

# ENGINE

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## GENERAL INFORMATION

N09BACD

The 2.6L (159 cu.in.) displacement engine is a four cylinder overhead camshaft power plant with a cast iron cylinder block, an aluminum cylinder head and a silent shaft system.

The forged steel crankshaft is supported by five main bearings.

The cylinder block has a siamese type water jacket which ensures high cooling efficiency and uniform cooling of the cylinders.

Two counterbalance shafts (silent shafts) are incorporated in the cylinder block to reduce engine noise and vibration.

The pistons are made of aluminum alloy casting.

The piston pin is floating in the piston and pressed-in to the forged steel connecting rod. The piston pin is offset from the piston center toward the thrust side.

The oil pump is a gear type pump and also drives the right (front) silent shaft. The oil pump and left (rear) silent shaft are chain driven through sprockets by crankshaft.

The silent shaft system cancels the vertical vibration force of the engine and secondary vibrating forces such as the vibrating moment in the rolling direction. The silent shafts are located in the upper left (rearward side) and lower right (forward side) of the cylinder block. The left shaft rotates in the same direction as the crankshaft while the right shaft rotates in the opposite direction at twice the crankshaft speed. Each silent shaft is supported by two aluminum bearings.

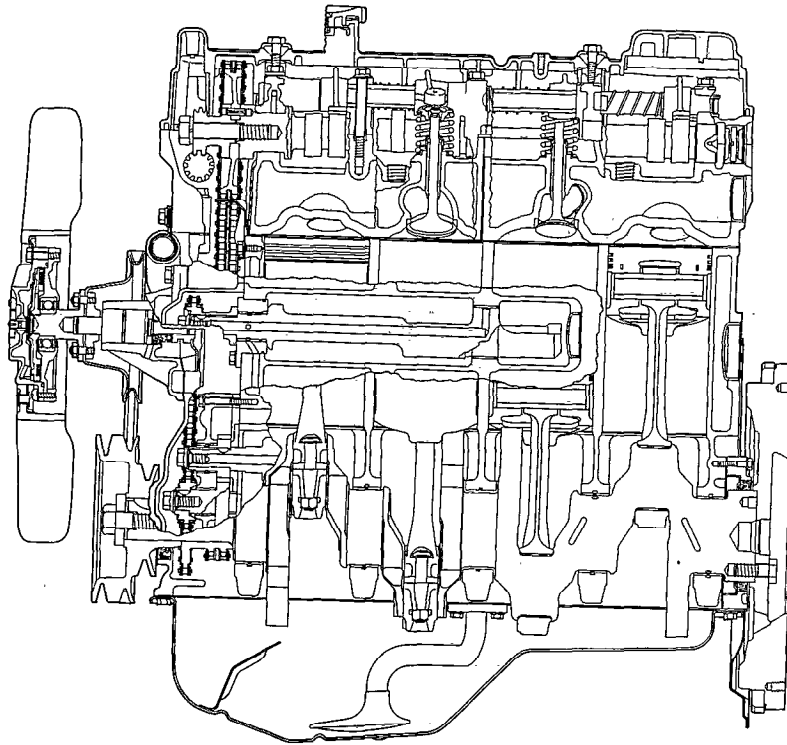
The cylinder head is an aluminum alloy casting with compact type combustion chambers. The intake and exhaust valves are made of heat-resistant steel and arranged in a "V" with a camshaft on center. The jet valve assemblies, consisting of the jet valve, jet body, stem seal, spring, retainer and retainer lock, are screwed into the cylinder head.

The cast iron camshaft is supported by five bearing journals and is driven by the crankshaft sprocket and camshaft sprocket by the timing chain. The distributor drive gear is mounted on the front of the camshaft. The camshaft drive chain is a double roller type chain. To provide the chain with the proper tension and ensure quiet operation at all times, tensioner is installed on the slack side.

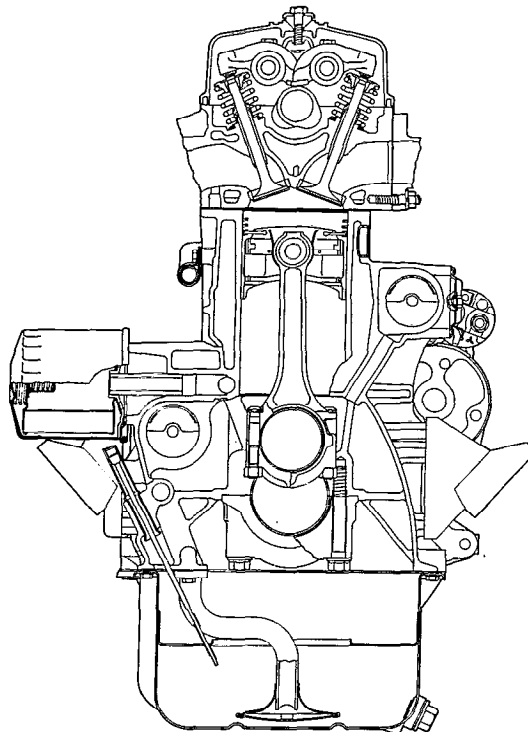
Two rocker arms are used with one for actuating the exhaust valves and the other for actuating the intake valves and jet valves.

The rocker arms are aluminum alloy die-castings with cemented carbide alloy slippers. By using the auto lash adjuster, the rocker arms eliminate the need for adjustment of intake and exhaust valve clearance. The oil pump is an internal-external involute gear type pump and is driven by crankshaft. The oil filter, paper filter element cartridge type, is mounted on the front facing side of the engine.

## SECTIONAL VIEW

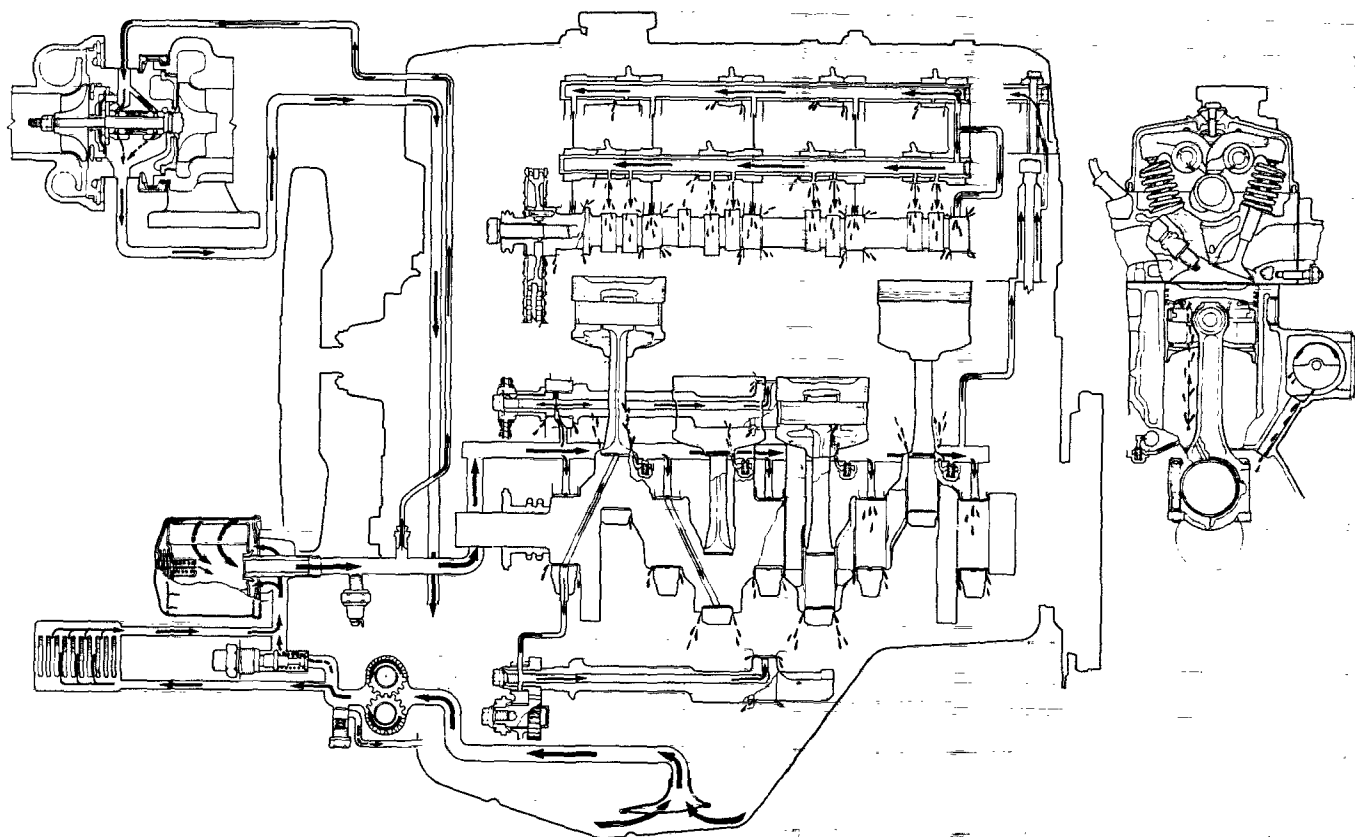


5GE019-A



5EN0019

## LUBRICATION SYSTEM



**SPECIFICATIONS****GENERAL SPECIFICATIONS**

Items	Specifications
Type	In-line, OHC
Number of cylinders	4
Bore mm (in.)	91.1 (3.587)
Stroke mm (in.)	98.0 (3.858)
Piston displacement cc (cu.in.)	2,555 (155.9)
Compression ratio	7.0
Firing order	1-3-4-2
Valve timing	
Intake valve	
Opens (BTDC)	25°
Closes (ABDC)	59°
Exhaust	
Opens (BBDC)	64°
Closes (ATDC)	20°
Jet valve	
Opens (BTDC)	25°
Closes (ABDC)	59°
Valve overlap	45°
Intake valve duration	264°
Exhaust valve duration	264°
Jet valve duration	264°

## SERVICE SPECIFICATIONS

N09CB-

Items	Standard value	Limit
Cylinder head		
Overall height mm (in.)	90.0 (3.543)	* -0.2 (* -.008) * Limit must be -0.2 (-.008) combined with amount of grinding of cylinder block gasket surface.
Flatness of gasket surface mm (in.)	Less than 0.05 (.0020)	0.2 (.008)
Flatness of manifold mounting surface mm (in.)	Less than 0.15 (.0059)	0.3 (.012)
Oversize rework dimension of valve seat hole mm (in.)		
Intake 0.3 mm (.0118 in.) O.S.	47.300 – 47.325 (1.8622 – 1.8632)	
0.6 mm (.0236 in.) O.S.	47.600 – 47.625 (1.8740 – 1.8750)	
Exhaust 0.3 mm (.118 in.) O.S.	40.300 – 40.325 (1.5856 – 1.5876)	
0.6 mm (.0236 in.) O.S.	40.600 – 40.625 (1.5984 – 1.5994)	
Oversize rework of valve guide hole (both intake and exhaust) mm (in.)		
0.05 mm (.002 in.) O.S.	13.050 – 13.068 (.5138 – .5145)	
0.25 mm (.010 in.) O.S.	13.250 – 13.268 (.5217 – .5224)	
0.50 mm (.020 in.) O.S.	13.500 – 13.518 (.5315 – .5422)	
Timing chain		
No. of links	102	
Pitch mm (in.)	9.5 (.374)	
Timing chain "B" for silent shaft drive		
No. of links	90	
Pitch mm (in.)	8.0 (.315)	
Clearance between chain and chain guide mm (in.)	0.2 – 0.8 (.008 – .031)	
Camshaft		
Cam height mm (in.)		
Intake	42.43 (1.6705)	41.93 (1.6508)
Exhaust	42.43 (1.6705)	41.93 (1.6508)
Height of fuel pump drive cam mm (in.)	37 (1.46)	
Journal diameter mm (in.)	34 (1.34)	
Oil clearance mm (in.)	0.05 – 0.09 (.0020 – .0035)	
End play mm (in.)	0.1 – 0.2 (.004 – .008)	0.4 (.016)
Rocker arm		
I.D. mm (in.)	18.9 (.744)	
Clearance (Rocker arm-to-shaft) mm (in.)	0.01 – 0.04 (.0004 – .0016)	
Rocker arm shaft		
O.D. mm (in.)	18.9 (.744)	

Items	Standard value	Limit
<b>Valve</b> Valve length mm (in.) Intake 107.96 (4.2504) Exhaust 105.86 (4.1677) Stem O.D. mm (in.) Intake 8.0 (.315) Exhaust 8.0 (.315) Face angle 45° – 45°30' Thickness of valve head (Margin) mm (in.) Intake 1.2 (.047) 0.7 (.028) Exhaust 2.0 (.079) 1.5 (.059) Valve stem to valve guide clearance mm (in.) Intake 0.03 – 0.06 (.0012 – .0024) 0.10 (.0039) Exhaust 0.05 – 0.09 (.0020 – .0035) 0.15 (.0059)		
<b>Valve guide</b> Length mm (in.) Intake 47 (1.85) Exhaust 52 (2.05) Oversize mm (in.) 0.05 (.002), 0.25 (.010), 0.50 (.020)		
<b>Valve seat</b> Width of seat contact mm (in.) 0.7 – 1.2 (.028 – .047) Seat angle 45° Oversize rework of valve seat insert height mm (in.) Intake 0.3 mm (.012 in.) 7.9 – 8.1 (.311 – .319) 0.6 mm (.024 in.) 8.2 – 8.4 (.323 – .331) Exhaust 0.3 mm (.012 in.) 7.9 – 8.1 (.311 – .319) 0.6 mm (.024 in.) 8.2 – 8.4 (.323 – .331)		
<b>Valve spring</b> Free length mm (in.) 49.8 (1.961) 48.8 (1.922) Load N (lbs.) 329 (73) at installed height Installed height mm (in.) 40.4 (1.591) 41.4 (1.630) Out of squareness Less than 2° 4°		
<b>Jet valve</b> Length mm (in.) 92.53 (3.6429) Stem O.D. mm (in.) 4.3 (.169) Seat angle 45° Valve clearance – Hot engine mm (in.) 0.25 (.0098) Valve clearance – Cold engine (Reference) mm (in.) 0.17 (.0067)		

Items	Standard value	Limit
Jet valve spring		
Free length mm (in.)	29.60 (1.1654)	
Load N (lbs.)	35 (7.7) at installed height	
Installed height mm (in.)	21.5 (.8465)	
Out of squareness	Max. 1.5°	
Cylinder block		
Cylinder bore mm (in.)	91.1 (3.587)	
Out-of-roundness and taper of cylinder bore mm (in.)	Max. 0.02 (.0008)	
Overall height mm (in.)	316 (12.44)	*-0.2 (*-.008) *Limit must be -0.2 (-.008) combined with amount of grinding of cylinder head gasket surface.
Flatness of gasket surface mm (in.)	Max. 0.05 (.0020)	0.1 (.004)
Right silent shaft		
Front journal diameter mm (in.)	21 (.83)	
Rear journal diameter mm (in.)	43 (1.69)	
Oil clearance mm (in.)		
Rear	0.094 – 0.135 (.0037 – .0053)	
Left silent shaft		
Front journal diameter mm (in.)	23 (.91)	
Rear journal diameter mm (in.)	43 (1.69)	
Oil clearance mm (in.)		
Front	0.020 – 0.062 (.0008 – .0024)	
Rear	0.094 – 0.135 (.0037 – .0053)	
Piston		
O.D. mm (in.)	91.1 (3.587)	
Clearance (Piston-to-cylinder) mm (in.)	0.03 – 0.05 (.0012 – .0020)	
Ring groove width mm (in.)		
No. 1 and No. 2	1.5 (.059)	
Oil	4.0 (.157)	
Compression pressure kPa (psi)	1,000 (142) (250 – 400 rpm)	
Oversize mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039)	
Piston ring		
Side clearance mm (in.)		
No. 1	0.05 – 0.09 (.0020 – .0035)	0.12 (.0047)
No. 2	0.02 – 0.06 (.0008 – .0024)	0.10 (.0039)
End gap mm (in.)		
No. 1	0.30 – 0.45 (.0118 – .0177)	0.8 (.031)
No. 2	0.25 – 0.40 (.0098 – .0157)	0.8 (.031)
Oil ring side rail	0.30 – 0.80 (.0118 – .0315)	1.0 (.039)
Oversize mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039)	

Items	Standard value	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) or less per 100 (3.937) 0.10 (.0039) or less per 100 (3.937) 0.10 – 0.25 (.0039 – .0098) 7,500 – 17,500 (1,653 – 3,858)	0.4 (.016)
Connecting rod bearing Oil clearance mm (in.) Undersize mm (in.)	0.02 – 0.05 (.0008 – .0020) 0.25 (.010), 0.50 (.020), 0.75 (.030)	0.1 (.004)
Crankshaft main bearing Oil clearance mm (in.) Undersize mm (in.)	0.021 – 0.046 (.0008 – .0018) 0.25 (.010), 0.50 (.020), 0.75 (.030)	
Crankshaft Pin O.D. mm (in.) Journal O.D. mm (in.) Out-of-roundness of journal & pin mm (in.) Taper of journal & pin mm (in.) End play mm (in.) Undersize rework dimension of pin mm (in.) 0.25 mm (.010 in.) U.S. 0.50 mm (.020 in.) U.S. 0.75 mm (.030 in.) U.S. Undersize rework dimension of journal mm (in.) 0.25 mm (.010 in.) U.S. 0.50 mm (.020 in.) U.S. 0.75 mm (.030 in.) U.S.	53 (2.09) 60 (2.36) Less than 0.015 (.0006) Less than 0.005 (.0002) 0.05 – 0.18 (.0020 – .0071) 52.735 – 52.750 (2.0762 – 2.0768) 52.485 – 52.500 (2.0663 – 2.0669) 52.235 – 52.250 (2.0565 – 2.0571) 59.735 – 59.750 (2.3518 – 2.3524) 59.485 – 59.500 (2.3419 – 2.3425) 59.235 – 59.250 (2.3321 – 2.3327)	0.4 (.016)
Flywheel Runout mm (in.)		Less than 0.13 (.0051)
Oil pressure at curb idle speed kPa (psi) [Conditions: Oil temperature is 75 to 90°C (167 to 194°F)]	Min. 80 (11.4)	
Oil pump Driven gear Tip clearance mm (in.) Side clearance mm (in.) Drive gear Tip clearance mm (in.) Side clearance mm (in.)	0.11 – 0.15 (.0043 – .0059) 0.04 – 0.10 (.0016 – .0039) 0.11 – 0.15 (.0043 – .0059) 0.05 – 0.11 (.0020 – .0043)	0.20 (.0079) 0.15 (.0060) 0.20 (.0079) 0.15 (.0060)

Items	Standard value	Limit
Relief spring		
Free length mm (in.)	46.6 (1.835)	
Load N (lbs.) [at 40.1 mm (1.5787 in.)]	61 (13)	

## NOTE

O.D. = Outer Diameter

I.D. = Inner Diameter

O.S. = Oversize Diameter

U.S. = Undersize Diameter

## TORQUE SPECIFICATIONS

N09CC-

Items	Nm	ft.lbs
Cylinder head bolts – Cold engine	90 – 100	65 – 72
Cylinder head bolts – Hot engine	100 – 110	73 – 79
Cylinder head bolt (M8 bolt)	15 – 22	11 – 15
Camshaft bearing cap bolts	19 – 21	14 – 15
Camshaft sprocket bolts	50 – 60	37 – 43
Rocker cover bolts	5 – 7	3.7 – 5.0
Jet valve assembly	18 – 22	13 – 15
Engine oil cooler eye bolt	30 – 35	22 – 25
Intercooler air hose band	3 – 5	2 – 4
Accelerator cable lock nut	8 – 11	5.8 – 8.0
Rear catalytic converter to front catalytic converter nut	30 – 40	22 – 29
Turbocharger oil pipe flare nut	16 – 23	13 – 17
Engine mounting front insulator to engine nut	13 – 20	9.4 – 14
Engine mounting front insulator to cross member bolt	30 – 40	22 – 29
Engine mounting rear insulator to engine support bracket bolt	13 – 20	9.4 – 14
Engine mounting rear insulator to engine nut	20 – 24	14 – 17
Engine support bracket to body bolt	10	7.2
Power steering oil pump to bracket bolt	25 – 33	18 – 24
Air conditioner compressor to bracket bolt	20 – 29	14 – 22
Automatic transmission oil cooler eye bolt	30 – 50	22 – 36
Clutch tube flare nut	13 – 17	9.4 – 12.3
Propeller shaft to torque tube companion flange bolt	50 – 60	36 – 43
Rocker arm adjusting nuts for jet valve	8 – 10	5.8 – 7.2
Main bearing cap bolts	75 – 85	55 – 61
Connecting rod cap nuts	45 – 48	33 – 34
Dumper pulley bolts	110 – 130	80 – 94
Oil pump sprocket bolt	60 – 70	44 – 50
Silent shaft sprocket bolt	60 – 70	44 – 50
Timing chain case bolt	12 – 14	9 – 10
Silent shaft camber cover bolts	5 – 7	3.7 – 5.0
Flywheel bolts	130 – 140	94 – 101
Engine support brackets bolts	50 – 60	37 – 43
Chain guide "B" bolt (Upper)	8 – 10	5.8 – 7.2
Chain guide "B" bolt (Lower)	15 – 22	11 – 15

Items	Nm	ft.lbs
Oil pump driven gear bolts	60 – 70	44 – 50
Oil pump cover bolts	10 – 12	7.3 – 8.6
Oil pump assembly mounting bolt	10 – 12	7.3 – 8.6
Thrust plate bolt	10 – 12	7.3 – 8.6
Oil pan bolt	6 – 8	4.4 – 5.7
Oil pan drain plug	35 – 45	26 – 32
Oil screen bolt	15 – 22	11 – 15
Oil filter	11 – 12	8.0 – 8.6
Oil relief valve plug	30 – 45	22 – 32


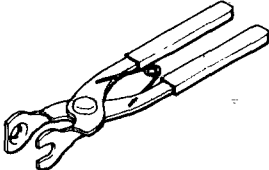

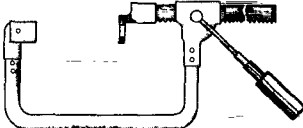
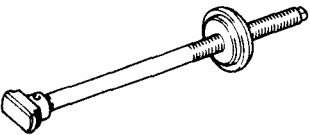
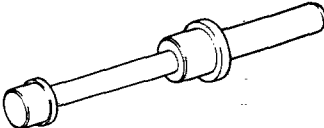
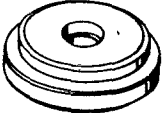

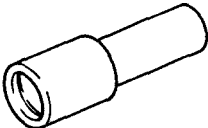
**SEALANTS**

N09CE-

Items	Specified sealant	Quantity
Oil pressure switch	MOPAR Part No. 4318034 or equivalent	As required
Cylinder block lower surface, 4 positions	MITSUBISHI GENUINE Part No. MZ100168 or equivalent	As required
Semi-circular packing	MOPAR Part No. 4318034 or equivalent	As required

## SPECIAL TOOLS

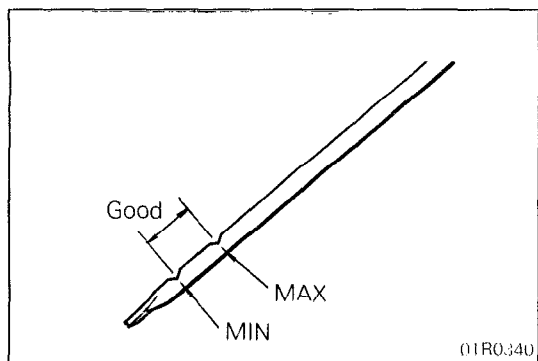
N09DA--

Tool (Number and name)	Use	Tool (Number and name)	Use
MD998308 Jet valve stem seal installer	Installation of jet valve stem seal	MD998309 Jet valve spring prier	Disassembly and reassembly of jet valve
			
MD998310 Jet valve wrench	Removal and installation of jet valve assembly	C-3422-B Valve spring compressor	Removal and installation of valve and related parts
			
MD998251 Silent shaft bearing puller (For rear bearing)	Removal of silent shaft bearing	MD998250 Silent shaft bearing installer (For rear bearing)	Press-fitting of silent shaft bearing
			
MD998376 Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal	MD998443 Auto-lash adjuster holder	Retaining the auto-lash adjuster
			
MD998729 Valve stem seal installer [Used with valve spring seat]	Installing valve stem seals		
			

## TROUBLESHOOTING

N09EAABa

Symptom	Probable cause	Remedy
Compression too low	Cylinder head gasket blown	Replace gasket
	Piston ring worn or damaged	Replace rings
	Piston or cylinder worn	Repair or replace piston and/or cylinder block
	Valve seat worn or damaged	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	Replace oil filter
	Oil pump gears or body worn	Replace gears and/or body
	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 auto-lash adjuster	Replace auto-lash adjuster
	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"
	Excessive bearing clearance	Replace bearings
Timing chain noise	Incorrect chain tension	Adjust chain tension
Excessive engine rolling and vibration	Loose engine support bracket	Retighten bracket
	Broken engine mounting front insulator	Replace insulator
	Broken engine mounting rear insulator	Replace insulator



## ENGINE ADJUSTMENT

N09FAAAa

### 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

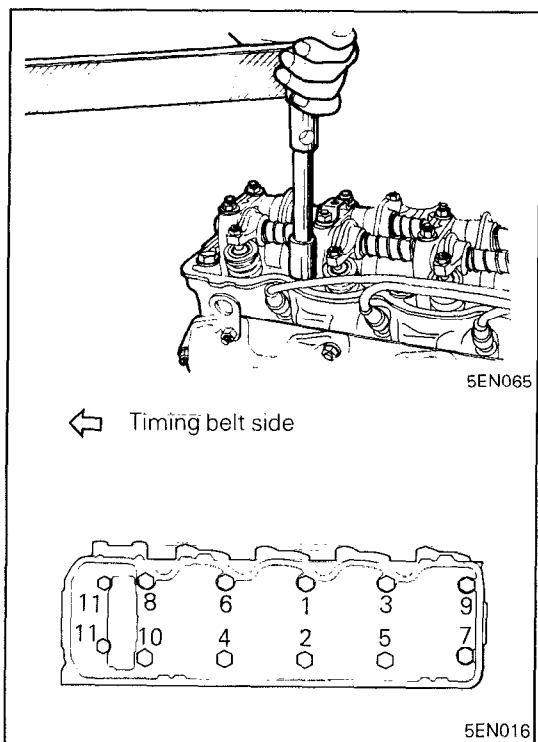
N09FBAAa

Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.

