EC300000

REGULAR INSPECTION AND ADJUSTMENTS

MAINTENANCE INTERVALS

The following schedule is intended as a general guide to maintenance and lubrication. Bear in mind that such factors as weather, terrain, geographical location, and individual usage will alter the required maintenance and lubrication intervals. If you are a doubt as to what intervals to follow in maintaining and lubricating your machine, consult your Yamaha dealer.

Item	After break-in	Every race	Every third (or 500 km)	Every fifth (or 1,000 km)	As required	Remarks
ENGINE OIL Replace	●			●		
VALVES Check the valve clearances Inspect Replace	●		●	●	●	The engine must be cold. Check the valve seats and valve stems for wear.
VALVE SPRINGS Inspect Replace				●	●	Check the free length and the tilt.
VALVE LIFTERS Inspect Replace				●	●	Check for scratches and wear.
CAMSHAFTS Inspect Replace				●	●	Inspect the camshaft surface. Inspect the decompression system
CAMSHAFT SPROCKETS Inspect Replace				●	●	Check for wear on the teeth and for damage.
PISTON Inspect Clean Replace				●	● ● ●	Inspect crack Inspect carbon deposits and eliminate them.
PISTON RING Inspect Replace				● ●	●	Check ring end gap
PISTON PIN Inspect Replace				●	●	
CYLINDER HEAD Inspect and clean				●		Inspect carbon deposits and eliminate them. Change gasket
CYLINDER Inspect and clean Replace				●	●	Inspect score marks Inspect wear
CLUTCH Inspect and adjust Replace	●	●			●	Inspect housing, friction plate, clutch plate and spring
TRANSMISSION Inspect Replace bearing					● ●	

Item	After break-in	Every race	Every third (or 500 km)	Every fifth (or 1,000 km)	As required	Remarks
SHIFT FORK, SHIFT CAM, GUIDE BAR Inspect					●	Inspect wear
ROTOR NUT Retighten	●			●		
MUFFLER Inspect and retighten Clean Replace	●	●		● ●		* Whichever comes first
*SPARK ARRESTER Clean					(Every six months) ●	
CRANK Inspect and clean				●	●	
CARBURETOR Inspect, adjust and clean	●	●				
SPARK PLUG Inspect and clean Replace	●		●		 ●	
DRIVE CHAIN Lubricate, slack, alignment Replace	●	●			 ●	Use chain lube Chain slack: 40 ~ 50 mm (1.57 ~ 1.97 in)
COOLING SYSTEM Check coolant level and leakage Check radiator cap operation Replace coolant Inspect hoses	●	● ●			 ● ●	 Every two years
OUTSIDE NUTS AND BOLTS Retighten	●	●				Refer to “STARTING AND BREAK-IN” section in the CHAPTER 1.
AIR FILTER Clean and lubricate Replace	●	●			 ●	Use foam air-filter oil or equivalent oil
OIL FILTER Replace	●			●		
OIL STRAINER (frame) Clean				●		
FRAME Clean and inspect	●	●				
FUEL TANK, COCK Clean and inspect	●		●			
BRAKES Adjust lever position and pedal height Lubricate pivot point Check brake disc surface Check fluid level and leakage Retighten brake disc bolts, caliper bolts, master cylinder bolts and union bolts Replace pads Replace brake fluid	 ● ● ● ●	 ● ● ● ●			 ● ●	 Every one year

3

Item	After break-in	Every race	Every third (or 500 km)	Every fifth (or 1,000 km)	As required	Remarks
FRONT FORKS						
Inspect and adjust	●	●				
Replace oil	●			●		Suspension oil “01”
Replace oil seal					●	
FRONT FORK OIL SEAL AND DUST SEAL						
Clean and lube	●	●				Lithium base grease
REAR SHOCK ABSORBER					(After rain ride)	
Inspect and adjust	●	●				
Lube			●		●	Molybdenum disulfide grease
Retighten	●	●				
CHAIN GUARD AND ROLLERS						
Inspect	●	●				
SWINGARM						Molybdenum disulfide grease
Inspect, lube and retighten	●	●				
RELAY ARM, CONNECTING ROD						Molybdenum disulfide grease
Inspect, lube and retighten	●	●				
STEERING HEAD						
Inspect free play and retighten	●	●				
Clean and lube				●		Lithium base grease
Replace bearing					●	
TIRE, WHEELS						
Inspect air pressure, wheel run-out, tire wear and spoke looseness	●	●				
Retighten sprocket bolt	●	●				
Inspect bearings			●			
Replace bearings					●	
Lubricate			●			Lithium base grease
THROTTLE, CONTROL CABLE						
Check routing and connection	●	●				Yamaha cable lube or SAE 10W-30 motor oil
Lubricate	●	●				
HOT STARTER, CLUTCH LEVER						
Inspect free play					●	
BATTERY						
Check terminal for looseness and corrosion					●	

* marked: For USA

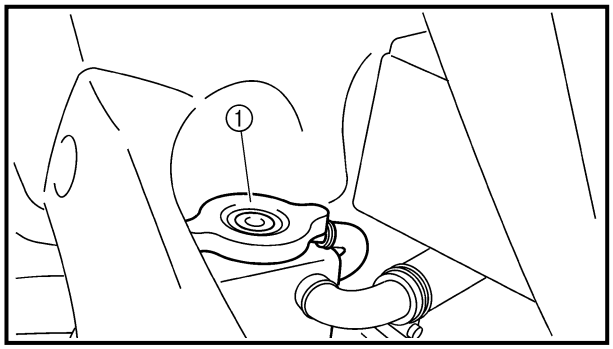
EC320000

PRE-OPERATION INSPECTION AND MAINTENANCE

Before riding for break-in operation, practice or a race, make sure the machine is in good operating condition.
Before using this machine, check the following points.

GENERAL INSPECTION AND MAINTENANCE

Item	Routine	Page
Coolant	Check that coolant is filled up to the radiator filler cap. Check the cooling system for leakage.	P.3-5 ~ 9
Fuel	Check that a fresh gasoline is filled in the fuel tank. Check the fuel line for leakage.	P.1-14
Engine oil	Check that the oil level is correct. Check the crankcase and frame oil line for leakage.	P.3-14 ~ 18
Gear shifter and clutch	Check that gears can be shifted correctly in order and that the clutch operates smoothly.	P.3-10
Throttle grip/Housing	Check that the throttle grip operation and free play are correctly adjusted. Lubricate the throttle grip and housing, if necessary.	P.3-10 ~ 11
Brakes	Check the play of front brake and effect of front and rear brake.	P.3-26 ~ 32
Chain	Check chain slack and alignment. Check that the chain is lubricated properly.	P.3-33 ~ 36
Wheels	Check for excessive wear and tire pressure. Check for loose spokes and have no excessive play.	P.3-44 ~ 45
Steering	Check that the handlebar can be turned smoothly and have no excessive play.	P.3-45 ~ 46
Front forks and rear shock absorber	Check that they operate smoothly and there is no oil leakage.	P.3-36 ~ 43
Cables (wires)	Check that the clutch and throttle cables move smoothly. Check that they are not caught when the handlebars are turned or when the front forks travel up and down.	—
Muffler	Check that the muffler is tightly mounted and has no cracks.	—
Sprocket	Check that the driven sprocket tightening bolt is not loose.	P.3-33
Lubrication	Check for smooth operation. Lubricate if necessary.	P.3-47
Bolts and nuts	Check the chassis and engine for loose bolts and nuts.	P.1-19
Lead connectors	Check that the AC magneto, CDI unit, and ignition coil are connected tightly.	P.1-6
Settings	Is the machine set suitably for the condition of the racing course and weather or by taking into account the results of test runs before racing? Are inspection and maintenance completely done?	P.7-1 ~ 21

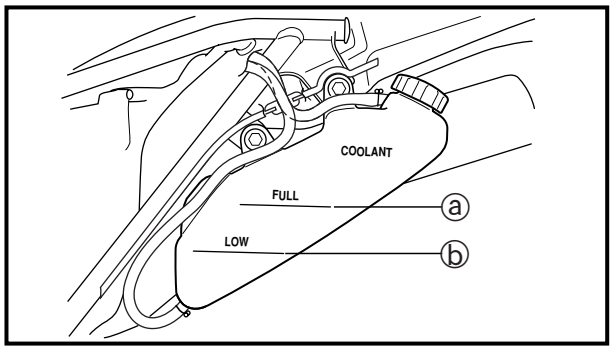


EC350000
ENGINE

COOLANT LEVEL INSPECTION

⚠ WARNING

Do not remove the radiator cap ①, drain bolt and hoses when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury.
When the engine has cooled, place a thick towel over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.



CAUTION:

Hard water or salt water is harmful to the engine parts. You may use distilled water, if you can't get soft water.

1. Place the machine on a level place, and hold it in an upright position.
2. Inspect:
   - Coolant level
     Coolant level should be between the maximum ⓐ and minimum ⓑ marks.
     Coolant level is below the "LOW" level line → Add soft water (tap water) up to the proper level.
3. Start the engine and let it warm up for several minutes.
4. Turn off the engine and check the coolant level again.

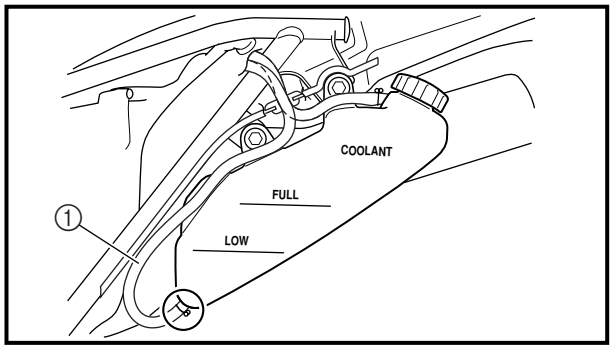
NOTE:

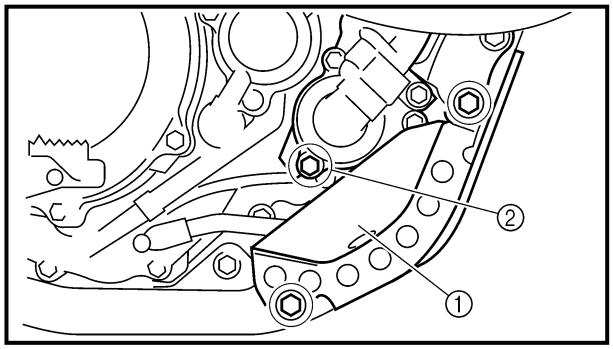
Before checking the coolant level, wait a few minutes until the coolant settles.

COOLANT REPLACEMENT

⚠ WARNING

Do not remove the radiator cap when the engine is hot.





CAUTION:

Take care so that coolant does not splash on painted surfaces. If it splashes, wash it away with water.

1. Place a container under the engine.
2. Remove:
   - Seat

   Refer to "SEAT, FUEL TANK AND SIDE COVERS" section in the CHAPTER 4.
3. Disconnect:
   - Coolant reservoir hose ①

   Drain the coolant completely.
4. Connect:
   - Coolant reservoir hose
5. Remove:
   - Engine guard ①
   - Coolant drain bolt ②
6. Remove:
   - Radiator cap

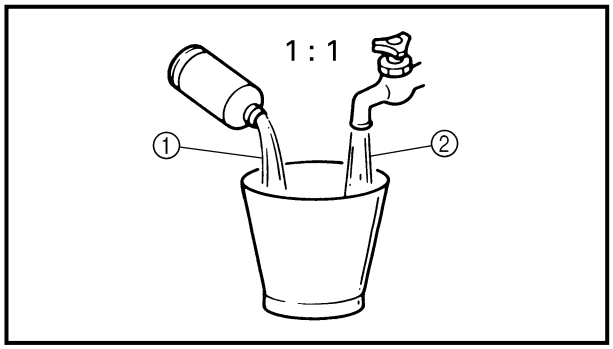
   Drain the coolant completely.
7. Clean:
   - Cooling system

   Thoroughly flush the cooling system with clean tap water.
8. Install:
   - Copper washer **New**
   - Coolant drain bolt

     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Engine guard
   - Bolt [engine guard (front)]

     34 Nm (3.4 m · kg, 24 ft · lb)
   - Bolt [engine guard (rear)]

     23 Nm (2.3 m · kg, 17 ft · lb)



9. Fill:
   - Radiator
   - Engine

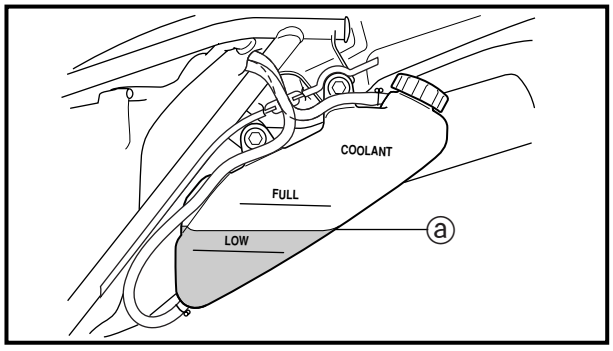
   To specified level.

Recommended coolant:
High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine
Coolant ① and water (soft water) ② mixing ratio:
50%/50%
Coolant capacity:
1.25 L (1.10 Imp qt, 1.32 US qt)

CAUTION:
- **Do not mix more than one type of ethylene glycol antifreeze containing corrosion inhibitors for aluminum engine.**
- **Do not use water containing impurities or oil.**

Handling notes of coolant:
The coolant is harmful so it should be handled with special care.

⚠ WARNING
- **When coolant splashes to your eye. Thoroughly wash your eye with water and see your doctor.**
- **When coolant splashes to your clothes. Quickly wash it away with water and then with soap.**
- **When coolant is swallowed. Quickly make him vomit and take him to a doctor.**

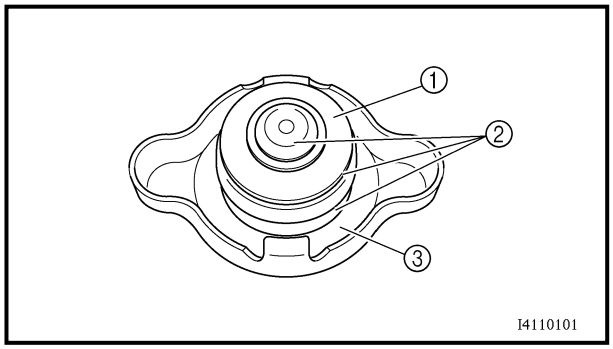


10. Install:
    - Radiator cap
11. Fill:
    - Coolant reservoir tank

    Midway ⓐ between maximum and minimum marks on the tank.

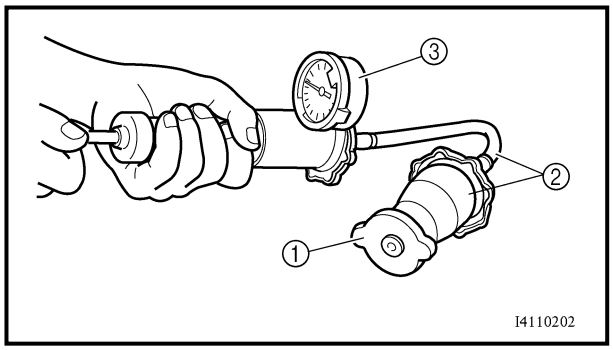
12. Install:
    - Coolant reservoir cap
13. Start the engine and let it warm up for several minutes.
14. Turn off the engine and inspect the coolant level.
    Refer to "COOLANT LEVEL INSPECTION" section.

NOTE:
Before checking the coolant level wait a few minutes until the coolant settles.



EC355000
RADIATOR CAP INSPECTION

1. Inspect:
   - Seal (radiator cap) ①
   - Valve and valve seat ②
     Crack/damage → Replace.
     Exist fur deposits ③ → Clean or replace.



EC356001
RADIATOR CAP OPENING PRESSURE INSPECTION

1. Attach:
   - Radiator cap tester ① and adapter ②

Radiator cap tester:
YU-24460-01/90890-01325
Adapter:
YU-33984/90890-01352

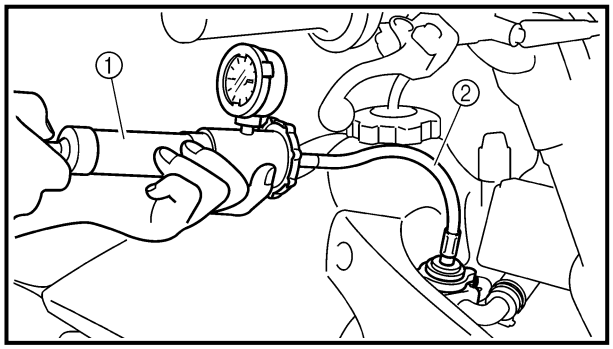
NOTE:
Apply water on the radiator cap seal.

③ Radiator cap

2. Apply the specified pressure.

Radiator cap opening pressure:
110 kPa (1.1 kg/cm^2, 15.6 psi)

3. Inspect:
   - Pressure
     Impossible to maintain the specified pressure for 10 seconds → Replace.



EC357002
COOLING SYSTEM INSPECTION

1. Inspect:
   - Coolant level
2. Attach:
   - Radiator cap tester ① and adapter ②

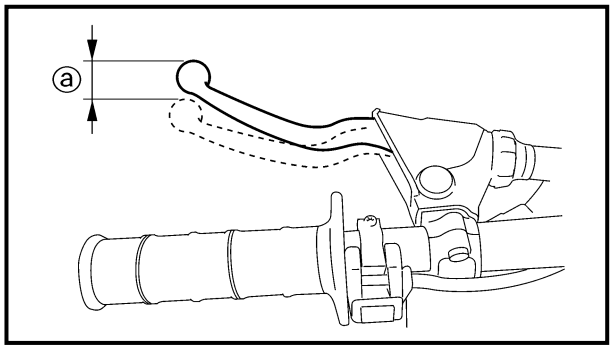
Radiator cap tester:
YU-24460-01/90890-01325
Adapter:
YU-33984/90890-01352

3. Apply the specified pressure.

Standard pressure:
180 kPa (1.8 kg/cm², 25.6 psi)

NOTE:
- Do not apply pressure more than specified pressure.
- Radiator should be filled fully.

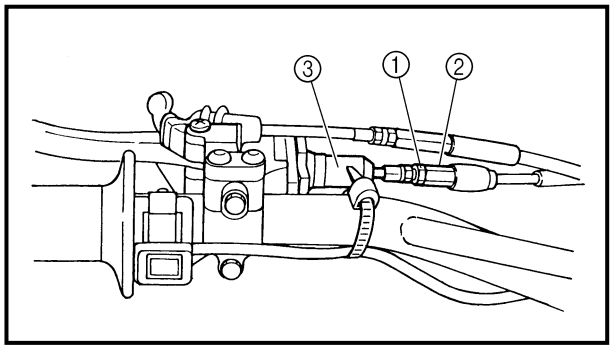
4. Inspect:
   - Pressure
     Impossible to maintain the specified pressure for 10 seconds → Repair.
   - Radiator
   - Radiator hose joint
     Coolant leakage → Repair or replace.
   - Radiator hose
     Swelling → Replace.



EC359020
CLUTCH ADJUSTMENT

1. Check:
   - Clutch lever free play ⓐ
     Out of specification → Adjust.

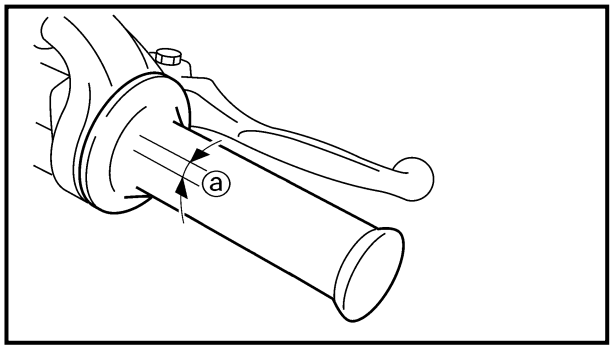
Clutch lever free play ⓐ:
8 ~ 13 mm (0.31 ~ 0.51 in)



2. Adjust:
   - Clutch lever free play

Clutch lever free play adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② until free play ⓐ is within the specified limits.
- Tighten the locknut.

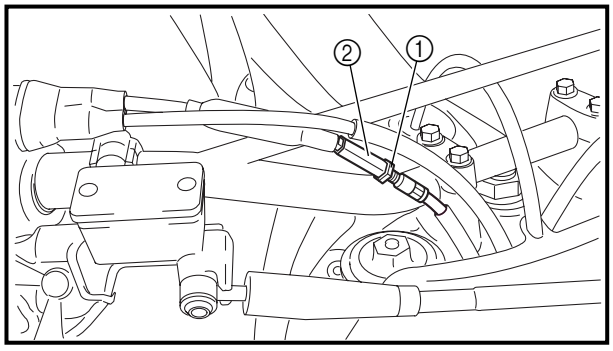
NOTE:
- Make minute adjustment on the lever side using the adjuster ③.
- After adjustment, check proper operation of clutch lever.



EC35A001
THROTTLE CABLE ADJUSTMENT

1. Check:
   - Throttle grip free play ⓐ
     Out of specification → Adjust.

Throttle grip free play ⓐ:
3 ~ 5 mm (0.12 ~ 0.20 in)

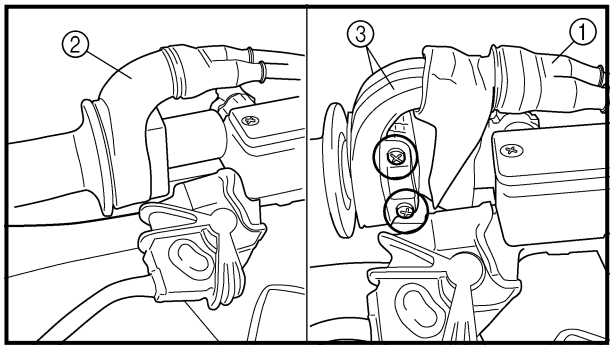


2. Adjust:
   - Throttle grip free play

Throttle grip free play adjustment steps:
- Slide the adjuster cover.
- Loosen the locknut ①.
- Turn the adjuster ② until the specified free play is obtained.
- Tighten the locknut.

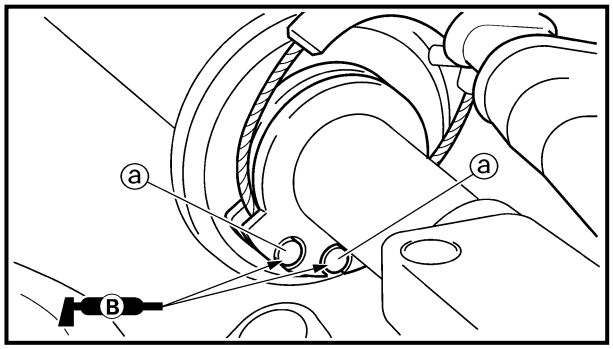
NOTE:
Before adjusting the throttle cable free play, the engine idle speed should be adjusted.

⚠ WARNING
After adjusting the throttle cable free play, start the engine and turn the handlebar to right and left and make sure that the engine idling does not run faster.



THROTTLE LUBRICATION

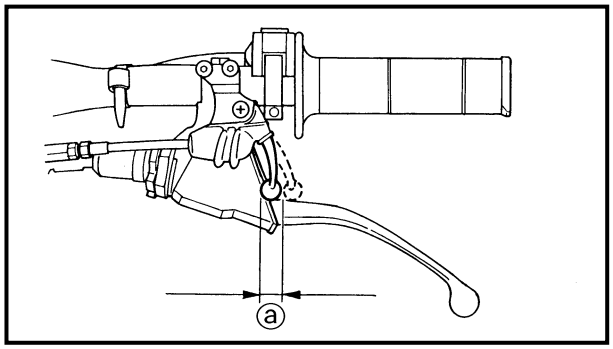
1. Remove:
   - Cover (throttle cable cap) ①
   - Cover (grip cap) ②
   - Throttle cable cap ③



2. Apply:
   - Lithium soap base grease
     On the throttle cable end ⓐ.
3. Install:
   - Throttle cable cap
   - Screw (throttle cable cap)

4 Nm (0.4 m · kg, 2.9 ft · lb)

   - Cover (grip cap)
   - Cover (throttle cable cap)



HOT STARTER LEVER ADJUSTMENT

1. Check:
   - Hot starter lever free play ⓐ
     Out of specification → Adjust.

Hot starter lever free play ⓐ:
3 ~ 6 mm (0.12 ~ 0.24 in)

2. Adjust:
   - Hot starter lever free play

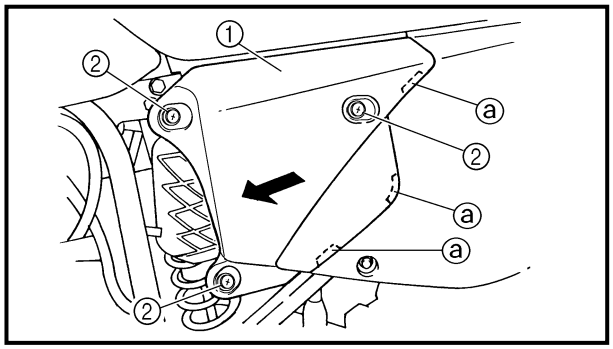
Hot starter lever free play adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② until free play ⓐ is within the specified limits.
- Tighten the locknut.

NOTE:
After adjustment, check proper operation of hot starter.

AIR FILTER CLEANING

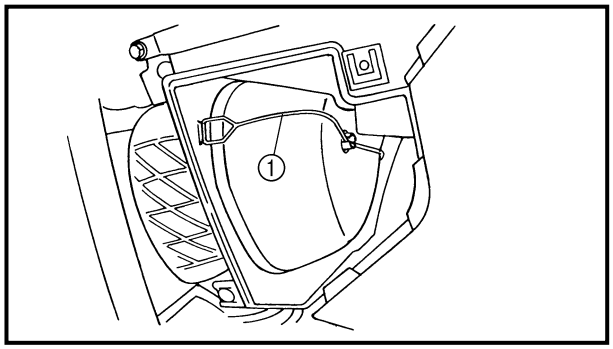
NOTE:
Proper air filter maintenance is the biggest key to preventing premature engine wear and damage.

CAUTION:
Never run the engine without the air filter element in place; this would allow dirt and dust to enter the engine and cause rapid wear and possible engine damage.

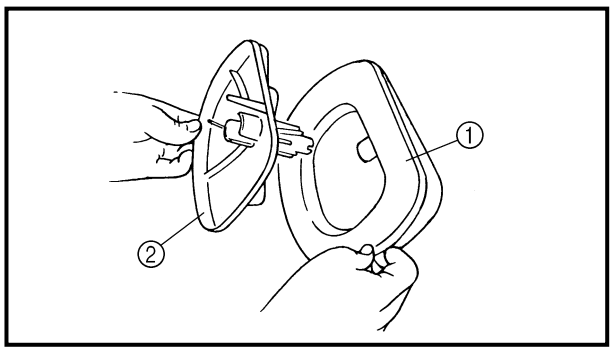


1. Remove:
   - Air filter case cover ①

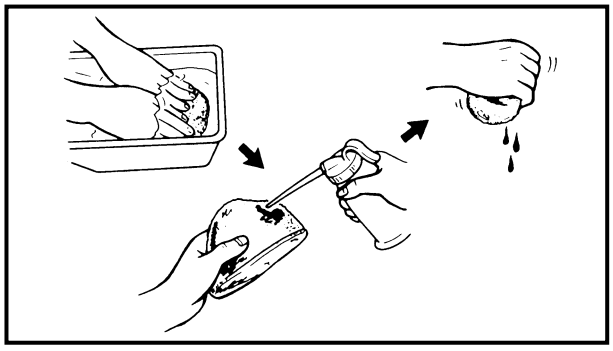
NOTE:
Loosen the quick screw ② and draw the air filter case cover to remove it because its claws ⓐ are inserted in the side cover as shown.



2. Unhook:
   - Binder ①



3. Remove:
   - Air filter element ①
   - Filter guide ②



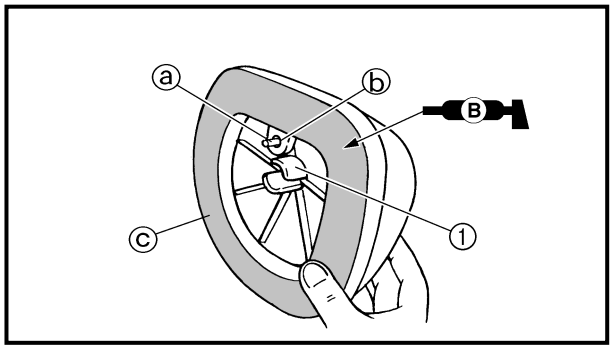
4. Clean:
   - Air filter element
     Clean them with solvent.

NOTE:
After cleaning, remove the remaining solvent by squeezing the element.

CAUTION:
- **Do not twist the element when squeezing the element.**
- **Leaving too much of solvent in the element may result in poor starting.**

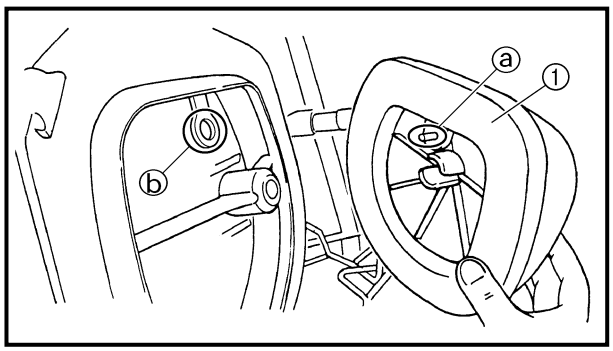
5. Inspect:
   - Air filter element
     Damage → Replace.
6. Apply:
   - Foam-air-filter oil or equivalent oil to the element.

NOTE:
- Squeeze out the excess oil. Element should be wet but not dripping.
- Wipe off the oil left on the element surface using a clean dry cloth. (Excess oil in the element may adversely affect engine starting.)



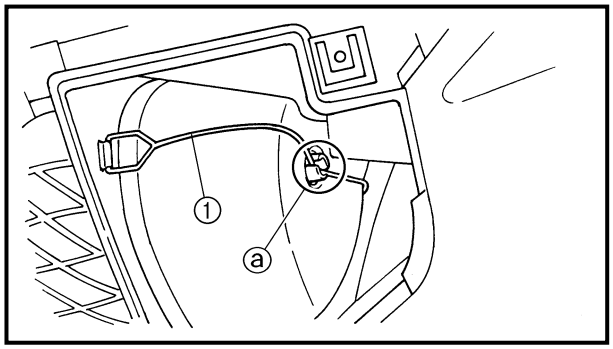
7. Install:
   - Filter guide ①

NOTE:
- Align the projection ⓐ on filter guide with the hole ⓑ in air filter element.
- Apply the lithium soap base grease on the matching surface ⓒ on air filter element.



8. Install:
   - Air filter element ①

NOTE:
Align the projection ⓐ on filter guide with the hole ⓑ in air filter case.



9. Hook:
   - Binder ①

NOTE:
Hook the binder ① so that it contacts the filter guide projections ⓐ.

ENGINE OIL LEVEL INSPECTION

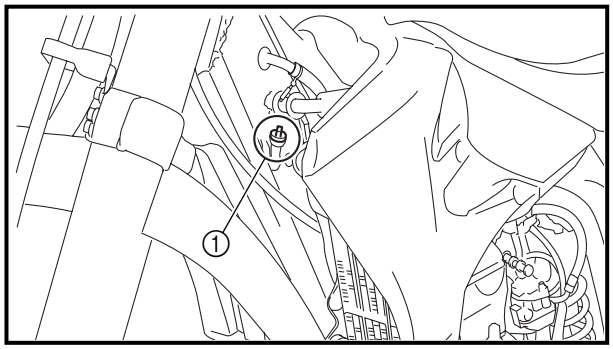
1. Stand the motorcycle on a level surface.

NOTE:
- When checking the oil level make sure that the motorcycle is upright.
- Place the motorcycle on a suitable stand.

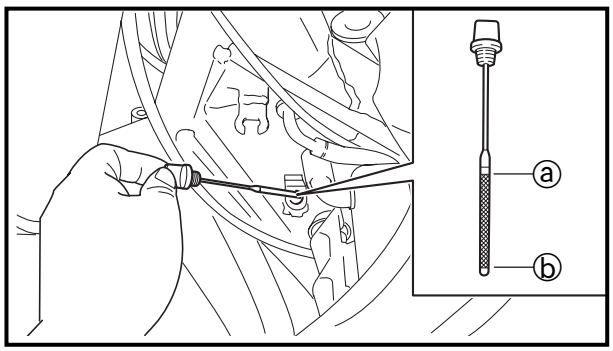
⚠ WARNING

Never remove the oil tank cap just after high speed operation. The heated oil could spurt out. causing danger. Wait until the oil cools down to approximately 70 ˚C (158 ˚F).

2. Idle the engine more than 3 minutes while keeping the motorcycle upright. Then stop the engine and inspect the oil level.

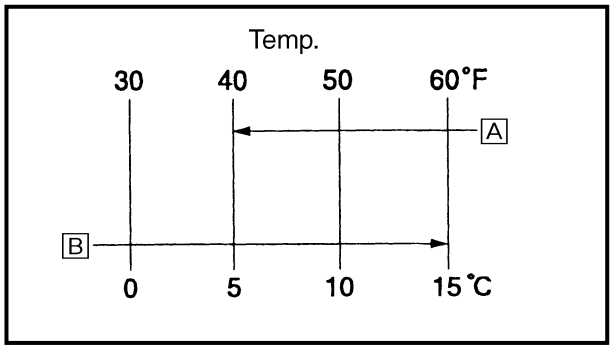


3. Remove:
   - Oil tank cap ①



4. Inspect:
   - Oil level
     Oil level should be between maximum ⓐ and minimum ⓑ marks.
     Oil level low → Add oil to proper level.

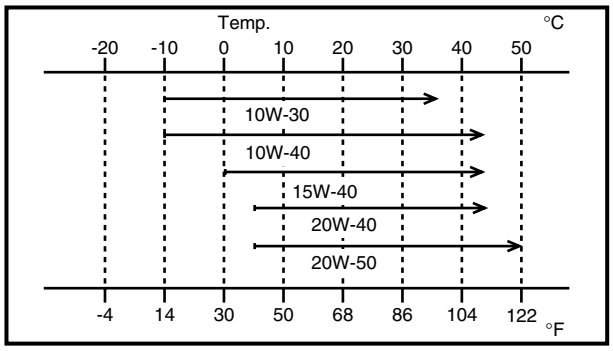
NOTE:
When inspecting the oil level, do not screw the oil level gauge into the oil tank.
Insert the gauge lightly.



(For USA and CDN)

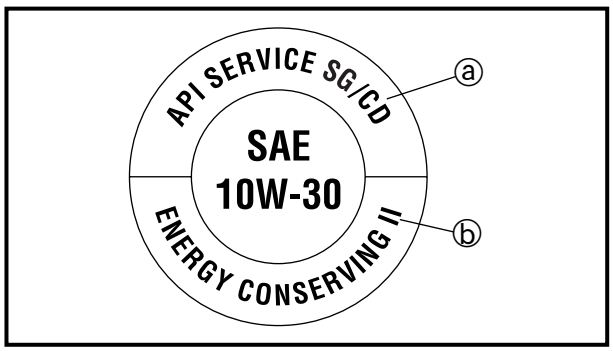
Recommended oil:
At 5 ˚C (40 ˚F) or higher A
Yamalube 4 (20W-40) or SAE 20W-40 type SG motor oil (Non-Friction modified)
At 15 ˚C (60 ˚F) or lower B
Yamalube 4 (10W-30) or SAE 10W-30 type SG motor oil (Non-Friction modified)
and/or
Yamalube 4-R (15W-50) (Non-Friction modified)

CAUTION:
- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Do not allow foreign material to enter the crankcase.**



(Except for USA and CDN)

Recommended oil:
Refer to the following chart for selection of oils which are suited to the atmospheric temperatures.
Recommended engine oil classification:
API STANDARD:
API "SG" or higher grade (Designed primarily for motorcycles)

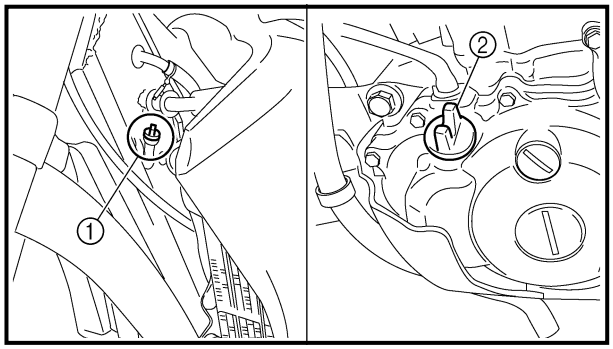


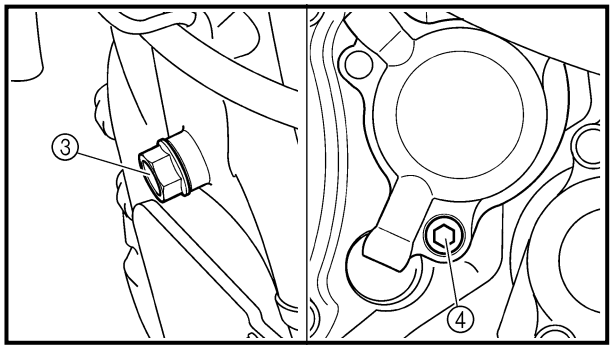
CAUTION:
- **Do not add any chemical additives or use oils with a grade of CD ⓐ or higher.**
- **Do not use oils labeled "ENERGY CONSERVING II" ⓑ or higher. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Do not allow foreign materials to enter the crankcase.**

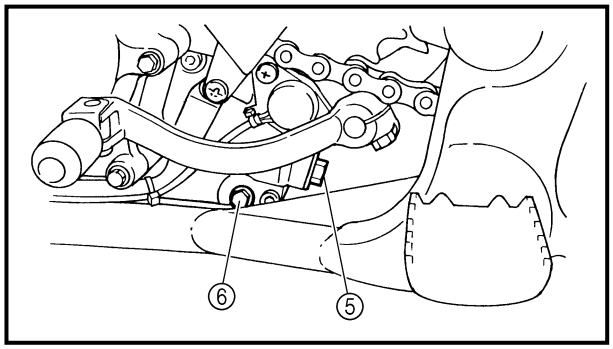
5. Start the engine and let it warm up for several minutes.

CAUTION:
When the oil tank is empty, never start the engine.

6. Idle the engine more than 10 seconds while keeping the motorcycle upright. Then stop the engine and add the oil to the maximum level.
7. Install:
   - Oil tank cap



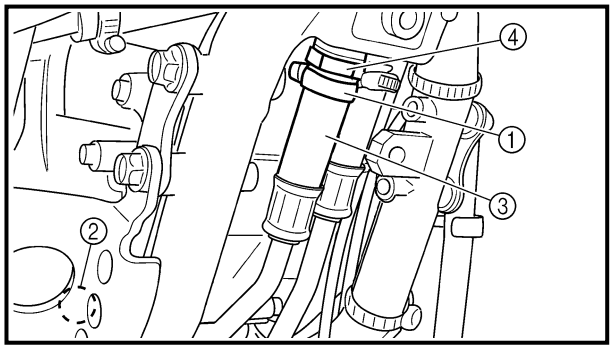




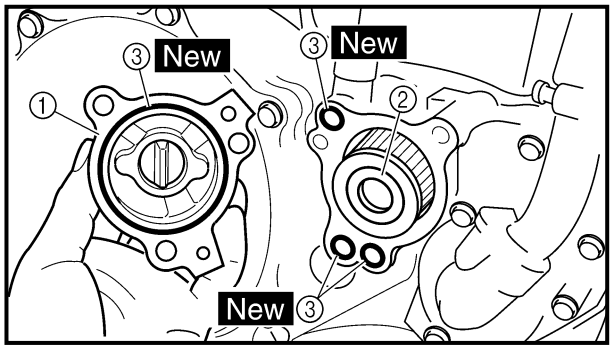
ENGINE OIL REPLACEMENT

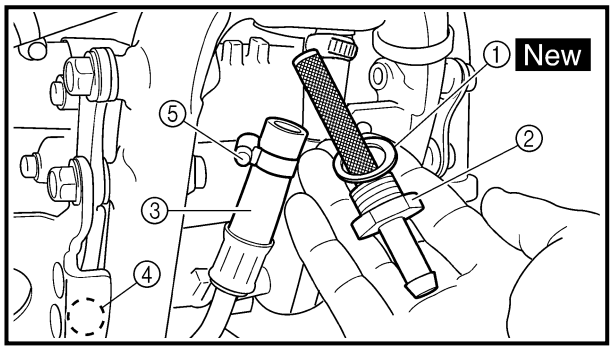
1. Start the engine and let it warm up for several minutes.
2. Stop the engine and place an oil pan under the drain bolt.
3. Remove:
   - Oil tank plug ①
   - Oil filler cap ②
   - Drain bolt (with gasket) ③
   - Oil filter drain bolt (O-ring) ④
   - Drain bolt (with gasket) ⑤
   - Drain bolt (with gasket) ⑥

   Drain the crankcase and oil tank (frame) of its oil.



4. Remove:
   - Engine skid plate
   - Engine oil hose clamp ①
   - Bolt (engine oil hose) ②
   - Engine oil hose ③
   - Oil strainer (frame) ④
5. Clean:
   - Oil strainer (frame)





6. If the oil filter is to be replaced during this oil change, remove the following parts and reinstall them.

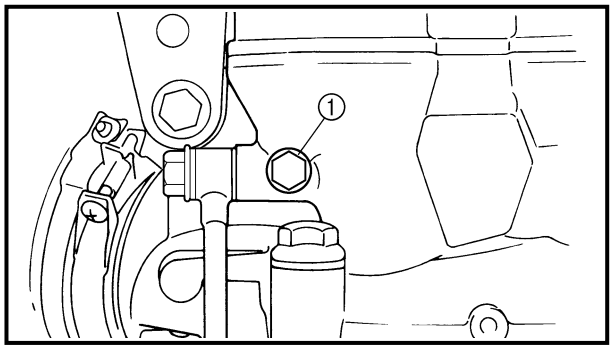
Replacement steps:
- Remove the exhaust pipe.
- Remove the oil filter cover ① and oil filter element ②.
- Check the O-rings ③, if cracked or damaged, replace them with a new one.
- Install the oil filter element and oil filter cover.

Oil filter cover:
10 Nm (1.0 m • kg, 7.2 ft • lb)

7. Install:
   - Plain washer ① New
   - Oil strainer (frame) ②
     90 Nm (9.0 m · kg, 65 ft · lb)
   - Engine oil hose ③
   - Bolt (engine oil hose) ④
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Engine oil hose clamp ⑤
     2 Nm (0.2 m · kg, 1.4 ft · lb)
   - Engine skid plate
8. Install:
   - Gaskets New
   - Oil filter drain bolt
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Drain bolt (crankcase rear)
     20 Nm (2.0 m · kg, 14 ft · lb)
   - Drain bolt (crankcase left)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Drain bolt (frame)
     23 Nm (2.3 m · kg, 17 ft · lb)
9. Fill:
   - Crankcase

Oil quantity:
Total amount:
1.2 L (1.06 Imp qt, 1.27 US qt)
Periodic oil change:
1.0 L (0.88 Imp qt, 1.06 US qt)
With oil filter replacement:
1.1 L (0.97 Imp qt, 1.16 US qt)

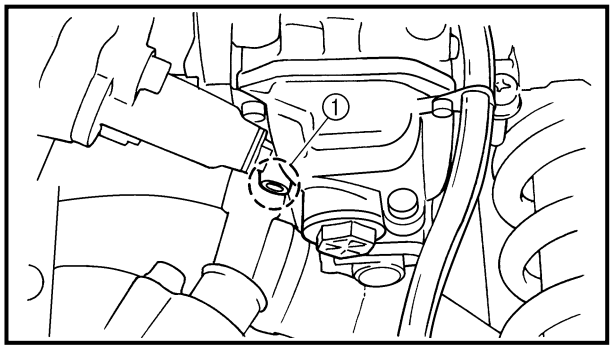
10. Install:
    - Oil filler plug
11. Inspect:
    - Engine (for oil leaks)
    - Oil level
      Refer to “ENGINE OIL LEVEL INSPECTION”.



12. Check:
    - Oil pressure

Checking steps:
- Slightly loosen the oil gallery bolt ①.
- Start the engine and keep it idling until oil starts to seep from the oil gallery bolt. If no oil comes out after one minute, turn the engine off so it will not seize.
- Check oil passages, oil filter and oil pump for damage or leakage.
- Start the engine after solving the problem(s) and recheck the oil pressure.
- Tighten the oil gallery bolt to specification.

Oil gallery bolt:
10 Nm (1.0 m • kg, 7.2 ft • lb)



PILOT SCREW ADJUSTMENT

1. Adjust:
    - Pilot screw ①

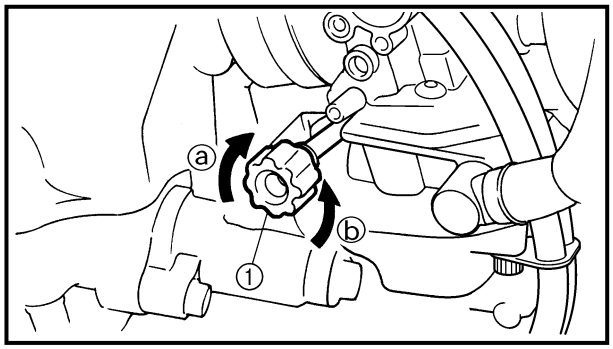
Adjusting steps:

NOTE:
To optimize the fuel flow at a smaller throttle opening, each machine's pilot screw has been individually set at the factory. Before adjusting the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

- Turn in the pilot screw until it is lightly seated.
- Turn out the pilot screw by the factory-set number of turns.

Pilot screw:
1-3/4 turns out (example)
***1-1/2 turns out (example)**

* Except for USA



EC35M021
IDLE SPEED ADJUSTMENT

1. Start the engine and thoroughly warm it up.
2. Adjust:
   - Idle speed

Adjustment steps:
- Adjust the pilot screw.
  Refer to "PILOT SCREW ADJUSTMENT" section.
- Turn the throttle stop screw ① until the engine runs at the lowest possible speed.

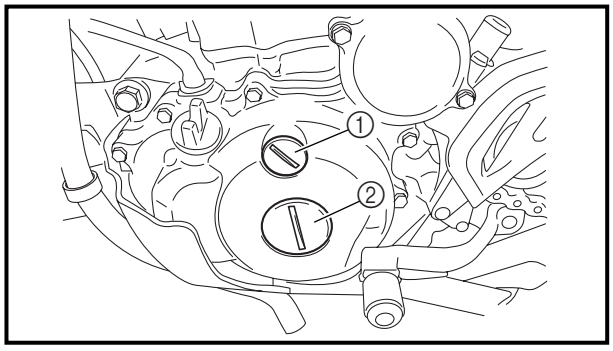
To increase idle speed →
Turn the throttle stop screw ① in ⓐ.
To decrease idle speed →
Turn the throttle stop screw ① out ⓑ.

Engine idling speed:
1,700 ~ 1,900 r/min

VALVE CLEARANCE ADJUSTMENT

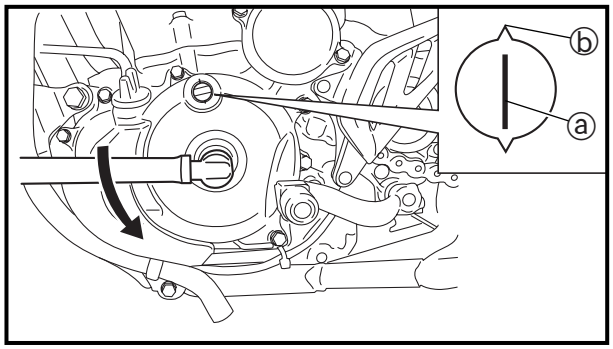
NOTE:
- The valve clearance should be adjusted when the engine is cool to the touch.
- The piston must be at Top Dead Center (T.D.C.) on compression stroke to check or adjust the valve clearance.

1. Remove:
   - Seat
   - Fuel tank
     Refer to "SEAT, FUEL TANK AND SIDE COVERS" section in the CHAPTER 4.
2. Remove:
   - Carburetor
     Refer to "CARBURETOR" section in the CHAPTER 4.
   - Spark plug cap
   - Engine stay (upper)
   - Cylinder head cover
     Refer to "CAMSHAFTS" section in the CHAPTER 4.
3. Remove:
   - Timing plug ①
   - Straight plug ②
   - O-ring



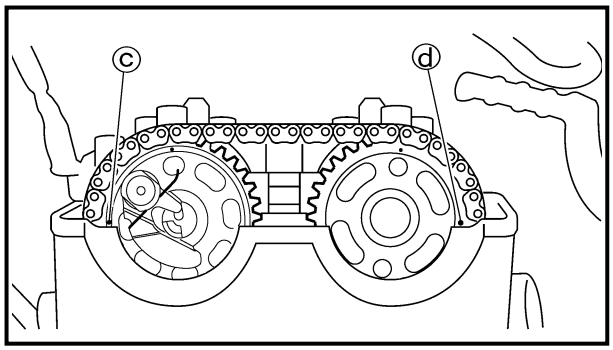
4. Check:
   - Valve clearance
     Out of specification → Adjust.

Valve clearance (cold):
Intake valve:
0.10 ~ 0.15 mm
(0.0039 ~ 0.0059 in)
Exhaust valve:
0.20 ~ 0.25 mm
(0.0079 ~ 0.0098 in)



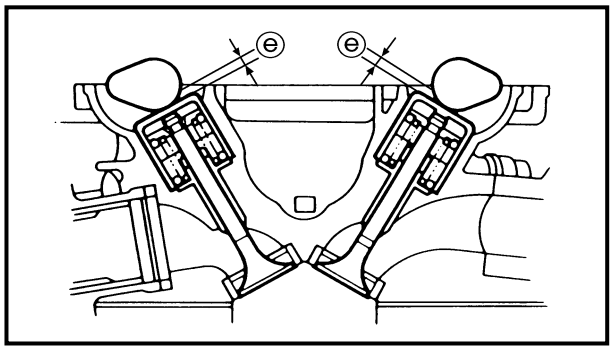
Checking steps:
- Turn the crankshaft counterclockwise with a wrench.
- Align the T.D.C. mark ⓐ on the rotor with the align mark ⓑ on the crankcase cover when piston is at T.D.C. on compression stroke.

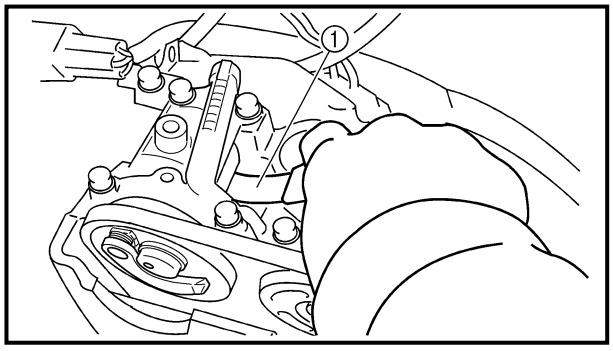
NOTE:
In order to be sure that the piston is at Top Dead Center, the punch mark ⓒ on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

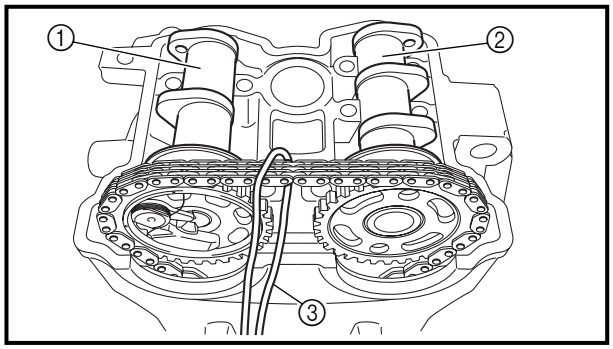


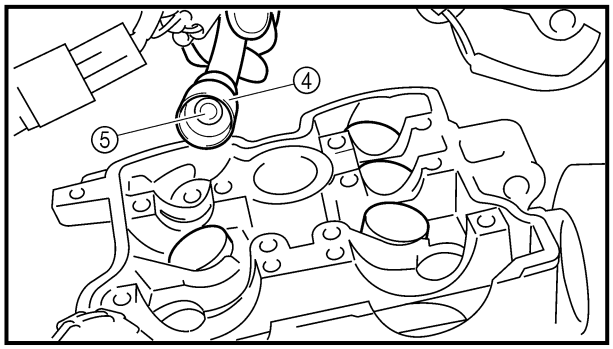
- Measure the valve clearance ⓔ using a feeler gauge ①.

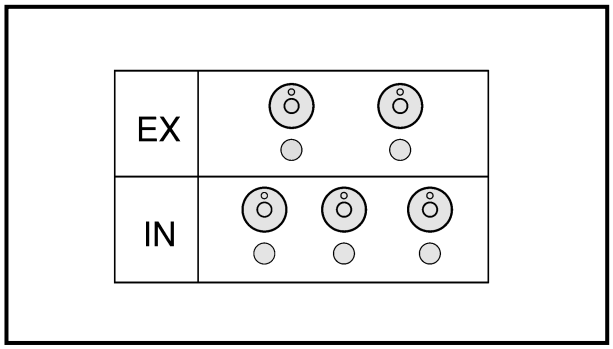
NOTE:
Record the measured reading if the clearance is incorrect.

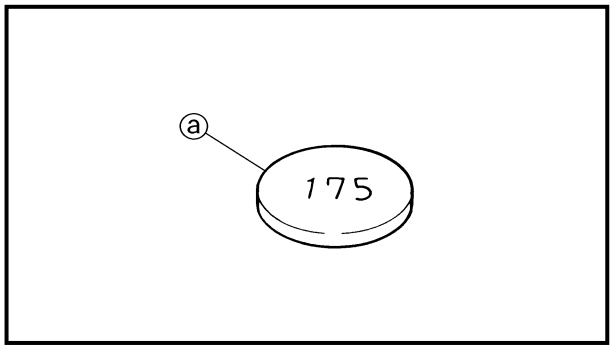












5. Adjust:
   - Valve clearance

Adjustment steps:
- Loosen the timing chain tensioner cap bolt.
- Remove the timing chain tensioner and camshaft caps.

NOTE:
Remove the camshaft cap bolts in a criss-cross pattern from the outside working inwards.

- Remove the camshaft (exhaust ① and intake ②).

NOTE:
Attach a wire ③ to the timing chain to prevent it from falling into the crankcase.

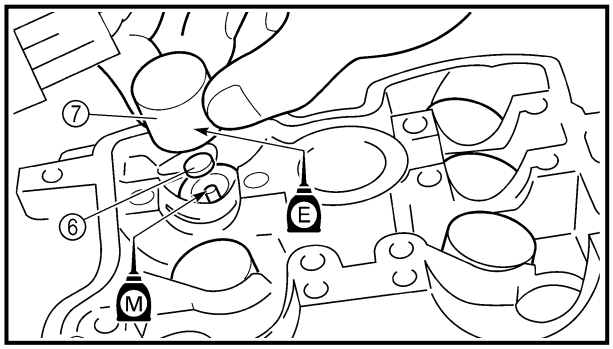
- Remove the valve lifters ④ and the pads ⑤.

NOTE:
- Place a rag in the timing chain space to prevent pads from falling into the crankcase.
- Identity each valve lifter and pad position very carefully so that they can be reinstalled in their original place.

- Select the proper pad using the pad selecting table.

Pad range		Pad Availability: 25 increments
No. 120 ~ No. 240	1.20 mm ~ 2.40 mm	Pads are available in 0.05 mm increments

NOTE:
The thickness ⓐ of each pad is indicated in hundreths of millimeters on the pad upper surface.



- Round off the last digit of the installed pad number to the nearest increment.

Last digit of pad number	Rounded value
0, 1 or 2	0
4, 5 or 6	5
8 or 9	10

EXAMPLE:
Installed pad number = 148
Rounded off value = 150

NOTE:
Pads can only be selected in 0.05 mm increments.

- Locate the rounded-off value and the measured valve clearance in the chart "PAD SELECTION TABLE". The field where these two coordinates intersect shows the new pad number to use.

NOTE:
Use the new pad number only as a guide when verifying the valve clearance adjustment.

- Install the new pads ⑥ and the valve lifters ⑦.

NOTE:
- Apply the engine oil on the valve lifters.
- Apply the molybdenum disulfide oil on the valve stem ends.
- Valve lifter must turn smoothly when rotated with a finger.
- Be careful to reinstall valve lifters and pads in their original place.

- Install the camshafts (exhaust and intake), the timing chain and the camshaft caps. Refer to "CAMSHAFTS" section in the CHAPTER 4.

Bolt (camshaft cap):
10 Nm (1.0 m • kg, 7.2 ft • lb)

- Install the timing chain tensioner.
  Refer to “CAMSHAFTS” section in the CHAPTER 4.

NOTE:
Turn the crankshaft counterclockwise several turns so that the installed parts settle into the right position.

- Recheck the valve clearance.
- If the clearance is still incorrect, repeat all the clearance adjustment steps until the specified clearance is obtained.

6. Install:
   - All removed parts

NOTE:
Install all removed parts in reversed order of their removal. Note the following points.

INTAKE

MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.05 ~ 0.09		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.10 ~ 0.15	STANDARD CLEARANCE																								
0.16 ~ 0.20	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.21 ~ 0.25	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.26 ~ 0.30	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.31 ~ 0.35	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.36 ~ 0.40	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.41 ~ 0.45	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.46 ~ 0.50	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.51 ~ 0.55	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.56 ~ 0.60	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.61 ~ 0.65	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.66 ~ 0.70	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.71 ~ 0.75	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.76 ~ 0.80	185	190	195	200	205	210	215	220	225	230	235	240													
0.81 ~ 0.85	190	195	200	205	210	215	220	225	230	235	240														
0.86 ~ 0.90	195	200	205	210	215	220	225	230	235	240															
0.91 ~ 0.95	200	205	210	215	220	225	230	235	240																
0.96 ~ 1.00	205	210	215	220	225	230	235	240																	
1.01 ~ 1.05	210	215	220	225	230	235	240																		
1.06 ~ 1.10	215	220	225	230	235	240																			
1.11 ~ 1.15	220	225	230	235	240																				
1.16 ~ 1.20	225	230	235	240																					
1.21 ~ 1.25	230	235	240																						
1.26 ~ 1.30	235	240																							
1.31 ~ 1.35	240																								

VALVE CLEARANCE (cold):
0.10 ~ 0.15 mm
Example: Installed is 175
Measured clearance is 0.22 mm
Replace 175 pad with 185 pad
Pad number: (example)
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm

EXHAUST

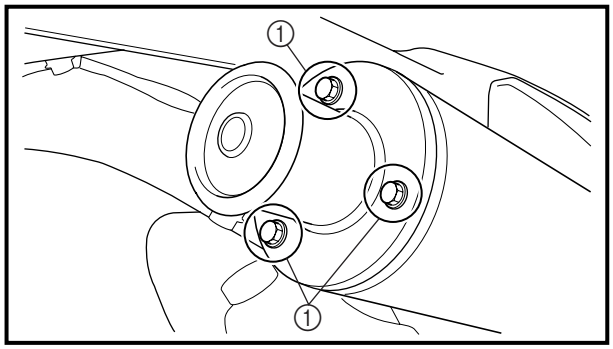
MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.05 ~ 0.09				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.10 ~ 0.14			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.15 ~ 0.19		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.20 ~ 0.25	STANDARD CLEARANCE																								
0.26 ~ 0.30	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.31 ~ 0.35	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.36 ~ 0.40	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.41 ~ 0.45	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.46 ~ 0.50	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.51 ~ 0.55	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.56 ~ 0.60	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.61 ~ 0.65	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.66 ~ 0.70	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.71 ~ 0.75	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.76 ~ 0.80	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.81 ~ 0.85	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.86 ~ 0.90	185	190	195	200	205	210	215	220	225	230	235	240													
0.91 ~ 0.95	190	195	200	205	210	215	220	225	230	235	240														
0.96 ~ 1.00	195	200	205	210	215	220	225	230	235	240															
1.01 ~ 1.05	200	205	210	215	220	225	230	235	240																
1.06 ~ 1.10	205	210	215	220	225	230	235	240																	
1.11 ~ 1.15	210	215	220	225	230	235	240																		
1.16 ~ 1.20	215	220	225	230	235	240																			
1.21 ~ 1.25	220	225	230	235	240																				
1.26 ~ 1.30	225	230	235	240																					
1.31 ~ 1.35	230	235	240																						
1.36 ~ 1.40	235	240																							
1.41 ~ 1.45	240																								

VALVE CLEARANCE (cold):
0.20 ~ 0.25 mm
Example: Installed is 175
Measured clearance is 0.32 mm
Replace 175 pad with 185 pad
Pad number: (example)
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm

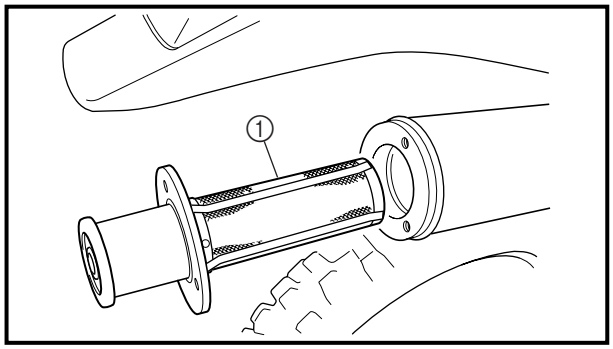
SPARK ARRESTER CLEANING (For USA)

⚠ WARNING

- **Be sure the exhaust pipe and muffler are cool before cleaning the spark arrester.**
- **Do not start the engine when cleaning the exhaust system.**



1. Remove:
   - Bolt (spark arrester) ①



2. Remove:
   - Spark arrester ①

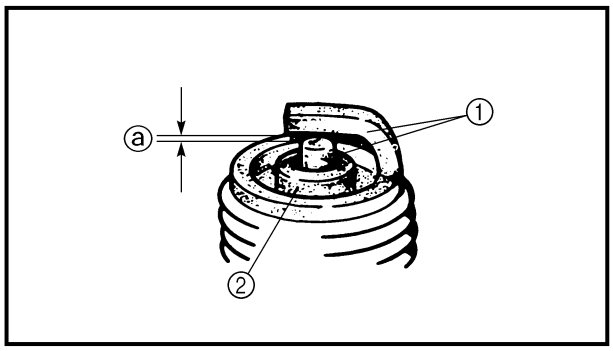
   Pull the spark arrester out of the muffler.

3. Clean:
   - Spark arrester

   Tap the spark arrester lightly, then use a wire brush to remove any carbon deposits.
4. Install:
   - Spark arrester

   Insert the spark arrester into the muffler and align the bolt holes.
   - Bolt (spark arrester)

	10 Nm (1.0 m · kg, 7.2 ft · lb)



EC370000
ELECTRICAL

EC371001
SPARK PLUG INSPECTION

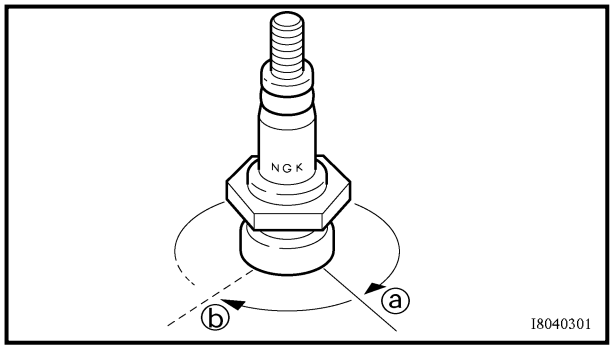
1. Remove:
   - Spark plug
2. Inspect:
   - Electrode ①
     Wear/damage → Replace.
   - Insulator color ②
     Normal condition is a medium to light tan color.
     Distinctly different color → Check the engine condition.

NOTE:
When the engine runs for many hours at low speeds, the spark plug insulator will become sooty, even if the engine and carburetor are in good operating condition.

3. Measure:
   - Plug gap ⓐ
     Use a wire gauge or thickness gauge.
     Out of specification → Regap.

Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

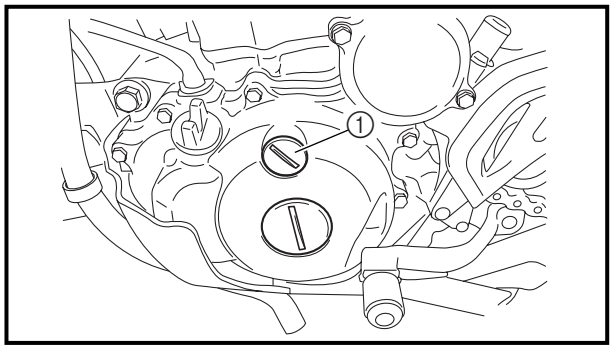
4. Clean the plug with a spark plug cleaner if necessary.



5. Tighten:
   - Spark plug

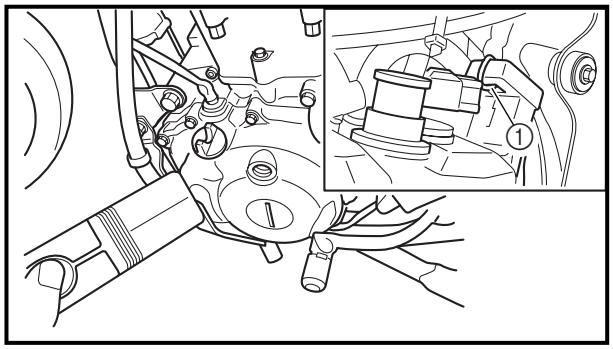
13 Nm (1.3 m · kg, 9.4 ft · lb)

NOTE:
- Before installing a spark plug, clean the gasket surface and plug surface.
- Finger-tighten ⓐ the spark plug before torquing to specification ⓑ.



