ENGINE SERVICE

CUTAWAY VIEW

Fig. 3-1

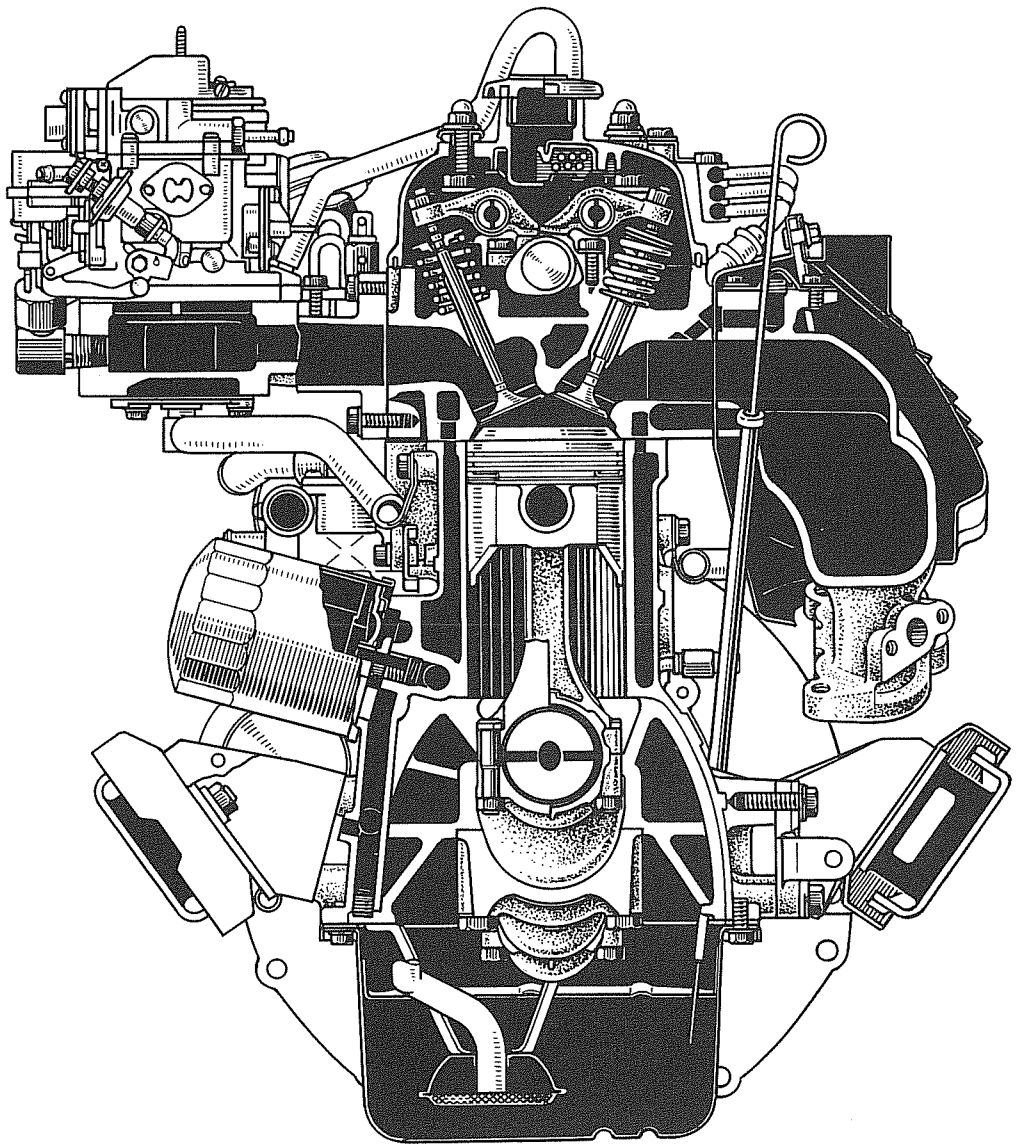
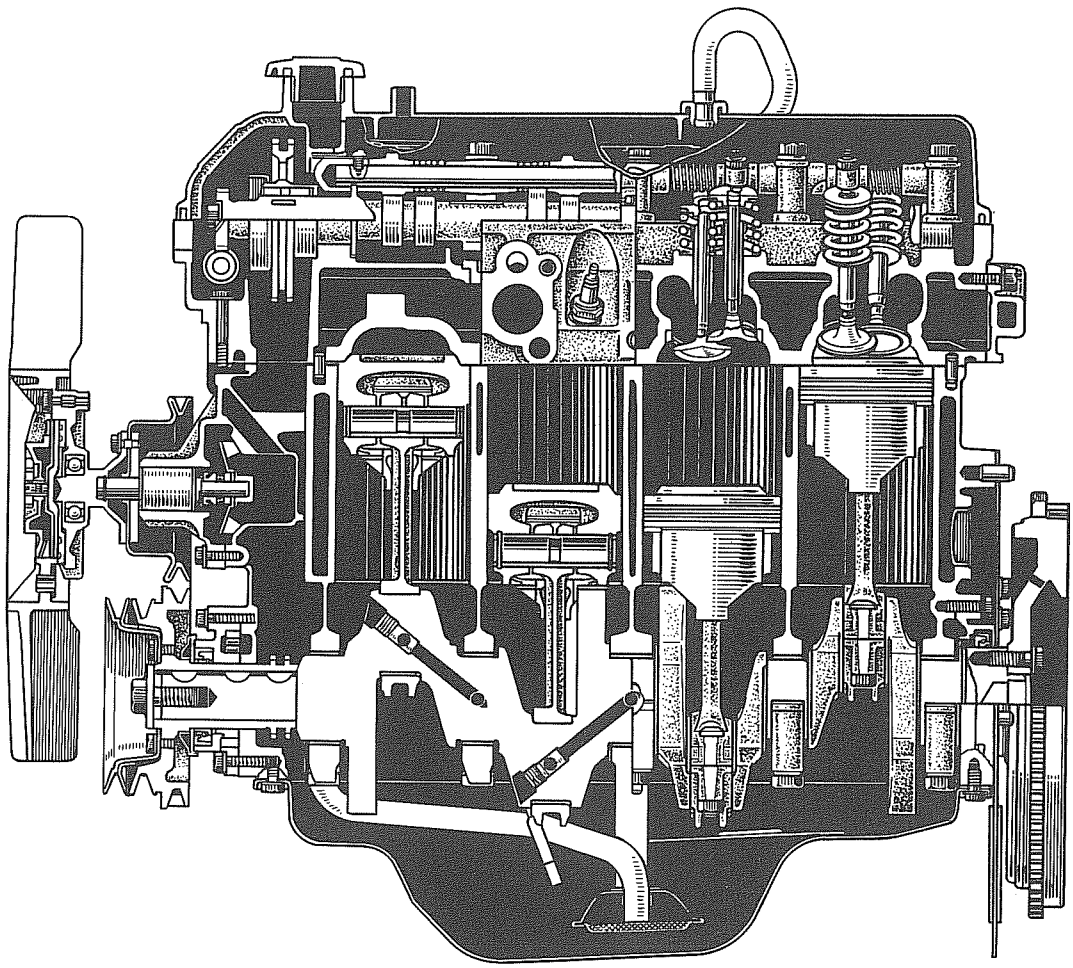


Fig. 3-2

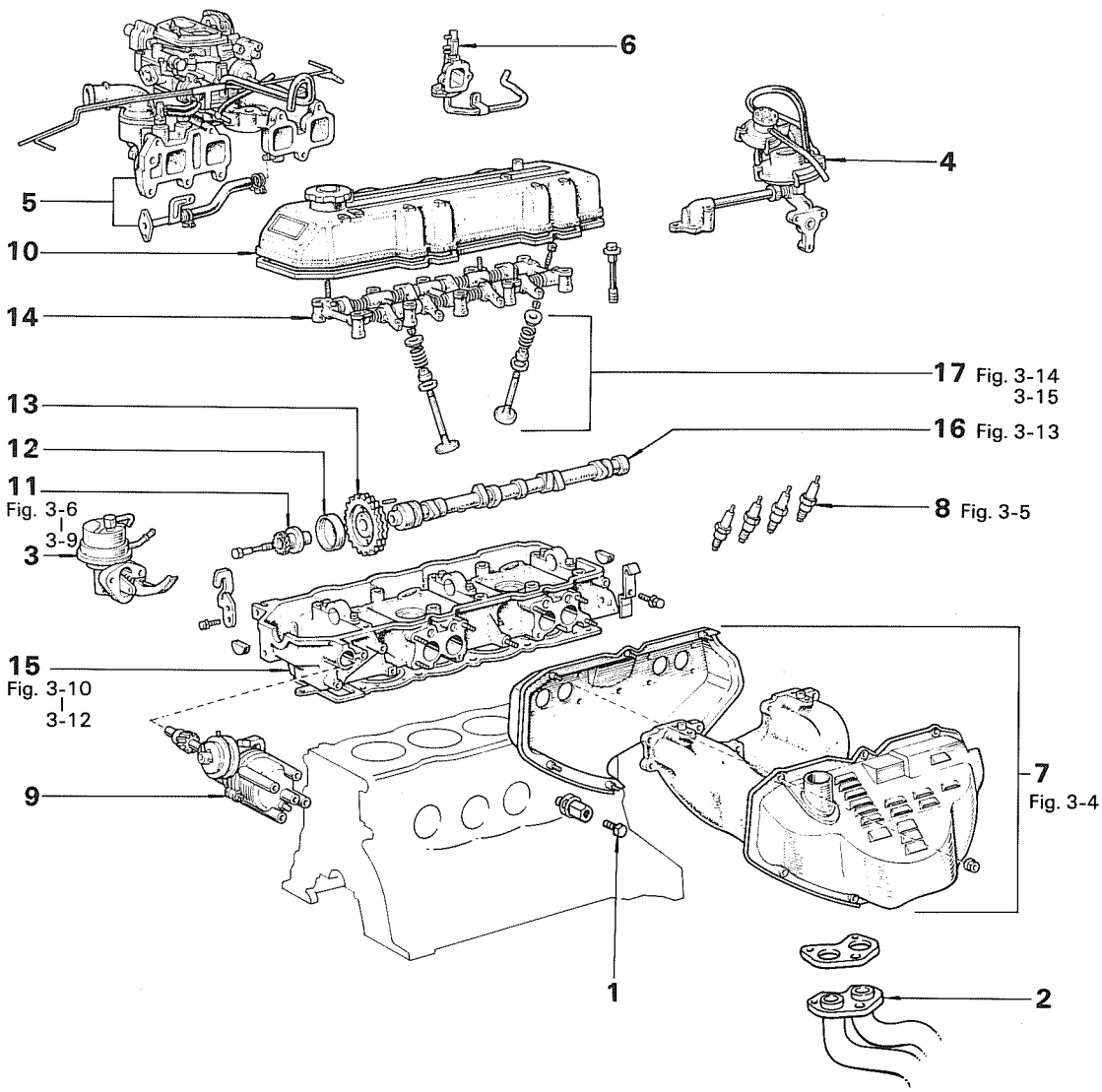


CYLINDER HEAD

DISASSEMBLY

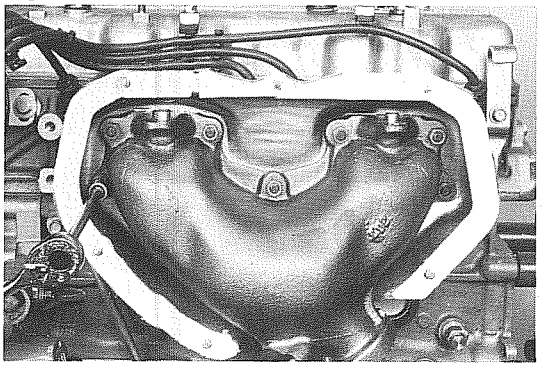
Disassemble the parts in the numerical order shown in the figure.

Fig. 3-3



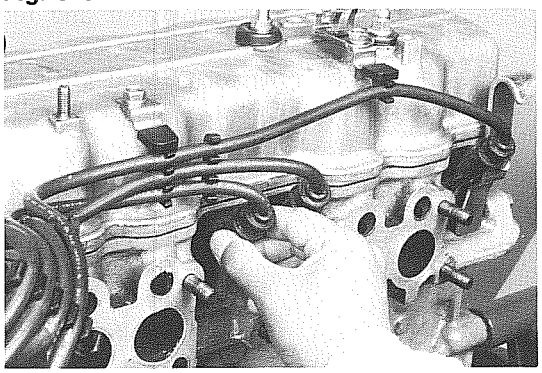
1. Water Drain Plug
2. Exhaust Pipe
3. Fuel Pump
4. EGR Valve
5. Intake Manifold & Water Pipe
6. Cylinder Head Side Cover with TVSV
7. Exhaust Manifold & Insulator
8. Spark Plug
9. Distributor
10. Cylinder Head Cover & Gasket
11. Distributor Drive Gear
12. Fuel Pump Drive Cam
13. Camshaft Sprocket
14. Rocker Arm Assembly
15. Cylinder Head
16. Camshaft & Bearing Cap
17. Valve & Compression Spring

Fig. 3-4



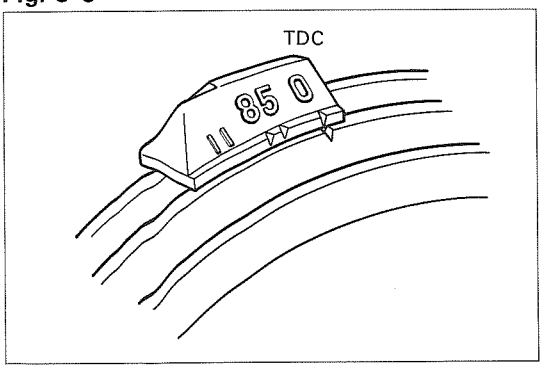
Remove the exhaust manifold.

Fig. 3-5



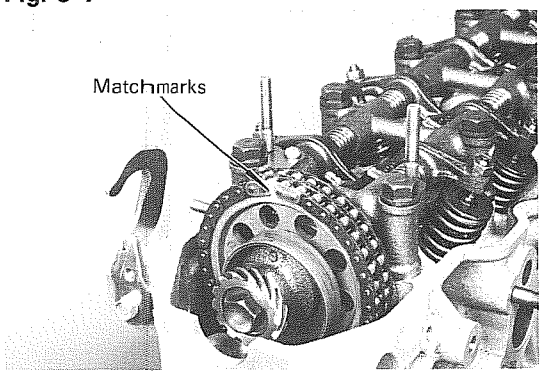
Remove the plug cords by carefully pulling on the rubber boots.

Fig. 3-6



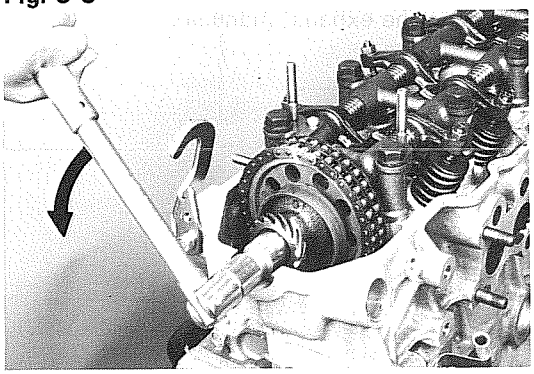
Set No. 1 cylinder to TDC/compression.

Fig. 3-7



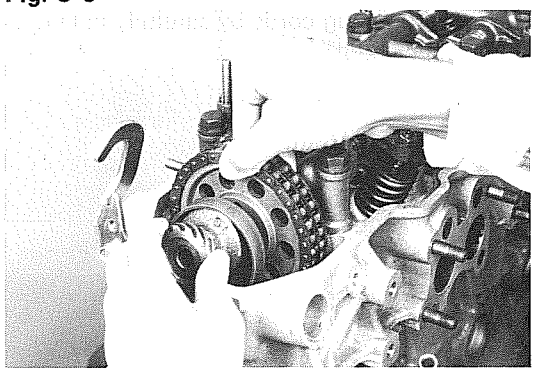
Place matchmarks on the camshaft sprocket and timing chain.

Fig. 3-8



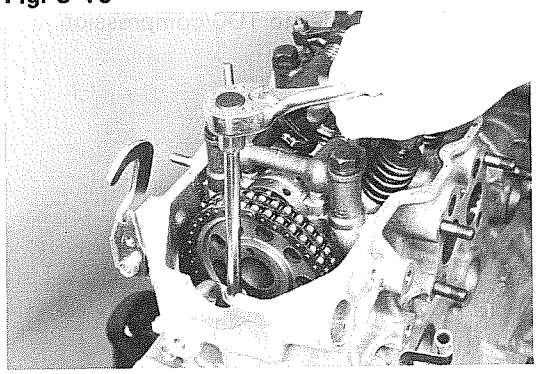
Remove the camshaft sprocket set bolt.

Fig. 3-9



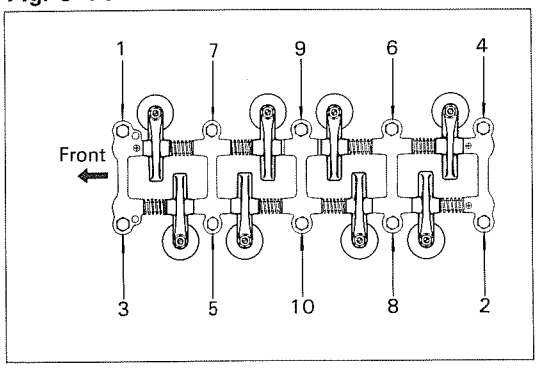
Remove the distributor drive gear and fuel pump drive cam from the sprocket.
Allow the camshaft sprocket and chain to remain in position shown.

Fig. 3-10



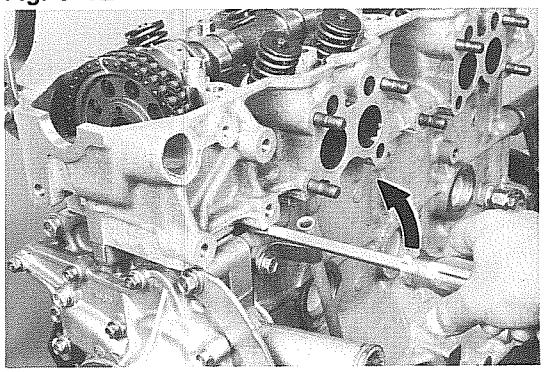
Remove the chain cover bolt.

Fig. 3-11



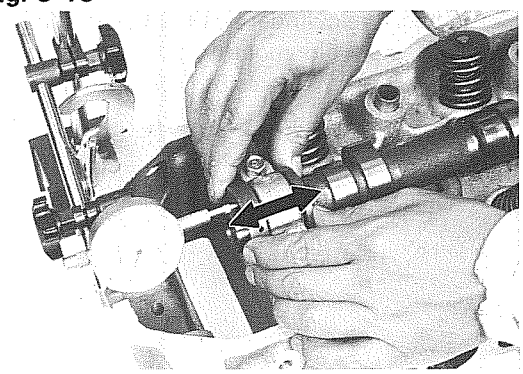
Loosen each cylinder head bolt a little at a time in the sequence shown in the figure.

Fig. 3-12



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

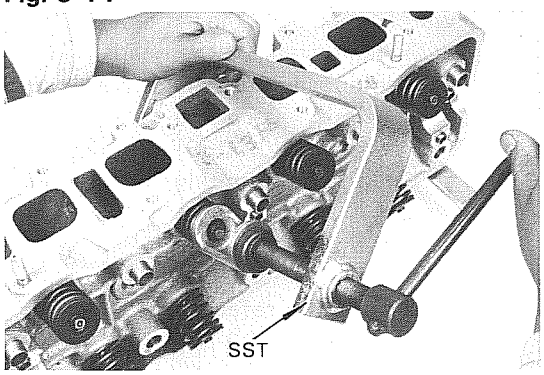
Fig. 3-13



Measure the camshaft thrust clearance.

Thrust clearance:
Limit 0.25 mm
(0.0098 in.)

Fig. 3-14



Remove the valves and springs with SST.
SST [09202-43013]

Fig. 3-15

Arrange the valves and springs in order.

