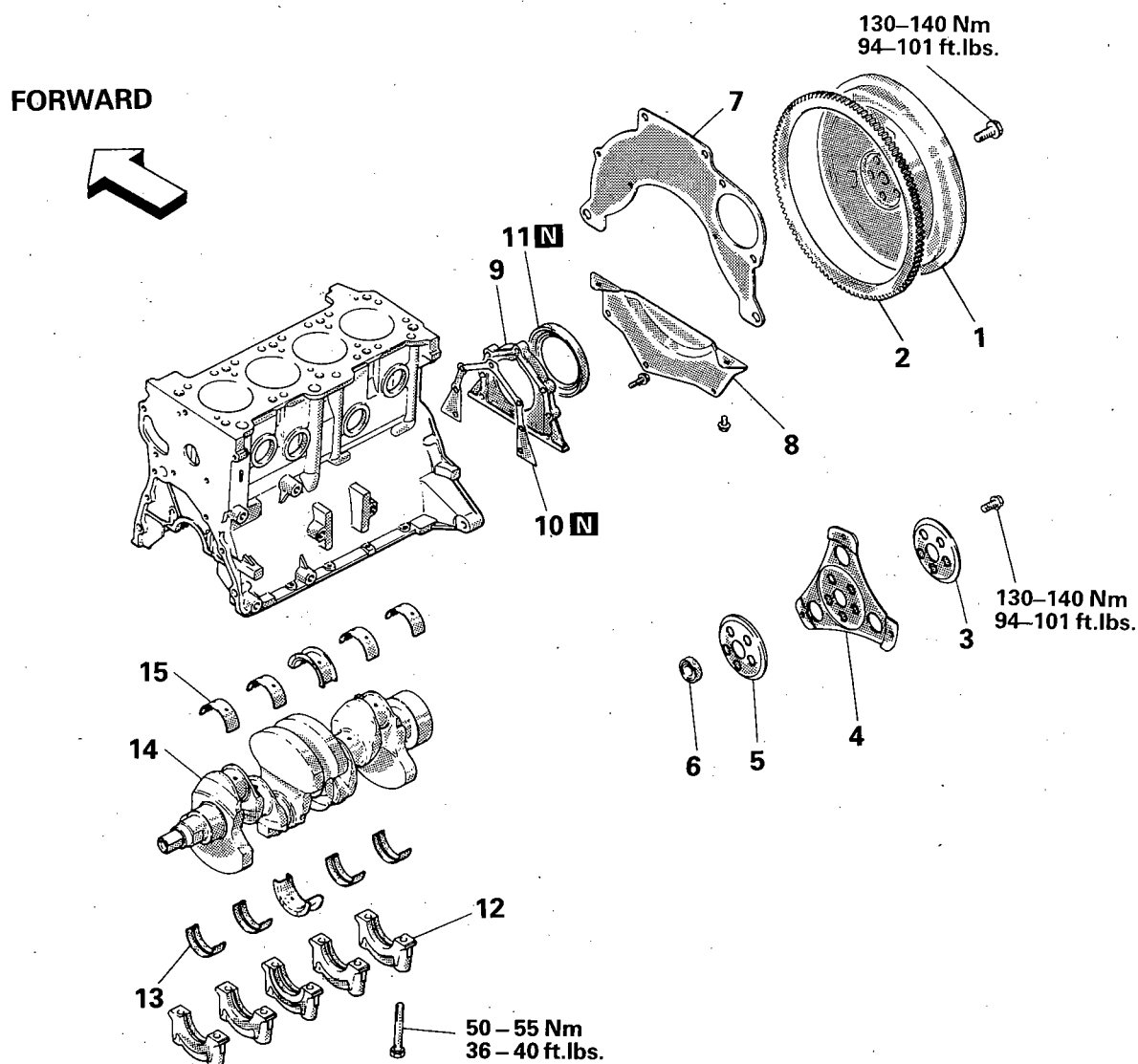
Standard value: 0.10 – 0.25 mm (.0039 – .0098 in.)

Limit: 0.4 mm (.016 in.)

CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

DISASSEMBLY AND REASSEMBLY

N09UE-A



Disassembly steps

1. Flywheel <M/T>
2. Ring gear <M/T>
3. Adaptor plate <A/T>
4. Drive plate <A/T>
5. Adaptor plate
6. Crankshaft bushing
7. Rear plate
8. Bell housing cover
9. Oil seal case
10. Gasket
11. Rear oil seal
12. Bearing cap
13. Lower bearing
14. Crankshaft
15. Upper bearing

NOTE

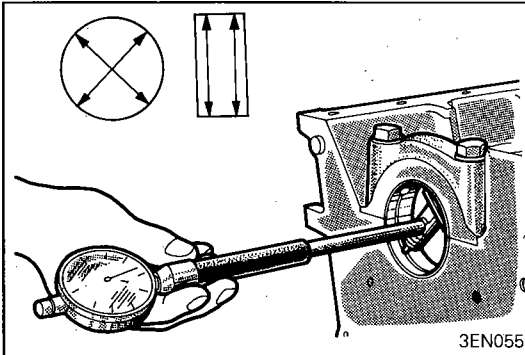
- (1) Reverse the disassembly procedures to reassemble.
- (2) ♦♦: Refer to "Service Points of Reassembly".
- (3) **N**: Non-reusable parts

INSPECTION

N09UCAE

CRANKSHAFT

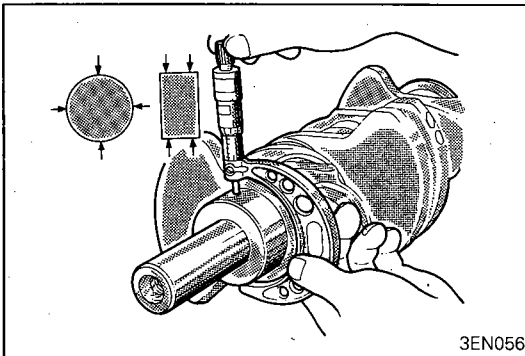
- (1) Check the crankshaft journals and pins for streaks and seizure. Replace if necessary.



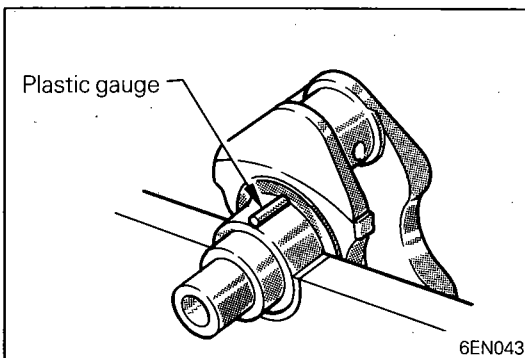
3EN055

- (2) Measure the journal diameter and main bearing inside diameter. If the clearance (oil clearance) exceeds the limit, replace the main bearing and crankshaft if necessary. Alternatively, machine the crankshaft to undersize and replace the main bearing with an undersize one.

Standard value: 0.021 – 0.045 mm (.0008 – .0018 in.)
Limit: 0.1 mm (.0039 in.)



3EN056



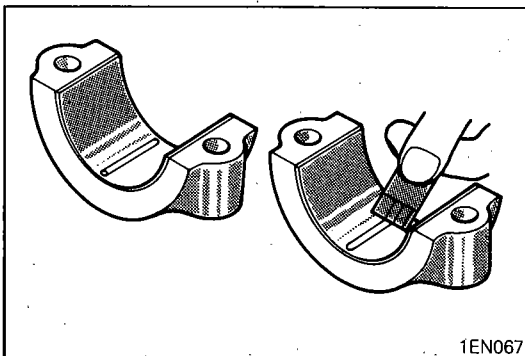
6EN043

CRANKSHAFT OIL CLEARANCE (PLASTIC GAUGE METHOD)

N09UCCG0

The crankshaft oil clearance can be measured easily by using a plastic gauge, as follows:

- (1) Remove oil and grease and any other foreign matters from crankshaft journal and bearing inner surface.
- (2) Install the crankshaft.
- (3) Cut the plastic gauge to the same length as the width of bearing and place it on journal in parallel with its axis.
- (4) Gently place the crankshaft bearing cap over it and tighten the bolts to the specified torque.
- (5) Remove the bolts and gently remove the crankshaft bearing cap.
- (6) Measure the width of the smashed plastic gauge at its widest section by using a scale printed on the plastic gauge bag.

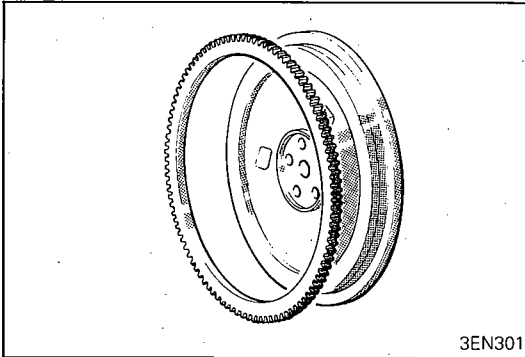


1EN067

CRANKSHAFT REAR OIL SEAL

N09UCDB0

- (1) Check oil seal lip for wear and damage.
- (2) Check rubber for deterioration or hardening.
- (3) Check oil seal case for cracks and damage.

**RING GEAR <M/T>**

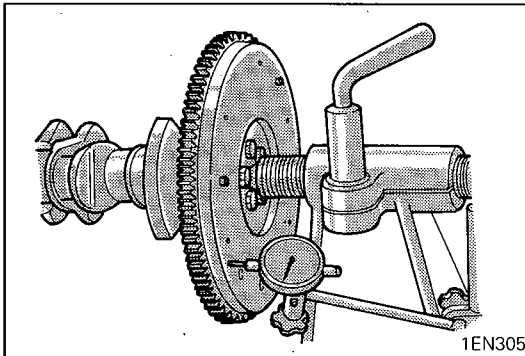
N09UCEF0

Check teeth of ring gear for wear and damage. If necessary, replace the ring gear.

If the ring gear teeth are worn or damaged, also check the starter motor pinion.

To remove the ring gear, strike the ring gear at several points on its outer circumference. The ring gear cannot be removed if it is heated.

To install the ring gear, heat the ring gear to 300°C (572°F) for shrink fit.

**FLYWHEEL <M/T>**

N09UCFC0

- (1) Check the clutch disc friction surface for ridge wear, streaks, and seizure. If necessary, replace flywheel.
- (2) If the runout of flywheel exceeds the limit, replace.

Limit: 0.13 mm (.0051 in.)

DRIVE PLATE <A/T>

N09UCGD0

Check the drive plate for deformation, damage and cracks. If necessary, replace.

SERVICE POINTS OF REASSEMBLY

N09UGAC

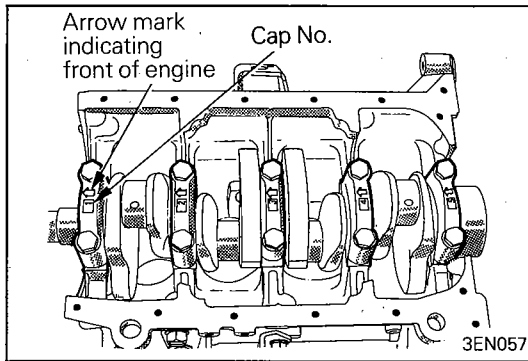
15. INSTALLATION OF UPPER BEARING

When reusing the main bearings, install them in their original positions by referring to location marking made at the time of removal.

Be sure that oil holes in bearings align with those in cylinder block.

13. INSTALLATION OF LOWER BEARING

Make sure that a bearing without oil groove is used as lower bearing.



12. INSTALLATION OF BEARING CAP

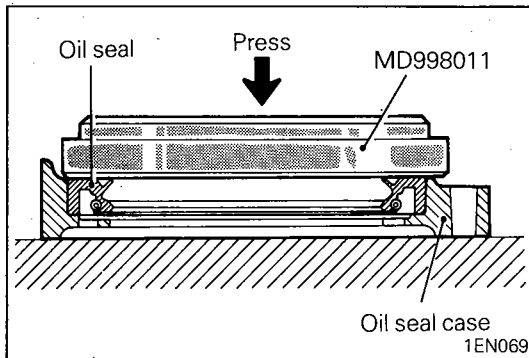
- (1) Install the bearing caps with their arrow mark directed toward the timing belt side of engine. Cap numbers must be in correct order.
- (2) Tighten cap bolts in the sequence of center, No. 2, No. 4, front and rear cap bolts.
- (3) Cap bolts should be tightened evenly in 2 to 3 steps before they are finally tightened.

- (4) Make certain that the crankshaft turns freely and has a proper end play by checking the clearance between the center main bearing thrust flange and the connecting rod big end bearing.

Crankshaft end play:

0.05 – 0.18 mm (.0020 – .0071 in.)

Limit: 0.25 mm (.0098 in.)



11. INSTALLATION OF REAR OIL SEAL

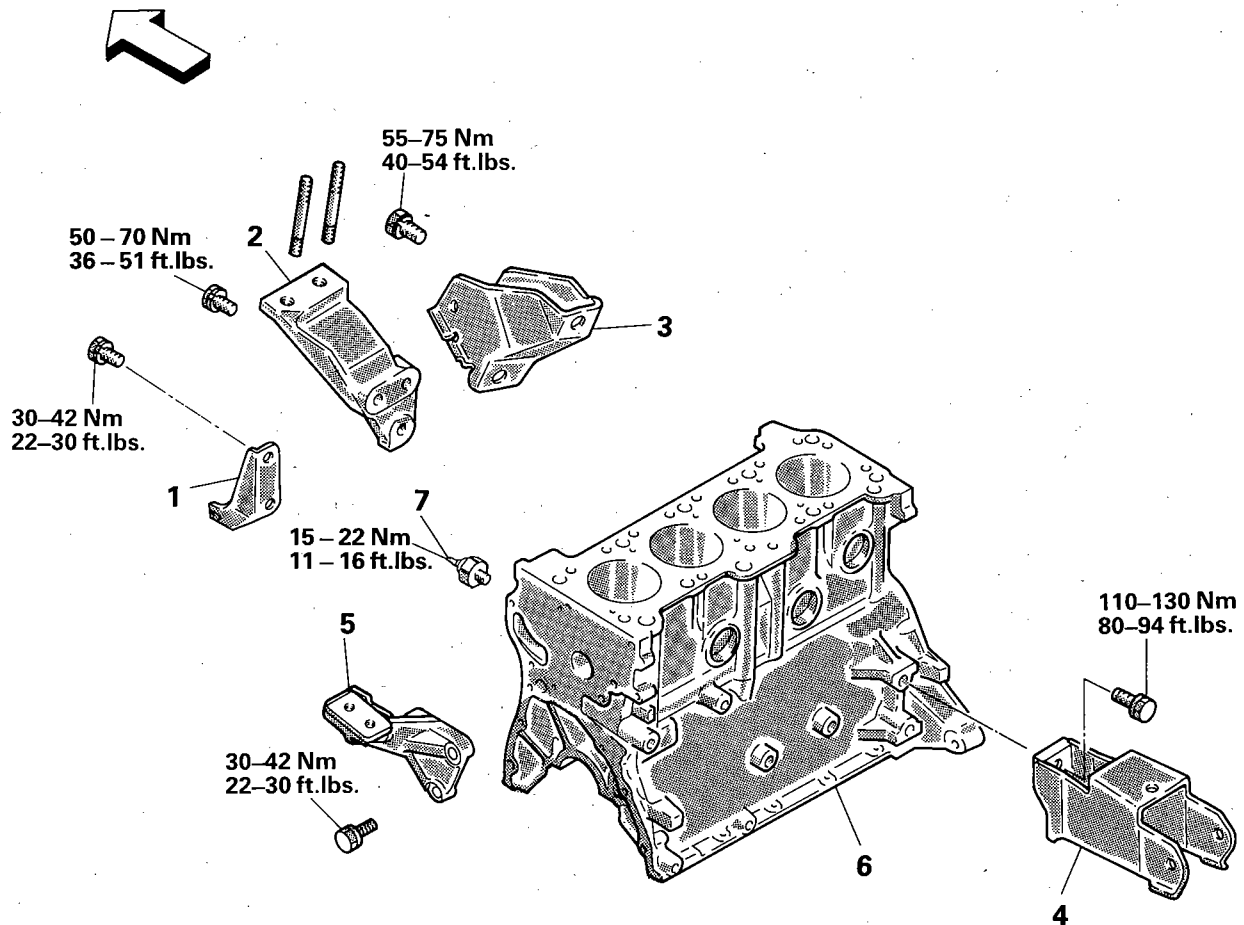
Install oil seal in the crankshaft rear oil seal case. Using the special tool, press fit the oil seal all the way in without tilting it.

CYLINDER BLOCK

N09VF-A

DISASSEMBLY AND REASSEMBLY

FORWARD

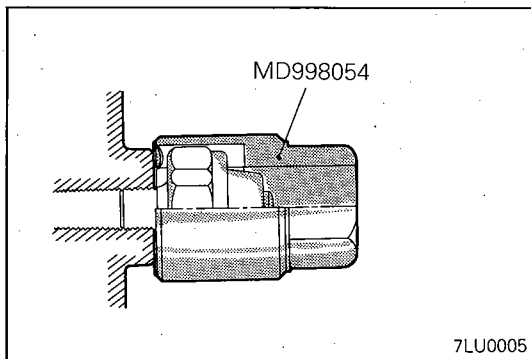


1. Exhaust pipe support bracket
2. Engine support bracket, front
3. Front roll stopper bracket
4. Rear roll stopper bracket
5. Engine support bracket, left
6. Cylinder block
7. Oil pressure switch



NOTE

- (1) ◆◆: Refer to "Service Points of Disassembly".
 (2) ◆◆: Refer to "Service Points of Reassembly".



SERVICE POINT OF DISASSEMBLY

N09VGAA

7. REMOVAL OF OIL PRESSURE SWITCH

- (1) Disconnect the oil pressure switch terminal.
- (2) Using the deep socket, remove the oil pressure switch.

Caution

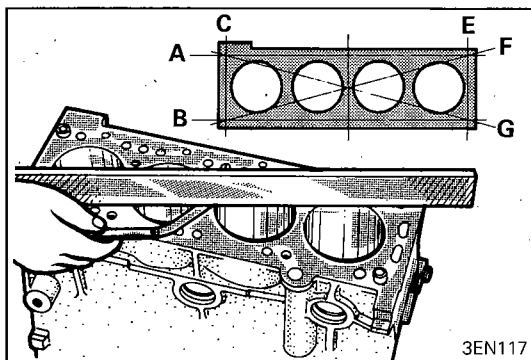
Sealant is coated on the threaded part, so be careful not to damage when removing.

INSPECTION

N09VCAH0

NOTE

1. Clean parts to remove dust, oil carbon deposits, and scale before starting the inspection and repair procedure.
2. Check cylinder block for water leaks and damage before cleaning.
3. Remove deposits from oil holes and make sure that they are not clogged.
4. Keep parts neatly arranged according to a matched pair.



CYLINDER BLOCK

- (1) Visually check for scratches, rust, and corrosion. Use also a flaw detecting agent for the check. If defects are evident, correct or replace.
- (2) Using a straightedge and feeler gauge, check the block top surface for warpage. Make sure that the surface is free from gasket chips and other foreign matter.

Standard value: 0.05 mm (.0020 in.) or less

Limit: 0.1 mm (.0039 in.)

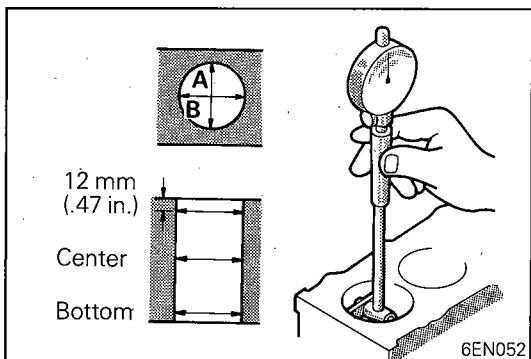
- (3) If the distortion is excessive, correct within the allowable limit or replace.

Grinding limit: 0.2 mm (.008 in.)

The total thickness of the stock allowed to be removed from cylinder block and mating cylinder head is 0.2 mm (.008 in.) at maximum.

Cylinder block height (when new):

255.9 – 256.1 mm (10.04 – 10.08 in.)

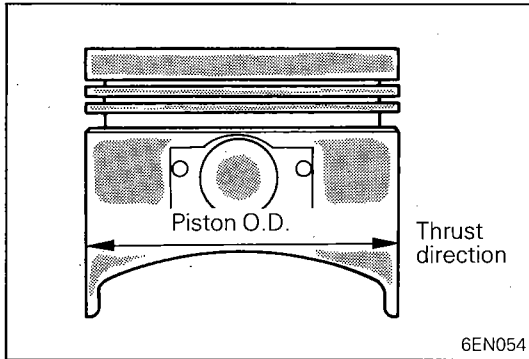


- (4) Check cylinder walls for scratches and seizure. If defects are evident, correct (bored to oversize) or replace.
- (5) Using cylinder gauge, measure the cylinder bore and cylindricity. If worn badly, correct cylinder to an oversize and replace piston and piston rings. Measure at the points shown in illustration.

Standard value:

Cylinder I.D. 75.50 – 75.53 mm (2.9724 – 2.9736 in.)

Out-of-round and taper 0.02 mm (.0008 in.) or less

**BORING CYLINDER**

N09VEAB

- (1) Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

Piston size identification

Size	Identification mark
0.25 mm (.01 in.) O.S.	0.25
0.50 mm (.02 in.) O.S.	0.50
0.75 mm (.03 in.) O.S.	0.75
1.00 mm (.04 in.) O.S.	1.00

NOTE

Size mark is stamped on piston top.

- (2) Measure outside diameter of piston to be used. Measure it in thrust direction as shown.
 (3) Based on measured piston O.D. calculate boring finish dimension.

Boring finish dimension = Piston O.D. + (clearance between piston O.D. and cylinder) – 0.02 mm (.0008 in.) (honing margin)

- (4) Bore all cylinders to calculate boring finish dimension.

Caution

To prevent distortion that may result from temperature rise during honing, bore cylinders, working from No. 2 to No. 4 to No. 1 to No. 3.

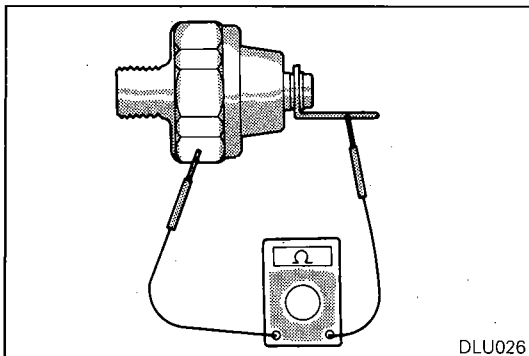
- (5) Hone to final finish dimension (piston O.D. + clearance between piston O.D. and cylinder).
 (6) Check clearance between piston and cylinder.

Clearance between piston and cylinder:

0.02 – 0.04 mm (.0008 – .0016 in.)

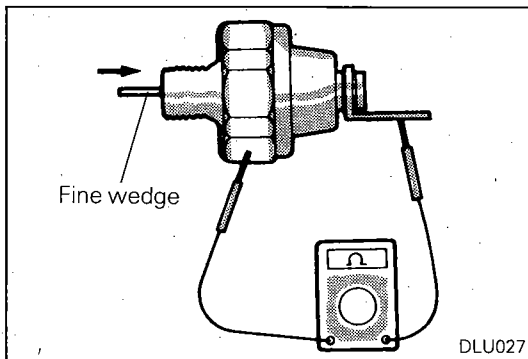
NOTE

When boring cylinders, finish all of four cylinders to same oversize. Do not bore only one cylinder to an oversize.

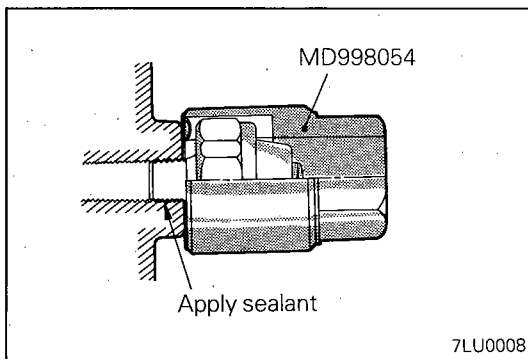
**OIL PRESSURE SWITCH**

N09RCLA0

- (1) Connect a tester (ohm range) between the terminal and the body and check for conductivity. If there is no conductivity, replace the switch.



- (2) Next insert a very fine wedge through the oil hole, pushing it slightly. There should be no conductivity (resistance should be infinite). If there is conductivity even when wedge is pushed, replace the switch.
- (3) Or, if there is no conductivity when a 50 kPa (71 psi) vacuum is placed through the oil hole, the switch is operating properly. Check at this time to see that there is no air pressure leakage. If there is air pressure leakage, the diaphragm is broken, and the switch should be replaced.



SERVICE POINT OF REASSEMBLY

N09VHAA

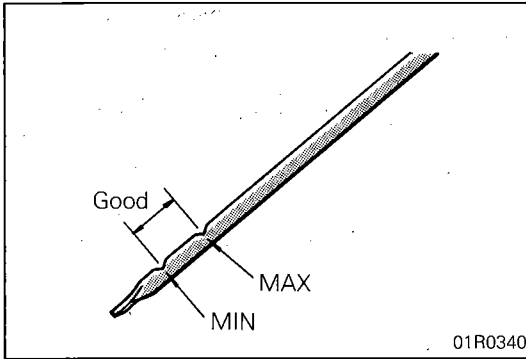
7. INSTALLATION OF OIL PRESSURE SWITCH

Coat the threads of switch with sealant and install the switch using the special tool.

Specified sealant: MOPAR Part No. 4318034 or equivalent

Caution

1. Keep the end of threaded portion clear of sealant.
2. Avoid an overtightening.



01R0340

ENGINE <1.6L Engine>

N09FAAA1

ENGINE ADJUSTMENT

CHECKING ENGINE OIL

- (1) Check to ensure that the engine oil level is within the level range indicated on the oil dip stick.
- (2) Check to ensure that the oil is not noticeably dirty or mixed with coolant or gasoline, and that it has the proper viscosity.

ENGINE OIL REPLACEMENT

N09FBAA1

Refer to GROUP 0 – Maintenance Service.

ENGINE OIL FILTER REPLACEMENT

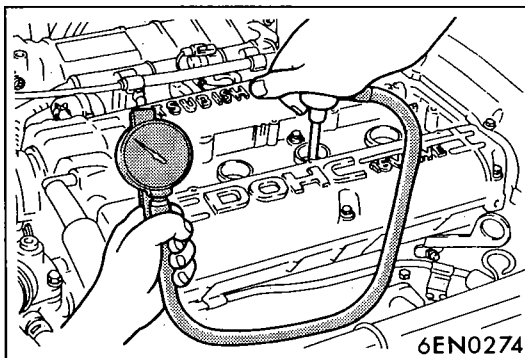
N09FCAA1

Refer to GROUP 0 – Maintenance Service.

CHECKING COMPRESSION PRESSURE

N09FAAC1

- (1) Before checking compression, ensure that engine oil, the starter motor, and battery are all in good condition.
- (2) Start the engine and wait until engine coolant temperature has risen to 85 – 95°C (185 – 205°F).
- (3) Stop the engine and pull the spark plug cables.
- (4) Remove the spark plugs.
- (5) Crank the engine to remove any foreign objects in the cylinders.



6EN0274

Caution

Cover the spark plug holes with shop towel, etc., in order to keep expelled foreign objects from flying out, and keep away from the holes. When measuring compression with water, oil, or fuel having entered the cylinder through a crack, etc., these will come flying out of the spark plug hole hot and fast, so be sure to take the proper precautions.

- (6) Set the compression gauge to the spark plug hole.
- (7) Holding the throttle valve full open, crank the engine and measure compression.

Limit:

<N/A> 960 kPa (171 psi)

<T/C> 840 kPa (149 psi)

- (8) Perform 6 and 7 above for all the cylinders, ensuring that compression pressure differential for each of the cylinders is within the specified limit.

Differential limit: Less than 100 kPa (14 psi)

- (9) If a cylinder's compression or pressure differential exceeds the limit, add a small amount of oil through the spark plug hole and repeat steps (6) – (8).
- ① If the addition of oil brings compression up, it is possible that there is poor contact between the piston ring and cylinder wall.
 - ② If compression does not come up, valve seizure, poor valve seating, or a compression leak from the gasket are all possible.

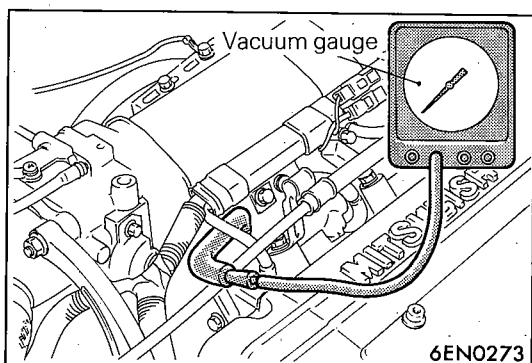
MANIFOLD VACUUM INSPECTION

N09FNAI

- (1) Before inspection and adjustment, put the vehicle into the following state.
 - Engine coolant temperature: 85 – 95°C (185 – 205°F)
 - Lights, electric, motor cooling fan, and accessories: OFF
 - Transaxle: Neutral <N or P for A/T>
 - Steering wheel: Neutral position
- (2) Check that the idling revolution speed is normal.
- (3) Remove the PCV hose from the PCV valve and attach a vacuum gauge.
- (4) Check that the vacuum at the intake manifold during idle revolution is normal.

Standard value: 64 kPa (19 in.Hg)

- (5) If outside the standard value, isolate the cause by referring to the following table and repair the fault.

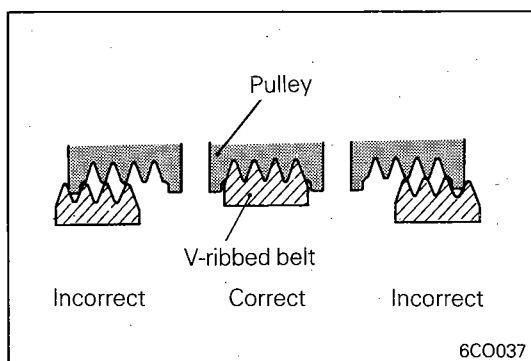


Symptom	Cause	Remedy
<ul style="list-style-type: none"> The vacuum gauge reading is less than standard value, but the pointer is stable. 	<ul style="list-style-type: none"> Ignition timing is retarded. 	<ul style="list-style-type: none"> Adjust the ignition timing.
<ul style="list-style-type: none"> The vacuum gauge pointer swings slowly. 	<ul style="list-style-type: none"> The gas mixture is excessively rich. 	<ul style="list-style-type: none"> Check ECI-MULTI system.
<ul style="list-style-type: none"> The vacuum gauge pointer drops irregularly. 	<ul style="list-style-type: none"> The gas mixture is excessively lean. 	<ul style="list-style-type: none"> Check ECI-MULTI system.
<ul style="list-style-type: none"> The vacuum gauge pointer drops intermittently to 4.0 – 21.3 kPa (1.2 – 6.3 in.Hg). 	<ul style="list-style-type: none"> The valve is too tight. 	<ul style="list-style-type: none"> Check and repair the valve.
<ul style="list-style-type: none"> The vacuum gauge pointer drops suddenly from the normal reading to 33.3 kPa (9.8 in.Hg), then returns to normal. 	<ul style="list-style-type: none"> Malfunction of cylinder head gasket 	<ul style="list-style-type: none"> Replace cylinder head gasket.

IGNITION TIMING INSPECTION AND ADJUSTMENT

N09FLAB1

Refer to GROUP 8 – Ignition System.



DRIVE BELTS TENSION ADJUSTMENT

N09FMBC1

- (1) Check that the belts are not damaged and are properly fitted into the pulley grooves.

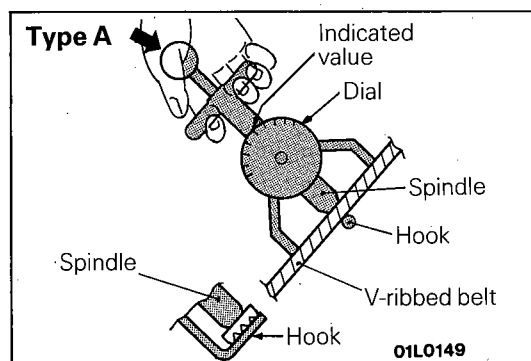
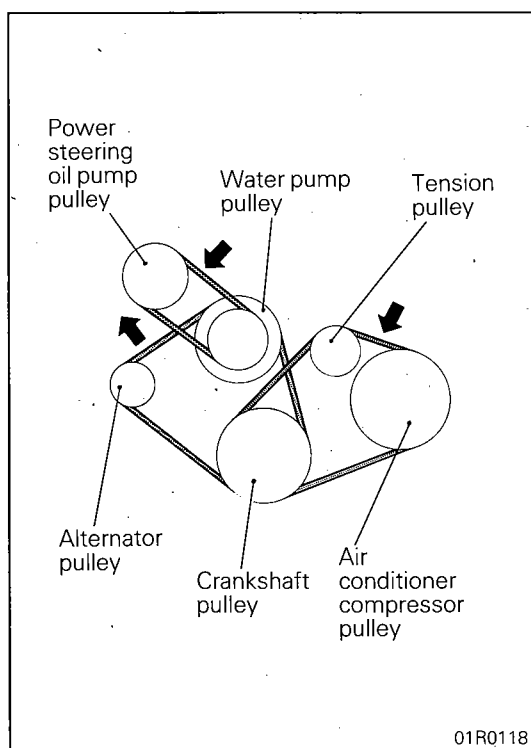
Caution

1. When installing the V-ribbed belt, check that the V-ribs are properly fitted without misalignment.
2. If creaking or slippage is observed, check the belt for wear, damage, or breakage on the pulley contact surface, check the pulley for scoring, in addition to deflection inspection.