IGNITION TIMING CHECK

1. Remove:
   - Timing plug ①

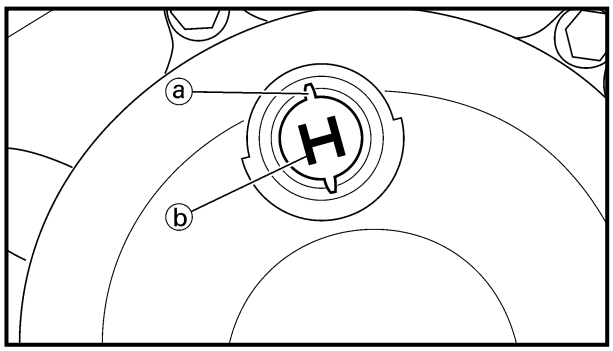


2. Attach:
   - Timing light
   - Inductive tachometer

   To the ignition coil lead (orange lead ①).

Timing light:
YM-33277-A/90890-03141
Inductive tachometer:
YU-8036-B
Engine tachometer:
90890-03113

3. Check:
   - Ignition timing



Checking steps:
- Start the engine and let it warm up. Let the engine run at the specified speed.
- Adjust the engine idling speed.
  Refer to "IDLE SPEED ADJUSTMENT" section.
- Visually check the stationary pointer ⓐ is within the firing range ⓑ on the rotor.
  Incorrect firing range → Check rotor and pickup assembly.

4. Install:
   - Timing plug

BATTERY INSPECTION AND CHARGING

⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL

- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL

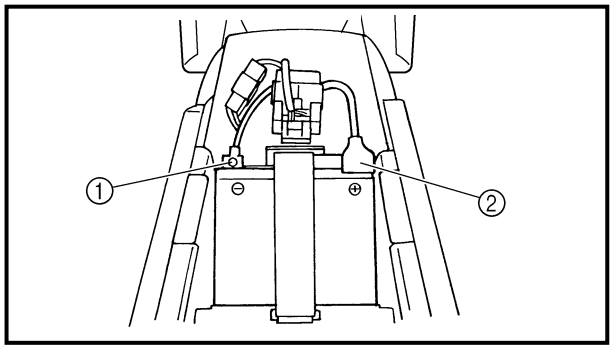
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:

Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

NOTE:
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

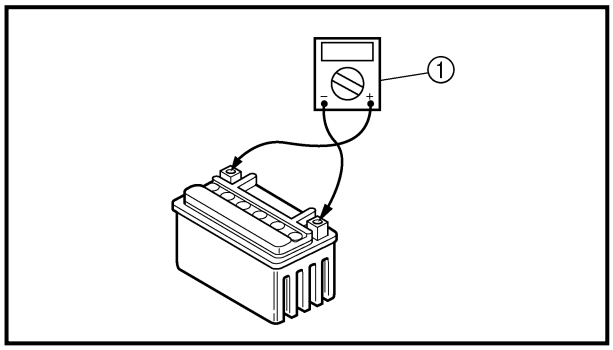
1. Remove:
   - Seat



2. Disconnect:
   - Battery leads
     (from the battery terminals)

CAUTION:
First, disconnect the negative battery lead ①, and then the positive battery lead ②.

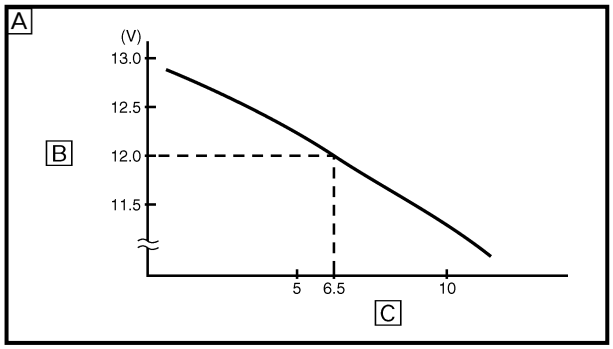
3. Remove:
   - Battery band
   - Battery
4. Measure:
   - Battery charge

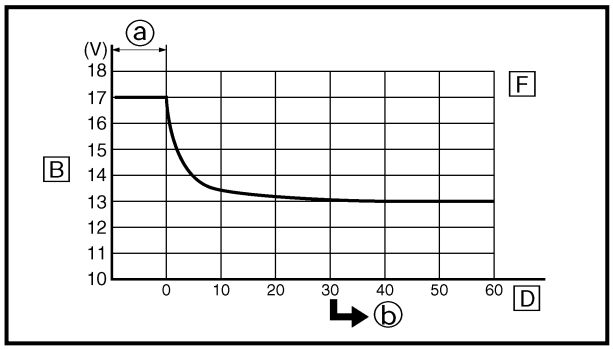


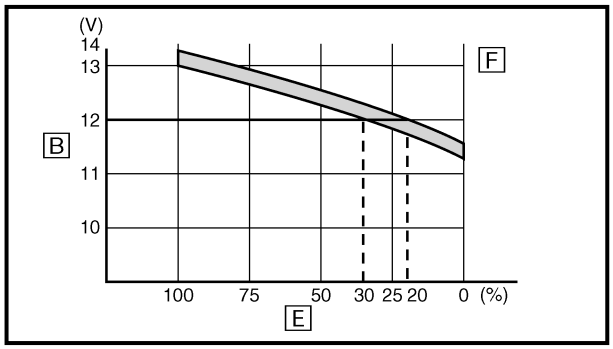
Measurement steps:
- Connect a pocket tester ① to the battery terminals.

Tester positive probe →
battery positive terminal
Tester negative probe →
battery negative terminal

NOTE:
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.







- Check the charge of the battery, as shown in the charts and the following example.

Example

Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20 ~ 30%

A Relationship between the open-circuit voltage and the charging time at 20 ˚C (68 ˚F)
(These values vary with the temperature, the condition of the battery plates, and the electrolyte level.)
B Open-circuit voltage
C Charging time (hours)
D Time (minutes)
E Charging condition of the battery
F Ambient temperature 20 ˚C (68 ˚F)
ⓐ Charging
ⓑ Check the open-circuit voltage.

5. Charge:
   - Battery
     (refer to the appropriate charging method illustration)

⚠ WARNING

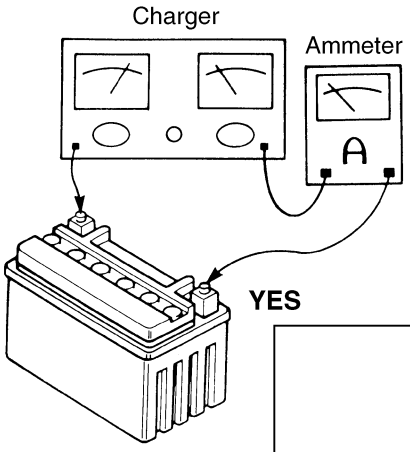
Do not quick charge a battery.

CAUTION:

- **Never remove the MF battery sealing caps.**
- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the machine. (If charging has to be done with the battery mounted on the machine, disconnect the negative battery lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**

- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**

Charging method using a variable voltage charger



Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

NOTE:
Set the charging voltage to 16-17 V.(If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)

Is the amperage higher than the standard charging amperage written on the battery?

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes. Is the standard charging amperage exceeded?

YES

NO

Adjust the voltage to obtain the standard charging amperage.

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

Set the timer to the charging time determined by the open -circuit voltage.
Refer to “BATTERY INSPECTION AND CHARGING” section.

If the required charging time exceeds 5 hours, it is advisable to check the charging amperage after 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging amperage.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

12.8 V ➔ Charging is complete.
12.0~12.7 V ➔ Recharging is required.
Under 12.0 V ➔ Replace the battery.

Charging method using a constant voltage charger

Measure the open-circuit voltage prior to charging.

NOTE:
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

↓

Connect a charger and ammeter to the battery and start charging.

↓

Is the amperage higher than the standard charging amperage written on the battery?

YES → Charge the battery until the charging voltage reaches 15 V.

NOTE:
Set the charging time to a maximum of 20 hours.

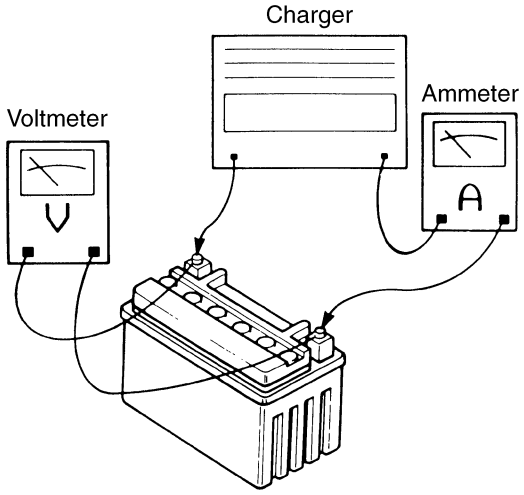
↓

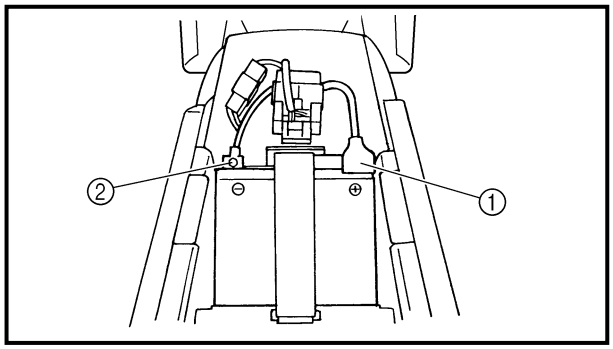
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

12.8 V ➔ Charging is complete.
12.0~12.7 V ➔ Recharging is required.
Under 12.0 V ➔ Replace the battery.

CAUTION:
Constant amperage chargers are not suitable for harging MF batteries.

NO → This type of battery charger cannot charge an MF battery. A variable voltage- charger is recommended.





6. Install:
   - Battery
   - Battery band
7. Connect:
   - Battery leads
     (to the battery terminals)

CAUTION:

First, connect the positive lead ①, then the negative lead ②.

8. Check:
   - Battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   - Battery terminal

	Recommended lubricant **Lithium soap base grease**

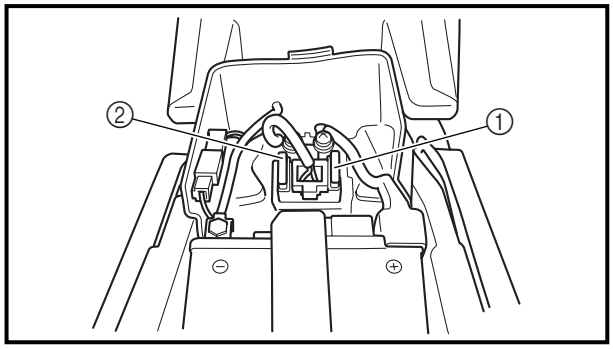
10. Install:
    - Seat

EAS00181
FUSE INSPECTION

CAUTION:

To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   - Seat
   - Fuse cover
2. Check:
   - Continuity



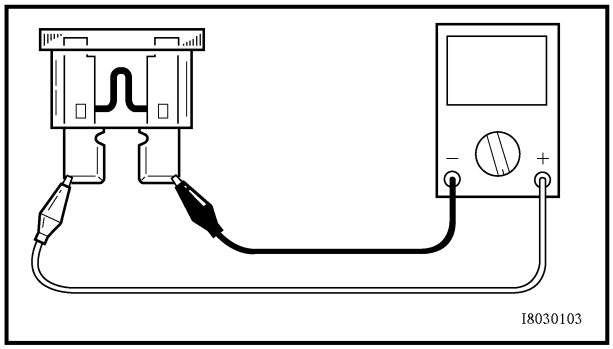
Checking steps:
- Remove the fuse ①.
- Connect the pocket tester to the fuse and check the continuity.

NOTE:
Set the pocket tester selector to "Ω × 1".

	Pocket tester **YU-3112-C/90890-03112**

- If the pocket tester indicates "∞", replace the fuse.

② Reserve fuse



3. Replace:
   - Blown fuse

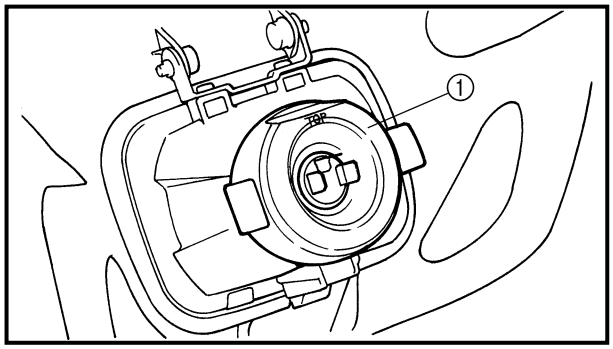
Replacement steps:
- Set the main switch to "OFF".
- Install a new fuse of the correct amperage.
- Set on the switches to verify if the electrical circuit is operational.
- If the fuse immediately blows again, check the electrical circuit.

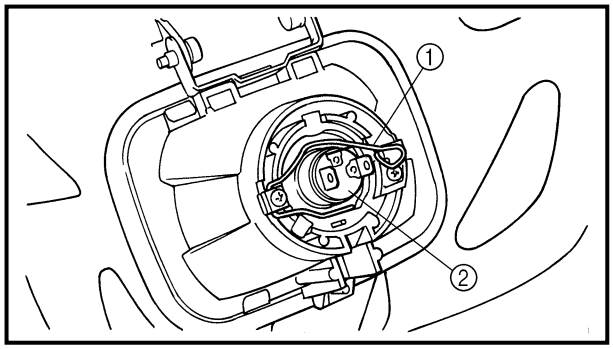
Items	Amperage rating	Q'ty
Main fuse	10 A	1

⚠ WARNING

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the starting and ignition systems to malfunction and could possibly cause a fire.

4. Install:
   - Fuse cover
   - Seat



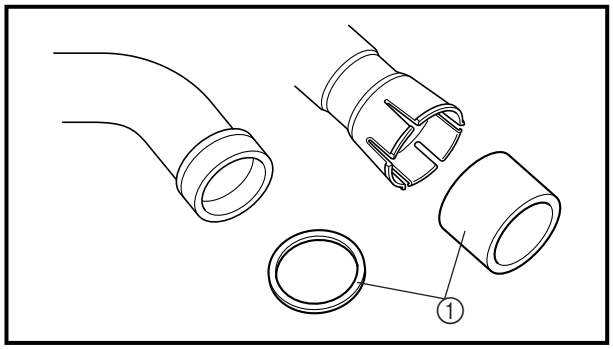


REPLACING THE HEADLIGHT BULBS

1. Remove:
   - Headlight
     Refer to "SEAT, FUEL TANK AND SIDE COVERS" section in the CHAPTER 4.
2. Remove:
   - Headlight bulb holder cover ①
3. Detach:
   - Headlight bulb holder ①
4. Remove:
   - Headlight bulb ②

⚠ WARNING

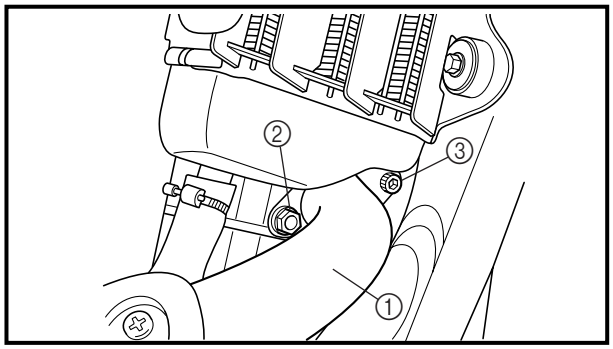
Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb unit it has cooled down.



INSPECTION

Exhaust pipe and silencer

1. Inspect:
   - Gasket ①
     Damage → Replace.



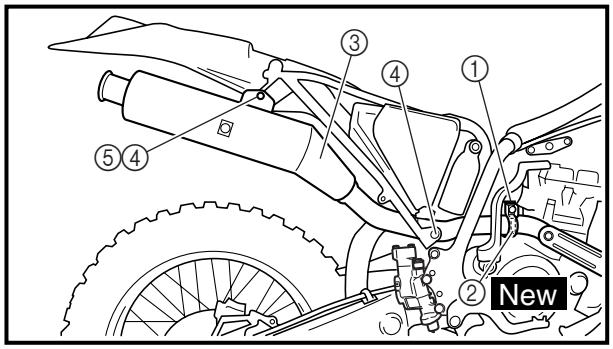
ASSEMBLY AND INSTALLATION

Exhaust pipe and silencer

1. Install:
   - Gasket New
   - Exhaust pipe ①
   - Nut (exhaust pipe) ②
     13 Nm (1.3 m · kg, 9.4 ft · lb)
   - Bolt (exhaust pipe) ③
     24 Nm (2.4 m · kg, 17 ft · lb)

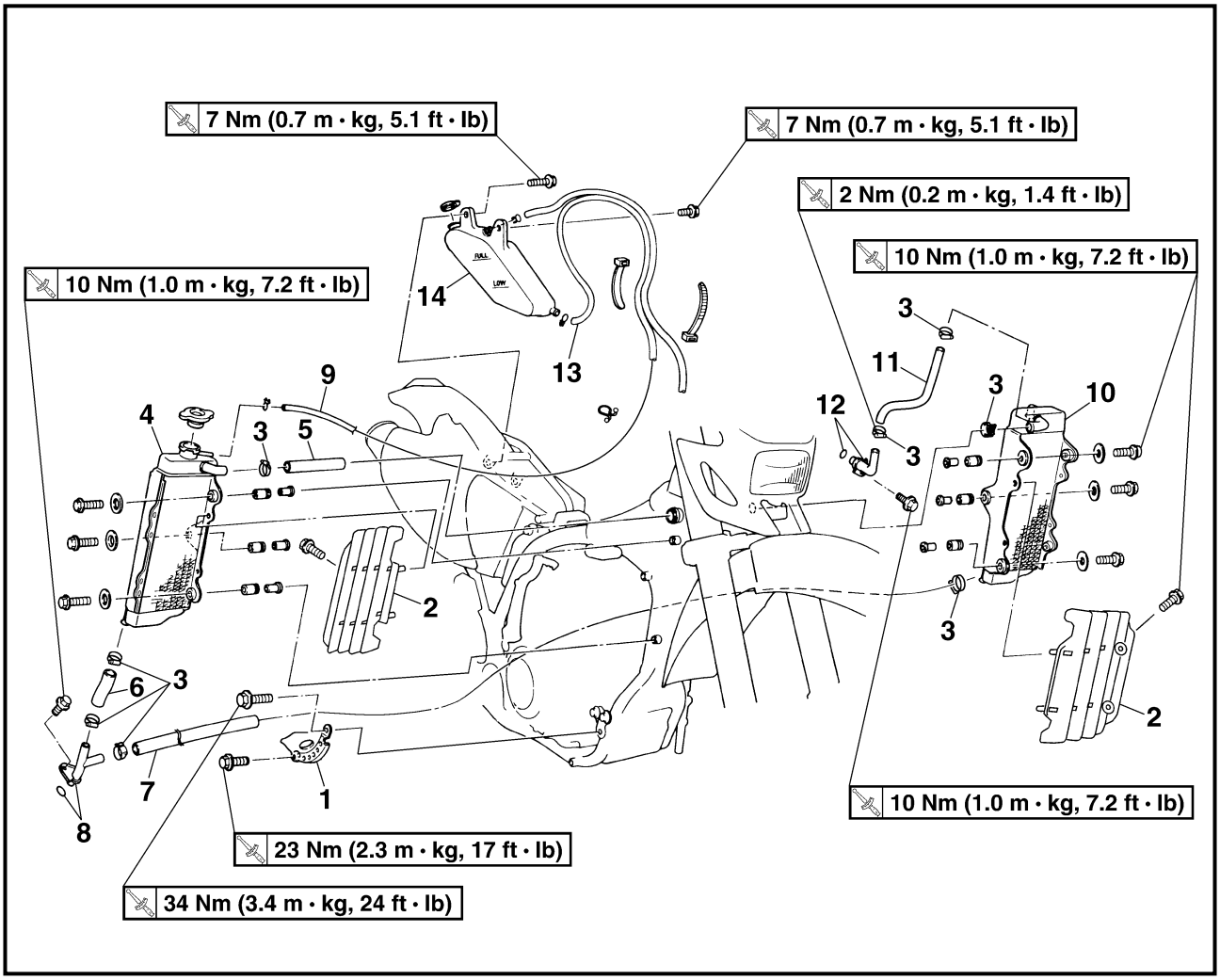
NOTE:

First, temporarily tighten the nut (exhaust pipe), then tighten the bolt (exhaust pipe) 20 Nm (2.0 m • kg, 14 ft • lb). After that, retighten the nut (exhaust pipe) 13 Nm (1.3 m • kg, 9.4 ft • lb) and then the bolt (exhaust pipe) 24 Nm (2.4 m • kg, 17 ft • lb).



2. Install:
   - Clamp ①
     20 Nm (2.0 m · kg, 14 ft · lb)
   - Gasket ② New
   - Silencer ③
   - Washer ④
   - Bolt (silencer) ⑤
     35 Nm (3.5 m · kg, 25 ft · lb)

EC450001
RADIATOR



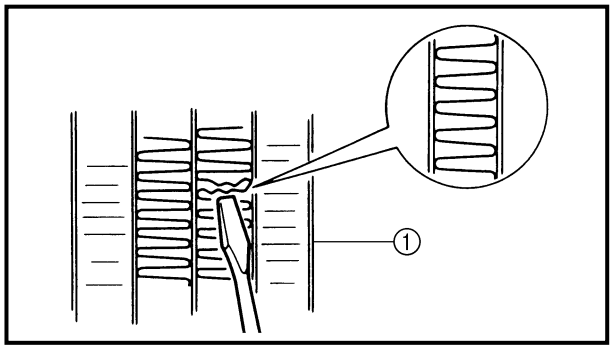
Extent of removal: ① Radiator removal ② Coolant reservoir removal

Extent of removal	Order	Part name	Q'ty	Remarks
		RADIATOR REMOVAL		
Preparation for removal		Drain the coolant.		Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3.
		Seat, fuel tank and side cover		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Exhaust pipe		Refer to "EXHAUST PIPE AND SILENCER" section.
①	1	Engine guard	1	
	2	Panel	2	
	3	Clamp	8	
	4	Radiator (right)	1	
	5	Hose 2	1	
	6	Hose 3	1	
	7	Hose 4	1	
	8	Pipe 2/O-ring	1/1	
	9	Radiator breather hose	1	
	10	Radiator (left)	1	
	11	Hose 1	1	
	12	Pipe 1/O-ring	1/1	
②	13	Coolant reservoir hose	1	
	14	Coolant reservoir tank	1	

EC456000
HANDLING NOTE

⚠ WARNING

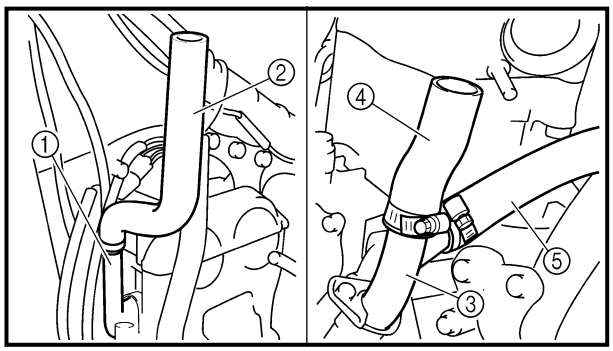
Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury.
When the engine has cooled, open the radiator cap by the following procedure:
Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

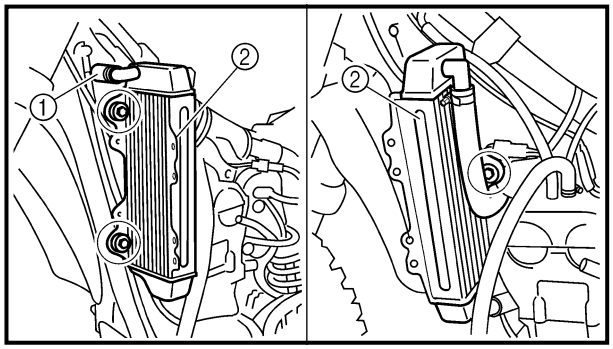


EC454000
INSPECTION

EC444100
Radiator

1. Inspect:
   - Radiator core ①
     Obstruction → Blow out with compressed air through rear of the radiator.
     Bent fin → Repair/replace.

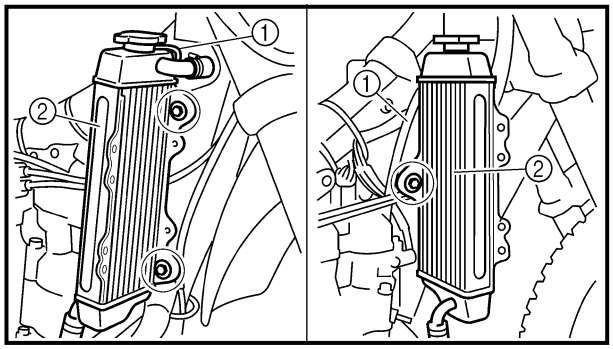




EC455000
ASSEMBLY AND INSTALLATION

Radiator

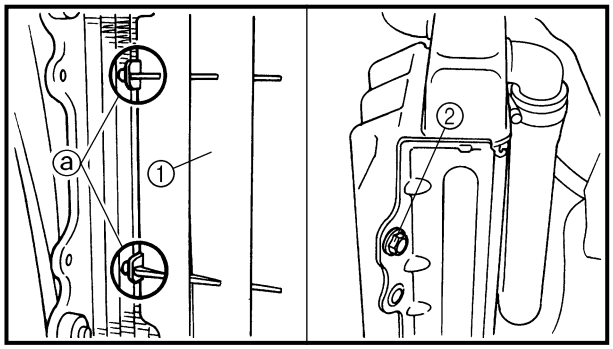
1. Install:
   - Pipe 1 ①
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Hose 1 ②
     2 Nm (0.2 m · kg, 1.4 ft · lb)
   - Pipe 2 ③
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Hose 3 ④
     2 Nm (0.2 m · kg, 1.4 ft · lb)
   - Hose 4 ⑤
     2 Nm (0.2 m · kg, 1.4 ft · lb)
2. Install:
   - Hose 2 ①
     2 Nm (0.2 m · kg, 1.4 ft · lb)
   - Radiator (left) ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)



3. Install:
   - Radiator breather hose ①
   - Radiator (right) ②

   10 Nm (1.0 m · kg, 7.2 ft · lb)

   Refer to "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.

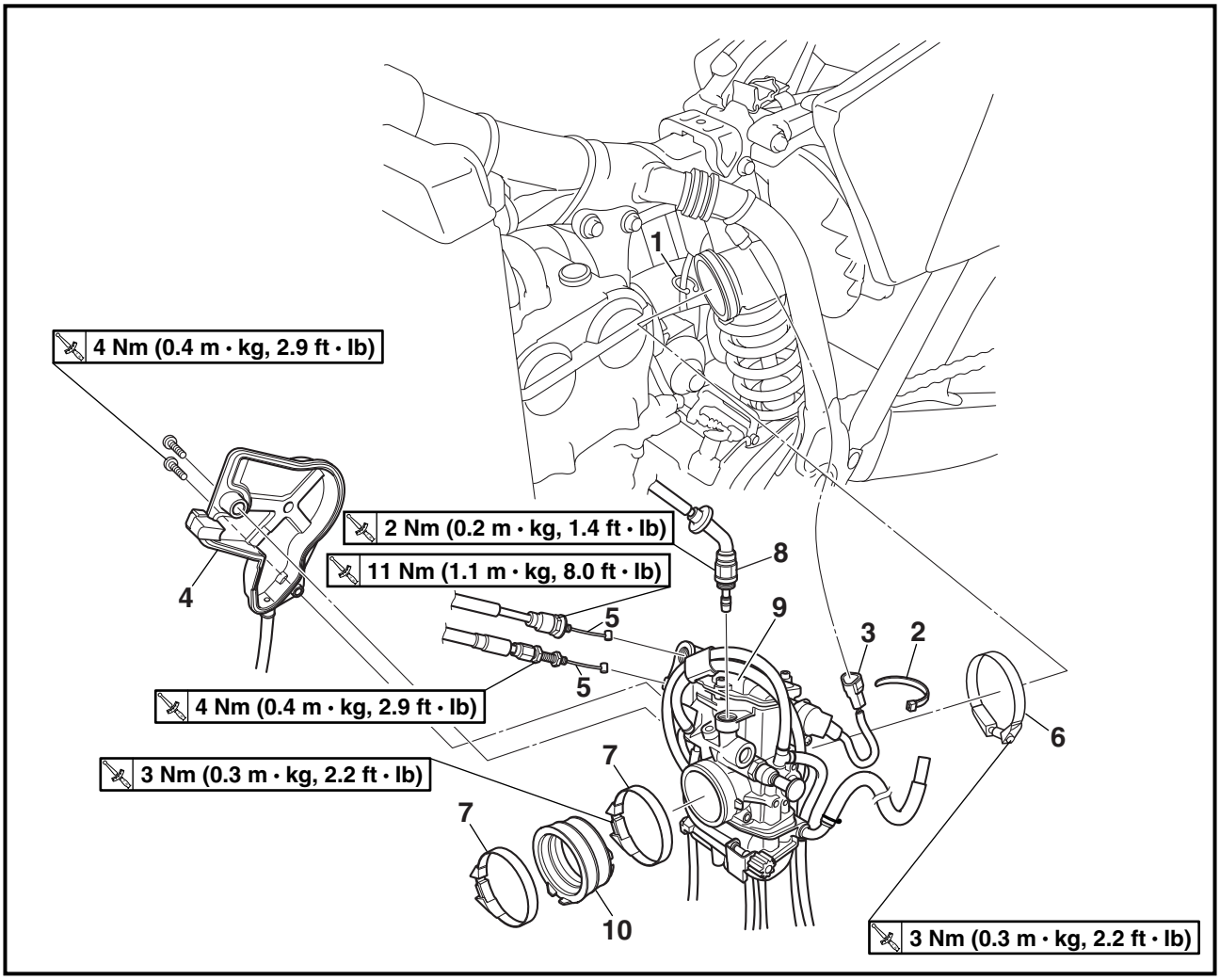


4. Install:
   - Panel ①
   - Bolt (radiator panel upper) ②

   10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Fit the hook ⓐ on the inner side first into the radiator.

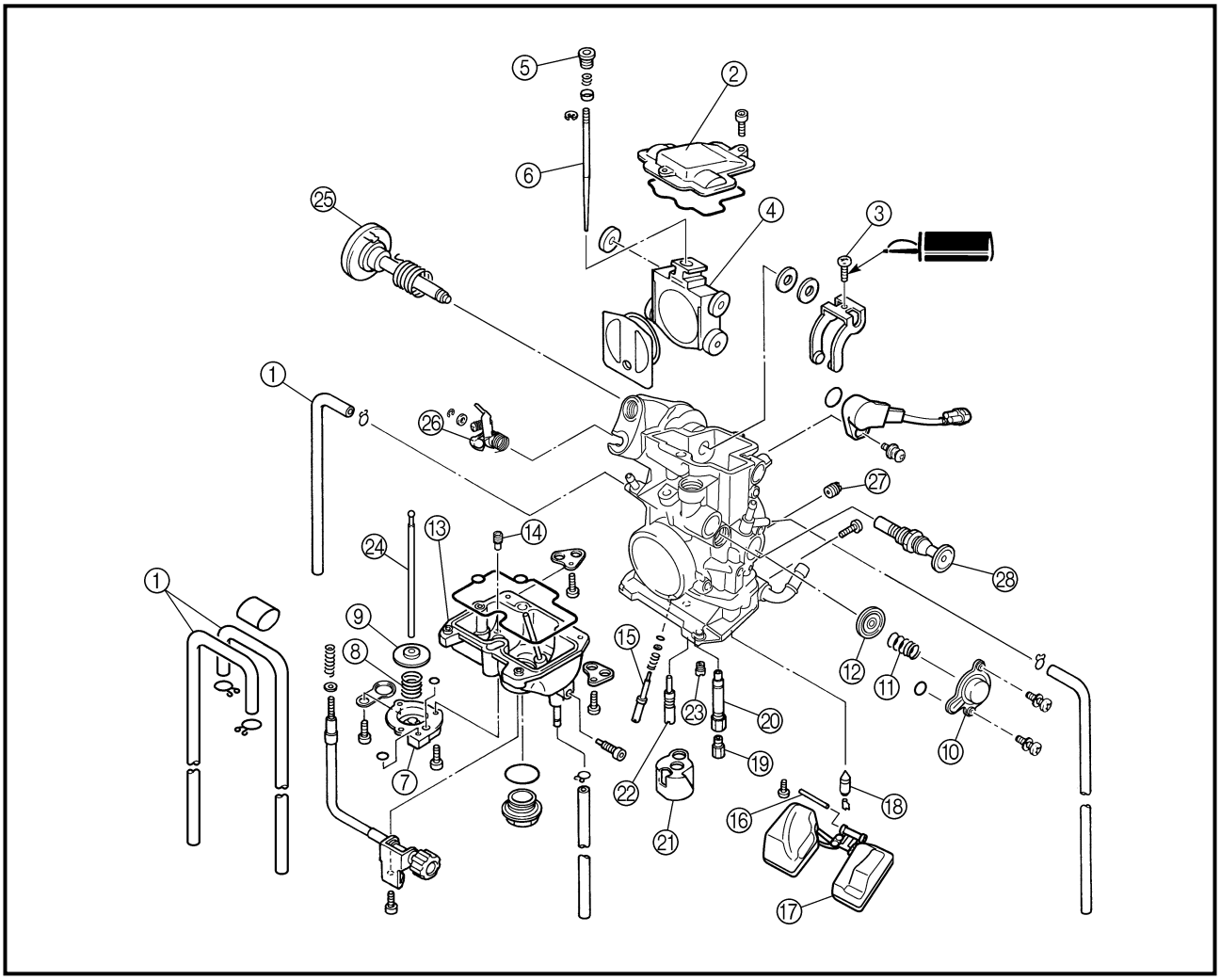
CARBURETOR



Extent of removal: ① Carburetor removal

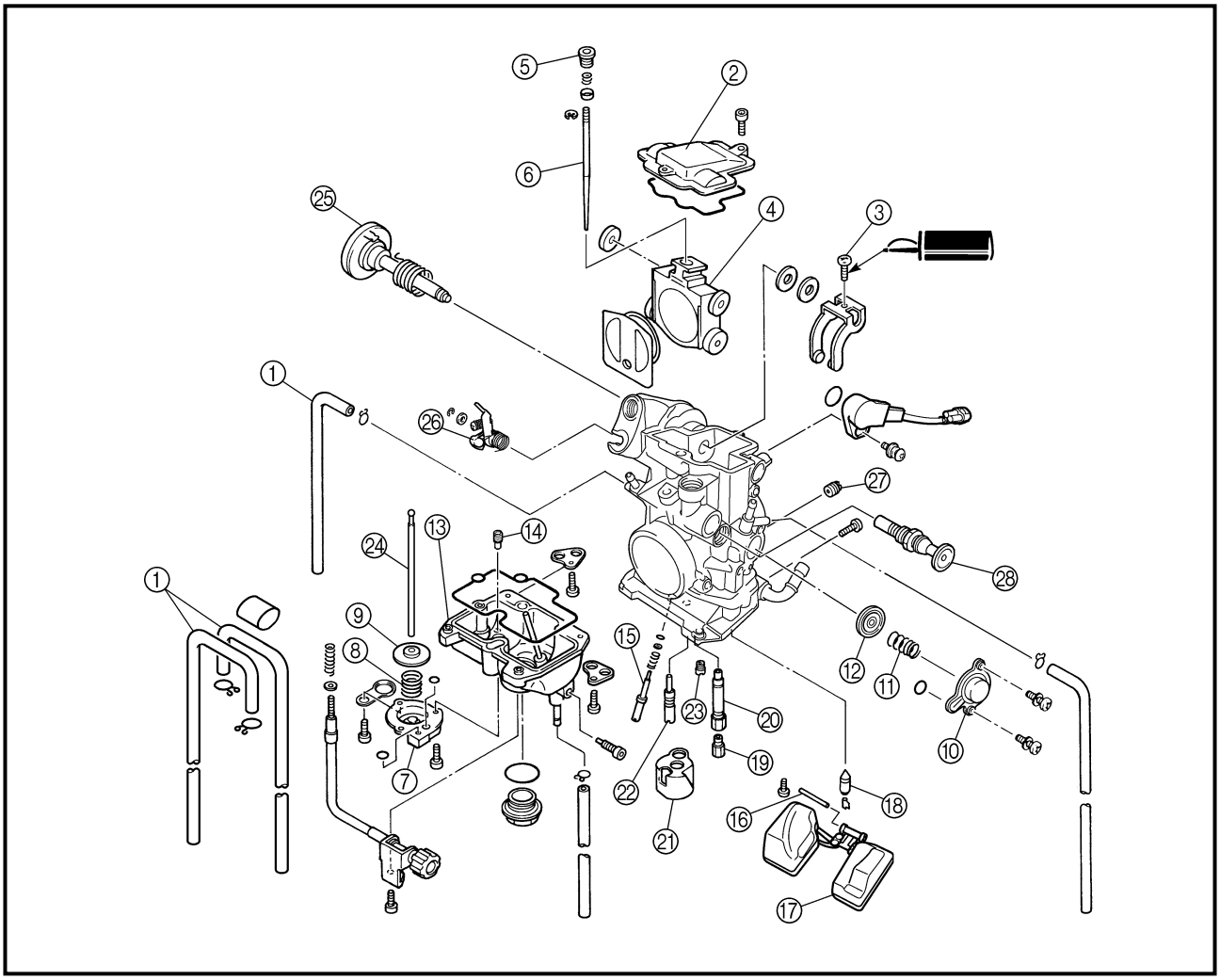
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**CARBURETOR REMOVAL** Fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
①	1	Clamp	1	
	2	Band	1	
	3	TPS coupler	1	
	4	Throttle cable cover	1	
	5	Throttle cable	2	
	6	Clamp (air cleaner joint)	1	Loosen the screw (air cleaner joint).
	7	Clamp (carburetor joint)	2	Loosen the screws (carburetor joint).
	8	Hot starter plunger	1	
	9	Carburetor	1	
	10	Carburetor joint	1	

CARBURETOR DISASSEMBLY

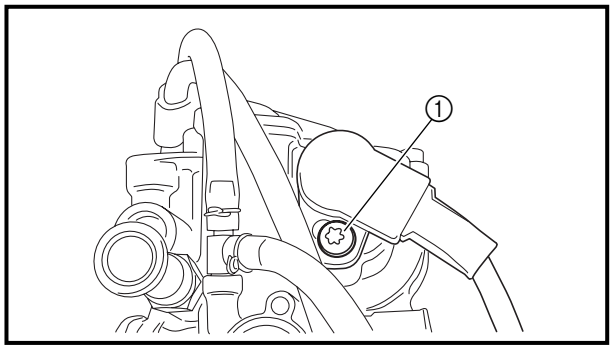


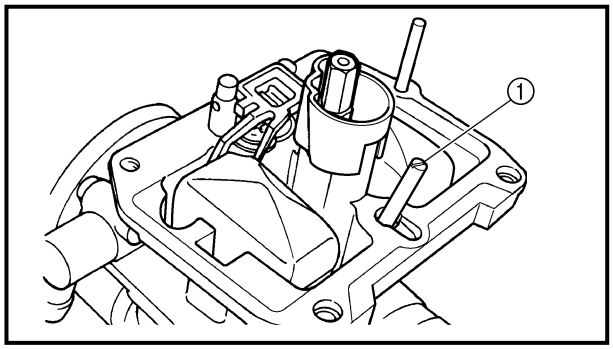
Extent of removal: ① Carburetor disassembly

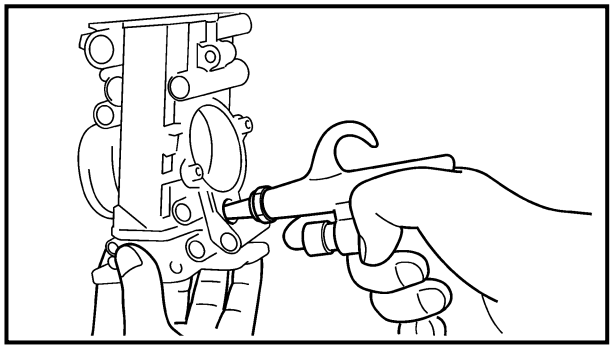
Extent of removal	Order	Part name	Q'ty	Remarks
		CARBURETOR DISASSEMBLY		
①	①	Breather hose	4	
	②	Valve lever housing cover	1	
	③	Screw (throttle shaft)	1	
	④	Throttle valve	1	
	⑤	Needle holder	1	
	⑥	Jet needle	1	
	⑦	Cover	1	
	⑧	Spring	1	
	⑨	Diaphragm (accelerator pump)	1	
	⑩	Air cut valve cover	1	
	⑪	Spring (air cut valve)	1	
	⑫	Diaphragm (air cut valve)	1	
	⑬	Float chamber	1	
	⑭	Leak jet	1	
	⑮	Pilot screw	1	Refer to "REMOVAL POINTS".
	⑯	Float pin	1	
	⑰	Float	1	

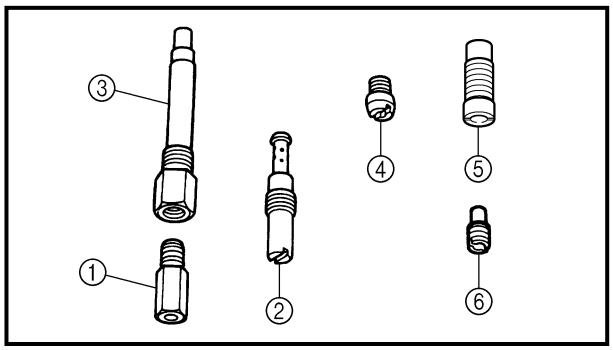


Extent of removal	Order	Part name	Q'ty	Remarks
①	⑱	Needle valve	1	
	⑲	Main jet	1	
	⑳	Needle jet	1	
	㉑	Spacer	1	
	㉒	Pilot jet	1	
	㉓	Starter jet	1	
	㉔	Push rod	1	Pull the push rod.
	㉕	Throttle shaft assembly	1	
	㉖	Push rod link lever assembly	1	
	㉗	Pilot air jet	1	
	㉘	Cold starter plunger	1	









EC466020
HANDLING NOTE

CAUTION:

Do not loosen the screws {TPS (throttle position sensor)} ① except when changing the TPS (throttle position sensor) due to failure because it will cause a drop in engine performance.

REMOVAL POINTS

Pilot screw

1. Remove:
   - Pilot screw ①

NOTE:

To optimize the fuel flow at a small throttle opening, each machine's pilot screw has been individually set at the factory. Before removing the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

INSPECTION

Carburetor

1. Inspect:
   - Carburetor body
     Contamination → Clean.

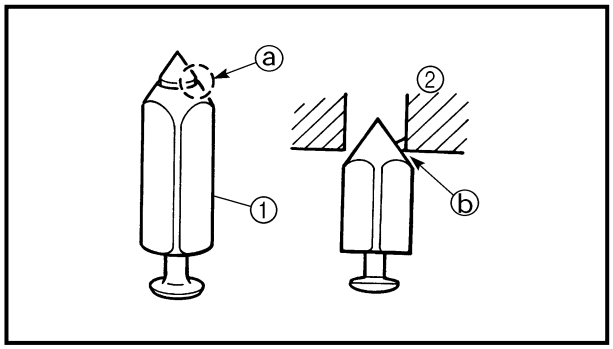
NOTE:

- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.
- Never use a wire.

2. Inspect:
   - Main jet ①
   - Pilot jet ②
   - Needle jet ③
   - Starter jet ④
   - Pilot air jet ⑤
   - Leak jet ⑥
     Damage → Replace.
     Contamination → Clean.

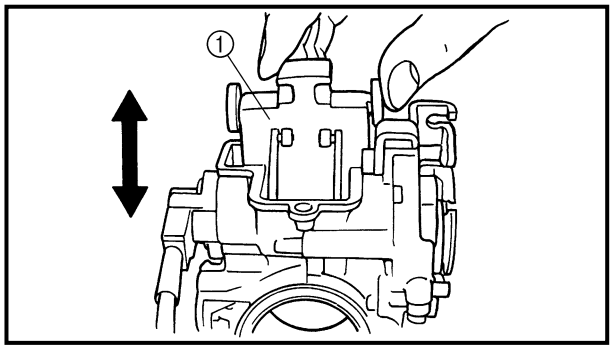
NOTE:

- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.
- Never use a wire.



Needle valve

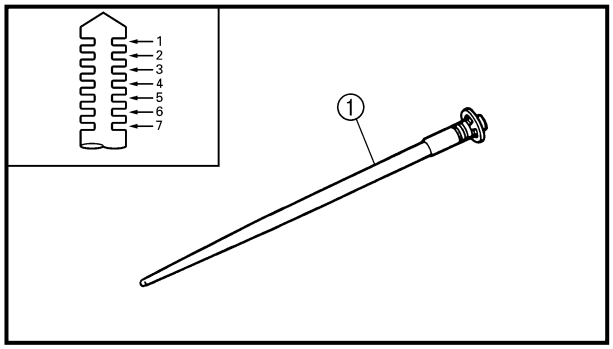
1. Inspect:
   - Needle valve ①
   - Valve seat ②
     Grooved wear ⓐ → Replace.
     Dust ⓑ → Clean.



EC464300

Throttle valve

1. Check:
   - Free movement
     Stick → Repair or replace.
     Insert the throttle valve ① into the carburetor body, and check for free movement.

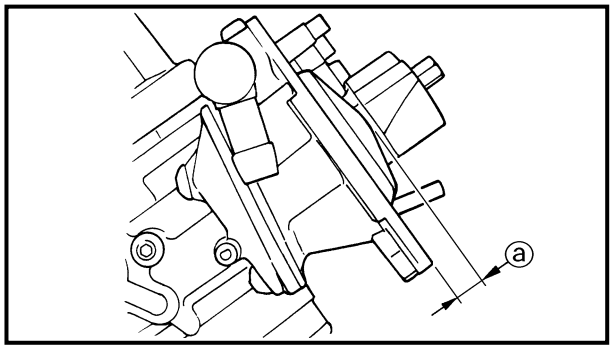


EC464400

Jet needle

1. Inspect:
   - Jet needle ①
     Bends/wear → Replace.
   - Clip groove
     Free play exists/wear → Replace.
   - Clip position

	Standard clip position: **No.4 Groove**



EC464511

Float height

1. Measure:
   - Float height ⓐ
     Out of specification → Adjust.

	Float height: **8.0 mm (0.31 in)**

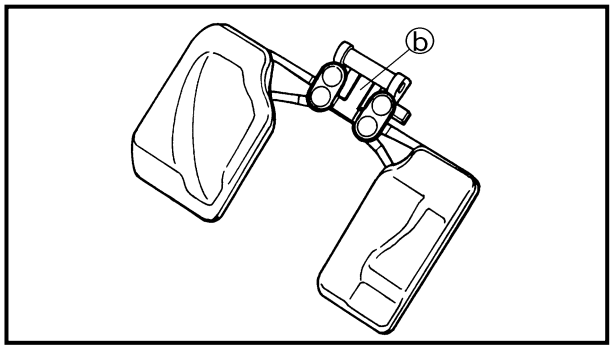
Measurement and adjustment steps:
- Hold the carburetor in an upside down position.

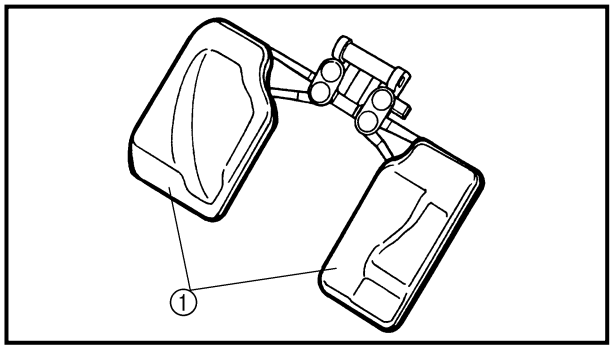
NOTE:
- Slowly tilt the carburetor in the opposite direction, then take the measurement when the needle valve aligns with the float arm.
- If the carburetor is level, the weight of the float will push in the needle valve, resulting in an incorrect measurement.

- Measure the distance between the mating surface of the float chamber and top of the float using a vernier calipers.

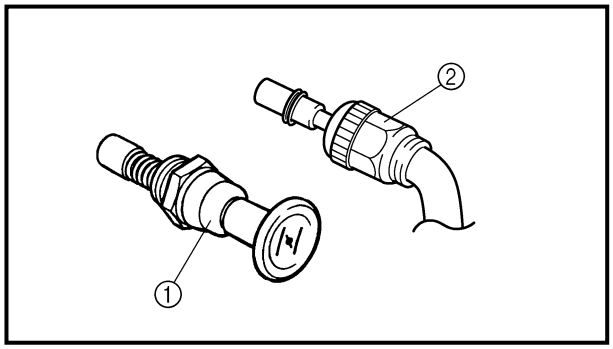
NOTE:
The float arm should be resting on the needle valve, but not compressing the needle valve.

- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tab ⓑ on the float.
- Recheck the float height.

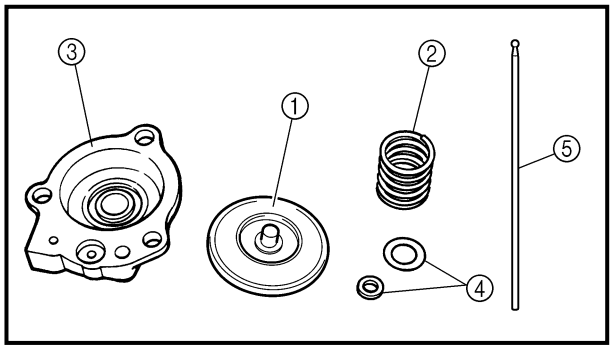




EC464600
Float
1. Inspect:
   - Float ①
     Damage → Replace.



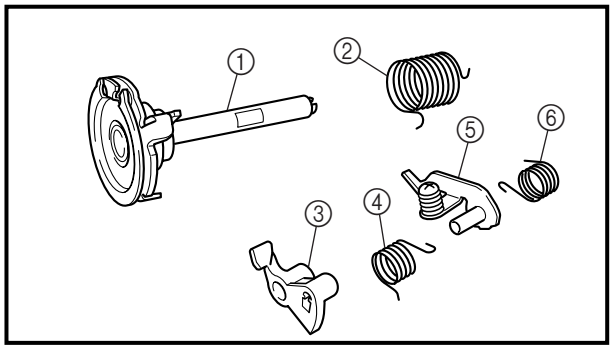
Starter plunger
1. Inspect:
   - Cold starter plunger ①
   - Hot starter plunger ②
     Wear/damage → Replace.



Accelerator pump

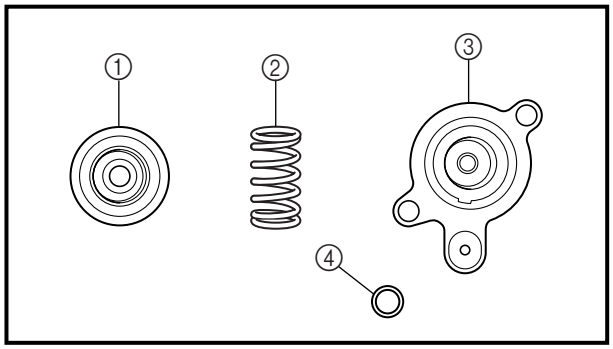
1. Inspect:
   - Diaphragm (accelerator pump) ①
   - Spring ②
   - Cover ③
   - O-ring ④
   - Push rod ⑤

   Tears (diaphragm)/damage → Replace.
   Dirt → Clean.



2. Inspect:
   - Throttle shaft ①
   - Spring ②
   - Lever 1 ③
   - Spring 1 ④
   - Lever 2 ⑤
   - Spring 2 ⑥

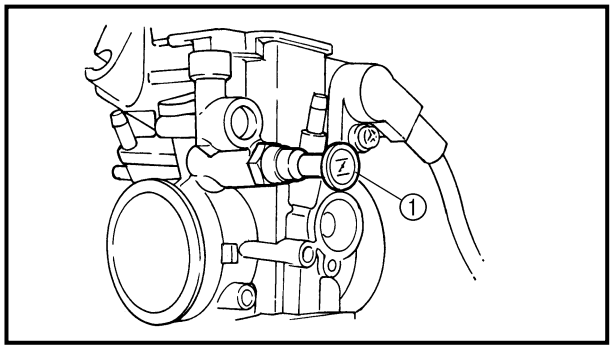
   Dirt → Clean.



Air cut valve

1. Inspect:
   - Diaphragm (air cut valve) ①
   - Spring (air cut valve) ②
   - Air cut valve cover ③
   - O-ring ④

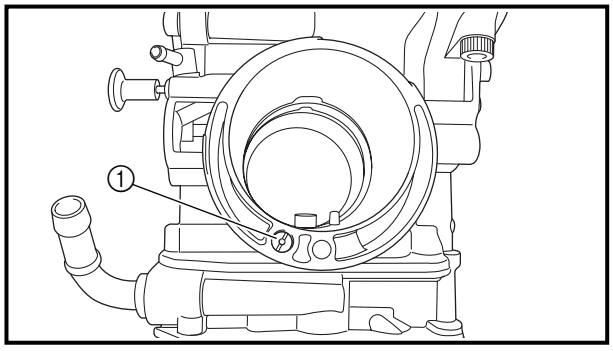
   Tears (diaphragm)/damage → Replace.



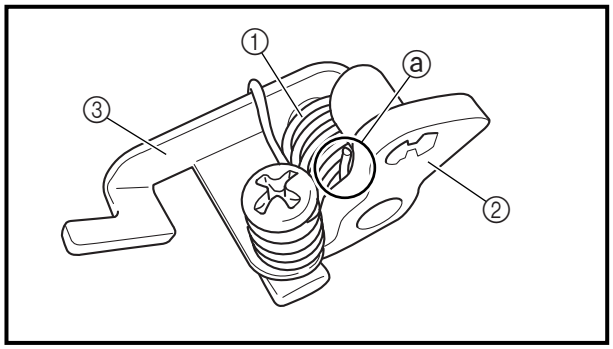
ASSEMBLY AND INSTALLATION

Carburetor

1. Install:
   - Cold starter plunger ①

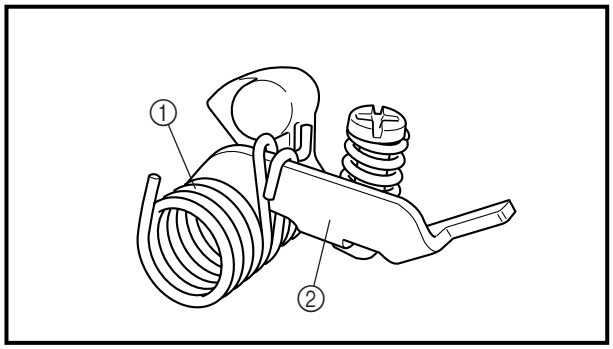


2. Install:
   - Pilot air jet ①

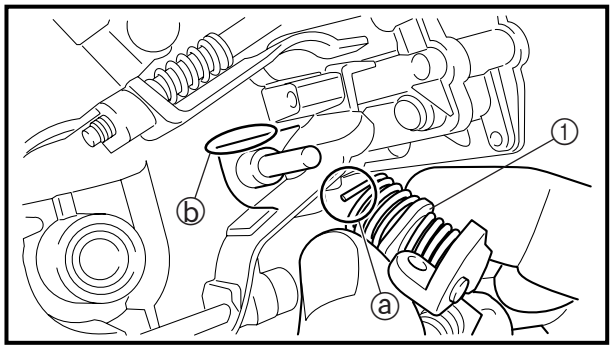


3. Install:
   - Spring 1 ①
   - Lever 1 ②
     To lever 2 ③.

NOTE:
Make sure the spring 1 fits on the stopper ⓐ of the lever 2.

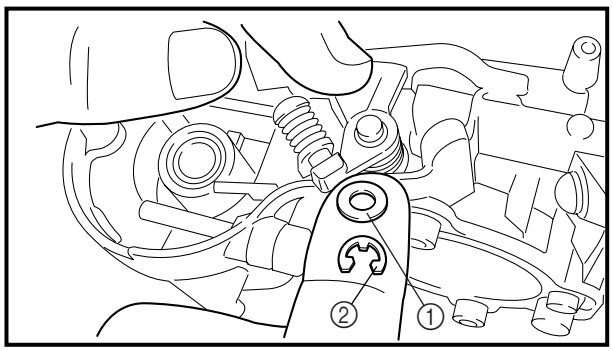


4. Install:
   - Spring 2 ①
     To lever 2 ②.

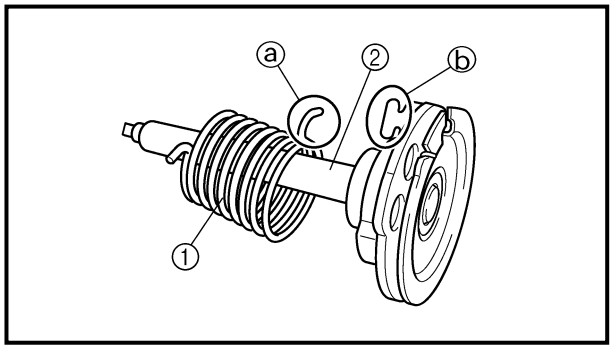


5. Install:
   - Push rod link lever assembly ①

NOTE:
Make sure the stopper ⓐ of the spring 2 fits into the recess ⓑ in the carburetor.

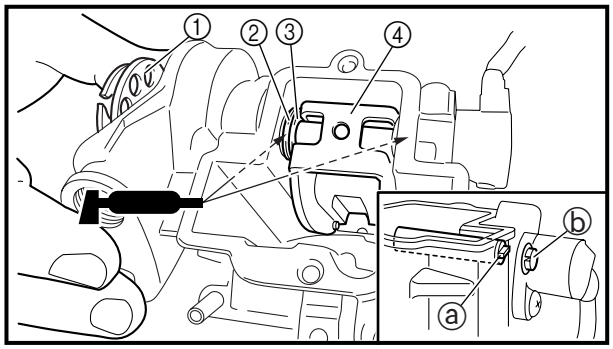


6. Install:
   - Plain washer ①
   - Circlip ②



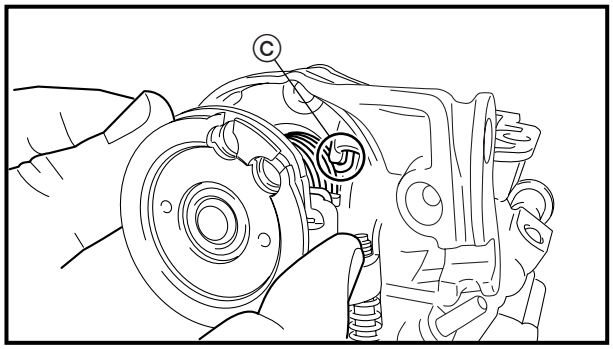
7. Install:
   - Spring ①
     To throttle shaft ②.

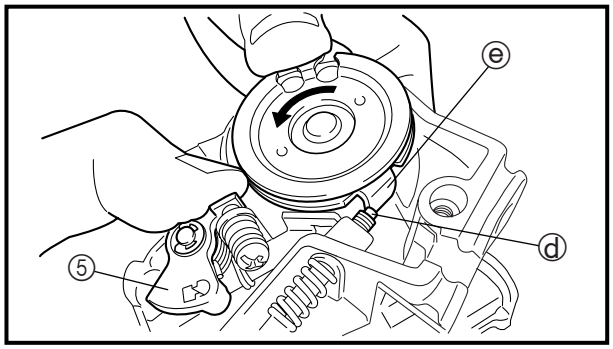
NOTE:
Install the bigger hook ⓐ of the spring fits on the stopper ⓑ of the throttle shaft pulley.

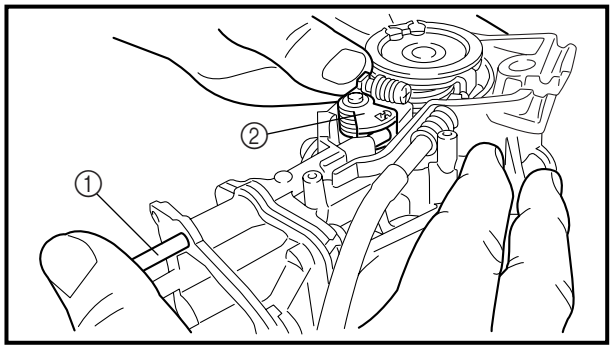


8. Install:
   - Throttle shaft assembly ①
   - Plain washer (metal) ②
   - Plain washer (resin) ③
   - Valve lever ④

NOTE:
- Apply the fluorochemical grease on the bearings.
- Fit the projection ⓐ on the throttle shaft assembly into the slot ⓑ in the TPS (throttle position sensor).
- Make sure the stopper ⓒ of the spring fits into the recess in the carburetor.
- Turn the throttle shaft assembly left while holding down the lever 1 ⑤ and fit the throttle stop screw tip ⓓ to the stopper ⓔ of the throttle shaft assembly pulley.

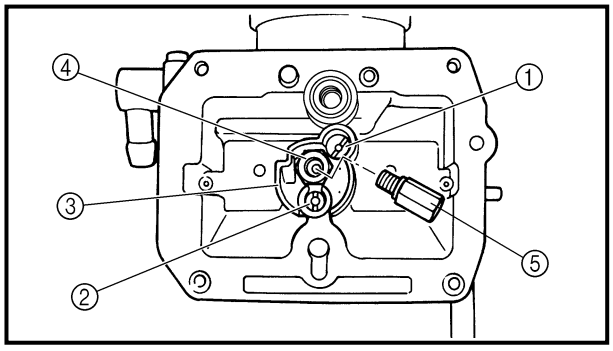




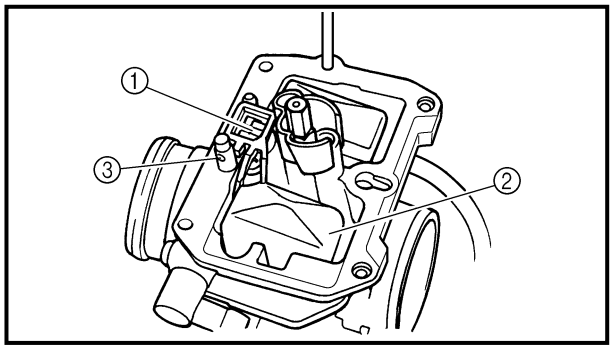


9. Install:
   - Push rod ①

NOTE:
While holding down the lever 1 ②, insert the push rod farthest into the carburetor.

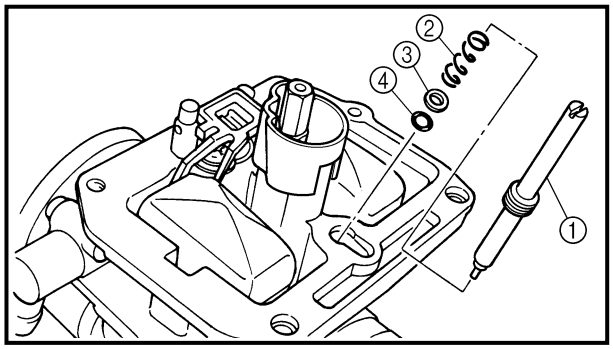


10. Install:
    - Starter jet ①
    - Pilot jet ②
    - Spacer ③
    - Needle jet ④
    - Main jet ⑤



11. Install:
- Needle valve ①
- Float ②
- Float pin ③

NOTE:
- After installing the needle valve to the float, install them to the carburetor.
- Check the float for smooth movement.

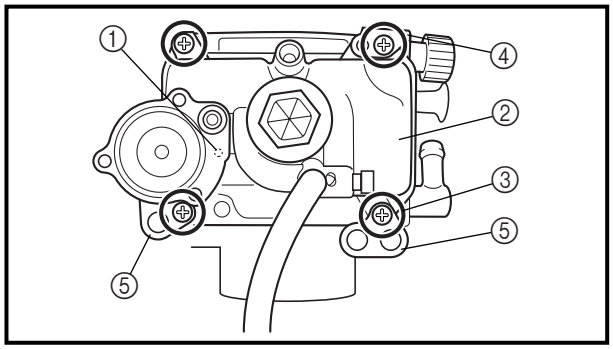


12. Install:
- Pilot screw ①
- Spring ②
- Washer ③
- O-ring ④

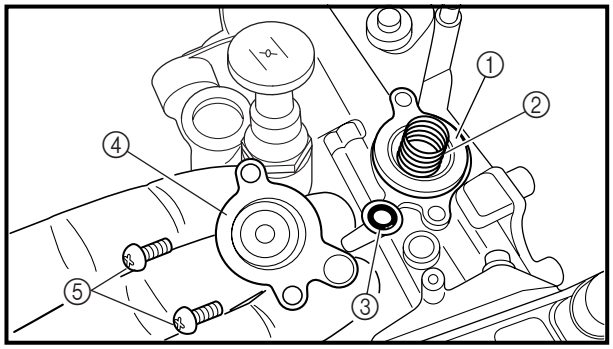
Note the following installation points:
- Turn in the pilot screw until it is lightly seated.
- Turn out the pilot screw by the number of turns recorded before removing.