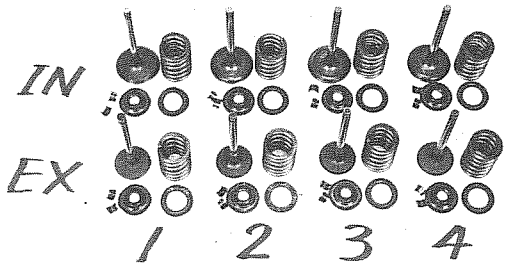
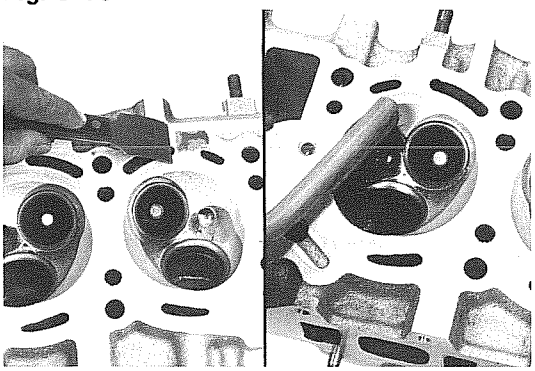


Fig. 3-16

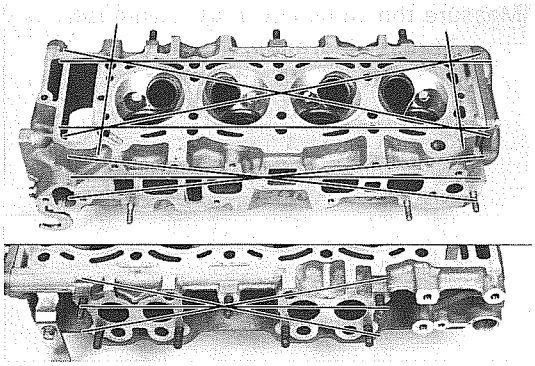


INSPECTION & REPAIR

Cylinder Head

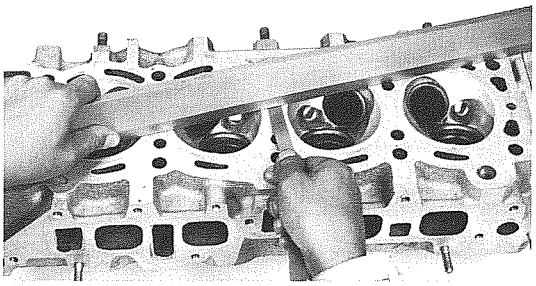
1. Clean the combustion chamber and remove any gasket material from the manifold and head surface.
   Check the cylinder head for cracks or excessively burnt valve seat surfaces.

Fig. 3-17



2. Check the cylinder head underside surface and manifold mounting surface for warpage with a precision straight edge and thickness gauge.

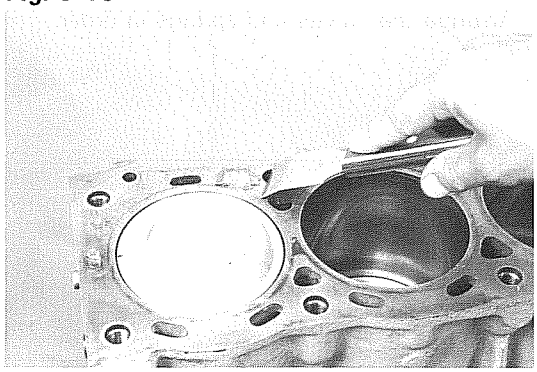
Fig. 3-18



3. If warpage exceeds the limit, correct it by machining, or replace the head.

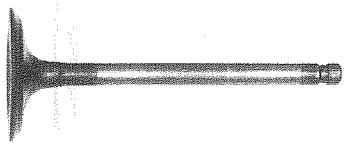
   Cylinder head surface warpage:
   Limit 0.15 mm (0.0059 in.)
   Manifold mounting surface warpage:
   Limit 0.20 mm (0.0079 in.)
   Maximum reface:
   Limit 0.20 mm (0.0079 in.)

Fig. 3-19



4. Clean the cylinder block upperside surface.
   Check the cylinder block. (Refer Fig. 3-110 to 3-114.)

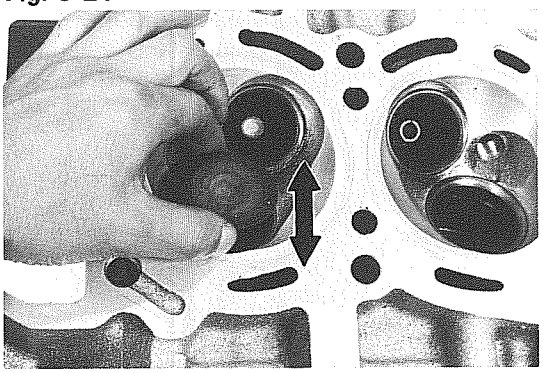
Fig. 3-20



Valve & Guide

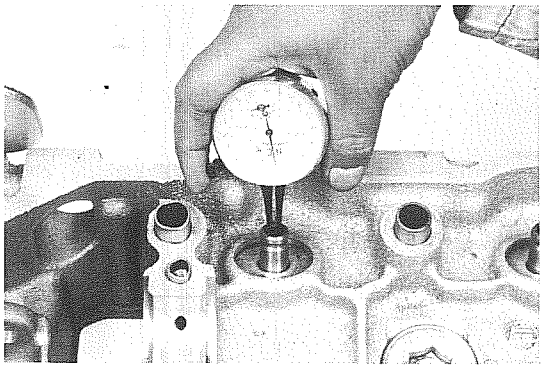
1. Clean and check the valves for wear, scores or bending.

Fig. 3-21



2. Check the valve stem to valve guide clearance of each valve by inserting the valve stem into the guide, as shown in the figure, and moving it back and forth.

Fig. 3-22



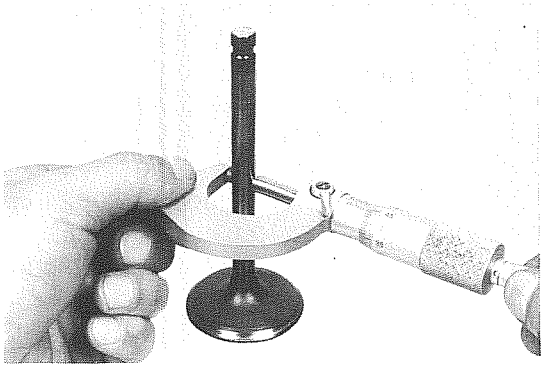
3. Measure the valve stem oil clearance.
   (1) Measure the inside diameter of the valve guide at several places with an inside dial gauge.
   (2) Measure the valve stem diameter.
   (3) Calculate the clearance between the valve stem and valve guide by subtracting the difference where the clearance is the largest.

Stem oil clearance:

Limit	**IN**	**0.08 mm (0.0031 in.)**
	EX	**0.10 mm (0.0039 in.)**

If the clearance exceeds the limit, replace both valve and guide.

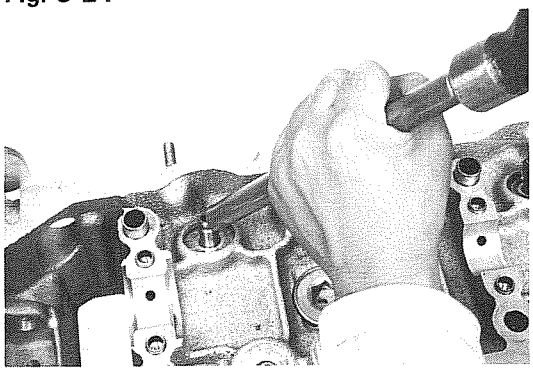
Fig. 3-23



– Note –

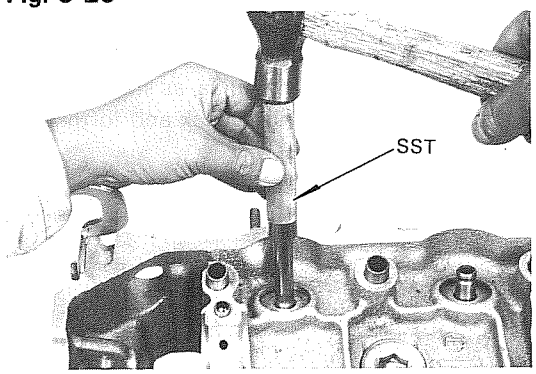
Measure at several places and use the maximum wear for calculation.

Fig. 3-24



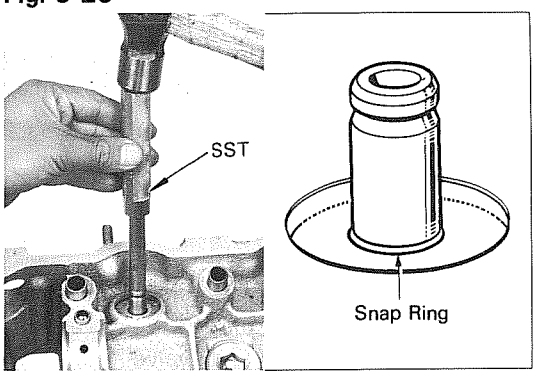
4. Replace the valve guide bushing.
   (1) Break off the bushing and remove the snap ring.

Fig. 3-25



(2) From the top, drive out the guide toward the combustion chamber with SST.
SST [09201-60011]

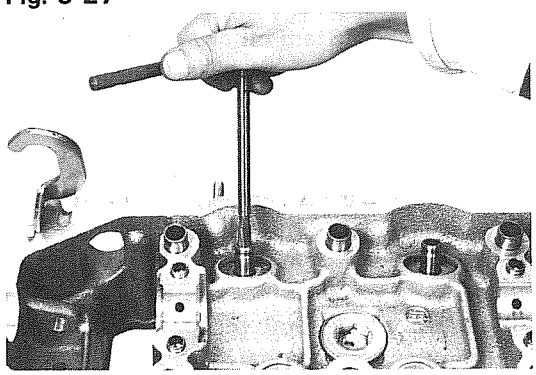
Fig. 3-26



(3) Using SST, drive in the guide until the snap ring makes contact with the cylinder head.
SST [09201-60011]

— Note —
Make sure that the hole is clean.

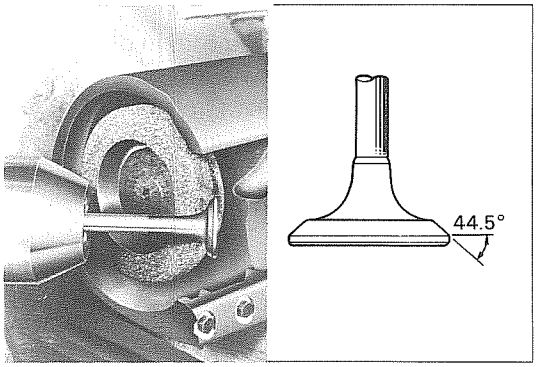
Fig. 3-27



(4) Ream the guide to the specified clearance with an 8 mm (0.31 in.) reamer.

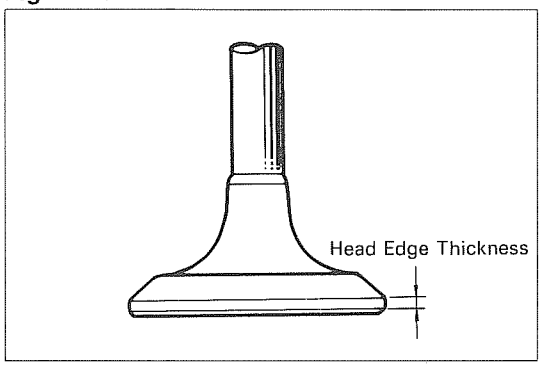
Stem oil clearance:
STD
IN 0.02 – 0.06 mm (0.0008 – 0.0024 in.)
EX 0.03 – 0.07 mm (0.0012 – 0.0028 in.)

Fig. 3-28



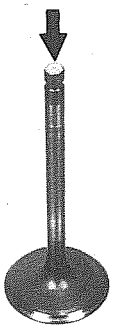
5. Grind the valve seat surface.
   (1) Grind all valves to remove the pits and carbon.
   Valve face angle: 44.5°

Fig. 3-29



(2) Check the valve head margin and replace if less than the limit.
Head edge thickness:
Limit 0.6 mm (0.024 in.)

Fig. 3-30



(3) Check the valve stem tip.

(4) If the valve stem tip is worn, resurface with a valve grinder, but do not grind off more than 0.5 mm (0.020 in.).
Overall length:
STD
21R, 21R-C
IN 115.5 mm (4.547 in.)
EX 113.4 mm (4.465 in.)
22R
IN 113.5 mm (4.468 in.)
EX 112.4 mm (4.425 in.)
Stem end refacing:
Limit 0.5 mm (0.020 in.)

Fig. 3-31

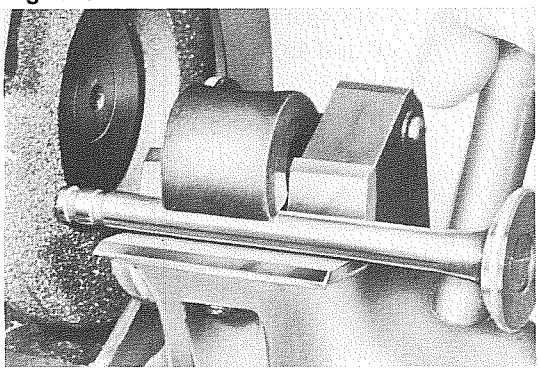
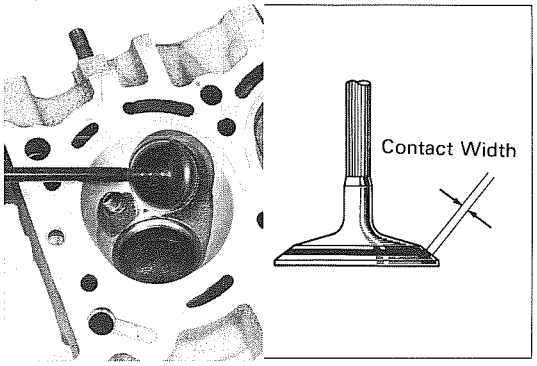


Fig. 3-32

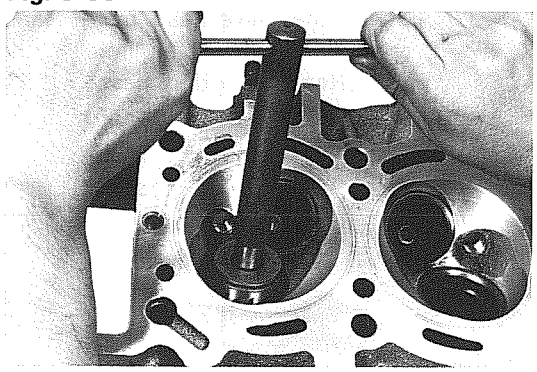


Valve Seat

1. Check the width and position of the valve contact with the seat. Coat the valve face with prussian blue or red lead. Locate the contact point on the valve by rotating the valve against the seat.

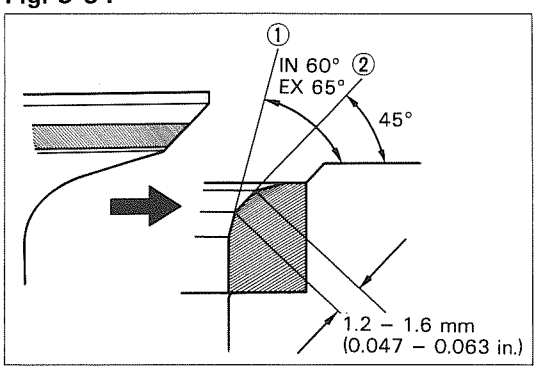
   Contact width:
   IN & EX 1.2 – 1.6 mm (0.047 – 0.063 in.)
   Contact position:
   Middle of valve face

Fig. 3-33



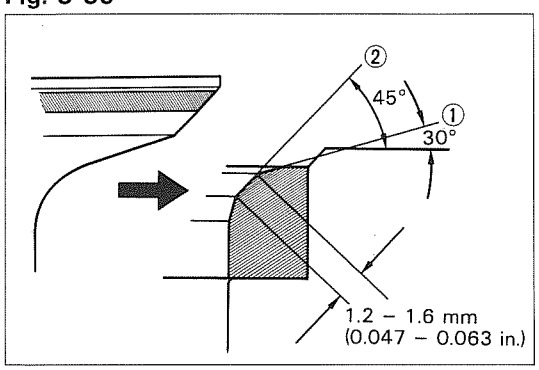
2. Resurface the valve seat with a 45° cutter to clean the seat.

Fig. 3-34



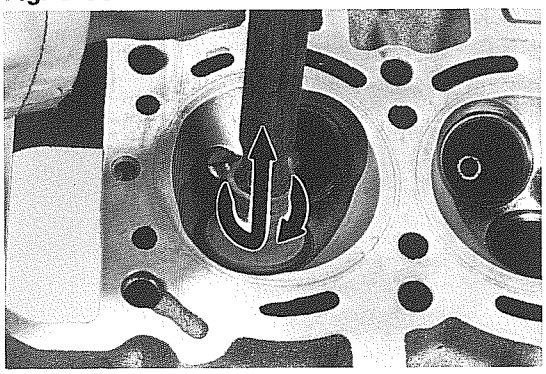
3. Correct the seat position.
   (1) If the seat position is too high, use 60° and 45° cutters (for intake), 65° and 45° cutters (for exhaust) in the order indicated.

Fig. 3-35



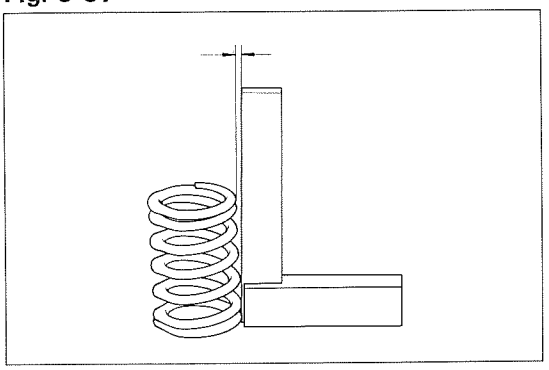
(2) If the seat position is too low, use 30° and 45° cutters in the order indicated.

Fig. 3-36



4. After correction, the valve and valve seat should be lapped lightly with a lapping compound.

Fig. 3-37

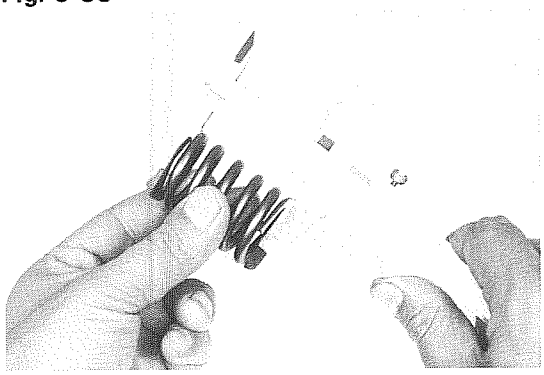


Valve Spring

1. Check the squareness of the valve springs with a steel square and surface plate. Turn the spring around slowly and observe the space between the top of the spring and the square. Replace the spring if it is out of square more than the specified limit.

Squareness:
Limit 1.6 mm (0.063 in.)

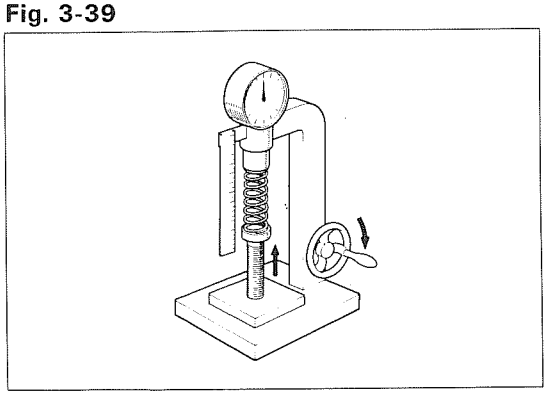
Fig. 3-38



2. Measure the spring free length. Replace the springs that do not meet specification.

Free length: 45.8 mm (1.803 in.)

