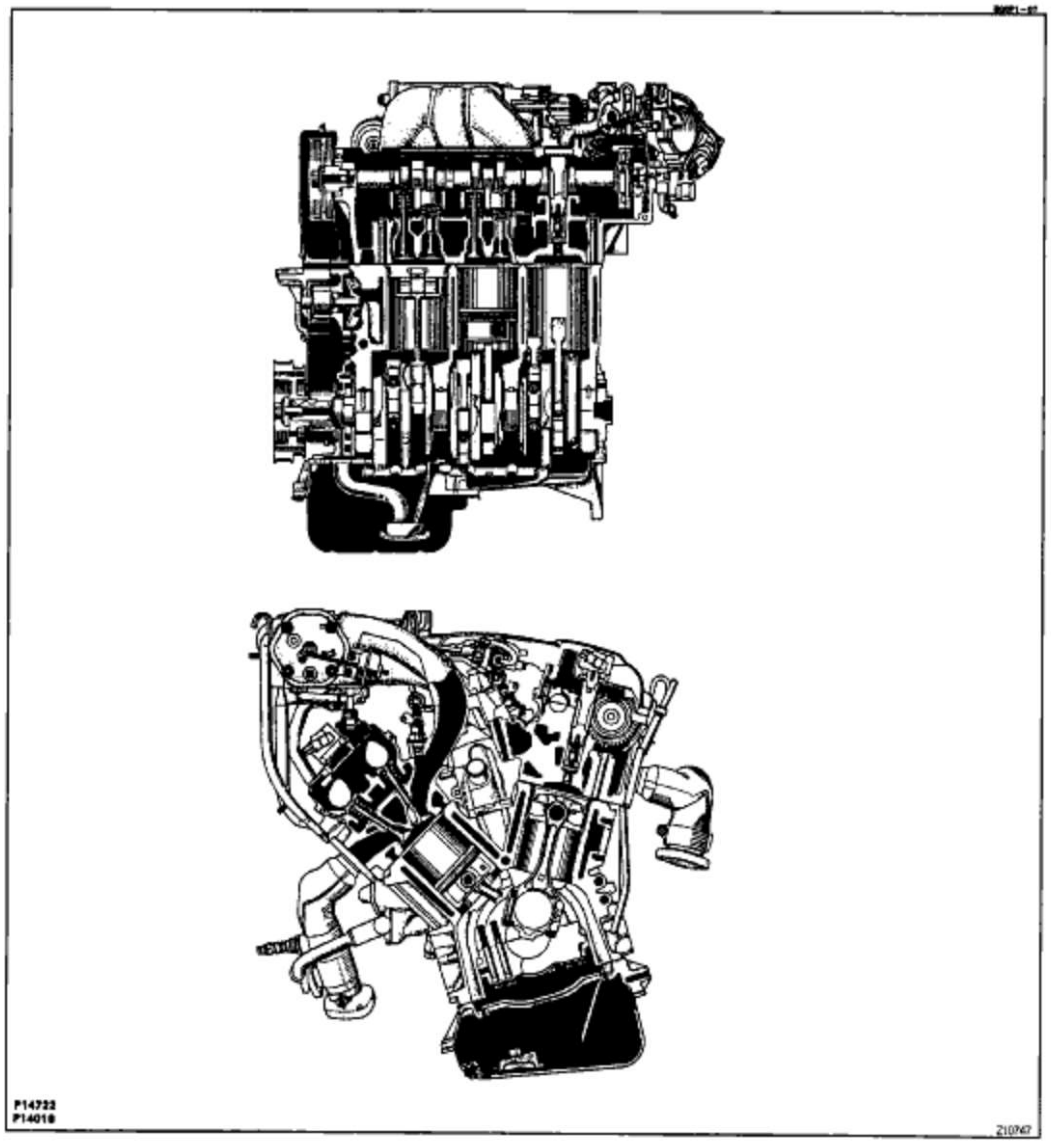
1MZ–FE ENGINE

ENGINE MECHANICAL

DESCRIPTION

The 1 MZ–FE engine is a V–6, 3.0 liter 24 valve DOHC engine.

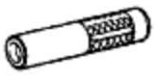
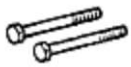
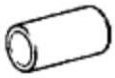
OPERATION

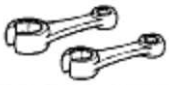


The 1 MZ–FE engine has 6 cylinders in a V arrangement at a bank angle of 60_2. From the front of the RH bank cylinders are numbered 1–3–5, and from the front of the LH bank cylinders are numbered 2–4–6. The crankshaft is supported by 4 bearings inside the crankcase. These bearings are made of copper and lead alloy.
The crankshaft is integrated with 9 semi counterweights for balance. Oil holes are placed in the center of the crankshaft for supply oil to the connecting rods, bearings, pistons and other components.
This engine's firing order is 1–2–3–4–5–6. The cylinder head is made of aluminum alloy, with a cross flow type intake and exhaust layout and with pent–roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.
At the front and rear of the intake manifold, a water passage has been provided which connects the RH and LH cylinder heads.
Exhaust and intake valves are equipped with irregular pitch springs made of special valve spring carbon steel which are capable of following the cam profile at all engine speeds.
The RH and LH exhaust camshafts are driven by a single timing belt, and a gear on the exhaust camshaft engages with a gear on the intake camshaft to drive it. The camshaft journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head. Lubrication of the cam journals and gears is accomplished by oil being supplied through the oiler port in the center of the camshaft.
Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.
The timing belt covers consist of the resin type No.2 and No.1 above and below the engine RH mounting bracket.
Pistons are made of high temperature–resistant aluminum alloy, and a depression is built into the piston head to prevent interference with the valves.
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 also 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 gas leakage from the cylinder and the oil ring works to clear oil off the cylinder walls to prevent it from entering the combustion chambers.
The cylinder block is made of aluminum alloy with a bank angle of 60_2. 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 heads 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 No. 1 and No.2 oil pans are bolted onto the bottom of the cylinder block. The No. 1 oil pan is made of aluminum alloy. The No.2 oil pan is an oil reservoir made of pressed sheet steel. An oil pan baffle plate keeps sufficient oil in the bottom of the No.2 oil pan even when the vehicle is tilted. This dividing plate also prevents the oil from sloshing when the vehicle is stopped suddenly and the oil shifts away from the oil pump suction pipe.
Plastic region tightening bolts are used for the cylinder head, main bearing caps and connecting rods.

PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09201–01055 Valve Guide Bushing Remover & Replacer 5.5	
	09201–41020 Valve Stem Oil Seal Replacer	
	09202–70010 Valve Spring Compressor	
	09213–54015 Crankshaft Pulley Holding Tool	
	09213–60017 Crankshaft Pulley & Gear Puller Set	
	(09213–00020) Body With Bolt	
	(09213–00030) Handle	
	(09213–00050) Bolt set	Crankshaft timing pulley
	(09213–00060) Bolt set	Crankshaft pulley
	08223–00010 Cover & Seal Replacer	Crankshaft front oil seal
	09223–15030 Oil Seal & Bearing Replacer	Crankshaft rear oil seal
	09223–46011 Crankshaft Front Oil Seal Replacer	Crankshaft timing pulley
	09248–55040 Valve Clearance Adjust Tool set	

	(09248 –05410) Valve Lifter Press	
	(09248–05420) Valve Lifter Stopper	
	09249–63010 Torque Wrench Adaptor	RH camshaft timing pulley
	09330–00021 Companion Flange Holding Tool	Crankshaft pulley
	09608–20012 Front Hub & Drive Pinion Bearing Tool Set	
	(09608–03020) Handle	Crankshaft rear oil seal Valve guide bushing
	(09608–03070) Replacer	Spark plug tube gasket
	09631–22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	
	09816–30010 Oil Pressure Switch Socket	Knock sensor Oil pressure switch
	09843–18020 Diagnosis Check Wire	
	09960–10010 Variable Pin Wrench Set	
	(09962–01000) Variable Pin Wrench Arm Assy	Camshaft timing pulley

RECOMMENDED TOOLS

	09040–00010 Hexagon Wrench Set	
	09090–04010 Engine Sling Device	For suspending engine
	09200–00010 Engine Adjust Kit	
	09258–00030 Hose Plug set	Plug for the vacuum hose, fuel hose etc.
	09904–00010 Expander Set	

EQUIPMENT

Battery specific gravity gauge	
Caliper gauge	
CO/HC meter	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune–up tester	
Heater	
Micrometer	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Magnetic finger	

Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	

COOLANT

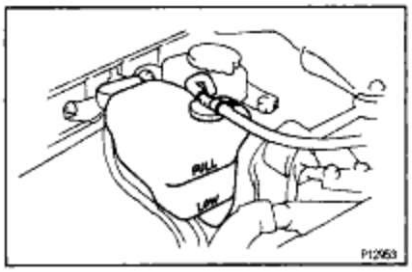
Item	Capacity	Classification
Engine coolant	8.7 liters (9.2 US qts, 7.7 Imp. qts)	Ethylene–glycol base

LUBRICANT

Item	Capacity	Classification
Engine oil Dry fill Drain and refill w/ Oil filter change w/o Oil filter change	 5.5 liters (5.8 US qts, 4.8 Imp. qts) 4.7 liters (5.0 US qts, 4.1 Imp. qts) 4.5 liters (4.8 US qts, 4.0 Imp. qts)	API grade SG or SH, Energy–Conserving II or ILSC multigrade and recommended viscosity oil with SAE 5W–30 being the preferred engine oil

SSM (SERVICE SPECIAL MATERIALS)

08826–00080 Seal packing or equivalent	Camshaft bearing cap Semi–circular plug Spark plug tube Cylinder head cover
08826–00080 Seal packing or equivalent	Intake air control valve Rear oil seal retainer No. 1 oil pan No.2 oil pan
08826–00100 Seal Packing 1282B, THREE BOND 1282B or equivalent	Engine coolant drain cock Water seal plate Water inlet housing
08833–00070 Adhesive 1311, THREE BOND 1311 or equivalent	Drive plate bolt TVV
08833–00080 Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pressure switch

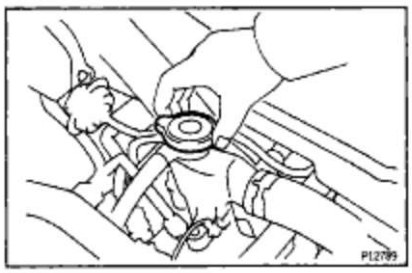


TUNE–UP

ENGINE COOLANT INSPECTION

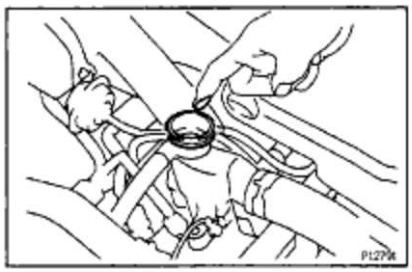
1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

The engine coolant level should be between the "LOW" and "FULL" lines.
If low, check for leaks and add engine coolant up to the "FULL" line.



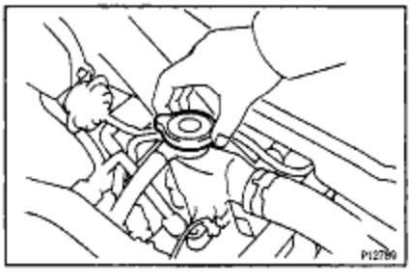
2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap from the water outlet.
CAUTION: To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

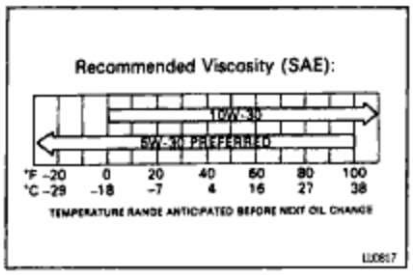


(b) There should not be any excessive deposits of rust or scale around the radiator cap or water outlet filler hole, and the coolant should be free from oil.
If excessively dirty, clean the coolant passages and replace the coolant.
Capacity:
8.7 liters (9.2 US qts, 7.7 Imp. qts)
HINT:
- Use a good brand of ethylene–glycol base coolant and mix it according to the manufacturer's directions.
- Using coolant which includes more than 50 % ethylene–glycol (but not more than 70 %) is recommended.

NOTICE:
- **Do not use an alcohol type coolant.**
- **The coolant should be mixed with demineralized water or distilled water.**



(c) Reinstall the radiator cap.



ENGINE OIL INSPECTION

1. CHECK OIL QUALITY

Check the oil for deterioration, entry of water, dis–coloring or thinning.

If oil quality is visibly poor, replace the oil.

Oil grade:

API grade SG or SH, Energy – Conserving H or ILSAC multigrade engine oil. Recommended viscosi–ty is as shown in the illustration, with SAE 5W–30 being the preferred engine oil.

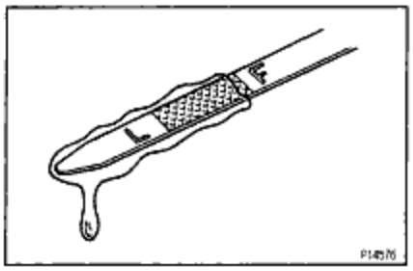
Drain and refill capacity:

w/ Oil filter change

4.7 liters (5.0 US qts, 4.1 Imp, qts)

w/o Oil filter change

4.5 liters (4.8 US qts, 4.0 Imp. qts)



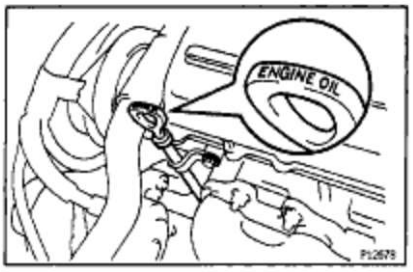
2. CHECK ENGINE OIL LEVEL

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

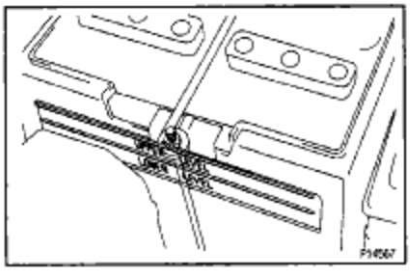
If low, check for leakage and add oil up to the ”F” mark.

NOTICE:

- **Do not fill with engine oil above the ’F’ mark.**



- **Install the oil dipstick facing the direction shown in the illustration.**



BATTERY INSPECTION

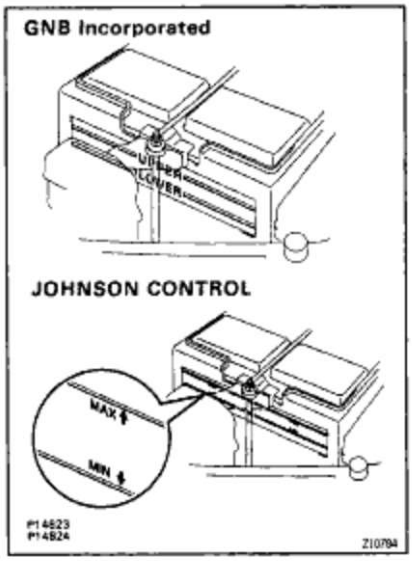
1. Except Delco Battery:

CHECK BATTERY ELECTROLYTE LEVEL

Check the electrolyte quantity of each cell.

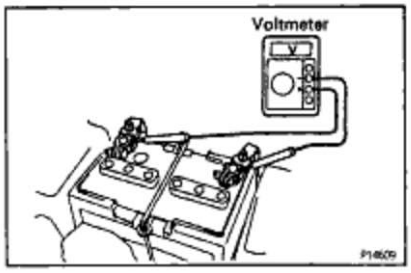
A. Maintenance Free Battery

If under the lower level, replace the battery (or add distilled water if possible). Check the charging system.



B. Except Maintenance Free Battery

If under the ”LOWER” or ”MIN’ line, add distilled water.



2. Except Delco Battery:

CHECK BATTERY VOLTAGE AND SPECIFIC GRAVITY

A. Maintenance Free Battery

Measure the battery voltage between the terminals negative (–) and positive (+) of the battery.

Standard voltage:

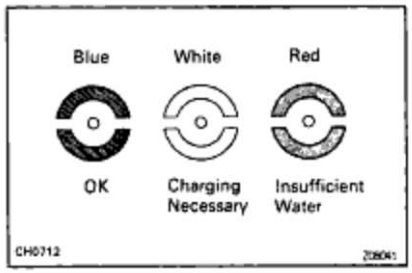
12.7 – 12.9 V at 20˚C (68˚F)

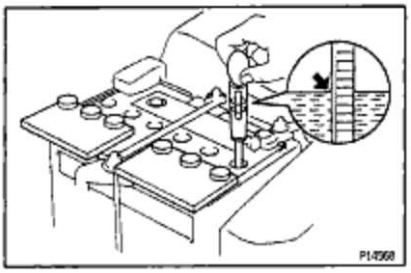
HINT:

- Before measuring the voltage, turn the ignition switch to LOCK and turn off the electrical sys–tems (headlight, blower motor, rear defogger etc.; for 60 seconds to remove the surface charge.
- If the vehicle has been running, wait 5 minutes or more after the vehicle stops before measuring the battery voltage.

If the voltage is less than specification, charge the battery.

HINT: Check the indicator as shown in the illustration.





B. Except Maintenance Free Battery

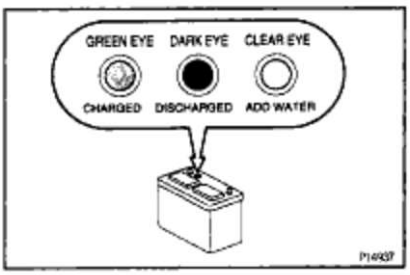
Check the specific gravity of each cell.

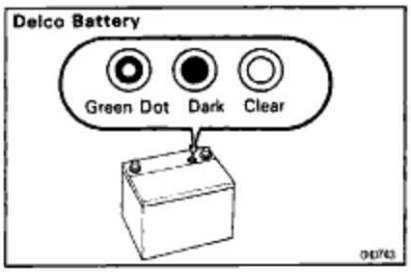
Standard specific gravity:

55D23L battery for GNB Incorporated
1.25 – 1.27 at 20˚C (60˚F)
5513231– battery for JOHNSON CONTROLS
1.26 – 1.28 at 27˚C (81˚F)
80D26L battery for GNB Incorporated
1.27 – 1.29 at 20˚C (68˚F)
80D26L battery for JOHNSON CONTROLS
1.28 – 1.30 at 27˚C (80˚F)

If the gravity is less than specification, charge the battery.

HINT: Check the indicator as shown in the illustration.





3. Delco Battery:

CHECK HYDROMETER

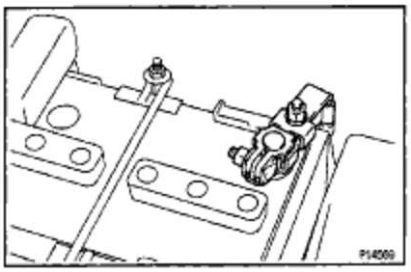
Green Dot visible:
Battery is adequately charged
Dark (Green Dot not visible):
Battery must be charged
Clear or Light Yellow:
Replace battery

HINT: There is no need to add water during the entire service life of the battery.

4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

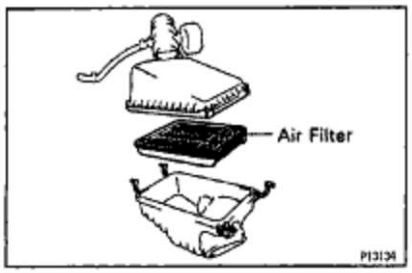
(a) Check that the battery terminals are not loose or corroded.

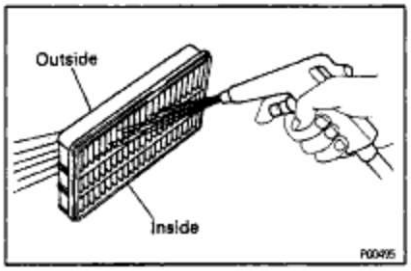
(b) Check the fusible link and fuses for continuity.



AIR FILTER INSPECTION AND CLEANING

1. REMOVE AIR FILTER





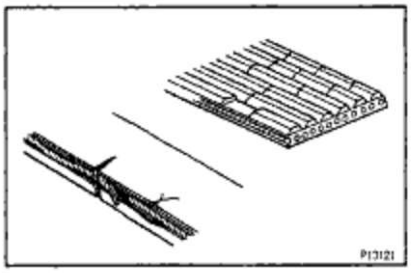
2. INSPECT AND CLEAN AIR FILTER

(a) Visually check that the air filter is not excessively dirty, damaged or oily.
If necessary, replace the air filter.
(b) Clean the air filter with compressed air.
First blow from the inside thoroughly, then blow from the outside of the air filter.

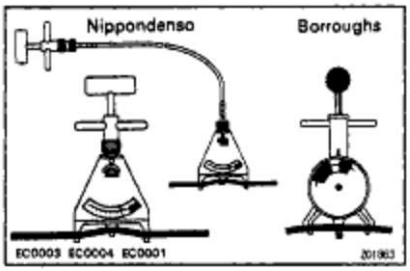
3. REINSTALL AIR FILTER

GENERATOR DRIVE BELT INSPECTION

INSPECT DRIVE BELT

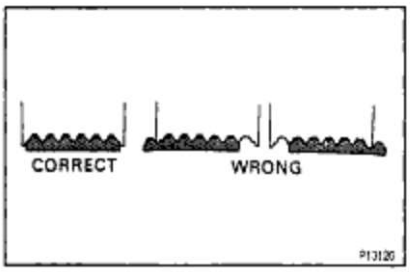


(a) Visually check the belt for excessive wear, frayed cords etc.
If necessary, replace the drive belt.
HINT: Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.
(b) Using a belt tension gauge, measure the drive belt tension.

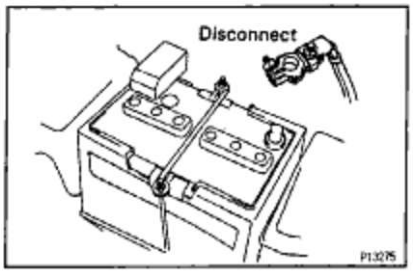


Belt tension gauge:
Nippondenso BTG – 20 (95506–00020)
Borroughs No. BT–33–73F
Drive belt tension:
New belt
175 ± 5 lbf
Used belt
115 ±20 lbf

If the belt tension is not as specified, adjust it.
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.
- After installing the belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



VALVE CLEARANCE INSPECTION AND ADJUSTMENT

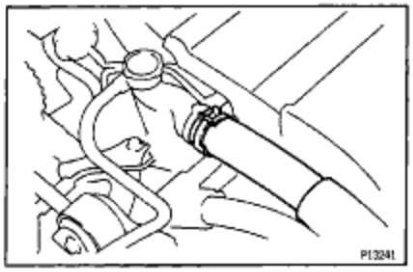
HINT: Inspect and adjust the valve clearance when the engine is cold.

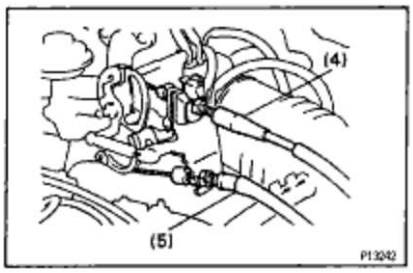
1. DISCONNECT NEGATIVE (–) TERMINAL CABLE TO BATTERY

CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

2. DRAIN ENGINE COOLANT

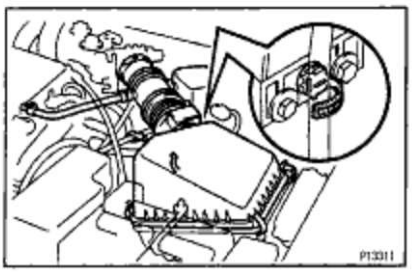
3. DISCONNECT RADIATOR INLET HOSE





4. DISCONNECT ACCELERATOR CABLE

5. DISCONNECT THROTTLE CABLE

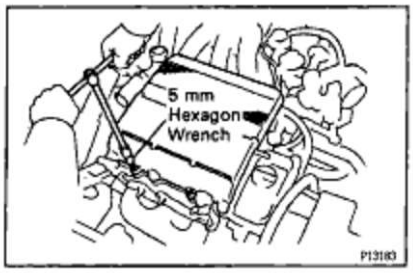


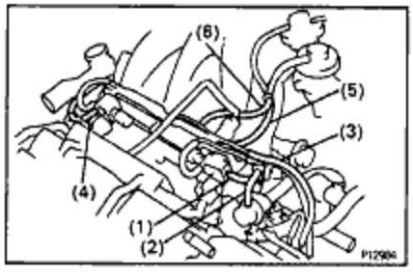
6. REMOVE AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE

(a) Disconnect the volume air flow meter connector and wire clamp.
(b) Disconnect the accelerator cable clamp.
(c) Disconnect the PCV hose.
(d) Loosen the air cleaner hose clamp bolt.
(e) Disconnect the 4 air cleaner cap clips.
(f) Remove the air cleaner cap and volume air flow meter together with the air cleaner hose.

7. REMOVE V–BANK COVER

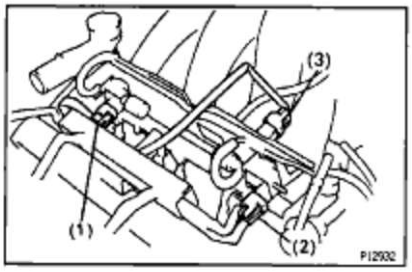
Using a 5 mm hexagon wrench, remove the 2 nuts and V–bank cover.



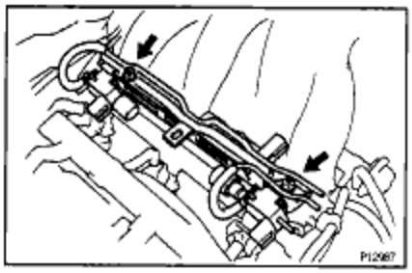


8. REMOVE EMISSION CONTROL VALVE SET

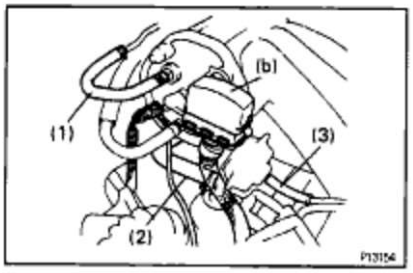
(a) Disconnect the following vacuum hoses:
- (1) Vacuum hose from fuel pressure control VSV
- (2) Vacuum hose from fuel pressure regulator
- (3) Vacuum hose from cylinder head rear plate
- (4) Vacuum hose from intake air control valve VSV
- (5) Vacuum hose from EGR vacuum modulator
- (6) Vacuum hose from EGR valve



(b) Disconnect the following connectors:
- (1) Intake air control valve connector
- (2) Fuel pressure connector
- (3) EGR VSV connector

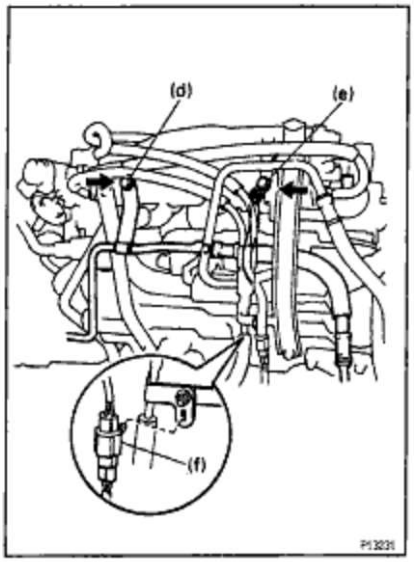


(c) Remove the 2 nuts and emission control valve set.

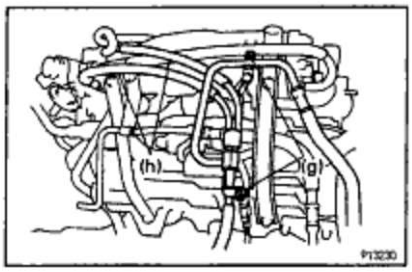


9. REMOVE AIR INTAKE CHAMBER

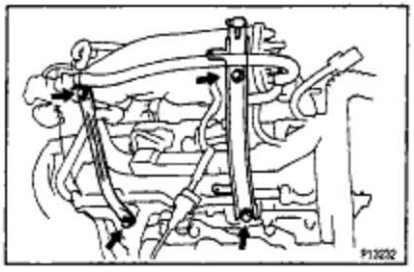
(a) Disconnect the following hoses:
- (1) Brake booster vacuum hose
- (2) PCV hose
- (3) Intake air control valve vacuum hose
- (b) Disconnect the data link connector 1.
- (c) Remove the nut and disconnect the 2 ground straps.



(d) Remove the bolt and disconnect the hydraulic motor pressure hose from the air intake chamber.
(e) Remove the bolt, and disconnect the ground strap.
(f) Disconnect the RH oxygen sensor connector clamp from the PS pressure tube.

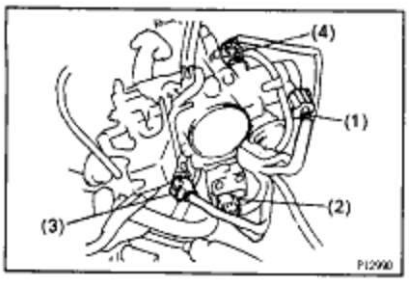


(g) Remove the 2 nuts, and disconnect the PS pressure tube.
(h) Disconnect the 2 PS air hoses.

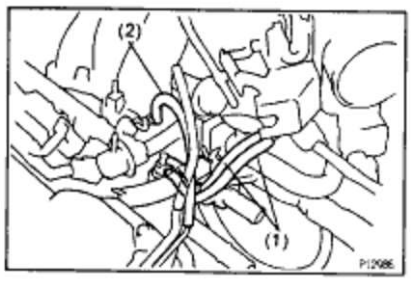


(i) Remove the 2 bolts and No.1 engine hanger.
(j) Remove the 2 bolts and air intake chamber stay.

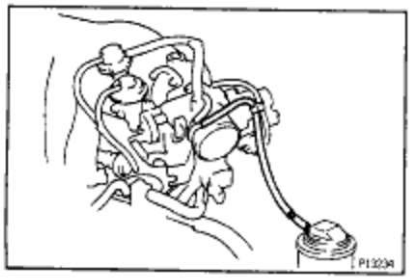
(k) Remove the 4 nuts, EGR pipe and 2 gaskets.



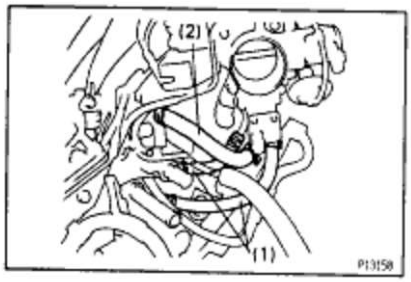
(l) Disconnect the following connectors:
(1) Throttle position sensor connector
(2) IAC valve connector
(3) EGR gas temperature sensor connector
(4) A/C idle–up connector



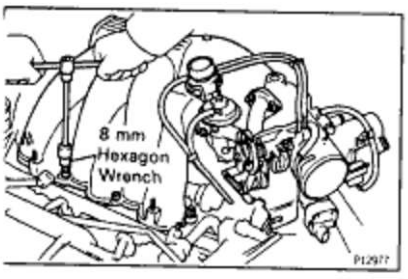
(m) Disconnect the following vacuum hoses:
(1) 2 vacuum hoses from TVV
(2) Vacuum hose from cylinder head rear plate



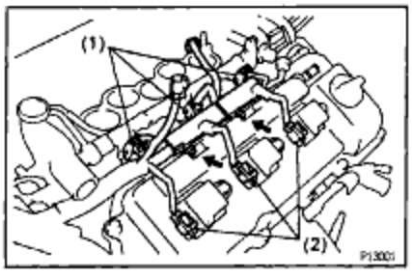
(3) Vacuum hose from charcoal canister



(n) Disconnect the following hoses:
(1) 2 water bypass hoses
(2) Air assist hose

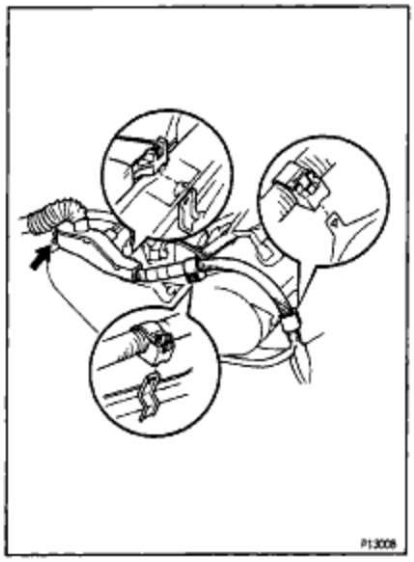


(o) Using an 8 mm hexagon wrench, remove the 2 bolts, 2 nuts, air intake chamber and gasket.



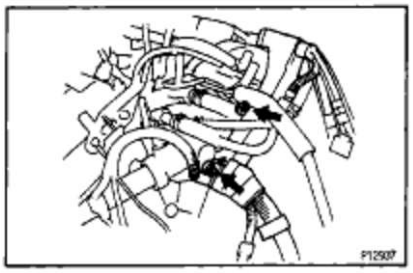
10. DISCONNECT ENGINE WIRE FROM ENGINE LH SIDE

(a) Disconnect the following connectors:
(1) 3 injector connectors
(2) 3 ignition coil connectors
(b) Remove the 2 nuts, and disconnect the engine wire.



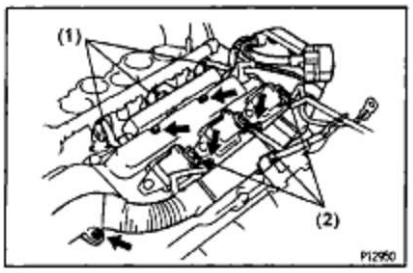
11. DISCONNECT ENGINE WIRE FROM NO.3 TIMING BELT COVER

Remove the bolt and 3 clamps, and disconnect the engine wire.



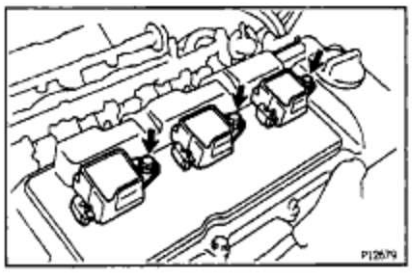
12. DISCONNECT ENGINE WIRE FROM ENGINE REAR SIDE

Remove the 2 nuts, and disconnect the engine wire.

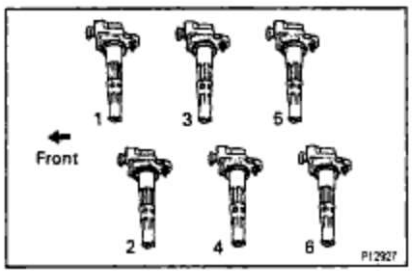


13. DISCONNECT ENGINE WIRE FROM ENGINE RH SIDE

(a) Disconnect the following connectors:
(1) 3 injector connectors
(2) 3 ignition coil connectors
(b) Remove the 5 nuts, and disconnect the engine wire.

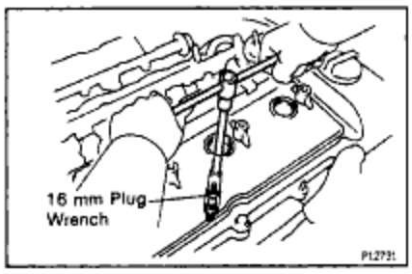


14. REMOVE IGNITION COILS
Remove the 6 bolts and 6 ignition coils from the RH and LH cylinder heads.

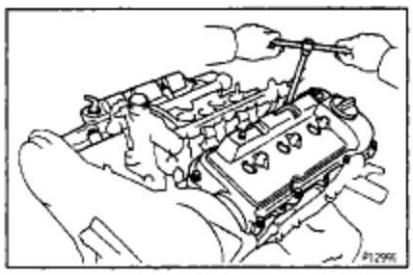


HINT: Arrange the ignition coils in the correct order.

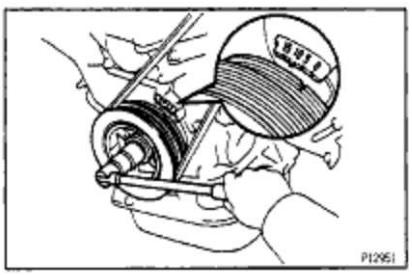
15. REMOVE SPARK PLUGS
Using a 16 mm plug wrench, remove the 6 spark plugs from the RH and LH cylinder heads.

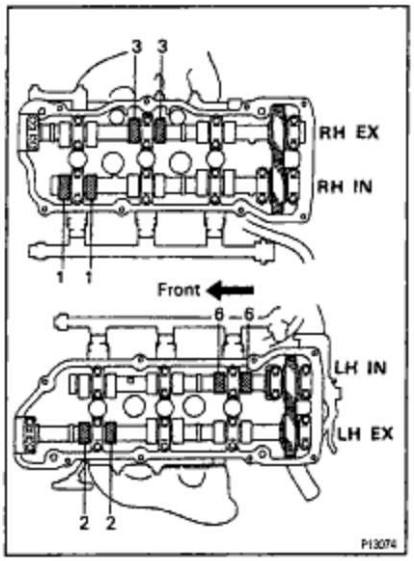


16. REMOVE CYLINDER HEAD COVERS
Remove the 8 bolts, cylinder head cover and gasket.
Remove the 2 cylinder head covers.



17. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Turn the crankshaft pulley, and align its groove with the timing mark ”0” of the No.1 timing belt cover.
(b) Check that the valve lifters on the No.1 (IN) are loose and valve lifters on the No.1 (EX) are tight.
If not, turn the crankshaft 1 revolution (360°) and align the mark as above.





18. INSPECT VALVE CLEARANCE

(a) Check only those valves indicated in the illustration.

- Using a feeler gauge, measure the clearance be–tween the valve lifter and camshaft.
- Record out of specification valve clearance mea–surements. They will be used later to determine the required replacement adjusting shim.

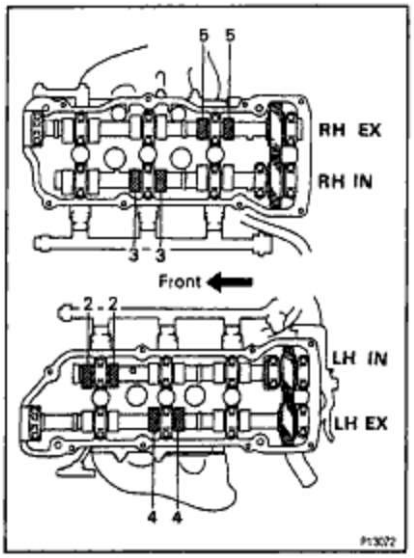
Valve clearance (Cold):

Intake

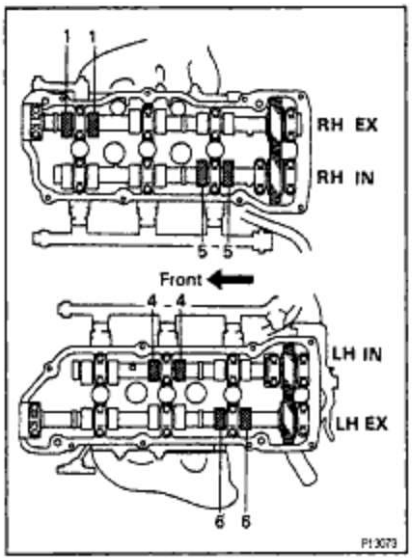
0.15 – 0.25 mm (0.006 – 0.010 in.)

Exhaust

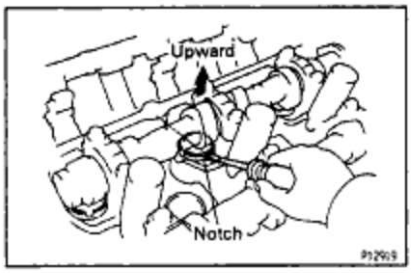
0.25 – 0.35 mm (0.010 – 0.014 in.)



(b) Turn the crankshaft 2/3 of a revolution (240_2), and check only. the valves indicated in the illustration. Measure the valve clearance.
(See procedure step (a))



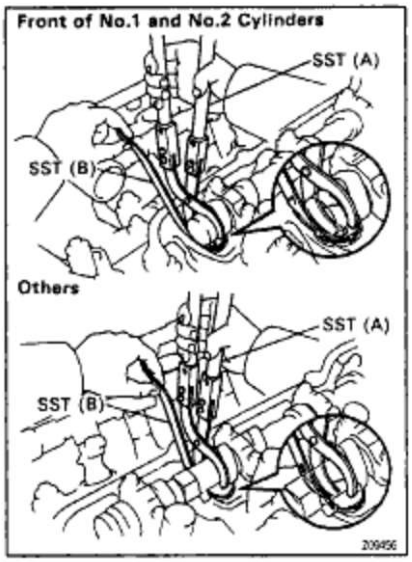
(c) Turn the crankshaft a further 2/3 of a revolution (240_2), and check only the valves indicated in the illustration.
Measure the valve clearance.
(See procedure step (a))



19. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.

- Turn the camshaft so that the cam lobe for the valve to be adjusted faces up.
- Turn the valve lifter with a screwdriver so that the notches would be perpendicular to the cam–shaft.

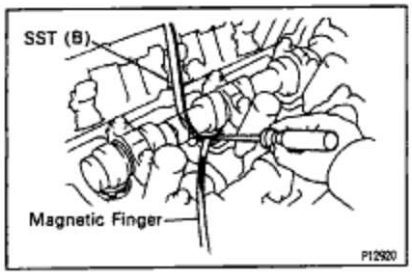


- Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

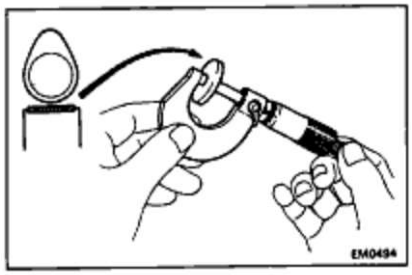
SST 09248–55040 (09248–05410, 09248–05420)

HINT:

- Apply SST (B) at a slight angle on the side marked with ”9” or ”7”, at the position shown in the illustration.
- When SST (B) is inserted too deeply, it will get pinched by the shim. To prevent it from being stuck, insert it gently from the intake side, at a slight angle.



- Using a small screwdriver and a magnetic finger, remove the adjusting shim.



(b) Determine the replacement adjusting shim size according to the following Formula or Charts on the next 2 pages:

- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so the valve clearance comes within specified value.

T ..... Thickness of used shim
A ..... Measured valve clearance
N ..... Thickness of new shim

Intake

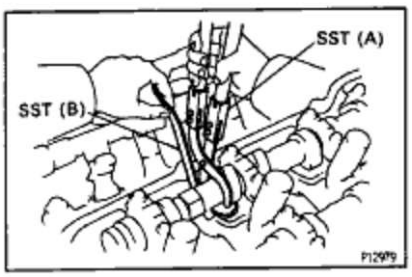
N = T + (A – 0.20 mm (0.008 in.))

Exhaust

N = T + (A – 0.30 mm (0.012 in.))

- Select a new shim with a thickness as close as possible to the calculated values.

HINT: Shims are available in 17 sizes in increments of 0.050 mm (0.0020 in.), from 2.500 mm (0.0984 in.) to 3.300 mm (0.1299 in.).

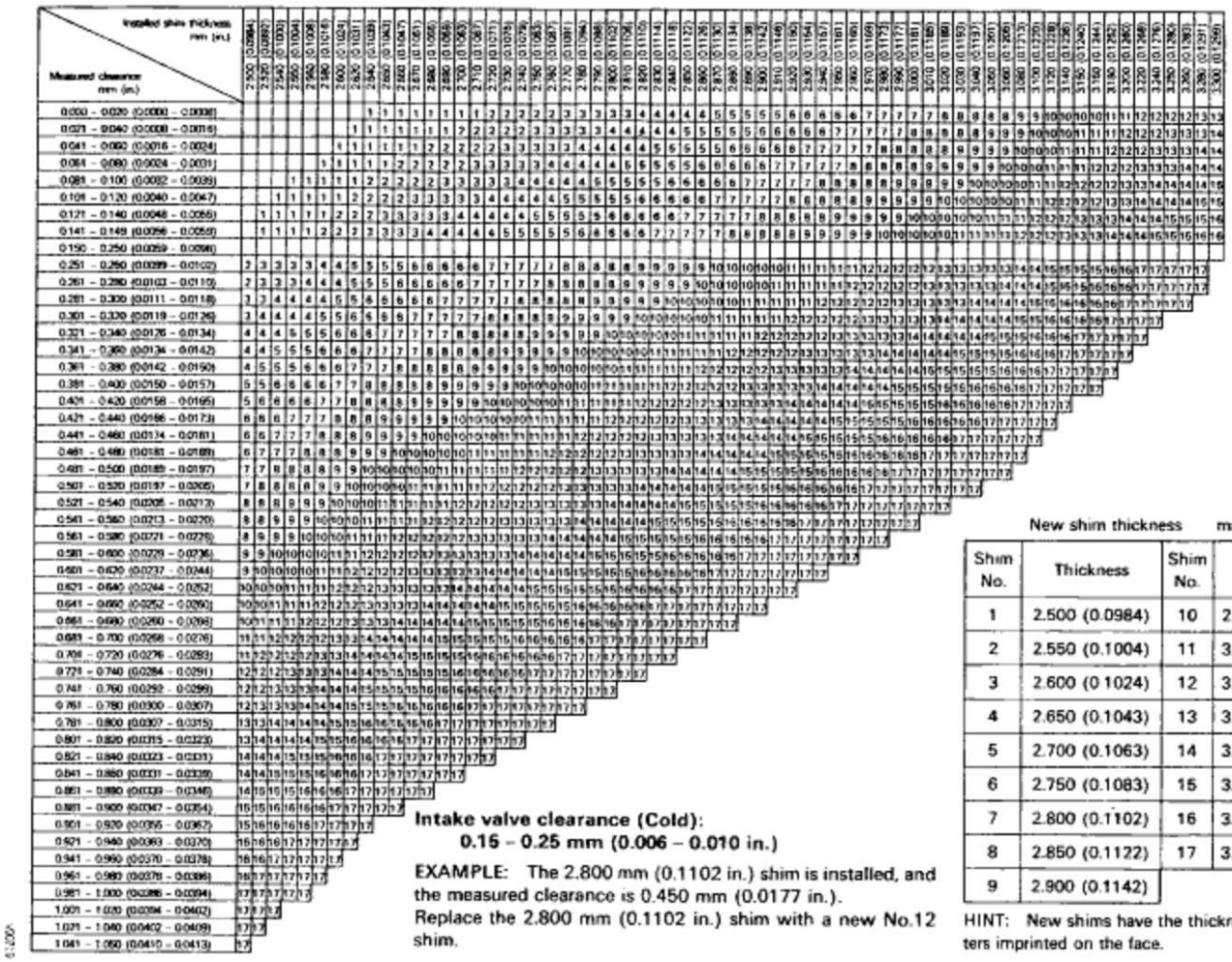


(c) Install a new adjusting shim.

- Place a new adjusting shim on the valve lifter, with imprinted numbers facing down.
- Press down the valve lifter with SST (A), and remove SST (B).
  SST 09248–55040 (09248–05410, 09248–05420)

(d) Recheck the valve clearance.

Adjusting Shim Selection Chart (Intake)



Intake valve clearance (Cold):
0.15 – 0.25 mm (0.006 – 0.010 in.)

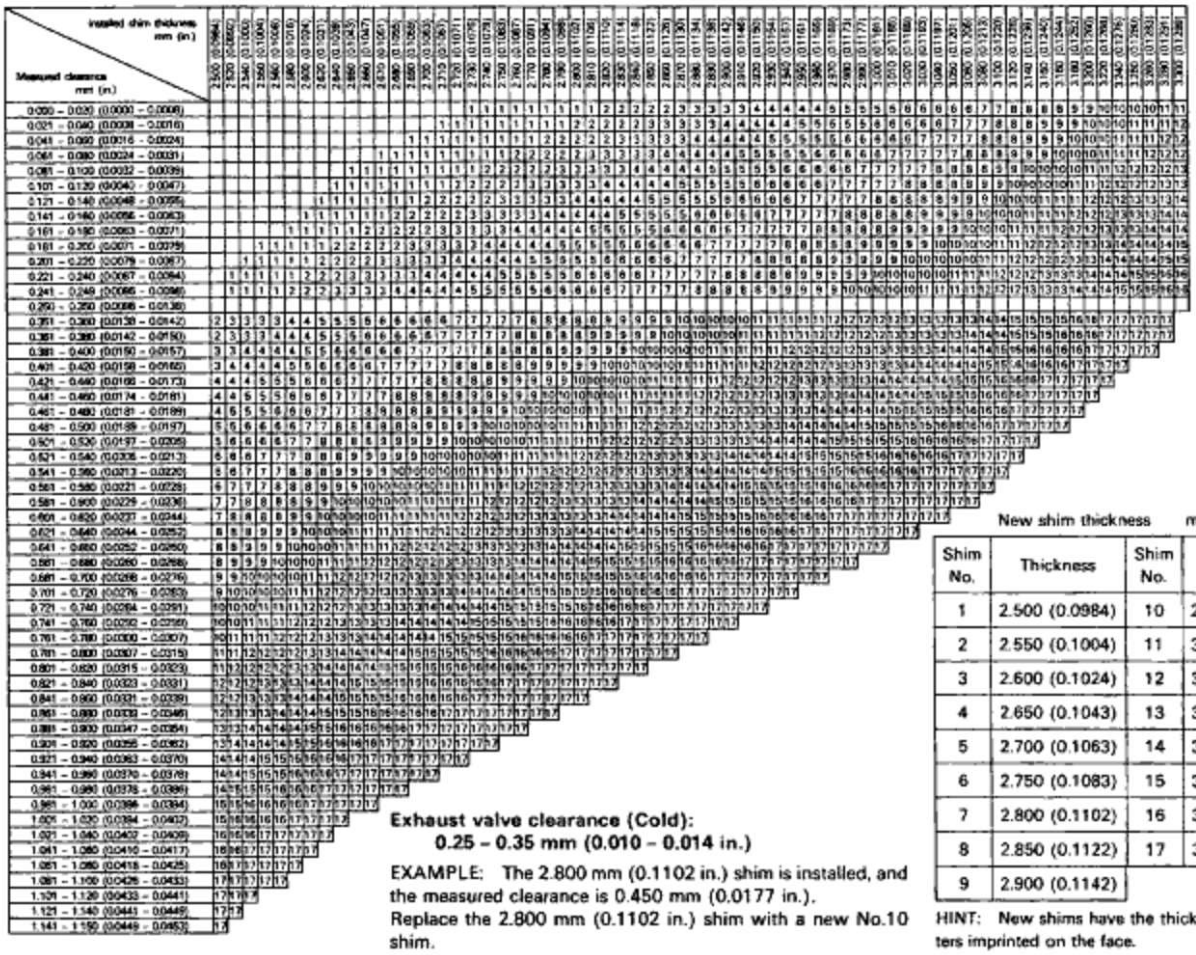
EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.12 shim.

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT: New shims have the thickness in millimeters imprinted on the face.

Adjusting Shim Selection Chart (Exhaust)



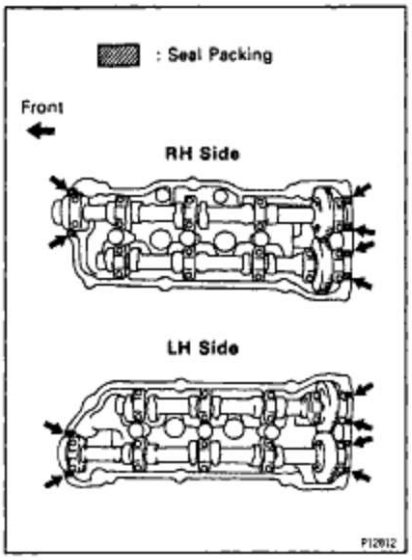
Exhaust valve clearance (Cold):
0.25 – 0.35 mm (0.010 – 0.014 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.10 shim.

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT: New shims have the thickness in millimeters imprinted on the face.

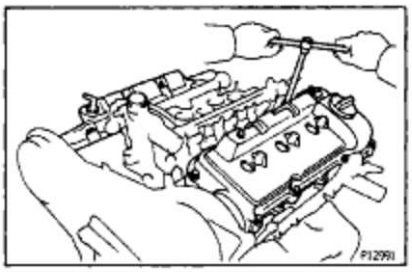


20. REINSTALL CYLINDER HEAD COVERS

(a) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing:

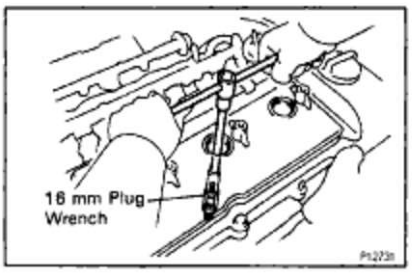
Part No. 08826–00080 or equivalent



(b) Install the gasket to the cylinder head cover.

(c) Install the cylinder head cover with the 8 bolts. Uniformly tighten the bolts in several passes. Install the 2 cylinder head covers.

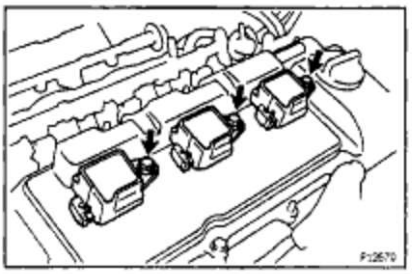
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



21. REINSTALL SPARK PLUGS

Using a 16 mm plug wrench, install the 6 spark plugs to the RH and LH cylinder heads.

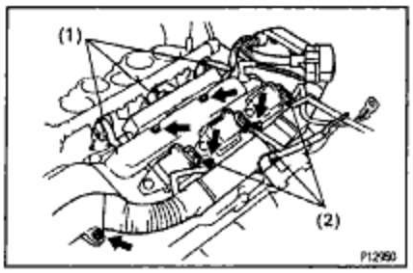
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)



22. REINSTALL IGNITION COILS

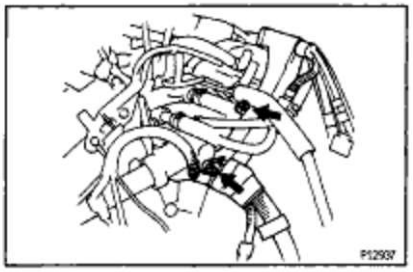
Install the6 ignition coils to the RH and LH cylinder heads.

Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



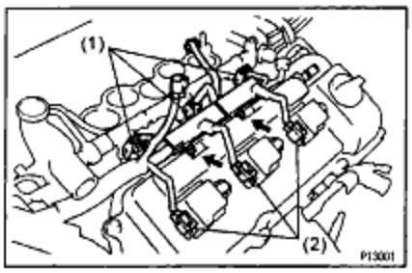
23. RECONNECT ENGINE WIRE TO ENGINE RH SIDE

(a) Connect the engine wire with the 5 nuts.
(b) Connect the following connectors:
(1) 3 injector connectors
(2) 3 ignition coil connectors



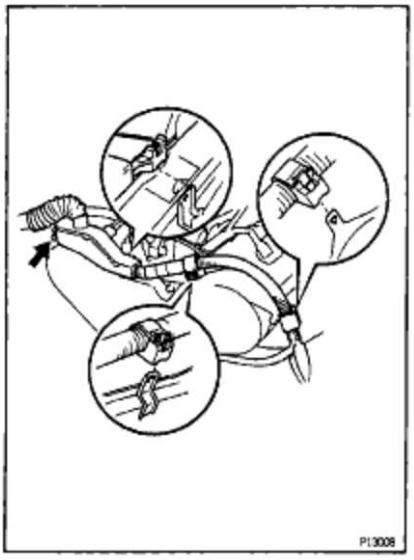
24. RECONNECT ENGINE WIRE TO ENGINE REAR SIDE

Connect the engine wire with the 2 nuts.



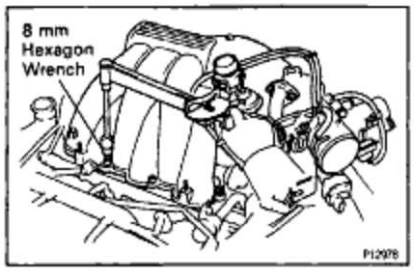
25. RECONNECT ENGINE WIRE TO ENGINE LH SIDE

(a) Connect the engine wire with the 2 nuts.
(b) Connect the following connectors:
(1) 3 injector connectors
(2) 3 ignition coil connectors



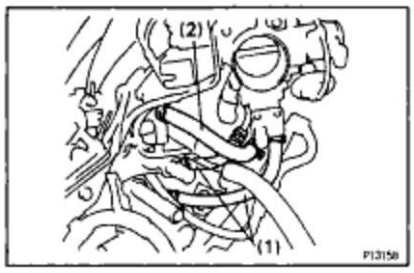
26. RECONNECT ENGINE WIRE TO NO.3 TIMING BELT COVER

(a) Connect the 3 clamps.
(b) Connect the engine wire with the bolt.