### ENGINE OIL FILTER REPLACEMENT

N09FCAAa

Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.



### RETORQUING CYLINDER HEAD BOLTS

N09FDAB

- (1) Using torque wrench, first slightly loosen cylinder head bolts and then tighten to specified torque.

#### Tightening torque:

##### Cylinder head bolt (No. 1 to 10)

Cold engine 90 – 100 Nm (65 – 72 ft.lbs.)

Hot engine 100 – 110 Nm (73 – 79 ft.lbs.)

##### Cylinder head bolt (No. 11)

Cold engine 15 – 22 Nm (11 – 15 ft.lbs.)

Hot engine 15 – 22 Nm (11 – 15 ft.lbs.)

- (2) Be sure to follow the specific torquing sequence.

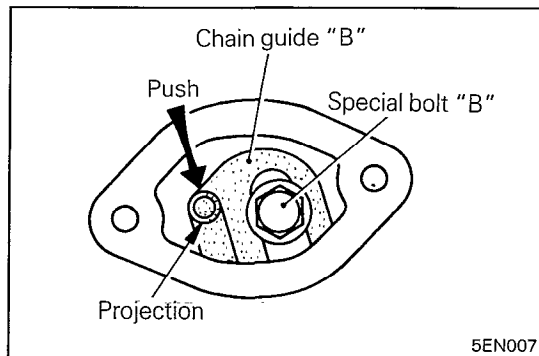
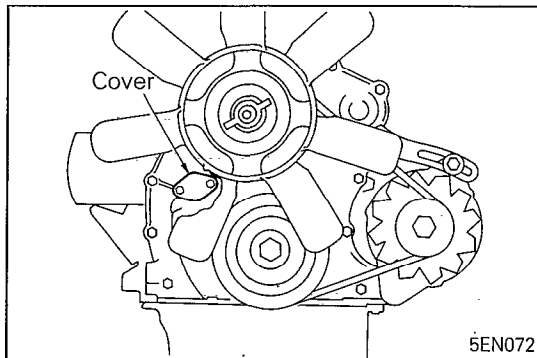
#### NOTE

Run engine until normal operating temperature is reached, allow it to cool down, and then retorque bolts to specification for best results.

### VALVE CLEARANCE ADJUSTMENT

N09FEAAa

Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.



## SILENT SHAFT DRIVE CHAIN TENSION ADJUSTMENT PROCEDURE

N09FIAA

When a loose silent shaft drive chain is suspected as the probable cause of abnormal noise, the tension must be readjusted.

Tension of silent shaft drive chain can be adjusted without removing timing chain cover as follows.

- (1) Remove cover from access hole provided at center of chain case (under water pump).
- (2) Loosen special bolt "B".
- (3) Using your finger, push projection on chain guide "B" in direction of arrow. Do not push projection with a screwdriver or other tool. Improper chain tension will cause abnormal noise.
- (4) Tighten special bolt "B".
- (5) Install cover. Do not reuse damaged gasket.

### Cover bolt tightening torque:

**10 – 12 Nm (7.3 – 8.6 ft.lbs.)**

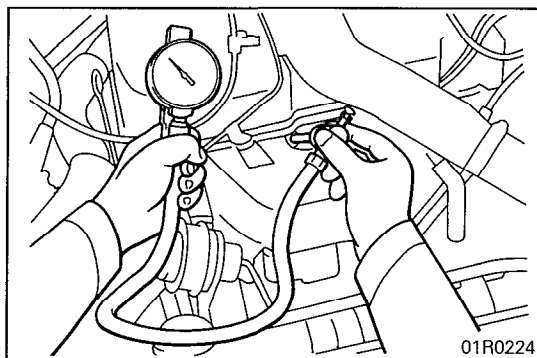
## COMPRESSION PRESSURE CHECK

N09FFAA

- (1) Before inspection, check that the engine oil, starter motor and battery are in normal state.
- (2) Start and run the engine until the engine coolant temperature rises to 80 to 90°C (176 to 194°F).
- (3) Stop the engine and disconnect the spark plug cables.
- (4) Remove the spark plugs.
- (5) Crank the engine to drive out foreign matter from cylinders.

### Caution

**Cover the spark plug holes with cloth to prevent scattering of foreign matter. Also keep away from the spark plug holes. This operation is necessary to be performed before compression pressure check to prevent danger of exposure to hot water, oil, fuel or other foreign matter that could enter the cylinders through cracks etc., as they will gush out from the spark plug holes at the time of compression pressure check.**



- (6) Set a compression gauge at the spark plug hole.
- (7) With the throttle valve held fully open, crank the engine and measure the compression pressure.

**Standard value: 1,000 kPa (142 psi) [250 – 400 rpm]**

**Limit: 800 kPa (113 psi) [250 – 400 rpm]**

- (8) Repeat steps (6) and (7) on all cylinders to check that the compression pressure difference among all cylinders is within the following limit.

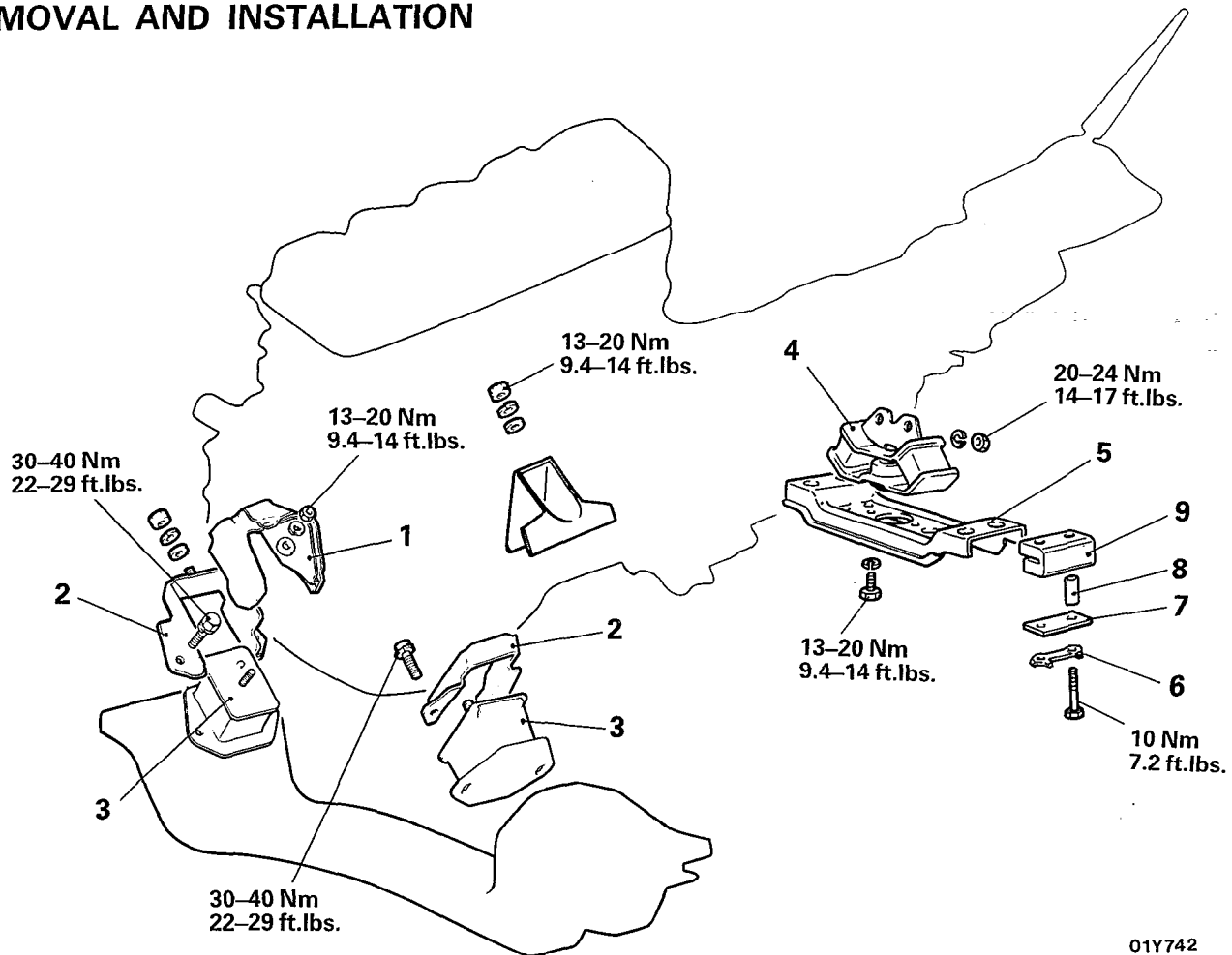
**Limit: Max. 100 kPa (14 psi)**

- (9) If any of cylinders has a compression pressure and/or pressure difference that exceeds the limits, add a small amount of engine oil through the spark plug hole and repeat steps (6) through (8) on that cylinder.
  - ① If addition of engine causes an increases of compression pressure, the piston and/or cylinder wall may have been worn or damaged.
  - ② If addition of engine oil does not cause any increase of compression pressure, valve seizure, poor valve contact, pressure leaks through gasket are suspected.

# ENGINE MOUNTING

## REMOVAL AND INSTALLATION

N09GA--



### Front mounting

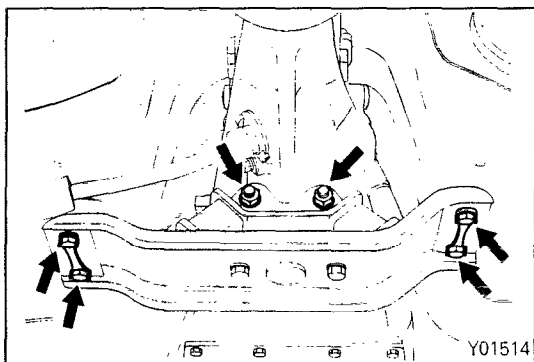
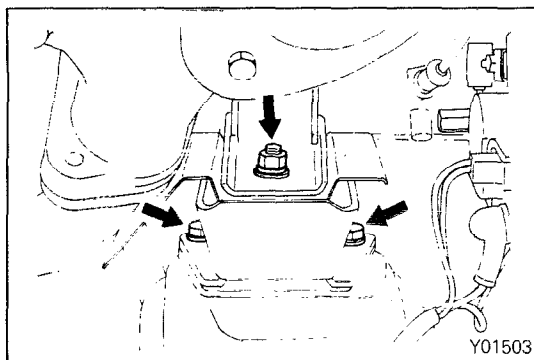
- 1. Heat protector
- 2. Front insulator stopper
- ◆◆ ◆◆ 3. Engine mounting front insulator

### Rear mounting

- ◆◆ 4. Engine mounting rear insulator
- 5. Engine support bracket
- ◆◆ 6. Lock washer
- 7. Plate
- 8. Lower cushion
- 9. Upper cushion

### NOTE

- (1) ◆◆: Refer to "Service Points of Removal".
- (2) ◆◆: Refer to "Service Points of Installation".



### SERVICE POINTS OF REMOVAL

N09GBAC

#### 3. REMOVAL OF ENGINE MOUNTING FRONT INSULATOR

- (1) Remove the engine mounting nuts and bolts from the front insulators.
- (2) Attach a chain to the engine hangers.
- (3) Using an engine hoist, raise the engine and remove the insulators.

#### Caution

Avoid applying a strain on the radiator and fuel hoses and cables by raising the engine too high.

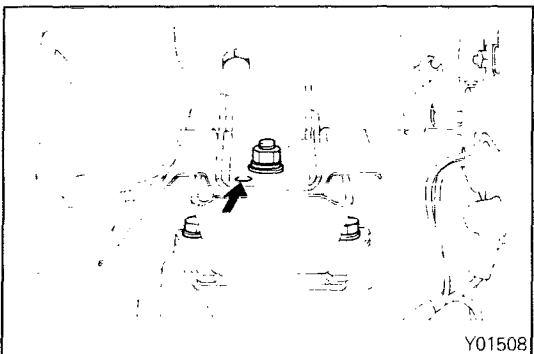
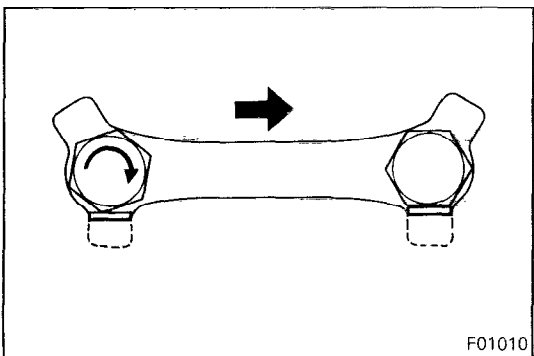
#### 4. REMOVAL OF ENGINE MOUNTING REAR INSULATOR

- (1) Support the transmission with a jack.
- (2) Remove the support bracket and insulator assembly.

### INSPECTION

N09GCAB

- Check the insulators for cracks, separation and deformation.
- Check the cushion pad for cracks and wear.
- Check the engine support bracket for deformation and corrosion.



### SERVICE POINTS OF INSTALLATION

N09GDAC

#### 6. INSTALLATION OF LOCK WASHER

Install the rear insulator and bend the lock washer tabs to keep the engine support bracket mounting bolts from turning.

#### Caution

Do not distort rubber portions, and never stain rubber portions with fuel or oil.

#### 3. INSTALLATION OF ENGINE MOUNTING FRONT INSULATOR

Make sure that the locating boss and hole are in alignment.

#### Caution

Do not distort rubber portions, and never stain rubber portions with fuel or oil.

## ENGINE AND TRANSMISSION ASSEMBLY

## REMOVAL AND INSTALLATION

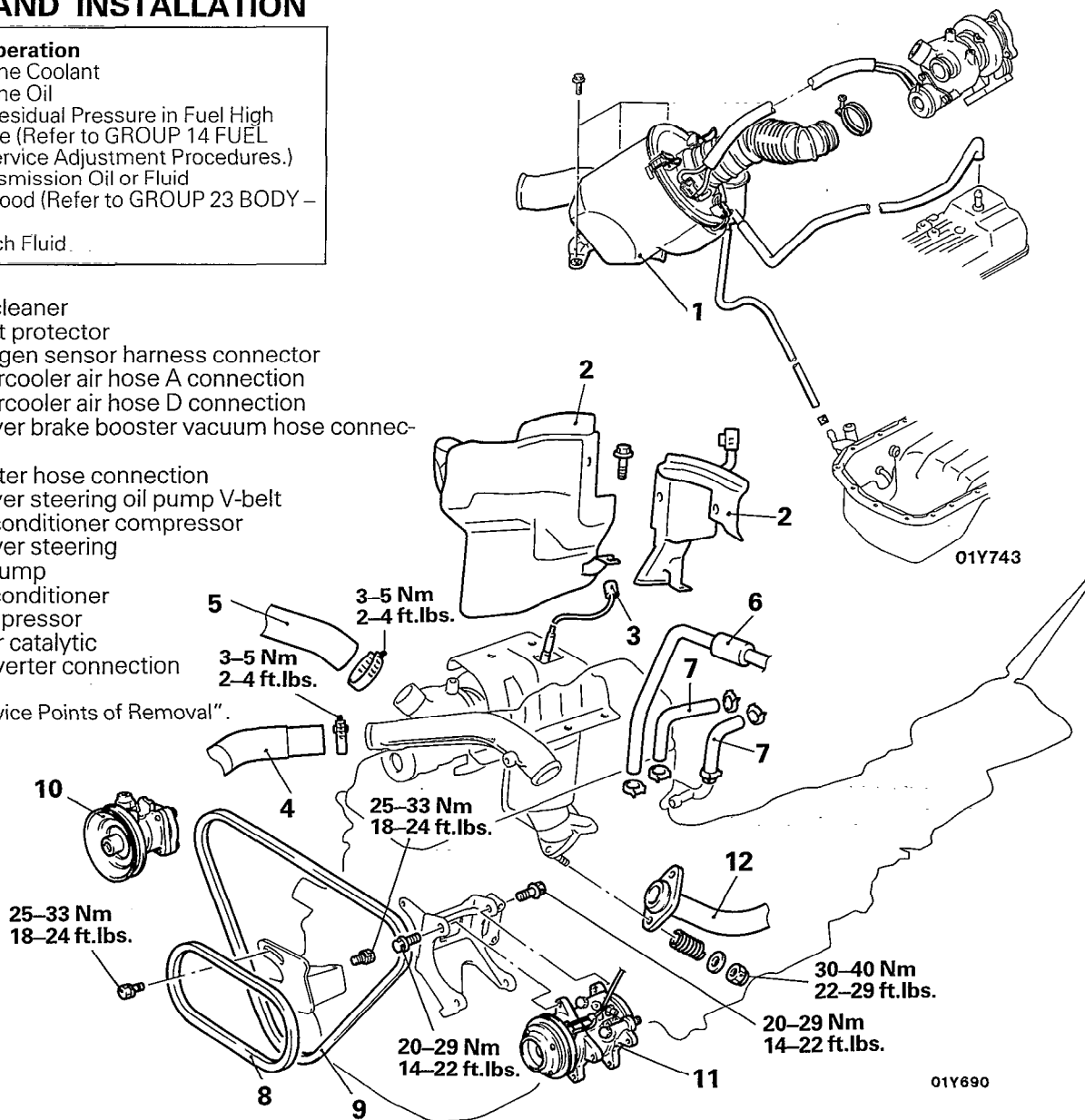
**Pre-removal Operation**

- Draining Engine Coolant
- Draining Engine Oil
- Removal of Residual Pressure in Fuel High Pressure Hose (Refer to GROUP 14 FUEL SYSTEM – Service Adjustment Procedures.)
- Draining Transmission Oil or Fluid
- Removal of Hood (Refer to GROUP 23 BODY – Hood.)
- Draining Clutch Fluid

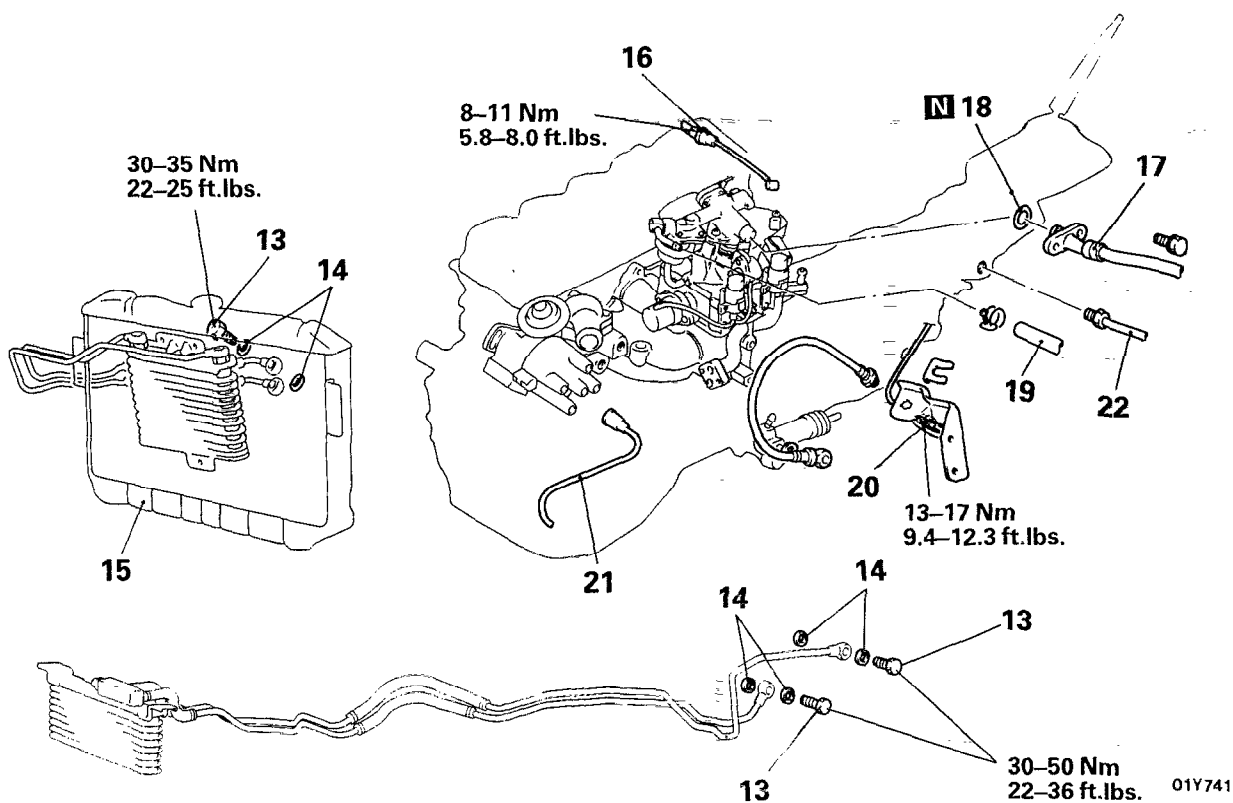
1. Air cleaner
2. Heat protector
3. Oxygen sensor harness connector
4. Intercooler air hose A connection
5. Intercooler air hose D connection
6. Power brake booster vacuum hose connection
7. Heater hose connection
8. Power steering oil pump V-belt
9. Air conditioner compressor
10. Power steering oil pump
11. Air conditioner compressor
12. Rear catalytic converter connection

**NOTE**

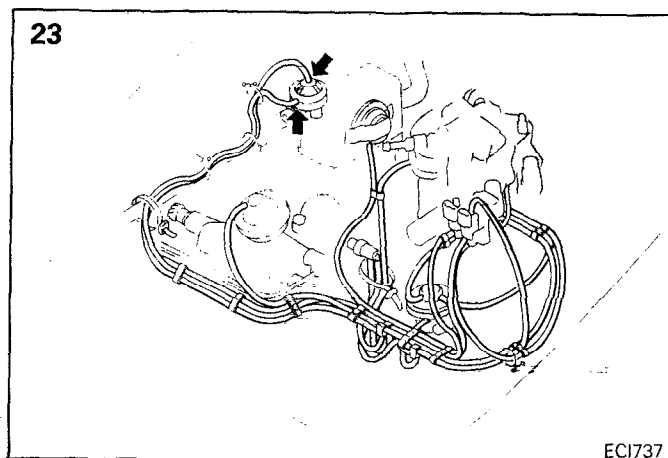
↔: Refer to "Service Points of Removal".