Pilot screw:
1-3/4 turns out (example)
***1-1/2 turns out (example)**

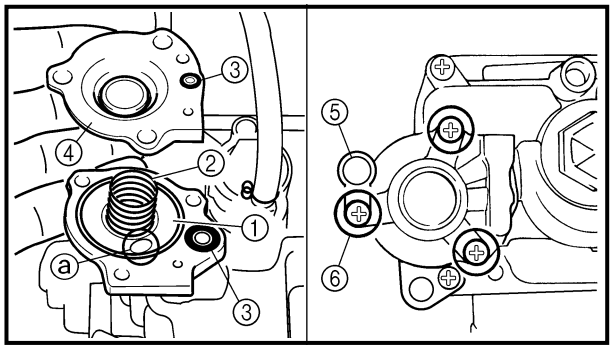
* Except for USA



13. Install:
- O-ring
- Leak jet ①
- Float chamber ②
- Screw (float chamber) ③
- Cable holder (throttle stop screw cable) ④
- Hose holder (carburetor breather hose) ⑤

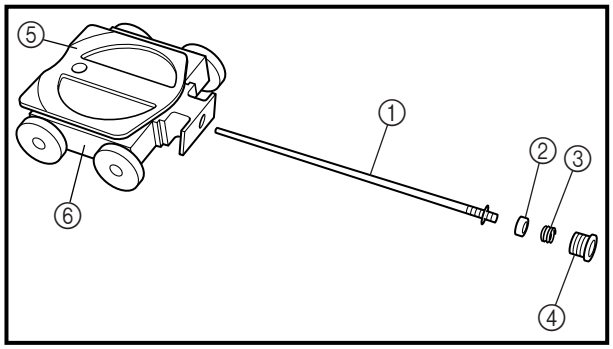


14. Install:
- Diaphragm (air cut valve) ①
- Spring (air cut valve) ②
- O-ring ③
- Air cut valve cover ④
- Screw (air cut valve cover) ⑤

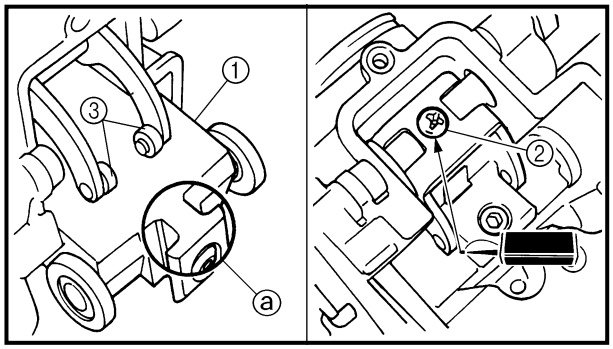


15. Install:
- Diaphragm (accelerator pump) ①
- Spring ②
- O-ring ③
- Cover ④
- Hose holder (drain hose) ⑤
- Screw (cover) ⑥

NOTE:
Install the diaphragm (accelerator pump) with its mark ⓐ facing the spring.

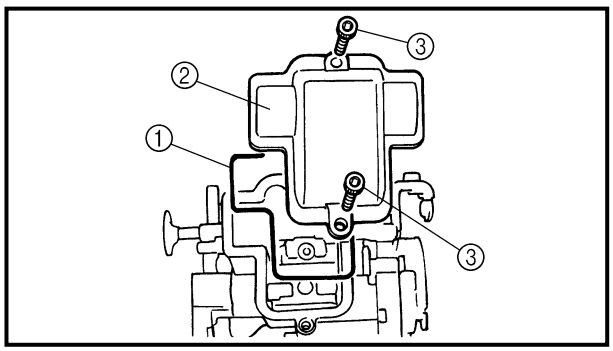


16. Install:
- Jet needle ①
- Collar ②
- Spring ③
- Needle holder ④
- Throttle valve plate ⑤
  To throttle valve ⑥.

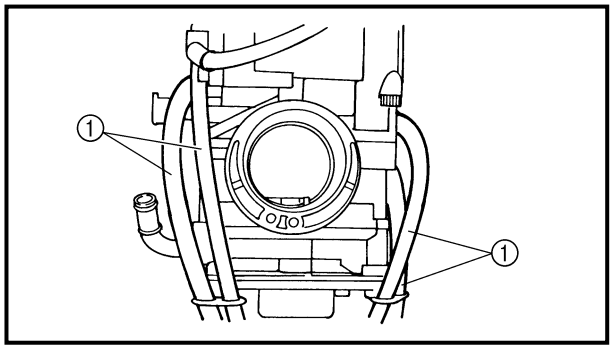


17. Install:
- Throttle valve assembly ①
- Screw (throttle shaft) ②

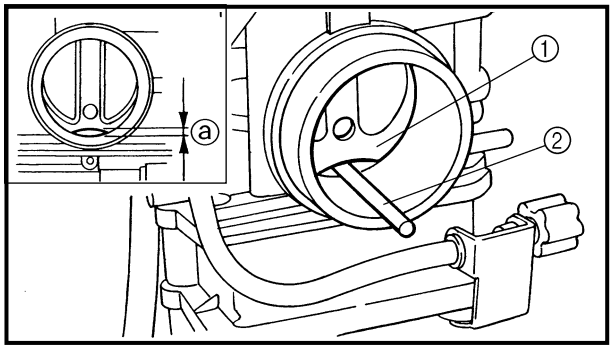
NOTE:
Install the valve lever rollers ③ into the slits ⓐ of the throttle valve.

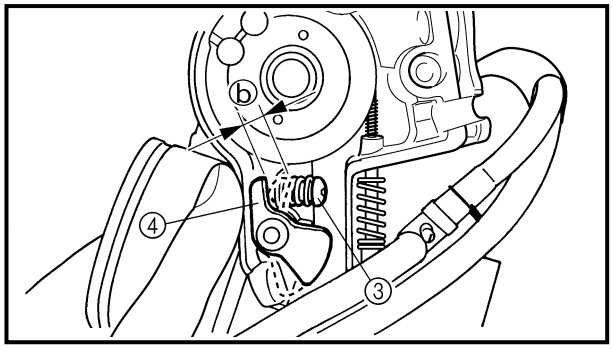


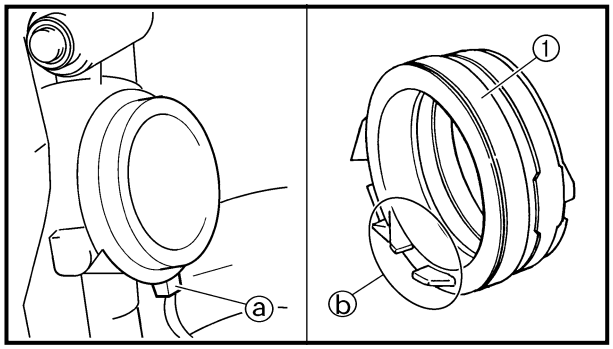
18. Install:
- O-ring ①
- Valve lever housing cover ②
- Bolt (valve lever housing cover) ③

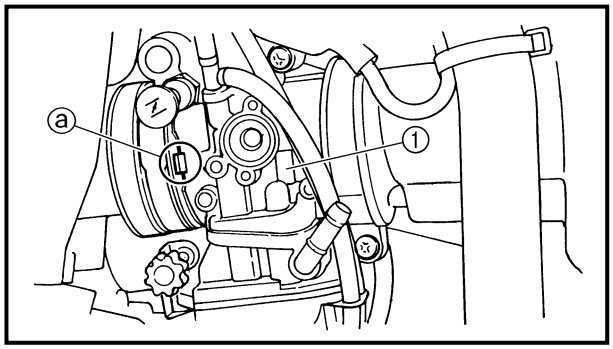


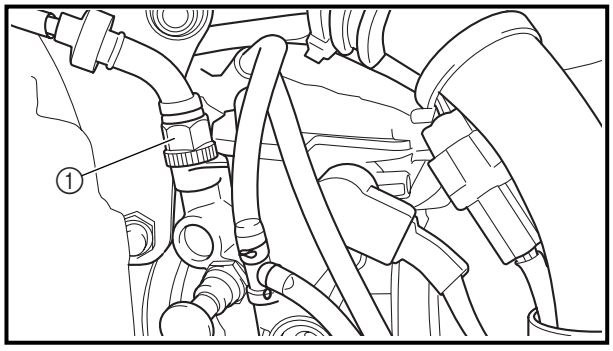
19. Install:
- Carburetor breather hose ①
  Refer to "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.











Accelerator pump timing adjustment

Adjustment steps:

NOTE:
In order for the throttle valve height ⓐ to achieve the specified value, tuck under the throttle valve plate ① the rod ② etc. with the same outer diameter as the specified value.

Throttle valve height:
3.1 mm (0.122 in)

- Fully turn in the accelerator pump adjusting screw ③.
- Check that the link lever ④ has free play ⓑ by pushing lightly on it.
- Gradually turn out the adjusting screw while moving the link lever until it has no more free play.

Carburetor installation

1. Install:
   - Carburetor joint ①

3 Nm (0.3 m · kg, 2.2 ft · lb)

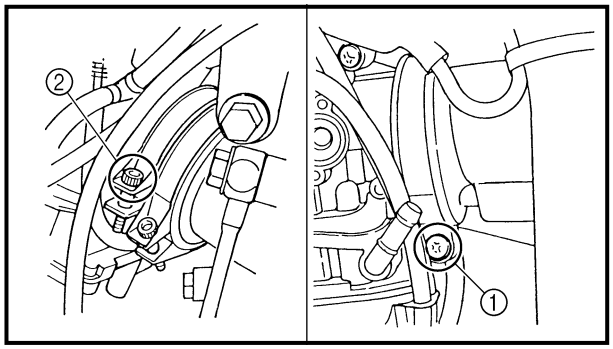
NOTE:
Install the projection ⓐ on the cylinder head between the carburetor joint slots ⓑ.

2. Install:
   - Carburetor ①

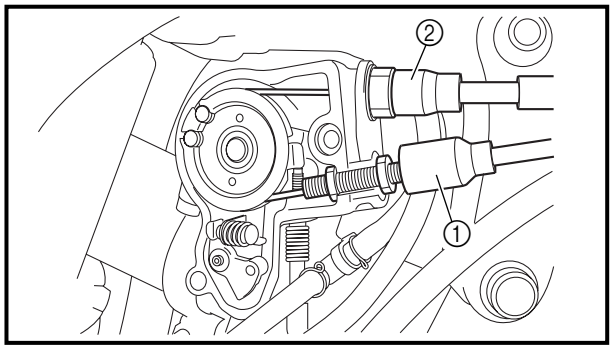
NOTE:
Install the projection ⓐ between the carburetor joint slots.

3. Install:
   - Hot starter plunger ①

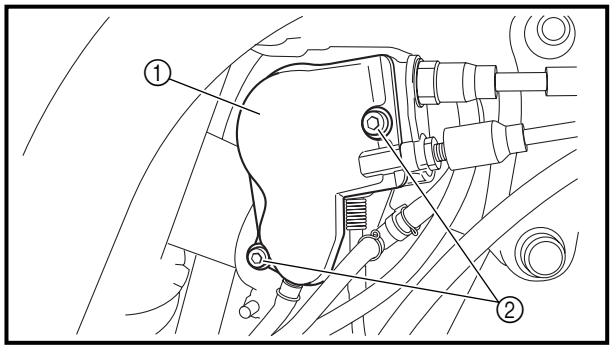
2 Nm (0.2 m · kg, 1.4 ft · lb)



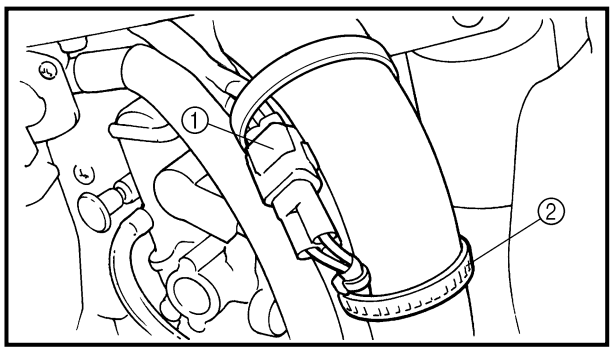
4. Tighten:
   - Screw (air cleaner joint) ①
     3 Nm (0.3 m · kg, 2.2 ft · lb)
   - Screw (carburetor joint) ②
     3 Nm (0.3 m · kg, 2.2 ft · lb)



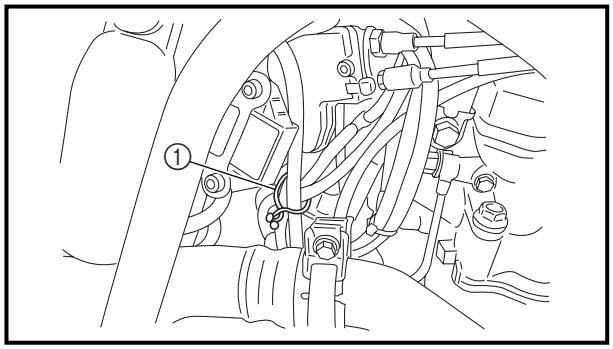
5. Install:
   - Throttle cable (pull) ①
     4 Nm (0.4 m · kg, 2.9 ft · lb)
   - Throttle cable (return) ②
     11 Nm (1.1 m · kg, 8.0 ft · lb)
6. Adjust:
   - Throttle grip free play
     Refer to "THROTTLE CABLE ADJUSTMENT" section in the CHAPTER 3.



7. Install:
   - Throttle cable cover ①
   - Screw (throttle cable cover) ②
     4 Nm (0.4 m · kg, 2.9 ft · lb)

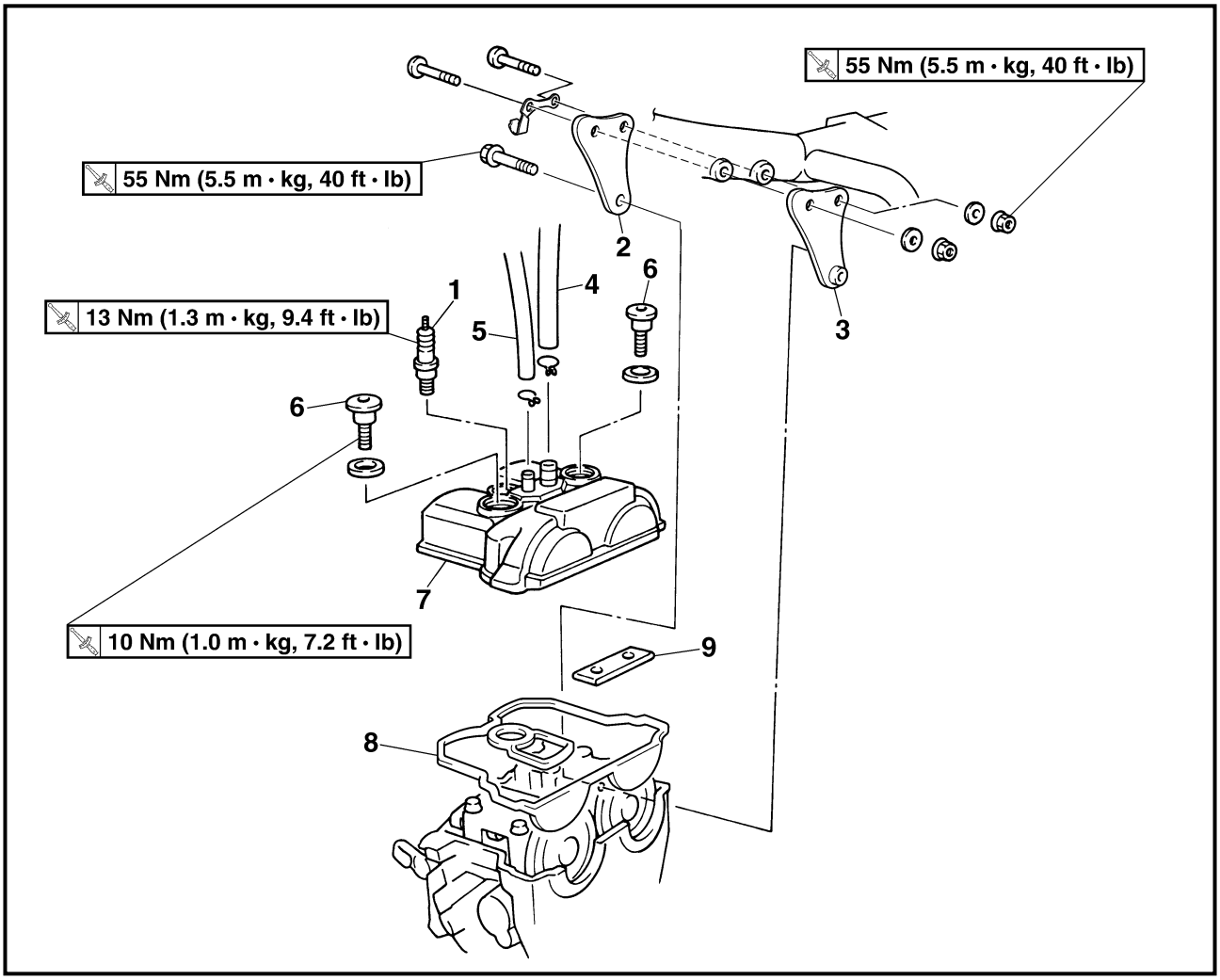


8. Install:
   - TPS (throttle position sensor) coupler ①
   - Clamp ②
     Refer to "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.



9. Install:
   - Clamp ①
     Refer to "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.

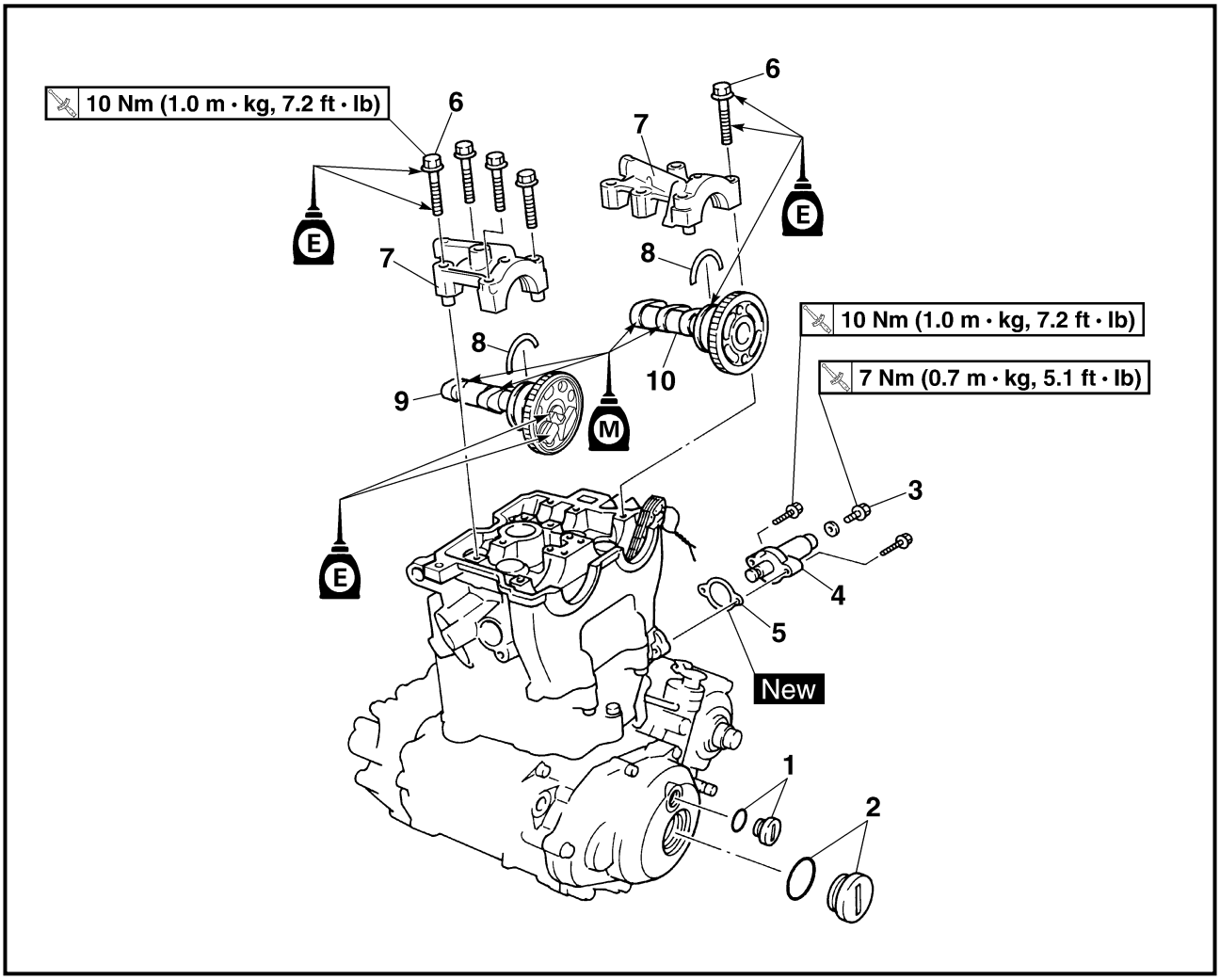
CAMSHAFTS
CYLINDER HEAD COVER



Extent of removal: ① Cylinder head cover removal

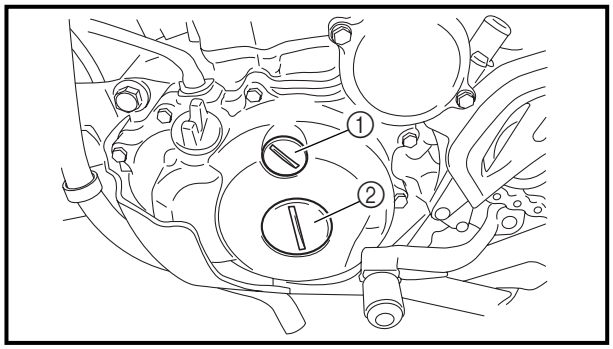
Extent of removal	Order	Part name	Q'ty	Remarks
		CYLINDER HEAD COVER REMOVAL		
Preparation for removal		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Carburetor		Refer to "CARBURETOR" section.
①	1	Spark plug	1	
	2	Engine upper bracket (right)	1	
	3	Engine upper bracket (left)	1	
	4	Cylinder head breather hose	1	
	5	Oil tank breather hose	1	
	6	Bolt (cylinder head cover)	2	
	7	Cylinder head cover	1	
	8	Gasket	1	
	9	Timing chain guide (upper)	1	

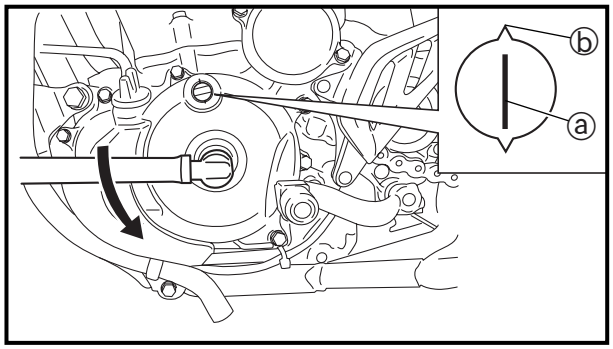
CAMSHAFTS

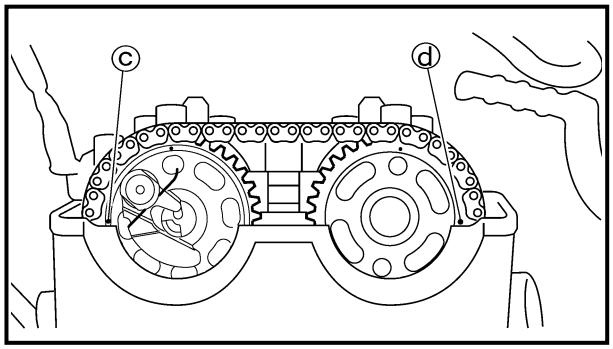


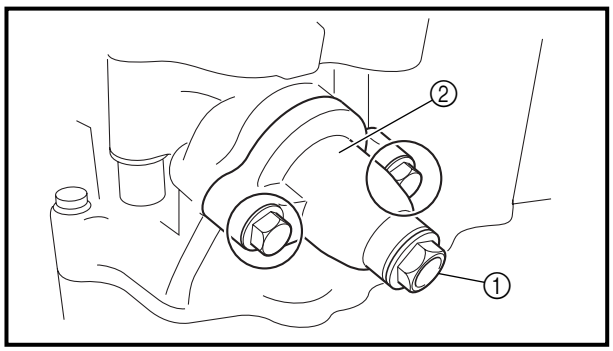
Extent of removal: ① Camshaft removal

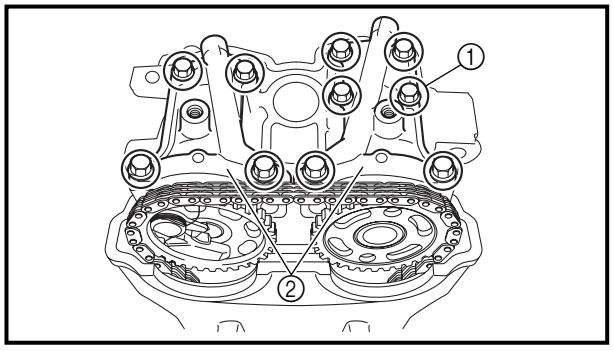
Extent of removal	Order	Part name	Q'ty	Remarks
		CAMSHAFTS REMOVAL		
①	1	Timing plug	1	Refer to "REMOVAL POINTS".
	2	Straight plug	1	
	3	Tensioner cap bolt	1	
	4	Timing chain tensioner	1	
	5	Gasket	1	
	6	Bolt (camshaft cap)	10	
	7	Camshaft cap	2	
	8	Clip	2	
	9	Exhaust camshaft	1	
	10	Intake camshaft	1	











REMOVAL POINTS

Camshaft

1. Remove:
   - Timing plug ①
   - Straight plug ②
2. Align:
   - "I" mark
     With stationary pointer.

Checking steps:

- Turn the crankshaft counterclockwise with a wrench.
- Align the "I" mark ⓐ on the rotor with the stationary pointer ⓑ on the crankcase cover. When the "I" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (T.D.C.).

NOTE:

- In order to be sure that the piston is at Top Dead Center, the punch mark ⓒ on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.

3. Loosen:
   - Tensioner cap bolt ①
4. Remove:
   - Timing chain tensioner ②

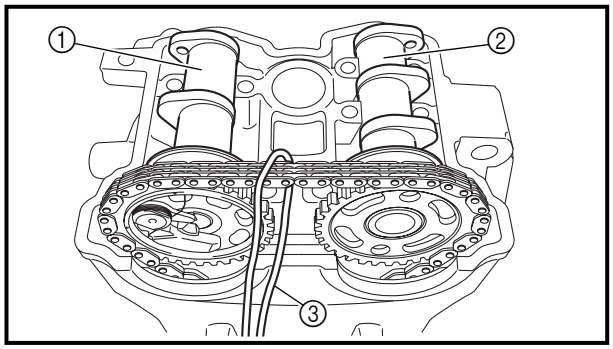
5. Remove:
   - Bolt (camshaft cap) ①
   - Camshaft caps ②

NOTE:

Remove the bolts (camshaft cap) in a criss-cross pattern, working from the outside in.

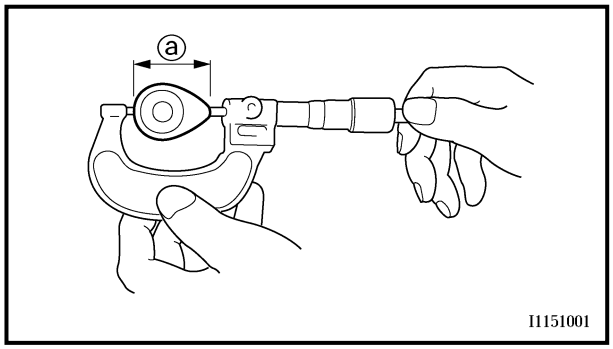
CAUTION:

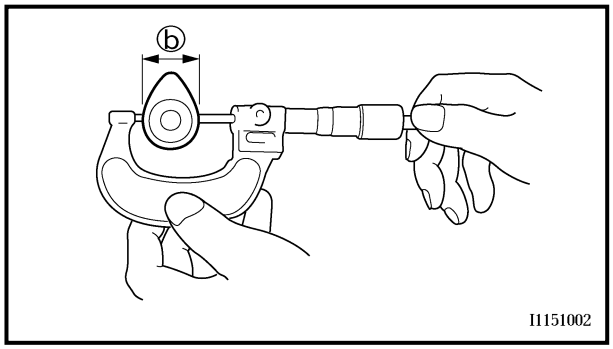
The bolts (camshaft cap) must be removed evenly to prevent damage to the cylinder head, camshafts or camshaft caps.



6. Remove:
   - Clips
   - Exhaust camshaft ①
   - Intake camshaft ②

NOTE:
Attach a wire ③ to the timing chain to prevent it from falling into the crankcase.



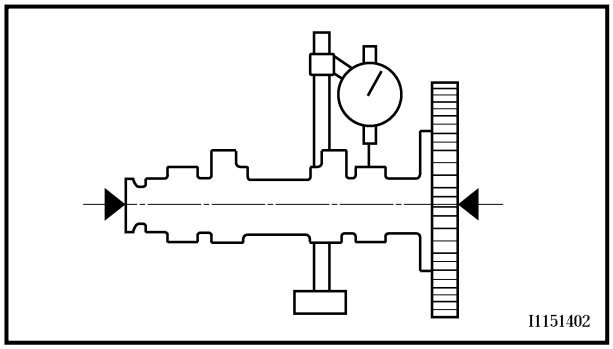


INSPECTION

Camshaft

1. Inspect:
   - Cam lobes
     Pitting/scratches/blue discoloration → Replace.
2. Measure:
   - Cam lobes length ⓐ and ⓑ
     Out of specification → Replace.

Cam lobes length:
Intake:
ⓐ 31.200 ~ 31.300 mm (1.2283 ~ 1.2323 in)
<Limit>: 31.100 mm (1.2244 in)
ⓑ 22.550 ~ 22.650 mm (0.8878 ~ 0.8917 in)
<Limit>: 22.450 mm (0.8839 in)
Exhaust:
ⓐ 30.950 ~ 31.050 mm (1.2185 ~ 1.2224 in)
<Limit>: 30.850 mm (1.2146 in)
ⓑ 22.494 ~ 22.594 mm (0.8856 ~ 0.8895 in)
<Limit>: 22.394 mm (0.8817 in)

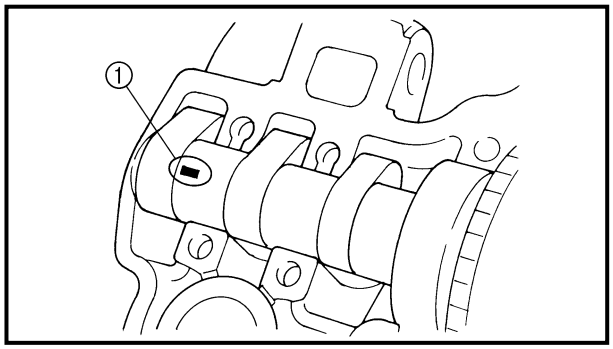


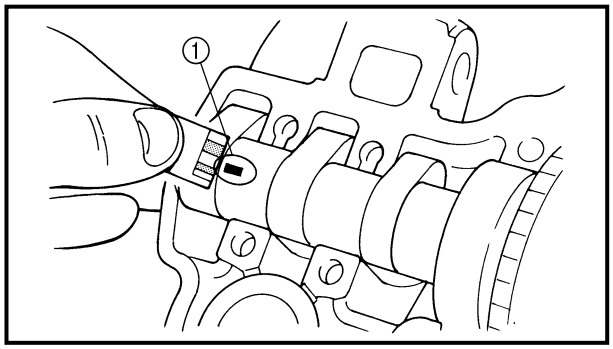
3. Measure:
   - Runout (camshaft)
     Out of specification → Replace.

Runout (camshaft):
Less than 0.03 mm (0.0012 in)

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

Camshaft-to-cap clearance:
0.020 ~ 0.054 mm
(0.0008 ~ 0.0021 in)
<Limit>: 0.08 mm (0.003 in)



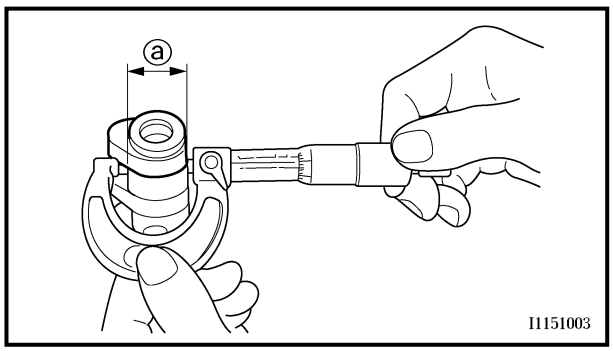


Measurement steps:
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the circlip, dowel pins and camshaft caps.

Bolt (camshaft cap):
10 Nm (1.0 m • kg, 7.2 ft • lb)

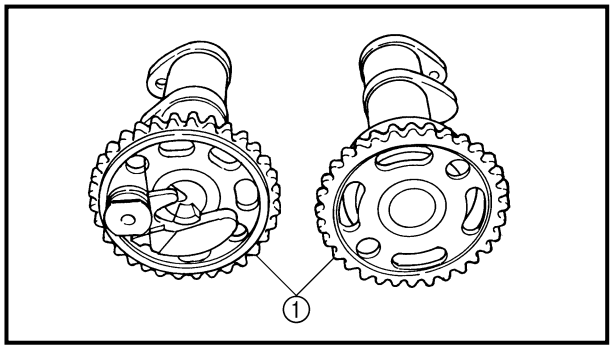
NOTE:
- Tighten the bolts (camshaft cap) in a criss-cross pattern from innermost to outer caps.
- Do not turn the camshaft when measuring clearance with the Plastigauge®.

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



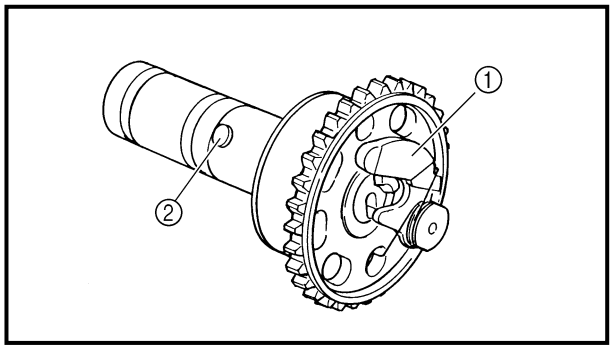
5. Measure:
   - Camshaft journal diameter ⓐ
     Out of specification → Replace the camshaft.
     Within specification → Replace camshaft case and camshaft caps as a set.

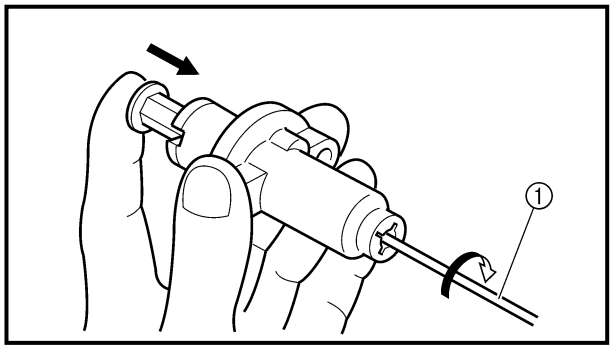
Camshaft journal diameter:
21.967 ~ 21.980 mm
(0.8648 ~ 0.8654 in)

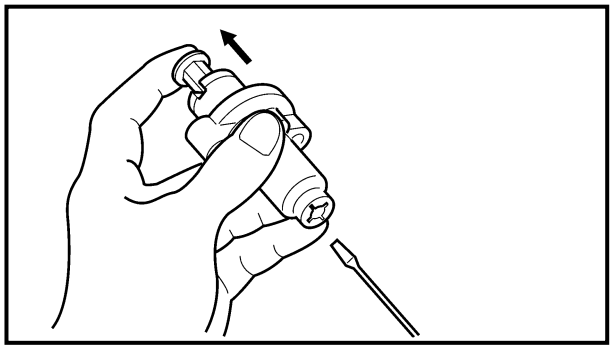


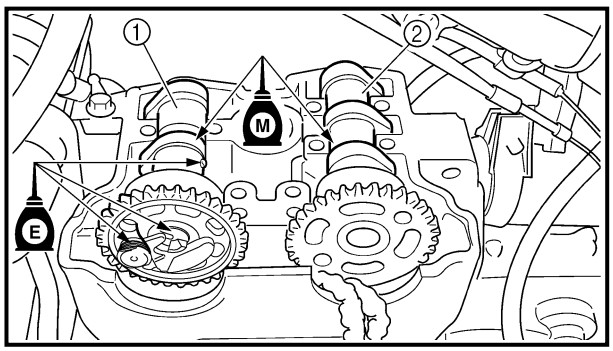
Camshaft sprocket

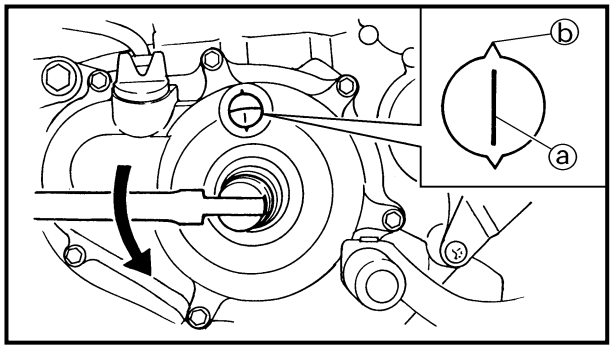
1. Inspect:
   - Camshaft sprocket ①
     Wear/damage → Replace the camshaft assembly and timing chain as a set.











Decompression system

1. Check:
   - Decompression system

Checking steps:
- Check that the decompressor cam ① moves smoothly.
- Check that the decompressor lever pin ② projects from the camshaft.

Timing chain tensioner

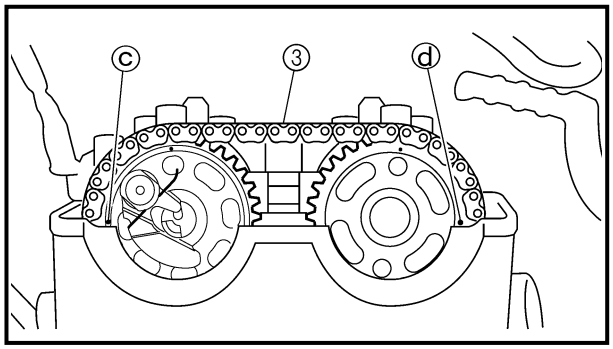
1. Check:
   - While pressing the tensioner rod lightly with fingers, use a thin screwdriver ① and wind the tensioner rod up fully clockwise.
   - When releasing the screwdriver by pressing lightly with fingers, make sure that the tensioner rod will come out smoothly.
   - If not, replace the tensioner assembly.

ASSEMBLY AND INSTALLATION

1. Install:
   - Exhaust camshaft ①
   - Intake camshaft ②

Installation steps:
- Turn the crankshaft counterclockwise until the "I" mark ⓐ on the rotor is aligned with the stationary pointer ⓑ on the crankcase cover.

NOTE:
- Apply the molybdenum disulfide oil on the camshafts.
- Apply the engine oil on the decompression system.



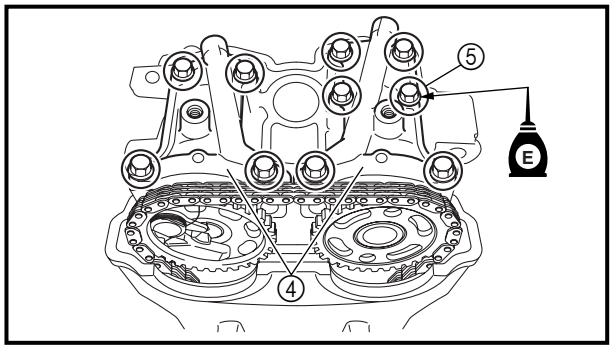
- Fit the timing chain ③ onto both camshaft sprockets and install the camshafts on the cylinder head.

NOTE:
The camshafts should be installed onto the cylinder head so that the exhaust cam sprocket punch mark ⓒ and the intake cam sprocket punch mark ⓓ align with the surface of the cylinder head.

CAUTION:
Do not turn the crankshaft during the camshaft installation. Damage or improper valve timing will result.

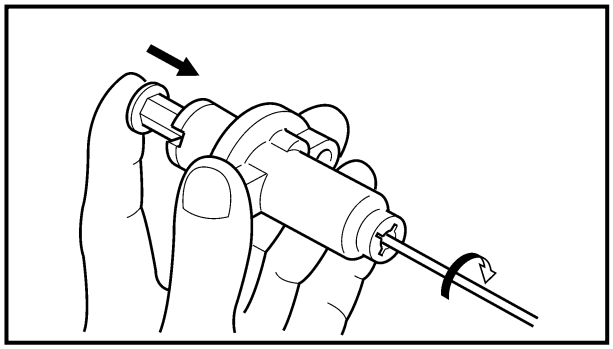
- Install the clips and camshaft caps ④.

Bolt (camshaft cap):
10 Nm (1.0 m • kg, 7.2 ft • lb)



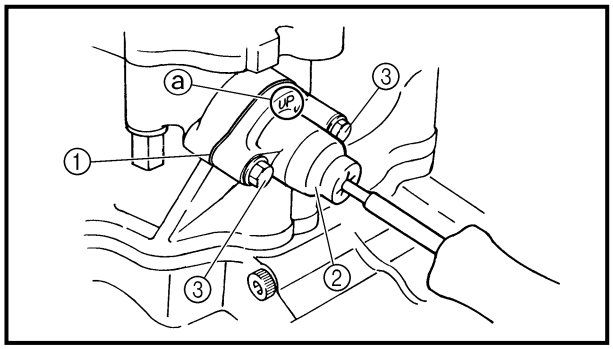
NOTE:
- Apply the engine oil on the thread and contact surface of the bolts (camshaft cap) ⑤.
- Tighten the bolts (camshaft cap) in a criss-cross pattern.

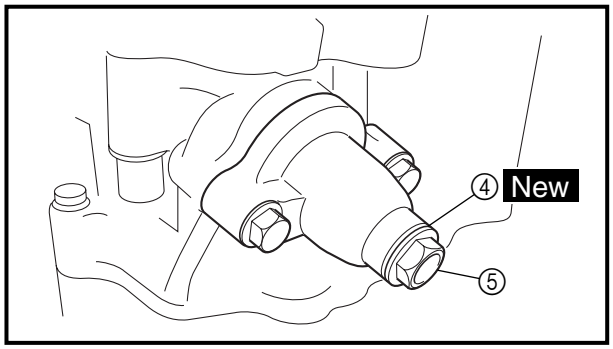
CAUTION:
The bolts (camshaft cap) must be tightened evenly, or damage to the cylinder head, camshaft caps, and camshaft will result.



2. Install:
   - Timing chain tensioner

Installation steps:
- While pressing the tensioner rod lightly with fingers, use a thin screwdriver and wind the tensioner rod up fully clockwise.





- With the rod fully wound and the chain tensioner UP mark ⓐ facing upward, install the gasket ① and the chain tensioner ②, and tighten the bolt ③ to the specified torque.

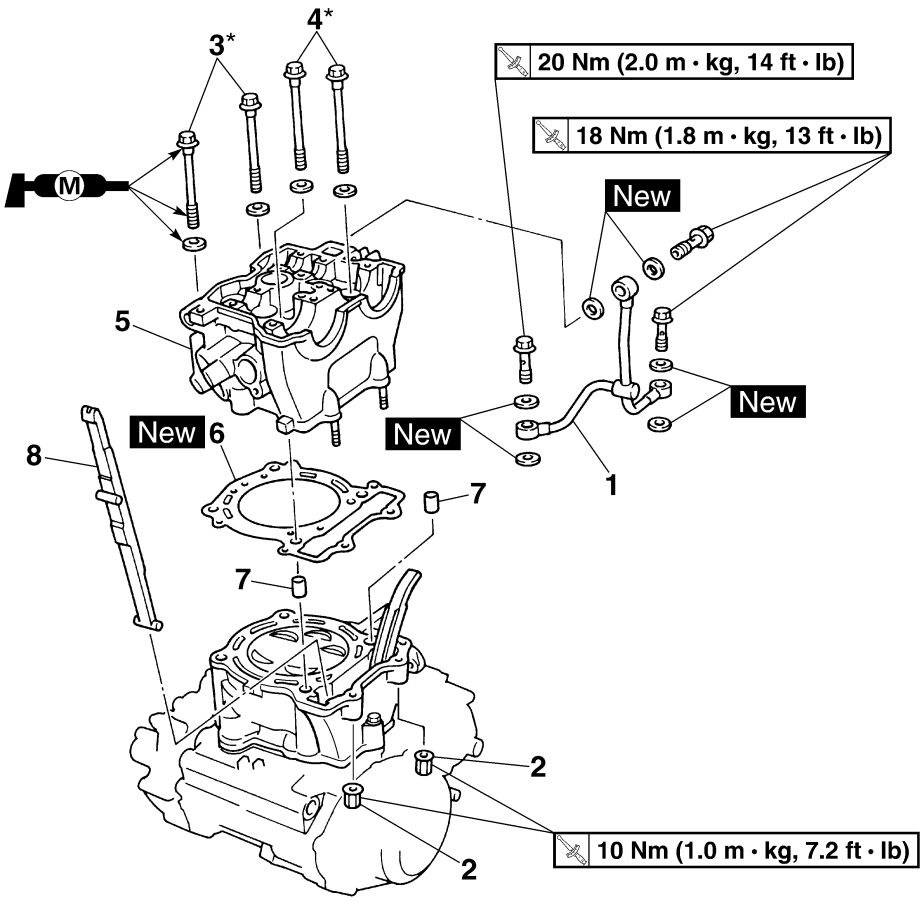
Bolt (timing chain tensioner):
10 Nm (1.0 m • kg, 7.2 ft • lb)

- Release the screwdriver, check the tensioner rod to come out and tighten the gasket ④ and the cap bolt ⑤ to the specified torque.

Tensioner cap bolt:
7 Nm (0.7 m • kg, 5.1 ft • lb)

3. Turn:
   - Crankshaft
     Counterclockwise several turns
4. Check:
   - Rotor “I” mark
     Align with the crankcase stationary pointer.
   - Camshaft match marks
     Align with the cylinder head surface.
     Out of alignment → Adjust.

CYLINDER HEAD
CYLINDER HEAD

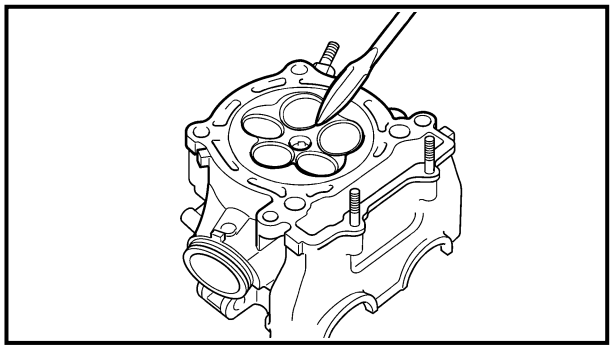


Extent of removal: ① Cylinder head removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**CYLINDER HEAD REMOVAL** Seat and fuel tank Exhaust pipe and silencer Radiator Carburetor Camshaft		 Refer to "SEAT, FUEL TANK AND SIDE COVERS" section. Refer to "EXHAUST PIPE AND SILENCER" section. Refer to "RADIATOR" section. Refer to "CARBURETOR" section. Refer to "CAMSHAFTS" section.
①	1 2 3* 4* 5 6 7 8	Oil delivery pipe Nut Bolt (L = 150 mm) Bolt (L = 160 mm) Cylinder head Gasket Dowel pin Timing chain guide (front)	1 2 2 2 1 1 2 1	 Refer to NOTE.

NOTE:

Tighten the cylinder head bolts to 30 Nm (3.0 m · kg, 22 ft · lb) in the proper tightening sequence, remove and retighten the cylinder head bolts to 20 Nm (2.0 m · kg, 14 ft · lb) in the proper tightening sequence, and then tighten the cylinder head bolts further to reach the specified angle 180˚ in the proper tightening sequence.



INSPECTION

Cylinder head

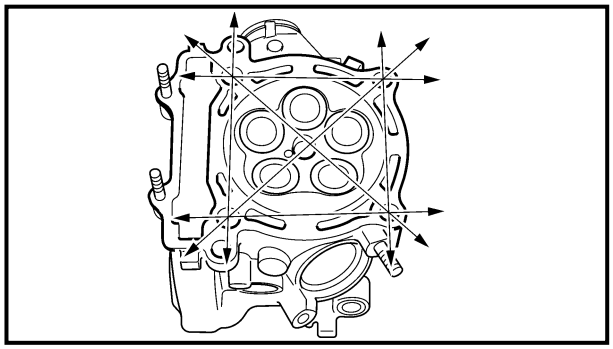
1. Eliminate:
   - Carbon deposits (from the combustion chambers)
     Use a rounded scraper.

NOTE:

Do not use a sharp instrument to avoid damaging or scratching:

- Spark plug threads
- Valve seats

2. Inspect:
   - Cylinder head
     Scratches/damage → Replace.



3. Measure:
   - Cylinder head warpage
     Out of specification → Resurface.

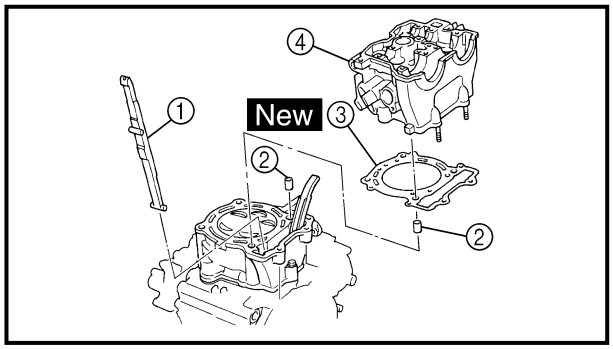
Cylinder head warpage:
Less than 0.05 mm (0.002 in)

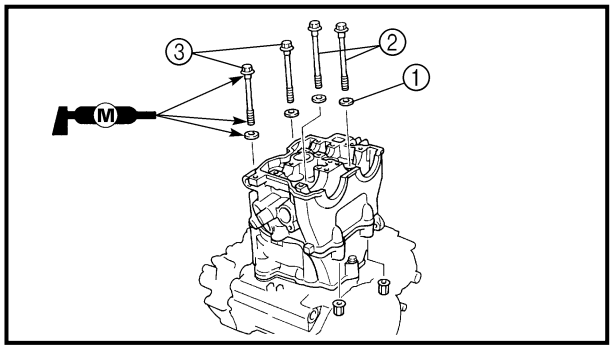
Warpage measurement and resurfacement steps:

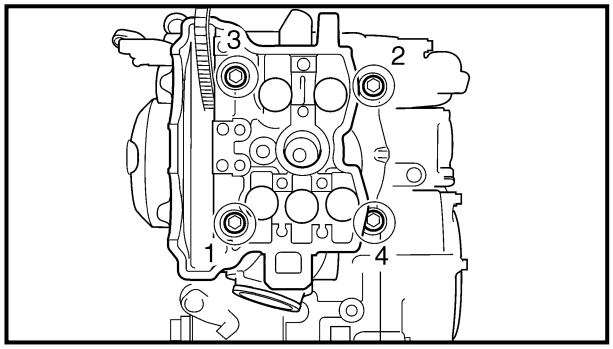
- Place a straightedge and a feeler gauge across the cylinder head.
- Use a feeler gauge to measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

NOTE:

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







ASSEMBLY AND INSTALLATION

1. Install:
   - Timing chain guide (front) ①
   - Dowel pin ②
   - Cylinder head gasket ③ New
   - Cylinder head ④

NOTE:
While pulling up the timing chain, install the timing chain guide (front) and cylinder head.

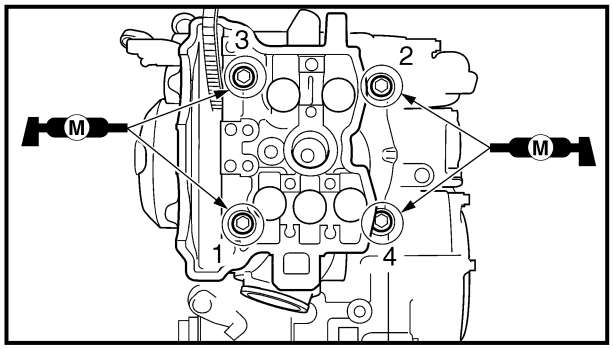
2. Install:
   - Plain washer ①
   - Bolt [L=160 mm (6.30 in)] ②
   - Bolt [L=150 mm (5.91 in)] ③

Installation steps:

CAUTION:
Tighten the cylinder head using the rotation angle procedure to obtain uniform tightening torque.

- Wash the threads and contact surfaces of the bolts, the contact surfaces of the plain washers, the contact surface of the cylinder head, and the threads of the crankcase.
- Apply the molybdenum disulfide grease on the threads and contact surfaces of the bolts and on both contact surfaces of the plain washers.
- Install the plain washers and bolts.
- Tighten the bolts to the specified torque in two or three steps in the proper tightening sequence as shown.

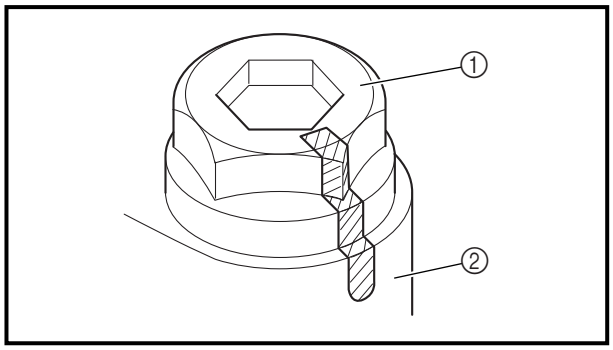
Bolts (cylinder head):
1st:
30 Nm (3.0 m • kg, 22 ft • lb)



- Remove the bolts.
- Again apply the molybdenum disulfide grease on the threads and contact surfaces of the bolts and on both contact surfaces of the plain washers.
- Retighten the bolts.

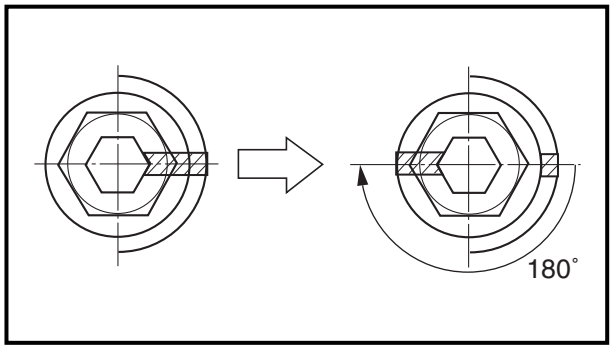
NOTE:
Tighten the bolts to the specified torque in two or three steps in the proper tightening sequence as shown.

Bolts (cylinder head):
2nd:
20 Nm (2.0 m • kg, 14 ft • lb)

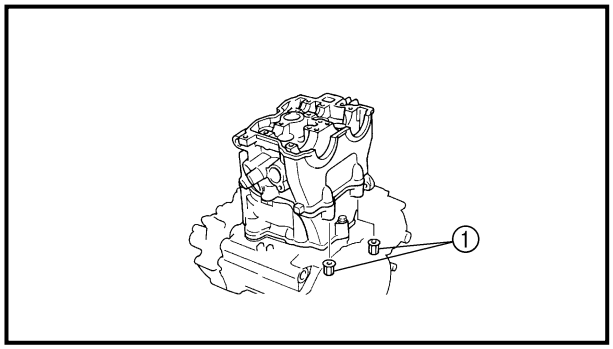


- Put a mark on the corner ① of the bolt (cylinder head) and the cylinder head ② as shown.

NOTE:
Tighten the bolts 90˚ in each of the two steps to reach the specified angle of 180˚ in the proper tightening sequence as shown.

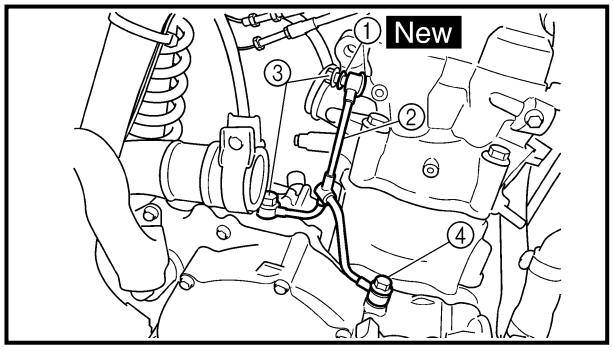


Bolts (cylinder head):
Final:
Specified angle 180˚



3. Install:
   - Nut (cylinder head) ①

10 Nm (1.0 m · kg, 7.2 ft · lb)



4. Install:
   - Copper washer ① New
   - Oil delivery pipe ②
   - Union bolt (M8) ③

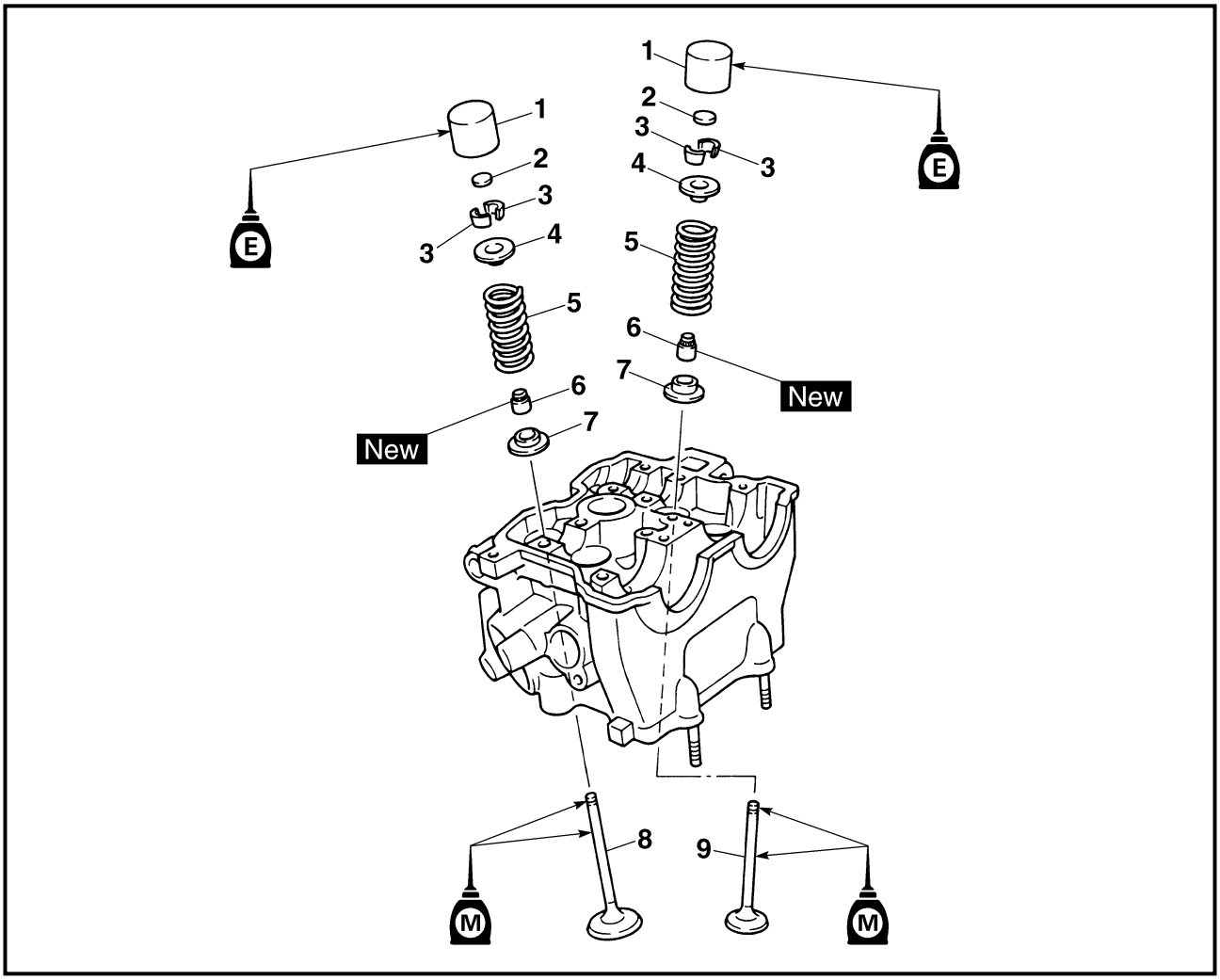
18 Nm (1.8 m · kg, 13 ft · lb)

   - Union bolt (M10) ④

20 Nm (2.0 m · kg, 14 ft · lb)

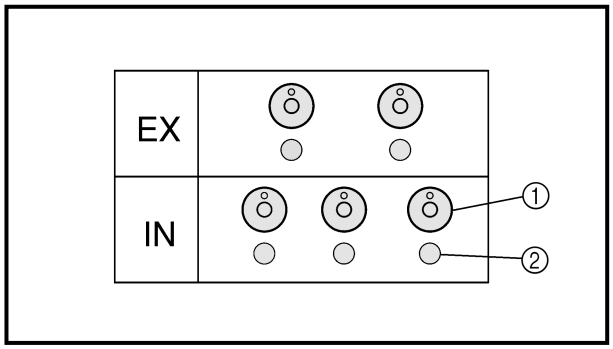
VALVES AND VALVE SPRINGS

VALVES AND VALVE SPRINGS



Extent of removal: ① Valve removal

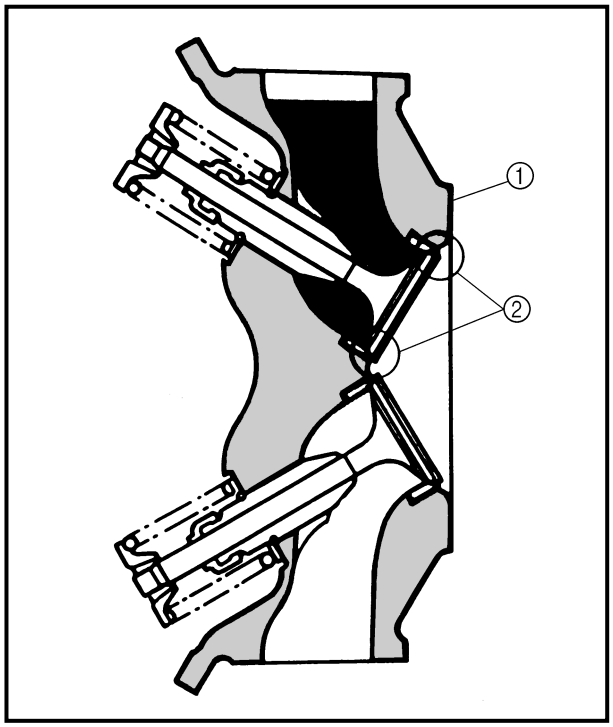
Extent of removal	Order	Part name	Q'ty	Remarks
		VALVES AND VALVE SPRINGS REMOVAL		
Preparation for removal		Cylinder head		Refer to "CYLINDER HEAD" section.
①	1	Valve lifter	5	Use special tool. Refer to "REMOVAL POINTS".
	2	Adjusting pad	5	
	3	Valve cotter	10	
	4	Valve retainer	5	
	5	Valve spring	5	
	6	Stem seal	5	
	7	Valve spring seat	5	
	8	Exhaust valve	2	
	9	Intake valve	3	



REMOVAL POINTS

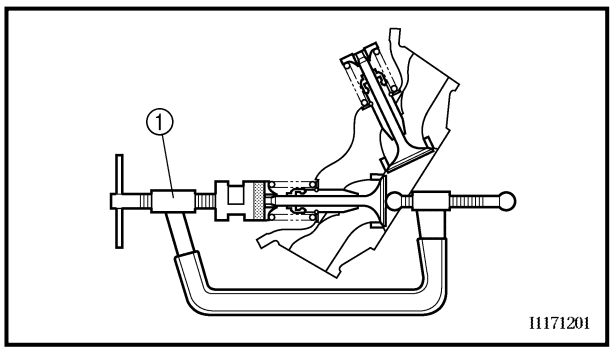
1. Remove:
   - Valve lifters ①
   - Pads ②

NOTE:
Identify each lifter ① and pad ② position very carefully so that they can be reinstalled in their original place.



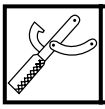
2. Check:
   - Valve sealing
     Leakage at the valve seat → Inspect the valve face, valve seat and valve seat width.

Checking steps:
- Pour a clean solvent ① into the intake and exhaust ports.
- Check that the valve seals properly.
  There should be no leakage at the valve seat ②.

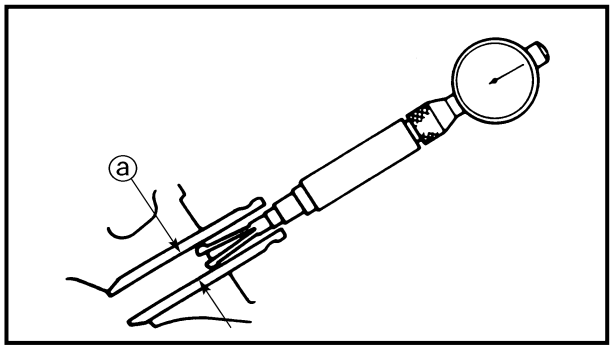


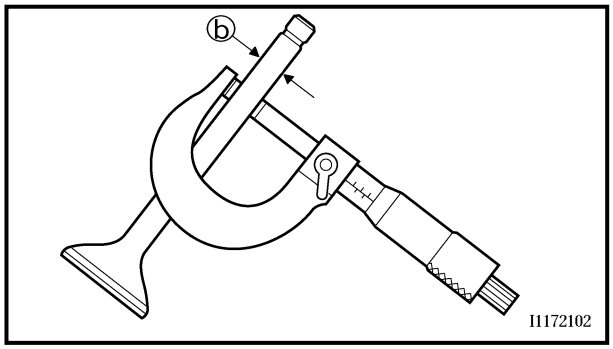
3. Remove:
   - Valve cotters

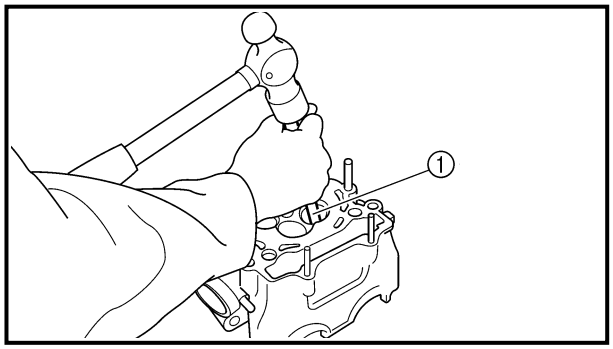
NOTE:
Attach a valve spring compressor ① between the valve spring retainer and the cylinder head to remove the valve cotters.

