YAMAHA

OWNER'S SERVICE MANUAL

YZF-R7

5FL-28199-E0

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EC010010

YZF-R7
OWNER'S SERVICE MANUAL
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1st Edition, December 1998
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Printed in Japan

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EAU00001

INTRODUCTION

Welcome to the Yamaha world of motorcycling!

As the owner of a YZF-R7, you are benefiting from Yamaha's vast experience in and newest technology for the design and the manufacture of high-quality products, which have earned Yamaha a reputation for dependability.

Please take the time to read this manual thoroughly, so as to enjoy all your YZF-R7's advantages. The owner's service manual does not only instruct you in how to operate, inspect and basic maintain your motorcycle, but also in how to safeguard yourself and others from trouble and injury.

In addition, the many tips given in this manual will help to keep your motorcycle in the best possible condition. If you have any further questions, do not hesitate to contact your Yamaha dealer.

The Yamaha team wishes you many safe and pleasant rides. So, remember to put safety first!

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EC050000

TO THE NEW OWNER

This manual will provide you with a good basic understanding of features, operation, and basic maintenance and inspection items of this motorcycle. Please read this manual carefully and completely before operating your new motorcycle. If you have any questions regarding the operation or maintenance of your motorcycle, please consult your Yamaha dealer.

NOTE:

This manual should be considered a permanent part of this motorcycle and should remain with it even if the motorcycle is subsequently sold.

EC060000

NOTICE

Some data in this manual may become outdated due to improvements made to this model in the future. If there is any question you have regarding this manual or your motorcycle, please consult your Yamaha dealer.

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EC080000

HOW TO USE THIS MANUAL

EC081000

PARTICULARLY IMPORTANT INFORMATION

⚠

The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING

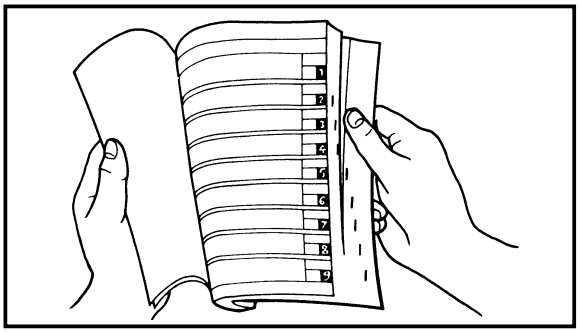
Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the motorcycle.

CAUTION:

A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.

NOTE:

A NOTE provides key information to make procedures easier or clearer.



EC082000

FINDING THE REQUIRED PAGE

1. This manual consists of eight chapters; "General Information", "Specifications", "Periodic checks and adjustments", "Engine", "Cooling system", "Electronic fuel injection", "Chassis", "Electrical".
2. The table of contents is at the beginning of the manual. Look over the general layout of the book before finding the required chapter and item.
   Bend the book at its edge, as shown, to find the required fore edge symbol mark and go to a page for required item and description.

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EC083000
MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been complied to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.

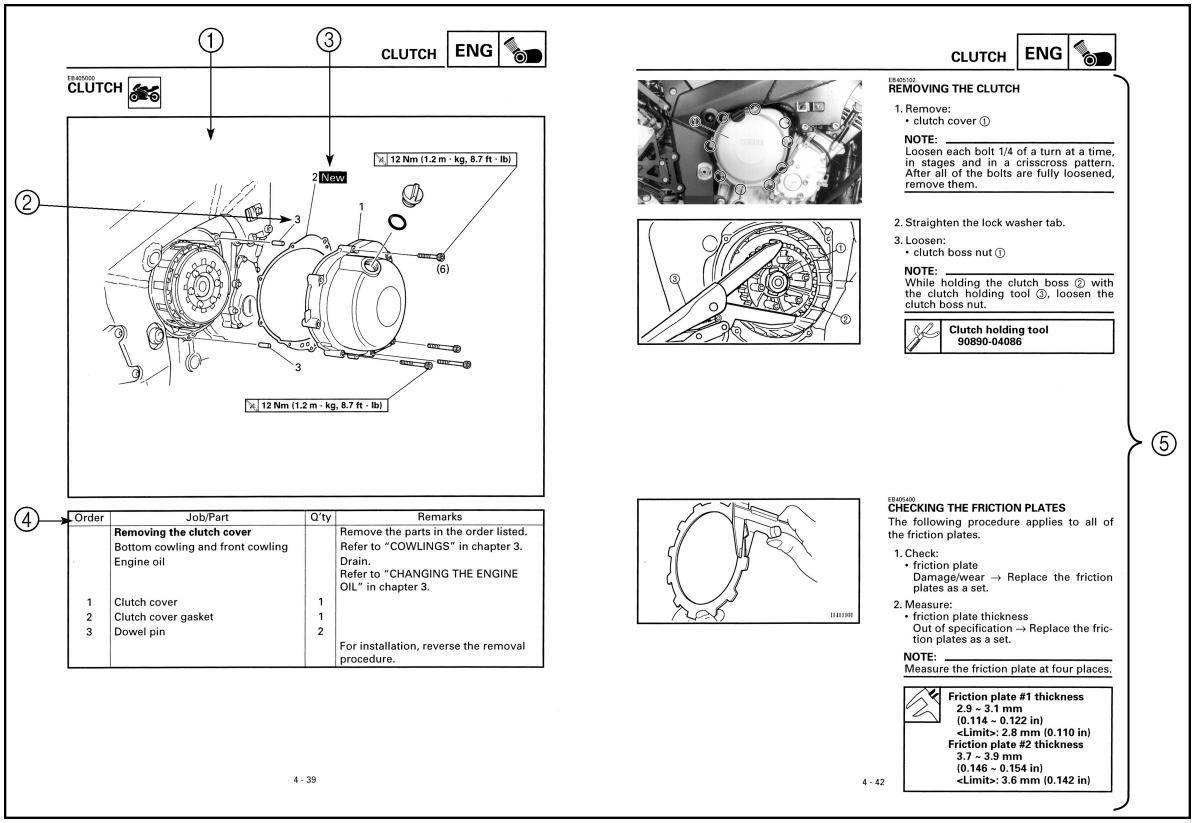
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

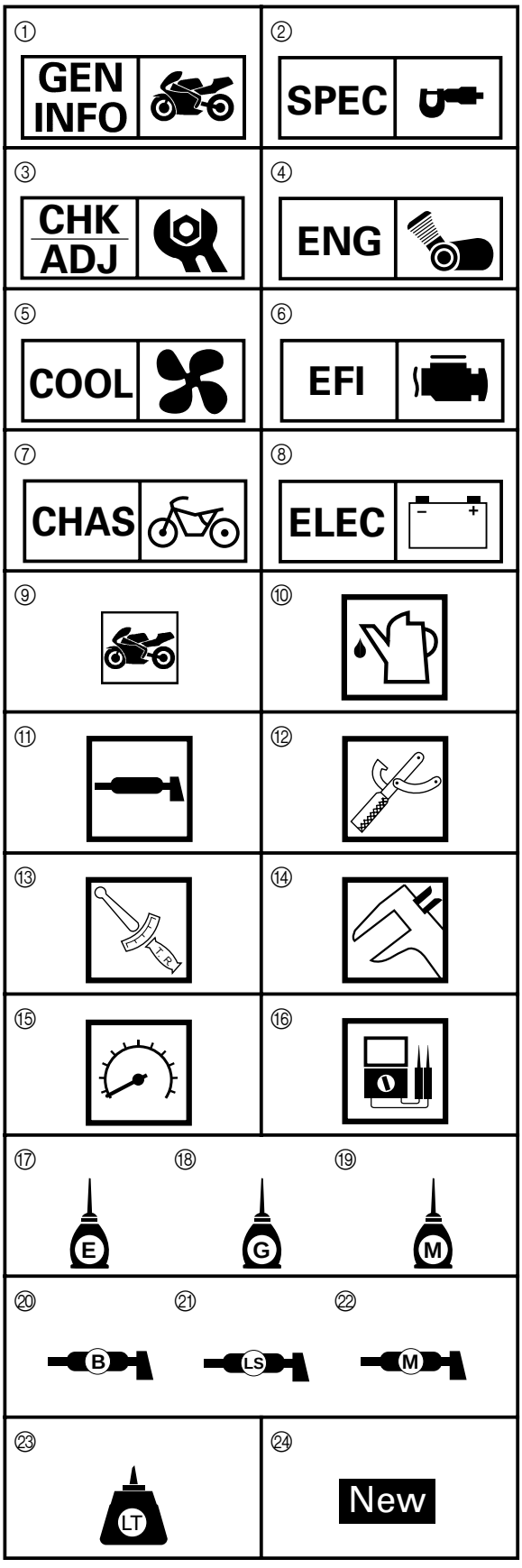
EC084002
HOW TO READ DESCRIPTIONS

To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ① is provided for removal and disassembly jobs.
2. Numbers ② are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ③. The meanings of the symbol marks are given on the next page.
4. A job instruction chart ④ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
5. For jobs requiring more information, the step-by-step format supplements ⑤ are given in addition to the exploded diagram and job instruction chart.



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SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑨ indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Overhauling the engine
⑤ Cooling system
⑥ Electronic fuel injection
⑦ Chassis
⑧ Electrical

Symbols ⑨ to ⑯ indicate the following.

⑨ Serviceable with engine mounted
⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Tightening torque
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Electrical data

Symbols ⑰ to ㉒ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑰ Engine oil
⑱ Gear oil
⑲ Molybdenum disulfide oil
⑳ Wheel bearing grease
㉑ Lithium soap base grease
㉒ Molybdenum disulfide grease

Symbols ㉓ to ㉔ in the exploded diagrams indicate the following.

㉓ Apply locking agent (LOCTITE®)
㉔ Replace the part

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GENERAL INFORMATION

GIVE SAFETY THE RIGHT OF WAY

Motorcycles are fascinating vehicles, which can give you an unsurpassed feeling of power and freedom. However, they also impose certain limits, which you must accept; even the best motorcycle does not ignore the laws of physics.

Regular care and maintenance are essential for preserving your motorcycle's value and operating condition. Moreover, what is true for the motorcycle is also true for the rider: good performance depends on being in good shape. Riding under the influence of medication, drugs and alcohol is, of course, out of the question. Motorcycle riders – more than car drivers – must always be at their mental and physical best. Under the influence of even small amounts of alcohol, there is a tendency to take dangerous risks.

Protective clothing is as essential for the motorcycle rider as seat belts are for car drivers and passengers. Always wear a complete motorcycle suit (whether made of leather or tear-resistant synthetic materials with protectors), sturdy boots, motorcycle gloves and a properly fitting helmet. Optimum protective wear, however, should not encourage carelessness. Though full-coverage helmets and suits, in particular, create an illusion of total safety and protection, motorcyclists will always be vulnerable. Riders who lack critical self-control run the risk of going too fast and are apt to take chances. This is even more dangerous in wet weather. The good motorcyclist rides safely, predictably and defensively – avoiding all dangers, including those caused by others.

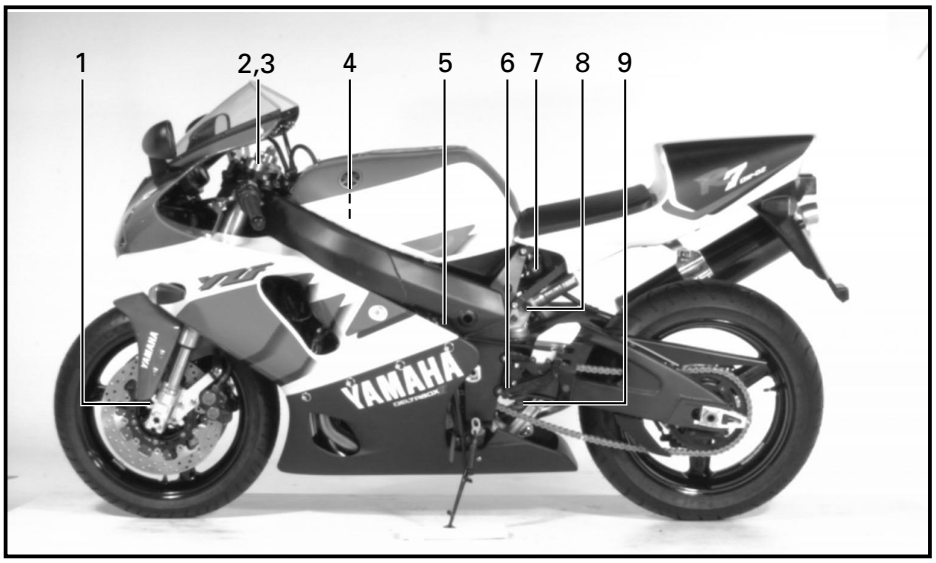
Enjoy your ride!

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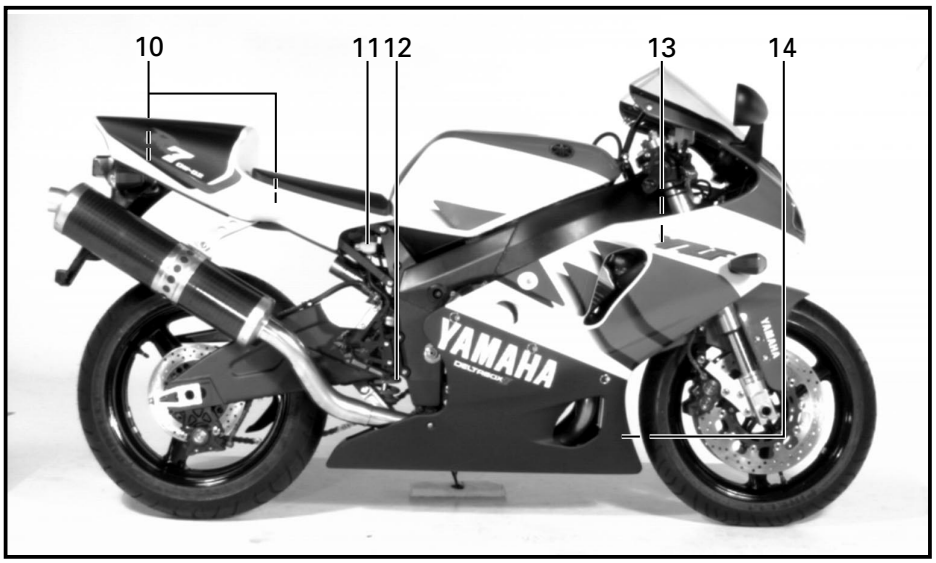
DESCRIPTION

Left view

1



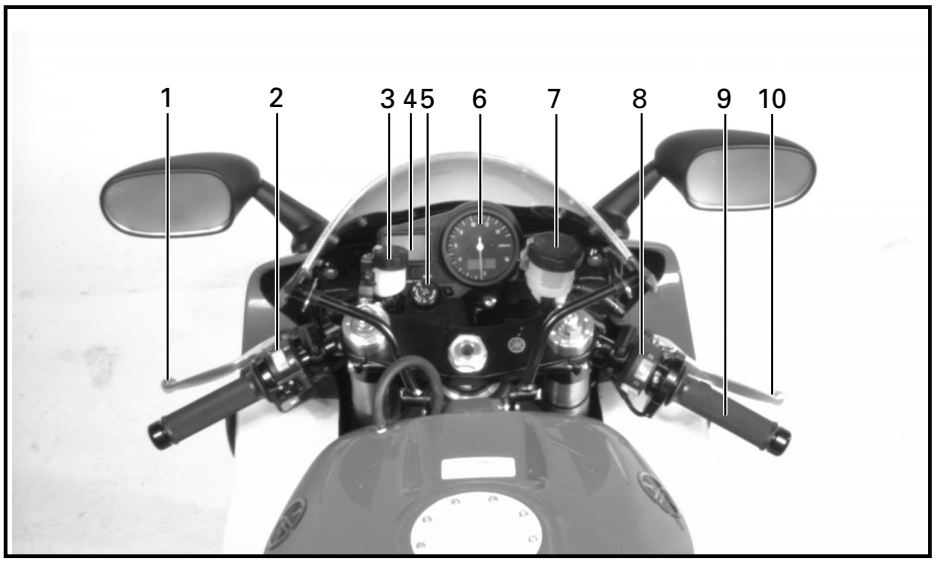
Right view



1. Front fork compression damping force adjusting screw
2. Front fork rebound damping force adjusting screw
3. Front fork spring preload adjusting bolt
4. Air filter
5. Starter (choke) "⎸↘⎸"
6. Shift pedal
7. Rear shock absorber spring preload adjusting ring
8. Rear shock absorber compression damping force adjusting screw
9. Rear shock absorber rebound damping force adjusting screw
10. Fuses
11. Rear brake resorvoir
12. Rear brake pedal
13. Radiator cap and coolant reservoir tank cap
14. Engine oil filter

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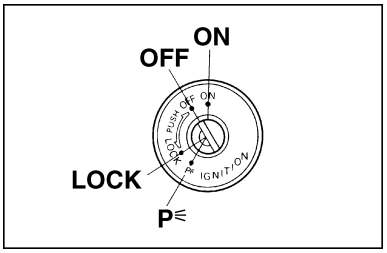
Controls/Instruments



1. Clutch lever
2. Left handlebar switches
3. Clutch reservoir
4. Digital speedometer
5. Main switch
6. Tachometer
7. Front brake reservoir
8. Right handlebar switches
9. Throttle grip
10. Front brake lever

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INSTRUMENT AND CONTROL FUNCTIONS



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Main switch/Steering lock

The main switch controls the ignition and lighting systems. Its operation is described below.

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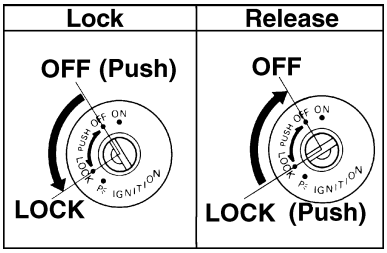
ON

Electrical circuits are switched on. The engine can be started. The key cannot be removed in this position.

EAU00038

OFF

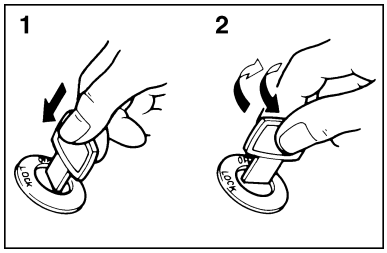
All electrical circuits are switched off. The key can be removed in this position.



EAU00040

LOCK

The steering is locked in this position and all electrical circuits are switched off. The key can be removed in this position. To lock the steering, turn the handlebars all the way to the left. While pushing the key into the main switch, turn it from "OFF" to "LOCK" and remove it. To release the lock, turn the key to "OFF" while pushing.



1. Push
2. Turn

EW000016

⚠ WARNING

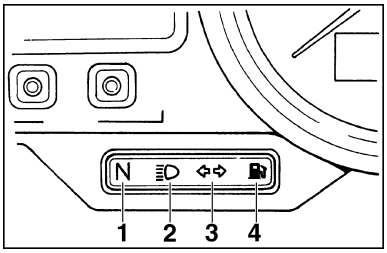
Never turn the key to "OFF" or "LOCK" when the motorcycle is moving. The electrical circuits will be switched off which may result in loss of control or an accident. Be sure the motorcycle is stopped before turning the key to "OFF" or "LOCK".

EAU01574

P⋜ (Parking)

The steering is locked in this position, and the taillights and auxiliary lights come on, but all other circuits are off. The key can be removed in this position.

To use the parking position, first lock the steering, then turn the key to "P⋜". Do not use this position for an extended length of time as the battery may discharge.



1. Neutral indicator light "N"
2. High beam indicator light "≡D"
3. Turn indicator light "⇦ ⇨"
4. Fuel indicator light "⛽"

EAU00056

Indicator lights

EAU00061

Neutral indicator light "N"

This indicator comes on when the transmission is in neutral.

EAU00063

High beam indicator light "≡D"

This indicator comes on when the headlight high beam is used.

EAU00057

Turn indicator light "⇦ ⇨"

This indicator flashes when the turn switch is moved to the left or right.

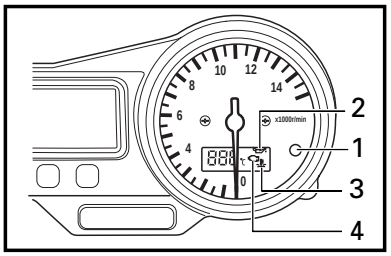
EAU01154

Fuel indicator light "⛽"

When the fuel level drops below approximately 4.8 L, this light will come on. When this light comes on, fill the tank at the first opportunity. This light circuit can be checked by the procedure on page 1-7.

If there is a shortcircuit or discontinuity at the thermistor, the fuel indicator light will flash 8 times and then stay off for 3 seconds repeatedly.

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1. Warning light
2. Oil level symbol “ ”
3. Coolant temperature symbol “ ”
4. Engine trouble symbol “ ”

EAU01564

Warning light

This indicator light has three functions.

- The light will come on and symbol “ ” will flash if the engine oil level is low.
  If this symbol flashes, stop the engine immediately and fill it with oil to the specified level.
- The light will come on and symbol “ ” will flash if trouble occurs in a monitoring circuit. In such a case, take the motorcycle to a Yamaha dealer to have the self-diagnostic systems checked.
- The light will come on and symbol “ ” will flash if the coolant temperature is too high. The following chart shows the conditions of the indicator light, symbol and temperature display in accordance to coolant temperature.

The light circuit can be checked by the procedure on page 1-6.

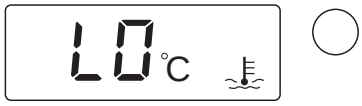
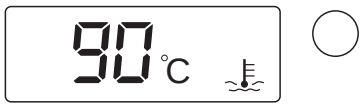
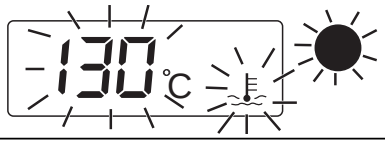
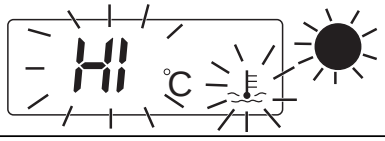
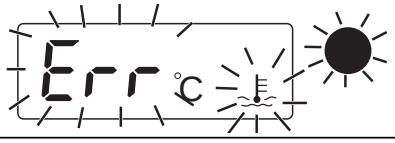
EC000118

CAUTION:

- **Do not run the motorcycle until you know it has sufficient engine oil.**
- **Do not run the motorcycle if the engine is overheated.**

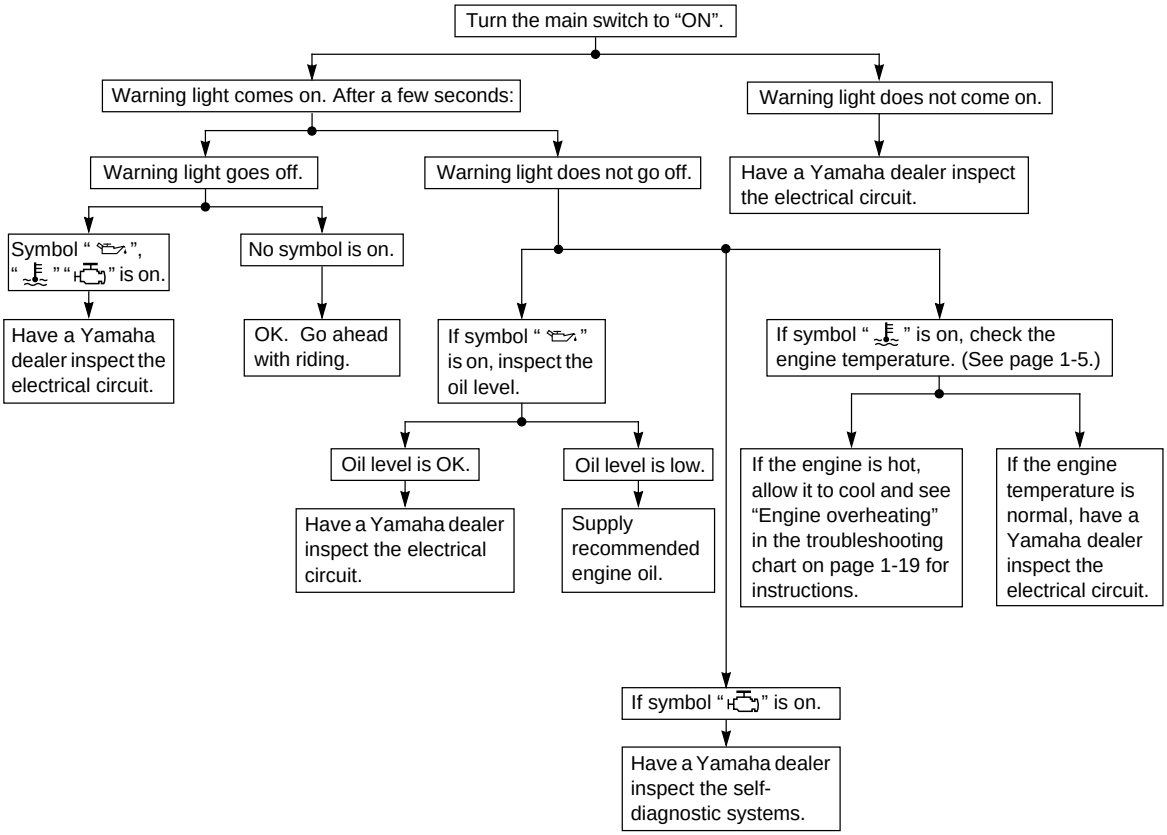
NOTE:

Even if the oil is filled to the specified level, the indicator light may flicker when riding on a slope or during sudden acceleration or deceleration, but this is normal.

Coolant temperature	Display	Conditions	What to do
~ 39 ˚C		Symbol is on and “LO” is displayed.	OK. Go ahead with riding.
40 ˚C ~ 120 ˚C		Symbol is on and temperature is displayed.	OK. Go ahead with riding.
121 ˚C ~ 139 ˚C		Symbol and temperature flash. Warning light comes on.	Stop the motorcycle and allow it to idle until coolant temperature goes down. If the temperature does not go down, stop the engine.
140 ˚C ~		Symbol and message “HI” flash. Warning light comes on.	Stop the engine and allow it to cool. Seen page 1-19 if the engine overheats.
—		Symbol and message “Err” flash. Warning light comes on.	Ask a Yamaha dealer to inspect the motorcycle.

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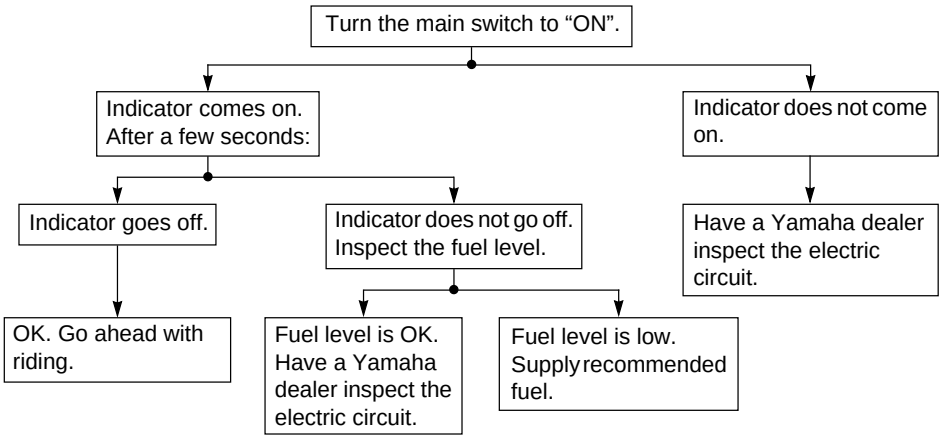
Warning light circuit check

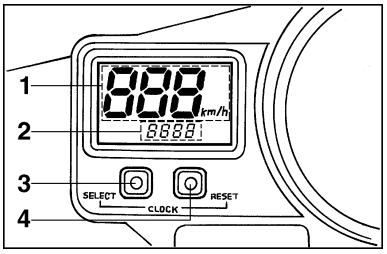


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EAU01295

Fuel indicator light circuit check





1. Speedometer
2. Clock, odometer
3. “SELECT” button
4. “RESET” button

EAU01601

Digital speedometer

This speedometer is equipped with:

- an odometer
- two trip odometers
- a fuel reserve trip meter
- a clock

NOTE:

For UK models only:

To change the speedometer display from kilometers to miles, press the “SELECT” button for at least two seconds.

Odometer and trip meter modes

Use the trip meters to estimate how far you can ride on a tank of fuel.

Use the fuel reserve trip meter to see the distance traveled from when the fuel level dropped to the reserve level.

Selecting a mode

Push the “SELECT” button to change between the odometer mode “ODO” and the trip odometer modes “TRIP 1” and “TRIP 2” in the following order:

“ODO” → “TRIP 1” → “TRIP 2” → “ODO”

If the fuel level indicator light comes on the odometer display will automatically change to the fuel reserve trip meter mode “TRIP F” and start counting the distance traveled from that point. Push the “SELECT” button to change between the fuel odometer, trip odometer and odometer modes in the following order:

“TRIP F” → “TRIP 1” → “TRIP 2” → “ODO” → “TRIP F”

Resetting a meter

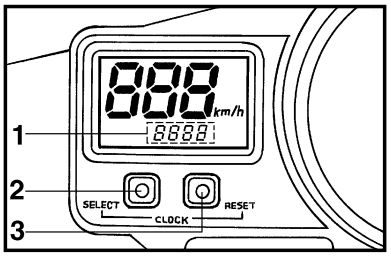
To reset a trip odometer to 0.0, select it by pushing the “SELECT” button and push the “RESET” button for at least one second.

To reset the fuel reserve trip meter, select it by pushing the “SELECT” button and push the “RESET” button for at least one second. The display will return to “TRIP 1”. If you do not reset the fuel reserve trip meter manually, it will automatically reset and return to “TRIP 1” after refueling and the motorcycle has traveled 5 km (3.1 miles).

NOTE:

After the fuel reserve trip meter is reset, the display always returns to the “TRIP 1” mode. If “TRIP 2” was being used before the fuel reserve trip meter is reset, be sure to push the “SELECT” button to change back to the “TRIP 2” mode.

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1. Clock, odometer
2. "SELECT" button
3. "RESET" button

Clock mode

To change the display to the clock mode, push both the "SELECT" and "RESET" buttons.

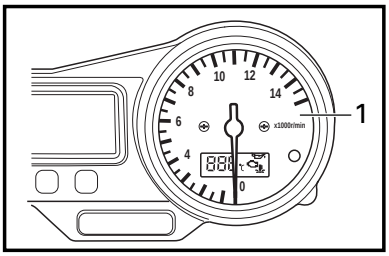
To change the display back to the odometer mode, push the "RESET" button.

To set the clock

1. Push both the "SELECT" and "RESET" buttons for at least two seconds.
2. When the hour digits start flashing, push the "RESET" button to set the hours.
3. Push the "SELECT" button to change the minutes.
4. When the minute digits start flashing, push the "RESET" button to set the minutes.
5. Push the "SELECT" button to start the clock.

NOTE:

After setting the clock, be sure to push the "SELECT" button before turning the main switch to "OFF", otherwise the clock will not be set.



1. Tachometer

EAU00101

Tachometer

This model is equipped with an electric tachometer so the rider can monitor the engine speed and keep it within the ideal power range.

EC000003

CAUTION:

Do not operate at 13,800 r/min and above.

Diagnosis device

This model is equipped with a self diagnosis.

Refer to "ELECTRICAL CONTROL SYSTEM USER MODE" in chapter 8.

If some trouble should occur in an electrical circuit the tachometer will repeatedly display change in r/min.

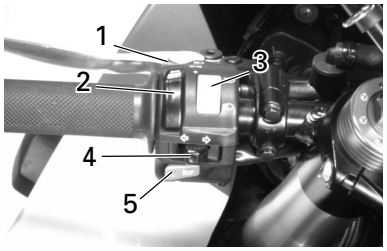
If this occurs take your motorcycle to a Yamaha dealer for repair.

EC000004

CAUTION:

To prevent engine damage, be sure to consult a Yamaha dealer as soon as possible if the tachometer displays a repeated change in rpm.

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1. Pass switch “PASS”
2. Lights switch
3. Dimmer switch
4. Turn signal switch
5. Horn switch “ ”

EAU00118

Handlebar switches

EAU00120

Pass switch “PASS”

Press the switch to operate the passing light.

EAU00134

Lights switch

Turning the lights switch to “ ”, turns on the auxiliary light, meter lights and taillight. Turning the lights switch to “ ”, turns the headlight on also.

EAU00121

Dimmer switch

Turn the switch to “ ” for the high beam and to “ ” for the low beam.

EAU00127

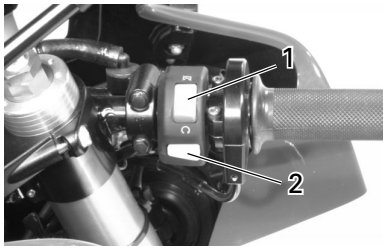
Turn signal switch

To signal a right-hand turn, push the switch to “ ”. To signal a left-hand turn, push the switch to “ ”. Once the switch is released it will return to the center position. To cancel the signal, push the switch in after it has returned to the center position.

EAU00129

Horn switch “ ”

Press the switch to sound the horn.



1. Engine stop switch
2. Start switch “ ”

EAU00138

Engine stop switch

The engine stop switch is a safety device for use in an emergency such as when the motorcycle overturns or if trouble occurs in the throttle system. Turn the switch to “ ” to start the engine. In case of emergency, turn the switch to “ ” to stop the engine.

EAU00143

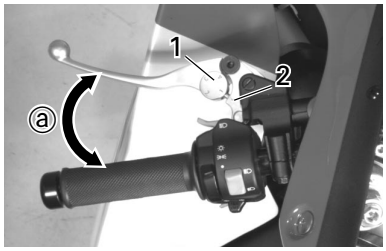
Start switch “ ”

The starter motor cranks the engine when pushing the start switch.

EC000005

CAUTION:

See starting instructions prior to starting the engine.



1. Lever position adjusting dial
2. Arrow mark
a. Lever distance

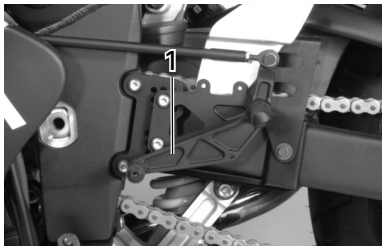
EAU00153

Clutch lever

The clutch lever is located on the left handlebar. It is equipped with a clutch lever adjusting dial and a clutch switch, which is integrated into the ignition circuit cut-off system. (Refer to the engine starting procedures for a description of this system.) To disengage the clutch, pull the clutch lever toward the handlebar. To engage the clutch, release the lever. The lever should be pulled rapidly and released slowly for smooth clutch operation.

To adjust the distance between the clutch lever and the handlebar grip, turn the clutch adjusting dial while pushing the lever forward. Make sure the setting on the clutch lever adjusting dial is aligned with the arrow mark.

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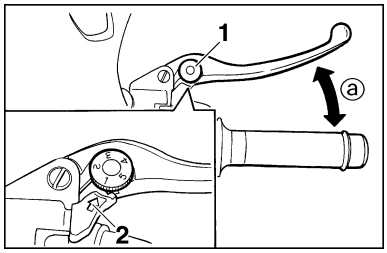


1. Shift pedal

EAU00157

Shift pedal

This motorcycle is equipped with a constant-mesh 6-speed transmission.
The shift pedal is located on the left side of the engine and is used in combination with the clutch when shifting.

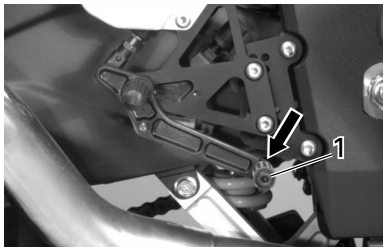


1. Lever position adjusting dial
2. Arrow mark
a. Lever distance

EAU00161

Front brake lever

The front brake lever is located on the right handlebar and is equipped with a brake lever adjusting dial.
To activate the front brake, pull the lever toward the handlebar.
To adjust the front brake lever position, turn the brake lever adjusting dial while pulling the lever forward. Make sure the setting on the brake lever adjusting dial is aligned with the arrow mark.

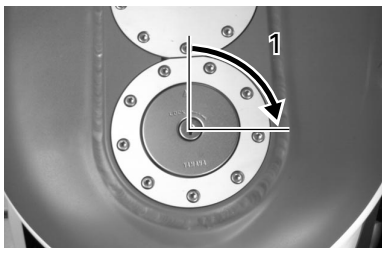


1. Rear brake pedal

EAU00162

Rear brake pedal

The rear brake pedal is on the right side of the motorcycle. Press down on the brake pedal to apply the rear brake.



1. Open

EAU00172

Fuel tank cap

To open

Insert the key and turn it 1/4 turn clockwise. The lock will be released and the cap can be opened.

To close

Push the tank cap into position with the key inserted. To remove the key, turn it counterclockwise to the original position.

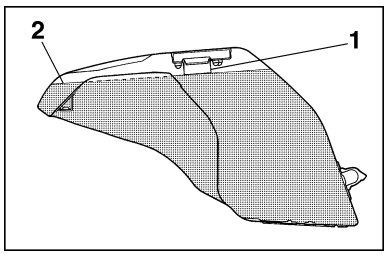
NOTE:

This tank cap cannot be closed unless the key is in the lock. The key cannot be removed if the cap is not locked properly.

EW000023

⚠ WARNING

Be sure the cap is properly installed and locked in place before riding the motorcycle.



1. Filler tube
2. Fuel level

EAU01183

Fuel

Make sure there is sufficient fuel in the tank. Fill the fuel tank to the bottom of the filler tube as shown in the illustration.

EW000130

⚠ WARNING

Do not overfill the fuel tank. Avoid spilling fuel on the hot engine. Do not fill the fuel tank above the bottom of the filler tube or it may overflow when the fuel heats up later and expands.

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EAU00185

CAUTION:

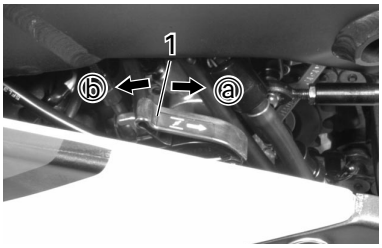
Always wipe off spilled fuel immediately with a dry and clean soft cloth. Fuel may deteriorate painted surfaces or plastic parts.

EAU00191

Recommended fuel:
Premium unleaded gasoline with a research octane number of 95 or higher.
Fuel tank capacity:
Total:
23 L
Reserve:
4.8 L

NOTE:

If knocking or pinging occurs, use a different brand of gasoline or higher octane grade.



1. Starter (choke) "⎣↘⎦"

EAU00210

Starter (choke) "⎣↘⎦"

Starting a cold engine requires a richer air-fuel mixture. A separate starter circuit supplies this mixture.
Move in direction ⓐ to turn on the starter (choke).
Move in direction ⓑ to turn off the starter (choke).

EAU00331

Sidestand/clutch switch operation check

Check the operation of the sidestand switch and clutch switch against the information below.

TURN THE MAIN SWITCH TO "ON" AND THE ENGINE STOP SWITCH TO "◯".
↓
TRANSMISSION IS IN GEAR AND SIDESTAND IS UP.
↓
PULL IN CLUTCH LEVER AND PUSH THE START SWITCH.
↓
ENGINE WILL START.
↓
CLUTCH SWITCH IS OK.
↓
SIDESTAND IS DOWN.
↓

ENGINE WILL STALL.
↓
SIDESTAND SWITCH IS OK.

EW000045

⚠ WARNING

If improper operation is noted, consult a Yamaha dealer immediately.

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OPERATION AND IMPORTANT RIDING POINTS

EAU00373

⚠ WARNING

- **Before riding this motorcycle, become thoroughly familiar with all operating controls and their functions. Consult a Yamaha dealer regarding any control or function that you do not thoroughly understand.**
- **Never start your engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and can cause loss of consciousness and death within a short time. Always operate your motorcycle in an area with adequate ventilation.**
- **Before starting out, always be sure the sidestand is up. Failure to retract the sidestand completely can result in a serious accident when you try to turn a corner.**

EAU01382*

Starting the engine

NOTE:

This motorcycle is equipped with an ignition circuit cut-off system.
The engine can be started only under one of the following conditions:

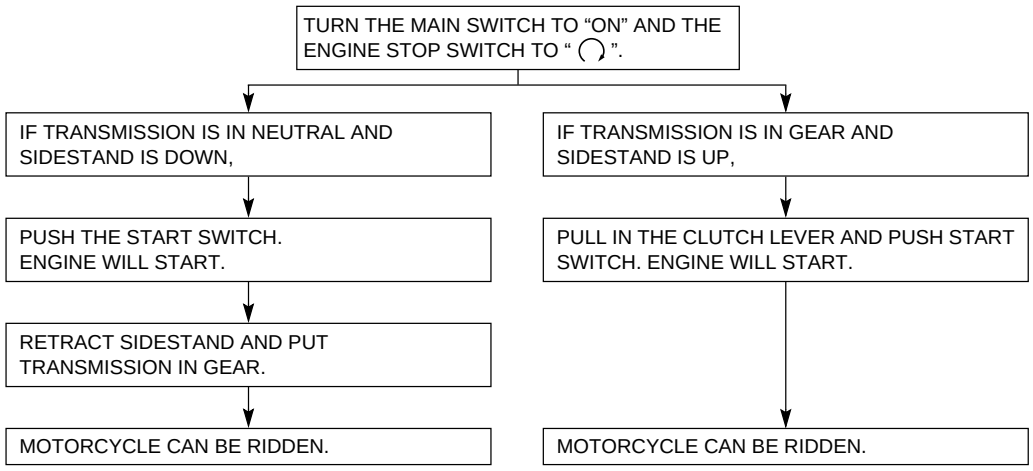
- The transmission is in neutral.
- The sidestand is up, the transmission is in gear and the clutch is disengaged.

The motorcycle must not be ridden when the sidestand is down.

EW000054

⚠ WARNING

Before going through the following steps, check the function of the sidestand switch and clutch switch. (Refer to page 1-11.)



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1. Turn the main switch to “ON” and the engine stop switch to “ ”.

ECA00005

CAUTION:

The warning light and fuel indicator light should come on for a few seconds and then go off. If an indicator light does not go off, refer to the corresponding indicator light circuit check in the “INSTRUMENT AND CONTROL FUNCTIONS” section.

2. Shift the transmission into neutral.

NOTE:

When the transmission is in neutral, the neutral indicator light should be on. If the light does not come on, ask a Yamaha dealer to inspect it.

3. Turn on the starter (choke) and completely close the throttle grip.
4. Start the engine by pushing the start switch.

NOTE:

If the engine fails to start, release the start switch, wait a few seconds, then try again. Each attempt should be as short as possible to preserve the battery. Do not crank the engine more than 10 seconds on any one attempt.

5. After starting the engine, move the starter (choke) to the halfway position.

NOTE:

For maximum engine life, never accelerate hard with a cold engine!

6. After the engine is warm, turn off the starter (choke) completely.

NOTE:

The engine is warm when it responds normally to the throttle with the starter (choke) turned off.

EAU01258

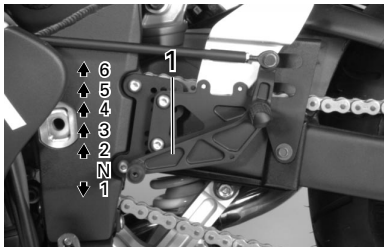
Starting a warm engine

The starter (choke) is not required when the engine is warm.

EC000046

CAUTION:

See the “Engine break-in” section prior to operating the motorcycle for the first time.



1. Shift pedal
N. Neutral

EAU00423

Shifting

The transmission lets you control the amount of power you have available at a given speed for starting, accelerating, climbing hills, etc. The use of the shift pedal is shown in the illustration.

To shift into neutral, depress the shift pedal repeatedly until it reaches the end of its travel, then raise the pedal slightly.

EC000048

CAUTION:

- **Do not coast for long periods with the engine off, and do not tow the motorcycle a long distance. Even with gears in neutral, the transmission is only properly lubricated when the engine is running. Inadequate lubrication may damage the transmission.**
- **Always use the clutch when changing gears. The engine, transmission, and driveline are not designed to withstand the shock of forced shifting and can be damaged by shifting without using the clutch.**

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EAU01128

Engine break-in

There is never a more important period in the life of your motorcycle than the period between zero and 1,600 km. For this reason we ask that you carefully read the following material. Because the engine is brand new, you must not put an excessive load on it for the first 1,600 km. The various parts in the engine wear and polish themselves to the correct operating clearances. During this period, prolonged full throttle operation, or any condition which might result in excessive heating of the engine, must be avoided.

EAU01329

0 ~ 1,000 km

Avoid operation above 5,500 r/min.

1,000 ~ 1,600 km

Avoid cruising speeds in excess of 7,000 r/min.

EC000052

CAUTION:

After 1,000 km of operation, be sure to replace the engine oil and oil filter.

1,600 km and beyond

Proceed with normal riding.

EC000053

CAUTION:

- **Never let engine speeds enter the red zone.**
- **If any engine trouble should occur during the break-in period, consult a Yamaha dealer immediately.**

EAU00460

Parking

When parking the motorcycle, stop the engine and remove the ignition key.

EW000058

WARNING

The exhaust system is hot. Park the motorcycle in a place where pedestrians or children are not likely to touch the motorcycle. Do not park the motorcycle on a slope or soft ground; the motorcycle may overturn.

INCLUDED ACCESSORIES

EAU01575

Tool kit

The tools provided in the owner's tool kit are to assist you in the performance of periodic maintenance. However, some other tools such as a torque wrench are also necessary to perform the maintenance correctly.

The service information included in this manual is intended to provide you, the owner, with the necessary information for completing some of your own preventive maintenance and minor repairs.

NOTE:

If you do not have necessary tools required during a service operation, take your motorcycle to a Yamaha dealer for service.

EW000063

WARNING

Modifications to this motorcycle not approved by Yamaha may cause loss of performance, and render it unsafe for use. Consult a Yamaha dealer before attempting any changes.

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MOTORCYCLE CARE AND STORAGE

Care

The exposure of its technology makes a motorcycle charming but also vulnerable. Although high-quality components are used, they are not all rust-resistant. While a rusty exhaust pipe may remain unnoticed on a car, it does look unattractive on a motorcycle. Frequent and proper care, however, will keep your motorcycle looking good, extend its life and maintain its performance. Moreover, the warranty states that the vehicle must be properly taken care of. For all these reasons, it is recommended that you observe the following cleaning and storing precautions.

Before cleaning

1. Cover up the muffler outlet with a plastic bag.
2. Make sure that all caps and covers as well as all electrical couplers and connectors, including the spark plug caps, are tightly installed.
3. Remove extremely stubborn dirt, like oil burnt onto the crankcase, with a degreasing agent and a brush, but never apply such products onto seals, gaskets, sprockets, the drive chain and wheel axles. Always rinse the dirt and degreaser off with water.

Cleaning

After normal use

Remove dirt with warm water, a neutral detergent and a soft clean sponge, then rinse with plenty of clean water. Use a tooth or bottle brush for hard-to-reach parts. Tougher dirt and insects will come off more easily if the area is covered with a wet cloth for a few minutes before cleaning.

ECA00010

CAUTION:

- **Avoid using strong acidic wheel cleaners, especially on spoked wheels. If you do use such products for hard-to-remove dirt, do not leave it on any longer than instructed, then thoroughly rinse it off with water, immediately dry the area and apply a corrosion protection spray.**
- **Improper cleaning can damage windshields, cowlings, panels and other plastic parts. Use only a soft, clean cloth or sponge with mild detergent and water to clean plastic.**
- **Do not use any harsh chemical products on plastic parts. Be sure to avoid using cloths or sponges which have been in contact with strong or abrasive cleaning products, solvent or thinner, fuel (gasoline), rust removers or inhibitors, brake fluid, antifreeze or electrolyte.**
- **Do not use high-pressure washers or steam-jet cleaners since they cause water seepage and deterioration in the following areas: seals (of wheel bearings, swingarm bearings, forks and brakes), electric components (couplers, connectors, instruments, switches and lights), breather hoses and vents.**
- **For motorcycles equipped with a windshield: Do not use strong cleaners or hard sponges as they will cause dulling or scratching. Some cleaning compounds for plastic may leave scratches on the windshield. Test the product on a small hidden part of the windshield to make sure they do not leave any marks. If the windshield is scratched, use a quality plastic polishing compound after washing.**
- **Do not rub the frame, swingarm and other similar matte metal parts with a cloth (neither one dampened with solvents or gasoline nor a dry one), as this may deteriorate their finish. Wash off dirt with water only. For hard-to-remove dirt, add a mild detergent and rub only lightly.**

After riding in the rain, near the sea or on salt-sprayed roads

Since sea salt or salt sprayed on the roads in the winter are extremely corrosive in combination with water, carry out the following steps after each ride in the rain, near the sea or on salt-sprayed roads. (Salt sprayed in the winter may remain on the roads well into spring.)

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1. Clean your motorcycle with cold water and soap after the engine has cooled down.

ECA00012

CAUTION:

Do not use warm water since it increases the corrosive action of the salt.

2. Be sure to apply a corrosion protection spray on all (even chrome- and nickel-plated) metal surfaces to prevent corrosion.

After cleaning

1. Dry the motorcycle with a chamois or an absorbing cloth.
2. Immediately dry the drive chain and lubricate it to prevent it from rusting.
3. Use a chrome polish to shine chrome, aluminum and stainless-steel parts, including the exhaust system. (Even the thermally induced discoloring of stainless-steel exhaust systems can be removed through polishing.)
4. To prevent corrosion, it is recommended to apply a corrosion protection spray on all (even chrome- and nickel-plated) metal surfaces.
5. Use spray oil as a universal cleaner to remove any remaining dirt.
6. Touch up minor paint damage caused by stones, etc.
7. Wax all painted surfaces.

CAUTION:

Do not wax the frame, swingarm and other similar matte metal parts, as this may deteriorate their finish.

8. Let the motorcycle dry completely before storing it or covering it.

EWA00001

WARNING

Make sure that there is no oil or wax on the brakes and tires. If necessary, clean the brake discs and linings with a regular brake disc cleaner or acetone, and wash the tires with warm water and mild soap. Then, carefully test the motorcycle for its braking performance and cornering behavior.

ECA00013

CAUTION:

- **Apply spray oil and wax sparingly and wipe off any excess.**
- **Never apply oil or wax on rubber and plastic parts, but treat them with a suitable care product.**
- **Avoid using abrasive polishing compounds as they wear away the paint.**

NOTE:

Consult a Yamaha dealer for advice on what products to use.

Storage

Short-term

Always store your motorcycle in a cool, dry place and, if necessary, protect it against dust with a porous cover.

ECA00014

CAUTION:

- **Storing the motorcycle in a poorly ventilated room or covering it with a tarp while it is still wet will allow water and humidity to seep in and cause rust.**
- **To prevent corrosion, avoid damp cellars, stables (because of the presence of ammonia) and areas where strong chemicals are stored.**

Long-term

Long term storage (60 days or more) of your motorcycle will require some preventive procedures to guard against deterioration. After throughly cleaning the motorcycle, prepare for storage as follows:

1. Drain the fuel tank.
2. Remove the empty fuel tank, pour a cup of engine oil in the tank, shake the tank to coat the inner surfaces thoroughly and drain off the excess oil. Reinstall the tank.
3. Remove the spark plug, pour about one tablespoon of engine oil in the spark plug hole and reinstall the spark plug. Turn the engine over several times (ground spark plug lead wires) to coat the cylinder walls with oil.

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⚠ WARNING

When using the starter motor to crank the engine, remove the spark plug wires, and ground them to prevent sparking.

4. Remove the drive chain. Thoroughly clean the chain with kerosene and lubricate it. Reinstall the chain or store it in a plastic bag (tied to frame for safekeeping).
5. Lubricate all control cables.
6. Block up the frame to raise both wheels off the ground.
7. Tie a plastic bag over the exhaust pipe outlet to prevent moisture from entering.
8. If strong in a humid or salt-air atmosphere, coat all exposed metal surfaces with a light film of oil. Do not apply oil to any rubber parts or the seat cover.
9. Remove the battery and charge it. Store it in a dry place and rechange it once a month. Do not store the battery in an excessively warm or cold place (less than 0°C (30°F) or more than 30°C (90°F)).

NOTE:

Make any necessary repairs before storing the motorcycle.

CONSUMER INFORMATION

EAU01040

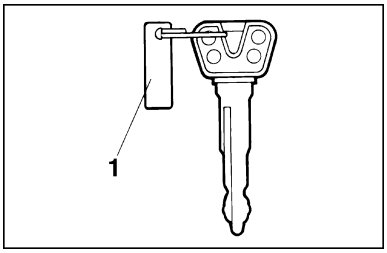
Identification numbers record

Record the key identification number, vehicle identification number and model label information in the spaces provided for assistance when ordering spare parts from a Yamaha dealer or for reference in case the vehicle is stolen.

1. KEY IDENTIFICATION NUMBER:

2. VEHICLE IDENTIFICATION NUMBER:

3. MODEL LABEL INFORMATION:

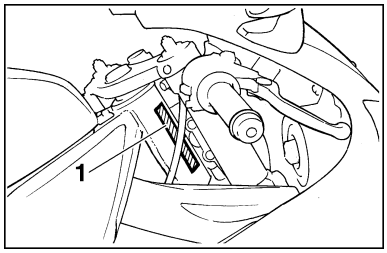


1. Key identification number

EAU01041

Key identification number

The key identification number is stamped on the key tag. Record this number in the space provided and use it for reference when obtaining a new key.



1. Vehicle identification number

EAU01043

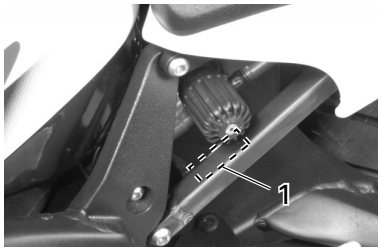
Vehicle identification number

The vehicle identification number is stamped into the steering head pipe. Record this number in the space provided.

NOTE:

The vehicle identification number is used to identify your motorcycle and may be used to register your motorcycle with the licensing authority in your state.

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1. Model label

EAU01049

Model label

The model label is affixed to the location shown in the figure. Record the information on this label in the space provided. This information will be needed to order spare parts from your Yamaha dealer.

TROUBLESHOOTING

TROUBLESHOOTING CHART

EW000125

⚠ WARNING

Never check the fuel system while smoking or in the vicinity of an open flame.

1. Fuel

Check if there is fuel in the fuel tank.
- Enough fuel. → Go to compression check.
- No fuel. → Supply fuel. → Engine doesn't start, go to compression check.

2. Compression

Use electric starter.
- There is compression. → Go to ignition check.
- No compression. → Ask a Yamaha dealer to inspect.

3. Ignition

Remove spark plugs and check electrodes.
- Wet. → Wipe clean with dry cloth and correct spark gap or replace spark plugs. → Open throttle half-way and start the engine. → Engine doesn't start, go to battery check.
- Dry. → Ask a Yamaha dealer to inspect.

4. Battery

Use electric starter.
- Engine turns over quickly. → Battery good.
- Engine turns over slowly. → Check connections or recharge.

→ Engine doesn't start, ask a Yamaha dealer to inspect.

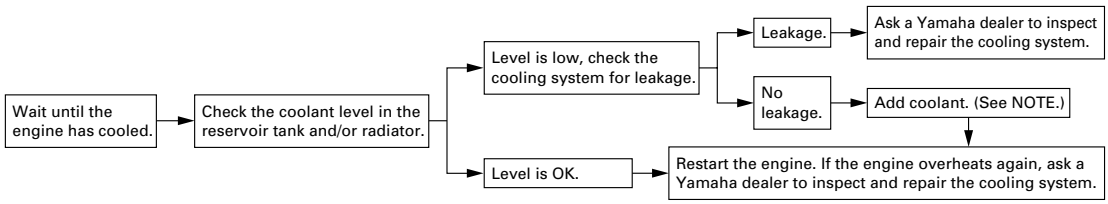
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5. Engine overheating

EW000070

⚠ WARNING

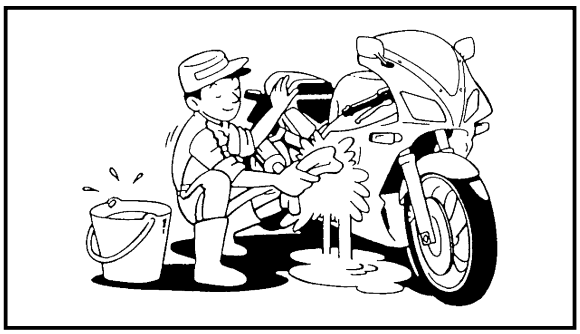
Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. Open the radiator cap as follows. Wait until the engine has cooled. Remove the radiator cap stopper by removing the screw. Place a thick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



NOTE:

If it is difficult to get the recommended coolant, tap water can be temporarily used, provided that it is changed to the recommended coolant as soon as possible.

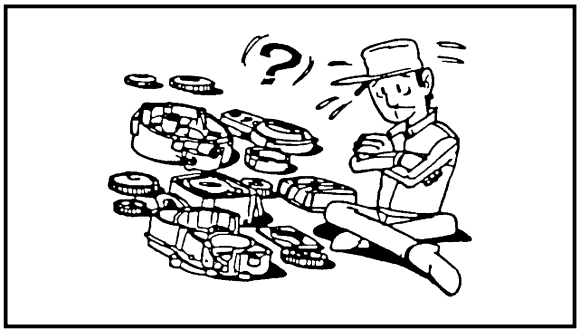
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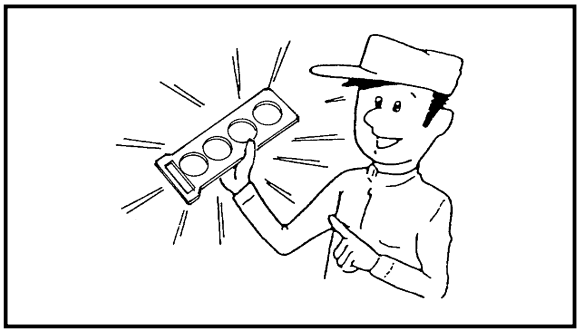
EB102000
IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust, and foreign material.



2. Use only the proper tools and cleaning equipment.
   Refer to “SPECIAL TOOLS”.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.



EB102010
REPLACEMENT PARTS

Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

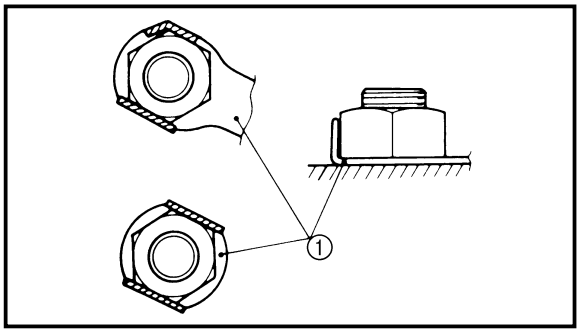
EB102020
GASKETS, OIL SEALS AND O-RINGS

1. When overhauling the engine, replace all gaskets, seals, and O-rings. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.

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USING A DYNAMOMETER

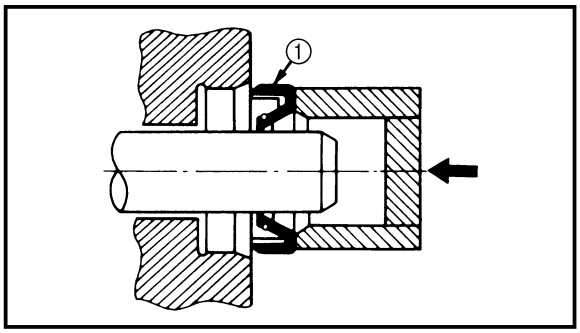
The YZF-R7 has a carbon muffler that may change color when exposed to high temperatures. Therefore, when using a dynamometer always use a fan to cool the muffler.



EB102030

LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock washer tabs and the cotter pin ends along a flat of the bolt or nut.



EB102040

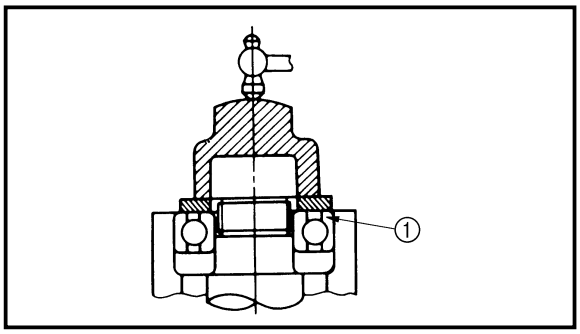
BEARINGS AND OIL SEALS

1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium soap base grease. Oil bearings liberally when installing, if appropriate.

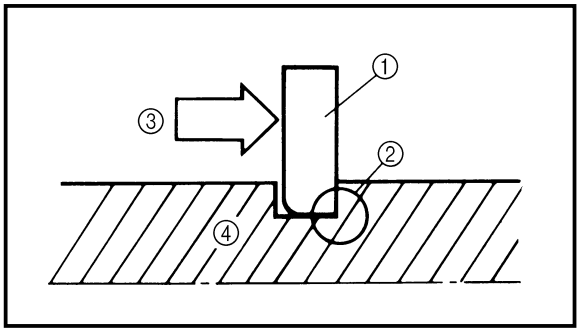
① Oil seal

CAUTION:

Do not spin the bearing with compressed air because this will damage the bearing surfaces.



① Bearing



EB102050

CIRCLIPS

Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ that the circlip receives.

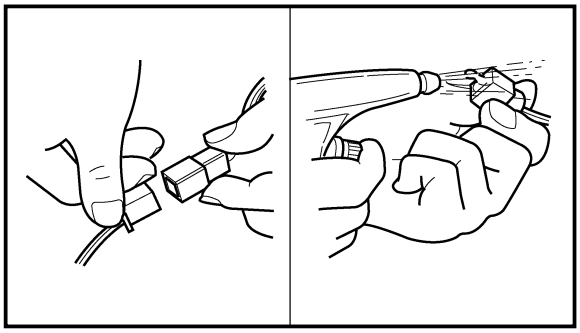
④ Shaft

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EB103000
CHECKING THE CONNECTIONS

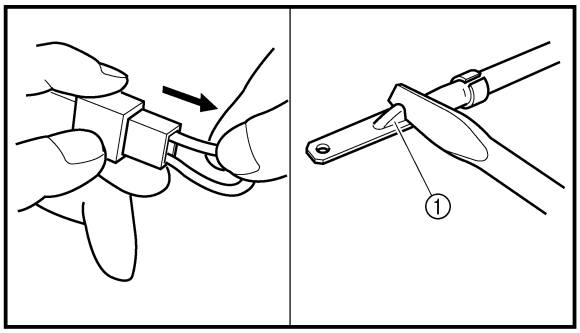
Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - lead
   - coupler
   - connector



2. Check:
   - lead
   - coupler
   - connector

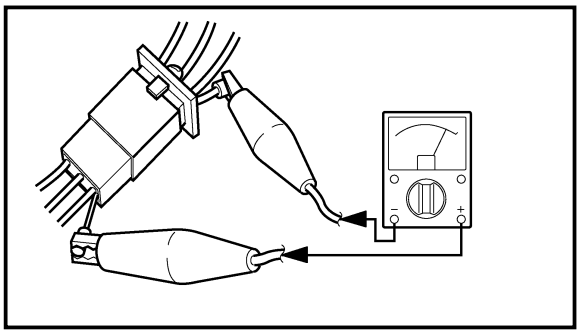
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.



3. Check:
   - all connections

   Loose connection → Connect properly.

NOTE:
If the pin ① on the terminal is flattened, bend it up.

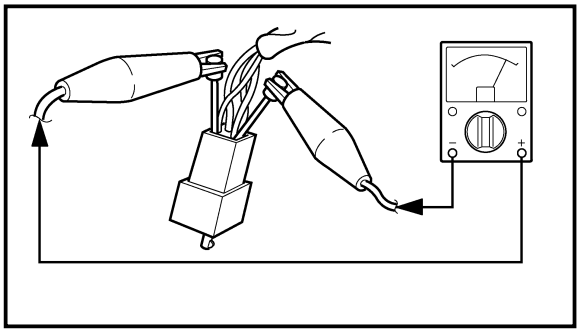


4. Connect:
   - lead
   - coupler
   - connector

NOTE:
Make sure that all connections are tight.

5. Check:
   - continuity

   (with the pocket tester)



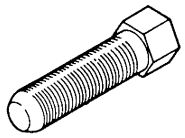
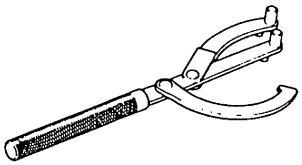
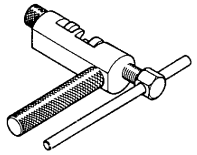
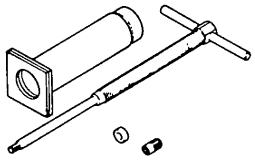
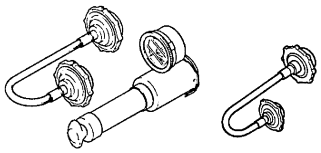
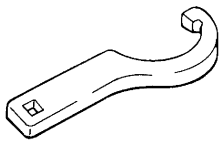
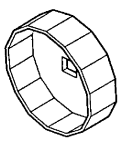
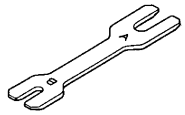
	Pocket tester **90890-03112**

NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

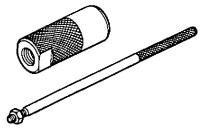
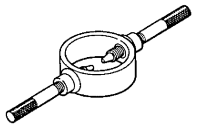
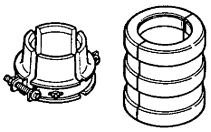
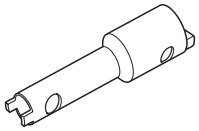
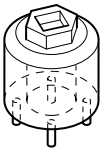
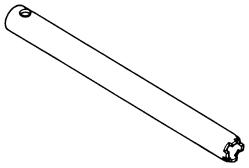
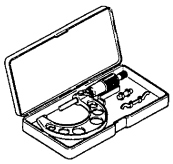
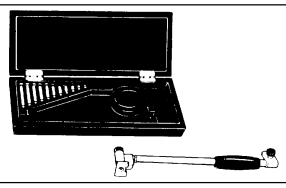
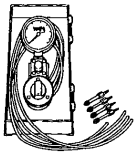
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SPECIAL TOOLS

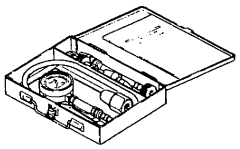
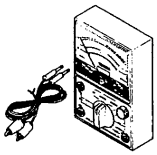
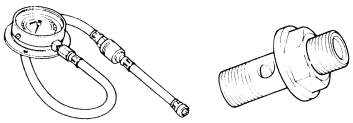
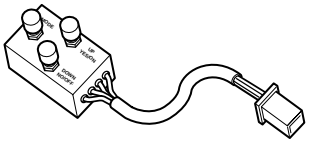
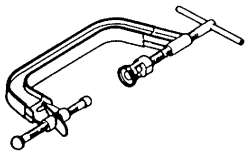
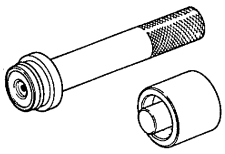
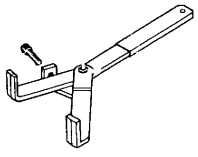
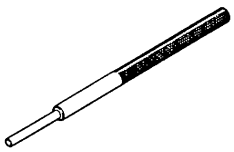
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques.
When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name/Function	Illustration
90890-01080	Flywheel puller This tool is used to remove the generator rotor.	
90890-01235	Rotor holding tool This tool is used to hold the generator rotor when removing or installing the generator rotor bolt or pickup coil rotor bolt.	
90890-01286	Drive chain cutter This tool is used to remove the drive chain.	
90890-01304	Piston pin puller This tool is used to remove the piston pins.	
Radiator cap tester 90890-01325 Adapter 90890-01352	Radiator cap tester Adapter These tools are used to check the cooling system.	
90890-01403	Steering nut wrench This tool is used to loosen or tighten the steering stem ring nuts.	
90890-01426	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	
90890-01434	Rod holder This tool is used to support the damper adjusting rod.	

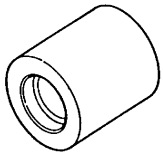
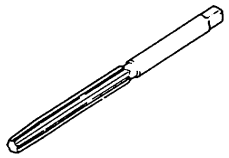
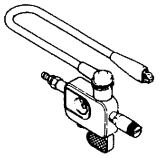
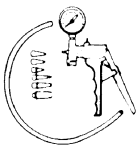
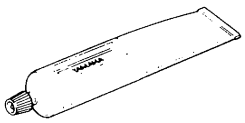
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Tool No.	Tool name/Function	Illustration
Rod puller 90890-01437 Rod puller attachment 90890-01436	Rod puller Rod puller attachment These tools are used to pull up the front fork damper rod.	
90890-01441	Fork spring compressor This tool is used to disassemble or assemble the front fork legs.	
90890-01442	Fork seal driver This tool is used to install the front fork's oil seal and dust seal.	
90890-01471	Pivot shaft wrench This tool is used to remove or install the engine mounting spacer bolts.	
90890-01472	Front fork cap bolt wrench This tool is used to remove or install the front fork cap bolt.	
90890-01473	Damper rod holder This tool is used to hold the damper rod assembly when loosening or tightening the damper rod assembly bolt.	
90890-03008	Micrometer (50 ~ 75 mm) This tool is used to measure the piston skirt diameter.	
90890-03017	Cylinder bore gauge (50 ~ 100 mm) This tool is used to measure the cylinder bore.	
Vacuum gauge 90890-03094 Vacuum gauge attachment 90890-03060	Vacuum gauge Vacuum gauge attachment This gauge is used to synchronize the throttle bodies.	

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Tool No.	Tool name/Function	Illustration
Compression gauge 90890-03081 Adapter 90890-04136	Compression gauge Adapter These tools are used to measure engine compression.	
90890-03112	Pocket tester This tool is used to check the electrical system.	
Pressure gauge 90890-03153 Adapter 90890-03151	Pressure gauge Adapter These tools are used to measure the fuel pressure.	
90890-03149	Test coupler adapter This tool is used to check the electrical control system.	
90890-03171	Co, diagnosis switch box This tool is used to check the electrical control system.	
Valve spring compressor 90890-04019 Attachment 90890-04108 90890-04114	Valve spring compressor Attachment These tools are used to remove or install the valve assemblies.	
Middle driven shaft bearing driver 90890-04058 Mechanical seal installer 90890-04078	Middle driven shaft bearing driver Mechanical seal installer These tools are used to install the water pump seal.	
90890-04086	Clutch holding tool This tool is used to hold the clutch boss when removing or installing the clutch boss nut.	
90890-04111	Valve guide remover This tool is used to remove or install the valve guides.	

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Tool No.	Tool name/Function	Illustration
90890-04112	Valve guide installer This tool is used to install the valve guides.	
90890-04113	Valve guide reamer This tool is used to rebore the new valve guides.	
90890-06754	Ignition checker This tool is used to check the ignition system components.	
90890-06756	Mity vac This tool is used to measure the vacuum pressure.	
90890-06760	Engine tachometer This tool is used to check engine speed.	
90890-85505	Yamaha bond No. 1215 This bond is used to seal two mating surfaces (e.g., crankcase mating surfaces).	

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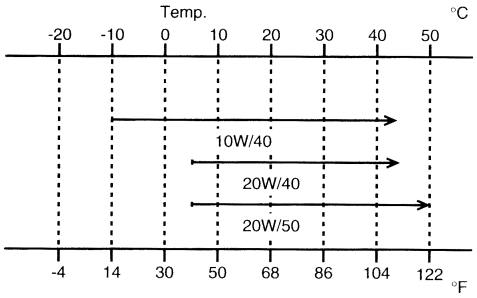
SPECIFICATIONS

GENERAL SPECIFICATIONS

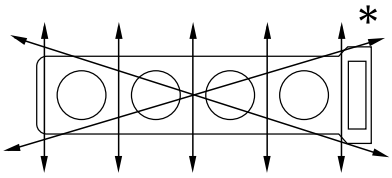
Item	Standard	Limit
Dimensions		
Overall length	2,060 mm (81.1 in)	----
Overall width	720 mm (28.3 in)	----
Overall height	1,125 mm (44.3 in)	----
Seat height	840 mm (33.1 in)	----
Wheelbase	1,400 mm (55.1 in)	----
Minimum ground clearance	120 mm (4.72 in)	----
Minimum turning radius	3,800 mm (150 in)	----
Weight		
Wet (with oil and a full fuel tank)	207 kg (456 lb)	----
Dry (without oil and fuel)	176 kg (388 lb)	----
Maximum load (total of rider and accessories)	317 kg (699 lb)	----

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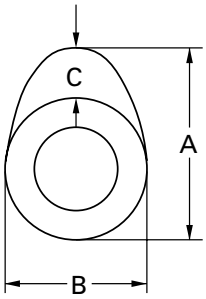
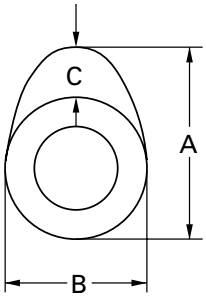
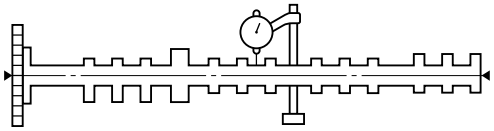
ENGINE SPECIFICATIONS

Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	----
Displacement	749 cm^3	----
Cylinder arrangement	Forward-inclined parallel 4-cylinder	----
Bore × stroke	72 × 46 mm (2.83 × 1.81 in)	----
Compression ratio	11.4:1	----
Engine idling speed	1,000 ~ 1,200 r/min	----
Vacuum pressure at engine idling speed	15.8 ~ 18.4 kPa (120 ~ 140 mm Hg, 4.72 ~ 5.51 in Hg)	----
Standard compression pressure (at sea level)	157 kPa (1.57 kgf/cm^2, 22.3 psi) at 500 r/min	----
Fuel		
Recommended fuel	Premium unleaded gasoline	----
Fuel tank capacity		
Total (including reserve)	23 L (20.2 Imp qt, 24.3 US qt)	----
Reserve only	4.8 L (4.22 Imp qt, 5.07 US qt)	----
Engine oil		
Lubrication system	Wet sump	----
Recommended oil	 Yamalube 4 (20W40) or SAE 20W40 type SE motor oil (40°F/5°C or above) (Non-Friction modified) Yamalube 4 (10W40) or SAE 10W40 type SE motor oil (60°F/15°C or below) (Non-Friction modified)	----
Quantity		
Total amount	3.6 L (3.2 Imp qt, 3.8 US qt)	----
Without oil filter cartridge replacement	2.6 L (2.3 Imp qt, 2.7 US qt)	----
With oil filter cartridge replacement	2.8 L (2.5 Imp qt, 3.0 US qt)	----
Oil pressure (hot)	40 kPa (0.4 kgf/cm^2, 5.69 psi) at 1,100 r/min	----
Relief valve opening pressure	480 ~ 560 kPa (4.8 ~ 5.6 kgf/cm^2, 68.3 ~ 79.7 psi)	----

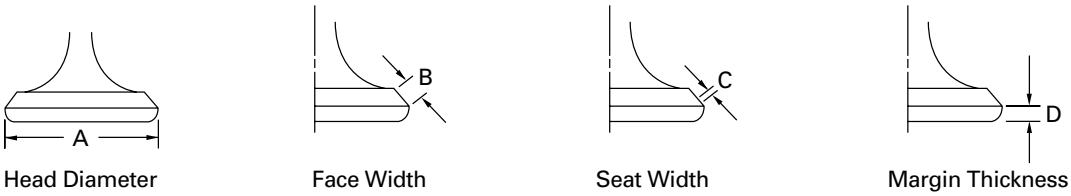
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Item	Standard	Limit
Oil filter		
Oil filter type	Cartridge (paper)	----
Bypass valve opening pressure	180 ~ 220 kPa (1.8 ~ 2.2 kgf/cm^2, 25.6 ~ 31.3 psi)	----
Oil pump		
Oil pump type	Trochoidal	----
Inner rotor-to-outer rotor tip clearance	0.09 ~ 0.15 mm (0.004 ~ 0.006 in)	----
Outer rotor-to-oil pump housing clearance	0.03 ~ 0.08 mm (0.001 ~ 0.003 in)	----
Cooling system		
Radiator capacity	2.75 L (2.42 Imp qt, 2.91 US qt)	
Radiator cap opening pressure	95 ~ 125 kPa (0.95 ~ 1.25 kgf/cm^2, 13.1 ~ 17.8 psi)	----
Upper radiator core		
Width	414 mm (16.3 in)	----
Height	248 mm (9.76 in)	----
Depth	24 mm (0.94 in)	----
Lower radiator core		
Width	211 mm (8.31 in)	----
Height	158 mm (6.22 in)	----
Depth	24 mm (0.94 in)	----
Coolant reservoir		
Capacity	0.6 L (0.53 Imp qt, 0.63 US qt)	----
Water pump		
Water pump type	Single-suction centrifugal pump	----
Reduction ratio	88/47 × 28/25 (2.097)	----
Maximum impeller shaft tilt	----	0.15 mm (0.006 in)
Starting system type	Electric starter	
Spark plugs		
Model (manufacturer) × quantity	R0256R-10 (NGK) × 4	----
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in)	----
Cylinder head		
Maximum warpage 	----	0.06 mm (0.0024 in)

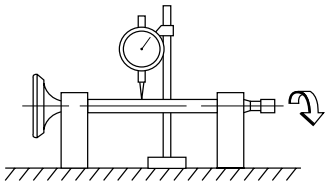
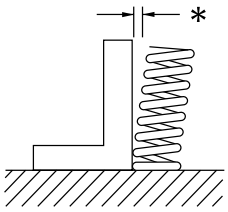
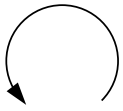
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Item	Standard	Limit
Camshafts		
Drive system	Chain drive (right)	----
Camshaft cap inside diameter	24.500 ~ 24.521 mm (0.9646 ~ 0.9654 in)	----
Camshaft journal diameter	24.452 ~ 24.465 mm (0.9627 ~ 0.9632 in)	----
Camshaft journal-to-camshaft cap clearance	0.035 ~ 0.069 mm (0.0014 ~ 0.0027 in)	----
Intake camshaft lobe dimensions		
		
Measurement A	33.36 ~ 33.46 mm (1.3134 ~ 1.3173 in)	33.31 mm (1.3114 in)
Measurement B	24.95 ~ 25.05 mm (0.9823 ~ 0.9862 in)	24.90 mm (0.9803 in)
Measurement C	8.31 ~ 8.51 mm (0.3272 ~ 0.3350 in)	----
Exhaust camshaft lobe dimensions		
		
Measurement A	33.00 ~ 33.10 mm (1.2992 ~ 1.3031 in)	32.95 mm (1.2972 in)
Measurement B	24.986 ~ 25.086 mm (0.9837 ~ 0.9876 in)	24.936 mm (0.9817 in)
Measurement C	7.95 ~ 8.15 mm (0.3130 ~ 0.3209 in)	----
Maximum camshaft runout	----	0.03 mm (0.0012 in)
		

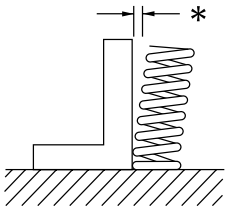
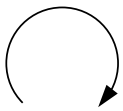
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Item	Standard	Limit
Timing chain		
Model/number of links	DID219FTH3/100	----
Tensioning system	Automatic	----
Valves, valve seats, valve guides		
Valve clearance (cold)		
Intake	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in)	----
Exhaust	0.25 ~ 0.30 mm (0.0098 ~ 0.0118 in)	----
Valve dimensions		
 Head Diameter Face Width Seat Width Margin Thickness		
Valve head diameter A		
Intake	22.1 ~ 22.3 mm (0.8701 ~ 0.8780 in)	----
Exhaust	23.4 ~ 23.6 mm (0.9213 ~ 0.9291 in)	----
Valve face width B		
Intake	0.54 ~ 1.57 mm (0.0213 ~ 0.0618 in)	----
Exhaust	0.88 ~ 1.87 mm (0.0346 ~ 0.0736 in)	----
Valve seat width C		
Intake	0.7 ~ 0.9 mm (0.028 ~ 0.035 in)	----
Exhaust	0.7 ~ 0.9 mm (0.028 ~ 0.035 in)	----
Valve margin thickness D		
Intake	0.9 ~ 1.2 mm (0.028 ~ 0.047 in)	----
Exhaust	1.0 ~ 1.3 mm (0.039 ~ 0.051 in)	----
Valve stem diameter		
Intake	3.983 ~ 3.995 mm (0.1568 ~ 0.1573 in)	3.953 mm (0.1556 in)
Exhaust	3.978 ~ 3.990 mm (0.1566 ~ 0.1571 in)	3.948 mm (0.1544 in)
Valve guide inside diameter		
Intake	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in)	4.05 mm (0.1594 in)
Exhaust	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in)	4.05 mm (0.1594 in)
Valve stem-to-valve guide clearance		
Intake	0.005 ~ 0.029 mm (0.0002 ~ 0.0011 in)	0.06 mm (0.0024 in)
Exhaust	0.010 ~ 0.034 mm (0.0004 ~ 0.0013 in)	0.07 mm (0.0028 in)

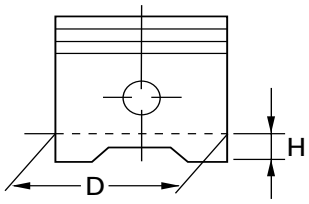
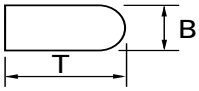
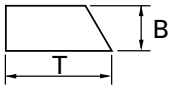
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Item	Standard	Limit
Valve stem runout	----	0.01 mm (0.0004 in)
		
Valve seat width		
Intake	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	1.6 mm (0.06 in)
Exhaust	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)	1.6 mm (0.06 in)
Valve springs		
Inner spring		
Free length		
Intake	32.35 mm (1.27 in)	30.73 mm (1.21 in)
Exhaust	28.82 mm (1.13 in)	27.37 mm (1.08 in)
Installed length (valve closed)		
Intake	27.96 mm (1.10 in)	----
Exhaust	24.6 mm (0.97 in)	----
Compressed spring force (installed)		
Intake	101 ~ 117 N (10.30 ~ 11.93 kgf, 22.7 ~ 26.3 lb)	----
Exhaust	106 ~ 122 N (10.81 ~ 12.44 kgf, 23.8 ~ 27.4 lb)	----
Spring tilt		
		
Intake	----	2.5°/1.4 mm (2.5°/0.055 in)
Exhaust	----	2.5°/1.3 mm (2.5°/0.051 in)
Winding direction (top view)		
Intake	Counter clockwise	----
Exhaust	Counter clockwise	----
		

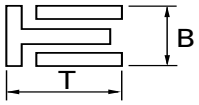
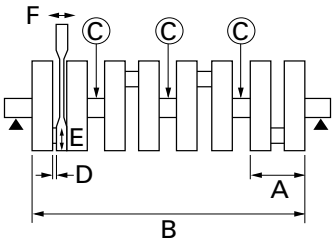
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Item	Standard	Limit
Outer springs		
Free length		
Intake	36.42 mm (1.43 in)	34.60 mm (1.36 in)
Exhaust	33.91 mm (1.34 in)	32.21 mm (1.27 in)
Installed length (valve closed)		
Intake	32.03 mm (1.26 in)	----
Exhaust	30.25 mm (1.19 in)	----
Compressed spring force (installed)		
Intake	230 ~ 266 N (23.45 ~ 27.12 kgf, 51.7 ~ 59.8 lb)	----
Exhaust	286 ~ 329 N (29.16 ~ 33.55 kgf, 62.3 ~ 74.0 lb)	----
Spring tilt		
		
Intake	----	2.5°/1.6 mm (2.5°/0.063 in)
Exhaust	----	2.5°/1.5 mm (2.5°/0.059 in)
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise	----
		
Cylinders		
Cylinder arrangement	Forward-inclined, parallel 4-cylinder	----
Bore × stroke	72 × 46 mm (2.83 × 1.81 in)	----
Compression ratio	11.4:1	----
Bore	72.000 ~ 72.008 mm (2.8346 ~ 2.8350 in)	----
Maximum taper	----	0.05 mm (0.0016 in)
Maximum out of round	----	0.05 mm (0.0016 in)

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Item	Standard	Limit
Pistons		
Piston-to-cylinder clearance	0.028 ~ 0.054 mm (0.0011 ~ 0.0021 in)	0.1 mm (0.004 in)
Diameter D	71.954 ~ 71.972 mm (2.8328 ~ 2.8335 in)	----
		
Height H	10 mm (0.39 in)	----
Piston pin bore (in the piston)		
Diameter	17.004 ~ 17.015 mm (0.6694 ~ 0.6699 in)	17.045 mm (0.6711 in)
Offset	0 mm (0 in)	----
Piston pins		
Outside diameter	16.995 ~ 17.000 mm (0.6691 ~ 0.6693 in)	16.975 mm (0.6683 in)
Piston pin-to-piston pin bore clearance	0.004 ~ 0.020 mm (0.00016 ~ 0.00079 in)	0.070 mm (0.0028 in)
Piston rings		
Top ring		
		
Ring type	Barrel	----
Dimensions (B × T)	0.8 × 2.7 mm (0.031 × 0.106 in)	----
End gap (installed)	0.15 ~ 0.25 mm (0.006 ~ 0.010 in)	0.50 mm (0.020 in)
Ring side clearance	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.12 mm (0.0047 in)
2nd ring		
		
Ring type	Taper	----
Dimensions (B × T)	0.8 × 2.8 mm (0.031 × 0.110 in)	----
End gap (installed)	0.25 ~ 0.35 mm (0.009 ~ 0.014 in)	0.70 mm (0.028 in)
Ring side clearance	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.12 mm (0.0047 in)

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Item	Standard	Limit
Oil ring		
		
Dimensions (B × T)	1.5 × 2.5 mm (0.059 × 0.098 in)	----
End gap (installed)	0.1 ~ 0.3 mm (0.004 ~ 0.012 in)	----
Connecting rods		
Crankshaft pin-to-big end bearing clearance	0.058 ~ 0.078 mm (0.0023 ~ 0.0031 in)	----
Bearing color code	2 = Blue, 3·4 = Black, 5·6 = Brown, 7·8 = Green, 9 = Yellow	----
Crankshaft		
		
Width A	54.4 ~ 56.0 mm (2.142 ~ 2.205 in)	----
Width B	292.8 ~ 294.0 mm (11.53 ~ 11.57 in)	----
Maximum runout C		0.035 mm (0.0014 in)
Big end side clearance D	0.16 ~ 0.26 mm (0.006 ~ 0.010 in)	----
Crankshaft journal-to-crankshaft journal bearing clearance	0.036 ~ 0.056 mm (0.0014 ~ 0.0022 in)	----
Bearing color code	1·2 = Blue, 3·4 = Black, 5·6 = Brown, 7·8 = Green, 9·10 = Yellow, 11 = Violet	----
Clutch		
Clutch type	Wet, multiple disc	----
Clutch release method	Hydraulic inner push	----
Operation	Left-hand operation	----
Recommended fluid	Brake fluid DOT4	----
Friction plates #1		
Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	2.8 mm (0.110 in)
Plate quantity	8	----
Friction plate #2		
Thickness	3.7 ~ 3.9 mm (0.146 ~ 0.154 in)	3.6 mm (0.142 in)
Plate quantity	1	----

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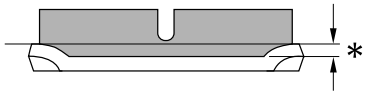
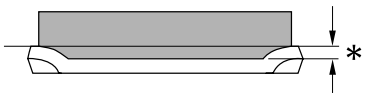
Item	Standard	Limit
Clutch plates		
Thickness	1.5 ~ 1.7 mm (0.059 ~ 0.067 in)	----
Plate quantity	8	----
Maximum warpage	----	0.1 mm (0.004 in)
Clutch springs		
Free length	7.1 mm (0.280 in)	----
Spring quantity	1 spring per valve	----
Transmission		
Transmission type	Constant mesh, 6-speed	----
Primary reduction system	Spur gear	----
Primary reduction ratio	88/47 (1.872)	----
Secondary reduction system	Chain drive	----
Secondary reduction ratio	43/17 (2.529)	----
Operation	Left-foot operation	----
Gear ratios		
1st gear	38/17 (2.235)	----
2nd gear	36/19 (1.895)	----
3rd gear	35/21 (1.667)	----
4th gear	33/23 (1.435)	----
5th gear	31/24 (1.292)	----
6th gear	27/23 (1.174)	----
Maximum main axle runout	----	0.08 mm (0.003 in)
Maximum drive axle runout	----	0.08 mm (0.003 in)
Shifting mechanism		
Shift mechanism type	Shift drum	----
Maximum shift fork guide bar bending	----	0.05 mm (0.002 in)
Installed shift rod length	294 mm (11.57 in)	----
Air filter type	Dry element	----
Fuel pump		
Pump type	Electrical	----
Model (manufacturer)	5FL (MITSUBISHI)	----
Output pressure	450 ~ 600 kPa (4.5 ~ 6.0 kgf/cm^2, 64 ~ 85 psi)	----
Throttle bodies		
ID mark	5FL1	----
Throttle valve	#100	----
Intake vacuum pressure	15.8 ~ 18.4 kPa (120 ~ 140 mmHg, 4.72 ~ 5.51 in Hg)	----
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm (0.12 ~ 0.20 in)	----

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CHASSIS SPECIFICATIONS

Item	Standard	Limit
Frame		
Frame type	Diamond	----
Caster angle	22.7°	----
Trail	95 mm (3.74 in)	----
Front wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT3.50	----
Material	Aluminum	----
Wheel travel	120 mm (4.72 in)	----
Wheel runout		
Maximum radial wheel runout	----	1 mm (0.04 in)
Maximum lateral wheel runout	----	0.5 mm (0.02 in)
Rear wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT6.00	----
Material	Aluminum	----
Wheel travel	138 mm (5.43 in)	----
Wheel runout		
Maximum radial wheel runout	----	1 mm (0.04 in)
Maximum lateral wheel runout	----	0.5 mm (0.02 in)
Front tire		
Tire type	Tubeless	----
Size	120/70 ZR17 (58W)	----
Model (manufacturer)	MTR01A (PIRELLI)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kg/cm^2, 3.6 psi)	----
90 kg (198 lb) ~ Maximum load*	250 kPa (2.5 kg/cm^2, 3.6 psi)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 3.6 psi)	----
	* Load is the total weight of the rider and accessories.	
Minimum tire tread depth	----	1.6 mm (0.06 in)

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Item	Standard	Limit
Rear tire		
Tire type	Tubeless	----
Size	180/55 ZR17 73W	----
Model (manufacturer)	MTR08 (PIRELLI)	----
Tire pressure (cold)		
0 ~ 90 kg (0 ~ 198 lb)	250 kPa (2.5 kg/cm^2, 3.6 psi)	----
90 kg (198 lb) ~ Maximum load*	290 kPa (2.9 kg/cm^2, 4.1 psi)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 3.6 psi)	----
	* Load is the total weight of the rider and accessories.	
Minimum tire tread depth	----	1.6 mm (0.06 in)
Front brakes		
Brake type	Dual-disc brake	----
Operation	Right-hand operation	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	320 × 5 mm (12.6 × 0.20 in)	----
Minimum thickness	----	4.5 mm (0.18 in)
Maximum deflection	----	0.1 mm (0.004 in)
Brake pad lining thickness	5.5 mm (0.22 in)	0.5 mm (0.02 in)
		
Master cylinder inside diameter	14 mm (0.55 in)	----
Caliper cylinder inside diameter	30.2 mm (1.19 in) and 27 mm (1.06 in)	----
Rear brake		
Brake type	Single-disc brake	----
Operation	Right-foot operation	----
Brake pedal position (from the top of the brake pedal to the center of the rider footrest bracket bolt)	31~ 36 mm (1.22 ~ 1.42 in)	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	245 × 5 mm (9.65 × 0.20 in)	----
Minimum thickness	----	4.5 mm (0.18 in)
Maximum deflection	----	0.1 mm (0.004 in)
Brake pad lining thickness	5.5 mm (0.22 in)	0.5 mm (0.02 in)
		
Master cylinder inside diameter	12.7 mm (0.5 in)	----
Caliper cylinder inside diameter	38.2 mm (1.50 in)	----

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Item	Standard	Limit
Front suspension		
Suspension type	Telescopic fork	----
Front fork type	Coil spring/oil damper	----
Front fork travel	120 mm (4.72 in)	----
Spring		
Free length	240 mm (9.45 in)	----
Spacer length	127 mm (5.00 in)	----
Installed length	226 mm (8.90 in)	----
Spring rate (K1)	9.3 N/mm (0.95 kgf/mm, 53.2 lb/in)	
Spring stroke (K1)	0 ~ 120 mm (0 ~ 4.72 in)	----
Optional spring available	No	----
Fork oil		
Recommended oil	Suspension oil "01" or equivalent	----
Quantity (each front fork leg)	460 cm^3 (16.2 Imp oz, 15.6 US oz)	----
Level (from the top of the outer tube, with the outer tube fully down, and without the fork spring)	170 mm (6.69 in)	----
Damper adjusting rod locknut distance	31 mm (1.22 in)	----
Spring preload adjusting positions		
Minimum	0 [0 mm (0 in)]	----
Standard	14 [14 mm (0.55 in)]	----
Maximum	18-1/2 [18.5 mm (0.73 in)]	----
Rebound damping adjusting positions		
Minimum*	17	----
Standard*	6	----
Maximum*	1	----
Compression damping adjusting positions		
Minimum*	20	----
Standard*	6	----
Maximum*	1	----
* from the fully turned-in position		

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Item	Standard	Limit
Steering		
Steering bearing type	Angular ball bearings	----
Rear suspension		
Suspension type	Swingarm (link suspension)	----
Rear shock absorber assembly type	Coil spring/gas-oil damper	----
Rear shock absorber assembly travel	63 mm (2.48 in)	----
Spring		
Free length	160 mm (6.30 in)	----
Installed length	146 mm (5.75 in)	----
Spring rate (K1)	95 N/mm (9.69 kgf/mm, 543 lb/in)	----
Spring stroke (K1)	0 ~ 63 mm (0 ~ 2.48 in)	----
Optional spring available	No	----
Standard spring preload gas/air pressure	1,200 kPa (12 kgf/cm^2, 171 psi)	----
Spring preload adjusting positions		
Minimum	0 [11 mm (0.43 in)]	----
Standard	6 [14 mm (0.55 in)]	----
Maximum	20 [21 mm (0.84 in)]	----
Rebound damping adjusting positions		
Minimum*	50	----
Standard*	10	----
Maximum*	0	----
Compression damping adjusting positions		
Minimum*	25	----
Standard*	10	----
Maximum*	0	----
* from the fully turned-in position		
Swingarm		
Free play (at the end of the swingarm)		
Radial	----	1 mm (0.04 in)
Axial	----	1 mm (0.04 in)
Drive chain		
Model (manufacturer)	50ZVM (DAIDO)	----
Link quantity	118	----
Drive chain slack	40 ~ 50 mm (1.57 ~ 1.97 in)	----
Maximum ten-link section	150.1 mm (5.91 in)	----

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ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	----
Ignition system		
Ignition system type	C.D.I.	----
Ignition timing	5˚ BTDC at 1,100 r/min	----
Advanced timing	55˚ BTDC at 5,000 r/min	----
Advancer type	Throttle position sensor and electrical	----
Pickup coil resistance/color	421 ~ 569 Ω / Gy–B	----
C.D.I. unit model (manufacturer)	F8T19371 (MITSUBISHI)	----
Ignition coils		
Model (manufacturer)	F6T549 (MITSUBISHI)	----
Minimum ignition spark gap	6 mm (0.24 in)	----
Primary coil resistance	0.16 ~ 0.21 Ω	----
Secondary coil resistance	5.0 ~ 6.8 kΩ	----
Throttle position sensor standard resistance	4 ~ 6 kΩ	----
Charging system		
System type	AC magneto	----
Model (manufacturer)	F4T254 (MITSUBISHI)	----
Nominal output	14 V / 22.5 A at 5,000 r/min	----
Stator coil resistance	0.38 ~ 0.46 Ω at 20˚C (68˚F)	----
Rectifier/regulator		
Regulator type	Semiconductor-short circuit	----
Model	SH650D-11 (SHINDENGEN)	----
No-load regulated voltage	14.1 ~ 14.9 V	----
Capacity	18 A	----
Withstand voltage	200 V	----
Battery		
Battery type	GT9B-4	----
Battery voltage/capacity	12V / 8AH	----
Headlight type	Halogen bulb	
Indicator light type × quantity	LED × 5	
Bulbs (voltage/wattage × quantity)		
Headlight	R. 12 V 60 W × 1 / L. 12 V 51 W × 1	----
Auxiliary light	12 V 5 W × 2	----
Tail/brake light	12 V 5 W / 21 W × 1	----
Front turn signal light	12 V 21 W × 2	----
Rear turn signal light	12 V 21 W × 2	----
Meter light	12 V 1.4 W × 2	----

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Item	Standard	Limit
Electric starting system		
System type	Constant mesh	----
Starter motor		
Model (manufacturer)	SM-14 (MITSUBA)	----
Power output	0.6 kW	----
Armature coil resistance	0.0015 ~ 0.0025 Ω	----
Brushes		
Overall length	10 mm (0.40 in)	3.5 mm (0.14 in)
Spring force	7.16 ~ 9.52 N (730 ~ 971 gf, 25.8 ~ 34.3 oz)	----
Commutator resistance	0.025 ~ 0.035 Ω	----
Commutator diameter	28 mm (1.10 in)	27 mm (1.06 in)
Mica undercut	0.7 mm (0.03 in)	----
Starter relay		
Model (manufacturer)	MS5F-631 (JIDECO)	----
Amperage	180 A	----
Coil resistance	4.18 ~ 4.62 Ω	----
Horn		
Horn type	Plain	----
Model (manufacturer) × quantity	YF-12 (NIKKO) × 1	----
Max. amperage	3 A	----
Turn signal relay		
Relay type	Full-transistor	----
Model (manufacturer)	FE246BH (DENSO)	----
Self-cancelling device built-in	No	----
Turn signal blinking frequency	75 ~ 95 cycles/min.	----
Wattage	21 W × 2 + 3.4 W	----
Oil level switch model (manufacturer)	071380-0480 (DENSO)	----
Fuel pump relay model (manufacturer)	G8R-30Y-J (OMRON)	----
Thermo switch model (manufacturer)	5EB (NIPPON THERMOSTAT)	----
Fuses (amperage × quantity)		
Main fuse	30 A × 1	----
Headlight fuse	20 A × 1	----
Signaling system fuse	20 A × 1	----
EFI fuse	20 A × 1	----
ECU fuse	7.5 A × 1	----
Radiator fan fuse	7.5 A × 1	----
Backup fuse (odometer)	7.5 A × 1	----

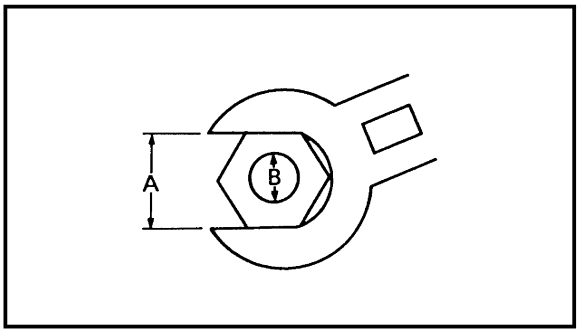
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EB202001

TIGHTENING TORQUES

GENERAL TIGHTENING TORQUES

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



A: Width across flats
B: Thread diameter

A (nut)	B (bolt)	General tightening torques		
		Nm	m•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

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ENGINE TIGHTENING TORQUES

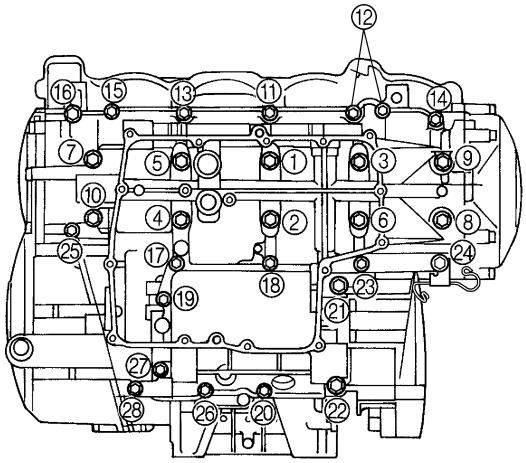
Item	Fastener	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kgf	ft·lb	
Spark plugs	–	M10	4	13	1.3	9.4	
Cylinder head	Nut	M10	8	50	5.0	36	E
Cylinder head	Cap nut	M10	2	50	5.0	36	E
Cylinder head	Bolt	M6	2	12	1.2	8.7	
Camshaft caps	Bolt	M6	28	10	1.0	7.2	E
Cylinder head cover	Bolt	M6	6	12	1.2	8.7	
Oil passage check bolt	Bolt	M8	1	20	2.0	14	
Cap bolt (timing chain tensioner)	Bolt	M6	1	10	1.0	7.2	
Camshaft sprocket	Bolt	M7	4	24	2.4	17	
Generator rotor	Bolt	M10	1	65	6.5	47	E
Pickup coil rotor	Bolt	M10	1	45	4.5	32	E
Water pump inlet pipe	Bolt	M6	1	10	1.0	7.2	LT
Water pump outlet pipe	Bolt	M6	1	10	1.0	7.2	LT
Oil/water pump assembly driven sprocket	Bolt	M6	1	15	1.5	11	LT
Oil pump	Bolt	M6	1	12	1.2	8.7	
Oil cooler	Bolt	M20	1	63	6.3	45	E
Engine oil drain bolt	–	M14	1	43	4.3	31	
Oil strainer housing	Bolt	M6	2	10	1.0	7.2	LT
Oil/water pump assembly driven sprocket cover	Bolt	M6	1	12	1.2	8.7	LT
Oil delivery pipe	Bolt	M6	1	10	1.0	7.2	LT
Oil filter bolt	Bolt	M20	1	70	7.0	50	
Oil filter cartridge	–	M20	1	17	1.7	12	E
Exhaust pipe joints	Bolt	M8	8	20	2.0	14	
Exhaust pipe	Bolt	M8	1	20	2.0	14	
Exhaust pipe bracket	Bolt	M8	1	24	2.4	17	
Exhaust pipe emission check bolts	Bolt	M6	4	10	1.0	7.2	
Muffler clamp	Bolt	M8	1	20	2.0	14	
Muffler	Bolt	M10	1	38	3.8	27	
Muffler bracket	Bolt	M8	2	28	2.8	20	
Crankcase (cylinder head)	Stud bolt	M10	10	10	1.0	7.2	E
Crankcase	Bolt	M9	10	32	3.2	23	E
Crankcase	Bolt	M6	2	14	1.4	10	E
Crankcase	Bolt	M6	14	12	1.2	8.7	E
Crankcase	Bolt	M8	2	24	2.4	17	E
Generator rotor cover	Bolt	M6	9	12	1.2	8.7	
Clutch cover	Bolt	M6	9	12	1.2	8.7	
Pickup coil rotor cover	Bolt	M6	7	12	1.2	8.7	

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Item	Fastener	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kgf	ft·lb	
Shift shaft cover	Bolt	M6	6	12	1.2	8.7	
Oil baffle plate	Bolt	M6	5	10	1.0	7.2	LT
Timing mark accessing screw	–	M8	1	15	1.5	11	
Starter clutch	Bolt	M6	3	12	1.2	8.7	LT
Clutch boss	Nut	M20	1	70	7.0	50	Use a lock washer.
Clutch spring	Bolt	M6	6	8	0.8	5.8	
Drive sprocket	Nut	M18	1	70	7.0	50	Use a lock washer.
Main axle bearing housing	Screw	M6	3	12	1.2	8.7	LT
Shift drum retainer	Bolt	M6	2	10	1.0	7.2	LT
Shift shaft spring stopper	Bolt	M8	1	22	2.2	16	LT
Shift rod locknut	Nut	M6	2	7	0.7	5.1	
Shift arm	Bolt	M6	1	10	1.0	7.2	
Stator coil	Bolt	M6	3	10	1.0	7.2	LT
Neutral switch	–	M10	1	20	2.0	14	
Pickup coil	Screw	M5	2	4	0.4	2.9	LT
Thermo switch	–	M16	1	23	2.3	17	
Camshaft sensor	Bolt	M6	1	10	1.0	7.2	LT
Speed sensor	Bolt	M6	1	10	1.0	7.2	LT
Coolant temperature sensor	–	M12	1	18	1.8	13	
Intake air temperature sensor	–	M12	1	18	1.8	13	
Intake air pressure sensor	Screw	M5	2	5	0.5	3.6	LT
Atmospheric pressure sensor	Screw	M5	2	5	0.5	3.6	LT
Air funnel	Bolt	M6	8	10	1.0	7.2	LT
Throttle body assembly	Bolt	M6	16	10	1.0	7.2	
Injector 2 cover	Bolt	M5	8	8	0.8	5.8	LT
Fuel distributor	Bolt	M6	6	10	1.0	7.2	LT
Injector fuel pipe 1,3 and 4	Union bolt	M12	3	30	3.0	22	
Injector fuel pipe 2	–	M12	1	30	3.0	22	
Fuel hose joint pipe	Bolt	M5	1	6	0.6	4.3	LT
Pressure sensor bracket	Bolt	M5	2	8	0.8	5.8	LT

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Crankcase tightening sequence:



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CHASSIS TIGHTENING TORQUES

Item	Thread size	Tightening torque			Remarks
		Nm	m·kgf	ft·lb	
Upper bracket pinch bolts	M8	26	2.6	19	
Steering stem nut	M28	115	11.5	85	
Handlebar pinch bolts	M6	13	1.3	9.4	
Lower ring nut	M30	9	0.9	6.5	See NOTE.
Lower bracket pinch bolts	M6	11	1.1	8.0	
Front brake hose union bolts	M10	30	3.0	22	
Front brake master cylinder	M6	13	1.3	9.4	
Engine mounting					
Spacer bolts	M16	18	1.8	13	
Left front mounting bolts	M10	40	4.0	29	
Right front mounting bolts	M10	40	4.0	29	
Rear mounting bolts	M10	55	5.5	40	
Pinch bolts	M8	17	1.7	12	
Exhaust pipe bracket	M8	24	2.4	17	
Pivot shaft nut	M18	125	12.5	90	
Connecting arms	M10	40	4.0	29	
Relay arm and connecting arms	M10	40	4.0	29	
Relay arm	M10	40	4.0	29	
Rear shock absorber and relay arm	M10	40	4.0	29	
Rear shock absorber assembly	M10	40	4.0	29	
Fuel pump and fuel tank	M5	4	0.4	2.9	
Coolant reservoir and radiator	M6	5	0.5	3.6	
Rider footrest bracket	M8	28	2.8	20	
Rear master cylinder	M8	23	2.3	17	
Rear brake hose union bolts	M10	30	3.0	22	
Sidestand bracket	M8	26	2.6	19	
Front wheel axle	M20	79	7.9	57	
Rear wheel axle	M24	150	15.0	110	
Rear wheel axle nut	M24	45	4.5	32	
Front brake caliper and front fork	M10	40	4.0	29	
Rear brake caliper and bracket	M10	40	4.0	29	
Brake disc and wheel	M6	18	1.8	13	
Rear wheel sprocket and rear wheel drive hub	M10	69	6.9	50	
Brake caliper and bleed screw	M8	6	0.6	4.3	
Pinch bolt (front wheel axle)	M8	23	2.3	17	

NOTE:

1. First, tighten the ring nut to approximately 18 Nm (1.8 m • kg, 13 ft • lb) with a torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.

