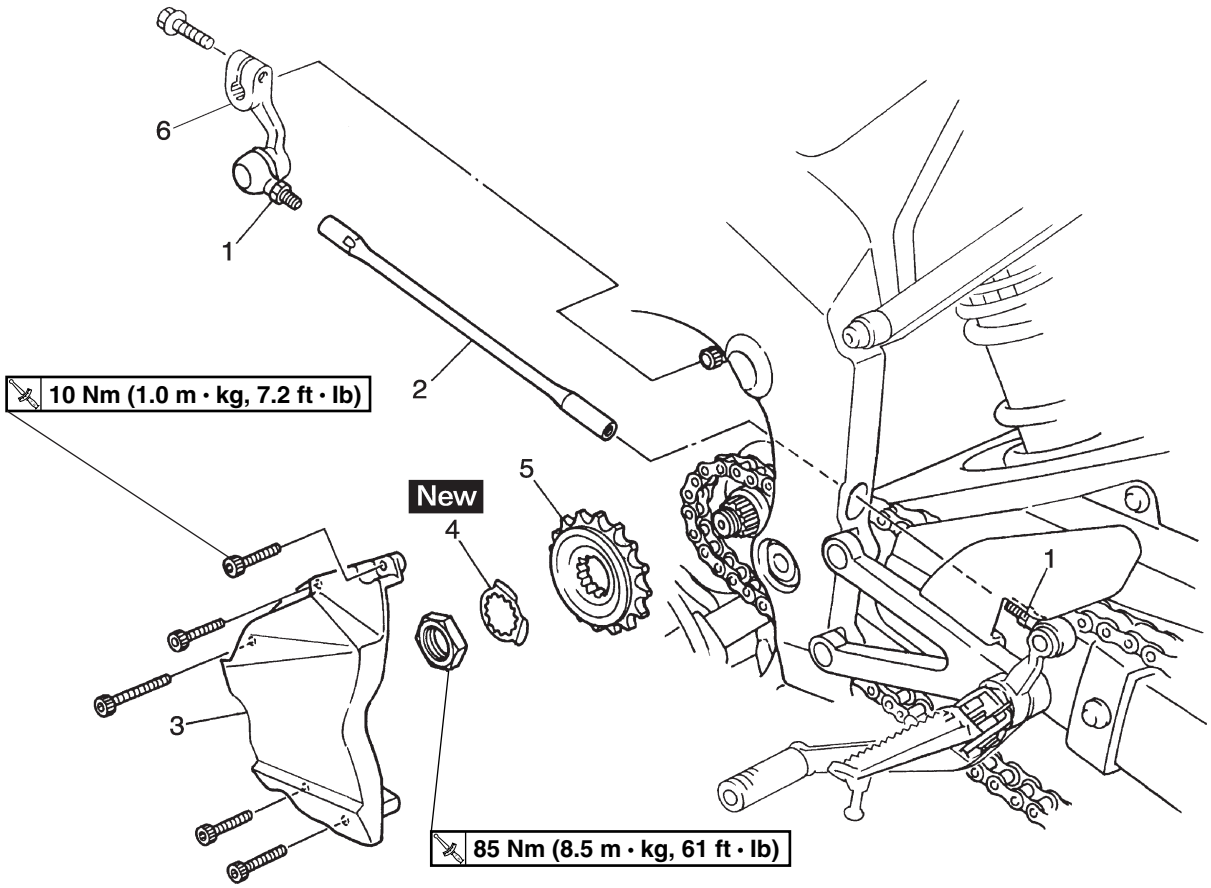
EAS00188

OVERHAULING THE ENGINE

ENGINE

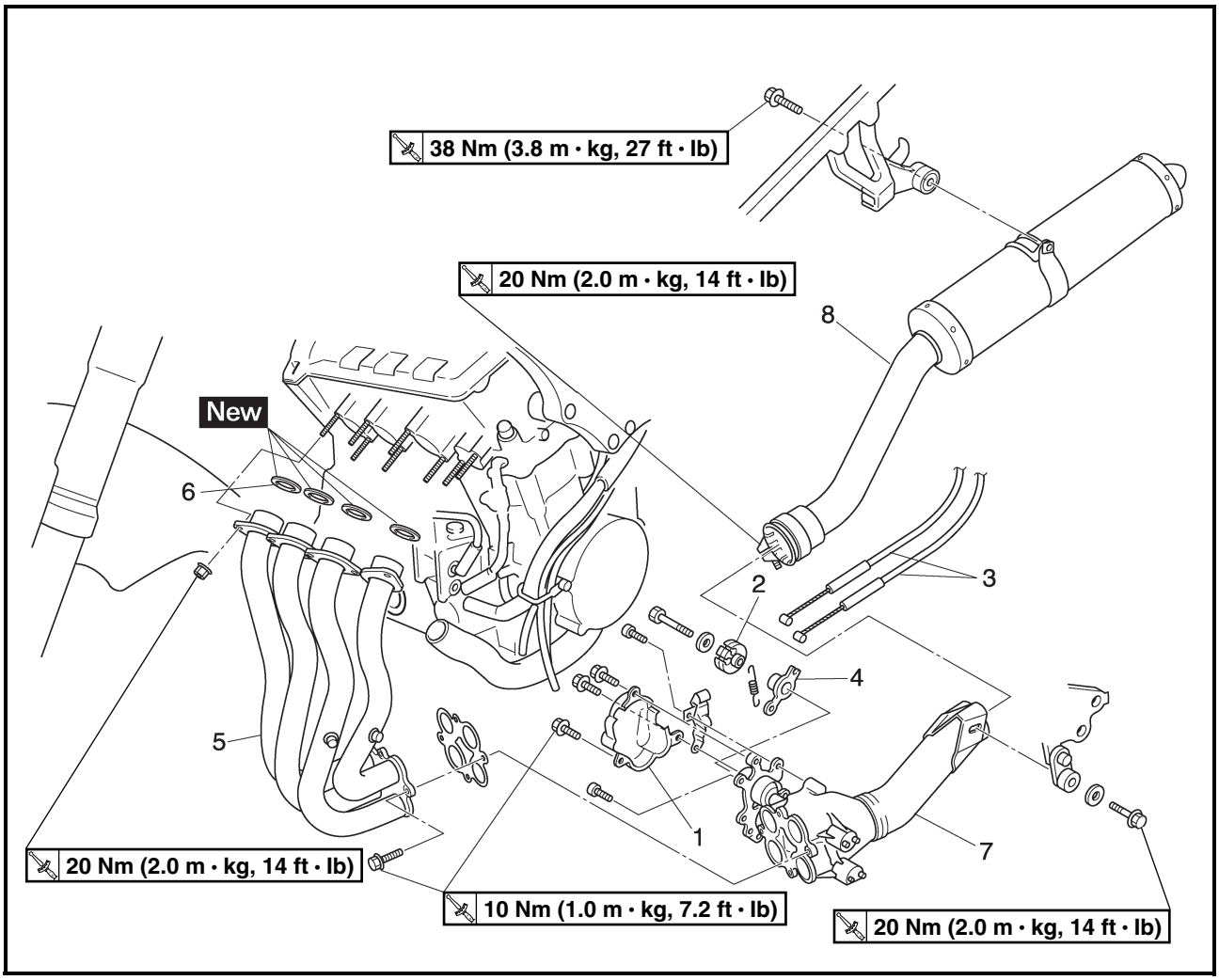
DRIVE SPROCKET



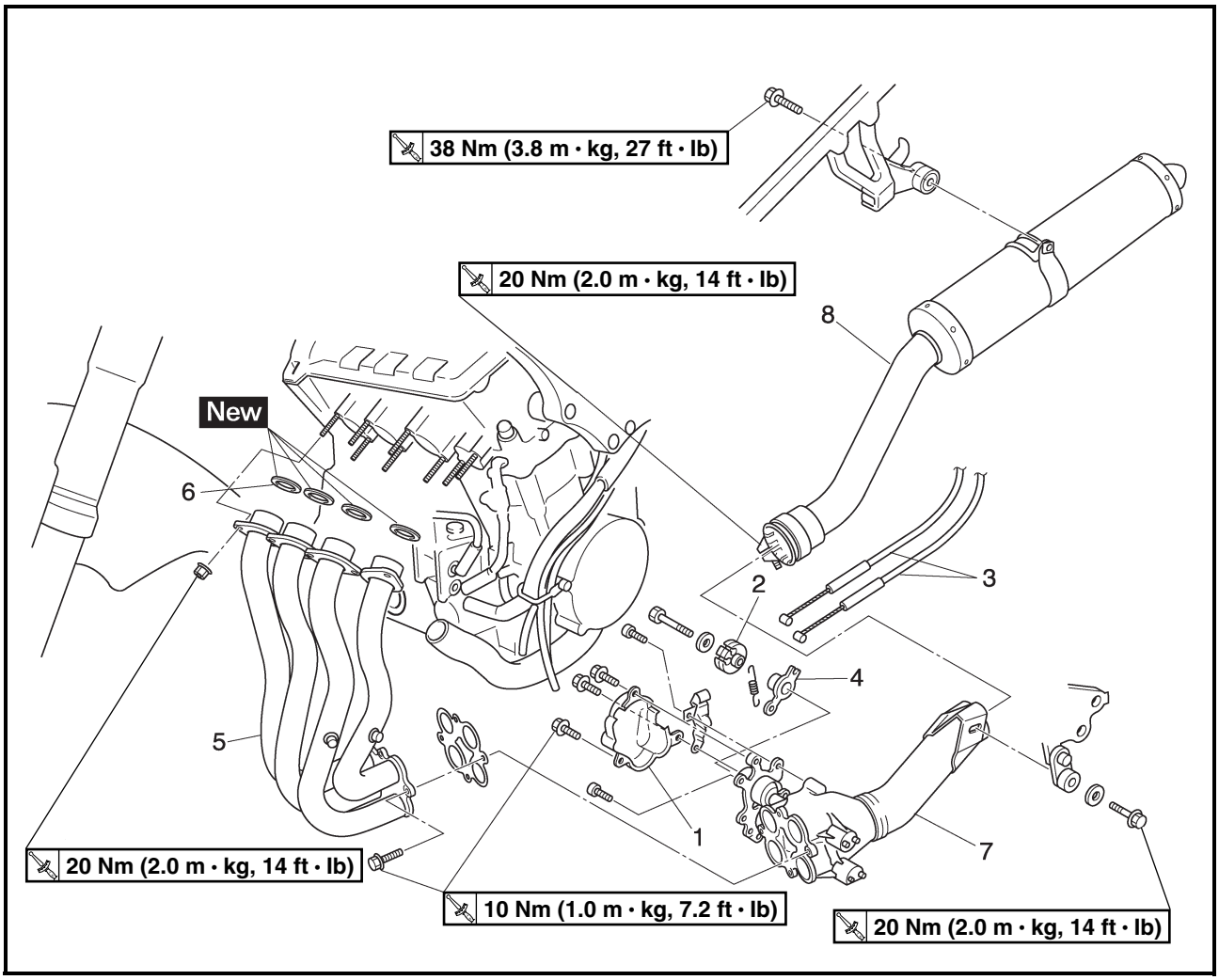
Order	Job/Part	Q'ty	Remarks
	Removing the drive sprocket		Remove the parts in the order listed.
1	Locknut	2	
2	Shift rod	1	
3	Drive sprocket cover	1	
4	Lock washer	1	
5	Drive sprocket	1	
6	Shift arm	1	
			For installation, reverse the removal procedure.

EAS00189

EXHAUST PIPE

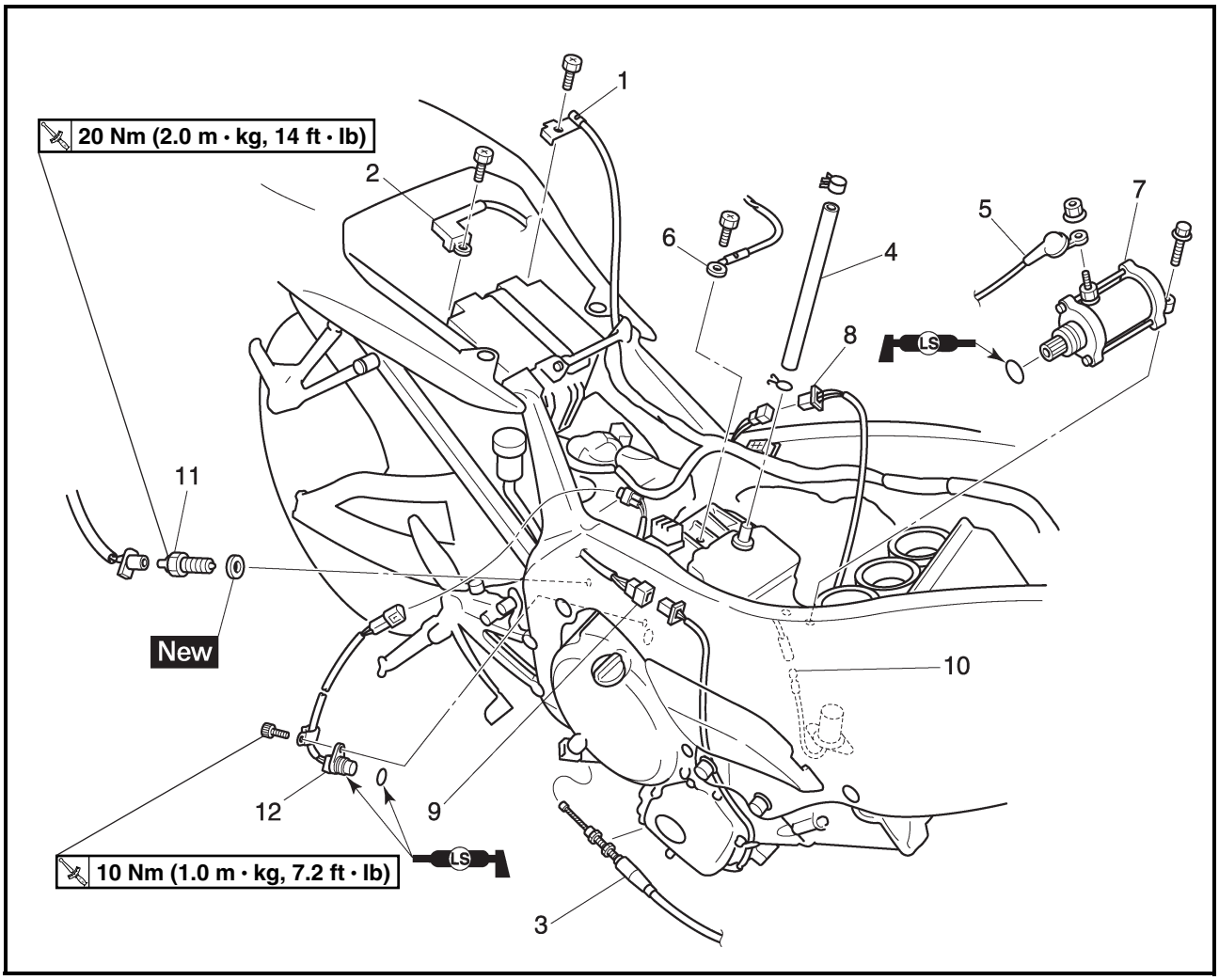


Order	Job/Part	Q'ty	Remarks
	Removing the exhaust pipe		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling and side cowlings		Refer to "COWLINGS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly		Refer to "RADIATOR" in chapter 6.
1	EXUP valve pulley cover	1	
2	EXUP valve pulley	1	
3	EXUP cable	2	
4	EXUP valve linkage	1	
5	Exhaust pipe assembly	1	
6	Exhaust pipe gasket	4	

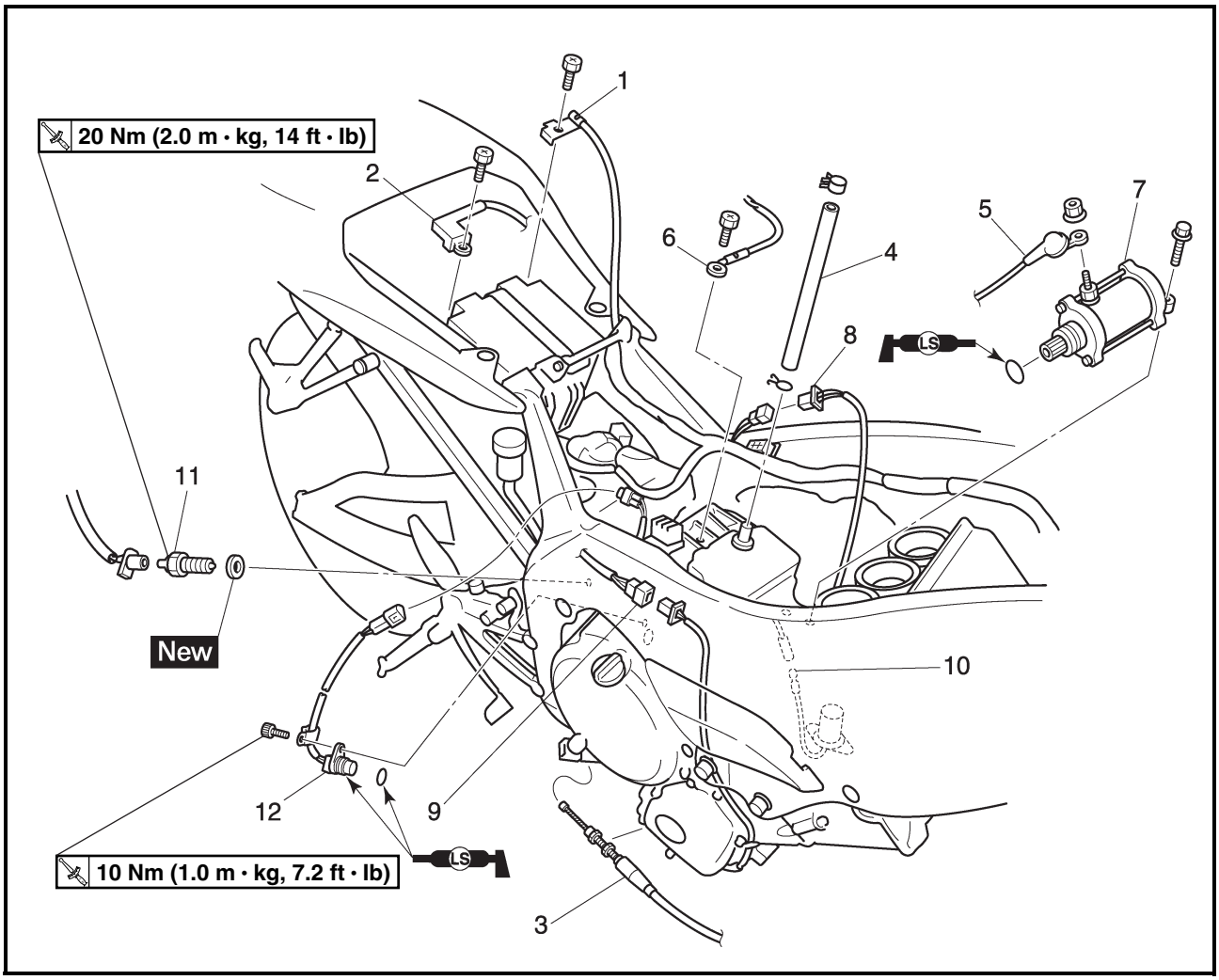


Order	Job/Part	Q'ty	Remarks
7	Exhaust valve pipe	1	
8	Muffler	1	
			For installation, reverse the removal procedure.

LEADS AND HOSES



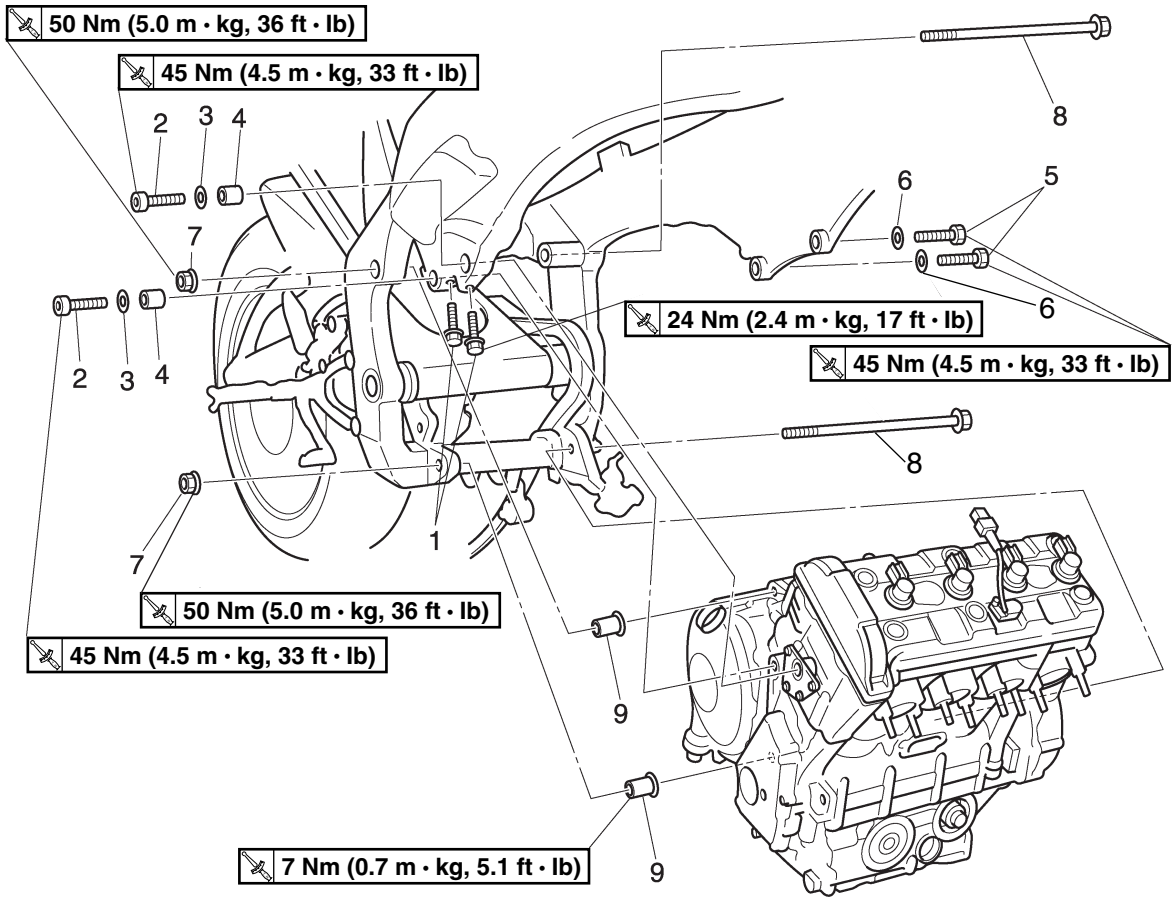
Order	Job/Part	Q'ty	Remarks
	Disconnecting the leads and hoses		Disconnect the parts in the order listed.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Throttle body assembly		Refer to "THROTTLE BODIES" in chapter 7.
	Engine oil and oil filter cartridge		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Oil cooler and thermostat assembly		Refer to "OIL COOLER" and "THERMOSTAT" in chapter 6.
1	Battery negative lead	1	**CAUTION:** **First, disconnect the negative lead, then the positive lead.**
2	Battery positive lead	1	



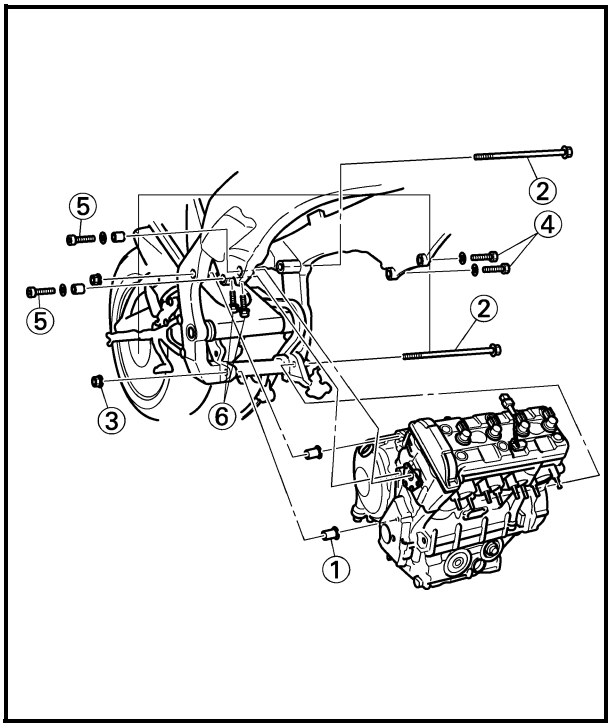
Order	Job/Part	Q'ty	Remarks
3	Clutch cable	1	
4	Crankcase breather hose	1	
5	Starter motor lead	1	Disconnect.
6	Ground lead	1	Disconnect.
7	Starter motor	1	
8	Stator coil assembly coupler	1	Disconnect.
9	Pickup coil coupler	1	Disconnect.
10	Oil level switch connector	1	Disconnect.
11	Neutral switch	1	
12	Speed sensor	1	
			For connecting, reverse the disconnection procedure.

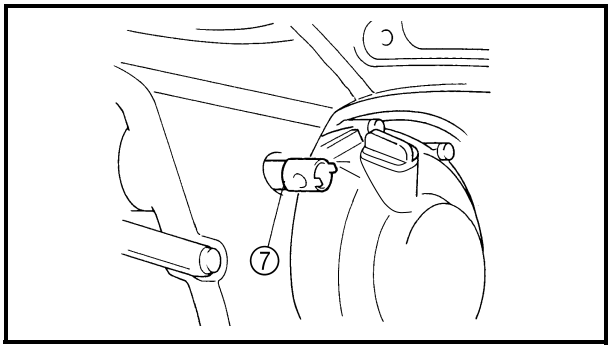
EAS00191

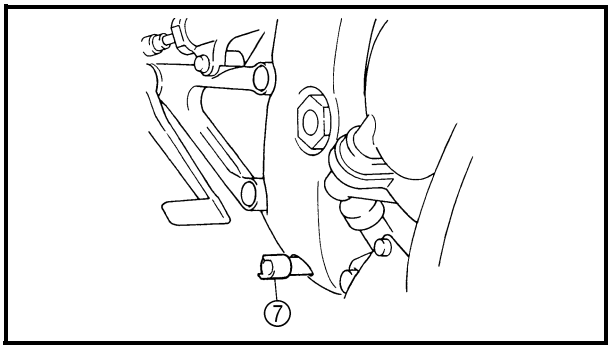
ENGINE

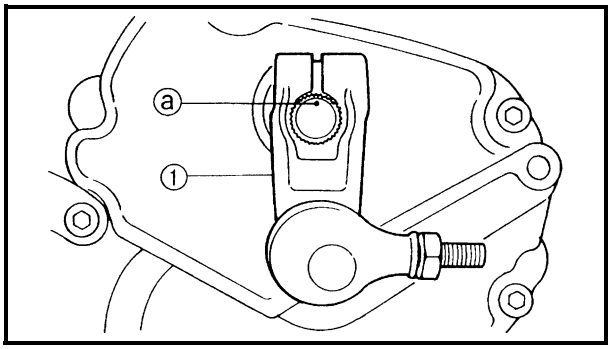


Order	Job/Part	Q'ty	Remarks
	Removing the engine		Remove the parts in the order listed. **NOTE:** Place a suitable stand under the frame and engine.
1	Pinch bolt	2	Loosen.
2	Right front mounting bolt	1	
3	Washer	1	
4	Spacer	1	
5	Left front mounting bolt	2	
6	Washer	2	
7	Self-locking nut	2	
8	Rear mounting bolt	2	
9	Engine mounting adjust bolt	2	
			For installation, reverse the removal procedure.









EAS00192
INSTALLING THE ENGINE

1. Install:
   - engine mounting adjust bolts ①
   - rear mounting bolts ②
   - self-locking nuts ③
   - left front mounting bolt ④
   - right front mounting bolt ⑤
   - pinch bolt ⑥

NOTE:
- Lubricate the rear mounting bolt threads with lithium soap base grease.
- Do not fully tighten the bolts.

NOTE:
Use the pivot shaft wrench ⑦ to tighten the engine mounting adjust bolt.

	Pivot shaft wrench **YM-01471**

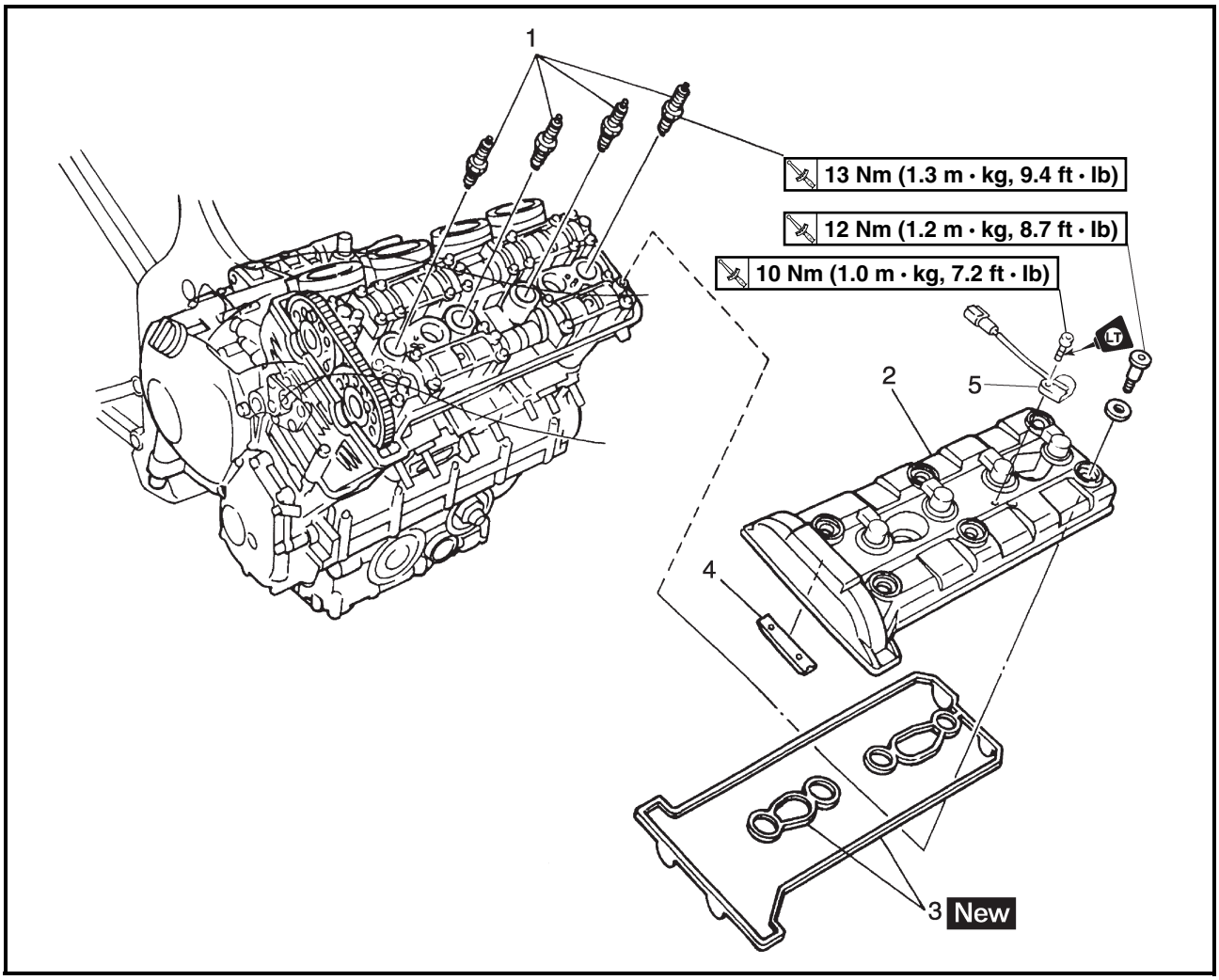
2. Tighten the bolts in the following order.

	Engine mounting adjust bolt ① **7 Nm (0.7 m · kg, 5.1 ft · lb)** **Self-locking nut ③** **50 Nm (5.0 m · kg, 36 ft · lb)** **Left front mounting bolt ④** **45 Nm (4.5 m · kg, 33 ft · lb)** **Right front mounting bolt ⑤** **45 Nm (4.5 m · kg, 33 ft · lb)** **Pinch bolt ⑥** **24 Nm (2.4 m · kg, 17 ft · lb)**

3. Install:
   - shift arm ① — **10 Nm (1.0 m · kg, 7.2 ft · lb)**

NOTE:
- Align the punch mark ⓐ in the shift shaft with the slot in the shift arm.
- Align the bottom edge of the shift pedal with the mark on the frame-to-swingarm bracket.

