

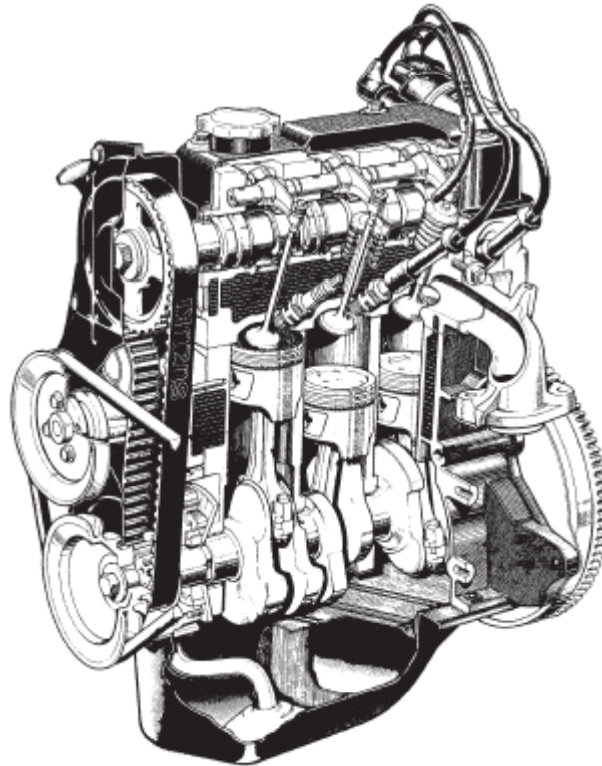
# **ENGINE GUIDELINE**

**ENGINE MECHANICAL  
F8B ENGINE**

**SUPRA SAEINDIA 2011  
POWERTRAIN WORKSHOP**

**ARAI, PUNE  
15<sup>th</sup> Feb 2011**

# ENGINE MECHANICAL - F8B ENGINE



# CONTENT

- 1) Specification
- 2) Periodic Maintenance
- 3) Engine Lubrication/Cooling /  
Mechanical System
- 4) MPFI System
- 5) Transmission System
- 6) Do's and Don't

# SPECIFICATION

Specification:	
Type	F8B
No.of Cylinders & arrangement	3 cylinder in line
Valve Mechanism	6 valve SOHC belt drive
Displacement	796 cc
Bore x Stroke	68.5 x 72 mm
Compression Ratio	8.8 : 1
Maximum Output	37 BHP at 5000 RPM
Maximum Torque	59 N-m at 2500 RPM
Firing Order	1-3-2
Ignition Timing	$5^{\circ} \pm 1$ at $900 \pm 50$ RPM
Oil Pressure	3-4.5 kg/cm <sup>2</sup> @ 3000 rpm

# PERIODIC MAINTENANCE SCHEDULE

Interval: This interval should be judged by odometer reading or months, which- ever comes first.	This table includes services as scheduled up to 80,000 km mileage. Beyond 80,000 km, carry out the same services at the same intervals respectively.										
	Km (x 1,000)	1	5	10	20	30	40	50	60	70	80
	Months	1	6	12	24	36	48	60	72	84	96
<b>ENGINE</b>											
1. Water pump drive belt (tension, wear)	A	I	I	I	I	I	I	R	A	I	
2. Engine coolant (level, leakage)	I	I	I	R	I	R	I	R	I	R	
3. Engine oil (API GRADE SF, SG, SH) & Oil filter	R	I	R	R	R	R	R	R	R	R	
4. Cooling system hoses and connections (leakage, damage)	I	I	I	I	I	I	I	I	I	I	
5. Engine bolts (All cylinder head and manifold fixings)	—	—	T	—	T	—	T	—	T	—	
6. Engine mounting (loose, damage)	—	—	T	—	T	—	T	—	T	—	
7. Valve clearance	—	A	—	A	—	A	—	A	—	A	
8. Camshaft timing belt (damage, wear)	—	—	—	I	—	I	—	I	—	I	
	Replace every 1,00,000 km										
9. Exhaust system (noise, leakage or otherwise defective)	—	I	—	I	—	I	—	I	—	I	
10. Positive crankcase ventilation System (Hoses, connections and valve)	—	I	—	I	—	I	—	I	—	I	

# PERIODIC MAINTENANCE SCHEDULE

IGNITION										
1. Ignition wiring, (damage, deterioration)	—	—	—	I	—	I	—	I	—	I
2. Distributor cap and rotor (wear, deterioration)	—	—	—	I	—	I	—	I	—	I
3. Spark plugs (clean and adjust the gap)	—	—	I	R	I	R	I	R	I	R
FUEL										
1. Air cleaner	Paved-road	Clean every 5,000 km. Replace every 40,000 km.								
	Dusty condition	Clean every 2,500 km. or as required. Replace every 40,000 km. More frequent replacement if dust condition is severe.								
2. Accelerator cable and Throttle shafts	—	I&L	I&L	I&L	I&L	I&L	I&L	I&L	I&L	I&L
3. Fuel tank cap, fuel lines & connections (leakage, damage)	—	I	—	—	—	I	—	—	—	I
4. Fuel filter (leakage)	I	I	I	I	I	R	I	I	I	R
CLUTCH AND TRANSMISSION										
1. Clutch pedal (play)	I	I	I	I	I	I	I	I	I	I
2. Clutch slipping (dragging or excessive damage)	I	I	I	I	I	I	I	I	I	I
3. Manual Transmission/Transfer and Differential oil (level, leakage)	I	I	I	R	I	R	I	R	I	R

# PERIODIC MAINTENANCE SCHEDULE

STEERING										
1. Steering wheel (play, loose)										
2. Power Steering fluid (level, leakage)/Connections										
3. All rods and arms (loose, damage, wear)										
ELECTRICAL										
1. Battery electrolyte (level, leakage)										
2. Wiring harness connection (looseness, damage)	—									
3. Lighting system (operation, stains, damage)										
4. Horn (operation)										
5. System voltage	—									
BODY										
1. All chassis bolts and nuts (tighten)	—		T	T	T	T	T	T	T	T
2. All Latches, Hinges & Locks (function)		I&L	I&L	I&L	I&L	I&L	I&L	I&L	I&L	I&L

# PERIODIC MAINTENANCE SCHEDULE

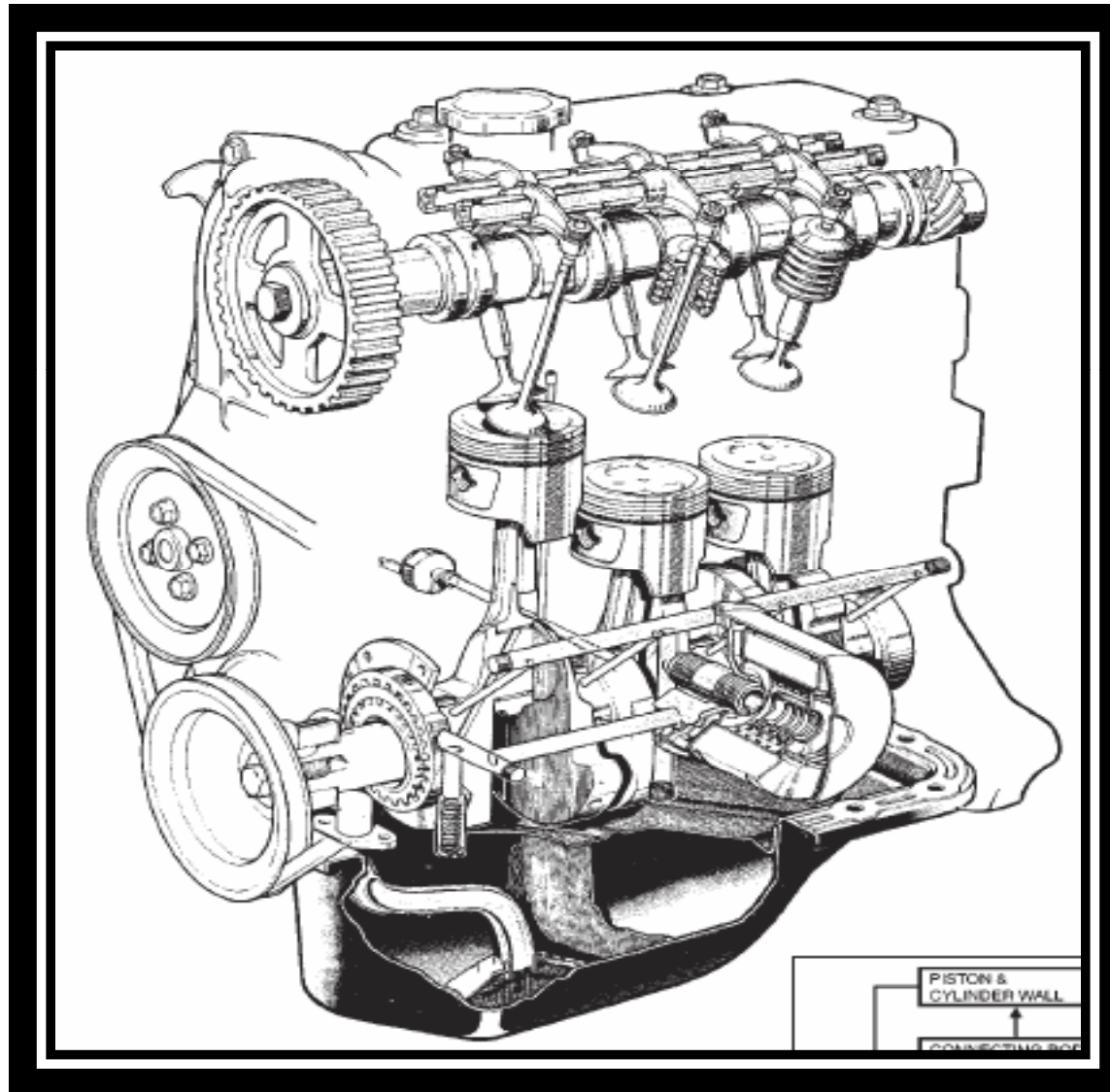
ROAD TEST										
1. Operation of Brakes, Gear shifting & speedometer										
2. Body and Chassis noise										
AIR CONDITIONER (if equipped)										
1. Check belt tension										
2. Check receiver drier bubbles										
3. Tighten compressor mounting bolts	—	T	T	T	T	T	T	T	T	T
4. Check all hose joints, tighten if necessary										
5. Check functioning of Recir flap										
6. Clean condenser with low pressure water		C	C	C	C	C	C	C	C	C
7. Check belt for frayed edges, change if necessary	—									
8. Check all mounting bolts	—									