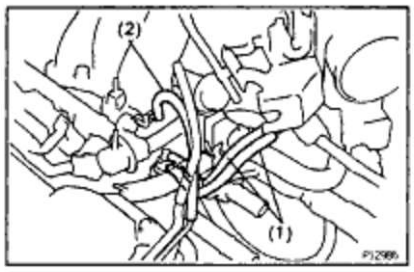


27. REINSTALL AIR INTAKE CHAMBER

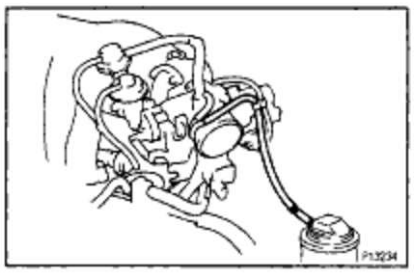
(a) Using an 8 mm hexagon wrench, install a new gasket and the air intake chamber with the 2 bolts and 2 nuts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



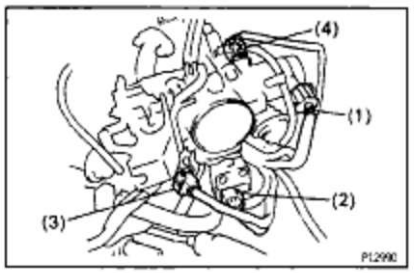
(b) Connect the following hoses:
(1) 2 water bypass hoses
(2) Air assist hose



(c) Connect the following vacuum hoses:
(1) 2 vacuum hoses to TVV
(2) Vacuum hose to cylinder head rear plate

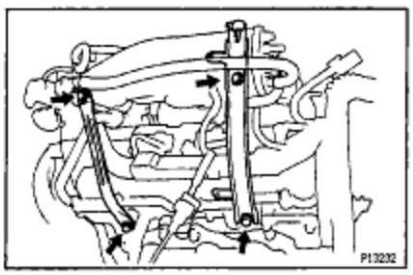


(3) Vacuum hose to charcoal canister

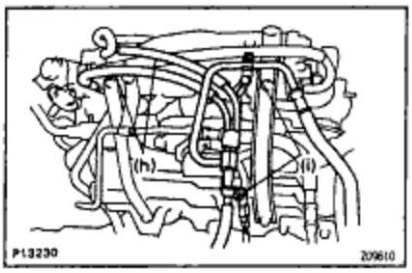


(d) Connect the following connectors:
(1) Throttle position sensor connector
(2) IACV valve connector
(3) EGR gas temperature sensor connector
(4) A/C idle–up connector

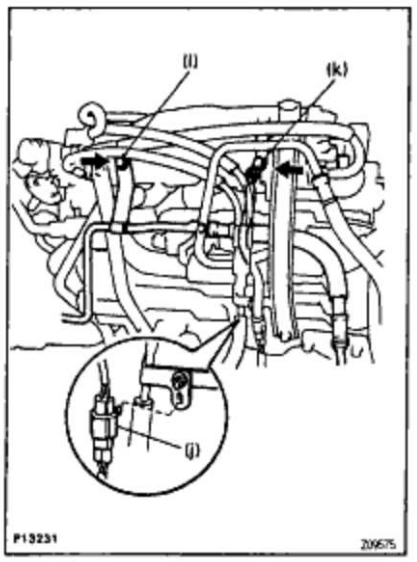
(e) Install 2 new gaskets and EGR pipe with the 4 nuts.
Torque: 12 N–m (120 kgf–cm. 9 ft–lbf)



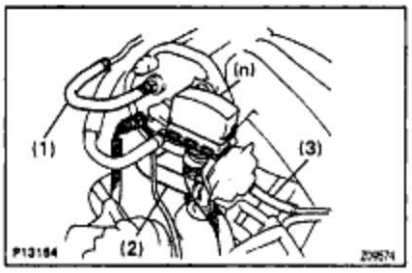
(f) install the No. 1 engine hanger with the 2 bolts.
Torque: 39 N–m (400 kgf–cm, 19 ft–lbf)
(g) Install the air intake chamber stay with the 2 bolts.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)



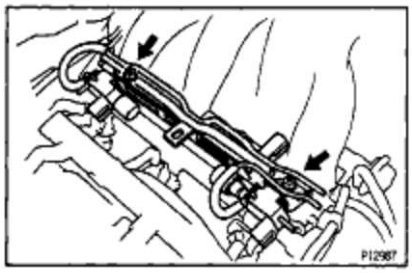
(h) Connect the 2 PS air hoses.
(i) Connect the PS pressure tube with the 2 nuts.



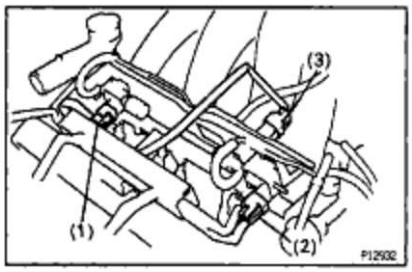
(j) Connect the RH oxygen sensor connector clamp to the PS pressure tube.
(k) Connect the ground strap with the bolt.
(1) Connect the hydraulic pressure pipe to the air intake chamber with the bolt.



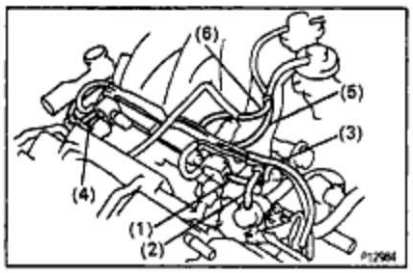
(m) Connect the following hoses:
(1) Brake booster vacuum hose
(2) PCV hose
(3) Intake air control valve vacuum hose
(n) Connect the data link connector 1.
(o) Connect the 2 ground straps with the nut.



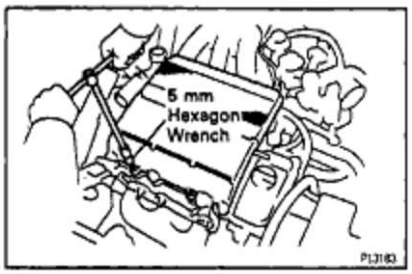
28. REINSTALL EMISSION CONTROL VALVE SET
(a) Install the emission control valve set with the 2 bolts.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



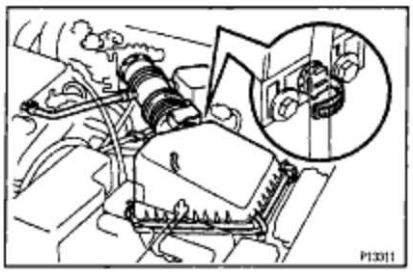
(b) Connect the following connectors:
(1) Intake control valve connector
(2) Fuel pressure connector
(3) EGR VSV connector



(c) Connect the following vacuum hoses:
(1) Vacuum hose to fuel pressure control VSV
(2) Vacuum hose to fuel pressure regulator
(3) Vacuum hose to cylinder head rear plate
(4) Vacuum hose to intake air control valve
(5) Vacuum hose to EGR vacuum modulator
(6) Vacuum hose to EGR valve

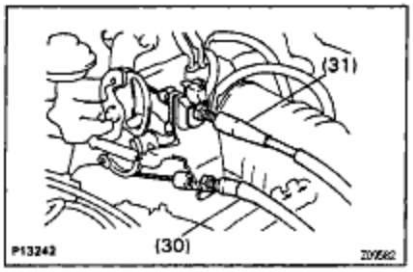


28. REINSTALL V–BANK COVER
Using a 5 mm hexagon wrench, install the V– bank cover with the 2 nuts.

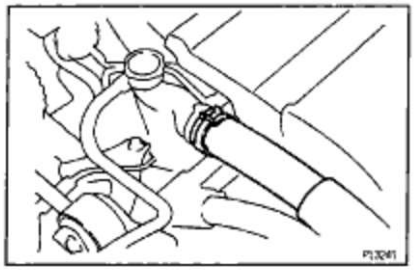


29. REINSTALL AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE

(a) Connect the air cleaner hose, and install the air clean–er cap and volume air flow meter with the 4 clips.
(b) Tighten the air cleaner hose clamp bolt.
(c) Connect the PCV hose.
(d) Connect the accelerator cable clamp.
(e) Connect the volume air flow meter connector and wire clamp.



30. RECONNECT THROTTLE CABLE
31. RECONNECT ACCELERATOR CABLE



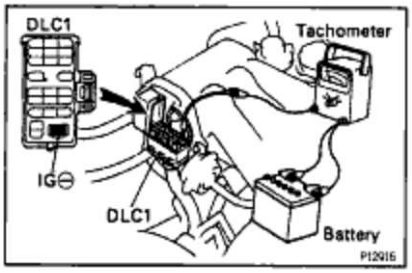
32. RECONNECT RADIATOR INLET HOSE

33. FILL WITH ENGINE COOLANT
Capacity:
8.7 liters (9.2 US qts, 7.7 Imp. qts)
34. RECONNECT NEGATIVE (–) TERMINAL CABLE TO BATTERY

IGNITION TIMING INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



2. CONNECT TACHOMETER TO ENGINE

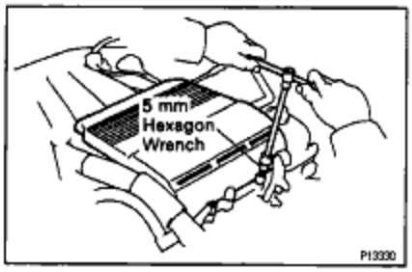
Connect the tester probe of a tachometer to terminal IG(–) of the data link connector 1.

NOTICE:

- **Never allow the tachometer terminal 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 use.**

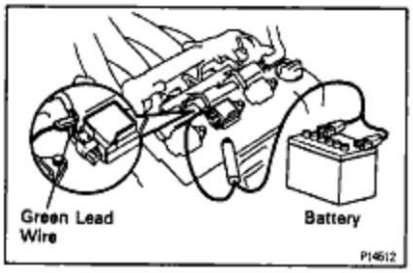
3. CONNECT TIMING LIGHT TO ENGINE

(a) Using a 5 mm hexagon wrench, remove the 2 cap nuts and V– bank cover.



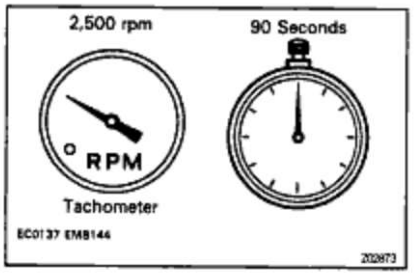
(b) Connect the timing light pickup clip to the the green lead wire for the No.4 ignition coil.

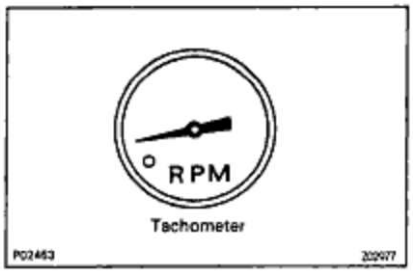
HINT: Use a timing light that can detect the primary signal.



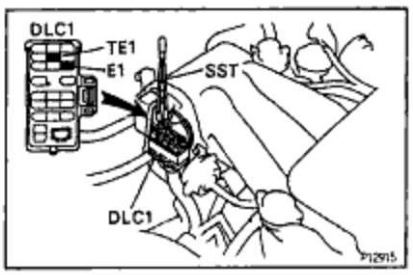
4. CHECK IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.

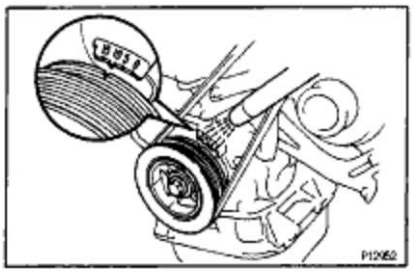




(b) Check the idle speed.
Idle speed:
700 ± 60 rpm

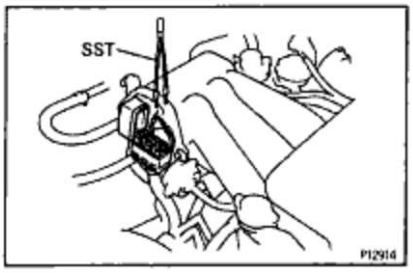


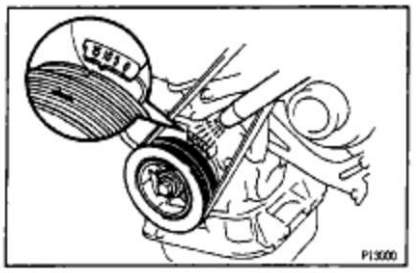
5. INSPECT IGNITION TIMING
(a) Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843–18020



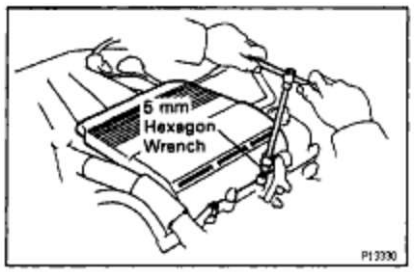
(b) Using a timing light, check the ignition timing.
Ignition timing:
8 – 12$_2$ BTDC @ idle
(Transmission in neutral position)
If the ignition timing is not as specified, check that following conditions are normal:
- Throttle valve fully closed
- Continuity between terminals IDL1 and E2 of the throttle position sensor.
- Valve timing

(c) Remove the SST from the data link connector 1.
SST 09843–18020





6. FURTHER CHECK IGNITION TIMING
Ignition timing:
7 – 17$_2$ BTDC @ idle
(Transmission in neutral position)
HINT: The timing mark moves in a range between 7$_2$ and 17$_2$.



7. DISCONNECT TIMING LIGHT FROM ENGINE

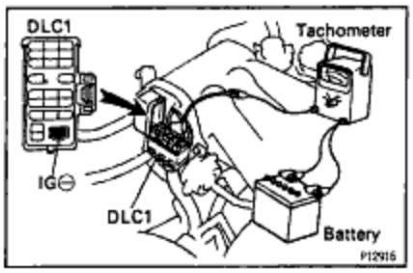
(a) Remove the timing light.
(b) Using a 5 mm hexagon wrench, install the V–bank cover with the 2 cap nuts.

8. DISCONNECT TACHOMETER FROM ENGINE

IDLE SPEED INSPECTION

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 system, etc. should be properly connected.
(f) SFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission, in neutral position

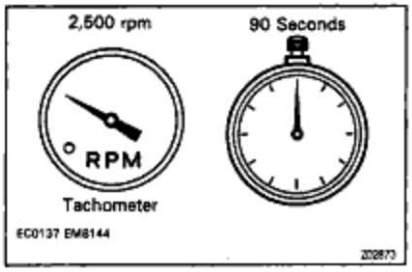


2. CONNECT TACHOMETER

Connect the tester probe of a tachometer to terminal IG(–) of the data link connector 1.

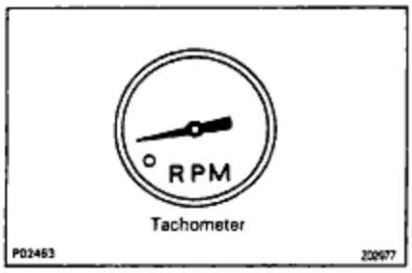
NOTICE:

- **Never allow the tachometer terminal 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 use.**



3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.



(b) Check the idle speed.

Idle speed:

700 ± 50 rpm

If the idle speed is not as specified, check the IAC valve and air intake system.

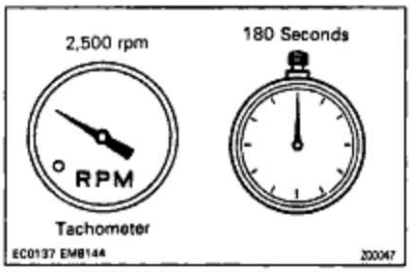
4. DISCONNECT TACHOMETER

IDLE AND OR 2500 RPM CO HC CHECK

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

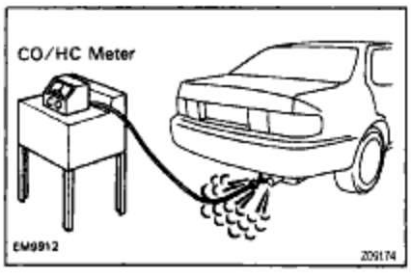
1. INITIAL CONDITIONS

(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) SFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position
(i) Tachometer and CO/HC meter calibrated by hand



2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/NC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT: When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

Troubleshooting

If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.
See the table below for possible causes, and then inspect and correct the applicable causes if neces–sary.

CO	HC	Phenomenon	Causes
Normal	High	Rough idle	1. Faulty ignitions: • 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
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hose • EGR valve • Intake manifold • Air intake chamber • Throttle body • IAC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty SFI systems: • Faulty fuel pressure regulator • Clogged fuel return line • Defective ECT switch • Faulty ECM • Faulty injector • Faulty throttle position sensor • Faulty volume air flow meter

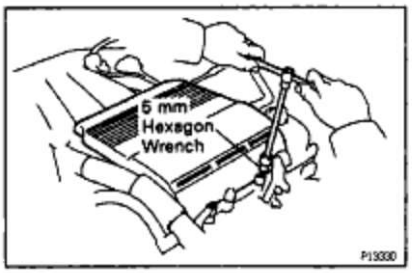
V02907

COMPRESSION CHECK

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

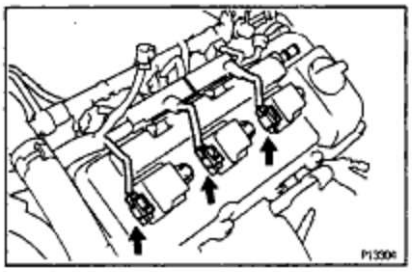
1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.



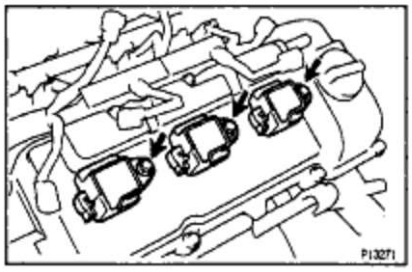
2. REMOVE V–BANK COVER

Using a 5 mm hexagon wrench, remove the 2 cap nuts and V– bank cover.

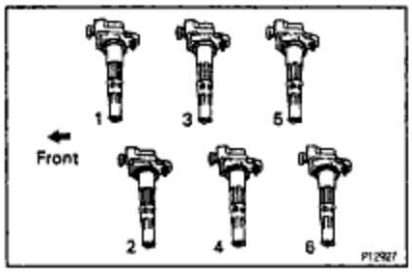


3. REMOVE IGNITION COILS

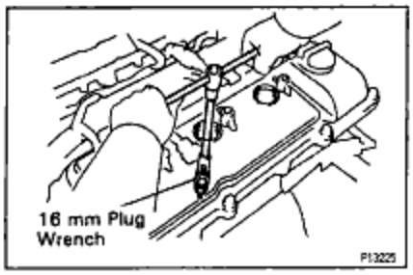
(a) Disconnect the 6 connectors from the RH and LH cylinder heads.



(b) Remove the 6 bolts and 6 ignition coils from the RH and LH cylinder heads.

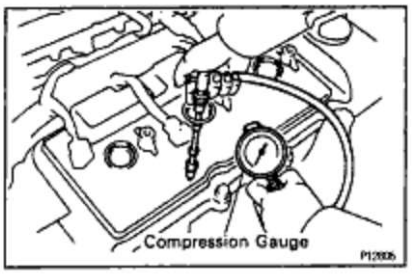


HINT: Arrange the ignition coils in the correct order.



4. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the 6 spark plugs from the RH and LH cylinder heads.



5. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.
(b) Fully open the throttle.
(c) While cranking the engine, measure the compression pressure.
HINT: Always use a fully charged battery to obtain engine speed of 250 rpm or more.

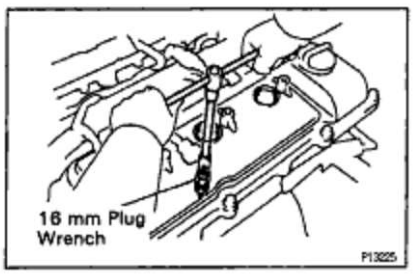
(d) Repeat steps
(a) through
(c) for each cylinder.

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

Compression pressure:
1,226 kPa (12.5 kgf/cm^2, 178 psi) or more
Minimum pressure:
981 kPa (10.0 kgf/cm^2, 142 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

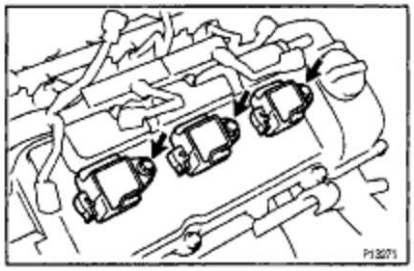
(e) If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.



6. REINSTALL SPARK PLUGS

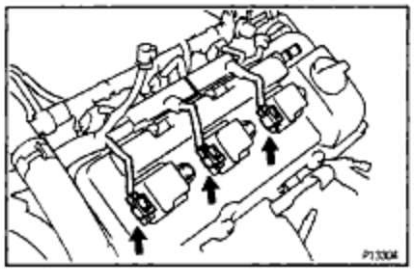
Using a 16 mm plug wrench, install the 6 spark plugs to the RH and LH cylinder heads.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)



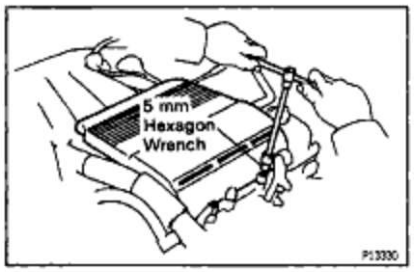
7. INSTALL IGNITION COILS

(a) Install the 6 ignition coil to the RH and LH cylinder heads with the 6 bolts.

Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



(b) Connect the 6 ignition coil connectors.

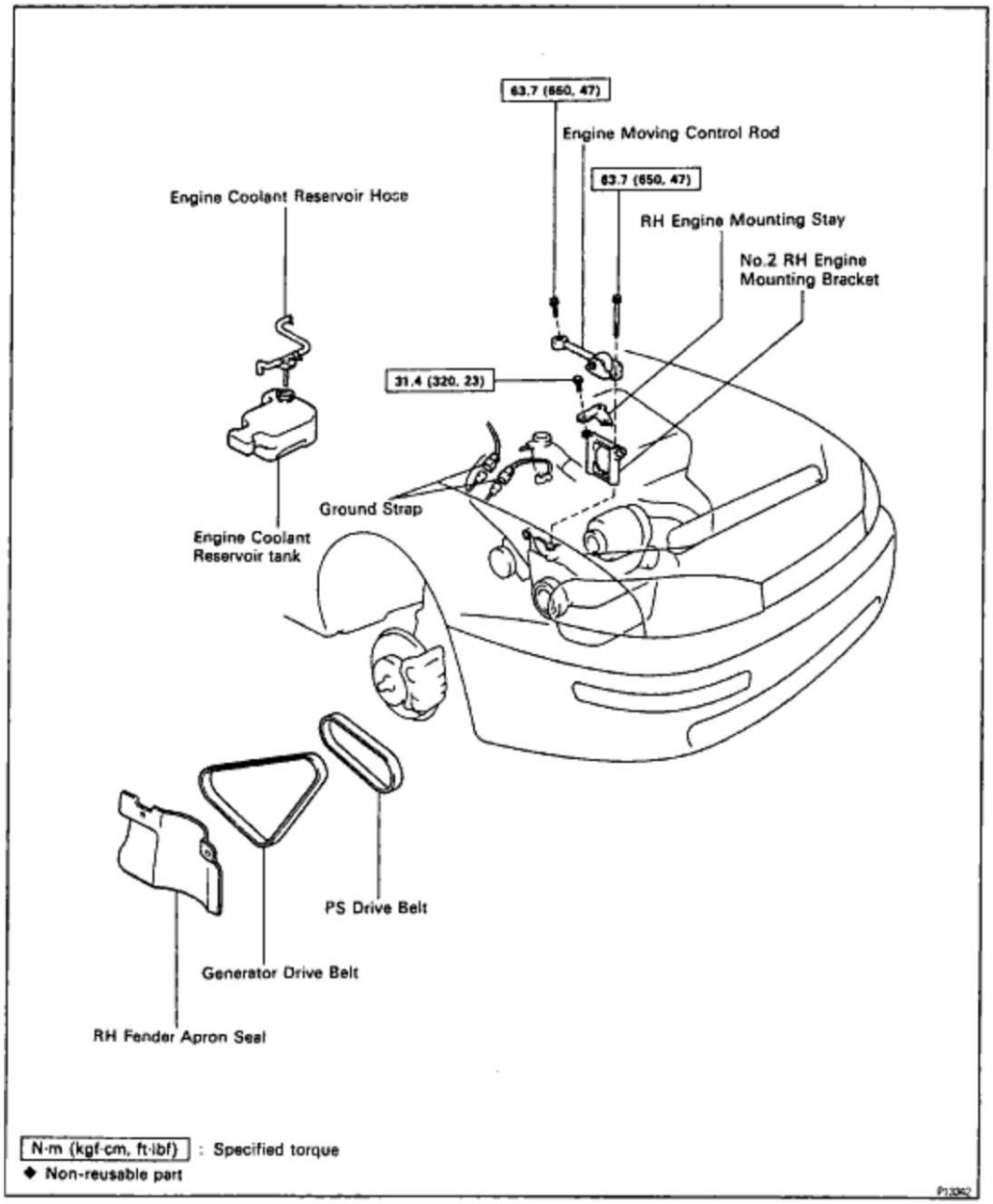


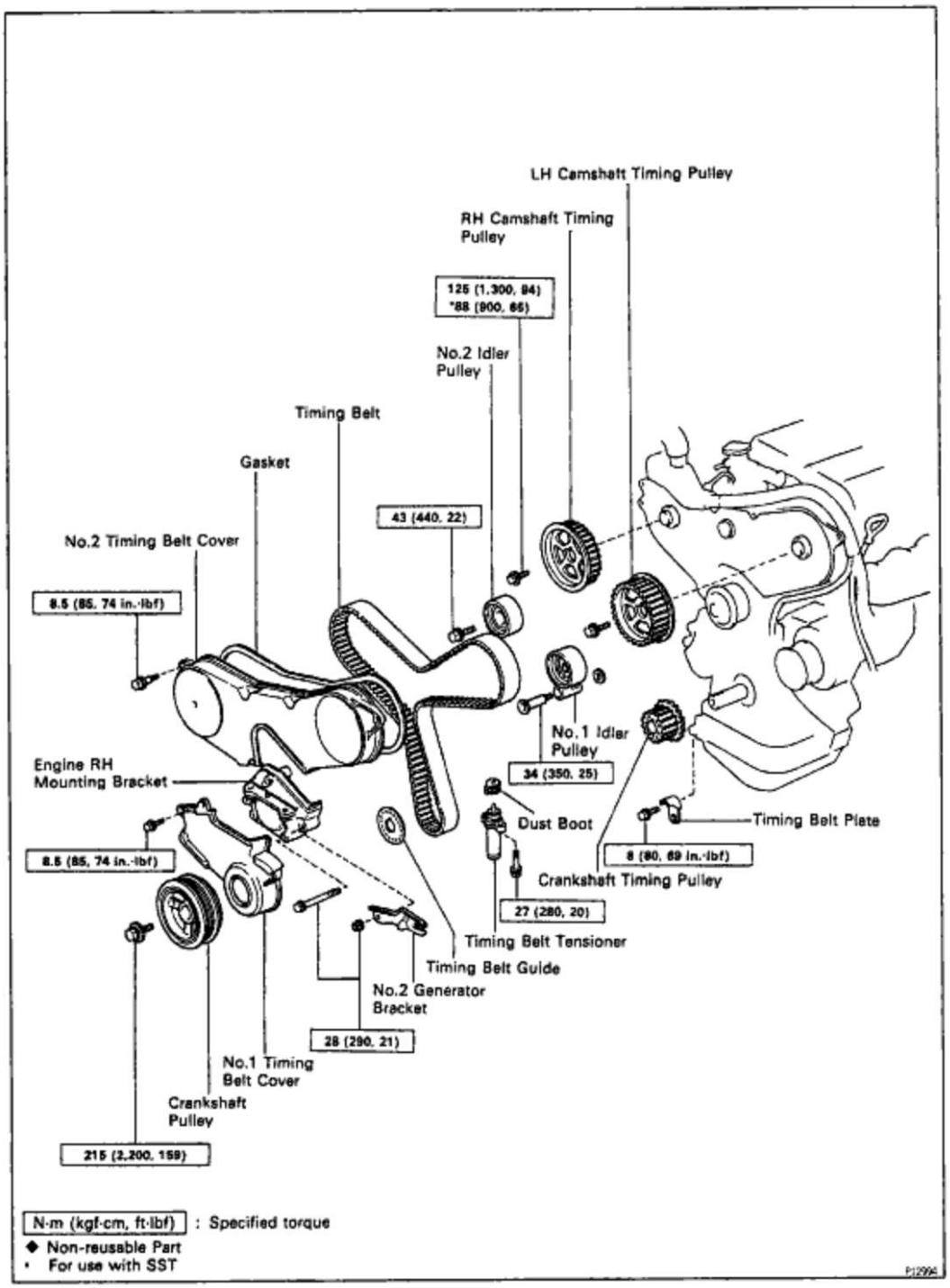
8. REINSTALL V–BANK COVER

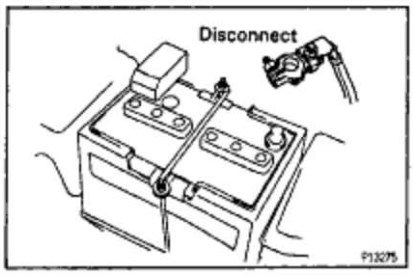
Using a 5 mm hexagon wrench, install the V –bank cover with the 2 cap nuts.

TIMING BELT

COMPONENTS FOR REMOVAL AND INSTALLATION




LH Camshaft Timing Pulley
RH Camshaft Timing Pulley
125 (1,300, 94)
*88 (900, 65)
No.2 Idler Pulley
Timing Belt
Gasket
43 (440, 32)
No.2 Timing Belt Cover
8.5 (85, 74 in.·lbf)
No.1 Idler Pulley
34 (350, 25)
Engine RH Mounting Bracket
Dust Boot
Timing Belt Plate
8.5 (85, 74 in.·lbf)
8 (80, 69 in.·lbf)
Crankshaft Timing Pulley
27 (280, 20)
Timing Belt Tensioner
Timing Belt Guide
No.2 Generator Bracket
28 (290, 21)
No.1 Timing Belt Cover
Crankshaft Pulley
215 (2,200, 159)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable Part
* For use with SST

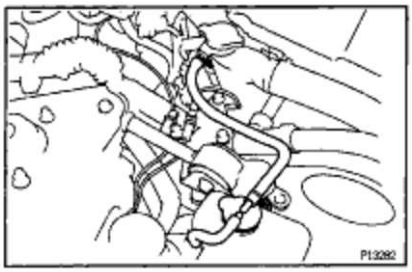


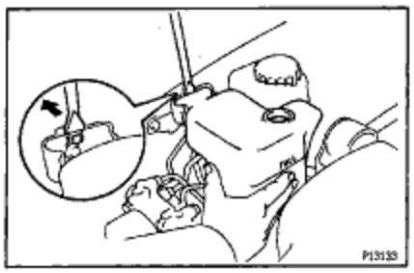
TIMING BELT REMOVAL

(See Components for Removal and Installation)

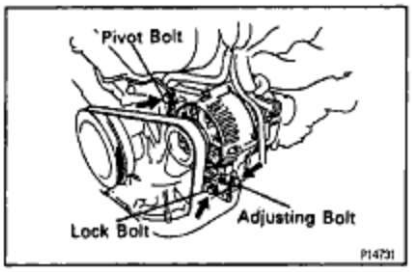
1. DISCONNECT NEGATIVE (–) TERMINAL CABLE FROM BATTERY
CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the 'LOCK' position and the negative (–) terminal cable is disconnected from the battery.

2. REMOVE ENGINE COOLANT RESERVOIR TANK
(a) Disconnect the reservoir hose.

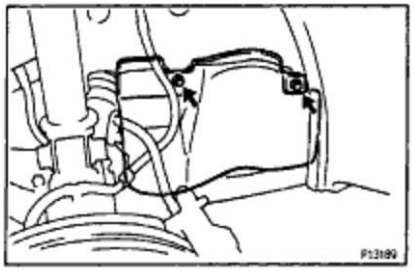




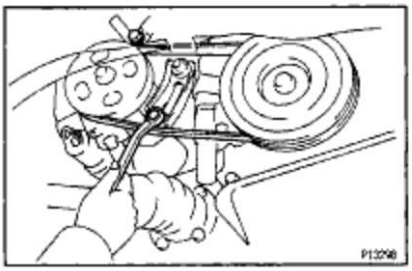
(b) Using a screwdriver, remove the reservoir tank.



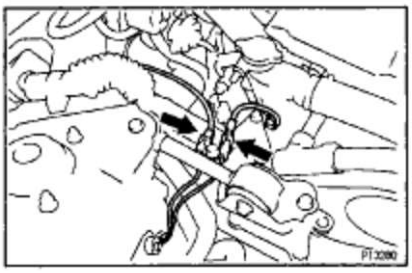
3. REMOVE GENERATOR DRIVE BELT
Loosen the pivot bolt and adjusting lock bolt, and remove the drive belt.



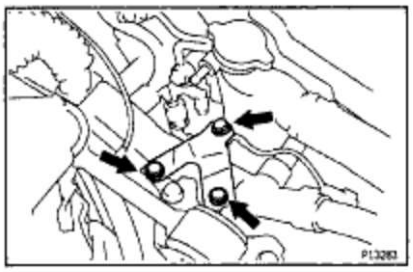
4. REMOVE RH FRONT WHEEL
5. REMOVE RH FENDER APRON SEAL



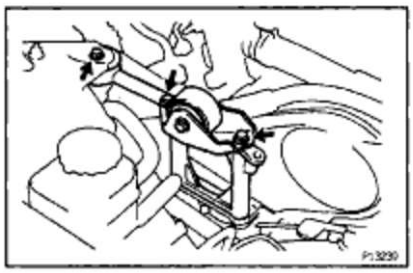
6. REMOVE PS DRIVE BELT
Loosen the 2 bolts, and remove the drive belt.



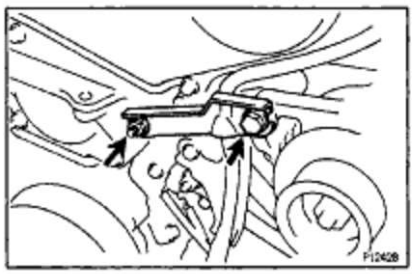
7. DISCONNECT GROUND STRAPS
Disconnect the 2 straps.



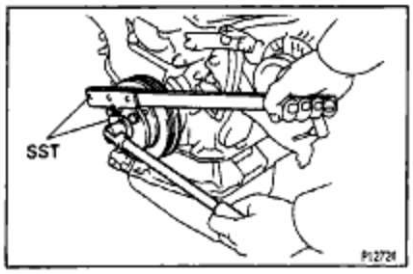
8. REMOVE RH ENGINE MOUNTING STAY
Remove the 3 bolts and RH engine mounting stay.



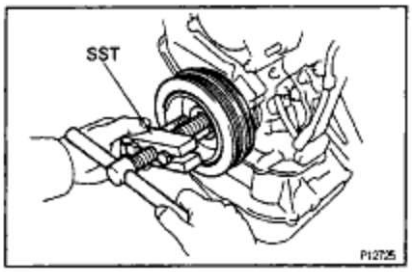
9. REMOVE ENGINE MOVING CONTROL ROD AND NO.2 RH ENGINE MOUNTING BRACKET
Remove the 3 bolts, control rod and mounting brack–et.



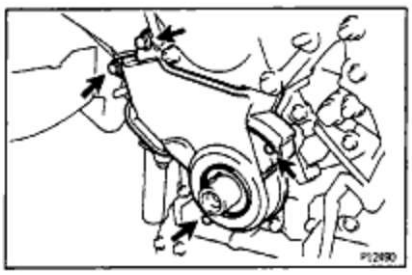
10. REMOVE NO.2 GENERATOR BRACKET
(a) Loosen the generator pivot bolt.
(b) Remove the nut and bracket.



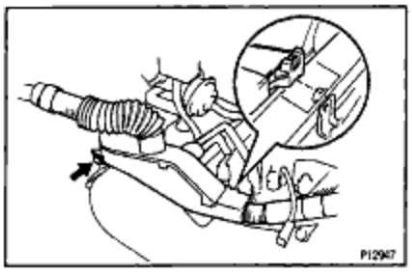
11. REMOVE CRANKSHAFT PULLEY
(a) Using SST, remove the pulley bolt.
SST 09213–54016, 09330–00021



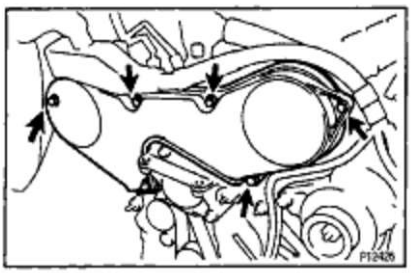
(b) Using SST, remove the pulley.
SST 09213–00060



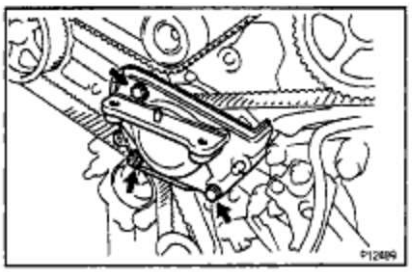
12. REMOVE No.1 TIMING BELT COVER
Remove the 4 bolts and timing belt cover.



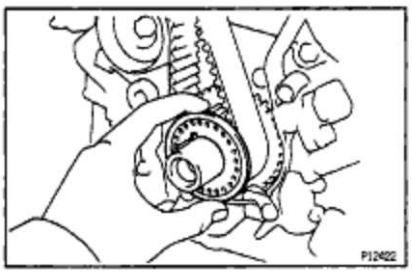
13. DISCONNECT ENGINE WIRE
(a) Remove the bolt holding the engine wire to the No.3 timing belt cover.
(b) Disconnect the engine wire from the clamp.



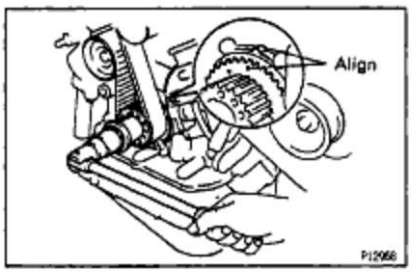
14. REMOVE N0.2 TIMING BELT COVER
Remove the 5 bolts and timing belt cover.



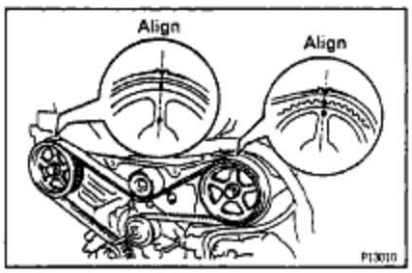
15. REMOVE ENGINE RH MOUNTING BRACKET
Remove the 2 bolts, nut and mounting bracket.



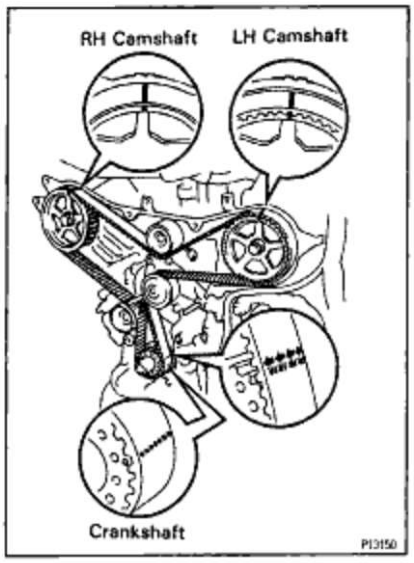
16. REMOVE TIMING BELT GUIDE



17. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Temporarily install the crankshaft pulley bolt to the crankshaft.
(b) Turn the crankshaft and align the crankshaft timing pulley groove with the oil pump alignment mark.
NOTICE: Always turn the crankshaft clockwise.



(c) Check that timing marks of the camshaft timing pul–leys and No.3 timing belt cover are aligned.
If not, turn the crankshaft 1 revolution (360°).
(d) Remove the crankshaft pulley bolt.

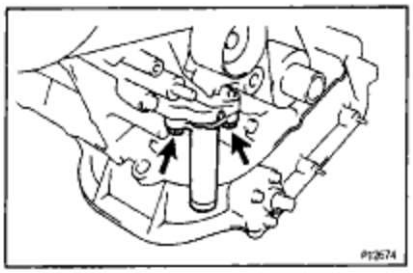


18. IF REUSING TIMING BELT, CHECK INSTALLATION MARKS ON TIMING BELT

Check that there are 3 installation marks and front mark on the timing belt.

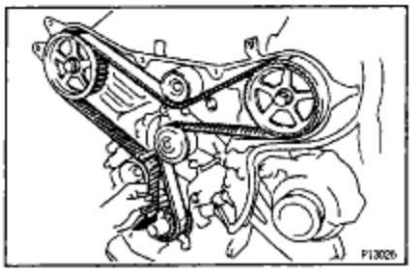
If the installation and front marks have disappeared, before removing the timing belt, place new installation and front marks on the timing belt to the following position:

- Timing mark of RH camshaft timing pulley
- Timing mark of LH camshaft timing pulley
- Dot mark of crankshaft timing pulley

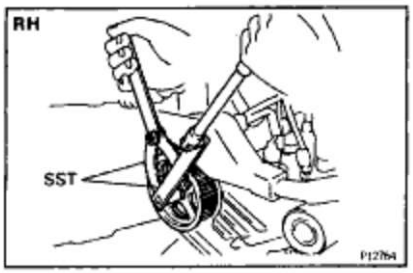


19. REMOVE TIMING BELT TENSIONER

Alternately loosen the 2 bolts, and remove them, the tensioner and dust boot.



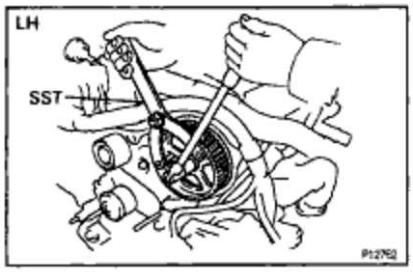
20. REMOVE TIMING BELT



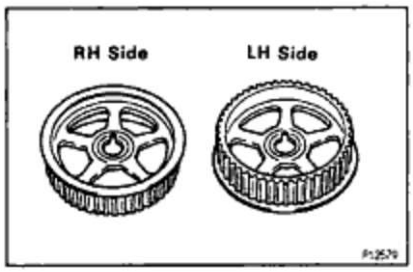
21. REMOVE CAMSHAFT TIMING PULLEYS

(a) Using SST, remove the bolt and RH timing pulley.

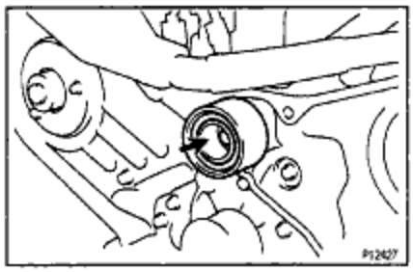
SST 09249 – 63010, 09960 –10010 (09962 – 01000)



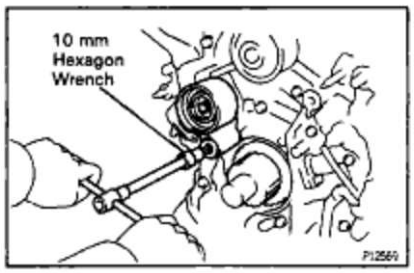
(b) Using SST, remove the LH timing pulley.
SST 09960–10010 (09962–01000)



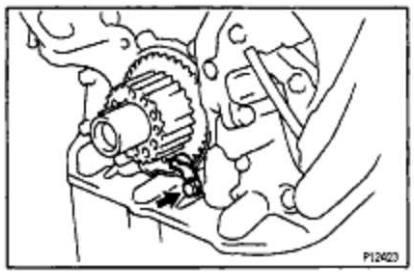
HINT: Arrange the camshaft timing pulleys (RH and LH sides).



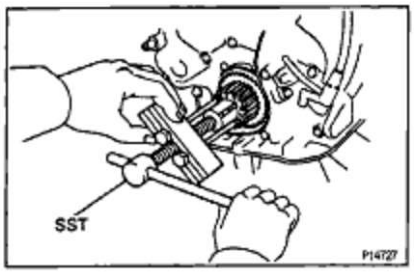
22. REMOVE NO.2 IDLER PULLEY
Remove the bolt and idler pulley.



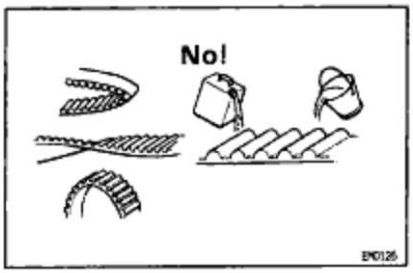
23. REMOVE No.1 IDLER PULLEY
Using a 10 mm hexagon wrench, remove the bolt, idler pulley and plate washer.



24. REMOVE CRANKSHAFT TIMING PULLEY
(a) Remove the bolt and timing belt plate.

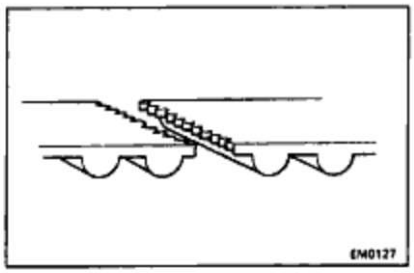


(b) Using SST, remove the crankshaft timing pulley.
SST 09213–60017 (09213–00020, 09213–00030, 09213–00050)
NOTICE: Do not scratch the sensor part of the crankshaft timing pulley.

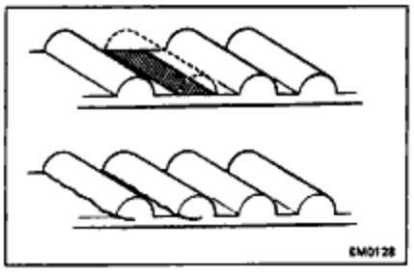


TIMING BELT INSPECTION

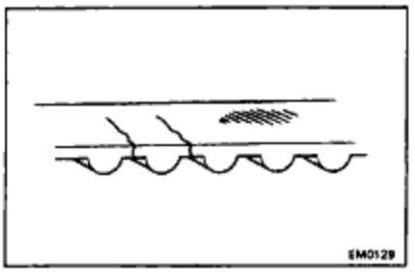
1. INSPECT TIMING BELT
NOTICE:
- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into contact with oil, water or steam.**
- **Do not utilize timing belt tension when installing or removing the mount bolt of the camshaft timing pulley.**



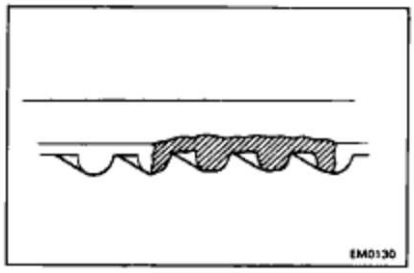
If there are any defects, as shown in the illustrations, check the following points:
(a) Premature parting
- Check for proper installation.
- Check the timing cover gasket for damage and proper installation.



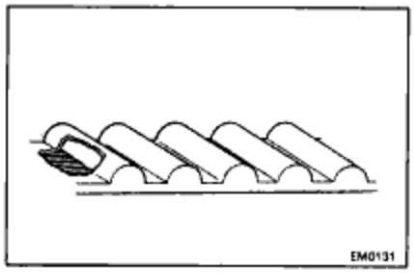
(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.



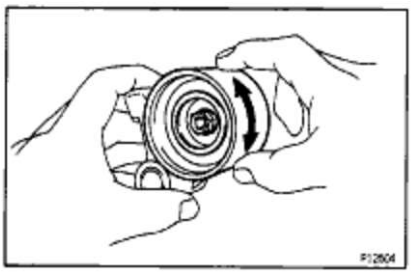
(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock and water pump.



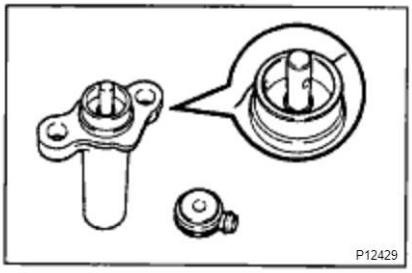
(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.



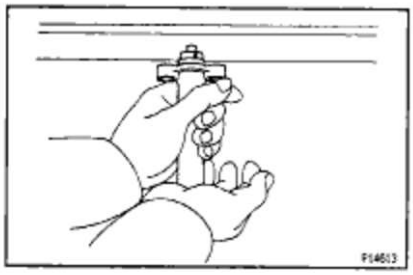
(e) If there is noticeable wear on the belt teeth, check timing cover for damage and check gasket has been installed correctly and for foreign material on the pulley teeth.
If necessary, replace the timing belt.



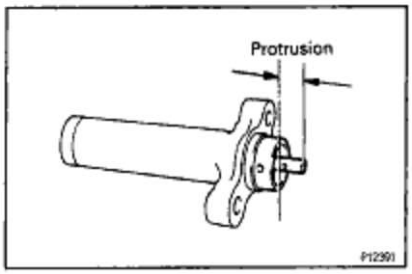
2. INSPECT IDLER PULLEYS
Check that the idler pulley turns smoothly.
If necessary, replace the idler pulley.



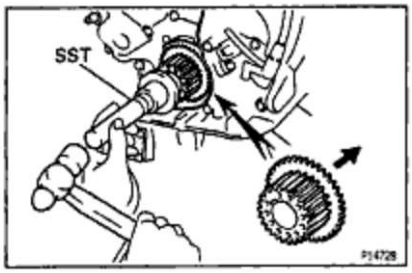
3. INSPECT TIMING BELT TENSIONER
(a) Visually check tensioner for oil leakage.
HINT: If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.
If leakage is found, replace the tensioner.



(b) Hold the tensioner with both hands and push the push rod strongly as shown to check that it doesn't move.
If the push rod moves, replace the tensioner.
NOTICE: Never hold the tensioner push rod facing down–ward.



(c) Measure the protrusion of the push rod from the housing end.
Protrusion:
10.0 – 10.8 mm (0.394 – 0.425 In.)
If the protrusion is not as specified, replace the tensioner.

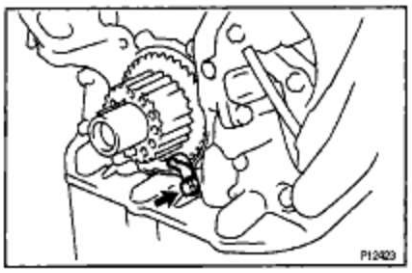


TIMING BELT INSTALLATION

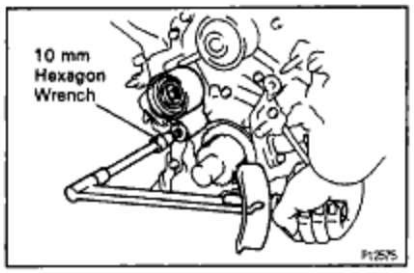
(See Components for Removal and Installation)

1. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the pulley set key with the key groove of the timing pulley and slide on the timing pulley.
(b) Using SST and a hammer, tap in the timing pulley, facing the sensor side rearward.
SST 09223–46011
NOTICE: Do not scratch the sensor part of the crankshaft timing pulley.

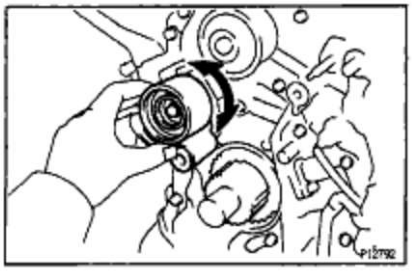


(c) Install the timing belt plate with the bolt.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)

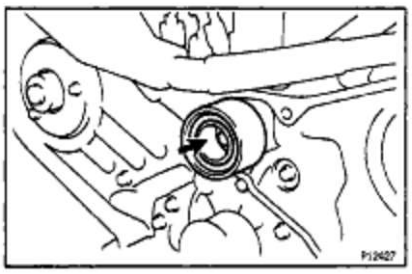


2. INSTALL NO.1 IDLER PULLEY

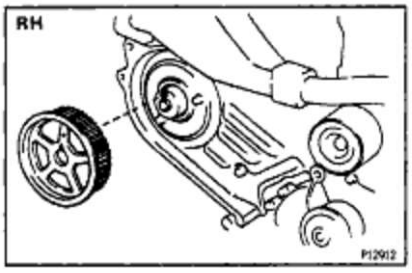
(a) Using a 10 mm hexagon wrench, install the idler pulley with the plate washer and bolt.
Torque: 34 N–m (350 kgf–cm, 25 ft–lbf)



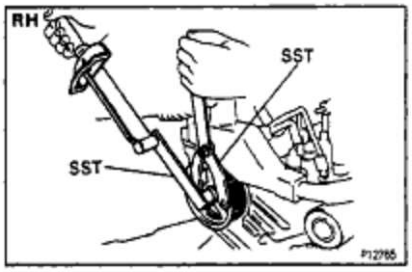
(b) Check that the pulley bracket moves smoothly.



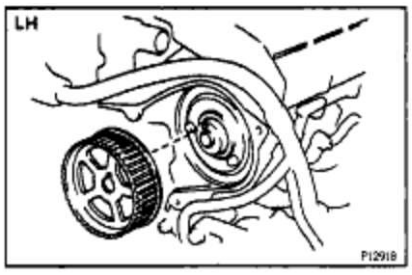
3. INSTALL No.2 IDLER PULLEY
(a) Install the idler pulley with the bolt.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(b) Check that the idler pulley moves smoothly.



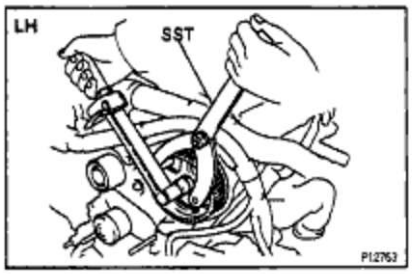
4. INSTALL RH CAMSHAFT TIMING PULLEY
(a) Install the timing pulley, facing the flange side out–ward.
(b) Align the knock pin hole of the camshaft with the knock pin groove of the timing pulley as shown.



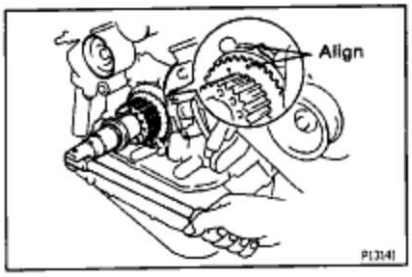
(c) Using SST, install and torque the bolt.
SST 09249–63010, 09960–10010 (09962–01000)
Torque: 88 N–m (900 kgf–cm, 65 ft–lbf)
HINT: Use a torque wrench with a fulcrum length of 340 mm (113.39 in.)



5. INSTALL LH CAMSHAFT TIMING PULLEY
(a) Install the timing pulley, facing the flange side inward.
(b) Align the knock pin hole of the camshaft with the knock pin groove of the timing pulley as shown.

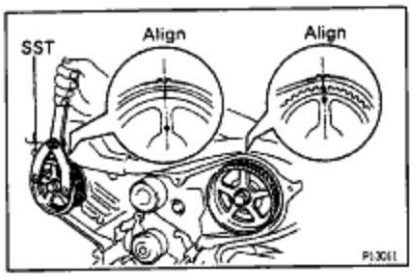


(d) Using SST, install and torque the bolt.
SST 09960–10010 (09962–01000)
Torque: 126 N–m (1,300 kgf–cm, 94 ft–lbf)



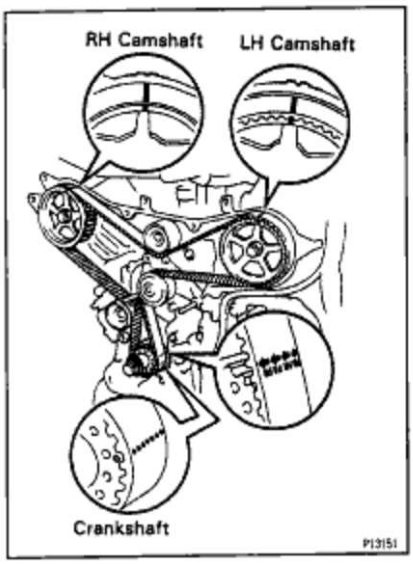
6. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Crankshaft Timing Pulley Position:
Temporarily install the crankshaft pulley bolt to the crankshaft.
Turn the crankshaft and align the crankshaft timing pulley groove with the oil pump alignment mark.



(b) RH Camshaft Timing Pulley Position:
Using SST, turn the camshaft pulley, align the timing marks of the camshaft and the No.3 timing belt cover.
SST 09960–10010 (09962–01000)

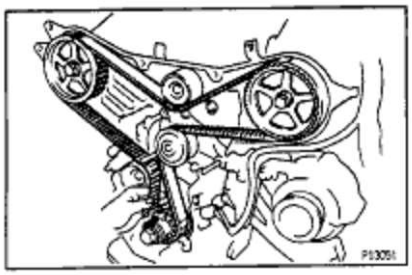
(c) LH Camshaft Timing Pulley Position:
Using SST, turn the camshaft pulley, align the timing marks of the camshaft and the No.3 timing belt cover.
SST 09960 –10010 (09962 – 01000)



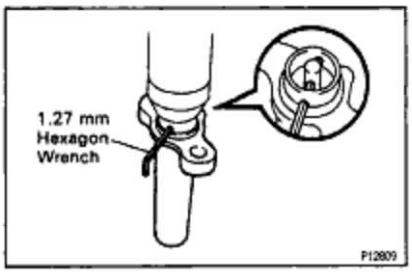
7. INSTALL TIMING BELT

NOTICE: The engine should be cold.

(a) Remove any oil or water on the pulleys, and keep them clean.
(b) Check the timing belt front mark.
(c) Align the installation mark on the timing belt with the dot mark of the crankshaft timing pulley.
(d) Align the installation marks on the timing belt with the timing marks of the camshaft timing pulleys.



(e) Install the timing belt with the following order:
- Crankshaft timing pulley
- Water pump pulley
- LH camshaft timing pulley
- No.2 idler pulley
- RH camshaft timing pulley
- No.1 idler pulley

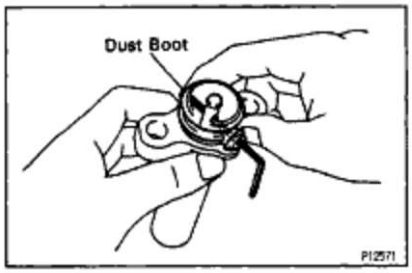


8. SET TIMING BELT TENSIONER

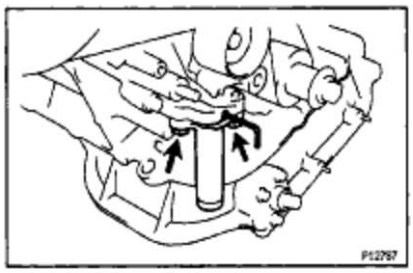
(a) Using a press, slowly press in the push rod using 981 –9,807 N (1100–1,000 kgf, 200–2,205 lbf) of pres–sure.

(b) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.

(c) Release the press.



(d) Install the dust boot to the tensioner.

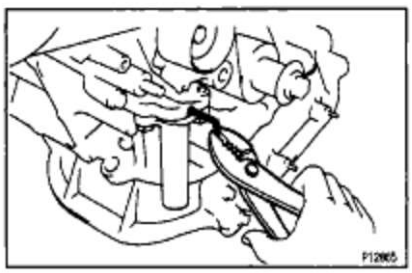


9. INSTALL TIMING BELT TENSIONER

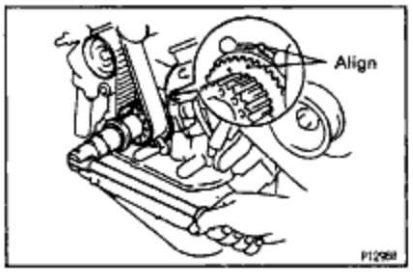
(a) Temporarily install the tensioner with the 2 bolts.

(b) Alternately tighten the 2 bolts.

Torque: 27 N–m (280 kgf–cm, 20 ft–lbf)



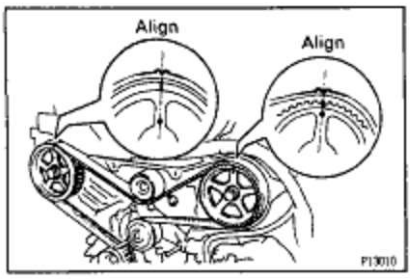
(c) Remove the 1.27 mm hexagon wrench from the tensi–oner.



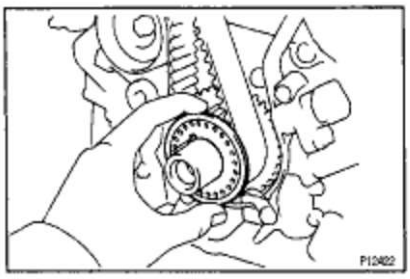
10. CHECK VALVE TIMING

(a) Turn the crankshaft, and align the crankshaft timing pulley groove with the oil pump alignment mark.