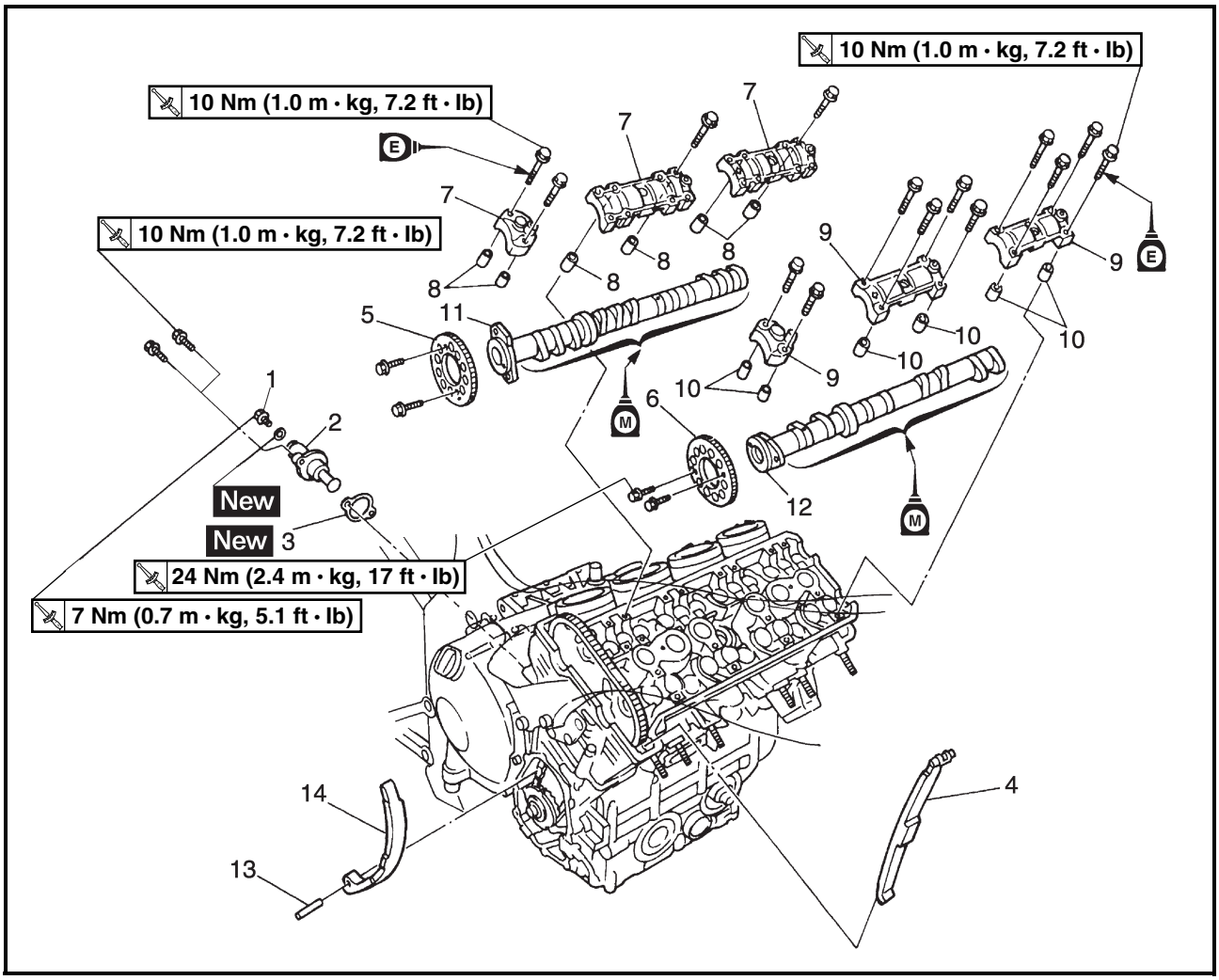
EAS00194
CAMSHAFT
CYLINDER HEAD COVERS



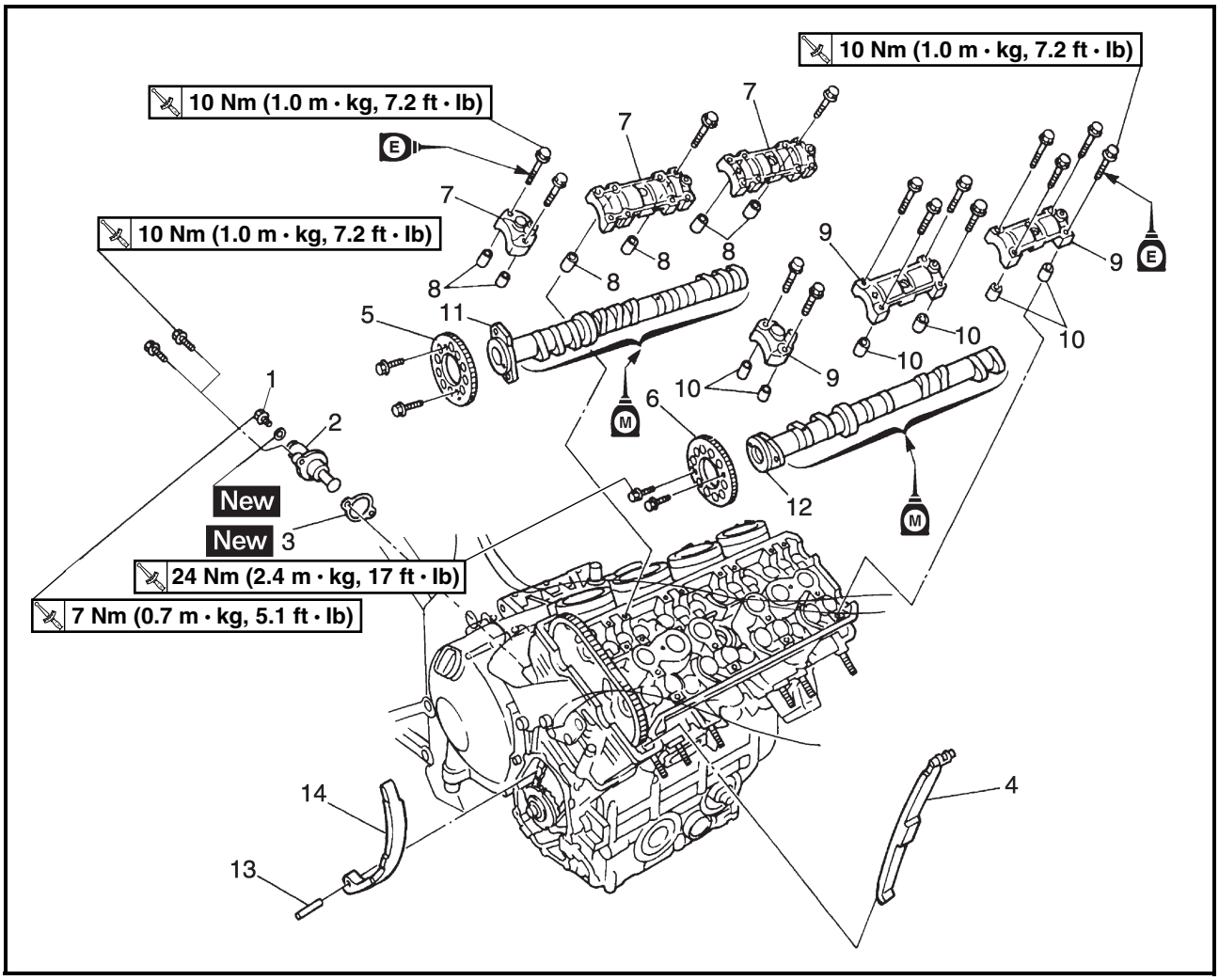
Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head covers		Remove the parts in the order listed.
	Throttle body assembly		Refer to "THROTTLE BODIES" in chapter 7.
	Radiator assembly and thermostat assembly		Refer to "RADIATOR" and "THERMOSTAT" in chapter 6.
1	Spark plug	4	
2	Cylinder head cover	1	
3	Cylinder head cover gasket	1	
4	Timing chain guide (top side)	1	
5	Cylinder identification sensor	1	
			For installation, reverse the removal procedure.

EAS00196

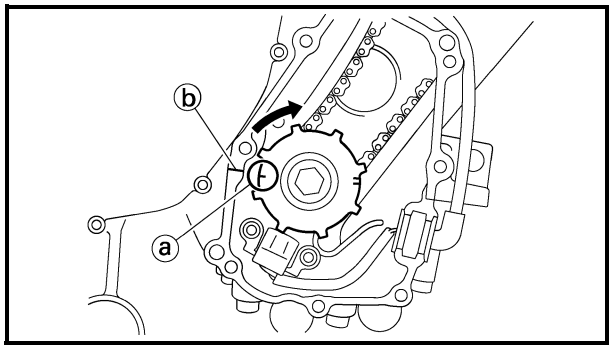
CAMSHAFTS



Order	Job/Part	Q'ty	Remarks
	Removing the camshafts		Remove the parts in the order listed.
	Pickup coil rotor cover		Refer to "PICKUP COIL".
1	Timing chain tensioner cap bolt	1	
2	Timing chain tensioner	1	
3	Timing chain tensioner gasket	1	
4	Timing chain guide (exhaust side)	1	
5	Intake camshaft sprocket	1	**NOTE:** During removal, the dowel pins may still be connected to the camshaft caps.
6	Exhaust camshaft sprocket	1	
7	Intake camshaft cap	3	
8	Dowel pin	6	
9	Exhaust camshaft cap	3	
10	Dowel pin	6	
11	Intake camshaft	1	
12	Exhaust camshaft	1	



Order	Job/Part	Q'ty	Remarks
13	Pin	1	
14	Timing chain guide (intake side)	1	
			For installation, reverse the removal procedure.



EAS00198
REMOVING THE CAMSHAFTS

1. Align:
   - TDC mark on the pickup coil rotor (with the crankcase mating surface)

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a. Turn the crankshaft clockwise.
b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ on the pickup coil rotor with the crankcase mating surface ⓑ.

NOTE:

TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

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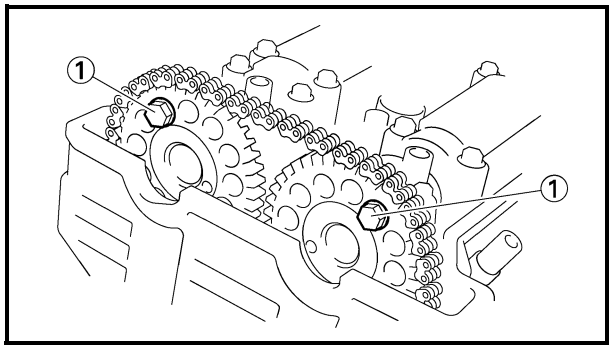
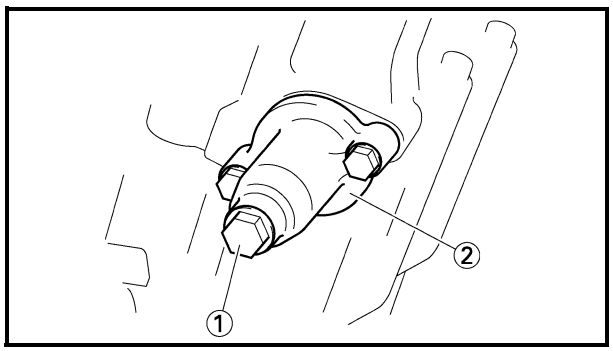
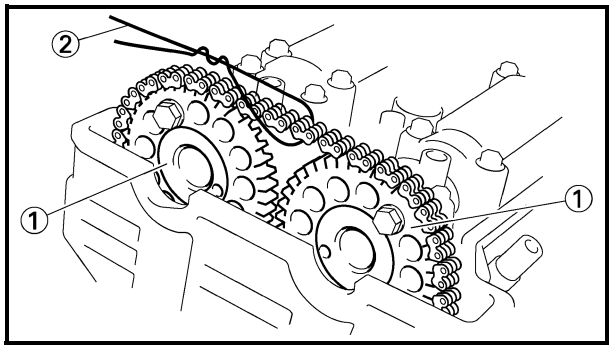


2. Loosen:
   - camshaft sprocket bolts ①



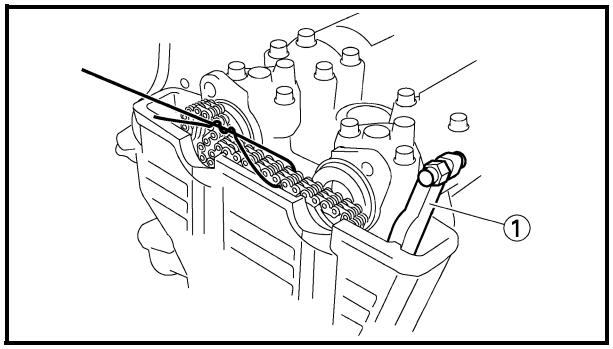
3. Loosen:
   - cap bolt ①
4. Remove:
   - timing chain tensioner ②
   - gasket



5. Remove:
   - camshaft sprockets ①

NOTE:

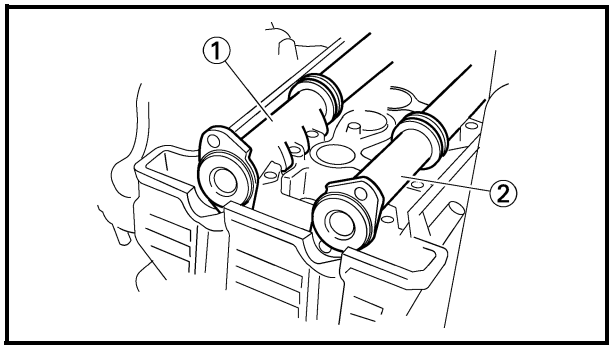
To prevent the timing chain from falling into the crankcase, fasten it with a wire ②.



6. Remove:
   - timing chain guide (exhaust side) ①
   - camshaft caps
   - dowel pins

CAUTION:

To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.

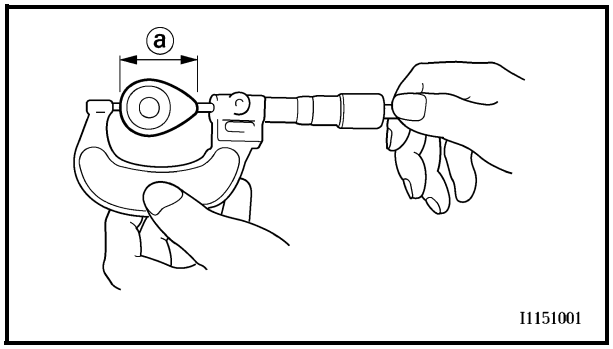


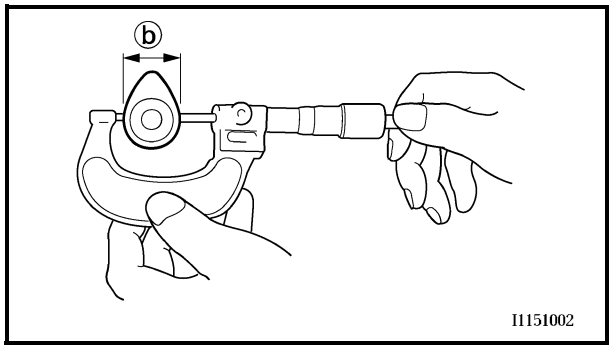
7. Remove:
   - intake camshaft ①
   - exhaust camshaft ②

EAS00204

CHECKING THE CAMSHAFTS

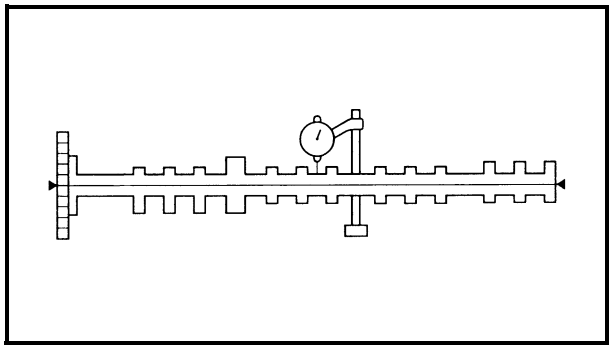
1. Check:
   - camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.





2. Measure:
   - camshaft lobe dimensions ⓐ and ⓑ
     Out of specification → Replace the camshaft.

Camshaft lobe dimension limit
Intake camshaft
ⓐ 32.4 mm (1.2756 in)
ⓑ 24.85 mm (0.9783 in)
Exhaust camshaft
ⓐ 32.85 mm (1.2933 in)
ⓑ 24.85 mm (0.9783 in)

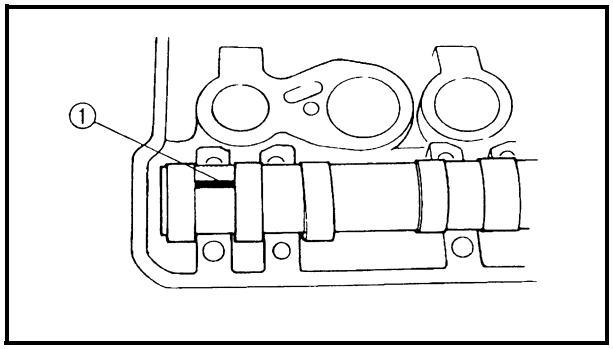


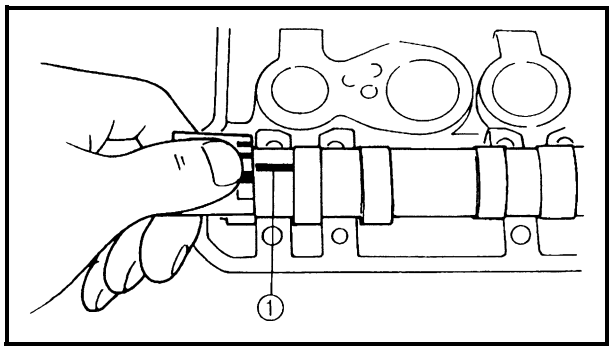
3. Measure:
   • camshaft runout
   Out of specification → Replace.

	Camshaft runout limit **0.03 mm (0.0012 in)**

4. Measure:
   • camshaft-journal-to-camshaft-cap clearance
   Out of specification → Measure the camshaft journal diameter.

	Camshaft-journal-to-camshaft-cap clearance **0.028 ~ 0.062 mm** **(0.0011 ~ 0.0024 in)**





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a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
b. Position a strip of Plastigauge® ① onto the camshaft journal as shown.
c. Install the dowel pins and camshaft caps.

NOTE:

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

	Camshaft cap bolt **10 Nm (1.0 m · kg, 7.2 ft · lb)**

d. Remove the camshaft caps and then measure the width of the Plastigauge® ①.

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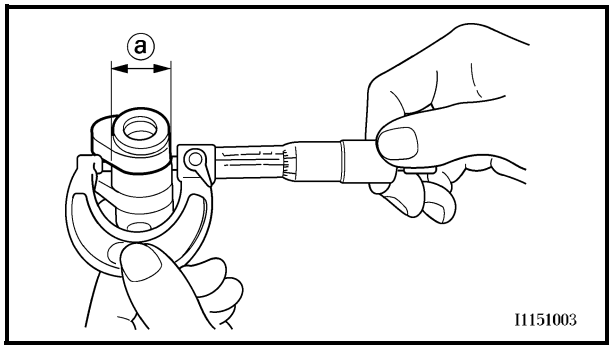
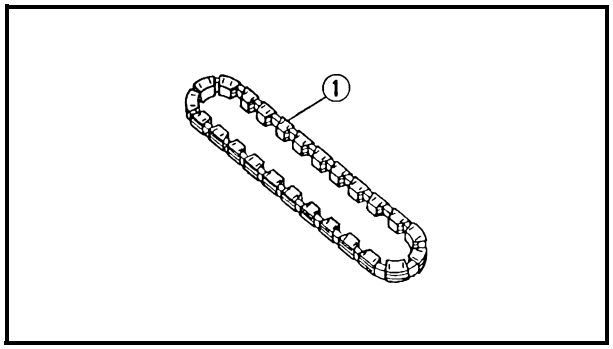


5. Measure:
   • camshaft journal diameter ⓐ
   Out of specification → Replace the camshaft.
   Within specification → Replace the cylinder head and the camshaft caps as a set.

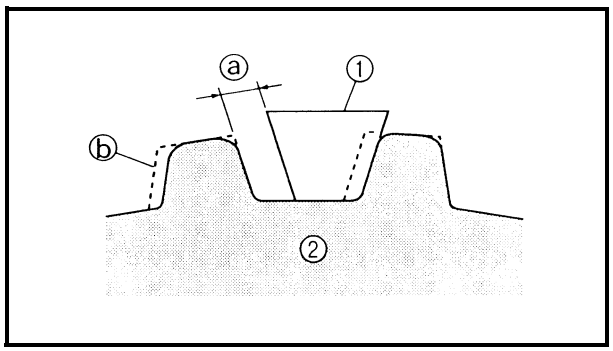
Camshaft journal diameter
24.459 ~ 24.472 mm
(0.9630 ~ 0.9635 in)



EAS00208
CHECKING THE TIMING CHAIN, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

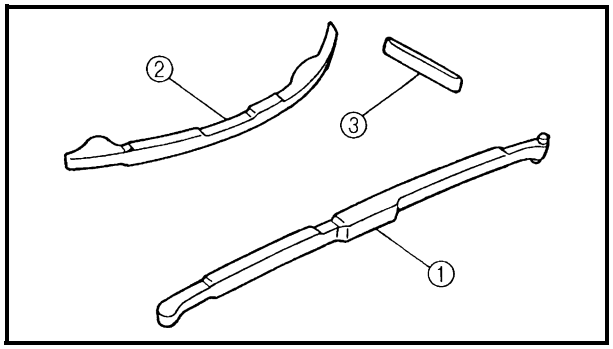
The following procedure applies to all of the camshaft sprockets and timing chain guides.

1. Check:
   • timing chain ①
   Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.

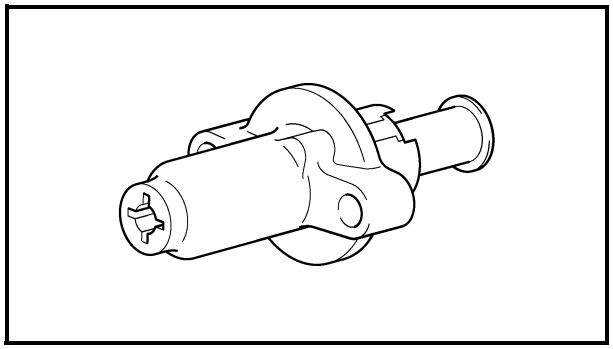


2. Check:
   • camshaft sprocket
   More than 1/4 tooth wear ⓐ → Replace the camshaft sprockets and the timing chain as a set.

ⓐ 1/4 tooth
ⓑ Correct
① Timing chain roller
② Camshaft sprocket



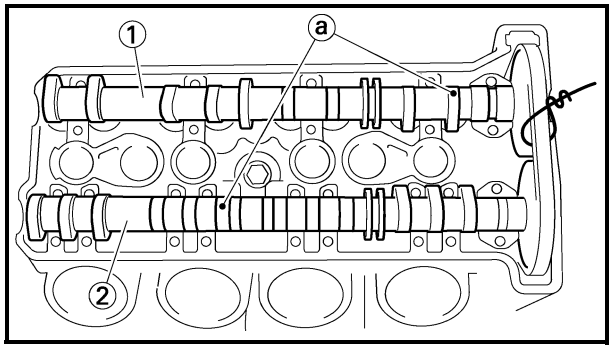
3. Check:
   • timing chain guide (exhaust side)①
   • timing chain guide (intake side)②
   • timing chain guide (top side)③
   Damage/wear → Replace the defective part(s).



EAS00210
CHECKING THE TIMING CHAIN TENSIONER

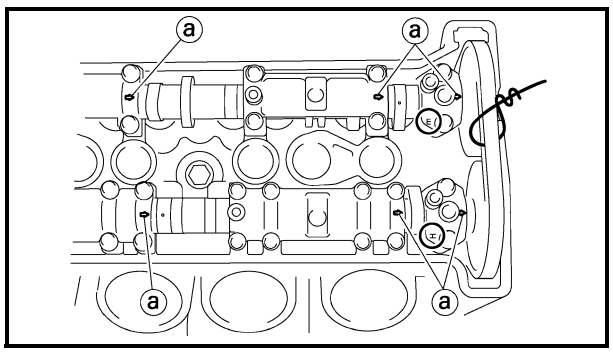
1. Check:
   - timing chain tensioner
     Cracks/damage → Replace.
2. Check:
   - one-way cam operation
     Rough movement → Replace the timing chain tensioner housing.
3. Check:
   - cap bolt
   - copper washer
   - spring
   - one-way cam
   - gasket
   - timing chain tensioner rod
     Damage/wear → Replace the defective part(s).

EAS00214
INSTALLING THE CAMSHAFTS



1. Install:
   - exhaust camshaft ①
   - intake camshaft ②
     (with the camshaft sprockets temporarily tightened)

NOTE:
Make sure the punch mark ⓐ faces up.



2. Install:
   - dowel pins
   - intake camshaft caps
   - exhaust camshaft caps

NOTE:
- Make sure each camshaft cap is installed in its original place. Refer to the identification marks as follows:

"I": Intake
"E": Exhaust

- Make sure the arrow mark ⓐ on each camshaft cap points towards the right side of the engine.

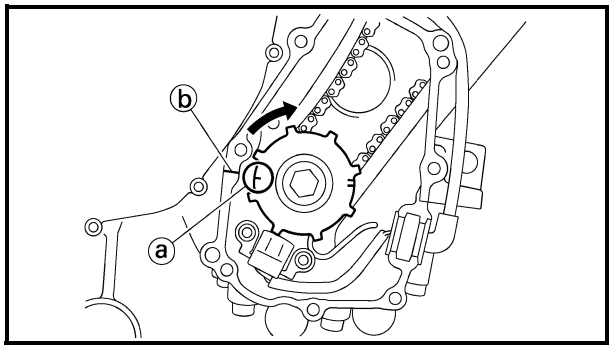
3. Install:
   - camshaft cap bolts

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.

CAUTION:

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.



4. Install:
   - intake camshaft sprocket
   - exhaust camshaft sprocket

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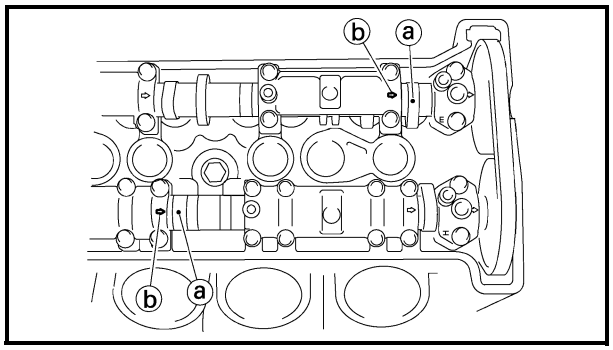
a. Turn the crankshaft clockwise.
b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ with the crankshaft mating surface ⓑ.
c. Install the timing chain onto both camshaft sprockets and then install the camshaft sprockets onto the camshafts.

NOTE:

When installing the camshaft sprockets, start with the exhaust camshaft and be sure to keep the timing chain as tight as possible on the exhaust side.

CAUTION:

Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.



d. Turn both camshafts opposite each other so that the punch mark ⓐ on the camshaft is aligned with the arrow mark ⓑ in the camshaft cap as shown.
e. While holding the camshafts, temporarily tighten the camshaft sprocket bolts.

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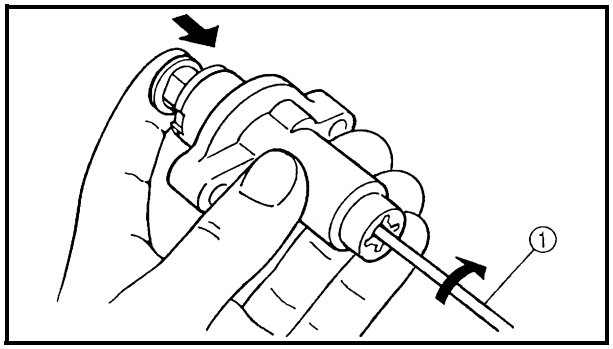
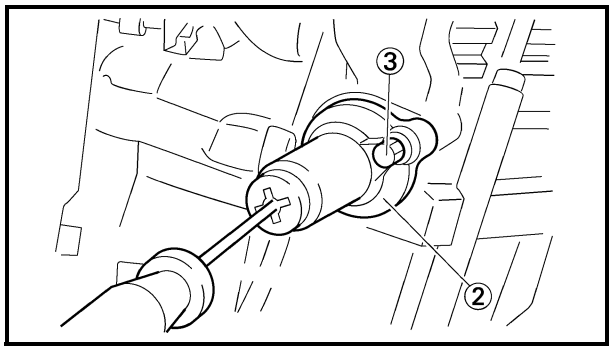
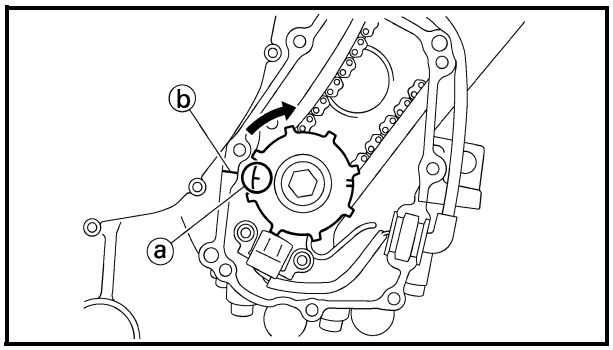
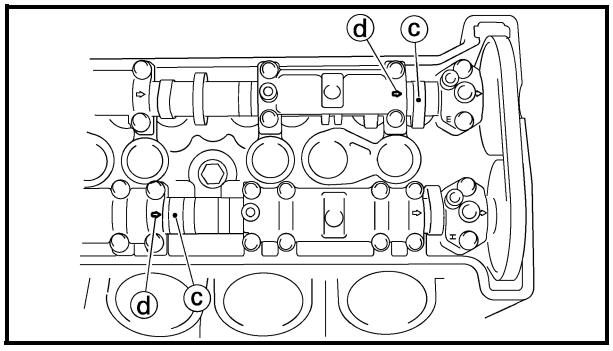
5. Install:
   - timing chain guide (exhaust side)









6. Install:
   • timing chain tensioner

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a. While lightly pressing the timing chain tensioner rod by hand, turn the tensioner rod fully clockwise with a thin screwdriver ①.
b. With the timing chain tensioner rod turned all the way into the timing chain tensioner housing (with the thin screwdriver still installed), install the gasket and the timing chain tensioner ② onto the cylinder block.

NOTE:
The "UP" mark on the timing chain tensioner should face UP.

⚠ WARNING

Always use a new gasket.

c. Tighten the timing chain tensioner bolts ③ to the specified torque.

	Timing chain tensioner bolt **10 Nm (1.0 m · kg, 7.2 ft · lb)**

d. Remove the screwdriver, mark sure that the timing chain tensioner rod releases, and then tighten the cap bolt to the specified torque.

	Cap bolt **7 Nm (0.7 m · kg, 5.1 ft · lb)**

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7. Turn:
   • crankshaft
   (several turns clockwise)
8. Check:
   • TDC mark ⓐ
   Make sure the TDC mark ⓐ is aligned with the crankcase mating surface ⓑ.

   • camshaft punch mark ⓒ
   Make sure the punch mark ⓒ on the camshaft is aligned with the camshaft cap arrow mark ⓓ.
   Out of alignment → Adjust.
   Refer to the installation steps above.

9. Tighten:
   • camshaft sprocket bolts

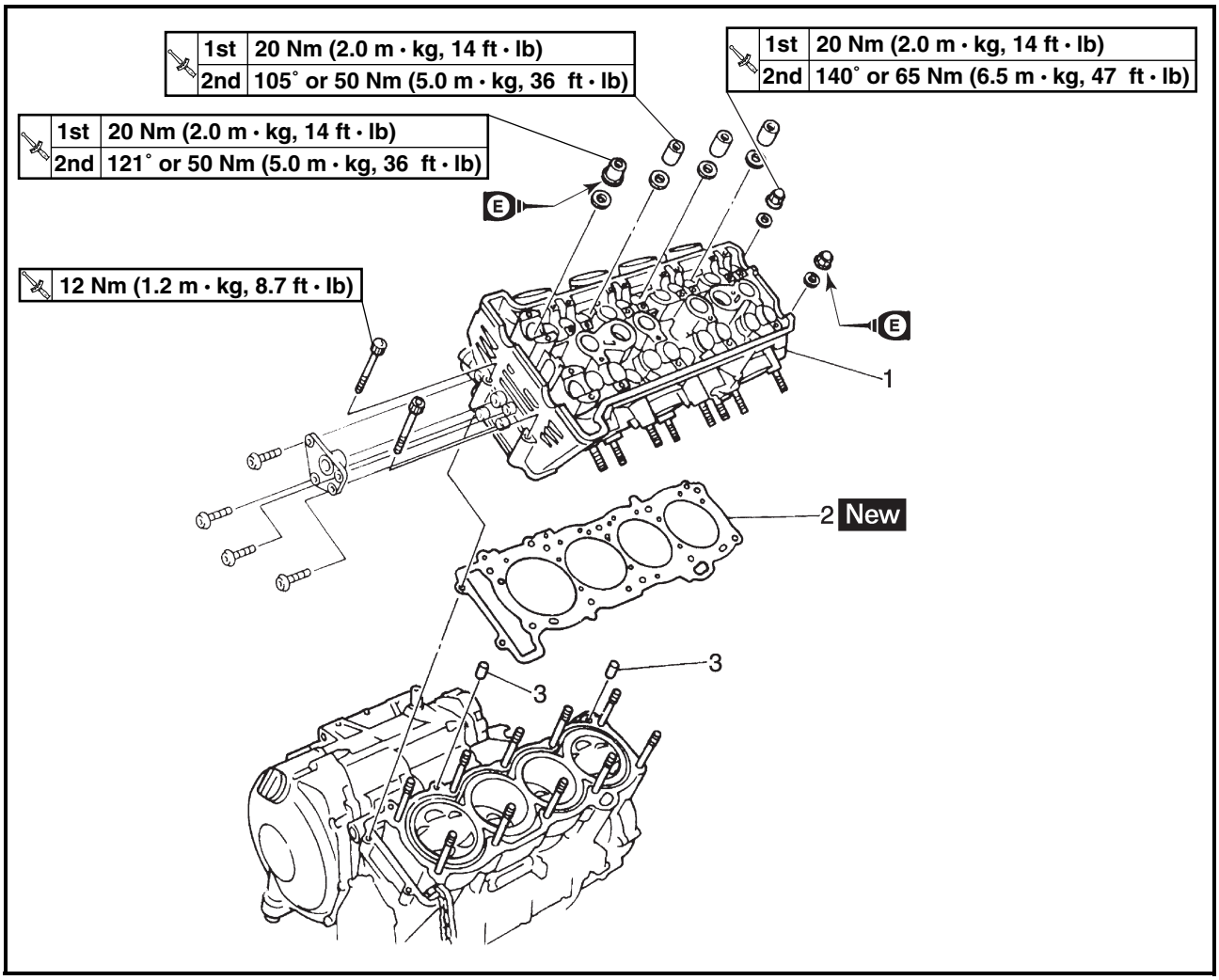
24 Nm (2.4 m · kg, 17 ft · lb)

CAUTION:

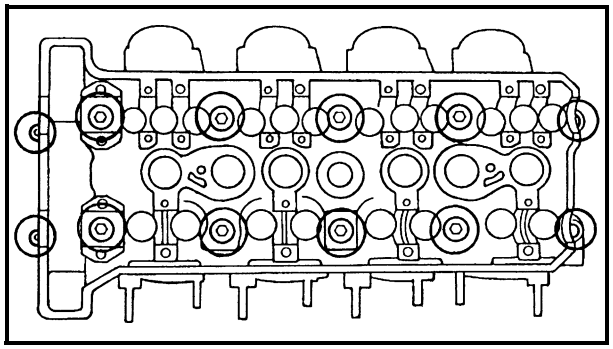
Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

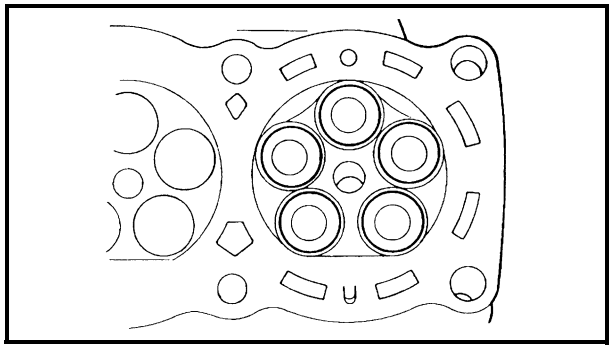
10. Install:
    • timing chain guide (top side)
11. Measure:
    • valve clearance
      Out of specification → Adjust.
      Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.
12. Install:
    • timing plate cover

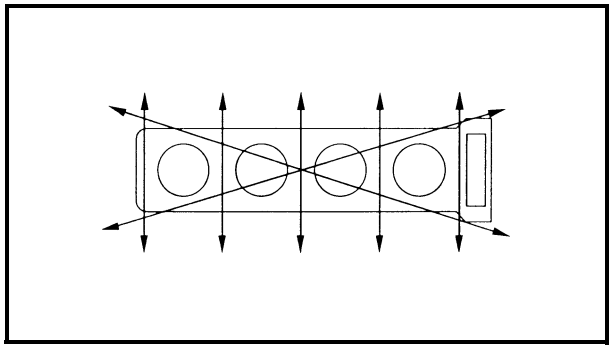
EAS00221
CYLINDER HEAD

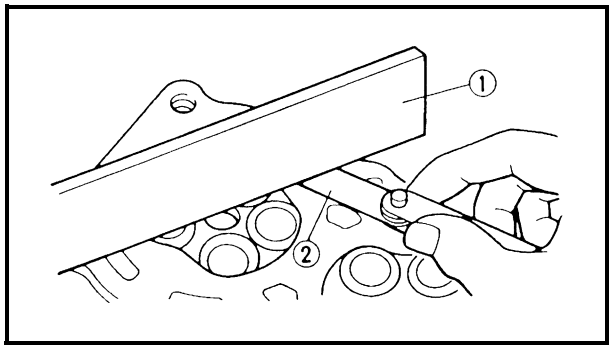


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Intake and exhaust camshafts		Refer to "CAMSHAFTS".
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.









EAS00222
REMOVING THE CYLINDER HEAD

1. Remove:
   - cylinder head nuts
   - cylinder head bolts

NOTE:
- Loosen the nuts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.

EAS00227
CHECKING THE CYLINDER HEAD

1. Eliminate:
   - combustion chamber carbon deposits (with a rounded scraper)

NOTE:
Do not use a sharp instrument to avoid damaging or scratching:
- spark plug bore threads
- valve seats

2. Check:
   - cylinder head
     Damage/scratches → Replace.
3. Measure:
   - cylinder head warpage
     Out of specification → Resurface the cylinder head.

Maximum cylinder head warpage
0.1 mm (0.0039 in)

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a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

NOTE:
To ensure an even surface, rotate the cylinder head several times.