Fig. 3-39

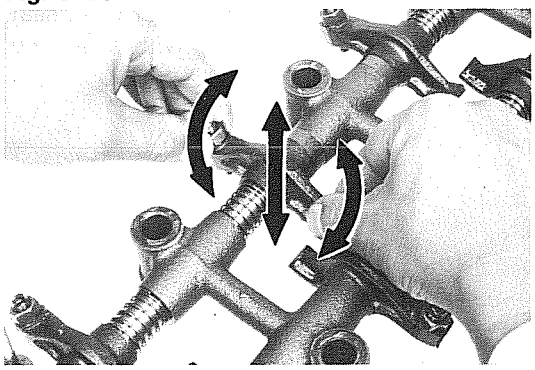


3. Using a spring tester, measure the tension of each spring at the specified installed length.
Replace any spring that does not meet specification.

Installed length: 40.5 mm (1.594 in.)

Installed load:
STD 27.2 kg (60 lb)
Limit 24.5 kg (54 lb)

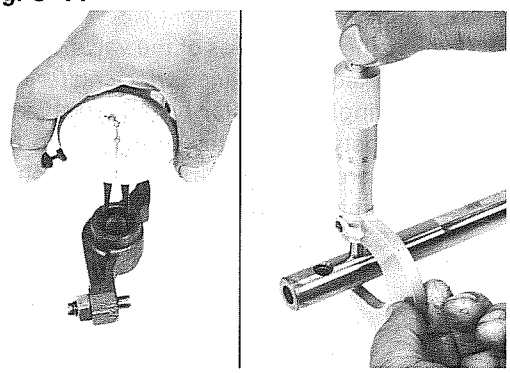
Fig. 3-40



Rocker Arm & Shaft

1. Check the rocker arm to shaft clearance. If worn excessively, disassemble and check.

Fig. 3-41

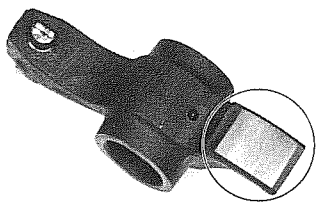


2. Measure the clearance with a dial indicator and outside micrometer. If clearance exceeds the limit, replace the rocker arm and/or shaft.

Oil clearance:

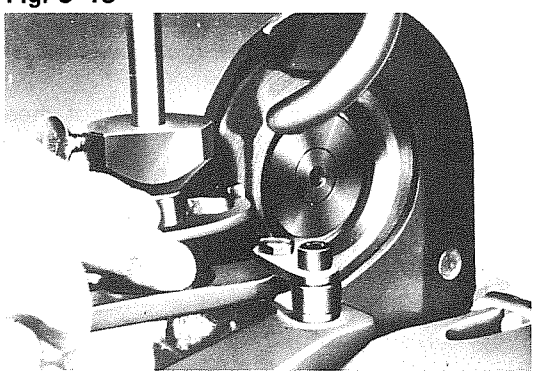
STD	**0.01 – 0.05 mm (0.0004 – 0.0020 in.)**
Limit	**0.08 mm (0.0031 in.)**

Fig. 3-42



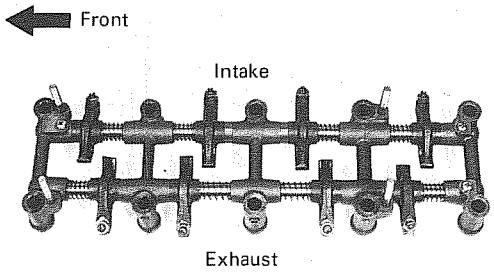
3. Check the contact surface for wear or damage.

Fig. 3-43



4. If only a light ridged wear, correct the cam contacting surface of the rocker arm with a valve refacer and oil stone.

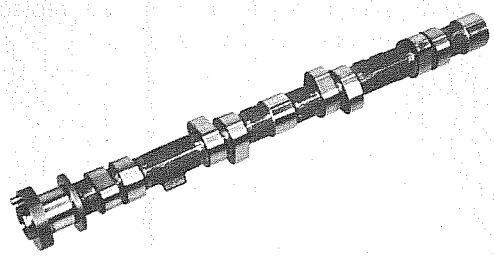
Fig. 3-44



5. Assemble the rocker arm assembly as shown, and install three screws.

— Note —
All rocker arms are the same, but all rocker arm support are different and must be assembled in the correct order.

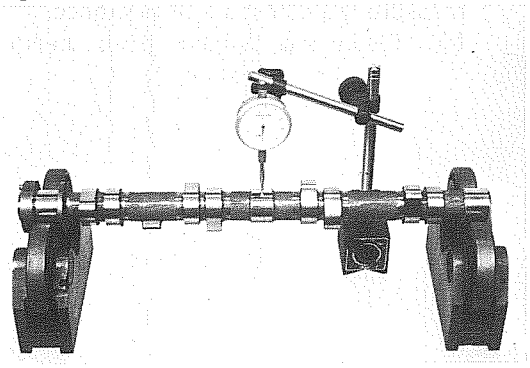
Fig. 3-45



Camshaft & Camshaft Bearing Cap

1. Inspect the cam and journal for damage or wear.
   If damaged, replace the camshaft.

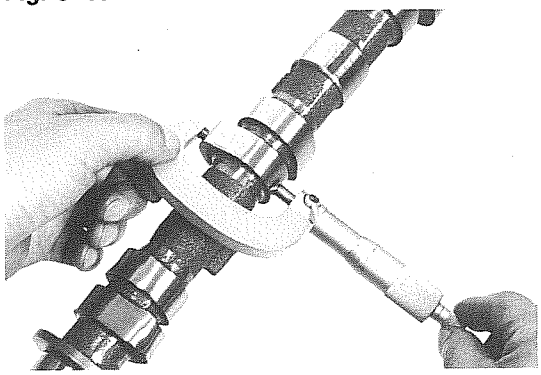
Fig. 3-46



2. Measure the camshaft for runout.
   Replace the camshaft if it exceeds the limit.

Circle runout:
Limit 0.2 mm (0.008 in.)

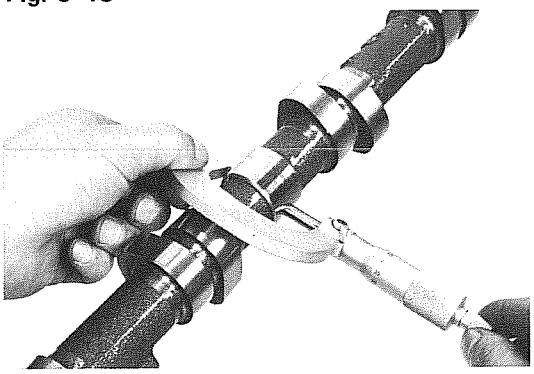
Fig. 3-47



3. Measure the cam lobe height. If wear exceeds limit, replace the camshaft.

Cam height:
STD IN 42.63 – 42.72 mm (1.6783 – 1.6819 in.)
EX 42.69 – 42.78 mm (1.6807 – 1.6842 in.)
Limit IN 42.43 mm (1.6705 in.)
EX 42.49 mm (1.6728 in.)

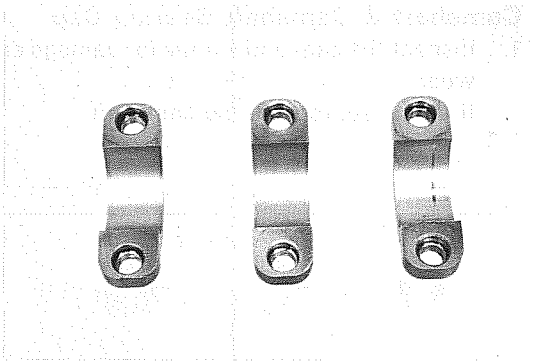
Fig. 3-48



4. Measure the journal diameter.
   If it is less than specified, replace the camshaft.

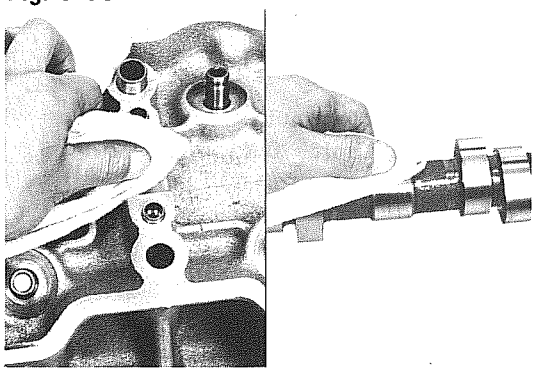
   Journal diameter:
   STD 32.98 – 33.00 mm
   (1.2984 – 1.2992 in.)

Fig. 3-49



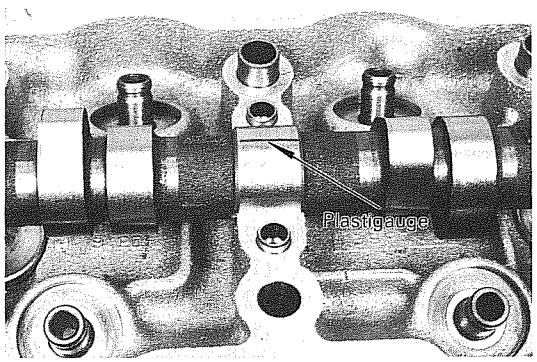
5. Inspect the bearing caps and cylinder head for flaking or scoring. If bearing caps and cylinder head are damaged, replace the caps and cylinder head.

Fig. 3-50



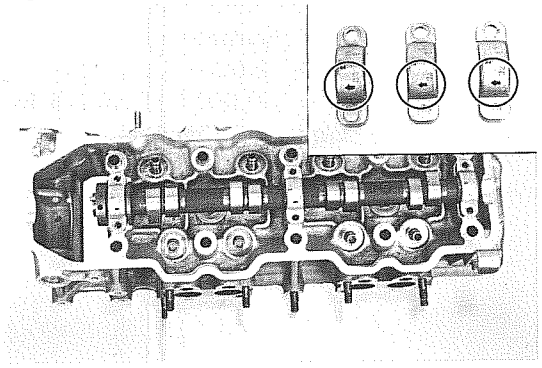
6. Measure the camshaft oil clearance.
   (1) Clean the cylinder head, bearing caps and camshaft.

Fig. 3-51



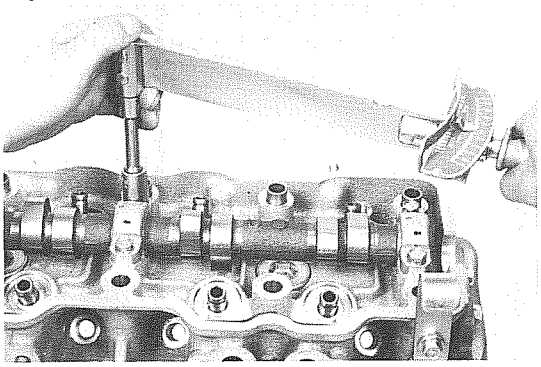
(2) Place a piece of plastigauge across the full width of the journal surface.

Fig. 3-52



(3) When installing the bearing caps, insure that the front marks and engraved numbers match.

Fig. 3-53

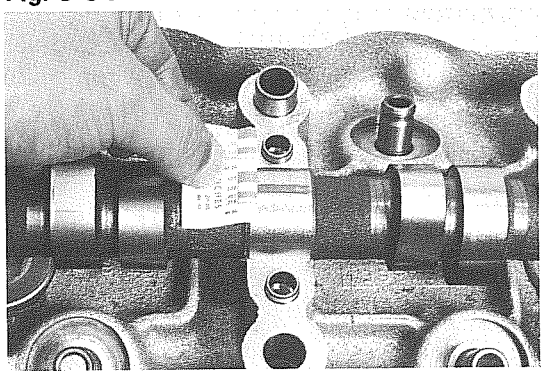


(4) Install the bearing cap, and tighten the bolts to specified torque.

Tightening torque:
1.7 – 2.3 kg-m
(13 – 16 ft-lb)

– Note –
Do not turn the camshaft while the plastigauge is in place.

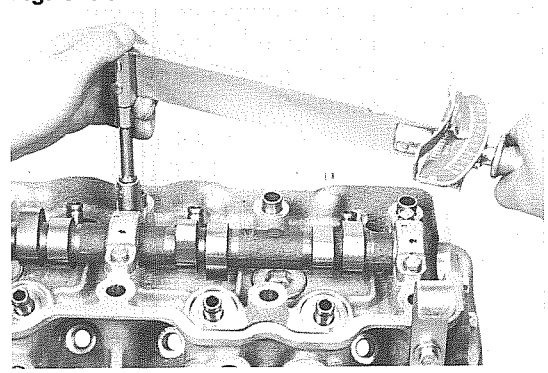
Fig. 3-54



(5) Remove the bearing caps.
(6) With the plastigauge scale, measure the width of the plastigauge at its widest point. If clearance exceeds the specification limit, replace the caps and cylinder head.

Oil clearance:
STD 0.01 – 0.05 mm
(0.0004 – 0.0020 in.)
Limit 0.1 mm
(0.004 in.)

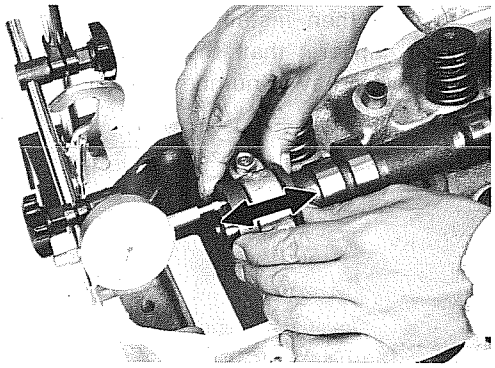
Fig. 3-55



7. Measure the camshaft thrust clearance.
(1) Install the bearing cap, and tighten the bolts to specified torque.

Tightening torque:
1.7 – 2.3 kg-m
(13 – 16 ft-lb)

Fig. 3-56



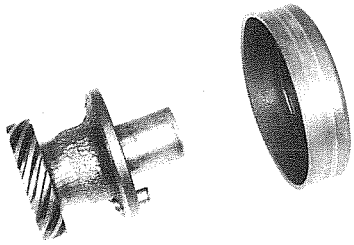
(2) Measure the thrust clearance.

Thrust clearance:

STD 0.08 – 0.18 mm (0.0031 – 0.0071 in.)

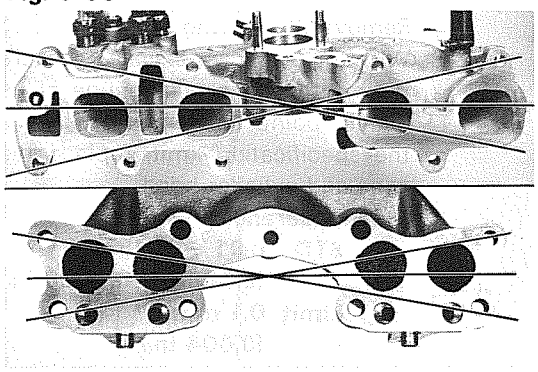
Limit 0.25 mm (0.0098 in.)

Fig. 3-57



8. Inspect the distributor drive gear and fuel pump drive cam for wear or damage.

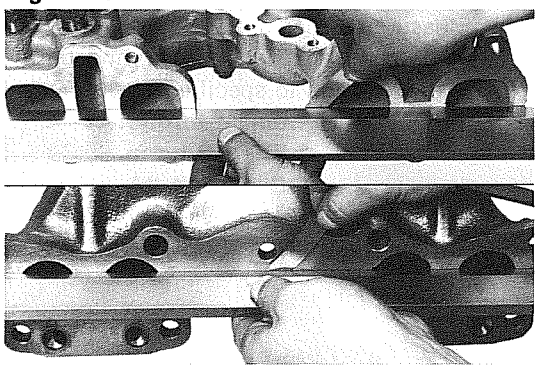
Fig. 3-58



Manifold

1. Check the cylinder head contacting surfaces for warpage with a precision straight edge and thickness gauge.

Fig. 3-59



2. If warpage exceeds the limit, correct it by machining, or replace the manifold.

Contacting surface warpage:

Limit IN 0.20 mm (0.0079 in.)

EX 0.70 mm (0.0276 in.)

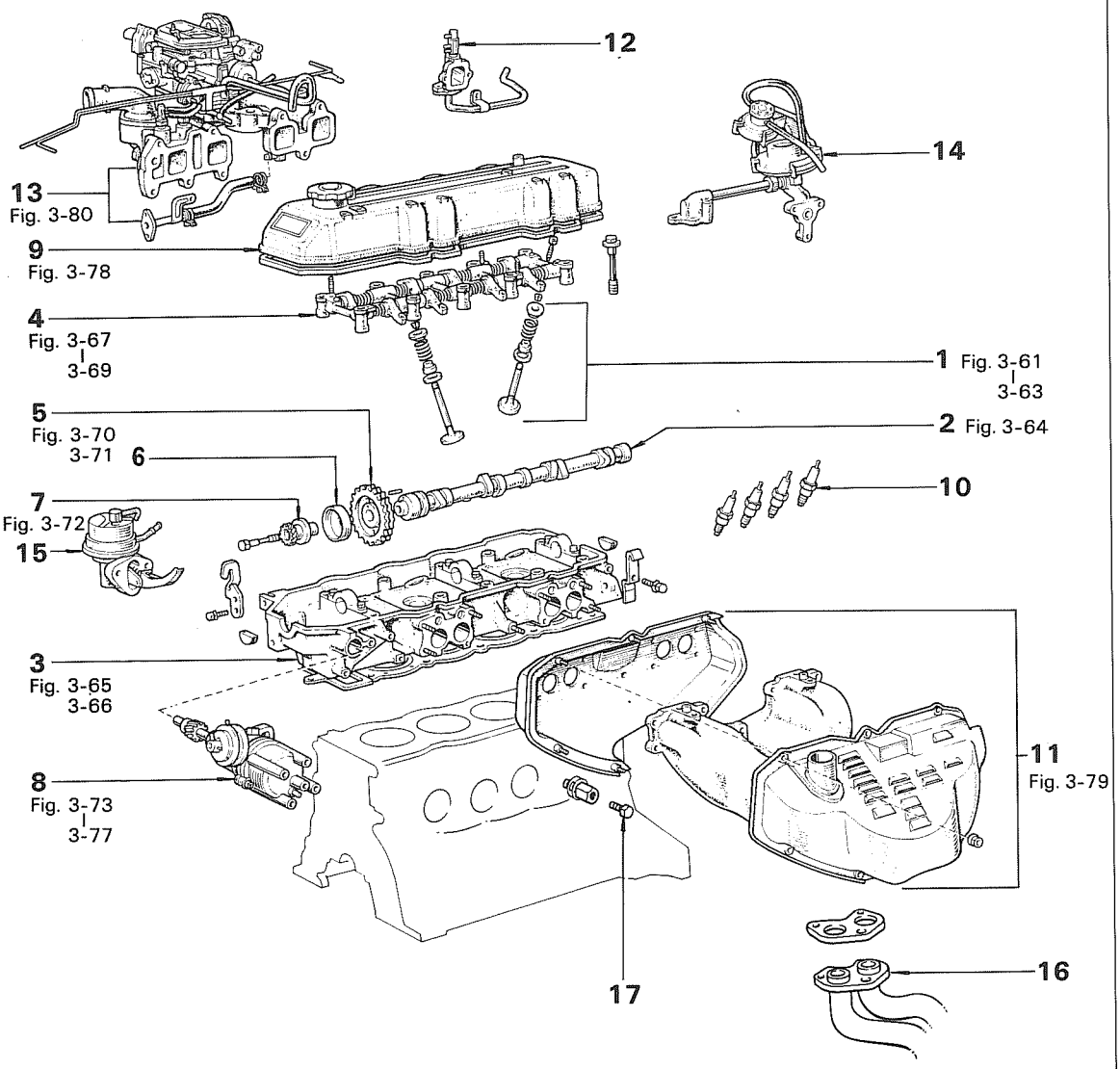
Maximum reface:

Limit 0.20 mm (0.0079 in.)