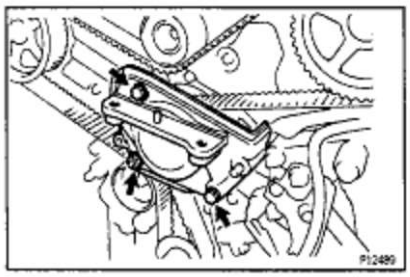
NOTICE: Always turn the crankshaft clockwise.



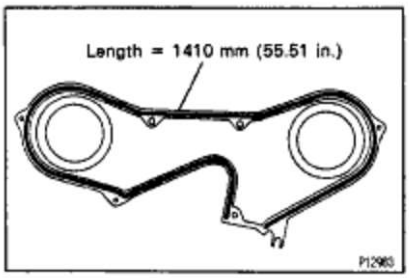
(b) Check that the timing marks of the RH and LH timing pulleys with the timing marks of the No.3 timing belt cover as shown in the illustration.
If the marks do not align, remove the timing belt and reinstall it.
(c) Remove the crankshaft pulley bolt.



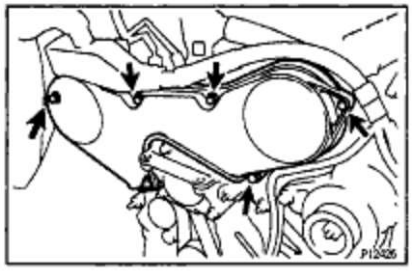
11. INSTALL TIMING BELT GUIDE
Install the belt guide, facing the cup side outward.



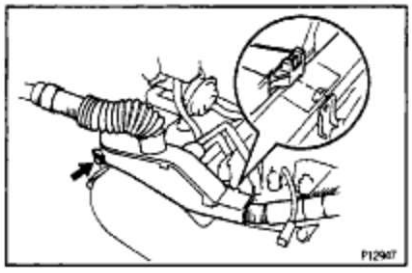
12. INSTALL ENGINE RH MOUNTING BRACKET
Install the mounting bracket with the 2 bolts and nut.
Torque: 28 N–m (290 kgf–cm, 21 ft–lbf)



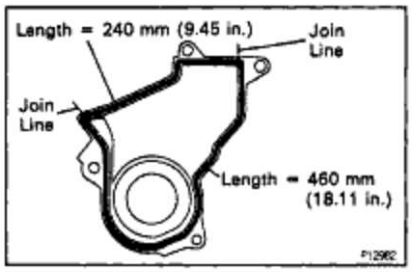
13. INSTALL N0.2 TIMING BELT COVER
(a) Check that the timing belt cover gasket has no cracks or peeling, etc.
If the gasket does have cracks or peeling, etc., replace it using following steps.
(1) Using a screwdriver and gasket scraper, remove all the old gasket material.
(2) Thoroughly clean all components to remove all the loose material.
(3) Remove the backing paper from a new gasket and install the gasket evenly to the part of the belt cover shaded black in the illustration.
(4) After installing the gasket, press down on it sc that the adhesive firmly sticks to the belt cover.
(b) Install new gasket to the No.2 belt cover.



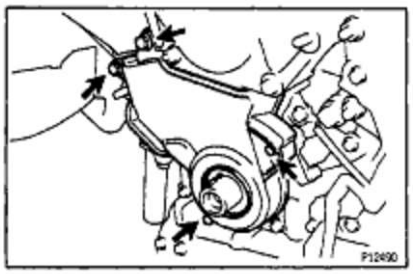
(c) Install the belt cover with the 5 bolts.
Torque: 8.5 N–m (85 kgf–cm. 74 in.–lbf)



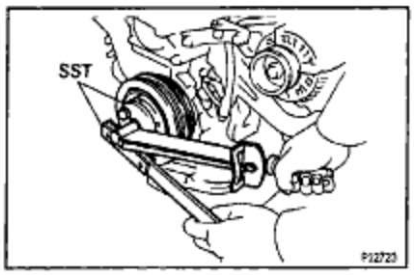
14. CONNECT ENGINE WIRE
(a) Connect the engine wire with the clamp.
(b) Install the bolt holding the engine wire to the No.3 timing belt cover.



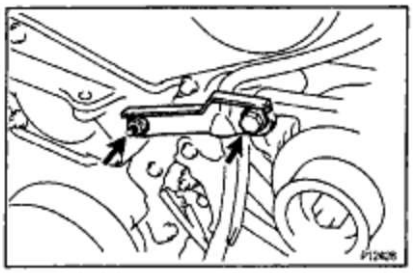
15. INSTALL NO.1 TIMING BELT COVER
(a) Check that the timing belt cover gaskets have cracks or peeling, etc.
If the gasket does have cracks or peeling, etc., replace it using following steps, peeling, etc., replace them using following steps.
(1) Using a screwdriver and gasket scraper, remove all the old gasket material.
(2) Thoroughly clean all components to remove all the loose material.
(3) Remove the backing paper from a new gasket and install the gasket evenly to the part of the belt cover shaded back in the illustration.
NOTICE: When joining 2 gaskets, do not leave a gap between them. Cut off any excess gasket.
(4) After installing the gasket, press down on it so that the adhesive firmly sticks to the belt cover.
(b) Install new gaskets to the No.1 belt cover.



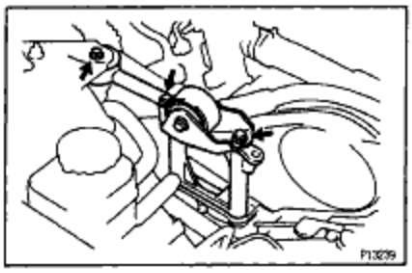
(c) Install the belt cover with the 4 bolts.
Torque: 8.5 N–m (85 kgf–cm, 74 in.–lbf)



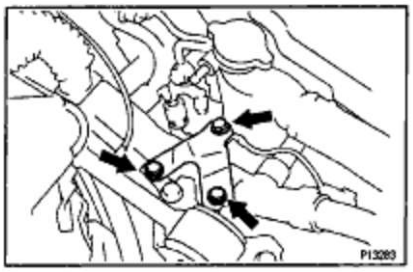
16. INSTALL CRANKSHAFT PULLEY
(a) Align the pulley set key with the key groove of the pulley, and slide the pulley.
(b) Using SST, install and torque the bolt.
SST 09213–54015, 09330–00021
Torque: 216 N–m (2,200 kgf–cm, 159 ft–lbf)



17. INSTALL NO.2 GENERATOR BRACKET
Install the bracket with the pivot bolt and nut. Do not tighten the bolt yet.
Torque: 28 N–m (290 kgf–cm, 21 ft–lbf) for Nut

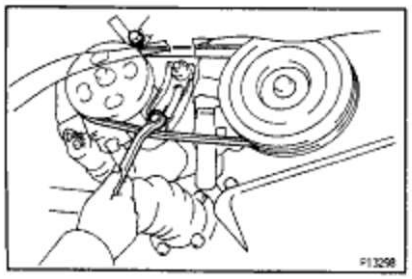


18. INSTALL NO.2 RH ENGINE MOUNTING BRACKET AND ENGINE MOVING CONTROL ROD
Install the mounting bracket and control rod with the 3 bolts.
Torque: 63.7 N–m (650 kgf–cm, 47 ft–lbf)

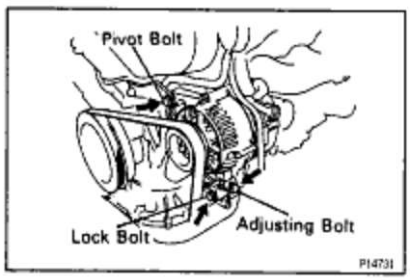


19. INSTALL RH ENGINE MOUNTING STAY
Install the mounting stay with the 3 bolts.
Torque: 31.4 N–m (320 kgf–cm. 23 ft–lbf)

24. CONNECT GROUND STRAPS
Connect the 2 straps.

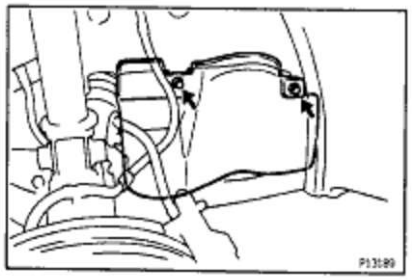


21. INSTALL AND ADJUST PS DRIVE BELT
Install the drive belt with the pivot and adjusting bolts.
Drive belt tension:
New belt
150 ± 185 l bf
Used belt
115 ± 20 lbf



22. INSTALL GENERATOR DRIVE BELT
Adjust the drive belt. (See CH section)
Drive belt tension:
New belt
175 ± 5 lbf
Used belt
115 ± 20 lbf

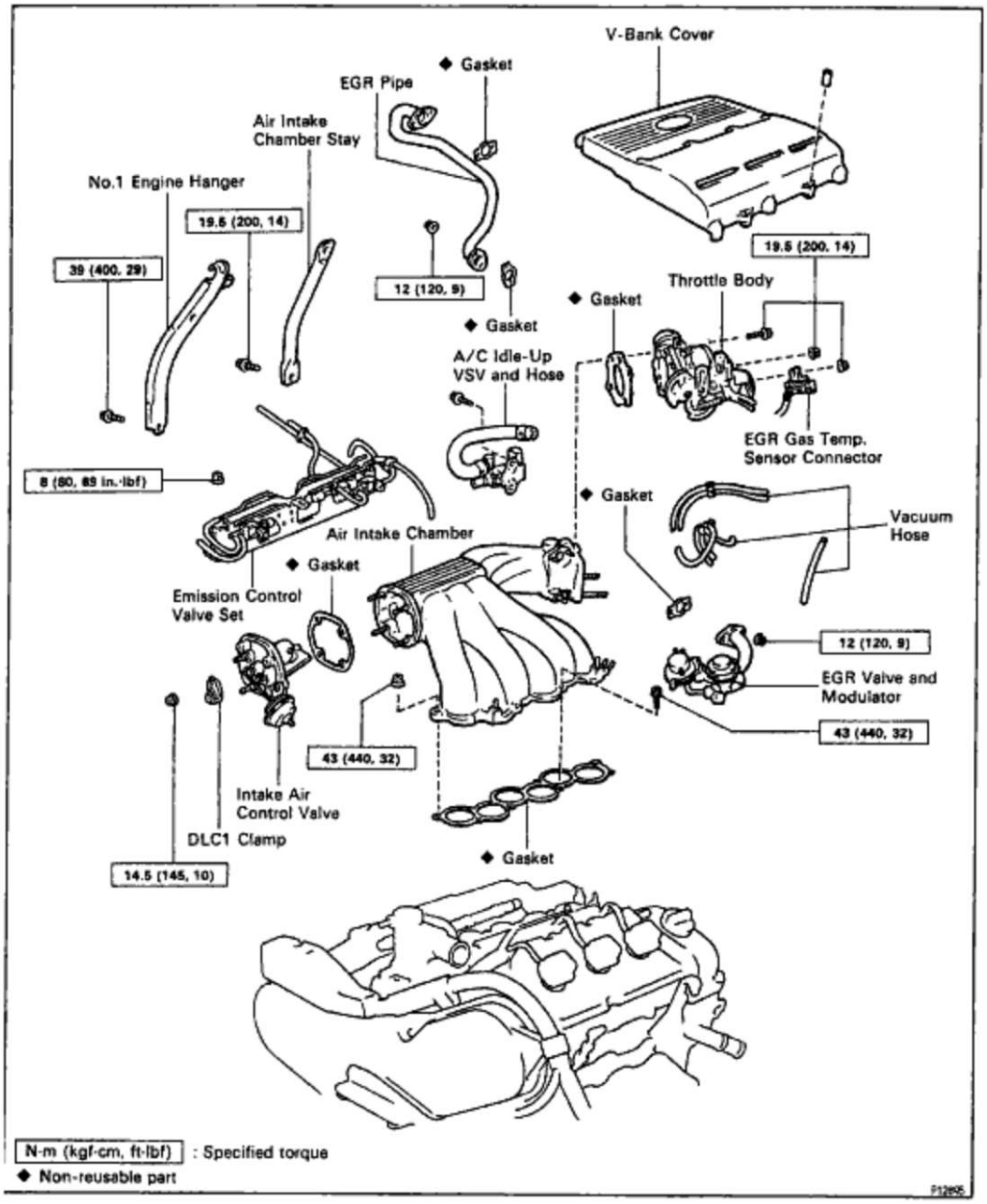
23. INSTALL COOLANT RESERVOIR TANK
24. CONNECT NEGATIVE (–) TERMINAL CABLE TO BATTERY
25. START ENGINE, AND CHECK FOR ABNORMAL NOISE AND SMOOTH OPERATION

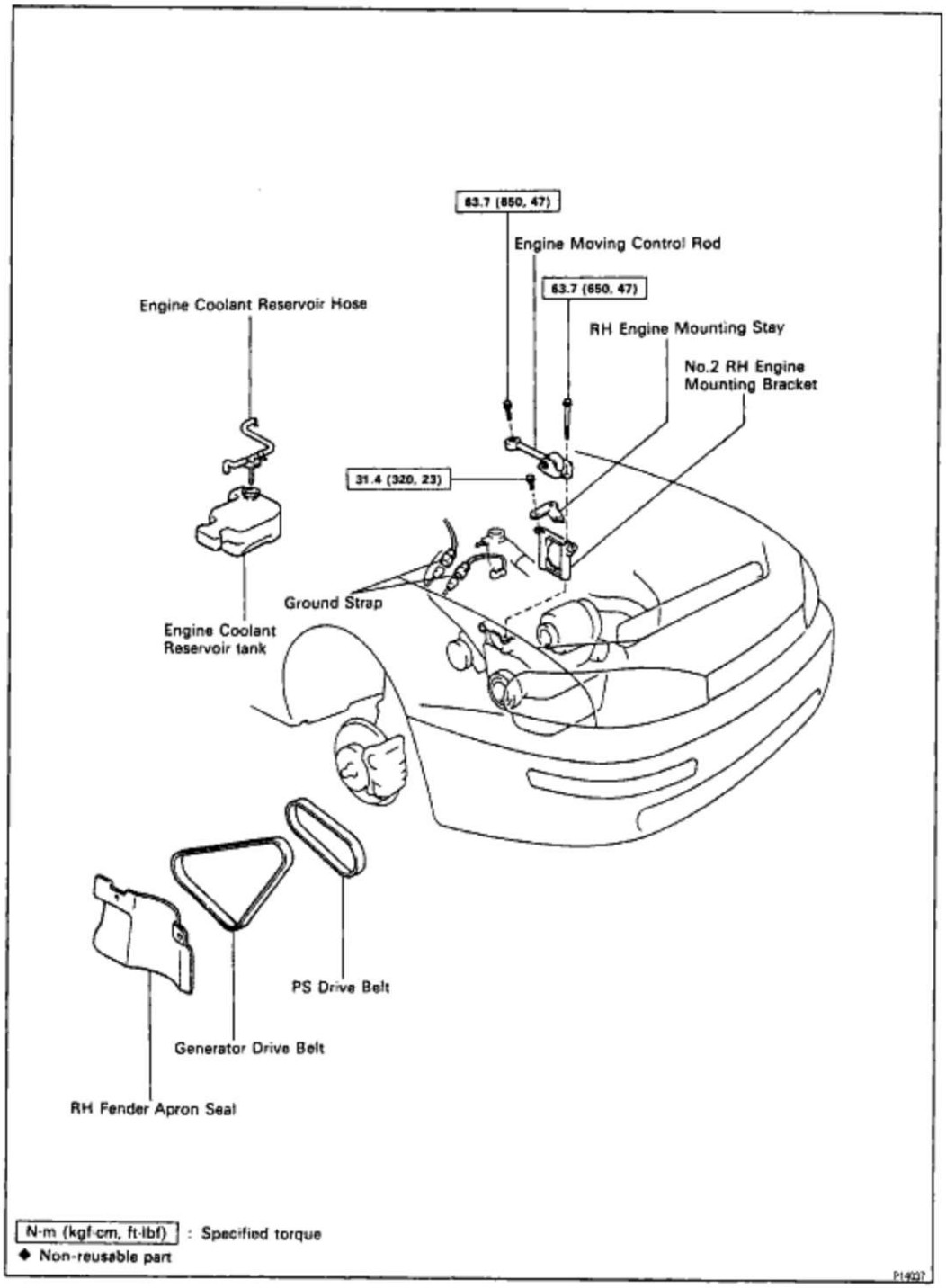


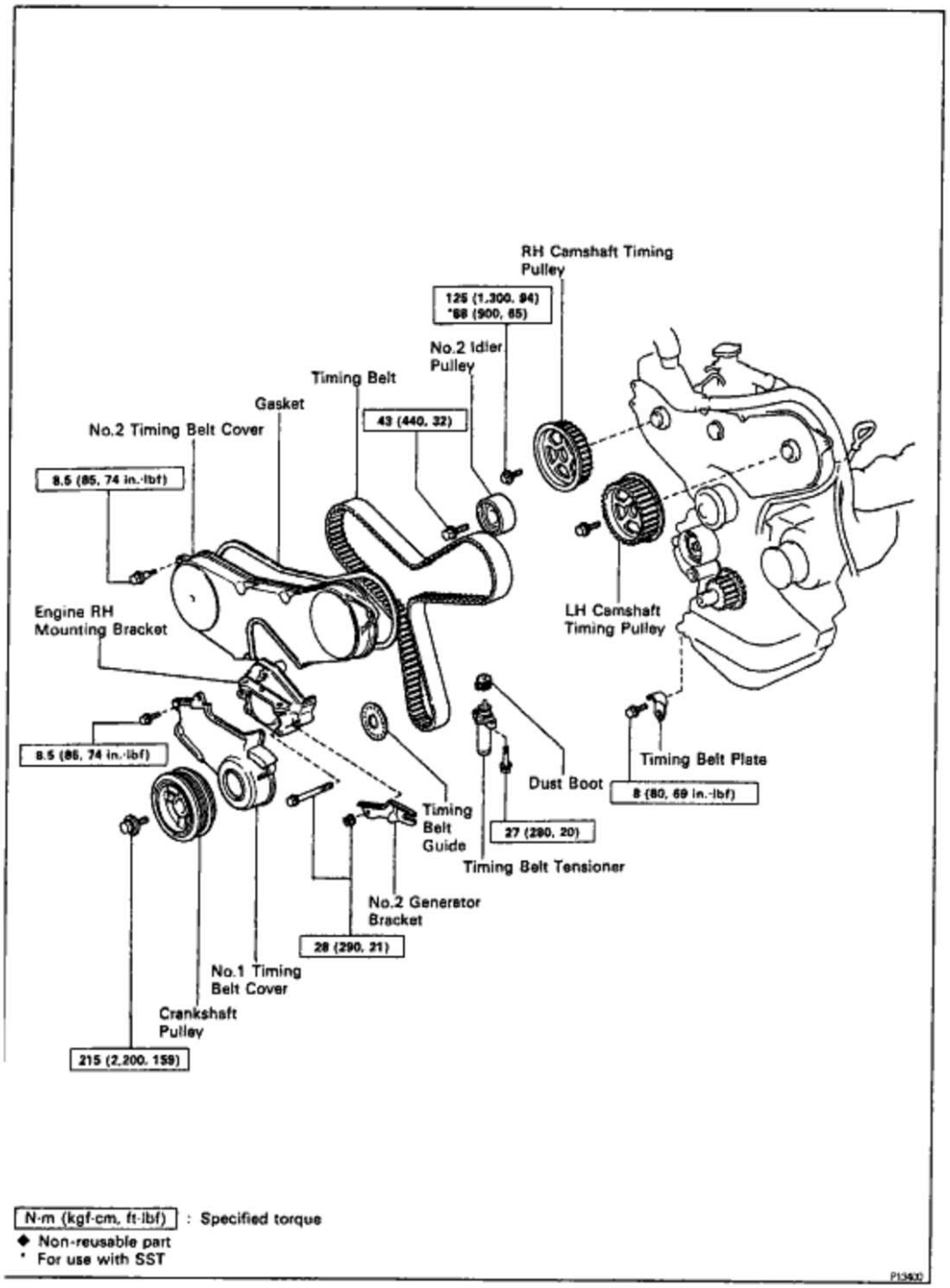
26. INSTALL RH FENDER APRON SEAL
27. INSTALL RH FRONT WHEEL

CYLINDER HEAD

COMPONENTS FOR REMOVAL AND INSTALLATION

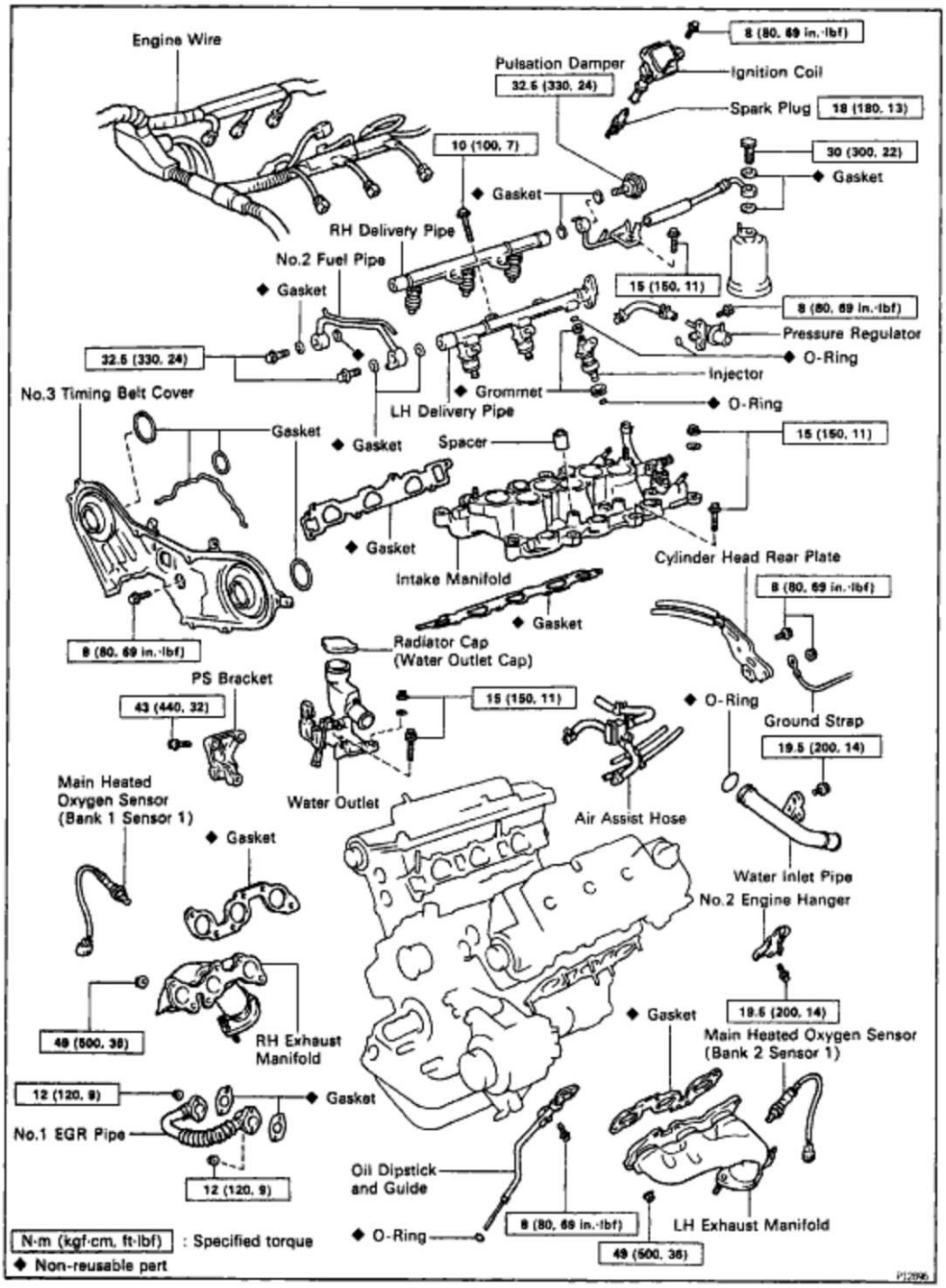


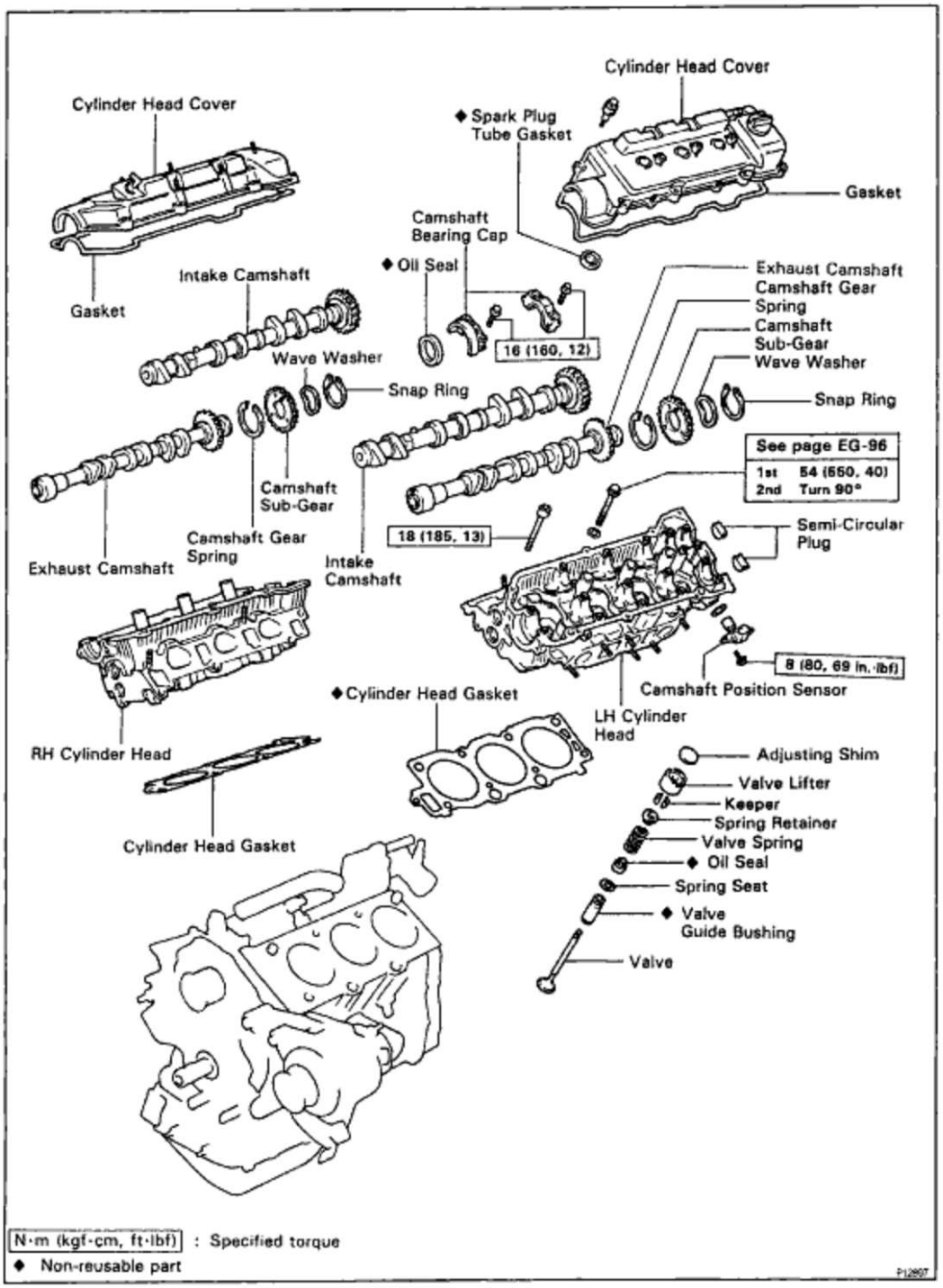

63.7 (650, 47)
Engine Moving Control Rod
63.7 (650, 47)
Engine Coolant Reservoir Hose
RH Engine Mounting Stay
No.2 RH Engine Mounting Bracket
31.4 (320, 23)
Ground Strap
Engine Coolant Reservoir tank
PS Drive Belt
Generator Drive Belt
RH Fender Apron Seal
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P14927

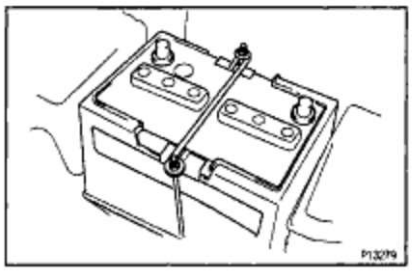


N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
* For use with SST

P13400


Engine Wire
8 (80, 69 in.·lbf)
Pulsation Damper
32.5 (330, 24)
Ignition Coil
Spark Plug
18 (180, 13)
10 (100, 7)
30 (300, 22)
Gasket
Gasket
RH Delivery Pipe
No.2 Fuel Pipe
Gasket
15 (150, 11)
8 (80, 69 in.·lbf)
Pressure Regulator
32.5 (330, 24)
O-Ring
Injector
No.3 Timing Belt Cover
Grommet
O-Ring
LH Delivery Pipe
Gasket
Gasket
Spacer
15 (150, 11)
Gasket
Intake Manifold
Cylinder Head Rear Plate
8 (80, 69 in.·lbf)
Gasket
Radiator Cap
(Water Outlet Cap)
8 (80, 69 in.·lbf)
PS Bracket
43 (440, 32)
15 (150, 11)
O-Ring
Ground Strap
19.5 (200, 14)
Main Heated
Oxygen Sensor
(Bank 1 Sensor 1)
Water Outlet
Air Assist Hose
Gasket
Water Inlet Pipe
No.2 Engine Hanger
49 (500, 36)
RH Exhaust
Manifold
Gasket
19.5 (200, 14)
Main Heated Oxygen Sensor
(Bank 2 Sensor 1)
12 (120, 9)
Gasket
No.1 EGR Pipe
12 (120, 9)
Oil Dipstick
and Guide
8 (80, 69 in.·lbf)
LH Exhaust Manifold
O-Ring
49 (500, 36)
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part


Cylinder Head Cover
Cylinder Head Cover
◆ Spark Plug Tube Gasket
Gasket
Camshaft Bearing Cap
◆ Oil Seal
Intake Camshaft
Gasket
16 (160, 12)
Exhaust Camshaft
Camshaft Gear
Spring
Camshaft Sub-Gear
Wave Washer
Wave Washer
Snap Ring
Snap Ring
See page EG-96
1st 54 (550, 40)
2nd Turn 90°
Camshaft Sub-Gear
Camshaft Gear Spring
Exhaust Camshaft
Intake Camshaft
18 (185, 13)
Semi-Circular Plug
8 (80, 69 in.·lbf)
Camshaft Position Sensor
◆ Cylinder Head Gasket
LH Cylinder Head
RH Cylinder Head
Adjusting Shim
Valve Lifter
Keeper
Spring Retainer
Valve Spring
◆ Oil Seal
Spring Seat
◆ Valve Guide Bushing
Valve
Cylinder Head Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P12807



CYLINDER HEADS REMOVAL

(See Components for Removal and Installation)

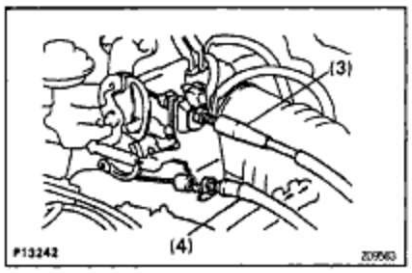
1. REMOVE BATTERY AND TRAY

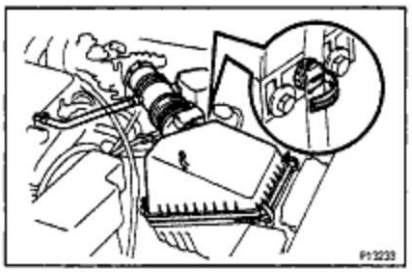
CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the 'LOCK' position and the negative (–) terminal cable is disconnected from the battery.

2. DRAIN ENGINE COOLANT

3. DISCONNECT ACCELERATOR CABLE

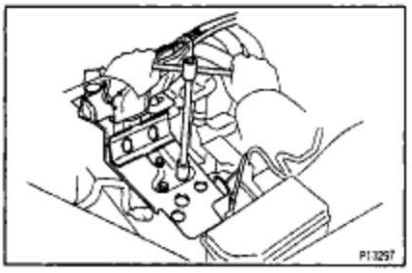
4. DISCONNECT THROTTLE CABLE





5. REMOVE AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE

(a) Disconnect the volume air flow meter connector and wire clamp.
(b) Disconnect the accelerator cable clamp.
(c) Disconnect the PCV hose.
(d) Loosen the air cleaner hose clamp bolt.
(e) Disconnect the 4 air cleaner cap clips.
(f) Remove the air cleaner cap and volume air flow meter together with the air cleaner hose.

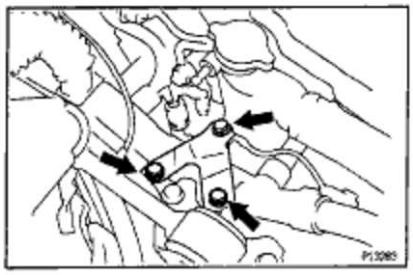


6. w/ CRUISE CONTROL SYSTEM:
REMOVE CRUISE CONTROL ACTUATOR

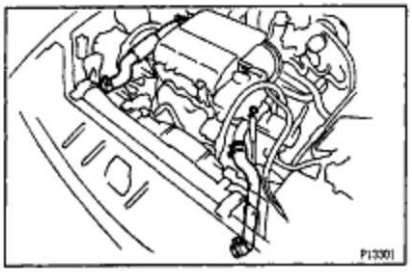
(a) Remove the bolt, clip and actuator cover.
(b) Disconnect the actuator connector and clamp.
(c) Remove the 3 bolts, and disconnect the actuator with the bracket.

7. DISCONNECT GROUND STRAPS

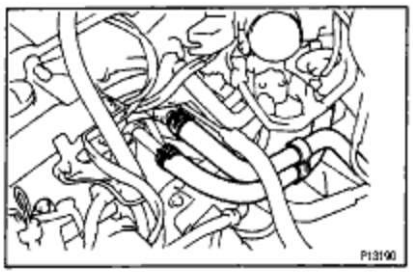
Disconnect the 2 straps.



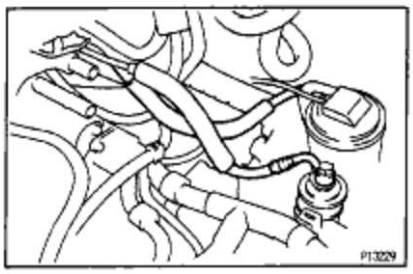
8. REMOVE RH ENGINE MOUNTING STAY
Remove the 3 bolts and RH engine mounting stay.



9. DISCONNECT RADIATOR HOSES

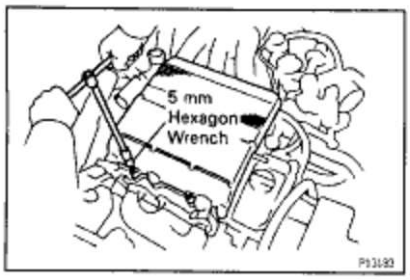


10. DISCONNECT HEATER HOSES
Disconnect the 2 hoses.



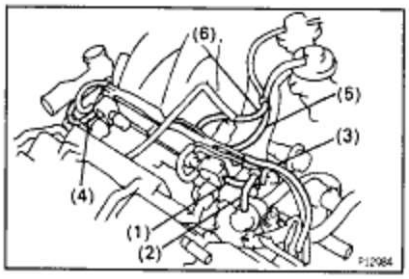
11. DISCONNECT FUEL HOSES
Disconnect the fuel inlet and return hoses.
CAUTION: Catch leaking fuel in a container.

12. DISCONNECT PRESSURE HOSE OF HYDRAULIC MOTOR
Remove the bolt, and disconnect the pressure hose from the water inlet.



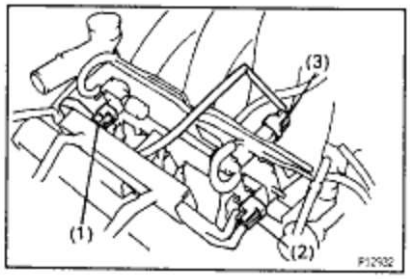
13. REMOVE V – BANK COVER

Using a 5 mm hexagon wrench, remove the 2 nuts and V–bank cover.

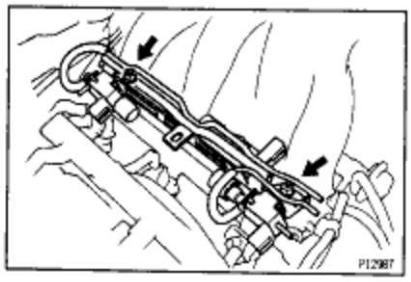


14. REMOVE EMISSION CONTROL VALVE SET

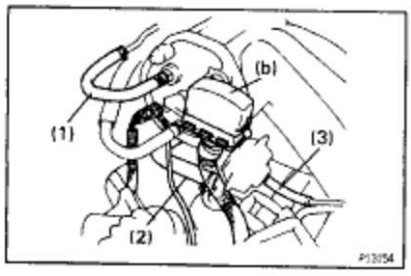
(a) Disconnect the following vacuum hoses:
- (1) Vacuum hose from fuel pressure control VSV
- (2) Vacuum hose from fuel pressure regulator
- (3) Vacuum hose from cylinder head rear plate
- (4) Vacuum hose from intake air control valve VSV
- (5) Vacuum hose from EGR vacuum modulator
- (6) Vacuum hose from EGR valve



(b) Disconnect the following connectors:
- (1) Intake air control valve connector
- (2) Fuel pressure connector
- (3) EGR VSV connector



(c) Remove the 2 nuts and emission control valve set.

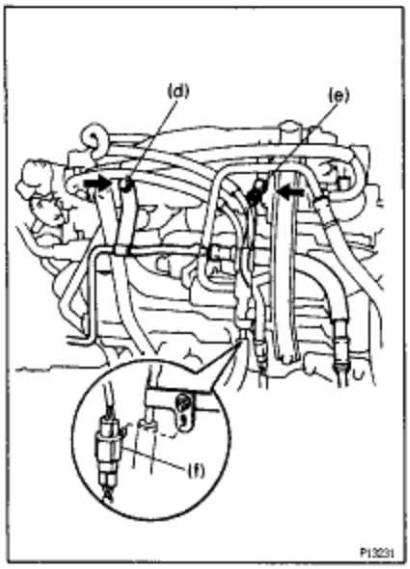


15. REMOVE AIR INTAKE CHAMBER

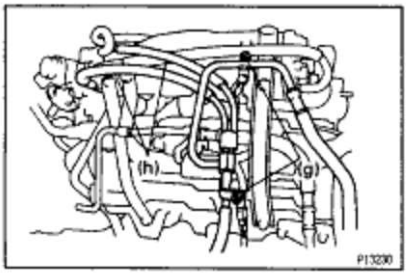
(a) Disconnect the following hoses:
- (1) Brake booster vacuum hose
- (2) PCV hose
- (3) Intake air control valve vacuum hose

(b) Disconnect the data link connector 1.

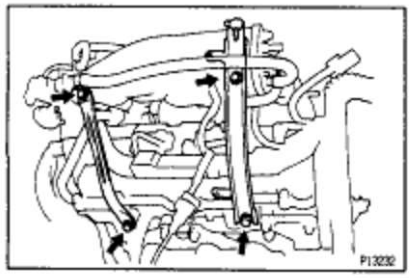
(c) Remove the nut and disconnect the 2 ground straps.



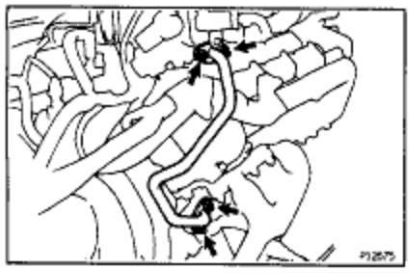
(d) Remove the bolt and disconnect the hydraulic motor pressure hose from the air intake chamber.
(e) Remove the bolt, and disconnect the ground strap.
(f) Disconnect the RH oxygen sensor connector clamp from the PS pressure tube.



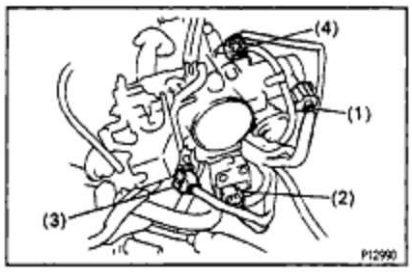
(g) Remove the 2 nuts, and disconnect the PS pressure tube.
(h) Disconnect the 2 PS air hoses.



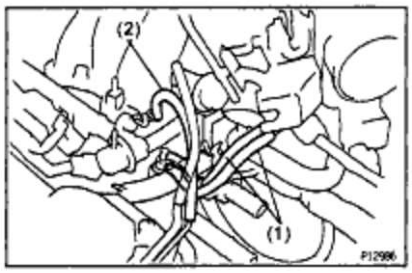
(i) Remove the 2 bolts and No.1 engine hanger.
(j) Remove the 2 bolts and air intake chamber stay.



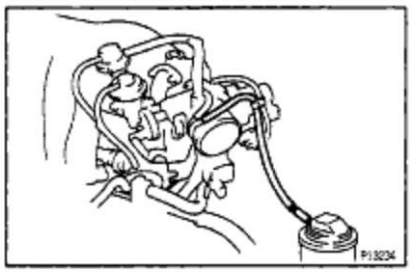
(k) Remove the 4 nuts, EGR pipe and 2 gaskets.



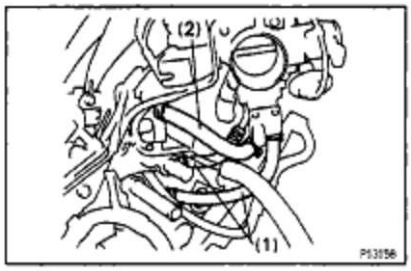
(l) Disconnect the following connectors:
(1) Throttle position sensor connector
(2) IAC valve connector
(3) EGR gas temperature sensor connector
(4) A/C idle–up connector



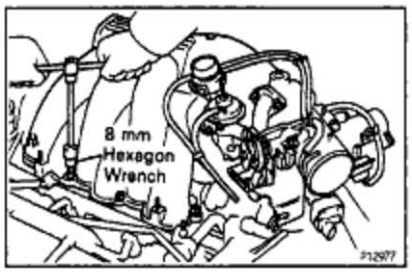
(m) Disconnect the following vacuum hoses:
(1) 2 vacuum hoses from TVV
(2) Vacuum hose from cylinder head rear plate



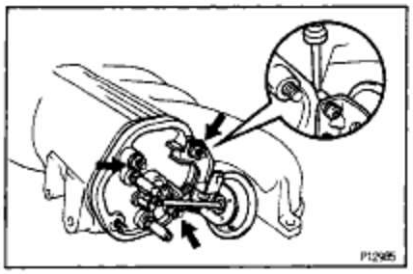
(3) Vacuum hose from charcoal canister



(n) Disconnect the following hoses:
(1) 2 water bypass hoses
(2) Air assist hose

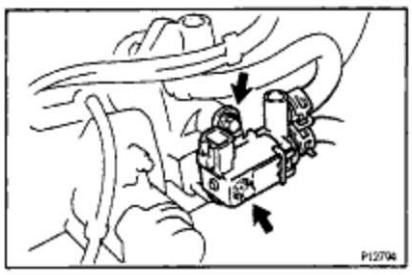


(o) Using an 8 mm hexagon wrench, remove the 2 bolts, 2 nuts, air intake chamber and gasket.



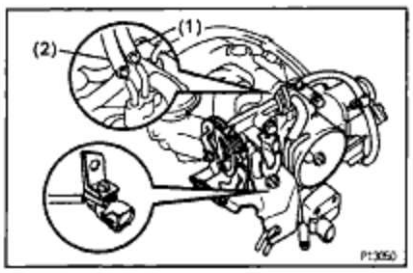
16. REMOVE INTAKE AIR CONTROL VALVE FROM AIR INTAKE CHAMBER

(a) Disconnect the A/C air hose.
(b) Remove the 3 nuts and data link connector 1 clamp.
(c) Remove the intake air control valve by prying a screw–driver between the intake air control valve and air intake chamber.
(d) Remove the gasket.



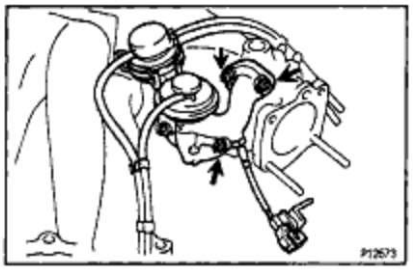
17. REMOVE A/C IDLE–UP VSV FROM AIR INTAKE CHAMBER

(a) Disconnect the air hose.
(b) Remove the 2 bolts and A/C idle–up VSV.



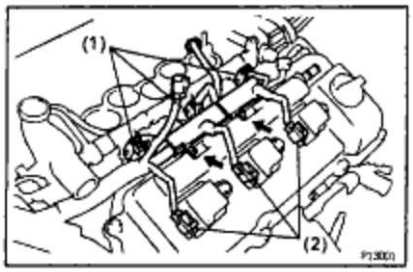
18. REMOVE THROTTLE BODY FROM AIR INTAKE CHAMBER

(a) Disconnect the following vacuum hoes:
(1) Vacuum hose from P port of EGR vacuum modu–lator
(2) Vacuum hose from R port of EGR vacuum modu–lator
(b) Remove the 2 bolts, 2 nuts, throttle body and gasket.



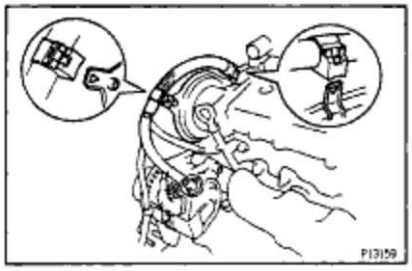
19. REMOVE EGR VALVE AND VACUUM MODULATOR FROM AIR INTAKE CHAMBER

Remove the 3 nuts, EGR valve, vacuum modulator and gasket.



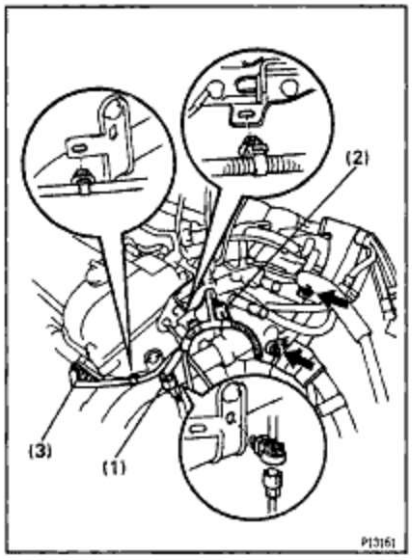
20. DISCONNECT ENGINE WIRE FROM ENGINE LH SIDE

(a) Disconnect the following connectors:
(1) 3 injector connectors
(2) 3 ignition coil connectors
(b) Remove the 2 nuts, and disconnect the engine wire.



21. DISCONNECT ENGINE WIRE FROM NO.3 TIMING BELT COVER

Disconnect the 2 clamps and engine wire.

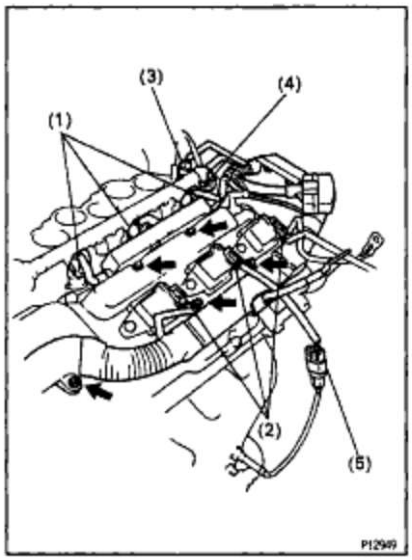


22. DISCONNECT ENGINE WIRE FROM ENGINE REAR SIDE

(a) Disconnect the following connectors:
- (1) LH oxygen sensor
- (2) Engine coolant temperature sensor
- (3) Camshaft position sensor

(b) Disconnect the 3 clamps.

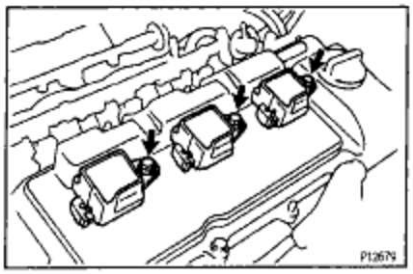
(c) Remove the 2 nuts, and disconnect the engine wire.



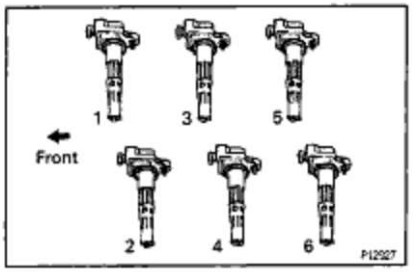
23. DISCONNECT ENGINE WIRE FROM ENGINE RH SIDE

(a) Disconnect the following connectors:
- (1) 3 injector connectors
- (2) 3 ignition coil connectors
- (3) Water temperature sender gauge connector
- (4) Water temperature sensor connector
- (5) RH oxygens sensor connector

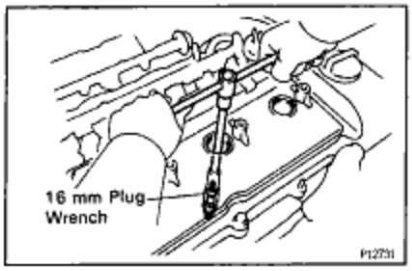
(b) Remove the 5 nuts, and disconnect the engine wire.



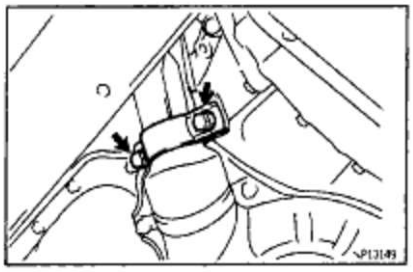
24. REMOVE IGNITION COILS
Remove the6 bolts and6 ignition coils from the RH and LH cylinder heads.



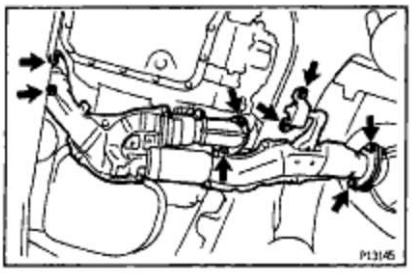
HINT: Arrange the ignition coils in the correct order.



25. REMOVE SPARK PLUGS
Using a 16 mm plug wrench, remove the6 spark plugs from the RH and LH cylinder heads.

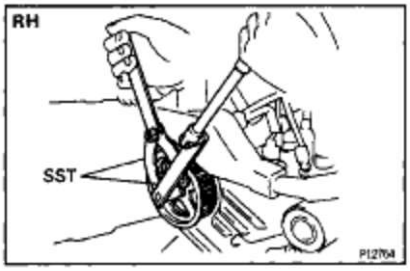


26. REMOVE FRONT EXHAUST PIPE
(a) Remove the 2 bolts and front exhaust pipe clamp.

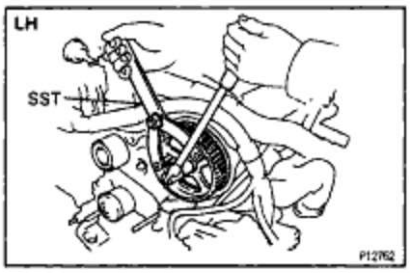


(b) Remove the 2 bolts, and disconnect the bracket.
(c) Remove the 2 bolts and 2 nuts holding the front exhaust pipe to the three–way catalytic converter.
(d) Remove the 4 nuts holding the front exhaust pipe to the exhaust manifolds.
(e) Remove the front exhaust pipe and gaskets.

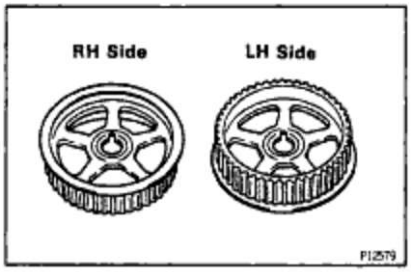
27. REMOVE TIMING BELT
(See steps 2 to 20 on pages EG2–41 to 45)



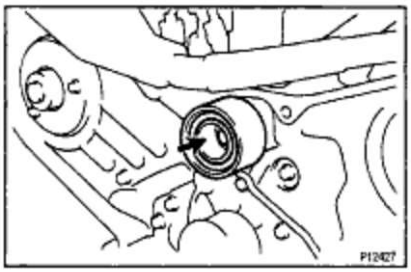
28. REMOVE CAMSHAFT TIMING PULLEYS
(a) Using SST, remove the bolt and RH timing pulley.
SST 09249–63010, 09960–10010 (09862–01000)



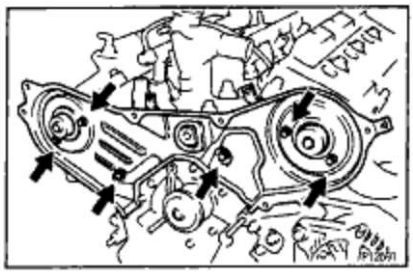
(b) Using SST, remove the LH timing pulley.
SST 09960–10010 (09962–01000)



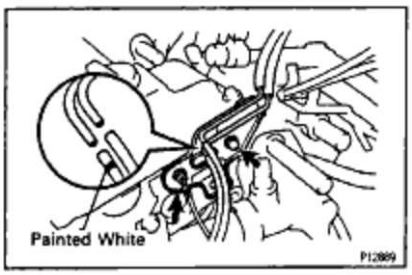
HINT: Arrange the camshaft timing pulleys (RH and LH sides).



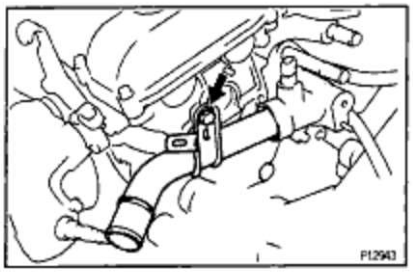
29. REMOVE NO.2 IDLER PULLEY
Remove the bolt and idler pulley.



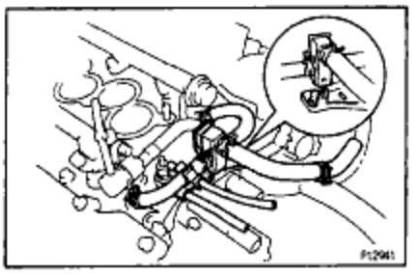
30. REMOVE NO.3 TIMING BELT COVER
Remove the 6 bolts and belt cover.



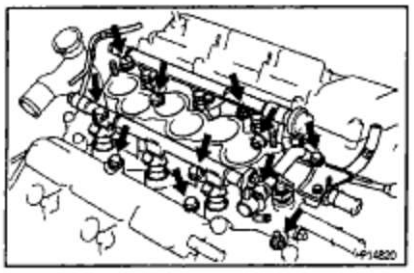
31. REMOVE CYLINDER HEAD REAR PLATE
(a) Disconnect the vacuum hose from the vacuum tank.
(b) Remove the nut, and disconnect the ground strap.
(c) Remove the bolt and rear plate.



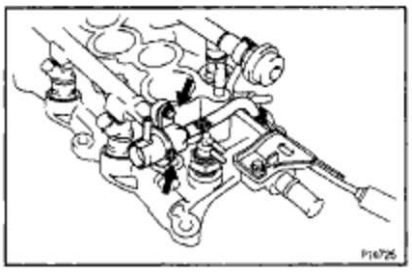
32. REMOVE WATER INLET PIPE
(a) Remove the bolt and inlet pipe.
(b) Remove the O–ring.



33. REMOVE AIR ASSIST HOSE AND VACUUM HOSE



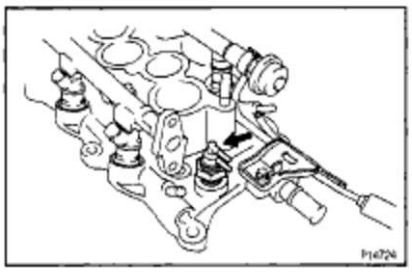
34. REMOVE INTAKE MANIFOLD, DELIVERY PIPES AND INJECTORS
Remove the 9 bolts, 2 nuts, 2 plate washers and intake manifold together with the delivery pipes, and injectors.



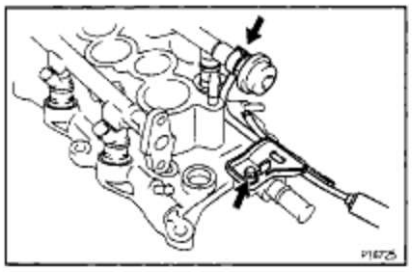
35. REMOVE FUEL PRESSURE REGULATOR FROM LH DELIVERY PIPE

(a) Remove the 2 bolts, and pull out the pressure regula–tor.

(b) Remove the 0–ring from the pressure regulator.

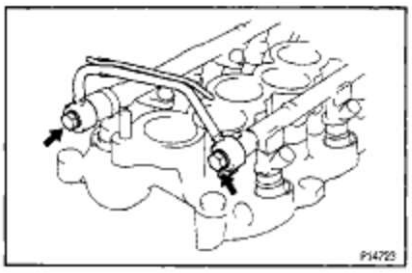


36. REMOVE TVV FROM INTAKE MANIFOLD



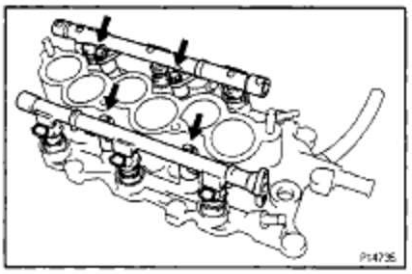
37. REMOVE FUEL PULSATION DAMPER AND No.1 FUEL PIPE

Remove the bolt, pulsation damper, No. 1 fuel pipe and 2 gaskets.



38. REMOVE No.2 FUEL PIPE

Remove the 2 union bolts, No.2 fuel pipe and 4 gas–kets.

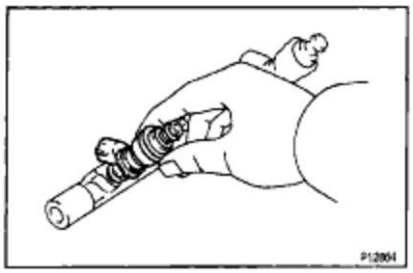


39. REMOVE DELIVERY PIPES AND INJECTORS

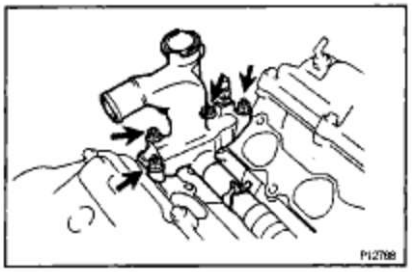
(a) Remove the 4 bolts, delivery pipes together with the 6 injectors.

NOTICE: Be careful not to drop the injectors when rem–oving the delivery pipes.