- (2) Measure the tension of the belt by applying a force of 100 N (22 lbs.) to the belt back midway between the pulleys as shown in the illustration and observe the degree of deflection. Alternatively, a belt tension gauge can be used.

Standard value:

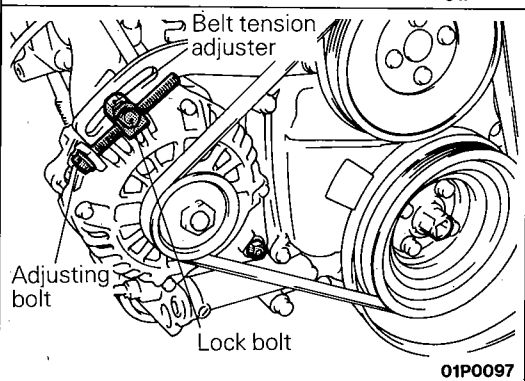
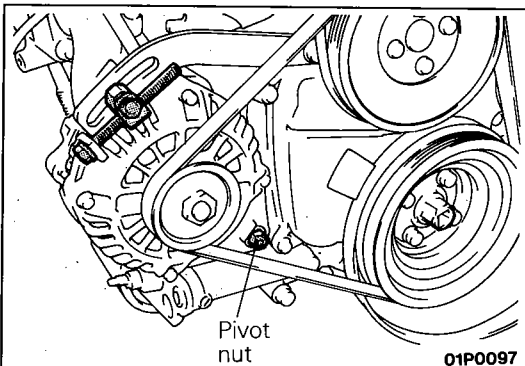
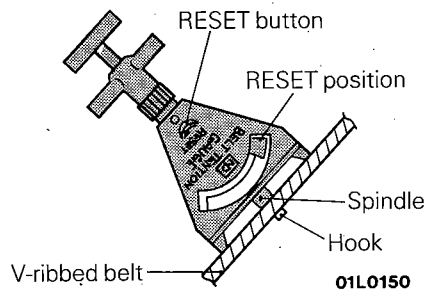
Items		Inspection value	Adjustment value	
			New belt	Used belt
For alternator	Deflection mm (in.)	9.0 – 11.5 (.354 – .453)	7.5 – 9.0 (.295 – .354)	10 (.394)
	Gauge N (lbs.)	250 – 500 (55 – 110)	500 – 700 (110 – 154)	400 (88)
For air conditioner compressor	Deflection mm (in.)	Approx. 8.0 (.315)	5.0 – 5.5 (.197 – .217)	6.0 – 7.0 (.236 – .276)
	Gauge N (lbs.)	250 – 500 (55 – 110)	470 – 570 (104 – 126)	320 – 400 (71 – 81)
For power steering oil pump	Deflection mm (in.)	6.0 – 9.0 (.236 – .354)	–	–



NOTE

Different types of belt tension gauges are available, such as Type A and Type B. All types of gauges should be used according to the manufacturer's instructions.

Type B



TENSION ADJUSTMENT OF THE ALTERNATOR DRIVE BELT

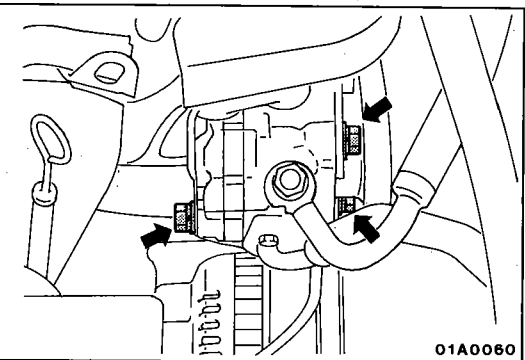
Caution

1. Before checking, rotate the engine one or more revolutions.
2. If the belt is too tight, the alternator or water pump bearing can get damaged. Conversely, if the belt is too loose, it will slip, producing noise and causing premature wear.

- (1) Loosen the alternator pivot nut.
- (2) Loosen the lock bolt of the belt tension adjuster.
- (3) Using the adjustment bolt, adjust the belt tension to specified.
- (4) Tighten the lock bolt.
- (5) Tighten the nut of the alternator pivot nut.
- (6) Check the deflection or the tension of belt; readjust if necessary.

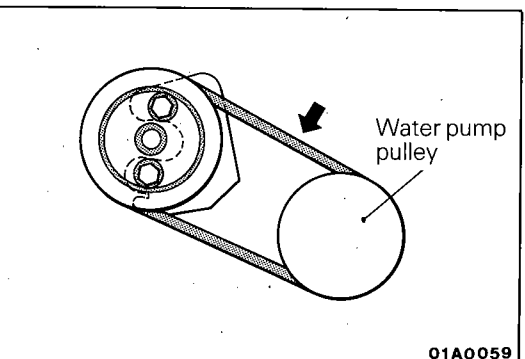
NOTE

The tension of a new belt which has been used for more than five minutes must be adjusted using the value for used belts.

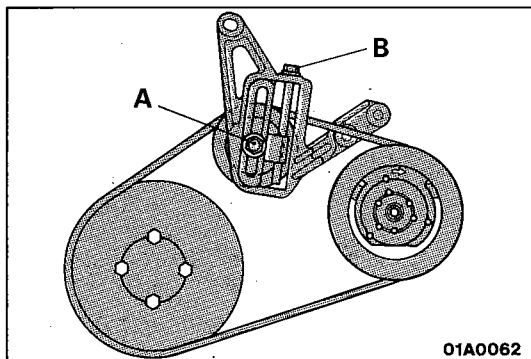


TENSION ADJUSTMENT OF POWER STEERING OIL PUMP DRIVE BELT

- (1) Loosen power steering oil pump fixing bolt.



- (2) Move power steering pump, tension belt moderately and adjust deflection.
- (3) Tighten fixing bolts.
- (4) Run the engine one time or more.
- (5) Check the belt deflection. Readjust, if necessary.

**TENSION ADJUSTMENT OF THE AIR CONDITIONER COMPRESSOR DRIVE BELT**

- (1) Loosen tension pulley fixing bolt A.
- (2) Adjust belt deflection with adjusting bolt B.
- (3) Tighten fixing bolt A.
- (4) Run the engine one time or more.
- (5) Check the belt tension. Readjust, if necessary

NOTE

The tension of a new belt which has been used for more than five minutes must be adjusted using the value for used belts.

ENGINE MOUNTING

N09GA-B

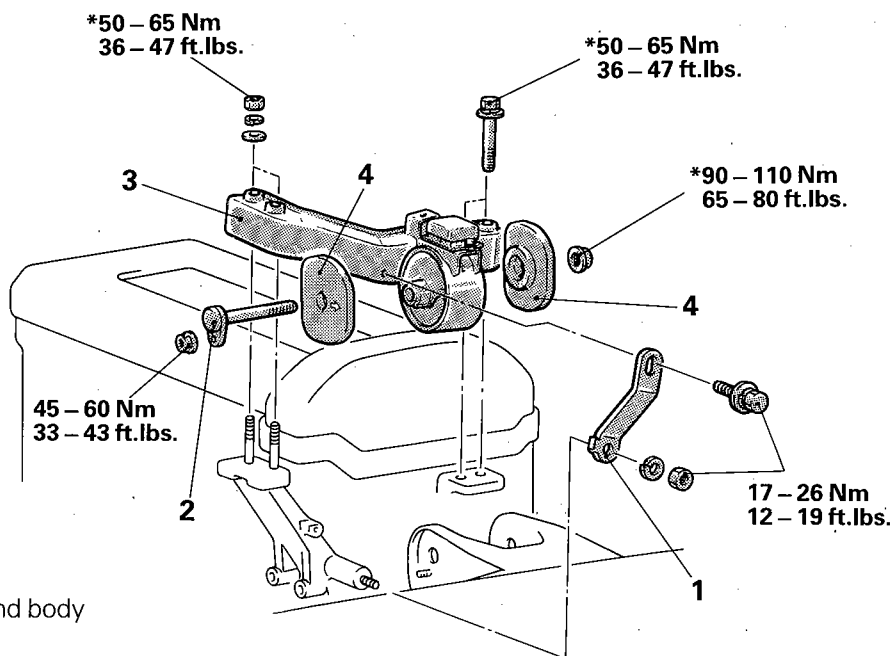
REMOVAL AND INSTALLATION

Pre-removal Operation

- Raise and suspend the engine so that the engine is no longer resting on the engine mount.

Post-installation Operation

- Lower the engine.



01P0107

Removal steps

1. Bracket
2. Engine mount bracket and body connection
3. Engine mount bracket
- ◆◆ 4. Mounting stopper

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

INSPECTION

N09GCAH3

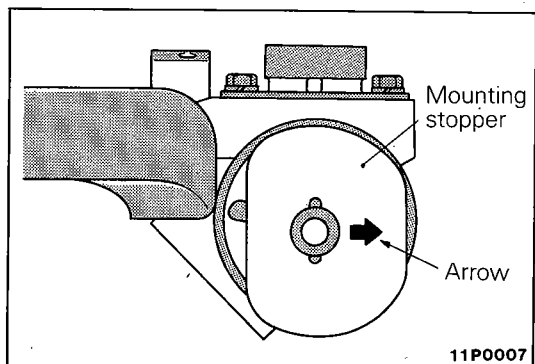
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINTS OF INSTALLATION

N09GDAQ

4. INSTALLATION OF MOUNTING STOPPER

Install the mounting stoppers with the arrows on them pointing in the direction shown.



11P0007

TRANSAXLE MOUNTING

REMOVAL AND INSTALLATION

N09GE-B

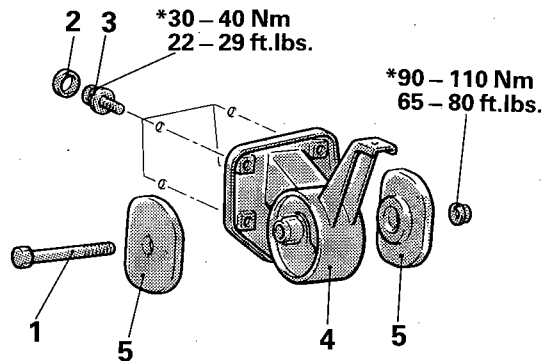
<M/T>

Pre-removal Operation

- Raise and suspend the transaxle so that the transaxle is no longer resting on the transaxle mount.
- Removal of the Air Cleaner (Refer to GROUP 11 – Air Cleaner.)

Post-installation Operation

- Lower the transaxle.
- Installation of Air Cleaner (Refer to GROUP 11 – Air Cleaner.)



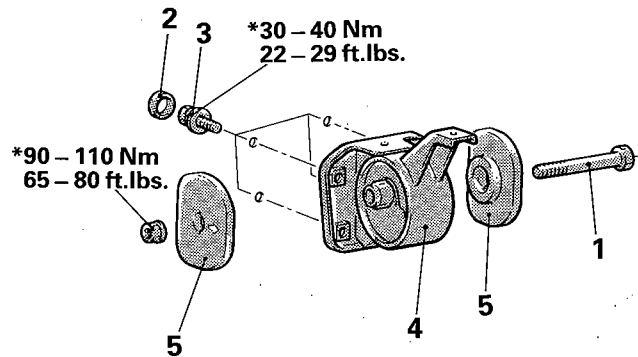
<A/T>

Removal steps

1. Transaxle mount bracket and transaxle connection bolt
2. Caps
3. Transaxle mount bracket installation bolt
4. Transaxle mount bracket
- ◆◆ 5. Mounting stopper

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.



01P0014

INSPECTION

N09GCAH4

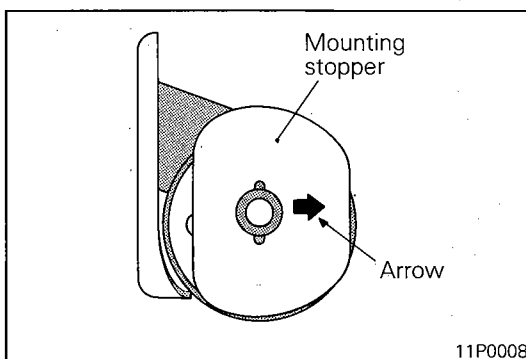
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINTS OF INSTALLATION

N09GDA01

5. INSTALLATION OF MOUNTING STOPPER

For A/T vehicles, install the mounting stoppers with the arrow on them pointing in the direction shown.



11P0008

ENGINE ROLL STOPPER, CENTER MEMBER

N09GF-B

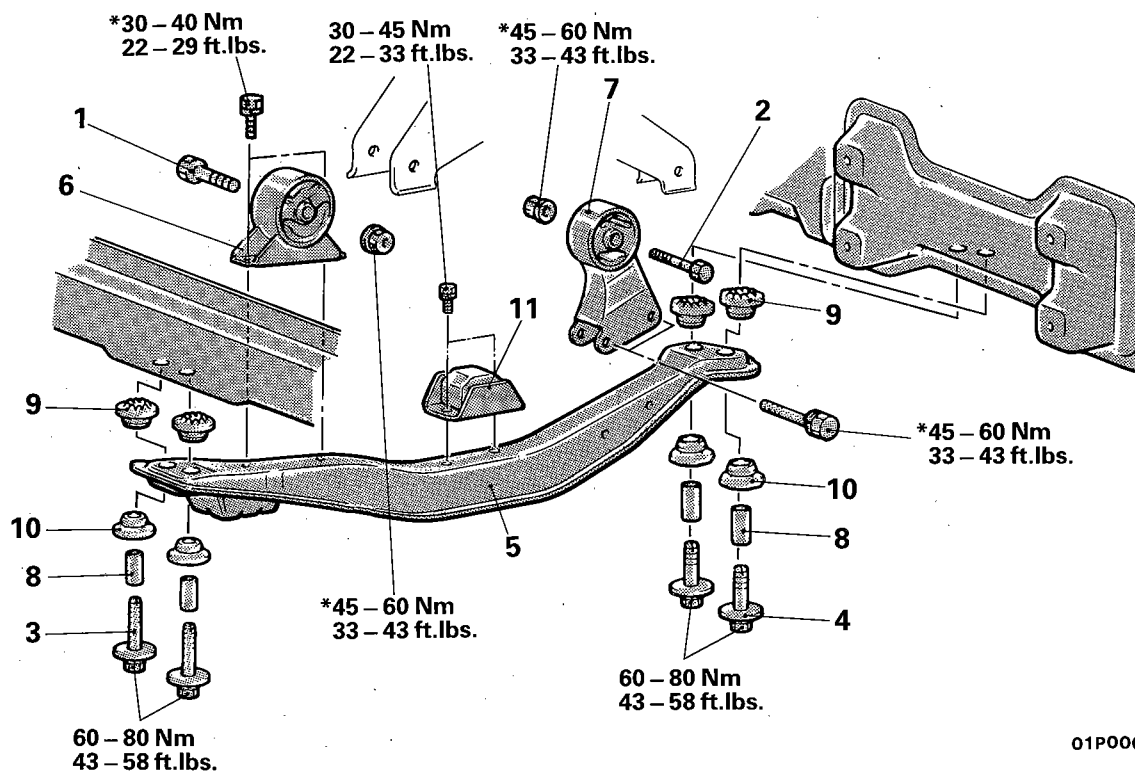
REMOVAL AND INSTALLATION

Pre-removal Operation

- Raise and suspend the engine so that the engine is no longer resting on the engine mount.

Post-installation Operation

- Lower the engine.



01P0067

Removal steps

1. Front roll stopper bracket and engine connection bolt
2. Rear roll stopper bracket and engine connection bolt
3. Center member installation bolts (front side)
4. Center member installation bolts (rear side)
5. Center member
- ◆◆ 6. Front roll stopper bracket
7. Rear roll stopper bracket
8. Collar
9. Bushing (upper side)
10. Bushing (lower side)
11. Damper <Seden models>

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

INSPECTION

N09GCAH5

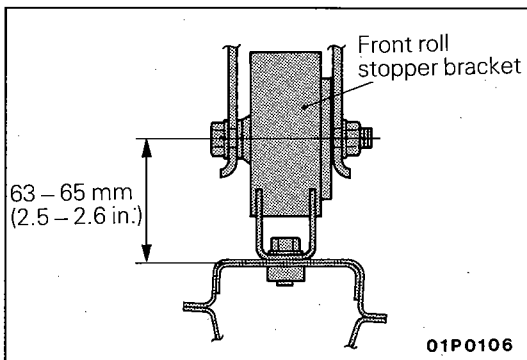
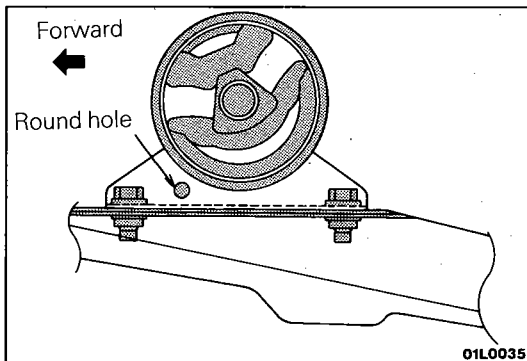
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINT OF INSTALLATION

N09GDAP1

6. INSTALLATION OF FRONT ROLL STOPPER BRACKET

- (1) Install the front roll stopper bracket so that the part where the round hole is made is facing the front of the vehicle.



- (2) On an M/T vehicle, temporarily tighten the front roll stopper bracket bolt nut. Then, after the total weight of the engine has been placed on the vehicle body, finish tightening the nut with the distance between the lower edge of the bracket and the center hole of the insulator set as specified.

ENGINE ASSEMBLY

N09SA-B

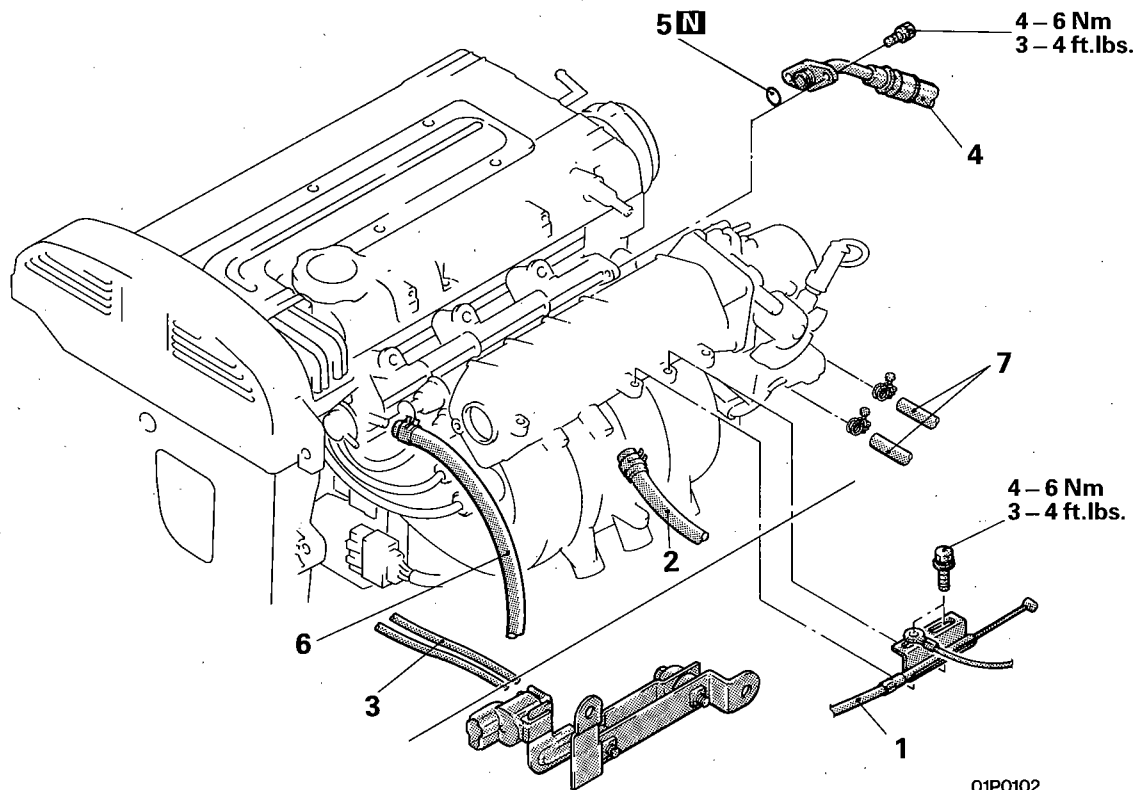
REMOVAL AND INSTALLATION

Pre-removal Operation

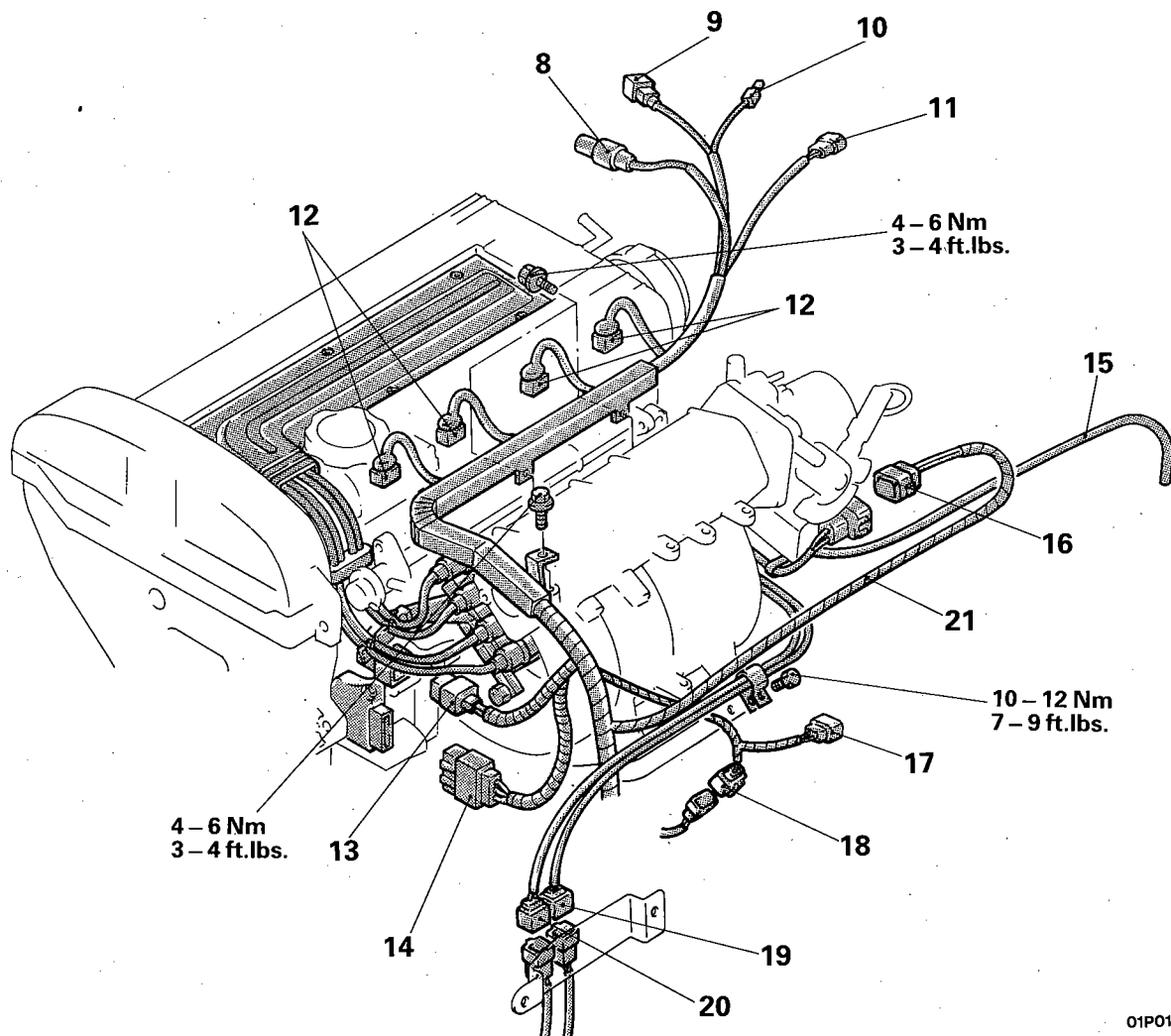
- Eliminating Fuel Pressure in Fuel Lines (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Engine Hood
- Draining Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Removal of Transaxle Assembly (Refer to GROUP 21 – Transaxle Assembly.)
- Removal of Radiator Assembly (Refer to GROUP 7 – Radiator.)

Post-installation Operation

- Installation of Radiator Assembly (Refer to GROUP 7 – Radiator.)
- Installation of Transaxle Assembly (Refer to GROUP 21 – Transaxle Assembly.)
- Refilling Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Installation of Engine Hood

**Removal steps**

- ◆◆ 1. Connection for accelerator cable
- 2. Connection for brake booster vacuum hose
- 3. Connection for vacuum hoses
- 4. Connection for high-pressure fuel hose
- 5. O-ring
- 6. Connection for fuel return hose
- 7. Connection for heater hose

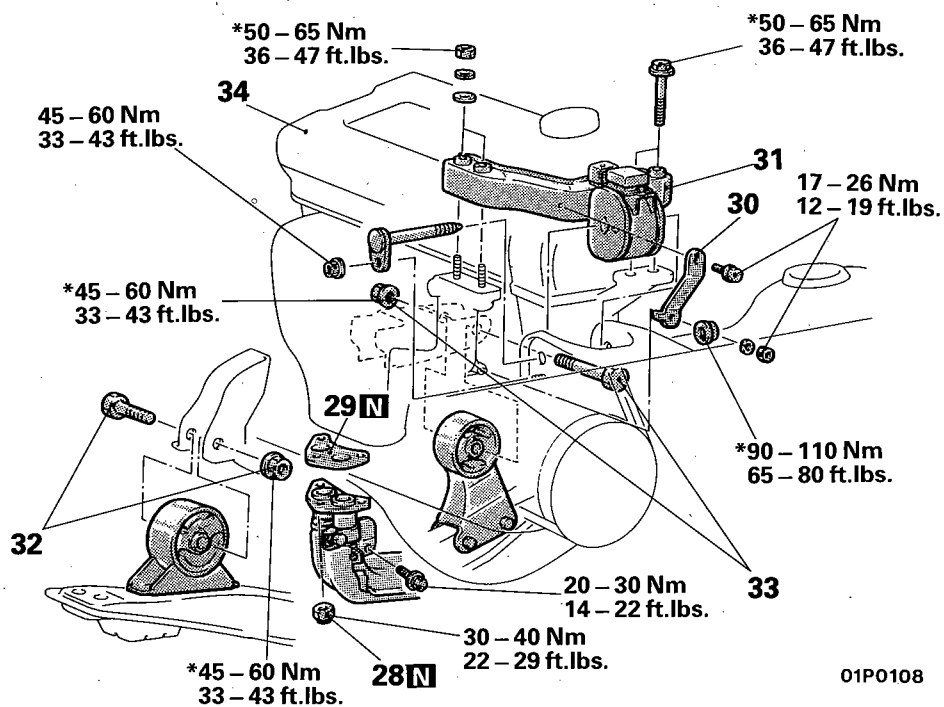
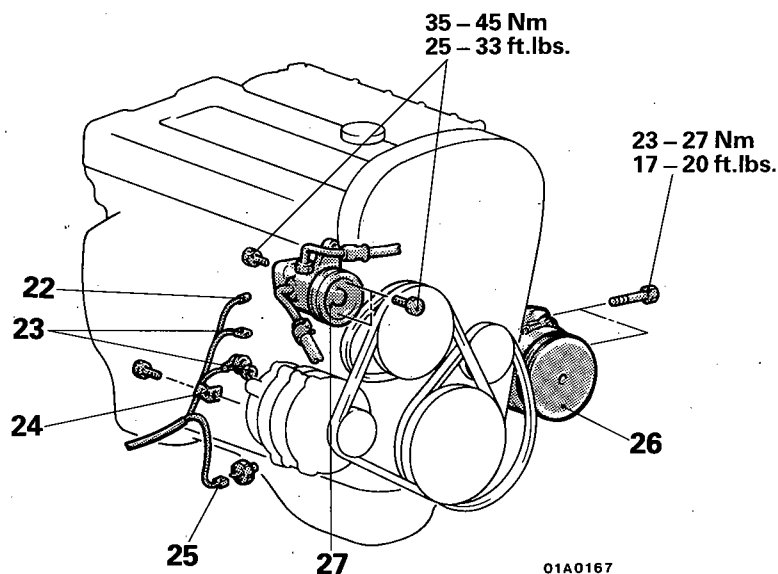


01P0104

- | | |
|--|---|
| 8. Connection for oxygen sensor | 18. Connection for detonation sensor <T/C> |
| 9. Connection for engine coolant temperature sensor | 19. Connection for throttle position sensor |
| 10. Connection for engine coolant temperature gauge unit | 20. Connection for crankshaft angle sensor |
| 11. Connection for engine coolant temperature switch <Air conditioner> | 21. Control wiring harness |
| 12. Connection for injector | |
| 13. Connection for ignition coil | |
| 14. Connection for power transistor | |
| 15. Connection for vacuum hoses | |
| 16. Connection for ISC motor | |
| 17. Connection for EGR temperature sensor <California> | |

NOTE

- (1) Reverse the removal procedures to reinstall.
 (2) : Refer to "Service Points of Installation".
 (3) **N**: Non-reusable parts

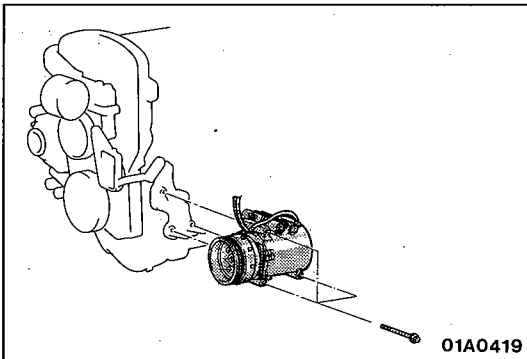


Removal steps

22. Connection for oil pressure switch (Power steering)
23. Connection for alternator
24. Clamp
25. Connection for oil pressure switch
- ◆◆◆◆ 26. Connection for air conditioner compressor
- ◆◆◆◆ 27. Connection for power steering oil pump
28. Self-locking nut
29. Gasket
30. Bracket
- ◆◆ 31. Engine mount bracket
32. Connection for front roll stopper
33. Connection for rear roll stopper
- ◆◆◆◆ 34. Engine assembly

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts
- (5) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

**SERVICE POINTS OF REMOVAL**

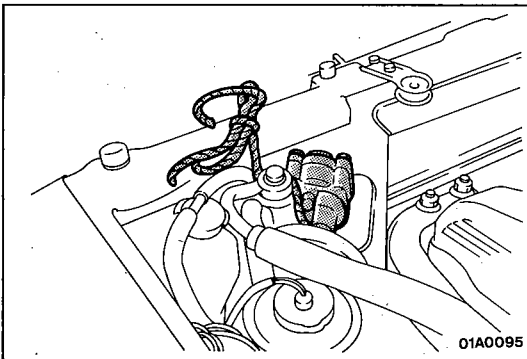
N09SBDE1

26. REMOVAL OF AIR CONDITIONER COMPRESSOR

Disconnect the connection of the air conditioner compressor, and then remove the compressor (with the hose attached) from the compressor bracket.

NOTE

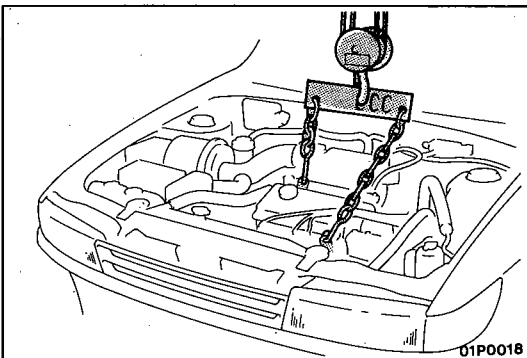
Suspend the removed air conditioner compressor (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

**27. REMOVAL OF POWER STEERING OIL PUMP**

Remove the oil pump (with the hose attached).

NOTE

Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

**31. REMOVAL OF ENGINE MOUNT BRACKET**

- (1) Attach wire or similar material to the engine hook, and then suspend (to the extent that there is no slackness of the wire) by using a chain block or similar arrangement.
- (2) Remove the engine mount bracket.

34. REMOVAL OF ENGINE ASSEMBLY

- (1) Check to be sure that all cables, hoses, harness connectors, etc. are disconnected from the engine.
- (2) Lift the chain block slowly to remove the engine assembly upward from the engine compartment.

SERVICE POINTS OF INSTALLATION

N09SDAM

34. INSTALLATION OF ENGINE ASSEMBLY

Install the engine assembly. When doing so, check carefully to be sure that all pipes and hoses are connected, and that none are twisted, damaged, etc.

27. INSTALLATION OF POWER STEERING OIL PUMP / 26. AIR CONDITIONER COMPRESSOR

Adjust belt tension.
(Refer to P.9-81.)