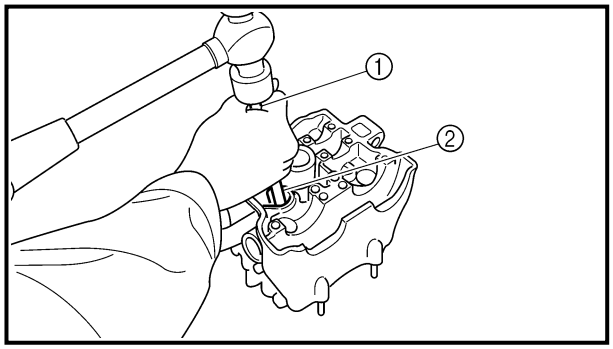


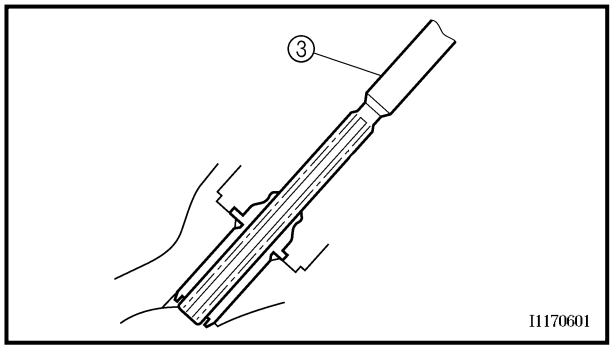
Valve spring compressor:
YM-4019/90890-04019











INSPECTION

Valve

1. Measure:
   - Stem-to-guide clearance

Stem-to-guide clearance =
valve guide inside diameter ⓐ –
valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Clearance (stem to guide):
Intake:
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.003 in)
Exhaust:
0.020 ~ 0.047 mm
(0.0008 ~ 0.0019 in)
<Limit>: 0.10 mm (0.004 in)

2. Replace:
   - Valve guide

Replacement steps:

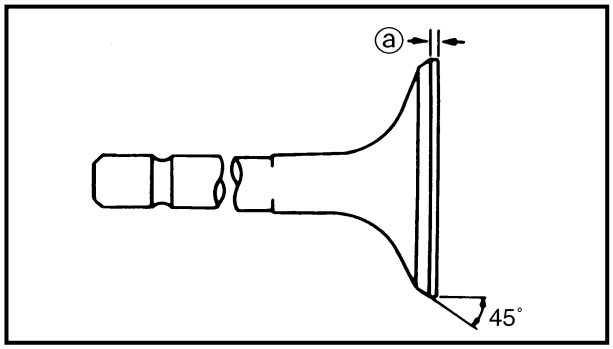
NOTE:
To ease guide removal, installation and to maintain correct fit heat the cylinder head in an over to 100 ˚C (212 ˚F).

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

Valve guide remover:
Intake: 4.5 mm (0.18 in)
YM-4116/90890-04116
Exhaust: 5.0 mm (0.20 in)
YM-4097/90890-04097
Valve guide installer:
Intake:
YM-4117/90890-04117
Exhaust:
YM-4098/90890-04098
Valve guide reamer:
Intake: 4.5 mm (0.18 in)
YM-4118/90890-04118
Exhaust: 5.0 mm (0.20 in)
YM-4099/90890-04099

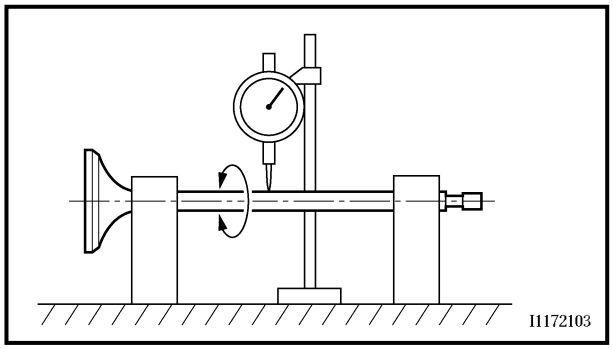
NOTE:
After replacing the valve guide reface the valve seat.

3. Inspect:
   - Valve face
     Pitting/wear → Grind the face.
   - Valve stem end
     Mushroom shape or diameter larger than the body of the stem → Replace.



4. Measure:
   - Margin thickness ⓐ
     Out of specification → Replace.

Margin thickness:
Intake:
1.0 mm (0.039 in)
<Limit>: 0.85 mm (0.033 in)
Exhaust:
1.0 mm (0.039 in)
<Limit>: 0.85 mm (0.033 in)

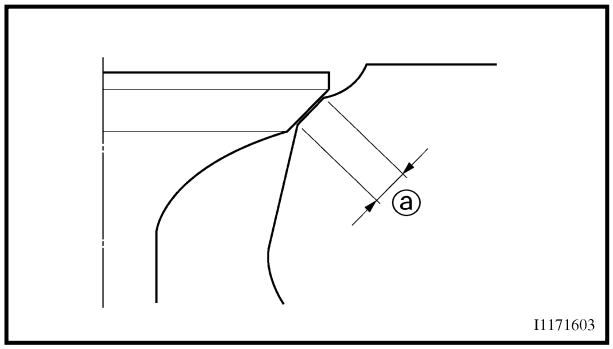


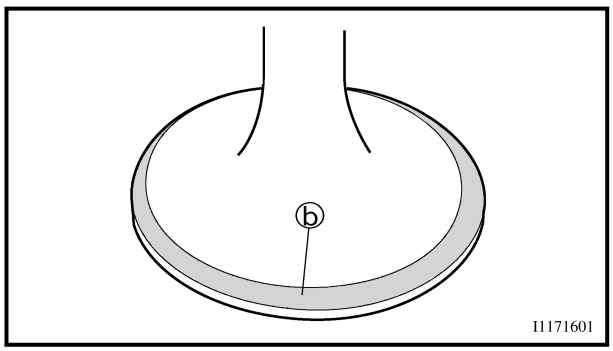
5. Measure:
   - Runout (valve stem)
     Out of specification → Replace.

Runout limit:
0.01 mm (0.0004 in)

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

6. Eliminate:
   - Carbon deposits
     (from the valve face and valve seat)
7. Inspect:
   - Valve seats
     Pitting/wear → Reface the valve seat.





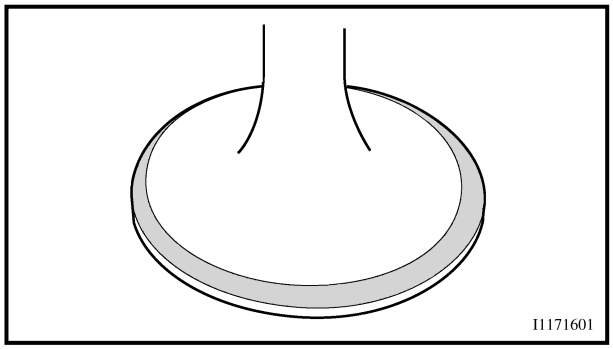
8. Measure:
   - Valve seat width ⓐ
     Out of specification → Reface the valve seat.

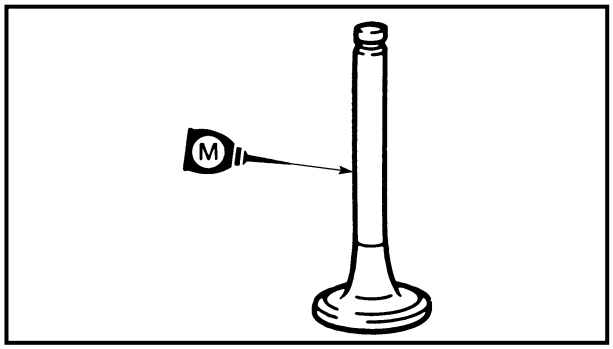
Valve seat width:
Intake:
0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)
Exhaust:
0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)
<Limit>: 1.6 mm (0.0630 in)

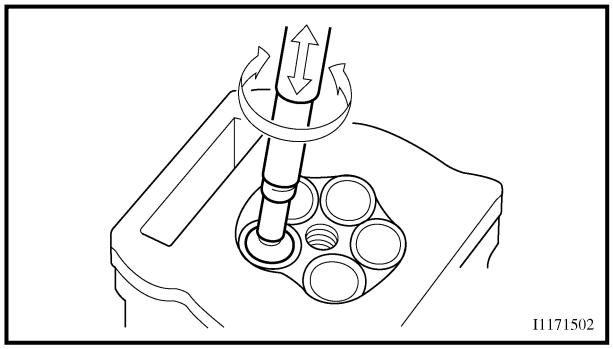
Measurement steps:
- Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.
- If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

9. Lap:
   - Valve face
   - Valve seat

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







Lapping steps:
- Apply a coarse lapping compound to the valve face.

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

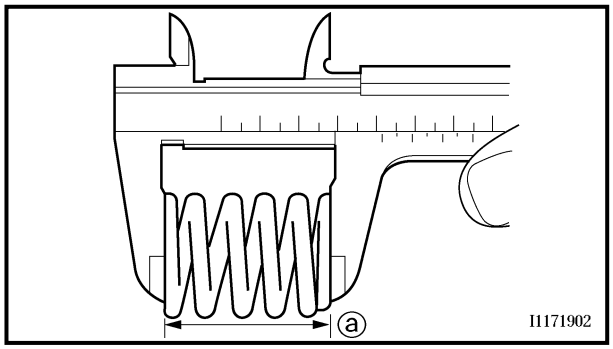
- Apply molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.

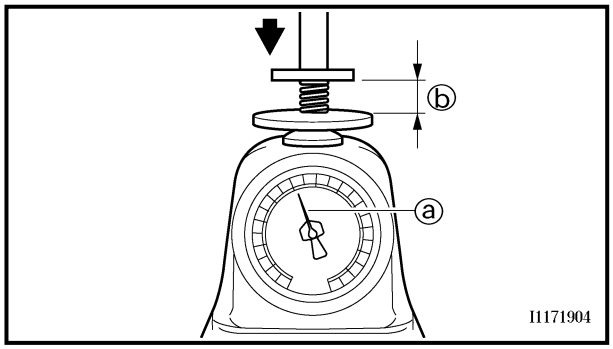
NOTE:
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- Apply a fine lapping compound to the valve face and repeat the above steps.

NOTE:
After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.

- Apply Mechanic's blueing dye (Dykem) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.





Valve spring

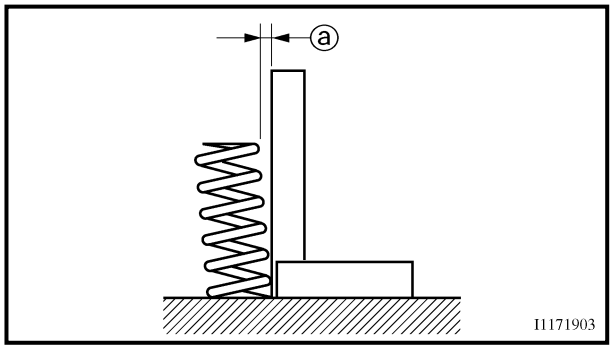
1. Measure:
   - Valve spring free length ⓐ
     Out of specification → Replace.

Free length (valve spring):
Intake:
37.03 mm (1.46 in)
<Limit>: 35.17 mm (1.38 in)
Exhaust:
37.68 mm (1.48 in)
<Limit>: 35.79 mm (1.41 in)

2. Measure:
   - Compressed spring force ⓐ
     Out of specification → Replace.

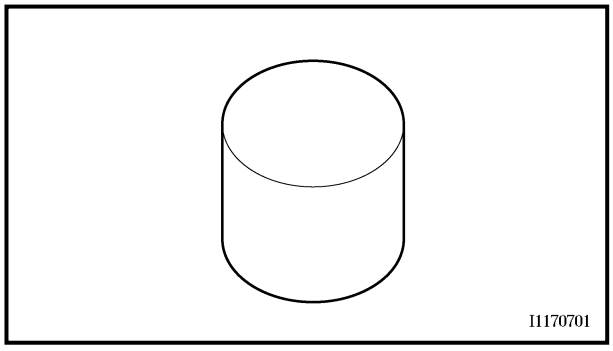
ⓑ Installed length

Compressed spring force:
Intake:
111.3 ~ 127.9 N at 27.87 mm (11.3 ~ 13.0 kg at 27.87 mm, 24.91 ~ 28.66 lb at 1.10 in)
Exhaust:
127.4 ~ 146.4 N at 27.38 mm (13.0 ~ 14.9 kg at 27.38 mm, 28.66 ~ 32.85 lb at 1.08 in)



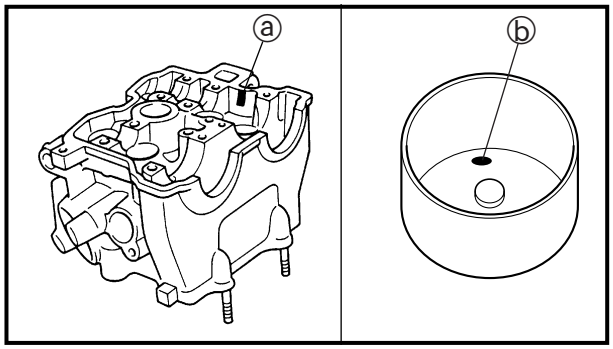
3. Measure:
   - Spring tilt ⓐ
     Out of specification → Replace.

Spring tilt limit:
Intake:
2.5°/1.61 mm (0.063 in)
Exhaust:
2.5°/1.65 mm (0.065 in)



Valve lifter

1. Inspect:
   - Valve lifter
     Scratches/damage → Replace both lifters and cylinder head.



Combination of cylinder head and valve lifter

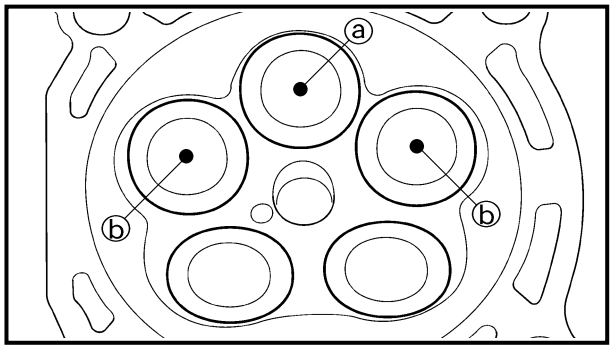
1. Combination:
   For this combination, match the paint color on the cylinder head with that on the valve lifter according to the chart below.

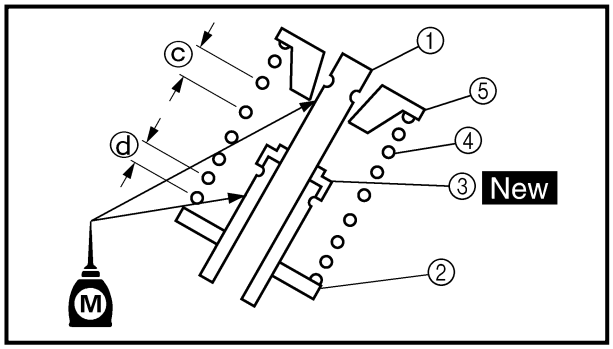
Combination	
Cylinder head mark ⓐ (color)	**Valve lifter mark ⓑ (color)**
Blue	**Blue**
Yellow	**Yellow**
Purple	**Black**

NOTE:
When you purchase a cylinder head, you cannot designate its size. Choose the valve lifter that matches the above chart.

ASSEMBLY AND INSTALLATION

1. Apply:
   - Molybdenum disulfide oil
     Onto the valve stem and valve stem seal.

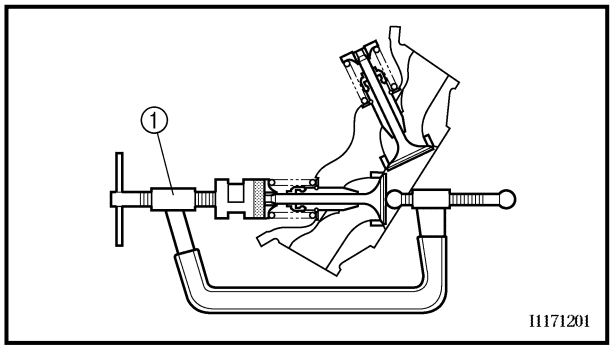


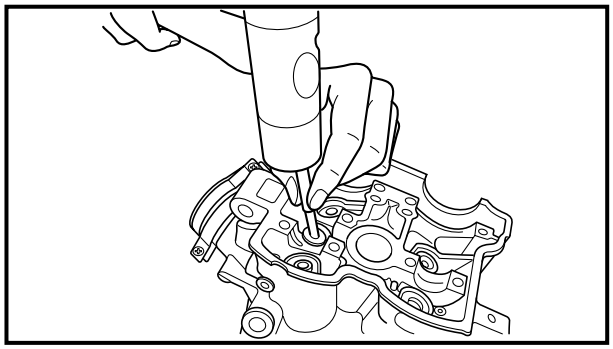


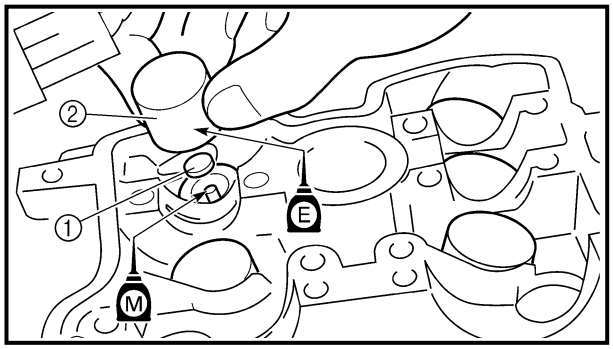
2. Install:
   - Valves ①
   - Valve spring seats ②
   - Valve stem seals ③ New
   - Valve springs ④
   - Valve spring retainers ⑤

NOTE:
- Make sure that each valve is installed in its original place, also referring to the painted color as follows.
  Intake (middle) ⓐ: blue
  Intake (right/left) ⓑ: gray
  Exhaust: not paint
- Install the valve springs with the larger pitch ⓒ facing upward.

ⓓ Smaller pitch

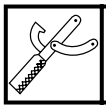






3. Install:
   - Valve cotters

NOTE:
While compressing the valve spring with a valve spring compressor ① install the valve cotters.



Valve spring compressor:
YM-4019/90890-04019

4. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a piece of wood.

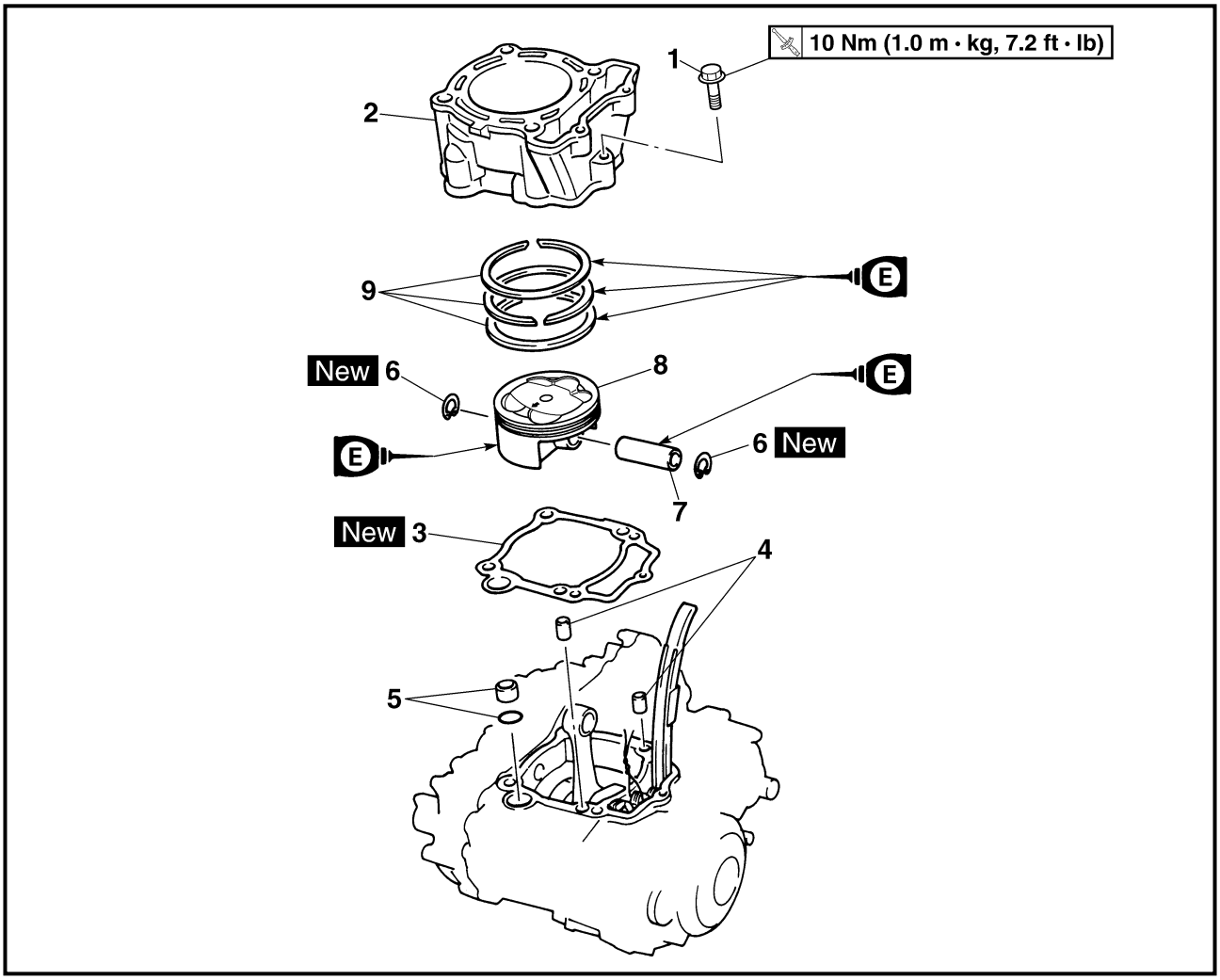
CAUTION:
Hitting the valve tip with excessive force could damage the valve.

5. Install:
   - Adjusting pad ①
   - Valve lifter ②

NOTE:
- Apply the engine oil on the valve lifters.
- Apply the molybdenum disulfide oil on the valve stem end.
- Valve lifter must turn smoothly when rotated with a finger.
- Be careful to reinstall valve lifters and pads in their original place.

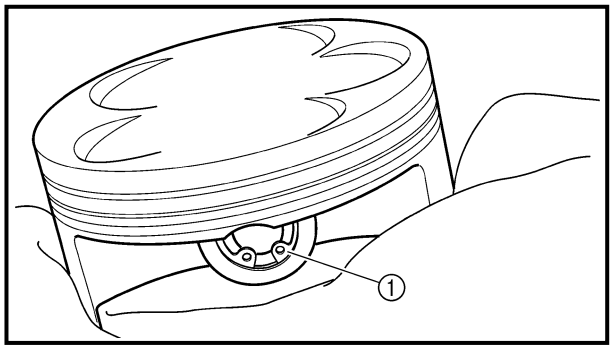
CYLINDER AND PISTON

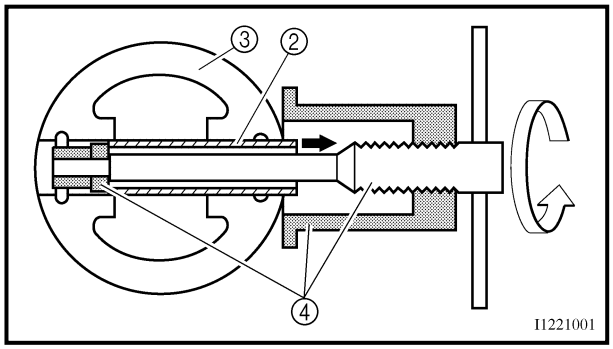
CYLINDER AND PISTON



Extent of removal: ① Cylinder removal ② Piston removal

Extent of removal	Order	Part name	Q'ty	Remarks
		CYLINDER AND PISTON REMOVAL		
Preparation for removal		Cylinder head		Refer to "CYLINDER HEAD" section.
①	1	Bolt (cylinder)	1	
	2	Cylinder	1	
	3	Gasket	1	
	4	Dowel pin	2	
②	5	Dowel pin/O-ring	1/1	
	6	Piston pin clip	2	
	7	Piston pin	1	Use special tool.
	8	Piston	1	Refer to "REMOVAL POINTS".
	9	Piston ring set	1	





REMOVAL POINTS

Piston

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

NOTE:

- Put identification marks on each piston head for reference during reinstallation.
- Before removing each piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller ④.

	Piston pin puller: YU-1304/90890-01304

CAUTION:

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

Piston ring

1. Remove:
   - Piston rings

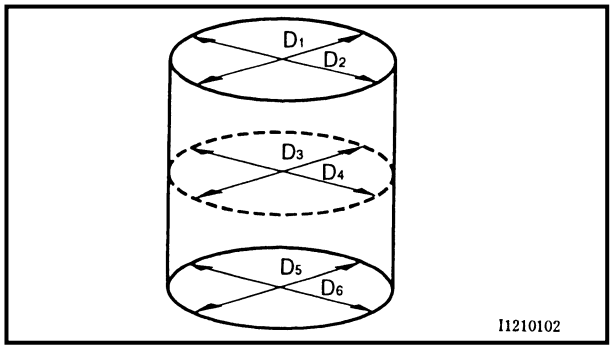
NOTE:

Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown, as shown in the illustration.

INSPECTION

Cylinder and piston

1. Inspect:
   - Cylinder and piston walls
     Vertical scratches → Replace cylinder and piston.
2. Measure:
   - Piston-to-cylinder clearance



Measurement steps:

1st step:

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

NOTE:

Measure the cylinder bore “C” in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

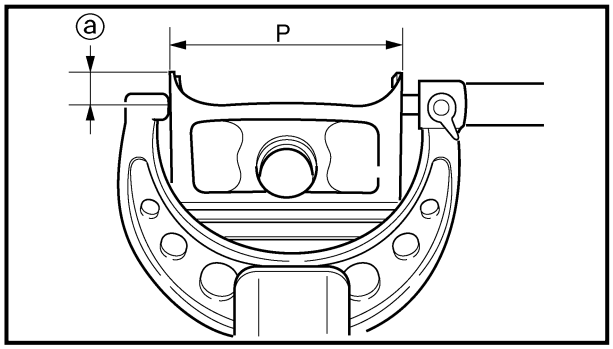
Cylinder bore "C"	**95.00 ~ 95.01 mm (3.7402 ~ 3.7406 in)**
Taper limit "T"	**0.05 mm (0.002 in)**
Out of round "R"	**0.05 mm (0.002 in)**

"C" = Maximum D

"T" = (Maximum D_1 or D_2) – (Maximum D_5 or D_6)

"R" = (Maximum D_1, D_3 or D_5) – (Minimum D_2, D_4 or D_6)

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



2nd step:

- Measure the piston skirt diameter "P" with a micrometer.

ⓐ 8 mm (0.315 in) from the piston bottom edge

	Piston size "P"
Standard	**94.945 ~ 94.960 mm (3.738 ~ 3.739 in)**

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

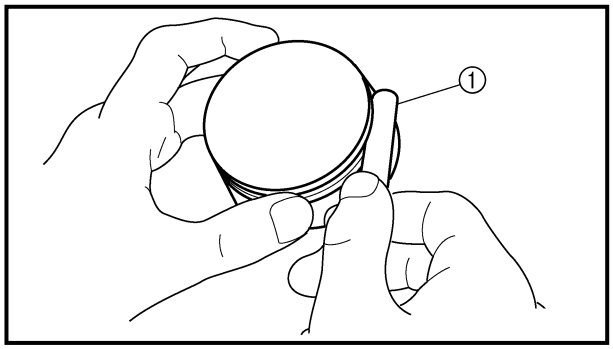
3rd step:

- Calculate the piston-to-cylinder clearance with following formula:

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

Piston-to-cylinder clearance: 0.040 ~ 0.065 mm (0.0016 ~ 0.0026 in) <Limit>: 0.1 mm (0.004 in)

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



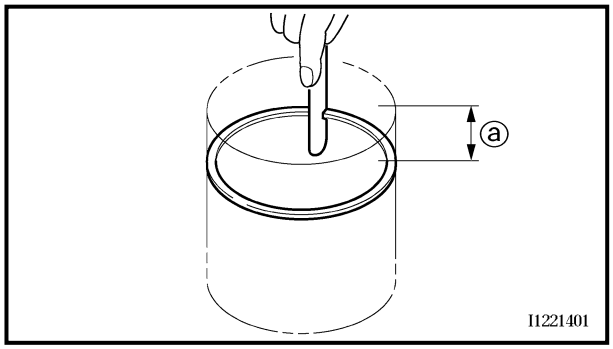
Piston ring

1. Measure:
   - Ring side clearance
     Use a feeler gauge ①.
     Out of specification → Replace the piston and rings as a set.

NOTE:
Clean carbon from the piston ring grooves and rings before measuring the side clearance.

	Side clearance:	
	Standard	<Limit>
Top ring	0.030 ~ 0.065 mm (0.0012 ~ 0.0026 in)	0.12 mm (0.005 in)
2nd ring	0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in)	0.12 mm (0.005 in)

2. Position:
   - Piston ring
     (in cylinder)



NOTE:
Insert a ring into the cylinder and push it approximately 10 mm (0.39 in) into the cylinder. Push the ring with the piston crown so that the ring will be at a right angle to the cylinder bore.

ⓐ 10 mm (0.39 in)

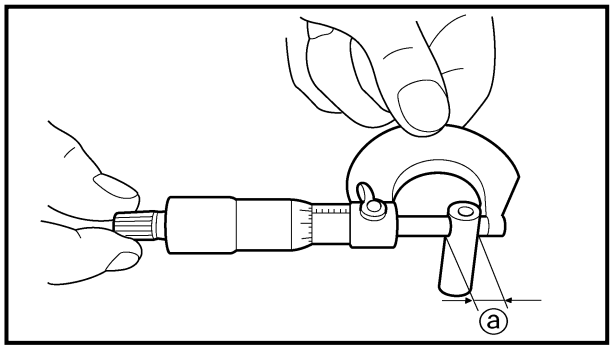
3. Measure:
   - Ring end gap
     Out of specification → Replace.

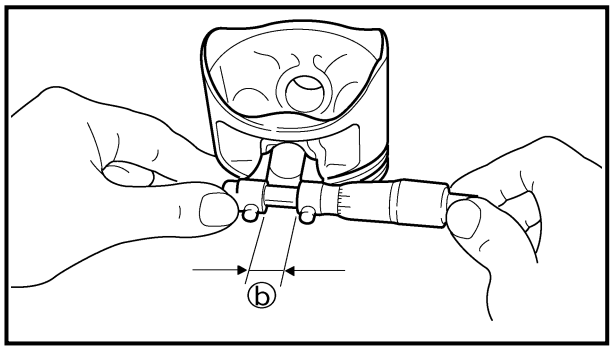
NOTE:
You cannot measure the end gap on the expander spacer of the oil control ring. If the oil control ring rails show excessive gap, replace all three rings.

	End gap:	
	Standard	<Limit>
Top ring	0.20 ~ 0.30 mm (0.008 ~ 0.012 in)	0.55 mm (0.022 in)
2nd ring	0.35 ~ 0.50 mm (0.014 ~ 0.020 in)	0.85 mm (0.033 in)
Oil ring	0.20 ~ 0.50 mm (0.01 ~ 0.02 in)	—

Piston pin

1. Inspect:
   - Piston pin
     Blue discoloration/grooves → Replace, then inspect the lubrication system.
2. Measure:
   - Piston pin-to-piston clearance





Measurement steps:

- Measure the outside diameter (piston pin) ⓐ.
  If out of specification, replace the piston pin.

Outside diameter (piston pin):
17.991 ~ 18.000 mm
(0.7083 ~ 0.7087 in)

- Measure the inside diameter (piston) ⓑ.

Inside diameter (piston):
18.004 ~ 18.015 mm
(0.7088 ~ 0.7093 in)

- Calculate the piston pin-to-piston clearance with the following formula.

Piston pin-to-piston clearance =
Inside diameter (piston) ⓑ –
Outside diameter (piston pin) ⓐ

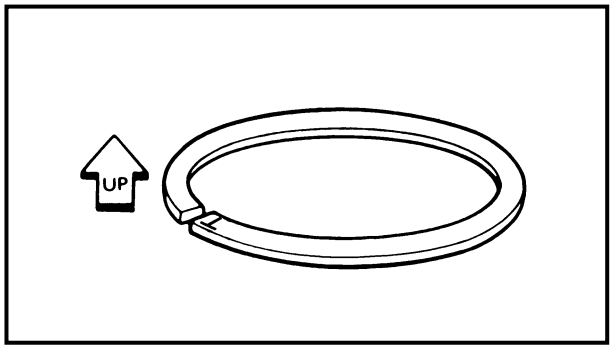
- If out of specification, replace the piston.

Piston pin-to-piston clearance:
0.004 ~ 0.024 mm
(0.00016 ~ 0.00094 in)
<Limit>: 0.07 mm (0.003 in)

ASSEMBLY AND INSTALLATION

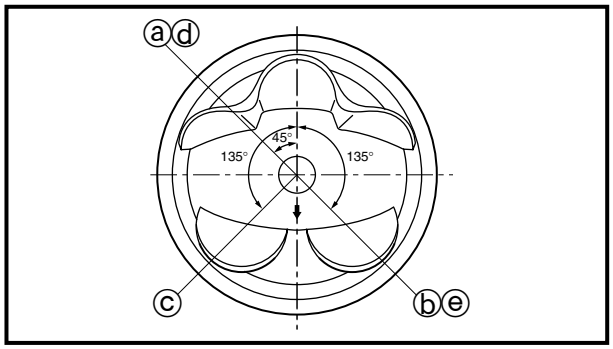
Piston

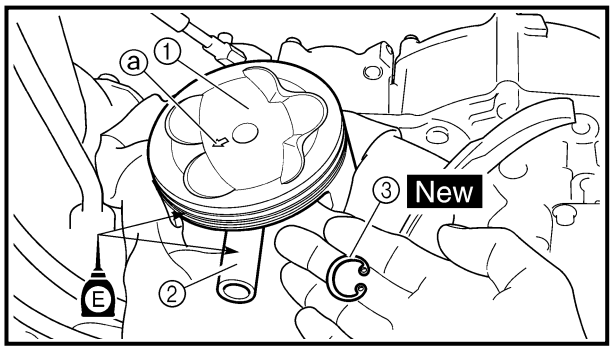
1. Install:
   - Piston rings
     Onto the piston.

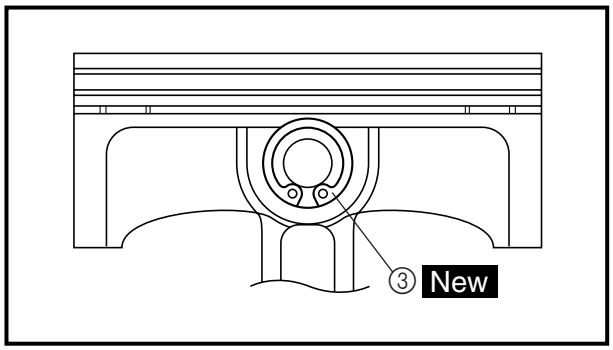


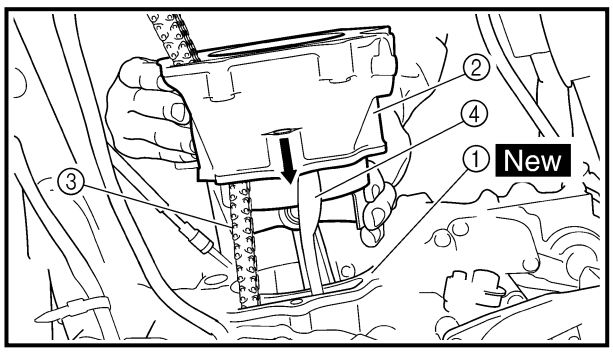
NOTE:

- Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings.
- Lubricate the piston and piston rings liberally with engine oil.









2. Position:
   - Top ring
   - 2nd ring
   - Oil ring

   Offset the piston ring end gaps as shown.

ⓐ Top ring end
ⓑ 2nd ring end
ⓒ Oil ring end (upper)
ⓓ Oil ring
ⓔ Oil ring end (lower)

3. Install:
   - Piston ①
   - Piston pin ②
   - Piston pin clips ③ New

NOTE:
- Apply engine oil onto the piston pin and piston.
- Be sure that the arrow mark ⓐ on the piston points to the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Install the piston pin clips with their ends facing downward.

4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder

NOTE:
Apply a liberal coating of engine oil.

Cylinder

1. Install:
   - Dowel pins
   - O-ring
   - Gasket ① New
   - Cylinder ②

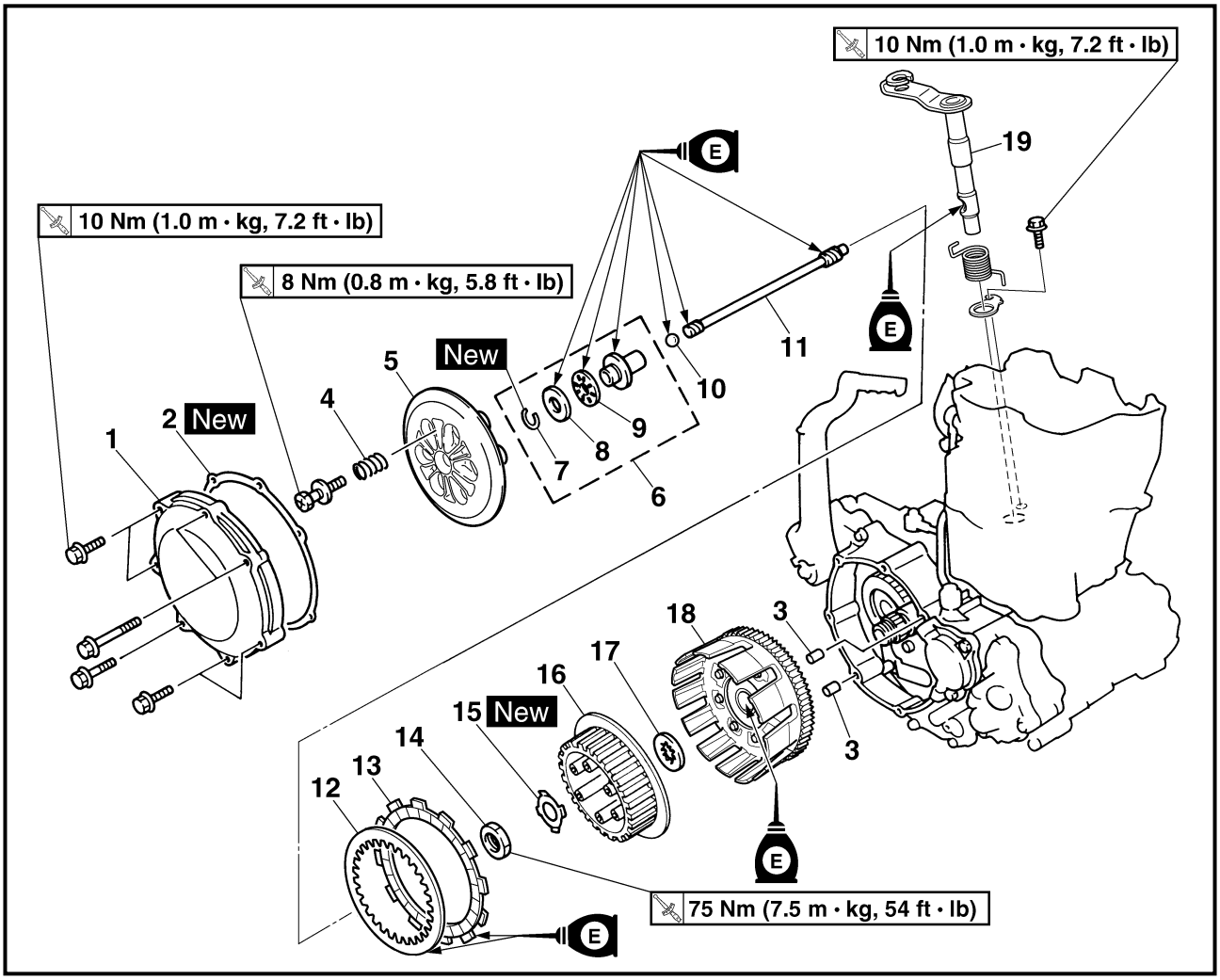
NOTE:
Install the cylinder with one hand while compressing the piston rings with the other hand.

CAUTION:
- **Pass the timing chain ③ through the timing chain cavity.**
- **Be careful not to damage the timing chain guide ④ during installation.**

2. Install:
   - Bolt (cylinder)

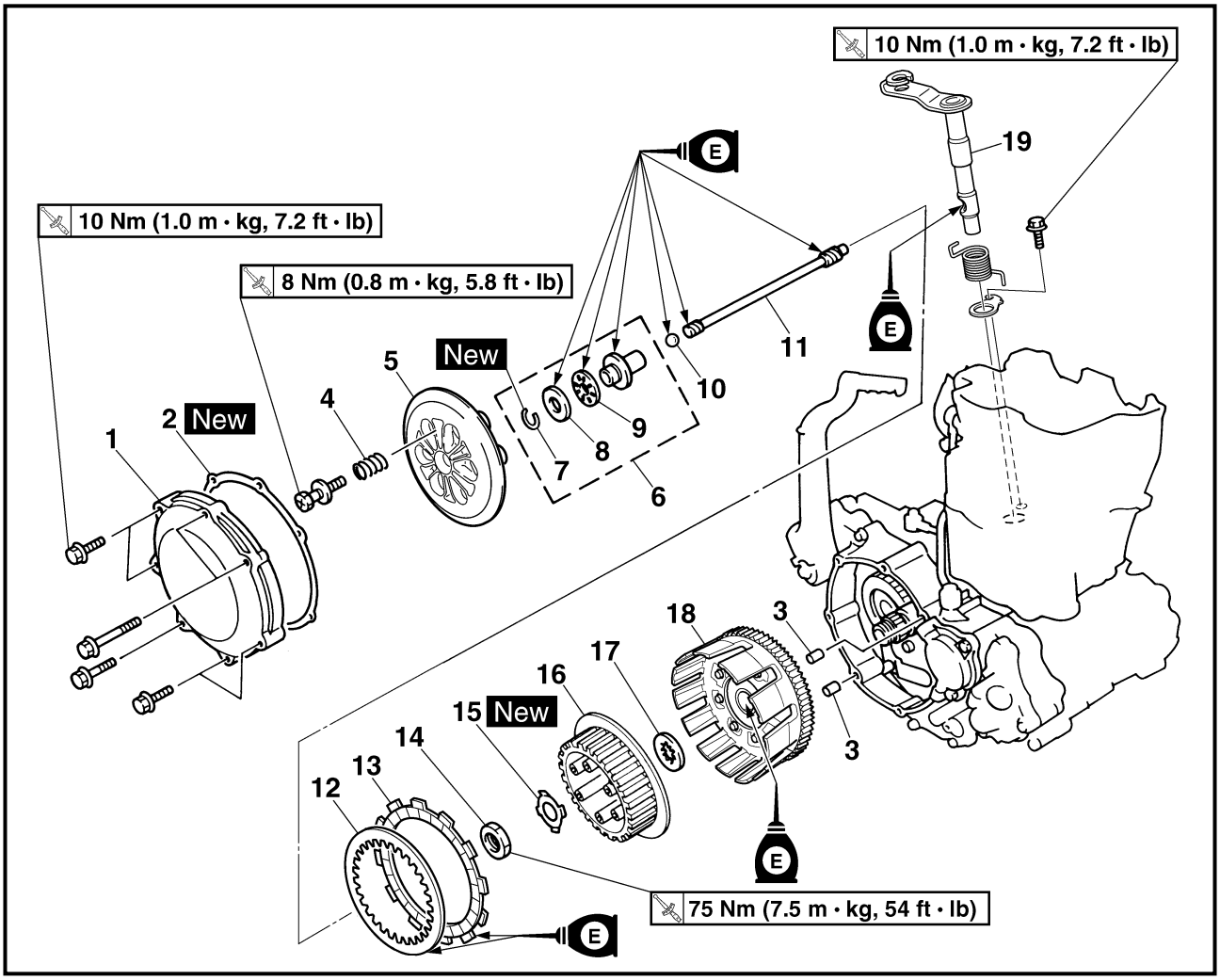
10 Nm (1.0 m · kg, 7.2 ft · lb)

CLUTCH
CLUTCH

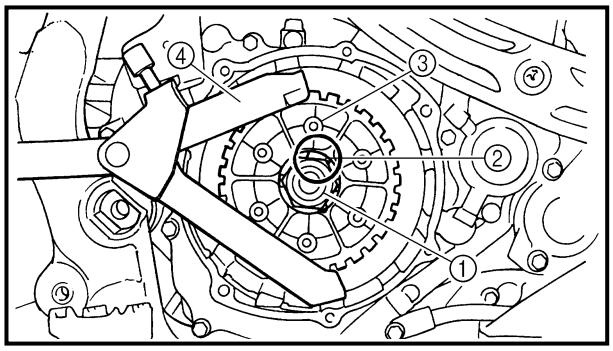


Extent of removal: ① Push rod and push lever removal ② Push pod 1 disassembly ③ Friction plate and clutch plate removal ④ Clutch housing removal

Extent of removal	Order	Part name	Q'ty	Remarks
		CLUTCH REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Brake pedal		Refer to "ENGINE REMOVAL" section.
		Clutch cable		Disconnect at engine side.
① ② ③ ④	1	Clutch cover	1	
	2	Gasket	1	
	3	Dowel pin	2	
	4	Clutch spring	6	
	5	Pressure plate	1	
	6	Push rod 1	1	
	7	Circlip	1	
	8	Plain washer	1	
	9	Bearing	1	
①	10	Ball	1	
	11	Push rod 2	1	

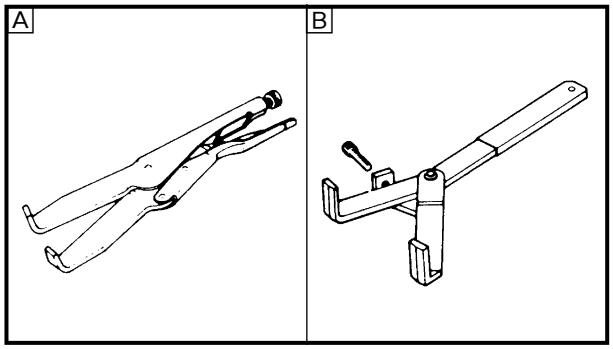


Extent of removal	Order	Part name	Q'ty	Remarks
③ ④	12	Clutch plate	8	
	13	Friction plate	9	
	14	Nut	1	Use special tool. Refer to "REMOVAL POINTS".
	15	Look washer	1	
	16	Clutch boss	1	
	17	Thrust washer	1	
	18	Clutch housing	1	
①	19	Push lever	1	



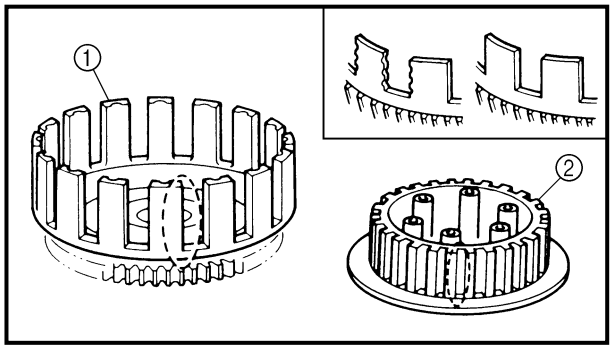
EC493000
REMOVAL POINTS
EC483211
Clutch boss
1. Remove:
   - Nut ①
   - Lock washer ②
   - Clutch boss ③

NOTE:
Straighten the lock washer tab and use the clutch holding tool ④ to hold the clutch boss.

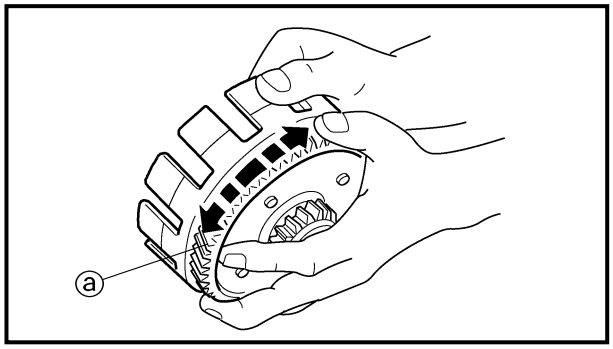


	Clutch holding tool: YM-91042/90890-04086

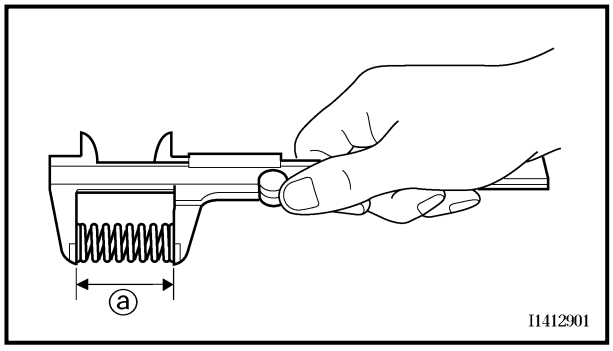
A For USA and CDN
B Except for USA and CDN



EC494000
INSPECTION
EC484100
Clutch housing and boss
1. Inspect:
   - Clutch housing ①
     Cracks/wear/damage → Replace.
   - Clutch boss ②
     Scoring/wear/damage → Replace.

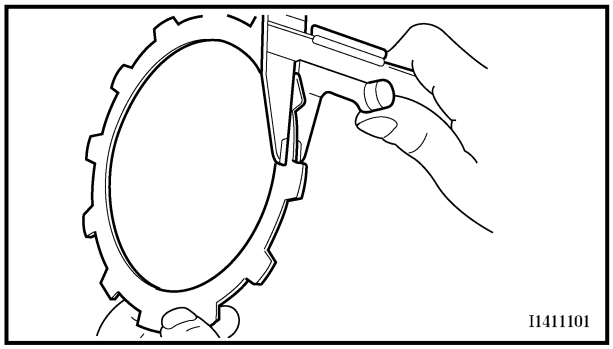


EC484201
Primary driven gear
1. Check:
   - Circumferential play
     Free play exists → Replace.
   - Gear teeth ⓐ
     Wear/damage → Replace.



EC484400
Clutch spring
1. Measure:
   - Clutch spring free length ⓐ
     Out of specification → Replace springs as a set.

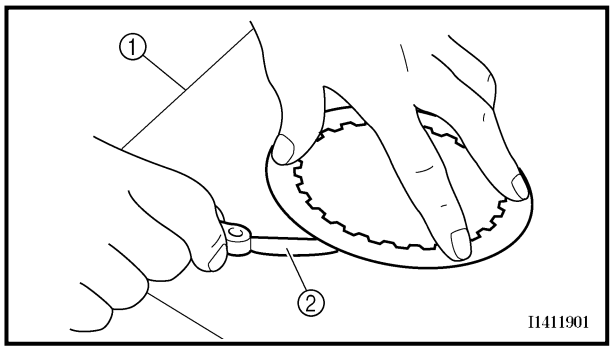
Clutch spring free length:	
Standard	**<Limit>**
48.4 mm (1.91 in)	**47.4 mm (1.87 in)**



EC484500
Friction plate

1. Measure:
   - Friction plate thickness
     Out of specification → Replace friction plate as a set.
     Measure at all four points.

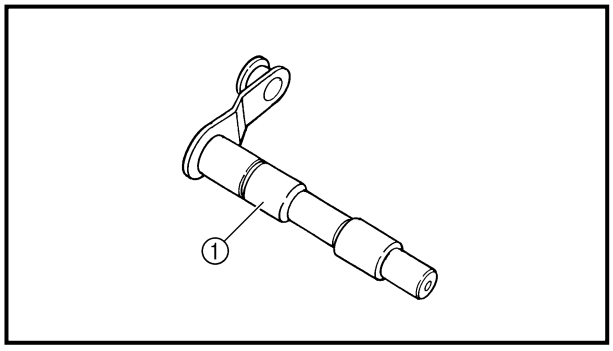
Friction plate thickness:
2.92 ~ 3.08 mm
(0.115 ~ 0.121 in)
<Limit>: 2.8 mm (0.110 in)



EC484600
Clutch plate

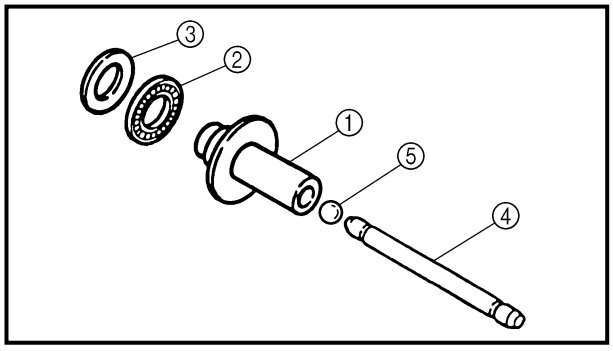
1. Measure:
   - Clutch plate warpage
     Out of specification → Replace clutch plate as a set.
     Use a surface plate ① and thickness gauge ②.

Warp limit:
0.1 mm (0.004 in)



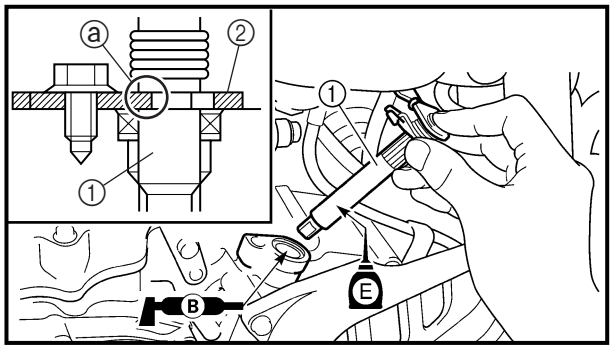
Push lever

1. Inspect:
   - Push lever ①
     Wear/damage → Replace.



EC484810
Push rod

1. Inspect:
   - Push rod 1 ①
   - Bearing ②
   - Plain washer ③
   - Push rod 2 ④
   - Ball ⑤
     Wear/damage/bend → Replace.



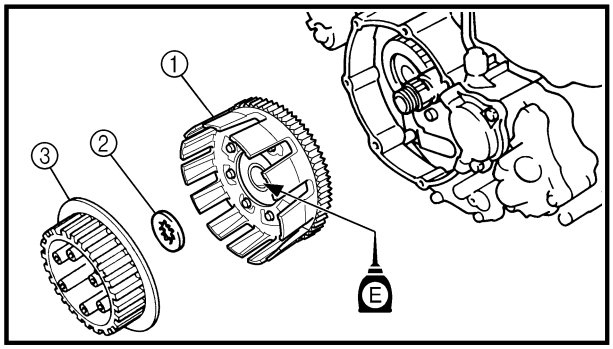
EC4A5000
ASSEMBLY AND INSTALLATION

Push lever

1. Install:
   - Push lever ①
   - Bolt (push lever)

	10 Nm (1.0 m · kg, 7.2 ft · lb)

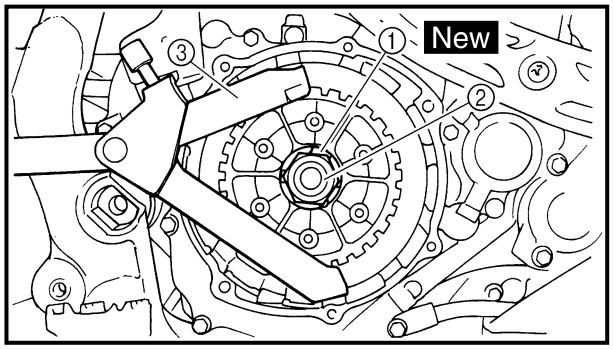
NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- Apply the engine oil on the push lever.
- Fit the seat plate ② in the groove ⓐ of the push lever and tighten the bolt (seat plate).



Clutch

1. Install:
   - Primary driven gear ①
   - Thrust washer ②
   - Clutch boss ③

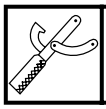
NOTE:
Apply the engine oil on the primary driven gear inner circumference.



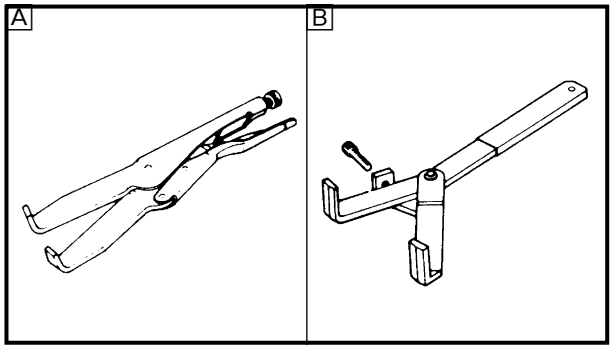
2. Install:
   - Lock washer ① New
   - Nut (clutch boss) ②

	75 Nm (7.5 m · kg, 54 ft · lb)

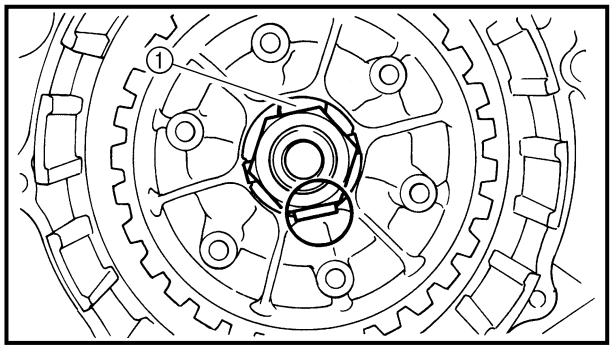
NOTE:
Use the clutch holding tool ③ to hold the clutch boss.



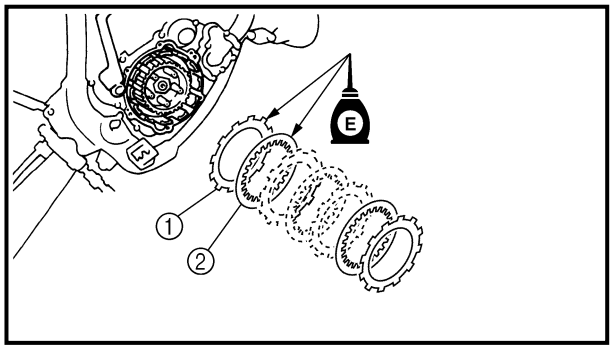
Clutch holding tool:
YM-91042/90890-04086



A For USA and CDN
B Except for USA and CDN

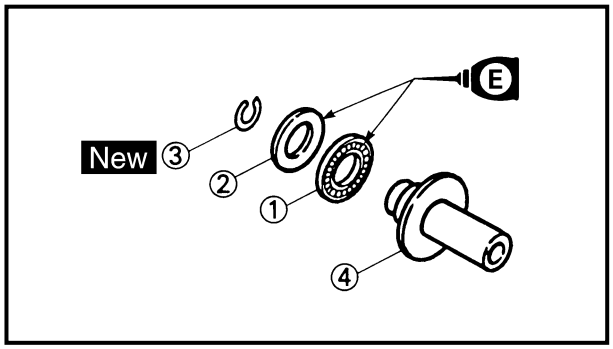


3. Bend the lock washer ① tab.



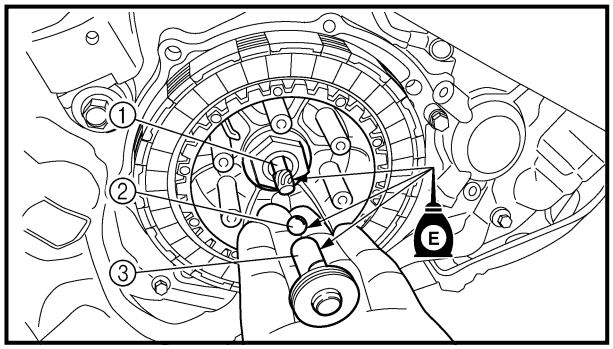
4. Install:
   - Friction plate ①
   - Clutch plate ②

NOTE:
- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- Apply the engine oil on the friction plates and clutch plates.



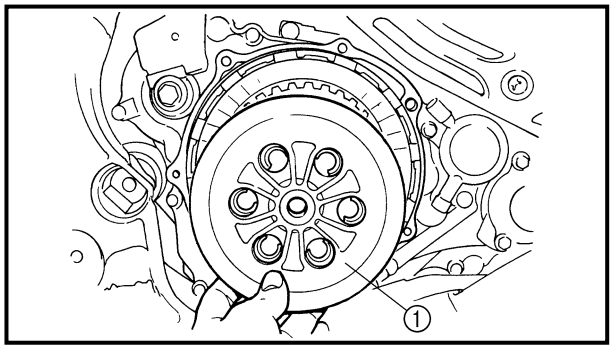
5. Install:
   - Bearing ①
   - Plain washer ②
   - Circlip ③ New
     To push rod 1 ④.

NOTE:
Apply the engine oil on the bearing and plain washer.

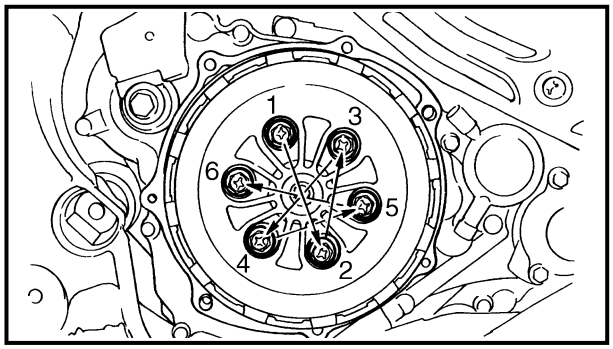


6. Install:
   - Push rod 2 ①
   - Ball ②
   - Push rod 1 ③

NOTE:
Apply the engine oil on the push rod 1, 2 and ball.



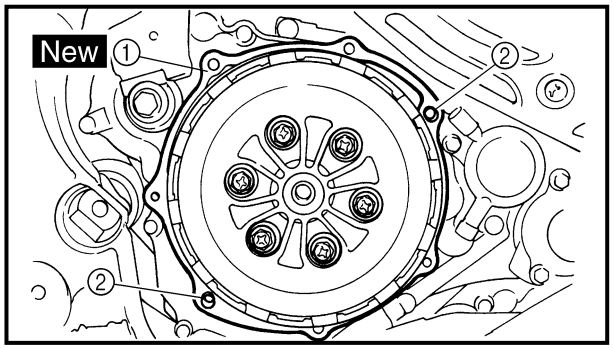
7. Install:
   - Pressure plate ①



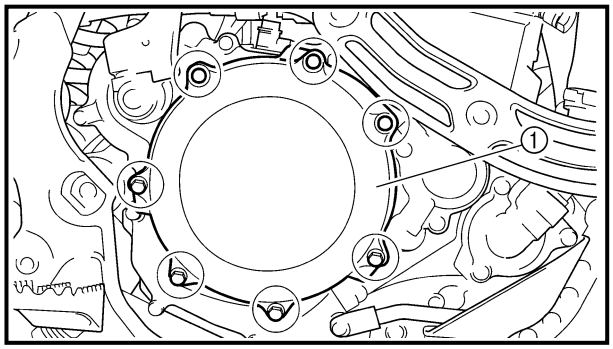
8. Install:
   - Clutch spring
   - Bolt (clutch spring)

8 Nm (0.8 m · kg, 5.8 ft · lb)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.



9. Install:
   - Gasket (clutch cover) ① New
   - Dowel pin ②



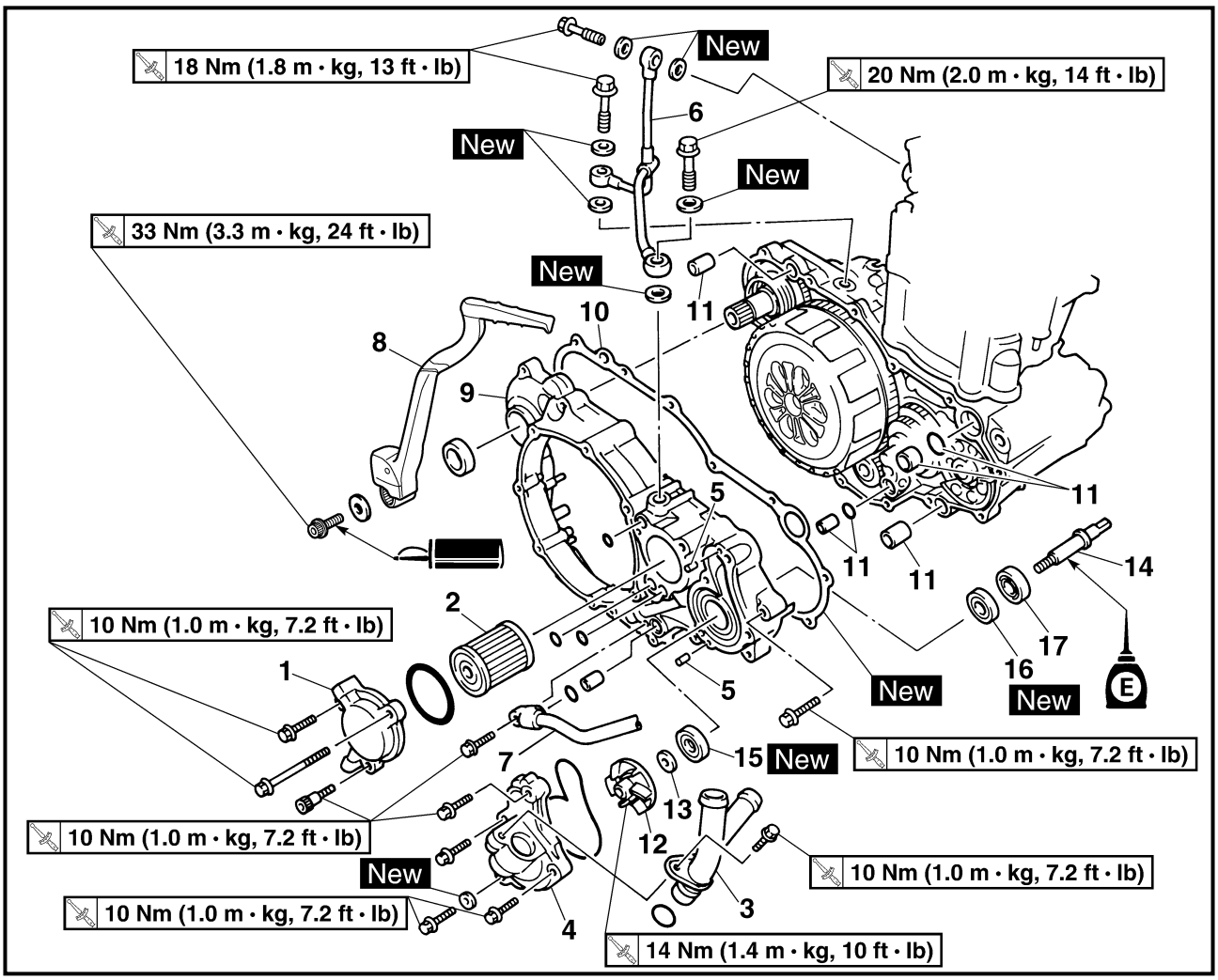
10. Install:
    - Clutch cover ①
    - Bolt (clutch cover)

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.

