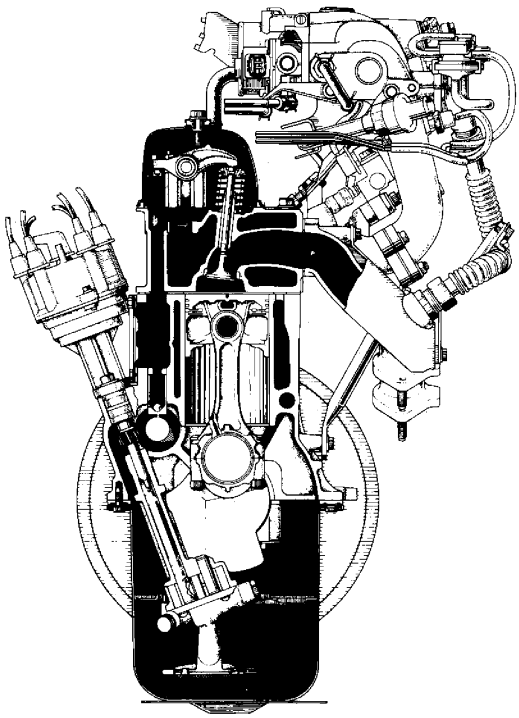
ENGINE MECHANICAL

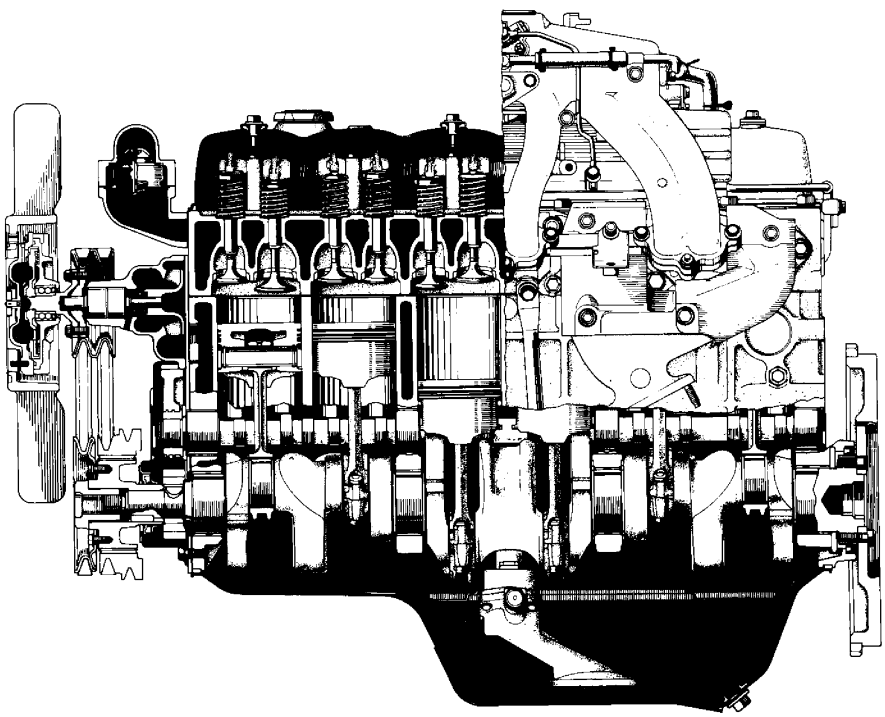
REFER TO 3F ENGINE REPAIR MANUAL (Pub. No. 36253E)

NOTE: The following pages contain only the points which differ from the above listed manual.

DESCRIPTION

The 3F-E engine is an in-line 6-cylinder 4.0 liter OHV 12-valve engine.





EM5416
EM5417

The 3F-E engines are an in-line 6-cylinder engine with the cylinders numbered 1-2-3-4-5-6 from the front. The crankshaft is supported by 4 bearings specified by the inside of the crankcase.

The crankshaft is integrated with 9 weights which are cast along with it for balance. Oil holes are built into the center of the crankshaft for supplying oil to the connecting rods, pistons and other components.

These engine's ignition order is 1-5-3-6-2-4. The cylinder head is made of case iron, with a counter-flow type intake and exhaust layout and with wedge type combustion chambers. The spark plugs are located in the right side of the combustion chambers.

Exhaust and intake valves are equipped with irregular pitch springs which are capable of following the valves even at high engine speeds.

Each valve lifter is lifted up by the rotation of the camshaft so that valve is driven via a push rod and rocker arm.

The camshaft is located in the cylinder block. The camshaft is turned by the crankshaft by means of the timing gears. To rotate the camshaft once, the crankshaft must rotate twice because the camshaft timing gear has twice as many teeth as the crankshaft timing gear.

Pistons are made of high temperature-resistant aluminum alloy.

Piston pins are the full-floating type, with the pins fastened to neither the piston boss nor the connecting rods. Instead, snap rings are fitted on both ends of the pins, preventing the pins from falling out.

The No. 1 compression ring is made of steel and the No. 2 compression ring is made of cast iron. The oil ring is made of a combination of steel and stainless steel. The outer diameter of each piston ring is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No. 1 and No. 2 work to prevent the leakage of gas from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion chamber.

The cylinder block is made of cast iron. It has 6 cylinders which are approximately 1.6 times the length of the piston stroke. The top of the cylinders is closed off by the cylinder head and the lower end of the cylinders becomes the crankcase, in which the crankshaft is installed. In addition, the cylinder block contains a water jacket, through which coolant is pumped to cool the cylinders.

The oil pan is bolted onto the bottom of the cylinder block. The oil pan is an oil reservoir made of pressed steel sheet. A dividing plate is included inside the oil pan to keep sufficient oil in the bottom of the pan even when the vehicle is tilted. This dividing plate also prevents the oil from making waves when the vehicle is stopped suddenly and thus shifting the oil away from the oil pump suction pipe.

TROUBLESHOOTING

ENGINE OVERHEATING

Problem	Possible cause	Remedy	Page
Engine overheats	Cooling system faulty	Troubleshoot cooling system	
	Incorrect ignition timing	Reset timing	EM-11

HARD STARTING

Problem	Possible cause	Remedy	Page
Engine will not crank or cranks slowly	Starting system faulty	Troubleshoot starting system	
Engine will not start / hard to start (cranks OK)	No fuel supply to injector • No fuel in tank • Fuel pump no working • Fuel filter clogged • Fuel line clogged or leaking	Troubleshoot EFI system	FI-9
	EFI system problems	Repair as necessary	
	Ignition problems • Ignition coil • Igniter • Distributor	Perform spark test	IG-5
	Spark plug faulty	Inspect plugs	IG-6
	High-tension cords disconnected broken	Inspect cords	IG-6
	Vacuum leaks • PCV line • EGR line • Intake manifold • Air intake chamber • Throttle body • ISC valve • Brake booster line	Repair as necessary	
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Low compression	Check compression	EM-16

ROUGH IDLING

Problem	Possible cause	Remedy	Page
Rough idle, stalls or misses	Spark plug faulty	Inspect plugs	IG-6
	High-tension cord faulty	Inspect cords	IG-6
	Ignition problems		
	• Ignition coil	Inspect coil	IG-7
	• Igniter	Inspect igniter	IG-5
	• Distributor	Inspect distributor	IG-7
	Incorrect ignition timing	Reset timing	EM-11
	Vacuum leaks • PCV line • EGR line • Intake manifold • Air intake chamber	Repair as necessary	

ROUGH IDLING (Cont'd)

Problem	Possible cause	Remedy	Page
Rough idle, stalls or misses (Cont'd)	• Throttle body • ISC valve • Brake booster line		
	Pulling in air between air flow meter and throttle body		
	Incorrect idle speed	Check ISC system	FI-40,67
	Incorrect valve clearance	Adjust valve clearance	EM-10
	EFI system problems	Repair as necessary	
	Engine overheats	Check cooling system	
	Low compression	Check compression	EM-16

ENGINE HESITATES/POOR ACCELERATION

Problem	Possible cause	Remedy	Page
Engine hesitates/ poor acceleration	Spark plug faulty	Inspect plugs	IG-6
	High-tension cord faulty	Inspect cords	IG-6
	Vacuum leaks • PCV line • EGR line • Intake manifold • Air intake chamber • Throttle body • ISC valve • Brake booster line	Repair as necessary	
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Incorrect ignition timing	Reset timing	EM-11
	Incorrect valve clearance	Adjust valve clearance	EM-10
	Fuel system clogged	Check fuel system	
	Air cleaner clogged	Check air cleaner	EM-8
	EFI system problems	Repair as necessary	
	Emission control system problem (Cold engine) • EGR system always on	Check EGR system	
	Engine overheats	Check cooling system	
	Low compression	Check compression	EM-16

ENGINE DIESELING

Problem	Possible cause	Remedy	Page
Engine diesels (runs after ignition switch turned off)	EFI system problems	Repair as necessary	

AFTER FIRE, BACKFIRE

Problem	Possible cause	Remedy	Page
Muffler explosion (after fire) on deceleration only	Deceleration fuel cut system always off	Check EFI (fuel cut) system	
Muffler explosion (after fire) all the time	Air cleaner clogged	Check air cleaner	EM-8
	EFI system problem	Repair as necessary	
	Incorrect ignition timing	Reset timing	EM-11
Engine backfires	EFI system problem	Repair as necessary	
	Vacuum leak • PCV line • EGR line • Intake manifold • Air intake chamber • Throttle body • ISC valve • Brake booster line	Check hoses and repair as necessary	
	Pulling in air between air flow meter and throttle body	Repair as necessary	
	Insufficient fuel flow	Troubleshoot fuel system	FI-9
	Incorrect ignition timing	Reset timing	EM-11
	Incorrect valve clearance	Adjust valve clearance	EM-10
	Carbon deposits in combustion chambers	Inspect cylinder head	

EXCESSIVE OIL CONSUMPTION

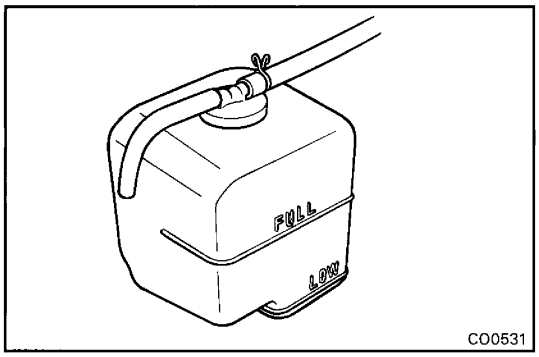
Problem	Possible cause	Remedy	Page
Excessive oil consumption	Oil leak	Repair as necessary	
	PCV line clogged	Check PCV system	
	Piston ring worn or damaged	Check rings	EM-45
	Valve stem and guide bushing worn	Check valves and guide bushing	
	Valve stem oil seal worn	Check seals	

POOR GASOLINE MILEAGE

Problem	Possible cause	Remedy	Page
Poor gasoline mileage	Fuel leak	Repair as necessary	
	Air cleaner clogged	Check air cleaner	EM-8
	Incorrect ignition timing	Reset timing	EM-11
	EFI system problems • Injector faulty • Deceleration fuel cut system faulty	Repair as necessary	
	Idle speed too high	Check ISC system	FI-40,67
	Spark plug faulty	Inspect plugs	IG-6
	EGR system always on	Check EGR system	
	Low compression	Check compression	EM-16
	Tires improperly inflated	Inflate tires to proper pressure	
	Brakes drag	Troubleshoot brakes	

UNPLEASANT ODOR

Problem	Possible cause	Remedy	Page
Unpleasant odor	Incorrect idle speed	Check ISC system	FI-40,67
	Incorrect ignition timing	Reset timing	EM-11
	Vacuum leaks • PCV line • EGR line • Intake manifold • Air intake chamber • Throttle body • ISC valve • Brake booster line	Repair as necessary	
	EFI system problems	Repair as necessary	



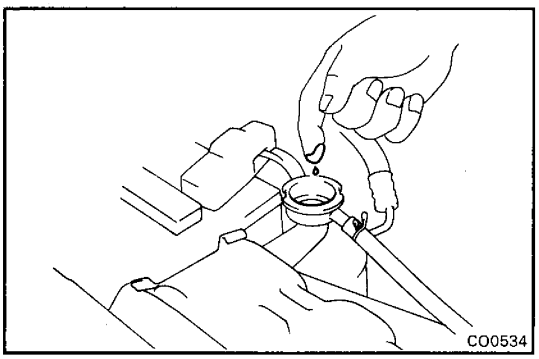
ENGINE TUNE-UP

INSPECTION OF ENGINE COOLANT

1. CHECK ENGINE COOLANT LEVEL AT RESERVE TANK

The coolant level should be between the "LOW" and "FULL" lines.

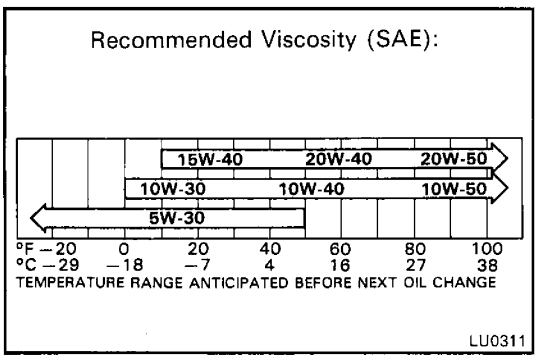
If low, check for leaks and add coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

There should not be any excessive rust deposits or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, replace the coolant.



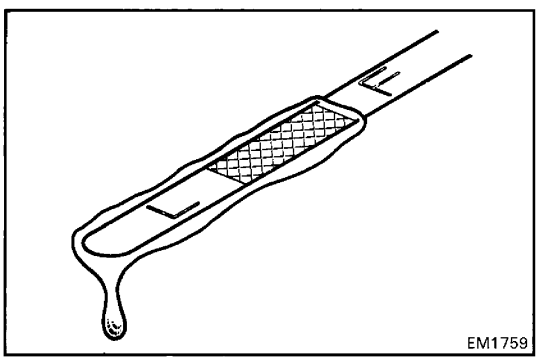
INSPECTION OF ENGINE OIL

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is poor, replace the oil.

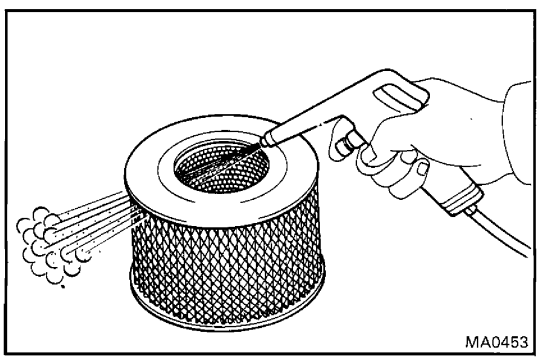
Use API grade SC, SD, SE, SF or better and recommended viscosity oil.



2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to the "F" mark.



INSPECTION OF AIR FILTER

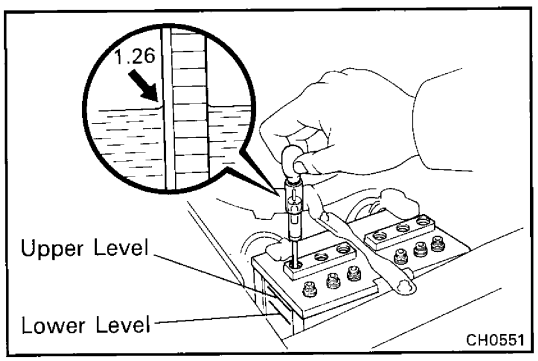
INSPECT AIR FILTER

(a) Visually check that the air cleaner element is not excessively dirty, damaged or oily.

If necessary, replace the air cleaner element.

(b) Clean the element with compressed air.

First blow from inside thoroughly, then blow off the outside of the element.



INSPECTION OF BATTERY

1. CHECK BATTERY SPECIFIC GRAVITY

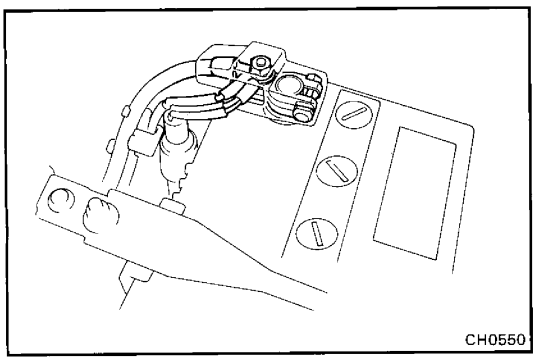
(a) Check the specific gravity of each cell.

Standard specific gravity
When fully charged at 20°C (68°F): 1.25 – 1.27

If not within specification, charge the battery.

(b) Check the electrolyte quantity of each cell.

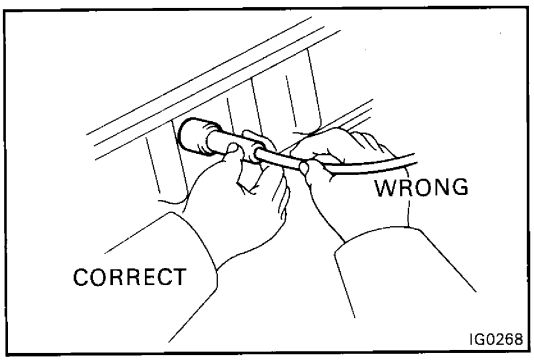
If insufficient, refill with distilled (or purified) water.



2. CHECK BATTERY TERMINALS, FUSIBLE LINKS AND FUSES

(a) Check that the battery terminals are not loose or corroded.

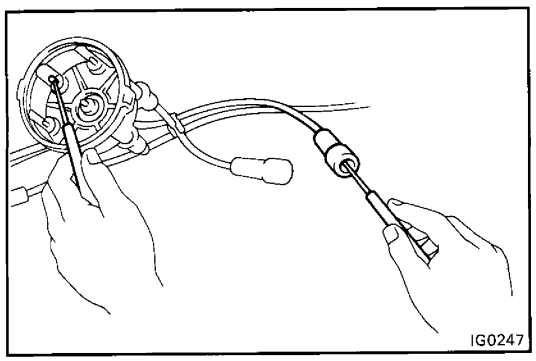
(b) Check the fusible links and fuses for continuity.



INSPECTION OF HIGH-TENSION CORDS

1. CAREFULLY REMOVE HIGH-TENSION CORDS BY THEIR RUBBER BOOTS FROM SPARK PLUGS

NOTICE: Pulling on or bending the cords may damage the conductor inside.

