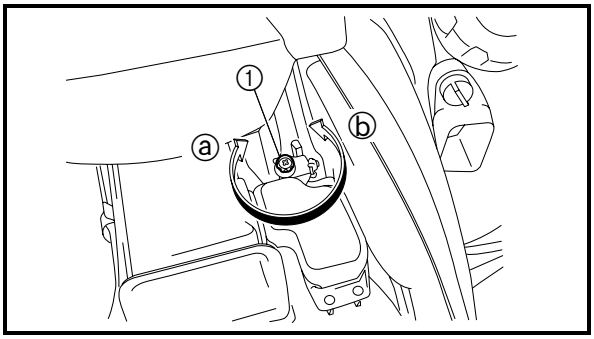

5. Adjust:
   • engine idling speed

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a. Turn the idle speed adjusting screw ① in direction ⓐ or ⓑ until the specified idling speed is obtained.

Direction ⓐ	**Idling speed becomes higher.**
Direction ⓑ	**Idling speed becomes lower.**

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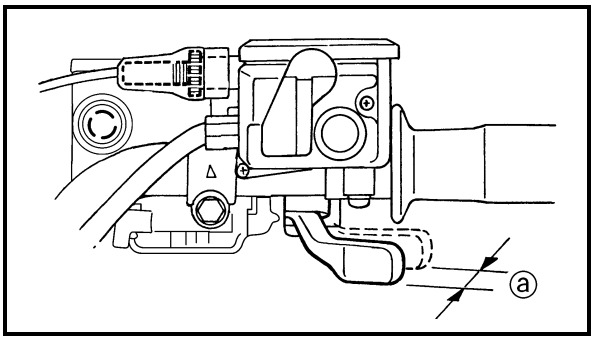
6. Detach:
   • tachometer
7. Adjust:
   • throttle lever free play
   Refer to "ADJUSTING THE THROTTLE LEVER FREE PLAY".

Throttle lever free play
3.0 ~ 5.0 mm (0.12 ~ 0.20 in)

8. Install:
   • fuel tank cover
   Refer to "SEAT AND SIDE PANELS".



EBS00052

ADJUSTING THE THROTTLE LEVER FREE PLAY

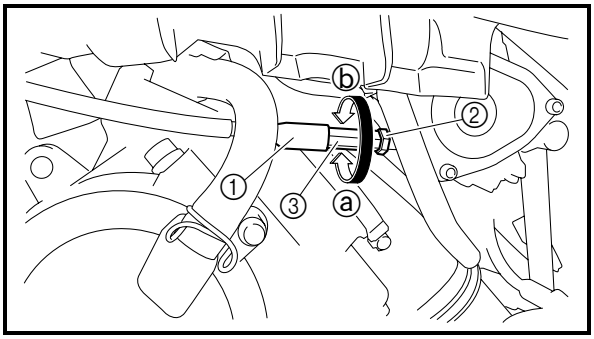
NOTE:

Engine idling speed should be adjusted properly before adjusting the throttle lever free play.

1. Measure:
   • throttle lever free play ⓐ
   Out of specification → Adjust.

Throttle lever free play
3.0 ~ 5.0 mm (0.12 ~ 0.20 in)

2. Remove:
   • left side panel
   Refer to "SEAT AND SIDE PANELS".



3. Adjust:
   • throttle lever free play

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First step:

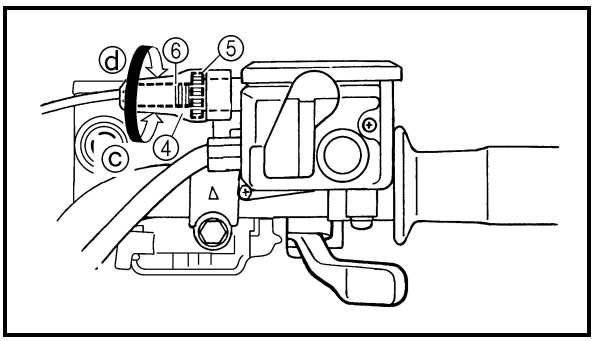
a. Slide back the rubber cover ①.
b. Loosen the locknut ② on the throttle body side.
c. Turn the adjusting nut ③ in direction ⓐ or ⓑ until the correct free play is obtained.

Direction ⓐ	**Free play is increased.**
Direction ⓑ	**Free play is decreased.**

d. Tighten the locknut.
e. Slide the rubber cover to its original position.

NOTE:

If the free play cannot be adjusted here, adjust it at the throttle lever side of the cable.



Second step:

f. Slide back the rubber cover ④.
g. Loosen the locknut ⑤.
h. Turn the adjusting bolt ⑥ in direction ⓒ or ⓓ until the correct free play is obtained.

Direction ⓒ	**Free play is increased.**
Direction ⓓ	**Free play is decreased.**

i. Tighten the locknut.
j. Slide the rubber cover to its original position.

⚠ WARNING

After adjusting the free play, turn the handlebar to the right and left to make sure that the engine idling speed does not increase.

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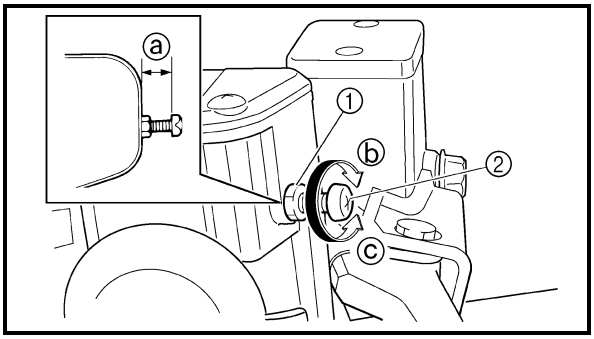
4. Install:
   • left side panel
   Refer to “SEAT AND SIDE PANELS”.



EBS00053

ADJUSTING THE SPEED LIMITER

The speed limiter keeps the throttle from becoming fully-opened even when the throttle lever is applied to the maximum position. Screwing in the adjusting screw stops the engine speed from increasing.

1. Measure:
   - speed limiter length ⓐ
     Out of specification → Adjust.

	Speed limiter length **Less than 12 mm (0.47 in)**

2. Adjust:
   - speed limiter length

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a. Loosen the locknut ①.
b. Turn the adjuster ② in direction ⓑ or ⓒ until the specified speed limiter length is obtained.

Direction ⓑ	**Speed limiter length is decreased.**
Direction ⓒ	**Speed limiter length is increased.**

c. Tighten the locknut.

⚠ WARNING

- **Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as their riding technique improves. Never remove the speed limiter for a beginning rider.**
- **For proper throttle lever operation do not turn out the adjuster more than 12 mm (0.47 in). Also, always adjust the throttle lever free play to 3.0 ~ 5.0 mm (0.12 ~ 0.20 in).**

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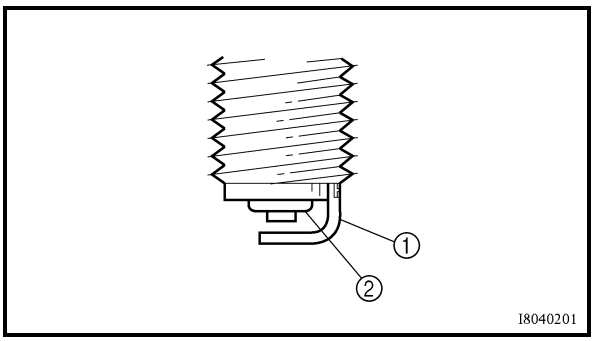
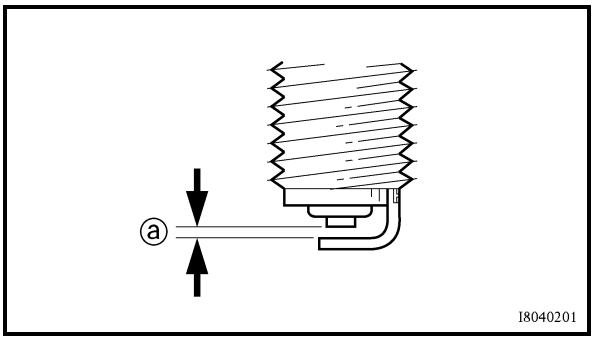
EBS00057
CHECKING THE SPARK PLUG

1. Remove:
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
2. Disconnect:
   - spark plug cap
3. Remove:
   - spark plug
4. Check:
   - spark plug type
     Incorrect → Change.

Standard spark plug
CR8E/NGK



5. Check:
   - electrode ①
     Wear/damage → Replace.
   - insulator ②
     Abnormal color → Replace.
     Normal color is a medium-to-light tan color.
6. Clean:
   - spark plug
     (with a spark plug cleaner or wire brush)



7. Measure:
   - spark 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)

8. 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.

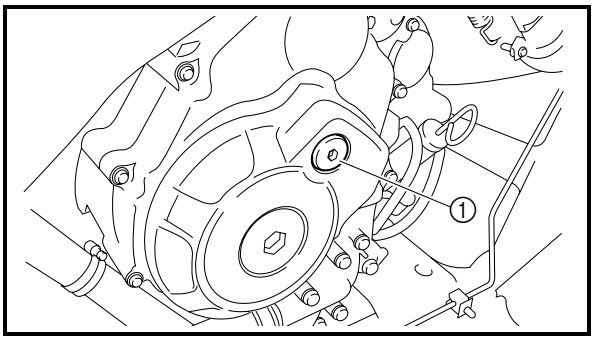
9. Connect:
   - spark plug cap
10. Install:
    - right side panel
      Refer to “SEAT AND SIDE PANELS”.

EBS00058
CHECKING THE IGNITION TIMING

NOTE:
Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:
   - left side panel
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - footrest board
     Refer to “FOOTREST BOARDS”.
2. Attach:
   - tachometer
   - timing light
     (to spark plug lead)

Digital tachometer
90890-06760, YU-39951-B
Timing light
90890-03141
Inductive clamp timing light
YU-03141



3. Check:
   - ignition timing

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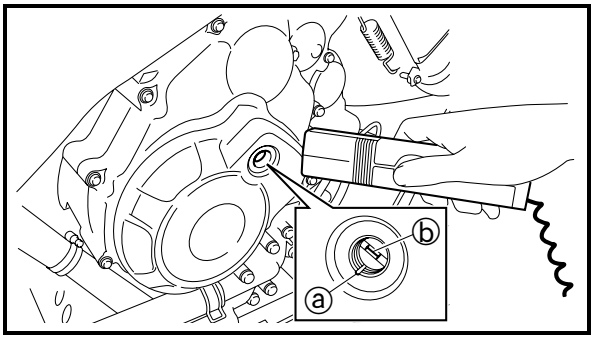
a. Warm up the engine and keep it at the specified speed.

Engine speed
1,350 ~ 1,450 r/min

b. Remove the timing mark accessing screw ①.



c. Visually check the stationary pointer ⓐ to verify it is within the required firing range ⓑ indicated on the AC magneto rotor.
Incorrect firing range → Check the pulser coil assembly.

NOTE:
When checking the ignition timing, make sure that the timing light cord does not come in contact with the exhaust muffler.

d. Install the timing mark accessing screw.

	Timing mark accessing screw 6 Nm (0.6 m · kg, 4.3 ft · lb)

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4. Detach:
   - timing light
   - tachometer
5. Install:
   - footrest board
     Refer to “FOOTREST BOARDS”.
   - right side panel
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.

EBS00061
MEASURING THE COMPRESSION PRESSURE

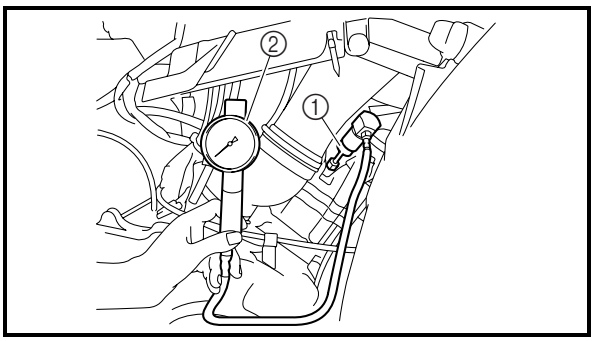
NOTE:
Insufficient compression pressure will result in a loss of performance.

1. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to “ADJUSTING THE VALVE CLEARANCE”.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.

4. Disconnect:
   • spark plug cap
5. Remove:
   • spark plug

CAUTION:

Before removing a spark plug, use compressed air to blow away any dirt accumulated in the spark plug well to prevent it from falling into the cylinder.



6. Attach:
   • extension ①
   • compression gauge ②

Compression gauge
90890-03081
Engine compression tester
YU-33223
Extension
90890-04082

7. Measure:
   • compression pressure
   Out of specification → Refer to steps (c) and (d).

Compression pressure (at sea level)
Minimum
392 kPa (3.92 kg/cm², 55.8 psi)
Standard
450 kPa (4.50 kg/cm², 64.0 psi)
Maximum
504 kPa
(5.04 kg/cm², 71.7 psi)

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a. Set the main switch to “ON”.

b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

⚠ WARNING

To prevent sparking, ground the spark plug lead before cranking the engine.

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
   Carbon deposits → Eliminate.
d. If the compression pressure is below the minimum specification, squirt a few drops of oil into the cylinder and measure again.
   Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading	**Diagnosis**
Higher than without oil	**Piston ring(s) wear or damage → Repair.**
Same as without oil	**Piston, valves, cylinder head gasket or piston rings possibly defective → Repair.**

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8. Install:
   • spark plug — **13 Nm (1.3 m · kg, 9.4 ft · lb)**
9. Connect:
   • spark plug cap
10. Install:
   • V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
   • right side panel
     Refer to “SEAT AND SIDE PANELS”.

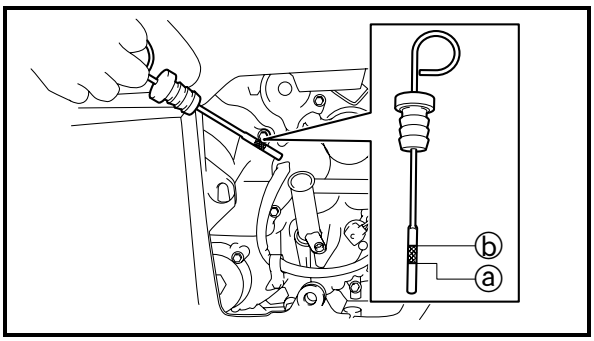
EBS00064
CHECKING THE ENGINE OIL LEVEL

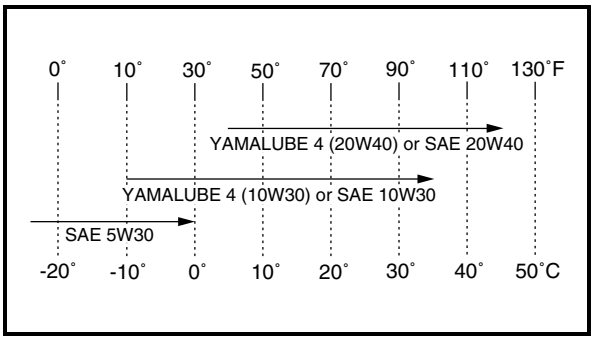
1. Place the vehicle on a level surface.
2. Check the engine oil level on a cold engine.

NOTE:

If the engine was started before checking the oil level, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

3. Remove:
   - dipstick accessing panel
     Refer to "SEAT AND SIDE PANELS".





4. Check:
   - engine oil level
     Oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
     Oil level low → Add oil to the proper level.

NOTE:

To obtain an accurate oil level reading, the dipstick must be inserted completely into the oil filter hole.

Recommended engine oil type
YAMALUBE 4, SAE5W30, SAE10W30 or SAE20W40
Recommended engine oil grade
API service SG type or higher, JASO standard MA

CAUTION:

Do not allow foreign material to enter the crankcase.

5. Check the engine oil level again.

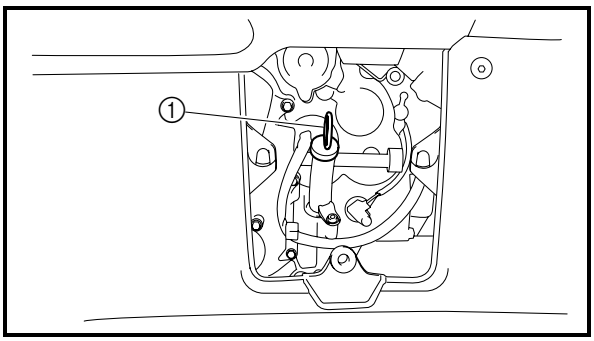
CAUTION:

Be sure the engine oil is at the correct level, otherwise engine damage may result.

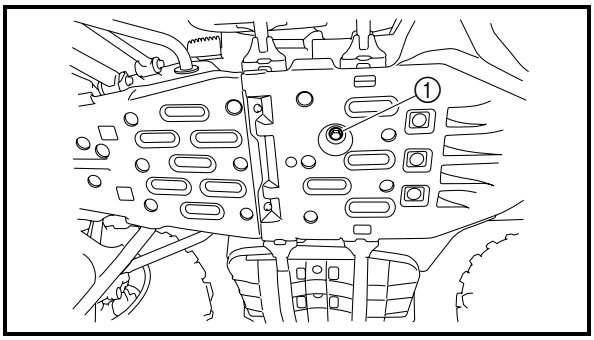
6. Install:
   • dipstick accessing panel
   Refer to “SEAT AND SIDE PANELS”.

EBS00069
CHANGING THE ENGINE OIL

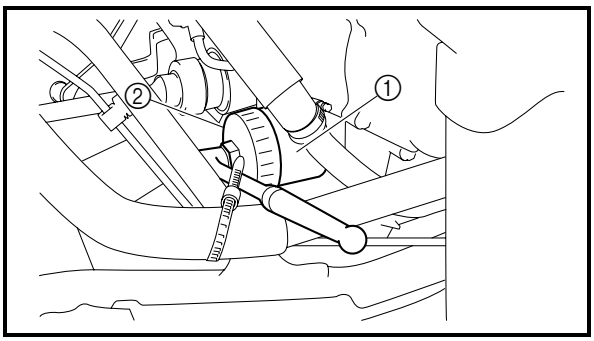
1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   • dipstick accessing panel
   Refer to “SEAT AND SIDE PANELS”.



4. Remove:
   • dipstick ①



5. Remove:
   • engine oil drain bolt ①
   (along with the gasket)
6. Drain:
   • engine oil
   (completely from the crankcase)



7. If the oil filter cartridge is also to be replaced, perform the following procedure.

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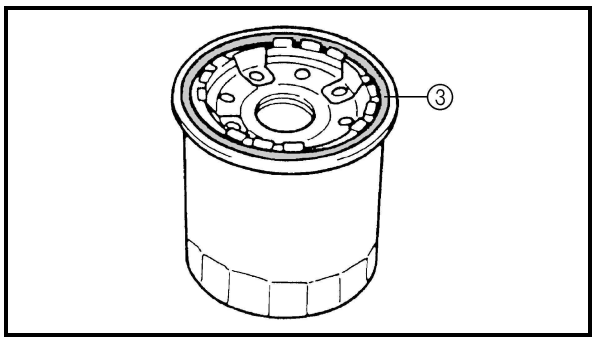
a. Remove the oil filter cartridge ① with an oil filter wrench ②.

	Oil filter wrench **90890-01426, YU-38411**



b. Lubricate the O-ring ③ of the new oil filter cartridge with a thin coat of engine oil.

CAUTION:

Make sure the O-ring ③ is positioned correctly in the groove of the oil filter cartridge.

c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

Oil filter cartridge
17 Nm (1.7 m · kg, 12 ft · lb)

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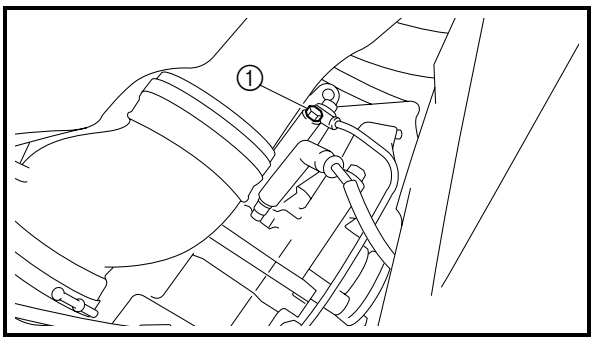
8. Check:
   - engine oil drain bolt gasket
     Damage → Replace.
9. Install:
   - engine oil drain bolt
     (along with the gasket)

30 Nm (3.0 m · kg, 22 ft · lb)

10. Fill:
    - crankcase
      (with the specified amount of the recommended engine oil)

Quantity
Total amount
2.40 L (2.11 Imp qt, 2.54 US qt)
Without oil filter cartridge replacement
2.00 L (1.76 Imp qt, 2.11 US qt)
With oil filter cartridge replacement
2.10 L (1.85 Imp qt, 2.22 US qt)

11. Install:
    - dipstick
12. Start the engine, warm it up for several minutes, and then turn it off.
13. Check:
    - engine
      (for engine oil leaks)
14. Check:
    - engine oil level
      Refer to “CHECKING THE ENGINE OIL LEVEL”.



15.Check:
- engine oil pressure

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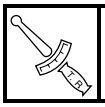
a. Slightly loosen the oil gallery bolt ①.
b. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "CRANKSHAFT AND OIL PUMP" in chapter 4.
d. Start the engine after solving the problem(s) and check the engine oil pressure again.
e. Tighten the oil gallery bolt to specification.

	**Oil gallery bolt** **10 Nm (1.0 m · kg, 7.2 ft · lb)**

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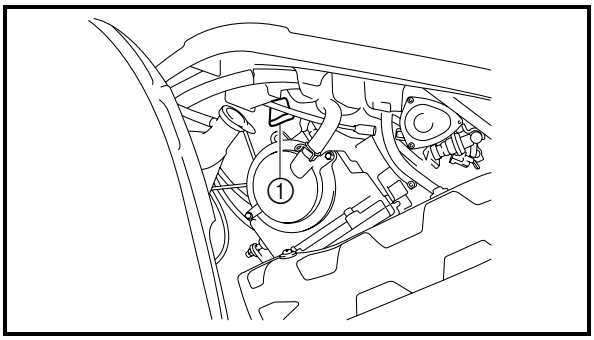
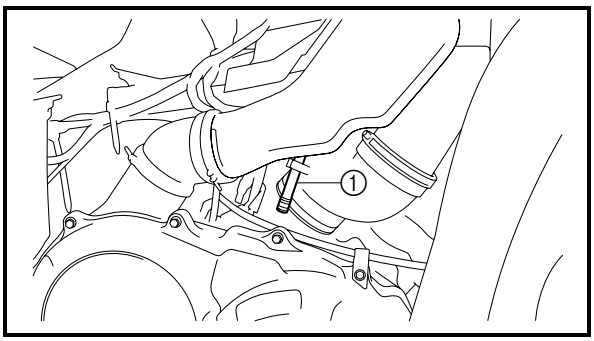




EBS00073

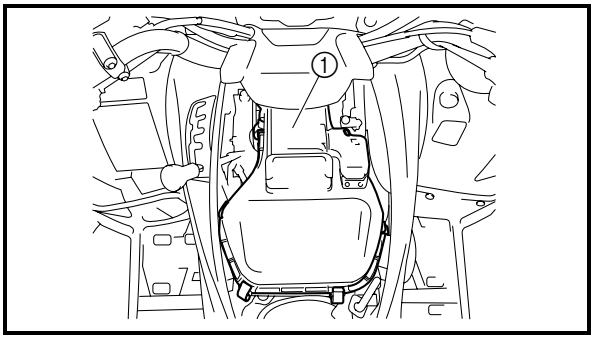
CLEANING THE AIR FILTER ELEMENT

1. Remove:
   - fuel tank cover
   - left side panel
   - right side panel

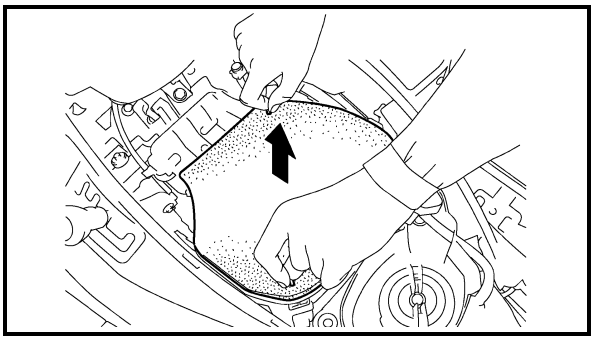
   Refer to "SEAT AND SIDE PANELS".

NOTE:

There are two check hoses ① at the bottom of the air filter case. If dust and/or water collects in them, clean the air filter element, air filter mesh and air filter case.



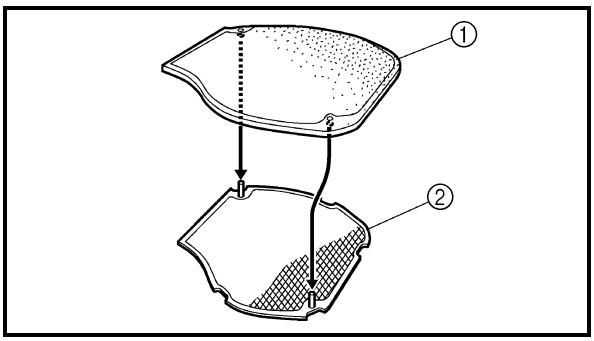
2. Remove:
   • air filter case cover ①



3. Remove:
   • air filter element ①
   • air filter element frame ②

CAUTION:

The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.



4. Check:
   • air filter element
   • air filter element frame
   Damage → Replace.
5. Clean:
   • air filter element
   Use compressed air to blow off dust from the inner surface of the element.

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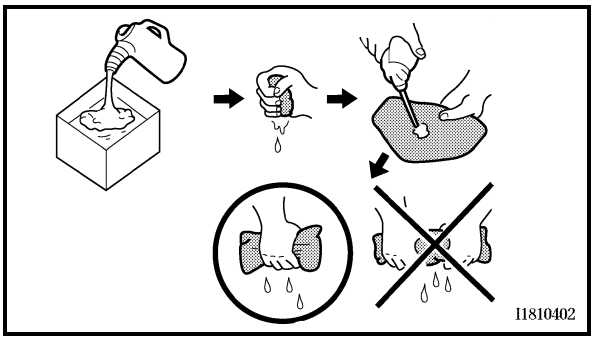
a. Wash the element gently, but thoroughly in solvent.



⚠ WARNING

Use a cleaning solvent which is designed to clean parts only. Never use gasoline or low flash point solvents as they may cause a fire or explosion.

b. Squeeze the excess solvent out of the element and let it dry.

CAUTION:

Do not twist or wring out the element. This could damage the foam material.

c. Apply Yamaha foam air filter oil or other quality foam air filter oil to the element.

d. Squeeze out the excess oil.

NOTE:
The element should be wet but not dripping.

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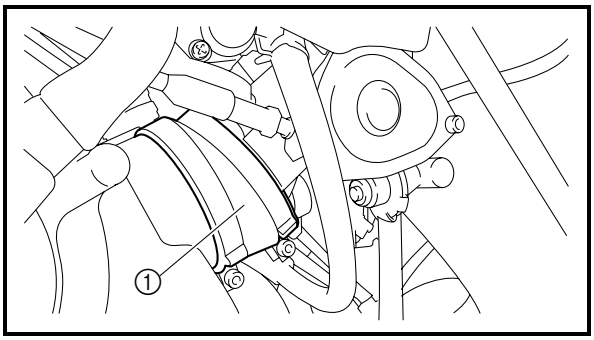
6. Install:
   - air filter element frame
   - air filter element

NOTE:
Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

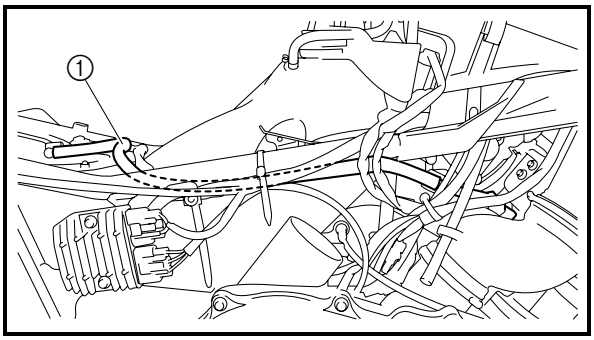
7. Install:
   - air filter case cover
8. Install:
   - right side panel
   - left side panel
   - fuel tank cover
   Refer to “SEAT AND SIDE PANELS”.



EAS00094
CHECKING THE THROTTLE BODY JOINT

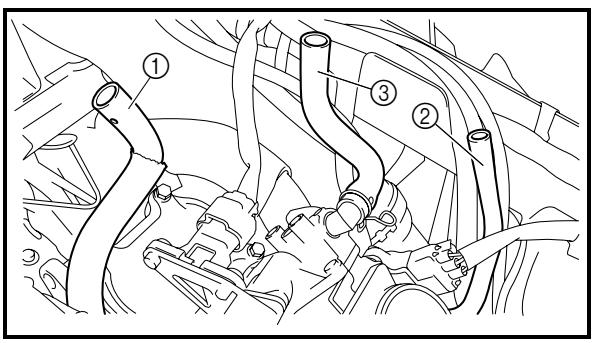
1. Remove:
   - left side panel
   Refer to “SEAT AND SIDE PANELS”.
2. Check:
   - throttle body joint ①
   Cracks/damage → Replace.
   Refer to “THROTTLE BODY” in chapter 6.
3. Install:
   - left side panel
   Refer to “SEAT AND SIDE PANELS”.

EAS00096
CHECKING THE FUEL HOSE



1. Remove:
   - seat
   - right side panel
     Refer to “SEAT AND SIDE PANELS”.
   - rear fender
     Refer to “REAR CARRIER AND REAR FENDER”.
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
2. Check:
   - fuel hose ①
     Cracks/damage → Replace.
     Loose connection → Connect properly.
3. Install:
   - V-belt cooling duct 2
     Refer to “ENGINE REMOVAL” in chapter 4.
   - rear fender
     Refer to “REAR CARRIER AND REAR FENDER”.
   - right side panel
   - seat
     Refer to “SEAT AND SIDE PANELS”.