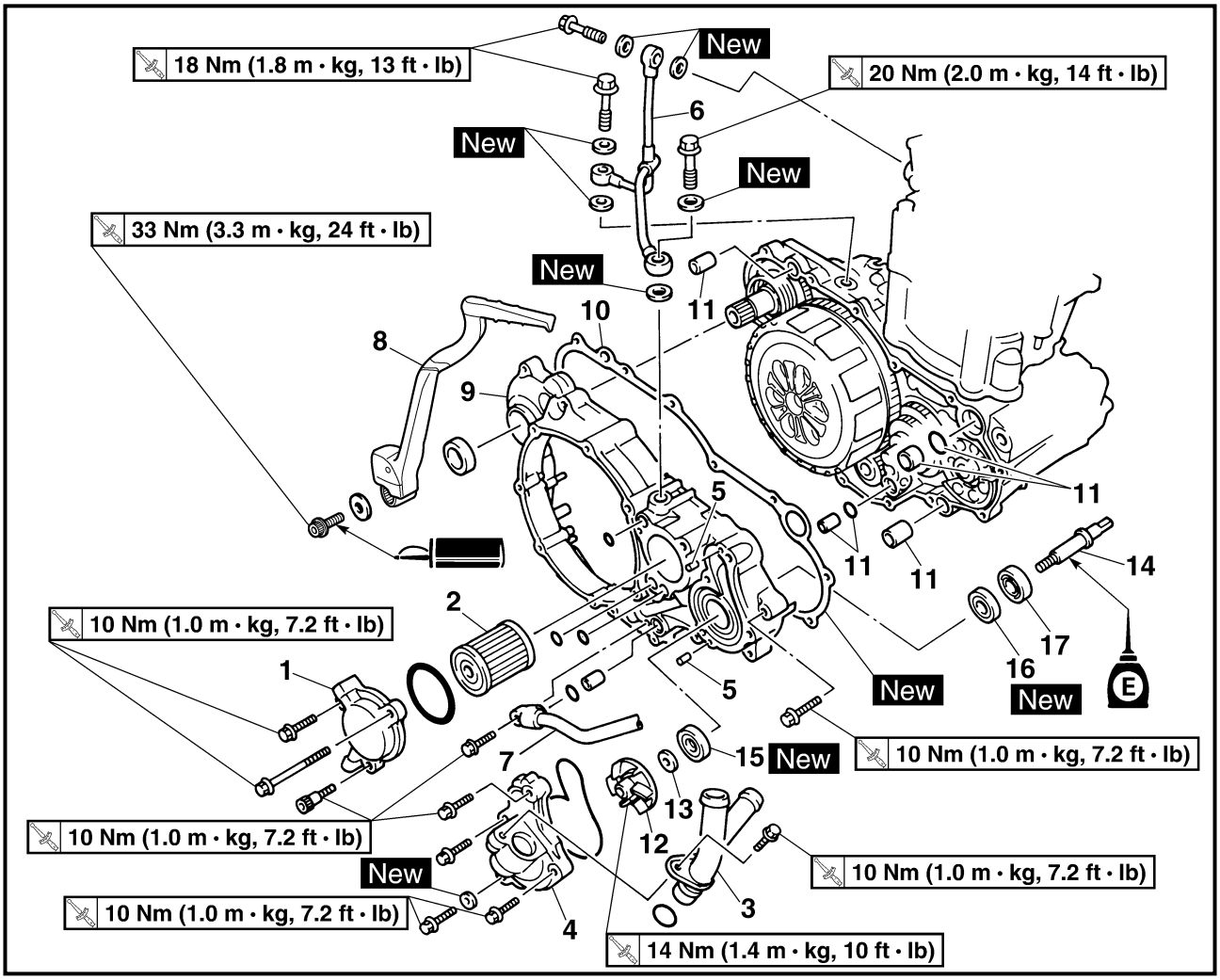
OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)

OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)

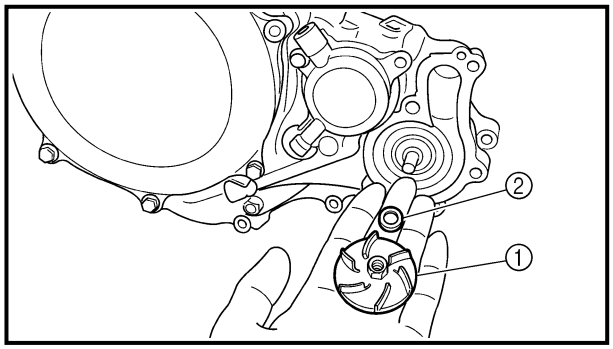


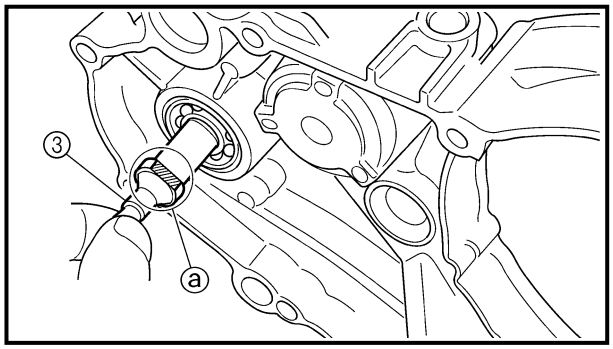
Extent of removal: ① Oil filter removal ② Water pump removal ③ Crankcase cover (right) removal

Extent of removal	Order	Part name	Q'ty	Remarks
		OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT) REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Drain the coolant.		Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3.
		Exhaust pipe		Refer to "EXHAUST PIPE AND SILENCER" section.
		Brake pedal		Refer to "ENGINE REMOVAL" section.
		Clutch cover		Refer to "CLUTCH" section.
① ② ③	1	Oil filter cover	1	
	2	Oil filter	1	
	3	Coolant pipe 2	1	
	4	Water pump housing	1	
	5	Pin	2	
	6	Oil delivery pipe	1	



Extent of removal	Order	Part name	Q'ty	Remarks
	7	Oil hose	1	
②	8	Kickstarter	1	
③	9	Crankcase cover (right)	1	
	10	Gasket	1	
	11	Dowel pin/O-ring	4/2	
	12	Impeller	1	Refer to "REMOVAL POINTS".
	13	Plain washer	1	
②	14	Impeller shaft	1	
	15	Oil seal 1	1	
	16	Oil seal 2	1	
	17	Bearing	1	



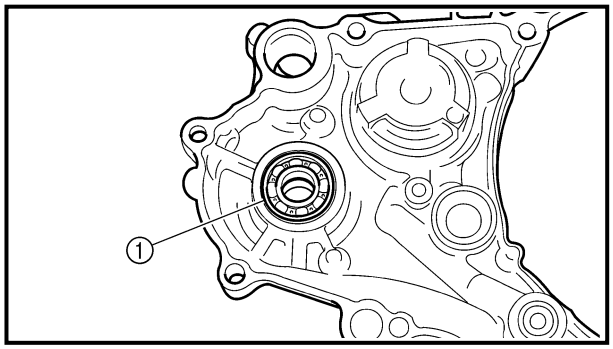


REMOVAL POINTS

EC4G3110
Impeller shaft

1. Remove:
   - Impeller ①
   - Plain washer ②
   - Impeller shaft ③

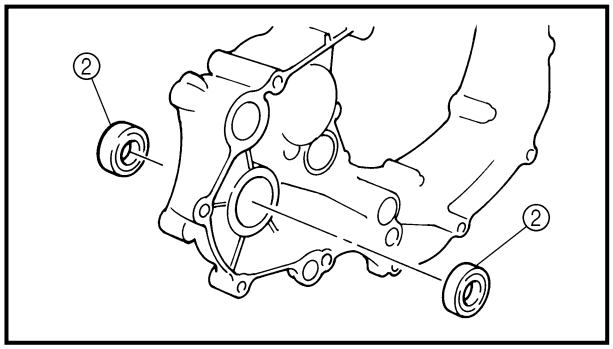
NOTE:
Hold the impeller shaft on its width across the flats ⓐ with spanners, etc. and remove the impeller.

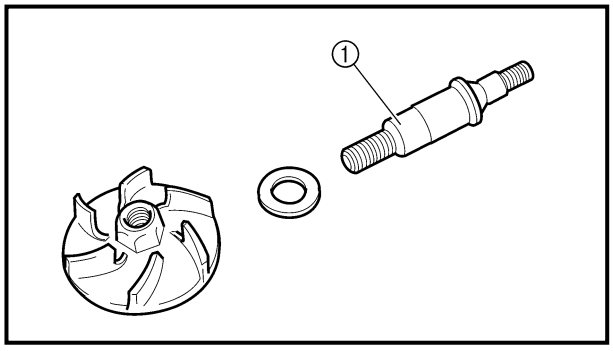


EC4G3210
Oil seal

NOTE:
It is not necessary to disassemble the water pump, unless there is an abnormality such as excessive change in coolant level, discoloration of coolant, or milky transmission oil.

1. Remove:
   - Bearing ①
   - Oil seal ②

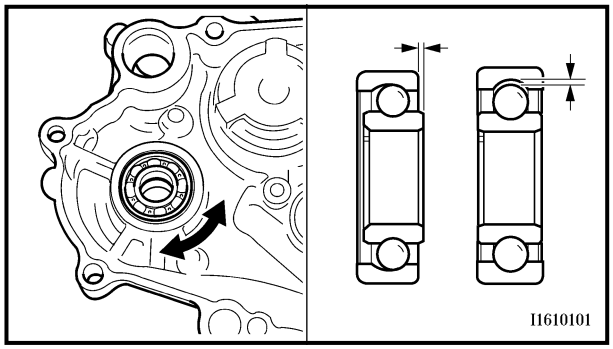




INSPECTION

EC444200
Impeller shaft

1. Inspect:
   - Impeller shaft ①
     Bend/wear/damage → Replace.
     Fur deposits → Clean.

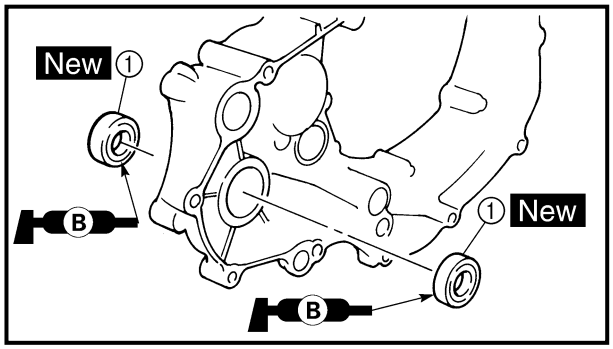


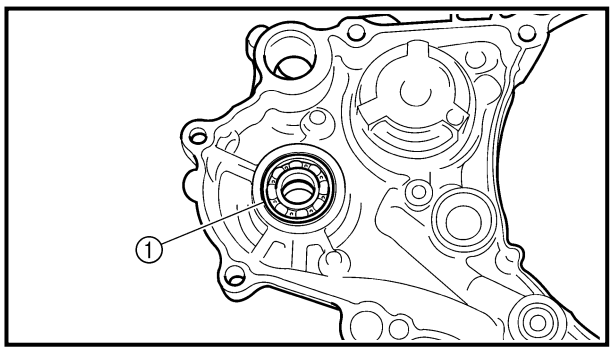
EC4H4600
Bearing

1. Inspect:
   - Bearing
     Rotate inner race with a finger.
     Rough spot/seizure → Replace.

EC444400
Oil seal

1. Inspect:
   - Oil seal
     Wear/damage → Replace.





ASSEMBLY AND INSTALLATION

EC4G5110
Oil seal

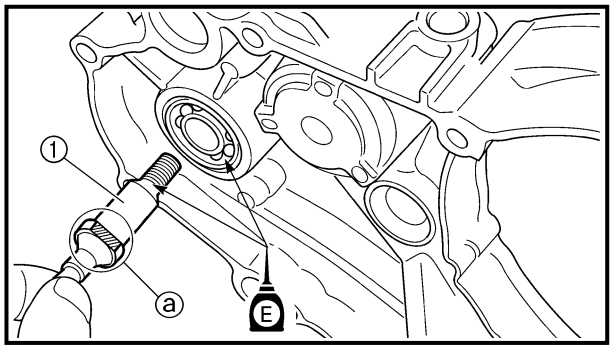
1. Install:
   - Oil seal ① New

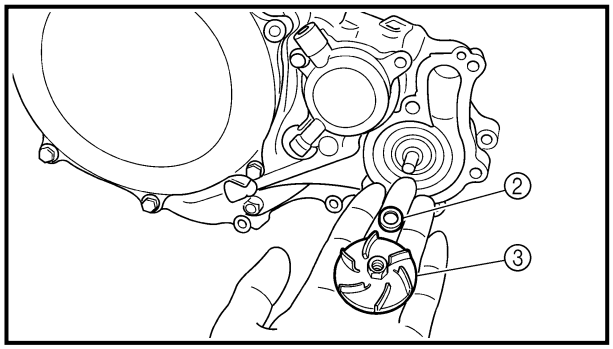
NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- Install the oil seal with its manufacture's marks or numbers facing inward.

Bearing

1. Install:
   - Bearing ①

NOTE:
Install the bearing by pressing its outer race parallel.





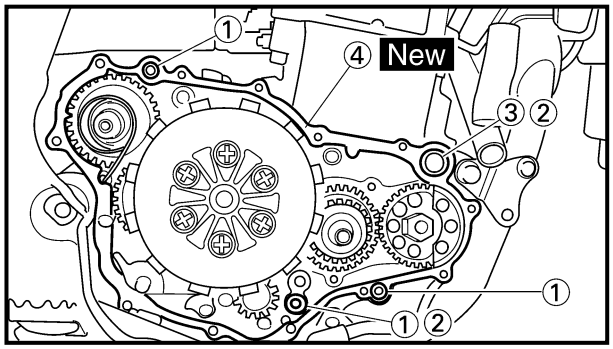
EC4G5220
Impeller shaft

1. Install:
   - Impeller shaft ①
   - Plain washer ②
   - Impeller ③

	14 Nm (1.4 m · kg, 10 ft · lb)

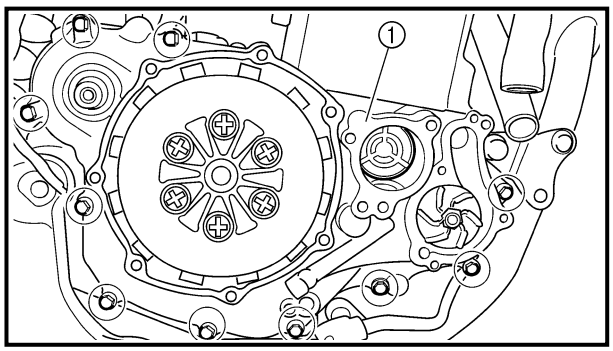
NOTE:

- Take care so that the oil seal lip is not damaged or the spring does not slip off its position.
- When installing the impeller shaft, apply the engine oil on the oil seal lip, bearing and impeller shaft. And install the shaft while turning it.
- Hold the impeller shaft on its width across the flats ⓐ with spanners, etc. and install the impeller.



Crankcase cover (right)

1. Install:
   - Dowel pin ①
   - O-ring ②
   - Collar ③
   - Gasket ④ New

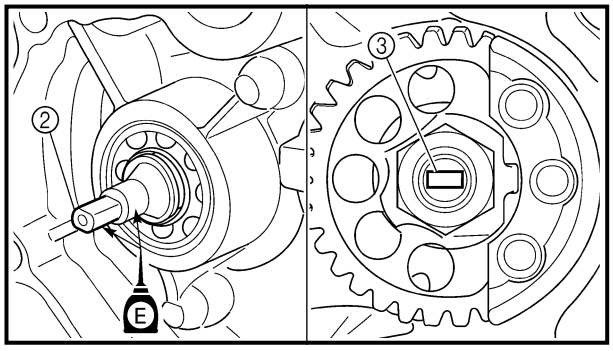


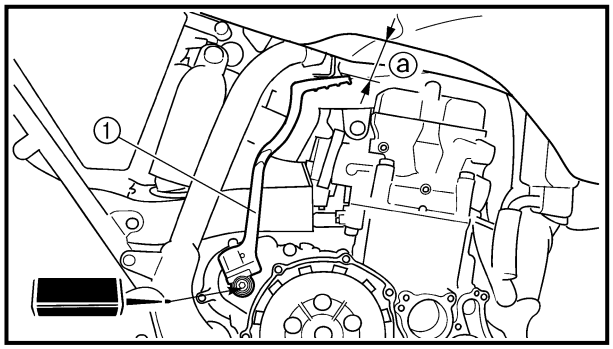
2. Install:
   - Crankcase cover (right) ①
   - Bolt

	10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:

- Apply the engine oil on the impeller shaft end.
- When installing the crankcase cover onto the crankcase, be sure that the impeller shaft end ② aligns with the balancer end slot ③.
- Tighten the bolts in stage, using a crisscross pattern.



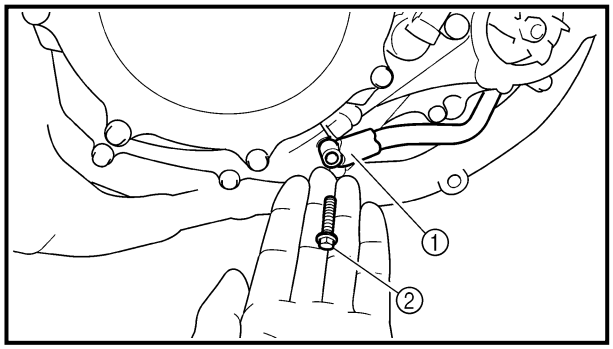


Kick crank

1. Install:
   - Kickstarter ①
   - Plain washer
   - Bolt (kickstarter)

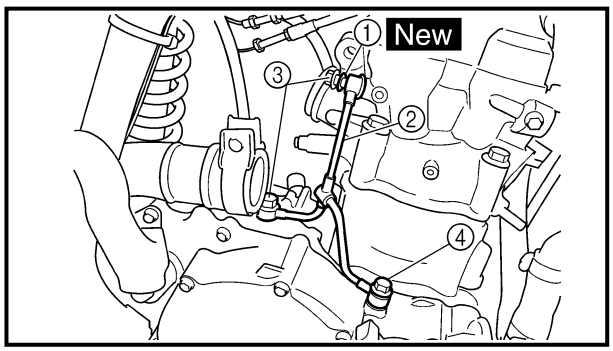
33 Nm (3.3 m · kg, 24 ft · lb)

NOTE:
Install the kickstarter so that the distance ⓐ between the kickstarter and the fuel tank is 12 mm (0.47 in) or more.



2. Install:
   - Oil hose ①
   - Bolt (oil hose) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

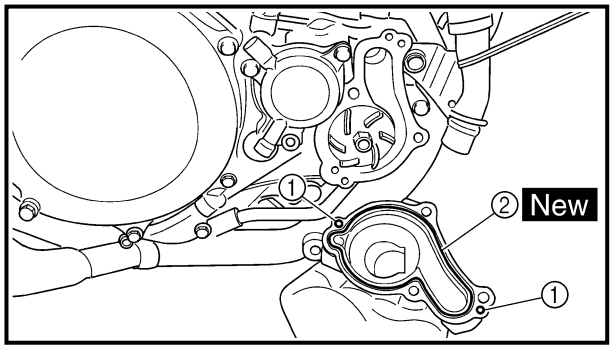


3. Install:
   - Copper washer ① New
   - Oil delivery pipe ②
   - Union bolt (M8) ③

18 Nm (1.8 m · kg, 13 ft · lb)

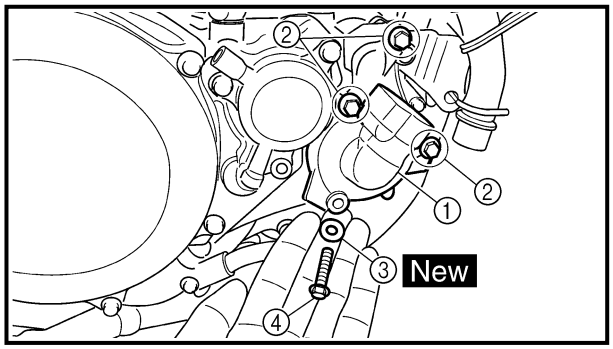
   - Union bolt (M10) ④

20 Nm (2.0 m · kg, 14 ft · lb)



Water pump housing

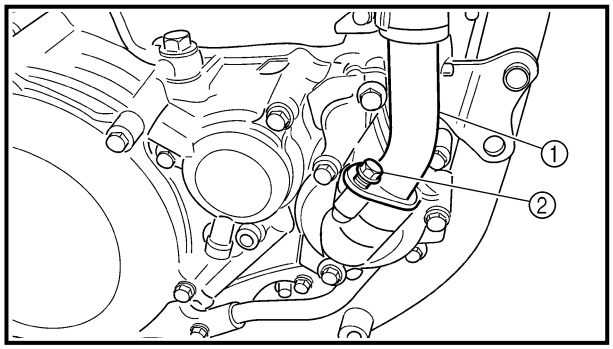
1. Install:
   - Dowel pin ①
   - O-ring ② New



2. Install:
   - Water pump housing ①
   - Bolt (water pump housing) ②

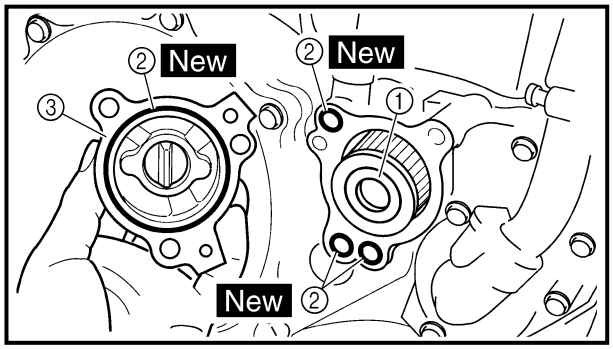
   10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Plain washer ③ New
   - Coolant drain bolt ④

   10 Nm (1.0 m · kg, 7.2 ft · lb)



3. Install:
   - O-ring
   - Coolant pipe ①
   - Bolt (coolant pipe) ②

   10 Nm (1.0 m · kg, 7.2 ft · lb)

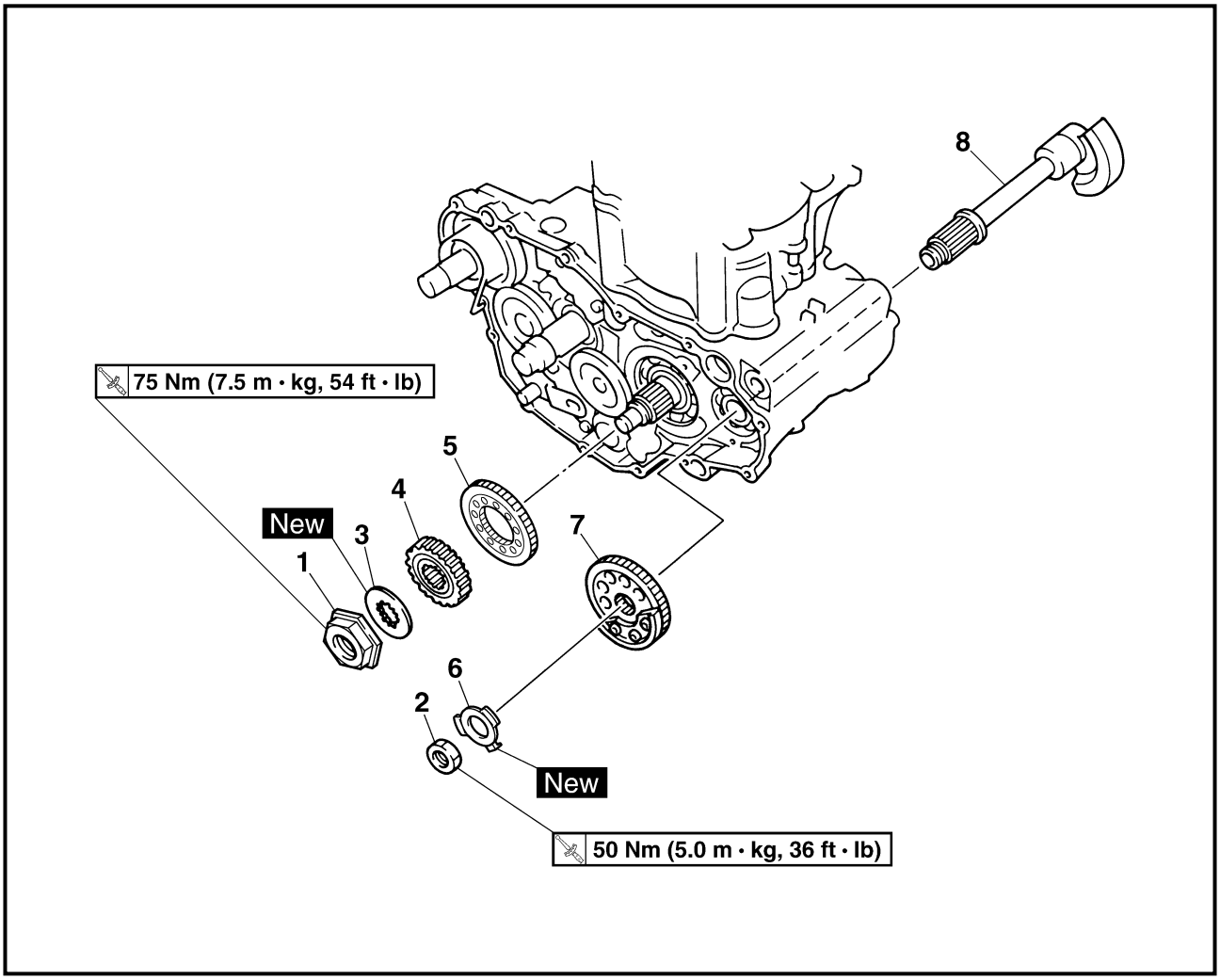


Oil filter

1. Install:
   - Oil filter ①
   - O-ring ② New
   - Oil filter cover ③
   - Bolt (oil filter cover)

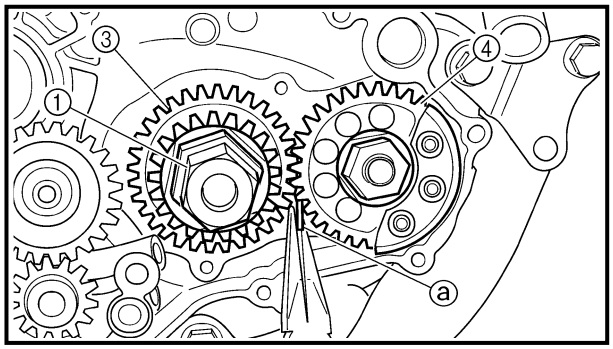
   10 Nm (1.0 m · kg, 7.2 ft · lb)

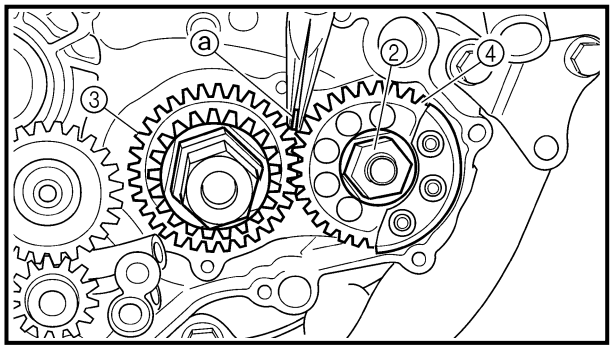
BALANCER
BALANCER



Extent of removal: ① Balancer drive gear ② Balancer

Extent of removal	Order	Part name	Q'ty	Remarks
		BALANCER REMOVAL		
Preparation for removal		Clutch housing		Refer to "CLUTCH" section.
		Crankcase cover (right)		Refer to "OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)" section.
		Stator		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
②	1	Nut (primary drive gear)	1	Refer to "REMOVAL POINTS".
②	2	Nut (balancer)	1	
①	3	Lock washer	1	
①	4	Primary drive gear	1	
①	5	Balancer drive gear	1	
①	6	Lock washer	1	
②	7	Balancer driven gear	1	
②	8	Balancer	1	Refer to "REMOVAL POINTS".





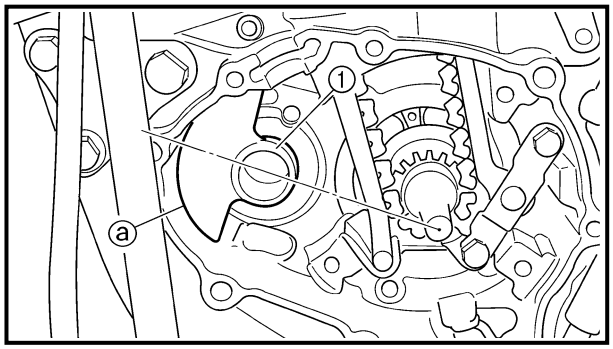
REMOVAL POINTS

Balancer drive gear and balancer driven gear

1. Straighten the lock washer tab.
2. Loosen:
   - Nut (primary drive gear) ①
   - Nut (balancer) ②

NOTE:

Place an aluminum plate ⓐ between the teeth of the balancer drive gear ③ and driven gear ④.

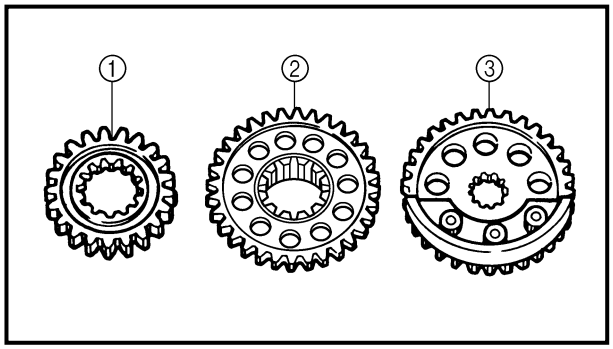


Balancer

1. Remove:
   - Balancer ①

NOTE:

When removing the balancer shaft, align the center of the balancer shaft weight ⓐ along the line connecting the centers of the crankshaft and balancer shaft.

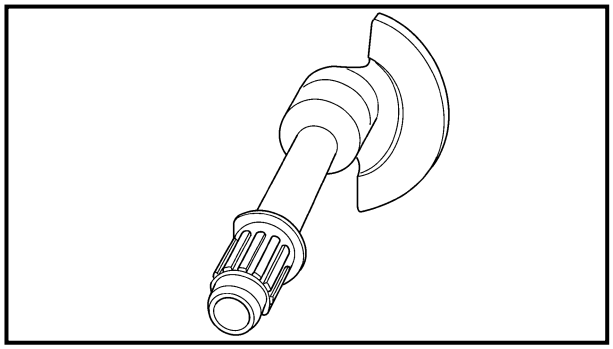


INSPECTION

Primary drive gear, balancer drive gear and balancer driven gear

1. Inspect:
   - Primary drive gear ①
   - Balancer drive gear ②
   - Balancer driven gear ③

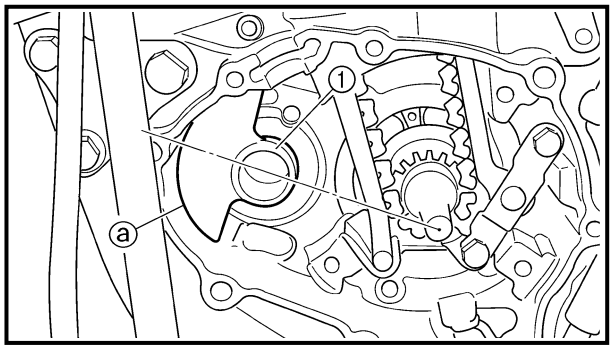
   Wear/damage → Replace.

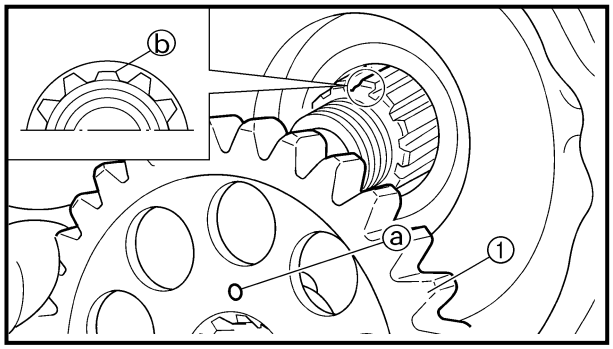


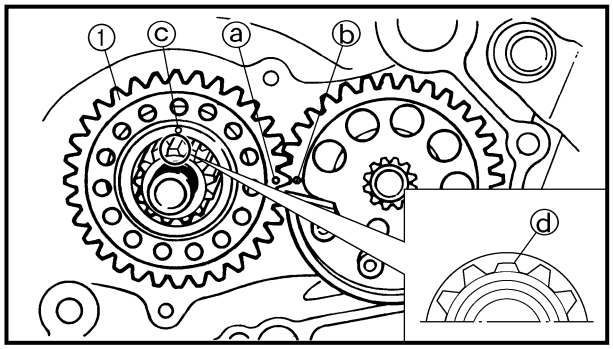
Balancer

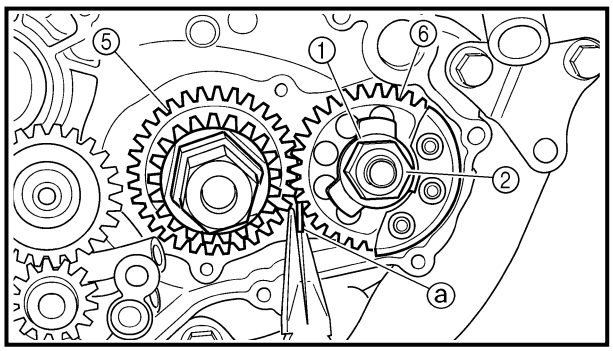
1. Inspect:
   - Balancer

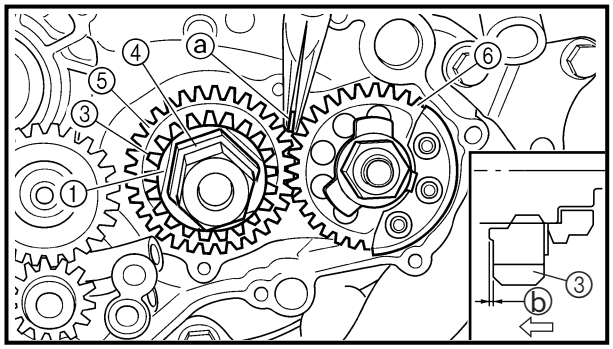
   Cracks/damage → Replace.











ASSEMBLY AND INSTALLATION

Balancer, balancer drive gear and balancer driven gear

1. Install:
   - Balancer ①

NOTE:

When installing the balancer shaft, align the center of the balancer shaft weight ⓐ along the line connecting the centers of the crankshaft and balancer shaft.

2. Install:
   - Balancer driven gear ①

NOTE:

Install the balancer driven gear onto the balancer while aligning the punch mark ⓐ on the balancer driven gear with the lower spline ⓑ on the balancer end.

3. Install:
   - Balancer drive gear ①

NOTE:

- Align the punched mark ⓐ on the balancer drive gear with the punched mark ⓑ on the balancer driven gear.
- Align the punched mark ⓒ on the balancer drive gear with the lower spline ⓓ on the crankshaft.

4. Install:
   - Lock washer ①
   - Nut (balancer) ②

     50 Nm (5.0 m · kg, 36 ft · lb)
   - Primary drive gear ③
   - Nut (primary drive gear) ④

     75 Nm (7.5 m · kg, 54 ft · lb)

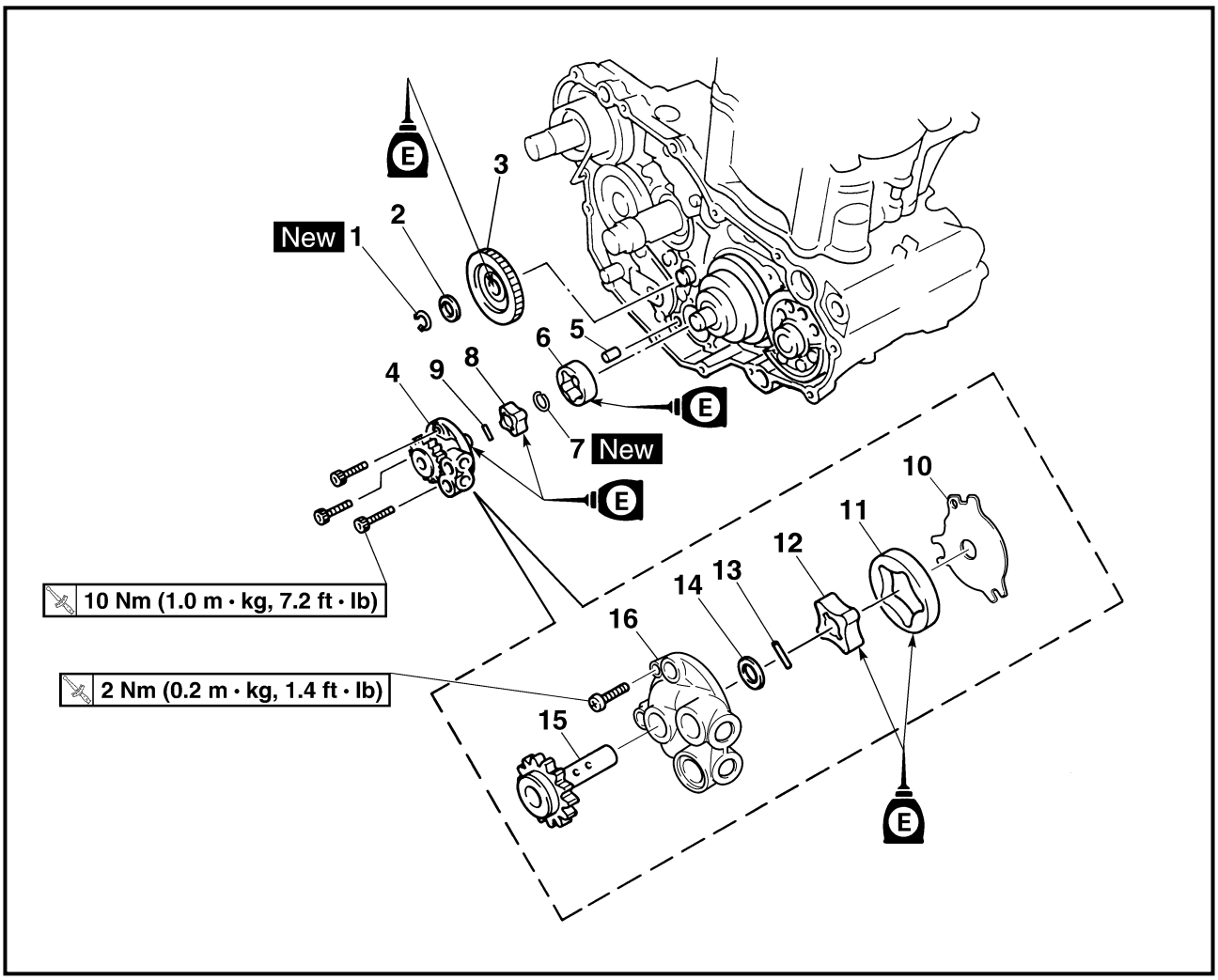
NOTE:

- Install the primary drive gear with its stepped side ⓑ facing the engine.
- Place an aluminum plate ⓐ between the teeth of the balancer drive gear ⑤ and driven gear ⑥.

5. Bend the lock washer tab.

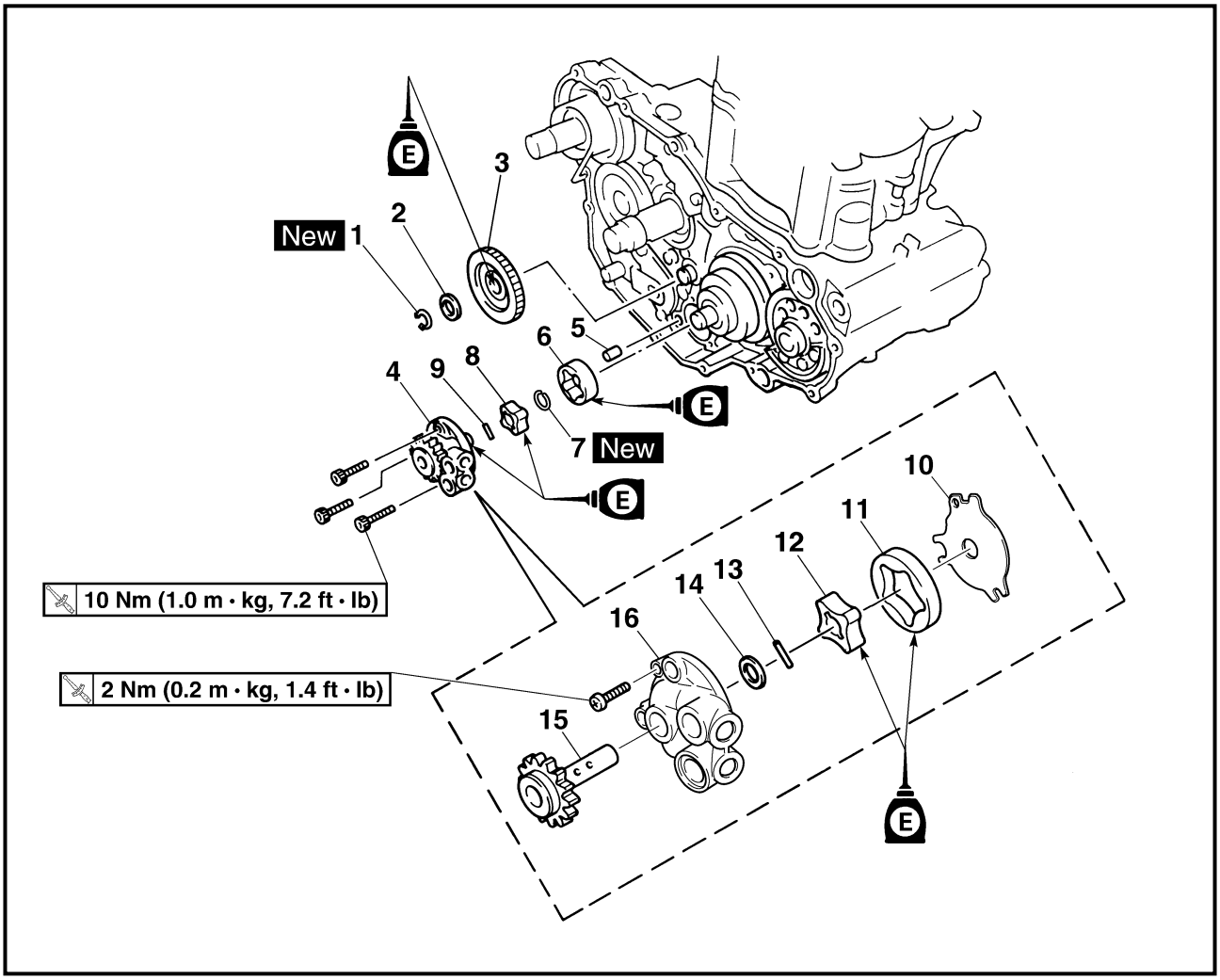
OIL PUMP

OIL PUMP



Extent of removal: ① Oil pump removal ② Oil pump disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
		OIL PUMP REMOVAL AND DISASSEMBLY		
Preparation for removal		Clutch housing Crankcase cover (right)		Refer to "CLUTCH" section. Refer to "OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)" section.
①	1	Circlip	1	
	2	Plate washer	1	
	3	Oil pump drive gear	1	
	4	Oil pump assembly	1	
	5	Dowel pin	1	
②	6	Outer rotor 2	1	
	7	Circlip	1	
	8	Inner rotor 2	1	
	9	Pin	1	
	10	Oil pump cover	1	
	11	Outer rotor 1	1	
	12	Inner rotor 1	1	



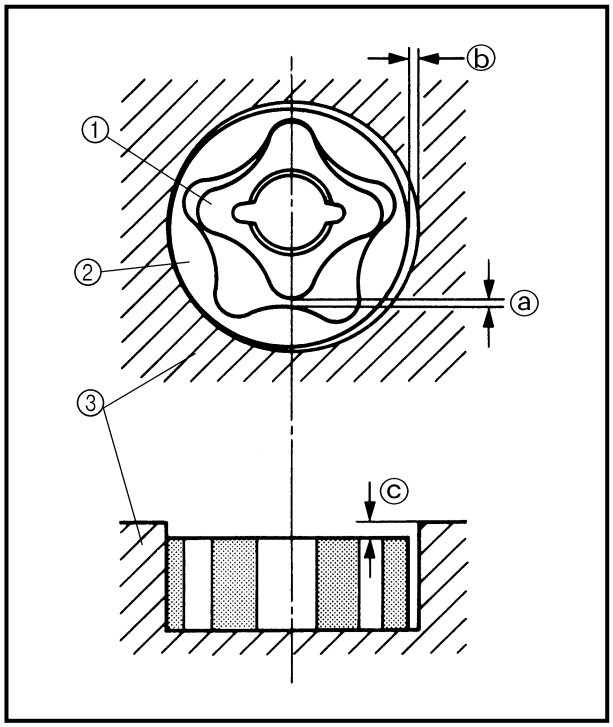
Extent of removal	Order	Part name	Q'ty	Remarks
②	13	Pin	1	
	14	Washer	1	
	15	Oil pump drive shaft	1	
	16	Rotor housing	1	

INSPECTION

Oil pump

1. Inspect:
   - Oil pump drive gear
   - Oil pump driven gear
   - Rotor housing
   - Oil pump cover

   Cracks/wear/damage → Replace.



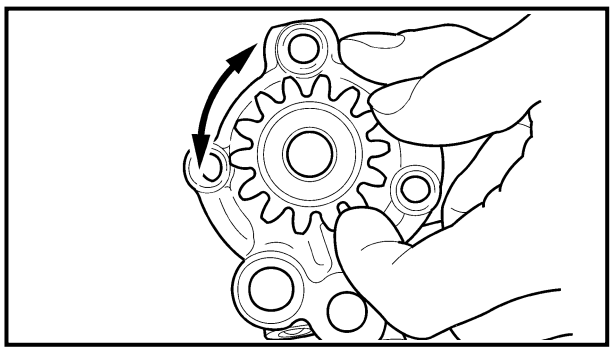
2. Measure:
   - Tip clearance ⓐ

     Between the inner rotor ① and the outer rotor ②.
   - Tip clearance ⓑ

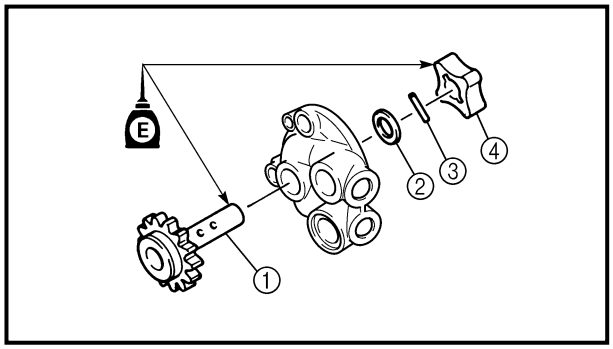
     Between the outer rotor ② and the rotor housing ③.

     Out of specification → Replace the oil pump.

Tip clearance ⓐ:
0.12 mm or less
(0.0047 in or less)
<Limit>: 0.20 mm (0.008 in)
Tip clearance ⓑ:
0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in)
<Limit>: 0.24 mm (0.009 in)
Side clearance ⓒ:
0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)
<Limit>: 0.17 mm (0.007 in)



3. Check:
   - Unsmooth → Repeat steps #1 and #2 or replace the defective parts.

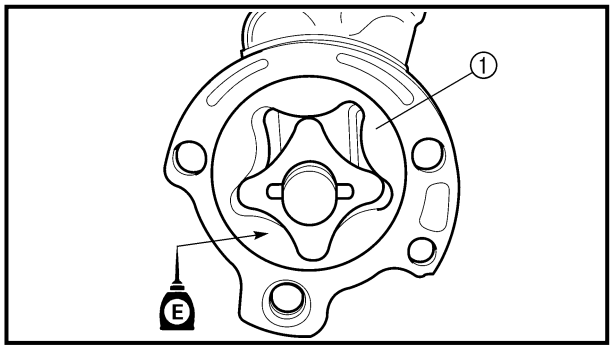


ASSEMBLY AND INSTALLATION

Oil pump

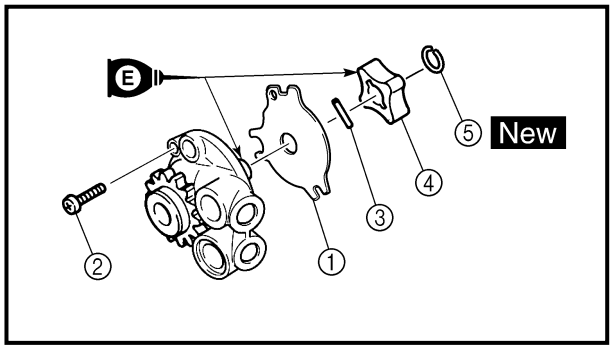
1. Install:
   - Oil pump drive shaft ①
   - Washer ②
   - Pin ③
   - Inner rotor 1 ④

NOTE:
- Apply the engine oil on the oil pump drive shaft and inner rotor 1.
- Fit the pin into the groove in the inner rotor 1.



2. Install:
   - Outer rotor 1 ①

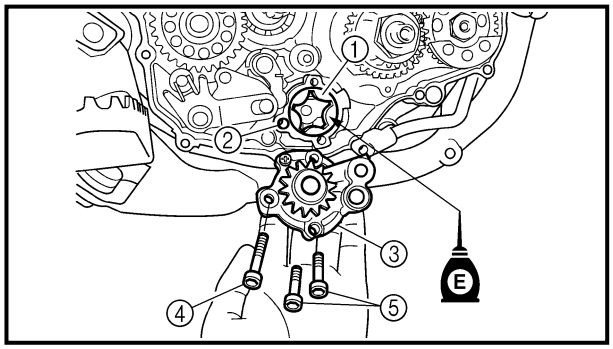
NOTE:
Apply the engine oil on the outer rotor 1.



3. Install:
   - Oil pump cover ①
   - Screw (oil pump cover) ②

     2 Nm (0.2 m · kg, 1.4 ft · lb)
   - Pin ③
   - Inner rotor 2 ④
   - Circlip ⑤ New

NOTE:
- Apply the engine oil on the oil pump drive shaft end and inner rotor 2.
- Fit the pin into the groove in the inner rotor 2.

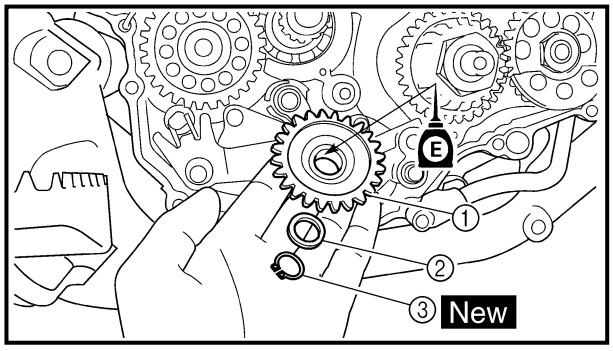


4. Install:
   - Outer rotor 2 ①
   - Dowel pin ②
   - Oil pump assembly ③
   - Bolt (oil pump assembly) [L = 30 mm (1.18 in)] ④

     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Bolt (oil pump assembly) [L = 25 mm (0.98 in)] ⑤

     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the engine oil on the outer rotor 2.

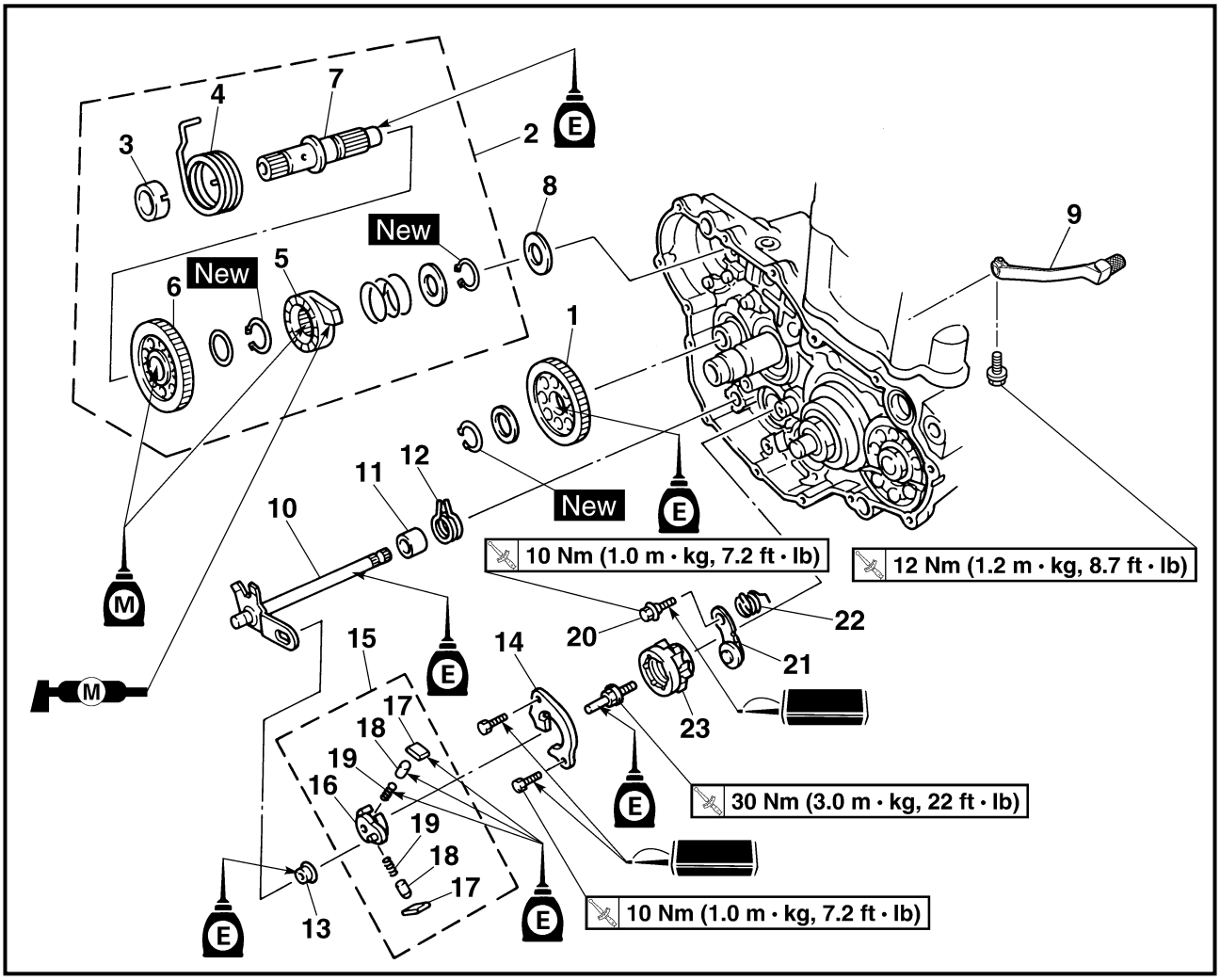


5. Install:
   - Oil pump drive gear ①
   - Plate washer ②
   - Circlip ③ New

NOTE:
Apply the engine oil on the oil pump drive gear inner circumference.

KICK AXLE AND SHIFT SHAFT

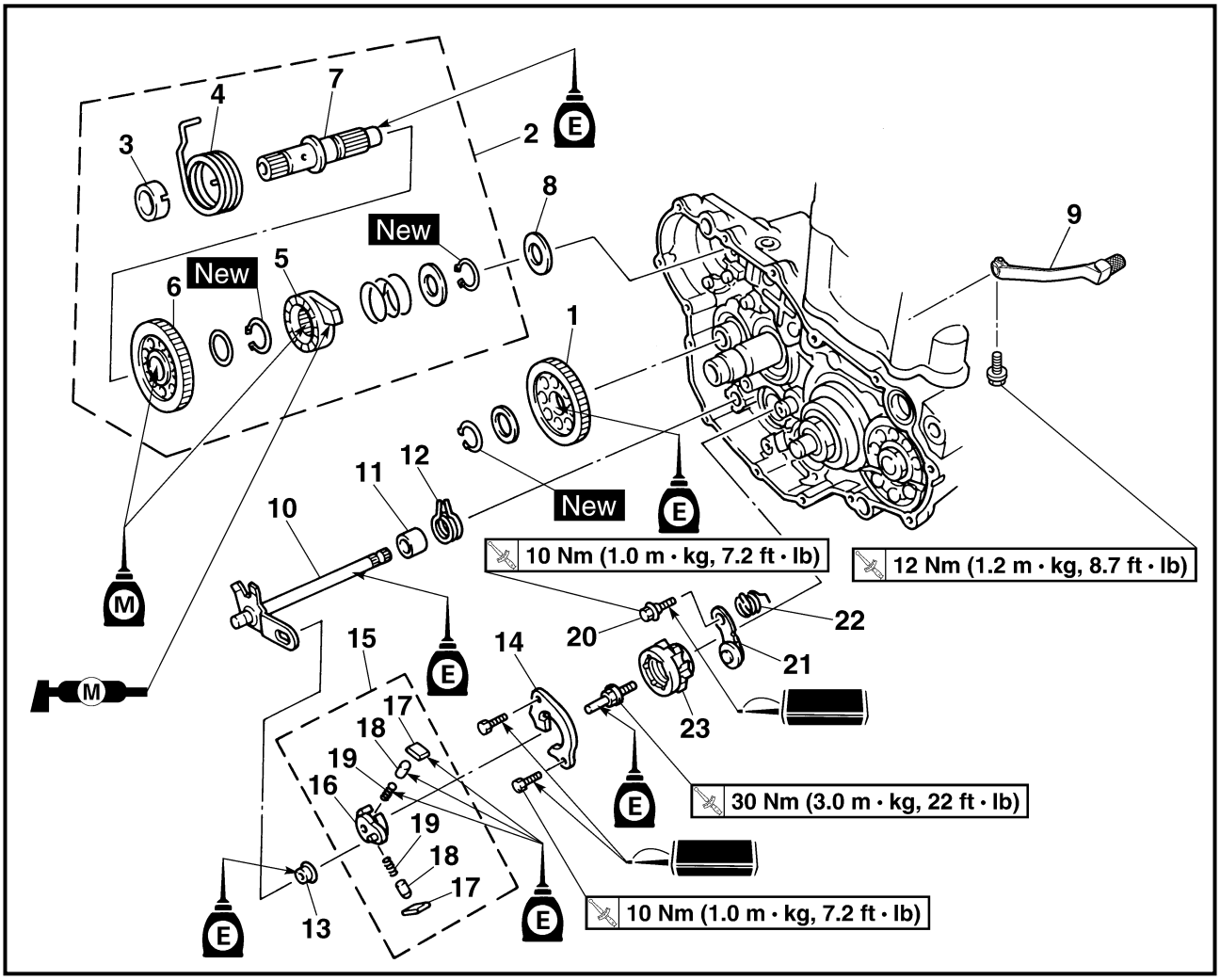
KICK AXLE AND SHIFT SHAFT



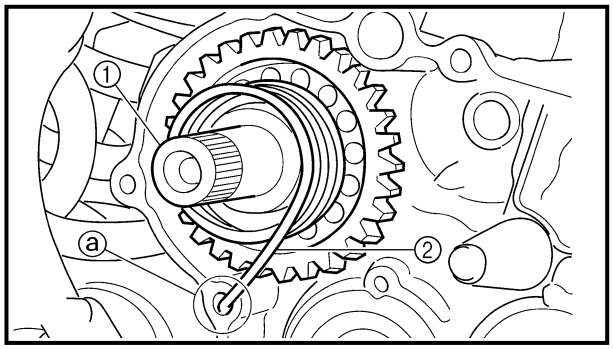
Extent of removal:

① Kick axle removal
② Kick axle disassembly
③ Shift shaft removal
④ Segment removal

Extent of removal	Order	Part name	Q'ty	Remarks
		KICK AXLE AND SHIFT SHAFT REMOVAL		
Preparation for removal		Oil pump		Refer to "OIL PUMP" section.
①	1	Kick idle gear	1	
	2	Kick axle assembly	1	Refer to "REMOVAL POINTS".
	3	Spring guide	1	
②	4	Torsion spring	1	
	5	Ratchet wheel	1	
	6	Kick gear	1	
	7	Kick axle	1	
①	8	Plain washer	1	
	9	Shift pedal	1	
③ ④	10	Shift shaft	1	
	11	Collar	1	
	12	Torsion spring	1	



Extent of removal	Order	Part name	Q'ty	Remarks
	13	Roller	1	
	14	Shift guide	1	Refer to "REMOVAL POINTS".
	15	Shift lever assembly	1	
	16	Shift lever	1	
	17	Pawl	2	
④	18	Pawl pin	2	
	19	Spring	2	
	20	Bolt (stopper lever)	1	
	21	Stopper lever	1	
	22	Torsion spring	1	
	23	Segment	1	Refer to "REMOVAL POINTS".

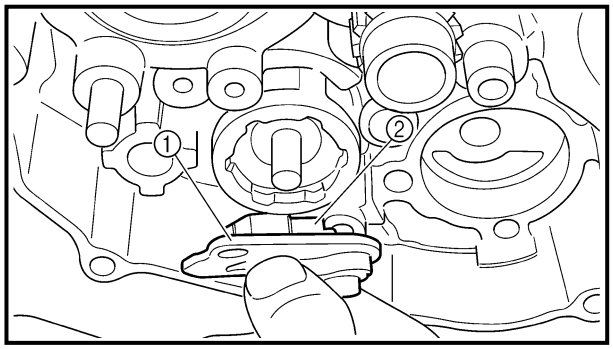


REMOVAL POINTS

EC4B3101
Kick axle assembly

1. Remove:
   - Kick axle assembly ①

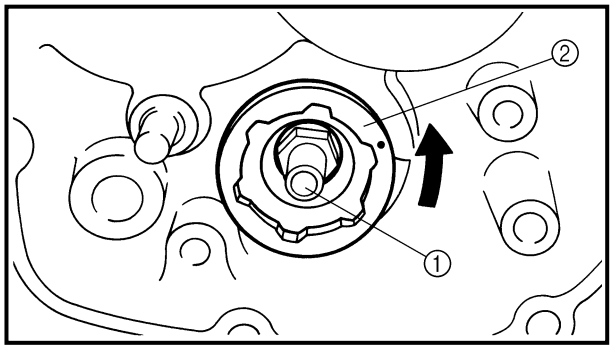
NOTE:
Unhook the torsion spring ② from the hole ⓐ in the crankcase.



EC4C3101
Shift guide and shift lever assembly

1. Remove:
   - Bolt (shift guide)
   - Shift guide ①
   - Shift lever assembly ②

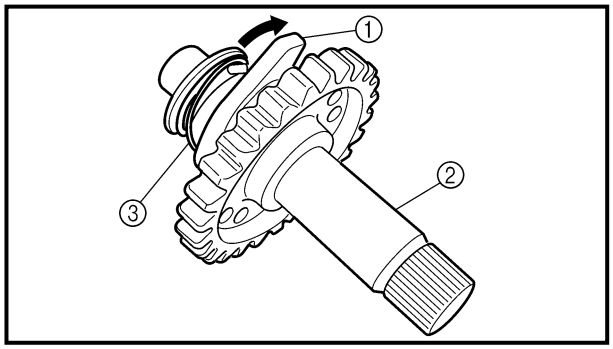
NOTE:
The shift lever assembly is disassembled at the same time as the shift guide.