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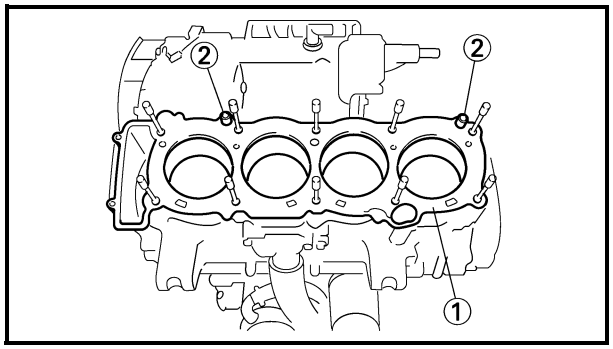
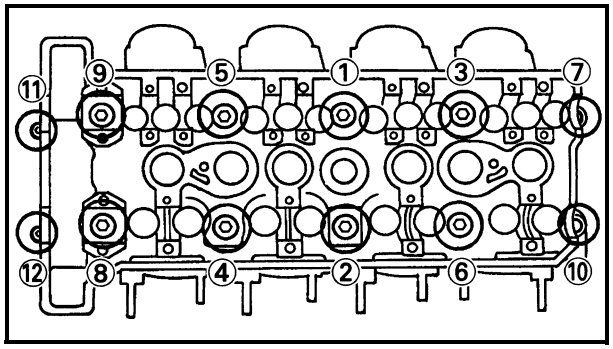




EAS00233
INSTALLING THE CYLINDER HEAD

1. Install:
   - gasket New ①
   - dowel pins ②
2. Install:
   - cylinder head

NOTE:
Pass the timing chain through the timing chain cavity.

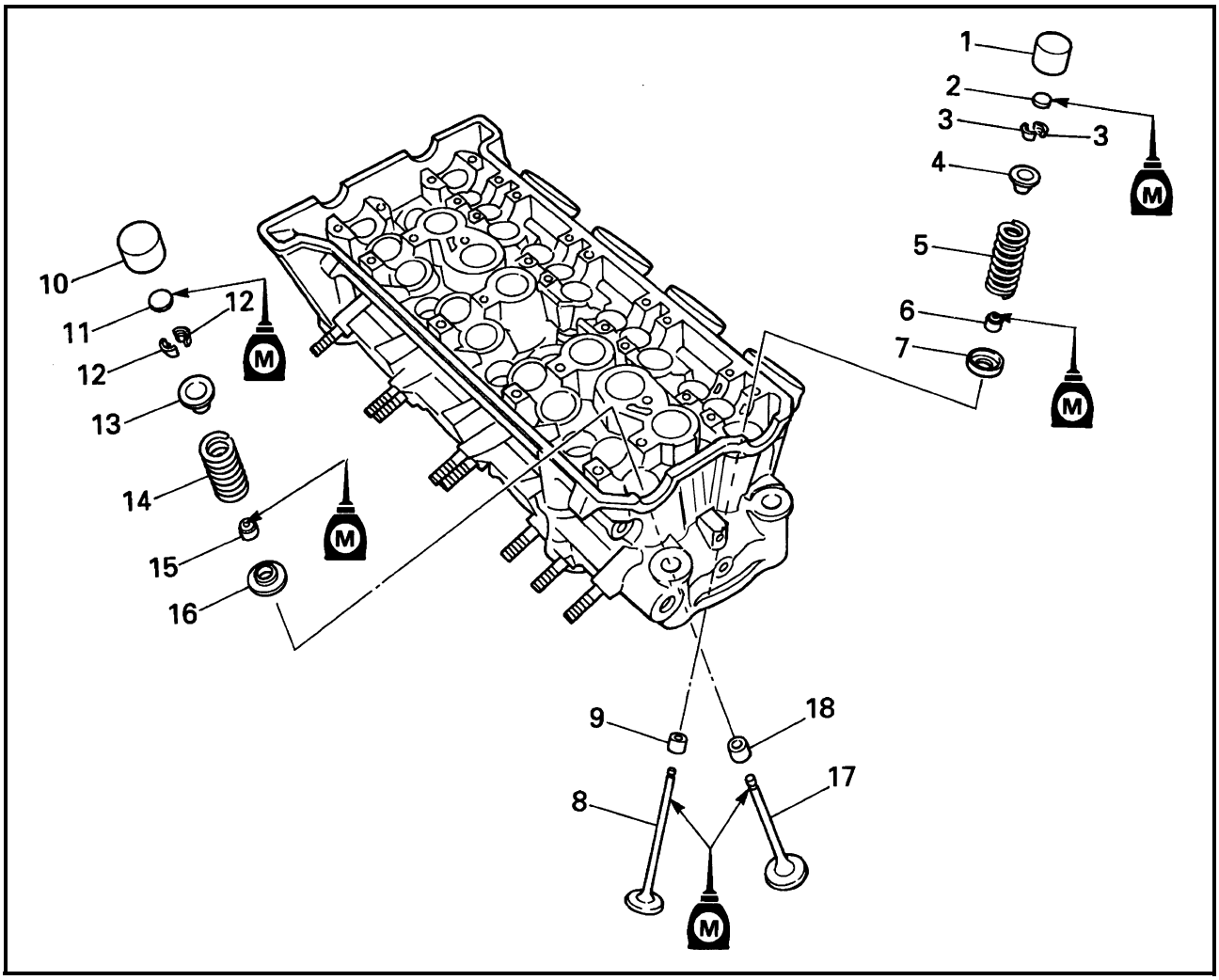
3. Tighten:
   - cylinder head nuts ① ~ ⑥
     1st **20 Nm (2.0 m · kg, 14 ft · lb)**
     2nd **105° or 50 Nm (5.0 m · kg, 36 ft · lb)**
   - cylinder head nuts ⑦, ⑩
     1st **20 Nm (2.0 m · kg, 14 ft · lb)**
     2nd **140° or 65 Nm (6.5 m · kg, 47 ft · lb)**
   - cylinder head nuts ⑧, ⑨
     1st **20 Nm (2.0 m · kg, 14 ft · lb)**
     2nd **121° or 50 Nm (5.0 m · kg, 36 ft · lb)**
   - cylinder head bolt ⑪, ⑫
     12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
- First, tighten the nuts ① ~ ⑩ to approximately 20 Nm (2.0 m · kg, 14 ft · lb) with a torque wrench.
- Retighten the nuts to specification torque.

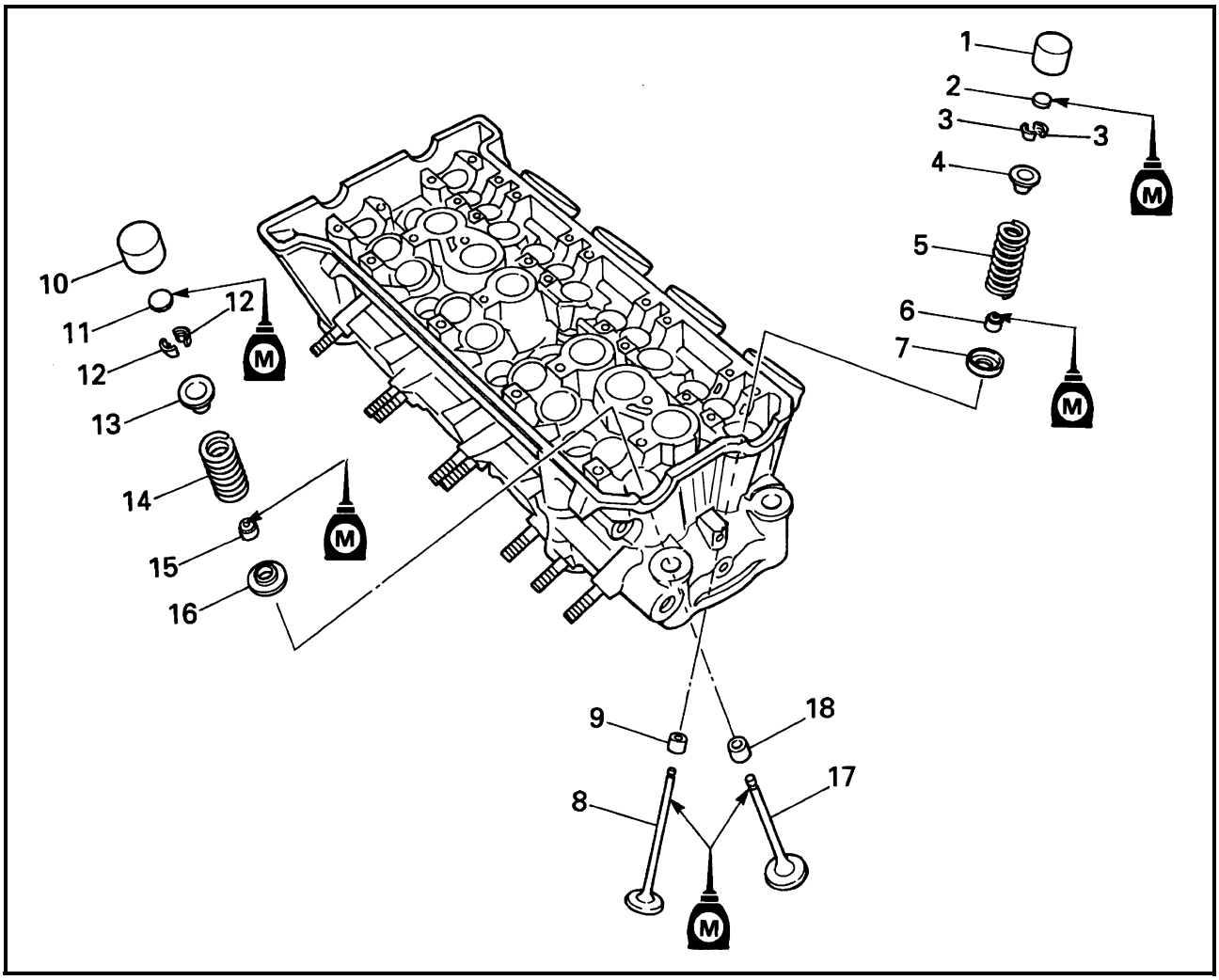
NOTE:
- Lubricate the cylinder head nuts with engine oil.
- Tighten the cylinder head nuts in the proper tightening sequence as shown and torque them in two stages.

4. Install:
   - exhaust camshaft
   - intake camshaft
     Refer to “INSTALLING THE CAMSHAFTS”.

EAS00236
VALVES AND VALVE SPRINGS



Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Intake valve lifter	12	
2	Intake valve pad	12	
3	Intake valve cotter	24	
4	Intake valve upper spring seat	12	
5	Intake valve spring	12	
6	Intake valve oil seal	12	
7	Intake valve lower spring seat	12	
8	Intake valve	12	
9	Intake valve guide	12	



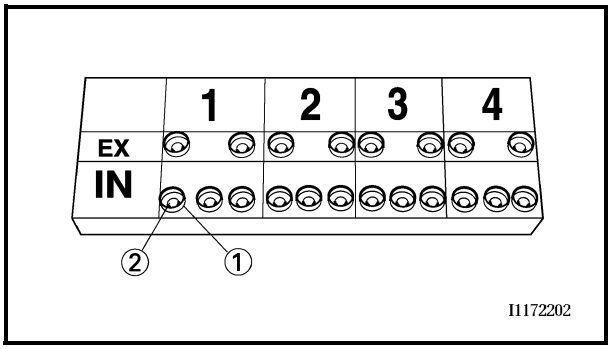
Order	Job/Part	Q'ty	Remarks
10	Exhaust valve lifter	8	
11	Exhaust valve pad	8	
12	Exhaust valve cotter	16	
13	Exhaust valve upper spring seat	8	
14	Exhaust valve spring	8	
15	Exhaust valve oil seal	8	
16	Exhaust valve lower spring seat	8	
17	Exhaust valve	8	
18	Exhaust valve guide	8	
			For installation, reverse the removal procedure.

EAS00237
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

NOTE:

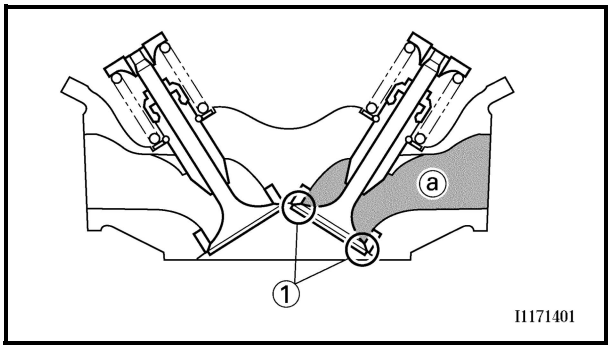
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.



1. Remove:
   - valve lifter ①
   - valve pad ②

NOTE:

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



2. Check:
   - valve sealing

   Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS".

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a. Pour a clean solvent ⓐ into the intake and exhaust ports.
b. Check that the valves properly seal.

NOTE:

There should be no leakage at the valve seat ①.

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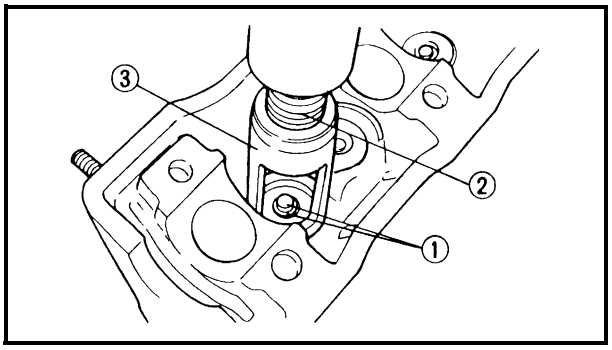
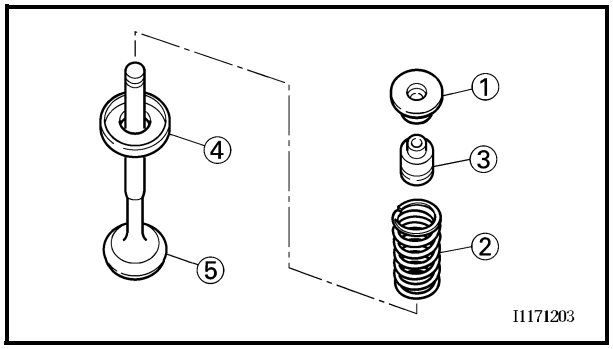


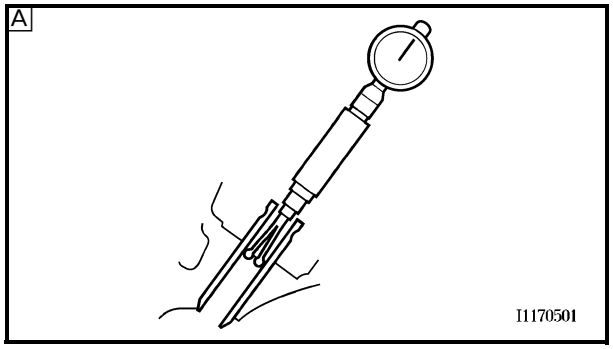
3. Remove:
   - valve cotters ①

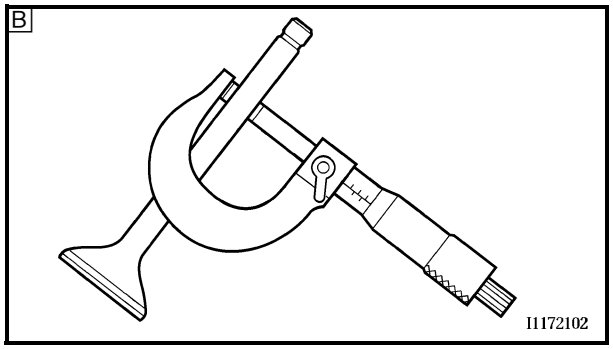
NOTE:

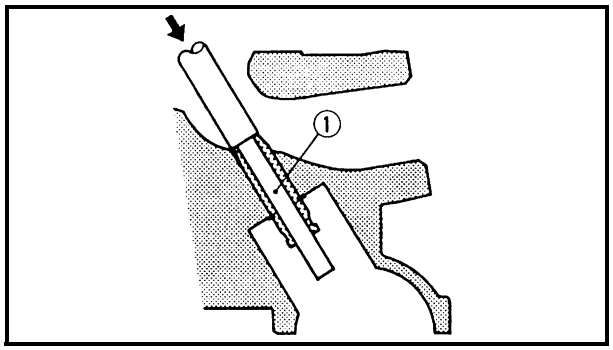
Remove the valve cotters by compressing the valve spring with the valve spring compressor ② and the valve spring compressor attachment ③.

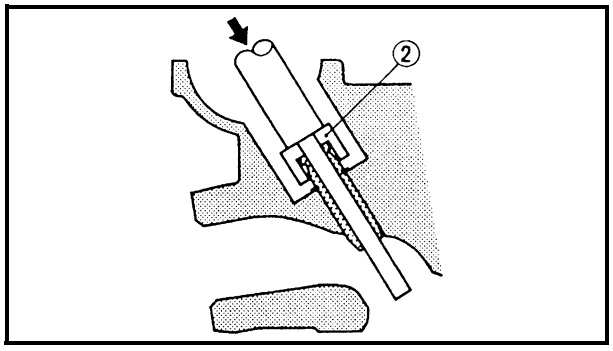
Valve spring compressor
YM-04019
Valve spring compressor attachment
Intake valve
YM-4114
Exhaust valve
YM-4108











4. Remove:
   - upper spring seat ①
   - valve spring ②
   - valve stem seal ③
   - lower spring seat ④
   - valve ⑤

NOTE:
Identify the position of each part very carefully so that it can be reinstalled in its original place.

EAS00239
CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.

1. Measure:
   - valve-stem-to-valve-guide clearance

Valve-stem-to-valve-guide clearance =
Valve guide inside diameter A –
Valve stem diameter B

Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance
Intake
0.0010 ~ 0.0037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.0031 in)
Exhaust
0.020 ~ 0.047 mm
(0.0008 ~ 0.0019 in)
<Limit>: 0.10 mm (0.0039 in)

2. Replace:
   - valve guide

NOTE:
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C in an oven.

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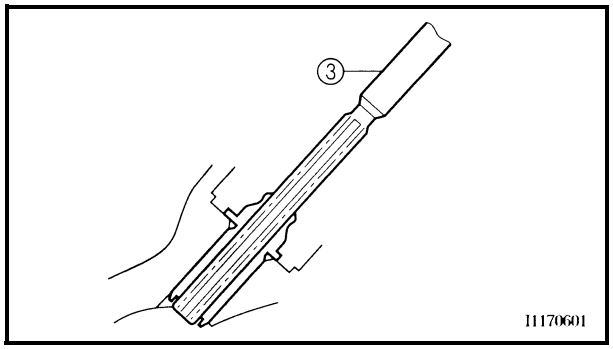
a. Remove the valve guide with the valve guide remover ①.
b. Install the new valve guide with the valve guide installer ② and valve guide remover ①.
c. After installing the valve guide, bore the valve guide with the valve guide reamer ③ to obtain the proper valve-stem-to-valve-guide clearance.

NOTE:
After replacing the valve guide, reface the valve seat.



Valve guide remover
Intake (4.0 mm, 0.16 in)
90890-04111
Exhaust (4.5 mm, 0.18 in)
YM-4116
Valve guide installer
Intake (4.0 mm, 0.16 in)
90890-04112
Exhaust (4.5 mm, 0.18 in)
YM-4117
Valve guide reamer
Intake (4.0 mm, 0.16 in)
90890-04113
Exhaust (4.5 mm, 0.18 in)
YM-4118

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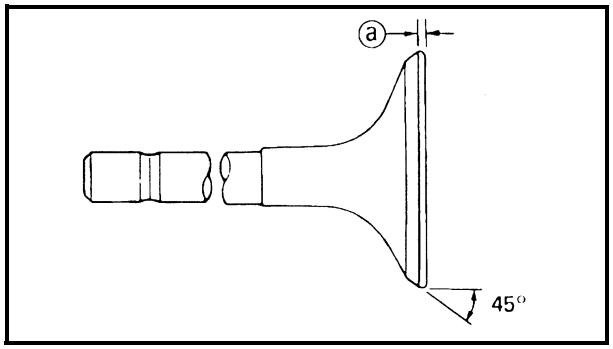
3. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
4. Check:
   - valve face
     Pitting/wear → Grind the valve face.
   - valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

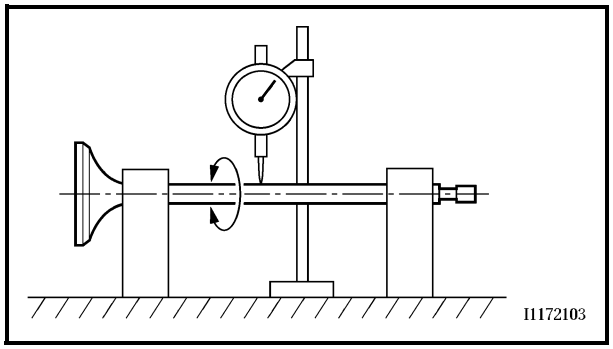


5. Measure:
   - valve margin thickness ⓐ
     Out of specification → Replace the valve.

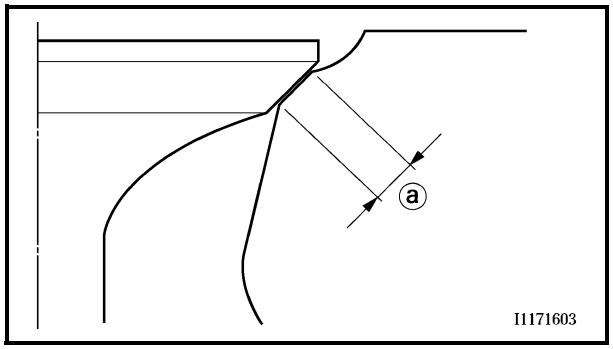
Valve margin thickness
0.5 ~ 0.9 mm (0.0197 ~ 0.0354 in)

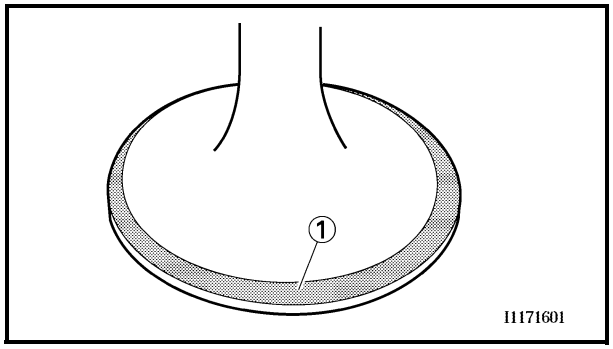
6. Measure:
   - valve stem runout
     Out of specification → Replace the valve.

NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.



Valve stem runout
0.01 mm (0.0004 in)





EAS00240
CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
2. Check:
   - valve seat
     Pitting/wear → Replace the cylinder head.
3. Measure:
   - valve seat width ⓐ
     Out of specification → Replace the cylinder head.

Valve seat width
Intake: 0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
Exhaust: 0.9 ~ 1.1 mm
(0.0354 ~ 0.0433 in)
<Limit: 1.6 mm> (0.063 in)

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a. Apply Mechanic's blueing dye (Dykem) ① onto the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

NOTE:
Where the valve seat and valve face contacted one another, the blueing will have been removed.

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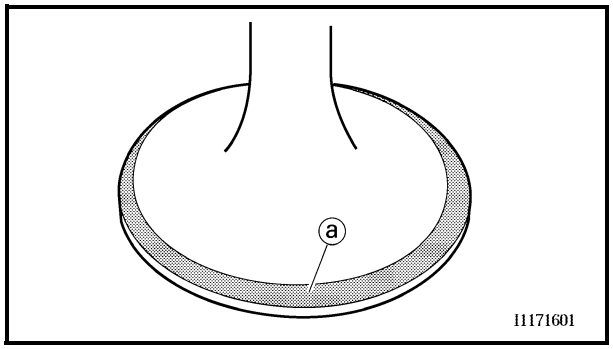
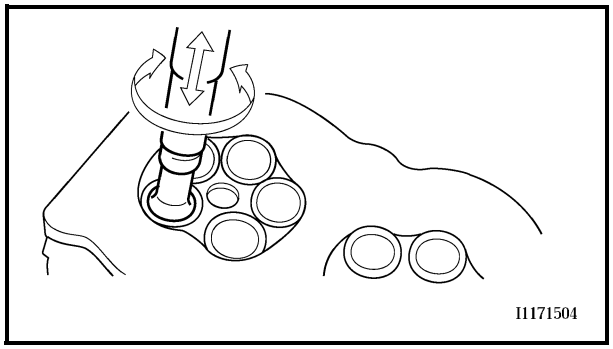
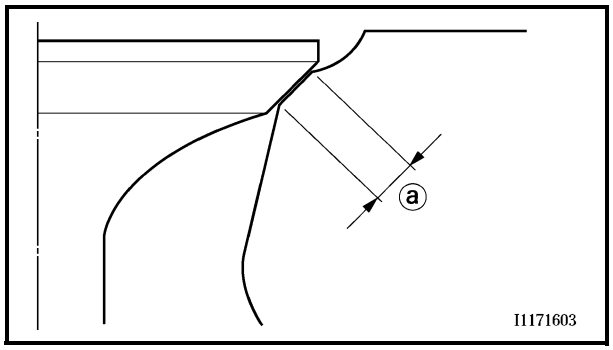
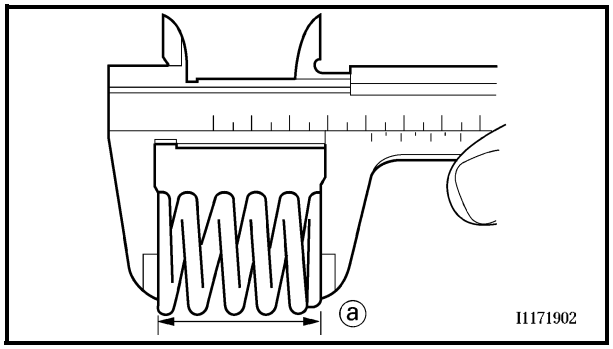
4. Lap:
   - valve face
   - valve seat

NOTE:
After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.









a. Apply a coarse lapping compound ⓐ to the valve face.

CAUTION:

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

NOTE:

For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply Mechanic's blueing dye (Dykem) onto the valve face.
h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat width ⓐ again. If the valve seat width is out of specification, reface and lap the valve seat.

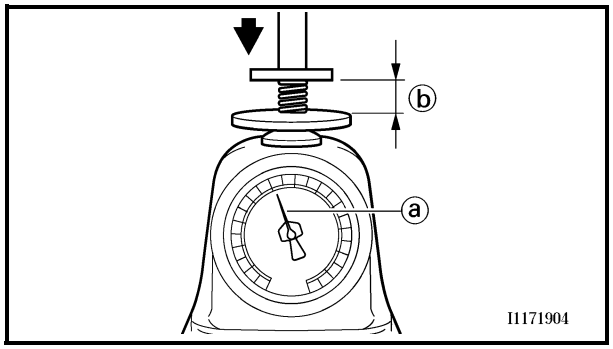
EAS00241

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:
   - valve spring free length ⓐ
     Out of specification → Replace the valve spring.

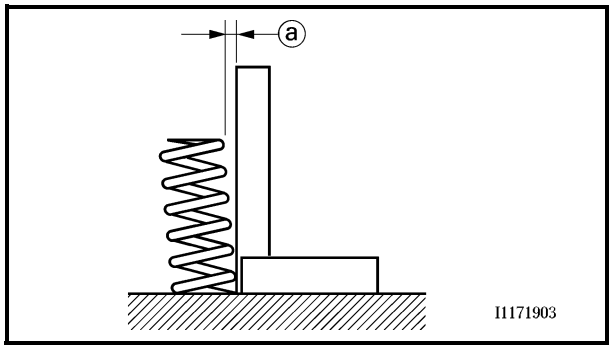
Valve spring free length
Intake valve spring
38.9 mm (1.53 in)
<Limit: 37.0 mm (1.46 in)>
Exhaust valve spring
40.67 mm (1.60 in)
<Limit: 38.6 mm (1.52 in)>



2. Measure:
   • compressed valve spring force ⓐ
     Out of specification → Replace the valve spring.

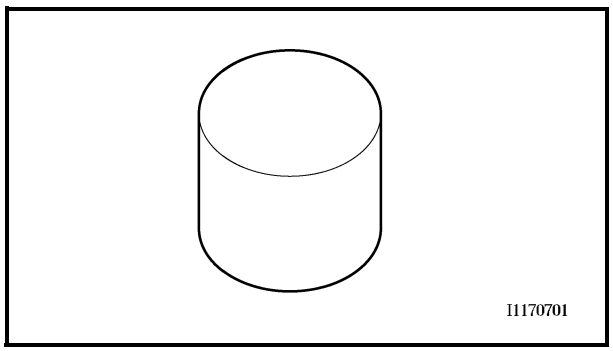
ⓑ Installed length

Compressed valve spring force (installed)
Intake valve spring
82 ~ 96 N
(8.2 ~ 9.6 kg, 18.43 ~ 21.58 lb)
at 34.5 mm (1.36 in)
Exhaust valve spring
110 ~ 126 N
(11.0 ~ 12.6 kg, 24.73 ~ 28.32 lb)
at 35 mm (1.38 in)



3. Measure:
   • valve spring tilt ⓐ
     Out of specification → Replace the valve spring.

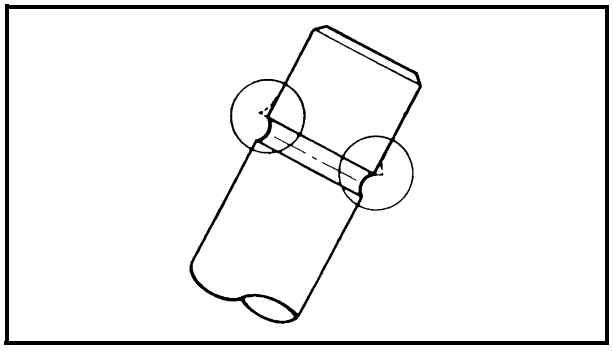
Spring tilt limit
Intake valve spring
1.7 mm (0.067 in)
Exhaust valve spring
1.8 mm (0.071 in)



EAS00242
CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

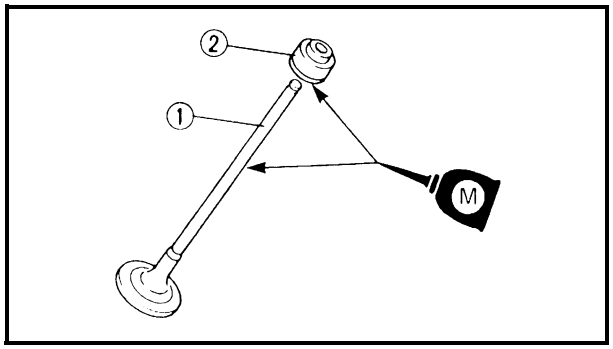
1. Check:
   • valve lifter
     Damage/scratches → Replace the valve lifters and cylinder head.



EAS00245
INSTALLING THE VALVES

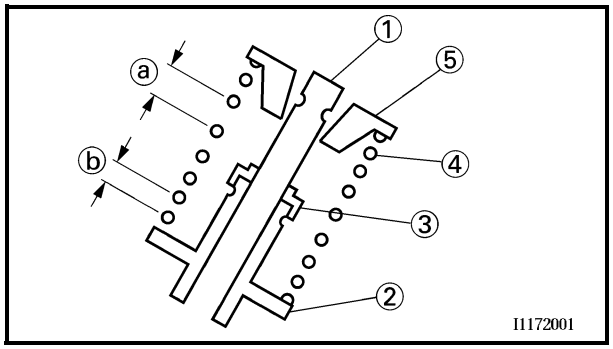
The following procedure applies to all of the valves and related components.

1. Deburr:
   • valve stem end
     (with an oil stone)



2. Lubricate:
   - valve stem ①
   - valve stem seal ②
     (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

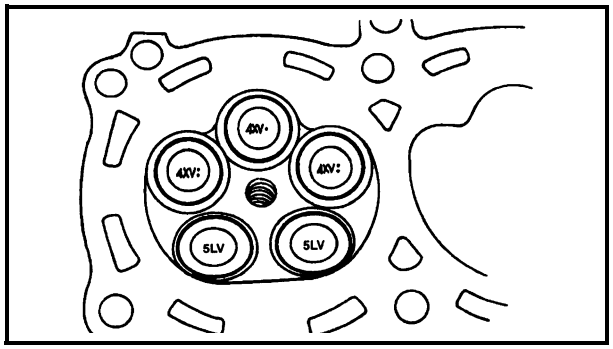


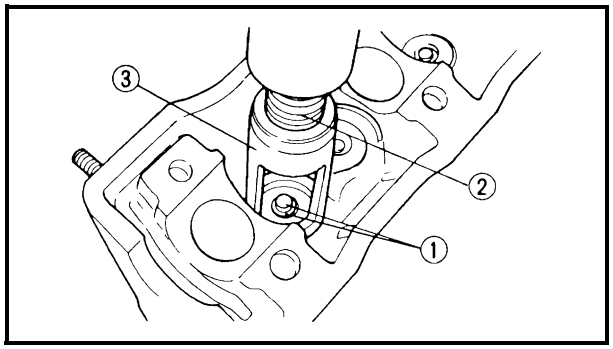
3. Install:
   - valve ①
   - lower spring seat ②
   - valve stem seal ③
   - valve spring ④
   - upper spring seat ⑤
     (into the cylinder head)

NOTE:
Install the valve spring with the larger pitch ⓐ facing up.

ⓑ Smaller pitch

NOTE:
Make sure that each valve is installed in its original place. Refer to the following embossed marks.
Right and left intake valve(-s): “4XV:”
Middle intake valve(-s): “4XV.”
Exhaust valve(-s): “5LV”

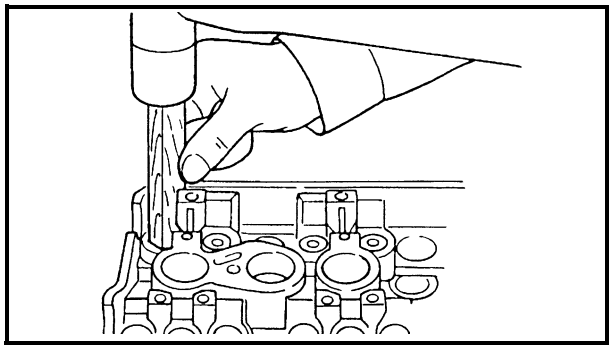




4. Install:
   - valve cotters ①

NOTE:
Install the valve cotters by compressing the valve spring with the valve spring compressor ② and the valve spring compressor attachment ③.

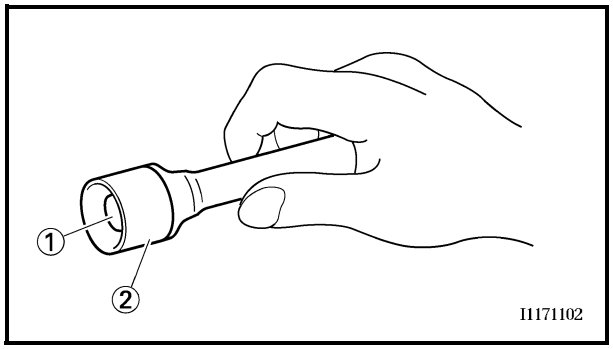
	Valve spring compressor **YM-04019** **Valve spring compressor attachment** **Intake valve** **YM-4114** **Exhaust valve** **YM-4108**



5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

CAUTION:

Hitting the valve tip with excessive force could damage the valve.