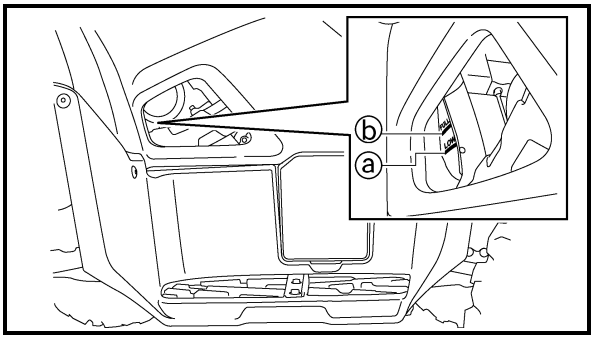
EAS00098
CHECKING THE BREATHER HOSES



1. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
   - air filter case
     Refer to “AIR FILTER CASE”.
2. Check:
   - cylinder head breather hose ①
   - breather hose (air filter case to throttle body) ②
   - breather hose (air filter case to fast idle plunger unit) ③
     Cracks/damage → Replace.
     Loose connection → Connect properly.

CAUTION:

Make sure the breather hoses are routed correctly.



EBS00076
CHECKING THE COOLANT LEVEL

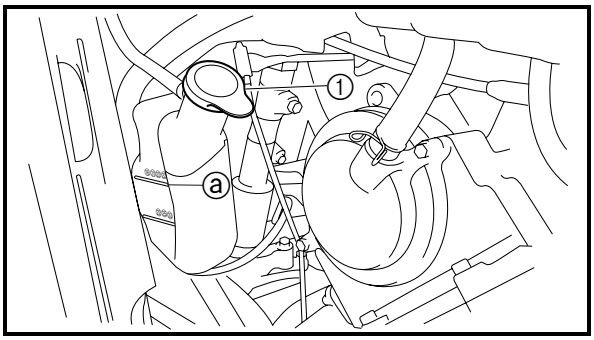
1. Place the vehicle on a level surface.

NOTE:
The coolant level must be checked on a cold engine since the level varies with engine temperature.

2. Check:
   - coolant level
     The coolant level should be between the minimum level mark ⓐ and maximum level mark ⓑ in the coolant reservoir.

CAUTION:
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**

3. If the coolant is at or below the minimum level mark, remove the left side panel.
   Refer to “SEAT AND SIDE PANELS”.

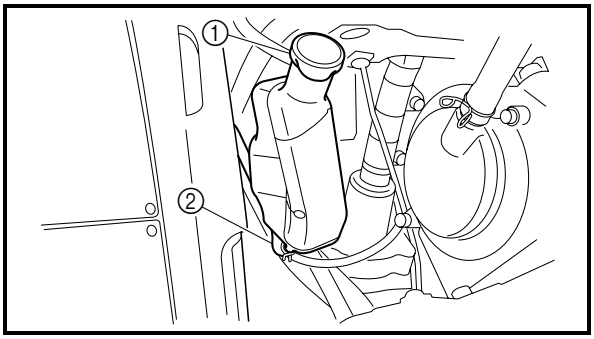


4. Remove the reservoir cap ①, add coolant or distilled water to the maximum level mark ⓐ, install the reservoir cap, and then install the panel.

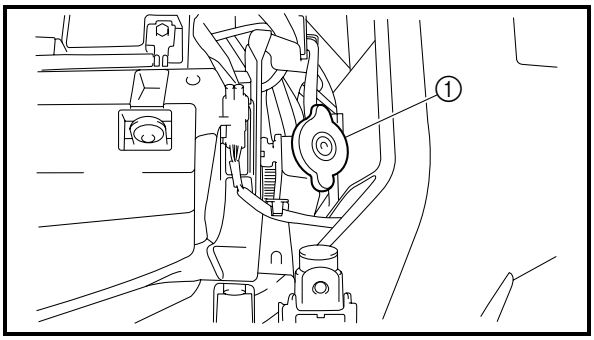
Coolant reservoir capacity (up to the maximum level mark):
0.17 L (0.15 Imp qt, 0.18 US qt)

EBS00075
CHANGING THE COOLANT

1. Remove:
   - right side panel
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.
   - front carrier
   - upper panel
     Refer to “FRONT CARRIER AND FRONT GUARD”.



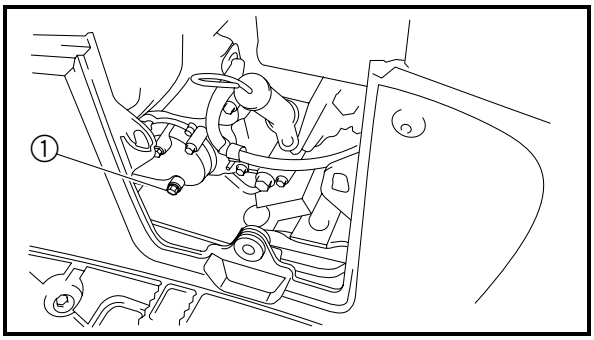
2. Remove:
   • coolant reservoir cap ①
3. Disconnect:
   • coolant reservoir hose ②
4. Drain:
   • coolant
   (from the coolant reservoir)
5. Connect:
   • coolant reservoir hose



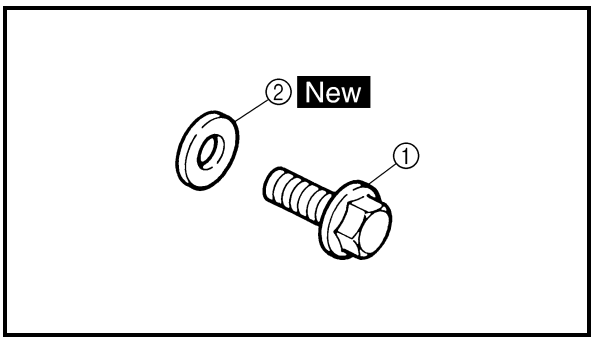
6. Remove:
   • radiator cap ①

⚠ WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

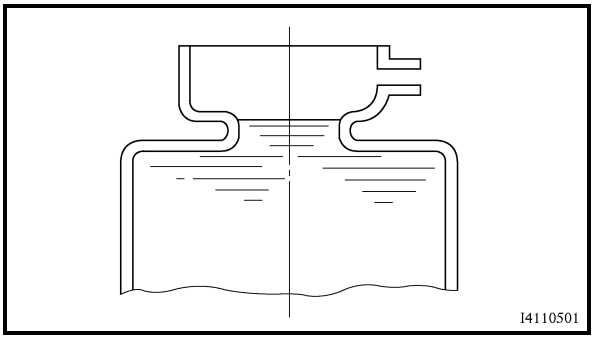


7. Remove:
   • coolant drain bolt ①
   (along with the copper washer)
8. Drain:
   • coolant
   (from the engine and radiator)



9. Check:
   • coolant drain bolt ①
   Damage → Replace.
10. Install:
   • copper washer ② New
   • coolant drain bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)



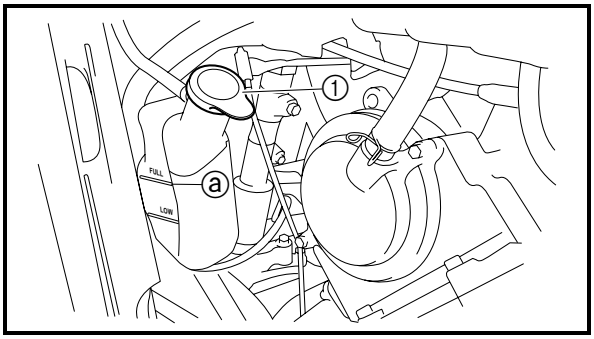
11.Fill:
- cooling system
  (with the specified amount of the recommended coolant)

Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)
Quantity
Total amount
1.99 L
(1.75 Imp qt, 2.10 US qt)
Coolant reservoir capacity (up to the maximum level mark)
0.17 L
(0.15 Imp qt, 0.18 US qt)
From minimum to maximum level mark
0.14 L
(0.12 Imp qt, 0.15 US qt)

Handling notes for coolant
Coolant is potentially harmful and should be handled with special care.

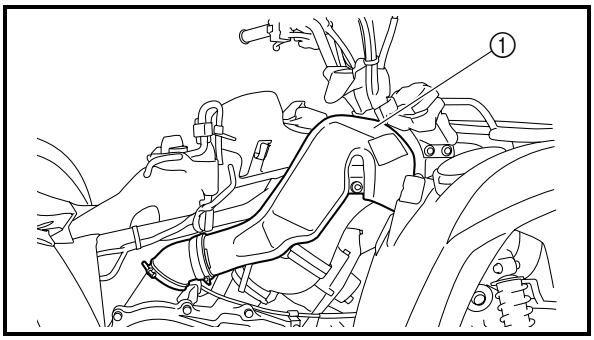
⚠ WARNING
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

CAUTION:
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**



12.Fill:
- coolant reservoir
  (with the recommended coolant to the maximum level mark ⓐ)

13.Install:
- coolant reservoir cap ①



14.Bleed:
- coolant system

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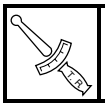
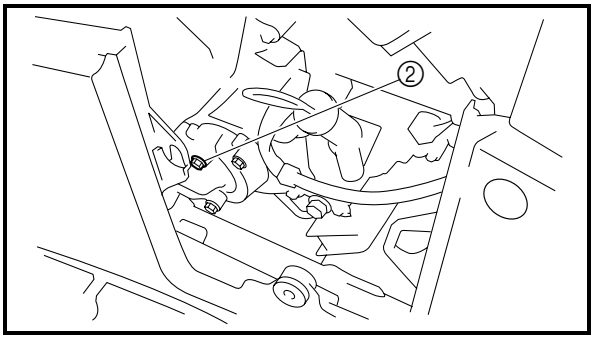
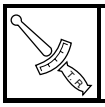
a. Remove the V-belt cooling duct 2 ①.
b. Loosen the water pump air bleed bolt ②, without removing it, to allow all of the air to escape from the air bleed bolt hole.
c. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.



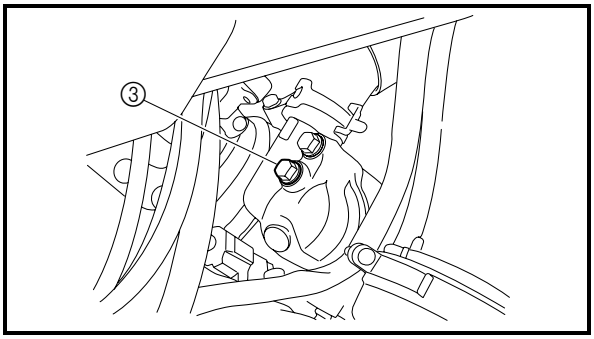
Water pump air bleed bolt
10 Nm (1.0 m · kg, 7.2 ft · lb)



d. Loosen the cylinder head air bleed bolt ③, without removing it, to allow all of the air to escape from the air bleed bolt hole.
e. When coolant begins to flow out of the bolt hole, tighten the cylinder head air bleed bolt to specification.



Cylinder head air bleed bolt
10 Nm (1.0 m · kg, 7.2 ft · lb)



f. Install the V-belt cooling duct 2.

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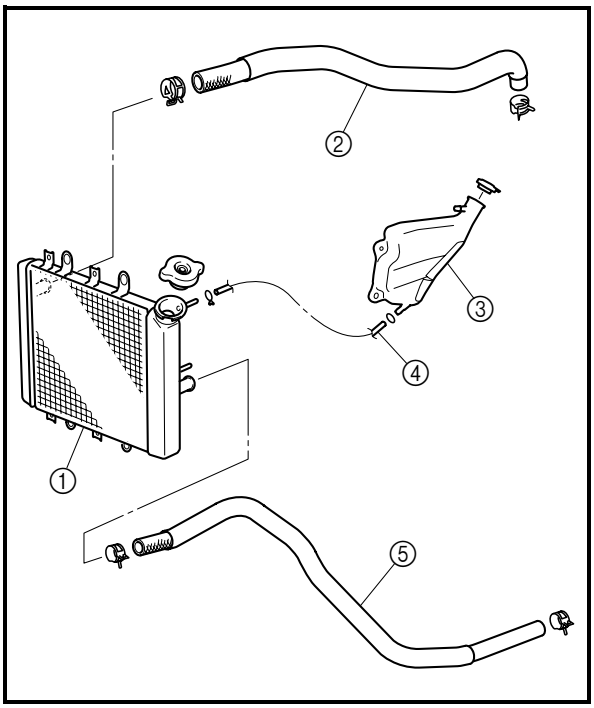
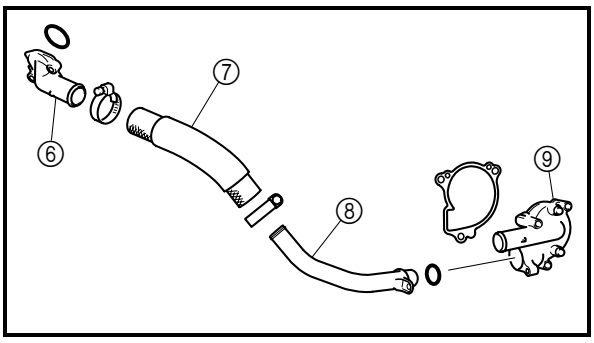
15.Start the engine, warm it up for ten minutes, and then rev the engine five times.
16.Pour the recommended coolant into the radiator until it is full.
17.Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.
18.Start the engine, and then check for coolant leakage.

19. Install:
- upper panel
- front carrier
  Refer to “FRONT CARRIER AND FRONT GUARD”.
- left side panel
- right side panel
  Refer to “SEAT AND SIDE PANELS”.

EAS00104
CHECKING THE COOLING SYSTEM

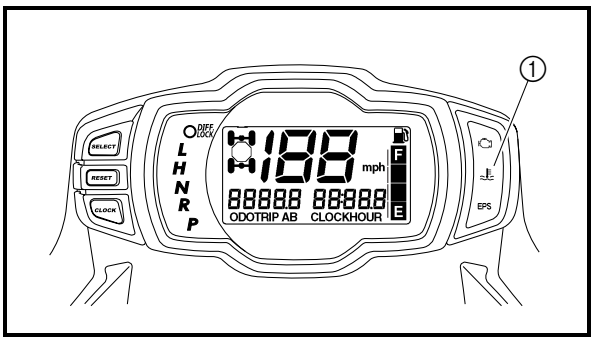
1. Remove:
- front fenders
  Refer to “FRONT FENDERS AND FRONT GRILL”.
- left footrest board
  Refer to “FOOTREST BOARDS”.





2. Check:
- radiator ①
- radiator inlet hose ②
- coolant reservoir ③
- coolant reservoir hose ④
- radiator outlet hose ⑤
- water jacket ⑥
- water pump outlet hose ⑦
- water pump outlet pipe ⑧
- water pump housing ⑨
  Cracks/damage → Replace.
  Refer to “COOLING SYSTEM” in chapter 5.

3. Install:
- left footrest board
  Refer to “FOOTREST BOARDS”.
- front fenders
  Refer to “FRONT FENDERS AND FRONT GRILL”.

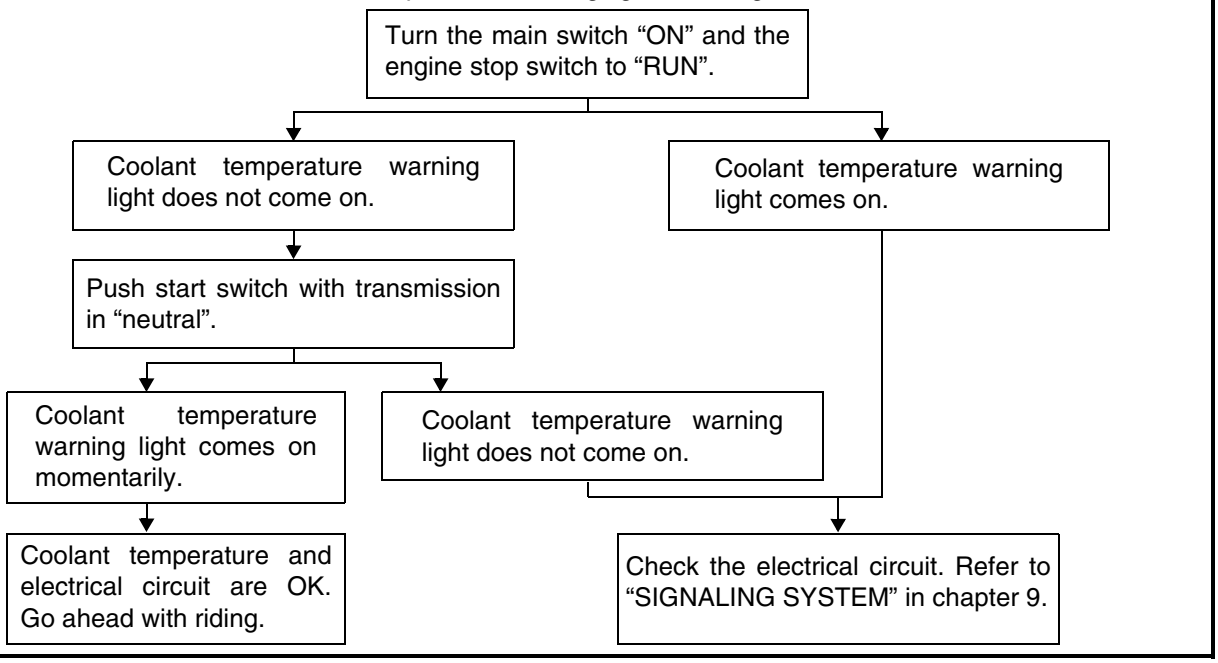


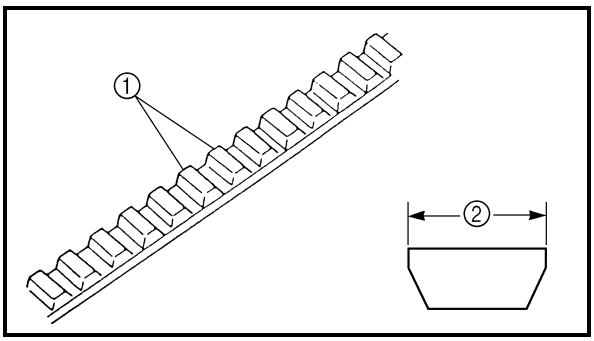
EBS00077

CHECKING THE COOLANT TEMPERATURE WARNING LIGHT

① Coolant temperature warning light

Coolant temperature warning light checking method

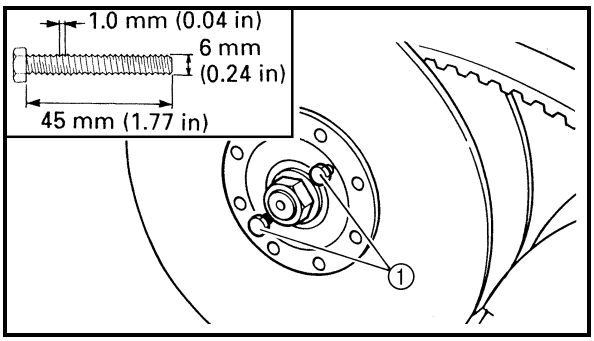




EBS00078
CHECKING THE V-BELT

1. Remove:
   - drive belt cover
     Refer to "PRIMARY AND SECONDARY SHEAVES" in chapter 4.
2. Check:
   - V-belt ①
     Cracks/wear/scaling/chipping → Replace.
     Oil/grease → Check primary sheave and secondary sheave.
3. Measure:
   - V-belt width ②
     Out of specification → Replace.

V-belt width
31.7 mm (1.25 in)
<Limit>: 31.3 mm (1.23 in)



4. Replace:
   - V-belt

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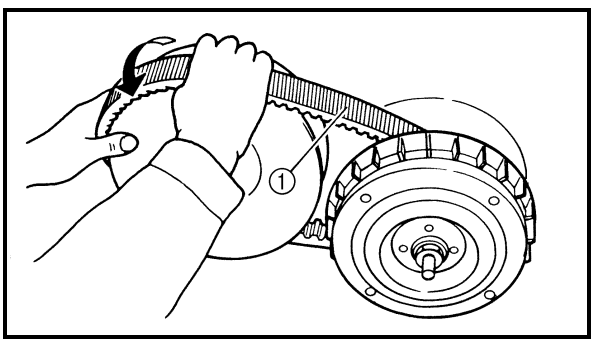
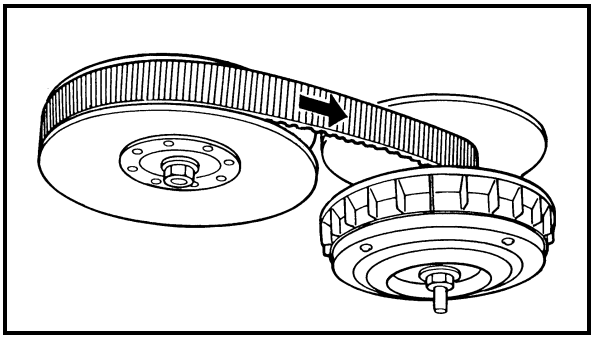
a. Install the bolts ① (90101-06016) into the secondary fixed sheave hold.

NOTE:
Tightening the bolts ① will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.



b. Remove the V-belt ① from the primary sheave and secondary sheave.



c. Install the V-belt.

NOTE:
Install the V-belt so that its arrow faces the direction shown in the illustration.

d. Remove the bolts.

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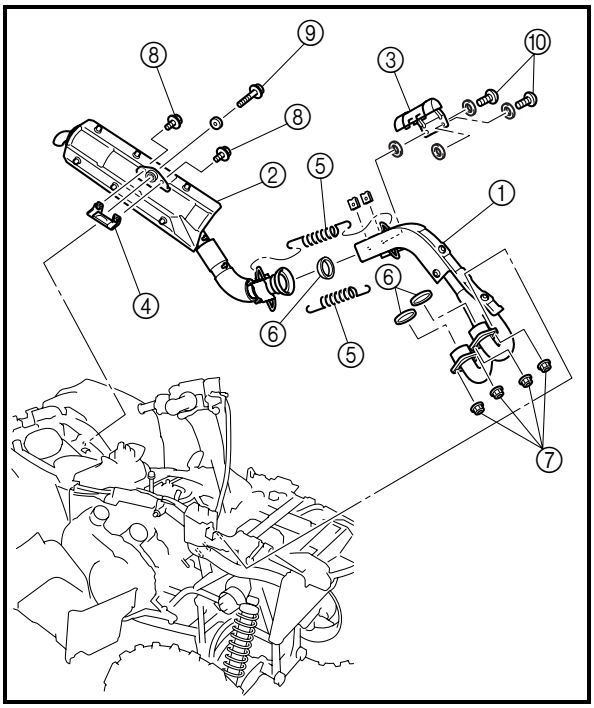
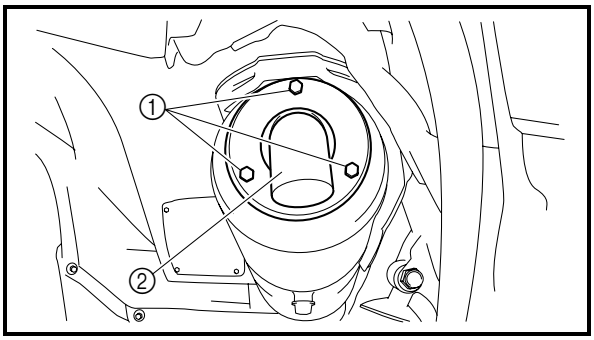


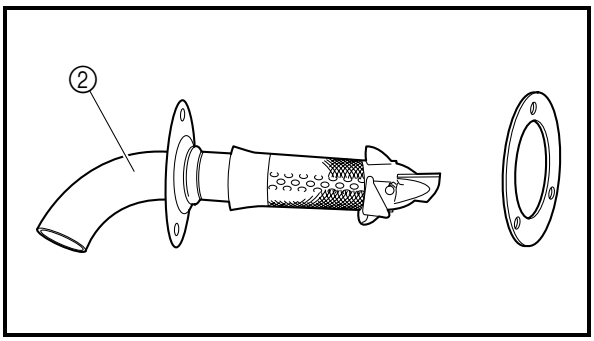
EAS00099
CHECKING THE EXHAUST SYSTEM

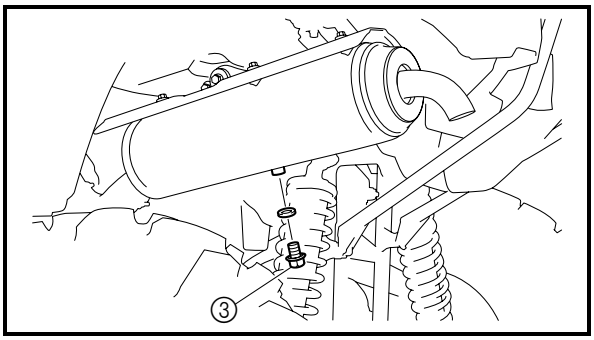
The following procedure applies to all of the exhaust pipe gaskets.

1. Check:
   - exhaust pipe ①
   - muffler ②
   - exhaust pipe protector ③
   - muffler bracket ④
   - springs ⑤
     Cracks/damage → Replace.
   - gaskets ⑥
     Exhaust gas leaks → Replace.
2. Check:
   - tightening torques

Exhaust pipe nut ⑦
20 Nm (2.0 m · kg, 14 ft · lb)
Muffler and muffler bracket bolt ⑧
20 Nm (2.0 m · kg, 14 ft · lb)
Muffler bolt ⑨
20 Nm (2.0 m · kg, 14 ft · lb)
Exhaust pipe protector bolt ⑩
7 Nm (0.7 m · kg, 5.1 ft · lb)







CLEANING THE SPARK ARRESTER

1. Clean:
   - spark arrester

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⚠ WARNING

- **Select a well-ventilated area free of combustible materials.**
- **Always let the exhaust system cool before performing this operation.**
- **Do not start the engine when removing the tailpipe from the muffler.**
- **Make sure that the transmission is in neutral.**

a. Remove the bolts ①.
b. Remove the tailpipe ② by pulling it out of the muffler and the gasket.
c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and inside of the tail pipe housing.
d. Install the gasket, and then insert the tailpipe into the muffler and align the bolt holes.
e. Insert the bolts ① and tighten them.

	Bolt **10 Nm (1.0 m · kg, 7.2 ft · lb)**

f. Remove the purging bolt ③.
g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
h. Stop the engine and allow the exhaust pipe to cool.
i. Install the purging bolt ③ and tighten it.

	Purging bolt **27 Nm (2.7 m · kg, 19 ft · lb)**

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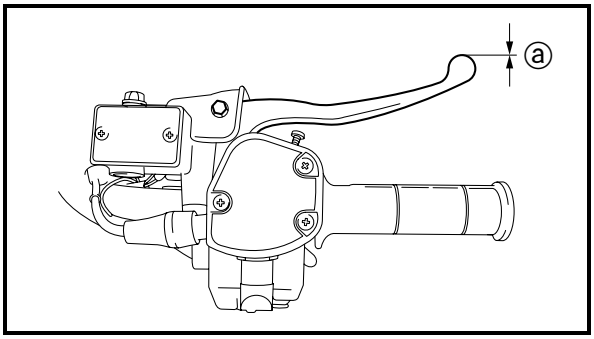


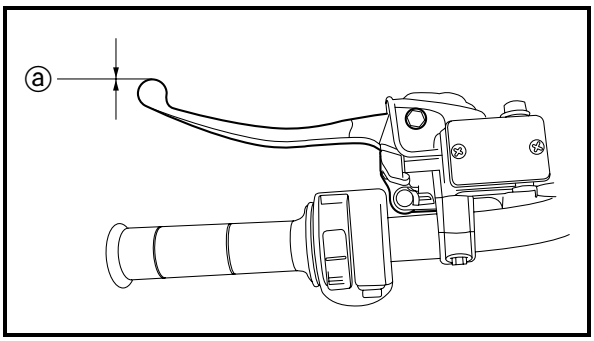
EBS00080

CHASSIS

ADJUSTING THE FRONT BRAKE

1. Measure:
   - front brake lever free play ⓐ
     Out of specification → Bleed the front brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM".

Front brake lever free play (at the end of the brake lever)
0 mm (0 in)



EBS00085

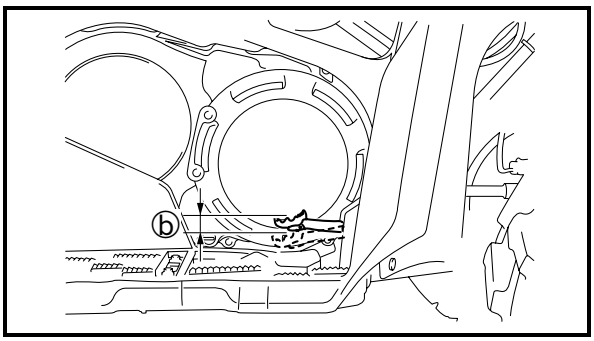
ADJUSTING THE REAR BRAKE

⚠ WARNING

Always adjust both the brake pedal and the rear brake lever whenever adjusting the rear brake.

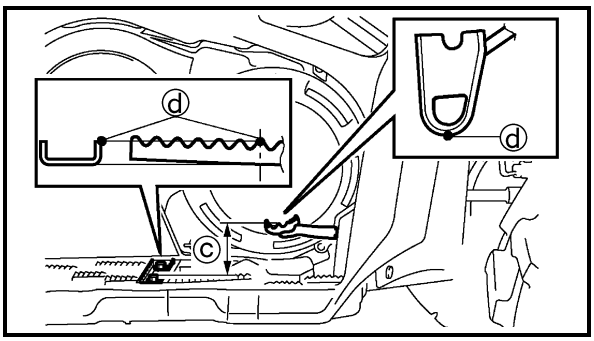
1. Measure:
   - rear brake lever free play ⓐ
     Out of specification → Bleed the rear brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM".

Rear brake lever free play (at the end of the brake lever)
0 mm (0 in)



2. Measure:
   - brake pedal free play ⓑ
     Out of specification → Adjust.

Brake pedal free play
0 ~ 5.0 mm (0 ~ 0.20 in)



3. Measure:
   • brake pedal height ⓒ
   Out of specification → Adjust.

	Brake pedal height 56.7 mm (2.23 in)

ⓓ Measuring points

4. Adjust:
   • brake pedal free play
   • brake pedal height
5. Remove:
   • front fender inner panel
   Refer to “FRONT FENDERS AND FRONT GRILL”.

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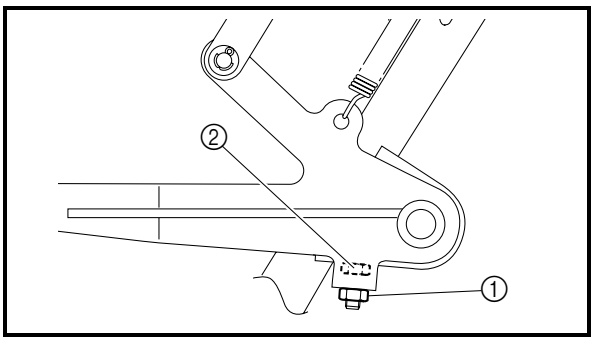
a. Loosen the locknut ①.
b. Turn the adjusting bolt ② until the brake pedal height is within the specified limits.