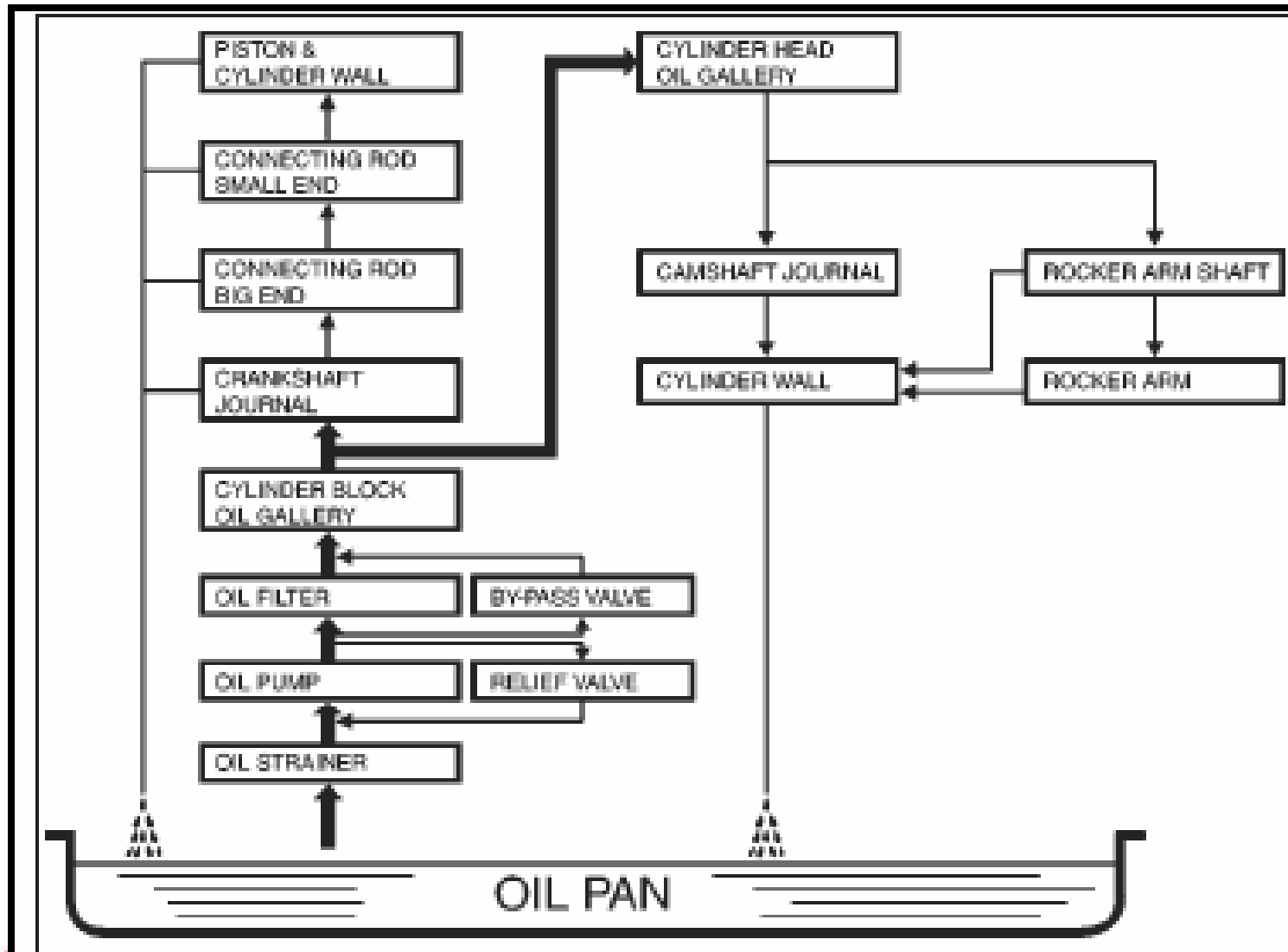
## CONSUMABLE

- Engine oil – 2.7 Ltrs.with Filter (20W40-  
Castrol / Shell )
- Transmission oil – 2.0 Ltrs. XP 90 / Super  
Gear 90/HD 90 (Servo super/Indian oil)
- Coolant – 3.5 Lt (Golden Cruiser/Koolex)

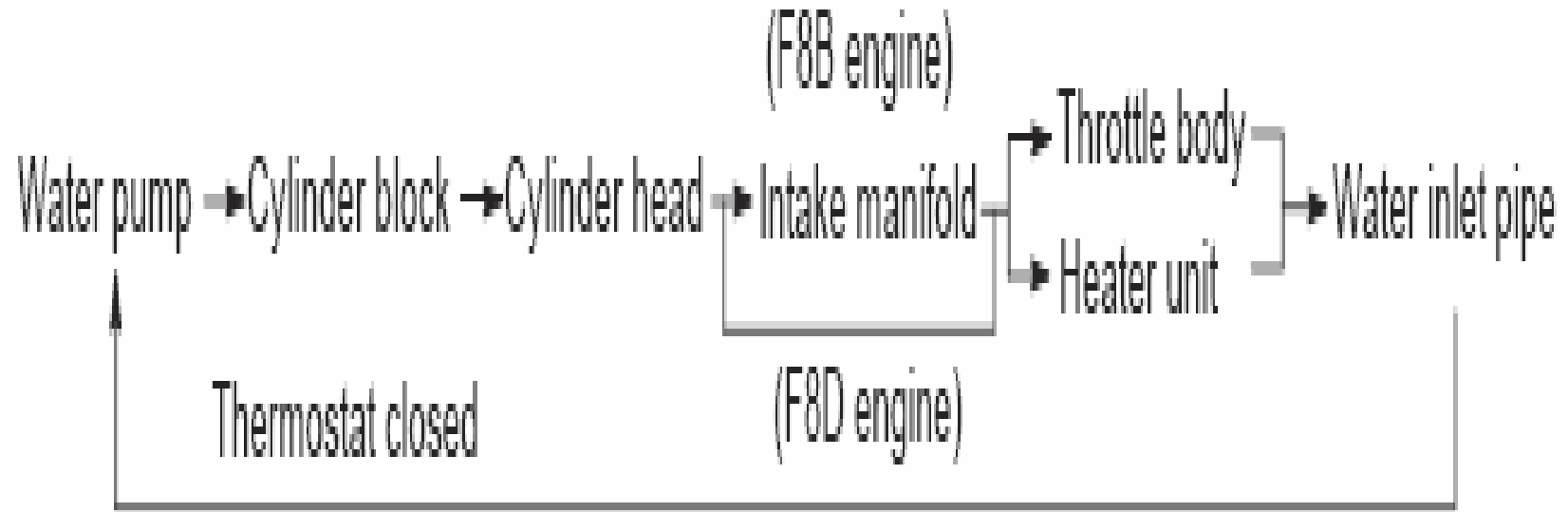
# LUBRICATION SYSTEM



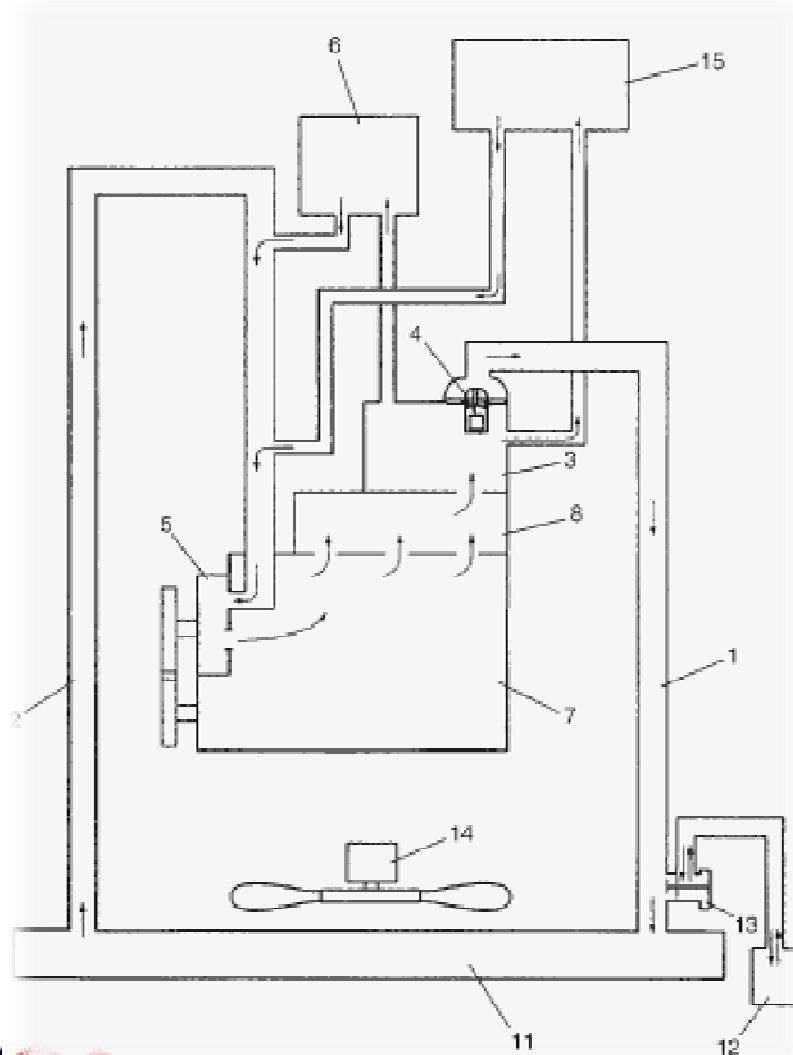
# LUBRICATION SYSTEM



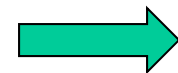
# COOLING SYSTEM



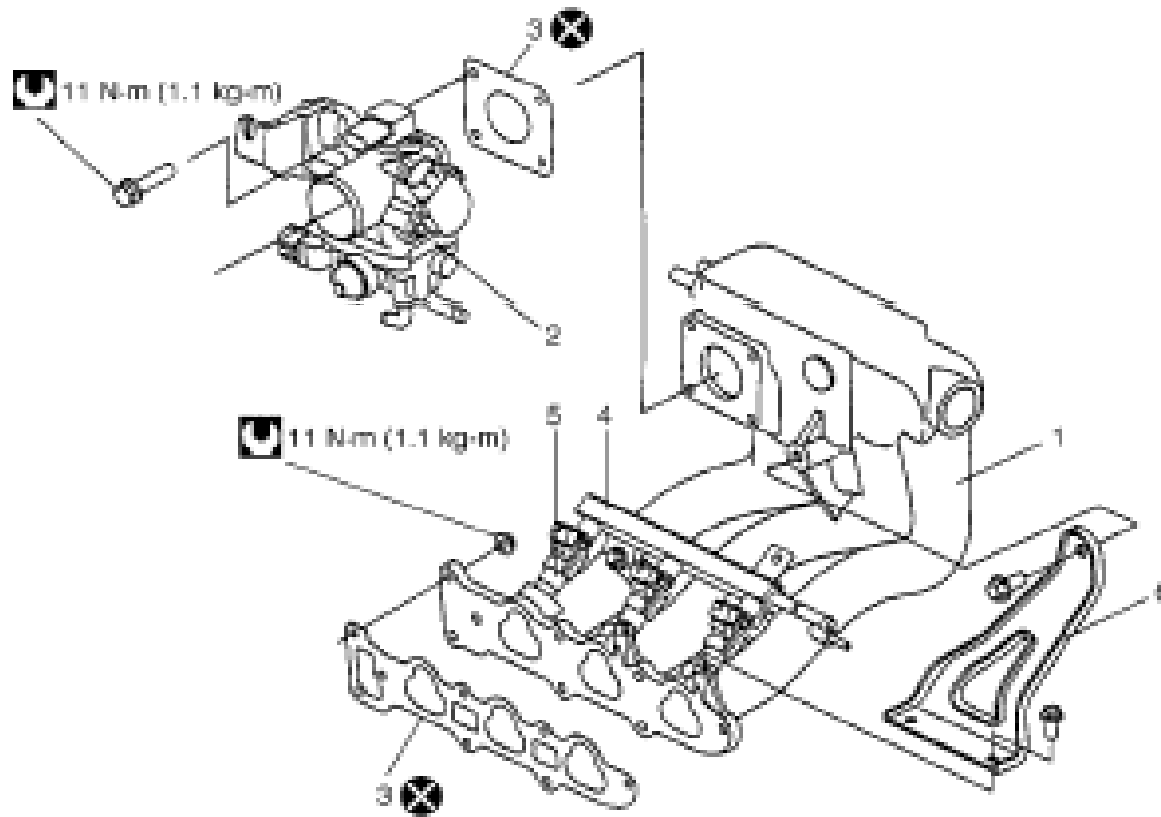
# COOLING SYSTEM



1. Radiator inlet hose
2. Radiator outlet hose
3. Intake manifold
4. Thermostat
5. Water pump
6. Throttle body
7. Cylinder block
8. Cylinder head
9. Heater inlet hose (if equipped)
10. Heater outlet hose (if equipped)
11. Radiator
12. Reservoir
13. Radiator cap
14. Cooling fan
15. Heater unit