1. INSTALLATION AND ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

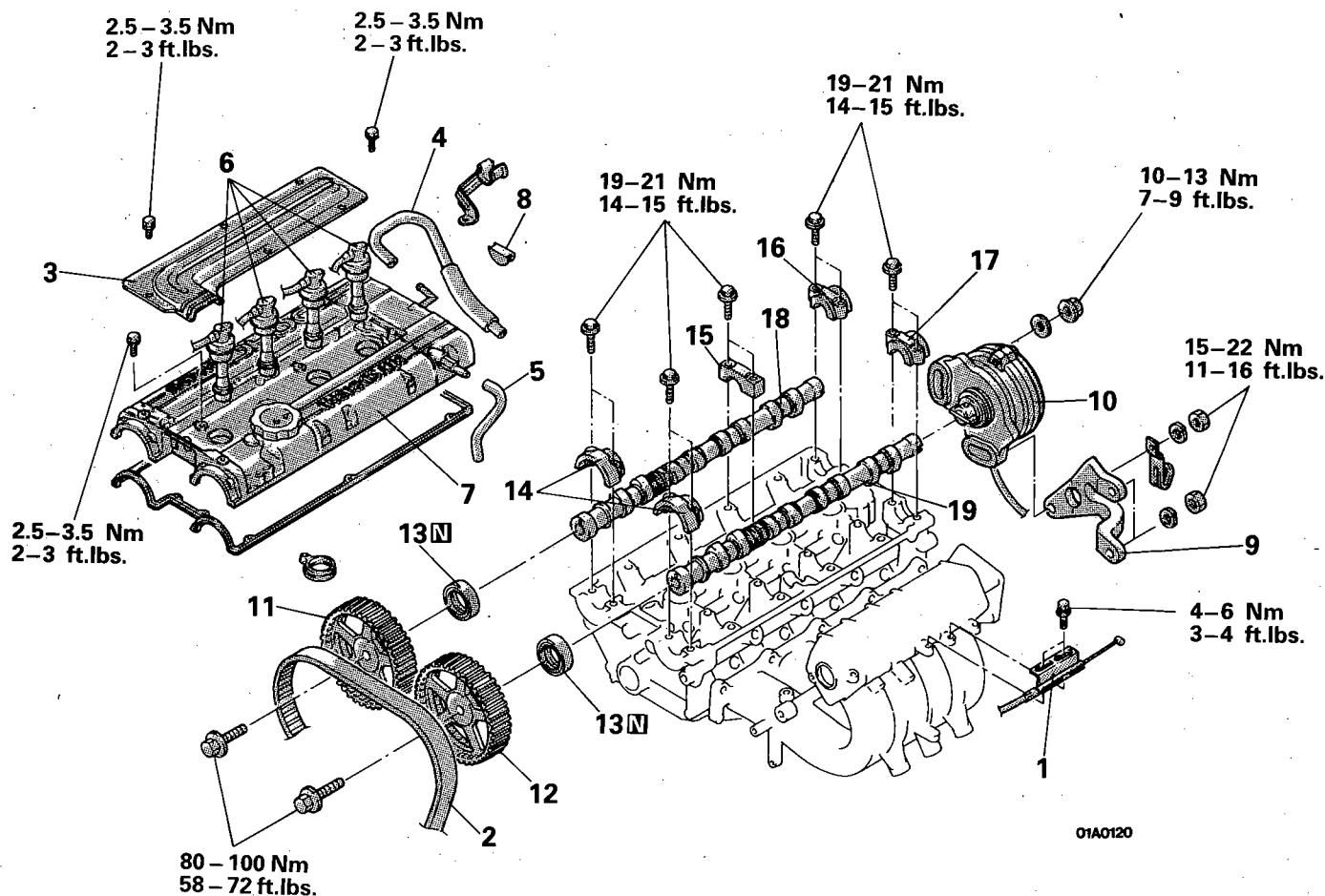
CAMSHAFTS AND CAMSHAFT OIL SEALS

N09ZA-B

REMOVAL AND INSTALLATION

Post-installation Operation

- Engine Adjustment
(Refer to P.9-79.)



01A0120

Removal steps

- ◆◆ 1. Connection for accelerator cable
- ◆◆◆ 2. Timing belt
- ◆◆ 3. Center cover
- ◆◆ 4. Connection for breather hose
- ◆◆ 5. Connection for PCV hose
- ◆◆ 6. Connection for spark plug cables
- ◆◆ 7. Rocker cover
- ◆◆ 8. Semi-circular packing
- ◆◆ 9. Throttle body stay
- ◆◆ 10. Crankshaft angle sensor
- ◆◆ 11. Exhaust camshaft sprocket
- ◆◆ 12. Intake camshaft sprocket
- ◆◆◆ 13. Camshaft oil seals
- ◆◆◆ 14. Front camshaft bearing caps
- ◆◆◆ 15. Camshaft bearing caps
- ◆◆◆ 16. Rear camshaft bearing cap (R.H.)
- ◆◆◆ 17. Rear camshaft bearing cap (L.H.)
- ◆◆ 18. Exhaust camshaft
- ◆◆ 19. Intake camshaft

NOTE

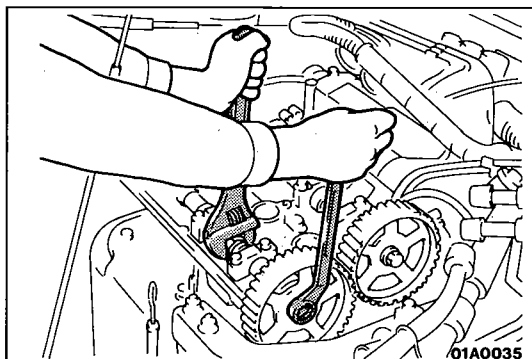
- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".
- (4) N: Non-reusable parts

SERVICE POINTS OF REMOVAL

N09ZBAB

2. REMOVAL OF TIMING BELT

Refer to P.9-112.

**11. REMOVAL OF EXHAUST CAMSHAFT SPROCKET / 12. INTAKE CAMSHAFT SPROCKET**

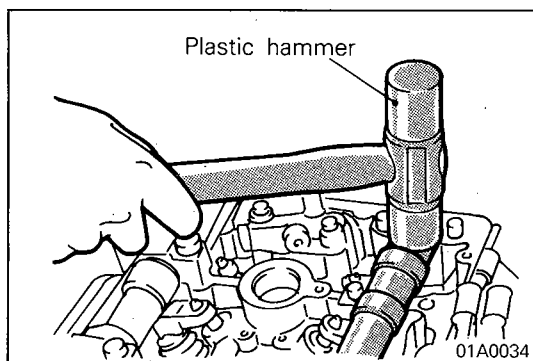
- (1) Using a wrench at the hexagonal part of the camshaft (to prevent the crankshaft from turning), loosen the camshaft sprocket bolt.
- (2) Remove the camshaft sprockets.

13. REMOVAL OF CAMSHAFT OIL SEALS

Remove the oil seals using a screwdriver or similar tool.

Caution**Take care not to damage front camshaft bearing cap and camshaft.****14. 15. 16. 17. REMOVAL OF CAMSHAFT BEARING CAPS**

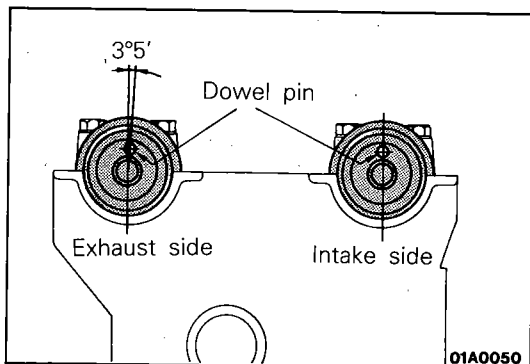
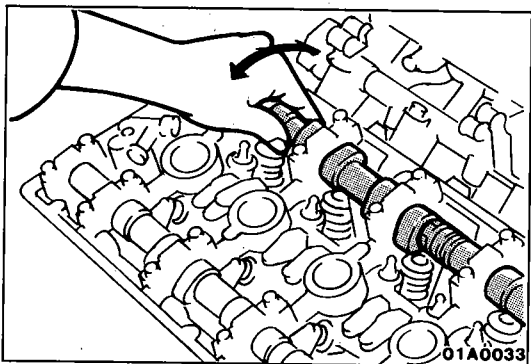
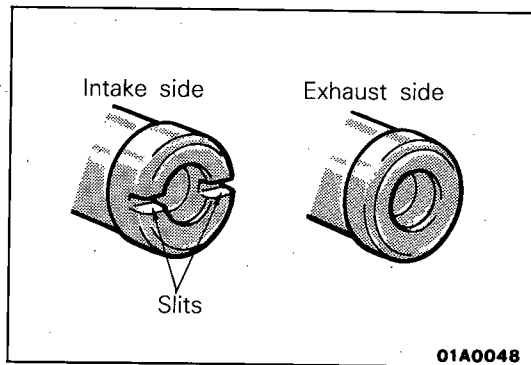
- (1) Loosen the bearing cap installation bolts in two or three steps.



- (2) Remove the bearing cap.

NOTE

If the bearing cap is difficult to remove, use a plastic hammer to gently tap the rear part of the camshaft, and then remove.



SERVICE POINTS OF INSTALLATION

N09ZDAE

19. INSTALLATION OF INTAKE CAMSHAFT / 18. EXHAUST CAMSHAFT

- (1) Install the camshafts on the cylinder head.

Caution

Be sure not to mistake the intake side and the exhaust side. There are slits for crank angle sensor drive in the rear end of the intake camshaft.

NOTE

Install new camshafts using the following procedure.

- (1) Remove the rocker arms.
- (2) Lay the camshafts on the cylinder head and install the bearing caps.
- (3) Check that the camshaft can be easily turned by hand.
- (4) After checking, remove the bearing caps and the camshafts, and install the rocker arms.

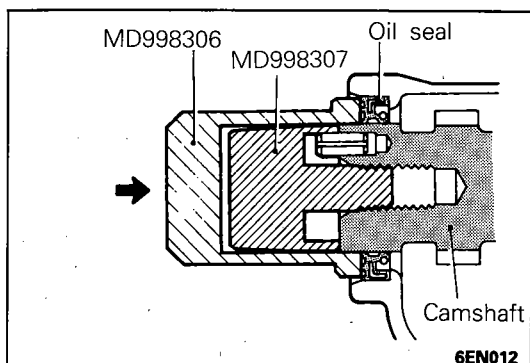
- (2) The camshaft's dowel pins should be at the positions shown in the illustration.

17. 16. 15. 14. INSTALLATION OF CAMSHAFT BEARING CAPS

Tighten the bearing cap installation bolts to the specified torque in two or three steps.

Caution

Tighten uniformly, otherwise the rocker arms will not be straight.

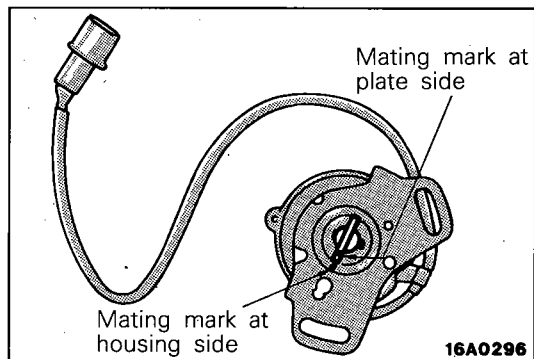


13. INSTALLATION OF CAMSHAFT OIL SEALS

Using the special tool, press in the oil seal as shown in the illustration.

NOTE

Apply a coating of oil to the outer circumference of the guide.

**10. INSTALLATION OF CRANKSHAFT ANGLE SENSOR**

- (1) Align the mating mark (punch mark) on the housing of the crank angle sensor with the mating mark (notch) in the plate.
- (2) Install the crank angle sensor to the engine.

Caution

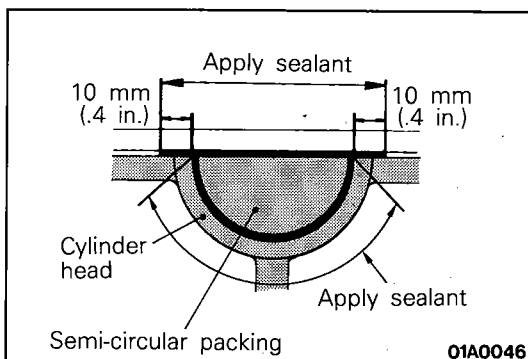
When tightening the nut of the crankshaft angle sensor, make sure that the crank angle sensor does not turn.

- (3) Check that the ignition timing is set at the standard value. (Refer to GROUP 8 – Ignition System.)

8. INSTALLATION OF SEMI-CIRCULAR PACKING

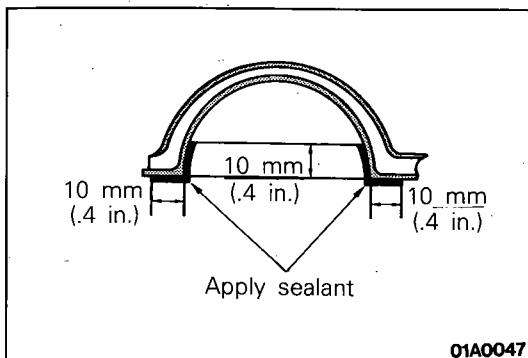
Install the semi-circular packing to the cylinder head, and apply a coating of the specified sealant where shown in the illustration.

Specified sealant: MOPAR Part No. 4318034 or equivalent

**7. INSTALLATION OF ROCKER COVER**

Apply a coating of the specified sealant where shown in the illustration, and then install the rocker cover to the cylinder head assembly.

Specified sealant: MOPAR Part No. 4318034 or equivalent

**2. INSTALLATION AND ADJUSTMENT OF TIMING BELT**

Refer to P.9-112.

1. ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

OIL PAN AND OIL SCREEN REMOVAL AND INSTALLATION

N09HA-B

Pre-removal Operation

- Draining Engine Oil
(Refer to P.9-79.)

Post-installation Operation

- Refilling Engine Oil
(Refer to P.9-79.)

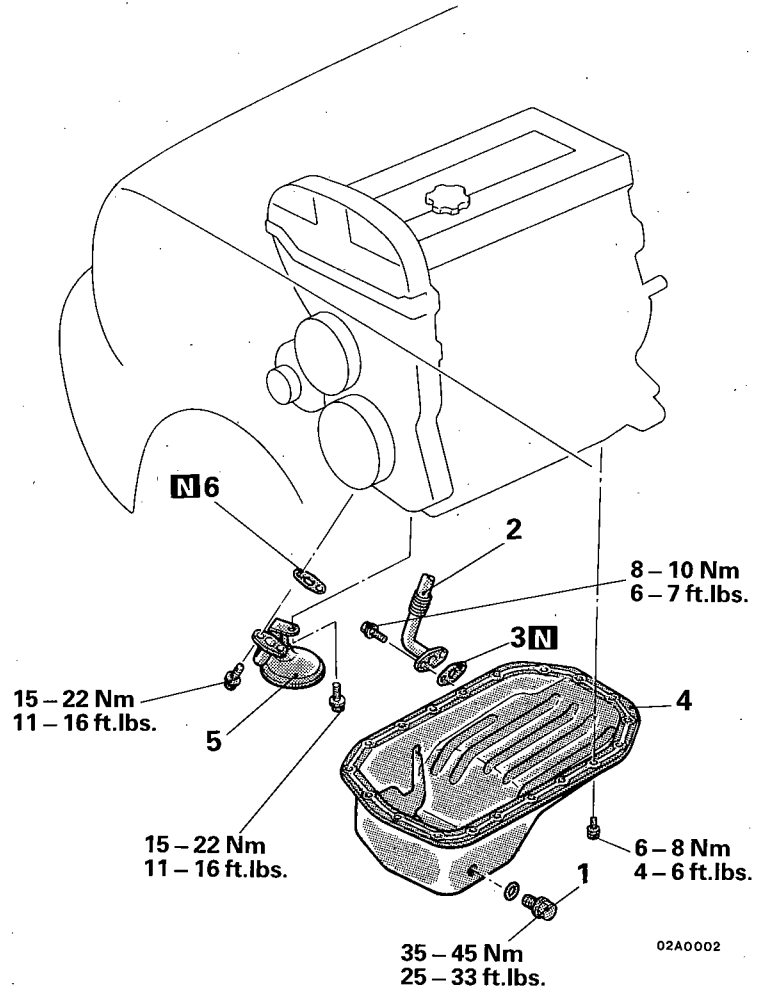
Removal steps

1. Drain plug
2. Oil return pipe <T/C>
3. Gasket <T/C>
4. Oil pan
5. Oil screen
6. Oil screen gasket

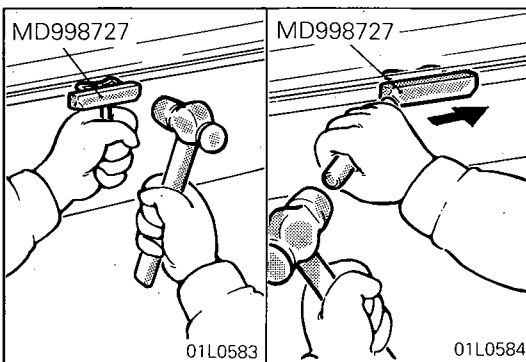


NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) : Refer to "Service Points of Removal".
- (3) : Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts



02A0002



SERVICE POINT OF REMOVAL

N09HBAF1

4. REMOVAL OF OIL PAN

- (1) Remove the oil pan mounting bolt.
- (2) Drive the special tool into the gap between the cylinder block and oil pan with a hammer.

Caution

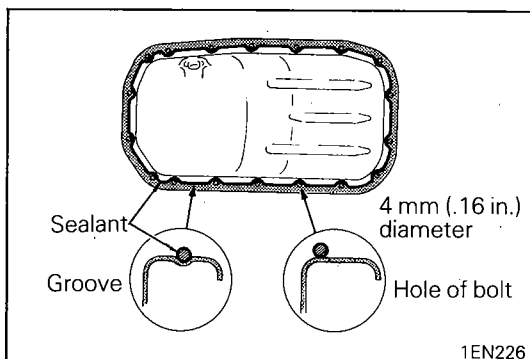
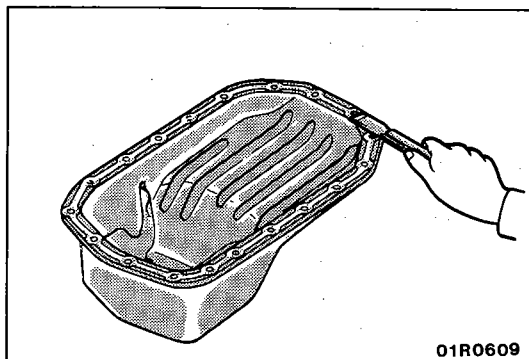
Avoid using a screwdriver or punch to remove the oil pan.

- (3) Tap a brass bar applied to the edge of the special tool with a hammer to separate the oil pan from the cylinder block.

INSPECTION

N09HCAC1

- Check the oil pan for damage and cracks. Replace if faulty.
- Check the oil screen for clogging, damage and cracks. Replace if faulty.

**SERVICE POINT OF INSTALLATION**

N09HDAP1

4. INSTALLATION OF OIL PAN

- (1) Remove all sealant from the oil pan and cylinder block with a scraper, etc.
- (2) Degrease the areas to be coated with sealant and mating surfaces.

- (3) Apply the specified sealant around the surface of oil pan as specified in illustration.

Specified sealant: MITSUBISHI GENUINE PART No. MZ100168 or equivalent

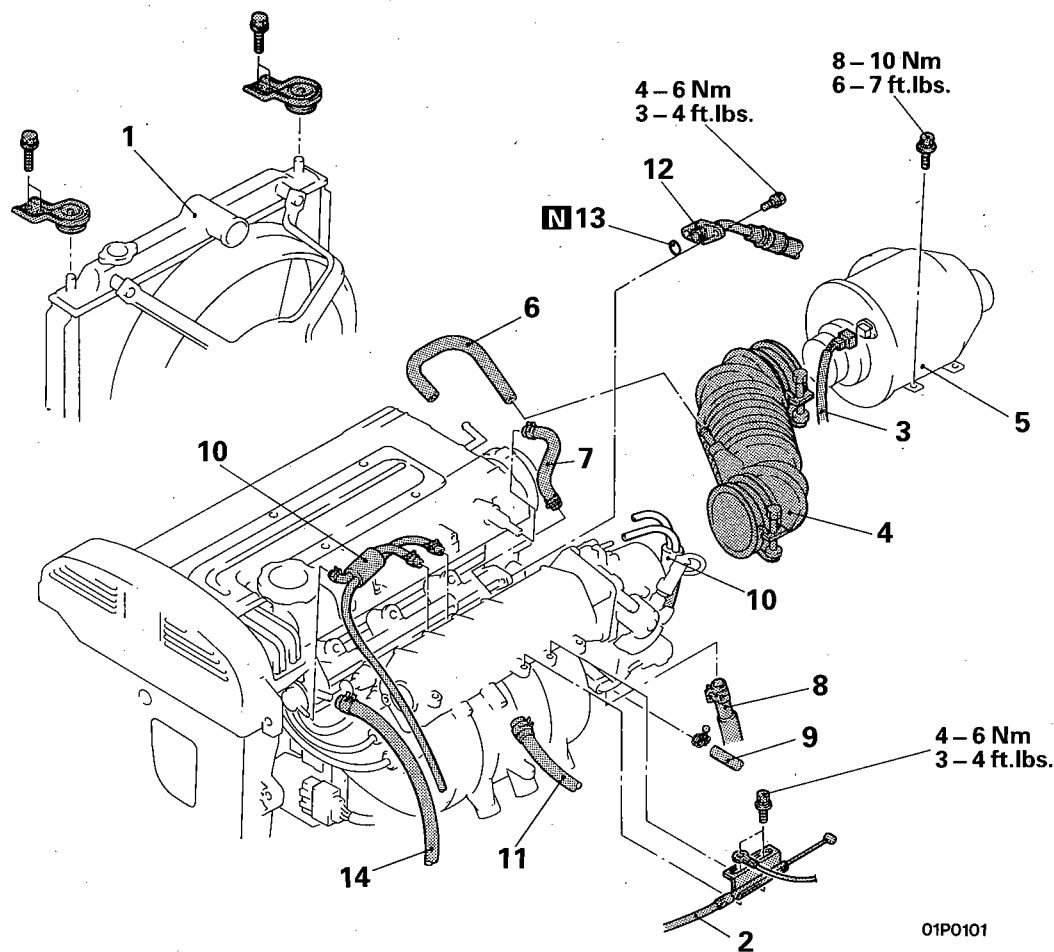
- (4) Assemble oil pan to cylinder block within 15 minutes after applying the sealant.

CYLINDER HEAD GASKET <N/A>

REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining Engine Coolant.
(Refer to GROUP 7 – Service Adjustment Procedures.)



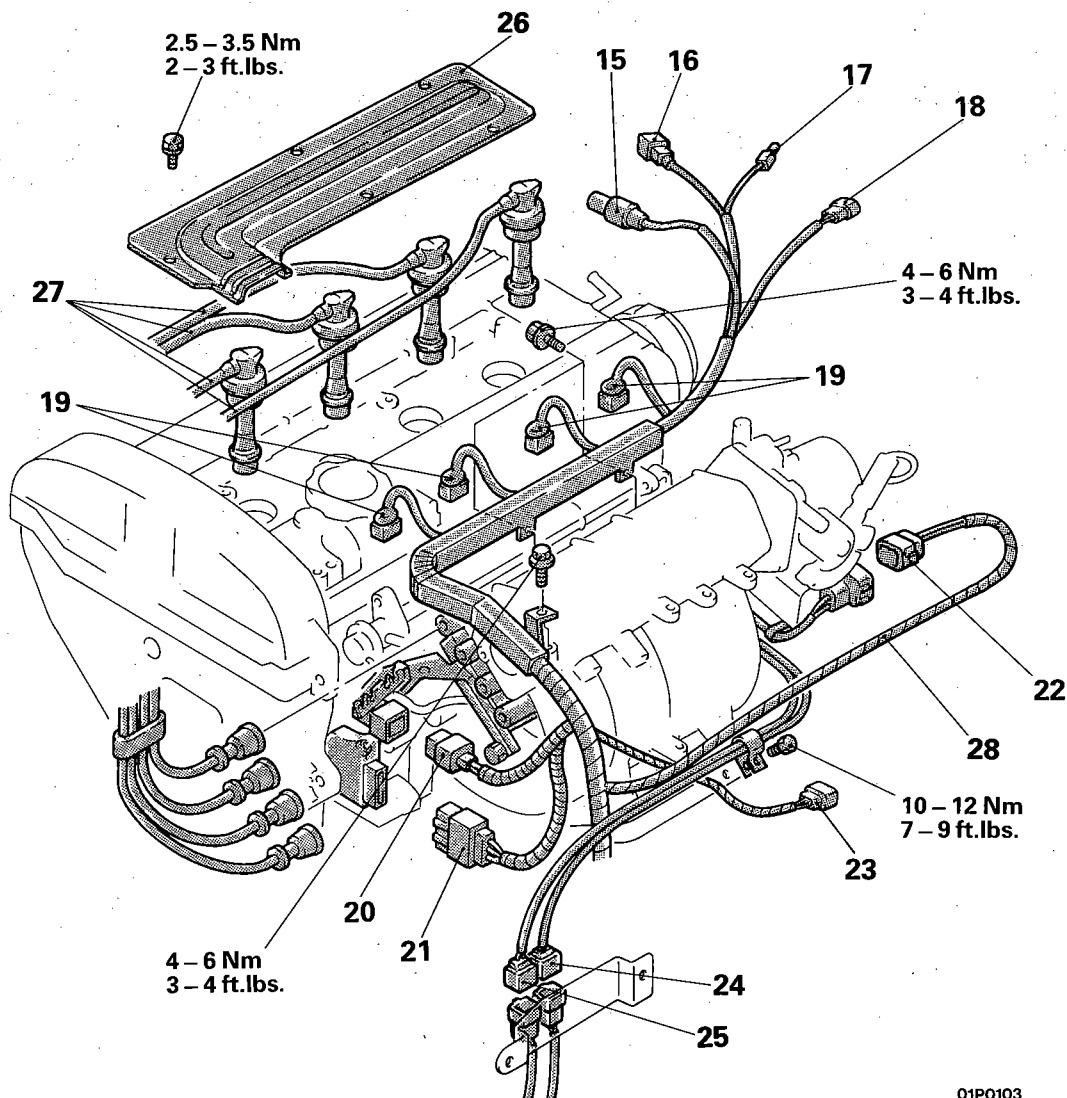
01P0101

Removal steps

- ↔ ♦♦ 1. Radiator assembly
- ♦♦ 2. Connection for accelerator cable
- 3. Connection for air flow sensor
- 4. Air intake hose
- 5. Air cleaner assembly
- 6. Breather hose
- 7. PCV hose
- 8. Connection for water bypass hose
- 9. Connection for heater hose
- 10. Connection for vacuum hose
- 11. Connection for brake booster vacuum hose
- ↔ ♦♦ 12. Connection for high-pressure fuel hose
- 13. O-ring
- 14. Connection for fuel return hose

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ♦♦: Refer to "Service Points of Removal".
- (3) ♦♦: Refer to "Service Points of Installation".
- (4) (N): Non-reusable parts



01P0103

Removal steps

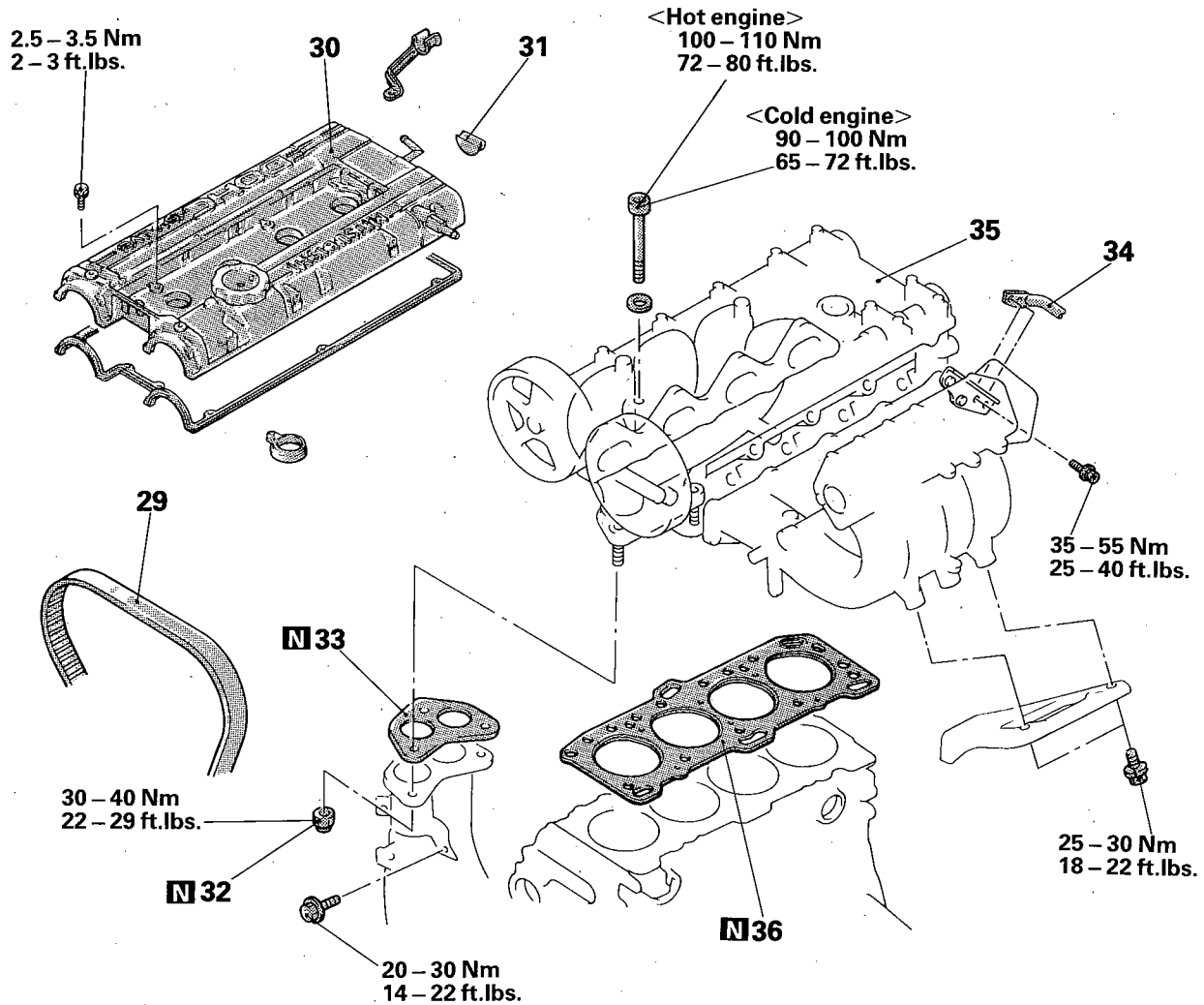
- | | |
|--|--|
| 15. Connection for oxygen sensor | 25. Connection for crankshaft angle sensor |
| 16. Connection for engine coolant temperature sensor | 26. Center cover |
| 17. Connection for engine coolant temperature gauge unit | 27. Connection for spark plug cable assembly |
| 18. Connection for engine coolant temperature switch <Air conditioner> | 28. Control wiring harness |
| 19. Connection for injector | |
| 20. Connection for ignition coil | |
| 21. Connection for power transistor | |
| 22. Connection for ISC motor | |
| 23. Connection for EGR temperature sensor <California> | |
| 24. Connection for throttle position sensor | |

NOTE

Reverse the removal procedures to reinstall.

Post-installation Operation

- Replenishing Engine Coolant
(Refer to GROUP 7 – Service Adjustment Procedures.)
- Engine Adjustment
(Refer to P.9-79.)



01P0039

Removal steps

- ◄◄ 29. Timing belt
- ◆◆ 30. Rocker cover
- ◆◆ 31. Semi-circular packing
- ◆◆ 32. Self-locking nut
- ◆◆ 33. Gasket
- ◆◆ 34. Tension rod
- ◄◄ 35. Cylinder head assembly
- ◆◆ 36. Cylinder head gasket

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◄◄: Refer to "Service Points of Removal".
- (3) ◆◆: Refer to "Service Points of Installation".
- (4) **N**: Non-reusable parts

N09JBAJ0

SERVICE POINTS OF REMOVAL**1. REMOVAL OF RADIATOR ASSEMBLY**

Refer to GROUP 7 – Radiator.