ASSEMBLY

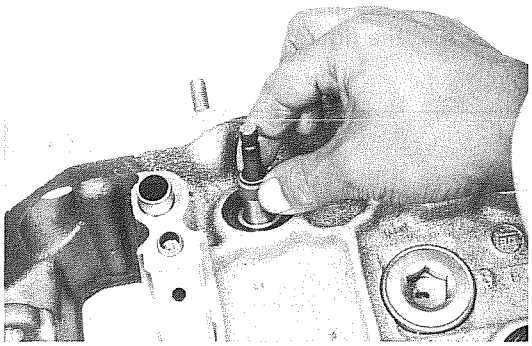
Assemble the parts in the numerical order shown in the figure.

Fig. 3-60



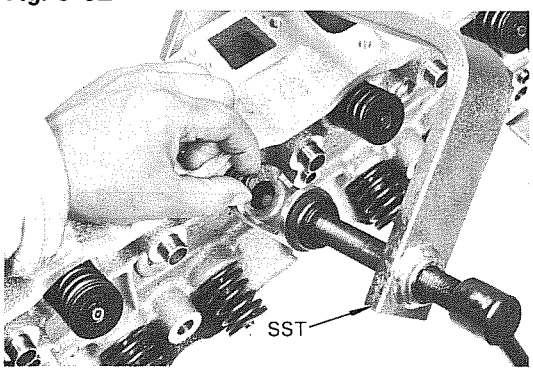
1. Valve & Compression Spring
2. Camshaft & Bearing Cap
3. Cylinder Head
4. Rocker Arm Assembly
5. Camshaft Sprocket
6. Fuel Pump Drive Cam
7. Distributor Drive Gear
8. Distributor
9. Cylinder Head Cover & Gasket
10. Spark Plug
11. Exhaust Manifold & Insulator
12. Cylinder Head Side Cover with TVSV
13. Intake Manifold & Water Pipe
14. EGR Valve
15. Fuel Pump
16. Exhaust Pipe
17. Water Drain Plug

Fig. 3-61



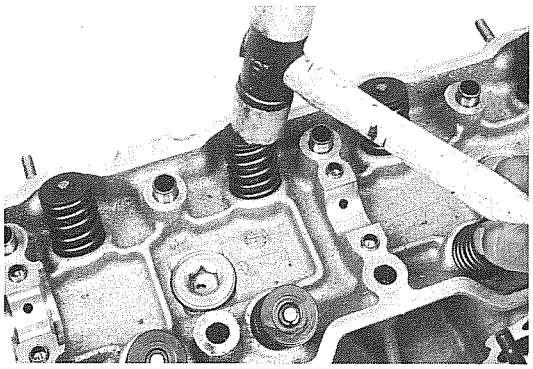
Coat the valve stem with engine oil.
Install the spring seat and new oil seal as shown in the figure.

Fig. 3-62



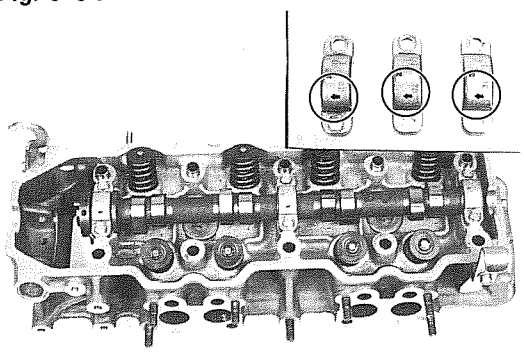
Assemble the valve spring and install the retainer locks with SST.
SST [09202-43013]

Fig. 3-63



Tap the valve stems lightly with a plastic hammer or such to assure proper fit.

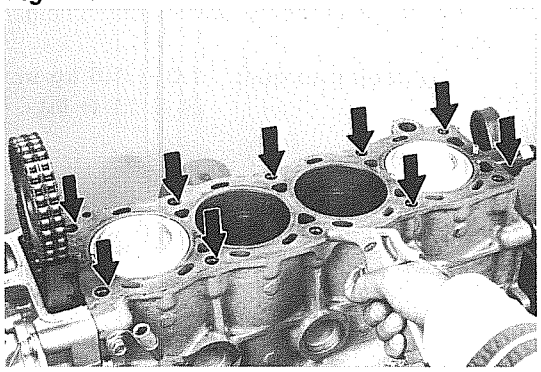
Fig. 3-64



Install the bearing caps in numerical order beginning from the front with arrows pointing toward the front.

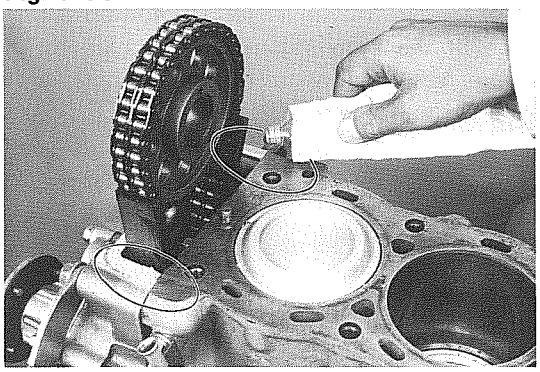
Tightening torque: 1.7 – 2.3 kg-m (13 – 16 ft-lb)

Fig. 3-65



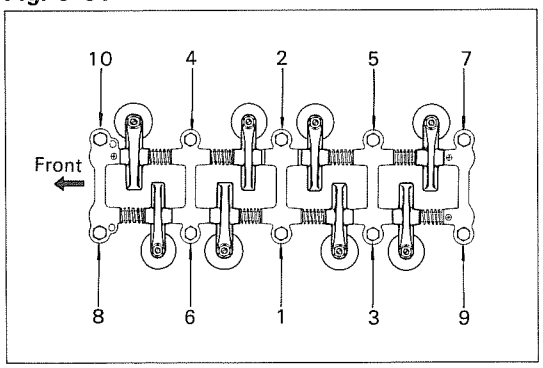
Clean the bolt holes with compressed air.

Fig. 3-66



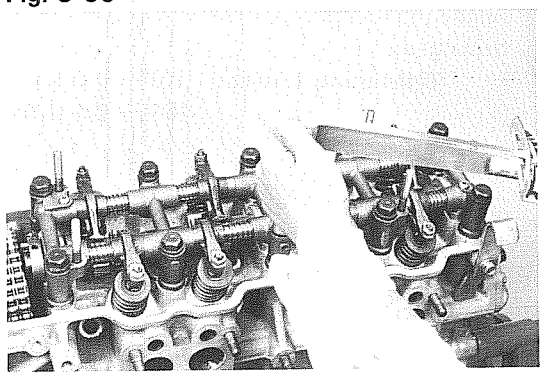
Apply liquid sealer to the cylinder head at the points shown in the figure.

Fig. 3-67



Tighten each cylinder head bolt a little at a time in the sequence shown in the figure.

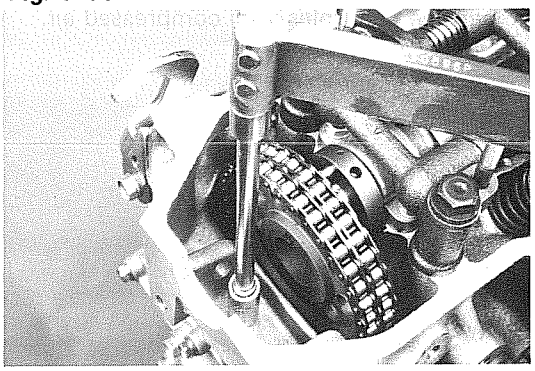
Fig. 3-68



Tighten the cylinder head bolts to specified torque.

Tightening torque: 7.2 – 8.8 kg-m (53 – 63 ft-lb)

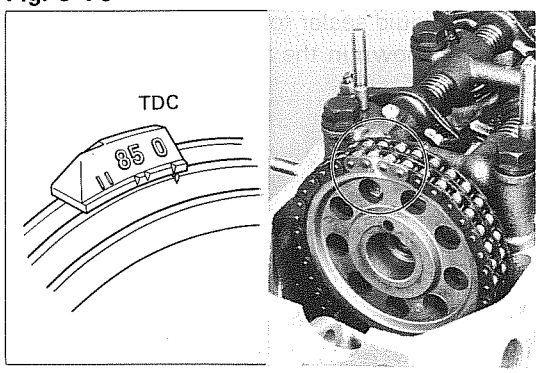
Fig. 3-69



Tighten the chain cover bolt to the specified torque.

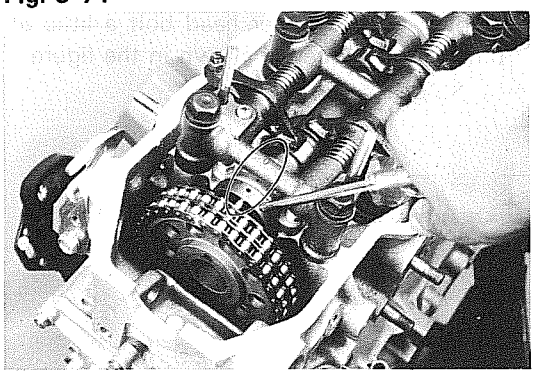
Tightening torque: 1.0 – 1.6 kg-m (8 – 11 ft-lb)

Fig. 3-70



Set the No. 1 cylinder to TDC/compression. Install the cam sprocket and chain to the camshaft while aligning the matchmarks put on during removal.

Fig. 3-71

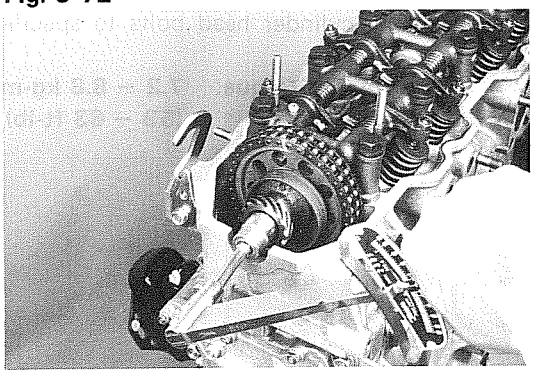


Align the camshaft timing hole with the front mark of rocker support.

– Note –

If the chain does not seem long enough, turn the camshaft back and forth while pulling up on the chain and sprocket.

Fig. 3-72



Install the fuel pump drive cam and distributor drive gear.

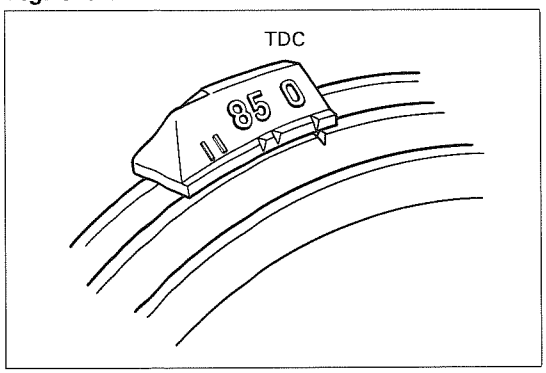
Tightening torque: 7.0 – 9.0 kg-m (51 – 65 ft-lb)

Fig. 3-73

SEE
IGNITION SYSTEM
DISTRIBUTOR INSTALLATION
SECTION
Fig. 8-64 to 8-71

Install the distributor.

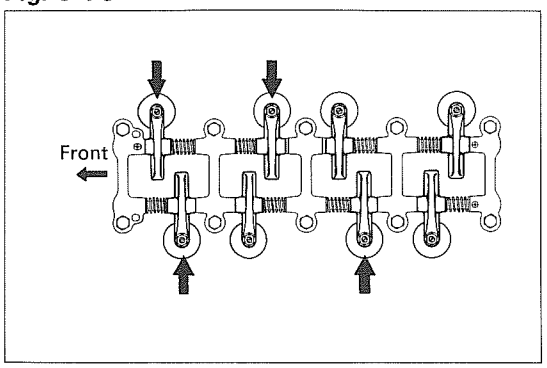
Fig. 3-74



Adjust the valve clearance.

1. Confirm that the No. 1 cylinder is at TDC/ compression.

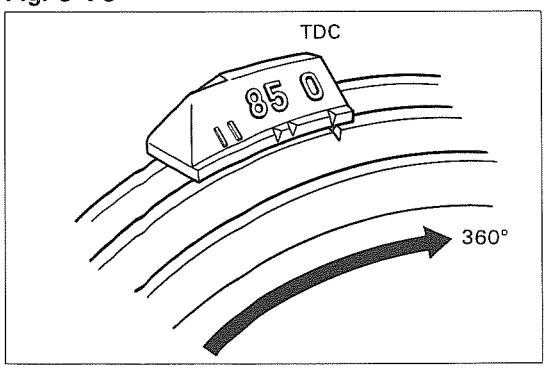
Fig. 3-75



2. First, adjust the valve clearance of only the valves indicated by arrows in the figure.

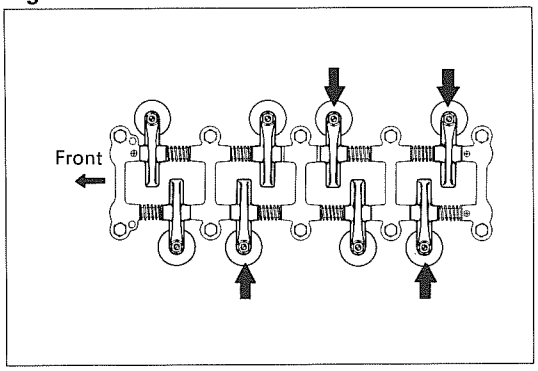
Valve clearance (Hot):
IN 0.20 mm (0.008 in.)
EX 0.30 mm (0.012 in.)

Fig. 3-76



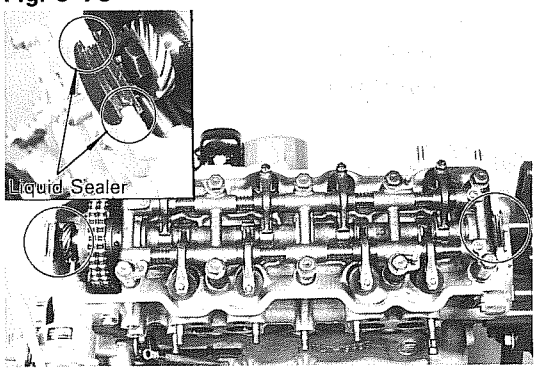
3. Turn the crankshaft 360° and align the mark.

Fig. 3-77



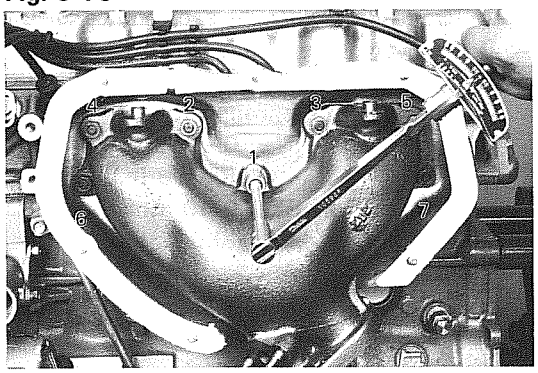
4. Next, adjust the clearances of the remaining valves (indicated by arrows).

Fig. 3-78



Apply liquid sealer at the semi-circular plug.

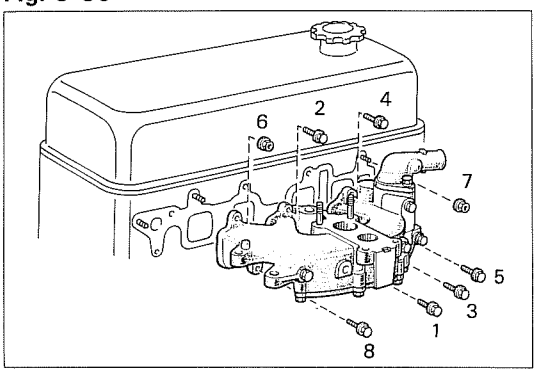
Fig. 3-79



Tighten each exhaust manifold bolt and nut a little at a time to the specified torque in the sequence shown in the figure.

Tightening torque:
4.0 – 5.0 kg-m
(29 – 36 ft-lb)

Fig. 3-80



Tighten each intake manifold bolt and nut a little at a time to the specified torque in the sequence shown in the figure.

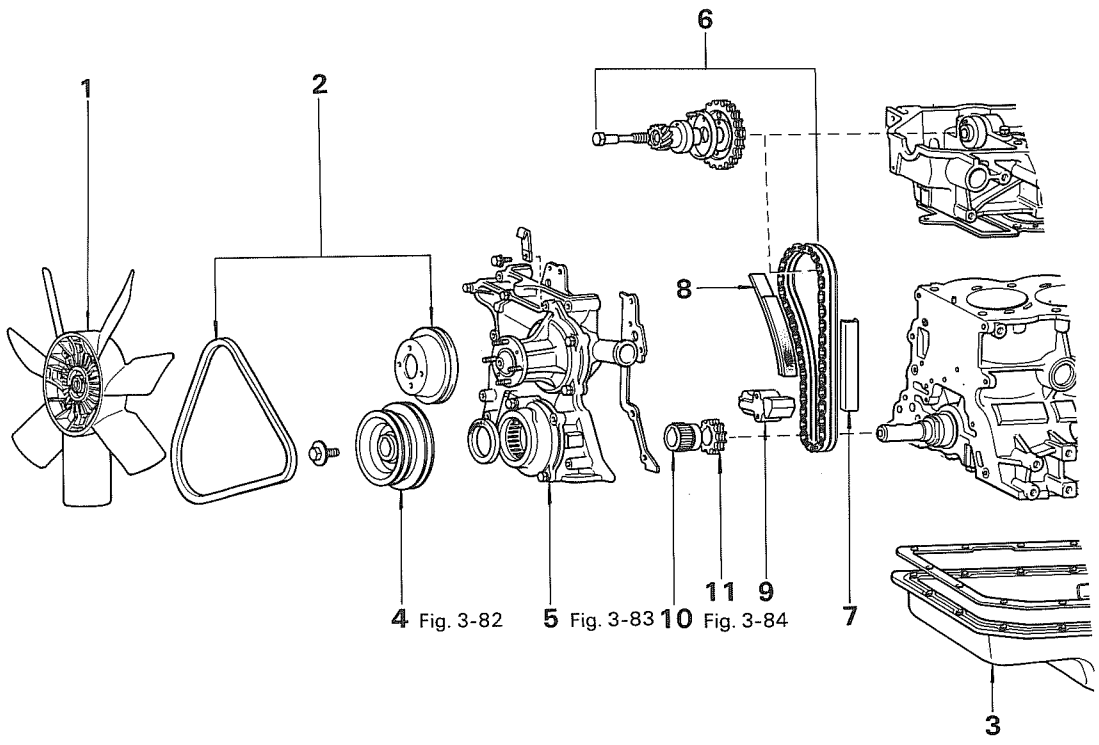
Tightening torque:
Bolt 1.8 – 2.6 kg-m
(13 – 19 ft-lb)
Nut 1.5 – 2.2 kg-m
(11 – 15 ft-lb)

TIMING CHAIN

DISASSEMBLY

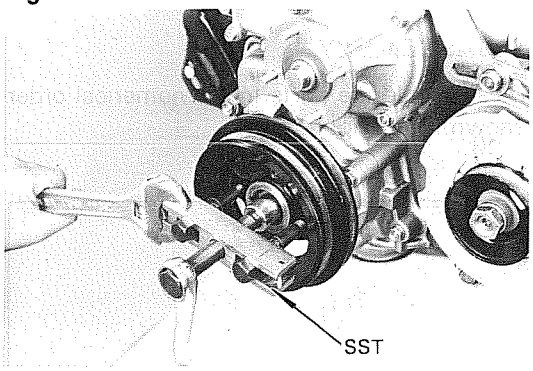
Disassemble the parts in the numerical order shown in the figure.

