



# OWNER'S SERVICE MANUAL

## *WR250FS*

LIT-11626-17-51

5UM-28199-11

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**⚠ WARNING**

**The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.**

YAMAHA

LIT-CALIF-65-01

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**WR250FS**  
**OWNER'S SERVICE MANUAL**  
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## INTRODUCTION

Congratulations on your purchase of a Yamaha WR series. This model is the culmination of Yamaha's vast experience in the production of pacesetting racing machines. It represents the highest grade of craftsmanship and reliability that have made Yamaha a leader.

This manual explains operation, inspection, basic maintenance and tuning of your machine. If you have any questions about this manual or your machine, please contact your Yamaha dealer.

**NOTE:**

As improvements are made on this model, some data in this manual may become outdated. If you have any questions, please consult your Yamaha dealer.

** WARNING**

**PLEASE READ THIS MANUAL CAREFULLY AND COMPLETELY BEFORE OPERATING THIS MACHINE. DO NOT ATTEMPT TO OPERATE THIS MACHINE UNTIL YOU HAVE ATTAINED A SATISFACTORY KNOWLEDGE OF ITS CONTROLS AND OPERATING FEATURES AND UNTIL YOU HAVE BEEN TRAINED IN SAFE AND PROPER RIDING TECHNIQUES. REGULAR INSPECTIONS AND CAREFUL MAINTENANCE, ALONG WITH GOOD RIDING SKILLS, WILL ENSURE THAT YOU SAFELY ENJOY THE CAPABILITIES AND THE RELIABILITY OF THIS MACHINE.**

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EC030002  
**YAMAHA MOTOR CORPORATION, U.S.A.**  
**YZ/WR MOTORCYCLE LIMITED WARRANTY**

Yamaha Motor Corporation, U.S.A. hereby warrants to the original retail purchaser that the following components equipped on new Yamaha YZ or WR motorcycles purchased from an authorized Yamaha motorcycle dealer in the continental United States will be free from defects in material and workmanship for the period of time stated herein, subject to certain stated limitations. YZ or WR components included under this warranty are the engine, frame, swingarm, and monoshock. It is understood that the balance of the YZ or WR components are not covered by any warranty, expressed or implied. The balance of the components equipped on the unit are sold on an "as is" basis. This warranty applies to the original purchaser only and is not transferable.

**THE PERIOD OF WARRANTY** for the above-listed Yamaha YZ or WR components as originally installed on the unit shall be thirty (30) days from the date of purchase.

**MODELS EXCLUDED FROM WARRANTY** include those used for non-Yamaha-authorized renting, leasing, or other commercial purposes.

**DURING THE PERIOD OF WARRANTY** any authorized Yamaha motorcycle dealer will, free of charge, repair or replace, at Yamaha's option, any part adjudged defective by Yamaha due to faulty workmanship or material from the factory. Parts used in warranty repairs will be warranted for the balance of the product's warranty period. All parts replaced under warranty become property of Yamaha Motor Corporation U.S.A.

**GENERAL EXCLUSIONS** from this warranty shall include any failures caused by:

- a. Installation of parts or accessories that are not qualitatively equivalent to genuine Yamaha parts.
- b. Abnormal strain, neglect, or abuse.
- c. Accident or collision damage.
- d. Modification to original parts.
- e. Lack of proper maintenance.
- f. Damage due to improper transportation.

**SPECIFIC EXCLUSIONS** from this warranty shall include parts replaced due to normal wear or routine maintenance.

**THE CUSTOMER'S RESPONSIBILITY** under this warranty shall be to:

1. Operate and maintain the YZ or WR as specified in the appropriate Owner's Service Manual, and
2. Give notice to an authorized Yamaha motorcycle dealer of any and all apparent defects within ten (10) days after discovery, and make the machine available at that time for inspection and repairs at such dealer's place of business.

**YAMAHA MOTOR CORPORATION, U.S.A. MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE OBLIGATIONS AND TIME LIMITS STATED IN THIS WARRANTY ARE HEREBY DISCLAIMED BY YAMAHA MOTOR CORPORATION, U.S.A. AND EXCLUDED FROM THIS WARRANTY.**

**SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE**

**LIMITATION MAY NOT APPLY TO YOU. ALSO EXCLUDED FROM THIS WARRANTY ARE ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING LOSS OF USE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU.**

**THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.**

YAMAHA MOTOR CORPORATION, U.S.A.  
Post Office Box 6555  
Cypress, California 90630