12. DISCONNECTION OF HIGH-PRESSURE FUEL HOSE**Caution**

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

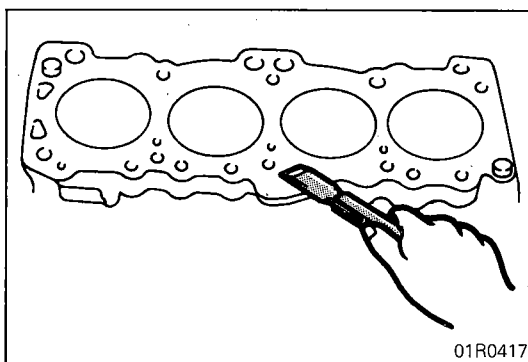
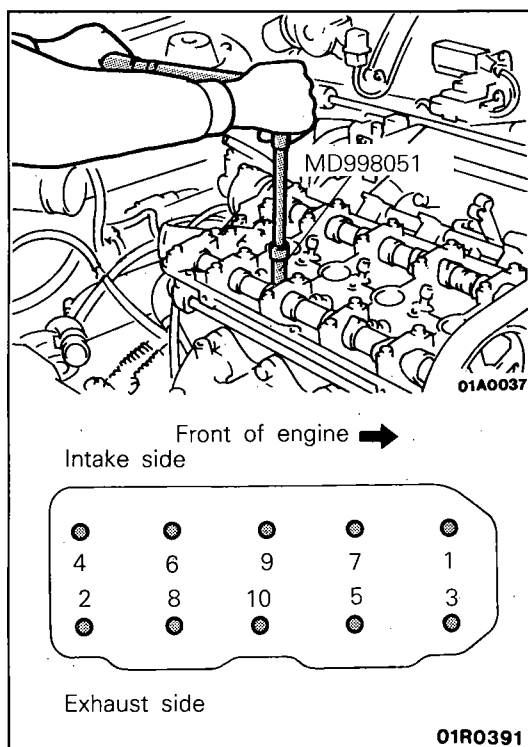
For information concerning the bleeding of the residual pressure, refer to GROUP 14 – Service Adjustment Procedures.

29. REMOVAL OF TIMING BELT

Refer to P.9-112.

35. REMOVAL CYLINDER HEAD ASSEMBLY

Using the special tool, loosen the bolts in the order shown in the illustration (in 2 or 3 cycles) and remove. Then remove the cylinder head assembly.

**SERVICE POINTS OF INSTALLATION**

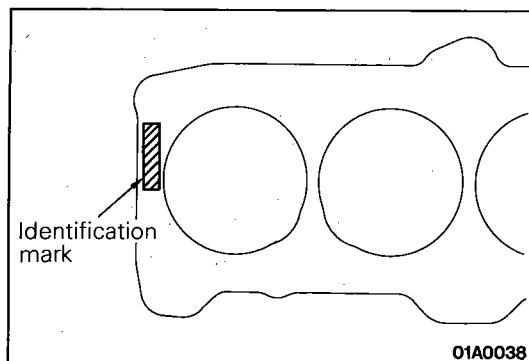
N09JDDG0

36. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Use a scraper to clean the gasket surface of the cylinder block.

Caution

Take care that no foreign material gets into the cylinder, or into coolant passages or oil passages.



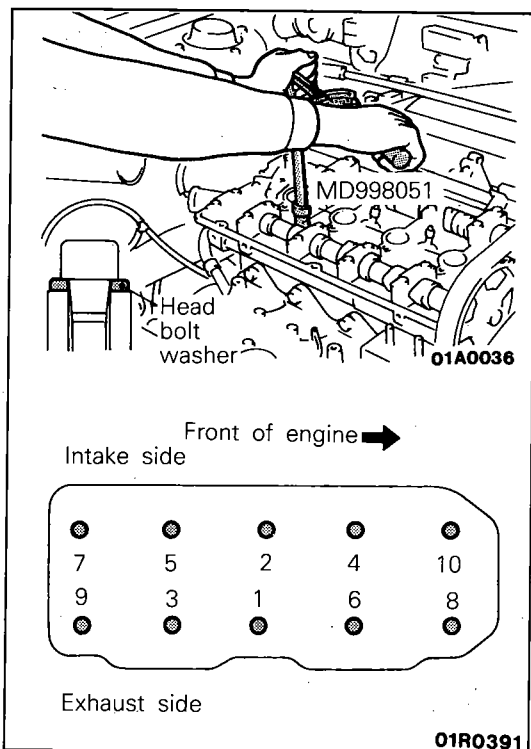
- (2) Make sure that the gasket has the proper identification mark for the engine.
- (3) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.

35. INSTALLATION OF CYLINDER HEAD ASSEMBLY

- (1) Use a scraper to clean the gasket surface of the cylinder head assembly.

Caution

Take care that no foreign material gets into the coolant passages or oil passages.



- (2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration (in two or three cycles).

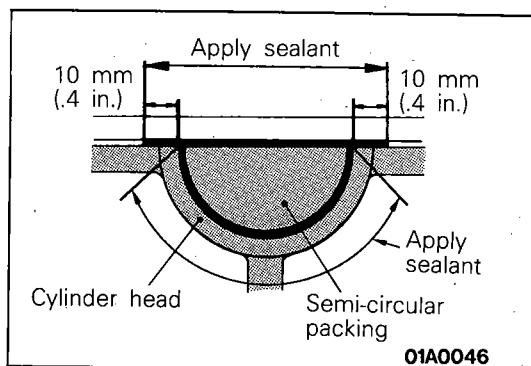
Caution

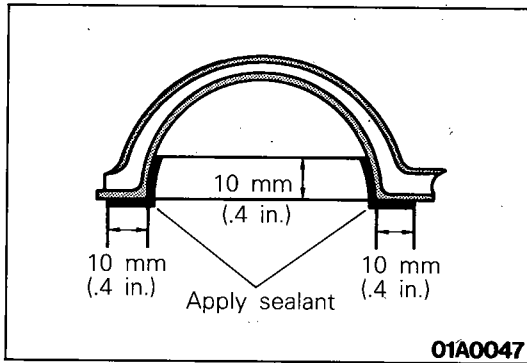
Install the head bolt washers as shown in the illustration.

31. APPLICATION OF SEALANT TO SEMI-CIRCULAR PACKING

Apply a coating of the specified sealant to the semi-circular packing and the cylinder head top surfaces.

Specified sealant: MOPAR Part No. 4318034 or equivalent





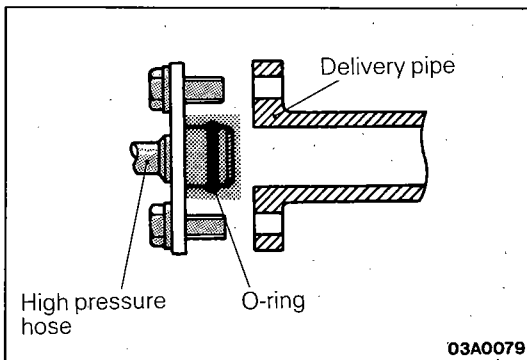
30. INSTALLATION OF ROCKER COVER

Apply a coating of the specified sealant where shown in the illustration, and then install the rocker cover to the cylinder head assembly.

Specified sealant: MOPAR Part No. 4318034 or equivalent

29. INSTALLATION AND ADJUSTMENT OF TIMING BELT

Refer to P.9-112.



12. CONNECTION OF HIGH-PRESSURE FUEL HOSE

When connecting the high-pressure fuel hose to the delivery pipe, apply a coating of gasoline to the hose union, and insert so that the O-ring is not damaged.

2. ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

1. INSTALLATION OF RADIATOR ASSEMBLY

Refer to GROUP 7 – Radiator.

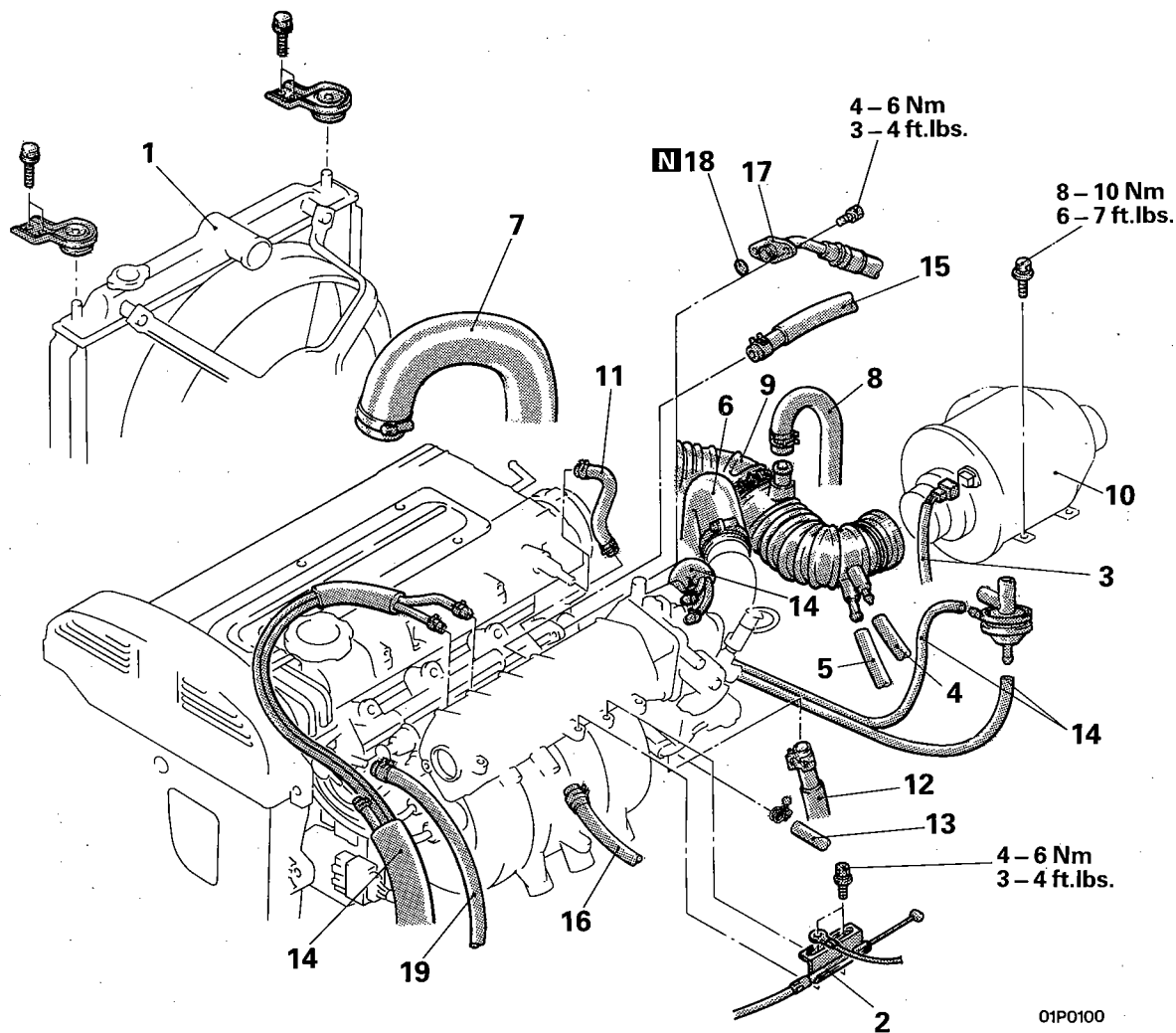
CYLINDER HEAD GASKET <T/C>

N09JA-C

REMOVAL AND INSTALLATION

Pre-removal Operation

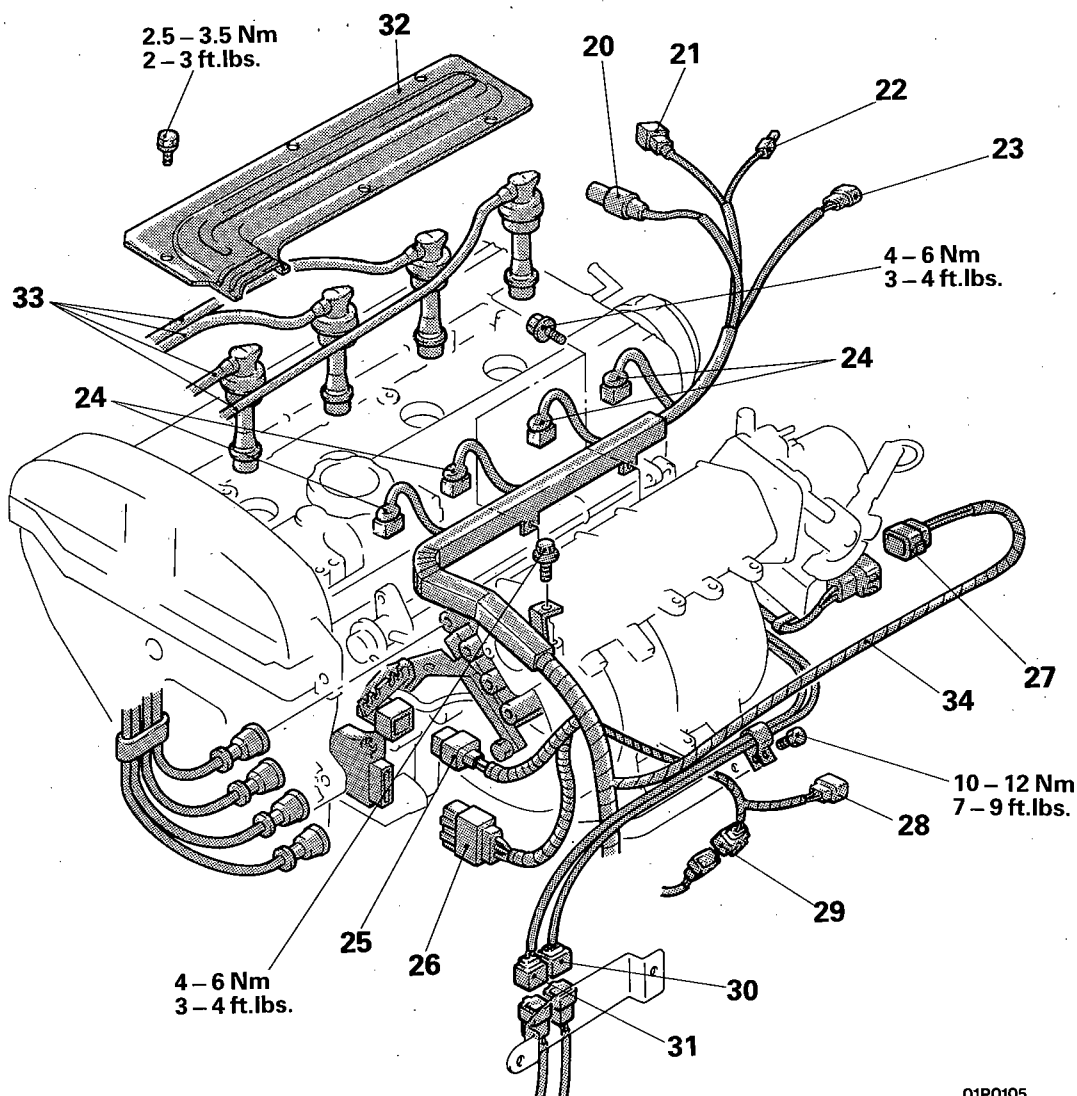
- Removal of Engine Coolant
(Refer to GROUP 7 – Service Adjustment Procedures.)



01P0100

Removal steps

- | | | | |
|---|--------------------------------------|--|--|
| ↔ | 1. Radiator assembly | 15. Connection for vacuum hose | |
| ↔ | 2. Connection for accelerator cable | 16. Connection for brake booster vacuum hose | |
| ↔ | 3. Connection for air flow sensor | ↔ | 17. Connection for high-pressure fuel hose |
| | 4. Breather hose | | 18. O-ring |
| | 5. Connection for purge hose | | 19. Connection for fuel return hose |
| | 6. Air hose E | | |
| | 7. Air hose A | | |
| | 8. Connection for air by-pass hose | | |
| | 9. Air intake hose | | |
| | 10. Air cleaner assembly | | |
| | 11. PCV hose | | |
| | 12. Connection for water bypass hose | | |
| | 13. Connection for heater hose | | |
| | 14. Connection for vacuum hose | | |



01P0105

- 20. Connection for oxygen sensor
- 21. Connection for engine coolant temperature sensor
- 22. Connection for engine coolant temperature gauge unit
- 23. Connection for engine coolant temperature switch <Air conditioner>
- 24. Connection for injector
- 25. Connection for ignition coil
- 26. Connection for power transistor
- 27. Connection for ISC motor
- 28. Connection for EGR temperature sensor <California>

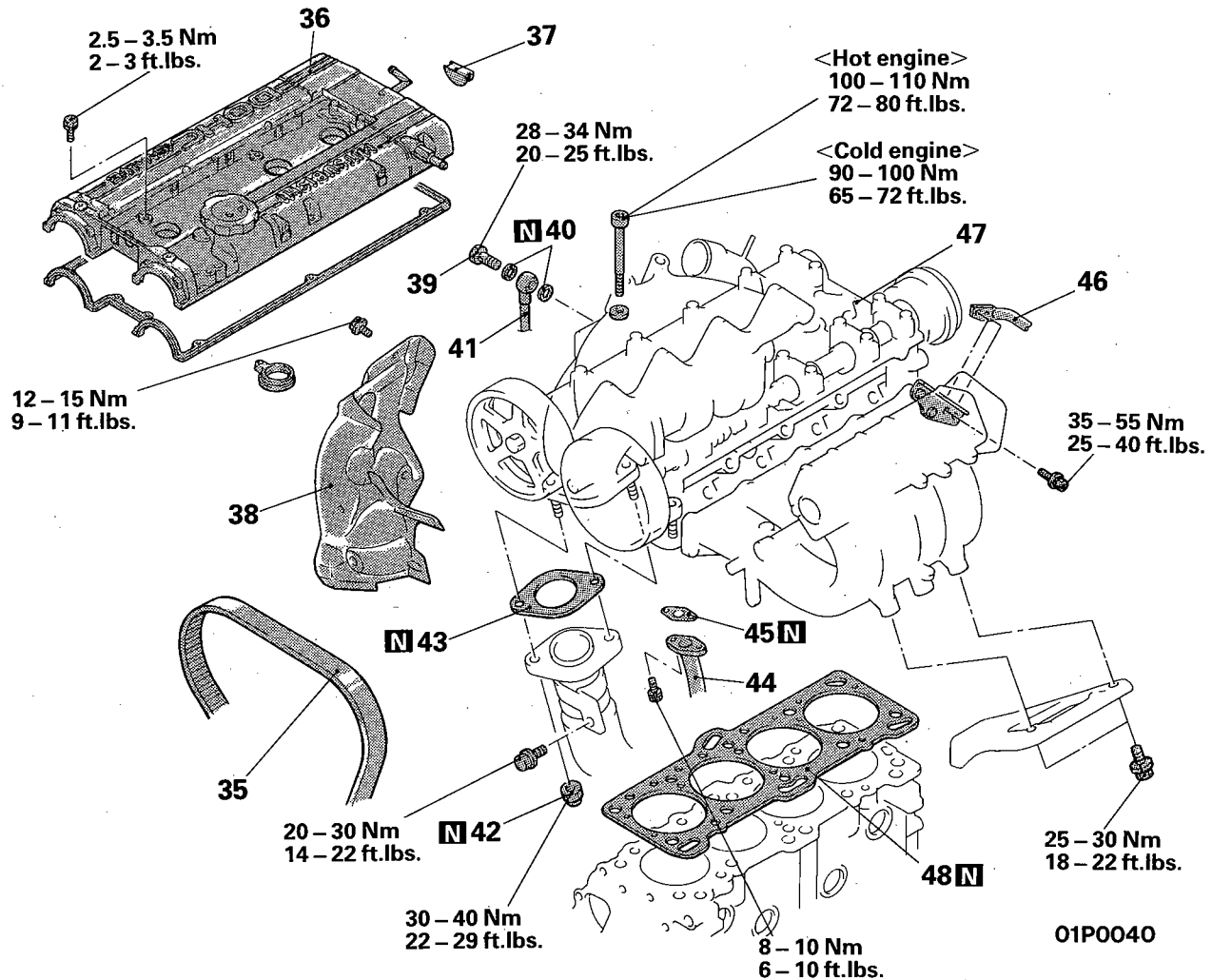
- 29. Connection for detonation sensor
- 30. Connection for throttle position sensor
- 31. Connection for crankshaft angle sensor
- 32. Center cover
- 33. Connection for spark plug cable assembly
- 34. Control wiring harness

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) : Refer to "Service Points of Removal".
- (3) : Refer to "Service Points of Installation".
- (4) : Non-reusable parts

Post-installation Operation

- Replenishing Engine Coolant
(Refer to GROUP 7 – Service Adjustment Procedures.)
- Engine Adjustment
(Refer to P.9-79.)

**Removal steps**

- ↔ 35. Timing belt
- ♦♦ 36. Rocker cover
- ♦♦ 37. Semi-circular packing
- ♦♦ 38. Heat protector B
- ♦♦ 39. Eye bolt
- ♦♦ 40. Gasket
- ♦♦ 41. Connection for water pipe B
- ♦♦ 42. Self-locking nut
- ♦♦ 43. Gasket
- ♦♦ 44. Connection for oil return pipe
- ♦♦ 45. Gasket
- ♦♦ 46. Tension rod
- ↔ 47. Cylinder head assembly
- ♦♦ 48. Cylinder head gasket

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ↔: Refer to "Service Points of Removal".
- (3) ♦♦: Refer to "Service Points of Installation".
- (4) N: Non-reusable parts

N09JBAJ1

SERVICE POINTS OF REMOVAL**1. REMOVAL OF RADIATOR ASSEMBLY**

Refer to GROUP 7 – Radiator.

17. DISCONNECTION OF HIGH-PRESSURE FUEL HOSE**Caution**

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

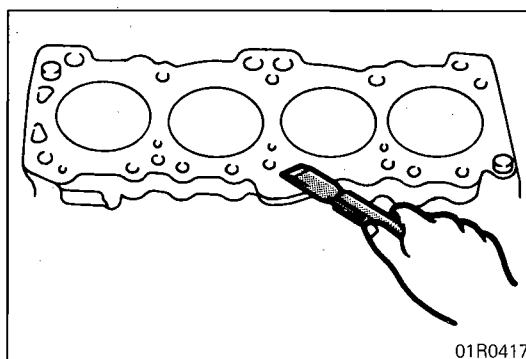
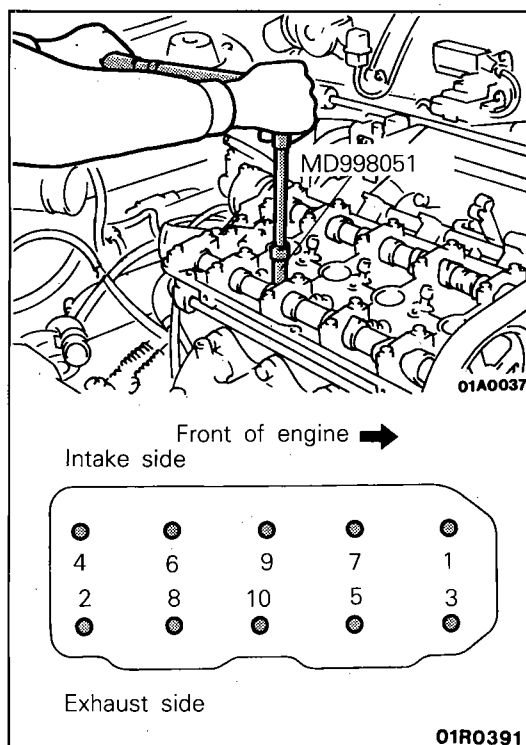
For information concerning the bleeding of the residual pressure, refer to GROUP 14 – Service Adjustment Procedures.

35. REMOVAL OF TIMING BELT

Refer to P.9-112.

47. REMOVAL CYLINDER HEAD ASSEMBLY

Using the special tool, loosen the bolts in the order shown in the illustration (in 2 or 3 cycles) and remove. Then remove the cylinder head assembly.

**SERVICE POINTS OF INSTALLATION**

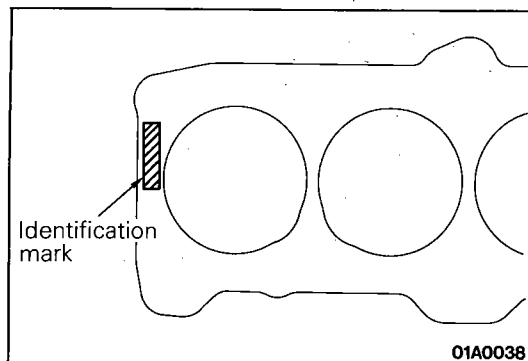
N09JDDG1

48. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Use a scraper to clean the gasket surface of the cylinder block.

Caution

Take care that no foreign material gets into the cylinder, or into coolant passages or oil passages.



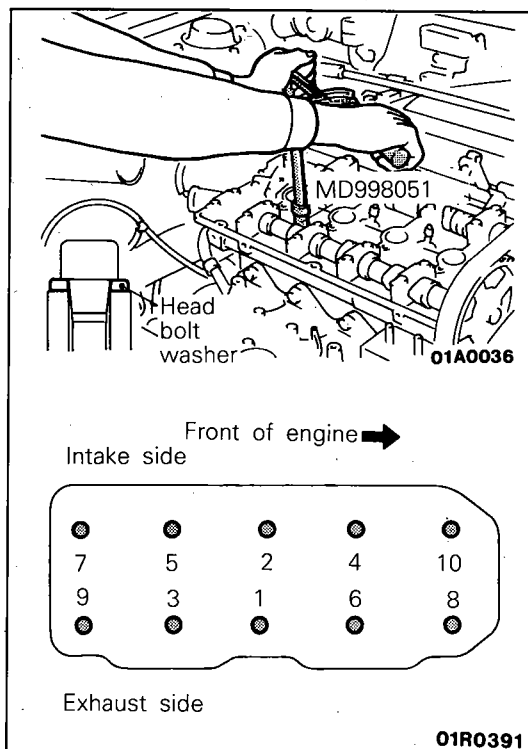
- (2) Make sure that the gasket has the proper identification mark for the engine.
- (3) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.

47. INSTALLATION OF CYLINDER HEAD ASSEMBLY

- (1) Use a scraper to clean the gasket surface of the cylinder head assembly.

Caution

Take care that no foreign material gets into the coolant passages or oil passages.



- (2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration (in two or three cycles).

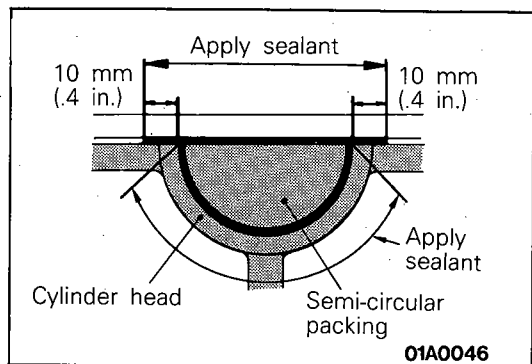
Caution

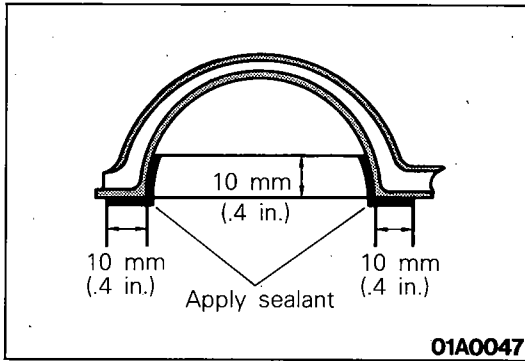
Install the head bolt washers as shown in the illustration.

37. APPLICATION OF SEALANT TO SEMI-CIRCULAR PACKING

Apply a coating of the specified sealant to the semi-circular packing and the cylinder head top surfaces.

Specified sealant: MOPAR Part No. 4318034 or equivalent



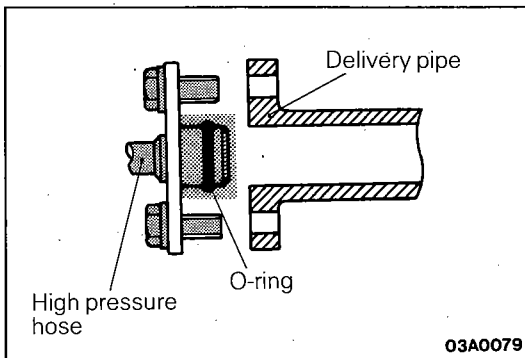
**36. INSTALLATION OF ROCKER COVER**

Apply a coating of the specified sealant where shown in the illustration, and then install the rocker cover to the cylinder head assembly.

Specified sealant: MOPAR Part No. 4318034 or equivalent

35. INSTALLATION AND ADJUSTMENT OF TIMING BELT

Refer to P.9-112.

**17. CONNECTION OF HIGH-PRESSURE FUEL HOSE**

When connecting the high-pressure fuel hose to the delivery pipe, apply a coating of gasoline to the hose union, and insert so that the O-ring is not damaged.

2. ADJUSTMENT OF ACCELERATOR CABLE

Refer to GROUP 14 – Service Adjustment Procedures.

1. INSTALLATION OF RADIATOR ASSEMBLY

Refer to GROUP 7 – Radiator.

CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

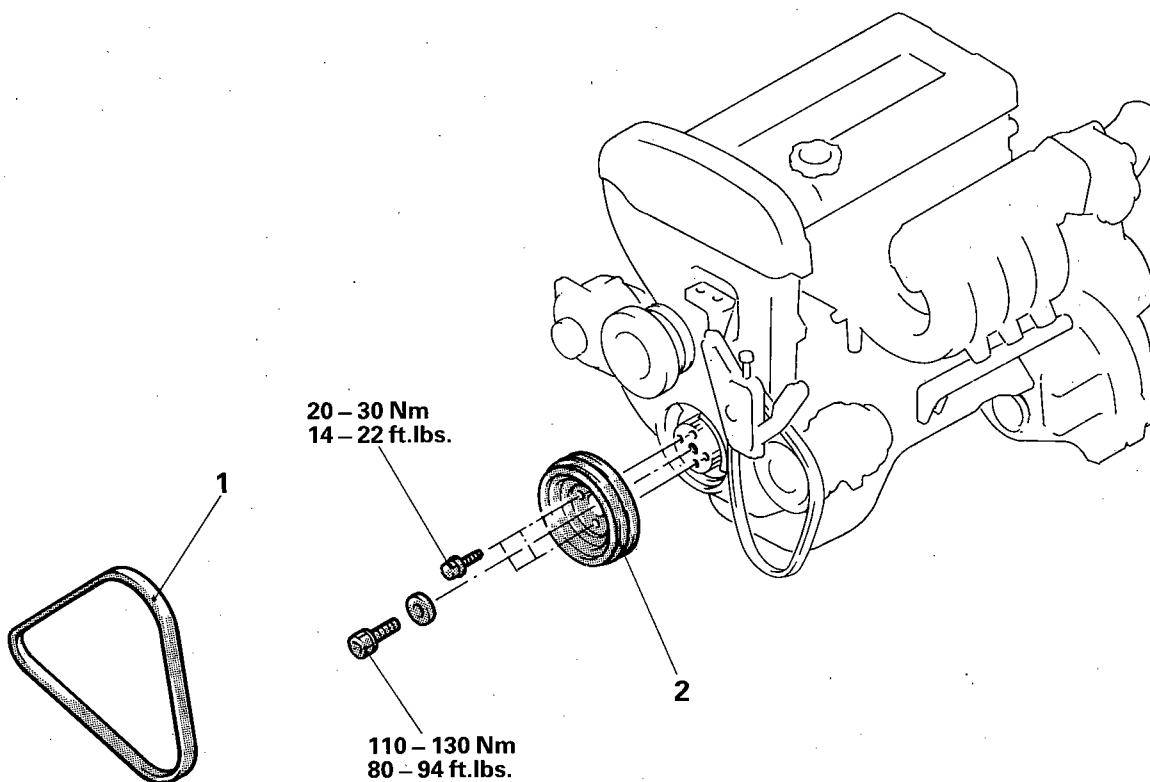
N09ZE-B

Pre-removal Operation

- Removal of Under Cover

Post-installation Operation

- Installation of Under Cover



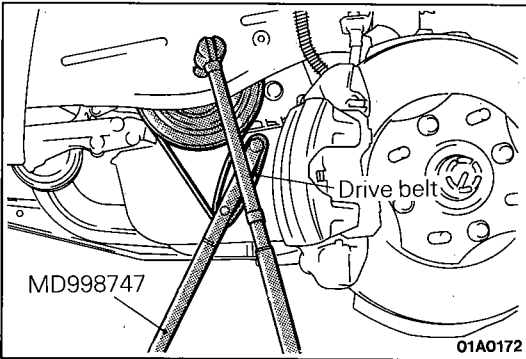
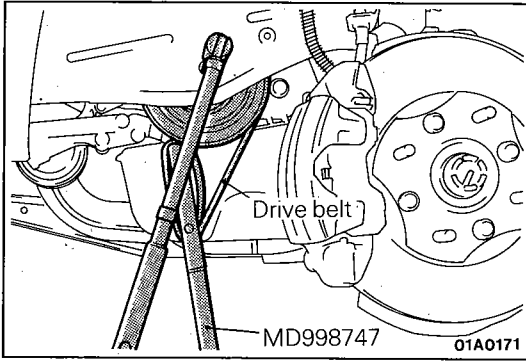
01P0034

Removal steps

- ◆◆ 1. Drive belt (Alternator)
- ◆◆◆ 2. Crankshaft pulley

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".



SERVICE POINTS OF REMOVAL

N09ZF00A

2. REMOVAL OF CRANKSHAFT PULLEY

- (1) Using the special tool and a disused drive belt, stop the rotation of the crankshaft pulley.

Caution

1. **This drive belt will be damaged. Do Not use the engine's drive belt.**
2. **Never use a damaged drive belt.**
- (2) Remove the crankshaft sprocket bolts.
- (3) Remove the crankshaft pulley bolts, and remove the crankshaft pulley.