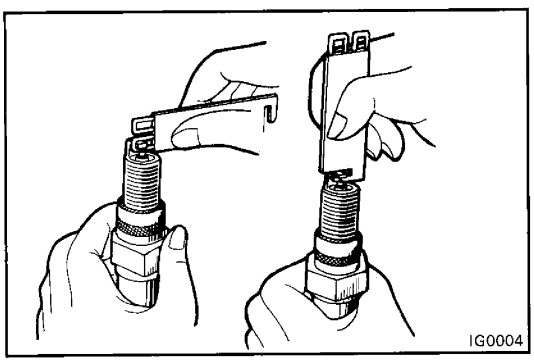


2. INSPECT HIGH-TENSION CORD RESISTANCE

Using an ohmmeter, measure the resistance without disconnecting the distributor cap.

Maximum resistance: 25 kΩ per cord

If resistance is greater than maximum, check the terminals. If necessary, replace the high-tension cord and/or distributor cap.



INSPECTION OF SPARK PLUGS

(See page IG-6)

Recommended spark plug: ND W16EXR-U
NGK BPR5EY

Correct electrode gap: 0.8 mm (0.031 in.)

INSPECTION OF ALTERNATOR DRIVE BELT

(See page CH-4)

Drive belt deflection:

New belt	7.0 – 9.0 mm (0.278 – 0.354 in.)
Used belt	9.0 – 12.0 mm (0.354 – 0.472 in.)

Drive belt tension:

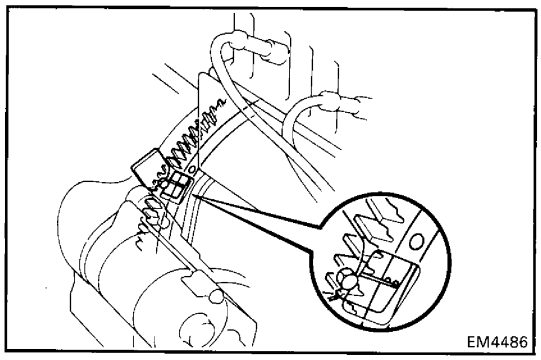
New belt	55 – 65 kg
Used belt	30 – 45 kg

INSPECTION AND ADJUSTMENT OF VALVE CLEARANCE

HINT: Inspect and adjust the valve clearance after engine has reached normal operating temperature.

1. **REMOVE AIR CLEANER HOSE**

2. **REMOVE CYLINDER HEAD COVER**
(See step 21 on page EM-19)

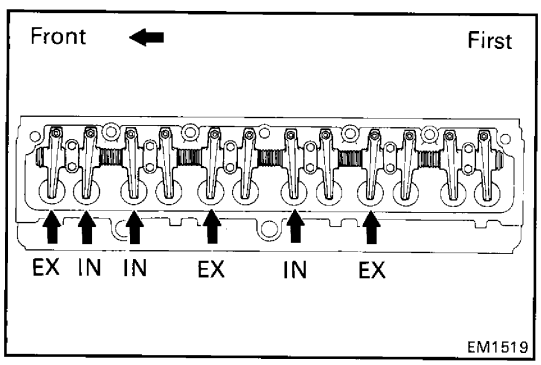


3. **SET NO. 1 CYLINDER TO TDC/COMPRESSION**

(a) Align the TDC mark of the drive plate with the timing pointer by turning the crankshaft clockwise with a wrench.

(b) Check that the rocker arms on the No. 1 cylinder are loose and rocker arms on the No. 6 are tight.

If not, turn the crankshaft one revolution (360°) and align the mark as above.

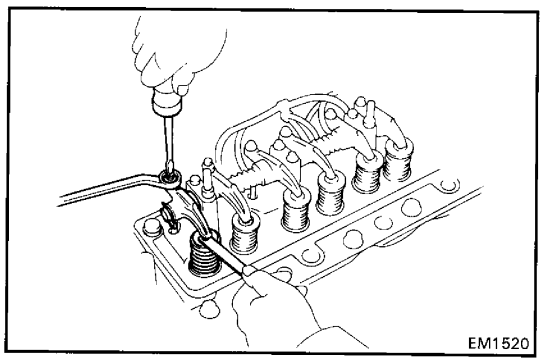


4. **INSPECT AND ADJUST VALVE CLEARANCE**

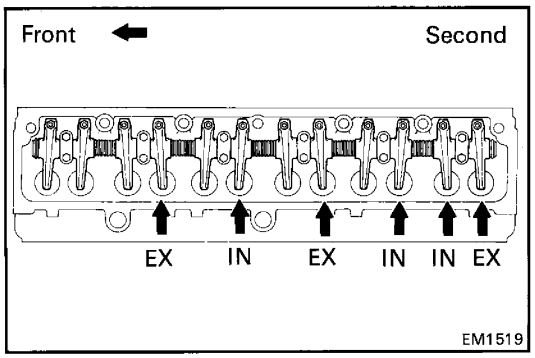
(a) Measure only those valves indicated by arrows.

Valve clearance (Hot):

Intake	0.20 mm (0.008 in.)
Exhaust	0.35 mm (0.014 in.)



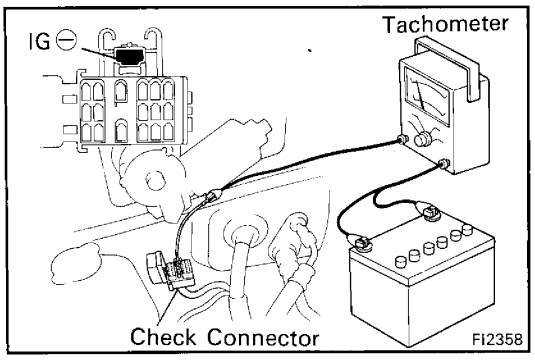
- Using a thickness gauge, measure the valve clearance between the valve stem and rocker arm.
  Loosen the lock nut and turn the adjusting screw to set the proper clearance.
  Hold the adjusting screw in position and tighten the lock nut.
- Recheck the valve clearance. The thickness gauge should slide with a very slight drag.



(b) Turn the crankshaft pulley one revolution (360°) and align the mark as above.
Adjust only the valves indicated by arrows.

5. **INSTALL CYLINDER HEAD COVER**
(See step 6 on page EM-29)

6. **INSTALL AIR CLEANER HOSE**



INSPECTION AND ADJUSTMENT OF IGNITION TIMING

1. **WARM UP ENGINE**

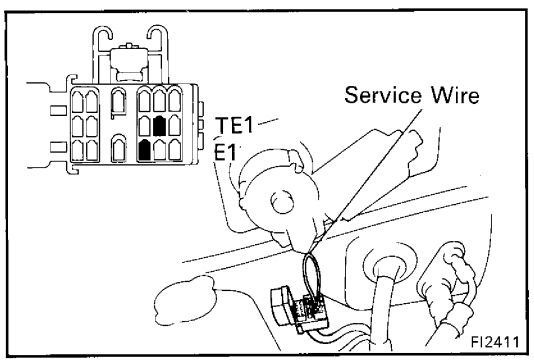
Allow the engine to reach normal operating temperature.

2. **CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE**

Connect the tachometer test probe to terminal IG⊖ of the check connector.

NOTICE:

- **NEVER allow the tachometer terminals to touch ground as it could result in damage to the igniter and /or ignition coil.**
- **As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before using.**

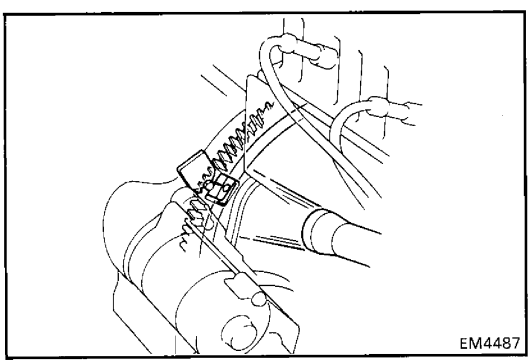


3. **INSPECT AND ADJUST IGNITION TIMING**

(a) Using a service wire, connect terminals TE1 and E1 of the check connector.

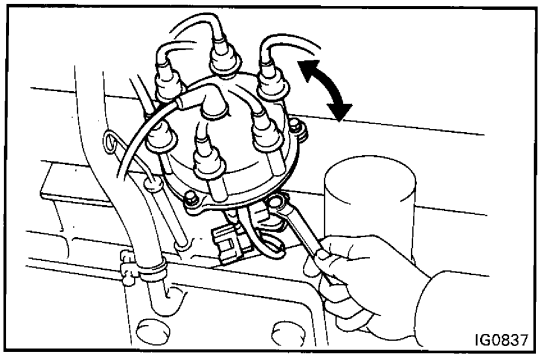
(b) Check the idle speed.

Idle speed: 650 rpm



(c) Using a timing light, check the ignition timing.

Ignition timing: 7° BTDC @ idle
(w/ connected TE1-E1,
Transmission in N position)



If necessary, loosen the distributor bolts and turn the distributor until the timing on the drive plate is aligned with the 7° mark.

(d) Tighten the distributor bolt and recheck the ignition timing,

Torque: 175 kg-cm (13 ft-lb, 17 N·m)

(e) Remove the service wire.

4. FURTHER CHECK IGNITION TIMING

Ignition timing: 12° BTDC @ idle
(Transmission in N range)

5. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

IDLE HC/CO CONCENTRATION CHECK METHOD

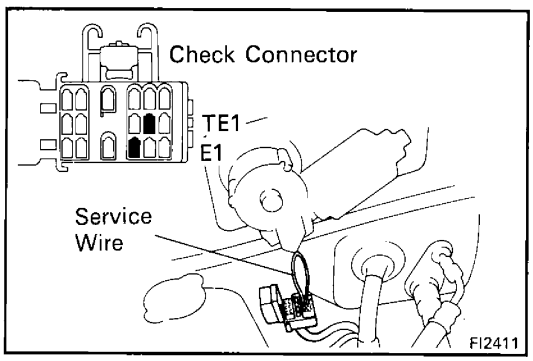
HINT: This check is used only to determine whether or not the idle HC/CO complies with regulations.

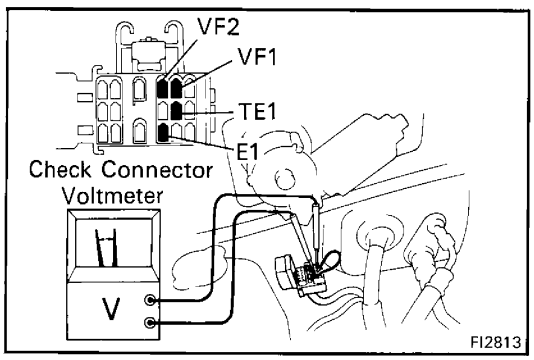
1. **INITIAL CONDITIONS**
   (a) Engine at normal operating temperature
   (b) Air cleaner installed
   (c) All pipes and hoses of air induction system connected
   (d) All accessories switched OFF
   (e) All vacuum lines properly connected

   HINT: All vacuum hoses for EGR systems, etc. should be properly connected.

   (f) EFI system wiring connectors fully plugged
   (g) Ignition timing set correctly
   (h) Transmission in "N" range
   (i) Tachometer and HC/CO meter at hand and calibrated

2. **START ENGINE**





3. **CHECK OXYGEN SENSORS OPERATION**
   (a) Using a service wire, connect terminals TE1 and E1 of the check connector.
   (b) Connect the positive (+) probe of a voltmeter to terminal VF1 (VF2) of the check connector, and negative (–) probe to terminals E1.
   (c) Hold the engine speed at 2,500 rpm for approx. 2 minutes.
   (d) Then, maintaining engine at 2,500 rpm, count how many times needle of voltmeter fluctuates between 0 and 5 V.

   Minimum needle fluctuation:
   8 times for every 10 seconds

If the fluctuation is less than minimum, check the air induction system for leakage. If necessary, see EFI SYSTEM.

4. **RACE ENGINE AT 2,500 RPM FOR APPROX. 2 MINUTES**

5. **INSERT HC/CO METER TESTING PROBE INTO TAIL PIPE AT LEAST 40 cm (1.3 ft)**

6. **MEASURE HC/CO CONCENTRATION AT IDLE**

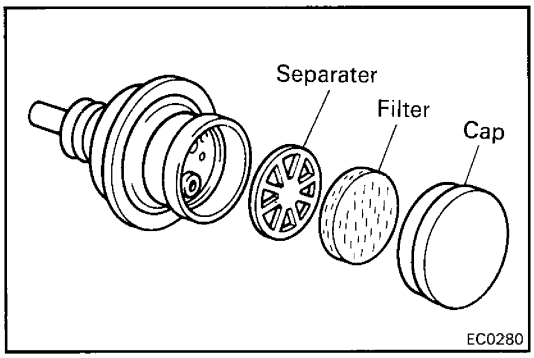
   Wait at least one minute before measuring to allow the concentration to stabilize.

   Complete the measuring within three minutes.

   If the HC/CO concentration does not conform to regulations, see the table below for possible causes.

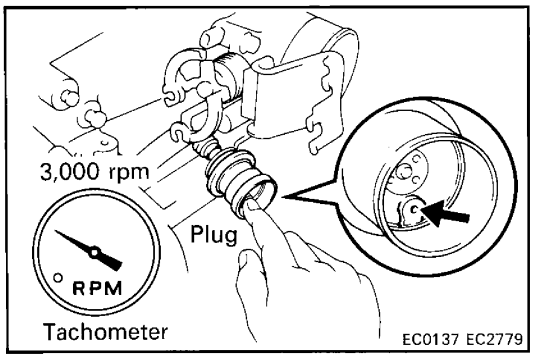
Troubleshooting

HC	CO	Problem	Cause
High	Normal	Rough idle	1. Faulty ignition: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed high-tension cords • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky EGR valve 4. Leaky intake and exhaust valves 5. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leak: • PCV hose • EGR valve • Intake manifold • Air intake chamber • Throttle body • ISC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty EFI system • Faulty pressure regulator • Clogged fuel return line • Defective water temp. sensor • Defective air temp. sensor • Faulty ECU • Faulty injector • Faulty cold start injector • Faulty throttle position sensor • Air flow meter

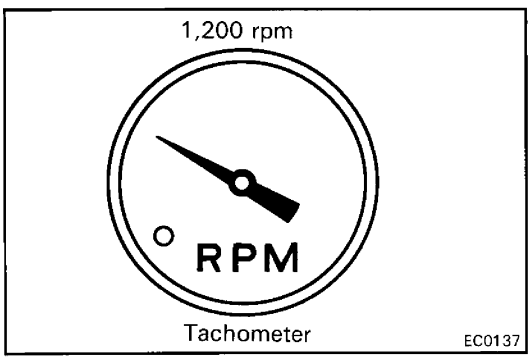


INSPECTION AND ADJUSTMENT OF DASH POT (DP) SETTING SPEED

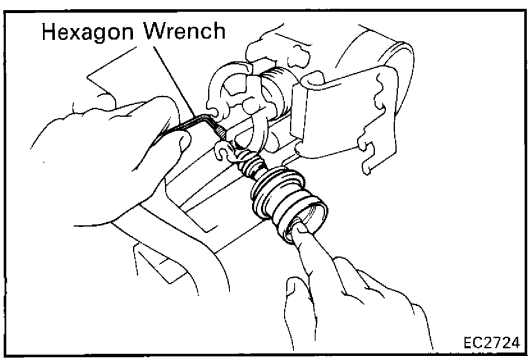
1. **WARM UP ENGINE**
2. **CHECK IDLE SPEED**
3. **DISCONNECT ISC CONNECTOR**
4. **REMOVE CAP, FILTER AND SEPARATER FROM DP**



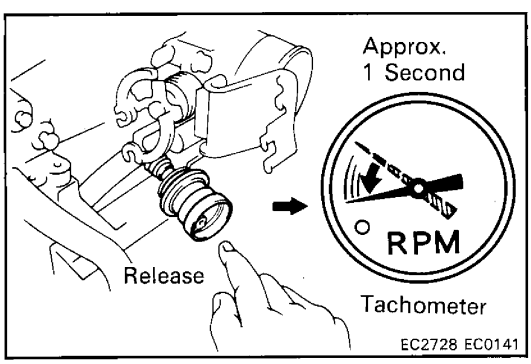
5. **CHECK DP SETTING SPEED**
   (a) Maintain engine speed at 2,500 rpm.
   (b) Plug the VTV hole with your finger.



   (c) Release the throttle valve.
   (d) Check that the DP is set.
   DP setting speed: 1,200 rpm.



If not as specified, adjust with the DP adjusting screw.

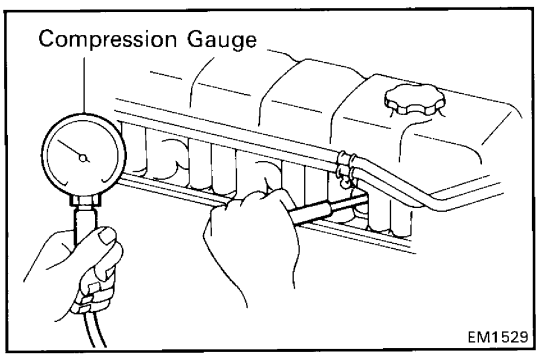


6. **CHECK OPERATION OF VTV**
   (a) Set the DP speed in the same procedure as above; (a) to (c).
   (b) Release the plugged hole and check that the engine returns to idle in approx. 1 second.
7. **REINSTALL DP SEPARATER, FILTER AND CAP**
8. **RECONNECT ISC CONNECTOR**

COMPRESSION CHECK

HINT: If there is lack of power, excessive oil consumption or poor fuel economy, measure the cylinder compression pressure.

1. **WARM UP AND STOP ENGINE**
2. **DISCONNECT DISTRIBUTOR CONNECTOR**
3. **DISCONNECT COLD START INJECTOR CONNECTOR**
4. **REMOVE SPARK PLUGS**
5. **CHECK CYLINDER COMPRESSION PRESSURE**



(a) Insert a compression gauge into the spark plug hole.

(b) Fully open the throttle valve.

(c) While cranking the engine with the starter, measure the compression pressure.

HINT: Always use a fully charged battery to obtain engine revolutions of more than 200 rpm.

NOTICE: This measurement must be done for as short a time as possible.

(d) Repeat steps (a) through (c) for each cylinder.

Compression pressure:
10.5 kg/cm² (149 psi, 1,030 kPa) or more
Minimum pressure:
8.0 kg/cm² (114 psi, 785 kPa)
Difference between each cylinder:
0.5 kg/cm² (7 psi, 49 kPa) or less

(e) If compression of one or more cylinders is low, pour a small amount of engine oil into that cylinder through the spark plug hole and repeat steps (a) through (c) for the cylinder with low compression.