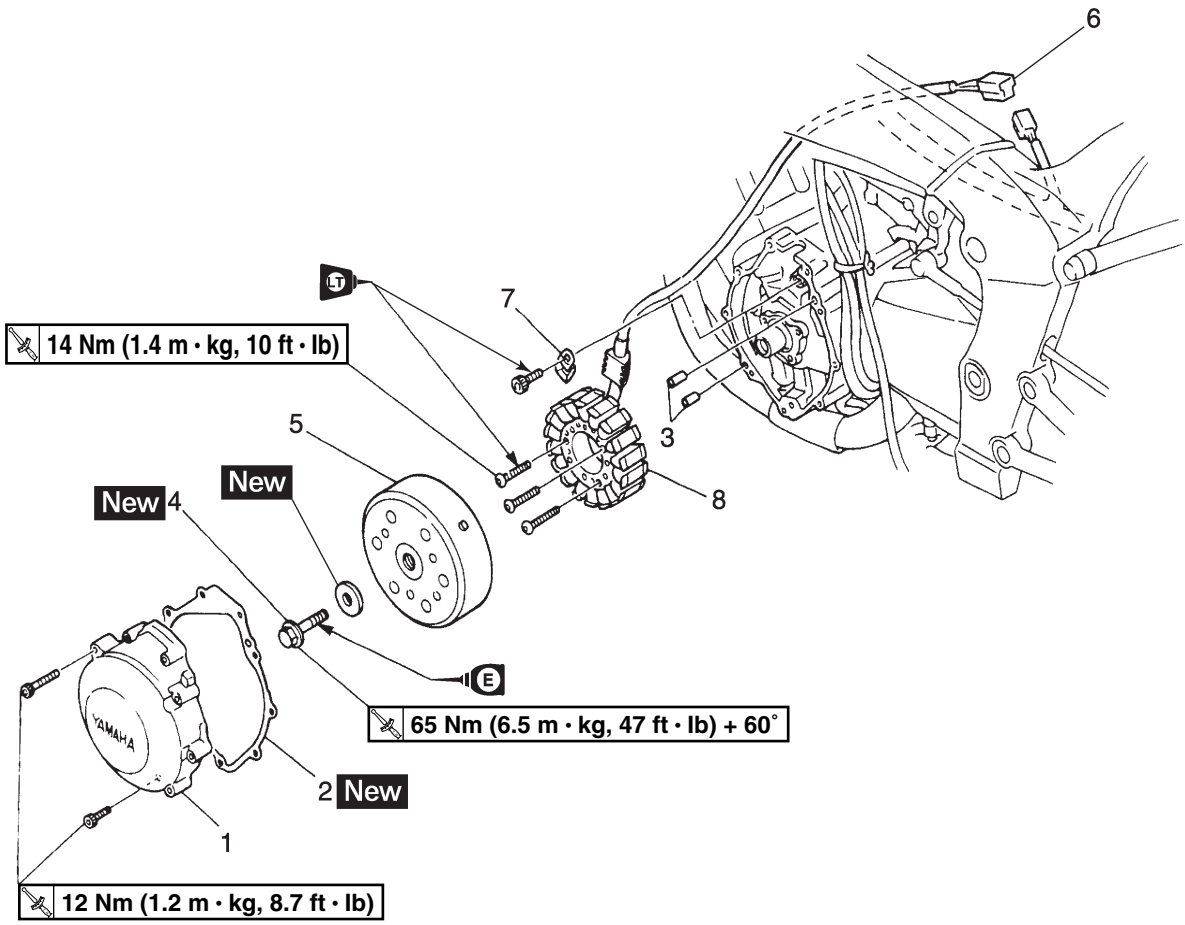


6. Install:
   - valve pad ①
   - valve lifter ②

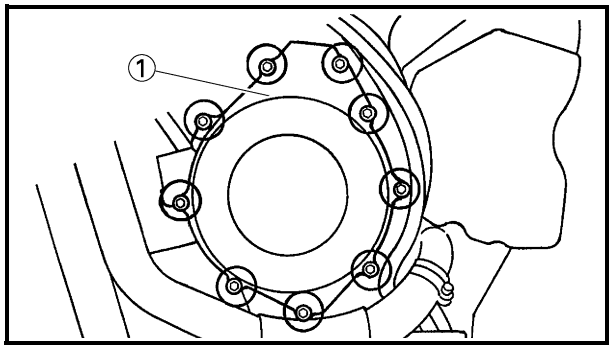
NOTE:

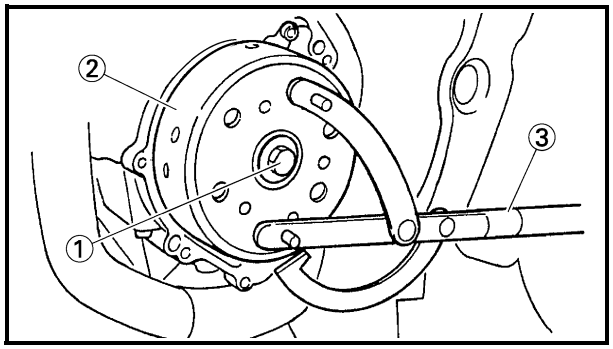
- Lubricate the valve lifter and valve pad with molybdenum disulfide oil.
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

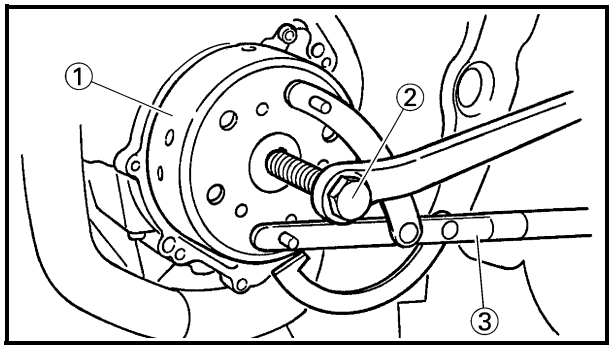
GENERATOR

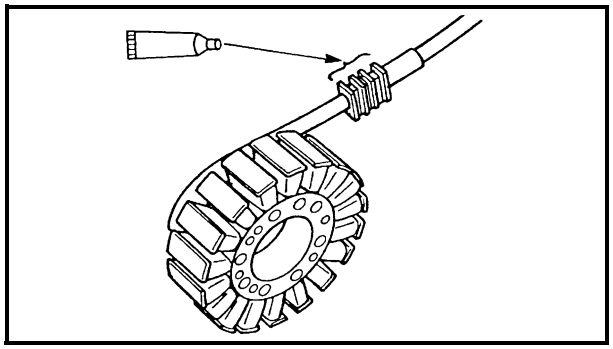


Order	Job/Part	Q'ty	Remarks
	Removing the stator coil assembly		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Generator rotor cover	1	
2	Generator rotor cover gasket	1	
3	Dowel pin	2	
4	Generator rotor bolt	1	
5	Generator rotor	1	
6	Stator coil assembly coupler	1	Disconnect.
7	Stator coil assembly lead holder	1	
8	Stator coil assembly	1	
			For installation, reverse the removal procedure.









REMOVING THE GENERATOR

1. Remove:
   - generator rotor cover ①

NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.

2. Remove:
   - generator rotor bolt ①
   - washer

NOTE:

While holding the generator rotor ② with the rotor holding tool ③, loosen the generator rotor bolt.

	Rotor holding tool **YU-01235**

3. Remove:
   - generator rotor ①
     (with the flywheel puller ② and rotor holding tool ③)

	Flywheel puller **YM-01080-A**

INSTALLING THE GENERATOR

1. Apply:
   - sealant
     (onto the stator coil assembly lead grommet)

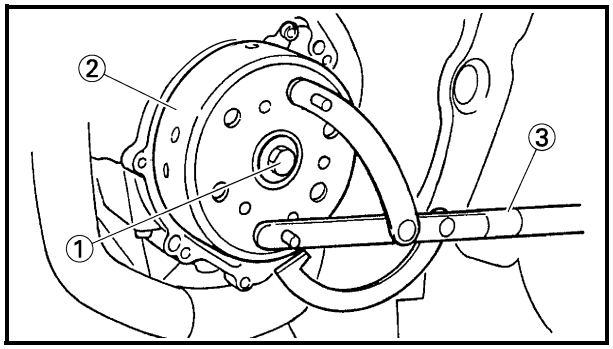
	Quick Gasket® **ACC-11001-05-01**

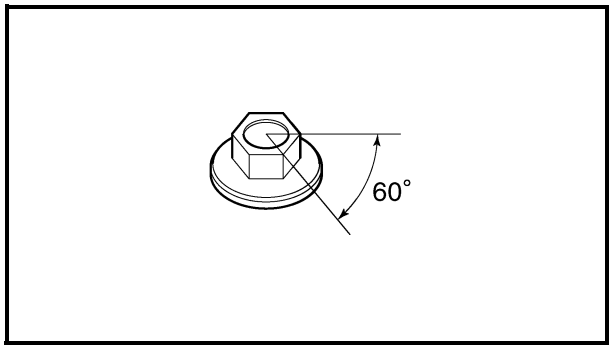
2. Install:
   - generator rotor
   - washer
   - generator rotor bolt

⚠ WARNING

Always use a new generator rotor bolt.

CAUTION:
- **Clean the tapered portion of the crankshaft and the generator rotor hub with lacquer thinner.**
- **Lubricate the generator rotor bolt threads with engine oil.**





3. Tighten:
   - generator rotor bolt ① New

65 Nm (6.5 m · kg, 47 ft · lb) + 60°

NOTE:
While holding the generator rotor ② with the rotor holding tool ③, tighten the generator rotor bolt.

Rotor holding tool
YU-01235

⚠ WARNING
- **Replace the rotor bolt and washer with new ones.**
- **Clean the rotor bolt.**

NOTE:
The tightening procedure of rotor bolt is angle controlled, therefore tighten the nuts using the following procedure.

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Tighten the connecting rod nuts to the specified torque.

Rotor bolt
1st
65 Nm (6.5 m · kg, 47 ft · lb)

b. Tighten the rotor bolt further to reach the specified angle (60°).

Rotor bolt
Final
Specified angle 60°

⚠ WARNING

When the bolt are tightened more than the specified angle, do not loosen the bolt and then retighten it.
Replace the bolt with a new one and perform the procedure again.

CAUTION:

- **Do not use a torque wrench to tighten the bolt to the specified angle.**
- **Tighten the bolt until it is at the specified angle.**

NOTE:

When using a hexagon bolt, note that the angle from one corner to another is 60°.

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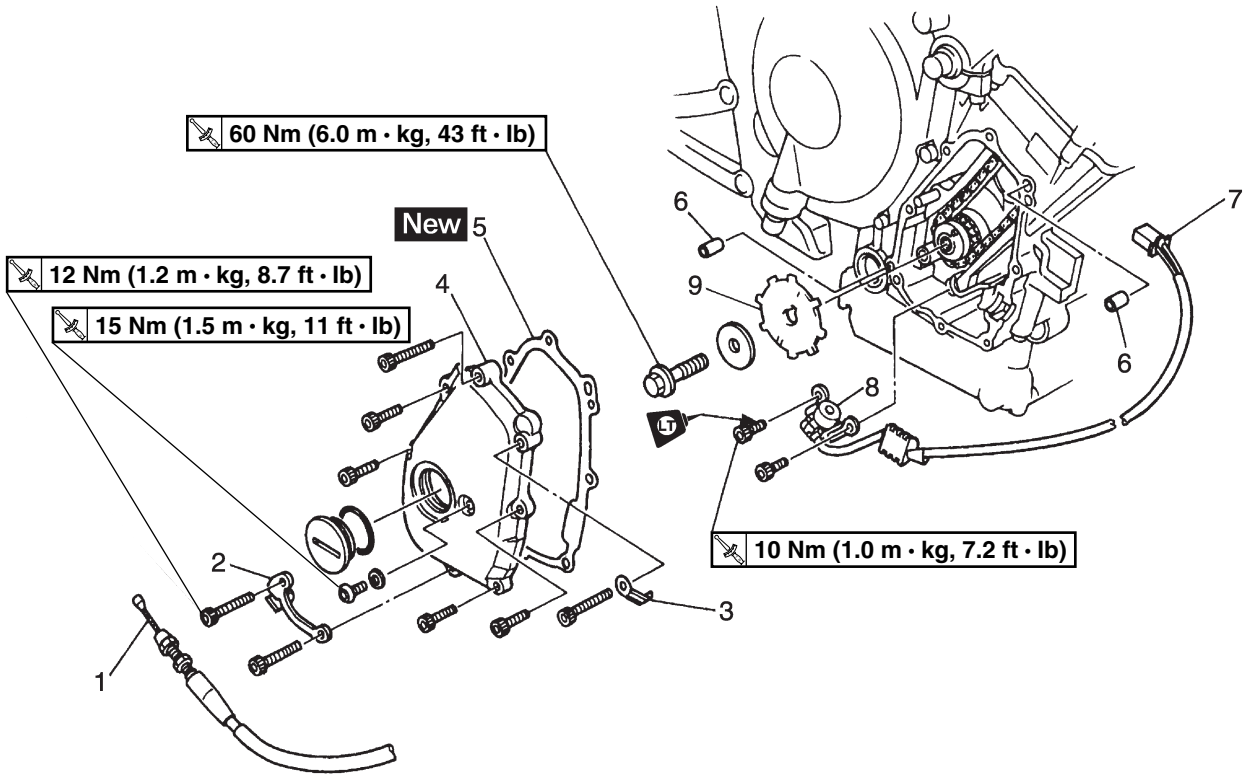
4. Install:
   - generator rotor cover

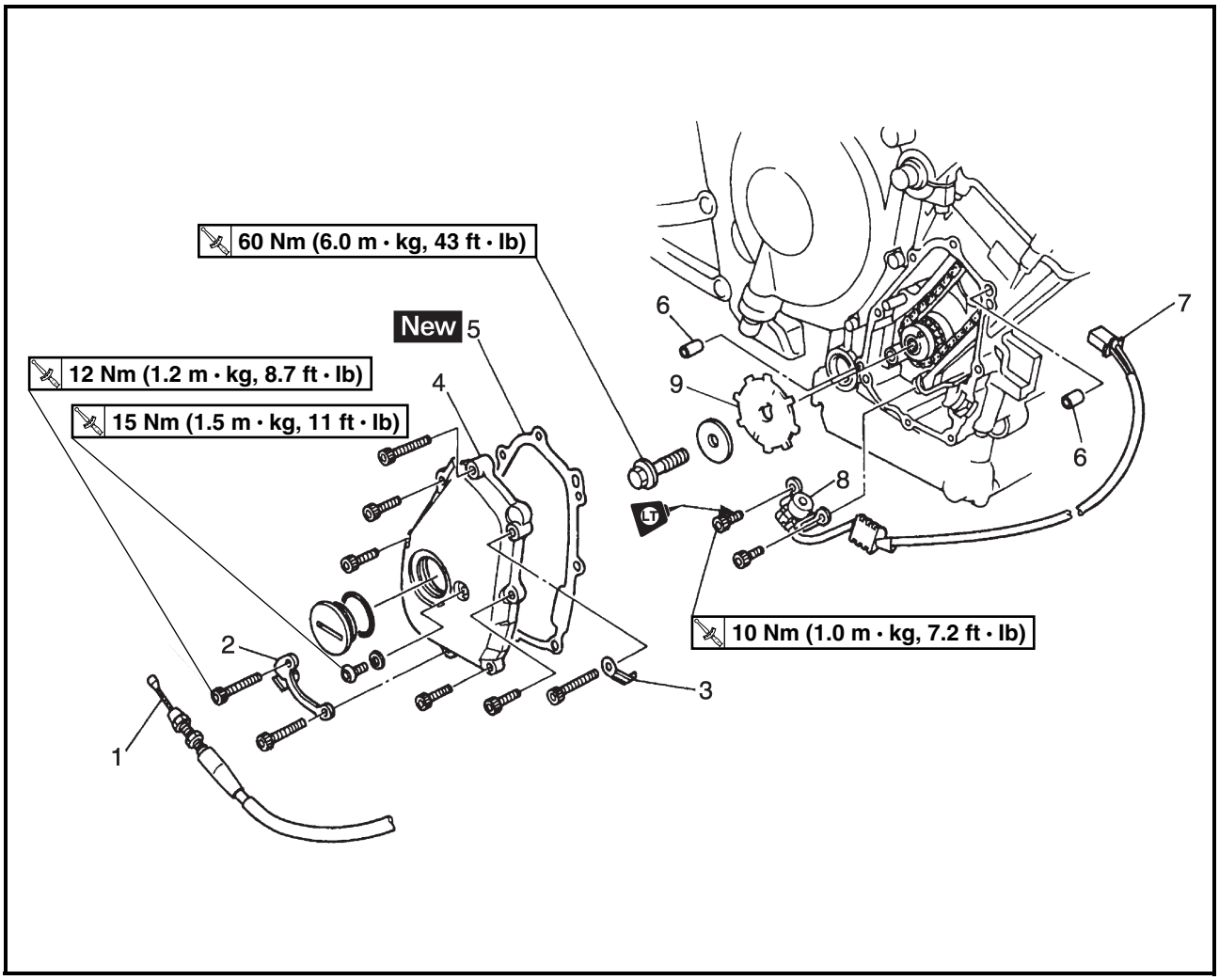
NOTE:

Tighten the generator rotor cover bolts in stages and in a crisscross pattern.

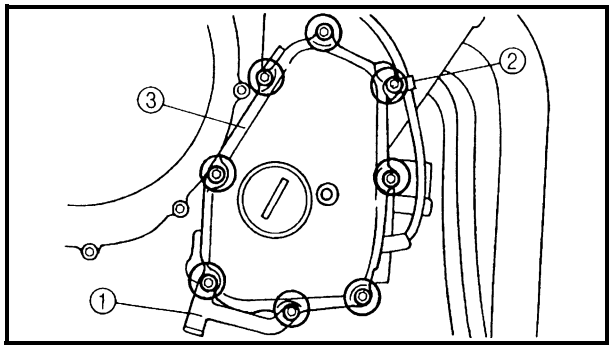
PICKUP COIL



Order	Job/Part	Q'ty	Remarks
	Removing the pickup coil and pickup coil rotor		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Bottom cowling and right side cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Generator rotor cover		Refer to "GENERATOR".
1	Clutch cable	1	
2	Clutch cable holder	1	
3	Pickup coil lead holder	1	
4	Pickup coil rotor cover	1	
5	Pickup coil rotor cover gasket	1	
6	Dowel pin	2	



Order	Job/Part	Q'ty	Remarks
7	Crankshaft position sensor coupler	1	Disconnect.
8	Crankshaft position sensor	1	
9	Pickup coil rotor	1	
			For installation, reverse the removal procedure.

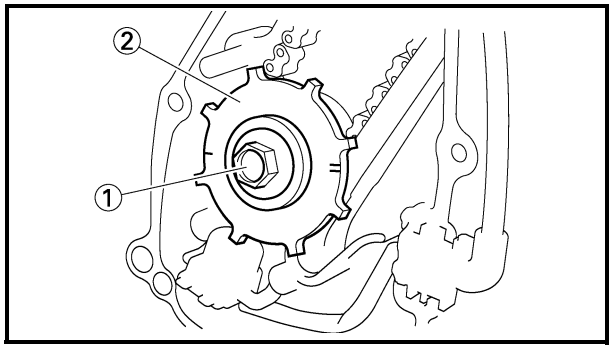


REMOVING THE PICKUP COIL ROTOR

1. Remove:
   - clutch cable holder ①
   - pickup coil lead holder ②
   - pickup coil rotor cover ③

NOTE:

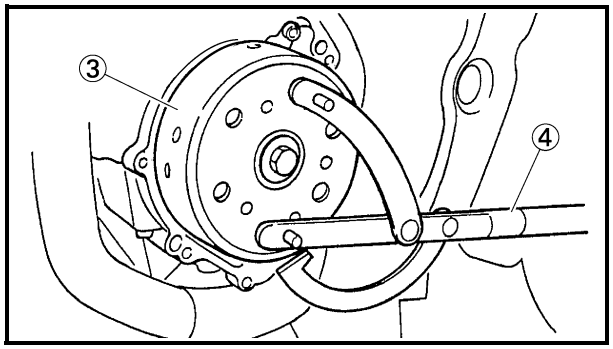
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.



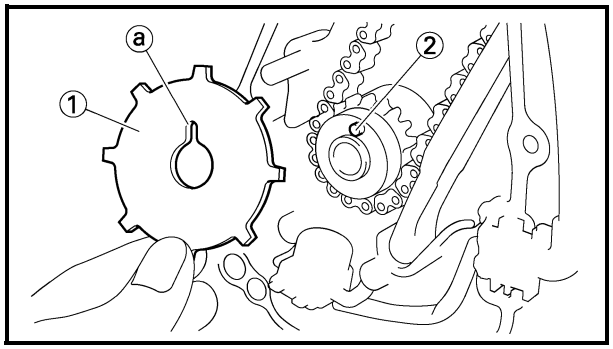
2. Remove:
   - pickup coil rotor bolt ①
   - washer
   - pickup coil rotor ②

NOTE:

While holding the generator rotor ③ with the rotor holding tool ④, loosen the pickup coil rotor bolt.



Rotor holding tool
YU-01235

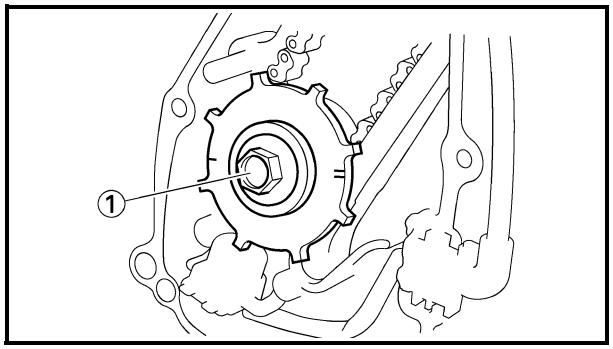


INSTALLING THE PICKUP COIL ROTOR

1. Install:
   - pickup coil rotor ①
   - washer
   - pickup coil rotor bolt

NOTE:

When installing the pickup coil rotor, align the pin ② in the crankshaft sprocket with the groove ⓐ in the pickup coil rotor.

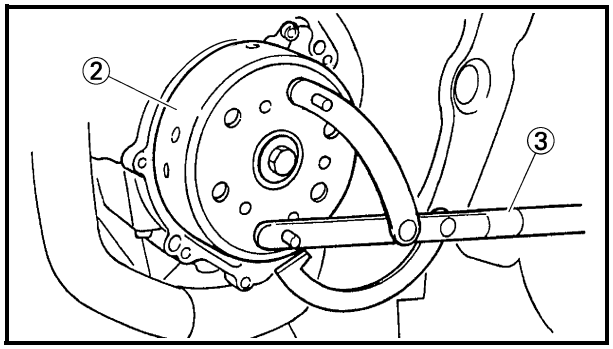


2. Tighten:
   - pickup coil rotor bolt ①

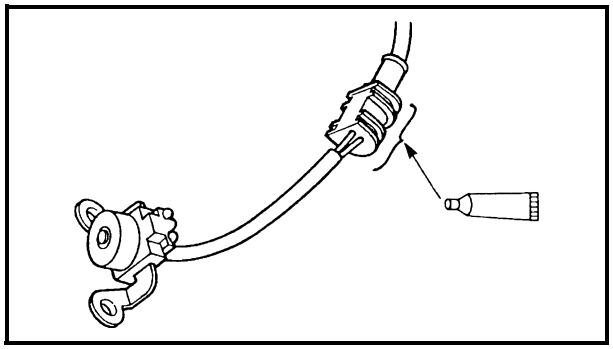
60 Nm (6.0 m · kg, 43 ft · lb)

NOTE:

While holding the generator rotor ② with the rotor holding tool ③, tighten the pickup coil rotor bolt.

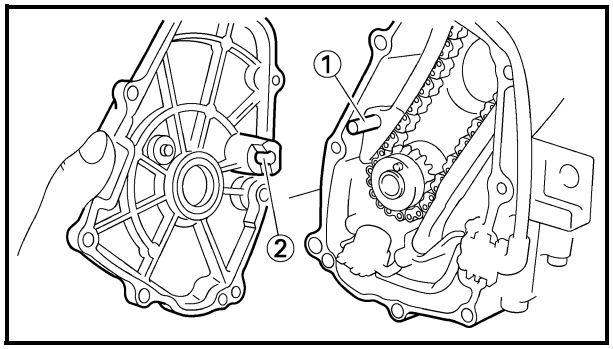


Rotor holding tool
YU-01235



3. Apply:
   - sealant
     (onto the crankshaft position sensor lead grommet)

Quick Gasket®
ACC-11001-05-01

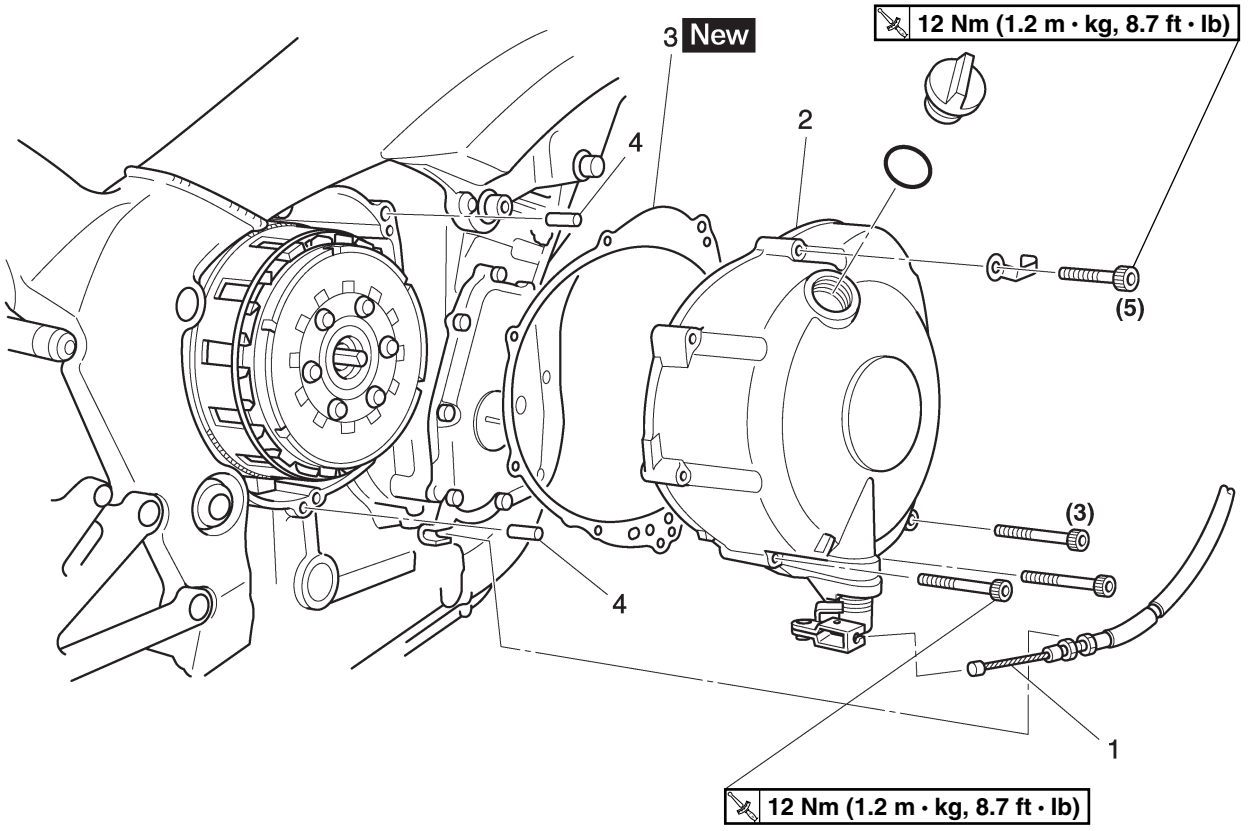


4. Install:
   - pickup coil rotor cover
   - pickup coil lead holder
   - clutch cable holder

NOTE:

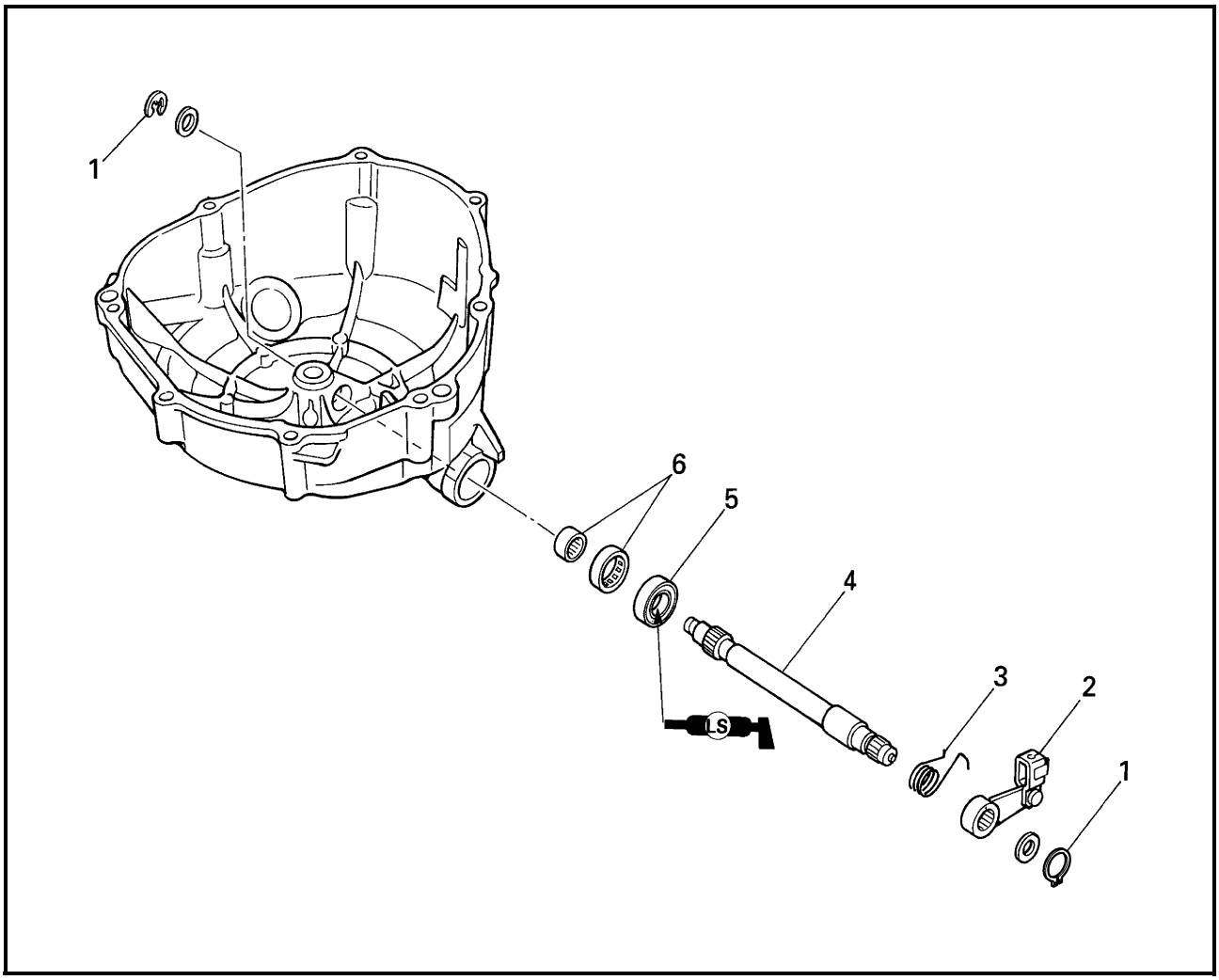
- When installing the pickup coil rotor cover, align the timing chain guide (intake side) pin ① of the with the hole ② in the pickup coil rotor cover.
- Tighten the pickup coil rotor cover bolts in stages and in a crisscross pattern.

CLUTCH
CLUTCH COVER



Order	Job/Part	Q'ty	Remarks
	Removing the clutch cover		Remove the parts in the order listed.
	Bottom cowling and right side cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	
2	Clutch cover	1	
3	Clutch cover gasket	1	
4	Dowel pin	2	
			For installation, reverse the removal procedure.

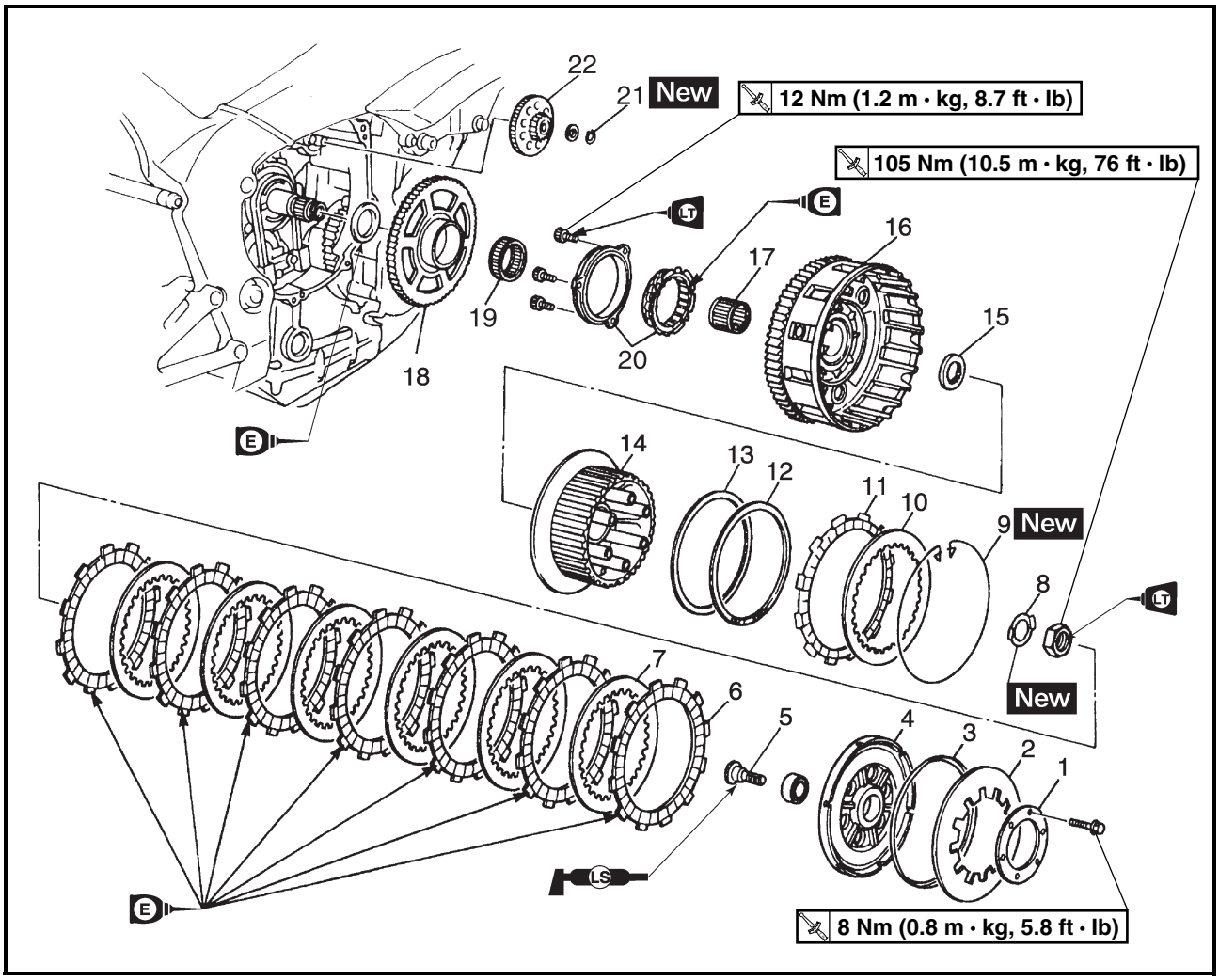
PULL LEVER SHAFT



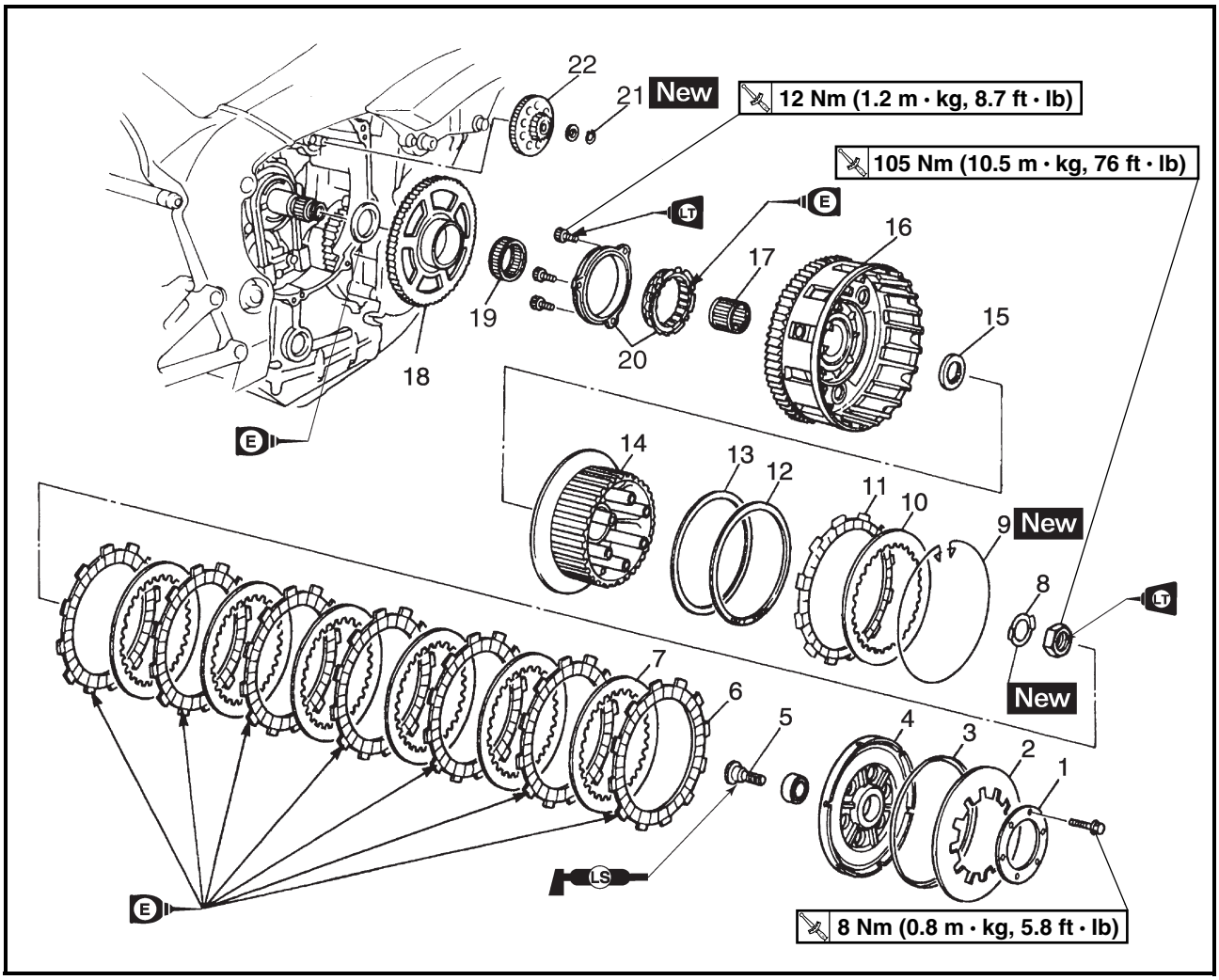
Order	Job/Part	Q'ty	Remarks
	Removing the pull lever shaft		Remove the parts in the order listed.
1	Circlip	2	
2	Pull lever	1	
3	Pull lever spring	1	
4	Pull lever shaft	1	
5	Oil seal	1	
6	Bearing	2	
			For installation, reverse the removal procedure.