SERVICE POINTS OF INSTALLATION

N09ZH00A

2. INSTALLATION OF CRANKSHAFT PULLEY

- (1) Using the special tool and a disused drive belt, stop the rotation of the crankshaft pulley.
- (2) Tighten the crankshaft sprocket bolt to the specified torque.

1. INSTALLATION OF DRIVE BELT

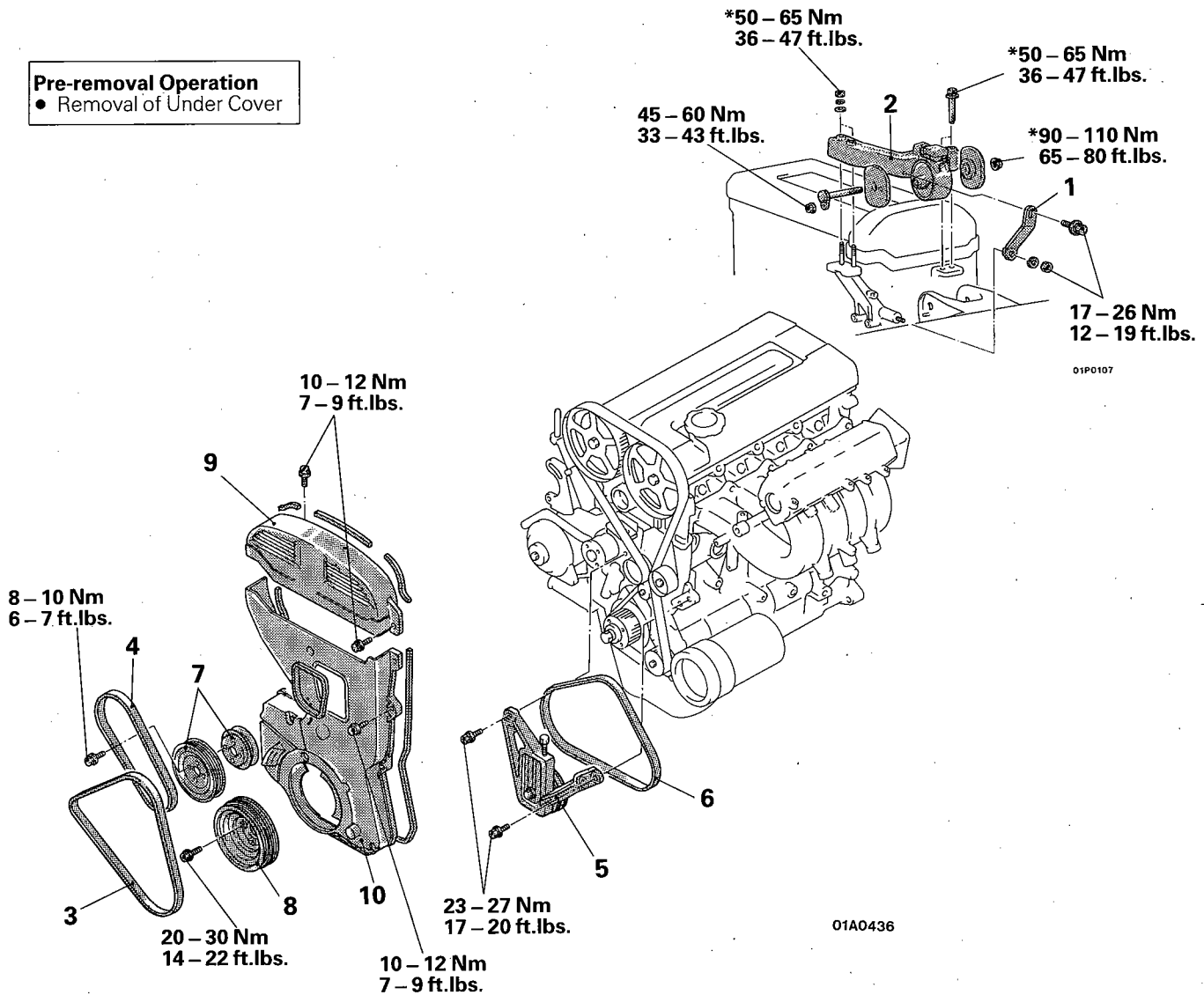
Refer to P.9-81.

TIMING BELT

REMOVAL AND INSTALLATION

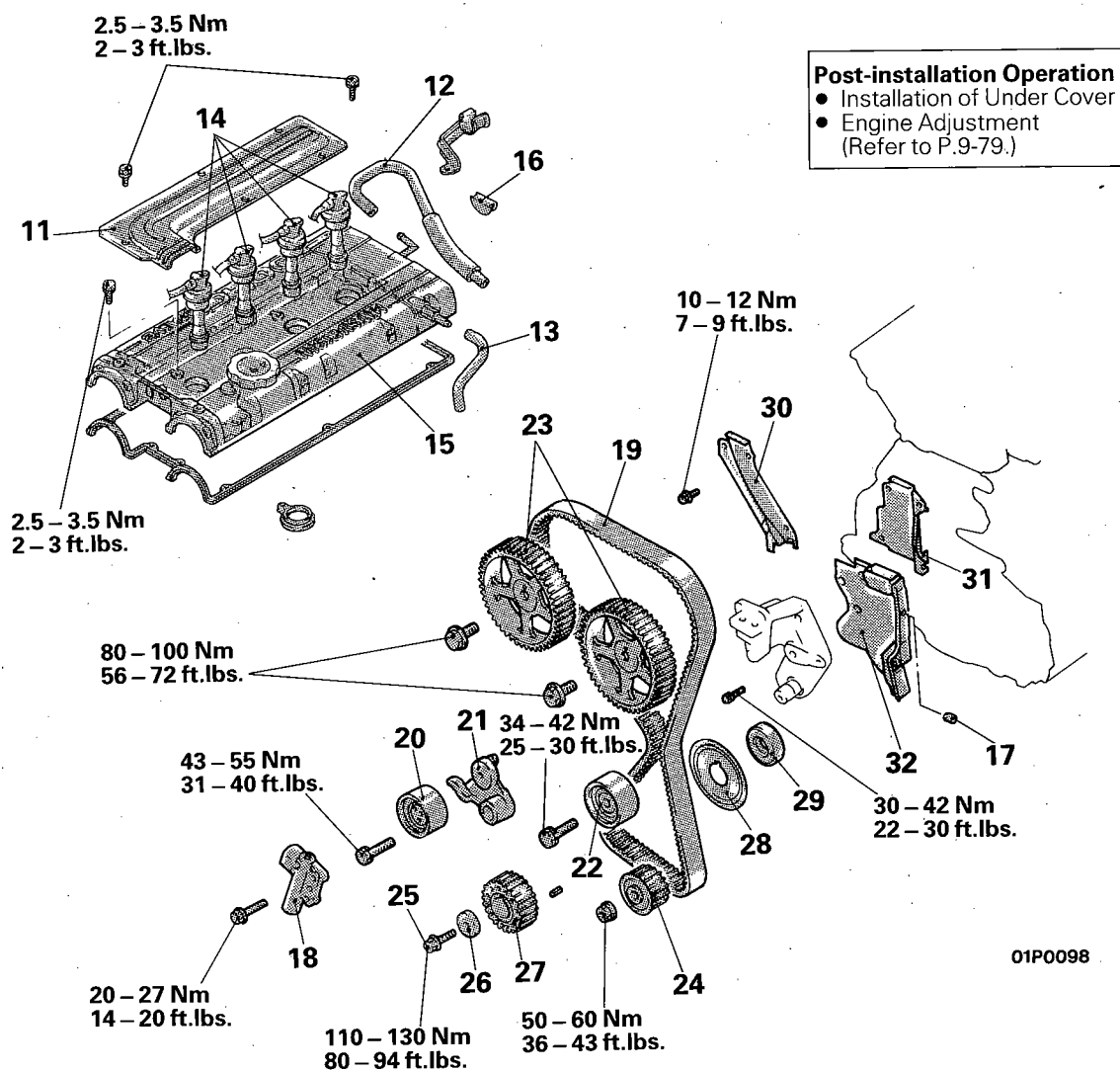
Pre-removal Operation

- Removal of Under Cover



Removal steps

- | | |
|--------------------------------------|---|
| 1. Bracket | 16. Semi-circular packing |
| 2. Engine mount bracket | 17. Plug rubber |
| 3. Drive belt (alternator) | 18. Auto tensioner |
| 4. Drive belt (power steering) | 19. Timing belt |
| 5. Tensioner pulley bracket | 20. Tensioner pulley |
| 6. Drive belt (air conditioner) | 21. Tensioner arm |
| 7. Water pump pulley | 22. Idler pulley |
| 8. Crankshaft pulley | 23. Camshaft sprocket |
| 9. Timing belt front upper cover | 24. Oil pump sprocket |
| 10. Timing belt front lower cover | 25. Crankshaft sprocket bolt |
| 11. Center cover | 26. Special washer |
| 12. Breather hose | 27. Crankshaft sprocket |
| 13. PCV hose | 28. Flange |
| 14. Connection for spark plug cables | 29. Spacer |
| 15. Rocker cover | 30. Timing belt rear right cover |
| | 31. Timing belt rear left cover (upper) |
| | 32. Timing belt rear left cover (lower) |

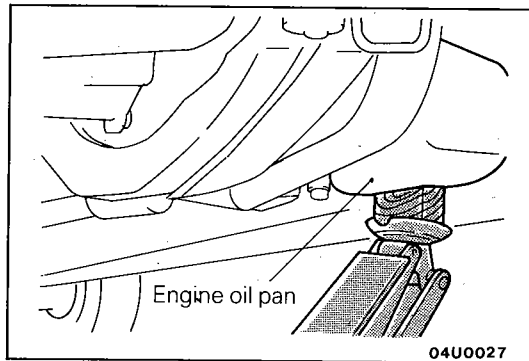


Installation steps

- | | |
|---|--------------------------------------|
| 32. Timing belt rear left cover (lower) | ◆◆ 15. Rocker cover |
| 31. Timing belt rear left cover (upper) | 14. Connection for spark plug cables |
| 30. Timing belt rear right cover | 13. PCV hose |
| 29. Spacer | 12. Breather hose |
| ◆◆ 28. Flange | 11. Center cover |
| ◆◆ 27. Crankshaft sprocket | 10. Timing belt front lower cover |
| 26. Special washer | ◆◆ 9. Timing belt front upper cover |
| 25. Crankshaft sprocket bolt | ◆◆ 8. Crankshaft pulley |
| 24. Oil pump sprocket | 7. Water pump pulley |
| ◆◆ 23. Camshaft sprocket | ◆◆ 6. Drive belt (air conditioner) |
| 22. Idler pulley | 5. Tensioner pulley bracket |
| ◆◆ 18. Auto tensioner | ◆◆ 4. Drive belt (power steering) |
| 21. Tensioner arm | ◆◆ 3. Drive belt (alternator) |
| ◆◆ 20. Tensioner pulley | 2. Engine mount bracket |
| ◆◆ 19. Timing belt | 1. Bracket |
| ◆◆ Adjustment of timing belt tension | |
| 17. Plug rubber | |
| ◆◆ 16. Semi-circular packing | |

NOTE

- (1) ◆◆: Refer to "Service Points of Removal".
- (2) ◆◆◆: Refer to "Service Points of Installation".
- (3) The fasteners marked * should be temporarily tightened before they are finally tightened once the total weight of the engine has been placed on the vehicle body.

**SERVICE POINTS OF REMOVAL**

N09KBDH

2. REMOVAL OF ENGINE MOUNT BRACKET

- (1) With a wooden block placed against the oil pan part of the engine, jack up the vehicle.

Caution

Jack up gently, so as not to apply a load to the various parts.

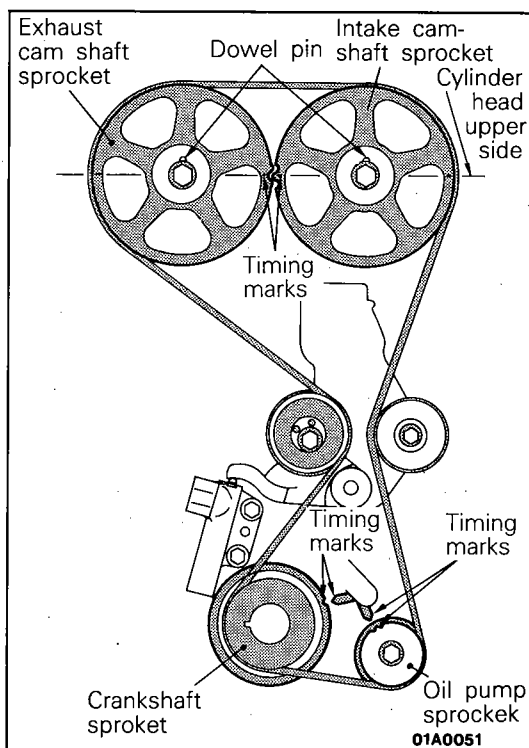
- (2) Remove the engine mount bracket.

3. REMOVAL OF DRIVE BELT

Before removing the drive belt, loosen the water pump pulley mounting bolts.

8. REMOVAL OF CRANKSHAFT PULLEY

Refer to P.9-110.

**18. REMOVAL OF AUTO TENSIONER**

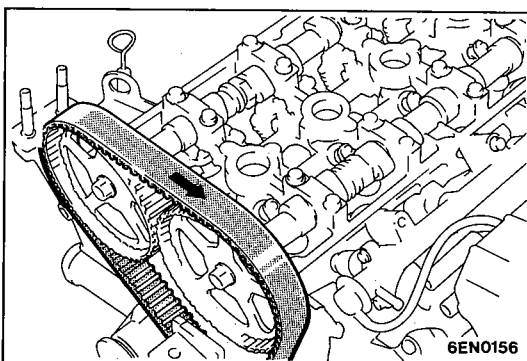
- (1) Turn the crankshaft clockwise and align the timing marks so as to bring the No. 1 cylinder to compression top-dead-center position.

At this time the timing marks of the camshaft sprocket and the upper surface of the cylinder head should coincide, and the dowel pin of the camshaft sprocket should be at the upper side.

Caution

The crankshaft must always be rotated clockwise.

- (2) Remove the auto tensioner.

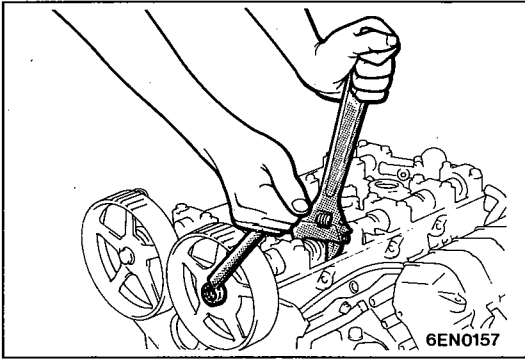
**19. REMOVAL OF TIMING BELT**

Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

Caution

Water or oil on the belt shorten its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.

If there is oil or water on each part, check the front case oil seals, camshaft oil seal and water pump for leaks.

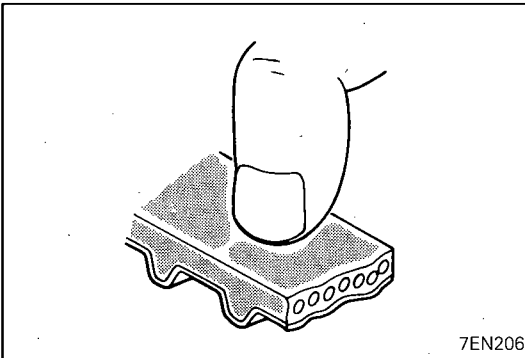
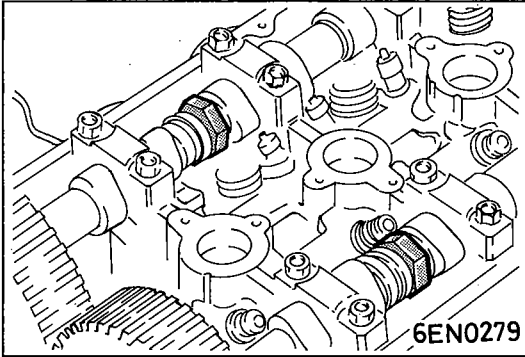
**23. REMOVAL OF CAMSHAFT SPROCKETS**

- (1) Using a wrench, hold the camshaft at its hexagon (between the No. 2 and No. 3 journals) and remove the camshaft sprocket bolt.

Caution

Locking the camshaft sprocket with a tool damages the sprocket.

- (2) Remove the camshaft sprockets

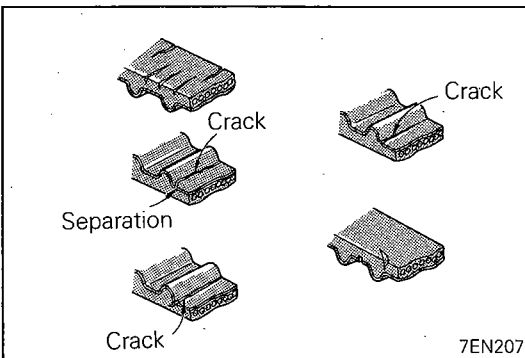
**INSPECTION**

N09KCAC

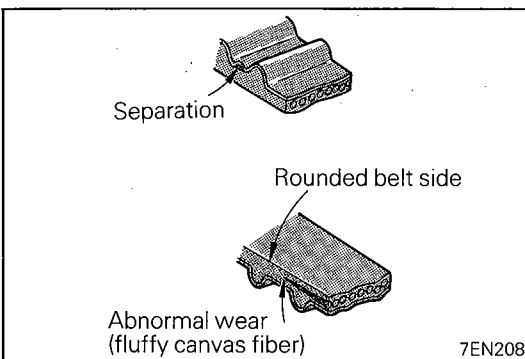
TIMING BELTS

The timing belts must be checked closely. Should the following defects be evident, replace the belt with a new one.

- (1) Hardened back surface rubber
Glossy, non-elastic, and so hard that no mark is produced even when scratched by a fingernail.



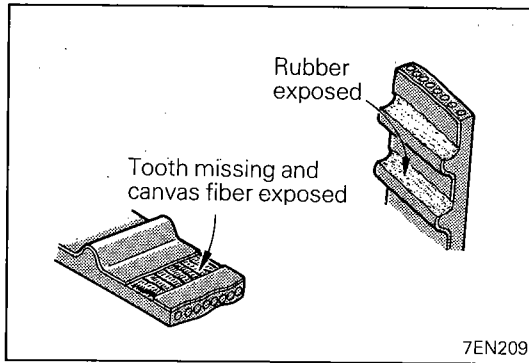
- (2) Cracked back surface rubber.
- (3) Cracked or separated canvas.
- (4) Cracked tooth bottom.
- (5) Cracked side of belt.



- (6) Abnormal wear on side.

NOTE

Normal belt should have clear-cut sides as if cut with a sharp knife.



(7) Abnormal wear on teeth

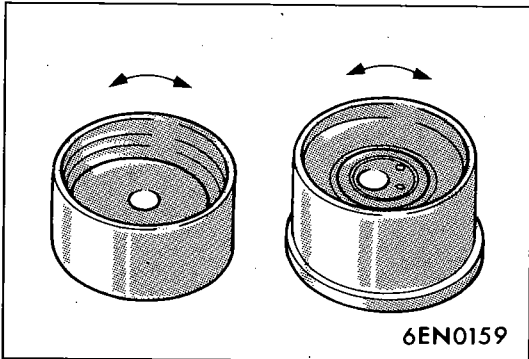
Initial stage:

Canvas on load side tooth flank worn (fluffy canvas fibers, rubber gone and color changed to white, and unclear canvas texture)

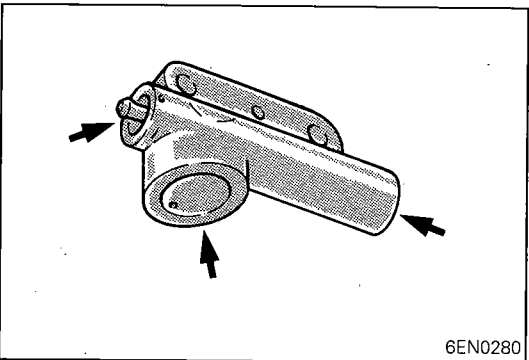
Last stage:

Canvas on load side flank worn down and rubber exposed (tooth width reduced)

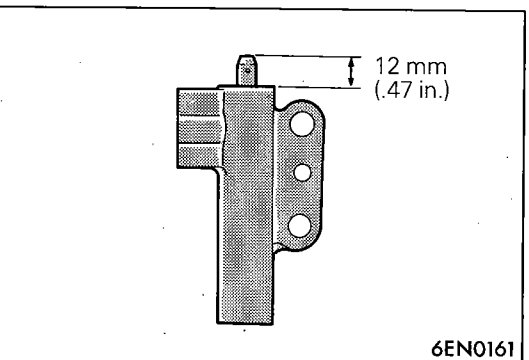
(8) Missing tooth

**TENSIONER PULLEY AND IDLER PULLEY**

- (1) Turn the pulleys to check for possible binding, excessive play, and unusual noise. Replace the pulley if any of these defects is evident.
- (2) Replace if there is a grease leak.

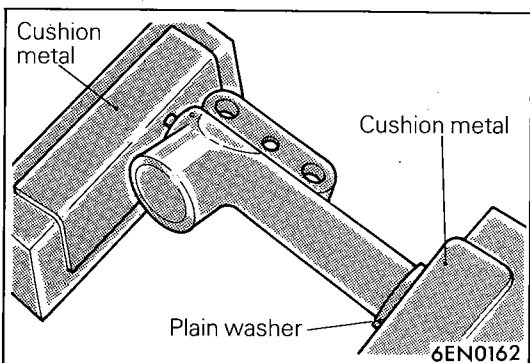
**AUTO TENSIONER**

- (1) Check the auto tensioner for possible leaks and replace as necessary.
- (2) Check the rod end for wear or damage and replace as necessary.



- (3) Measure the rod protrusion. If it is out of specification, replace the auto tensioner.

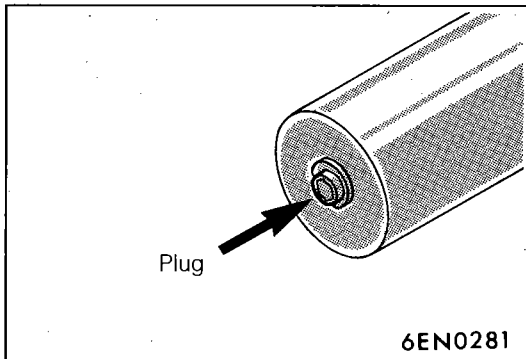
Standard value: 12 mm (.47 in.)



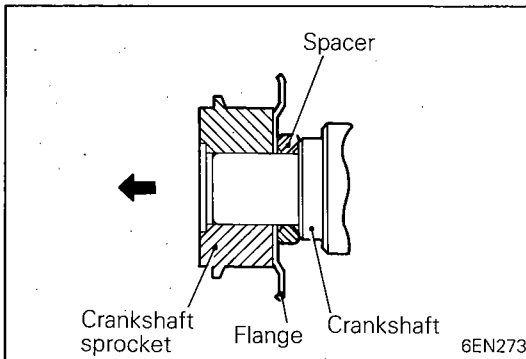
- (4) Using a vise with soft jaws push in the auto tensioner rod. If the rod can be easily retracted, replace the auto tensioner. You should feel a fair amount of resistance when pushing the rod in.

Caution

1. **Clamp the auto tensioner in the vise so it maintains a level position.**



2. If the plug at the bottom of the auto tensioner protrudes, apply a plain washer as illustrated to prevent the plug from being in direct contact with the vise.



SERVICE POINTS OF INSTALLATION

N09KDCG

28. INSTALLATION OF FLANGE

Install the flange in correct direction as shown.

Caution

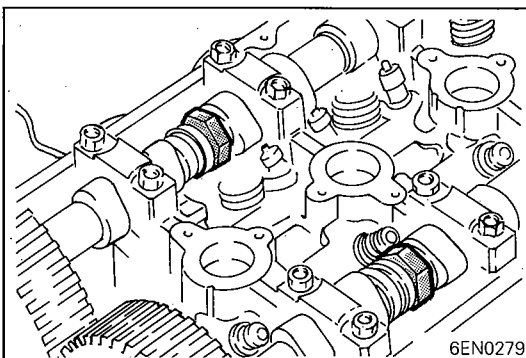
Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken timing belt could result.

27. INSTALLATION OF CRANKSHAFT SPROCKET

Install the crankshaft sprocket in the correct direction as shown.

Caution

Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken timing belt could result.

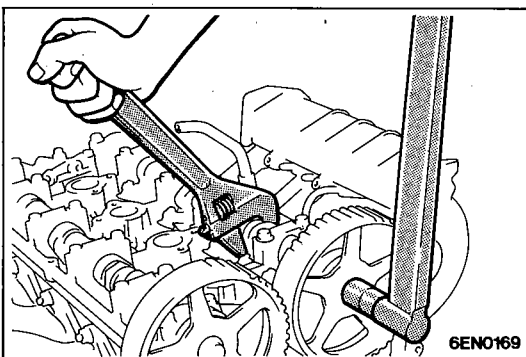


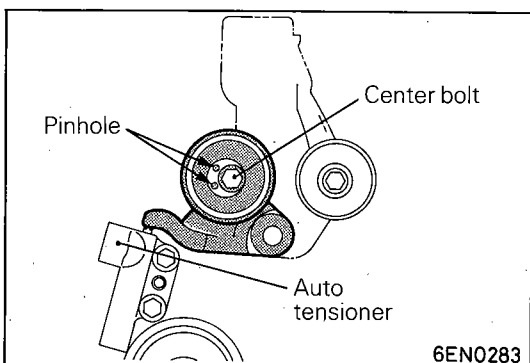
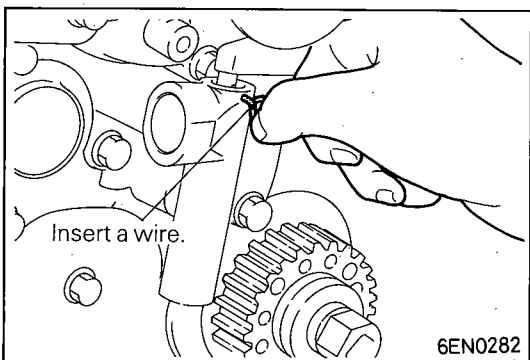
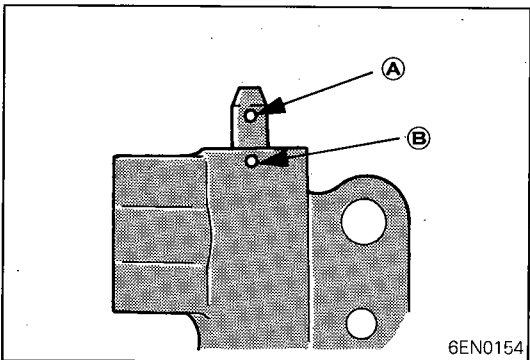
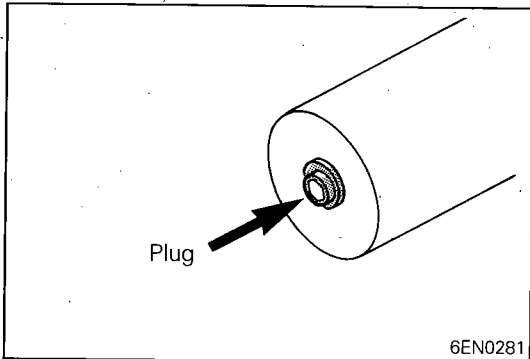
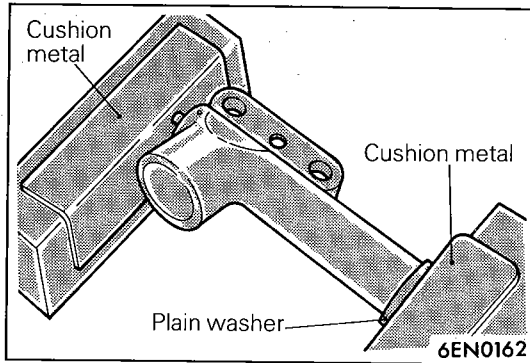
23. INSTALLATION OF CAMSHAFT SPROCKETS

Using a wrench, hold the camshaft at its hexagon (between the No. 2 and No. 3 journals) and tighten the bolt to specification.

Caution

Locking the camshaft sprocket with a tool damages the sprocket.





18. INSTALLATION OF AUTO TENSIONER

(1) If the auto tensioner rod is in its fully extended position, reset it as follows.

- ① Keep the auto tensioner level and, in that position, clamp it in the vise with soft jaws.

If the plug at the bottom of the auto tensioner protrudes, apply a plain washer as illustrated to prevent the plug from being in direct contact with the vise.

- ② Push in the rod little by little with the vise until the set hole **A** in the rod is aligned with that **B** in the cylinder.

- ③ Insert a wire [1.4 mm (.055 in.) in diameter] into the set holes.

- ④ Unclamp the auto tensioner from the vise.

(2) Install the auto tensioner.

Caution

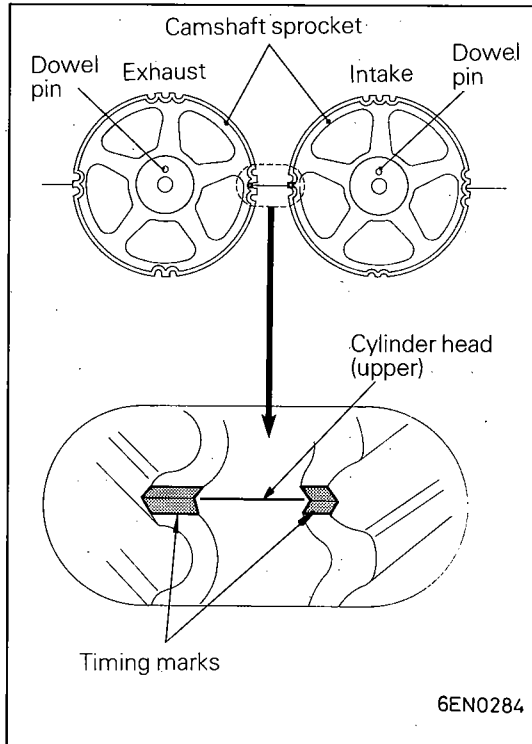
Leave the wire installed in the auto tensioner.

20. INSTALLATION OF TENSIONER PULLEY

- (1) Install the tensioner pulley onto the tensioner arm.
- (2) Locate the pinhole in the tensioner pulley shaft to the left of the center bolt. Then, tighten the center bolt finger-tight.

Caution

Leave the wire installed in the auto tensioner.

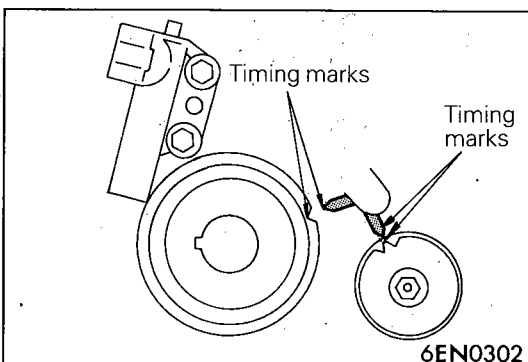
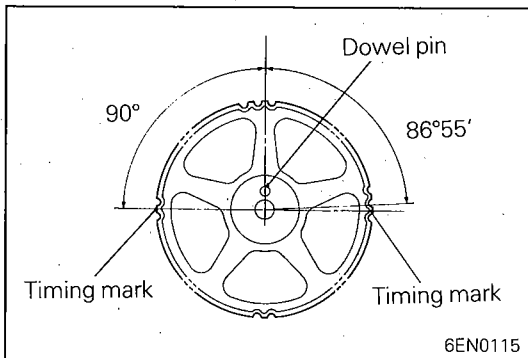
**19. INSTALLATION OF TIMING BELT**

- (1) Turn the two sprockets so that their dowel pins are located on top. Then, align the timing marks facing each other with the top surface of the cylinder head. When you let go of the exhaust camshaft sprocket, it will rotate one tooth in the counter-clockwise direction. This should be taken into account when installing the timing belt on the sprockets.

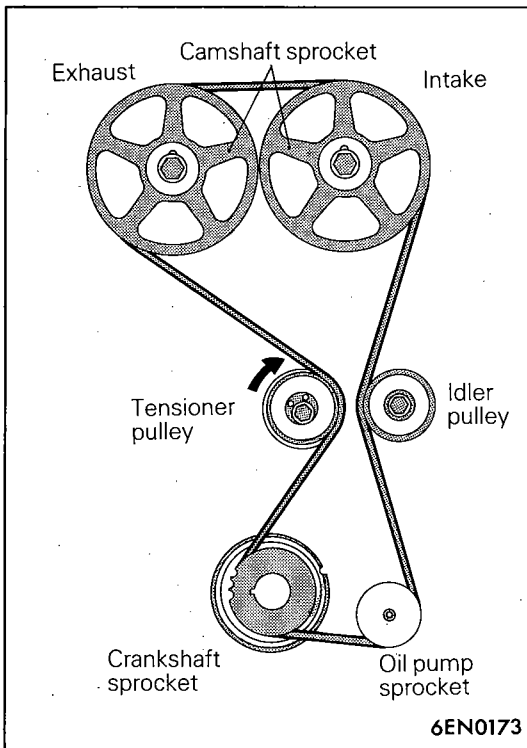
NOTE

The same camshaft sprocket is used for the intake and exhaust camshafts and is provided with two timing marks.