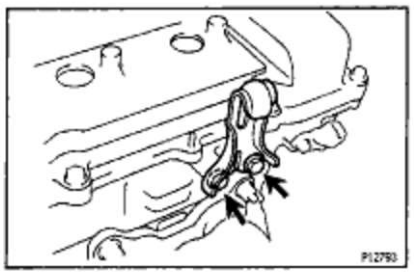
(b) Remove the 4 spacers from the intake manifold.



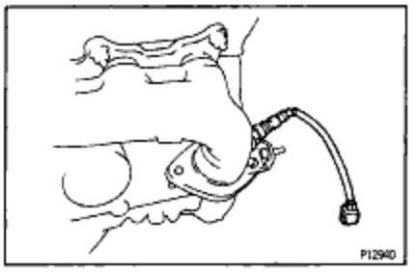
(c) Pull out the 6 injectors from the delivery pipes.
Remove the 0–ring and grommet from each injector.



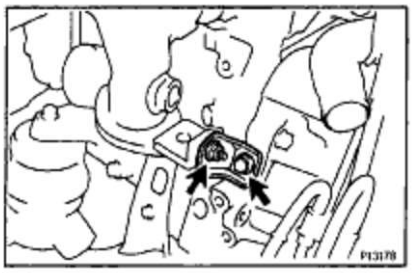
40. REMOVE WATER OUTLET
(a) Remove the 2 bolts, 2 nuts and 2 plate washers.
(b) Disconnect the water bypass hose and remove the water outlet.
(c) Remove the 2 intake manifold gaskets.



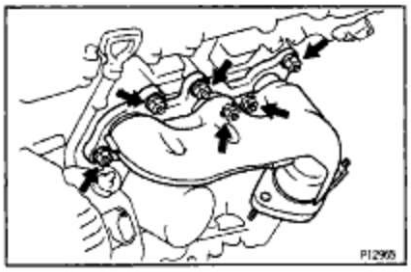
41. REMOVE No.2 ENGINE HANGER
Remove the 2 bolts and engine hanger.



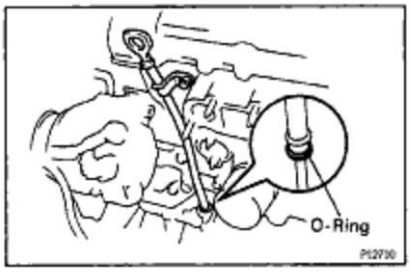
42. REMOVE LH EXHAUST MANIFOLD
(a) Remove the main heated oxygen sensor (Bank 2 Sensor 1).



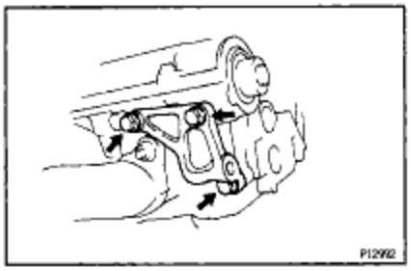
(b) Remove the bolt, nut and exhaust manifold stay.



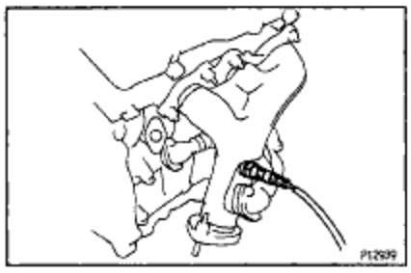
(c) Remove the 6 nuts, exhaust manifold and gasket.



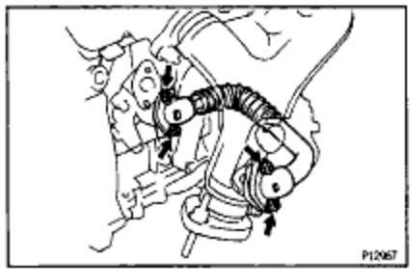
43. REMOVE OIL DIPSTICK AND GUIDE
(a) Remove the bolt holding the dipstick guide to the LH cylinder head.
(b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.
(c) Remove 0–ring from the dipstick guide.



44. REMOVE PS BRACKET
Remove the 3 bolts and PS bracket.

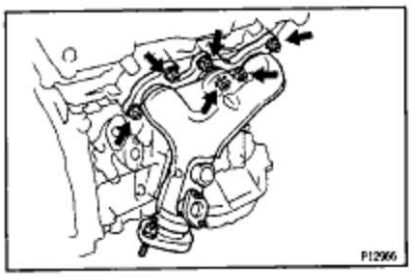


45. REMOVE RH EXHAUST MANIFOLD
(a) Remove the main heated oxygen sensor (Bank 1 Sensor 1).

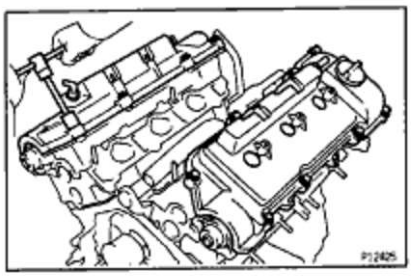


(b) Remove the 4 nuts, EGR pipe and 2 gaskets.

(c) Remove the bolts, 2 nuts, exhaust manifold stay and exhaust manifold plate.

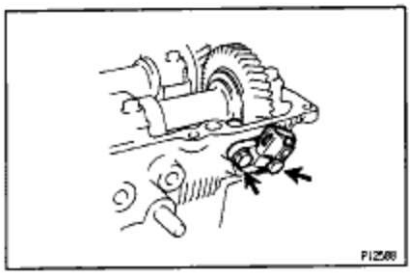


(d) Remove the 6 nuts, exhaust manifold and gasket.



46. REMOVE CYLINDER HEAD COVERS

Remove the 8 bolts, cylinder head cover and gasket.
Remove the 2 cylinder head covers.

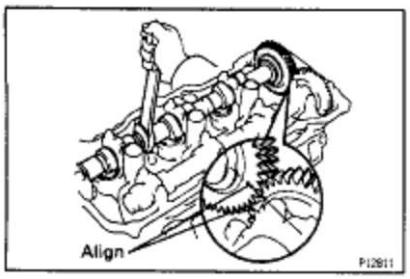


47. REMOVE CAMSHAFT POSITION SENSOR

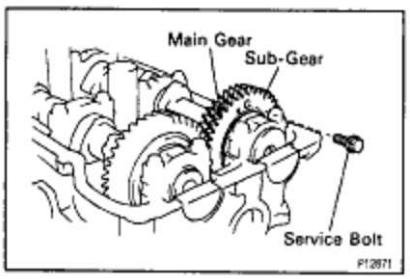
(a) Remove the bolt and position sensor.
(b) Remove the gasket from the position sensor.

48. REMOVE CAMSHAFTS

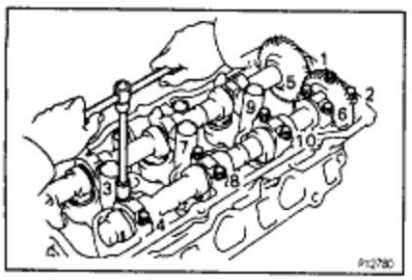
NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be held level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



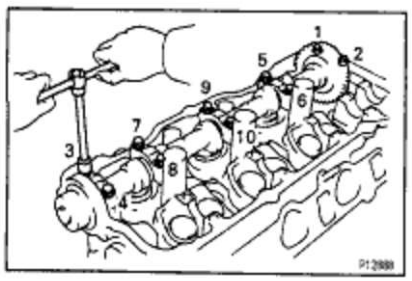
A. Remove intake camshaft of RH cylinder head
(a) Align the timing marks (2 dot marks) of the camshaft drive and driven gears by turning the camshaft with a wrench.



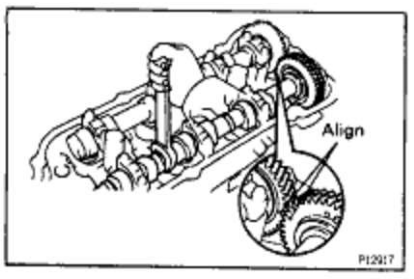
(b) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.
Recommended service bolt:
Thread diameter 6 mm
Thread pitch 1.0 mm
Bolt length 16–20 mm
HINT: When removing the camshaft, mark certain that the torsional spring force of the sub–gear has been eliminated by the above operation.



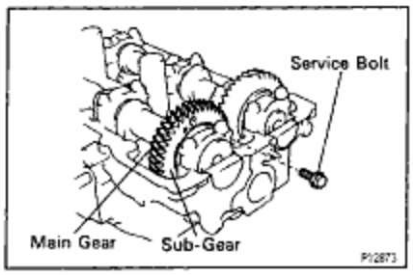
(c) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
(d) Remove the 5 bearing caps and intake camshaft.



B. Remove exhaust camshaft of RH cylinder head
(a) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
(b) Remove the 5 bearing caps, oil seal and exhaust cam–shaft.



C. Remove intake camshaft of LH cylinder head
(a) Align the timing marks (11 dot mark) of the camshaft drive and driven gears by turning the camshaft with a wrench.

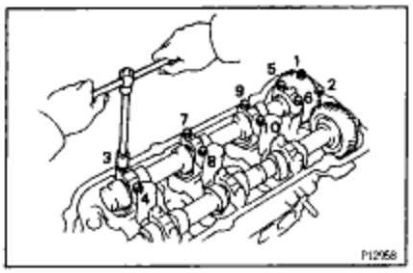


(b) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.

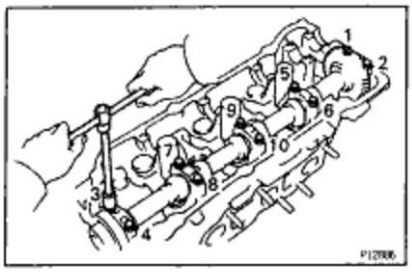
Recommended service bolt:

Thread diameter 6 mm
Thread pitch 1.0 mm
Bolt length 16–20 mm

HINT: When removing the camshaft, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.

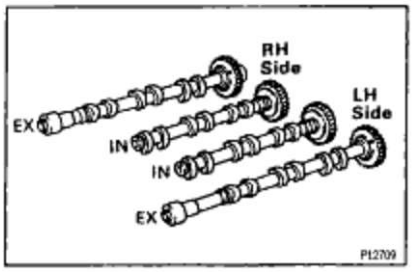


(c) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
(d) Remove the 5 bearing caps and intake camshaft.



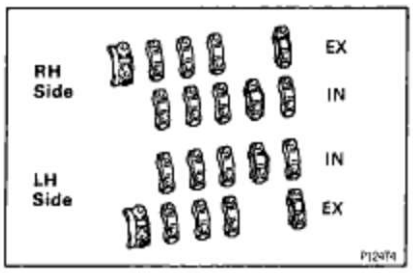
D. Remove exhaust camshaft of LH cylinder head

(a) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
(b) Remove the 5 bearing caps, oil seal and exhaust cam–shaft.

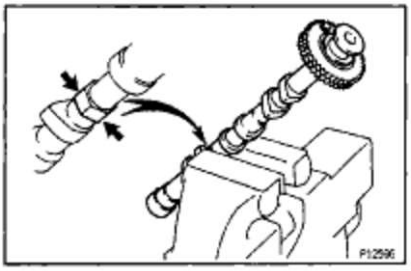


HINT:

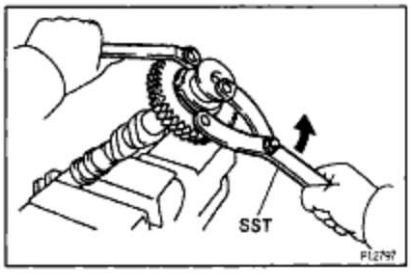
- Arrange the camshafts in the correct order.



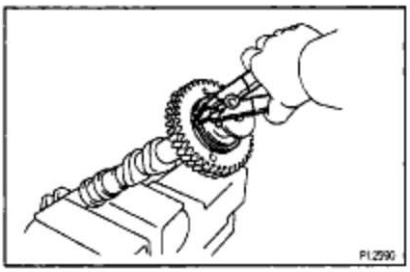
- Arrange the bearing caps in the correct order.



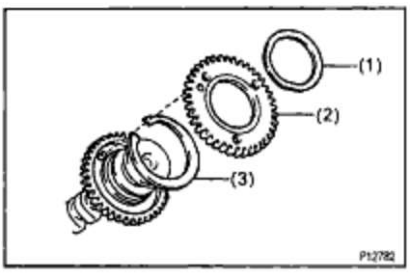
49. DISASSEMBLE EXHAUST CAMSHAFTS
(a) Mount the hexagonal wrench head portion of the camshaft in a vise.
NOTICE: Be careful not to damage the camshaft.



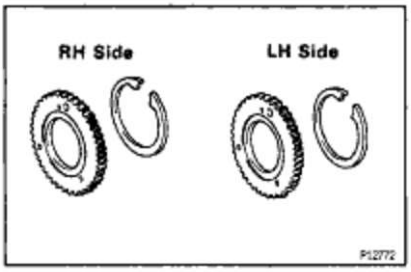
(b) Using SST, turn the sub–gear counterclockwise, and remove the service bolt.
SST 09960–10010 (09962–0100)



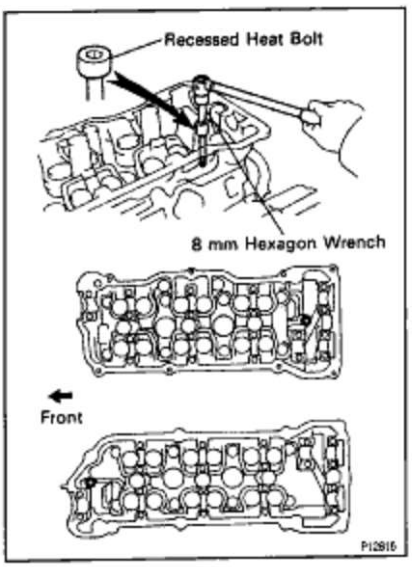
(c) Using snap ring pliers, remove the snap ring.



(d) Remove the following parts:
(1) Wave washer
(2) Camshaft sub–gear
(3) Camshaft gear spring

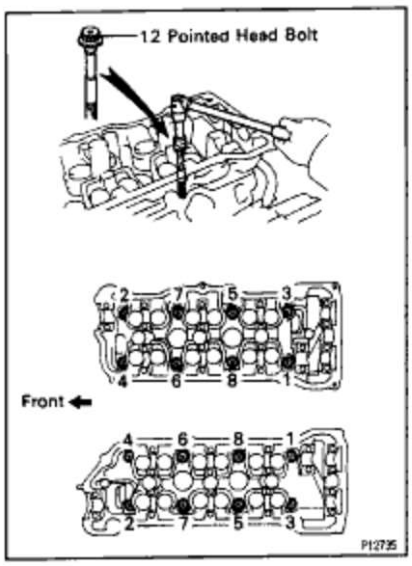


HINT: Arrange the camshaft sub–gears and gear spr–ings (RH and LH sides).



50. REMOVE CYLINDER HEADS

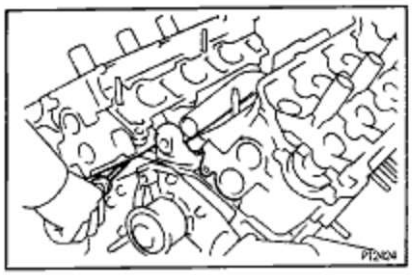
(a) Using a 8 mm hexagon wrench, remove the cylinder head (recessed head) bolt on each cylinder head, then repeat for the other side, as shown.



(b) Uniformly loosen and remove the 8 cylinder head (12 pointed head) bolts on each cylinder head, in several passes, in the sequence shown, then repeat for the other side, as shown.

Remove the 16 cylinder head bolts and plate washers.

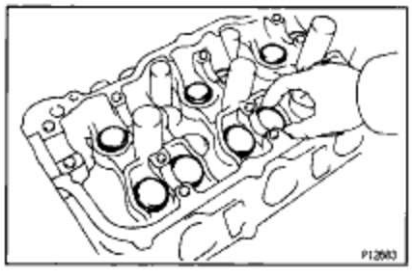
NOTICE: Head warpage or cracking could result from removing bolts in an incorrect order.



(c) Lift the cylinder head from the dowels on the cylinder block and place the 2 cylinder heads 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 cylinder block saliences.

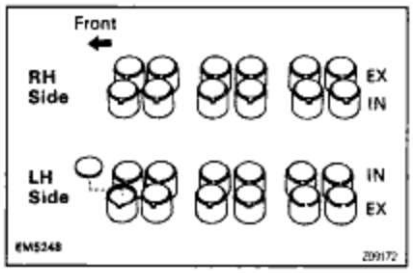
NOTICE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.



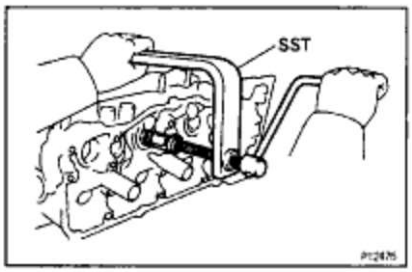
CYLINDER HEAD DISASSEMBLY

(See Components for Removal and Installation)

1. REMOVE VALVE LIFTERS AND SHIMS

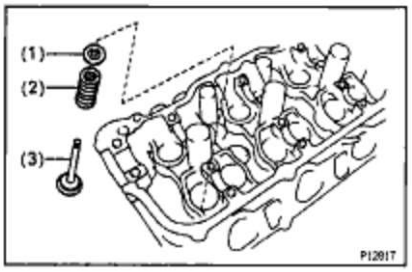


HINT: Arrange the valve lifters and shims in the cor–rect order.

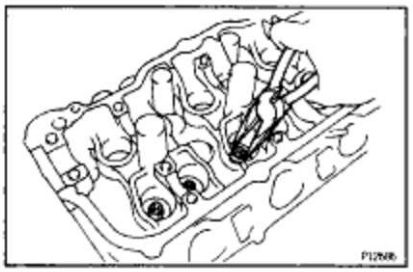


2. REMOVE VALVES

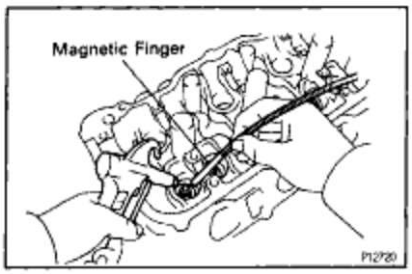
(a) Using SST, compress the valve spring and remove the 2 keepers.
SST 09202 – 70010



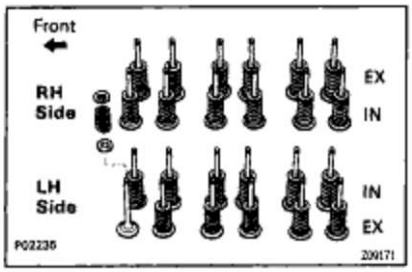
(b) Remove the following parts:
(1) Spring retainer
(2) Valve spring
(3) Valve



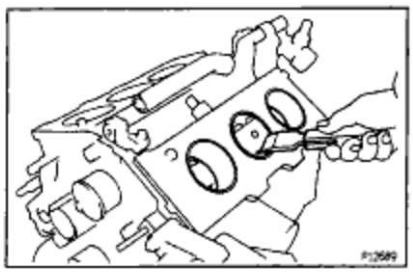
(c) Using needle–nose pliers, remove the oil seal.



(d) Using compressed air and a magnetic finger, remove the spring seat by blowing air.



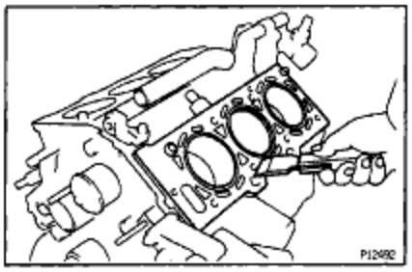
HINT: Arrange the valves, valve springs, spring seats and spring retainers in the correct order.



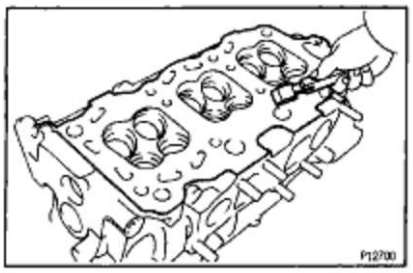
CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



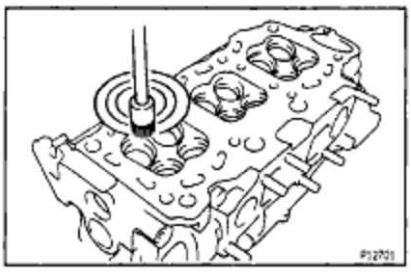
(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.
(c) Using compressed air, blow carbon and oil from the bolt holes.
CAUTION: Protect your eyes when using high pressure compressed air.



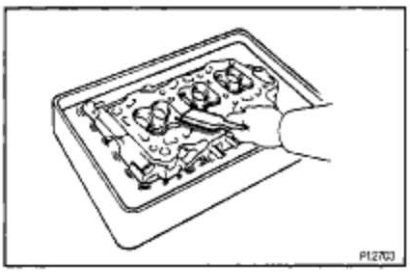
2. CLEAN CYLINDER HEAD

A. Remove gasket material

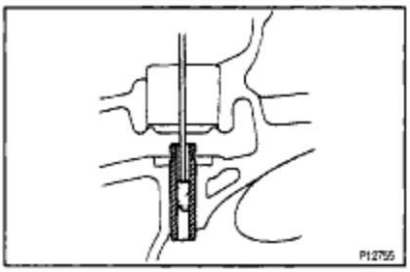
Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.
NOTICE: Be careful not to scratch the cylinder block contact surface.



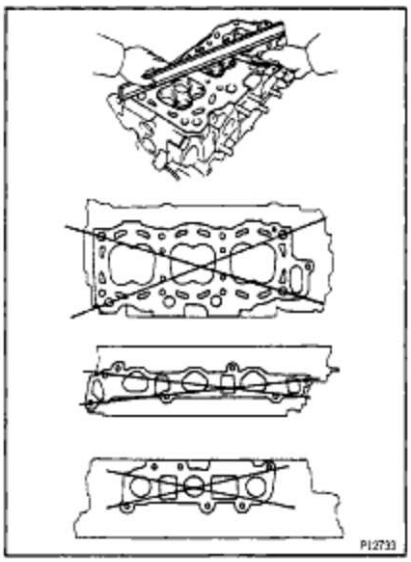
B. Clean combustion chambers
Using a wire brush, remove all the carbon from the combustion chambers.
NOTICE: Be careful not to scratch the cylinder block contact surface.



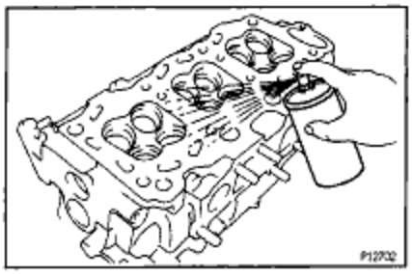
C. Clean cylinder head
Using a soft brush and solvent, thoroughly clean the cylinder head.



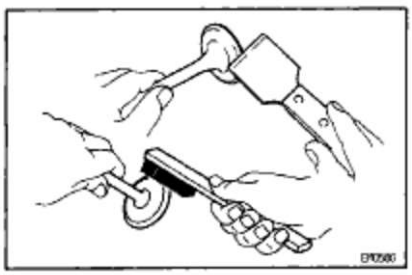
D. Clean valve guide bushings
Using a valve guide bushing brush and solvent, clean all the guide bushings.



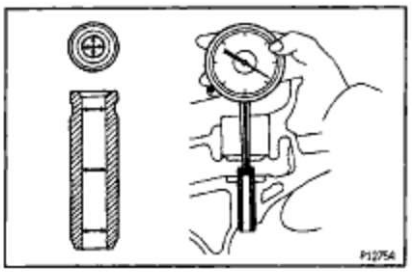
3. INSPECT CYLINDER HEAD
A. Inspect for flatness
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.
Maximum warpage:
0.10 mm (0.0039 in.)
If warpage is greater than maximum, replace the cylinder head.



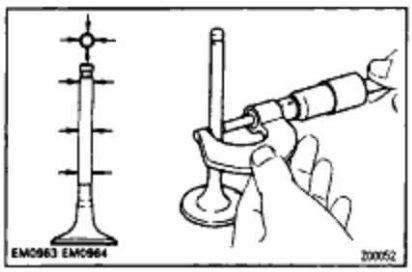
B. Inspect for cracks
Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.
If cracked, replace the cylinder head.



4. CLEAN VALVES
(a) Using a gasket scraper, chip off any carbon from the valve head.
(b) Using a wire brush, thoroughly clean the valve.



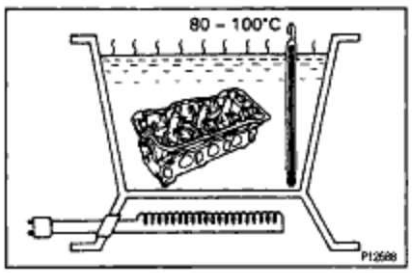
5. INSPECT VALVE STEMS AND GUIDE BUSHINGS
(a) Using a caliper gauge, measure the inside diameter of the guide bushing.
Bushing inside diameter:
5.510 – 5.530 mm (0.2169 – 0.2177 in.)



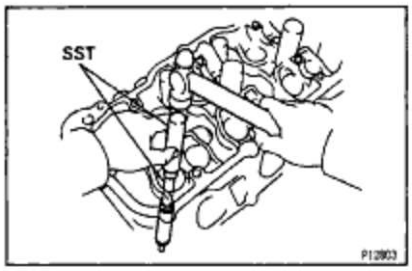
(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
Intake
5.470 – 5.485 mm (0.2154 – 0.2159 in.)
Exhaust
5.465 – 5.480 mm (0.2152 – 0.2157 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.
Standard oil clearance:
Intake
0.025 – 0.060 mm (0.0010 – 0.0024 in.)
Exhaust
0.030 – 0.065 mm (0.0012 – 0.0026 in.)

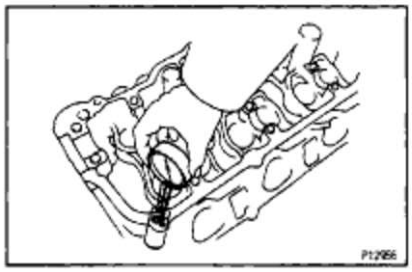
Maximum oil clearance:
Intake
0.08 mm (0.0031 in.)
Exhaust
0.10 mm (0.0039 in.)
If the clearance is greater than maximum, replace the valve and guide bushing.



6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS
(a) Gradually heat the cylinder head to 80 – 100_2 C (176 – 212_2 F).



(b) Using SST and a hammer, tap out the guide bushing.
SST 09201– 01055, 09608–20012 (09608–03020)



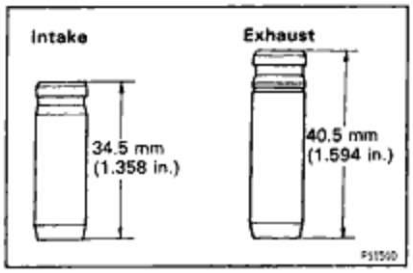
(c) Using a caliper gauge, measure the bushing bore di–ameter of the cylinder head.

Both intake and exhaust

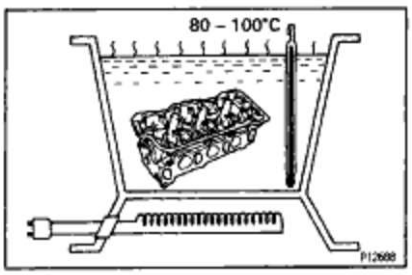
Bushing bore diameter mm (in.)	Bushing size
10.295 –10.313 (0.4053 – 0.4060)	Use STD
10.345 – 10.363 (0.4073 – 0.4080)	Use O/S 0.05

V04650

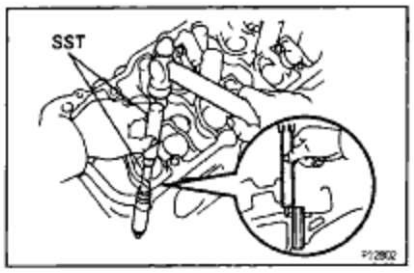
(d) Select a new guide bushing (STD or O/S 0.05).
If the bushing bore diameter of the cylinder head is greater than 10.313 mm (0.4060 in.), machine the bushing bore to the following dimension:
10.345 – 10.363 mm (0.4073 – 0.4080 in.)
If the bushing bore diameter of the cylinder head is greater than 10.363 mm (0.4080 in.), replace the cylinder head.



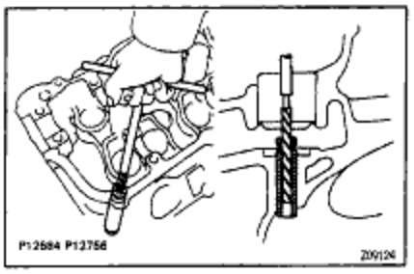
HINT: Different bushings are used for the intake and exhaust.



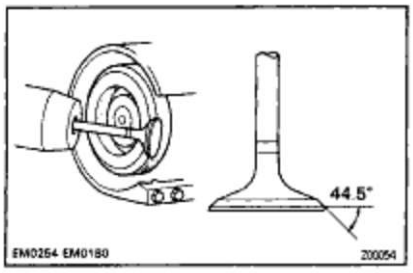
(e) Gradually heat the cylinder head to 80 – 100₂C (176 – 212₂F).



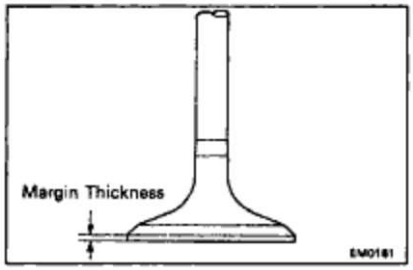
(f) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
SST 09201– 01055, 09608–20012 (09608–03020)
Protrusion height:
Intake
11.1 – 11.3 mm (0.437 – 0.445 in.)
Exhaust
8.9 – 9.3 mm (0.350 – 0.366 in.)



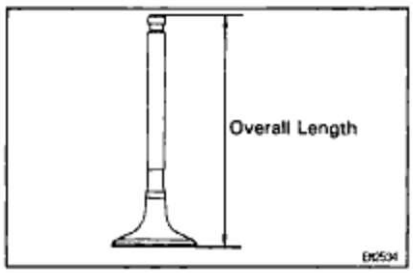
(h) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step 5 above) between the guide bushing and valve stem.



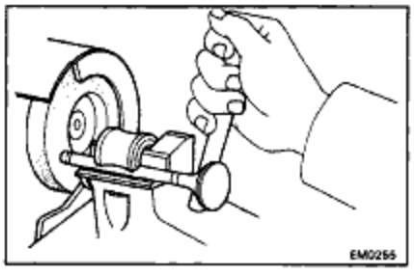
7. INSPECT AND GRIND VALVES
(a) Grind the valve enough to remove pits and carbon.
(b) Check that the valve is ground to the correct valve face angle.
Valve face angle:
44.5₂



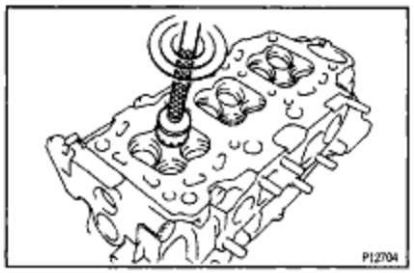
(c) Check the valve head margin thickness.
Standard margin thickness:
1.0 mm (0.039 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



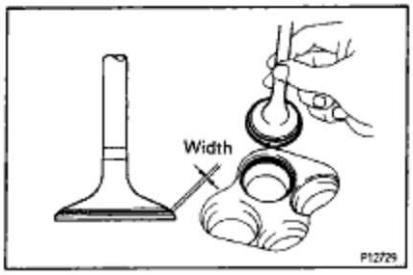
(d) Check the valve overall length.
Standard overall length:
Intake
95.45 mm (3.5779 in.)
Exhaust
95.40 mm (3.7559 in.)
Minimum overall length:
Intake
94.95 mm (3.7382 in.)
Exhaust
94.90 mm (3.7362 in.)
If the overall length is less than minimum, replace the valve.



(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.
NOTICE: Do not grind off more than minimum.



8. INSPECT AND CLEAN VALVE SEATS
(a) Using a 45_2 carbide cutter, resurface the valve seats.
Remove only enough metal to clean the seats.

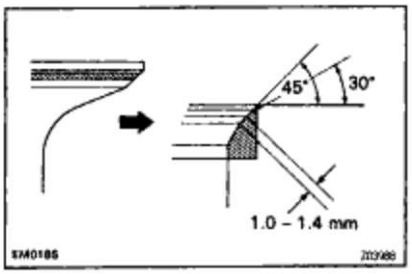


(b) Check the valve seating position.
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.
(c) Check the valve face and seat for the following:

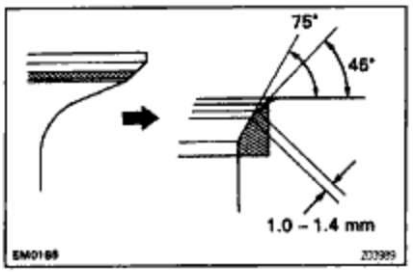
- If blue appears 360_2 around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360_2 around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:
  1.0 – 1.4 mm (0.039 – 0.055 In.)

If not, correct the valve seats as follows:

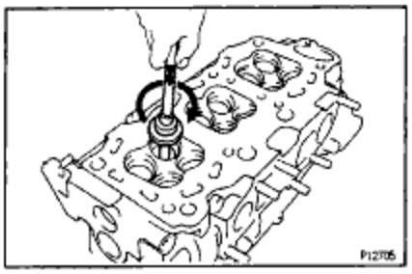
(1) If the seating is too high on the valve face, use 30_2 and 45_2 cutters to correct the seat.



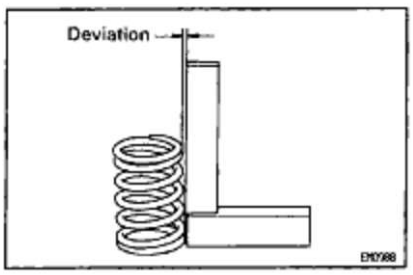
(2) If the seating is too low on the valve face, use 75_2 and 45_2 cutters to correct the seat.

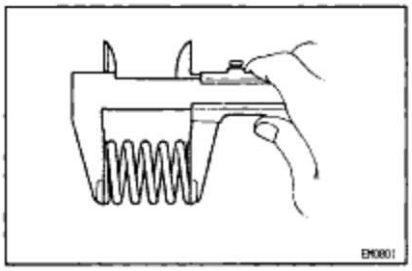


(d) Hand–lap the valve and valve seat with an abrasive compound.
(e) After hand–lapping, clean the valve and valve seat.

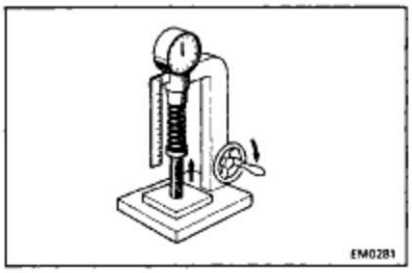


9. INSPECT VALVE SPRINGS
(a) Using a steel square, measure the deviation of the valve spring.
Maximum deviation:
2.0 mm (0.079 in.)
If the deviation is greater than maximum, replace the valve spring.

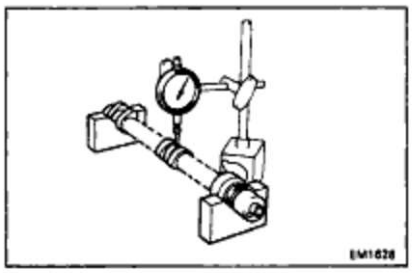




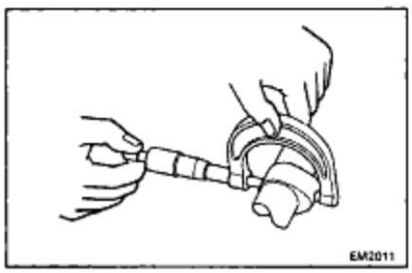
(b) Using a vernier caliper, measure the free length of the valve spring.
Free length:
45.50 mm (1.7913 in.)
If the free length is not as specified, replace the valve spring.



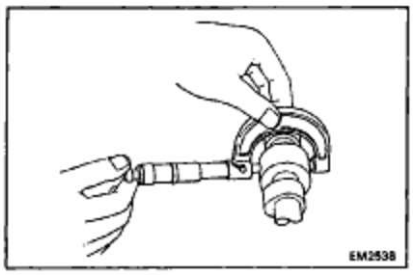
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.
Installed tension:
186 – 206 N (19.0 – 21.0 kgf, 41.9 – 46.3 lbf)
at 33.8 mm (1.331 in.)
If the installed tension is not as specified, replace the valve spring.



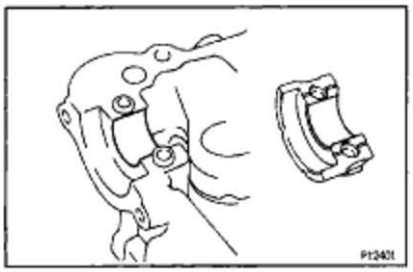
10. INSPECT CAMSHAFTS AND BEARINGS
A. Inspect camshaft for runout
(a) Place the camshaft on V – blocks.
(b) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.06 mm (0.0024 in.)
If the circle runout is greater than maximum, replace the camshaft.



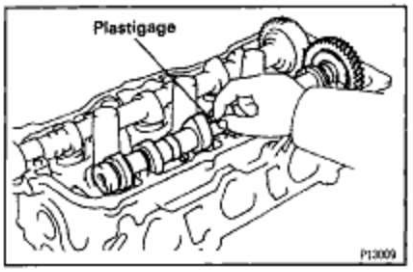
B. Inspect cam lobes
Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
Intake
42.11 – 42.21 mm (1.6579 – 1.6618 in.)
Exhaust
41.96 – 42.06 mm (1.6520 – 1.6559 in.)
Minimum cam lobe height:
Intake
41.96 mm (1.6520 in.)
Exhaust
41.81 mm (1.6461 in.)
If the cam lobe height is less than minimum, replace the camshaft.



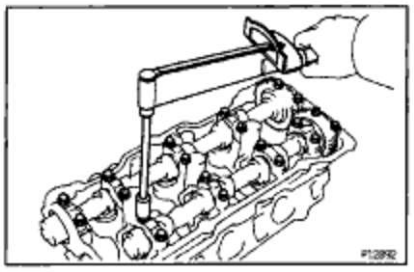
C. Inspect camshaft journals
Using a micrometer, measure the journal diameter.
Journal diameter:
26.949 – 26.965 mm (1.0610 – 1.061 6 in.)
If the journal diameter is not as specified, check the oil clearance.



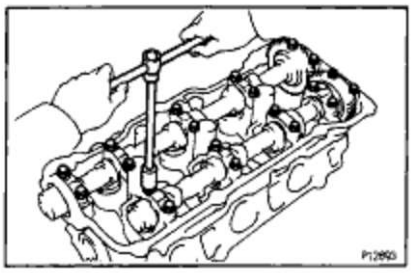
D. Inspect camshaft bearings
Check that bearings for flaking and scoring.
If the bearings are damaged, replace the bearing caps and cylinder head as a set.



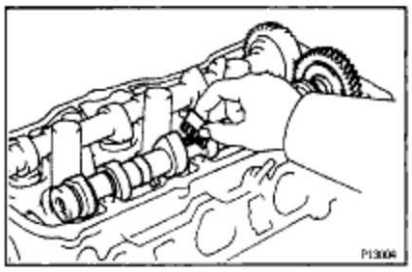
E. Inspect camshaft journal oil clearance
(a) Clean the bearing caps and camshaft journals.
(b) Place the camshafts on the cylinder head.
(c) Lay a strip of Plastigage across each of the camshaft journals.



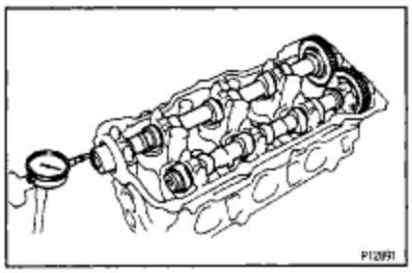
(d) Install the bearing caps.
(See step 3 on pages EG2–98 to 102)
Torque: 16 N–m (160 kgf–cm, 12 ft–lbf)
NOTICE: Do not turn the camshaft.



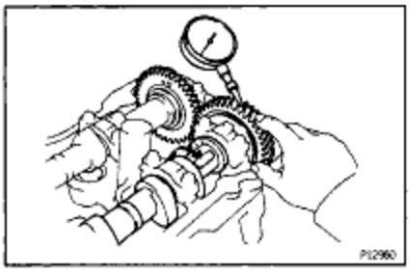
(e) Remove the bearing caps.



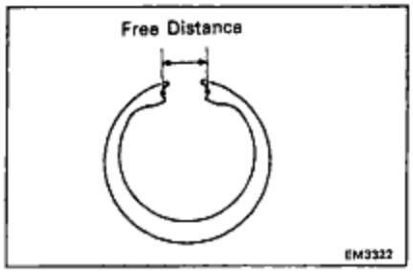
(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.035 – 0.072 mm (0.0014 – 0.0028 in.)
Maximum oil clearance:
0.10 mm (0.0039 fn.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.
(g) Completely remove the Plastigage.
(h) Remove the camshafts.



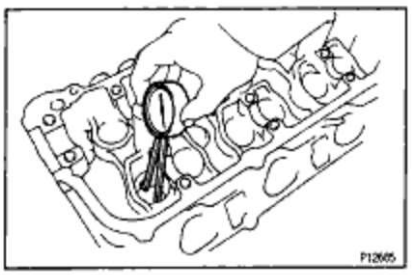
F. Inspect camshaft thrust clearance
(a) Install the camshafts.
(See step 3 on pages EG2–98 to 102)
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.040 – 0.090 mm (0.0016 – 0.0035 in.)
Maximum thrust clearance:
0.12 mm (0.0047 in.)
If the thrust clearance is greater than maximum, re–place the camshaft. If necessary, replace the bearing caps and cylinder head as a set.
(c) Remove the camshafts.



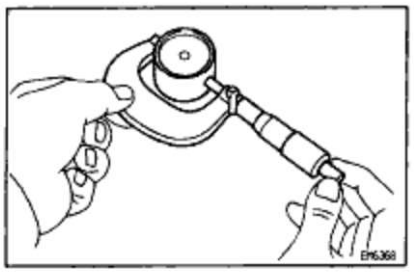
G. Inspect camshaft gear backlash
(a) Install the camshafts without installing the exhaust cam sub–gear.
(See step 3 on pages EG2–98 to 102)
(b) Using a dial indicator, measure the backlash.
Standard backlash:
0.020 – 0.200 mm (0.0008 – 0.0079 In.)
Maximum backlash:
0.30 mm (0.0188 in.)
If the backlash is greater then maximum, replace the camshafts.
(c) Remove the camshafts.



H. Inspect camshaft gear spring
Using a vernier caliper, measure the free distance between the spring ends.
Free distance:
18.2 – 18.8 mm (0.712 – 0.740 in.)
If the free distance is not as specified, replace the gear spring.

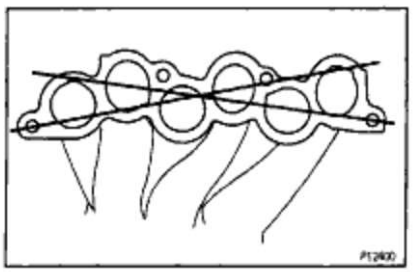


11. INSPECT VALVE LIFTERS AND LIFTER BORES
(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.000 – 31.018 mm (1.2205 – 1.2212 in.)

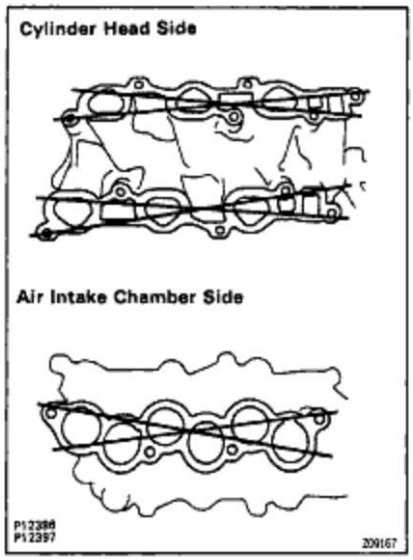


(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 – 30.976 mm (1.2191 – 1.2196 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024 – 0.050 mm (0.0009 – 0.0020 in.)
Maximum oil clearance:
0.07 mm (0.0028 In.)
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



12. INSPECT AIR INTAKE CHAMBER
Using a precision straight edge and feeler gauge, measure the surface contacting the intake manifold for warpage.
Maximum warpage:
0.10 mm (0.0039 in.)
If warpage is greater than maximum, replace the chamber.



13. INSPECT INTAKE MANIFOLD

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

Maximum warpage:

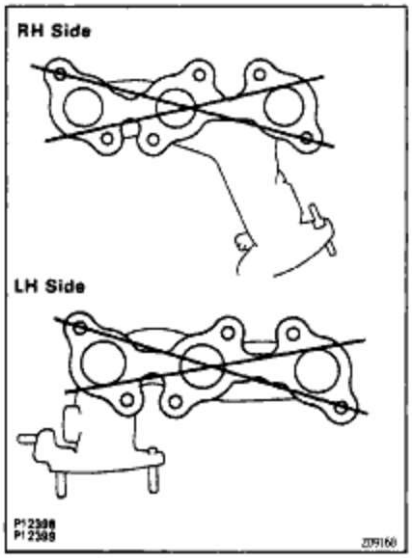
Air Intake Chamber Side

0.15 mm (0.0059 in.)

Cylinder Head Side

0.08 mm (0.0031 in.)

If warpage is greater than maximum, replace the manifold.



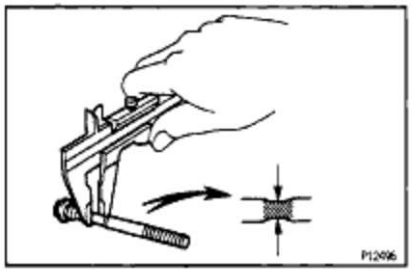
14. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage:

0.50 mm (0.0196 in.)

If warpage is greater than maximum, replace the manifold.



15. INSPECT CYLINDER HEAD BOLTS

(for 12 Pointed Head Bolts)

Using a caliper gauge, measure the thread outside diameter of the bolt.

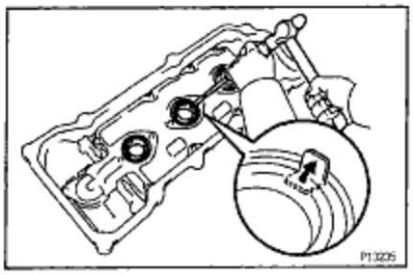
Standard outside diameter:

8.95 – 9.05 mm (0.3524 – 0.3563 in.)

Minimum outside diameter:

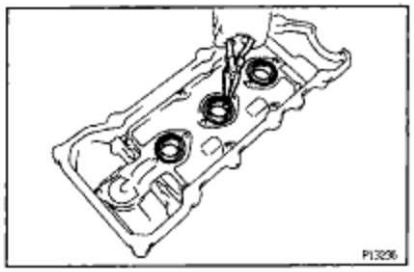
8.75 mm (0.3445 in.)

If the diameter is less than minimum, replace the bolt.

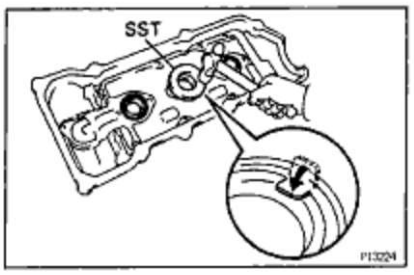


16. IF NECESSARY, REPLACE SPARK PLUG TUBE GASKETS

(a) Bend up the tab on the ventilation baffle plate which prevents the gasket from the slipping out.
(b) Using a screwdriver and hammer, tap out the gasket.



(c) Using needle–nose pliers, ply out the gasket.

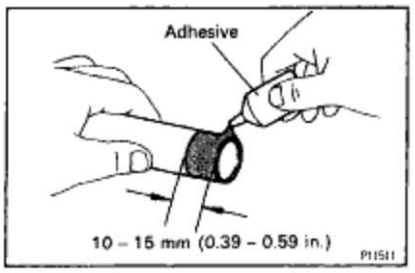


(d) Using SST and a hammer, tap in a new gasket until its surface is flush with the upper edge of the cylinder head cover.
SST 09608–20012 (09608–03070)
(e) Apply a light coat of MP grease to the gasket lip.
(f) Return the ventilation plate tab to its original position.

CYLINDER HEAD ASSEMBLY

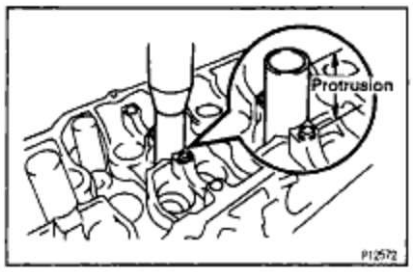
(See Components for Removal and Installation)

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.

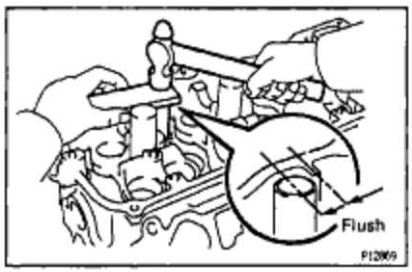


1. INSTALL SPARK PLUG TUBES

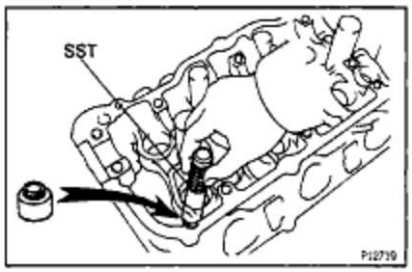
HINT: When using a new cylinder head, spark plug tubes must be installed.
(a) Apply adhesive to the end of the spark plug tube.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Using a press, press in a new spark plug tube until there is 42.4 – 43.4 mm (1.669 – 1.749) protruding from the camshaft bearing cap installation surface of the cylinder head.
NOTICE: Avoid pressing a new spark plug tube In too far by measuring the amount of the protrusion while press–ing.

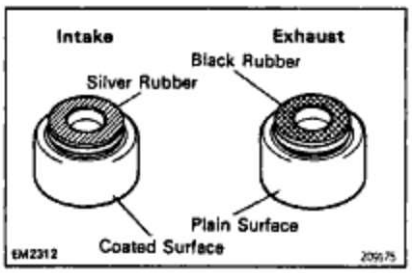


2. INSTALL PCV PIPES
HINT: When using a new cylinder head, PCV pipe must be installed.
Using a wooden block and hammer, tap in a new spark tube until its top side is flush with the cylinder head edge.
NOTICE: Be careful not to damage the cylinder head edge.

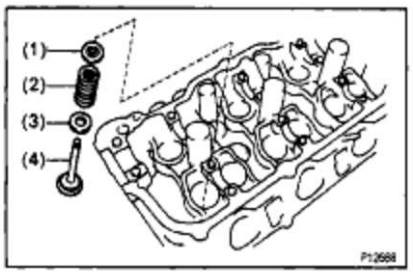


3. INSTALL VALVES

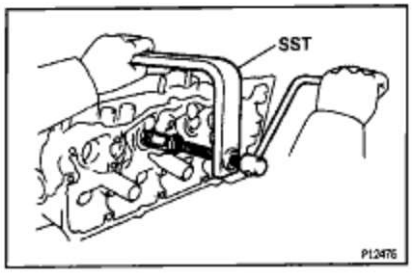
(a) Using SST, push in a new oil seal.
SST 09201 –41020



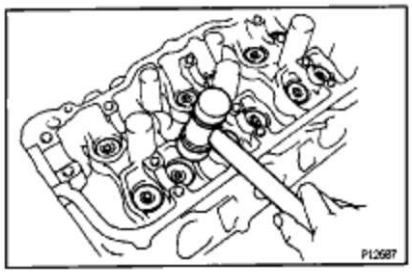
HINT: The intake valve oil seal is silver and the ex–haust valve oil seal is black.



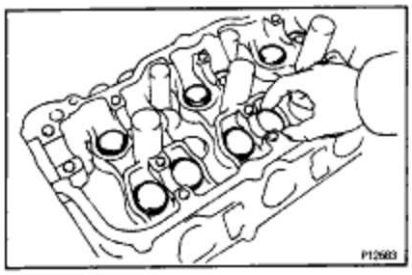
(b) Install the following parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



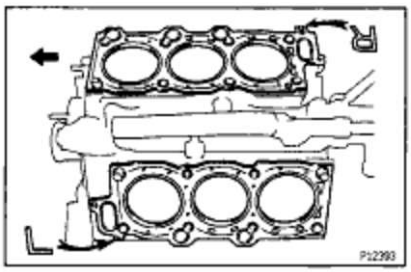
(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202 – 70010



(d) Using a plastic–faced hammer, lightly tap the valve stem tip to ensure a proper fit.



4. INSTALL VALVE LIFTERS AND SHIMS
(a) Install the valve lifter and shim.
(b) Check that the valve lifter rotates smoothly by hand.



CYLINDER HEAD INSTALLATION

(See Components for Removal and Installation)

1. INSTALL CYLINDER HEADS

A. Place cylinder head on cylinder block

(a) Place 2 new cylinder head gaskets in position on the cylinder block.

NOTICE: Be careful of the installation direction.

(b) Place the 2 cylinder heads in position on the cylinder head gaskets.

B. Install cylinder head (12 pointed head) bolts

HINT:

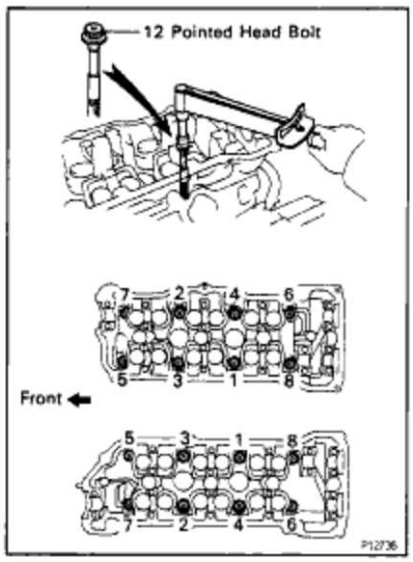
- The cylinder head bolts are tightened in 2 pro–gressive steps (steps (b) and (d)).
- If any bolt is broken or deformed, replace it.

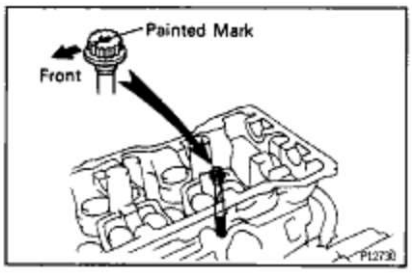
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install and uniformly tighten the . cylinder head bolts on each cylinder head, in several passes, in the se–quence shown, then repeat for the other side, as shown.

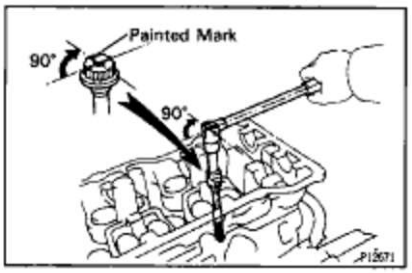
Torque: 64 N–m (550 kgf–cm, 40 ft–lbf)

If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



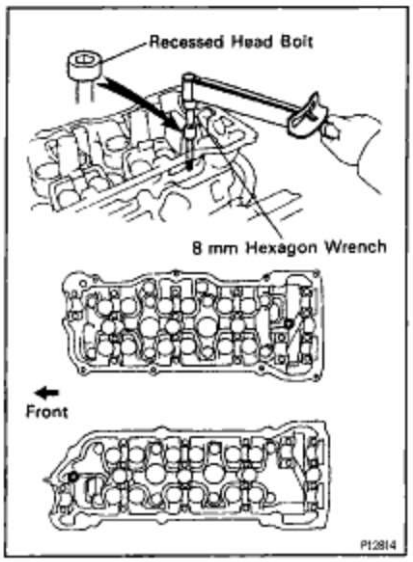


(c) Mark the front of the cylinder head bolt head with paint.

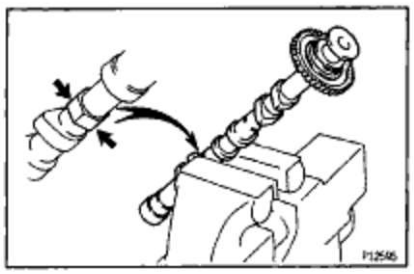


(d) Retighten the cylinder head bolts by 90_2 in the numer–ical order shown.

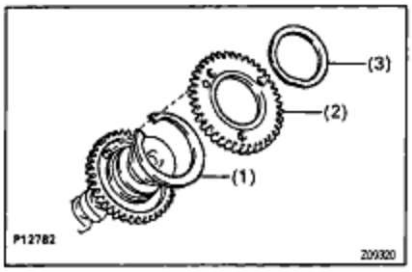
(e) Check that the painted mark is now at a 90_2 angle to the front.



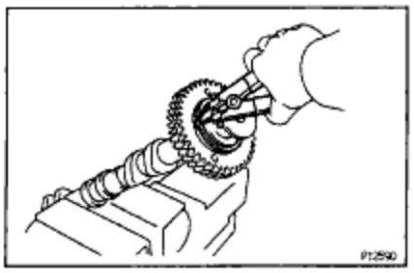
C. Install cylinder head (recessed head) bolts
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
(b) Using a 8 mm hexagon wrench, install the cylinder head bolt on each cylinder head, then repeat for the other side, as shown.
Torque: 18.5 N–m (185 kgf–cm, 13 ft–lbf)



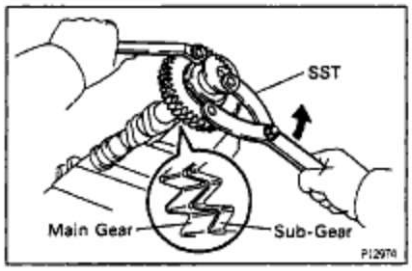
2. ASSEMBLY EXHAUST CAMSHAFTS
(a) Mount the hexagonal wrench head portion of the camshaft in a vise.
NOTICE: Be careful not to damage the camshaft.



(b) Install the following parts:
(1) Camshaft gear spring
(2) Camshaft sub–gear
(3) Wave washer



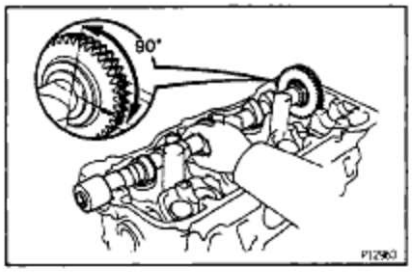
(c) Using snap ring pliers, install the snap ring.



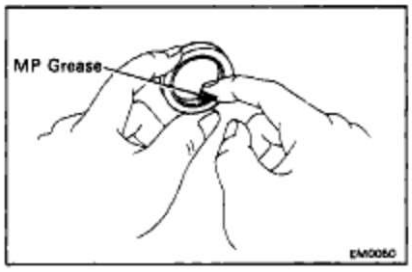
(d) Using SST, align the holes of the camshaft main gear and sub–gear by turning camshaft sub–gear counterclockwise, and install a service bolt.
SST 09960–10010 (09962–0100)
HINT: Align the pins on the gears with the gear spring ends.