- If adding oil helps the compression, probably the piston rings and / or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seated improperly, or there may be leakage past the gasket surface.

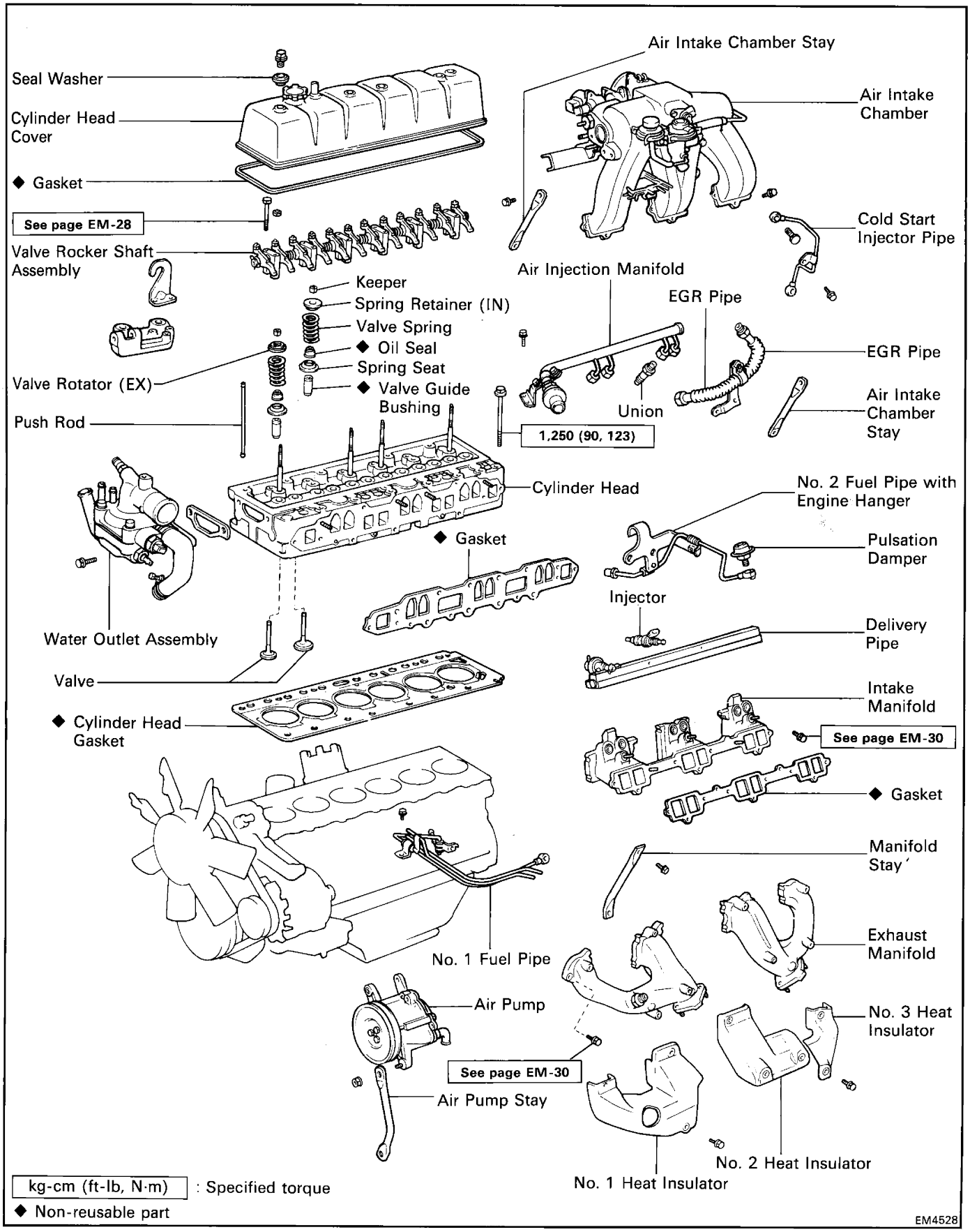
6. **REINSTALL SPARK PLUGS**

Torque: 180 kg-cm (13 ft-lb, 18 N·m)

7. **RECONNECT COLD START INJECTOR CONNECTOR**
8. **RECONNECT DISTRIBUTOR CONNECTOR**

CYLINDER HEAD

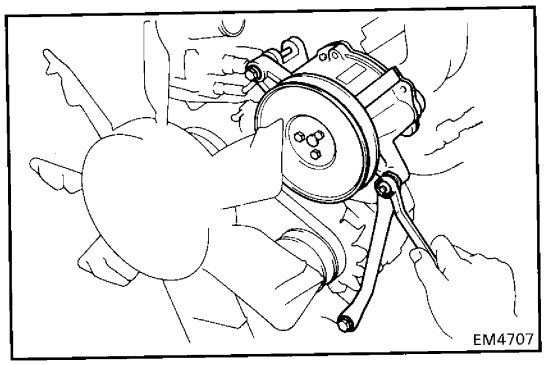
COMPONENTS



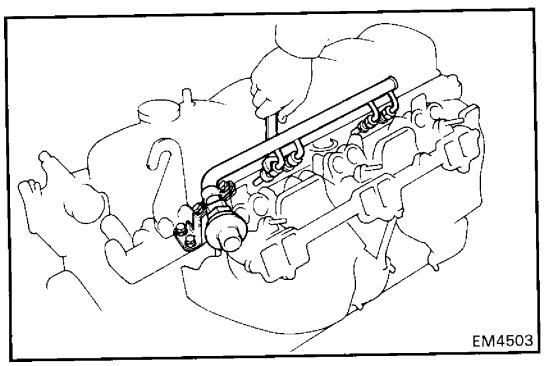
REMOVAL OF CYLINDER HEAD

(See page EM-17)

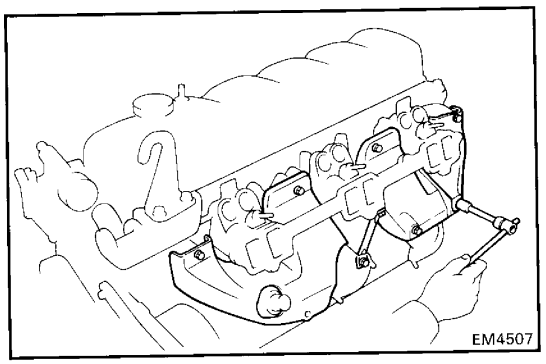
1. DRAIN ENGINE COOLANT
2. REMOVE PS PUMP BRACKETS
3. DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS AND IGNITION COIL


EM4707

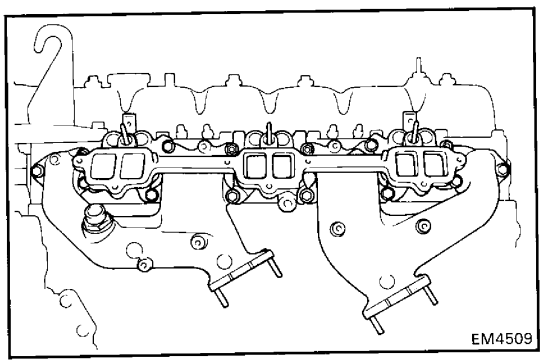
4. REMOVE AIR PUMP
   (a) Disconnect the air hose.
   (b) Remove the bolt, nut and air pump stay.
   (c) Remove the through bolt, nut and air pump.
5. REMOVE DELIVERY PIPE AND INJECTORS
   (See steps 4 to 9 on pages FI-56 and 57)


EM4503

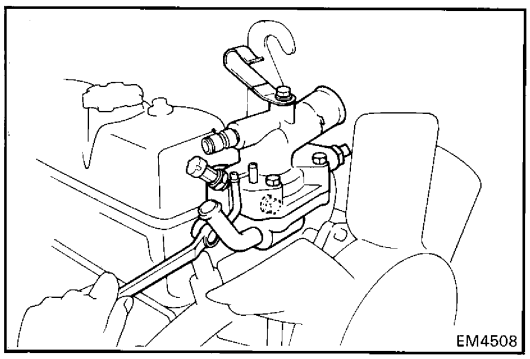
6. REMOVE AIR INJECTION MANIFOLD
   Remove the two bolts, four union nuts and air injection manifold.


EM4507

7. REMOVE INTAKE AND EXHAUST MANIFOLDS
   (a) Remove the two bolts and manifold stay.
   (b) Remove the six bolts and three manifold heat insulators.


EM4509

   (c) Remove the ten bolts, four nuts, intake manifold, exhaust manifolds and gasket.

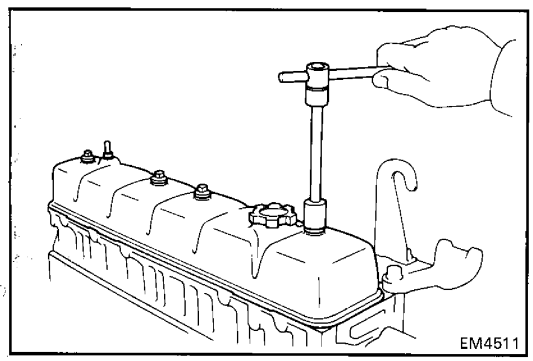


8. REMOVE WATER OUTLET ASSEMBLY

(a) Disconnect the water by-pass hose from the water outlet.

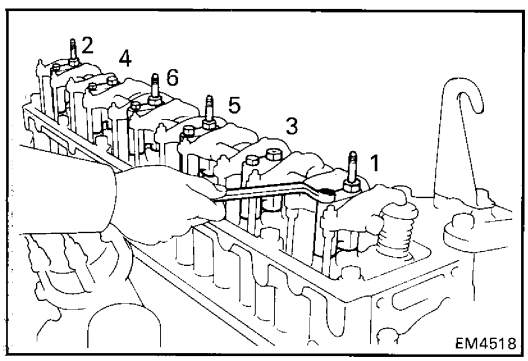
(b) Remove the two bolts holding the water outlet housing to the cylinder head, and remove the water outlet assembly and gasket.

9. REMOVE SPARK PLUGS



10. REMOVE CYLINDER HEAD COVER

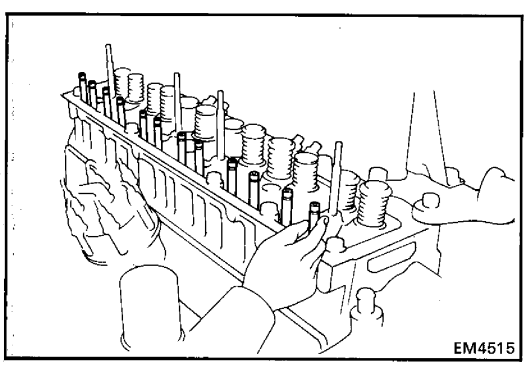
Remove the four cap nuts, seal washers, cylinder head cover and gasket.



11. REMOVE VALVE ROCKER SHAFT ASSEMBLY

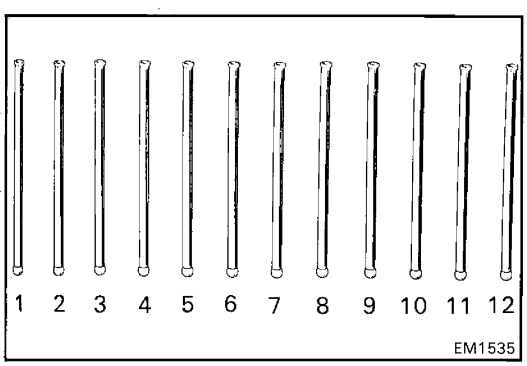
(a) Uniformly loosen and remove the eight bolts and four nuts in several passes, in the sequence shown.

(b) Remove the rocker shaft assembly.

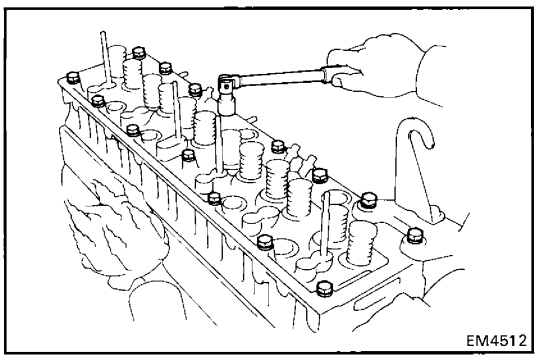


12. REMOVE PUSH RODS

Remove the twelve push rods in order, beginning from the No. 1 push rod.



HINT: Arrange the push rods in correct order.

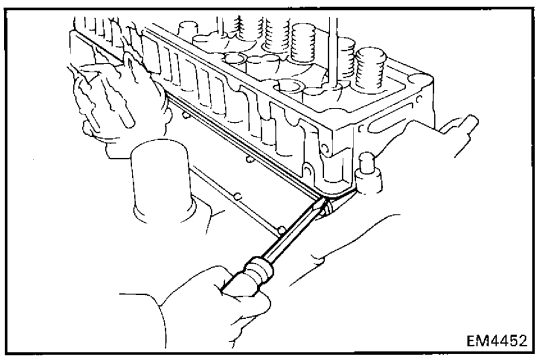

EM4512

13. REMOVE CYLINDER HEAD

(a) Uniformly loosen and remove the fifteen head bolts in several passes, in the sequence shown.

NOTICE: Head warpage or cracking could result from removing the bolts in incorrect order.

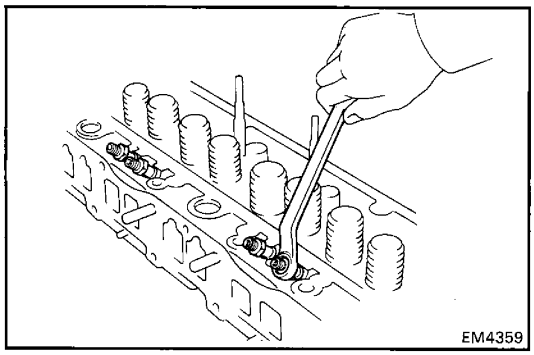
(b) Remove the air pump bracket with engine hanger.


EM4452

(c) Lift the cylinder head from the dowels on the cylinder block and place it on wooden blocks on a bench.

HINT: If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block saliences.

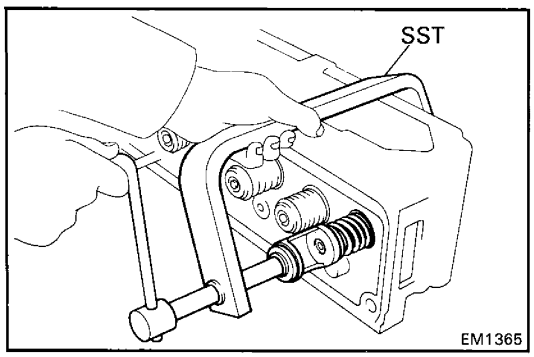
NOTICE: Be careful not to damage the cylinder head and block surface on the cylinder and head gasket sides.



DISASSEMBLY OF CYLINDER HEAD

(See page EM-17)

1. REMOVE AIR INJECTION MANIFOLD UNIONS

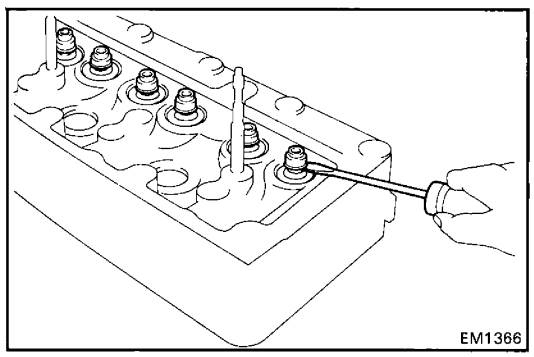


2. REMOVE VALVES

(a) Using SST, press the valve springs and remove the two keepers.

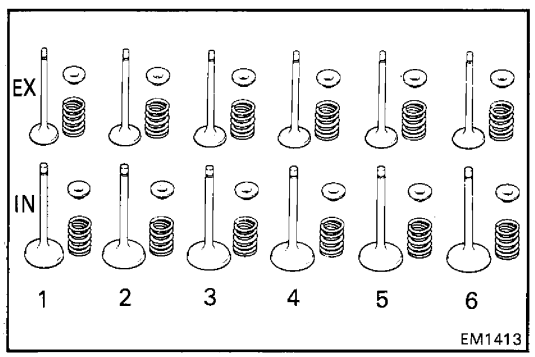
SST 09202-43013

(b) Remove the spring retainer (or valve rotator), valve springs and valve.

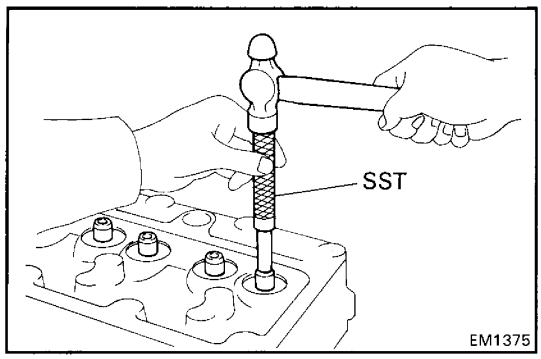


(c) Using a screwdriver, pry out the valve stem oil seal.

(d) Remove the valve spring seat.



NOTE: Arrange the valves, valve springs and spring retainers (or valve rotators) in correct order.

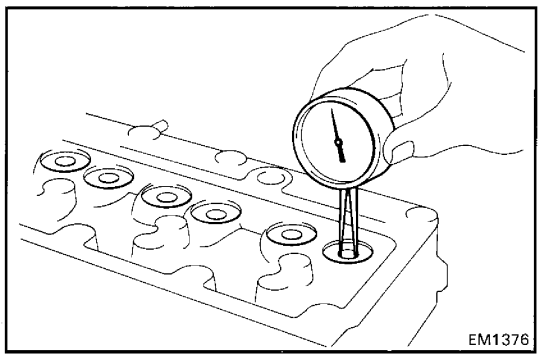


INSPECTION, CLEANING AND REPAIR OF CYLINDER HEAD COMPONENTS

10. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

(a) Using SST and a hammer, drive out the valve guide bushing.

SST 09201-60011



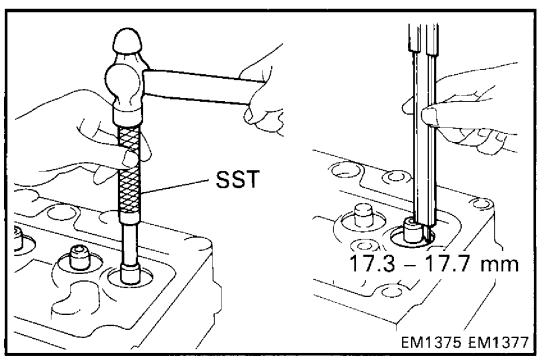
(b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Standard valve guide bore (cold):
14.000 – 14.018 mm (0.5512 – 0.5519 in.)