Fig. 3-81



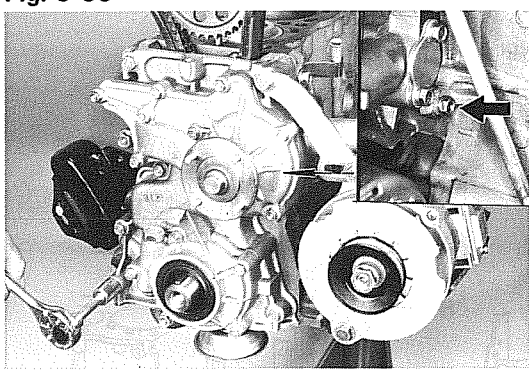
1. Cooling Fan
2. Drive Belt & Fan Pulley
3. Oil Pan
4. Crankshaft Pulley
5. Timing Chain Cover
6. Timing Chain & Camshaft Sprocket
7. Chain Damper No. 1
8. Chain Damper No. 2
9. Chain Tensioner
10. Oil Pump Drive Spline
11. Crankshaft Sprocket

Fig. 3-82



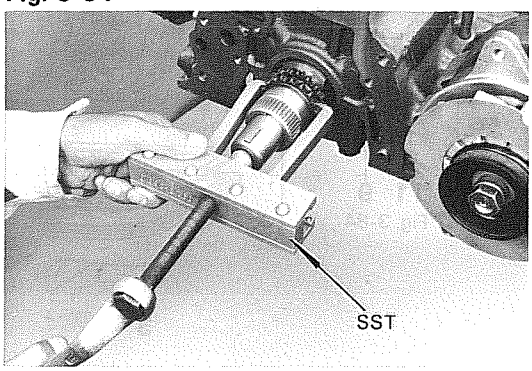
Remove the crankshaft pulley with SST.
SST [09213-31021]

Fig. 3-83



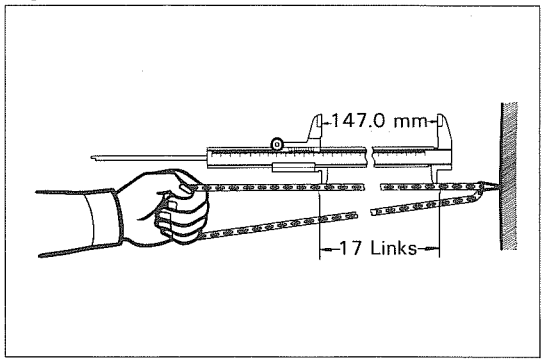
Remove the timing chain cover as shown in the figure.

Fig. 3-84



Remove the oil pump drive spline and crankshaft sprocket with SST.
SST [09213-36020]

Fig. 3-85



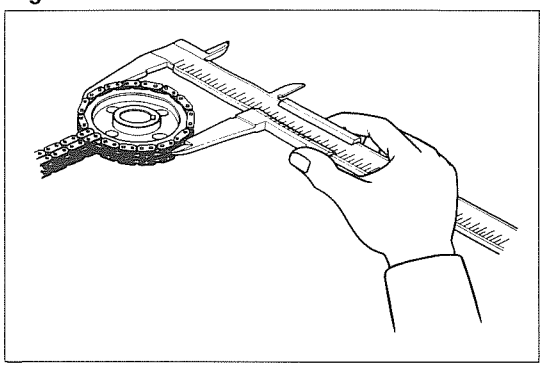
INSPECTION & REPAIR

Timing Chain

Measure the length of 17 links with the chain stretched tight by one hand.
Make the same measurement at three other locations selected at random.
If over the limit at any one place, replace the chain.

Timing chain elongation:
Limit
at 17 links 147.0 mm
(5.787 in.)

Fig. 3-86

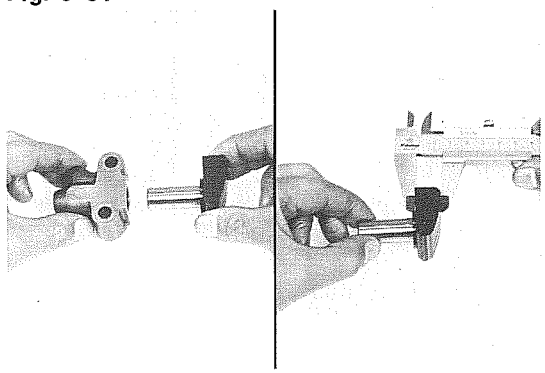


Sprockets

Wrap the chain around the gear and, with vernier calipers, measure the gear outside diameter (outer sides of chain rollers).

Wear:
Limit
for crankshaft sprocket
59.4 mm
(2.339 in.)
for camshaft timing sprocket
113.8 mm
(4.480 in.)

Fig. 3-87

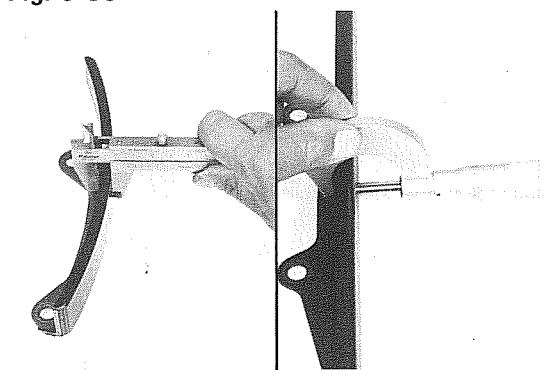


Chain Tensioner

1. Inspect the tensioner plunger to see that it slides smoothly in the body cylinder.
2. Measure the tensioner head thickness.
   If the thickness is less than the limit, replace the cylinder and plunger as a set.

Thickness:
Limit 11.0 mm
(0.433 in.)

Fig. 3-88



Chain Damper

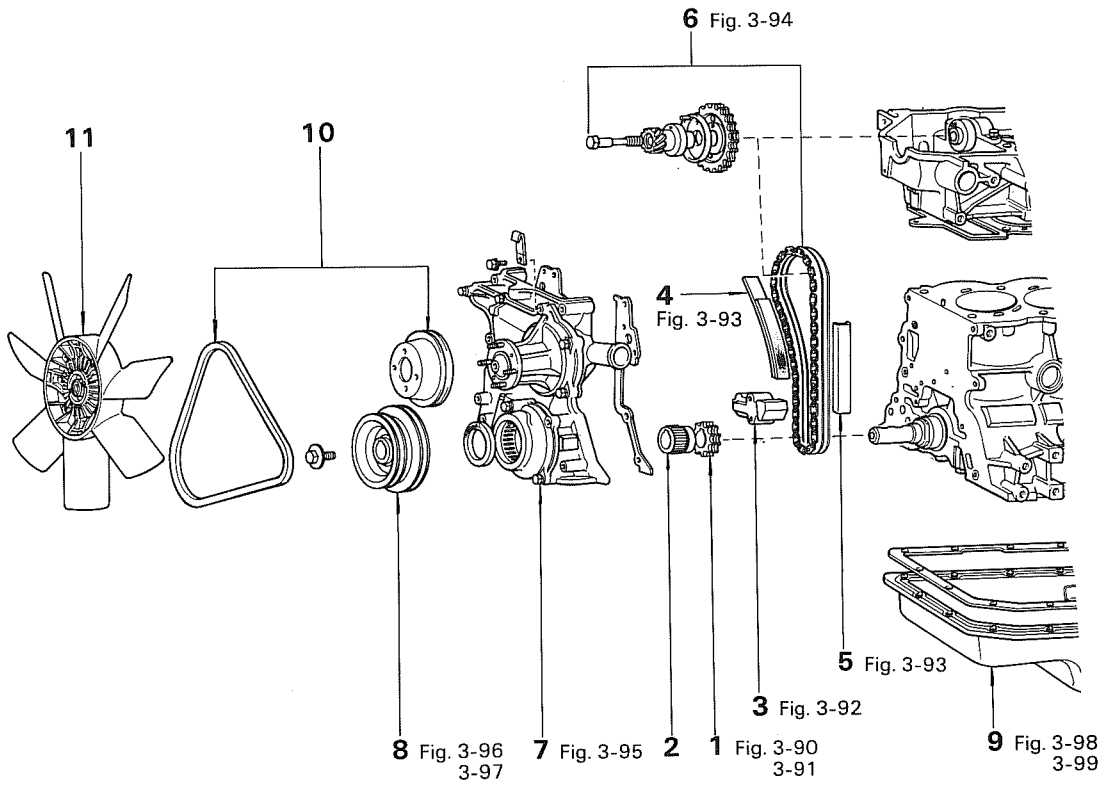
Measure the wall thickness of the vibration dampers.

Wall thickness:
Vibration damper No. 1
Limit 5.0 mm
(0.197 in.)
Vibration damper No. 2
Limit 4.5 mm
(0.177 in.)

ASSEMBLY

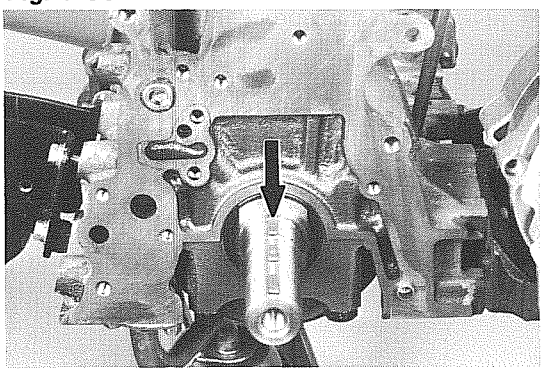
Assemble the parts in the numerical order shown in the figure.

Fig. 3-89



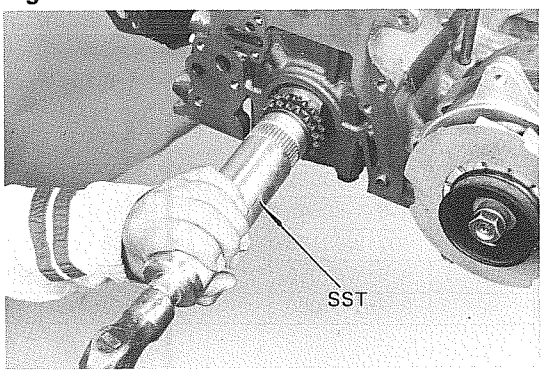
1. Crankshaft Sprocket
2. Oil Pump Drive Spline
3. Chain Tensioner
4. Chain Damper No. 2
5. Chain Damper No. 1
6. Timing Chain & Camshaft Sprocket
7. Timing Chain Cover
8. Crankshaft Pulley
9. Oil Pan
10. Drive Belt & Fan Pulley
11. Cooling Fan

Fig. 3-90



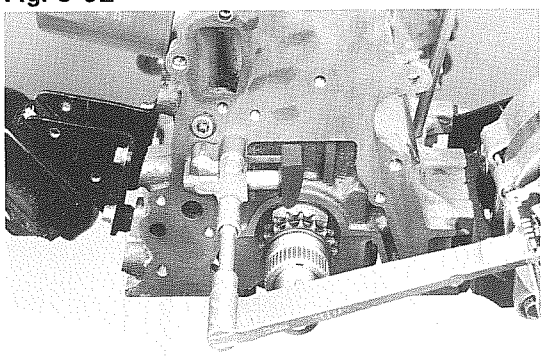
Position the crankshaft keyway upward.

Fig. 3-91



Install the crankshaft sprocket and oil pump drive spline with SST.
SST [09608-35013]

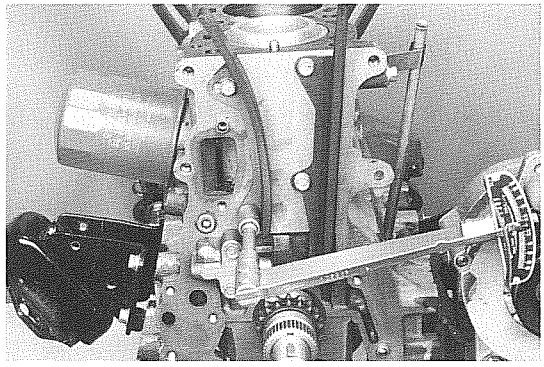
Fig. 3-92



Install the chain tensioner.

Tightening torque: 1.5 – 2.1 kg-m (11 – 15 ft-lb)

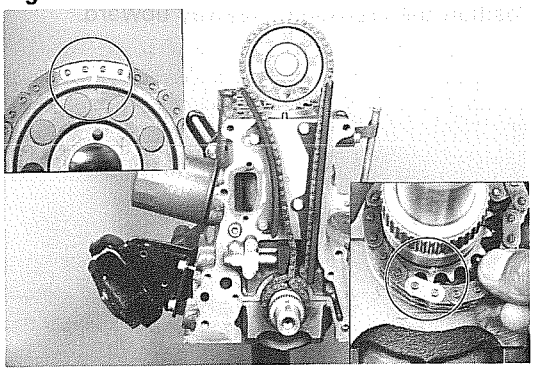
Fig. 3-93



Install the chain dampers as shown in the figure.

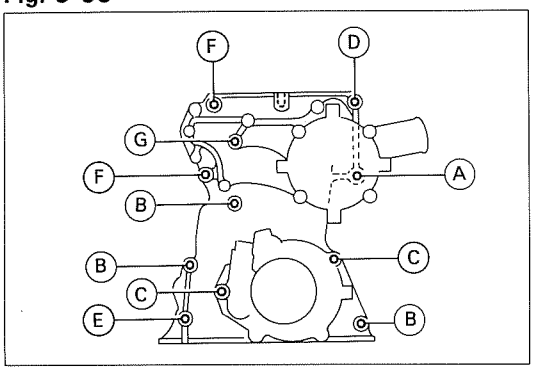
Tightening torque: 1.0 – 1.6 kg-m (8 – 11 ft-lb)

Fig. 3-94



Align the chain and sprocket matchmarks and install.

Fig. 3-95

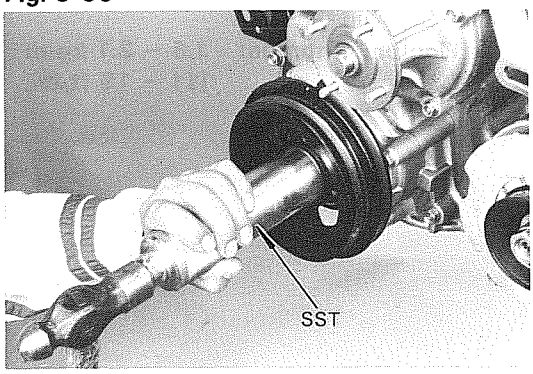


Use the proper bolt when installing the chain cover.

Tightening torque: 1.0 – 1.6 kg-m (8 – 11 ft-lb)

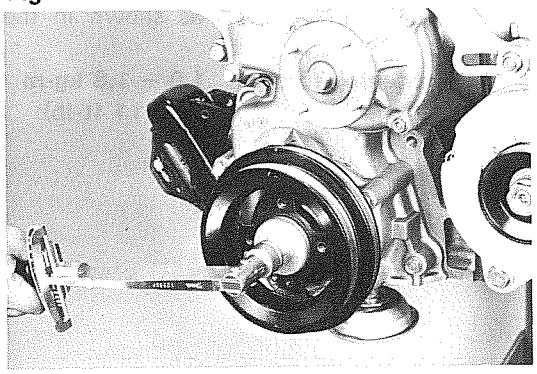
Location	Part No.	Location	Part No.
A	91611-40822	F	91651-61060 (w/o Air con.)
B	91611-60840		
C	90119-08106		91651-61065 (w/ Air con.)
D	91611-61065		
E	91651-61060	G	90119-08183

Fig. 3-96



Drive in the crankshaft pulley with SST.
SST [09608-35013]

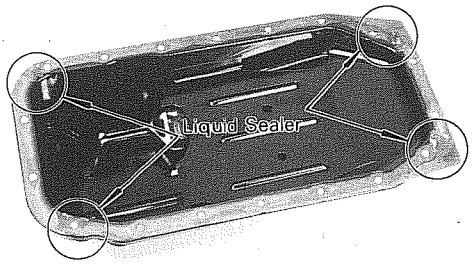
Fig. 3-97



Tighten the crankshaft pulley bolt.

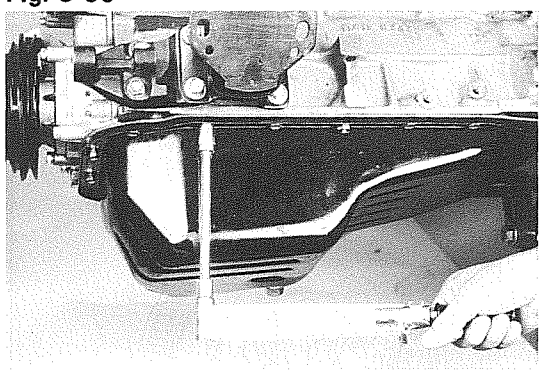
Tightening torque:
14.0 – 18.0 kg-m
(102 — 130 ft-lb)

Fig. 3-98



Apply liquid sealer to the areas indicated in the figure.

Fig. 3-99



Tighten the oil pan bolts.

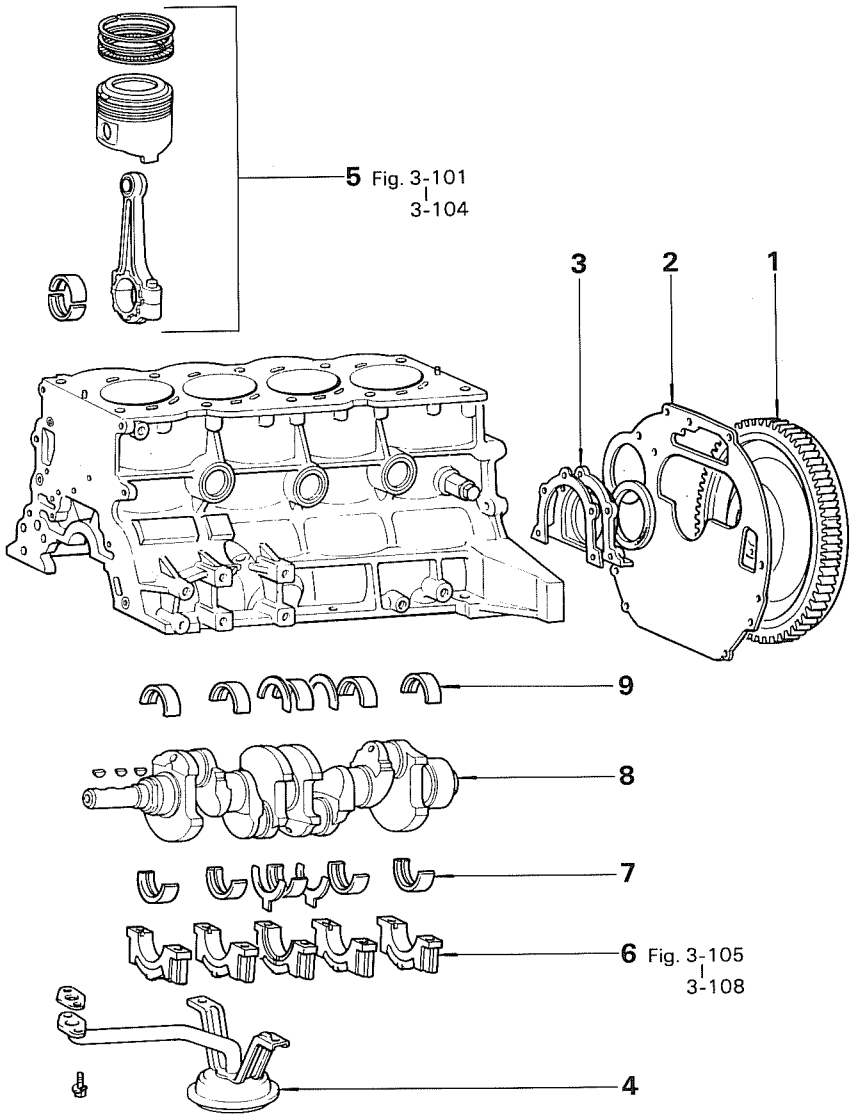
Tightening torque: 0.3 – 0.9 kg-m (27 – 78 in.-lb)

CYLINDER BLOCK

DISASSEMBLY

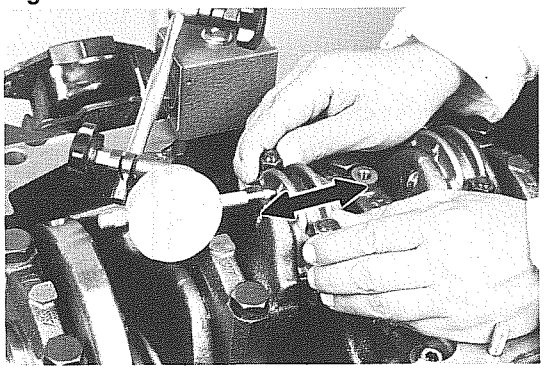
Disassemble the parts in the numerical order shown in the figure.