**Post-installation Operation**

- Refilling Engine Coolant
- Refilling Engine Oil
- Refilling Transmission Oil or Fluid
- Refilling Clutch Fluid
- Installation of Under Cover (Refer to GROUP 23 BODY – Loose Panel.)
- Installation of Hood (Refer to GROUP 23 BODY – Hood.)
- Bleeding Clutch Line (Refer to GROUP 6 CLUTCH – Service Adjustment Procedures.)
- Adjustment of Air Conditioner Compressor V-belt Tension (Refer to GROUP 24 HEATERS AND AIR CONDITIONING – Service Adjustment Procedures.)
- Adjustment of Power Steering Oil Pump V-belt (Refer to GROUP 19 STEERING – POWER – Service Adjustment Procedures.)
- Adjustment of Accelerator Cable Free Play (Refer to GROUP 14 FUEL SYSTEM – Service Adjustment Procedures.)
- Adjustment of Clutch Pedal Cable Free Play (Refer to GROUP 6 CLUTCH – Service Adjustment Procedures.)
- Adjustment of Hood (Refer to GROUP 23 BODY – Service Adjustment Procedures.)
- Adjustment of Engine (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)
- Checking Oil, Engine Coolant or Fluid Leaks
- Checking Meter and Gauge Operation
- Rod Test
  - (1) Steering Wheel Operation
  - (2) Transmission Gear Shift Lever Operation
  - (3) Clutch Operation
  - (4) Brake Operation



01Y741

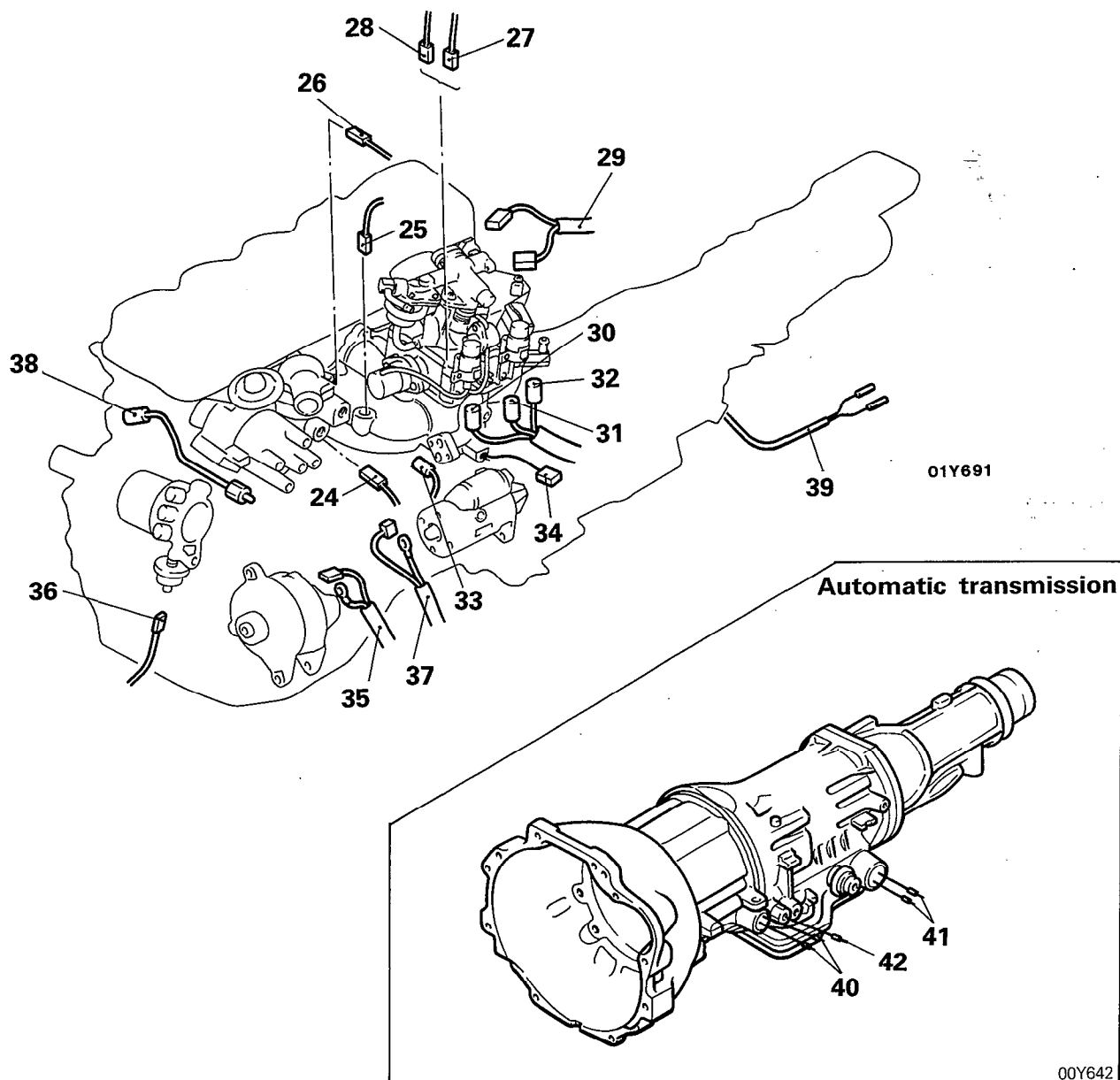


ECI737

- 13. Eye bolt
- 14. Gasket
- 15. Radiator
- 16. Accelerator cable connection
- 17. Fuel high pressure hose connection
- 18. O-ring
- 19. Fuel return hose connection
- 20. Clutch tube connection
- 21. High tension cable connection
- 22. Speedometer cable connection
- 23. Vacuum hose connection

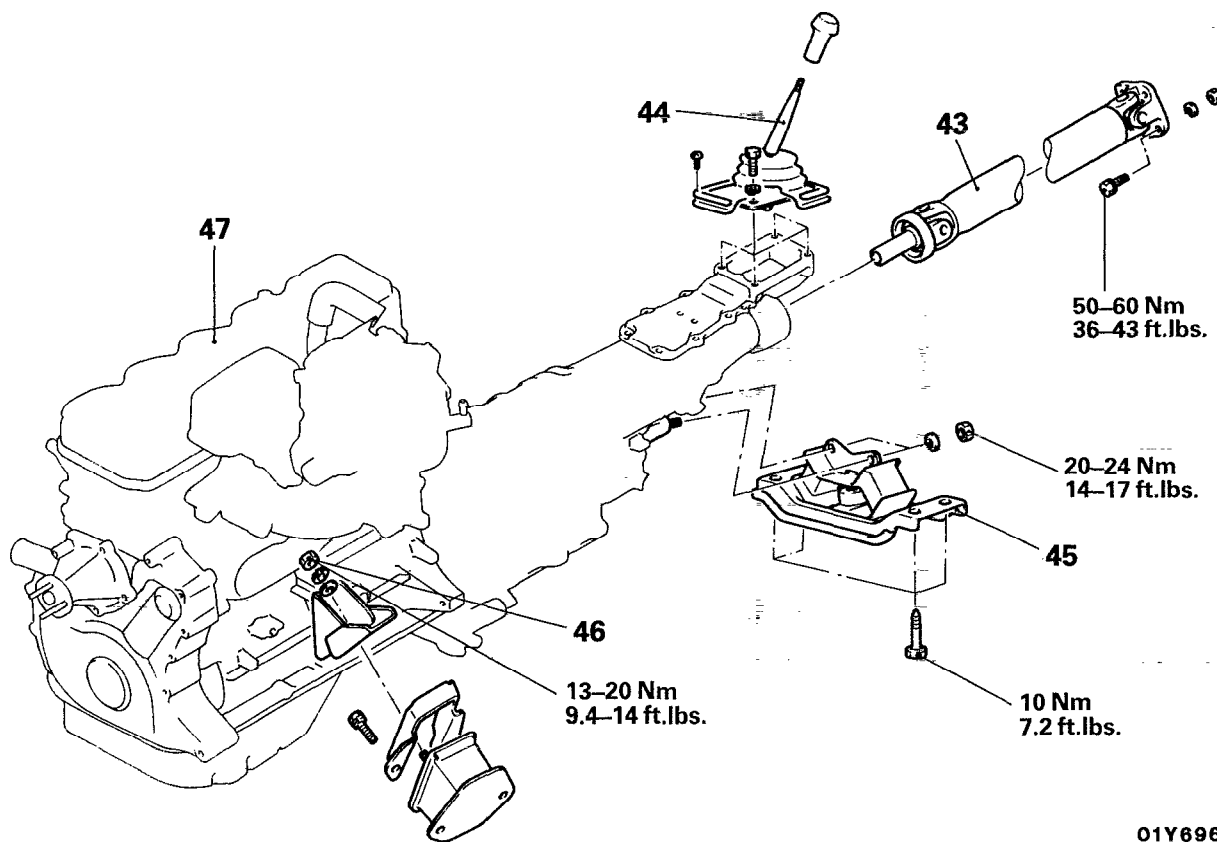
## NOTE

**N**: Non-reusable parts



- 24. Water temperature unit harness connector connection
- 25. Water temperature sensor harness connector connection
- 26. Water temperature switch harness connector connection
- 27. Secondary air solenoid valve harness connector connection
- 28. EGR solenoid valve harness connector connection
- 29. Injector harness connector connection
- 30. Throttle position sensor harness connector connection
- 31. ISC servo harness connector connection
- 32. Motor position sensor harness connector connection
- 33. Distributor signal generator harness connector connection

- 34. Ground cable connector connection
- 35. Alternator harness connector connection
- 36. Oil pressure gauge unit harness connector connection
- 37. Starter motor harness connector connection
- 38. Detonation sensor harness connector connection
- 39. Back-up light switch harness connector connection
- 40. O.D. cancel solenoid harness connector connection
- 41. Downshift solenoid harness connector connection
- 42. Inhibitor switch harness connector connection



- ◆◆ ◆◆ 43. Propeller shaft
- ◆◆ 44. Gear shift lever assembly
- ◆◆ 45. Rear mounting
- 46. Nut
- 47. Engine and transmission assembly

## NOTE

- (1) ◆◆: Refer to "Service Points of Removal".
- (2) ◆◆: Refer to "Service Points of Installation".

**SERVICE POINTS OF REMOVAL**

N09SBCA

**10. REMOVAL OF POWER STEERING OIL PUMP / 11. AIR CONDITIONER COMPRESSOR**

Hold the power steering oil pump and air compressor by wires since they are removed with hoses as connected.

**43. REMOVAL OF PROPELLER SHAFT**

Refer to GROUP 16 PROPELLER SHAFT AND UNIVERSAL JOINTS – Propeller Shaft and Universal Joints.

**44. REMOVAL OF GEAR SHIFT LEVER ASSEMBLY**

Refer to GROUP 21 TRANSMISSION – MANUAL AND AUTOMATIC – Gear Shift Lever Assembly.

**SERVICE POINTS OF INSTALLATION**

N09SDAC

**45. INSTALLATION OF REAR MOUNTING**

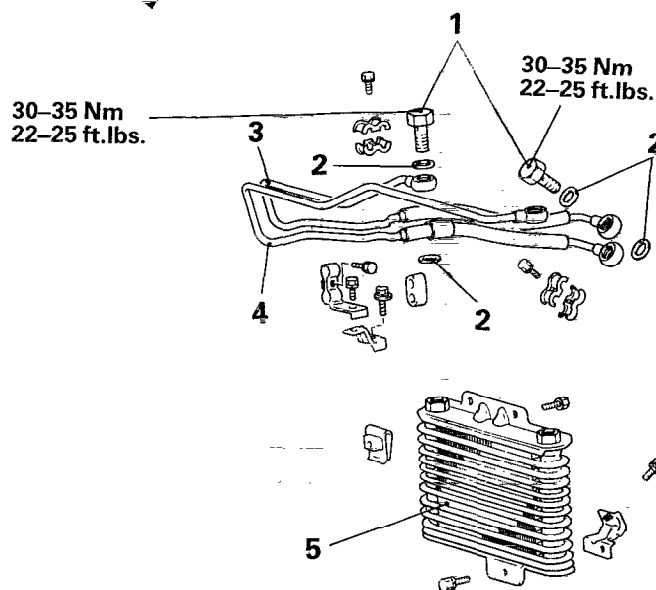
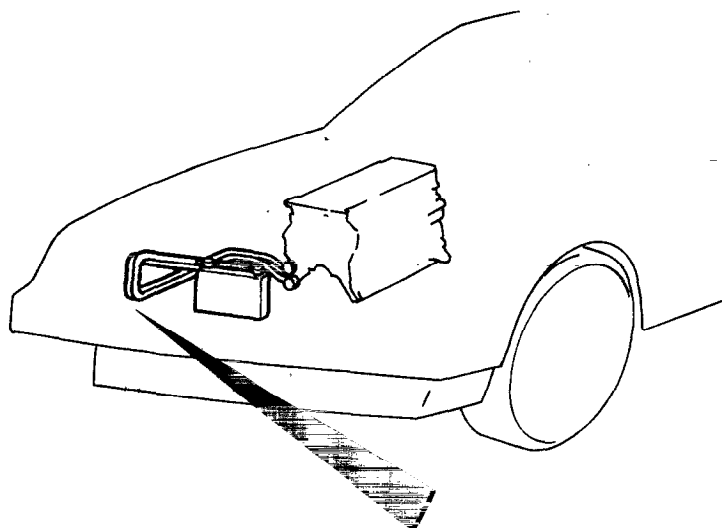
Refer to P.9-17

**43. INSTALLATION OF PROPELLER SHAFT**

Refer to GROUP 16 PROPELLER SHAFT AND UNIVERSAL JOINTS – Propeller Shaft and Universal Joints.

# ENGINE OIL COOLER REMOVAL AND INSTALLATION

N09MA--

**Pre-removal Operation**

- Draining Engine Oil

**Post-installation Operation**

- Refilling Engine Oil

**Removal steps**

- ↔
1. Eye bolt
  2. Gasket
  3. Engine oil return hose assembly
  4. Engine oil feed hose assembly
  5. Engine oil cooler

**NOTE**

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

01Y701

**SERVICE POINT OF REMOVAL**

N09MBAA

**1. REMOVAL OF EYE BOLT****Caution**

Be sure to hold the weld nut of the oil cooler while loosening the eye bolt.

**INSPECTION**

N09MCAA

- Check the engine oil cooler fins for bends, breaks or plugs.
- Check the engine oil cooler hoses for cracks, damage, clogging or deterioration.
- Check the gaskets for damage or deformation.
- Check the eye bolts for clogging or deformation.

# OIL PAN AND OIL SCREEN REMOVAL AND INSTALLATION

N09HA--

**Pre-removal Operation**

- Draining Engine Oil

**Post-installation Operation**

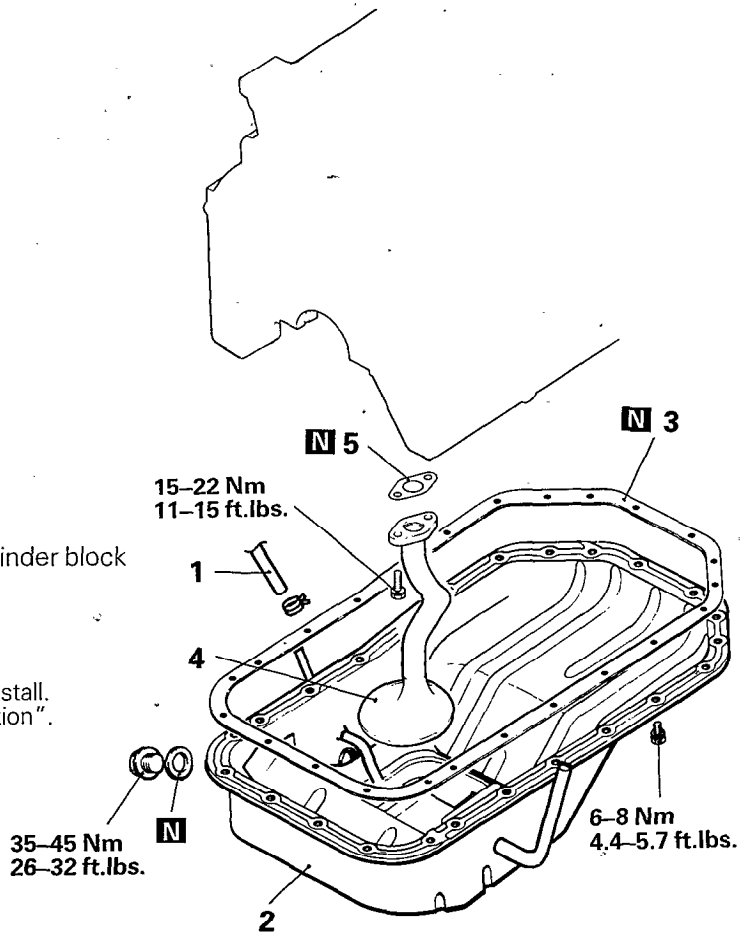
- Refilling Engine Oil

**Removal steps**

1. Oil drain hose
2. Oil pan
3. Oil pan gasket
- ◆◆ Application of sealant to cylinder block
5. Oil screen gasket

**NOTE**

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

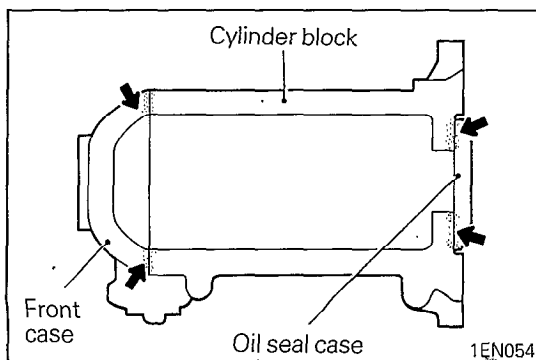


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**INSPECTION**

N09HCAA

- Check the oil pan for failure, damage and cracks. Replace if defective.
- Check the oil screen for clogging, damage and cracks and replace if defective.

**SERVICE POINT OF INSTALLATION**

N09HDAB

**• APPLICATION OF SEALANT TO CYLINDER BLOCK**

Apply specified sealant to four places shown in illustration.

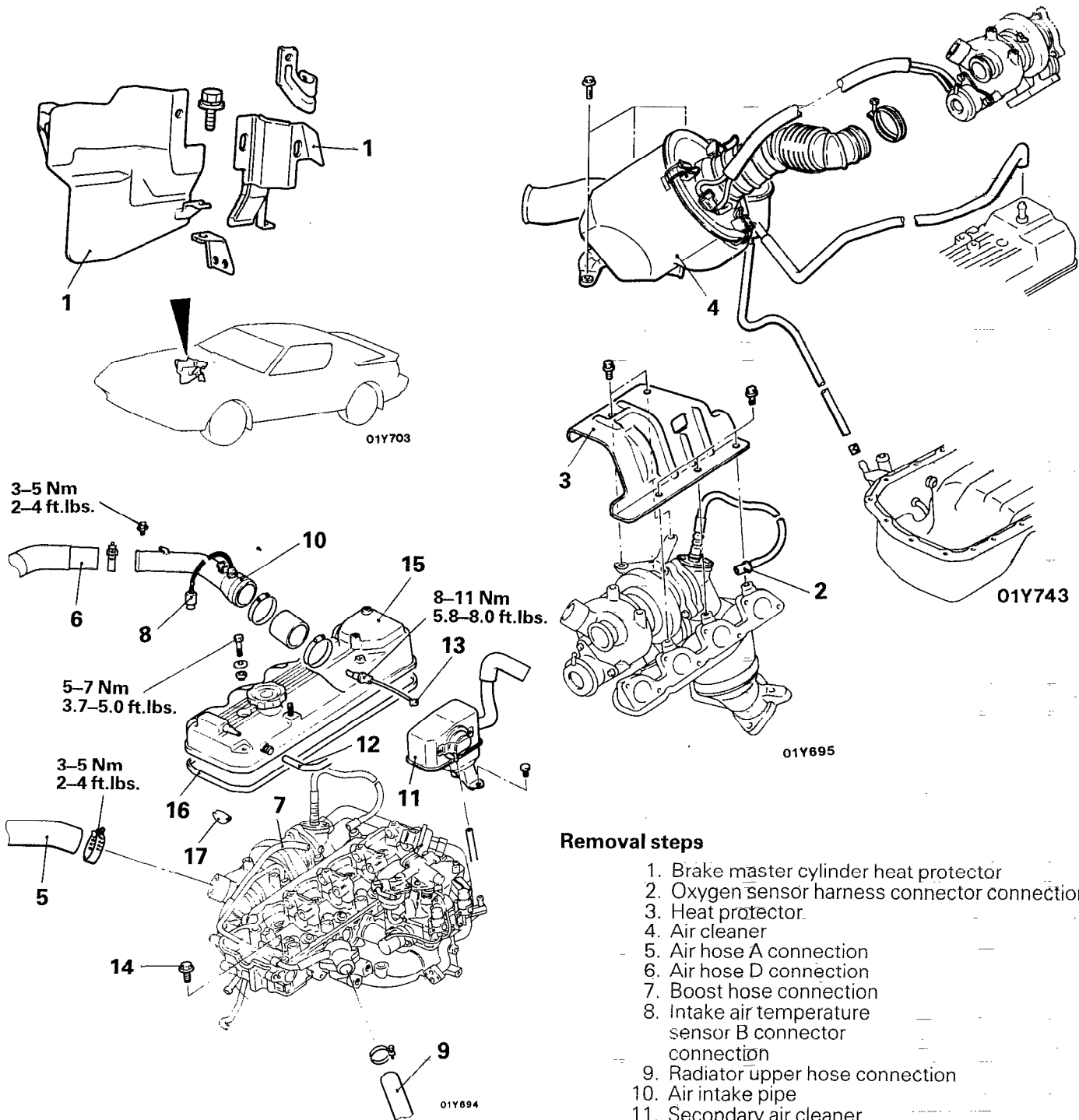
**Specified sealant: MITSUBISHI GENUINE Part No. MZ100168 or equivalent**

**Caution**

**Do not apply sealant to oil pan gasket.**

# CYLINDER HEAD GASKET REMOVAL AND INSTALLATION

N09JA--



## Removal steps

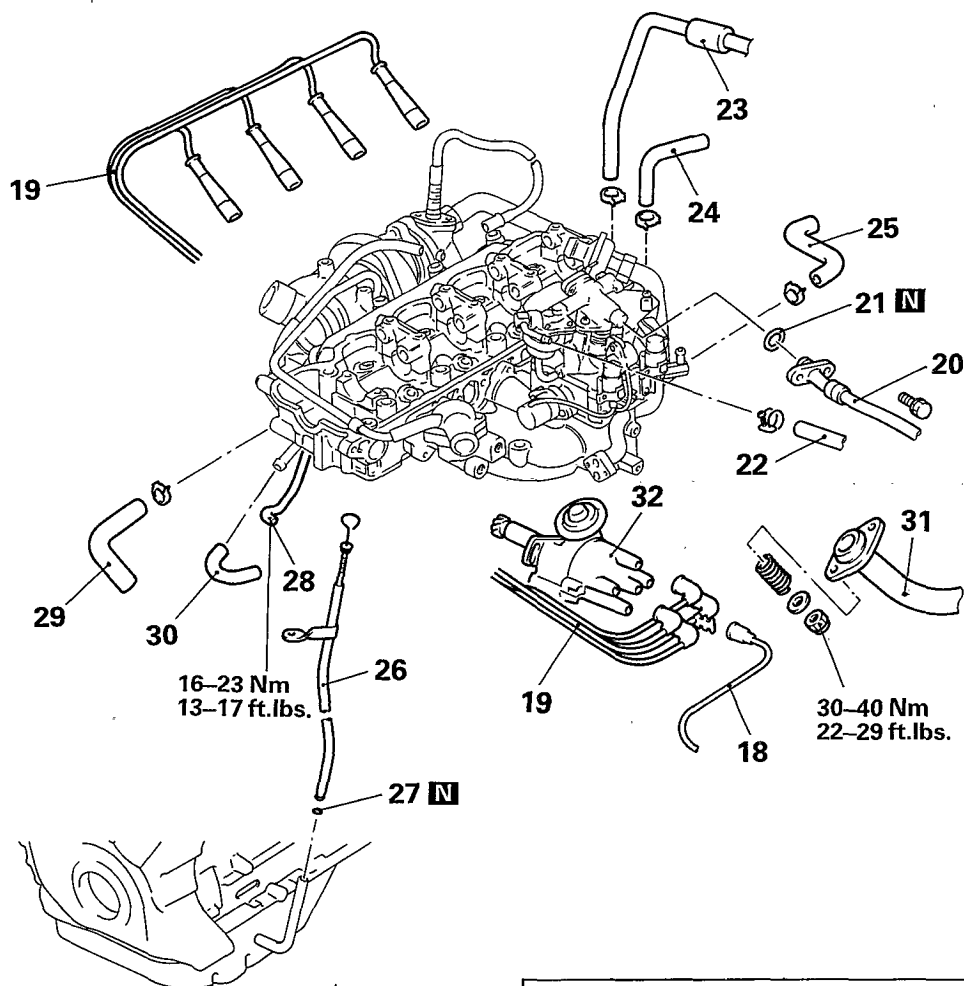
1. Brake master cylinder heat protector
  2. Oxygen sensor harness connector connection
  3. Heat protector
  4. Air cleaner
  5. Air hose A connection
  6. Air hose D connection
  7. Boost hose connection
  8. Intake air temperature sensor B connector connection
  9. Radiator upper hose connection
  10. Air intake pipe
  11. Secondary air cleaner
  12. PCV valve hose connection
  13. Accelerator cable connection
  14. Bolt
  15. Rocker cover
  16. Rocker cover gasket
  17. Semi-circular packing
- Alignment of timing mark

## Pre-removal Operation

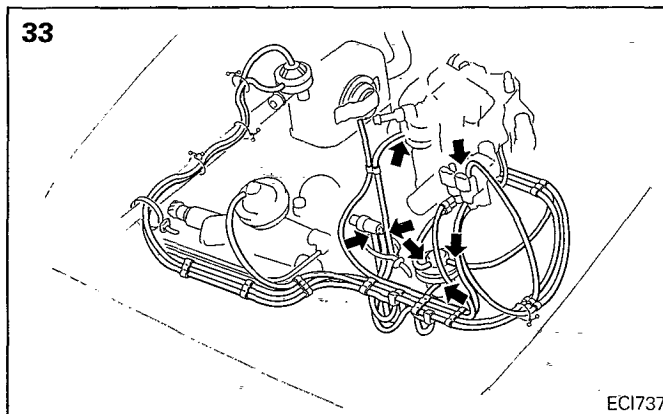
- Draining Engine Coolant
- Draining Engine Oil
- Removal of Residual Pressure in Fuel High Pressure Hose (Refer to GROUP 14 FUEL SYSTEM – Service Adjustment Procedures.)
- Removal of Air Conditioner Compressor V-belt (Refer to GROUP 24 HEATERS AND AIR CONDITIONING – Receiver, Condenser, Compressor, Clutch Assembly.)