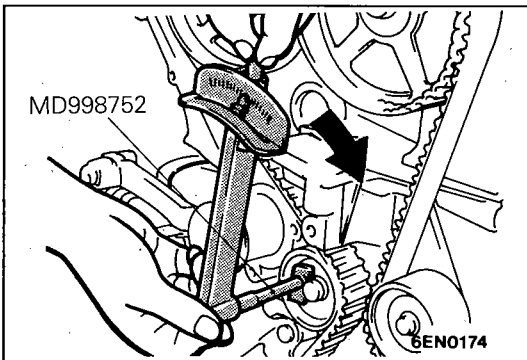
When the sprocket is mounted on the exhaust camshaft, use the timing mark on the right with the dowel pin hole on top. For the intake camshaft sprocket, use the one on the left with the dowel pin hole on top.



- (2) Align the crankshaft sprocket timing marks.
- (3) Align the oil pump sprocket timing marks.



- (4) Install the timing belt around sprockets as follows.
- ① Install the timing belt around the tensioner pulley and crankshaft sprocket and secure the timing belt onto the tensioner pulley with your left hand.
 - ② Pulling the belt with your right hand, install it around the oil pump sprocket.
 - ③ Install the belt around the idler pulley.
 - ④ Install it around the intake camshaft sprocket.
 - ⑤ Turn the exhaust camshaft sprocket one tooth clockwise to align its timing mark with the cylinder head top surface [see illustration in step (1)]. Then, pulling the belt with both hands, install it around the exhaust camshaft sprocket.
 - ⑥ Gently raise the tensioner pulley as shown by the arrow, so that the belt does not sag, and temporarily tighten the center bolt.



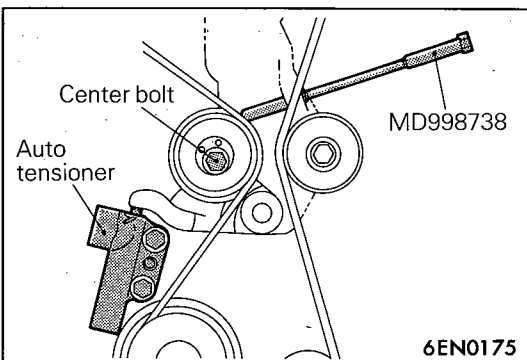
• ADJUSTMENT OF TIMING BELT TENSION

- (1) After turning the crankshaft 1/4 turn counterclockwise, turn it clockwise to move the No. 1 cylinder to top dead center.
- (2) Loosen the center bolt, and then, as shown in the illustration, attach the special tool and a torque wrench and apply a torque of 2.6 – 2.8 Nm (1.88 – 2.03 ft.lbs.). If the body interferes with the special tool and the torque wrench, use a jack to slightly raise the engine assembly.

NOTE

Use a torque wrench that is capable of measurement within a range of 0 – 3 Nm (0 – 2.2 ft.lbs.).

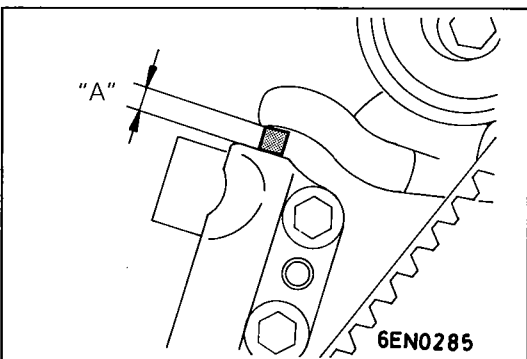
- (3) Holding the tensioner pulley with the special tool and torque wrench, tighten the center bolt to specification.
- (4) Screw the special tool into the engine left support bracket until its end makes contact with the tensioner arm. At that point, screw the special tool some more and then remove the set wire attached to the auto tensioner.
- (5) Remove the special tool.

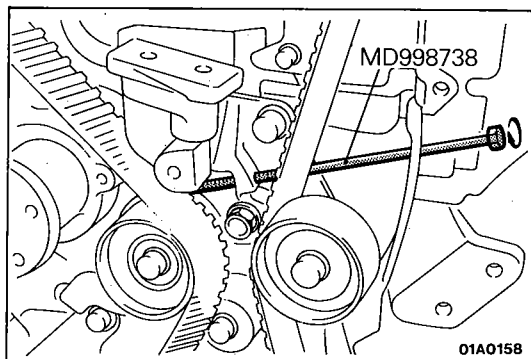


- (6) Rotate the crankshaft two complete turns clockwise and leave it as is for about 15 minutes. Then, measure the auto tensioner protrusion "A" (distance between the tensioner arm and auto tensioner body) to ensure that it is up to specification.

Standard value: 3.8 – 4.5 mm (.15 – .18 in.)

If it is out of specification, repeat steps (1) through (6) until the specified value is obtained.



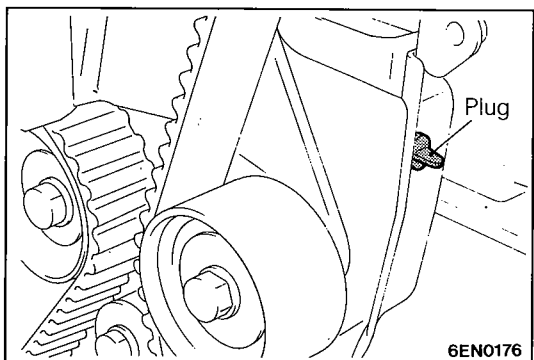
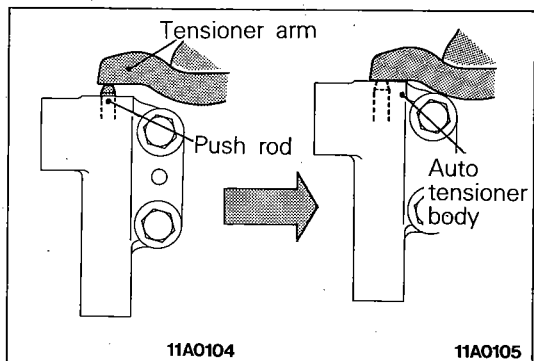


(7) If the clearance "A" between the tensioner arm and the auto tensioner body cannot be measured (when the engine is mounted on the vehicle, for example), the following alternative method may be used.

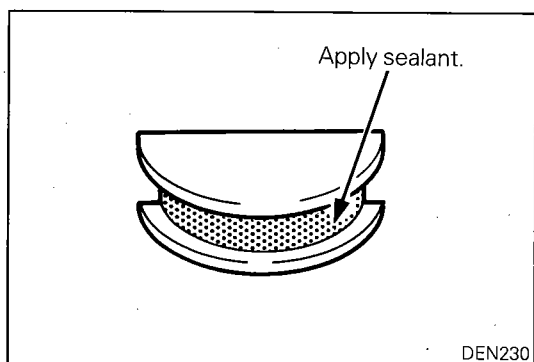
① Screw in the special tool until its end makes contact with the tensioner arm.

② Starting with that position, screw in the special tool some more to retract the auto tensioner push rod while counting the number of turns of the tool makes until the tensioner arm is brought into contact with the auto tensioner body. Make sure that the number of turns the special tool makes conforms with the standard value.

Standard value: 2.5 – 3 turns



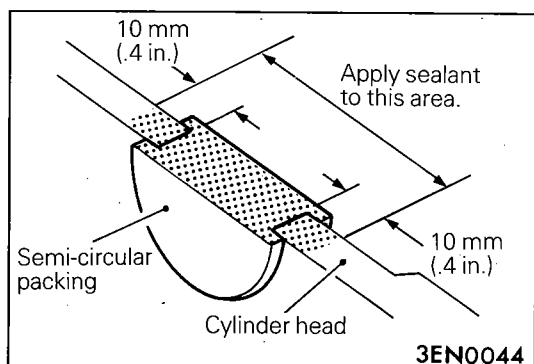
(8) Install the rubber plug to the timing belt rear cover.



16. APPLICATION OF SEALANT ON SEMI-CIRCULAR PACKING

Apply sealant on the periphery of the semi-circular packing.

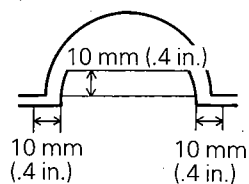
Specified sealant: MOPAR Part No. 4318034 or equivalent



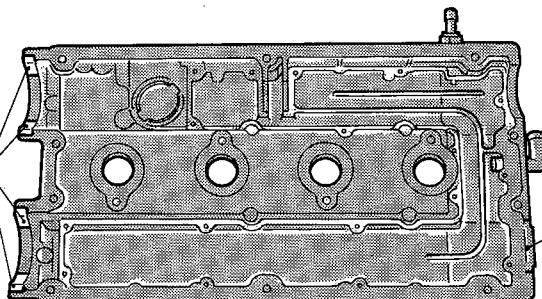
15. APPLICATION OF SEALANT ON ROCKER COVER

Apply sealant to the areas indicated in the illustration.

Specified sealant: MOPAR Part No. 4318034 or equivalent



Apply sealant

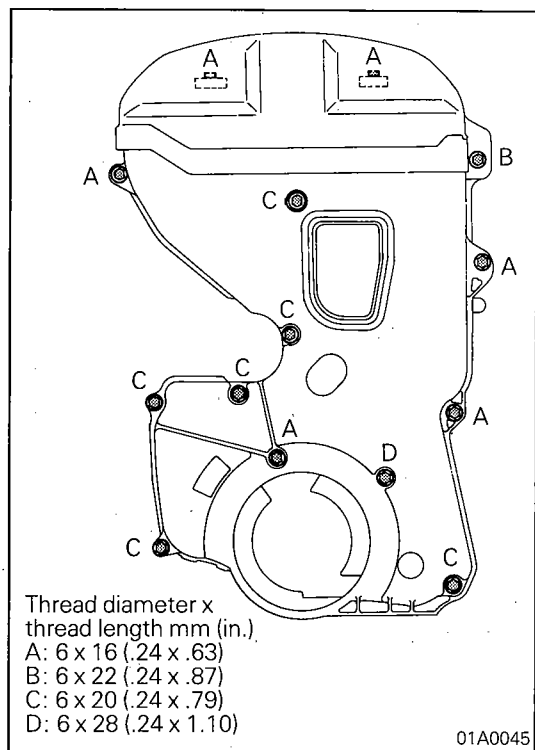


Apply sealant

6EN0286

10. INSTALLATION OF TIMING BELT LOWER COVER / 9. TIMING BELT UPPER COVER

The dimensions of the installation bolts for the timing covers differ according to the installation location, so be sure not to install the bolts in the incorrect locations.

**8. INSTALLATION OF CRANKSHAFT PULLEY**

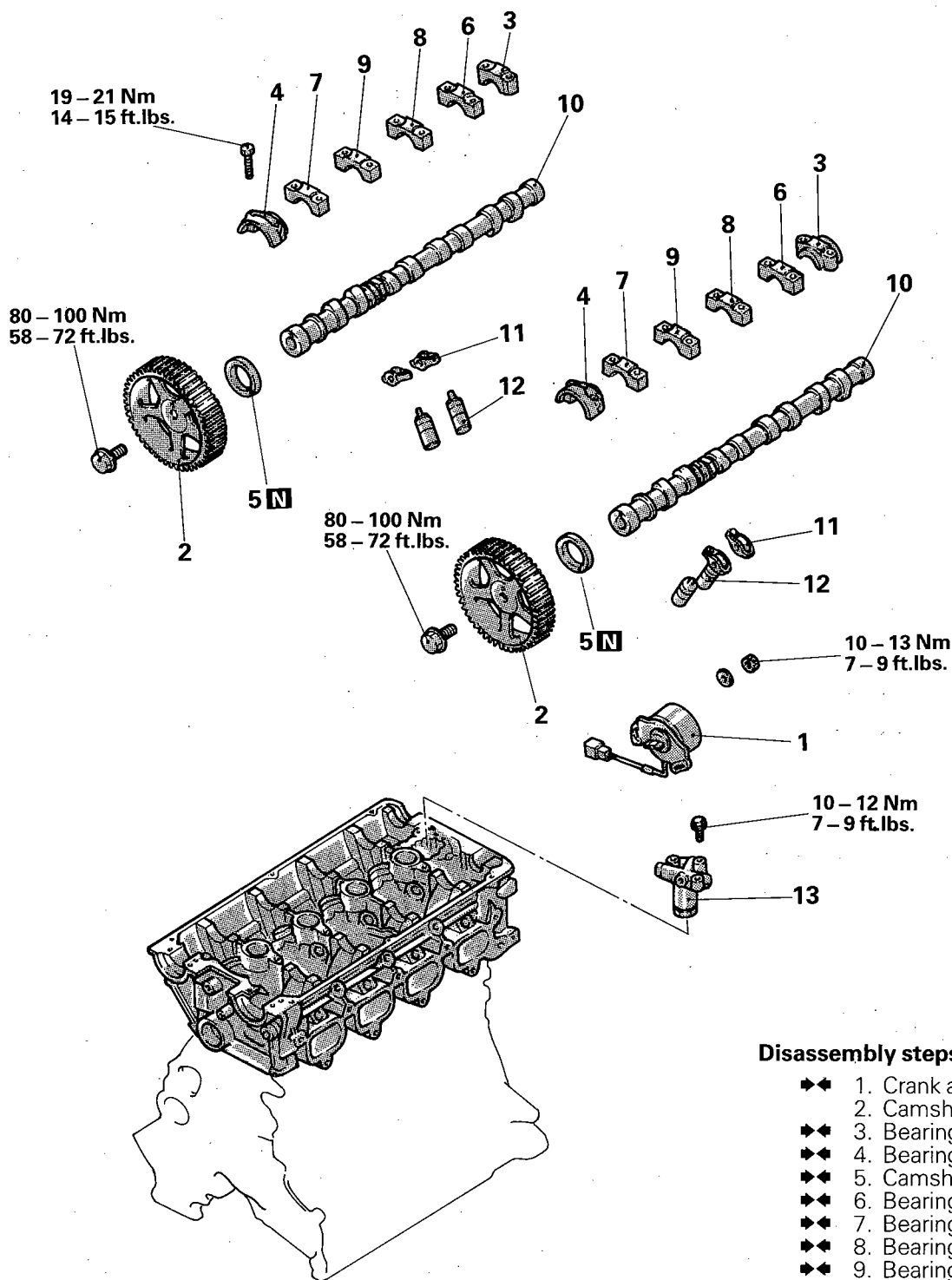
Refer to P.9-110.

6. 4. 3. ADJUSTMENT OF DRIVE BELT TENSION

Refer to P.9-81.

CAMSHAFT AND ROCKER ARMS

DISASSEMBLY AND REASSEMBLY

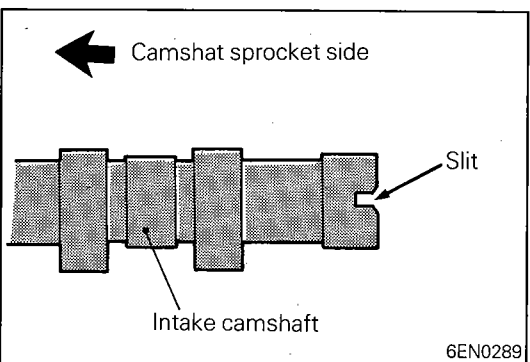
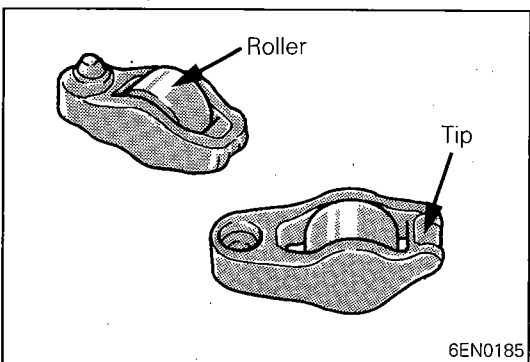
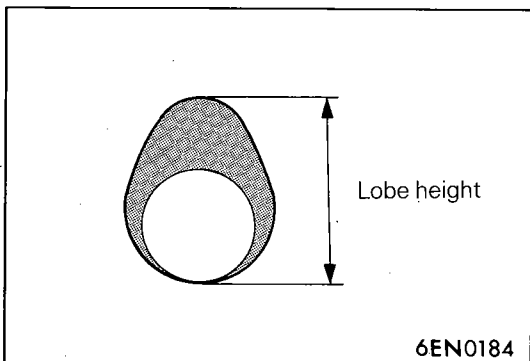
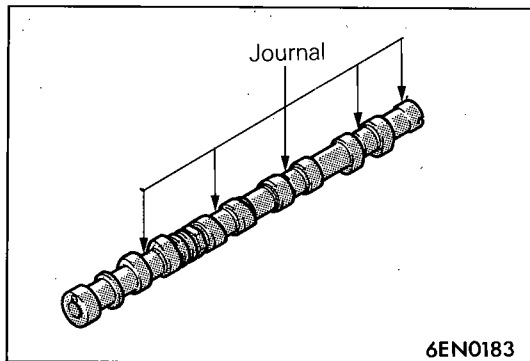


Disassembly steps

- ◆◆ 1. Crank angle sensor
- ◆◆ 2. Camshaft sprocket
- ◆◆ 3. Bearing cap, rear
- ◆◆ 4. Bearing cap, front
- ◆◆ 5. Camshaft oil seal
- ◆◆ 6. Bearing cap No. 5
- ◆◆ 7. Bearing cap No. 2
- ◆◆ 8. Bearing cap No. 4
- ◆◆ 9. Bearing cap No. 3
- ◆◆ 10. Camshaft
- 11. Rocker arm
- 12. Lash adjuster
- 13. Valve body

NOTE

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Reassembly".
- (3) **N**: Non-reusable parts



INSPECTION

N09LCDC

CAMSHAFT

- (1) Visually check the camshaft journal surfaces and replace if damage or seizure is evident.
If the journal is seized, check the cylinder head for possible damage. Check also for clogged oil holes in the cylinder head.

- (2) Check cams for excessive wear and damage and replace if defects are evident. Measure the lobe height and replace if the limit is not reached.

Standard value:

Intake 35.200 mm (1.3858 in.)

Exhaust 34.907 mm (1.3743 in.)

Limit:

Intake 34.700 mm (1.3661 in.)

Exhaust 34.407 mm (1.3546 in.)

ROCKER ARM

- (1) Visually check the roller and replace if dent, damage, or seizure is evident.
- (2) Check the roller for smooth rotation. Replace if it binds or there is an excessive play.
- (3) Check the valve contact surface for possible damage or seizure and replace as necessary.

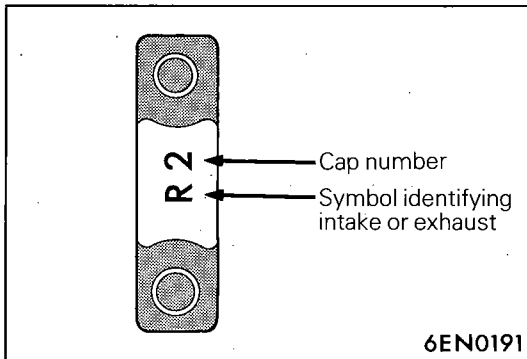
SERVICE POINTS OF REASSEMBLY

N09LGAB

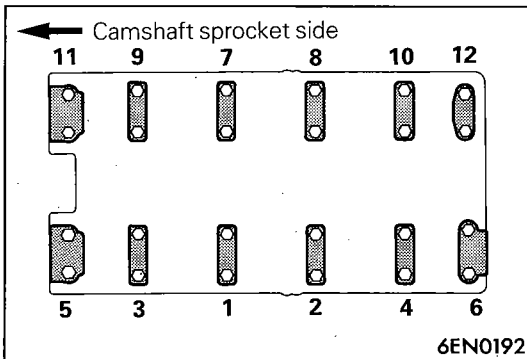
10. INSTALLATION OF CAMSHAFTS

- (1) Apply engine oil to journals and cams of the camshafts.
- (2) Install the camshafts on the cylinder head.
Use care not to confuse the intake camshaft with the exhaust one. The intake camshaft has a slit on its rear end for driving the crank angle sensor.

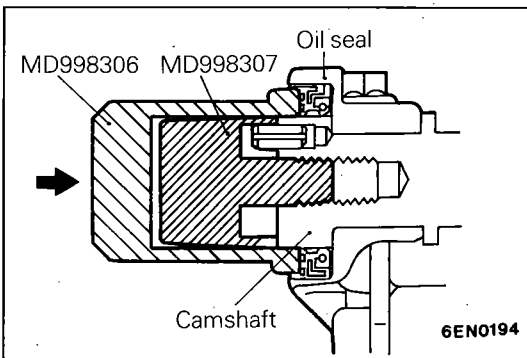
- (3) Make also sure that the dowel pins on the camshaft sprocket end are located on the top.

**9. 8. 7. 6. 4. 3. INSTALLATION OF BEARING CAPS**

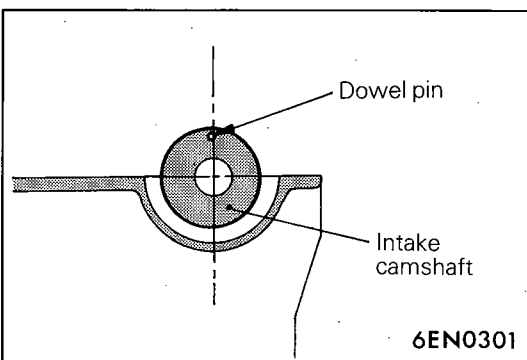
- (1) Bearing caps Nos. 2 to 5 are of the same shape. At installation, check the markings on the caps to identify the cap number and intake/exhaust identification symbol. Only "L" or "R" is stamped on No. 1 bearing cap.
L: For intake camshaft side
R: For exhaust camshaft side



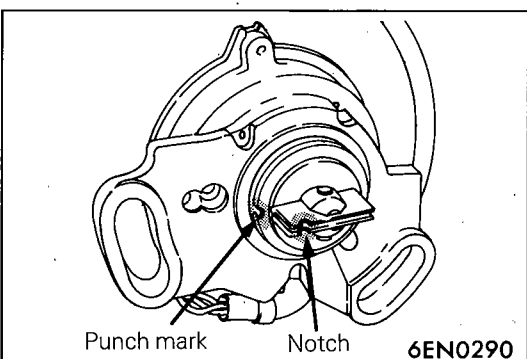
- (2) Tighten the bearing caps in the order shown two to three times by torquing progressively. Tighten to specification in the final sequence.
- (3) Make sure that the rocker arm is correctly mounted on the lash adjuster and the valve stem end.

**5. INSTALLATION OF CAMSHAFT OIL SEAL**

- (1) Install the special tool, Guide, on the camshaft.
- (2) Apply oil to the oil seal and insert the oil seal along the Guide until it contacts the cylinder head.
- (3) Using the special tool, Installer, press-fit the oil seal into the cylinder head.

**1. INSTALLATION OF CRANK ANGLE SENSOR**

- (1) Locate the dowel pin on the sprocket side of the intake camshaft at top.



- (2) Align the punch mark on the crank angle sensor housing with the notch in plate.

NOTE

The crank angle sensor can be installed even when the punch mark is positioned opposite the notch; however, the position results in incorrect fuel injection and ignition timings.

- (3) Install the crank angle sensor on the cylinder head.

CYLINDER HEAD AND VALVE

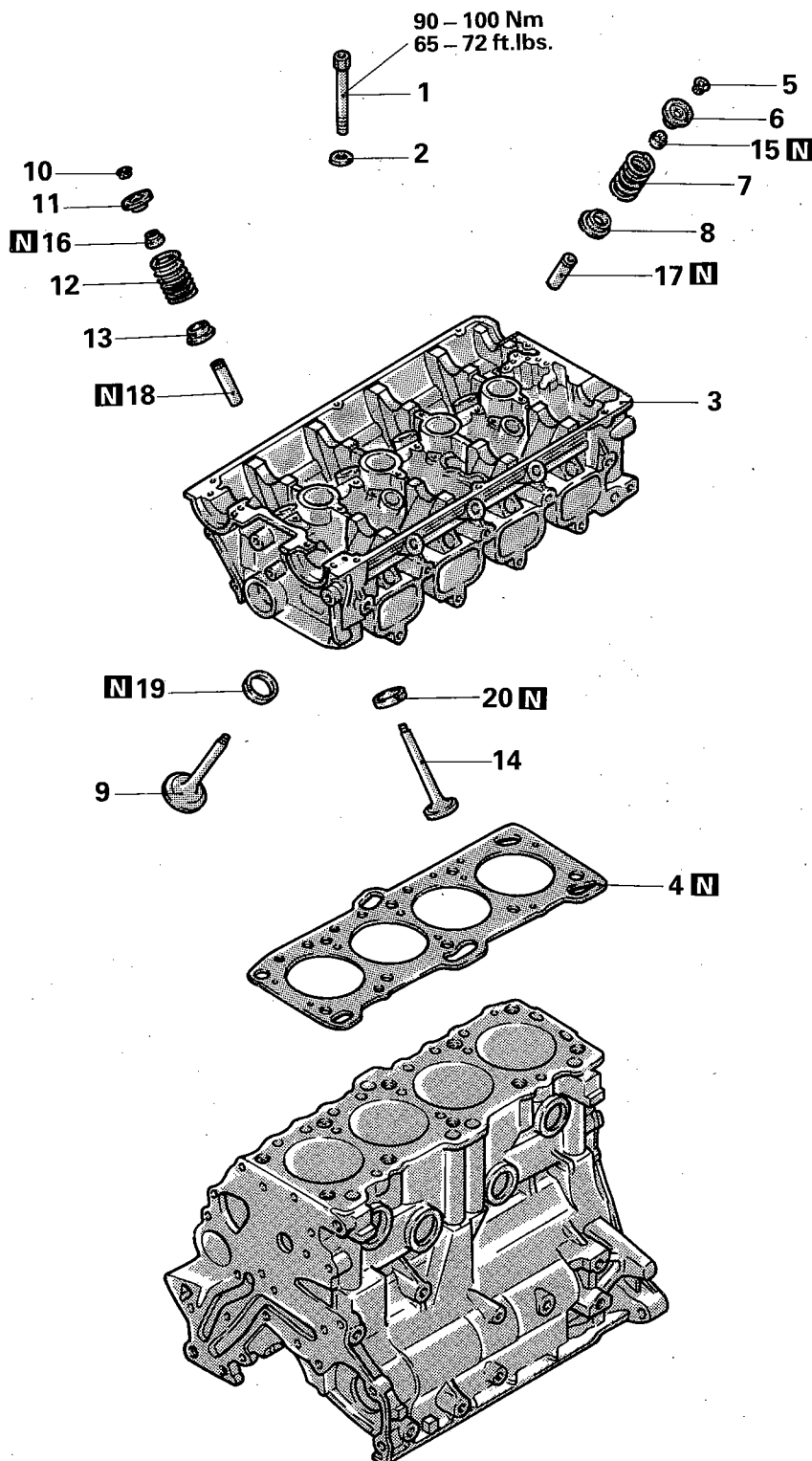
DISASSEMBLY AND REASSEMBLY

Disassembly steps

- ↔ 1. Cylinder head bolt
- 2. Washer
- 3. Cylinder head
- 4. Gasket
- 5. Retainer lock
- 6. Valve spring retainer
- 7. Valve spring
- 8. Valve spring seat
- ↔ 9. Intake valve
- 10. Retainer lock
- 11. Valve spring retainer
- 12. Valve spring
- 13. Valve spring seat
- ↔ 14. Exhaust valve
- ↔ 15. Valve stem seal
- ↔ 16. Valve stem seal
- 17. Intake valve guide
- 18. Exhaust valve guide
- 19. Intake valve seat
- 20. Exhaust valve seat

Reassembly steps

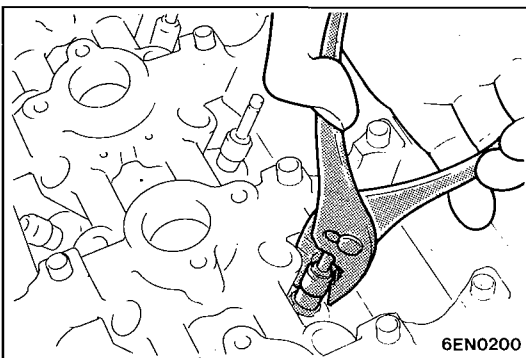
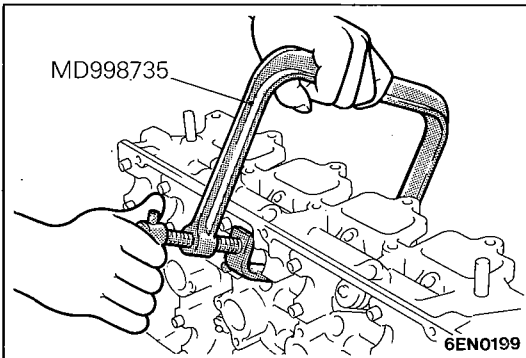
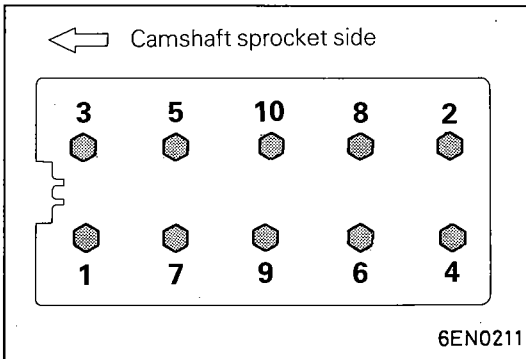
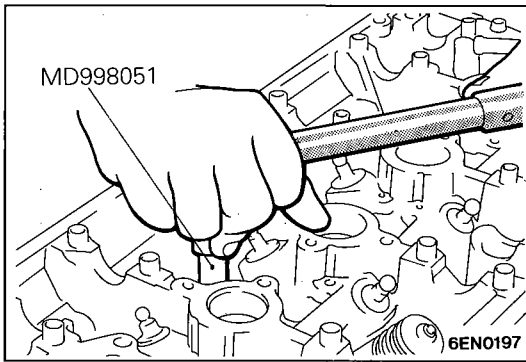
- 20. Exhaust valve seat
- 19. Intake valve seat
- 18. Exhaust valve guide
- 17. Intake valve guide
- 13. Valve spring seat
- ↔ 16. Valve stem seal
- 8. Valve spring seat
- ↔ 15. Valve stem seal
- 14. Exhaust valve
- 12. Valve spring
- 11. Valve spring retainer
- ↔ 10. Retainer lock
- 9. Intake valve
- 7. Valve spring
- 6. Valve spring retainer
- ↔ 5. Retainer lock
- ↔ 4. Gasket
- 3. Cylinder head
- 2. Washer
- ↔ 1. Cylinder head bolt



NOTE

- (1) ↔: Refer to "Service Points of Disassembly".
- (2) ↔: Refer to "Service Points of Reassembly".
- (3) N: Non-reusable parts

6EN0196

**SERVICE POINTS OF DISASSEMBLY**

N09PFAH

1. REMOVAL OF CYLINDER HEAD BOLTS

(1) Using the special tool, remove the cylinder head bolts.

(2) Loosen the cylinder head bolts in the order shown. Loosen bolts evenly little by little, taking several steps.

9. REMOVAL OF INTAKE VALVE / 14. EXHAUST VALVE

- (1) Using the special tool, compress the spring and remove the retainer lock.
- (2) Remove the special tool and remove the spring retainer, valve spring, spring seat, and valve.
- (3) Keep removed parts in order according to the cylinder number and intake/exhaust.

15. 16. REMOVAL OF VALVE STEM SEALS

To remove the valve stem seal, use pliers.

Caution

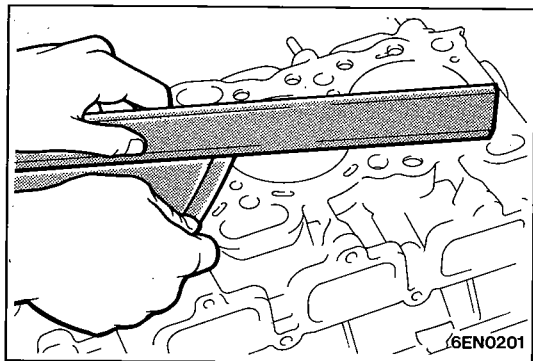
Do not reuse the stem seals.

INSPECTION

N09OCAH1

CYLINDER HEAD

- (1) Before cleaning the cylinder head, be sure to check for possible coolant or gas leak, damage, and cracks.
- (2) Completely remove oil, scale, sealant, and carbon deposits. After the oil passages have been flushed, blow air into the passages to ensure that they are not plugged.



- (3) Using a straightedge and feeler gauge, check the cylinder head bottom surface for flatness. If it warps excessively, correct by grinding within the allowable limit.

Bottom surface distortion

Standard value: Within 0.05 mm (.0020 in.)

Limit: 0.2 mm (.008 in.)

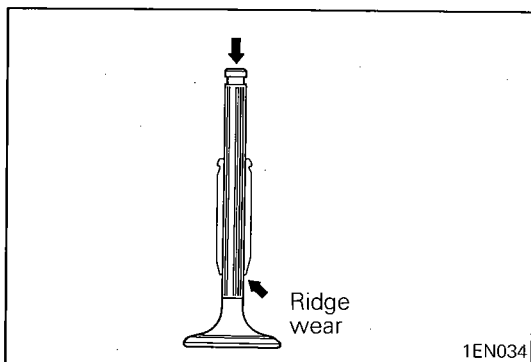
Grinding limit: 0.2 mm (.008 in.)