Fig. 3-100



1. Flywheel
2. Rear End Plate
3. Rear Oil Seal Retainer
4. Oil Strainer
5. Piston with Connecting Rod
6. Crankshaft Bearing Cap
7. Crankshaft Bearing Lower Side
8. Crankshaft
9. Crankshaft Bearing Upper Side

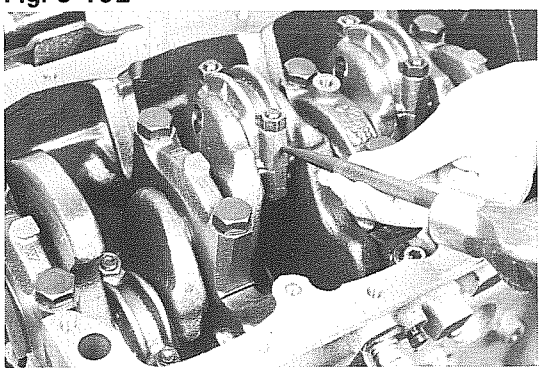
Fig. 3-101



Measure the connecting rod thrust clearance. If it exceeds the limit, replace the connecting rod.

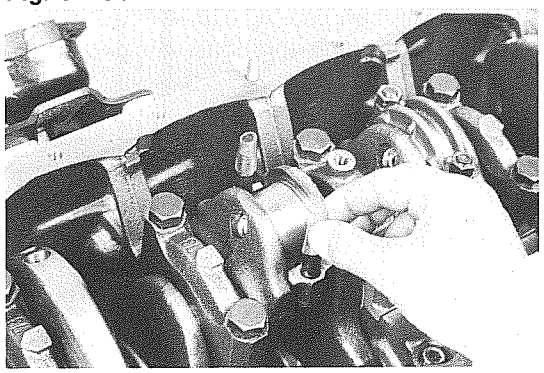
Thrust clearance:
Limit 0.3 mm (0.012 in.)

Fig. 3-102



Place the matchmarks on the cap and connecting rod.

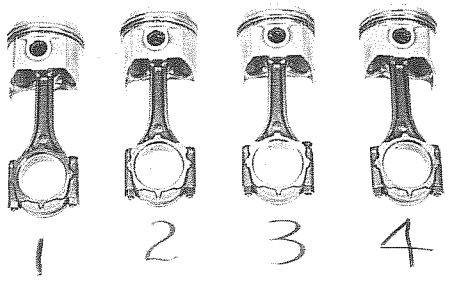
Fig. 3-103



Cover the rod bolts with short pieces of hose.

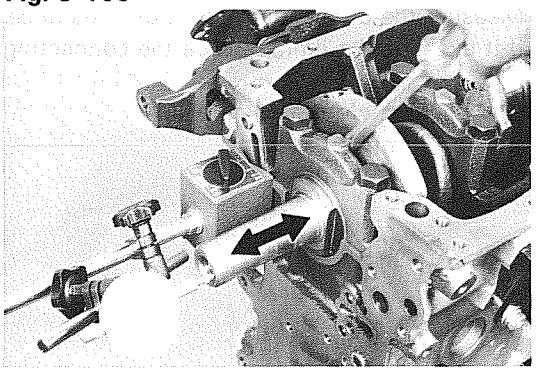
— Note —
To prevent the crankshaft pin and cylinder bore from damage, this step must be performed before removing the pistons.

Fig. 3-104



Arrange the piston and connecting rod caps in order.

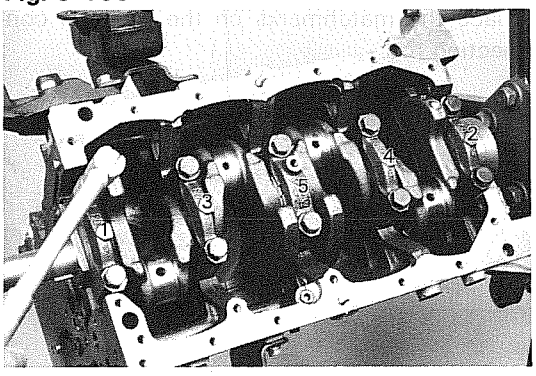
Fig. 3-105



Measure the crankshaft thrust clearance. If it exceeds the limit, replace the thrust washer as a set.

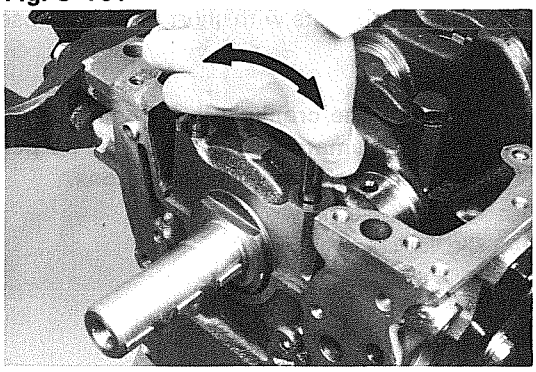
Thrust clearance:
Limit 0.3 mm (0.012 in.)

Fig. 3-106



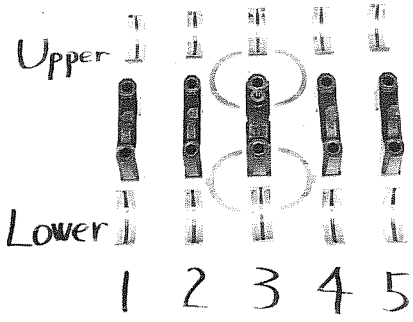
Remove each crankshaft bearing cap in the sequence shown in the figure.

Fig. 3-107



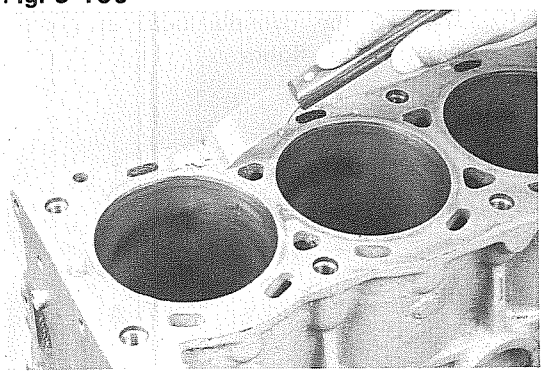
If the crankshaft bearing cap will not come off, remove by raising the bolts and prying back and forth.

Fig. 3-108



Arrange the crankshaft bearings and caps in order.

Fig. 3-109

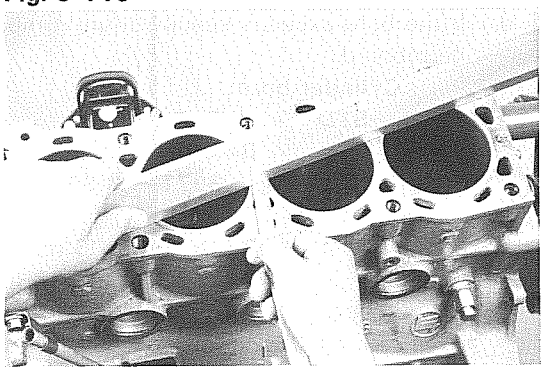


INSPECTION & REPAIR

Cylinder Block

1. Clean and check the cylinder block for cracks or scoring.

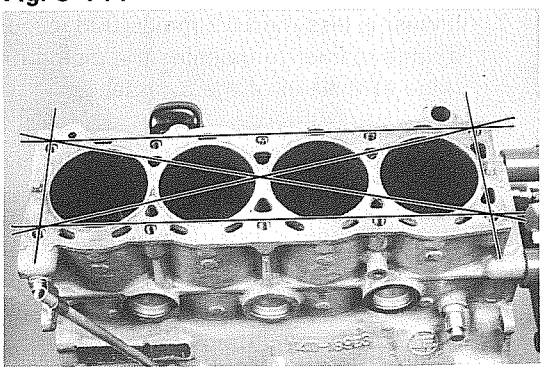
Fig. 3-110



2. Check the block gasket surface for warpage. If warpage exceeds the specified limit, replace the block.

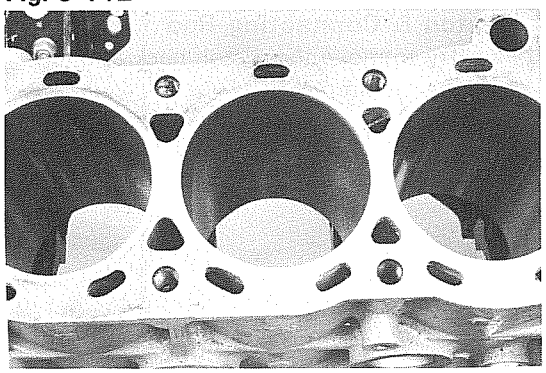
Warpage:
Limit 0.05 mm (0.0020 in.)

Fig. 3-111



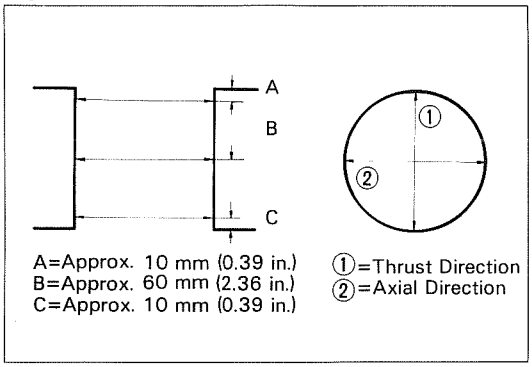
3. Check for warpage along the lines indicated in the figure.

Fig. 3-112



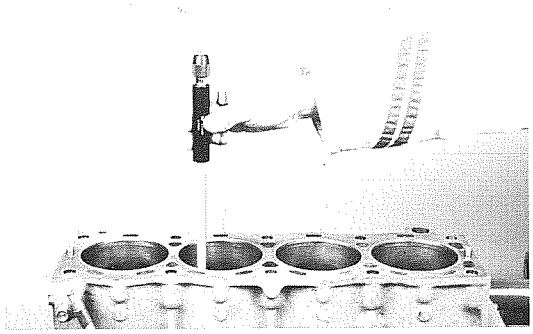
4. Visually check the cylinder for vertical scratches. If deep scratches are present, the cylinder must be rebored.

Fig. 3-113



5. Measure the cylinder bore at position shown in the figure.

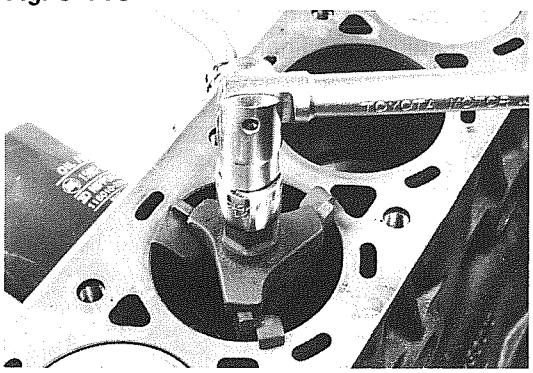
Fig. 3-114



6. If the bore exceeds specification, it must be rebored.

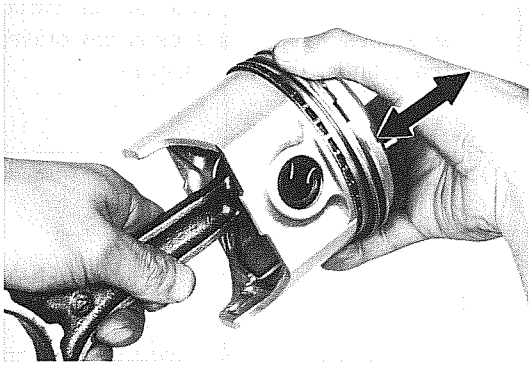
Cylinder bore:
STD 21R, 21R-C
84.00 – 84.03 mm
(3.3071 – 3.3083 in.)
22R
92.00 – 92.03 mm
(3.6220 – 3.6232 in.)
Wear:
Limit 0.2 mm
(0.008 in.)

Fig. 3-115



7. If wear is less than 0.2 mm (0.008 in.), use a ridge reamer to machine the piston ring ridge at the top of the cylinder.

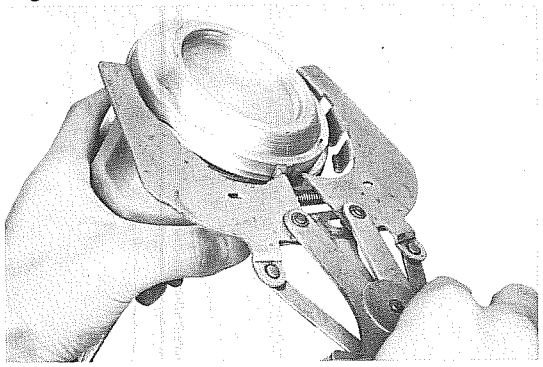
Fig. 3-116



Piston & Connecting Rod

1. Try to move the piston back and forth on the piston pin.
   If any movement is felt, replace the piston and pin.

Fig. 3-117



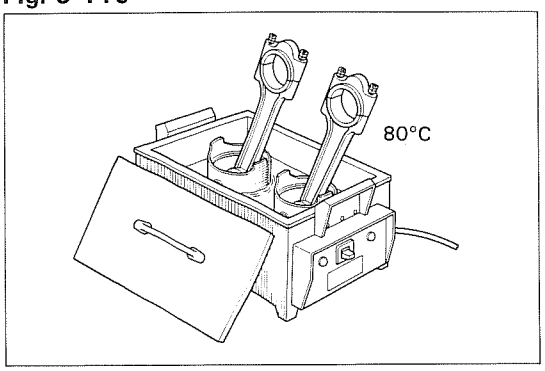
2. Remove the piston ring with a piston ring expander.

Fig. 3-118

3. Remove the snap rings in the hole.

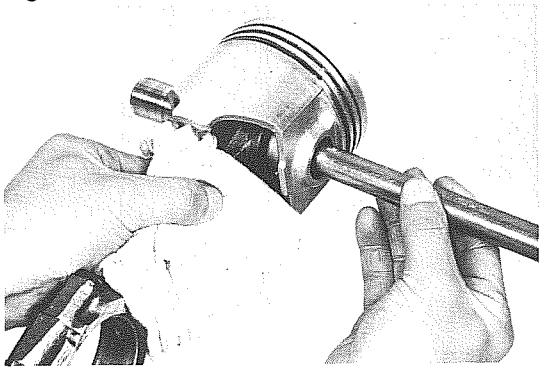
— Note —
Use new snap rings for assembly.

Fig. 3-119



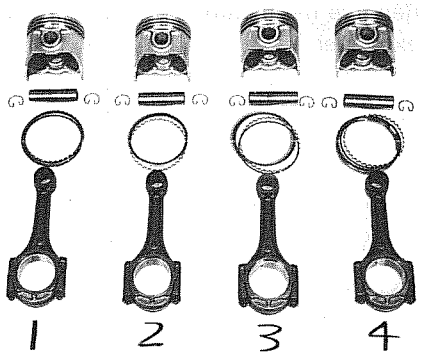
4. Heat the piston to about 80°C (176°F) with piston heater or such.

Fig. 3-120



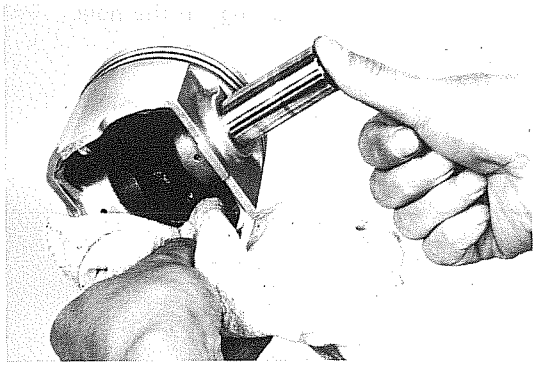
5. Push out the piston pin.

Fig. 3-121



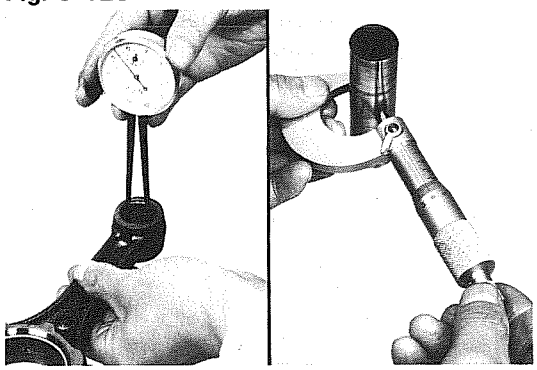
6. After disassembly, arrange the parts in order.

Fig. 3-122



7. Check the piston pin fitness.
Heat the piston up to about 80°C (176°F), and coat the pin with engine oil.
It should then be possible to push the pin into the piston hole with thumb pressure.

Fig. 3-123

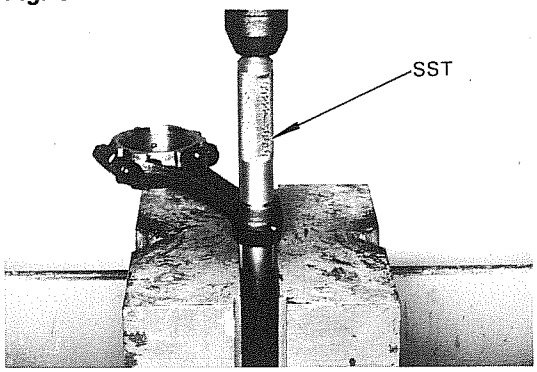


8. Measure the oil clearance between the connecting rod bushing and piston pin.

Oil clearance:

STD	**0.005 – 0.011 mm (0.0002 – 0.0004 in.)**
Limit	**0.015 mm (0.0006 in.)**

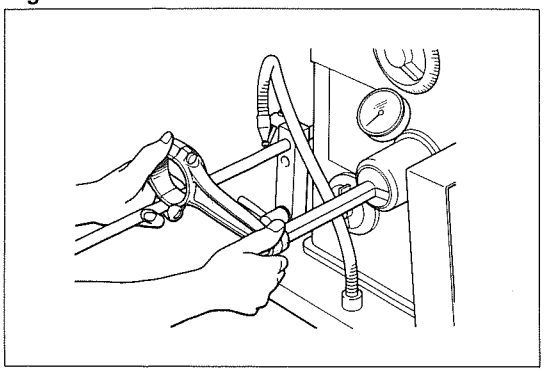
Fig. 3-124



9. If the bushing is worn or damaged, replace it with SST.
SST [09222-30010]

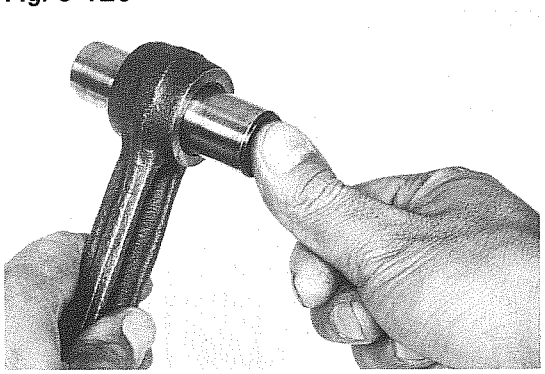
– Note –
Align the bushing oil hole with the connecting rod oil hole.

Fig. 3-125



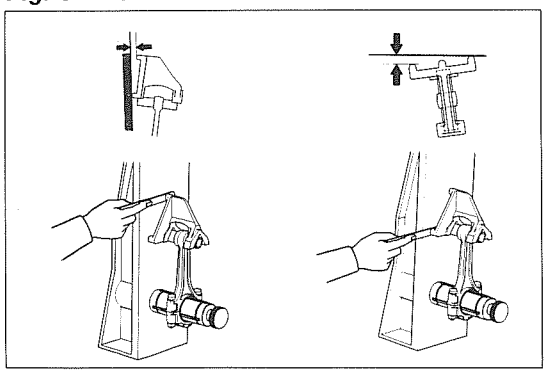
10. After installing the bushing, finish the bushing bore with a pin hole grinder.

Fig. 3-126



11. The fitting between bushing and pin should be such that the pin, when coated with engine oil, can be pushed in with thumb pressure at normal temperature.