## NOTE

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



01Y693

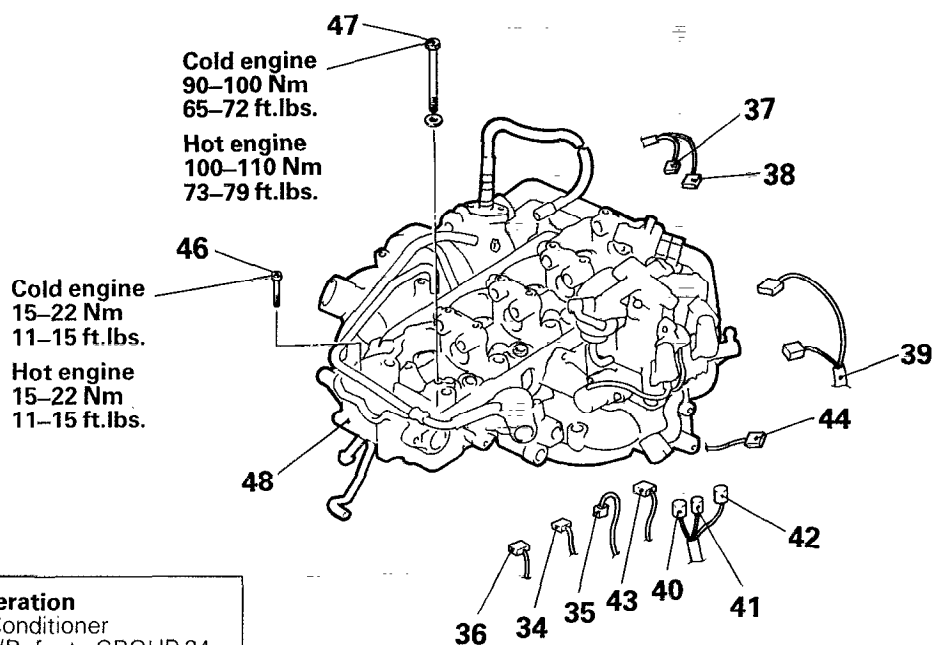


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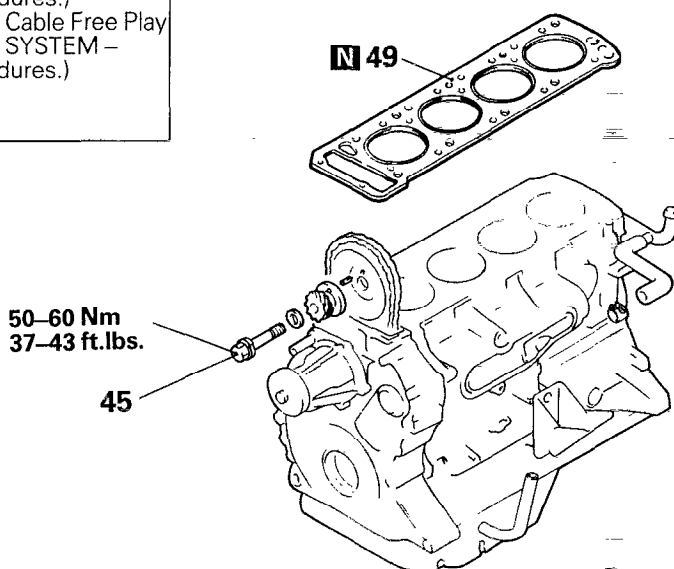
- 18. High tension cable connection
- 19. Spark plug cable connection
- 20. Fuel high pressure hose connection
- 21. O-ring
- 22. Fuel return hose connection
- 23. Power brake booster hose connection
- 24. Heater hose connection
- 25. Water hose connection
- 26. Engine oil level gauge guide
- 27. O-ring
- 28. Turbocharger oil pipe connection
- 29. Turbachelor oil return hose connection
- 30. Turbocharger water hose connection
- 31. Rear catalytic converter connection
- ◆◆ 32. Distributor
- 33. Vacuum hose connection

## - NOTE

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

**Post-installation Operation**

- Adjustment of Air Conditioner Compressor V-belt (Refer to GROUP 24 HEATERS AND AIR CONDITIONING – Service Adjustment Procedures.)
- Adjustment of Accelerator Cable Free Play (Refer to GROUP 14 FUEL SYSTEM – Service Adjustment Procedures.)
- Refilling Engine Oil
- Refilling Engine Coolant



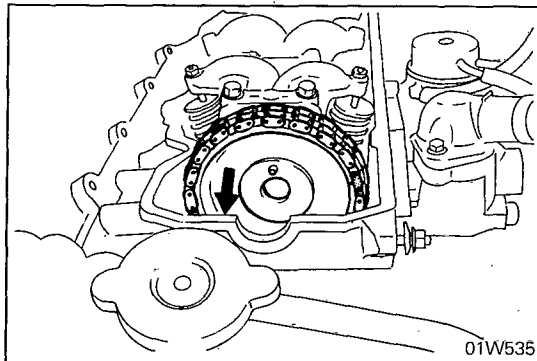
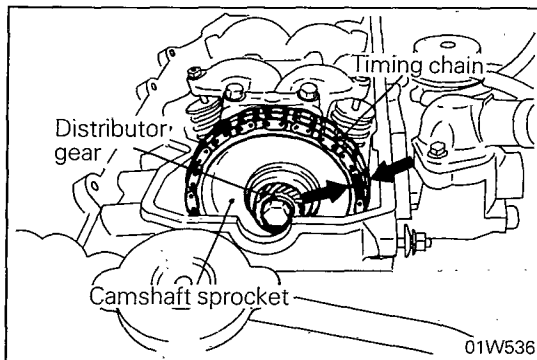
01Y700

34. Water temperature unit harness connector connection
35. Water temperature sensor harness connector connection
36. Water temperature switch harness connector connection
37. Secondary air solenoid valve harness connector connection
38. EGR solenoid valve harness connector connection
39. Injector harness connector connection
40. Throttle position sensor harness connector connection
41. ISC servo harness connector connection
42. Motor position sensor harness connector connection
43. Distributor signal generator harness connector connection

44. Ground cable connector connection
45. Camshaft sprocket to camshaft bolt
46. Bolt
47. Cylinder head bolt
48. Cylinder head
49. 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**

N09JBAB

- **ALIGNMENT OF TIMING MARK**

Turn the crankshaft clockwise to align the timing marks.

**Caution**

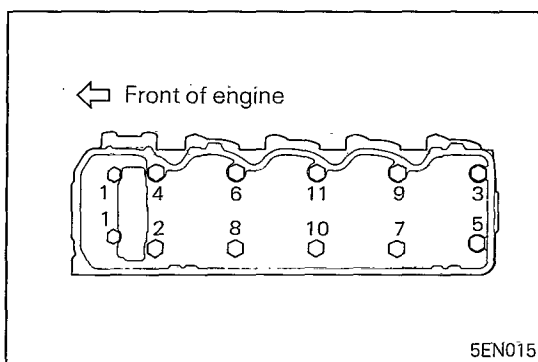
Always turn the crankshaft clockwise.

**45. REMOVAL OF CAMSHAFT SPROCKET TO CAMSHAFT BOLT**

- (1) Remove the cam sprocket installation bolt, and remove the distributor gear.
- (2) Pull the camshaft sprocket (with the timing chain attached) out from the camshaft, and place it on top of the camshaft sprocket holder.

**Caution**

1. The crankshaft must not be rotated after the camshaft sprocket is pulled out from the camshaft.
2. Be careful not to allow the timing chain to come off from the camshaft sprocket.

**46. REMOVAL OF BOLTS / 47. CYLINDER HEAD BOLTS**

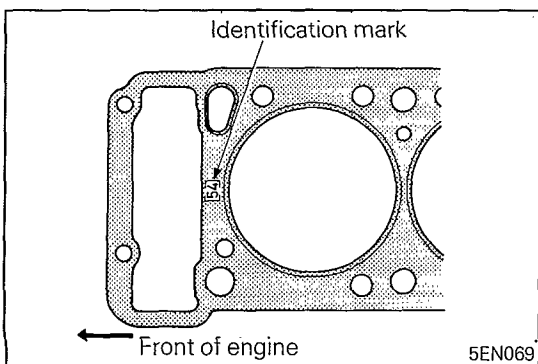
Loosen the bolts (in the order indicated in the figure) in 2 or 3 steps, and remove from the cylinder head.

**49. REMOVAL OF CYLINDER HEAD GASKET**

Remove gaskets from the cylinder head and block completely using a gasket scraper, etc.

**Caution**

Be careful not to scratch the surfaces. Do not allow gasket fragments to fall into the cylinder.

**SERVICE POINTS OF INSTALLATION**

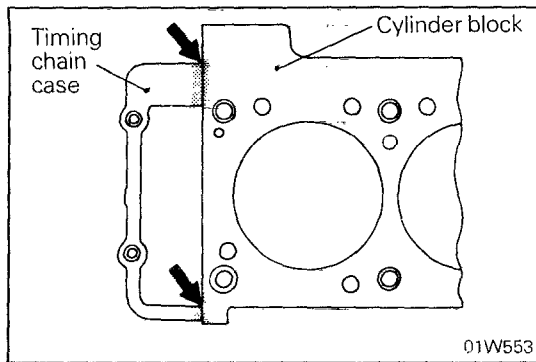
N09JDCA

**49. INSTALLATION OF CYLINDER HEAD GASKET**

- (1) Clean the cylinder block and head surfaces in contact with gasket.
- (2) Lay the cylinder head gasket on the cylinder block with the identification mark at front top.

**Caution**

Do not apply sealant to cylinder head gasket.

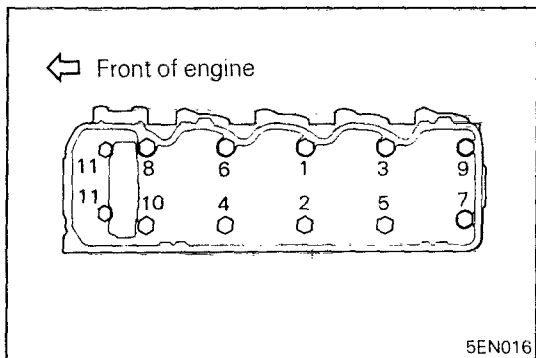


- (3) Before cylinder head gasket is installed, apply specified sealant to top surface of each butt joint between cylinder block and timing chain case.

**Specified sealant: MOPAR Part No. 4318034 or equivalent**

**Caution**

**Be careful not to allow sealant to enter the oil hole in the cylinder block.**

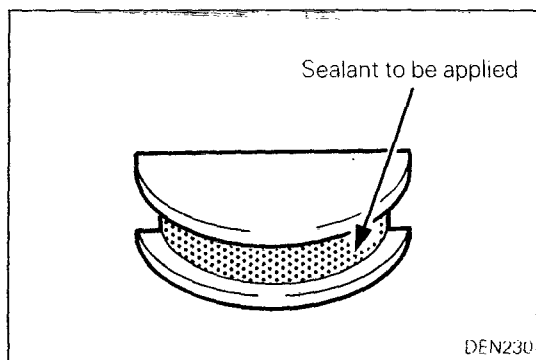


**47. INSTALLATION OF CYLINDER HEAD BOLTS / 46. BOLTS**

Tighten the bolts (in the order indicated in the illustration) in 2 or 3 steps; and finally tighten them at the specified torque.

**32. INSTALLATION OF DISTRIBUTOR**

Refer to GROUP 8 ELECTRICAL – Distributor.



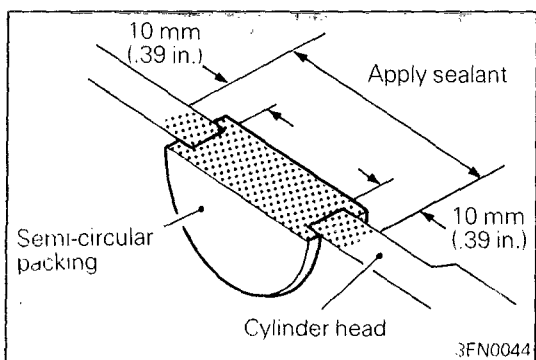
**17. APPLICATION OF SEALANT TO SEMI-CIRCULAR PACKING**

Apply a coating of the specified sealant to the semi-circular gasket and the cylinder head top surfaces, and then tighten the rocker cover assembly at the specified torque.

**Specified sealant: MOPAR Part No. 4318034 or equivalent**

**Caution**

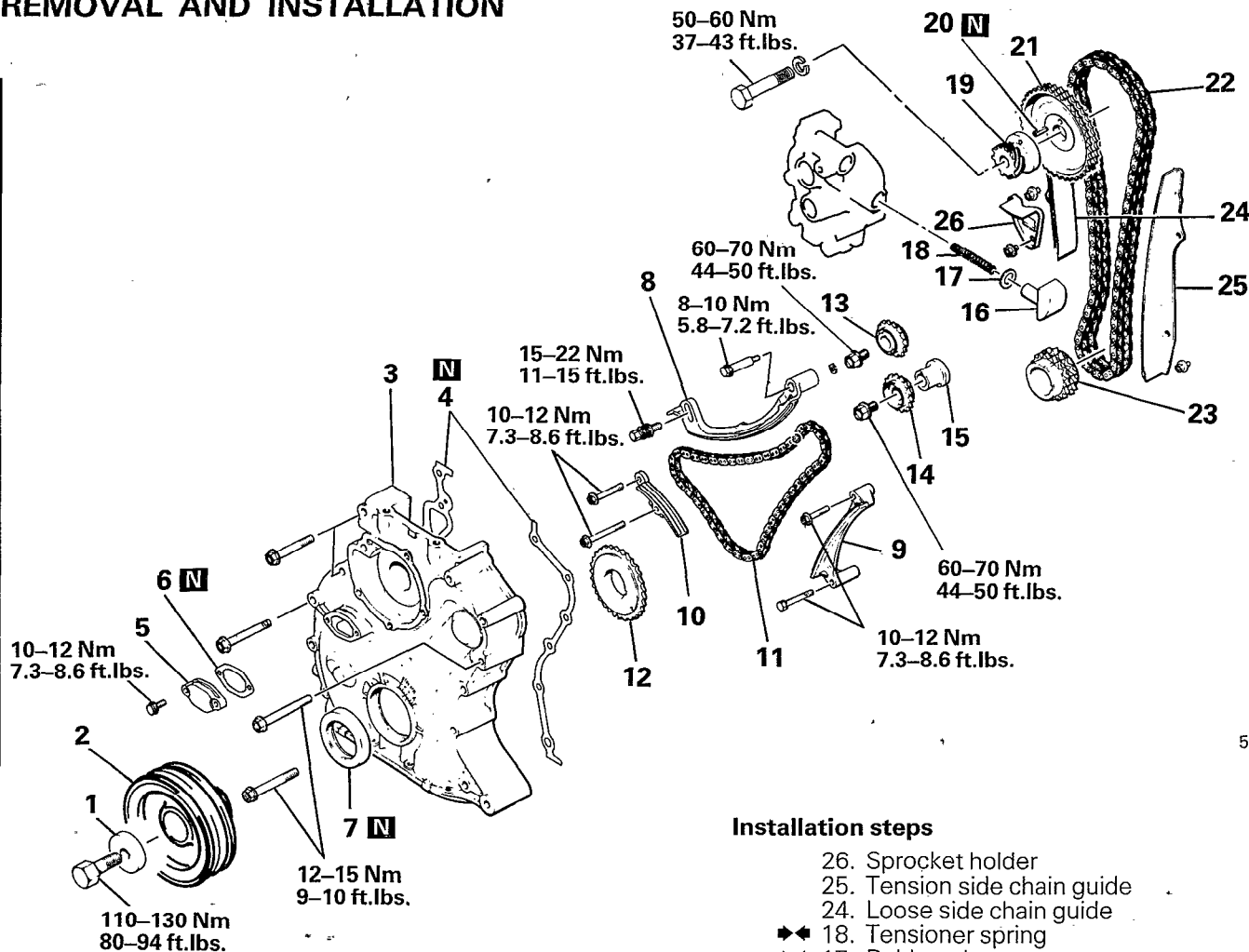
**If they are overtightened, a deformed rocker cover or oil leakage could result.**



## TIMING CHAIN TRAIN

## REMOVAL AND INSTALLATION

N09WA



5EN196

## Removal steps

1. Special washer
2. Damper pulley
3. Timing chain case
4. Chain case gasket
5. Chain guide access hole cover
6. Chain guide access hole gasket
7. Oil seal
8. Chain guide "B"
9. Chain guide "A"
10. Chain guide "C"
11. Chain "B"
12. Crankshaft sprocket "B"
13. Oil pump sprocket
14. Left silent shaft sprocket
15. Spacer
16. Tensioner sleeve
17. Rubber sheet
18. Tensioner spring
19. Distributor gear
20. Spring pin
21. Camshaft sprocket
22. Timing chain
23. Crankshaft sprocket
24. Loose side chain guide
25. Tension side chain guide
26. Sprocket holder

## Installation steps

26. Sprocket holder
25. Tension side chain guide
24. Loose side chain guide
18. Tensioner spring
17. Rubber sheet
16. Tensioner sleeve
23. Crankshaft sprocket
22. Timing chain
21. Camshaft sprocket
20. Spring pin
19. Distributor gear
15. Spacer
14. Left silent shaft sprocket
13. Oil pump sprocket
12. Crankshaft sprocket "B"
11. Chain "B"
10. Chain guide "C"
9. Chain guide "A"
8. Chain guide "B"
7. Oil seal
6. Chain guide access hole gasket
5. Chain guide access hole cover
4. Chain case gasket
3. Timing chain case
2. Damper pulley
1. Special washer

## NOTE

- (1) Refer to "Service Points of Removal".
- (2) Refer to "Service Points of Installation".
- (3) N: Non-reusable parts

**SERVICE POINTS OF REMOVAL**

N09WBAA

**21. REMOVAL OF CAMSHAFT SPROCKET / 22. TIMING CHAIN / 23. CRANKSHAFT SPROCKET**

Remove the timing chain combined with camshaft sprocket and crankshaft sprocket.

**INSPECTION**

N09WCAA

- Check the timing chain for roller play, wear, damage or disconnected links.  
Replace if necessary.
- Check the tensioner and chain guide rubber shoe for wear or damage.  
Replace if necessary.

**SERVICE POINTS OF INSTALLATION**

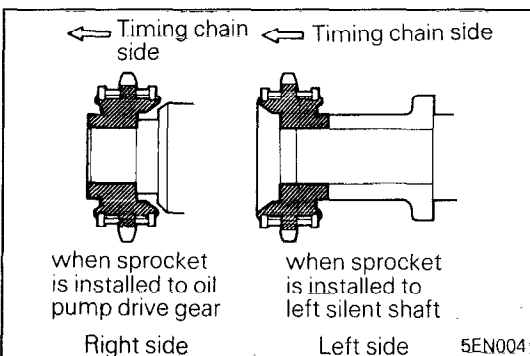
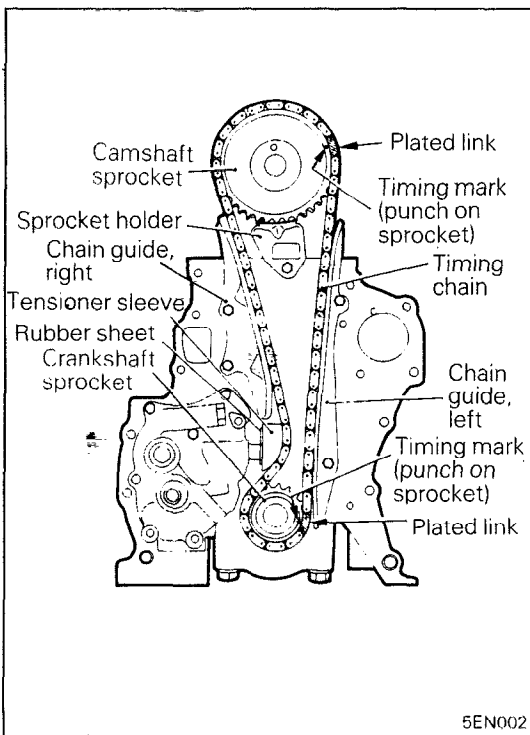
N09WDAA

**18. INSTALLATION OF TENSIONER SPRING / 17. RUBBER SHEET / 16. TENSIONER SLEEVE**

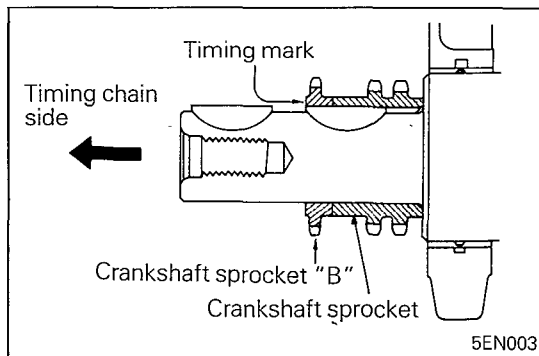
Install tensioner spring sleeve and rubber sheet to oil pump, and then install the oil pump.

**22. INSTALLATION OF TIMING CHAIN**

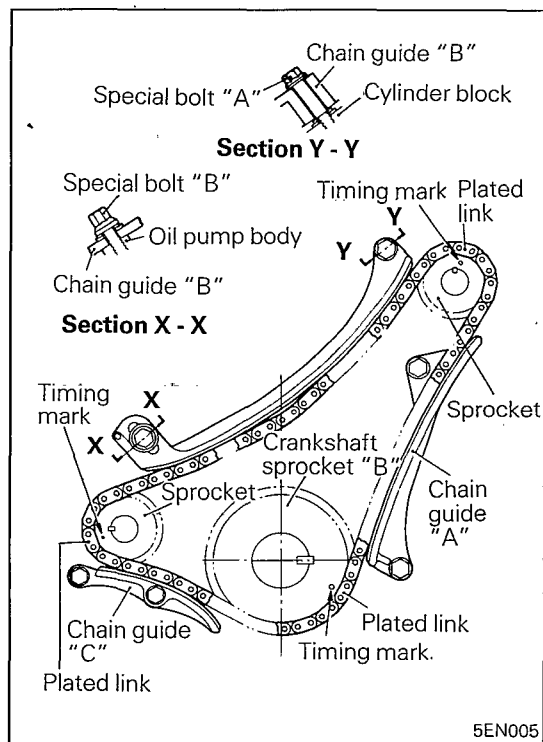
- (1) Turn crankshaft until piston of No.1 cylinder is at top dead center.
- (2) Line up plated links of timing chain and timing marks on sprockets as chain and sprockets are assembled.
- (3) While sliding crankshaft sprocket onto crankshaft, install chain and sprocket. Place camshaft sprocket on sprocket holder.

**14. INSTALLATION OF LEFT SILENT SHAFT SPROCKET**

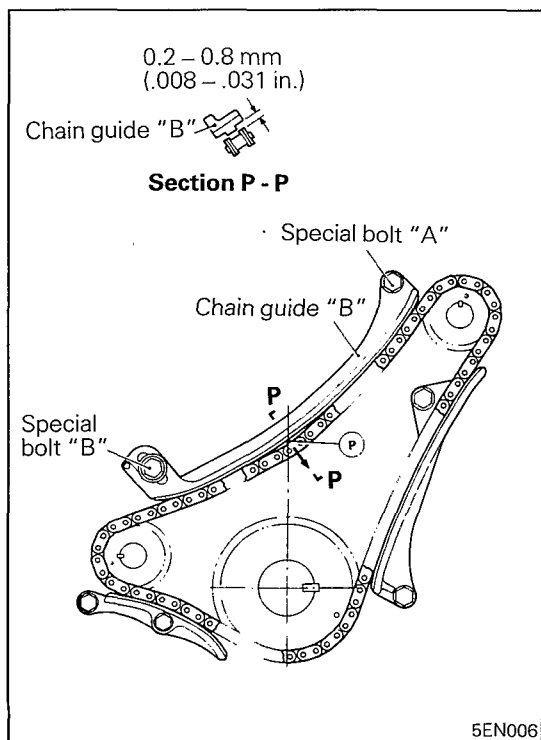
- (1) Assemble silent shaft sprockets to chain "B". Make sure that timing marks are in alignment with plated links.
- (2) Use care not to confuse right and left sprockets, as they are installed in opposite directions.

**12. INSTALLATION OF CRANKSHAFT SPROCKET "B"**

Install crankshaft sprocket "B" (for driving silent shafts) on crankshaft.

**11. INSTALLATION OF CHAIN "B"**

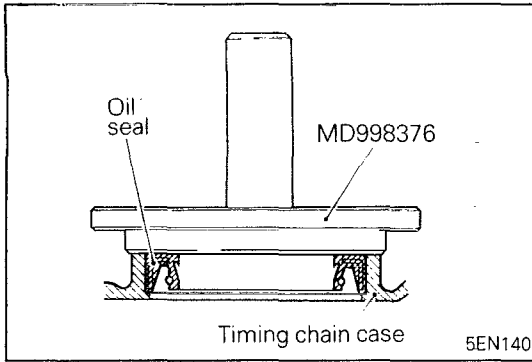
- (1) Holding assembled sprockets and chain "B", align timing mark on crankshaft sprocket "B" with that on chain "B", and install sprockets to oil pump drive gear and left silent shaft. Partially tighten bolt.



- (2) Rotate both silent shaft sprockets slightly to position chain slack at point P.
- (3) Adjust position of chain guide "B" so that when chain is pulled in direction of arrow with finger tips, clearance between chain guide "B" and links of chain "B" will be as shown below.