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EB202000

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Bearings	E
Crankshaft pins	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts and nuts	MOLYKOTE® G-n paste
Crankshaft journals	E
Camshaft lobes	M
Camshaft journals	M
Valve stems (intake and exhaust)	M
Valve stem ends (intake and exhaust)	E
Water pump impeller shaft	E
Oil pump rotors (inner and outer)	E
Oil pump housing	E
Oil strainer	E
Starter clutch idle gear inner surface	E
Starter clutch assembly	E
Primary driven gear	E
Transmission gears (wheel and pinion)	M
Main axle and drive axle	M
Shift drum	E
Shift forks and shift fork guide bars	E
Shift shaft	E
Shift shaft boss	LS
Cylinder head cover mating surface	Yamaha bond No. 1215
Cylinder head cover	Yamaha bond No. 1215
Crankcase mating surface	Yamaha bond No. 1215
Clutch cover (crankcase mating surface)	Yamaha bond No. 1215
Generator rotor cover (crankcase mating surface)	Yamaha bond No. 1215
Pickup coil rotor cover (crankcase mating surface)	Yamaha bond No. 1215

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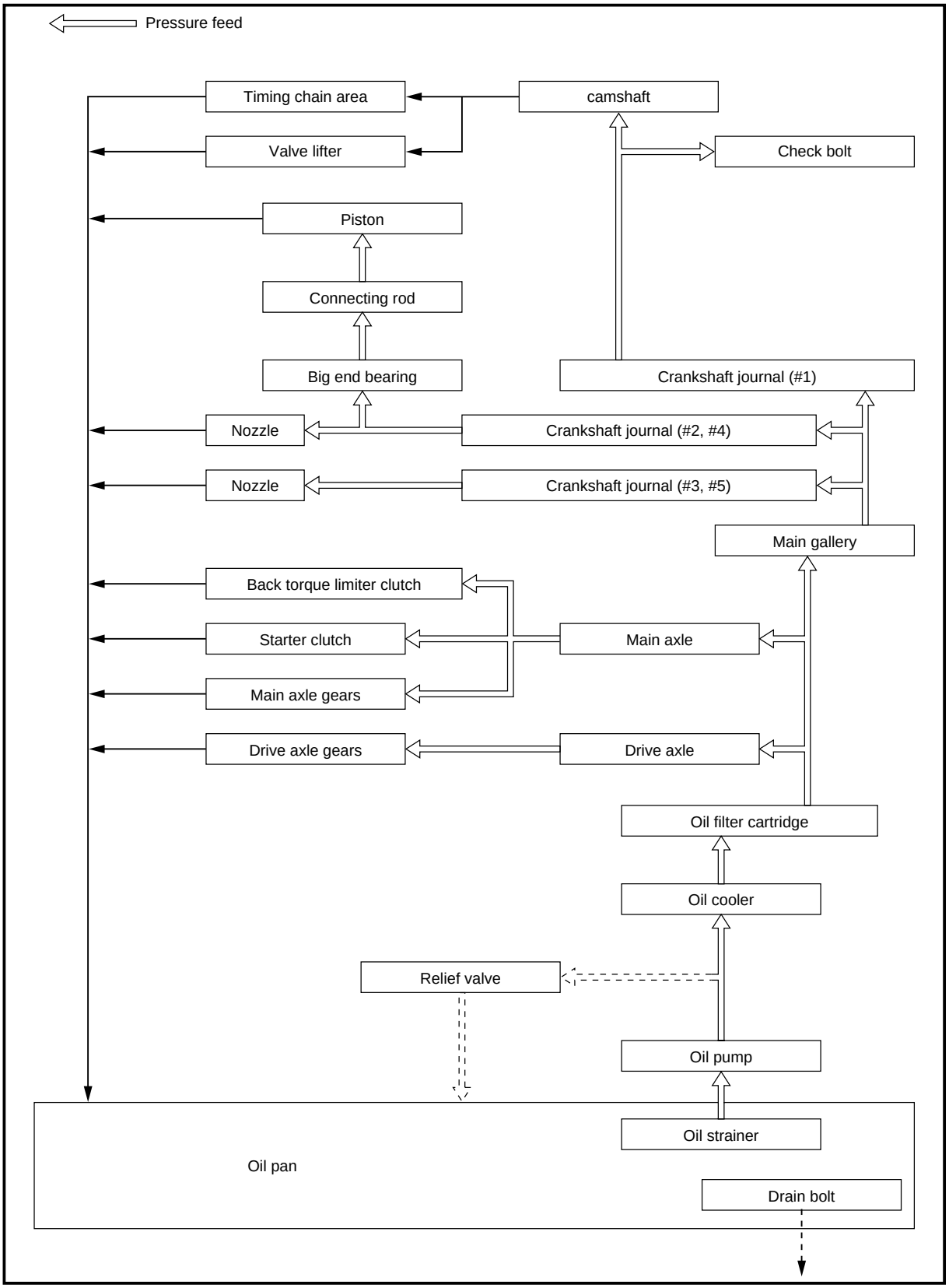
EB202010

CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	LS
Front wheel oil seal (right and left)	LS
Rear wheel oil seal	LS
Rear wheel drive hub oil seal	LS
Rear wheel drive hub mating surface	LS
Rear brake pedal	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Throttle grip inner surface	LS
Brake lever pivoting point and metal-to-metal moving parts	LS
Clutch lever pivoting point and metal-to-metal moving parts	LS
Pivot shaft	M
Connecting arm bearing (left and right)	M
Spacer (relay arm and connecting arm)	M
Oil seal (relay arm and connecting arm)	M

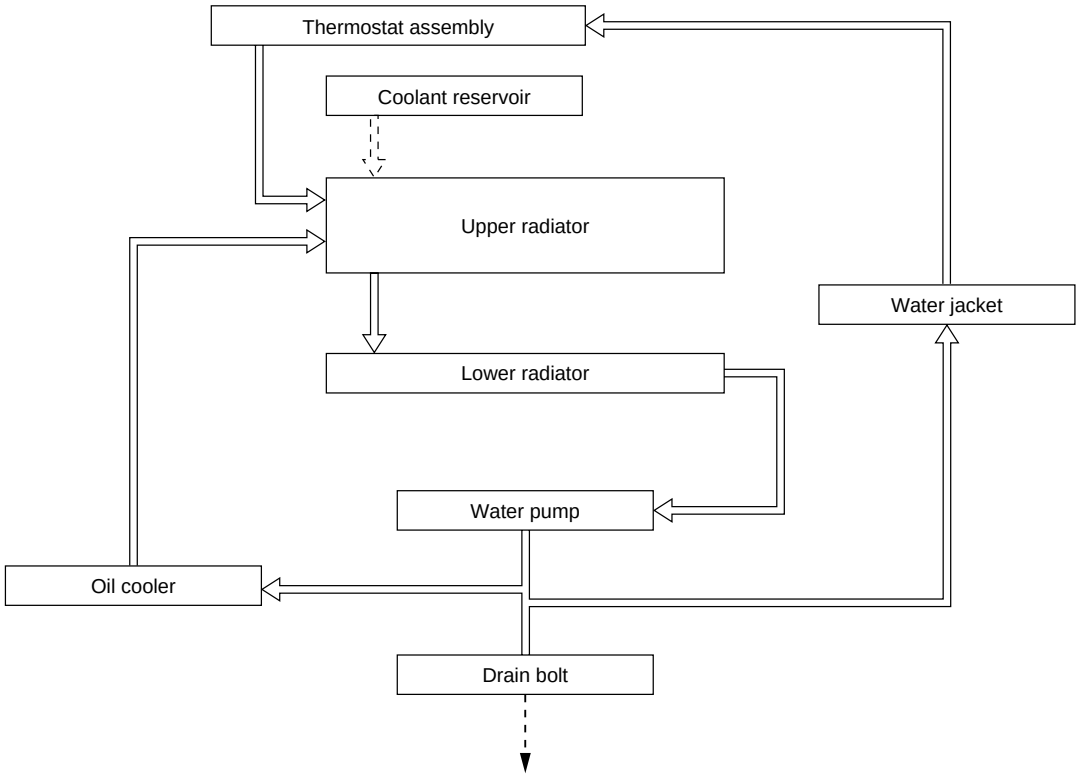
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OIL FLOW CHART



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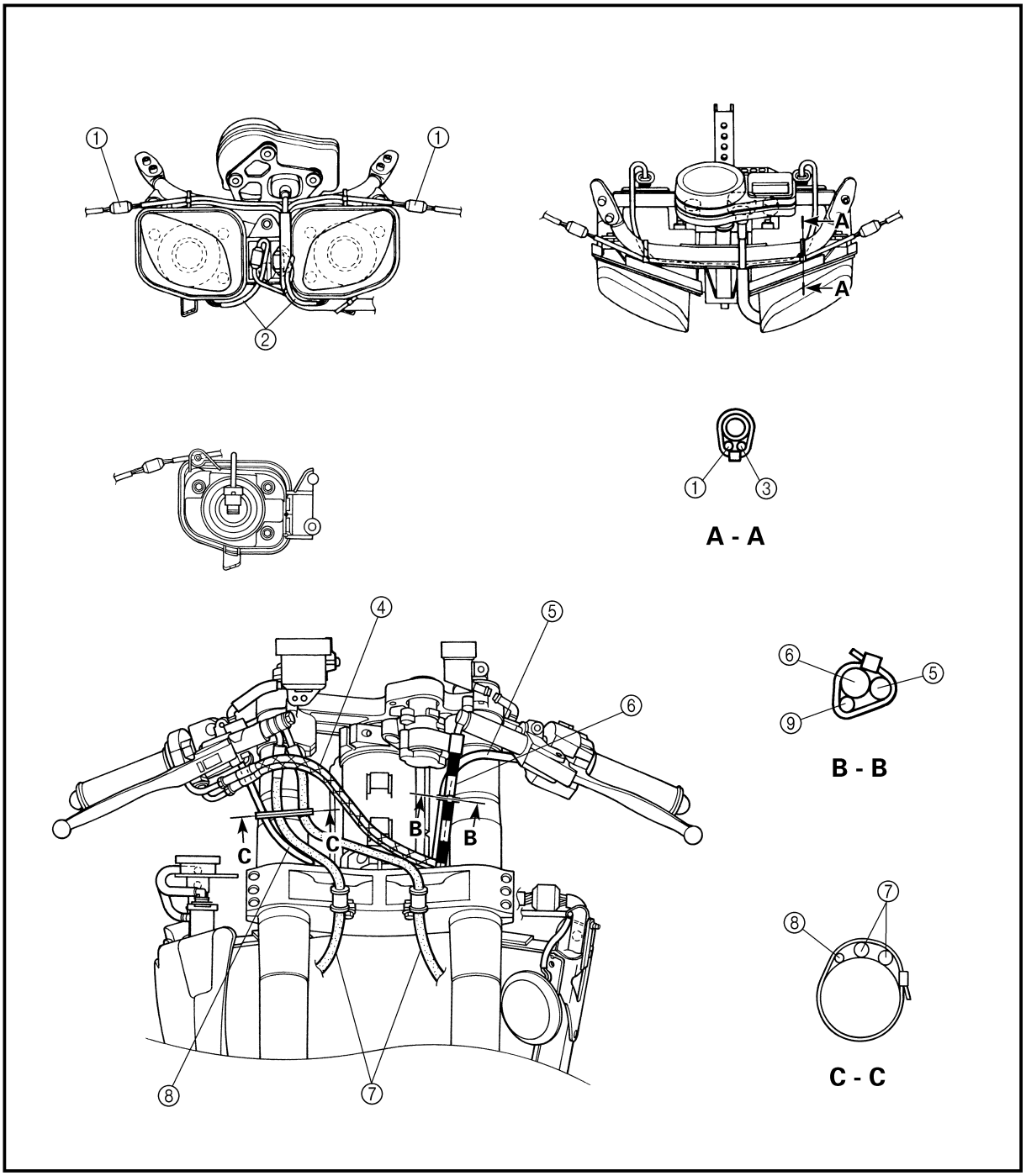
COOLANT FLOW CHART



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CABLE ROUTING

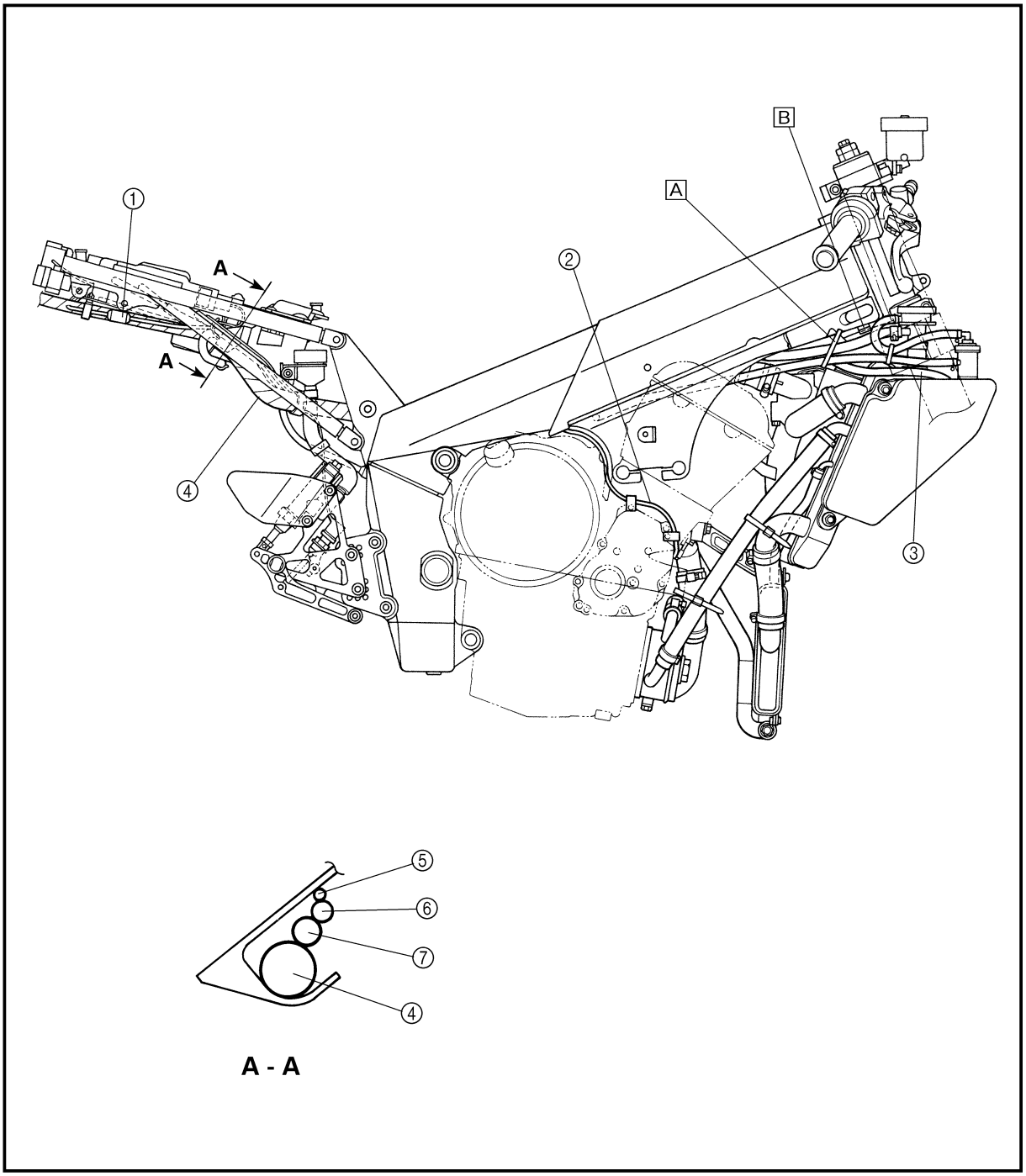
① Front turn signal coupler
② Auxiliary light lead
③ Headlight lead
④ Throttle cable
⑤ Left handlebar switch lead
⑥ Clutch hose
⑦ Front brake hose
⑧ Right handlebar switch lead
⑨ Main switch lead



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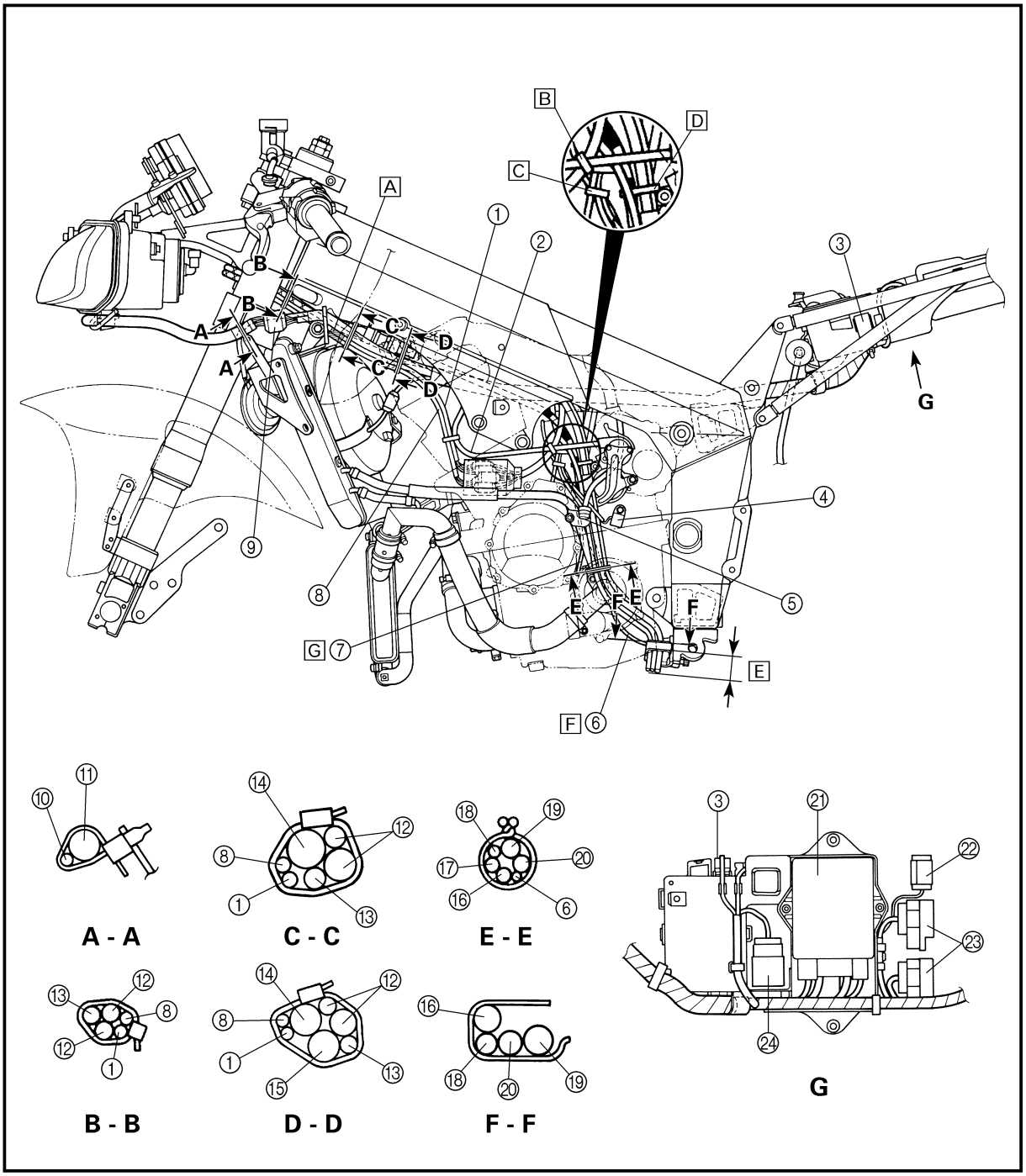
① Rear brake switch coupler
② Pickup coil lead
③ Thermo switch lead
④ Wire harness
⑤ Rear brake switch lead
⑥ Ground lead
⑦ Starter motor lead

A Fasten the coolant reservoir breather hose, thermo switch lead and thermostat assembly breather hose with a plastic locking tie. Do not crush the breather hoses with the plastic locking tie.
B Fasten the right handlebar switch lead with a plastic clamp.



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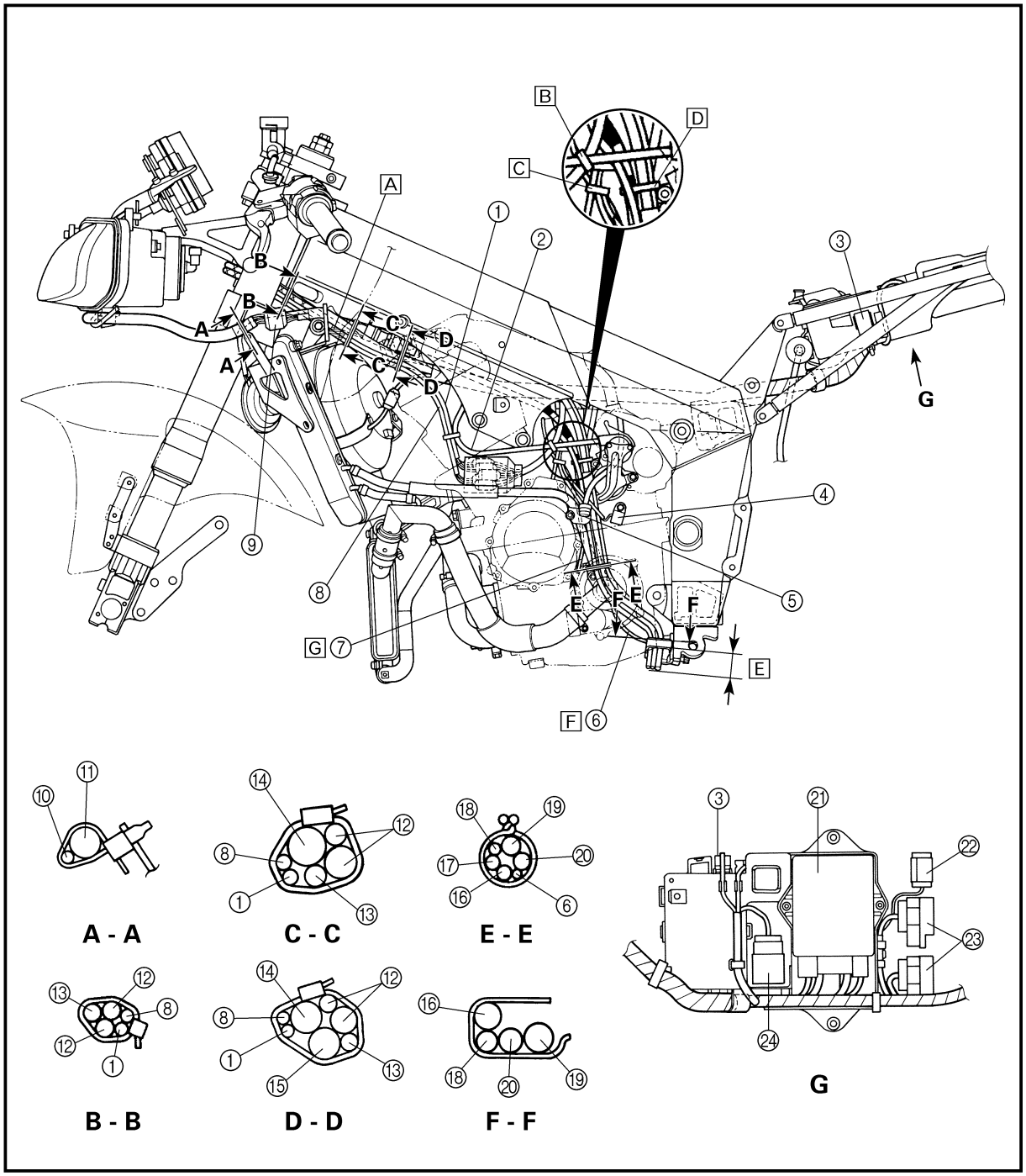
① Left handlebar switch lead
② Starter cable
③ Main relay
④ Speed sensor
⑤ Throttle stop screw
⑥ Sidestand switch lead
⑦ Oil level switch lead
⑧ Main switch lead
⑨ Headlight and meter sub-wire harness coupler
⑩ Horn lead
⑪ Headlight and meter sub-wire harness lead
⑫ Throttle cable
⑬ Clutch hose
⑭ Wire harness (to headlight and meter sub-wire harness)
⑮ Wire harness
⑯ Fuel tank overflow hose
⑰ Water pump breather hose
⑱ Coolant reservoir breather hose
⑲ Air filter case breather hose



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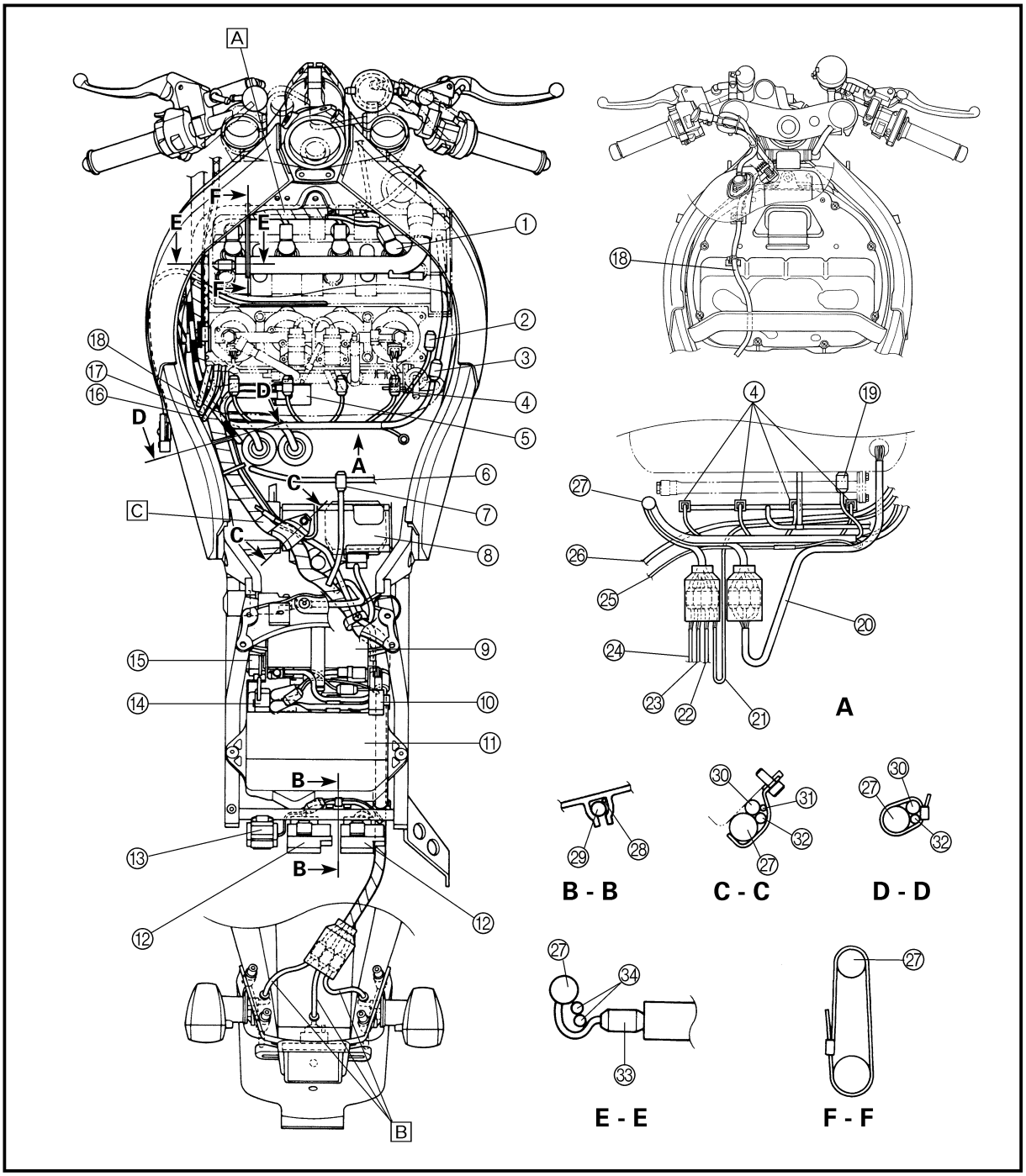
⑳ Fuel tank breather hose
㉑ CDI unit
㉒ Fall detection switch
㉓ Fuse box
㉔ Relay unit

[A] Align the portions of the main switch lead and left handlebar switch lead marked with white tape with the radiator bracket at the frame.
[B] Fasten the starter cable and wire harness with a plastic band.
[C] Fasten the oil level switch lead, speed sensor lead, sidestand switch lead and stator coil assembly lead with a plastic band.
[D] Fasten the air filter breather hose, fuel tank overflow hose, clutch hose and fuel tank breather hose with a plastic band.
[E] 20 mm (0.79 in)
[F] Route the sidestand switch lead behind the water pump breather hose.
[G] Route the oil level switch lead to the outside of the water pump breather hose guide.



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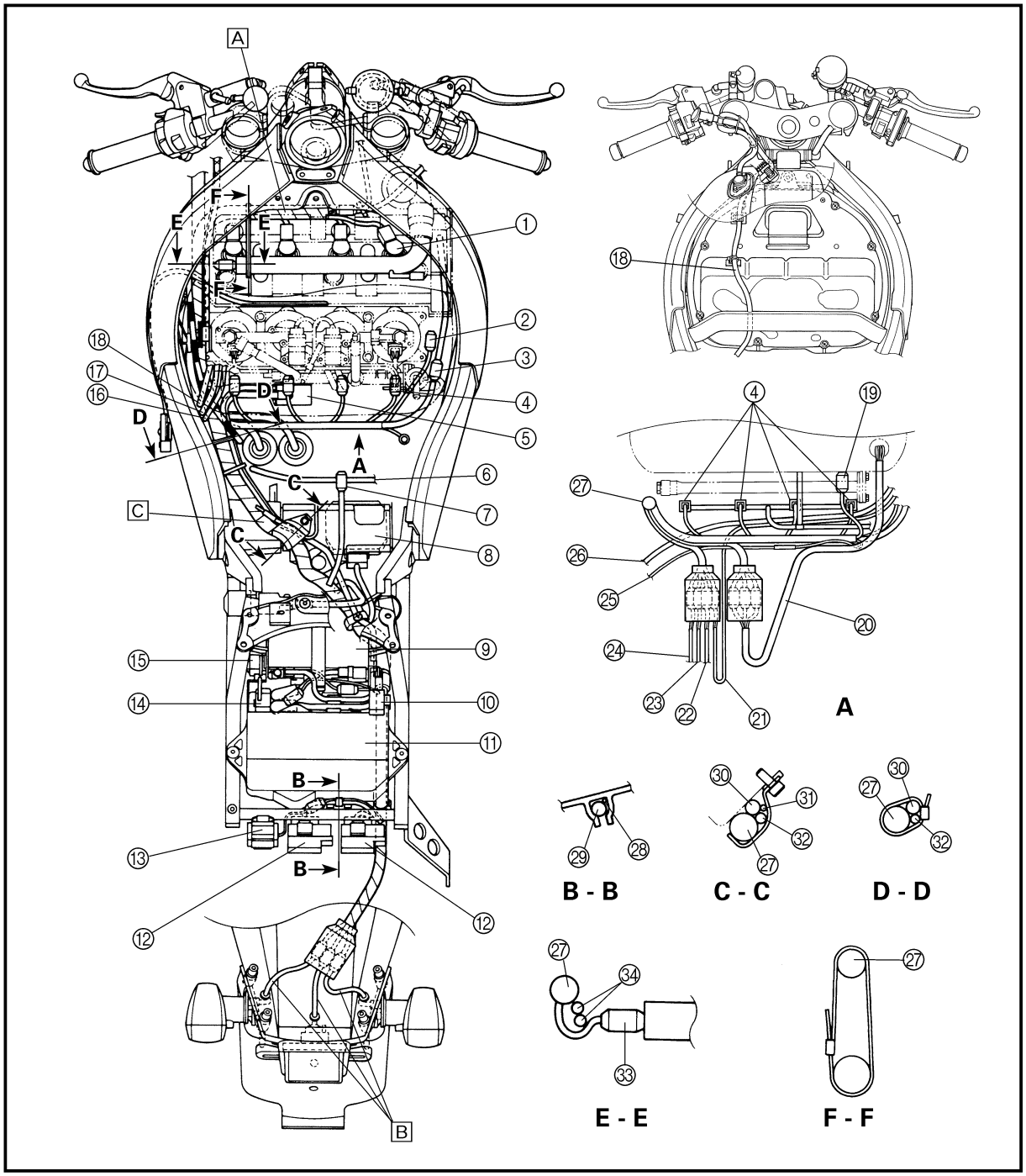
① Ignition coil
② Throttle position sensor coupler
③ Camshaft sensor
④ Injector 1 coupler
⑤ Starter motor
⑥ Fuel tank overflow hose
⑦ Fuel pump coupler
⑧ Rectifier/regurator
⑨ Battery
⑩ Turn signal relay
⑪ ECU
⑫ Fuse box
⑬ Fall detection switch
⑭ Starter relay
⑮ Main relay
⑯ Throttle stop screw cable
⑰ Fuel tank breather hose
⑱ Air filter case breather hose
⑲ Intake air temperature sensor coupler
⑳ Injector 2 sub-lead



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㉑ Pickup coil lead
㉒ Stator coil lead
㉓ Speed sensor lead
㉔ Sidestand switch lead
㉕ Oil level switch lead
㉖ Coolant reservoir breather hose
㉗ Wire harness
㉘ Wire harness lead (to fall detection switch coupler)
㉙ Wire harness lead (to fuse box)
㉚ Starter motor lead
㉛ Neutral switch lead
㉜ Ground lead
㉝ Coolant temperature sensor coupler
㉞ Throttle cable

A Route the wire harness in front of the ignition coils.
B Be sure that there is no slack in the tail/brake light lead and rear turn signal leads below the rear fender panel.
C Align the portions of the wire harness, ground lead and starter motor lead marked with white tape with the lead holder.



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EB300000

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

No.		ITEM	CHECKS AND MAINTENANCE JOBS	INITIAL 1,000 km	EVERY	
					6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
1	*	**Fuel line**	• Check fuel hoses for cracks or damage. • Replace if necessary.		√	√
2	*	**Fuel filter**	• Check condition. • Replace if necessary.	**Every 50,000 km**		
3		**Spark plugs**	• Check condition. • Clean, regap or replace if necessary.	√	√	√
4	*	**Valves**	• Check valve clearance. • Adjust if necessary.	**Every 42,000 km or 42 months (whichever comes first)**		
5		**Air filter element**	• Clean or replace if necessary.		√	√
6		**Clutch**	• Check operation and fluid leakage. (See NOTE on page 3-2.) • Correct if necessary.	√	√	√
7	*	**Front brake**	• Check operation, fluid level and vehicle for fluid leakage. (See NOTE on page 3-2.) • Correct accordingly. • Replace brake pads if necessary.	√	√	√
8	*	**Rear brake**	• Check operation, fluid level and vehicle for fluid leakage. (See NOTE on page 3-2.) • Correct accordingly. • Replace brake pads if necessary.	√	√	√
9	*	**Wheels**	• Check balance, runout and for damage. • Rebalance or replace if necessary.		√	√
10	*	**Tires**	• Check tread depth and for damage. • Replace if necessary. • Check air pressure. • Correct if necessary.		√	√
11	*	**Wheel bearings**	• Check bearing for looseness or damage. • Replace if necessary.		√	√
12	*	**Swingarm**	• Check swingarm pivoting point for play. • Correct if necessary. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√
13		**Drive chain**	• Check chain slack. • Adjust if necessary. Make sure that the rear wheel is properly aligned. • Clean and lubricate.	**Every 1,000 km and after washing the motorcycle or riding in rain.**		
14	*	**Steering bearings**	• Check bearing play and steering for roughness. • Correct accordingly. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√

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No.		ITEM	CHECKS AND MAINTENANCE JOBS	INITIAL 1,000 km	EVERY	
					6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
15	*	**Chassis fasteners**	• Make sure that all nuts, bolts and screws are properly tightened. • Tighten if necessary.		√	√
16		**Sidestand**	• Check operation. • Lubricate and repair if necessary.		√	√
17	*	**Sidestand switch**	• Check operation. • Replace if necessary.	√	√	√
18	*	**Front fork**	• Check operation and for oil leakage. • Correct accordingly.		√	√
19	*	**Rear shock absorber assembly**	• Check operation and shock absorber for oil leakage. • Replace shock absorber assembly if necessary.		√	√
20	*	**Rear suspension relay arm and connecting arm pivoting points**	• Check operation. • Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).		√	√
21	*	**Electronic fuel injection system**	• Check engine idling speed, synchronization and starter operation. • Adjust if necessary.	√	√	√
22		**Engine oil**	• Check oil level and vehicle for oil leakage. • Correct if necessary. • Change. (Warm engine before draining.)	√	√	√
23		**Engine oil filter cartridge**	• Replace.	√		√
24	*	**Cooling system**	• Check coolant level and vehicle for coolant leakage. • Correct if necessary. • Change coolant every 24,000 km 24 months (whichever comes first).		√	√

* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

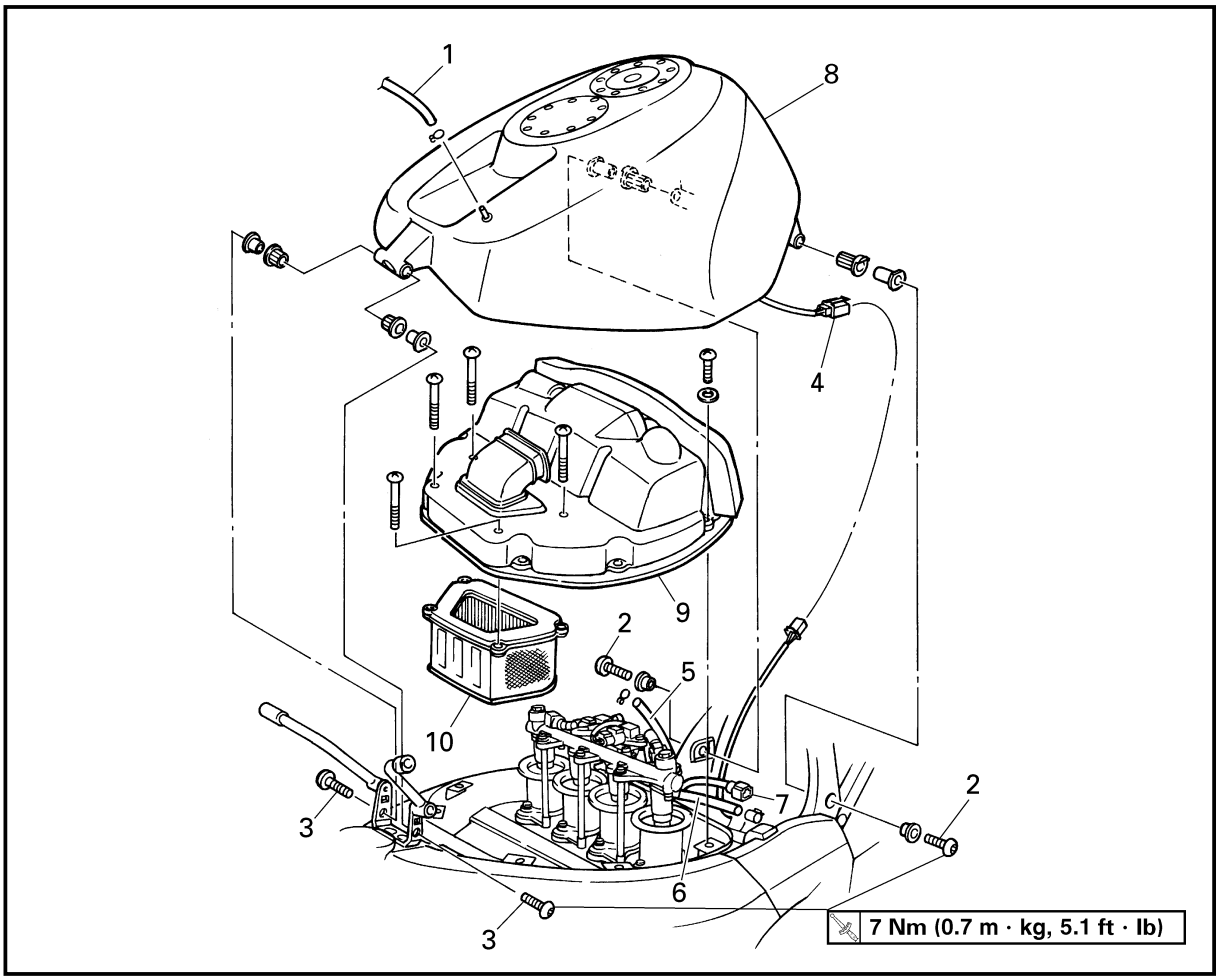
NOTE:

- The air filter element needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake system
  - Replace the brake fluid or clutch fluid after disassembling the master cylinder, caliper cylinder or release cylinder.
  - Check the brake fluid or clutch fluid level and add fluid as required.
  - Replace the master cylinder, caliper cylinder and release cylinder oil seals every two years.
  - Replace the brake hoses and clutch hose every four years, or if cracked or damaged.

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EB302010
FUEL TANK AND AIR FILTER



Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank and air filter		Remove the parts in the order listed.
	Fuel		Drain.
1	Fuel tank breather hose	1	
2	Bolt	2	
3	Bolt	2	
4	Fuel pump coupler	1	Disconnect.
5	Fuel tank overflow hose	1	
6	Fuel return hose	1	Disconnect.
7	Fuel hose	1	Disconnect.
8	Fuel tank	1	
9	Air filter case cover	1	
10	Air filter element	1	
			For installation, reverse the removal procedure.

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REMOVAL

1. Drain:
   • fuel
   (completely from the fuel tank)

NOTE:
Remove the fuel tank cap and use a pump to remove the fuel from the fuel tank.
The fuel tank must be drained to avoid leakage at the fuel pump outlet.

2. Disconnect:
   • fuel pump coupler
   • fuel hose
   • fuel return hose

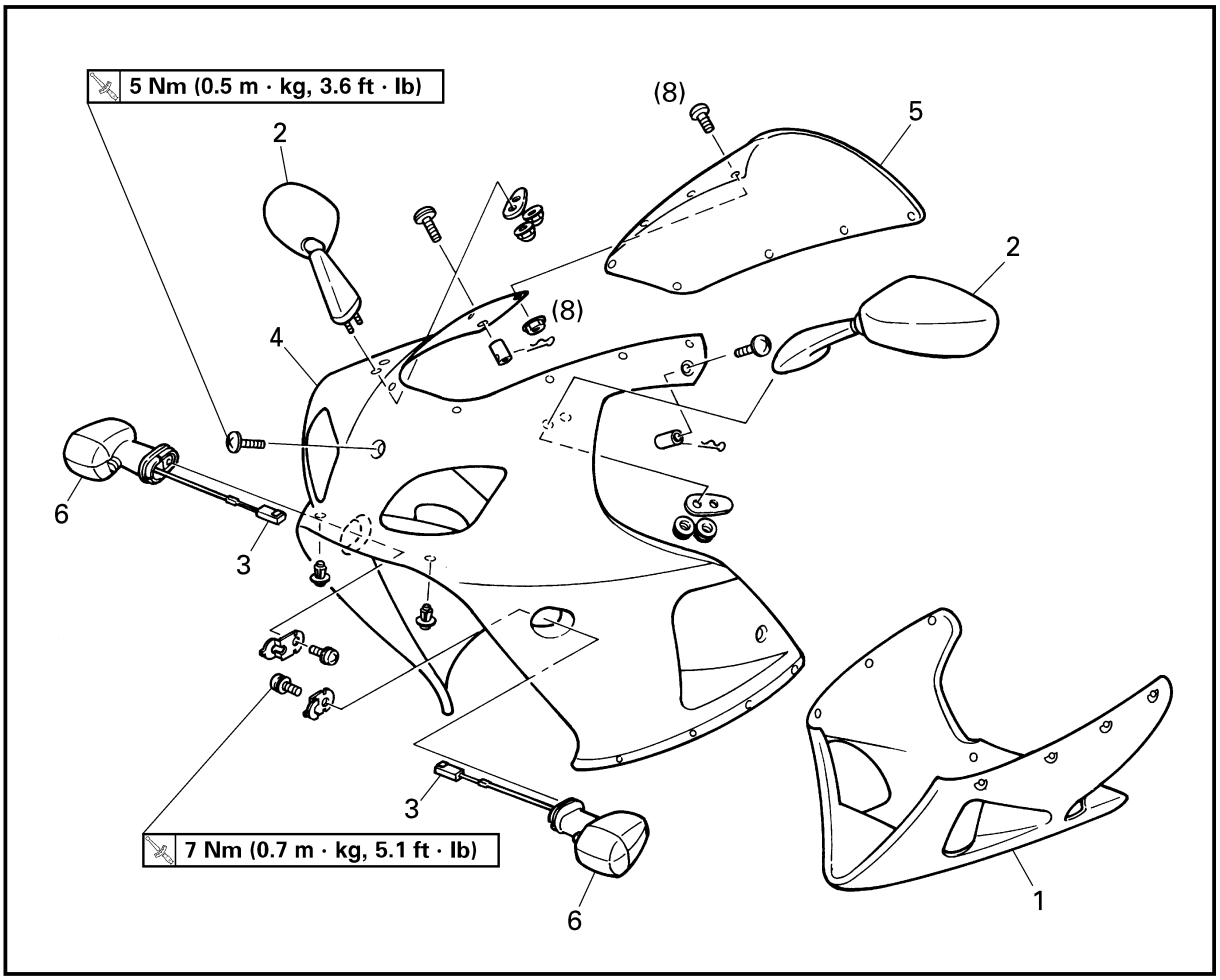
⚠ WARNING

Gasoline is highly flammable.
Avoid spilling fuel on the hot engine.

NOTE:
Wrap the rag over the fuel hose joints to avoid spilling fuel.

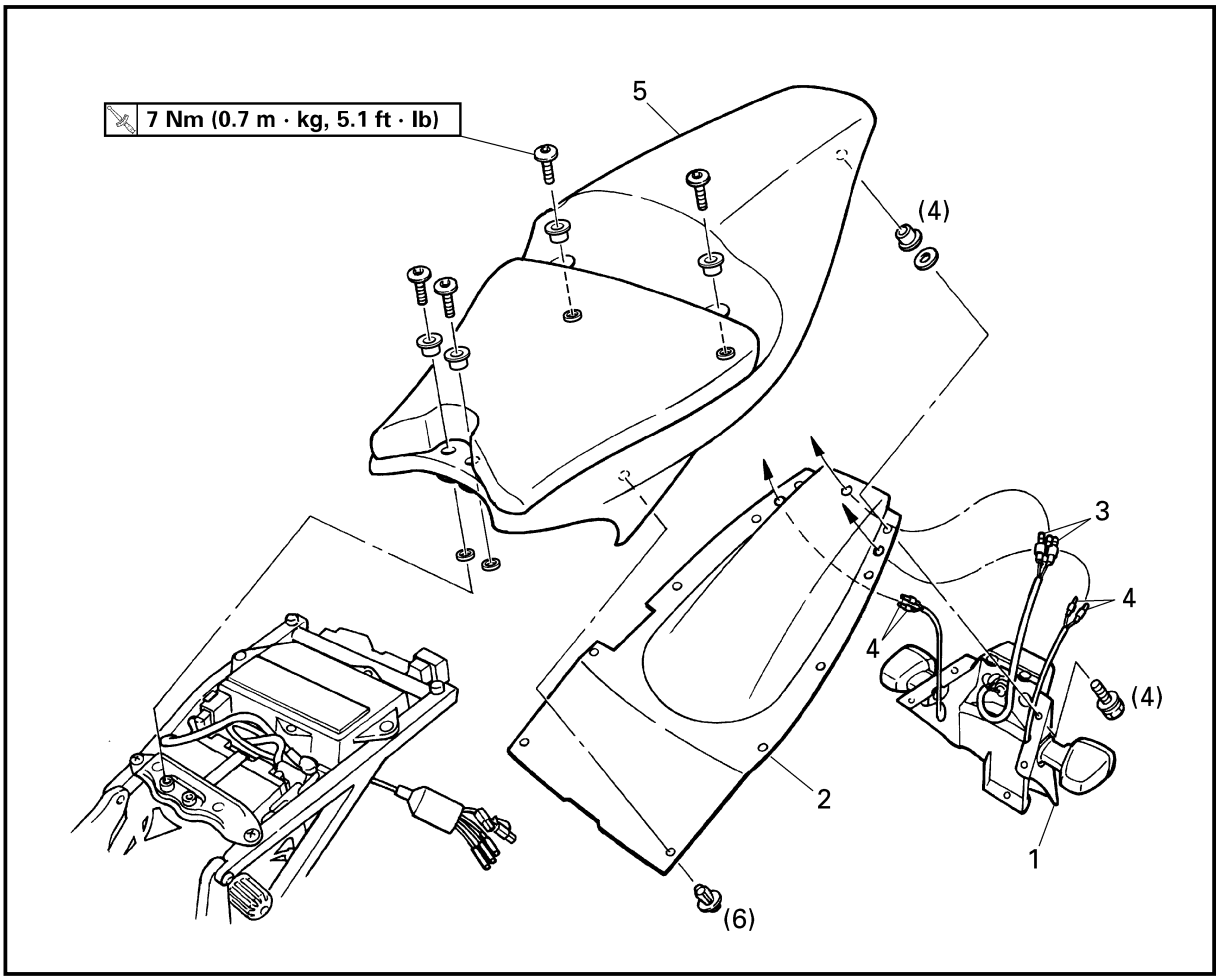
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EB302020
COWLINGS



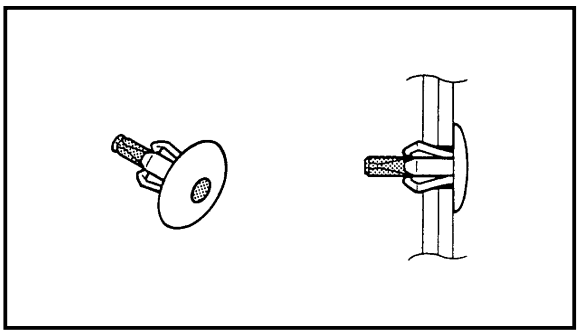
Order	Job/Part	Q'ty	Remarks
	Removing the front cowling		Remove the parts in the order listed.
1	Bottom cowling	1	
2	Rear view mirror	2	
3	Front turn signal coupler	2	Disconnect.
4	Front cowling	1	
5	Windshield	1	
6	Front turn signal	2	
			For installation, reverse the removal procedure.

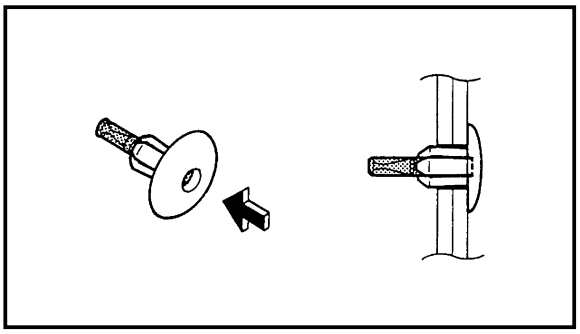
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Order	Job/Part	Q'ty	Remarks
	Removing the rear cowling		Remove the parts in the order listed.
1	Rear fender	1	
2	Rear fender panel	1	
3	Tail/brake light connector	2	Disconnect.
4	Rear turn signal connector	4	Disconnect.
5	Rear cowling	1	
			For installation, reverse the removal procedure.

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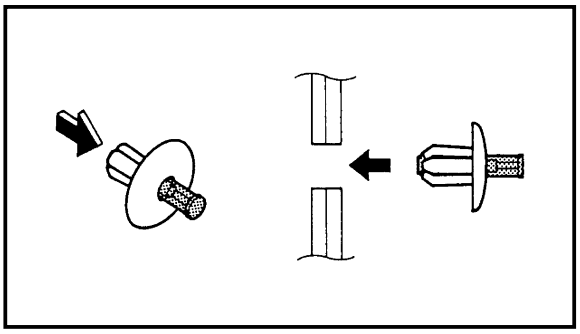


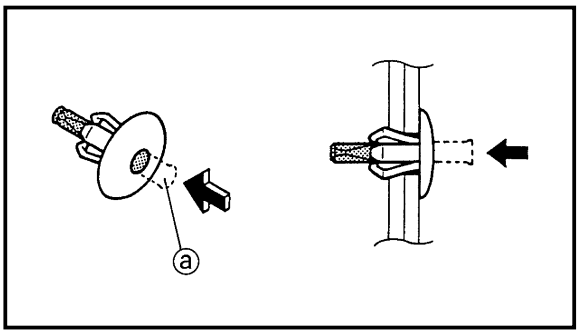


REMOVAL

1. Remove:
   • rear cowling

NOTE:
To remove the quick fastener, push its center in with a screwdriver, then pull the fastener out.





INSTALLATION

1. Install:
   • rear cowling

NOTE:
To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the cowling and push the pin ⓐ in with a screwdriver. Make sure that the pin is flush with the fastener's head.

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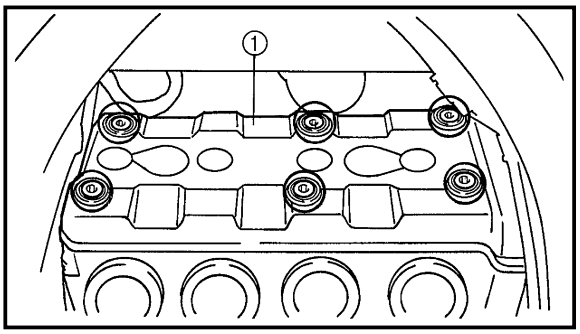
EB303001
ENGINE

ADJUSTING THE VALVE CLEARANCE

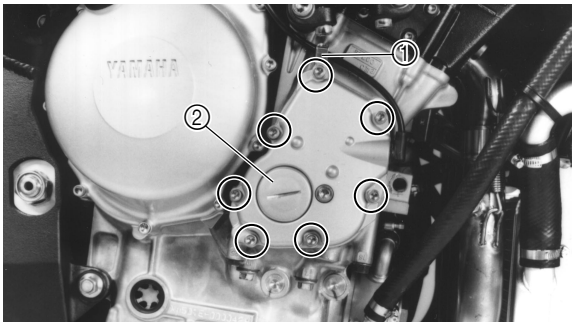
The following procedure applies to all of the valves.

NOTE:
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

1. Remove:
   - bottom cowling
   - front cowling
   - rear cowling
   Refer to "COWLINGS".
   - fuel tank
   - air filter case cover
   Refer to "FUEL TANK AND AIR FILTER".
   - air filter case
   - throttle body assembly
   Refer to "ELECTRONIC FUEL INJECTION" IN CHAPTER 6.
   - radiator assembly
   - thermostat assembly
   Refer to "RADIATOR AND THERMOSTAT" in chapter 5.

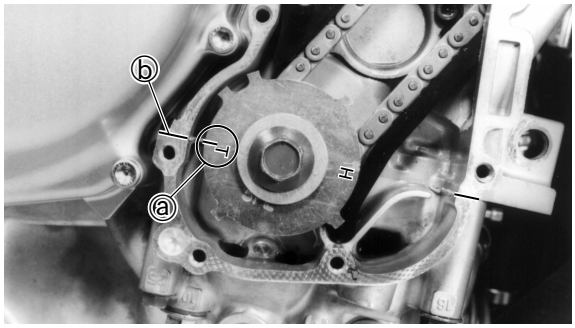


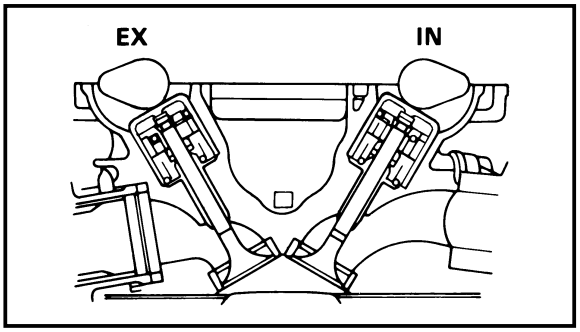
2. Disconnect:
   - camshaft sensor coupler
   - ignition coil couplers
3. Remove:
   - ignition coils
   - spark plugs
   - cylinder head cover ①
   - cylinder head cover gasket

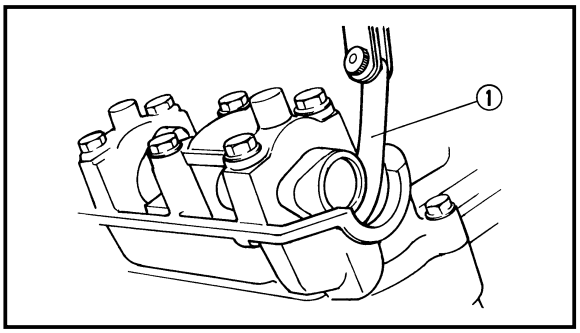


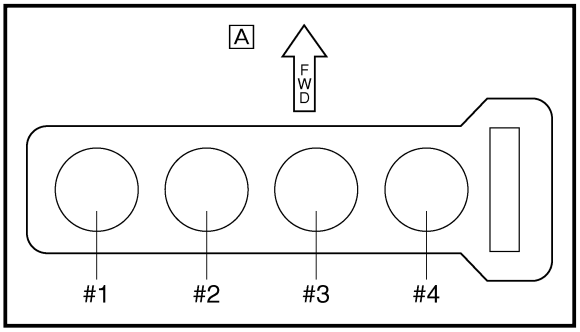
4. Remove:
   - pickup coil lead holder ①
   - pickup coil rotor cover ②

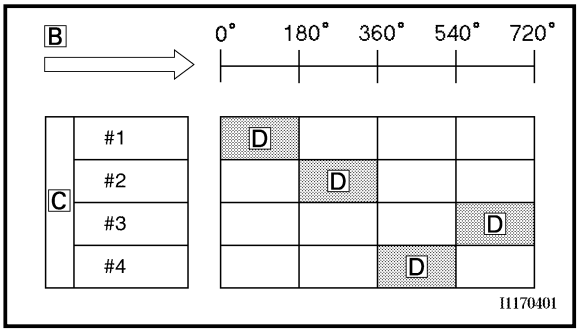
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5. Measure:
   - valve clearance
     Out of specification → Adjust.

Valve clearance (cold)
Intake valve
0.20 ~ 0.25 mm
(0.0079 ~ 0.0098 in)
Exhaust valve
0.25 ~ 0.30 mm
(0.0098 ~ 0.0119 in)

a. Turn the crankshaft clockwise.

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

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

c. Measure the valve clearance with a thickness gauge ①.

NOTE:
- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2 → #4 → #3

A Front

d. To measure the valve clearances of the other cylinders, starting with cylinder #1 at TDC, turn the crankshaft counterclockwise as specified in the following table.

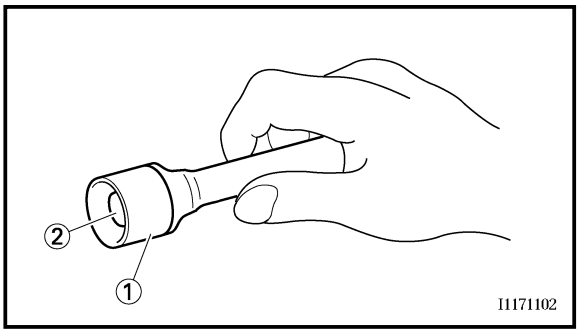
B Degrees that the crankshaft is turned counterclockwise
C Cylinder
D Combustion cycle

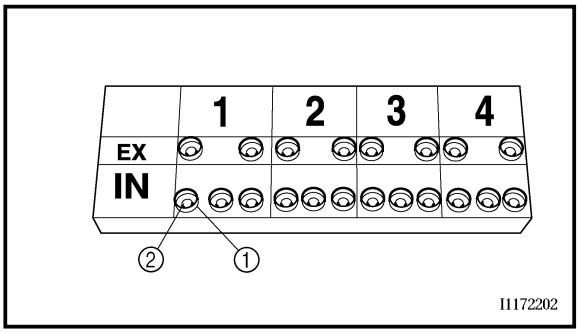
Cylinder #2	**180°**
Cylinder #4	**360°**
Cylinder #3	**540°**

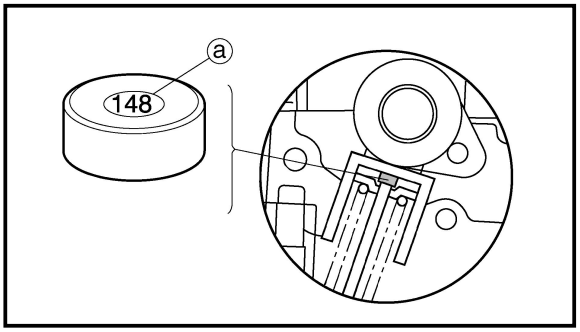
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6. Remove:
   - timing chain tensioner
   - timing chain guide (exhaust side)
   - intake camshaft caps
   - exhaust camshaft caps
   - timing chain
     (from the camshaft sprockets)
   - intake camshaft
   - exhaust camshaft

NOTE:
- Refer to "CAMSHAFTS" in chapter 4.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.







7. Adjust:
   - valve clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Remove the valve lifter ① and the valve pad ②.

NOTE:
- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
- Make a note of the position of each valve lifter ① and valve pad ② so that they can be installed in the correct place.

b. Select the proper valve pad from the following table.

Valve pad thickness range		Available valve pads
Nos. 120 ~ 240	1.20 ~ 2.40 mm	25 thicknesses in 0.05 mm increments

NOTE:
- The thickness ⓐ of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.
- Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.

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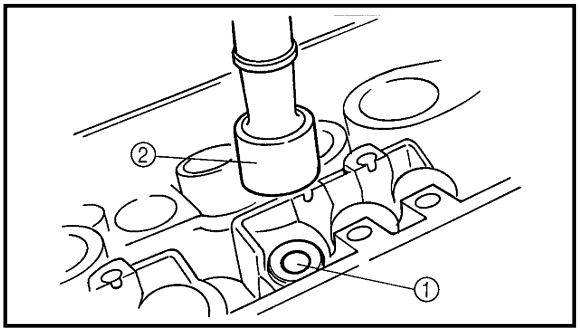
c. Round off the original valve pad number according to the following table.

Last digit	Rounded value
0 or 2	0
5	5
8	10

EXAMPLE:
Original valve pad number = 148 (thickness = 1.48 mm)
Rounded value = 150

d. Locate the rounded number of the original valve pad and the measured valve clearance in the valve pad selection table. The point where the column and row intersect is the new valve pad number.

NOTE:
The new valve pad number is only an approximation. The valve clearance must be measured again and the above steps should be repeated if the measurement is still incorrect.



e. Install the new valve pad ① and the valve lifter ②.

NOTE:
- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with molybdenum disulfide oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.

f. Install the exhaust and intake camshafts, timing chain and camshaft caps.

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

NOTE:
- Refer to "CAMSHAFTS" in chapter 4.
- Lubricate the camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft marks with the camshaft cap marks.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

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VALVE PAD SELECTION TABLE

INTAKE

B MEASURED VALVE CLEARANCE	A ORIGINAL VALVE PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.01					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.02 ~ 0.07				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.08 ~ 0.13			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.14 ~ 0.19		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.20 ~ 0.25	C STANDARD CLEARANCE																								
0.26 ~ 0.31	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.32 ~ 0.37	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.38 ~ 0.43	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.44 ~ 0.49	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.50 ~ 0.55	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.56 ~ 0.61	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.62 ~ 0.67	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.68 ~ 0.73	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.74 ~ 0.79	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.80 ~ 0.85	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.86 ~ 0.91	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.92 ~ 0.97	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.98 ~ 1.03	185	190	195	200	205	210	215	220	225	230	235	240													
1.04 ~ 1.09	190	195	200	205	210	215	220	225	230	235	240														
1.10 ~ 1.15	195	200	205	210	215	220	225	230	235	240															
1.16 ~ 1.21	200	205	210	215	220	225	230	235	240																
1.22 ~ 1.27	205	210	215	220	225	230	235	240																	
1.28 ~ 1.33	210	215	220	225	230	235	240																		
1.34 ~ 1.39	215	220	225	230	235	240																			
1.40 ~ 1.45	220	225	230	235	240																				
1.46 ~ 1.51	225	230	235	240																					
1.52 ~ 1.57	230	235	240																						
1.58 ~ 1.63	235	240																							
1.64 ~ 1.69	240																								

Example:
Valve Clearance (cold)
0.20 ~ 0.25 mm (0.008 ~ 0.010 in)
Rounded value 150
Measured valve clearance is 0.35 mm (0.014 in)
Replace pad 150 with pad 160
Pad No. 150 = 1.50 mm (0.060 in)
Pad No. 160 = 1.60 mm (0.062 in)
Always install the valve pad with the number facing down.

EXHAUST

B MEASURED VALVE CLEARANCE	A ORIGINAL VALVE PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.01						120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
0.01 ~ 0.06					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.07 ~ 0.12				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.13 ~ 0.18			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.19 ~ 0.24		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.25 ~ 0.30	C STANDARD CLEARANCE																								
0.31 ~ 0.36	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.37 ~ 0.42	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.43 ~ 0.48	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.49 ~ 0.54	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.55 ~ 0.60	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.61 ~ 0.66	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.67 ~ 0.72	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.73 ~ 0.78	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.79 ~ 0.84	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.85 ~ 0.90	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.91 ~ 0.96	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.97 ~ 1.02	180	185	190	195	200	205	210	215	220	225	230	235	240												
1.03 ~ 1.08	185	190	195	200	205	210	215	220	225	230	235	240													
1.09 ~ 1.14	190	195	200	205	210	215	220	225	230	235	240														
1.15 ~ 1.20	195	200	205	210	215	220	225	230	235	240															
1.21 ~ 1.26	200	205	210	215	220	225	230	235	240																
1.27 ~ 1.32	205	210	215	220	225	230	235	240																	
1.33 ~ 1.38	210	215	220	225	230	235	240																		
1.39 ~ 1.44	215	220	225	230	235	240																			
1.45 ~ 1.50	220	225	230	235	240																				
1.51 ~ 1.56	225	230	235	240																					
1.57 ~ 1.62	230	235	240																						
1.63 ~ 1.68	235	240																							
1.69 ~ 1.74	240																								

Example:
Valve Clearance (cold)
0.25 ~ 0.30 mm (0.010 ~ 0.012 in)
Rounded value 175
Measured valve clearance is 0.40 mm (0.016 in)
Replace pad 175 with pad 185
Pad No. 175 = 1.75 mm (0.069 in)
Pad No. 185 = 1.85 mm (0.073 in)
Always install the valve pad with the number facing down.

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g. Measure the valve clearance again.

h. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

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8. Install:
   • all removed parts

NOTE:
For installation, reverse the removal procedure. Note the following points.

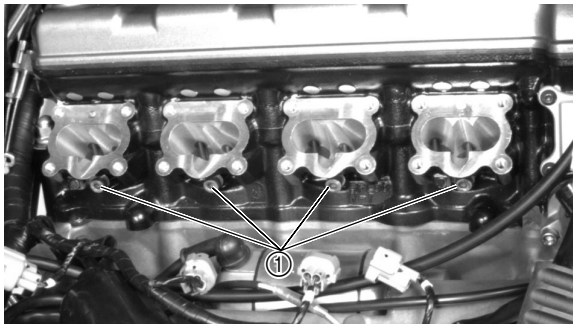
SYNCHRONIZING THE THROTTLE BODIES

NOTE:
Prior to synchronizing the throttle bodies, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

1. Stand the motorcycle on a level surface.

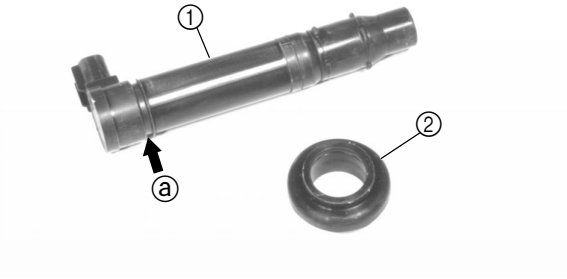
NOTE:
Place the motorcycle on a suitable stand.

2. Remove:
   • fuel tank
     Refer to "FUEL TANK AND AIR FILTER".
   • bottom cowling
   • front cowling
     Refer to "COWLINGS".



3. Remove:
   • bolts ①
   • copper washers

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4. Install:
   • vacuum gauge attachments
     (into the bolt holes)
   • vacuum gauge
     (onto the vacuum gauge attachments)
   • engine tachometer
     (onto the ignition coil of cylinder #1)

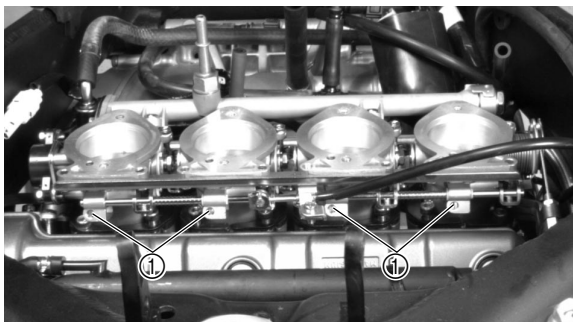
Vacuum gauge
90890-03094
Vacuum gauge attachment
90890-03060
Engine tachometer
90890-06760

NOTE:
Disconnect the ignition coil coupler and remove the ignition coil ① of cylinder #1, remove the rubber cover ②, and wrap the engine tachometer lead several times around section ⓐ of the ignition coil. Then, install the ignition coil and connect the ignition coil coupler.

5. Install:
   • fuel tank
     Refer to "FUEL TANK AND AIR FILTER".
6. Start the engine and let it warm up for several minutes.

7. Measure:
   • engine idling speed
     Out of specification → Adjust.
     Refer to "ADJUSTING THE ENGINE IDLING SPEED".

Engine idling speed
1,000 ~ 1,200 r/min



8. Adjust:
   • throttle body synchronization

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Turn the air screws ① to adjust the vacuum pressure of all throttle bodies to specification.

NOTE:
Do not turn the synchronizing screws.

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Vacuum pressure at engine idling speed
15.8 ~ 18.4 kPa (120 ~ 140 mm Hg, 4.72 ~ 5.51 in Hg)

NOTE:
The difference in vacuum pressure between two throttle bodies should not exceed 1.33 kPa (10 mm Hg, 0.4 in Hg).

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9. Measure:
   • engine idling speed
   Out of specification → Adjust.
10. Stop the engine and remove the measuring equipment.
11. Adjust:
   • throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".



Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

ADJUSTING THE ENGINE IDLING SPEED

NOTE:
Prior to adjusting the engine idling speed, the throttle body synchronization should be adjusted properly, the air filter element should be clean, and the engine should have adequate compression.

1. Start the engine and let it warm up for several minutes.
2. Remove:
   • bottom cowling
   • front cowling
   Refer to "COWLINGS".

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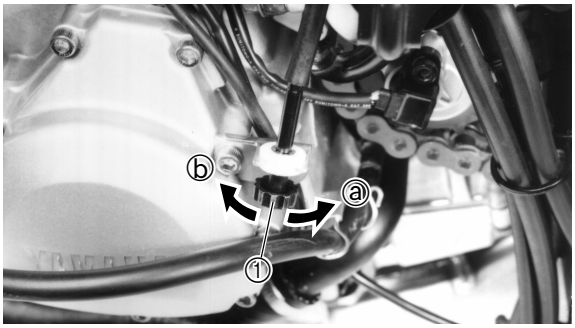
3. Install:
   • engine tachometer
   (onto the ignition coil of cylinder #1)

	Engine tachometer **90890-06760**

NOTE:
Refer to "SYNCHRONIZING THE THROTTLE BODIES" for the engine tachometer installation.

4. Measure:
   • engine idling speed
   Out of specification → Adjust.

	Engine idling speed **1,000 ~ 1,200 r/min**



5. Adjust:
   • engine idling speed

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a. Turn the throttle stop screw ① in direction ⓐ or ⓑ until the specified engine idling speed is obtained.

Direction ⓐ	**Engine idling speed is increased.**
Direction ⓑ	**Engine idling speed is decreased.**

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6. Adjust:
   • throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

	Throttle cable free play **(at the flange of the throttle grip)** **3 ~ 5 mm (0.12 ~ 0.20 in)**

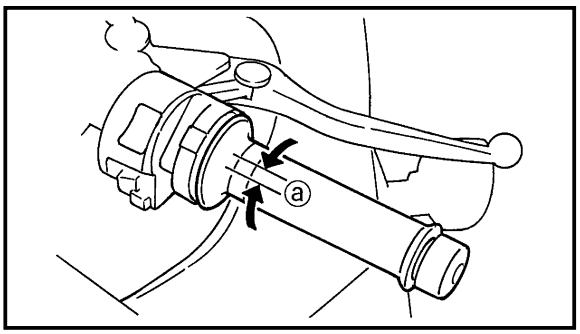
EB303031
ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:
Prior to adjusting the throttle cable free play, the engine idling speed and throttle body synchronization should be adjusted properly.

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ADJUSTING THE THROTTLE CABLE FREE PLAY

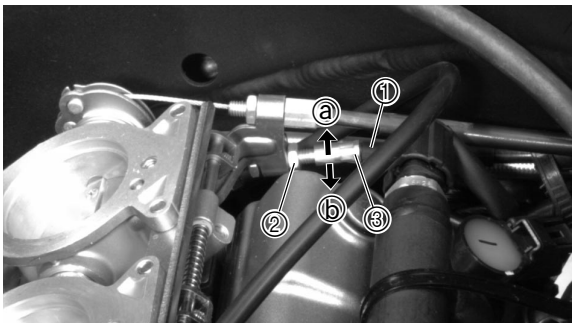
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1. Measure:
   • throttle cable free play ⓐ
   Out of specification → Adjust.

Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

2. Remove:
   • fuel tank
   • air filter case cover
   Refer to "FUEL TANK AND AIR FILTER".
   • air filter case
   Refer to "ELECTRONIC FUEL INJECTION" in chapter 6.



3. Adjust:
   • throttle cable free play

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NOTE:
When the throttle is opened, the accelerator cable ① is pulled.

Throttle body side

a. Loosen the locknut ② on the accelerator cable.

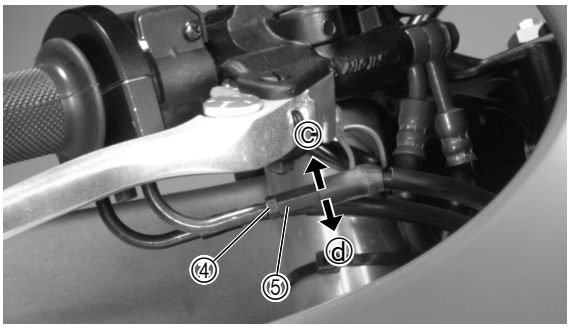
b. Turn the adjusting bolt ③ in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

Direction ⓐ	**Throttle cable free play is increased.**
Direction ⓑ	**Throttle cable free play is decreased.**

c. Tighten the locknut.

NOTE:
If the specified throttle cable free play cannot be obtained on the throttle body side of the cable, use the adjusting nut on the handlebar side.

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Handlebar side

a. Loosen the locknut ④.

b. Turn the adjusting nut ⑤ in direction ⓒ or ⓓ until the specified throttle cable free play is obtained.

Direction ⓒ	**Throttle cable free play is increased.**
Direction ⓓ	**Throttle cable free play is decreased.**

c. Tighten the locknut.

⚠ WARNING

After adjusting the throttle cable free play, start the engine and turn the handlebars to the right and to the left to ensure that this does not cause the engine idling speed to change.

EB303040

CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:
   - fuel tank
   - air filter case cover
     Refer to "FUEL TANK AND AIR FILTER".
   - air filter case
     Refer to "ELECTRONIC FUEL INJECTION" in chapter 6.
2. Disconnect:
   - ignition coil couplers
3. Remove:
   - ignition coils
   - spark plug

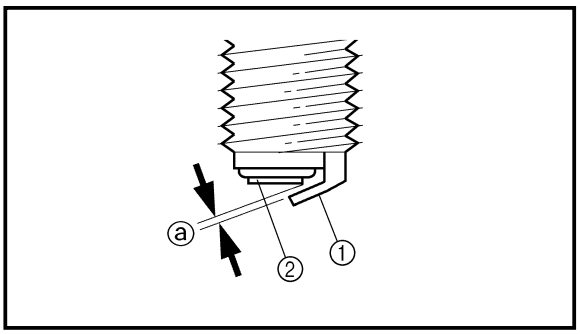
CAUTION:

Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

4. Check:
   - spark plug type
     Incorrect → Change.

Spark plugs
Model (manufacturer)
R0256R-10 (NGK)

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5. Check:
   • electrodes ①
   Damage/wear → Replace the spark plug.
   • insulator ②
   Abnormal color → Replace the spark plug.
   Normal color is medium-to-light tan.
6. Clean:
   • spark plug
   (with a spark plug cleaner or wire brush)
7. Measure:
   • spark plug gap ⓐ
   (with a wire gauge)
   Out of specification → Regap.

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

8. Install:
   • spark plug

13 Nm (1.3 m · kg, 9.4 ft · lb)

NOTE:
Before installing the spark plug, clean the spark plug and gasket surface.

EB303060
MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

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

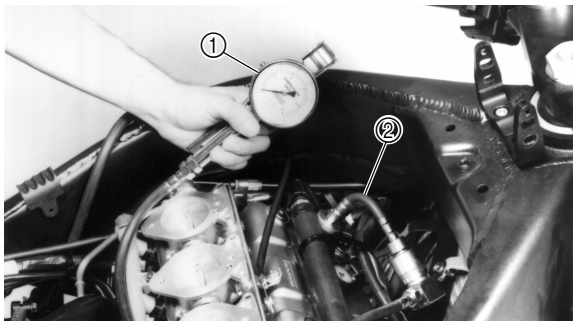
1. Measure:
   • valve clearance
   Out of specification → Adjust.
   Refer to "ADJUSTING THE VALVE CLEARANCE".
2. Start the engine, warm it up for several minutes, and then stop it.

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3. Remove:
   • fuel tank
   • air filter case cover
     Refer to "FUEL TANK AND AIR FILTER".
   • air filter case
   • throttle body assembly
     Refer to "ELECTRONIC FUEL INJECTION" in chapter 6.
   • ignition coil
4. Remove:
   • spark plug

CAUTION:

Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.



5. Install:
   • compression gauge ①
   • adapter ②

Compression gauge
90890-03081
Adapter
90890-04136

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

Compression pressure (at sea level)
Minimum
1,500 kPa
(15.0 kg/cm², 213 psi)
Standard
1,600 kPa
(16.0 kg/cm², 228 psi)
Maximum
1,700 kPa
(17.0 kg/cm², 242 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.

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⚠ WARNING

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

NOTE:
The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm^2, 14 psi).

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 wear or damage → Repair.**
Same as without oil	**Piston ring(-s), valve(-s), cylinder head gasket or piston possibly defective → Repair.**

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7. Install:
   • spark plug

13 Nm (1.3 m · kg, 9.4 ft · lb)

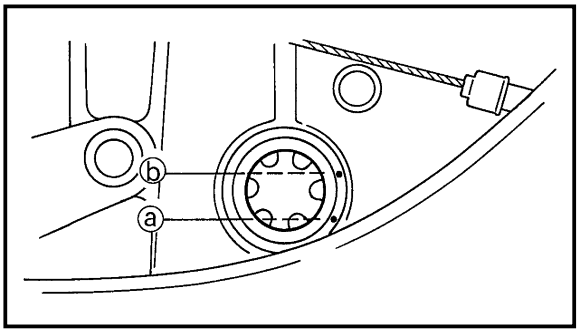
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EB303070
CHECKING THE ENGINE OIL LEVEL

1. Stand the motorcycle on a level surface.

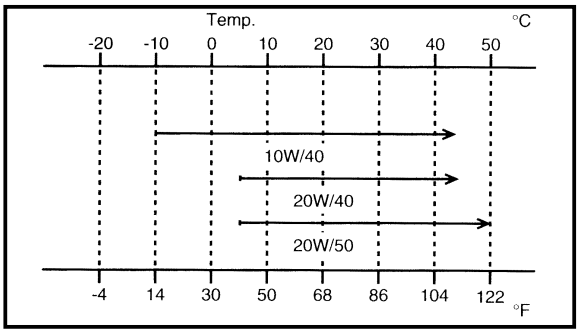
NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.

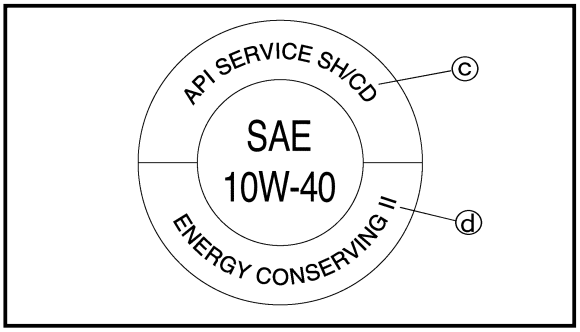
2. Start the engine, let it idle for several minutes, and then stop it.



3. Check:
- engine oil level
  The engine oil level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
  Below the minimum level mark → Add the recommended engine oil to the proper level.

Recommended oil
Refer to the chart for the engine oil grade which is best suited for certain atmospheric temperatures.
API standard
SE or higher grade
(Non-Friction modified)



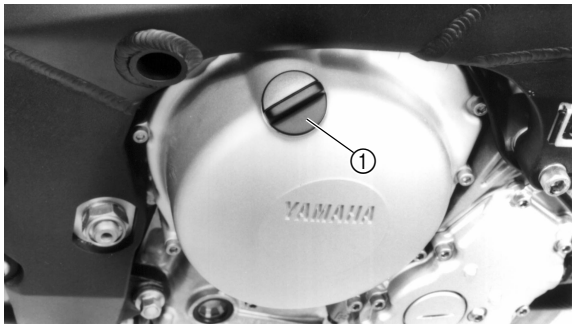


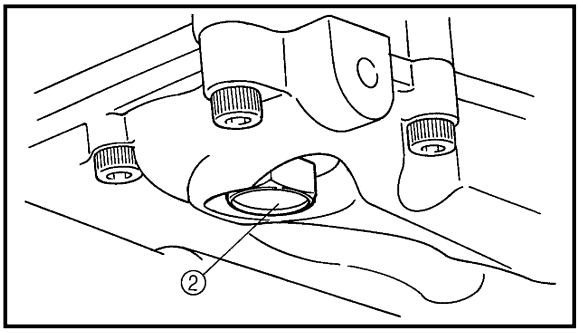
CAUTION:
- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD ⓒ or higher and do not use oils labeled "ENERGY CONSERVING II" ⓓ or higher.**
- **Do not allow foreign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

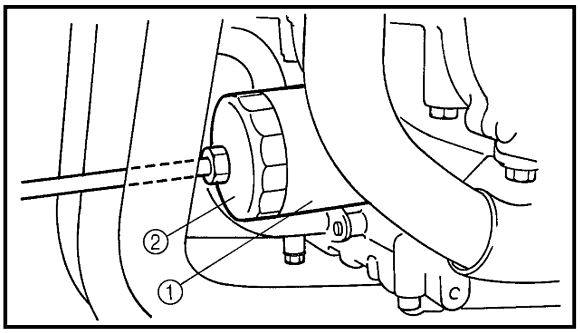
4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
- engine oil level

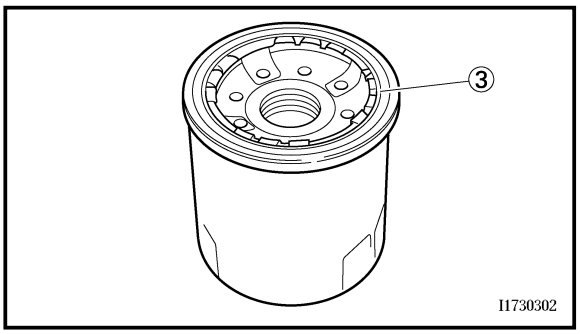
NOTE:
Before checking the engine oil level, wait a few minutes until the oil has settled.

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EB303081
CHANGING THE ENGINE OIL

1. Remove:
   - bottom cowling
   - front cowling
   Refer to "COWLINGS".
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Place a container under the engine oil drain bolt.
4. Remove:
   - engine oil filler cap ①
   - engine oil drain bolt ②
   (along with the washer)
5. Drain:
   - engine oil
   (completely from the crankcase)
6. 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**

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

CAUTION:

Make sure that 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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7. Check:
   - engine oil drain bolt washer
   Damage → Replace.
8. Install:
   - engine oil drain bolt

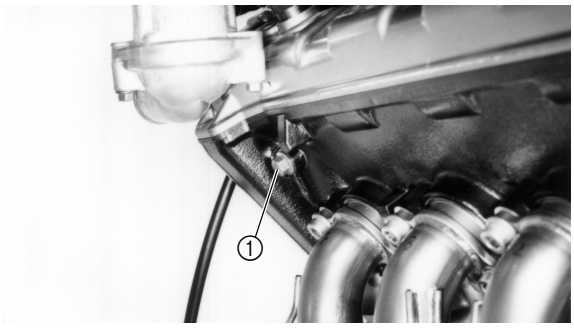
43 Nm (4.3 m · kg, 31 ft • lb)

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9. Fill:
   • crankcase
   (with the specified amount of the recommended engine oil)

Quantity
Total amount
3.6 L (3.2 Imp qt, 3.8 US qt)
Without oil filter cartridge replacement
2.6 L (2.3 Imp qt, 2.7 US qt)
With oil filter cartridge replacement
2.8 L (2.5 Imp qt, 3.0 US qt)

10. Install:
   • engine oil filler cap
11. Start the engine, warm it up for several minutes, and then turn it off.
12. Check:
   • engine
   (for engine oil leaks)
13. Check:
   • engine oil level
   Refer to "CHECKING THE ENGINE OIL LEVEL".



14. 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 "OIL PAN 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
20 Nm (2.0 m • kg, 14 ft • lb)

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15. Install:
- front cowling
- bottom cowling
  Refer to "COWLINGS".

EB303100
CHECKING THE CLUTCH FLUID LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.



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

Recommended clutch fluid
Brake fluid DOT 4

⚠ WARNING

- **Use only the designated clutch fluid. Other fluids may cause the rubber seals to deteriorate, causing leakage and poor clutch performance.**
- **Refill with the same type of fluid. Mixing fluids may result in a harmful chemical reaction leading to poor clutch performance.**
- **When refilling, be careful that water does not enter the clutch fluid reservoir. Water will significantly lower the boiling point of the fluid and could cause vapor lock.**

CAUTION:

Clutch fluid may damage painted surfaces and plastic parts. Always clean up any split fluid immediately.

NOTE:
In order to ensure a correct reading of the clutch fluid level, make sure that the top of the clutch fluid reservoir is horizontal.

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BLEEDING THE HYDRAULIC CLUTCH SYSTEM

⚠ WARNING

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

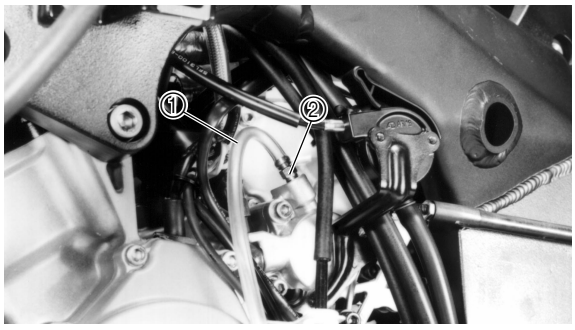
NOTE:
- Be careful not to spill any clutch fluid or allow the clutch fluid reservoir to overflow.
- When bleeding the hydraulic clutch system, make sure that there is always enough clutch fluid before applying the clutch. Ignoring this precaution could allow air to enter the hydraulic clutch system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the clutch fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Bleed:
   - hydraulic clutch system

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a. Fill the clutch fluid reservoir to the proper level with the recommended clutch fluid.

b. Install the clutch fluid reservoir diaphragm.



c. Connect a clear plastic hose ① tightly to the bleed screw ②.

d. Place the other end of the hose into a container.

e. Slowly apply the clutch several times.

f. Fully squeeze the clutch lever and hold it in position.

g. Loosen the bleed screw.

NOTE:
Loosening the bleed screw will release the pressure and cause the clutch lever to contact the grip.

h. Tighten the bleed screw and then release the clutch lever.

i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the clutch fluid in the plastic hose.

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j. Tighten the bleed screw to specification.

	Bleed screw **6 Nm (0.6 m • kg, 4.3 ft • lb)**

k. Fill the clutch fluid reservoir to the proper level with the recommended clutch fluid.
Refer to "CHECKING THE CLUTCH FLUID LEVEL".

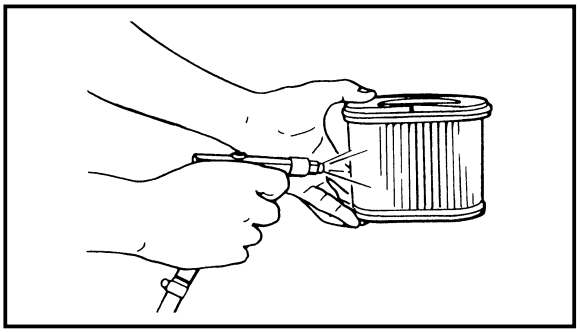
⚠ WARNING

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

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EB303130
CLEANING THE AIR FILTER ELEMENT

1. Remove:
   • fuel tank
   • air filter case cover
   • air filter element
   Refer to "FUEL TANK AND AIR FILTER".



2. Clean:
   • air filter element
   Apply compressed air to the outer surface of the air filter element.
3. Check:
   • air filter element
   Damage → Replace.
4. Install:
   • air filter element
   • air filter case cover

CAUTION:

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect the electronic fuel injection, leading to poor engine performance and possible overheating.

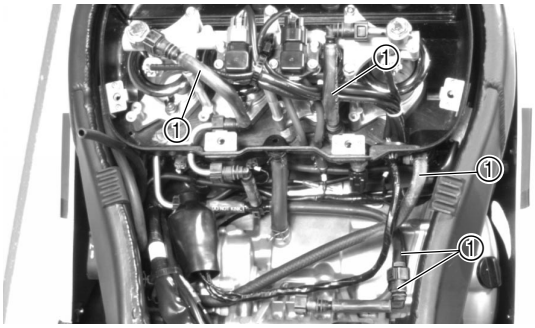
5. Install:
   • fuel tank
   Refer to "FUEL TANK AND AIR FILTER".

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CHECKING THE FUEL HOSES

The following procedure applies to all of the fuel hoses.

1. Remove:
   - fuel tank
   - air filter case cover
   Refer to "FUEL TANK AND AIR FILTER".



2. Check:
   - fuel hose ①
   Cracks/damage → Replace.

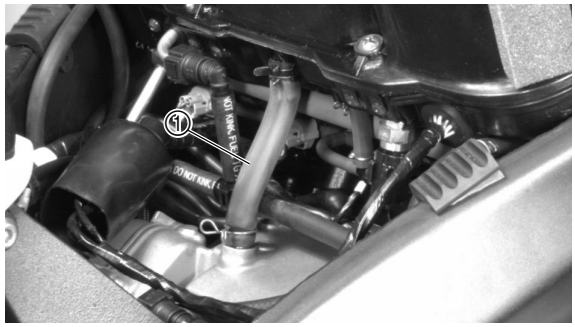
NOTE:
Drain and flush the fuel tank if abrasive damage to any components of the fuel line is evident.

3. Install:
   - air filter case cover
   - fuel tank
   Refer to "FUEL TANK AND AIR FILTER".

EB303190

CHECKING THE CRANKCASE BREATHER HOSE

1. Remove:
   - fuel tank
   Refer to "FUEL TANK AND AIR FILTER".

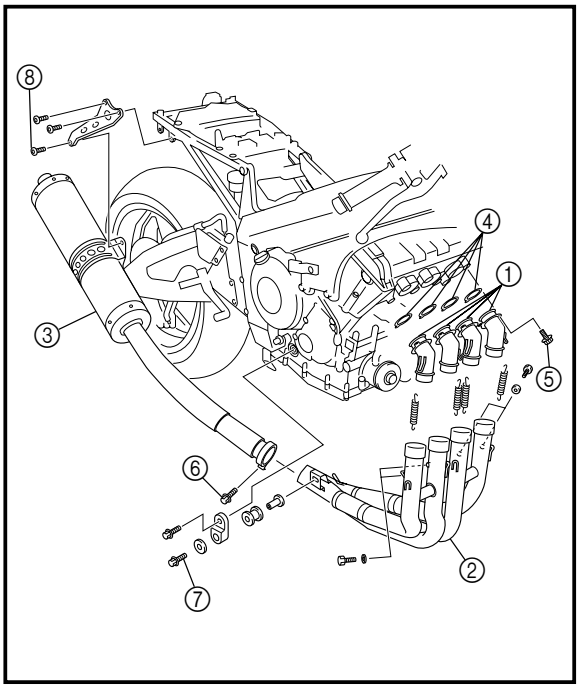


2. Check:
   - crankcase breather hose ①
   Cracks/damage → Replace.
   Loose connection → Connect properly.

CAUTION:
Make sure that the crankcase breather hose is routed correctly.

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3. Install:
   • fuel tank
   Refer to "FUEL TANK AND AIR FILTER".



EB303200
CHECKING THE EXHAUST SYSTEM

The following procedure applies to all of the exhaust pipes and gaskets.

1. Remove:
   • radiator assembly
   Refer to "RADIATOR AND THERMOSTAT" in chapter 5.
2. Check:
   • exhaust pipe joint ①
   • exhaust pipe ②
   • muffler ③
   Cracks/damage → Replace.
   • gasket ④
   Exhaust gas leaks → Replace.
3. Measure:
   • tightening torque

Exhaust pipe joint bolt ⑤
20 Nm (2.0 m • kg, 14 ft • lb)
Muffler clamp bolt ⑥
20 Nm (2.0 m • kg, 14 ft • lb)
Exhaust pipe bolt ⑦
20 Nm (2.0 m • kg, 14 ft • lb)
Muffler bolt ⑧
38 Nm (3.8 m • kg, 27 ft • lb)

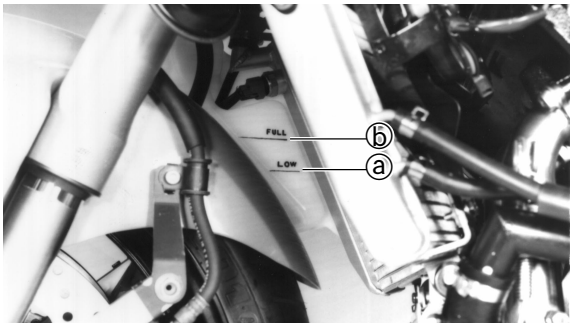
4. Install:
   • radiator assembly
   Refer to "RADIATOR AND THERMOSTAT" in chapter 5.

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EB303220
CHECKING THE COOLANT LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
- Place the motorcycle on a suitable stand.
- Make sure that the motorcycle is upright.



2. Remove:
   - bottom cowling
   - front cowling

   Refer to "COWLINGS".
3. Check:
   - coolant level

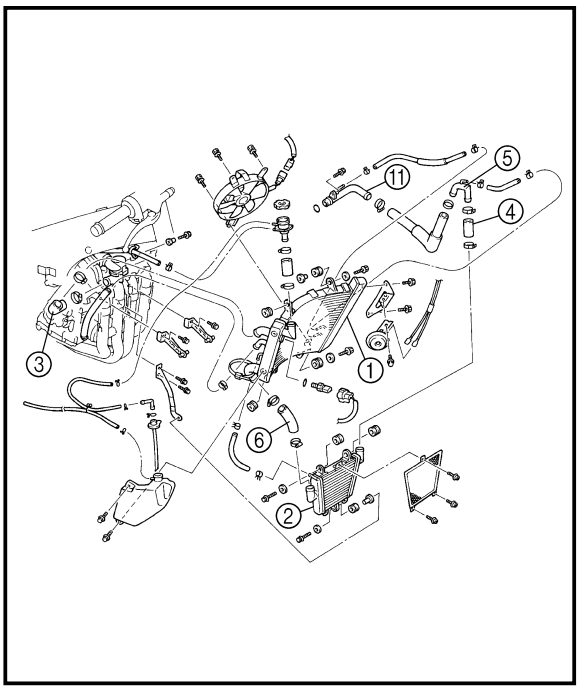
   The coolant level should be between the minimum level mark ⓐ and maximum level mark ⓑ.
   Below the minimum level mark → Add the recommended coolant to the proper level.

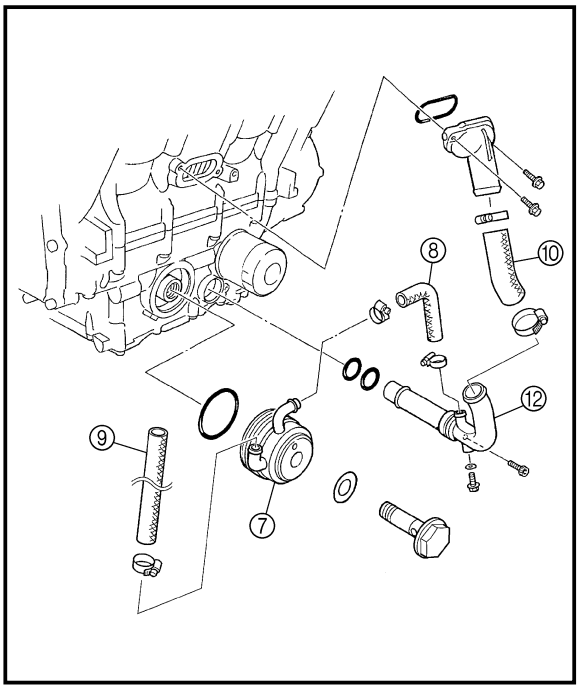
CAUTION:
- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**

4. Start the engine, warm it up for several minutes, and then turn it off.
5. Check:
   - coolant level

NOTE:
Before checking the coolant level, wait a few minutes until the coolant has settled.

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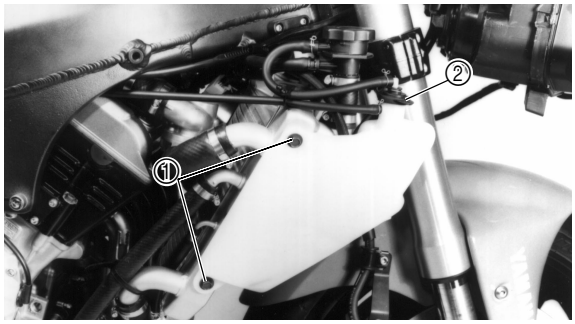
EB303230
CHECKING THE COOLING SYSTEM

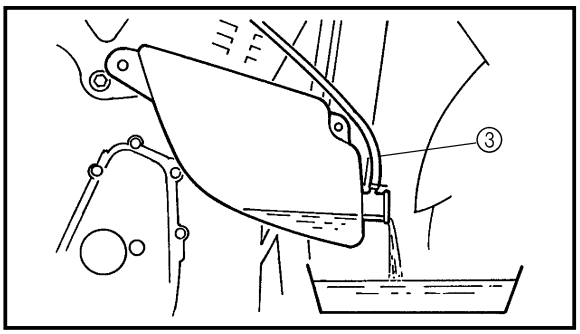
1. Remove:
   - bottom cowling
   - front cowling
   Refer to "COWLINGS".
2. Check:
   - upper radiator ①
   - lower radiator ②
   - radiator inlet hose ③
   - radiator outlet hose ④
   - radiator outlet pipe ⑤
   - radiator joint hose ⑥
   - oil cooler ⑦
   - oil cooler inlet hose ⑧
   - oil cooler outlet hose ⑨
   - water jacket joint inlet hose ⑩
   - water pump inlet pipe ⑪
   - water pump outlet pipe ⑫

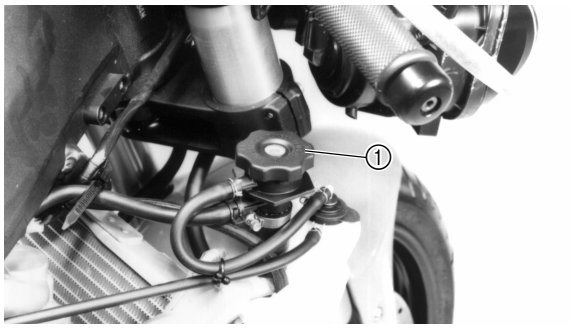
   Cracks/damage → Replace.
   Refer to "COOLING SYSTEM" in chapter 5.
3. Install:
   - front cowling
   - bottom cowling

   Refer to "COWLINGS".

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EB303240
CHANGING THE COOLANT

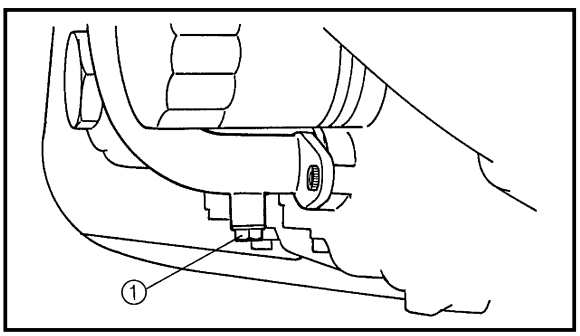
1. Remove:
   • bottom cowling
   • front cowling
   Refer to "COWLINGS".
2. Remove:
   • coolant reservoir bolts ①
   • coolant reservoir cap ②

NOTE:
When draining the coolant from the coolant reservoir, be sure to tilt the reservoir so that coolant cannot flow through the coolant reservoir breather hose ③.

3. Drain:
   • coolant
   (from the coolant reservoir)
4. Install:
   • coolant reservoir bolts
5. Remove:
   • radiator cap ①

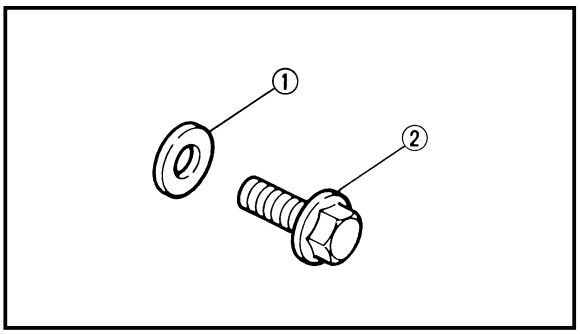
⚠ WARNING

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, turn the radiator cap counterclockwise while pressing down on it and then remove it.



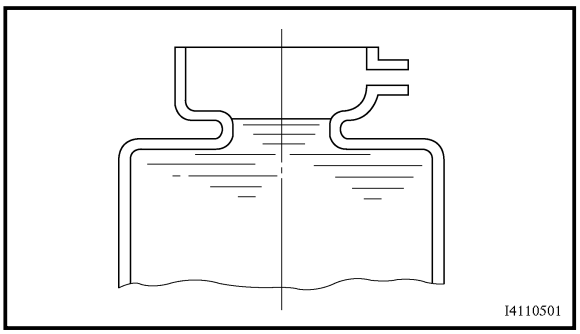
6. Remove:
   • coolant drain bolt ①
   (along with the copper washer)
7. Drain:
   • coolant

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8. Check:
   - copper washer ①
   - coolant drain bolt ②
   Damage → Replace.
9. Install:
   - coolant drain bolt

7 Nm (0.7 m · kg, 5.1 ft · lb)



10. 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
2.75 L
(2.42 Imp qt, 2.91 US qt)
Coolant reservoir capacity
0.25 L
(0.22 Imp qt, 0.26 US qt)

Handling notes for coolant

Coolant is potentially harmful and should be handled with special care.

⚠ WARNING

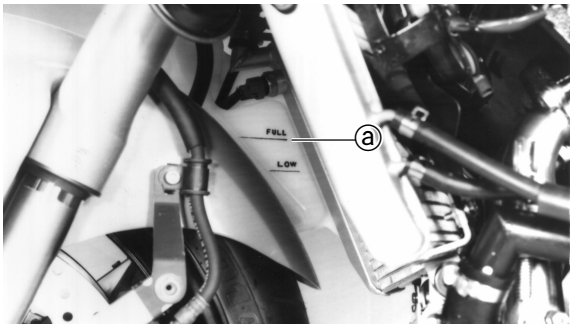
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

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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.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

11. Install:
    - radiator cap



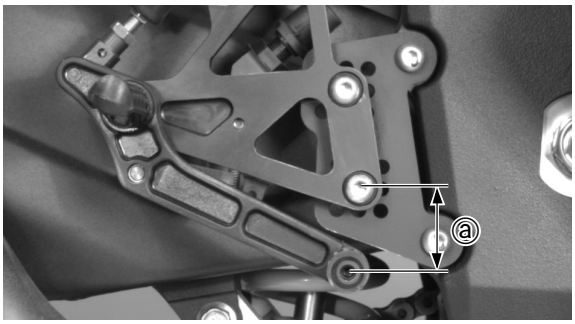
12. Fill:
    - coolant reservoir
      (with the recommended coolant to the maximum level mark ⓐ)
13. Install:
    - coolant reservoir cap
14. Start the engine, warm it up for several minutes, and then turn it off.
15. Check:
    - coolant level
      Refer to "CHECKING THE COOLANT LEVEL".

NOTE:

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

16. Install:
    - front cowling
    - bottom cowling
      Refer to "COWLINGS".

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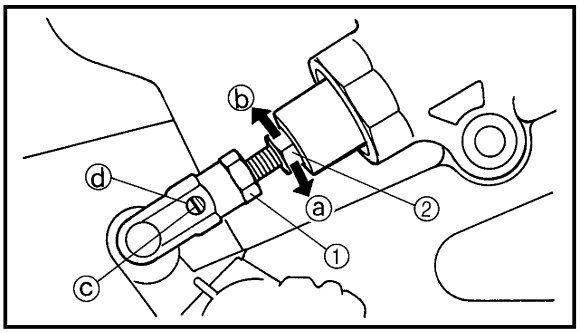


EB304001
CHASSIS

EB304010
ADJUSTING THE REAR BRAKE

1. Measure:
   • brake pedal position
   (distance ⓐ from the top of the brake pedal to the bottom of the rider footrest bracket)
   Out of specification → Adjust.

Brake pedal position (from the top of the brake pedal to the center of the rider footrest bracket bolt)
31 ~ 36 mm (1.22 ~ 1.42 in)



2. Adjust:
   • brake pedal position

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a. Loosen the locknut ①.

b. Turn the adjusting bolt ② in direction ⓐ or ⓑ until the specified brake pedal position is obtained.

Direction ⓐ	**Brake pedal is raised.**
Direction ⓑ	**Brake pedal is lowered.**

⚠ WARNING

After adjusting the brake pedal position, check that the end of the adjusting bolt ⓒ is visible through the hole ⓓ.

c. Tighten the locknut ① to specification.

Locknut
16 Nm (1.6 m • kg, 11 ft • lb)

⚠ WARNING

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, check and, if necessary, bleed the brake system.

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CAUTION:

After adjusting the brake pedal position, make sure that there is no brake drag.

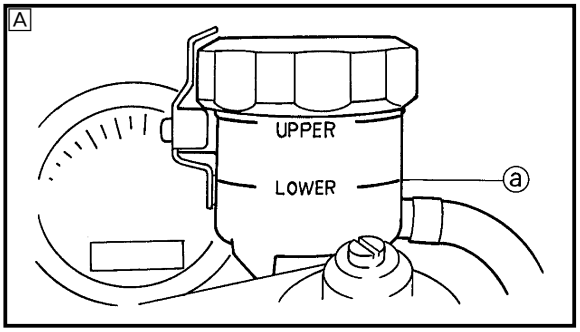
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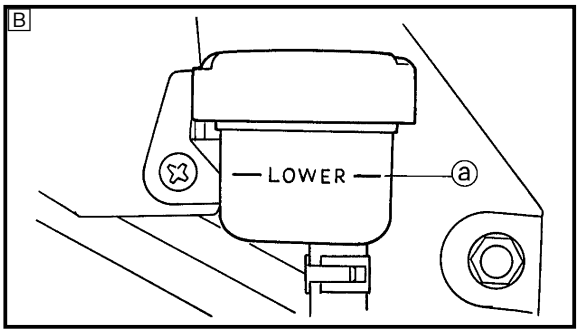
3. Adjust:
   • rear brake light switch
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH".

EB304020
CHECKING THE BRAKE FLUID LEVEL

1. Stand the motorcycle on a level surface.

NOTE:
• Place the motorcycle on a suitable stand.
• Make sure that the motorcycle is upright.





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

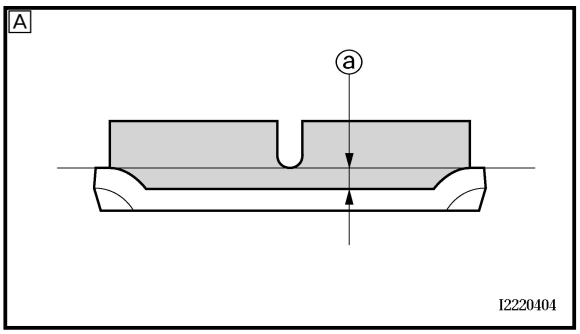
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor 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.**

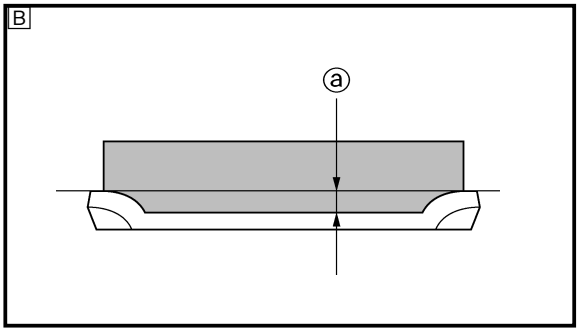
CAUTION:

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 fluid reservoir is horizontal.

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EB304032
CHECKING THE BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - front brake pad
   - rear brake pad

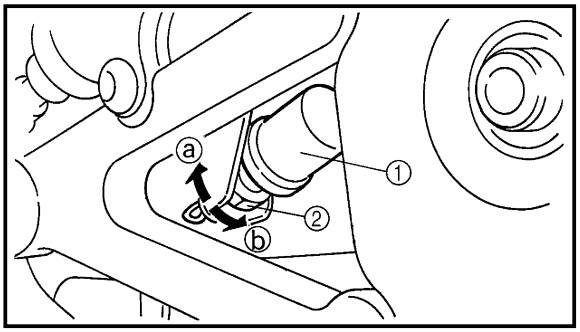
   Brake pad wear limit ⓐ
   Wear limit reached → Replace the brake pads as a set.
   Refer to "FRONT AND REAR BRAKES" in chapter 7.

	Brake pad wear limit 0.5 mm (0.02 in)

A Front brake
B Rear brake

EB304050
ADJUSTING THE REAR BRAKE LIGHT SWITCH

NOTE:
- The rear brake light switch is operated by movement of the brake pedal.
- The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.



1. Check:
   - rear brake light operation timing

   Incorrect → Adjust.
2. Adjust:
   - rear brake light operation timing

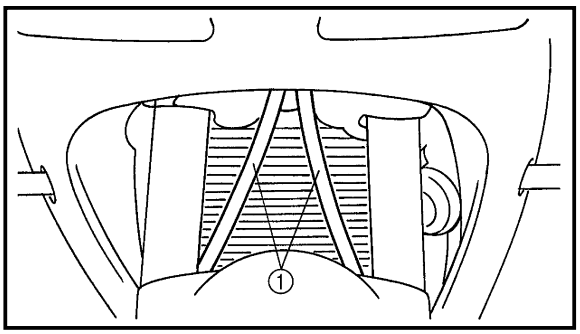
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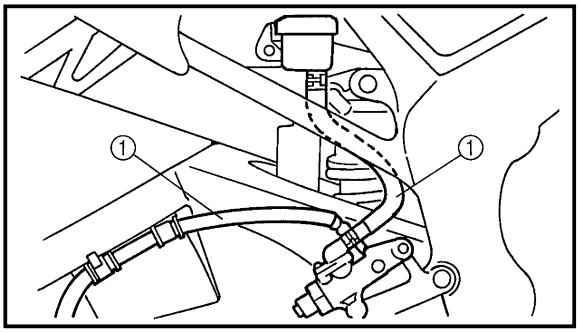
a. Hold the main body ① of the rear brake light switch so that it does not rotate and turn the adjusting nut ② in direction ⓐ or ⓑ until the rear brake light comes on at the proper time.

Direction ⓐ	**Brake light comes on sooner.**
Direction ⓑ	**Brake light comes on later.**

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EB304062

CHECKING THE BRAKE HOSES

The following procedure applies to all of the brake hoses and brake hose clamps.

1. Check:
   - brake hose ①
     Cracks/damage/wear → Replace.
2. Check:
   - brake hose clamp
     Loose → Tighten the clamp bolt.
3. Hold the motorcycle upright and apply the brake several times.
4. Check:
   - brake hose
     Brake fluid leakage → Replace the damaged hose.
     Refer to "FRONT AND REAR BRAKES" in chapter 7.

EB304072

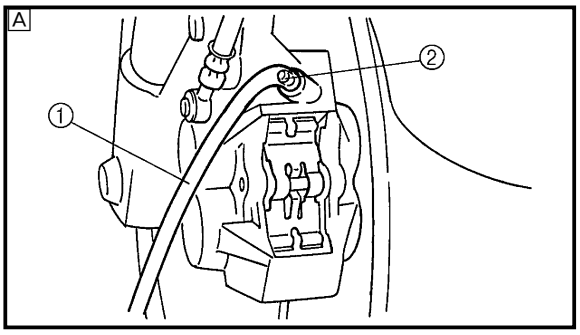
BLEEDING THE HYDRAULIC BRAKE SYSTEM

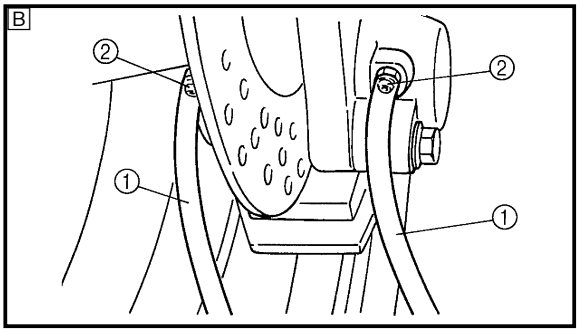
⚠ WARNING

Bleed the hydraulic brake system whenever:
- **the brake system was disassembled,**
- **a brake hose was 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 fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure that 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.

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1. Bleed:
   • hydraulic brake system

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a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.

b. Install the brake fluid reservoir diaphragm.

c. Connect a clear plastic hose ① tightly to the bleed screw ②.
   A Front brake
   B Rear brake

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 throttle 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** **6 Nm (0.6 m • kg, 4.3 ft • lb)**

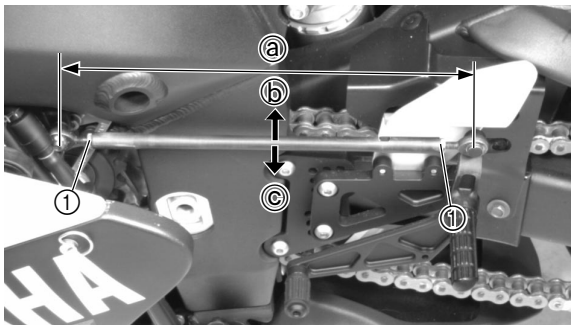
k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
   Refer to "CHECKING THE BRAKE FLUID LEVEL".

⚠ WARNING

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

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EB304081
ADJUSTING THE SHIFT PEDAL

NOTE:
The shift pedal position is determined by the installed shift rod length ⓐ.

1. Measure:
   • installed shift rod length ⓐ
   Incorrect → Adjust.

	Installed shift rod length 294 mm (11.57 in)

2. Adjust:
   • installed shift rod length ⓐ

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a. Loosen both locknuts ①.

b. Turn the shift rod ② in direction ⓑ or ⓒ to obtain the correct shift pedal position.

Direction ⓑ	**Installed shift rod length decreases.**
Direction ⓒ	**Installed shift rod length increases.**

c. Tighten both locknuts.

d. Make sure that the installed shift rod length is within specification.

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EB304092
ADJUSTING THE DRIVE CHAIN SLACK

NOTE:
The drive chain slack must be checked at the tightest point on the chain.

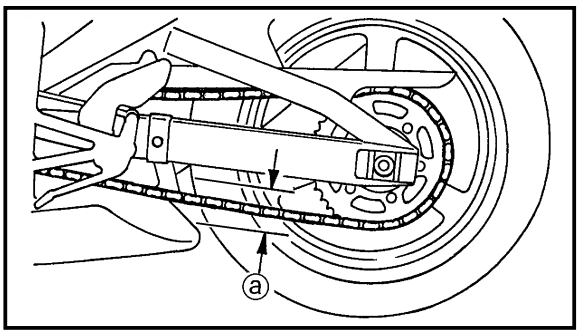
CAUTION:
A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

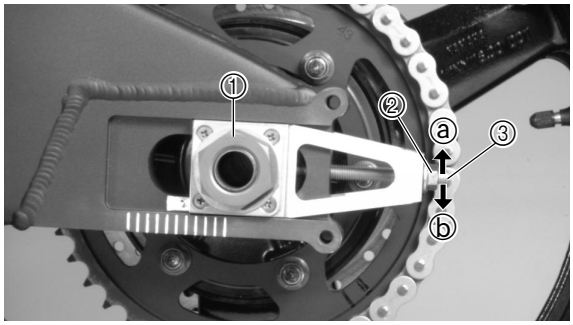
1. Stand the motorcycle on a level surface.

⚠ WARNING
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.

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2. Rotate the rear wheel several times and check the drive chain to locate its tightest point.
3. Measure:
   • drive chain slack ⓐ
   Out of specification → Adjust.

	Drive chain slack **40 ~ 50 mm (1.57 ~ 1.97 in)**

4. Adjust:
   • drive chain slack

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a. Loosen the wheel axle nut ① and wheel axle.

b. Loosen both locknuts ②.

c. Turn both adjusting bolts ③ in direction ⓐ or ⓑ until the specified drive chain slack is obtained.

Direction ⓐ	**Drive chain slack is decreased.**
Direction ⓑ	**Drive chain slack is increased.**

NOTE:
To maintain the proper wheel alignment, adjust both sides evenly.

d. Tighten both locknuts.

e. Tighten the wheel axle and wheel axle nut to specification.

	Wheel axle **150 Nm** **(15.0 m • kg, 110 ft • lb)** **Wheel axle nut** **45 Nm (4.5 m • kg, 32 ft • lb)**

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EB304100
LUBRICATING THE DRIVE CHAIN

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out rapidly. Therefore, the drive chain should be serviced, especially when the motorcycle is used in dusty areas. This motorcycle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosine to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.

Recommended lubricant
Engine oil or chain lubricant suitable for O-ring chains

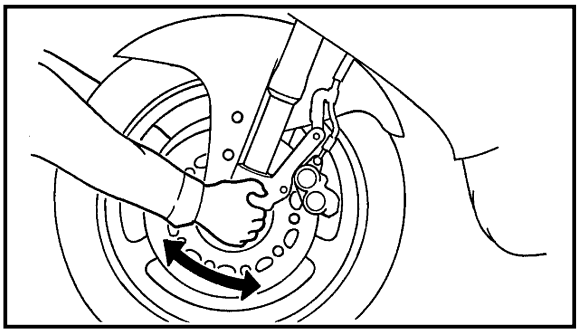
EB304130
CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the motorcycle on a level surface.

⚠ WARNING

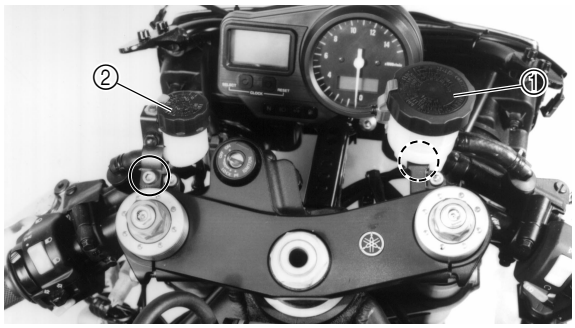
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.

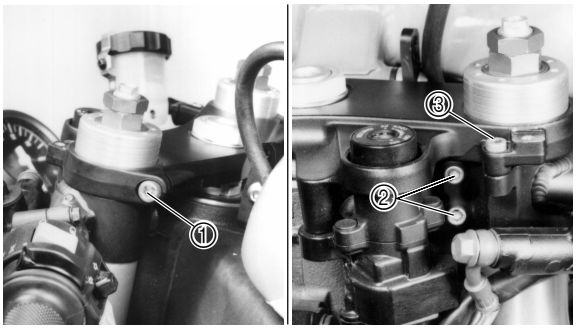


2. Check:
   - steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Looseness/binding → Adjust the steering head.

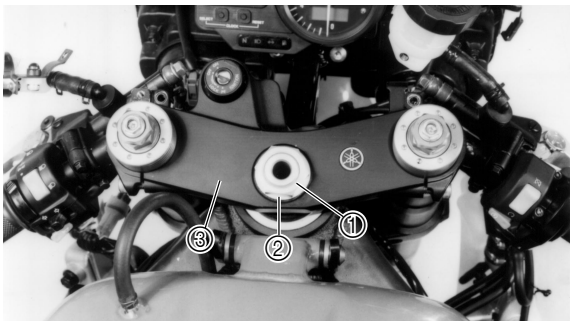
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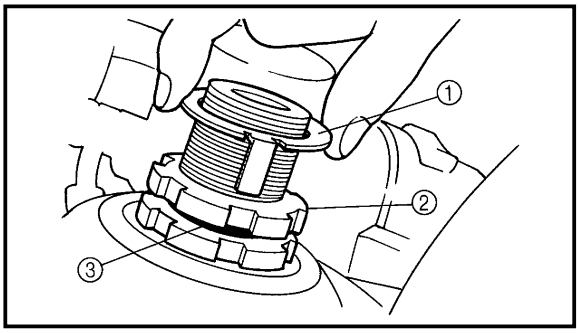
3. Remove:
   • bottom cowling
   • front cowling
   Refer to "COWLINGS".
4. Remove:
   • front brake fluid reservoir ①
   • clutch fluid reservoir ②

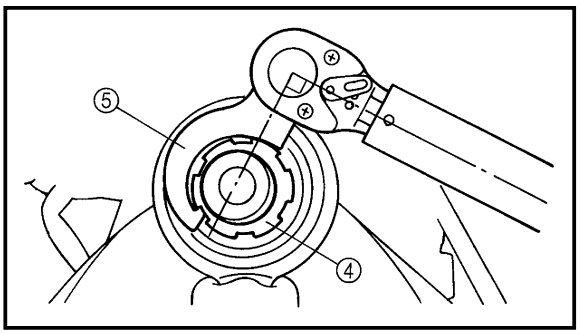


5. Loosen:
   • upper bracket pinch bolts ①
   • handlebar pinch bolts ②
6. Remove:
   • upper bracket bolts ③
   • handlebars
   (from the upper bracket)



7. Remove:
   • steering stem nut ①
   • washer ②
   • upper bracket ③



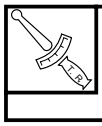


8. Adjust:
   • steering head

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a. Remove the lock washer ①, the upper ring nut ②, and the rubber washer ③.
b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.

NOTE:
Set the torque wrench at a right angle to the steering nut wrench.

	**Steering nut wrench** **90890-01403**
	**Lower ring nut (initial tightening torque)** **18 Nm (1.8 m • kg, 13 ft • lb)**

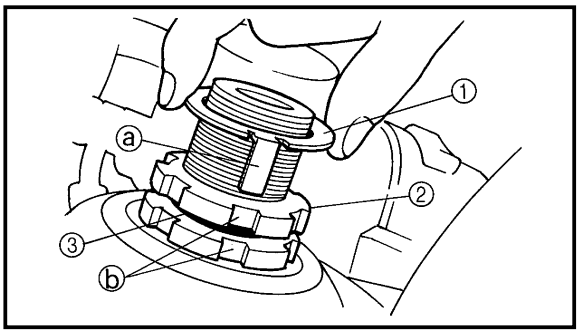
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c. Loosen the lower ring nut completely, then tighten it to specification.

⚠ WARNING

Do not overtighten the lower ring nut.

Lower ring nut (final tightening torque)
9 Nm (0.9 m • kg, 6.5 ft • lb)



d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
Refer to "STEERING HEAD" in chapter 7.

e. Install the rubber washer ③.

f. Install the upper ring nut ②.

g. Finger tighten the upper ring nut ②, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

h. Install the lock washer ①.

NOTE:
Make sure that the lock washer tabs ⓐ sit correctly in the ring nut slots ⓑ.

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9. Install:
- steering stem nut
  115 Nm (11.5 m · kg, 85 ft · lb)
- upper bracket bolt
  13 Nm (1.3 m · kg, 9.4 ft · lb)
- handlebar pinch bolt
  13 Nm (1.3 m · kg, 9.4 ft · lb)
- upper bracket pinch bolt
  26 Nm (2.6 m · kg, 16 ft · lb)

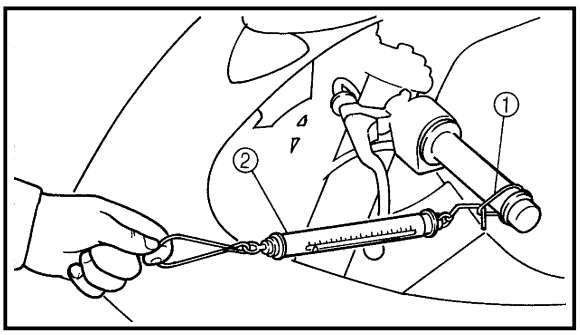
10. Measure:
- steering head tension
  (with the motorcycle still on the stand)

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NOTE:
Make sure that all of the cables and wires are properly routed.

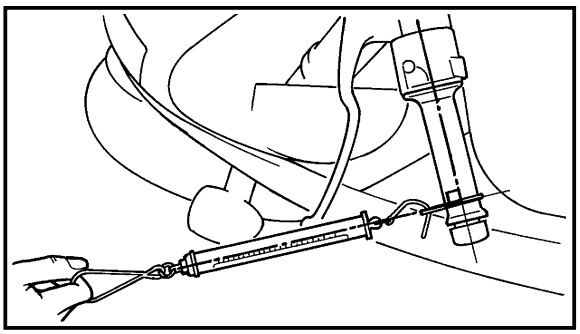
a. Point the front wheel straight ahead.

b. Install a plastic locking tie ① loosely around the end of the handlebar as shown.



c. Hook a spring gauge ② onto the plastic locking tie.

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d. Hold the spring gauge at a 45° angle from the handlebar, pull the spring gauge, and record the measurement when the handlebar starts to turn.

Steering head tension
200 ~ 500 g (7.06 ~ 17.65 oz)

e. Repeat the above procedure on the opposite handlebar.