**WARRANTY QUESTIONS AND ANSWERS**

- Q. What costs are my responsibility during the warranty period?
- A. The customer's responsibility includes all costs of normal maintenance services, non-warranty repairs, accident and collision damage, and oil, oil filters, air filters, spark plugs, and brake shoes or pads.
- Q. What are some examples of "abnormal" strain, neglect, or abuse?
- A. These terms are general and overlap each other in areas. Specific examples include: Running the machine without oil; operating the machine with a broken or damaged part which causes another part to fail, damage or failure due to improper or careless transportation and or tie down; and so on. If you have any specific questions on operation or maintenance, please contact your dealer for advice.
- Q. Does the warranty cover incidental costs such as towing or transportation due to a failure?
- A. No. The warranty is limited to repair of the machine itself.
- Q. May I perform any or all of the recommended maintenance shown in the Owner's Service Manual instead of having the dealer do them?
- A. Yes, if you are a qualified mechanic and follow the procedures specified in the Owner's Service Manual. We do recommend, however, that items requiring special tools or equipment be done by a Yamaha motorcycle dealer.
- Q. Will the warranty be void or canceled if I do not operate or maintain my new YZ or WR exactly as specified in the Owner's Service Manual?
- A. No. The warranty on a new motorcycle cannot be "voided" or "cancelled." **However, if a particular failure is caused by operation or maintenance other than as shown in the Owner's Service Manual, that failure may not be covered under warranty.**
- Q. What responsibility does my dealer have under this warranty?
- A. Each Yamaha motorcycle dealer is expected to:
1. Completely set up every new machine before sale.
  2. Explain the operation, maintenance, and warranty requirements to your satisfaction at the time of sale, and upon your request at any later date.  
In addition, each Yamaha motorcycle dealer is held responsible for his setup, service and warranty repair work.
- Q. Does the warranty on the engine include the carburetor, air filter, air box, and exhaust pipe?
- A. No. The warranty covers only the engine components.

**CUSTOMER SERVICE**

If your machine requires warranty service, you must take it to any authorized Yamaha motorcycle dealer within the continental United States. Be sure to bring your warranty registration identification or other valid proof of the original date of purchase. If a question or problem arises regarding warranty, first contact the owner of the dealer-ship. Since all warranty matters are handled at the dealer level, this person is in the best position to help you. If you are still not satisfied and require additional assistance, please write:

YAMAHA MOTOR CORPORATION U.S.A.  
CUSTOMER RELATIONS DEPARTMENT  
P.O. Box 6555  
Cypress, California 90630

When contacting Yamaha Motor Corporation, U.S.A. don't forget to include any important information such as names, addresses, model, V.I.N. (frame number), dates, and receipts.

**CHANGE OF ADDRESS**

The federal government requires each manufacturer of a motor vehicle to maintain a complete, up-to-date list of all first purchasers against the possibility of a safety-related defect and recall. This list is compiled from the purchase registrations sent to Yamaha Motor Corporation, U.S.A. by the selling dealer at the time of your purchase.

If you should move after you have purchased your new motorcycle, please advise us of your new address by sending a postcard listing your motorcycle model name, V.I.N. (frame number), dealer number (or dealer's name) as it is shown on your warranty identification, your name and new mailing address. Mail to:

YAMAHA MOTOR CORPORATION, U.S.A.  
WARRANTY DEPARTMENT  
P.O.Box 6555  
Cypress, California 90630

This will ensure that Yamaha Motor Corporation, U.S.A. has an up-to-date registration record in accordance with federal law.

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## IMPORTANT NOTICE

THIS MACHINE IS DESIGNED STRICTLY FOR COMPETITION USE, ONLY ON A CLOSED COURSE. It is illegal for this machine to be operated on any public street, road, or highway. Off-road use on public lands may also be illegal. Please check local regulations before riding.

### SAFETY INFORMATION

- 1. THIS MACHINE IS TO BE OPERATED BY AN EXPERIENCED RIDER ONLY.**  
Do not attempt to operate this machine at maximum power until you are totally familiar with its characteristics.
- 2. THIS MACHINE IS DESIGNED TO BE RIDDEN BY THE OPERATOR ONLY.**  
Do not carry passengers on this machine.
- 3. ALWAYS WEAR PROTECTIVE APPAREL.**  
When operating this machine, always wear an approved helmet with goggles or a face shield. Also wear heavy boots, gloves, and protective clothing. Always wear proper fitting clothing that will not be caught in any of the moving parts or controls of the machine.
- 4. ALWAYS MAINTAIN YOUR MACHINE IN PROPER WORKING ORDER.**  
For safety and reliability, the machine must be properly maintained. Always perform the pre-operation checks indicated in this manual. Correcting a mechanical problem before you ride may prevent an accident.
- 5. GASOLINE IS HIGHLY FLAMMABLE.**  
Always turn off the engine while refueling. Take care to not spill any gasoline on the engine or exhaust system. Never refuel in the vicinity of an open flame, or while smoking.