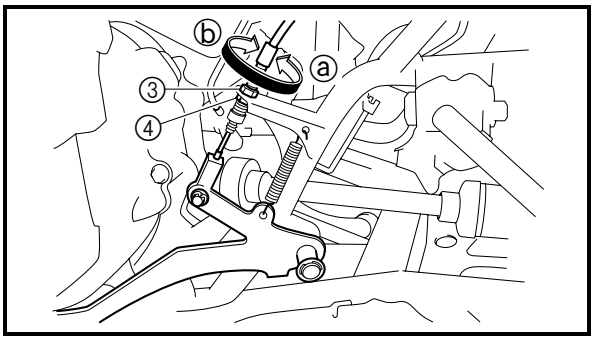


	Brake pedal height 56.7 mm (2.23 in)

c. Tighten the locknut ①.

	Locknut 7 Nm (0.7 m · kg, 5.1 ft · lb)

d. Loosen the locknut ③.
e. Turn the adjusting nut ④ in direction ⓐ or ⓑ until the specified brake pedal free play is obtained.



Direction ⓐ	**Brake pedal free play is increased.**
Direction ⓑ	**Brake pedal free play is decreased.**

f. Tighten the locknut ③.

	Locknut 7 Nm (0.7 m · kg, 5.1 ft · lb)

g. Adjust the shift control cable.
Refer to "ADJUSTING THE SELECT LEVER CONTROL CABLE AND SHIFT ROD".

⚠ WARNING

After this adjustment is performed, lift the front and rear wheels off the ground by placing a block under the engine, and spin the rear wheels to ensure there is no brake drag. If any brake drag is noticed perform the above steps again.

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6. Install:
   - front fender inner panel
     Refer to "FRONT FENDERS AND FRONT GRILL".

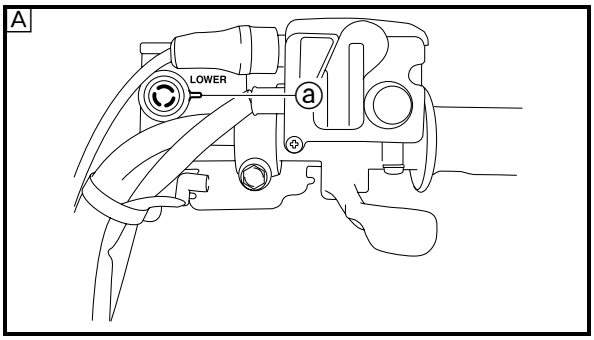
EBS00087

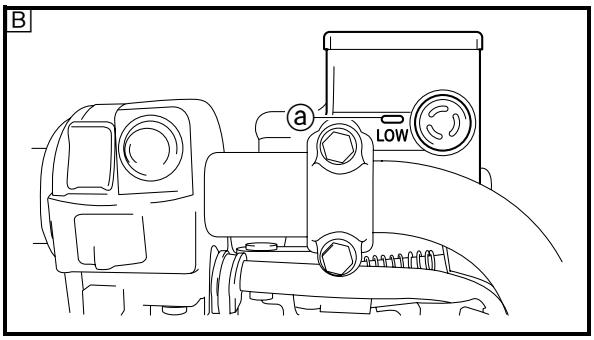
CHECKING THE BRAKE FLUID LEVEL

1. Place the vehicle on a level surface.

NOTE:

When checking the brake fluid level, make sure that the top of the brake fluid reservoir top is horizontal.





2. Check:
   - brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.

Recommended brake fluid
DOT 4

A Front brake
B Rear brake

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**

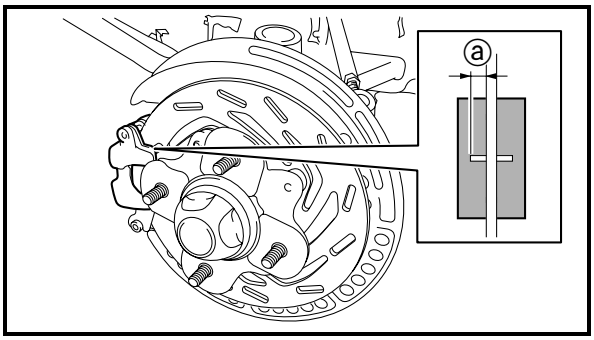
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

NOTE:

In order to ensure a correct reading of the brake fluid level, make sure that the top of the brake master cylinder reservoir is horizontal.



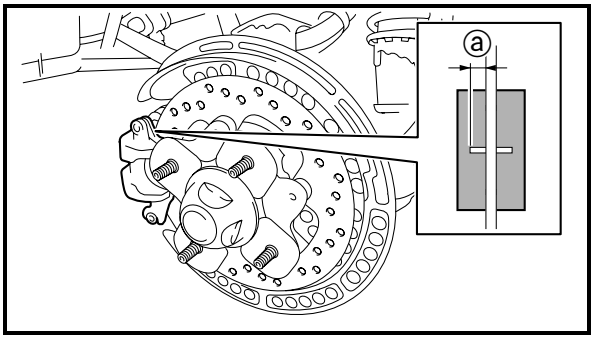
EBS00088

CHECKING THE FRONT BRAKE PADS

1. Remove:
   - front wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Check:
   - brake pads
     Wear indicator groove ⓐ almost disappeared → Replace the brake pads as a set.
     Refer to “FRONT AND REAR BRAKES” in chapter 8.

Brake pad wear limit ⓐ
1.0 mm (0.04 in)

3. Operate the brake lever.
4. Install:
   - front wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.

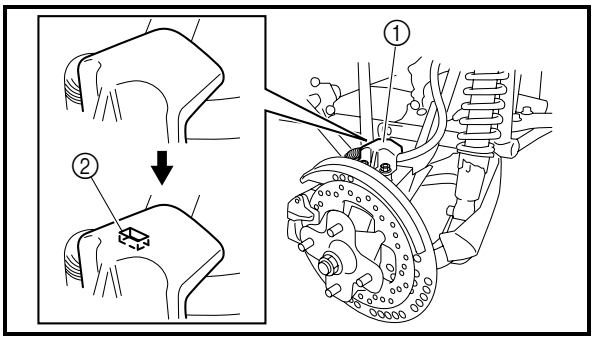


EBS00089
CHECKING THE REAR BRAKE PADS

1. Remove:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Check:
   - brake pads
     Wear indicator groove ⓐ almost disappeared → Replace the brake pads as a set.
     Refer to “FRONT AND REAR BRAKES” in chapter 8.

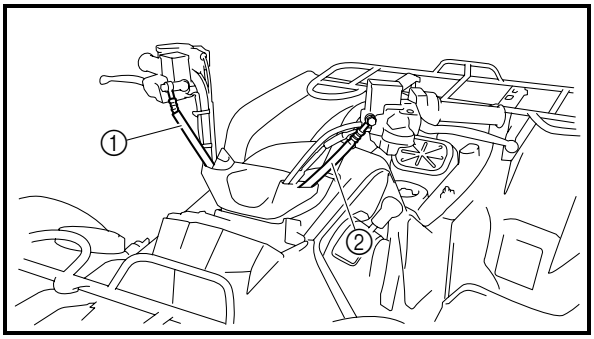
Brake pad wear limit ⓐ
1.0 mm (0.04 in)

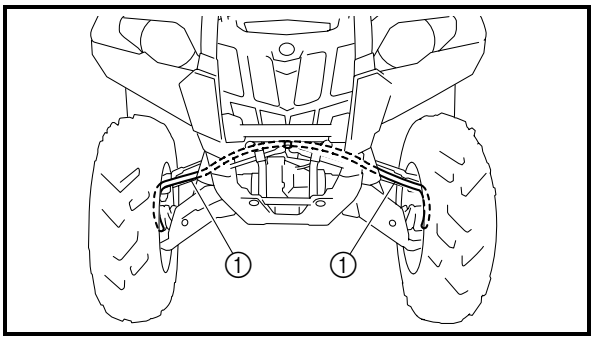
3. Operate the brake lever or brake pedal.
4. Install:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.

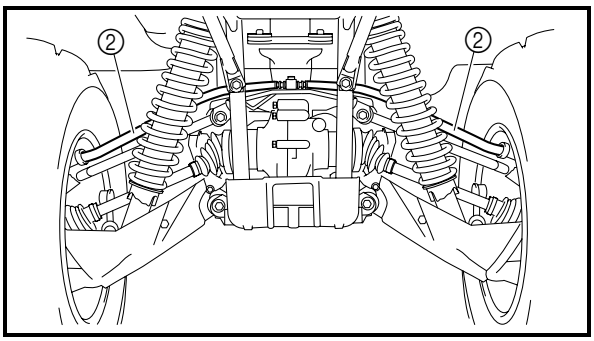


CHECKING THE REAR BRAKE HOSE PROTECTORS

1. Remove:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Check:
   - rear brake hose protectors ①
     Wear indicator ② becomes visible → Replace the rear brake hose protector.
     Refer to “REAR KNUCKLES AND STABILIZER” in chapter 8.
3. Install:
   - rear wheels
     Refer to “FRONT AND REAR WHEELS” in chapter 8.







EBS00092
CHECKING THE BRAKE HOSES

1. Check:
   - front brake hoses ①
   - rear brake hoses ②
   Cracks/wear/damage → Replace.
2. Check:
   - brake hose holders
   Loosen → Tighten.
3. Hold the vehicle in an upright position and apply the front or rear brake.
4. Check:
   - brake hoses
   Apply the brake lever several times.
   Fluid leakage → Replace the hoses.
   Refer to “FRONT AND REAR BRAKES” in chapter 8.

EBS00094
BLEEDING THE HYDRAULIC BRAKE SYSTEM

⚠ WARNING

Bleed the hydraulic brake system whenever:
- **the system is disassembled,**
- **a brake hose is loosened, disconnected or replaced,**
- **the brake fluid level is very low,**
- **brake operation is faulty.**

NOTE:
- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir to overflow.

- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Remove:
   - rear wheel
     Refer to “FRONT AND REAR WHEELS” in chapter 8.
2. Bleed:
   - hydraulic brake system

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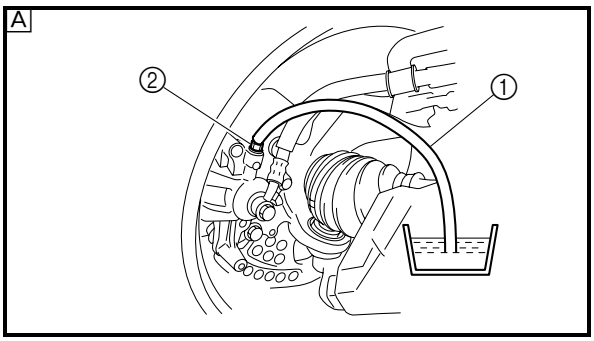
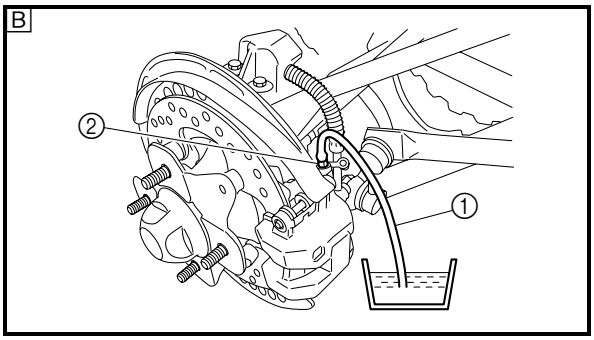
a. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
b. Install the diaphragm (brake master cylinder reservoir).
c. Connect a clear plastic hose ① tightly to the bleed screw ②.



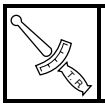
A Front
B Rear



d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
g. Loosen the bleed screw.

NOTE:
Loosening the bleed screw will release the pressure and cause the brake lever to contact the handlebar grip or the brake pedal to fully extend.

h. Tighten the bleed screw and then release the brake lever or brake pedal.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Tighten the bleed screw to specification.

	**Bleed screw** **5 Nm (0.5 m · kg, 3.6 ft · lb)**

k. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
Refer to “CHECKING THE BRAKE FLUID LEVEL”.

⚠ WARNING

After bleeding the hydraulic brake system, check the brake operation.

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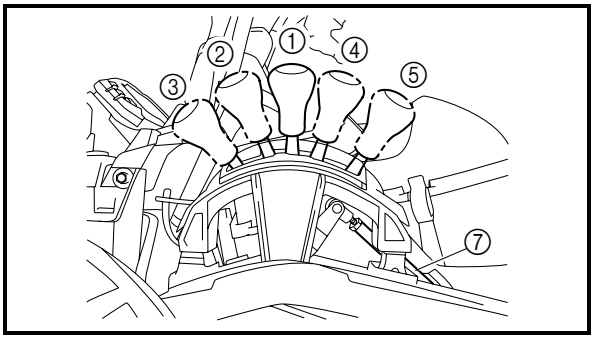
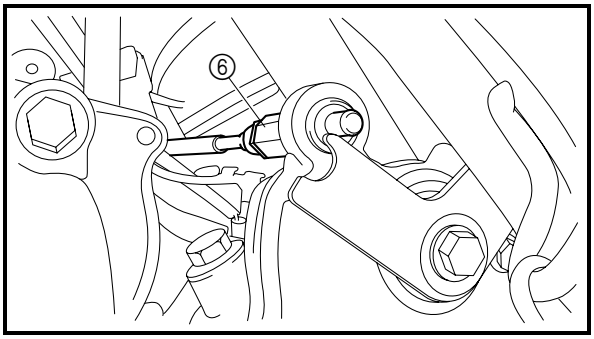
3. Install:
   - rear wheel
     Refer to “FRONT AND REAR WHEELS” in chapter 8.





EBS00100

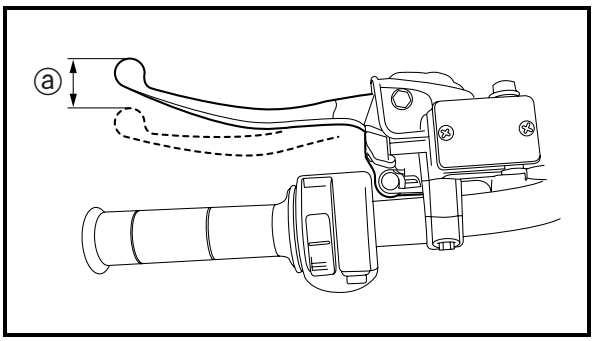
ADJUSTING THE SELECT LEVER CONTROL CABLE AND SHIFT ROD

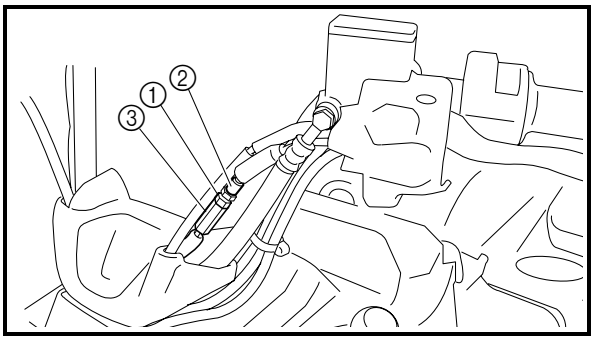
① NEUTRAL
② HIGH
③ LOW
④ REVERSE
⑤ PARK
⑥ Control cable
⑦ Select lever shift rod

⚠ WARNING

Before moving the select lever, bring the vehicle to a complete stop and return the throttle lever to its closed position. Otherwise the transmission may be damaged.

1. Adjust:
   - brake pedal free play
     Refer to “ADJUSTING THE REAR BRAKE”.
2. Remove:
   - left side panel
     Refer to “SEAT AND SIDE PANELS”.





3. Adjust:
   - shift control cable
   - shift rod

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Shift control cable:

a. Make sure that the select lever is in NEUTRAL.
b. Squeeze the brake lever 30 mm (1.18 in) ⓐ, loosen the locknut ①, and then adjust the shift control cable ② with the adjuster ③ so that the select lever can be shifted to REVERSE from NEUTRAL, and to PARK from REVERSE.
c. Release the brake lever so that ⓐ is 0 mm (0 in), and then verify that the select lever cannot be shifted to REVERSE from NEUTRAL, or to PARK from REVERSE.
d. If the operation of the select lever is incorrect, repeat steps (a) to (c).
e. Tighten the locknut.

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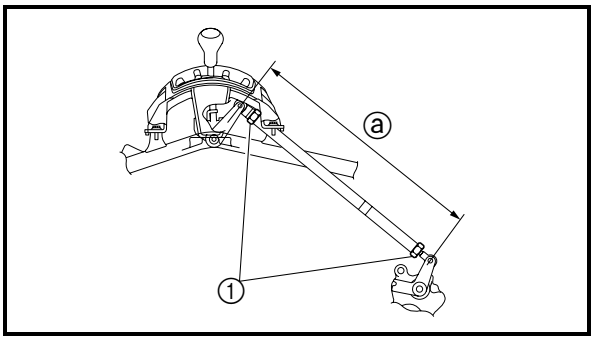

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Shift rod:

a. Make sure that the select lever and transmission are in HIGH.
b. Loosen both locknuts ①.
c. Adjust the length ⓐ of the shift rod to 413 mm (16.3 in).
d. Tighten the locknuts.

	**Locknut** **15 Nm (1.5 m · kg, 11 ft · lb)**

e. Start the engine, and then check that the select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.
f. Adjust the shift control cable again.

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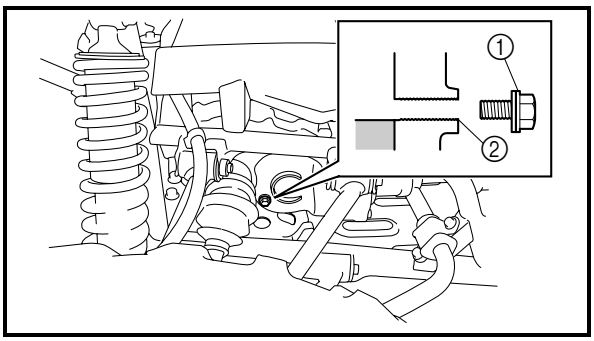


EBS00101
CHECKING THE FINAL GEAR OIL LEVEL

1. Place the vehicle on a level place.
2. Remove:
   - final gear oil level check bolt ①
3. Check:
   - oil level
     Oil level should be up to the bottom brim ② of the hole.
     Oil level low → Add oil to the proper level.

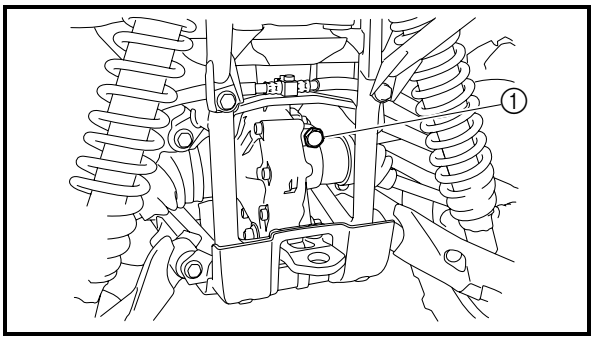
Recommended oil
SAE80 API GL-4 Hypoid gear oil

CAUTION:

Take care not allow foreign material to enter the final gear case.

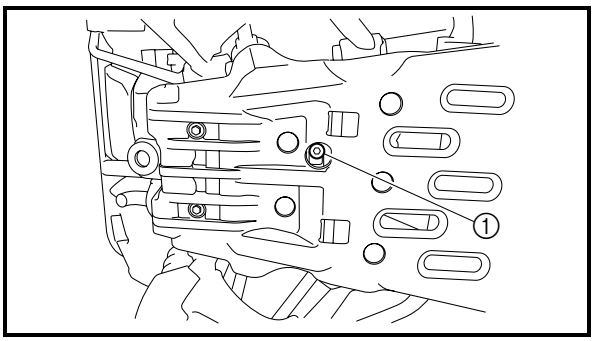
4. Install:
   - final gear oil level check bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)



EBS00102
CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Remove:
   - final gear oil filler bolt ①
3. Place a receptacle under the final gear case.



4. Remove:
   - final gear oil level check bolt
   - final gear oil drain bolt ①
5. Drain:
   - final gear oil

6. Install:
   • final gear oil drain bolt
   23 Nm (2.3 m · kg, 17 ft · lb)

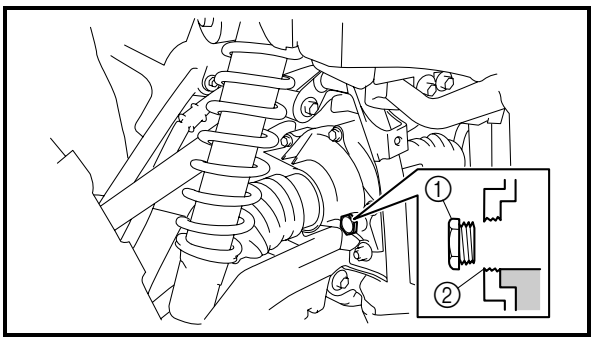
NOTE:
Check the gasket (drain bolt). If it is damaged, replace it with a new one.

7. Fill:
   • final gear case

Periodic oil change
0.20 L (0.18 Imp qt, 0.21 US qt)
Total amount
0.25 L (0.22 Imp qt, 0.26 US qt)
Recommended oil
SAE80 API GL-4 Hypoid gear oil

CAUTION:
Take care not to allow foreign material to enter the final gear case.

8. Check:
   • oil level
   Refer to "CHECKING THE FINAL GEAR OIL LEVEL".
9. Install:
   • final gear oil level check bolt
   10 Nm (1.0 m · kg, 7.2 ft · lb)
   • final gear oil filler bolt
   23 Nm (2.3 m · kg, 17 ft · lb)



EBS00103
CHECKING THE DIFFERENTIAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
   - differential gear oil filler bolt ①
3. Check:
   - oil level
     Oil level should be up to the brim ② of hole.
     Oil level low → Add oil to proper level.

Recommended oil
SAE80 API GL-4 Hypoid gear oil

CAUTION:

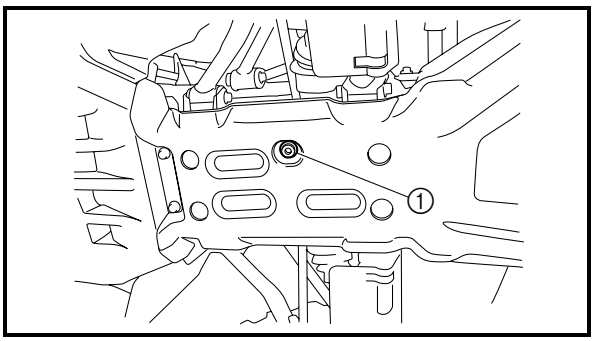
Take care not allow foreign material to enter the differential gear case.

4. Install:
   - differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)

EBS00104
CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential gear case.



3. Remove:
   - differential gear oil filler bolt
   - differential gear oil drain bolt ①
4. Drain:
   - differential gear oil
5. Install:
   - differential gear oil drain bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)

6. Fill:
   • differential gear case

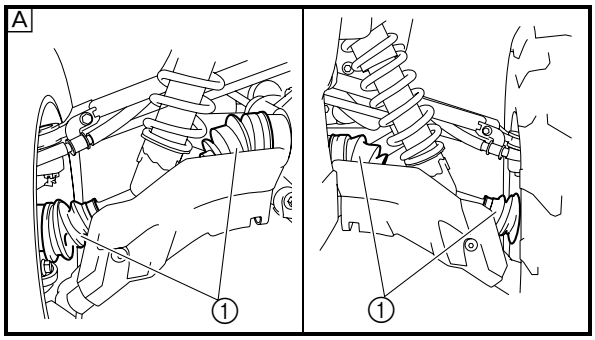
Periodic oil change
0.215 L (0.19 Imp qt, 0.23 US qt)
Total amount
0.23 L (0.20 Imp qt, 0.24 US qt)
Recommended oil
SAE80 API GL-4 Hypoid gear oil

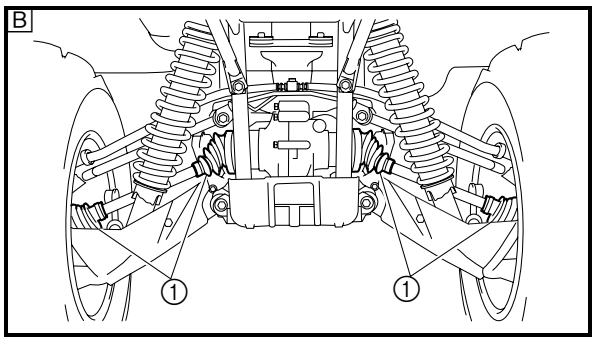
NOTE:
If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential gear case breather hose. Therefore, check the quantity of the oil, not its level.

CAUTION:
Take care not to allow foreign material to enter the differential gear case.

7. Install:
   • differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)

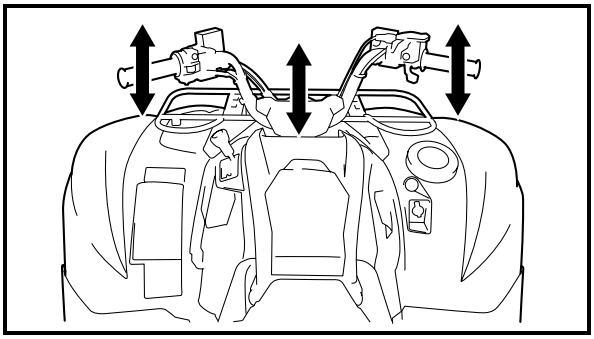


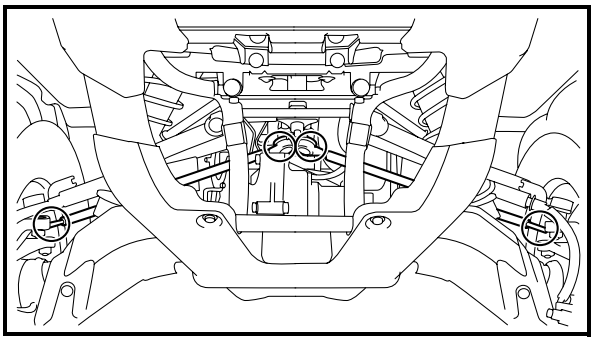


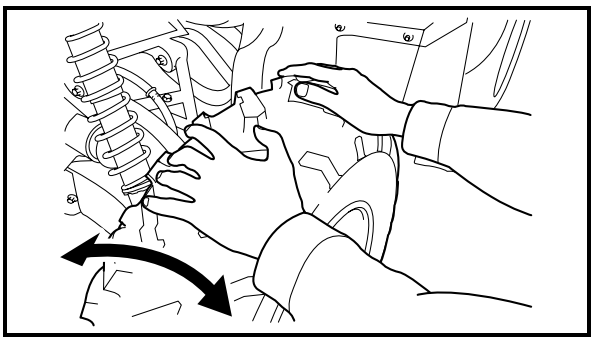
EBS00105
CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS

1. Check:
   • dust boots ①
   Damage → Replace.
   Refer to “FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR” and “REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR” in chapter 7.

A Front
B Rear

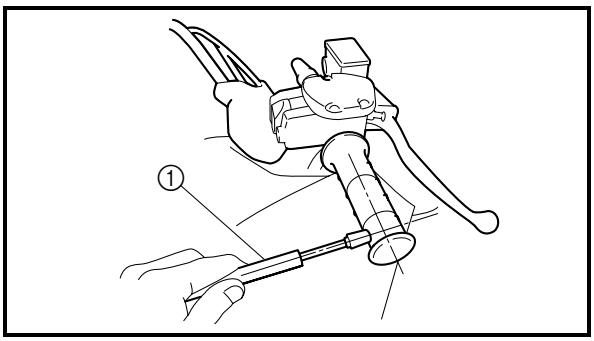






EBS00106
CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.
2. Check:
   - steering assembly bushings
     Move the handlebar up and down, and/or back and forth.
     Excessive play → Replace the steering stem bushings.
3. Check:
   - tie-rod ends
     Turn the handlebar to the left and/or right until it stops completely, then move the handlebar from the left to the right slightly.
     Tie-rod end has any vertical play → Replace the tie-rod end(s).
4. Raise the front end of the vehicle so that there is no weight on the front wheels.
5. Check:
   - ball joints and/or wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.



6. Measure:
   - steering tension
     Above specification → Adjust.

Steering tension
50 N (5.0 kgf)

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a. Turn the main switch to “OFF”.
b. Place the vehicle on a suitable stand so that the front wheels are elevated.
c. Point the front wheels straight ahead.
d. Hold the belt tension gauge ① at a 90° angle to the handlebar, push the gauge against the handlebar, and then record the measurement when the handlebar starts to turn.

Belt tension gauge
90890-03170
Rear drive belt tension gauge
YM-03170

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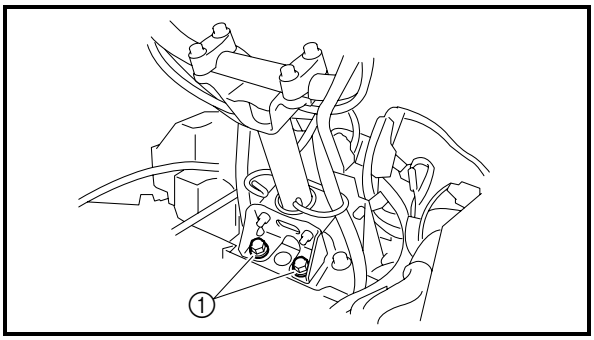

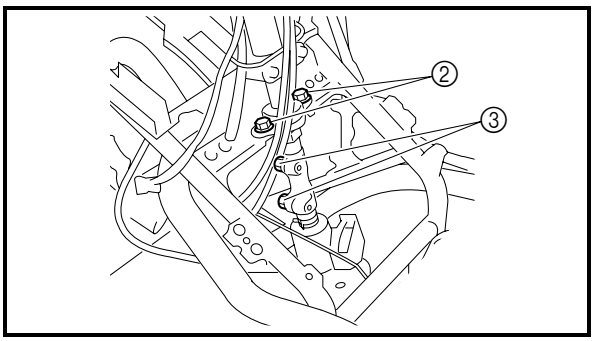

7. Adjust:
   • steering tension

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a. Remove the electrical components tray. Refer to "ELECTRICAL COMPONENTS TRAY".
b. Loosen the steering stem bracket bolts ①, steering stem bearing bolts ②, and steering stem joint bolts ③ completely.