EAS00274

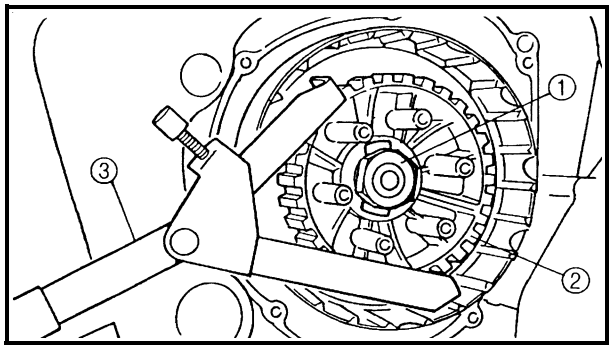
CLUTCH



Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring plate retainer	1	
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Pull rod	1	
6	Friction plate	7	Inside diameter = 124 mm
7	Clutch plate	6	
8	Lock washer	1	
9	Wire circlip	1	
10	Clutch plate	1	
11	Friction plate	1	Inside diameter = 135 mm
12	Clutch damper spring	1	
13	Clutch damper spring seat	1	
14	Clutch boss	1	



Order	Job/Part	Q'ty	Remarks
15	Thrust washer	1	
16	Clutch housing	1	
17	Bearing	1	
18	Starter clutch gear	1	
19	Bearing	1	
20	Starter clutch assembly	1	
21	Circlip	1	
22	Starter clutch idle gear	1	
			For installation, reverse the removal procedure.

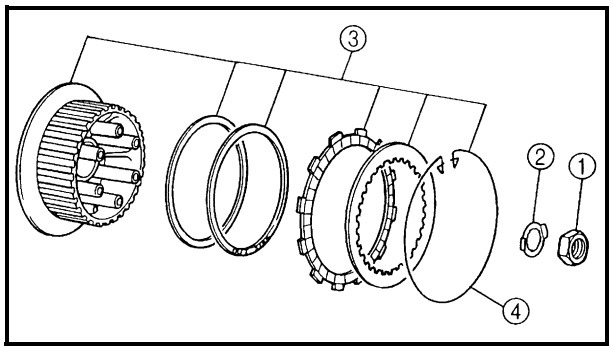


EAS00277
REMOVING THE CLUTCH

1. Straighten the lock washer tab.
2. Loosen:
   - clutch boss nut ①

NOTE:

While holding the clutch boss ② with the universal clutch holder ③, loosen the clutch boss nut.



Universal clutch holder
YM-91042

3. Remove:
   - clutch boss nut ①
   - lock washer ②
   - clutch boss assembly ③
   - thrust washer

NOTE:

There is a built-in damper between the clutch boss and the clutch plate. It is not necessary to remove the wire circlip ④ and disassemble the built-in damper unless there is serious clutch chattering.

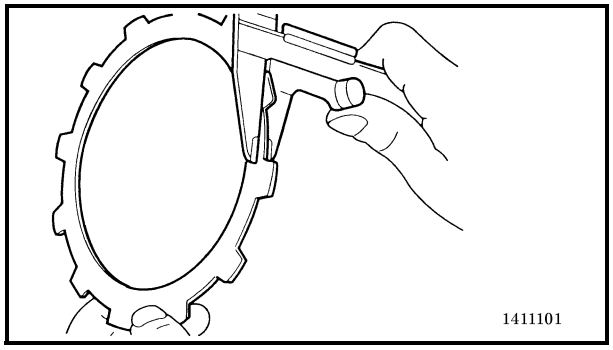
EAS00280
CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

1. Check:
   - friction plate
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   - friction plate thickness
     Out of specification → Replace the friction plates as a set.

NOTE:

Measure the friction plate at four places.

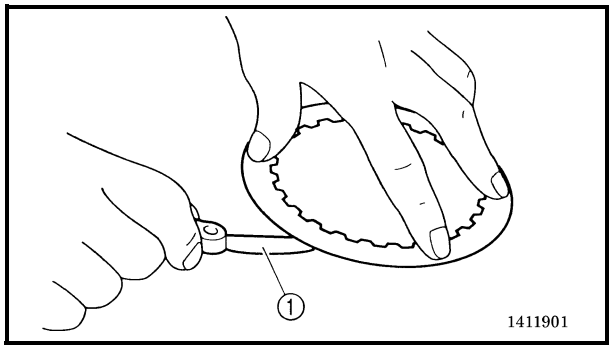


Friction plate thickness
2.9 ~ 3.1 mm
(0.114 ~ 0.122 in)
<Limit>: 2.8 mm (0.110 in)

EAS00281
CHECKING THE CLUTCH PLATES

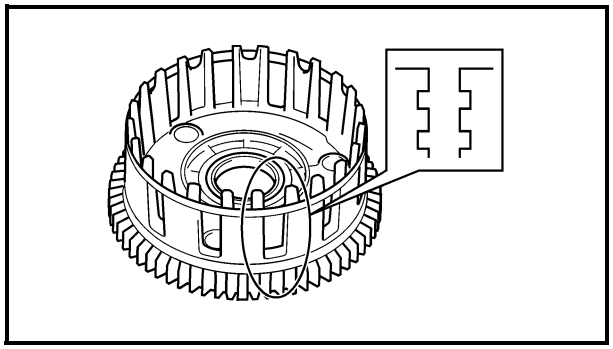
The following procedure applies to all of the clutch plates.

1. Check:
   - clutch plate
     Damage → Replace the clutch plates as a set.



2. Measure:
   - clutch plate warpage
     (with a surface plate and thickness gauge ①)
     Out of specification → Replace the clutch plates as a set.

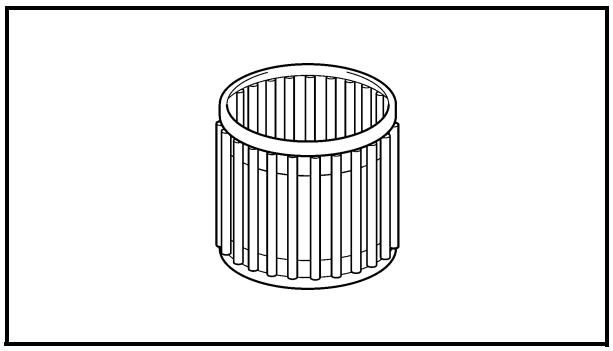
Clutch plate warpage limit
0.1 mm (0.004 in)



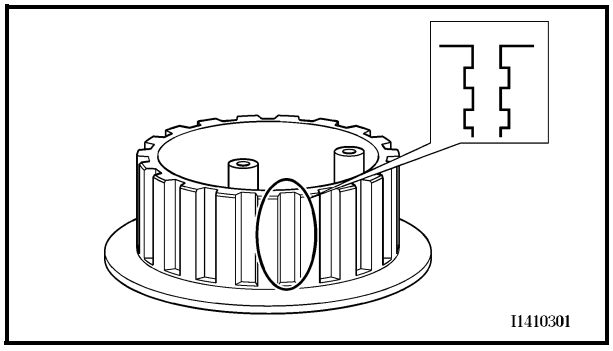
EAS00284
CHECKING THE CLUTCH HOUSING

1. Check:
   - clutch housing dogs
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE:
Pitting on the clutch housing dogs will cause erratic clutch operation.



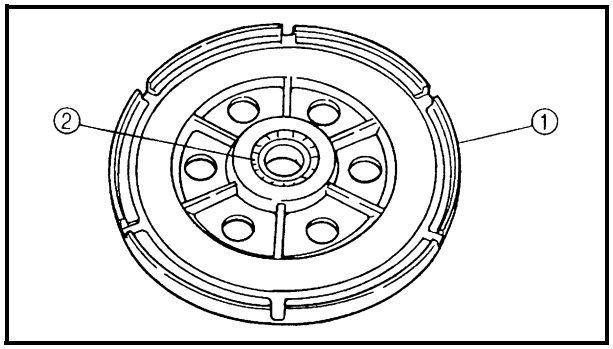
2. Check:
   - bearing
     Damage/wear → Replace the bearing and clutch housing.



EAS00285
CHECKING THE CLUTCH BOSS

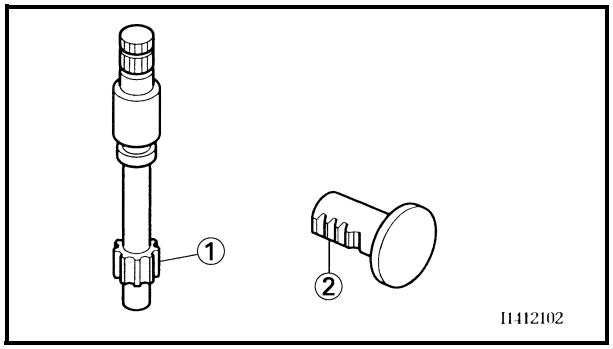
1. Check:
   - clutch boss splines
     Damage/pitting/wear → Replace the clutch boss.

NOTE:
Pitting on the clutch boss splines will cause erratic clutch operation.



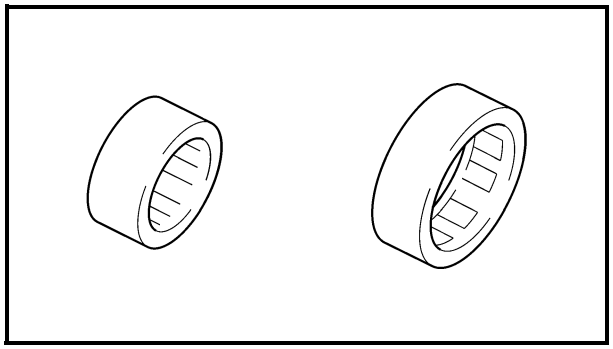
EAS00286
CHECKING THE PRESSURE PLATE

1. Check:
   - pressure plate ①
     Cracks/damage → Replace.
   - bearing ②
     Damage/wear → Replace.

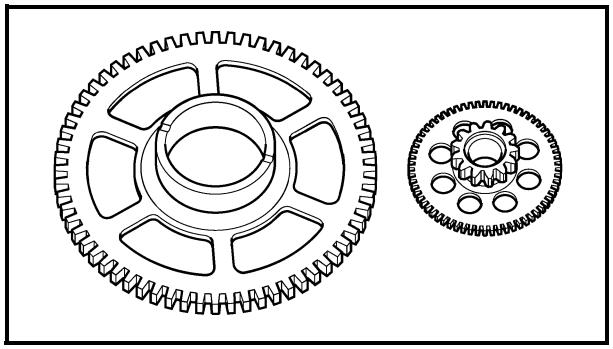


EAS00287
CHECKING THE PULL LEVER SHAFT AND PULL ROD

1. Check:
   - pull lever shaft pinion gear teeth ①
   - pull rod teeth ②
     Damage/wear → Replace the pull rod and pull lever shaft pinion gear as a set.

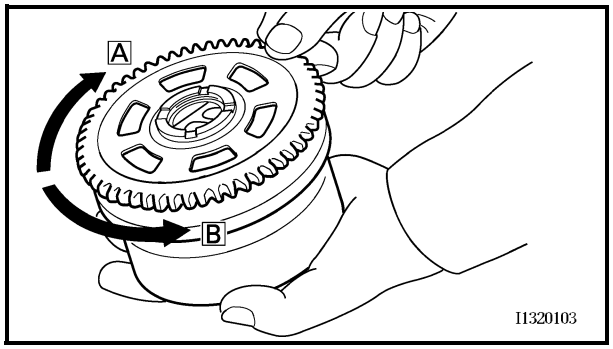


2. Check:
   - pull rod bearing
     Damage/wear → Replace.



EAS00348
CHECKING THE STARTER CLUTCH

1. Check:
   - starter clutch idle gear
   - starter clutch drive gear
   - starter clutch gear
     Burrs/chips/roughness/wear → Replace the defective part(s).



2. Check:
   • starter clutch operation

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Install the starter clutch drive gear onto the starter clutch and hold the starter clutch.
b. When turning the starter clutch drive gear clockwise [A], the starter clutch and the starter clutch drive gear should engage, otherwise the starter clutch is faulty and must be replaced.
c. When turning the starter clutch drive gear counterclockwise [B], it should turn freely, otherwise the starter clutch is faulty and must be replaced.

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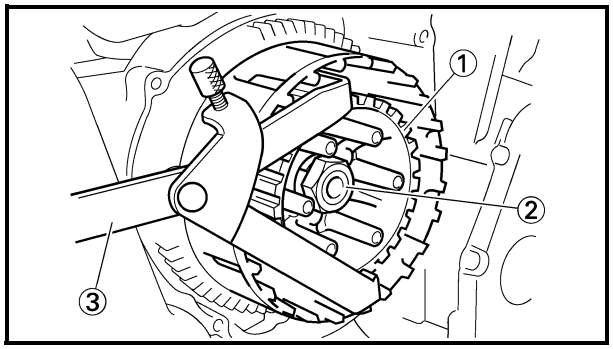


EAS00299
INSTALLING THE CLUTCH

1. Install:
   • clutch boss ①
   • lock washer New
   • clutch boss nut ②
2. Tighten:
   • clutch boss nut

   105 Nm (10.5 m · kg, 76 ft · lb) **LOCTITE®**

NOTE:

While holding the clutch boss with the universal clutch holder ③, tighten the clutch boss nut.

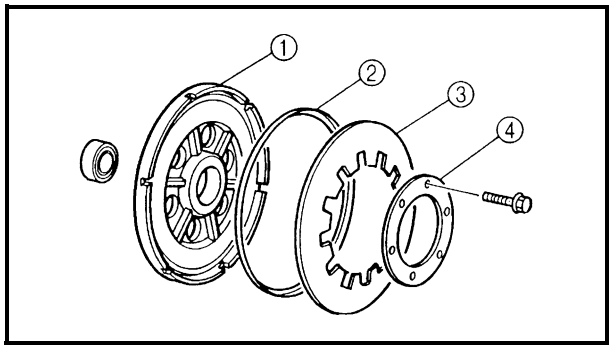
	**Universal clutch holder** **YM-91042**

3. Bend the lock washer tab along a flat side of the nut.
4. Lubricate:
   • friction plates
   • clutch plates
   (with the recommended lubricant)

	**Recommended lubricant** **Engine oil**

5. Install:
   - friction plates
   - clutch plates

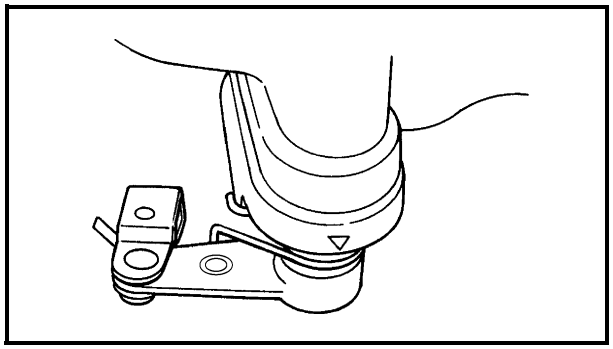
NOTE:
First, install a friction plate and then alternate between a clutch plate and a friction plate.



6. Install:
   - pressure plate ①
   - clutch spring plate seat ②
   - clutch spring plate ③
   - clutch spring plate retainer ④

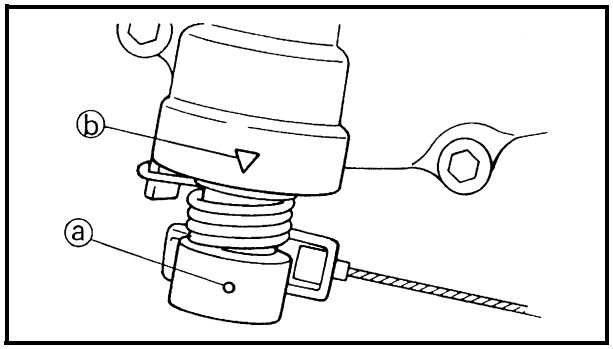
8 Nm (0.8 m · kg, 5.8 ft · lb)

NOTE:
Tighten the clutch spring plate retainer bolts in stages and in a crisscross pattern.



7. Install:
   - pull lever

NOTE:
Install the pull lever with the "⬭" mark facing towards the clutch cover.

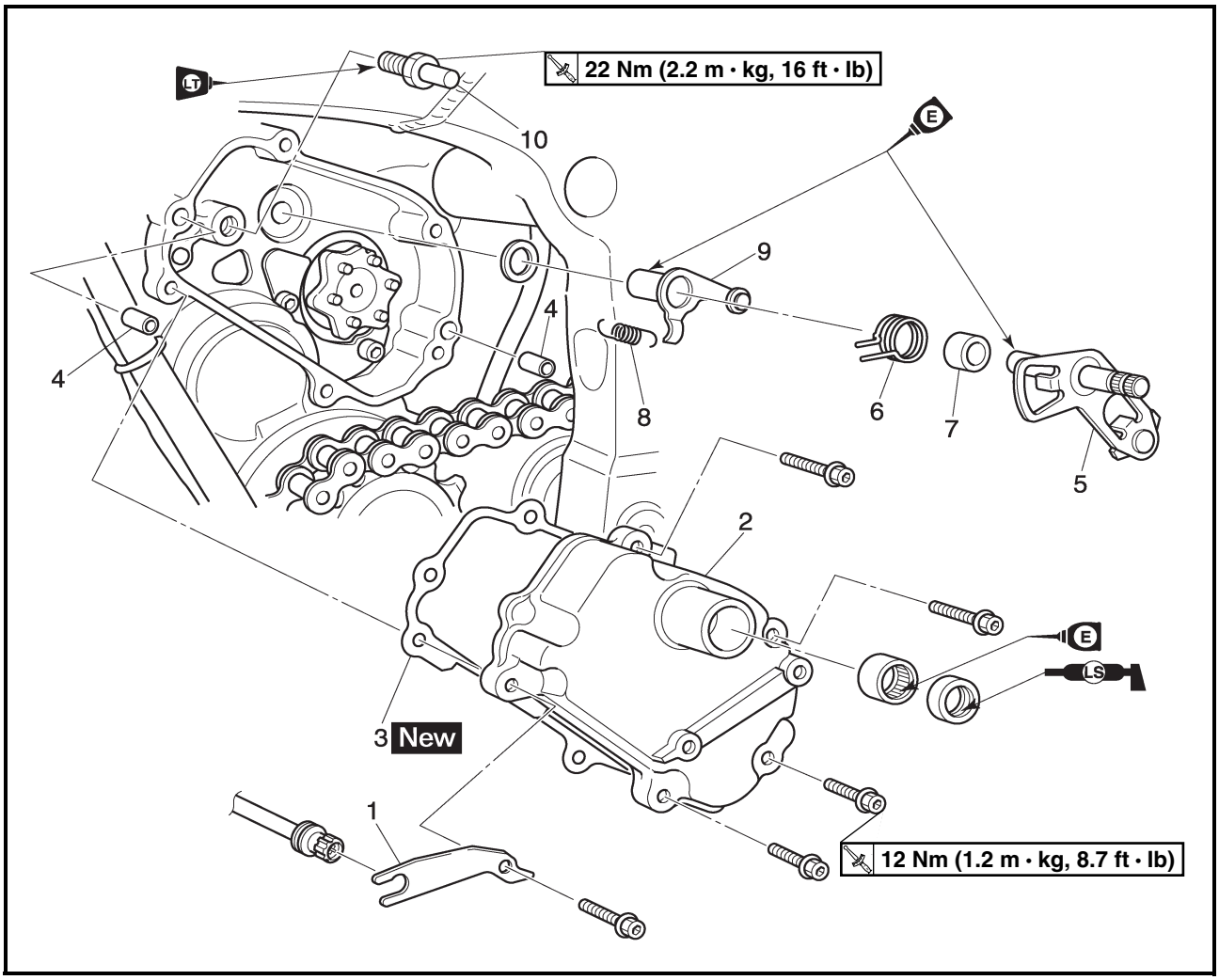


8. Install:
   - clutch cover

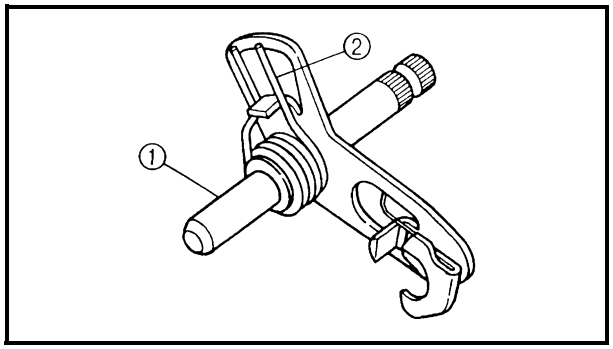
12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
- When installing the clutch cover, push the pull lever and check that the punch mark ⓐ on the pull lever aligns with the mark ⓑ on the clutch cover. Make sure that the pull rod teeth and pull lever shaft pinion gear are engaged.
- Tighten the clutch cover bolts in stages and in a crisscross pattern.

EAS00327
SHIFT SHAFT
SHIFT SHAFT AND STOPPER LEVER

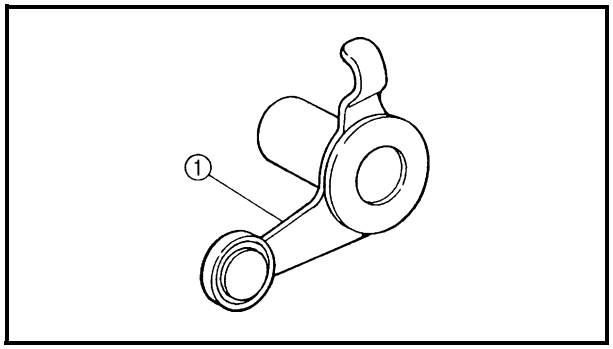


Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Drive sprocket cover		Refer to "ENGINE".
1	Throttle stop screw holder	1	
2	Shift shaft cover	1	
3	Shift shaft cover gasket	1	
4	Dowel pin	2	
5	Shift shaft	1	
6	Shift shaft spring	1	
7	Spacer	1	
8	Stopper lever spring	1	
9	Stopper lever	1	
10	Shift shaft spring stopper	1	
			For installation, reverse the removal procedure.



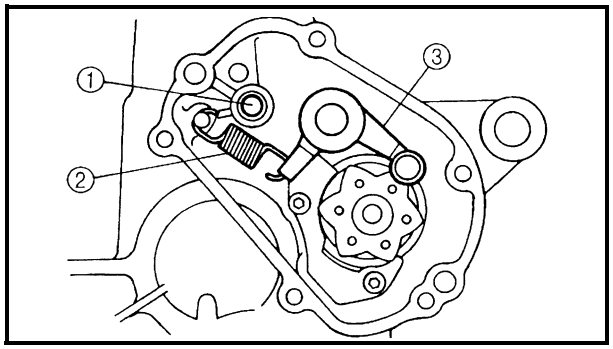
CHECKING THE SHIFT SHAFT

1. Check:
   - shift shaft ①
     Bends/damage/wear → Replace.
   - shift shaft spring ②
     Damage/wear → Replace.



CHECKING THE STOPPER LEVER

1. Check:
   - stopper lever ①
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



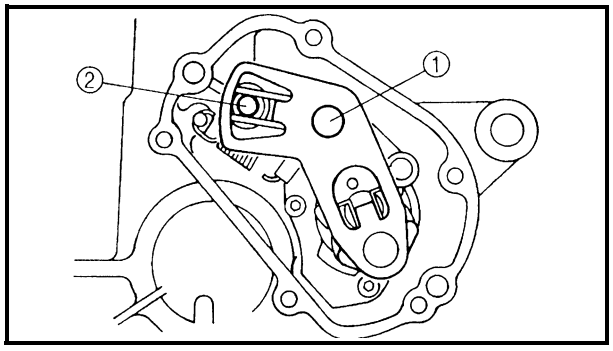
INSTALLING THE SHIFT SHAFT

1. Install:
   - shift shaft spring stopper ①

     22 Nm (2.2m · kg, 16 ft · lb)
   - stopper lever spring ②
   - stopper lever ③

NOTE:

- Apply LOCTITE® to the threads of the shift shaft spring stopper.
- Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.

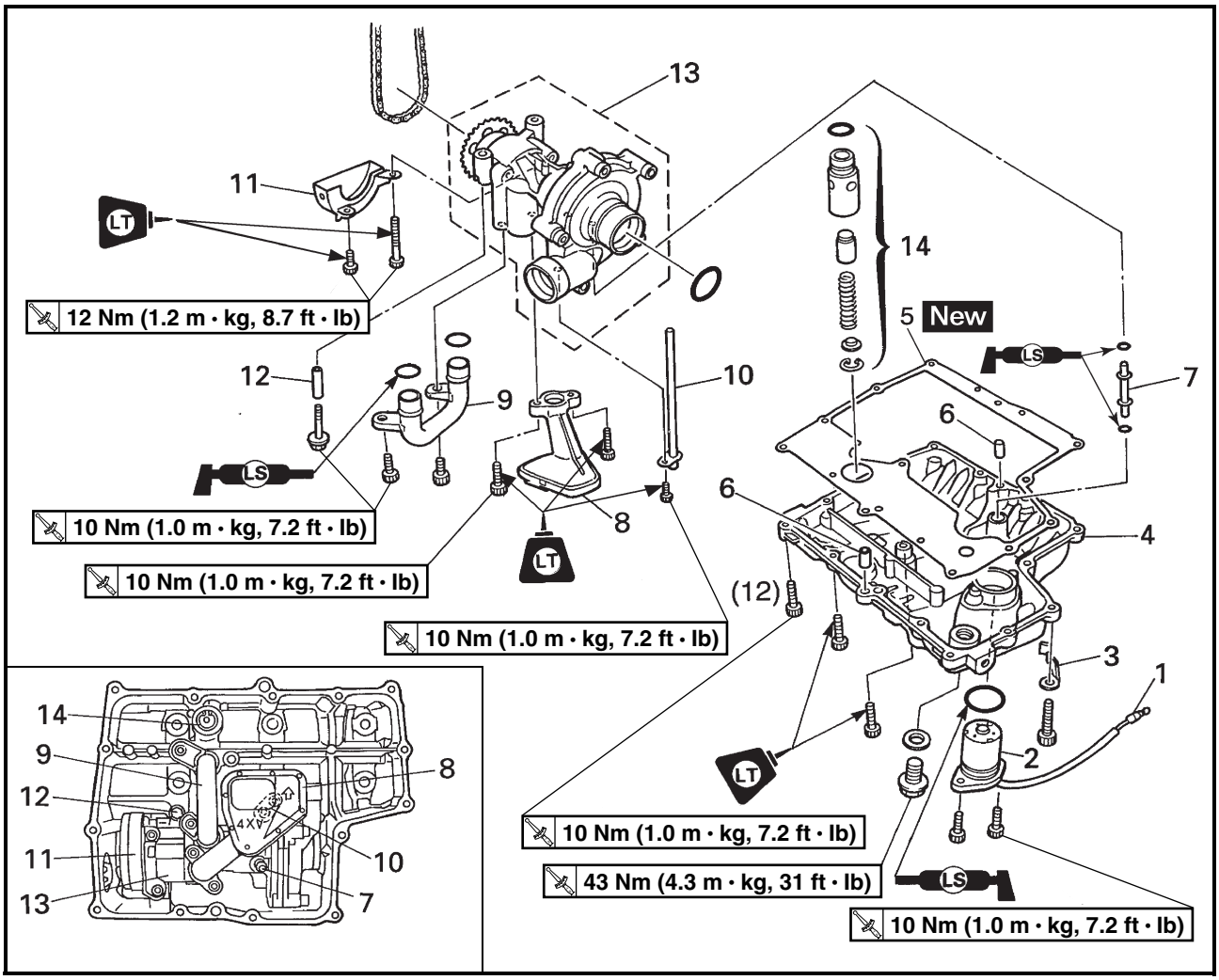


2. Install:
   - shift shaft ①
   - spacer

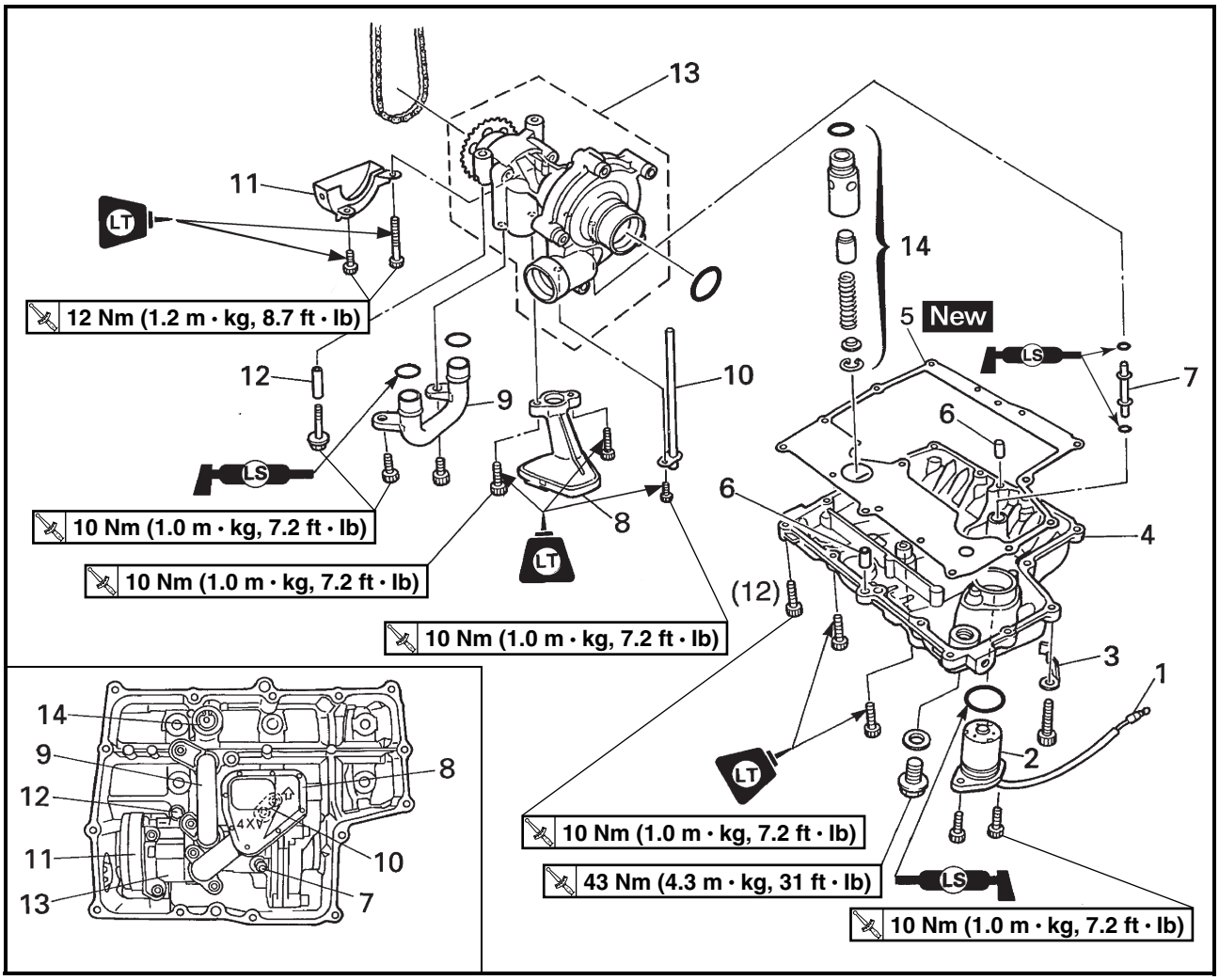
NOTE:

- Lubricate the oil seal lips with lithium soap base grease.
- Install the end of the shift shaft spring onto the shift shaft spring stopper ②.