3. INSTALL CAMSHAFTS

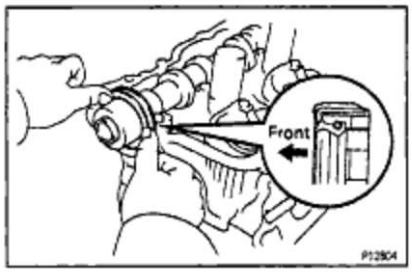
NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be held level while it Is being installed. If the camshaft Is not level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



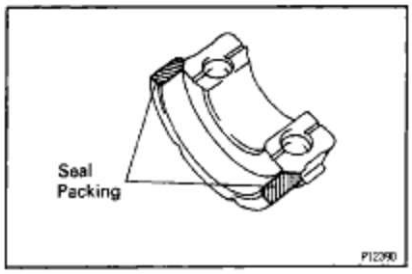
A. Install exhaust camshaft of RH cylinder head
(a) Apply new engine oil to the thrust portion and journal of the camshaft.
(b) Place the exhaust camshaft at 90_2 angle of timing mark (2 dot marks) on the cylinder head.



(c) Apply MP grease to a new oil seal lip.

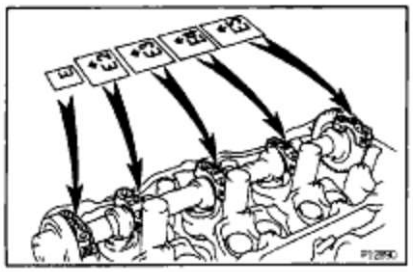


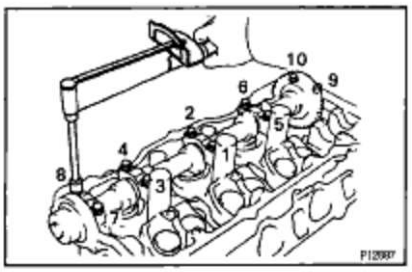
(d) Install the oil seal to the camshaft.



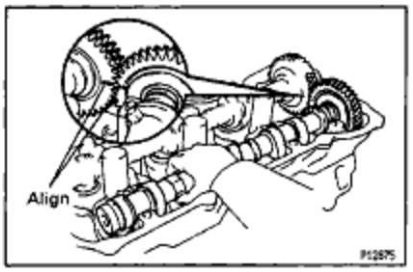
(e) Remove any old packing (FIPG) material.
(f) Apply seal packing to the No. 1 bearing cap as shown.
Seal packing:
Part No. 08826–00080 or equivalent

(g) Install the 5 bearing caps in their proper locations.

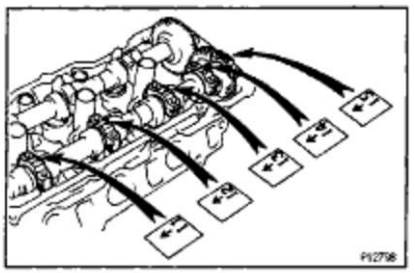




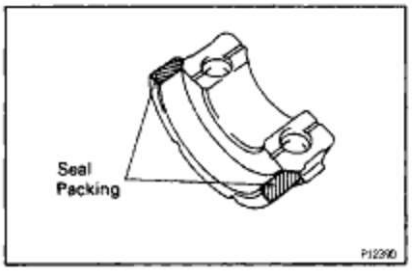
(h) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(i) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N–m (160 kgf–cm, 12 ft–lbf)



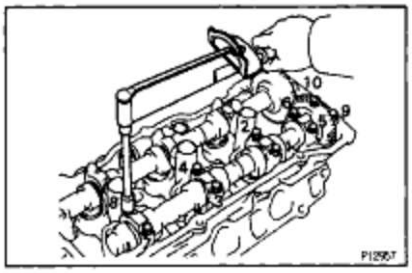
B. Install intake camshaft of RH cylinder head
(a) Apply new engine oil to the thrust portion and journal of the camshaft.
(b) Align the timing marks (2 dot marks) of the camshaft drive and driven gears.
(c) Place the intake camshaft on the cylinder head.



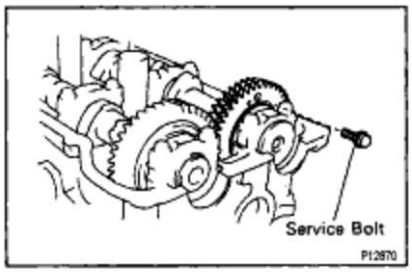
(d) Install the 5 bearing caps in their proper locations.



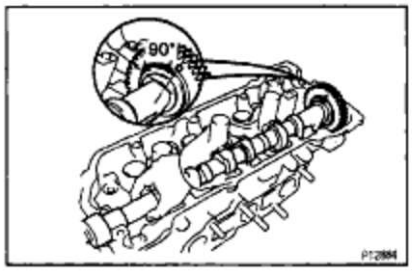
(e) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.



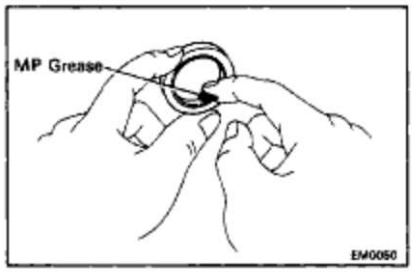
(f) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N–m (160 kgf–cm, 12 ft–lbf)



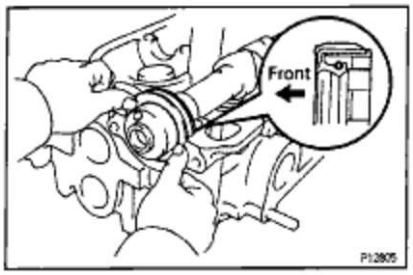
(g) Remove the service bolt



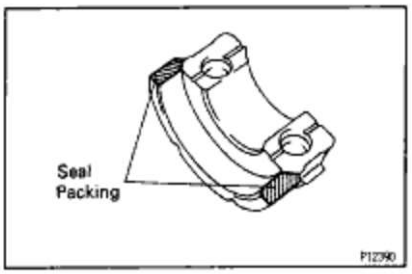
C. Install exhaust camshaft of LH cylinder head
(a) Apply MP grease to the thrust portion of the cam–shaft.
(b) Place the intake camshaft at 90_2 angle of timing mark (1 dot mark) on the cylinder head.



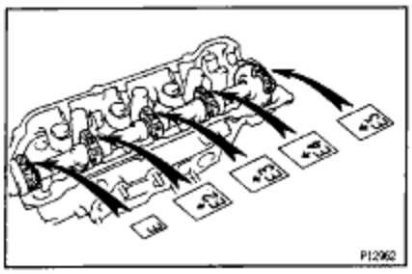
(c) Apply MP grease to a new oil seal lip.



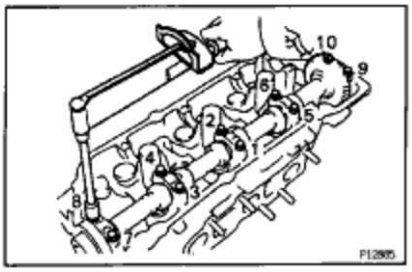
(d) Install the oil seal to the camshaft.



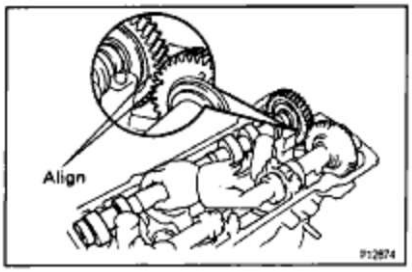
(e) Remove any old packing (FIPG) material.
(f) Apply seal packing to the No. 1 bearing cap as shown.
Seal packing:
Part No. 08826–00080 or equivalent



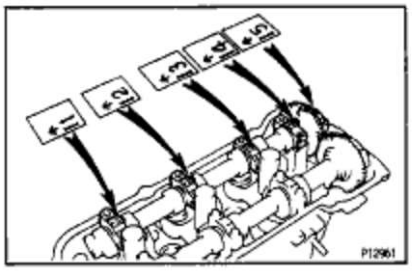
(g) Install the 5 bearing caps in their proper locations.



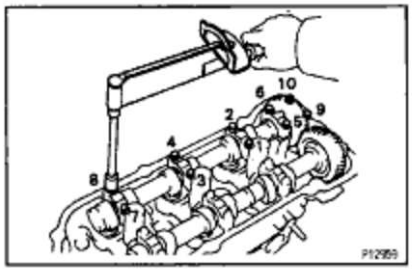
(h) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(i) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N–m (160 kgf–cm, 12 ft–lbf)



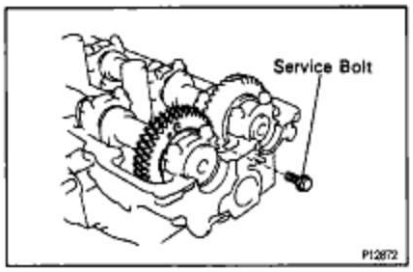
D. Install intake camshaft of LH cylinder head
(a) Apply MP grease to the thrust portion of the cam–shaft.
(b) Align the timing marks (1 dot mark) of the camshaft drive and driven gears.
(c) Place the intake camshaft on the cylinder head.



(d) Install the 5 bearing caps in their proper locations.

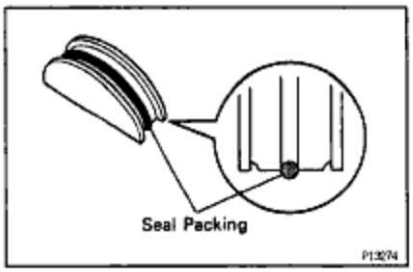


(e) Apply a light coat of engine oil on the threads and under the heads of bearing cap bolts.
(f) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N–m (160 kgf–cm, 12 ft–lbf)

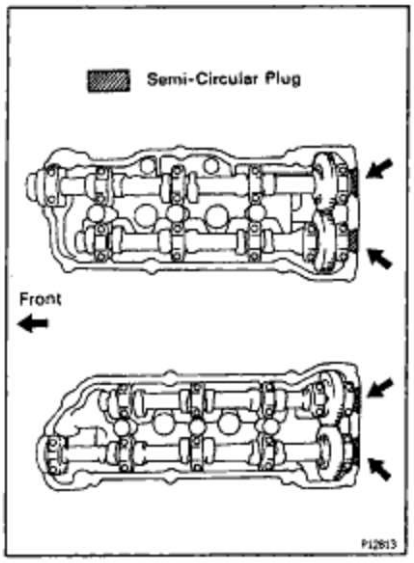


(g) Remove the service bolt.

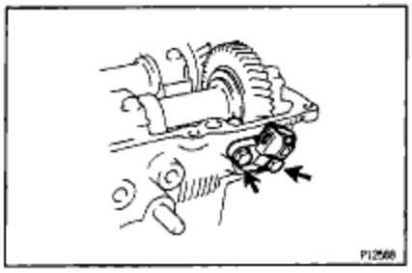
4. CHECK AND ADJUST VALVE CLEARANCE
(See steps 17 to 19 on pages EG2–18 to 23)
Turn the camshaft and position the cam lobe upward, and check and adjust the valve clearance.
Valve clearance (Cold):
Intake
0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust
0.25–0.35mm(0.010–0.014in.)



6. INSTALL SEMI–CIRCULAR PLUGS
(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the semi–circular plug grooves,
Seal packing:
Part No. 08826–00080 or equivalent



(c) Install the 4 semi–circular plugs to the cylinder heads.

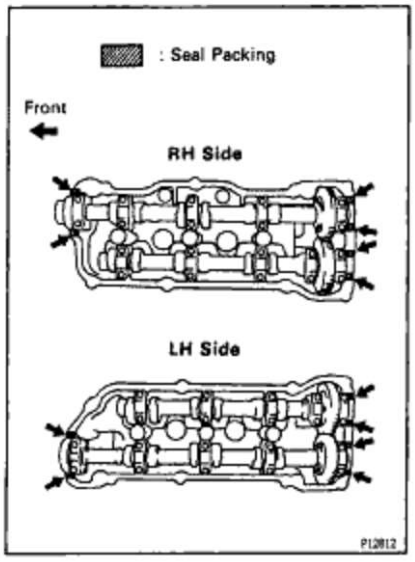


6. INSTALL CAMSHAFT POSITION SENSOR

(a) Install a new gasket to the position sensor.

(b) Install the positron sensor with the bolt.

Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)

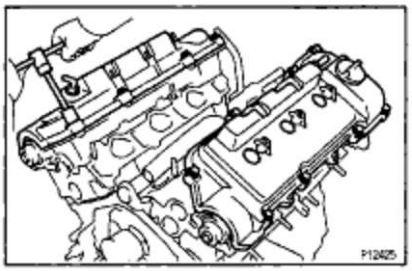


7. INSTALL CYLINDER HEAD COVERS

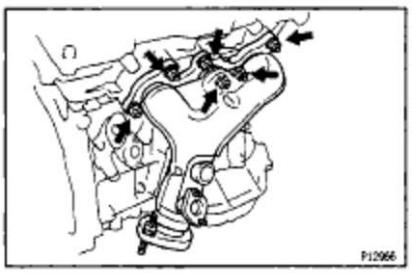
(a) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing:

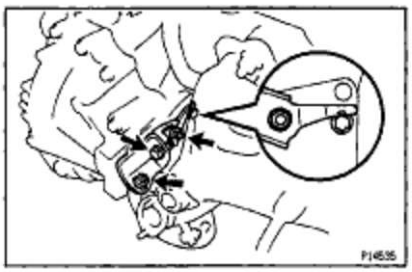
Part No. 08826–00080 or equivalent



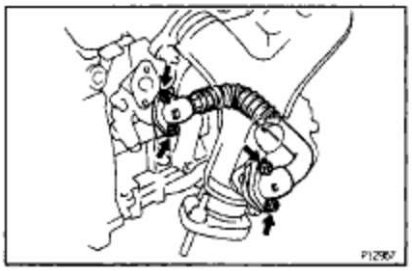
(b) Install the gasket to the cylinder head cover.
(c) Install the cylinder head cover with the 8 bolts. Uniformly tighten the bolts in several passes. Install the 2 cylinder head covers.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



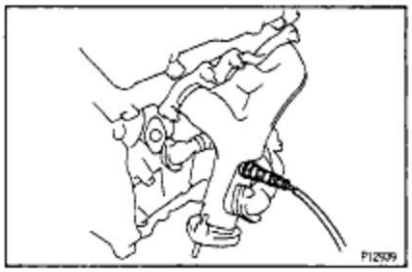
8. INSTALL RH EXHAUST MANIFOLD
(a) Install a new gasket and the exhaust manifold with the 6 nuts.
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)



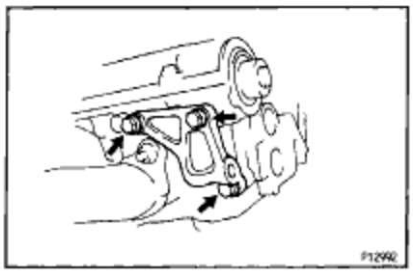
(b) Install the exhaust manifold stay and plate with the bolt and 2 nuts.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)
HINT: Install the manifold stay so that the tip of the stay touches the head of the differential retainer installation bolt as shown in the illustration.



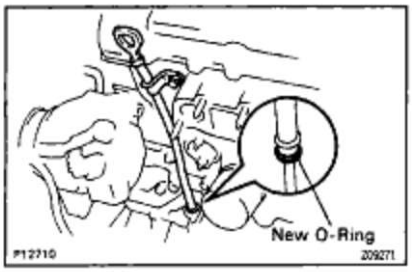
(c) Install 2 new gaskets and the EGR pipe with the 4 nuts.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



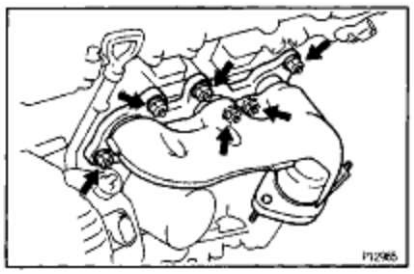
(d) Install the main heated oxygen sensor (Bank 1 Sensor 1).
Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)



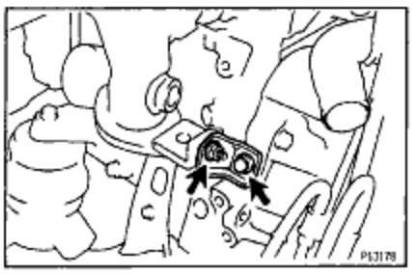
9. INSTALL PS BRACKET
Install the PS bracket with the 3 bolts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



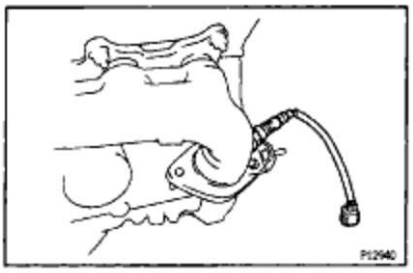
10. INSTALL OIL DIPSTICK AND GUIDE
(a) Install a new O–ring to the dipstick guide.
(b) Apply soapy water to the 0– ring.
(c) Push in the dipstick guide end into the guide hole of the No. 1 oil pan.
(d) Install the dipstick guide with the bolt.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)
(e) Install the dipstick.



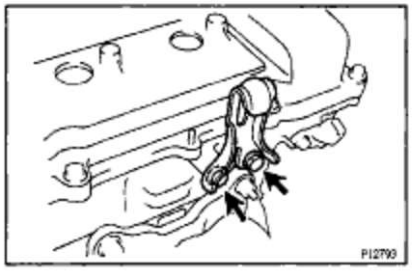
11. INSTALL LH EXHAUST MANIFOLD
(a) Install a new gasket and the exhaust manifold with the 6 nuts.
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)



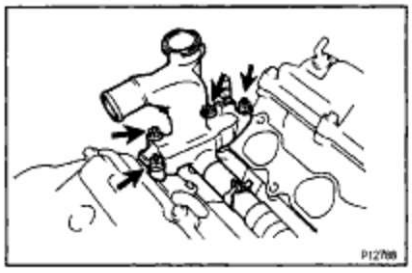
(b) Install the exhaust main manifold stay with the bolt and nut.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)



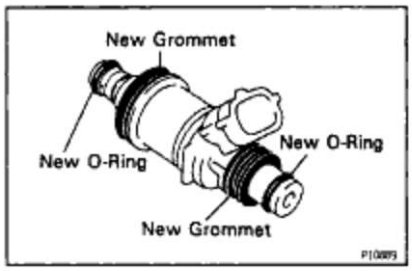
(c) Install the main heated oxygen sensor (Bank 2 Sensor 1).
Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)



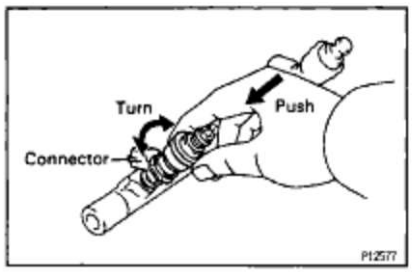
12. INSTALL No.2 ENGINE HANGER
Install the engine hanger with the 2 bolts.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)



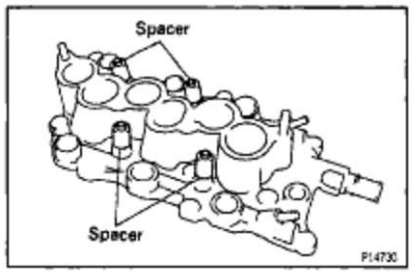
13. INSTALL WATER OUTLET
(a) Connect the water outlet to the bypass hose.
(b) Install 2 new gaskets and the water outlet with the 2 bolts, 2 nuts and 2 plate washers.
Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)
NOTICE: Do not scratch the seal surface of the water outlet with the stud bolt.



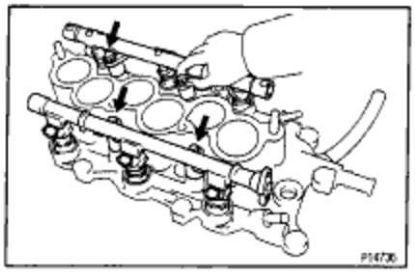
14. INSTALL INJECTORS AND DELIVERY PIPES
(a) Install 2 new grommets to each injector.
(b) Apply a light coat of gasoline to 2 new 0–rings and install them to each injector.



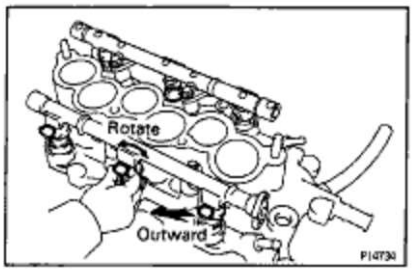
(c) While turning the injector clockwise and counter–clockwise, push it to the delivery pipes. Install the 6 injectors.
(d) Position the injector connector outward.



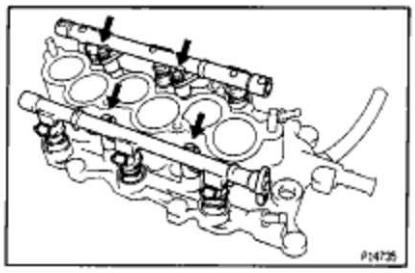
(e) Place the 4 spacers in position on the intake manifold.



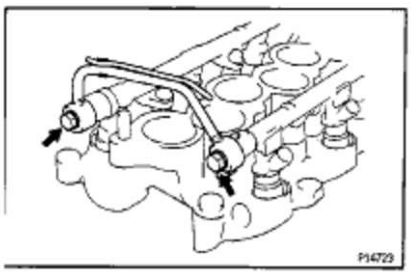
(f) Place the delivery pipes together with the 6 injectors in position on the intake manifold.
(g) Temporarily install the 4 bolts holding the delivery pipes to the intake manifold.



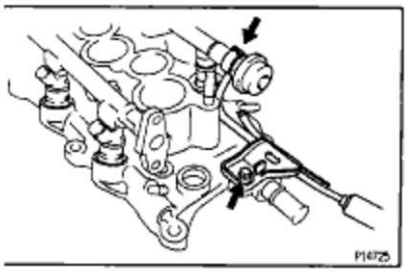
(h) Check that the injectors rotate smoothly.
HINT: If injectors do not rotate smoothly, the probable cause is incorrect installation of O–rings. Replace the O–rings.
(i) Position the injector connector outward.



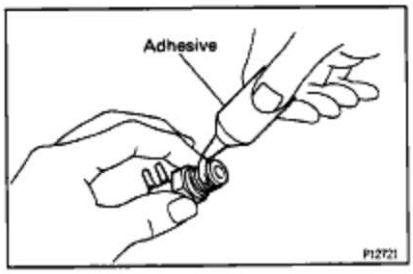
(j) Tighten the 4 bolts holding the delivery pipes to the intake manifold.
Torque: 10 N–m (100 kgf–cm, 7 ft–lbf)



15. INSTALL No.2 FUEL PIPE
Install the No.2 fuel pipe with the 2 union bolts and 4 gaskets.
Torque: 32.5 N–m (330 kgf–cm, 24 ft–lbf)



16. INSTALL NO.1 FUEL PIPE AND PULSATION DAMPER
Install the No.1 fuel pipe with the pulsation damper, 4 new gaskets and bolt.
Torque: 32.5 N–m (330 kgf–cm, 24 ft–lbf) for Pulsation damper
Torque: 15 N–m (150 kgf–cm, 11 ft–lbf) for Bolt

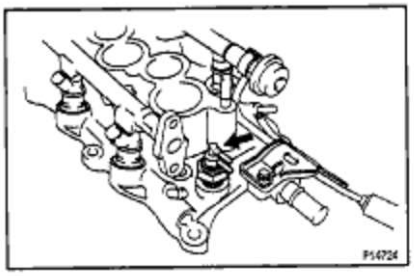


17. INSTALL TVV

(a) Apply adhesive to 2 or 3 threads.

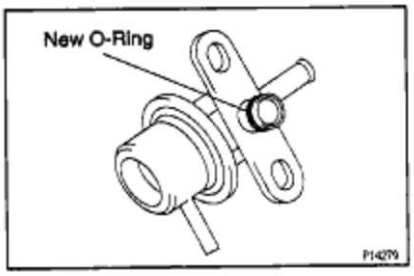
Adhesive:

Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Install the TVV.

Torque: 30 N–m (305 kgf–cm, 22 ft–lbf)



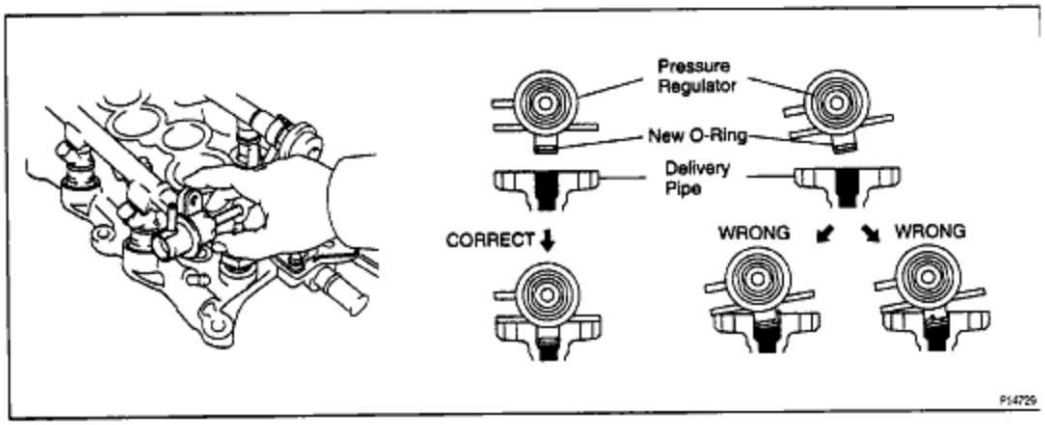
18. INSTALL FUEL PRESSURE REGULATOR

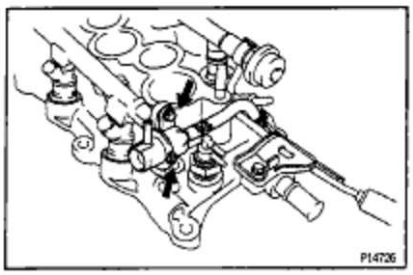
(a) Apply a light coat of gasoline to a new 0–ring, and install it to the pressure regulator.

(b) Attach the pressure regulator to the delivery pipe.

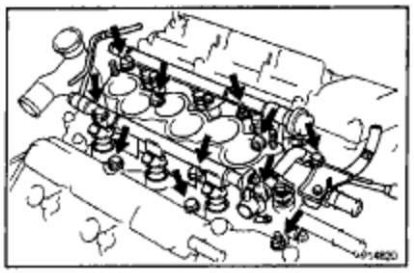
(c) Check that the pressure regulator rotates smoothly.

NOTICE: If it does not rotate smoothly, the O–ring may be pinched, so remove the pressure regulator and repeat steps (b) and (e) above.

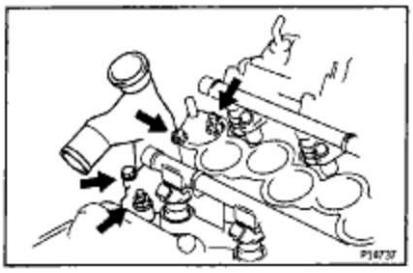




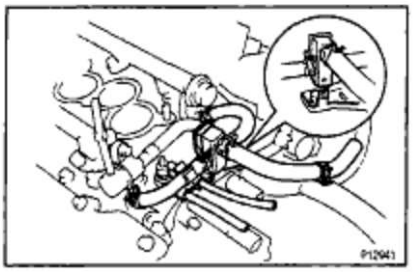
(d) Install the pressure regulator with the 2 bolts.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



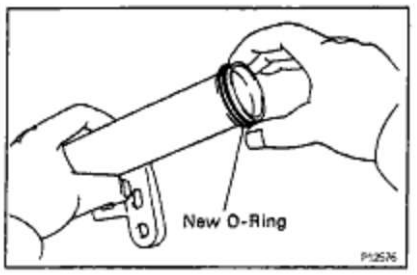
19. INSTALL INTAKE MANIFOLD
Install the intake manifold with the 9 bolts, 2 nuts and 2 plate washers.
Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)



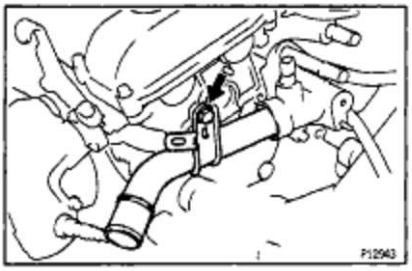
20. RETIGHTEN WATER OUTLET MOUNTING BOLTS AND NUTS
Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)



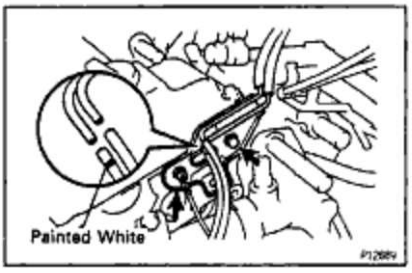
21. INSTALL AIR ASSIST HOSE



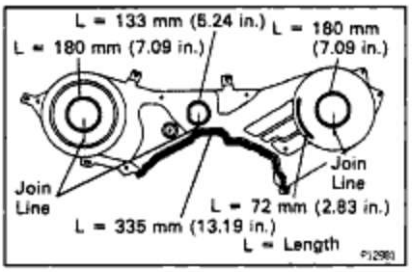
22. INSTALL WATER INLET PIPE
(a) Install a new O–ring to the water inlet pipe.
(b) Apply soapy water to the O–ring.



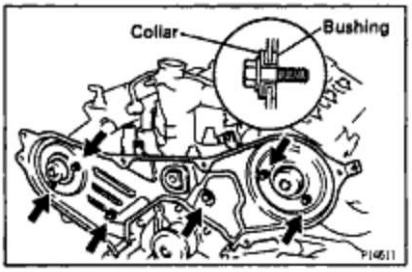
(c) Connect the water inlet pipe to the water inlet.
(d) Install the bolt holding the water inlet pipe to the cylinder head.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)



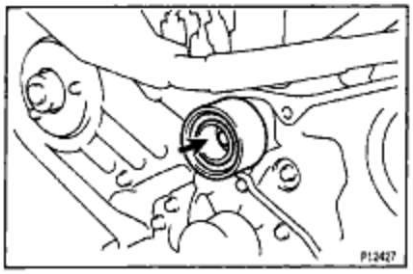
23. INSTALL CYLINDER HEAD REAR PLATE
(a) Install the rear plate and grand strap with the bolt and nut.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)
(b) Connect the vacuum hose to the air intake chamber.
(c) Connect the 2 vacuum hoses to the vacuum tank.



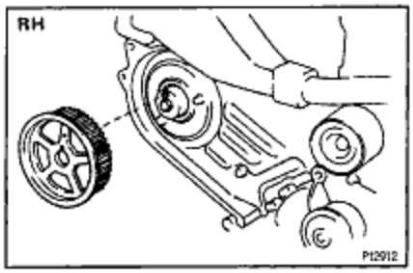
24. INSTALL NO–3 TIMING BELT COVER
(a) Check that the timing belt cover gaskets have no cracks or peeling, etc.
If the gaskets do have cracks or peeling etc., replace them using following steps.
(1) Using a screwdriver and gasket scraper, remove all the old gasket material.
(2) Thoroughly clean all components to remove all the loose material.
(3) Remove the backing paper from a new gasket and install the gasket evenly to the part of the belt cover shaded black in the illustration.
NOTICE: When joining gaskets, do not leave a gap between them. Cut off any excess gasket.
(4) After installing the gasket, press down on it so that the adhesive firmly sticks to the belt cover.
(b) Install new gaskets to the No.3 belt cover.



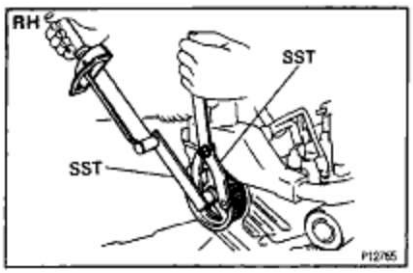
(c) Install the belt cover with the 6 bolts.
Torque: 8.5 N–m (85 kgf–cm, 74 in–lbf)



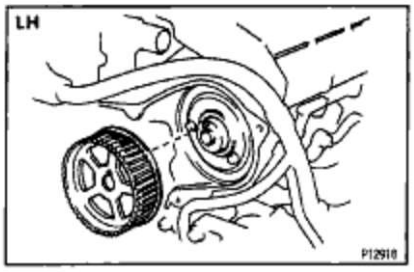
25. INSTALL NO.2 IDLER PULLEY
(a) Install the idler pulley with the bolt.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(b) Check that the idler pulley moves smoothly.



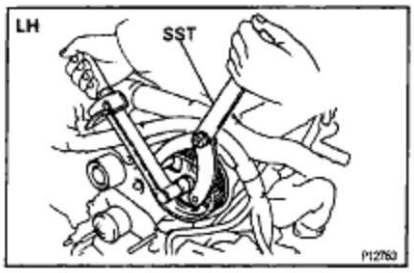
26. INSTALL RH CAMSHAFT TIMING PULLEY
(a) Install the timing pulley, facing the flange side out–ward.
(b) Align the knock pin hole of the camshaft with the knock pin groove of the timing pulley as shown.



(c) Using SST, install and torque the bolt.
SST 09249–63010, 09960–10010 (09962–01000)
Torque: 88 N–m (900 kgf–cm, 65 ft–lbf)
HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.)

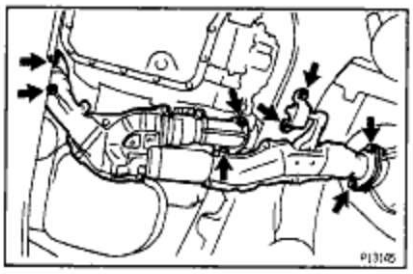


27. INSTALL LH CAMSHAFT TIMING PULLEY
(a) Install the timing pulley, facing the flange side inward.
(b) Align the knock pin hole of the camshaft with the knock pin groove of the timing pulley as shown.

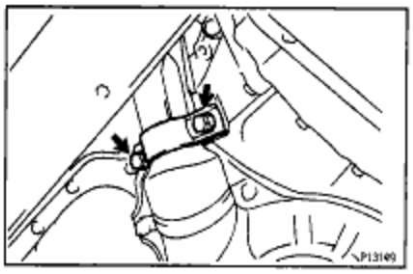


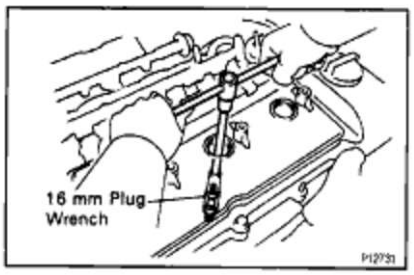
(d) Using SST, install and torque the bolt.
SST 09960–10010 (09962–01000)
Torque: 125 N–m (1,300 kgf–cm, 94 ft–lbf)

28. INSTALL TIMING BELT
(See steps 6 to 27 on pages EG2–51 to 66)

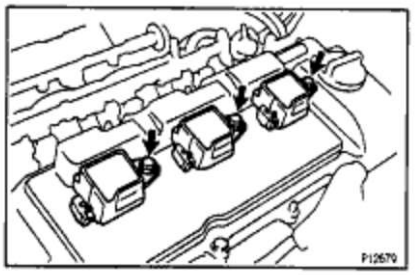


29. INSTALL FRONT EXHAUST PIPE
(a) Temporarily install 3 new gaskets and the front ex–haust pipe with the 2 bolts and 6 nuts.
(b) Tighten the 4 nuts holding the exhaust manifolds to the front exhaust pipe.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)
(c) Tighten the 2 bolts and 2 nuts holding the three–way catalytic converter to the front exhaust pipe.
Torque: 56 N–m (570 kgf–cm, 41 ft–lbf)
(d) Connect the bracket with the 2 bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)
(e) Connect the front exhaust pipe clamp with the 2 bolts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

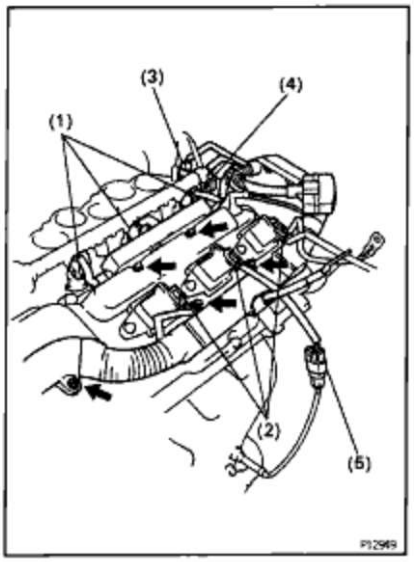




30. INSTALL SPARK PLUGS
Using a 16 mm plug wrench, install the6 spark plugs to the RH and LH cylinder heads.



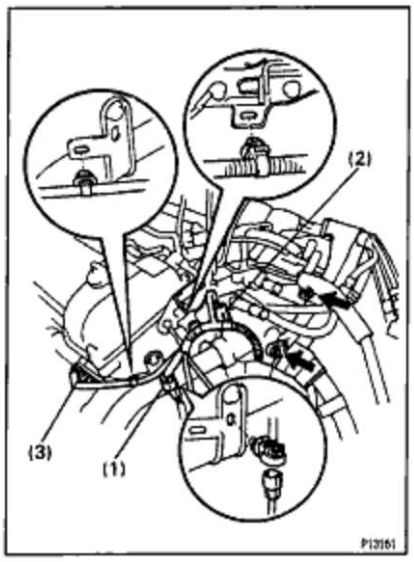
31. INSTALL IGNITION COILS
Install the6 ignition coils to the RH and LH cylinder heads.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



32. CONNECT ENGINE WIRE TO ENGINE RH SIDE

(a) Connect the following connectors:
- (1) 3 injector connectors
- (2) 3 ignition coil connectors
- (3) Water temperature sender gauge connector
- (4) Water temperature sensor connector
- (5) RH oxygens sensor connector

(b) Connect the engine wire with the 5 nuts.

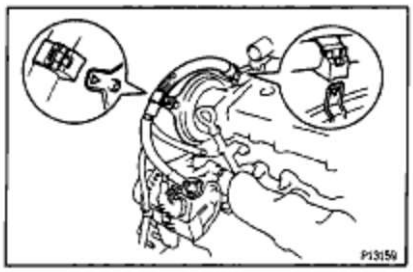


33. CONNECT ENGINE WIRE TO ENGINE REAR SIDE

(a) Connect the following connectors:
- (1) LH oxygen sensor
- (2) Engine coolant temperature sensor
- (3) Camshaft position sensor

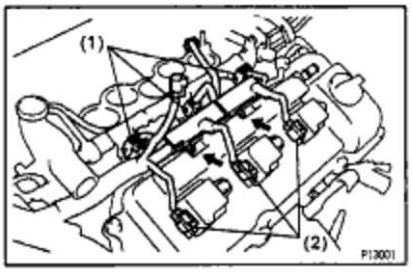
(b) Connect the 3 clamps.

(c) Connect the engine wire with the 2 nuts.



34. CONNECT ENGINE WIRE TO N0.3 TIMING BELT COVER

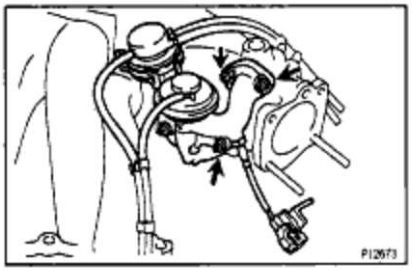
Connect the engine wire with the 2 clamps.



35. CONNECT ENGINE WIRE TO ENGINE LH SIDE

(a) Connect the following connectors:
- (1) 3 injector connectors
- (2) 3 ignition coil connectors

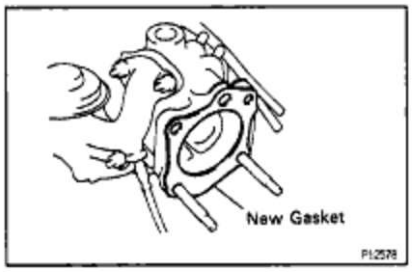
(b) Connect the engine wire with the 2 nuts.



36. INSTALL EGR VALVE AND VACUUM MODULATOR TO AIR INTAKE CHAMBER

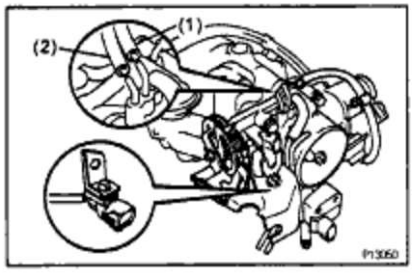
Install a new gasket, the EGR valve and vacuum mod–ulator with the 3 nuts.

Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



37. INSTALL THROTTLE BODY TO AIR INTAKE CHAMBER

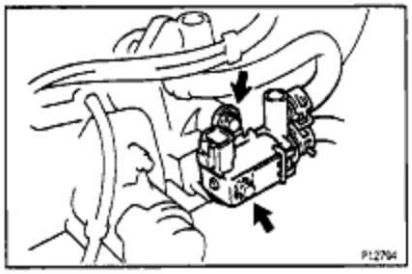
(a) Place a new gasket on the air intake chamber.



(b) Install the throttle body with the 2 bolts and 2 nuts.

Torque: 19.5 N–m (200 kgf–cm. 14 ft–lbf)

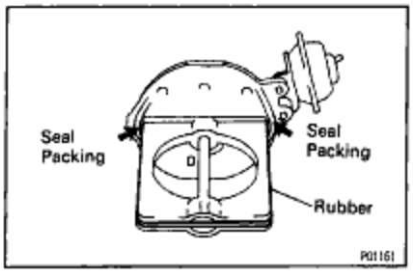
(c) Connect the following vacuum hoses:
- (1) Vacuum hose to P port of EGR vacuum modula–tor
- (2) Vacuum hose to R port of EGR vacuum modula–tor



38. INSTALL A/C IDLE–UP VSV TO AIR INTAKE CHAMBER

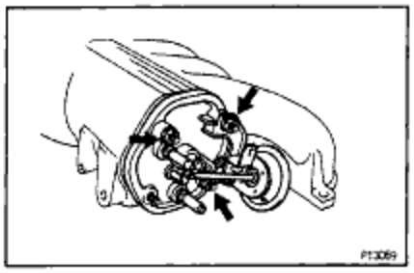
(a) Install the A/C idle–up VSV with the 2 bolts.

(b) Connect the air hose.

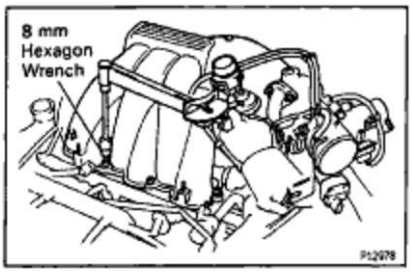


39. INSTALL INTAKE AIR CONTROL VALVE TO AIR INTAKE CHAMBER

(a) Install a new gasket to the air intake chamber.
(b) Apply a light coat of engine oil to the rubber portions.
(c) Apply seal packing to the positions of the intake air control valve as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent

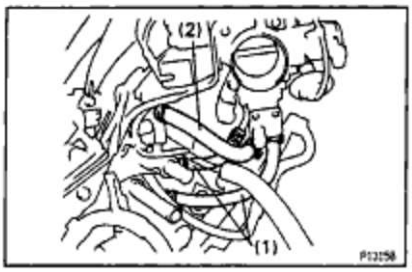


(d) Install the intake air control valve and data link connector 1 clamp with the 3 nuts.
Torque: 14.5 N–m (145 kgf–cm, 10 ft–lbf)
(d) Connect the A/C air hose.

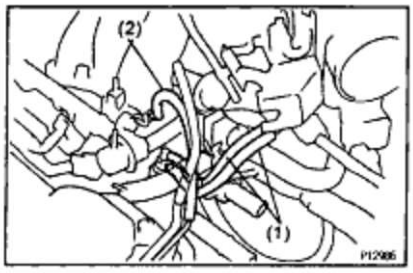


40. INSTALL AIR INTAKE CHAMBER

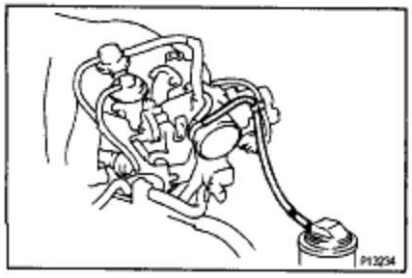
(a) Using an 8 mm hexagon wrench, install a new gasket and the air intake chamber with the 2 bolts and 2 nuts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



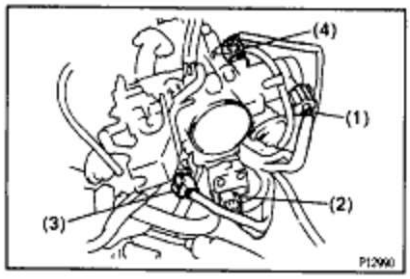
(b) Connect the following hoses:
(1) 2 water bypass hoses
(2) Air assist hose



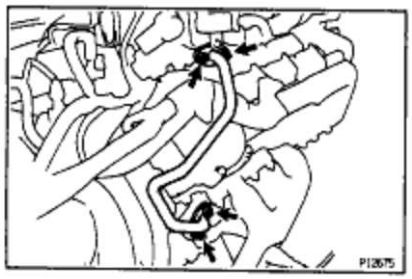
(c) Connect the following vacuum hoses:
(1) 2 vacuum hoses to TVV
(2) Vacuum hose to cylinder head rear plate



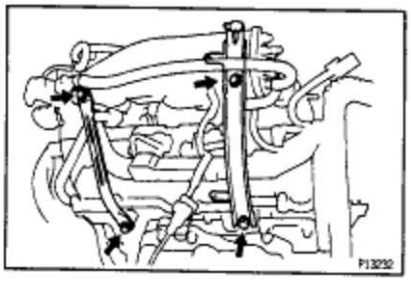
(3) Vacuum hose to charcoal canister



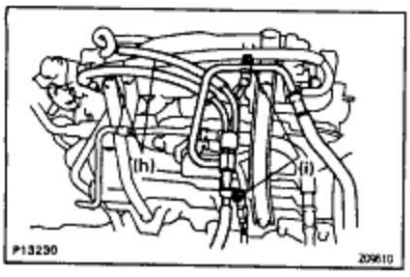
(d) Connect the following connectors:
(1) Throttle position sensor connector
(2) IAC valve connector
(3) EGR gas temperature sensor connector
(4) A/C idle–up connector



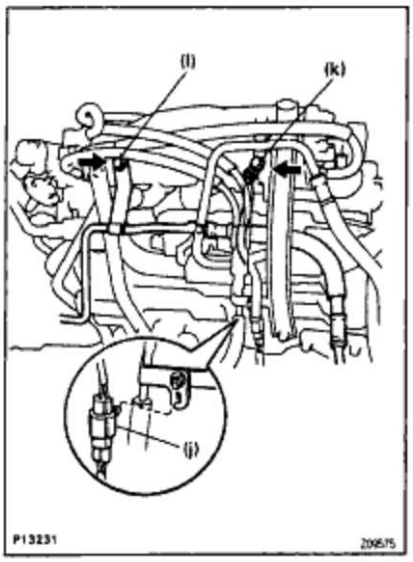
(e) Install 2 new gaskets and EGR pipe with the 4 nuts.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



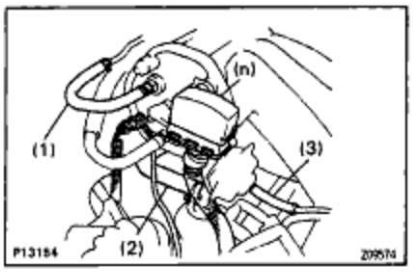
(f) Install the No.1 engine hanger with the 2 bolts.
Torque: 39 N–m (400 kgf–cm, 19 ft–lbf)
(g) Install the air intake chamber stay with the 2 bolts.
Torque: 19.5 N–m (200 kgf–cm, 14 ft–lbf)



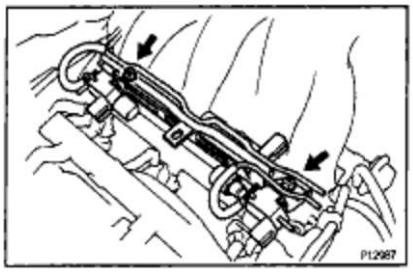
(h) Connect the 2 PS air hoses.
(i) Connect the PS pressure tube with the 2 nuts.



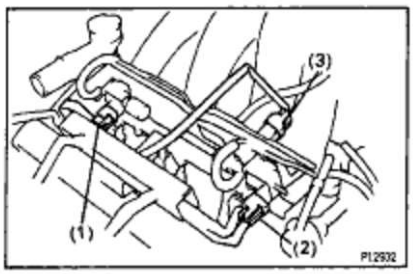
(j) Connect the RH oxygen sensor connector clamp to the PS pressure tube.
(k) Connect the ground strap with the bolt.
(l) Connect the hydraulic pressure pipe to the air intake chamber with the bolt.



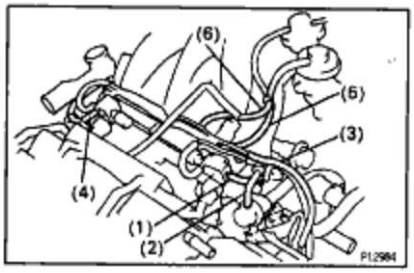
(m) Connect the following hoses:
(1) Brake booster vacuum hose
(2) PCV hose
(3) Intake air control valve vacuum hose
(n) Connect the data link connector 1.
(o) Connect the 2 ground straps with the nut.
Torque: 14.5 N–m (145 kgf–cm, 10 ft–lbf)



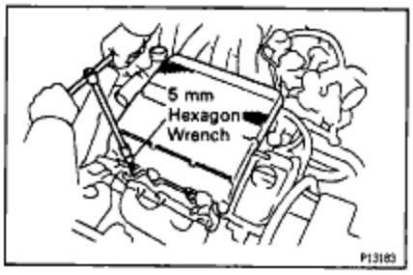
41. INSTALL EMISSION CONTROL VALVE SET
(a) Install the emission control valve set with the 2 bolts.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



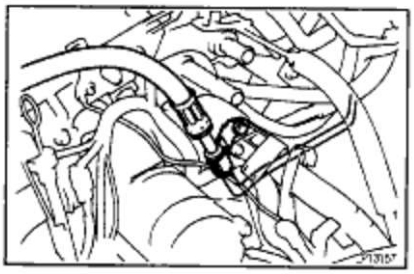
(b) Connect the following connectors:
(1) Intake air control connector
(2) Fuel pressure connector
(3) EGR VSV connector



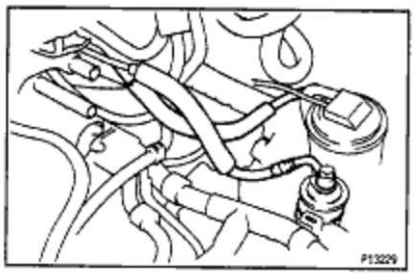
(c) Connect the following vacuum hoses:
(1) Vacuum hose to fuel pressure control VSV
(2) Vacuum hose to fuel pressure regulator
(3) Vacuum hose to cylinder head rear plate
(4) Vacuum hose to intake air control valve VSV
(5) Vacuum hose to EGR vacuum modulator
(6) Vacuum hose to EGR valve



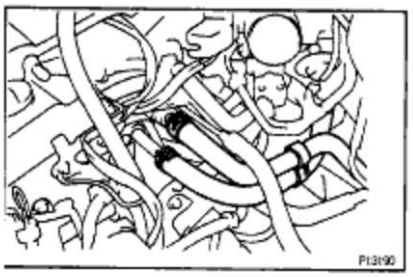
42. INSTALL V–BANK COVER
Using a 5 mm hexagon wrench, install the V–bank cover with the 2 nuts.



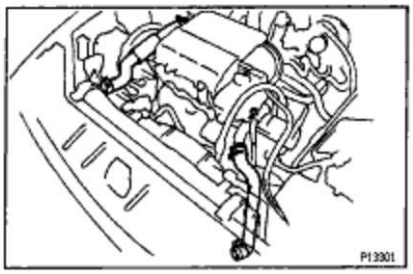
43. CONNECT PRESSURE HOSE TO HYDRAULIC MOTOR
Connect the pressure hose to the water inlet.



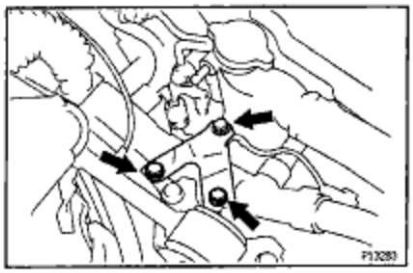
44. CONNECT FUEL HOSES
(a) Connect the fuel return hose to the fuel pipe.
(b) Connect the fuel inlet hose to the fuel filter.
Torque: 30 N–m (300 kgf–cm, 22 ft–lbf)



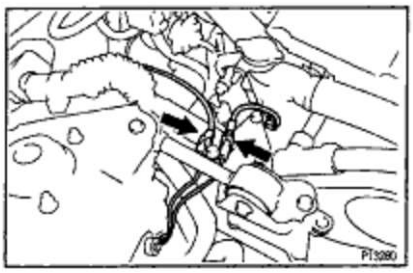
45. CONNECT HEATER HOSES
Connect the 2 hoses.



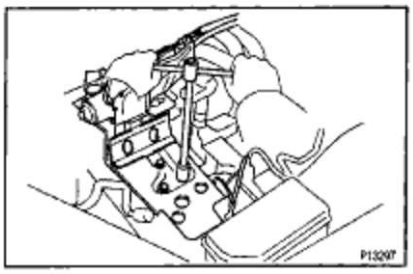
46. CONNECT RADIATOR HOSES
Connect the 2 hoses.



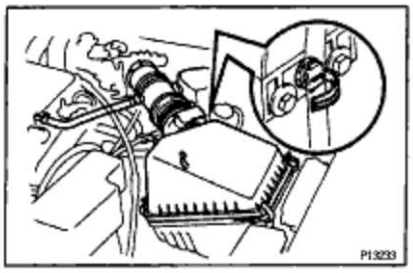
47. INSTALL RH ENGINE MOUNTING STAY
Install the mounting stay with the 3 bolts.
Torque: 31.4 N–m (320 kgf–cm, 23 ft–lbf)



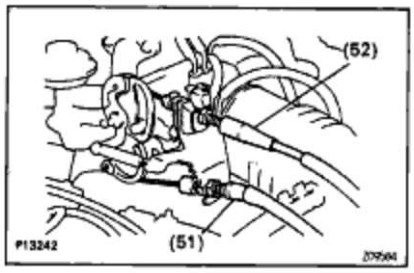
48. CONNECT GROUND STRAPS
Connect the 2 straps.



49. w/ CRUISE CONTROL SYSTEM:
INSTALL CRUISE CONTROL ACTUATOR
(a) Connect the actuator and bracket with the 3 bolts.
(b) Connect the actuator connector and clamp.
(c) Install the actuator cover with the bolt and clip.

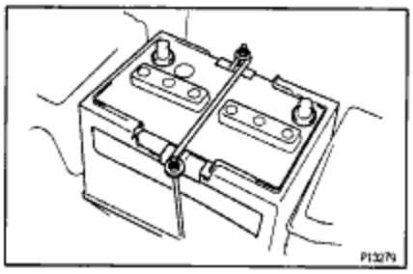


50. INSTALL AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE
(a) Connect the air cleaner hose, and install the air clean–er cap and volume air flow meter with the 4 clips.
(b) Tighten the air cleaner hose clamp bolt.
(c) Connect the PCV hose.
(d) Connect the accelerator cable clamp.
(e) Connect the volume air flow meter connector and wire clamp.



