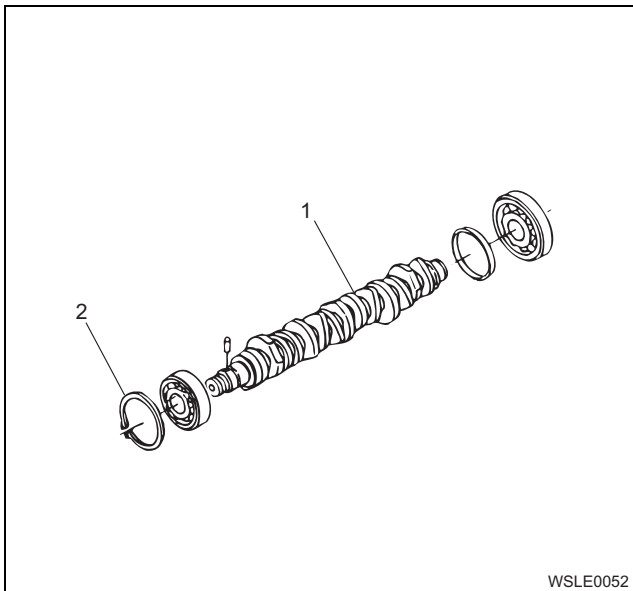


Removal

1. Remove the EGR cooler and the bracket.
Refer to 1A-20, "Removal, Engine Exterior Equipment".
2. Remove the cylinder head cover.
Refer to 1A-20, "Removal, Engine Exterior Equipment".
3. Remove the rocker arm bracket.
Refer to 1A-37, "Removal, Rocker Arm Shaft".
4. Remove the cylinder head.
Refer to 1A-43, "Removal, Cylinder Head".
5. Remove the tappet.
Refer to 1A-43, "Removal, Cylinder Head".
6. Remove the timing gear case.
Refer to 1A-69, "Removal, Crankshaft Front Oil Seal".
7. Remove the camshaft gear.
 - a. Pull out the sleeve from the end of the camshaft.
 - b. Remove the lock nut from the camshaft gear, and remove the flyweight ASM and the camshaft gear.
8. Remove the camshaft.
 - a. Remove the snap ring which holds the front bearing of the camshaft from the ring groove of the cylinder block.
 - b. Pull out the camshaft with the bearing from the cylinder block.



Name

1. Camshaft
2. Snap Ring

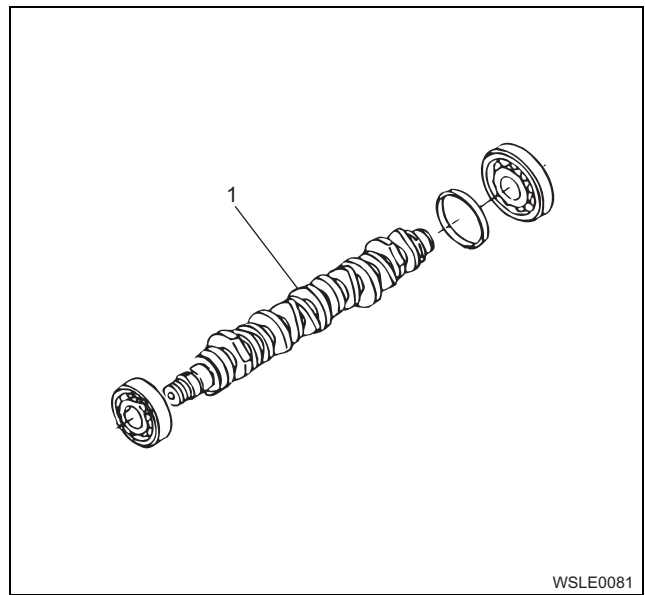
Inspection

Inspection of camshaft

Check the journal portion and the cam portion for wear, damage, and other abnormality.

CAUTION:

The ball bearings are fitted to the front and rear parts of the camshaft. Also, the roller bearing is press-fitted to the cylinder block at the center part. Check that each bearing has no rattle and rotates smoothly with this condition.