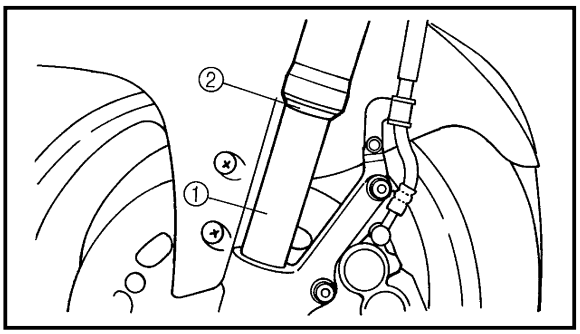
f. If the steering head tension is out of specification (both handlebars should be within specification), remove the upper bracket and loosen or tighten the upper ring nut.

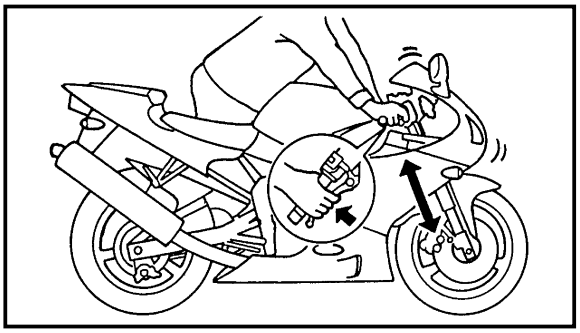
g. Reinstall the upper bracket and measure the steering head tension again as described above.

h. Repeat the above procedure until the steering head tension is within specification.

i. Grasp the bottom of the front fork legs and gently rock the front fork.
Looseness or binding → Adjust the steering head.

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EB304141
CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Check:
   - inner tube ①
     Damage/scratches → Replace.
   - dust seal ②
   - oil seal
     Oil leakage → Replace.
3. Hold the motorcycle upright and apply the front brake.
4. Check:
   - front fork operation
     Push down hard on the handlebars several times and check if the front fork rebounds smoothly.
     Rough movement → Repair.
     Refer to "FRONT FORK" in chapter 7.

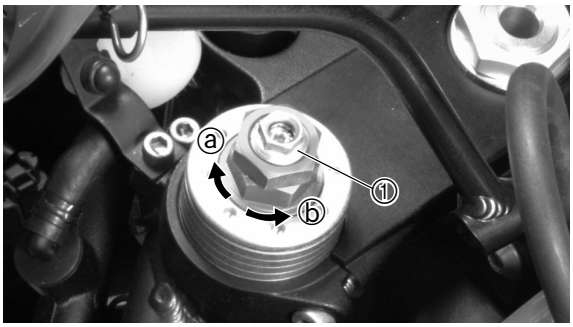
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EB304153
ADJUSTING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

⚠ WARNING

- **Always adjust both front fork legs evenly. Uneven adjustment can result in poor handling and loss of stability.**
- **Securely support the motorcycle so that there is no danger of it falling over.**



Spring preload

CAUTION:

- **Grooves are provided to indicate the adjustment position.**
- **Never go beyond the maximum or minimum adjustment positions.**

1. Adjust:
   - spring preload

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

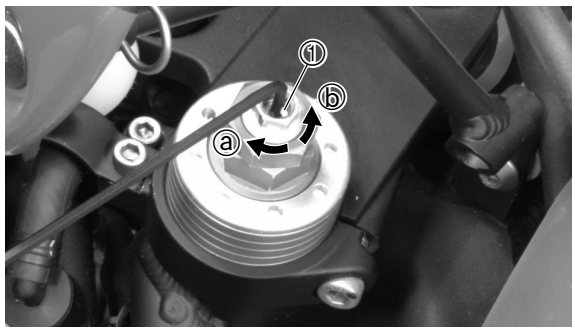
Direction ⓐ (turns in)	**Spring preload is increased (suspension is harder).**
Direction ⓑ (turns out)	**Spring preload is decreased (suspension is softer).**

Adjusting positions
Minimum: 0 turns in direction*
Standard: 14 turns in direction*
Maximum: 18-1/2 turns in direction*
*** after fully turning the adjusting bolt in direction ⓑ**

NOTE:
With each turn of the adjusting bolt, the installed length of the fork spring is changed by 1 mm.

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Rebound damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • rebound damping

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

Direction ⓐ	**Rebound damping is increased (suspension is harder).**
Direction ⓑ	**Rebound damping is decreased (suspension is softer).**

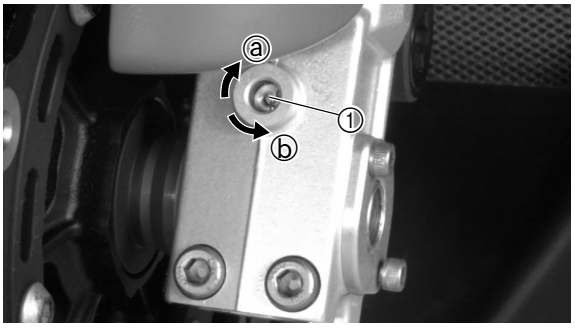
Adjusting positions
Minimum: 17 clicks out*
Standard: 6 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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Compression damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.



1. Adjust:
   • compression damping

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

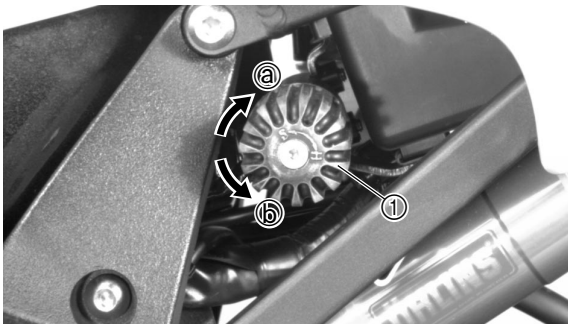
a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Compression damping is increased (suspension is harder).**
Direction ⓑ	**Compression damping is decreased (suspension is softer).**

Adjusting positions
Minimum: 20 clicks out*
Standard: 6 clicks out*
Maximum: 1 clicks out*
*** from the fully turned-in position**

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EB304162

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

Spring preload

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • spring preload

NOTE:

Adjust the spring preload with the special wrench and extension bar included in the owner's tool kit.

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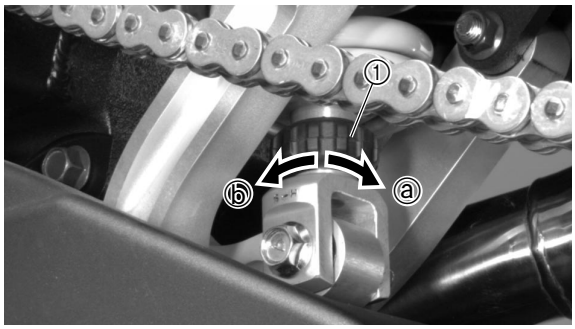
a. Turn the adjusting knob ① in direction ⓐ or ⓑ.

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

Adjusting positions
Minimum: 0 turns in*
Standard: 6 turns in *
Maximum: 20 turns in *
*** from the fully turned-out position**

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Rebound damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.

1. Adjust:
   • rebound damping

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

Direction ⓐ	**Rebound damping is increased (suspension is harder).**
Direction ⓑ	**Rebound damping is decreased (suspension is softer).**

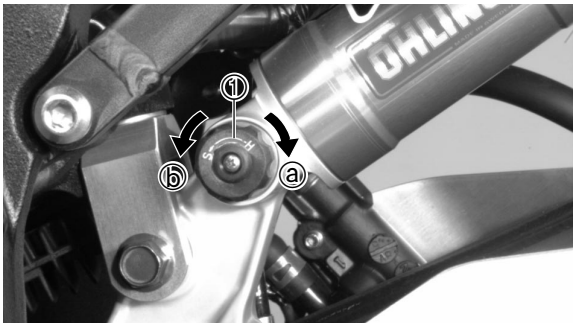
Adjusting positions
Minimum: 50 clicks out*
Standard: 10 clicks out*
Maximum: 0 clicks out*
*** from the fully turned-in position**

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Compression damping

CAUTION:

Never go beyond the maximum or minimum adjustment positions.



1. Adjust:
   • compression damping

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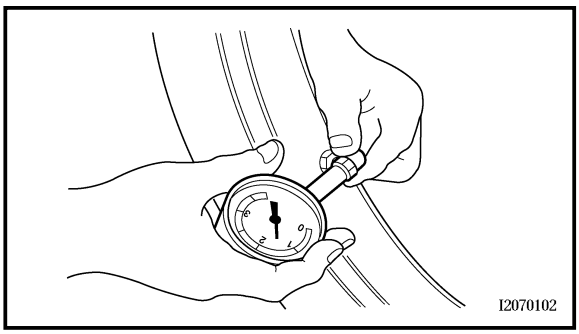
a. Turn the adjusting screw ① in direction ⓐ or ⓑ.

Direction ⓐ	**Compression damping is increased (suspension is harder).**
Direction ⓑ	**Compression damping is decreased (suspension is softer).**

Adjusting positions
Minimum: 25 clicks out*
Standard: 10 clicks out*
Maximum: 0 clicks out*
*** from the fully turned-in position**

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EB304170
CHECKING THE TIRES

The following procedure applies to both of the tires.

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

⚠ WARNING

- **The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.**
- **The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.**
- **Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.**

NEVER OVERLOAD THE MOTORCYCLE.

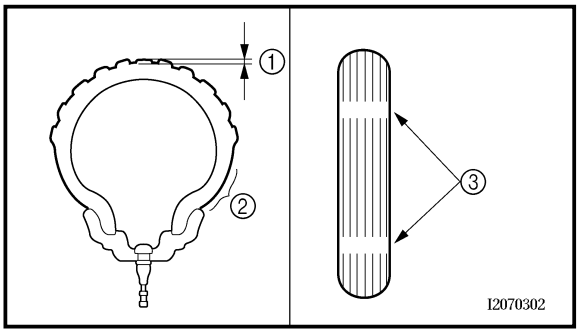
Basic weight (with oil and a full fuel tank)	**207 kg (456 lb)**	
Maximum load*	**317 kg (699 lb)**	
Cold tire pressure	**Front**	**Rear**
Up to 90 kg (198 lb) load*	**250 kPa (2.5 kgf/cm², 36 psi)**	**250 kPa (2.5 kgf/cm², 36 psi)**
90 kg (198 lb) ~ maximum load*	**250 kPa (2.5 kgf/cm², 36 psi)**	**290 kPa (2.9 kgf/cm², 41 psi)**
High-speed riding	**250 kPa (2.5 kgf/cm², 36 psi)**	**250 kPa (2.5 kgf/cm², 36 psi)**

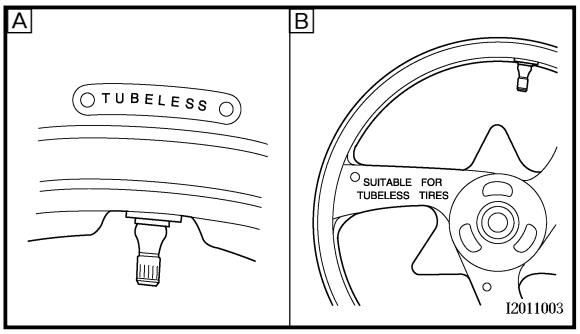
* total of cargo, rider and accessories

⚠ WARNING

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

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2. Check:
   - tire surfaces
     Damage/wear → Replace the tire.

	Minimum tire tread depth 1.6 mm (0.06 in)

① Tire tread depth
② Side wall
③ Wear indicator

⚠ WARNING

- **Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.**
- **When using a tube tire, be sure to install the correct tube.**
- **Always replace a new tube tire and a new tube as a set.**
- **To avoid pinching the tube, make sure that the wheel rim band and tube are centered in the wheel groove.**
- **Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.**

Ⓐ Tire Ⓑ Wheel

Tube wheel	**Tube tire only**
Tubeless wheel	**Tube or tubeless tire**

- **After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. The front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this motorcycle.**

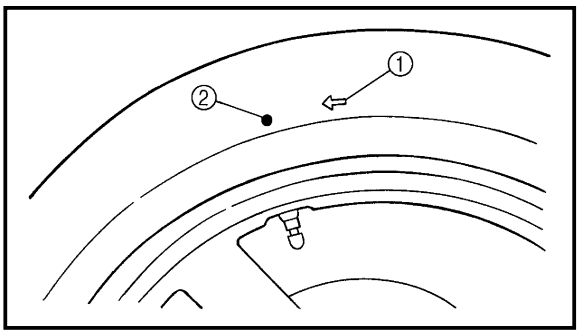
Front tire

Manufacturer	Size	Model
PIRELLI	120/70 ZR17 (58W)	MTR01A

Rear tire

Manufacturer	Size	Model
PIRELLI	180/55 ZR17 (73W)	MTR08

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⚠ WARNING

After mounting a new tire, ride conservatively for a while to become accustomed to the "feel" of the new tire and to allow the tire to seat itself properly in the rim. Failure to do so could lead to an accident with possible injury to the rider or damage to the motorcycle.

NOTE:

For tires with a direction of rotation mark ①:
- Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark ② with the valve installation point.

EB304180

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

1. Check:
   - wheel
     Damage/out-of-round → Replace.

⚠ WARNING

Never attempt to make any repairs to the wheel.

NOTE:

After a tire or wheel has been changed or replaced, always balance the wheel.

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EB304200
CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

⚠ WARNING

Damaged cable sheaths may cause the cable to corrode and interfere with its movement. Replace damaged cable sheaths and cables as soon as possible.

1. Check:
   • cable sheath
   Damage → Replace.
2. Check:
   • cable operation
   Rough movement → Lubricate.

Recommended lubricant
Engine oil or a suitable cable lubricant

NOTE:
Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubing device.

EB304210
LUBRICATING THE LEVERS AND PEDALS

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

Recommended lubricant
Lithium soap base grease

EB304220
LUBRICATING THE SIDESTAND

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

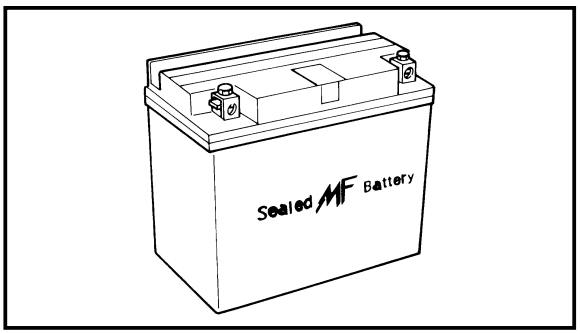
Recommended lubricant
Lithium soap base grease

EB304240
LUBRICATING THE REAR SUSPENSION

Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.

Recommended lubricant
Molybdenum disulfide grease

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EB305020

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.**

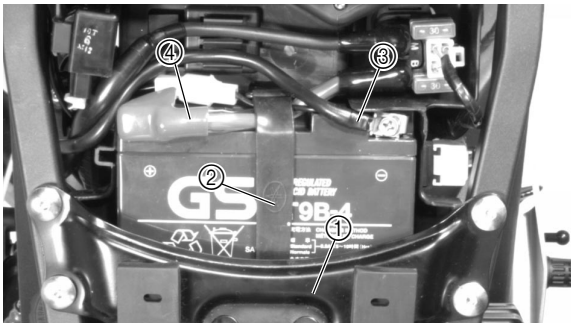
FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin – Wash with water.**
- **Eyes – Flush with water for 15 minutes and get immediate medical attention.**

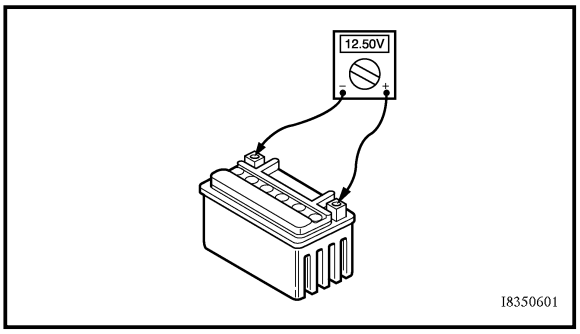
INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

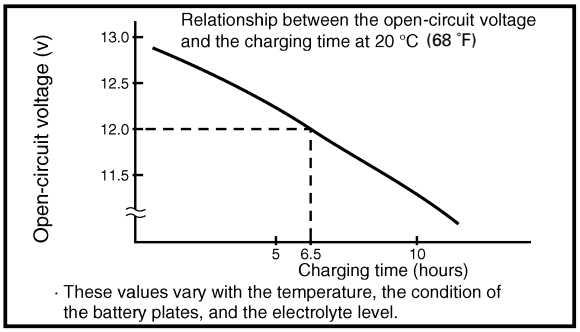
CAUTION:

- **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.**

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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:
   - rear cowling
     Refer to "COWLINGS".
   - rear cowling bracket ①
   - battery band ②
2. Disconnect:
   - battery leads
     (from the battery terminals)

CAUTION:

First, disconnect the negative lead ③, then the positive lead ④.

3. Remove:
   - battery
4. Measure:
   - battery charge

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a. Connect a digital voltmeter to the battery terminals.

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

NOTE:

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

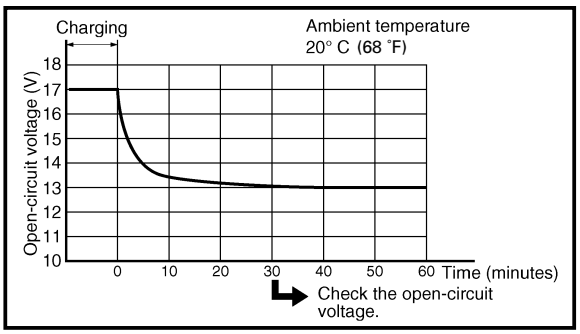
b. Check the charge of the battery, as shown in the charts and the following example.

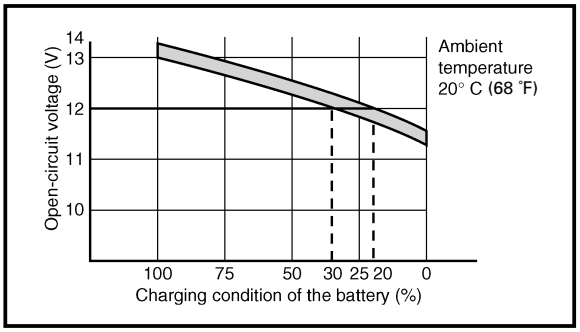
Example

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

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

⚠ WARNING

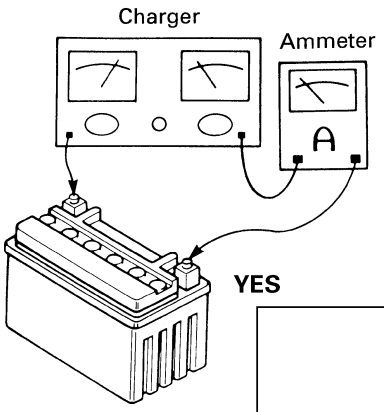
Do not quick charge a battery.

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 motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative 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 that 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.**

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Charging method using a variable-voltage charger



Measure the open-circuit voltage prior to charging.

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

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

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

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

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

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

YES

NO

Adjust the voltage to obtain the standard charging amperage.

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

Set the timer to the charging time determined by the open -circuit voltage.
Refer to "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.

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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.

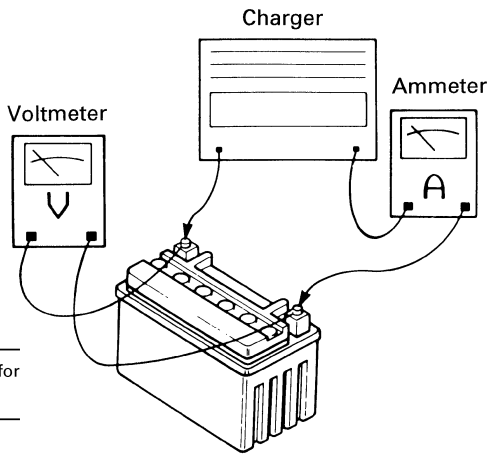
NOTE:
Set the charging time to a maximum of 20 hours.

↓

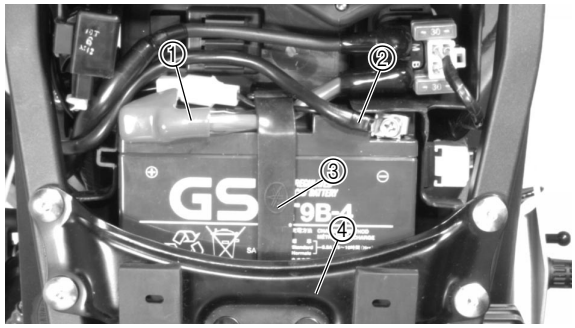
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V ➔ Charging is complete.
12.0~12.7 V ➔ Recharging is required.
Under 12.0 V ➔ Replace the battery.

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.



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

CAUTION:

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

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

	Recommended lubricant **Dielectric grease**

10. Install:
    • battery band ③
    • rear cowling bracket ④
    • rear cowling
    Refer to "COWLINGS".

EB305040
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:
   • rear cowling
   Refer to "COWLINGS".
2. Check:
   • continuity

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

NOTE:

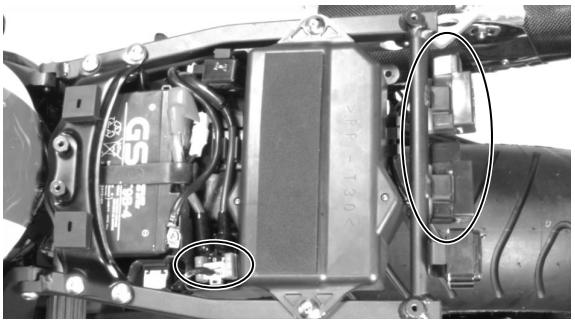
Set the pocket tester selector to "Ω × 1".

	Pocket tester **90890-03112**

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 the main switch to "ON" and verify if the electrical circuit is operational.

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

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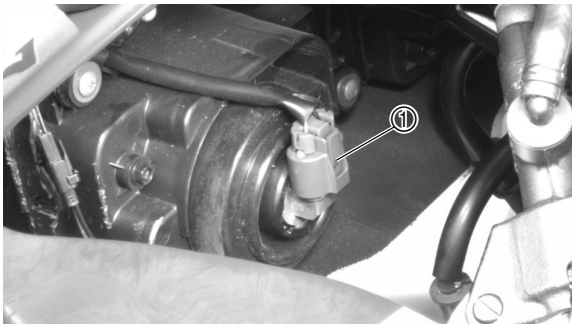
Item	Amperage	Q'ty
Main fuse	30 A	1
Headlight fuse	20 A	1
Signaling system fuse	20 A	1
Electronic fuel injection system fuse	20 A	1
ECU fuse	7.5 A	1
Radiator fan motor fuse	7.5 A	1
Backup fuse (odometer)	7.5 A	1
Reserve	30 A	1
Reserve	20 A	2
Reserve	7.5 A	2

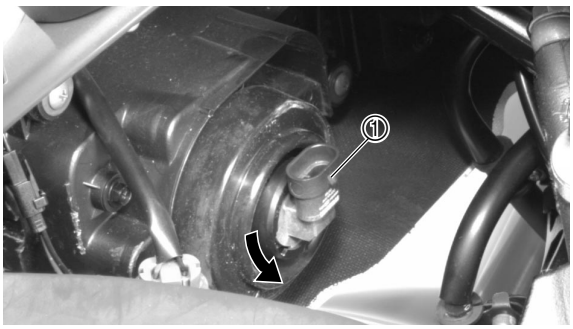
⚠ WARNING

Never use a fuse with an amperage 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.

4. Install:
   • rear cowling
   Refer to "COWLINGS".

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EB305051
REPLACING THE HEADLIGHT BULBS

The following procedure applies to both of the headlight bulbs.

1. Disconnect:
   • headlight coupler ①

2. Remove:
   • headlight bulb ①

⚠ WARNING

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

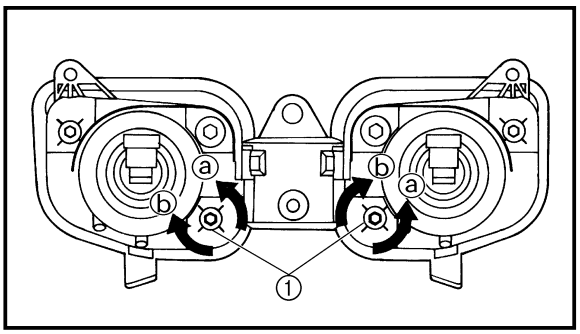
3. Install:
   • headlight bulb New
   Secure the new headlight bulb with the headlight bulb holder.

CAUTION:

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

4. Connect:
   • headlight coupler

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EB305061
ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

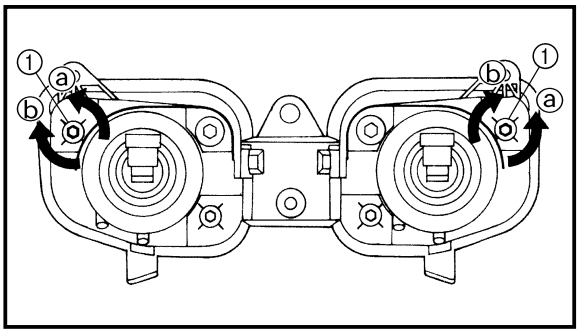
1. Adjust:
   • headlight beam (vertically)

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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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2. Adjust:
   • headlight beam (horizontally)

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

Left headlight

Direction ⓐ	**Headlight beam moves to the right.**
Direction ⓑ	**Headlight beam moves to the left.**

Right headlight

Direction ⓐ	**Headlight beam moves to the left.**
Direction ⓑ	**Headlight beam moves to the right.**

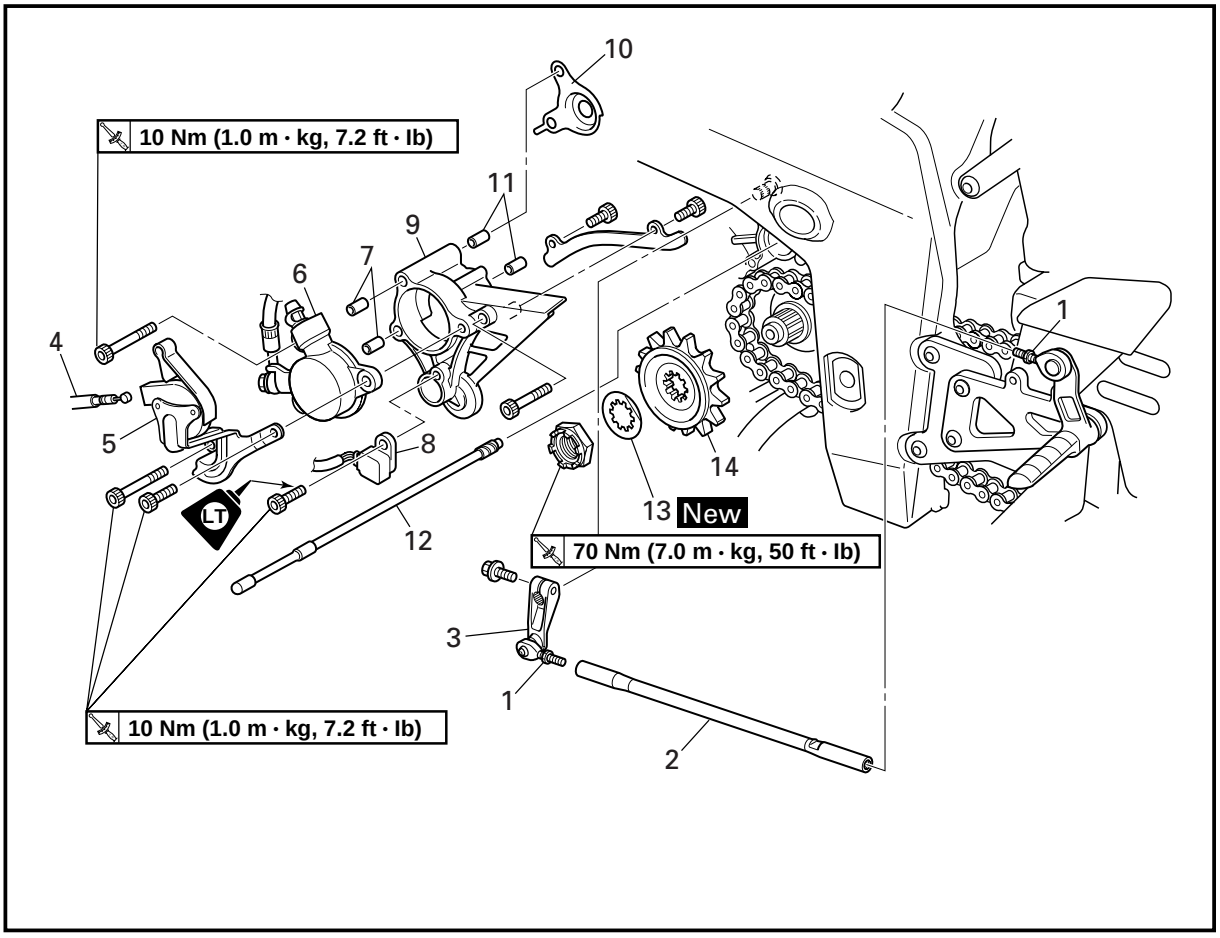
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EB400011

OVERHAULING THE ENGINE

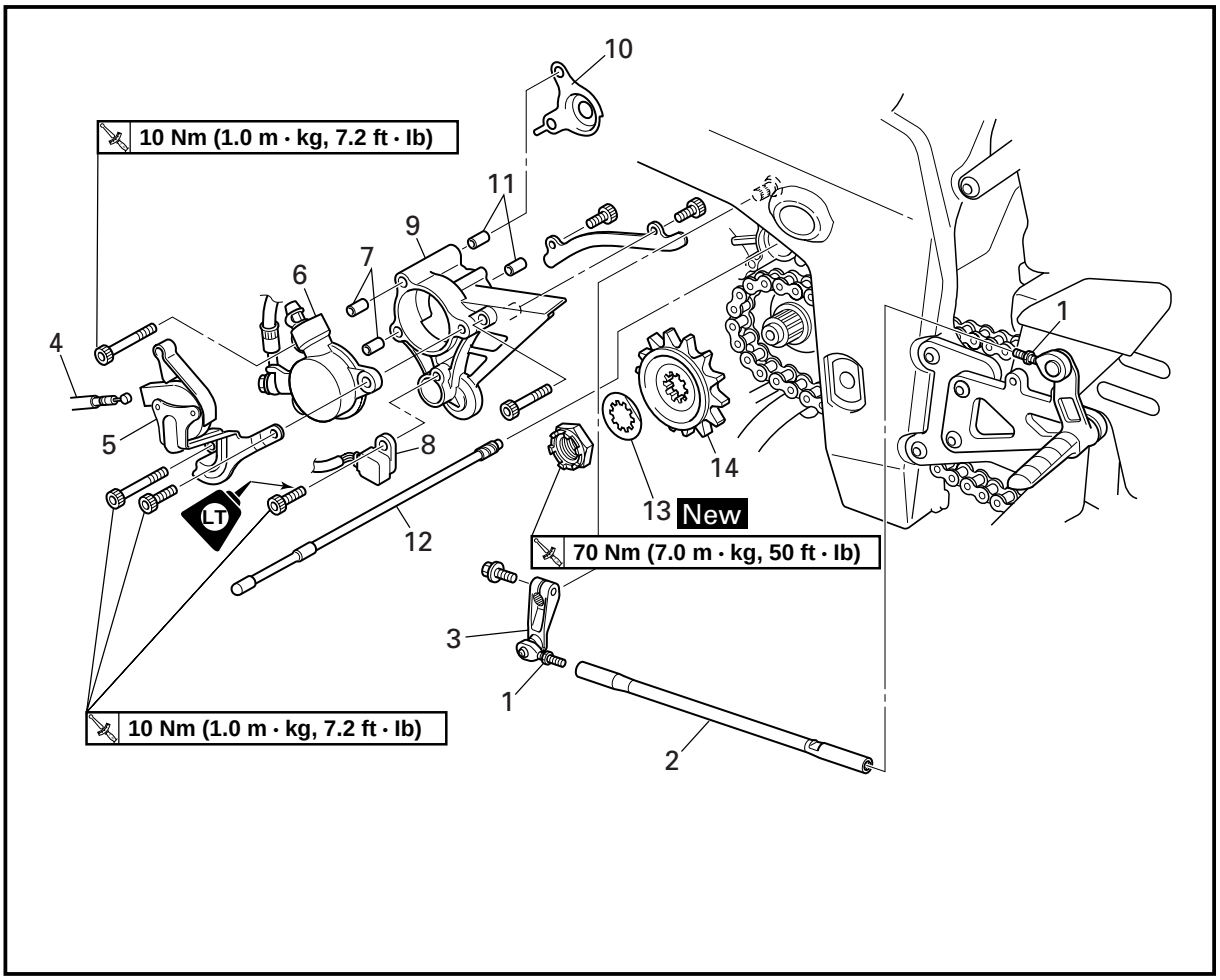
ENGINE



Order	Job/Part	Q'ty	Remarks
	Removing the drive sprocket		Remove the parts in the order listed.
	Bottom cowling and front cowling		Refer to "COWLINGS" in chapter 3.
1	Locknut	2	Loosen.
2	Shift rod	1	
3	Shift arm	1	
4	Starter cable	1	
5	Starter knob	1	
6	Clutch release cylinder	1	
7	Dowel pin	2	

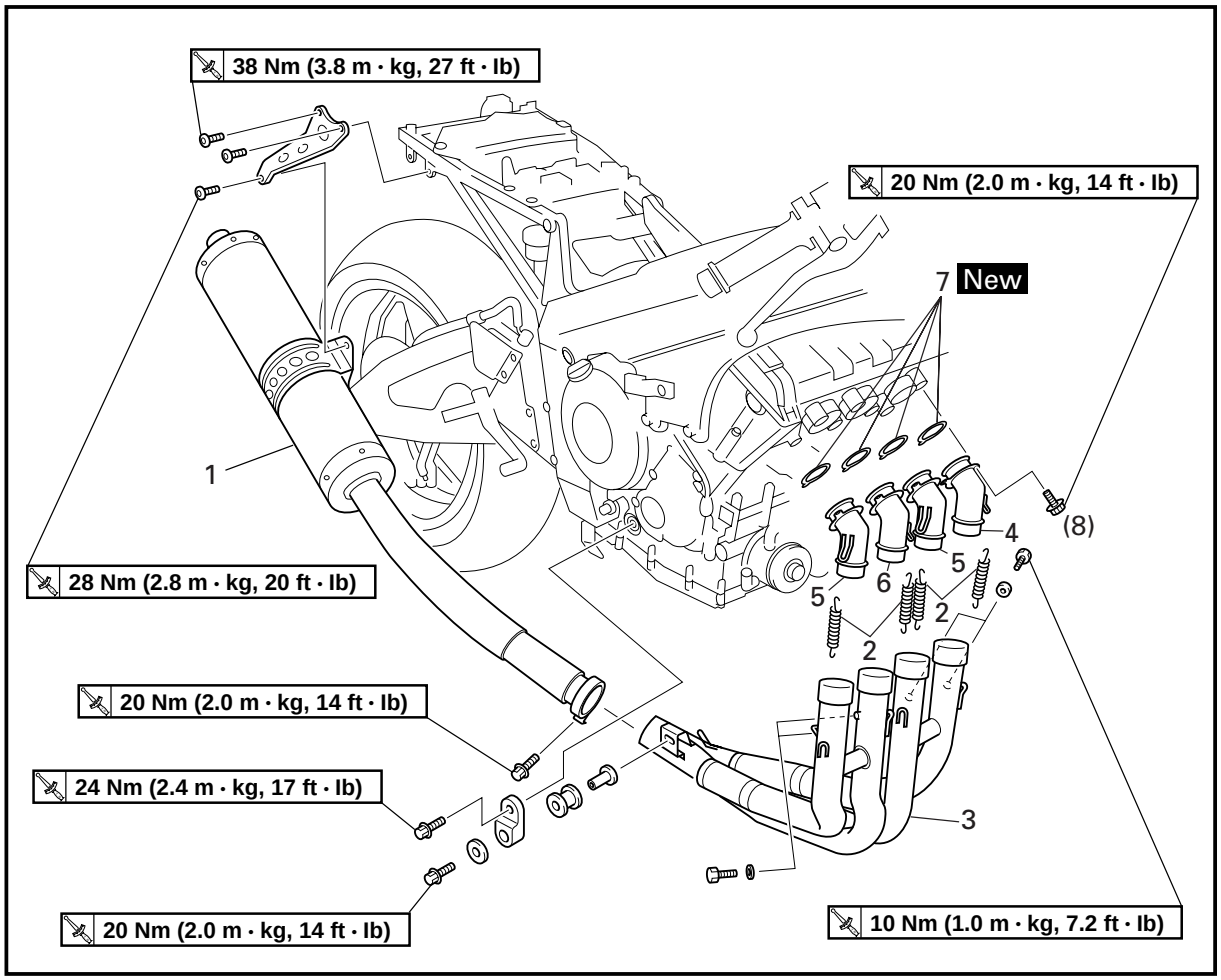
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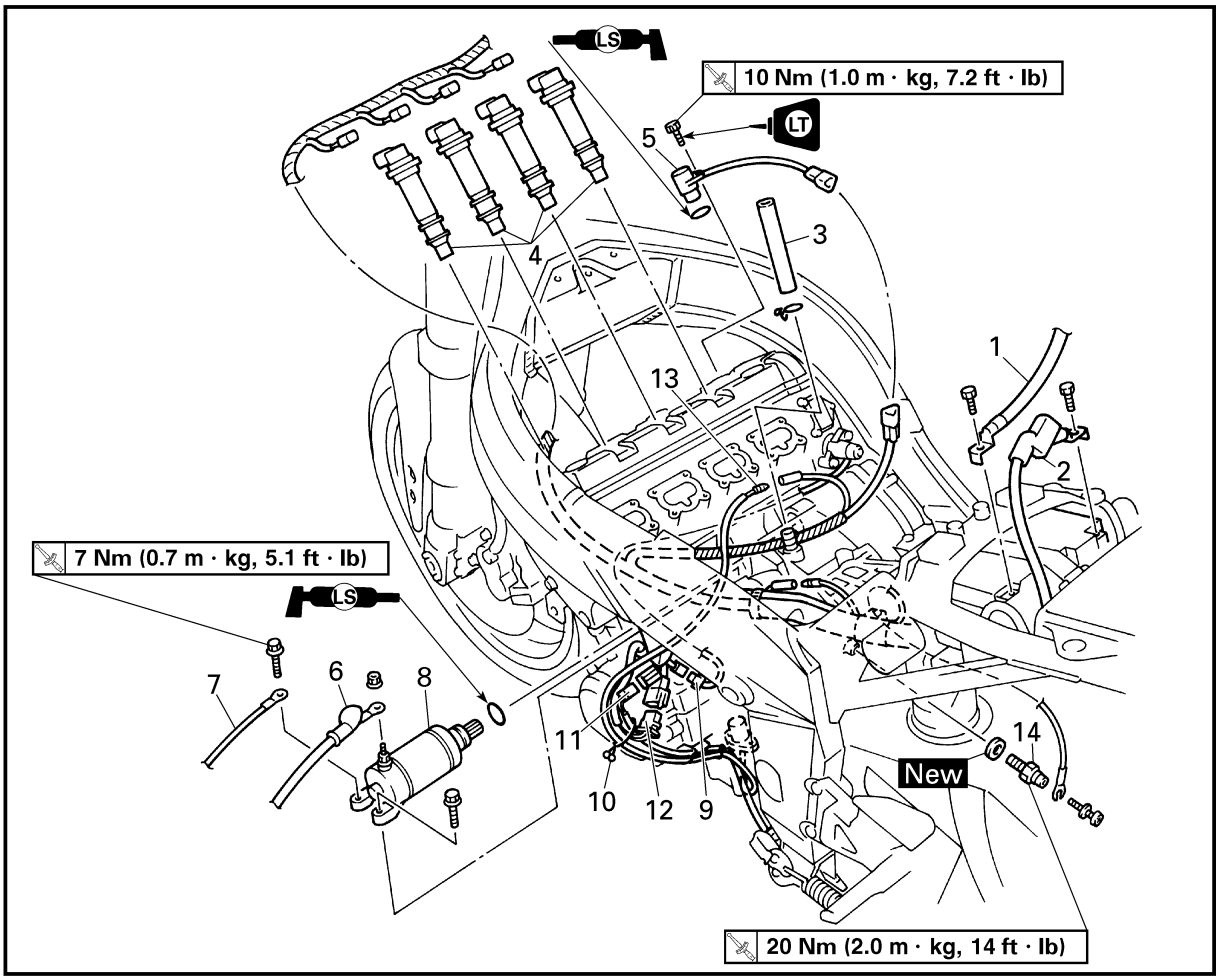
Order	Job/Part	Q'ty	Remarks
8	Speed sensor	1	
9	Drive sprocket cover	1	
10	Oil seal support plate	1	
11	Dowel pin	2	
12	Push rod #2	1	
13	Lock washer	1	
14	Drive sprocket	1	
			For installation, reverse the removal procedure.

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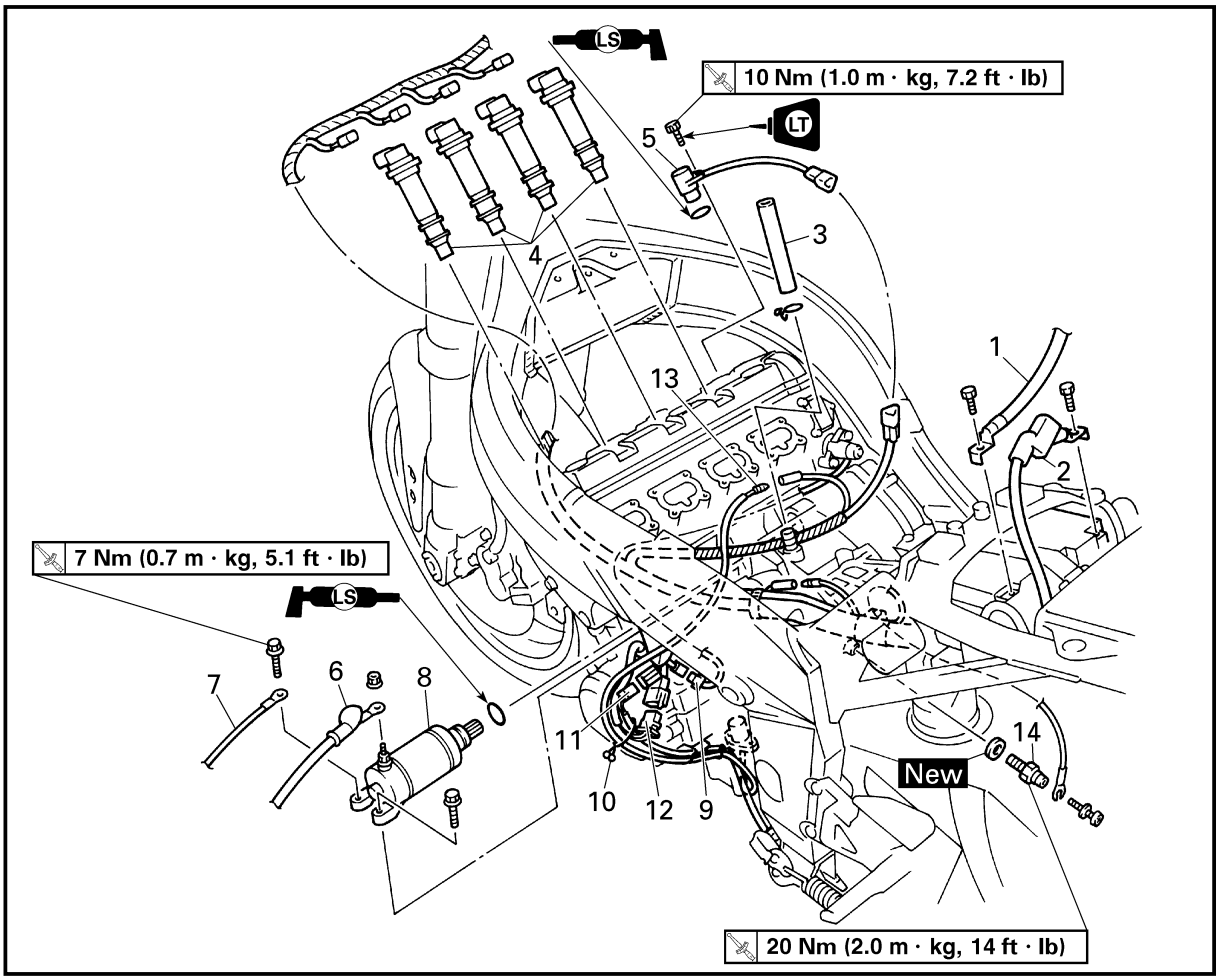
Order	Job/Part	Q'ty	Remarks
	Removing the exhaust assembly		Remove the parts in the order listed.
	Rear cowling		Refer to "COWLINGS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Radiator assembly		Refer to "RADIATOR AND THERMOSTAT" in chapter 5.
1	Muffler	1	
2	Spring	4	
3	Exhaust pipe assembly	1	
4	Exhaust pipe joint 1	1	
5	Exhaust pipe joint 2	2	
6	Exhaust pipe joint 4	1	
7	Exhaust pipe joint gasket	4	
			For installation, reverse the removal procedure.

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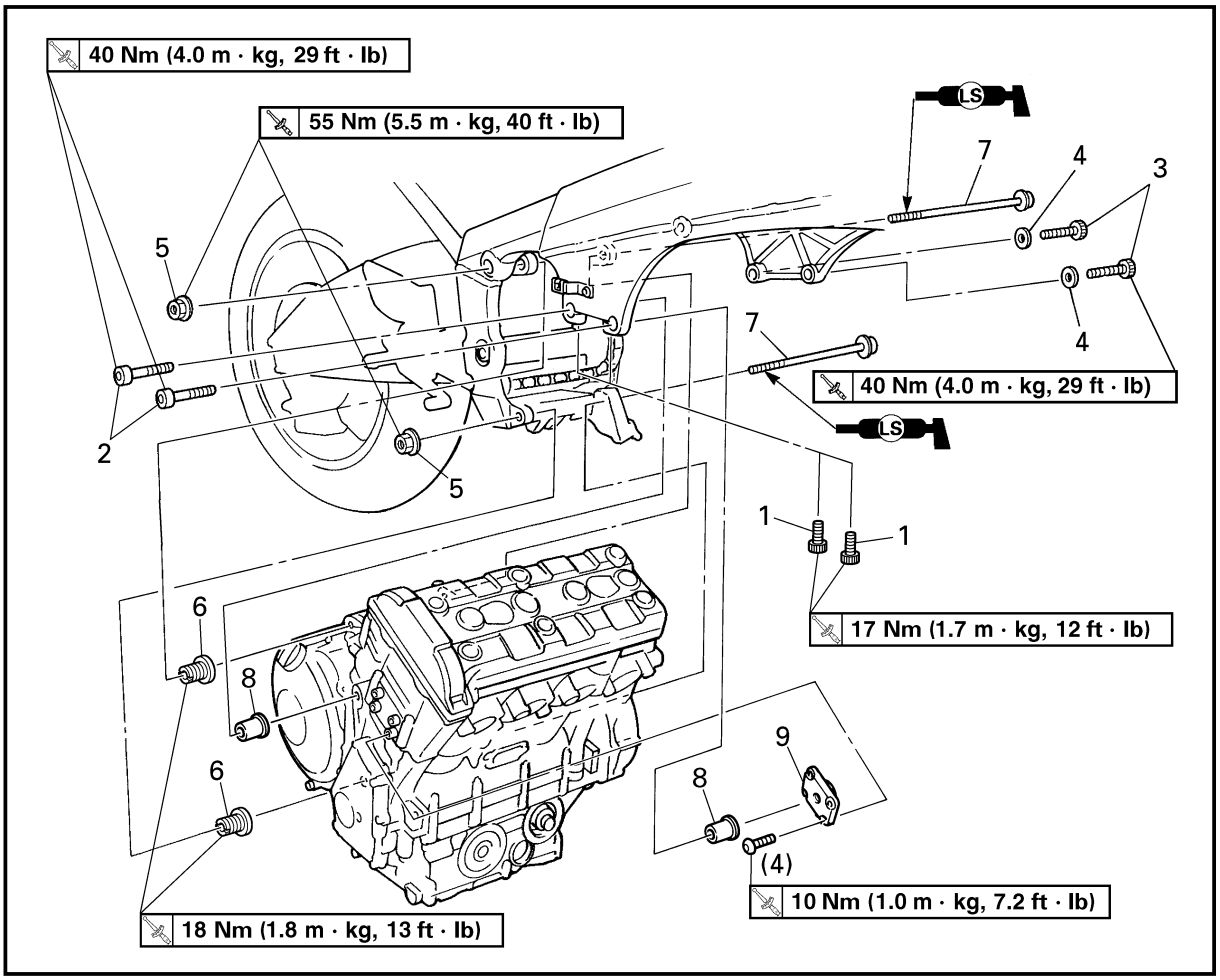
Order	Job/Part	Q'ty	Remarks
	Disconnecting the leads and hoses		Disconnect the parts in the order listed.
	Fuel tank and air filter case cover		Refer to "FUEL TANK AND AIR FILTER COVER" in chapter 3.
	Air filter case and throttle body assembly		Refer to "ELECTRONIC FUEL INJECTION" in chapter 6.
	Engine oil and oil filter cartridge		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Oil cooler and thermostat assembly		Refer to "OIL COOLER" and "THERMOSTAT ASSEMBLY" in chapter 5.
1	Battery negative lead	1	**CAUTION:** **First, disconnect the negative lead, then the positive lead.**
2	Battery positive lead	1	

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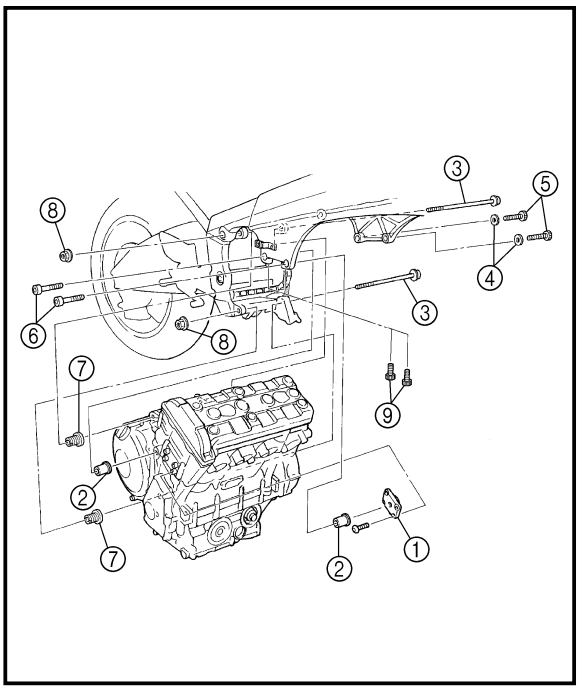
Order	Job/Part	Q'ty	Remarks
3	Crankcase breather hose	1	
4	Ignition coil	4	
5	Camshaft sensor	1	
6	Starter motor lead	1	Disconnect.
7	Ground lead	1	Disconnect.
8	Starter motor	1	
9	Pickup coil coupler	1	Disconnect.
10	Plastic clip	1	
11	Stator coil assembly coupler	1	Disconnect.
12	Sidestand switch coupler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

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

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EB400700
INSTALLING THE ENGINE

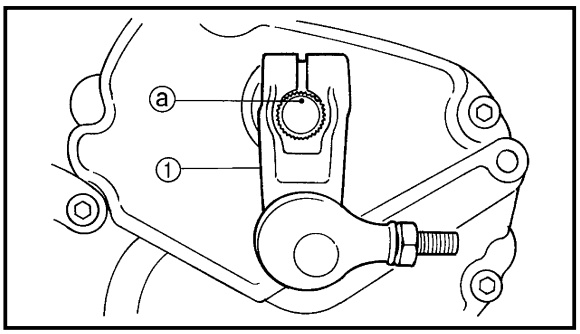
1. Install:
   - mounting bracket ①
   - spacers ②
   - rear mounting bolts ③
   - washers ④
   - left front mounting bolts ⑤
   - right front mounting bolts ⑥

NOTE:
Do not fully tighten the bolts.

2. Tighten:
   - spacer bolts ⑦
     18 Nm (1.8 m · kg, 13 ft · lb)
   - self-locking nut ⑧
     55 Nm (5.5 m · kg, 40 ft · lb)
   - left front mounting bolts
     40 Nm (4.0 m · kg, 29 ft · lb)
   - right front mounting bolt
     40 Nm (4.0 m · kg, 29 ft · lb)
   - pinch bolts ⑨
     17 Nm (1.7 m · kg, 12 ft · lb)

NOTE:
- Tighten the spacer bolt ⑦ it to specification with a pivot shaft wrench.
- When tightened, the spacer bolt should be flat against the engine surface.

Pivot shaft wrench
90890-01471

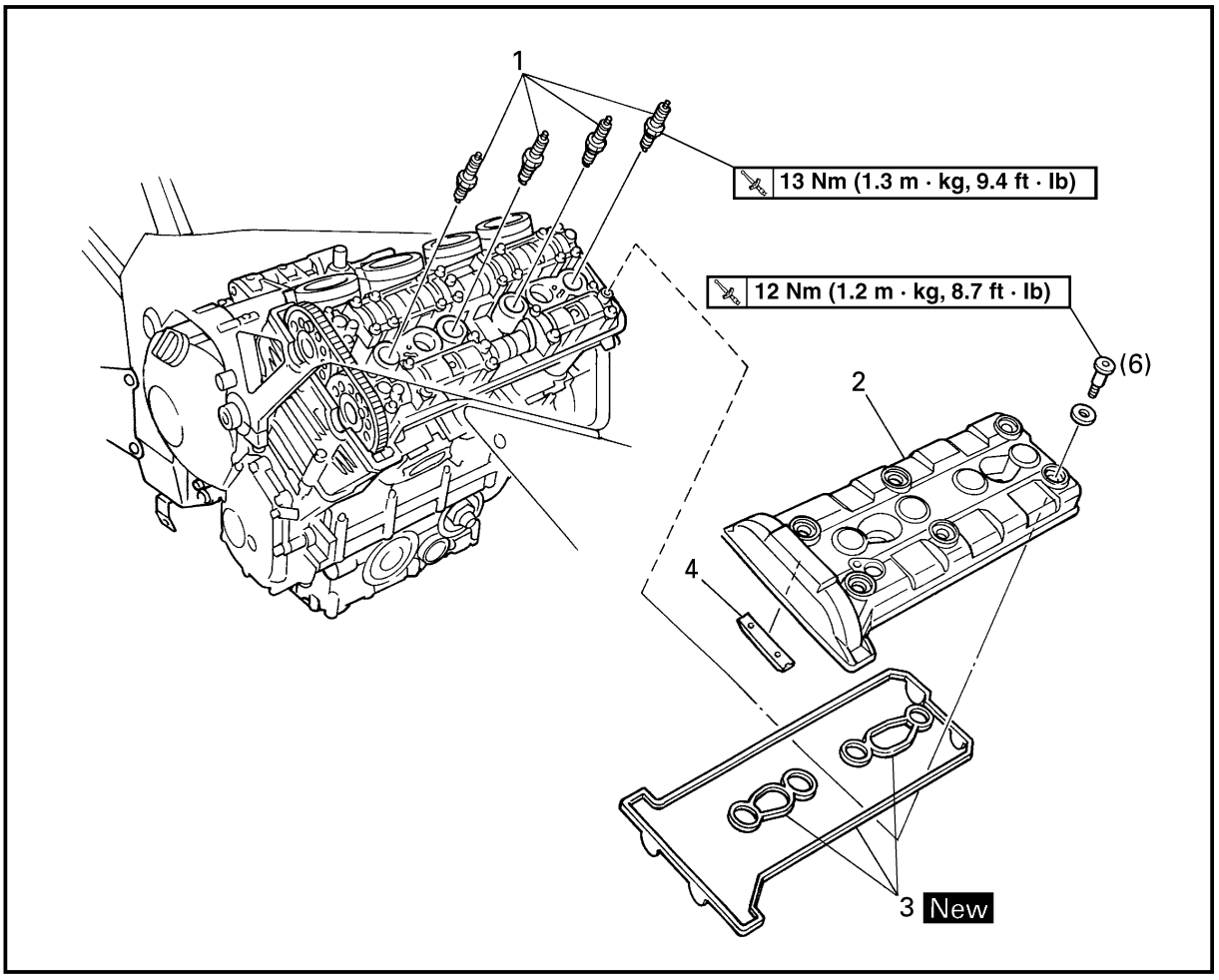


3. Install:
   - shift arm①
     10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:
Align the punch mark ⓐ in the shift shaft with the slot in the shift arm.

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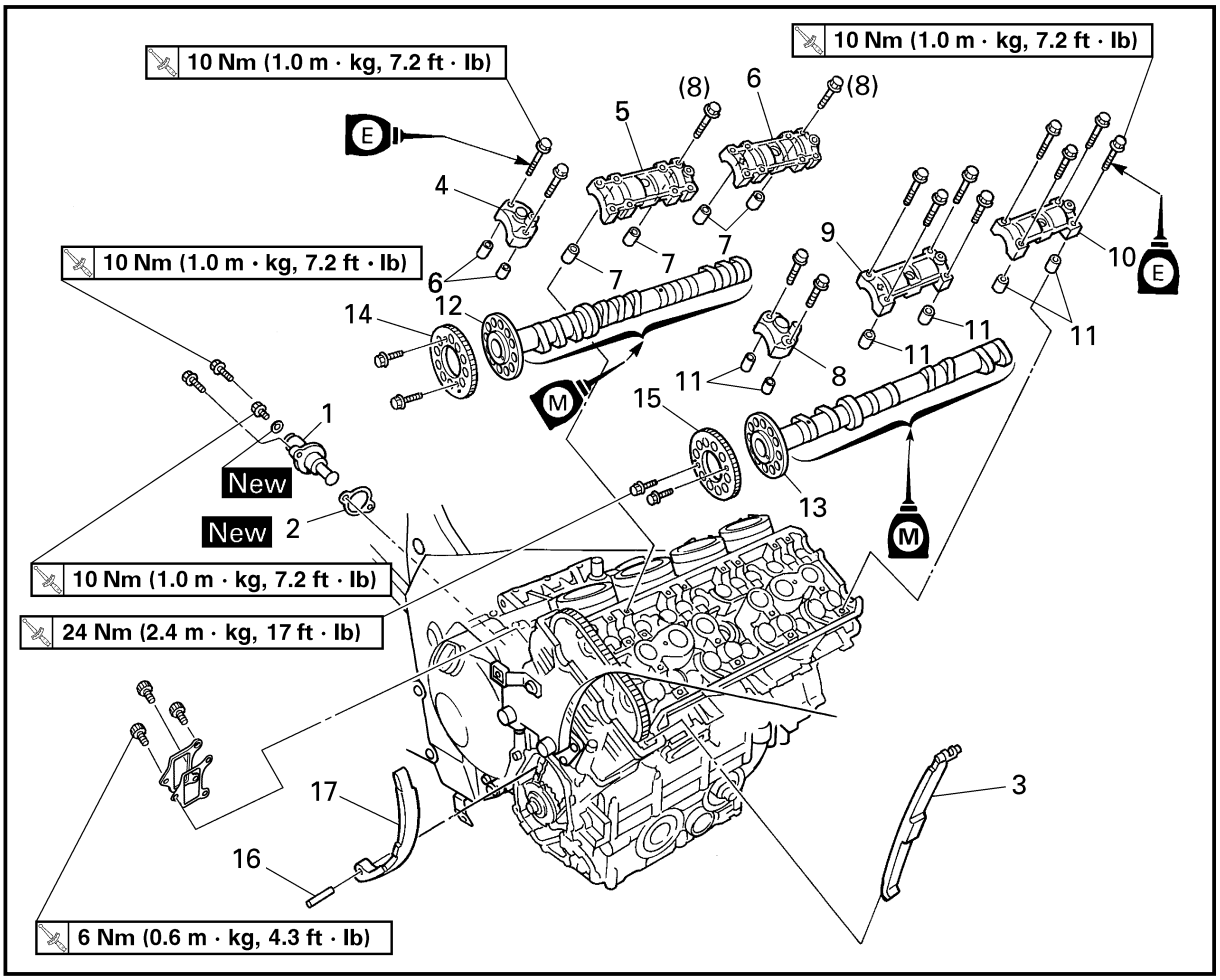
EB401000
CAMSHAFTS



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

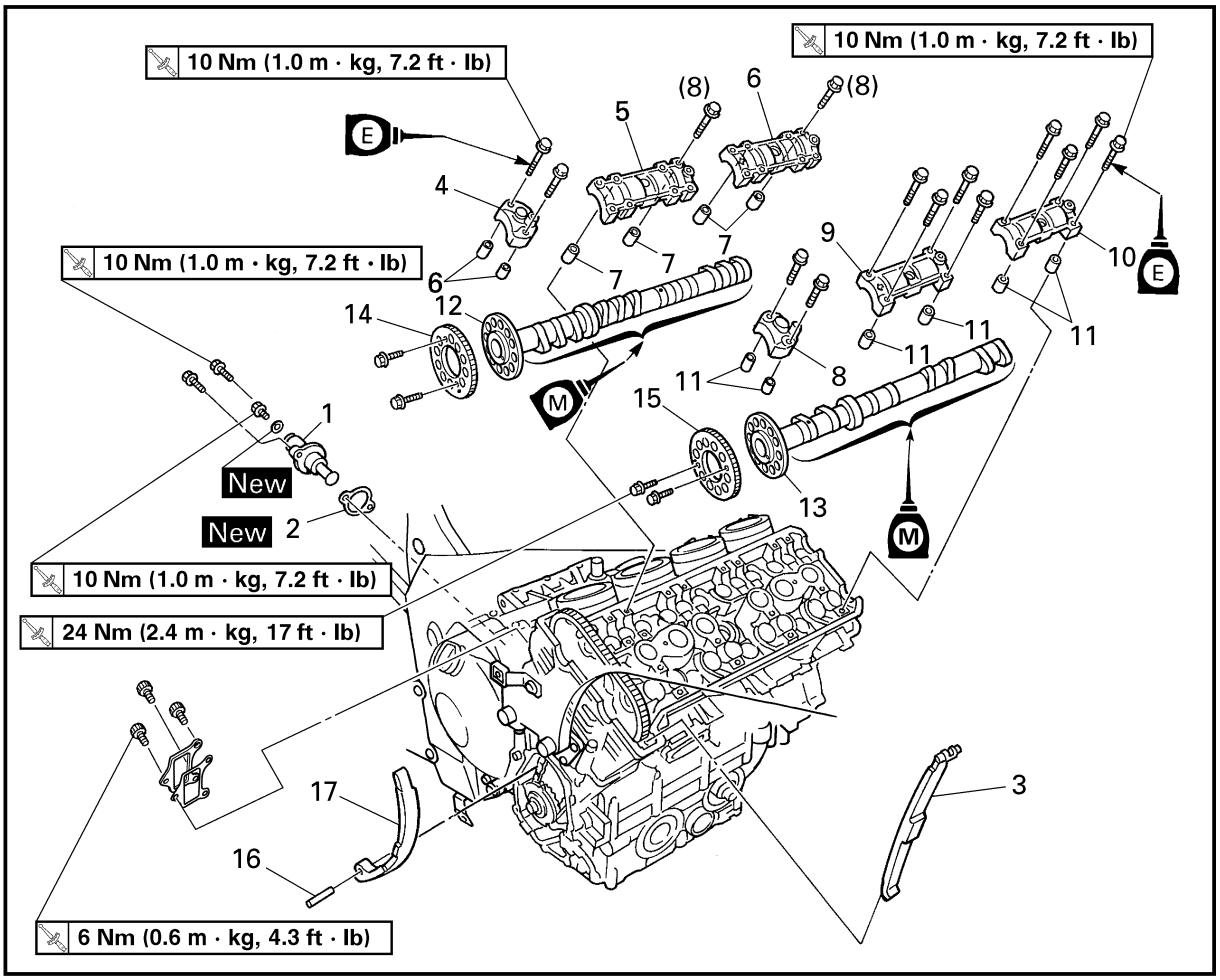
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EB401011



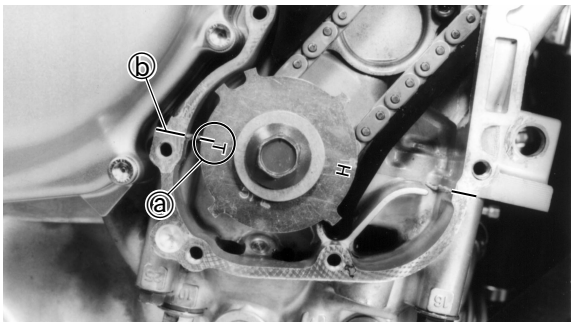
Order	Job/Part	Q'ty	Remarks
	Removing the camshafts		Remove the parts in the order listed.
	Pickup coil rotor cover		Refer to "PICKUP COIL".
1	Timing chain tensioner	1	
2	Timing chain tensioner gasket	1	
3	Timing chain guide (exhaust side)	1	
4	Intake camshaft cap "I"	1	
5	Intake camshaft cap "R"	1	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

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Order	Job/Part	Q'ty	Remarks
12	Intake camshaft	1	
13	Exhaust camshaft	1	
14	Intake camshaft sprocket	1	
15	Exhaust camshaft sprocket	1	
16	Pin	1	
17	Timing chain guide (intake side)	1	
			For installation, reverse the removal procedure.

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EB401101
REMOVING THE CAMSHAFTS

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

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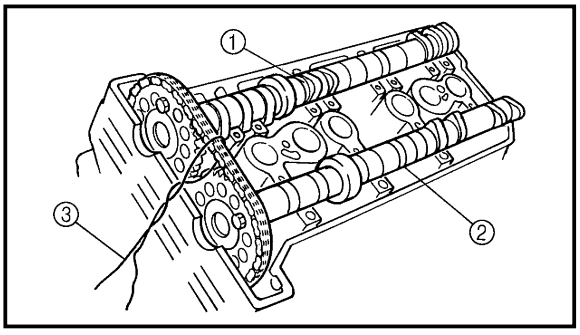
   a. Turn the crankshaft clockwise.
   b. When piston #1 is at TDC on the compression stroke, align the TDC mark ⓐ on the pickup coil rotor with the crankcase mating surface ⓑ.

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

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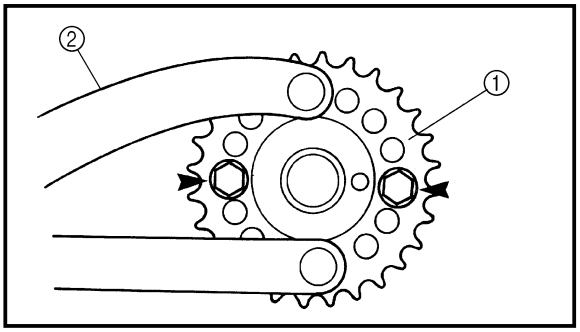
2. Remove:
   • float chamber air vent hose holder
   • timing chain tensioner
3. Remove:
   • timing chain guide (exhaust side)
4. Remove:
   • camshaft caps
   • dowel pins

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



5. Remove:
   • intake camshaft ①
   • exhaust camshaft ②

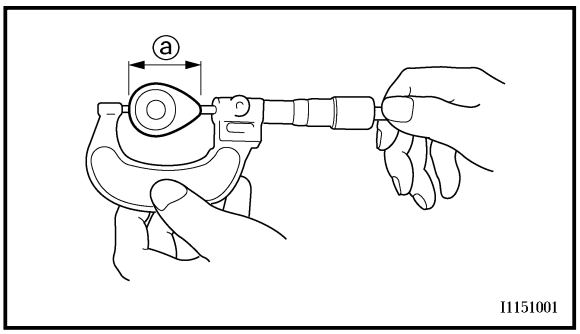
NOTE:
To prevent the timing chain from falling into the crankcase, fasten it with a wire ③.

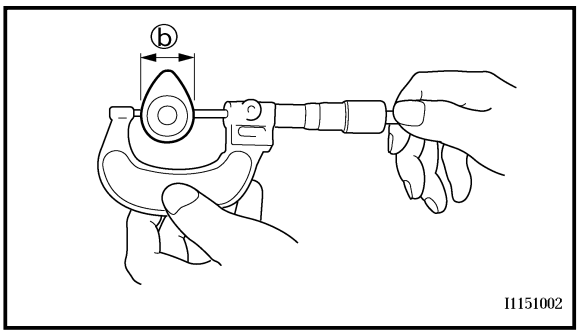


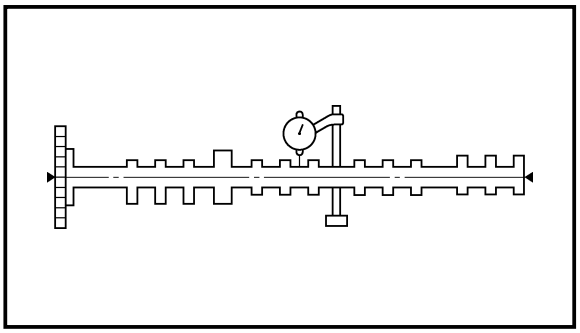
6. Remove:
   • camshaft sprockets ①
   (with the flywheel puller ②)

	Flywheel puller **90890-01080**

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EB401401
CHECKING THE CAMSHAFTS

1. Check:
   • camshaft lobes
   Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   • camshaft lobe dimensions ⓐ and ⓑ
   Out of specification → Replace the camshaft.

Camshaft lobe dimensions limit
Intake camshaft
ⓐ 33.31 mm (1.3114 in)
ⓑ 24.90 mm (0.9803 in)
Exhaust camshaft
ⓐ 32.95 mm (1.2972 in)
ⓑ 24.936 mm (0.9817 in)

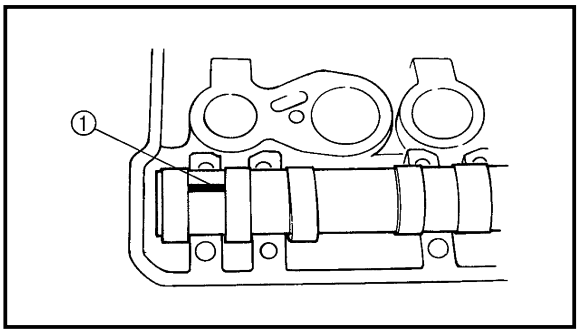
3. Measure:
   • camshaft runout
   Out of specification → Replace.

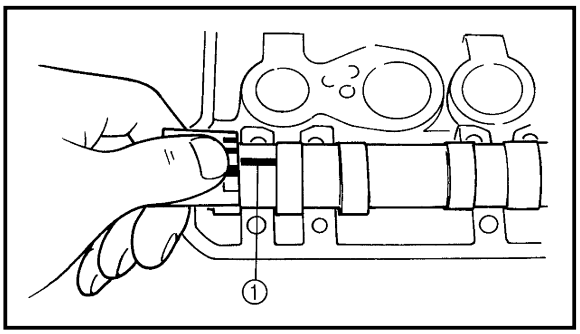
Maximum camshaft runout
0.03 mm (0.0012 in)

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

Camshaft journal-to-camshaft cap clearance
0.035 ~ 0.069 mm
(0.0014 ~ 0.0027 in)

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a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).

b. Position a strip of Plastigauge® ① onto the camshaft journal as shown.

c. Install the dowel pins and camshaft caps.

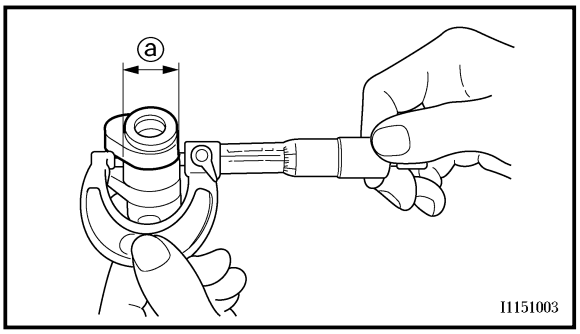
NOTE:

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

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

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

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

Camshaft journal diameter
24.452 ~ 24.465 mm
(0.9627 ~ 0.9632 in)

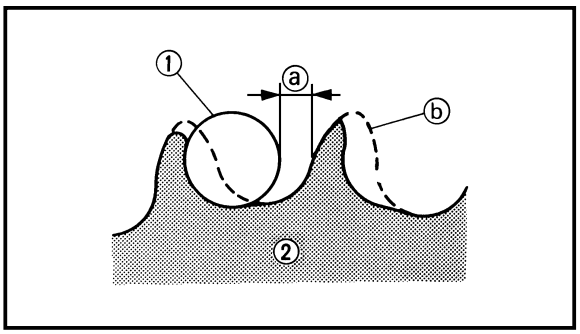
EB401421

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

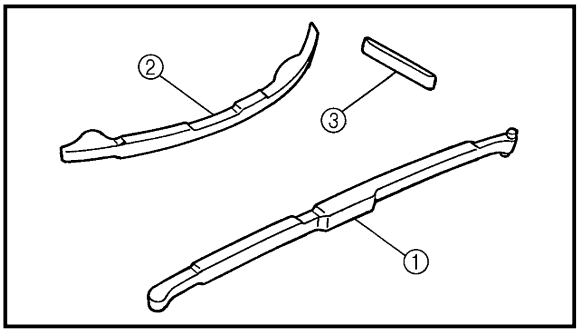
The following procedure applies to all of the camshaft sprockets and timing chain guides.

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

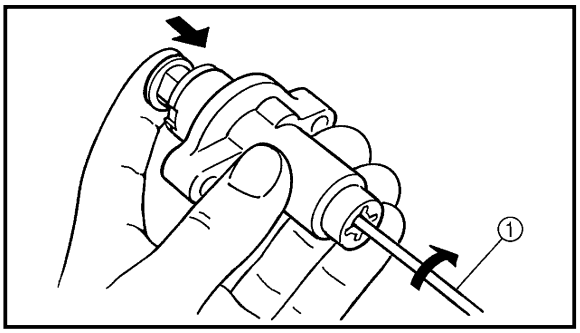
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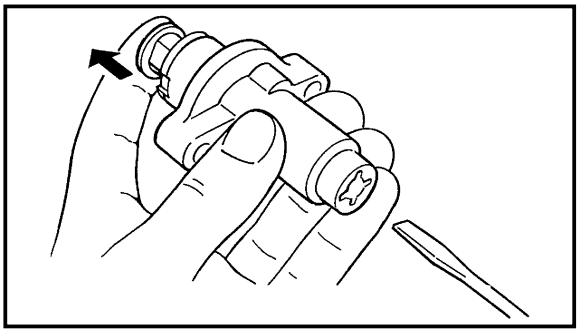


2. Check:
   - camshaft sprocket
     More than 1/4 tooth wear ⓐ → Replace the camshaft sprockets and the timing chain as a set.
     ⓐ 1/4 tooth
     ⓑ Correct
     ① Timing chain roller
     ② Camshaft sprocket



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





EB401430
CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   - timing chain tensioner
     Cracks/damage/rough movement → Replace.

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

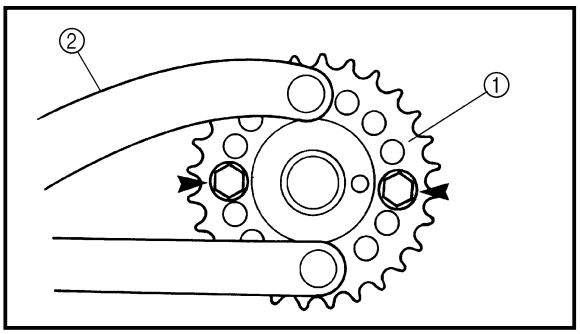
NOTE:
While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.

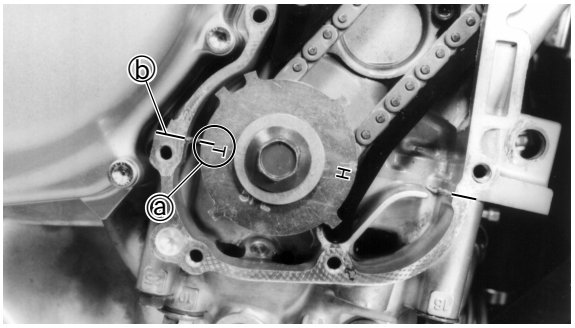
b. Remove the screwdriver and slowly release the timing chain tensioner rod.

c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

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EB401701
INSTALLING THE CAMSHAFTS

1. Install:
   • timing chain guide (intake side)
2. Install:
   • camshaft sprockets ①
   24 Nm (2.4 m · kg, 17 ft · lb)
   (with the flywheel puller ②)

	Flywheel puller **90890-01080**

3. Install:
   • exhaust camshaft
   • intake camshaft
   • exhaust camshaft caps
   • intake camshaft caps

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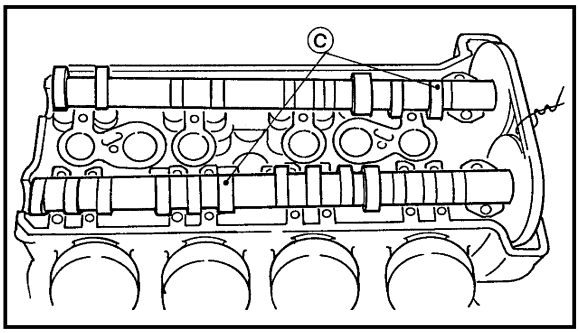
a. Turn the crankshaft clockwise.

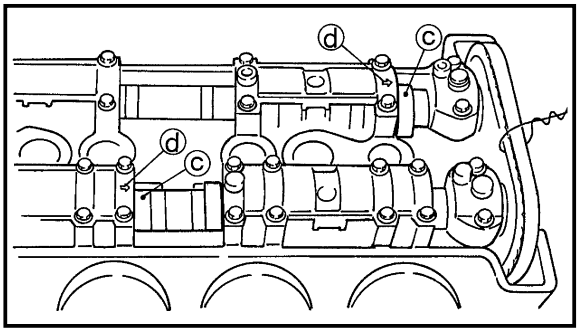
b. When piston #1 is at TDC on the compression stroke, align the TDC ⓐ mark on the pickup coil rotor with the crankcase mating surface ⓑ.

c. Install the timing chain onto both camshaft sprockets and then install the camshaft sprockets onto the camshafts.

CAUTION:

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





NOTE:

Make sure that the punch marks ⓒ on the camshafts face up.

d. Install the exhaust and intake camshaft caps.

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

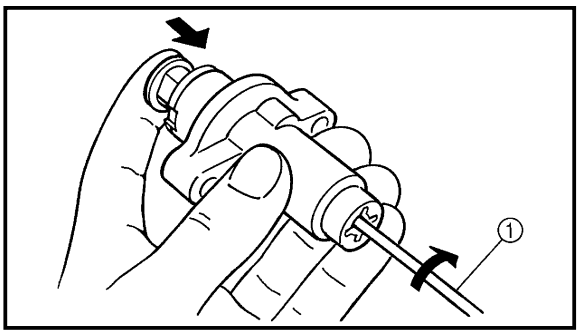
NOTE:

Make sure that the punch marks ⓒ on the camshafts are aligned with the arrow marks ⓓ on the camshaft caps. Out of alignment → Reinstall.

e. Remove the wire from the timing chain.

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4. Install:
   • timing chain guide (exhaust side)
5. Install:
   • timing chain tensioner

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a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver ① until it stops.
c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner and gasket onto the cylinder block. Then, tighten the timing chain tensioner bolts to the specified torque.

⚠ WARNING

Always use a new gasket.

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

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

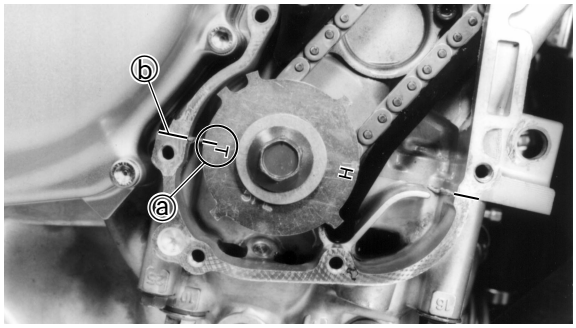
d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

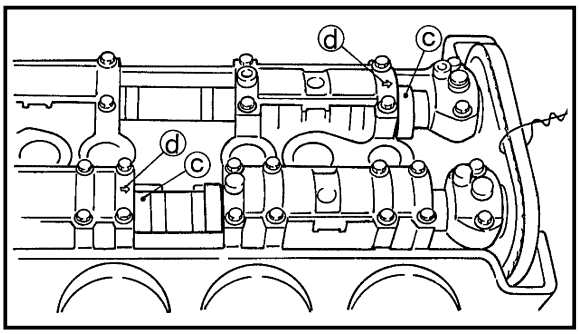
	Cap bolt **10 Nm (1.0 m • kg, 7.2 ft • lb)**

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6. Turn:
   • crankshaft
   (several turns counterclockwise)

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7. Check:
   - TDC mark ⓐ
     Make sure that the TDC mark is aligned with the crankcase mating surface ⓑ.
   - camshaft punch mark ⓒ
     Make sure that the camshaft punch mark is aligned with the arrow mark ⓓ on the camshaft cap.
     Out of alignment → Adjust.
     Refer to the installation steps above.

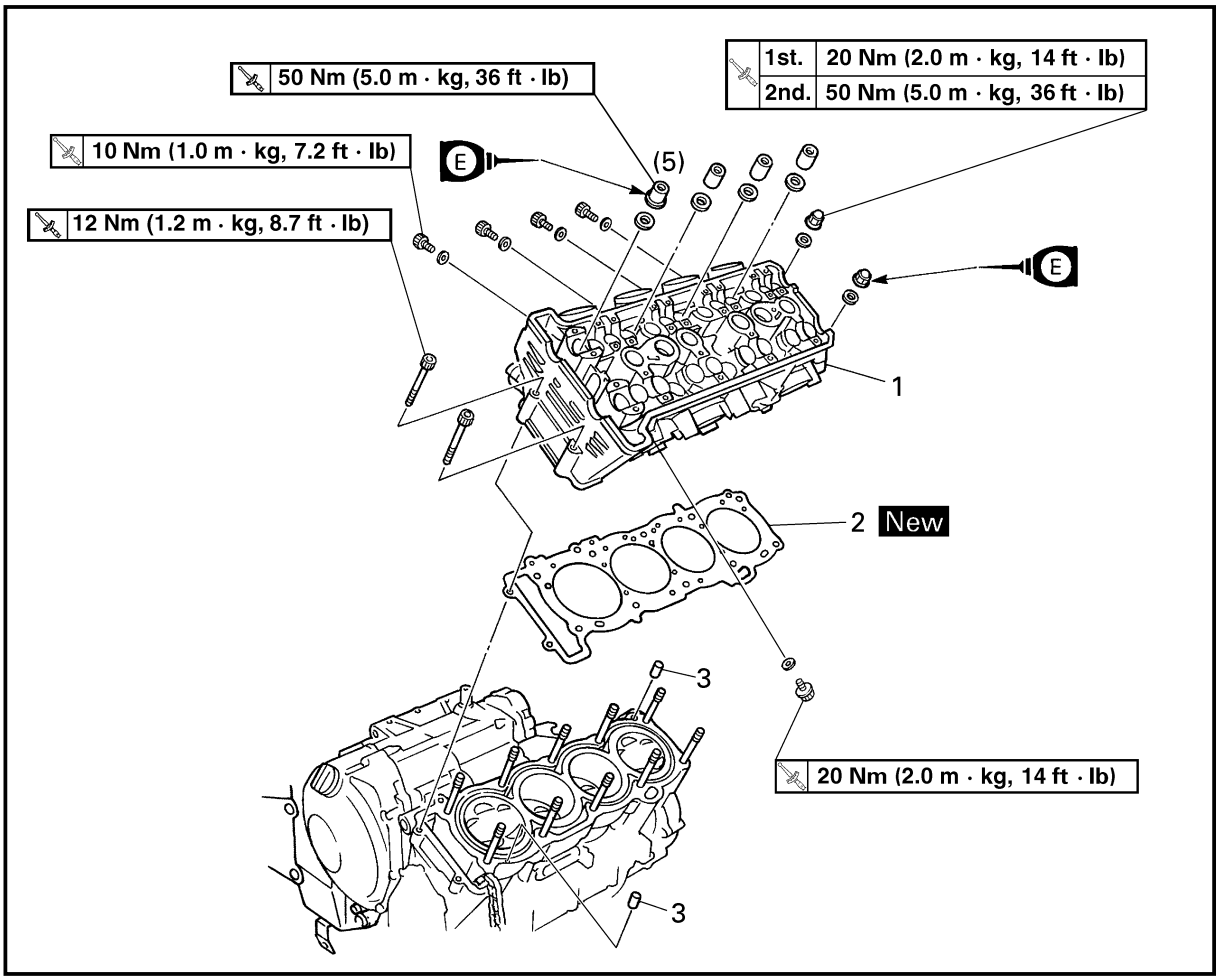
8. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE" in chapter 3.

9. Install:
   - cylinder head cover gasket
   - cylinder head cover

NOTE:
- Apply bond TB1541 onto the mating surfaces of the cylinder head cover and cylinder head cover gasket.
- Apply bond 1215B onto the mating surfaces of the cylinder head cover gasket and cylinder head.
- Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

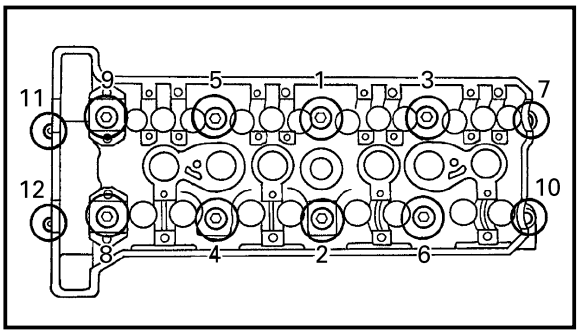
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EB402000
CYLINDER HEAD



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

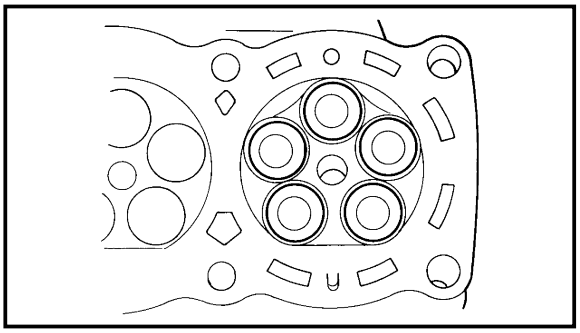
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EB402102
REMOVING THE CYLINDER HEAD

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

NOTE:
• Loosen each bolt and nut 1/2 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts and nuts are fully loosened, remove them.
• Loosen the bolts and nuts in decreasing numerical order (refer to the numbers in the illustration).



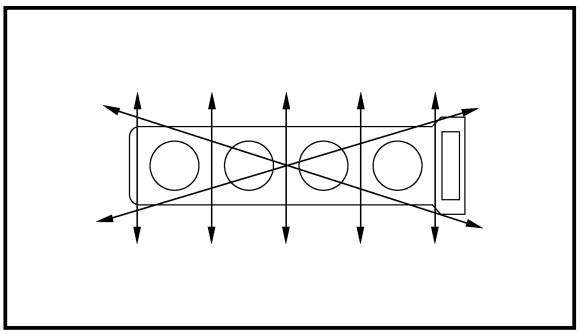
EB402402
CHECKING THE CYLINDER HEAD

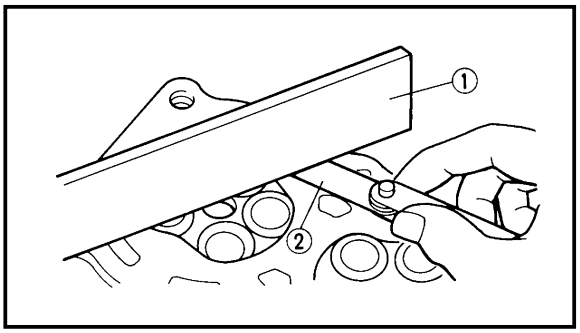
1. Eliminate:
   • combustion chamber carbon deposits (with a rounded scraper)

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.

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

Maximum cylinder head warpage
0.06 mm (0.0024 in)

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a. Place a straightedge ① and a thickness gauge ② across the cylinder head.

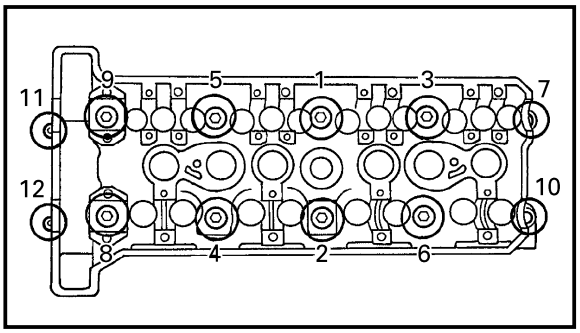
b. Measure the warpage.

c. If the limited 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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EB402702
INSTALLING THE CYLINDER HEAD

1. Install:
   • cylinder head
   • cylinder head nut (1 ~ 10)

	1st.	20 Nm (2.0 m · kg, 14 ft · lb)
	2nd.	50 Nm (5.0 m · kg, 36 ft · lb)

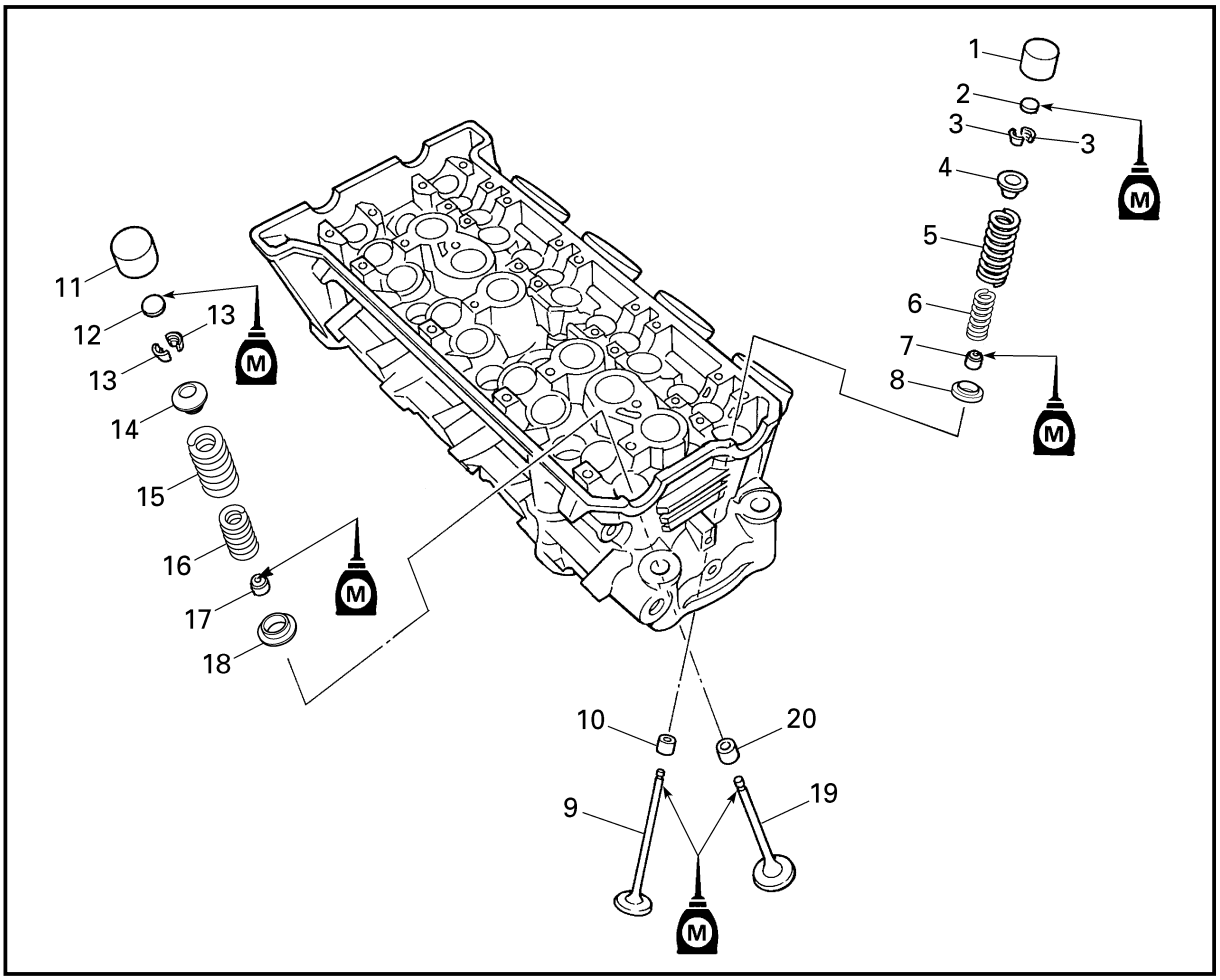
   • cylinder head bolt (11, 12)

	12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:
• Lubricate the cylinder head nuts with engine oil.
• Tighten the cylinder head nuts and bolts in two stages and in a crisscross pattern.
• Tighten the nuts and bolts in numerical order (refer to the numbers in the illustration).

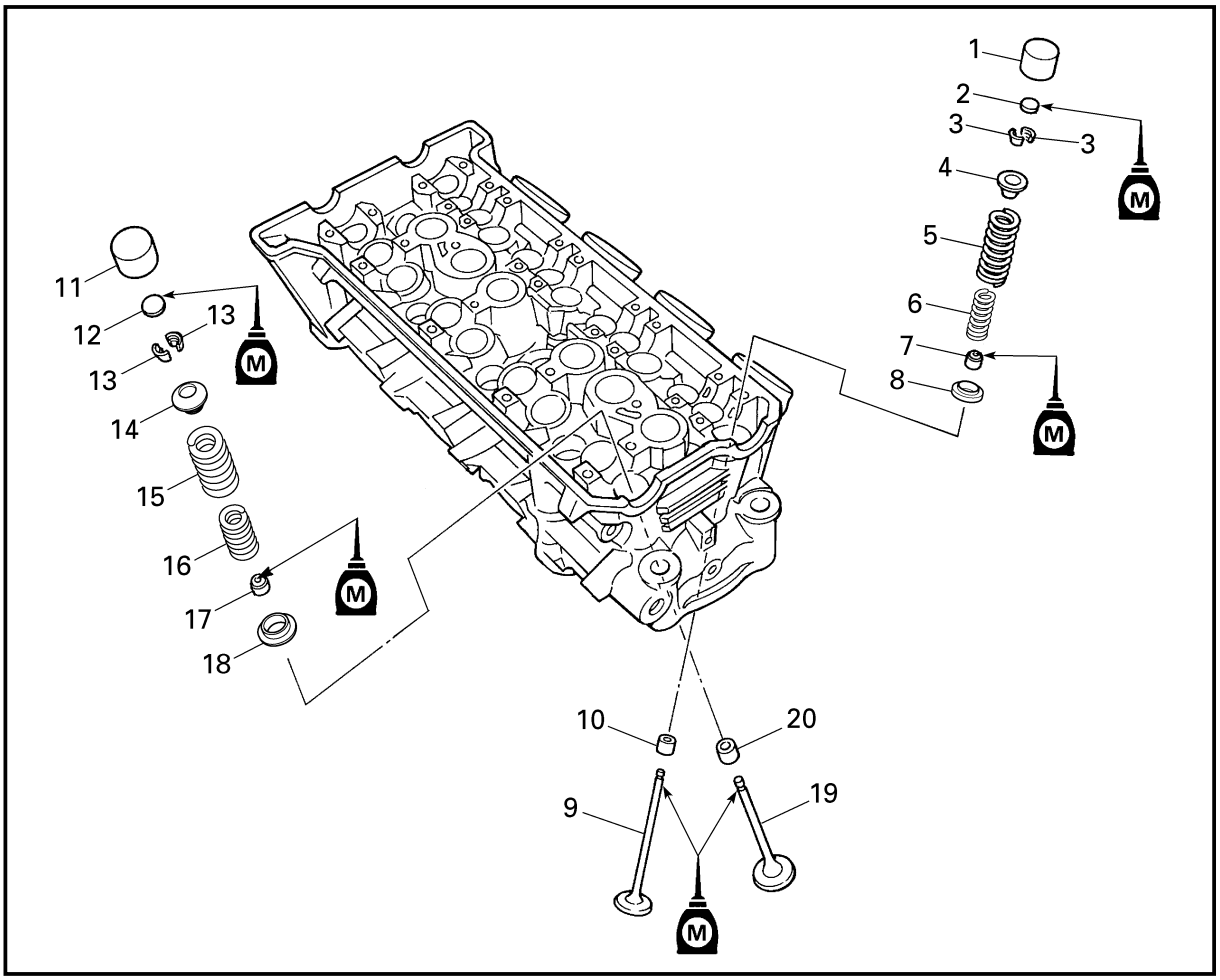
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EB403000
VALVES AND VALVE SPRINGS



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

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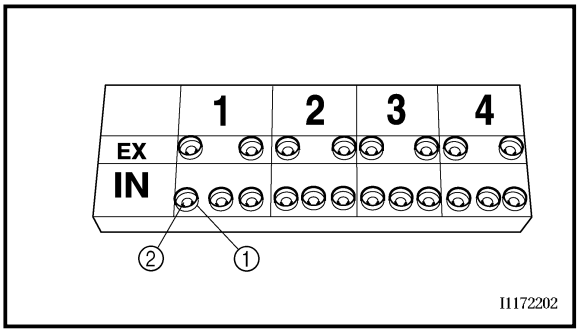
Order	Job/Part	Q'ty	Remarks
11	Exhaust valve lifter	8	
12	Exhaust valve pad	8	
13	Exhaust valve cotter	16	
14	Exhaust valve upper spring seat	8	
15	Exhaust outer valve spring	8	
16	Exhaust inner valve spring	8	
17	Exhaust valve oil seal	8	
18	Exhaust valve lower spring seat	8	
19	Exhaust valve	8	
20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

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EB403100
REMOVING THE VALVES

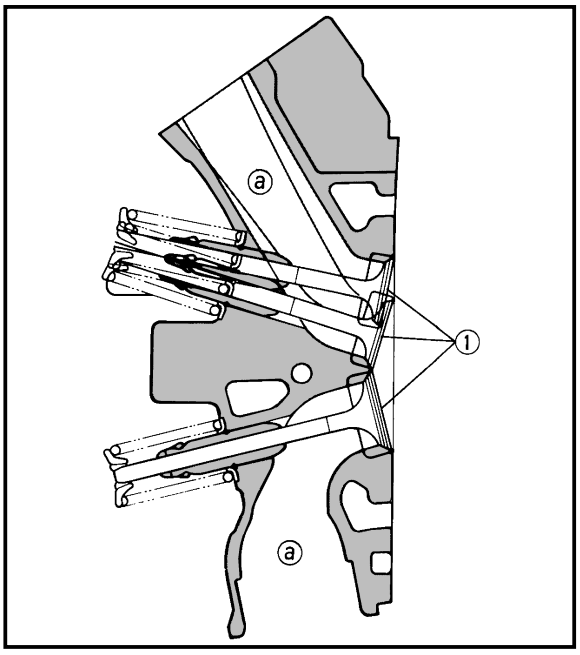
The following procedure applies to all of the valves and related components.

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



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

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



2. Check:
   - valve
     (for leakage)
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS".

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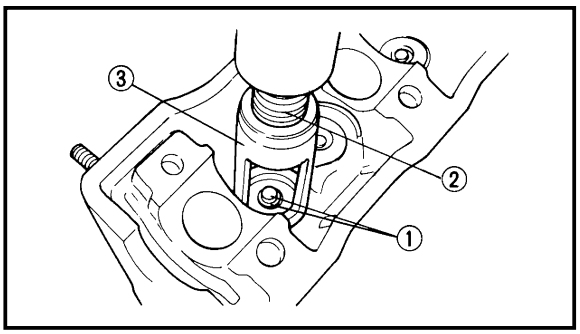
a. Pour a clean solvent ⓐ into the intake and exhaust ports.

b. Check that the valves properly seal.

NOTE:
There should be no leakage at the valve seat ①.

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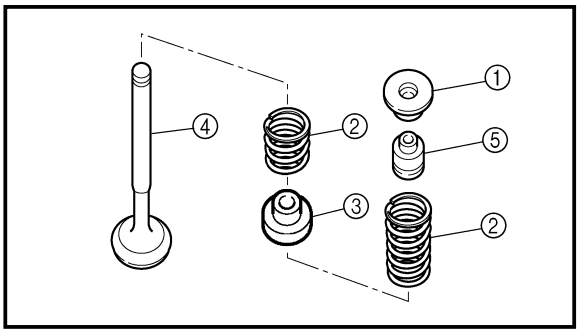
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3. Remove:
   • valve cotters ①

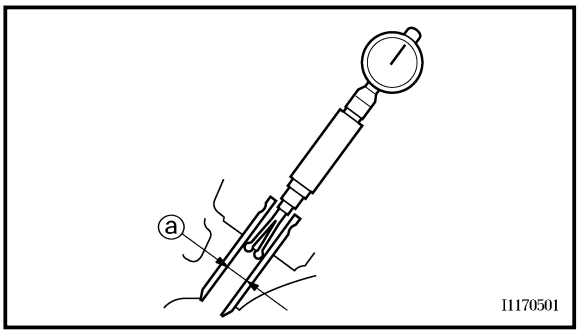
NOTE:
Remove the valve cotters by compressing the valve spring with the valve spring compressor ② and attachment ③.

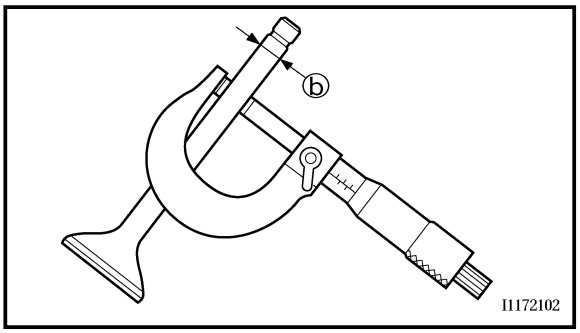
Valve spring compressor
90890-04019
Attachment
(for the intake valve)
90890-04114
(for the exhaust valve)
90890-04108



4. Remove:
   • upper spring seat ①
   • valve springs ②
   • lower spring seat ③
   • valve ④
   • oil seal ⑤

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





EB403400
CHECKING THE VALVES AND VALVE GUIDES

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

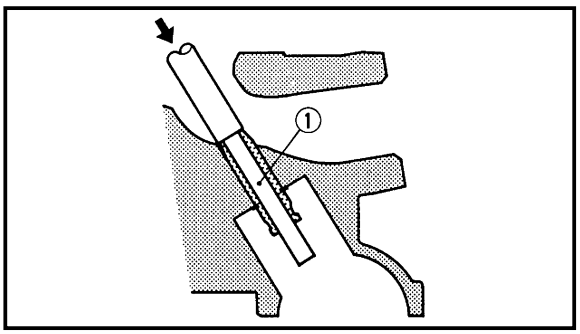
1. Measure:
   • valve stem-to-valve guide clearance

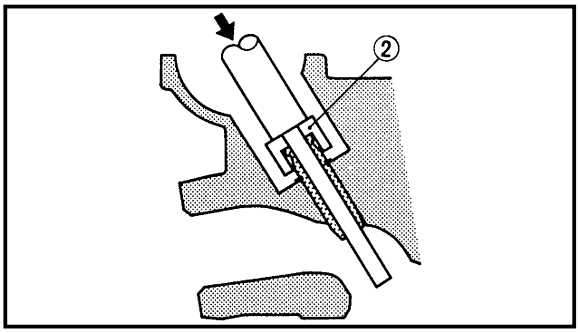
Valve stem-to-valve guide clearance = Valve guide inside diameter ⓐ – Valve stem diameter ⓑ

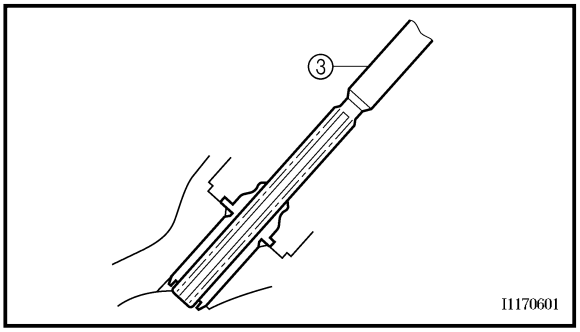
Out of specification → Replace the valve guide.

Valve stem-to-valve guide clearance
Intake
0.005 ~ 0.029 mm
(0.0002 ~ 0.0011 in)
<Limit>: 0.06 mm (0.0024 in)
Exhaust
0.010 ~ 0.034 mm
(0.0004 ~ 0.0013 in)
<Limit>: 0.07 mm (0.0028 in)

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

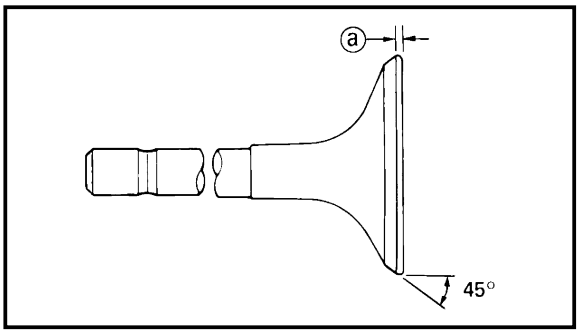
NOTE:
After replacing the valve guide, reface the valve seat.

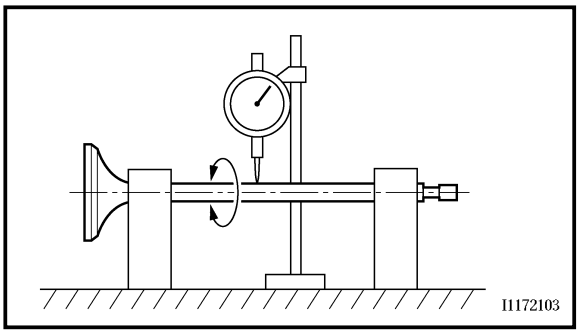
Valve guide remover
Intake (4.0 mm)
90890-04111
Valve guide installer
Intake (4.0 mm)
90890-04112
Valve guide reamer
Intake
90890-04113

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

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

Valve margin thickness
Intake
0.9 ~ 1.2 mm
(0.028 ~ 0.047 in)
Exhaust
1.0 ~ 1.3 mm
(0.039 ~ 0.051 in)

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

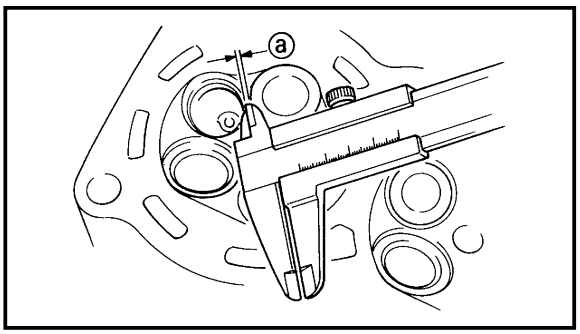
NOTE:
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.

Valve stem runout
0.01 mm (0.0004 in)

EB403410
CHECKING THE VALVE SEATS

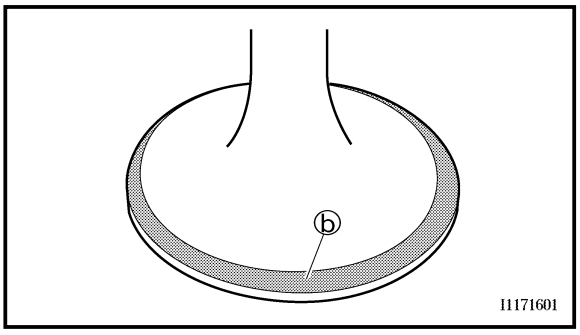
The following procedure applies to all of the valves and valve seats.

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



Valve seat width
0.9 ~ 1.1 mm
(0.035 ~ 0.043 in)
<Limit>: 1.6 mm (0.06 in)

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a. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.

b. Install the valve into the cylinder head.

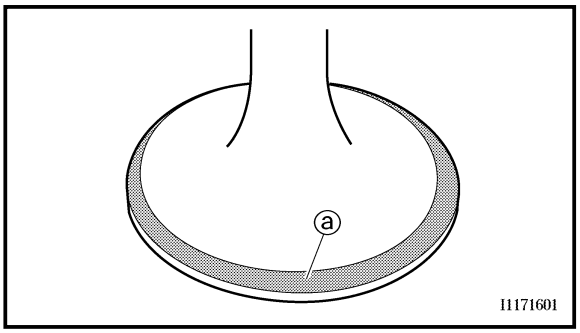
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.

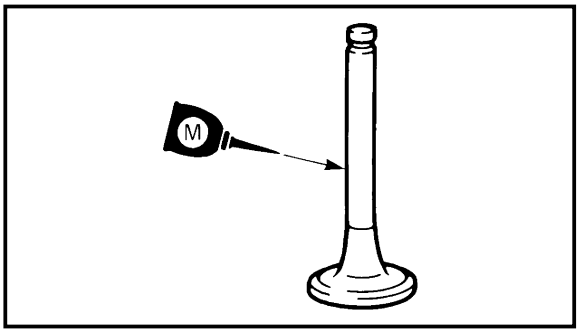
d. Measure the valve seat width.

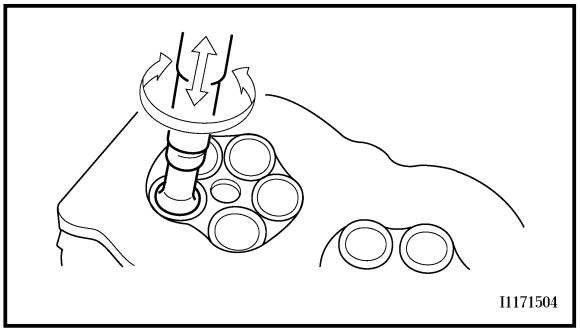
NOTE:

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

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4. Lap:
   - valve face
   - valve seat

NOTE:

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

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

CAUTION:

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

b. Apply molybdenum disulfide oil onto the valve stem.

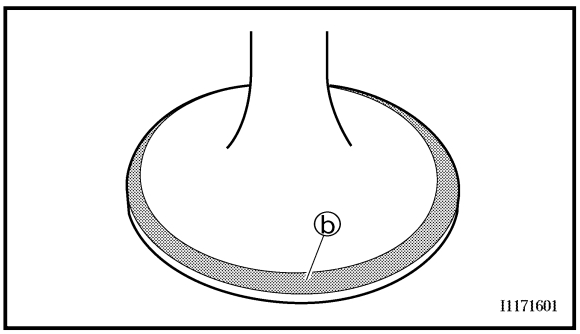
c. Install the valve into the cylinder head.

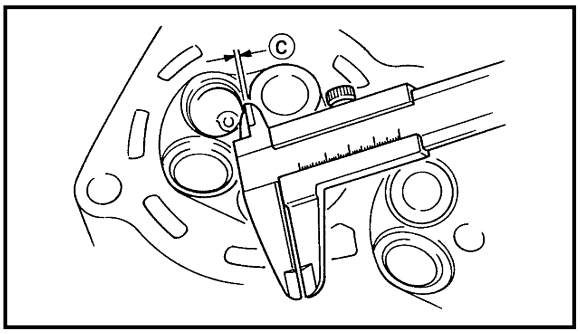
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

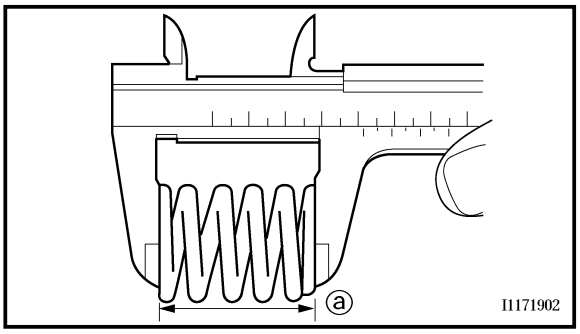
NOTE:

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

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

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

g. Apply Mechanic's blueing dye (Dykem) ⓑ onto the valve face.

h. Install the valve into the cylinder head.

i. Press the valve through the valve guide and onto the valve seat to make a clear impression.

j. Measure the valve seat width ⓒ again. If the valve seat width is out of specification, reface and lap the valve seat.

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EB403420

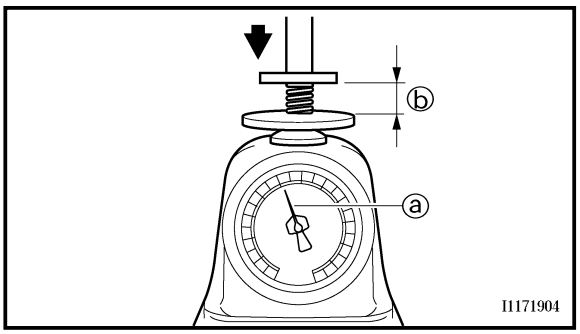
CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

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

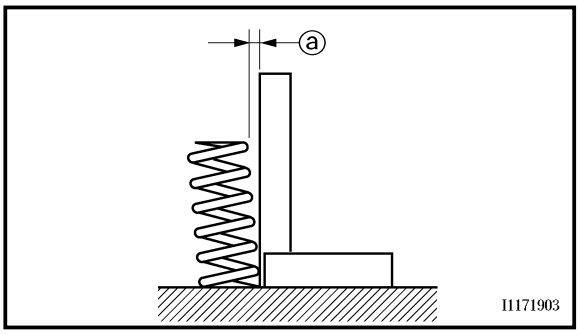
Valve spring free length
Inner spring
Intake valve spring
32.35 mm (1.27 in)
<Limit>: 30.73 mm (1.21 in)
Exhaust valve spring
28.82 mm (1.13 in)
<Limit>: 27.37 mm (1.08 in)
Outer spring
Intake valve spring
36.42 mm (1.43 in)
<Limit>: 34.60 mm (1.36 in)
Exhaust valve spring
33.91 mm (1.34 in)
<Limit>: 32.21 mm (1.27 in)

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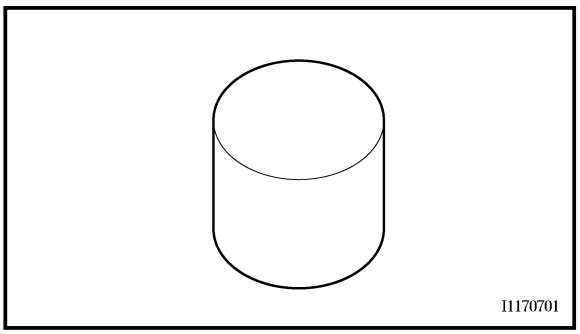
2. Measure:
   • compressed spring force ⓐ
   Out of specification → Replace the valve spring.
   ⓑ Installed length

Compressed spring force (installed)
Inner spring
Intake valve spring
10.30 ~ 11.93 kg at 27.96 mm
(22.7 ~ 26.3 lb at 1.10 in)
Exhaust valve spring
10.81 ~ 12.44 kg at 24.6 mm
(23.8 ~ 27.4 lb at 0.97 in)
Outer spring
Intake valve spring
23.45 ~ 27.12 kg at 32.03 mm
(51.7 ~ 59.8 lb at 1.26 in)
Exhaust valve spring
29.16 ~ 33.55 kg at 30.25 mm
(62.3 ~ 74.0 lb at 1.19 in)



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

Maximum spring tilt
Inner spring
Intake valve spring
1.4 mm (0.055 in)
Exhaust valve spring
1.3 mm (0.051 in)
Outer spring
Intake valve spring
1.6 mm (0.063 in)
Exhaust valve spring
1.5 mm (0.059 in)

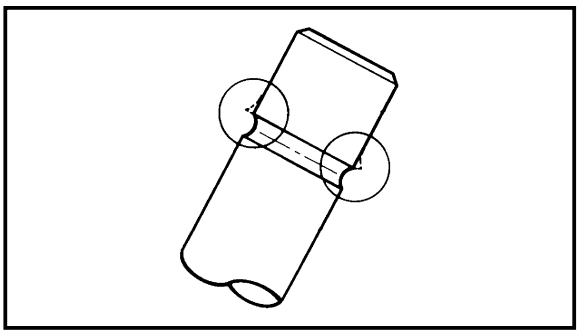


EB403430
CHECKING THE VALVE LIFTERS

The following procedure applies to all of the valve lifters.

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

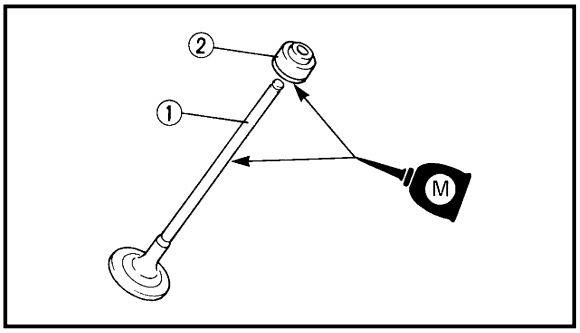
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EB403702
INSTALLING THE VALVES

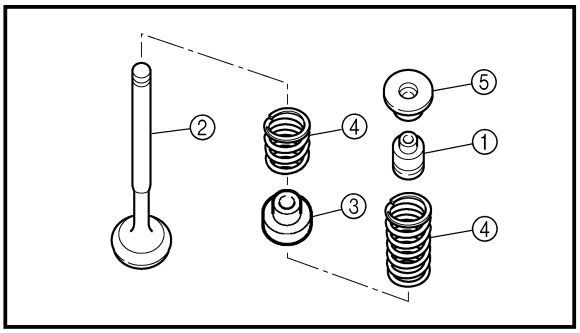
The following procedure applies to all of the valves and related components.