NOTE:
After loosening the bolts, be sure to check that the steering stem joint moves smoothly on the serrations of the steering stem and shaft of the EPS unit.

c. Tighten the steering stem bearing bolts to specification.

Steering stem bearing bolt
50 Nm (5.0 m · kg, 36 ft · lb)
LOCTITE®

d. Tighten the steering stem bracket bolts to specification.

Steering stem bracket bolt
50 Nm (5.0 m · kg, 36 ft · lb)
LOCTITE®

e. Tighten the steering stem joint bolts to specification.

Steering stem joint bolt
30 Nm (3.0 m · kg, 22 ft · lb)
LOCTITE®

f. Measure the steering tension again.
g. Repeat the above procedure until the steering tension is below specification.

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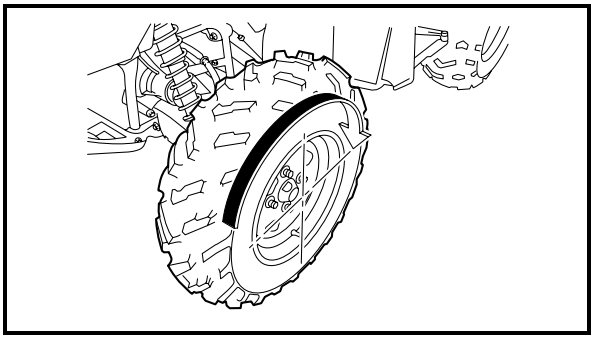

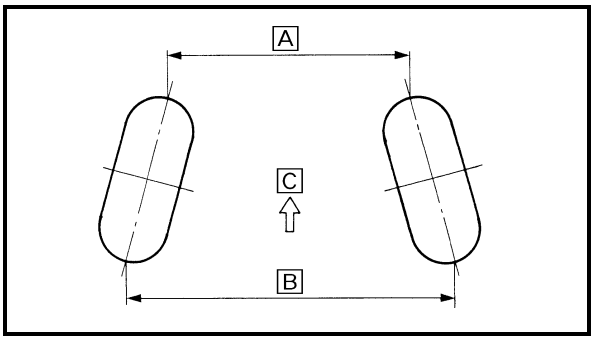

EBS00108

ADJUSTING THE TOE-IN

1. Place the vehicle on a level surface.
2. Measure:
   - toe-in

   Out of specification → Adjust.

Toe-in
0 ~ 10 mm (0 ~ 0.39 in)
(with tires touching the ground)

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NOTE:

Before measuring the toe-in, make sure that the tire pressure is correct.

a. Mark both front tire tread centers.
b. Face the handlebar straight ahead.
c. Measure the width A between the marks.
d. Rotate the front tires 180° until the marks are exactly opposite one another.
e. Measure the width B between the marks.
f. Calculate the toe-in using the formula given below.

Toe-in = B – A

g. If the toe-in is incorrect, adjust it.

C Forward

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3. Adjust:
   - toe-in

⚠ WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mishandling and an accident.**
- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**

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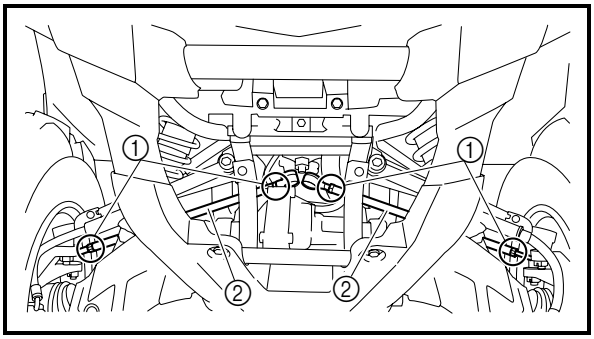
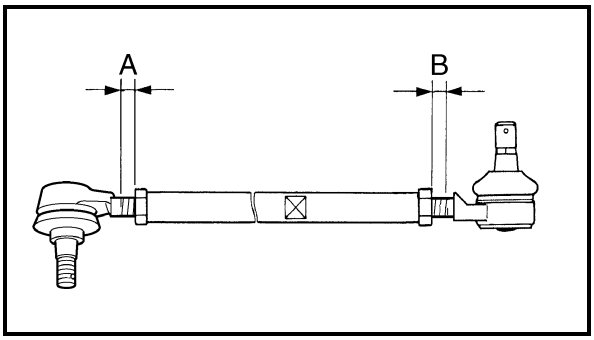
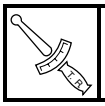
a. Mark both tie-rods ends.
   This reference point will be needed during adjustment.





b. Loosen the locknuts (tie-rod end) ① of both tie-rods.
c. The same number of turns should be given to both the right and left tie-rods ② until the specified toe-in is obtained. This is to keep the length of the rods the same.
d. Tighten the rod end locknuts of both tie rods.

	**Locknut (rod end)** **15 Nm (1.5 m · kg, 11 ft · lb)**

NOTE:
Adjust the rod ends so that A and B are equal.

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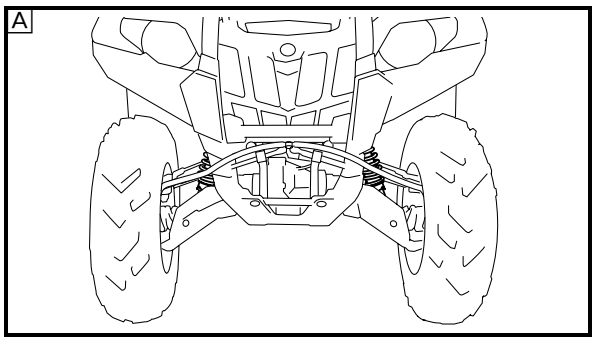
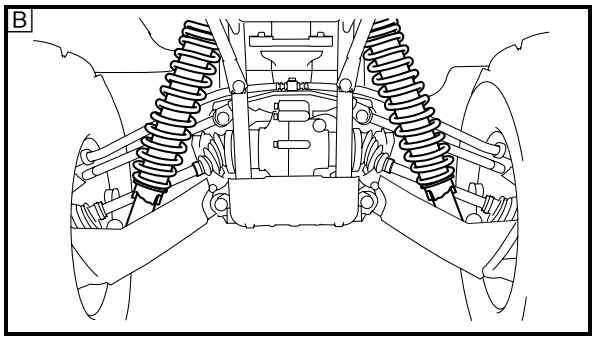
EBS00109
CHECKING THE FRONT AND REAR SHOCK ABSORBERS

1. Place the vehicle on a level place.
2. Check:
   - damper rod
     Bends/damage → Replace the front/rear shock absorber assembly.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.
   - oil leakage
     Excessive oil leakage → Replace the front/rear shock absorber assembly.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.
   - spring
     Fatigue → Replace the front/rear shock absorber assembly.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.





3. Check:
   - operation
     Pump the shock absorbers up and down for several times.
     Unsmooth operation → Replace front/rear shock absorber.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" in chapter 8.

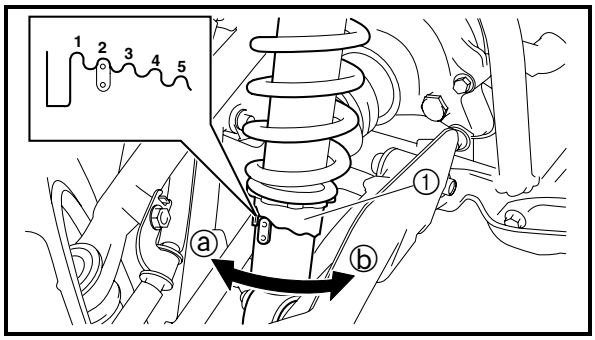
A Front shock absorber
B Rear shock absorber

EBS00110

ADJUSTING THE FRONT SHOCK ABSORBERS

⚠ WARNING

Always adjust the spring preload for both front shock absorber to the same setting. Uneven adjustment can cause poor handling and loss of stability.



1. Adjust:
   - spring preload
     Turn the adjuster ① in direction ⓐ or ⓑ.

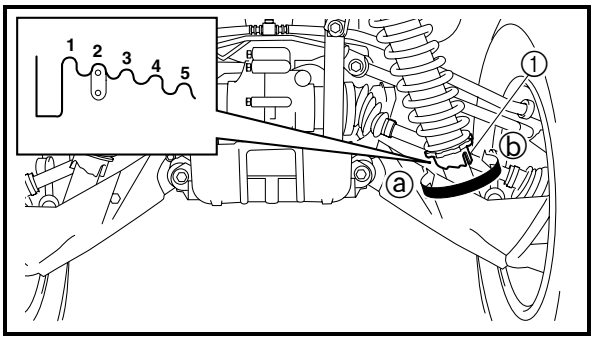
Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Standard position: 2
Minimum position: 1
Maximum position: 5

EBS00112
ADJUSTING THE REAR SHOCK ABSORBERS

⚠ WARNING

Always adjust the spring load for both rear shock absorber spring preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.



1. Adjust:
   - spring preload
     Turn the adjuster ① in direction ⓐ or ⓑ.

Direction ⓐ	**Spring preload is increased (suspension is harder).**
Direction ⓑ	**Spring preload is decreased (suspension is softer).**

Standard position: 2
Minimum position: 1
Maximum position: 5

EBS00115
CHECKING THE TIRES

⚠ WARNING

This model is equipped with low pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

• TIRE CHARACTERISTICS

1) Tire characteristics influence the handling of ATVs. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.

	Manufacturer	Size	Type
Front	DUNLOP	AT25 × 8-12	KT421
Rear	DUNLOP	AT25 × 10-12	KT425

• TIRE PRESSURE

1) Recommended tire pressure
Front 35 kPa (0.35 kg/cm², 5.0 psi)
Rear 30 kPa (0.30 kg/cm², 4.3 psi)

2) Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
The following are minimums:
Front 32 kPa (0.32 kg/cm², 4.6 psi)
Rear 27 kPa (0.27 kg/cm², 3.9 psi)

3) Use no more than
Front 250 kPa (2.5 kg/cm², 36 psi)
Rear 250 kPa (2.5 kg/cm², 36 psi)
when seating the tire beads. Higher pressures may cause the tire to burst.
Inflate the tires slowly and carefully.
Fast inflation could cause the tire to burst.

• MAXIMUM LOADING LIMIT

1) Vehicle load limits: 220 kg (485 lb)
***Total weight of the cargo, trailer hitch vertical load, rider, and accessories.**

2) Front carrier: 45.0 kg (99 lb)

3) Rear carrier: 85.0 kg (187 lb)

4) Front storage box: 0.5 kg (1 lb)

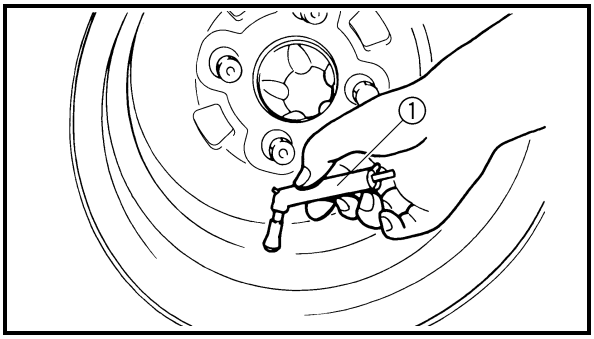
5) Rear storage box: 2.0 kg (4 lb)

6) Trailer hitch:

Pulling load (total weight of trailer and cargo): 5,390 N (550 kg, 1,212 lb)

Tongue weight (vertical weight on trailer hitch point): 147 N (15 kg, 33 lb)

Be extra careful of the vehicle balance and stability when towing a trailer.



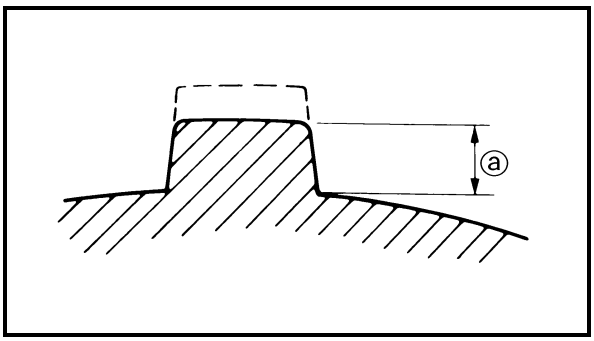
1. Measure:
   • tire pressure
   Out of specification → Adjust.

NOTE:
- The low-pressure tire gauge ① is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.

Cold tire pressure	Front	Rear
Standard	35 kPa (0.35 kg/cm², 5.0 psi)	30 kPa (0.30 kg/cm², 4.3 psi)
Minimum	32 kPa (0.32 kg/cm², 4.6 psi)	27 kPa (0.27 kg/cm², 3.9 psi)
Maximum	38 kPa (0.38 kg/cm², 5.5 psi)	33 kPa (0.33 kg/cm², 4.8 psi)

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.
- **Maintain proper tire pressures.**
- **Set tire pressures when the tires are cold.**
- **Tire pressures must be equal in both front tires and equal in both rear tires.**

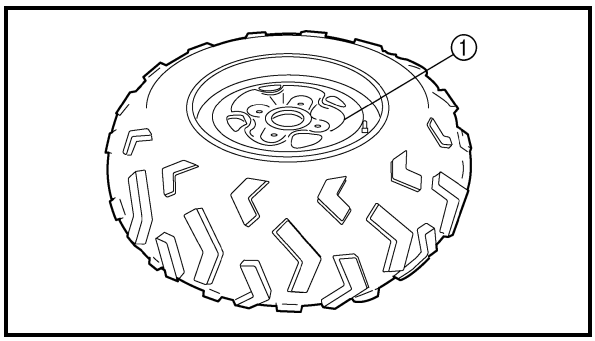


2. Check:
   • tire surfaces
   Wear/damage → Replace.

Tire wear limit ⓐ
Front and rear: 3 mm (0.12 in)

⚠ WARNING

It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.



EBS00116
CHECKING THE WHEELS

1. Check:
   - wheel ①
     Damage/bends → Replace.

NOTE:
Always balance the wheel when a tire or wheel has been changed or replaced.

⚠ WARNING
- **Never attempt even small repairs to the wheel.**
- **Ride conservatively after installing a tire to allow it to seat itself properly on the rim.**

EBS00117
CHECKING AND LUBRICATING THE CABLES

⚠ WARNING
A damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result, so replace a damaged cable as soon as possible.

1. Check:
   - cable sheath
     Damage → Replace.
2. Check:
   - cable operation
     Unsmooth operation → Lubricate or replace.

Recommended lubricant
Yamaha chain and cable lube or engine oil

NOTE:
Hold the cable end up and apply several drops of lubricant to the cable.

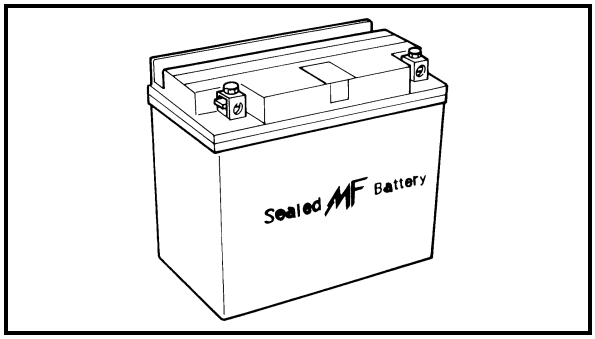
3. Apply:
   - lithium-soap-based grease
     (onto end of the cable)

EBS00118

LUBRICATING THE LEVERS AND PEDALS

Lubricate the pivoting point and metal-to-metal moving parts of the levers and pedals.

	Recommended lubricant **Lithium-soap-based grease**



EBS00120

ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

⚠ 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

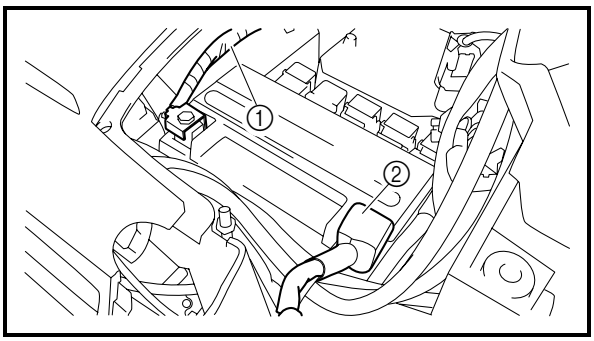
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

CAUTION:

- **This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **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.

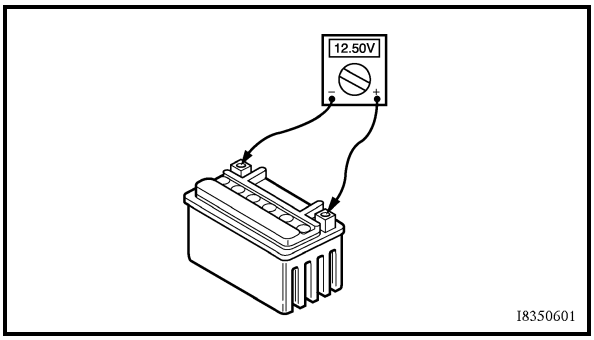
1. Remove:
   - battery cover
     Refer to "SEAT AND SIDE PANELS".
   - front carrier
   - battery holding bracket
     Refer to "FRONT CARRIER AND FRONT GUARD".



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
4. Check:
   - battery charge



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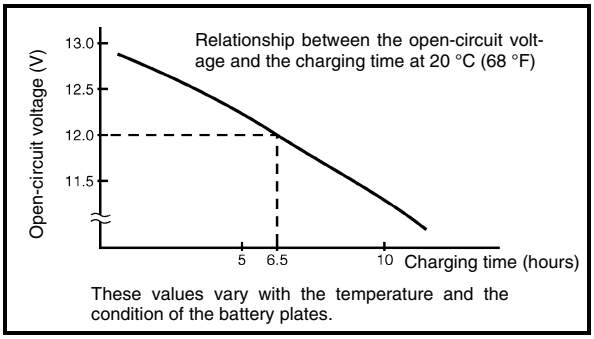
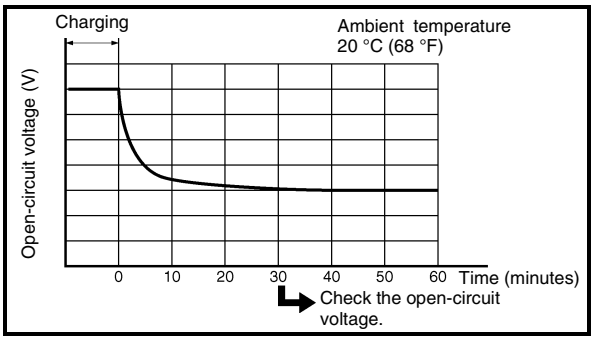
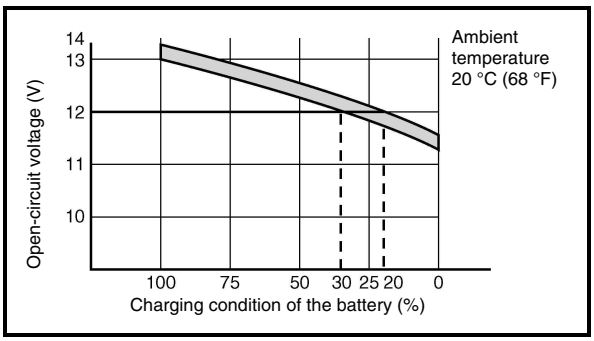
a. Connect a pocket tester to the battery terminals.

Positive tester probe →
positive battery terminal
Negative tester probe →
negative battery 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.







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

Example

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

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5. Charge:
   • battery
   (refer to the appropriate charging method illustration)

⚠ WARNING

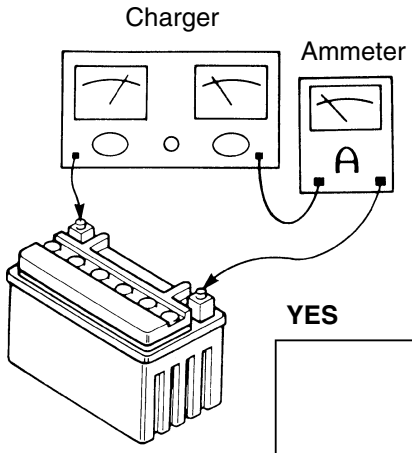
Do not quick charge a battery.

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 vehicle. (If charging has to be done with the battery mounted on the vehicle, 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-current (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 “CHECKING AND CHARGING THE BATTERY”.

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.

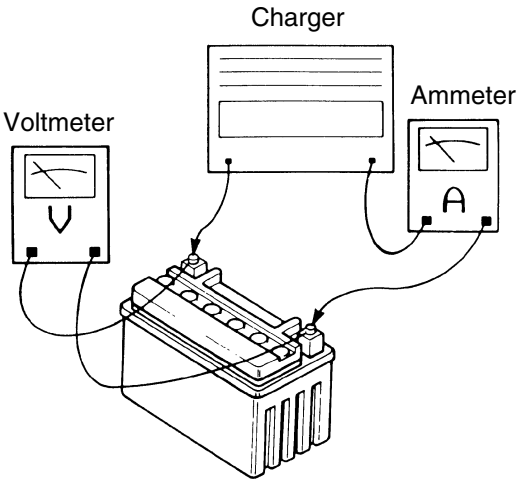
NOTE:
Set the charging time to a maximum of 20 hours.

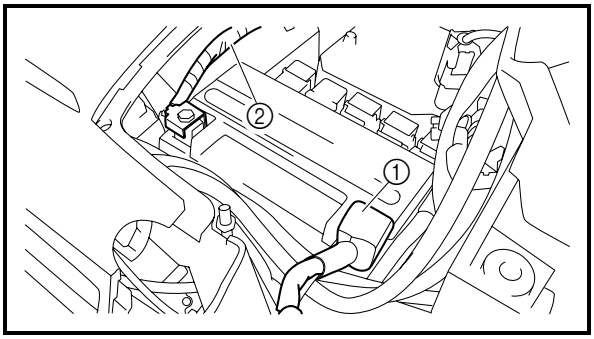
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

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

NO

This type of battery charger cannot charge an MF battery. A variable-voltage charger is recommended.





6. Install:
   • battery
7. Connect:
   • battery leads
     (to the battery terminals)

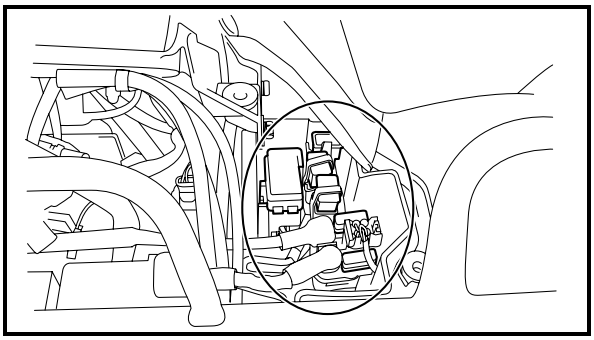
CAUTION:

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

8. Check:
   • battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   • battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
    • battery holding bracket
    • front carrier
      Refer to “FRONT CARRIER AND FRONT GUARD”.
    • battery cover
      Refer to “SEAT AND SIDE PANELS”.



EBS00121

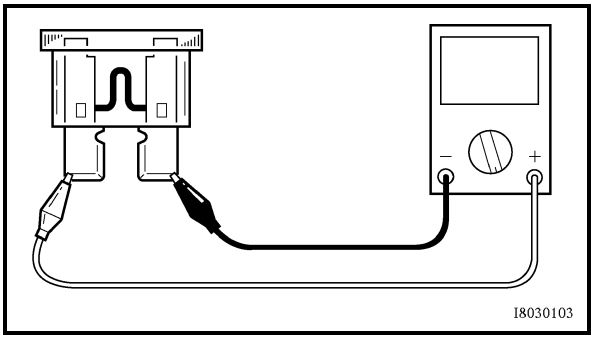
CHECKING THE FUSES

The following procedure applies to all of the fuses.

CAUTION:

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

1. Remove:
   • battery cover
     Refer to “SEAT AND SIDE PANELS”.



2. Check:
   • fuse

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a. Connect the pocket tester to the fuse and check the continuity.

NOTE:

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

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

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

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3. Replace:
   • blown fuse

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a. Set the main switch to "OFF".
b. Install a new fuse of the correct amperage.
c. Set on the switches to verify if the electrical circuit is operational.

d. If the fuse immediately blows again, check the electrical circuit.

Items	Amperage rating	Q'ty
Main fuse	40 A	1
EPS fuse	40 A	1
Fuel injection system fuse	15 A	1
Ignition fuse	10 A	1
Headlight fuse	15 A	1
Four-wheel-drive motor fuse	10 A	1
Radiator fan motor fuse	15 A	1
Signaling system fuse	5 A	1
Auxiliary DC jack fuse	15 A	1
Spare fuse	40 A 15 A 10 A 5 A	1 2 1 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 lighting and ignition systems to malfunction and could possibly cause a fire.

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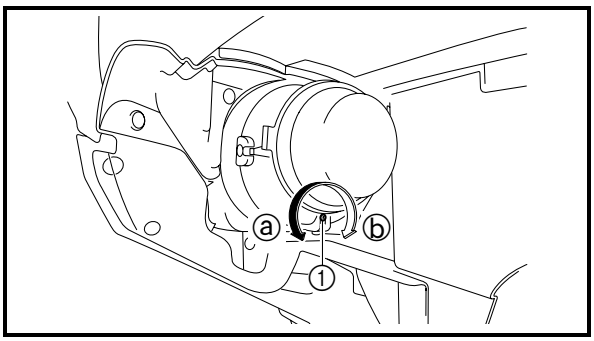
4. Install:
   - battery cover
     Refer to "SEAT AND SIDE PANELS".



EBS00122
ADJUSTING THE HEADLIGHT BEAMS

1. Adjust:
   • headlight beam (vertically)

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a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Headlight beam is raised.**
Direction ⓑ	**Headlight beam is lowered.**

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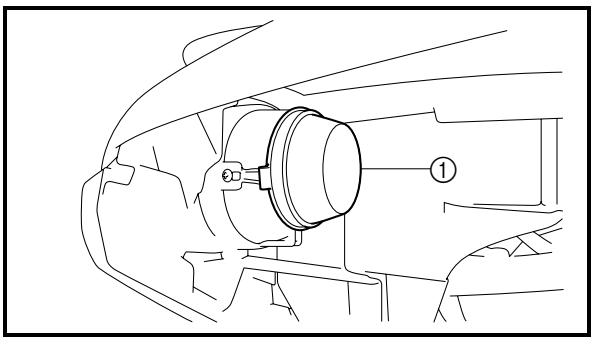
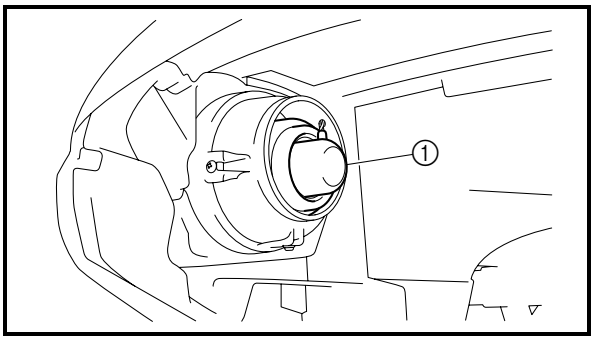
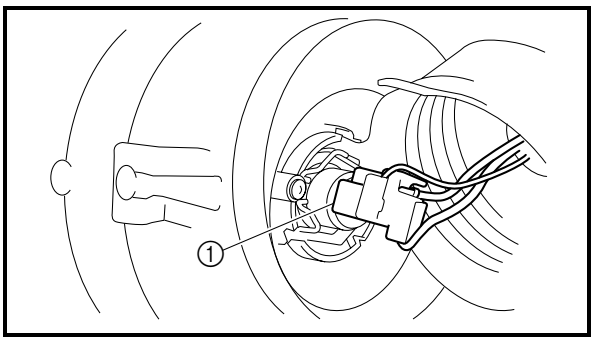


EBS00124
REPLACING THE HEADLIGHT BULBS

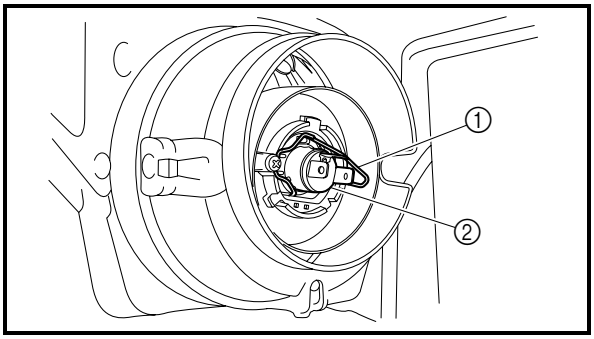
1. Remove:
   • cover at the rear of the headlight ①



2. Remove:
   • headlight bulb cover ①



3. Disconnect:
   • headlight coupler ①



4. Remove:
   - headlight bulb holder ①
   - headlight bulb ②

NOTE:
Unhook the headlight bulb holder, and then remove the defective bulb.

⚠ WARNING

Keep flammable products and your hands away from the bulb while it is on, as it will be hot. Do not touch the bulb until it cools down.