51. CONNECT THROTTLE CABLE
52. CONNECT ACCELERATOR CABLE

53. FILL WITH ENGINE COOLANT
Capacity:
8.7 liters (9.2 US qts, 7.7 Imp. qts)

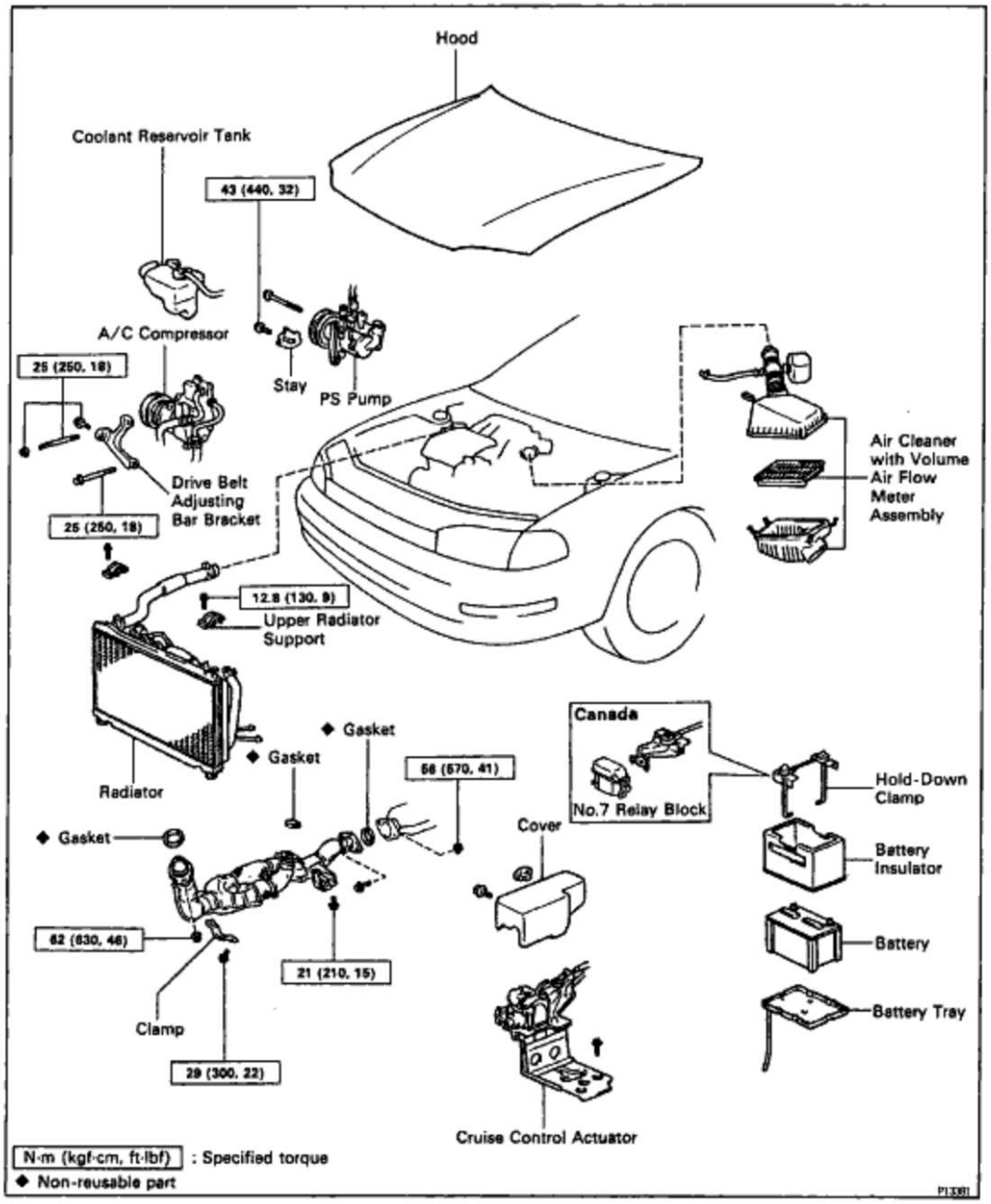


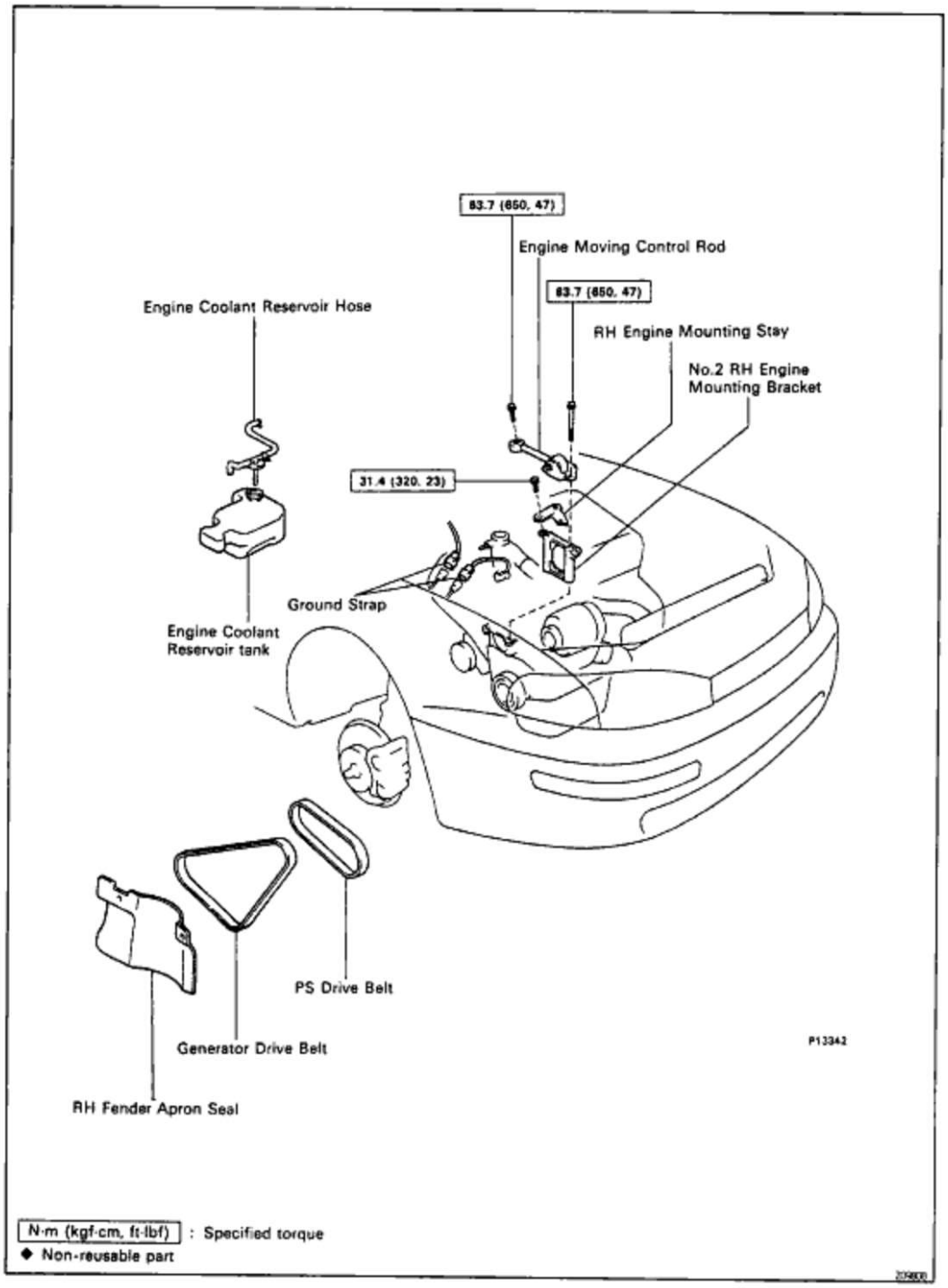
54. INSTALL BATTERY TRAY AND BATTERY

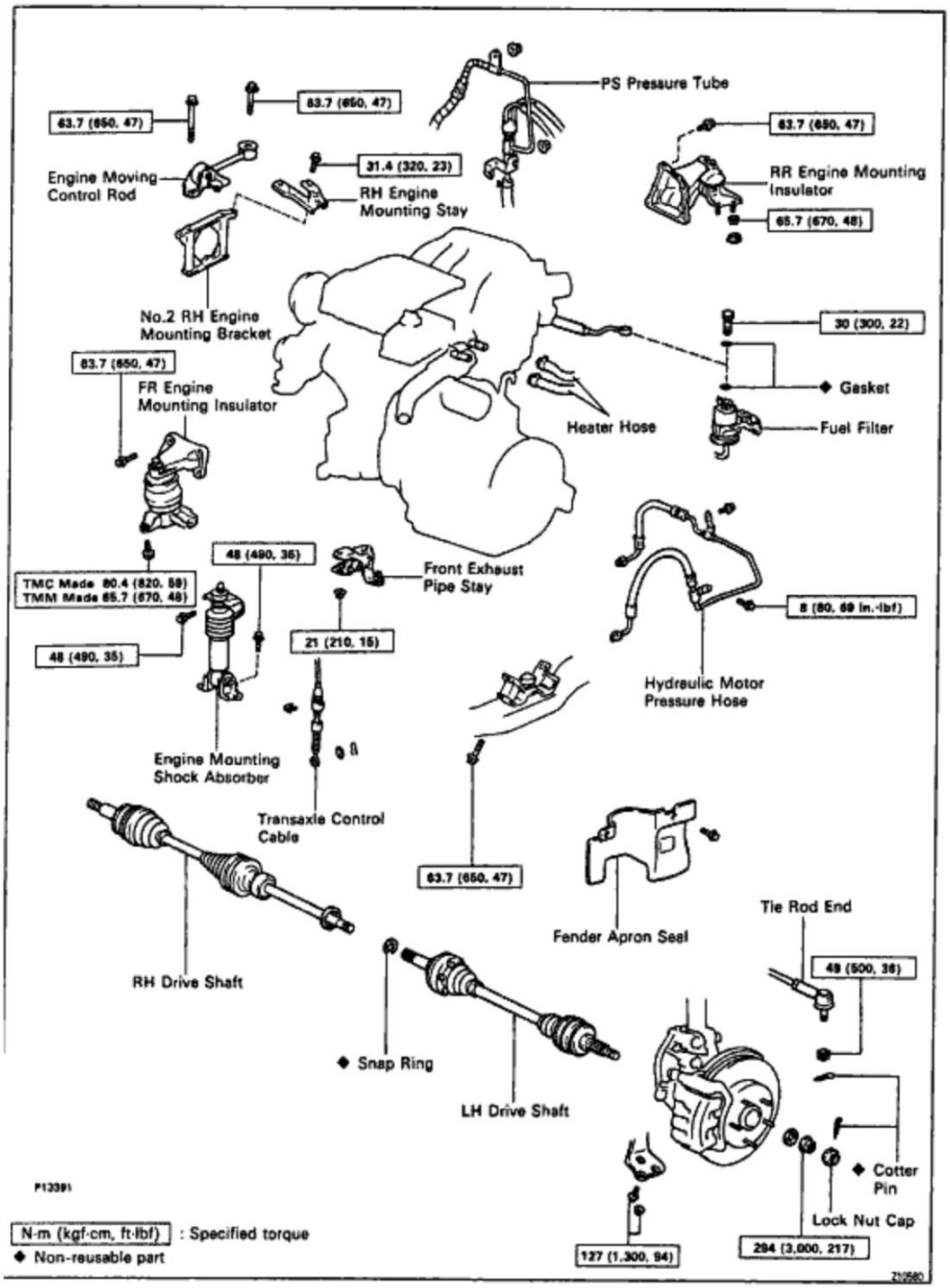
55. START ENGINE AND CHECK FOR LEAKS
56. PERFORM ROAD TEST
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.
57. RECHECK ENGINE COOLANT LEVEL

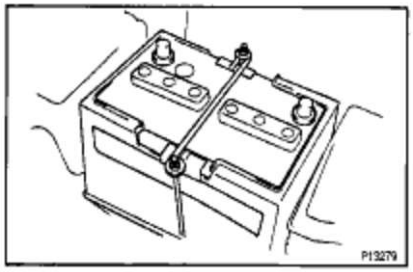
CYLINDER BLOCK

COMPONENTS FOR ENGINE REMOVAL AND INSTALLATION




83.7 (850, 47)
Engine Moving Control Rod
83.7 (850, 47)
Engine Coolant Reservoir Hose
RH Engine Mounting Stay
No.2 RH Engine Mounting Bracket
31.4 (320, 23)
Ground Strap
Engine Coolant Reservoir tank
PS Drive Belt
Generator Drive Belt
RH Fender Apron Seal
P13342
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part


PS Pressure Tube
83.7 (650, 47)
83.7 (650, 47)
83.7 (650, 47)
Engine Moving Control Rod
31.4 (320, 23)
RH Engine Mounting Stay
RR Engine Mounting Insulator
65.7 (670, 48)
No.2 RH Engine Mounting Bracket
30 (300, 22)
83.7 (650, 47)
FR Engine Mounting Insulator
◆ Gasket
Heater Hose
Fuel Filter
48 (490, 35)
Front Exhaust Pipe Stay
TMC Made 80.4 (820, 59)
TMM Made 65.7 (670, 48)
8 (80, 69 in.-lbf)
48 (490, 35)
21 (210, 15)
Hydraulic Motor Pressure Hose
Engine Mounting Shock Absorber
Transaxle Control Cable
63.7 (650, 47)
Fender Apron Seal
Tie Rod End
49 (500, 36)
RH Drive Shaft
◆ Snap Ring
LH Drive Shaft
◆ Cotter Pin
Lock Nut Cap
294 (3,000, 217)
127 (1,300, 94)
P13391
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Z10580



ENGINE REMOVAL

(See Components for Engine Removal and Installation)

1. REMOVE BATTERY AND TRAY

CAUTION: Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

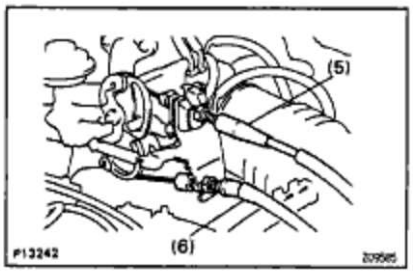
2. REMOVE HOOD

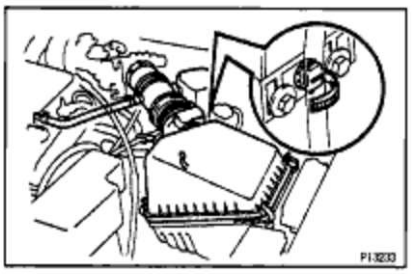
3. DRAIN ENGINE COOLANT

4. DRAIN ENGINE OIL

5. DISCONNECT ACCELERATOR CABLE

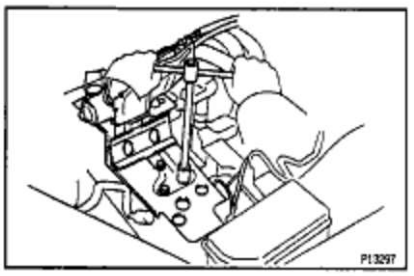
6. DISCONNECT THROTTLE CABLE





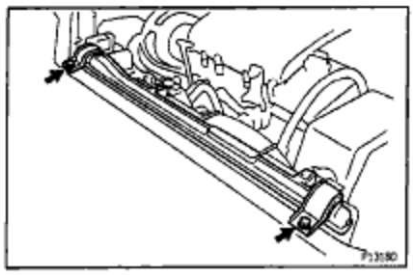
7. REMOVE AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE

(a) Disconnect the volume air flow meter connector and wire clamp.
(b) Disconnect the accelerator cable clamp.
(c) Disconnect the PCV hose.
(d) Loosen the air cleaner hose clamp bolt.
(e) Disconnect the 4 air cleaner cap clips.
(f) Remove the air cleaner cap and volume air flow meter together with the air cleaner hose.
(g) Remove the element.
(h) Remove the 3 bolts and air cleaner case.

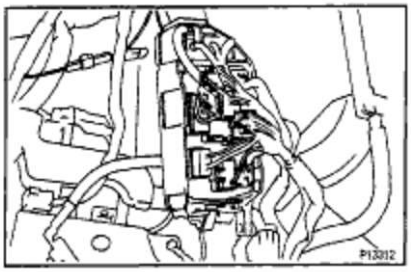


8. w/ CRUISE CONTROL SYSTEM:
REMOVE CRUISE CONTROL ACTUATOR

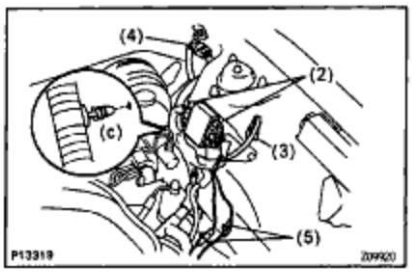
(a) Remove the bolt, clip and actuator cover.
(b) Disconnect the actuator connector and clamp.
(c) Remove the 3 bolts, and disconnect the actuator with the bracket.



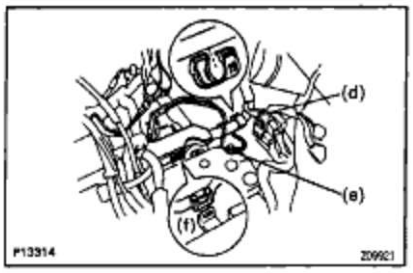
9. REMOVE RADIATOR
(See page EG2–336)



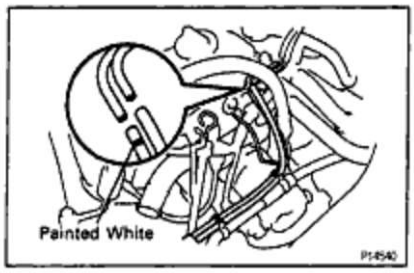
10. DISCONNECT ENGINE WIRE
(a) Remove the 2 bolts and disconnect the engine relay box.
(b) Disconnect the following wires and connectors:
(1) 5 connectors from relay box



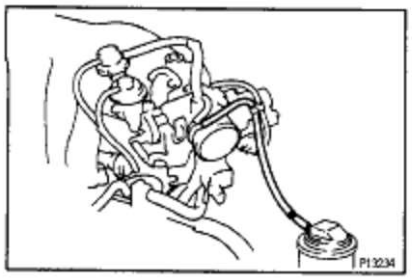
(2) 2 igniter connectors
(3) Noise filter connector
(4) Connector from LH fender apron
(5) 2 ground straps
(c) Disconnect the wire clamp.



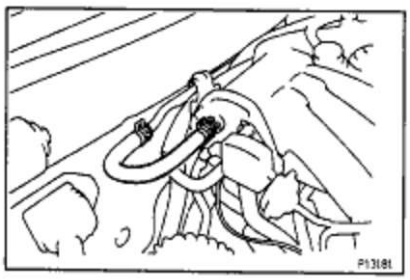
(d) Disconnect the connector from the LH fender apron.
(e) Remove the bolt and disconnect the ground strap.
(f) Disconnect the wire clamp.



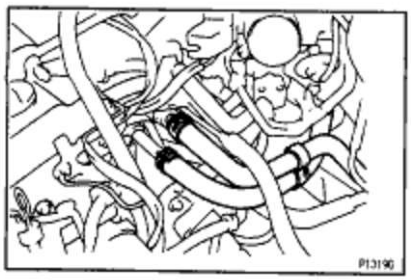
11. DISCONNECT VACUUM HOSES
Disconnect the following vacuum hoses:
(1) Vacuum hoses from vacuum tank for intake air control valve



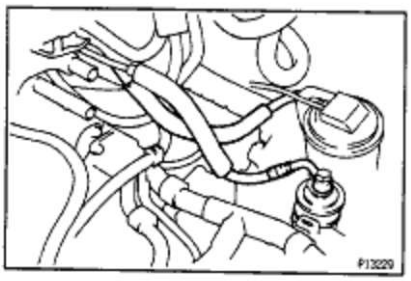
(2) Vacuum hose from charcoal canister



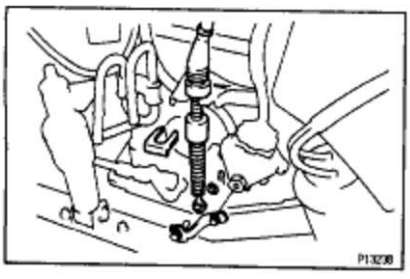
(3) Brake booster vacuum hose from air intake cha–mber



12. DISCONNECT HEATER HOSES
Disconnect the 2 hoses.



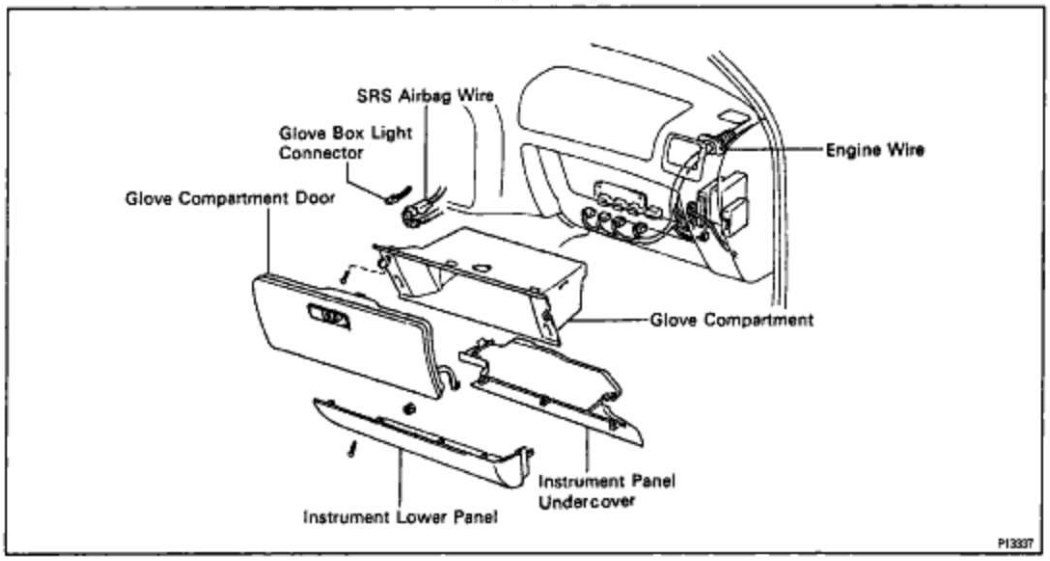
13. DISCONNECT FUEL HOSES
Disconnect the fuel inlet and return hoses.
CAUTION: Catch leaking fuel in a container.

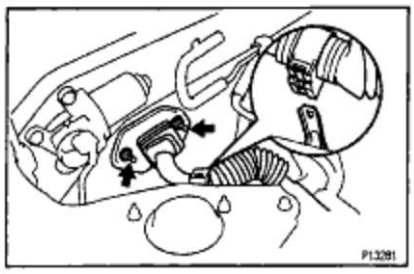


14. DISCONNECT TRANSAXLE CONTROL CABLE FROM TRANSAXLE

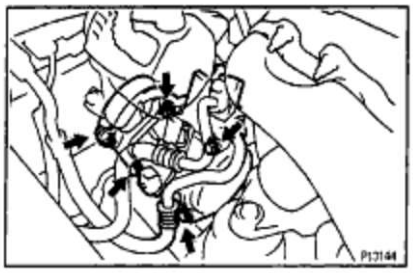
15. DISCONNECT ENGINE WIRE FROM CABIN

(a) Remove the following parts:
(1) Under cover
(2) Lower instrument panel
(3) Glove compartment door
(4) Glove compartment
(b) Disconnect the following connectors:
(1) 3 ECM connectors
(2) 5 cowl wire connectors
(3) Cooling fan ECU connector



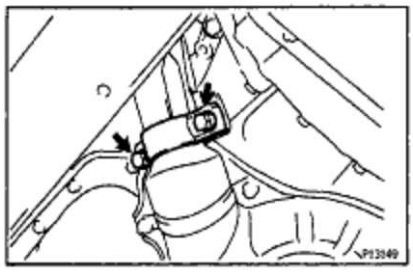


(c) Disconnect the wire clamp.
(d) Remove the 2 nuts, and pull out the engine wire from the cowl panel.

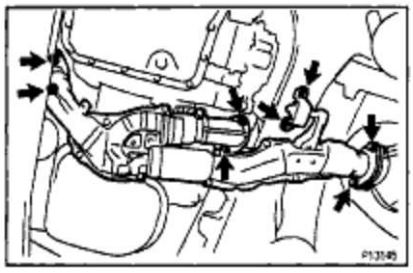


16. REMOVE A/C COMPRESSOR WITHOUT DISCONNECTING HOSES

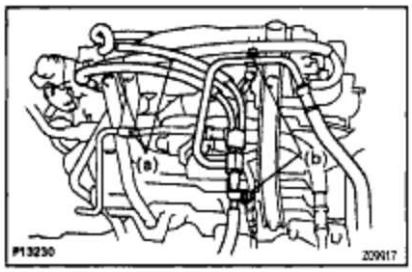
(a) Disconnect the A/C compressor connector.
(b) Remove the drive belt.
(c) Remove the 5 bolts and drive belt adjusting bar brack–et and, disconnect the A/C compressor.
HINT: Move the compressor aside and suspend it.



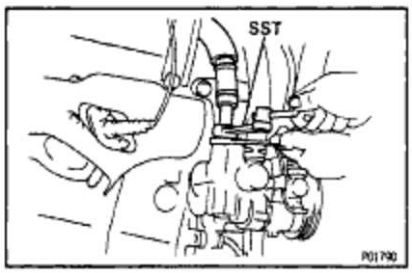
17. REMOVE FRONT EXHAUST PIPE
(a) Remove the 2 bolts and exhaust pipe clamp.



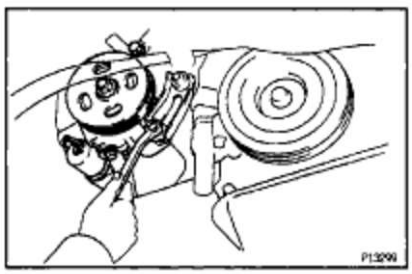
(b) Remove the 2 bolts, and disconnect the bracket.
(c) Remove the 2 bolts and 2 nuts holding the front exhaust pipe to the three–way catalytic converter.
(d) Remove the 4 nuts holding the front exhaust pipe to the exhaust manifolds.
(e) Remove the front exhaust pipe and 3 gaskets.
18. REMOVE DRIVE SHAFTS
(See SA section)



19. DISCONNECT PS PRESSURE TUBE
(a) Disconnect the 2 PS air hoses.
(b) Remove the 2 nuts and disconnect the PS pressure tube.

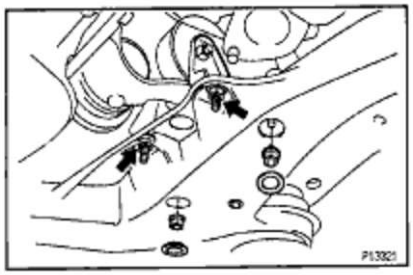


20. DISCONNECT HYDRAULIC COOLING FAN PRESSURE HOSE
Using SST, disconnect the pressure hose.
SST 09631– 22020

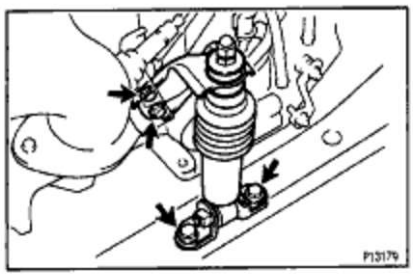


21. REMOVE PS PUMP WITHOUT DISCONNECTING HOSES
(a) Remove the PS drive belt.
(b) Remove the 2 bolts, and disconnect the PS pump from the engine.
HINT: Move the PS pump aside and suspend it.

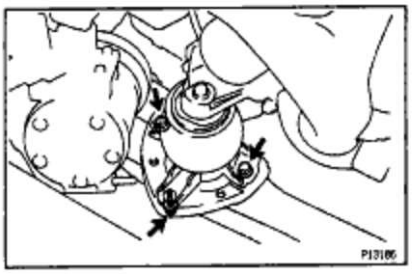
22. DISCONNECT LH ENGINE MOUNTING INSULATOR
Remove the 4 bolts, and disconnect the mounting insulator.



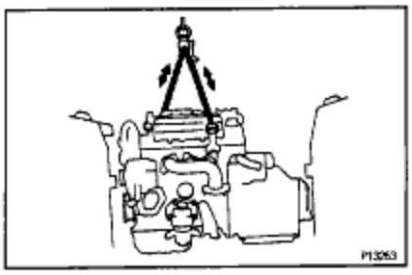
23. DISCONNECT RR ENGINE MOUNTING INSULATOR
(a) Remove the 2 hole plugs.
(b) Remove the 4 nuts, and disconnect the mounting insulator.



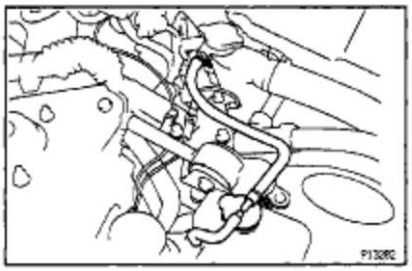
24. REMOVE ENGINE MOUNTING SHOCK ABSORBER
Remove the 4 bolts and engine mounting shock absorber.



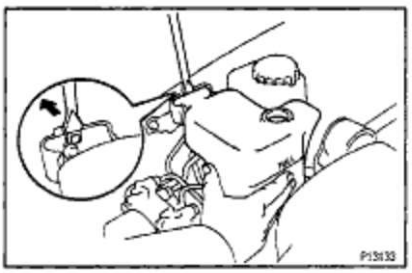
25. DISCONNECT FR ENGINE MOUNTING INSULATOR
Remove the 3 bolts, and disconnect the mounting insulator.



26. ATTACH ENGINE SLING DEVICE TO ENGINE HANGERS

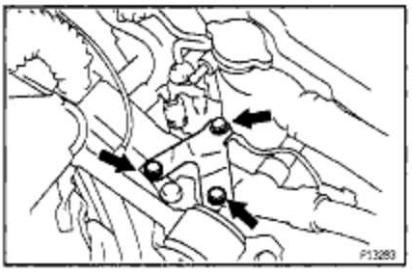


27. REMOVE COOLANT RESERVOIR TANK
(a) Disconnect the reservoir hose.

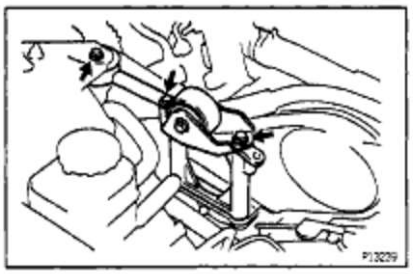


(b) Using a screwdriver, remove the reservoir tank.

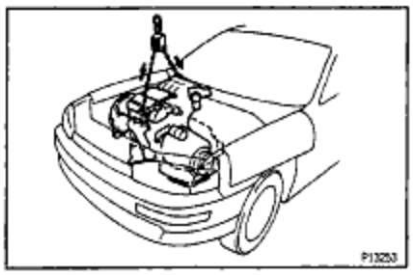
28. DISCONNECT GROUND STRAPS
Disconnect the 2 straps.



29. REMOVE RH ENGINE MOUNTING STAY
Remove the 3 bolts and RH engine mounting stay.



30. REMOVE ENGINE MOVING CONTROL ROD AND NO.2 RH ENGINE MOUNTING BRACKET
Remove the 3 bolts, control rod and mounting brack–et.



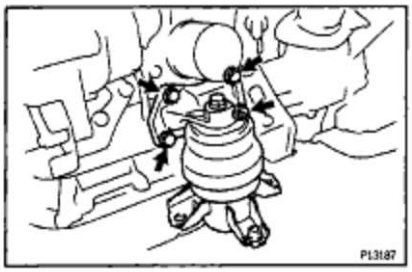
31. REMOVE ENGINE AND TRANSAXLE ASSEMBLY PROM VEHICLE

(a) Lift the engine out of the vehicle slowly and carefully.

NOTICE: Be careful not to hit the PS gear housing or park/neutral position switch.

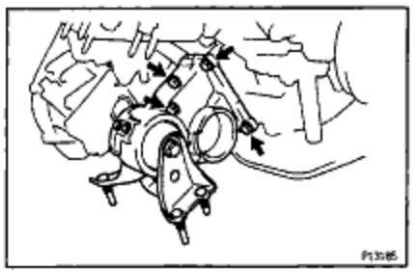
(b) Make sure the engine is clear of all wiring, hoses and cables.

(c) Place the engine and transaxle assembly onto the stand.



32. REMOVE FR ENGINE MOUNTING INSULATOR

Remove the 4 bolts and mounting insulator.



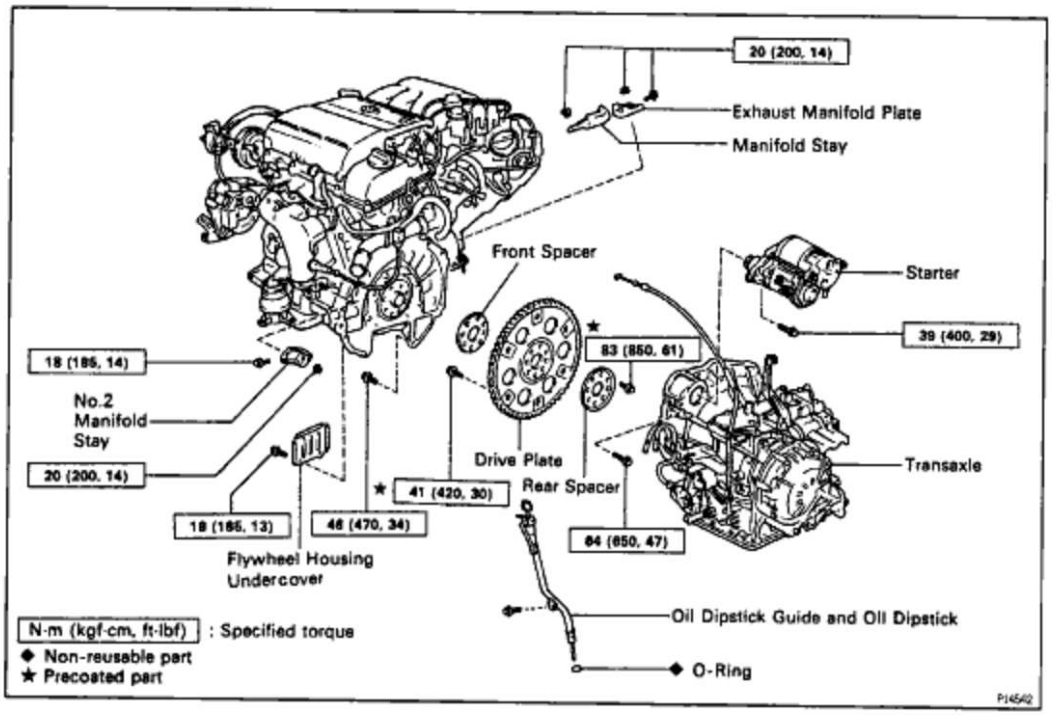
33. REMOVE RR ENGINE MOUNTING INSULATOR

Remove the 4 bolts and mounting insulator.

34. REMOVE FRONT EXHAUST PIPE STAY

Remove the 2 bolts and pipe stay.

COMPONENTS FOR ENGINE & TRANSAXLE SEPARATION AND ASSEMBLY



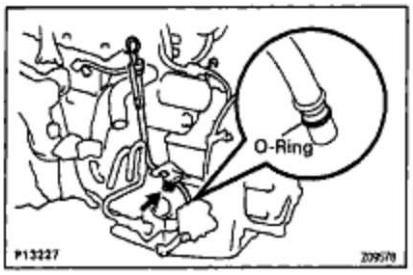
ENGINE & TRANSAXLE SEPARATION

(See Components for Engine & Transaxle Separation and Assembly)

1. DISCONNECT ENGINE WIRE

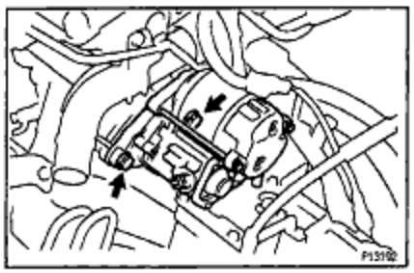
(a) Disconnect the following connector:
- (1) O/D solenoid connector
- (2) PNP switch speedometer
- (3) Starter 50 terminal
- (4) Starter B terminal
- (5) Speed sensor connector

(b) Disconnect the 2 wire clamps from the transaxle.



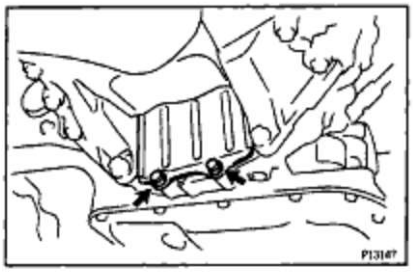
2. REMOVE OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSAXLE

(a) Remove the mounting bolt.
(b) Pull out the dipstick guide and dipstick from the port of transaxle.
(c) Remove the 0–ring from the dipstick guide.



3. REMOVE STARTER

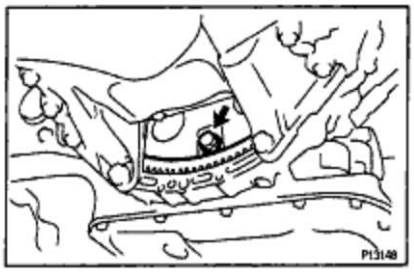
Remove the 2 bolts and starter.



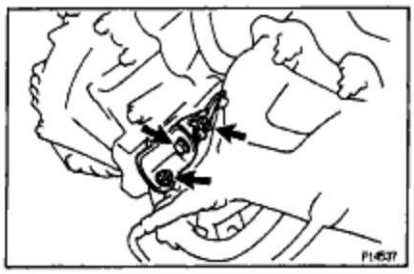
4. REMOVE TRANSAXLE

A. Remove torque converter clutch mounting bolts

(a) Remove the 2 bolts and flywheel housing undercover.

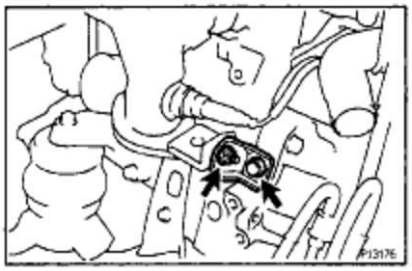


(b) Turn the crankshaft pulley bolt to gain access to each bolt.
(c) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.

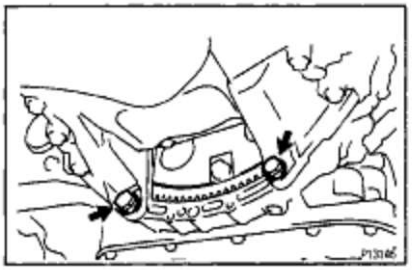


6. Remove transaxle

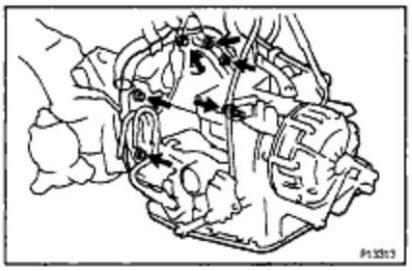
(a) Remove the bolt, 2 nuts, manifold stay and exhaust manifold plate.



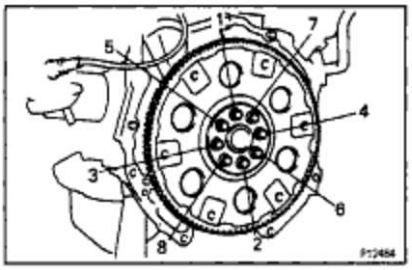
(b) Remove the bolt, nut and No.2 manifold stay.



(c) Remove the 2 bolts holding the No.2 oil pan to the transaxle.

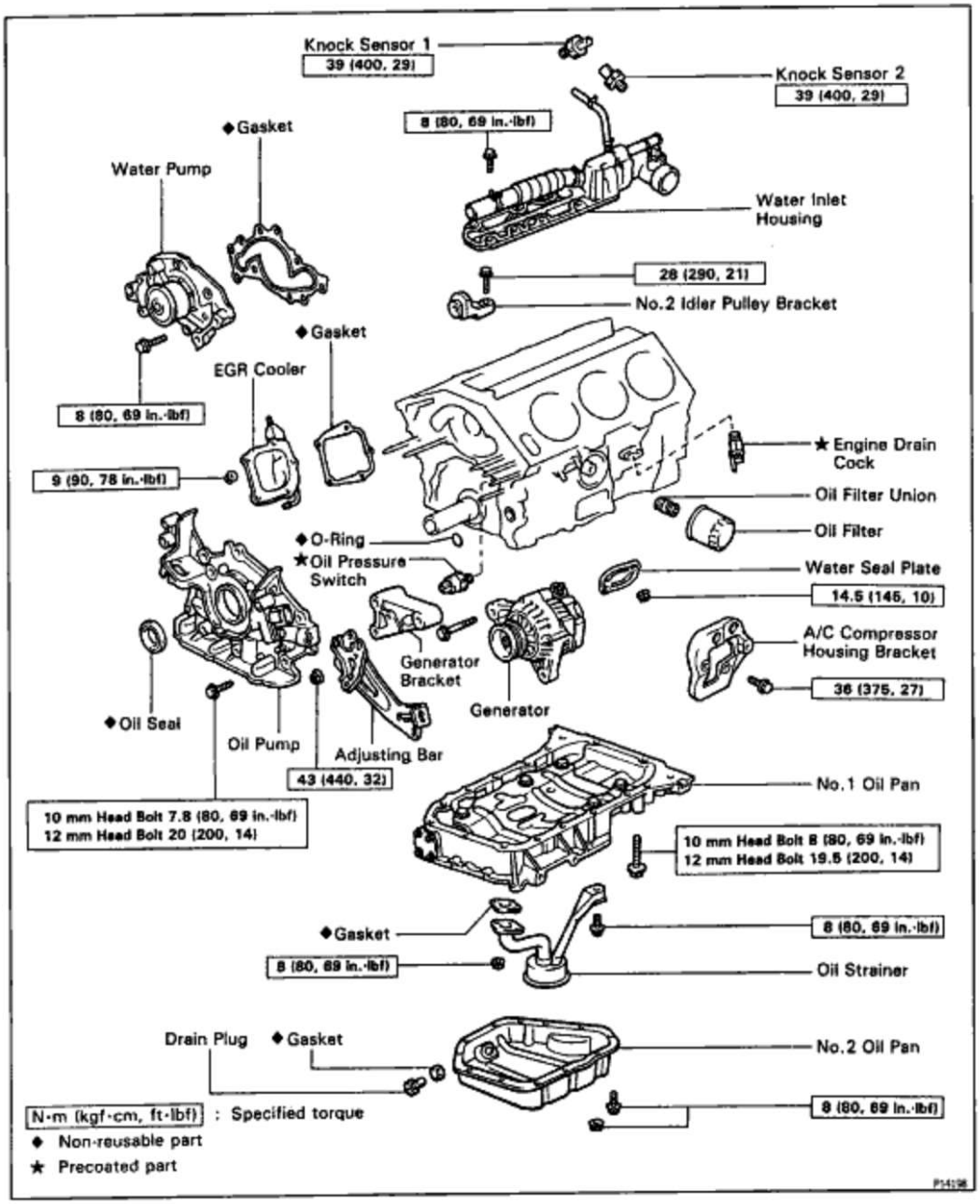


(d) Remove the 6 bolts holding the engine to the trans–axle.
(e) Remove the transaxle together with the torque con–verter clutch from the engine.



5. REMOVE DRIVE PLATE
Uniformly loosen and remove the drive plate bolts, in several passes, in the sequence shown.

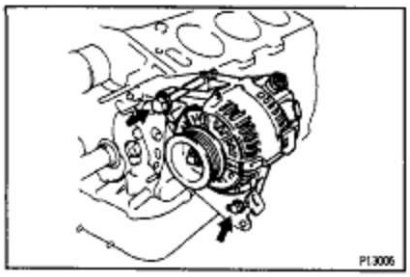
COMPONENTS FOR PREPARATION AND AFTER ASSEMBLY



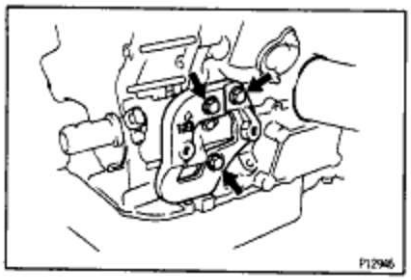
PREPARATION FOR DISASSEMBLY

(See Components for Cylinder Block Preparation of Disassembly and After Assembly)

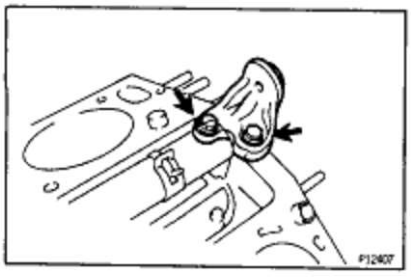
1. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
2. REMOVE TIMING BELT AND PULLEYS
(See pages EG2–42 to 47)
3. REMOVE CYLINDER HEAD
(See pages EG2–64 to 79)
4. REMOVE GENERATOR
Remove the 2 bolts and generator.



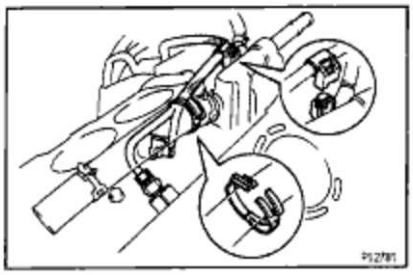
5. REMOVE GENERATOR ADJUSTING BAR AND BRACKET
Remove the 3 nuts, generator adjusting bar and bracket.



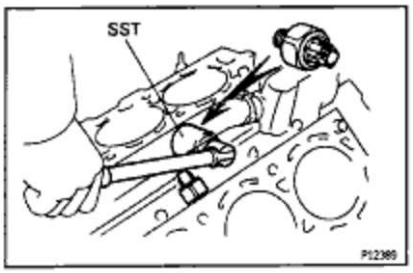
6. REMOVE A/C COMPRESSOR HOUSING BRACKET
Remove the 3 bolts and compressor housing bracket.



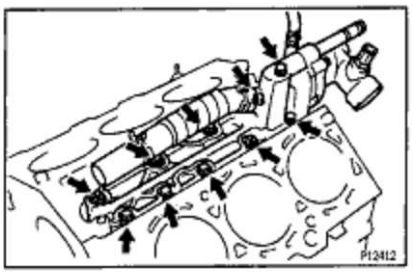
7. REMOVE No.2 IDLER PULLEY BRACKET
Remove the 2 bolts and idler pulley bracket.



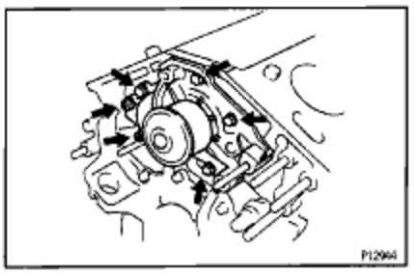
8. REMOVE KNOCK SENSORS
(a) Disconnect the 2 knock sensor connectors.
(b) Remove the wire band.
(c) Disconnect the engine wire clamp.



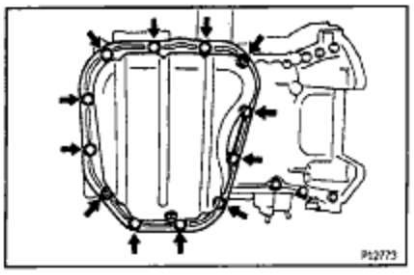
(d) Using SST, remove the 2 knock sensors.
SST 09816 – 30010



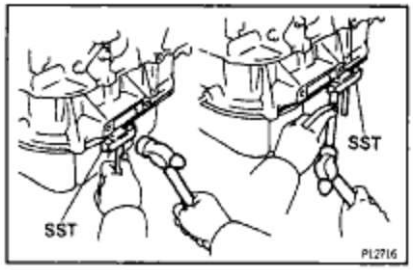
9. REMOVE WATER INLET HOUSING
Remove the 8 bolts, 2 nuts and water inlet housing.



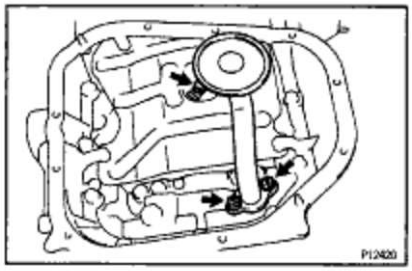
10. REMOVE WATER PUMP
Remove the 4 bolts, 2 nuts, water pump and gasket.



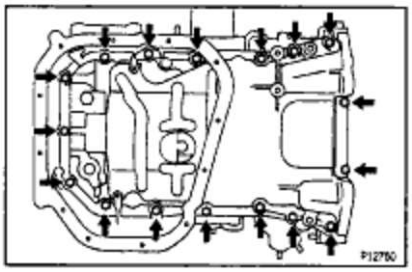
11. REMOVE NO.2 OIL PAN
(a) Remove the 10 bolts and 2 nuts.



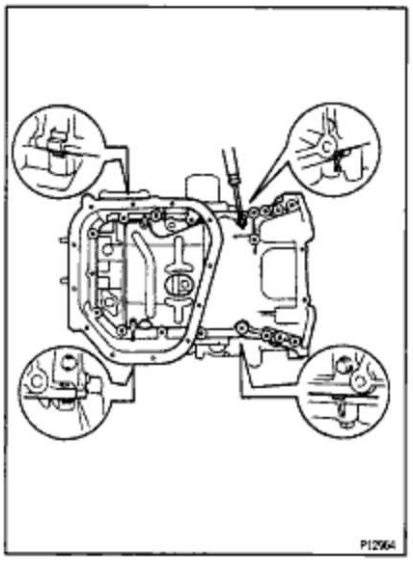
(b) Insert the blade of SST between the No. 1 and No.2 oil pans, and cut off applied sealer and remove the No. 1 oil pan.
SST 09032 – 00100
NOTICE:
- **Be careful not to the damage the No.2 oil pan con–tact surface of the No.1 oil pan.**
- **Be careful not to damage the No.2 oil pan flange.**



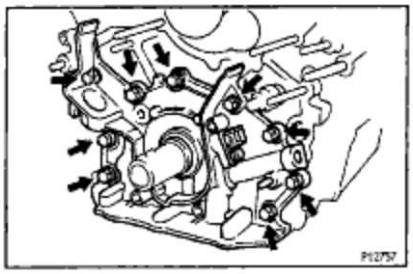
12. REMOVE OIL STRAINER
Remove the bolt, 2 nuts, oil strainer and gasket.



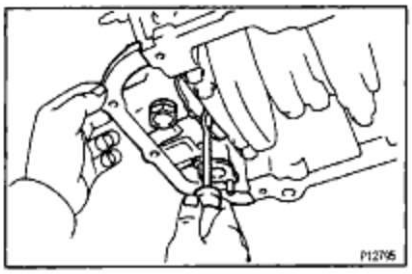
13. REMOVE NO.1 OIL PAN
(a) Remove the 17 bolts.



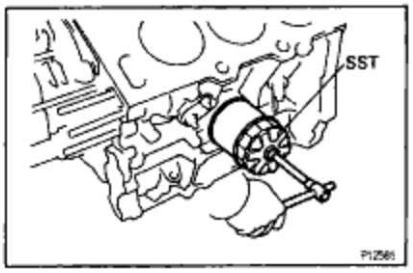
(b) Using a screwdriver, remove the No. 1 oil pan by prying the portions between the cylinder block and No.1 oil pan.
NOTICE: Be careful not to damage the contact surfaces of the cylinder block and No.1 oil pan.



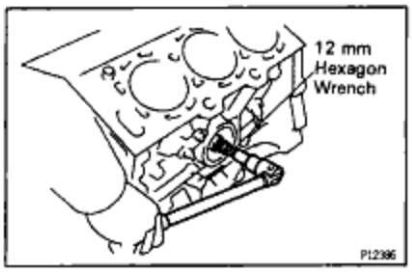
14. REMOVE OIL PUMP
(a) Remove the 9 bolts.



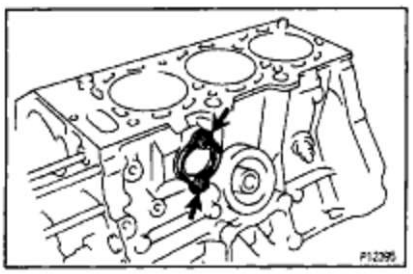
(b) Remove the oil pump by prying a screwdriver between the oil pump and main bearing cap.
(c) Remove the 0–ring.



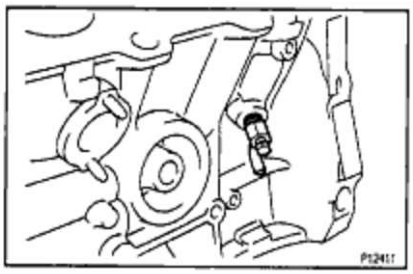
15. REMOVE OIL FILTER
Using SST, remove the oil filter.
SST 09816 – 30010



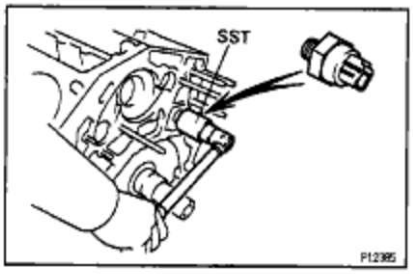
16. REMOVE OIL FILTER UNION
Using a 12 mm hexagon wrench, remove the oil filter union.



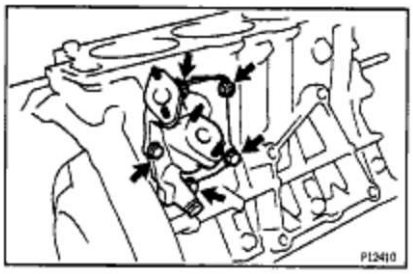
17. REMOVE WATER SEAL PLATE
Remove the 2 nuts and seal plate.



18. REMOVE ENGINE COOLANT DRAIN COCK

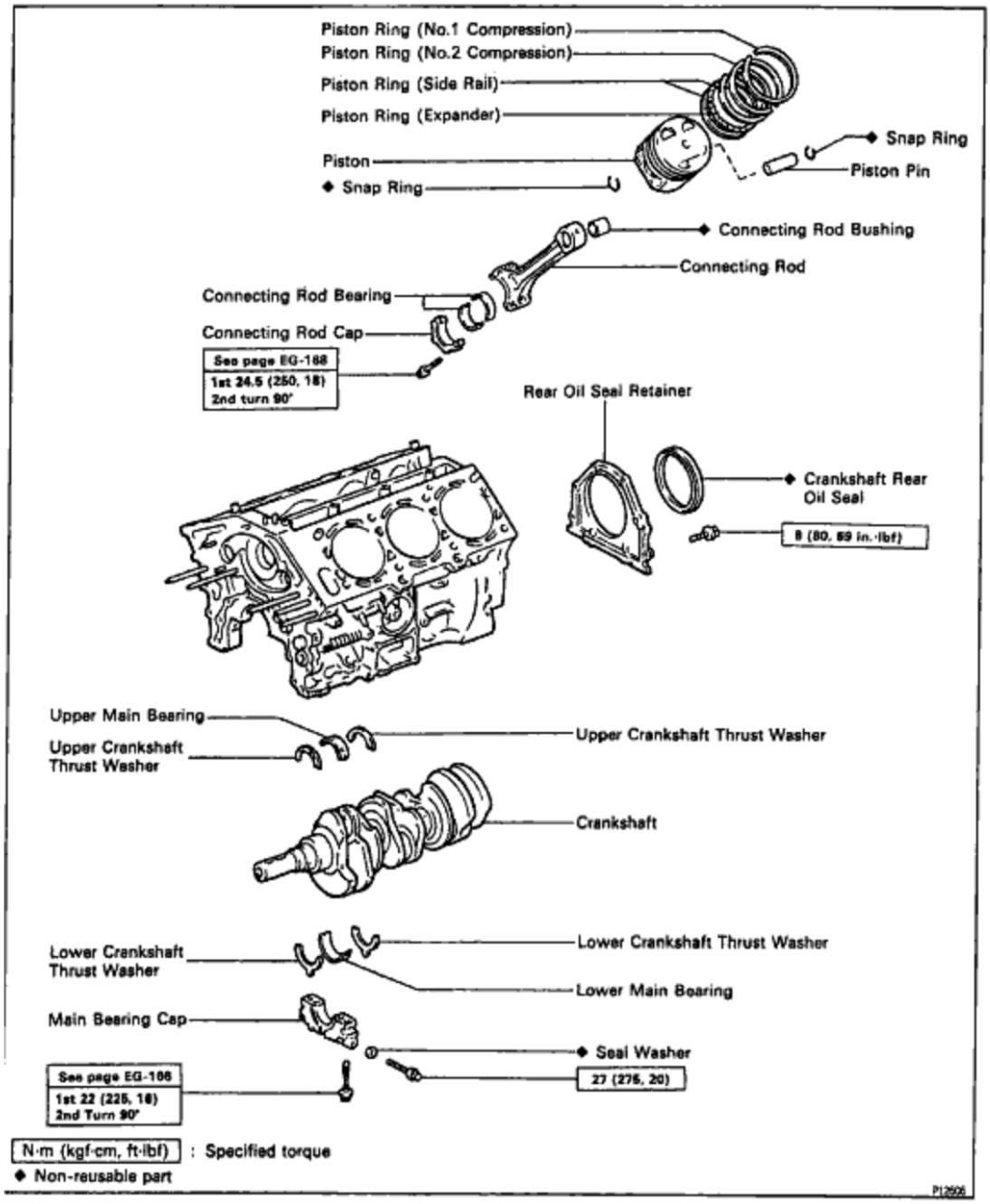


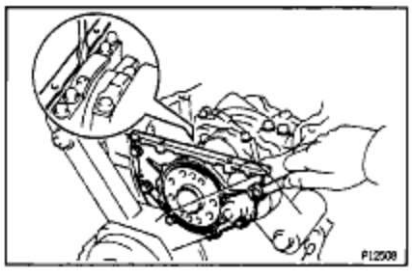
19. REMOVE OIL PRESSURE SWITCH
Using SST, remove the oil pressure switch.
SST 09816 – 30010



20. REMOVE EGR COOLER
Remove the 3 bolts, 2 nuts, EGR cooler and gasket.

COMPONENTS FOR CYLINDER BLOCK DISASSEMBLY AND ASSEMBLY





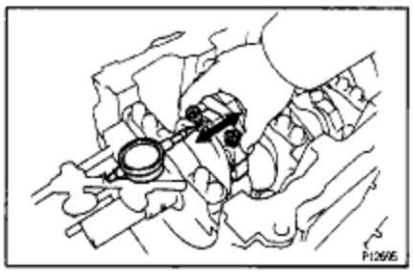
CYLINDER BLOCK DISASSEMBLY

(See Components for Disassembly and Assembly)

1. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 6 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.



2. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back an forth.

Standard thrust clearance:

0.15 – 0.30 mm (0.0059 – 0.0118 in.)

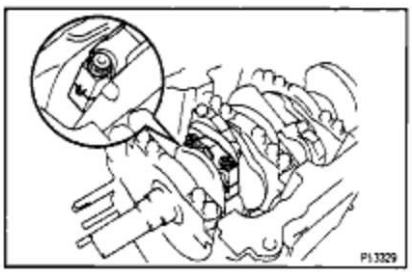
Maximum thrust clearance:

0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, re–place the connecting rod assembly (s). If necessary, replace the crankshaft.

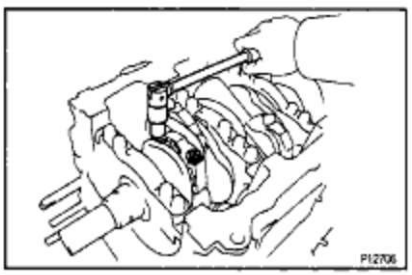
Connecting rod thickness:

20.80 – 20.85 mm (0.8189 – 0.8209 in.)

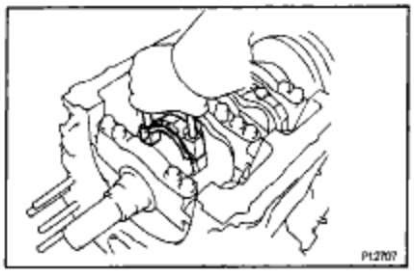


3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

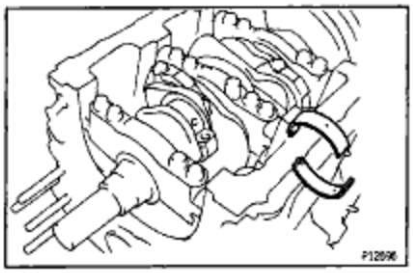
(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.



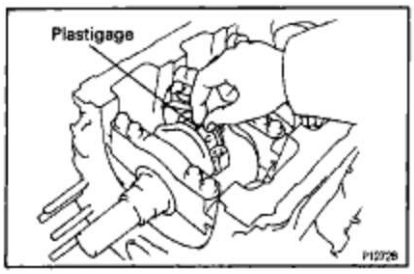
(b) Remove the 2 connecting rod cap bolts.



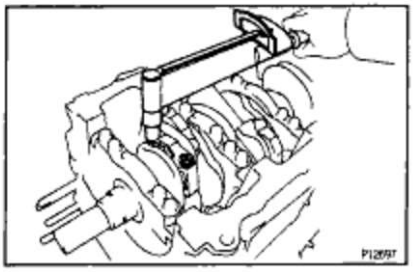
(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT: Keep the lower bearing inserted with the con–necting rod cap.



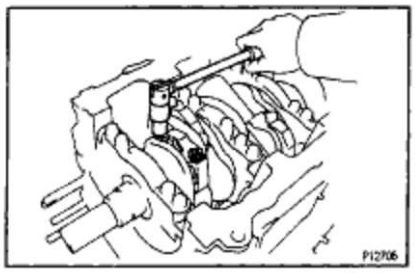
(d) Clean the crank pin and bearing.
(e) Check the crank pin and bearing for pitting and scrat–ches.
If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



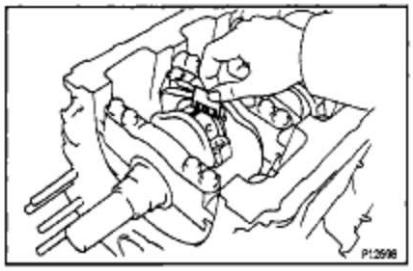
(f) Lay a strip of Plastigage across the crank pin.