Name

1. Camshaft

Inspection of journal and cam

1. Height of the cam (A – B)

| | | | mm {in} |
|---------|----------------|---------------|---------------------|
| | Standard value | Service limit | Repairing procedure |
| Inlet | 6.13 {0.241} | 5.83 {0.230} | Replace. |
| Exhaust | 6.43 {0.253} | 6.13 {0.241} | |

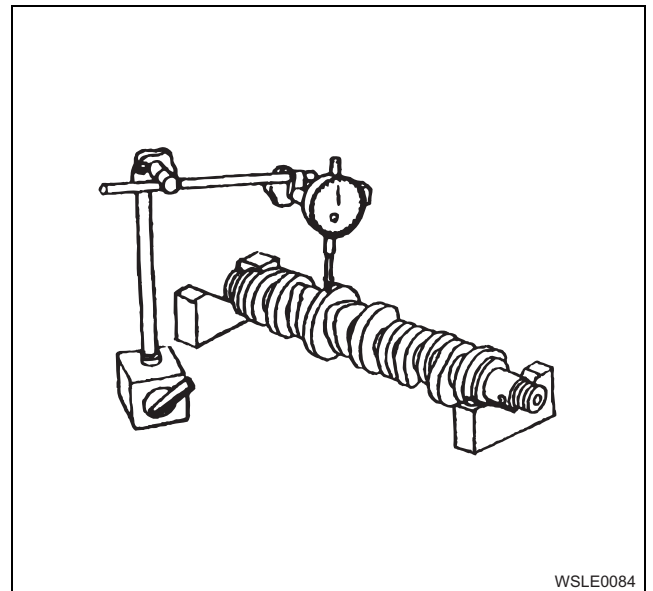
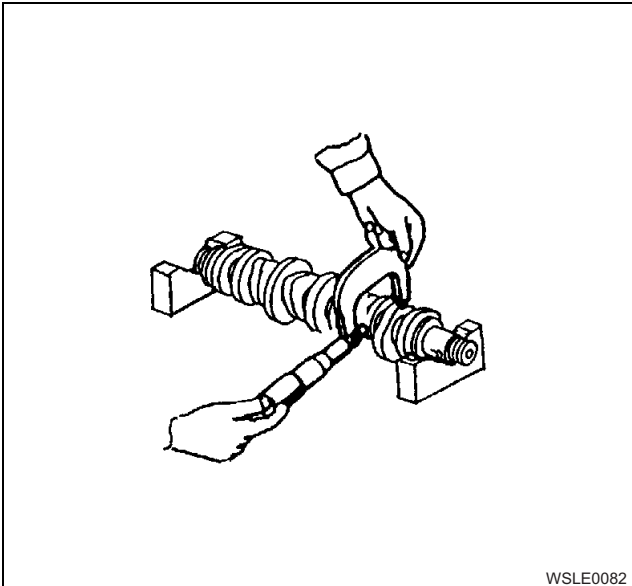
2. Center journal diameter (the dimensions in X – X and Y – Y directions)

| | | | mm {in} |
|-------------------|----------------|---------------------|---------|
| Nominal dimension | Service limit | Repairing procedure | |
| φ52 {2.047} | φ51.92 {2.044} | Replace. | |

3. Uneven wear of the journal (the difference between the measurements in X – X and Y – Y directions)

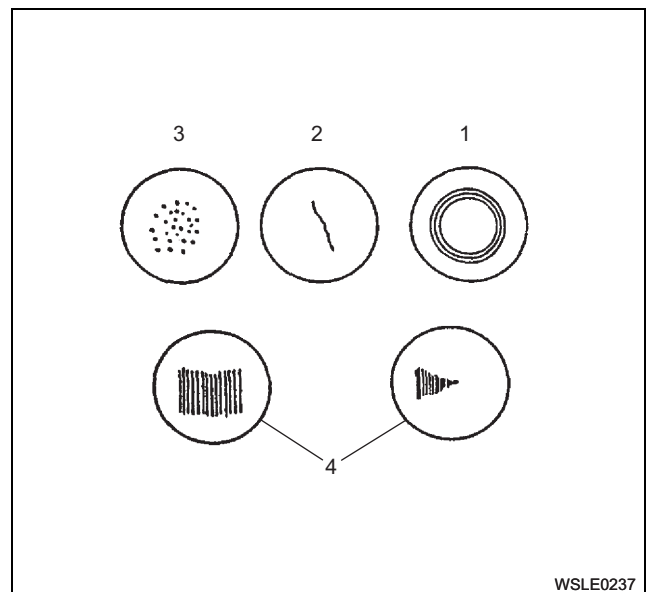
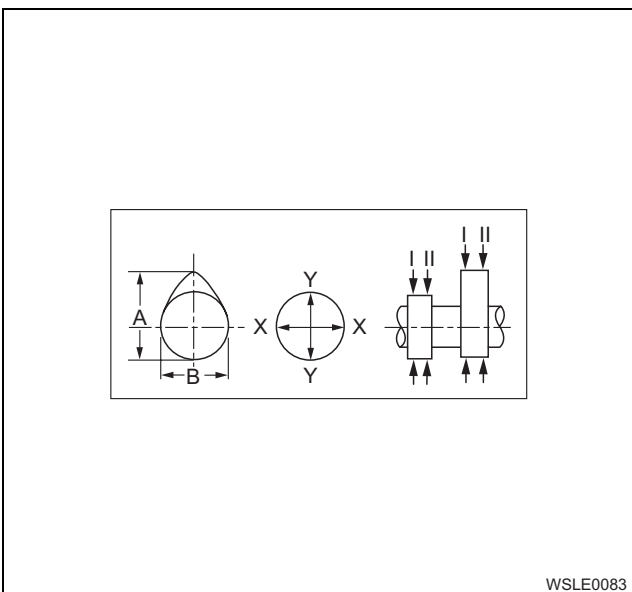
| mm {in} | | |
|-------------------|---------------|---------------------|
| Nominal dimension | Service limit | Repairing procedure |
| φ52 {2.047} | 0.05 {0.002} | Replace. |