EC4N3100
Segment

1. Remove:
   - Bolt (segment) ①
   - Segment ②

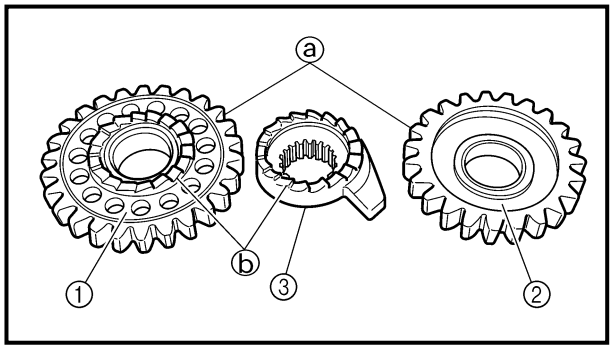
NOTE:
Turn the segment counterclockwise until it stops and loosen the bolt.



INSPECTION

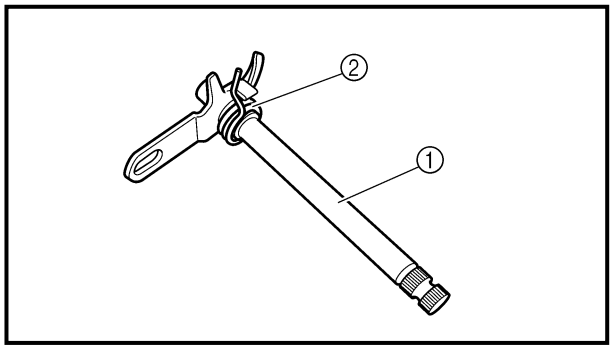
EC4C4200
Kick axle and ratchet wheel

1. Check:
   - Ratchet wheel ① smooth movement
     Unsmooth movement → Replace.
   - Kick axle ②
     Wear/damage → Replace.
   - Spring ③
     Broken → Replace.



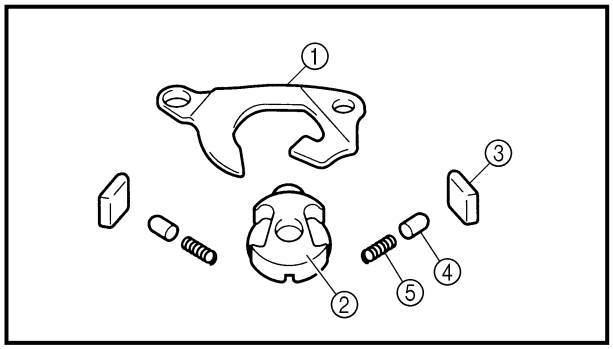
EC4C4300
Kick gear, kick idle gear and ratchet wheel

1. Inspect:
   - Kick gear ①
   - Kick idle gear ②
   - Ratchet wheel ③
   - Gear teeth ⓐ
   - Ratchet teeth ⓑ
     Wear/damage → Replace.



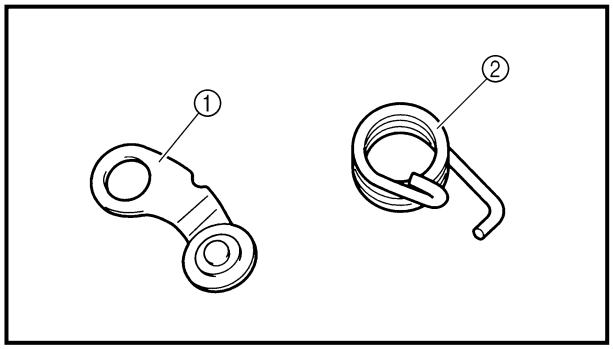
EC4B4400
Shift shaft

1. Inspect:
   - Shift shaft ①
     Bend/damage → Replace.
   - Spring ②
     Broken → Replace.



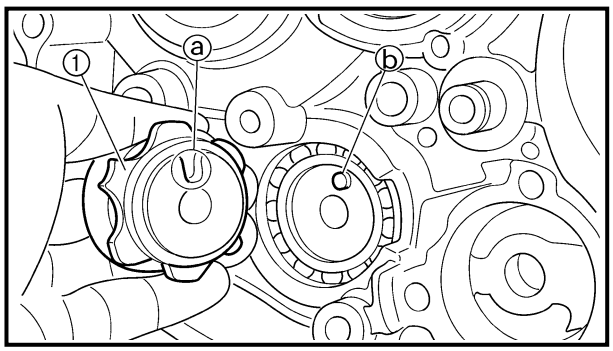
EC4C4100
Shift guide and shift lever assembly

1. Inspect:
   - Shift guide ①
   - Shift lever ②
   - Pawl ③
   - Pawl pin ④
   - Spring ⑤
     Wear/damage → Replace.



EC4B4500
Stopper lever

1. Inspect:
   - Stopper lever ①
     Wear/damage → Replace.
   - Torsion spring ②
     Broken → Replace.

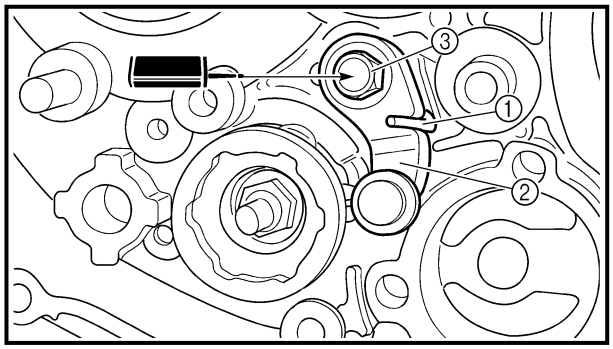


EC4C5000
ASSEMBLY AND INSTALLATION
Segment

1. Install:
   - Segment ①
   - Bolt (segment)

	30 Nm (3.0 m · kg, 22 ft · lb)

NOTE:
Align the notch ⓐ on the segment with the pin ⓑ on the shift cam.

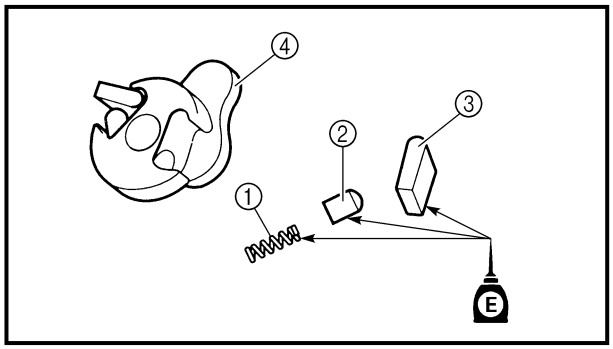


EC4B5111
Stopper lever

1. Install:
   - Torsion spring ①
   - Stopper lever ②
   - Bolt (stopper lever) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Align the stopper lever roller with the slot on segment.

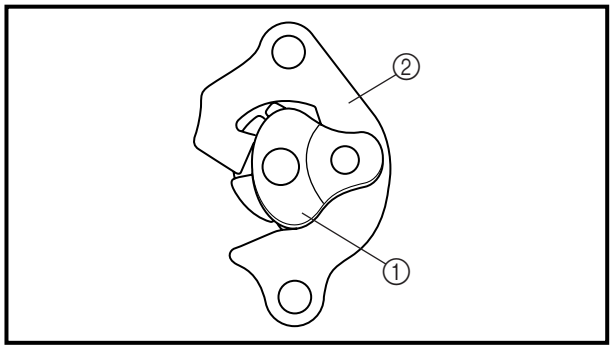


Shift guide and shift lever assembly

1. Install:
   - Spring ①
   - Pawl pin ②
   - Pawl ③

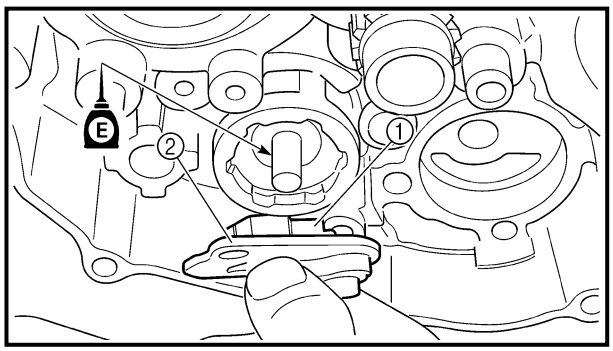
   To shift lever ④.

NOTE:
Apply the engine oil on the springs, pawl pins and pawls.



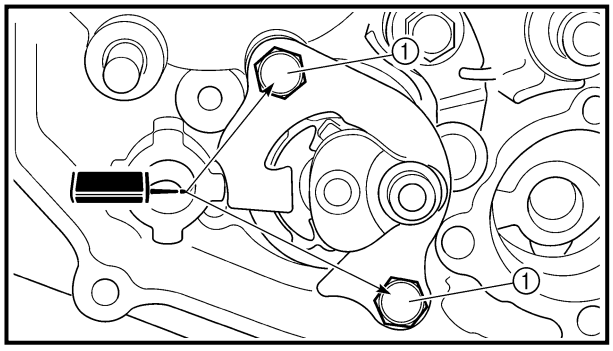
2. Install:
   - Shift lever assembly ①

   To shift guide ②.



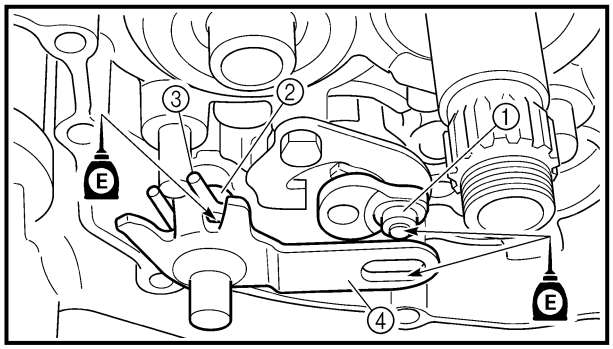
3. Install:
   - Shift lever assembly ①
   - Shift guide ②

NOTE:
- The shift lever assembly is installed at the same time as the shift guide.
- Apply the engine oil on the bolt (segment) shaft.



4. Install:
   - Bolt (shift guide) ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

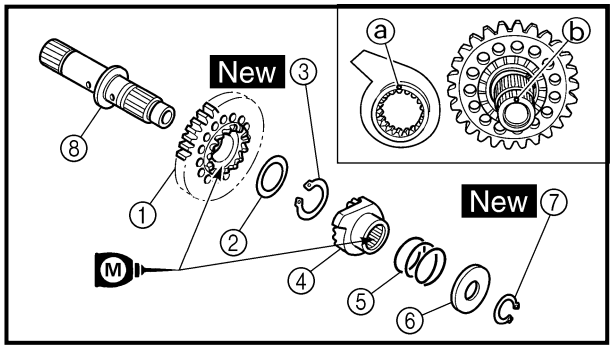


EC4C5301
Shift shaft

1. Install:
   - Roller ①
   - Collar ②
   - Torsion spring ③
   - Shift shaft ④

NOTE:
Apply the engine oil on the roller and shift shaft.

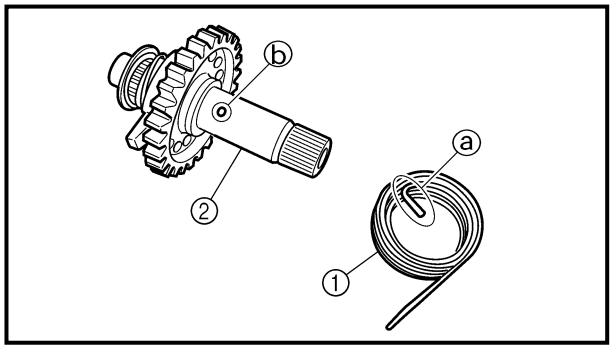
2. Install:
   - Shift pedal
     Refer to "AC MAGNETO AND STARTER CLUTCH" section.



Kick axle assembly

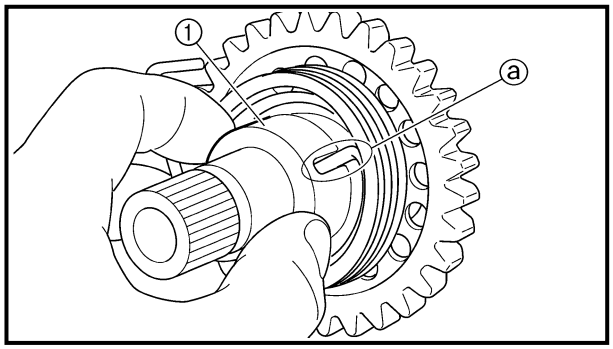
1. Install:
   - Kick gear ①
   - Plain washer ②
   - Circlip ③ New
   - Ratchet wheel ④
   - Spring ⑤
   - Plain washer ⑥
   - Circlip ⑦ New
     To kick axle ⑧.

NOTE:
- Apply the molybdenum disulfide oil on the inner circumferences of the kick gear and ratchet wheel.
- Align the punch mark ⓐ on the ratchet wheel with the punch mark ⓑ on the kick axle.



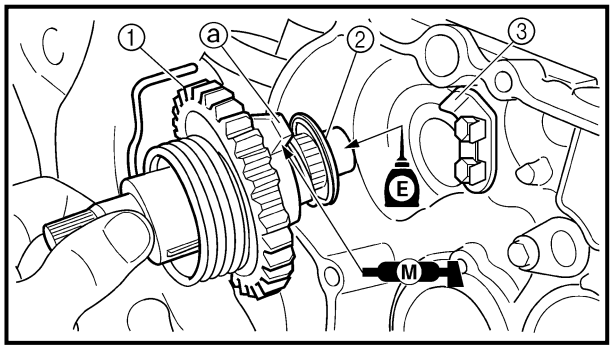
2. Install:
   - Torsion spring ①
     To kick axle ②.

NOTE:
Make sure the stopper ⓐ of the torsion spring fits into the hole ⓑ on the kick axle.



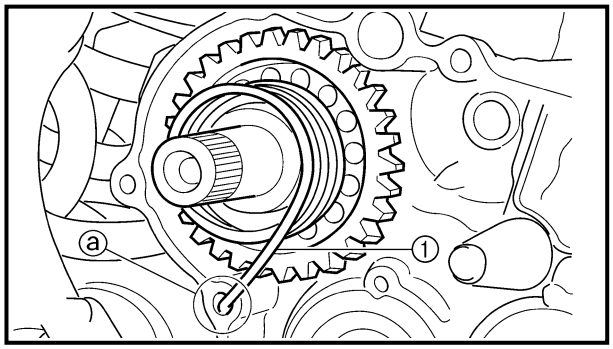
3. Install:
   - Spring guide ①

NOTE:
Slide the spring guide into the kick axle, make sure the groove ⓐ in the spring guide fits on the stopper of the torsion spring.



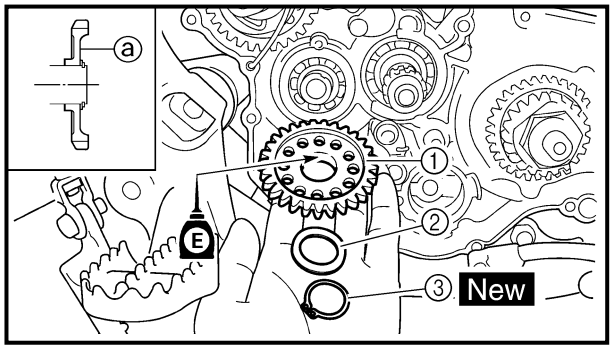
4. Install:
   - Kick axle assembly ①
   - Plain washer ②

NOTE:
- Apply the molybdenum disulfide grease on the contacting surfaces of the kick axle stopper ⓐ and stopper plate ③.
- Apply the engine oil on the kick axle.
- Slide the kick axle assembly into the crankcase and make sure the kick axle stopper fits into the stopper plate.



5. Hook:
   - Torsion spring ①

NOTE:
Turn the torsion spring clockwise and hook into the proper hole ⓐ in the crankcase.

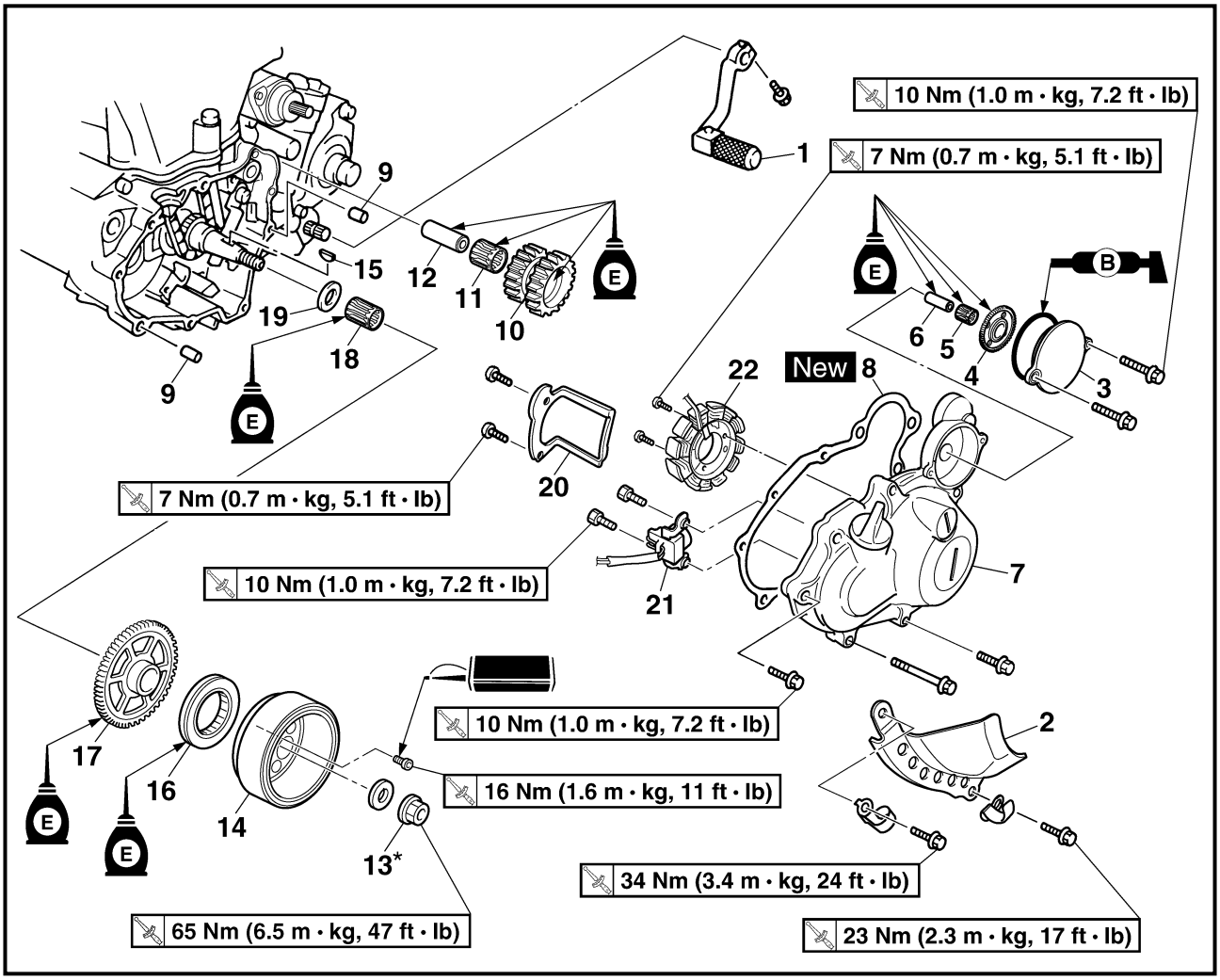


Kick idle gear

1. Install:
   - Kick idle gear ①
   - Plain washer ②
   - Circlip ③ New

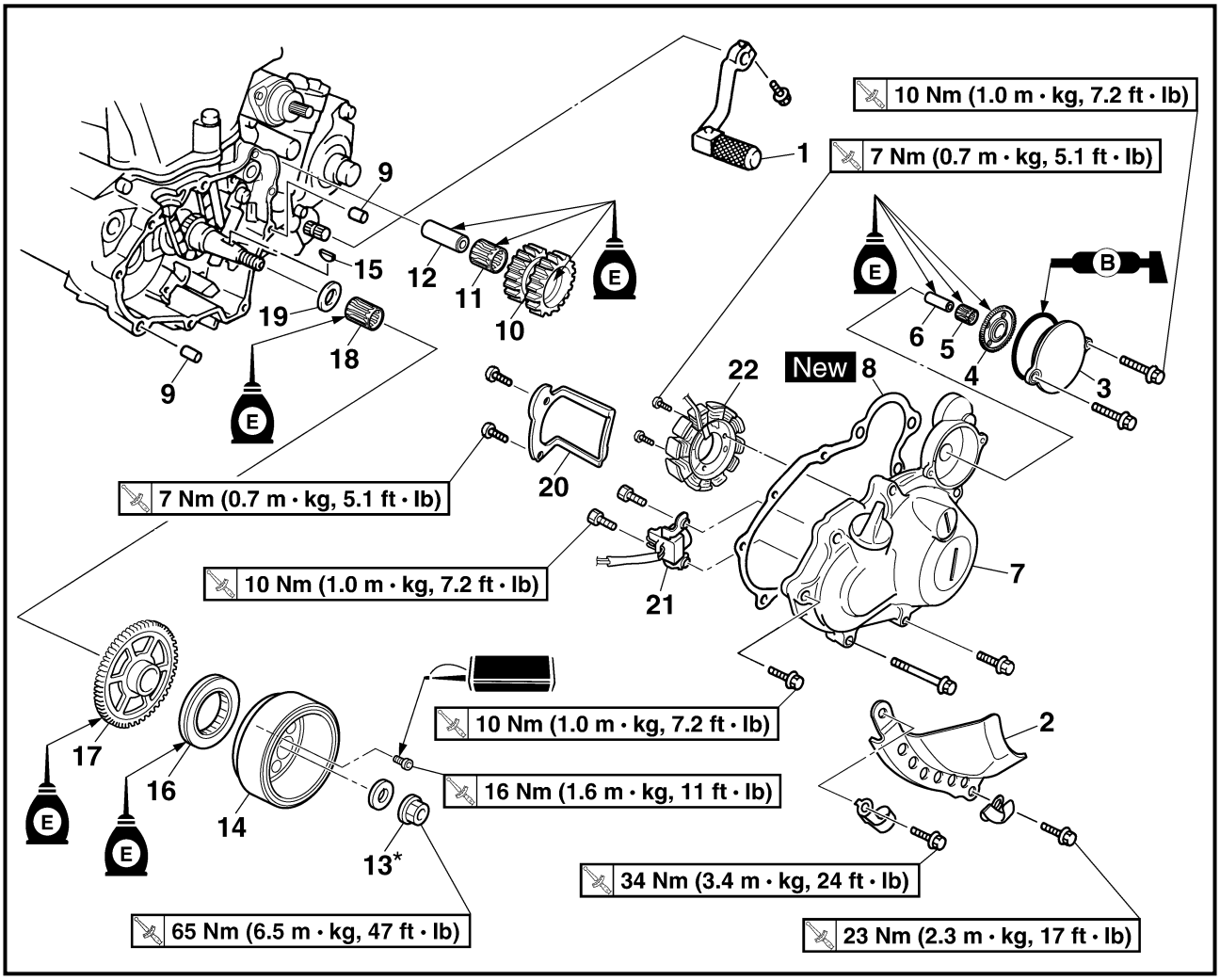
NOTE:
- Install the kick idle gear with its depressed side ⓐ toward you.
- Apply the engine oil on the kick idle gear inner circumference.

AC MAGNETO AND STARTER CLUTCH



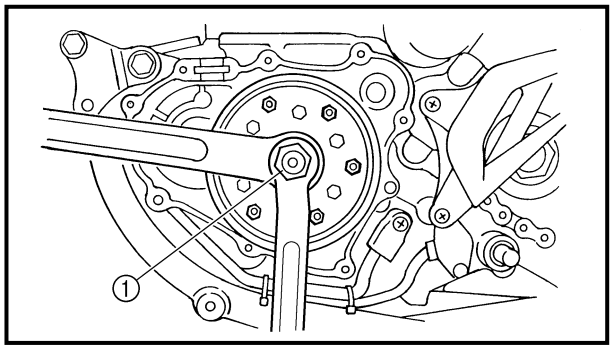
Extent of removal: ① Starter clutch/wheel gear removal ② Rotor removal ③ Pickup coil/stator removal

Extent of removal	Order	Part name	Q'ty	Remarks
		AC MAGNETO AND STATOR REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Bolt [radiator (left)] Disconnect the AC magneto lead.		Refer to "RADIATOR" section.
① ③	1	Shift pedal	1	
	2	Engine guard (left)	1	
	3	Cover (idle gear 1)	1	
	4	Idle gear 1	1	
	5	Bearing	1	
	6	Shaft	1	
	7	Crankcase cover (left)	1	
	8	Gasket	1	

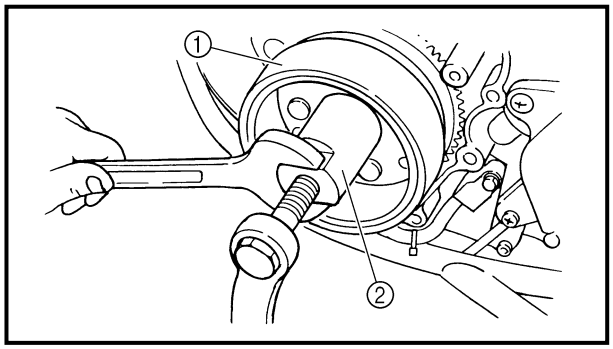


Extent of removal	Order	Part name	Q'ty	Remarks
③	9	Dowel pin	2	
	10	Idle gear 2	1	
	11	Bearing	1	
	12	Shaft	1	
	13*	Nut (rotor)	1	Refer to NOTE.
① ②	14	Rotor	1	Use special tool. Refer to "REMOVAL POINTS".
	15	Woodruff key	1	
	16	Starter clutch	1	
	17	Starter clutch drive gear	1	
	18	Bearing	1	
	19	Plain washer	1	
	20	Holder	1	
③	21	Pick-up coil	1	
	22	Stator	1	

NOTE:
Tighten the rotor nut to 65 Nm (6.5 m·kg, 47 ft·lb), loosen and retighten the rotor nut to 65 Nm (6.5 m·kg, 47 ft·lb).



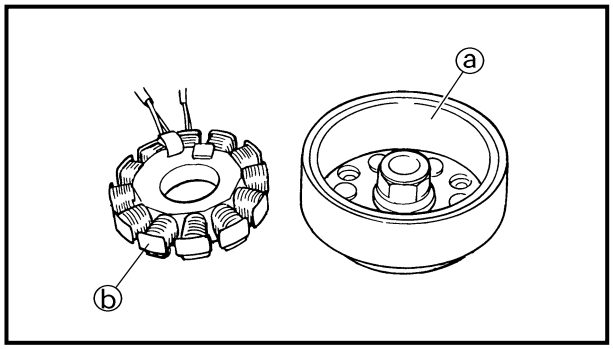
EC4L3000
REMOVAL POINTS
Rotor
1. Remove:
   - Nut (rotor) ①
   - Plain washer



2. Remove:
   - Rotor ①

   Use the rotor puller ②.

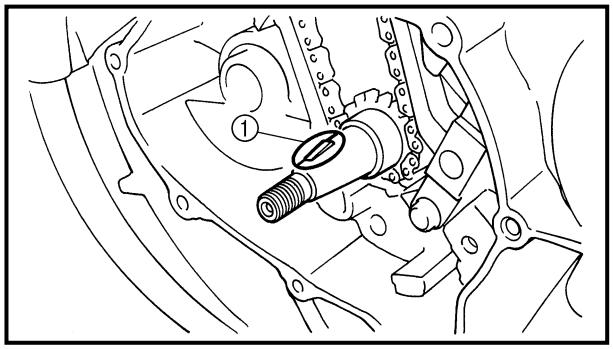
	Rotor puller: **YM-04141/90890-04141**



EC4L4000
INSPECTION
AC magneto
1. Inspect:
   - Rotor inner surface ⓐ
   - Stator outer surface ⓑ

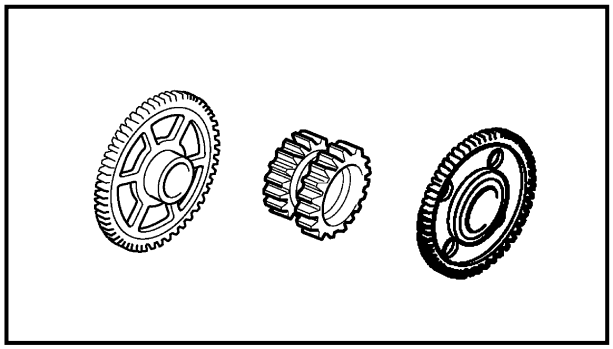
   Damage → Inspect the crankshaft runout and crankshaft bearing.

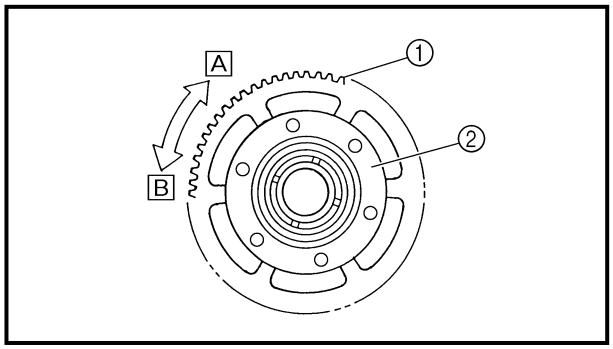
   If necessary, replace AC magneto and/or stator.



EC4L4200
Woodruff key
1. Inspect:
   - Woodruff key ①

   Damage → Replace.

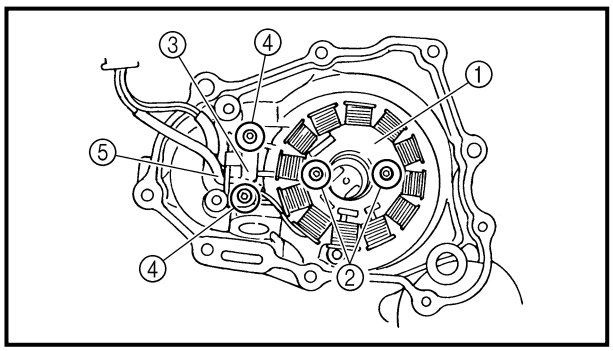




Starter clutch

1. Check:
   - Starter clutch
     Damage/wear → Replace.
2. Check:
   - Idle gear
   - Idle gear shaft
   - Starter clutch gear
     Pitting/burrs/chips/roughness/wear → Replace the defective parts.
3. Check:
   - Starter clutch operation

- Install the starter clutch drive gear ① onto the starter clutch ② and hold the starter clutch.
- When turning the starter clutch drive gear counterclockwise [B], the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the starter clutch is faulty and must be replaced.
- When turning the starter clutch drive gear clockwise [A], it should turn freely.
  If the starter clutch drive gear does not turn freely, the starter clutch is faulty and must be replaced.



EC4L5000

ASSEMBLY AND INSTALLATION

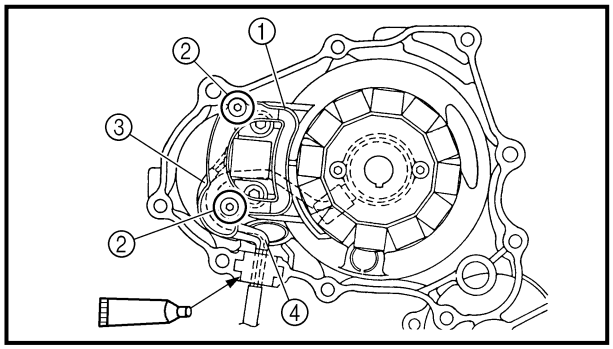
AC magneto and starter clutch

1. Install:
   - Stator ①
   - Bolt (stator) ②

     7 Nm (0.7 m · kg, 5.1 ft · lb)
   - Pick-up coil ③
   - Bolt (pick-up coil) ④

     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Pass the AC magneto lead ⑤ under the pick-up coil.

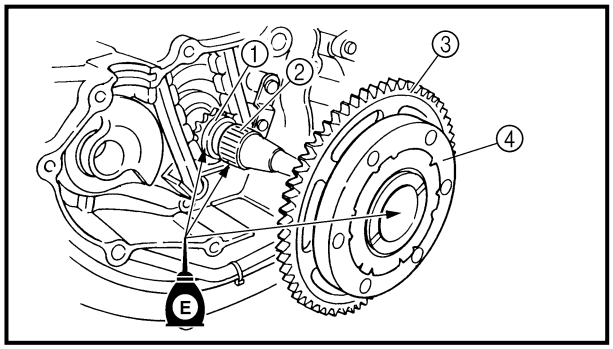


2. Install:
   - Holder ①
   - Bolt ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

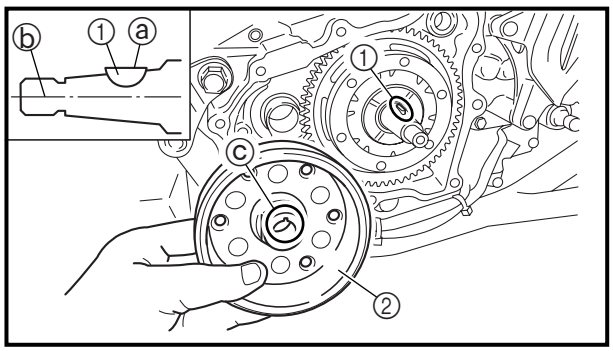
NOTE:
- Pass the pick-up coil lead ③ and AC magneto lead ④ under the holder as shown.
- Take care not to catch the AC magneto lead between crankcase cover ribs.
- Apply the sealant to the grommet of the AC magneto lead.

Quick gasket®:
ACC-QUICK-GS-KT
YAMAHA Bond No. 1215:
90890-85505



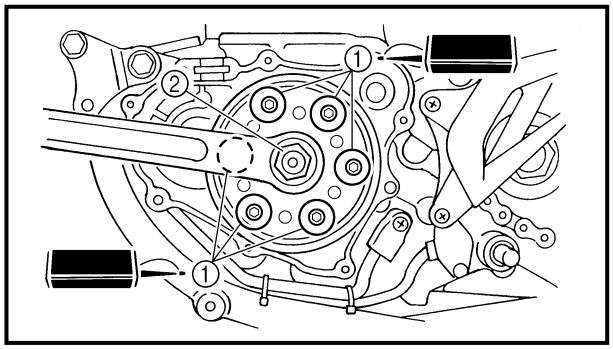
3. Install:
   - Plain washer ①
   - Bearing ②
   - Starter clutch drive gear ③
   - Starter clutch ④

NOTE:
Apply the engine oil on the plain washer, bearing and starter clutch drive gear inner circumference.



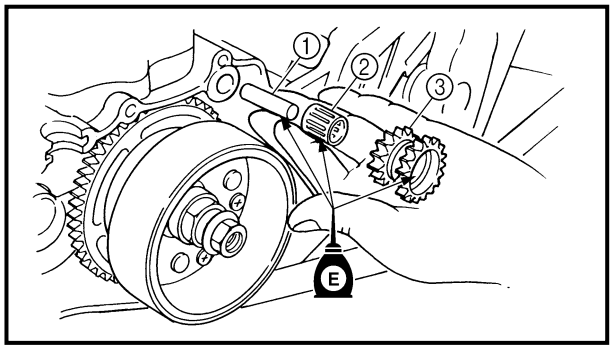
4. Install:
   - Woodruff key ①
   - Rotor ②

NOTE:
- Clean the tapered portions of the crankshaft and rotor.
- When installing the woodruff key, make sure that its flat surface ⓐ is in parallel with the crankshaft center line ⓑ.
- When installing the rotor, align the keyway ⓒ of the rotor with the woodruff key.



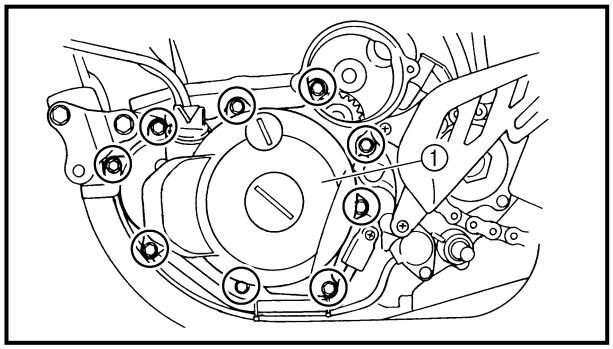
5. Install:
   - Bolt (starter clutch) ①
     16 Nm (1.6 m · kg, 11 ft · lb)
   - Plain washer (rotor)
   - Nut (rotor) ②
     65 Nm (6.5 m · kg, 47 ft · lb)

NOTE:
Tighten the rotor nut to 65 Nm (6.5 m·kg, 47 ft·lb), loosen and retighten the rotor nut to 65 Nm (6.5 m·kg, 47 ft·lb).



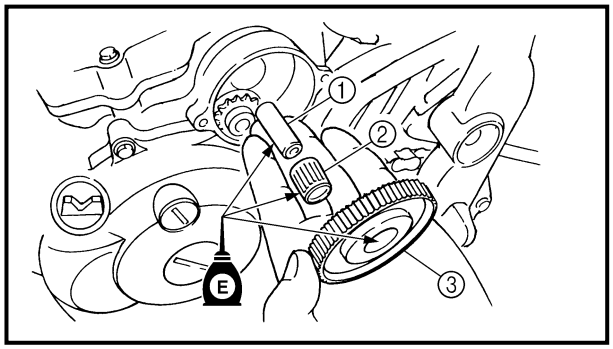
6. Install:
   - Shaft ①
   - Bearing ②
   - Idle gear 2 ③

NOTE:
Apply the engine oil on the shaft, bearing and idle gear inner circumference.



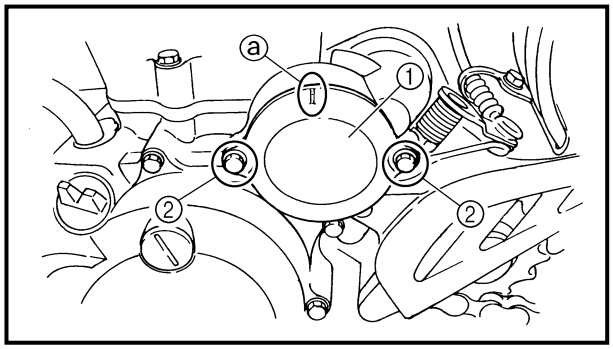
7. Install:
   - Dowel pin
   - Gasket [crankcase cover (left)] New
   - Crankcase cover (left) ①
   - Bolt [crankcase cover (left)]
     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the bolts in stage, using a crisscross pattern.



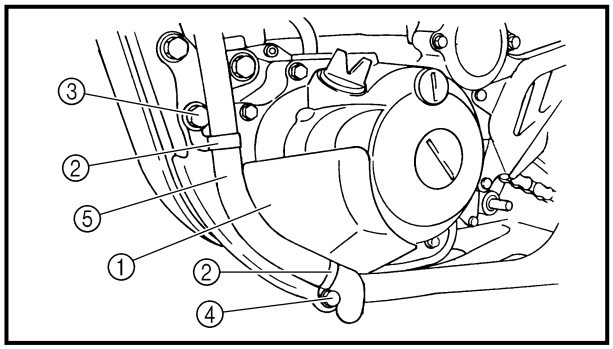
8. Install:
   - Shaft ①
   - Bearing ②
   - Idle gear 1 ③

NOTE:
Apply the engine oil on the shaft, bearing and idle gear inner circumference.



9. Install:
   - Cover (idle gear 1) ①
   - Bolt ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)

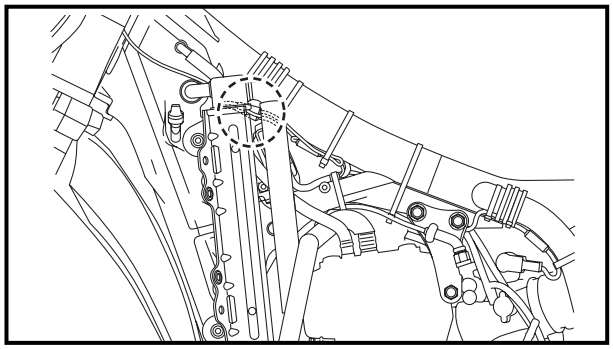
NOTE:
Install the cover (idle gear 1) with its mark ⓐ facing upward.



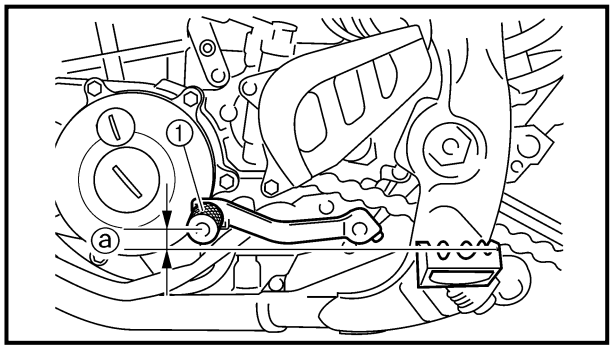
10. Install:
    - Engine guard ①
    - Clamp ②
    - Bolt [engine guard (front)] ③

      34 Nm (3.4 m · kg, 24 ft · lb)
    - Bolt [engine guard (rear)] ④

      23 Nm (2.3 m · kg, 17 ft · lb)
    - Cylinder head breather hose ⑤



11. Connect:
    - AC magneto lead
      Refer to "CABLE ROUTING DIAGRAM" section in the CHAPTER 2.

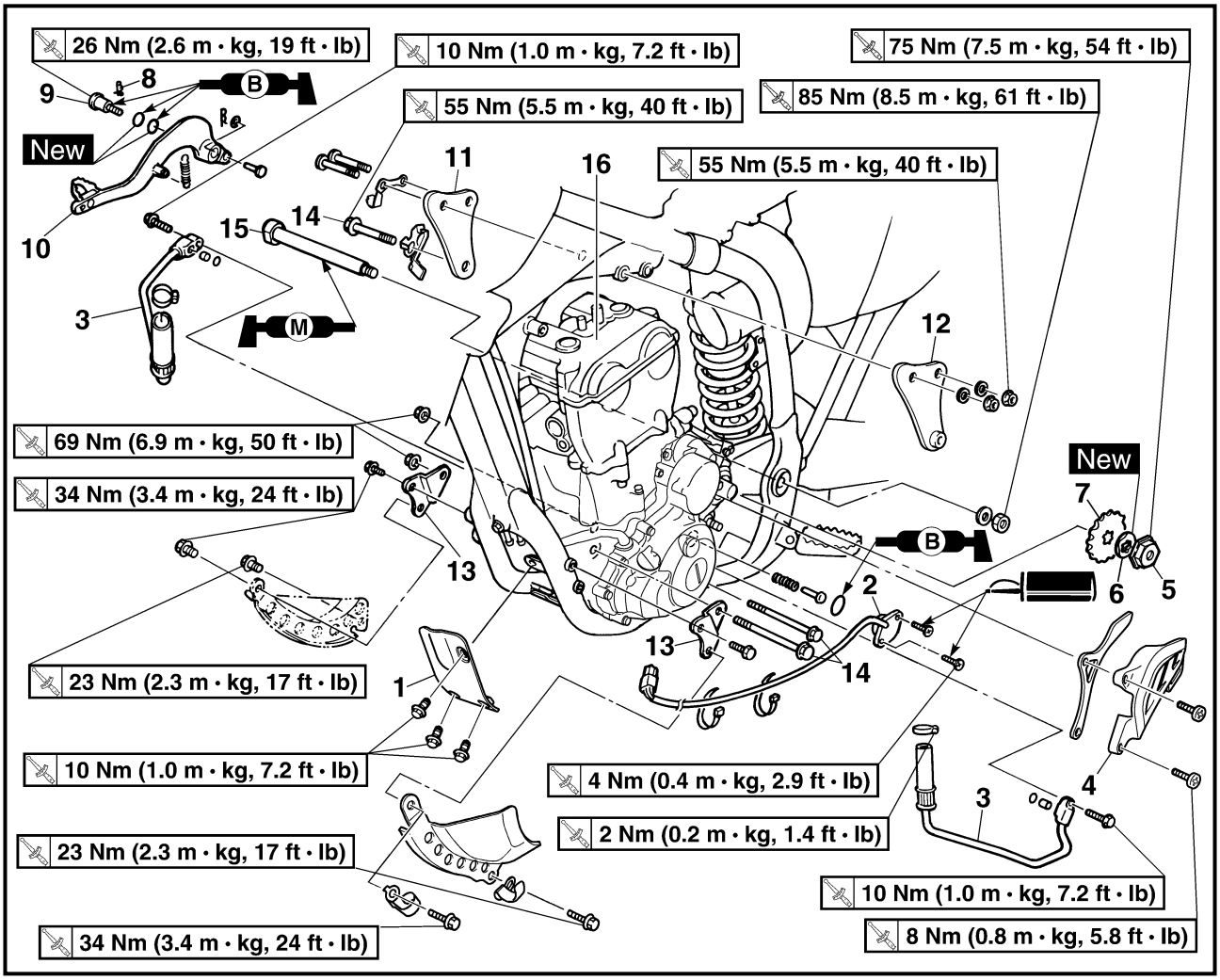


12. Install:
    - Shift pedal ①
    - Bolt (shift pedal)

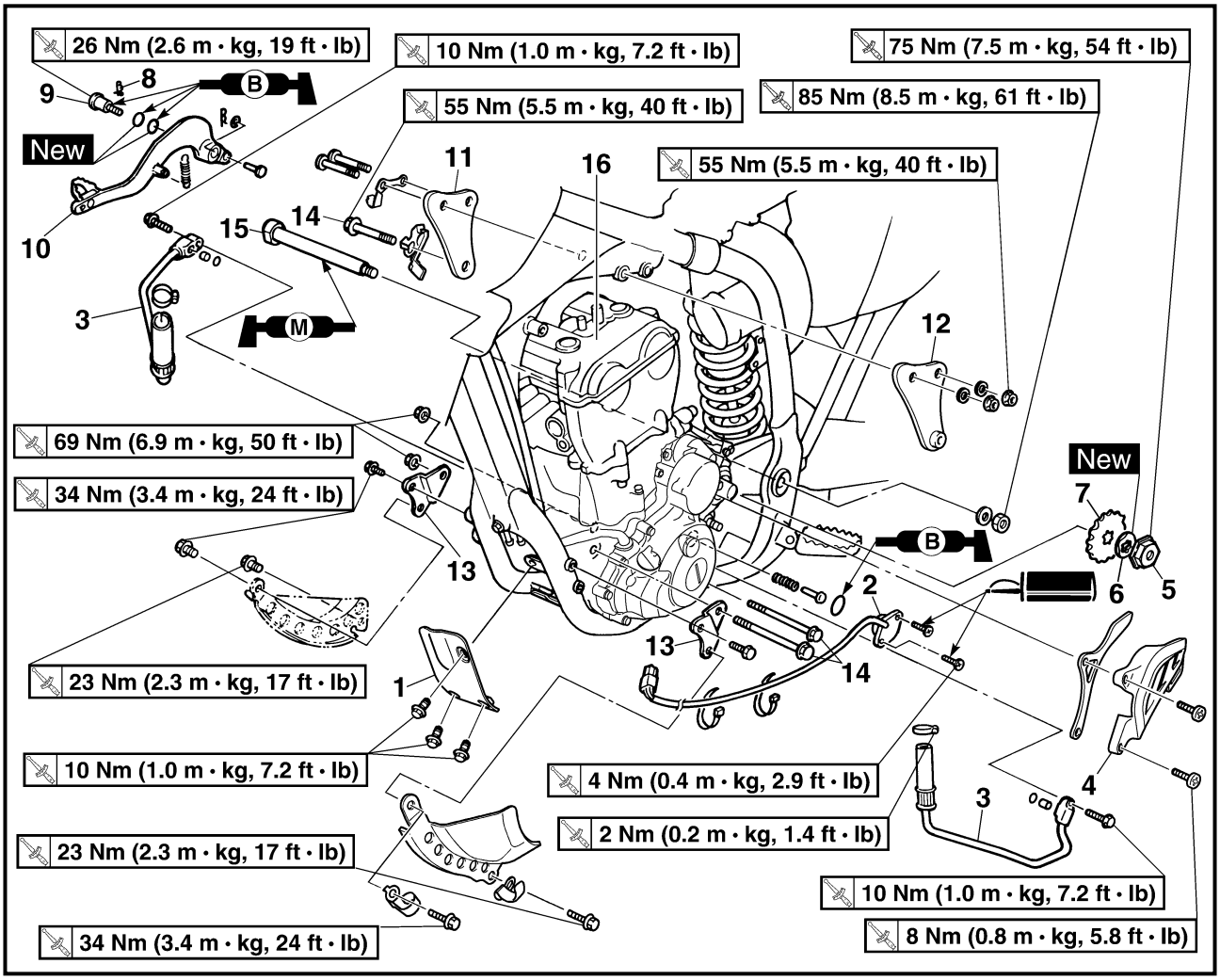
      12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
When installing the shift pedal onto the shift shaft, be sure that the center of the shift pedal is about 1 mm (0.04 in) ⓐ above the top of the footrest.

EC4M0000
ENGINE REMOVAL

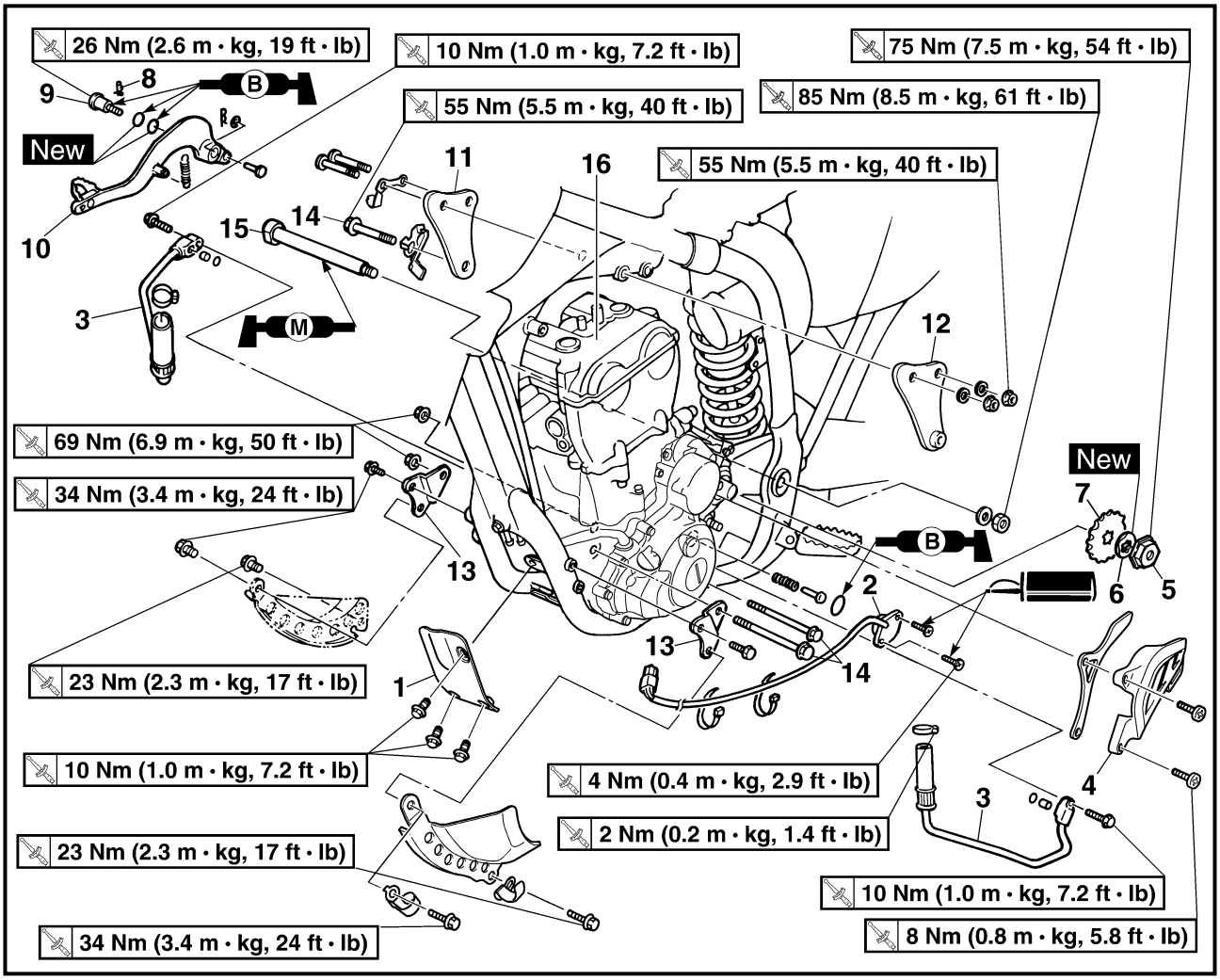


Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**ENGINE REMOVAL** Hold the machine by placing the suitable stand under the frame.		**⚠ WARNING** **Support the machine securely so there is no danger of it falling over.**
		Drain the engine oil		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Carburetor		Refer to "CARBURETOR" section.
		Exhaust pipe and silencer		Refer to "EXHAUST PIPE AND SILENCER" section.
		Clutch cable and guide		Disconnect at the engine side.
		Radiator		Refer to "RADIATOR" section.
		Shift pedal		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
		Cylinder head breather hose and oil tank breather hose		Refer to "CAMSHAFTS" section.
		Ignition coil		
		Disconnect the AC magneto lead.		

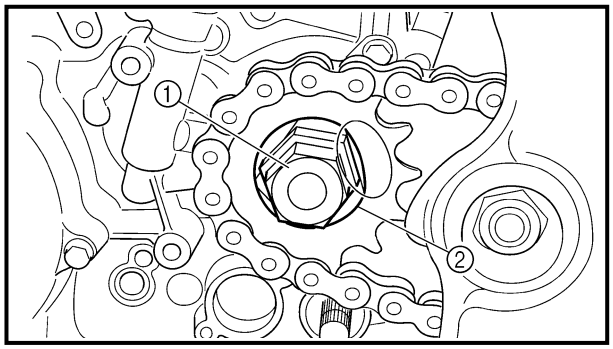


Extent of removal: ① Engine removal

Extent of removal	Order	Part name	Q'ty	Remarks
		Crankcase cover (left)		Refer to "AC MAGNETO AND STARTER CLUTCH" section for removing the starter motor lead.
		Disconnect the starter motor lead.		Refer to "ELECTRIC STARTING SYSTEM" section in the CHAPTER 6.
		Negative battery lead		Disconnect at the starter motor side.
①	1	Engine skid plate (front)	1	
	2	Neutral switch	1	
	3	Oil hose	2	
	4	Chain cover	1	
	5	Nut (drive sprocket)	1	Refer to "REMOVAL POINTS".
	6	Lock washer	1	
	7	Drive sprocket	1	
	8	Clip	1	
	9	Bolt (brake pedal)	1	
	10	Brake pedal	1	

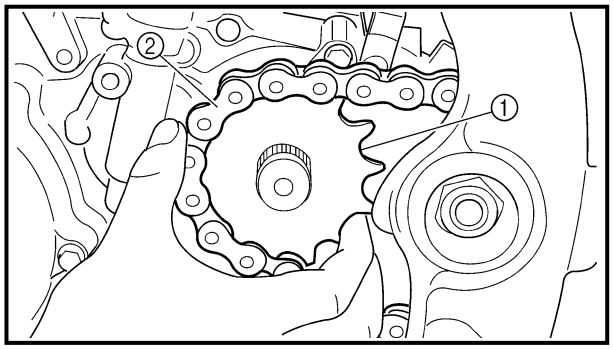


Extent of removal	Order	Part name	Q'ty	Remarks
①	11	Engine upper bracket (right)	1	
	12	Engine upper bracket (left)	1	
	13	Engine lower bracket	2	
	14	Engine mounting bolt	3	
	15	Pivot shaft	1	Refer to "REMOVAL POINTS".
	16	Engine	1	



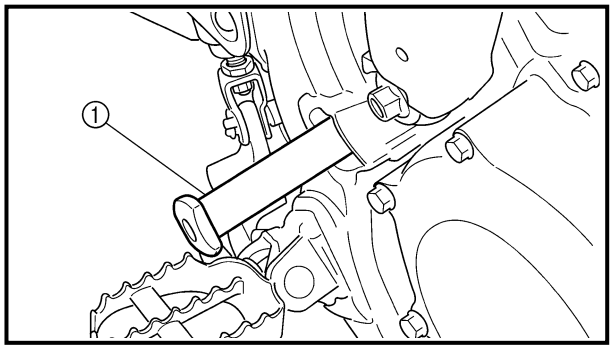
EC4M3000
REMOVAL POINTS
EC4F3100
Drive sprocket
1. Remove:
   - Nut (drive sprocket) ①
   - Lock washer ②

NOTE:
- Straighten the lock washer tab.
- Loosen the nut while applying the rear brake.



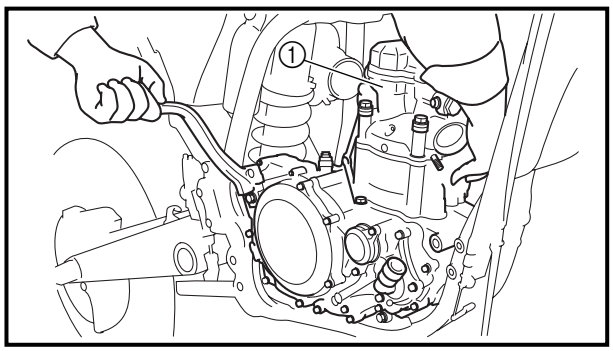
2. Remove:
   - Drive sprocket ①
   - Drive chain ②

NOTE:
Remove the drive sprocket together with the drive chain.



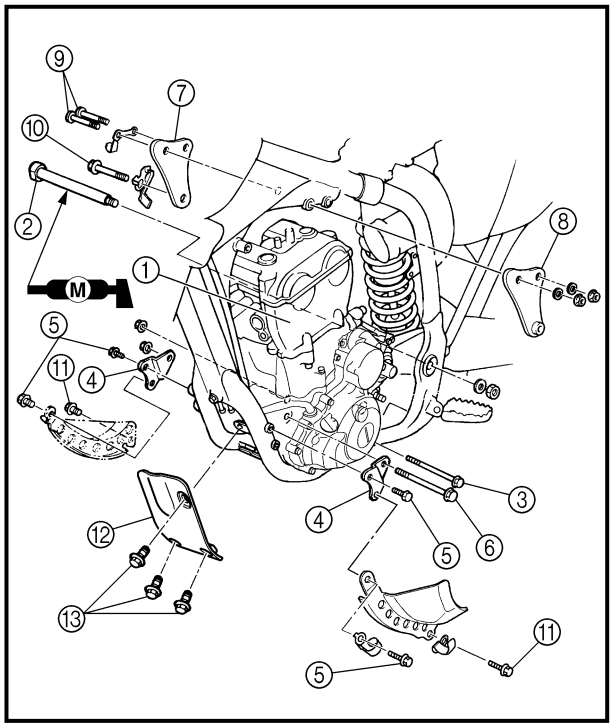
EC4M3301
Engine removal
1. Remove:
   - Pivot shaft ①

NOTE:
If the pivot shaft is pulled all the way out, the swingarm will come loose. If possible, insert a shaft of similar diameter into the other side of the swingarm to support it.



2. Remove:
   - Engine ①
     From right side.

NOTE:
Make sure that the couplers, hoses and cables are disconnected.



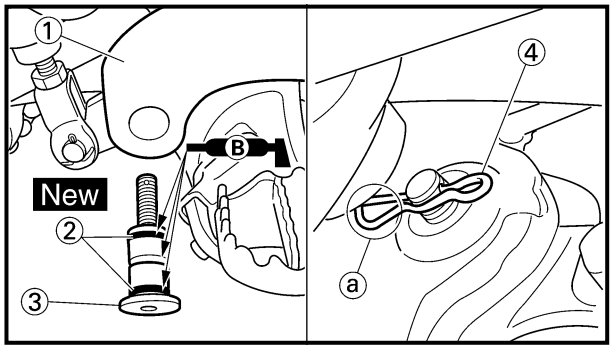
EC4M5000

ASSEMBLY AND INSTALLATION

Engine installation

1. Install:
   - Engine ①
     Install the engine from right side.
   - Pivot shaft ②
     85 Nm (8.5 m · kg, 61 ft · lb)
   - Engine mounting bolt (lower) ③
     69 Nm (6.9 m · kg, 50 ft · lb)
   - Engine lower bracket ④
   - Bolt (engine bracket) ⑤
     34 Nm (3.4 m · kg, 24 ft · lb)
   - Engine mounting bolt (front) ⑥
     69 Nm (6.9 m · kg, 50 ft · lb)
   - Engine upper bracket (right) ⑦
   - Engine upper bracket (left) ⑧
   - Bolt (engine bracket) ⑨
     55 Nm (5.5 m · kg, 40 ft · lb)
   - Engine mounting bolt (upper) ⑩
     55 Nm (5.5 m · kg, 40 ft · lb)
   - Bolt (engine guard) ⑪
     23 Nm (2.3 m · kg, 17 ft · lb)
   - Engine skid plate (front) ⑫
   - Bolt (engine skid plate) ⑬
     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the molybdenum disulfide grease on the pivot shaft.

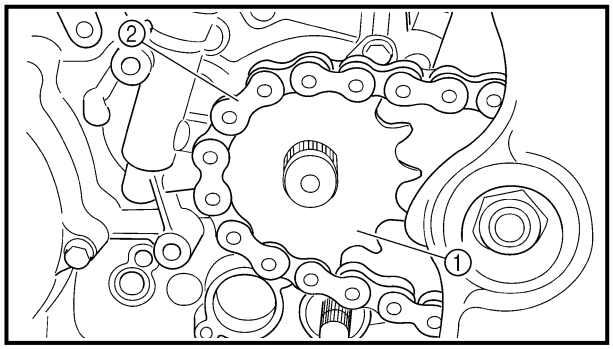


EC4M5211

Brake pedal

1. Install:
   - Spring
   - Brake pedal ①
   - O-ring ② New
   - Bolt (brake pedal) ③
     26 Nm (2.6 m · kg, 19 ft · lb)
   - Clip ④

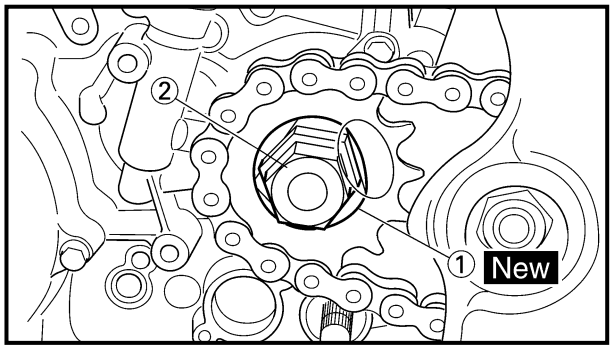
NOTE:
- Apply the lithium soap base grease on the bolt, O-rings and brake pedal bracket.
- Install the clip with its stopper portion ⓐ facing inward.



Drive sprocket

1. Install:
   - Drive sprocket ①
   - Drive chain ②

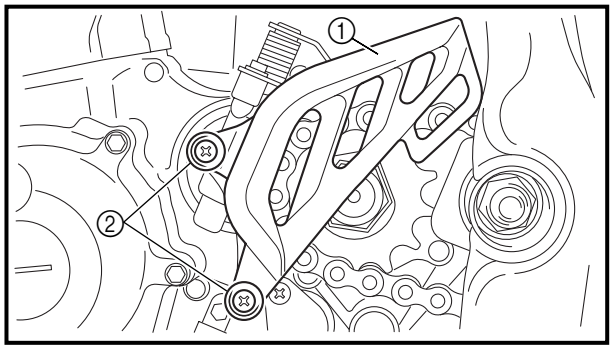
NOTE:
Install the drive sprocket together with the drive chain.



2. Install:
   - Lock washer ① New
   - Nut (drive sprocket) ②

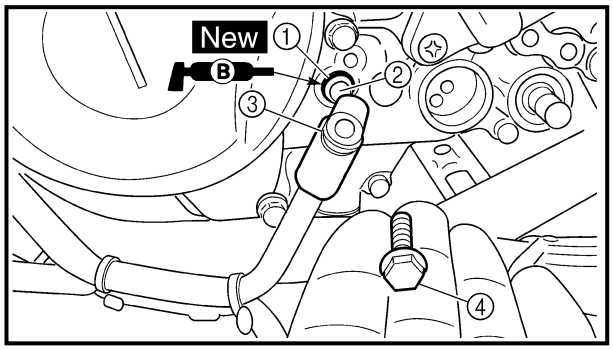
75 Nm (7.5 m · kg, 54 ft · lb)

NOTE:
Tighten the nut while applying the rear brake.



3. Bend the lock washer tab to lock the nut.
4. Install:
   - Chain guide
   - Chain cover ①
   - Screw (chain cover) ②

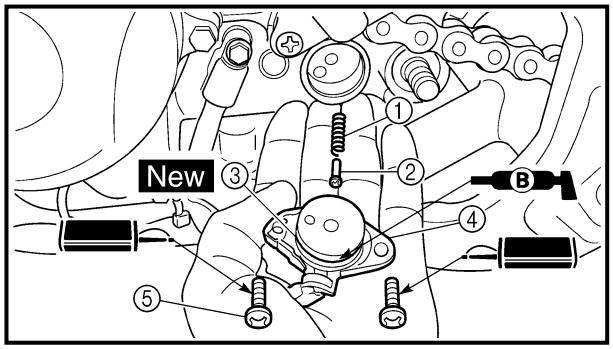
8 Nm (0.8 m · kg, 5.8 ft · lb)



5. Install:
   - O-ring ① New
   - Dowel pin ②
   - Oil hose ③
   - Bolt (oil hose) ④

10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Apply the lithium soap base grease on the O-ring.