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



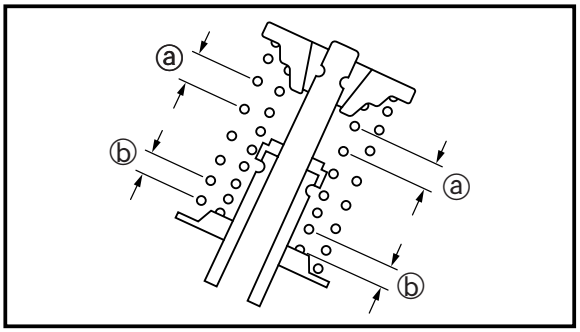
2. Lubricate:
   • valve stem ①
   • oil seal ②
   (with the recommended lubricant)

	Recommended lubricant **Molybdenum disulfide oil**



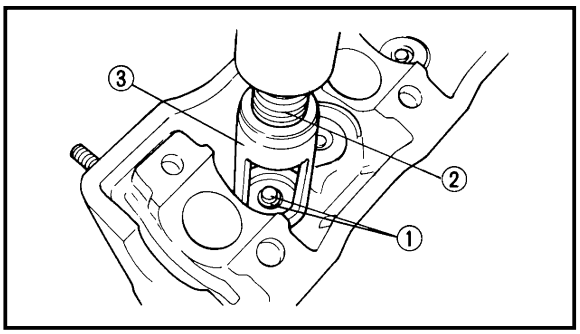
3. Install:
   • oil seal ① New
   • valve ②
   • lower spring seat ③
   • valve springs ④
   • upper spring seat ⑤
   (into the cylinder head)

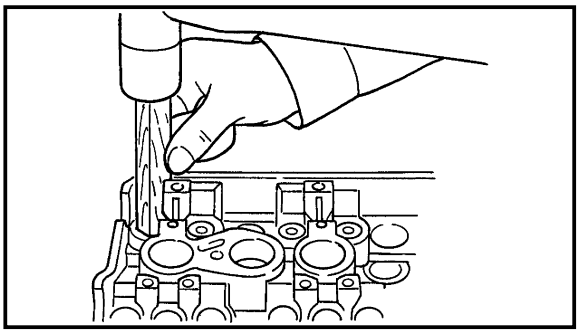
NOTE:
- Make sure that each valve is installed in its original place.
- Install the valve spring with the larger pitch ⓐ facing up.



ⓑ Smaller pitch

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4. Install:
   • valve cotters ①

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

Valve spring compressor
90890-04019
Attachment
(for the intake valve spring)
9080-04114
(for the exhaust valve spring)
90890-04108

5. To secure the valve cotters ① onto the valve stem, lightly tap the valve tip with a soft-face hammer.

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

6. Lubricate:
   • valve pad
   (with the recommended lubricant)

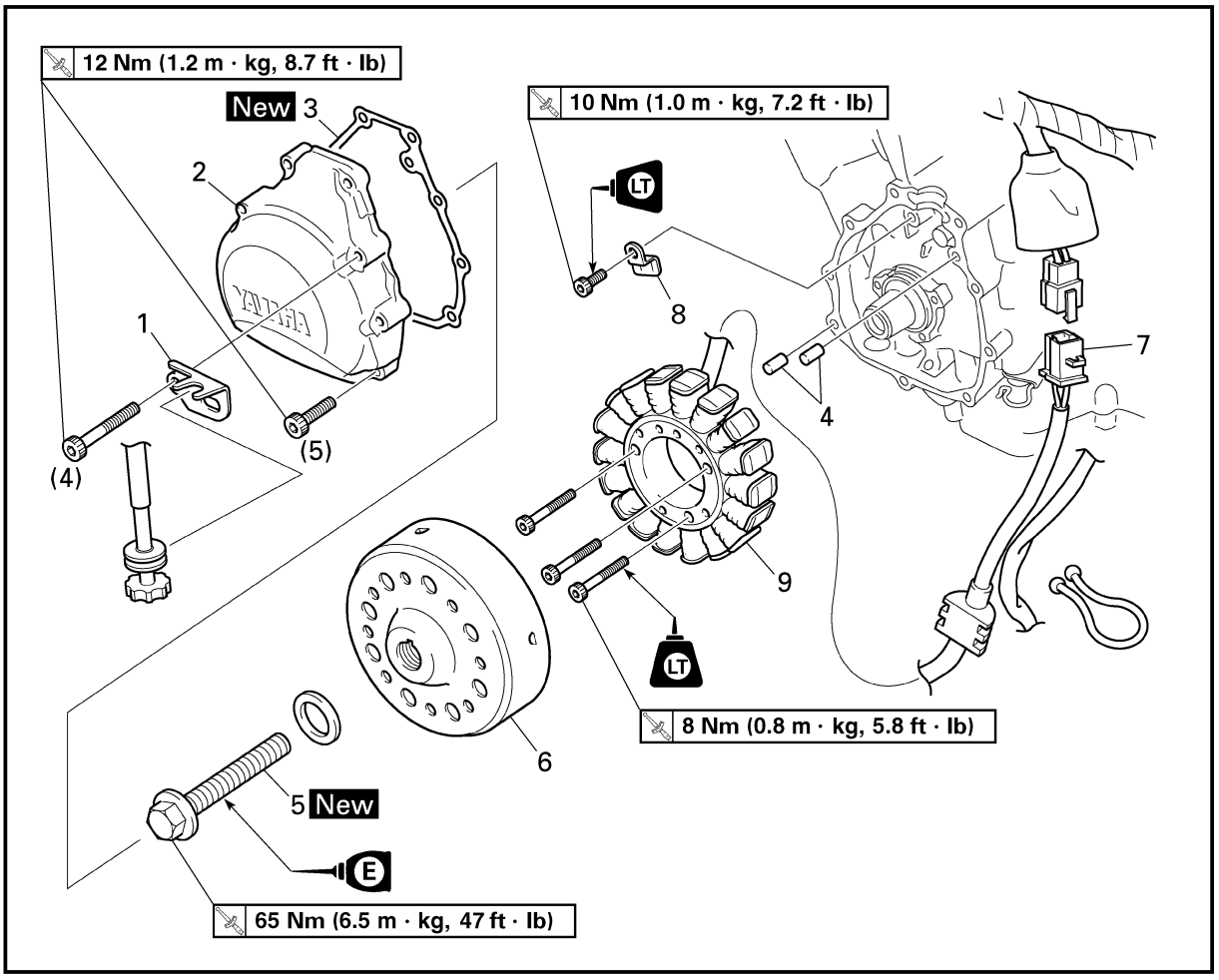
Recommended lubricant
Molybdenum disulfide oil

7. Install:
   • valve pad
   • valve lifter

NOTE:
- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be reinstalled in its original position.

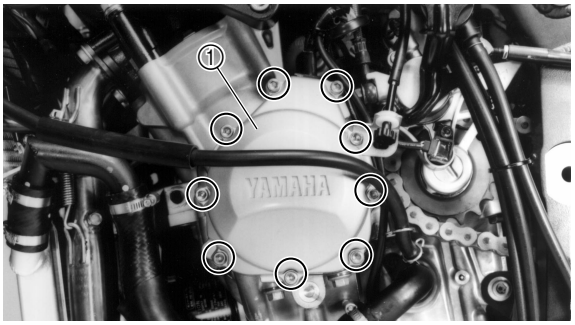
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EB410000
GENERATOR



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

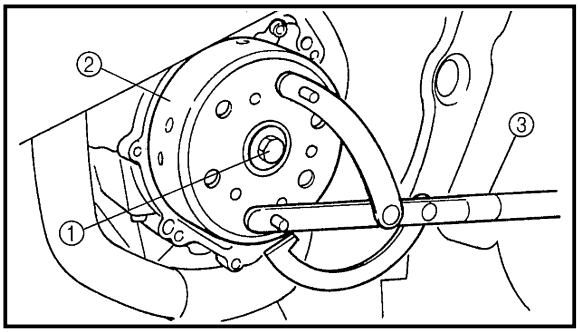
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EB410110
REMOVING THE GENERATOR

1. Remove:
   • generator rotor cover ①

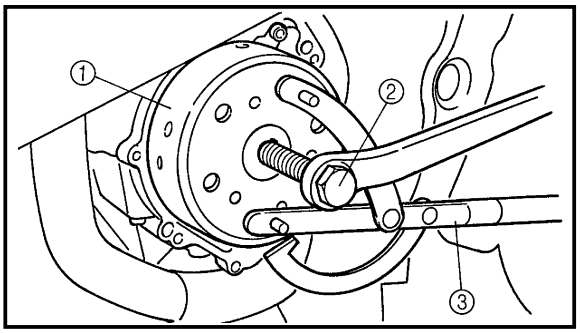
NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



2. Remove:
   • generator rotor bolt ①
   • washer

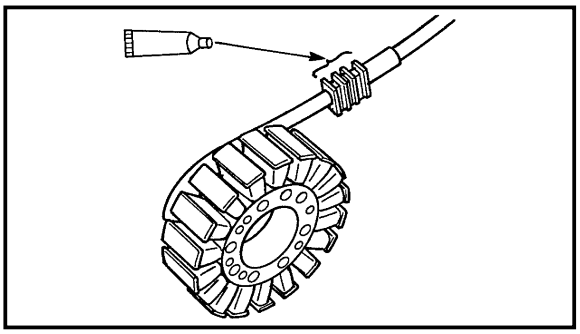
NOTE:
While holding the generator rotor ② with the rotor holding tool ③, loosen the generator rotor bolt.

Rotor holding tool
90890-01235



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

Flywheel puller
90890-01080



EB410700
INSTALLING THE GENERATOR

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

Yamaha bond No. 1215
90890-85505

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

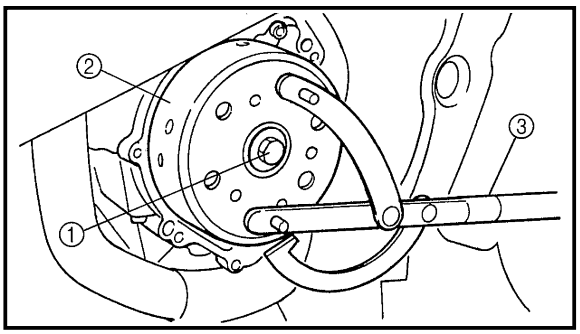
⚠ WARNING

Always use a new generator rotor bolt.

CAUTION:

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

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3. Tighten:
   • generator rotor bolt ① New

	65 Nm (6.5 m · kg, 47 ft · lb)

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

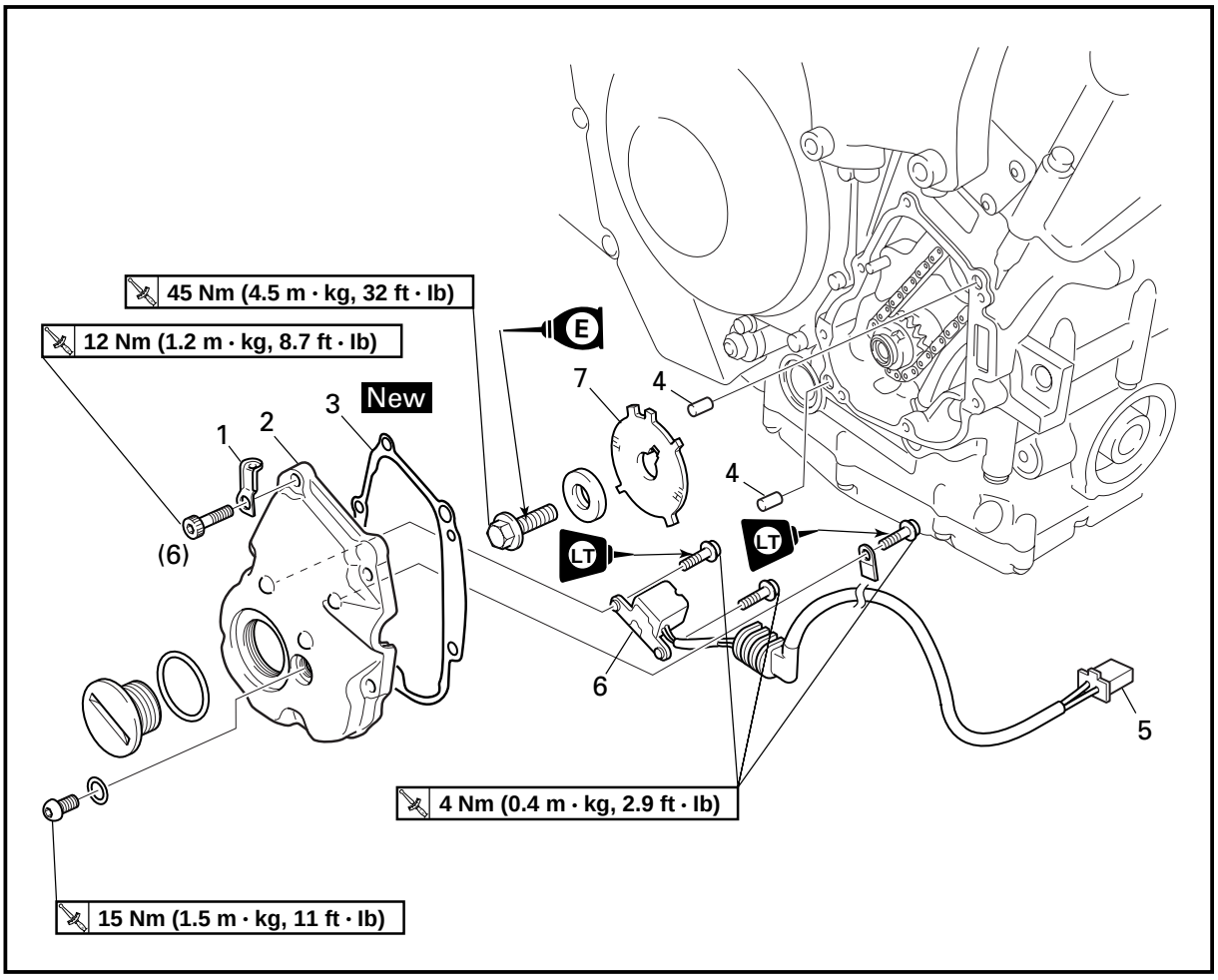
	Rotor holding tool **90890-01235**

4. Install:
   • generator rotor cover

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

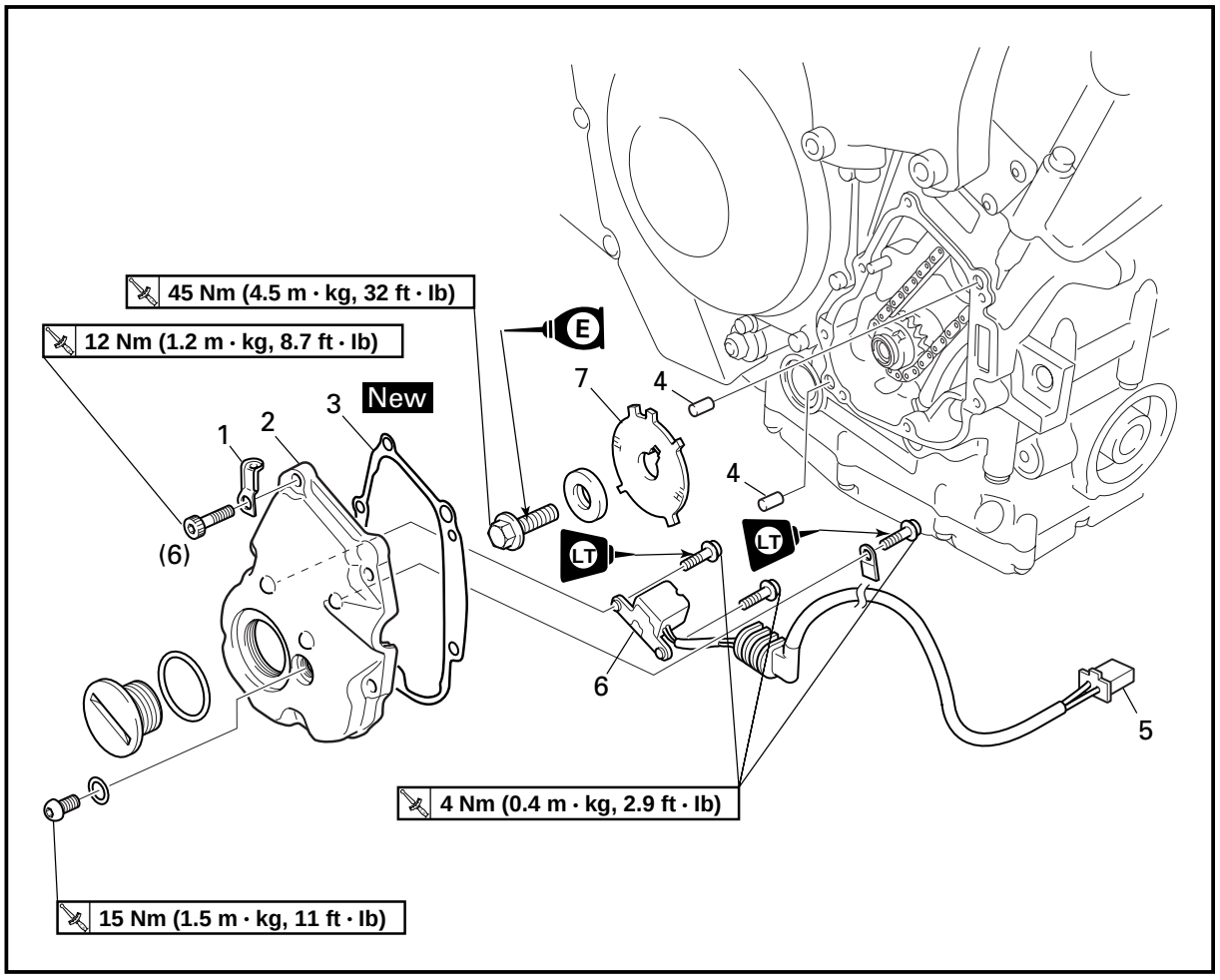
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PICKUP COIL



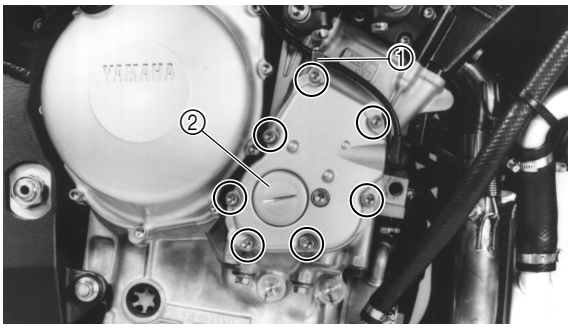
Order	Job/Part	Q'ty	Remarks
	Removing the pickup coil and pickup coil rotor		Remove the parts in the order listed.
	Fuel tank		Refer to "FUEL TANK AND AIR FILTER" in chapter 3.
	Bottom cowling and front cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
	Generator rotor cover		Refer to "GENERATOR".
1	Pickup coil lead holder	1	
2	Pickup coil rotor cover	1	
3	Pickup coil rotor cover gasket	1	
4	Dowel pin	2	

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Order	Job/Part	Q'ty	Remarks
5	Pickup coil coupler	1	Disconnect.
6	Pickup coil	1	
7	Pickup coil rotor	1	
			For installation, reverse the removal procedure.

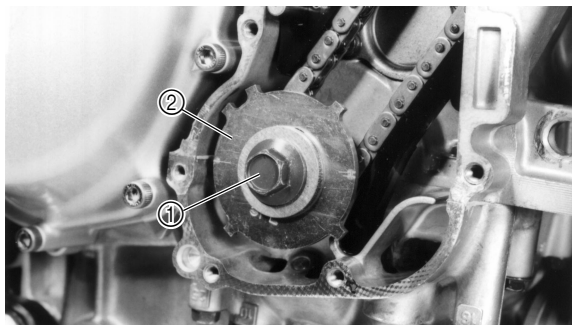
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REMOVING THE PICKUP COIL ROTOR

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

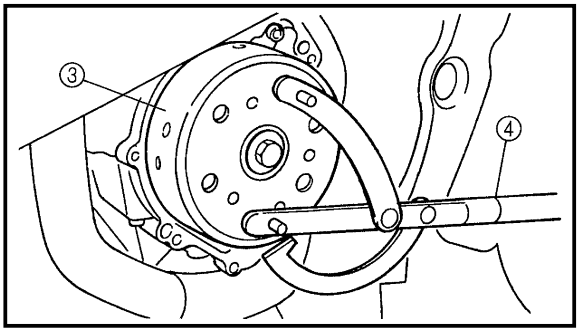
NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

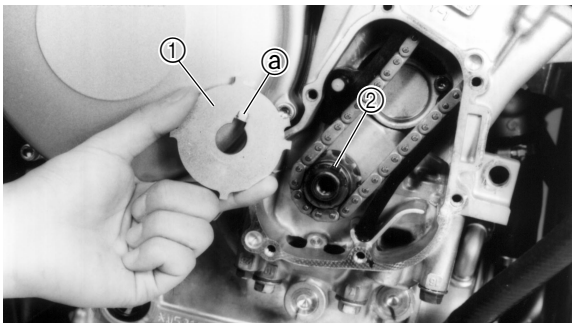


2. Remove:
   - pickup coil rotor bolt ①
   - washer
   - pickup coil rotor ②

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

	Rotor holding tool **90890-01235**





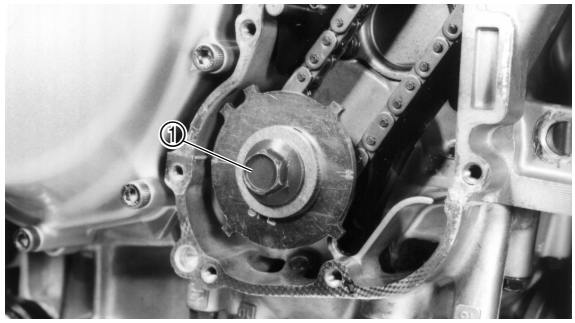
INSTALLING THE PICKUP COIL ROTOR

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

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

CAUTION:
Lubricate the pickup coil rotor bolt threads with engine oil.

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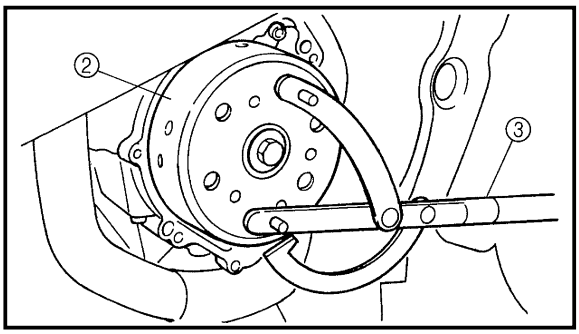


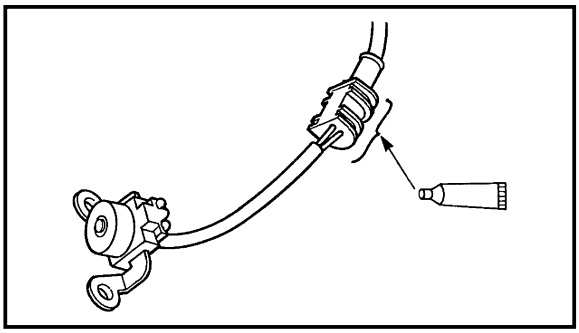
2. Tighten:
   • pickup coil rotor bolt ①

	45 Nm (4.5 m · kg, 32 ft · lb)

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

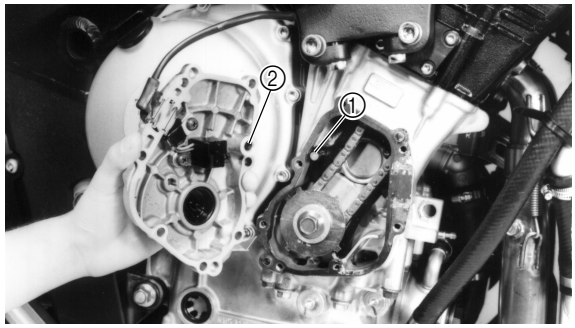
	Rotor holding tool **90890-01235**





3. Apply:
   • sealant
   (onto the pickup coil lead grommet)

	Yamaha bond No. 1215 **90890-85505**

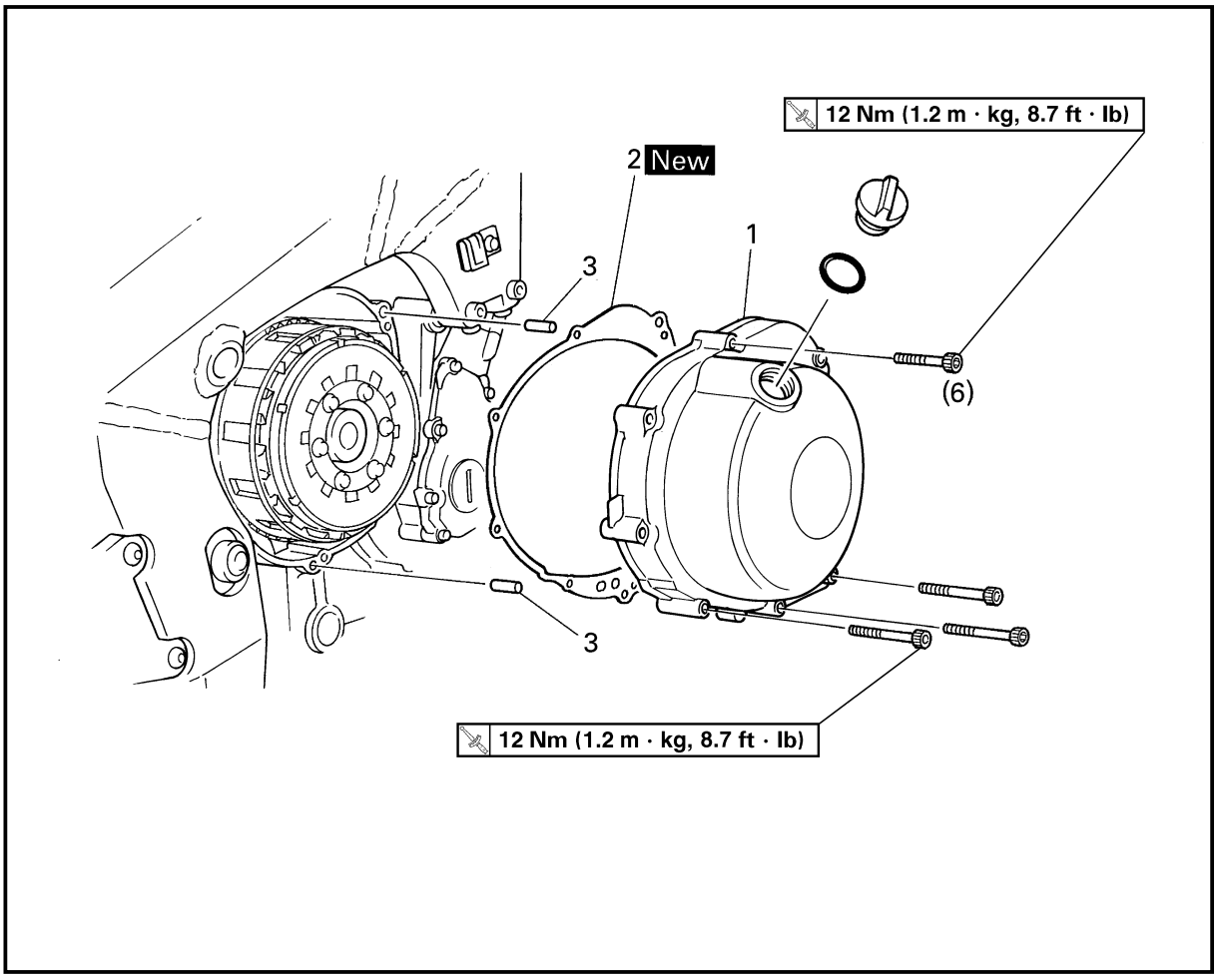


4. Install:
   • pickup coil rotor cover
   • pickup coil lead holder
   • clutch cable holder

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

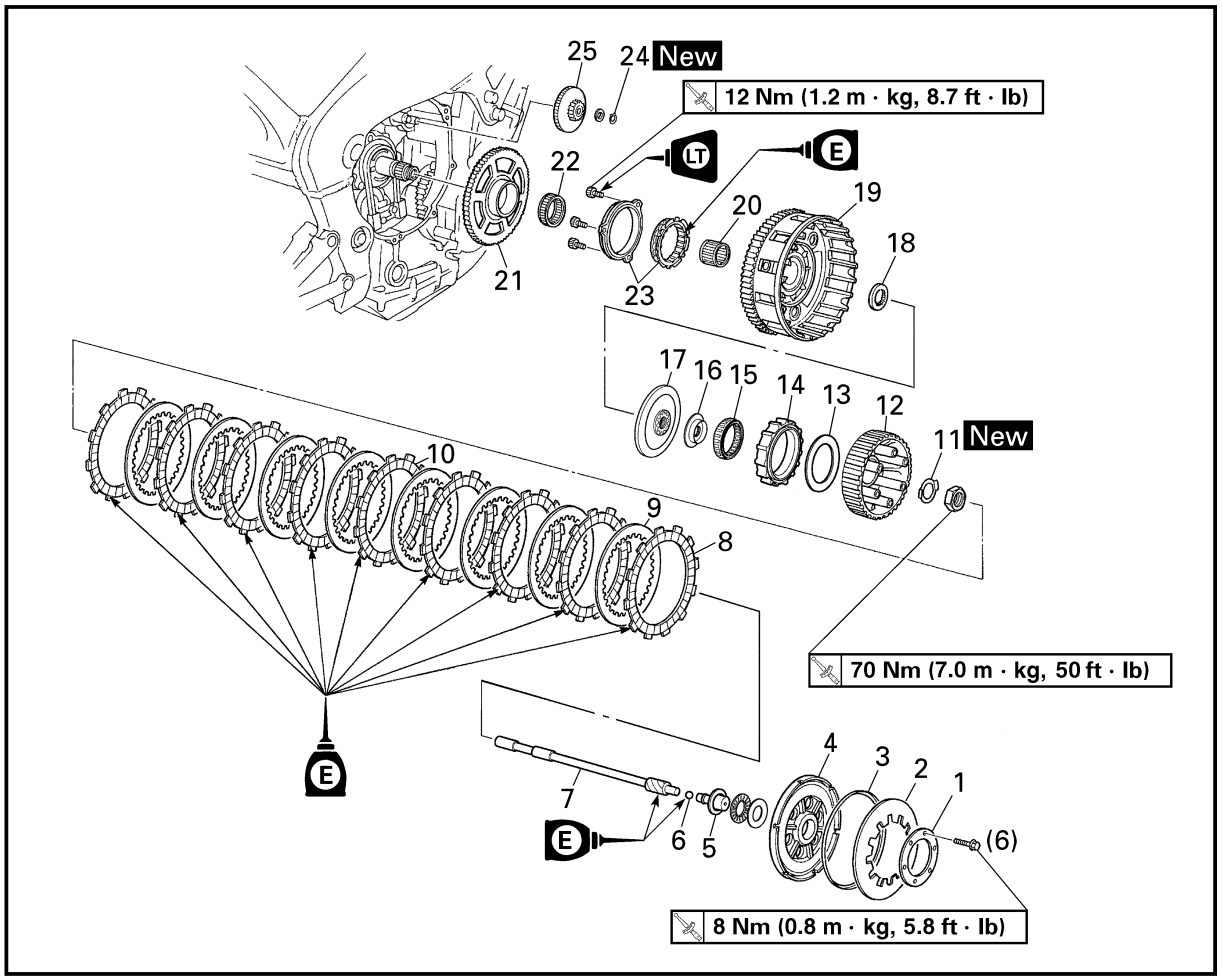
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EB405000
CLUTCH



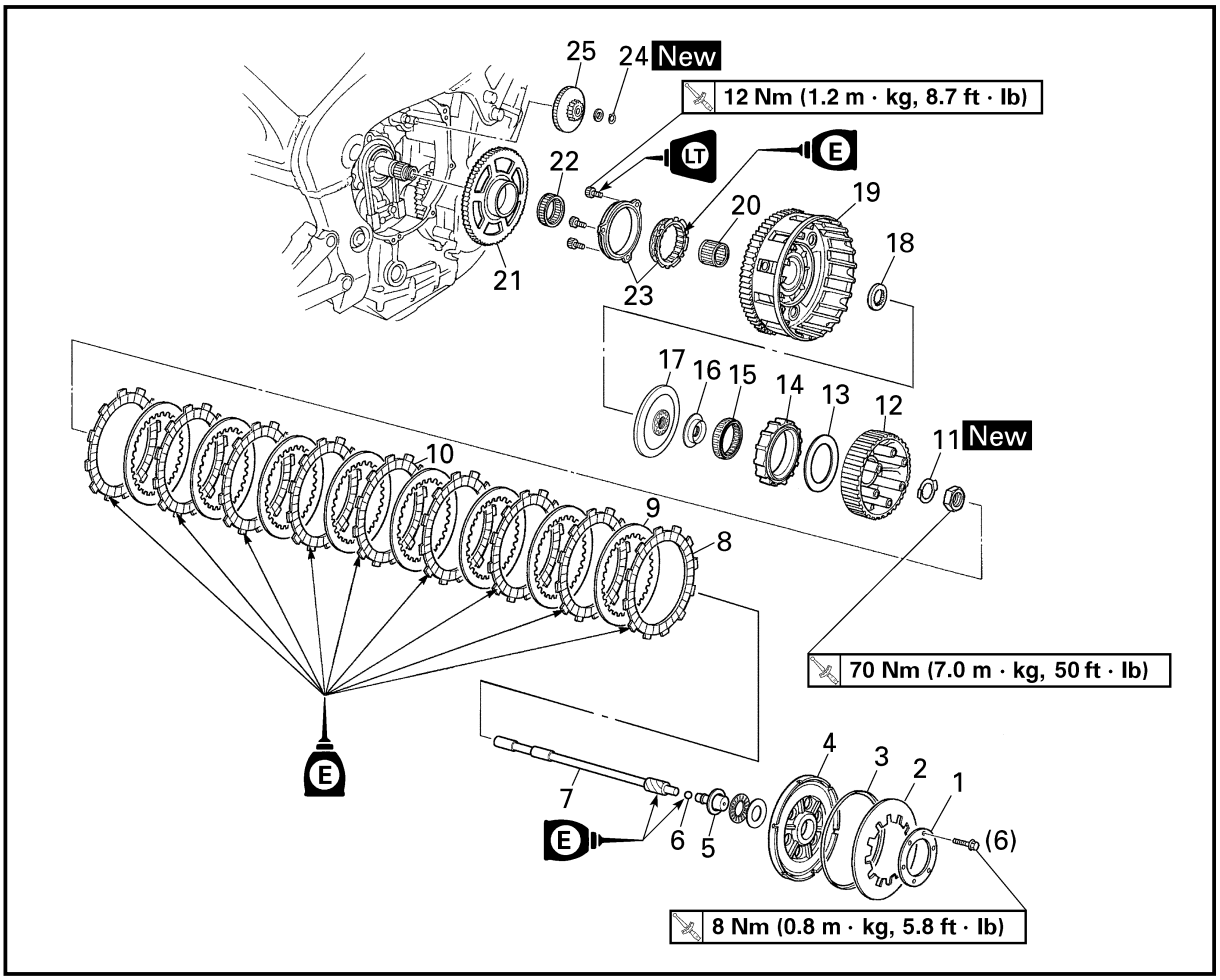
Order	Job/Part	Q'ty	Remarks
	Removing the clutch cover		Remove the parts in the order listed.
	Bottom cowling and front cowling		Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cover	1	
2	Clutch cover gasket	1	
3	Dowel pin	2	
			For installation,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

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Order	Job/Part	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring plate retainer	1	
2	Clutch spring plate	1	
3	Clutch spring plate seat	1	
4	Pressure plate	1	
5	Push rod #1	1	
6	Ball	1	
7	Push rod #2	1	
8	Friction plate #1	8	3.00 mm (0.12 in)
9	Clutch plate	8	
10	Friction plate #2	1	3.85 mm (0.15 in)
11	Lock washer	1	
12	Clutch boss	1	
13	Thrust washer	1	

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Order	Job/Part	Q'ty	Remarks
14	Back torque limiter outer boss	1	
15	Back torque limiter bearing	1	
16	Back torque limiter inner boss	1	
17	Thrust plate	1	
18	Thrust washer	1	
19	Clutch housing	1	
20	Bearing	1	
21	Starter clutch gear	1	
22	Bearing	1	
23	Starter clutch assembly	1	
24	Circlip	1	
25	Starter clutch idle gear	1	
			For installation, reverse the removal procedure.

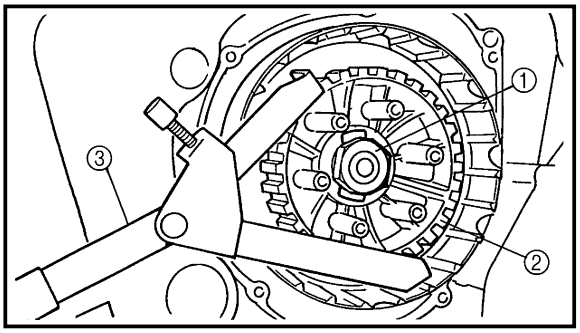
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EB405102
REMOVING THE CLUTCH

1. Remove:
   • clutch cover ①

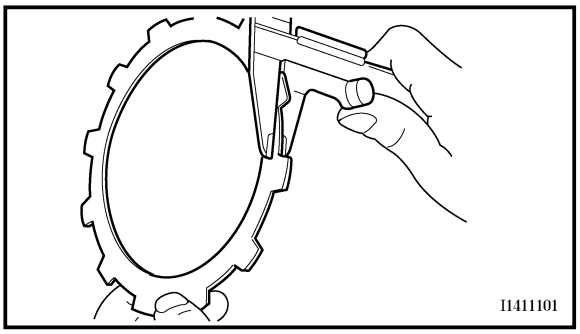
NOTE:
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



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

NOTE:
While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

Clutch holding tool
90890-04086



EB405400
CHECKING THE FRICTION PLATES

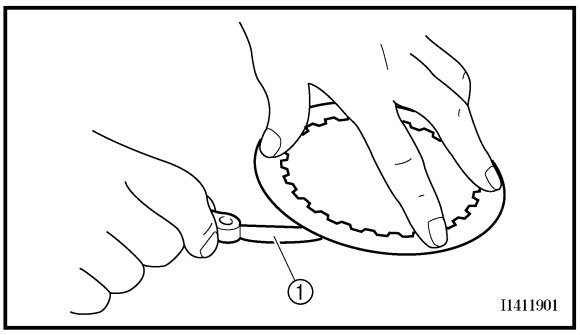
The following procedure applies to all of the friction plates.

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

NOTE:
Measure the friction plate at four places.

Friction plate #1 thickness
2.9 ~ 3.1 mm
(0.114 ~ 0.122 in)
<Limit>: 2.8 mm (0.110 in)
Friction plate #2 thickness
3.7 ~ 3.9 mm
(0.146 ~ 0.154 in)
<Limit>: 3.6 mm (0.142 in)

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EB405410
CHECKING THE CLUTCH PLATES

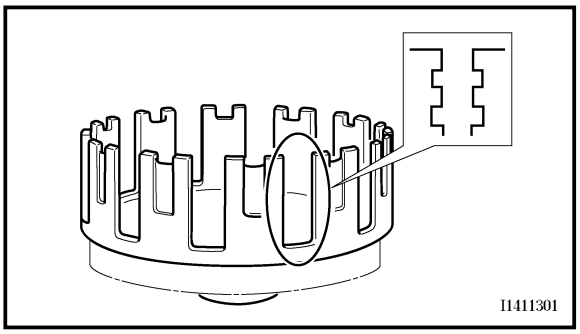
The following procedure applies to all of the clutch plates.

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

Maximum clutch plate warpage
0.1 mm (0.004 in)

EB405430
CHECKING THE CLUTCH SPRING PLATE

1. Check:
   • clutch spring plate
   Damage → Replace.
2. Check:
   • clutch spring plate seat
   Damage → Replace.



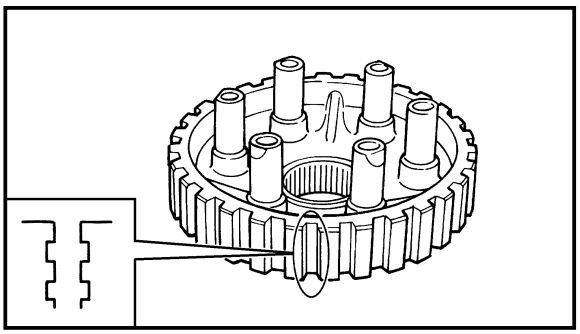
EB405440
CHECKING THE CLUTCH HOUSING

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

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

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

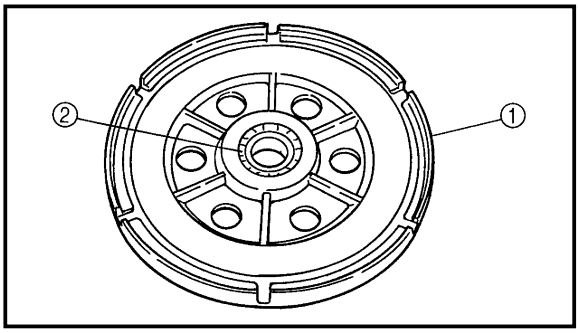
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EB405450
CHECKING THE CLUTCH BOSS

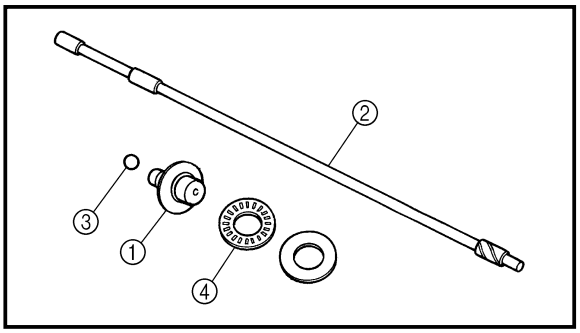
1. Check:
   • clutch boss splines
   Damage/pitting/wear → Replace the clutch boss.

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



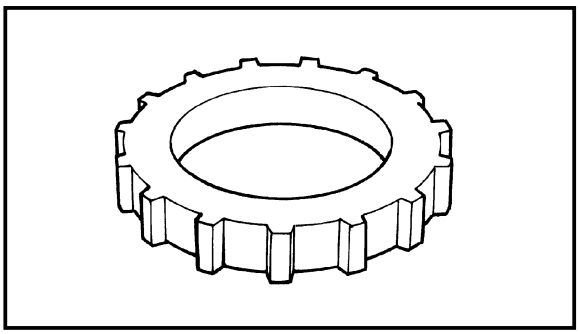
EB405460
CHECKING THE PRESSURE PLATE

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



CHECKING THE PUSH RODS AND BALL

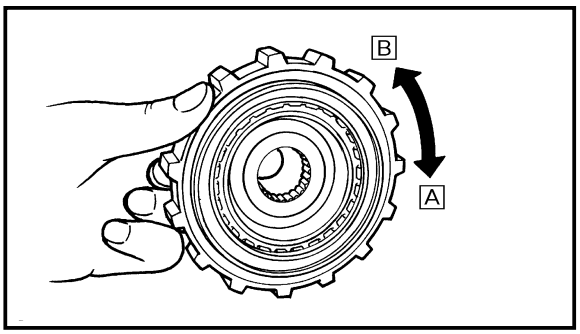
1. Check:
   • push rod #1 ①
   • push rod #2 ②
   • ball ③
   Damage/wear → Replace the pull rods and ball as a set.
2. Check:
   • push rod bearing ④
   Damage/wear → Replace.



CHECKING THE BACK TORQUE LIMITER

1. Check:
   • back torque limiter outer boss splines
   Damage/pitting/wear → Replace the back torque limiter outer boss.

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2. Check:
   • back torque limiter clutch

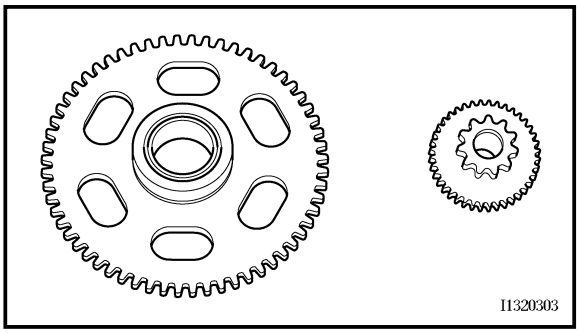
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a. Install the back torque limiter bearing and back torque limiter outer boss onto the back torque limiter inner boss and hold the back torque limiter inner boss.

b. When turning the back torque limiter outer boss clockwise [A], the back torque limiter inner boss and back torque limiter outer boss should engage, otherwise the back torque limiter is faulty and must be replaced.

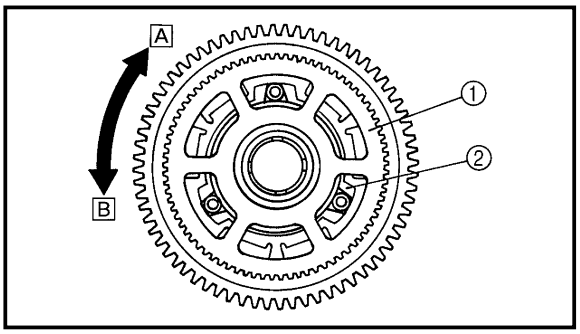
c. When turning the back torque limiter outer boss counterclockwise [B], it should turn freely, otherwise the back torque limiter is faulty and must be replaced.

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CHECKING THE STARTER CLUTCH

1. Check:
   • starter clutch gear
   • starter clutch idle gear
   Chips/pitting/roughness/wear → Replace the defective part(-s).



2. Check:
   • starter clutch operation

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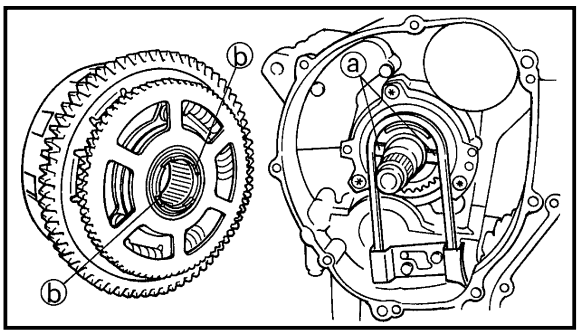
a. Install the starter clutch gear ① onto the starter clutch ② and hold the starter clutch.

b. When turning the starter clutch gear clockwise [A], the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.

c. When turning the starter clutch gear counterclockwise [B], it should turn freely, otherwise the starter clutch is faulty and must be replaced.

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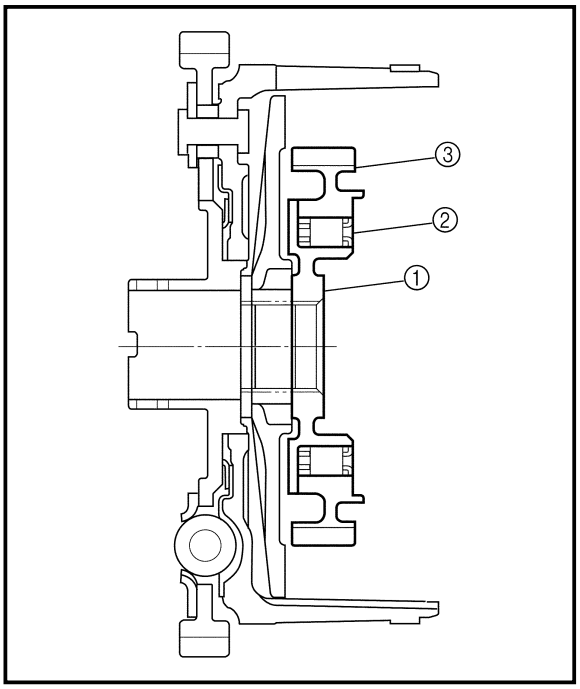
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EB405703
INSTALLING THE CLUTCH

1. Install:
   • clutch housing

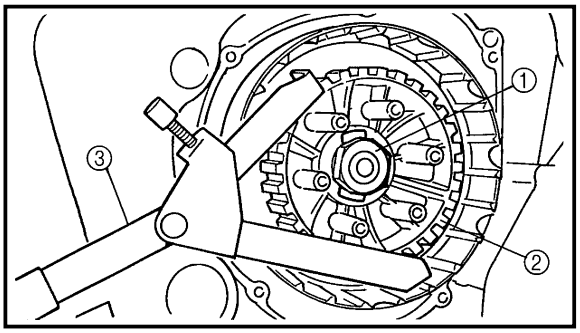
NOTE:
- Make sure that the slots ⓐ in the clutch housing align with the tabs ⓑ on the oil/water pump assembly drive sprocket.
- Make sure that the primary driven gear teeth and primary drive gear teeth mesh correctly.
- Make sure that the starter clutch gear teeth and starter clutch idle gear teeth mesh correctly.



2. Install:
   • back torque limiter inner boss ①
   • back torque limiter bearing ②
   • back torque limiter outer boss ③

CAUTION:

Be sure that the back torque limiter bearing is installed facing in the correct direction as shown.



3. Install:
   • lock washer New
   • clutch boss nut ①

70 Nm (7.0 m · kg, 50 ft · lb)

NOTE:
While holding the clutch boss ② with the clutch holding tool ③, tighten the clutch boss nut.

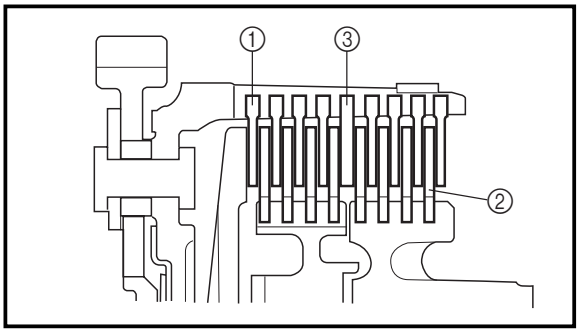


Clutch holding tool
90890-04086

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

	Recommended lubricant **Engine oil**

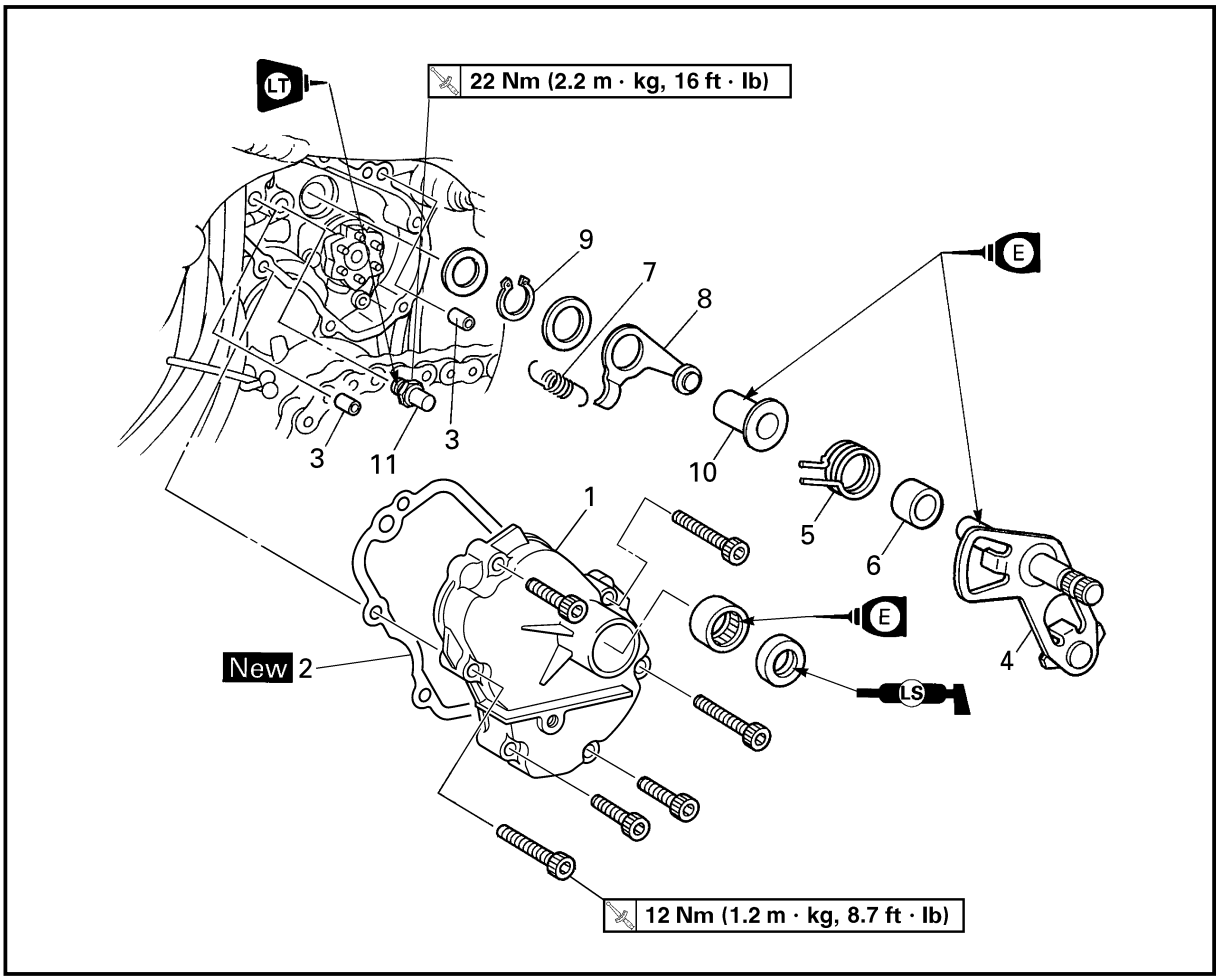


6. Install:
   - friction plates ① - 3.00 mm (0.12 in)
   - clutch plates ②
   - friction plate ③ - 3.85 mm (0.15 in)

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

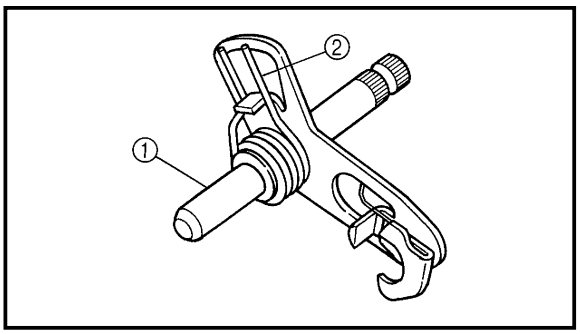
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EB408000
SHIFT SHAFT



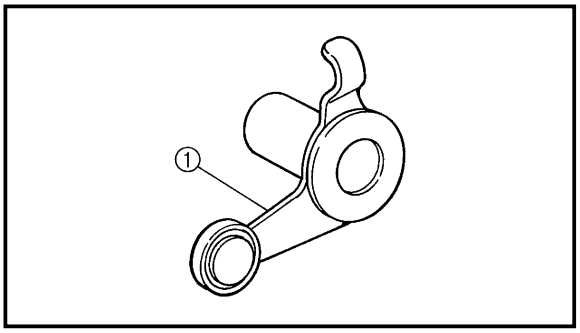
Order	Job/Part	Q'ty	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed.
	Drive sprocket cover		Refer to "ENGINE".
1	Shift shaft cover	1	
2	Shift shaft cover gasket	1	
3	Dowel pin	2	
4	Shift shaft	1	
5	Shift shaft spring	1	
6	Spacer	1	
7	Stopper lever spring	1	
8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

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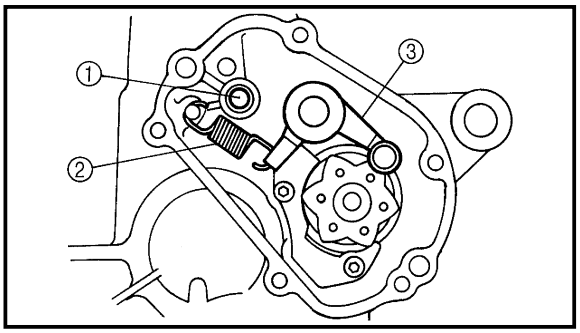
EB408401
CHECKING THE SHIFT SHAFT

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



EB408410
CHECKING THE STOPPER LEVER

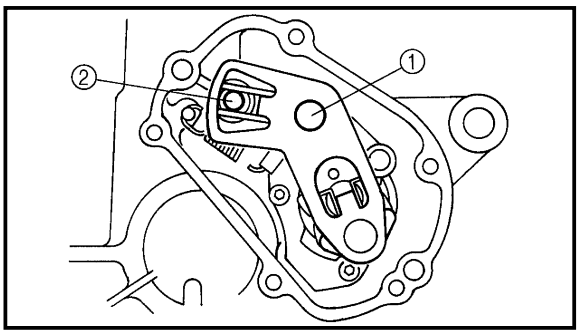
1. Check:
   - stopper lever ①
     Bends/damage → Replace.
     Roller turns roughly → Replace the stopper lever.



EB408703
INSTALLING THE SHIFT SHAFT

1. Install:
   - shift shaft spring stopper ①
     22 Nm (2.2 m · kg, 16 ft · lb)
   - stopper lever spring ②
   - stopper lever ③

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

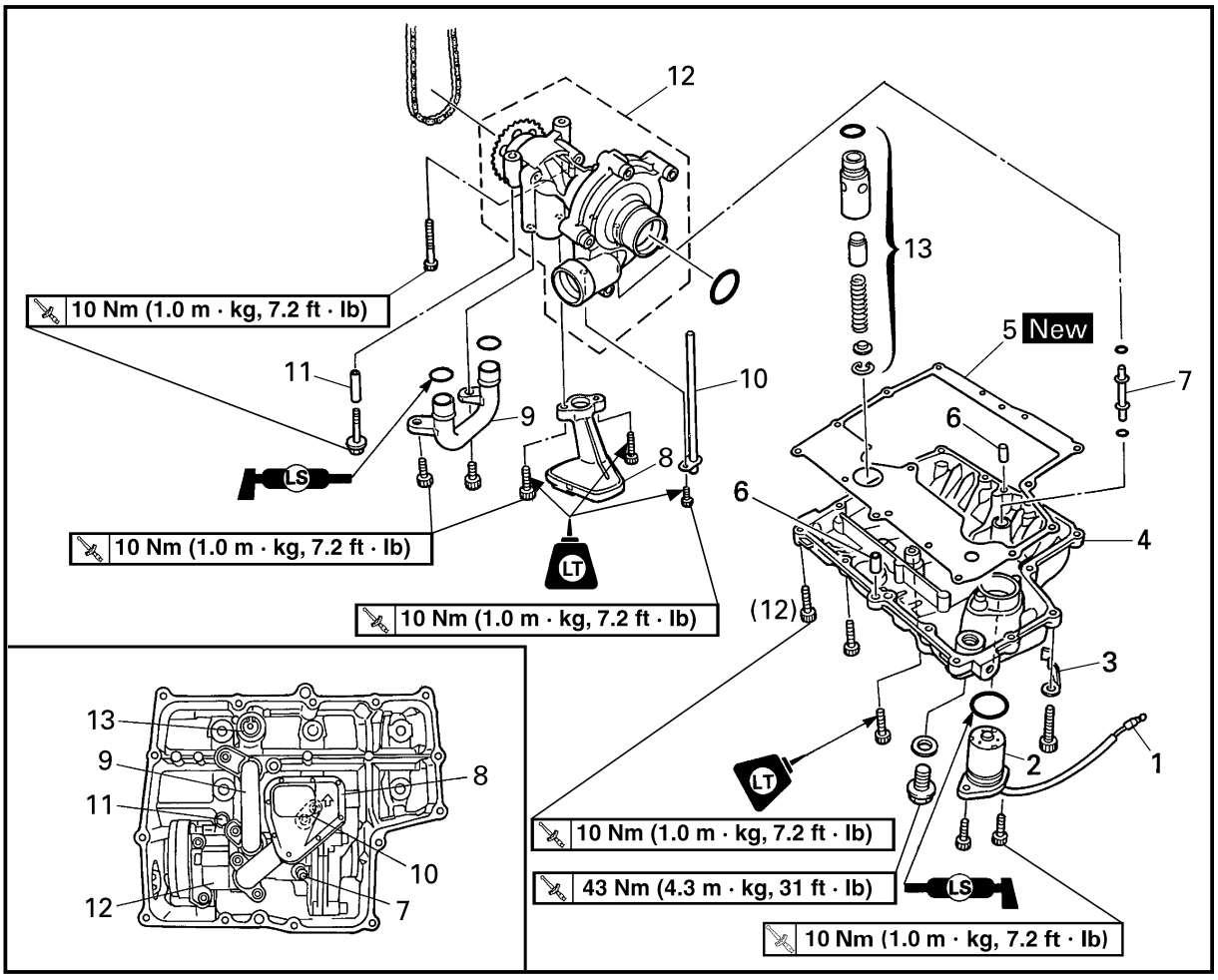


2. Install:
   - shift shaft ①
   - spacer

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

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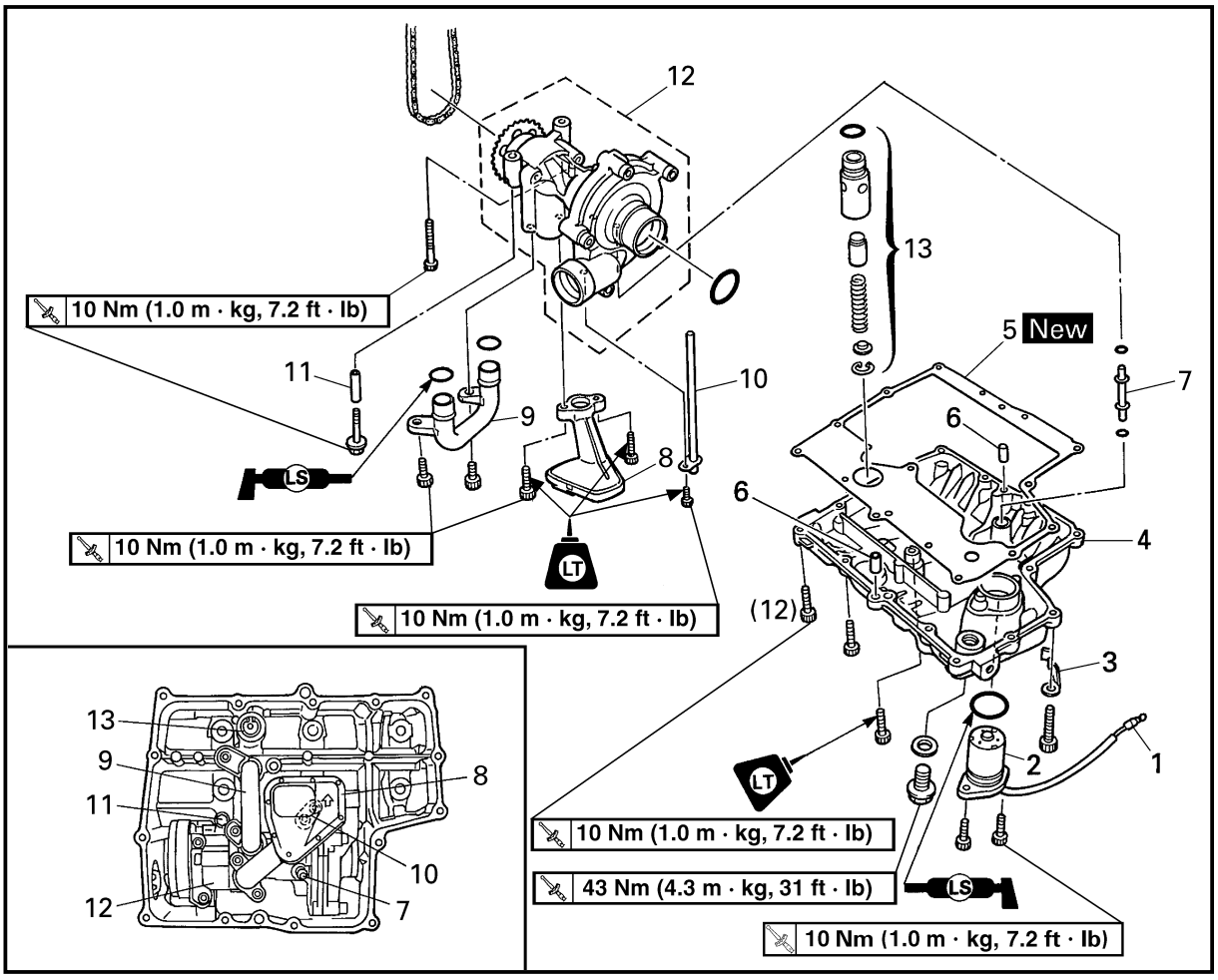
EB411000
OIL PAN AND OIL PUMP



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

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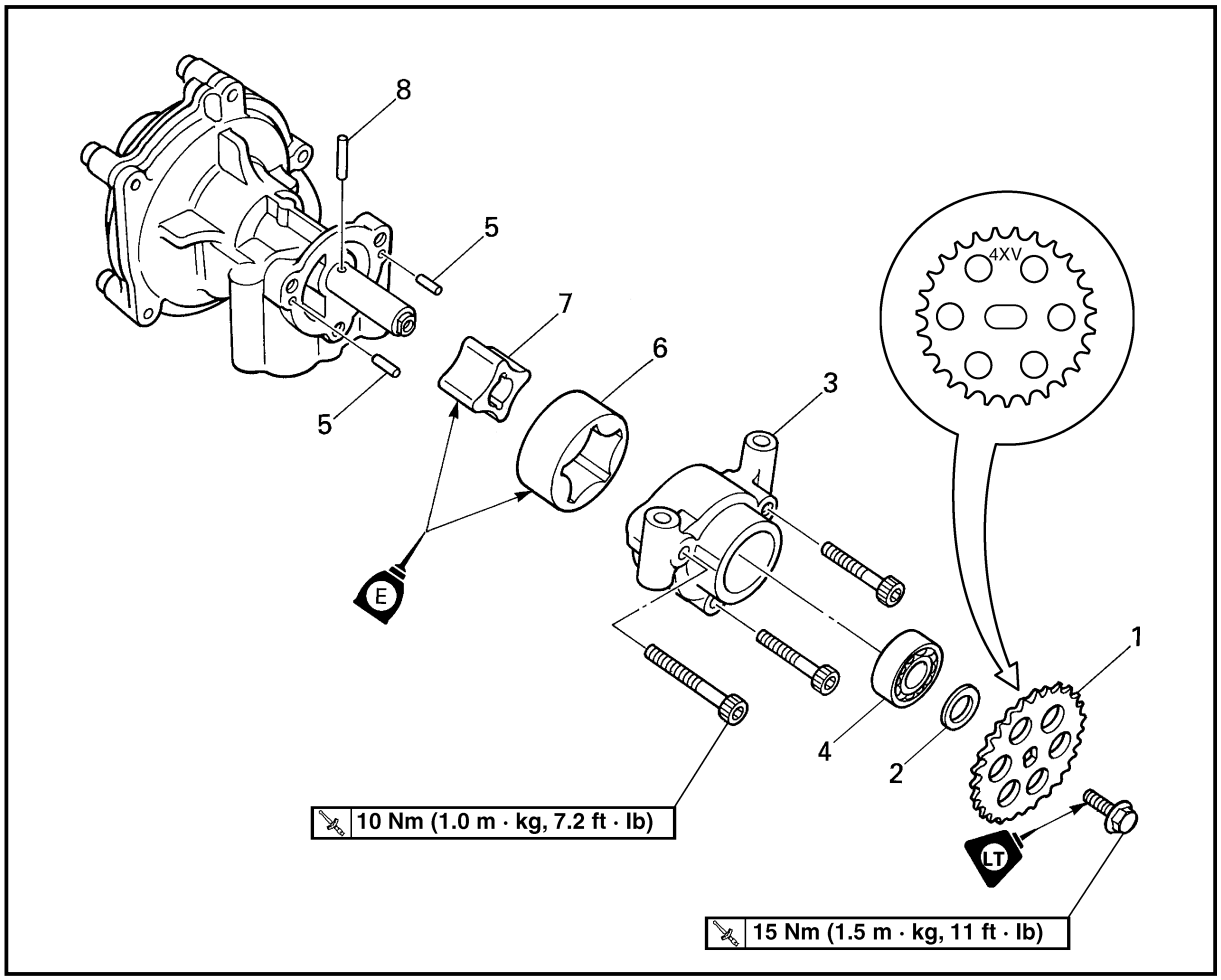
EB411001



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

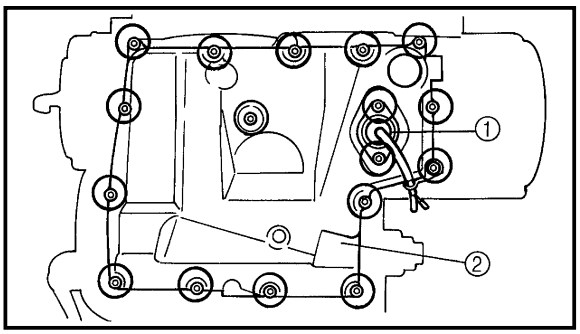
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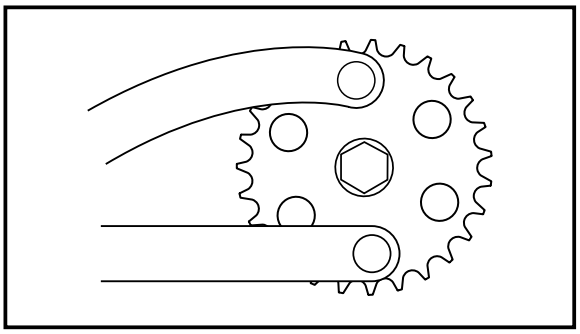
EB411003



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

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EB411100
REMOVING THE OIL PAN

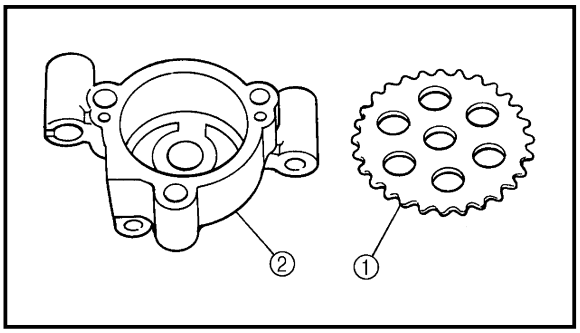
1. Remove:
   - oil level switch ①
   - oil pan ②
   - oil pan gasket
   - dowel pins

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

REMOVING THE OIL PUMP

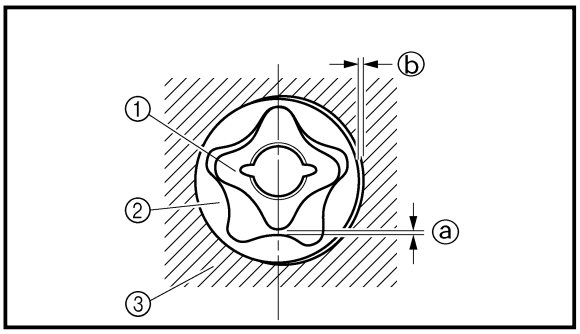
1. Remove:
   - oil/water pump assembly driven sprocket

	Flywheel puller **90890-01080**



EB411400
CHECKING THE OIL PUMP

1. Check:
   - oil/water pump assembly driven sprocket ①
   - oil pump housing ②
     Cracks/damage/wear → Replace the defective part(-s).

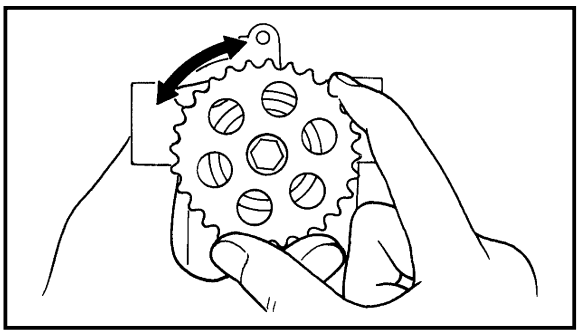


2. Measure:
   - inner rotor-to-outer rotor tip clearance ⓐ
   - outer rotor-to-oil pump housing clearance ⓑ
     Out of specification → Replace the oil pump.

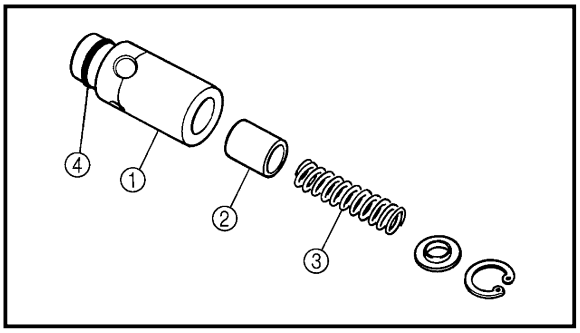
① Inner rotor
② Outer rotor
③ Oil pump housing

	Inner rotor-to-outer rotor tip clearance **0.09 ~ 0.15 mm** **(0.004 ~ 0.006 in)** **Outer rotor-to-oil pump housing clearance** **0.03 ~ 0.08 mm** **(0.001 ~ 0.003 in)**

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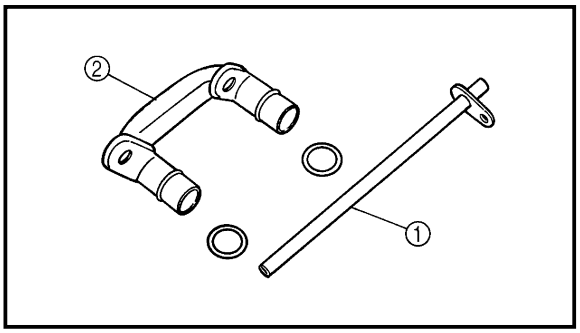


3. Check:
   • oil pump operation
   Unsmooth → Repair or replace the defective part(-s).
   Refer to "WATER PUMP" in chapter 5.



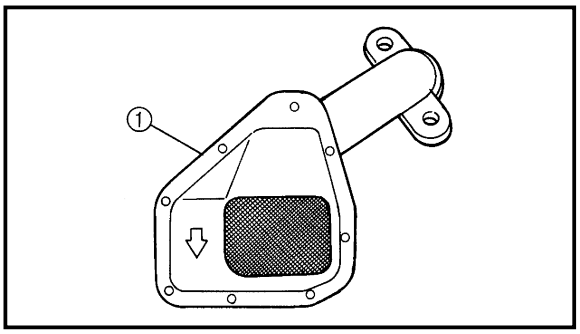
EB411410
CHECKING THE RELIEF VALVE

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



EB411421
CHECKING THE OIL DELIVERY PIPE AND OIL PIPE

1. Check:
   • oil delivery pipe ①
   • oil pipe ②
   Damage → Replace.
   Obstruction → Wash and blow out with compressed air.



EB411430
CHECKING THE OIL STRAINER

1. Check:
   • oil strainer ①
   Damage → Replace.
   Contaminants → Clean with engine oil.

EB411701
ASSEMBLING THE OIL PUMP

1. Lubricate:
   • inner rotor
   • outer rotor
   • impeller shaft
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

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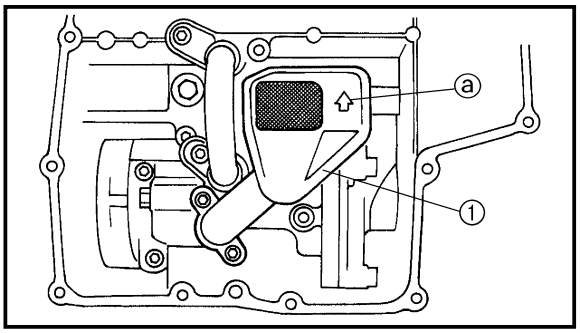
2. Check:
   • oil pump operation
   Refer to "CHECKING THE OIL PUMP".

EB411710
INSTALLING THE OIL PUMP

1. Install:
   • oil pump ①

12 Nm (1.2 m · kg, 8.7 ft · lb)

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

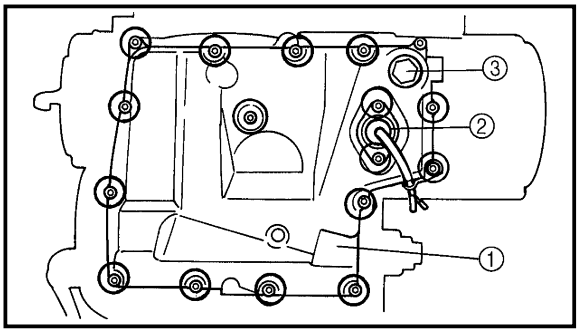


EB411720
INSTALLING THE OIL STRAINER

1. Install:
   • oil strainer ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

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



EB411730
INSTALLING THE OIL PAN

1. Install:
   • dowel pins
   • oil pan gasket New
   • oil pan ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

   • oil level switch ②
   • engine oil drain bolt ③

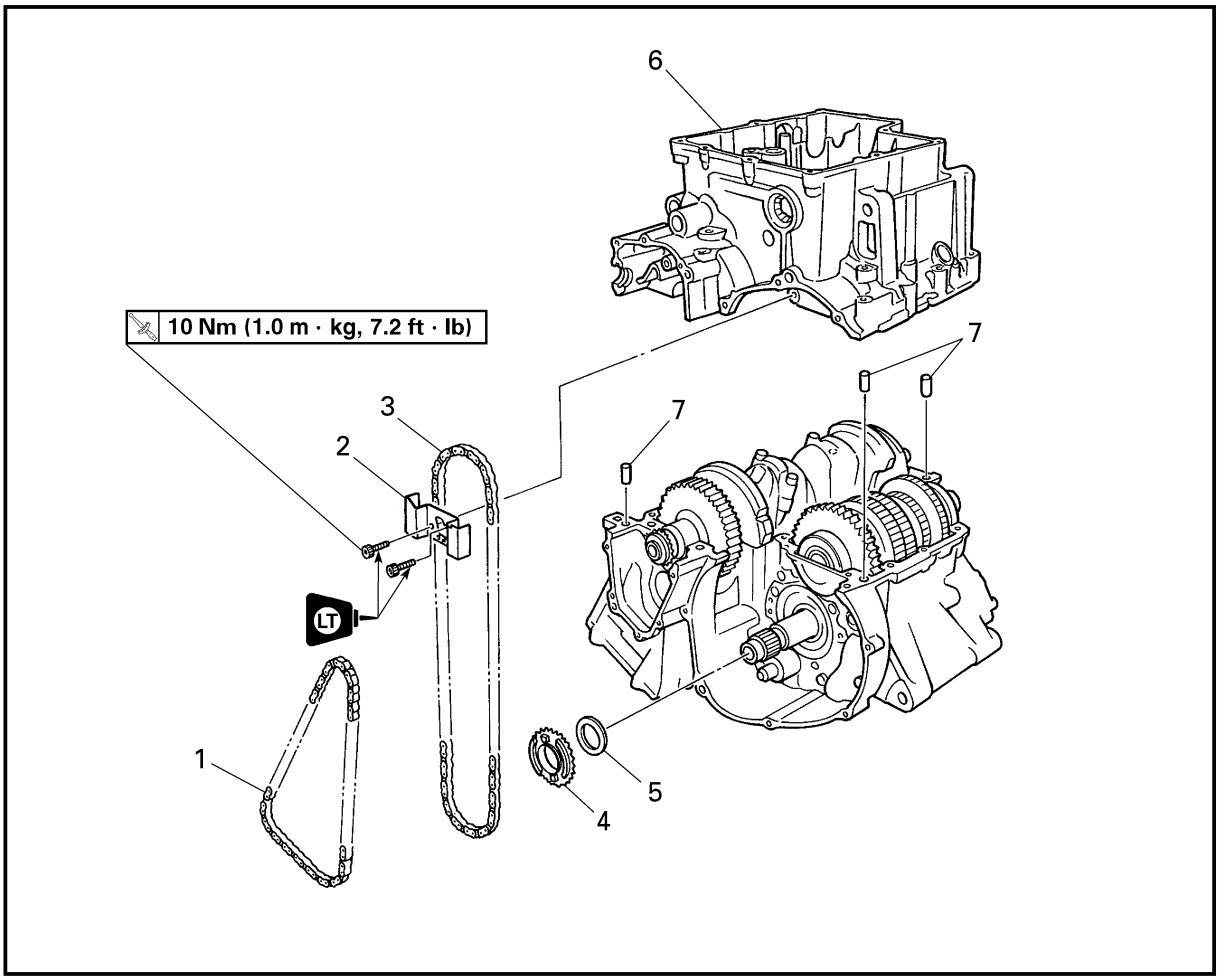
43 Nm (4.3 m · kg, 31 ft · lb)

⚠ WARNING
Always use new copper washers.

NOTE:
• Tighten the oil pan bolts in stages and in a crisscross pattern.
• Lubricate the oil level switch O-ring with lithium soap base grease.

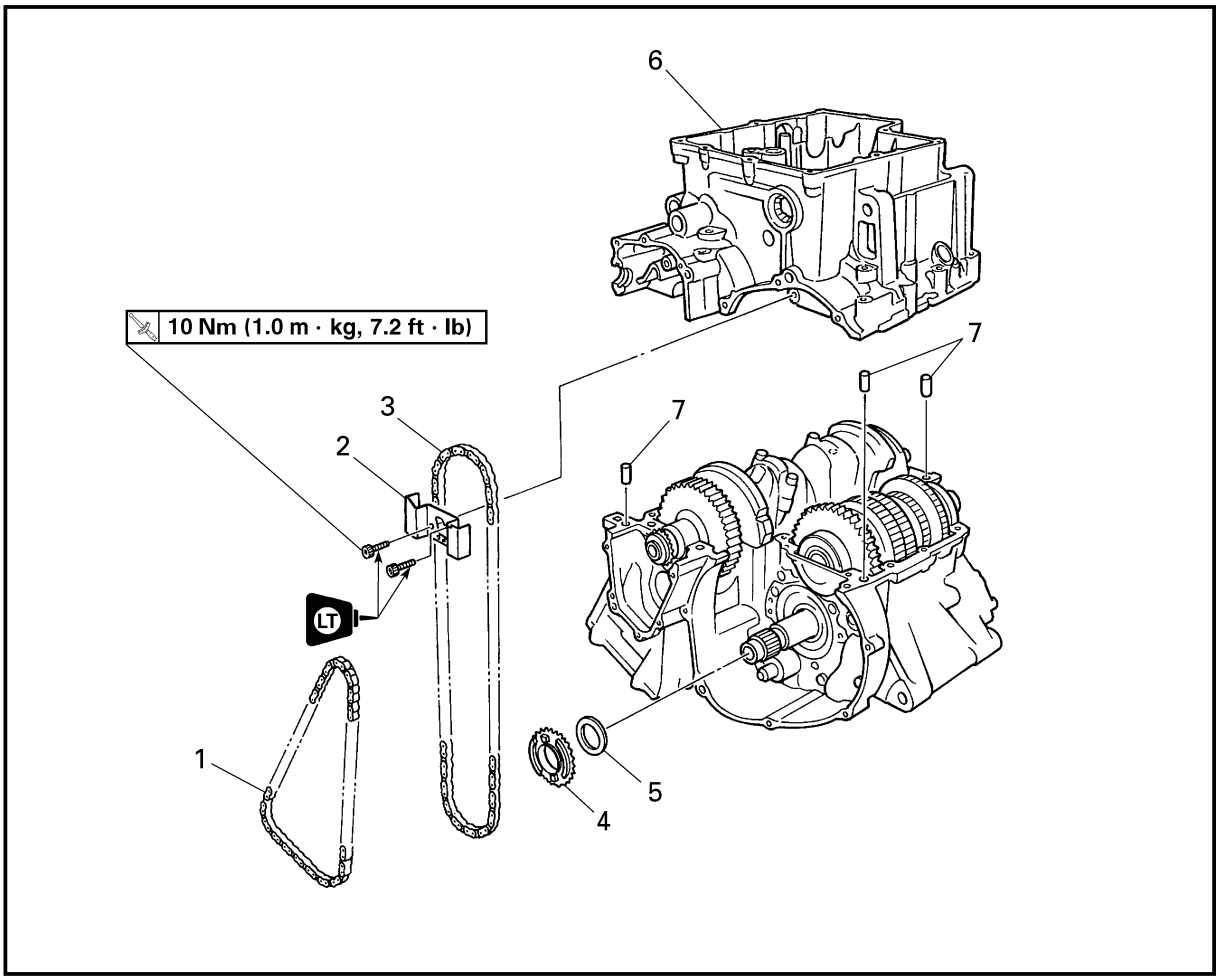
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CRANKCASE



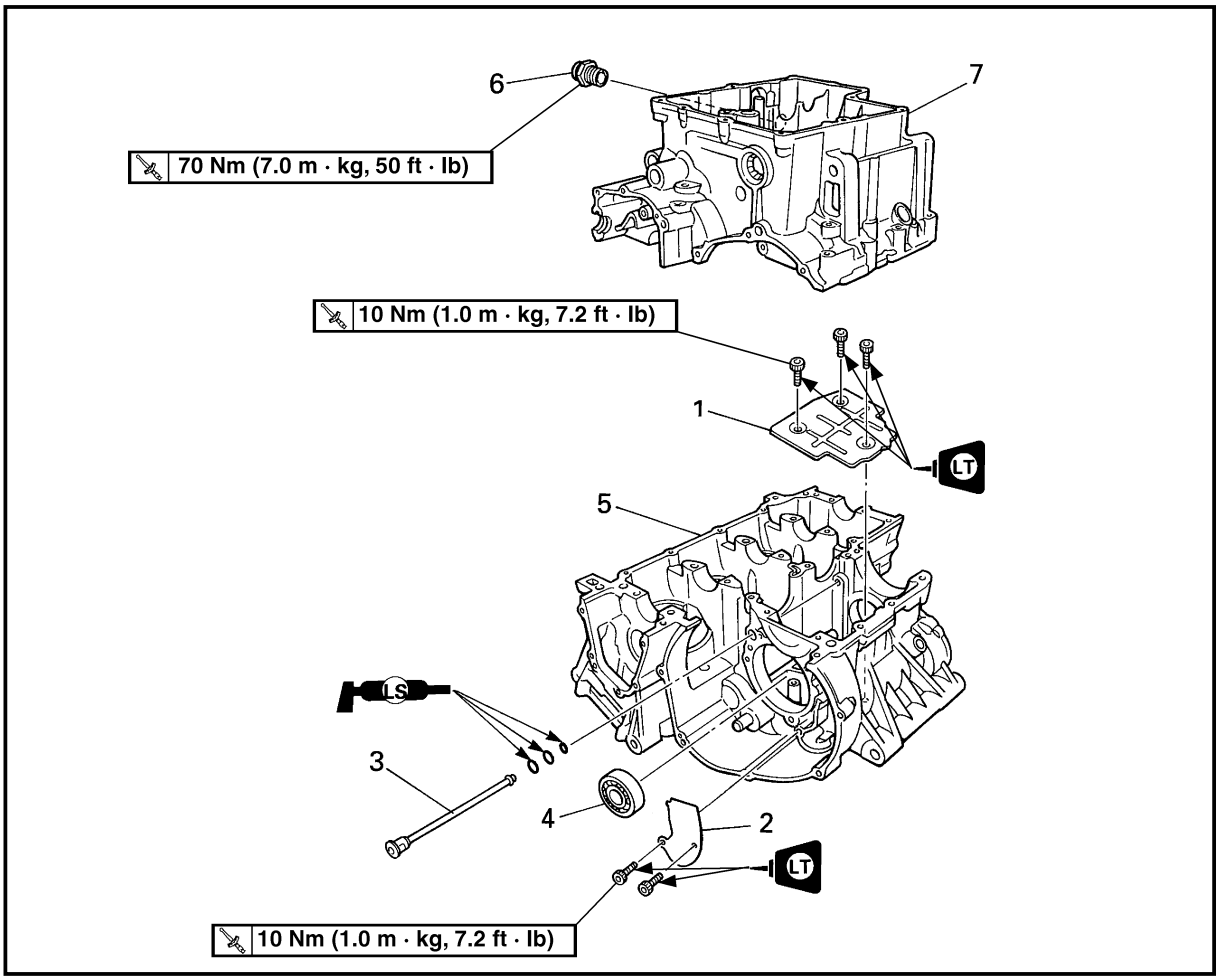
Order	Job/Part	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Cylinder head		Refer to "CYLINDER HEAD".
	Pickup coil and pickup coil rotor		Refer to "PICKUP COIL".
	Stator coil assembly		Refer to "GENERATOR".
	Clutch housing and starter clutch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

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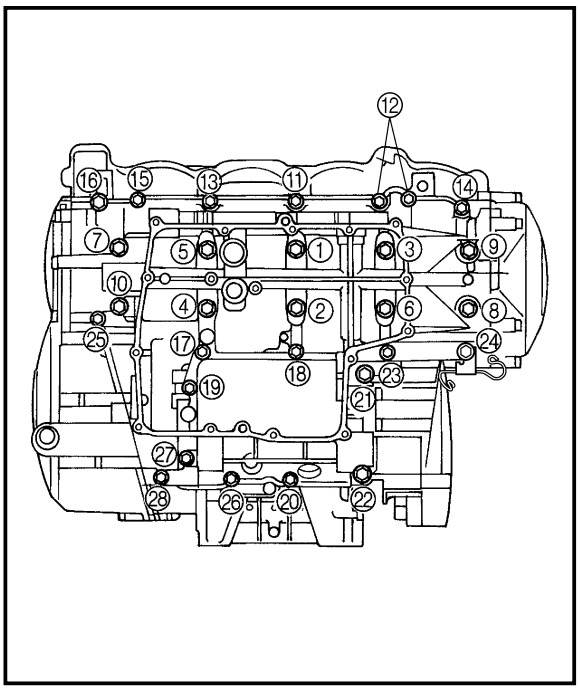
Order	Job/Part	Q'ty	Remarks
4	Oil/water pump assembly drive sprocket	1	
5	Washer	1	
6	Lower crankcase	1	
7	Dowel pin	3	
			For installation, reverse the removal procedure.

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Order	Job/Part	Q'ty	Remarks
	Removing the oil baffle plates and oil filter bolt		Remove the parts in the order listed.
	Connecting rod assemblies		Refer to "CONNECTING RODS AND PISTONS".
	Crankshaft		Refer to "CRANKSHAFT".
	Transmission		Refer to "TRANSMISSION".
1	Oil baffle plate	1	
2	Oil baffle plate	1	
3	Oil delivery pipe	1	
4	Bearing	1	
5	Upper crankcase	1	
6	Oil filter bolt	1	
7	Lower crankcase	1	
			For installation, reverse the removal procedure.

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EB412100
DISASSEMBLING THE CRANKCASE

1. Remove:
   • crankcase bolts

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

2. Place the engine upside down.
3. Remove:
   • lower crankcase

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

M9 × 105 mm bolts: ① ~ ⑩
M8 × 60 mm bolt: ㉑, ㉒
M6 × 70 mm bolts: ⑰, ⑲, ㉕, ㉗
M6 × 64 mm bolts: ⑯, ㉔
M6 × 60 mm bolt: ㉓
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 50 mm bolt: ⑱
M6 × 45 mm bolts: ⑳, ㉖, ㉘

4. Remove:
   • dowel pins

5. Remove:
   • crankshaft journal lower bearing (from the lower crankcase)

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

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EB412420
CHECKING THE CRANKCASE

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

EB412440
CHECKING THE BEARINGS AND OIL SEALS

1. Check:
   - bearings
     Clean and lubricate the bearings, then rotate the inner race with your finger.
     Rough movement → Replace.

CHECKING THE SPROCKETS AND CHAINS

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

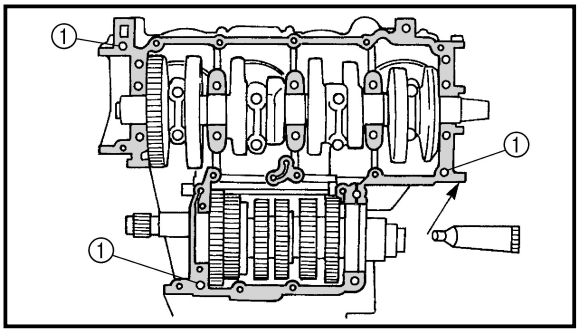
2. Check:
   - timing chain
     Damage/stiffness → Replace the timing chain and crankshaft as a set.
   - oil/water pump assembly drive chain
     Damage/stiffness → Replace the oil/water pump assembly drive chain and oil/water pump assembly drive sprocket as a set.

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EB412743
ASSEMBLING THE CRANKCASE

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

	Recommended lubricant **Engine oil**

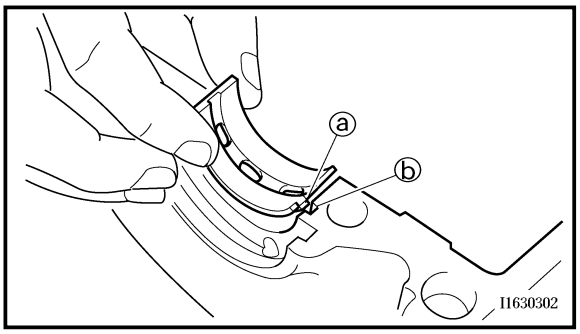


2. Apply:
   • sealant
   (onto the crankcase mating surfaces)

	Yamaha bond No. 1215 **90890-85505**

NOTE:
Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the crankshaft journal bearings.

3. Install:
   • dowel pins ①

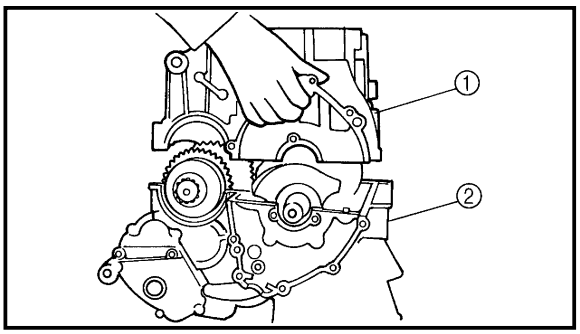


4. Install:
   • crankshaft journal lower bearings
   (into the lower crankcase)

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

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

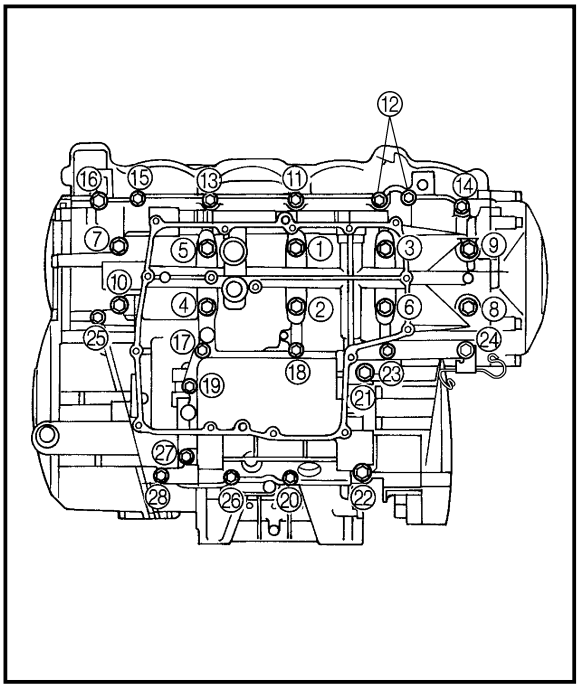
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6. Install:
   • lower crankcase ①
   (onto the upper crankcase ②)

CAUTION:

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



7. Install:
   • crankcase bolts

NOTE:
- Lubricate the bolt threads with engine oil.
- Install a washer on bolts ① ~ ⑩.
- Tighten the bolts in the tightening sequence cast on the crankcase.

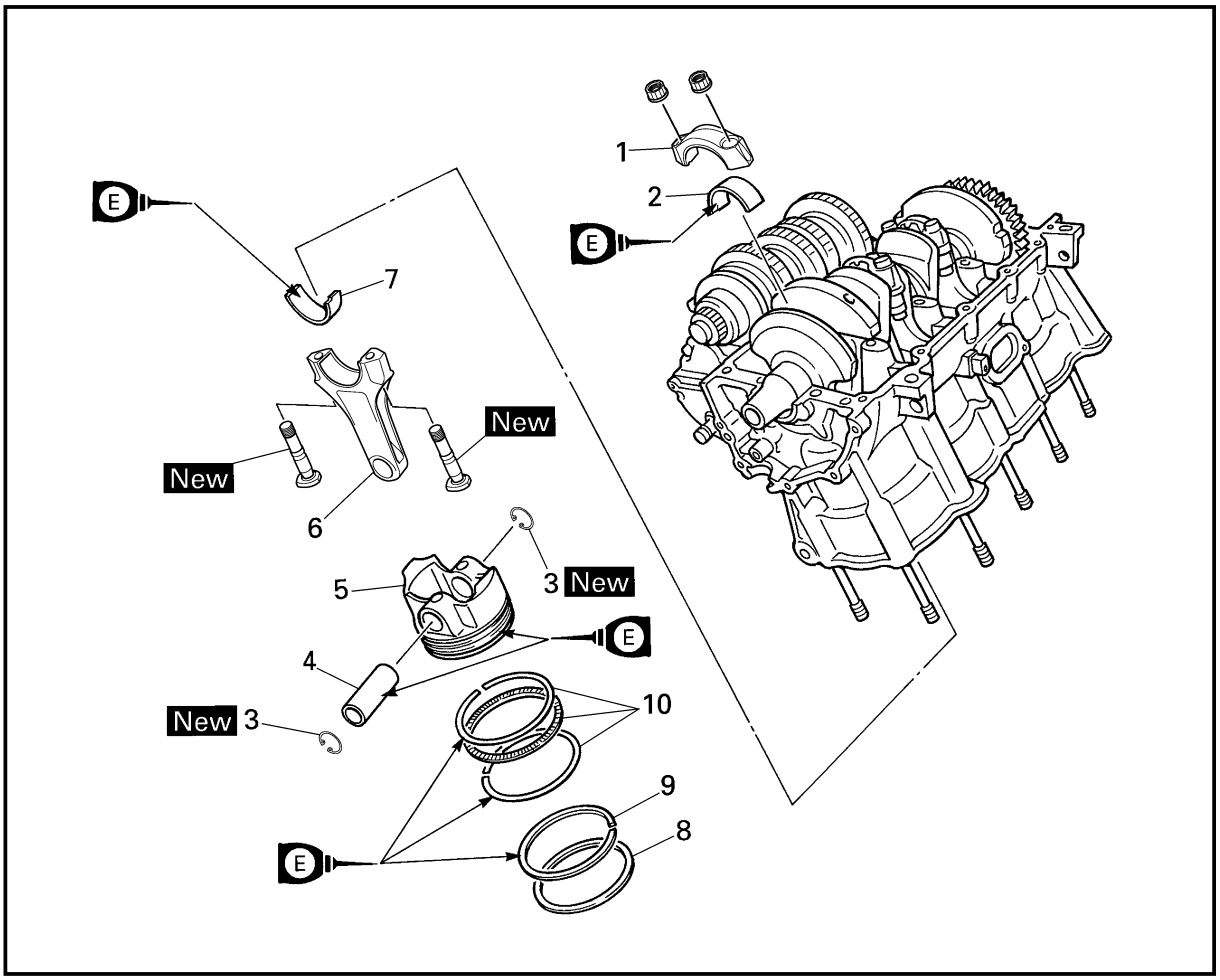
M9 × 105 mm bolts: ① ~ ⑩
M8 × 60 mm bolt: ㉑, ㉒
M6 × 70 mm bolts: ⑰, ⑲, ㉕, ㉗
M6 × 64 mm bolts: ⑯, ㉔
M6 × 60 mm bolt: ㉓
M6 × 55 mm bolts: ⑪ ~ ⑮
M6 × 50 mm bolt: ⑱
M6 × 45 mm bolts: ⑳, ㉖, ㉘



Bolt ① ~ ⑩
32 Nm (3.2 m • kg, 23 ft • lb)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m • kg, 8.7 ft • lb)
Bolt ⑯, ㉔
14 Nm (1.4 m • kg, 10 ft • lb)
Bolt ㉑, ㉒
24 Nm (2.4 m • kg, 17 ft • lb)

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EB404001
CONNECTING RODS AND PISTONS



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

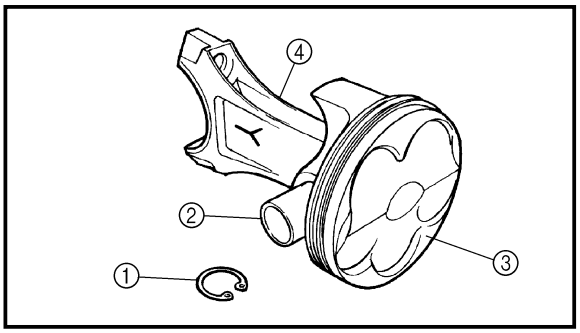
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EB412131
REMOVING THE CONNECTING RODS AND PISTONS

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

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

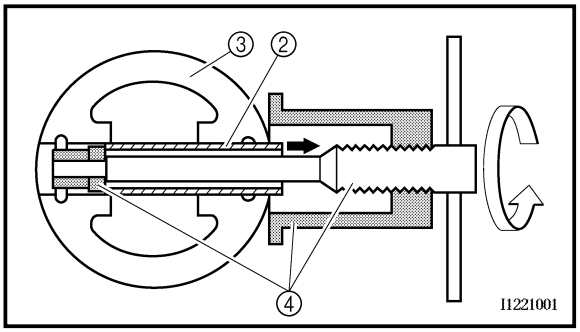
NOTE:
Identify the position of each big end bearing so that it can be reinstalled in its original place.



2. Remove:
   - piston pin clips ①
   - piston pin ②
   - piston ③
   - connecting rod ④

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

NOTE:
- For reference during installation, put identification marks on the piston crown.
- Before removing the piston pin, deburr the piston pin clip groove and the piston pin bore area in the piston. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.

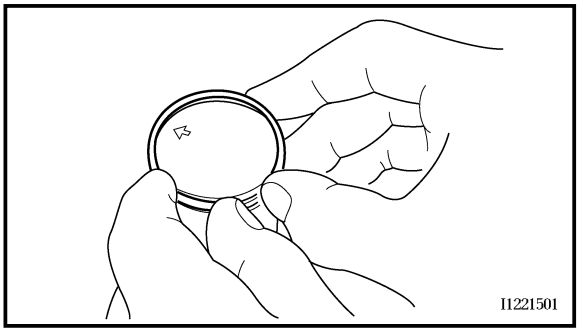




Piston pin puller
90890-01304

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

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



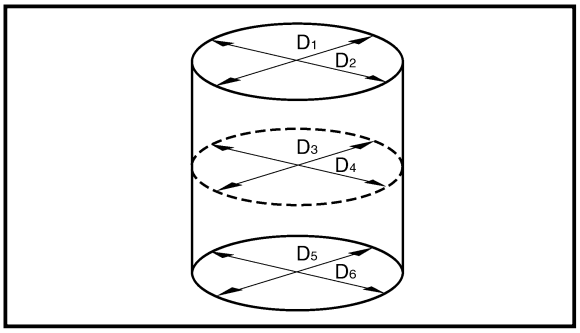
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EB404403
CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:
   - piston wall
   - cylinder wall

   Vertical scratches → Replace the crankcases, and the piston and piston rings as a set.



2. Measure:
   - piston-to-cylinder clearance

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

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

NOTE:

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

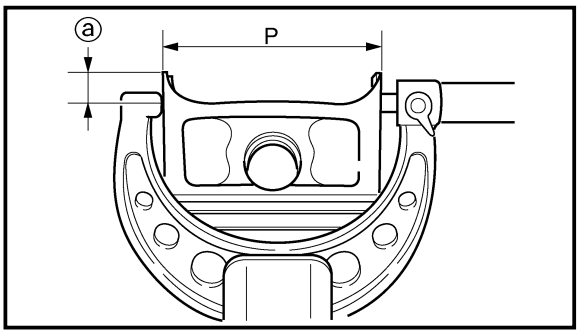
	Cylinder bore gauge 90890-03017

Cylinder bore "C"	**72.000 ~ 72.008 mm (2.8346 ~ 2.8350 in)**
Maximum taper "T"	**0.05 mm (0.0016 in)**
Out of round "R"	**0.05 mm (0.0016 in)**

"C"= maximum of D_1 ~ D_6
"T" = maximum of D_1, or D_2 – maximum of D_5 or D_6
"R" = maximum of D_1, D_3 or D_5 – minimum of D_2, D_4 or D_6

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

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



	Micrometer 90890-03008

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

	Piston size "P"
Standard	**71.954 ~ 71.972 mm (2.8328 ~ 2.8335 in)**

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

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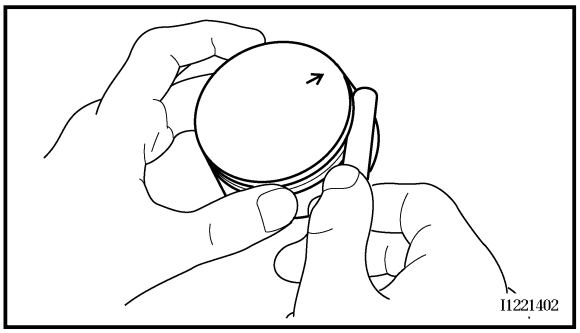
e. Calculate the piston-to-cylinder clearance with the following formula.

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

Piston-to-cylinder clearance
0.028 ~ 0.054 mm
(0.0011 ~ 0.0021 in)
<Limit>: 0.1 mm (0.004 in)

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

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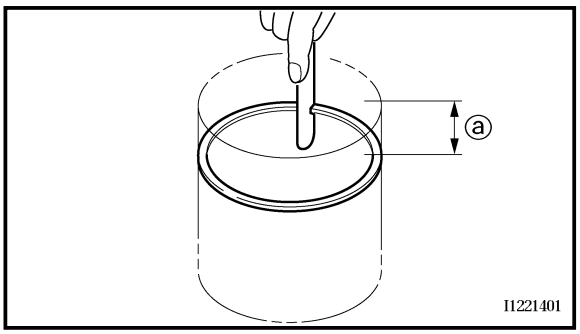


EB404410
CHECKING THE PISTON RINGS

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
0.03 ~ 0.07 mm
(0.0012 ~ 0.0028 in)
<Limit>: 0.12 mm (0.0047 in)
2nd ring
0.02 ~ 0.06 mm
(0.0008 ~ 0.0024 in)
<Limit>: 0.12 mm (0.0047 in)



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

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

ⓐ 5 mm (0.20 in)

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

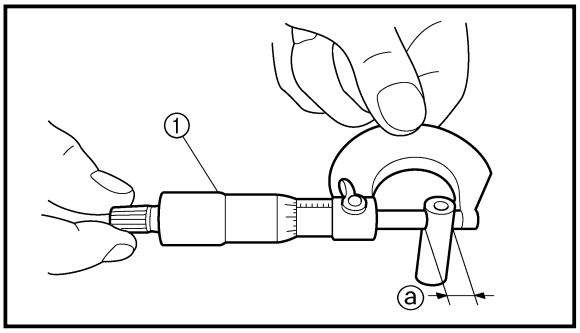
NOTE:
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

Piston ring end gap
Top ring
0.15 ~ 0.25 mm
(0.006 ~ 0.010 in)
<Limit>: 0.50 mm (0.020 in)
2nd ring
0.25 ~ 0.35 mm
(0.009 ~ 0.014 in)
<Limit>: 0.70 mm (0.028 in)
Oil ring
0.1 ~ 0.3 mm
(0.004 ~ 0.012 in)

EB404421
CHECKING THE PISTON PINS

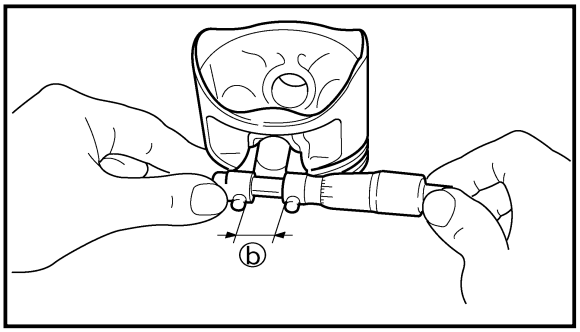
The following procedure applies to all of the piston pins.

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



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

Piston pin outside diameter
16.995 ~ 17.000 mm
(0.6691 ~ 0.6693 in)
<Limit>: 16.975 mm (0.6683 in)



3. Measure:
   • piston pin bore diameter (in the piston)
   Out of specification → Replace the piston pin.

Piston pin bore diameter (in the piston)
17.004 ~ 17.015 mm
(0.6694 ~ 0.6699 in)
<Limit>: 17.045 mm (0.6711 in)

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

Piston pin-to-piston pin bore clearance =
Piston pin bore diameter (in the piston) –
Piston pin outside diameter

Piston pin-to-piston pin bore clearance
0.004 ~ 0.020 mm
(0.00016 ~ 0.00079 in)
<Limit>: 0.070 mm (0.0028 in)

CHECKING THE BIG END BEARINGS

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

Crankshaft pin-to-big end bearing clearance
0.058 ~ 0.078 mm
(0.0023 ~ 0.0031 in)

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The following procedure applies to all of the connecting rods.

CAUTION:

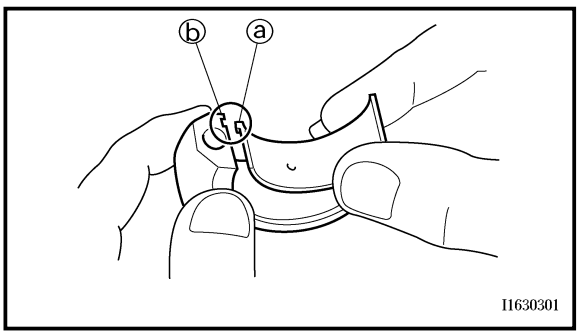
Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft pin-to-big end bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

a. Clean the big end bearings, crankshaft pins, and bearing portions of the connecting rods.

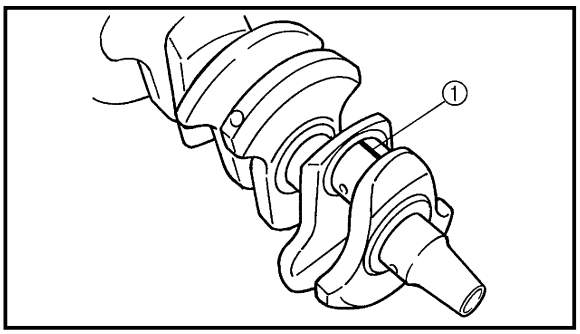
b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

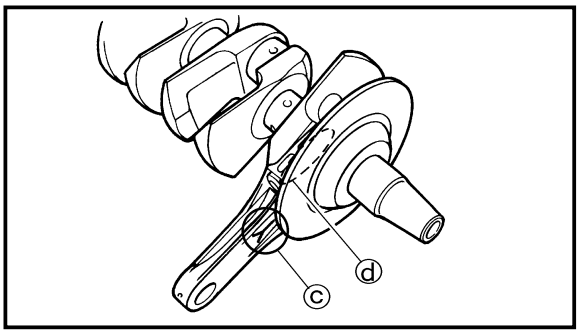
NOTE:

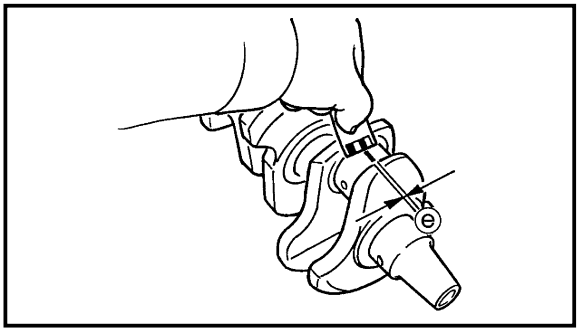
Align the projections ⓐ on the big end bearings with the notches ⓑ in the connecting rod and connecting rod cap.



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c. Put a piece of Plastigauge® ① on the crankshaft pin.

d. Assemble the connecting rod halves.

NOTE:
- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolt threads and nut seats with MOLYKOTE® G-n paste.
- Make sure that the "Y" mark ⓒ on the connecting rod faces towards the left side of the crankshaft.
- Make sure that the characters ⓓ on both the connecting rod and connecting rod cap are aligned.

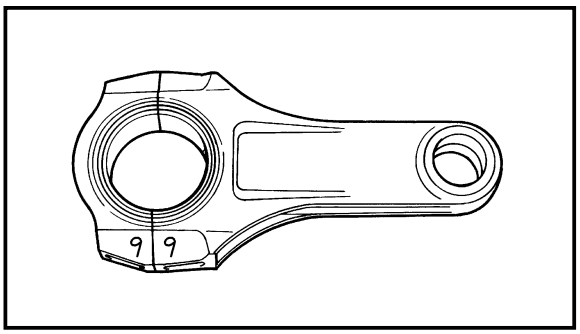
e. Tighten the connecting rod nuts.
Refer to "INSTALLING THE PISTONS AND CONNECTING RODS".

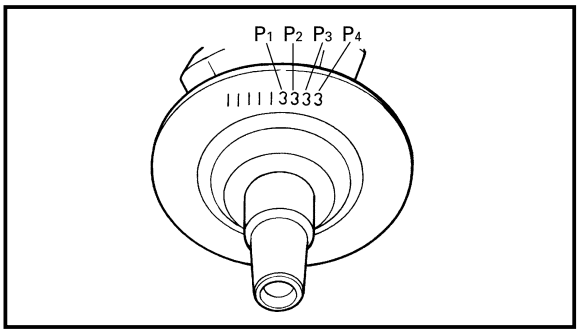
f. Remove the connecting rod and big end bearings.
Refer to "REMOVING THE CONNECTING RODS AND PISTONS".

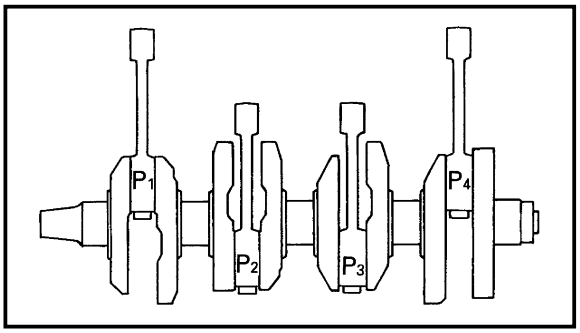
g. Measure the compressed Plastigauge® width ⓔ on the crankshaft pin.
If the crankshaft pin-to-big end bearing clearance is out of specification, select replacement big end bearings.

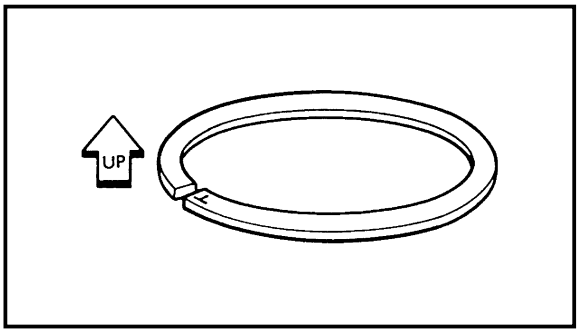
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2. Select:
   • big end bearings ("P_1"~ "P_4")

NOTE:
- The numbers stamped into the crankshaft web and the numbers on the connecting rods are used to determine the replacement big end bearing sizes.
- "P_1"~"P_4" refer to the bearings shown in the crankshaft illustration.

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For example, if the connecting rod "P_1" and the crankshaft web "P_1" numbers are "9" and "3" respectively, then the bearing size for "P_1" is:

"P_1" (connecting rod) – "P_1" (crankshaft) =
9 – 3 = 6

BIG END BEARING COLOR CODE	
2	blue
3	black
4	
5	brown
6	
7	green
8	
9	yellow

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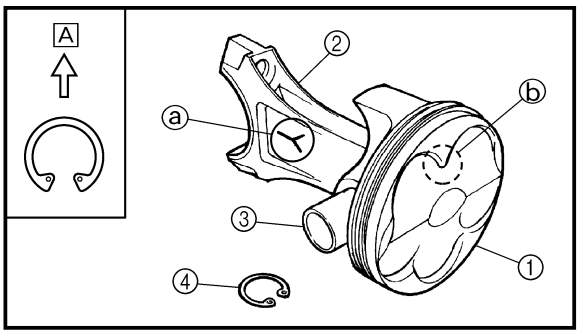
INSTALLING THE PISTONS AND CONNECTING RODS

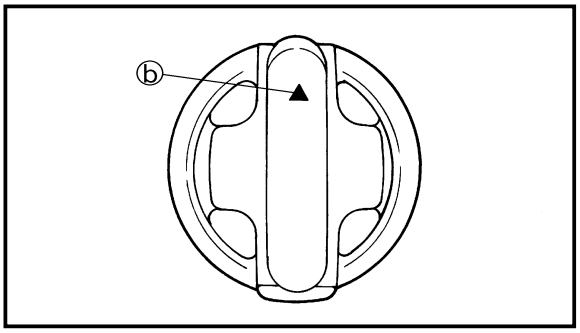
The following procedure applies to all of the pistons and cylinders.