5. Install:
   - bulb New
     Secure the new bulb with the headlight unit.

CAUTION:

Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

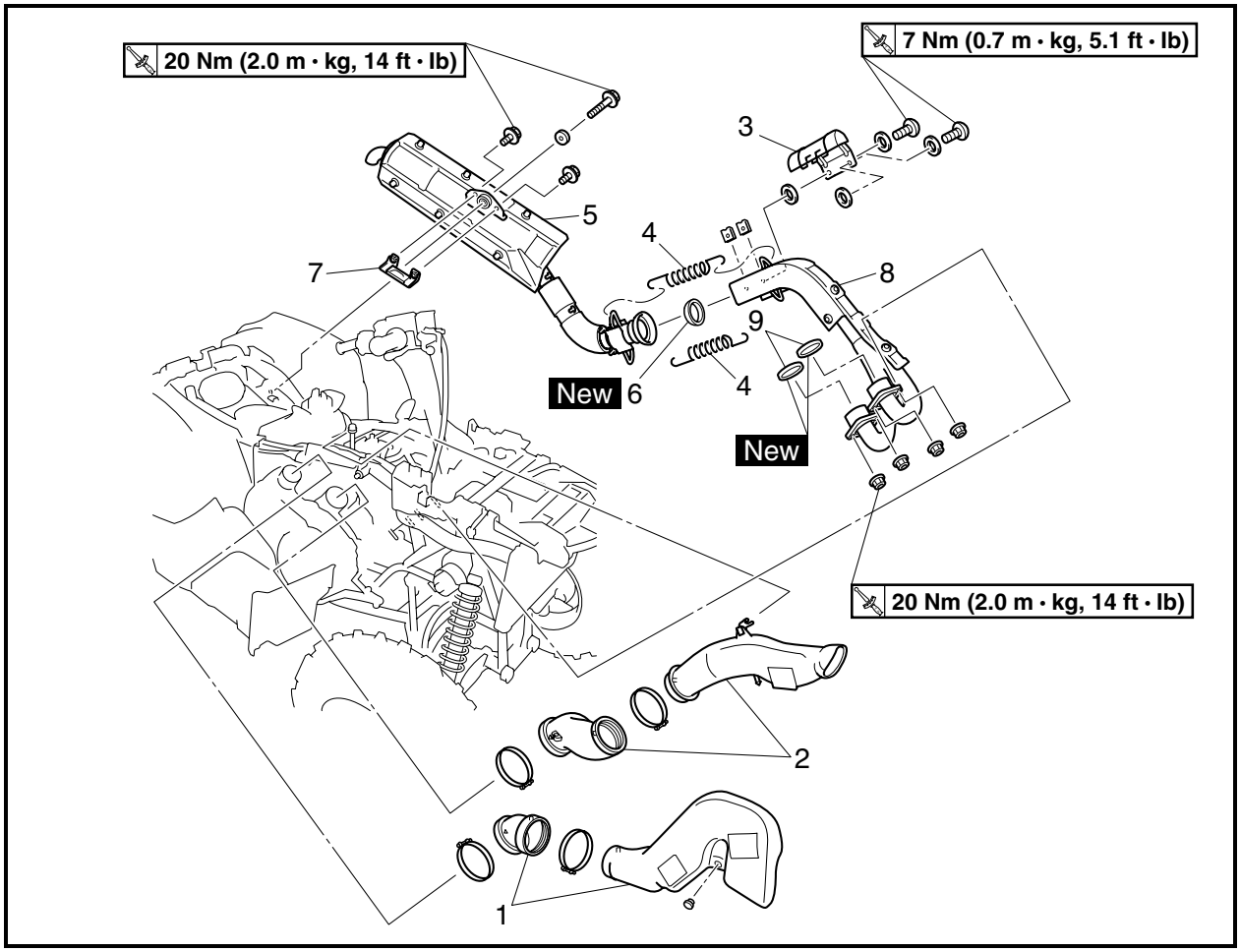
6. Install:
   - headlight bulb holder
7. Connect:
   - headlight coupler
8. Install:
   - headlight bulb cover
   - cover at the rear of the headlight

EBS00200

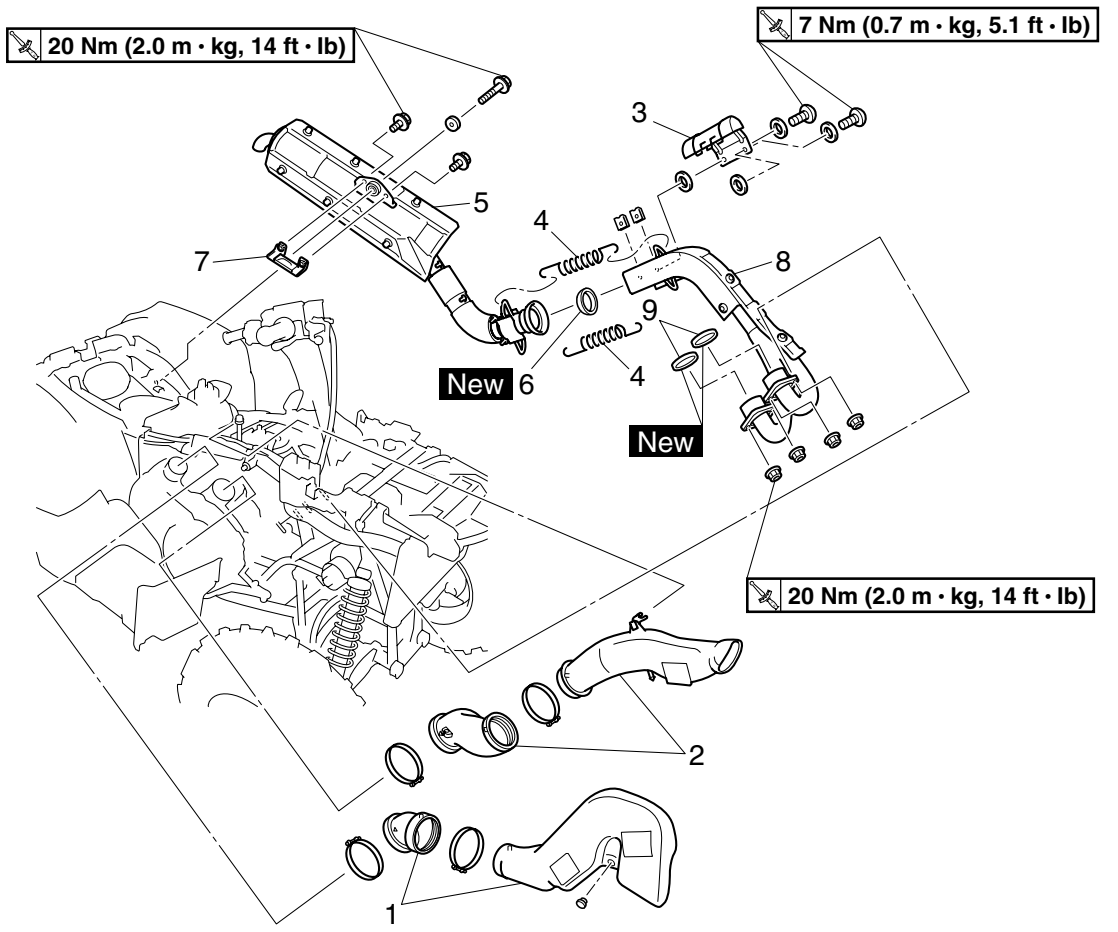
ENGINE

ENGINE REMOVAL

AIR DUCTS, MUFFLER AND EXHAUST PIPE



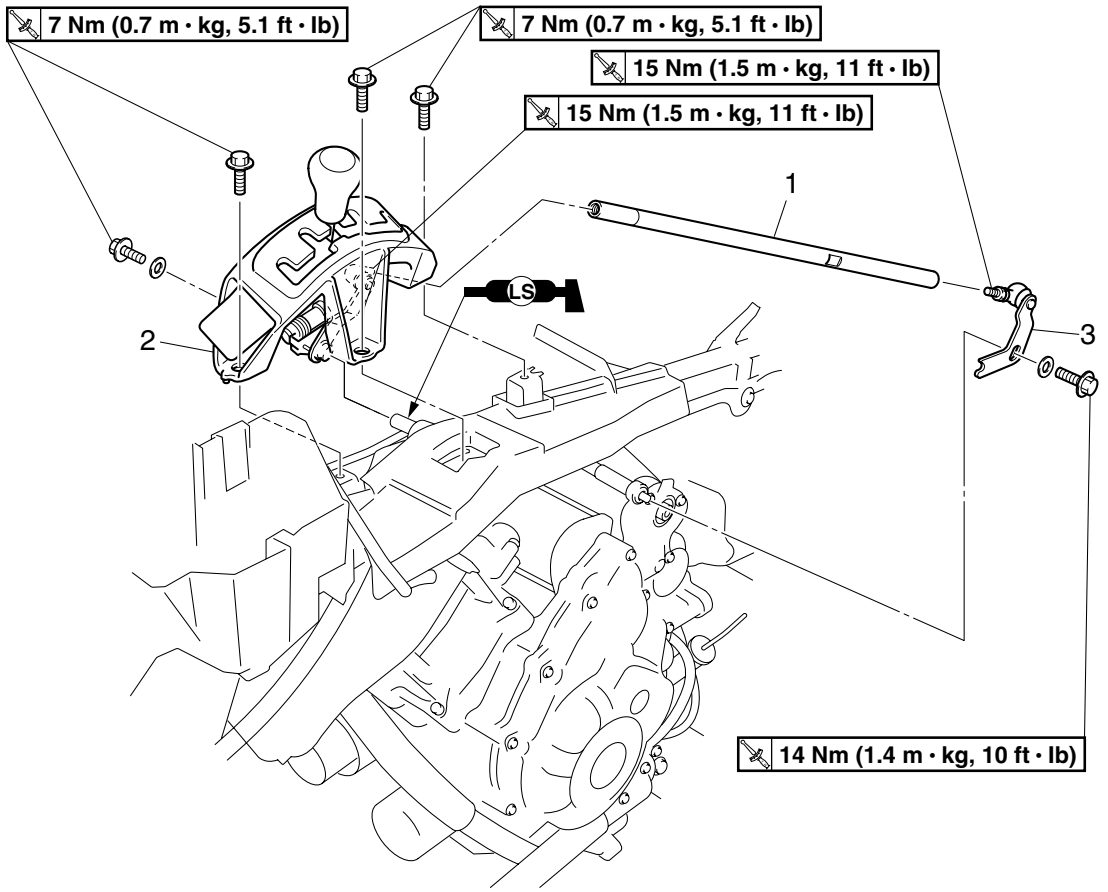
Order	Job/Part	Q'ty	Remarks
	Removing the air ducts, muffler and exhaust pipe		Remove the parts in the order listed.
	Front fender/rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Meter assembly		Refer to "ELECTRICAL COMPONENTS TRAY" in chapter 3.
1	V-belt cooling duct 2	1	
2	V-belt cooling duct 1	1	
3	Exhaust pipe protector	1	
4	Spring	2	
5	Muffler	1	



Order	Job/Part	Q'ty	Remarks
6	Gasket	1	
7	Muffler bracket	1	
8	Exhaust pipe	1	
9	Gasket	2	
			For installation, reverse the removal procedure.

EBS00202

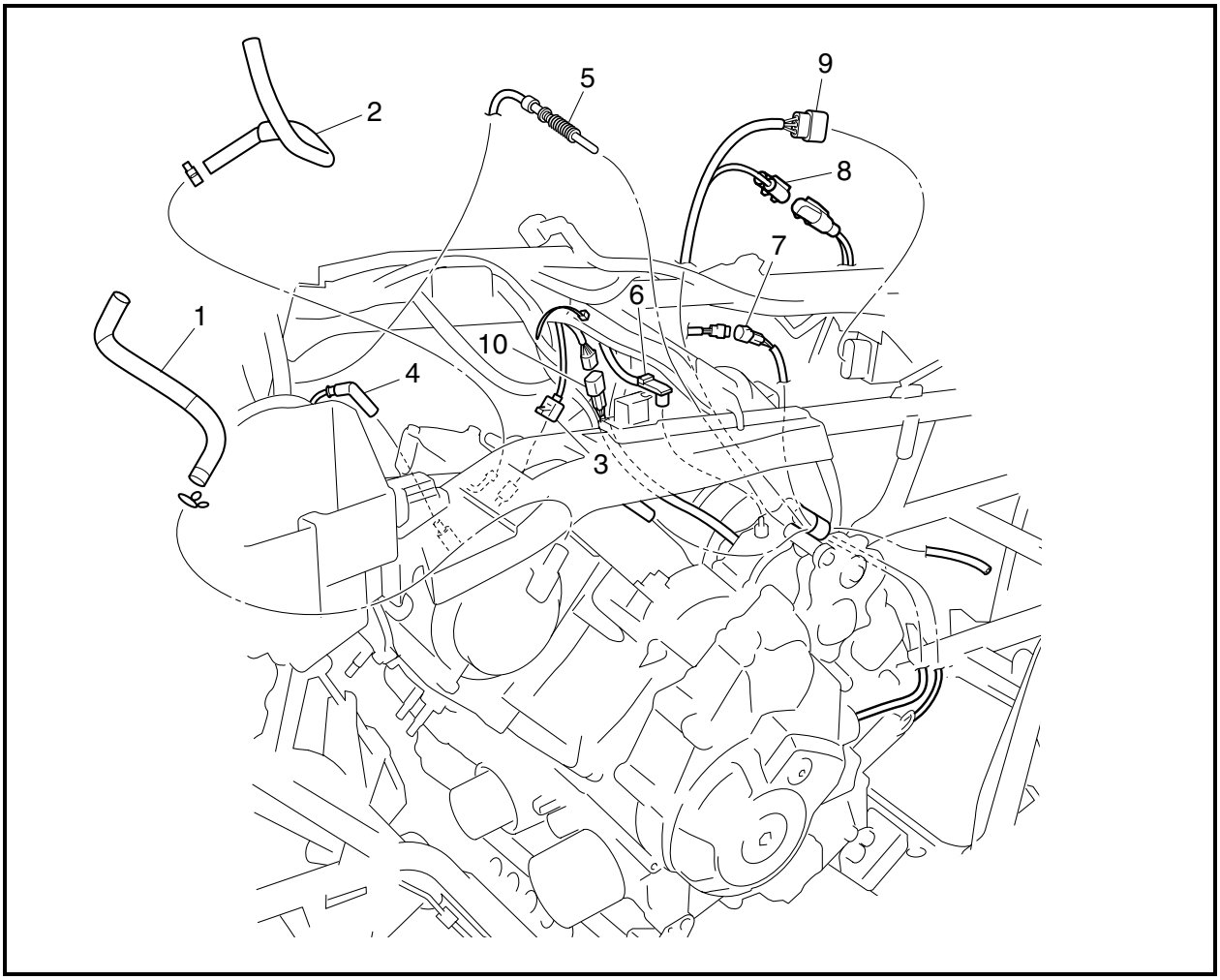
SELECT LEVER UNIT



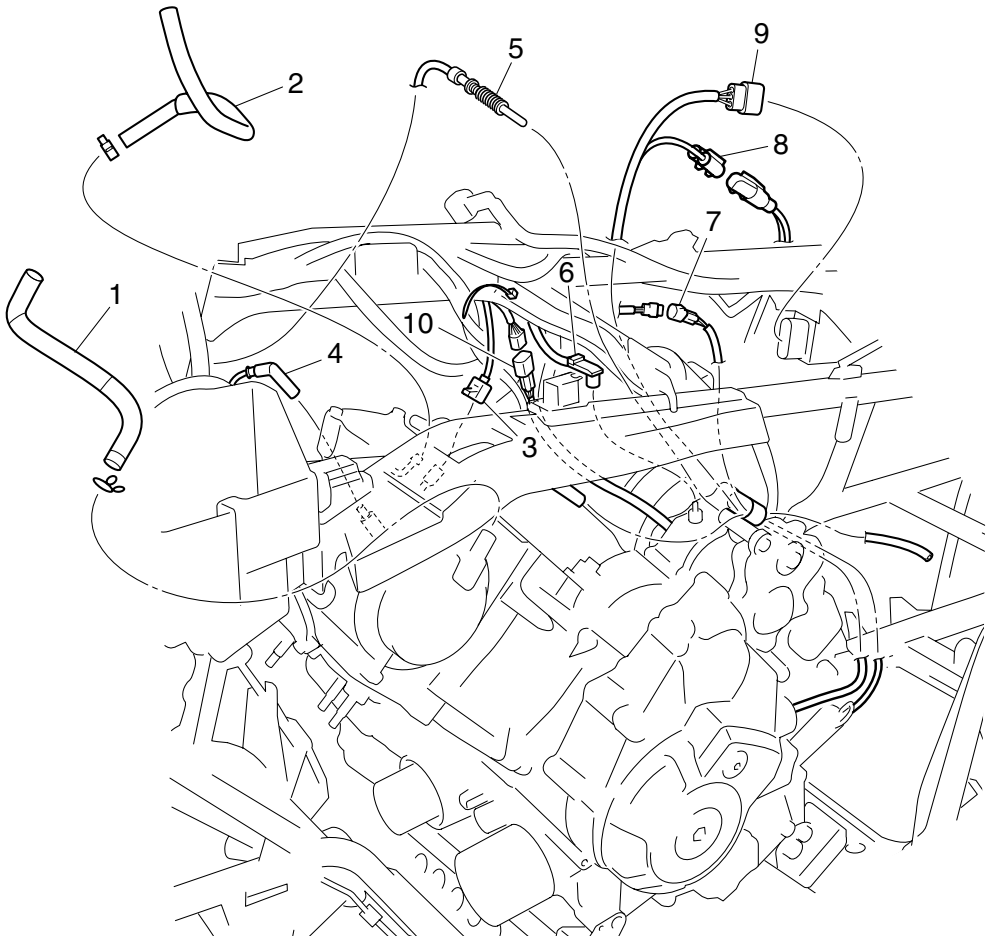
Order	Job/Part	Q'ty	Remarks
	Removing the select lever unit		Remove the parts in the order listed.
1	Select lever shift rod	1	Refer to "INSTALLING THE SELECT LEVER UNIT".
2	Select lever unit	1	
3	Shift arm	1	
			For installation, reverse the removal procedure.

EBS00204

LEADS, CABLES AND HOSES



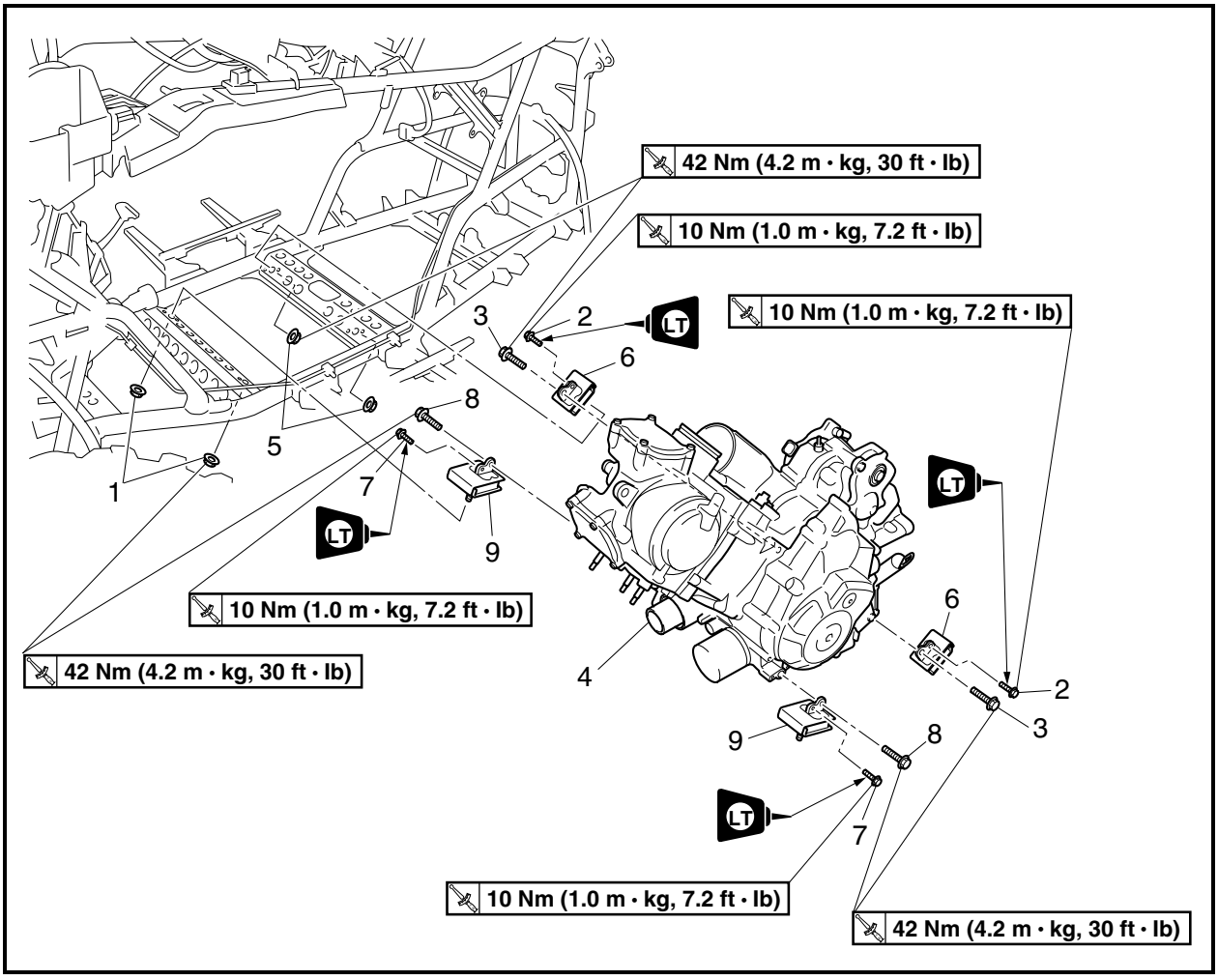
Order	Job/Part	Q'ty	Remarks
	Removing the leads, cables and hoses		Remove the parts in the order listed.
	Footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Fuel tank/fuel tank shield		Refer to "FUEL TANK" in chapter 6.
	Coolant reservoir		Refer to "RADIATOR" in chapter 5.
	Thermostat		Refer to "THERMOSTAT" in chapter 5.
	Water pump assembly		Refer to "WATER PUMP" in chapter 5.
	Oil delivery pipe		Refer to "CYLINDER HEAD".
	Final gear case assembly		Refer to "REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR" in chapter 7.



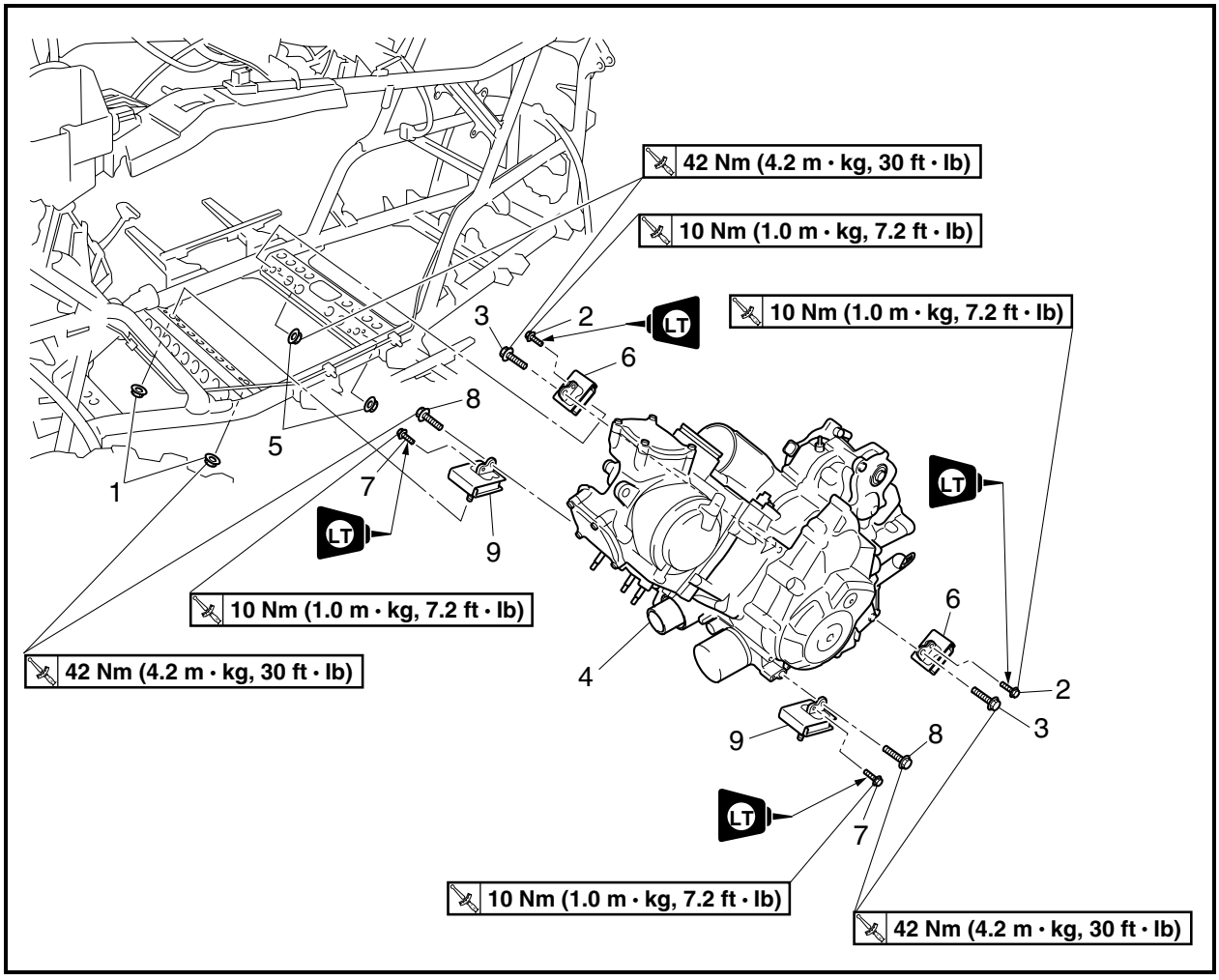
Order	Job/Part	Q'ty	Remarks
	Starter motor		Refer to "STARTER MOTOR" in chapter 9.
	Drive belt case		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Cylinder head breather hose	1	
2	Fast idle plunger inlet hose	1	
3	Coolant temperature sensor coupler	1	Disconnect.
4	Spark plug cap	1	
5	Shift control cable	1	Disconnect.
6	Reverse switch lead	1	Disconnect.
7	Speed sensor coupler	1	Disconnect.
8	Crankshaft position sensor coupler	1	Disconnect.
9	AC magneto coupler	1	Disconnect.
10	Gear position switch coupler	1	Disconnect.
			For installation, reverse the removal procedure.

EBS00205

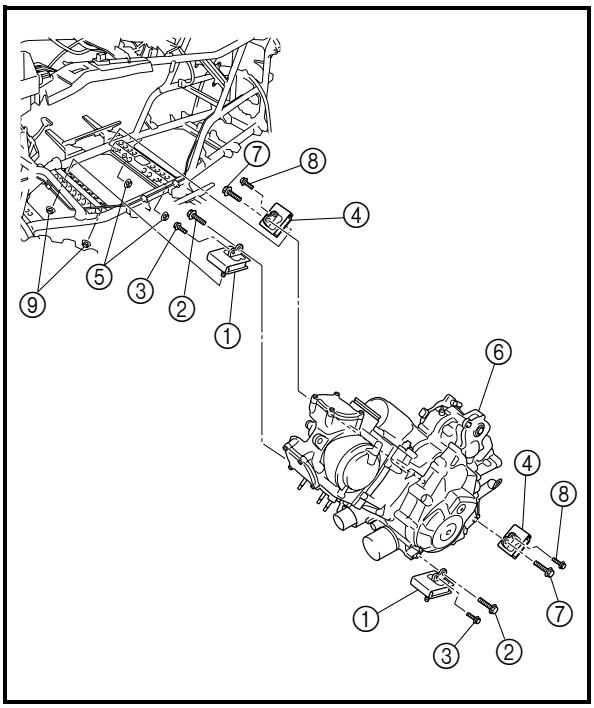
ENGINE MOUNTING BOLTS



Order	Job/Part	Q'ty	Remarks
	Removing the engine mounting bolts		Remove the parts in the order listed.
1	Rubber damper nut (front side)	2	
2	Engine mounting bolt (rear upper side)	2	Refer to "INSTALLING THE ENGINE".
3	Engine mounting bolt (rear lower side)	2	
4	Engine	1	**CAUTION:** **Make sure that the engine does not strike the brake pipe when removing it.** **NOTE:** Remove the engine from the left side of the vehicle.
5	Rubber damper nut (rear side)	2	



Order	Job/Part	Q'ty	Remarks
6	Rubber damper (rear side)	2	Refer to "INSTALLING THE ENGINE".
7	Engine mounting bolt (front upper side)	2	
8	Engine mounting bolt (front lower side)	2	
9	Rubber damper (front side)	2	
			For installation, reverse the removal procedure.



EBS00207
INSTALLING THE ENGINE

1. Install:
   - rubber dampers (front side) ①
   - engine mounting bolts (front lower side) ②
   - engine mounting bolts (front upper side) ③
   - rubber dampers (rear side) ④
   - rubber damper nuts (rear side) ⑤
   - engine ⑥
   - engine mounting bolts (rear lower side) ⑦
   - engine mounting bolts (rear upper side) ⑧
   - rubber damper nuts (front side) ⑨

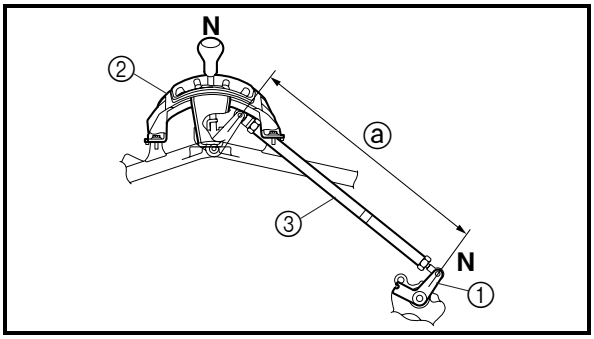
CAUTION:

Make sure that the engine does not strike the brake pipe when installing it.

NOTE:

Do not fully tighten the bolts and nuts.