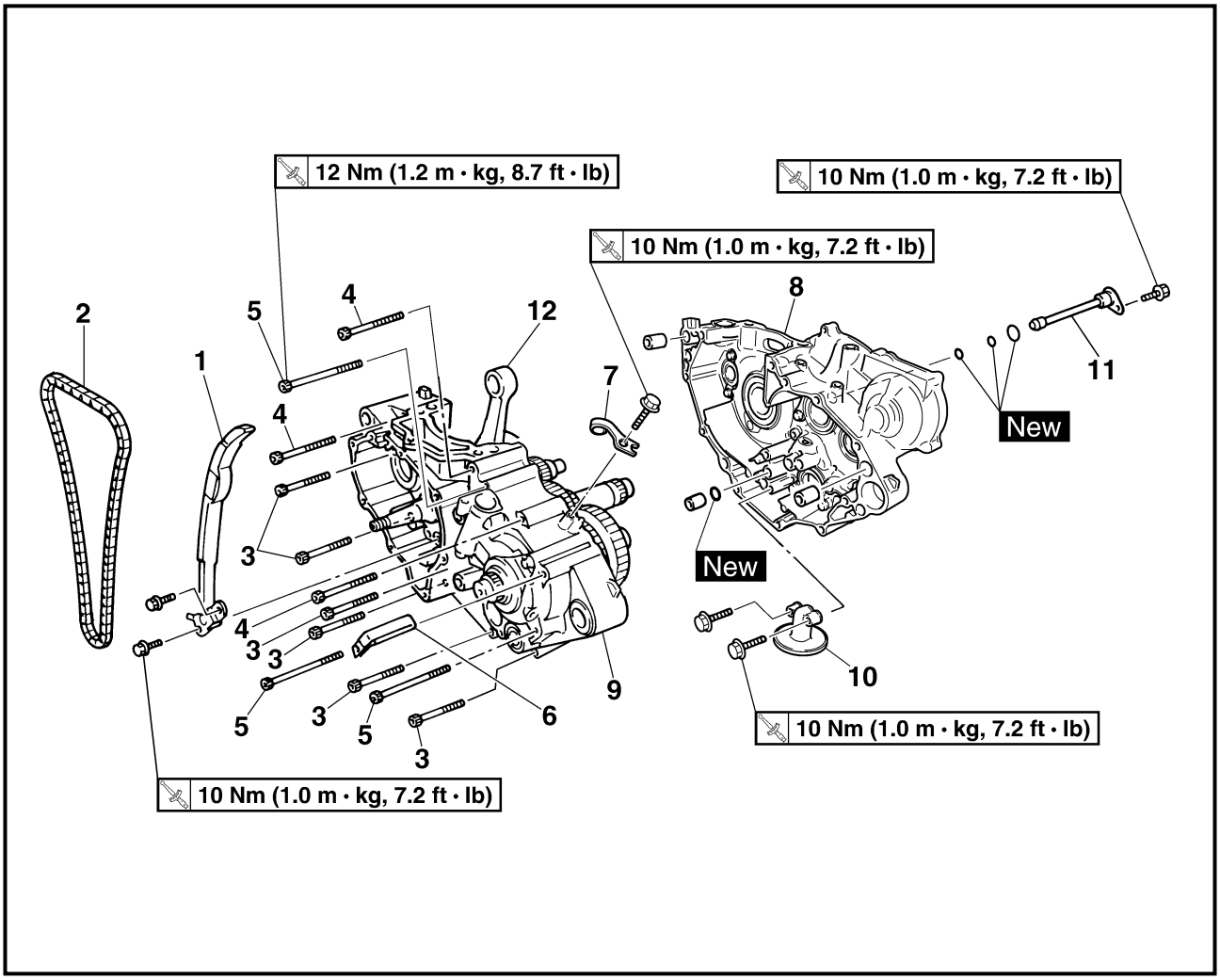
6. Install:
   - Spring ①
   - Pin ②
   - O-ring ③ New
   - Neutral switch ④
   - Screw (neutral switch) ⑤

4 Nm (0.4 m · kg, 2.9 ft · lb)

NOTE:
Apply the lithium soap base grease on the O-ring.

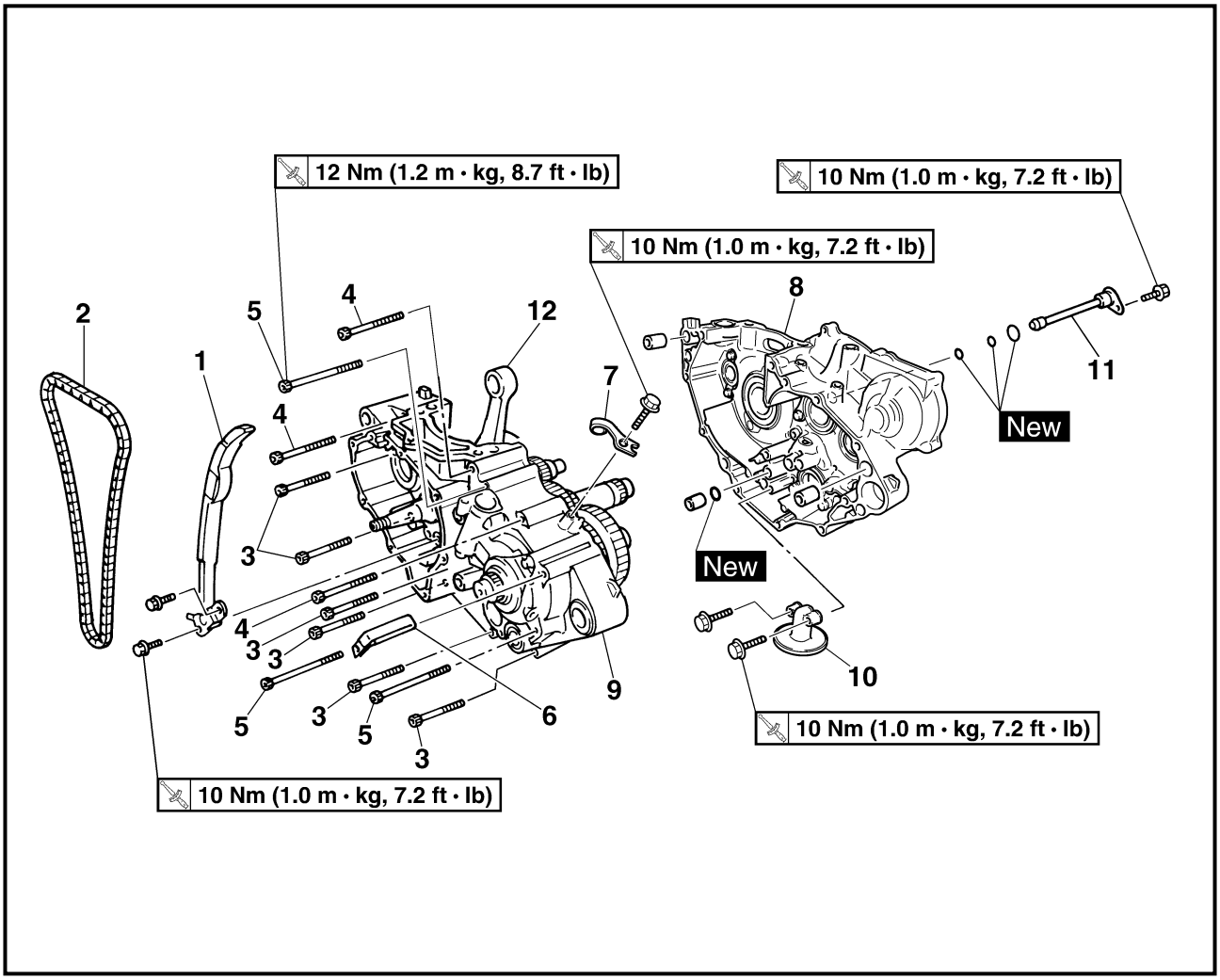
CRANKCASE AND CRANKSHAFT

CRANKCASE AND CRANKSHAFT



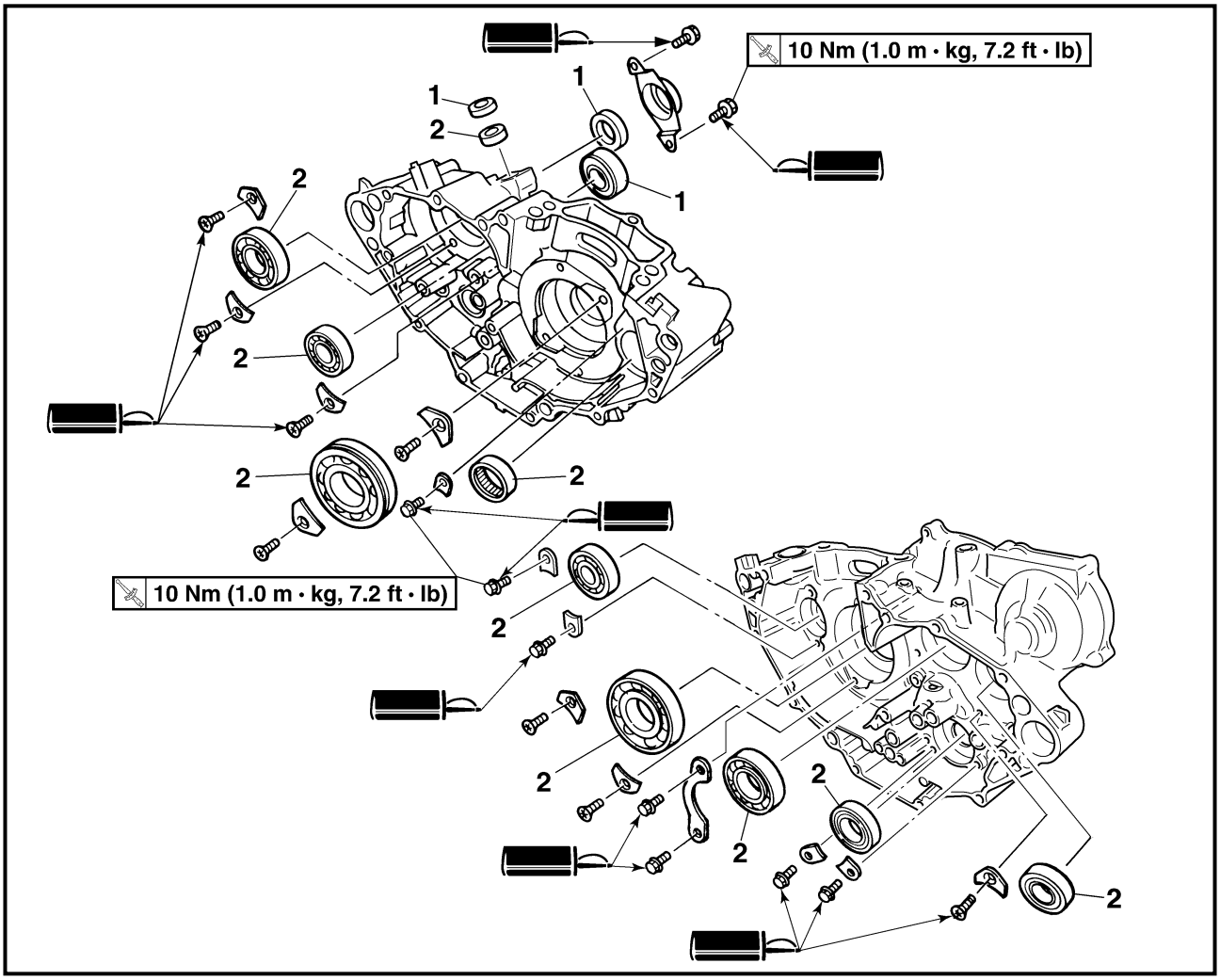
Extent of removal: ① Crankcase separation ② Crankshaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**CRANKCASE SEPARATION**		
		Engine		Refer to "ENGINE REMOVAL" section.
		Piston		Refer to "CYLINDER AND PISTON" section.
		Balancer		Refer to "BALANCER" section.
		Kick axle assembly		Refer to "KICK AXLE AND SHIFT SHAFT" section.
		Segment		
		Stator		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
① ②	1	Timing chain guide (rear)	1	Refer to "REMOVAL POINTS".
	2	Timing chain	1	
	3	Bolt (50 mm)	6	
	4	Bolt (60 mm)	3	
	5	Bolt (75 mm)	3	
	6	Hose guide	1	
	7	Clutch cable holder	1	
	8	Crankcase (right)	1	
	9	Crankcase (left)	1	



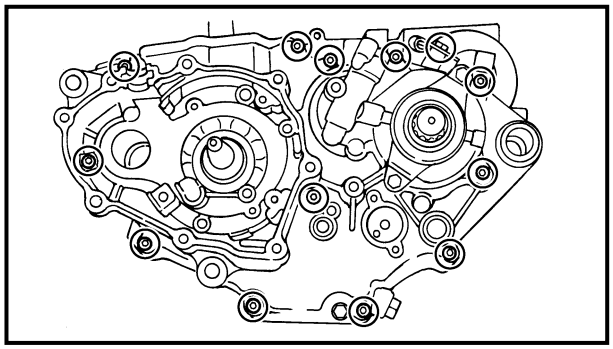
Extent of removal	Order	Part name	Q'ty	Remarks
②	10	Oil strainer	1	
	11	Oil delivery pipe 2	1	
	12	Crankshaft	1	Use special tool. Refer to "REMOVAL POINTS".

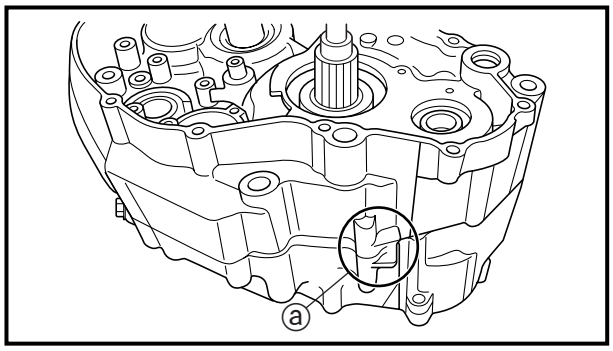
CRANKCASE BEARING

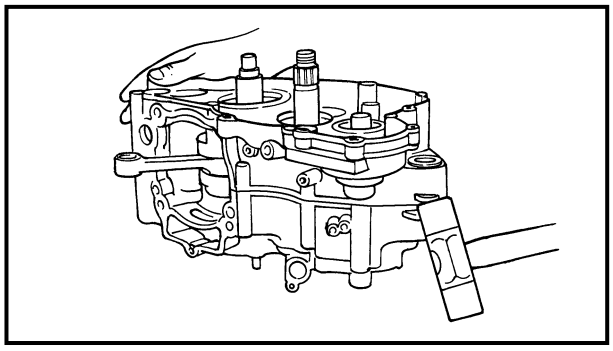


Extent of removal: ① Crankcase bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
		CRANKCASE BEARING REMOVAL		
Preparation for removal		Transmission Shift cam and shift fork		Refer to "TRANSMISSION, SHIFT CAM AND SHIFT FORK" section.
①	1	Oil seal	3	
	2	Bearing	10	Refer to "REMOVAL POINTS".







REMOVAL POINTS

Crankcase

1. Separate:
   - Crankcase (right)
   - Crankcase (left)

Separation steps:

- Remove the crankcase bolts, hose guide and clutch cable holder.

NOTE:

Loosen each bolt 1/4 of a turn at a time and after all the bolts are loosened, remove them.

- Remove the crankcase (right).

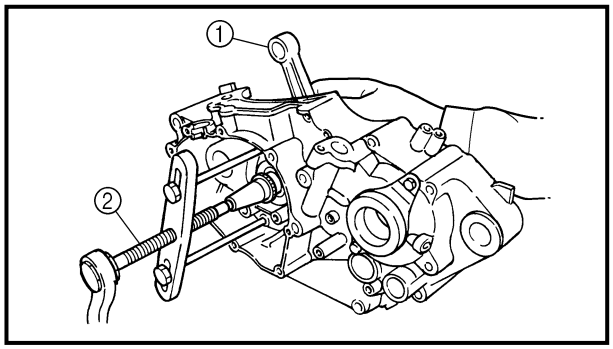
NOTE:

- Place the crankcase with its left side downward and split it by inserting a screwdriver tip into the splitting slit ⓐ in the crankcase.
- Lift the crankcase (right) horizontally while lightly patting the case splitting slit and engine mounting boss using a soft hammer, and leave the crankshaft and transmission with the crankcase (left).

CAUTION:

Use soft hammer to tap on the case half. Tap only on reinforced portions of case. Do not tap on gasket mating surface. Work slowly and carefully. Make sure the case halves separate evenly. If one end "hangs up", take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

- Remove the dowel pins and O-ring.



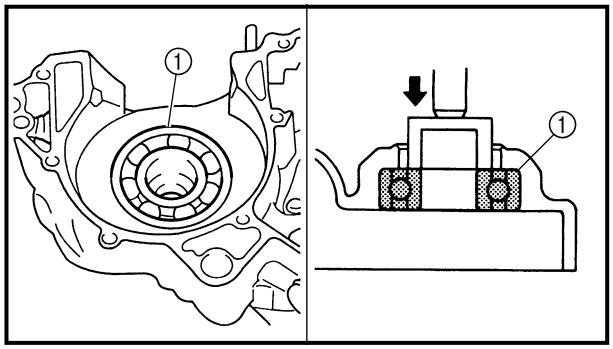
Crankshaft

1. Remove:
   - Crankshaft ①
     Use the crankcase separating tool ②.

	Crankcase separating tool: YU-1135-A/90890-01135

CAUTION:

Do not use a hammer to drive out the crankshaft.

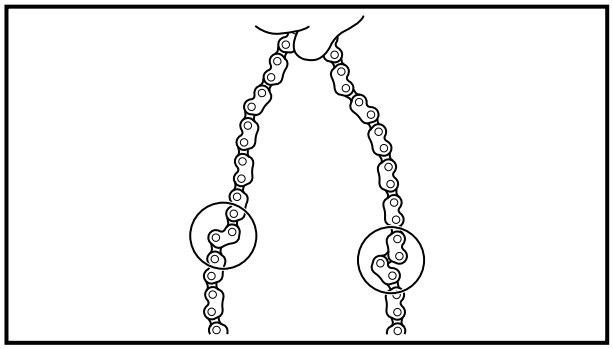


Crankshaft bearing

1. Remove:
   - Bearing ①

NOTE:

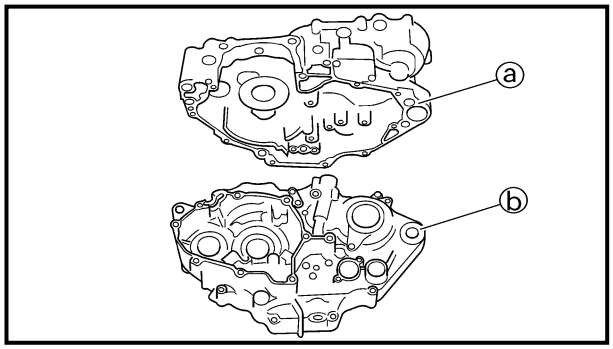
- Remove the bearing from the crankcase by pressing its inner race.
- Do not use the removed bearing.



INSPECTION

Timing chain and timing chain guide

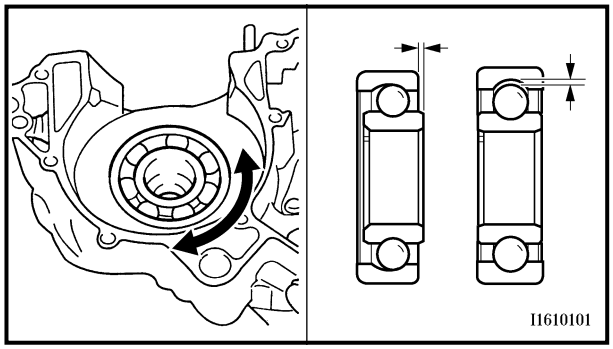
1. Inspect:
   - Timing chain
     Cracks/stiff → Replace the timing chain and camshaft sprocket as a set.
2. Inspect:
   - Timing chain guide
     Wear/damage → Replace.



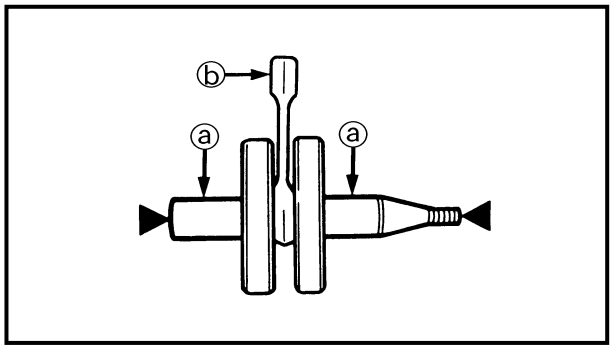
EC4N4101

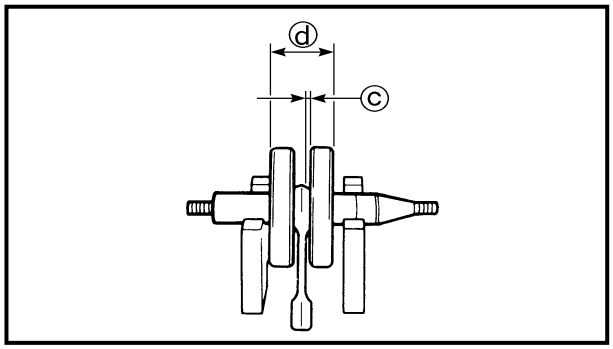
Crankcase

1. Inspect:
   - Contacting surface ⓐ
     Scratches → Replace.
   - Engine mounting boss ⓑ, crankcase
     Cracks/damage → Replace.



2. Inspect:
   - Bearing
     Rotate inner race with a finger.
     Rough spot/seizure → Replace.
3. Inspect:
   - Oil seal
     Wear/damage → Replace.





EC4N4201
Crankshaft

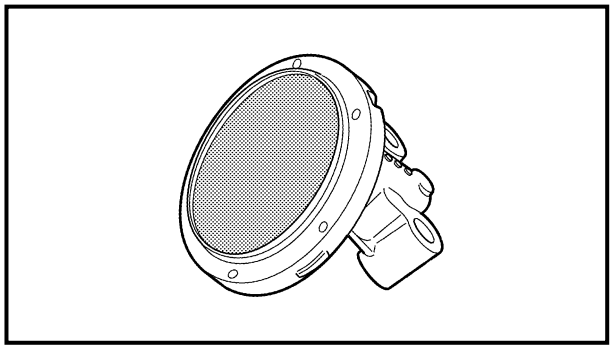
1. Measure:
   - Runout limit ⓐ
   - Small end free play limit ⓑ
   - Connecting rod big end side clearance ⓒ
   - Crank width ⓓ

   Out of specification → Replace.

   Use the dial gauge and a thickness gauge.

	Dial gauge and stand: YU-3097/90890-01252

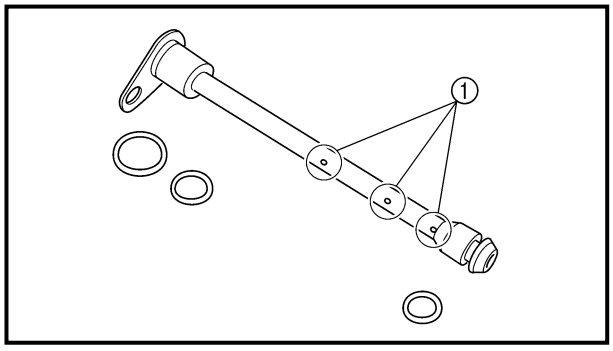
	Standard	<Limit>
Runout limit:	**0.03 mm (0.0012 in)**	**0.05 mm (0.002 in)**
Small end free play:	**0.4 ~ 1.0 mm (0.016 ~ 0.039 in)**	**2.0 mm (0.08 in)**
Side clearance:	**0.15 ~ 0.45 mm (0.0059 ~ 0.0177 in)**	**0.50 mm (0.02 in)**
Crack width:	**61.95 ~ 62.00 mm (2.439 ~ 2.441 in)**	**—**



Oil strainer

1. Inspect:
   - Oil strainer

   Damage → Replace.

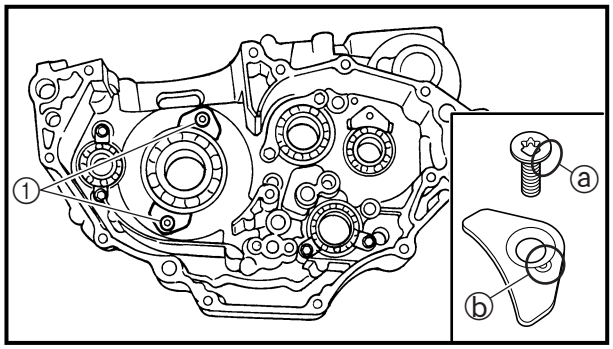


Oil delivery pipe

1. Inspect:
   - Oil delivery pipe

   Cracks/damage → Replace.
   - Oil delivery pipe holes ①

   Clogged → Blow out with compressed air.

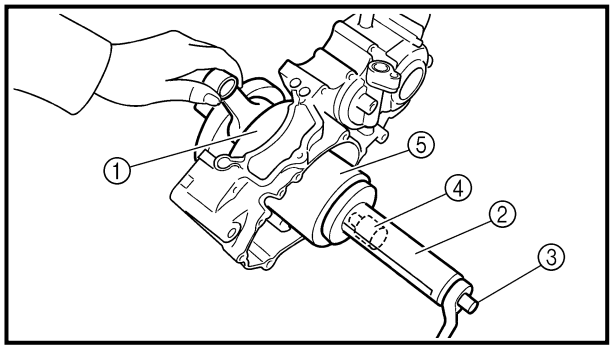


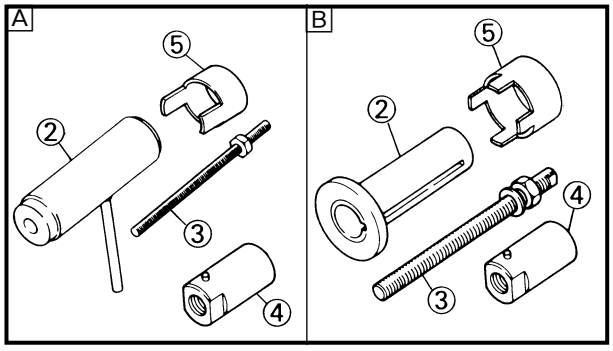
EC4N5000
ASSEMBLY AND INSTALLATION

Crankshaft bearing

1. Install:
   - Bearing **New**
   - Bearing stopper
   - Bolt (bearing stopper)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Screw (bearing stopper)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Screw [bearing stopper (crankshaft)] ①
     10 Nm (1.0 m · kg, 7.2 ft · lb)
     To crankcase (left and right).

NOTE:
- Install the bearing by pressing its outer race parallel.
- To prevent the screw [bearing stopper (crankshaft)] from becoming loose, crush the screw head periphery ⓐ into the concave ⓑ using a punch etc. In so doing, take care not to damage the screwdriver receiving hole in the screw head.





Crankshaft

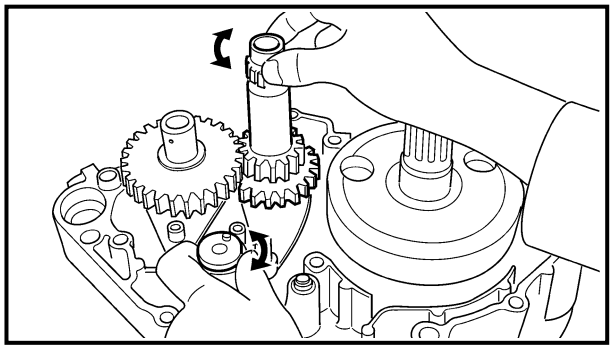
1. Install:
   - Crankshaft ①
     Use the crankshaft installing tool ②, ③, ④ and ⑤.

Crankshaft installing pot ②:
YU-90050/90890-01274
Crankshaft installing bolt ③:
YU-90050/90890-01275
Adaptor (M12) ④:
YU-90063/90890-01278
Spacer (crankshaft installer) ⑤:
YM-91044/90890-04081

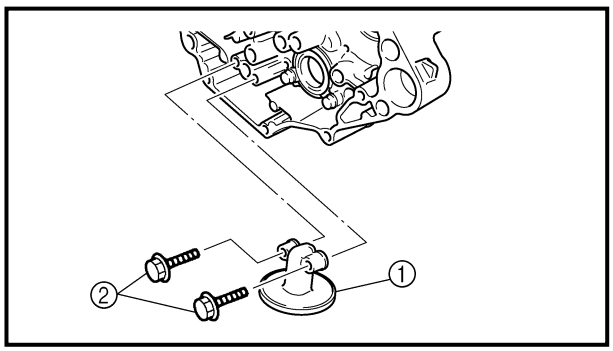
A For USA and CDN
B Except for USA and CDN

NOTE:
- Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.
- Before installing the crankshaft, clean the contacting surface of crankcase.

CAUTION:
Do not use a hammer to drive in the crankshaft.

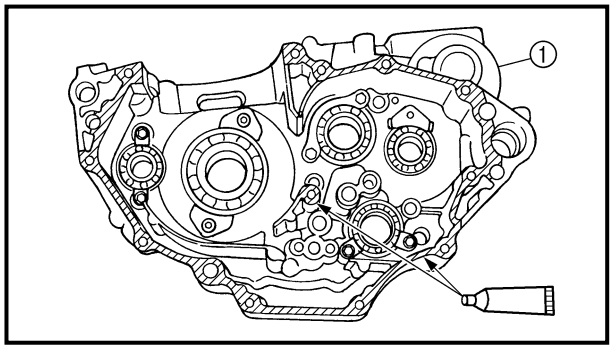


2. Check:
   - Shifter operation
   - Transmission operation
   Unsmooth operation → Repair.



3. Install:
   - Oil strainer ①
   - Bolt (oil strainer) ②

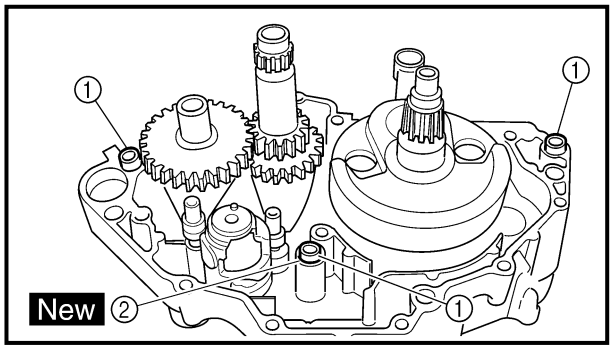
	10 Nm (1.0 m · kg, 7.2 ft · lb)



4. Apply:
   - Sealant
   On the crankcase (right) ①.

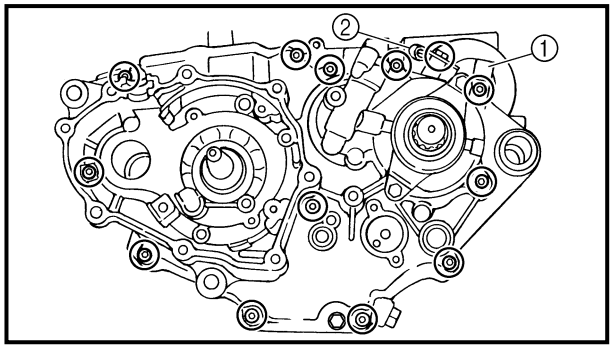
Quick gasket®:
ACC-QUICK-GS-KT
YAMAHA Bond No. 1215:
90890-85505

NOTE:
Clean the contacting surface of crankcase (left and right) before applying the sealant.



5. Install:
   - Dowel pin ①
   - O-ring ② New
   - Crankcase (right)
     To crankcase (left).

NOTE:
- Fit the crankcase (right) onto the crankcase (left). Tap lightly on the case with soft hammer.
- When installing the crankcase, the connecting rod should be positioned at TDC (top dead center).



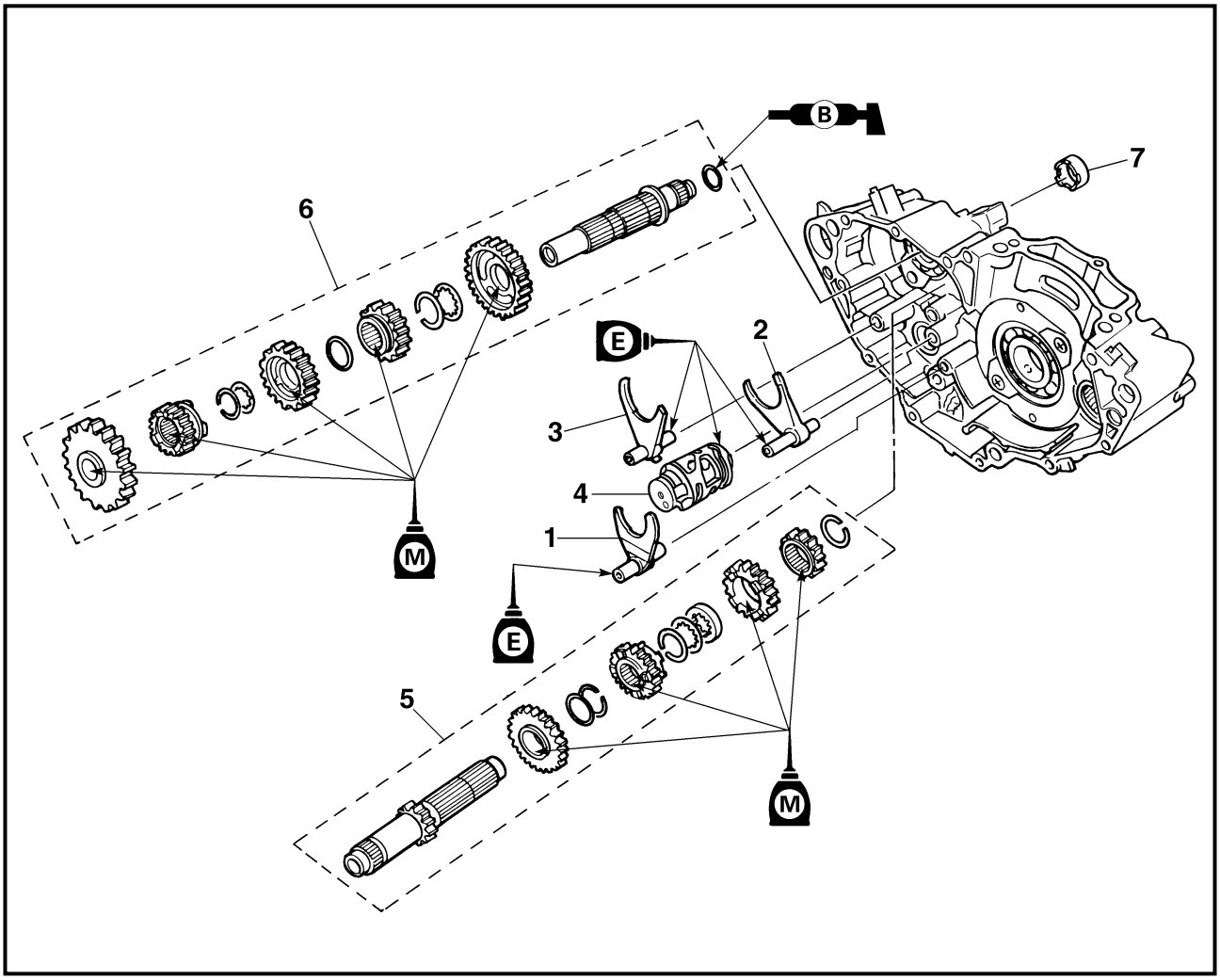
6. Tighten:
   - Hose guide ①
   - Clutch cable holder ②
   - Bolt (clutch cable holder)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
   - Bolt (crankcase)
     12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
Tighten the crankcase tightening bolts in stage, using a crisscross pattern.

7. Install:
   - Oil delivery pipe
   - O-ring New
   - Bolt (oil delivery pipe)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
8. Install:
   - Timing chain
   - Timing chain guide (rear)
   - Bolt (timing chain guide)
     10 Nm (1.0 m · kg, 7.2 ft · lb)
9. Remove:
   - Sealant
     Forced out on the cylinder mating surface.
10. Apply:
    - Engine oil
      To the crank pin, bearing and oil delivery hole.
11. Check:
    - Crankshaft and transmission operation.
      Unsmooth operation → Repair.

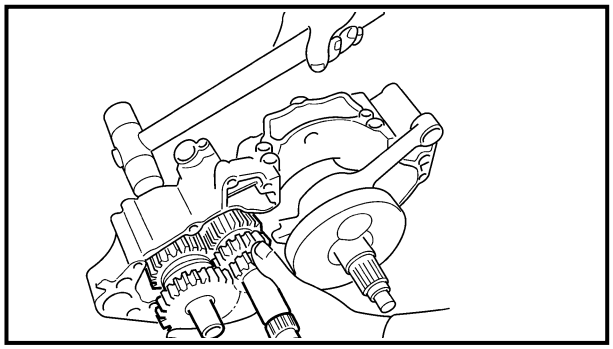
TRANSMISSION, SHIFT CAM AND SHIFT FORK

TRANSMISSION, SHIFT CAM AND SHIFT FORK



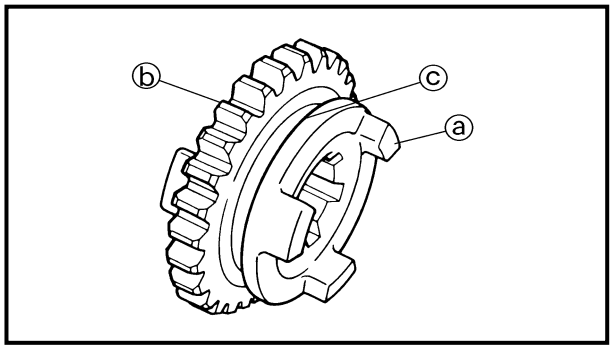
Extent of removal: ① Shift fork, shift cam, main axle and drive axle removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		**TRANSMISSION, SHIFT CAM AND SHIFT FORK REMOVAL** Engine Separate the crankcase.		Refer to "ENGINE REMOVAL" section. Refer to "CRANKCASE AND CRANKSHAFT" section.
①	1	Shift fork 1	1	Refer to "REMOVAL POINTS".
	2	Shift fork 2	1	
	3	Shift fork 3	1	
	4	Shift cam	1	
	5	Main axle	1	
	6	Drive axle	1	
	7	Collar	1	

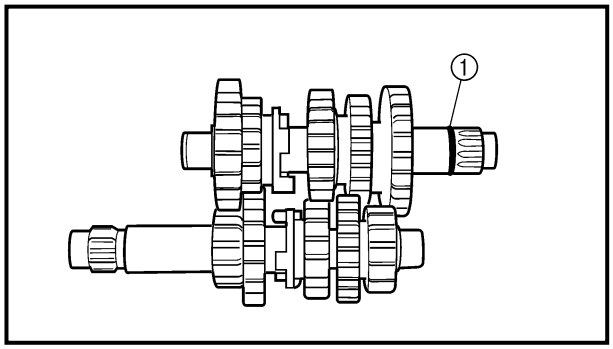


EC4H3000
REMOVAL POINTS
Shift fork, shaft cam and transmission
1. Remove:
   - Shift forks
   - Shift cam
   - Main axle
   - Drive axle

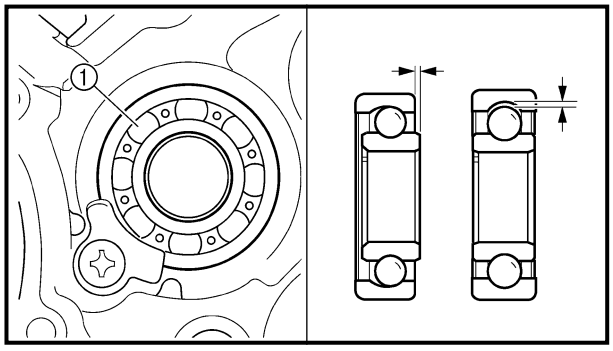
NOTE:
- Tap lightly on the transmission drive axle and shift cam with a soft hammer to remove.
- Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.



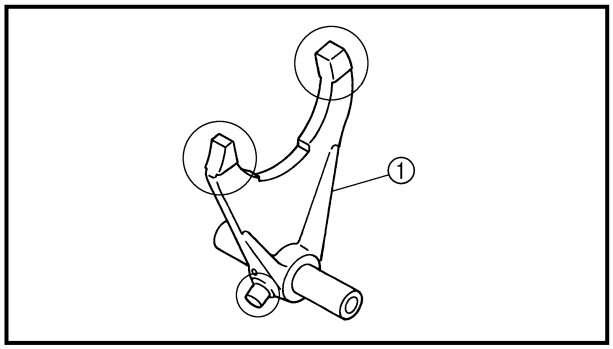
EC4H4000
INSPECTION
EC4H4200
Gears
1. Inspect:
   - Matching dog ⓐ
   - Gear teeth ⓑ
   - Shift fork groove ⓒ
   Wear/damage → Replace.



2. Inspect:
   - O-ring ①
   Damage → Replace.
3. Check:
   - Gears movement
   Unsmooth movement → Repair or replace.

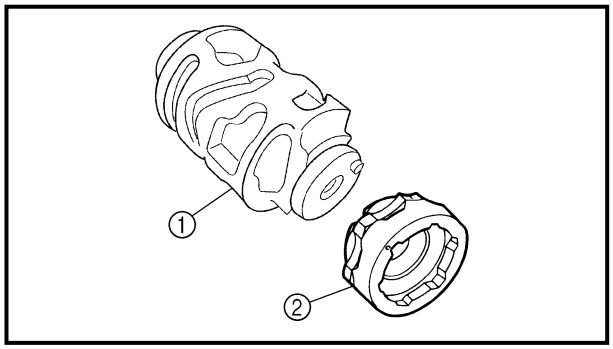


EC4H4600
Bearing
1. Inspect:
   - Bearing ①
   Rotate inner race with a finger.
   Rough spot/seizure → Replace.

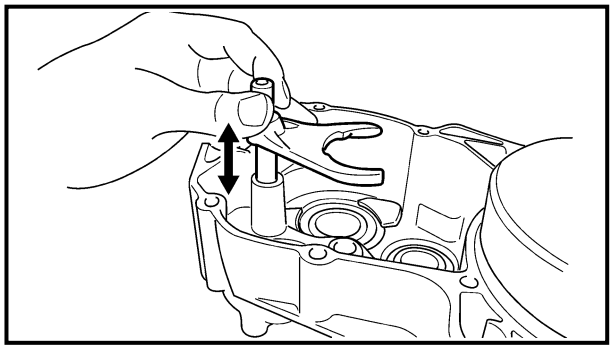


EC4H4801
Shift fork, shift cam and segment

1. Inspect:
   - Shift fork ①
     Wear/damage/scratches → Replace.

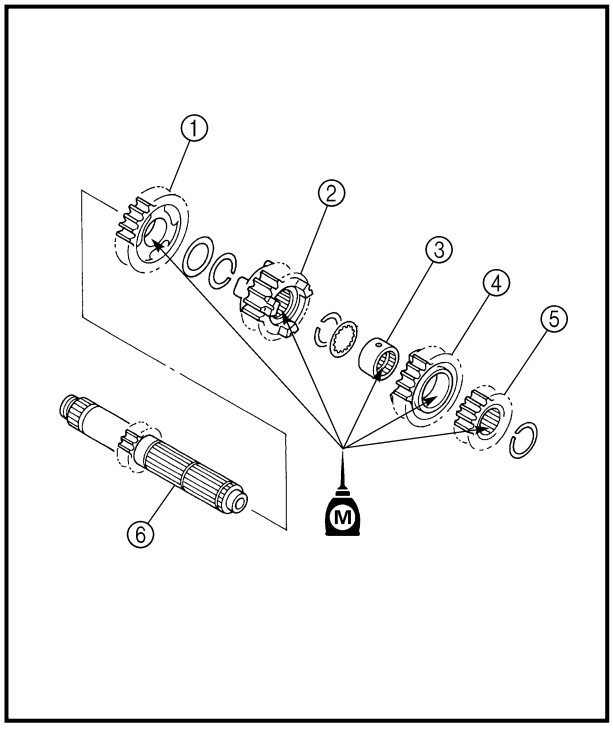


2. Inspect:
   - Shift cam ①
   - Segment ②
     Bend/wear/damage → Replace.



3. Check:
   - Shift fork movement
     Unsmooth operation → Replace shift fork.

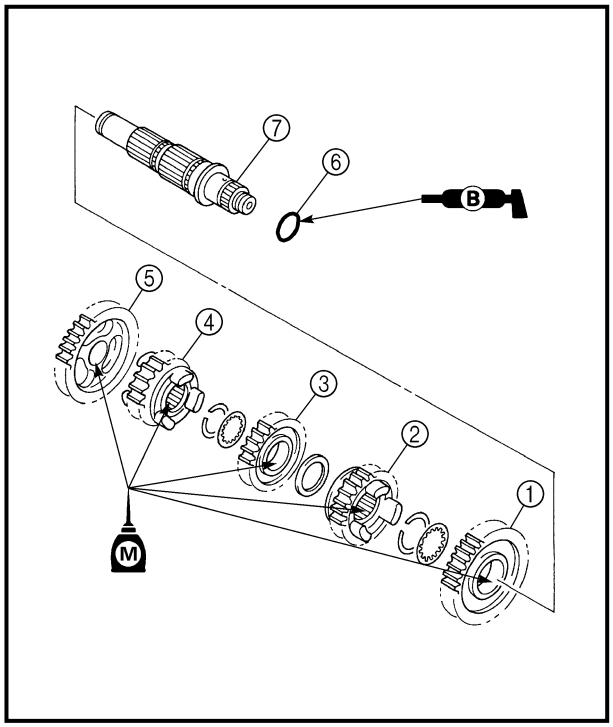
NOTE:
For a malfunctioning shift fork, replace not only the shift fork itself but the two gears each adjacent to the shift fork.



ASSEMBLY AND INSTALLATION
Transmission

1. Install:
   - 5th pinion gear (25T) ①
   - 3rd pinion gear (16T) ②
   - Collar ③
   - 4th pinion gear (20T) ④
   - 2nd pinion gear (15T) ⑤
     To main axle ⑥.

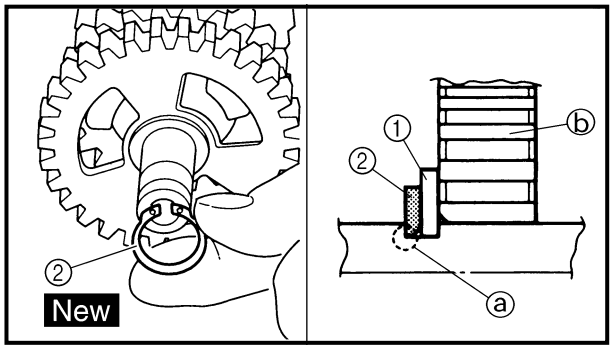
NOTE:
- Apply the molybdenum disulfide oil on the 4th and 5th pinion gears inner circumference and on the end surface.
- Apply the molybdenum disulfide oil on the 2nd and 3rd pinion gears inner circumference.



2. Install:
   - 2nd wheel gear (26T) ①
   - 4th wheel gear (21T) ②
   - 3rd wheel gear (21T) ③
   - 5th wheel gear (21T) ④
   - 1st wheel gear (29T) ⑤
   - O-ring ⑥

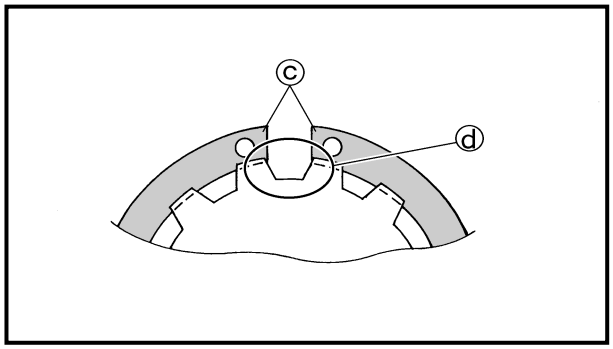
     To drive axle ⑦.

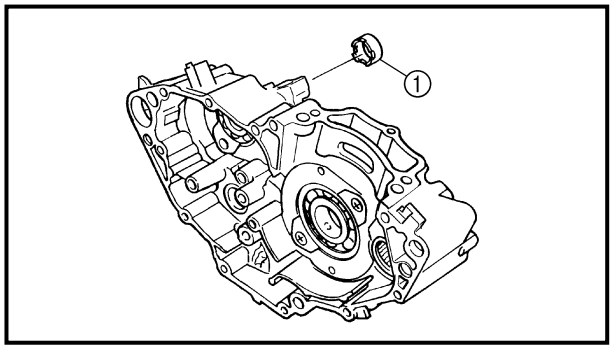
NOTE:
- Apply the molybdenum disulfide oil on the 1st, 2nd and 3rd wheel gears inner circumference and on the end surface.
- Apply the molybdenum disulfide oil on the 4th and 5th wheel gears inner circumference.
- Apply the lithium soap base grease on the O-ring.



3. Install:
   - Plain washer ①
   - Circlip ② New

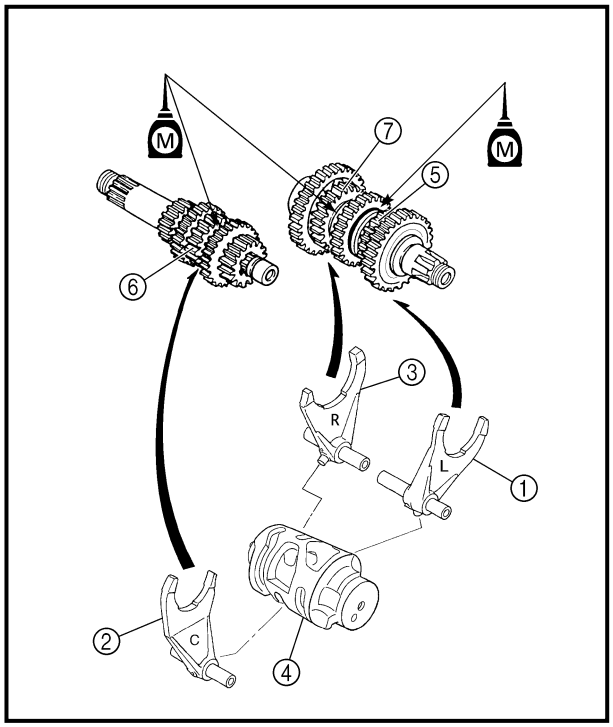
NOTE:
- Be sure the circlip sharp-edged corner ⓐ is positioned opposite side to the plain washer and gear ⓑ.
- Be sure the circlip end ⓒ is positioned at axle spline groove ⓓ.





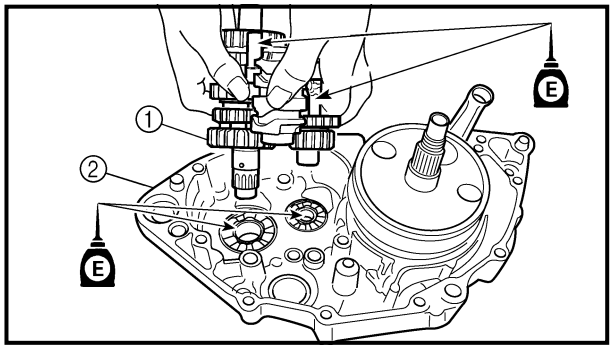
4. Install:
   - Collar ①

NOTE:
- Apply the lithium soap base grease on the oil seal lip.
- When installing the spacer into the crankcase, pay careful attention to the crankcase oil seal lip.



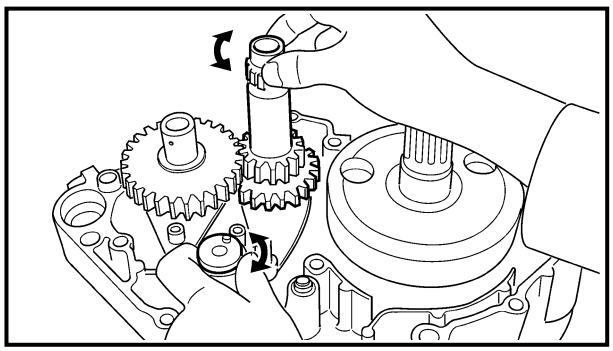
5. Install:
   - Shift fork 1 (L) ①
   - Shift fork 2 (C) ②
   - Shift fork 3 (R) ③
   - Shift cam ④
     To main axle and drive axle.

NOTE:
- Apply the molybdenum disulfide oil on the shift fork grooves.
- Mesh the shift fork #1 (L) with the 4th wheel gear ⑤ and #3 (R) with the 5th wheel gear ⑦ on the drive axle.
- Mesh the shift fork #2 (C) with the 3rd pinion gear ⑥ on the main axle.



6. Install:
   - Transmission assembly ①
     To crankcase (left) ②.

NOTE:
Apply the engine oil on the bearings and guide bars.

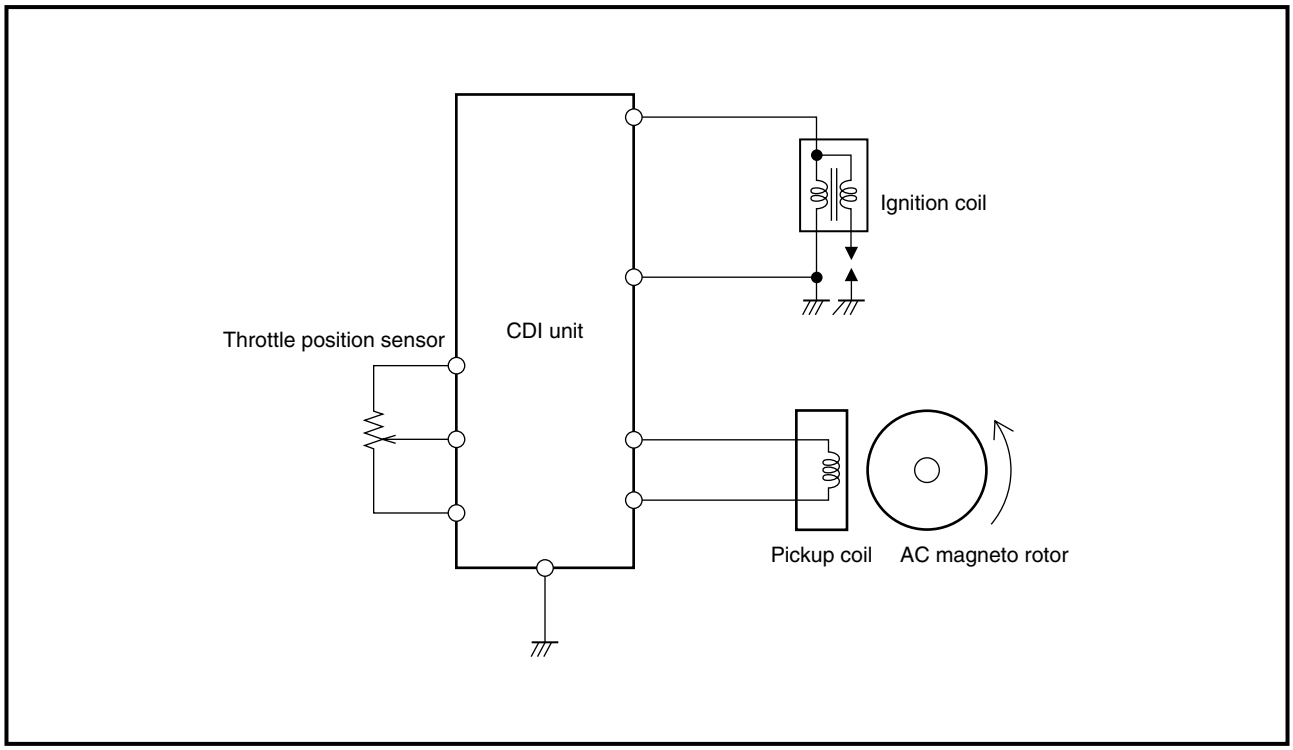


7. Check:
   - Shifter operation
   - Transmission operation
     Unsmooth operation → Repair.

MAP-CONTROLLED CDI UNIT

A map-controlled, CDI ignition system is used in the WR450F.

The microcomputer in the CDI unit detects the engine speed and throttle position, thus determining the optimum ignition timing through the entire operating range. In this way, quick throttle response can be achieved according to various riding conditions.

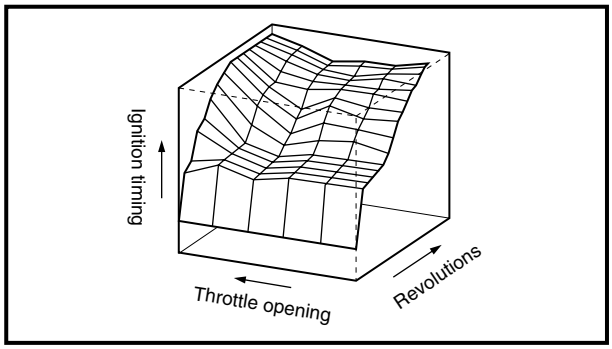


■ Function of Component

Component	Function
TPS (throttle position sensor)	Detects throttle valve opening and inputs it into the computer in the CDI unit as a throttle opening signal.
Pickup coil	Detects signal rotor revolutions and inputs them into the computer in the CDI unit as engine revolution signals.
CDI unit	The signals of the TPS and pickup coil sensor are analyzed by the computer in the CDI unit, which then adjusts ignition timing for the operation requirements.

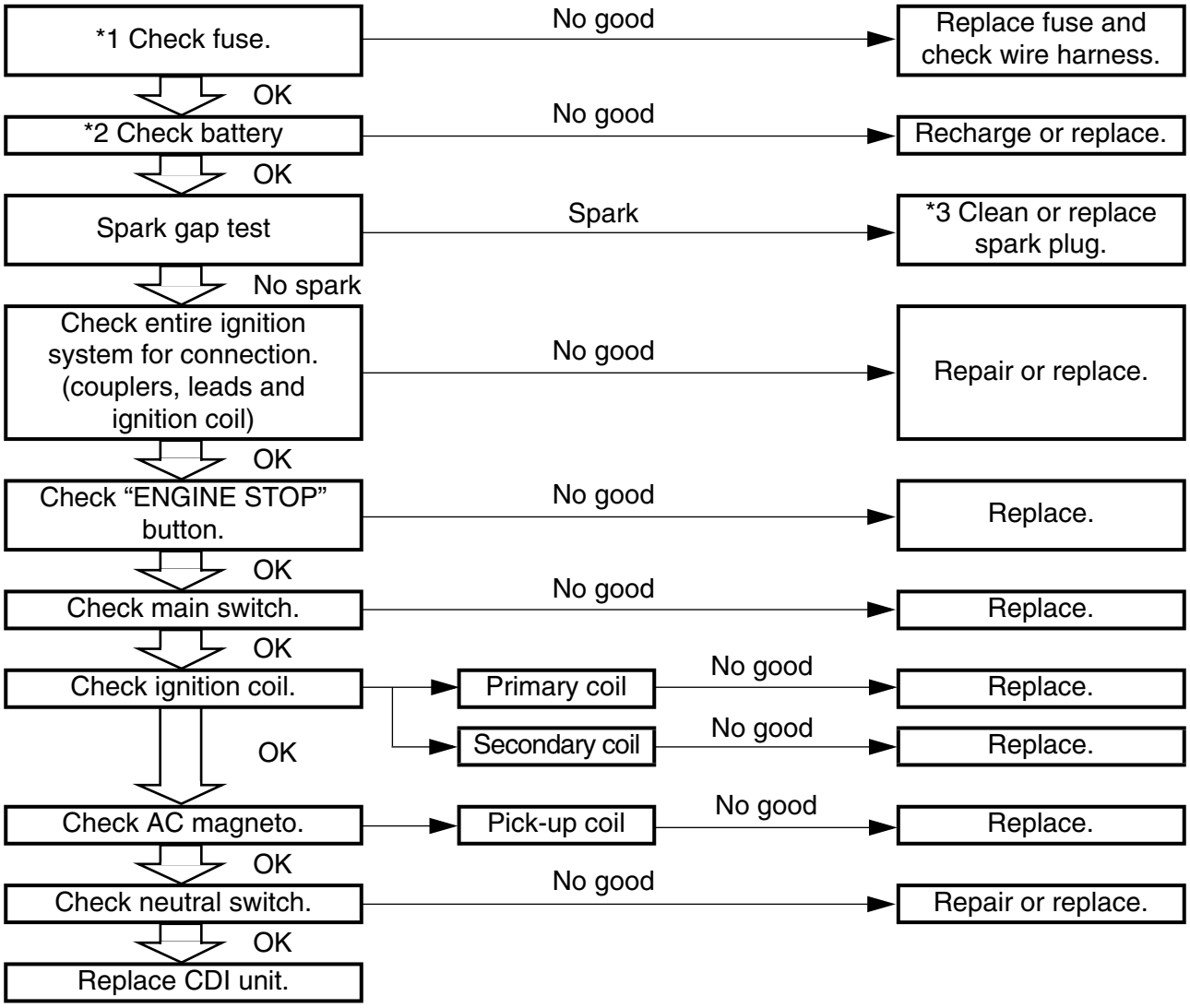
■ Principal of 3-Dimensional Control

Conventionally, ignition timing was controlled only by engine revolutions (2-dimensional control). However, ignition timing needs advancement also by engine load. Thus, accurate ignition timing can be determined by adding throttle opening to determine ignition timing (3-dimensional control).



3-D Image Map of Ignition Timing
(different from actual characteristics)

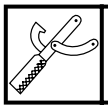
EC620000
IGNITION SYSTEM
INSPECTION STEPS
Use the following steps for checking the possibility of the malfunctioning engine being attributable to ignition system failure and for checking the spark plug which will not spark.



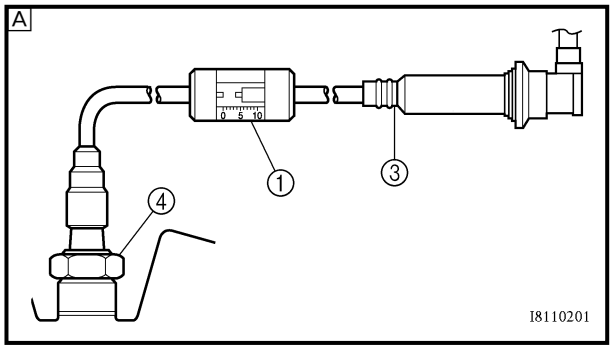
***1 marked: Refer to "FUSE INSPECTION" section in the CHAPTER 3.**
***2 marked: Refer to "BATTERY INSPECTION AND CHARGING" section in the CHAPTER 3.**
***3 marked: Only when the ignition checker is used.**

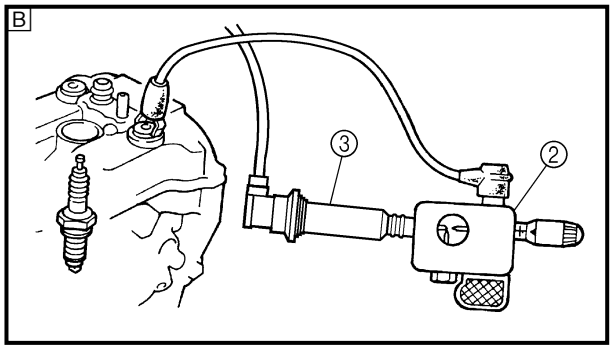
NOTE:
- Remove the following parts before inspection.
  1) Seat
  2) Fuel tank
- Use the following special tools in this inspection.

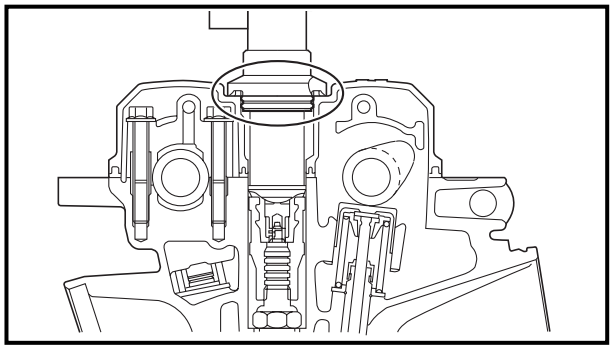
Dynamic spark tester:
YM-34487
Ignition checker:
90890-06754

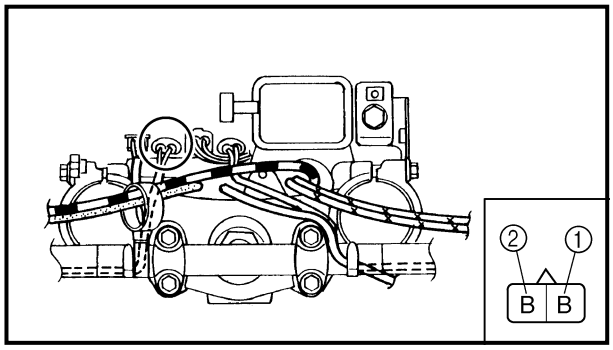


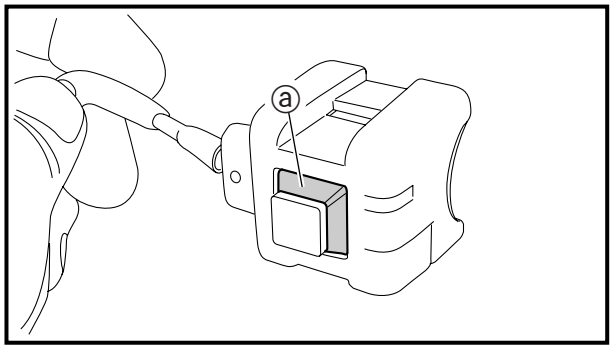
Pocket tester:
YU-3112-C/90890-03112











SPARK GAP TEST

1. Disconnect the ignition coil from spark plug.
2. Remove the ignition coil cap.
3. Connect the dynamic spark tester ① (ignition checker ②) as shown.
   - Ignition coil ③
   - Spark plug ④

A For USA and CDN
B Except for USA and CDN

4. Kick the kickstarter.
5. Check the ignition spark gap.
6. Start engine, and increase spark gap until misfire occurs. (for USA and CDN only)

Minimum spark gap:
6.0 mm (0.24 in)

COUPLERS, LEADS AND IGNITION COIL CONNECTION INSPECTION

1. Check:
   - Couplers and leads connection
     Rust/dust/looseness/short-circuit → Repair or replace.
   - Ignition coil and spark plug as they are fitted
     Push in the ignition coil until it closely contacts the spark plug hole in the cylinder head cover.