EAS00356
OIL PAN AND OIL PUMP



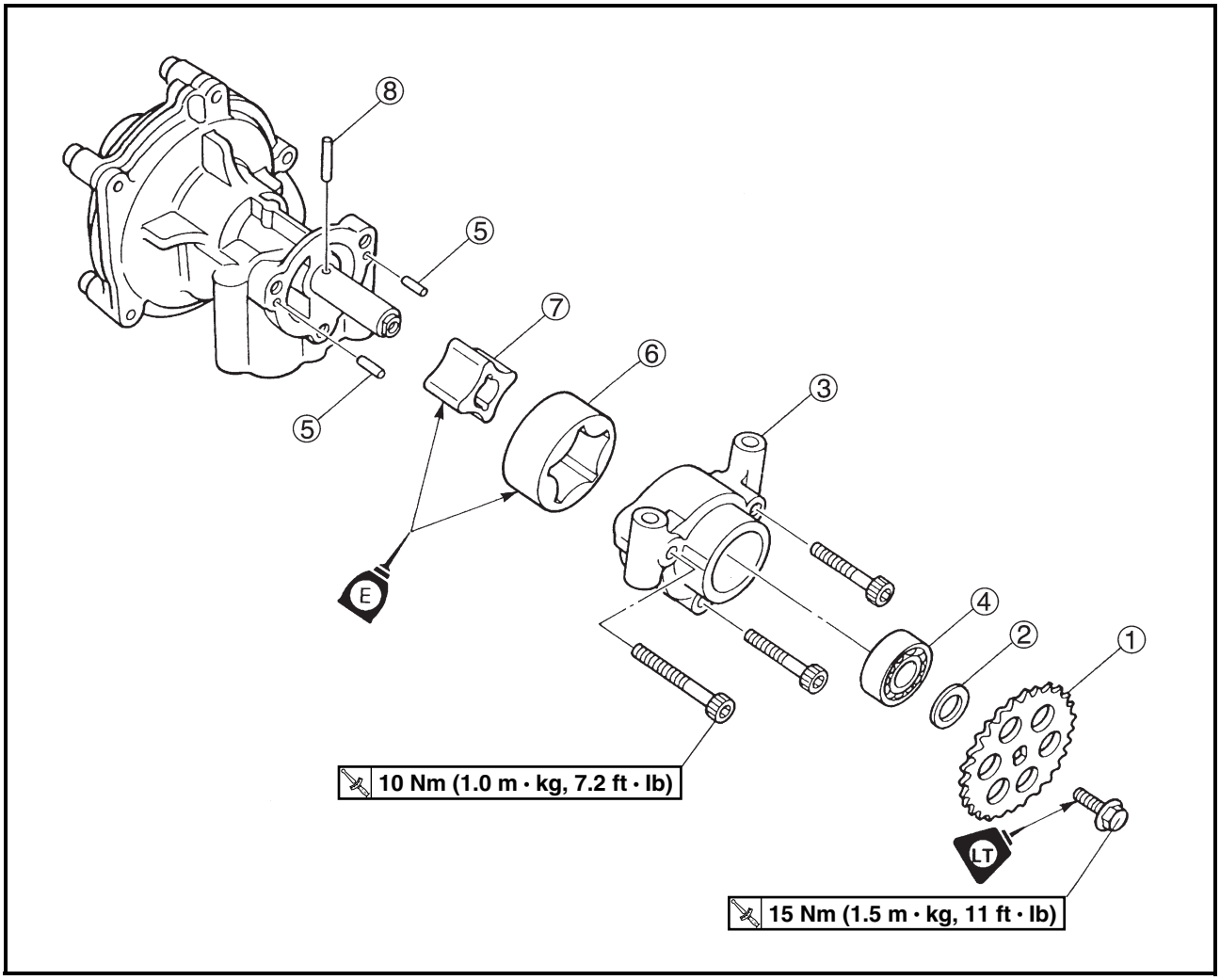
Order	Job/Part	Q'ty	Remarks
	Removing the oil pan and oil pump		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly and water pump outlet pipe		Refer to "RADIATOR" and "OIL COOLER" in chapter 6.
	Exhaust pipe assembly		Refer to "ENGINE".
1	Oil level switch connector	1	Disconnect.
2	Oil level switch	1	
3	Oil level switch lead holder	1	
4	Oil pan	1	
5	Oil pan gasket	1	
6	Dowel pin	2	



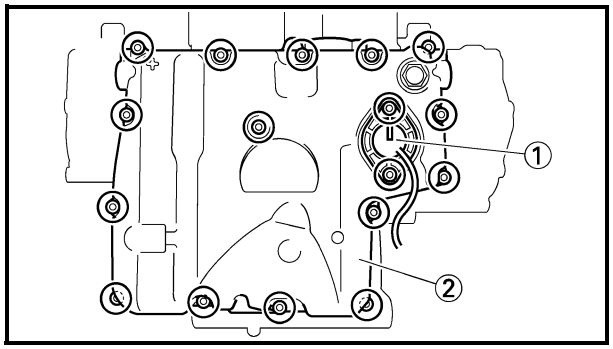
Order	Job/Part	Q'ty	Remarks
7	Drain pipe	1	
8	Oil strainer	1	
9	Oil pipe	1	
10	Oil delivery pipe	1	
11	Oil/water pump assembly drive sprocket cover	1	
12	Dowel pin	1	
13	Oil/water pump assembly	1	
14	Relief valve assembly	1	
			For installation, reverse the removal procedure.

EAS00360

OIL PUMP



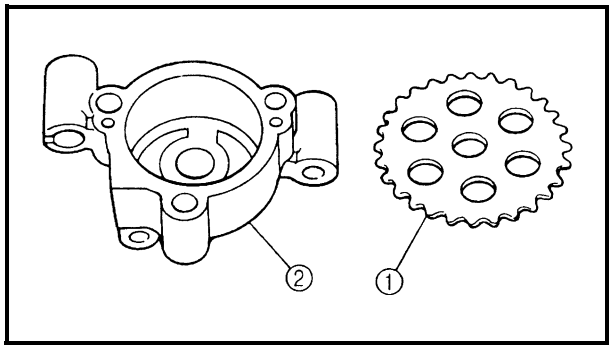
Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
①	Oil/water pump assembly driven sprocket	1	
②	Washer	1	
③	Oil pump housing	1	
④	Bearing	1	
⑤	Pin	2	
⑥	Oil pump outer rotor	1	
⑦	Oil pump inner rotor	1	
⑧	Pin	1	
			For assembly, reverse the disassembly procedure.

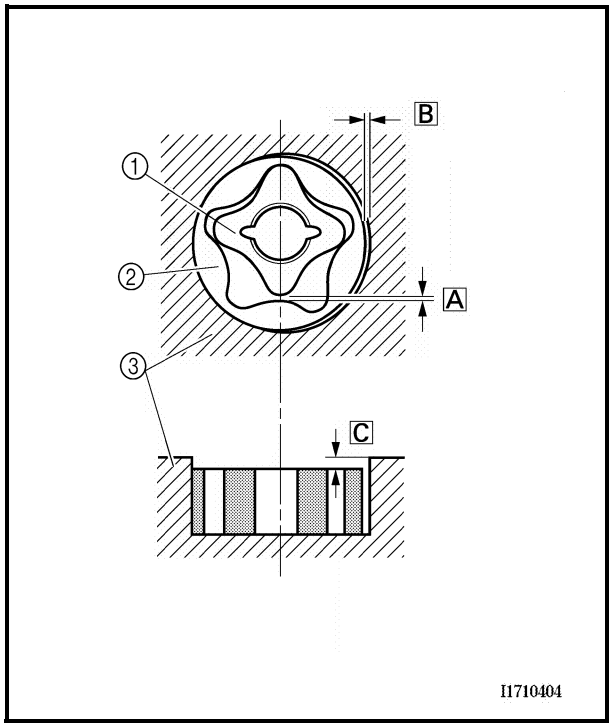


EAS00362
REMOVING THE OIL PAN

1. Remove:
   - oil level switch ①
   - oil pan ②
   - gasket
   - dowel pins

NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



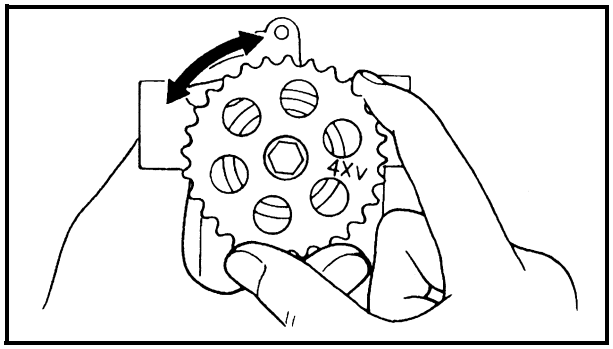


EAS00364
CHECKING THE OIL PUMP

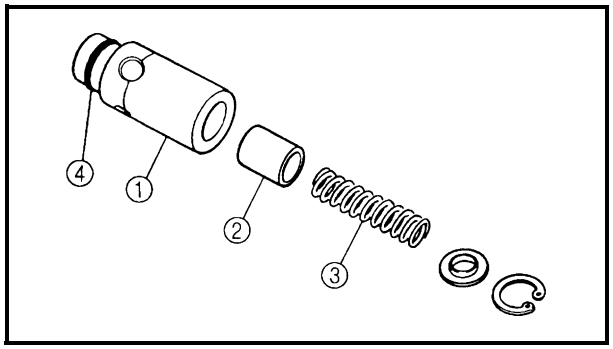
1. Check:
   - oil pump driven gear ①
   - oil pump housing ②
     Cracks/damage/wear → Replace the defective part(s).
2. Measure:
   - inner-rotor-to-outer-rotor-tip clearance [A]
   - outer-rotor-to-oil-pump-housing clearance [B]
   - oil-pump-housing-to-inner-rotor-and-outer-rotor clearance [C]
     Out of specification → Replace the oil pump.

① Inner rotor
② Outer rotor
③ Oil pump housing

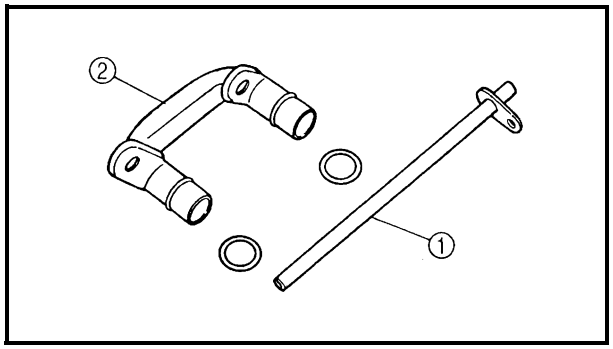
Inner-rotor-to-outer-rotor-tip clearance
0.01 ~ 0.10 mm
(0.0004 ~ 0.0039 in)
<Limit: 0.18 mm (0.0071 in)>
Outer-rotor-to-oil-pump-housing clearance
0.09 ~ 0.15 mm
(0.0035 ~ 0.0059 in)
<Limit: 0.22 mm (0.0087 in)>
Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance
0.06 ~ 0.11 mm
(0.0024 ~ 0.0043 in)
<Limit: 0.18 mm (0.0071 in)>



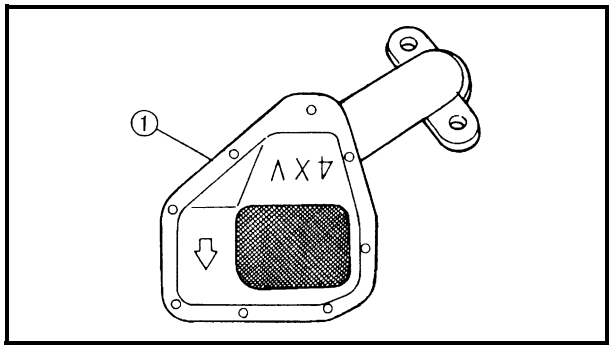
3. Check:
   • oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS00365
CHECKING THE RELIEF VALVE
1. Check:
   • relief valve body ①
   • relief valve ②
   • spring ③
   • O-ring ④
   Damage/wear → Replace the defective part(s).



EAS00367
CHECKING THE OIL DELIVERY PIPES
The following procedure applies to all of the oil delivery pipes.
1. Check:
   • oil delivery pipe ①
   • oil pipe ②
   Damage → Replace.
   Obstruction → Wash and blow out with compressed air.

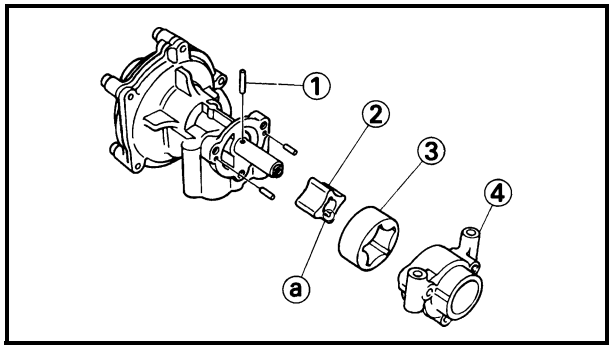


EAS00368
CHECKING THE OIL STRAINER
1. Check:
   • oil strainer ①
   Damage → Replace.
   Contaminants → Clean with solvent.

EAS00374
ASSEMBLING THE OIL PUMP

1. Lubricate:
   - inner rotor
   - outer rotor
   - oil pump shaft
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

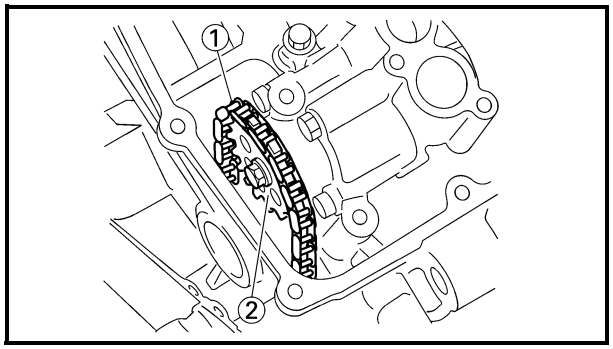


2. Install:
   - pin ①
   - inner rotor ②
   - outer rotor ③
   - oil pump housing ④
   - oil pump housing screw

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
When installing the inner rotor, align the pin ① in the oil pump shaft with the groove ⓐ in the inner rotor ②.

3. Check:
   - oil pump operation
     Refer to “CHECKING THE OIL PUMP”.

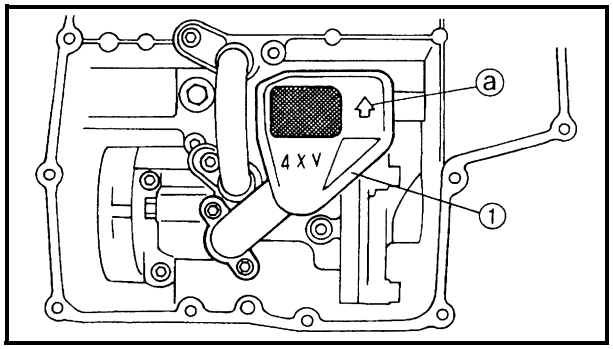


EAS00376
INSTALLING THE OIL PUMP

1. Install:
   - oil pump

15 Nm (1.5 m · kg, 11 ft · lb)

NOTE:
Install the oil/water pump drive chain ① onto the oil/water pump driven sprocket ②.



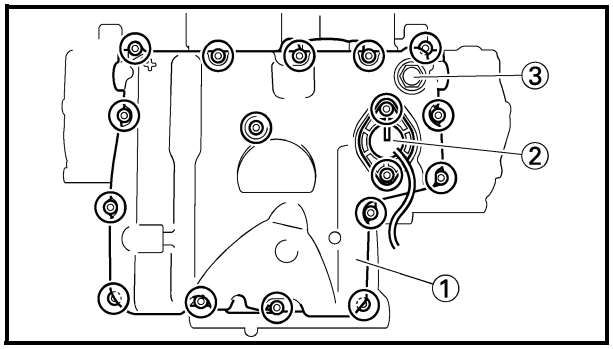
EAS00378
INSTALLING THE OIL STRAINER

1. Install:
   - oil strainer housing ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:

The arrow mark ⓐ on the oil strainer housing must point towards the front of the engine.



EAS00380
INSTALLING THE OIL PAN

1. Install:
   - dowel pins
   - gasket New
   - oil pan ① **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - oil level switch ② **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - engine oil drain bolt ③ **43 Nm (4.3 m · kg, 31 ft · lb)**

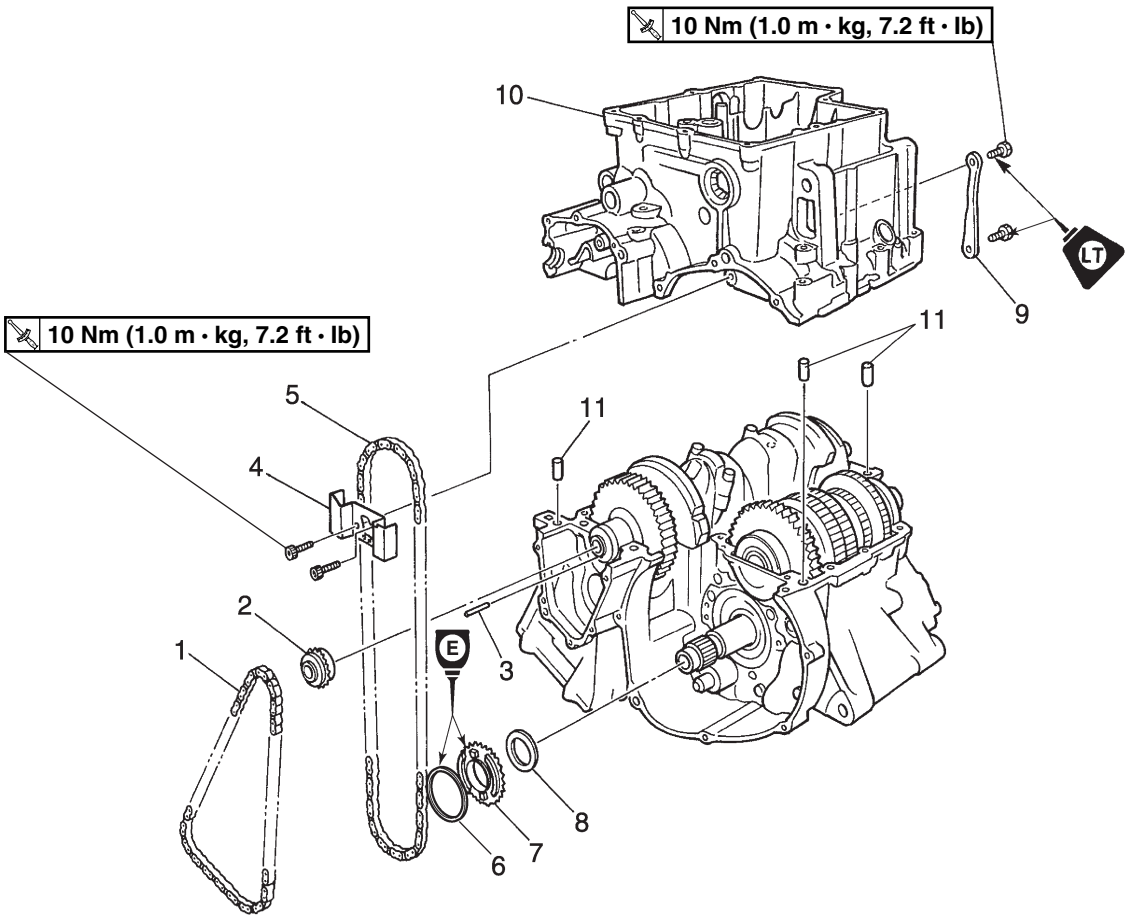
⚠ WARNING

Always use new copper washers.

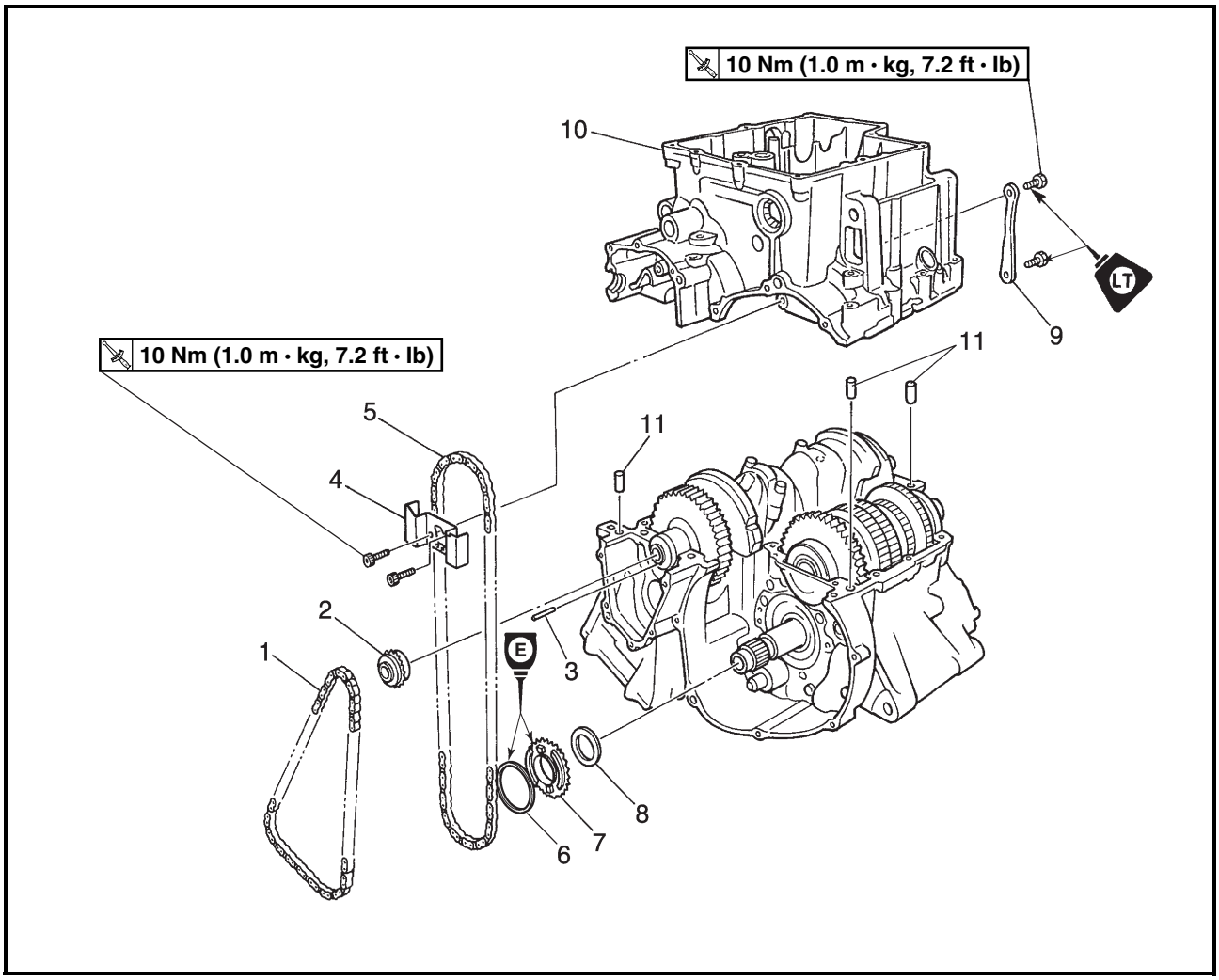
NOTE:

- Tighten the oil pan bolts in stages and in a crisscross pattern.
- Lubricate the oil level switch O-ring with engine oil.

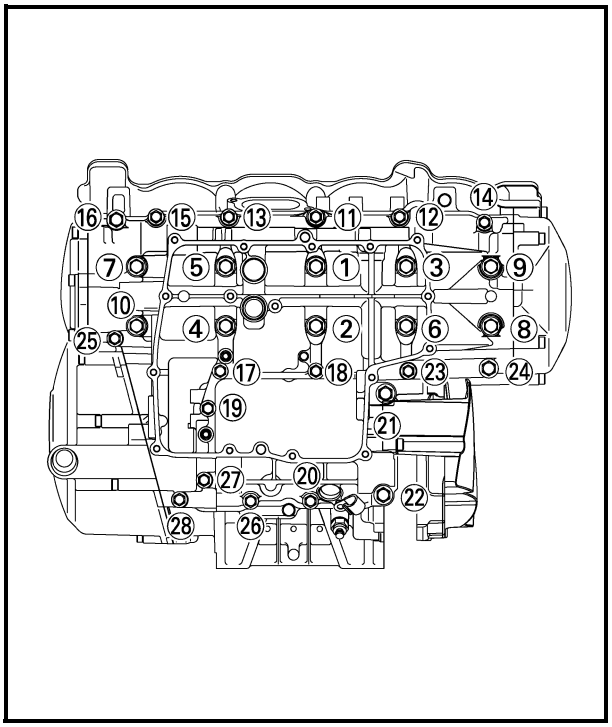
EAS00381
CRANKCASE



Order	Job/Part	Q'ty	Remarks
	Removing the crankcase		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Cylinder head		Refer to "CYLINDER HEAD".
	Pickup coil and pickup coil rotor		Refer to "PICKUP COIL".
	Stator coil assembly		Refer to "GENERATOR".
	Clutch housing and starter clutch idle gear		Refer to "CLUTCH".
	Oil/water pump assembly		Refer to "OIL PAN AND OIL PUMP".
1	Timing chain	1	
2	Crankshaft sprocket	1	
3	Pin	1	
4	Oil/water pump assembly drive chain guide	1	
5	Oil/water pump assembly drive chain	1	



Order	Job/Part	Q'ty	Remarks
6	Washer	1	
7	Oil/water pump assembly drive sprocket	1	
8	Washer	1	
9	Plate	1	
10	Lower crankcase	1	
11	Dowel pin	3	
			For installation, reverse the removal procedure.



EAS00384
DISASSEMBLING THE CRANKCASE

1. Place the engine upside down.
2. Remove:
   - crankcase bolts

NOTE:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration).
- The numbers embossed on the crankcase indicate the crankcase tightening sequence.

3. Remove:
   - lower crankcase

CAUTION:

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

M9 × 105 mm bolts: ① ~ ⑩
M8 × 50 mm bolt: ㉒
M8 × 60 mm bolt: ㉑
M6 × 45 mm bolts: ⑳, ㉖, ㉘
M6 × 50 mm bolt: ⑱
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 60 mm bolt: ㉓
M6 × 65 mm bolt: ㉗
M6 × 65 mm bolts: ⑯, ㉔
M6 × 70 mm bolts: ⑰, ⑲, ㉕

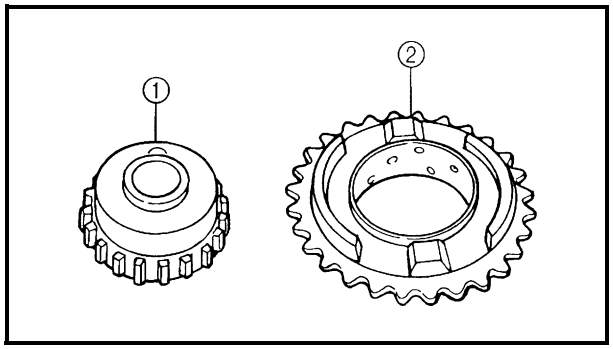
4. Remove:
   - dowel pins
   - O-ring
5. Remove:
   - crankshaft journal lower bearing (from the lower crankcase)

NOTE:

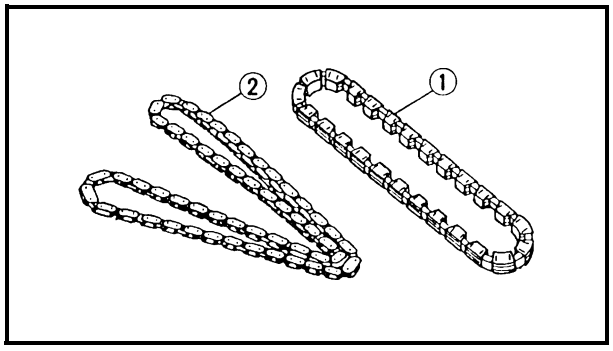
Identify the position of each crankshaft journal lower bearing so that it can be reinstalled in its original place.

EAS00399
CHECKING THE CRANKCASE
1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
   - crankcase
     Cracks/damage → Replace.
   - oil delivery passages
     Obstruction → Blow out with compressed air.

EAS00401
CHECKING THE BEARINGS AND OIL SEALS
1. Check:
   - bearings
     Clean and lubricate the bearings, then rotate the inner race with your finger.
     Rough movement → Replace.
2. Check:
   - oil seals
     Damage/wear → Replace.



CHECKING THE SPROCKET AND CHAINS
1. Check:
   - crankshaft sprocket ①
   - oil/water pump assembly drive sprocket ②
     Cracks/damage/wear → Replace the defective part(-s).

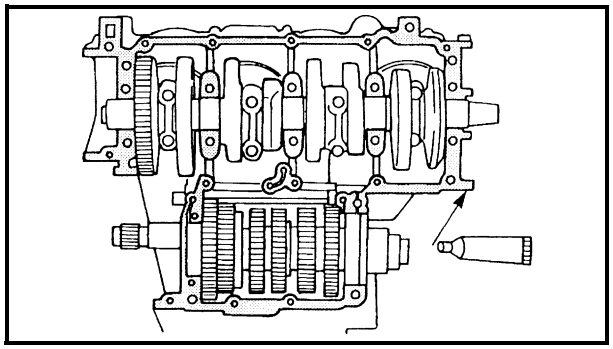


2. Check:
   - timing chain ①
     Damage/stiffness → Replace the timing chain and crankshaft sprocket as a set.
   - oil/water pump assembly drive chain ②
     Damage/stiffness → Replace the oil/water pump assembly drive chain and oil/water pump assembly drive sprocket as a set.

EAS00414
ASSEMBLING THE CRANKCASE

1. Lubricate:
   • crankshaft journal bearings
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

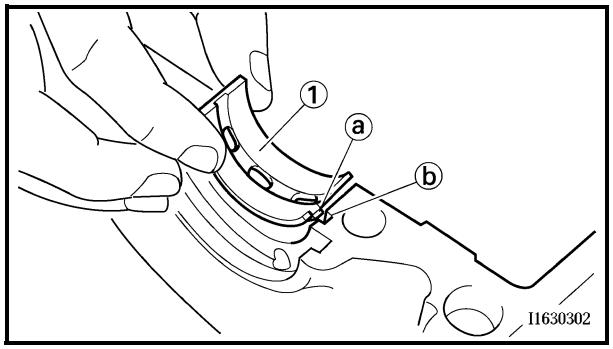


2. Apply:
   • sealant
   (onto the crankcase mating surfaces)

	Quick Gasket® **ACC-11001-05-01**

NOTE:
Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.

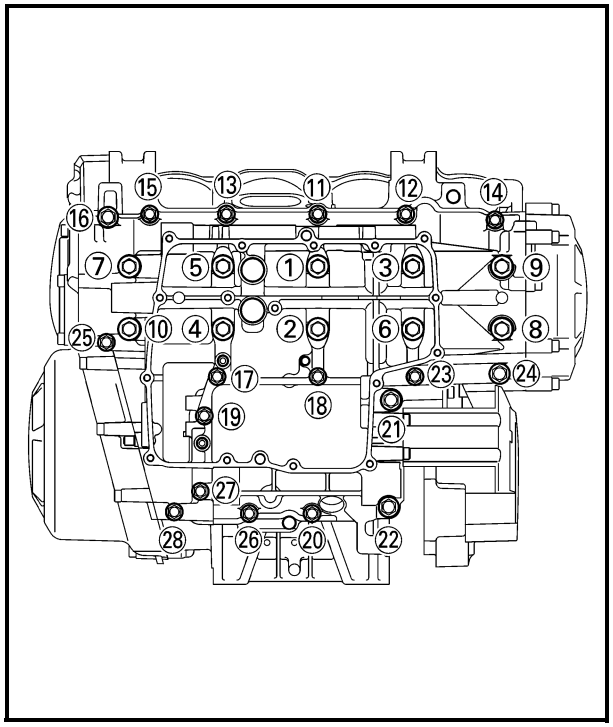
3. Install:
   • dowel pin



4. Install:
   • crankshaft journal lower bearings ①
   (into the lower crankcase)

NOTE:
- Align the projections ⓐ on the crankshaft journal lower bearings with the notches ⓑ in the lower crankcase.
- Install each crankshaft journal lower bearing in its original place.

5. Set the shift drum assembly and transmission gears in the neutral position.



6. Install:
   • lower crankcase ①
   (onto the upper crankcase ②)

CAUTION:

Before tightening the crankcase bolts, make sure the transmission gears shift correctly when the shift drum assembly is turned by hand.

7. Install:
   • crankcase bolts

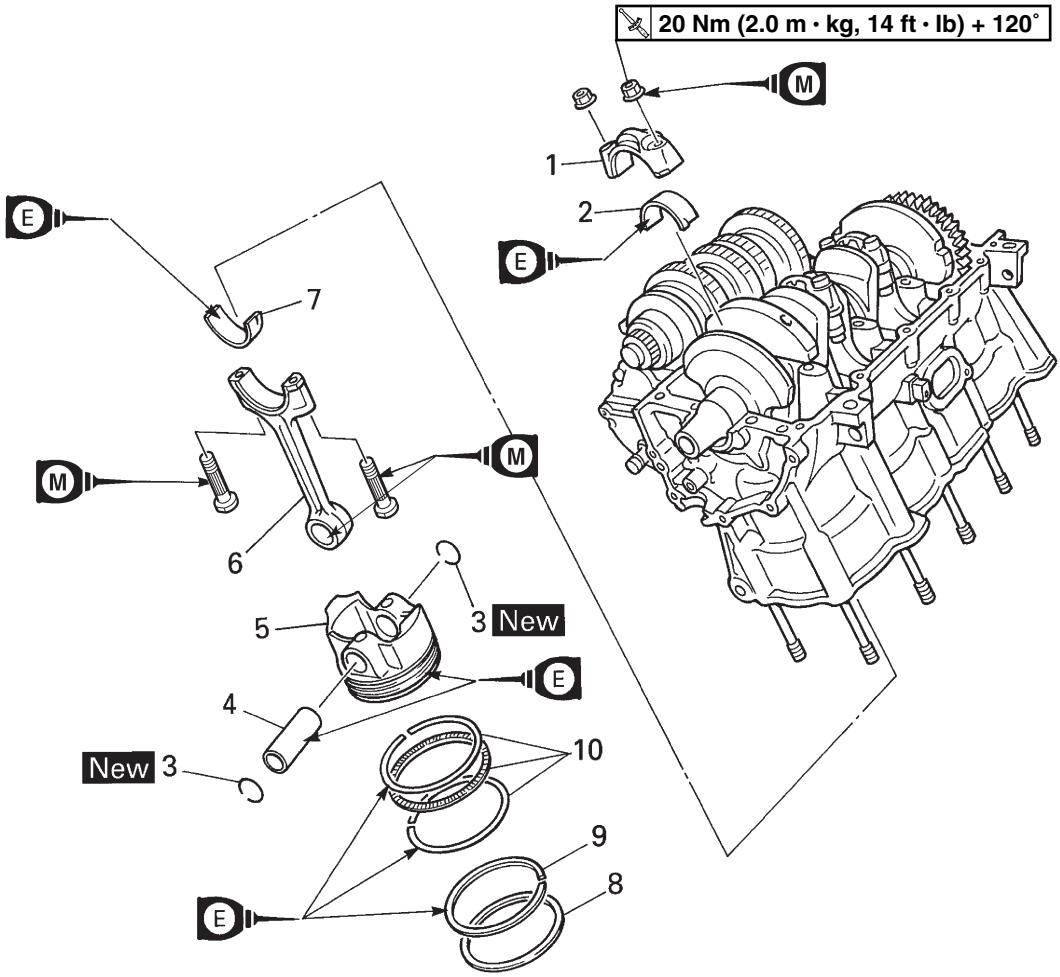
NOTE:

- Lubricate the bolt threads with engine oil.
- Tighten the bolts in increasing numerical order.
- Install washers on bolts ① ~ ⑩.

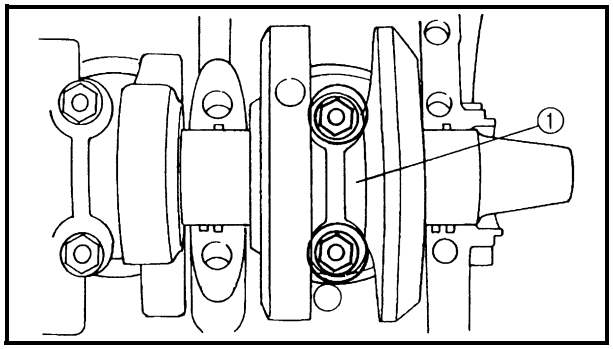
M9 × 105 mm bolts: ① ~ ⑩
M8 × 50 mm bolt: ㉒
M8 × 60 mm bolt: ㉑
M6 × 45 mm bolts: ⑳, ㉖, ㉘
M6 × 50 mm bolt: ⑱
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 60 mm bolt: ㉓
M6 × 65 mm bolt: ㉗
M6 × 65 mm bolts: ⑯, ㉔
M6 × 70 mm bolts: ⑰, ⑲, ㉕

Crankcase bolt
Bolt ① ~ ⑩
1st: 20 Nm
(2.0 m · kg, 14 ft · lb)
2nd: 20 Nm
(2.0 m · kg, 14 ft · lb) +
41 ~ 46° or 32 Nm
(3.2 m · kg, 23 ft · lb)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m · kg, 8.7 ft · lb)
Bolt ⑯, ㉔
14 Nm (1.4 m · kg, 10 ft · lb)
Bolt ㉑ ~ ㉒
24 Nm (2.4 m · kg, 17 ft · lb)

EAS00382
CONNECTING RODS AND PISTONS



Order	Job/Part	Q'ty	Remarks
	Removing the connecting rods and pistons		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
1	Connecting rod cap	4	
2	Big end lower bearing	4	
3	Piston pin clip	8	
4	Piston pin	4	
5	Piston	4	
6	Connecting rod	4	
7	Big end upper bearing	4	
8	Top ring	4	
9	2nd ring	4	
10	Oil ring	4	
			For installation, reverse the removal procedure.