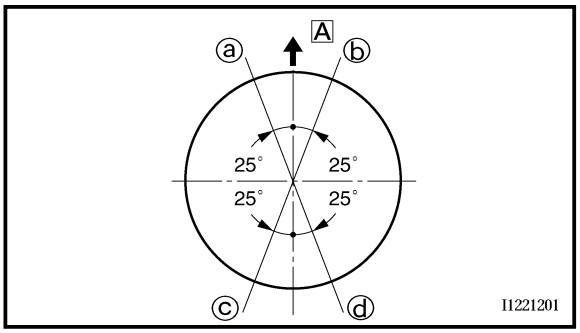
1. Install:
   • top ring
   • 2nd ring
   • oil ring

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

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

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

A Piston head

3. Offset:
   - piston ring end gaps
     ⓐ Top ring
     ⓑ Lower oil ring rail
     ⓒ Upper oil ring rail
     ⓓ 2nd ring
     A Intake side

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

	Recommended lubricant **Engine oil**

5. Lubricate:
   - bolt threads
   - nut seats
     (with the recommended lubricant)

	Recommended lubricant **MOLYKOTE® G-n paste**

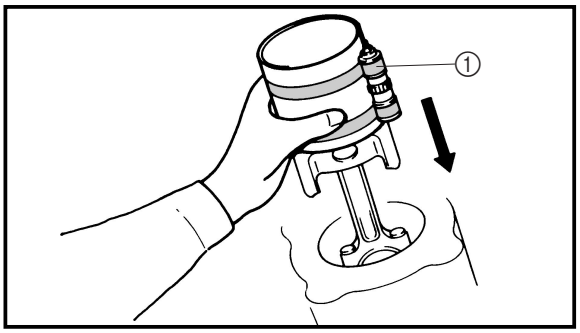
CAUTION:
MOLYKOTE® "G-n" paste is a special grease, which should not be applied to any part other than those specified.

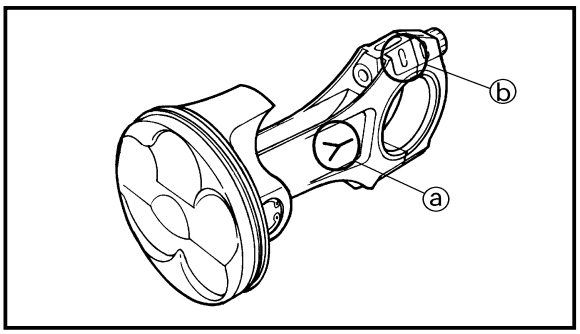
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NOTE:
Apply only a thin even layer of MOLYKOTE, "G-n" paste, otherwise the correct tightening torque cannot be achieved.

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

Recommended lubricant
Engine oil





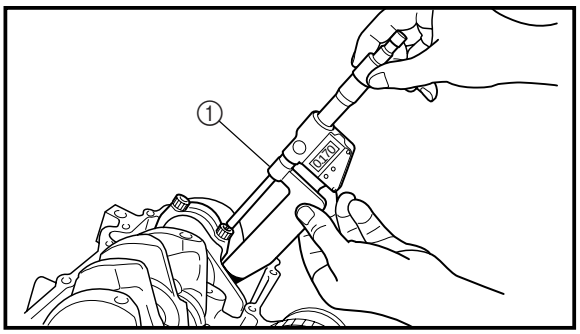
7. Install:
   - big end bearings
   - connecting rod assembly (into the cylinder and onto the crankshaft pin)
   - connecting rod cap (onto the connecting rod)

NOTE:
- Align the projections on the big end bearings with the notches in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.
- While compressing the piston rings with piston ring compressor ①, install the connecting rod assembly into the cylinder with the other hand.
- Make sure that the "Y" marks ⓐ on the connecting rods face towards the left side of the crankshaft.
- Make sure that the characters ⓑ on both the connecting rod and connecting rod cap are aligned.

Piston ring compressor:
90890-05158

8. Align:
   - bolt heads (with the connecting rods)

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9. Tighten:
   • connecting rod nuts

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• Tighten the connecting rod nuts in the following way.

NOTE:

• How much the connecting rod nut is tightened depends on how much the connecting rod bolt stretches.
• Use a general micrometer ① to measure the connecting rod bolts.

a. Before tightening the connecting rod nut, measure the length of the connecting rod bolt with an accuracy of three decimal places.

b. First tighten the connecting rod nut to 20 Nm (2.0 m • kg, 14 ft • lb), then up to 40 Nm (4.0 m • kg, 29 ft • lb).

c. Measure the length of the connecting rod bolt after tightening the connecting rod nut and then calculate how much the bolt has stretched.

d. Further tighten the connecting rod nut until the connecting rod bolt has stretched by between 0.170 and 0.175 mm.

CAUTION:

If the connecting rod nut cannot eventually be tightened to about 50 Nm (5.0 m • kg, 36 ft • lb), too much MOLYKOTE®, "G-n" paste may have been applied. Loosen the connecting rod nut and check the loosening torque. If the loosening torque is less than 40 Nm (4.0 m • kg, 29 ft • lb), too much MOLYKOTE®, "G-n" paste was applied. In that case, replace the connecting rod bolt with a new one and apply a thin uniform layer of MOLYKOTE®, "G-n" paste to the threads of the connecting rod bolt, the contact area between the connecting rod and the connecting rod bolt, and the seat of the connnecting rod nut. Then, tighten the connecting rod nut as explained above.

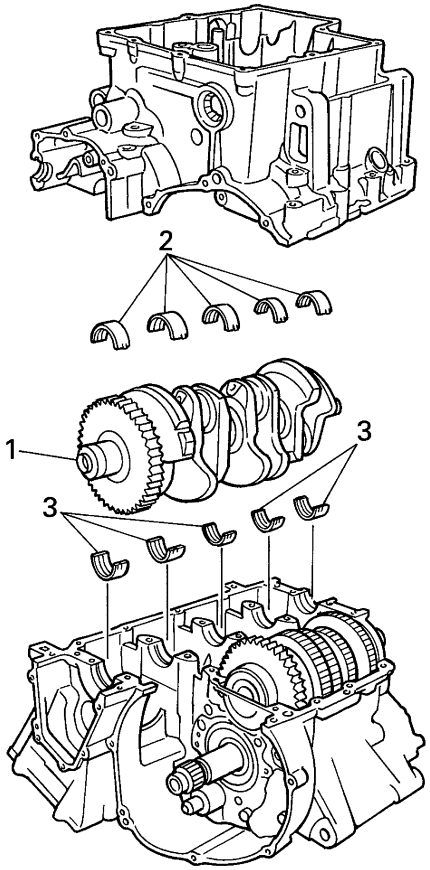
⚠ WARNING

Always replace the connecting rod bolt with a new one if loosening the connecting rod nut after it was tightened. Never use a connecting rod bolt more than once.

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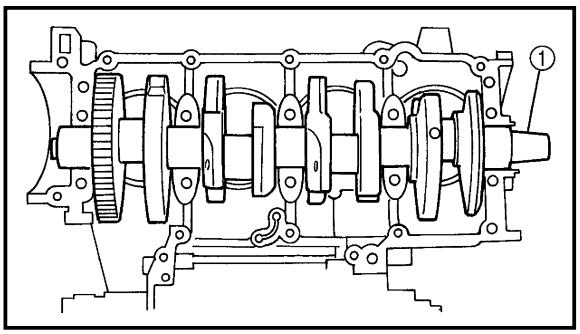
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EB412000
CRANKSHAFT



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

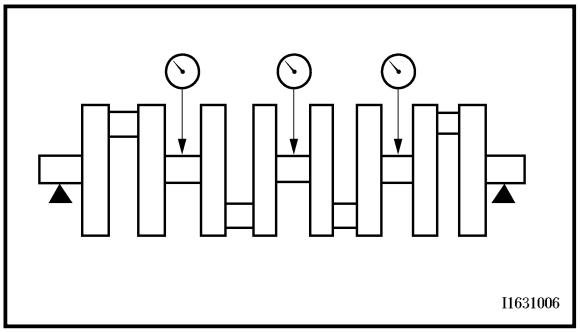
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EB412110
REMOVING THE CRANKSHAFT

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

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



EB412403
CHECKING THE CRANKSHAFT

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

Maximum crankshaft runout
0.035 mm (0.0014 in)

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

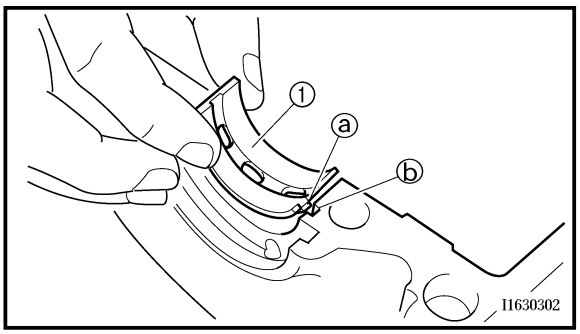
CHECKING THE CRANKSHAFT JOURNAL BEARINGS

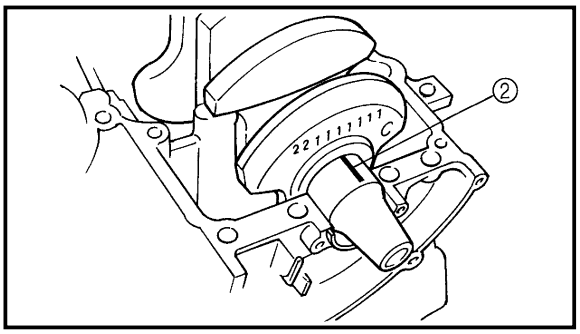
1. Measure:
   • crankshaft journal-to-crankshaft journal bearing clearance
   Out of specification → Replace the crankshaft journal bearings.

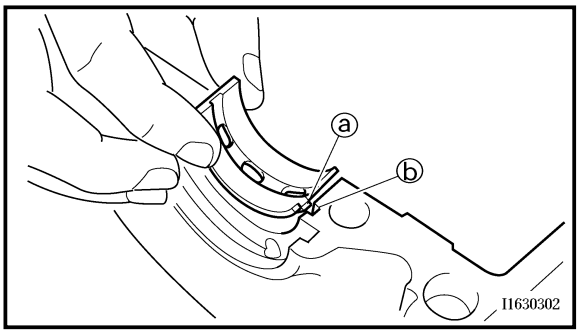
Crankshaft journal-to-crankshaft journal bearing clearance
0.036 ~ 0.056 mm
(0.0014 ~ 0.0022 in)

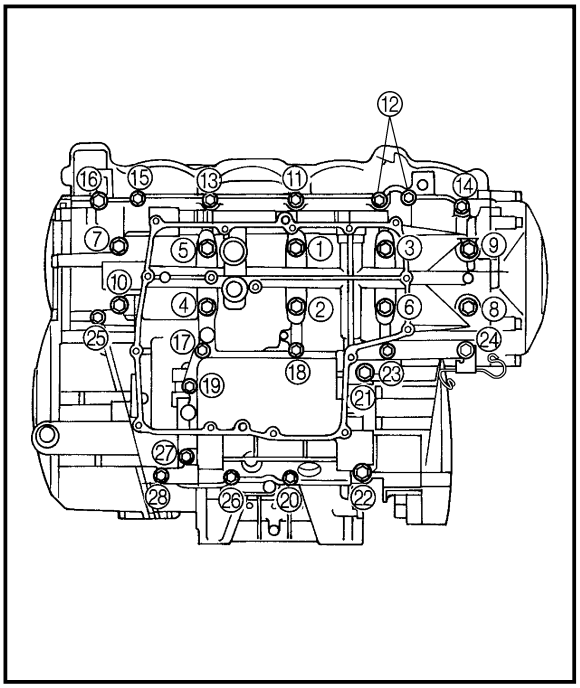
CAUTION:
Do not interchange the crankshaft journal bearings. To obtain the correct crankshaft journal-to-crankshaft journal bearing clearance and prevent engine damage, the crankshaft journal bearings must be installed in their original positions.

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a. Clean the crankshaft journal bearings, crankshaft journals, and bearing portions of the crankcase.

b. Place the upper crankcase upside down on a bench.

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

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

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

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

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

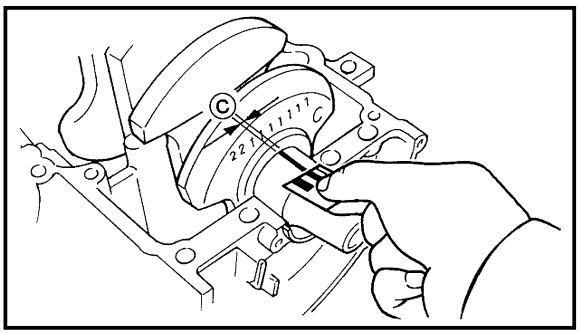
NOTE:
- Align the projections ⓐ on the crankshaft journal lower bearings with the notches ⓑ in the lower crankcase.
- Do not move the crankshaft until the clearance measurement has been completed.

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

Bolt ① ~ ⑩
32 Nm (3.2 m • kg, 23 ft • lb)
Bolt ⑪ ~ ⑮, ⑰ ~ ⑳, ㉓, ㉕ ~ ㉘
12 Nm (1.2 m • kg, 8.7 ft • lb)
Bolt ⑯, ㉔
14 Nm (1.4 m • kg, 10 ft • lb)
Bolt ㉑, ㉒
24 Nm (2.4 m • kg, 17 ft • lb)

NOTE:
Lubricate the crankcase bolt threads with engine oil.

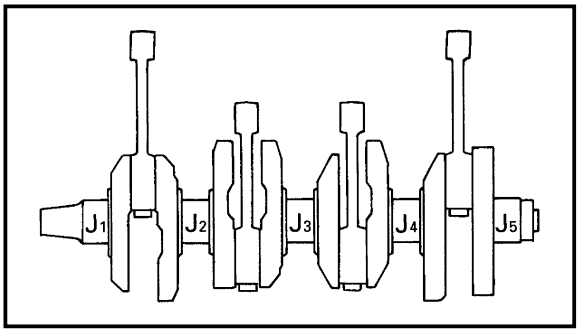
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g. Remove the lower crankcase and the crankshaft journal lower bearings.

h. Measure the compressed Plastigauge® width Ⓒ on each crankshaft journal.
If the clearance is out of specification, select replacement crankshaft journal bearings.

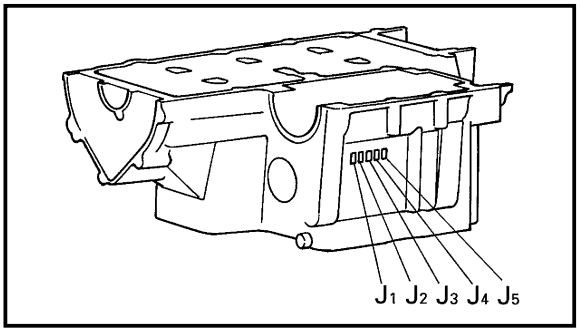
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2. Select:
• crankshaft journal bearings (J_1 ~ J_5)

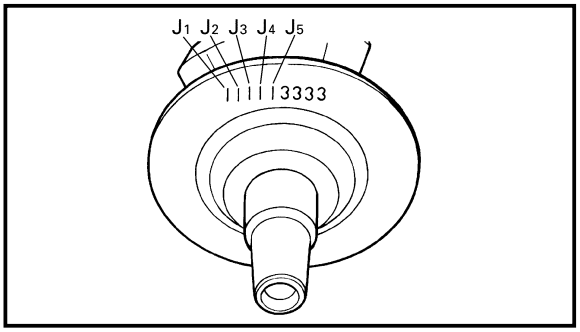
NOTE:
- The numbers stamped into the crankshaft web and the numbers stamped into the lower crankcase are used to determine the replacement crankshaft journal bearing sizes.
- "J_1" ~ "J_5" refer to the bearings shown in the crankshaft illustration.
- If "J_1" ~ "J_5" are the same, use the same size for all of the bearings.

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For example, if the crankcase "J_1" and crankshaft web "J_1" numbers are "8" and "3" respectively, then the bearing size for "J_1" is:

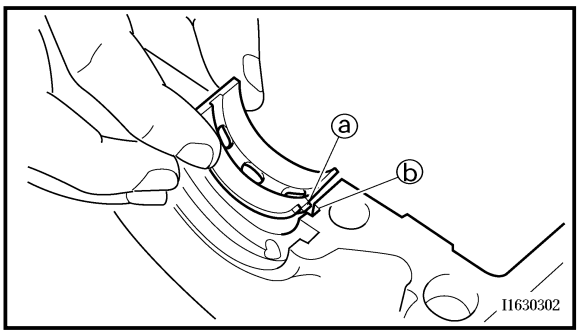
Bearing size for J_1:
"J_1" (crankcase) – "J_1" (crankshaft web) =
8 – 3 = 5



CRANKSHAFT JOURNAL BEARING COLOR CODE	
1	blue
2	
3	black
4	
5	brown
6	
7	green
8	
9	yellow
10	
11	violet

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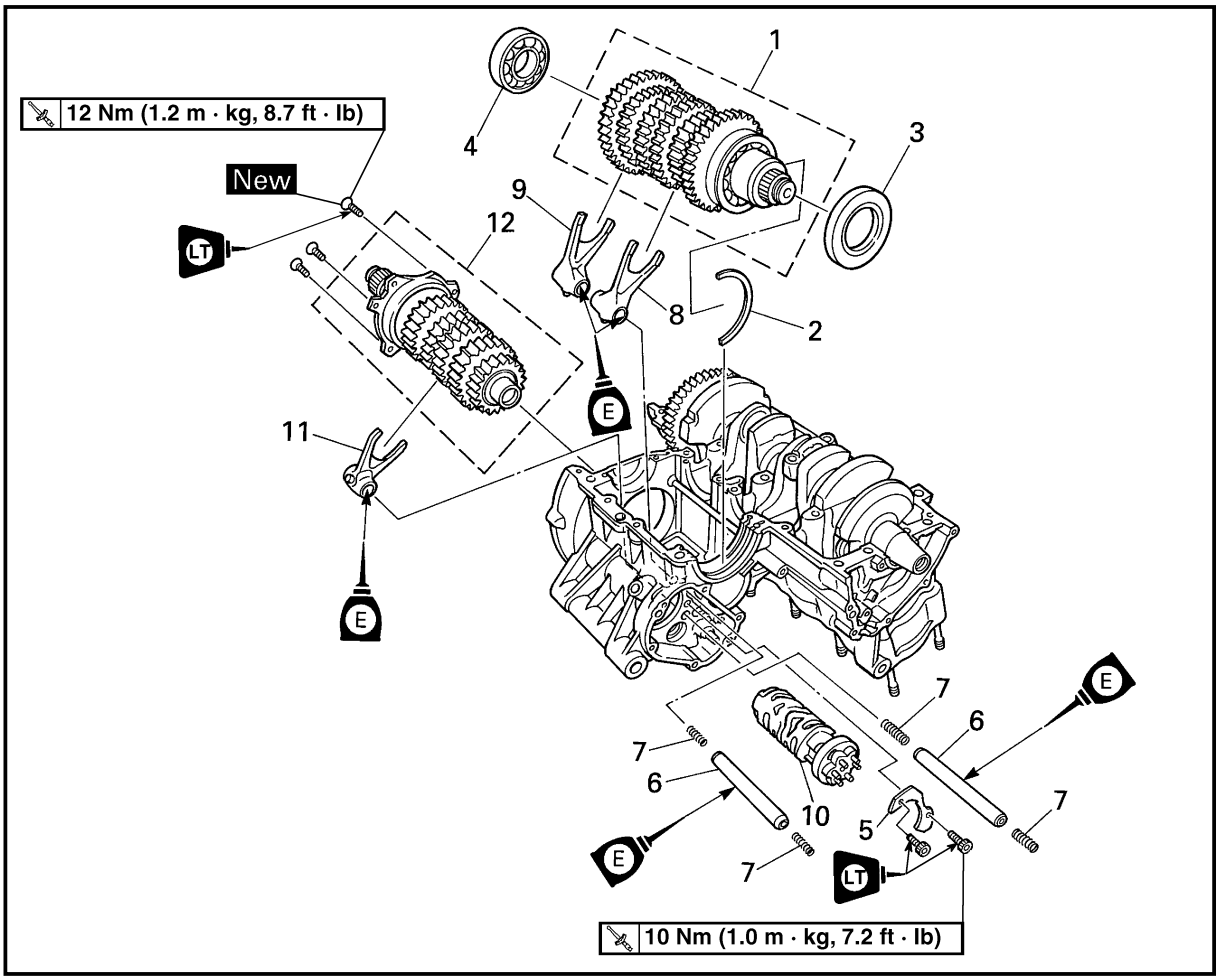
EB412720
INSTALLING THE CRANKSHAFT

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

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

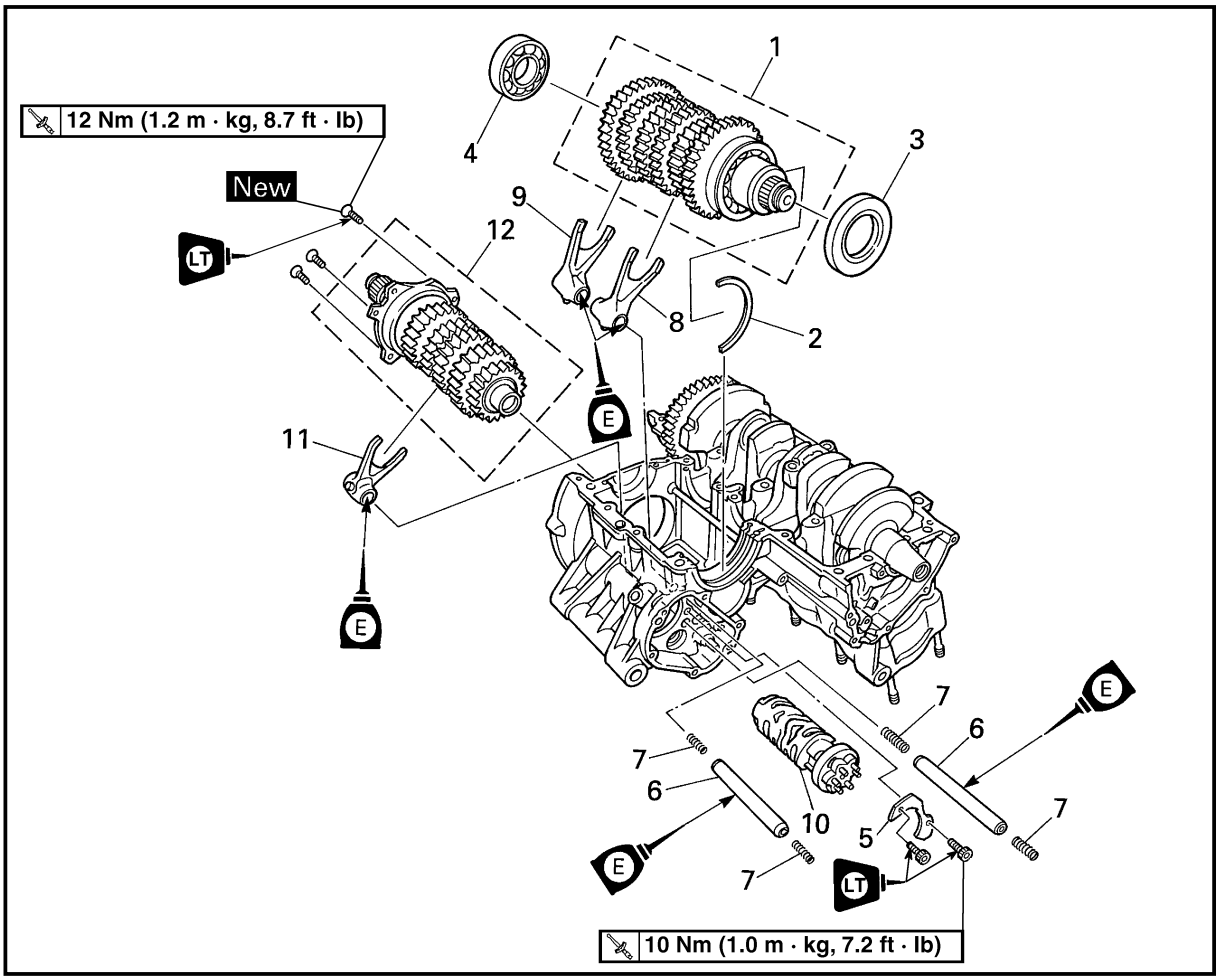
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EB413000
TRANSMISSION



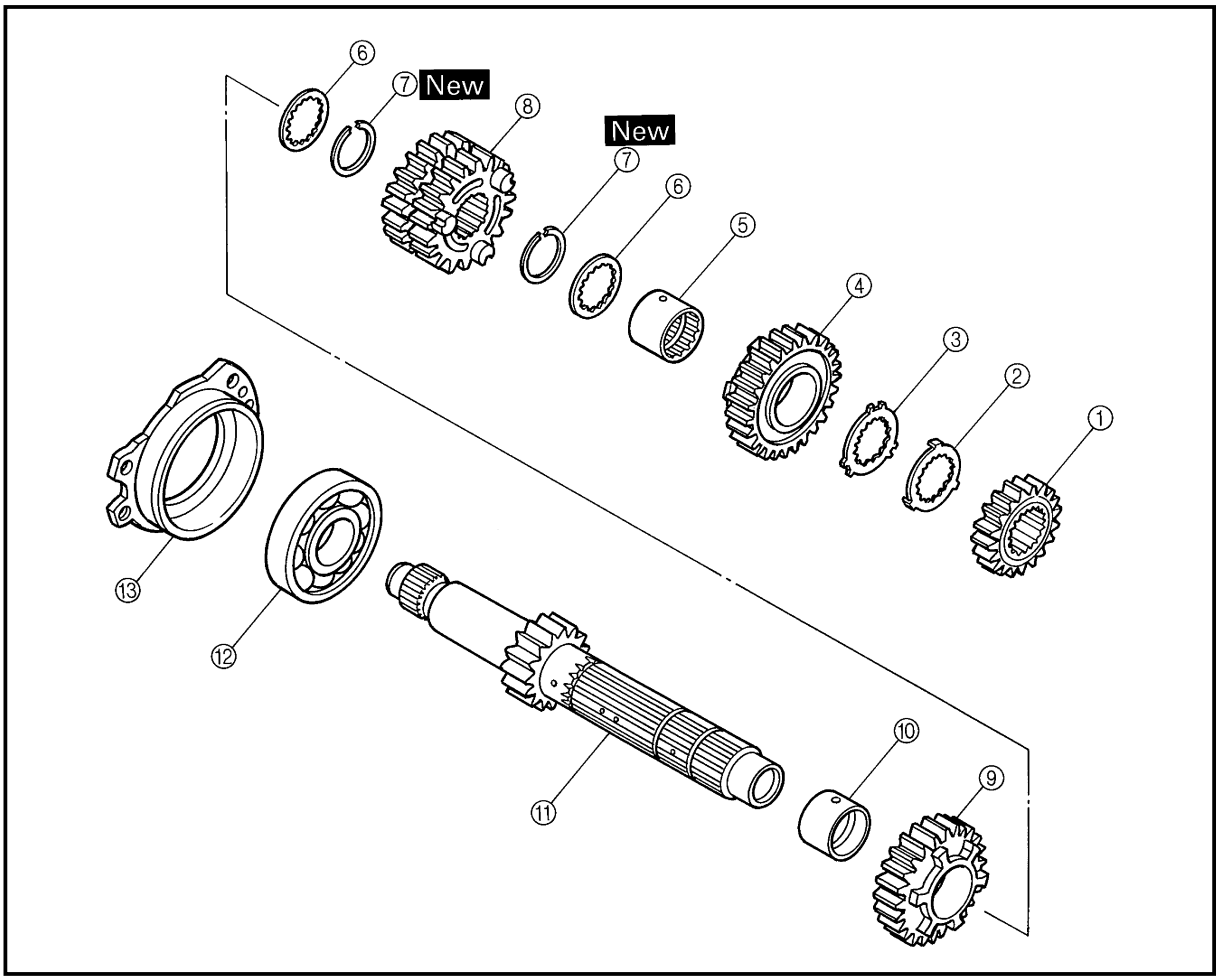
Order	Job/Part	Q'ty	Remarks
	Removing the transmission, shift drum assembly, and shift forks		Remove the parts in the order listed.
	Crankcase		Separate. Refer to "CRANKCASE".
	Stopper lever		Refer to "SHIFT SHAFT".
1	Drive axle assembly	1	
2	Circlip	1	
3	Oil seal	1	
4	Bearing	1	
5	Shift drum retainer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

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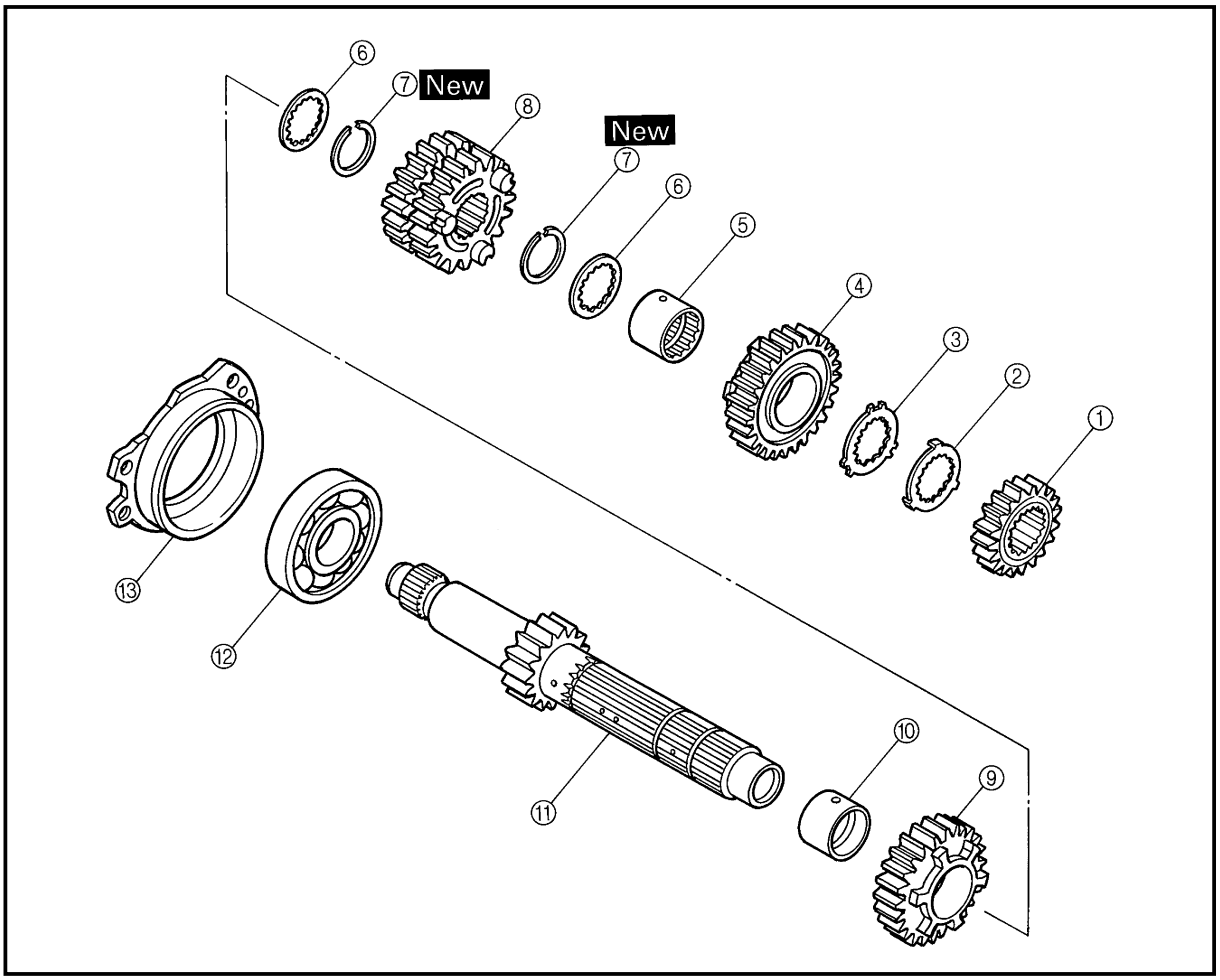
Order	Job/Part	Q'ty	Remarks
10	Shift drum assembly	1	
11	Shift fork "C"	1	
12	Main axle assembly	1	
			For installation, reverse the removal procedure.

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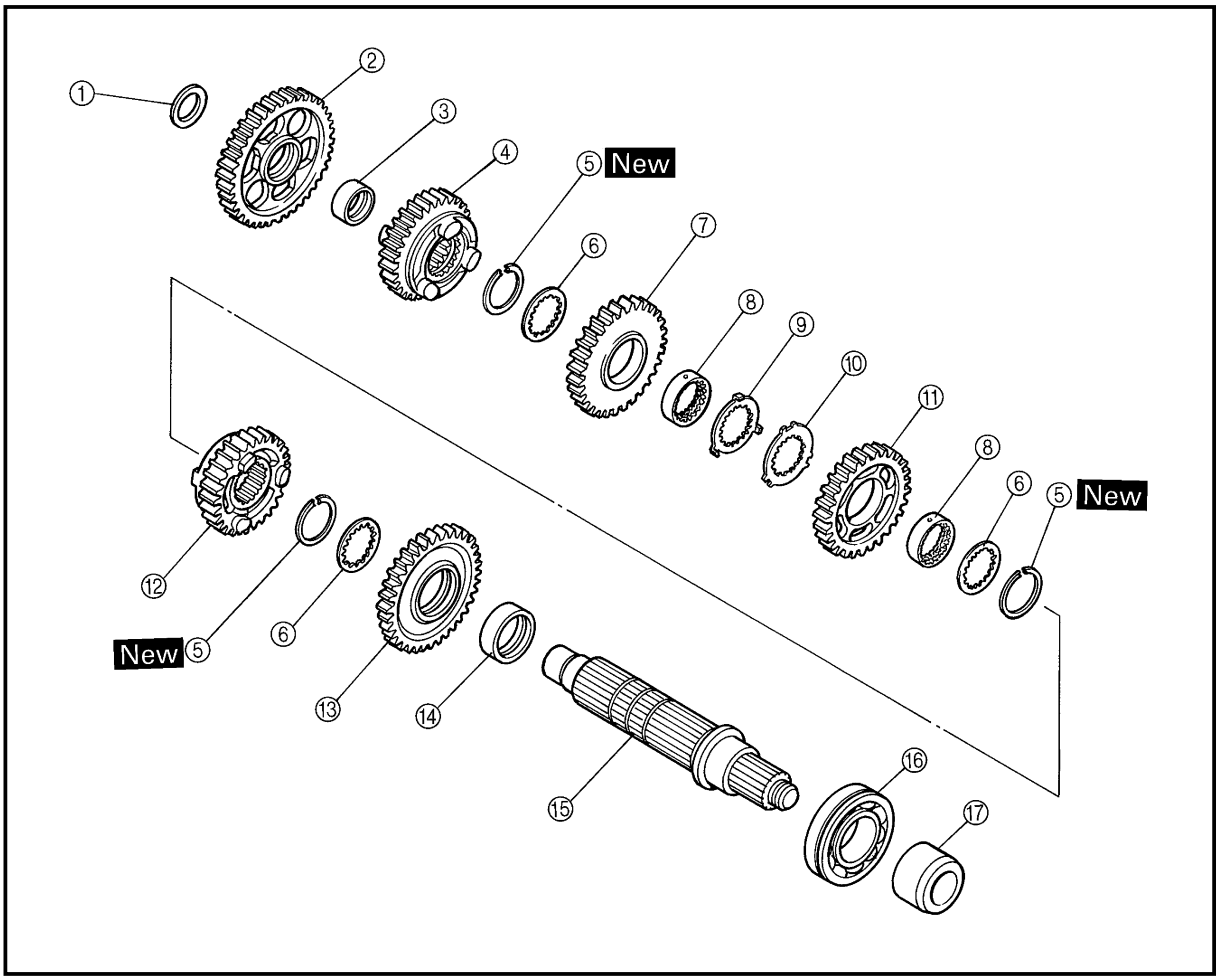
Order	Job/Part	Q'ty	Remarks
	Disassembling the main axle assembly		Remove the parts in the order listed.
①	2nd pinion gear	1	
②	Toothed lock washer	1	
③	Toothed lock washer retainer	1	
④	6th pinion gear	1	
⑤	Toothed spacer	1	
⑥	Toothed washer	2	
⑦	Circlip	2	
⑧	3rd/4th pinion gears	1	
⑨	5th pinion gear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

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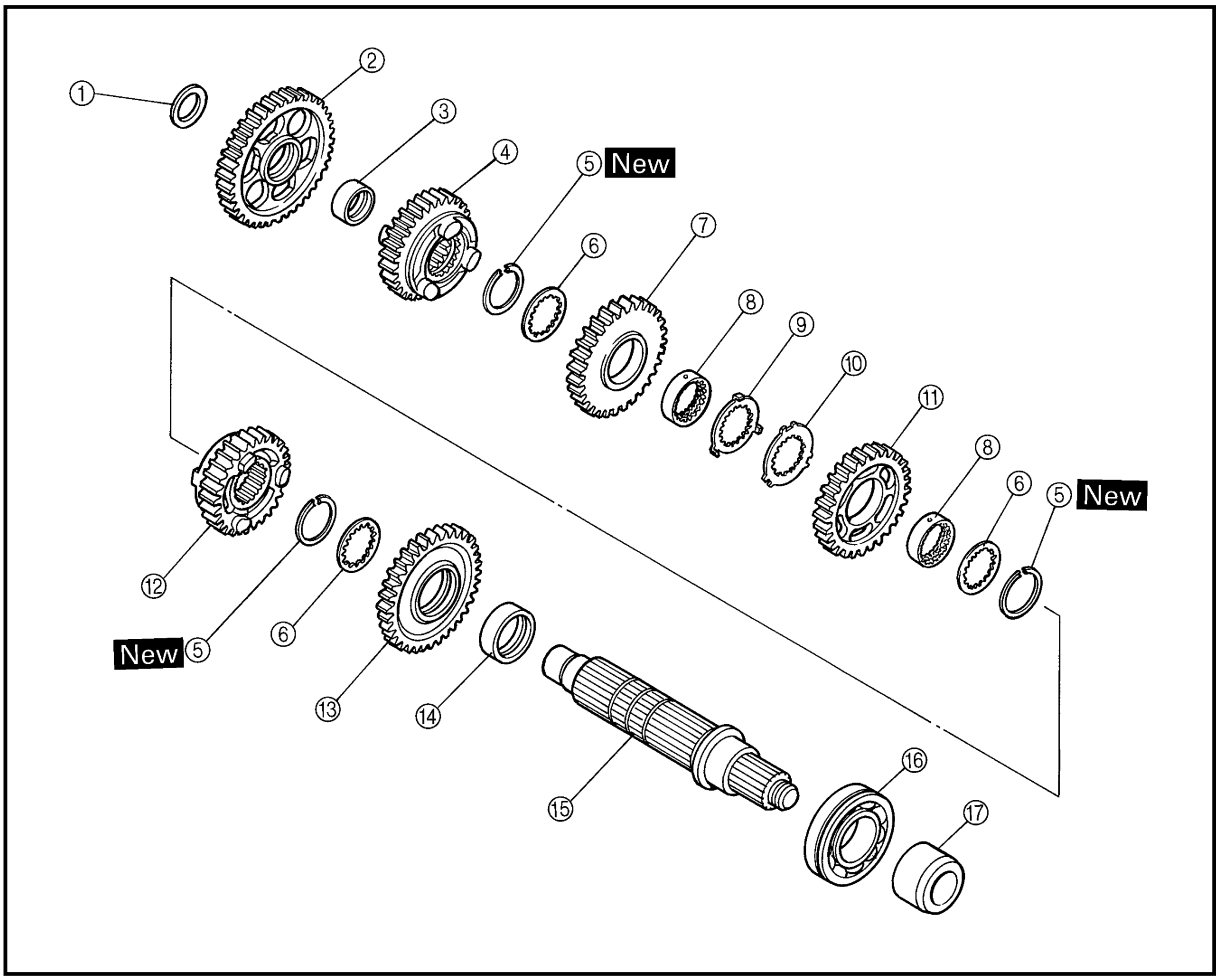
Order	Job/Part	Q'ty	Remarks
⑪	Main axle/1st pinion gear	1	
⑫	Bearing	1	
⑬	Main axle bearing housing	1	
			For installation, reverse the removal procedure.

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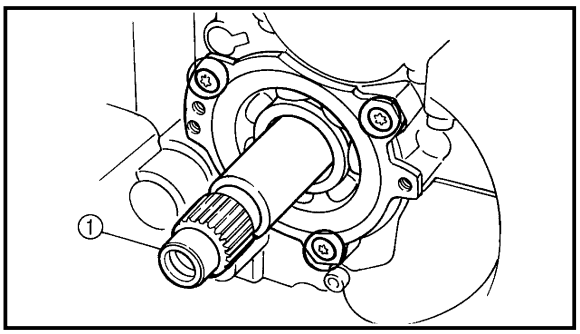
Order	Job/Part	Q'ty	Remarks
	Disassembling the drive axle assembly		Remove the parts in the order listed.
①	Washer	1	
②	1st wheel gear	1	
③	Spacer	1	
④	5th wheel gear	1	
⑤	Circlip	3	
⑥	Washer	3	
⑦	3rd wheel gear	1	
⑧	Toothed spacer	2	
⑨	Toothed lock washer	1	
⑩	Toothed lock washer retainer	1	

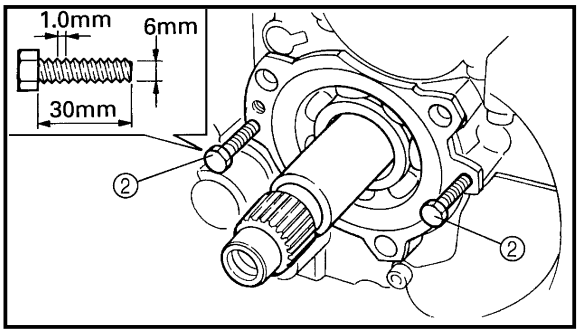
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Order	Job/Part	Q'ty	Remarks
⑪	4th wheel gear	1	
⑫	6th wheel gear	1	
⑬	2nd wheel gear	1	
⑭	Spacer	1	
⑮	Drive axle	1	
⑯	Bearing	1	
⑰	Spacer	1	
			For installation, reverse the removal procedure.

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EB413100
REMOVING THE TRANSMISSION

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

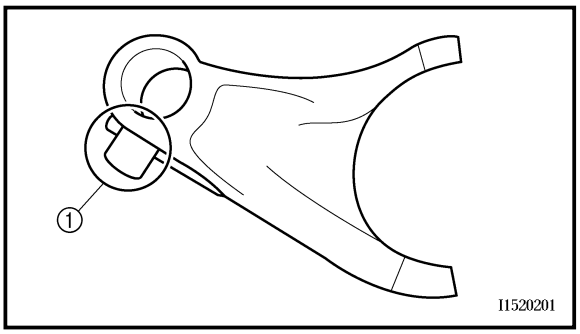
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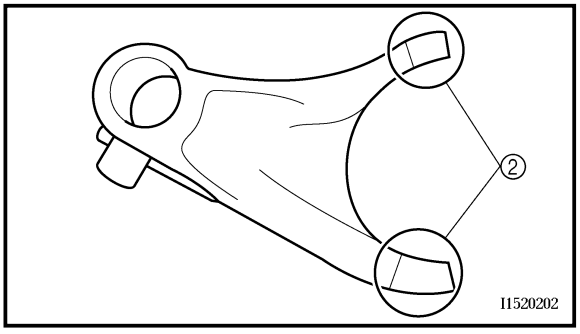
a. Insert two bolts ② of the proper size, as shown in the illustration, into the main axle assembly bearing housing.

b. Tighten the bolts until they contact the crankcase surface.

c. Continue tightening the bolts until the main axle assembly comes free from the upper crankcase.

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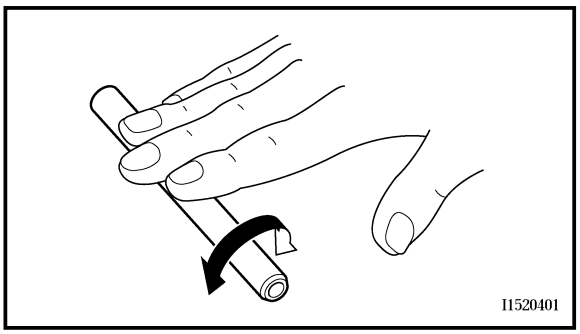




EB413400
CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

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

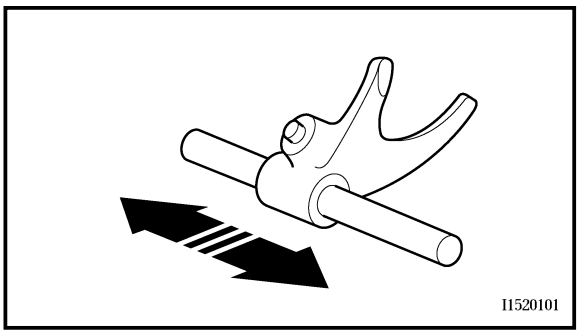


2. Check:
   • shift fork guide bar
   Roll the shift fork guide bar on a flat surface.
   Bends → Replace.

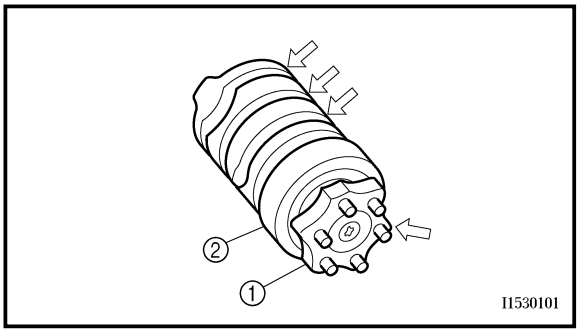
⚠ WARNING

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

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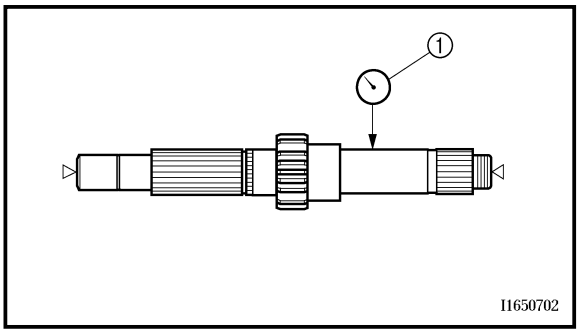


3. Check:
   • shift fork movement
   (along the shift fork guide bar)
   Rough movement → Replace the shift fork(-s) and shift fork guide bar as a set.



EB413410
CHECKING THE SHIFT DRUM ASSEMBLY

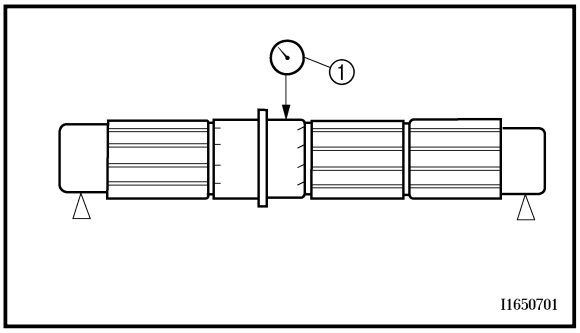
1. Check:
   • shift drum grooves
   Damage/scratches/wear → Replace the shift drum assembly.
   • shift drum segment ①
   Damage/wear → Replace the shift drum assembly.
   • shift drum bearing ②
   Damage/pitting → Replace the shift drum assembly.



EB413422
CHECKING THE TRANSMISSION

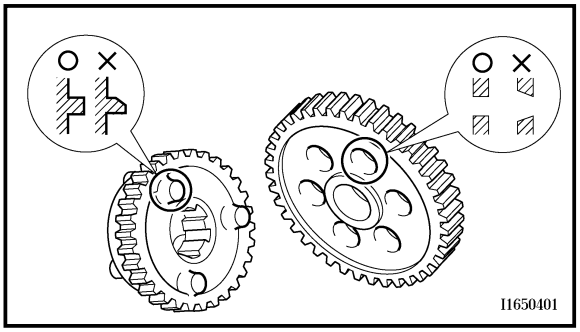
1. Measure:
   • main axle runout
   (with a centering device and dial gauge ①)
   Out of specification → Replace the main axle.

Maximum main axle runout
0.08 mm (0.003 in)



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

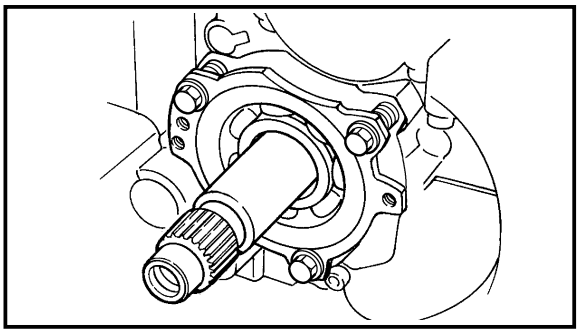
Maximum drive axle runout
0.08 mm (0.003 in)



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

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



INSTALLING THE TRANSMISSION

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

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

2. Check:
   • transmission
   Rough movement → Repair.

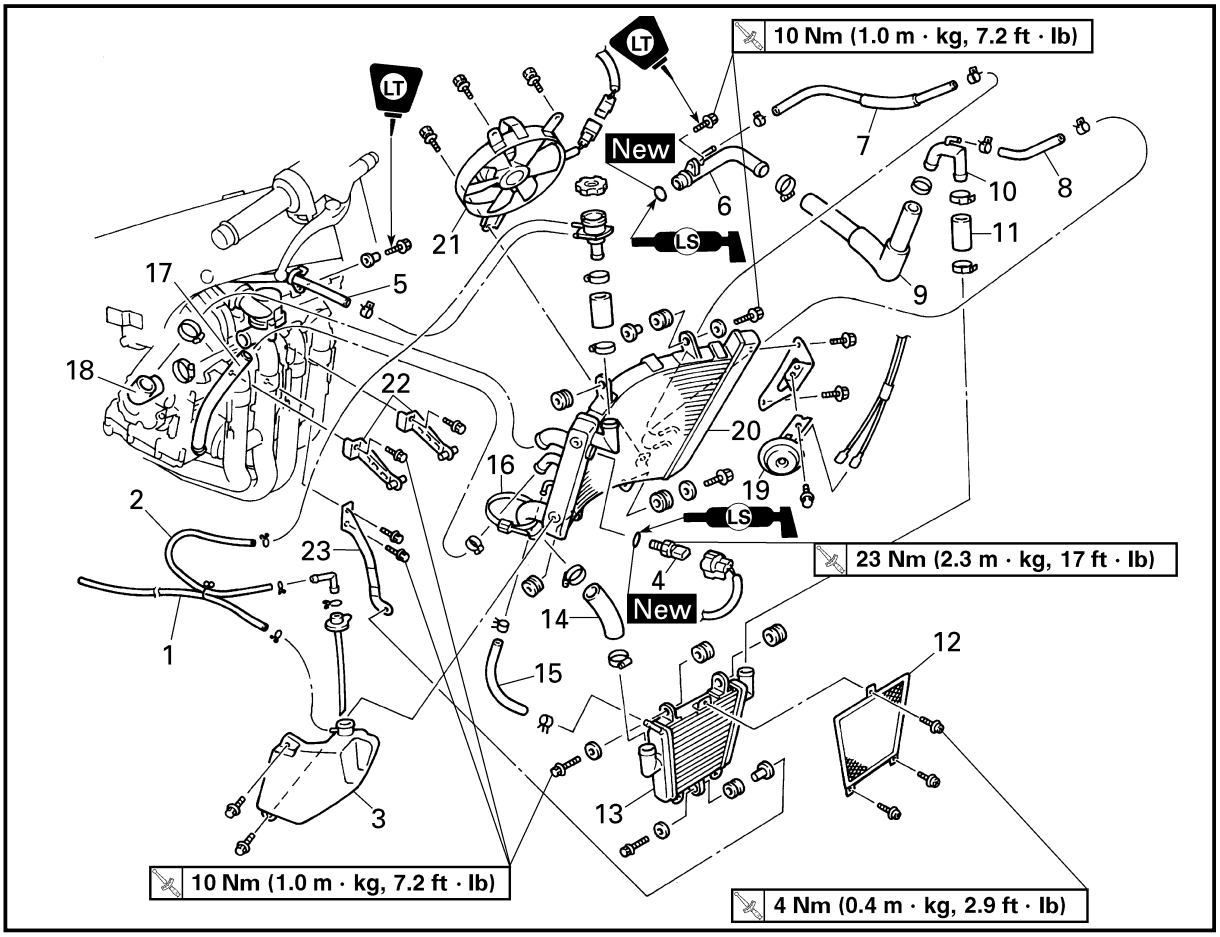
NOTE:
Oil each gear, shaft, and bearing thoroughly.

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EB500000

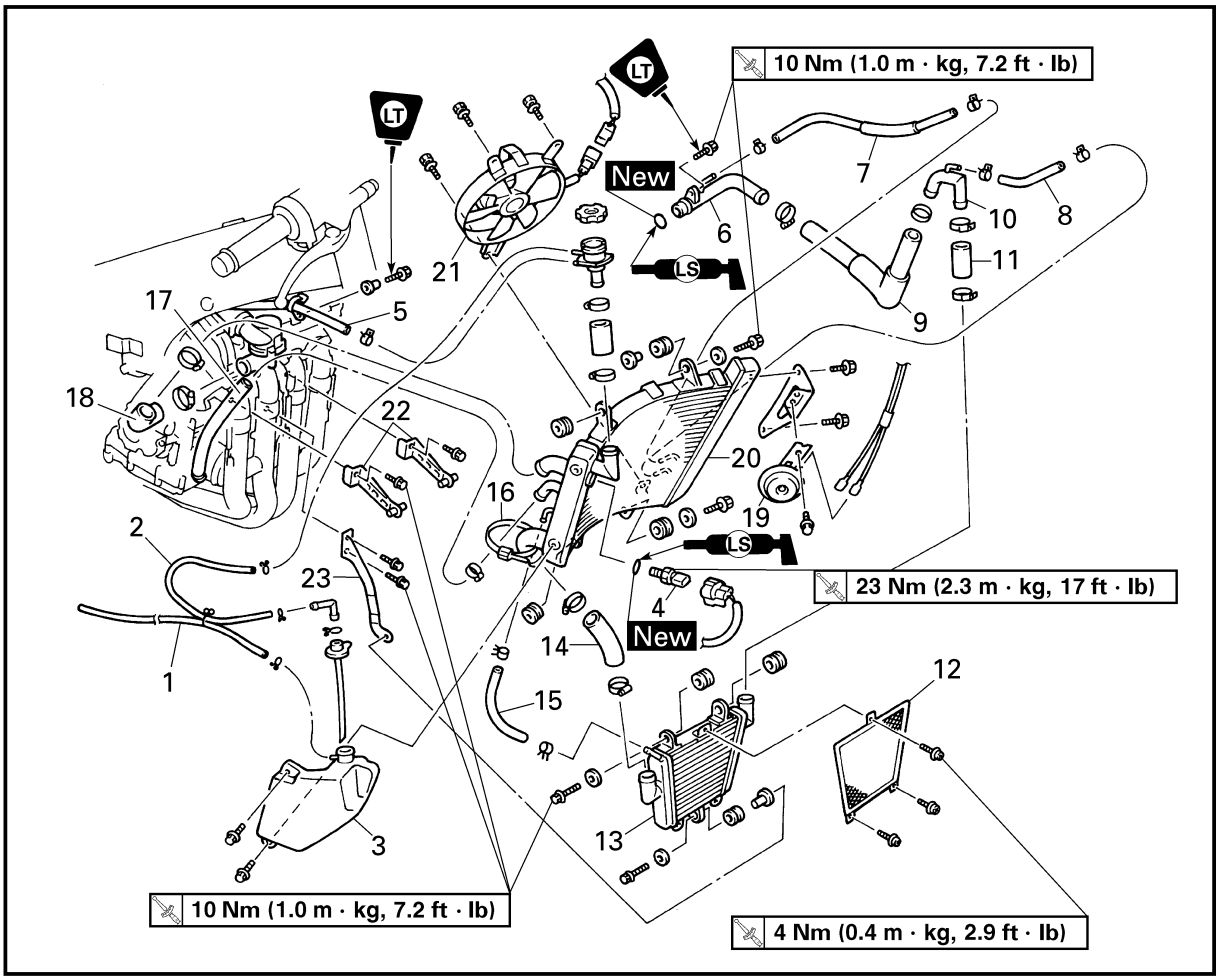
COOLING SYSTEM

RADIATOR AND THERMOSTAT



Order	Job/Part	Q'ty	Remarks
	Removing the radiator		Remove the parts in the order listed.
	Bottom cowling and front cowling		Refer to "COWLINGS" in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Coolant reservoir breather hose	1	
2	Coolant reservoir hose	1	
3	Coolant reservoir	1	
4	Thermo switch	1	
5	Thermostat assembly breather hose	1	Disconnect.
6	Water pump inlet pipe	1	
7	Water pump breather hose	1	
8	Radiator outlet pipe breather hose	1	
9	Water pump inlet hose	1	
10	Radiator outlet pipe	1	

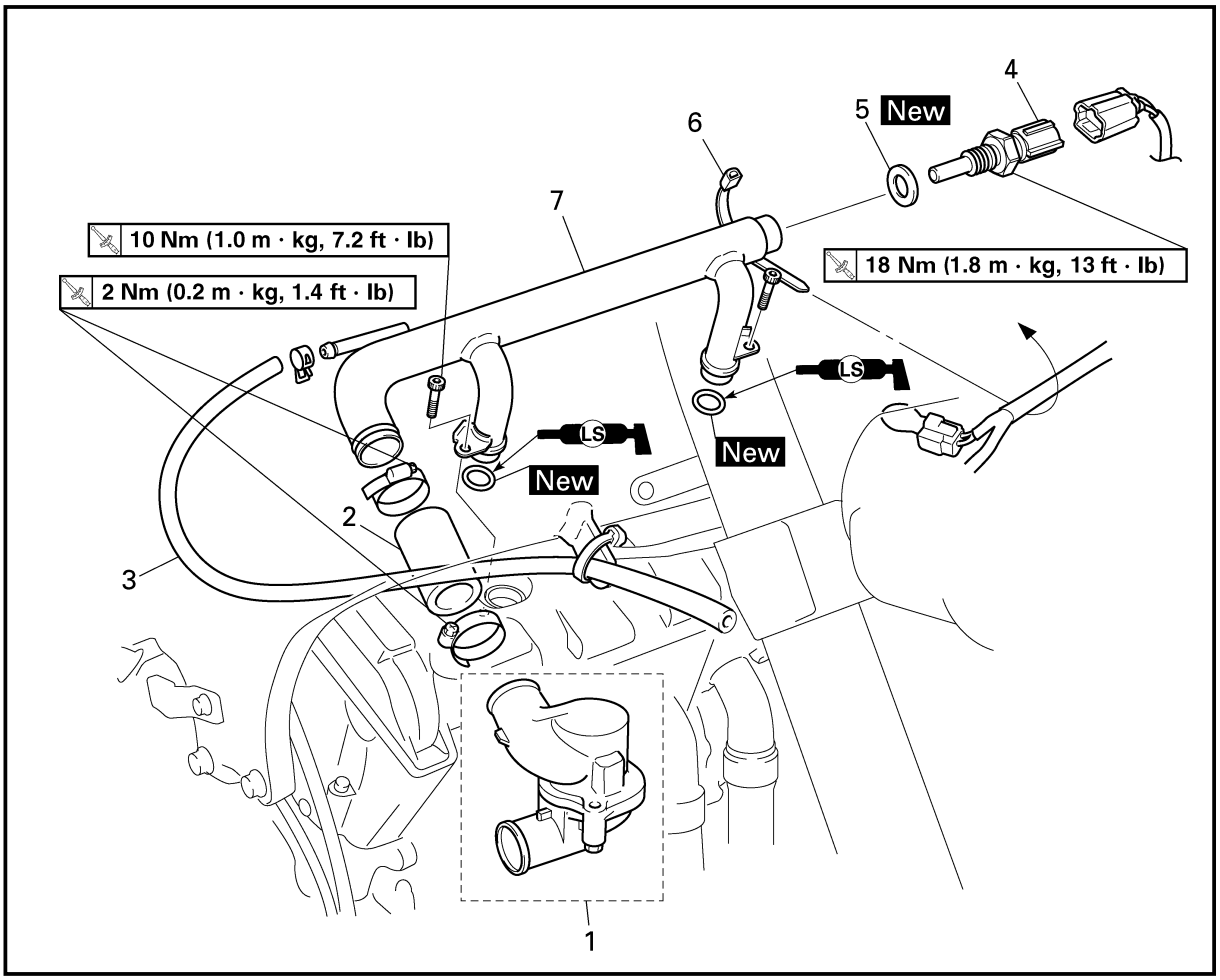
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Order	Job/Part	Q'ty	Remarks
11	Radiator outlet hose	1	
12	Lower radiator guard	1	
13	Lower radiator	1	
14	Lower radiator breather hose	1	
15	Radiator joint hose	1	
16	Plastic band	1	
17	Oil cooler outlet hose	1	Disconnect.
18	Radiator inlet hose	1	
19	Horn	1	
20	Upper radiator	1	
21	Radiator fan	1	
22	Upper radiator bracket	2	
23	Lower radiator bracket	1	
			For installation, reverse the removal procedure.

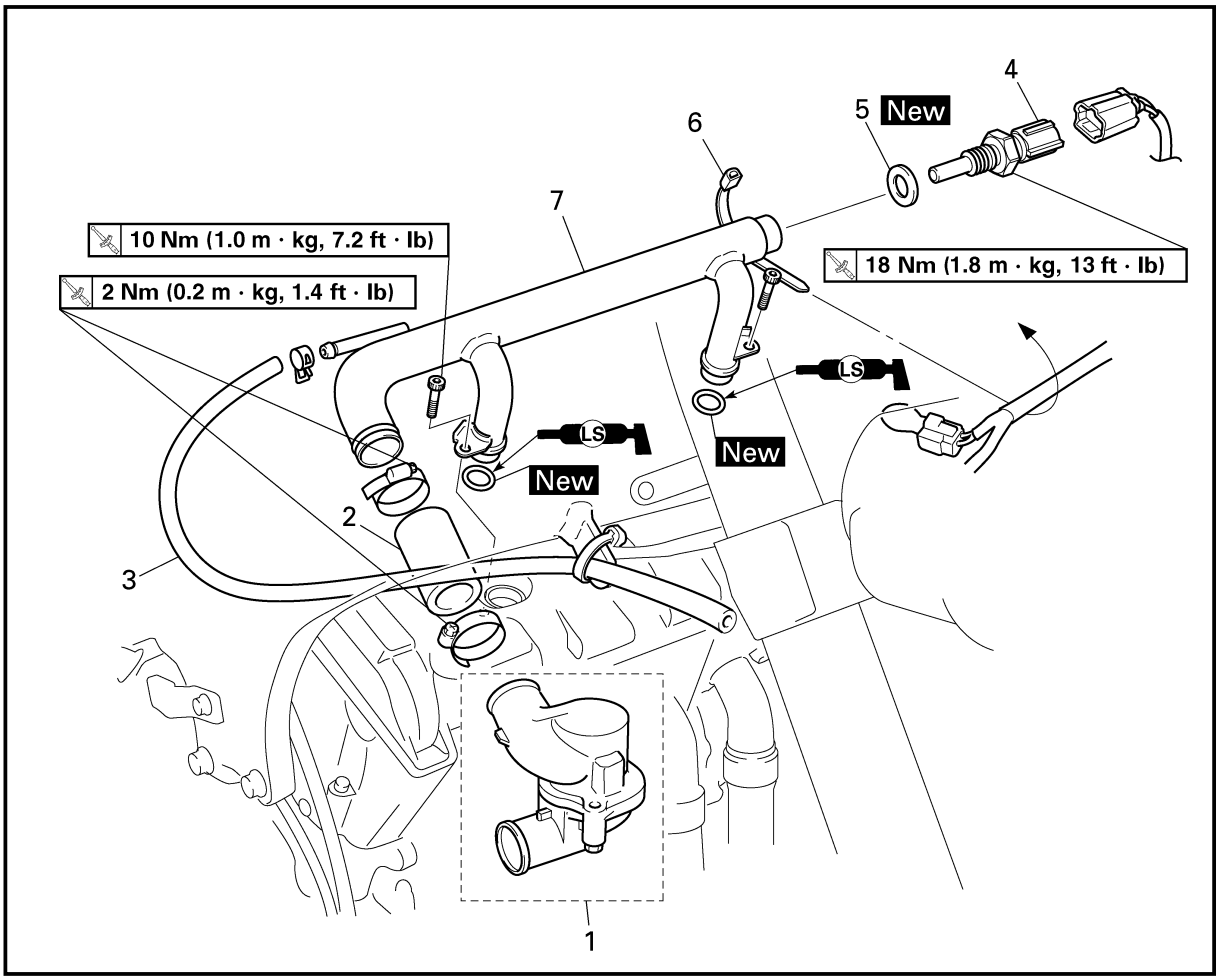
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EB502000
RADIATOR AND THERMOSTAT



Order	Job/Part	Q'ty	Remarks
	Removing the thermostat assembly		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Air filter case and rubber cover		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
	Carburetor assembly		Refer to "CARBURETORS" in chapter 6.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
	Fuel tank and air filter case cover		Refer to "FUEL TANK AND AIR FILTER" in chapter 3.
	Air filter case		Refer to "ELECTRONIC FUEL INJECTION" in chapter 6.
1	Thermostat assembly	1	
2	Thermostat assembly inlet hose	1	

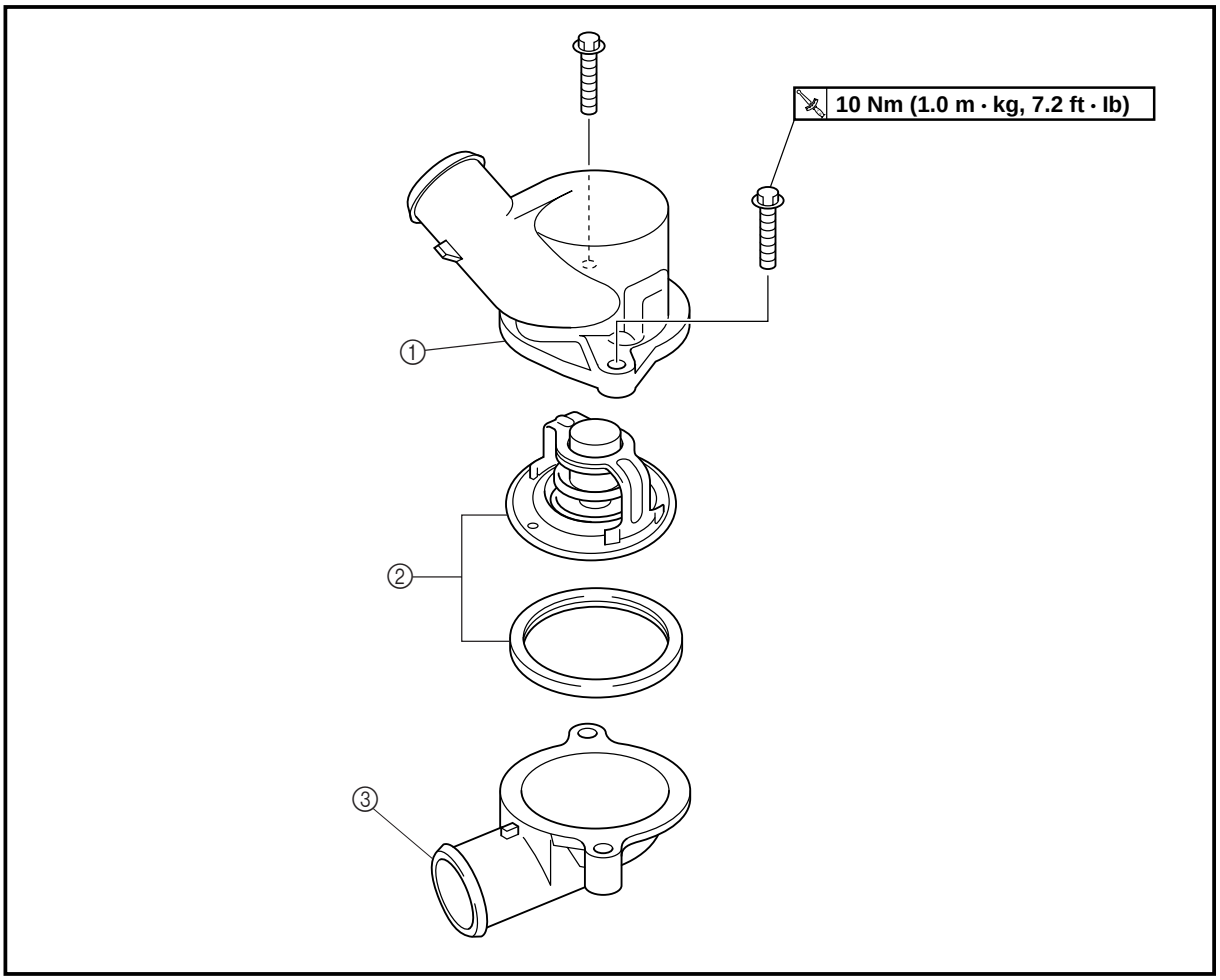
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Order	Job/Part	Q'ty	Remarks
3	Thermostat assembly breather hose	1	
4	Coolant temperature sensor	1	
5	Copper washer	1	
6	Plastic band	1	
7	Thermostat assembly inlet pipe	1	
			For installation, reverse the removal procedure.

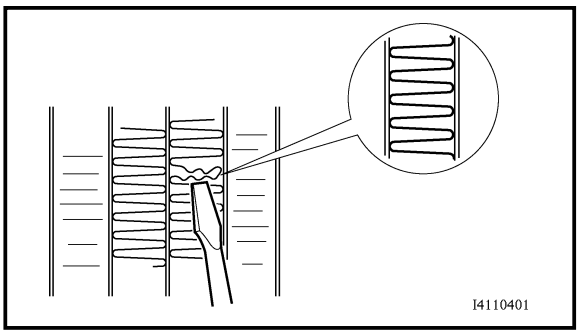
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EB502010



Order	Job/Part	Q'ty	Remarks
	Disassembling the thermostat assembly		Remove the parts in the order listed.
①	Thermostat housing cover	1	
②	Thermostat	1	
③	Thermostat housing	1	
			For assembly, reverse the disassembly procedure.

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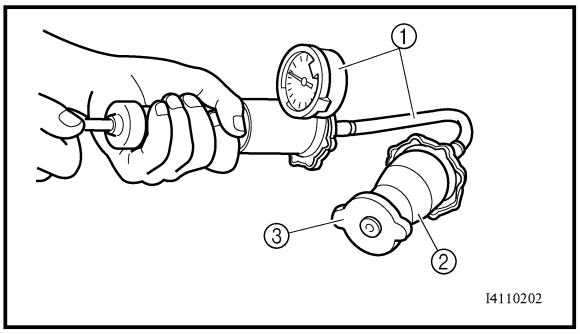


EB500010
CHECKING THE RADIATOR

1. Check:
   • radiator fins
   Obstruction → Clean.
   Apply compressed air to the rear of the radiator.
   Damage → Repair or replace.

NOTE:
Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:
   • radiator hoses
   Cracks/damage → Replace.



3. Measure:
   • radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.



Radiator cap opening pressure
95 ~ 125 kPa
(0.95 ~ 1.25 kg/cm², 3.51 ~ 7.78 psi)

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a. Install the radiator cap tester ① and adapter ② onto the radiator cap ③.



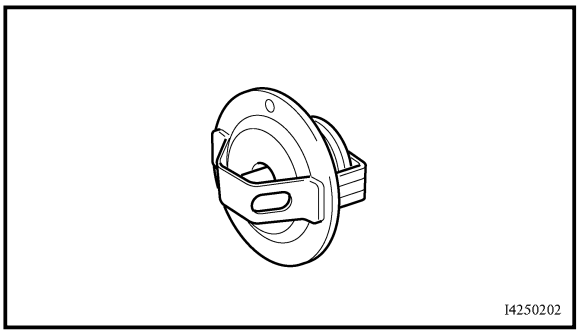
Radiator cap tester
90890-01325
Adapter
90890-01352

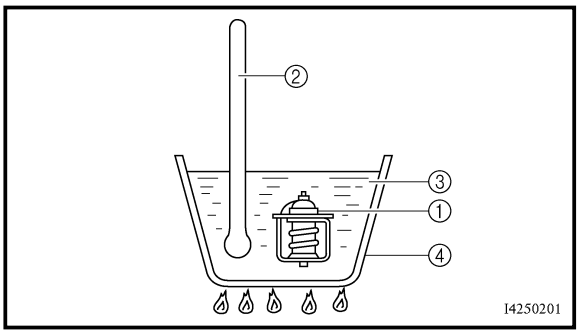
b. Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.

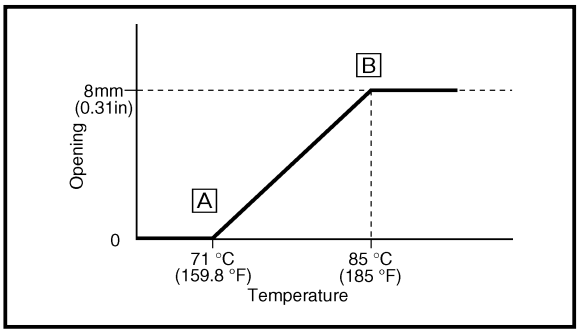
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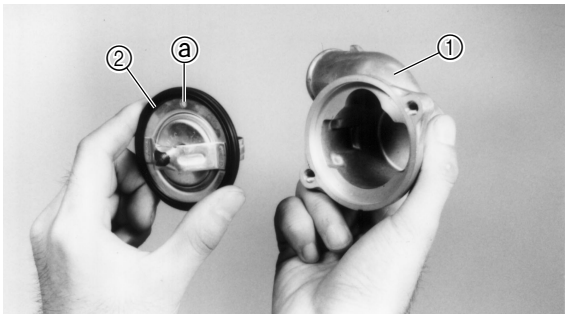
4. Check:
   • radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to “COOLING SYSTEM” in chapter 8.

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EB502020
CHECKING THE THERMOSTAT

1. Check:
   • thermostat ①
   Does not open at 71 ~ 85 °C (159.8 ~ 185 °F) → Replace.

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a. Suspend the thermostat in a container filled with water.

b. Slowly heat the water.

c. Place a thermometer in the water.

d. While stirring the water, observe the thermostat and thermometer's indicated temperature.

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① Thermostat
② Thermometer
③ Water
④ Container
A Fully closed
B Fully open

NOTE:
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:
   • thermostat housing cover
   • thermostat housing
   Cracks/damage → Replace.

EB502030
ASSEMBLING THE THERMOSTAT ASSEMBLY

1. Install:
   • thermostat housing ①
   • thermostat ②
   • thermostat housing cover

NOTE:
Install the thermostat with its breather hole ⓐ facing up.

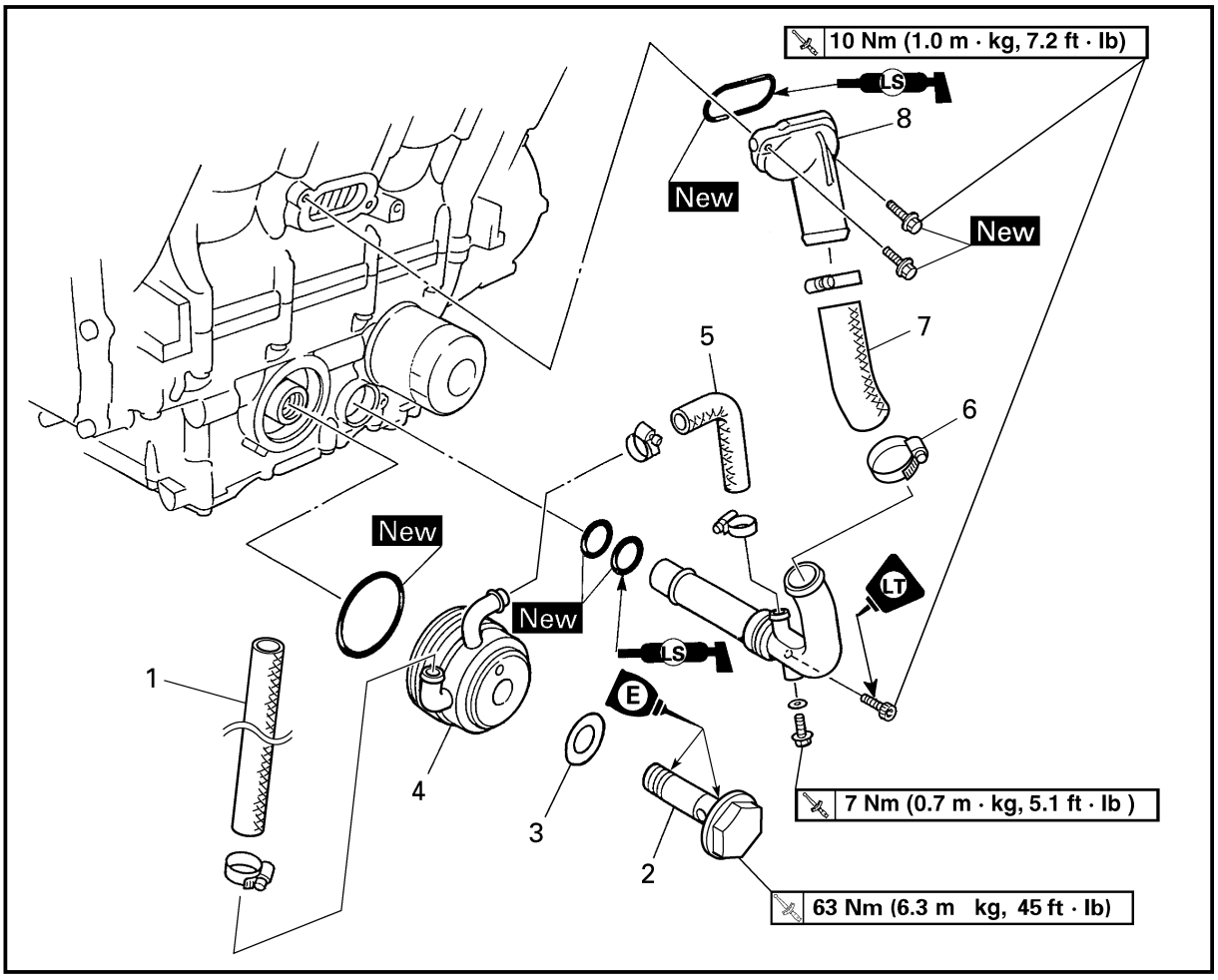
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INSTALLING THE THERMOSTAT ASSEMBLY AND RADIATOR

1. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" in chapter 3.
2. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
3. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to "CHECKING THE RADIATOR".

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EB501000
OIL COOLER



Order	Job/Part	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Radiator assembly		Refer to "RADIATOR AND THERMOSTAT".
	Exhaust pipe assembly		Refer to "ENGINE" in chapter 4.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Oil cooler outlet hose	1	
2	Bolt	1	
3	Gasket	1	
4	Oil cooler	1	
5	Oil cooler inlet hose	1	
6	Water pump outlet pipe	1	
7	Water jacket joint inlet hose	1	
8	Water jacket joint	1	
			For installation, reverse the removal procedure.

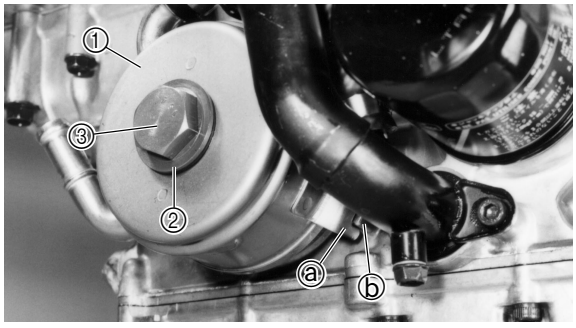
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EB501010
CHECKING THE OIL COOLER

1. Check:
   • oil cooler
   Cracks/damage → Replace.
2. Check:
   • oil cooler inlet hose
   • oil cooler outlet hose
   Cracks/damage/wear → Replace.
3. Check:
   • water jacket joint
   • water jacket joint inlet hose
   • water pump outlet hose
   Cracks/damage → Replace.

EB501020
INSTALLING THE OIL COOLER

1. Clean:
   • mating surfaces of the oil cooler and the crankcase
   (with a cloth dampened with lacquer thinner)



2. Install:
   • O-ring New
   • oil cooler ①
   • gasket ② New
   • bolt ③ 63 Nm (6.3 m · kg, 45 ft · lb)

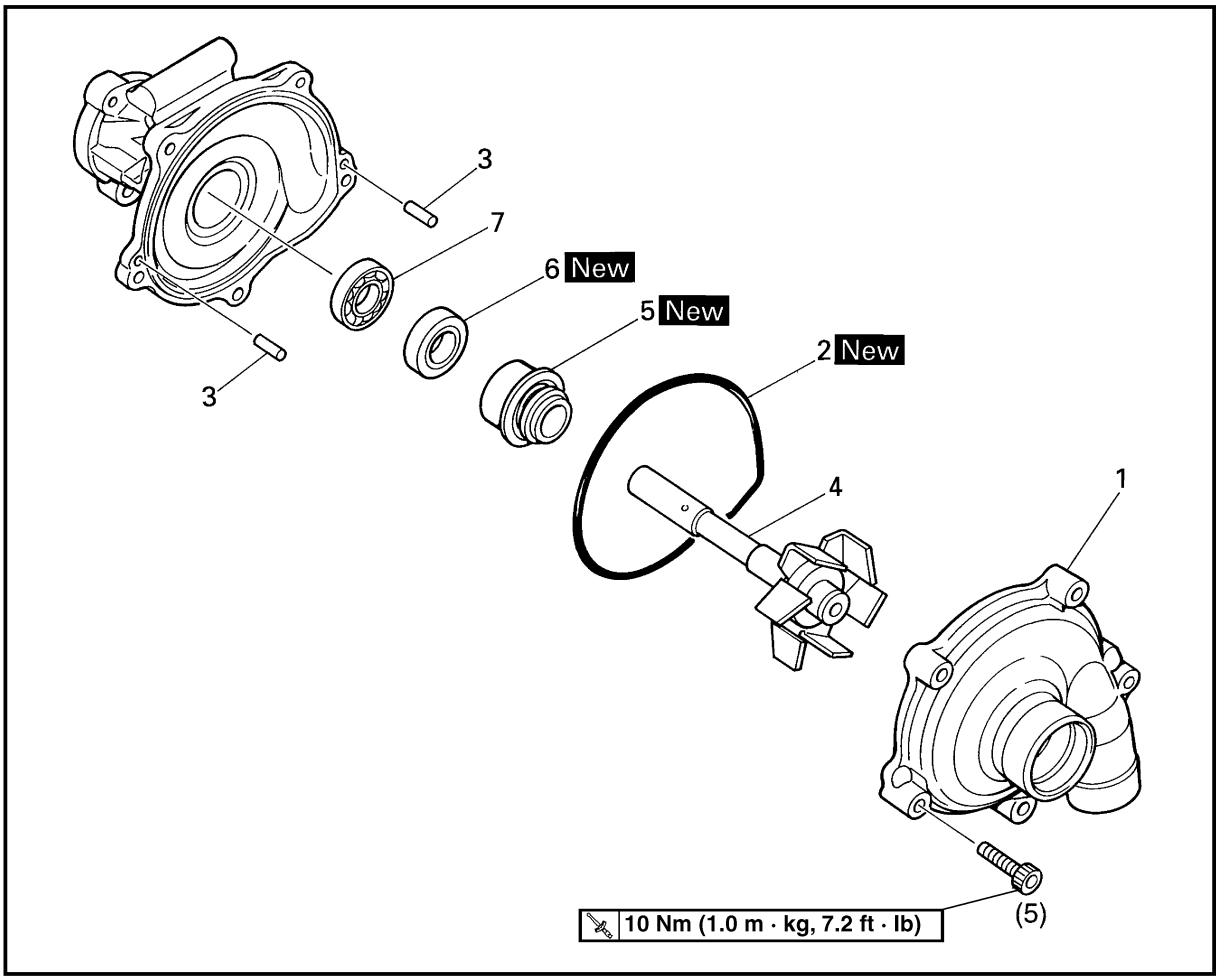
NOTE:
- Before installing the oil cooler, lubricate the oil cooler bolt and O-ring with a thin coat of engine oil.
- Make sure that the O-ring is positioned properly.
- Align the projection ⓐ on the oil cooler with the projection ⓑ in the crankcase.

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3. Fill:
   - cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" in chapter 3.
   - crankcase
     (with the specified amount of the recommended engine oil)
     Refer to "CHANGING THE ENGINE OIL" in chapter 3.
4. Check:
   - cooling system
     Leaks → Repair or replace any faulty part.
5. Measure:
   - radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.
     Refer to "CHECKING THE RADIATOR".

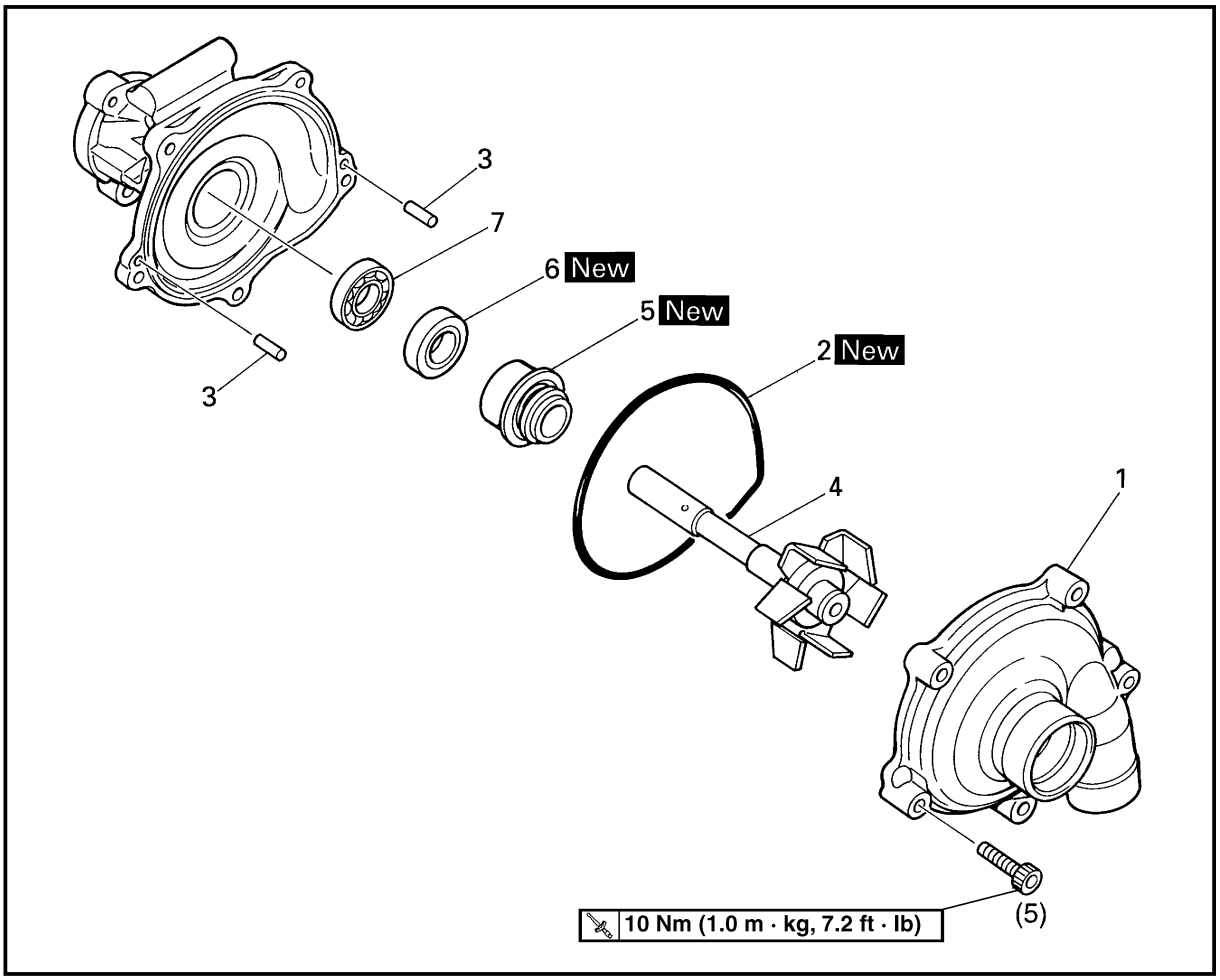
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EB503000
WATER PUMP



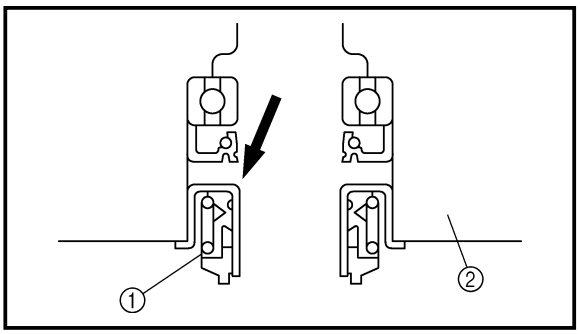
Order	Job/Part	Q'ty	Remarks
	Removing the impeller shaft		Remove the parts in the order listed. **NOTE:** • The water pump and oil pump are combined into one unit (oil/water pump assembly). • It is not necessary to remove the impeller shaft unless the coolant level is extremely low or coolant leaks from the oil pan.
	Oil/water pump assembly and oil pump rotor		Refer to "OIL PAN AND OIL PUMP" in chapter 4.
1	Water pump cover	1	
2	O-ring	1	
3	Pin	2	
4	Impeller shaft (along with the impeller)	1	

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Order	Job/Part	Q'ty	Remarks
5	Water pump seal	1	
6	Oil seal	1	
7	Bearing	1	
			For installation, reverse the removal procedure.

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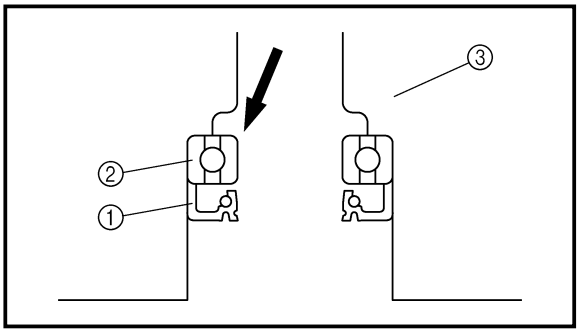


EB503020
DISASSEMBLING THE WATER PUMP

1. Remove:
   • water pump seal ①

NOTE:
Tap out the water pump seal from the inside of the water pump housing.

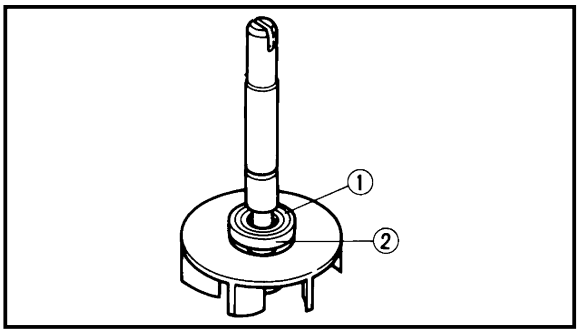
② Water pump housing



2. Remove:
   • oil seal ①
   • bearing ②

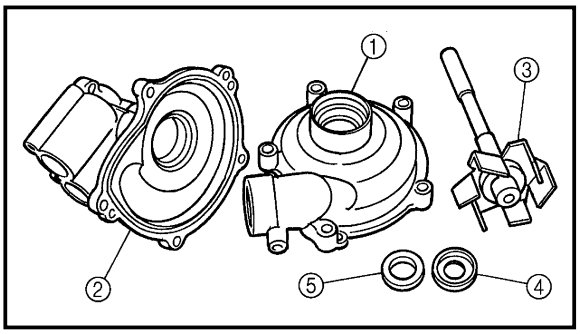
NOTE:
Tap out the bearing and oil seal from the outside of the water pump housing.

③ Water pump housing



3. Remove:
   • rubber damper holder ①
   • rubber damper ②
   (from the impeller, with a thin, flat-head screwdriver)

NOTE:
Do not scratch the impeller shaft.

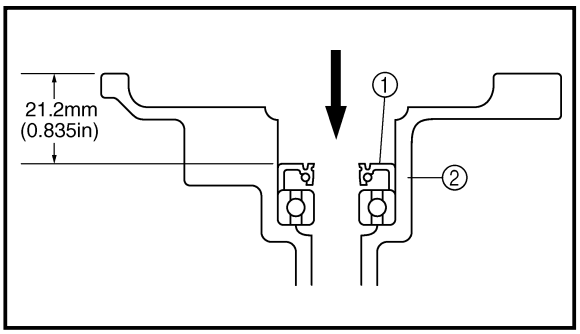


EB503032
CHECKING THE WATER PUMP

1. Check:
   • water pump housing cover ①
   • water pump housing ②
   • impeller ③
   • rubber damper ④
   • rubber damper holder ⑤
   Cracks/damage/wear → Replace.

2. Check:
   • water pump seal
   • oil seal
   • water pump inlet pipe
   Cracks/damage/wear → Replace.
   • bearing
   Rough movement → Replace.

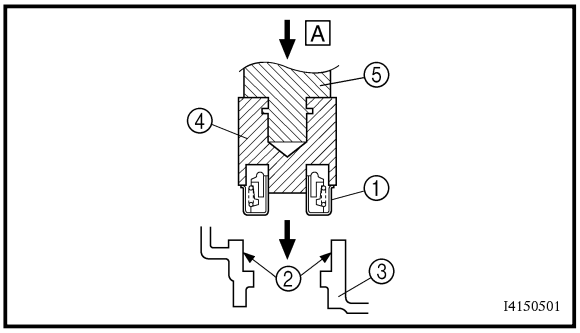
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EB503040
ASSEMBLING THE WATER PUMP

1. Install:
   • oil seal ① New
   (into the water pump housing ②)

NOTE:
- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket that matches its outside diameter.



2. Install:
   • water pump seal ① New

CAUTION:

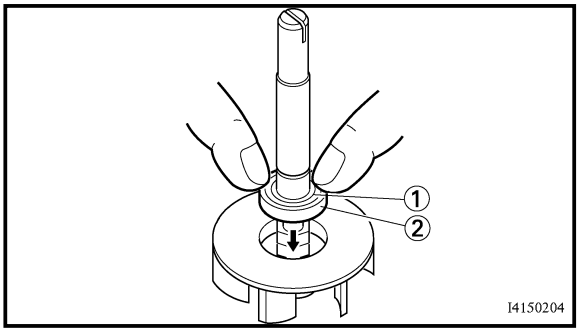
Never lubricate the water pump seal surface with oil or grease.

NOTE:
- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 ② to the water pump housing ③.



Mechanical seal installer ④
90890-04078
Middle driven shaft bearing driver ⑤
90890-04058
Yamaha bond No. 1215
90890-85505

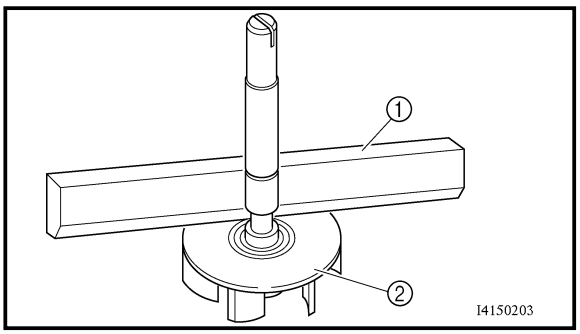
A Push down.



3. Install:
   • rubber damper ① New
   • rubber damper holder ② New

NOTE:
Before installing the rubber damper, apply tap water or coolant onto its outer surface.

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4. Measure:
   • impeller shaft tilt
   Out of specification → Repeat steps (3) and (4).

CAUTION:

Make sure that the rubber damper and rubber damper holder are flush with the impeller.

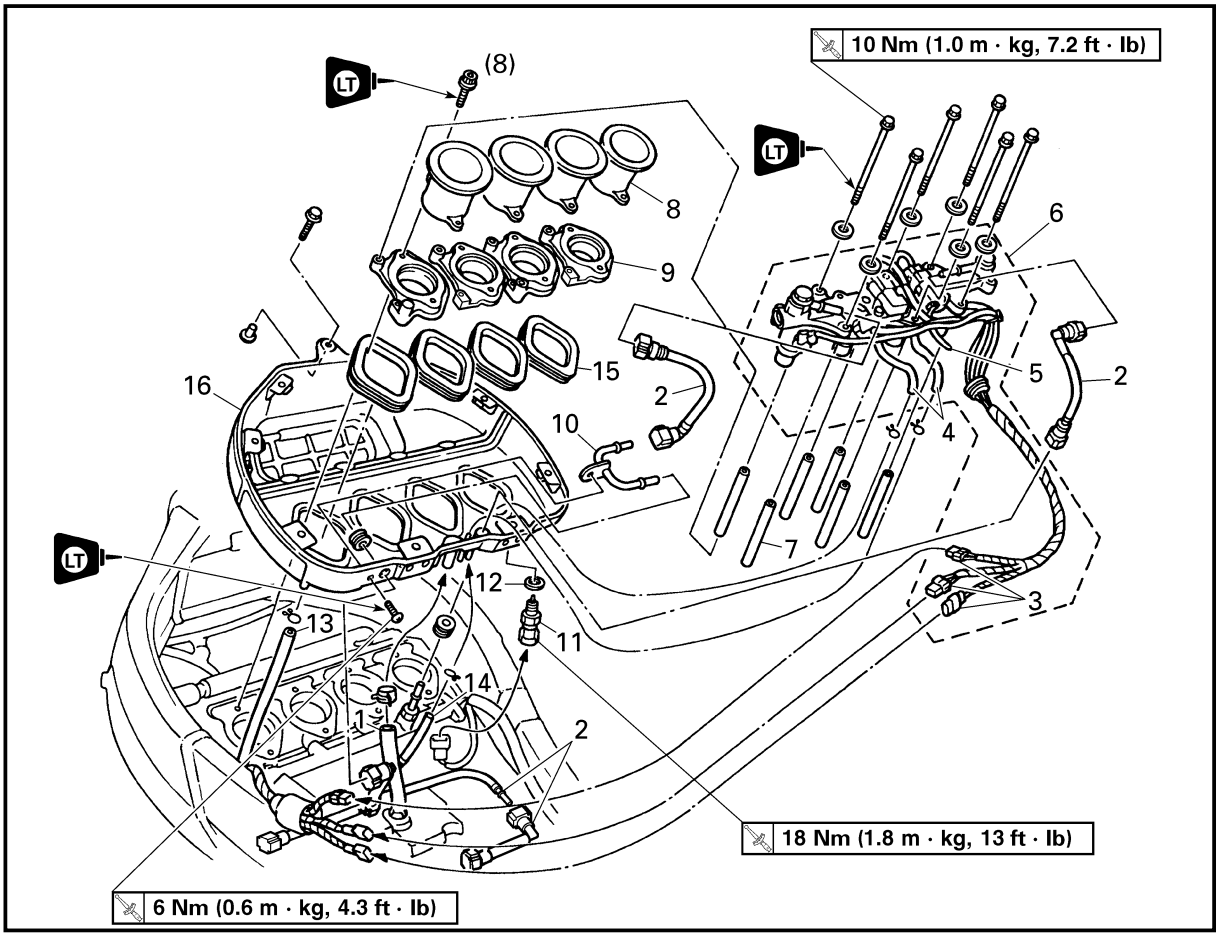
Max. impeller shaft tilt
0.15 mm (0.006 in)

① Straightedge
② Impeller

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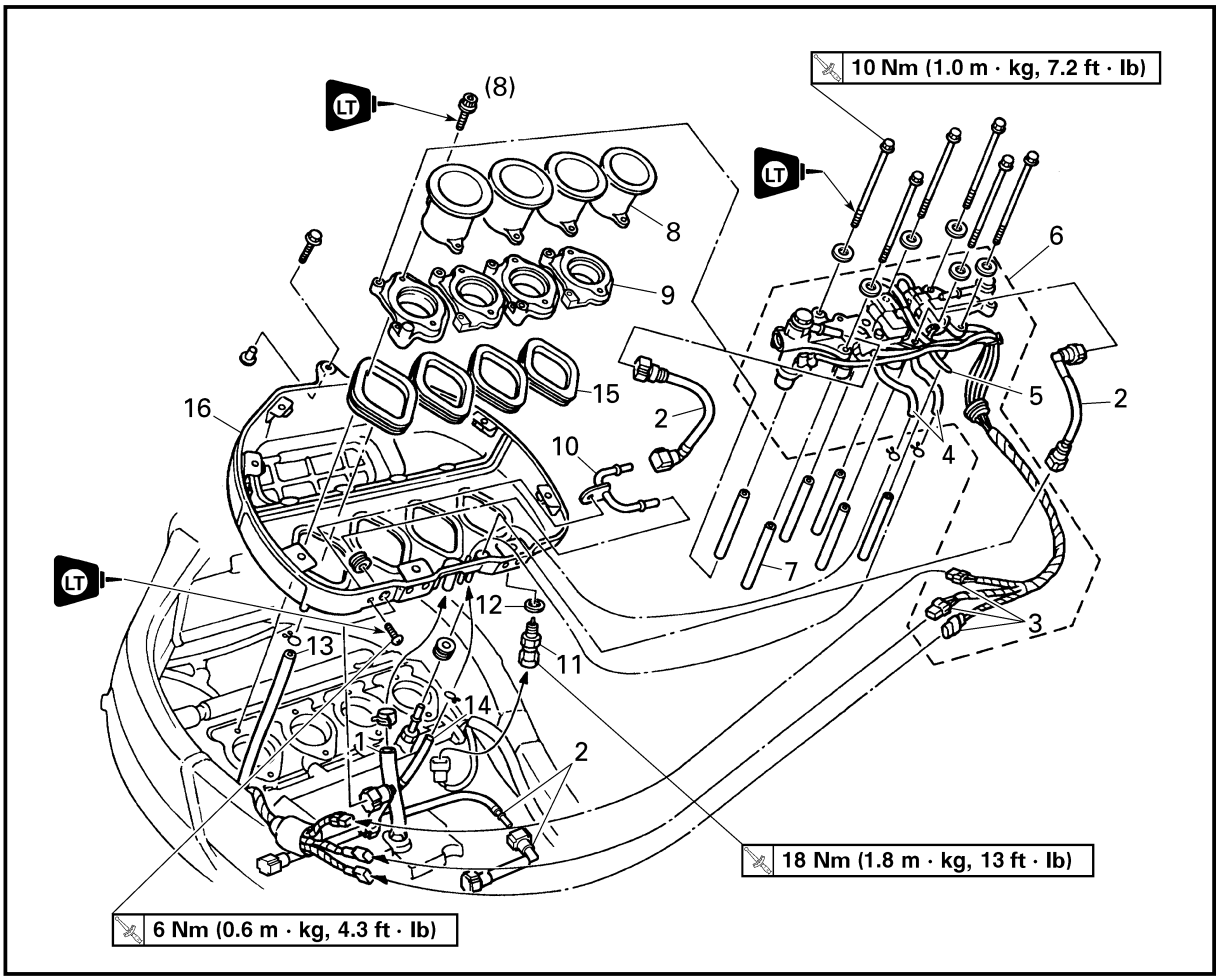
ELECTRONIC FUEL INJECTION

ELECTRONIC FUEL INJECTION



Order	Job/Part	Q'ty	Remarks
	Removing the injector 2 assembly and air filter case		Remove the parts in the order listed.
	Air filter case cover		Refer to "FUEL TANK AND AIR FILTER" in chapter 3.
1	Crankcase breather hose	1	Disconnect.
2	Fuel hose	3	
3	Injector 2 sub-lead coupler	3	Disconnect.
4	Pressure sensor hose	2	Disconnect.
5	Plastic band	1	
6	Injector 2 assembly	1	
7	Spacer	6	
8	Air funnel	4	
9	Air funnel bracket	4	
10	Fuel hose joint pipe	1	

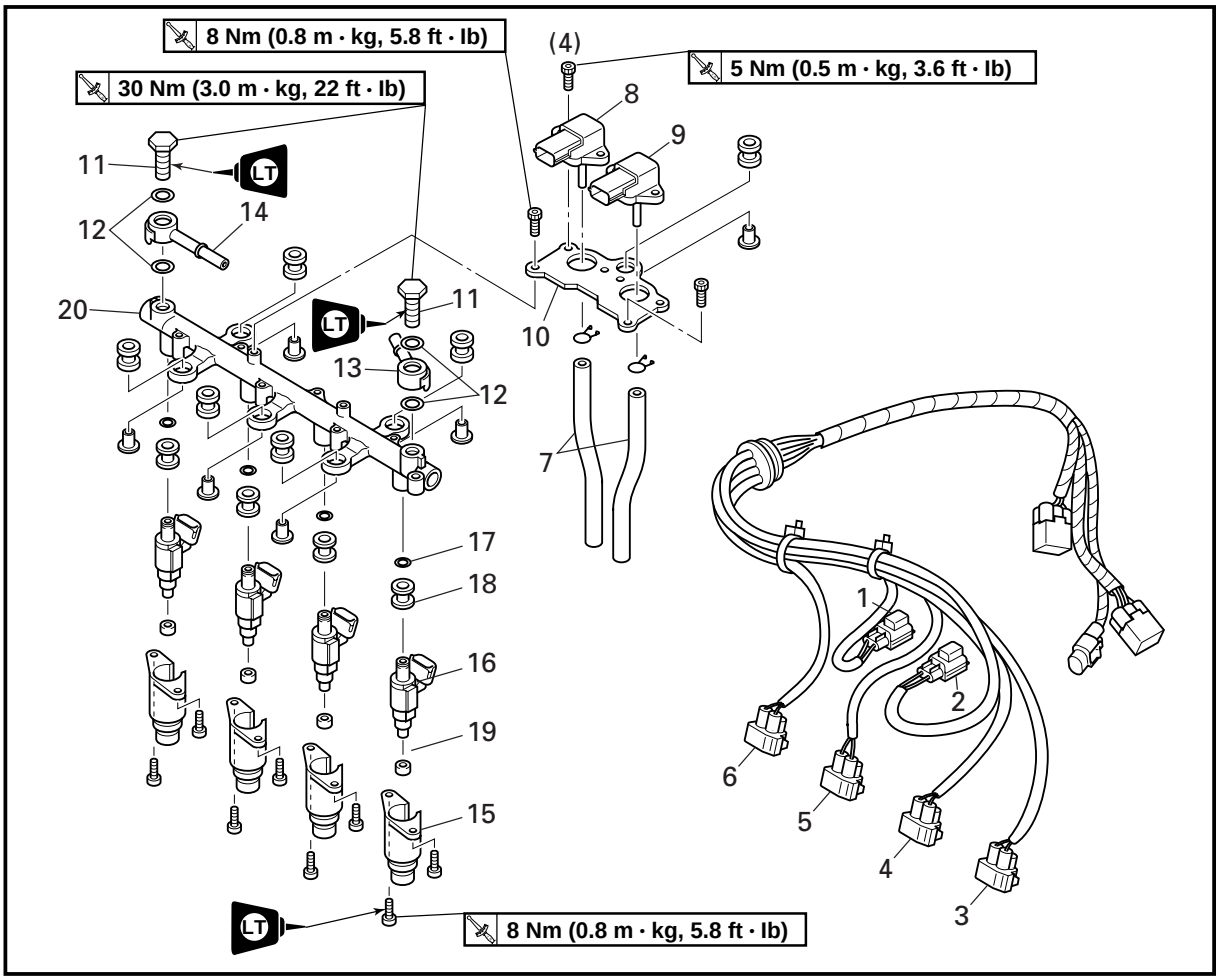
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Order	Job/Part	Q'ty	Remarks
11	Intake air temperature sensor	1	
12	Copper washer	1	
13	Air filter case breather hose	1	Disconnect.
14	Negative pressure hose	1	Disconnect.
15	Air funnel rubber seat	4	
16	Air filter case	1	
			For installation, reverse the removal procedure.

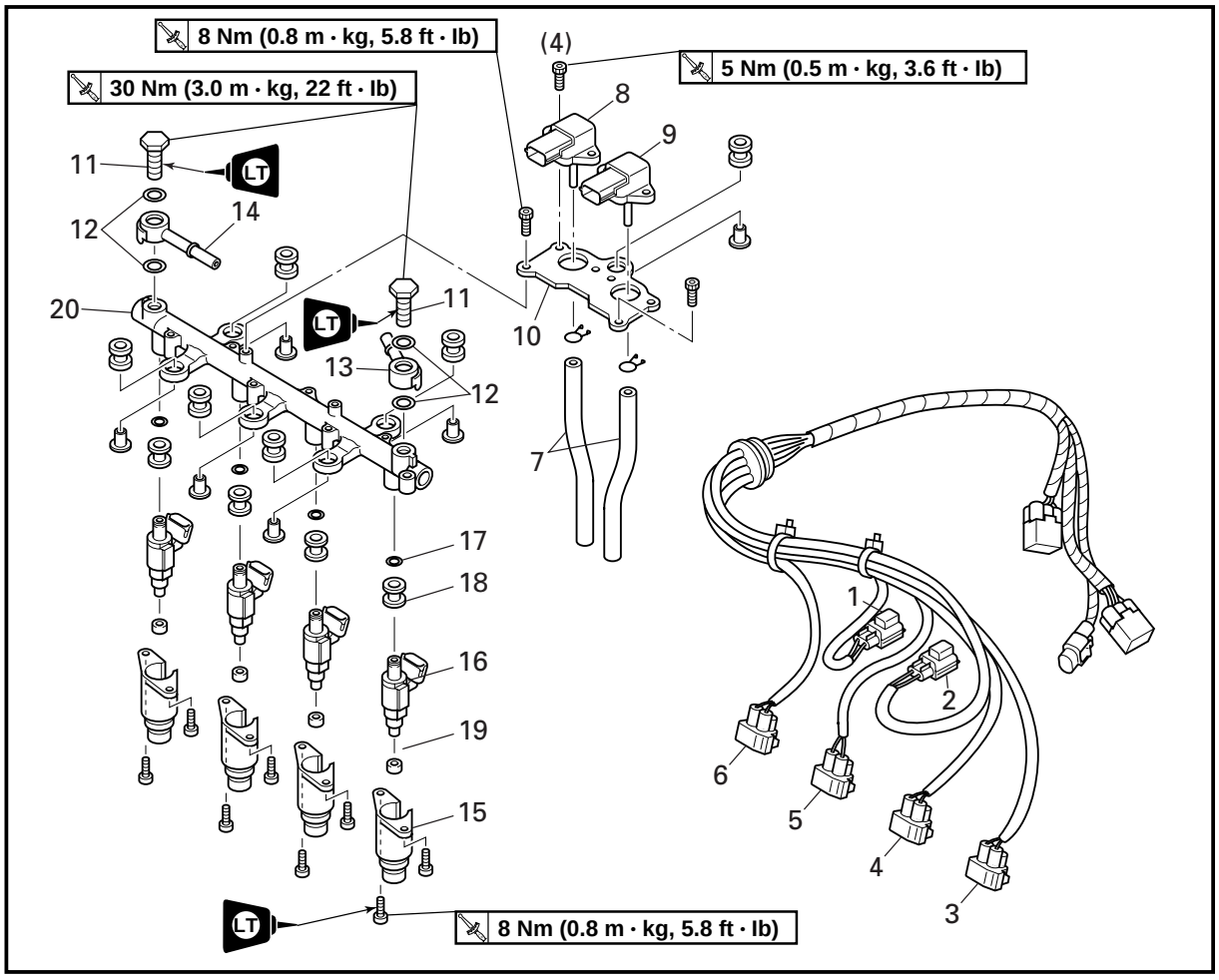
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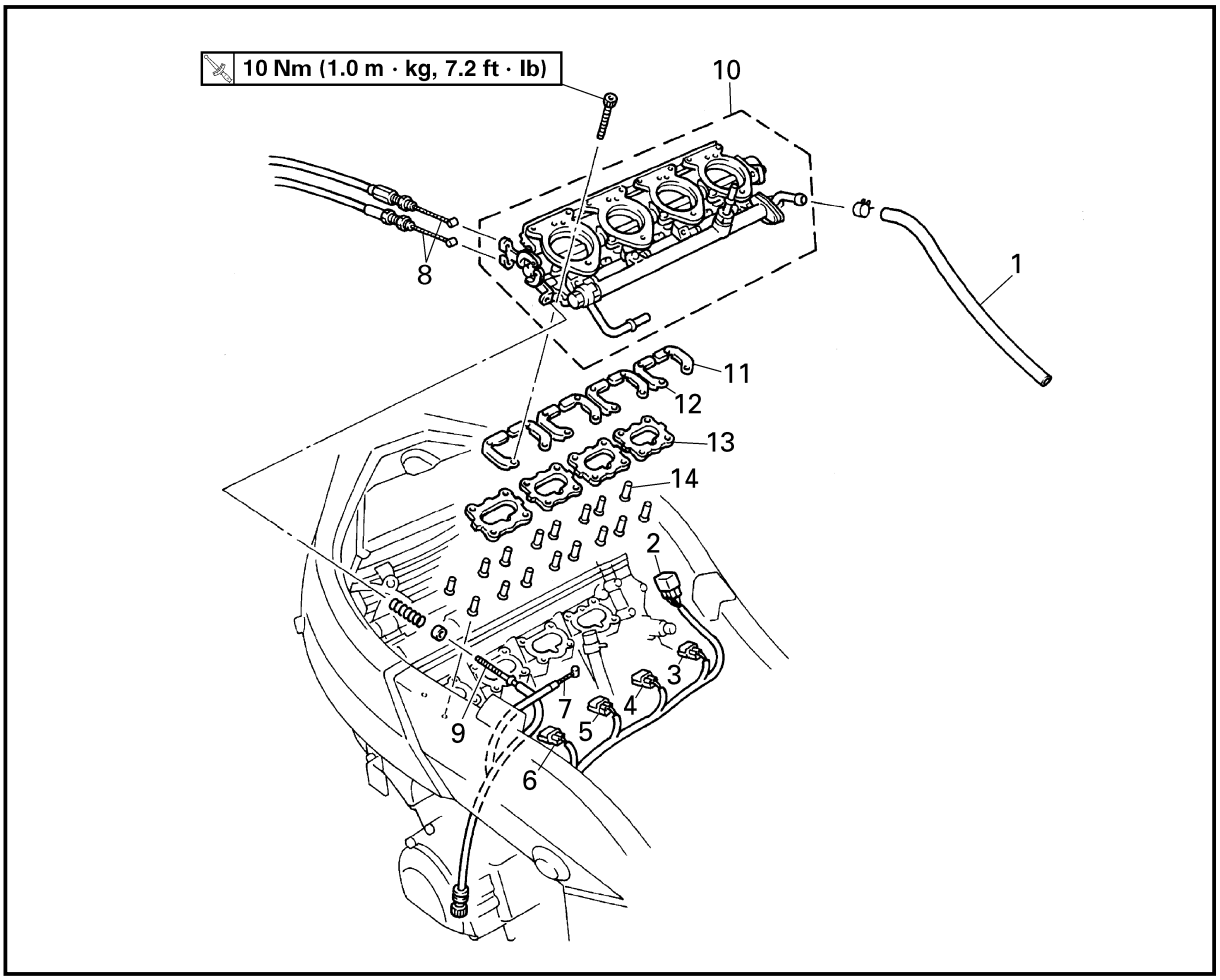
Order	Job/Part	Q'ty	Remarks
	Removing the injector 2		Remove the parts in the order listed.
1	Intake air pressure sensor coupler	1	
2	Atmospheric pressure sensor coupler	1	
3	Cylinder #1 – injector 2 coupler	1	
4	Cylinder #2 – injector 2 coupler	1	
5	Cylinder #3 – injector 2 coupler	1	
6	Cylinder #4 – injector 2 coupler	1	
7	Pressure sensor hose	2	
8	Intake air pressure sensor	1	
9	Atmospheric pressure sensor	1	
10	Pressure sensor bracket	1	
11	Union bolt	2	
12	Washer	4	

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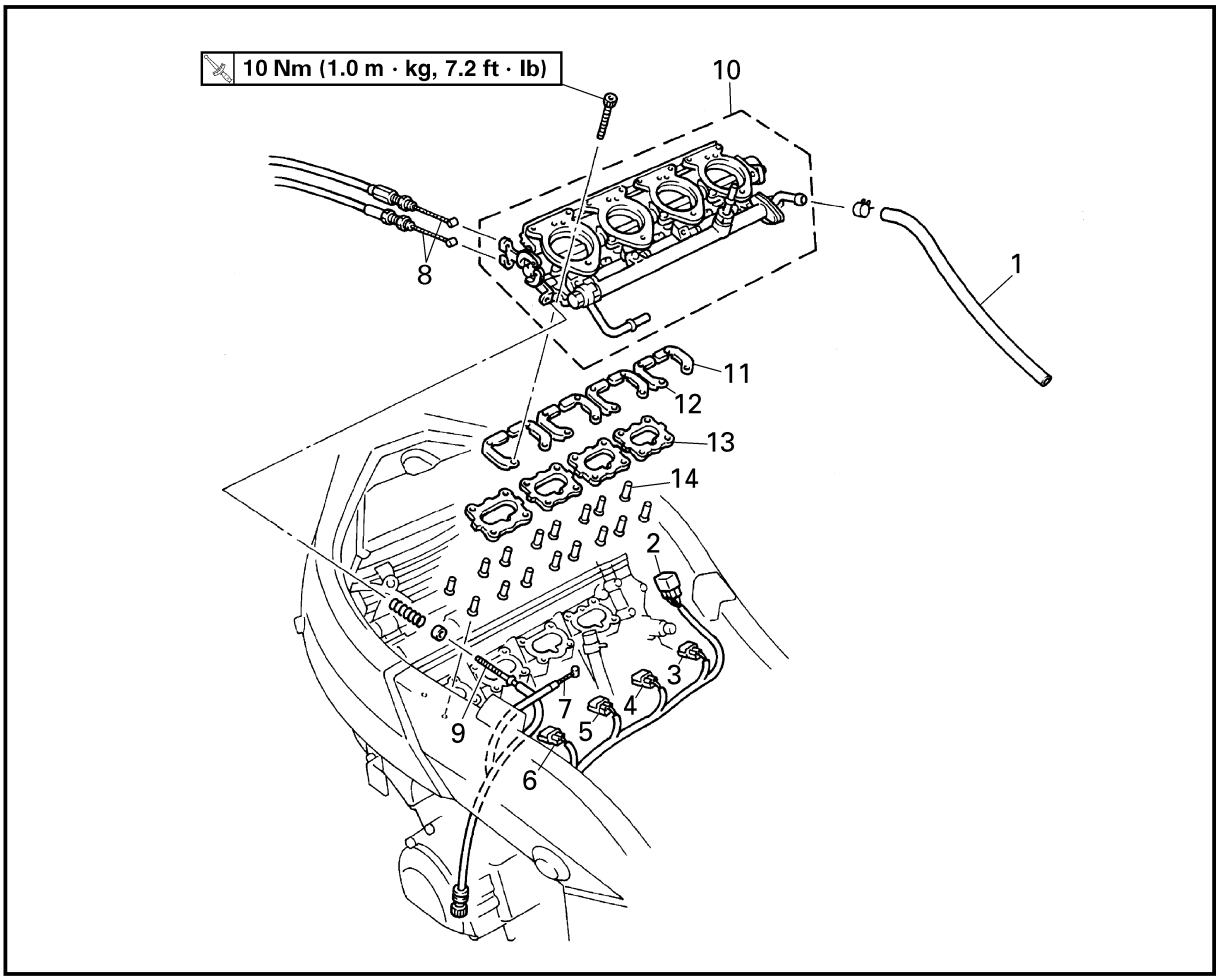
Order	Job/Part	Q'ty	Remarks
13	Injector fuel pipe 3	1	
14	Injector fuel pipe 4	1	
15	Injector 2 cover	8	
16	Injector 2	4	
17	O-ring	4	
18	Seal	4	
19	Seal	4	
20	Fuel distributor	1	
			For installation, reverse the removal procedure.