EC625001

"ENGINE STOP" BUTTON INSPECTION

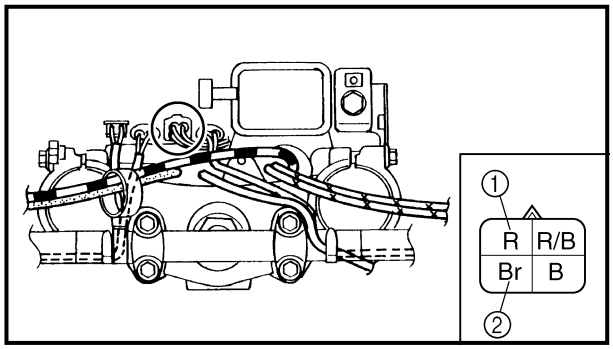
1. Inspect:
   - "ENGINE STOP" button conduct

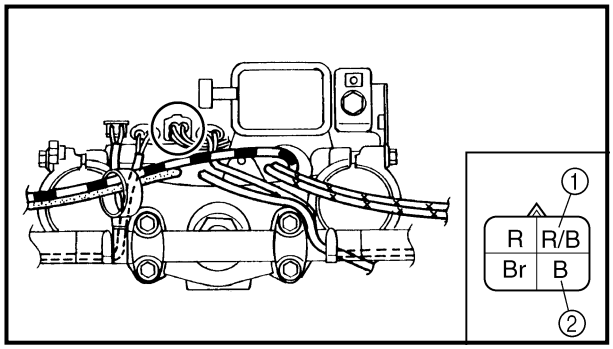
Tester (+) lead → Black lead ①
Tester (–) lead → Black lead ②

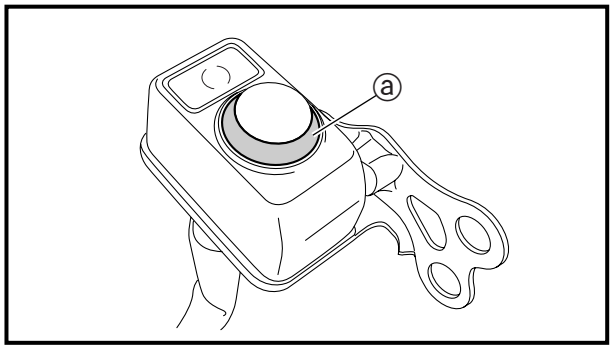
		B ①	B ②	Tester selector position
	PUSH IN	○—○		Ω×1
	FREE			

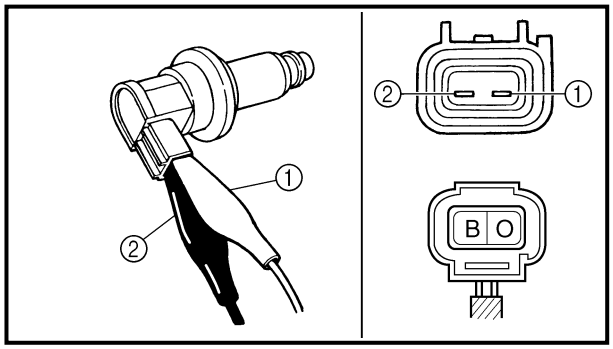
No continuity while being pushed → Replace.
Continuity while being freed → Replace.

2. Inspect:
   - Rubber part ⓐ
     Tears/damage → Replace.









MAIN SWITCH INSPECTION

1. Inspect:
   - Main switch conduct

Tester (+) lead → Red lead ①
Tester (–) lead → Brown lead ②

		R ①	Br ②	Tester selector position
	ON	○—○		Ω × 1
	OFF			

Continuous while the main switch is moved to "OFF" → Replace.
Not continuous while the main switch is moved to "ON" → Replace.

2. Inspect:
   - Main switch indicator light
     Use 12 V battery.

Battery (+) lead → Red/Black lead ①
Battery (–) lead → Black lead ②

Indicator light does not come on → Replace.

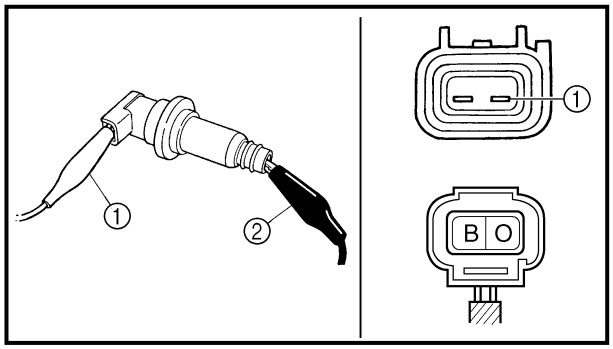
3. Inspect:
   - Rubber part ⓐ
     Tears/damage → Replace.

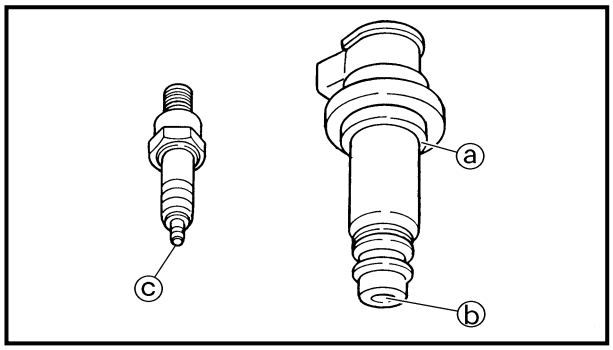
EC626002
IGNITION COIL INSPECTION

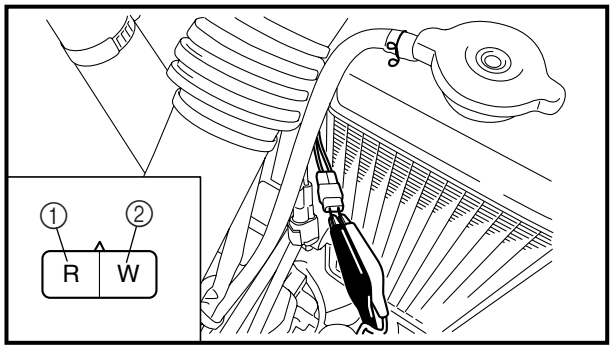
1. Remove the ignition coil cap.
2. Inspect:
   - Primary coil resistance
     Out of specification → Replace.

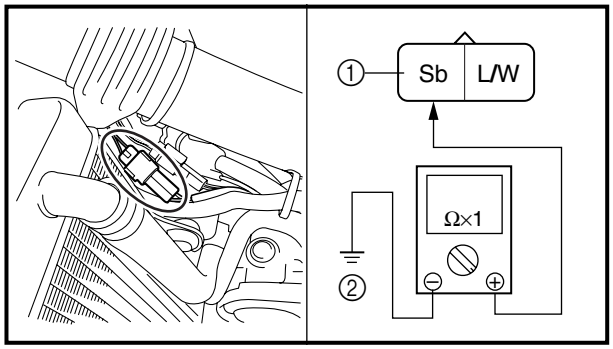
Tester (+) lead → Orange lead ①
Tester (–) lead → Black lead ②

	Primary coil resistance	Tester selector position
	0.08 ~ 0.10 Ω at 20 ˚C (68 ˚F)	Ω × 1









3. Inspect:
   - Secondary coil resistance
     Out of specification → Replace.

Tester (+) lead → Orange lead ①
Tester (–) lead → Spark plug terminal ②

	Secondary coil resistance	Tester selector position
	4.6 ~ 6.8 kΩ at 20 ˚C (68 ˚F)	**kΩ × 1**

4. Inspect:
   - Sealed portion of ignition coil ⓐ
   - Spark plug terminal pin ⓑ
   - Threaded portion of spark plug ⓒ
     Wear → Replace.

AC MAGNETO INSPECTION

1. Inspect:
   - Pick-up coil resistance
     Out of specification → Replace.

Tester (+) lead → Red lead ①
Tester (–) lead → White lead ②

	Pick-up coil resistance	Tester selector position
	248 ~ 372 Ω at 20 ˚C (68 ˚F)	**Ω × 100**

NEUTRAL SWITCH INSPECTION

1. Inspect:
   - Neutral switch conduct

Tester (+) lead → Sky blue lead ①
Tester (–) lead → Ground ②

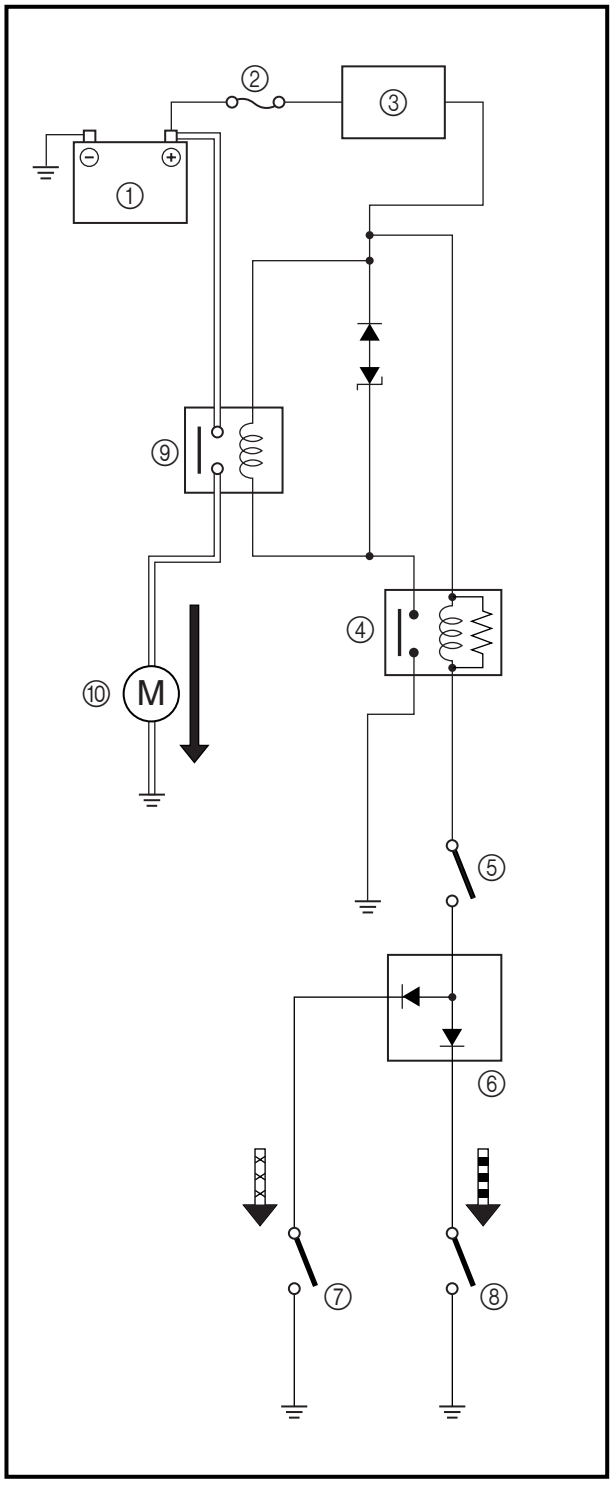
		Sb ①	Ground	Tester selector position
	NEUTRAL	○——○		Ω × 1
	IN GEAR			

No continuity while in neutral → Replace.
Continuity while in gear → Replace.

EC628000

CDI UNIT INSPECTION

Check all electrical components. If no fault is found, replace the CDI unit. Then check the electrical components again.



ELECTRIC STARTING SYSTEM

STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the main switch is set to “ON”, the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the start switch.

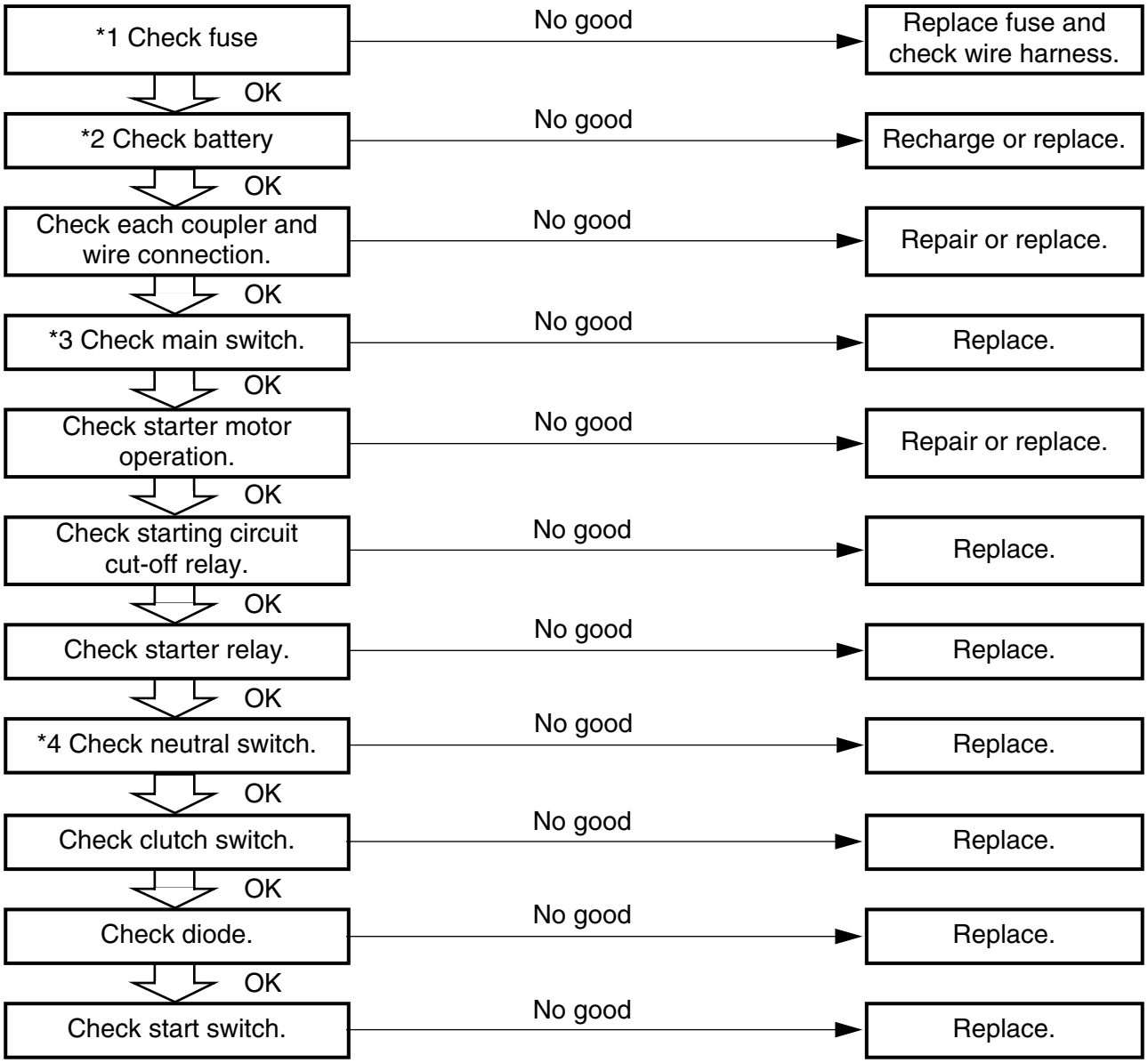
WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

① Battery
② Main fuse
③ Main switch
④ Starting circuit cut-off relay
⑤ Start switch
⑥ Diode
⑦ Clutch switch
⑧ Neutral switch
⑨ Starter relay
⑩ Starter motor

INSPECTION STEPS

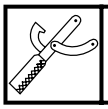
If the starter motor will not operate, use the following inspection steps.



***1 marked: Refer to "FUSE INSPECTION" section in the CHAPTER 3.**
***2 marked: Refer to "BATTERY INSPECTION AND CHARGING" section in the CHAPTER 3.**
***3 marked: Refer to "MAIN SWITCH INSPECTION" section.**
***4 marked: Refer to "NEUTRAL SWITCH INSPECTION" section.**

NOTE:

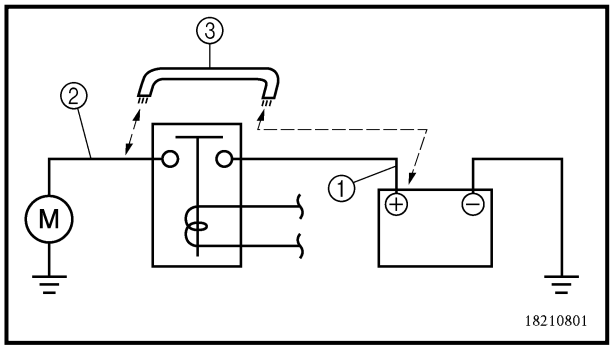
- Remove the following parts before inspection.
  1) Seat
  2) Rear fender
- Use 12 V battery in this inspection.
- Use the following special tools in this inspection.



Pocket tester:
YU-3112-C/90890-03112

EC624000
COUPLERS AND LEADS CONNECTION INSPECTION

1. Check:
   - Couplers and leads connection
     Rust/dust/looseness/short-circuit → Repair or replace.

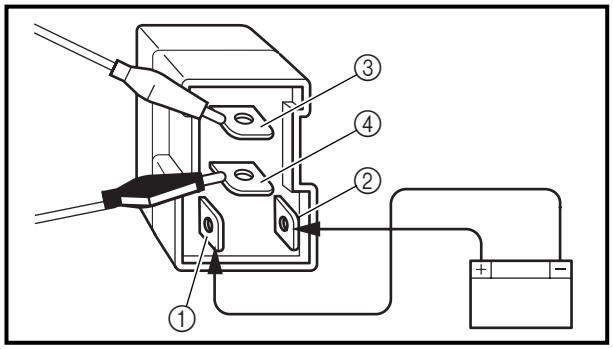


STARTER MOTOR OPERATION

1. Connect the positive battery terminal ① and starter motor lead ② with a jumper lead ③.
   Not operate → Repair or replace the starter motor.

⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.**

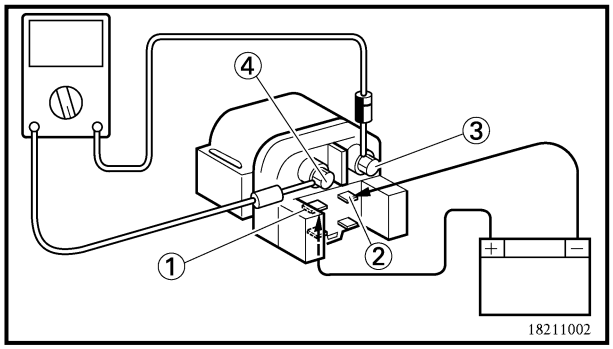


STARTING CIRCUIT CUT-OFF RELAY INSPECTION

1. Remove:
   - Starting circuit cut-off relay
2. Inspect:
   - Starting circuit cut-off relay conduct
     Use 12 V battery.

Battery (+) lead → Blue/Black lead ① **Battery (–) lead → Brown lead ②**
Tester (+) lead → Blue/White lead ③ **Tester (–) lead → Black lead ④**

		L/W ③	B ④	Tester selector position
	Connected to battery	○—○		Ω×1
	Not connected to battery			



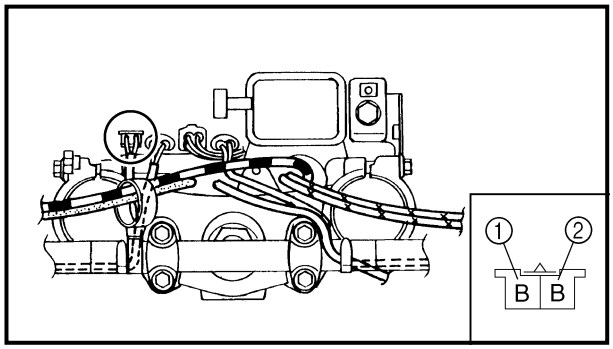
STARTER RELAY INSPECTION

1. Remove:
   - Starter relay
2. Inspect:
   - Starter relay conduct
     Use 12 V battery.

Battery (+) lead → **Starter relay terminal ①** **Battery (–) lead →** **Starter relay terminal ②**
Tester (+) lead → **Starter relay terminal ③** **Tester (–) lead →** **Starter relay terminal ④**

		Terminal ③	Terminal ④	Tester selector position
	Connected to battery	○—○		$\Omega \times 1$
	Not connected to battery			

Continuous while not connected to the battery → Replace.
Not continuous while connected to the battery → Replace.



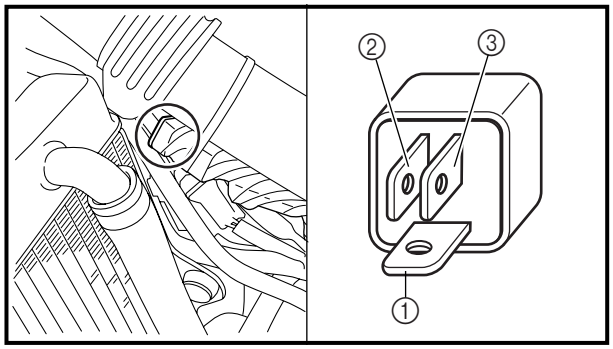
CLUTCH SWITCH INSPECTION

1. Inspect:
   - Clutch switch continuity

Tester (+) lead → Black lead ① **Tester (–) lead → Black lead ②**

		B ①	B ②	Tester selector position
	PULL	○—○		$\Omega \times 1$
	FREE			

No continuous while being pulled → Replace.
Continuous while being freed → Replace.

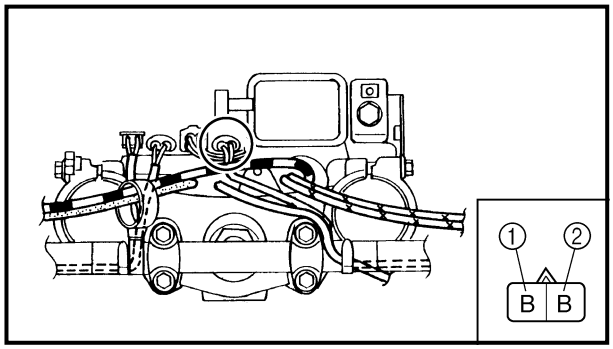


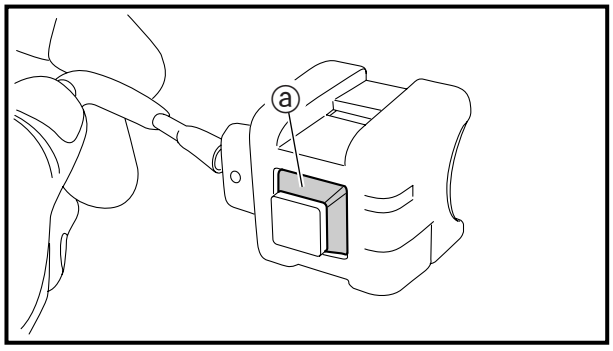
DIODE INSPECTION

1. Remove the diode from wire harness.
2. Inspect:
   - Diode continuity
     Use pocket tester (tester selection position $\Omega \times 1$)

Tester (+) → Blue/Red terminal ① Tester (–) → Sky blue terminal ②	**Continuous**
Tester (+) → Blue/Red terminal ① Tester (–) → Blue/Yellow terminal ③	**Continuous**
Tester (+) → Sky blue terminal ② Tester (–) → Blue/Red terminal ①	**No continuous**
Tester (+) → Blue/Yellow terminal ③ Tester (–) → Blue/Red terminal ①	**No continuous**

Incorrect continuity → Replace.





START SWITCH INSPECTION

1. Inspect:
   - Start switch continuity

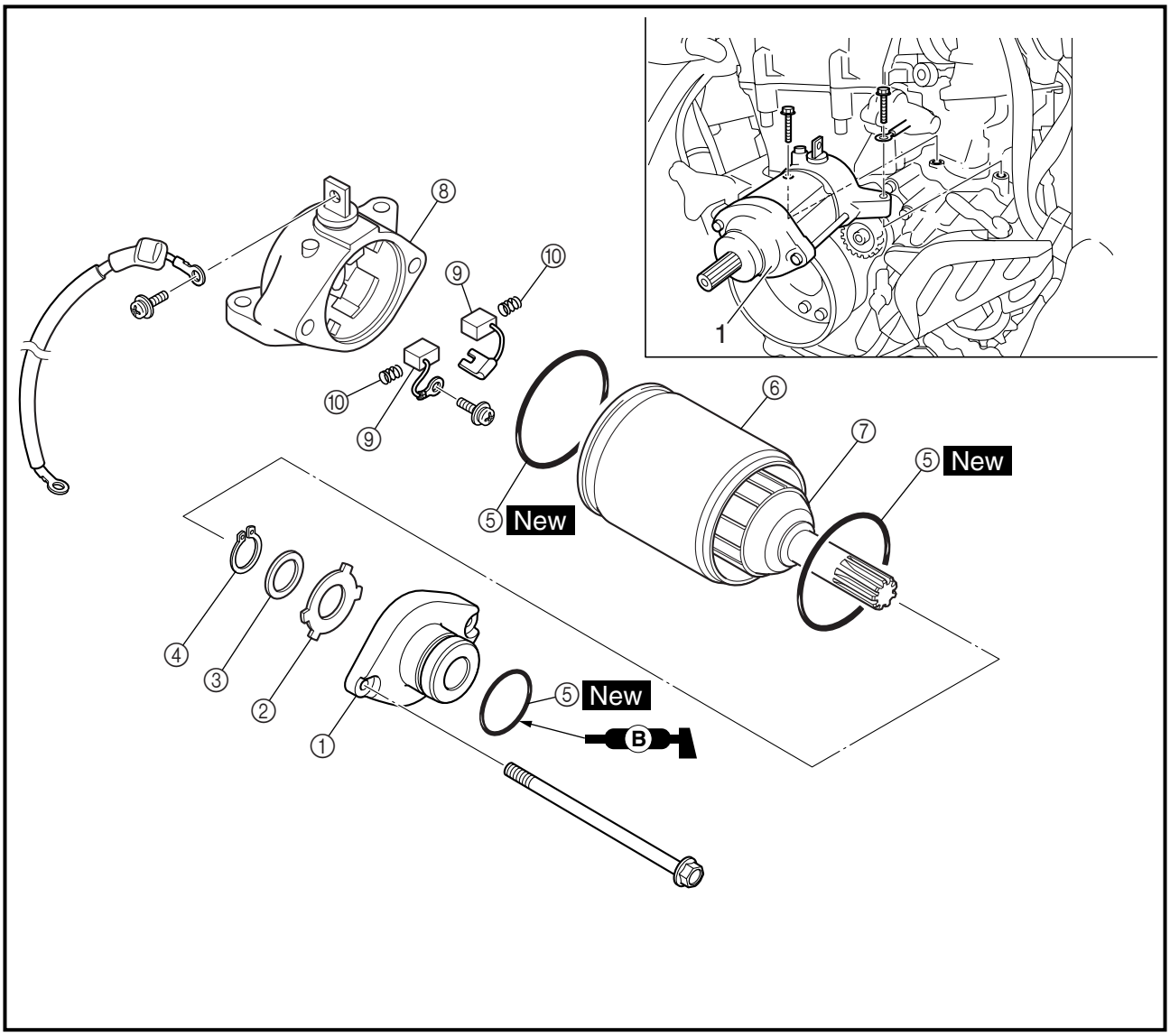
Tester (+) lead → Black lead ①
Tester (–) lead → Black lead ②

		B ①	B ②	Tester selector position
	PUSH IN	○——○		$\Omega \times 1$
	FREE			

No continuous while being pushed → Replace.
Continuous while being freed → Replace.

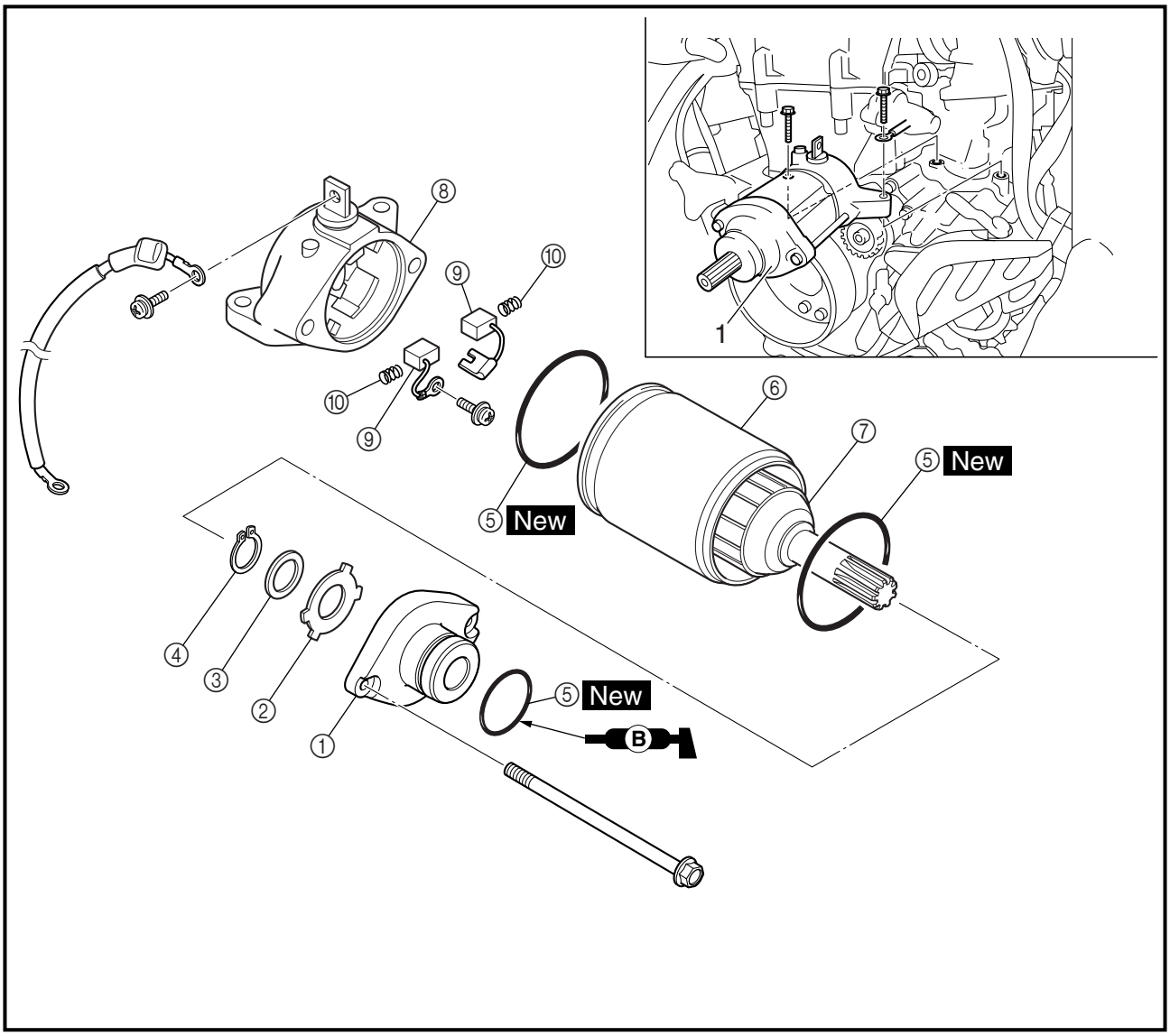
2. Inspect:
   - Rubber part ⓐ
     Tears/damage → Replace.

STARTER MOTOR

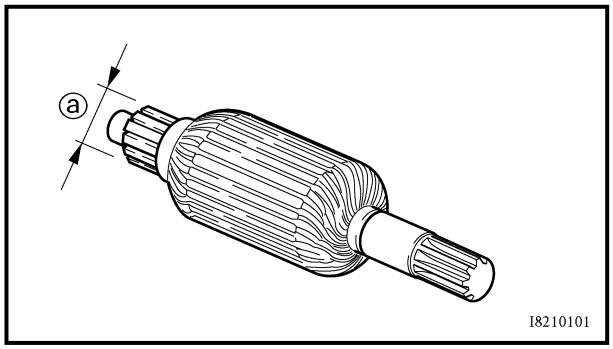


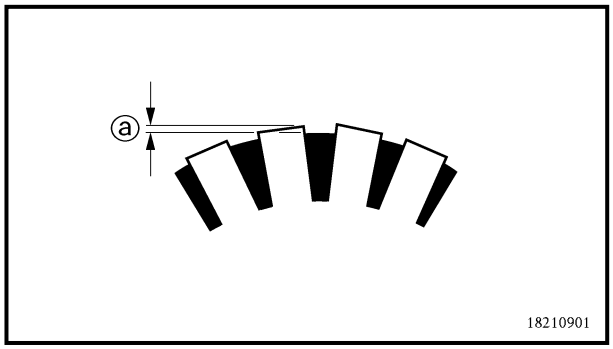
Extent of removal: ① Starter motor disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
		STARTER MOTOR REMOVAL		
Preparation for removal		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Crankcase cover (left)		Refer to "AC MAGNETO AND STARTER CLUTCH" section in the CHAPTER 4.
	1	Starter motor	1	
		STARTER MOTOR DISASSEMBLY		
①	①	Starter motor front cover	1	
	②	Washer (starter motor front cover)	1	
	③	Plain washer	1	
	④	Circlip	1	
	⑤	O-ring	3	



Extent of removal	Order	Part name	Q'ty	Remarks
①	⑥	Starter motor yoke	1	
	⑦	Armature assembly	1	
	⑧	Starter motor rear cover	1	
	⑨	Brush	2	
	⑩	Brush spring	2	





INSPECTION AND REPAIR

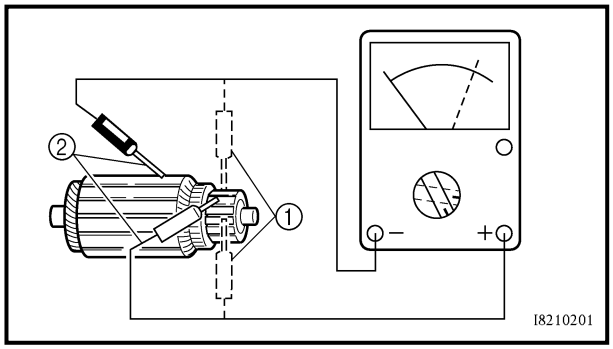
1. Check:
   - Commutator
     Dirt → Clean with 600 grit sandpaper.
2. Measure:
   - Commutator diameter ⓐ
     Out of specification → Replace the starter motor.

Min. commutator diameter
16.6 mm (0.65 in)

3. Measure:
   - Mica undercut ⓐ
     Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

Mica undercut
1.5 mm (0.06 in)

NOTE:
The mica must be undercut to ensure proper operation of the commutator.



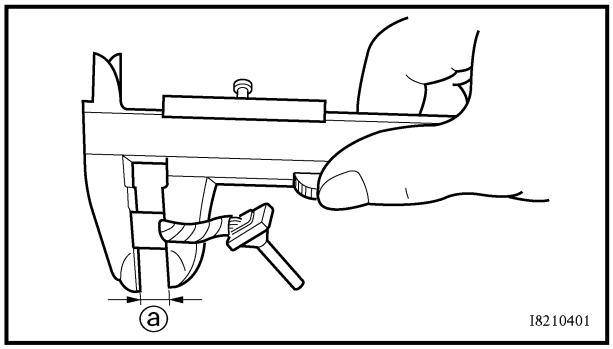
4. Measure:
   - Armature assembly resistances (commutator and insulation)
     Out of specification → Replace the starter motor.

- Measure the armature assembly resistances with the pocket tester.

Pocket tester
YU-03112-C/90890-03112

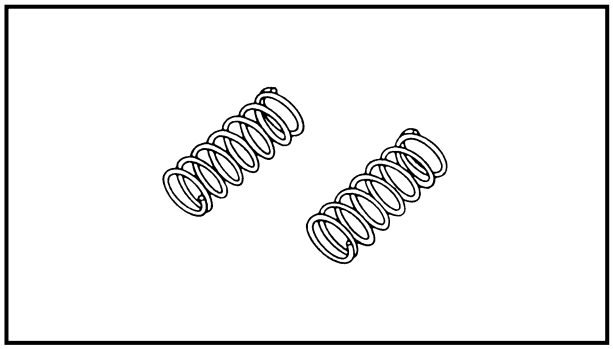
Armature assembly
Commutator resistance ①
0.0117 ~ 0.0143 Ω at 20 ˚C (68 ˚F)
Insulation resistance ②
Above 1 MΩ at 20˚C (68 ˚F)

- If any resistance is out of specification, replace the starter motor.



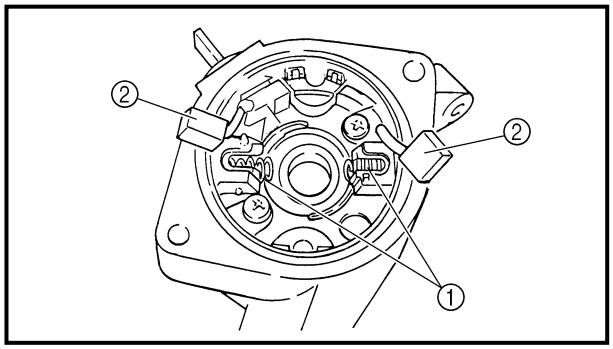
5. Measure:
   - Brush length ⓐ
     Out of specification → Replace the brushes as a set.

Min. brush length
3.5 mm (0.14 in)



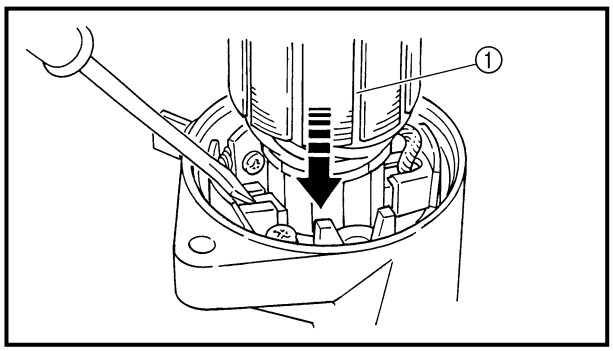
6. Measure:
   - Brush spring force
     Out of specification → Replace the brush springs as a set.

Brush spring force
3.92 ~ 5.88 N
(400 ~ 600 gf, 14.1 ~ 21.2 oz)



ASSEMBLY

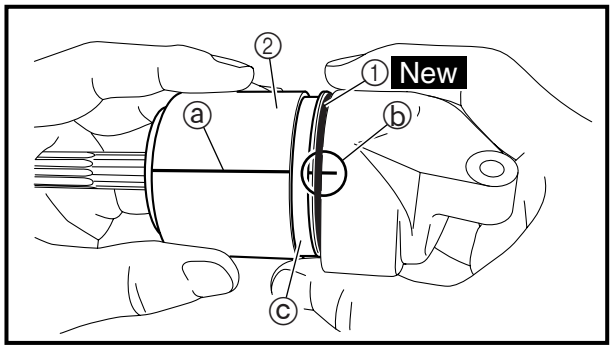
1. Install:
   - Brush spring ①
   - Brush ②



2. Install:
   - Armature assembly ①
     Install while holding down the brush using a thin screw driver.

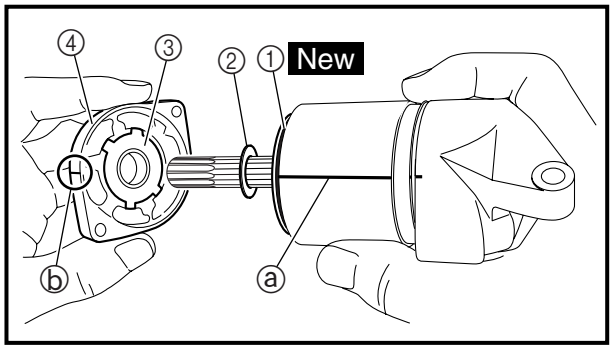
CAUTION:

Be careful not to damage the brush during installation.



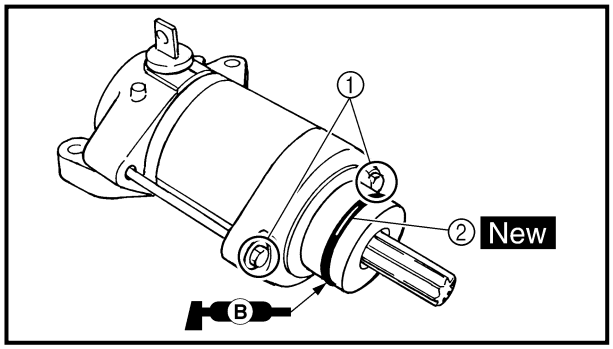
3. Install:
   - O-ring ① New
   - Starter motor yoke ②

NOTE:
- Align the match mark ⓐ on the starter motor yoke with the match mark ⓑ on the starter motor rear cover.
- Install the starter motor yoke with its groove ⓒ facing rear cover.



4. Install:
   - O-ring ① New
   - Circlip
   - Plain washer ②
   - Washer (starter motor front cover) ③
   - Starter motor front cover ④

NOTE:
- For installation, align the projections on the washer with the slots in the front cover.
- Align the match mark ⓐ on the starter motor yoke with the match mark ⓑ on the starter motor front cover.



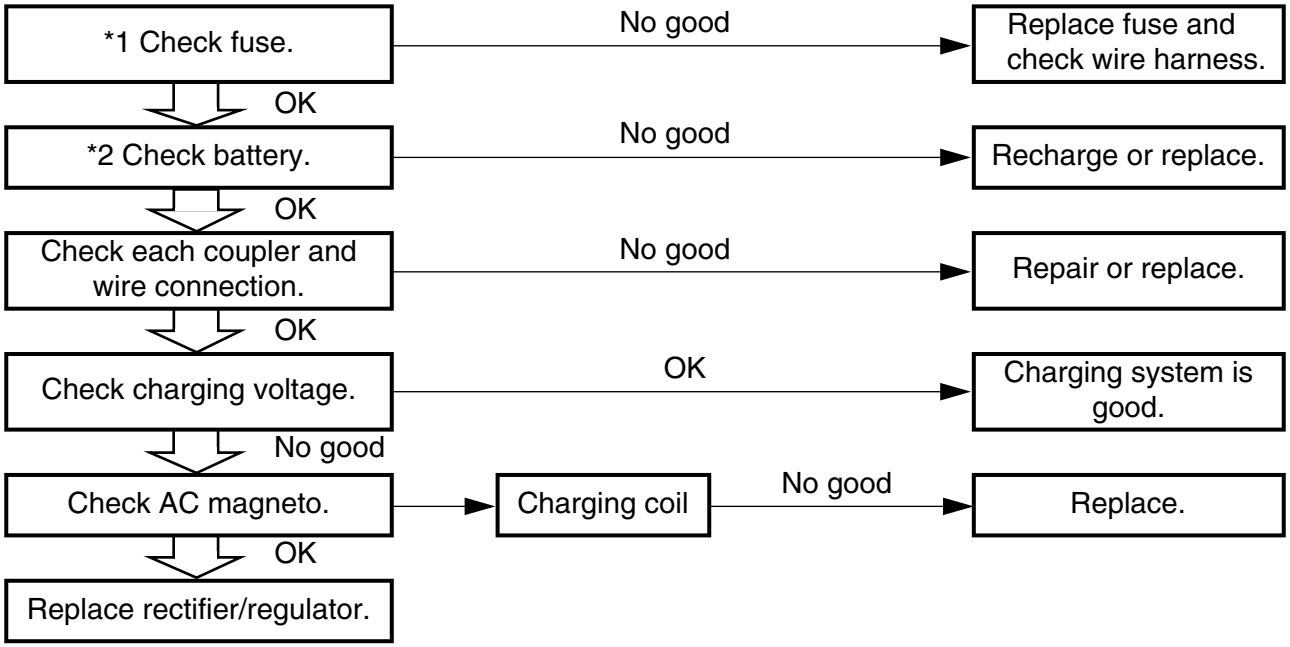
5. Install:
   - Bolt ①
   - O-ring ② New

NOTE:
Apply the lithium soap base grease on the O-ring.

EC680000
CHARGING SYSTEM

EC681001
INSPECTION STEPS

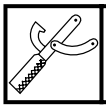
If the battery is not charged, use the following inspection steps.



***1 marked: Refer to "FUSE INSPECTION" section in the CHAPTER 3.**
***2 marked: Refer to "BATTERY INSPECTION AND CHARGING" section in the CHAPTER 3.**

NOTE:

- Remove the following parts before inspection.
  1) Seat
  2) Fuel tank
- Use the following special tool in this inspection.

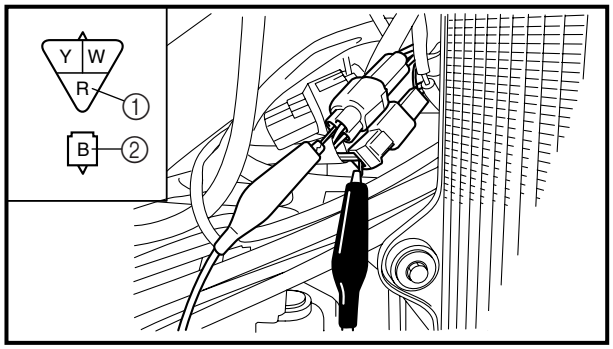


Pocket tester:
YU-3112-C/90890-03112

Inductive tachometer:
YU-8036-B
Engine tachometer:
90890-03113

EC624000
COUPLERS AND LEADS CONNECTION INSPECTION

1. Check:
   - Couplers and leads connection
     Rust/dust/looseness/short-circuit → Repair or replace.

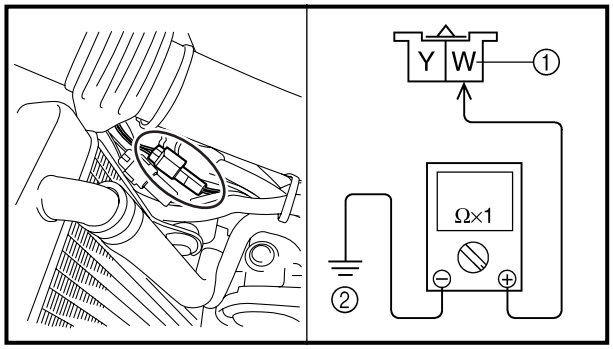


CHARGING VOLTAGE INSPECTION

1. Start the engine.
2. Inspect:
   - Charging voltage
     Out of specification → If no failure is found in checking the source coil resistance, replace the rectifier/regulator.

Tester (+) lead → Red lead ①
Tester (–) lead → Black lead ②

	Charging voltage	Tester selector position
	14.1 ~ 14.9 V at 5,000 r/min	DCV-20



3. Inspect:
   - Charging coil resistance
     Out of specification → Replace.

Tester (+) lead → White lead ①
Tester (–) lead → Ground ②

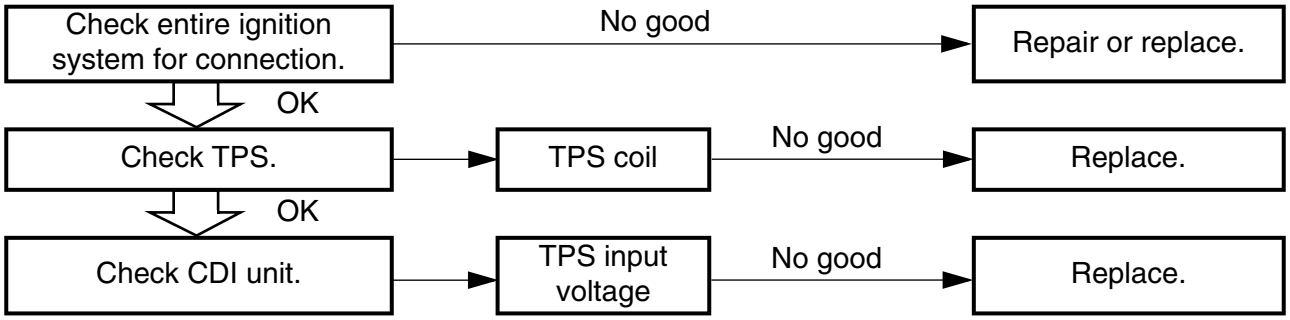
	Charging coil resistance	Tester selector position
	0.288 ~ 0.432 Ω at 20 ˚C (68 ˚F)	Ω × 1

EC690000

TPS (THROTTLE POSITION SENSOR) SYSTEM

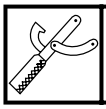
INSPECTION STEPS

If the TPS will not operate, use the following inspection steps.



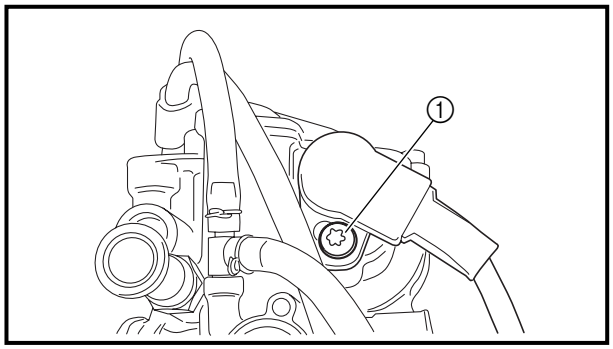
NOTE:

Use the following special tools in this inspection.



Pocket tester:
YU-3112-C/90890-03112

Inductive tachometer:
YU-8036-B
Engine tachometer:
90890-03113



HANDLING NOTE

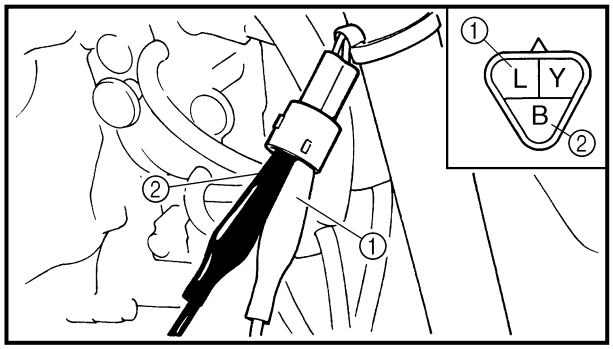
CAUTION:

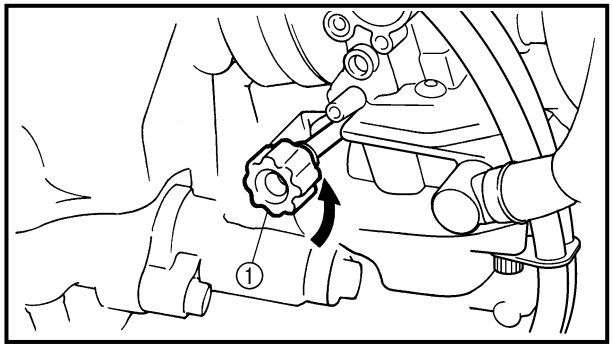
Do not loosen the screws {TPS (throttle position sensor)} ① except when changing the TPS (throttle position sensor) due to failure because it will cause a drop in engine performance.

EC624000

COUPLERS AND LEADS CONNECTION INSPECTION

1. Check:
   - Couplers and leads connection
     Rust/dust/looseness/short-circuit → Repair or replace.





TPS COIL INSPECTION

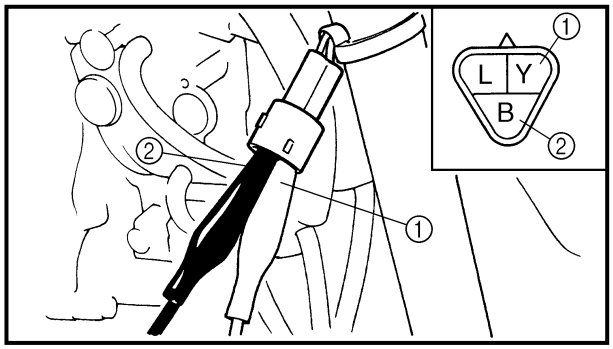
1. Inspect:
   - TPS coil resistance
     Out of specification → Replace.

Tester (+) lead → Blue lead ①
Tester (–) lead → Black lead ②

	TPS coil resistance	Tester selector position
	4 ~ 6 kΩ at 20 ˚C (68 ˚F)	kΩ × 1

2. Loosen:
   - Throttle stop screw ①

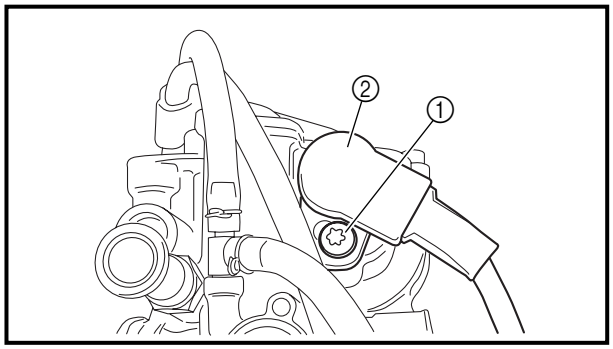
NOTE:
Turn out the throttle stop screw until the throttle shaft is in the full close position.

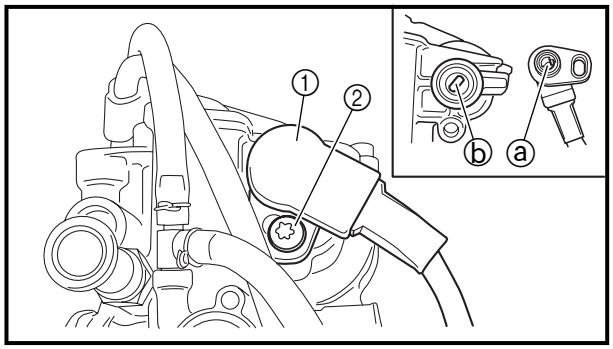


3. Inspect:
   - TPS coil variable resistance
     Check that the resistance in increased as the throttle grip is moved from the full close position to the full open position.
     Out of specification → Replace.

Tester (+) lead → Yellow lead ①
Tester (–) lead → Black lead ②

	TPS coil variable resistance		Tester selector position
	Full closed	Full opened	
	0 ~ 2 kΩ at 20 ˚C (68 ˚F)	4 ~ 6 kΩ at 20 ˚C (68 ˚F)	kΩ × 1





TPS REPLACEMENT AND ADJUSTMENT

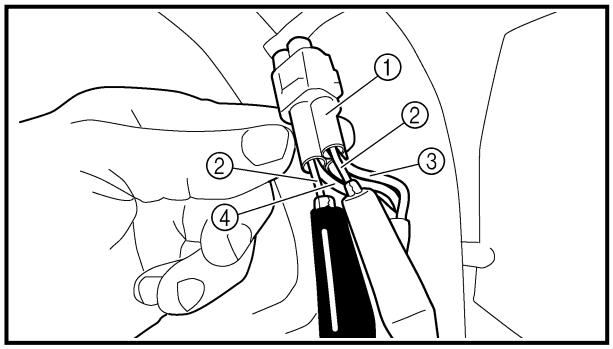
1. Remove:
   - TPS coupler
   - Screw (TPS) ①
   - TPS ②

NOTE:
Loosen the screws (TPS) using the T25 bit.

2. Replace:
   - TPS
3. Install:
   - TPS ①
   - Screw (TPS) ②
   - TPS coupler

NOTE:
- Align the slot ⓐ in the TPS with the projection ⓑ on the carburetor.
- Temporarily tighten the screws (TPS).

4. Adjust:
   - Idle speed
     Refer to "IDLE SPEED ADJUSTMENT" section in the CHAPTER 3.



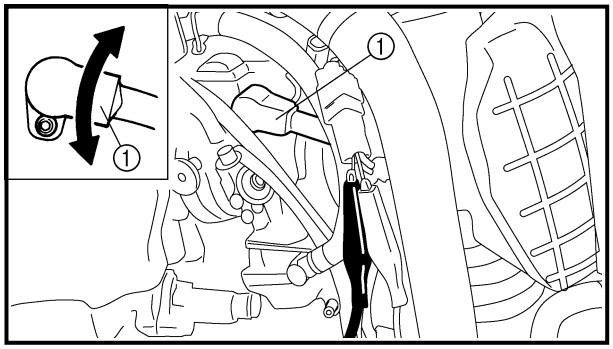
5. Insert the thin electric conductors ② (lead) into the TPS coupler ①, as shown, and connect the tester to them.

Tester (+) lead → Yellow lead ③
Tester (–) lead → Black lead ④

CAUTION:

- **Do not insert the electric conductors more than required because it may reduce the waterproof function of the coupler.**
- **Make sure that a short-circuit does not develop between the terminals because it may cause damage to electrical components.**

6. Start the engine.

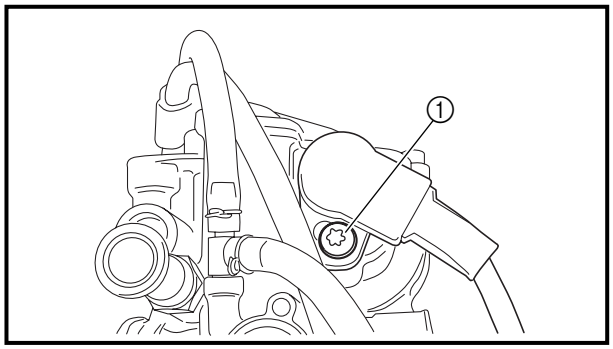


7. Adjust:
   - TPS output voltage

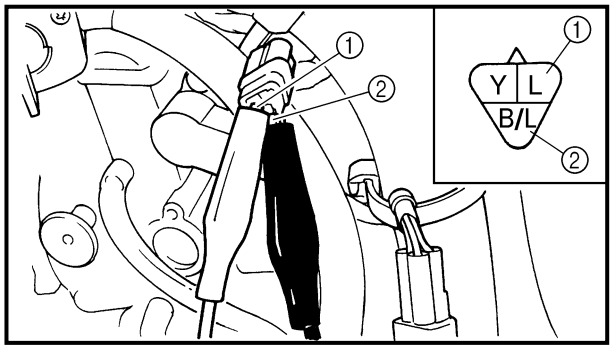
Adjustment steps:
Adjust the installation angle of the TPS ① to obtain the specified output voltage.

NOTE:
Measure the output voltage accurately with a digital electronic voltmeter that gives an easy reading of a small voltage.

	TPS output voltage	Tester selector position
	0.58 ~ 0.78 V	DCV



8. Tighten:
   - Screw (TPS) ①
9. Stop the engine.



EC694000
TPS INPUT VOLTAGE INSPECTION

1. Disconnect the TPS coupler.
2. Start the engine.
3. Inspect:
   - TPS input voltage
     Out of specification → Replace the CDI unit.

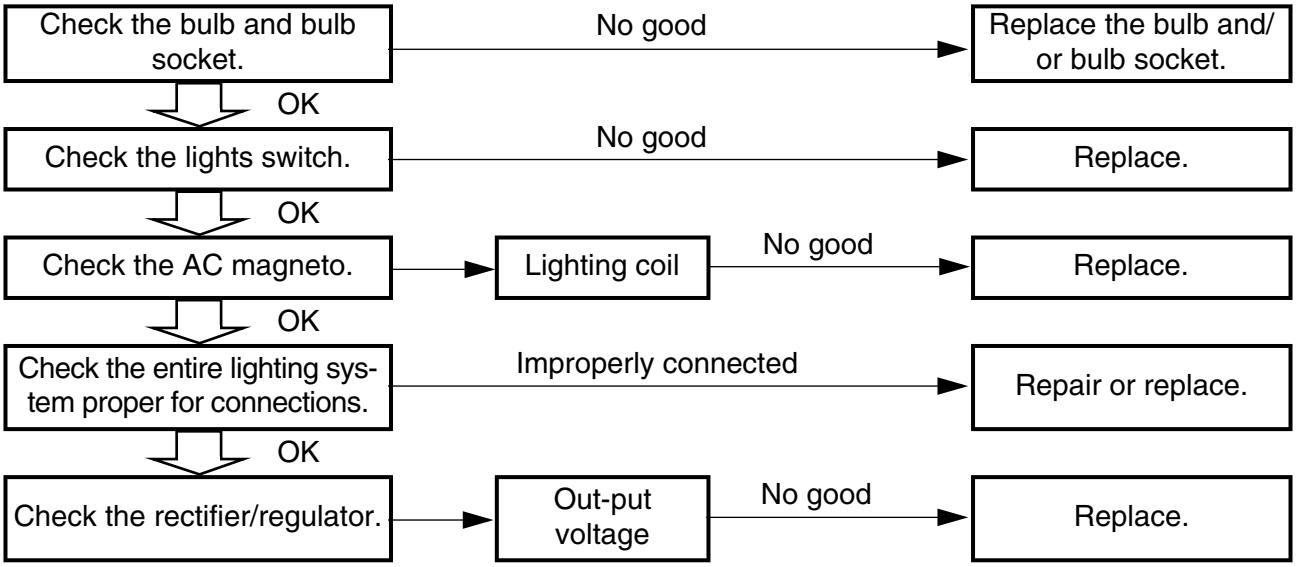
Tester (+) lead → Blue lead ①
Tester (–) lead → Black/Blue lead ②

	TPS input voltage	Tester selector position
	4 ~ 6 V	DCV-20

LIGHTING SYSTEM

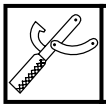
INSPECTION STEPS

Refer to the following flow chart when inspecting the ignition system for possible problems.



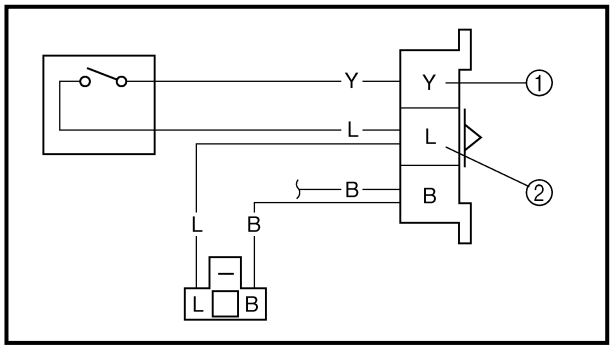
NOTE:

- Replace the bulb and/or bulb socket.
  1) Seat
  2) Fuel tank
- Use the following special tool.



Pocket tester:
YU-3112-C/90890-03112

Inductive tachometer:
YU-8036-B
Engine tachometer:
90890-03113



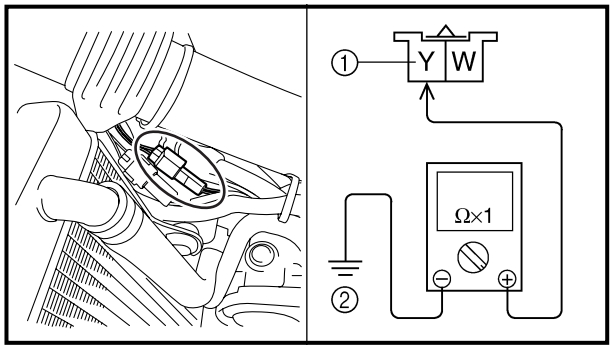
LIGHTS SWITCH INSPECTION

1. Inspect:
   - Lights switch conduct

Tester (+) lead → Yellow lead ①
Tester (–) lead → Blue lead ②

		Y ①	L ②	Tester selector position
	☼	○	○	Ω × 1
	OFF			

No continuous while being ☼ → Replace.
Continuous while being OFF → Replace.



AC MAGNETO INSPECTION

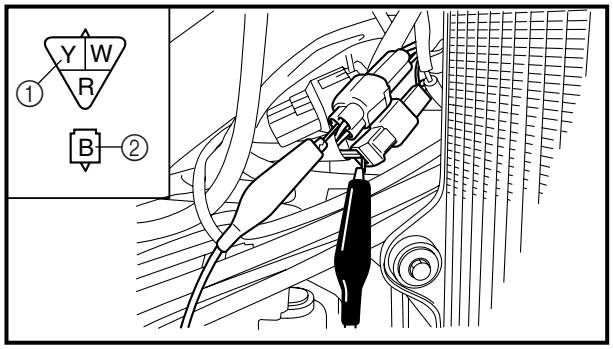
1. Inspect:
   - Lighting coil resistance
     Out of specification → Replace.

Tester (+) lead → Yellow lead ①
Tester (–) lead → Ground ②

	Lighting coil resistance	Tester selector position
	0.224 ~ 0.336 Ω at 20 ˚C (68 ˚F)	Ω × 1

RECTIFIER/REGULATOR INSPECTION

1. Connect the battery leads.
2. Start the engine.
3. Turn on the headlight and taillight by turning on the lights switch.
4. Inspect:
   - Out-put voltage
     Out of specification → Replace rectifier/ regulator.



Tester (+) lead → Yellow lead ①
Tester (–) lead → Black lead ②

	Out-put voltage	Tester selector position
	13.0 ~ 14.0 V at 5,000 r/min	ACV-20