2. Tighten:
   - engine mounting bolts (front lower side) ②
     42 Nm (4.2 m · kg, 30 ft · lb)
   - engine mounting bolts (front upper side) ③
     LT **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - engine mounting bolts (rear lower side) ⑦
     42 Nm (4.2 m · kg, 30 ft · lb)
   - engine mounting bolts (rear upper side) ⑧
     LT **10 Nm (1.0 m · kg, 7.2 ft · lb)**
   - rubber damper nuts (front side) ⑨
     42 Nm (4.2 m · kg, 30 ft · lb)
   - rubber damper nuts (rear side) ⑤
     42 Nm (4.2 m · kg, 30 ft · lb)



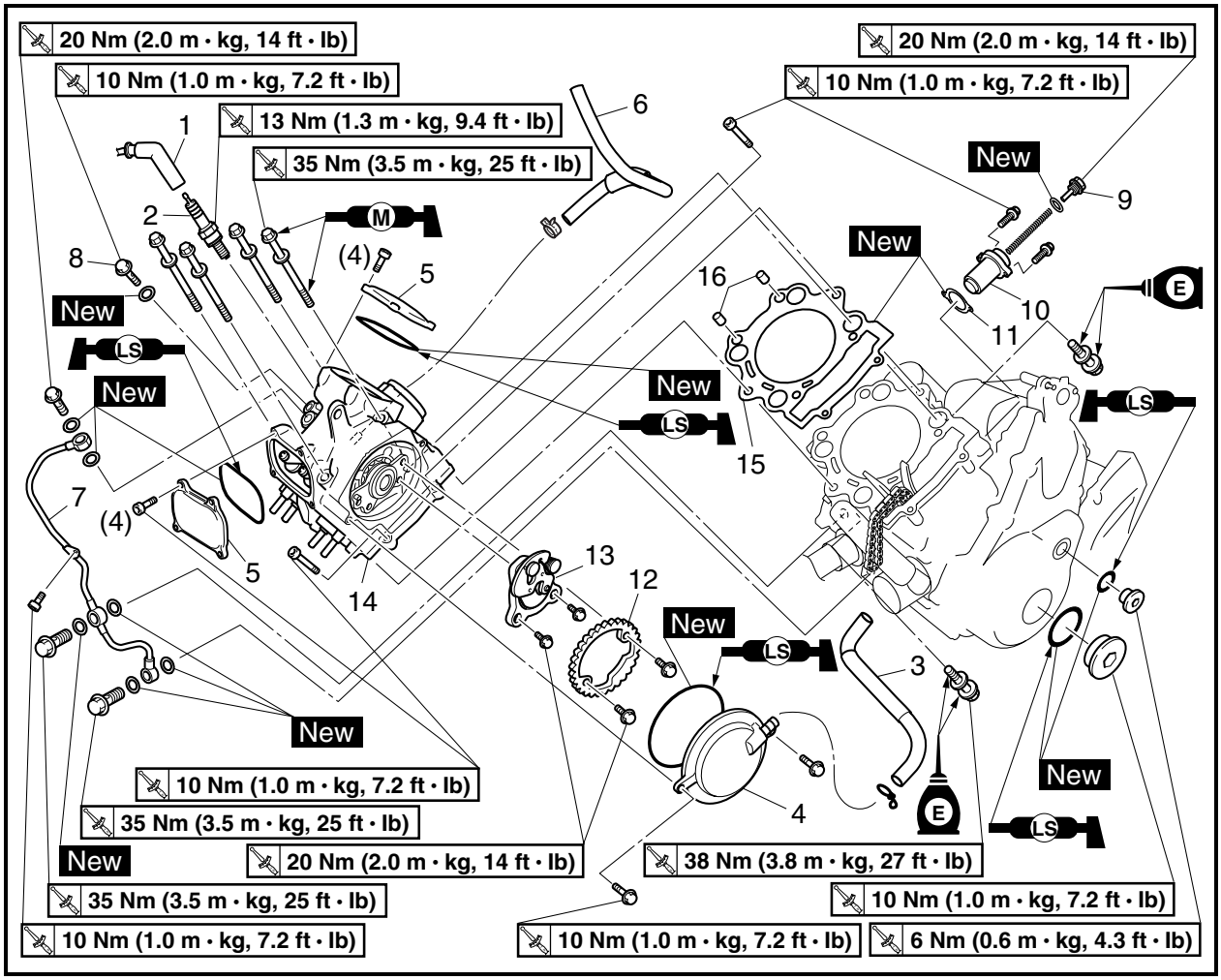
INSTALLING THE SELECT LEVER UNIT

1. Install:
   - shift arm ① — **14 Nm (1.4 m · kg, 10 ft · lb)**
   - select lever unit ② — **7 Nm (0.7 m · kg, 5.1 ft · lb)**
   - select lever shift rod ③ — **15 Nm (1.5 m · kg, 11 ft · lb)**

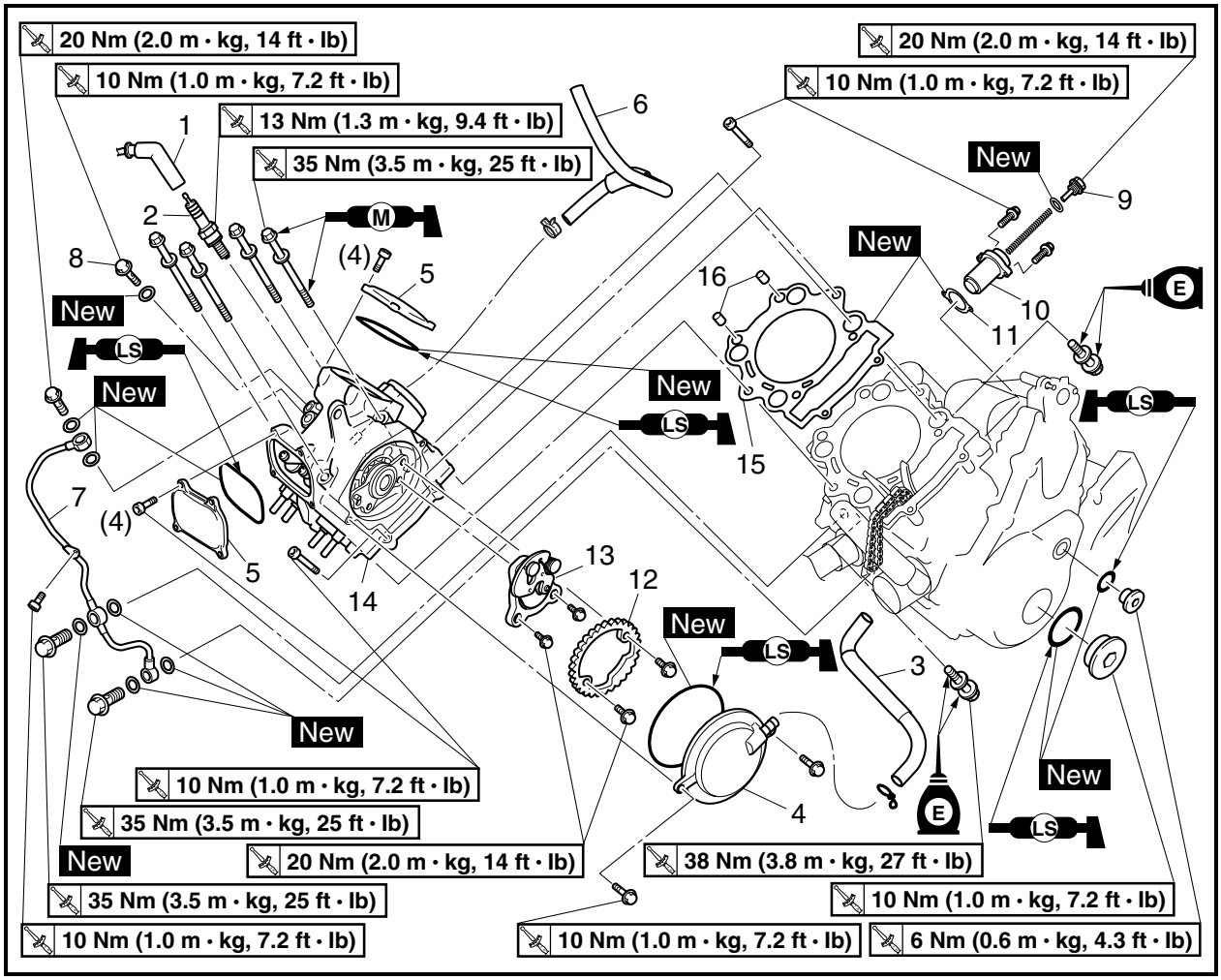
NOTE:

- Make sure that the select lever and transmission are in NEUTRAL.
- The installed length ⓐ of the shift rod is 413 mm (16.3 in).

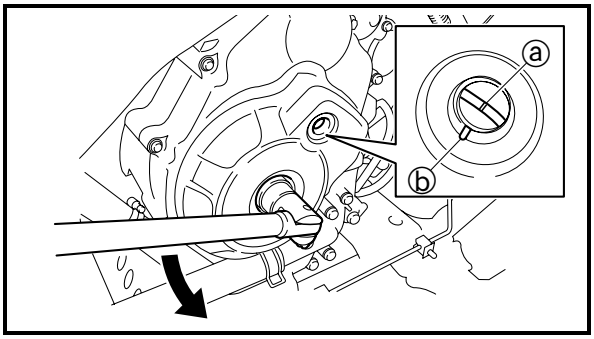
EBS00218
CYLINDER HEAD

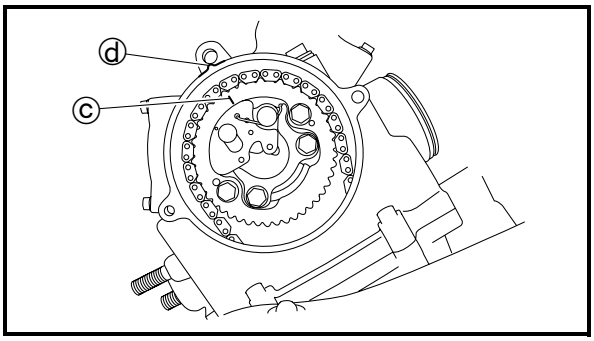


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Throttle body assembly		Refer to "THROTTLE BODY" in chapter 6.
	Thermostat/coolant temperature sensor		Refer to "THERMOSTAT" in chapter 5.
	Air ducts/exhaust pipe		Refer to "ENGINE REMOVAL".
1	Spark plug cap	1	Disconnect.
2	Spark plug	1	
3	Cylinder head breather hose	1	
4	Camshaft sprocket cover	1	
5	Tappet cover	2	
6	Fast idle plunger inlet hose	1	
7	Oil delivery pipe	1	
8	Oil gallery bolt	1	



Order	Job/Part	Q'ty	Remarks
9	Timing chain tensioner cap bolt	1	
10	Timing chain tensioner	1	
11	Gasket	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD".
12	Camshaft sprocket	1	
13	Decompressor assembly	1	
14	Cylinder head	1	
15	Cylinder head gasket	1	
16	Dowel pin	2	
			For installation, reverse the removal procedure.





EBS00220

REMOVING THE CYLINDER HEAD

1. Align:
   - "I" mark on the AC magneto rotor (with the stationary pointer on the AC magneto cover)

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a. Turn the crankshaft counterclockwise.
b. When the piston is at the top dead center (TDC) on the compression stroke, align the "I" mark ⓐ on the AC magneto rotor with the stationary pointer ⓑ on the AC magneto cover.

NOTE:

To position the piston at top dead center (TDC) on the compression stroke, align the "I" mark ⓒ on the camshaft sprocket with the stationary pointer ⓓ on the cylinder head, as shown in the illustration.

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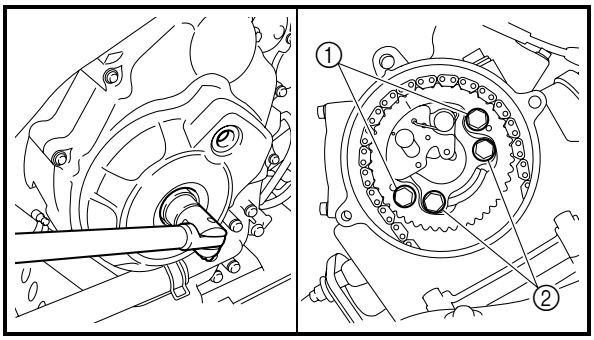


2. Loosen:
   - camshaft sprocket bolts ①
   - decompressor assembly bolts ②

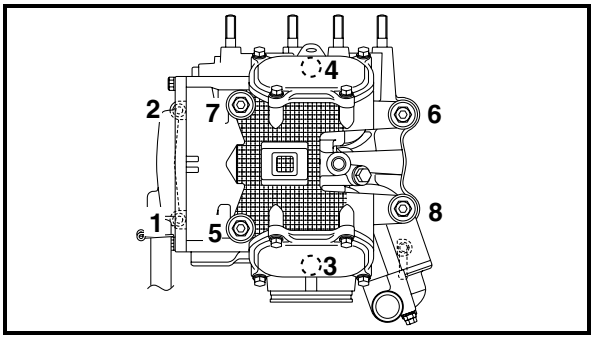
NOTE:

While holding the AC magneto rotor nut with a wrench, loosen the camshaft sprocket bolts and decompressor assembly bolts.

3. Loosen:
   - timing chain tensioner cap bolt
4. Remove:
   - timing chain tensioner (along with the gasket)
   - camshaft sprocket
   - timing chain

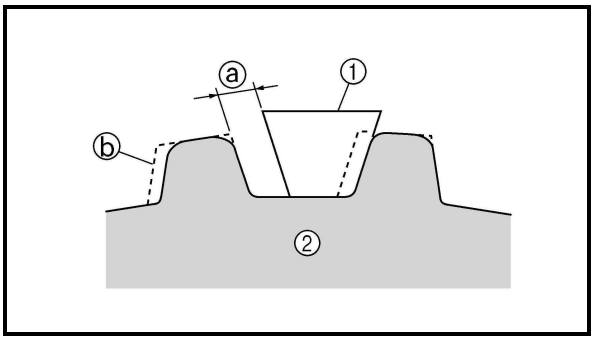
NOTE:

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



5. Remove:
   • cylinder head

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



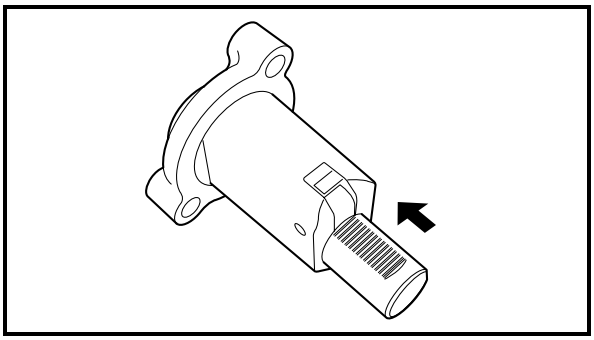
EBS00224
CHECKING THE CAMSHAFT SPROCKET

1. Check:
   • camshaft sprocket
   Wear/damage → Replace the camshaft sprocket and timing chain as a set.

ⓐ 1/4 of a tooth
ⓑ Correct
① Roller
② Sprocket

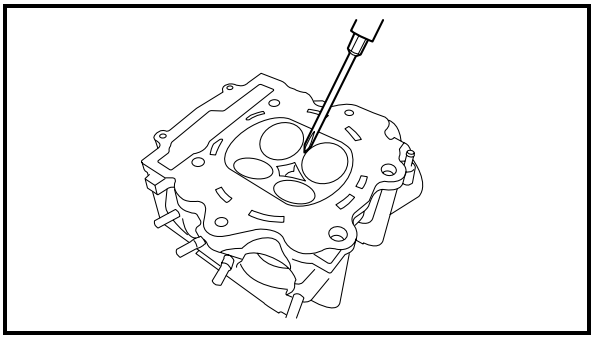
EBS00227
CHECKING THE TAPPET COVERS

1. Check:
   • tappet covers
   • camshaft sprocket cover
   Cracks/damage → Replace.



EBS00229
CHECKING THE TIMING CHAIN TENSIONER

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

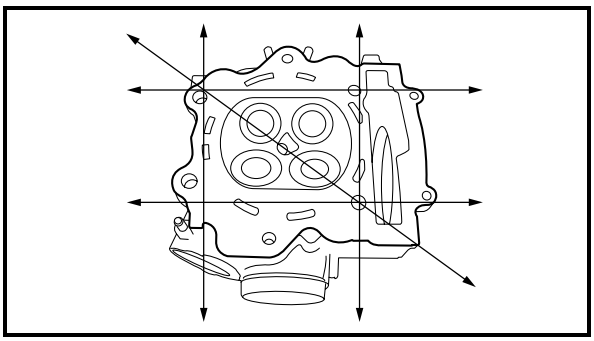


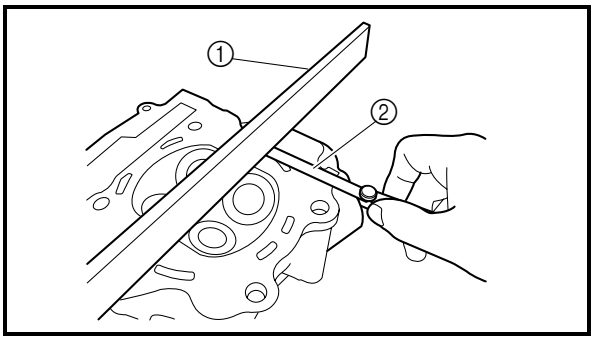
EBS00230
CHECKING THE CYLINDER HEAD

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

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

2. Check:
   - cylinder head
     Damage/scratches → Replace.
   - cylinder head water jacket
     Mineral deposits/rust → Eliminate.





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

Maximum cylinder head warpage
0.03 mm (0.0012 in)

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

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

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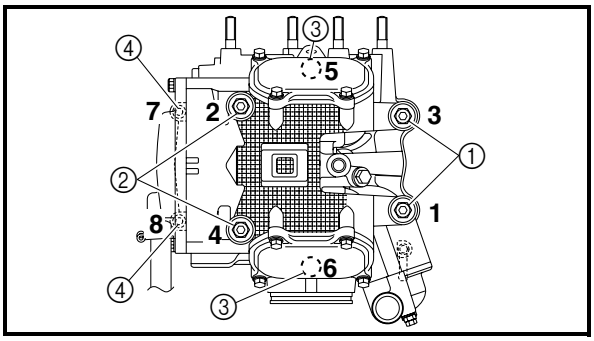
EBS00232
INSTALLING THE CYLINDER HEAD

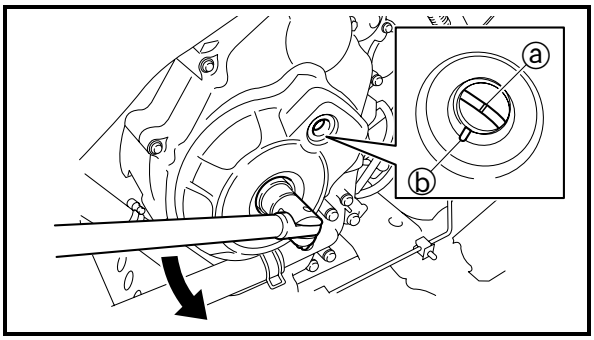
1. Install:
   - dowel pins
   - cylinder head gasket New
2. Install:
   - cylinder head
   - cylinder head bolts

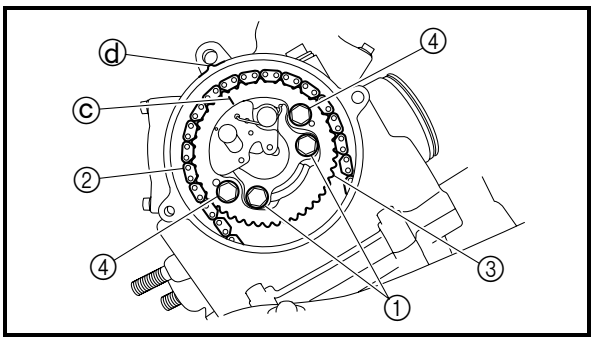
NOTE:
- Lubricate the cylinder head bolt ① and ② threads and mating surface with molybdenum disulfide grease.
- Lubricate the cylinder head bolts ③ threads and mating surface with engine oil.



3. Tighten:
   - cylinder head bolts ①: ℓ = 135 mm (5.31 in)
     35 Nm (3.5 m · kg, 25 ft · lb)
   - cylinder head bolts ②: ℓ = 145 mm (5.71 in)
     35 Nm (3.5 m · kg, 25 ft · lb)
   - cylinder head bolts ③
     38 Nm (3.8 m · kg, 27 ft · lb)
   - cylinder head bolts ④
     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Tighten the cylinder head bolts in the proper tightening sequence as shown and torque them in two stages.





4. Install:
   - decompressor assembly
   - camshaft sprocket
     (onto the camshaft)

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a. Install the decompressor assembly onto the camshaft, and then finger tighten the decompressor assembly bolts ①.
b. Turn the crankshaft counterclockwise.
c. Align the "I" mark ⓐ on the AC magneto rotor with the stationary pointer ⓑ on the AC magneto cover.
d. Install the timing chain ② onto the camshaft sprocket ③, then the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts ④.
e. Make sure the "I" mark ⓒ on the camshaft sprocket with the stationary pointer ⓓ on the cylinder head.

NOTE:
When installing the camshaft sprocket, keep the timing chain as tense as possible on the exhaust side.

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

f. Remove the wire from the timing chain.

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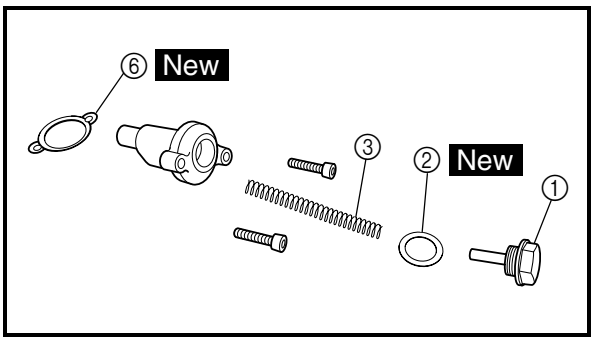

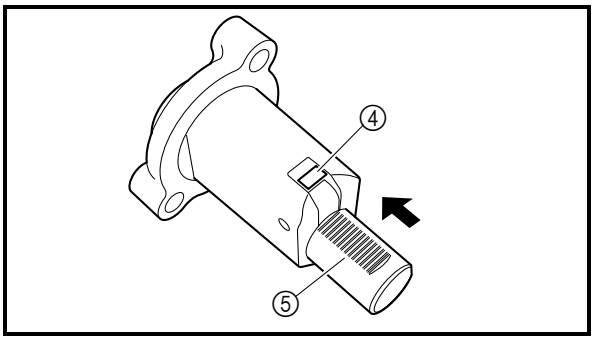

5. Install:
   • timing chain tensioner

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a. Remove the timing chain tensioner cap bolt ①, copper washer ② and spring ③.
b. Release the timing chain tensioner one-way cam ④ and push the timing chain tensioner rod ⑤ all the way into the timing chain tensioner housing.
c. Install the timing chain tensioner and gasket ⑥ onto the cylinder.

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

NOTE:
Install the gasket with its beaded side facing the timing chain tensioner end.

d. Install the spring and timing chain tensioner cap bolt.

	Timing chain tensioner cap bolt **20 Nm (2.0 m · kg, 14 ft · lb)**

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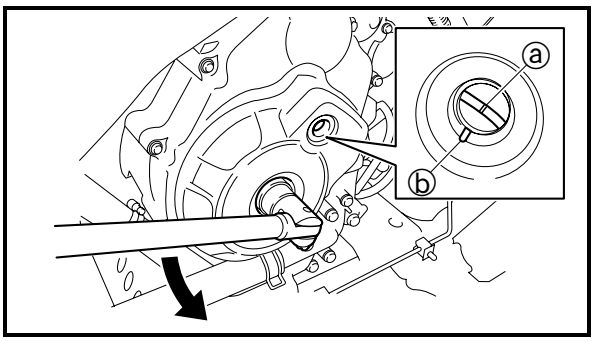
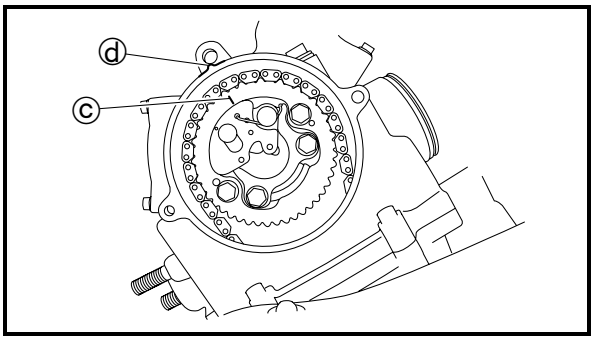
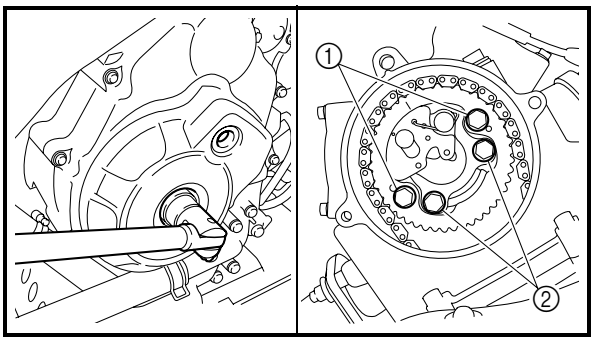
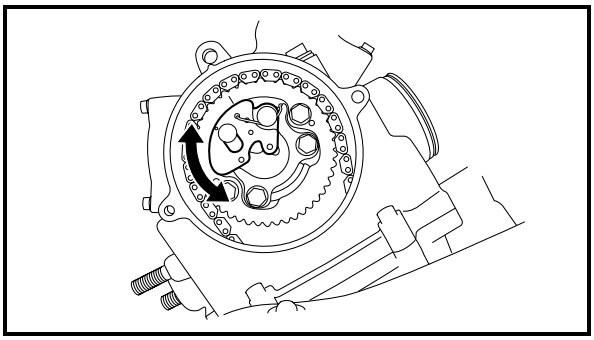
6. Turn:
   • crankshaft
   (several turns counterclockwise)









7. Check:
   - "I" mark ⓐ

NOTE:
Check that the "I" mark on the AC magneto rotor is aligned with the stationary pointer ⓑ on the AC magneto cover.

   - "I" mark ⓒ

NOTE:
Check that the "I" mark on the camshaft sprocket is aligned with the stationary pointer ⓓ on the cylinder head.

   Out of alignment → Correct.
   Repeat steps (4) to (7), if necessary.

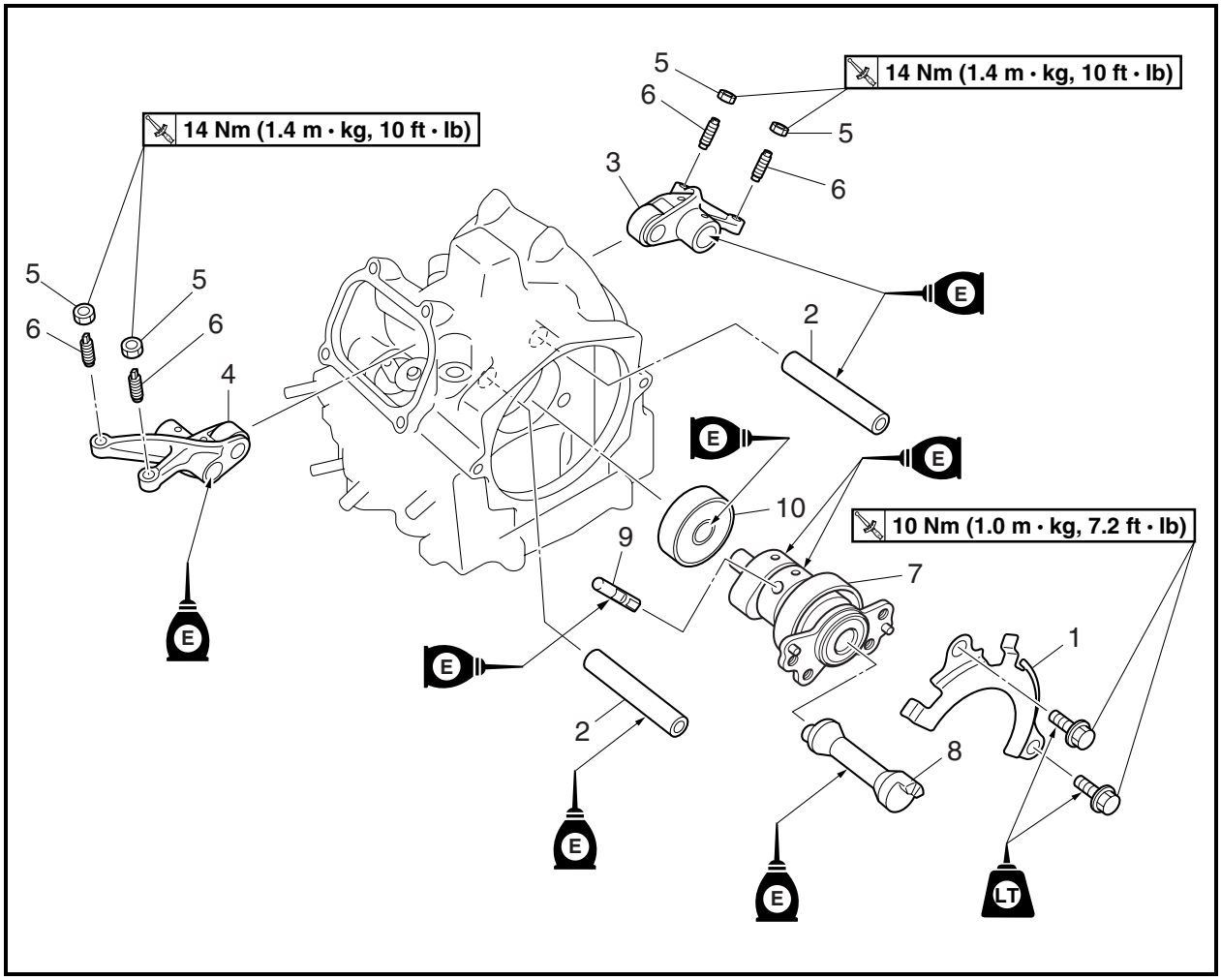
8. Tighten:
   - camshaft sprocket bolts ①
     20 Nm (2.0 m · kg, 14 ft · lb)
   - decompressor assembly bolts ②
     20 Nm (2.0 m · kg, 14 ft · lb)

NOTE:
- While holding the AC magneto rotor nut with a wrench, tighten the camshaft sprocket bolts and decompressor assembly bolts.
- After tightening the decompressor assembly bolts, check that decompressor assembly moves smoothly.