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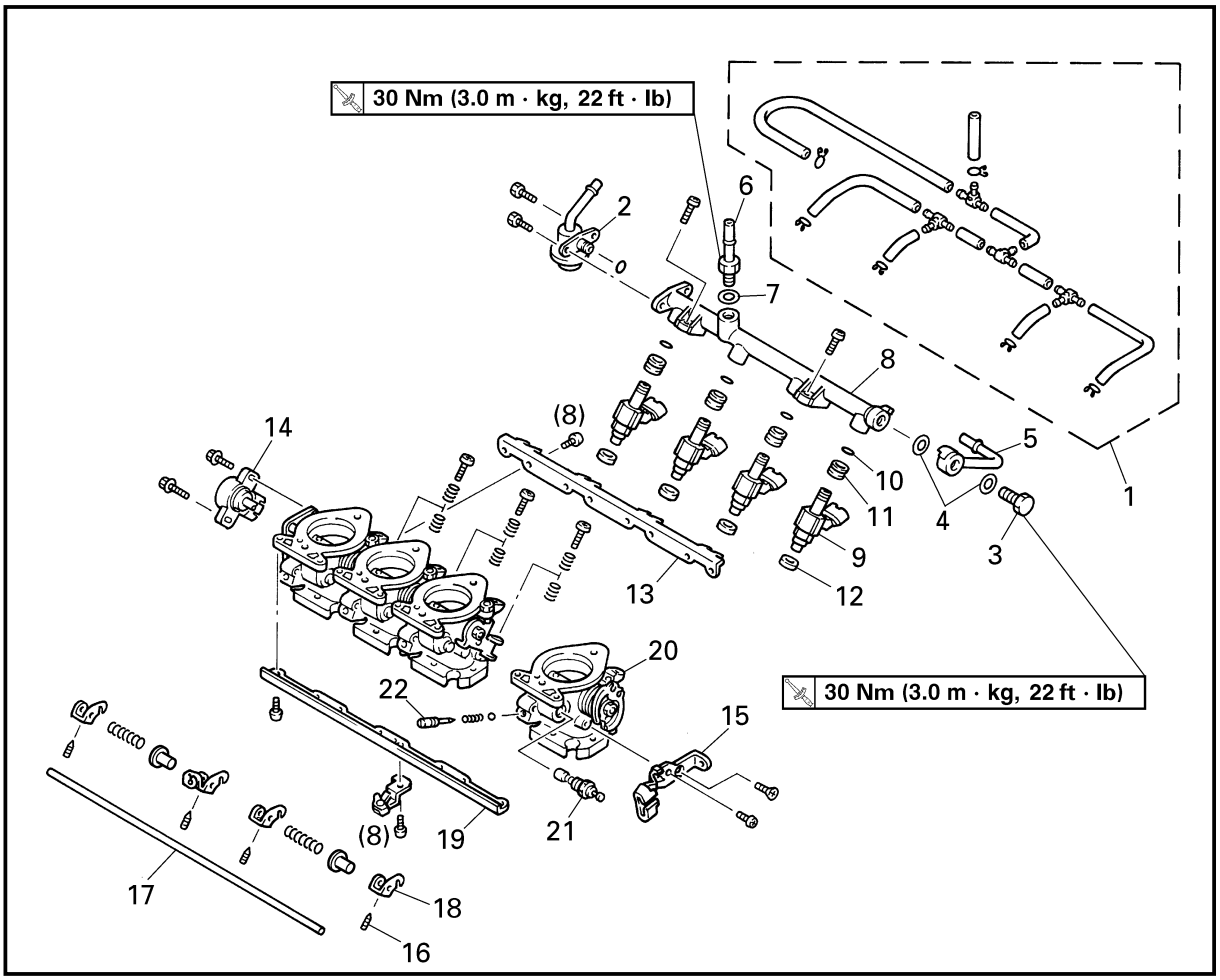
Order	Job/Part	Q'ty	Remarks
	Removing the throttle body assembly		Remove the parts in the order listed.
1	Fuel hose	1	
2	Throttle position sensor coupler	1	
3	Cylinder #4 – injector 1 coupler	1	
4	Cylinder #3 – injector 1 coupler	1	
5	Cylinder #2 – injector 1 coupler	1	
6	Cylinder #1 – injector 1 coupler	1	
7	Starter cable	1	Disconnect.
8	Throttle cable	2	Disconnect.
9	Throttle stop screw	1	Disconnect.
10	Throttle body assembly	1	
11	Left plate	4	
12	Right plate	4	

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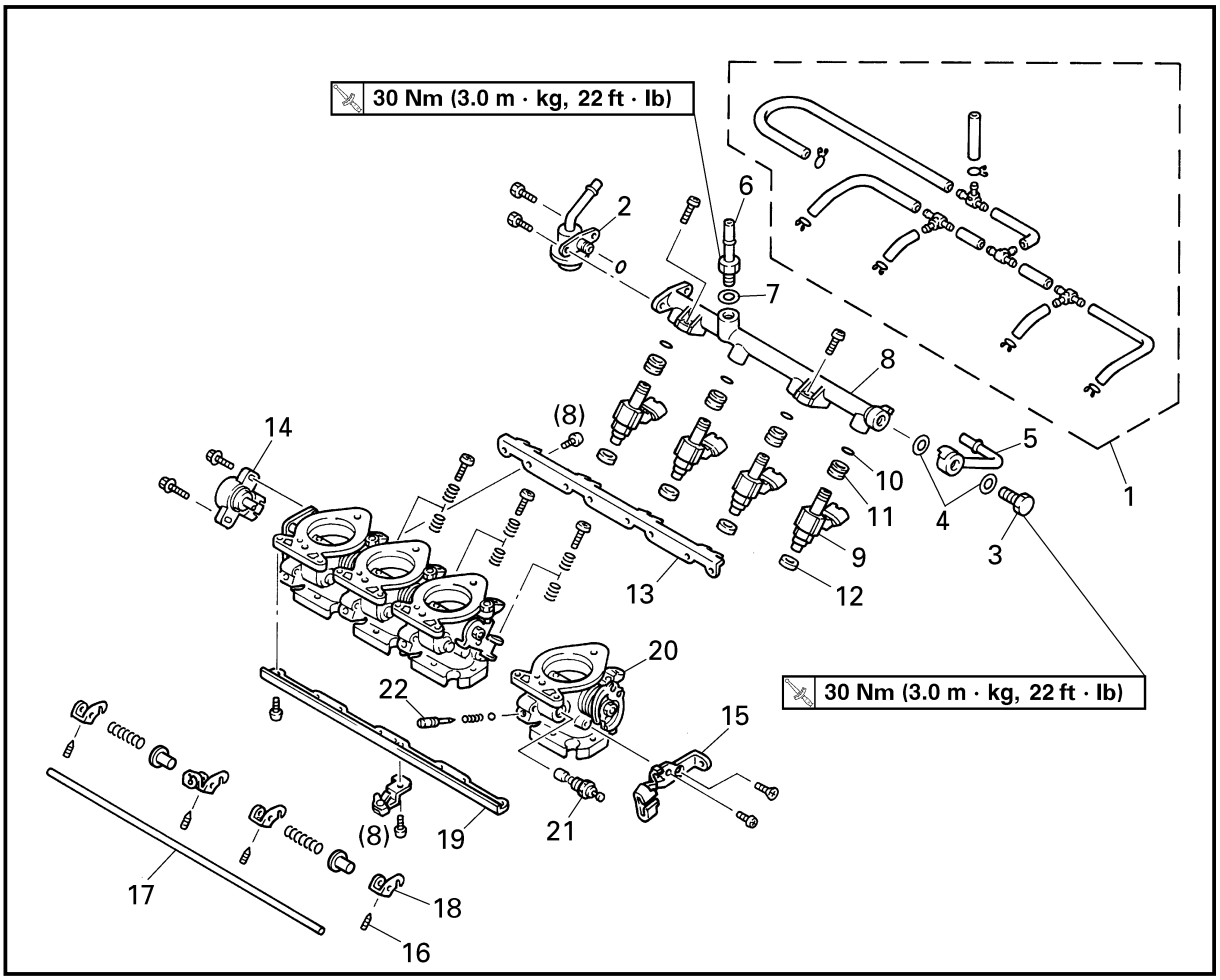
Order	Job/Part	Q'ty	Remarks
13	Gasket	4	
14	Spacer	16	
			For installation, reverse the removal procedure.

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Order	Job/Part	Q'ty	Remarks
	Removing the injector 1 and throttle body		Remove the parts in the order listed.
1	Negative pressure hose	1	
2	Pressure regulator	1	
3	Union bolt	1	
4	Washer	2	
5	Injector fuel pipe 1	1	
6	Injector fuel pipe 2	1	
7	Washer	1	
8	Fuel distributor	1	
9	Injector 1	4	
10	O-ring	4	
11	Seal	4	
12	Seal	4	
13	Rear connecting plate	1	

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Order	Job/Part	Q'ty	Remarks
14	Throttle position sensor	1	
15	Throttle cable holder	1	
16	Starter link lever screw	4	
17	Starter link	1	
18	Starter link lever	4	
19	Front connecting plate	1	
20	Throttle body	4	
21	Starter plunger	4	
22	Air screw	4	
			For installation, reverse the removal procedure.

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CAUTION:
The throttle bodies should not be disassembled unnecessarily.

CHECKING THE INJECTOR

1. Check:
   - injector 1
   - injector 2
   Damage → Replace.

CHECKING THE THROTTLE BODY

1. Check:
   - throttle body
   Cracks/damage → Replace the throttle body assembly.

2. Check:
   - fuel passages
   Obstruction → Clean.

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a. Wash the throttle body in a petroleum-based solvent.
   Do not use any caustic carburetor cleaning solution.

b. Blow out all of passages with compressed air.

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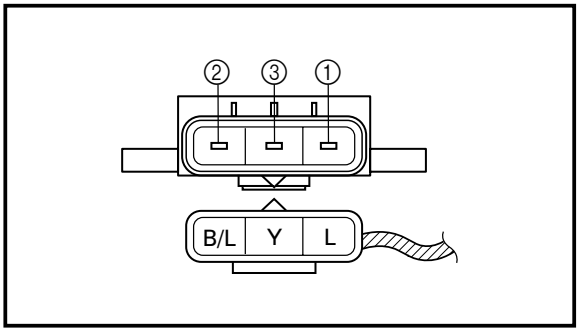
CHECKING THE PRESSURE REGULATOR

1. Check:
   • pressure regulator
   Damage → Replace.

EAS00502
CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

NOTE:
Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

1. Check:
   • throttle position sensor
   (installed on the throttle body)



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a. Disconnect the throttle position sensor coupler from the throttle position sensor.

b. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Positive tester probe →
blue terminal ①
Negative tester probe →
black/blue terminal ②

c. Measure the maximum throttle position sensor resistance.
Out of specification → Replace the throttle position sensor.

Maximum throttle position sensor resistance
4.0 ~ 6.0 kΩ at 20 °C (68 °F)
(blue — black/blue)

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d. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Positive tester probe →
yellow terminal ③
Negative tester probe →
black/blue terminal ②

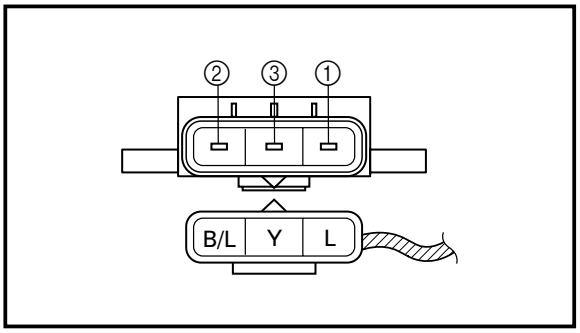
e. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.

NOTE:
Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

Out of specification or the resistance changes abruptly → Go to step 2 below.

Throttle position sensor resistance
(520 ~ 900 Ω) ~ (4.0 ~ 6.0 kΩ)
at 20 °C (68 °F)
(yellow — black/blue)

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2. Check:
• throttle position sensor
(removed from the throttle body)

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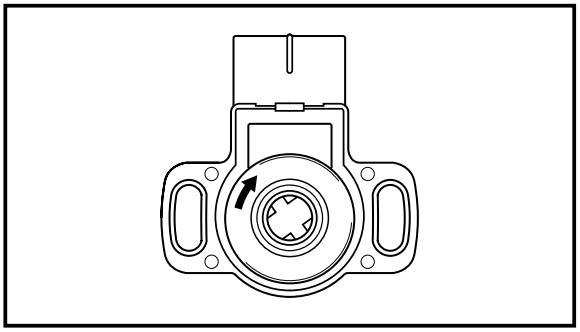
a. Disconnect the throttle position sensor coupler from the throttle position sensor.

b. Remove the throttle position sensor from the throttle body.

c. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Positive tester probe →
blue terminal ①
Negative tester probe →
black/blue terminal ②

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d. Measure the maximum throttle position sensor resistance.
Out of specification → Replace the throttle position sensor.

Maximum throttle position sensor resistance
4.0 ~ 6.0 kΩ at 20 °C (68 °F)
(blue — black/blue)

e. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Positive tester probe →
yellow terminal ③
Negative tester probe →
black/blue terminal ②

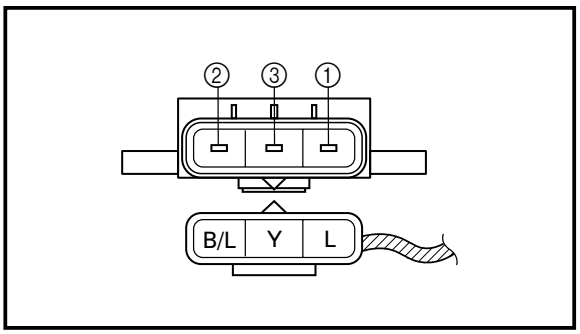
f. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.
The resistance does not change or it changes abruptly → Replace the throttle position sensor.
The slot is worn or broken → Replace the throttle position sensor.

NOTE:
Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

Throttle position sensor resistance
0 ~ 5 ± 1.0 kΩ at 20 °C (68 °F)
(yellow — black/blue)

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3. Adjust:
   • throttle position sensor angle

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a. Disconnect the throttle position sensor coupler from the throttle position sensor.

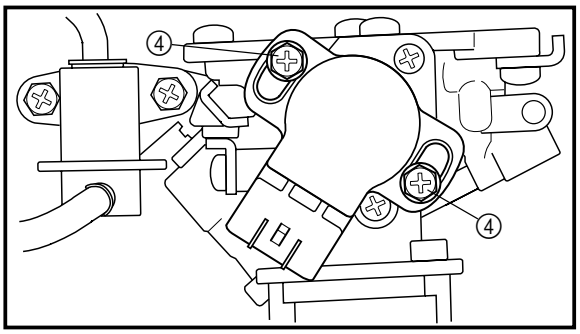
b. Connect the pocket tester (Ω × 1k) to the throttle position sensor.

Positive tester probe →
blue terminal ①
Negative tester probe →
black/blue terminal ②

c. Measure the throttle position sensor maximum resistance.

d. Calculate the throttle position sensor maximum resistance when the throttle is fully closed.

Throttle position sensor maximum resistance (throttle is fully closed) = Maximum resistance × (0.13 ~ 0.15)



Example:
If the maximum resistance = 5 kΩ, then the throttle position sensor's maximum resistance when the throttle is fully closed should be:
5 kΩ × (0.13 ~ 0.15) = 650 ~ 750 Ω
Lift the throttle body assembly slightly out of the intake manifolds.
Loosen the throttle position sensor screws ④.
Connect the pocket tester (Ω × 100) to the throttle position sensor.

Positive tester probe →
yellow terminal ③
Negative tester probe →
black/blue terminal ②

e. Adjust the throttle position sensor angle so that the measured resistance is within the specified range.

Throttle position sensor resistance
650 ~ 750 Ω
(yellow — black/blue)

After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.

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CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION

1. Check:
   • pressure regulator operation

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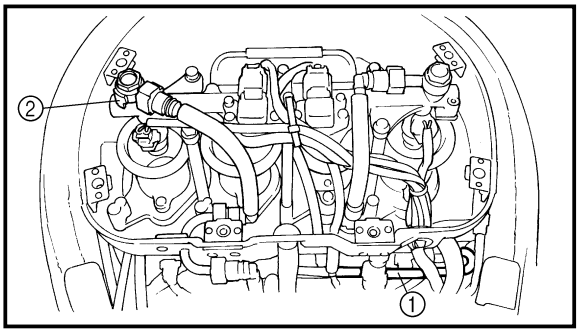
a. Remove the fuel tank and air filter case cover.
   Refer to "FUEL TANK AND AIR FILTER" in chapter 3.

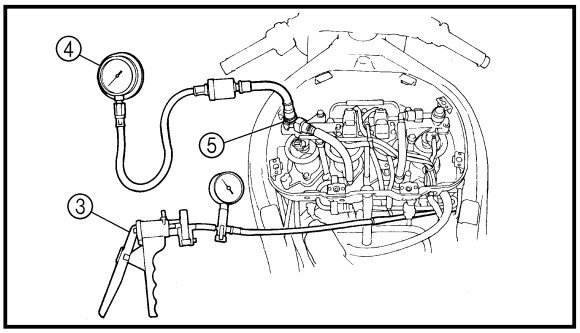
b. Disconnect the nagative pressure hose ① from the pressure regulator at the joint.

c. Disconnect the injector fuel pipe 3 ② from the fuel distributor.

d. Connect the mity vac ③ onto the negative pressure hose from the pressure regulator.

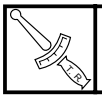
e. Install the pressure gauge ④ and adapter ⑤ with the washers and injector fuel pipe 3 onto the fuel distributor.







Mity vac
90890-06756
Pressure gauge
90890-03153
Adapter
90890-03151



Adapter
30 Nm (3.0 m • kg, 22 ft • lb)

f. Install the fuel tank.
   Refer to "FUEL TANK AND AIR FILTER" in chapter 3.

g. Start the engine.

h. Measure the fuel pressure.



Fuel pressure
250 ~ 260 kPa
(2.5 ~ 2.6 kgf/cm², 35.6 ~ 37.0 psi)

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i. Use the mity vac to adjust the fuel pressure in relation to the vacuum pressure as described below.

NOTE:
The vacuum pressure should not exceed 100 kPa (1 mmHg, 0.04 in. Hg).

Increase the vacuum pressure. → **Fuel pressure is decreased.**
Decrease the vacuum pressure. → **Fuel pressure is increased.**

Faulty → Replace the pressure regulator.

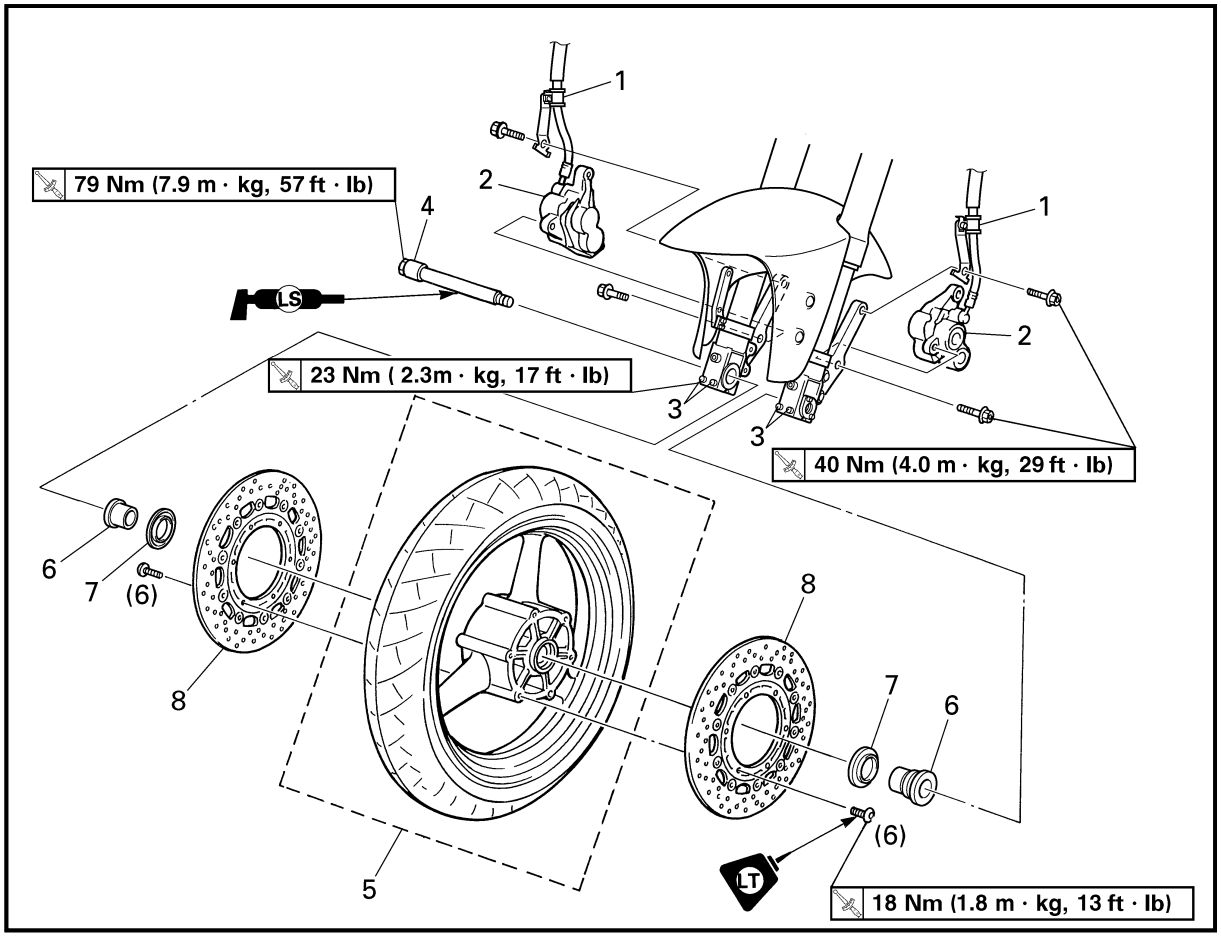
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EB700002

CHASSIS

FRONT WHEEL AND BRAKE DISCS

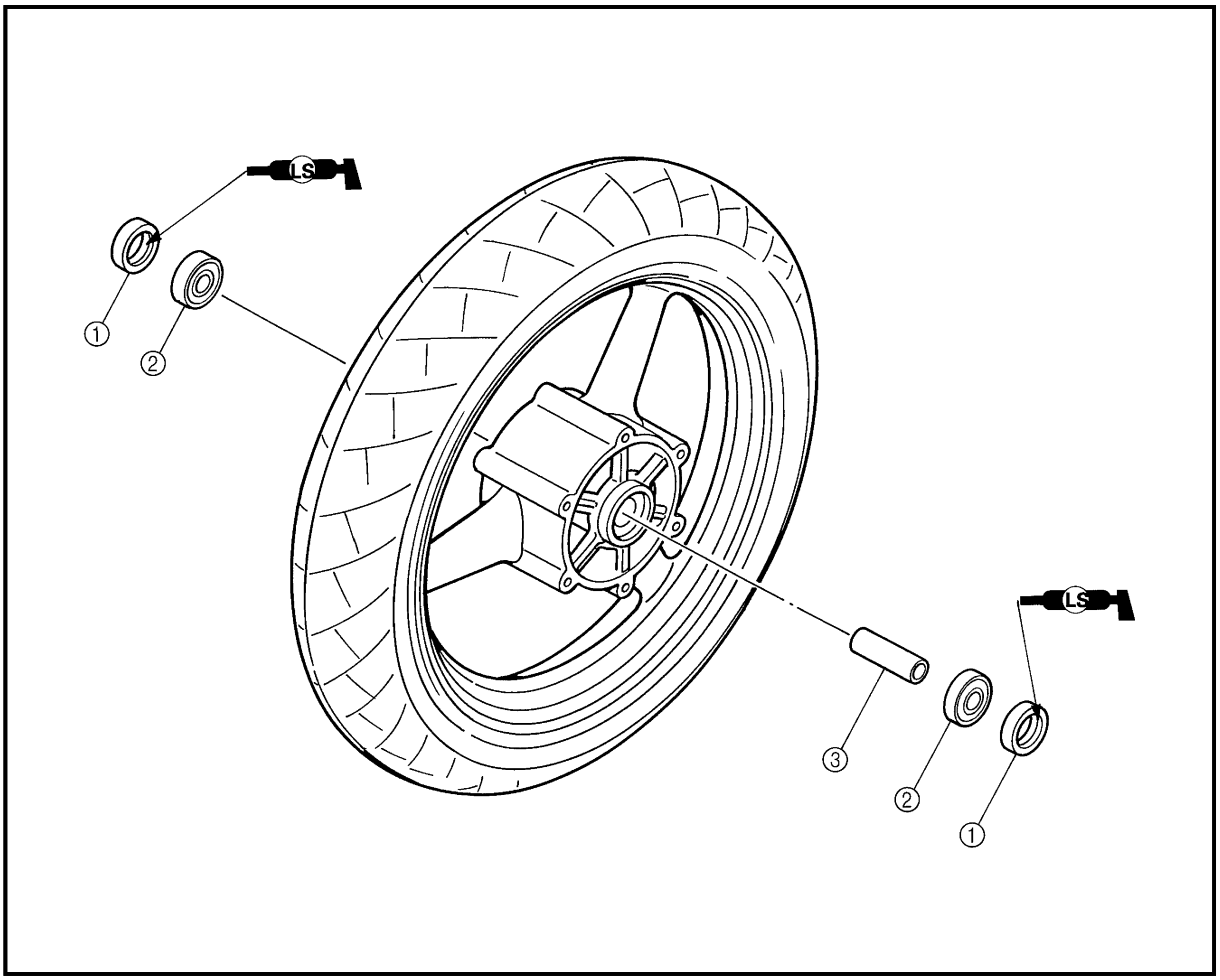


Order	Job/Part	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the front wheel is elevated.
1	Brake hose holder (left and right)	2	
2	Brake caliper (left and right)	2	
3	Wheel axle pinch bolt	4	Loosen.
4	Front wheel axle	1	
5	Front wheel	1	
6	Collar (left and right)	2	
7	Oil seal cover (left and right)	2	
8	Brake disc (left and right)	2	
			For installation, reverse the removal procedure.

7

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EB700010



Order	Job/Part	Q'ty	Remarks
	Disassembling the front wheel		Remove the parts in the order listed.
①	Oil seal (left and right)	2	
②	Wheel bearing (left and right)	2	
③	Spacer	1	
			For assembly, reverse the disassembly procedure.

7

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EB700102
REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

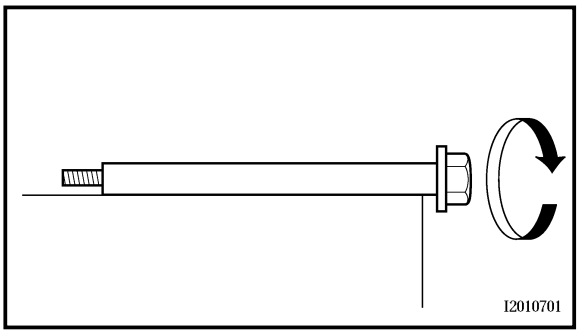
NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.

2. Remove:
   - left brake caliper
   - right brake caliper

NOTE:
Do not squeeze the brake lever when removing the brake calipers.

3. Elevate:
   - front wheel

NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.



EB700400
CHECKING THE FRONT WHEEL

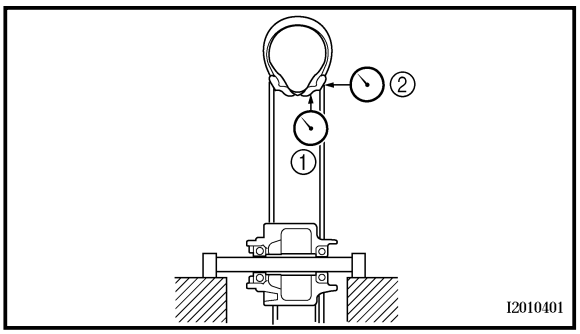
1. Check:
   - wheel axle
     Roll the wheel axle on a flat surface.
     Bends → Replace.

⚠ WARNING

Do not attempt to straighten a bent wheel axle.

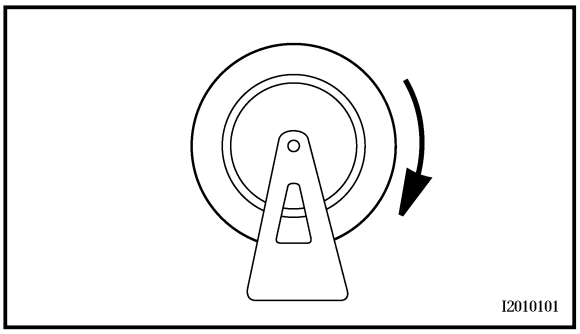
2. Check:
   - tire
   - front wheel
     Damage/wear → Replace.
     Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.

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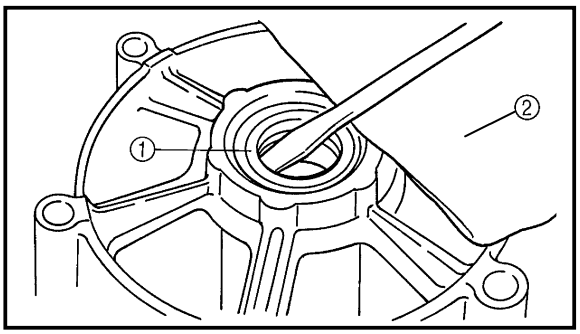


3. Measure:
   • radial wheel runout ①
   • lateral wheel runout ②
   Over the specified limits → Replace.

Max. radial wheel runout
1.0 mm (0.04 in)
Max. lateral wheel runout
0.5 mm (0.02 in)



4. Check:
   • wheel bearings
   Front wheel turns roughly or is loose → Replace the wheel bearings.
   • oil seals
   Damage/wear → Replace.



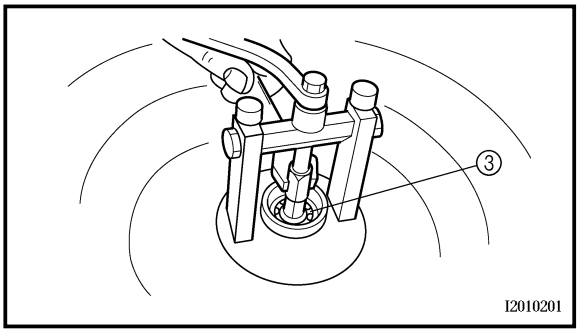
5. Replace:
   • wheel bearings New
   • oil seals New

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a. Clean the outside of the front wheel hub.

b. Remove the oil seals ① with a flat-head screwdriver.

NOTE:
To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel surface.

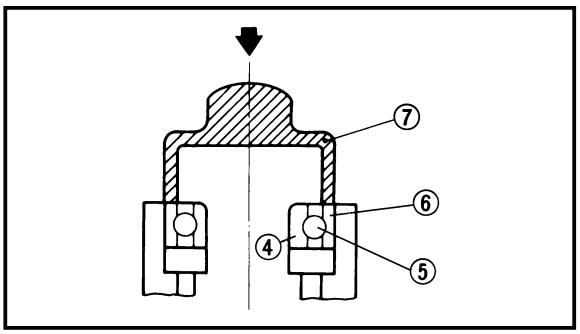


c. Remove the wheel bearings ③ with a general bearing puller.

d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

CAUTION:
Do not contact the wheel bearing center race ④ or balls ⑤. Contact should be made only with the outer race ⑥.

NOTE:
• First fully insert the right wheel bearing, then install the spacer and finally the left wheel bearing.
• Use a socket ⑦ that matches the diameter of the wheel bearing outer race and oil seal.



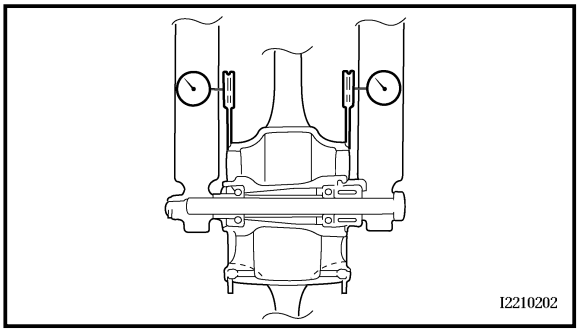
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EB700416
CHECKING THE BRAKE DISCS

The following procedure applies to both of the brake discs.

1. Check:
   • brake disc
   Damage/galling → Replace.
2. Measure:
   • brake disc deflection
   Out of specification → Correct the brake disc deflection or replace the brake disc.

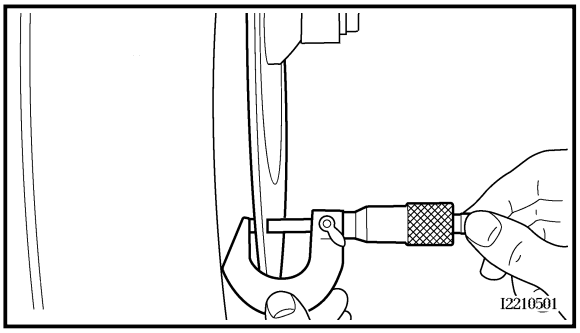


Max. brake disc deflection
Front: 0.1 mm (0.004 in)
Rear: 0.1 mm (0.004 in)

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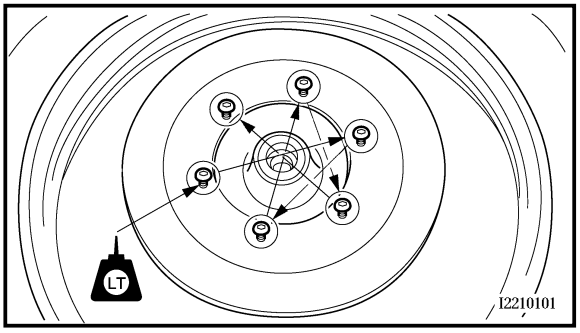
a. Place the motorcycle on a suitable stand so that the wheel is elevated.
b. Before measuring the front brake disc deflection, turn the handlebars to the left or right to ensure that the front wheel is stationary.
c. Remove the brake caliper.
d. Hold the dial gauge at a right angle against the brake disc surface.
e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.

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3. Measure:
   • brake disc thickness
   Measure the brake disc thickness at a few different locations.
   Out of specification → Replace.

Min. brake disc thickness
Front: 4.5 mm (0.18 in)
Rear: 4.5 mm (0.18 in)



4. Adjust:
   • brake disc deflection

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a. Remove the brake disc.
b. Rotate the brake disc by one bolt hole.
c. Install the brake disc.

NOTE:
Tighten the brake disc bolts in stages and in a crisscross pattern.

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Brake disc bolt
18 Nm (1.8 m • kg, 13 ft • lb)
LOCTITE®

d. Measure the brake disc deflection.

e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.

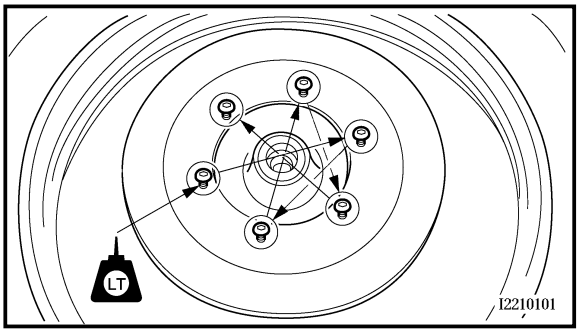
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

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EB700725
INSTALLING THE FRONT WHEEL

1. Lubricate:
   • wheel axle
   • oil seal lips

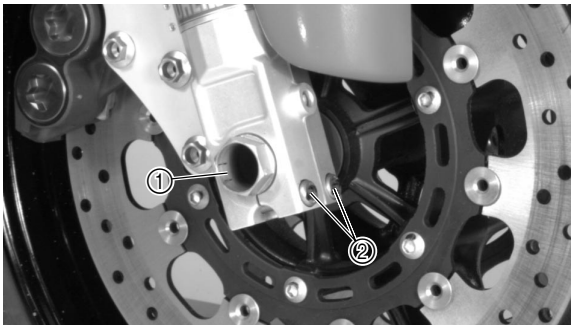
Recommended lubricant
Lithium soap base grease



2. Install:
   • brake discs

18 Nm (1.8 m · kg, 13 ft • lb)

NOTE:
- Apply locking agent (LOCTITE®) 648 to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.



3. Tighten:
   • wheel axle ①

79 Nm (7.9 m · kg, 57 ft · lb)

   • wheel axle pinch bolt ②

23 Nm (2.3 m · kg, 17 ft · lb)

CAUTION:

Before tightening the wheel axle nut, push down hard on the handlebars several times and check if the front fork rebounds smoothly.

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4. Install:
   • brake calipers

40 Nm (4.0 m · kg, 29 ft · lb)

⚠ WARNING

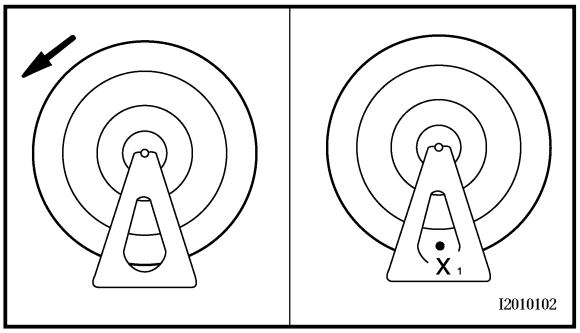
Make sure that the brake hose is routed properly.

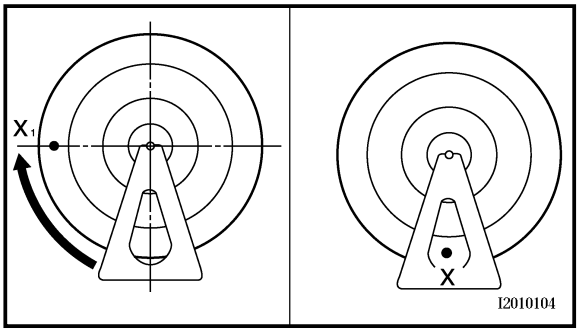
EB700901

ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:

- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake discs installed.





1. Remove:
   • balancing weight(-s)
2. Find:
   • front wheel's heavy spot

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a. Place the front wheel on a suitable balancing stand.

b. Spin the front wheel.

c. When the front wheel stops, put an "X_1" mark at the bottom of the wheel.

d. Turn the front wheel 90° so that the "X_1" mark is positioned as shown.

e. Release the front wheel.

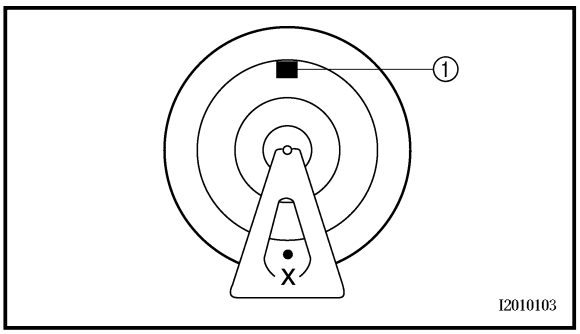
f. When the front wheel stops, put an "X_2" mark at the bottom of the wheel.

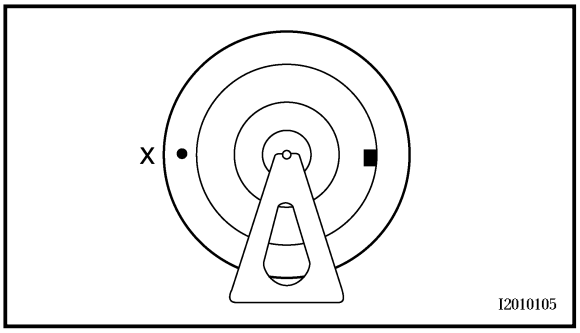
g. Repeat steps (a) through (d) several times until all the marks come to rest at the same spot.

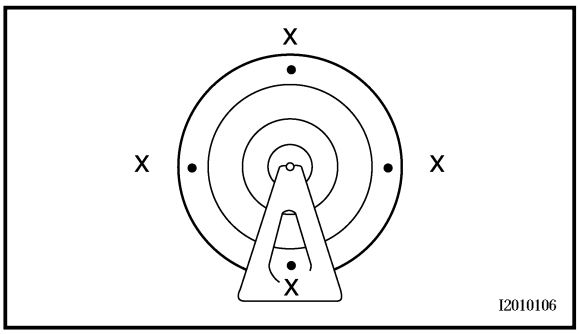
h. The spot where all the marks come to rest is the front wheel's heavy spot "X".

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3. Adjust:
   • front wheel static balance

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a. Install a balancing weight ① onto the rim exactly opposite the heavy spot "X".

NOTE:
Start with the lightest weight.

b. Turn the front wheel 90° so that the heavy spot is positioned as shown.

c. If the heavy spot does not stay in that position, install a heavier weight.

d. Repeat steps (b) and (c) until the front wheel is balanced.

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4. Check:
   • front wheel static balance

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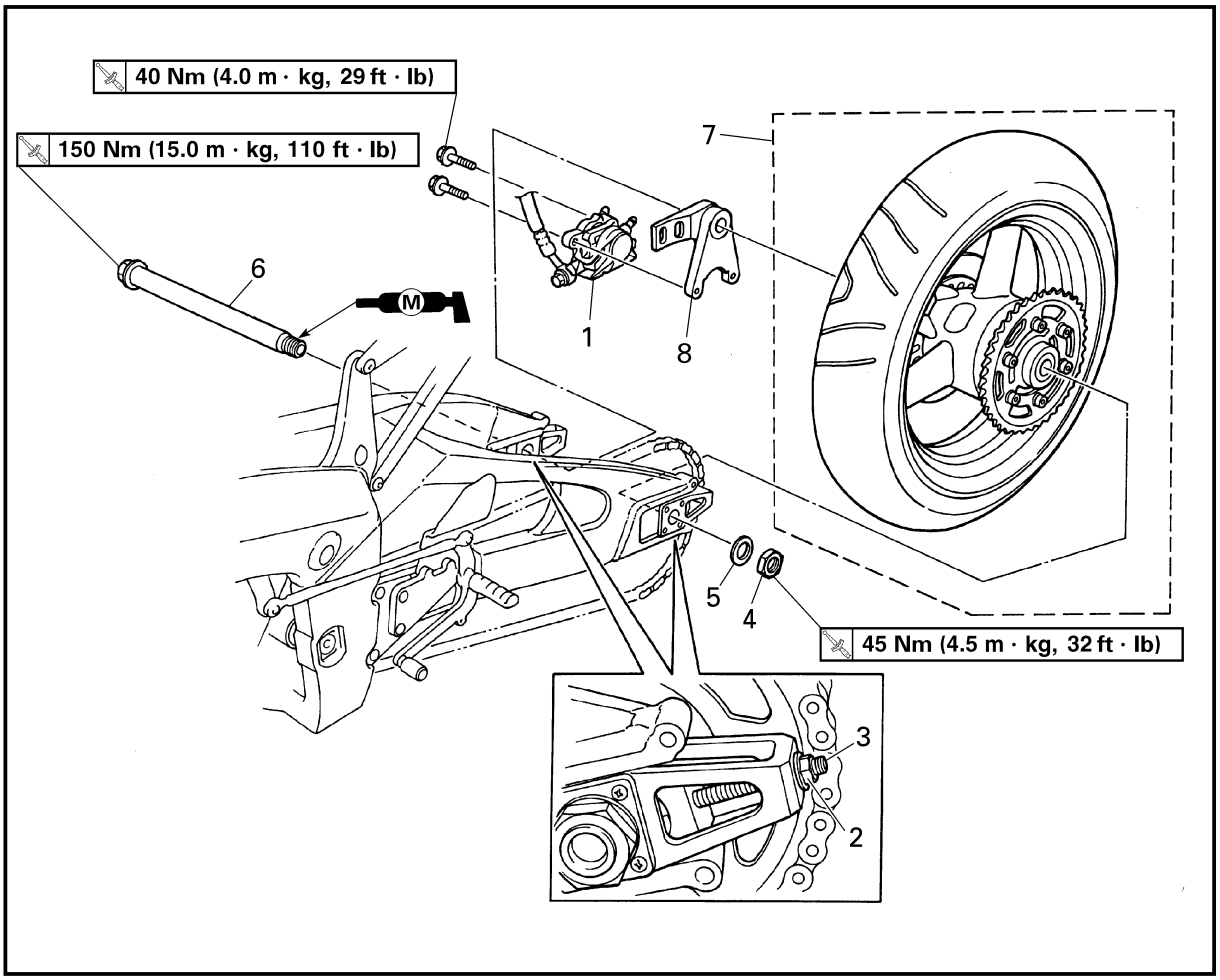
a. Turn the front wheel and make sure that it stays at each position shown.

b. If the front wheel does not remain stationary at all of the positions, rebalance it.

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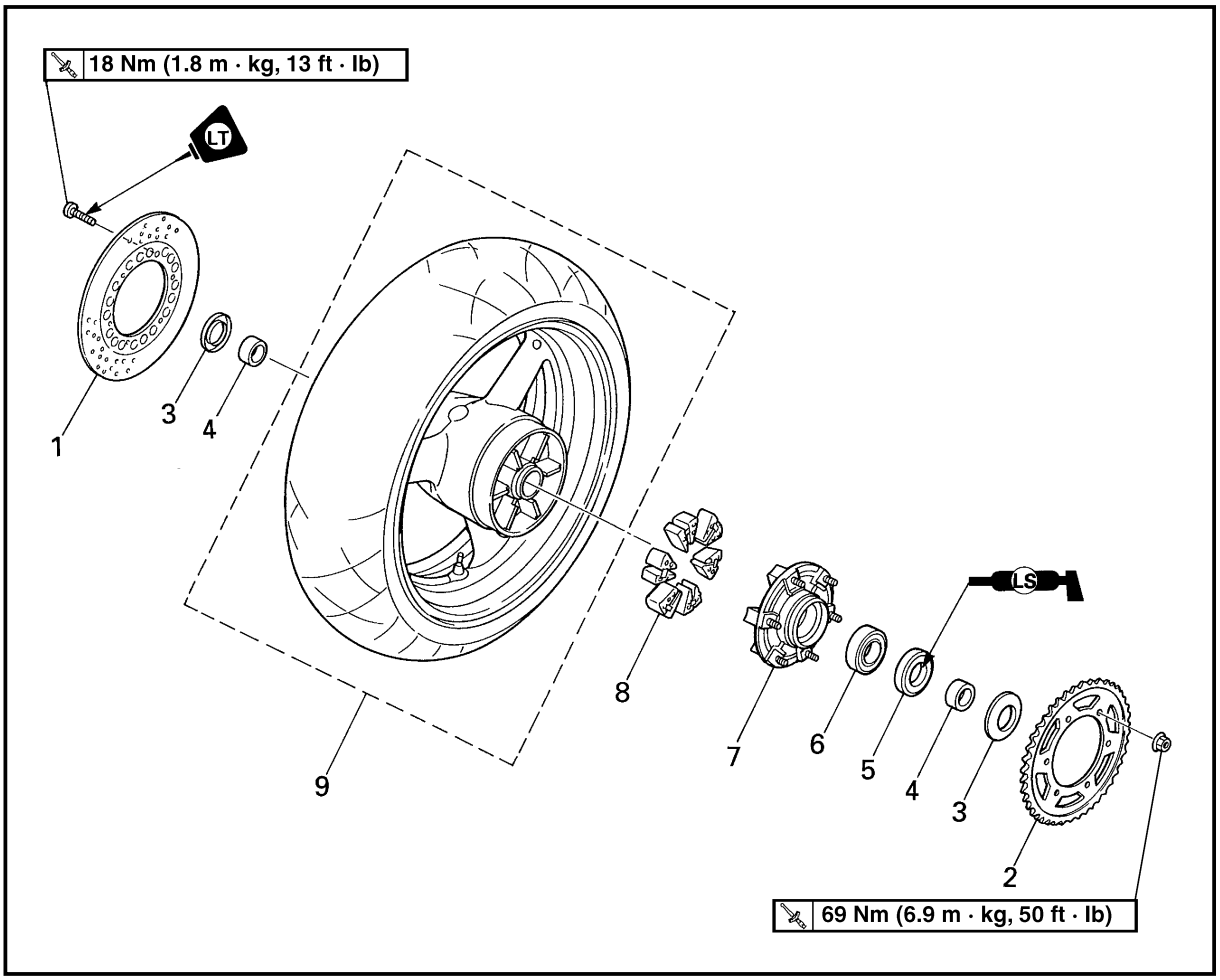
EB701000
REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheel		Remove the parts in the order listed. **NOTE:** Place the motorcycle on a suitable stand so that the rear wheel is elevated.
1	Brake caliper	1	
2	Locknut (left and right)	2	Loosen.
3	Adjusting bolt (left and right)	2	Loosen.
4	Wheel axle nut	2	
5	Washer	1	
6	Rear wheel axle	1	
7	Rear wheel	1	
8	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

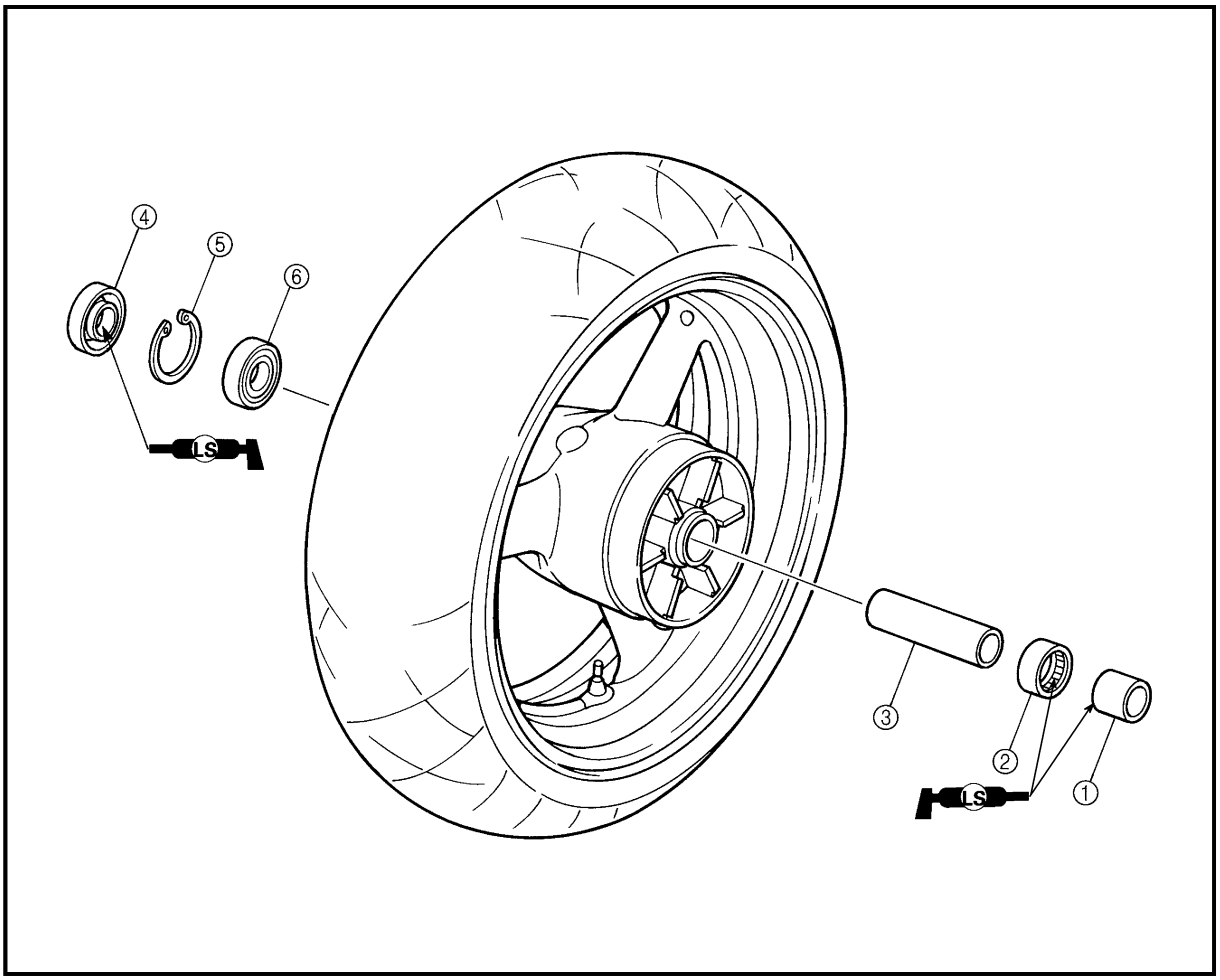
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EB701010



Order	Job/Part	Q'ty	Remarks
	Removing the brake disc and rear wheel sprocket		Remove the parts in the order listed.
1	Brake disc	1	
2	Rear wheel sprocket	1	
3	Oil seal cover (left and right)	2	
4	Spacer (left and right)	2	
5	Oil seal	1	
6	Bearing	1	
7	Rear wheel drive hub	1	
8	Rear wheel drive hub damper	6	
9	Rear wheel	1	
			For installation, reverse the removal procedure.

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Order	Job/Part	Q'ty	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed.
①	Spacer	1	
②	Bearing	1	
③	Spacer	1	
④	Oil seal	1	
⑤	Circlip	1	
⑥	Bearing	1	
			For assembly, reverse the disassembly procedure.

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EB701100
REMOVING THE REAR WHEEL

1. Stand the motorcycle on a level surface.

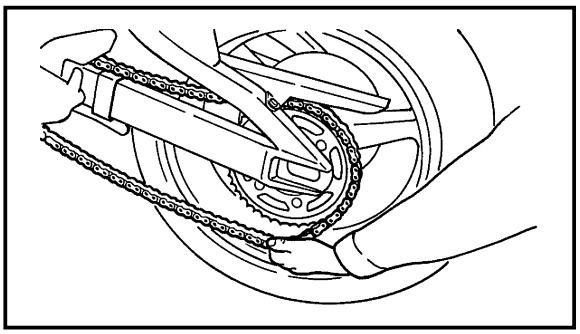
⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.

2. Remove:
   • brake caliper

NOTE:
Do not depress the brake pedal when removing the brake caliper.



3. Remove:
   • wheel axle nut
   • washer
   • wheel axle
   • rear wheel

NOTE:
Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.

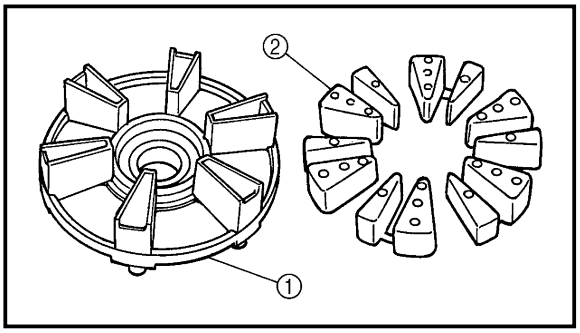
EB701400
CHECKING THE REAR WHEEL

1. Check:
   • wheel axle
   • rear wheel
   • wheel bearings
   • oil seals
   • brake disc
   Refer to “FRONT WHEEL”.
2. Check:
   • tire
   • rear wheel
   Damage/wear → Replace.
   Refer to “CHECKING THE TIRES” and “CHECKING THE WHEELS” in chapter 3.

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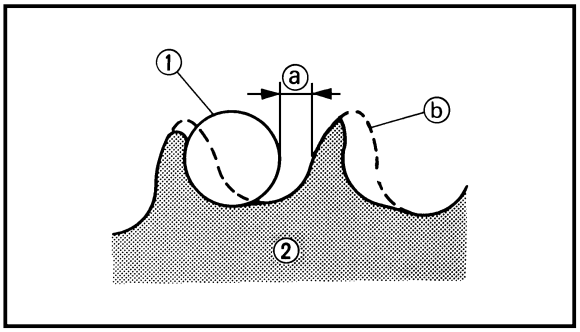
3. Measure:
   • radial wheel runout
   • lateral wheel runout
   Refer to "FRONT WHEEL".
   Over the specified limits → Replace.

Max. radial wheel runout
1.0 mm (0.04 in)
Max. lateral wheel runout
0.5 mm (0.02 in)



EB701430
CHECKING THE REAR WHEEL DRIVE HUB

1. Check:
   • rear wheel drive hub ①
   Cracks/damage → Replace.
   • rear wheel drive hub dampers ②
   Damage/wear → Replace.



EB701440
CHECKING AND REPLACING THE REAR WHEEL SPROCKET

1. Check:
   • rear wheel sprocket
   More than 1/4 tooth ⓐ wear → Replace the rear wheel sprocket.
   Bent teeth → Replace the rear wheel sprocket.
   ⓑ Correct
   ① Drive chain roller
   ② Rear wheel sprocket

2. Replace:
   • rear wheel sprocket

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a. Remove the self-locking nuts and the rear wheel sprocket.

b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.

c. Install the new rear wheel sprocket.

Rear wheel sprocket self-locking nut
150 Nm (15.0 m • kg, 110 ft • lb)

NOTE:
Tighten the self-locking nuts in stages and in a crisscross pattern.

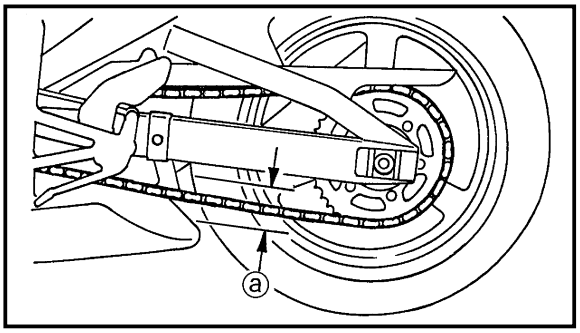
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EB701710
INSTALLING THE REAR WHEEL

1. Lubricate:
   - wheel axle
   - wheel bearings
   - oil seal lips

	Recommended lubricant **Lithium soap base grease**



2. Adjust:
   - drive chain slack ⓐ

	Drive chain slack **40 ~ 50 mm (1.57 ~ 1.97 in)**

Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.

3. Tighten:
   - wheel axle

150 Nm (15.0 m · kg, 110 ft · lb)

   - wheel axle nut

45 Nm (4.5 m · kg, 32 ft · lb)

   - brake caliper bolts

40 Nm (4.0 m · kg, 29 ft · lb)

⚠ WARNING

Make sure that the brake hose is routed properly.

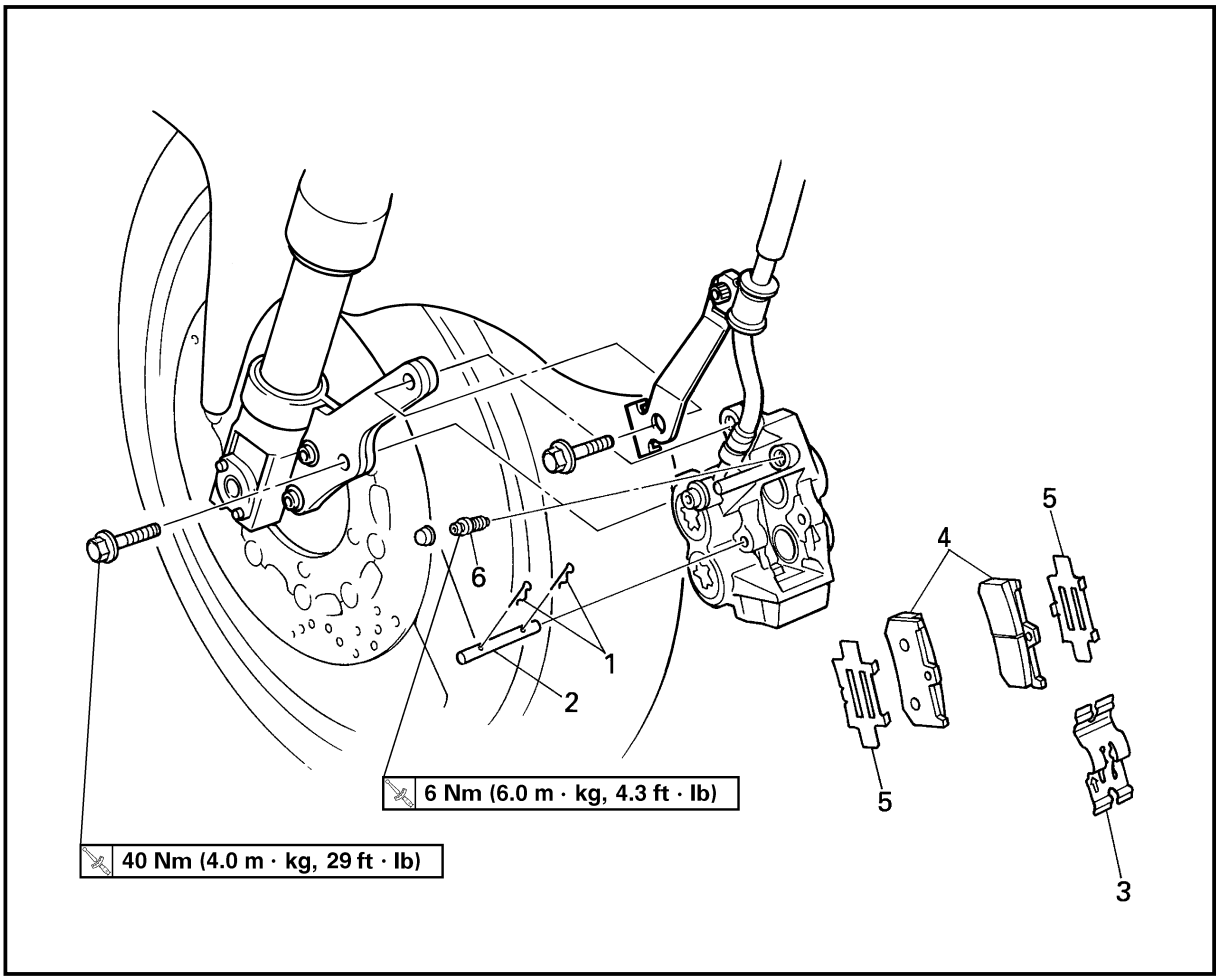
EB701900
ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:
- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

1. Adjust:
   - rear wheel static balance
   Refer to "FRONT WHEEL".

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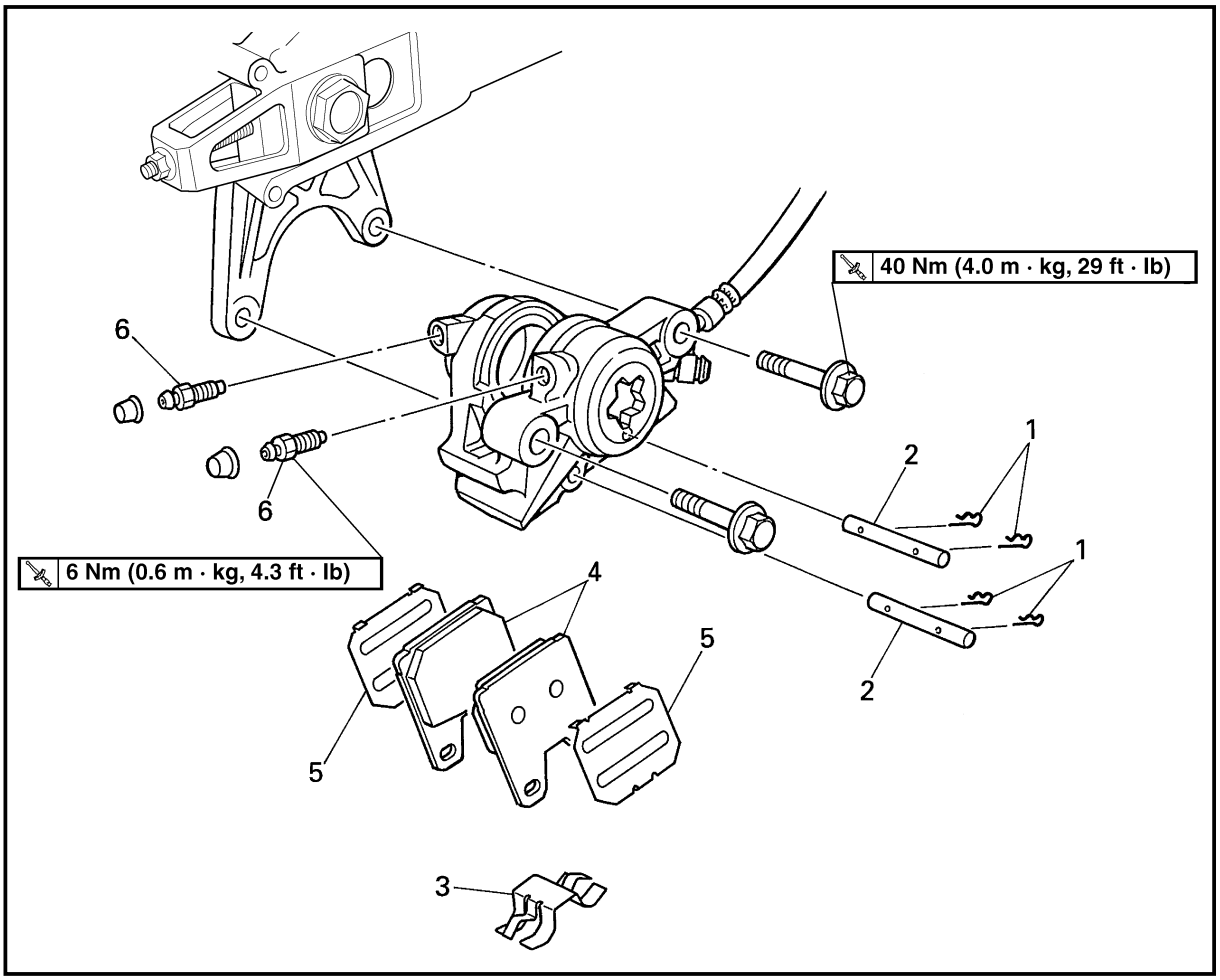
EB702001
FRONT AND REAR BRAKES



Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
1	Brake pad clip	2	
2	Brake pad pin	1	
3	Brake pad spring	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Bleed screw	1	
			For installation, reverse the removal procedure.

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EB702002



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed.
1	Brake pad clip	4	
2	Brake pad pin	2	
3	Brake pad spring	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Bleed screw	2	
			For installation, reverse the removal procedure.

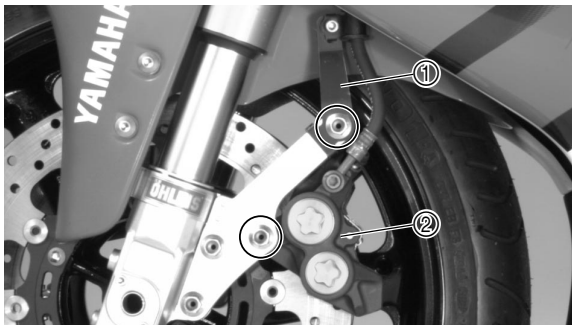
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EB702100

CAUTION:

Disc brake components rarely require disassembly.
Therefore, always follow these preventive measures:
- **Never disassemble brake components unless absolutely necessary.**
- **If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal brake components.**
- **Use only clean or new brake fluid for cleaning brake components.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Avoid brake fluid coming into contact with the eyes as it can cause serious injury.**

First aid for brake fluid entering the eyes:
- **Flush with water for 15 minutes and get immediate medical attention.**



EB702112

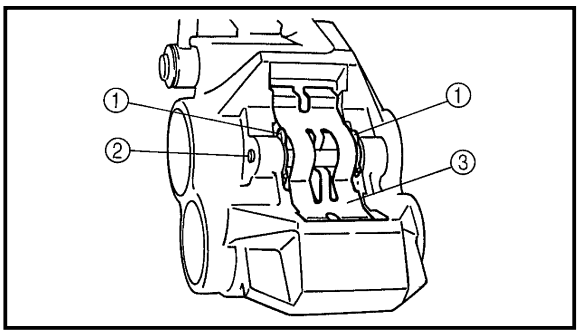
REPLACING THE FRONT BRAKE PADS

The following procedure applies to both brake calipers.

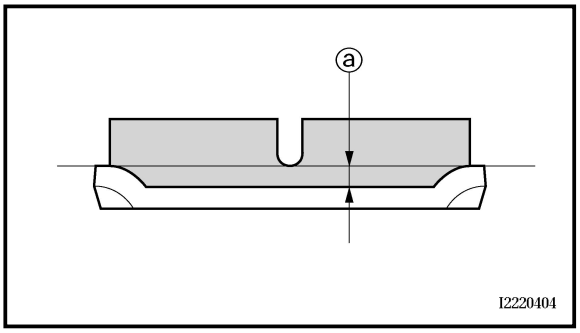
NOTE:
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:
   - brake hose holder ①
   - brake caliper ②

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2. Remove:
   - brake pad clips ①
   - brake pad pin ②
   - brake pad spring ③
   - brake pads
     (along with the brake pad shims)



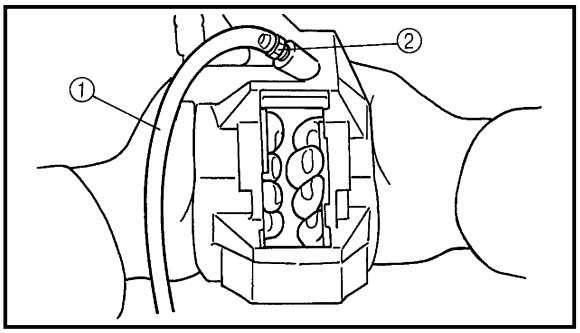
3. Measure:
   - brake pad wear limit ⓐ
     Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm (0.02 in)

4. Install:
   - brake pad shims
     (onto the brake pads)
   - brake pads
   - brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.

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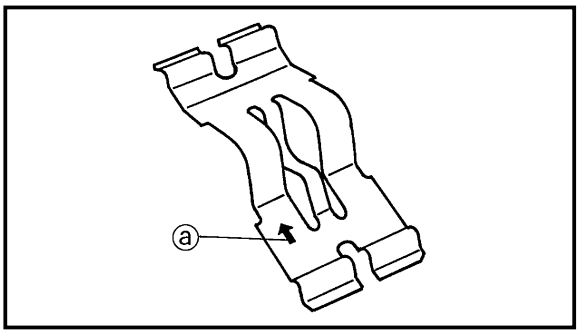


a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.

b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.

c. Tighten the bleed screw.

Bleed screw
6 Nm (0.6 m • kg, 4.3 ft • lb)



d. Install a new brake pad shim onto each new brake pads.

e. Install new brake pads and a new brake pad spring.

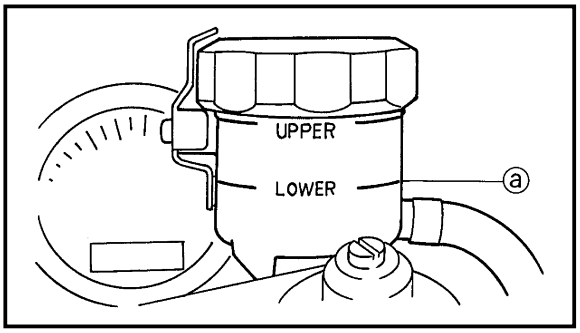
NOTE:
The arrow ⓐ on the brake pad spring must point in the direction of disc rotation.

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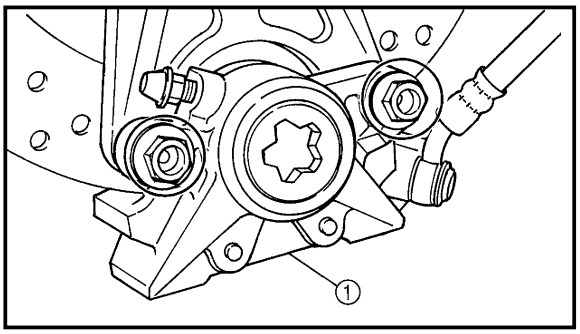
5. Install:
   • brake pad pin
   • brake pad clips
   • brake caliper

40 Nm (4.0 m · kg, 2.9 ft · lb)



6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

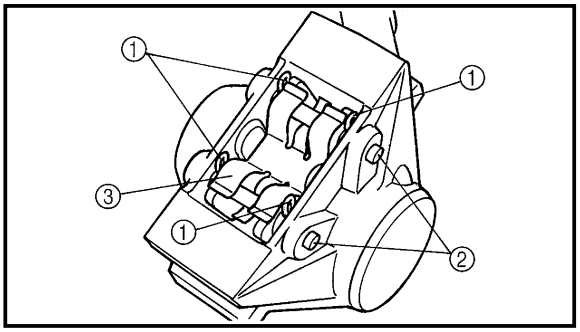
7. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



EB702113
REPLACING THE REAR BRAKE PADS

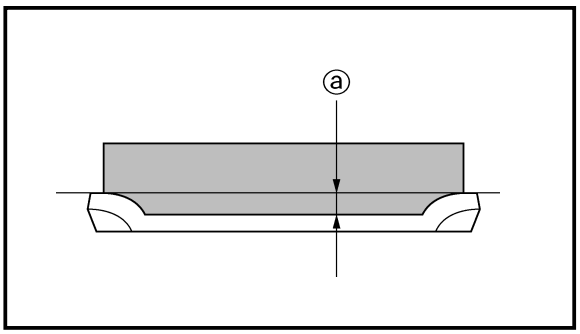
NOTE:
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Remove:
   • brake caliper ①



2. Remove:
   • brake pad clips ①
   • brake pad pins ②
   • brake pad spring ③
   • brake pads
   (along with the brake pad shims)

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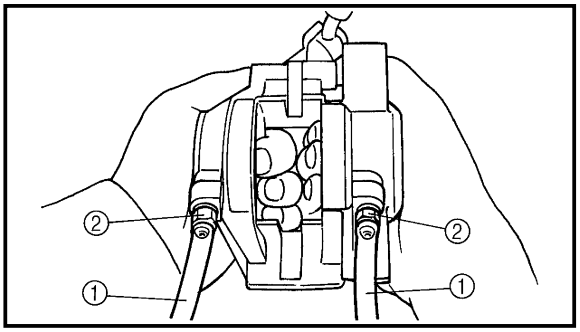
3. Measure:
   • brake pad wear limit ⓐ
   Out of specification → Replace the brake pads as a set.

Brake pad wear limit
0.5 mm (0.02 in)

4. Install:
   • brake pad shims
   (onto the brake pads)
   • brake pads
   • brake pad spring

NOTE:
Always install new brake pads, brake pad shims, and a brake pad spring as a set.

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a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.

b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.

c. Tighten the bleed screw.

Bleed screw
6 Nm (0.6 m • kg, 4.3 ft • lb)

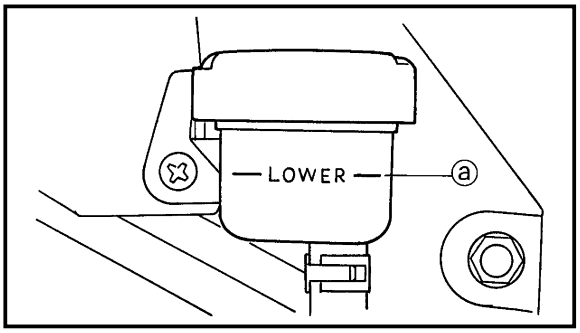
d. Install a new brake pad shim onto each new brake pad.

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5. Install:
   • brake pad pins
   • brake pad clips
   • brake caliper

40 Nm (4.0 m · kg, 29 ft · lb)

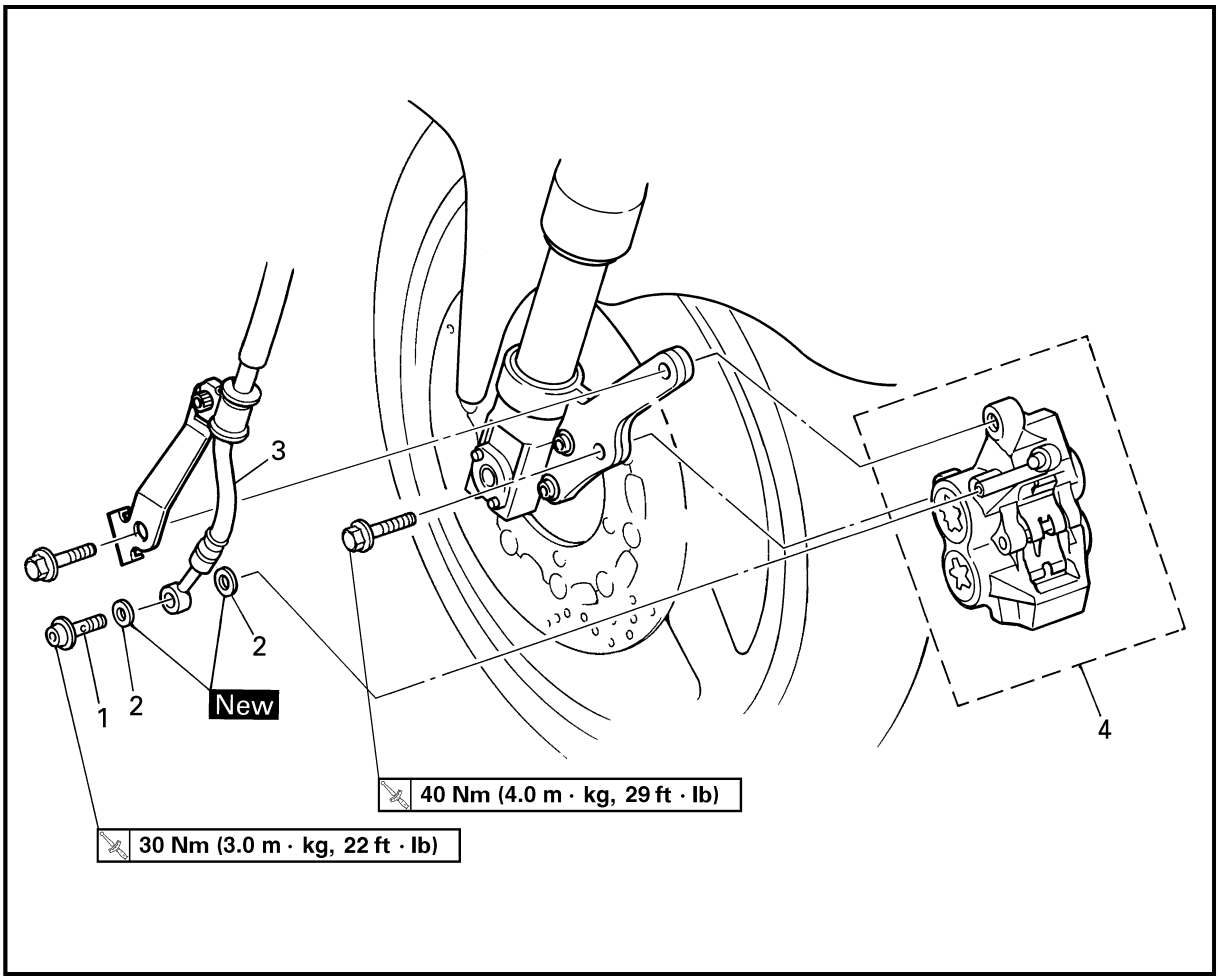


6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
   • brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

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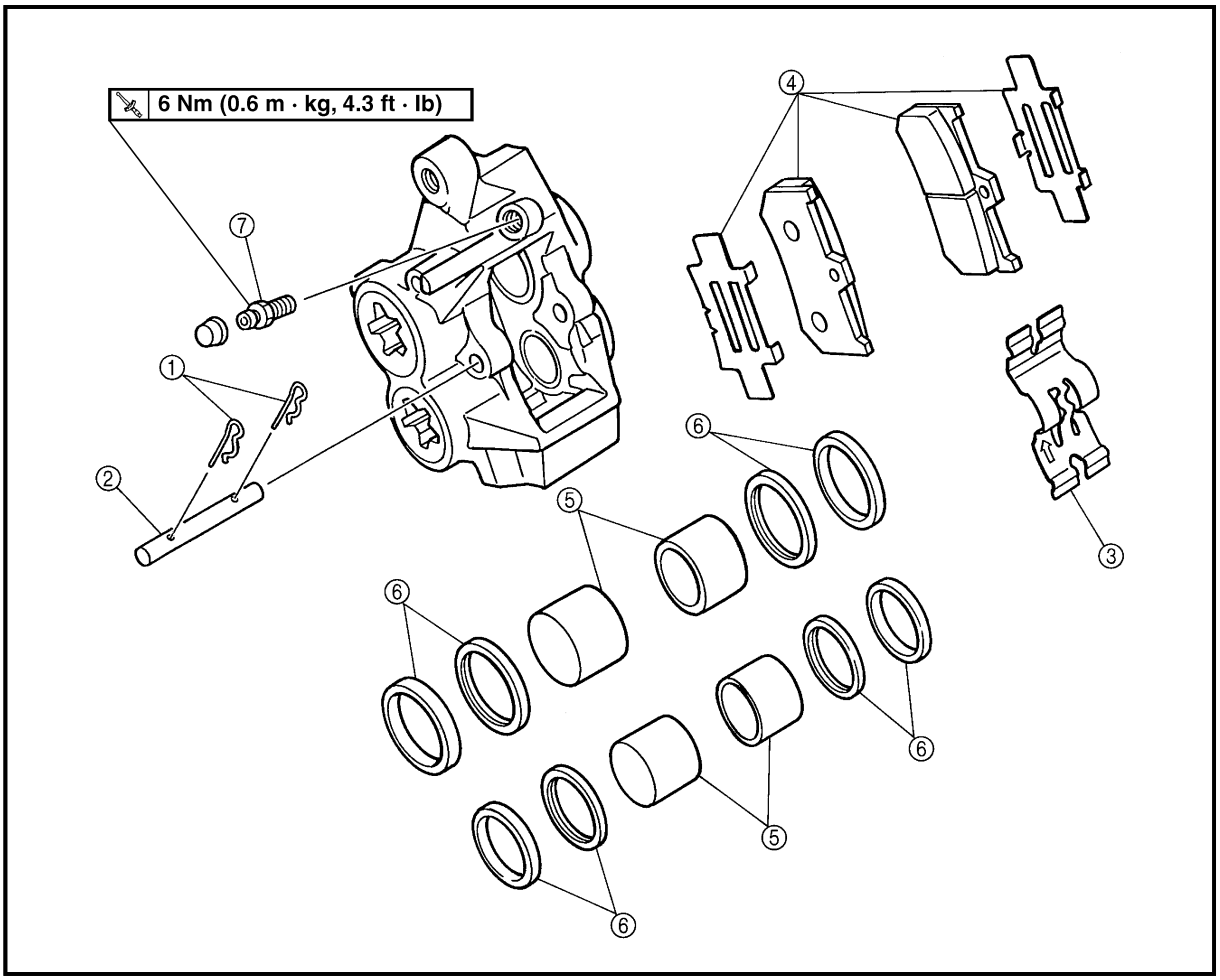
EB702301



Order	Job/Part	Q'ty	Remarks
	Removing the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper	1	
			For installation, reverse the removal procedure.

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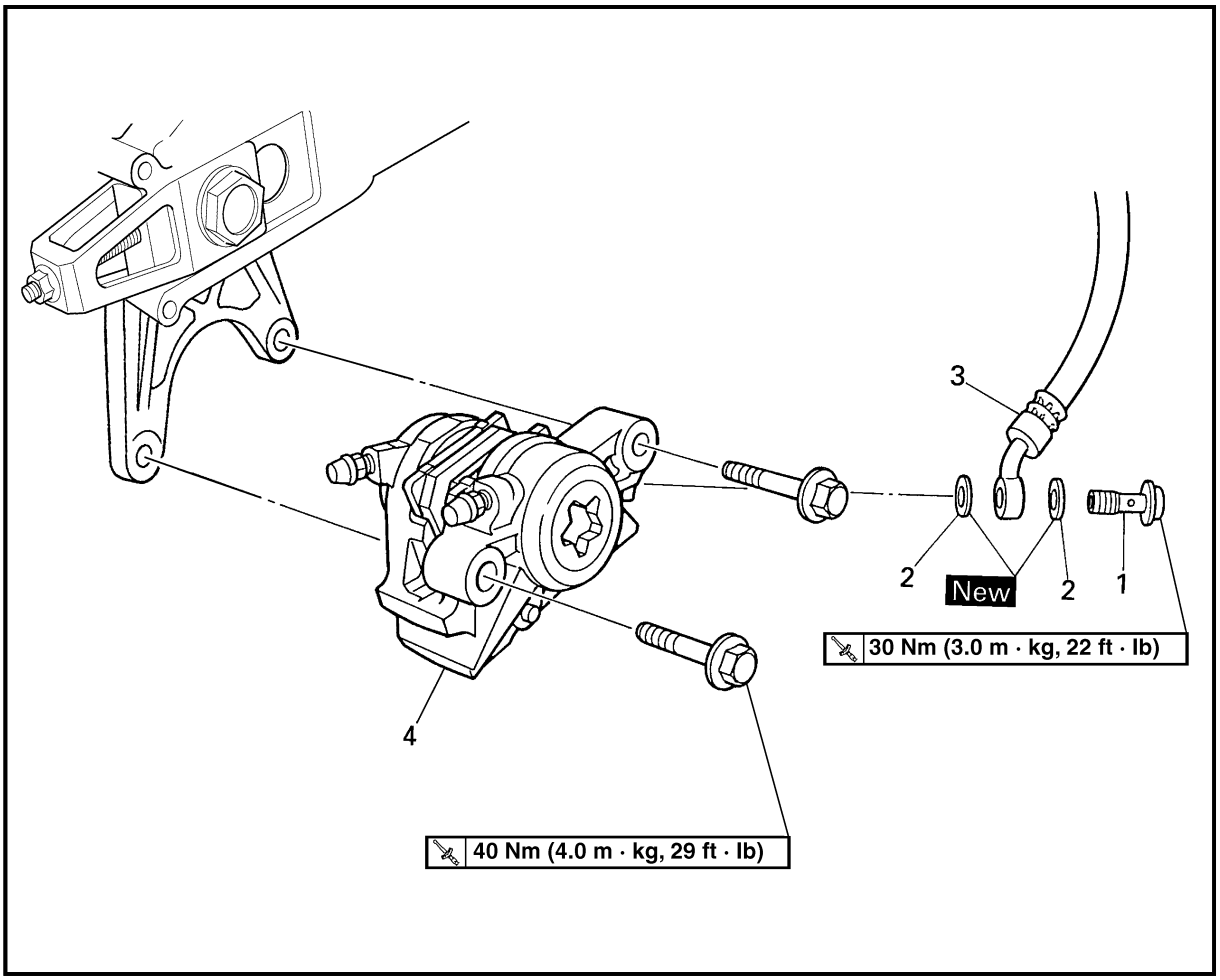
EB702303



Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad clip	2	
②	Brake pad pin	1	
③	Brake pad spring	1	
④	Brake pad	2	
⑤	Brake caliper piston	4	
⑥	Brake caliper piston seal	8	
⑦	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

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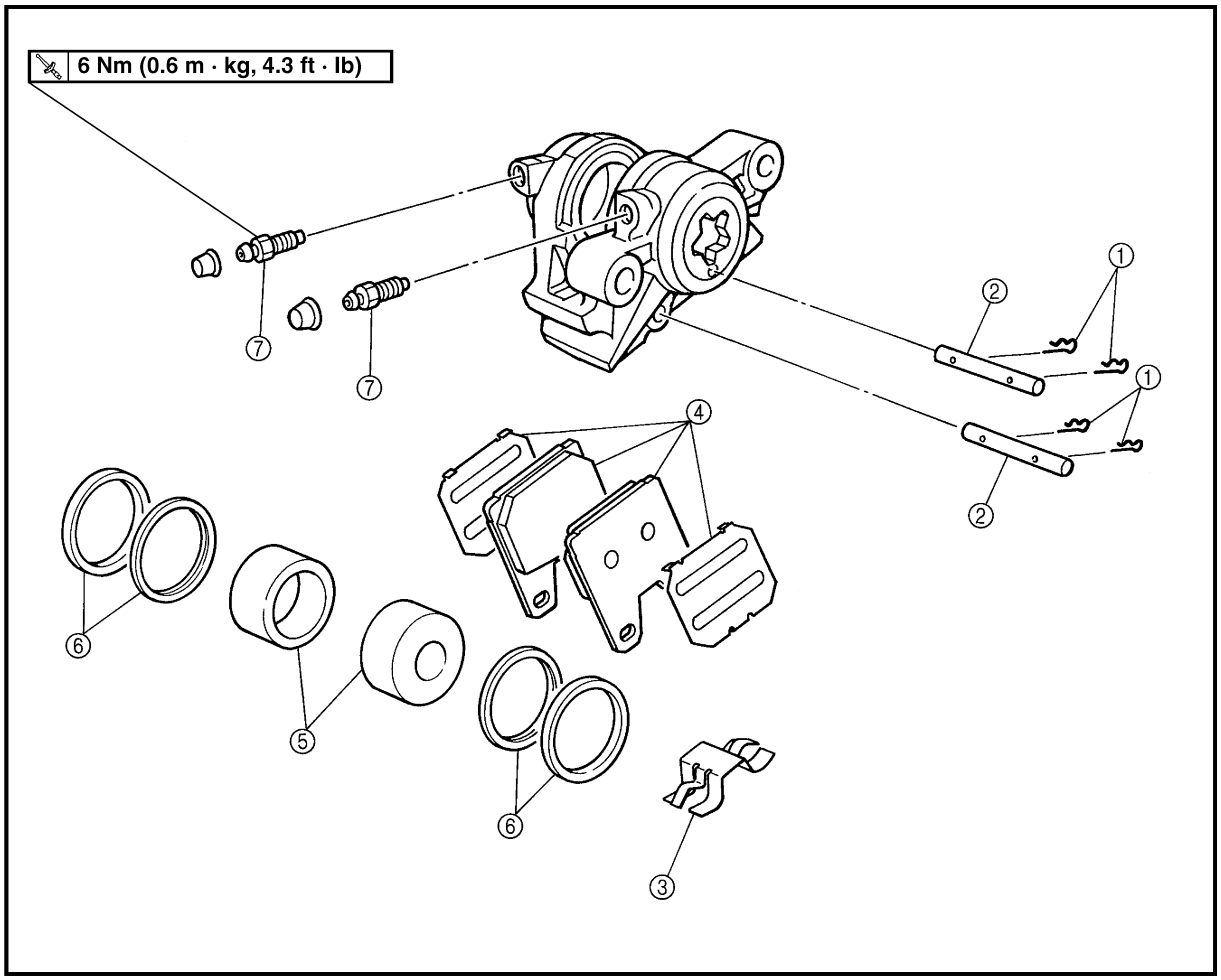
EB702304



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake caliper		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Brake caliper	1	
			For installation, reverse the removal procedure.

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EB702305



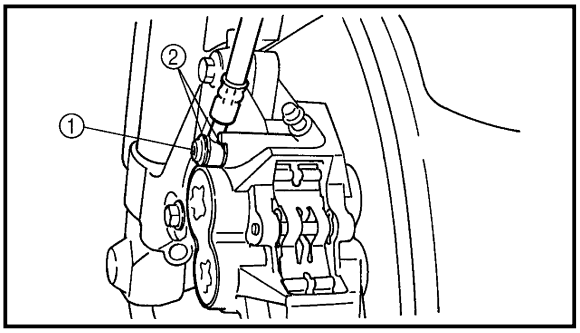
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Remove the parts in the order listed.
①	Brake pad clip	4	
②	Brake pad pin	2	
③	Brake pad spring	1	
④	Brake pad	2	
⑤	Brake caliper piston	2	
⑥	Brake caliper piston seal	4	
⑦	Bleed screw	2	
			For assembly, reverse the disassembly procedure.

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EB702317
DISASSEMBLING THE FRONT BRAKE CALIPERS

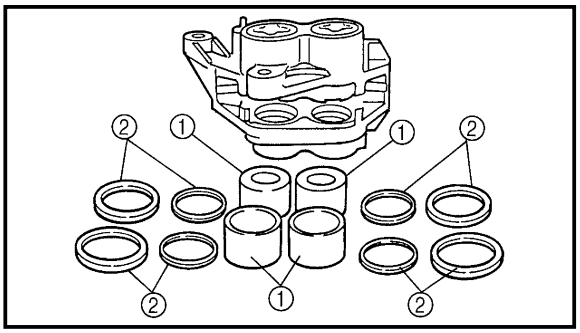
The following procedure applies to both of the brake calipers.

NOTE:
Before disassembling either brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose

NOTE:
Put the end of the brake hose into a container and pump out the brake fluid carefully.



2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②

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a. Secure the right side brake caliper pistons with a piece of wood ⓐ.

b. Blow compressed air into the brake hose joint opening ⓑ to force out the left side pistons from the brake caliper.

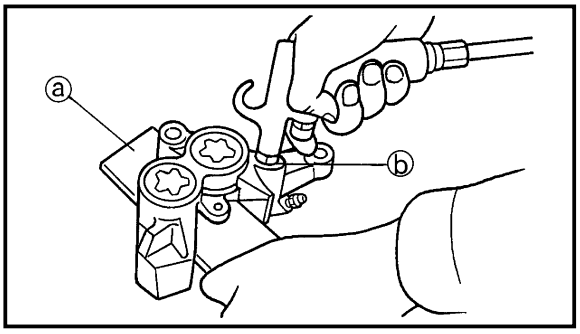
⚠ WARNING

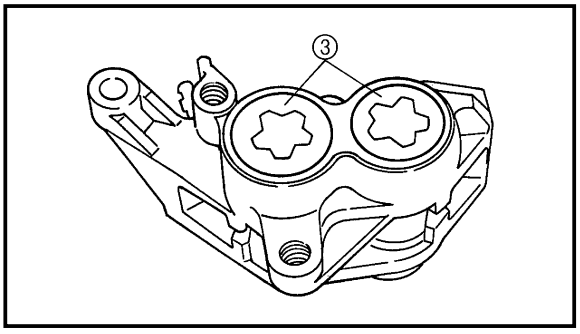
- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolts ③.**

c. Remove the brake caliper piston seals.

d. Repeat the previous steps to force out the right side pistons from the brake caliper.

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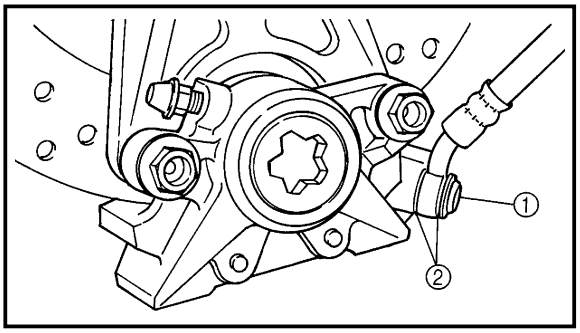




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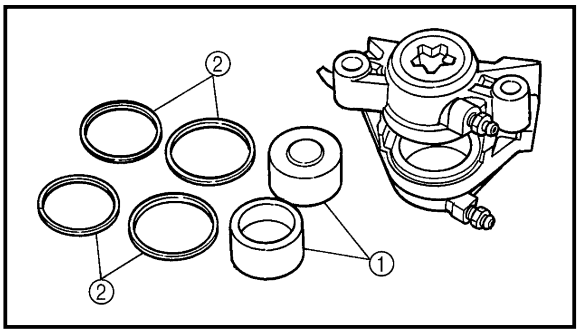
EB702322
DISASSEMBLING THE REAR BRAKE CALIPER

NOTE:
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.



1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose

NOTE:
Put the end of the brake hose into a container and pump out the brake fluid carefully.

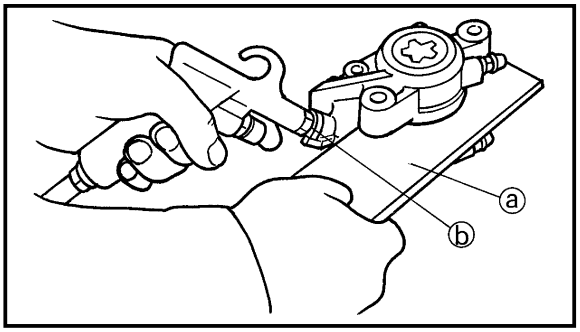


2. Remove:
   - brake caliper pistons ①
   - brake caliper piston seals ②

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a. Secure the right side brake caliper piston with a piece of wood ⓐ.

b. Blow compressed air into the brake hose joint opening ⓑ to force out the left side piston from the brake caliper.

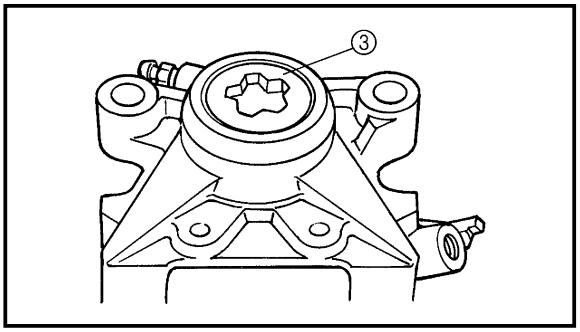


⚠ WARNING
- **Never try to pry out the brake caliper pistons.**
- **Do not loosen the bolt ③.**

c. Remove the brake caliper piston seals.

d. Repeat the previous steps to force out the right side piston from the brake caliper.

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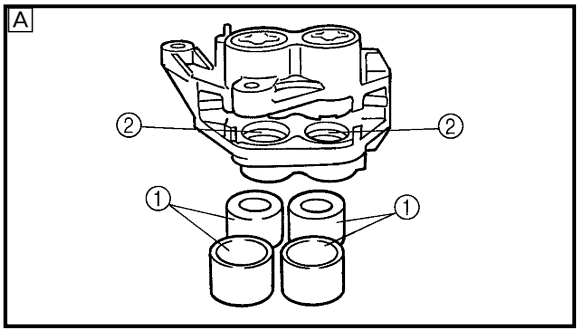
EB702343
CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule	
Brake pads	**If necessary**
Piston seals	**Every two years**
Brake hoses	**Every two years**
Brake fluid	**Every two years and whenever the brake is disassembled**

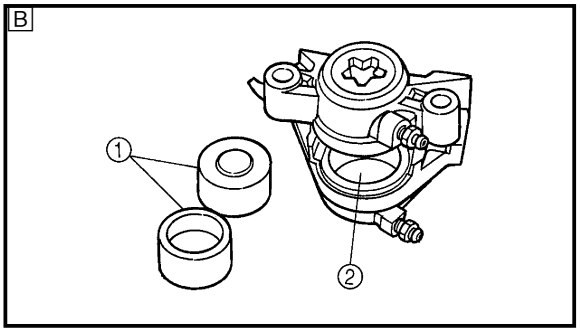
1. Check:
   - brake caliper pistons ①
     Rust/scratches/wear → Replace the brake caliper.
   - brake caliper cylinders ②
     Scratches/wear → Replace the brake caliper.
   - brake calipers
     Cracks/damage → Replace.
   - brake fluid delivery passages
     (brake caliper body)
     Obstruction → Blow out with compressed air.

⚠ WARNING

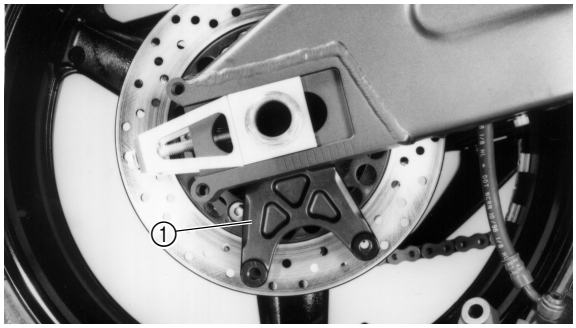
Whenever a brake caliper is disassembled, replace the brake caliper piston seals.



A Front



B Rear



2. Check:
   - rear brake caliper bracket ①
     Cracks/damage → Replace.

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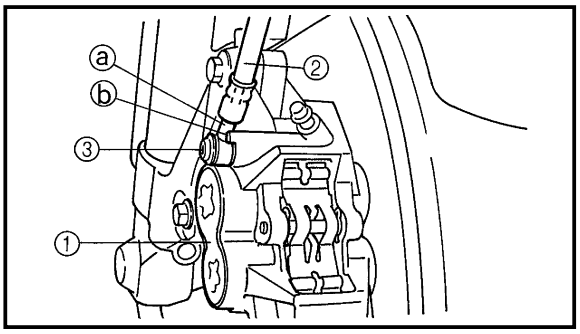
EB702376
ASSEMBLING AND INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

Recommended brake fluid
DOT 4



1. Install:
   - brake caliper ① (temporarily)
   - copper washers New
   - brake hose ②
   - union bolt ③

   30 Nm (3.0 m · kg, 22 ft · lb)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

2. Remove:
   - brake caliper

3. Install:
   - brake pads
   - brake pad spring
   - brake caliper

   40 Nm (4.0 m · kg, 29 ft · lb)

   Refer to "REPLACING THE FRONT BRAKE PADS".

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4. Fill:
   • brake fluid reservoir
   (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

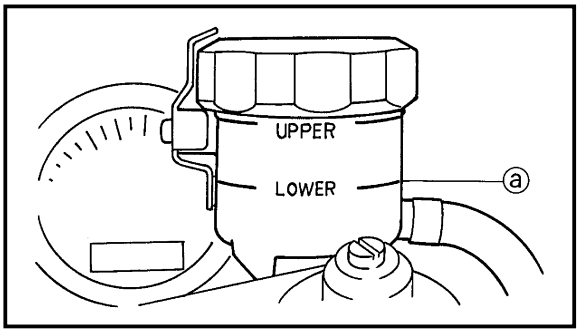
⚠ WARNING

- **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.

5. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

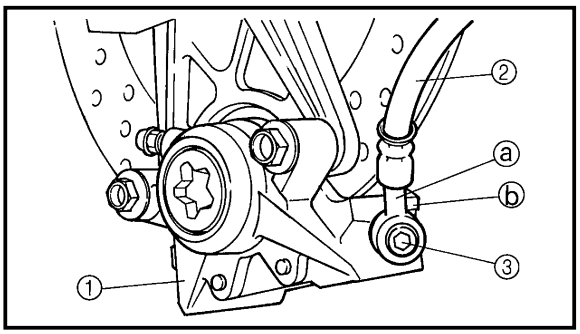
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EB702378
ASSEMBLING AND INSTALLING THE REAR BRAKE CALIPER

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seals.**

Recommended brake fluid
DOT 4



1. Install:
   - brake caliper ① (temporarily)
   - copper washers New
   - brake hose ②
   - union bolt ③

   30 Nm (3.0 m · kg, 22 ft · lb)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake caliper ①, make sure that the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

2. Remove:
   - brake caliper
3. Install:
   - brake pads
   - brake pad springs
   - brake caliper

   40 Nm (4.0 m · kg, 29 ft · lb)

   Refer to "REPLACING THE REAR BRAKE PADS".

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4. Fill:
   • brake fluid reservoir
   (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

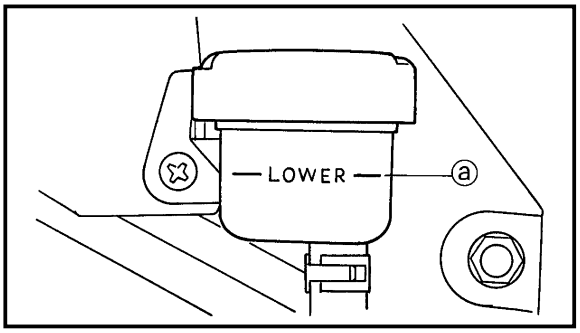
⚠ WARNING

- **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.

5. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

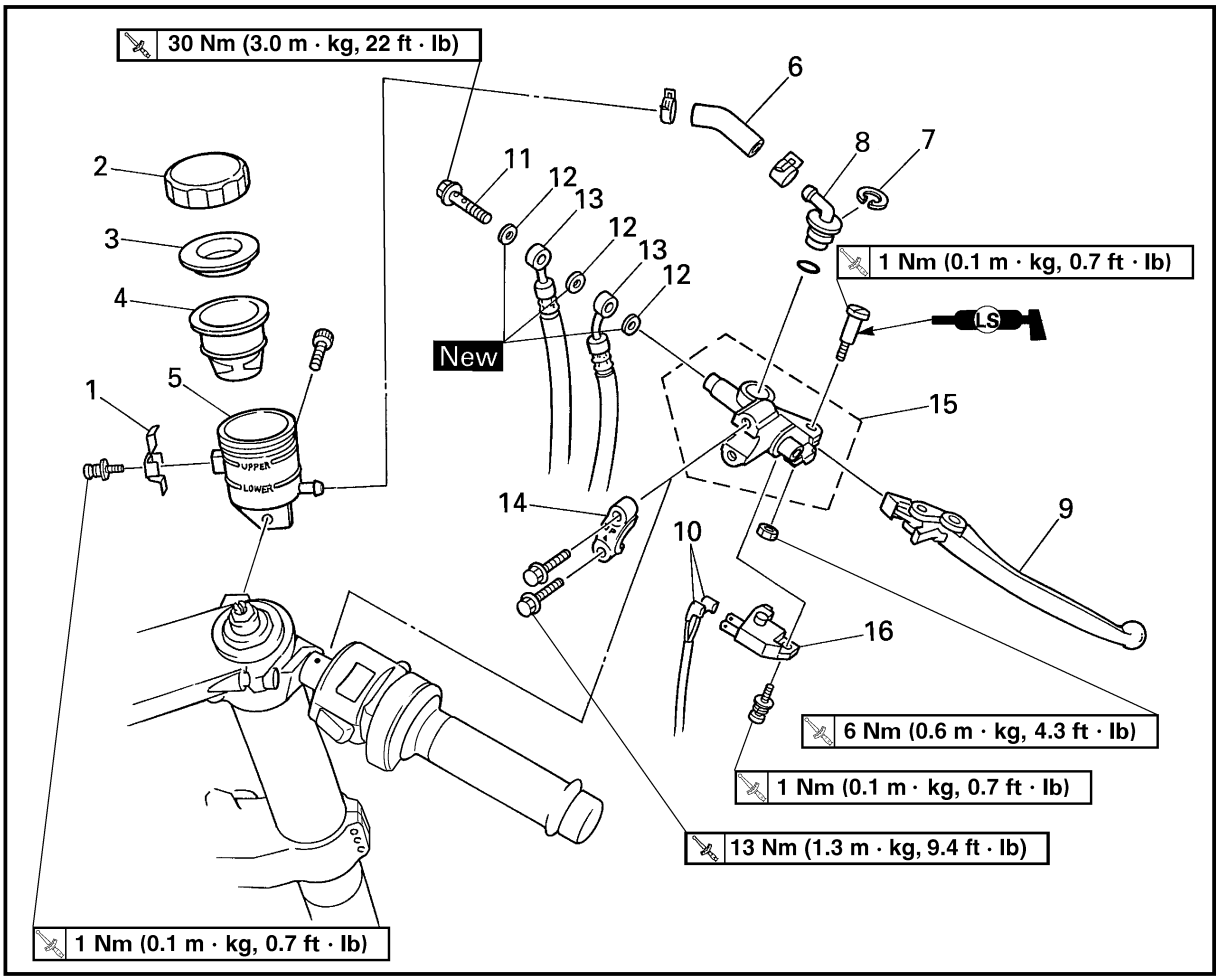


6. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

7. Check:
   • brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

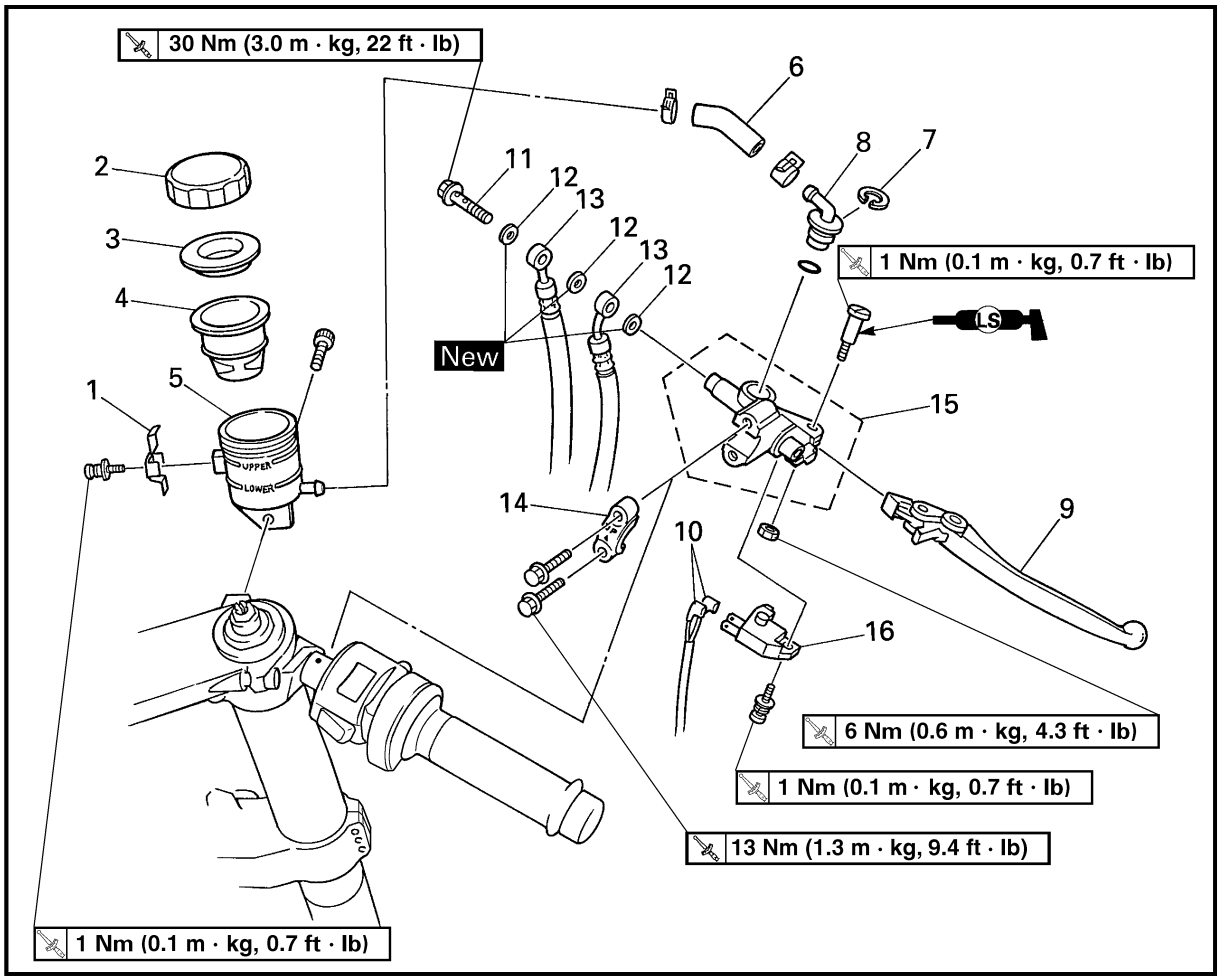
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EB702200



Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder and brake fluid reservoir		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap stopper	1	
2	Brake fluid reservoir cap	1	
3	Brake fluid reservoir diaphragm holder	1	
4	Brake fluid reservoir diaphragm	1	
5	Brake fluid reservoir	1	
6	Brake fluid reservoir hose	1	
7	Circlip	1	
8	Hose joint	1	
9	Brake lever	1	
10	Front brake switch connector	2	Disconnect.
11	Union bolt	1	
12	Copper washer	3	

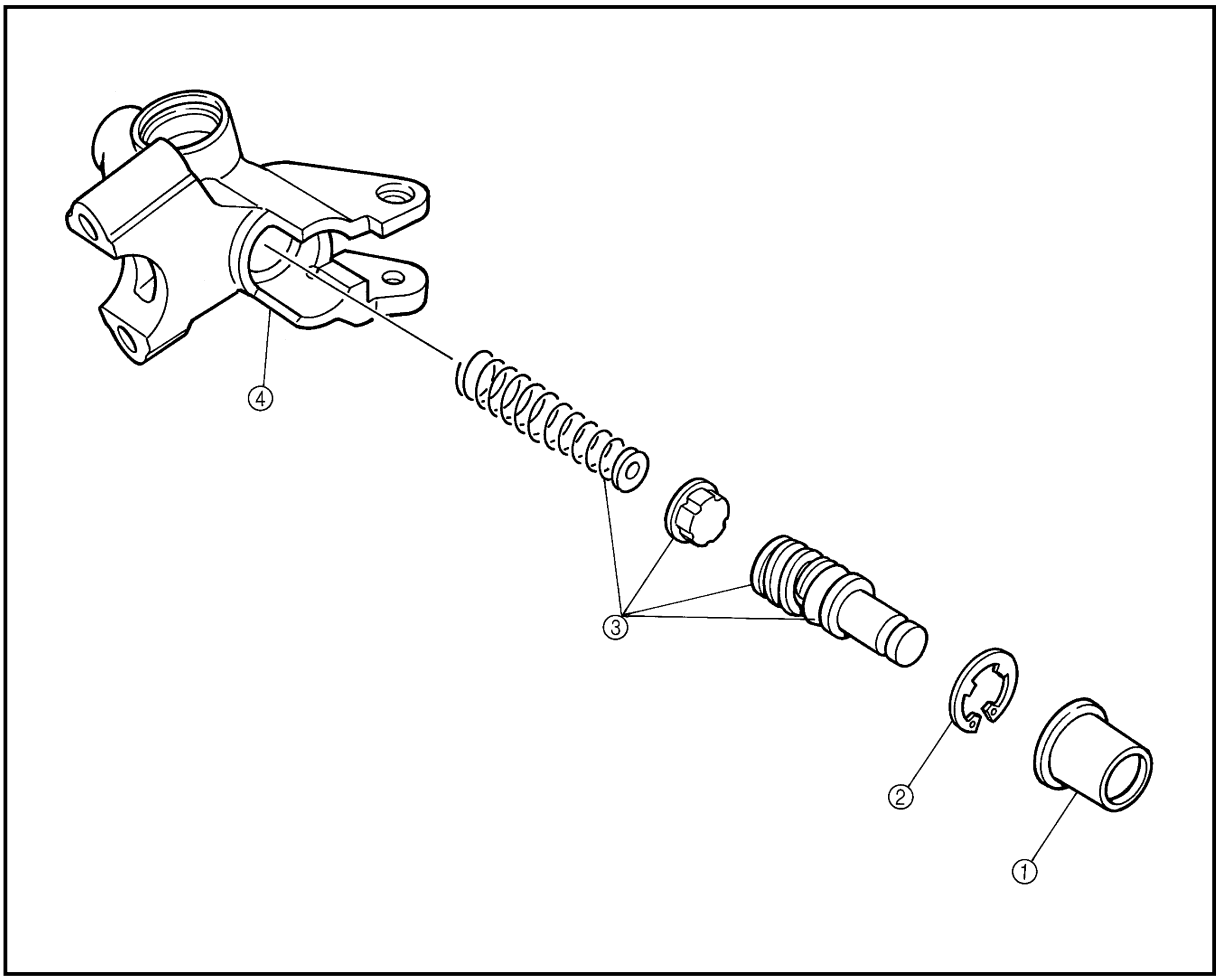
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Order	Job/Part	Q'ty	Remarks
13	Brake hose	2	
14	Brake master cylinder holder	1	
15	Brake master cylinder	1	
16	Front brake switch	1	
			For installation, reverse the removal procedure.