# THROTTLE BODY AND INTAKE MANIFOLD

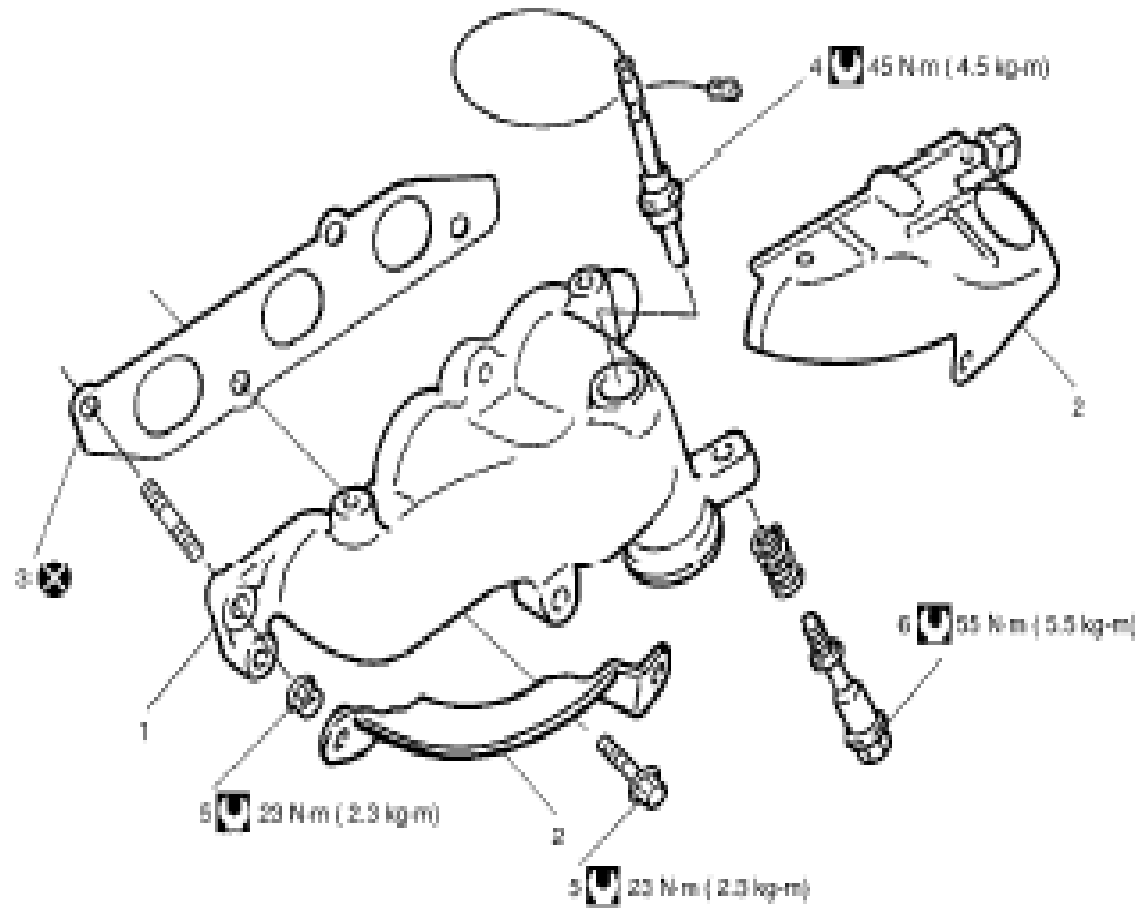


1. Intake manifold
2. Throttle body
3. Gasket
4. Fuel delivery pipe
5. Fuel injector
6. Stiffener



 : Tightening Torque

 : Do not reuse

# EXHAUST MANIFOLD



1. Exhaust manifold
2. Exhaust manifold cover
3. Gasket
4. Oxygen sensor
5. Exhaust manifold bolt and nut
6. Exhaust pipe bolt

 : Tightening Torque  
 : Do not reuse

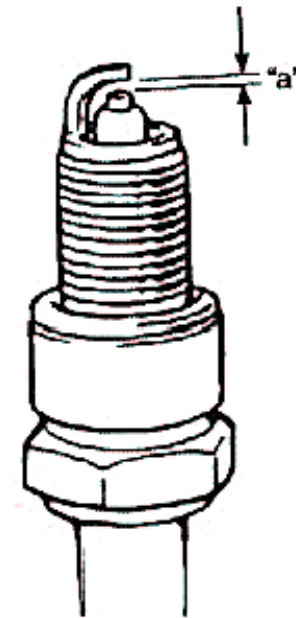
## SPARK PLUG

F8B engine

Spark plug air gap "a": 0.7- 0.8 mm

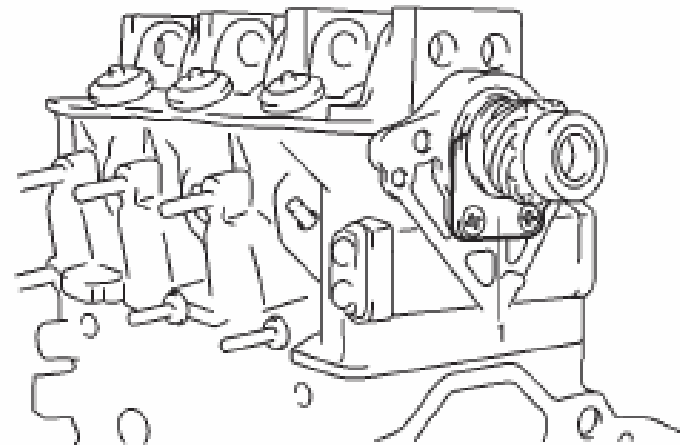
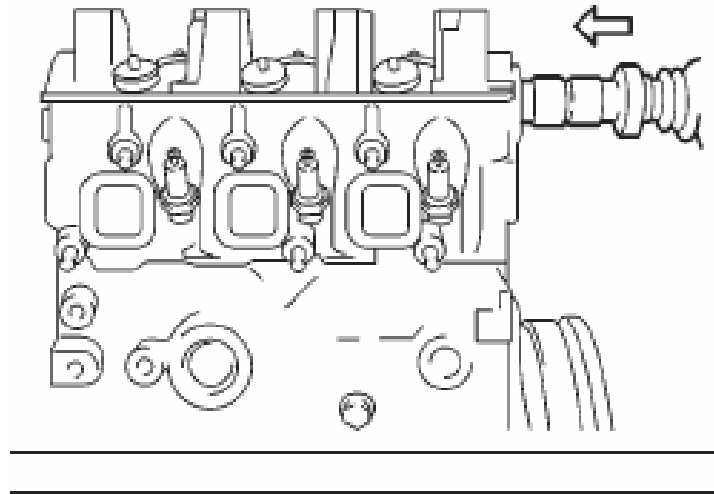
Spark plug type: NGK BPR5ES

: DENSO W16EXR-U

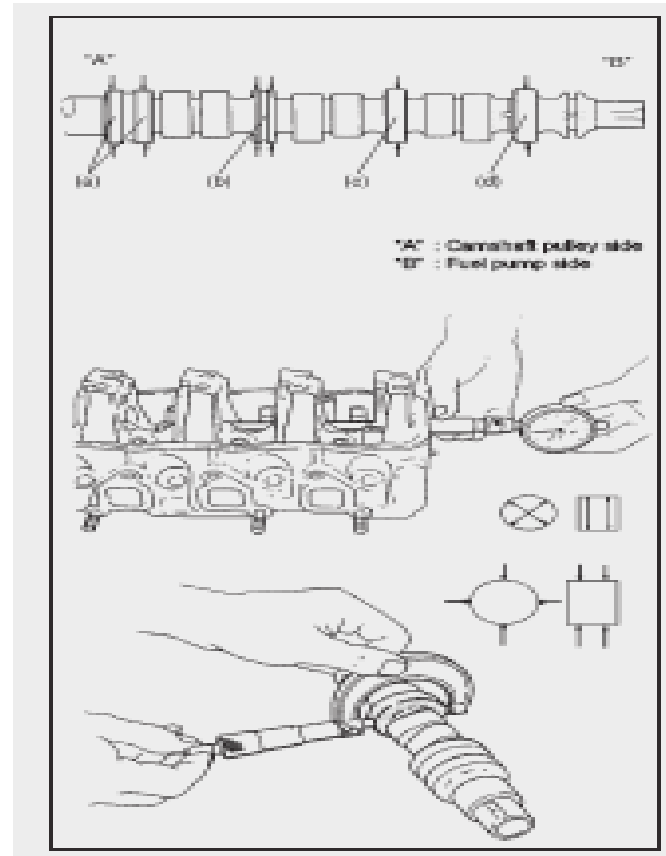
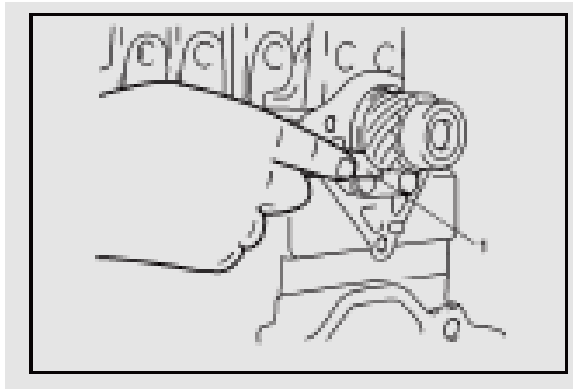
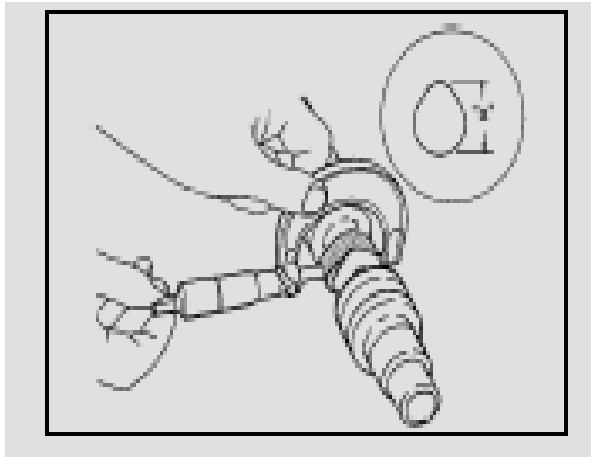




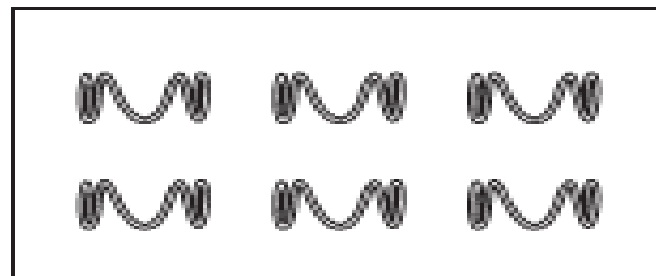
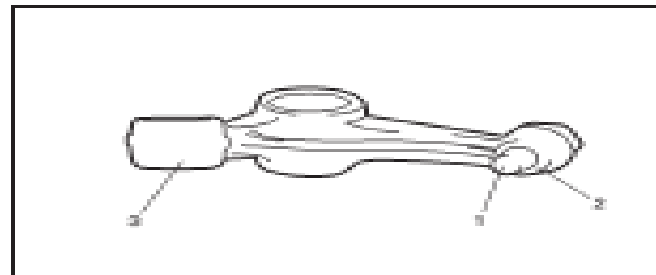
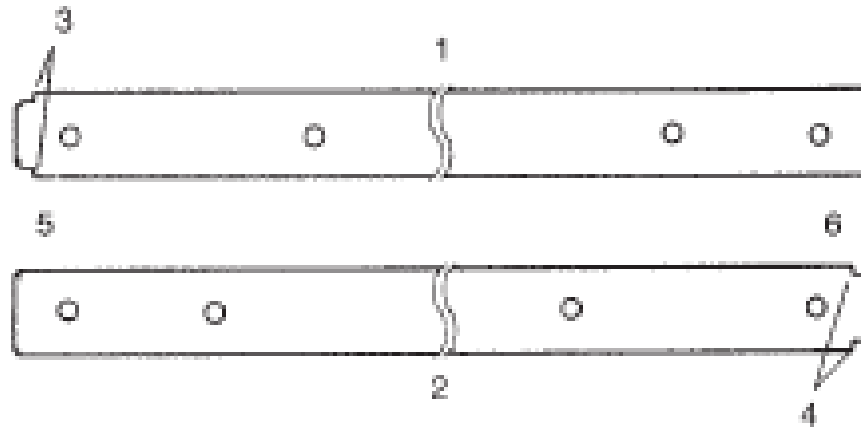
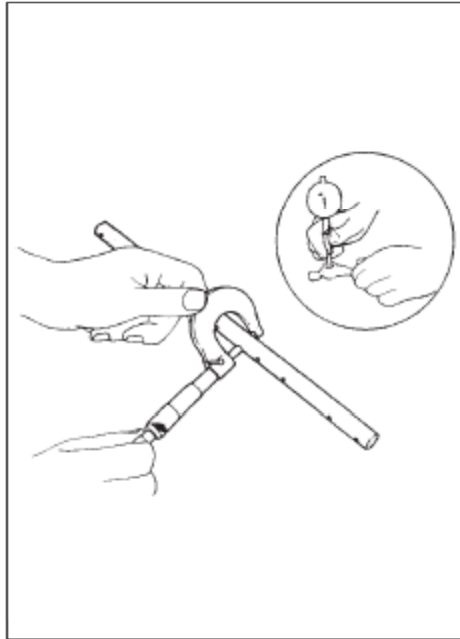
# CYLINDER HEAD AND CAMSHAFT ASSY DIRECTION