If the bushining bore diameter of the cylinder head is more than 14.018 mm (0.5512 in.), machine the bore to the following dimensions and install an oversized bushing (O/S 0.05).

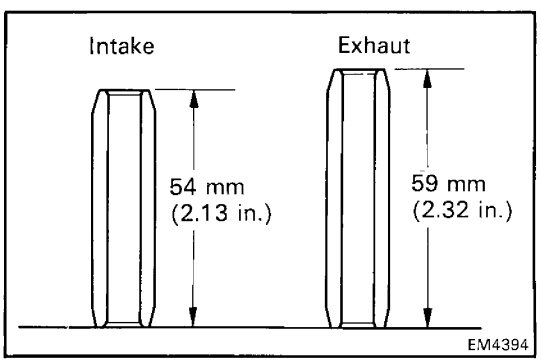
Rebored cylinder head bushing bore dimension:
14.050 – 14.068 mm (0.5531 – 0.5539 in.)

If the bushing bore diameter of the cylinder head is greater than 14.068 mm (0.5539 in.), replace the cylinder head.

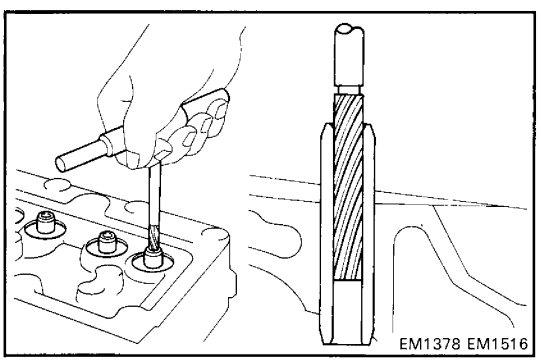


(c) Using SST and a hammer, drive in a new valve guide bushing so it is protruding 17.3 – 17.7 mm (0.681 – 0.697 in.) from the cylinder head.

SST 09201-60011

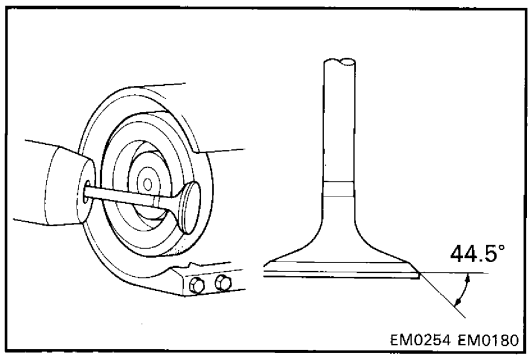


HINT: Different bushings are used for the intake and exhaust.



(d) Using a sharp 8.0 mm reamer, ream the valve guide bushing to obtain the specified clearance between the valve guide bushing and the new valve.

Intake clearance:	**0.025 – 0.060 mm (0.0010 – 0.0024 in.)**
Exhaust clearance:	**0.035 – 0.070 mm (0.0014 – 0.0028 in.)**

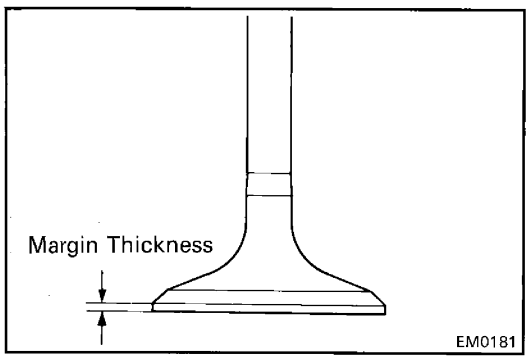


11. INSPECT AND GRIND VALVES

(a) Grind the valve only enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

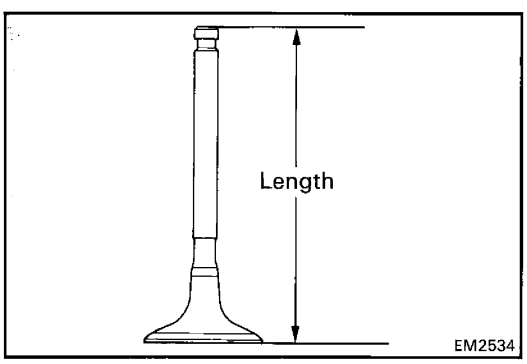
Valve face angle: 44.5°



(c) Check the valve head margin thickness.

Standard margin thickness:
Intake 1.5 – 2.1 mm (0.059 – 0.083 in.)
Exhaust 1.7 – 2.3 mm (0.067 – 0.091 in.)
Minimum margin thickness:
Intake 1.0 mm (0.039 in.)
Exhaust 1.2 mm (0.047 in.)

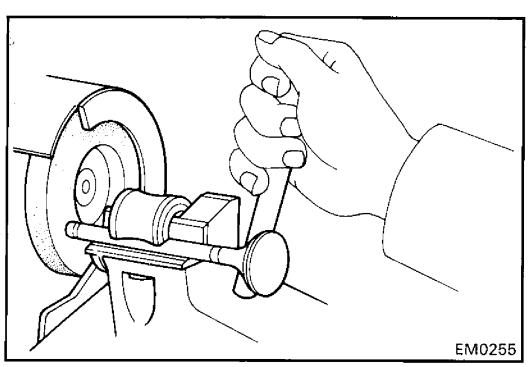
If the valve head margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:
Intake 124.8 mm (4.913 in.)
Exhaust 128.0 mm (5.039 in.)
Minimum overall length:
Intake 124.3 mm (4.894 in.)
Exhaust 127.5 mm (5.020 in.)

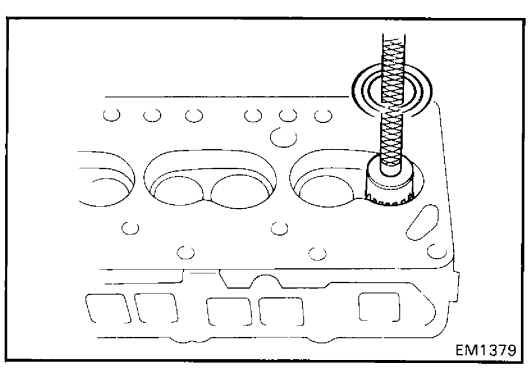
If the valve overall length is less than minimum, replace the valve.



(e) Check the surface of the valve stem tip for wear.

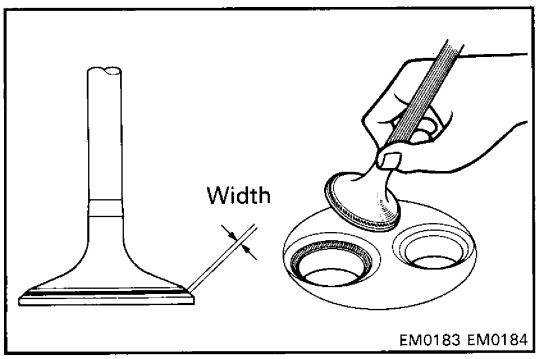
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

CAUTION: Do not grind off more than the minimum overall length.



12. INSPECT AND CLEAN VALVE SEATS

(a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.

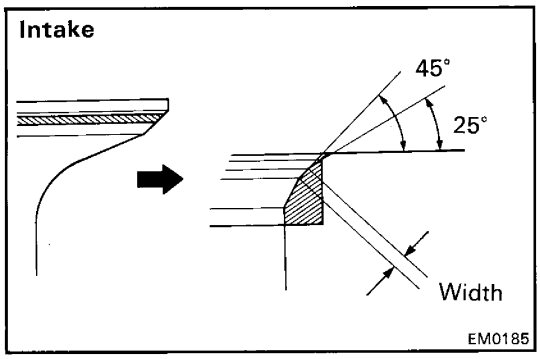


(b) Check the valve seating position.
Apply a thin coat of prussian blue (or white lead) to the valve face. Install the valve. While applying light pressure to the valve, rotate the valve against the seat.

(c) Check the valve face and seat for the following:

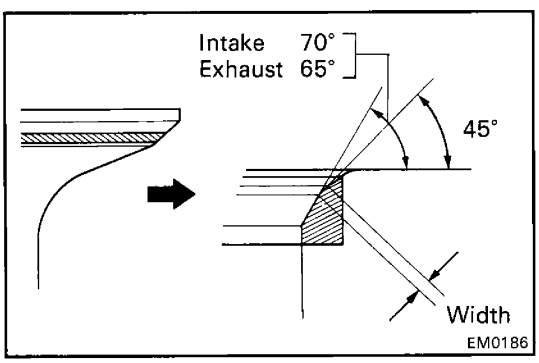
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and seat are concentric. If not, resurface the seat.
- Check that the seat contact is on the middle of the valve face with the following width:

Intake 1.1 – 1.7 mm (0.043 – 0.067 in.)
Exhaust 1.4 – 2.0 mm (0.055 – 0.079 in.)

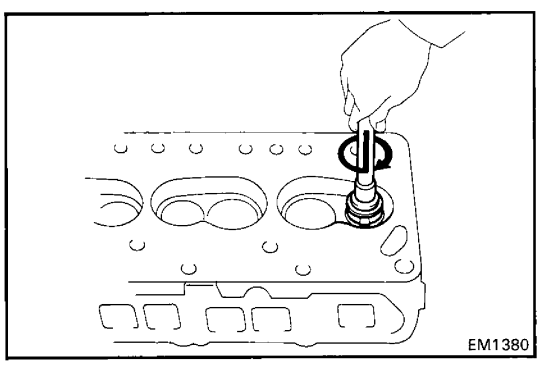


If not, correct the valve seat as follows:

(1) (Intake)
If the seating is too high on the valve face, use 25° (IN) and 45° cutters to correct the seat.

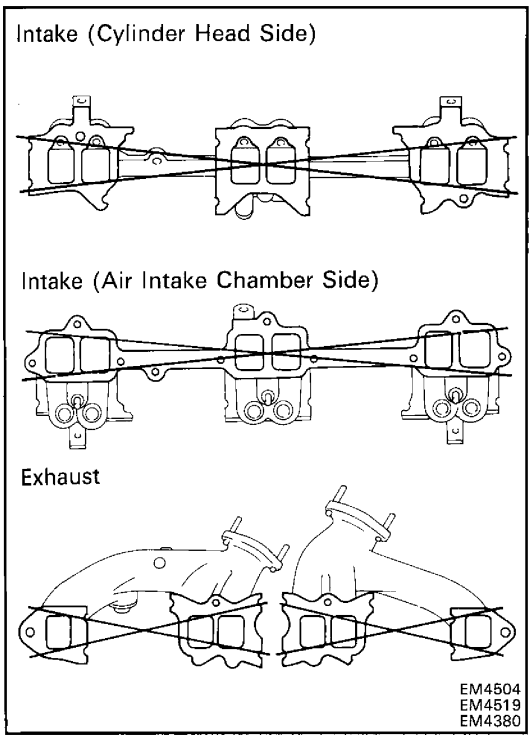


(2) If the seating is too low on the valve face, use 70° (IN) or 65° (EX) and 45° cutters to correct the seat.



(d) Hand-lap the valve and valve seat with an abrasive compound.

(e) After hand-lapping, clean the valve and valve seat.

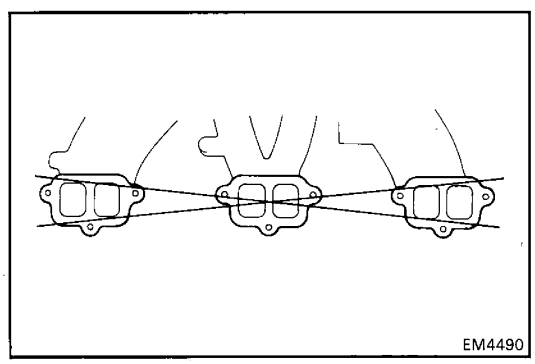


16. INSPECT INTAKE AND EXHAUST MANIFOLDS

Using a precision straight edge and thickness gauge, measure the surfaces contacting the cylinder head and air intake chamber for warpage.

Maximum warpage: 0.50 mm (0.0197 in.)

If the warpage is greater than maximum, replace the manifold.



17. INSPECT AIR INTAKE CHAMBER

Using a precision straight edge and thickness gauge, measure the surfaces contacting the intake manifold for warpage.

Maximum warpage: 0.2 mm (0.008 in.)

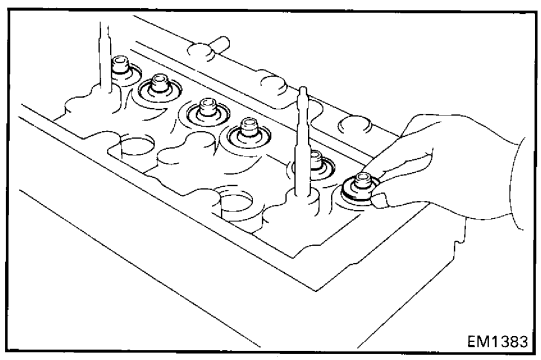
If the warpage is greater than maximum, replace the air intake chamber.

ASSEMBLY OF CYLINDER HEAD

(See page EM-17)

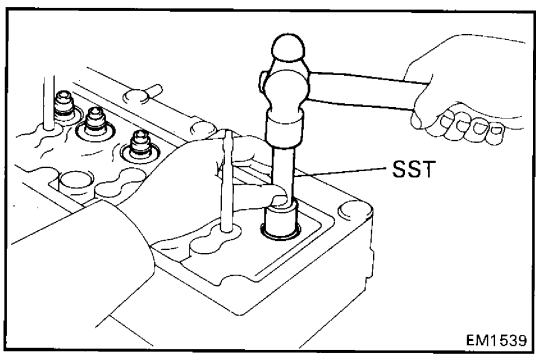
HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.

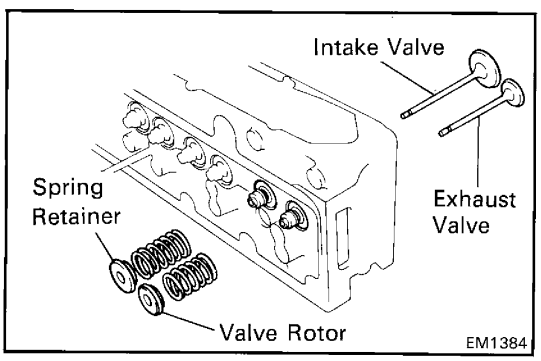


1. INSTALL VALVES

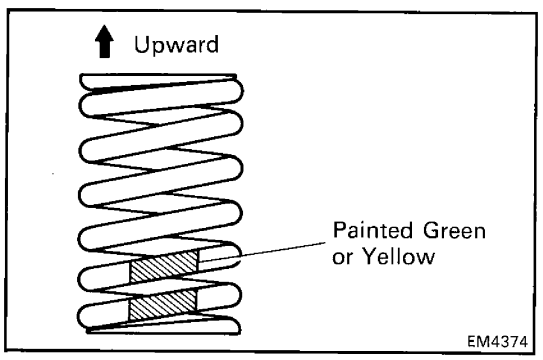
(a) Place the valve spring seat on spring seat.



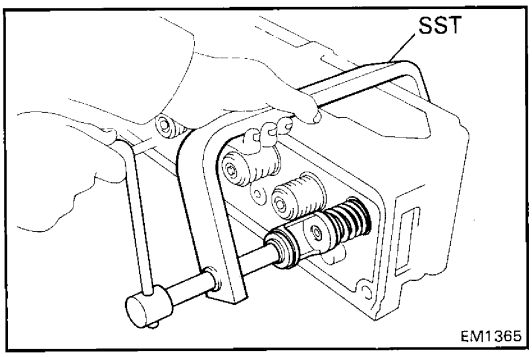
(b) Using SST and a hammer, tap in a new oil seal.
SST 09201-31010



(c) Install the valve, spring and spring retainer (or valve rotator).

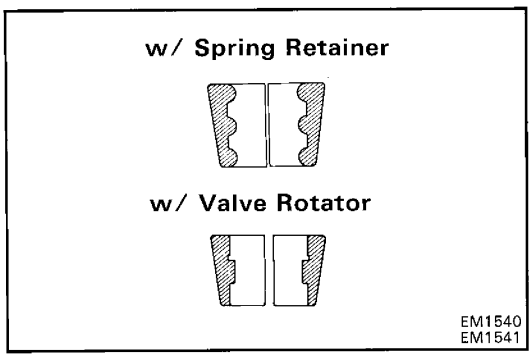


HINT: Install the spring in the correct direction as shown.

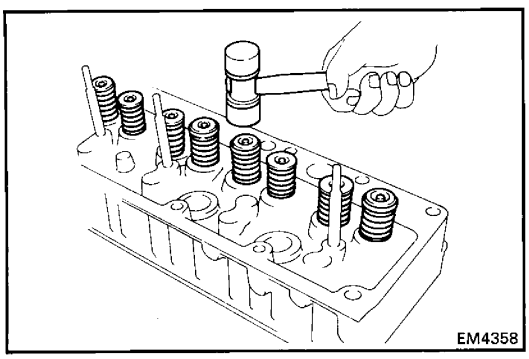


(d) Using SST, compress the valve spring and place the two keepers around the valve stem.

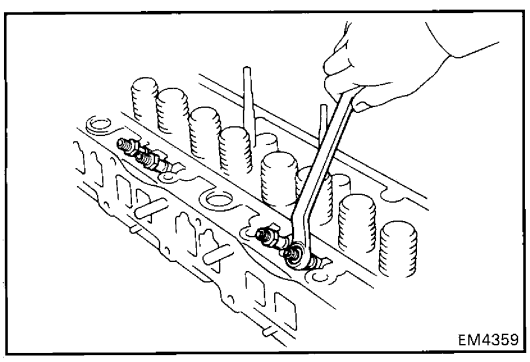
SST 09202-43013



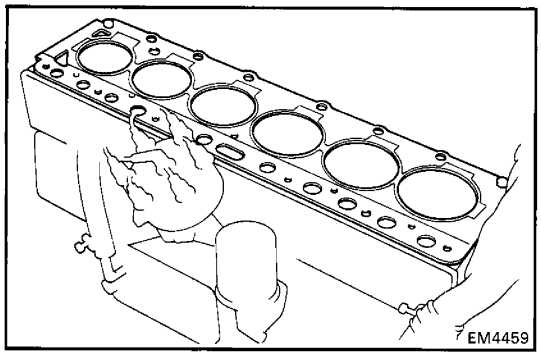
HINT: Different keepers are used for the spring retainer and valve rotator.