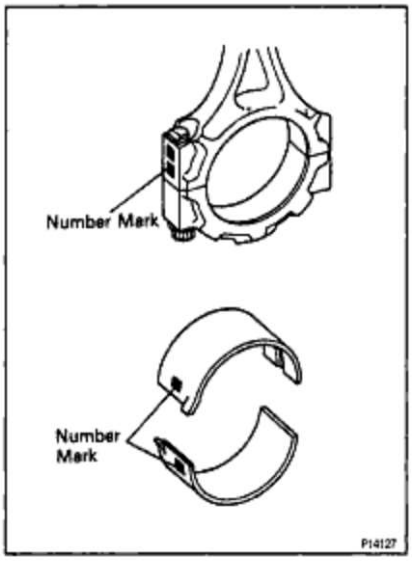
(g) Install the connecting rod cap with the 2 bolts.
(See step 7 on page EG2–167)
Torque:
1st 24.5 N–m (250 kgf–cm. 18 ft–lbf)
2nd Turn extra 90°
NOTICE: Do not turn the crankshaft.



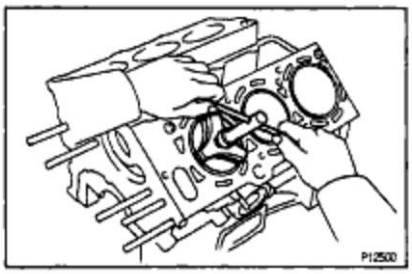
(h) Remove the 2 bolts, connecting rod cap and lower bearing. (See procedure (b) and (c) above)



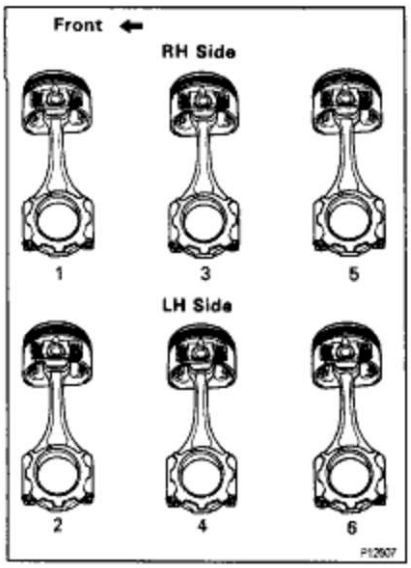
Measure the Plastigage at its widest point.
Standard oil clearance:
0.038 – 0.064 mm (0.0015 – 0.0025 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crank–shaft.



HINT: If replacing a bearing, replace it with 1 having the same number as marked on the connecting rod. There are 4 sizes of standard bearings, marked ”I”, ”2”, ”3” and ”4” accordingly.
Reference:
Connecting rod big end inside diameter:
Mark ’1”
518.000 – 56.006 mm (2.2047 – 2.2050 in.)
Mark ’2’
56.006 – 56.012 mm (2.2050 – 2.2052 in.)
Mark ’3’
56.012 – 56.018 mm (2.2052 – 2.2054 in.)
Mark ”4’
56.018 – 56.024 mm (2.2054 – 2.2057 in.)
Crankshaft crank pin diameter:
52.994 – 53.000 mm (2.0864 – 2.0868 in.)
Standard sized bearing center wall thickness:
Mark ’1’
1.484 – 1.487 mm (0.0584 – 0.0585 in.)
Mark ’2’
1.487 – 1.490 mm (0.0585 – 0.0587 in.)
Mark ’3’
1.490 – 1.493 mm (0.0587 – 0.0588 in.)
Mark W
1.493 – 1.496 mm (0.0588 – 0.0589 in.)
(j) Completely remove the Plastigage.

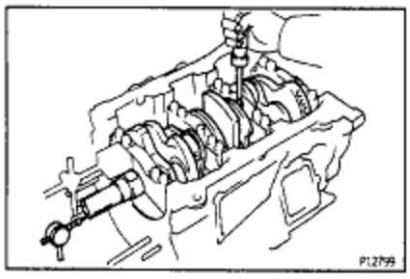


4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.
(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.



HINT:

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.



5. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.04 – 0.24 mm (0.0016 – 0.0095 In.)

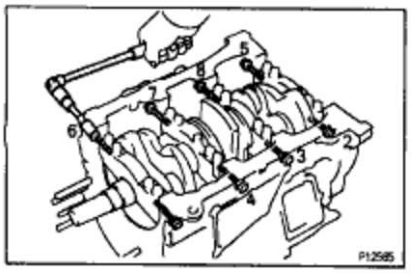
Maximum thrust clearance:

0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

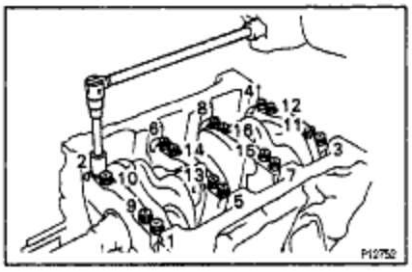
Thrust washer thickness:

1.930 – 1.980 mm (0.0760 – 0.0780 In.)

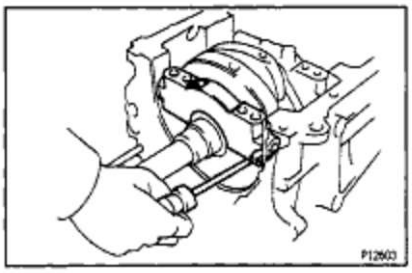


6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

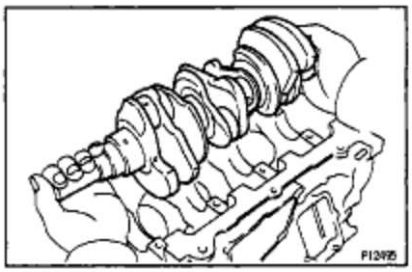
(a) Uniformly loosen and remove the 8 main bearing cap bolts and seal washers, in several passes, in the sequence shown.



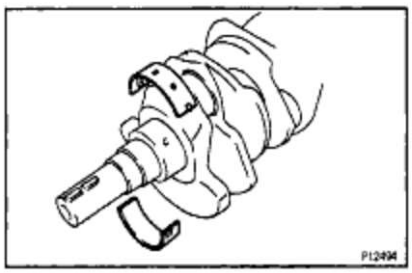
(b) Uniformly loosen and remove the 16 main bearing cap bolts, in several passes, in the sequence shown.



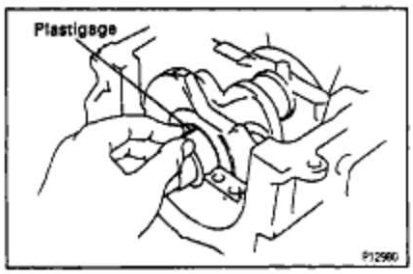
(c) Using a screwdriver, pry out main bearing caps, remove the 4 main bearing caps, lower bearings and (No.2 main bearing cap only) 2 lower thrust washers.
HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.



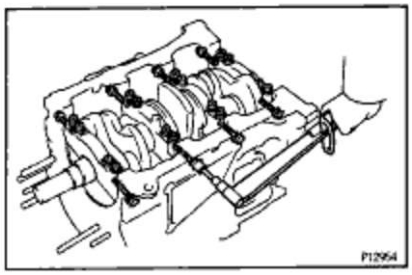
(d) Lift out the crankshaft.
HINT: Keep the upper bearings together with the cyl–inder block.



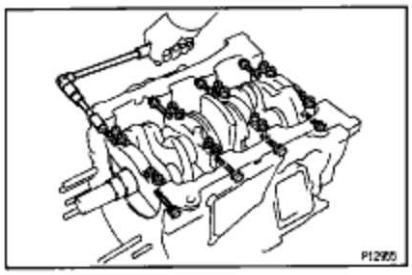
(e) Clean each main journal and bearing.
(f) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bear–ings. If necessary, replace the crankshaft.



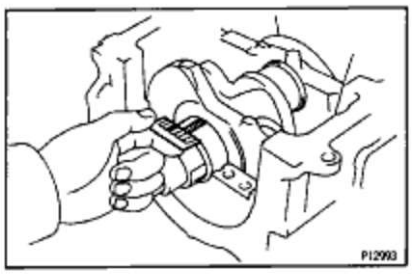
(g) Place the crankshaft on the cylinder block.
(h) Lay a strip of Plastigage across each journal.



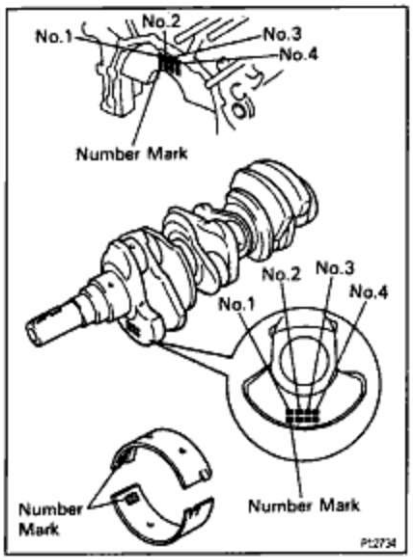
(i) Install the 4 main bearing caps.
(See step 4 on pages EG2–165)
12 Pointed Head Bolts:
Torque:
1 st 22 N–m (225 kgf–cm, 16 ft–lbf)
2nd Turn extra 90°
Hexagon Head Bolts:
Torque: 27 N–m (275 kgf–cm, 20 ft–lbf)
NOTICE: Do not turn the crankshaft.



(j) Remove the main bearing caps.
(See procedures (a) to (c) above)



(k) Measure the Plastigage at its widest point.
Standard oil clearance:
0.026 – 0.046 mm (0.0010 – 0.0018 in.)
Maximum clearance:
0.06 mm (0.0024 in.)
If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.
HINT: If using a bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 standard bearing sizes, marked '1', "2", "3", "4" and "5" accordingly.



	Total number	" ": Number mark			
Cylinder block (A) + Crankshaft (B) _	0–5	6–11	12–17	18–23	24–28
Use bearing	"1"	"2"	**"3"**	"4"	"5"

EXAMPLE: Cylinder block "06" (A)
+ Crankshaft "08" (B)
= Total number 14 (Use bearing "3")

Reference:
Cylinder block main journal bore diameter (A):
Mark ”00’
66.000 mm (2.5984 in.)
Mark ’01’
66.001 mm (2.5985 in.)
Mark ”02”
66.002 mm (2.5985 in.)
Mark ’03’
66.003 mm (2.5985 in.)
Mark ”04’
66.004 mm (2.5986 in.)
Mark ’05’
66.005 mm (2.5986 In.)
Mark ’06’
66.006 mm (2.5987 in.)
Mark ’07’
66.007 mm (2.5987 in.)
Mark ’08’
66.008 mm (2.5987 in.)
Mark ’09’
66.009 mm (2.5988 in.)
Mark ”10’
66.010 mm (2.5988 in.)
Mark ’11 ”
66.011 mm (2.5989 in.)
Mark ’12’
66.012 mm (2.5989 in.)
Mark ’13’
66.013 mm (2.5989 in.)
Mark ”14’
66.014 mm (2.5990 in.)
Mark ’15’
66.015 mm (2.5990 in.)
Mark ”16’
66.01 6 mm (2.5990 in.)

Crankshaft main journal diameter (B):
Mark '00"
61.000 mm (2.401 6 in.)
Mark "01'
60.999 mm (2.4015 in.)
Mark '02'
60.998 mm (2.4015 in.)
Mark "03"
60.997 mm (2.4015 in.)
Mark '04'
60.996 mm (2.4014 in.)
Mark '05'
60.995 mm (2.4014 in.)
Mark '06"
60.994 mm (2.4013 in.)
Mark '07'
60.993 mm (2.4012 in.)
Mark '08'
60.992 mm (2.4012 In.)
Mark '09"
60.991 mm (2.4012 In.)
Mark "10'
60.990 mm (2.4012 in.)
Mark '11'
60.989 mm (2.4011 in.)
Mark "12"
60.988 mm (2.4011 in.)
Standard sized bearing center wall thickness:
Mark "1'
2.488 – 2.489 mm (0.0979 – 0.0980 in.)
Mark "2
2.489 – 2.492 mm (0.0980 – 0.0981 in.)
Mark '3"
2.492 – 2.495 mm (0.0981 – 0.0982 in.)
Mark "4'
2.495 – 2.498 mm (0.0982 – 0.0983 in.)
Mark "5'
2.498 – 2.501 mm (0.0983 – 0.0985 in.)

Standard sized Bearing Selection Chart

Crankshaft number mark	Cylinder block number mark																
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
00	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3
01	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3
02	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4
03	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4
04	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4
05	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4
06	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4
07	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
08	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5
09	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5
10	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5
11	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5
12	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5

EXAMPLE: Cylinder block ”06”, Crankshaft ”08”
= Use bearing ”3”

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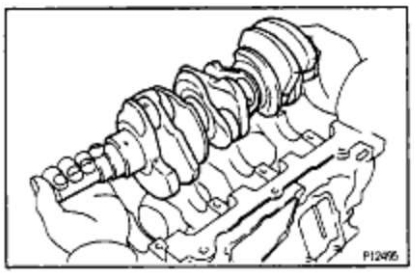
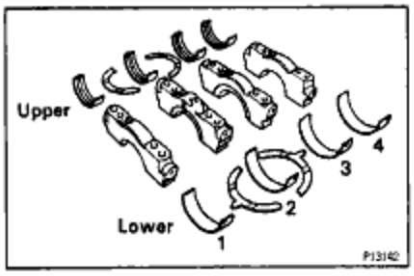
(l) Completely remove the Plastigage.



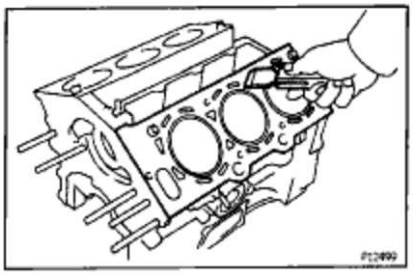
7. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the 4 upper main bearings and 2 upper thrust washers from the cylinder block.



HINT: Arrange the main bearing caps, bearings and thrust washers in correct order.



CYLINDER BLOCK INSPECTION AND REPAIR

1. CLEAN CYLINDER BLOCK

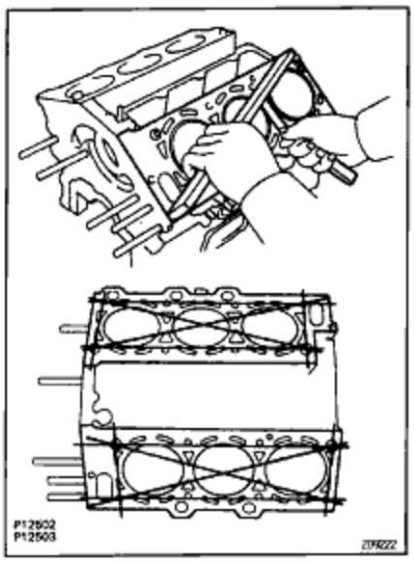
A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

B. Clean cylinder block

Using a soft brush and solvent, thoroughly clean the cylinder block.

NOTICE: If the cylinder is washed at high temperatures, the cylinder liner sticks out beyond the cylinder block, so always wash the cylinder block at a temperature of 45$_2$C (113$_2$F) or less.



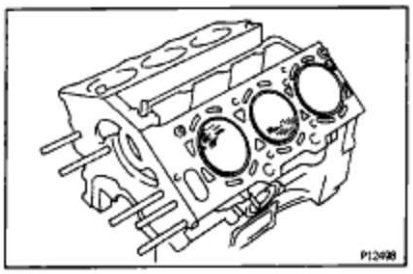
2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head gasket for warpage.

Maximum warpage:

0.07 mm (0.0028 In.)

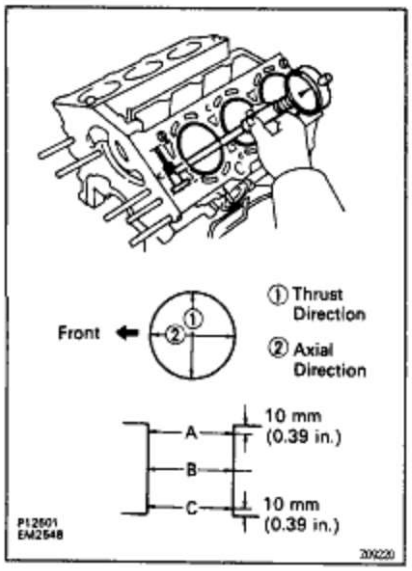
If warpage is greater than maximum, replace the cylinder block.



3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.



4. 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.

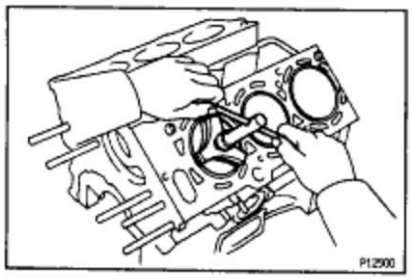
Standard diameter:

87.500 – 87.512 mm (3.4449 – 3.4453 in.)

Maximum diameter:

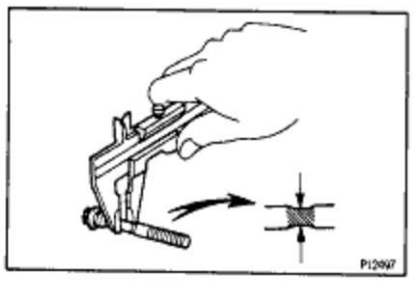
87.52 mm (3.4457 in.)

If the diameter is greater than maximum, replace the cylinder block.



5. REMOVE CYLINDER RIDGE

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



6. INSPECT MAIN BEARING CAP BOLTS

(for 12 Pointed Head Bolts)

Using a vernier caliper, measure the tension portion diameter of the main bearing cap bolt.

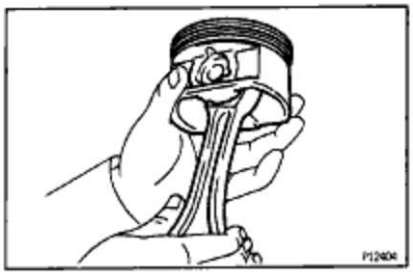
Standard diameter:

7.500 – 7.600 mm (0.2953 – 0.2992 in.)

Minimum diameter:

7.20 mm (0.2835 In.)

If the diameter is less than minimum, replace the bolt.

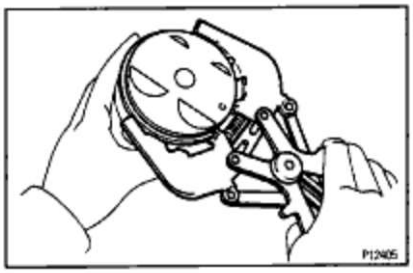


PISTON AND CONNECTING ROD DISASSEMBLY

1. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.

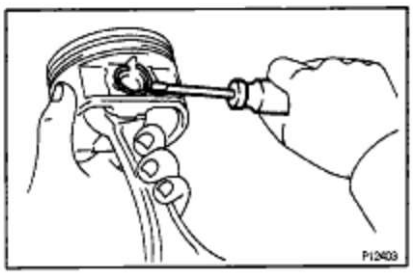


2. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compres–sion rings.

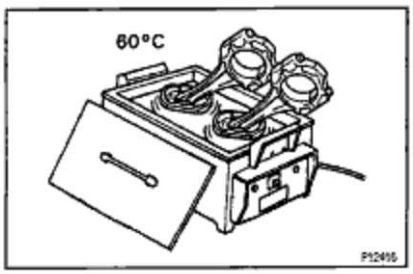
(b) Remove the 2 side rails and oil ring by hand.

HINT: Arrange the piston rings in correct order only.

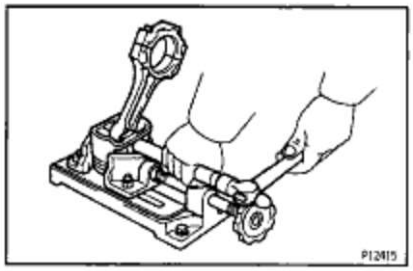


3. DISCONNECT CONNECTING ROD FROM PISTON

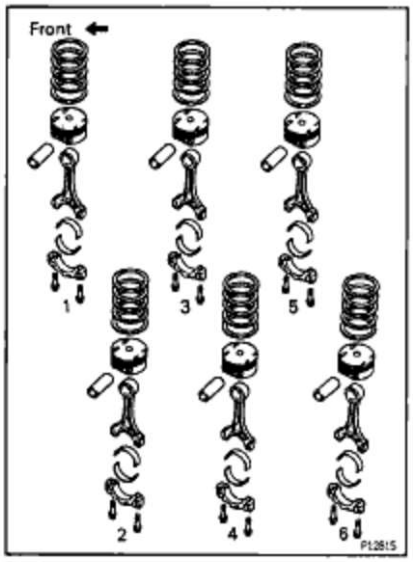
(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60_2C (140_2F).

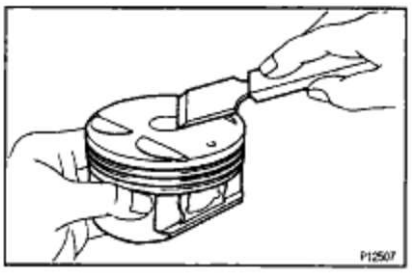


(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.



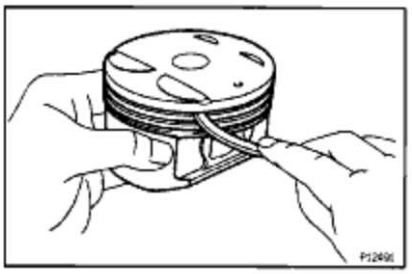
HINT:
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.

PISTON AND CONNECTING ROD INSPECTION

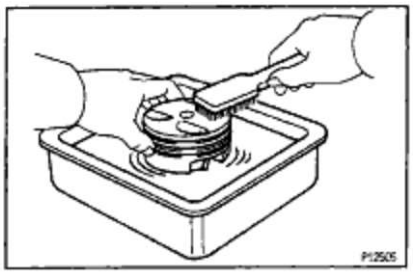


1. CLEAN PISTON

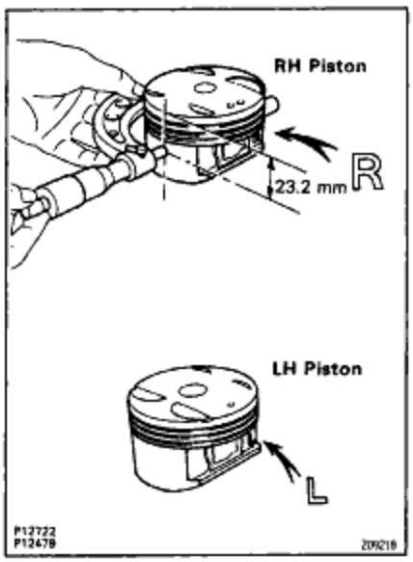
(a) Using a gasket scraper, remove the carbon from the piston top.



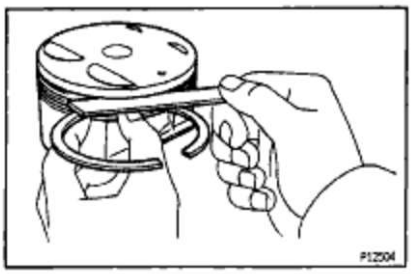
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



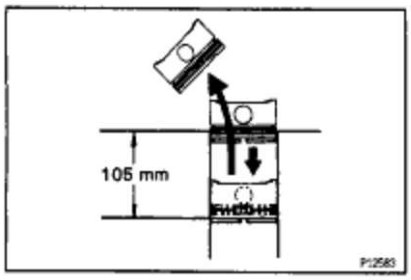
(c) Using solvent and a brush, thoroughly clean the piston.
NOTICE: Do not use a wire brush.



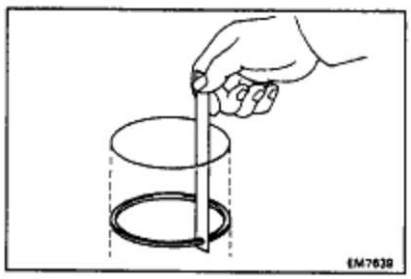
2. INSPECT PISTON
A. Inspect piston oil clearance
(a) Using a micrometer, measure the piston diameter at ring angles to the piston pin center line, 23.2 mm (0.913 in.) from the piston head.
Piston diameter:
87.406 – 87.416 mm (3.4412 – 3.4416 in.)
(b) Measure the cylinder bore diameter in the thrust di–rections. (See step 4 on page EG2–152)
(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.
Standard oil clearance:
0.084 – 0.106 mm (0.0033 – 0.0042 in.)
Maximum oil clearance:
0.13 mm (0.0051 in.)
If the oil clearance is greater than maximum, replace all the6 pistons. If necessary, replace the cylinder block.
HINT: The shape of the piston varies for the RH and LH banks. The RH piston is marked with ”R”, the LH piston with ”L”.



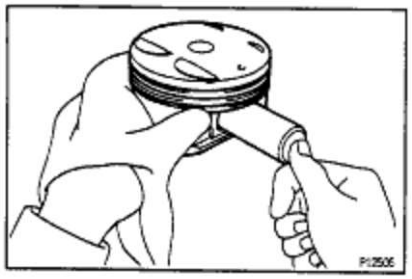
B. Inspect piston ring groove clearance
Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.
Ring groove clearance:
No.1
0.020 – 0.070 mm (0.0008 – 0.0028 in.)
No.2
0.020 – 0.060 mm (0.0008 – 0.0024 In.)
If the clearance is not as specified, replace the piston.



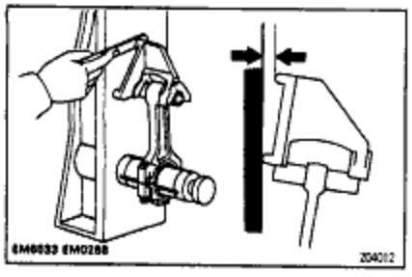
C. Inspect piston ring end gap
(a) Insert the piston ring into the cylinder bore.
(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



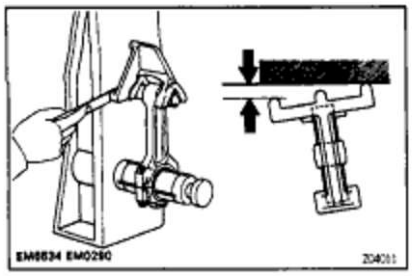
(c) Using a feeler gauge, measure the end gap.
Standard end gap:
No. 1
0.25 – 0.35 mm (0.0098 – 0.0138 in.)
No.2
0.35 – 0.45 mm (0.0138 – 0.0177 in.)
Oil (Side rail)
0.15 – 0.40 mm (0.0059 – 0.0157 in.)
Maximum end gap:
No.1
0.95 mm (0.0374 in.)
No.2
1.05 mm (0.0413 in.)
Oil (Side rail)
1.00 mm (0.0394 in.)
If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.



D. Inspect piston pin fit
At 60_2C (140_2F), you should be able to push the piston pin into the piston pin hole with your thumb.



3. INSPECT CONNECTING ROD
A. Inspect connecting rod alignment
Using a rod aligner and feeler gauge, check the con–necting rod alignment.
• Check for out–of–alignment.
Maximum out–of –alignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
If out–of–alignment is greater than maximum, re–place the connecting rod assembly.

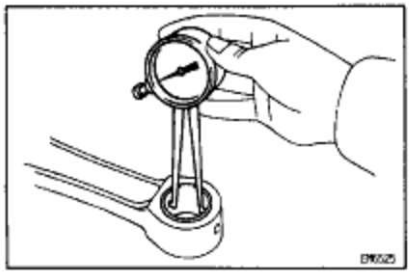


• Check for twist

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.

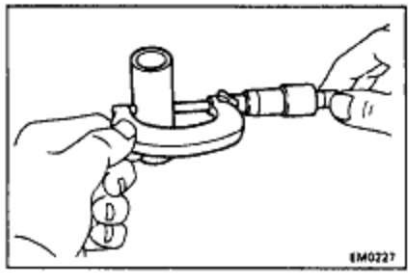


B. Inspect piston pin oil clearance

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

Bushing inside diameter:

22.005 – 22.014 mm (0.8663 – 0.8667 in.)



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

Piston pin diameter:

21.997 – 22.006 mm (0.8660 – 0.8664 in.)

(c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

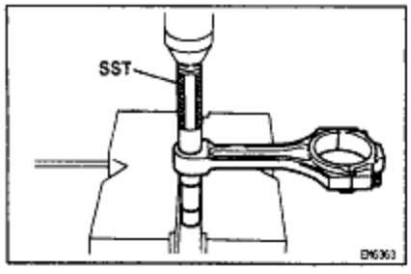
Standard oil clearance:

0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance:

0.05 mm (0.0020 in.)

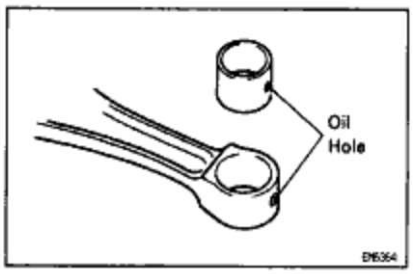
If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



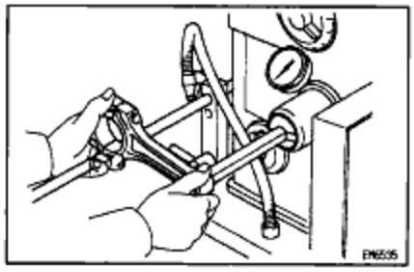
C. If necessary, replace connecting rod bushing

(a) Using SST and a press, press out the bushing.

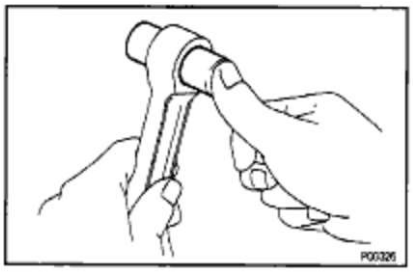
SST 09222 – 30010



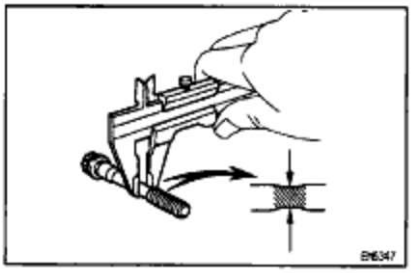
(b) Align the oil holes of a new bushing and the connecting rod.
(c) Using SST and a press, press in the bushing.
SST 09222–30010



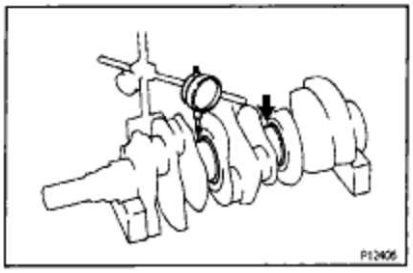
(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see step B above) between the bushing and piston pin.

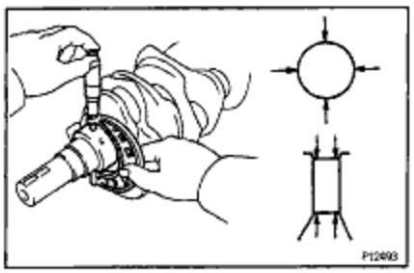


(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.



D. Inspect connecting rod bolts
Using a vernier caliper, measure the tension portion of of the connecting rod bolt.
Standard diameter:
7.2 – 7.3 mm (0.284 – 0.287 in.)
Minimum diameter:
7.0 mm (0.276 in.)
HINT: If the tension portion diameter is less than minimum, replace the connecting rod bolt.





CRANKSHAFT INSPECTION

1. INSPECT CRANKSHAFT FOR CIRCLE RUNOUT

(a) Place the crankshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout, as shown in the illustration.

Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the crankshaft.

2. INSPECT MAIN JOURNALS AND CRANK PINS

(a) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

60.988 –61.000 mm (2.4011 – 2.4016 in.)

Crank pin diameter:

52.994 – 53.000 mm (2.0864 – 2.0866 in.)

If the diameter is not as specified, check the oil clear–ance (See steps 3 or6 on page EG2–142 or 145). If necessary, replace the crankshaft.

(b) Check each main journal and crank pin for taper and out–of–round as shown.

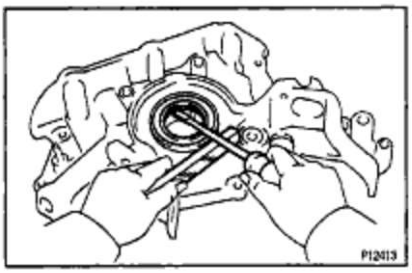
Maximum taper and out–of–round:

0.02 mm (0.0008 in.)

If the taper and out–of–round is greater than maxi–mum, replace the crankshaft.

CRANKSHAFT OIL SEALS REPLACEMENT

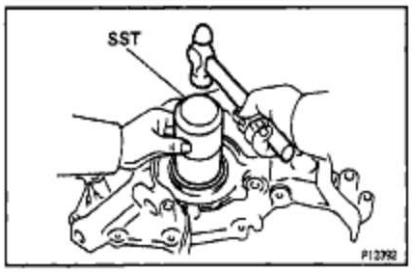
HINT: There are 2 methods (A and B) to replace the oil seal which are as follows:



1. REPLACE CRANKSHAFT FRONT OIL SEAL

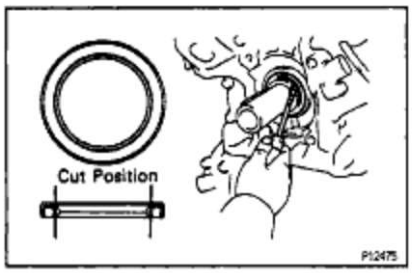
A. If oil pump is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09223 – 00010

(c) Apply MP grease to the oil seal lip.



B. If oil pump is installed to the cylinder block:

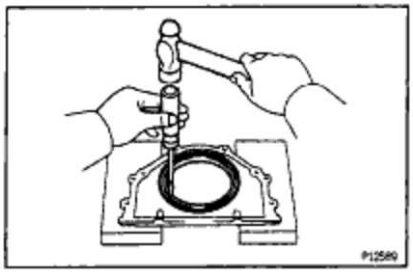
(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.

NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.

(c) Apply MP grease to a new oil seal lip.

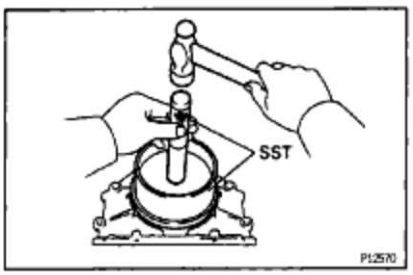
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09223 – 00010



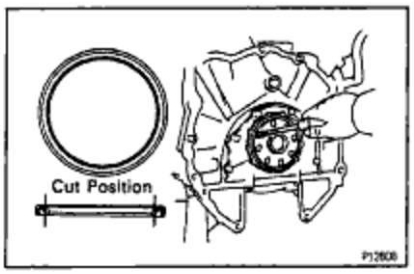
2. REPLACE CRANKSHAFT REAR OIL SEAL

A. If rear oil seal retainer is removed from cylinder block:

(a) Using a screwdriver and hammer, tap out the oil seal.

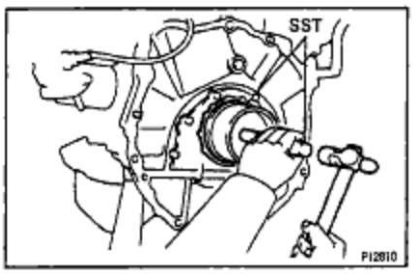


(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223 –15030, 09608 – 30022 (09608 – 05010)
(c) Apply MP grease to the oil seal lip.

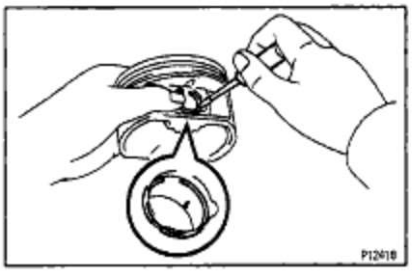


B. If rear oil seal retainer is installed to cylinder block:

(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



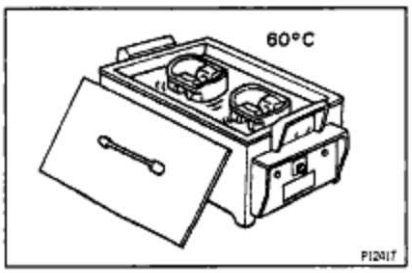
(c) Apply MP grease to a new oil seal lip.
(d) Using SST and a hammer, tap in the oil sea! until its surface is flush with the rear oil seal retainer edge.
SST 09223–15030, 09608–30022 (09608–05010)



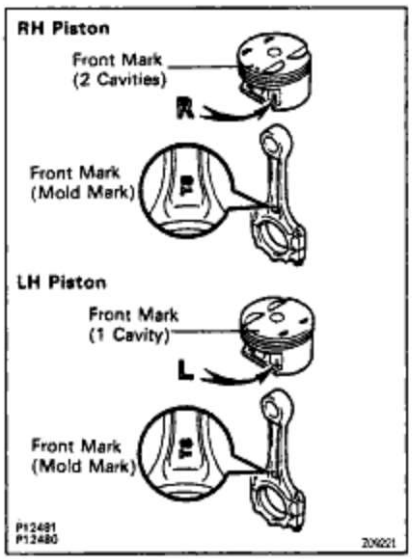
PISTON AND CONNECTING ROD ASSEMBLY

1. ASSEMBLE PISTON AND CONNECTING ROD

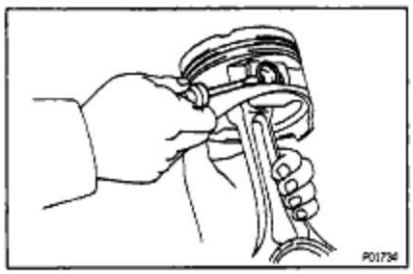
(a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.
HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



(b) Gradually heat the piston to about 60_2C (140_2F).



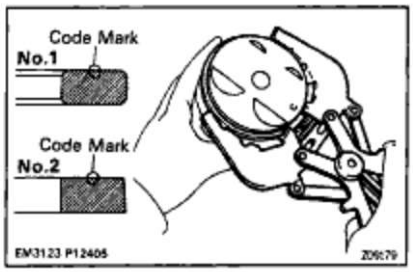
(c) Coat the piston pin with engine oil.
(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.



(e) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.
HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

2. INSTALL PISTON RINGS

(a) Install the oil ring expander and 2 side rails by hand.



(b) Using a piston ring expander, install the 2 compres–sion rings with the code mark facing upward.

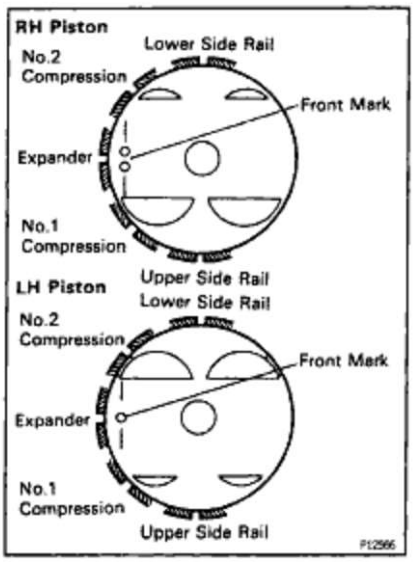
Code mark:

No.1

1RorT

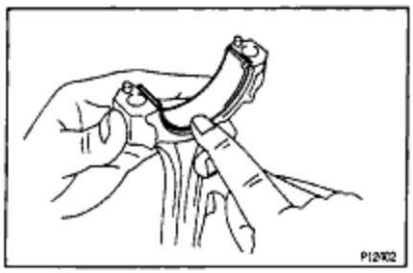
No.2

2R or 2T



(c) Position the piston rings so that the ring ends are as shown.

NOTICE: Do not align the ring ends.



3. INSTALL BEARINGS

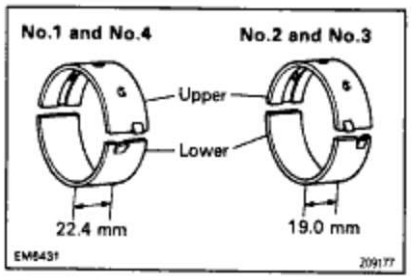
(a) Align the bearing claw with the groove of the connect–ing rod or connecting cap.

(b) Install the bearings in the connecting rod and con–necting rod cap.

CYLINDER BLOCK ASSEMBLY

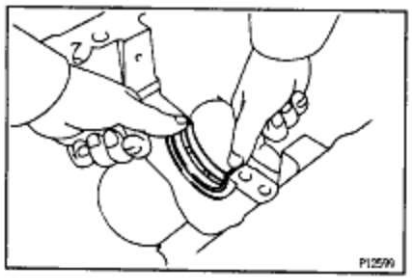
(See Components for Disassembly and Assembly)

HINT:
- Thoroughly clean all parts to be assembled. Before installing the parts, apply new engine oil to all sliding and and rotating surfaces.
- Replace all gaskets, 0–rings and oil seals with new parts.



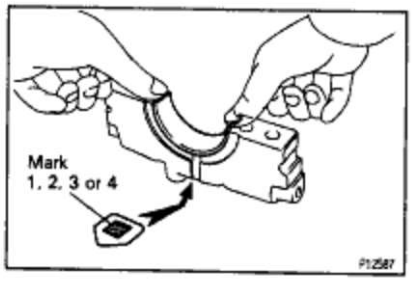
1. INSTALL MAIN BEARINGS

HINT:
- Main bearings come in widths of 19.0 mm (0.748 in.) and 22.4 mm (0.882 in.). Install the 22.4 mm (0.882 in.) bearings in the No. 1 and No.4 cylinder block journal positions with the main bearing cap.
- Install the 19.0 mm (0.748 in.) bearings in the No. 2 and No.3 positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

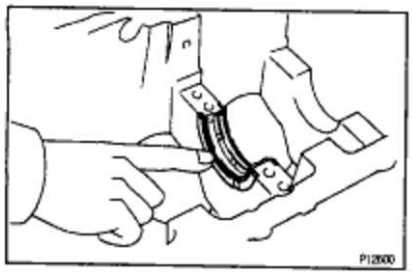


(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 4 upper bearings.

NOTICE: Install the bearing with the oil hole in the cylin–der block.

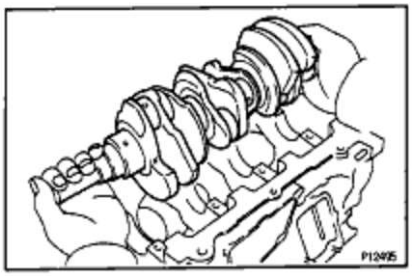


(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 4 lower bearings.
HINT: A number is marked on each main bearing cap to indicate the installation position.

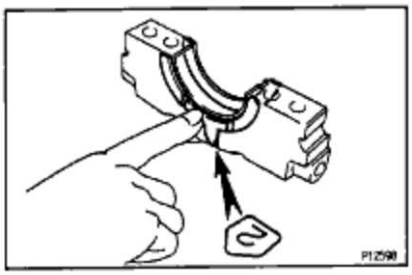


2. INSTALL UPPER THRUST WASHERS

Install the 2 thrust washers under the No.2 journal position of the cylinder block with the oil grooves facing outward.



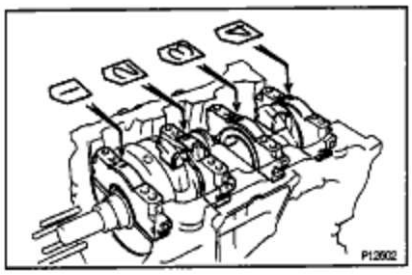
3. PLACE CRANKSHAFT ON CYLINDER BLOCK



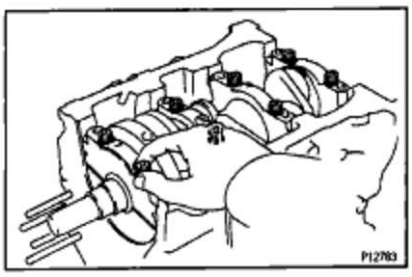
4. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

A. Place main bearing caps and lower thrust washers on cylinder block

(a) Install the 2 thrust washers on the No.2 bearing cap with the grooves facing outward.

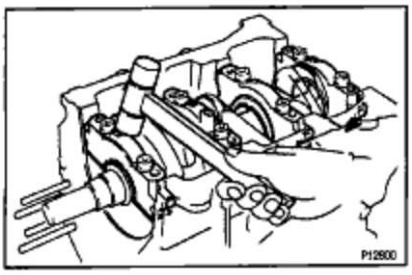


(b) Temporarily place the 4 main bearing caps level and let them in their proper locations.



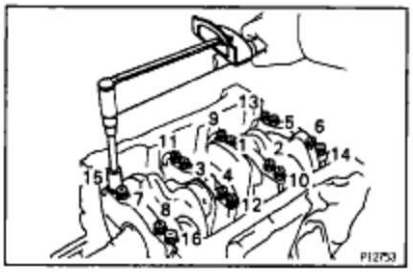
(c) Apply a light coat of engine oil on the threads and under the main bearing cap bolts (12 Pointed Head Bolts).

(d) Temporarily install the 8 main bearing cap bolts.

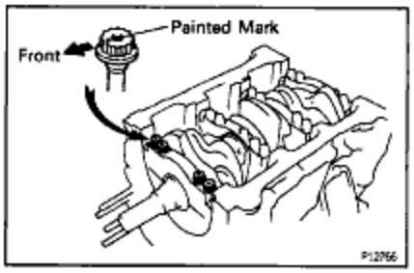


(e) Using a plastic–faced hammer, lightly tap the bearing cap to ensure a proper fit.

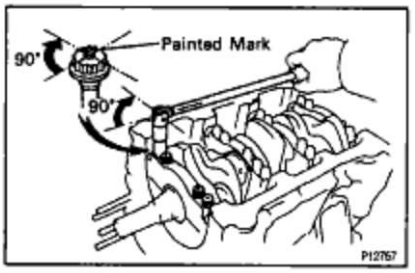
B. Install main bearing cap bolts
(for 12 Pointed Head Bolts)
HINT:
- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the main bearing cap bolts is broken or deformed, replace it.



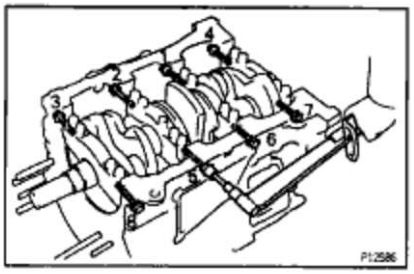
(a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.
(b) Install and uniformly tighten the 16 main bearing cap bolts, in several passes, in the sequence shown.
Torque: 22 N–m (225 kgf–cm, 16 ft–lbf)
If any of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



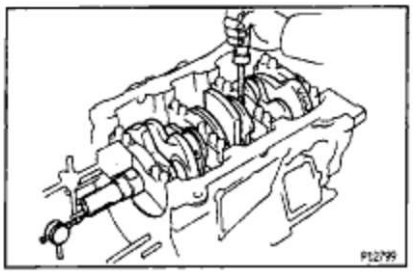
(c) Mark the front of the main bearing cap bolts with paint.



(d) Retighten the main bearing cap bolts by 90_2 in the numerical order shown.
(e) Check that the painted mark is now at a 90_2 angle to the front.



C. Install main bearing cap bolts
(for Hexagon Head Bolts)
(a) Install a new seal washer to the main bearing cap bolt.
(b) Install and uniformly tighten the 8 main bearing cap bolts, in several passes, in the sequence shown.
Torque: 27 N–m (275 kgf–cm, 20 ft–lbf)
(c) Check that the crankshaft turns smoothly.



5. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.04 – 0.24 mm (0.0016 – 0.0095 in.)

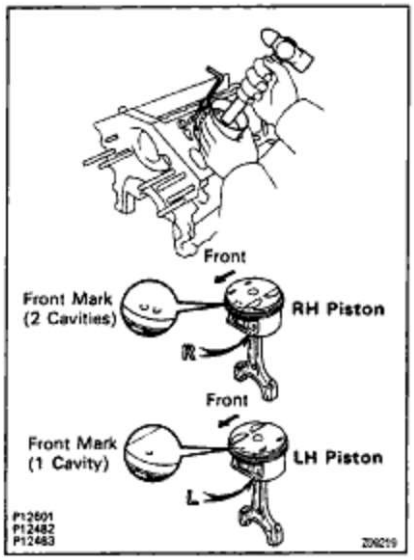
Maximum thrust clearance:

0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, re–place the thrust washers as a set.

Thrust washer thickness:

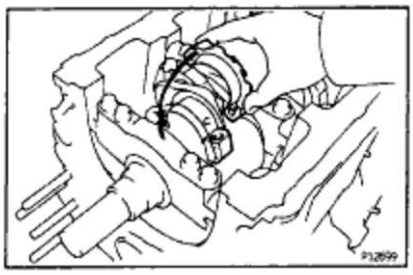
1.930 – 1.980 mm (0.0760 – 0.0780 in.)



6. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

HINT: The shape of the piston varies for the RH and LH banks. The RH piston is marked with ”R”, the LH piston with ”L”.

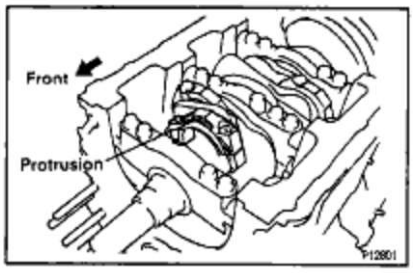


7. INSTALL CONNECTING ROD CAPS

A. Place connecting rod cap on connecting rod

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin dowels of the connecting rod cap with the pins of the connecting rod, and install the con–necting rod.

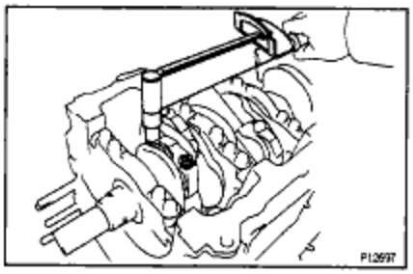


(c) Check that the protrusion of the connecting rod cap is facing in the correct direction.

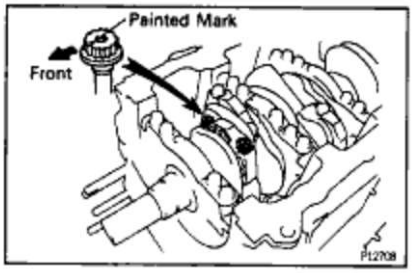
B. Install connecting rod cap bolts

HINT:

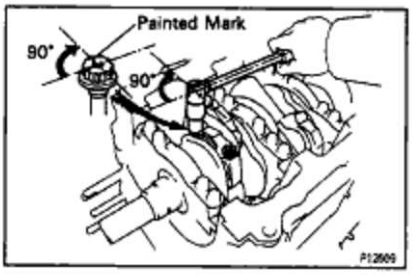
- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the connecting rod cap bolts is broken or deformed, replace it.



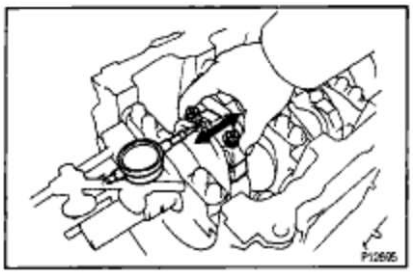
(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.
(b) Install and alternately tighten the 2 connecting rod cap bolts in several passes.
Torque: 24.5 N–m (250 kgf–cm, 18 ft–lbf)
If any of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



(c) Mark the front of the connecting cap bolts with paint.



(d) Retighten the cap bolts by 90_2 as shown.
(e) Check that the painted mark is now at a 90_2 angle to the front.
(f) Check that the crankshaft turns smoothly.



8. CHECK CONNECTING ROD OIL CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:

0.15 – 0.30 mm (0.0059 – 0.0118 in.)

Maximum thrust clearance:

0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, re–place the connecting rod assembly (s). If necessary, replace the crankshaft.

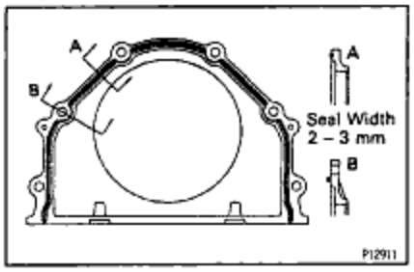
Connecting rod thickness:

20.80 – 20.85 mm (0.8189 – 0.8209 in.)

9. INSTALL REAR OIL SEAL RETAINER

(a) Remove any old packing (FIPG) material and be care–ful not to drop any oil on the contact surfaces of the oil seal retainer and cylinder block.

- Using a razor blade and gasket scraper, remove all the oil packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

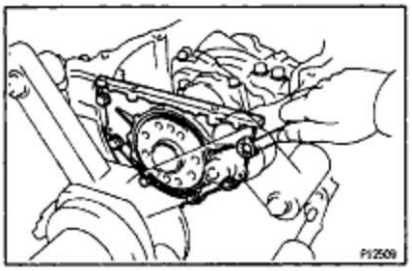


(b) Apply seal packing to the oil seal retainer as shown in the illustration.

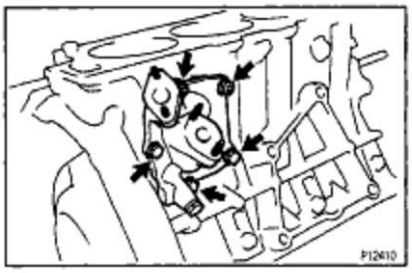
Seal packing:

Part No. 08826–00080 or equivalent

- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be re–moved and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



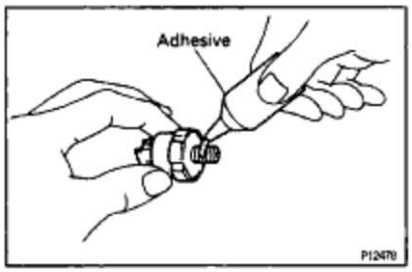
(c) Install the oil seal retainer with the 6 bolts.
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



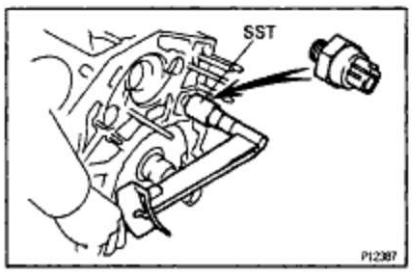
AFTER ASSEMBLY

(See Components for Cylinder Block Preparation of Disassembly and After Assembly)

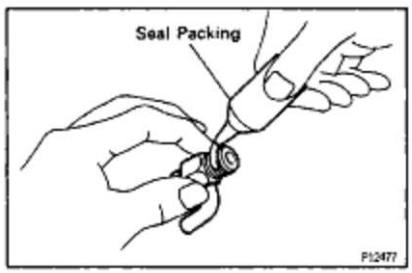
1. INSTALL EGR COOLER
Install a new gasket and the EGR cooler with the 3 bolts and 2 nuts.
Torque: 9 N–m (90 kgf–cm, 78 in.–lbf)



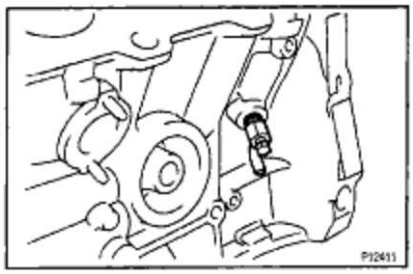
2. INSTALL OIL PRESSURE SWITCH
(a) Apply adhesive to 2 or 3 threads.
Adhesive:
Part No. 08833–00080. THREE BOND 1344, LOCTITE 242 or equivalent



(b) Using SST, install the oil pressure switch.
SST 09816 – 30010
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

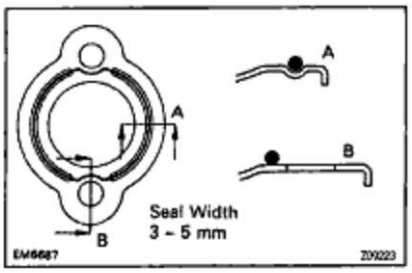


3. INSTALL ENGINE COOLANT DRAIN COCK
(a) Apply seal packing to 2 or 3 threads.
Seal packing:
Part No. 08826–00100 or equivalent

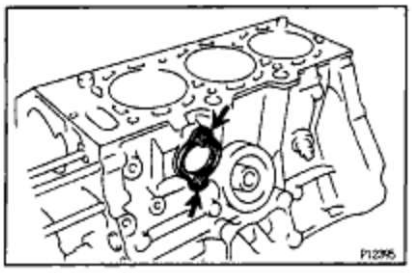


(b) Install the drain cock.
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)
HINT: After applying the specified torque, rotate the drain cock clockwise until it is in the position shown.

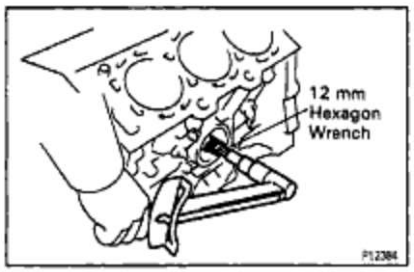
4. INSTALL WATER SEAL PLATE
(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the seal plate and cylinder block.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.



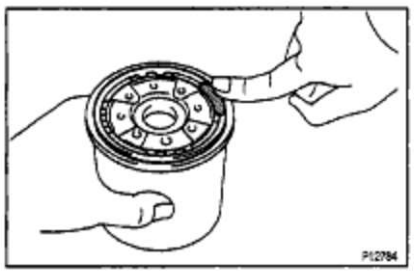
(b) Apply seal packing to the seal plate as shown in the illustration.
Seal packing:
Part No. 08826–00100 or equivalent
- Install a nozzle that has been cut to a 3–5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



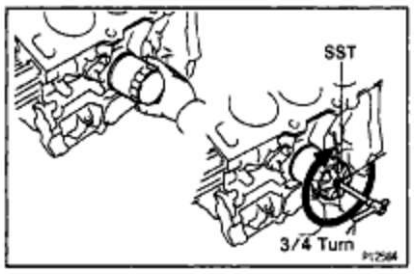
(c) Install the seal plate with the 2 nuts.
Torque: 14.5 N–m (145 kgf–cm. 10 ft–lbf)



5. INSTALL OIL FILTER UNION
Using a 12 mm hexagon wrench, install the oil filter union.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

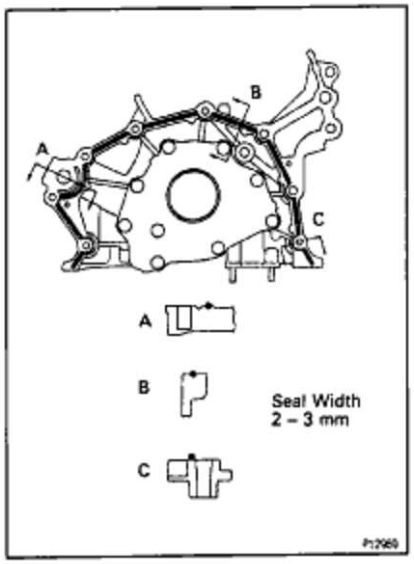


6. INSTALL OIL FILTER
(a) Apply clean engine oil to the gasket of anew oil filter.



(b) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
(c) Using SST, tighten it an additional 3/4 turn.
SST 09228–07500

7. INSTALL OIL PUMP
(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the oil pump as shown in the illustration.

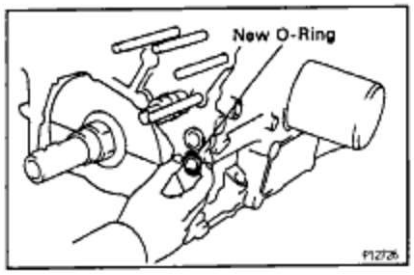
Seal packing:

Part No. 08826–00080 or equivalent

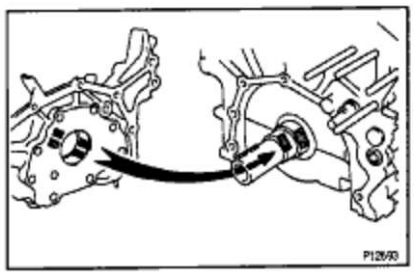
- Install a nozzle that has been cut to a 2–3 mm (0.08–0.12 in.) opening.