# CAMSHAFT



# ROCKER ARM AND ROCKERARM SHAFT

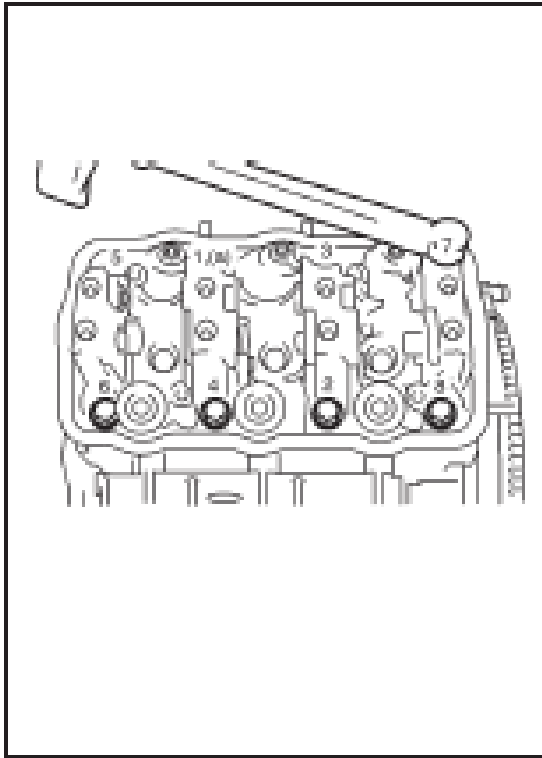


1. ADJUSTING SCREW

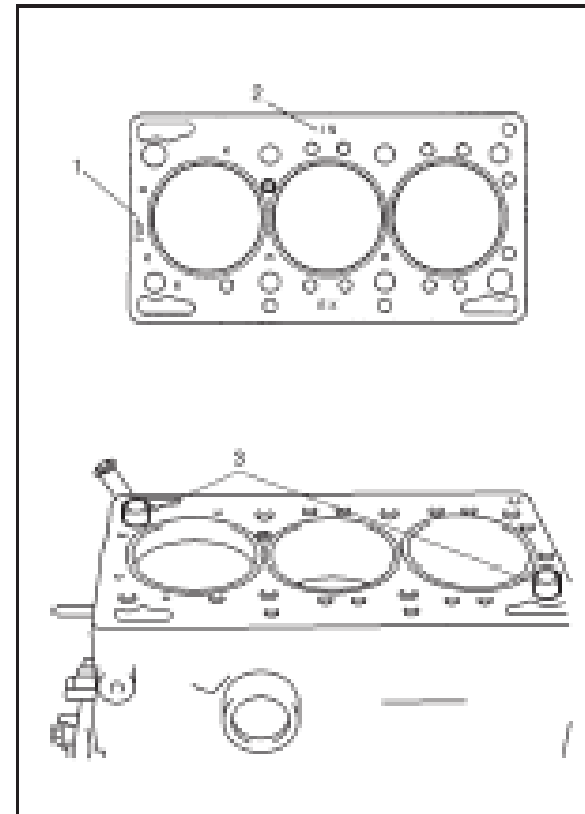
2. ROCKER

3. RIDING FACE

# CYLINDER HEAD & CYLINDER HEAD GASKET

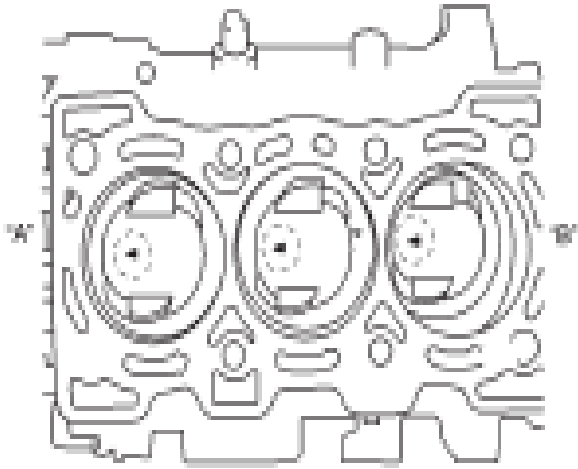


1. CRANKSHAFT PULLEY SIDE

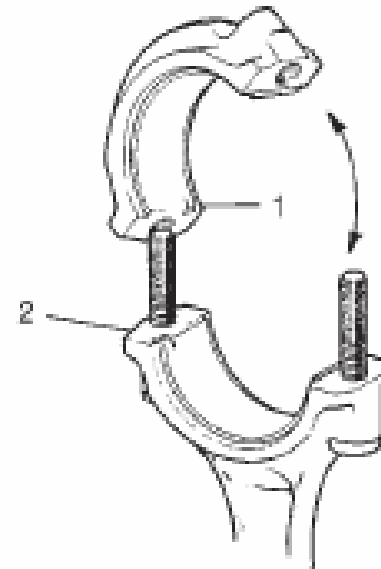
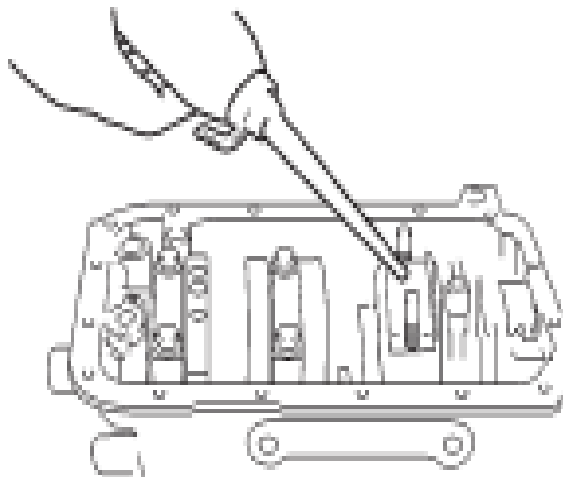
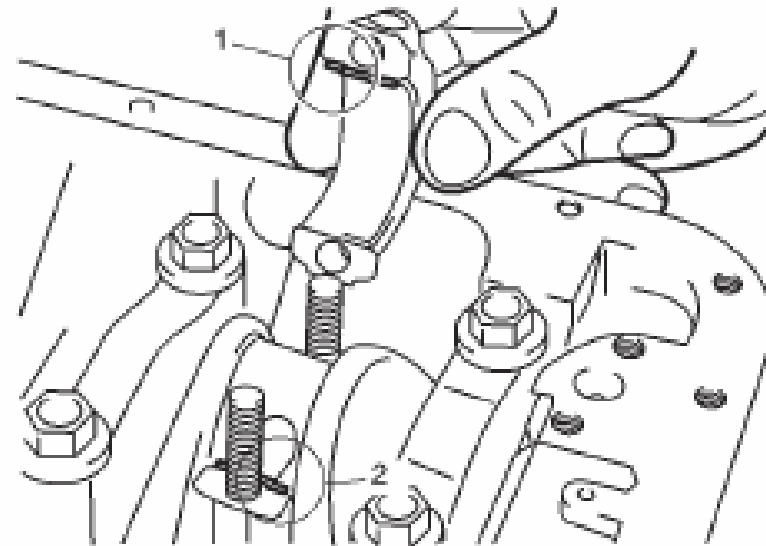


2. TOP MARK

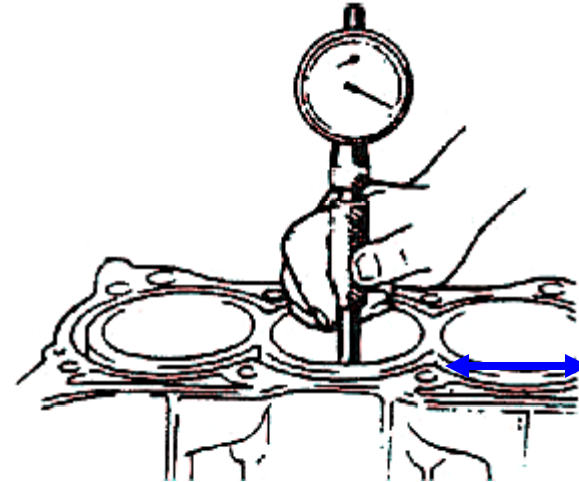
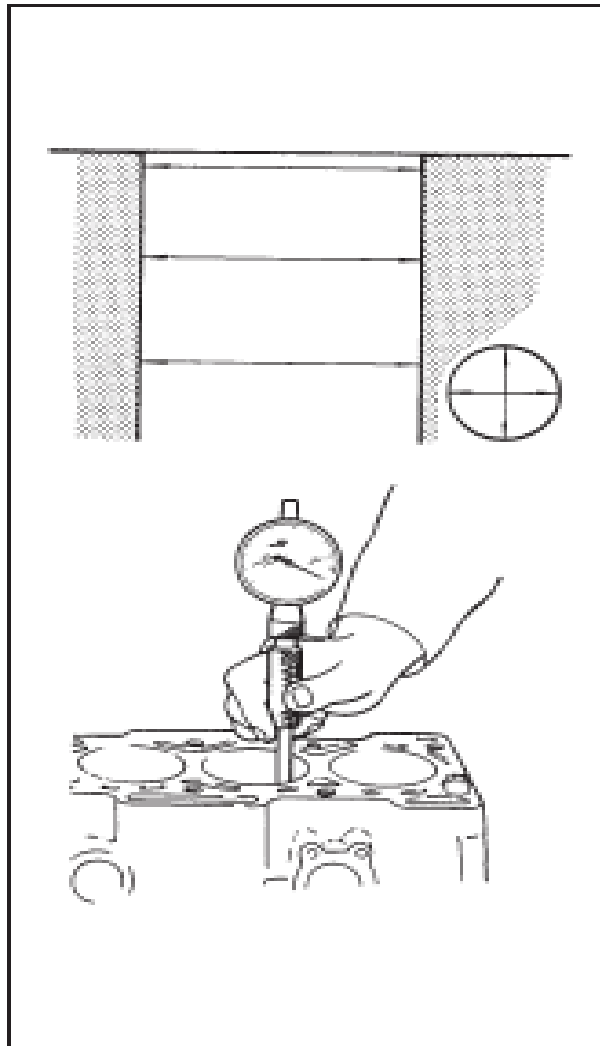
# CONNECTING ROD FITMENT



'A': Crankshaft pulley side  
'B': Flywheel side



# CYLINDER BORE



Wear limit on bore

0.05 mm (0.0020 In.)

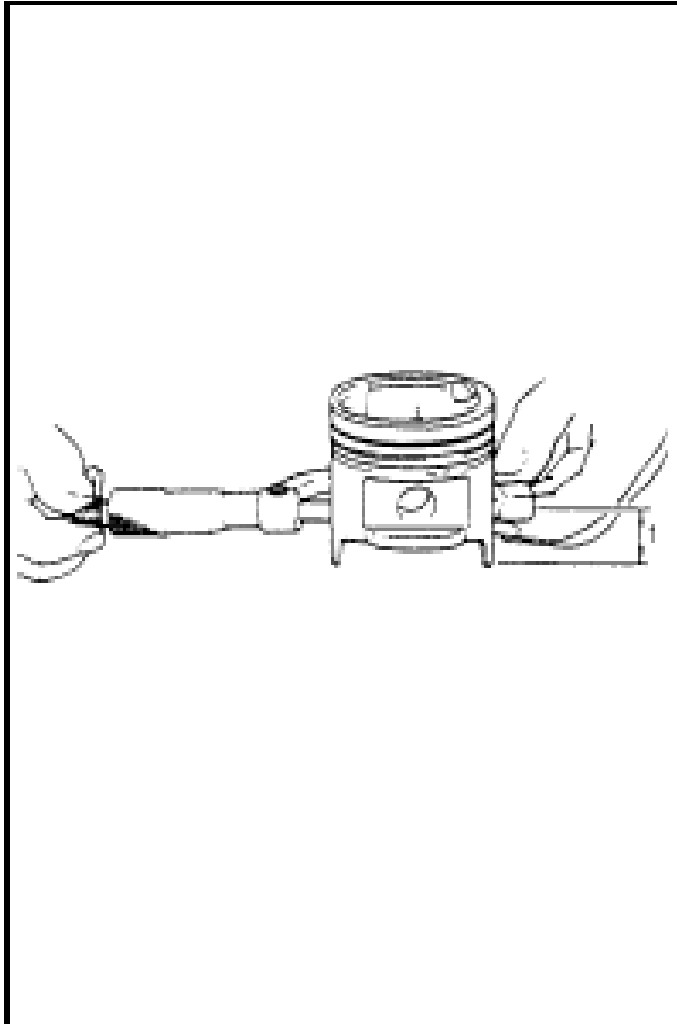
Piston-to-cylinder clearance

0.045 – 0.055 mm  
(0.0018 – 0.0022 In.)