**Clearance between chain and chain guide "B":****Standard value**

**0.2 - 0.8 mm (.008 - .031 in.)**

**7. INSTALLATION OF OIL SEAL**

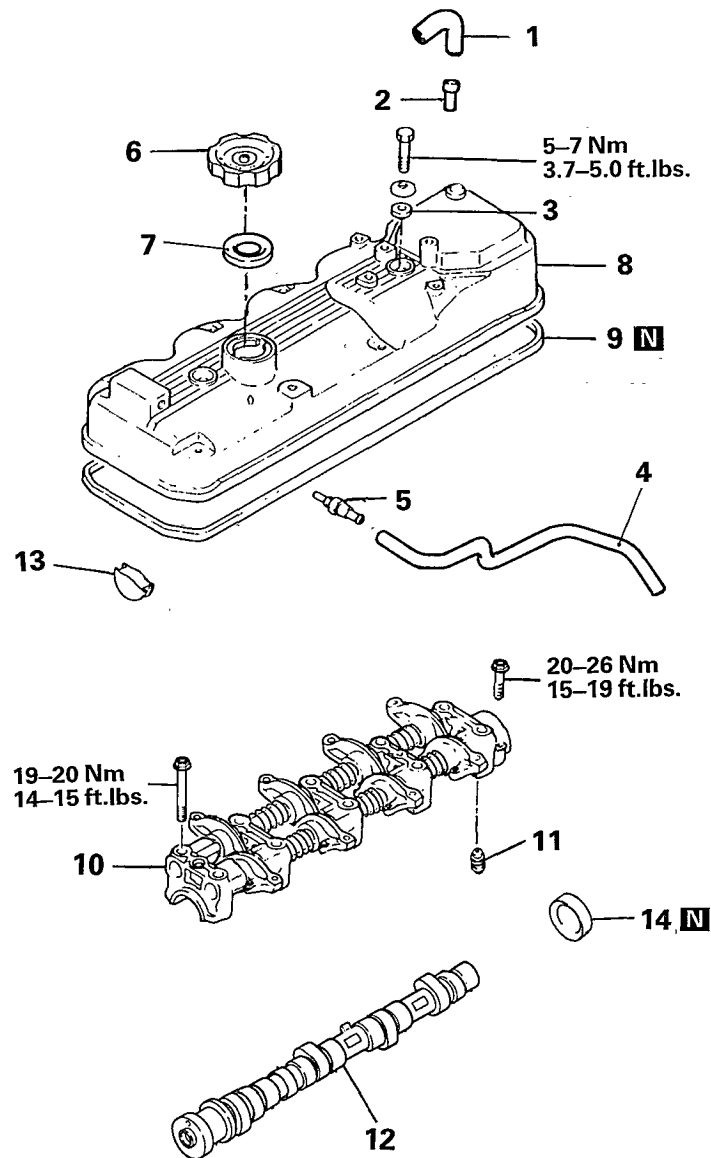
Using the special tool, install the oil seal.

**3. INSTALLATION OF TIMING CHAIN CASE**

- (1) Clean the gasket surfaces of chain case and cylinder block.
- (2) Install the chain case gaskets and chain case to the cylinder block.

N09LA--

# ROCKER ARMS, ROCKER ARM SHAFTS AND CAMSHAFT REMOVAL AND INSTALLATION

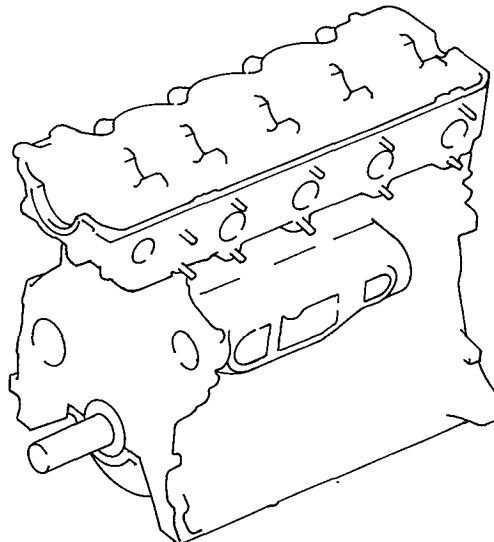


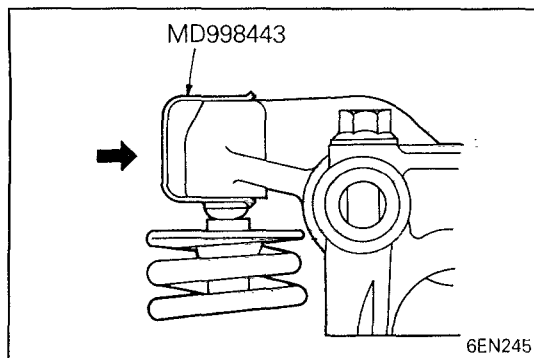
## Removal steps

1. Breather hose
2. Pipe
3. Oil seal
4. P.C.V. hose
5. P.C.V. valve
6. Oil filler cap
7. Packing
8. Rocker cover
9. Rocker cover gasket
- ↔ ↔ 10. Rocker arm and shaft assembly
- ↔ ↔ 11. Auto-lash adjuster
- ↔ 12. Camshaft
- ↔ 13. Semi-circular packing
- ↔ 14. Circular packing

## 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**

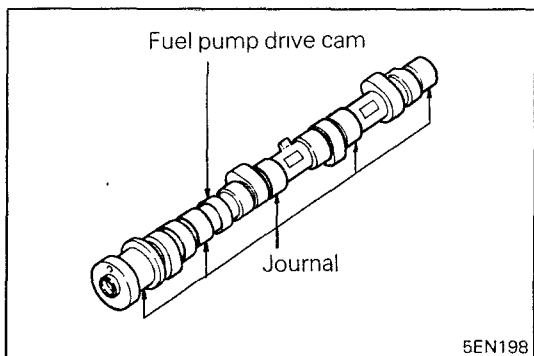
N09LBCA

**10. REMOVAL OF ROCKER ARM AND SHAFT ASSEMBLY / 11. AUTO-LASH ADJUSTER**

Before disassembling the rocker arm and shaft assembly, hold the auto-lash adjuster using the special tool.

**Caution**

Put the rocker arms and auto-lash adjusters in order in cylinder No. separated places with clear distinction between the intake and exhaust ones to prevent confusion.

**INSPECTION**

N09LCCA

- Check camshaft journals for wear or damage. Replace if necessary. If journals are damaged, also inspect camshaft bearings for wear or damage. If camshaft bearing is badly worn, replace cylinder head.
- Check the fuel pump drive cam and distributor drive gear teeth for wear or damage. Replace if necessary.

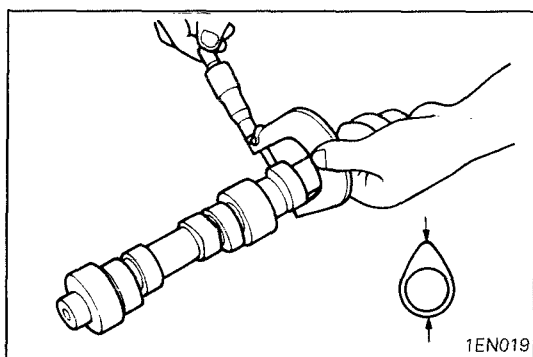
**Camshaft:****Standard value****Height of fuel pump drive cam**

37 mm (1.46 in.)

**Journal diameter**

34 mm (1.34 in.)

Oil clearance 0.05 – 0.09 mm (.0020 – .0035 in.)



- Check the cam surface for abnormal wear and damage and replace if faulty. Measure the cam height (cam major diameter) and replace if it exceeds the service limit.

**Cam height:****Standard value****Intake**

42.43 mm (1.6705 in.)

**Exhaust**

42.43 mm (1.6705 in.)

**Limit****Intake**

41.93 mm (1.6508 in.)

**Exhaust**

41.93 mm (1.6508 in.)

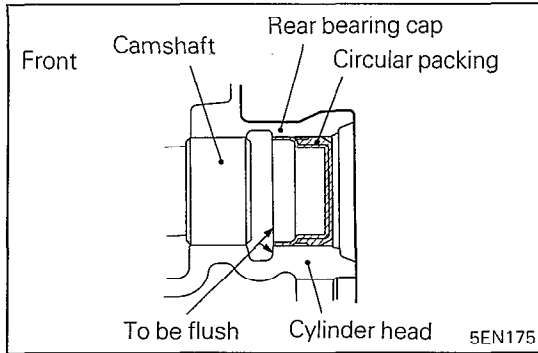
**End play:****Standard value**

0.1 – 0.2 mm (.004 – .008 in.)

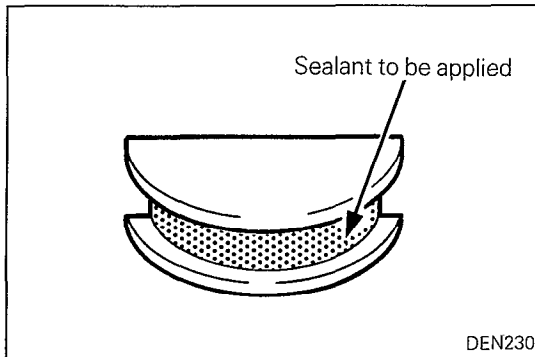
**Limit**

0.4 mm (.016 in.)

N09LDCA

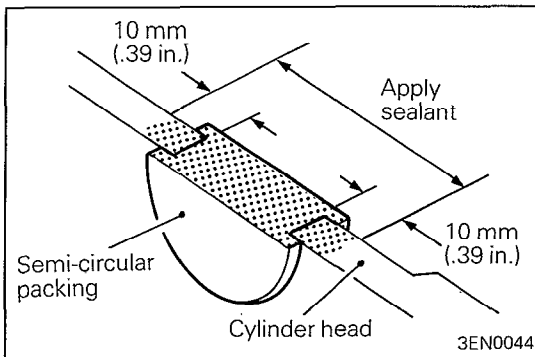
**SERVICE POINTS OF INSTALLATION****14. INSTALLATION OF CIRCULAR PACKING**

Set circular packing on cylinder head as illustrated and install cam cap.

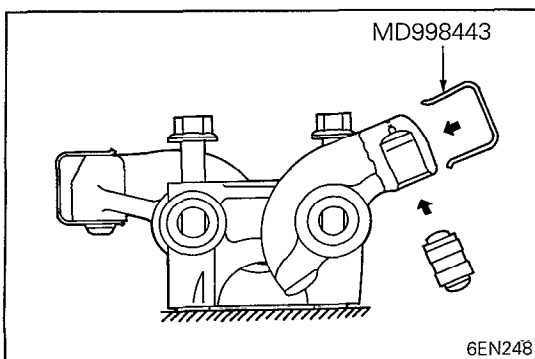
**13. APPLICATION OF SEALANT TO SEMI-CIRCULAR PACKING**

Apply specified sealant to portions indicated in illustration.

**Specified sealant: MOPAR Part No. 4318034 or equivalent**

**12. INSTALLATION OF CAMSHAFT**

Apply engine oil to the journals of camshaft and install it to cylinder head.

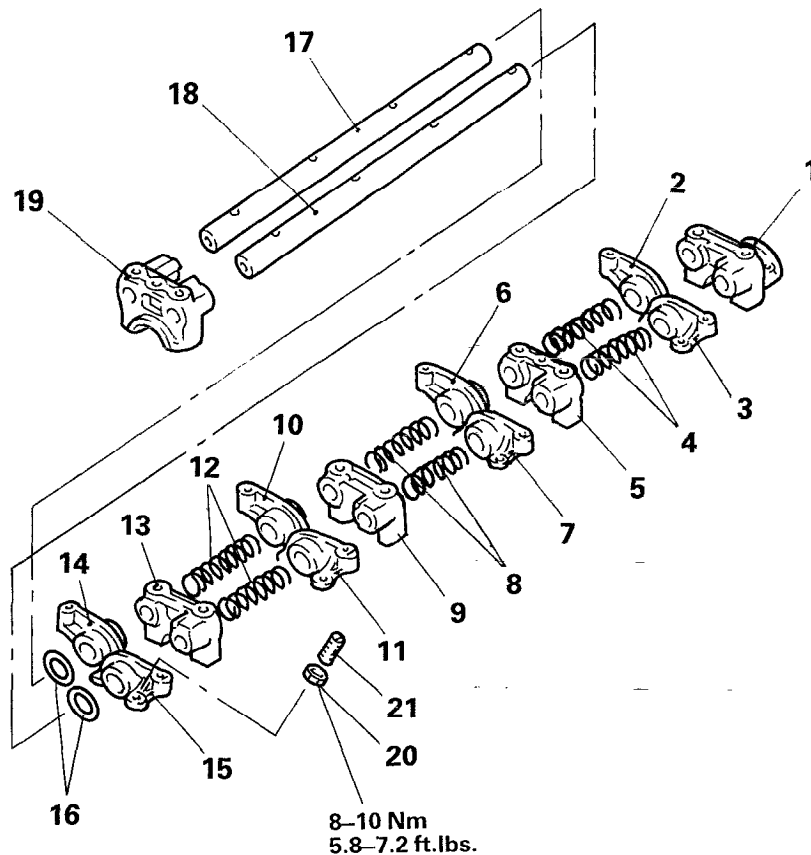
**11. INSTALLATION OF AUTO-LASH ADJUSTER / 10. ROCKER ARM AND SHAFT ASSEMBLY**

- (1) Insert the auto-lash adjuster from below as illustrated, using care not to spill light oil from the adjuster. Then, fit the special tool to prevent the adjuster from dropping.
- (2) Place the rocker arm and shaft assembly on the cylinder head and tighten the bearing cap bolt.
- (3) Remove the special tool.

## ROCKER ARM AND SHAFT ASSEMBLY

N09NE-

## DISASSEMBLY AND REASSEMBLY

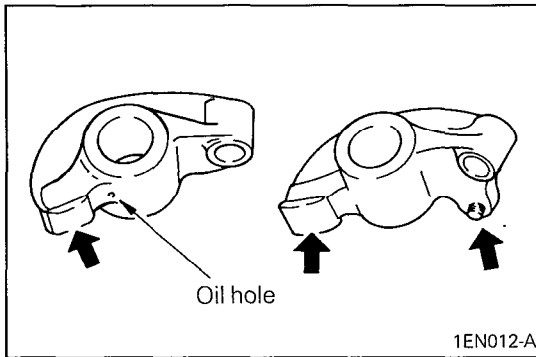


## Disassembly steps

1. Rear bearing cap
2. Rocker arm "C"
3. Rocker arm "A"
4. Rocker shaft spring
- ♦♦ 5. Bearing cap No. 4
6. Rocker arm "C"
7. Rocker arm "A"
8. Rocker shaft spring
- ♦♦ 9. Bearing cap No. 3
10. Rocker arm "C"
11. Rocker arm "A"
12. Rocker shaft spring
- ♦♦ 13. Bearing cap No. 2
14. Rocker arm "C"
15. Rocker arm "A"
- ♦♦ 16. Wave washer
- ♦♦ 17. Right rocker arm shaft
- ♦♦ 18. Left rocker arm shaft
- ♦♦ 19. Front bearing cap
20. Nut
21. Adjusting screw

## NOTE

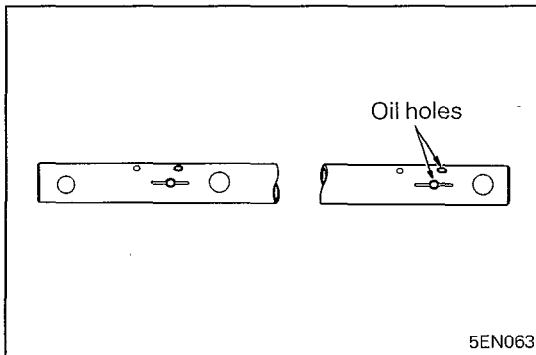
- (1) Reverse the disassembly procedures to reassemble.
- (2) ♦♦: Refer to "Service Points of Reassembly".

**INSPECTIONS**

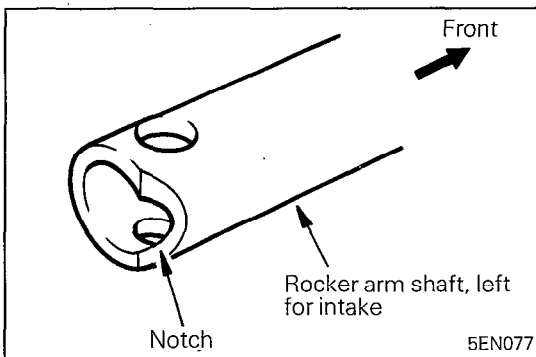
N09NGAB

**ROCKER ARM**

- (1) Check rocker arms for wear or damage. Replace if necessary.
- (2) Check to ensure that oil holes are clear.

**ROCKER ARM SHAFT**

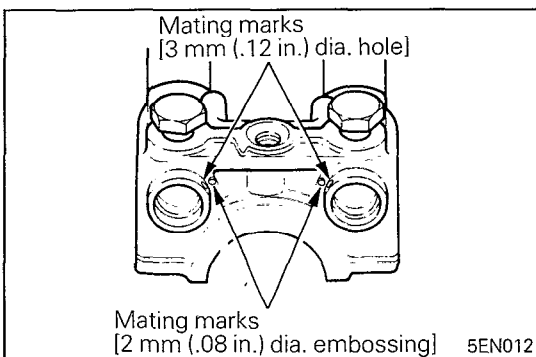
- (1) Check rocker arm mounting portions of rocker arm shaft for wear or damage. Replace as necessary.
- (2) Check to ensure that oil holes are clear.

**SERVICE POINTS OF REASSEMBLY**

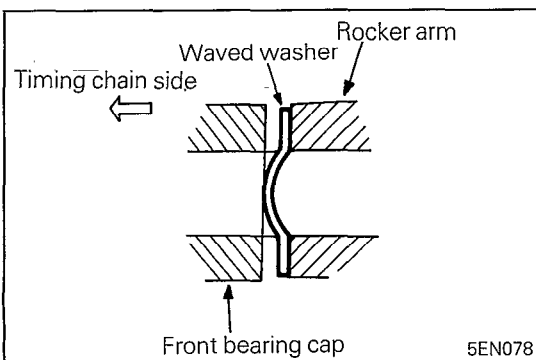
N09NHCA

**19. INSTALLATION OF FRONT BEARING CAP / 18. LEFT ROCKER ARM SHAFT / 17. RIGHT ROCKER ARM SHAFT**

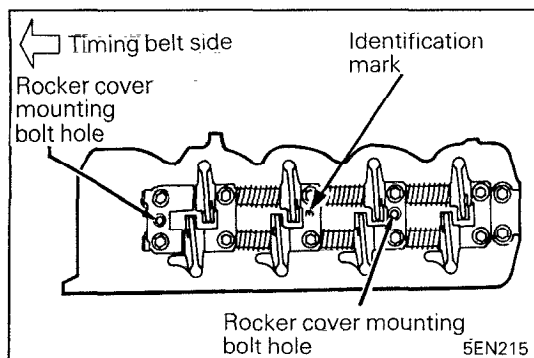
- (1) Insert the left and right rocker shafts into the front bearing cap. The rear end of left (intake) rocker arm shaft has a notch.
- (2) Align the mating mark of the rocker arm shaft front end to the mating mark of the front bearing cap. Then insert the bolts to hold shafts in bearing cap.



- (3) Assemble the rocker arm shaft so that the alignment mark at the front end matches the alignment mark of the front bearing cap.

**16. INSTALLATION OF WAVE WASHER**

Install the waved washer in the direction shown in the illustration.



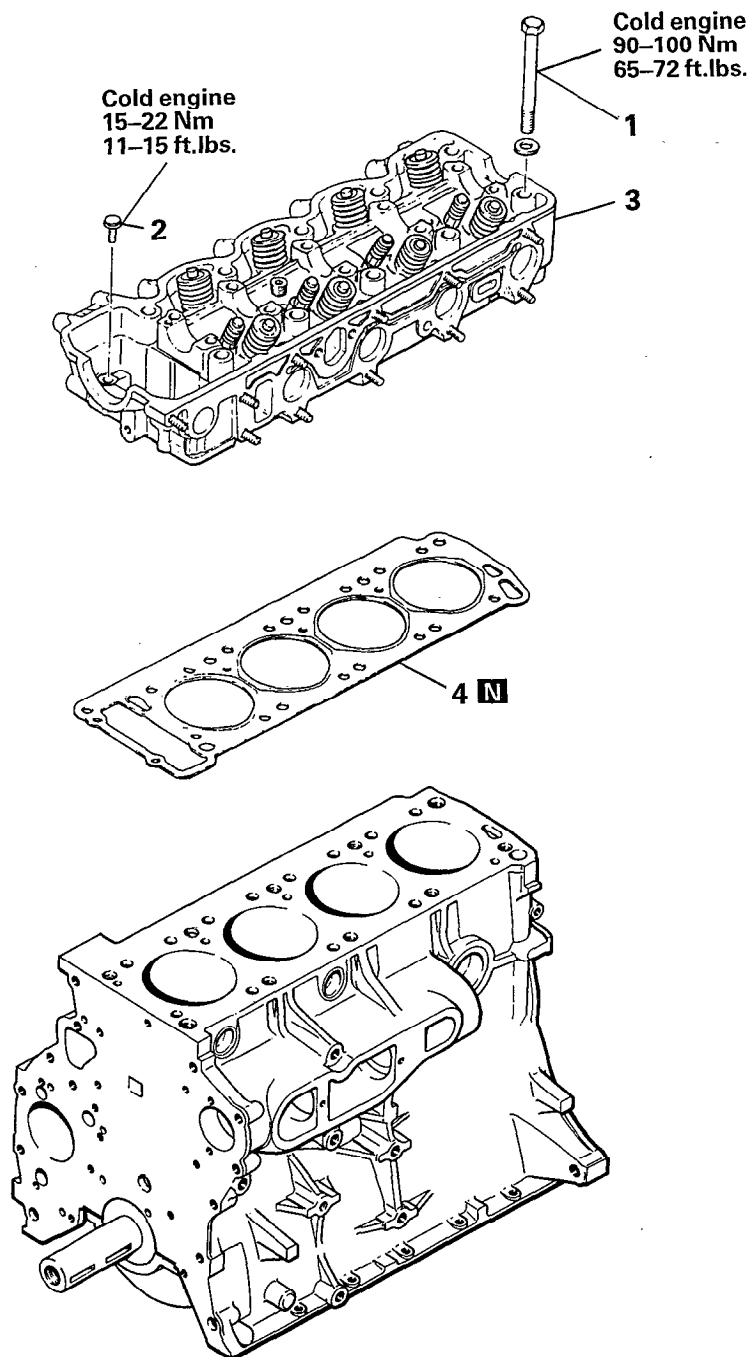
### 13. 9. 5. INSTALLATION OF BEARING CAP

No. 2, No. 3 and No. 4 caps are similar in shape. Note the stamped cap No. when assembling.

## CYLINDER HEAD

N090A-

## REMOVAL AND INSTALLATION

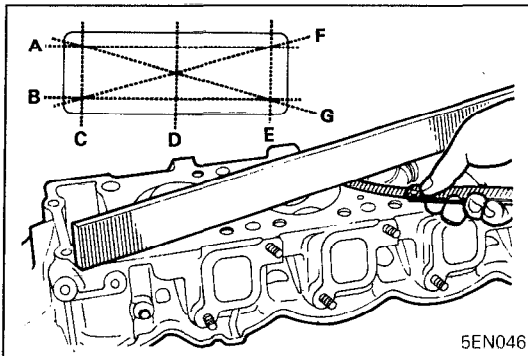
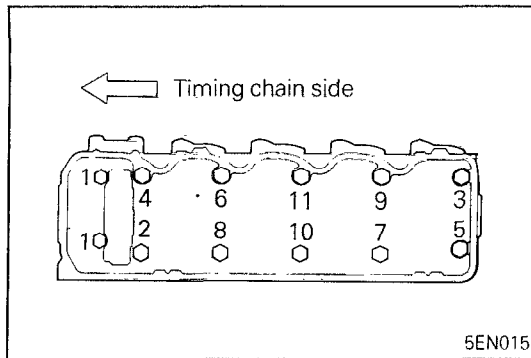


## Removal steps

- ↔ ↔ 1. Cylinder head bolt
- ↔ ↔ 2. Bolt
- ↔ ↔ 3. Cylinder head
- ↔ ↔ 4. 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

N090BAB

### 1. REMOVAL OF CYLINDER HEAD BOLT / 2. BOLT

Remove cylinder head bolts in sequence shown in illustration.

## INSPECTION

N090CAB

- Remove scale, sealing compound and carbon deposits completely. After cleaning oil passages, apply compressed air to make certain that the passages are not clogged.
- Check the jet air passage and EGR gas passage for clogging.
- Visually check the cylinder head for cracks, damage and water leakage.
- Check cylinder head gasket surface for flatness with a straight edge as shown in illustration.
- If flatness exceeds service limit in any direction, either replace cylinder head or lightly machine the cylinder head gasket surface.

#### Flatness of cylinder head gasket surface:

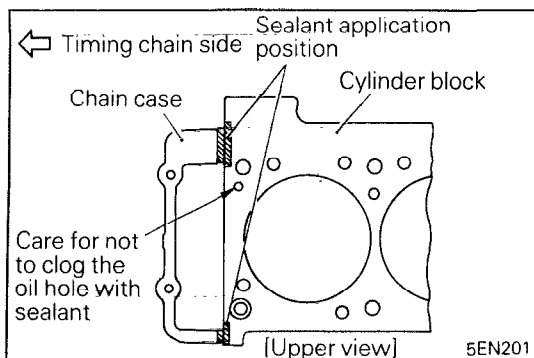
Standard value	Max. 0.05 mm (.0020 in.)
Limit	0.2 mm (.008 in.)