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**6. GASOLINE CAN CAUSE INJURY.**

If you should swallow some gasoline, inhale excess gasoline vapors, or allow any gasoline to get into your eyes, contact a doctor immediately. If any gasoline spills onto your skin or clothing, immediately wash skin areas with soap and water, and change your clothes.

**7. ONLY OPERATE THE MACHINE IN AN AREA WITH ADEQUATE VENTILATION.**

Never start the engine or let it run for any length of time in an enclosed area.

Exhaust fumes are poisonous. These fumes contain carbon monoxide, which by itself is odorless and colorless. Carbon monoxide is a dangerous gas which can cause unconsciousness or can be lethal.

**8. PARK THE MACHINE CAREFULLY; TURN OFF THE ENGINE.**

Always turn off the engine if you are going to leave the machine. Do not park the machine on a slope or soft ground as it may fall over.

**9. THE ENGINE, EXHAUST PIPE, MUFFLER, AND OIL TANK WILL BE VERY HOT AFTER THE ENGINE HAS BEEN RUN.**

Be careful not to touch them or to allow any clothing item to contact them during inspection or repair.

**10. PROPERLY SECURE THE MACHINE BEFORE TRANSPORTING IT.**

When transporting the machine in another vehicle, always be sure it is properly secured and in an upright position and that the fuel cock is in the "OFF" position. Otherwise, fuel may leak out of the carburetor or fuel tank.

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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 machine. Please read this manual carefully and completely before operating your new machine. If you have any questions regarding the operation or maintenance of your machine, please consult your Yamaha dealer.

**NOTE:** \_\_\_\_\_

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

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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 machine, please consult your Yamaha dealer.**

EC070001

**F.I.M. MACHINE WEIGHTS:** \_\_\_\_\_

**Weights of machines without fuel**

The minimum weights for motocross machines are:

for the class 125 cc..... minimum  
88 kg (194 lb)

for the class 250 cc..... minimum  
98 kg (216 lb)

for the class 500 cc..... minimum  
102 kg (225 lb)

In modifying your machine (e.g., for weight reduction), take note of the above limits of weight.



# HOW TO USE THIS MANUAL

## PARTICULARLY IMPORTANT INFORMATION



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

### **WARNING**

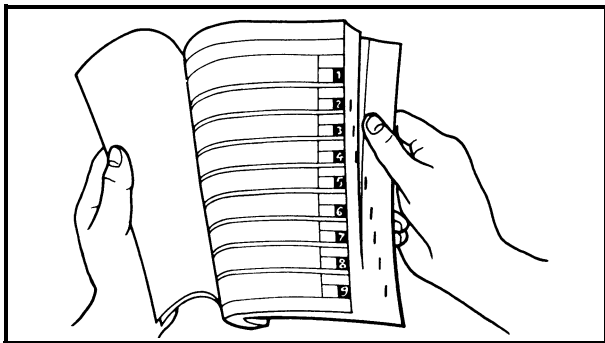
Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the machine.

### **CAUTION:**

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

### **NOTE:**

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



## FINDING THE REQUIRED PAGE

1. This manual consists of seven chapters; “General information”, “Specifications”, “Regular inspection and adjustments”, “Engine”, “Chassis”, “Electrical” and “Tuning”.
2. The table of contents is at the beginning of the manual. Look over the general layout of the book before finding then 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.

# MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled 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.

# 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. Extent of removal ⑤ is provided in the job instruction chart to save the trouble of an unnecessary removal job.
6. For jobs requiring more information, the step-by-step format supplements ⑥ are given in addition to the exploded diagram and job instruction chart.

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

**REMOVAL POINTS**

**Clutch boss**

- Remove:
  - Nut ①
  - Lock washer ②
  - Clutch boss ③

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

**Clutch holding tool:**  
YM-91042/90890-04086

Ⓐ For USA and CDN  
Ⓑ Except for USA and CDN

**INSPECTION**

**Clutch housing and boss**

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

**Primary driven gear**

- Check:
  - Circumferential play  
Free play exists → Replace.
  - Gear teeth ③  
Wear/damage → Replace.