(e) Using a plastic-faced hammer, lightly tap the valve stem tip to assure proper fit.



2. INSTALL AIR INJECTION MANIFOLD UNIONS



INSTALLATION OF CYLINDER HEAD

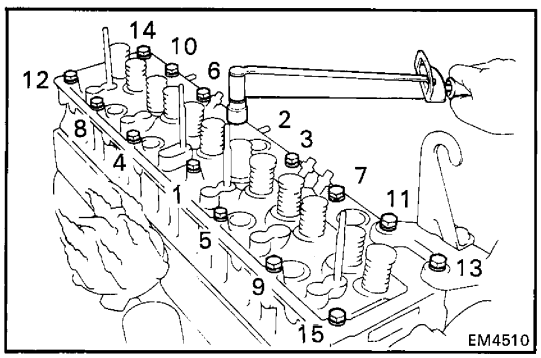
(See page EM-17)

1. INSTALL CYLINDER HEAD

(a) Place a new cylinder head gasket on the cylinder block.

NOTICE: Be careful of the installation direction.

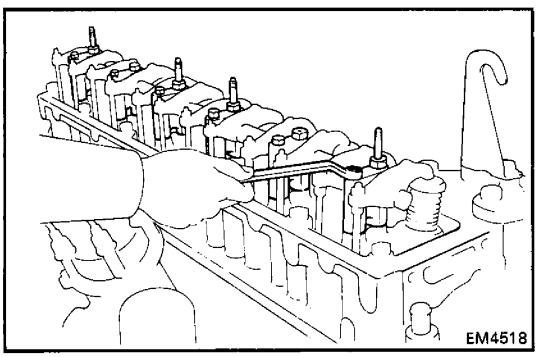
(b) Place the cylinder head on the cylinder head gasket.



(c) Apply a light coat of engine oil on the threads and under the cylinder head bolts.

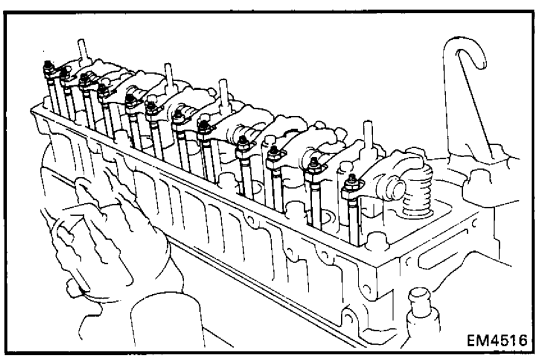
(d) Install and uniformly tighten the ten cylinder head bolts with the plate washers in several passes, in the sequence shown.

Torque: 1,250 kg-cm (90 ft-lb, 123 N·m)



2. INSTALL PUSH RODS

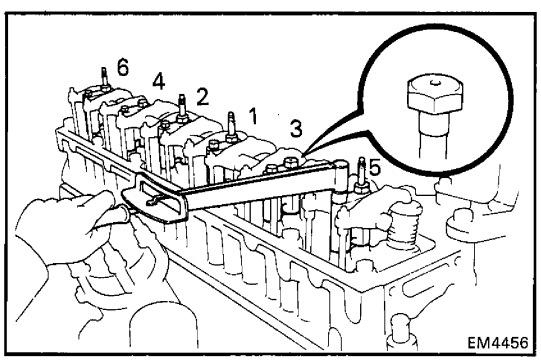
Install the twelve push rods.



3. INSTALL VALVE ROCKER SHAFT ASSEMBLY

(a) Place the rocker shaft assembly on the cylinder head.

(b) Align the rocker arm adjusting screws with the heads of the push rods.



(c) Install and uniformly tighten the eight bolts and four nuts in several passes, in the sequence shown.

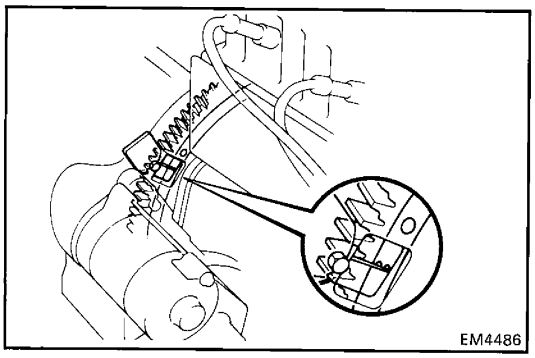
Torque:

12 mm bolt head

240 kg-cm (17 ft-lb, 24 N·m)

14 mm bolt head and nut

340 kg-cm (25 ft-lb, 33 N·m)

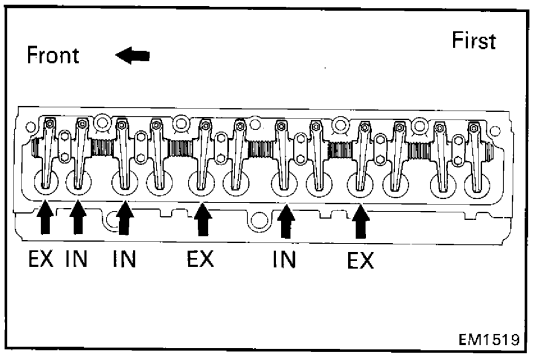


4. ADJUST VALVE CLEARANCE

(a) Set the No. 1 cylinder to TDC/compression.

- Align the TDC mark of the drive plate with the timing pointer by turning the crankshaft clockwise with a wrench.
- Check that the rocker arms on the No. 1 cylinder are loose and rocker arms on the No. 6 are tight.

If not, turn the crankshaft one revolution (360°) and align the mark as above.

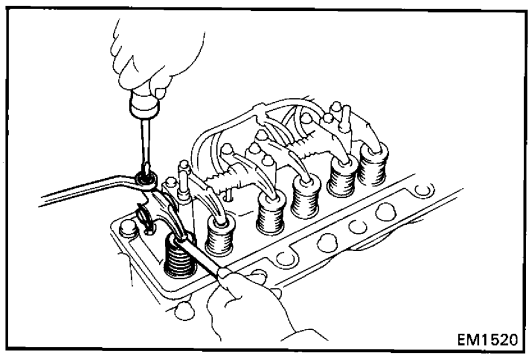


(b) Adjust only those valves indicated by arrows.

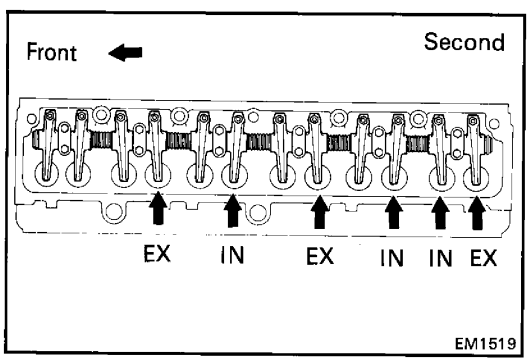
Valve clearance:

Intake 0.20 mm (0.008 in.)
Exhaust 0.35 mm (0.014 in.)

NOTE: After warm up, readjust the valve clearance.

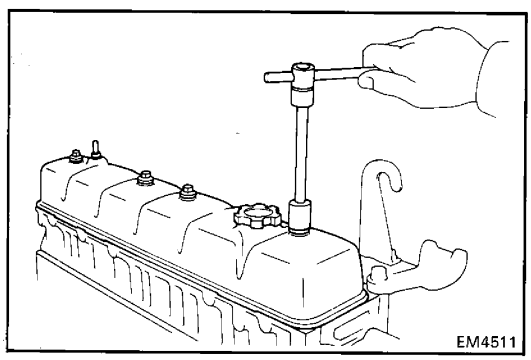


- Using a thickness gauge, measure the valve clearance between the valve stem and rocker arm. Loosen the lock nut and turn the adjusting screw to set the proper clearance.
  Hold the adjusting screw in position and tighten the lock nut.
- Recheck the valve clearance. The thickness gauge should slide with a very slight drag.



(c) Turn the crankshaft pulley one revolution (360°) and align the mark as above.
Adjust only the valves indicated by arrows.

5. INSTALL SPARK PLUGS

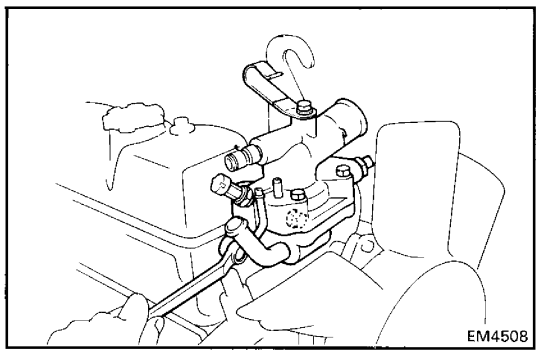


6. INSTALL CYLINDER HEAD COVER

(a) Install a new gasket to the cylinder head cover.

(b) Install the cylinder head cover with four seal washer and cap nuts.

Torque: 90 kg-cm (78 in.-lb, 8.8 N·m)

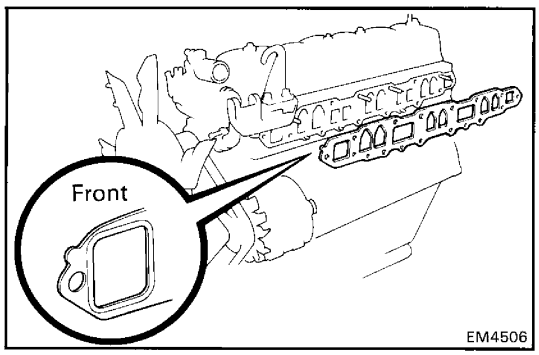


7. **INSTALL WATER OUTLET ASSEMBLY**

(a) Install a new gasket and the water outlet assembly with the two bolts.

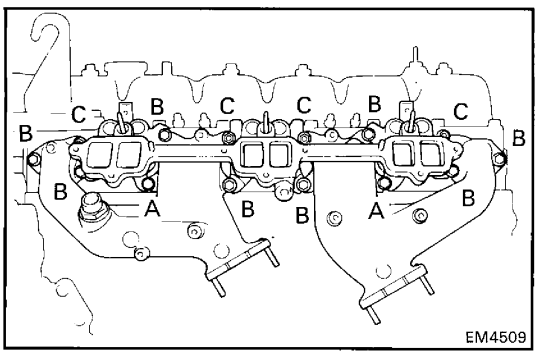
Torque: 250 kg-cm (18 ft-lb, 25 N·m)

(b) Connect the water by-pass hose.



8. **INSTALL INTAKE AND EXHAUST MANIFOLDS**

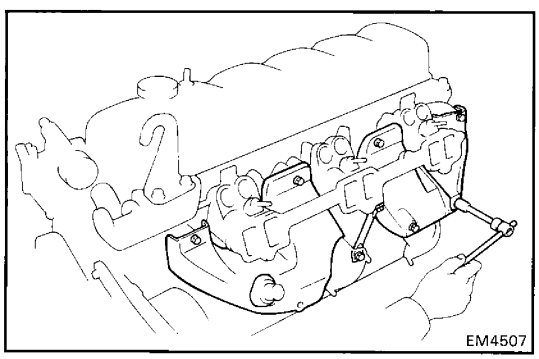
(a) Place a new gasket so that the front mark is toward the front side.



(b) Install the intake manifold and exhaust manifolds with the ten bolts, four plate washers and nuts. Torque the bolts and nuts.

Torque:

17 mm bolt (A)	**700 kg-cm (51 ft-lb, 69 N·m)**
14 mm bolt (B)	**510 kg-cm (37 ft-lb, 50 N·m)**
Nut (C)	**570 kg-cm (41 ft-lb, 56 N·m)**

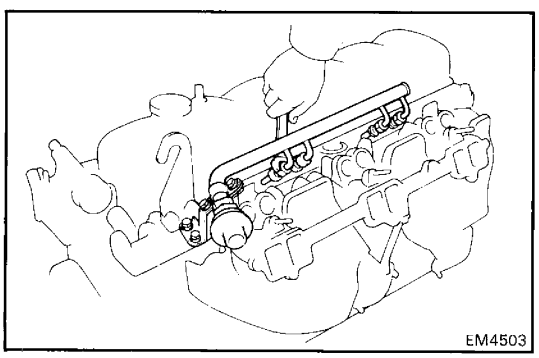


(c) Install the three manifold heat insulators with the six bolts.

Torque: 120 kg-cm (9 ft-lb, 12 N·m)

(d) Install the manifold stay with the two bolts.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

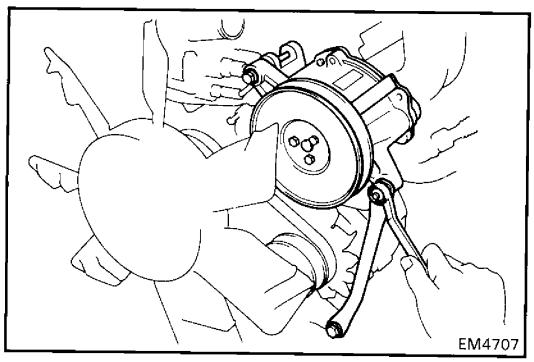


9. **INSTALL AIR INJECTION MANIFOLD**

Install the air injection manifold with the four union nuts and two clamp bolts.

Torque: 210 kg-cm (15 ft-lb, 21 N·m)

10. **INSTALL INJECTORS AND DELIVERY PIPE**
(See steps 1 to 6 on pages FI-59 to 61)



11. INSTALL AIR PUMP
    (a) Install the air pump with the through bolt and nut.
    (b) Install the air pump stay with the bolt and nut.
    (c) Connect the air hose.

12. CONNECT HIGH-TENSION CORDS TO SPARK PLUGS AND IGNITION COIL

13. INSTALL PS PUMP BRACKETS

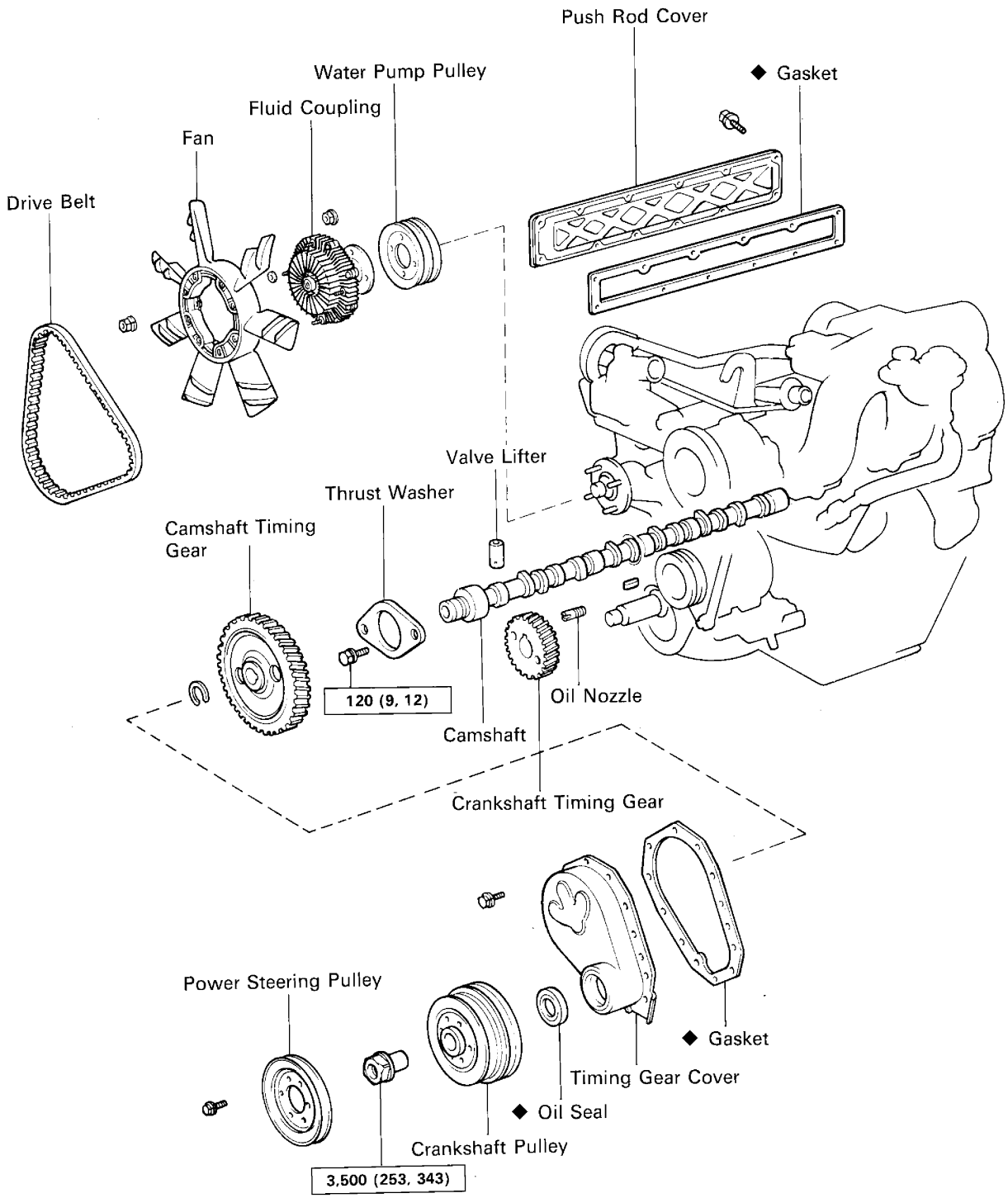
14. REFILL WITH ENGINE COOLANT

    Capacity:

    w/ Front heater
    17.5 liters (18.5 US qts, 15.4 Imp. qts)
    w/ Front and rear heaters
    19.5 liters (20.6 US qts, 17.2 Imp. qts)

TIMING GEARS AND CAMSHAFT

COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

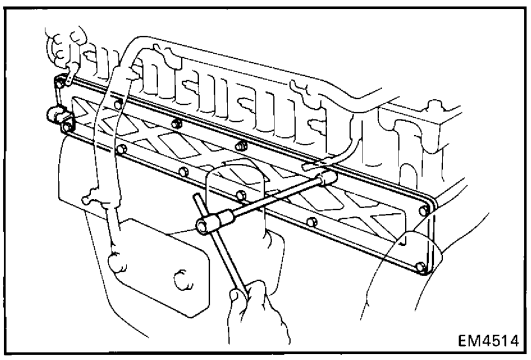
◆ Non-reusable part

EM4521

REMOVAL OF TIMING GEARS AND CAMSHAFT

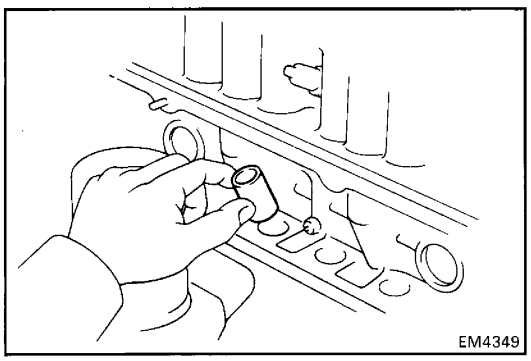
(See page EM-32)

1. DRAIN ENGINE COOLANT
2. REMOVE FLUID COUPLING WITH FAN AND WATER PUMP PULLEY
3. REMOVE PS BRACKETS
4. REMOVE DISTRIBUTOR
5. REMOVE VALVE ROCKER SHAFT ASSEMBLY
(See steps 10 to 12 on pages EM-19)


EM4514

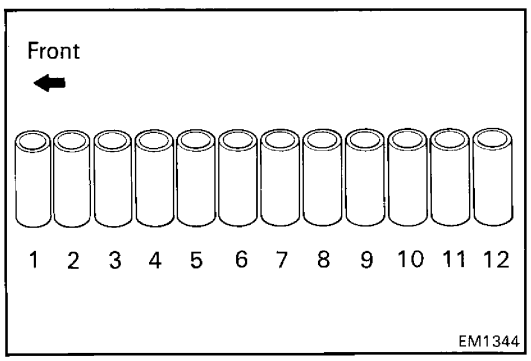
6. REMOVE PUSH ROD COVER

Remove the ten bolts, two nuts, push rod cover and gasket.