#### Overall height:

Standard value	90.0 mm (3.543 in.)
Limit	89.8 mm (3.535 in.)

#### Caution

If cylinder block gasket surface has already been ground, thickness of the removed stock should be included in the grinding limit of -0.2 mm (-.008 in.).



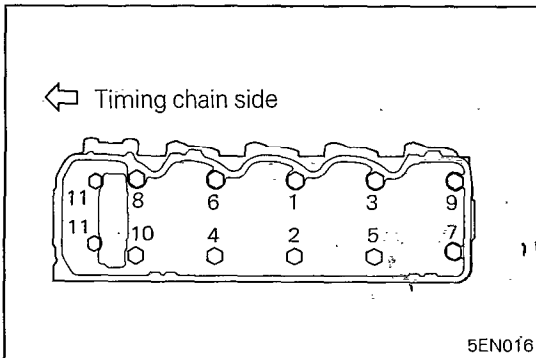
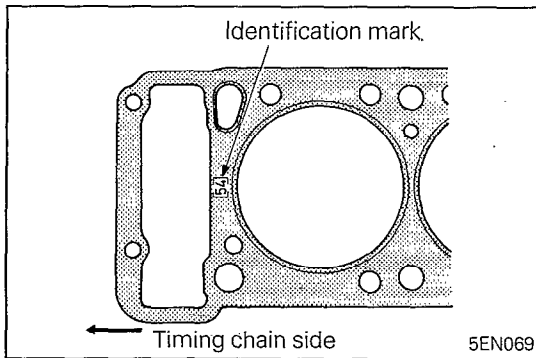
## SERVICE POINTS OF INSTALLATION

N090DAB

### 4. INSTALLATION OF CYLINDER HEAD GASKET

- (1) Clean gasket surfaces of cylinder head and cylinder block.
- (2) Apply sealant or equivalent at two positions – upper ends of the cylinder block and chain case mating surface, as shown in the illustration.

**Specified sealant: MOPAR Part No. 4318034 or equivalent**



- (3) Be sure to position the gasket on the cylinder block with the identification mark up.

**Identification mark: "54"**

- (4) Install aligning with the dowel pin on the cylinder block top surface.

**Caution**

**Do not apply sealant to cylinder head gasket.**

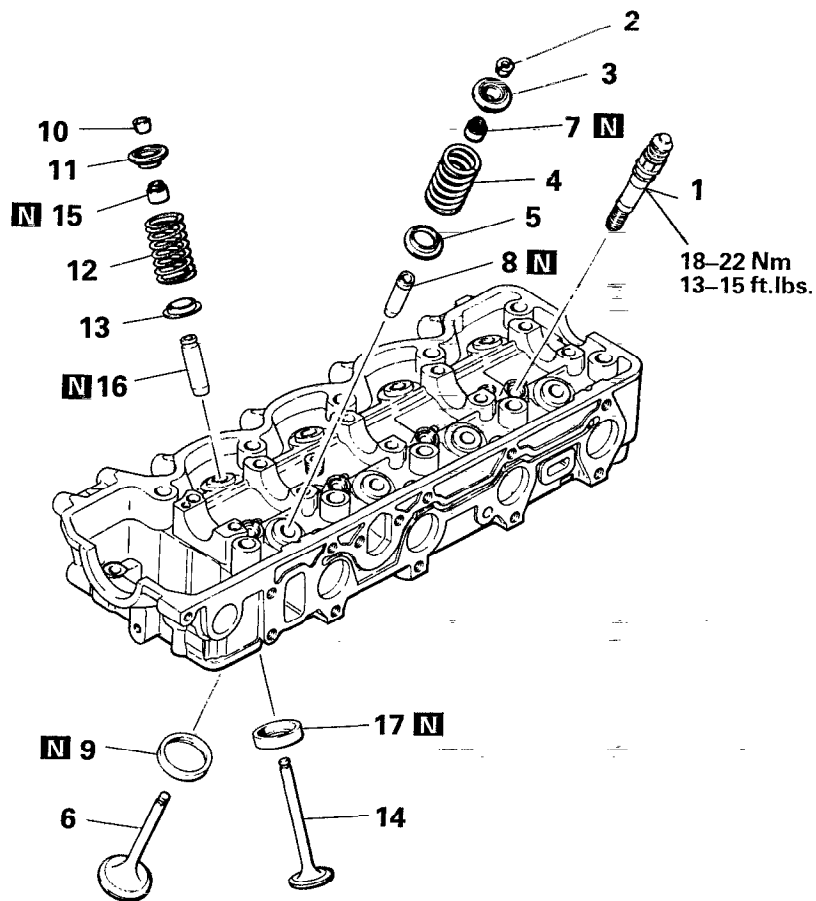
## 2. INSTALLATION OF BOLT / 1. CYLINDER HEAD BOLT

Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 1/2 of specified torque in sequence shown in illustration.

## VALVES AND VALVE SPRINGS

N09PE-

## DISASSEMBLY AND REASSEMBLY



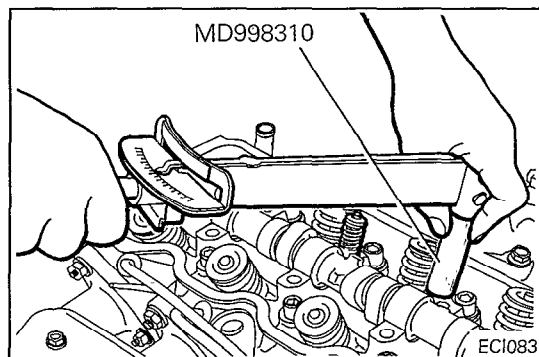
5EN212

## Disassembly steps

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

## 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**

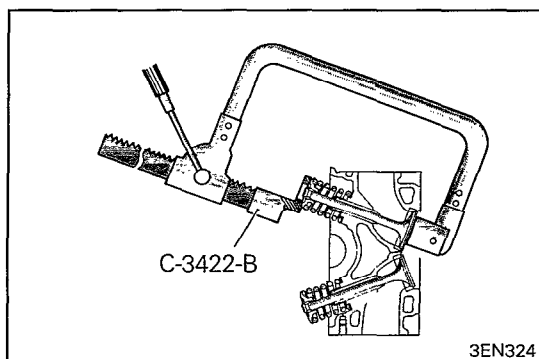
N09PFAB

**1. REMOVAL OF JET VALVE ASSEMBLY**

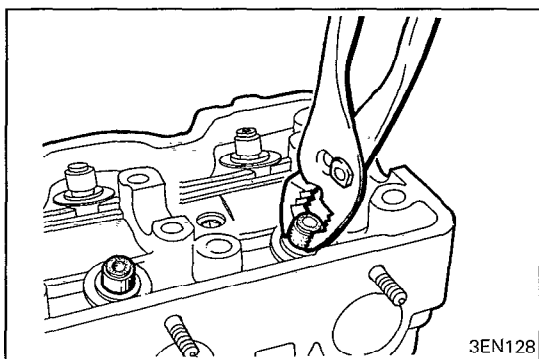
Using the special tool, remove the jet valve assembly.

**Caution**

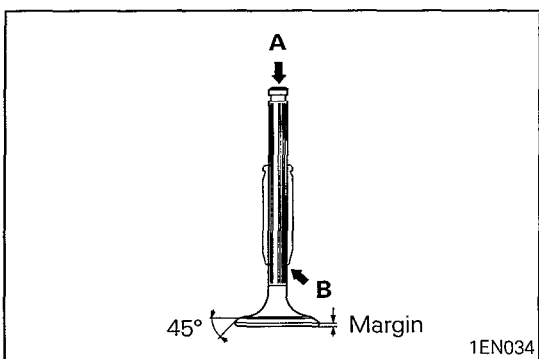
When the special tool is used, make certain that the wrench is not tilted with respect to the center of the jet valve. If the tool is tilted, the valve stem might be bent by the force exerted on the valve spring retainer, resulting in defective jet valve operation.

**2. 10. REMOVAL OF RETAINER LOCK**

- (1) Using the special tool, compress the valve spring and remove the retainer locks.
- (2) Keep these parts in order so that they can be reinstalled in their original positions.

**7. 15. REMOVAL OF VALVE STEM SEAL**

Remove the valve stem seals with pliers and discard them.

**INSPECTION  
VALVES**

N09PGAA

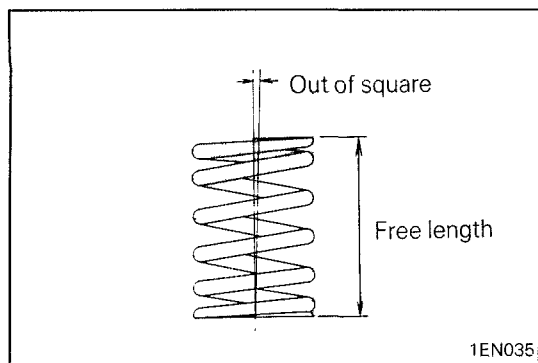
- (1) Check each valve for wear, damage and deformation of head and stem at "B". Repair or replace excessively worn, damaged or deformed valves.
- (2) If stem tip "A" has been pitted, correct with oil stone or other means. This correction must be limited to a minimum. Also reface the valve.
- (3) Replace the valve if the face margin has decreased to less than limit.

**Margin:****Standard value**

Intake	1.2 mm (.047 in.)
Exhaust	2.0 mm (.079 in.)

**Limit**

Intake	0.7 mm (.028 in.)
Exhaust	1.5 mm (.059 in.)

**VALVE SPRINGS**

N09PGBA

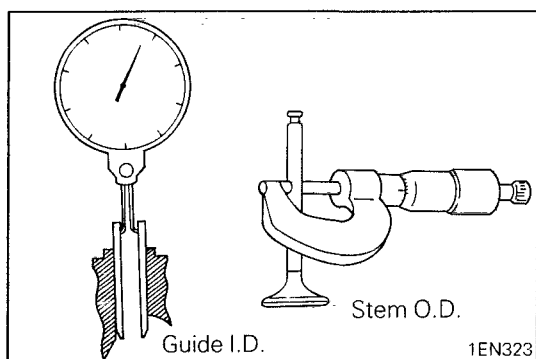
- (1) Check free length of each valve spring and replace if necessary.
- (2) Using a square, test squareness of each valve spring. If spring is excessively out of square, replace it.

**Valve spring:****Standard value**

Free length	49.8 mm (1.961 in.)
Load	329 N (73 lbs.) at installed height
Installed height	40.4 mm (1.591 in.)
Out of squareness	within 2°

**Limit**

Free length	48.8 mm (1.922 in.)
Installed height	41.4 mm (1.630 in.)
Out of squareness	4°

**VALVE GUIDES**

N09PGCA

Check the valve stem-to-guide clearance. If the clearance exceeds the service limit, replace the valve guide with new oversize part:

**Valve stem-to-guide clearance:****Standard value**

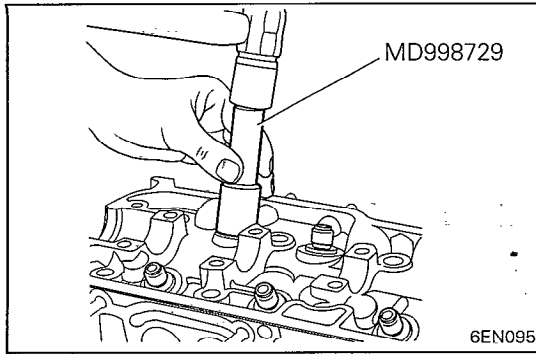
Intake	0.03 – 0.06 mm (.0012 – .0024 in.)
Exhaust	0.05 – 0.09 mm (.0020 – .0035 in.)

**Limit**

Intake	0.10 mm (.0039 in.)
Exhaust	0.15 mm (.0059 in.)

**Valve Guide Oversizes**

Size mm (in.)	Size mark	Cylinder head hole size mm (in.)
0.05 (.002) O.S.	5	13.050 – 13.068 (.5138 – .5145)
0.25 (.010) O.S.	25	13.250 – 13.268 (.5217 – .5224)
0.50 (.020) O.S.	50	13.500 – 13.518 (.5315 – .5422)

**SERVICE POINTS OF REASSEMBLY**

N09PKCA

**15. 7. INSTALLATION OF VALVE STEM SEAL / 13. 5. VALVE SPRING SEAT**

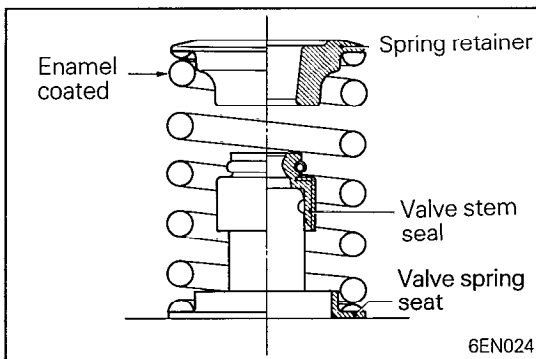
Install the spring seat, then using the special tool, install the stem seal by lightly tapping the tool. Seal is installed in specified position.

**Caution**

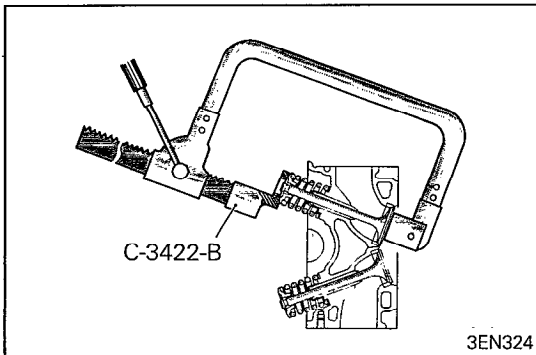
1. **Incorrect installation of the seal without using the special tool will result in poor sealing and cause oil leakage down valve guide.**
2. **Do not reuse stem seal.**

**14. INSTALLATION OF EXHAUST VALVE / 6. INTAKE VALVE**

Apply engine oil to each valve. Insert valves into the valve guides. Avoid inserting the valve into the seal with force. After insertion, check to see if the valve moves smoothly.

**12. 4. INSTALLATION OF VALVE SPRING**

Valve springs should be installed with the enamel coated side toward the valve spring retainer.

**10. 2. INSTALLATION OF RETAINER LOCK**

- (1) Using the special tool, compress the valve spring and install the retainer lock.

**Caution**

**When compressing the spring with the Valve Spring Compressor, check to see that the valve stem seal is not pressed to the bottom of the retainer. Then start installing the retainer lock.**

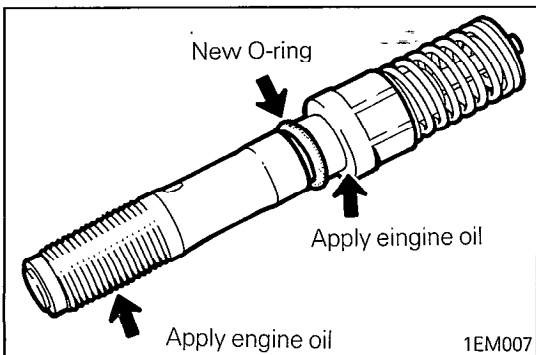
- (2) Make certain that retainer locks are positively installed.

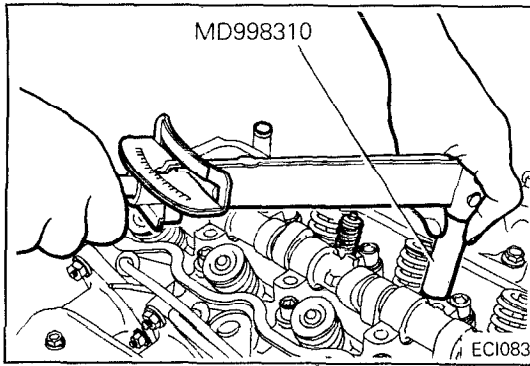
**1. INSTALLATION OF JET VALVE ASSEMBLY**

- (1) Apply engine oil to the O-ring, jet body threads and seat surface.

**Caution**

**Make sure that the O-ring is a new one.**



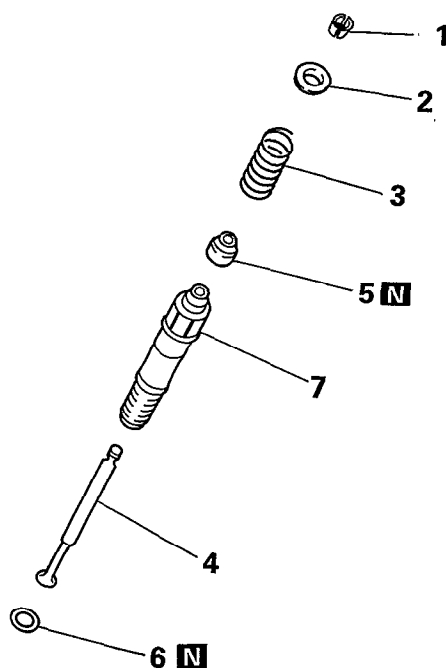


- (2) Screw the jet valve assembly into cylinder head by hand. Tighten the jet valve to the specified torque with the special tool and a torque wrench while holding the special tool in line with the jet valve centerline.

## JET VALVE

N09QE--

## DISASSEMBLY AND REASSEMBLY

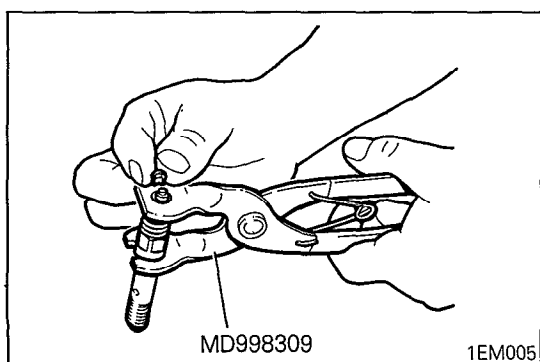
**Disassembly steps**

- ◄◄ 1. Retainer lock
- ◄◄ 2. Valve spring retainer
- ◄◄ 3. Valve spring
- ◄◄ 4. Jet valve
- ◄◄ 5. Stem seal
- ◄◄ 6. O-ring
- ◄◄ 7. Jet body

**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

1EM177



MD998309

1EM005

**SERVICE POINT OF DISASSEMBLY**

N09QFAA

**1. REMOVAL OF RETAINER LOCK**

Using the special tool, remove the retainer lock.

**INSPECTION**

N09QGAA

- Make sure that the jet valve slides smoothly in the jet body and has no play.

**Caution**

**Combination of the jet valve and jet body should not be disturbed and the jet valve and jet body should be replaced as an assembly.**

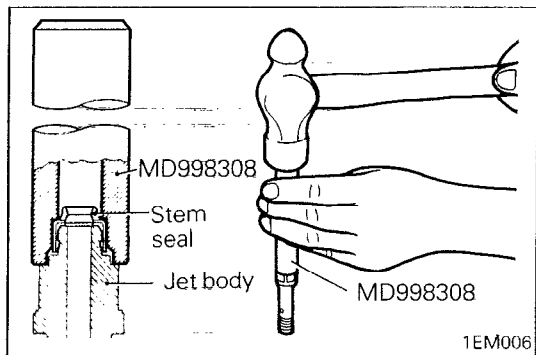
- Check the valve head and valve seat for damage or seizure.
- Check the spring for sag, cracks or breakage.

**Standard value:****Jet valve**

Length	92.53 mm (3.6429 in.)
Stem O.D.	4.3 mm (.169 in.)
Seat angle	45°

**Jet valve spring**

Free height	29.60 mm (1.1654 in.)
Load	35 N (7.7 lbs.) at installed height
Installed height	21.50 mm (.8465 in.)
Out of squareness	Max. 1.5°

**SERVICE POINTS OF REASSEMBLY**

N09QHAB

**5. INSTALLATION OF STEM SEAL**

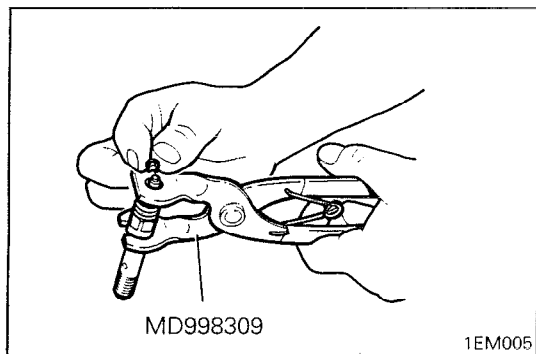
Using the special tool, install the stem seal.

**4. INSTALLATION OF JET VALVE**

- (1) Apply engine oil to the stem of the jet valve.
- (2) Use care to prevent damage to the new seal lips.
- (3) Check to ensure that the valve slides smoothly.

**3. INSTALLATION OF VALVE SPRING / 2. VALVE SPRING RETAINER / 1. RETAINER LOCK**

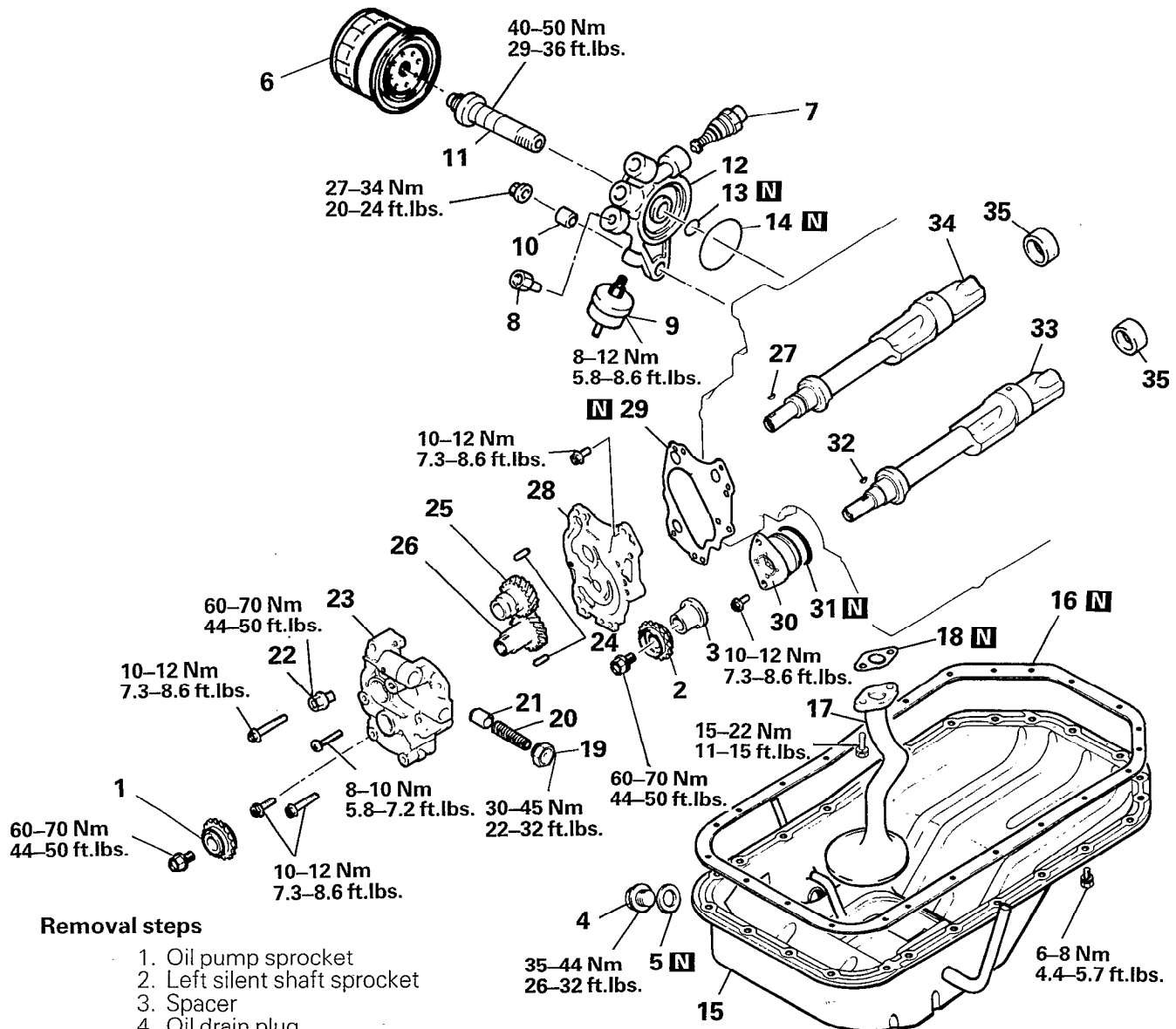
- (1) Mount the valve spring and valve spring retainer on jet body.
- (2) Compress the valve spring with the special tool, using care not to damage the valve stem by the bottom of valve spring retainer.
- (3) While the spring being kept compressed, install the retainer lock.