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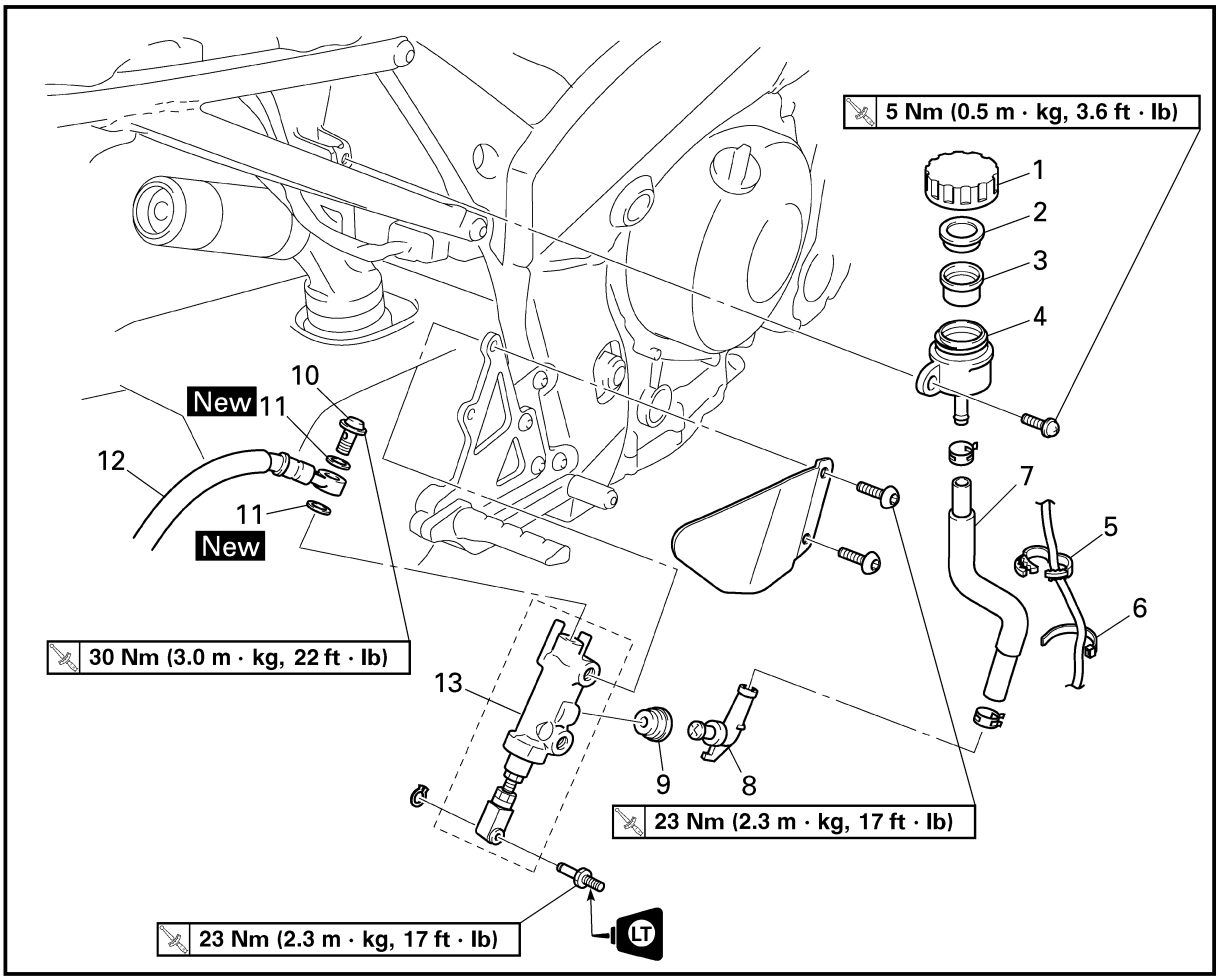
EB702201



Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake master cylinder		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Brake master cylinder kit	1	
④	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

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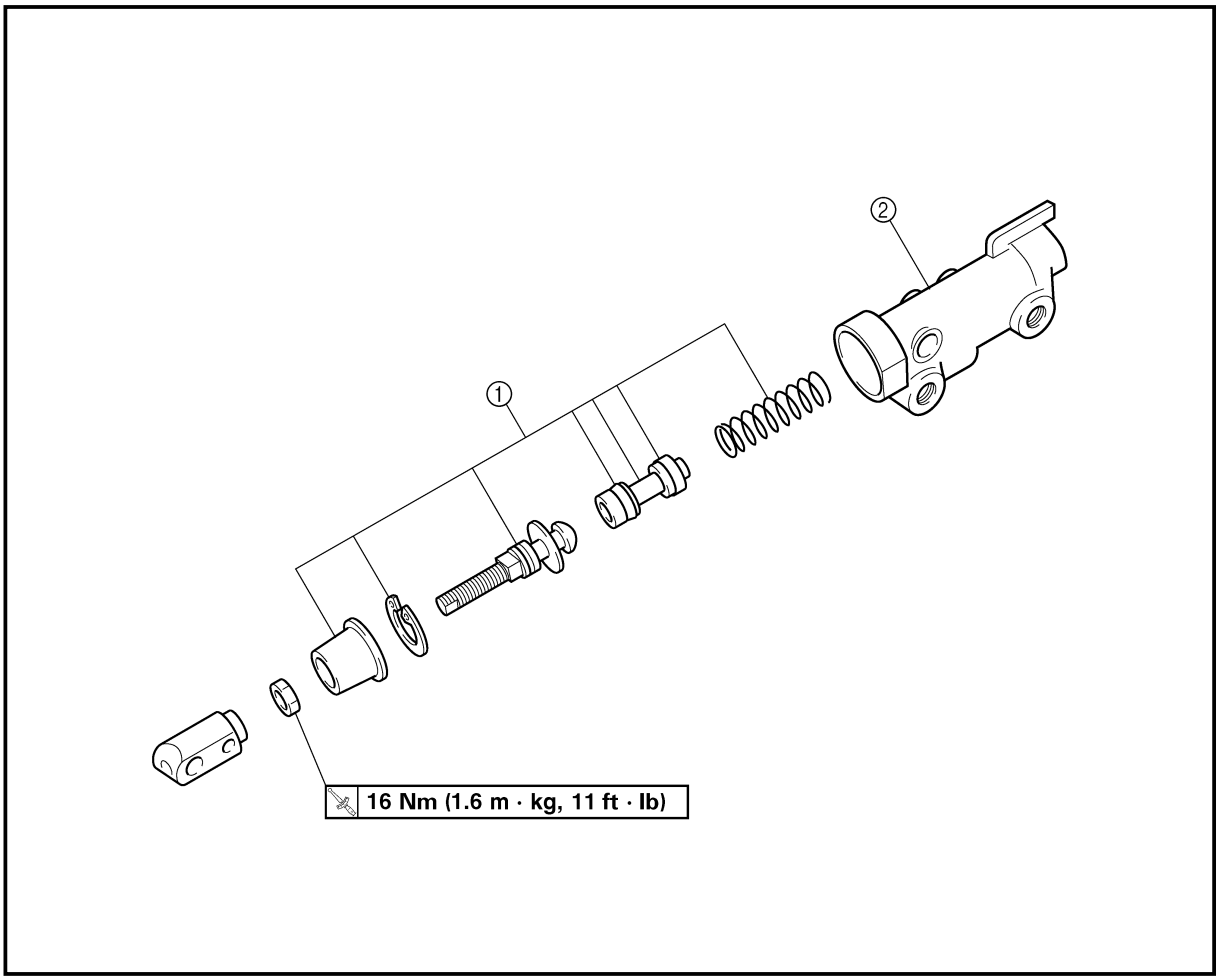
EB702202



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder and brake fluid reservoir		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Plastic clamp	1	
6	Plastic locking tie	1	
7	Brake fluid reservoir hose	1	
8	Hose joint	1	
9	Oil seal	1	
10	Union bolt	1	
11	Copper washer	2	
12	Brake hose	1	
13	Brake master cylinder	1	
			For installation, reverse the removal procedure.

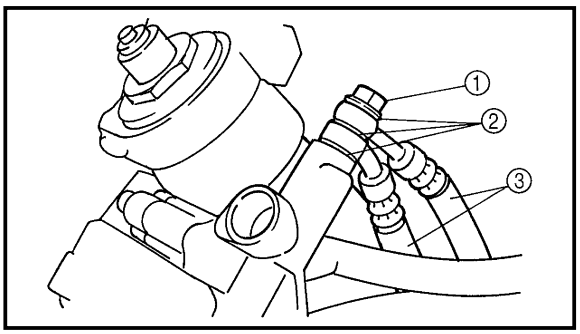
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EB702203



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake master cylinder		Remove the parts in the order listed.
①	Brake master cylinder kit	1	
②	Brake master cylinder	1	
			For assembly, reverse the disassembly procedure.

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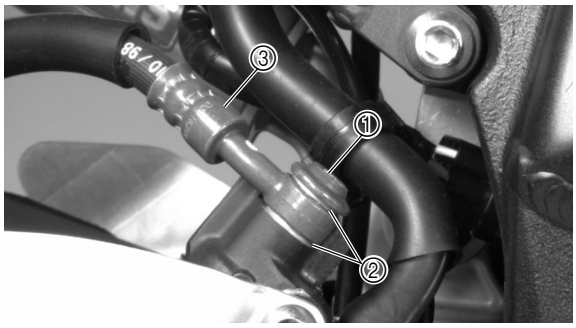


EB702210
DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

NOTE:
Before disassembling the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hoses ③

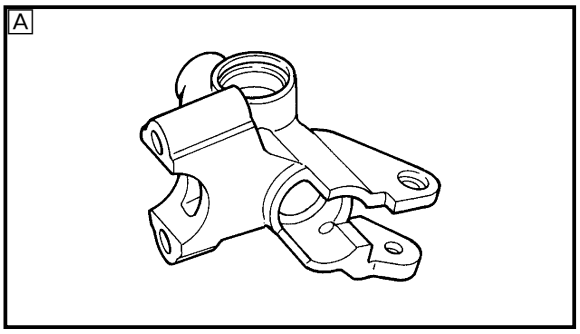
NOTE:
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

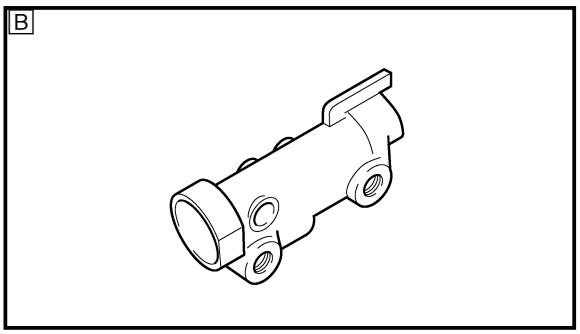


EB702220
DISASSEMBLING THE REAR BRAKE MASTER CYLINDER

1. Remove:
   - union bolt ①
   - copper washers ②
   - brake hose ③

NOTE:
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.





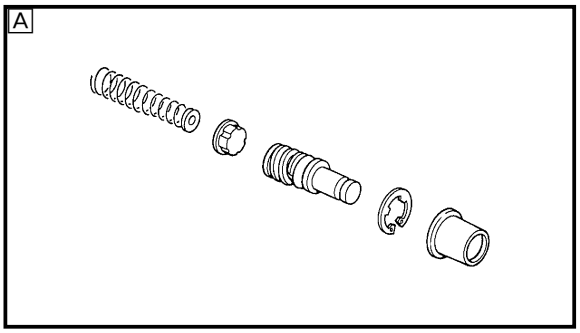
EB702243
CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

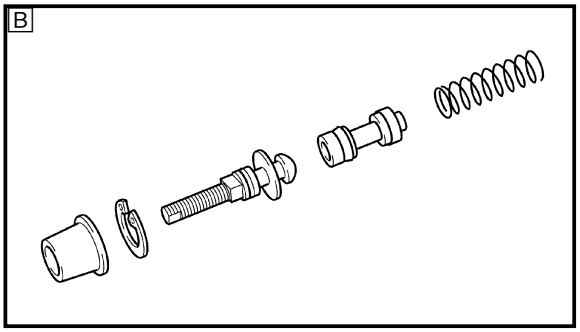
The following procedure applies to both of the brake master cylinders.

1. Check:
   - brake master cylinder
     Damage/scratches/wear → Replace.
   - brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.

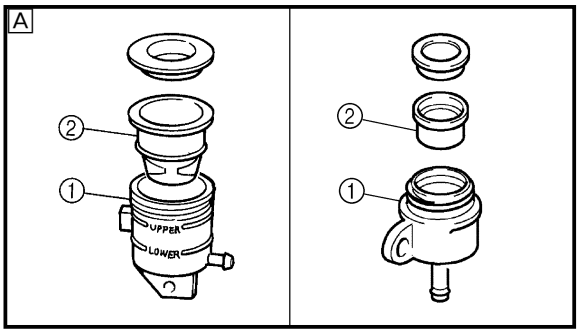
     A Front
     B Rear

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2. Check:
   - brake master cylinder kit
     Damage/scratches/wear → Replace.
     A Front
     B Rear



3. Check:
   - brake fluid reservoir ①
     Cracks/damage → Replace.
   - brake fluid reservoir diaphragm ②
     Cracks/damage → Replace.
4. Check:
   - brake hoses
     Cracks/damage/wear → Replace.

EB702283

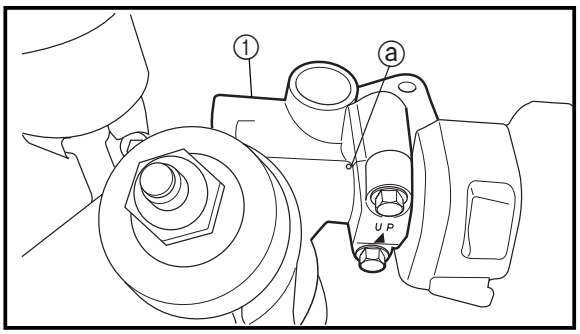
ASSEMBLING AND INSTALLING THE FRONT BRAKE MASTER CYLINDER

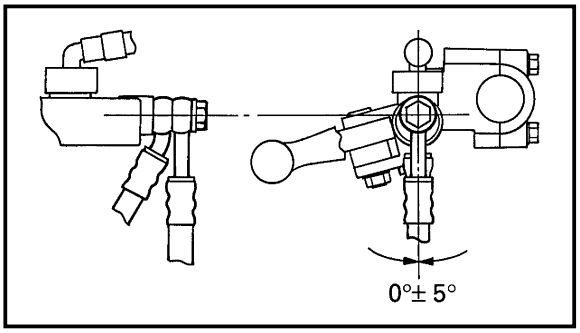
⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**

Recommended brake fluid
DOT 4

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1. Install:
   • brake master cylinder ①

   13 Nm (1.3 m · kg, 9.4 ft · lb)

NOTE:
- Install the brake master cylinder holder with the "UP" mark facing up.
- Align the end of the brake master cylinder holder with the punch mark ⓐ in the right handlebar.
- First, tighten the upper bolt, then the lower bolt.

2. Install:
   • copper washers New
   • brake hose
   • union bolt

   30 Nm (3.0 m · kg, 22 ft · lb)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

NOTE:
- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebars to the left and to the right to make sure that the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

3. Fill:
   • brake fluid reservoir
   (with the specified amount of the recommended brake fluid)

Recommended brake fluid
DOT 4

⚠ WARNING

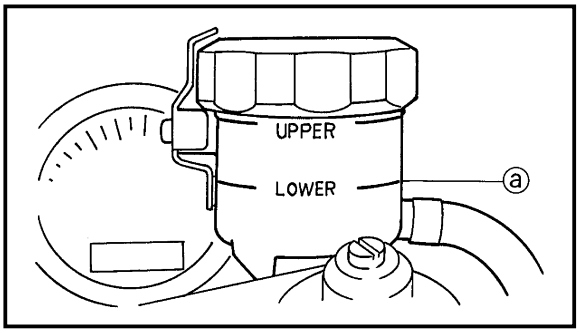
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor 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.**

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CAUTION:

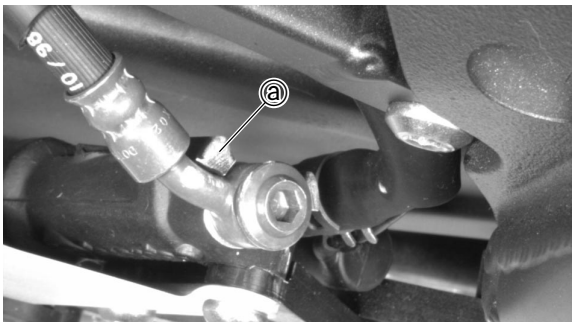
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



5. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

6. Check:
   • brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



EB702290

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   • copper washers New
   • brake hoses
   • union bolt

30 Nm (3.0 m · kg, 22 ft · lb)

⚠ WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the brake hose onto the brake master cylinder, make sure that the brake pipe touches the projection ⓐ as shown.

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2. Fill:
   • brake fluid reservoir

Recommended brake fluid
DOT 4

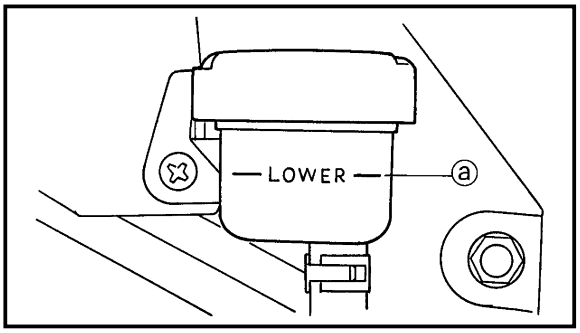
⚠ WARNING

- **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 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.

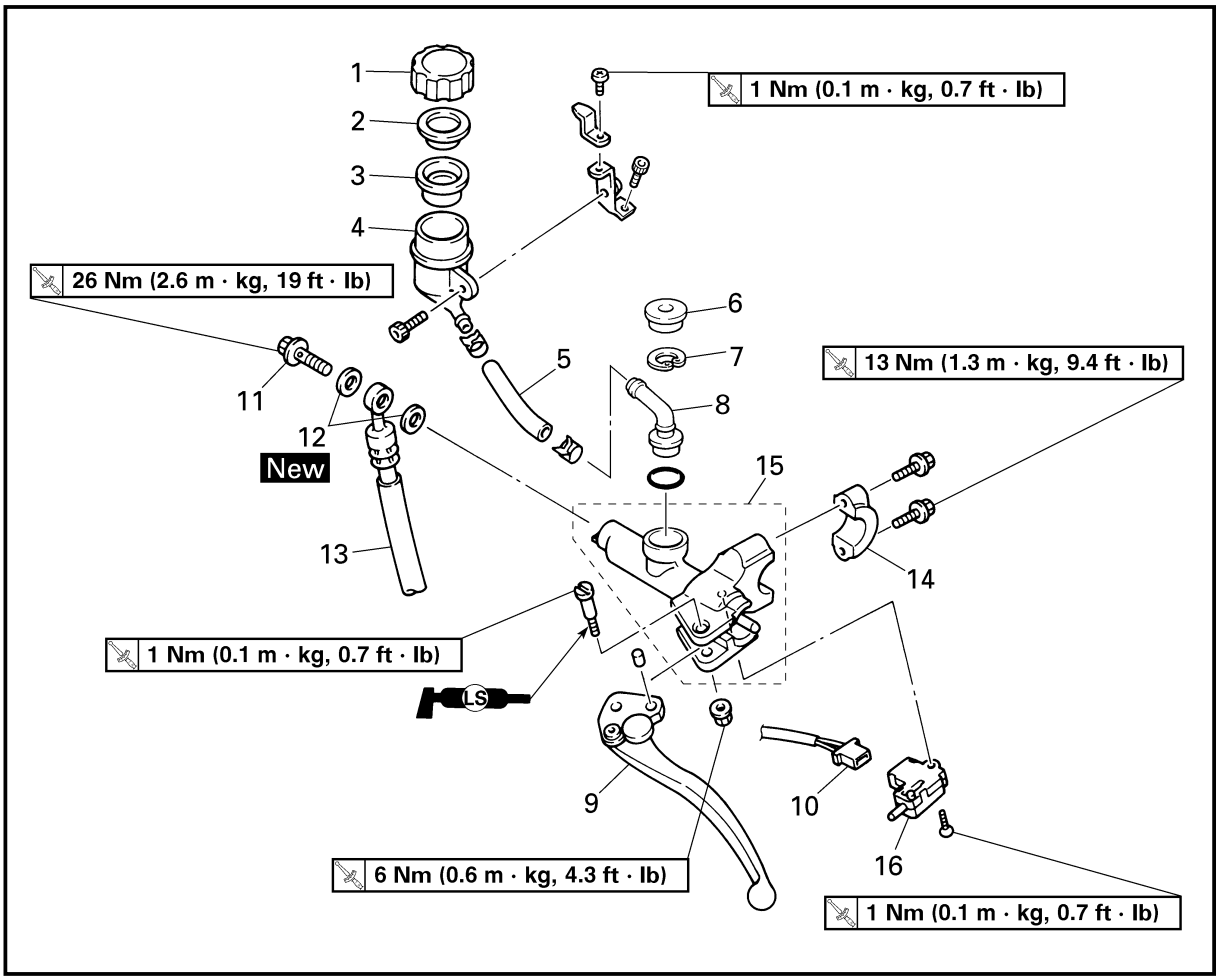
3. Bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



4. Check:
   • brake fluid level
   Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
5. Adjust:
   • brake pedal position
   Refer to "ADJUSTING THE REAR BRAKE" in chapter 3.
6. Adjust:
   • rear brake light operation timing
   Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" in chapter 3.

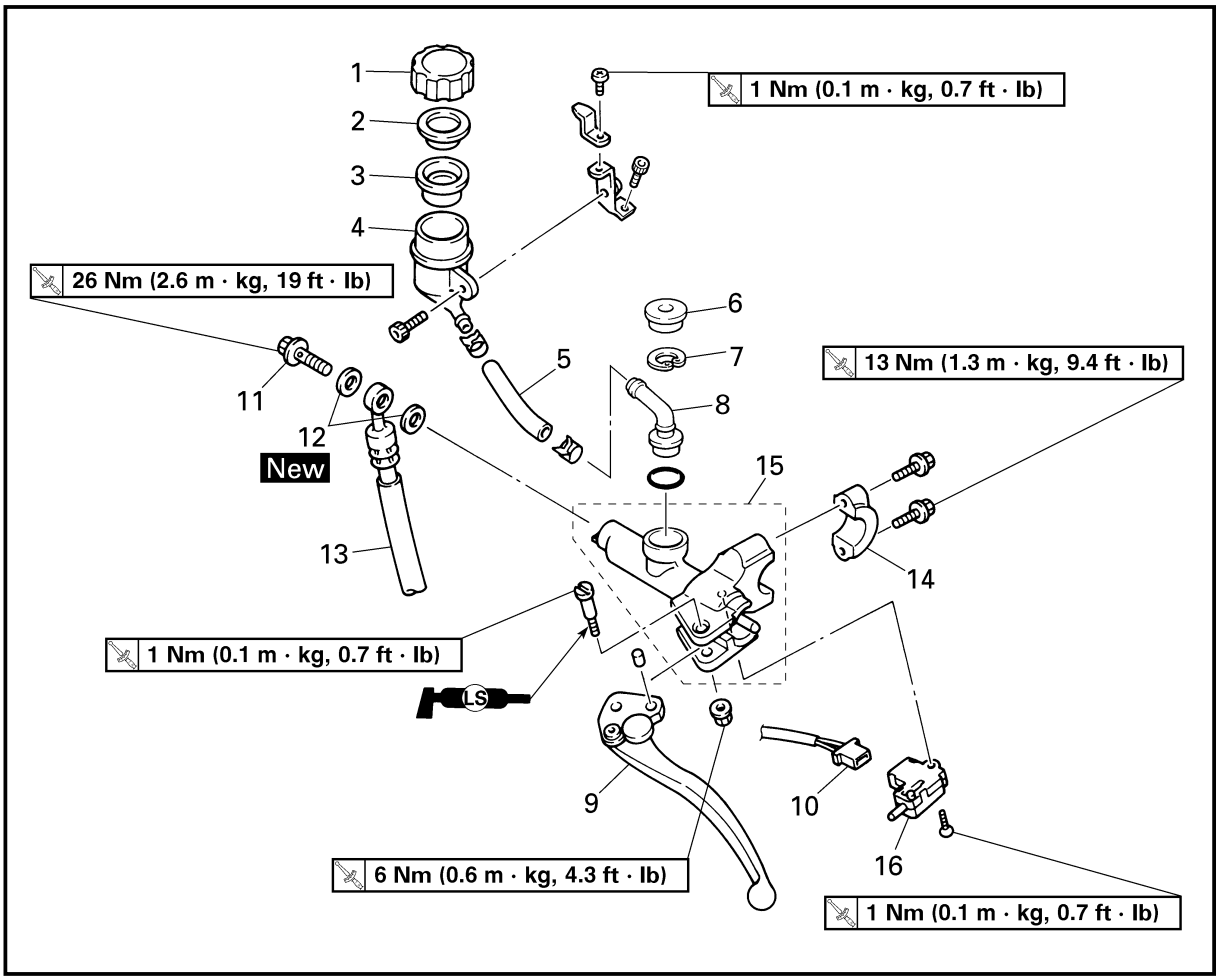
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.EAS00305
HYDRAULIC CLUTCH



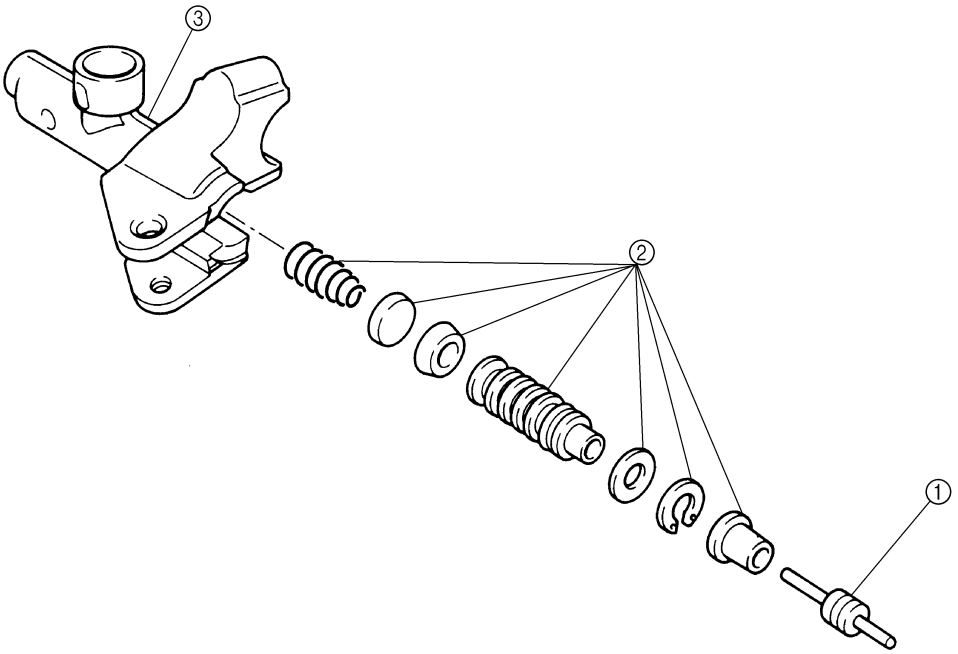
Order	Job/Part	Q'ty	Remarks
	Removing the clutch master cylinder		Remove the parts in the order listed.
	Clutch fluid		Drain.
1	Clutch fluid reservoir cap	1	
2	Clutch fluid reservoir diaphragm holder	1	
3	Clutch fluid reservoir diaphragm	1	
4	Clutch fluid reservoir	1	
5	Clutch fluid reservoir hose	1	
6	Dust seat	1	
7	Circlip	1	
8	Hose joint	1	
9	Clutch lever	1	
10	Clutch switch coupler	1	
11	Union bolt	1	

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Order	Job/Part	Q'ty	Remarks
12	Copper washer	2	
13	Clutch hose	1	
14	Clutch master cylinder holder	1	
15	Clutch master cylinder	1	
16	Clutch switch	1	
			For installation, reverse the removal procedure.

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Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch master cylinder		Remove the parts in the order listed.
①	Push rod	1	
②	Clutch master cylinder kit	1	
③	Clutch master cylinder	1	
			For assembly, reverse the disassembly procedure.

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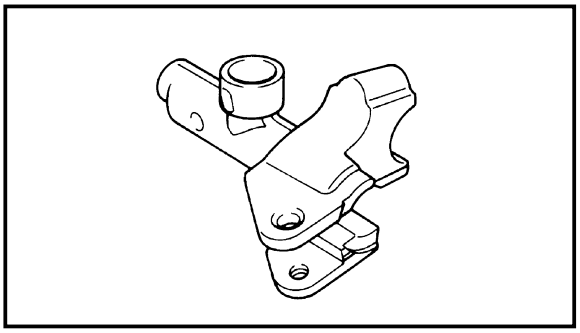
EAS00307

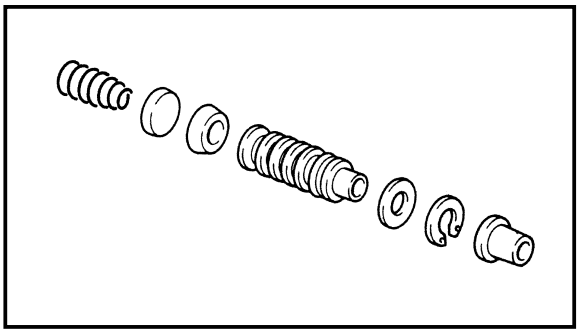
CAUTION:

Clutch components rarely require disassembly.
Therefore, always follow these preventive measures:

- **Never disassemble clutch components unless absolutely necessary.**
- **If any connection on the hydraulic clutch system is disconnected, the entire clutch system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal clutch components.**
- **Use only clean or new clutch fluid for cleaning clutch components.**
- **Clutch fluid may damage painted surfaces and plastic parts. Therefore, always clean up any split fluid immediately.**
- **Avoid clutch fluid coming into contact with the eyes as it can cause serious injury.**

First aid for clutch fluid entering the eyes:
Flush with water for 15 minutes and get immediate medical attention.



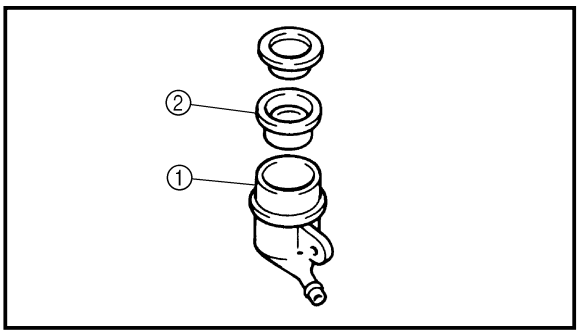


EAS00308

CHECKING THE CLUTCH MASTER CYLINDER

1. Check:
   - clutch master cylinder
     Damage/scratches/wear → Replace the clutch master cylinder.
   - clutch fluid delivery passage
     (clutch master cylinder body)
     Obstruction → Blow out with compressed air.
2. Check:
   - clutch master cylinder kit
     Damage/scratches/wear → Replace.

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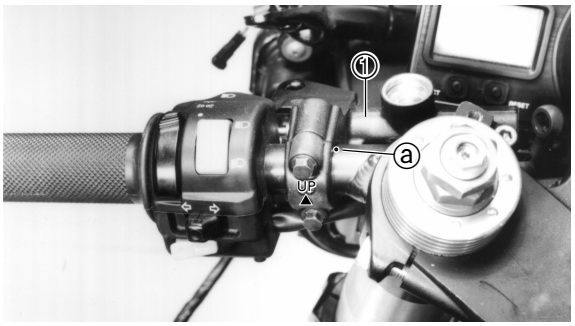
3. Check:
   • clutch fluid reservoir ①
     Cracks/damage → Replace.
   • clutch fluid reservoir diaphragm ②
     Cracks/damage → Replace.
4. Check:
   • clutch hose
     Cracks/damage/wear → Replace.

ASSEMBLING AND INSTALLING THE CLUTCH MASTER CYLINDER

⚠ WARNING

- **Before installation, all internal clutch components must be cleaned and lubricated with clean or new clutch fluid.**
- **Never use solvents on internal clutch components.**

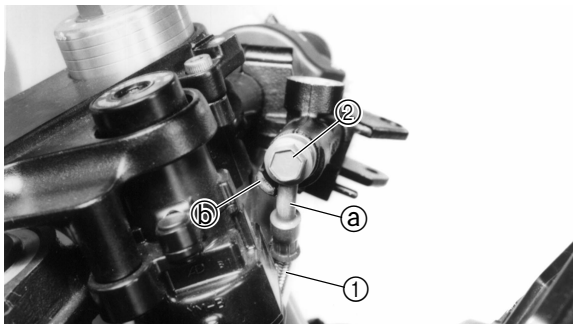
Recommended clutch fluid
Brake fluid DOT 4



1. Install:
   • clutch master cylinder ①

NOTE:
- Install the clutch master cylinder holder with the "UP" mark facing up.
- Align the end of the clutch master cylinder holder with the punch mark ⓐ in the handlebar.
- First, tighten the upper bolt, then the lower bolt.

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2. Install:
   - copper washers New
   - clutch hose ①
   - union bolt ②

26 Nm (2.6 m · kg, 19 ft · lb)

⚠ WARNING

Proper clutch hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the clutch hose onto the clutch master cylinder, make sure that the pipe ⓐ touches the projection ⓑ.

3. Fill:
   - clutch fluid reservoir
     (with the specified amount of the recommended clutch fluid)

Recommended clutch fluid
Brake fluid DOT 4

⚠ WARNING

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

CAUTION:

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.

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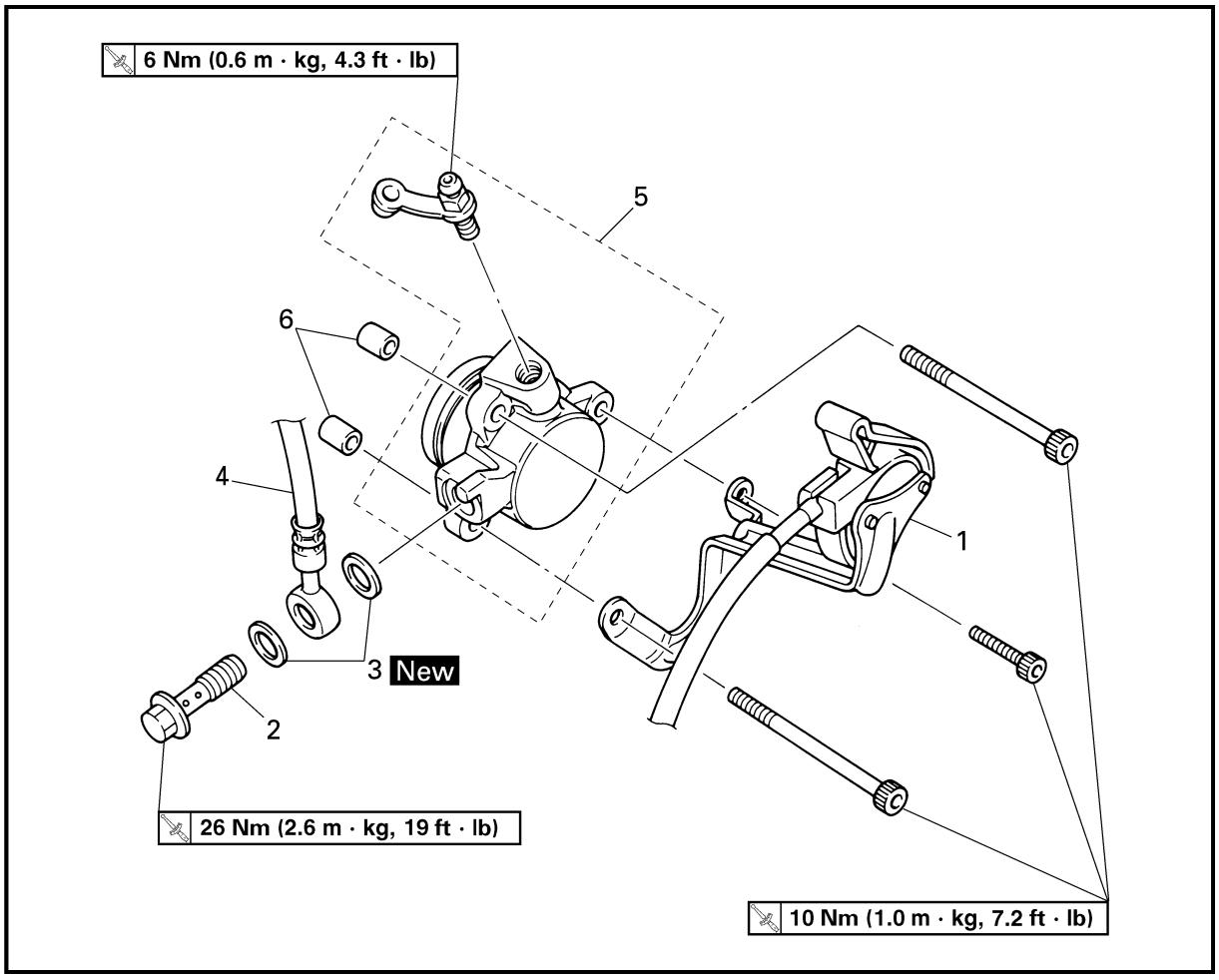
4. Bleed:
   • clutch system
   Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.



5. Check:
   • clutch fluid level
   Below the minimum level mark ⓐ → Add the recommended clutch fluid to the proper level.
   Refer to "CHECKING THE CLUTCH FLUID LEVEL" in chapter 3.
6. Check:
   • clutch lever operation
   Soft or spongy feeling → Bleed the clutch system.
   Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.

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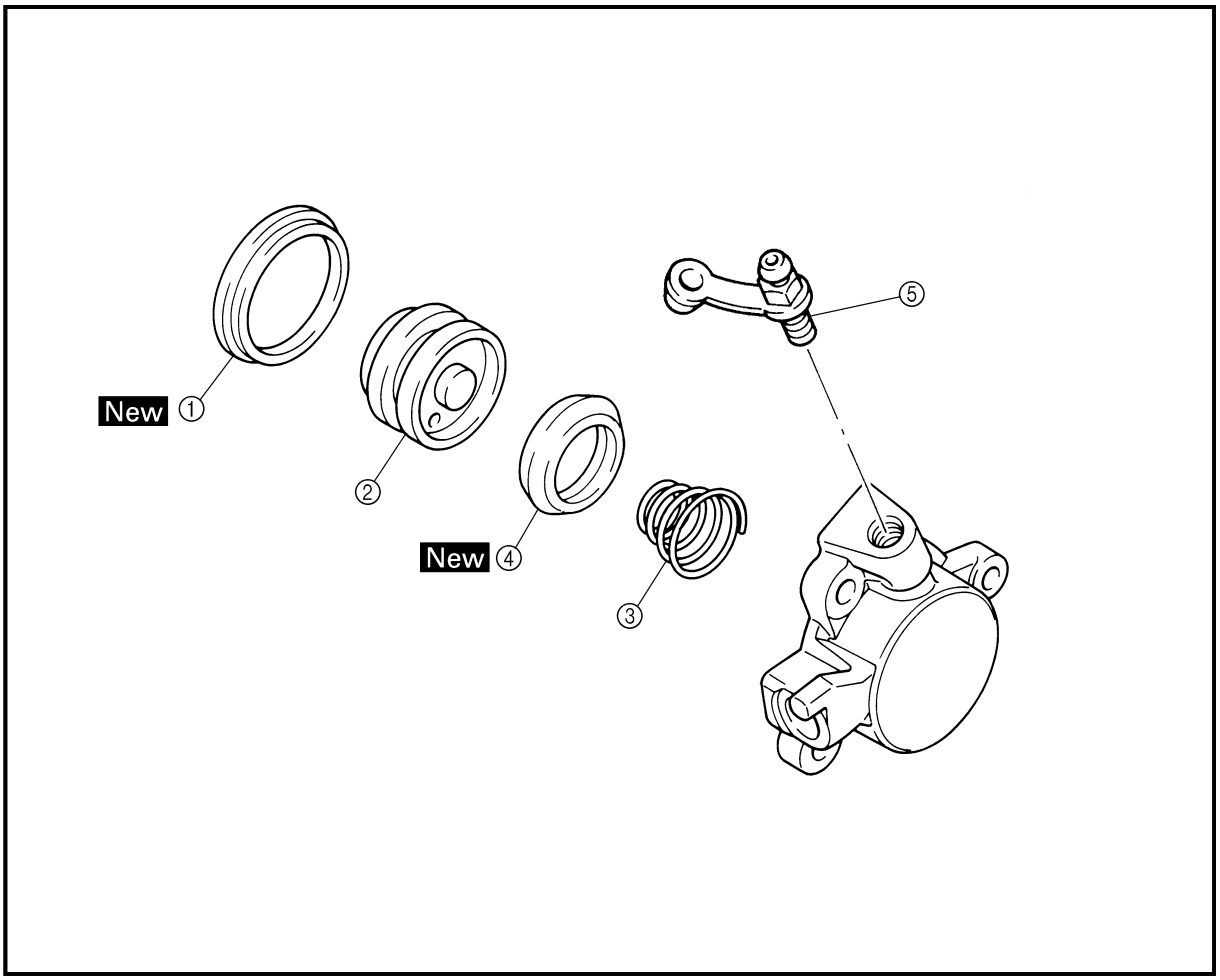
EAS00311



Order	Job/Part	Q'ty	Remarks
	Removing the clutch release cylinder		Remove the parts in the order listed.
	Bottom cowling		Refer to "COWLINGS" in chapter 3.
	Clutch fluid		Drain.
1	Starter knob	1	
2	Union bolt	1	
3	Copper washer	2	
4	Clutch hose	1	
5	Clutch release cylinder assembly	1	
6	Dowel pin	2	
			For installation, reverse the removal procedure.

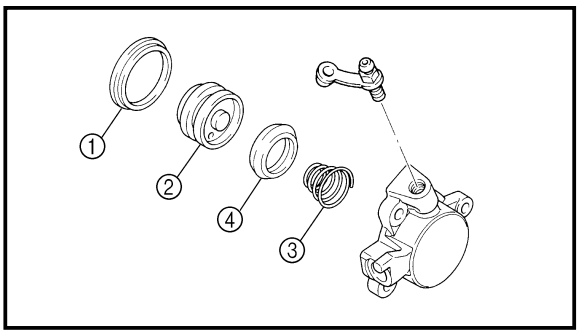
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EAS00312



Order	Job/Part	Q'ty	Remarks
	Disassembling the clutch release cylinder		Remove the parts in the order listed.
①	Dust seal	1	
②	Clutch release cylinder piston	1	
③	Spring	1	
④	Oil seal	1	
⑤	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

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EAS00313
DISASSEMBLING THE CLUTCH RELEASE CYLINDER

1. Remove:
   - dust seal ①
   - clutch release cylinder piston ②
   - spring ③
   - oil seal ④

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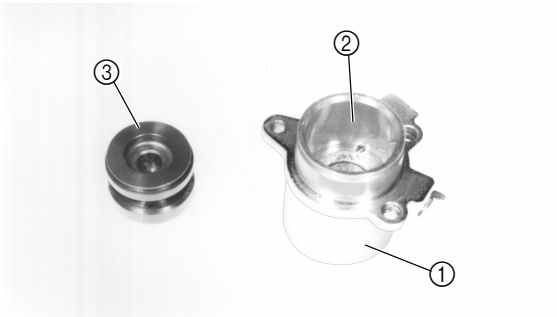
a. Blow compressed air into the clutch hose joint opening a to force out the piston from the clutch release cylinder.

⚠ WARNING

- **Cover the clutch release cylinder with a rag. Be careful not to get injured when the piston is expelled from the clutch release cylinder.**
- **Never try to pry out the clutch release cylinder piston.**

b. Remove the clutch release cylinder oil seal.

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EAS00314
CHECKING THE CLUTCH RELEASE CYLINDER

1. Check:
   - clutch release cylinder body ①
     Cracks/damage → Replace the clutch release cylinder.
   - clutch release cylinder ②
   - clutch release cylinder piston ③
     Rust/scratches/wear → Replace the clutch release cylinder and clutch release cylinder piston as a set.

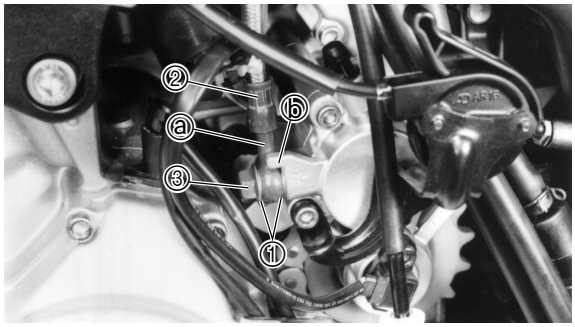
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EAS00315
ASSEMBLING AND INSTALLING THE CLUTCH RELEASE CYLINDER

⚠ WARNING

- **Before installation, all internal clutch components must be cleaned and lubricated with clean or new clutch fluid.**
- **Never use solvents on internal clutch components as they will cause the oil seal and dust seal to swell and distort.**
- **Whenever a clutch release cylinder is disassembled, replace the oil seal and dust seal.**

Recommended clutch fluid
Brake fluid DOT 4



1. Check:
   - copper washer ① New
   - clutch hose ②
   - union bolt ③

26 Nm (2.6 m · kg, 19 ft · lb)

⚠ WARNING

Proper clutch hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

CAUTION:

When installing the clutch hose onto the clutch release cylinder, make sure that the pipe ⓐ touches the projection ⓑ.

2. Fill:
   - clutch fluid reservoir
     (with the specified amount of the recommended clutch fluid)

Recommended clutch fluid
Brake fluid DOT 4

⚠ WARNING

- **Use only the designated clutch fluid. Other clutch fluids may cause the rubber seals to deteriorate, causing leakage and poor clutch performance.**
- **Refill with the same type of clutch fluid that is already in the system. Mixing clutch fluids may result in a harmful chemical reaction, leading to poor clutch performance.**

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- **When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the clutch fluid and could cause vapor lock.**

CAUTION:

Clutch fluid may damage painted surfaces or plastic parts. Therefore, always clean up any spilt clutch fluid immediately.

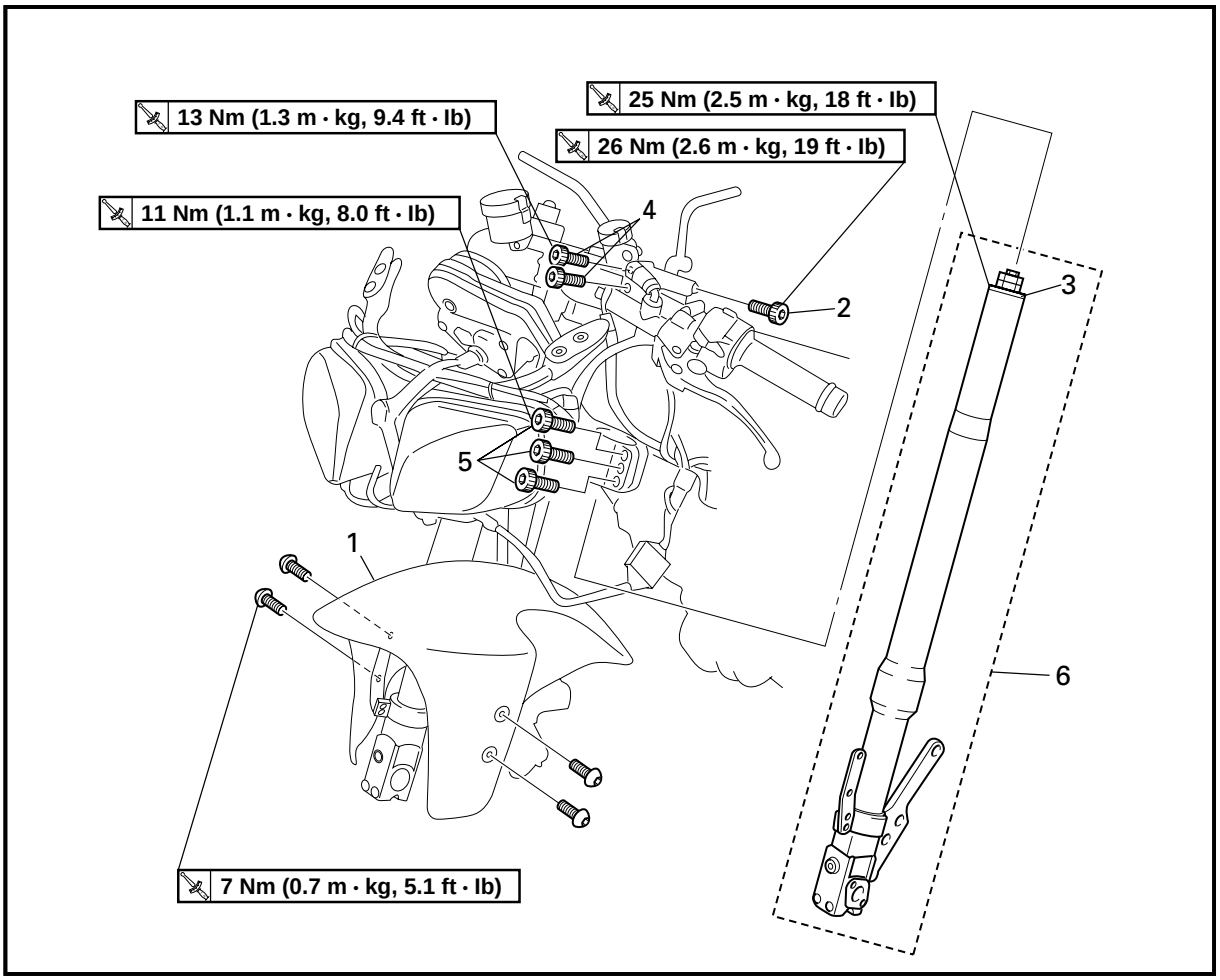
3. Bleed:
   - clutch system
     Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.



4. Check:
   - clutch fluid level
     Below the minimum level mark ⓐ → Add the recommended clutch fluid to the proper level.
     Refer to "CHECKING THE CLUTCH FLUID LEVEL" in chapter 3.
5. Check:
   - clutch lever operation
     Soft or spongy feeling → Bleed the clutch system.
     Refer to "BLEEDING THE HYDRAULIC CLUTCH SYSTEM" in chapter 3.

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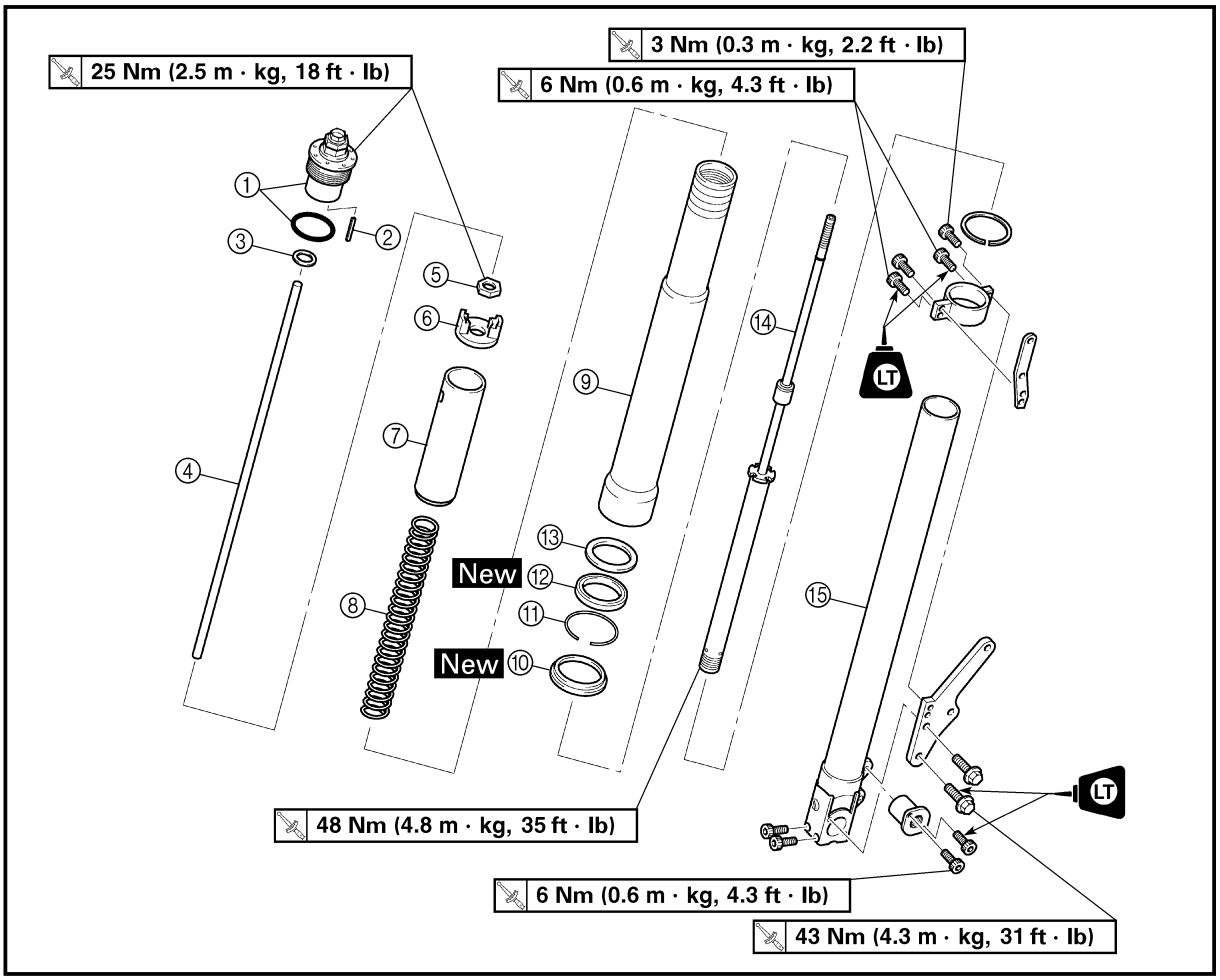
EB703001
FRONT FORK



Order	Job/Part	Q'ty	Remarks
	Removing the front fork legs		Remove the parts in the order listed.
			The following procedure applies to both of the front fork legs.
	Bottom cowling and front cowling		Refer to "COWLINGS" in chapter 3.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
1	Front fender	1	
2	Upper bracket pinch bolt	1	Loosen.
3	Cap bolt	1	Loosen.
4	Handlebar pinch bolt	2	
5	Lower bracket pinch bolt	3	
6	Front fork leg	1	
			For installation, reverse the removal procedure.

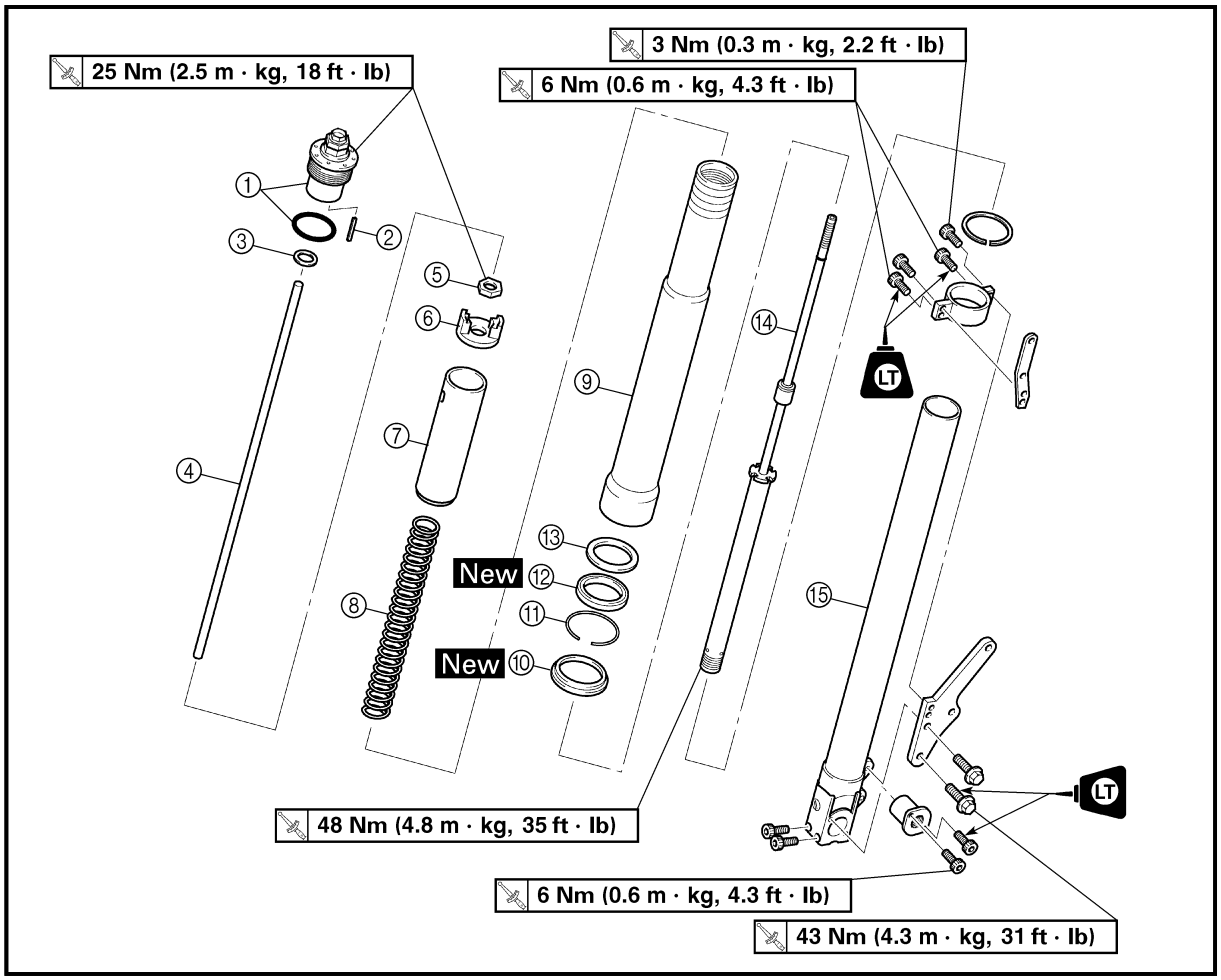
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EB703002



Order	Job/Part	Q'ty	Remarks
	Disassembling the front fork legs		Remove the parts in the order listed. The following procedure applies to both of the front fork legs.
①	Cap bolt/O-ring	1/1	
②	Straight key	1	
③	Washer	1	
④	Damper adjusting rod	1	
⑤	Nut	1	
⑥	Spring seat	1	
⑦	Spacer	1	
⑧	Fork spring	1	
⑨	Outer tube	1	
⑩	Dust seal	1	
⑪	Oil seal clip	1	
⑫	Oil seal	1	
⑬	Washer	1	

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Order	Job/Part	Q'ty	Remarks
⑭	Damper rod assembly	1	
⑮	Inner tube	1	
			For assembly, reverse the disassembly procedure.

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EB703100
REMOVING THE FRONT FORK LEGS

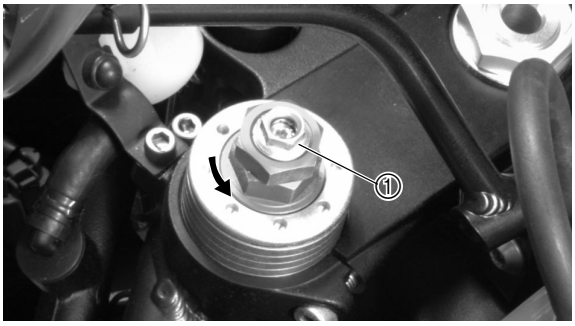
The following procedure applies to both of the front fork legs.

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the front wheel is elevated.



2. Adjust:
   • spring preload

NOTE:
Turn the adjusting bolt ① in fully so that it sits lightly. Refer to "ADJUSTING THE FRONT FORK LEGS" in chapter 3.



3. Loosen:
   • upper bracket pinch bolt ①
   • cap bolt ②
   (with the front fork cap bolt wrench)



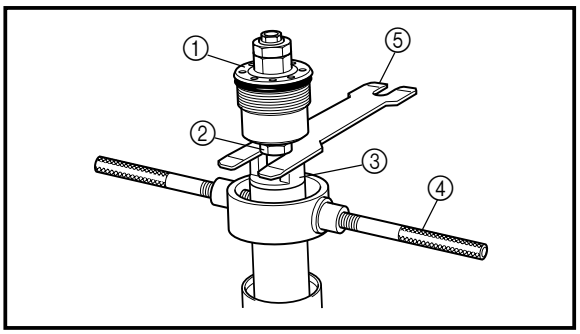
Front fork cap bolt wrench:
90890-01472

   • handlebar pinch bolts
   • lower bracket pinch bolts

⚠ WARNING

Before loosening the upper and lower bracket pinch bolts and handlebar pinch bolt, support the front fork leg.

4. Remove:
   • front fork leg



EB703113
DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Remove:
   • cap bolt ①
   (from the damper rod assembly)
   • straight key
   • washer
   • damper adjusting rod

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- nut ②
- spring seat ③
- spacer

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a. Press down on the spacer with the fork spring compressor ④.

b. Install the rod holder ⑤ between the nut ② and the spring seat ③.



Fork spring compressor
90890-01441
Rod holder
90890-01434

NOTE:
Use the side of the rod holder that is marked "A".

c. Loosen the nut.

d. Remove the cap bolt, straight key, washer and damper adjusting rod.

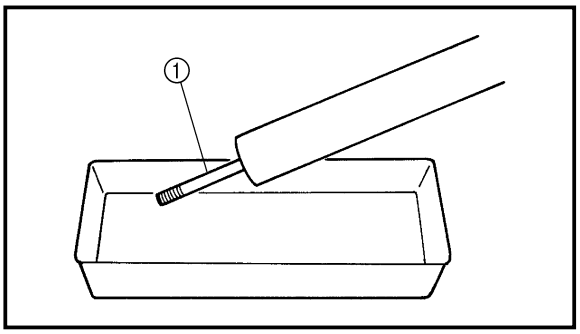
e. Remove the rod holder and fork spring compressor.

⚠ WARNING

The fork spring is compressed.

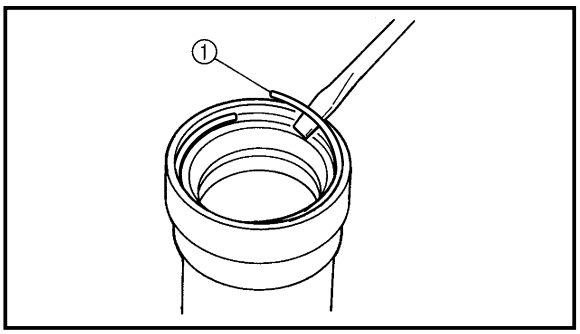
f. Remove the nut, spring seat and spacer.

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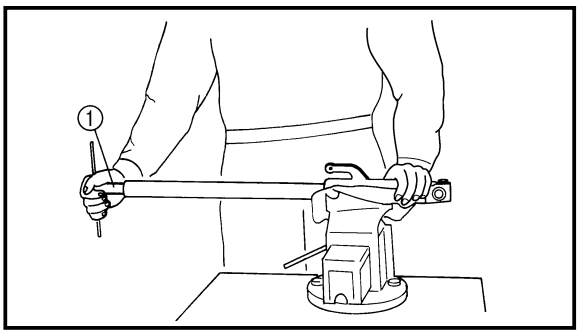
2. Drain:
   - fork oil

NOTE:
Stroke the damper rod ① several times while draining the fork oil.



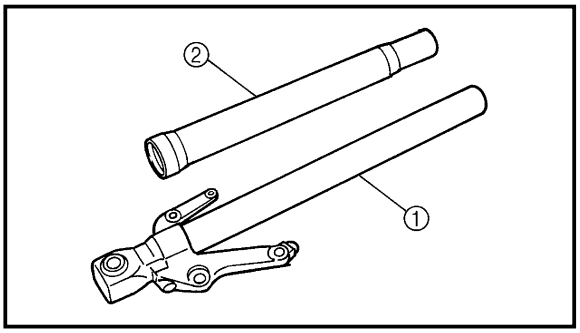
3. Remove:
   - outer tube
     (from inner tube)
4. Remove:
   - dust seal
   - oil seal clip ①
   - oil seal
   - washer
     (with a flat-head screwdriver)

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5. Remove:
   • damper rod assembly
   (with the damper rod holder ①)

	Damper rod holder **90890-01473**



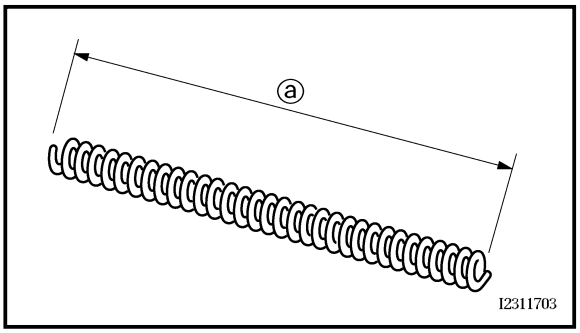
EB703401
CHECKING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Check:
   • inner tube ①
   • outer tube ②
   Bends/damage/scratches → Replace.

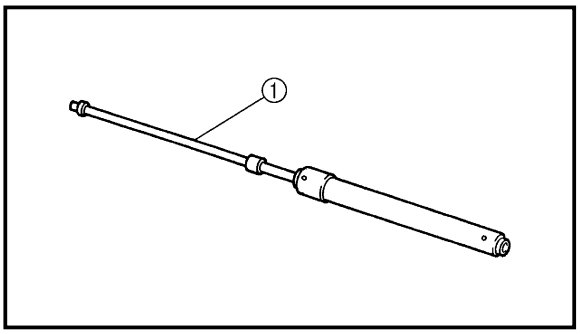
⚠ WARNING

Do not attempt to straighten a bent inner tube as this may dangerously weaken it.



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

	Spring free length limit **240 mm (9.45 in)**

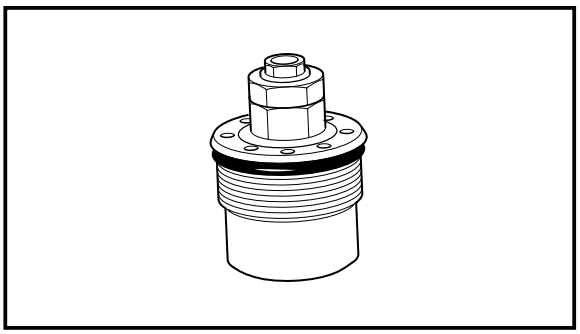


3. Check:
   • damper rod ①
   Damage/wear → Replace.
   Obstruction → Blow out all of the oil passages with compressed air.

CAUTION:

- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

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4. Check:
   • cap bolt O-ring
   Damage/wear → Replace.

EB703702
ASSEMBLING THE FRONT FORK LEGS

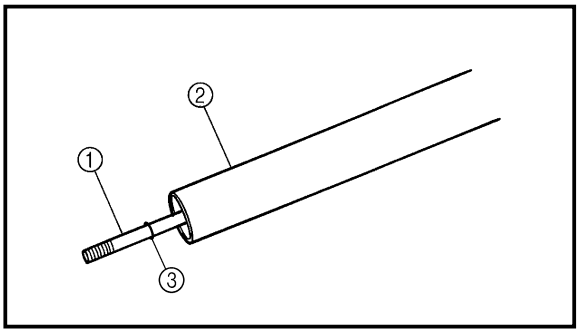
The following procedure applies to both of the front fork legs.

⚠ WARNING

- **Make sure that the oil levels in both front fork legs are equal.**
- **Uneven oil levels can result in poor handling and a loss of stability.**

NOTE:

- When assembling the front fork leg, be sure to replace the following parts:
  - inner tube bushing
  - outer tube bushing
  - oil seal
  - dust seal
- Before assembling the front fork leg, make sure that all of the components are clean.



1. Install:
   • damper rod assembly ①

CAUTION:

Allow the damper rod assembly to slide slowly down the inner tube ② until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

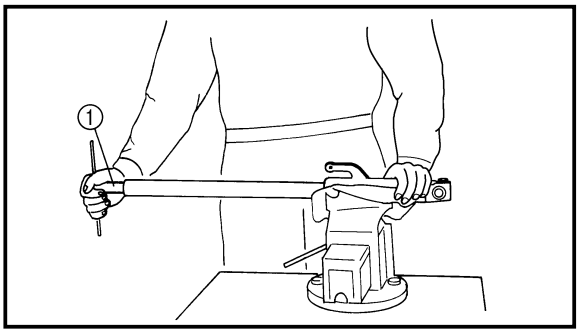
NOTE:

Be sure that the clip ③ is still correctly installed.

2. Lubricate:
   • inner tube's outer surface

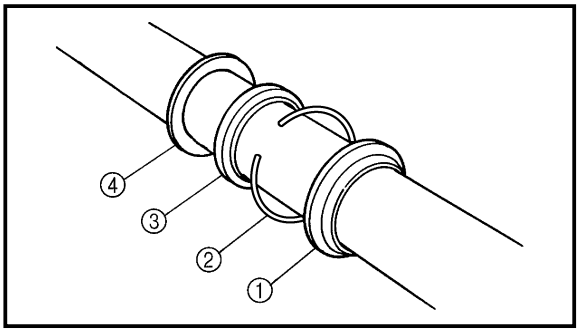
Recommended lubricant
Yamaha fork and shock oil M1 or equivalent

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3. Tighten:
   • damper rod assembly
   48 Nm (4.8 m · kg, 35 ft · lb)
   (with the damper rod holder ①)

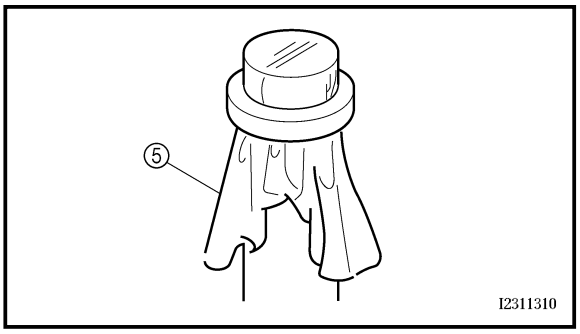
Damper rod holder
90890-01473



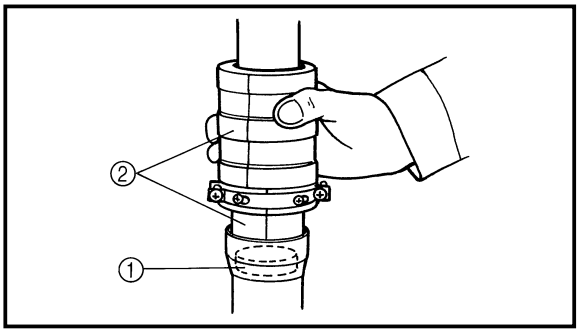
4. Install:
   • dust seal ①
   • oil seal clip ②
   • oil seal ③
   • washer ④

CAUTION:
Make sure that the numbered side of the oil seal faces up.

NOTE:
• Before installing the oil seal, lubricate its lips with lithium soap base grease.
• Lubricate the outer surface of the inner tube with fork oil.
• Before installing the oil seal, cover the top of the front fork leg with a plastic bag ⑤ to protect the oil seal during installation.

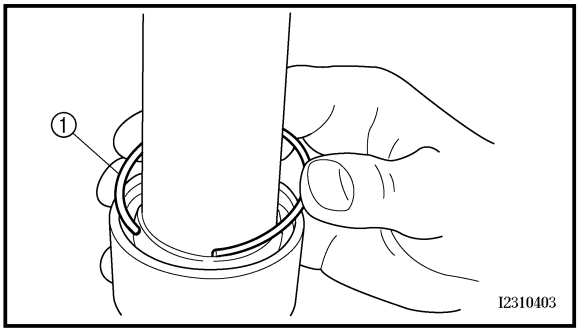


5. Install:
   • outer tube
   (onto the inner tube)



6. Install:
   • washer
   • oil seal ①
   (with the fork seal driver ②)

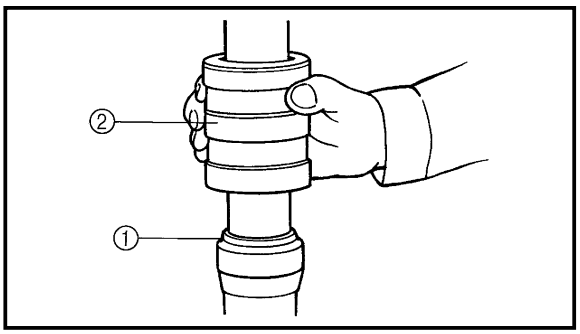
Fork seal driver
90890-01442



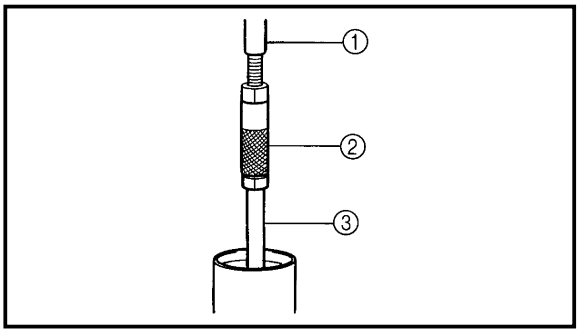
7. Install:
   • oil seal clip ①

NOTE:
Adjust the oil seal clip so that it fits into the outer tube's groove.

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8. Install:
   • dust seal ①
   (with the fork seal driver ②)



9. Install:
   • rod puller ①
   • adapter ②
   (onto the damper rod ③)

Rod puller
90890-01437
Adapter
90890-01436

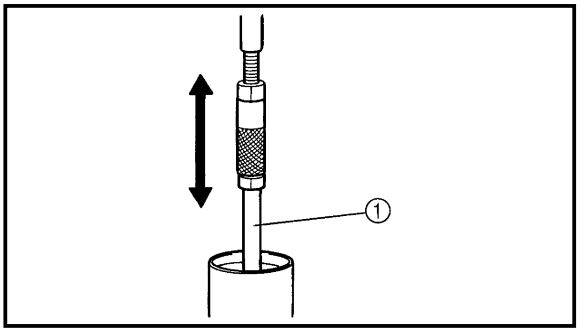
10. Fully compress the front fork leg.

11. Fill:
   • front fork leg
   (with the specified amount of the recommended fork oil)

Quantity (each front fork leg)
460 cm³
(16.2 Imp oz, 15.6 US oz)
Recommended oil
Yamaha fork and shock oil 01 or equivalent

CAUTION:

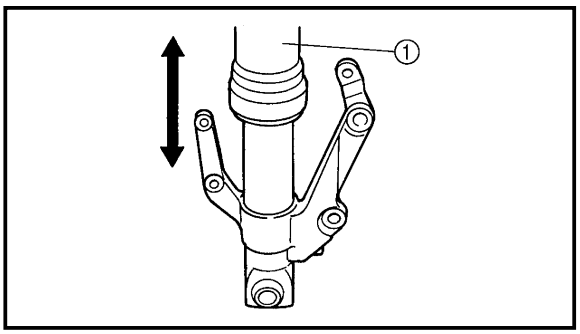
- **Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



12. After filling the front fork leg, slowly stroke the damper rod ① up and down (at least ten times) to distribute the fork oil.

NOTE:
Be sure to stroke the damper rod slowly because the fork oil may spurt out.

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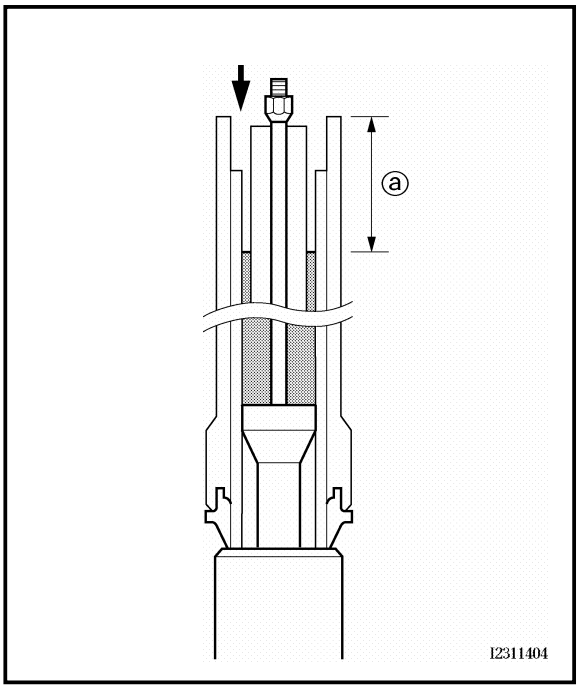


13. Slowly stroke the outer tube ① up and down to distribute the fork oil once more (1 stroke = about 100 mm, 3.94 in).

NOTE:
Be careful not to stroke the inner tube over 100 mm as this will cause air to enter. If the inner tube is stroked more than 100 mm, repeat steps (12) and (13).

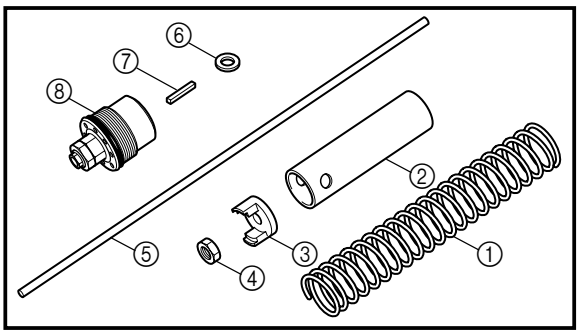
14. Before measuring the fork oil level, wait ten minutes until the oil has settled and the air bubbles have dispersed.

NOTE:
Be sure to bleed the front fork leg of any residual air.



15. Measure:
- front fork leg oil level ⓐ
  Out of specification → Correct.

Front fork leg oil level (from the top of the outer tube, with the outer tube fully down, and without the spring)
170 mm (6.69 in)



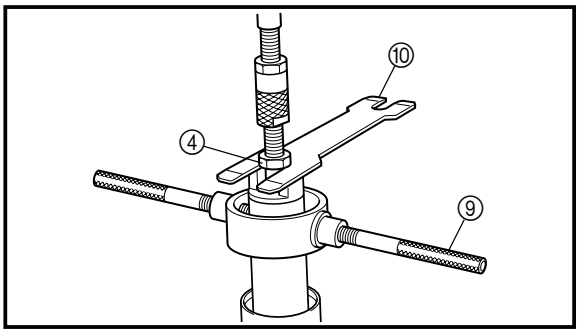
16. Install:
- fork spring ①
- spacer ②
- spring seat ③
- nut ④
- damper adjusting rod ⑤
- washer ⑥
- straight key ⑦
- cap bolt ⑧

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a. Remove the rod puller and adapter.

b. Install the nut.

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c. Install the fork spring, spacer, spring seat and nut.

NOTE:
Finger tighten the nut onto the winding at the damper rod end.

d. Install the rod puller and adapter onto the damper rod.

Rod puller
90890-01437
Adapter
90890-01436

e. Press down on the spacer with the fork spring compressor ⑨.

f. Pull up the rod puller and install the rod holder ⑩ between the nut ④ and the spring seat.

NOTE:
Use the side of the rod holder that is marked "A".

Fork spring compressor
90890-01441
Rod holder
90890-01434

g. Remove the rod puller and adapter.

h. Install the damper adjusting rod, washer, straight key and cap bolt, and then finger tighten the cap bolt.

NOTE:
- Make sure that the spring preload adjusting bolt at the top of cap bolt is fully, but lightly tightened.
- Insert the cap bolt fully into the damper rod.

i. Hold the cap bolt and tighten the nut.

Nut
25 Nm (2.5 m • kg, 18 ft • lb)

j. Remove the rod holder and fork spring compressor.

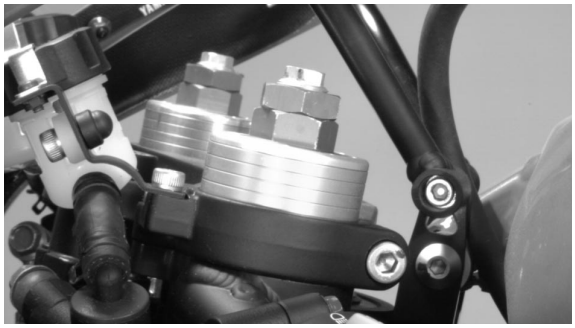
⚠ WARNING
- **The fork spring is compressed.**
- **Always use a new cap bolt O-ring.**

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17. Install:
    - outer tube
      (onto the cap bolt)

NOTE:
Temporarily tighten the cap bolt.





EB703710
INSTALLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Install:
   - front fork leg
     Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:
Align the top of the upper bracket with fourth groove below the cap bolt.

2. Tighten:
   - lower bracket pinch bolt ①, ②, ③

11 Nm (1.1 m · kg, 8.0 ft · lb)

NOTE:
Tighten the lower bracket pinch bolts ①, ② and ③ in the given order and in two stages. Finally, tighten the pinch bolt ① once more.

   - handlebar pinch bolt

13 Nm (1.3 m · kg, 9.4 ft · lb)

   - cap bolt

25 Nm (2.5 m · kg, 18 ft · lb)

   - upper bracket pinch bolt

26 Nm (2.6 m · kg, 19 ft · lb)

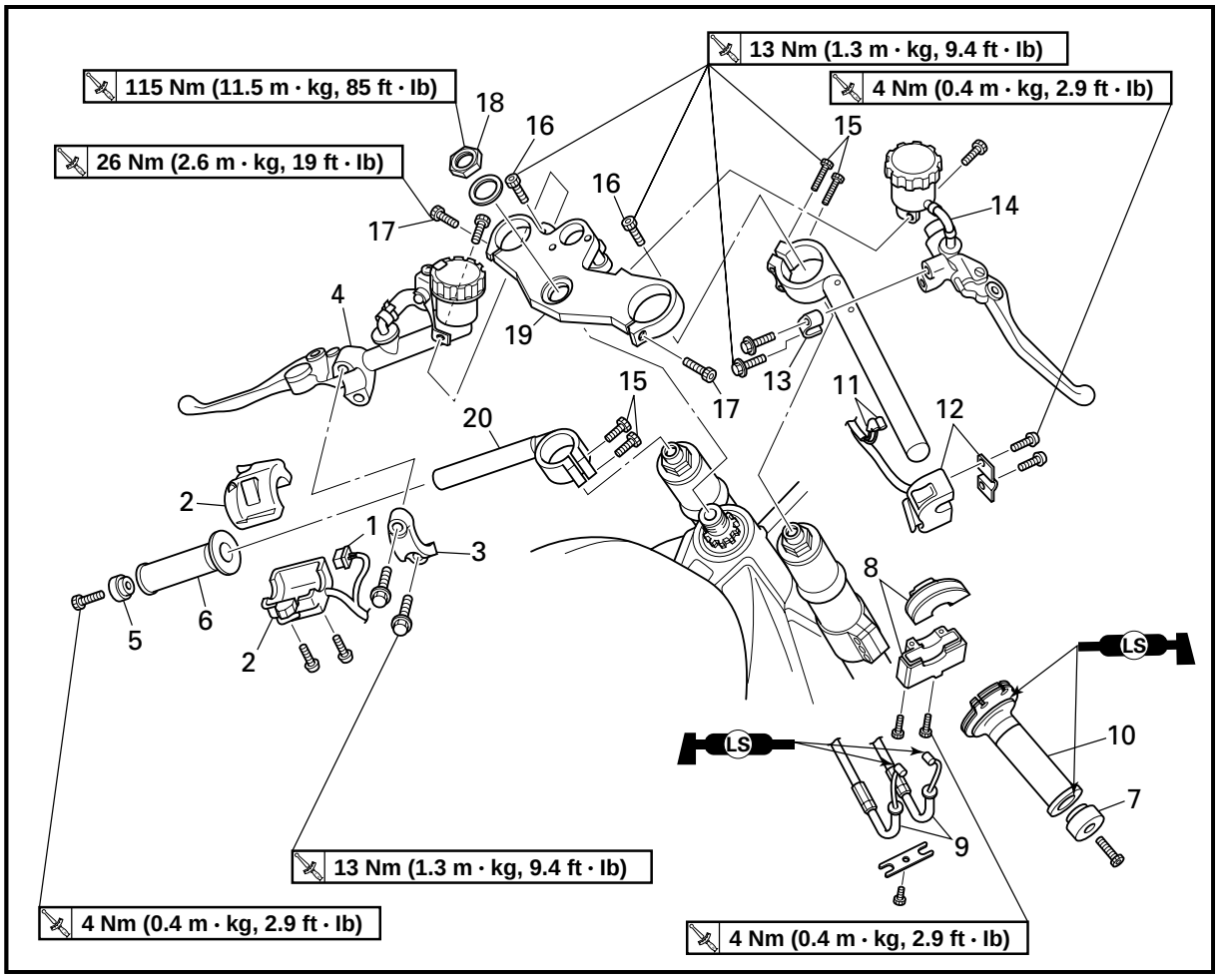
⚠ WARNING

Make sure that the brake hoses are routed properly.

3. Adjust:
   - spring preload
   - rebound damping
   - compression damping
     Refer to "ADJUSTING THE FRONT FORK LEGS" in chapter 3.

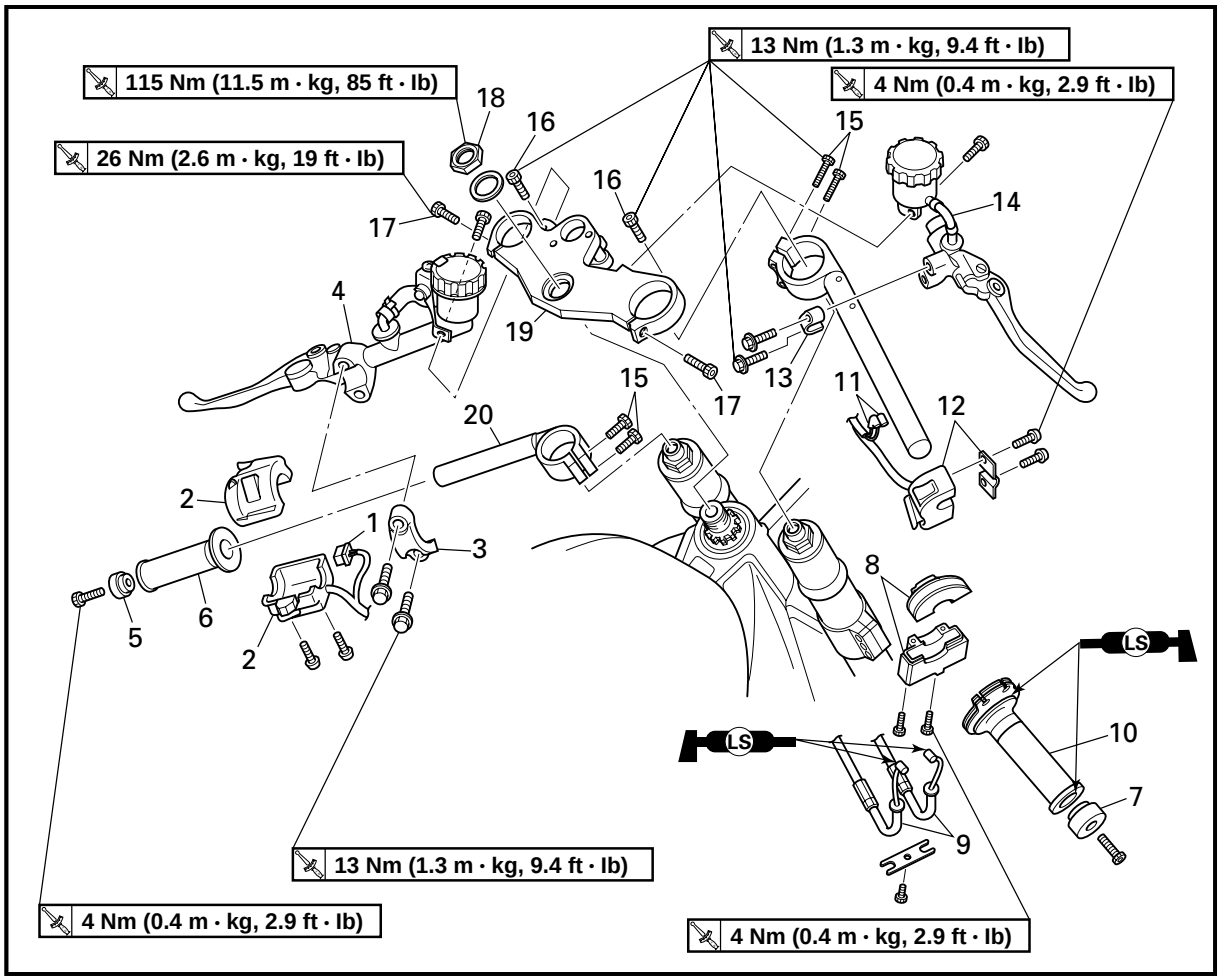
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EB704001
HANDLEBARS



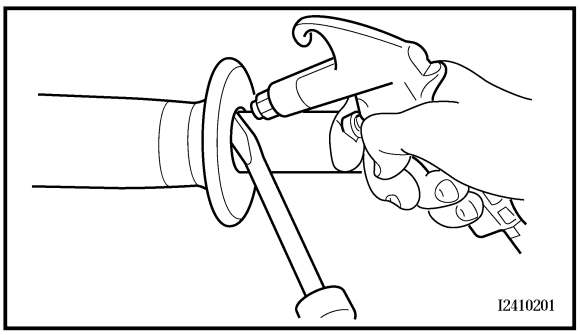
Order	Job/Part	Q'ty	Remarks
	Removing the handlebars		Remove the parts in the order listed.
1	Clutch switch coupler	1	Disconnect.
2	Left handlebar switch	1	
3	Clutch master cylinder holder	1	
4	Clutch master cylinder	1	
5	Left grip end	1	
6	Handlebar grip	1	
7	Right grip end	1	
8	Throttle cable housing	1	
9	Throttle cable	2	
10	Throttle grip	1	

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Order	Job/Part	Q'ty	Remarks
11	Front brake switch connector	2	Disconnect.
12	Right handlebar switch	1	
13	Brake master cylinder holder	1	
14	Brake master cylinder	1	
15	Handlebar pinch bolt	4	
16	Upper bracket bolt	2	
17	Upper bracket pinch bolt	2	
18	Steering stem nut	1	
19	Upper bracket	1	
20	Left handlebar	1	
21	Right handlebar	1	
			For installation, reverse the removal procedure.

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EB704101
REMOVING THE HANDLEBARS

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove:
   • handlebar grip

NOTE:

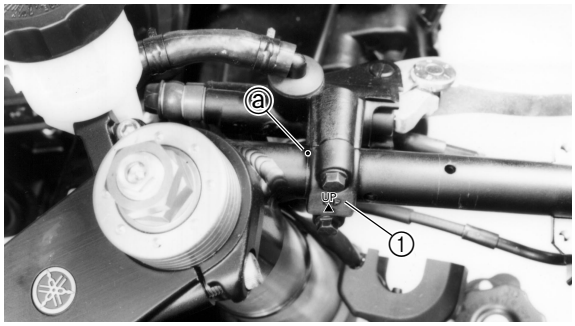
Blow compressed air between the left handlebar and the handlebar grip, and gradually push the grip off the handlebar.

EB704401
CHECKING THE HANDLEBARS

1. Check:
   • left handlebar
   • right handlebar
   Bends/cracks/damage → Replace.

⚠ WARNING

Do not attempt to straighten bent handlebars as this may dangerously weaken them.



EB704704
INSTALLING THE HANDLEBARS

1. Install:
   • brake master cylinder holder ①

13 Nm (1.3 m · kg, 9.4 ft · lb)

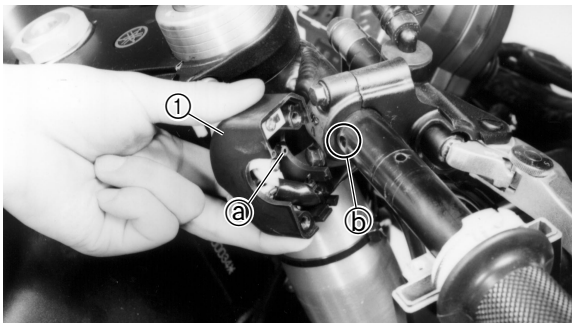
CAUTION:

- **Install the brake master cylinder holder with the "UP" mark facing up.**
- **First, tighten the upper bolt, then the lower bolt.**

NOTE:

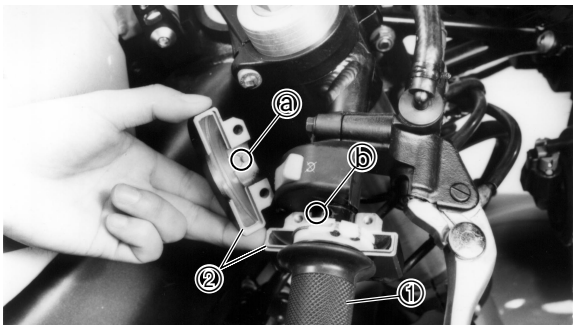
- Align the mating surfaces of the brake master cylinder holder with the punch mark ⓐ in the right handlebar.
- There should be 2 mm of clearance between the right handlebar switch and the brake master cylinder holder.

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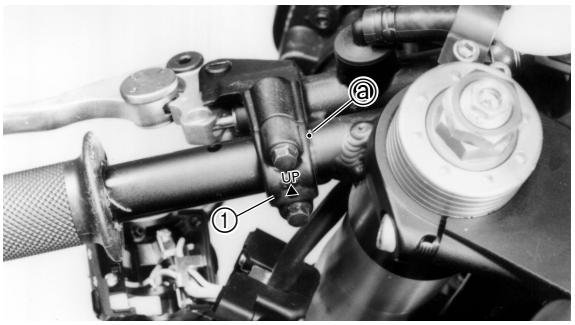
2. Install:
   • right handlebar switch ①

NOTE:
Align the projection ⓐ on the right handlebar switch with the hole ⓑ in the right handlebar.



3. Install:
   • throttle grip ①
   • throttle cable housing ②
   • throttle cables

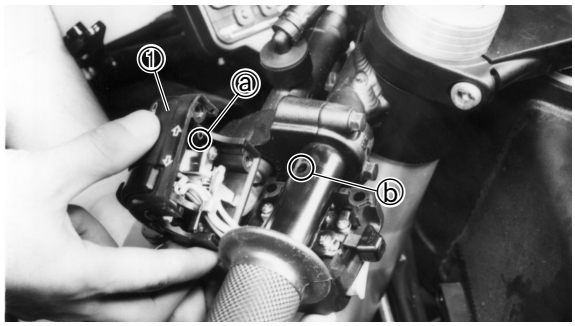
NOTE:
Align the projection ⓐ on the throttle cable housing with the hole ⓑ in the right handlebar.



4. Install:
   • clutch master cylinder holder ①

CAUTION:
- **Install the clutch master cylinder holder with the "UP" mark facing up.**
- **First tighten the upper bolt, then the lower bolt.**

NOTE:
Align the slit in the clutch master cylinder holder with the punch mark ⓐ in the left handlebar.



5. Install:
   • left handlebar switch ①

NOTE:
Align the projection ⓐ on the left handlebar switch with the hole ⓑ in the left handlebar.

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6. Install:
   • handlebar grip

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a. Apply a thin coat of rubber adhesive onto the end of the left handlebar.

b. Slide the handlebar grip over the end of the left handlebar.

c. Wipe off any excess rubber adhesive with a clean rag.

⚠ WARNING

Do not touch the handlebar grip until the rubber adhesive has fully dried.

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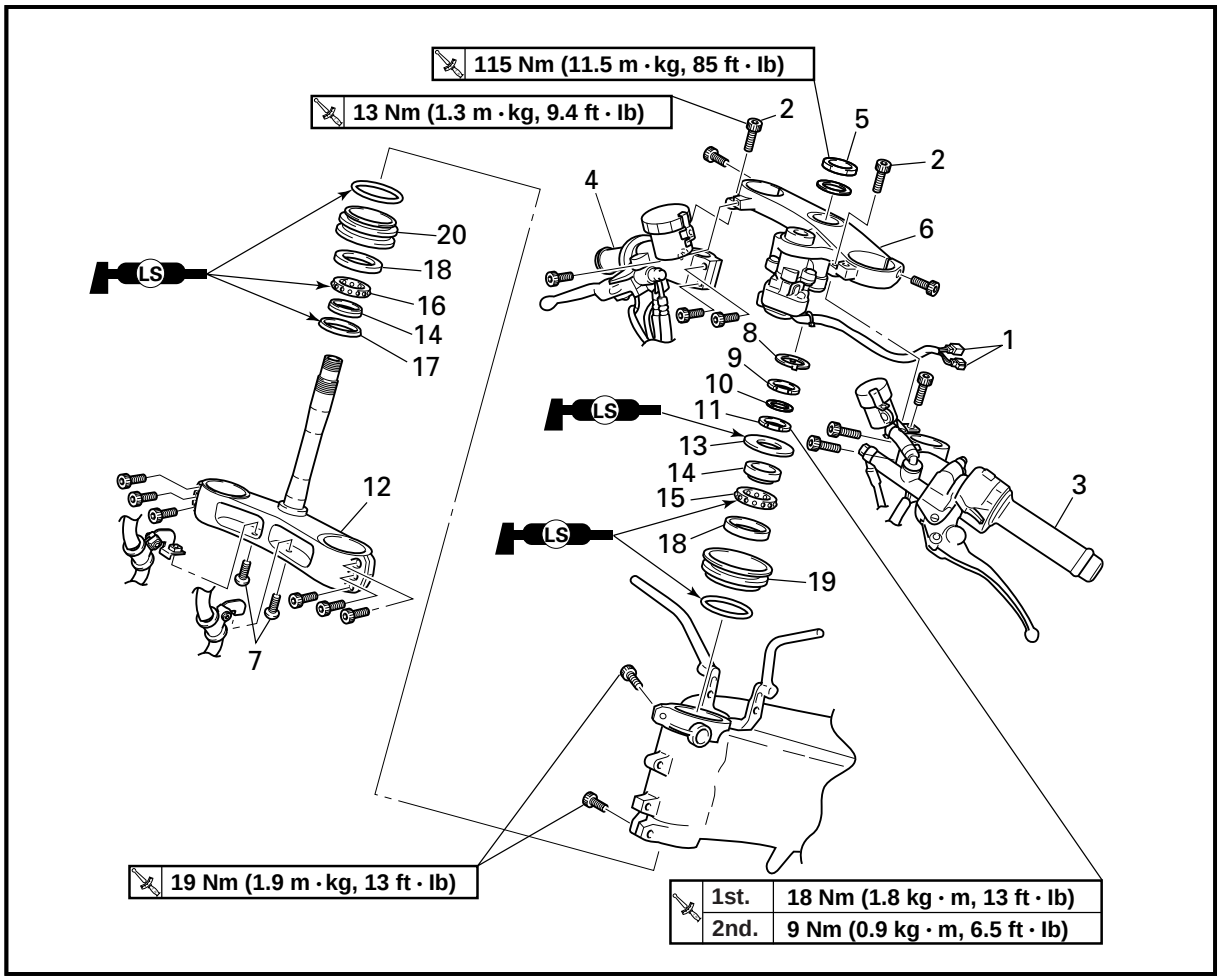
7. Adjust:
   • throttle cable free play
   Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.



Throttle cable free play (at the flange of the throttle grip)
3 ~ 5 mm (0.12 ~ 0.20 in)

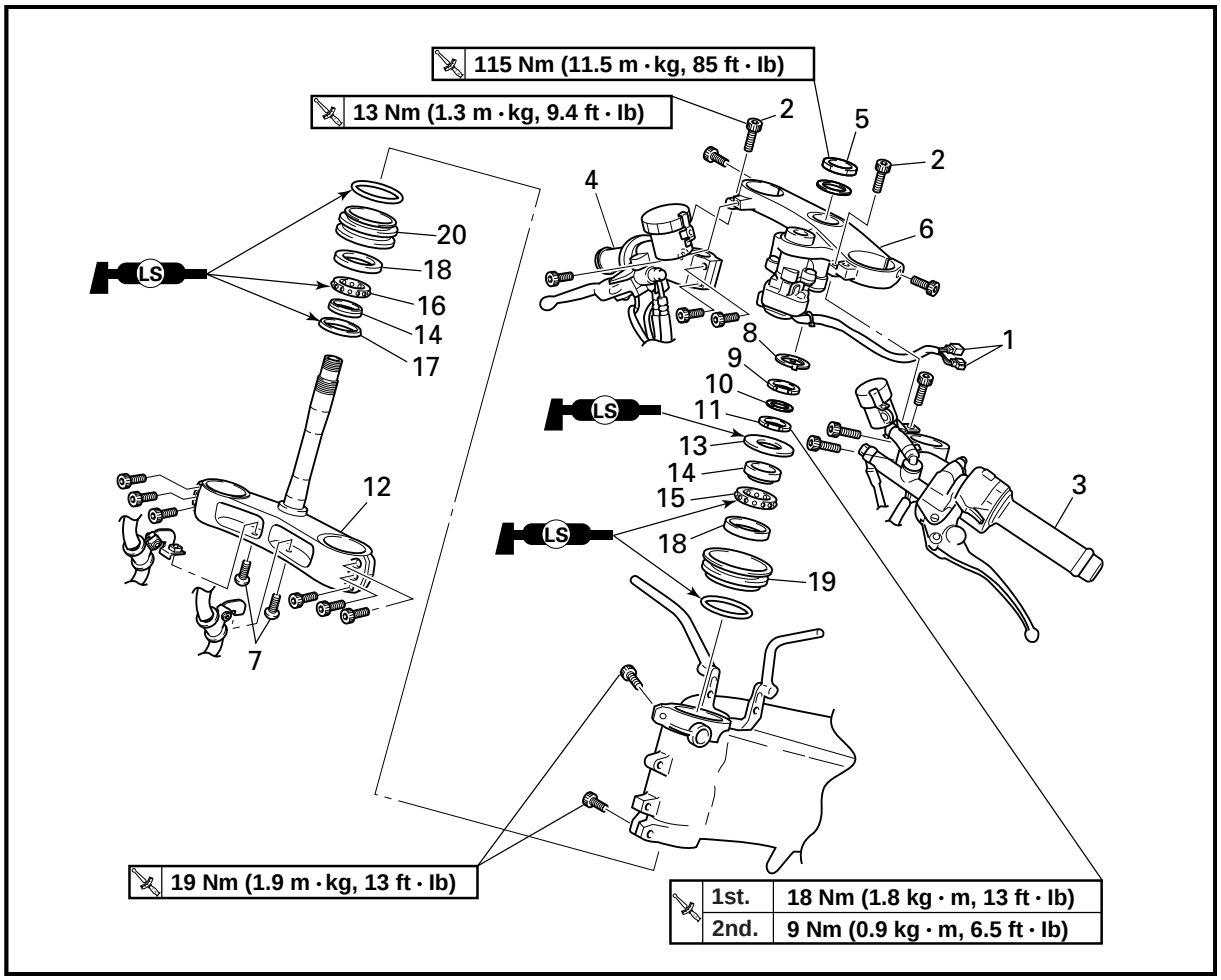
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EB705001
STEERING HEAD



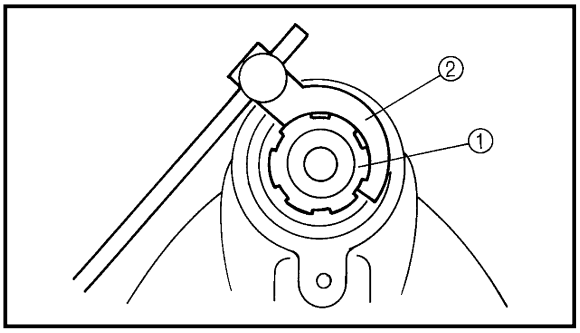
Order	Job/Part	Q'ty	Remarks
	Removing the lower bracket		Remove the parts in the order listed.
	Front wheel		Refer to "FRONT WHEEL AND BRAKE DISCS".
	Front fork legs		Refer to "FRONT FORK".
1	Main switch coupler	2	Disconnect.
2	Upper bracket bolt	2	
3	Left handlebar assembly	1	
4	Right handlebar assembly	1	
5	Steering stem nut	1	
6	Upper bracket	1	
7	Brake hose holder bolt	2	
8	Lock washer	1	
9	Upper ring nut	1	
10	Rubber washer	1	

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Order	Job/Part	Q'ty	Remarks
11	Lower ring nut	1	
12	Lower bracket	1	
13	Bearing cover	1	
14	Bearing inner race	2	
15	Upper bearing	1	
16	Lower bearing	1	
17	Dust seal	1	
18	Bearing outer race	2	
19	Upper bearing housing	1	
20	Lower bearing housing	1	
			For installation, reverse the removal procedure.

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EB705100
REMOVING THE LOWER BRACKET

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove:
   • lower ring nut ①
   (with the special tool ②)

	Ring nut wrench **90890-01403**

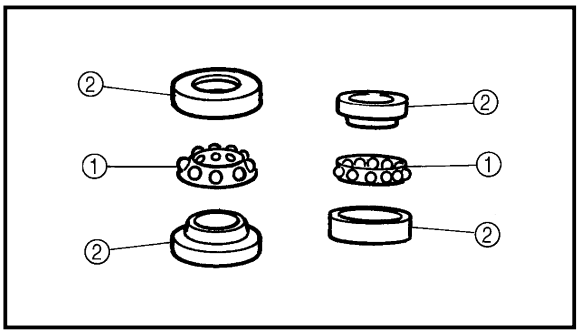
⚠ WARNING

Securely support the lower bracket so that there is no danger of it falling.

EB705401
CHECKING THE STEERING HEAD

1. Wash:
   • bearing balls
   • bearing races

	Recommended cleaning solvent **Kerosine**

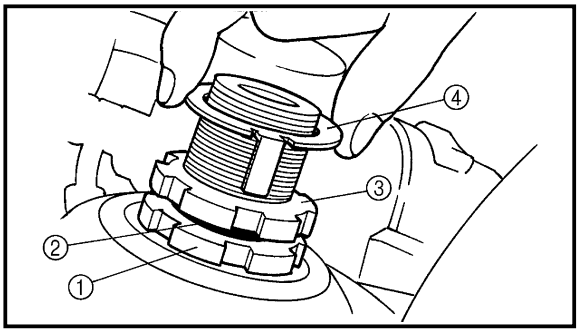


2. Check:
   • bearing balls ①
   • bearing races ②
   Damage/pitting → Replace.

3. Check:
   • upper bracket
   • lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

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EB705700
INSTALLING THE STEERING HEAD



1. Lubricate:
   - upper bearing
   - lower bearing
   - bearing races
   - O-ring
   - dust seat lips
   - bearing cover lips
   - steering stem shreads

	Recommended lubricant **Lithium soap base grease**

2. Install:
   - lower ring nut ①
   - rubber washer ②
   - upper ring nut ③
   - lock washer ④

   Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" in chapter 3.

3. Install:
   - upper bracket
   - steering stem nut

   NOTE:
   Temporarily tighten the steering stem nut.

4. Install:
   - front fork legs

   Refer to "FRONT FORK".

   NOTE:
   Temporarily tighten the upper and lower bracket pinch bolts, and handlebar pinch bolts.

5. Tighten:
   - steering stem nut

     115 Nm (11.5 m · kg, 85 ft · lb)
   - lower bracket pinch bolt

     11 Nm (1.1 m · kg, 8.0 ft · lb)
   - upper bracket pinch bolt

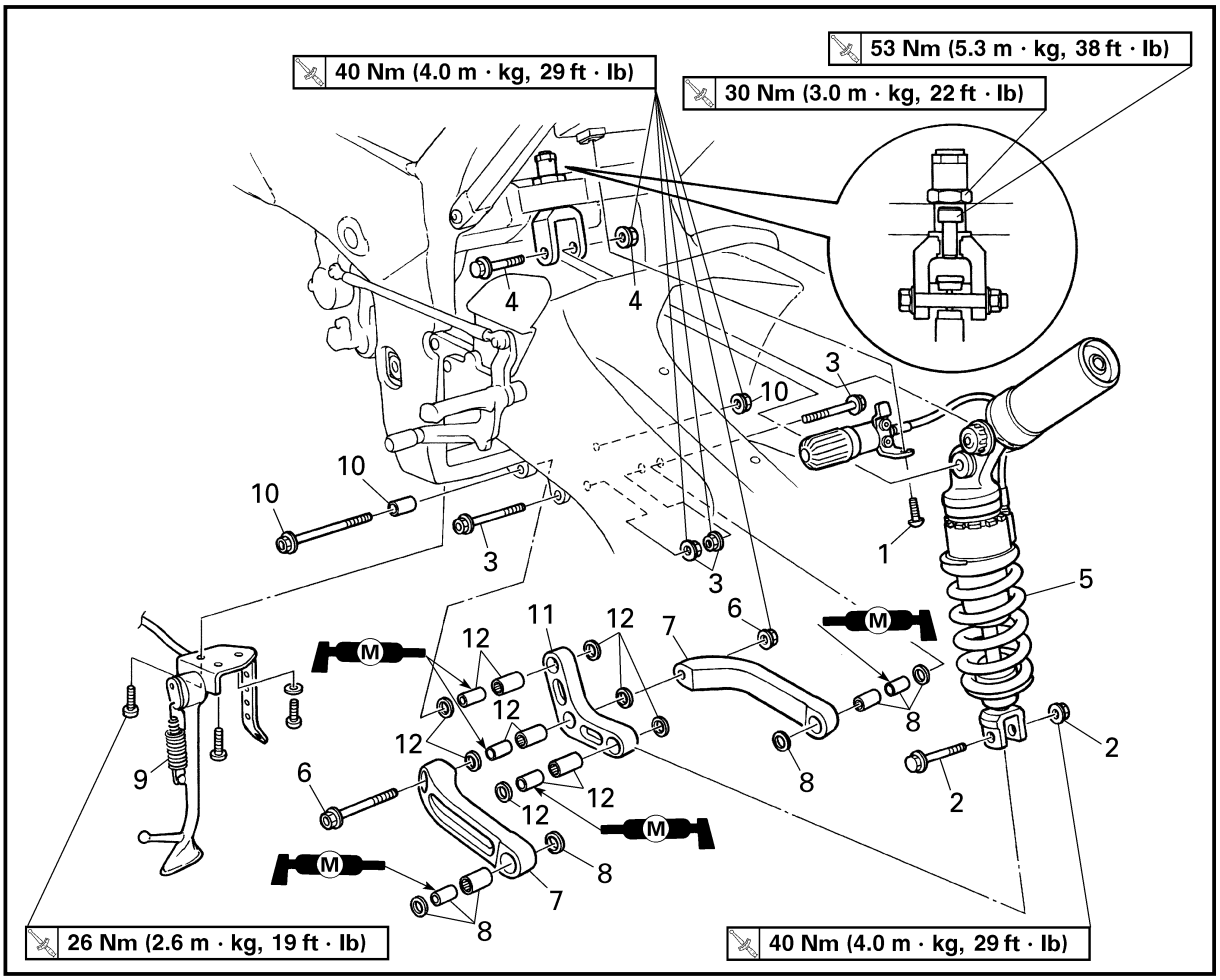
     26 Nm (2.6 m · kg, 19 ft · lb)
   - upper bracket bolt

     13 Nm (1.3 m · kg, 9.4 ft · lb)
   - handlebar pinch bolt

     13 Nm (1.3 m · kg, 9.4 ft · lb)

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EB706000
REAR SHOCK ABSORBER ASSEMBLY



Order	Job/Part	Q'ty	Remarks
	Removing the rear shock absorber assembly		Remove the parts in the order listed.
1	Bolt	1	
2	Self-locking nut/bolt	1/1	
3	Self-locking nut/bolt	2/2	
4	Self-locking nut/bolt	1/1	
5	Rear shock absorber assembly	1	
6	Self-locking nut/bolt	1/1	
7	Connecting arm	2	
8	Spacer/oil seal/bearing	2/4/2	
9	Sidestand	1	
10	Self-locking nut/bolt/spacer	1/1/1	
11	Relay arm	1	
12	Spacer/oil seal/bearing	3/6/3	
			For installation, reverse the removal procedure.

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EB706101
HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

⚠ WARNING

This rear shock absorber and gas cylinder contain highly compressed nitrogen gas. Before handling the rear shock absorber or gas cylinder, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber and gas cylinder.
- **Do not tamper or attempt to open the rear shock absorber or gas cylinder.**
- **Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.**
- **Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.**



EB706111
DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, press on the gas valve needle with a suitable tool as shown, until all of the gas is released (the hissing has stopped).

⚠ WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.

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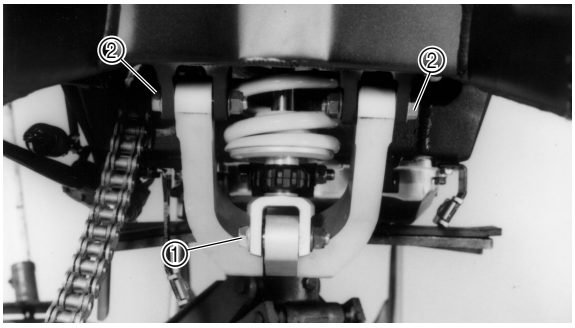
EB706204
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the motorcycle on a level surface.

⚠ WARNING

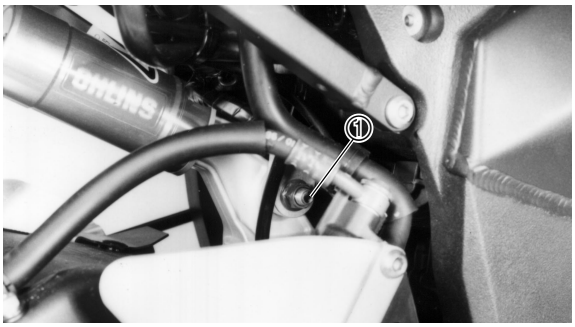
Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



2. Remove:
   - rear shock absorber assembly lower bolt ①
   - connecting arm-to-swingarm bolt ②

NOTE:
While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.



3. Remove:
   - rear shock absorber assembly upper bolt ①
   - rear shock absorber assembly

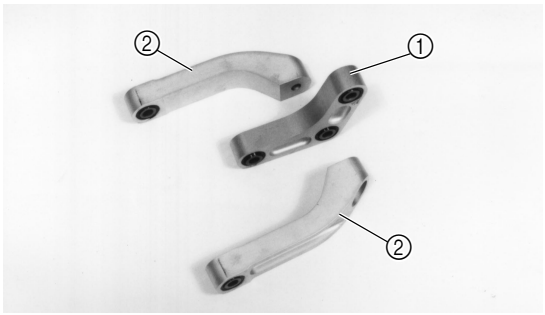
NOTE:
Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm.



EB706401
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY AND GAS CYLINDER

1. Check:
   - rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - spring
     Damage/wear → Replace the rear shock absorber assembly.
   - gas cylinder
     Damage/gas leaks → Replace.
   - bushings
     Damage/wear → Replace.
   - dust seals
     Damage/wear → Replace.
   - bolts
     Bends/damage/wear → Replace.

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CHECKING THE RELAY ARM AND CONNECTING ARM

1. Check:
   - relay arm ①
   - connecting arm ②
     Damage/wear → Replace.
   - bearings
   - oil seals
     Damage/pitting → Replace.
   - spacers
     Damage/scratches → Replace.