EM4349

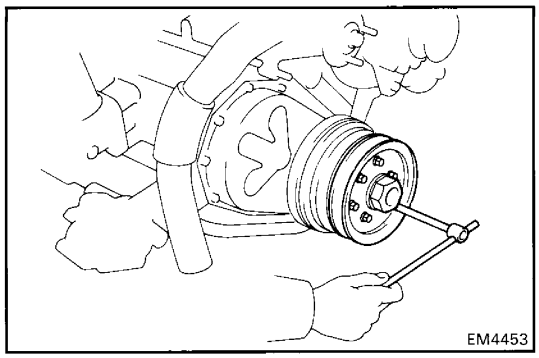
7. REMOVE VALVE LIFTERS

Remove the twelve valve lifters in order, beginning from the No. 1 valve lifter.



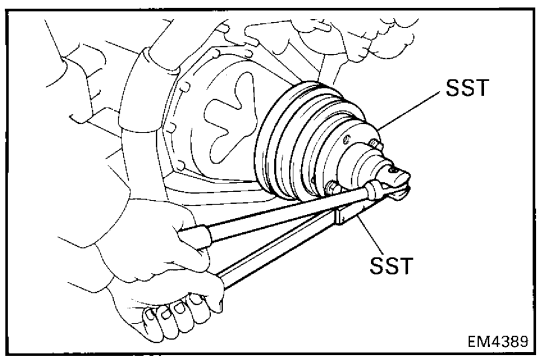
EM1344

HINT: Arrange the valve lifters in correct order.



8. REMOVE PS PULLEY FROM CRANKSHAFT PULLEY

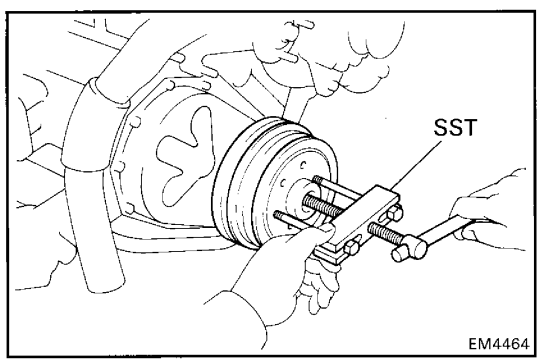
Remove the six bolts and PS pulley.



9. REMOVE CRANKSHAFT PULLEY

(a) Using SST and a 46 mm socket wrench, remove the pulley mount bolt.

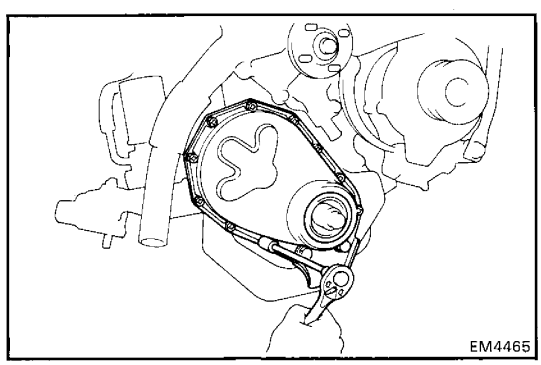
SST 09213-58011 and 09330-00021



(b) Using SST, remove the pulley.

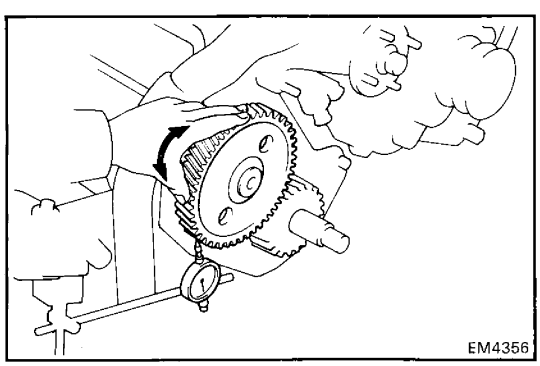
SST 09213-60017

10. REMOVE OIL COOLER PIPE WITH HOSE



11. REMOVE TIMING GEAR COVER

Remove the twelve bolts, gear cover and gasket.



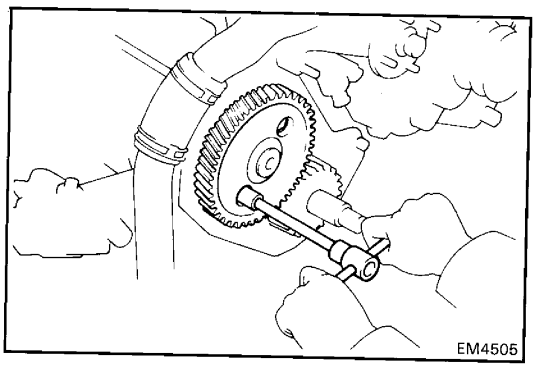
12. CHECK TIMING GEAR BACKLASH

Using a dial indicator, measure the backlash at several places while turning the camshaft clockwise and counterclockwise.

Standard backlash: **0.100 – 0.183 mm (0.0039 – 0.0072 in.)**

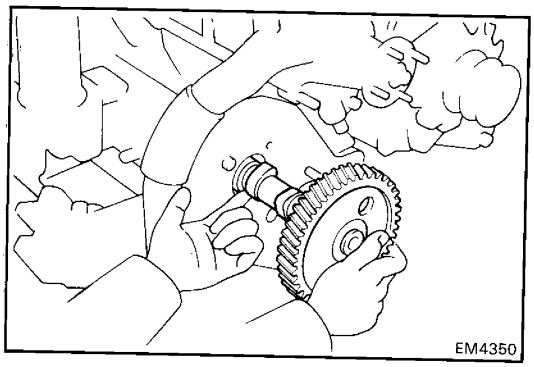
Maximum backlash: **0.25 mm (0.0098 in.)**

If the backlash is greater than maximum, replace the camshaft timing gears.



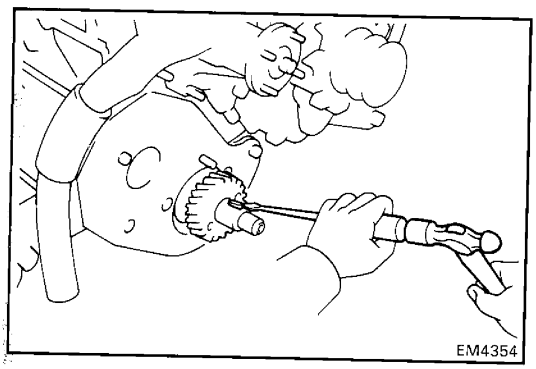
13. REMOVE CAMSHAFT TIMING GEAR AND CAMSHAFT ASSEMBLY

(a) Remove the two bolts mounting the thrust plate to the cylinder block.



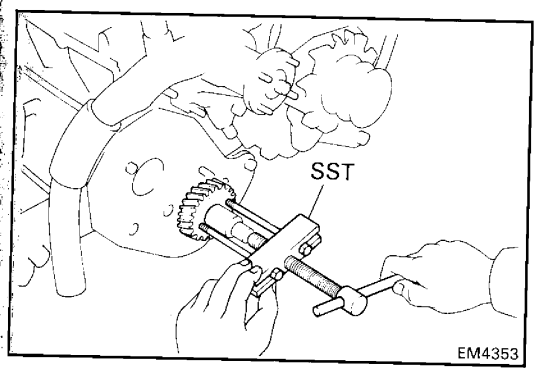
(b) Carefully pull out the camshaft and timing gear assembly.

NOTICE: Be careful not to damage the camshaft bearing.



14. REMOVE CRANKSHAFT TIMING GEAR

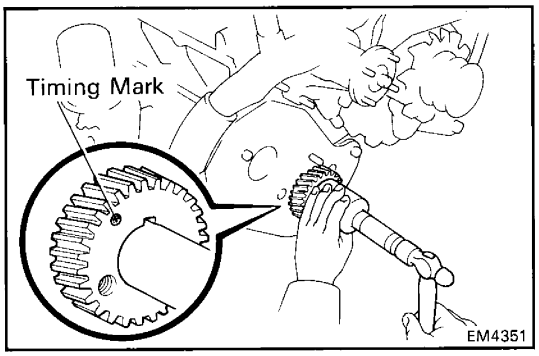
(a) Using a screwdriver and hammer, tap out the crankshaft pulley set key.



(b) Using SST, remove the timing gear.

SST 09213-60017 (09213-00020, 09213-00030, 09213-00090)

15. IF NECESSARY, REMOVE OIL NOZZLE



INSTALLATION OF TIMING GEARS AND CAMSHAFT

(See page EM-32)

1. INSTALL CRANKSHAFT TIMING GEAR

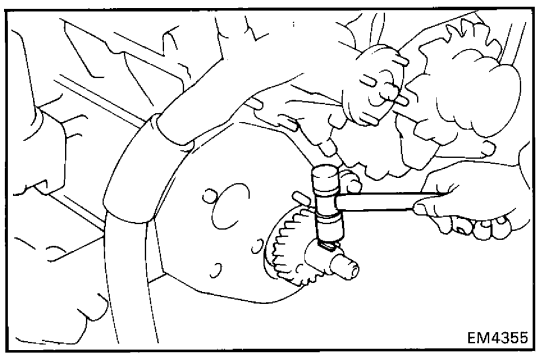
(a) Put the timing gear on the crankshaft with timing mark facing forward.

(b) Align the timing gear set key with the key groove of the timing gear.

(c) Using SST and a hammer, tap in the timing gear.

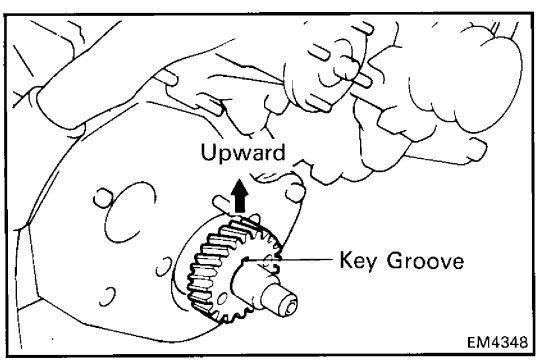
SST 09214-60010

(d) Using a plastic-faced hammer, tap in the crankshaft pulley set key.



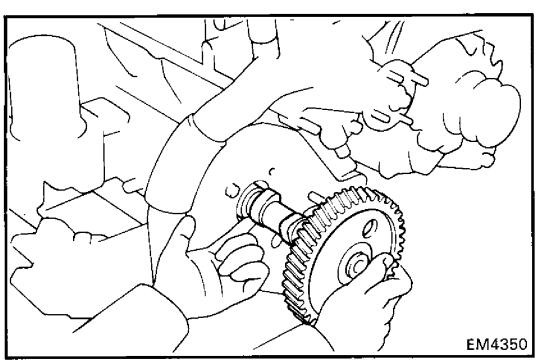
2. INSTALL CAMSHAFT TIMING GEAR AND CAMSHAFT ASSEMBLY

(a) Set the crankshaft timing gear with the key groove facing upward by turning the crankshaft clockwise.



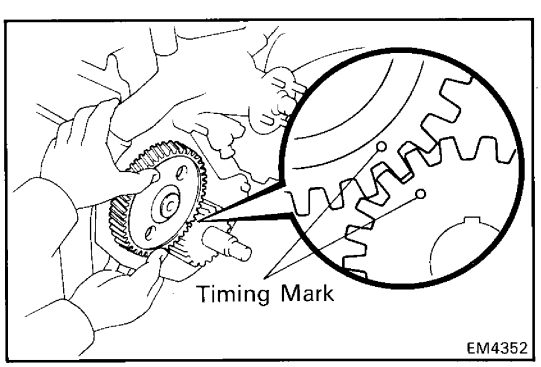
(b) Insert the camshaft into the cylinder block.

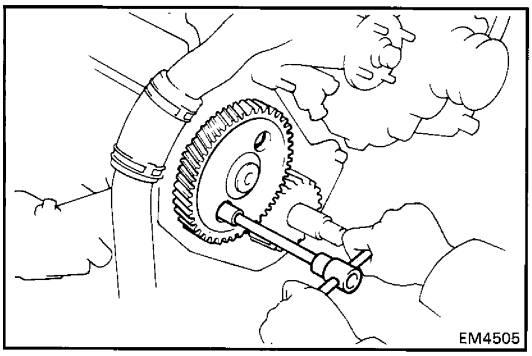
NOTICE: Be careful not to damage the camshaft bearings.



(c) Align the timing marks of the crankshaft and camshaft timing gears and mesh the gears.

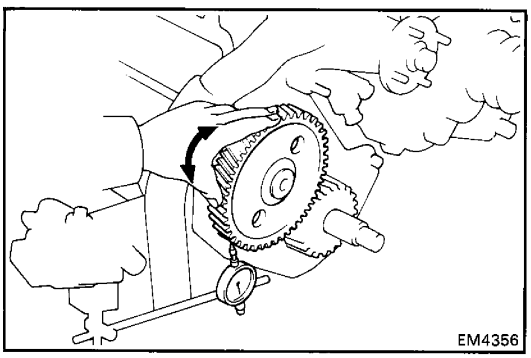
HINT: At this time, No 6 cylinder should be at TDC / compression.





(d) Install the two bolts mounting the thrust washer to the cylinder block. Torque the bolts.

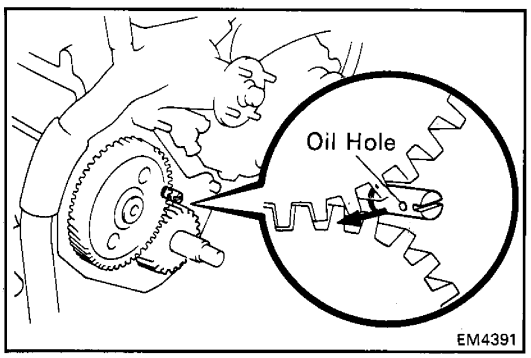
Torque: 120 kg-cm (9 ft-lb, 12 N·m)



3. CHECK TIMING GEAR BACKLASH

Using a dial indicator, measure the backlash at several places while turning the camshaft clockwise and counterclockwise.

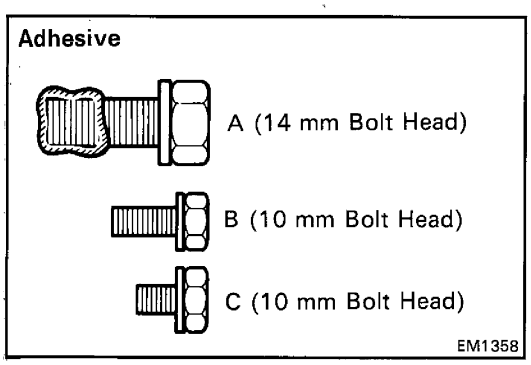
Standard backlash: 0.100 – 0.183 mm (0.0039 – 0.0072 in.)
Maximum backlash: 0.25 mm (0.0098 in.)



4. INSTALL OIL NOZZLE

(a) Install and set the oil nozzle in position.

(b) Using a chisel and hammer, stake the threads of the oil nozzle.

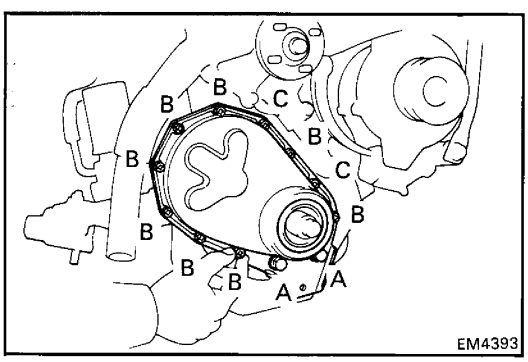


5. INSTALL TIMING GEAR COVER AND CRANKSHAFT PULLEY

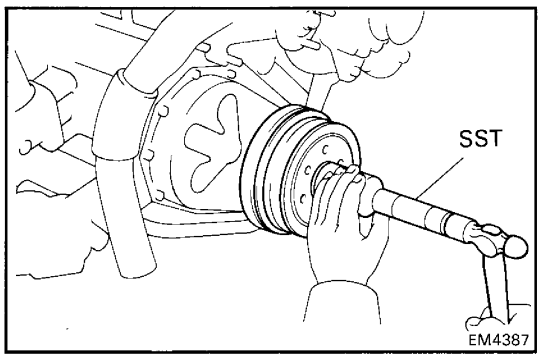
HINT: There are three sizes of timing gear cover bolts indicated A, B and C.

(a) Apply adhesive to the threads of the two A bolts.