## FRONT CASE, OIL PUMP AND SILENT SHAFT

N09RA- -

## REMOVAL AND INSTALLATION



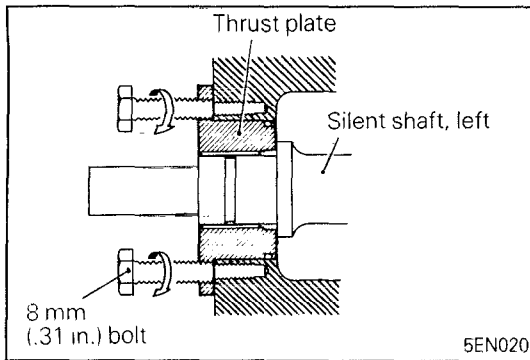
## Removal steps

1. Oil pump sprocket
2. Left silent shaft sprocket
3. Spacer
4. Oil drain plug
5. Oil drain plug gasket
- ◆◆ 6. Oil filter
7. Oil cooler by-pass valve
8. Oil pipe joint
9. Oil pressure gauge unit
10. Knock bushing
11. Oil filter bracket bolt
12. Oil filter bracket
13. O-ring
14. O-ring
- ◆◆ 15. Oil pan
16. Oil pan gasket
17. Oil screen
18. Oil screen gasket
19. Plug
20. Relief spring
21. Relief plunger
22. Flange bolt
- ◆◆ 23. Oil pump body

- 24. Pin
- ➡➡ 25. Driven gear
- ➡➡ 26. Drive gear
- 27. Woodruff key
- 28. Oil pump cover
- 29. Oil pump gasket
- ↔➡➡ 30. Thrust plate
- ➡➡ 31. O-ring
- 32. Woodruff key
- ➡➡ 33. Left silent shaft
- 34. Right silent shaft
- 35. Rear bearing

NOTE

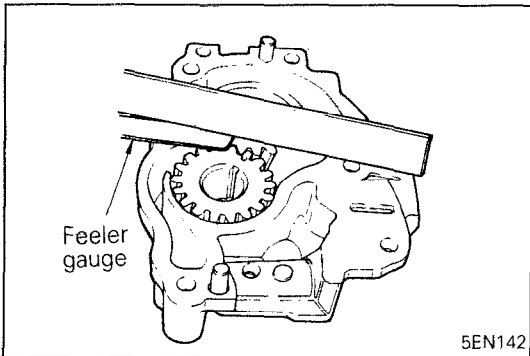
- NOTE
- (1) Reverse the removal procedures to reinstall.
  - (2) : Refer to "Service Points of Removal".
  - (3) : Refer to "Service Points of Installation".
  - (4) **N**: Non-reusable parts

**SERVICE POINT OF REMOVAL**

N09RBAB

**30. REMOVAL OF THRUST PLATE**

Install 8 mm (.31 in.) dia. bolts into threaded holes of flange and turn bolts in to remove the thrust plate.

**INSPECTION**

N09RCGB

**OIL PUMP**

- (1) Check gear contacting surfaces of cover for step wear.
- (2) Check the clearance of drive and driven gears. If clearance is excessive, replace case and cover assembly or gears.

**Standard value:****Driven gear**

Tip clearance 0.11 – 0.15 mm (.0043 – .0059 in.)

Side clearance 0.04 – 0.10 mm (.0016 – .0039 in.)

**Drive gear**

Tip clearance 0.11 – 0.15 mm (.0043 – .0059 in.)

Side clearance 0.05 – 0.11 mm (.0020 – .0043 in.)

**Limit:****Driven gear**

Tip clearance 0.20 mm (.0079 in.)

Side clearance 0.15 mm (.0060 in.)

**Drive gear**

Tip clearance 0.20 mm (.0079 in.)

Side clearance 0.15 mm (.0060 in.)

**RELIEF PLUNGER AND SPRING**

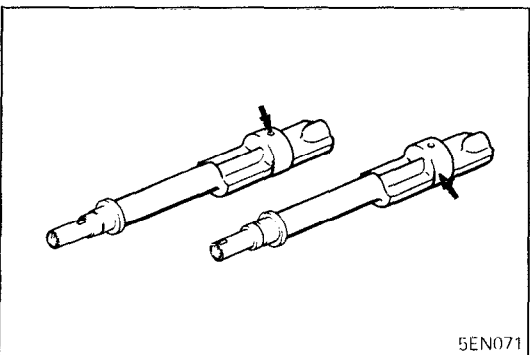
N09RCHA

- (1) Insert the relief plunger in the oil pump body and check to see if it operates smoothly.
- (2) Check the relief spring for breakage or sagging.

**Standard value:****Relief spring**

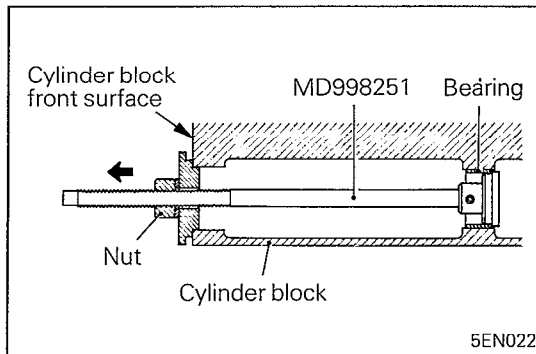
Free length 46.6 mm (1.835 in.)

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

**SILENT SHAFT**

N09RCIA

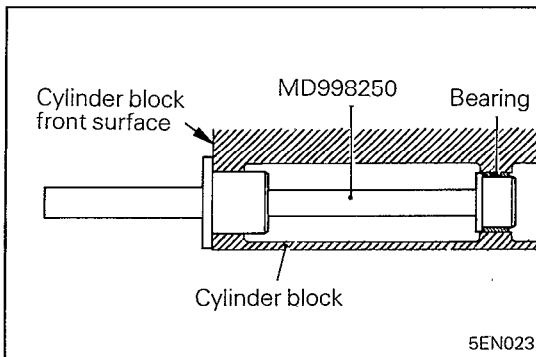
- (1) Check journals for wear, damage and seizure. If excessive damage or seizure is evident, check bearing as well. If necessary, replace silent shaft or bearing or both.
- (2) Check oil hole (passage) for clogging. Clean or repair as necessary.



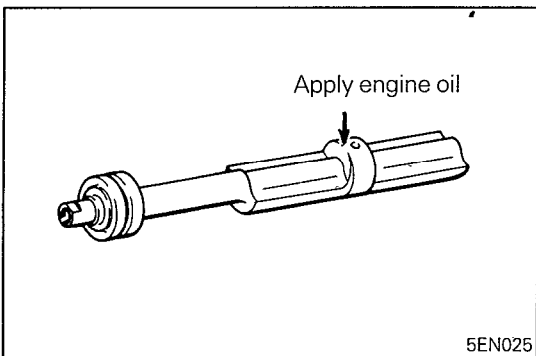
## SILENT SHAFT BEARING REPLACEMENT PROCEDURE

N09REAA

- (1) Using the special tool, remove silent shaft rear bearing.



- (2) Apply engine oil to O.D. of bearing. Using the special tool, install silent shaft bearing to cylinder block.

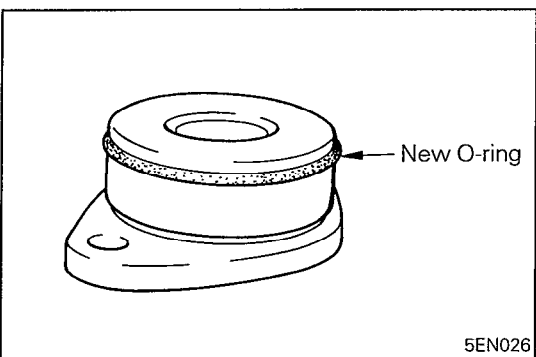


## SERVICE POINTS OF INSTALLATION

N09RDCA

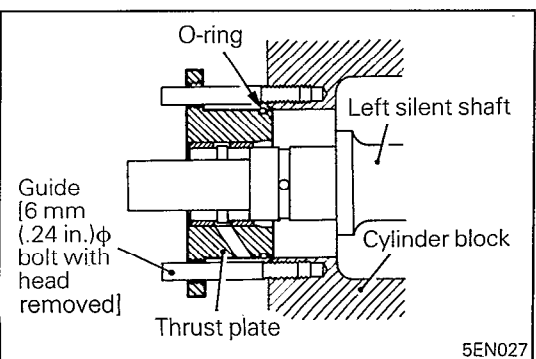
### 33. INSTALLATION OF LEFT SILENT SHAFT

- (1) Apply engine oil to journal of left silent shaft.
- (2) Insert left silent shaft into cylinder block. Insert silent shaft carefully to prevent damage to the bearing.



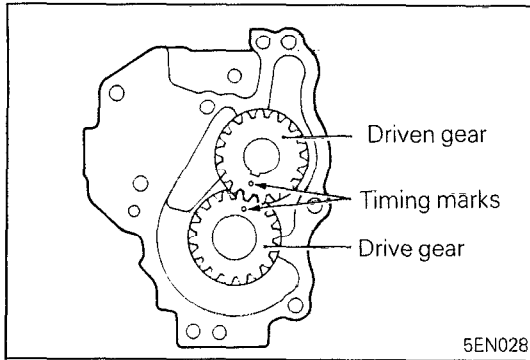
### 31. INSTALLATION OF O-RING

- (1) Install O-ring in groove of thrust plate.
- (2) Apply engine oil around O-ring.



### 30. INSTALLATION OF THRUST PLATE

- (1) Install two guides in threaded holes for mounting thrust plate. Guides should be fabricated by cutting off hexagon heads of bolts 6 mm (.24 in.) in diameter and 50 mm (1.97 in.) long.
- (2) Install thrust plate into cylinder block along guides. Without use of guide, threaded holes will be hard to align.

**26. INSTALLATION OF DRIVE GEAR / 25. DRIVEN GEAR**

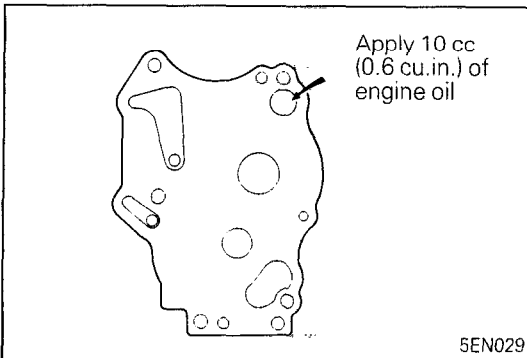
Install oil pump gears to oil pump body and align timing marks.

**Caution**

If timing marks are out of alignment, phase of silent shaft will change and vibration will result.

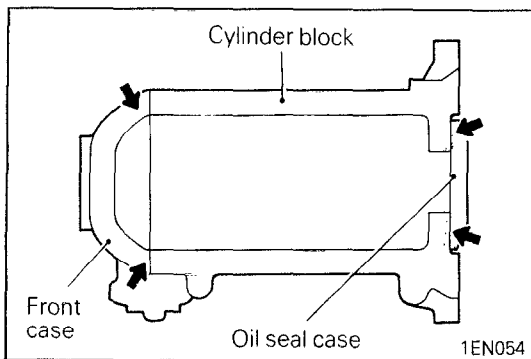
**23. INSTALLATION OF OIL PUMP BODY**

Place pump assembly in the same position as it was installed on engine and put approx. 10 cc (0.6 cu.in.) of clean engine oil in delivery port.

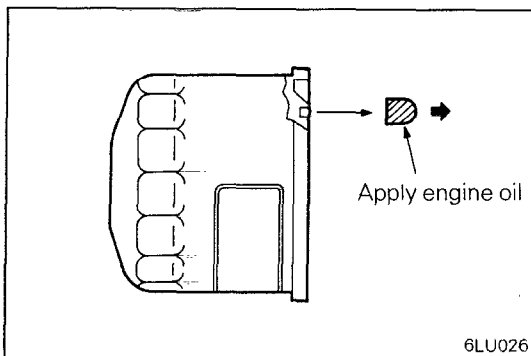
**15. APPLICATION OF SEALANT TO OIL PAN**

Apply sealant to the cylinder block at four positions which corresponds to the hatched area of the oil pan in the illustration.

**Specified sealant: MITSUBISHI GENUINE Part No. MZ100168 or equivalent**

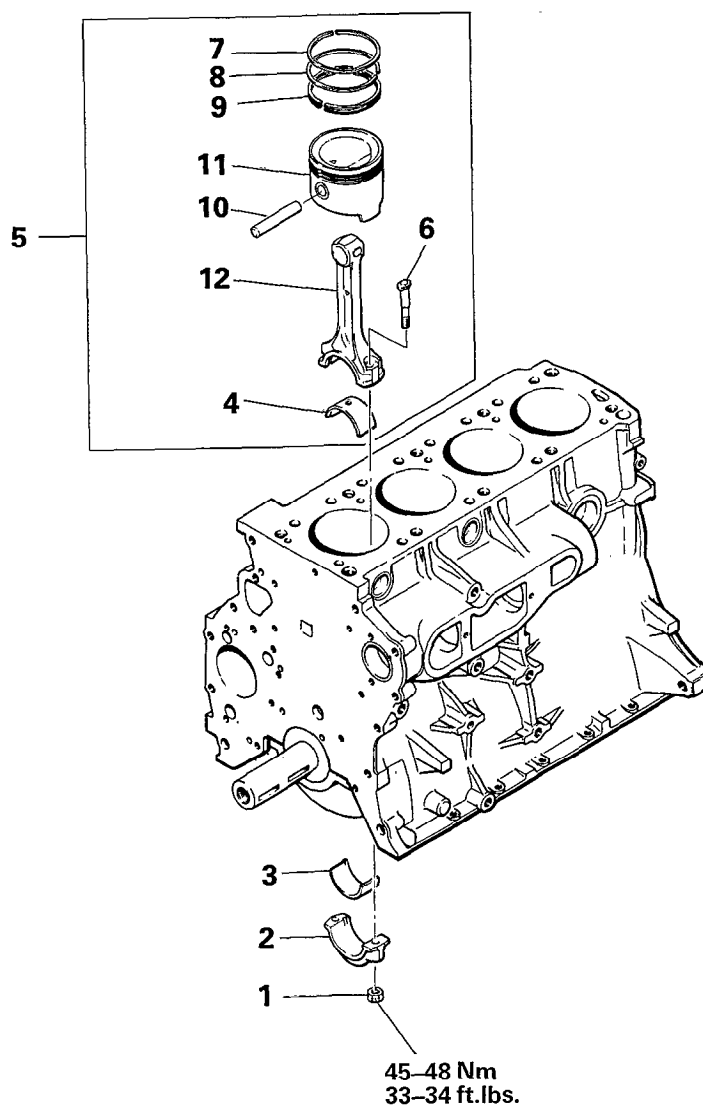
**6. APPLICATION OF ENGINE OIL TO OIL FILTER**

Apply thin coat of engine oil to the packing surface.



# PISTON AND CONNECTING ROD REMOVAL AND INSTALLATION

N09TA:-

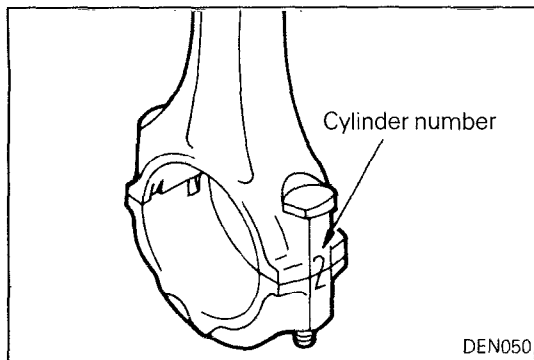


## Removal steps

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

## NOTE

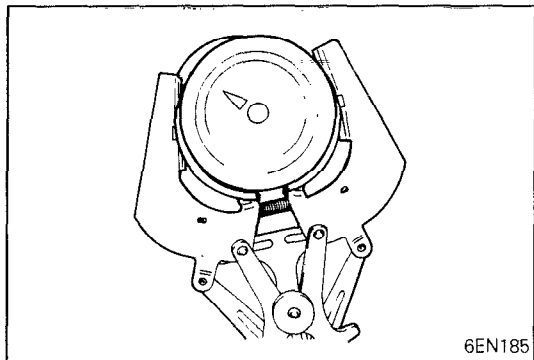
- (1) Reverse the removal procedures to reinstall.
- (2) ➡ ➡: Refer to "Service Points of Removal".
- (3) ➡ ➡: Refer to "Service Points of Installation".

**SERVICE POINTS OF REMOVAL**

N09TBCA

**2. REMOVAL OF CONNECTING ROD CAP**

Before removing the bearing cap, stamp cylinder number on connecting rod big end for reassembly.

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

Remove the piston rings with a piston ring expander.

**INSPECTION**

N09TCAA

**PISTON AND PISTON PIN**

- (1) Replace the piston if it has marks of streaks or seizure on the outside, thrust surface in particular. Also replace if it has cracks on the outside.
- (2) If the piston pin can be inserted into the piston pin hole snugly with a thumb, it is reusable. If it is inserted with no resistance or there is a play, replace the piston and pin as a set.

**PISTON RING**

N09TCBB

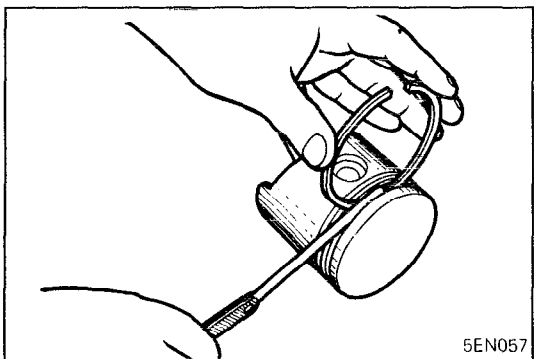
- (1) Check the piston ring for damage, abnormal wear and breakage and replace if defective. If the piston itself is replaced, also replace the piston ring.
- (2) Check the piston ring to ring groove clearance. If it exceeds the limit, replace the ring and/or piston.

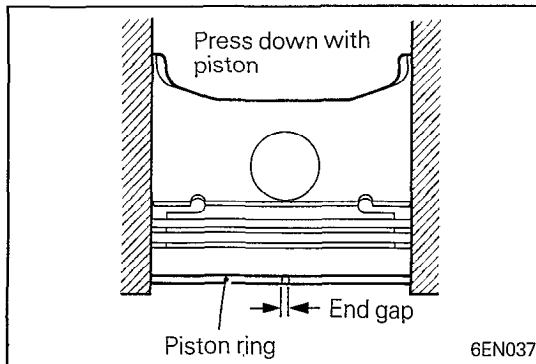
**Piston ring side clearance:****Standard value**

No. 1	0.05 – 0.09 mm (.0020 – .0035 in.)
No. 2	0.02 – 0.06 mm (.0008 – .0024 in.)

**Limit**

No. 1	0.12 mm (.0047 in.)
No. 2	0.10 mm (.0039 in.)





- (3) Insert a piston ring into cylinder bore. Correctly position the ring at right angles to the cylinder wall by gently pressing it down with a piston. Draw the piston up and out, then measure the gap with a feeler gauge. If the gap exceeds the limit, replace the piston ring.

#### Piston ring end gap:

##### Standard value

No. 1	0.30 – 0.45 mm (.0118 – .0177 in.)
No. 2	0.25 – 0.40 mm (.0098 – .0157 in.)
Oil ring	0.30 – 0.80 mm (.0118 – .0315 in.)

##### Limit

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

## BEARING

N09TCDA

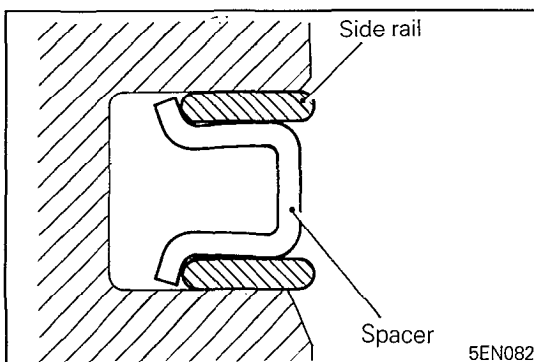
- (1) Visually check the bearing surface and replace the bearing if there is uneven contact, streak, scratch or burn. If there is heavy streak or burn, also check the crankshaft. Replace the crankshaft or machine it to an undersize if damaged.
- (2) Measure the connecting rod bearing I.D. and crankshaft pin O.D. and if the clearance exceeds the limit, replace the bearing and, if necessary, also replace the crankshaft. Or machine the crankshaft to an undersize and replace the bearing with an undersized one.

**Standard value:** 0.019 – 0.056 mm (.0007 – .0022 in.)

**Limit:** 0.1 mm (.004 in.)

#### NOTE

Refer to CRANKSHAFT for measurement of oil clearance with plastic-gauge.

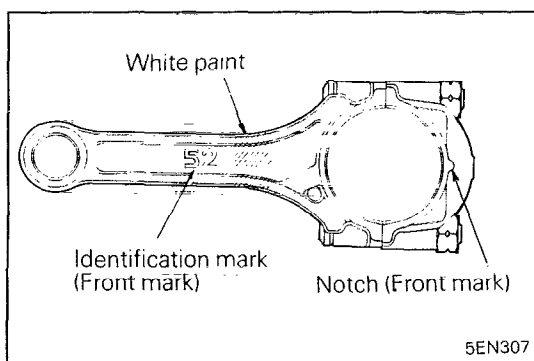
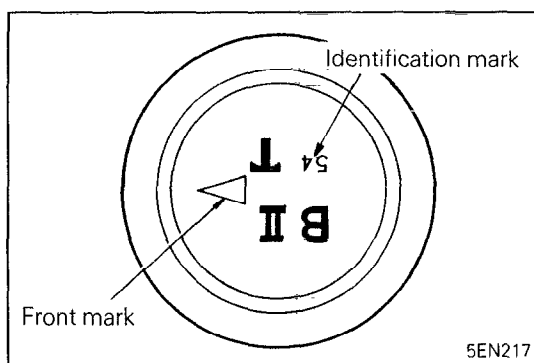
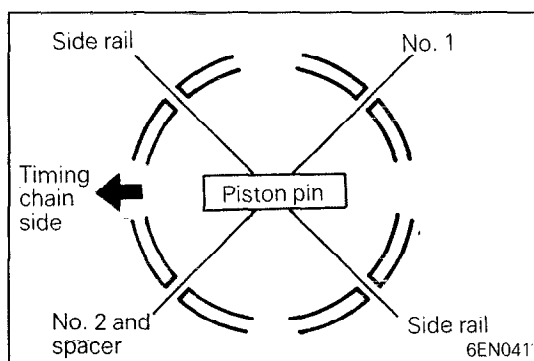
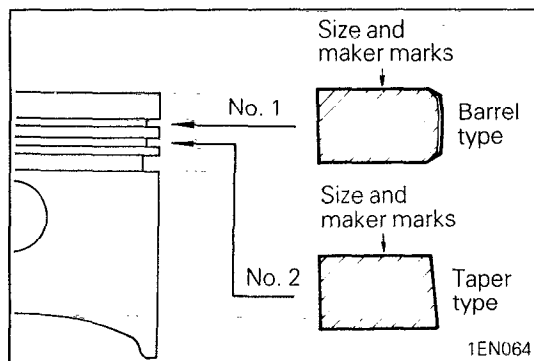
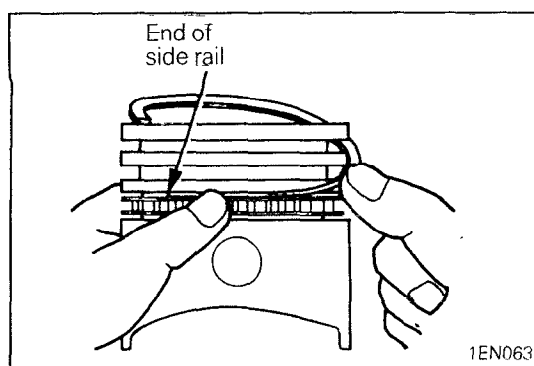


## SERVICE POINTS OF INSTALLATION

N09TDAC

### 9. INSTALLATION OF OIL RING

- (1) First, install the oil ring spacer in the piston ring groove. Next, install the upper side rail and then the lower side rail. Both upper and lower side rails may be installed with their either side facing up.



- (2) To install the side rail, first place one end in the gap between the groove and the spacer. While holding the end firmly, press the portion to be inserted with finger as illustrated until the side rail is in position.

### Caution

Do not use piston ring expander to install the side rail.

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

Using a piston ring expander, install No. 2 and No. 1 piston ring.

### Caution

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.

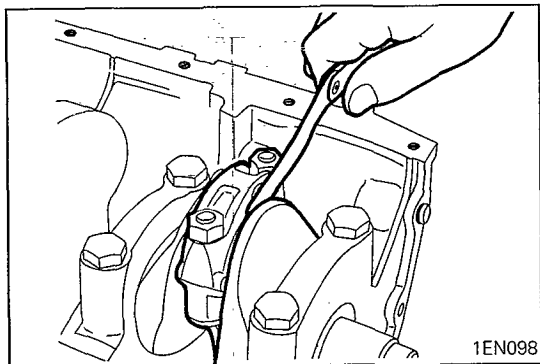
## 5. INSTALLATION OF PISTON AND CONNECTING ROD ASSEMBLY

- (1) Apply engine oil amply to the piston outside, piston rings and oil ring.
- (2) Position the gaps of the piston rings and oil ring (side rails, spacer) as illustrated.

- (3) Insert the piston and connecting rod assembly from the cylinder top with the front marks on piston top and connecting rod facing the timing belt side of engine.

## 2. INSTALLATION OF CONNECTING ROD CAP

When new connecting rod is installed, make sure that identification mark and notch are on same side.



Check the connecting rod big end side clearance.