Cylinder Bore Standard Size

68.505 mm-68.520 mm

# PISTON DIAMETER



## Pistons

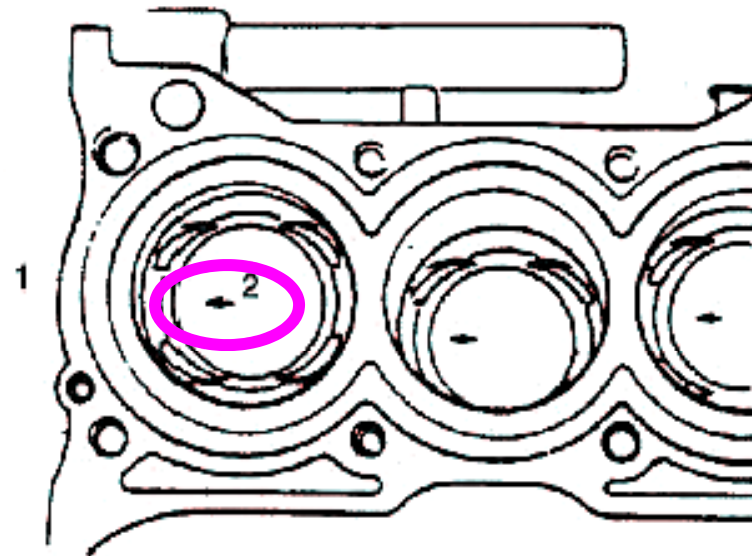
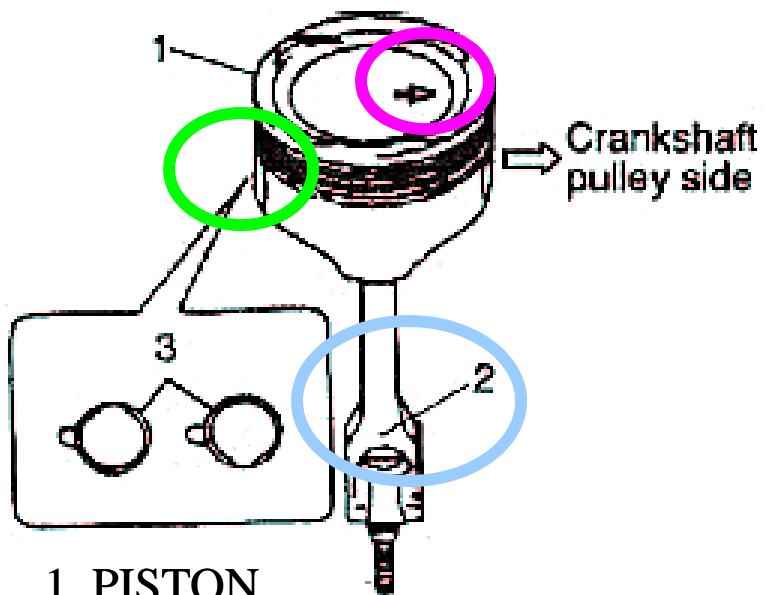
- Inspect piston for faults, cracks or other damaged. Damaged or faulty piston should be replaced.

- Piston diameter:

As indicated in figure, piston diameter should be measured at a position (1) 20 mm (0.79 in.) from piston skirt end in the direction perpendicular to piston pin.

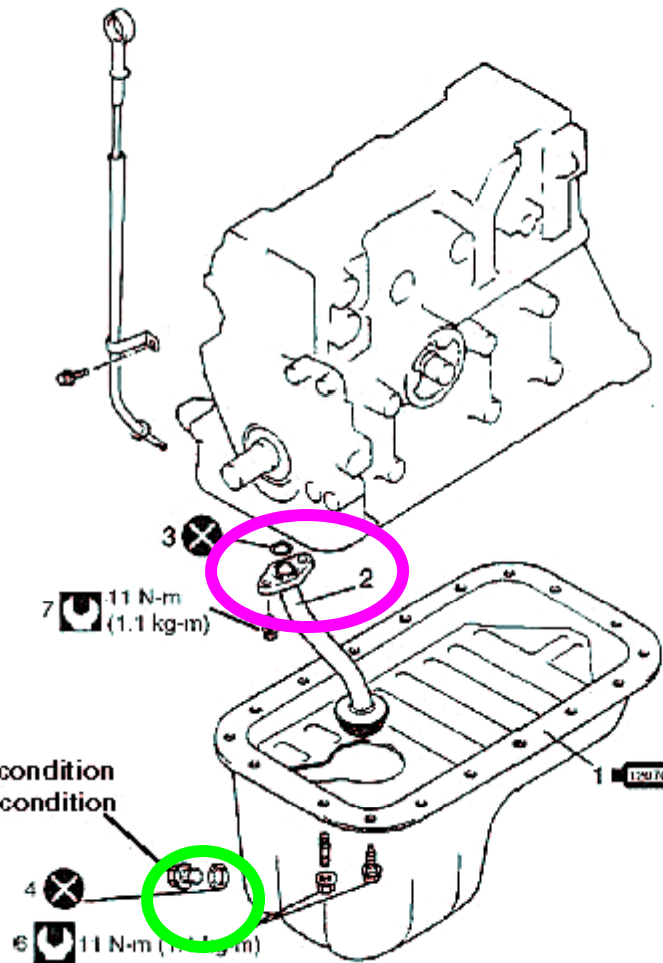
Piston diameter	Standard	68.465 – 68.485 mm (2.6955 – 2.6962 in.)
	Oversize: 0.25 mm (0.0098 in.)	68.720 – 68.740 mm (2.7055 – 2.7063 in.)
	0.50 mm (0.0196 in.)	68.970 – 68.990 mm (2.7153 – 2.7161 in.)


# FITMENT OF PISTON AND CONNECTING ROD








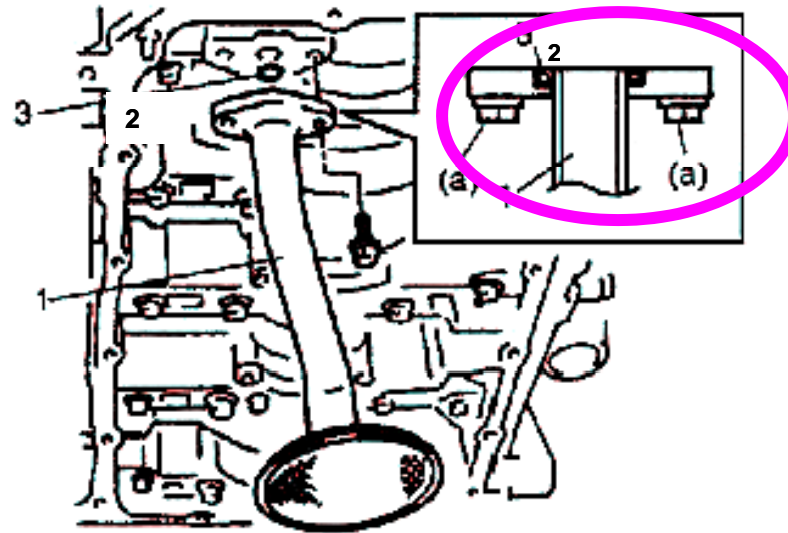
# CYLINDER BLOCK & OIL SUMP



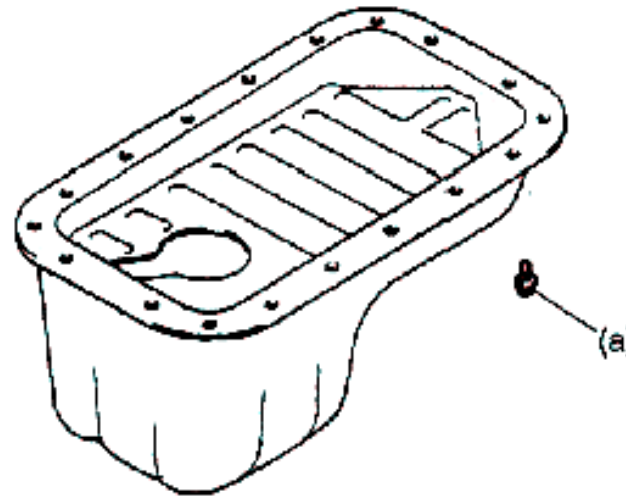
5  50 N-m (5.0 kg-m) : at dry condition  
 35 N-m (3.5 kg-m) : at wet condition

	1. Oil pan: Apply SUZUKI BOND No. 1207C 99000-31150 to mating surface.
	2 Oil pump strainer
	3 Seal
	4. Drain plug gasket
	5 Drain plug
	6 Oil pan bolt and nut
	7. Strainer bolt
	: Tightening Torque
	: Do not reuse