Adhesive: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent



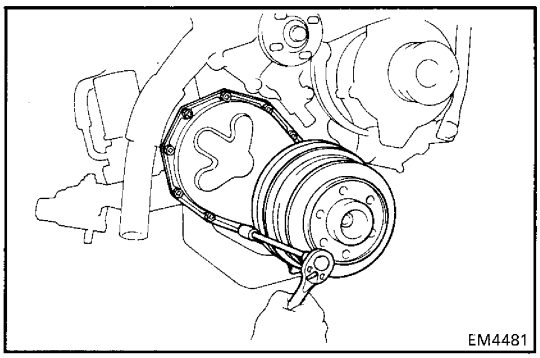
(b) Install a new gasket and the gear cover with the twelve bolts. Finger tighten all bolts.



(c) Align the pulley set key with the key groove of the pulley.

(d) Using SST and a hammer, tap in the pulley.

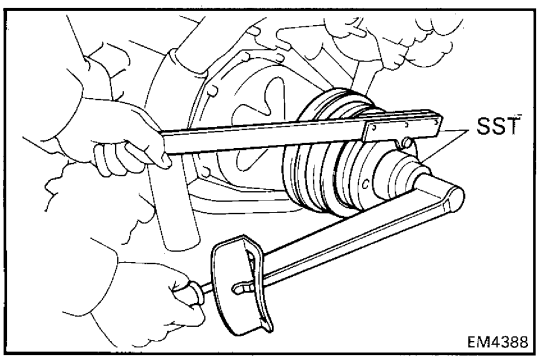
SST 09214-60010



(e) After installing the pulley, torque the cover bolts.

Torque:

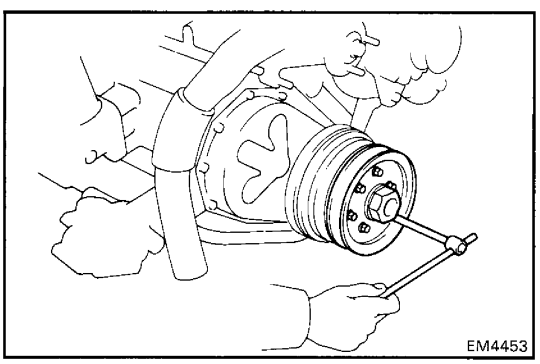
Bolts A	**250 kg-cm (18 ft-lb, 25 N·m)**
Bolts B and C	**50 kg-cm (43 in-lb, 4.9 N·m)**



(f) Using SST and a 46-mm socket wrench, install and torque the pulley mount bolt.

SST 09213-58011 and 09330-00021

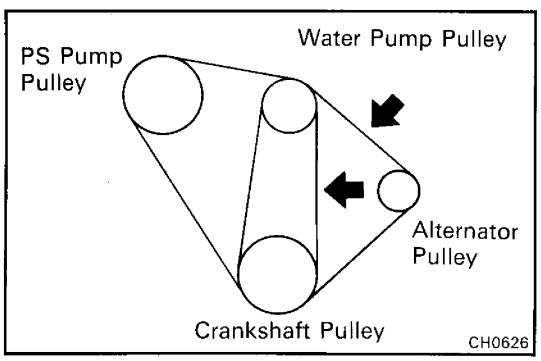
Torque: 3,500 kg-cm (253 ft-lb, 343 N·m)



6. INSTALL PS PULLEY TO CRANKSHAFT PULLEY

Install the PS pulley with the six bolts. Torque the bolts.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)



7. INSTALL AND ADJUST DRIVE BELTS

Check the drive belt deflection by pressing on the belt at the points indicated in the figure with 10 kg (22.0 lb, 98 N) of pressure.

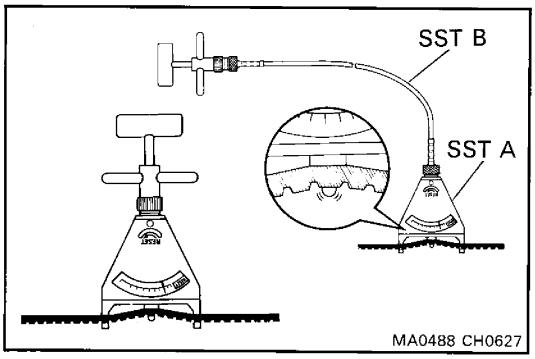
Drive belt deflection:

Alternator to water pump –

New belt	**7.0 – 9.0 mm (0.278 – 0.354 in.)**
Used belt	**9.0 – 12.0 mm (0.354 – 0.472 in.)**

PS pump to crankshaft –

New belt	**7.0 – 9.5 mm (0.278 – 0.374 in.)**
Used belt	**8.0 – 10.0 mm (0.315 – 0.393 in.)**



(Reference)

Using SST, check the drive belt tension.

SST A 09216-00020
SST B 09216-00030

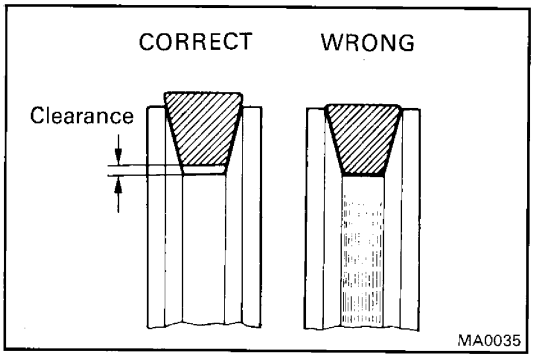
Drive belt tension:

Alternator to water pump –
New belt 55 – 65 kg
Used belt 30 – 45 kg

PS pump to crankshaft –
New belt 45 – 55 kg
Used belt 20 – 35 kg

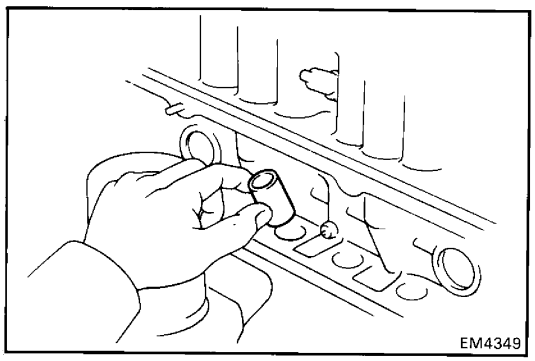
HINT:

- "New belt" refers to a belt which has been used, less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- Check that the belt does not touch the bottom of the pulley groove.
- After installing a new belt, run the engine for about 5 minutes and then recheck the deflection (tension).



8. **INSTALL VALVE LIFTERS**

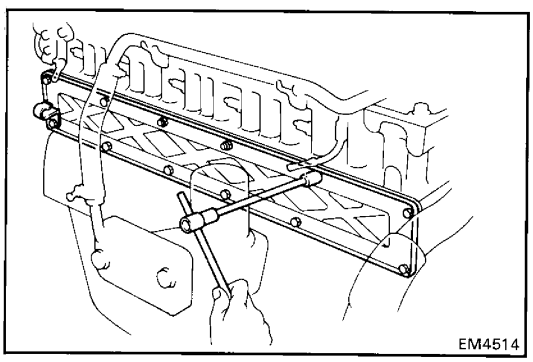
Carefully insert the twelve lifters into the lifter bore.



9. **INSTALL PUSH ROD COVER**

Install a new gasket and the push rod cover with the ten bolts and two nuts.

Torque: 40 kg-cm (35 in.-lb, 3.9 N·m)



10. **INSTALL VALVE ROCKER SHAFT ASSEMBLY (See steps 2 to 4 on pages EM-28, 29)**

11. **INSTALL DISTRIBUTOR (See page IG-10)**

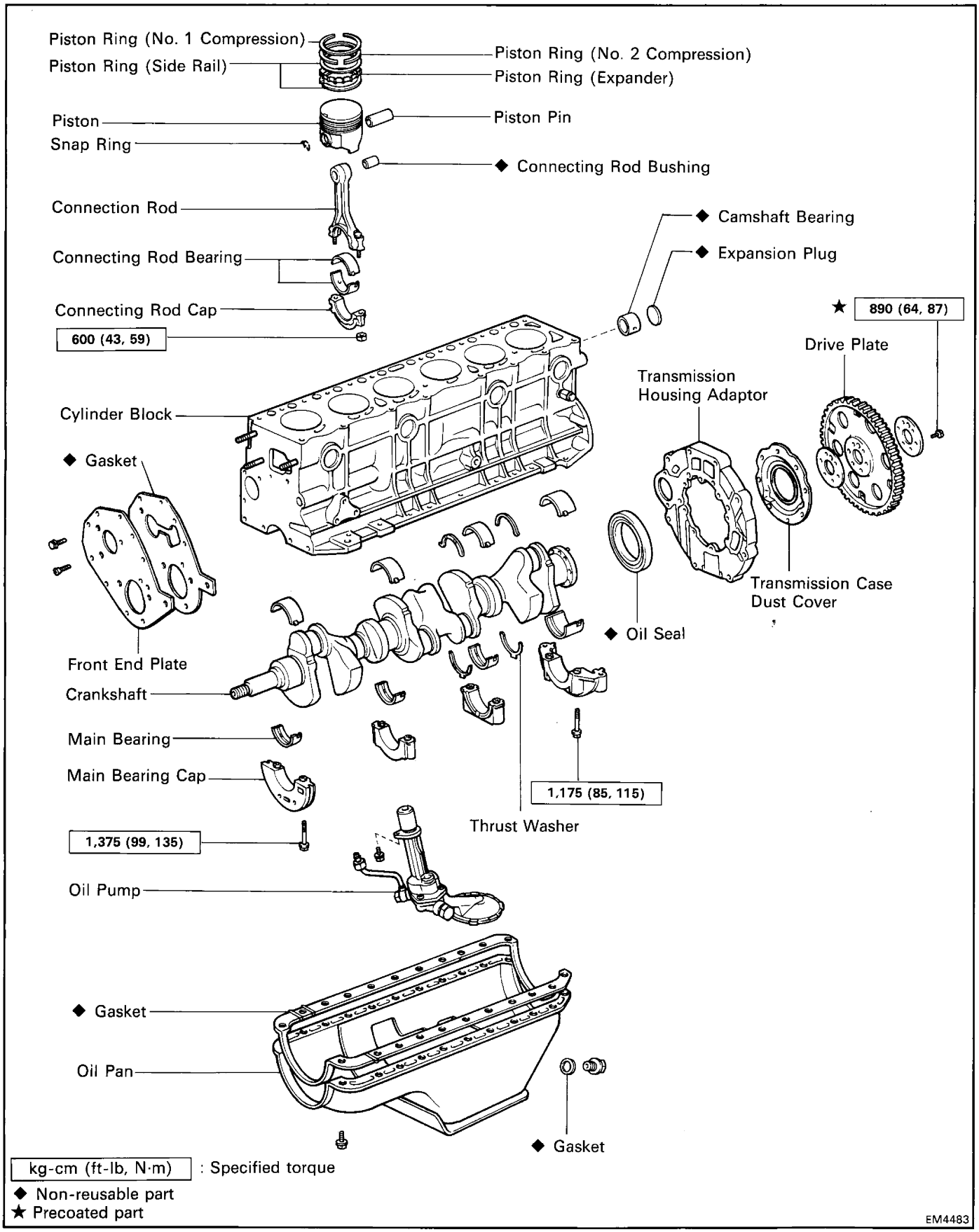
12. **INSTALL WATER PUMP PULLEY AND FLUID COUPLING WITH FAN**

13. **INSTALL PS BRACKETS**

14. **REFILL WITH ENGINE COOLANT**

CYLINDER BLOCK

COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

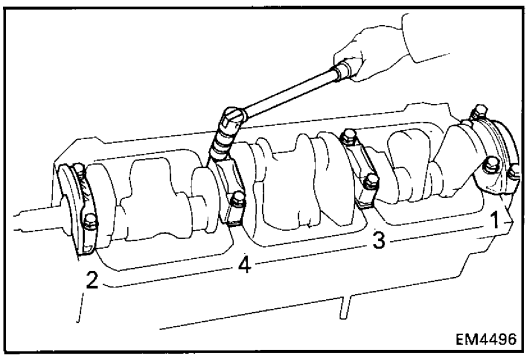
◆ Non-reusable part

★ Precoated part

EM4483

PREPARATION FOR DISASSEMBLY

1. REMOVE DRIVE PLATE
2. REMOVE TRANSMISSION HOUSING ADAPTOR
3. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
4. REMOVE CYLINDER HEAD
(See page EM-18)
5. REMOVE ALTERNATOR
6. REMOVE WATER PUMP
7. REMOVE TIMING GEAR AND CAMSHAFT
(See page EM-32)
8. REMOVE OIL COOLER AND OIL FILTER BRACKET
9. REMOVE OIL PAN AND OIL PUMP



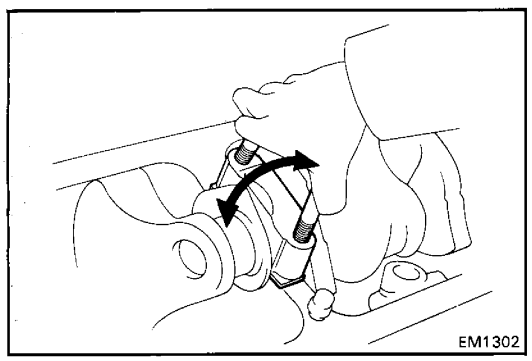
EM4496

DISASSEMBLY OF CYLINDER BLOCK

(See page EM-40)

15. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the main bearing cap bolts in several passes, in the sequence shown.


EM1302

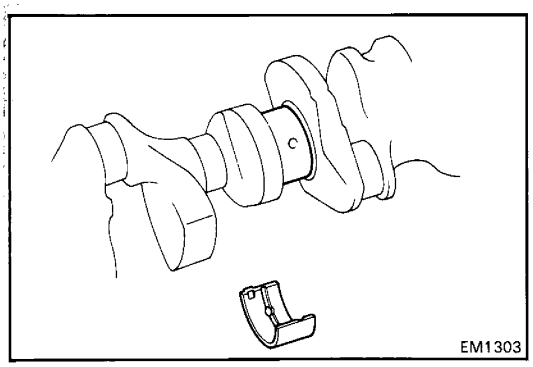
(b) Using the removed main bearing cap bolts, wiggle the cap back and forth, and remove the caps, lower bearings and lower thrust washers (No. 3 cap only).

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

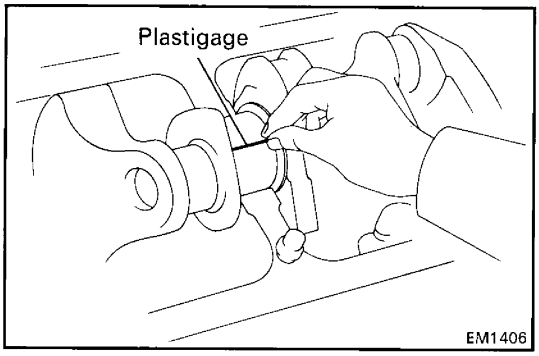
HINT: Keep the upper bearings and upper thrust washers together with the cylinder block.


EM1303

(d) Clean each journal and bearing.

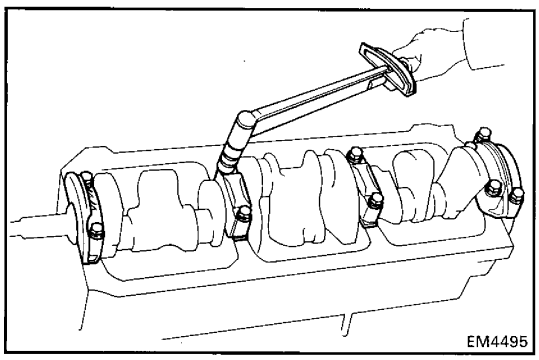
(e) Check each journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of Plastigage across each journal.

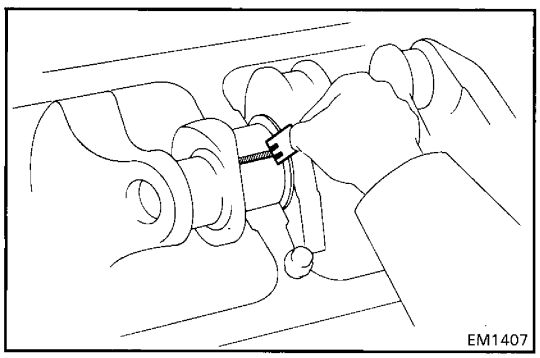


(h) Install the main caps.

Torque:

19 mm bolt head
1,375 kg-cm (99 ft-lb, 135 N·m)
17 mm bolt head
1,175 kg-cm (85 ft-lb, 115 N·m)

HINT: Do not turn the crankshaft.



(i) Remove the main bearing caps.

(j) Measure the Plastigage at its widest point.

Standard oil clearance:

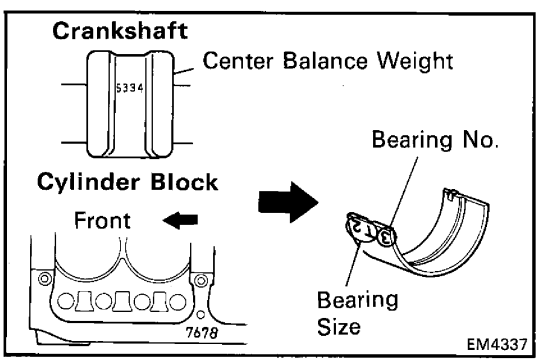
STD size	**0.020 – 0.044 mm (0.0008 – 0.0017 in.)**
U/S 0.25 and 0.50	**0.021 – 0.067 mm (0.0008 – 0.0026 in.)**
Maximum oil clearance:	**0.10 mm (0.0039 in.)**

HINT: If replacing the cylinder block subassembly the bearing standard clearance will be:
0.004 – 0.060 mm (0.002 – 0.0024 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

HINT: If replacing a standard size bearing with a standard oil clearance, replace with one having the same number. If the number of the bearing cannot be determined, select a bearing from the table below according to the numbers imprinted on the cylinder block and crankshaft.

There are five sizes of standard bearings, marked T1, T2, T3, T4 and T5.