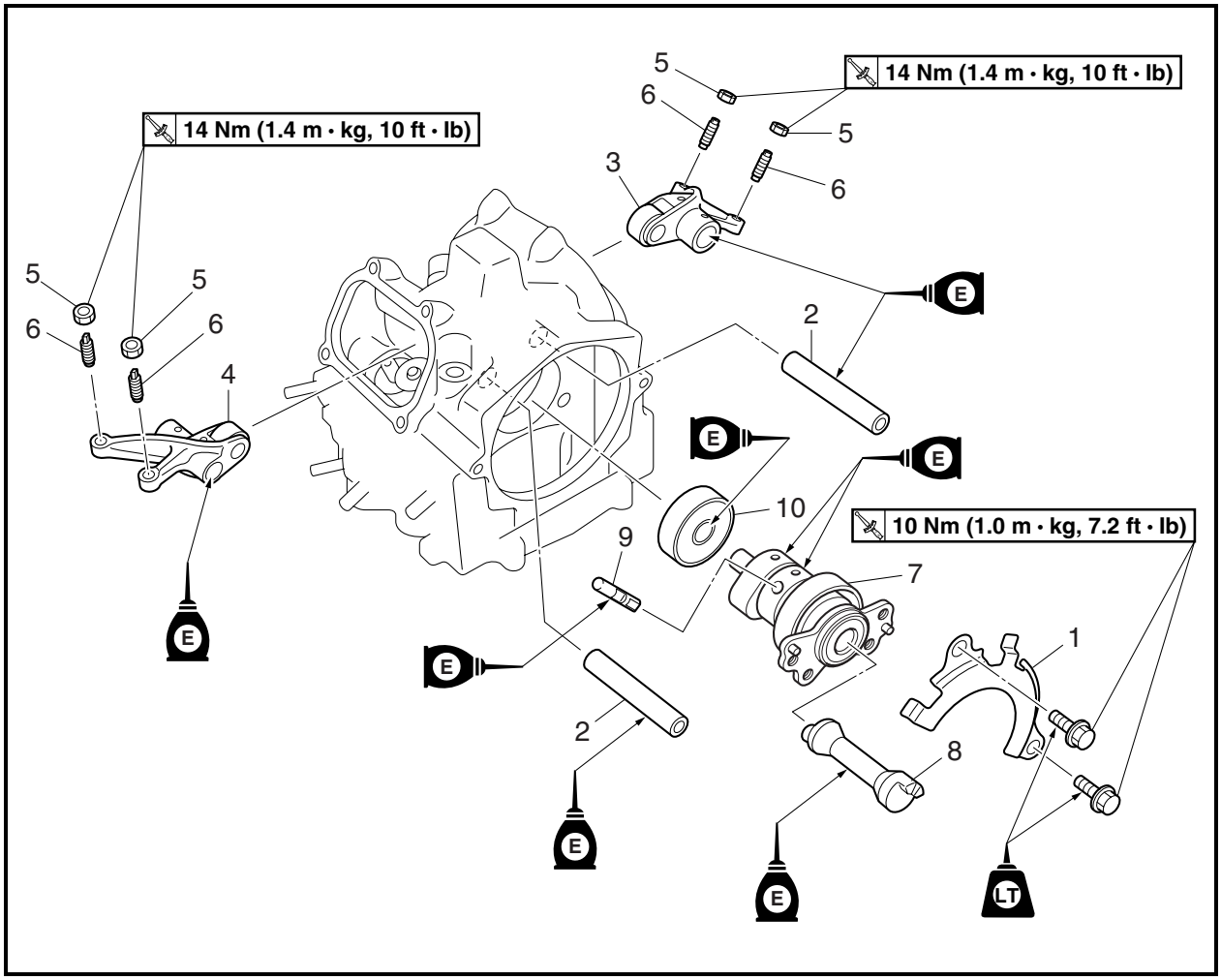
CAUTION:
Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

9. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

EBS00235
ROCKER ARMS AND CAMSHAFT



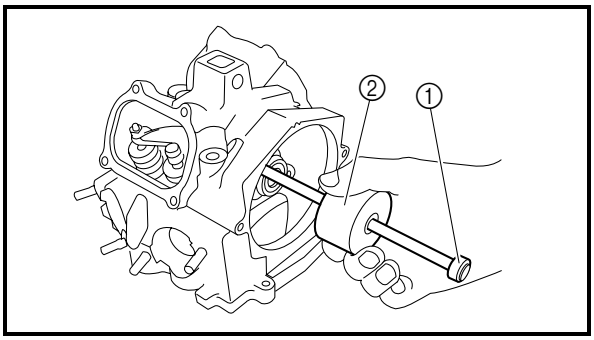
Order	Job/Part	Q'ty	Remarks
	Removing the rocker arms and camshaft		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Bearing retainer	1	
2	Rocker arm shaft	2	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS".
3	Intake rocker arm	1	
4	Exhaust rocker arm	1	
5	Locknut	4	
6	Valve adjusting screw	4	
7	Camshaft	1	**CAUTION:** **Do not disassemble the camshaft assembly.**
8	Decompressor lever	1	



Order	Job/Part	Q'ty	Remarks
9	Decompressor lever pin	1	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS". For installation, reverse the removal procedure.
10	Bearing	1	

EBS00237
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
   - locknuts
   - valve adjusting screws
2. Remove:
   - intake rocker arm shaft
   - exhaust rocker arm shaft
   - intake rocker arm
   - exhaust rocker arm

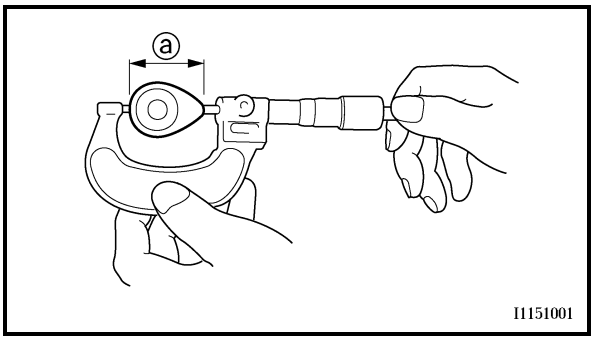


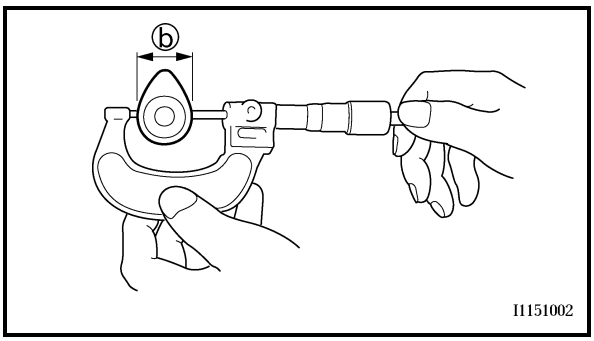
NOTE:
Remove the rocker arm shafts with the slide hammer bolt ① and weight ②.

Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1
Weight
90890-01084, YU-01083-3

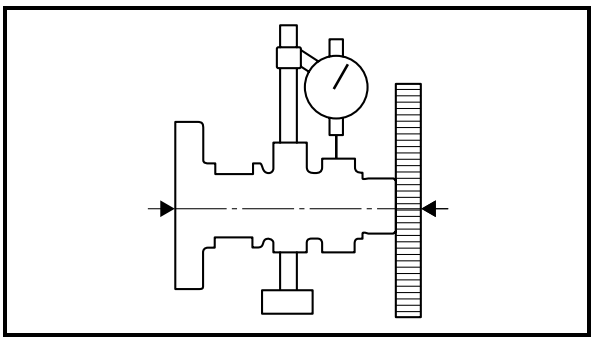
EBS00223
CHECKING THE CAMSHAFT

1. Check:
   - cam lobes
     Pitting/scratches/blue discoloration → Replace.
2. Measure:
   - cam lobe dimensions ⓐ and ⓑ
     Out of specification → Replace.



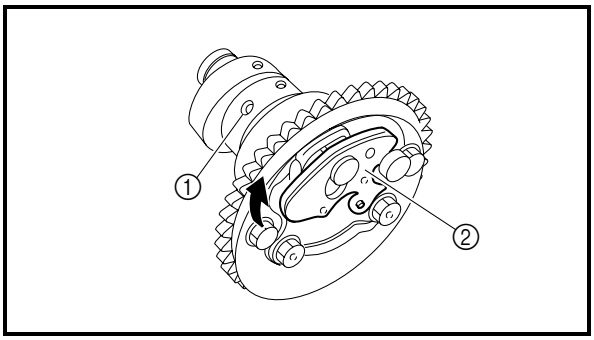


Camshaft lobe dimensions
Intake
ⓐ 43.488 ~ 43.588 mm (1.7121 ~ 1.7161 in)
<Limit>: 43.388 mm (1.7082 in)
ⓑ 36.959 ~ 37.059 mm (1.4551 ~ 1.4590 in)
<Limit>: 36.859 mm (1.4511 in)
Exhaust
ⓐ 43.129 ~ 43.229 mm (1.6980 ~ 1.7019 in)
<Limit>: 43.029 mm (1.6941 in)
ⓑ 37.007 ~ 37.107 mm (1.4570 ~ 1.4609 in)
<Limit>: 36.907 mm (1.4530 in)



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

Camshaft runout limit
0.015 mm (0.0006 in)



EBS00225
CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • decompression system

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a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and pin installed in the camshaft.
b. Check that the decompressor lever pin ① projects from the camshaft.
c. Check that the decompressor cam ② moves smoothly.

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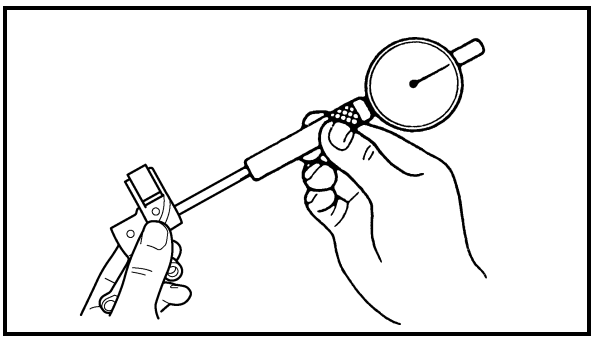
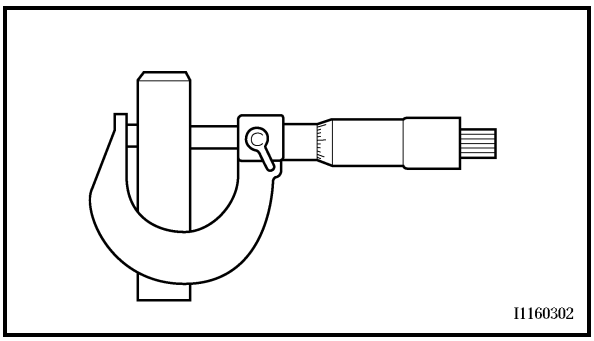
EBS00239
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to both of the rocker arms and rocker arm shafts.

1. Check:
   • rocker arm
   Damage/wear → Replace.
2. Check:
   • rocker arm shaft
   Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.
3. Measure:
   • rocker arm inside diameter
   Out of specification → Replace.



Rocker arm inside diameter
12.000 ~ 12.018 mm
(0.4724 ~ 0.4731 in)



4. Measure:
   • rocker arm shaft outside diameter
   Out of specification → Replace.

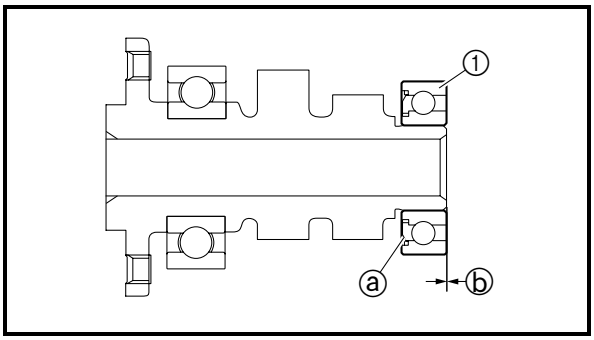
Rocker arm shaft outside diameter
11.981 ~ 11.991 mm
(0.4717 ~ 0.4721 in)

5. Calculate:
   • rocker-arm-to-rocker-arm-shaft clearance

NOTE:
Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

Out of specification → Replace the defective part(s).

Rocker-arm-to-rocker-arm-shaft clearance
0.009 ~ 0.037 mm
(0.0004 ~ 0.0015 in)



EAS00243
INSTALLING THE CAMSHAFT AND ROCKER ARMS

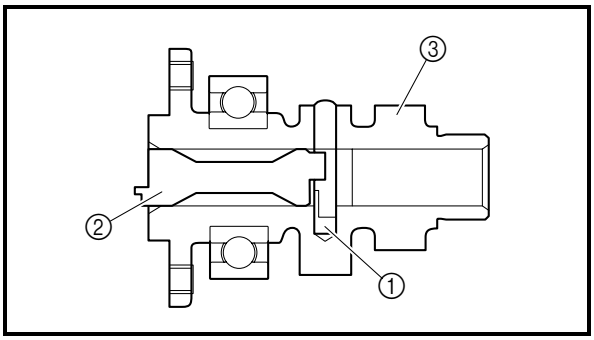
1. Install:
   • bearing ①
   (onto the cylinder head)

NOTE:
- Apply engine oil to the bearing.
- Install the bearing so that the seal is facing ⓐ the camshaft.

Installed depth ⓑ
0 mm (0 in)

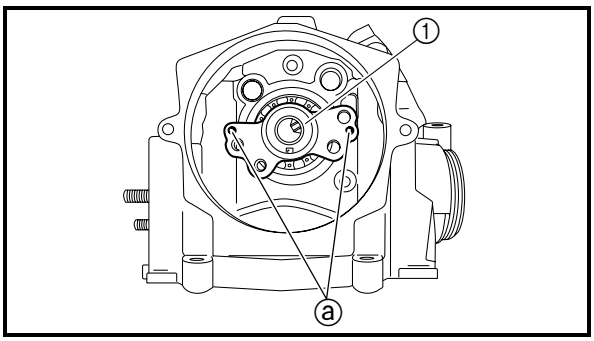
2. Lubricate:
   - camshaft
   - decompressor lever pin
   - decompressor lever

	Recommended lubricant **Engine oil**



3. Install:
   - decompressor lever pin ①
   - decompressor lever ②

NOTE:
Install the decompressor lever pin ① and decompressor lever ② in the camshaft ③ as shown in the illustration.

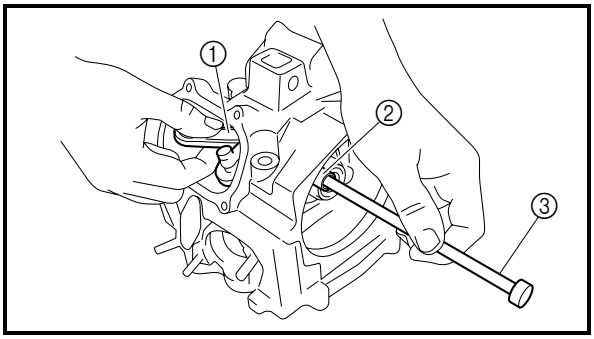


4. Install:
   - camshaft ①

NOTE:
Install the camshaft so that its projection ⓐ becomes horizontal.

5. Lubricate:
   - rocker arm shafts

	Recommended lubricant **Engine oil**



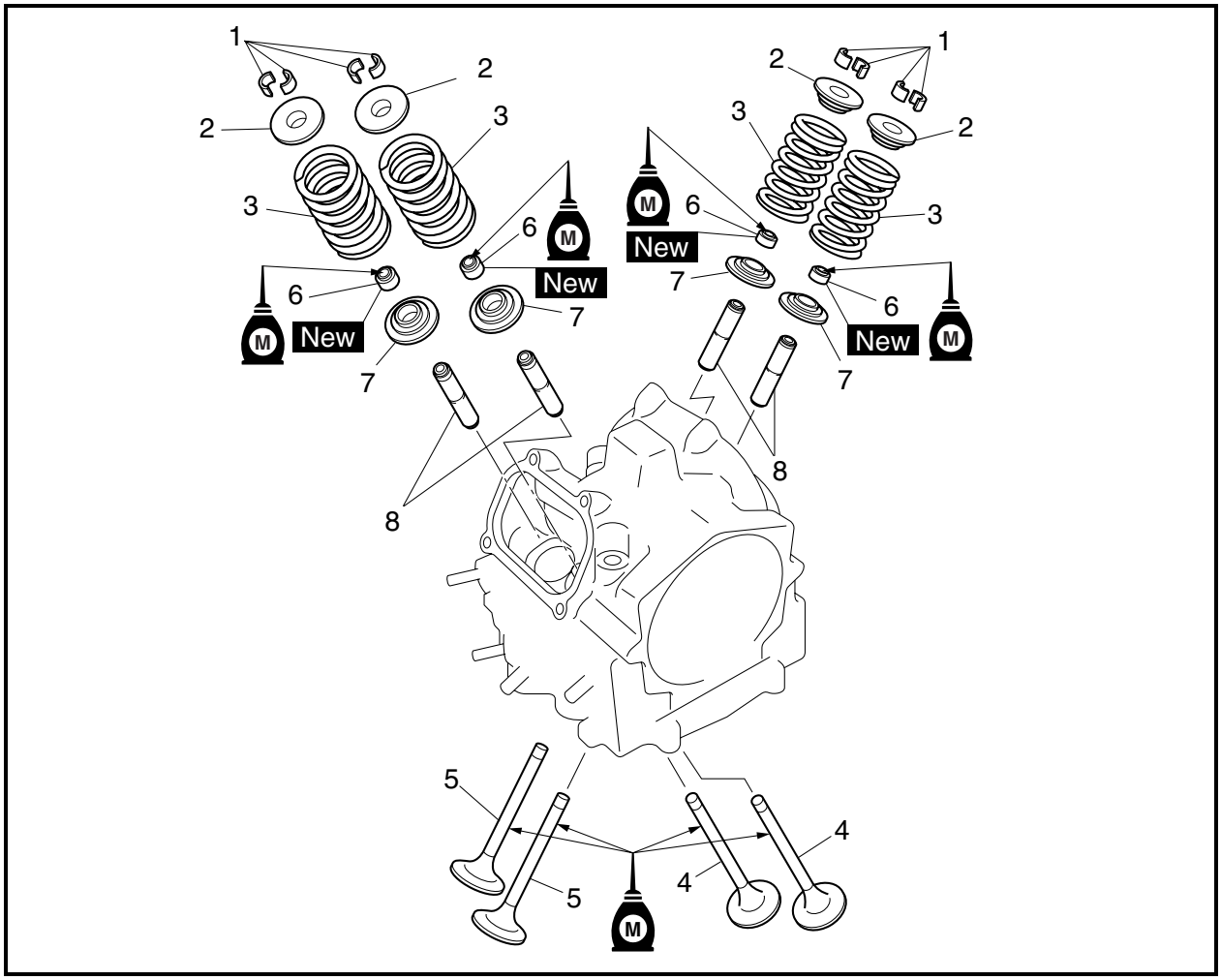
6. Install:
   - exhaust rocker arm ①
   - exhaust rocker arm shaft ②
   - intake rocker arm
   - intake rocker arm shaft

NOTE:

- Use a slide hammer bolt ③ to install the rocker arm shaft.
- Make sure the rocker arm shafts (intake and exhaust) are completely pushed into the cylinder head.

Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1

EBS00234
VALVES AND VALVE SPRINGS



Order	Job/Part	Q'ty	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
	Rocker arms/rocker arm shafts/camshaft		Refer to "ROCKER ARMS AND CAMSHAFT".
1	Valve cotter	8	Refer to "REMOVING THE VALVES AND VALVE SPRINGS" and "INSTALLING THE VALVES AND VALVE SPRINGS".
2	Valve spring retainer	4	
3	Valve spring	4	
4	Exhaust valve	2	
5	Intake valve	2	
6	Valve stem seal	4	
7	Valve spring seat	4	
8	Valve guide	4	Refer to "CHECKING THE VALVES AND VALVE SPRINGS".
			For installation, reverse the removal procedure.

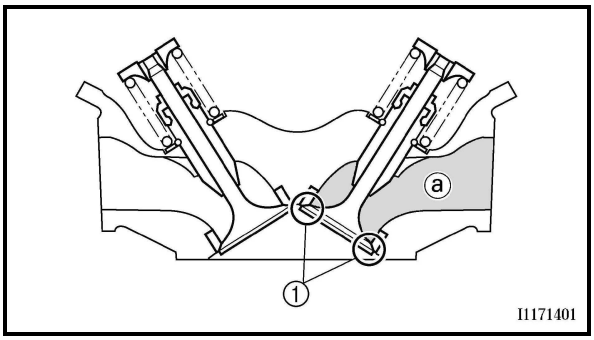
EBS00238

REMOVING THE VALVES AND VALVE SPRINGS

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

NOTE:

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



1. Check:
   - valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVES AND VALVE SPRINGS".

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

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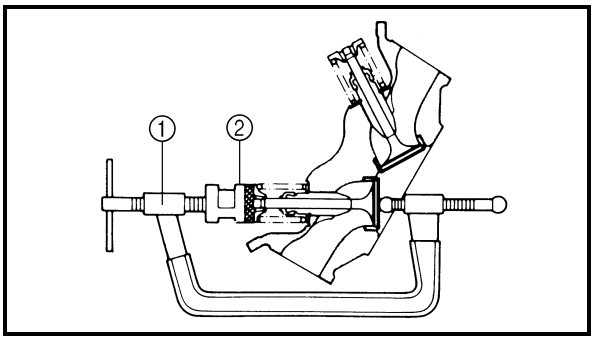
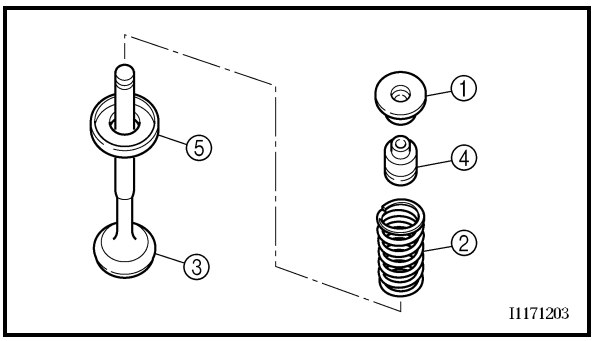


2. Remove:
   - valve cotters

NOTE:

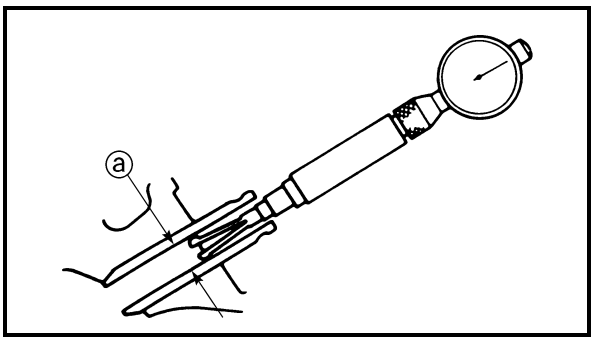
Attach a valve spring compressor ① and attachment ② between the valve spring retainer and the cylinder head to remove the valve cotters.

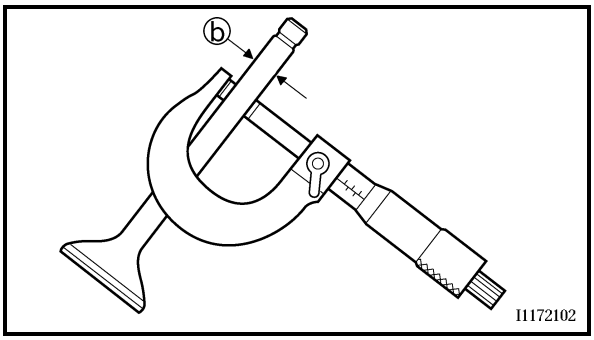
Valve spring compressor
90890-04019, YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1



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

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





EBS00240
CHECKING THE VALVES AND VALVE SPRINGS

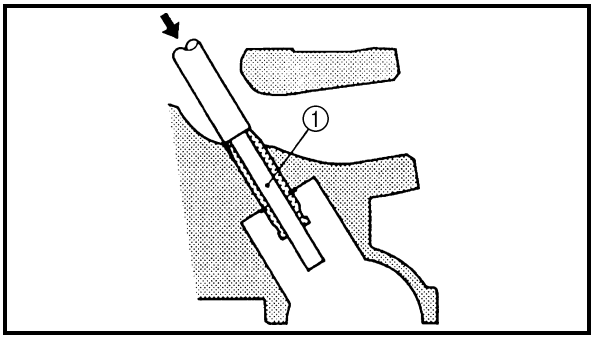
The following procedure applies to all of the valves and valve guides.

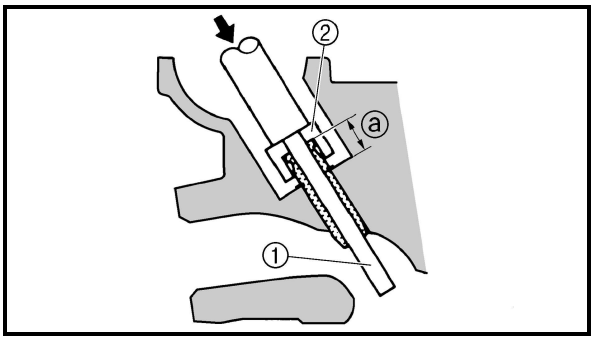
1. Measure:
   - valve-stem-to-valve-guide clearance

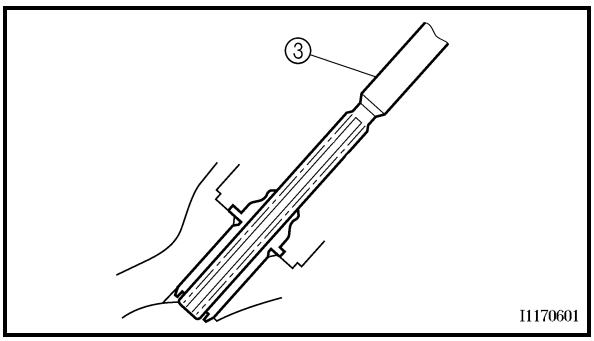
Stem-to-guide clearance =
valve guide inside diameter ⓐ -
valve stem diameter ⓑ

Out of specification → Replace the valve guide.

Stem-to-guide clearance
Intake
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.0031 in)
Exhaust
0.025 ~ 0.052 mm
(0.0010 ~ 0.0020 in)
<Limit>: 0.10 mm (0.0039 in)







2. Replace:
   • valve guide

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

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a. Remove the valve guide using a valve guide remover ①.
b. Install the new valve guide using a valve guide remover ① and valve guide installer ②.

Valve guide position ⓐ
12.7 ~ 13.1 mm (0.50 ~ 0.52 in)

c. 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 (ø6)
90890-04064
Valve guide remover (6.0 mm)
YM-04064-A
Valve guide installer (ø6)
90890-04065
Valve guide installer (6.0 mm)
YM-04065-A
Valve guide reamer (ø6)
90890-04066
Valve guide reamer (6.0 mm)
YM-04066

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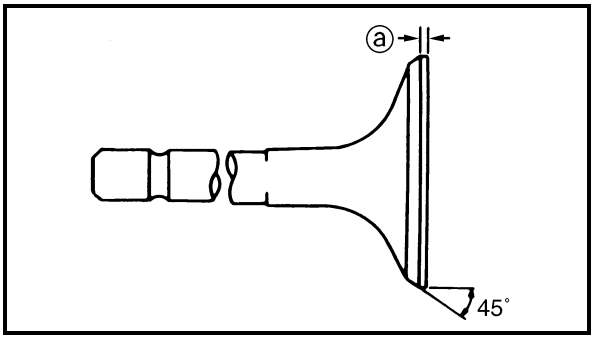
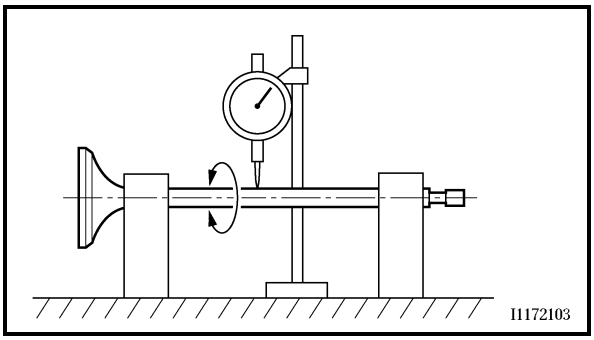
NOTE:
After replacing the valve guide, reface the valve seat.

3. Check:
   • valve face
     Pitting/wear → Grind the face.
   • valve stem end
     Mushroom shape or diameter larger than the body of the valve stem → Replace.



4. Measure:
   • margin thickness ⓐ
   Out of specification → Replace.

Margin thickness
0.80 ~ 1.20 mm
(0.0315 ~ 0.0472 in)

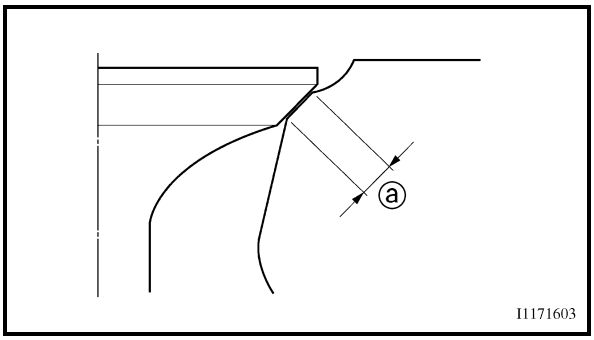


5. Measure:
   • valve stem runout
   Out of specification → Replace.

Runout limit
0.040 mm (0.0016 in)

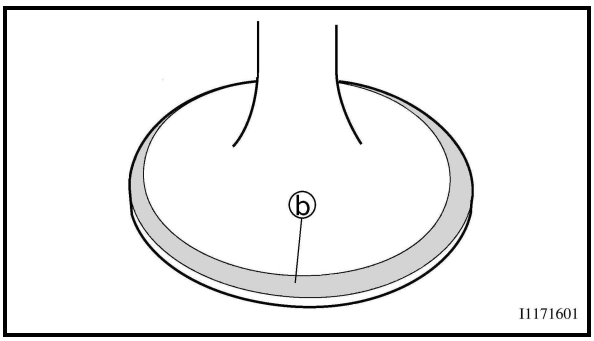
NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

6. Eliminate:
   • carbon deposits
   (from the valve face and valve seat)
7. Check:
   • valve seats
   Pitting/wear → Reface the valve seat.