Fig. 3-127

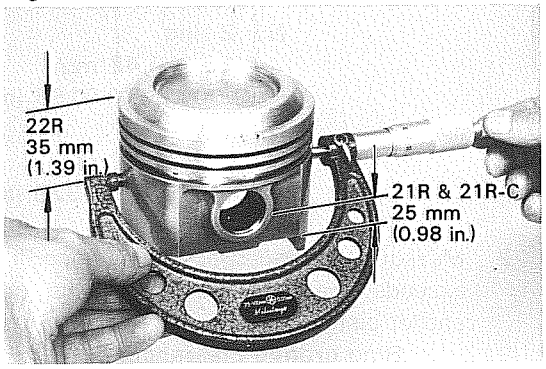


12. Inspect the connecting rod for bending or twisting.

Bend:
Limit 0.05 mm (0.0020 in.)

Twist:
Limit 0.15 mm (0.0059 in.)

Fig. 3-128

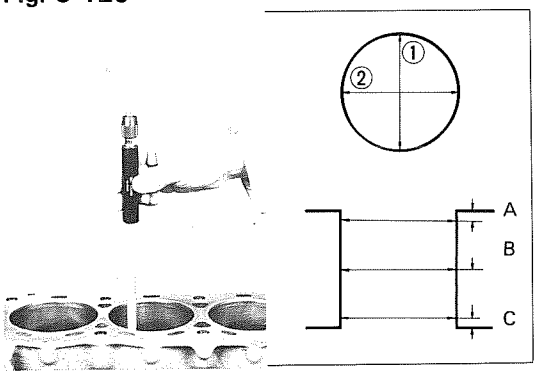


Piston Clearance

1. Measure the piston diameter at right angle to the piston pin center line. Measurement must be made at room temperature (20°C or 68°F).

Piston diameter:
STD 21R, 21R-C
83.96 – 83.99 mm
(3.3055 – 3.3067 in.)
22R
91.938 – 91.968 mm
(3.6196 – 3.6208 in.)

Fig. 3-129

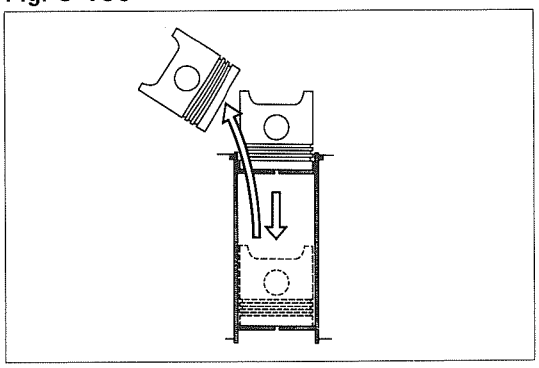


2. Measure the cylinder bore and subtract the piston measurement. If clearance exceeds specification, replace the piston.

Piston oil clearance:
21R, 21R-C
0.03 — 0.05 mm
(0.0012 — 0.0020 in.)
22R
0.052 — 0.072 mm
(0.0020 — 0.0028 in.)

— Note —
Use the measurement where the wear is at maximum.

Fig. 3-130



Piston Ring

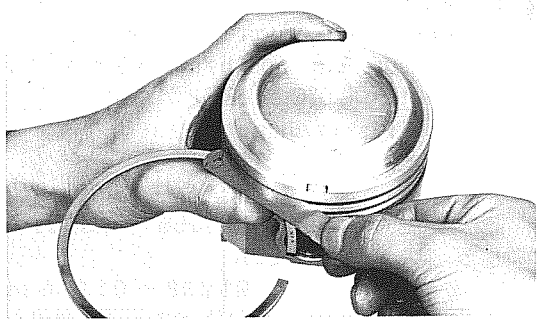
1. Measure the ring end gap.
   (1) Insert the ring into the cylinder using a piston. Position the ring at the lower part of the cylinder bore.

   (2) Measure the end gap. If it exceeds specification, the ring must be replaced.

End gap:
STD
21R & 21R-C
No. 1 ring
0.25 — 0.47 mm
(0.0098 — 0.0185 in.)
No. 2 ring
0.15 — 0.42 mm
(0.0059 — 0.0165 in.)
Oil ring
0.20 — 0.82 mm
(0.0079 — 0.0323 in.)
22R
No. 1 ring
0.24 — 0.39 mm
(0.0094 — 0.0154 in.)
No. 2 ring
0.18 — 0.42 mm
(0.0071 — 0.0165 in.)
Oil ring
0.20 — 0.82 mm
(0.0079 — 0.0323 in.)

Fig. 3-131

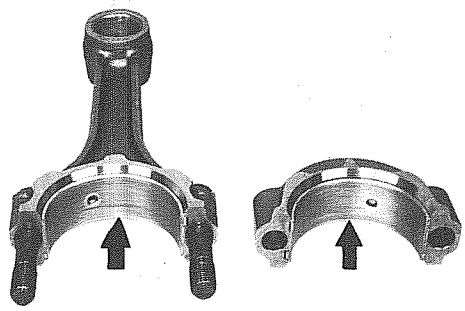
Fig. 3-132



2. Measure the ring groove clearance. If it exceeds specification, replace the ring and/or piston.

Ring groove clearance:
Compression No. 1 & No. 2
Limit 0.2 mm
(0.008 in.)

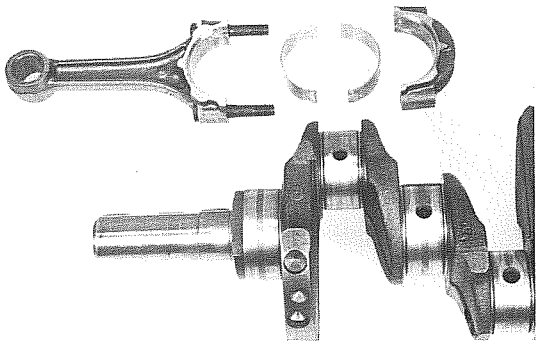
Fig. 3-133



Crankshaft Pin & Bearing

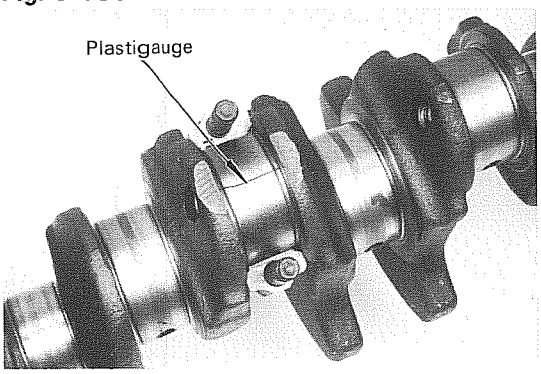
1. Check the bearings for flaking or scoring. If bearings are damaged, replace them.

Fig. 3-134



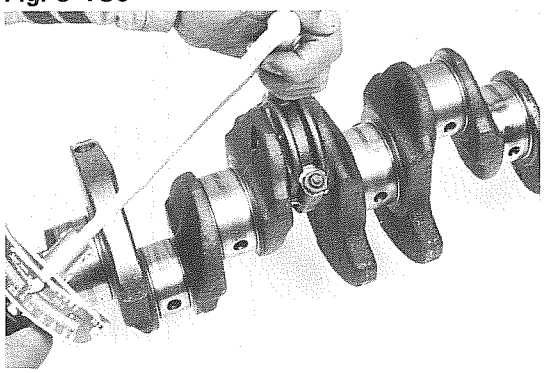
2. Measure the crank pin oil clearance.
   (1) Clean the crankshaft pin, rod, cap and bearing.

Fig. 3-135



(2) Lay a strip of plastigauge across the pin.

Fig. 3-136



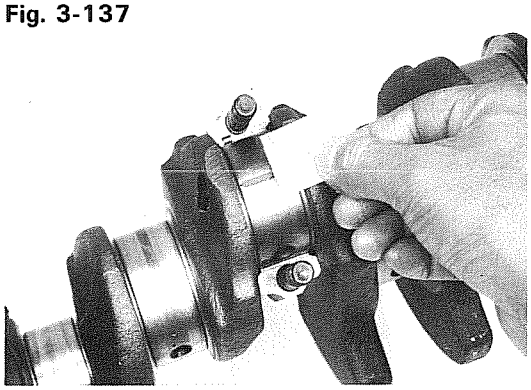
(3) Tighten the cap nuts to specified torque.

Tightening torque:
5.4 – 6.6 kg-m
(40 – 47 ft-lb)

(4) Loosen the cap nuts.

– Note –
Do not turn the connecting rod.

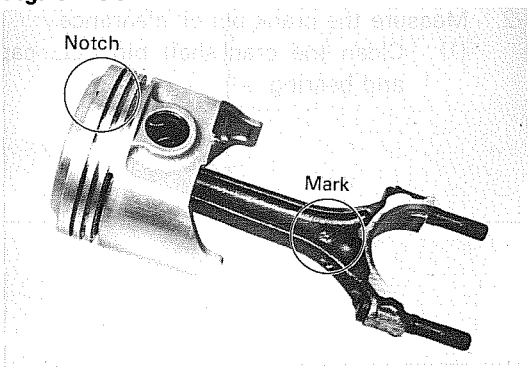
Fig. 3-137



(5) Measure the plastigauge at its widest point.
If clearance is not within specification, replace the bearings.

Bearing oil clearance:
STD 0.025 — 0.055 mm (0.0010 — 0.0022 in.)
Limit 0.08 mm (0.0031 in.)
U/S bearing size:
U/S 0.25

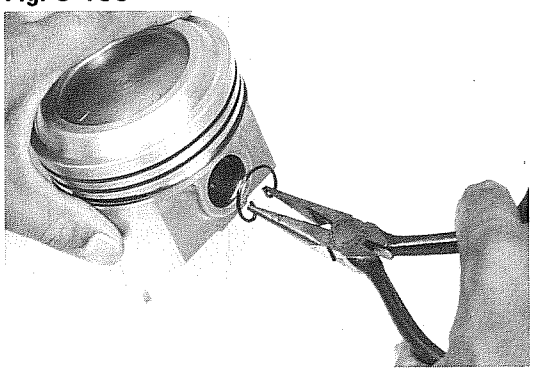
Fig. 3-138



Assemble The Piston & Connecting Rod

1. Align the notch on the piston with the mark on the connecting rod.

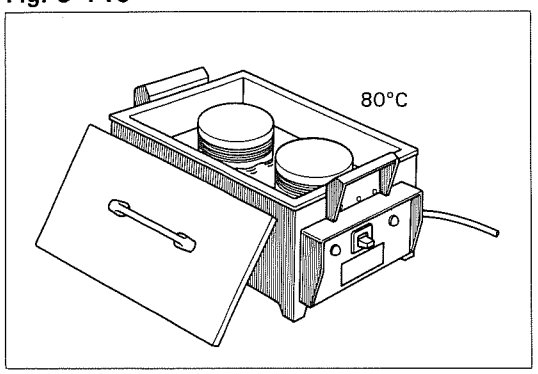
Fig. 3-139



2. Install a new snap ring in the hole on one side.

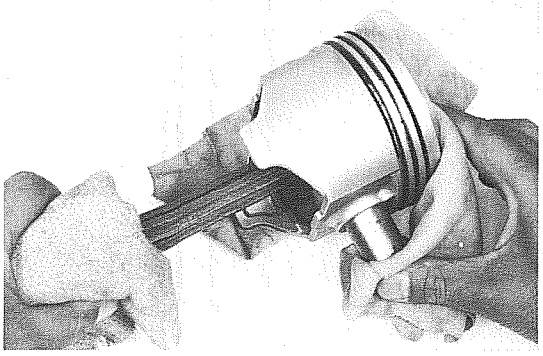
— Note —
Always replace the snap ring with new one when assembling.

Fig. 3-140



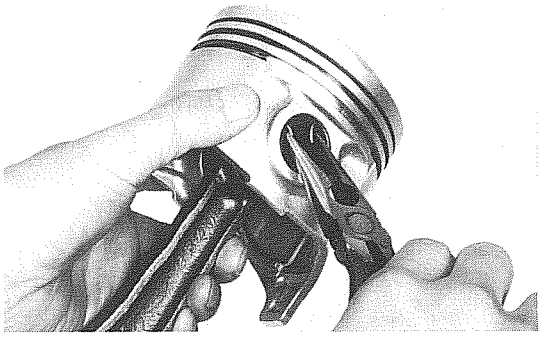
3. Heat the pistons to about 80°C (176°F) with a piston heater or such.

Fig. 3-141



4. Push in the piston pin.

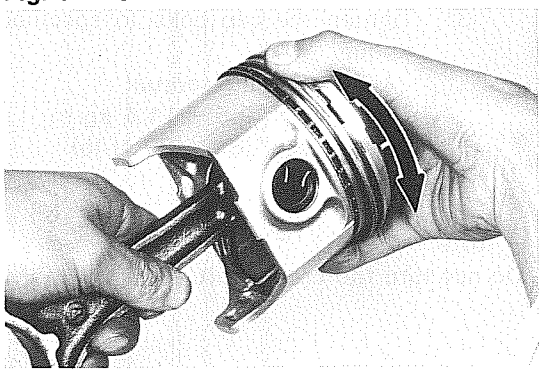
Fig. 3-142



5. Install a new snap ring on the other side.

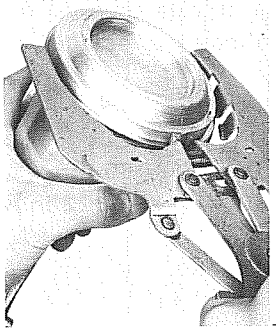
— Note —
Always replace the snap ring with new one when assembling.

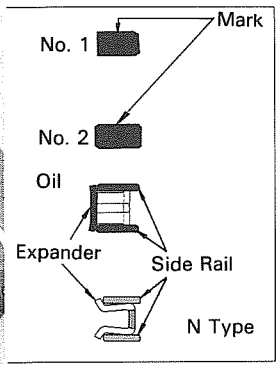
Fig. 3-143



6. Rock the piston and verify that movement is smooth.

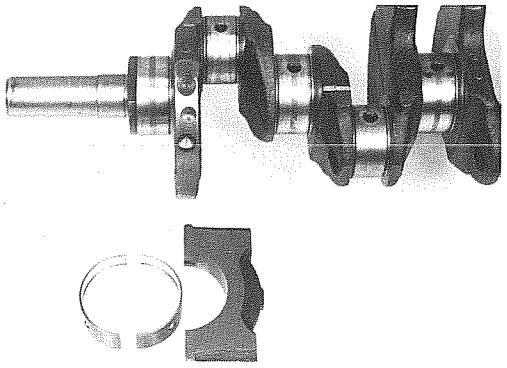
Fig. 3-144





7. Install the piston rings with a piston ring expander.
Install two compression rings with the code marks facing upward.

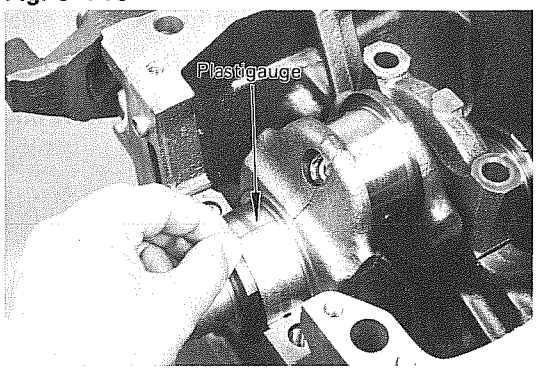
Fig. 3-145



Crankshaft & Bearing

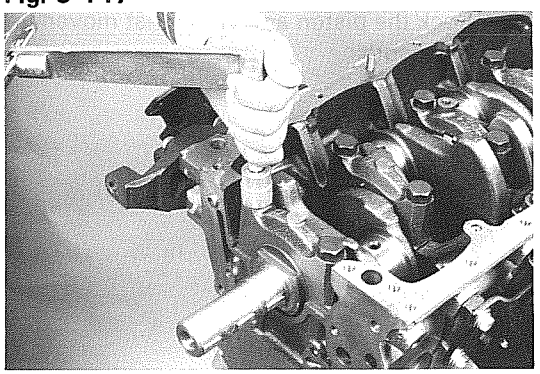
1. Measure the crankshaft oil clearance.
   (1) Clean the journal, cap and bearing.

Fig. 3-146



(2) Lay strip of plastigauge across the journal.

Fig. 3-147



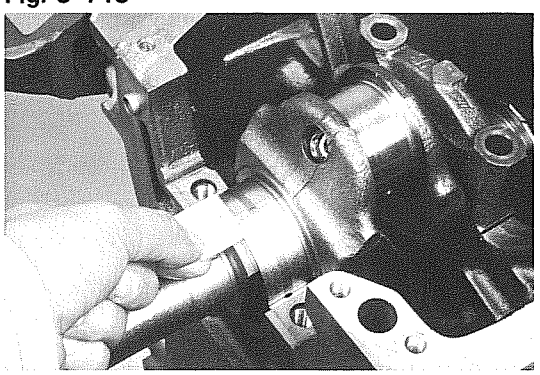
(3) Tighten the cap bolts to specified torque.

Tightening torque:
9.5 – 11.5 kg-m
(69 – 83 ft-lb)

(4) Loosen the cap bolts.

– Note –
Do not turn the crankshaft.

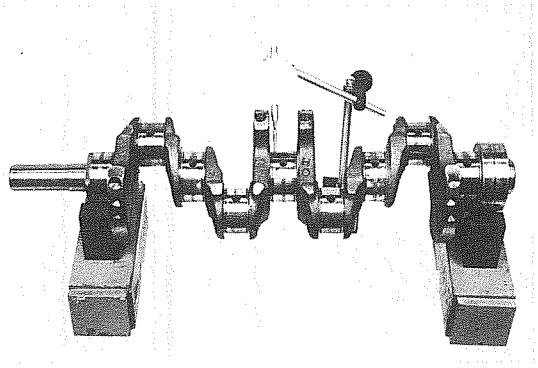
Fig. 3-148



(5) Measure the plastigauge at its widest point. If clearance is not within specification, replace the bearing.

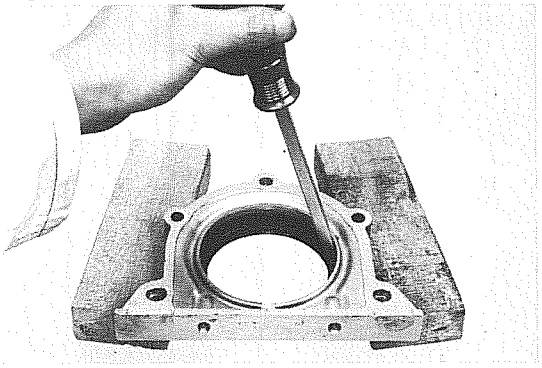
Journal oil clearance:
STD
0.025 – 0.055 mm
(0.0010 – 0.0022 in.)
Limit
0.08 mm
(0.0031 in.)
U/S bearing size:
U/S 0.25

Fig. 3-149



2. Measure the runout.
   Circle runout:
   Limit 0.1 mm (0.004 in.)

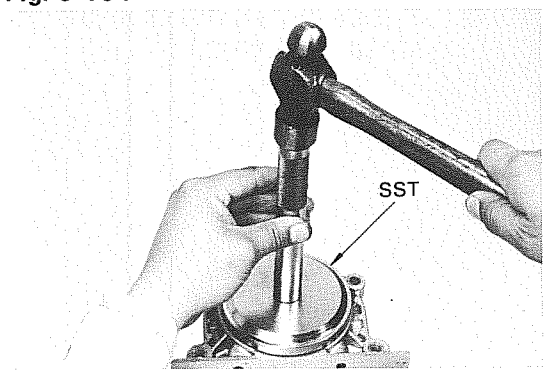
Fig. 3-150



Rear Oil Seal

1. Check the oil seal lip for wear or deformation.
2. Replace the rear oil seal.
   (1) Remove the oil seal with a screwdriver.