	Number marked								
Crankshaft	3			4			5		
Cylinder block	6	7	8	6	7	8	6	7	8
Bearing	T3	T4	T5	T2	T3	T4	T1	T2	T3

Example: Crankshaft "5", Cylinder Block "7" = Bearing "T2"

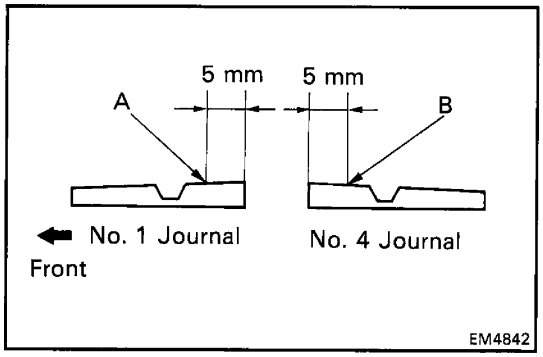
(Reference)

Crankshaft journal diameter:

Mark "3"	No.1	66.972 – 66.980 mm (2.6367 – 2.6370 in.)
	No.2	68.472 – 68.480 mm (2.6957 – 2.6961 in.)
	No.3	69.972 – 69.980 mm (2.7548 – 2.7551 in.)
	No.4	71.472 – 71.480 mm (2.8139 – 2.8142 in.)
Mark "4"	No.1	66.980 – 66.988 mm (2.6370 – 2.6373 in.)
	No.2	68.480 – 68.488 mm (2.6961 – 2.6964 in.)
	No.3	69.980 – 69.988 mm (2.7551 – 2.7554 in.)
	No.4	71.480 – 71.488 mm (2.8142 – 2.8145 in.)
Mark "5"	No.1	66.988 – 66.996 mm (2.6373 – 2.6376 in.)
	No.2	68.488 – 68.496 mm (2.6964 – 2.6967 in.)
	No.3	69.988 – 69.996 mm (2.7554 – 2.7557 in.)
	No.4	71.488 – 71.496 mm (2.8145 – 2.8148 in.)

Cylinder block main journal bore diameter:

Mark "6"	No.1	72.010 – 72.018 mm (2.8350 – 2.8353 in.)
	No.2	73.510 – 73.518 mm (2.8941 – 2.8944 in.)
	No.3	75.010 – 75.018 mm (2.9531 – 2.9535 in.)
	No.4	76.510 – 76.518 mm (3.0122 – 3.0125 in.)
Mark "7"	No.1	72.018 – 72.026 mm (2.8353 – 2.8357 in.)
	No.2	73.518 – 73.526 mm (2.8944 – 2.8947 in.)
	No.3	75.018 – 75.026 mm (2.9535 – 2.9538 in.)
	No.4	76.518 – 76.526 mm (3.0125 – 3.0128 in.)
Mark "8"	No.1	72.026 – 72.034 mm (2.8357 – 2.8360 in.)
	No.2	73.526 – 73.534 mm (2.8947 – 2.8950 in.)
	No.3	75.026 – 75.034 mm (2.9538 – 2.9541 in.)
	No.4	76.526 – 76.534 mm (3.0128 – 3.0131 in.)

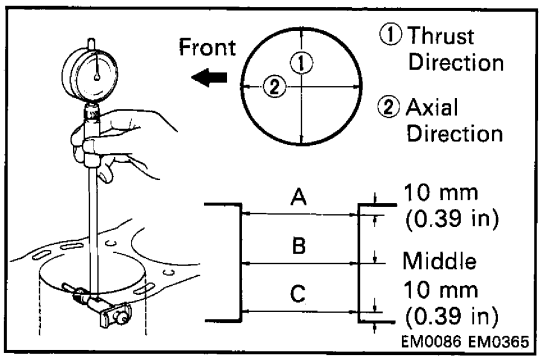


Standard bearing thickness (at center wall):

Mark "T1"	**2.493 – 2.497 mm (0.0981 – 0.0983 in.)**
Mark "T2"	**2.497 – 2.501 mm (0.0983 – 0.0985 in.)**
Mark "T3"	**2.501 – 2.505 mm (0.0985 – 0.0986 in.)**
Mark "T4"	**2.505 – 2.509 mm (0.0986 – 0.0988 in.)**
Mark "T5"	**2.509 – 2.513 mm (0.0988 – 0.0989 in.)**

HINT: Check the bearing thickness of No. 1 and No. 4 journals in the positions A, B shown in the illustration.

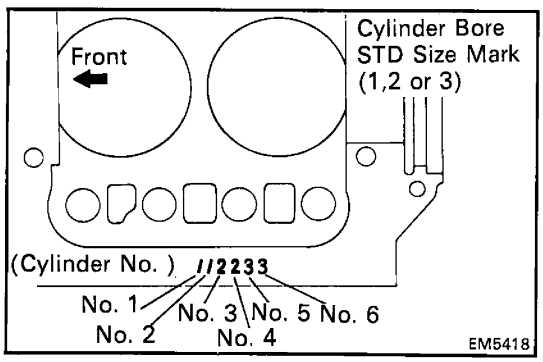
(k) completely remove the Plastigage.



INSPECTION OF CYLINDER BLOCK

5. INSPECT CYLINDER BORE DIAMETER

Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.



HINT: There are 3 standard sizes for the cylinder bore diameter which are marked on the cylinder block as shown in the illustration.

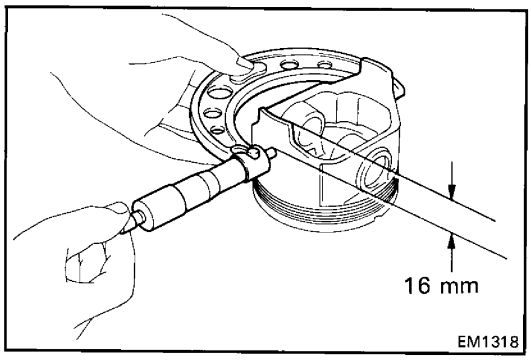
Standard diameter:

STD size	**Mark "1"**	**94.000 – 94.010 mm (3.7008 – 3.7012 in.)**
	Mark "2"	**94.010 – 94.020 mm (3.7012 – 3.7016 in.)**
	Mark "3"	**94.020 – 94.030 mm (3.7016 – 3.7020 in.)**

Maximum diameter:

STD size	**94.23 mm (3.7098 in.)**
O/S 0.50	**94.73 mm (3.7295 in.)**
O/S 1.00	**95.23 mm (3.7492 in.)**
O/S 1.50	**95.73 mm (3.7689 in.)**

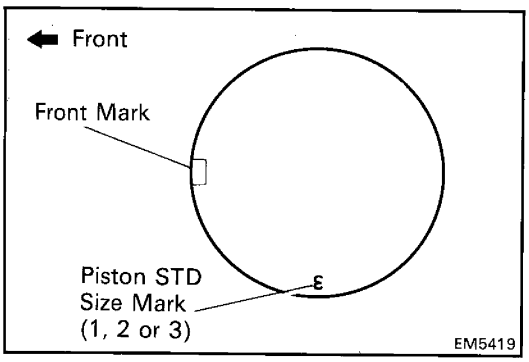
If the diameter is greater than maximum, rebore all six cylinders. If necessary, replace the cylinder block.



INSPECTION OF PISTON AND CONNECTING ROD ASSEMBLIES

2. INSPECT PISTON DIAMETER AND OIL CLEARANCE

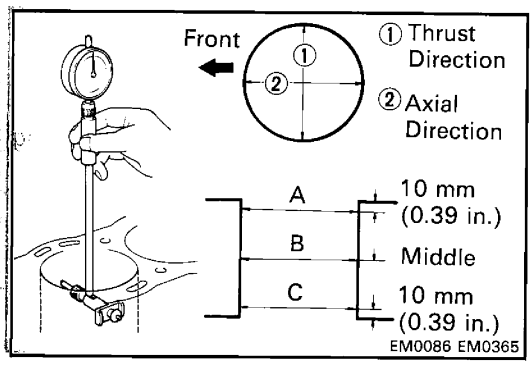
(a) Using a micrometer, measure the piston diameter at a right angle to the piston pin hole center line, 16 mm (0.63 in.) below the skirt bottom edge.



HINT: There are 3 sizes of standard pistons, marked 1, 2 or 3 as shown in the illustration.

Standard diameter:

STD size	**Mark "1"**	**93.963 – 93.973 mm (3.6993 – 3.6997 in.)**
	Mark "2"	**93.973 – 93.983 mm (3.6997 – 3.7001 in.)**
	Mark "3"	**93.983 – 93.993 mm (3.7001 – 3.7005 in.)**
	O/S 0.50	**94.463 – 94.493 mm (3.7190 – 3.7202 in.)**
	O/S 1.00	**94.963 – 94.993 mm (3.7387 – 3.7399 in.)**
	O/S 1.50	**95.463 – 95.493 mm (3.7584 – 3.7596 in.)**

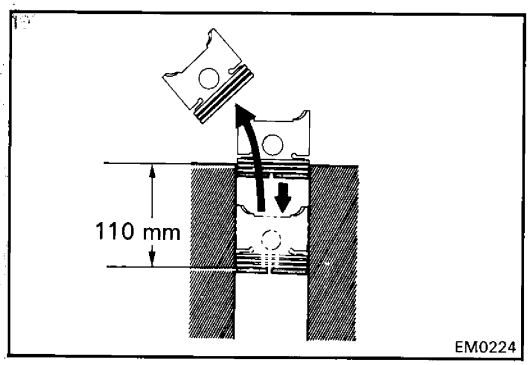


(b) Measure the cylinder bore diameter in thrust directions (See step 5 on page EM-44)

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Oil clearance: 0.027 – 0.047 mm (0.0011 – 0.0019 in.)

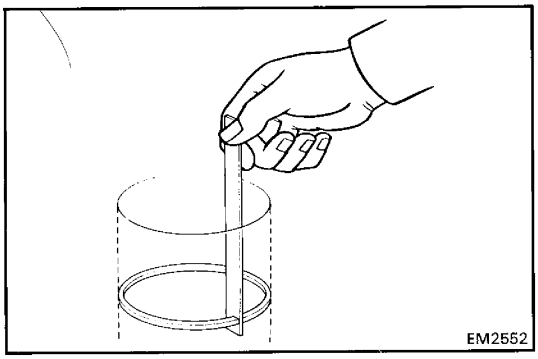
If the oil clearance is not within specification, replace the piston. If necessary, rebore all six cylinders and replace all six pistons. If necessary, replace the cylinder block, install a piston with the same mark as marked on the cylinder block.



4. INSPECT PISTON RING END GAP

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel.
(110 mm or 4.33 in. from top surface of cylinder block)


EM2552

(c) Using a thickness gauge, measure the end gap.

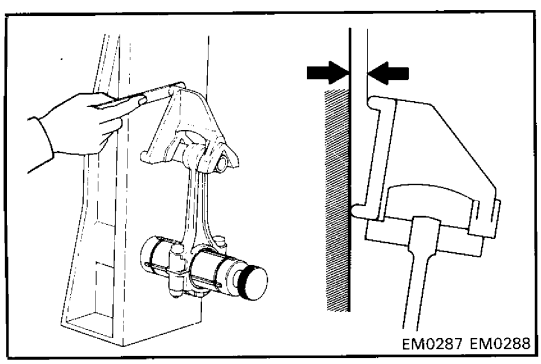
Standard end gap:

No. 1	**0.200 – 0.420 mm (0.0079 – 0.0165 in.)**
No. 2	**0.500 – 0.720 mm (0.0197 – 0.0283 in.)**
Oil (side rail)	**0.200 – 0.820 mm (0.0079 – 0.0323 in.)**

Maximum end gap:

No. 1	**1.02 mm (0.0402 in.)**
No. 2	**1.32 mm (0.0520 in.)**
Oil (Side rail)	**1.42 mm (0.0559 in.)**

If the gap is greater than maximum, replace the piston ring. If the gap is greater than maximum, even with a new piston ring, rebore the cylinder and use an O/S piston ring.


EM0287 EM0288

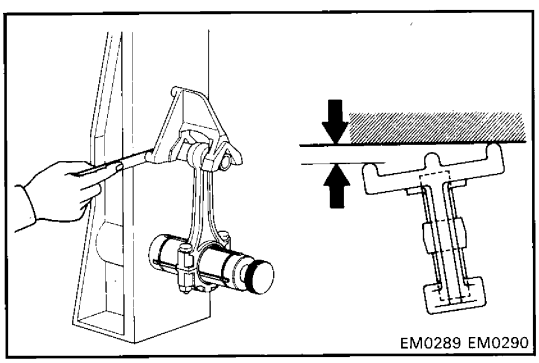
6. INSPECT CONNECTING RODS

(a) Using a rod aligner and thickness gauge, check the connecting rod alignment.

- Check for bend.

Maximum bend:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

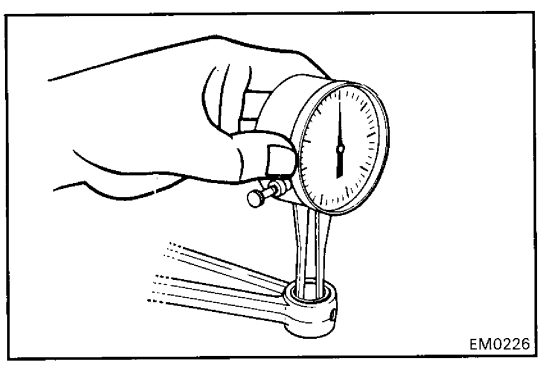
If bend is greater than maximum, replace the connecting rod assembly.


EM0289 EM0290

- Check for twist.

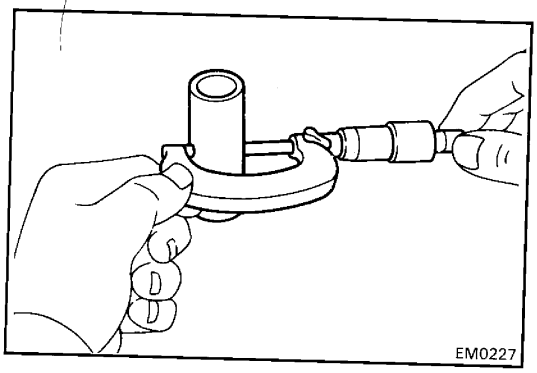
Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.


EM0226

(b) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter: 22.012 – 22.027 mm (0.8666 – 0.8672 in.)



(c) Using a micrometer, measure the piston pin diameter.

Piston pin diameter: 22.004 – 22.019 mm (0.8663 – 0.8669 in.)

(d) Subtract the piston pin diameter measurement from the busing inside diameter measurement.

Standard oil clearance: 0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance: 0.03 mm (0.0012 in.)

If the oil clearance is greater than maximum, replace the connecting rod bushing. If necessary, replace the piston and piston pin assembly.

BORING OF CYLINDERS

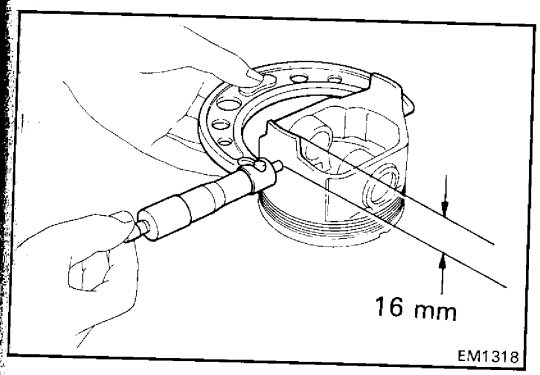
HINT:

- Bore all six cylinders for the oversized piston outside diameter.
- Replace the piston rings with ones to match the oversized pistons.

1. SELECT OVERSIZED PISTONS

Oversized piston diameter:

O/S	**0.50**	**94.463 – 94.493 mm (3.7190 – 3.7202 in.)**
O/S	**1.00**	**94.963 – 94.993 mm (3.7387 – 3.7399 in.)**
O/S	**1.50**	**95.463 – 95.493 mm (3.7584 – 3.7596 in.)**



2. CALCULATE AMOUNT TO BORE CYLINDER

(a) Using a micrometer, measure the piston diameter at a right angle to the piston pin hole center line, 16 mm (0.63 in.) below the skirt bottom edge.

(b) Calculate the amount each cylinder is to be rebored as follows:

Size to be rebored = P + C – H

P = Piston diameter

C = Piston clearance

0.027 – 0.047 mm (0.0012 – 0.0020 in.)

H = Allowance for honing

0.02 mm (0.0008 in.) or less

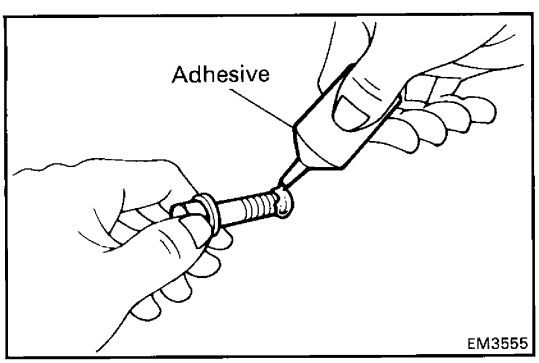
3. BORE AND HONE CYLINDERS TO CALCULATED DIMENSIONS

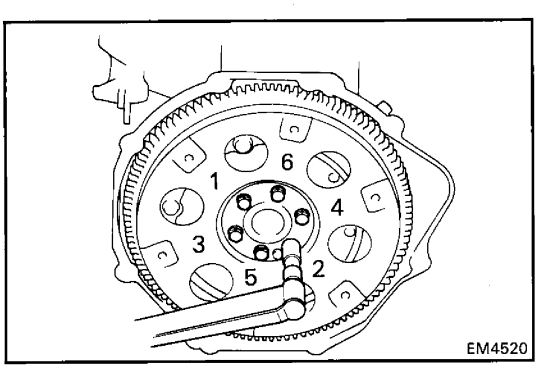
Maximum honing: 0.02 mm (0.0008 in.)

NOTICE: Excess honing will destroy the finished roundness.

POST ASSEMBLY

1. INSTALL OIL PUMP AND OIL PAN
2. INSTALL OIL COOLER AND OIL FILTER BRACKET
3. INSTALL TIMING GEARS AND CAMSHAFT
   (See page EM-36)
4. INSTALL WATER PUMP
5. INSTALL CYLINDER HEAD
   (See page EM-28)
6. REMOVE ENGINE STAND
7. INSTALL TRANSMISSION HOUSING ADAPTOR





8. INSTALL DRIVE PLATE
   (a) Clean the mount bolt threads and crankshaft bolt holes of any residual sealer, oil or foreign particles. Remove any oil with kerosene or gasoline.
   (b) Apply adhesive to two or three threads of the mount bolt end.

   Adhesive: Part No. 08833-00070, THREE BOND 1324 or equivalent

   HINT:
   - This sealant will not harden while exposed to air.
   - It will act as a sealer or binding agent only when applied to threads, etc. when the air is cut off.

   (c) Install the drive plate on the crankshaft.
   (d) Install and uniformly tighten the bolts in several passes, in the sequence shown.

   Torque: 890 kg-cm (64 ft-lb, 87 N·m)