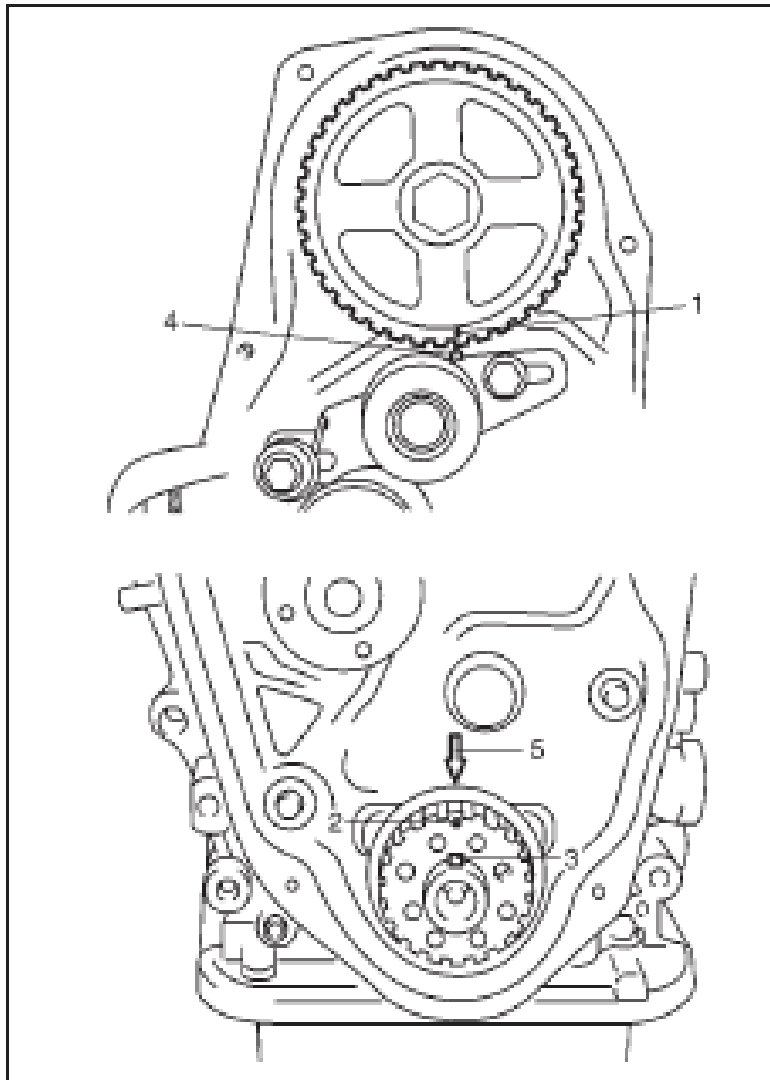
# OIL STRAINER



1. OIL PUMP  
STRAINER
2. O RING
- (A) OIL PUMP  
STRAINER BOLT  
(TIGHTENING  
TORQUE = 1.1 Kg-m)

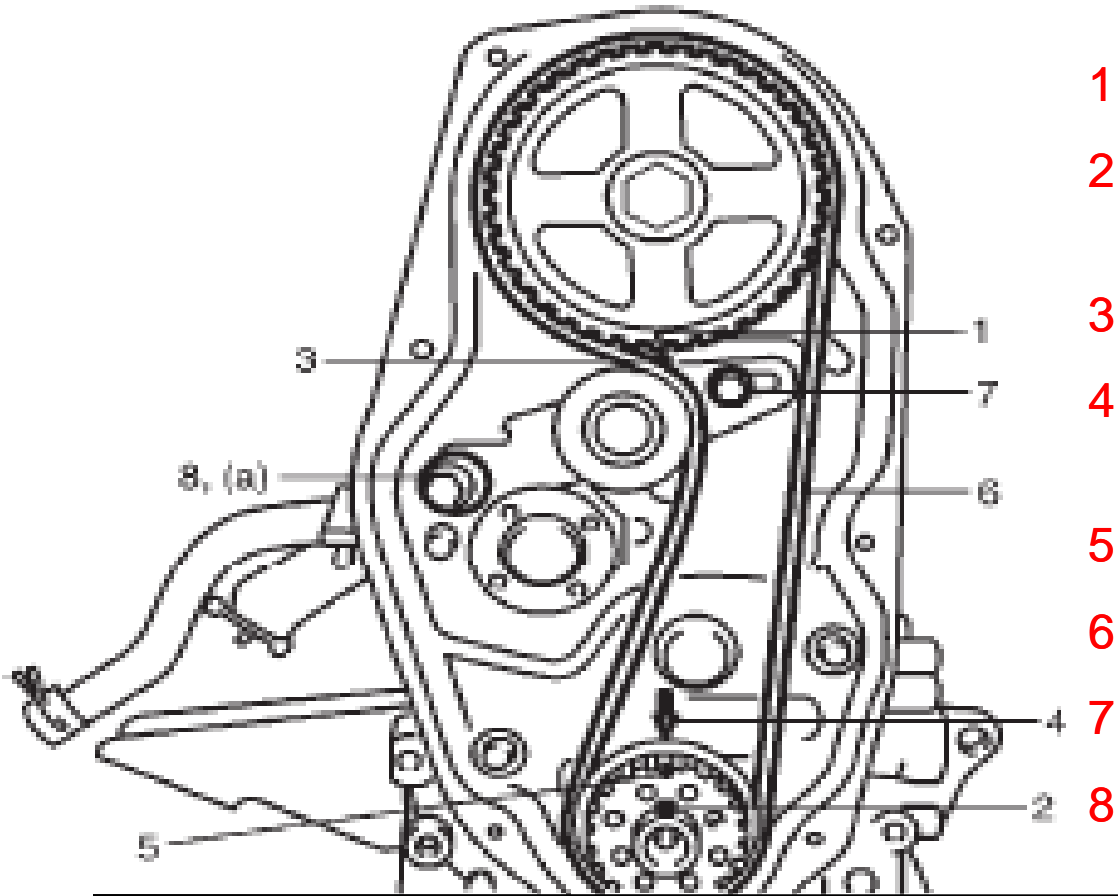


# TIMING BELT ASSEMBLY



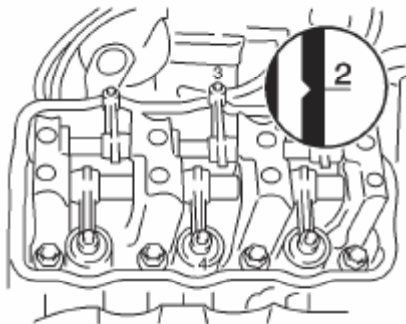
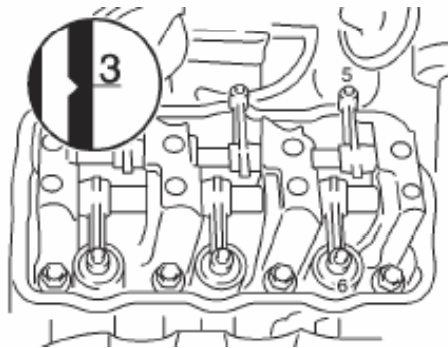
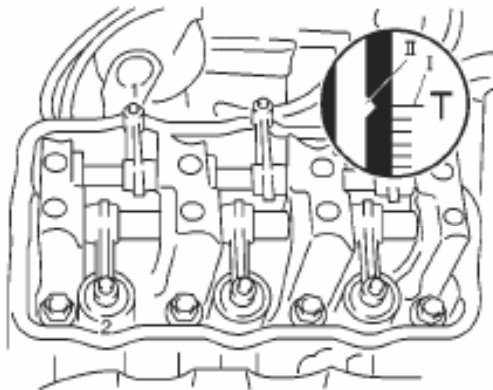
1. Cam Shaft Timing gear notch mark
2. Crankshaft Timing Gear dot mark
3. Crank shaft Key Position
4. Cylinder head timing cover notch mark (inside timing cover)
5. Cylinder block timing cover notch mark

# TIMING BELT ASSEMBLY



1. Timing sprocket notch mark
2. Crankshaft sprocket dot mark
3. Crank shaft key mark
4. Cylinder head notch mark (inside timing cover)
5. Cylinder block notch mark
6. Timing belt
7. Tensioner bolt
8. Tensioner bolt 2

# TAPPET ADJUSTMENT

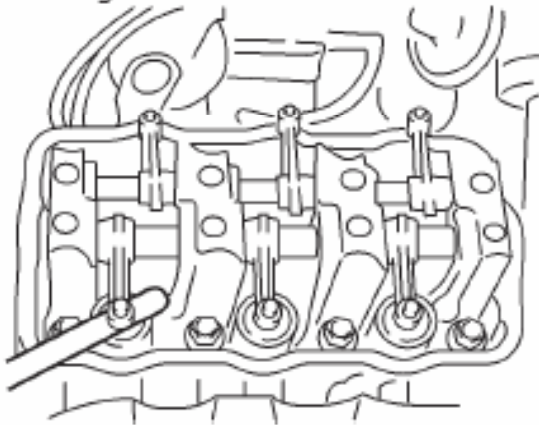


## Valve clearance (lash)

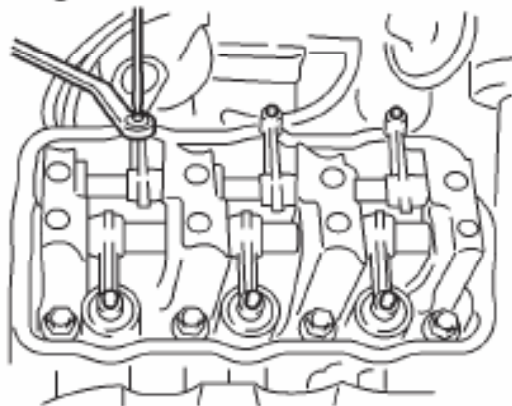
Valve clearance specification	When cold (Coolant temperature is 15 – 25° C or 59 – 77° F)		When hot (Coolant temperature is 60 – 68° C or 140 – 154° F)	
	Intake	0.13 – 0.18 mm (0.005 – 0.007 in.)	0.15 – 0.19 mm (0.006 – 0.007 in.)	0.15 – 0.19 mm (0.006 – 0.007 in.)
Exhaust	0.13 – 0.18 mm (0.005 – 0.007 in.)	0.15 – 0.19 mm (0.006 – 0.007 in.)	0.15 – 0.19 mm (0.006 – 0.007 in.)	0.15 – 0.19 mm (0.006 – 0.007 in.)

# TAPPET ADJUSTMENT

Measuring valve clearance

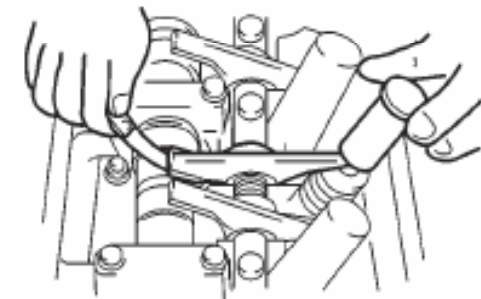
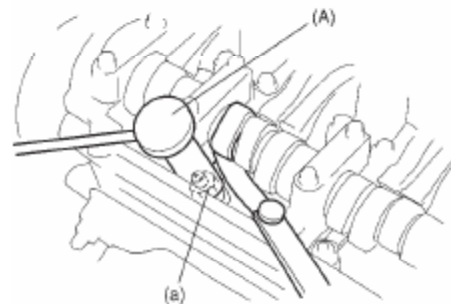


Adjusting valve clearance

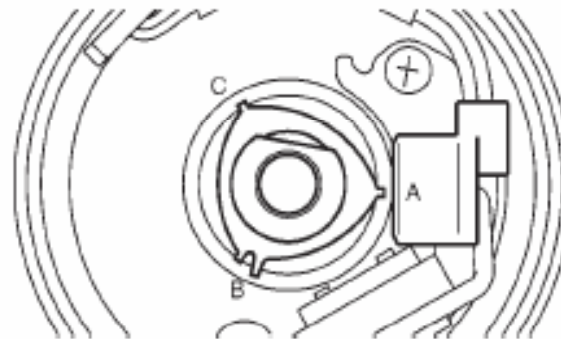
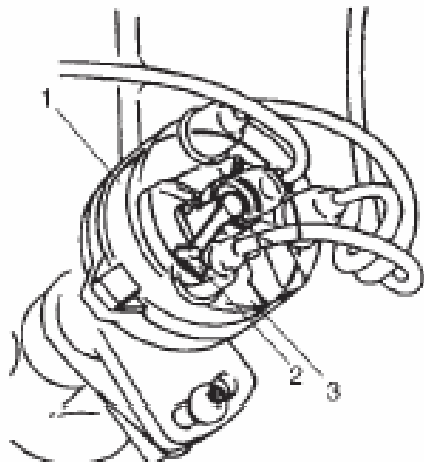