EB706701

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:
   - bearings
   - oil seals
   - spacers

	Recommended lubricant **Molybdenum disulfide grease**

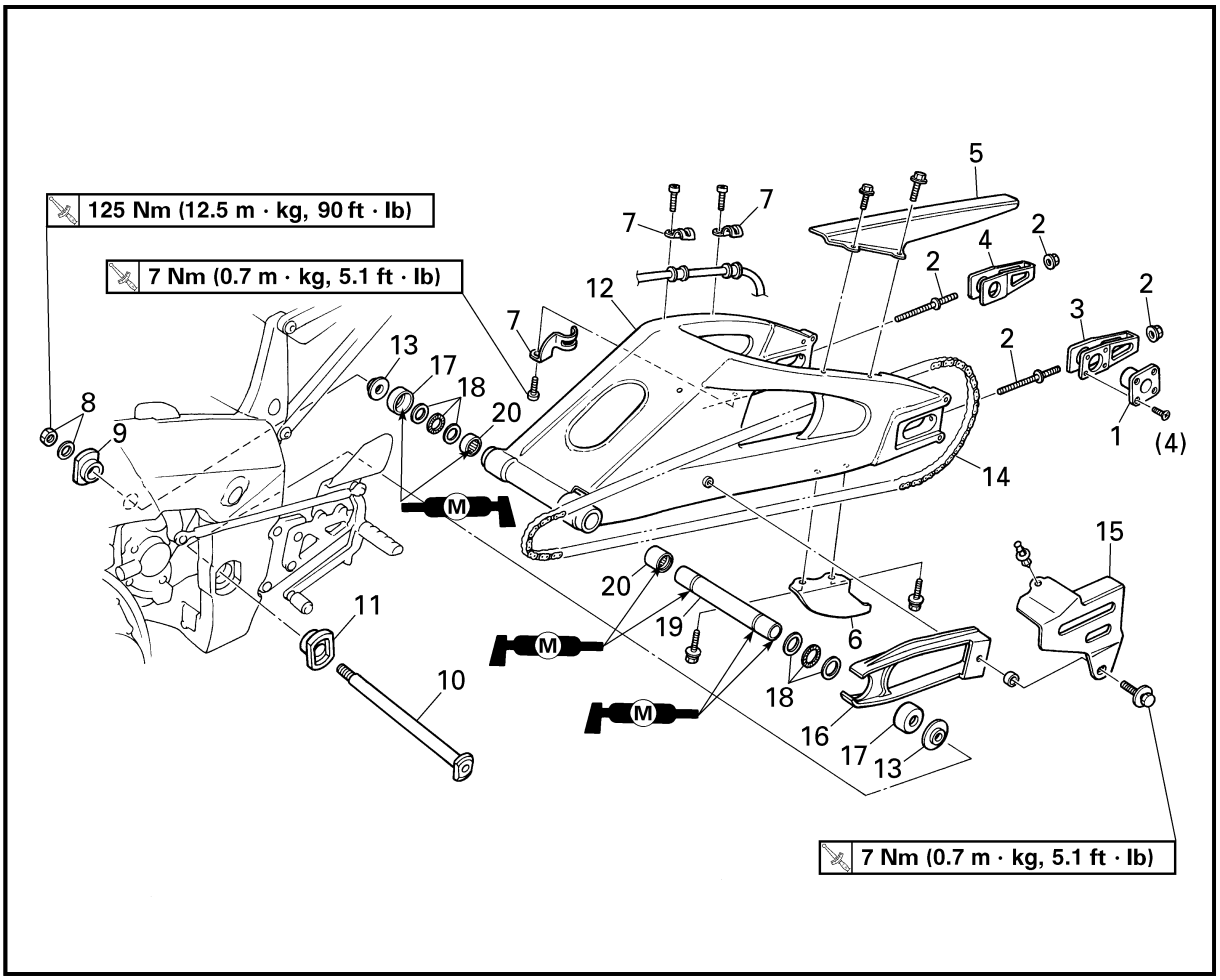
2. Install:
   - relay arm
   - connecting arms
   - rear shock absorber assembly

NOTE:
When installing the rear shock absorber assembly, lift up the swingarm.

3. Tighten:
   - relay arm-to-frame nut
     40 Nm (4.0 m · kg, 29 ft · lb)
   - relay arm-to-connecting arm nut
     40 Nm (4.0 m · kg, 29 ft · lb)
   - connecting arm-to-swingarm nut
     40 Nm (4.0 m · kg, 29 ft · lb)
   - rear shock absorber assembly upper nut
     40 Nm (4.0 m · kg, 29 ft · lb)
   - rear shock absorber assembly lower nut
     40 Nm (4.0 m · kg, 29 ft · lb)

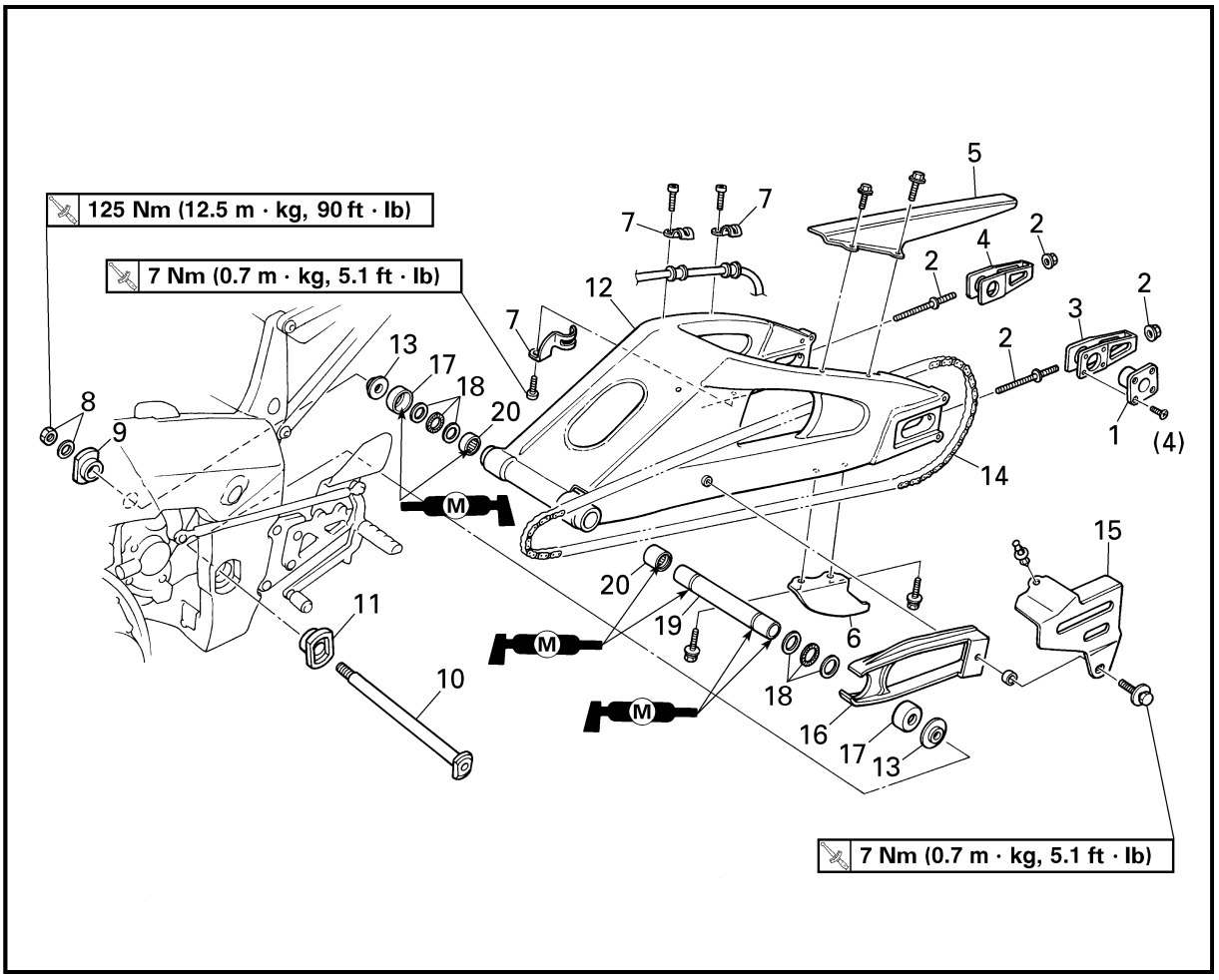
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EB707000
SWINGARM AND DRIVE CHAIN



Order	Job/Part	Q'ty	Remarks
	Removing the swingarm and drive chain		Remove the parts in the order listed.
	Drive sprocket		Refer to "ENGINE" in chapter 4.
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC, AND REAR WHEEL SPROCKET".
	Rear shock absorber assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLY".
1	Spacer	1	
2	Adjusting bolt/locknut	2/2	
3	Left drive chain puller	1	
4	Right drive chain puller	1	
5	Drive chain guard 1	1	
6	Drive chain guard 3	1	
7	Brake hose holder	3	
8	Pivot shaft nut/washer	1/1	
9	Right pivot shaft boss	1	

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Order	Job/Part	Q'ty	Remarks
10	Pivot shaft	1	
11	Left pivot shaft boss	1	
12	Swingarm	1	
13	Spacer	2	
14	Drive chain	1	
15	Drive chain guard 2	1	
16	Drive chain guide	1	
17	Dust cover	2	
18	Bearing	2	
19	Spacer	1	
20	Bearing	2	
			For installation, reverse the removal procedure.

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EB707100

NOTE:
Before removing the drive sprocket, drive chain, and rear wheel, measure the drive chain slack and the length of a ten-link section of the drive chain.

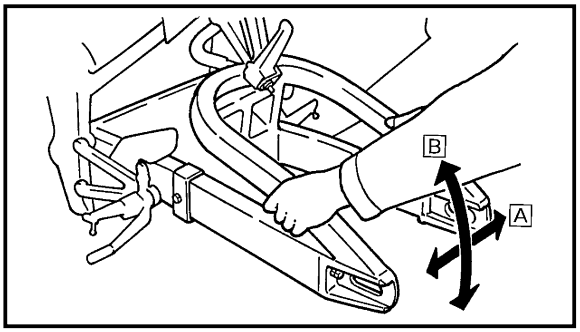
EB707111
REMOVING THE SWINGARM

1. Stand the motorcycle on a level surface.

⚠ WARNING

Securely support the motorcycle so that there is no danger of it falling over.

NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is elevated.



2. Measure:
   - swingarm side play
   - swingarm vertical movement

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a. Measure the tightening torque of the pivot shaft nut.

Pivot shaft nut
125 Nm (12.5 m • kg, 90 ft • lb)

b. Measure the swingarm side play A by moving the swingarm from side to side.

c. If the swingarm side play is out of specification, check the spacers, bearings, washers, and dust covers.

Swingarm side play (at the end of the swingarm)
1.0 mm (0.04 in)

d. Check the swingarm vertical movement B by moving the swingarm up and down.

If swingarm vertical movement is not smooth or if there is binding, check the spacers, bearings, washers, and dust covers.

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EB707120
REMOVING THE DRIVE CHAIN

1. Remove:
   • drive chain
   (with the drive chain cutter)

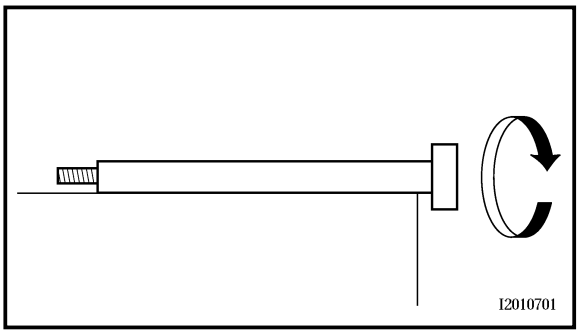
	**Drive chain cutter** **90890-01286**

NOTE:
Only cut the drive chain if it or the swingarm is to be replaced.

EB707400
CHECKING THE SWINGARM

1. Check:
   • swingarm
   Bends/cracks/damage → Replace.

NOTE:
If the swingarm must be replaced, the drive chain must be cut with a drive chain cutter.



2. Check:
   • pivot shaft
   Roll the pivot shaft on a flat surface.
   Bends → Replace.

⚠ WARNING

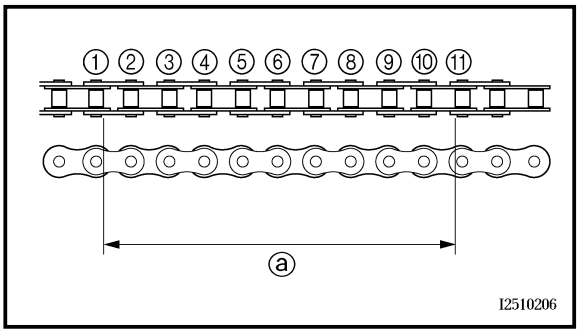
Do not attempt to straighten a bent pivot shaft.

3. Wash:
   • pivot shaft
   • dust covers
   • spacer
   • bearings

	**Recommended cleaning solvent** **Kerosine**

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4. Check:
   - dust covers
   - spacer
   - oil seals
     Damage/wear → Replace.
   - bearings
     Damage/pitting → Replace.

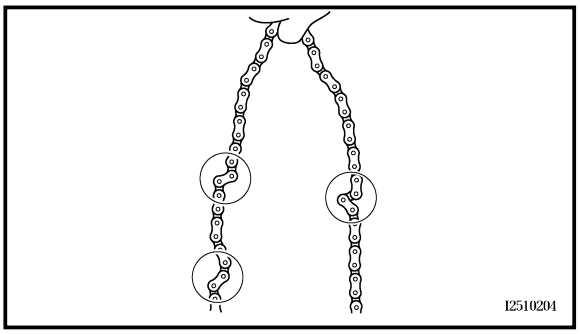


EB707410
CHECKING THE DRIVE CHAIN

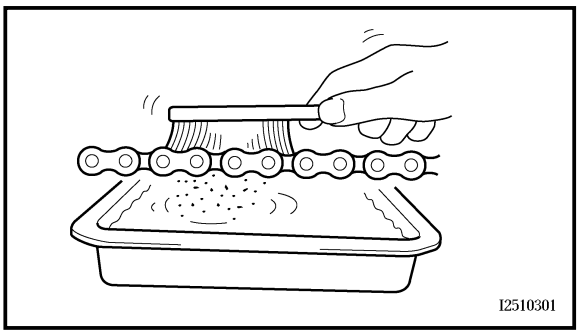
1. Measure:
   - ten-link section ⓐ of the drive chain
     Out of specification → Replace the drive chain.

Max. ten-link drive chain section
150.1 mm (5.91 in)

NOTE:
- While measuring the ten-link section, push down on the drive chain to increase its tension.
- Measure the length between drive chain roller ① and ⑪ as shown.
- Perform this measurement at two or three different places.



2. Check:
   - drive chain
     Stiffness → Clean and lubricate or replace.



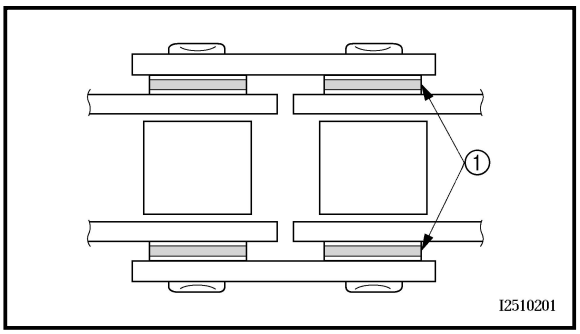
3. Clean:
   - drive chain

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a. Wipe the drive chain with a clean cloth.

b. Put the drive chain in kerosine and remove any remaining dirt.

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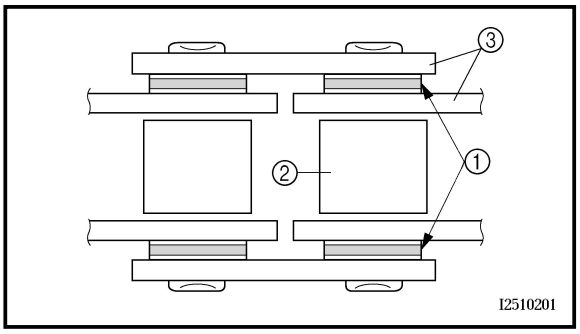


c. Remove the drive chain from the kerosine and completely dry it.

CAUTION:

This motorcycle has a drive chain with small rubber O-rings ① between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosine to clean the drive chain.

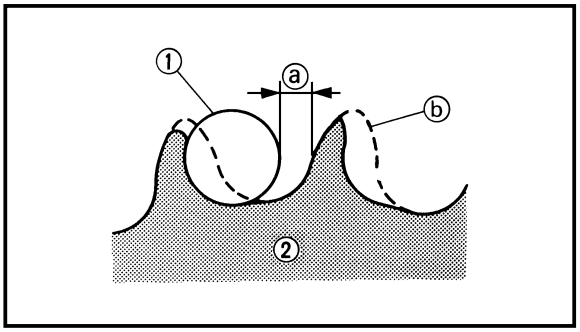
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4. Check:
   - O-rings ①
     Damage → Replace the drive chain.
   - drive chain rollers ②
     Damage/wear → Replace the drive chain.
   - drive chain side plates ③
     Cracks/damage/wear → Replace the drive chain.

5. Lubricate:
   - drive chain

Recommended lubricant
Engine oil or chain lubricant suitable for O-ring chains



6. Check:
   - drive sprocket
   - rear wheel sprocket
     More than 1/4 tooth ⓐ wear → Replace the drive chain sprockets as a set.
     Bent teeth → Replace the drive chain sprockets as a set.

     ⓑ Correct
     ① Drive chain roller
     ② Drive chain sprocket

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EB707700
INSTALLING THE SWINGARM

1. Lubricate:
   - bearings
   - spacers
   - dust covers
   - pivot shaft

	Recommended lubricant **Molybdenum disulfide grease**

2. Install:
   - spacers
   - swingarm
   - pivot shaft bosses
   - pivot shaft
   - washer
   - pivot shaft nut

	125 Nm (12.5 m · kg, 90 ft · lb)

3. Install:
   - drive chain pullers

NOTE:
Install the drive chain pullers onto the swingarm so that the sides stamped "IN" face toward the inside (i.e., the rear wheel).

4. Install:
   - rear shock absorber assembly
   - rear wheel

   Refer to "REAR SHOCK ABSORBER ASSEMBLY" and "REAR WHEEL".

5. Adjust:
   - drive chain slack

   Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.

	Drive chain slack **40 ~ 50 mm (1.57 ~ 1.97 in)**

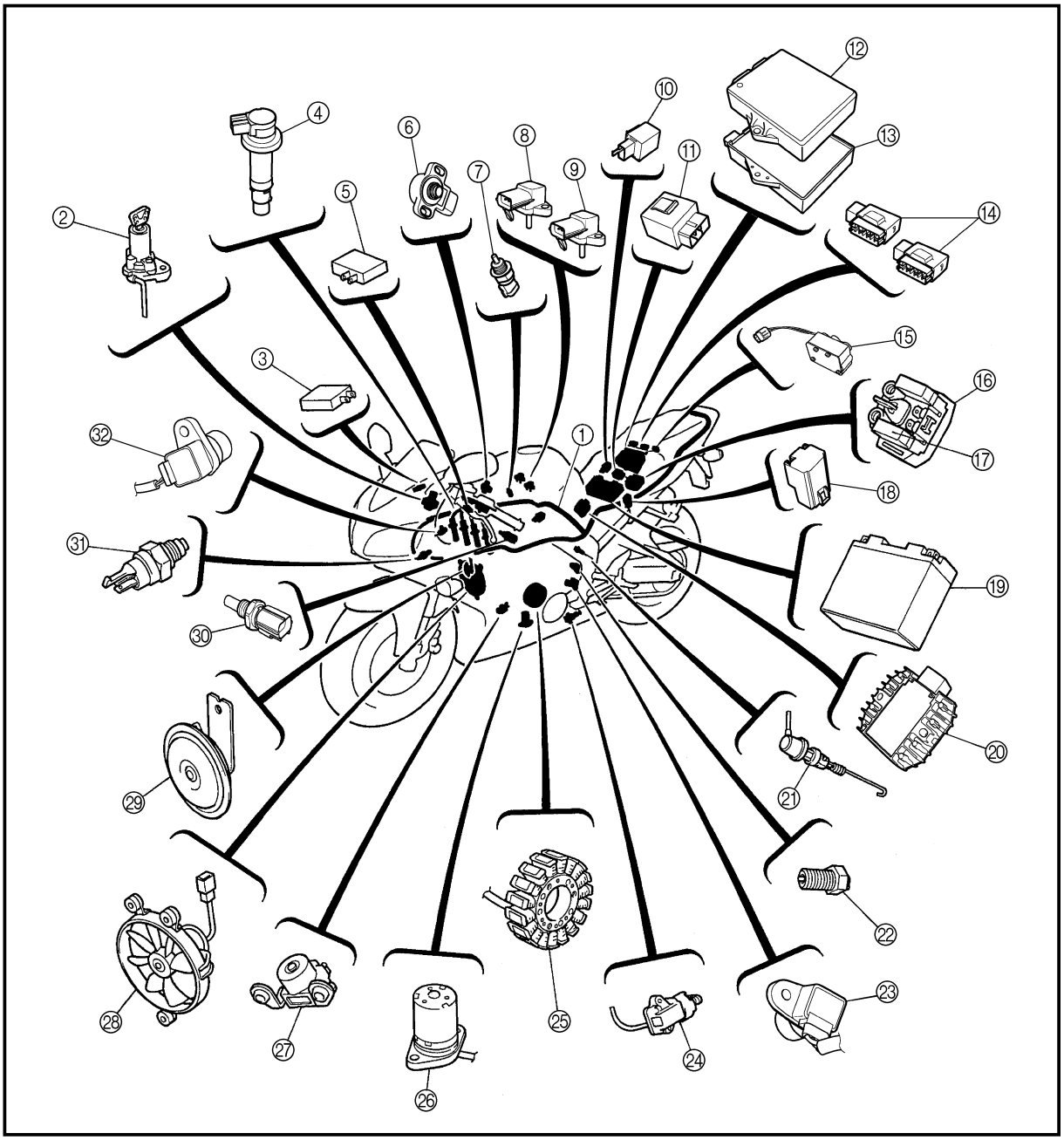
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EB800000

ELECTRICAL

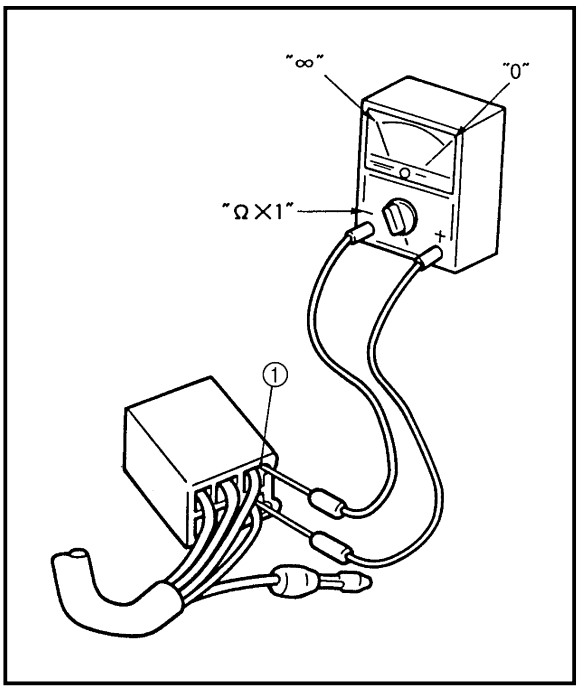
ELECTRICAL COMPONENTS

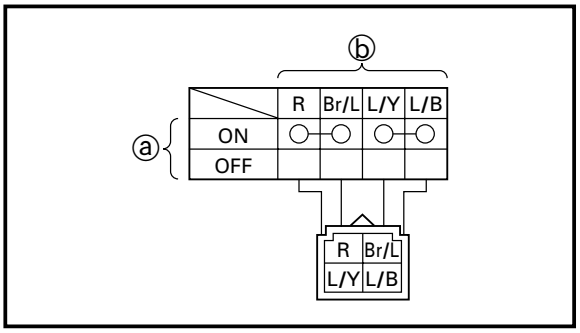
① Wire harness
② Main switch
③ Front brake light switch
④ Ignition coils
⑤ Clutch switch
⑥ Throttle position sensor
⑦ Intake air temperature sensor
⑧ Intake air pressure sensor
⑨ Atmospheric pressure sensor
⑩ Turn signal relay
⑪ Relay unit
⑫ ECU
⑬ CDI unit
⑭ Fuse box
⑮ Fall detection switch
⑯ Starter relay
⑰ Main fuse
⑱ Main relay
⑲ Battery
⑳ Rectifier/regulator
㉑ Rear brake light switch
㉒ Neutral switch
㉓ Speed sensor
㉔ Sidestand switch
㉕ Stator coil assembly
㉖ Oil level switch
㉗ Pickup coil
㉘ Radiator fan
㉙ Horn
㉚ Coolant temperature sender
㉛ Thermo switch
㉜ Camshaft sensor



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EB801000

SWITCHES

CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

Pocket tester
90890-03112

NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

NOTE:

"○——○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between blue/red and red when the switch is set to "P≦".

There is continuity between blue/red and blue, between brown/blue and red, and between blue/yellow and blue/black when the switch is set to "ON".

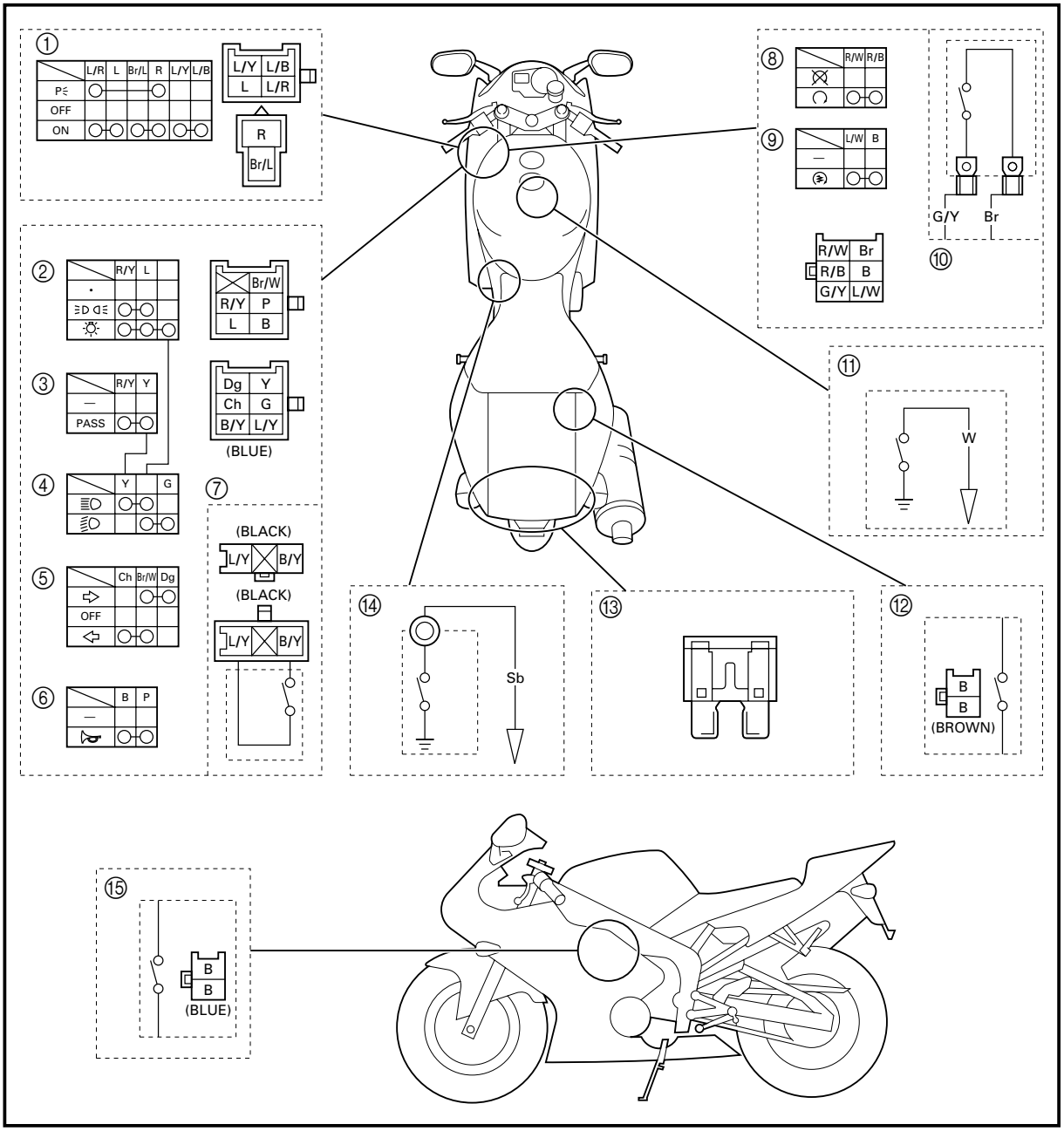
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EB801010
CHECKING THE SWITCHES

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".
Damage/wear → Repair or replace the switch.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.

① Main switch
② Light switch
③ Pass switch
④ Dimmer switch
⑤ Turn signal switch
⑥ Horn switch
⑦ Clutch switch
⑧ Engine stop switch
⑨ Start switch
⑩ Front brake light switch
⑪ Oil level switch
⑫ Rear brake light switch
⑬ Fuse
⑭ Neutral switch
⑮ Sidestand switch

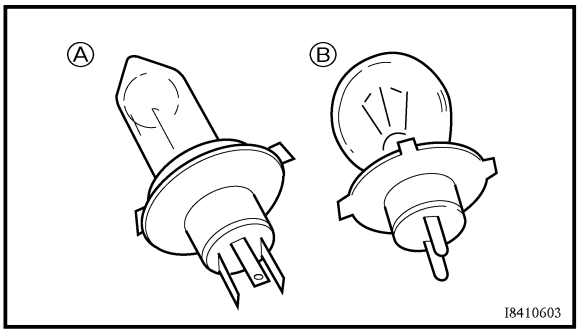


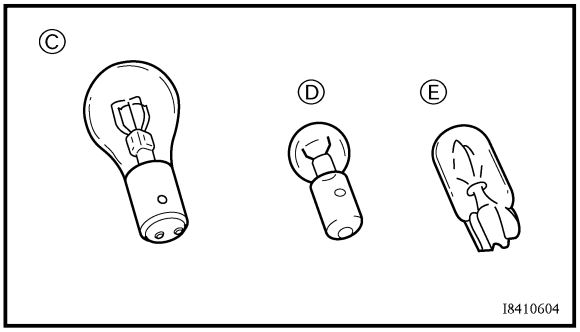
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EB801020
CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.





TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- Bulbs Ⓐ and Ⓑ are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb Ⓒ is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs Ⓓ and Ⓔ are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.

CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1.Remove:
- bulb

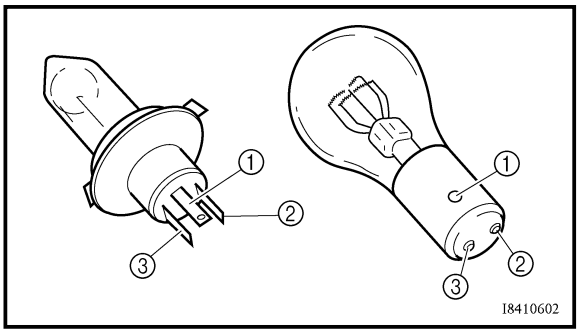
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⚠ WARNING

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

CAUTION:

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**



2.Check:
- bulb (for continuity)
  (with the pocket tester)
  No continuity → Replace.



Pocket tester
90890-03112

NOTE:
Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ②, and check the continuity.

b. Connect the tester positive probe to terminal ① and the tester negative probe to terminal ③, and check the continuity.

c. If either of the readings indicate no continuity, replace the bulb.

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CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

1.Check:
- bulb socket (for continuity)
  (with the pocket tester)
  No continuity → Replace.

	Pocket tester **90890-03112**

NOTE:
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.

b. Connect the pocket tester probes to the respective leads of the bulb socket.

c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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CHECKING THE LEDs

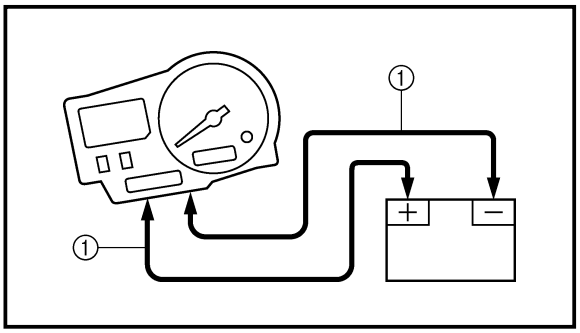
The following procedure applies to all of the LEDs.

1.Check:
  LED (for proper operation)

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a. Disconnect the meter assembly coupler (meter assembly side).

b. Connect two jumper leads ① from the battery terminals to the respective coupler terminals as shown.



⚠ WARNING

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure that no flammable gas or fluid is in the vicinity.**

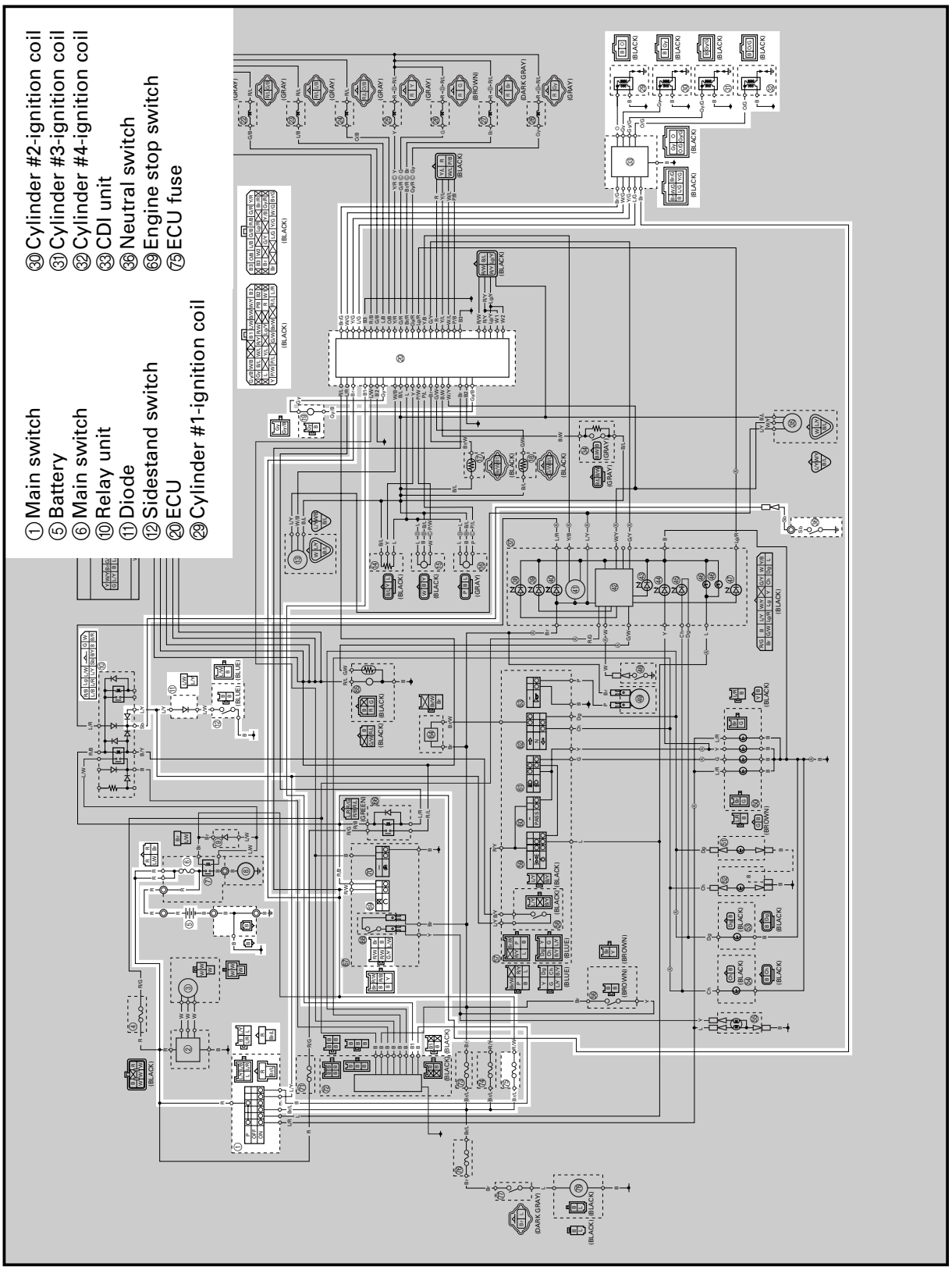
c. When the jumper leads are connected to the terminals the respective LED should illuminate.
  Does not light → Replace the meter assembly.

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EB802001
IGNITION SYSTEM

CIRCUIT DIAGRAM



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TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

- Check the main and ECU fuses for continuity.
  - No good → Replace.
  - OK ↓
- Check the condition of the battery.
  - No good → Recharge or replace.
  - OK ↓
- Check the spark plug.
  - No good → Re-gap or replace.
  - OK ↓
- Measure the ignition spark gap.
  - OK ⇒ Ignition system is OK.
  - No good ↓
- Measure the ignition coil resistance.
  - No good → Replace.
  - OK ↓
- Measure the pickup coil resistance.
  - No good → Replace.
  - OK ↓
- Check the main switch.
  - No good → Replace.
  - OK ↓
- Check the engine stop switch.
  - No good → Replace the right handlebar switch.
  - OK ↓
- Check the neutral switch.
  - No good → Replace.
  - OK ↓
- Check the diode.
  - No good → Replace.
  - OK ↓
- Check the sidestand switch.
  - No good → Replace.
  - OK ↓
- Check the relay unit.
  - No good → Replace.
  - OK ↓
- Check the entire ignition system's wiring.
  - No good → Repair or replace.
  - OK ↓
- Replace the CDI unit.

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BAD

Replace the ECU.

NOTE:

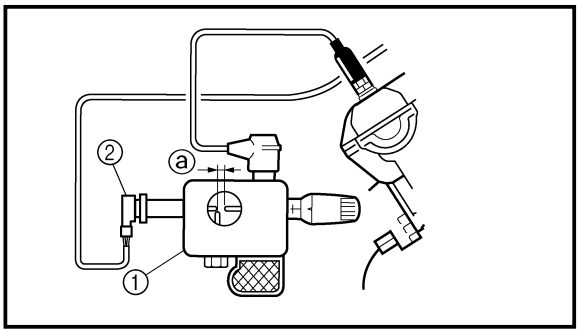
- Before troubleshooting, remove the following part(-s):

1) fuel tank
2) air filter case
3) bottom cowling
4) front cowling
5) rear cowling

- Troubleshoot with the following special tool(-s).



Ignition checker
90890-06754
Pocket tester
90890-03112



MEASURING THE IGNITION SPARK GAP

The following procedure applies to all of the spark plugs.

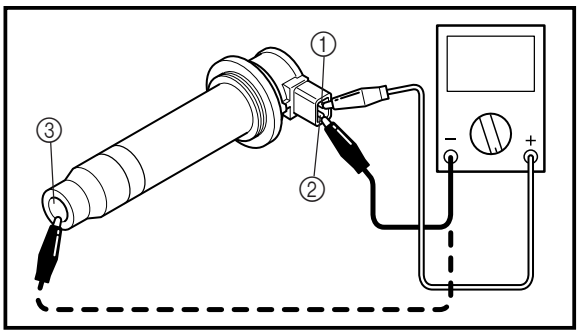
- Disconnect the ignition coil from the spark plug.
- Connect the ignition checker ① as shown.
  ② Ignition coil
- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



Minimum ignition spark gap
6 mm (0.24 in)

- Is there a spark and is the spark gap within specification?
  Yes → Good.
  No → Measure the ignition coil resistance.

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MEASURING THE IGNITION COIL RESISTANCE

The following procedure applies to all of the ignition coils.

- Remove the ignition coil from the cylinder head.
- Connect the pocket tester (Ω × 1) to the ignition coil as shown.

Tester positive probe →
orange (cylinder #1) ①
gray (cylinder #2)
gray/green (cylinder #3)
orange/green (cylinder #4)
Tester negative probe → black ②

- Measure the primary coil resistance.

Primary coil resistance
0.16 ~ 0.21 Ω at 20˚C (68˚F)

- Connect the pocket tester (Ω × 1k) to the ignition coil as shown.
- Measure the secondary coil resistance.

Tester positive probe →
orange (cylinder #1) ①
gray (cylinder #2)
gray/green (cylinder #3)
orange/green (cylinder #4)
Tester negative probe →
ignition coil hole ③

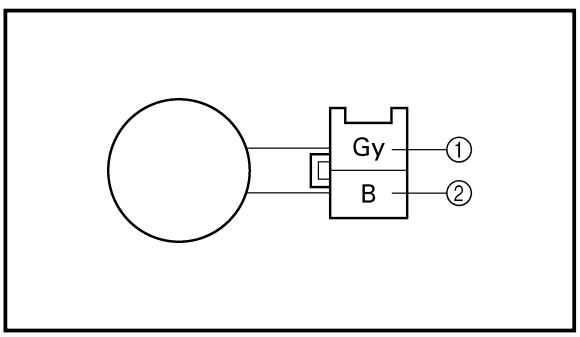
Secondary coil resistance
5.0 ~ 6.8 kΩ at 20˚C (68˚F)

- Is the ignition coil OK?
  Yes → Good.
  No → Replace.

MEASURING THE PICKUP COIL RESISTANCE

- Disconnect the pickup coil coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil coupler.

Tester positive probe → gray ①
Tester negative probe → black ②

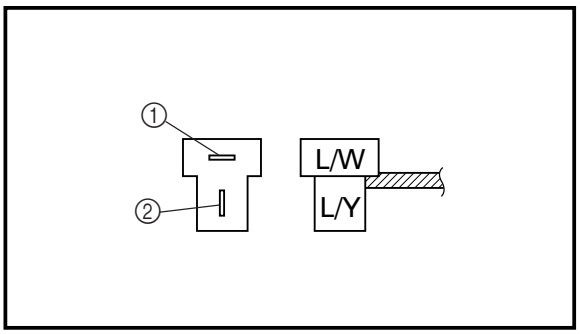


- Measure the pickup coil resistance.

Pickup coil resistance
421 ~ 569 Ω at 20˚C (68˚ F)
(between gray and black)

- Is the pickup coil OK?
  Yes → Good.
  No → Replace.

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CHECKING THE DIODE

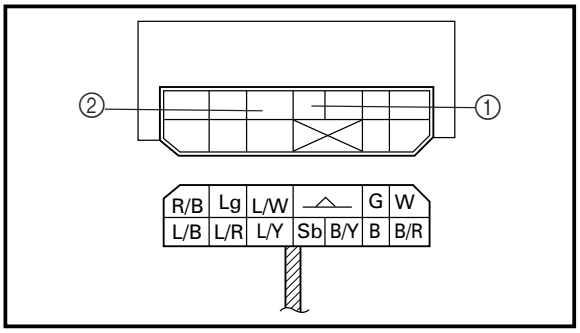
- Remove the diode from the coupler.
- Connect the pocket tester (Ω × 1) to the diode as shown.
- Check the diode for continuity.

Tester positive probe → blue/white ① **Tester negative probe → blue/yellow ②**	**Continuity**
Tester positive probe → blue/yellow ② **Tester negative probe → blue/white ①**	**No continuity**

NOTE:

When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?
  Yes → Good.
  No → Replace.



CHECKING THE RELAY UNIT

- Remove the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) to the relay unit terminals as shown.
- Check the starting circuit cutoff relay for continuity.

Tester positive probe → sky blue ① **Tester negative probe → blue/yellow ②**	**Continuity**
Tester positive probe → blue/yellow ② **Tester negative probe → sky blue ①**	**No continuity**

NOTE:

When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

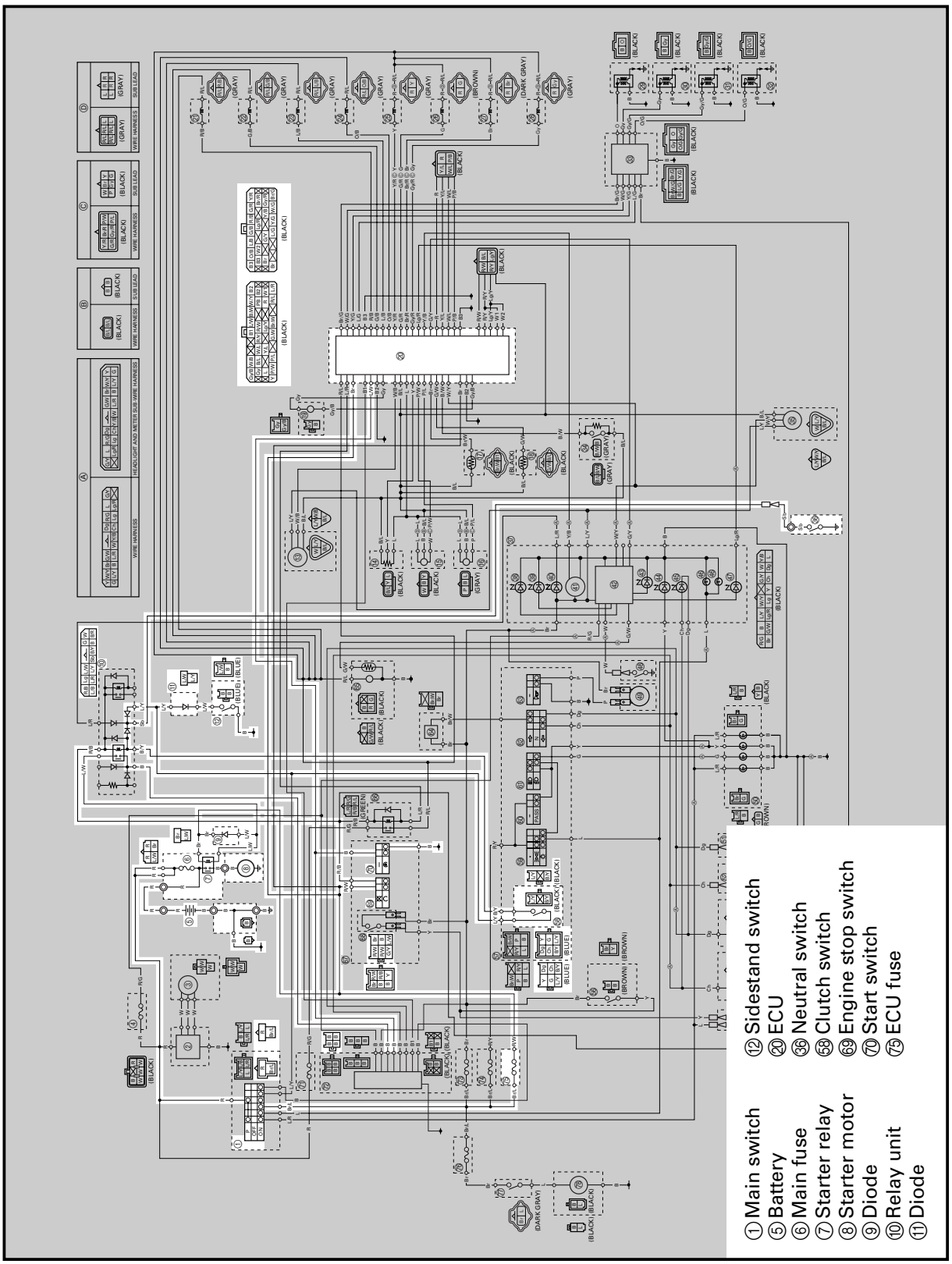
- Are the tester readings correct?
  Yes → Good.
  No → Replace.

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EB803000

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM



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TROUBLESHOOTING

The starter motor fails to turn.

- Check the main and ECU fuses for continuity.
  - No good → Replace.
  - OK ↓
- Check the condition of the battery.
  - No good → Recharge or replace.
  - OK ↓
- Check the starter motor.
  - No good → Repair or replace.
  - OK ↓
- Check the relay unit.
  - No good → Replace.
  - OK ↓
- Check the starter relay.
  - No good → Replace.
  - OK ↓
- Check the diodes.
  - No good → Replace.
  - OK ↓
- Check the main switch.
  - No good → Replace.
  - OK ↓
- Check the engine stop switch.
  - No good → Replace the right handlebar switch.
  - OK ↓
- Check the neutral switch.
  - No good → Replace.
  - OK ↓
- Check the sidestand switch.
  - No good → Replace.
  - OK ↓
- Check the clutch switch.
  - No good → Replace.
  - OK ↓
- Check the start switch.
  - No good → Replace the right handlebar switch.
  - OK ↓
- Check the entire starting system's wiring.
  - No good → Repair or replace.

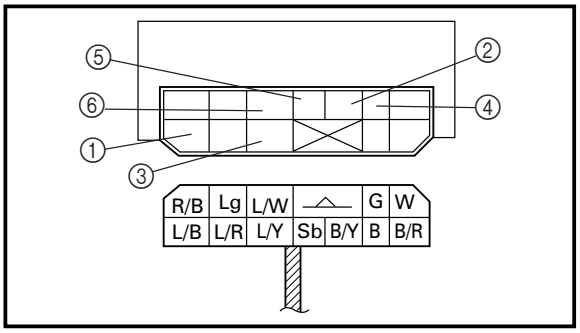
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NOTE:
- Before troubleshooting, remove the following part(-s):

1) fuel tank
2) air filter case
3) throttle body assembly
4) bottom cowling
5) front cowling
6) rear cowling

- Troubleshoot with the following special tool(-s).

	**Pocket tester** **90890-03112**



CHECKING THE RELAY UNIT
- Disconnect the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the relay unit terminals as shown.

Battery positive terminal → red/black ① **Battery negative terminal → black/yellow ②**
Tester positive probe → blue/white ③ **Tester negative probe → black ④**

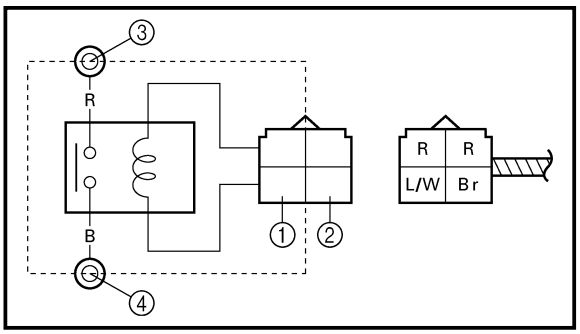
- Does the starting circuit cutoff relay have continuity between blue/white and black?
- Connect the pocket tester (Ω × 1) to the relay unit terminals as shown.
- Check the relay unit for continuity as follows.

Tester positive probe → sky blue ⑤ **Tester negative probe → black/yellow ②**	**Continuity**
Tester positive probe → sky blue ⑤ **Tester negative probe → blue/yellow ⑥**	
Tester positive probe → black/yellow ② **Tester negative probe → sky blue ⑤**	**No continuity**
Tester positive probe → blue/yellow ⑥ **Tester negative probe → sky blue ⑤**	

NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?
  Yes → Good.
  No → Replace.

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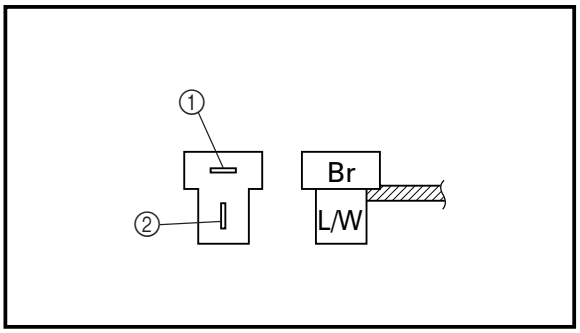


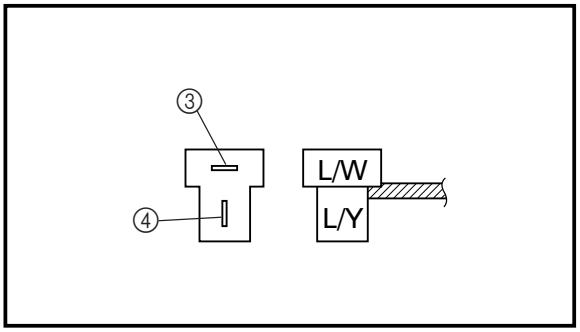
CHECKING THE STARTER RELAY

- Disconnect the starter relay from the coupler.
- Connect the pocket tester (Ω × 1) and battery (12 V) to the starter relay coupler as shown.

Battery positive terminal → brown ① **Battery negative terminal → blue/white ②**	
Tester positive probe → red ③ **Tester negative probe → black ④**	

- Does the starter relay have continuity between red and black?
  Yes → Good.
  No → Replace.





CHECKING THE DIODES

- Remove the diodes from the couplers.
- Connect the pocket tester (Ω × 1) to the diode as show.
- Check the diodes for continuity.

Tester positive probe → brown ① **Tester negative probe → blue/white ②**	**Continuity**
Tester positive probe → blue/white ③ **Tester negative probe → blue/yellow ④**	
Tester positive probe → blue/white ② **Tester negative probe → brown ①**	**No continuity**
Tester positive probe → blue/yellow ④ **Tester negative probe → blue/white ③**	

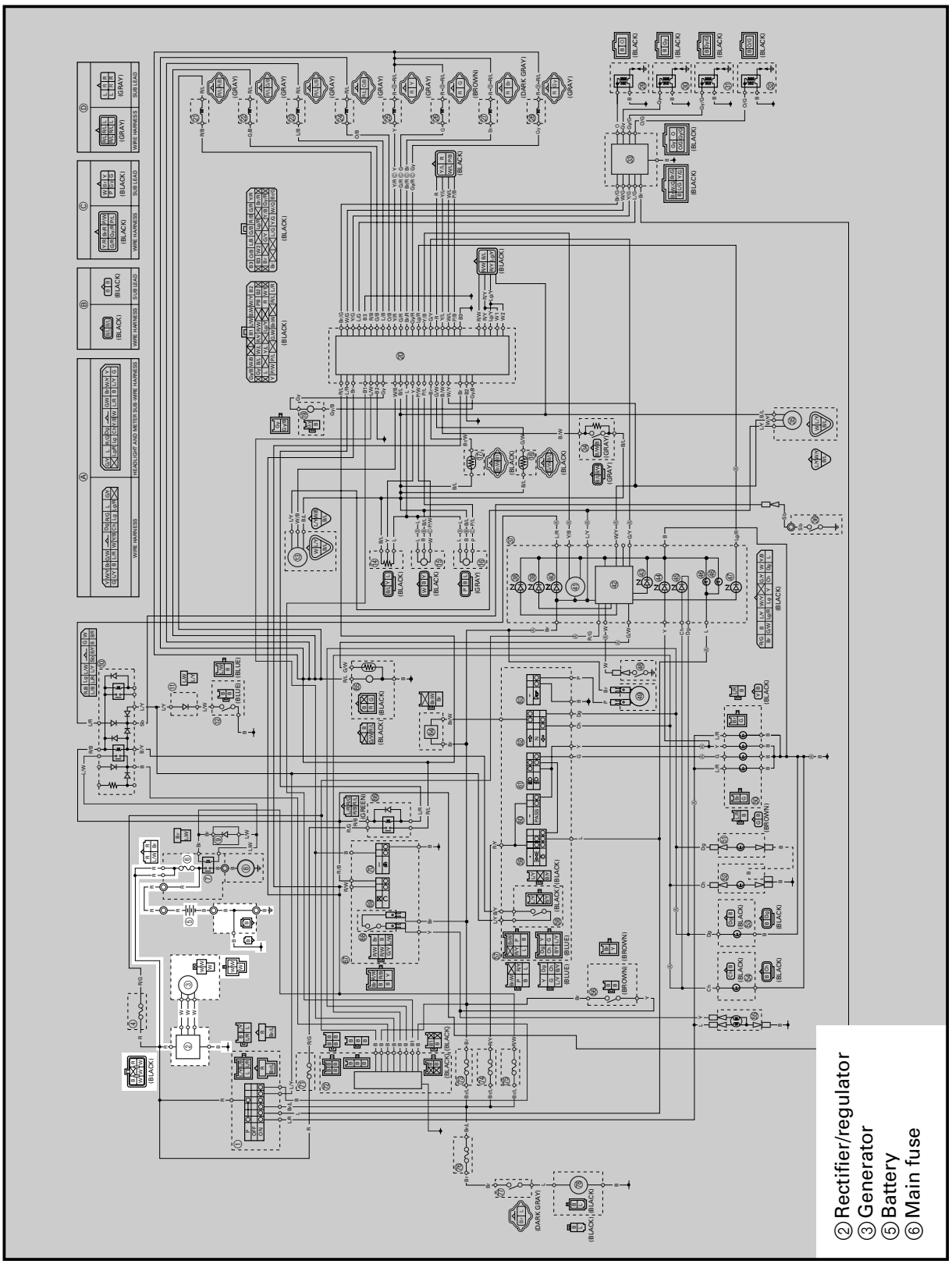
NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?
  Yes → Good.
  No → Replace the defective diode(-s).

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EB804000
CHARGING SYSTEM

CIRCUIT DIAGRAM



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TROUBLESHOOTING

The battery is not being charged.

- Check the main fuse for continuity.
  - No good → Replace.
  - OK ↓
- Check the condition of the battery.
  - No good → Recharge or replace.
  - OK ↓
- Measure the charging voltage.
  - ON ⇒ The charging circuit is OK.
  - No good ↓
- Measure the stator coil assembly resistance.
  - No good → Replace.
  - OK ↓
- Check the entire charging system's wiring.
  - No good → Repair or replace.
  - OK ↓
- Replace the rectifier/regulator.

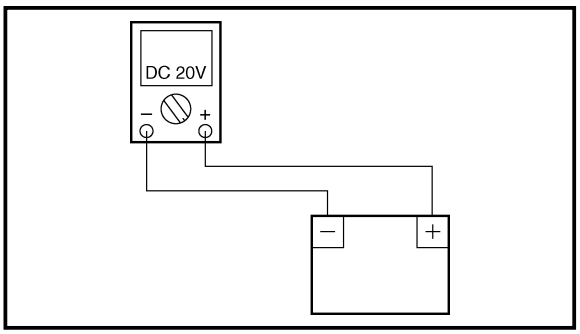
NOTE:

- Before troubleshooting, remove the following part(-s):
1) bottom cowling
2) front cowling
3) rear cowling
- Troubleshoot with the following special tool(-s).



Engine tachometer
90890-06760
Pocket tester
90890-03112

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MEASURING THE CHARGING VOLTAGE

- Connect the engine tachometer to the ignition coil of cylinder #1.
  Refer to "SYNCHRONIZING THE THROTTLE BODIES" in chapter 3.
- Connect the pocket tester (DC 20V) to the battery as shown.

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

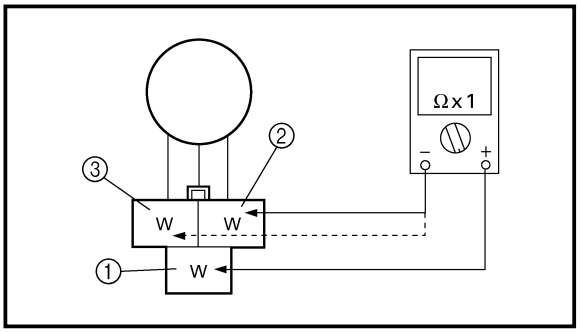
- Start the engine and let it run at approximately 1,100 r/min.
- Measure the charging voltage.

Charging voltage
12 V at 1,100 r/min

NOTE:

- Make sure that the battery is fully charged.
- When measuring, turn off the headlights and make sure that no load is applied.

- Is the charging voltage within specification?
  Yes → OK.
  No → Measure the stator coil assembly resistance.



MEASURING THE STATOR COIL ASSEMBLY RESISTANCES

- Disconnect the generator coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the stator coil assembly coupler as shown.

Tester positive probe → white ①
Tester negative probe → white ②

Tester positive probe → white ①
Tester negative probe → white ③

- Measure the stator coil assembly resistances.

Stator coil resistance
0.38 ~ 0.46 Ω at 20°C (68 °F)

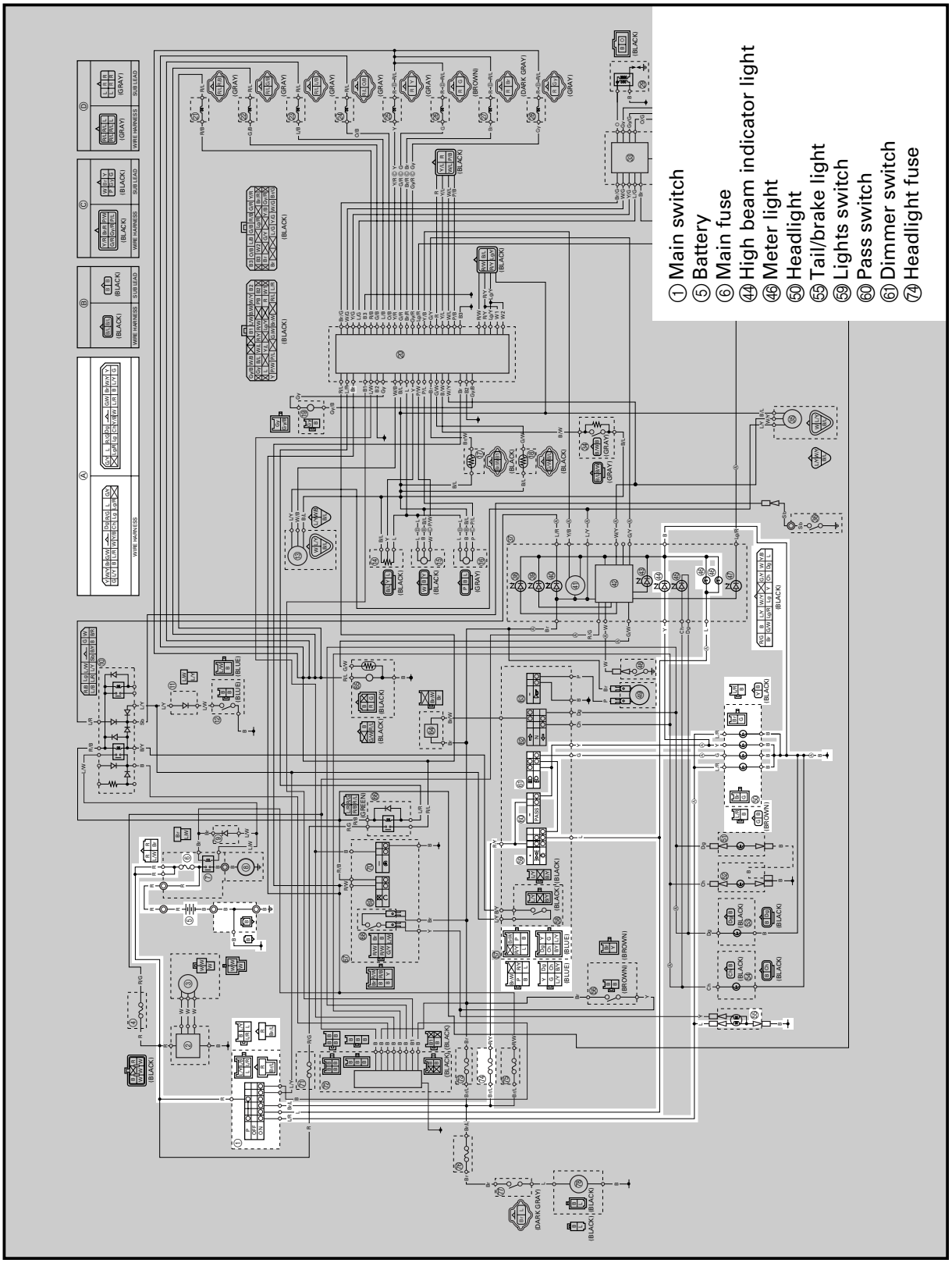
- Is the stator coil assembly OK?
  Yes → OK.
  No → Replace.

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EB805000

LIGHTING SYSTEM

CIRCUIT DIAGRAM



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TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light or meter light.

Check the main and headlight fuses for continuity.	No good	Replace.
OK ↓		
Check the condition of the battery.	No good	Recharge or replace.
OK ↓		
Check the bulbs and bulb sockets.	No good	Replace.
OK ↓		
Check the LED's of the indicator light.	No good	Replace the meter assembly.
OK ↓		
Check the main switch.	No good	Replace.
OK ↓		
Check the lights switch.	No good	Replace the left handlebar switch.
OK ↓		
Check the dimmer switch.	No good	Replace the left handlebar switch.
OK ↓		
Check the pass switch.	No good	Replace the left handlebar switch.
OK ↓		
Check the entire lighting system's wiring.	No good	Repair or replace.

NOTE:

- Before troubleshooting, remove the following part(-s):

1) bottom cowling
2) front cowling
3) rear cowling

- Troubleshoot with the following special tool(-s).

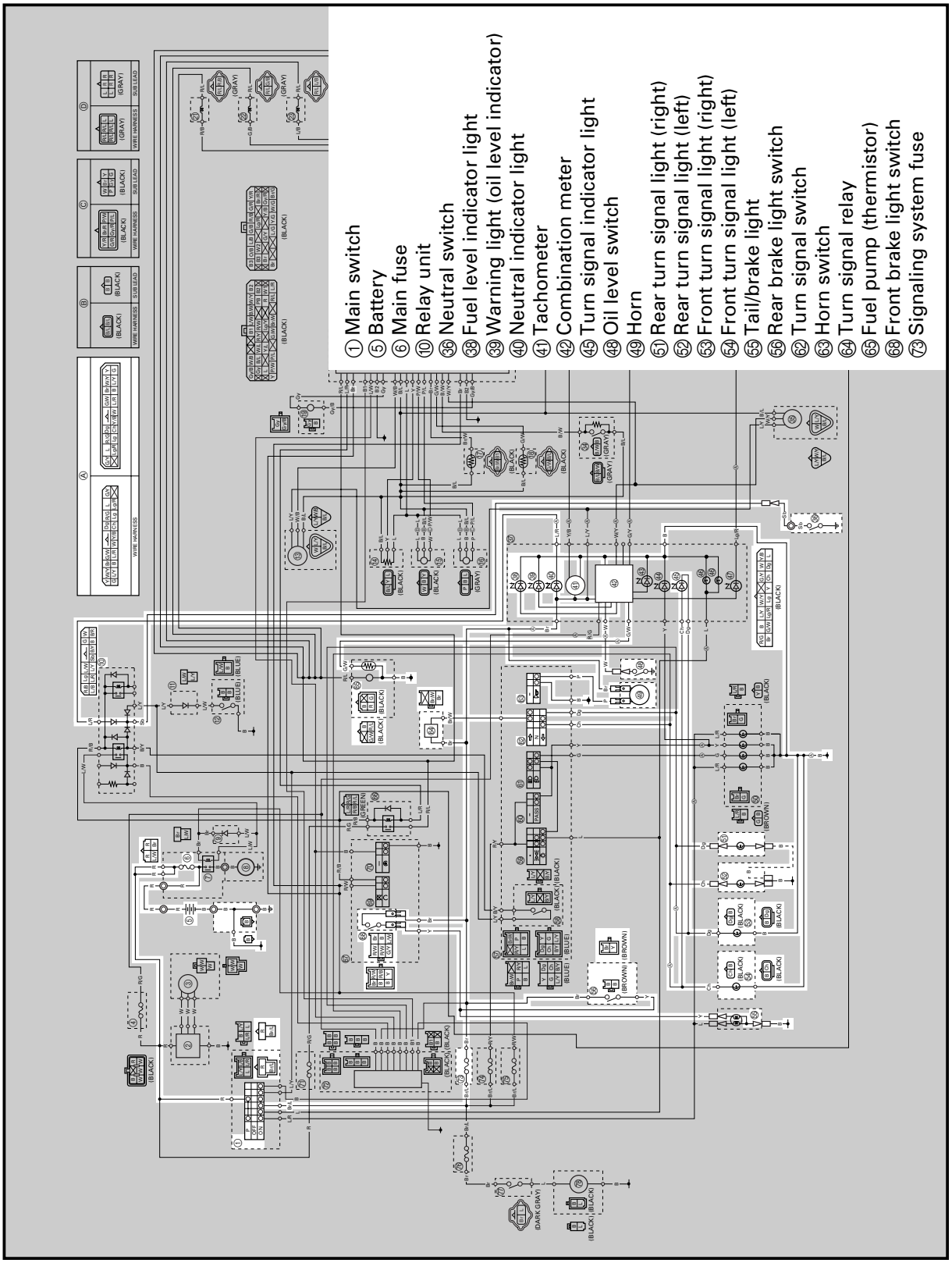


Pocket tester
90890-03112

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EB806000
SIGNALING SYSTEM

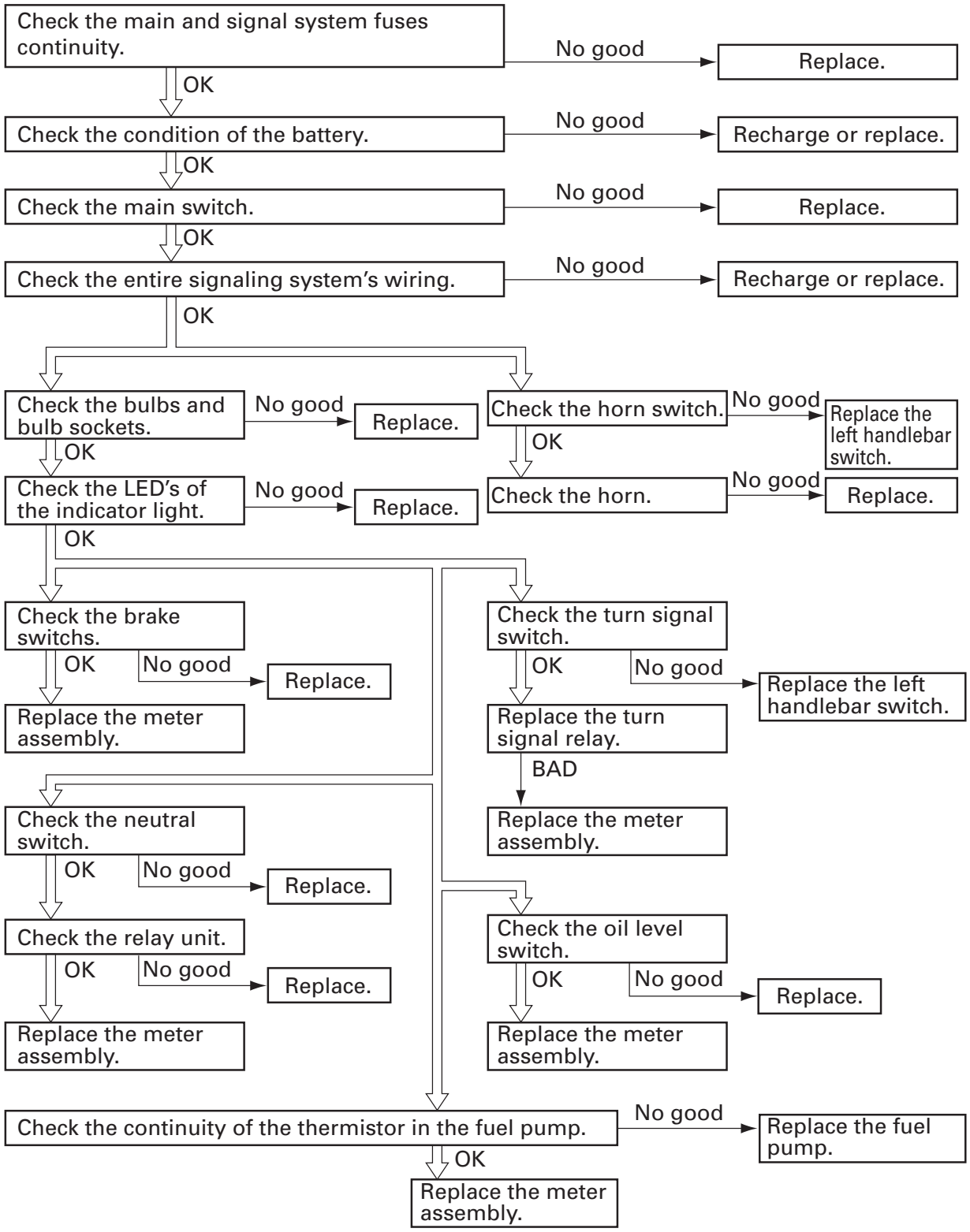
CIRCUIT DIAGRAM



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TROUBLE SHOOTING

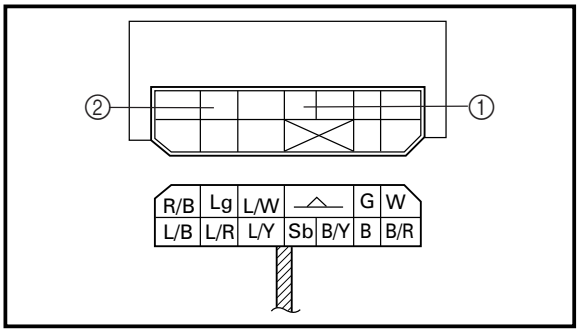
- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.



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NOTE:
- Before troubleshooting, remove the following part(-s):
1) fuel tank
2) bottom cowling
3) front cowling
4) rear cowling
- Troubleshoot with the following special tool(-s).

	Pocket tester **90890-03112**



CHECKING THE RELAY UNIT
- Remove the relay unit from the coupler.
- Connect the pocket tester (Ω × 1) to the relay unit terminals as shown.
- Check the starting circuit cutoff relay for continuity.

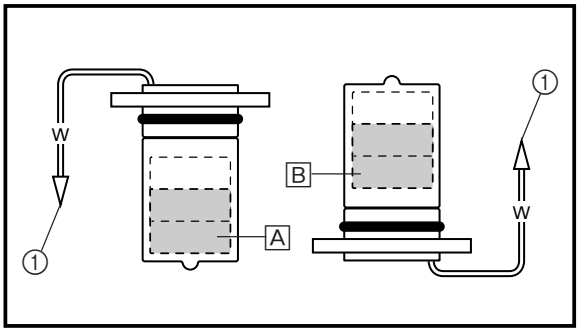
Tester positive probe → sky blue ① **Tester negative probe → blue/red ②**	**Continuity**
Tester positive probe → blue/red ② **Tester negative probe → sky blue ①**	**No continuity**

NOTE:
When you switch the tester's positive and negative probes, the readings in the above chart will be reversed.

- Are the tester readings correct?
  Yes → Good.
  No → Replace.

CHECKING THE OIL LEVEL SWITCH
- Drain the engine oil.
- Remove the oil level switch.
- Connect the pocket tester (Ω × 1) to the oil level switch connector as shown.
- Check the oil level switch for continuity as follows.

Tester positive probe → white ① **Tester negative probe → ground**	
Oil level switch float position is upper A.	**Continuity**
Oil level switch float position is lower B.	**No continuity**

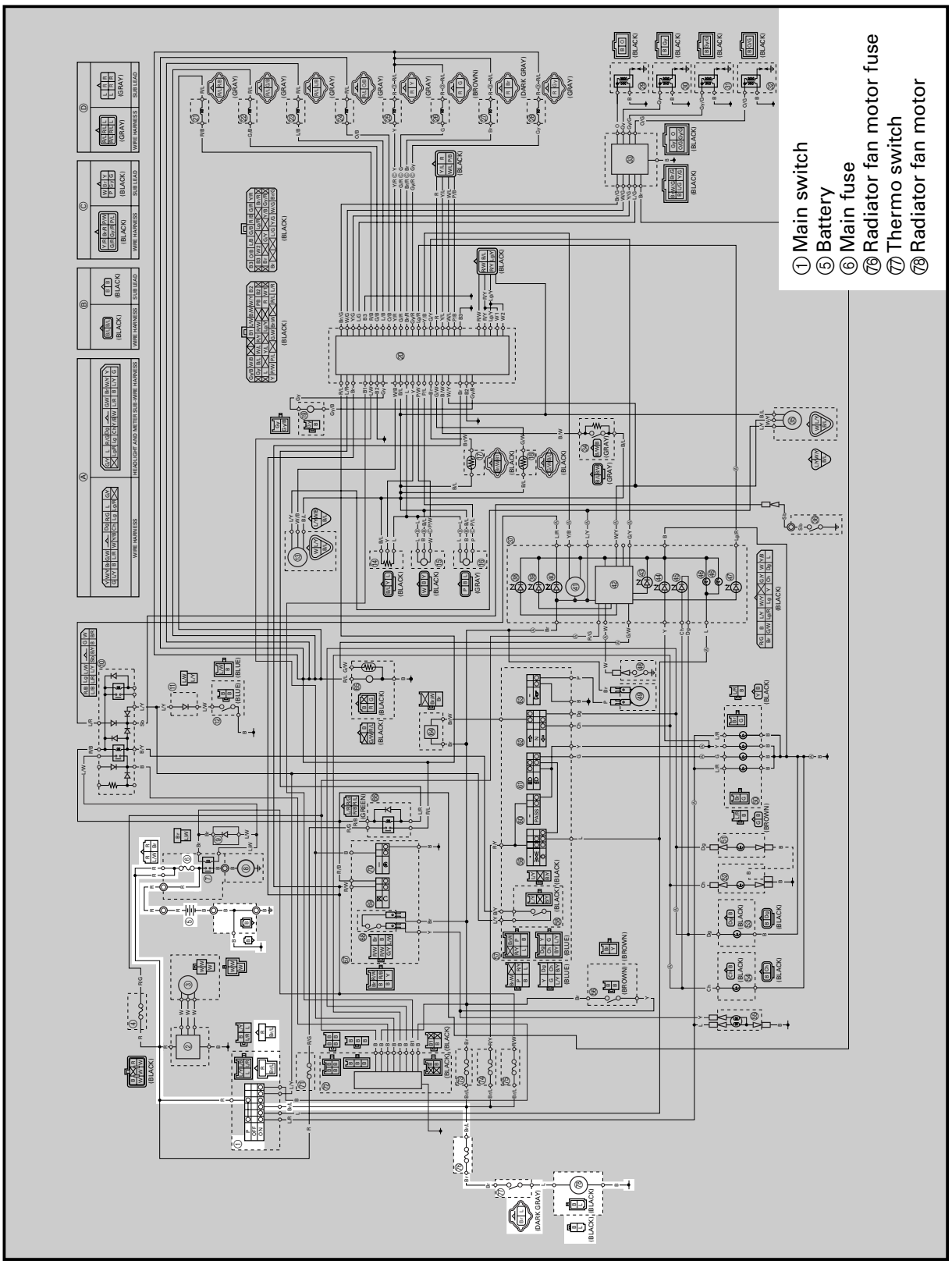


- Are the oil level switch readings correct?
  Yes → Good.
  No → Replace.

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EB807000
COOLING SYSTEM

CIRCUIT DIAGRAM



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TROUBLESHOOTING

- The radiator fan motor fails to turn.
- The coolant temperature meter needle fails to move when the engine is warm.

Check the main and radiator fan motor fuses for continuity.	No good	Replace.
OK ↓		
Check the condition of the battery.	No good	Recharge or replace.
OK ↓		
Check the main switch.	No good	Replace.
OK ↓		
Check the radiator fan motor.	No good	Replace.
OK ↓		
Check the thermo switch.	No good	Replace.
OK ↓		
Check the entire cooling system's wiring.	No good	Repair or replace.

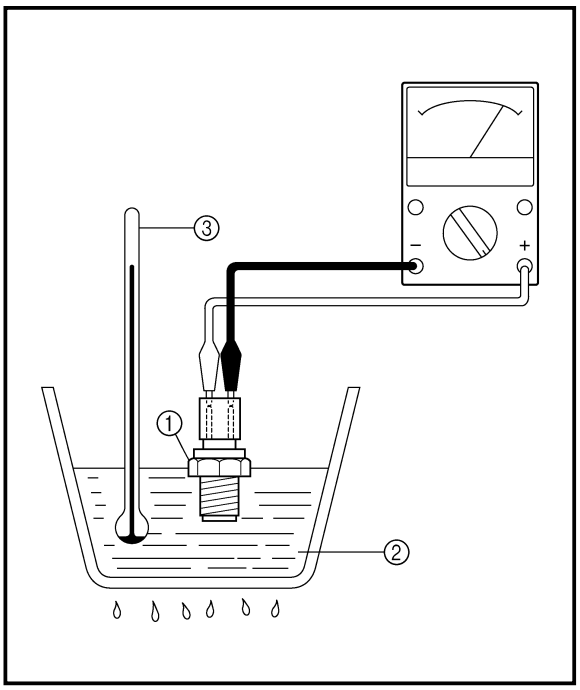
NOTE:

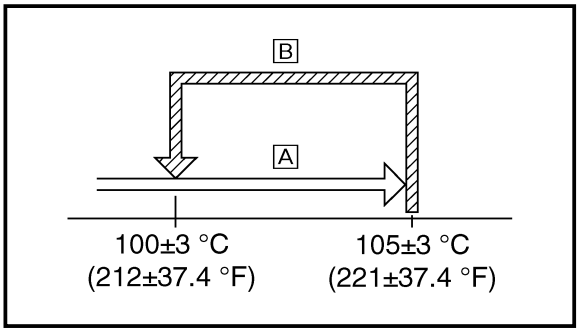
- Before troubleshooting, remove the following part(-s):
1) bottom cowling
2) front cowling
3) rear cowling
- Troubleshoot with the following special tool(-s).



Pocket tester
90890-03112

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CHECKING THE THERMO SWITCH

- Remove the thermo switch from the radiator.
- Connect the pocket tester (Ω × 1) to the thermo switch ① as shown.
- Immerse the thermo switch in a container filled with coolant ②.

NOTE:
Make sure that the thermo switch terminals do not get wet.

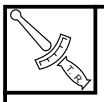
- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool to the specified temperature as indicted in the table.
- Check the thermo switch for continuity a the temperatures indicated in the table.

Test step	Coolant temperature Thermo switch	Continuity
1	0 ~ 100 ± 3˚C (0 ~ 212 ± 37.4˚F)	NO
2	More than 105 ± 3˚C (221 ± 37.4˚C)	YES
3*	105 to 100 ˚C (221 to 212 ˚F)	YES
4*	Less than 100 ˚C (212 ˚F)	NO

Test steps 1 & 2: Heating phase
Test steps 3* & 4*: Cooling phase

⚠ WARNING

- **Handle the thermo switch with special care.**
- **Never subject the thermo switch to strong shocks. If the thermo switch is dropped, replace it.**



Thermo switch
23 Nm (2.3 m • kg, 17 ft • lb)
Three bond sealock® 10

Ⓐ The thermo switch circuit is open and the radiator fan is off.
Ⓑ The thermo switch circuit is closed and the radiator fan is on.

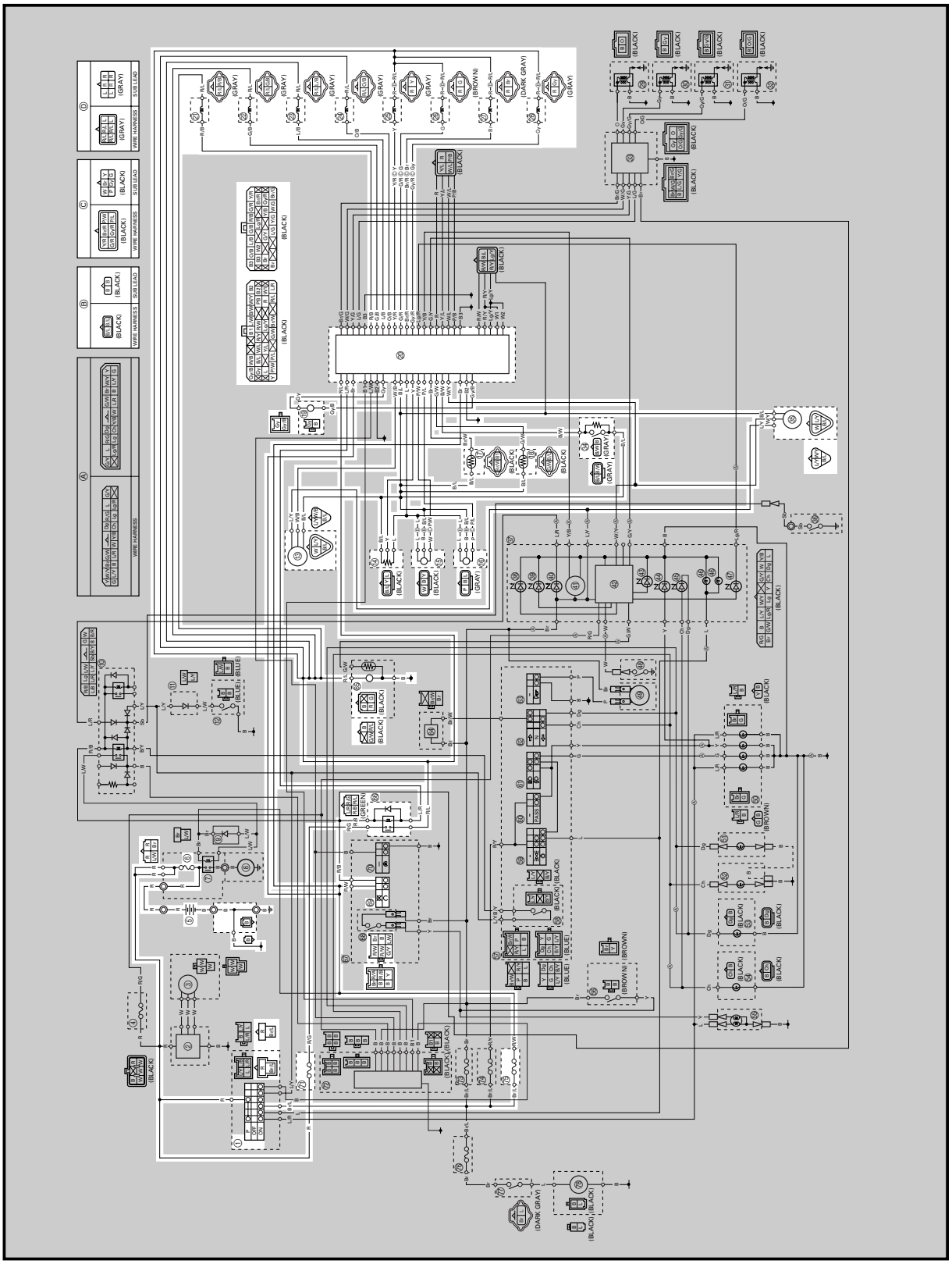
- Does the thermo switch operate properly as described above?
  Yes → OK.
  No → Replace.

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ELECTRONIC FUEL INJECTION SYSTEM

CIRCUIT DIAGRAM



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① Main switch
⑤ Battery
⑥ Main fuse
⑬ Camshaft sensor
⑭ Throttle position sensor
⑮ Intake air pressure sensor
⑯ Atmospheric pressure sensor
⑰ Intake air temperature sensor
⑱ Coolant temperature sensor
⑲ Pickup coil
⑳ ECU
㉑ Cylinder #1-injector 1
㉒ Cylinder #2-injector 1
㉓ Cylinder #3-injector 1
㉔ Cylinder #4-injector 1
㉕ Cylinder #1-injector 2
㉖ Cylinder #2-injector 2
㉗ Cylinder #3-injector 2
㉘ Cylinder #4-injector 2
㉞ Fall detection switch
㉟ Speed sensor
㊺ Fuel pump
㊻ Main relay
㊾ Engine stop switch
㊶ Electronic fuel injection system fuse
㊺ ECU fuse

TROUBLESHOOTING

The condition code is displayed by the tachometer.

Check the condition code list to identify the faulty part. Refer to "ELECTRICAL CONTROL SYSTEM".

In diagnosis mode, select the appropriate diagnosis code to check the operation of the faulty part. → Out of specification → Check the wiring. → No good → Replace.

NOTE:
- Before troubleshooting, remove the following part(-s):
1) bottom cowling
2) front cowling
- Troubleshoot with the following special tool(-s).



Co, diagnosis switch box
90890-03171
Test coupler adapter
90890-03149

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ELECTRICAL CONTROL SYSTEM

The YZF-R7 features an electrical control system with the following modes:
- user mode
- diagnosis mode
- CO emission adjustment mode

NOTE:
The vehicle is normally in user mode. Special tools are needed to switch to a diagnosis mode or to the CO emission adjustment mode.

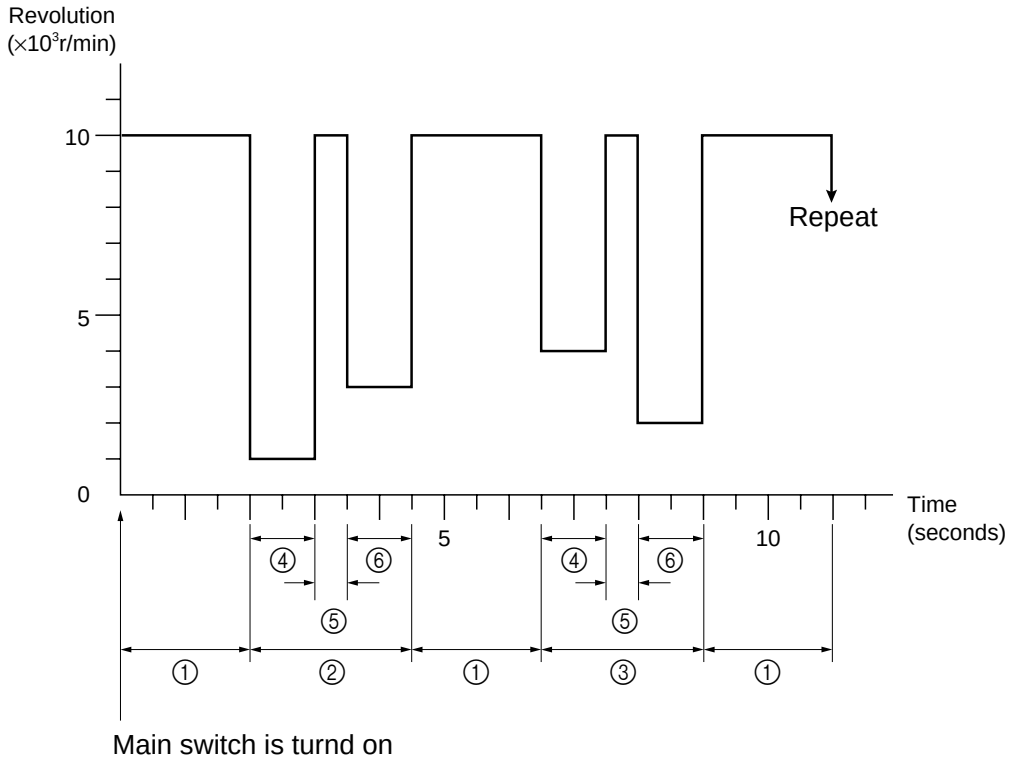
USER MODE

- If a circuit is defective, setting the main switch to "ON" (without starting the engine) will cause the corresponding condition code to be displayed by the tachometer, the warning light to light up, and the engine trouble symbol to blink. When the engine is started, the condition code is no longer displayed and the engine speed appears.
- Normally, when the main switch is set to "ON", the warning light comes on for 1.4 seconds and then goes off. The warning light also comes on while the start switch is pushed.
- When the engine is not running, the warning light flashes once every 0.16 second if the start switch is pushed under the following conditions.
    - The fall detection switch switches off the main relay.
    - Ignition is cut off by the sidestand switch.
    - The injector operating voltage decreases to 3 V or less, or the main relay malfunctions.
    - The pickup coil is defective.
    - The fall detection switch is defective.

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Tachometer display sequence (engine not running)

① 10,000 r/min for 2.0 seconds
② First condition code (13 = intake air pressure sensor)
③ Second condition code (42 = speed sensor)
④ 1st digit of condition code for 1.0 second
⑤ 10,000 r/min for 0.5 second
⑥ 2nd digit of condition code for 1.0 second



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Condition code list

Condition code	Circuit	Defect(s)	System response
11	Camshaft sensor	• No incoming signal	The ECU pairs the ignition of cylinders #1 and #4 and cylinders #2 and #3. The motorcycle can be ridden.
12*	Pickup coil	• No incoming signal	The motorcycle cannot be ridden.
13	Intake air pressure sensor	• Disconnected • Short-circuit	The ECU stays set to an intake air pressure of 760 mm Hg (29.9 in Hg). The motorcycle can be ridden.
14	Intake air pressure sensor hose and negative pressure hose	• Improper connection • Bending	
15	Throttle position sensor	• Disconnected • Short-circuit	The ECU stays set to a wide throttle opening. The motorcycle can be ridden.
16	Throttle position sensor	• Locked	
21	Coolant temperature sensor	• Disconnected • Short-circuit	The ECU stays set to a coolant temperature of 80°C (176°F). The motorcycle can be ridden.
22	Intake air temperature sensor	• Disconnected • Short-circuit	The ECU stays set to an intake air temperature of 40°C (104°F). The motorcycle can be ridden.
23	Atmospheric pressure sensor	• Disconnected • Short-circuit	The ECU stays set to an atmospheric pressure of 760 mm Hg (29.9 in Hg). The motorcycle can be ridden.
41	Fall detection switch	• Disconnected	The main relay stays switched off. The motorcycle cannot be ridden.
42**	Speed sensor	• Incorrect signal	The ECU stays set to 6th gear. The motorcycle can be ridden.
43***	Monitored voltage	• Incorrect	The ECU stays set to a monitored voltage of 12 V. The motorcycle can be ridden.
44	ROM operation	• CO emission adjustment error	The CO emission adjustment is set to 0.

NOTE:

* This condition code is also displayed in the following cases:
- when the starter switch is held down for more than 4 seconds, causing the warning light to flash
- when the ignition circuit cut-off system stops the engine or prevents it from starting

** This condition code is also displayed when the engine is operated at 5,000 r/min for at least 30 seconds with the rear wheel at standstill.

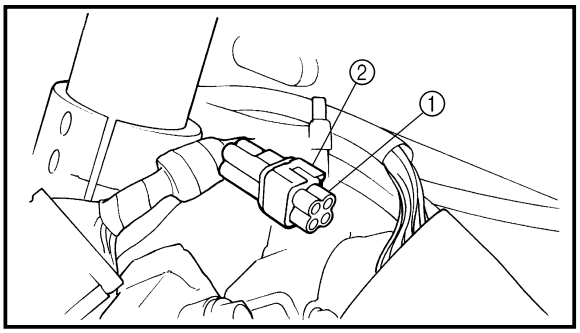
*** This condition code is also displayed when the engine stop switch is turned to "⊗" while riding with the transmission in gear.

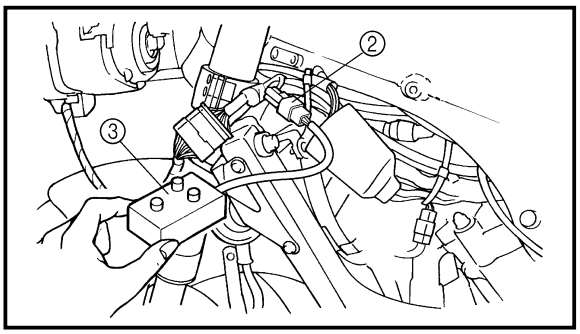
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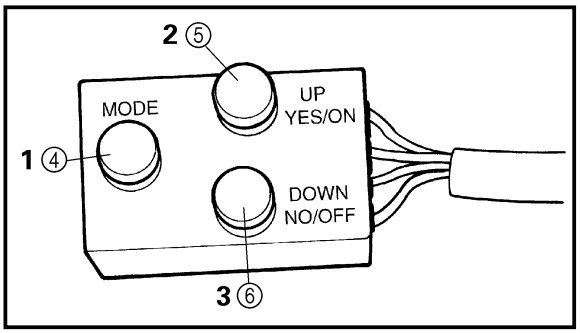
DIAGNOSIS MODE

There are two operation methods for this mode: one is performed using the CO, diagnosis switch box, the other is performed using the test coupler adapter. With the CO, diagnosis switch box method, the switches on the CO, diagnosis switch box are used. With the test coupler adapter method, the start switch and the engine stop switch are used. The procedures for selecting and using each method is explained below.

NOTE:
The engine cannot be started, the vehicle cannot be ridden, and no other mode can be selected while either of the diagnosis mode operation methods is being performed.







CO, diagnosis switch box method

- Remove the bottom cowling and the front cowling.
  Refer to "COWLINGS" in chapter 3.
- Remove the protection cap ① from the EFI test coupler ②.
- Connect the CO, diagnosis switch box ③ to the EFI test coupler ②.

CO, diagnosis switch box
90890-03171

- Turn the main switch to "ON".
- Turn the engine stop switch to "⟲".
- Within 4 seconds, press the following switches on the CO, diagnosis switch box in the order indicated to enter the diagnosis mode.

④ MODE switch = 1
⑤ UP switch = 2
⑥ DOWN switch = 3

1 → 2 → 1 → 3 → 1 → 2 → 1 → 3 → 1 → 2 → 1 → 3

The warning light flashes when the unit has entered the diagnosis mode.

NOTE:
Turn the main switch to "OFF" to cancel the diagnosis mode.

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Operation after entering the diagnosis mode

- Select a diagnosis code by holding down the MODE switch while pressing either the UP or DOWN switch. Refer to the diagnosis code list.
  First, press the UP switch once to select diagnosis code 01 or press the DOWN switch once to select diagnosis code 31. Afterwards, each press of the UP switch or the DOWN switch respectively increases or decreases the diagnosis code number by one. If diagnosis code 00 is selected, pressing the DOWN switch once selects diagnosis code 31. If diagnosis code 31 is selected, pressing the UP switch once selects diagnosis code 00.
- Release the MODE switch to start the test for the selected diagnosis code.

NOTE:
To select another diagnosis code, hold down the MODE switch and press either the UP switch or the DOWN switch.

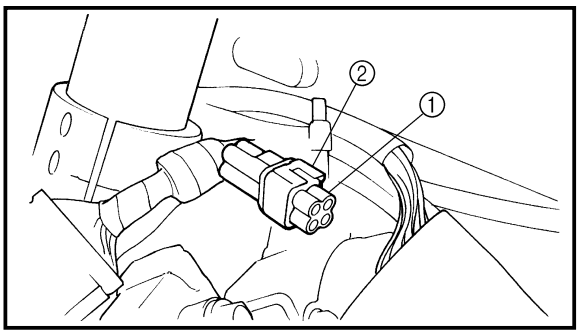
Example:
First, select diagnosis code 29 in either of the following ways.

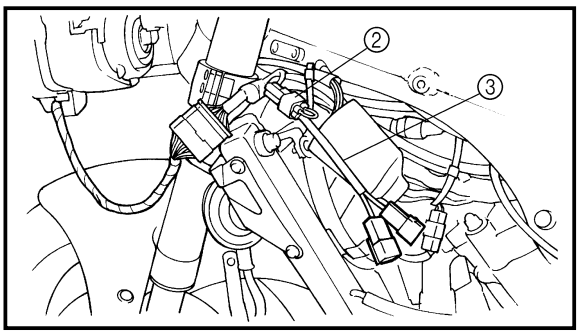
- Hold down the MODE switch, press the UP switch 29 times, and then release the MODE switch.
- Hold down the MODE switch, press the DOWN switch 3 times, and then release the MODE switch.

Next, select diagnosis code 10 in either of the following ways.

- Hold down the MODE switch, press the UP switch 13 times, and then release the MODE switch.
- Hold down the MODE switch, press the DOWN switch 19 times, and then release the MODE switch.

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Test coupler adapter method

- Remove the bottom cowling and the front cowling.
  Refer to "COWLINGS" in chapter 3.
- Remove the protection cap ① from the EFI test coupler ②.
- Connect the test coupler adapter ③ to the EFI test coupler ②.

Test coupler adapter
90890-03149

- Disconnect the fuel pump coupler from the wire harness.
- Turn the main switch to "ON".
- Turn the engine stop switch to "⊗".
- Press the start switch ten times within 4 seconds to enter the diagnosis mode.
  The warning light flashes when the unit has entered the diagnosis mode.

NOTE:
Turn the main switch to "OFF" to cancel the diagnosis mode.

Operation after entering the diagnosis mode

- Select a diagnosis code by pressing the start switch. Refer to the diagnosis code list.
  First, press the start switch once to select diagnosis code 01. Afterwards, each press of the start switch increases the diagnosis code number by one. If diagnosis code 31 is selected, pressing the start switch once selects diagnosis code 00.
- Turn the engine stop switch to "○" to start the test for the selected diagnosis code.

NOTE:
To select another diagnosis code, turn the engine stop switch to "⊗", and then press the start switch.

Example:
First, select diagnosis code 29 as follows.
- Turn the engine stop switch to "⊗".
- Press the start switch 29 times.
- Turn the engine stop switch to "○".

Next, select diagnosis code 10 as follows.
- Turn the engine stop switch to "⊗".
- Press the start switch 13 times.
- Turn the engine stop switch to "○".

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Diagnosis code list

Diagnosis code	Inspected item	System response	Tachometer display (0 ~ 10,000 r/min)
00	—	—	—
01	Voltage	The tachometer displays the voltage × 500. Example: If the voltage is 12.5 V, the tachometer displays 12.5 × 500 = 6,250 r/min.	0 r/min (0 V) – 10,000 r/min (20 V)
02	Atmospheric pressure	The tachometer displays the atmospheric pressure sensor signal. Example: If the atmospheric pressure is 760 mm Hg (29.9 in Hg), the tachometer displays 8,000 r/min.	
03	Intake air pressure	The tachometer displays the difference between the minimum intake air pressure sensor signal and the atmospheric pressure sensor signal after the main switch is turned to "ON" in the diagnosis mode.	0 r/min (0 mm Hg) – 1,000 r/min (100 mm Hg)
04	Throttle position sensor	The tachometer displays the throttle position sensor signal.	1,300 r/min (0.68 V) – 5,900 r/min (2.93 V)
05	Throttle position sensor	The tachometer displays the minimum throttle position sensor signal.	5,500 r/min (0.68 V) – 10,000 r/min (1.25 V)
06	Intake air temperature	The tachometer displays the intake air temperature signal.	4,800 r/min (20°C) – 5,700 r/min (30°C)
07	Coolant temperature	The tachometer displays the coolant temperature sensor signal.	4,900 r/min (20°C) – 9,200 r/min (100°C)
08	Speed sensor	The tachometer displays the speed sensor signal when the rear wheel is rotated by hand.	0 –
09	Fall detection switch	The tachometer displays whether the fall detection switch is on or whether it is off or disconnected.	0 r/min (on), 8,000 r/min (off) or 10,000 r/min (disconnected)
10	Sidestand switch	The tachometer displays whether the sidestand switch is on or off. The tachometer displays 0 r/min when the sidestand is down (switch on) and 10,000 r/min when the sidestand is up (switch off).	0 r/min (on) or 10,000 r/min (off)
11	—	—	—

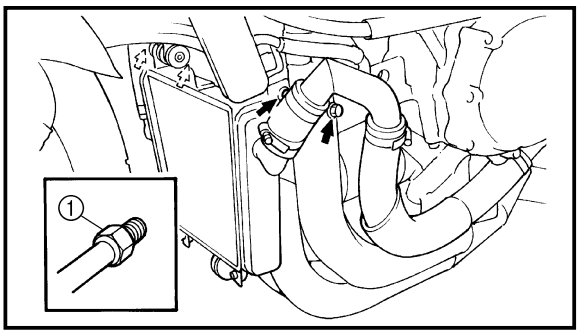
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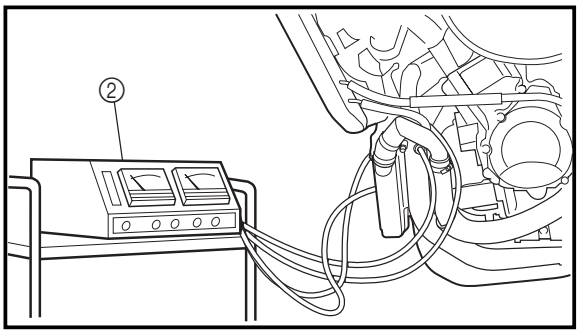
Diagnosis code	Inspected item	System response	Tachometer display (0 ~ 10,000 r/min)
12	Main relay	CO, diagnosis switch box method Within one second after the MODE switch is released, the main relay is switched on once every second for the next five seconds. During this time, the warning light lights up as long as the relay is switched on. Test coupler adapter method Within one second after the engine stop switch is turned to "◯", the main relay is switched off, then on again. The warning light lights up while the relay is switched off.	
13	Ignition coil for cylinder #1	CO, diagnosis switch box method Within one second after the MODE switch is released, the ignition coil for the selected cylinder is operated once every second for the next five seconds. During this time, the warning light lights up for 0.5 second once every second. Test coupler adapter method Within one second after the engine stop switch is turned to "◯", the ignition coil for the selected cylinder is operated once every second for the next five seconds. During this time, the warning light lights up for 0.5 second once every second.	
14	Ignition coil for cylinder #2		
15	Ignition coil for cylinder #3		
16	Ignition coil for cylinder #4		

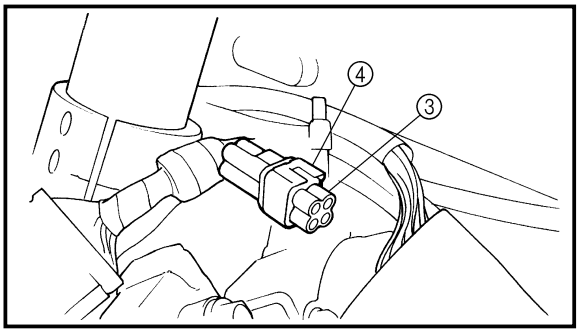
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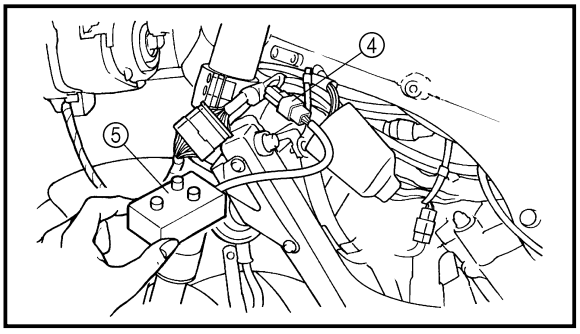
Diagnosis code	Inspected item	System response	Tachometer display (0 ~ 10,000 r/min)
17	Injector 1 for cylinder #1	CO, diagnosis switch box method Before selecting a code, disconnect the fuel pump coupler from the wire harness. Within one second after the MODE switch is released, the main relay is turned on, and the selected injector is operated once every second for the next five seconds. During this time, the warning light lights up for 0.5 second once every second. Test coupler adapter method Within one second after the engine stop switch is turned to "◯", the selected injector is operated for once every second for the next five seconds. During this time, the warning light lights up for 0.5 second once every second.	
18	Injector 1 for cylinder #2		
19	Injector 1 for cylinder #3		
20	Injector 1 for cylinder #4		
21	Injector 2 for cylinder #1		
22	Injector 2 for cylinder #2		
23	Injector 2 for cylinder #3		
24	Injector 2 for cylinder #4		
25 ~ 28	—	—	—
29	Condition code record of malfunctions	The condition code of any fixed malfunction is recorded in the ROM and displayed by the tachometer. Refer to the condition code list in "USER MODE" for details on the condition codes.	Condition codes 11 – 44
30	ROM (Clearing the condition code record)	Selecting this diagnosis code clears the condition code record of malfunctions stored in the ROM. If an error has occurred in a sensor signal, it was recorded in the ROM and the tachometer displays 10,000 r/min. If no error has occurred, the tachometer displays 0 r/min. CO, diagnosis switch box method Press the UP switch eight times within four seconds to clear the condition code record from the ROM. Test coupler adapter method Remove the rear cowling. Disconnect the relay unit coupler from the relay unit. Press the start switch ten times within four seconds to clear the condition code record from the ROM.	0 r/min (no error) or 10,000 r/min (errors) When the error record is cleared, 0 r/min is displayed.
31	ROM program version	The version number of the ROM program is displayed in the tachometer.	

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CO EMISSION ADJUSTMENT MODE

With the CO emission adjustment mode, the amount of fuel injected by the injector can be adjusted.

NOTE:

Prior to adjusting the CO emission, the throttle bodies must be properly synchronized.

- Remove the bottom cowling and front cowling.
  Refer to "COWLINGS" in chapter 3.
- Remove the CO check bolts from the exhaust pipe assembly.
- Install the exhaust attachment ① and CO tester ② to the exhaust pipe assembly.

Exhaust attachment
90890-03134

- Attach the engine tachometer to the ignition coil for cylinder #1.
  Refer to "SYNCHRONIZING THE THROTTLE BODIES" in chapter 3.

Engine tachometer
90890-06760

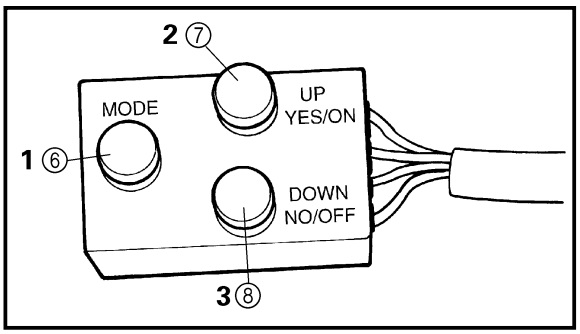
- Remove the protection cap ③ from the EFI test coupler ④.
- Connect the CO, diagnosis switch box ⑤ to the EFI test coupler 4.

CO, diagnosis switch box
90890-03171

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

Engine idling speed
1,000 ~ 1,200 r/min

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- Within 4 seconds, press the following switches on the CO, diagnosis switch box in the order indicated to enter the CO emission adjustment mode.

⑥ MODE switch = 1
⑦ UP switch = 2
⑧ DOWN switch = 3

1 → 2 → 3 → 1 → 2 → 3 → 1 → 2 → 3 → 1 → 2 → 3

The warning light flashes for 1.4 seconds when the unit has entered the CO emission adjustment mode. During this time, the tachometer displays the engine idling speed.

NOTE:
Turn the main switch to "OFF" to cancel the CO emission adjustment mode.

Tachometer display	Selected cylinder
1,000 r/min	Cylinder #1
2,000 r/min	Cylinder #2
3,000 r/min	Cylinder #3
4,000 r/min	Cylinder #4

- According to the following table, select the cylinder to be adjusted by holding down the MODE switch while pressing either the UP switch or the DOWN switch.
- Release the MODE switch to start the CO emission adjustment for the selected cylinder. The warning light flashes once every 0.5 second and the tachometer displays the engine speed.
- While watching the CO tester, press the UP switch or DOWN switch to adjust the CO emission.

Press the UP switch	Increase CO emission
Press the DOWN switch	Decrease CO emission

NOTE:
- If the UP switch is pressed when the CO emission has reached its maximum or if the DOWN switch is pressed when the CO emission has reached its minimum, the warning light flashes once every 0.16 second.

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• Adjust all four cylinders to specification.



Standard CO concentration
3.5 %

• To select a different cylinder, hold down the MODE switch while pressing either the UP switch or the DOWN switch.

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YZF-R7 WIRING DIAGRAM

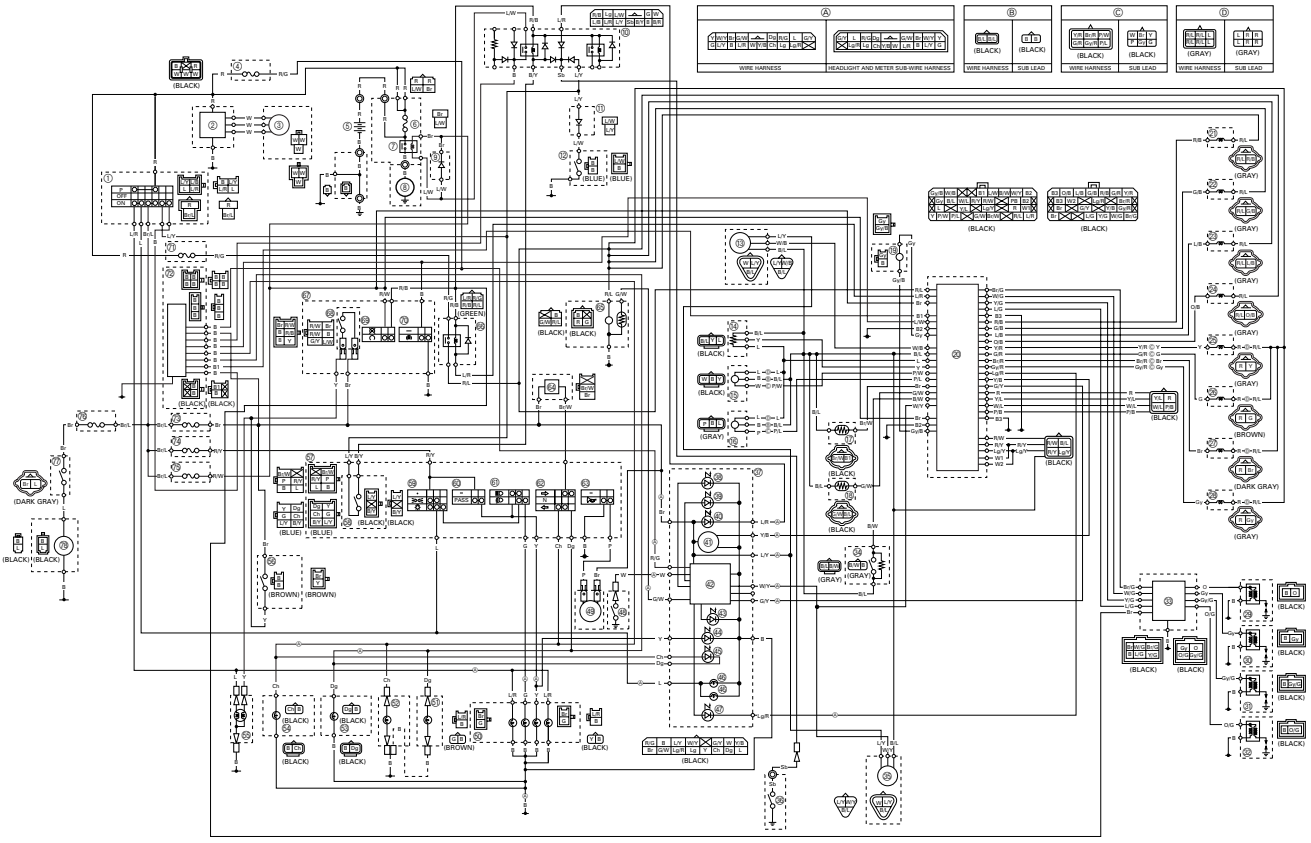
① Main switch
② Rectifier/regulator
③ Generator
④ Backup fuse (odometer)
⑤ Battery
⑥ Main fuse
⑦ Starter relay
⑧ Starter motor
⑨ Diode
⑩ Relay unit
⑪ Diode
⑫ Sidestand switch
⑬ Camshaft sensor
⑭ Throttle position sensor
⑮ Intake air pressure sensor
⑯ Atmospheric pressure sensor
⑰ Intake air temperature sensor
⑱ Coolant temperature sensor
⑲ Pickup coil
⑳ ECU
㉑ Cylinder #1 - injector 1
㉒ Cylinder #2 - injector 1
㉓ Cylinder #3 - injector 1
㉔ Cylinder #4 - injector 1
㉕ Cylinder #1 - injector 2
㉖ Cylinder #2 - injector 2
㉗ Cylinder #3 - injector 2
㉘ Cylinder #4 - injector 2
㉙ Cylinder #1 - ignition coil
㉚ Cylinder #2 - ignition coil
㉛ Cylinder #3 - ignition coil
㉜ Cylinder #4 - ignition coil
㉝ CDI unit
㉞ Fall detection switch
㉟ Speed sensor
㊱ Neutral switch
㊲ Meter assembly
㊳ Fuel level indicator light
㊴ Warning light (oil level indicator)
㊵ Neutral indicator light
㊶ Tachometer
㊷ Combination meter
㊸ Warning light (coolant temperature indicator)
㊹ High beam indicator light
㊺ Turn signal indicator light
㊻ Meter light
㊼ Warning light (engine trouble indicator)
㊽ Oil level switch
㊾ Horn
㊿ Headlight
(51) Rear turn signal light (right)
(52) Rear turn signal light (left)
(53) Front turn signal light (right)
(54) Front turn signal light (left)
(55) Tail/brake light
(56) Rear brake light switch
(57) Left handlebar switch
(58) Clutch switch
(59) Lights switch
(60) Pass switch
(61) Dimmer switch
(62) Turn signal switch
(63) Horn switch
(64) Turn signal relay
(65) Fuel pump
(66) Main relay
(67) Right handlebar switch
(68) Front brake light switch
(69) Engine stop switch
(70) Start switch
(71) Electronic fuel injection system fuse
(72) CYCLELOCK
(73) Signaling system fuse
(74) Headlight fuse
(75) ECU fuse
(76) Radiator fan motor fuse
(77) Thermo switch
(78) Radiator fan motor

COLOR CODE

B .....black
Br.....brown
Ch.....chocolate
Dg.....dark green
G.....green
Gy.....gray
L .....blue
Lg .....light green
O.....orange
P .....pink
R .....red
Sb.....sky blue
W.....white
Y .....yellow
B/L .....black/blue
B/R.....black/red
B/W .....black/white
B/Y.....black/yellow
Br/G .....brown/green
Br/L.....brown/blue
Br/R .....brown/red
Br/W .....brown/white
G/B .....green/black
G/R .....green/red
G/W .....green/white
G/Y .....green/yellow
Gy/B .....gray/black
Gy/G.....gray/green
Gy/R .....gray/red
L/B .....blue/black
L/G.....blue/green
L/R .....blue/red
L/W.....blue/white
L/Y .....blue/yellow
Lg/R.....light green/red
Lg/Y.....light green/yellow
O/B .....orange/black
O/G.....orange/green
P/B.....pink/black
P/L .....pink/blue
P/W.....pink/white
R/B.....red/black
R/G .....red/green
R/L .....red/blue
R/W .....red/white
R/Y.....red/yellow
W/B .....white/black
W/G .....white/green
W/L.....white/blue
W/Y .....white/yellow
Y/B.....yellow/black
Y/G .....yellow/green
Y/L .....yellow/blue
Y/R.....yellow/rod

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YZF-R7 WIRING DIAGRAM



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