Cylinder head height (when new):

131.9 – 132.1 mm (5.193 – 5.201 in.)

Caution

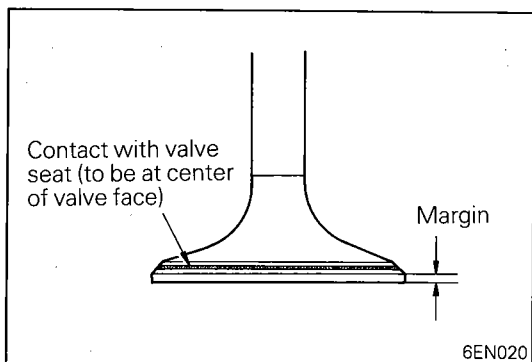
The total thickness of the stock allowed to be removed from the cylinder head and mating cylinder block is 0.2 mm (.008 in.) at maximum.



VALVE

N09PGA1

- (1) Check the valve stem for wear (ridge wear).
(2) Check the valve stem end face for wear and dents.



- (3) Check the valve seat for proper contact with the valve set. If it is not concentric, correct the valve seat.
(4) If the margin is out of the limit, replace the valve.

Standard value:

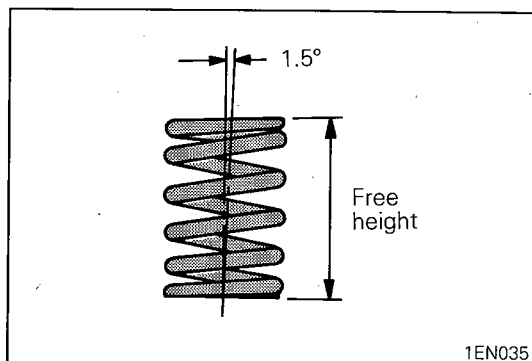
Intake 1.0 mm (.039 in.)

Exhaust 1.5 mm (.059 in.)

Limit:

Intake 0.7 mm (.028 in.)

Exhaust 1.0 mm (.039 in.)



VALVE SPRING

N09PGBC1

- (1) Measure the free height of the spring and replace if it is out of the limit.

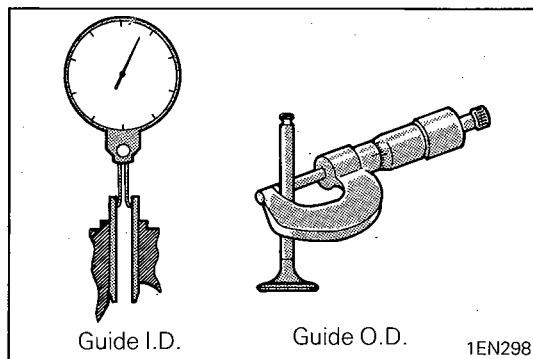
Standard value: 45.8 mm (1.803 in.)

Limit: 44.9 mm (1.768 in.)

- (2) Check the spring for squareness and replace if the limit is exceeded.

Standard value: Less than 1.5°

Limit: 4°

**VALVE GUIDE**

N09PGCC1

Measure the clearance between the valve guide and valve stem and, if the clearance exceeds the limit, replace the valve guide or valve, or both.

Standard value:

Intake 0.02 – 0.047 mm (.0008 – .0019 in.)

Exhaust 0.05 – 0.085 mm (.0020 – .0033 in.)

Limit:

Intake 0.10 mm (.0039 in.)

Exhaust 0.15 mm (.0059 in.)

SERVICE POINTS OF REASSEMBLY

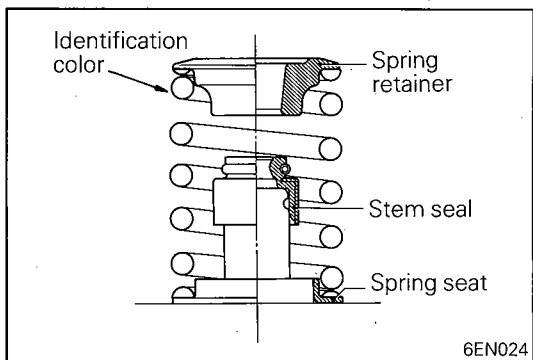
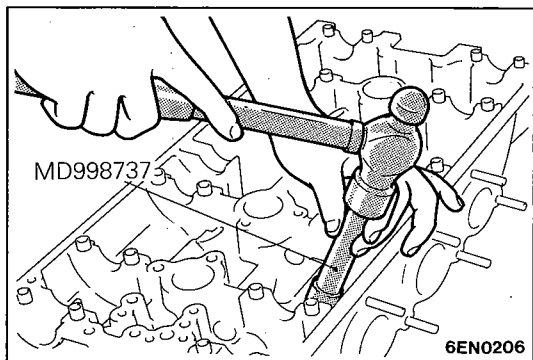
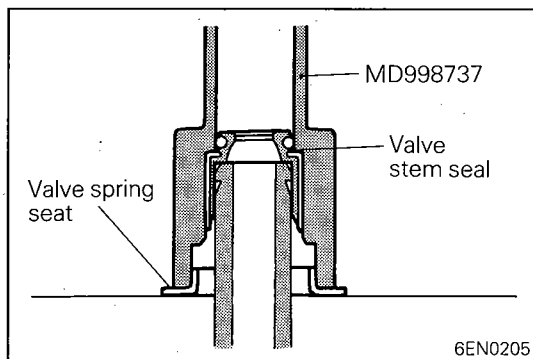
N09PKDF

16. 15. INSTALLATION OF VALVE STEM SEAL

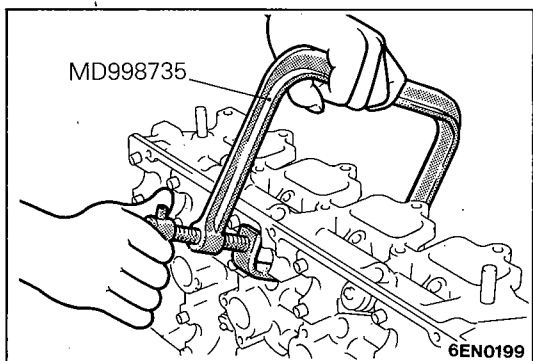
- (1) Install the valve spring seat.
- (2) Using the special tool, install a new stem seal to the valve guide.

Caution

1. Do not reuse the valve stem seal.
2. Use the special tool to install the valve stem seal. Improper installation can be a cause of leakage of oil down into the cylinder.

**10. 5. INSTALLATION OF RETAINER LOCK**

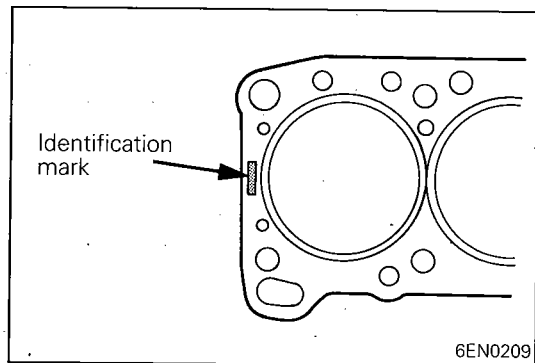
- (1) Install the valve spring so that its end with identification color is positioned on the rocker arm end.



- (2) Using the special tool, compress the valve spring and insert the retainer lock into position.

Caution

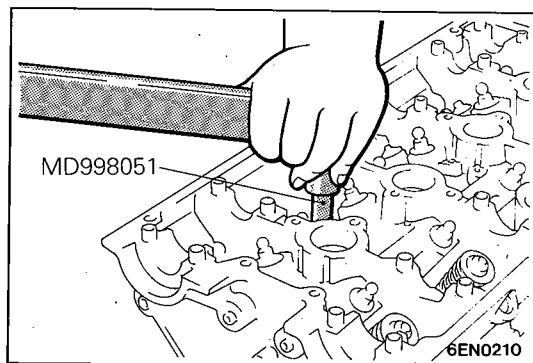
If the valve spring is compressed excessively, the lower end of the retainer contacts the stem seal, damaging the stem seal.



4. INSTALLATION OF CYLINDER HEAD GASKET

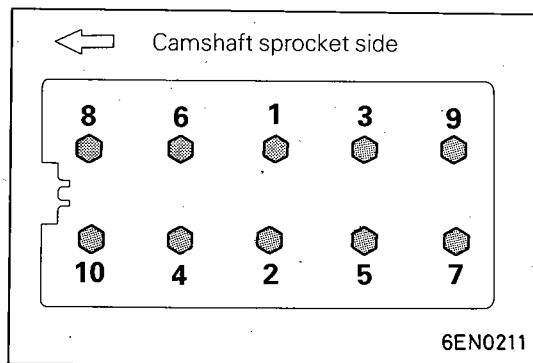
- (1) Clean both gasket surfaces of the cylinder block and cylinder head.
- (2) Place a new cylinder head gasket onto the cylinder block.

Identification mark: 16



1. INSTALLATION OF CYLINDER HEAD BOLTS

- (1) Using the special tool, tighten the cylinder head bolts.

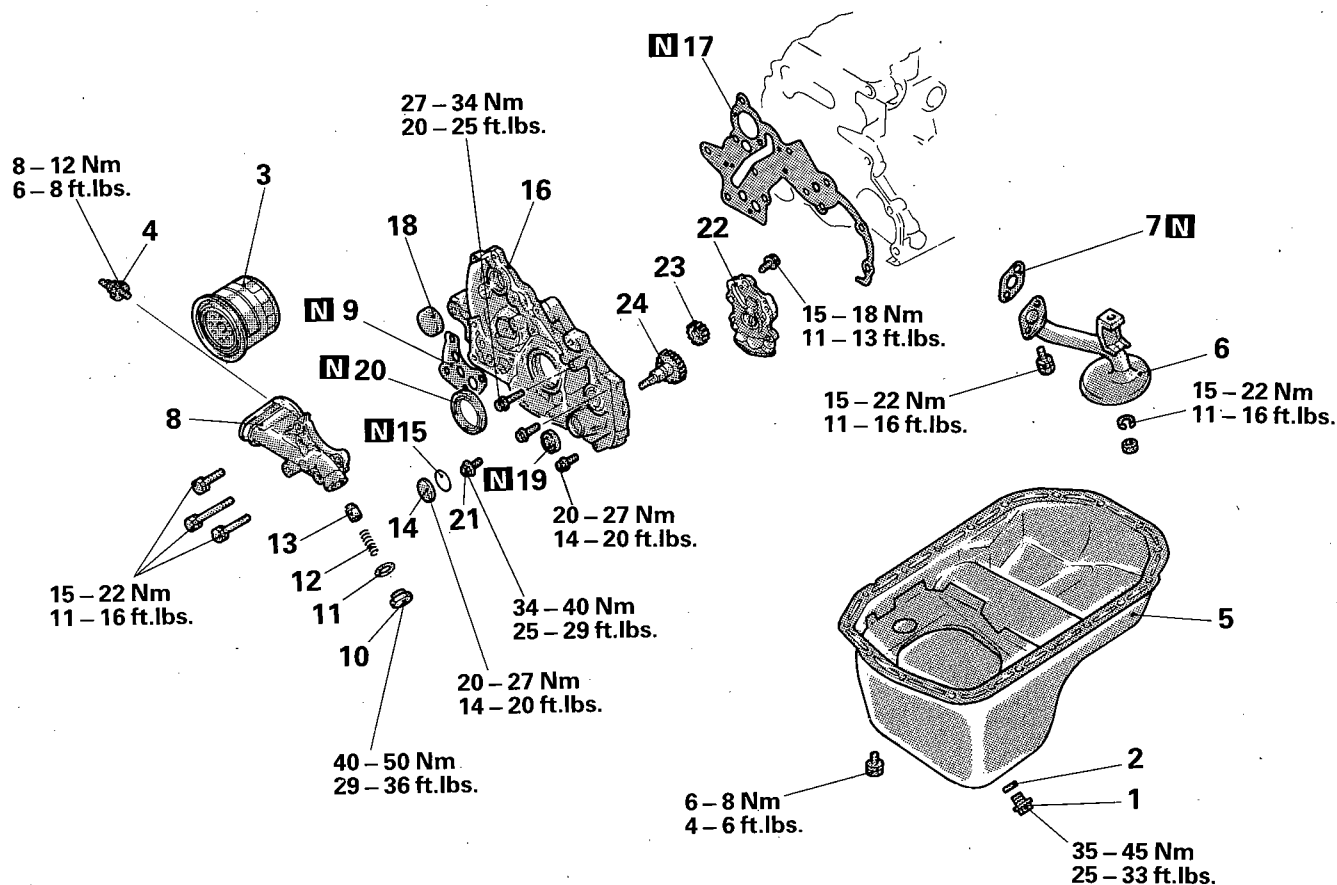


- (2) Tighten the cylinder head bolts in the sequence shown. Each bolt should be tightened in two to three steps, torquing progressively. Tighten to specified torque in the final sequence.

FRONT CASE AND OIL PUMP

DISASSEMBLY AND REASSEMBLY

N09RF-B



6EN0318

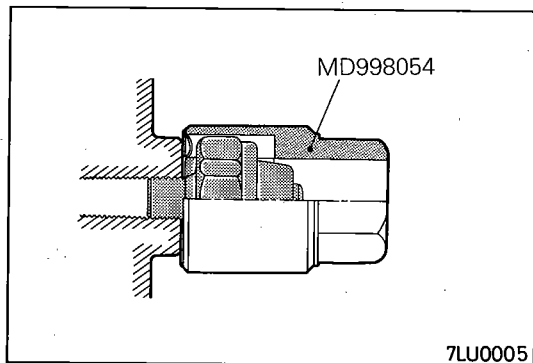
Disassembly steps

1. Drain bolt
2. Gasket
3. Oil filter
- ↔ ↔ 4. Oil pressure switch
- ↔ ↔ 5. Oil pan
6. Oil screen
7. Gasket
8. Oil filter bracket
9. Gasket
10. Relief plug
11. Gasket
12. Relief spring
13. Relief plunger
- ↔ ↔ 14. Plug cap
15. O-ring

- ↔ ↔ 16. Front case
17. Gasket
18. Cap
- ↔ ↔ 19. Oil seal
- ↔ ↔ 20. Oil seal
21. Driven gear bolt
22. Oil pump cover
- ↔ ↔ 23. Driven gear
- ↔ ↔ 24. Drive gear

NOTE

- (1) Reverse the disassembly procedures to reassemble.
- (2) ↔: Refer to "Service Points of Disassembly".
- (3) ↔: Refer to "Service Points of Reassembly".
- (4) N: Non-reusable parts



SERVICE POINTS OF DISASSEMBLY

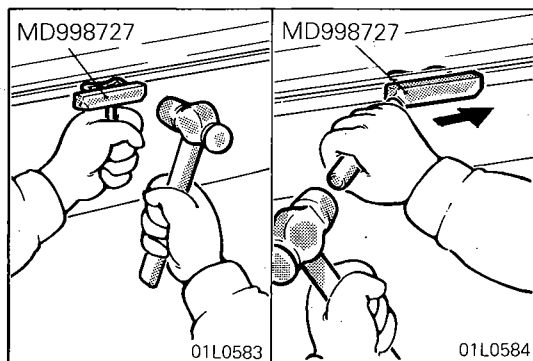
N09RGAB

4. REMOVAL OF OIL PRESSURE SWITCH

- (1) Remove the oil pressure switch terminals.
- (2) Using the special tool, remove the oil pressure switch.

Caution

Since sealant is coated on the thread area, be careful not to break it.



5. REMOVAL OF OIL PAN

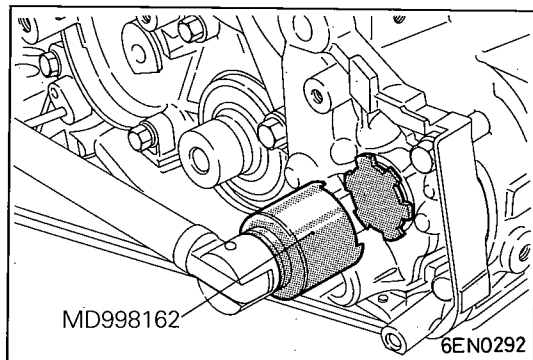
- (1) Remove the all oil pan bolts.
- (2) Drive in the special tool between the cylinder block and oil pan.

NOTE

Never use a screwdriver or chisel, instead of the special tool, as a deformed oil pan flange will result, resulting in oil leakage.

14. REMOVAL OF PLUG CAP

Using the special tool, remove the plug cap.



INSPECTION

N09RCJC

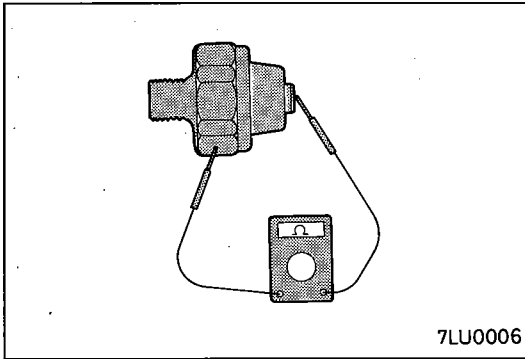
FRONT CASE

- (1) Check oil holes for clogging and clean if necessary.
- (2) Check silent shaft front bearing section for wear, damage and seizure. If there is anything wrong with the section, replace the front case.
- (3) Check the front case for cracks and other damage. Replace cracked or damaged front case.

OIL SEAL

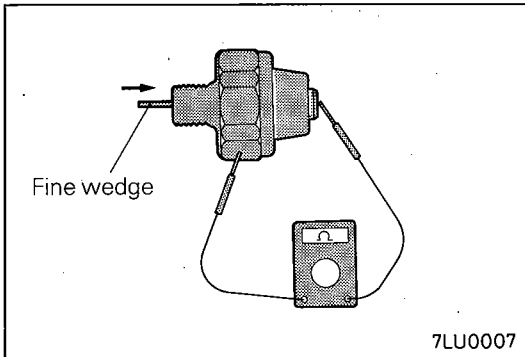
N09RCMA

- (1) Check the oil seal lip for wear and damage. Replace oil seal if necessary.
- (2) Check the oil seal lip for deterioration. Replace oil seal if necessary.

**OIL PRESSURE SWITCH**

N09RCLA1

- (1) Connect a tester (ohm range) between the terminal and the body and check for conductivity. If there is no conductivity, replace the switch.

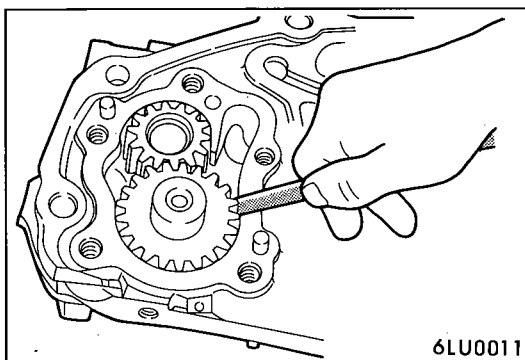


- (2) Next insert a very fine wire through the oil hole, pushing it slightly. There should be no conductivity (resistance should be infinite). If there is conductivity even when wedge is pushed, replace the switch.
- (3) Or, if there is no conductivity when a 50 kPa (71 psi) pressure is placed through the oil hole, the switch is operating properly. Check at this time to see that there is no air pressure leakage. If there is air pressure leakage, the diaphragm is broken, and the switch should be replaced.

OIL PUMP

N09RCGG

- (1) Assemble the oil pump gear to the front case and rotate it to ensure smooth rotation with no looseness.
- (2) Ensure that there is no ridge wear on the contact surface between the front case and the gear surface of the oil pump cover.



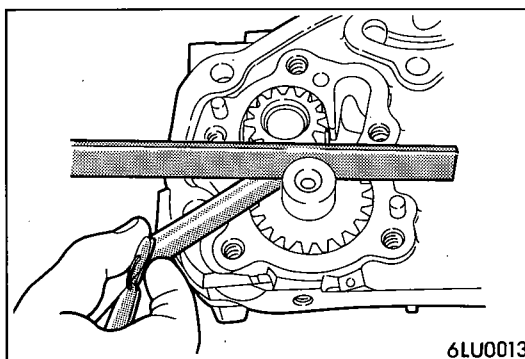
- (3) With the drive and driven gears installed into the front case, measure the tip clearance of the gears.

Standard value:

Drive gear	0.16 – 0.21 mm (.0063 – .0083 in.)
Driven gear	0.13 – 0.18 mm (.0051 – .0071 in.)

Limit:

Drive gear	0.25 mm (.0098 in.)
Driven gear	0.25 mm (.0098 in.)



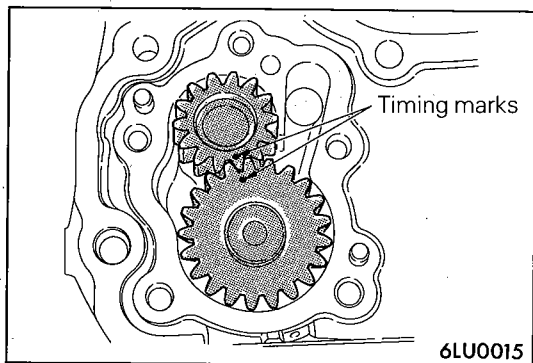
- (4) Check the side clearance.

Standard value:

Drive gear	0.08 – 0.14 mm (.0031 – .0055 in.)
Driven gear	0.06 – 0.12 mm (.0024 – .0047 in.)

Limit:

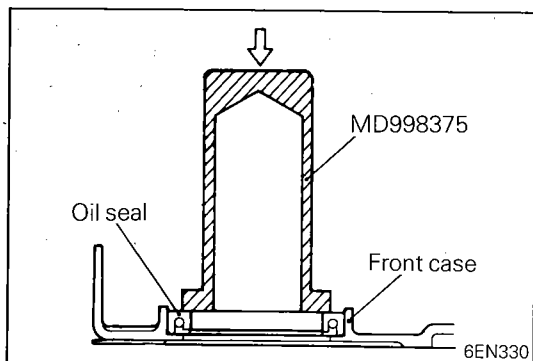
Drive gear	0.25 mm (.0098 in.)
Driven gear	0.25 mm (.0098 in.)

**SERVICE POINTS OF REASSEMBLY**

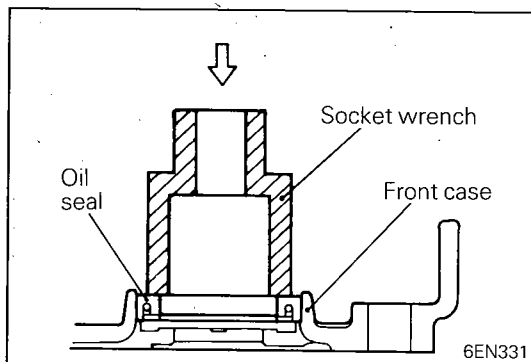
N09RHAB

24. INSTALLATION OF DRIVE GEAR / 23. DRIVEN GEAR

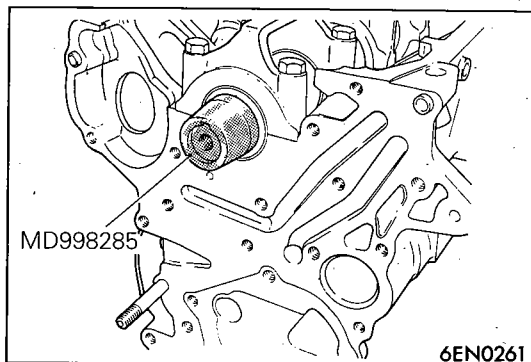
Coat the gear with plenty of engine oil, and align the two timing marks.

**20. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL**

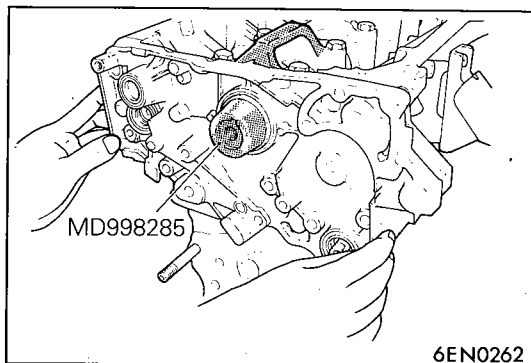
Using the special tool, install the crankshaft front oil seal into front case.

**19. INSTALLATION OF OIL SEAL**

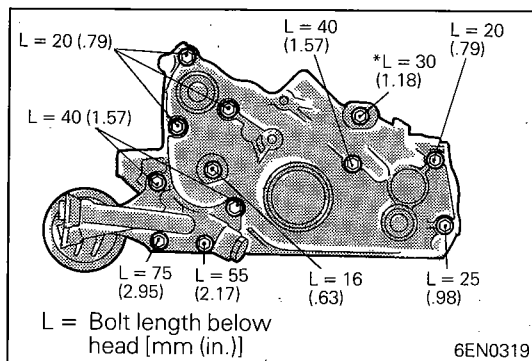
Using a socket wrench, press-in the oil seal into front case.

**16. INSTALLATION OF FRONT CASE**

- (1) Set the special tool on the front end of crankshaft and apply a thin coat of engine oil to the outer circumference of the special tool to install the front case.



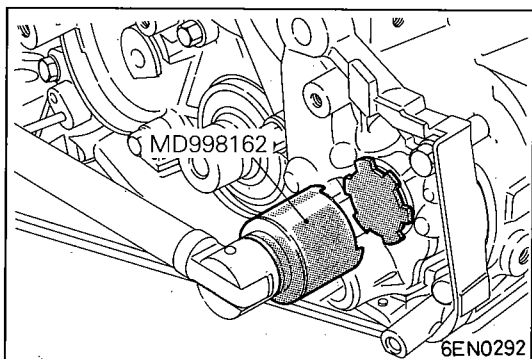
- (2) Install the front case assembly through a new front case gasket and temporarily tighten the flange bolts (other than those for tightening the filter bracket).



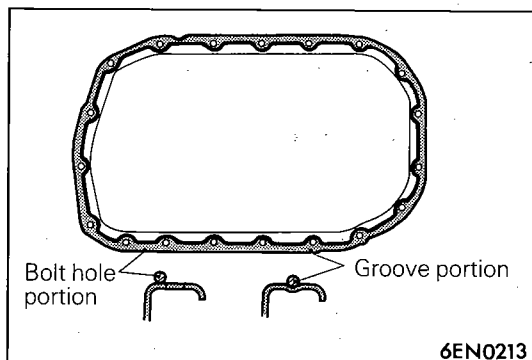
- (3) Mount the oil filter bracket with oil filter bracket gasket. Then, install the four bolts with washers.
- (4) Tighten the bolts to specification.

NOTE

Remember that the tightening torque [27 – 34 Nm (20 – 25 ft.lbs.)] for the bolt marked * in the illustration is different from that for other bolts.

**14. INSTALLATION OF PLUG CAP**

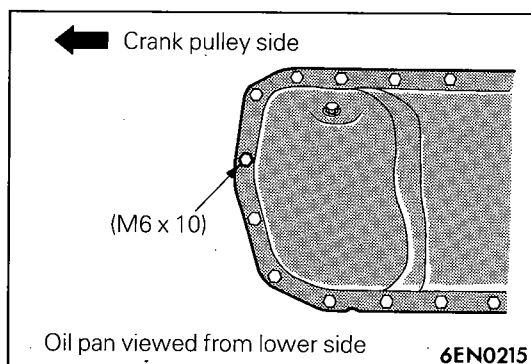
- (1) Install a new O-ring to the groove of front case.
- (2) Using the special tool, install the plug cap and tighten to specified torque.

**5. INSTALLATION OF OIL PAN**

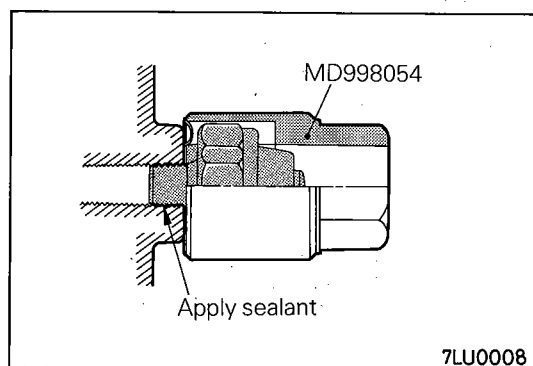
- (1) Clean both mating surfaces of oil pan and cylinder block.
- (2) Apply a 4 mm (.16 in.) wide bead of sealant to the entire circumference of the oil pan flange.

Specified sealant: MITSUBISHI GENUINE PART No. MZ100168 or equivalent

- (3) The oil pan should be installed in 15 minutes after the application of sealant.



- (4) Note the difference in bolt lengths at the location shown.

**4. INSTALLATION OF OIL PRESSURE SWITCH**

- (1) Coat sealant on the thread area, and using the special tool, install the pressure switch.

Specified sealant: MOPAR Part No. 4318034 or equivalent

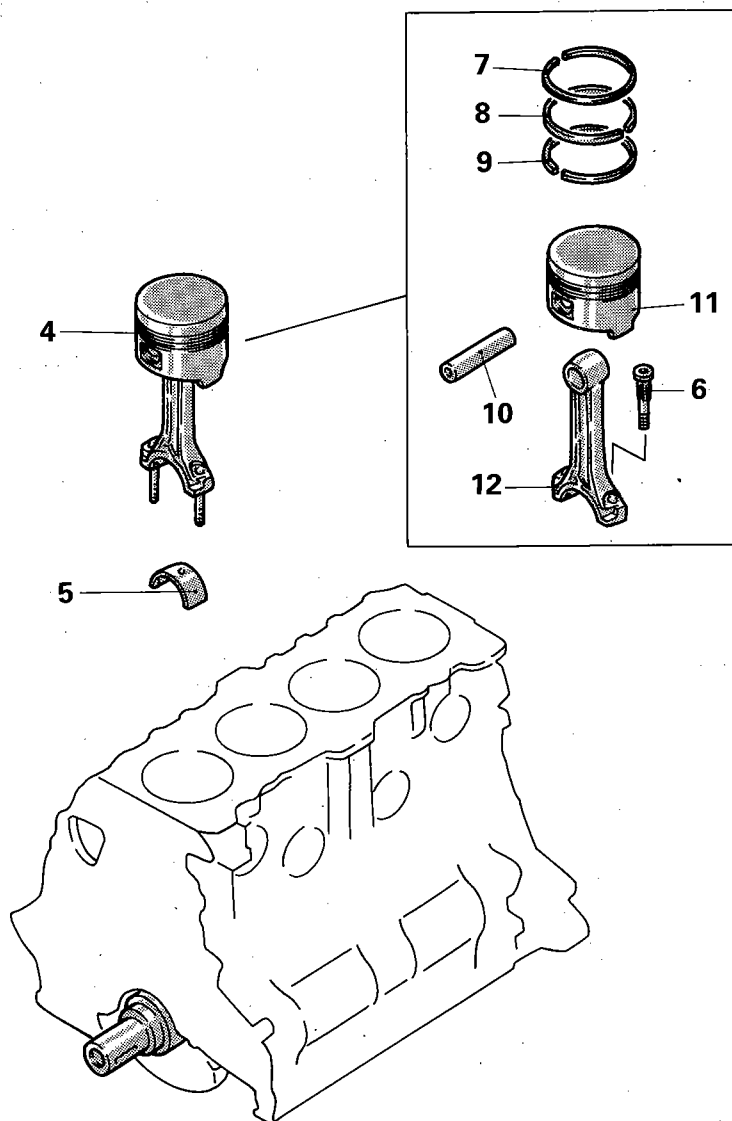
Caution

1. Do not let sealant ooze out of the top of the thread area.
 2. Do not overtighten the pressure switch.
- (2) Install the oil pressure switch terminals.

PISTON AND CONNECTING ROD

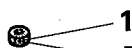
N09TE-B

DISASSEMBLY AND REASSEMBLY



Disassembly steps

- 1. Nut
- ◆◆ ◆◆ 2. Connecting rod cap
- ◆◆ 3. Connecting rod bearing
- ◆◆ 4. Piston and connecting rod assembly
- 5. Connecting rod bearing
- 6. Bolt
- ◆◆ ◆◆ 7. No. 1 piston ring
- ◆◆ ◆◆ 8. No. 2 piston ring
- ◆◆ 9. Oil ring
- 10. Piston pin
- 11. Piston
- 12. Connecting rod

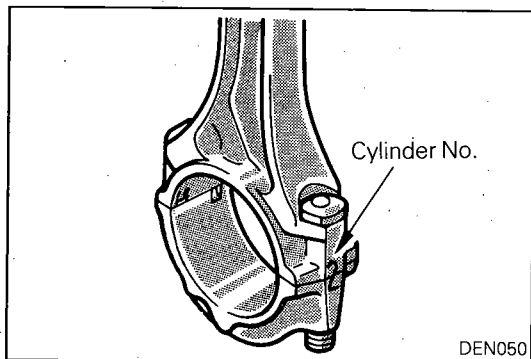


50 – 53 Nm
36 – 38 ft.lbs.