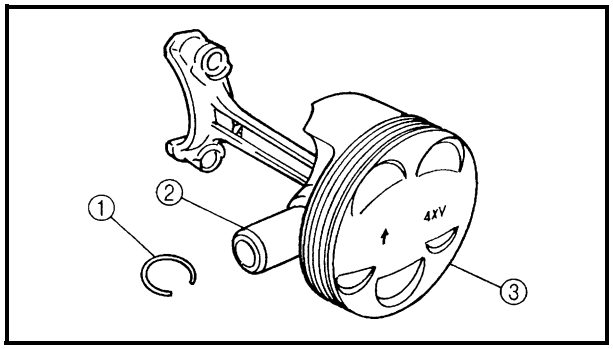
EAS00393
REMOVING THE CONNECTING RODS AND PISTONS

The following procedure applies to all of the connecting rods and pistons.

1. Remove:
   - connecting rod ①
   - big end bearings

NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



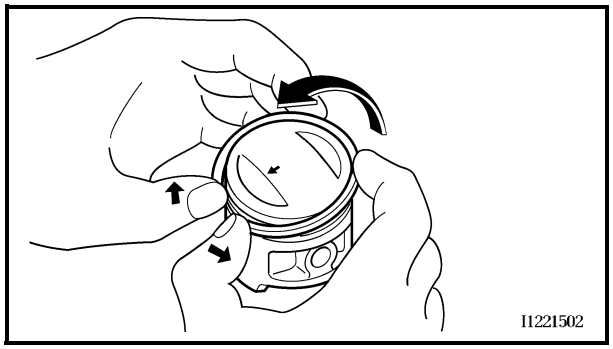
2. Remove:
   - piston pin clips ①
   - piston pin ②
   - piston ③

CAUTION:

Do not use a hammer to drive the piston pin out.

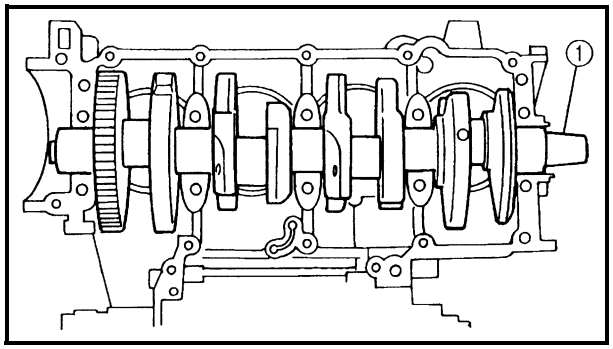
NOTE:

- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip groove and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set.



3. Remove:
   - top ring
   - 2nd ring
   - oil ring

NOTE:
When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



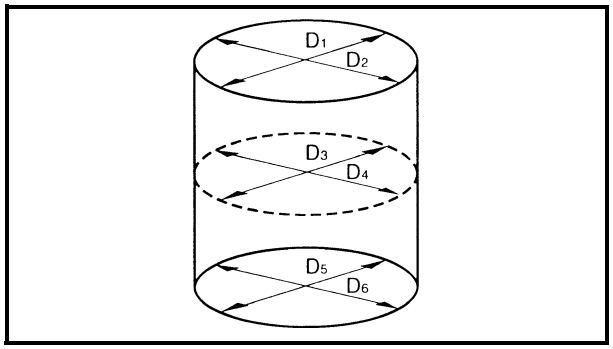
EAS00387
REMOVING THE CRANKSHAFT ASSEMBLY

1. Remove:
   - crankshaft assembly ①
   - crankshaft journal upper bearings (from the upper crankcase)

NOTE:
Identify the position of each crankshaft journal upper bearing so that it can be reinstalled in its original place.

EAS00261
CHECKING THE CYLINDER AND PISTONS

1. Check:
   - piston wall
   - cylinder wall
     Vertical scratches → Replace the cylinder, and the piston and piston rings as a set.



2. Measure:
   - piston-to-cylinder clearance

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a. Measure cylinder bore “C” with the cylinder bore gauge.

NOTE:
Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

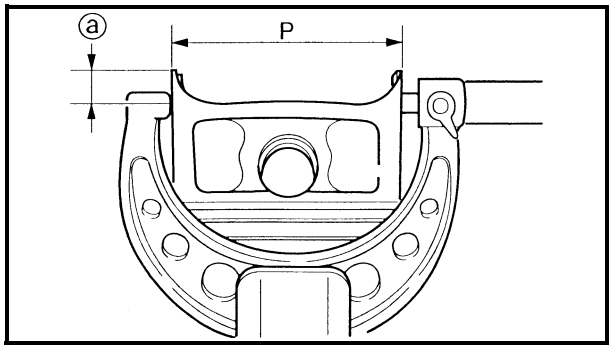
Cylinder bore "C"	**74.00 ~ 74.01 mm (2.9134 ~ 2.9138 in)**
Wear limit	**74.06 mm (2.9157 in)**
Taper limit "T"	**0.05 mm (0.002 in)**
Out of round "R"	**0.05 mm (0.002 in)**

"C" = maximum of D_1 ~ D_6

"T" = maximum of D_1 or D_2 – maximum of D_5 or D_6

"R" = maximum of D_1 D_3 or D_5 – minimum of D_2 D_4 or D_6

b. If out of specification, replace the cylinder, and the pistons and piston rings as a set.



c. Measure piston skirt diameter "P" with the micrometer.
ⓐ 5 mm from the bottom edge of the piston

Piston size "P"
73.975 ~ 73.990 mm (2.9124 ~ 2.9130 in)

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" –
Piston skirt diameter "P"

Piston-to-cylinder clearance
0.010 ~ 0.035 mm
(0.0004 ~ 0.0014 in)
<Limit>: 0.12 mm (0.0047 in)

f. If out of specification, replace the cylinder, and the piston and piston rings as a set.

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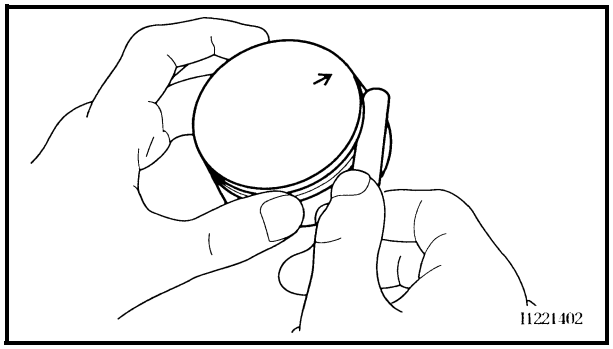
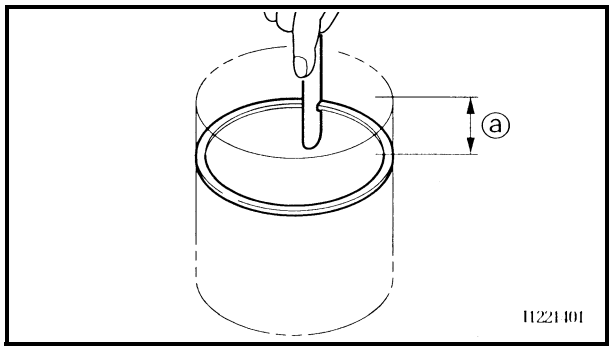


EAS00263
CHECKING THE PISTON RINGS

1. Measure:
   - piston ring side clearance
     Out of specification → Replace the piston and piston rings as a set.

NOTE:
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Piston ring side clearance
Top ring
0.030 ~ 0.065 mm
(0.0012 ~ 0.0026 in)
<Limit>: 0.115 mm (0.0045 in)
2nd ring
0.020 ~ 0.055 mm
(0.0008 ~ 0.0022 in)
<Limit>: 0.115 mm (0.0045 in)



2. Install:
   - piston ring
     (into the cylinder)

NOTE:
Level the piston ring into the cylinder with the piston crown.

ⓐ 5 mm (0.20 in)

3. Measure:
   - piston ring end gap
     Out of specification → Replace the piston ring.

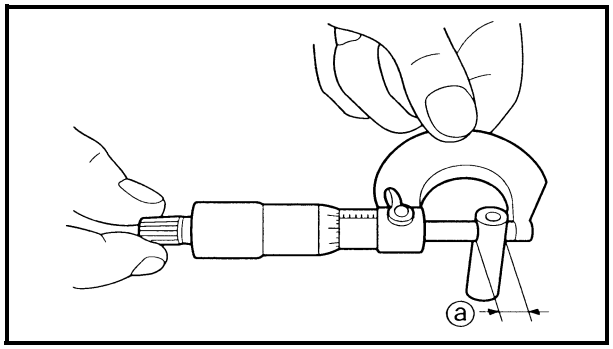
NOTE:
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

Piston ring end gap
Top ring
0.32 ~ 0.44 mm
(0.013 ~ 0.017 in)
<Limit>: 0.69 mm (0.027 in)
2nd ring
0.43 ~ 0.58 mm
(0.017 ~ 0.023 in)
<Limit>: 0.93 mm (0.037 in)
Oil ring
0.10 ~ 0.35 mm
(0.0039 ~ 0.0138 in)

CHECKING THE PISTON PINS

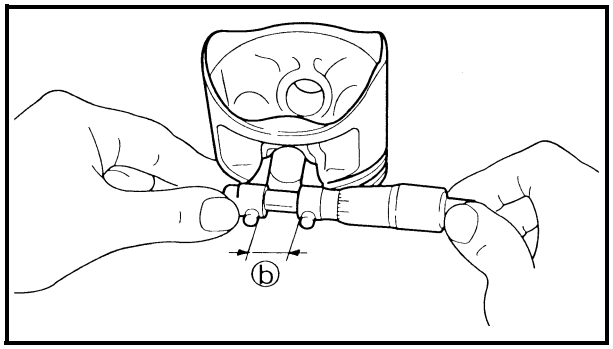
The following procedure applies to all of the piston pins.

1. Check:
   - piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.



2. Measure:
   - piston pin outside diameter ⓐ
     Out of specification → Replace the piston pin.

Piston pin outside diameter
16.991 ~ 17.000 mm
(0.6689 ~ 0.6693 in)
<Limit: 16.971 mm (0.6681 in)>



3. Measure:
   - piston pin bore inside diameter ⓑ
     Out of specification → Replace the piston.

Piston pin bore inside diameter
17.002 ~ 17.013 mm
(0.6694 ~ 0.6698 in)
<Limit: 17.043 mm (0.6710 in)>

4. Calculate:
   - piston-pin-to-piston clearance
     Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston clearance =
Piston pin bore size –
Piston pin outside diameter
Piston-pin-to-piston clearance
0.002 ~ 0.022 mm
(0.00008 ~ 0.00087 in)
<Limit: 0.072 mm (0.00238 in)>

CHECKING THE BIG END BEARINGS

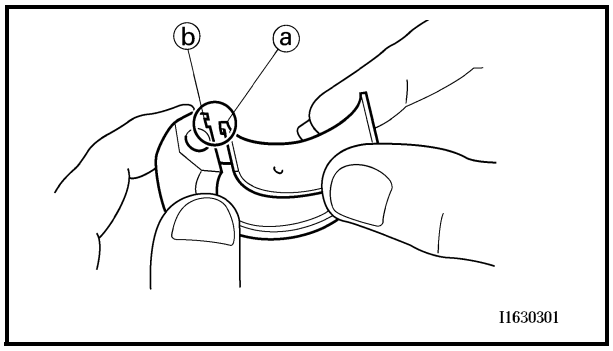
1. Measure:
   - crankshaft-pin-to-big-end-bearing clearance
     Out of specification → Replace the big end bearings.

Crankshaft-pin-to-big-end-bearing clearance
0.031 ~ 0.055 mm
(0.0012 ~ 0.0022 in)

The following procedure applies to all of the connecting rods.

CAUTION:

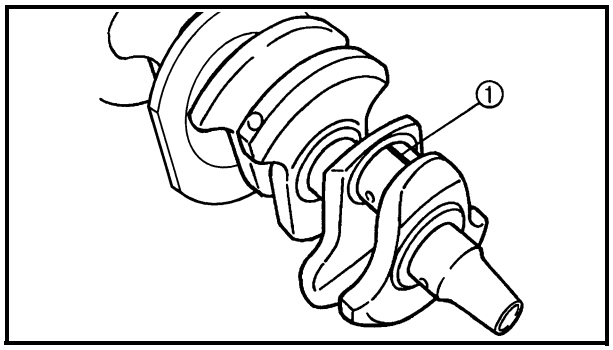
Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.



a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

NOTE:

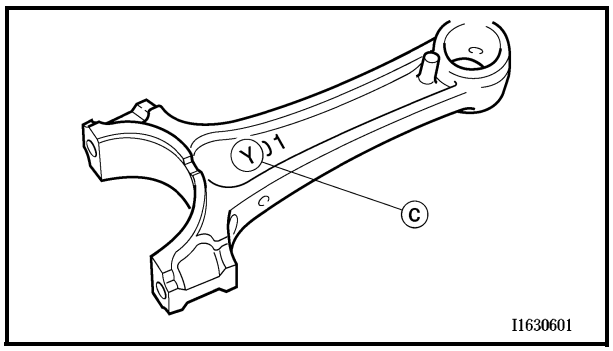
Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rod and connecting rod cap.

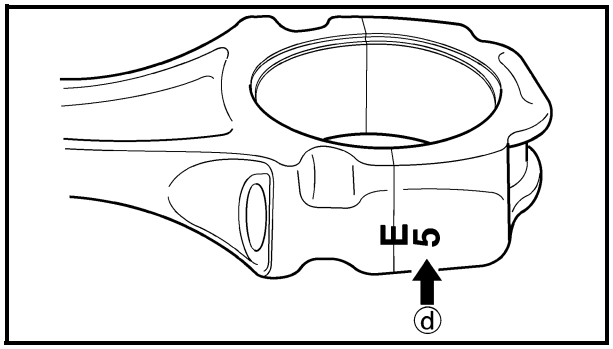


c. Put a piece of Plastigauge® ① on the crankshaft pin.
d. Assemble the connecting rod halves.

NOTE:

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure that the "Y" mark ⓒ on the connecting rod faces towards the left side of the crankshaft.
- Make sure that the characters ⓓ on both the connecting rod and connecting rod cap are aligned.





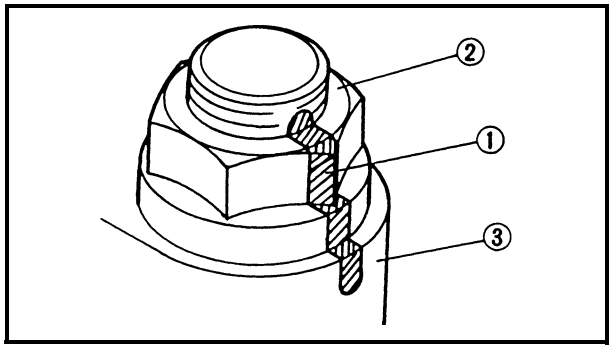
e. Tighten the connecting rod nuts.

	Connecting rod nut **20 Nm (2.0 m · kg, 14 ft · lb) + 120°**

f. Replace the connecting rod bolts and nuts with new ones.

CAUTION:

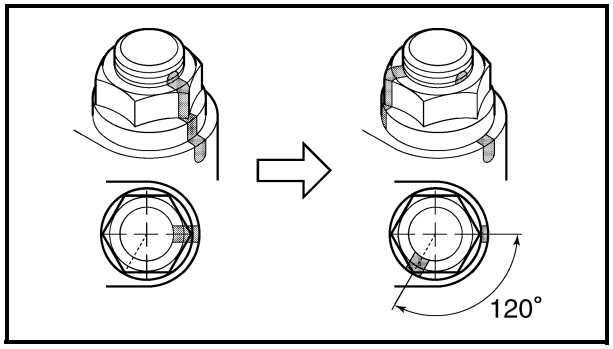
Tighten the connecting rod bolts using the plastic-region tightening angle method.
Always install new bolts and nuts.



g. Clean the connecting rod bolts and nuts.
h. Tighten the connecting rod nuts.
i. Put a mark ① on the corner of the connecting rod nut ② and the connecting rod ③.
j. Tighten the nuts further to reach the specified angle (120°).

⚠ WARNING

When the nut is tightened more than the specified angle, do not loosen the nut and then retighten it.
Replace the bolt with a new one and perform the procedure again.



CAUTION:

- **Do not use a torque wrench to tighten the nut to the specified angle.**
- **Tighten the nut until it is at the specified angles.**

NOTE:

When using a hexagonal nut, note that the angle from one corner to another is 60°

k. Remove the connecting rod and big end bearings.
l. Measure the compressed Plastigauge® width on the crankshaft pin.
   If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

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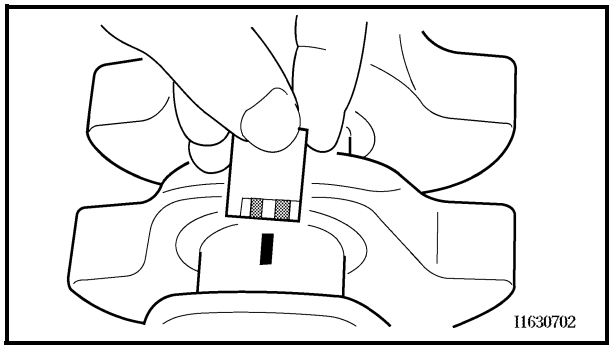
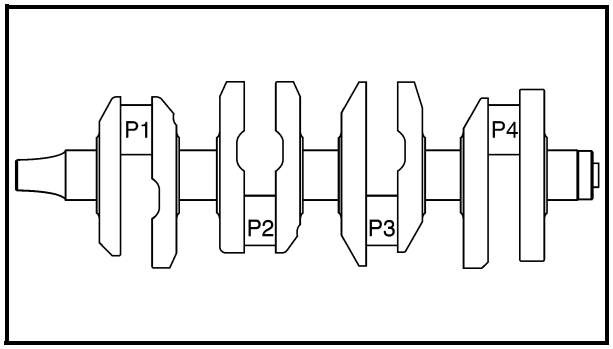
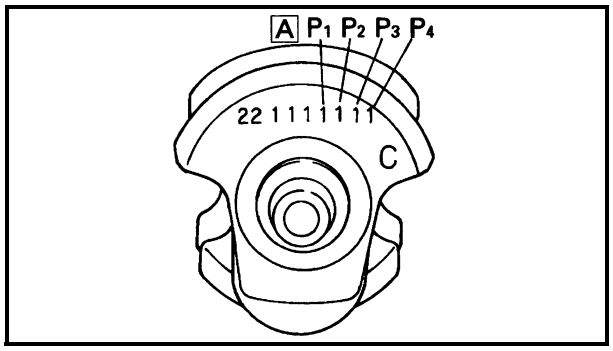
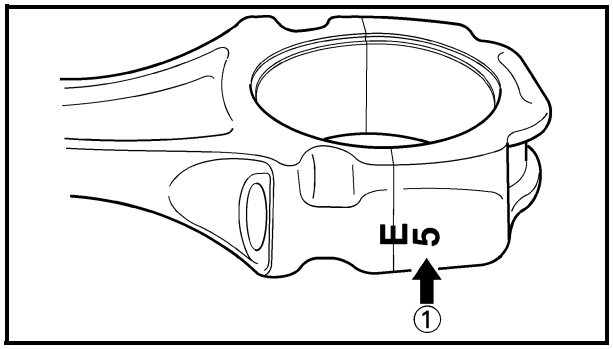
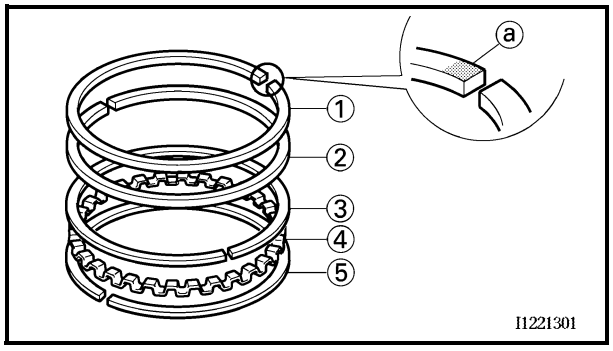










2. Select:
   - big end bearings (P1 ~ P4)

NOTE:
- The numbers A stamped into the crankshaft web and the numbers ① on the connecting rods are used to determine the replacement big end bearing sizes.
- "P1" ~ "P4" refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "4" and "1" respectively, then the bearing size for "P1" is:

"P_1" (connecting rod) –
"P_1" (crankshaft) – 2 =
5 – 1 – 2 = 2 (black)

BIG END BEARING COLOR CODE	
–1	violet
0	white
1	blue
2	black

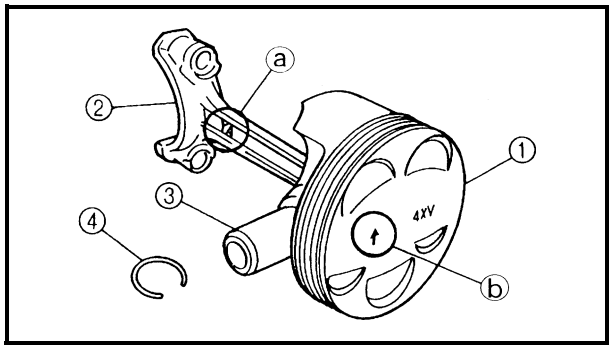
INSTALLING THE CONNECTING ROD AND PISTON

The following procedure applies to all of the connecting rods and pistons.

1. Install:
   - top ring ①
   - 2nd ring ②
   - upper oil ring rail ③
   - oil ring expander ④
   - lower oil ring rail ⑤

NOTE:

Be sure to install the piston rings so that the manufacturer's marks or numbers ⓐ face up.

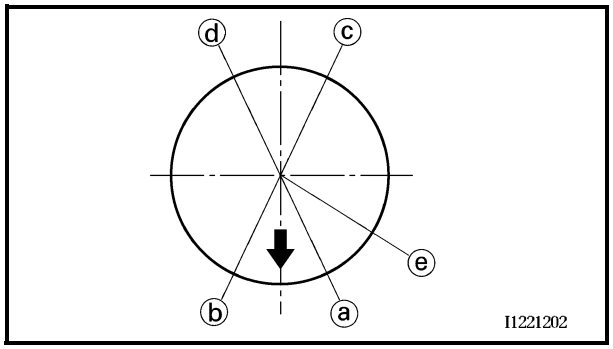


2. Install:
   - piston ①
     (onto the respective connecting rod ②)
   - piston pin ③
   - piston pin clip New ④

NOTE:
- Apply engine oil onto the piston pin.
- Make sure that the "Y" mark ⓐ on the connecting rod faces left when the arrow mark ⓑ on the piston is pointing up. Refer to the illustration.
- Reinstall each piston into its original cylinder (numbering order starting from the left: #1 to #4).

3. Lubricate:
   - piston
   - piston rings
   - cylinder
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**



4. Offset:
   - piston ring end gaps

ⓐ Top ring
ⓑ Lower oil ring rail
ⓒ Upper oil ring rail
ⓓ 2nd ring
ⓔ Oil ring expander

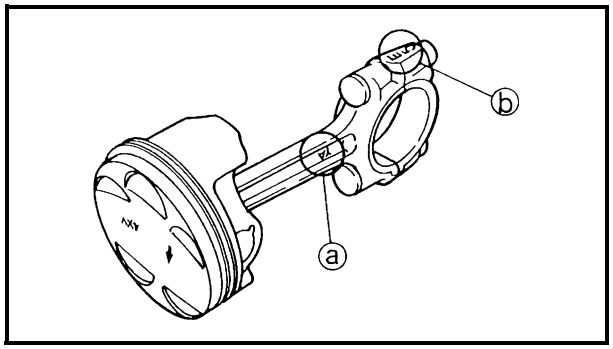
5. Lubricate:
   - crankshaft pins
   - big end bearings
   - connecting rod big end inner surface
     (with the recommended lubricant)

	Recommended lubricant **Engine oil**

6. Install:
   - big end bearings
   - connecting rod assembly
     (into the cylinder and onto the crankshaft pin).
   - connecting rod cap
     (onto the connecting rod)

NOTE:

- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- While compressing the piston rings with one hand, install the connecting rod assembly into the cylinder with the other hand.
- Make sure that the "Y" marks ⓐ on the connecting rods face towards the left side of the crankshaft.
- Make sure that the characters ⓑ on both the connecting rod and connecting rod cap are aligned.



7. Align:
   - bolt heads
     (with the connecting rod caps)
8. Tighten:
   - connecting rod nuts

	20 Nm (2.0m · kg, 14 ft · lb) + 120°

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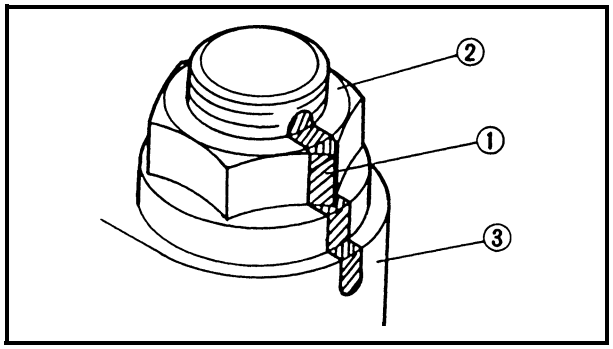
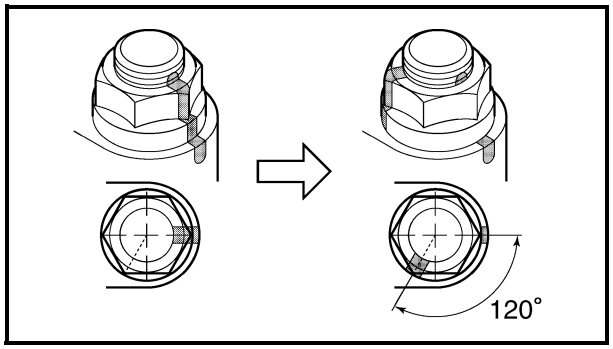
a. Replace the connecting rod bolts and nuts with new ones.

CAUTION:

Tighten the connecting rod bolts using the plastic-region tightening angle method.
Always install new bolts and nuts.



b. Clean the connecting rod bolts and nuts.
c. Tighten the connecting rod nuts.
d. Put a mark ① on the corner of the connecting rod nut ② and the connecting rod ③.



e. Tighten the nut further to reach the specified angle (120°).

⚠ WARNING

When the nut is tightened more than the specified angle, do not loosen the nut and then retighten it.
Replace the bolt with a new one and perform the procedure again.

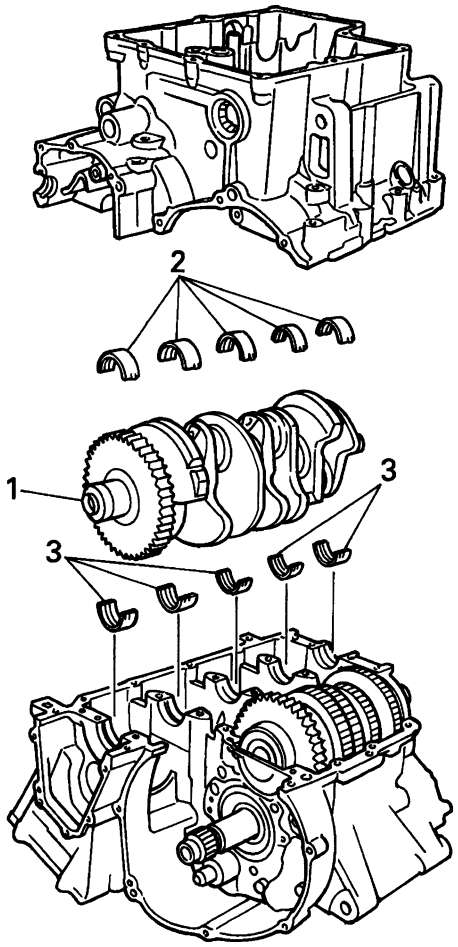
CAUTION:

- **Do not use a torque wrench to tighten the nut to the specified angle.**
- **Tighten the nut until it is at the specified angles.**

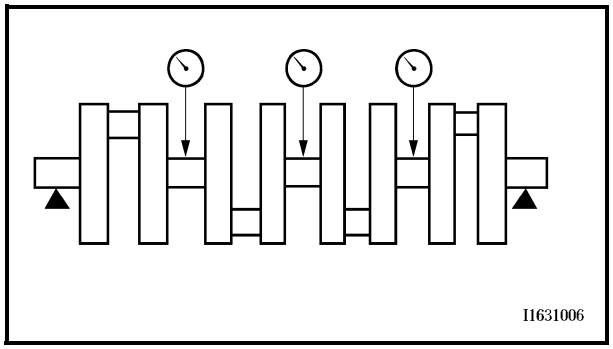
NOTE:

When using a hexagonal nut, note that the angle from one corner to another is 60°.

CRANKSHAFT



Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft assembly		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Connecting rod caps		Refer to "CONNECTING RODS AND PISTONS".
1	Crankshaft	1	
2	Crankshaft journal lower bearing	5	
3	Crankshaft journal upper bearing	5	
			For installation, reverse the removal procedure.



EAS00395
CHECKING THE CRANKSHAFT

1. Measure:
   - crankshaft runout
     Out of specification → Replace the crankshaft.

Crankshaft runout
Less than 0.03 mm (0.0012 in)

2. Check:
   - crankshaft journal surfaces
   - crankshaft pin surfaces
   - bearing surfaces
     Scratches/wear → Replace the crankshaft.

CHECKING THE CRANKSHAFT JOURNAL BEARINGS

1. Measure:
   - crankshaft-journal-to-crankshaft-journal-bearing clearance
     Out of specification → Replace the crankshaft journal bearings.

Crankshaft-journal-to-crankshaft-journal-bearing clearance
0.029 ~ 0.053 mm
(0.0011 ~ 0.0021 in)

CAUTION:

Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft-journal-to-crankshaft-journal-bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

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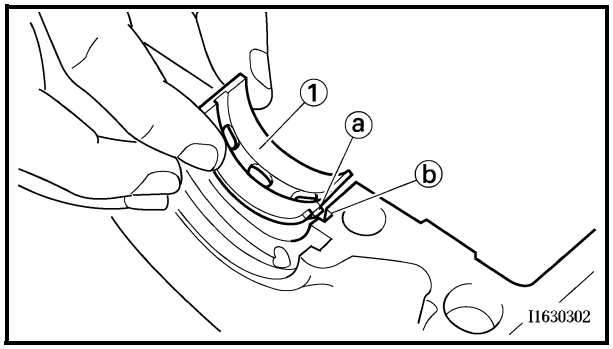
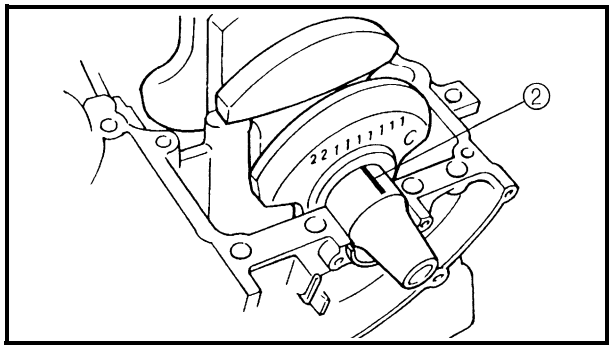
a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.
b. Place the upper crankcase upside down on a bench.



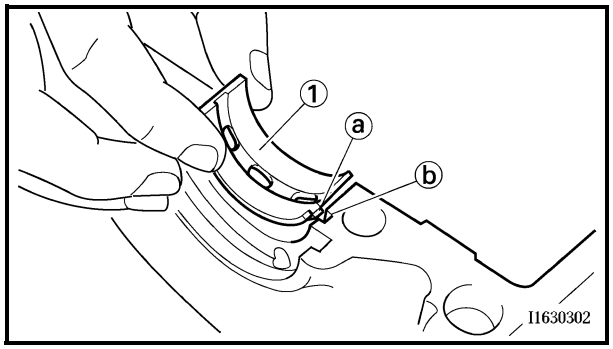
c. Install the crankshaft journal upper bearings ① and the crankshaft into the upper crankcase.

NOTE:
Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.



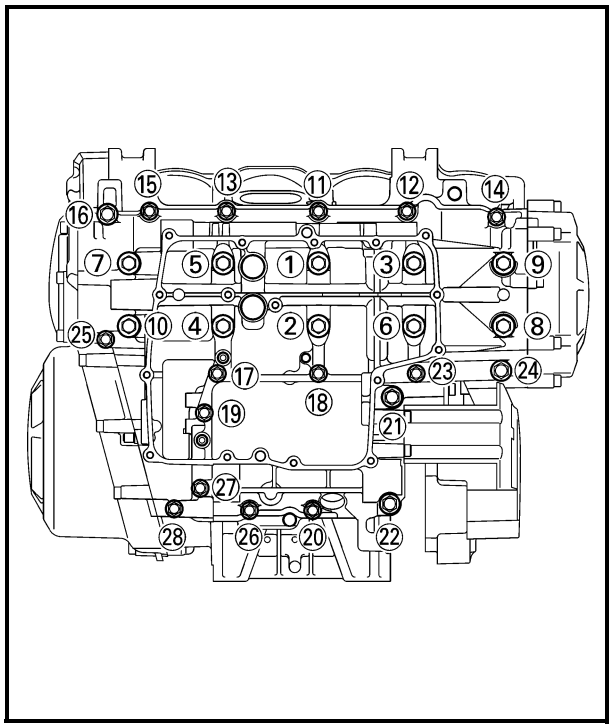
d. Put a piece of Plastigauge® ② on each crankshaft journal.

NOTE:
Do not put the Plastigauge® over the oil hole in the crankshaft journal.



e. Install the crankshaft journal lower bearings ① into the lower crankcase and assemble the crankcase halves.

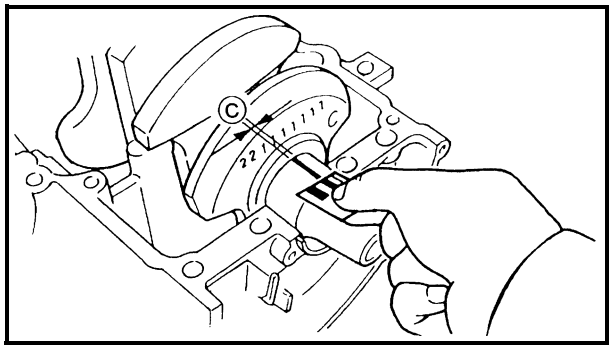
NOTE:
- Align the projections ⓐ of the crankshaft journal lower bearings with the notches ⓑ in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

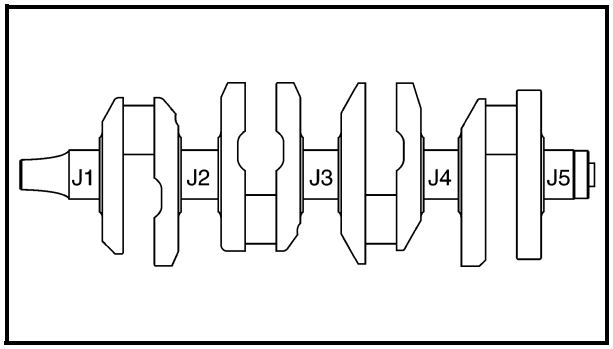


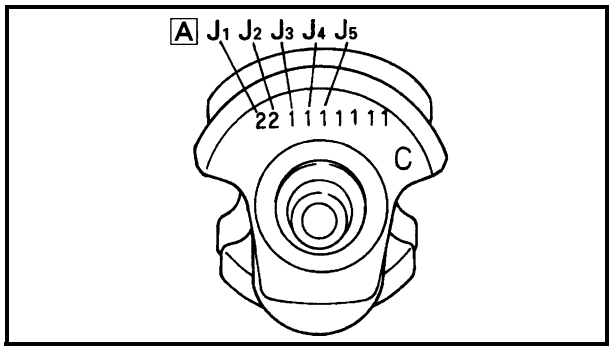
f. Tighten the bolts to specification in the tightening sequence cast on the crankcase.