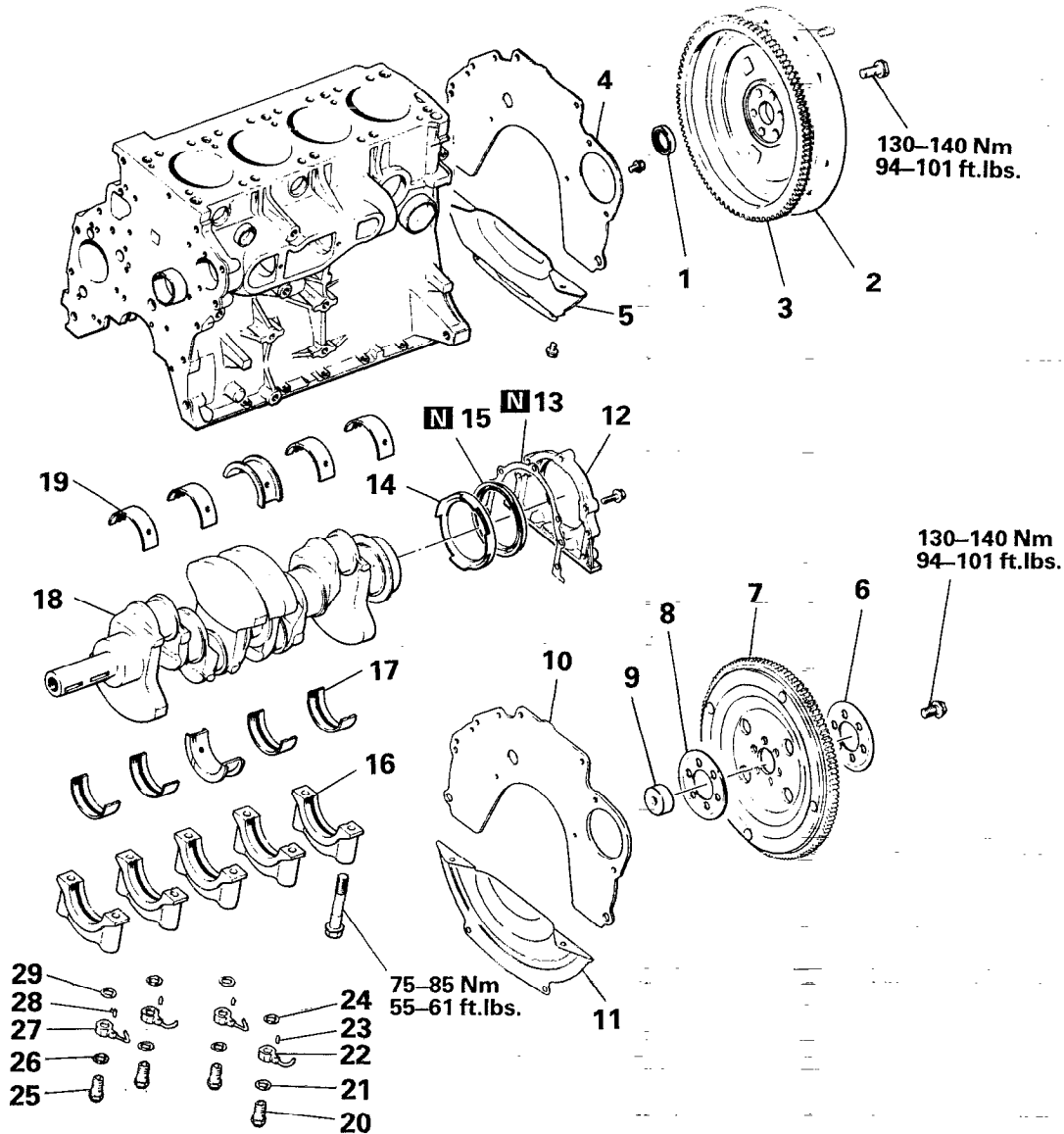
**Standard value: 0.10 – 0.25 mm (.0039 – .0098 in.)**

**Limit: 0.4 mm (.016 in.)**

## CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

N09UA-

## REMOVAL AND INSTALLATION



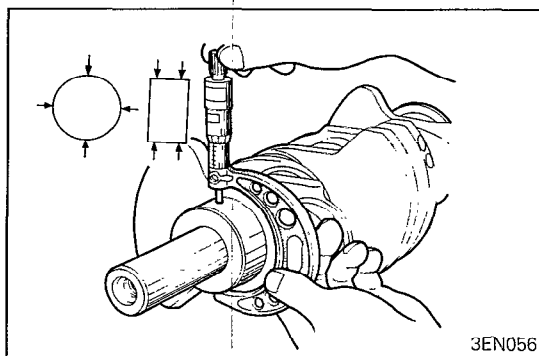
## Removal steps

- |                          |                      |
|--------------------------|----------------------|
| ◆◆ 1. Ball bearing       | ◆◆ 18. Crank shaft   |
| ◆◆ 2. Flywheel           | ◆◆ 19. Upper bearing |
| 3. Ring gear             | 20. Check valve      |
| 4. Rear plate            | 21. Gasket           |
| 5. Bell housing cover    | 22. Oil jet          |
| 6. Adapter plate         | 23. Spring pin       |
| 7. Drive plate           | 24. Gasket           |
| 8. Adapter plate         | 25. Check valve      |
| 9. Crank shaft bushing   | 26. Gasket           |
| 10. Rear plate           | 27. Oil jet          |
| 11. Bell housing cover   | 28. Spring pin       |
| 12. Oil seal case        | 29. Gasket           |
| 13. Oil seal case gasket |                      |
| ◆◆ 14. Oil separator     |                      |
| ◆◆ 15. Oil seal          |                      |
| ◆◆ 16. Bearing cap       |                      |
| ◆◆ 17. Lower cap bearing |                      |

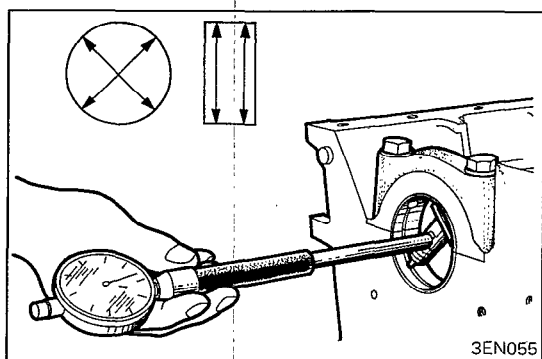
## NOTE

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

N09UCA

**INSPECTION****CRANKSHAFT**

- (1) Check the crankshaft journals and pins for damage, uneven wear and cracks. Also check oil holes for clogging. Correct or replace any defective part.
- (2) Inspect out-of-roundness and taper of crankshaft journal and pin.

**Standard value:****Crankshaft journal O.D.** 60 mm (2.36 in.)**Crank pin O.D.** 53 mm (2.09 in.)**Out-of-roundness of journal and pin** 0.015 mm (.0006 in.)**Taper of journal and pin** 0.005 mm (.0002 in.)**MAIN BEARINGS AND CONNECTING ROD BEARINGS**

N09UCBA

Visually inspect each bearing for peeling, melt, seizure and improper contact. Replace the defective bearings.

**OIL CLEARANCE MEASUREMENT**

N09UCCB

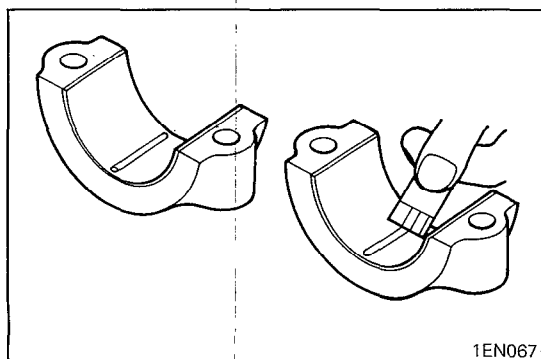
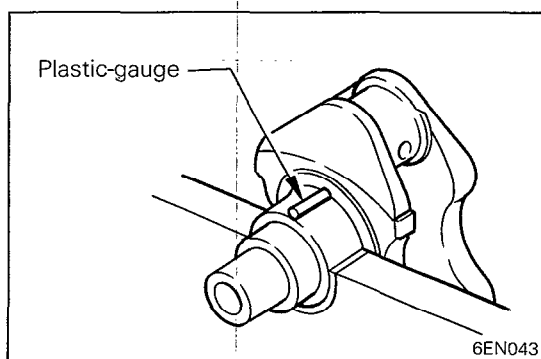
To check the oil clearance, measure the outside diameter of the crankshaft journal and the crank pin and the inside diameter of the bearing. The clearance can be obtained by calculating the difference between the measured outside and inside diameters.

**Oil clearance:****Crankshaft main bearing**

0.021 – 0.046 mm (.0008 – .0018 in.)

**Connecting rod bearing**

0.019 – 0.056 mm (.0007 – .0022 in.)



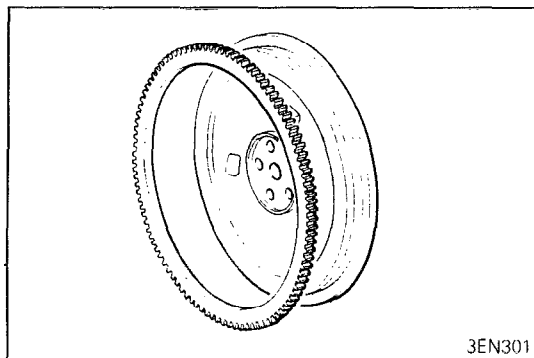
Plastic-gauge may be used to measure the clearance.

- (1) Remove oil and grease and any other dirt from bearings and journals.
- (2) Cut plastic-gauge to the same length as the width of the bearing and place it in parallel with the journal, off oil holes.
- (3) Install the crankshaft, bearings and caps and tighten them to the specified torques. During this operation, do NOT turn the crankshaft.
- (4) Remove the caps. Measure the width of the plastic-gauge at the widest part by using a scale printed on the plastic-gauge sleeve.
- (5) If the clearance exceeds the repair limit, the bearing should be replaced or an undersize bearing used.  
When installing a new crankshaft, be sure to use standard size bearings.
- (6) Should the standard clearance not be obtained even after bearing replacement, the journal should be ground to undersize and a bearing of the same size should be installed.

**OIL SEAL**

N09UCDA

Check front and rear oil seals for damage or worn lips.  
Replace any seal that is defective.



3EN301

**RING GEAR****(for vehicles with a manual transmission)**

N09UCEA

Check the ring gear for worn, damaged or broken teeth.  
Replace the ring gear if teeth are defective, and also check the starter motor pinion.

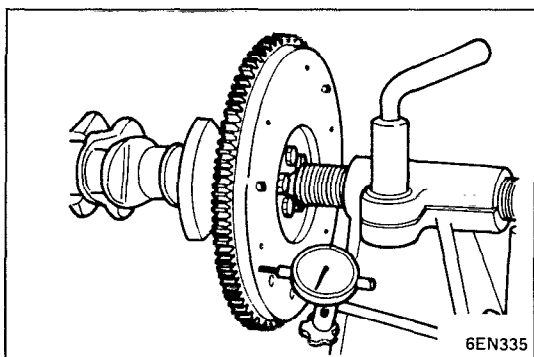
**Ring Gear Replacement Procedure**

- (1) Strike outer circumference of ring gear at several points and remove the gear.

**Caution**

**The ring gear cannot be removed if it is heated.**

- (2) Install the ring gear on flywheel after heating the ring gear to 260 – 280°C (500 – 536°F) for shrink fit.



6EN335

**FLYWHEEL****(for vehicles with a manual transmission)**

N09UCFA

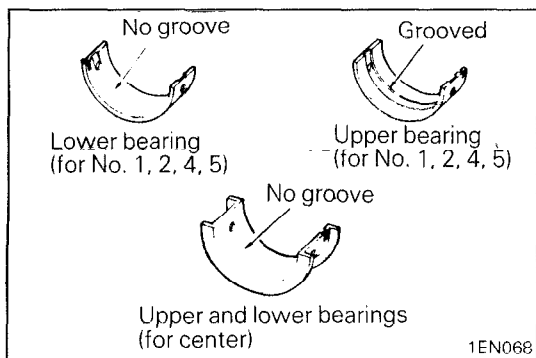
- (1) Visually check the clutch disc friction surface of flywheel for ridge wear, streaks and seizure.  
Replace as necessary.
- (2) If the flywheel runout exceeds the limit, replace it.

**Limit: 0.13 mm (.0051 in.)**

**DRIVE PLATE****(for vehicles with an automatic transmission)**

N09UCGA

Replace if deformed, damaged or cracked.



1EN068

**SERVICE POINTS OF INSTALLATION**

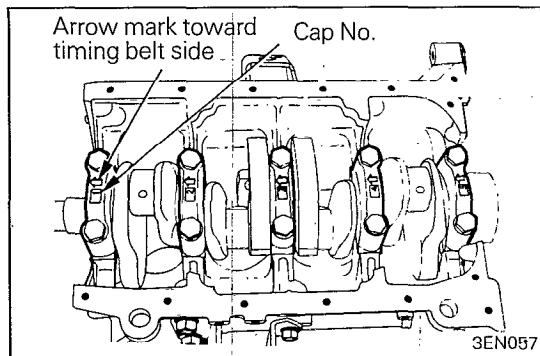
N09UDAB

**19. INSTALLATION OF UPPER BEARING**

When reusing the main bearings, remember to install them by referring to location marks made at the time of removal.  
Be sure oil holes in bearings align with oil hole in block.

**17. INSTALLATION OF LOWER BEARING**

Install bearings without grooves (lower bearing) on main bearing cap side.

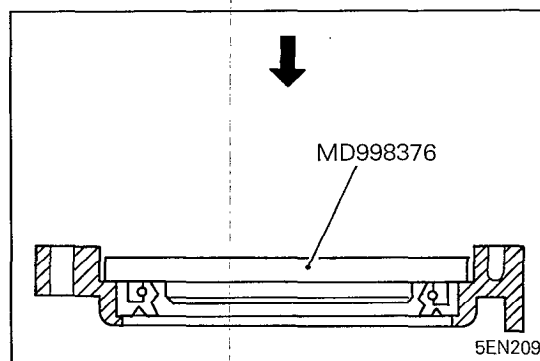
**16. INSTALLATION OF BEARING CAP**

- (1) The caps should be installed with the arrow mark directed toward the crank pulley side of engine. Cap numbers must be in correct order.
- (2) Tighten cap bolts in sequence: center, No. 2, No. 4, front and rear cap bolts.
- (3) Cap bolts should be tightened evenly in 2 to 3 stages before they are finally tightened.
- (4) Make certain that the crankshaft turns freely and has the proper clearance between the center main bearing thrust flange and the connecting rod big end bearing.

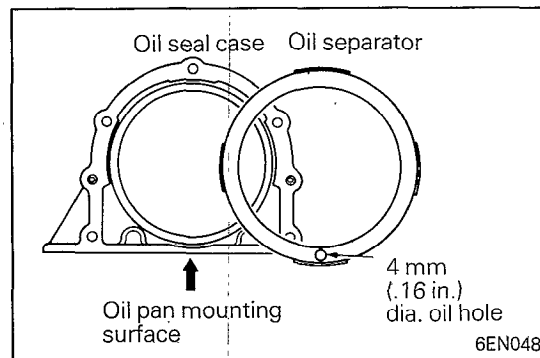
**Crankshaft end play:**

**Standard value** 0.05 – 0.18 mm (.0020 – .0071 in.)

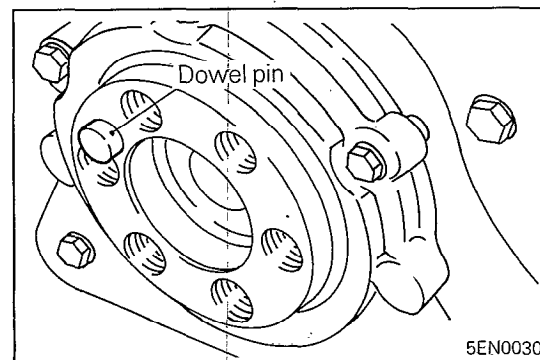
**Limit** 0.4 mm (.016 in.)

**15. INSTALLATION OF OIL SEAL**

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

**14. INSTALLATION OF OIL SEPARATOR**

Force the oil separator into the oil seal case, making sure that the oil hole in the separator is positioned at the bottom (indicated by an arrow in the illustration).

**2. INSTALLATION OF FLYWHEEL**

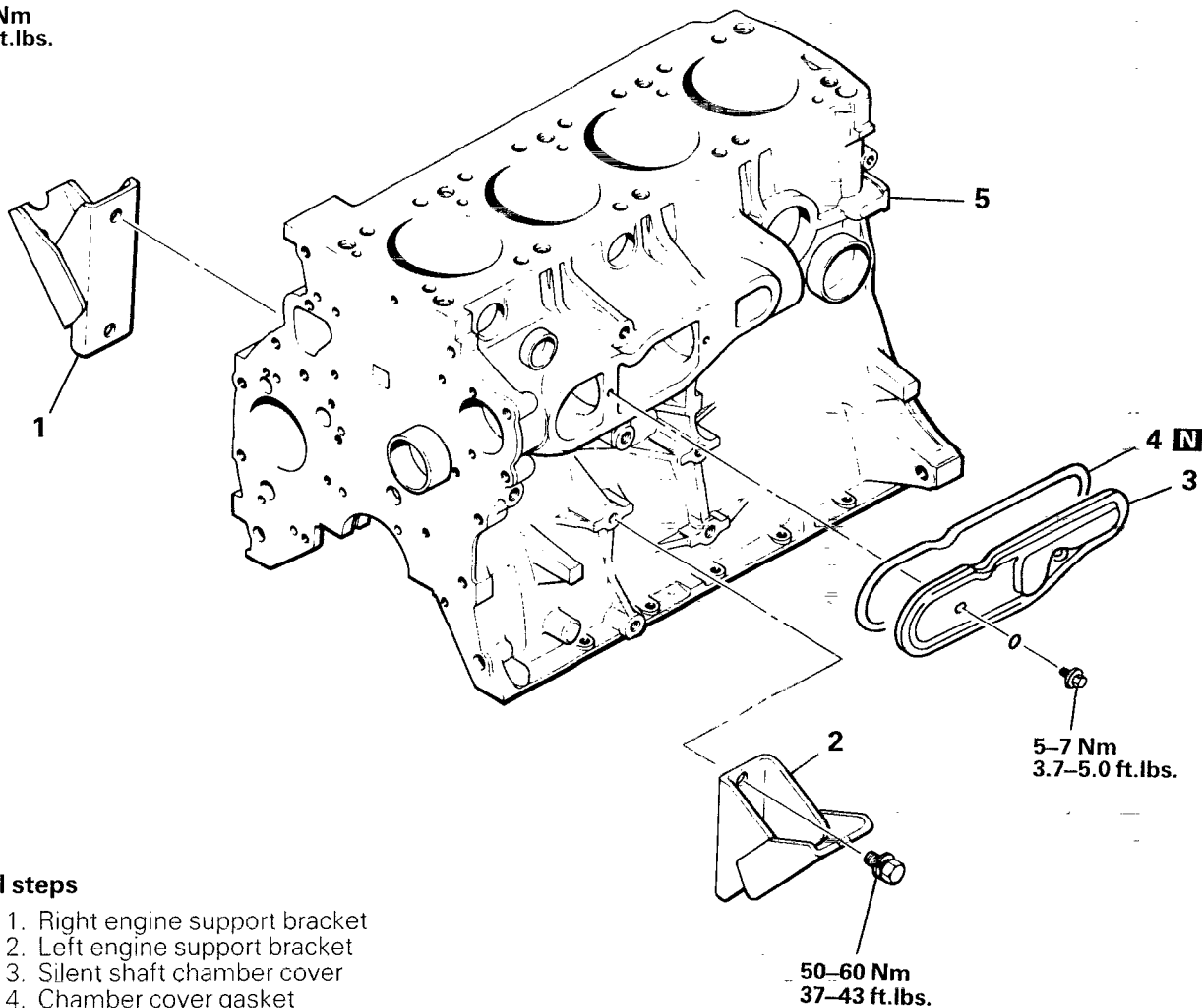
Install the flywheel with the crankshaft dowel pin aligned with the dowel pin hole in the flywheel.

## CYLINDER BLOCK

N09VA -

## REMOVAL AND INSTALLATION

50–60 Nm  
37–43 ft.lbs.



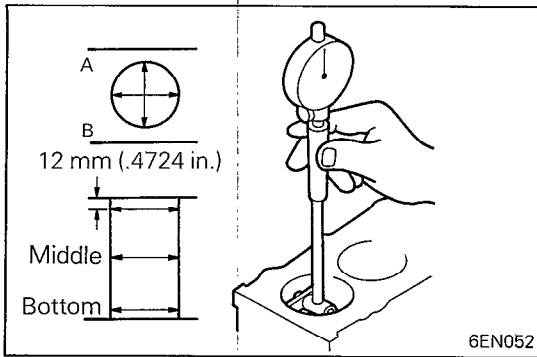
## Removal steps

1. Right engine support bracket
2. Left engine support bracket
3. Silent shaft chamber cover
4. Chamber cover gasket
5. Cylinder block

## NOTE

**N**: Non-reusable parts

5EN0027



## INSPECTION

- Visually check the cylinder block for scores, rust and corrosion. Also check for cracks or any other defects by using a flaw detecting agent (magnafluxing). Correct or replace the block if damaged.
- Measure the cylinder bore with a cylinder gauge at three levels in the directions of A and B. If the cylinder bores show more than specified out-of-round or taper or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed, and new oversize pistons and rings fitted.

Measuring points are as shown.

**Cylinder bore:** **91.1 mm (3.587 in.)**

**Out-of-roundness and taper of cylinder bore:**  
**Max. 0.02 mm (.0008 in.)**

- If cylinder top ridge is worn in stages, cut away with ridge reamer.
- Oversize pistons are available in four sizes.

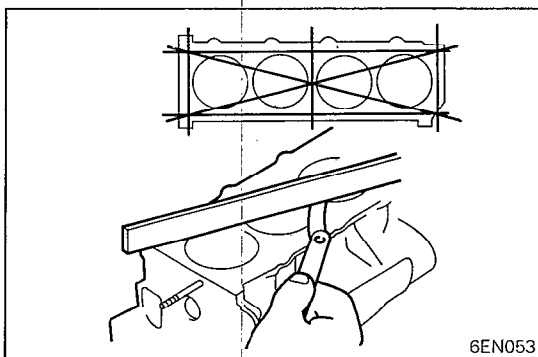
### Piston service size and mark:

<b>0.25 mm (.010 in.) O.S.</b>	<b>0.25</b>
<b>0.50 mm (.020 in.) O.S.</b>	<b>0.50</b>
<b>0.75 mm (.030 in.) O.S.</b>	<b>0.75</b>
<b>1.00 mm (.039 in.) O.S.</b>	<b>1.00</b>

- To rebores the cylinder bore to oversize, keep the specified clearance between the oversize piston and the bore, and make sure that all pistons used are of the same oversize. The standard measurement of the piston outside diameter is taken at a level 2 mm (.08 in.) above the bottom of the piston skirt and across the thrust faces.

### Piston-to-cylinder wall clearance:

**0.03 – 0.05 mm (.0012 – .0020 in.)**



- Check for damage and cracks.
- Check top surface for flatness. If excessive flatness is evident, grind to minimum limit or replace.

### Flatness of gasket surface:

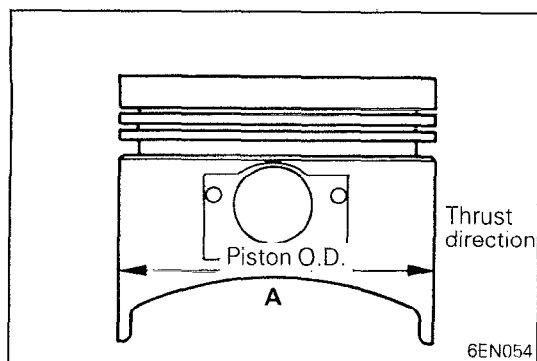
<b>Standard value</b>	<b>Max. 0.05 mm (.0020 in.)</b>
<b>Limit</b>	<b>0.1 mm (.004 in.)</b>

### Overall height:

<b>Standard value</b>	<b>316 mm (12.44 in.)</b>
<b>Limit</b>	<b>315.8 mm (12.433 in.)</b>

### Caution

If cylinder head gasket surface has already been ground, the thickness of the removed stock should be included in the grinding limit of **-0.2 mm (-.008 in.)**.



## REBORING CYLINDER

N09VEAA

- (1) Determine the oversize pistons to be used with reference to the cylinder with the largest bore.
- (2) There are four kinds of oversized piston available; 0.25 mm (.010 in.), 0.50 mm (.020 in.), 0.75 mm (.030 in.), 1.00 mm (.039 in.).

Bore the cylinder to a dimension so that piston O.D. to cylinder clearance meets the specification. The standard measuring point for piston O.D. is shown in the illustration.

- (3) Based on the measured piston O.D., calculate the boring dimension as follows:

Boring dimension = [Piston O.D.] + [Piston-to-cylinder clearance 0.03 – 0.05 mm (.0012 – .0020 in.)] – [Honing allowance 0.02 mm (.0008 in.)]

- (4) Bore each cylinder to the calculated boring dimension.

### Caution

**To prevent distortion caused by temperature rise during boring, work in the order of No. 2 to No. 4 to No. 1 to No. 3 cylinders.**

- (5) Hone to final finish dimension.
- (6) Check piston to cylinder clearance.

**Standard value: 0.03 – 0.05 mm (.0012 – .0020 in.)**