| mm {in} | | |
|-----------------------|---------------|---------------------|
| Standard value | Service limit | Repairing procedure |
| 0.02 {0.0008} or less | 0.1 {0.0039} | Replace. |



Inspection of tappet

Check the contact surface with the camshaft. If there is pitching, defective contact, vermiculation, or crack, replace the tappet.



Inspection of camshaft runout

1. Put the camshaft on the V block.
2. Place the dial gauge to the center journal part.
3. Rotate the camshaft once and read the deflection of the indicator.
If the measured value exceeds the limit, replace the camshaft.

Name

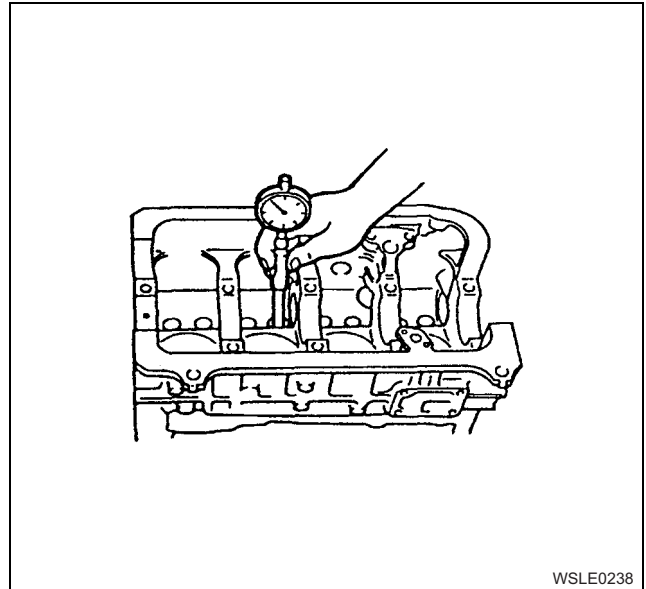
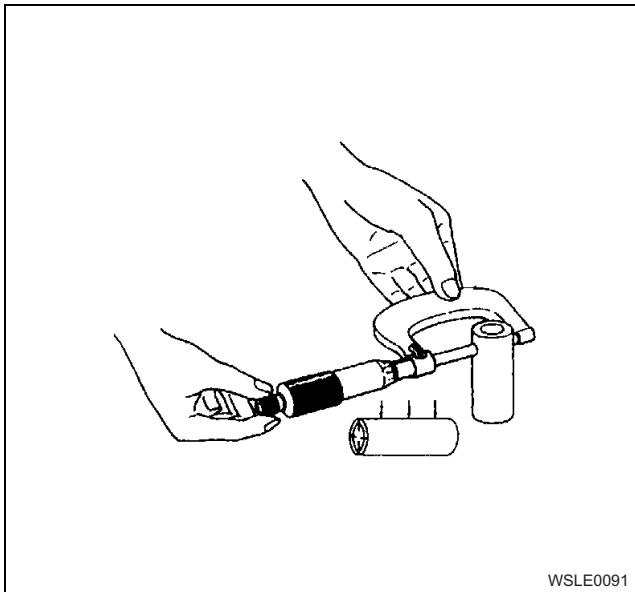
1. Normal
2. Cracks
3. Pitching
4. Abnormal Contact

Inspection for wear of the tappet outside diameter

Use a micrometer to measure the outside diameter of the tappet.