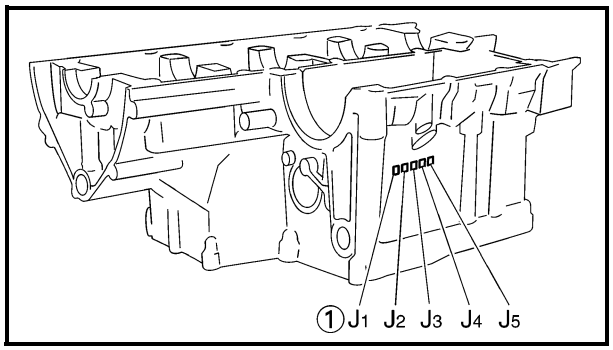
Crankcase bolt
Bolt ① ~ ⑩
1st: 20 Nm
(2.0 m · kg, 14 ft · lb)
2nd: 20 Nm
(2.0 m · kg, 14 ft · lb) +
41 ~ 46° or 32 Nm
(3.2 m · kg, 23 ft · lb)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m · kg, 8.7 ft · lb)
Bolt ⑯, ㉔
14 Nm (1.4 m · kg, 10 ft · lb)
Bolt ㉑ ~ ㉒
24 Nm (2.4 m · kg, 17 ft · lb)

NOTE:
Lubricate the crankcase bolt threads with engine oil.









g. Remove the lower crankcase and the crankshaft journal lower bearings.
h. Measure the compressed Plastigauge® width Ⓒ on each crankshaft journal.
   If the crankshaft-journal-to-crankshaft-journal-bearing clearance is out of specification, select replacement crankshaft journal bearings.

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2. Select:
   • crankshaft journal bearings (J1 ~ J5)

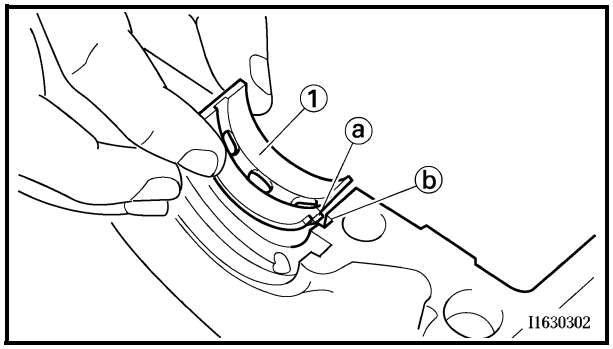
NOTE:

- The numbers Ⓐ stamped into the crankshaft web and the numbers ① stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J1 ~ J5" refer to the bearings shown in the crankshaft illustration.
- If "J1 ~ J5" are the same, use the same size for all of the bearings.
- if the size is the same for all "J_1 to J_5" one digit for that size is indicated. (Crankcase side only)

For example, if the crankcase "J_1" and crankshaft web "J_1" numbers are "6" and "2" respectively, then the bearing size for "J1" is:

"J_1" (crankcase) – "J_1" (crankshaft web) – 2 = 6 – 2 – 2 = 2 (black)

CRANKSHAFT JOURNAL BEARING COLOR CODE	
–1	violet
0	white
1	blue
2	black
3	brown



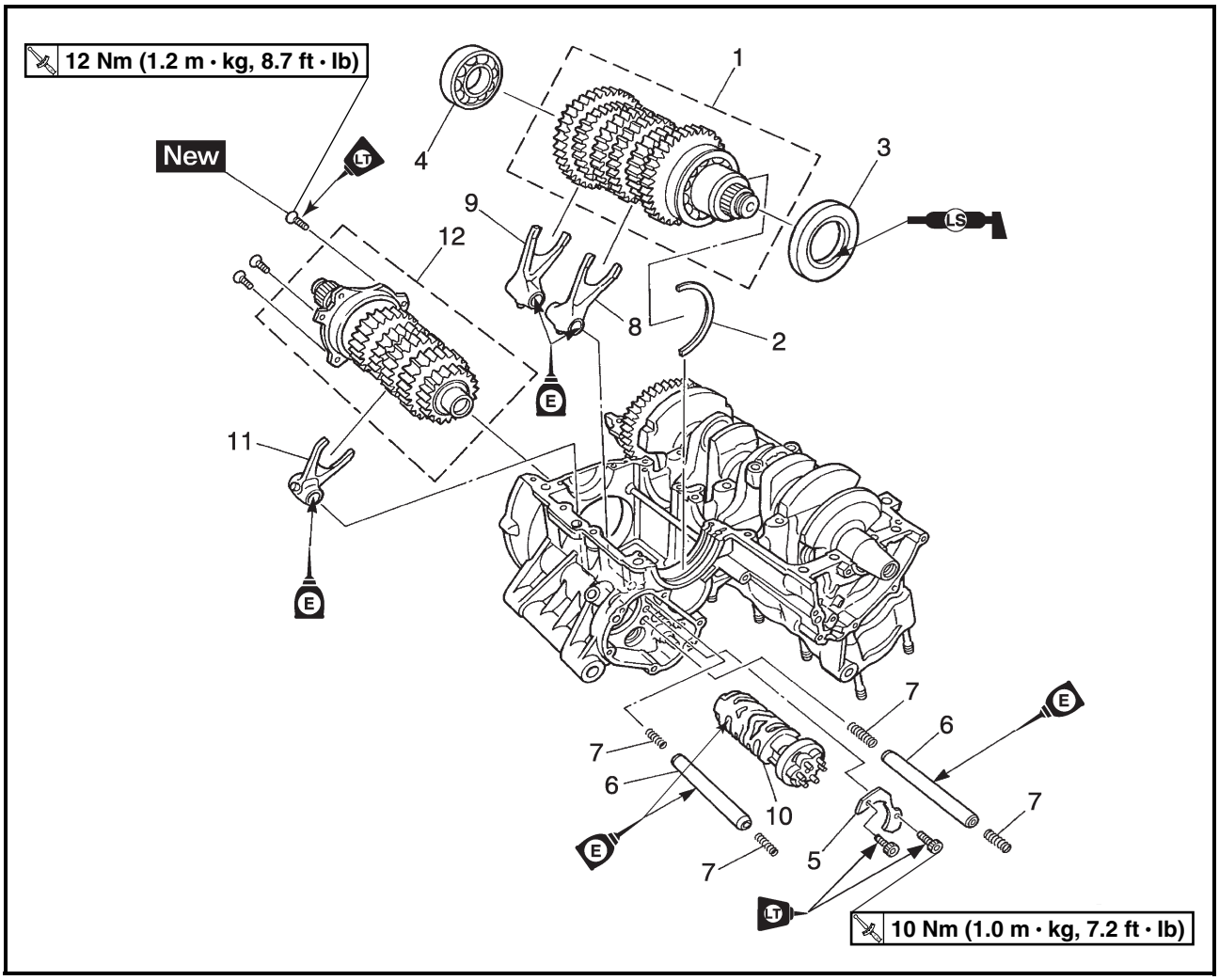
EAS00407
INSTALLING THE CRANKSHAFT

1. Install:
   - crankshaft journal upper bearings ①
     (into the upper crankcase)

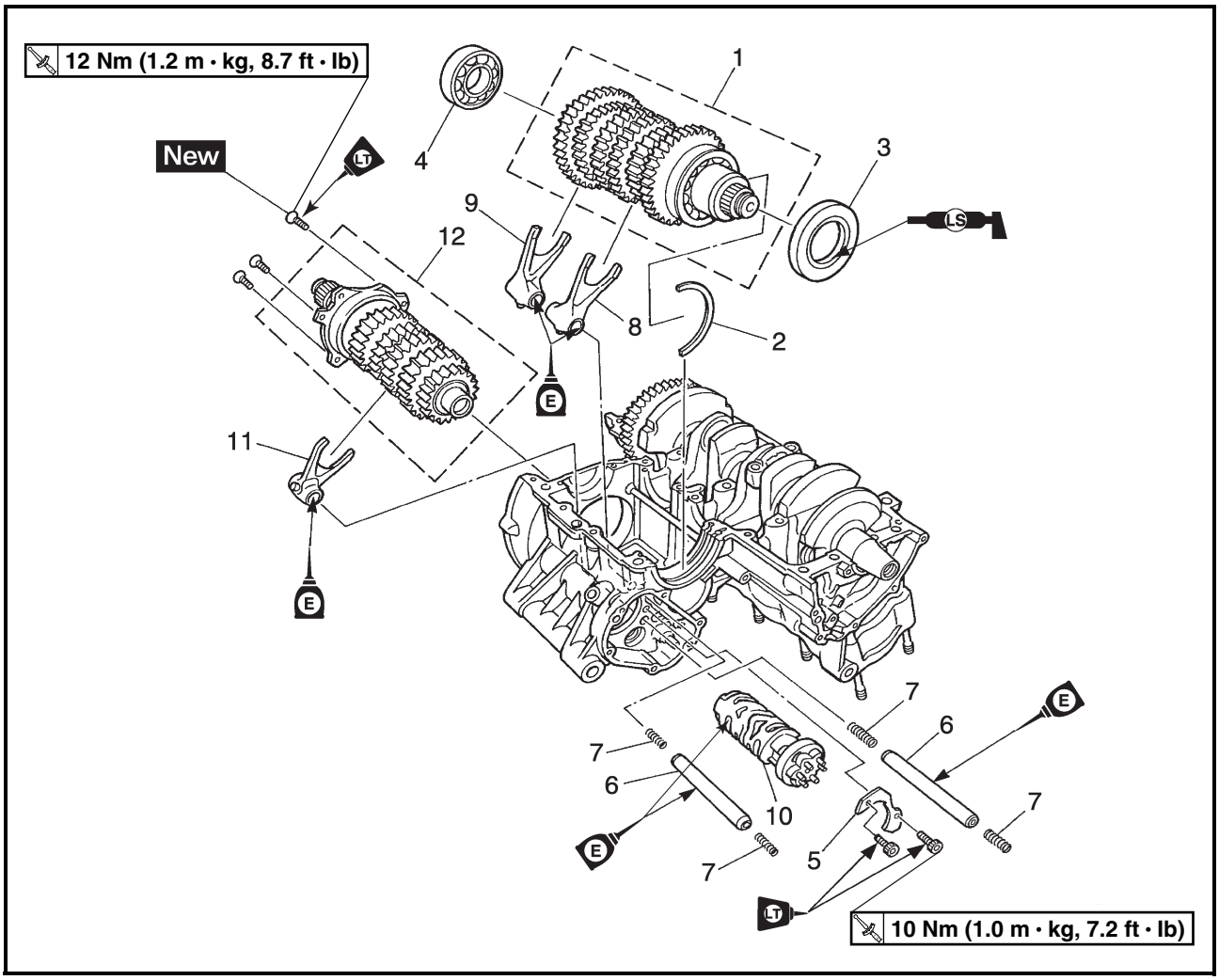
NOTE:
- Align the projections ⓐ on the crankshaft journal upper bearings with the notches ⓑ in the upper crankcase.
- Be sure to install each crankshaft journal upper bearing in its original place.

2. Install:
   - crankshaft

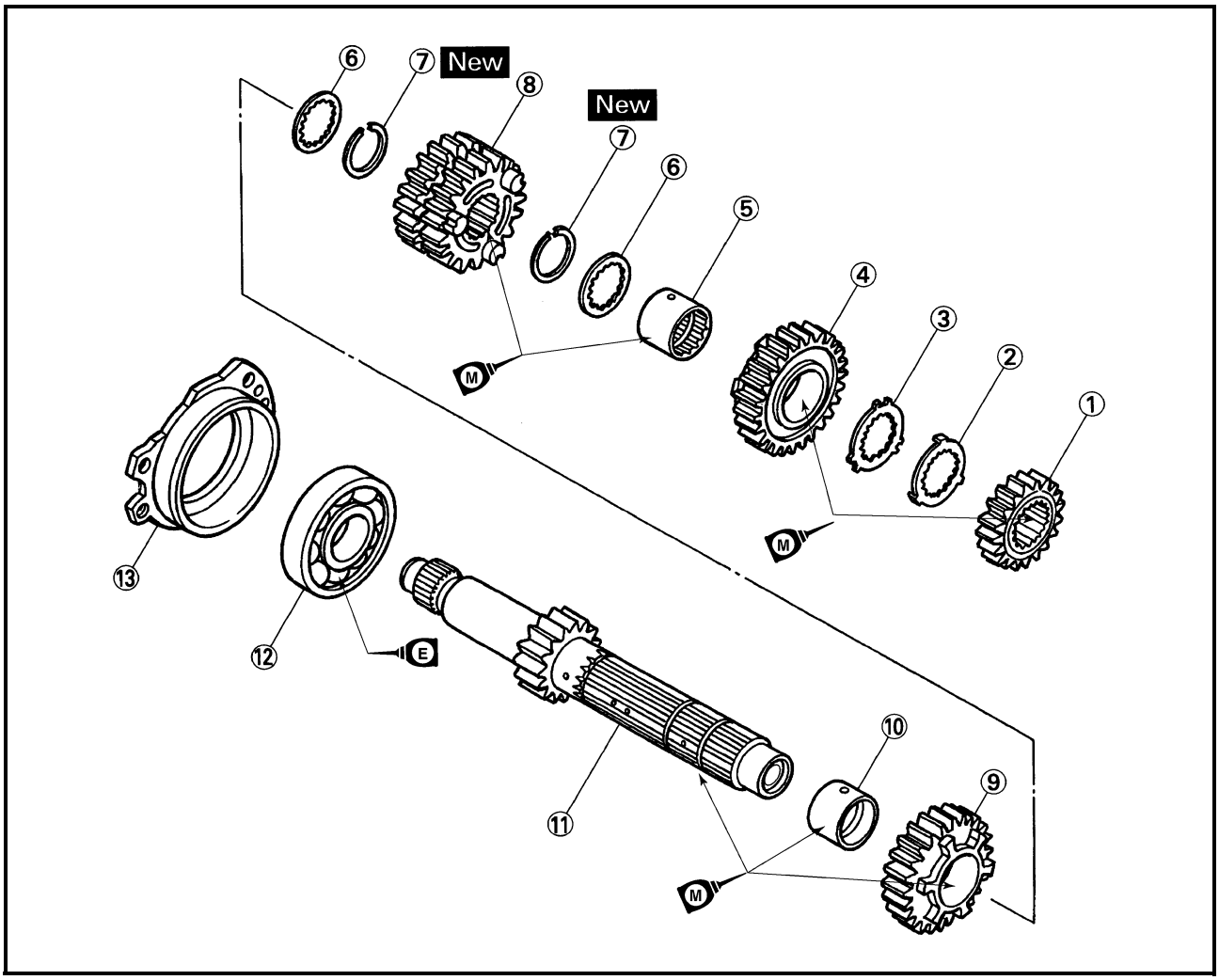
EAS00419
TRANSMISSION



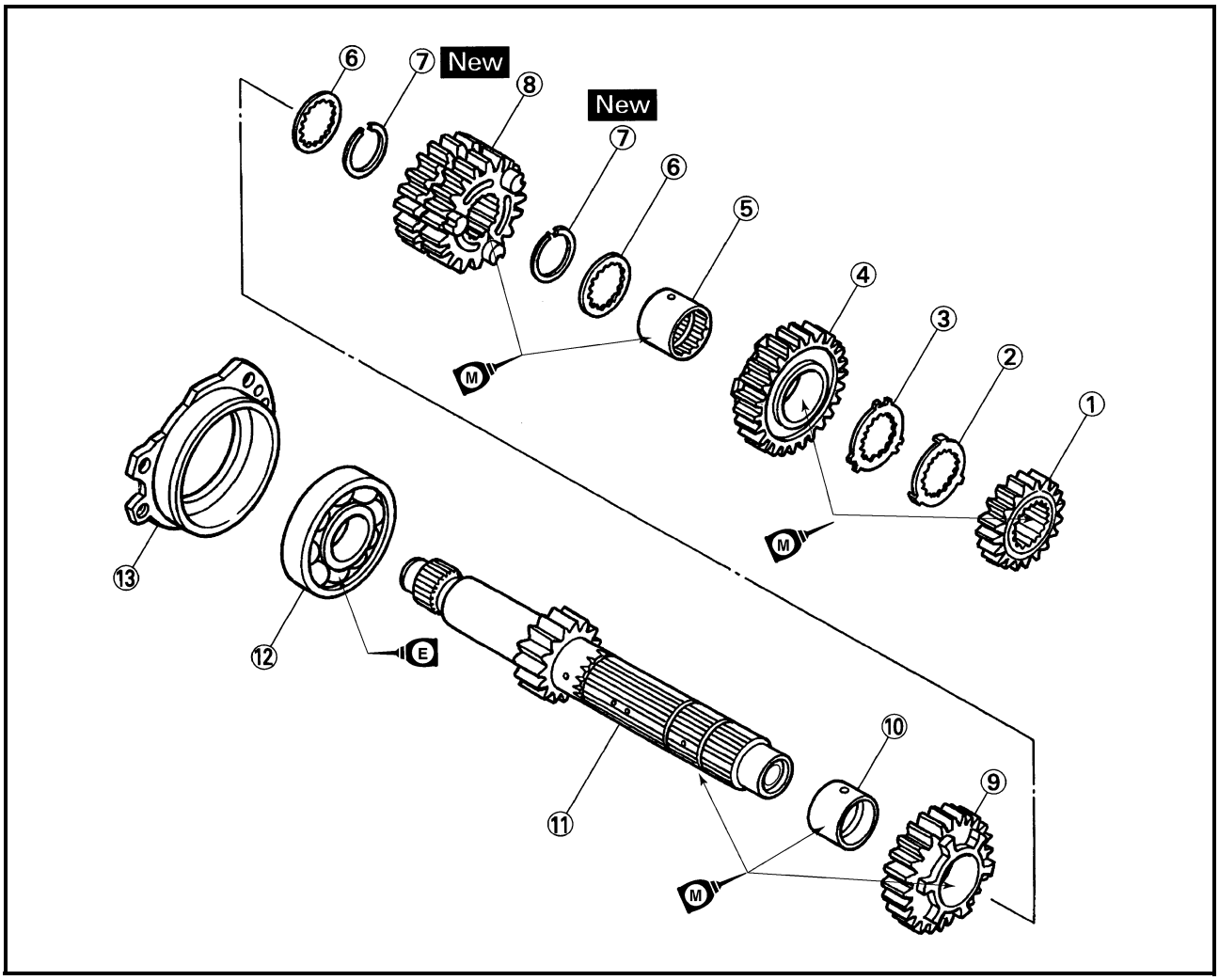
Order	Job/Part	Q'ty	Remarks
	Removing the transmission, shift drum assembly, and shift forks		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Stopper lever		Refer to "SHIFT SHAFT".
1	Drive axle assembly	1	
2	Circlip	1	
3	Oil seal	1	
4	Bearing	1	
5	Shift drum retainer	1	
6	Shift fork guide bar	2	
7	Spring	4	
8	Shift fork "L"	1	
9	Shift fork "R"	1	



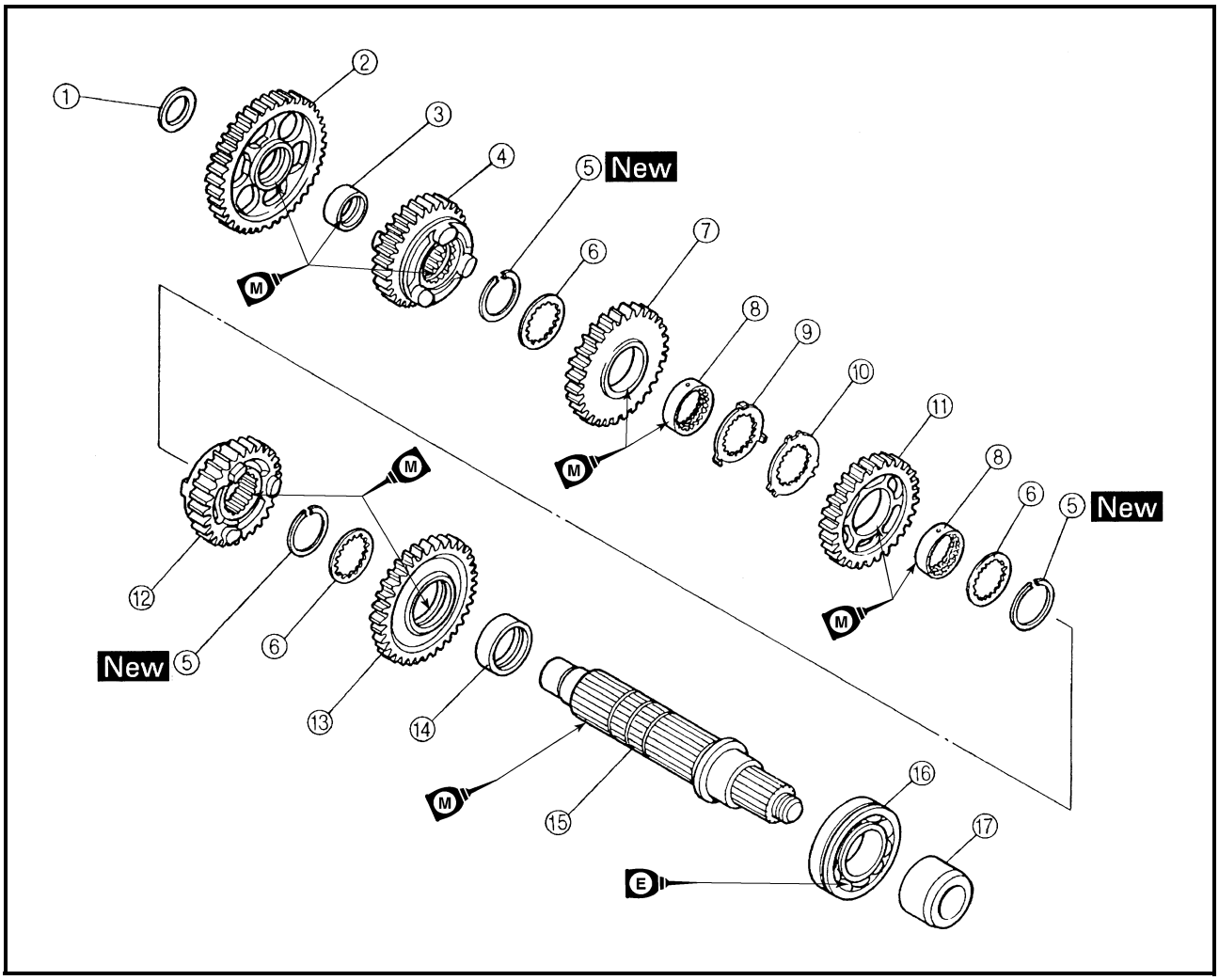
Order	Job/Part	Q'ty	Remarks
10	Shift drum assembly	1	
11	Shift fork "C"	1	
12	Main axle assembly	1	
			For installation, reverse the removal procedure.



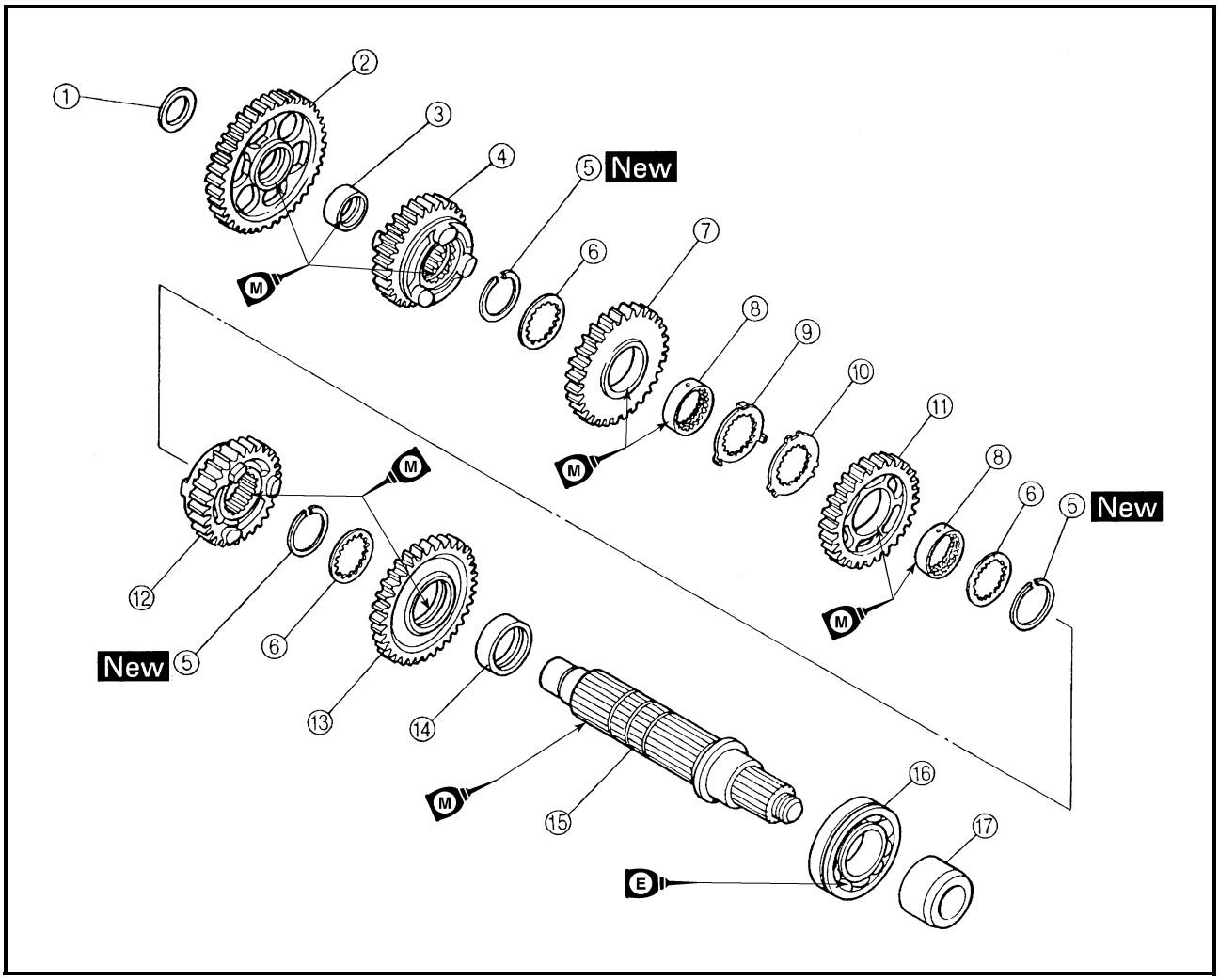
Order	Job/Part	Q'ty	Remarks
	Disassembling the main axle assembly		Disassembly the parts in the order listed.
①	2nd pinion gear	1	
②	Toothed lock washer	1	
③	Toothed lock washer retainer	1	
④	6th pinion gear	1	
⑤	Toothed spacer	1	
⑥	Toothed washer	2	
⑦	Circlip	2	
⑧	3rd/4th pinion gears	1	
⑨	5th pinion gear	1	
⑩	Collar	1	



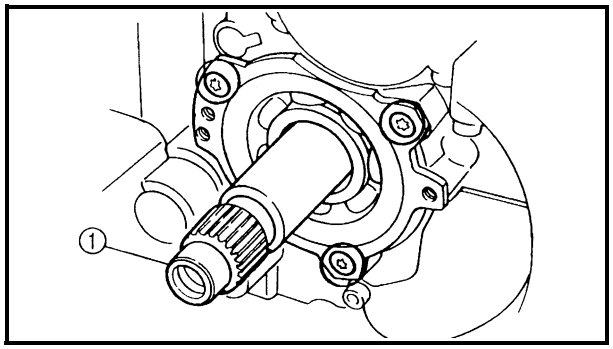
Order	Job/Part	Q'ty	Remarks
⑪	Main axle/1st pinion gear	1	
⑫	Bearing	1	
⑬	Main axle bearing housing	1	
			For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Disassembly the parts in the order listed.
①	Washer	1	
②	1st wheel gear	1	
③	Spacer	1	
④	5th wheel gear	1	
⑤	Circlip	3	
⑥	Washer	3	
⑦	3rd wheel gear	1	
⑧	Toothed spacer	2	
⑨	Toothed lock washer	1	
⑩	Toothed lock washer retainer	1	



Order	Job/Part	Q'ty	Remarks
⑪	4th wheel gear	1	
⑫	6th wheel gear	1	
⑬	2nd wheel gear	1	
⑭	Spacer	1	
⑮	Drive axle	1	
⑯	Bearing	1	
⑰	Spacer	1	
			For assembly, reverse the disassembly procedure.



EAS00420
REMOVING THE TRANSMISSION

1. Remove:
   - main axle assembly ①
     (with the Torx® wrench T30)

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a. Insert two bolts ② of the proper size, as shown in the illustration, into the main axle assembly bearing housing.
b. Tighten the bolts until they contact the crankcase surface.
c. Continue tightening the bolts until the main axle assembly comes free from the upper crankcase.

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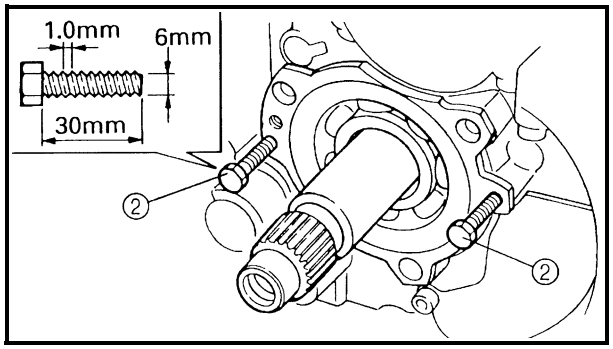
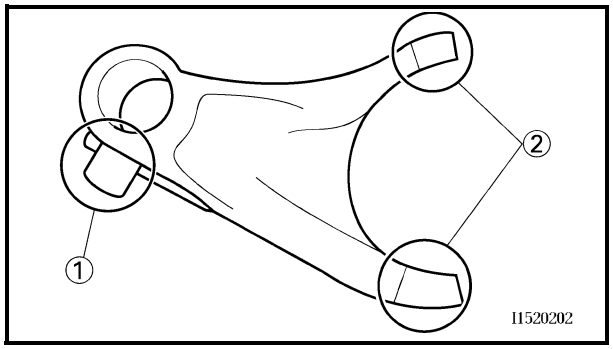
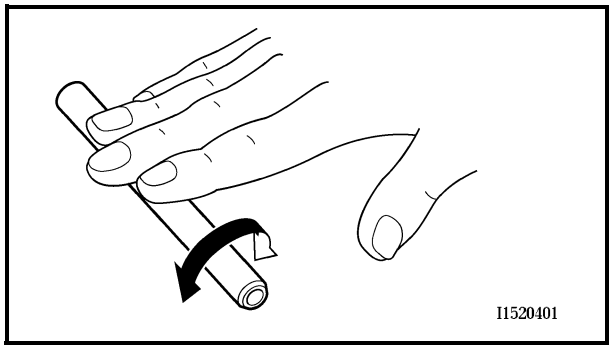




EAS00421
CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

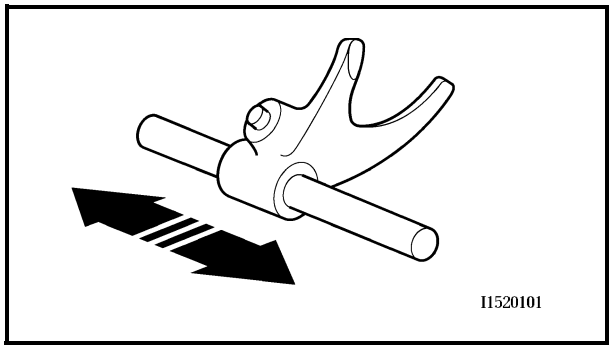
1. Check:
   - shift fork cam follower ①
   - shift fork pawl ②
     Bends/damage/scoring/wear → Replace the shift fork.



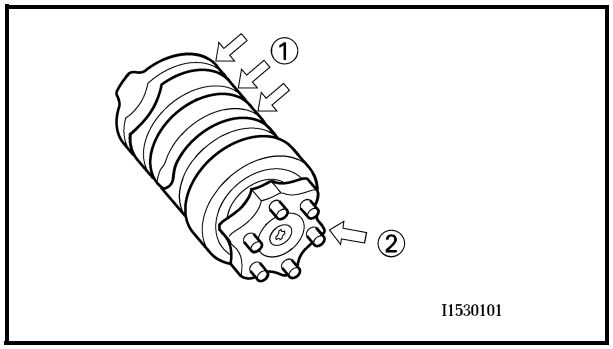
2. Check:
   - shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.

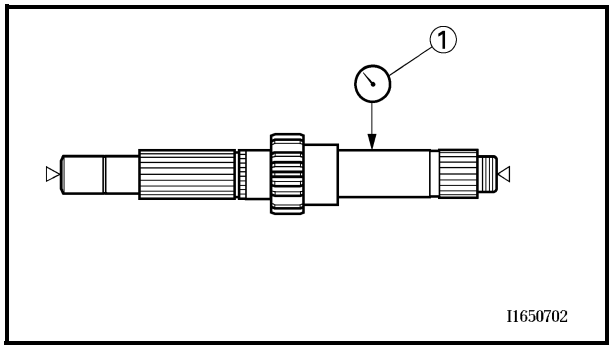


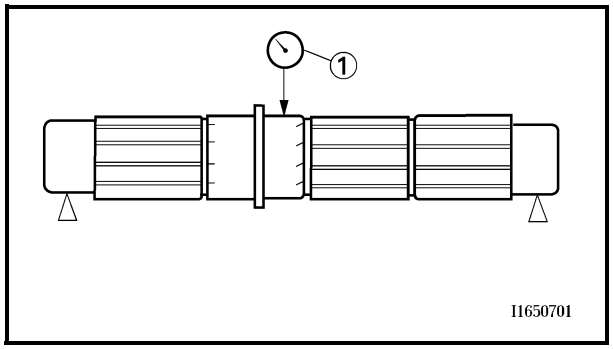
3. Check:
   - shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.

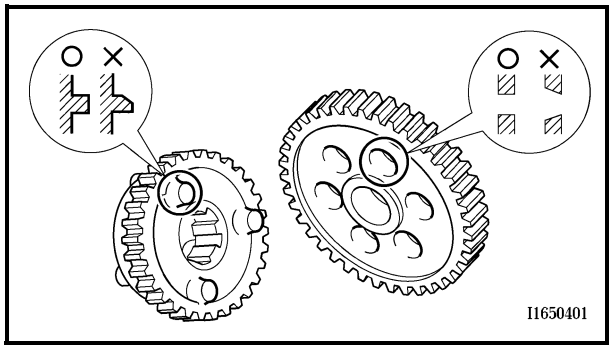


EAS00422
CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:
   - shift drum grooves
     Damage/scratches/wear → Replace the shift drum assembly.
   - shift drum segment ①
     Damage/wear → Replace the shift drum assembly.
   - shift drum bearing ②
     Damage/pitting → Replace the shift drum assembly.







EAS00425
CHECKING THE TRANSMISSION

1. Measure:
   - main axle runout
     (with a centering device and dial gauge ①)
     Out of specification → Replace the main axle.

	Main axle runout limit **0.08 mm (0.0031 in)**

2. Measure:
   - drive axle runout
     (with a centering device and dial gauge ①)
     Out of specification → Replace the drive axle.

	Drive axle runout limit **0.08 mm (0.0031 in)**

3. Check:
   - transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(s).
   - transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(s).

4. Check:
   • transmission gear engagement
   (each pinion gear to its respective wheel gear)
   Incorrect → Reassemble the transmission axle assemblies.
5. Check:
   • transmission gear movement
   Rough movement → Replace the defective part(s).
6. Check:
   • circlips
   Bends/damage/looseness → Replace.

EAS00428
INSTALLING THE TRANSMISSION

1. Install:
   • main axle assembly
   • shift fork “C”
   • shift drum assembly
   • shift fork “R”
   • shift fork “L”
   • springs
   • shift fork guide bars
   • drive axle assembly

NOTE:
- Carefully position the shift forks so that they are installed correctly into the transmission gears.
- Install shift fork “C” into the groove in the 3rd and 4th pinion gear on the main axle.
- Install shift fork “L” into the groove in the 6th wheel gear and shift fork “R” into the groove in the 5th wheel gear on the drive axle.
- Make sure that the drive axle bearing circlip is inserted into the grooves in the upper crankcase.

2. Check:
   • transmission
   Rough movement → Repair.

NOTE:
Oil each gear, shaft, and bearing thoroughly.