6EN0216

NOTE

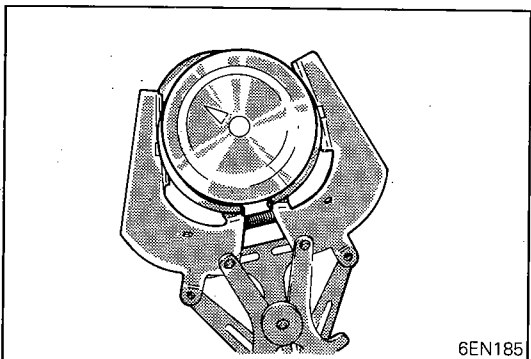
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Disassembly".
- (3) ◆◆: Refer to "Service Points of Reassembly".

**SERVICE POINTS OF DISASSEMBLY**

N09TFAC

2. REMOVAL OF CONNECTING ROD CAP

- (1) Mark the cylinder number on the side of the connecting rod big end for correct reassembly.
- (2) Keep the removed connecting rods, caps, and bearings in order according to the cylinder number.

**7. REMOVAL OF NO. 1 PISTON RING / 8. NO. 2 PISTON RING**

Remove the piston rings with a piston ring expander.

INSPECTION

N09TCAF1

PISTON

Replace the piston if scratches or seizure is evident on its surfaces (especially the thrust surface). Replace the piston if it is cracked.

PISTON PIN

- (1) Insert the piston pin into the piston pin hole with a thumb. You should feel a slight resistance. Replace the piston pin if it can be easily inserted or there is an excessive play.
- (2) The piston and piston pin must be replaced as an assembly.

PISTON RING

N09TCBF1

- (1) Check the piston ring for damage, excessive wear, and breakage and replace if defects are evident. If the piston has been replaced with a new one, the piston rings must also be replaced with new ones.
- (2) Check for the clearance between the piston ring and ring groove. If the limit is exceeded, replace the ring or piston, or both.

Standard value: 0.03 – 0.07 mm (.0012 – .0028 in.)

Limit: 0.1 mm (.004 in.)

- (3) Install the piston ring into the cylinder bore. Force it down with a piston, its crown being in contact with the ring, to correctly position it at right angles to the cylinder wall. Then, measure the end gap with a feeler gauge.
- If the ring gap is excessive, replace the piston ring.

Standard value:

No. 1 0.25 – 0.40 mm (.0098 – .0157 in.)

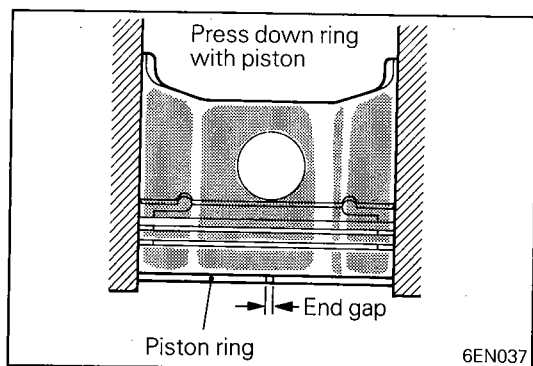
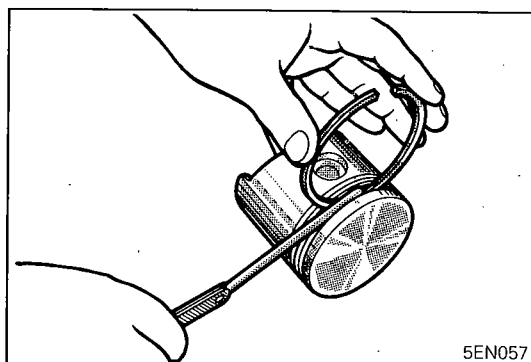
No. 2 0.35 – 0.50 mm (.0138 – .0197 in.)

Oil 0.20 – 0.70 mm (.0079 – .0276 in.)

Limit:

No. 1, No. 2 0.8 mm (.031 in.)

Oil 1.0 mm (.039 in.)



CONNECTING ROD BEARING

N09TCDC

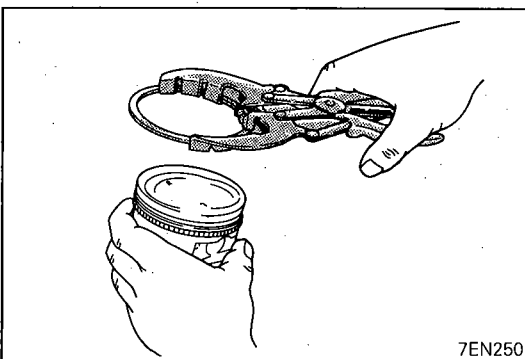
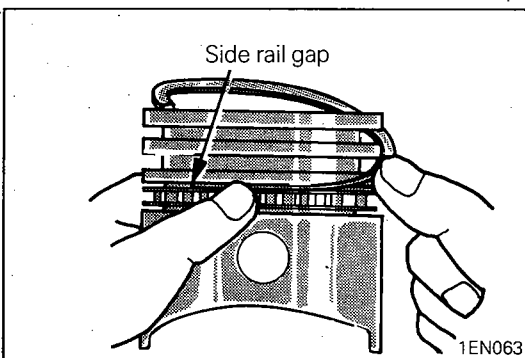
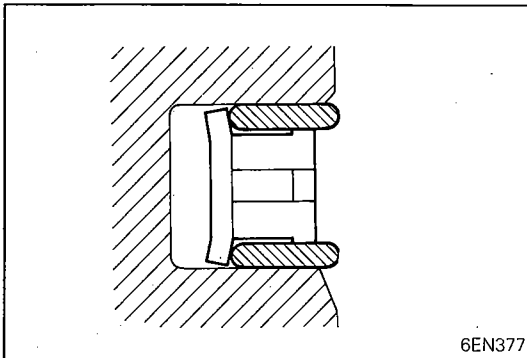
- (1) Visually check the bearing surface for uneven contact, streaks, scratches, and seizure. Replace if defects are evident. If streaks and seizure are excessive, check also the crankshaft. If damage is present on the crankshaft, replace crankshaft.
- (2) Measure the connecting rod bearing I.D. and crankshaft pin O.D. If the oil clearance exceeds the limit, replace bearing, and crankshaft if necessary.

Standard value: 0.02 – 0.05 mm (.0008 – .0020 in.)

Limit: 0.1 mm (.004 in.)

NOTE

For oil clearance measuring method using the plastic gauge, refer to the section CRANKSHAFT.

**SERVICE POINTS OF REASSEMBLY**

N09TGAC

9. INSTALLATION OF OIL RING

- (1) Fit the oil ring spacer into the piston ring groove.

NOTE

The side rails and spacer may be installed in either direction.

- (2) Install the upper side rail.

To install the side rail, first fit one end of the rail into the piston groove, then press the remaining portion into position by finger. See illustration.

Use of ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

NOTE

Do not use piston ring expander when installing side rail.

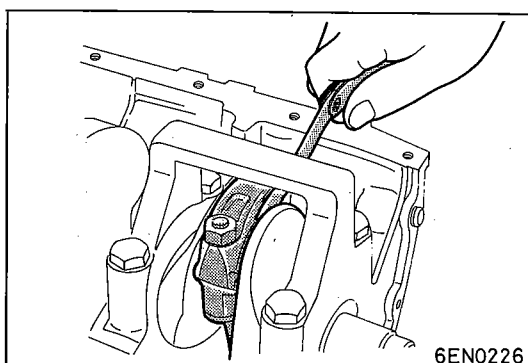
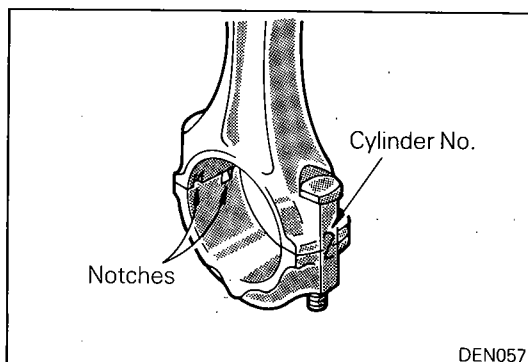
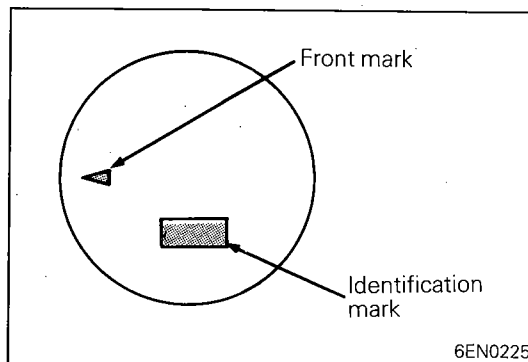
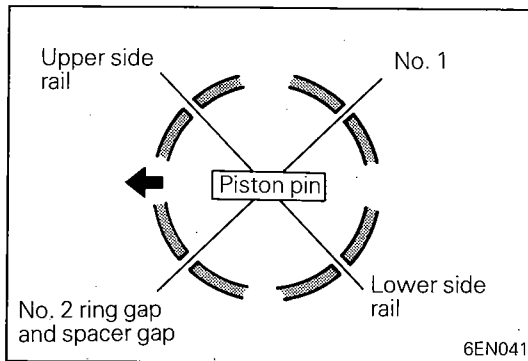
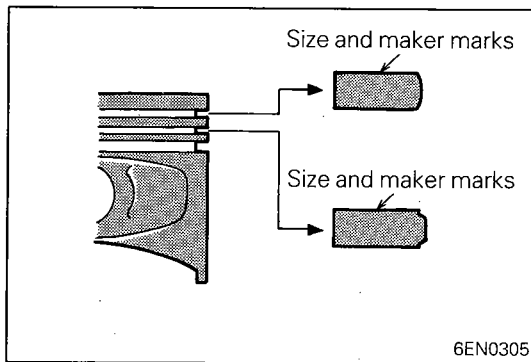
- (3) Install the lower side rail in the same procedure as described in step (2).
- (4) Make sure that the side rails move smoothly in either direction.

8. INSTALLATION OF NO. 2 PISTON RING / 7. NO. 1 PISTON RING

Using piston ring expander, fit No. 2 and then No. 1 piston ring into position.

NOTE

- (1) Note the difference in shape between No. 1 and No. 2 piston rings.
- (2) Install piston rings No. 1 and No. 2 with their side having marks facing up (on the piston crown side).



4. INSTALLATION OF PISTON AND CONNECTING ROD

- (1) Apply an ample amount of engine oil to the piston outside surfaces, piston rings, and oil ring.
- (2) Position the piston ring and oil ring (side rail and spacer) end gaps as shown in the illustration.
- (3) Insert the piston and connecting rod assembly into the cylinder, working from the cylinder top surface. Make sure that the front mark stamped on the piston top surface and that (identification mark) on the connecting rod face the front of engine.

Identification mark:

Piston

<N/A> 61D

<T/C> 61DT

Connecting rod G6

2. INSTALLATION OF CONNECTING ROD CAP

- (1) Mate the correct bearing cap with the correct connecting rod by checking with the alignment marks marked during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.

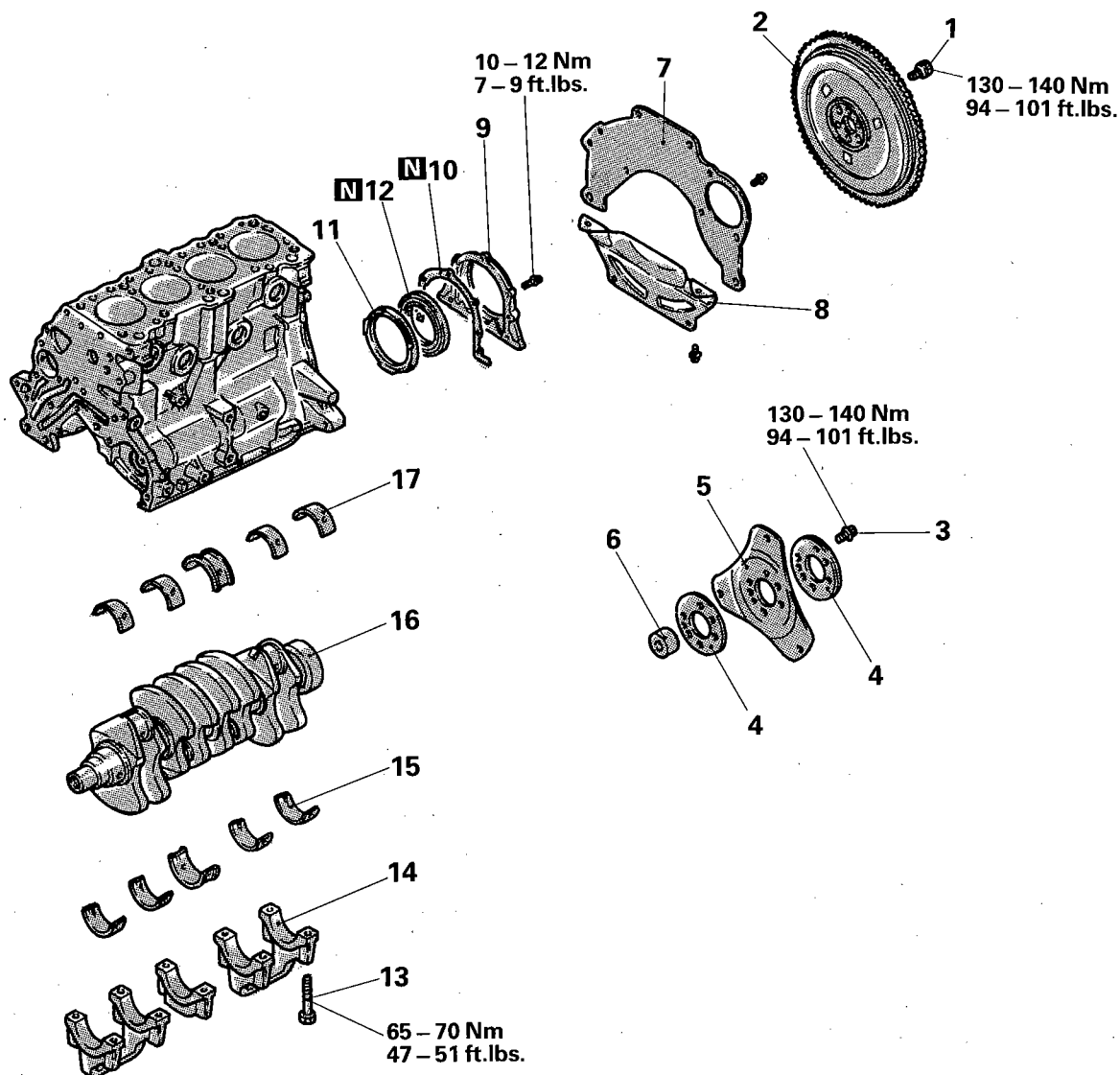
- (2) Check if the thrust clearance in the connecting rod big end is correct.

Standard value: 0.10 – 0.25 mm (.0039 – .0098 in.)

Limit: 0.4 mm (.0157 in.)

CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

DISASSEMBLY AND REASSEMBLY



6EN0227

Disassembly steps

1. Flywheel bolt
2. Flywheel
3. Drive plate bolt
4. Adapter plate
5. Drive plate
6. Crankshaft bushing
7. Rear plate
8. Bell housing cover
9. Oil seal case
10. Gasket
11. Oil separator
12. Oil seal
13. Bearing cap bolt
14. Bearing cap
15. Crankshaft bearing (lower)
16. Crankshaft
17. Crankshaft bearing (upper)

NOTE

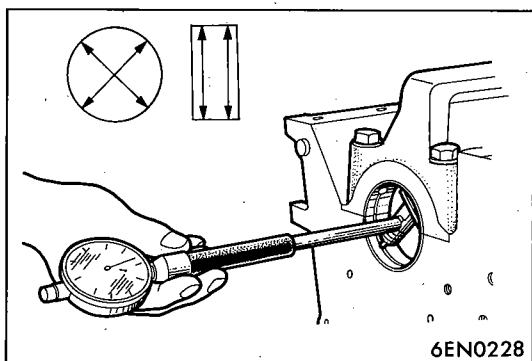
- (1) Reverse the disassembly procedures to reassemble.
- (2) ♦♦: Refer to "Service Points of Reassembly".
- (3) **N**: Non-reusable parts

INSPECTION

N09UCAD

CRANKSHAFT

- (1) Check the crankshaft journals and pins for streaks and seizure. Replace if necessary.



6EN0228

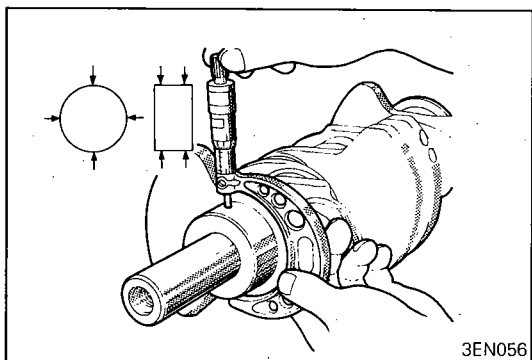
- (2) Measure the journal O.D. and main bearing I.D. to obtain the clearance between the two (oil clearance). If the clearance exceeds the limit, replace the main bearing and, if necessary, the crankshaft.

Standard value: 0.02 – 0.05 mm (.0008 – .0020 in.)

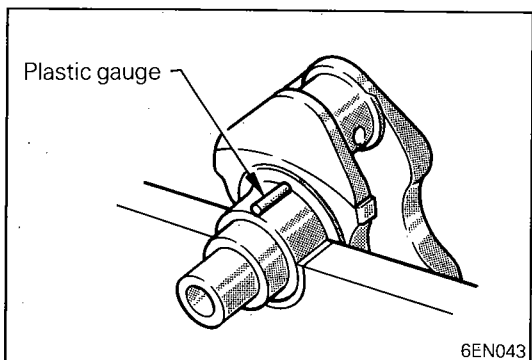
Limit: 0.1 mm (.0039 in.)

Caution

A special surface treatment has been applied to crankshaft. Do not machine it to undersize.



3EN056



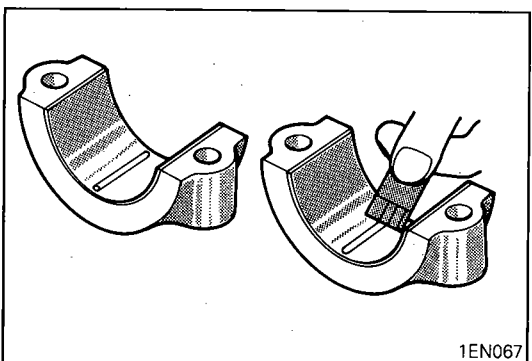
6EN043

CRANKSHAFT OIL CLEARANCE (PLASTIC GAUGE METHOD)

N09UCCG1

The crankshaft oil clearance can be measured easily by using a plastic gauge, as follows:

- (1) Remove oil and grease and any other foreign matters from crankshaft journal and bearing inner surface.
- (2) Install the crankshaft.
- (3) Cut the plastic gauge to the same length as the width of bearing and place it on journal in parallel with its axis.
- (4) Gently place the crankshaft bearing cap over it and tighten the bolts to the specified torque.
- (5) Remove the bolts and gently remove the crankshaft bearing cap.
- (6) Measure the width of the smashed plastic gauge at its widest section by using a scale printed on the plastic gauge bag.

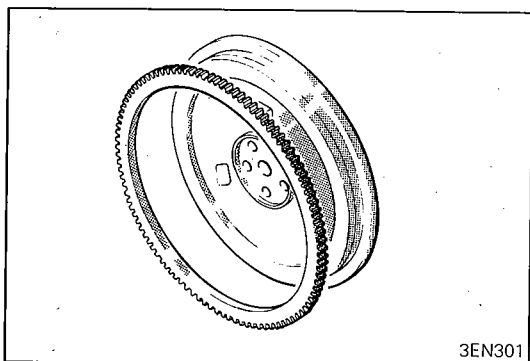


1EN067

CRANKSHAFT REAR OIL SEAL

N09UCDB1

- (1) Check oil seal lip for wear and damage.
- (2) Check rubber for deterioration or hardening.
- (3) Check oil seal case for cracks and damage.



3EN301

RING GEAR <M/T>

N09UCEF1

Check teeth of ring gear for wear and damage. If necessary, replace the ring gear.

If the ring gear teeth are worn or damaged, also check the starter motor pinion.

To remove the ring gear, strike the ring gear at several points on its outer circumference. The ring gear cannot be removed if it is heated.

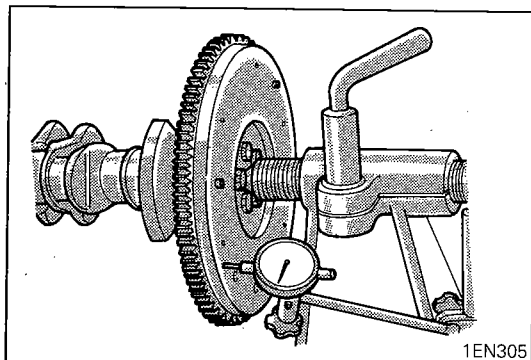
To install the ring gear, heat the ring gear to 300°C (572°F) for shrink fit.

FLYWHEEL <M/T>

N09UCFC1

- (1) Check the clutch disc friction surface for ridge wear, streaks, and seizure. If necessary, replace flywheel.
- (2) If the runout of flywheel exceeds the limit, replace.

Limit: 0.13 mm (.0051 in.)



1EN305

DRIVE PLATE <A/T>

N09UCGD1

Check the drive plate for deformation, damage and cracks. If necessary, replace.

SERVICE POINTS OF REASSEMBLY

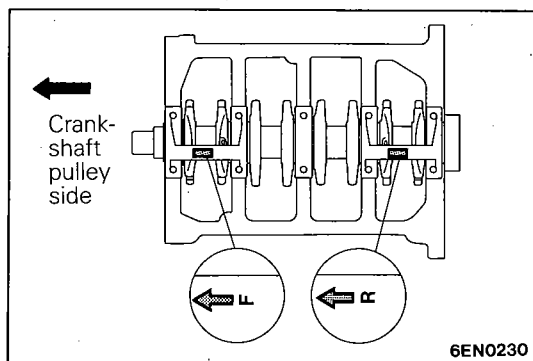
N09UGAB

17. INSTALLATION OF CRANKSHAFT BEARING (UPPER)

Install the upper crankshaft bearing to the cylinder block. There is an oil groove in the upper crankshaft bearing. There is no difference between upper and lower bearings for the center (with flange).

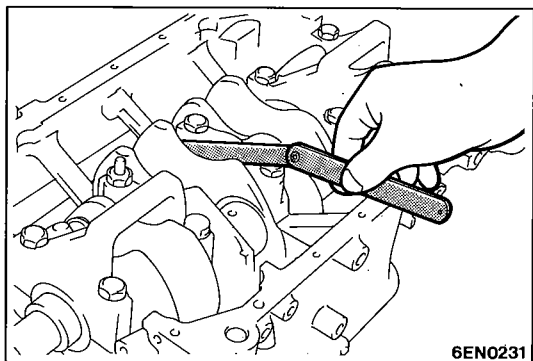
15. INSTALLATION OF CRANKSHAFT BEARING (LOWER)

Install the lower crankshaft bearing (with no oil groove; there is no difference for center) to each bearing cap and apply engine oil to bearing surfaces.



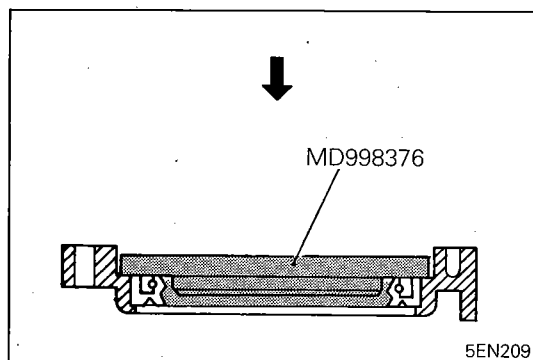
14. INSTALLATION OF BEARING CAP

- (1) Verify the correct identification mark and the direction of the arrow for installation.



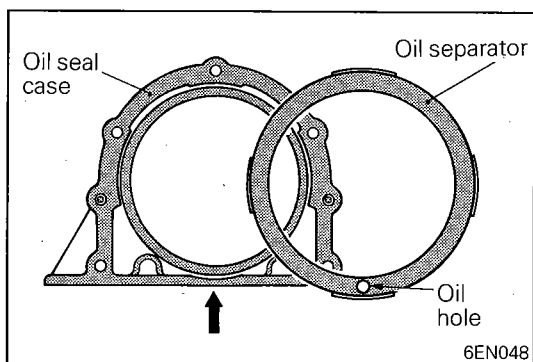
- (2) After installing the bearing caps, make sure that the crankshaft turns smoothly and the end play is correct. If the end play exceeds the limit, replace crankshaft bearings.

Standard value: 0.05 – 0.18 mm (.0020 – .0071 in.)
Limit: 0.25 mm (.0098 in.)



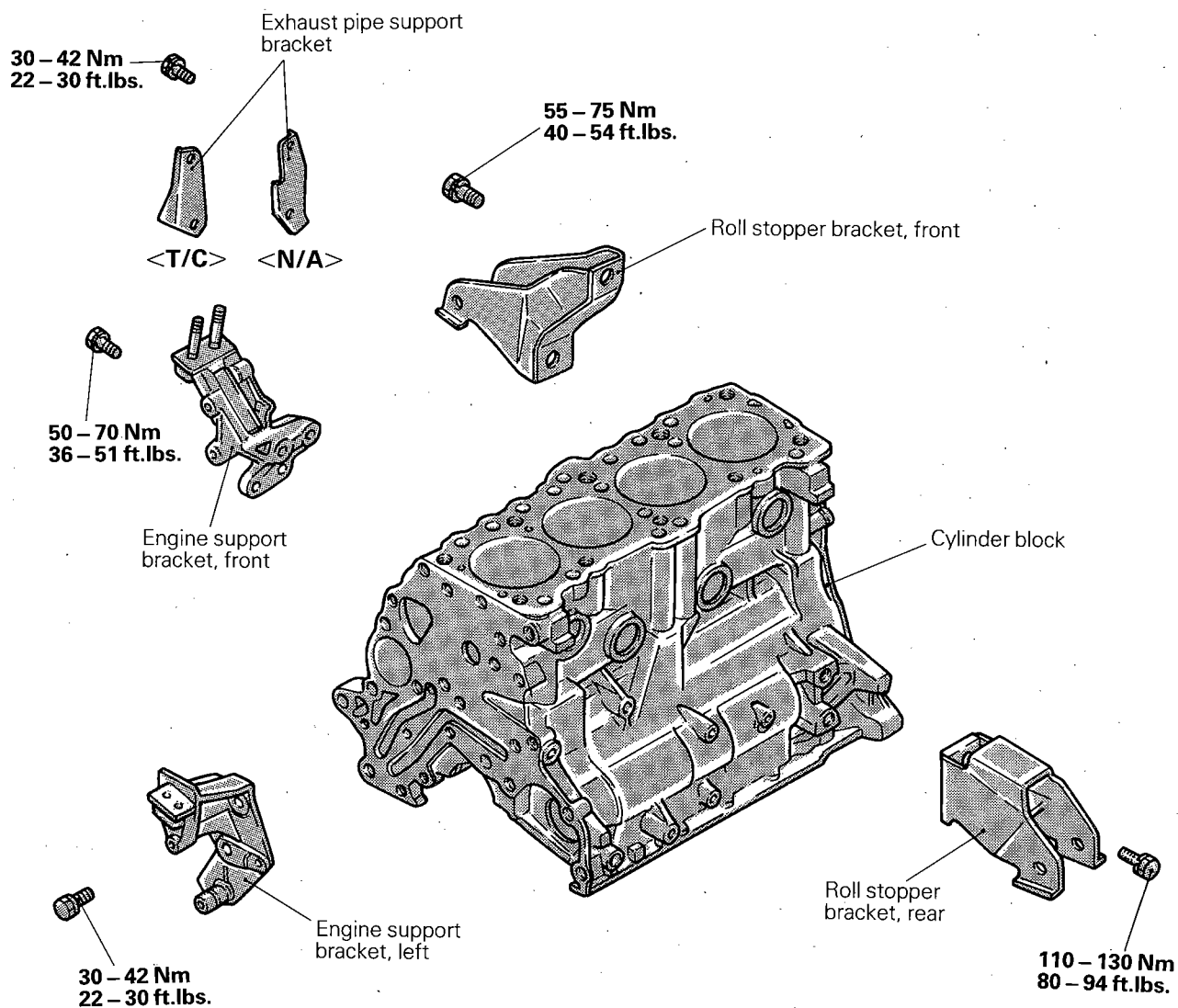
12. INSTALLATION OF OIL SEAL

Using the special tool, press-fit the oil seal into the crankshaft rear oil case. Use a new oil seal.



11. INSTALLATION OF OIL SEPARATOR

Force the oil separator into the oil seal case so that the oil hole in the separator is directed downward (arrow in illustration).

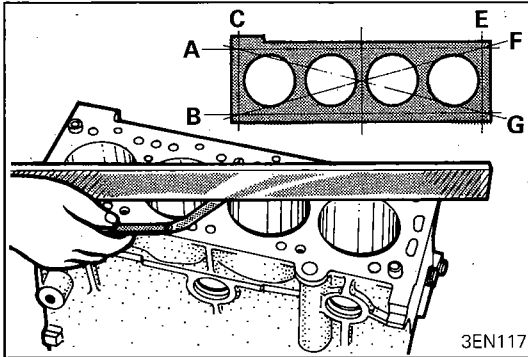
CYLINDER BLOCK**DISASSEMBLY AND REASSEMBLY**

6EN0320

N09VCAH1

INSPECTION**NOTE**

1. Clean parts to remove dust, oil, carbon deposits, and scale before starting the inspection and repair procedure.
2. Check cylinder block for water leaks and damage before cleaning.
3. Remove deposits from oil holes and make sure that they are not clogged.
4. Keep parts neatly arranged according to a matched pair.

**CYLINDER BLOCK**

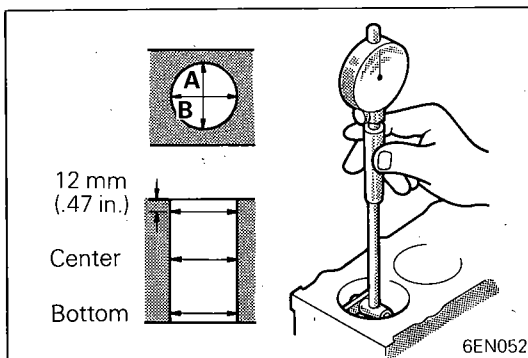
- (1) Visually check for scratches, rust, and corrosion. Use also a flaw detecting agent for the check. If defects are evident, correct, or replace.
- (2) Using a straightedge and feeler gauge, check the block top surface for warpage. Make sure that the surface is free from gasket chips and other foreign matter.

Standard value: 0.05 mm (.0020 in.) or less**Limit: 0.1 mm (.0039 in.)**

- (3) If the distortion is excessive, correct within the allowable limit or replace.

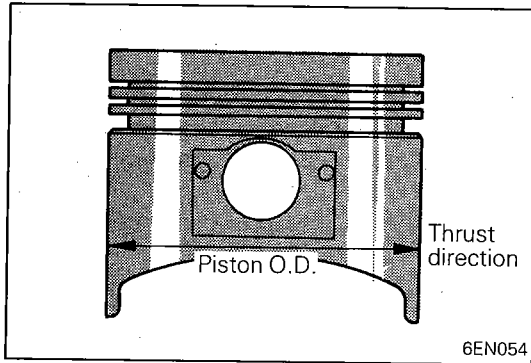
Grinding limit: 0.2 mm (.008 in.)

The total thickness of the stock allowed to be removed from cylinder block and mating cylinder head is 0.2 mm (.008 in.) at maximum.

Cylinder block height (when new): 284 mm (11.18 in.)

- (4) Check cylinder walls for scratches and seizure. If defects are evident, correct (bored to oversize) or replace.
- (5) Using cylinder gauge, measure the cylinder bore and cylindricity. If worn badly, correct cylinder to an oversize and replace piston and piston rings. Measure at the points shown in illustration.

Standard value:**Cylinder I.D. 82.30 – 82.33 mm (3.2402 – 3.2413 in.)****Out-of-roundness and taper of cylinder bore****0.01 mm (.0004 in.)**

**BORING CYLINDER**

N09VEDC

- (1) Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

Piston size identification

Size	Identification mark
0.25 mm (.01 in.) O.S.	0.25
0.50 mm (.02 in.) O.S.	0.50
0.75 mm (.03 in.) O.S.	0.75
1.00 mm (.04 in.) O.S.	1.00

NOTE

Size mark is stamped on piston top.

- (2) Measure outside diameter of piston to be used. Measure it in thrust direction as shown.
- (3) Based on measured piston O.D. calculate boring finish dimension.

Boring finish dimension = Piston O.D. + (clearance between piston O.D. and cylinder) – 0.02 mm (.0008 in.) (honing margin)

Clearance between piston and cylinder:

<N/A> 0.02 – 0.04 mm (.0008 – .0016 in.)

<T/C> 0.03 – 0.05 mm (.0012 – .0020 in.)

- (4) Bore all cylinders to calculated boring finish dimension.

Caution

To prevent distortion that may result from temperature rise during honing, bore cylinders, working from No. 2 to No. 4 to No. 1 to No. 3.

- (5)hone to final finish dimension (piston O.D. + clearance between piston O.D. and cylinder).
- (6) Check clearance between piston and cylinder.

NOTE

When boring cylinders, finish all of four cylinders to same oversize. Do not bore only one cylinder to an oversize.