Fig. 3-151

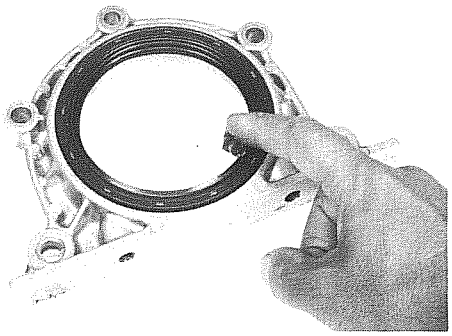


(2) Drive in a new oil seal with SST.
SST [09608-35013]

– Note –

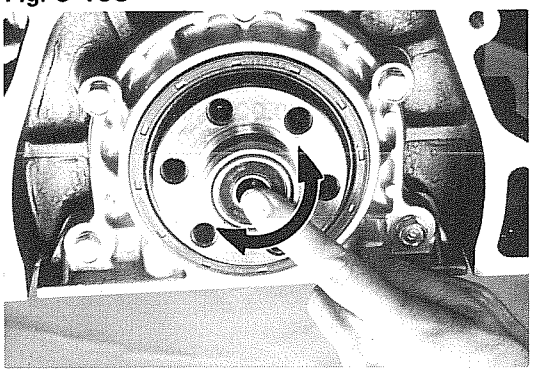
1. **Drive in the oil seal until it is about even with the rear oil seal retainer.**
2. **Be careful not to drive it in slantwise.**

Fig. 3-152



(3) After driving in the seal, coat the seal lip lightly with MP grease.

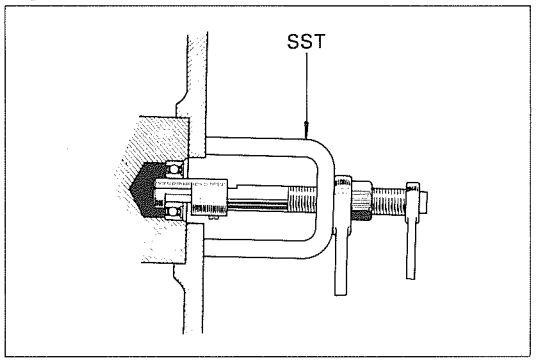
Fig. 3-153



Bearing (for Input Shaft Front)

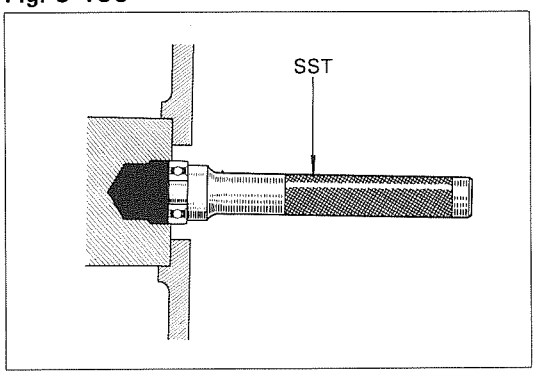
1. Inspect for wear or damage and replace if necessary.

Fig. 3-154



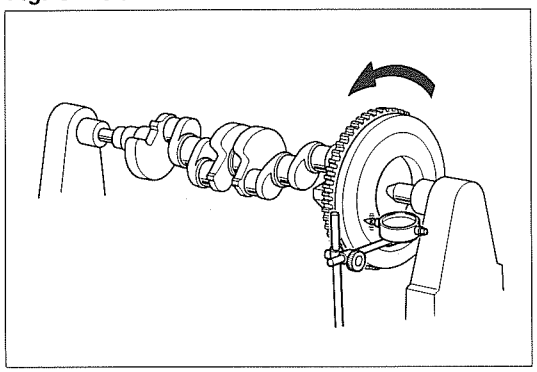
2. Replace the bearing.
   (1) Remove the bearing with SST.
   SST [09303-35011]

Fig. 3-155



(2) Install a new bearing with SST.
SST [09304-30012]

Fig. 3-156



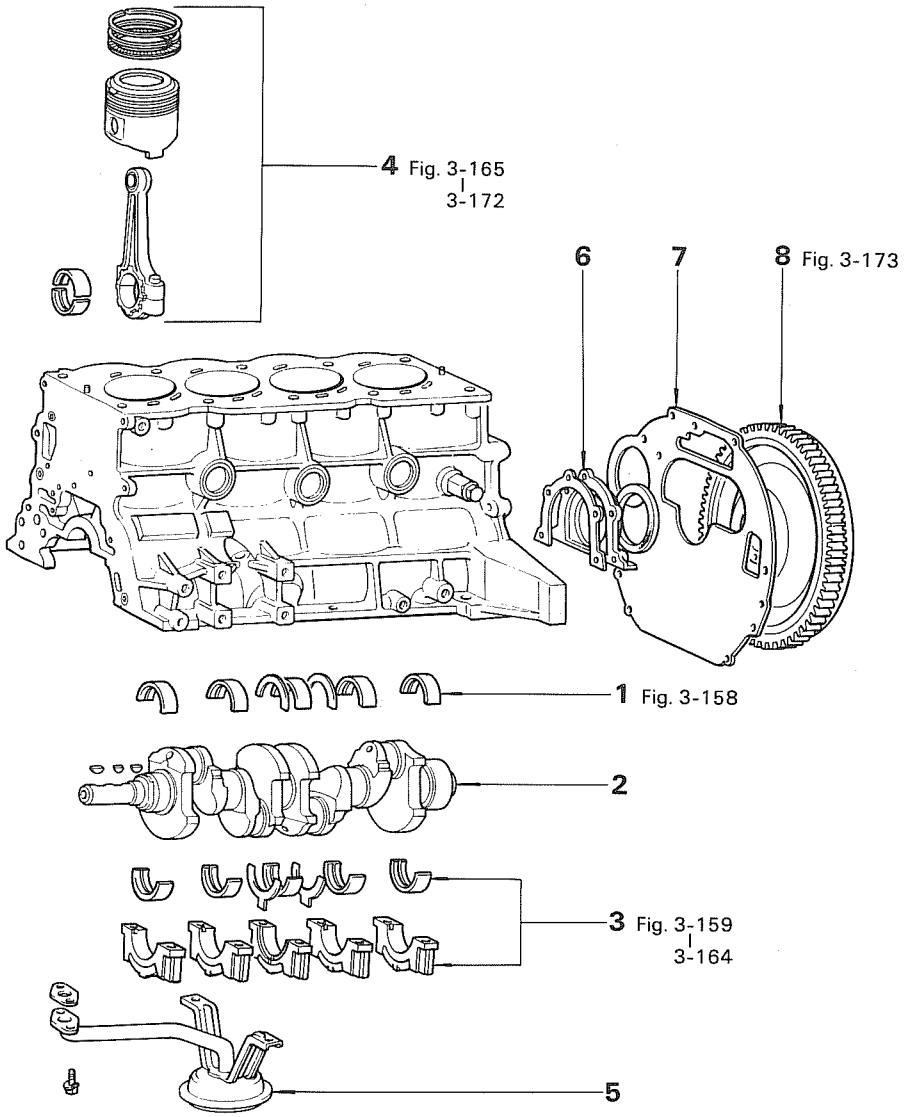
Flywheel

1. Check the surface contacting the clutch disc.
2. Measure the runout of the surface contacting the clutch disc.
   Runout:
   Limit 0.2 mm
   (0.008 in.)
3. Check the ring gear.

ASSEMBLY

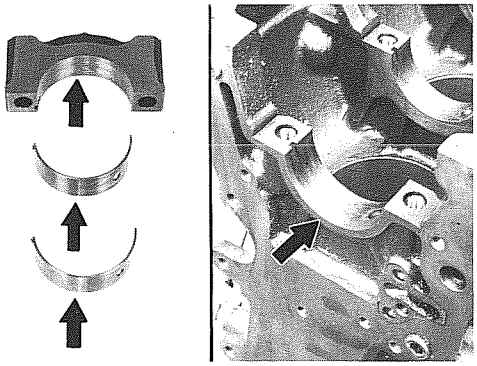
Assemble the parts in the numerical order shown in the figure.

Fig. 3-157



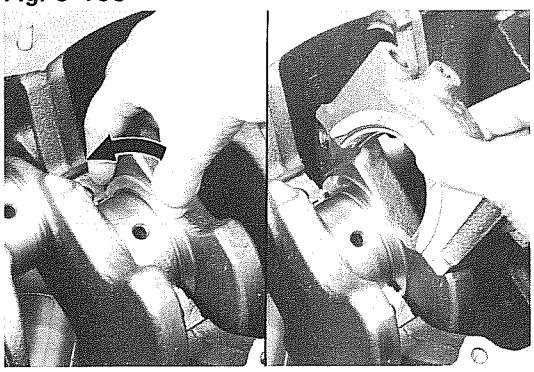
1. Crankshaft Bearing Upper Side
2. Crankshaft
3. Crankshaft Bearing Cap & Bearing Lower Side
4. Piston with Connecting Rod
5. Oil Strainer
6. Rear Oil Seal Retainer
7. Rear End Plate
8. Flywheel

Fig. 3-158



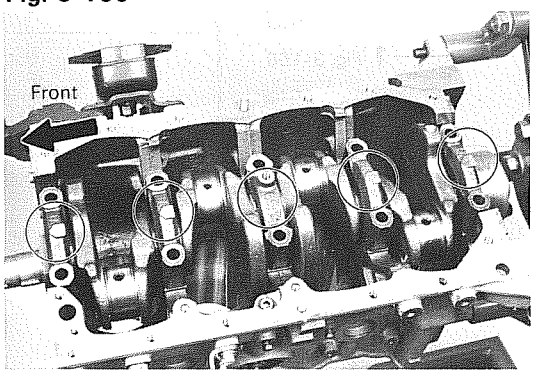
Do not allow oil to get on the back side of the bearing.

Fig. 3-159



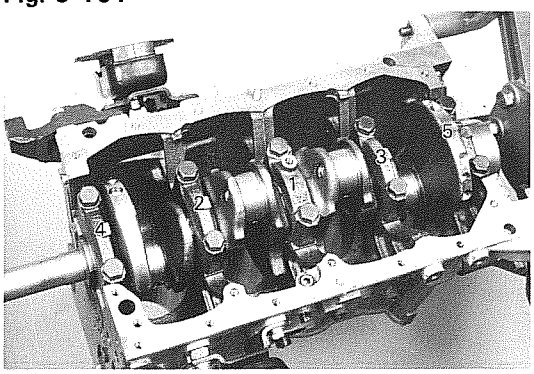
Face the oil groove of the thrust washer toward the outside.

Fig. 3-160



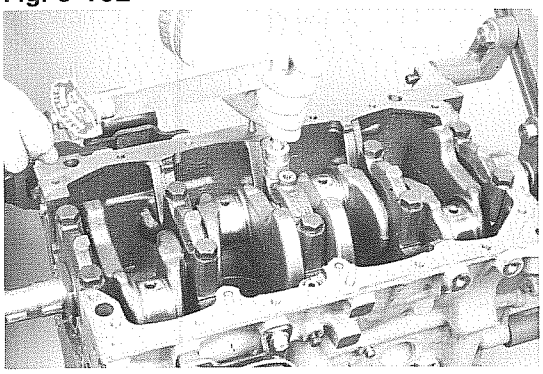
Face the arrows toward the front.

Fig. 3-161



Tighten each bearing cap a little at a time in the sequence shown in the figure.

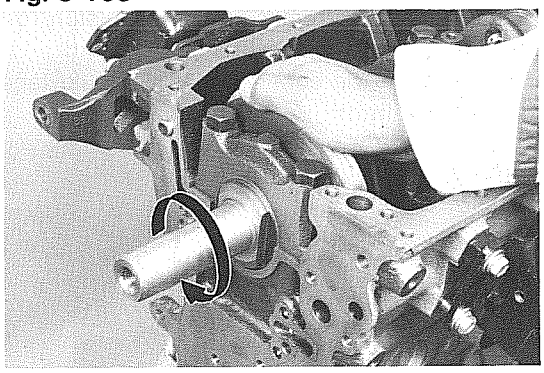
Fig. 3-162



Tighten the bearing caps to specified torque.

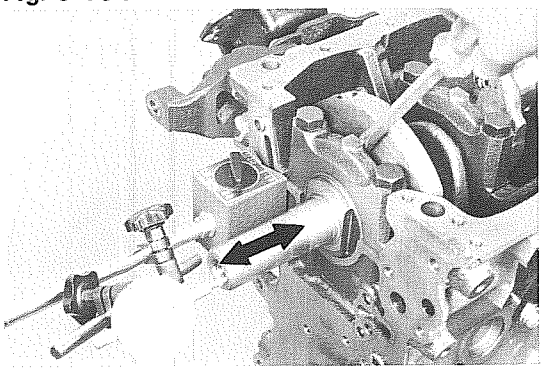
Tightening torque: 9.5 – 11.5 kg-m (69 – 83 ft-lb)

Fig. 3-163



After tightening each bolt, check the rotation.

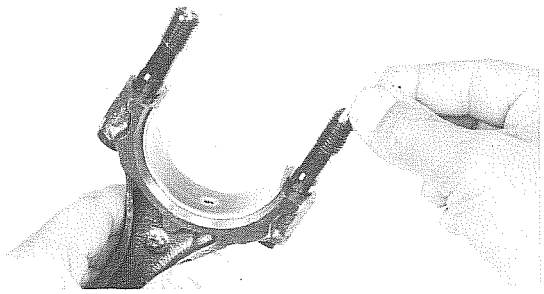
Fig. 3-164



Measure the crankshaft thrust clearance.
If it exceeds the limit, replace the thrust washer as a set.

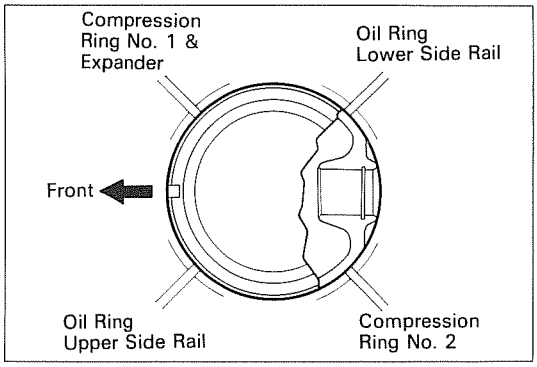
Thrust clearance:
STD 0.02 – 0.22 mm (0.0008 – 0.0087 in.)
Limit 0.3 mm (0.012 in.)
Thrust washer thickness:
STD 2.00 mm (0.0787 in.)
O/S washer size 0.125, 0.25

Fig. 3-165



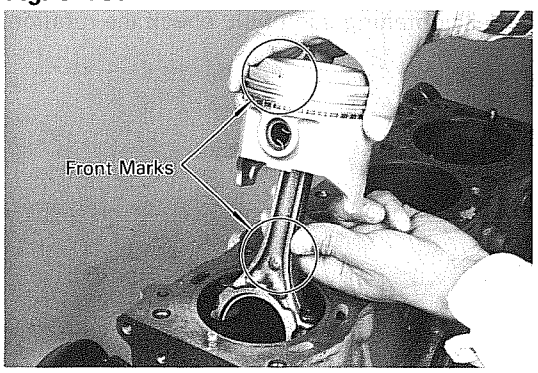
Cover the rod bolts with a hose to protect the crank pin and cylinder bore from damage.

Fig. 3-166



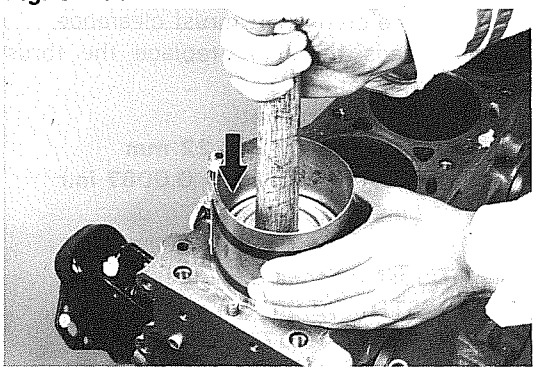
Position the ring gap in the direction shown in the figure.

Fig. 3-167



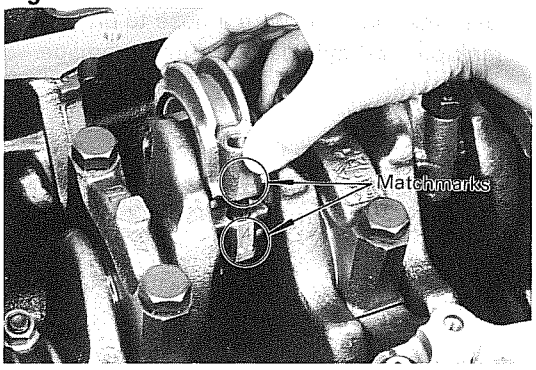
Push in each correctly numbered piston/rod assembly with the notch facing forward. The mark on the connecting rod should face toward the front.

Fig. 3-168



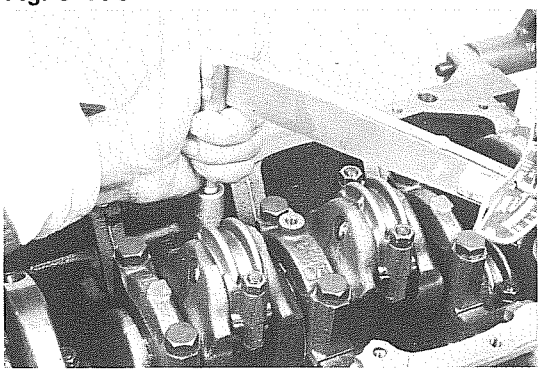
Insert the pistons into the cylinder while compressing the ring with a piston compressor.

Fig. 3-169



Align the rod and cap marks, and fit on the cap.

Fig. 3-170



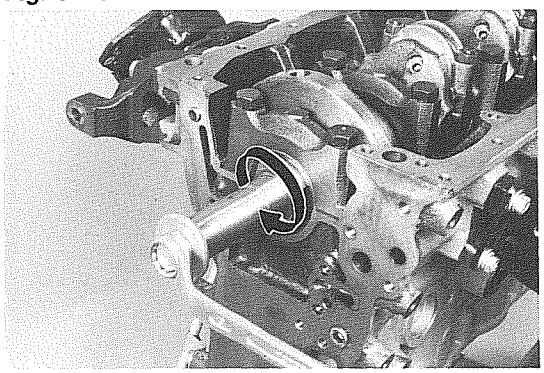
Tighten the rod cap to specified torque.

Tightening torque: 5.4 – 6.6 kg-m (40 – 47 ft-lb)

– Note –

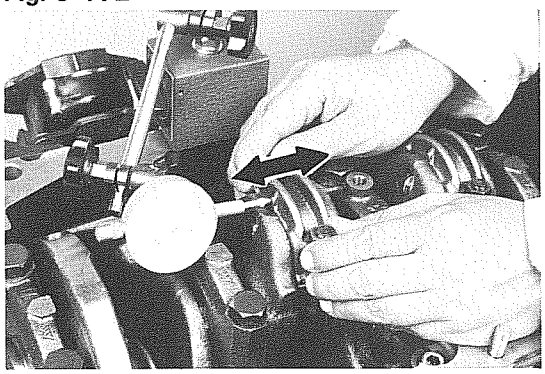
Check for smooth rotation after tightening each cap.

Fig. 3-171



Make sure that the crankshaft rotates smoothly.

Fig. 3-172



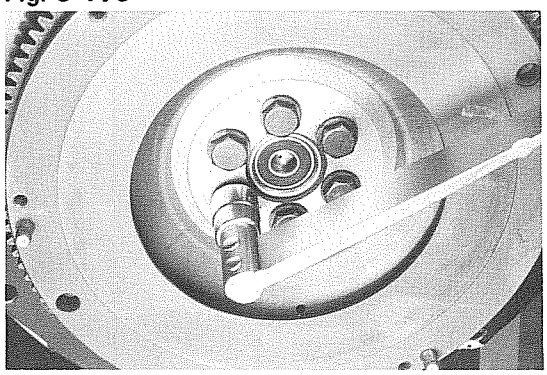
Check the connecting rod thrust clearance.

Thrust clearance:

STD 0.16 – 0.26 mm (0.0063 – 0.0102 in.)

Limit 0.3 mm (0.012 in.)

Fig. 3-173



Tighten the flywheel to specified torque.

Tightening torque: 10.0 – 12.0 kg-m (73 – 86 ft-lb)

MEMO