HINT: Avoid applying an excessive amount to the surface.

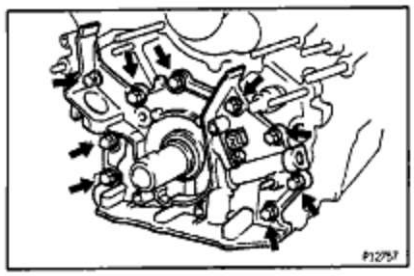
- Parts must be assembled within 3 minutes of application. Otherwise the material must be re–moved and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Place a new O–ring in position on the cylinder block.



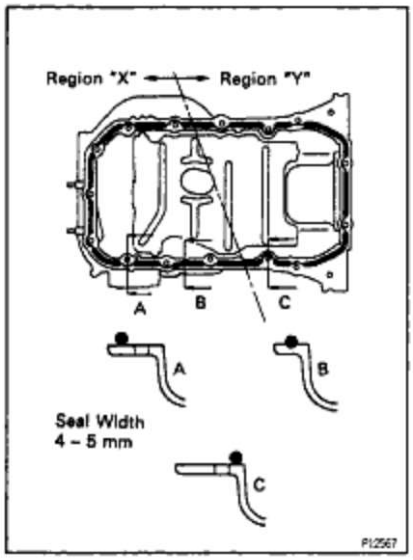
(d) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



(e) Install the oil pump with the 9 bolts.

Torque:

8 N–m (80 kgf–cm, 69 in.–lbf) for 10 mm head bolt
19.5 N–m (200 kgf–cm,14 ft–lbf) for 12 mm head bolt



8. INSTALL N0.1 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the No.1 oil pan and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

NOTICE: Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the No.2 oil pan as shown in the illustration.

Seal packing:

Part No. 08826–00080 or equivalent

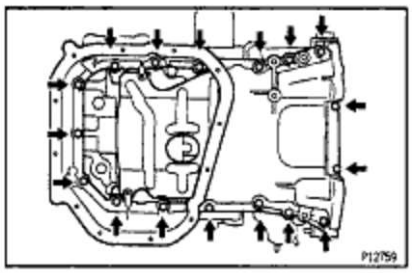
Region "x" is at the outer side of the bolt hole.

Region "*" is at the inner side of the bolt hole.

- Install a nozzle that has been cut to a 4–5 m m (0.16 – 0.20 in.) opening.

HINT: Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

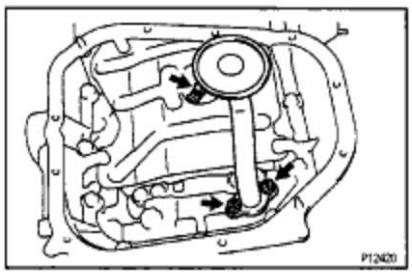


(c) Install the No.1 oil pan with the 17 bolts.

Torque:

8 N–m (80 kgf–cm, 69 in.–lbf) for 10 mm head bolt

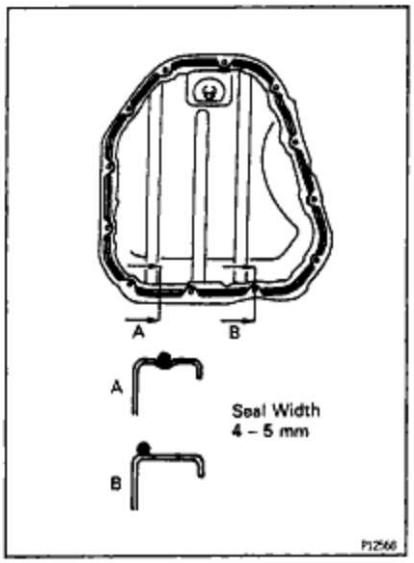
19.5 N–m (200 kgf–cm, 14 ft–lbf) for 12 mm head bolt



9. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the bolt and 2 nuts.

Torque: 8 N–m (80 kgf–cm, 69 in–lbf)



10. INSTALL NO.2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the No.1 and No.2 oil pans.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

NOTICE: Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the No.2 oil pan as shown in the illustration.

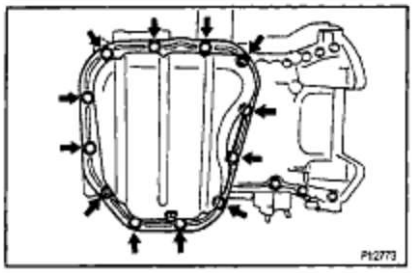
Seal packing:

Part No. 08828–00080 or equivalent

- Install a nozzle that–has been cut to a 4–5 mm (0.16 – 0.20 in.) opening.

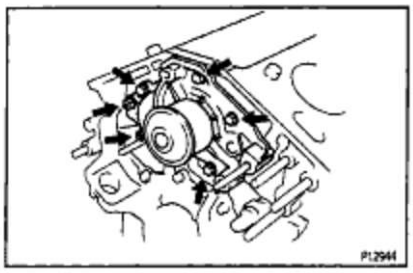
HINT: Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install the No.2 oil pan with the 10 bolts and 2 nuts.

Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)



11. INSTALL WATER PUMP

Install a new gasket and the water pump with the 4 bolts and 2 nuts.

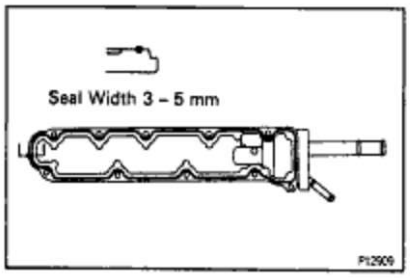
Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)

NOTICE: Do not got oil on the gasket.

12. INSTALL WATER INLET HOUSING

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water inlet housing and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the water inlet housing as shown in the illustration.

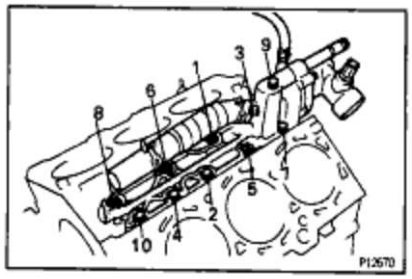
Seal packing:

Part No. 08826–00100 or equivalent

- Install a nozzle that has been cut to a 3–5 mm (0.12–0.20 in.) opening.

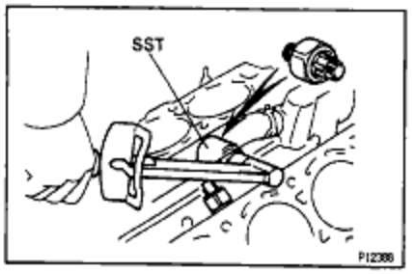
HINT: Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install the water inlet housing with the 8 bolts and 2 nuts, in the several passes, in the sequence shown.

Torque: 8 N–m (80 kgf–cm, 69 in.–lbf)

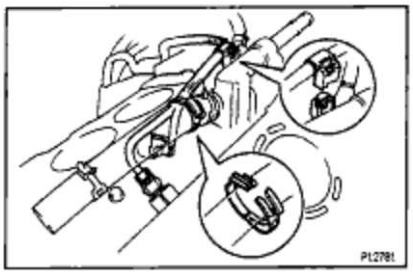


13. INSTALL KNOCK SENSORS

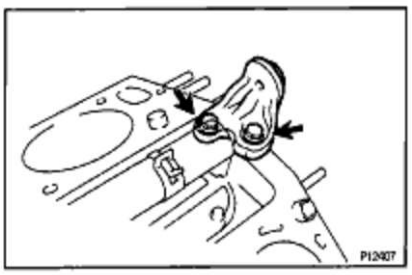
(a) Using SST, install the 2 knock sensors.

SST 09816 – 30010

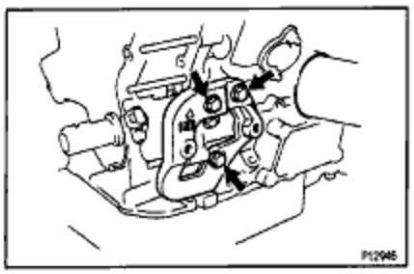
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)



(b) Connect the 2 knock sensor connectors.
(c) Install the wire band.
(d) Connect the engine wire clamp.

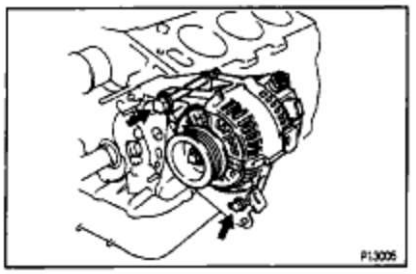


14. INSTALL NO.2 IDLER PULLEY BRACKET
Install the pulley bracket with the 2 bolts.
Torque: 28 N–m (290 kgf–cm, 21 ft–lbf)

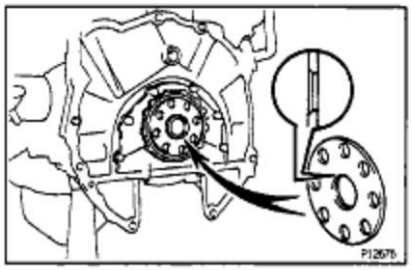


15. INSTALL A/C COMPRESSOR HOUSING BRACKET
Install the compressor housing bracket with the 3 bolts.
Torque: 25 N–m (250 kgf–cm. 18 ft–lbf)

16. INSTALL GENERATOR BRACKET AND ADJUSTING BAR
Install the generator bracket and adjusting bar with the 3 nuts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



17. INSTALL GENERATOR
Install the generator with the 2 bolts. Do not tighten the bolts yet.
18. INSTALL CYLINDER HEAD
(See pages EG2–96 **to 118)**
19. INSTALL TIMING PULLEYS AND BELT
(See pages EG2–49 **to 55)**
20. REMOVE ENGINE STAND

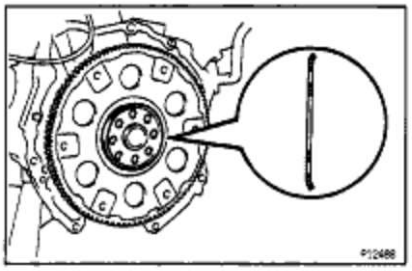


ENGINE & TRANSAXLE ASSEMBLY

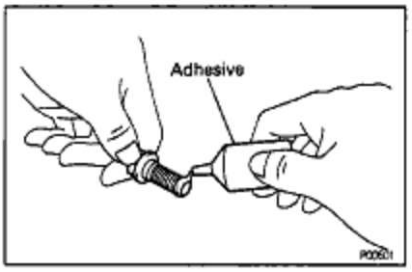
(See Components for Engine & Transaxle Separation and Assembly)

1. INSTALL DRIVE PLATE

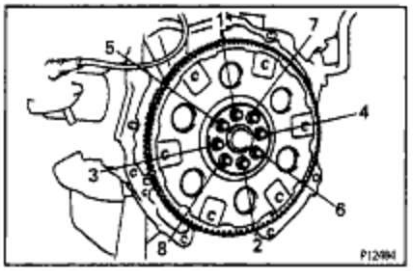
(a) Install the front spacer on the crankshaft with the chamfered end facing the shaft.



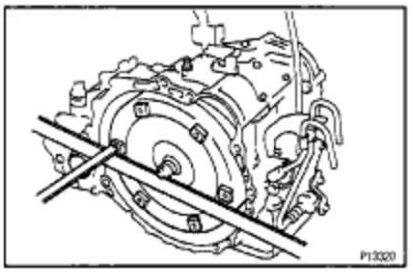
(b) Install the drive pate and rear spacer on the crank–shaft.



(c) Clean the threads of the bolt with the gasoline.
(d) Apply adhesive to 2 or 3 threads of the mount bolt.
Adhesive:
Part No. 08833–00070. THREE BOND 1324 or equivalent

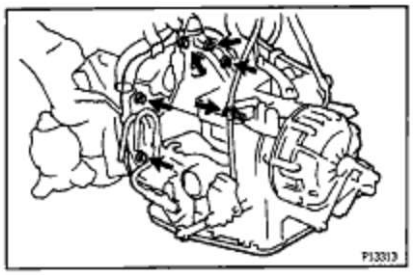


(e) Install and uniformly tighten the mounting bolts, in the several passes, in the sequence shown.
Torque: 83 N–m (850 kgf–cm, 61 ft–lbf)



2. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

Using a scale and a straight edge, measure from the installed surface to the front surface of the transaxle housing.
Correct distance:
13.7 mm (0.539 in.) or more



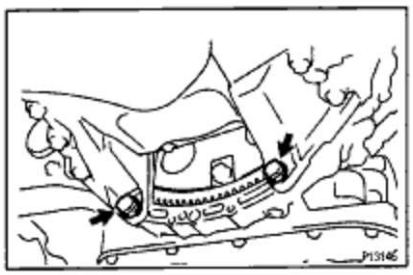
3. INSTALL TRANSAXLE TO ENGINE

A. Install transaxle

(a) Attach the transaxle to the engine.

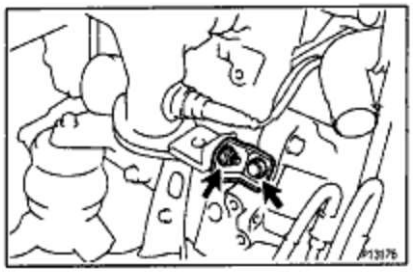
(b) Install the6 bolts.

Torque: 64 N–m (650 kgf–cm, 47 ft–lbf)



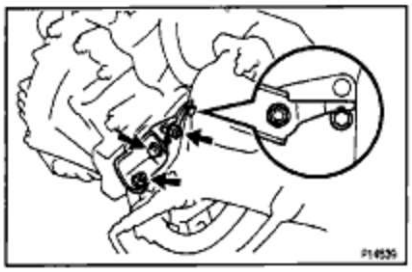
(c) Install the 2 bolts holding the No.2 oil pan to the transaxle.

Torque: 46 N–m (470 kgf–cm, 34 ft–lbf)



(e) Install the No.2 manifold stay with the bolt and nut.

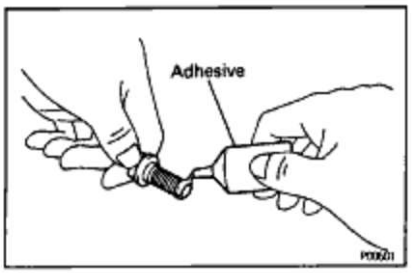
Torque: 20 N–m (200 kgf–cm. 14 ft–lbf)



(f) Install the manifold stay, exhaust manifold plate with the bolt and 2 nuts.

Torque: 20 N–m (200 kgf–cm, 14 ft–lbf)

HINT: Install the manifold so that the tip of the stay touches the head of the differential retainer installa–tion bolt as shown in the illustration.



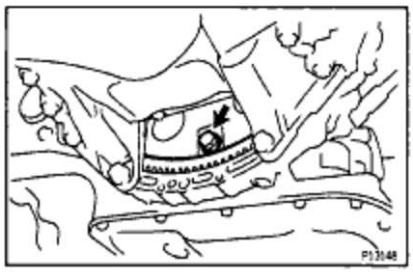
B. Install torque converter clutch mounting bolts

(a) Clean the threads of the bolt with the gasoline.

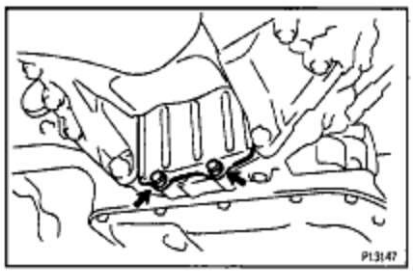
(b) Apply adhesive to 2 or 3 threads of the mount bolt.

Adhesive:

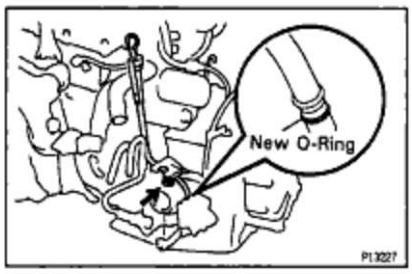
Part No. 08833–00070, THREE BOND 1324 or equivalent



(c) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolts evenly.
Torque: 41 N–m (420 kgf–cm, 30 ft–lbf)
HINT: First install the dark green colored bolt, then install the other bolts.



(d) Install the flywheel housing under cover with the 2 bolts.
Torque: 18 N–m (185 kgf–cm, 13 ft–lbf)



4. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION
(a) Install a new 0–ring to the dipstick guide.
(b) Apply soapy water to the 0 – ring.
(c) Connect the dipstick guide end to the dipstick tube of the oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.

5. CONNECT ENGINE WIRE
(a) Connect the following parts:
(1) O/D solenoid connector
(2) PNP switch speedometer
(3) Starter 50 terminal
(4) Starter B terminal
(5) Speed sensor connector
(b) Disconnect the 2 wire clamps from the transaxle.
(c) Install the 2 wire clamps to the transaxle.

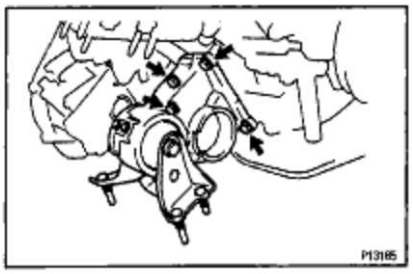
ENGINE INSTALLATION

(See Components for Engine Removal and Installation)

1. INSTALL FRONT EXHAUST PIPE STAY

Install the pipe stay with the 2 bolts.

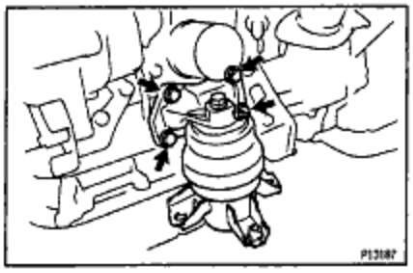
Torque: 21 N–m (210 kgf–cm, 16 ft–lbf)



2. INSTALL RR ENGINE MOUNTING INSULATOR

Install the mounting insulator with the 4 bolts.

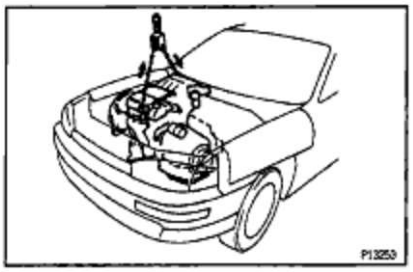
Torque:63.7 N–m (650 kgf–cm, 47 ft–lbf)



3. INSTALL FR ENGINE MOUNTING INSULATOR

Install the mounting insulator with the 4 bolts.

Torque: 6.74 N–m (650 kgf–cm, 47 ft–lbf)



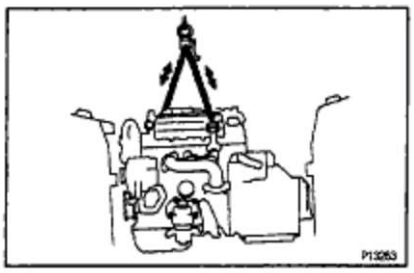
4. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

(a) Attach the engine sling device to the engine hangers.

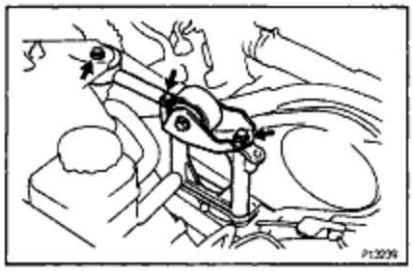
(b) Lower the engine into the engine compartment.

Tilt the transaxle downward, lower the engine and clear the LH mounting.

NOTICE: Be careful not to hit the PS gear housing or neutral start switch.



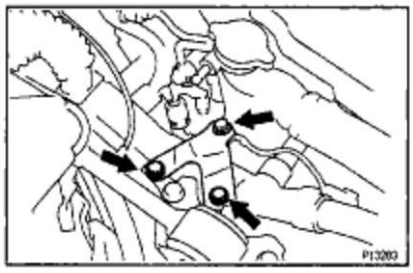
(c) Keep the engine level, and align RH and LH mountings with the body bracket.



5. INSTALL N0.2 ENGINE MOUNTING BRACKET AND ENGINE MOVING CONTROL ROD

Install the engine moving control rod and No.2 engine mounting bracket with the 3 bolts.

Torque: 63.7 N–m (650 kgf–cm, 47 ft–lbf)



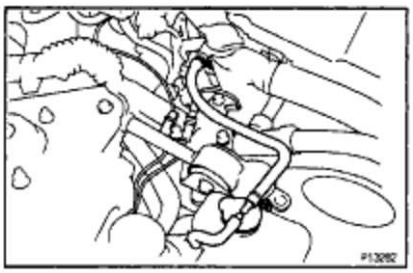
6. INSTALL RH ENGINE MOUNTING STAY

Install the RH mounting stay with the 3 bolts.

Torque: 31.4 N–m (320 kgf–cm, 23 ft–lbf)

7. CONNECT GROUND STRAPS

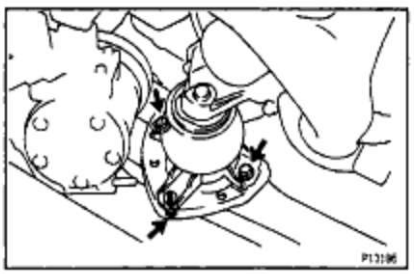
Connect the 2 straps.



8. INSTALL COOLANT RESERVOIR TANK

(a) Install the reservoir tank.

(b) Connect the reservoir hose.

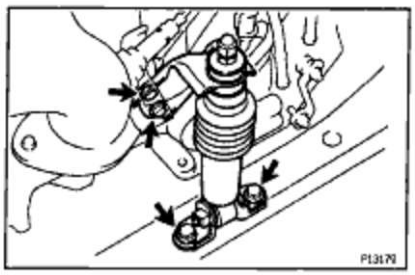


9. CONNECT FR ENGINE MOUNTING INSULATOR

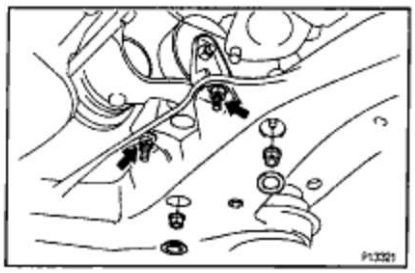
Connect the mounting insulator with the 3 bolts.

Torque: 80.4 N–m (820 kgf–cm, 59 ft–lbf) for TMC made

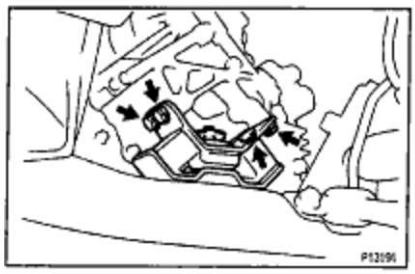
Torque: 65.7 N–m (670 kgf–cm, 48 ft–lbf) for TMM made



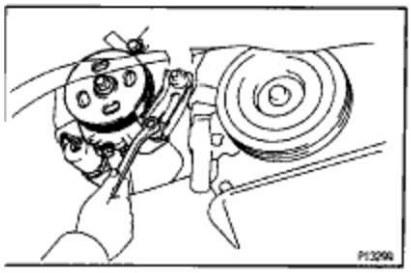
10. INSTALL ENGINE MOUNTING ABSORBER
Install the engine mounting absorber with the 4 bolts.
Torque: 48 N–m (490 kgf–cm, 35 ft–lbf)



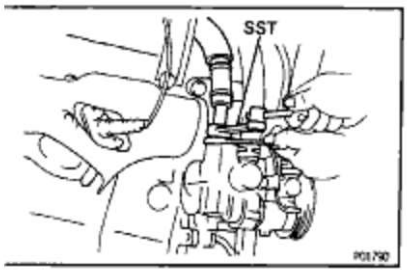
11. CONNECT RR ENGINE MOUNTING INSULATOR
(a) Connect the mounting insulator with the 4 nuts.
Torque: 65.7 N–m (670 kgf–cm, 48 ft–lbf)
(b) Install the 2 hole plugs.



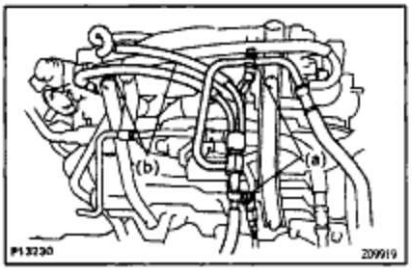
12. CONNECT LH ENGINE MOUNTING INSULATOR
Connect the mounting insulator with the 4 bolts.
Torque: 63.7 N–m (650 kgf–cm, 47 ft–lbf)
13. REMOVE ENGINE SLING DEVICE



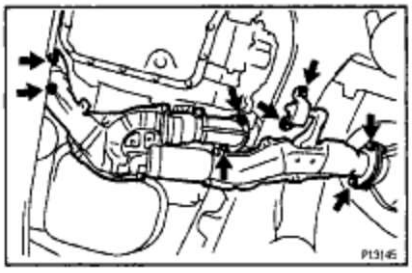
14. INSTALL PS PUMP
(a) Install the PS pump with the 2 bolts.
Torque: 43 N–m (440 kgf–cm, 31 ft–lbf)
(b) Install the drive belt.



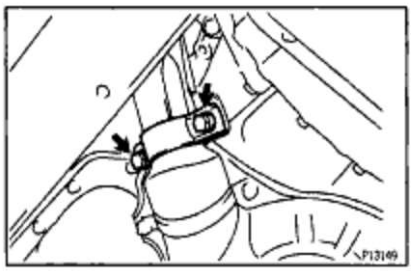
15. CONNECT HYDRAULIC COOLING FAN PRESSURE HOSE
Using SST, connect the pressure hose.
SST 09631– 22020
Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)



16. CONNECT PS PRESSURE TUBE
(a) Connect the PS pressure tube with the 2 nuts.
(b) Connect the 2 PS air hoses.
17. INSTALL DRIVE SHAFTS (See SA section)

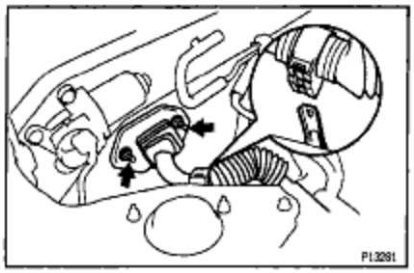


18. INSTALL FRONT EXHAUST PIPE
(a) Temporarily install 3 new gaskets and the front exhaust pipe with the 2 bolts and 6 nuts.
(b) Tighten the 4 nuts holding the exhaust manifolds to the front exhaust pipe.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)
(c) Tighten the 2 bolts and 2 nuts holding the three–way catalytic converter to the front exhaust pipe.
Torque: 56 N–m (570 kgf–cm, 41 ft–lbf)
(d) Connect the bracket with the 2 bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



(e) Connect the front exhaust pipe clamp with the 2 bolts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

19. INSTALL A/C COMPRESSOR
(a) Install the A/C compressor and drive belt adjusting bar bracket with the 5 bolts.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



20. CONNECT ENGINE WIRE TO CABIN

(a) Push in the engine wire through the cowl panel. Install the 2 nuts.

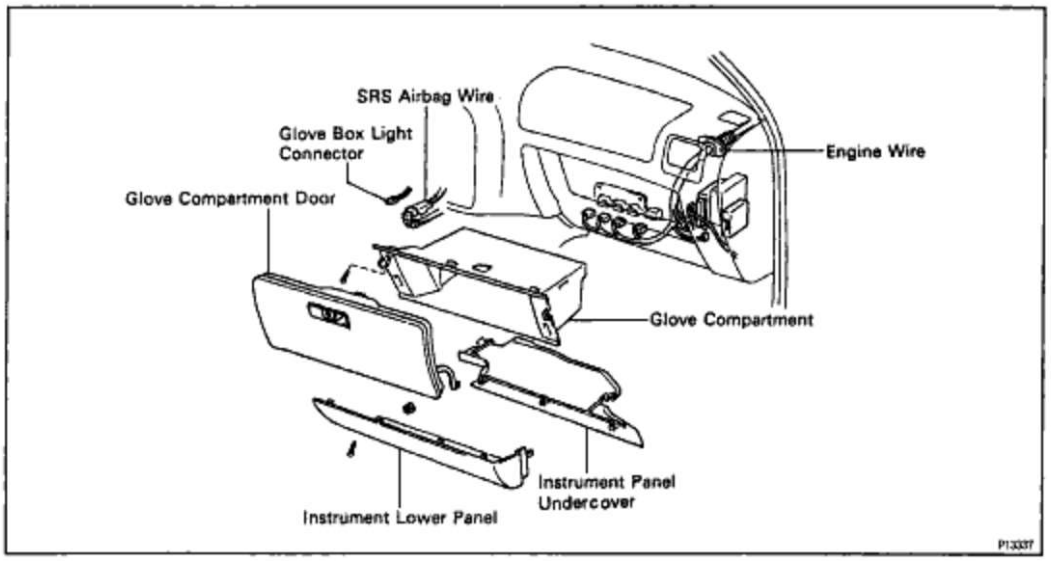
(b) Connect the wire clamp.

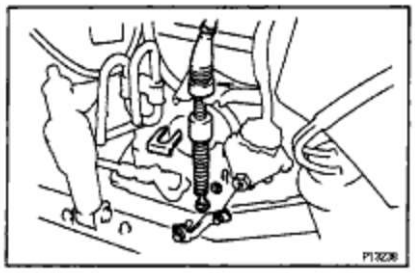
(c) Connect the following connectors:

(1) 3 engine ECM connectors
(2) 5 cowl wire connectors
(3) Cooling fan ECU connector

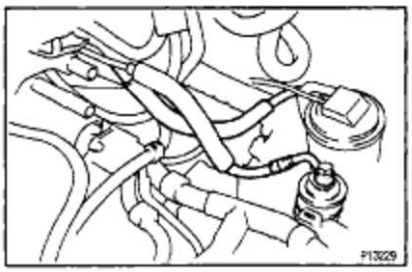
(d) Install the following parts:

(1) Glove compartment
(2) Glove compartment door
(3) Lower instrument panel
(4) Under cover

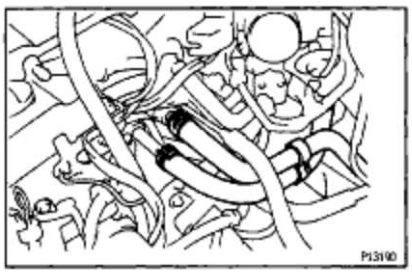




21. CONNECT TRANSAXLE CONTROL CABLE TO TRANSAXLE

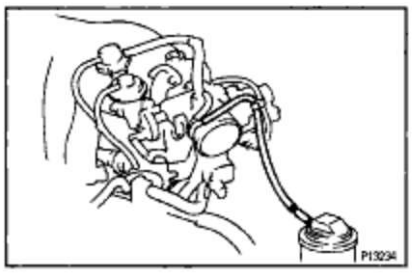


22. CONNECT FUEL HOSES
(a) Connect the fuel return hose to the fuel pipe.
(b) Connect the fuel inlet hose to the fuel filter.
Torque: 30 N–m (300 kgf–cm, 22 ft–lbf)

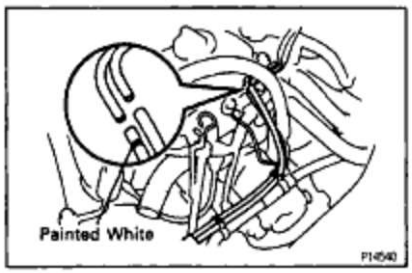


23. CONNECT HEATER HOSES
Connect the 2 hoses.

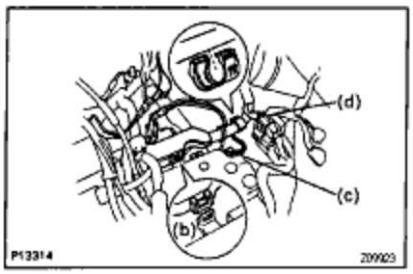
24. CONNECT VACUUM HOSES
Connect the following vacuum hoses:
(1) Brake booster vacuum hose to air intake chamber



(2) Vacuum hose to charcoal canister

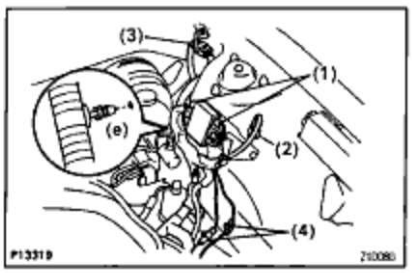


(3) Vacuum hoses to vacuum tank for intake air control valve

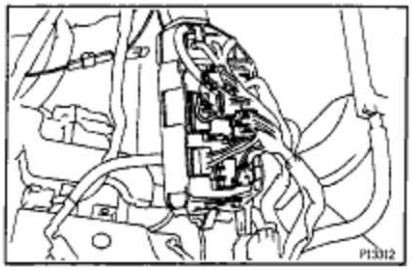


25. CONNECT ENGINE WIRE

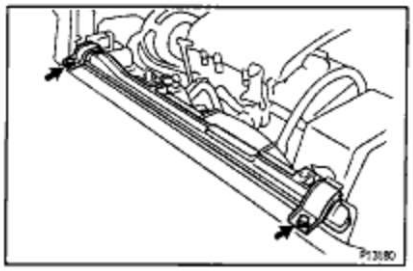
(a) Connect the wire clamps.
(b) Connect the ground strap with the bolt.
(c) Connect the connector to the LH fender apron.



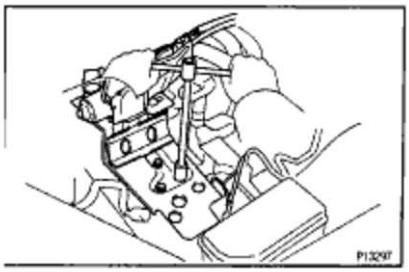
(d) Connect the wire clamps
(e) Connect the following wires and connectors:
(1) 2 igniter connectors
(2) Noise filter connector
(3) Connector to LH fender apron
(4) 2 ground straps



(5) 5 connectors to relay box
(f) Connect the engine relay box with the 2 bolts.

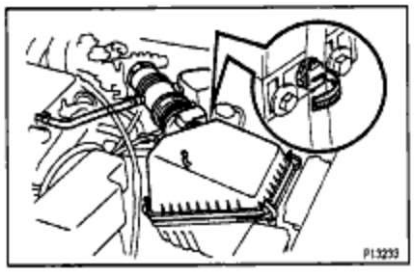


26. INSTALL RADIATOR
(See page EG2–342)



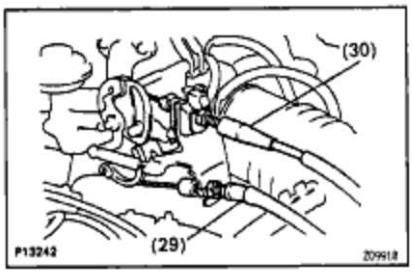
27. w/ CRUISE CONTROL SYSTEM:
INSTALL CRUISE CONTROL ACTUATOR

(a) Connect the actuator and bracket with the 3 bolts.
(b) Connect the actuator connector and clamp.
(c) Install the actuator cover with the bolt and clip.

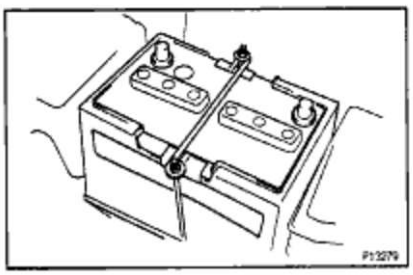


28. INSTALL AIR CLEANER CAP, VOLUME AIR FLOW METER AND AIR CLEANER HOSE

(a) Connect the air cleaner hose, and install the air clean–er cap and volume air flow meter with the 4 clips.
(b) Tighten the air cleaner hose clamp bolt.
(c) Connect the PCV hose.
(d) Connect the accelerator cable clamp.
(e) Connect the volume air flow meter connector and wire clamp.



29. CONNECT THROTTLE CABLE
30. CONNECT ACCELERATOR CABLE
31. FILL ENGINE WITH OIL
Capacity:
Drain and refill
w/ Oil filter change
4.7 liters (5.0 US qts, 4.1 Imp. qts)
w/o Oil filter change
4.5 liters (4.8 US qts, 4.0 Imp. qts)
Dry fill
5.5 liters (5.8 US qts, 4.8 Imp. qts)
32. FILL WITH ENGINE COOLANT
Capacity:
8.7 liters (9.2 US qts, 7.7 Imp. qts)



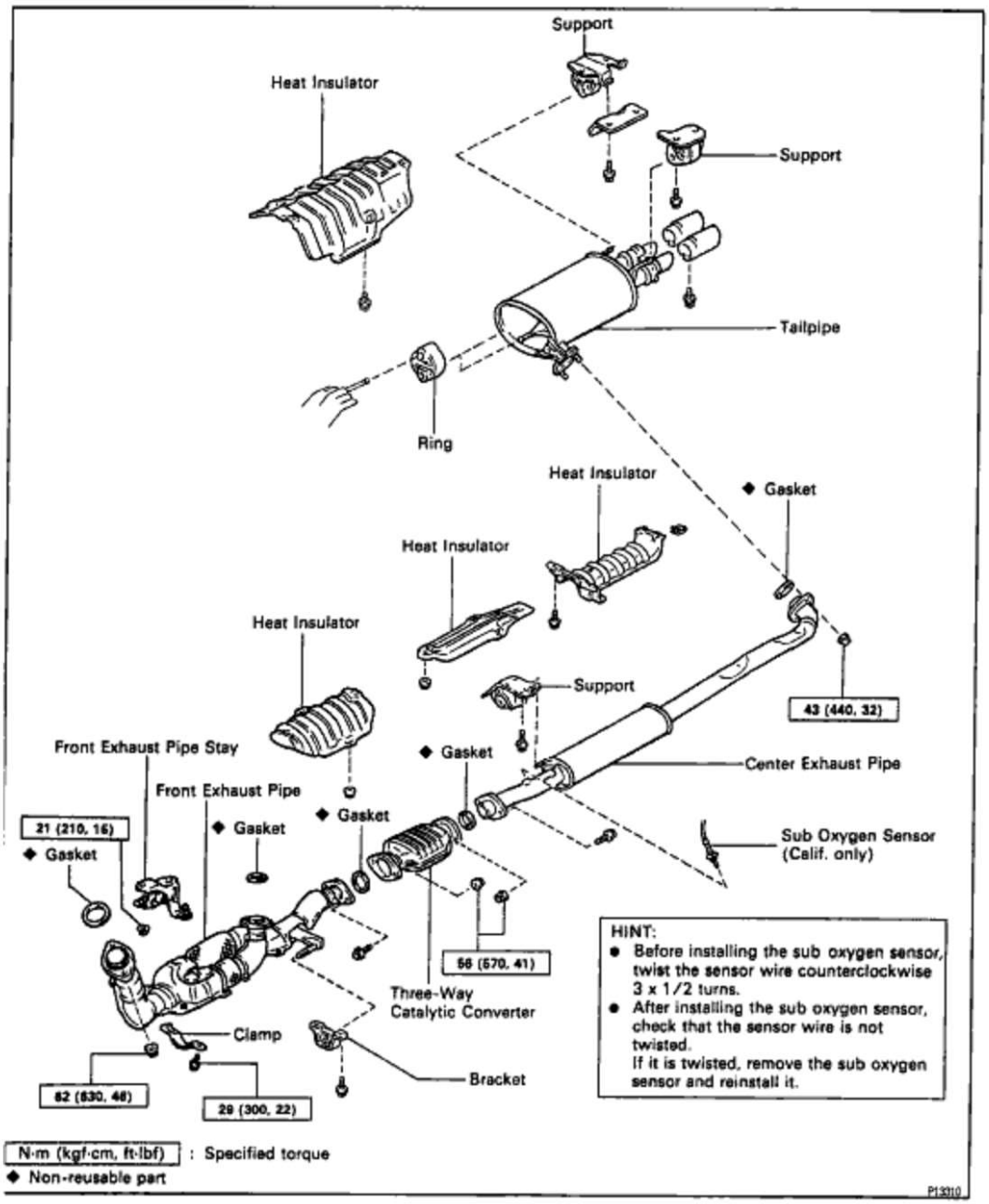
33. INSTALL BATTERY TRAY AND BATTERY
34. START ENGINE AND CHECK FOR LEAKS
35. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

36. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS

EXHAUST SYSTEM

COMPONENTS



SERVICE SPECIFICATIONS

SERVICE DATA

Engine tune – up	Battery (Except Delco Battery)		
	Specific gravity (Except maintenance free battery)		
	55D23L Battery		
	GNB Incorporated	at 20°C (68°F)	1.25 – 1.27
	JHONSON CONTROLS	at 27°C (81°F)	1.26 – 1.28
	80D26L Battery		
	GNB Incorporated	at 20°C (68°F)	1.27 – 1.29
	JHONSON CONTROLS	at 27°C (81°F)	1.28 – 1.30
	Voltage (Maintenance free battery)	at 20°C (68°F)	12.7 – 12.9 V
	Drive belt tension	New belt	175 ± 5 lbf
		Used belt	115 ± 20 lbf
	Valve clearance (Cold)	Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
		Exhaust	0.25 – 0.35 mm (0.010 – 0.014 in.)
	Valve clearance adjusting shim (for repair part)		
		Mark 2.500	2.500 mm (0.0984 in.)
		Mark 2.550	2.550 mm (0.1004 in.)
		Mark 2.600	2.600 mm (0.1024 in.)
		Mark 2.650	2.650 mm (0.1043 in.)
		Mark 2.700	2.700 mm (0.1063 in.)
		Mark 2.750	2.750 mm (0.1083 in.)
		Mark 2.800	2.800 mm (0.1102 in.)
		Mark 2.850	2.850 mm (0.1122 in.)
		Mark 2.900	2.900 mm (0.1142 in.)
		Mark 2.950	2.950 mm (0.1161 in.)
		Mark 3.000	3.000 mm (0.1181 in.)
		Mark 3.050	3.050 mm (0.1201 in.)
		Mark 3.100	3.100 mm (0.1220 in.)
		Mark 3.150	3.150 mm (0.1240 in.)
		Mark 3.200	3.200 mm (0.1260 in.)
		Mark 3.250	3.250 mm (0.1280 in.)
		Mark 3.300	3.300 mm (0.1299 in.)
	Ignition timing		10° BTDC @ idle
			(w/ Terminals TE1 and E1 connected of DLC1)
	Idle speed		700 ± 50 rpm
Intake manifold vacuum	at idle speed		60 kPa (450 mmHg, 17.7 in.Hg) or more
Compression pressure	at 250 rpm	STD	1,226 kPa (12.5 kgf/cm², 178 psi) or more
		Limit	981 kPa (10.0 kgf/cm², 142 psi)
	Difference of pressure between each cylinder		98 kPa (1.0 kgf/cm², 14 psi) or less
Tinning belt tensioner	Protrusion (from housing side)		10.0 – 10.8 mm (0.394 – 0.425 in.)

Cylinder head	Warpage	Limit	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 75°
	Contacting angle		45°
	Contacting width		1.0 – 1.4 mm (0.039 – 0.055 in.)
	Cylinder head bolt thread inside diameter	STD	10.70 – 11.00 mm (0.4213 – 0.4724 in.)
		Limit	9.60 mm (0.3780 in.)
Valve guide bushing	Inside diameter		5.510 – 5.530 mm (0.2169 – 0.2177 in.)
	Outside diameter (for repair part)	STD	10.295 – 10.313 mm (0.4053 – 0.4060 in.)
		O/S 0.05	10.345 – 10.363 mm (0.4073 – 0.4080 in.)
	Protrusion height	Intake	11.1 – 11.3 mm (0.437 – 0.445 in.)
		Exhaust	8.9 – 9.3 mm (0.350 – 0.366 in.)
Valve	Valve overall length	STD (Intake)	95.45 mm (3.5front in.)
		(Exhaust)	95.40 mm (3.7559 in.)
		Limit (Intake)	94.95 mm (3.7382 in.)
		(Exhaust)	94.90 mm (3.7362 in.)
	Vale face angle		44.5°
	Stem diameter	Intake	5.470 – 5.485 mm (0.2154 – 0.2159 in.)
		Exhaust	5.465 – 5.480 mm (0.2152 – 0.2157 in.)
	Stem oil clearance	STD (Intake)	0.025 – 0.060 mm (0.0010 – 0.0024 in.)
		(Exhaust)	0.030 – 0.065 mm (0.0012 – 0.0026 in.)
		Limit (Intake)	0.08 mm (0.0031 in.)
		(Exhaust)	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.0 mm (0.039 in.)
		Limit	0.5 mm (0.020 in.)
Valve spring	Deviation	Limit	2.0 mm (0.079 in.)
	Free length		45.50 mm (1.7913 in.)
	Installed tension at 33.8 mm (1.331 in.)		186 – 206 N (19.0 – 21.0 kgf, 41.9 – 46.3 lbf)
Valve lifter	Lifter diameter		30.966 – 30.976 mm (1.2191 – 2.2195 in.)
	Lifter bore diameter		31.000 – 31.016 mm (1.2205 – 1.2211 in.)
	Oil clearance	STD	0.024 – 0.050 mm (0.0009 – 0.0020 in.)
		Limit	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD	0.040 – 0.090 mm (0.0016 – 0.0035 in.)
		Limit	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.035 – 0.072 mm (0.0014 – 0.0028 in.)
		Limit	0.10 mm (0.0039 in.)
	Journal diameter		26.949 – 26.965 mm (1.0610 – 1.0616 in.)
	Circle runout	Limit	0.06 mm (0.0024 in.)
	Cam lobe height	STD (Intake)	42.11 – 42.21 mm (1.6579 – 1.6618 in.)
		(Exhaust)	41.96 – 42.06 mm (1.6520 – 1.6559 in.)
		Limit (Intake)	41.96 mm (1.6520 in.)
		(Exhaust)	41.81 mm (1.6461 in.)
	Camshaft gear backlash	STD	0.020 – 0.200 mm (0.0008 – 0.0079 in.)
		Limit	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 – 18.8 mm (0.712 – 0.740 in.)
Air intake chamber	Warpage	Limit	0.10 mm (0.0039 in.)

Intake manifold	Warpage		
	Air intake side	Limit	0.15 mm (0.0059 in.)
	Cylinder head side	Limit	0.08 mm (0.0031 in.)
Exhaust manifold	Warpage	Limit	0.50 mm (0.0196 in.)
Cylinder block	Cylinder head surface warpage	Limit	0.07 mm (0.0028 in.)
	Cylinder bore diameter		87.500 – 87.512 mm (3.4449 – 3.4453 in.)
		Limit	87.52 mm (3.4457 in.)
	Main journal bore diameter		
	(Reference)	Mark 00	66.000 mm (2.5984 in.)
		Mark 01	66.001 mm (2.5985 in.)
		Mark 02	66.002 mm (2.5985 in.)
		Mark 03	66.003 mm (2.5985 in.)
		Mark 04	66.004 mm (2.5986 in.)
		Mark 05	66.005 mm (2.5986 in.)
		Mark 06	66.006 mm (2.5987 in.)
		Mark 07	66.007 mm (2.5987 in.)
		Mark 08	66.008 mm (2.5987 in.)
		Mark 09	66.009 mm (2.5988 in.)
		Mark 10	66.010 mm (2.5988 in.)
		Mark 11	66.011 mm (2.5989 in.)
		Mark 12	66.012 mm (2.5989 in.)
		Mark 13	66.013 mm (2.5989 in.)
		Mark 14	66.014 mm (2.5990 in.)
		Mark 15	66.015 mm (2.5990 in.)
		Mark 16	66.016 mm (2.5990 in.)
	Main bearing cap stud bolt tension portion diameter		
		STD	7.500 – 7.600 mm (0.2953 – 0.2992 in.)
		Limit	7.40 mm (0.2913 in.)
Piston and piston ring	Piston diameter		87.406 – 87.416 mm (3.4412 – 3.4416 in.)
	Piston oil clearance	STD	0.084 – 0.106 mm (0.0033 – 0.0042)
		Limit	0.13 mm (0.0051 in.)
	Piston ring groove clearance	No.1	0.020 – 0.070 mm (0.0008 – 0.0028 in.)
		No.2	0.020 – 0.060 mm (0.0008 – 0.0024 in.)
	Piston ring end gap	STD (No.1)	0.25 – 0.35 mm (0.0098 – 0.0138 in.)
		(No.2)	0.35 – 0.45 mm (0.0138 – 0.0177 in.)
		(Oil)	0.15 – 0.40 mm (0.0059 – 0.0157 in.)
		Limit (No.1)	0.95 mm (0.0374 in.)
		(No.2)	1.05 mm (0.0413 in.)
		(Oil)	1.00 mm (0.0394 in.)
Connecting rod	Thrust clearance	STD	0.15 – 0.30 mm (0.0059 – 0.0118 in.)
		Limit	0.35 mm (0.0138 in.)
	Connecting rod thickness		20.80 – 20.85 mm (0.8189 – 0.8209 in.)
	Connecting rod big end inside diameter		
	(Reference)	Mark 1	56.000 – 56.006 mm (2.2047 – 2.2050 in.)
		Mark 2	56.006 – 56.012 mm (2.2050 – 2.2052 in.)
		Mark 3	56.012 – 56.018 mm (2.2052 – 2.2054 in.)
		Mark 4	56.018 – 56.024 mm (2.2054 – 2.2057 in.)

Connecting rod (Cont'd)	Connecting rod bearing center wall thickness		
	(Reference)	Mark 1	1.484 – 1.487 mm (0.0584 – 0.0585 in.)
		Mark 2	1.487 – 1.490 mm (0.0585 – 0.0587 in.)
		Mark 3	1.490 – 1.493 mm (0.0587 – 0.0588 in.)
		Mark 4	1.493 – 1.496 mm (0.0588 – 0.0589 in.)
	Connecting rod oil clearance	STD	0.038 – 0.064 mm (0.0015 – 0.0025 in.)
		Limit	0.08 mm (0.0031 in.)
	Rod out–of–alignment Limit per 100mm (3.94 in.)		0.05 mm (0.0020 in.)
	Rod twist Limit per 100mm (3.94 in.)		0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 – 22.014 mm (0.8663 – 0.8667 in.)
	Piston pin diameter		21.997 – 22.006 mm (0.8660 – 0.8664 in.)
	Bushing oil clearance	STD	0.005 – 0.011 mm (0.0002 – 0.0004 in)
		Limit	0.05 mm (0.0020 in.)
	Connecting rod bolt tension portion diameter	STD	7.2 – 7.3 mm (0.284 – 0.287 in.)
		Limit	7.0 mm (0.276 in.)
Crankshaft	Thrust clearance	STD	0.04 – 0.24 mm (0.0016 – 0.0095 in.)
		Limit	0.30 mm (0.0118 in.)
	Thrust washer thickness		1.930 – 1.980 mm (0.0760 – 0.0780 in.)
	Main journal oil clearance	STD	0.026 – 0.046 mm (0.0010 – 0.0018 in.)
		Limit	0.06 mm (0.0024 in.)
	Main journal diameter		60.988 – 61.000 mm (2.4011 – 2.4016 in.)
	Main bearing center wall thickness		
	(Reference)	Mark 1	2.486 – 2.489 mm (0.0979 – 0.0980 in.)
		Mark 2	2.489 – 2.492 mm (0.0980 – 0.0981 in.)
		Mark 3	2.492 – 2.495 mm (0.0981 – 0.0982 in.)
		Mark 4	2.495 – 2.498 mm (0.0982 – 0.0983 in.)
		Mark 5	2.498 – 2.501 mm (0.0983 – 0.0985 in.)
	Crank pin diameter		52.994 – 53.000 mm (2.0864 – 2.0866 in.)
	Circle runout	Limit	0.06 mm (0.0024 in.)
	Main journal taper and out–of–round	Limit	0.02 mm (0.0008 in.)
	Crank pin taper and out–of–round	Limit	0.02 mm (0.0008 in.)

more→

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Cylinder head cover x Cylinder head	8	80	69 in.·lbf
Spark plug x Cylinder head	18	180	13
Ignition coil x Cylinder head cover	8	80	69 in.·lbf
Air intake chamber x Intake manifold	43	440	32
EGR pipe x Exhaust manifold	12	120	9
EGR pipe x Air intake chamber	12	120	9
No.1 engine hanger x Air intake chamber	39	400	29
No.1 engine hanger x Cylinder heed	39	400	29
Air intake chamber stay x Air intake chamber	19.5	200	14
Air intake chamber stay x Cylinder head	19.5	200	14
Emission control valve set x Air intake chamber	8	80	69 in.·lbf
Timing belt plate x Oil pump	8	80	69 in.·lbf
No.1 idler pulley x Oil pump	34	350	25
No.2 idler pulley x No.2 idler pulley bracket	43	440	32

Camshaft timing pulley x Camshaft (For use with SST)	88	900	65
Camshaft timing pulley x Camshaft	125	1,300	94
Timing belt tensioner x Oil pump	27	280	20
Engine RH mounting bracket x Cylinder block	28	290	21
No.2 timing belt cover x No.3 timing belt cover	8.5	85	74 in.-lbf
No.1 timing belt cover x Oil pump	8.5	85	74 in.-lbf
Crankshaft pulley x Crankshaft	215	2,200	159
No.2 generator bracket x Engine RH mounting bracket	28	290	21
Engine moving control rod x Engine RH mounting bracket	63.7	650	47
Engine moving control rod x RH fender apron	63.7	650	47
RH engine mounting stay x Water outlet	31.4	320	23
RH engine mounting stay x Engine moving control rod	31.4	320	23
RH engine mounting stay x No.2 RH engine mounting bracket	31.4	320	23
Camshaft bearing cap x Cylinder head	16	160	12
Cylinder head x Cylinder block – 12–pointed head bolt (1 st)	54	550	40
Cylinder head x Cylinder block – 12–pointed head bolt (2nd)	Turn 90°	Turn 90°	Turn 90°
Cylinder head x Cylinder block – Recessed head bolt	18.5	185	13
Camshaft position sensor x Cylinder head	8	80	69 in.-lbf
Exhaust manifold x Cylinder head	49	500	36
EGR pipe x RH exhaust manifold	12	120	9
EGR pipe x EGR cooler	12	120	9
Exhaust manifold stay x Exhaust manifold	19.5	200	14
Exhaust manifold stay x Transmission housing	19.5	200	14
Oxygen sensor x Exhaust manifold	44	450	33
PS bracket x RH cylinder head	43	440	32
Oil dipstick guide x LH cylinder head	8	80	69 in.-lbf
No.2 engine hanger x LH cylinder head	19.5	200	14
Water outlet x Intake manifold	15	150	11
No.3 timing belt cover x Cylinder head	8.5	85	74 in.-lbf
Intake manifold x Cylinder head	15	150	11
Delivery pipe x Intake manifold	10	100	7
No. 1 fuel pipe x Intake manifold	19.5	200	14
Cylinder head rear plate x LH cylinder head	8	80	69 in.-lbf
Water inlet pipe x LH cylinder head	19.5	200	14
Front exhaust pipe x Exhaust manifold	62	630	46
Front exhaust pipe x Three–way catalytic converter	56	570	41
Front exhaust pipe bracket x Sub frame	19	195	14
Front exhaust pipe clamp x Front exhaust pipe stay	29	300	22
EGR valve x Air intake chamber	12	120	9
Throttle body x Air intake chamber	19.5	200	14
Intake air control valve x Air intake chamber	14.5	145	10
Fuel inlet hose x Fuel filter	30	300	22
Connecting rod cap x Connecting rod – 1 at	24.5	250	18
Connecting rod cap x Connecting rod – 2nd	Turn 90°	Turn 90°	Turn 90°
Main bearing cap x Cylinder block – 1 st (12 pointed head bolt)	22	225	16
Main bearing cap x Cylinder block – 2nd (12 pointed head bolt)	Turn 90°	Turn 90°	Turn 90°
Main bearing cap x Cylinder block (Hexagon head bolt)	27	275	20
Rear oil seal retainer x Cylinder block	8	80	69 in.-lbf
EGR cooler x Cylinder block	9	90	78 in.-lbf

Oil pressure switch x Cylinder block	13	130	9
Engine coolant drain cock x Cylinder block	39	400	29
Water seal plate x Cylinder block	14.5	145	10
Oil filter union x Cylinder block	13	130	9
Oil pump x Cylinder block (10 mm head bolt)	8	80	69 in.-lbf
Oil pump x Cylinder block (12 mm head bolt)	19.5	200	14
No.1 oil pan x Cylinder block	19.5	200	14
No.1 oil pan x Oil pump	8	80	69 in.-lbf
No.1 oil pan x Rear oil seal retainer	8	80	69 in.-lbf
Oil strainer x Main bearing cap	8	80	69 in.-lbf
Oil strainer x Oil pump	8	80	69 in.-lbf
No.2 oil pan x No. 1 oil pan	8	80	69 in.-lbf
Water pump x Cylinder block	8	80	69 in.-lbf
Water inlet housing x Cylinder block	8	80	69 in.-lbf
Knock sensor x Cylinder block	39	400	29
No.2 idler pulley bracket x Cylinder block	28	290	21
A/C compressor housing bracket x Cylinder block	25	250	18
Generator bracket x Cylinder block	43	440	32
Drive plate x Crankshaft	83	850	61
Transaxle x Engine	64	650	47
No.2 oil pan x Transaxle	46	470	34
Drive plate x Torque convertor clutch	41	420	30
Front exhaust pipe stay x No.1 oil pan	21	210	15
RR engine mounting insulator x Cylinder block	63.7	650	47
FR engine mounting insulator x Cylinder block	63.7	650	47
FR engine mounting insulator x Front suspension member (TMC made)	80.4	820	59
FR engine mounting insulator x Front suspension member (TM M made)	65.7	670	48
Engine mounting absorber x Front suspension member	48	490	35
Engine mounting absorber x Transaxle	48	490	35
RR engine mounting insulator x Front suspension member	65.7	670	48
LH engine mounting insulator x Transaxle	63.7	650	47
PS pump x PS pump bracket	43	440	31
PS pump x Hydraulic cooling fan pressure hose	44	450	33
A/C compressor x Generator bracket	25	250	18
A/C compressor x Cylinder block	25	250	18