**Clutch spring**











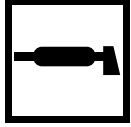


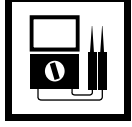





- Measure:
  - Clutch spring free length ④  
Out of specification → Replace springs as a set.

**Clutch spring free length:**

Standard	<Limit>
50 mm (1.97 in)	49 mm (1.93 in)

4 - 45

4 - 47

① GEN INFO 	② SPEC 
③ INSP ADJ 	④ ENG 
⑤ CHAS 	⑥ ELEC 
⑦ TUN 	⑧ 
⑨ 	⑩ 
⑪ 	⑫ 
⑬ 	⑭ 
⑮ 	⑯ 
⑰ 	⑱ 
⑲ 	⑳ <b>New</b>

## ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① to ⑦ are designed as thumb tabs to indicate the chapter's number and content.

- ① General information
- ② Specifications
- ③ Regular inspection and adjustments
- ④ Engine
- ⑤ Chassis
- ⑥ Electrical
- ⑦ Tuning

Illustrated symbols ⑧ to ⑭ are used to identify the specifications appearing in the text.

- ⑧ With engine mounted
- ⑨ Special tool
- ⑩ Filling fluid
- ⑪ Lubricant
- ⑫ Tightening
- ⑬ Specified value, Service limit
- ⑭ Resistance ( $\Omega$ ), Voltage (V), Electric current (A)

Illustrated symbols ⑮ to ⑱ in the exploded diagrams indicate grade of lubricant and location of lubrication point.

- ⑮ Apply engine oil
- ⑯ Apply molybdenum disulfide oil
- ⑰ Apply lightweight lithium-soap base grease
- ⑱ Apply molybdenum disulfide grease








Illustrated symbols ⑲ to ⑳ in the exploded diagrams indicate where to apply a locking agent and where to install new parts.

- ⑲ Apply locking agent (LOCTITE®)
- ⑳ Use new one

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# MEMO

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EC100000

**GENERAL INFORMATION**

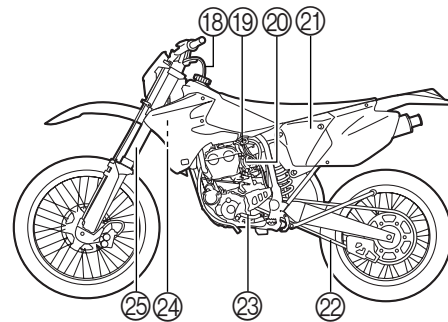
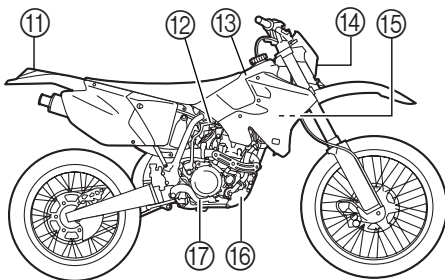
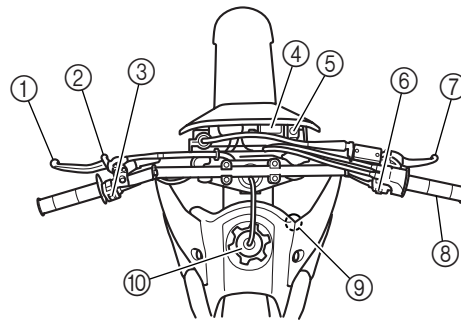
EC110000

**DESCRIPTION**

- ① Clutch lever
- ② Hot starter lever
- ③ Engine stop switch
- ④ Trip meter
- ⑤ Main switch
- ⑥ Start switch
- ⑦ Front brake lever
- ⑧ Throttle grip
- ⑨ Radiator cap
- ⑩ Fuel tank cap
- ⑪ Taillight
- ⑫ Kickstarter crank
- ⑬ Fuel tank
- ⑭ Headlight
- ⑮ Radiator
- ⑯ Coolant drain bolt
- ⑰ Rear brake pedal
- ⑱ Valve joint
- ⑲ Fuel cock
- ⑳ Cold starter knob
- ㉑ Air cleaner
- ㉒ Drive chain
- ㉓ Shift pedal
- ㉔ Oil dipstick
- ㉕ Front fork

**NOTE:**

- The machine you have purchased may differ slightly from those shown in the following.
- Designs and specifications are subject to change without notice.