## Valve clearance (lash)

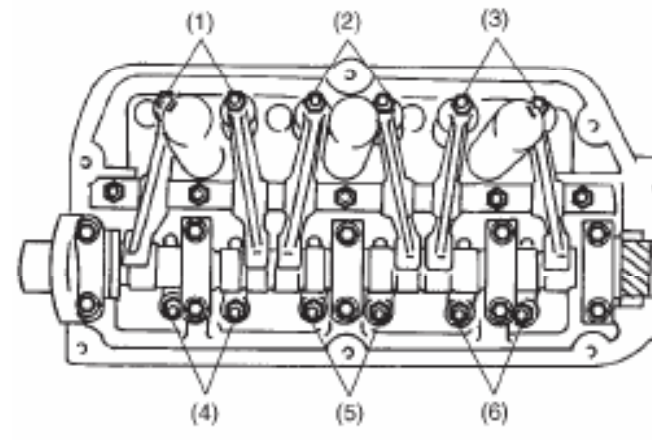
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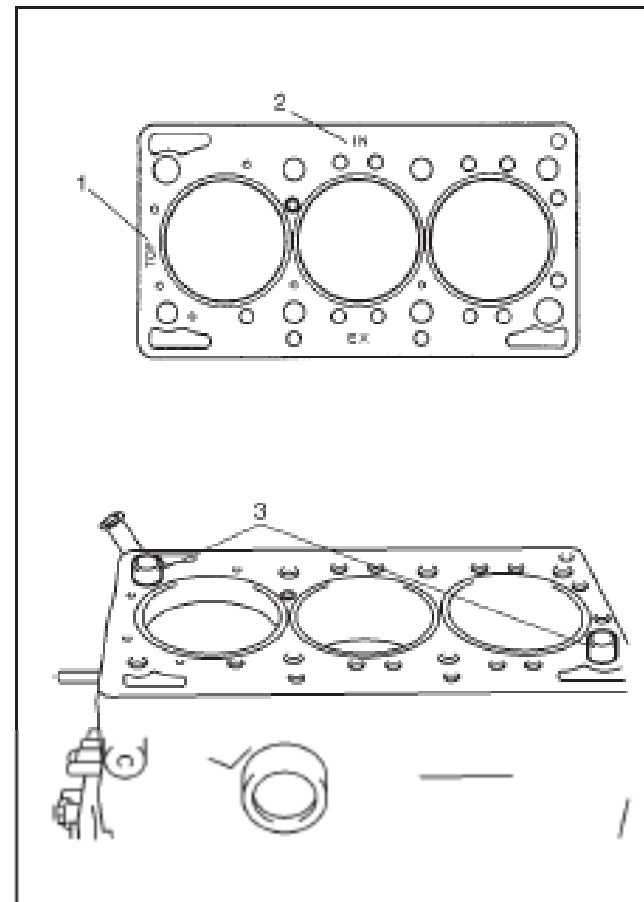
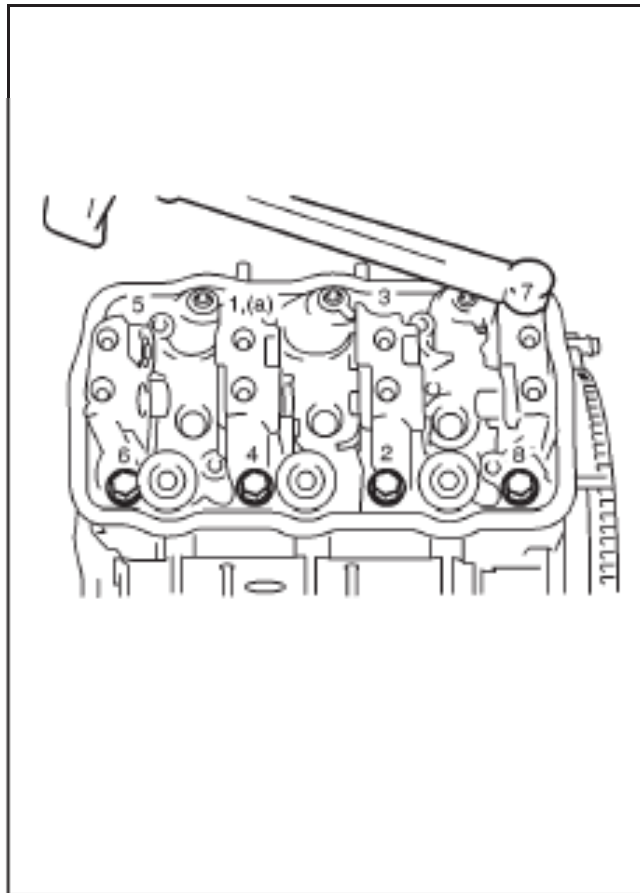
# DISTRUBUTOR FITMENT



A: Top dead center of No.1 piston  
B: Top dead center of No.2 piston  
C: Top dead center of No.3 piston



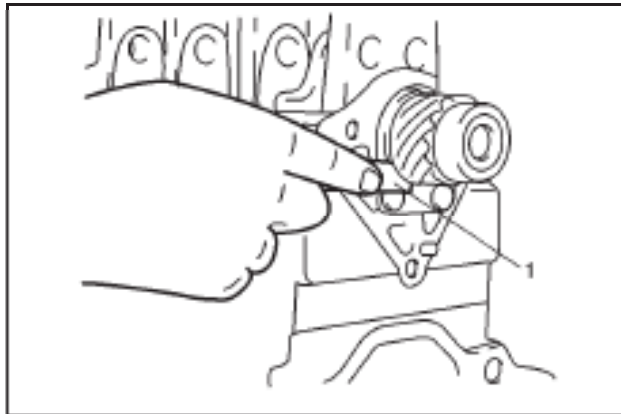
# CYLINDER HEAD BOLT AND HEAD GASKET



**(A) CYLINDER HEAD BOLT TIGHTENING TORQUE 680 KG-CM**



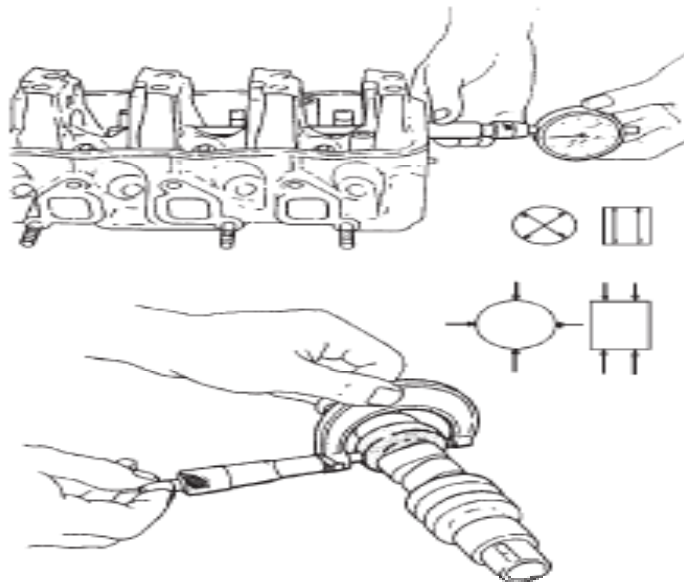
# CAMSHAFT JOURNAL CLEARANCE



- **Thrust clearance:**

Using a thickness gauge (1), measure this clearance as shown in figure, at the thrust plate. If the limit is exceeded, replace thrust plate or camshaft.

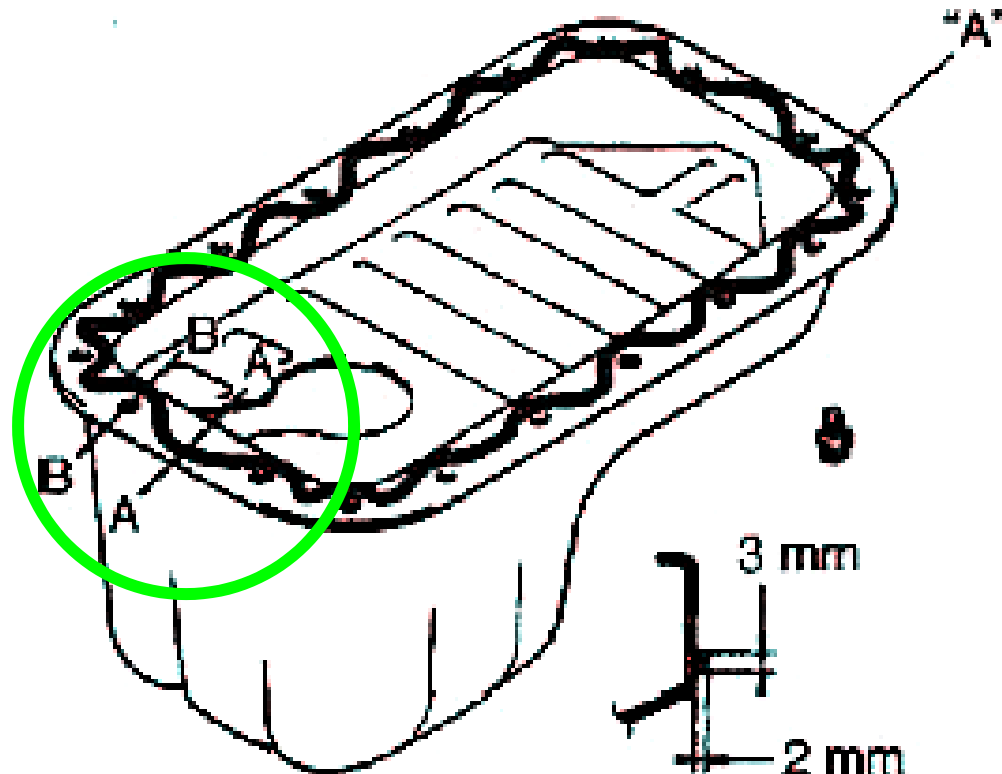
Item	Standard	Limit
Thrust clearance	0.050 – 0.150 mm (0.002 – 0.006 in.)	0.300 mm (0.012 in.)



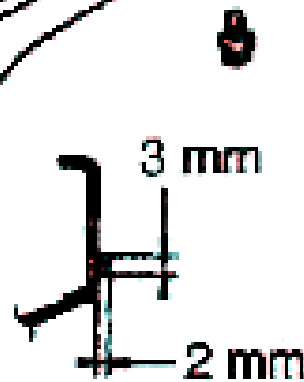
Item	Standard	Limit
Journal clearance	0.050 – 0.091 mm (0.0020 – 0.0036 in.)	0.15 mm (0.0060 in.)

	Camshaft journal dia.	Journal bore dia.
(a)	43.425 – 43.450 mm (1.710 – 1.711 in.)	43.500 – 43.516 mm (1.712 – 1.713 in.)
(b)	43.625 – 43.650 mm (1.718 – 1.719 in.)	43.700 – 43.716 mm (1.720 – 1.721 in.)
(c)	43.825 – 43.850 mm (1.725 – 1.726 in.)	43.900 – 43.916 mm (1.728 – 1.729 in.)
(d)	44.025 – 44.050 mm (1.733 – 1.734 in.)	44.100 – 44.116 mm (1.736 – 1.737 in.)

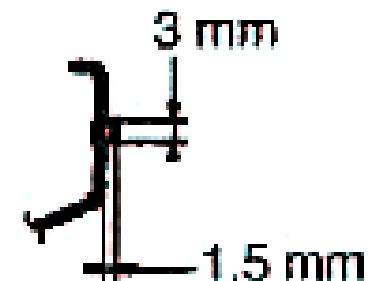
# OIL SUMP - SEALANT APPLICATION



“A” SEALANT (SUZUKI  
BOND NO 1207C)