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

Valve seat width
1.00 ~ 1.20 mm
(0.0394 ~ 0.0472 in)
<Limit>: 1.60 mm (0.0630 in)



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a. Apply Mechanic's blueing dye (Dykem) ⓑ to the valve face.
b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
d. Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.

e. If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

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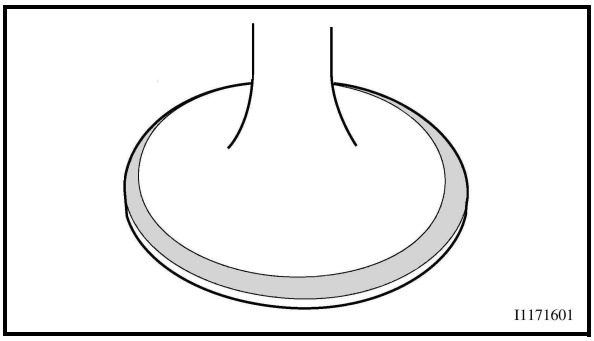
9. Lap:
   - valve face
   - valve seat

NOTE:

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



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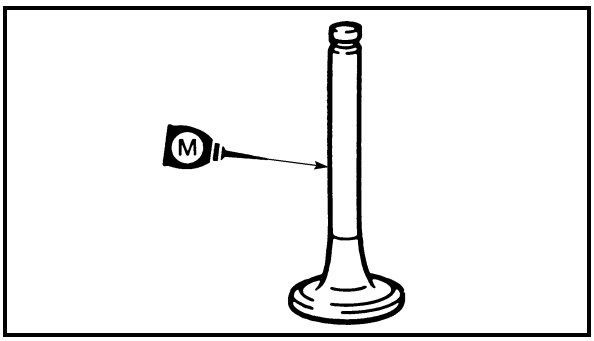
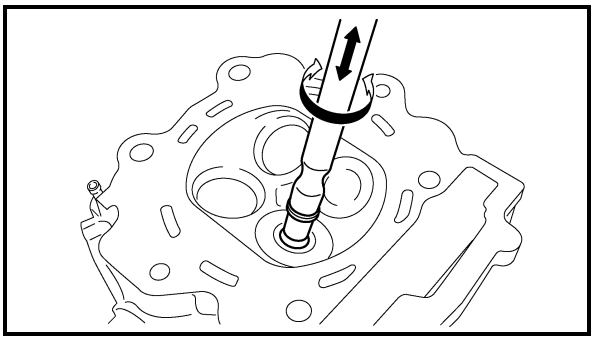
a. Apply a coarse lapping compound to the valve face.

CAUTION:

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



b. Apply molybdenum disulfide oil to the valve stem.
c. Install the valve into the cylinder head.



d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.

NOTE:

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

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

NOTE:

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

f. Apply Mechanic's blueing dye (Dykem) to the valve face.
g. Install the valve into the cylinder head.

h. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
i. Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.

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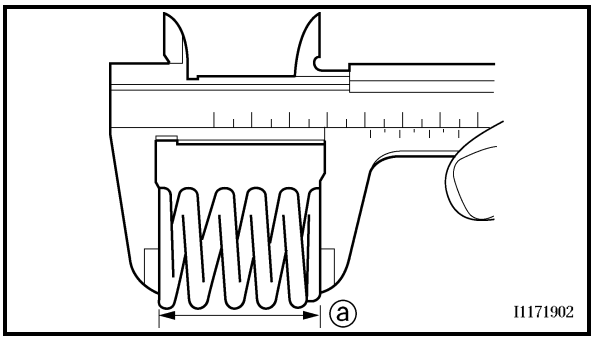
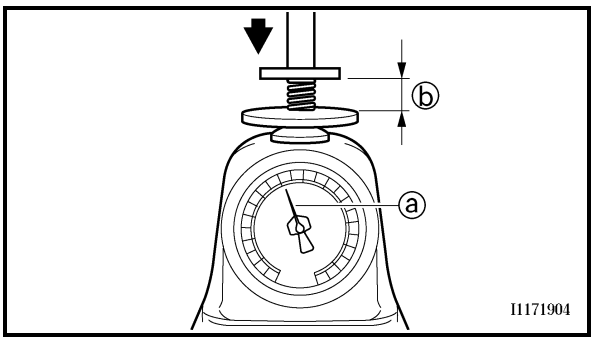


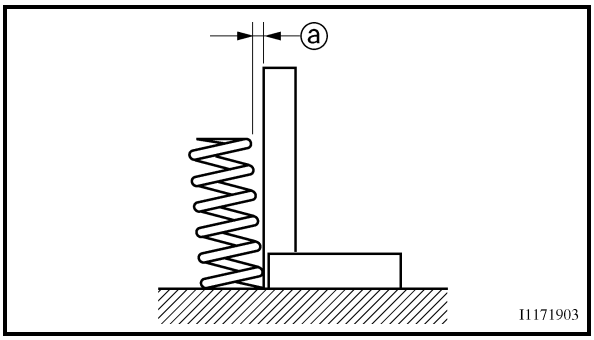
10.Measure:
• valve spring free length ⓐ
Out of specification → Replace.

Valve spring free length
38.79 mm (1.53 in)
<Limit>: 36.85 mm (1.45 in)



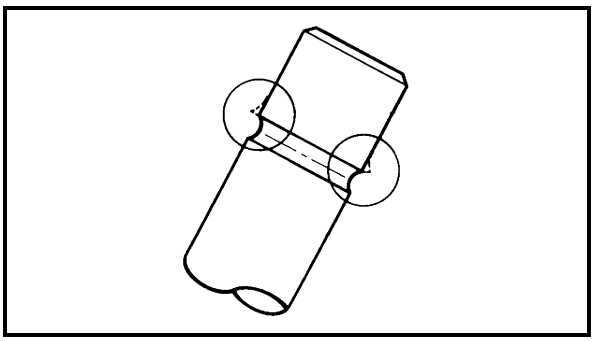
11.Measure:
• compressed spring force ⓐ
Out of specification → Replace.
ⓑ Installed length

Compressed spring force
169.0 ~ 199.0 N at 35.00 mm
(17.23 ~ 20.29 kg at 35.00 mm,
37.99 ~ 44.73 lb at 1.38 in)



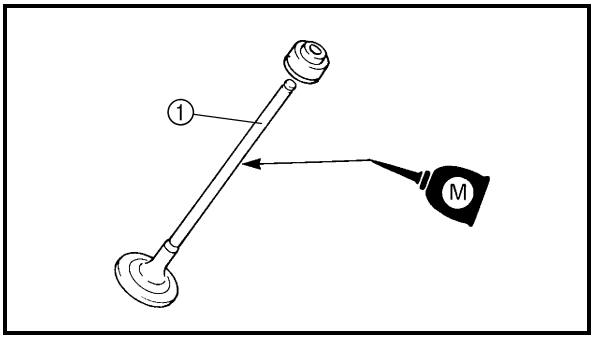
12.Measure:
• spring tilt ⓐ
Out of specification → Replace.

Spring tilt limit
2.5°/1.70 mm (0.067 in)



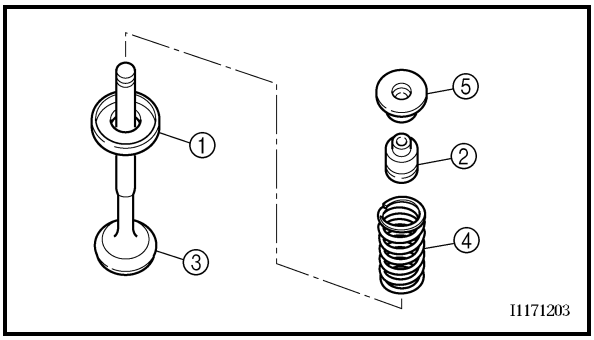
EBS00241
INSTALLING THE VALVES AND VALVE SPRINGS

The following procedure applies to all of the valves and related components.
1. Deburr:
• valve stem end
(with an oil stone)



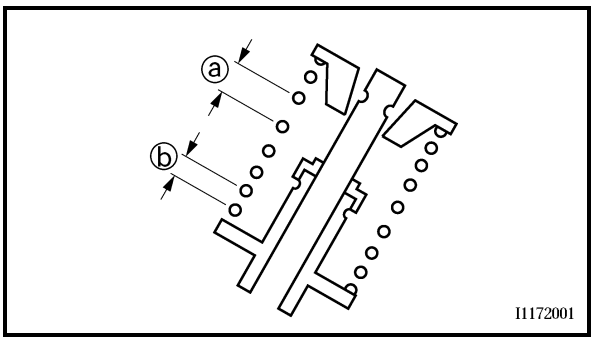
2. Lubricate:
   - valve stem ①
     (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**

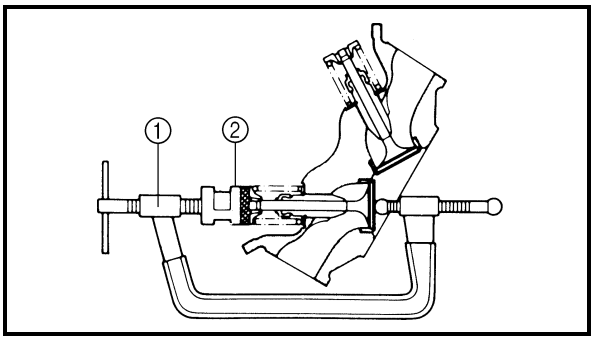


3. Install:
   - valve spring seats ①
   - valve stem seals ②
   - valves ③
   - valve springs ④
   - valve spring retainers ⑤

NOTE:
Install the valve springs with the larger pitch ⓐ facing upwards.



ⓑ Smaller pitch



4. Install:
   - valve cotters

NOTE:
Install the valve cotters while compressing the valve spring with the valve spring compressor ① and attachment ②.

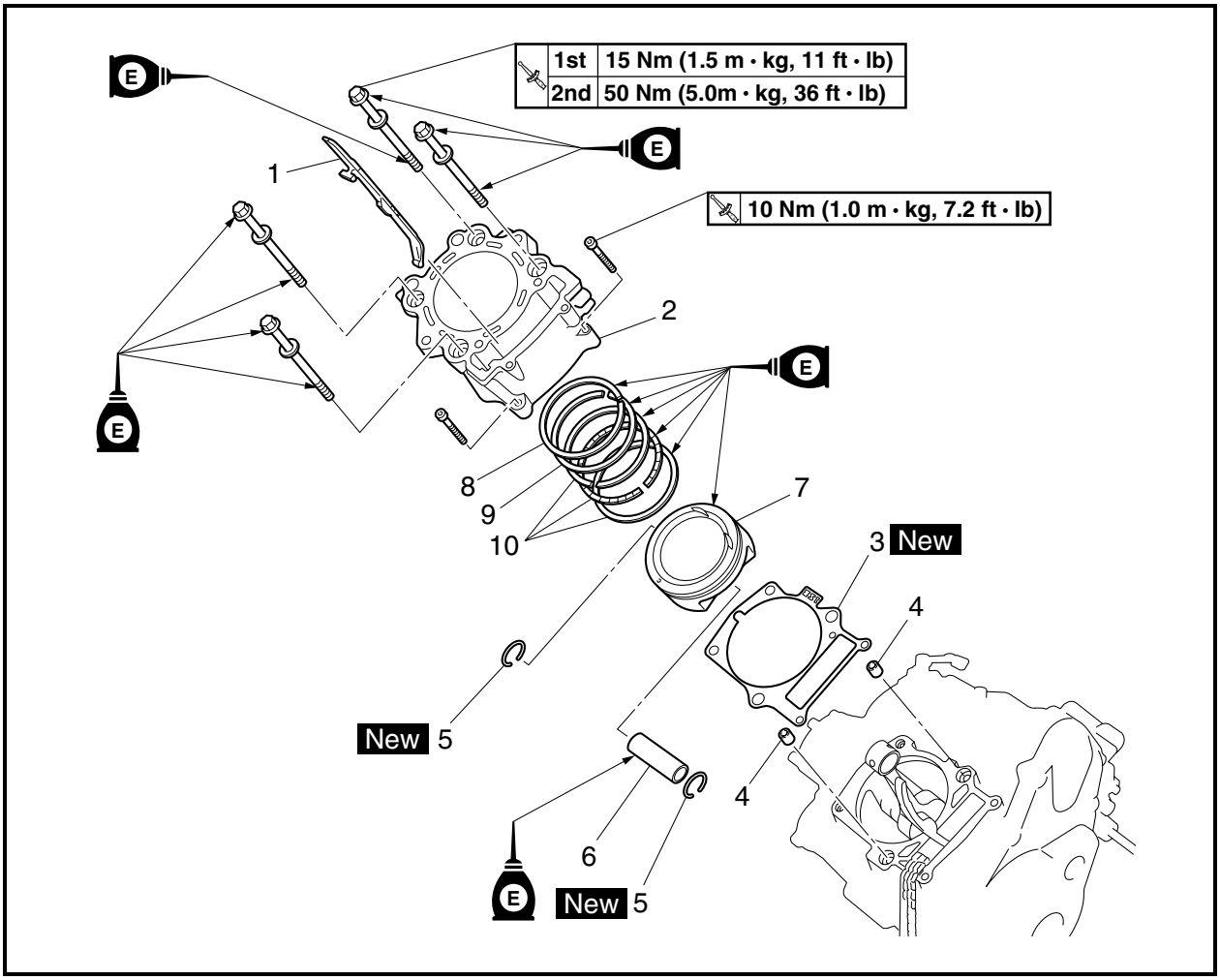
	Valve spring compressor **90890-04019, YM-04019** **Valve spring compressor attachment** **90890-01243** **Valve spring compressor adapter (26 mm)** **YM-01253-1**

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

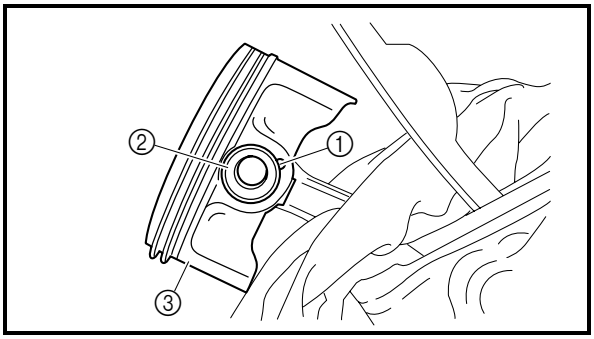
CAUTION:

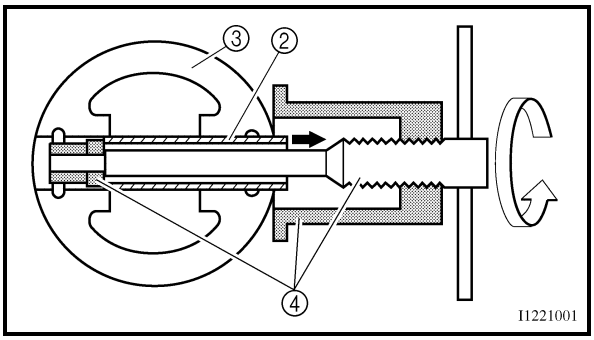
Hitting the valve tip with excessive force could damage the valve.

EBS00245
CYLINDER AND PISTON



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder and piston		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
	Water jacket joint		Refer to "WATER PUMP" in chapter 5.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	Refer to "INSTALLING THE PISTON AND CYLINDER".
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON AND CYLINDER".
6	Piston pin	1	
7	Piston	1	
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	
			For installation, reverse the removal procedure.





EBS00247
REMOVING THE PISTON

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

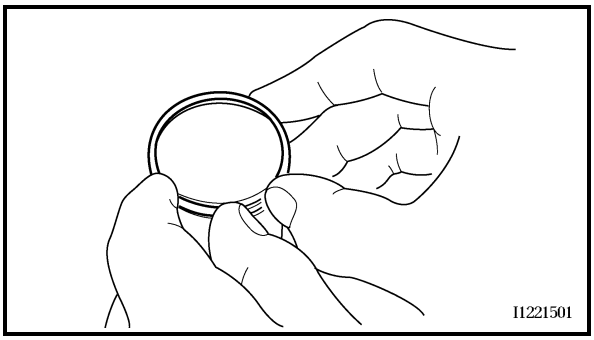
NOTE:

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip grooves and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set ④.

Piston pin puller set
90890-01304
Piston pin puller
YU-01304

CAUTION:

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



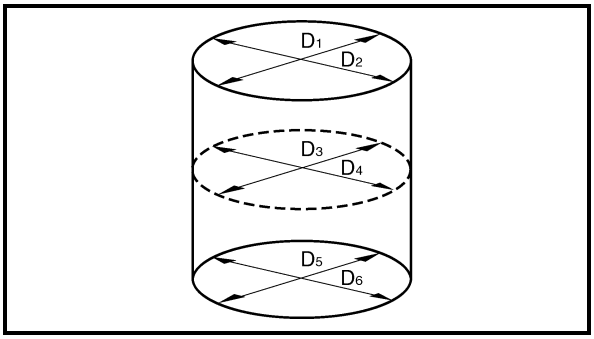
2. Remove:
   - piston rings

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.

EBS00249
CHECKING THE CYLINDER AND PISTON

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



2. Measure:
   • piston-to-cylinder clearance

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a. Measure the cylinder bore "C" with a cylinder bore gauge.

NOTE:

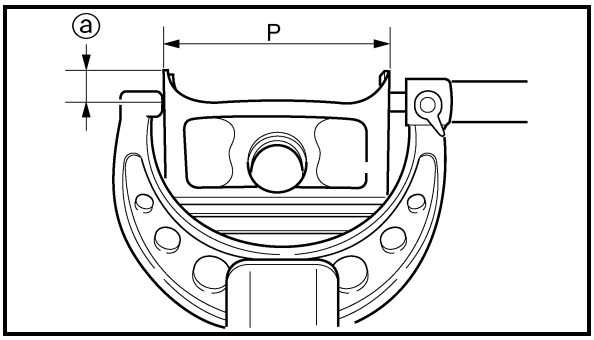
Measure the cylinder bore "C" in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

Cylinder bore "C"	**102.000 ~ 102.010 mm (4.0157 ~ 4.0161 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)	

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

c. Measure piston skirt diameter "P" with the micrometer.

ⓐ 10 mm (0.39 in) from the bottom edge of the piston



Piston size "P"	
Standard	**101.955 ~ 101.970 mm (4.0140 ~ 4.0146 in)**

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

e. Calculate the piston-to-cylinder clearance with the following formula.

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

Piston-to-cylinder clearance
0.030 ~ 0.055 mm
(0.0012 ~ 0.0022 in)
<Limit>: 0.13 mm (0.051 in)

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

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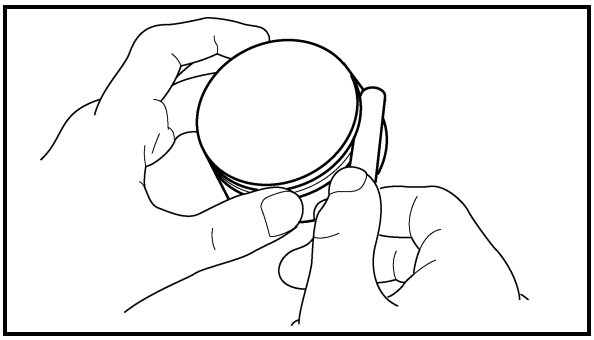


EBS00250

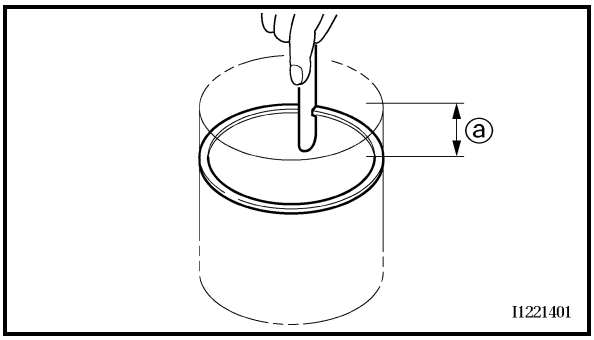
CHECKING THE PISTON RINGS

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

NOTE:

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

Piston ring side clearance
Top ring
0.030 ~ 0.070 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.12 mm (0.0047 in)
2nd ring
0.030 ~ 0.070 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.13 mm (0.0051 in)



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

NOTE:

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

ⓐ 50 mm (1.97 in)

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

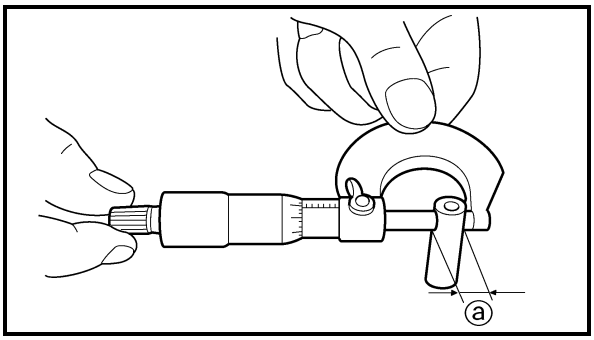
NOTE:

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

Piston ring end gap
Top ring
0.20 ~ 0.35 mm
(0.008 ~ 0.014 in)
<Limit>: 0.60 mm (0.024 in)
2nd ring
0.75 ~ 0.90 mm
(0.030 ~ 0.035 in)
<Limit>: 1.25 mm (0.049 in)
Oil ring
0.20 ~ 0.70 mm
(0.008 ~ 0.028 in)

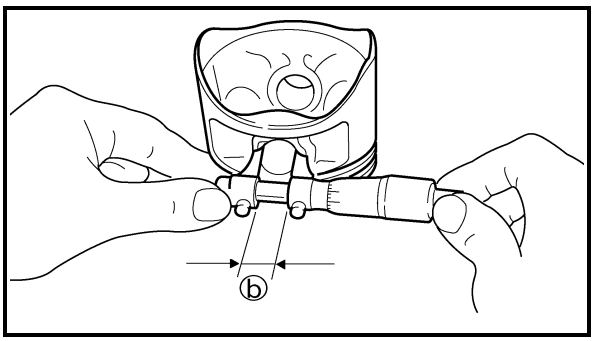
EBS00251
CHECKING THE PISTON PIN

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



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

Piston pin outside diameter
22.991 ~ 23.000 mm
(0.9052 ~ 0.9055 in)
<Limit>: 22.971 mm (0.9044 in)



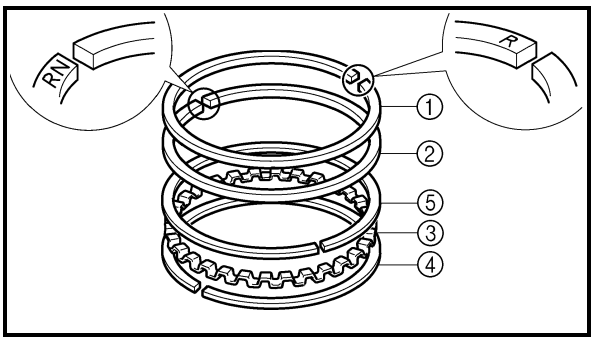
3. Measure:
   - piston pin bore inside diameter ⓑ
     Out of specification → Replace the piston.

Piston pin bore inside diameter
23.004 ~ 23.015 mm
(0.9057 ~ 0.9061 in)
<Limit>: 23.045 mm (0.9073 in)

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

Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter ⓑ – Piston pin outside diameter ⓐ

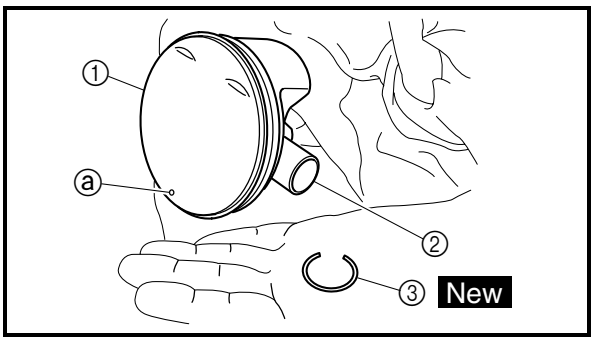
Piston-pin-to-piston clearance
0.004 ~ 0.024 mm
(0.0002 ~ 0.0009 in)
<Limit>: 0.074 mm (0.0029 in)



EBS00252
INSTALLING THE PISTON AND CYLINDER

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

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



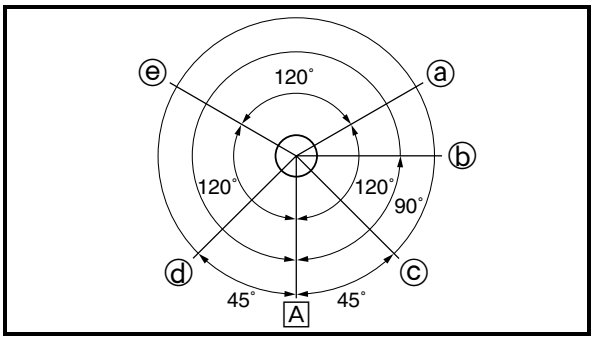
2. Install:
   - piston ①
   - piston pin ②
   - piston pin clips ③ New

NOTE:
- Apply engine oil to the piston pin.
- Make sure the punch mark ⓐ on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.

3. Install:
   - cylinder gasket New
   - dowel pins
4. Lubricate:
   - piston
   - piston rings
   - cylinder

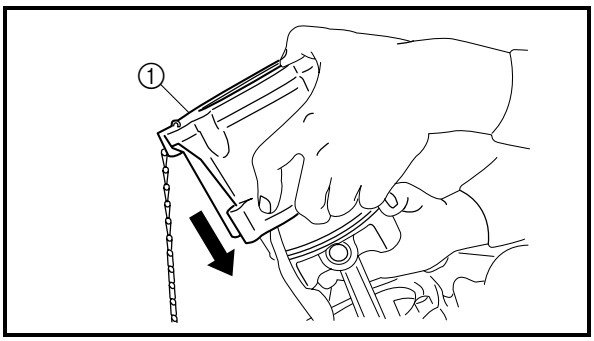
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**



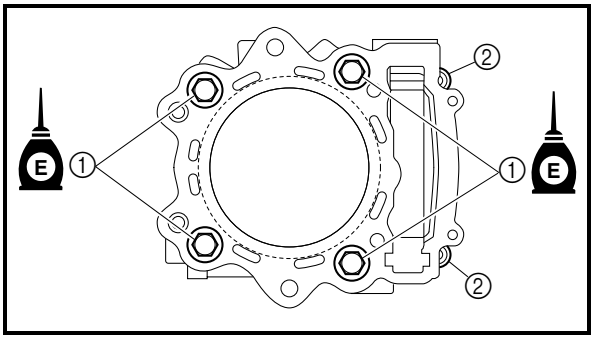
5. Offset:
   - piston ring end gaps

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



6. Install:
   - cylinder ①
   - timing chain guide (exhaust side)

NOTE:
- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

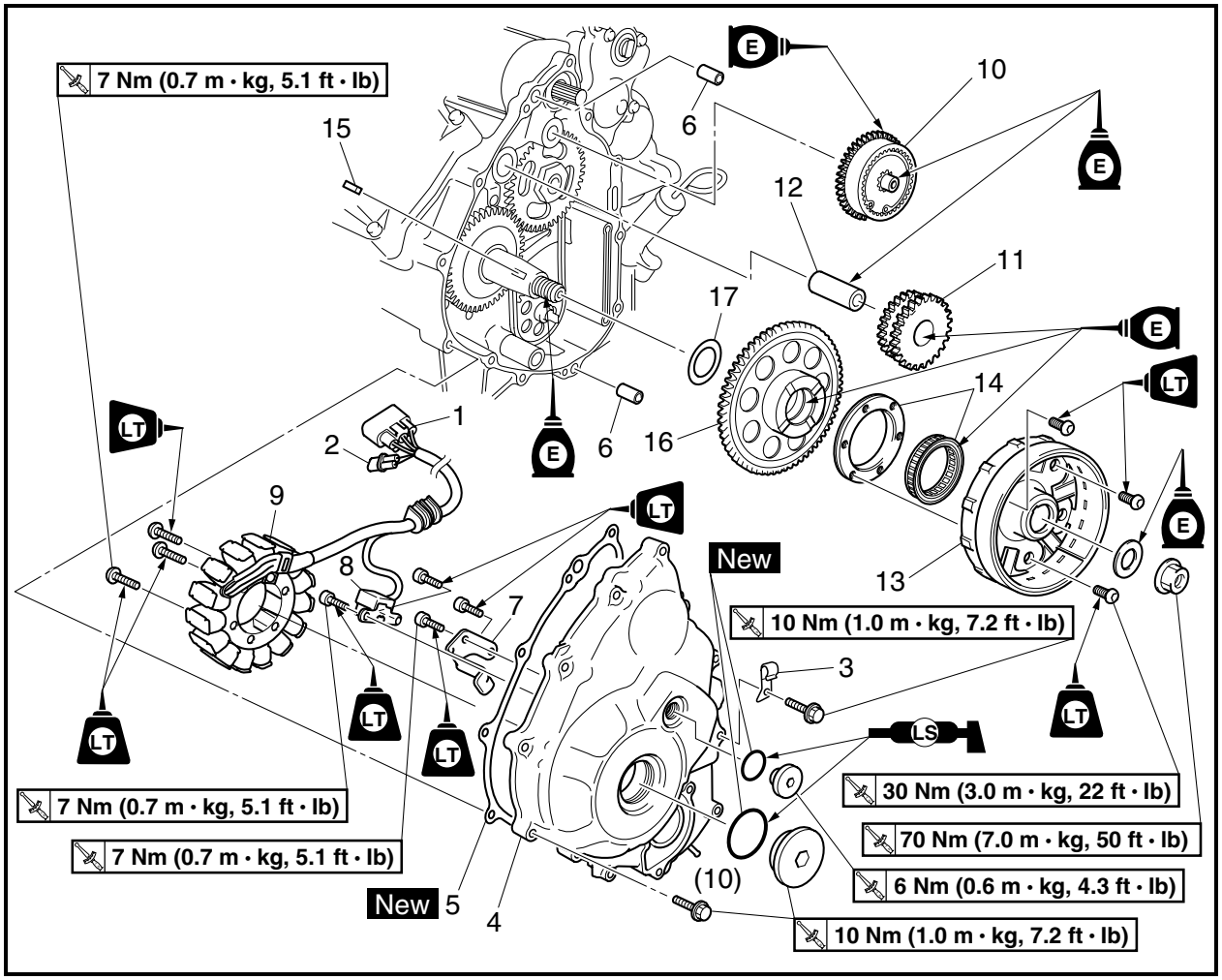


7. Install:
   • cylinder bolts

NOTE:
Lubricate the cylinder bolt ① threads and mating surface with engine oil.

8. Tighten:
   • cylinder bolts ① (1st)
     15 Nm (1.5 m · kg, 11 ft · lb)
   • cylinder bolts ① (2nd)
     50 Nm (5.0 m · kg, 36 ft · lb)
   • cylinder bolts (timing chain side) ②
     10 Nm (1.0 m · kg, 7.2 ft · lb)

EBS00256
AC MAGNETO



Order	Job/Part	Q'ty	Remarks
	Removing the AC magneto		Remove the parts in the order listed.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Left footrest board		Refer to "FOOTREST BOARDS" in chapter 3.
	Select lever unit		Refer to "SELECT LEVER UNIT".
	Water pump		Refer to "WATER PUMP" in chapter 5.
1	AC magneto coupler	1	Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Lead holder	1	Refer to "REMOVING THE AC MAGNETO ROTOR" and "INSTALLING THE AC MAGNETO ROTOR".
4	AC magneto cover	1	