If the measured value exceeds the limit, replace the tappet.

| Outside diameter of the tappet | | mm {in} |
|--|----------------|---------|
| Standard value | Service limit | |
| $\phi 20.97 - 20.98$ {0.8256 — 0.8260} | 20.92 {0.8240} | |



Inspection of clearance between the tappet and the cylinder block

Use the bore gauge to measure the bore diameter of the tappet insertion hole on the cylinder block and calculate the clearance.

| Clearance between the tappet and the cylinder block hole | | mm {in} |
|--|---------------|---------|
| Standard value | Service limit | |
| 0.020 — 0.054 {0.0008 — 0.0021} | 0.1 {0.0039} | |

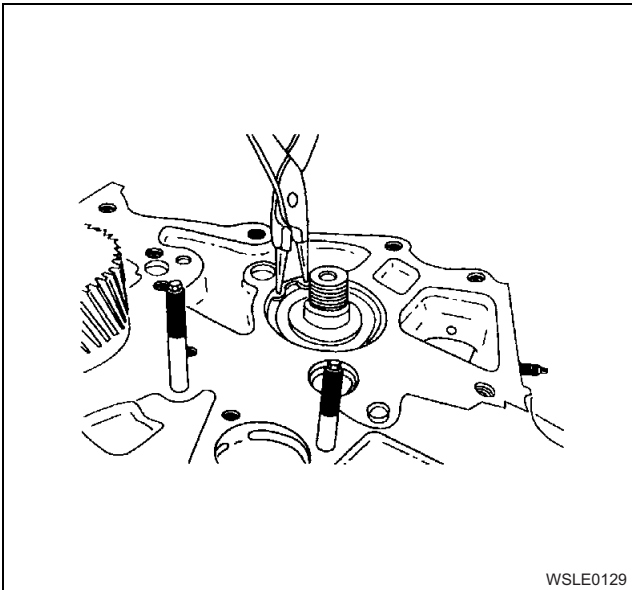
Installation

1. Install the camshaft ASM.
 - a. Apply engine oil to the camshaft journal, bearing, cam surface, and the inside of the cylinder block bearing. Then assemble the camshaft ASM.

CAUTION:

Be careful not to damage the bearing when assembling.

- b. Install the snap ring to the outside of the front bearing, and check that the camshaft rotates smoothly.



2. Install the camshaft gear and the sleeve.
 - a. Install the camshaft gear to the camshaft with its timing point (black dot) facing the forward direction.
 - b. Assemble the flyweight, apply engine oil to the thread and the seating surface of the lock nut, and tighten.

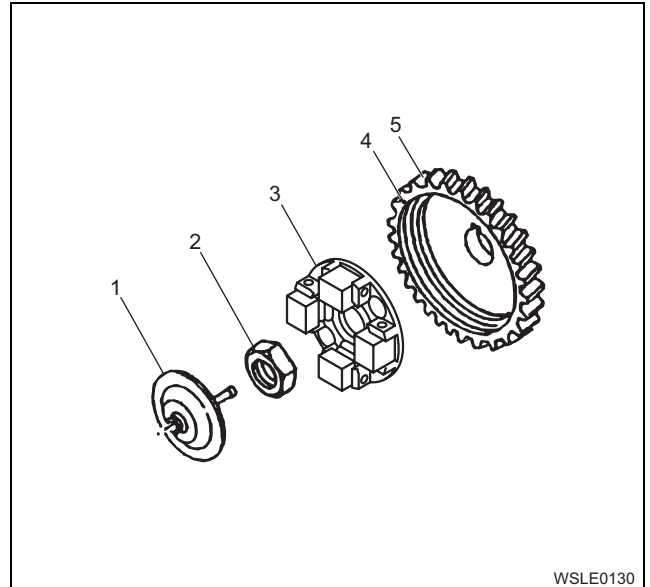
Tightening torque:

165 — 185 N·m {16.8 — 18.8 kgf·m/121.7 — 136.4 lb·ft}

- c. Apply engine oil to the sleeve shaft and the sliding surface of the flyweight.
- d. Insert the sleeve collar section to the concave portion of the flyweight. Then insert the sleeve shaft to the end of the camshaft.

Note:

Check that the sleeve moves smoothly.



Name

1. Sleeve
2. Lock Nut
3. Flyweight
4. Timing Point
5. Camshaft Gear

3. Install the timing gear case.
Refer to 1A-70, "Installation, Crankshaft Front Oil Seal".
4. Install the tappet.
Refer to 1A-52, "Installation, Cylinder Head".
5. Install the cylinder head.
Refer to 1A-52, "Installation, Cylinder Head".
6. Install the rocker arm bracket.
Refer to 1A-40, "Installation, Rocker Arm Shaft".
7. Install the cylinder head cover.
Refer to 1A-26, "Installation, Engine Exterior Equipment".

Torque Specifications