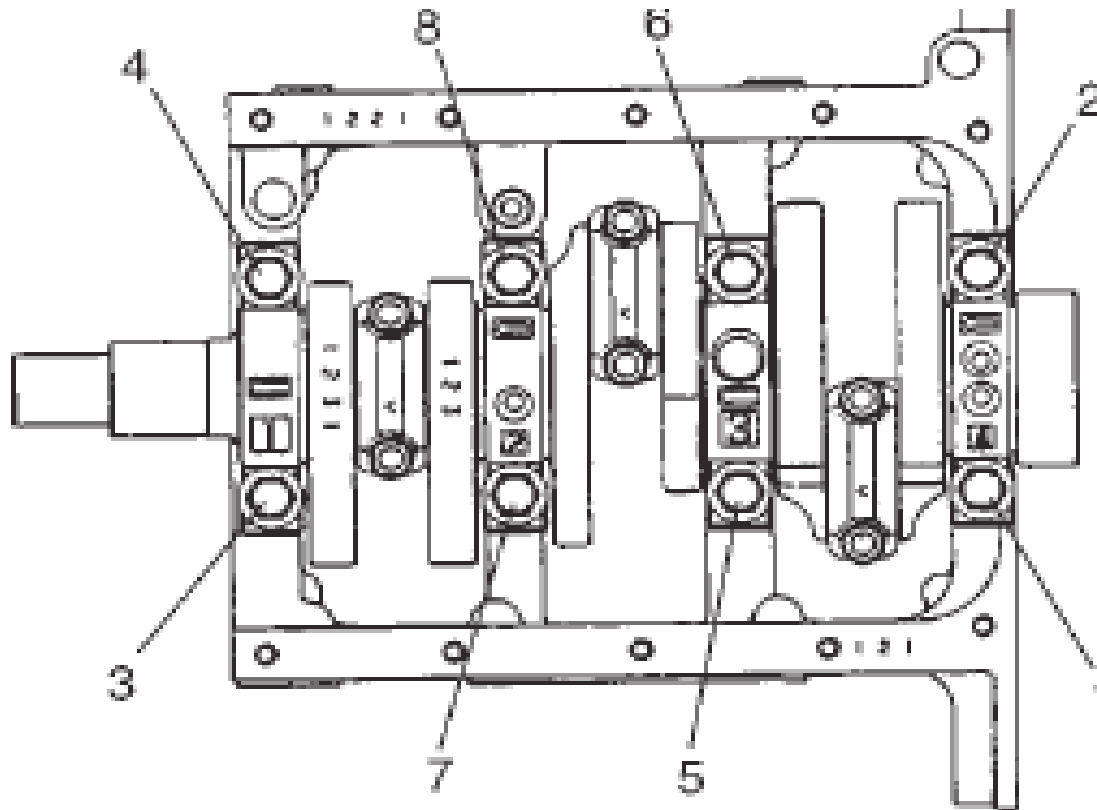


Section B - B



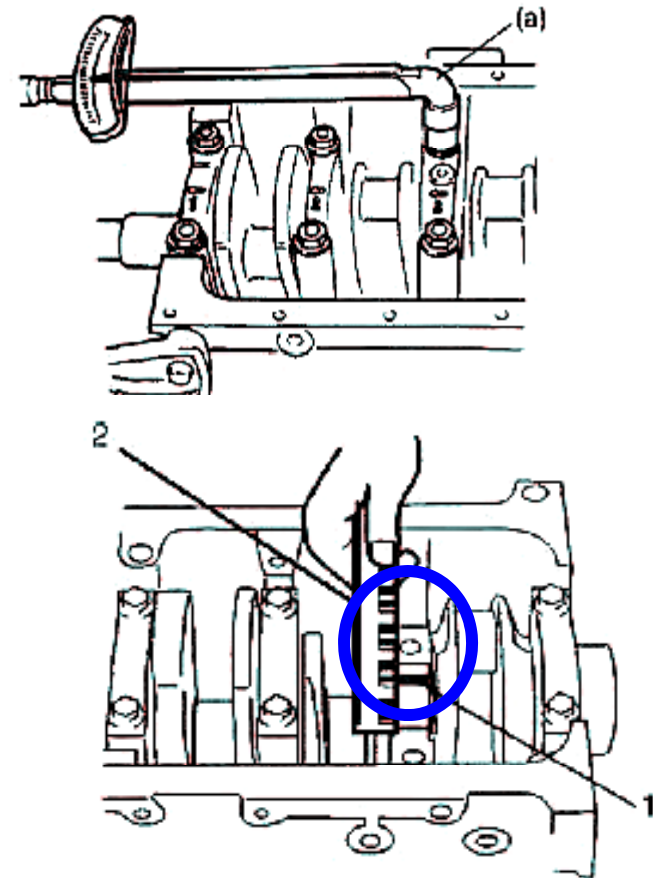
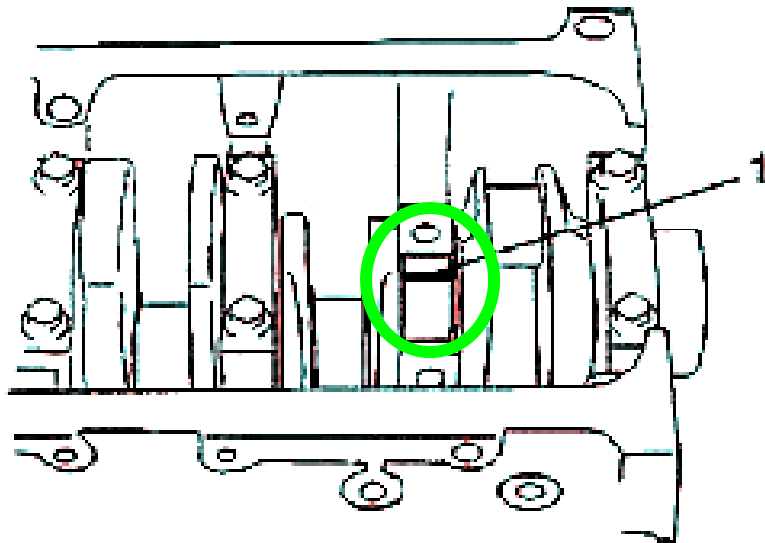
Section A - A

# CRANKSHAFT MAIN JOURNAL BEARING CAP (REMOVAL SEQUENCE)



NUMERALS INDICATE THE SEQUENCE FOR LOOSENING AND REMOVAL OF CRANKSHAFT BEARING CAP BOLTS.

# CRANKSHAFT BEARING SELECTION



A TORQUE 4.6 KG-M

B. GAUGING PLASTIC

1. CRUSHED GAUGING PLASTIC

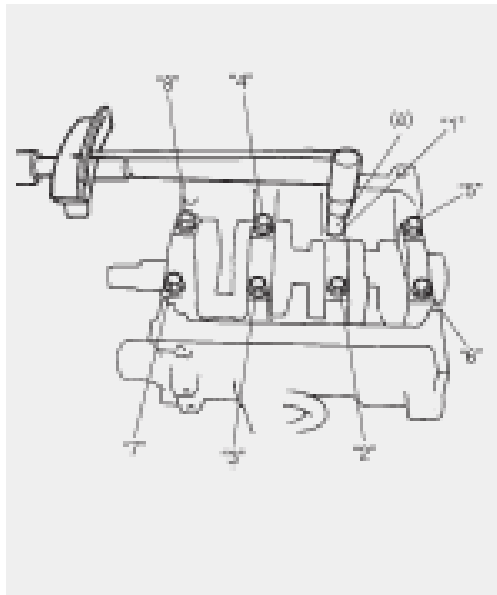
2. SCALE

Item	Standard	Limit
Journal-to-bearing clearance	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.080 mm (0.003 in.)

# CRANKSHAFT BEARING SELECTION



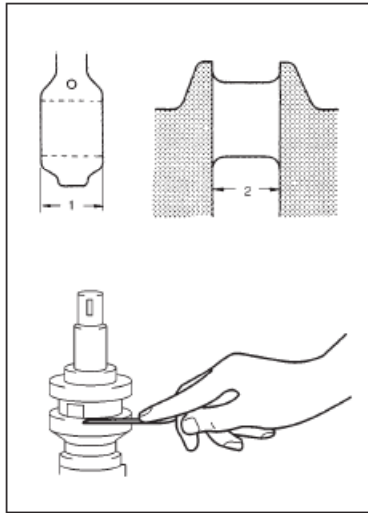
## 1. PAINT MARK



Color painted	Bearing thickness
Green	1.986 – 1.990 mm (0.0782 – 0.0783 in.)
Black	1.989 – 1.993 mm (0.0783 – 0.0784 in.)
Colorless (no paint)	1.992 – 1.996 mm (0.0784 – 0.0785 in.)
Yellow	1.995 – 1.999 mm (0.0785 – 0.0787 in.)
Blue	1.998 – 2.002 mm (0.0781 – 0.0788 in.)

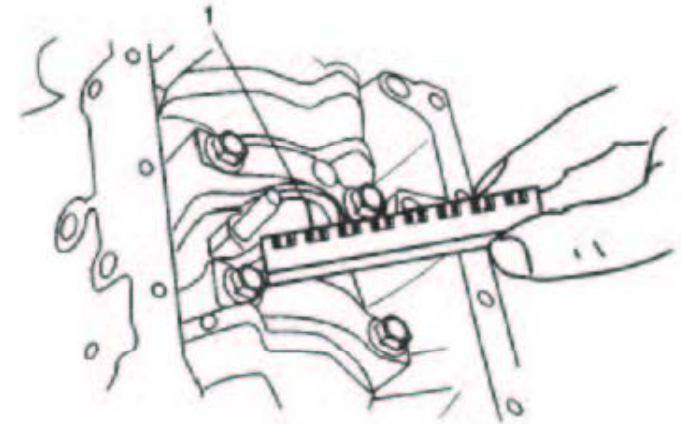
Item	Standard	Limit
Journal-to-bearing clearance	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.080 mm (0.003 in.)

# CONNECTING ROD BEARING SELECTION

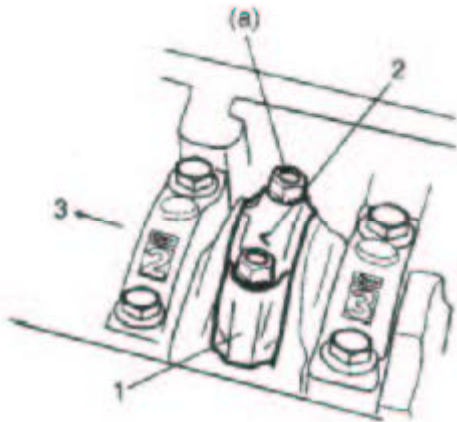


INSTALL GAUGING PLASTIC

Item	Standard	Limit
Crankpin-to-bearing clearance	0.020 - 0.040 mm (0.0008 - 0.0016 in.)	0.080 mm (0.0031 in.)



CHECKING CRUSHED WIDTH OF GAUGING PLASTIC

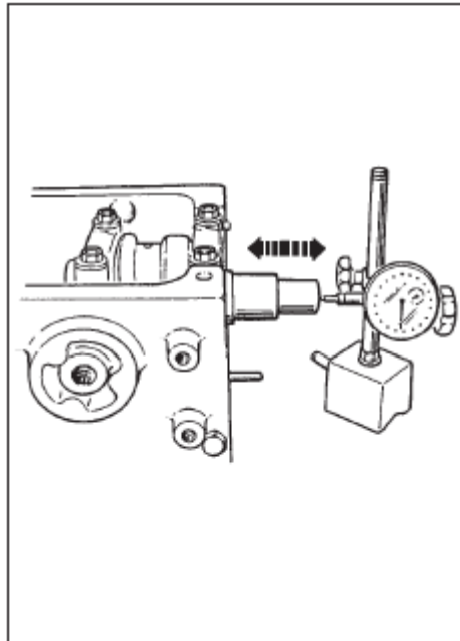


INSTALL BEARING CAP

Connecting rod bearing size	Crank pin diameter
Standard	37.982 - 38.000 mm (1.4953 - 1.4960 in.)
0.25 mm (0.0098 in.) undersize	37.732 - 37.750 mm (1.4855 - 1.4862 in.)

(A) TIGHTENING TORQUE 3.0 KG-M

# CRANKSHAFT THURST BEARING



Item	Standard	Limit
Crankshaft thrust play	0.13 – 0.28 mm (0.005 – 0.011 in.)	0.35 mm (0.014 in.)

Thickness of crankshaft thrust bearing	Standard	2.500 mm (0.0984 in.)
	Oversize: 0.125 mm (0.0049 in.)	2.563 mm (0.1009 in.)
	Oversize: 0.250 mm (0.0098 in.)	2.625 mm (0.1033 in.)

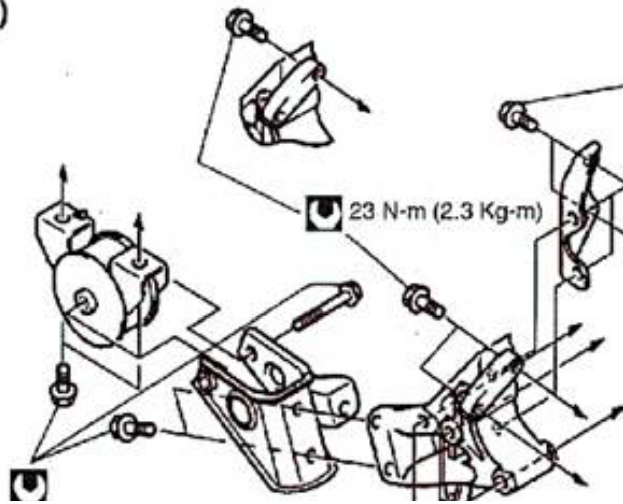
## Tightening Torque

(a): 46 N·m (4.6 kg·m, 33.5 lb-ft)

# ENGINE MOUNTINGS

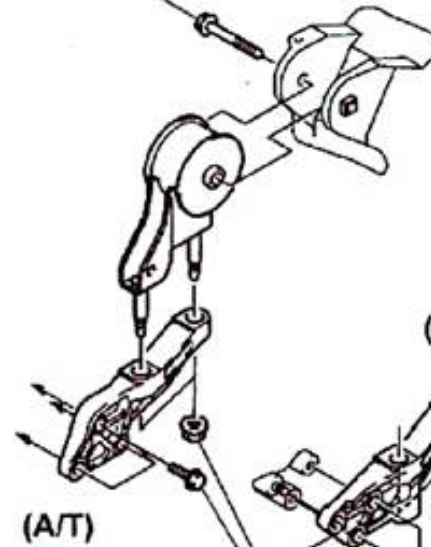


(M/T)



55 N-m (5.5 kg-m)

23 N-m (2.3 Kg-m)



(M/T)

(A/T)

55 N-m (5.5 kg-m)

55 N-m (5.5 kg-m)

55 N-m (5.5 kg-m)



## Do's & Don't's

1. Engine to be mounted on flexible mounting
2. Radiator cooling for engine
3. Engine mounting should be as per the vehicle position
4. Torque to be given to all the important locations

**THANK YOU**