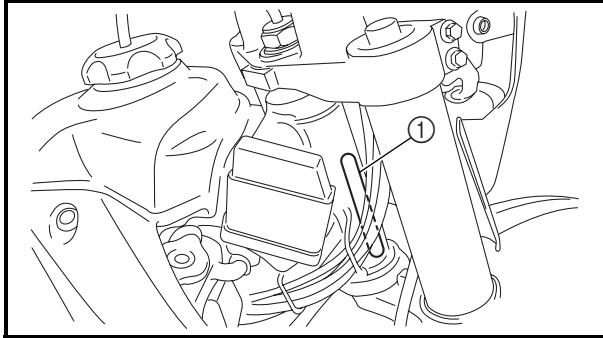
**1**

EC120001

## MACHINE IDENTIFICATION

There are two significant reasons for knowing the serial number of your machine:

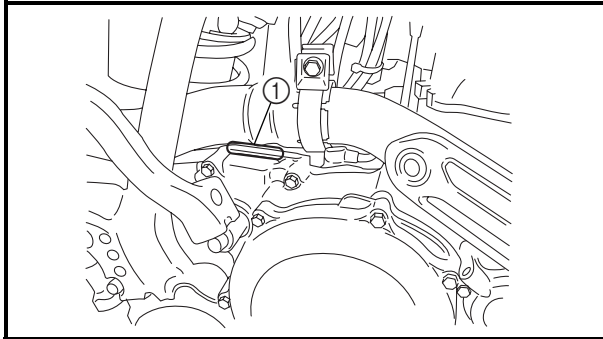
1. When ordering parts, you can give the number to your Yamaha dealer for positive identification of the model you own.
2. If your machine is stolen, the authorities will need the number to search for and identify your machine.



EC121001

## VEHICLE IDENTIFICATION NUMBER

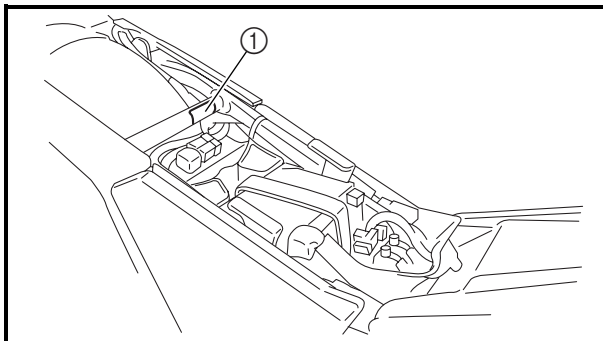
The vehicle identification number ① is stamped on the right of the steering head pipe.



EC123001

## ENGINE SERIAL NUMBER

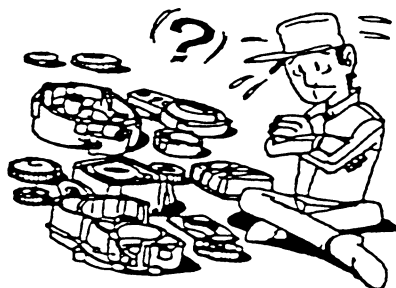
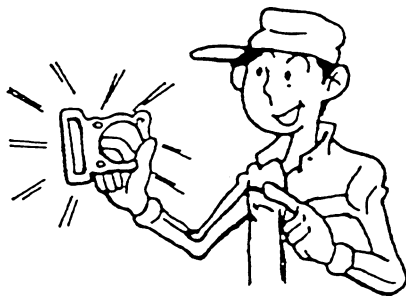
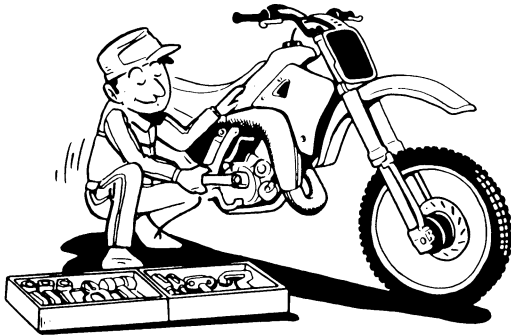
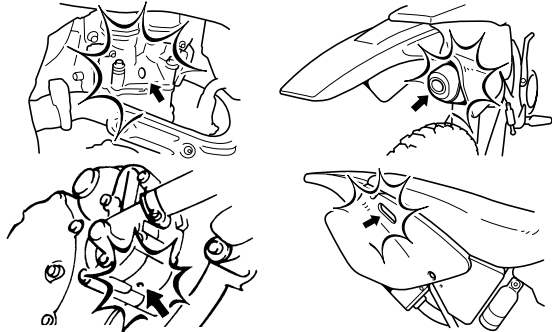
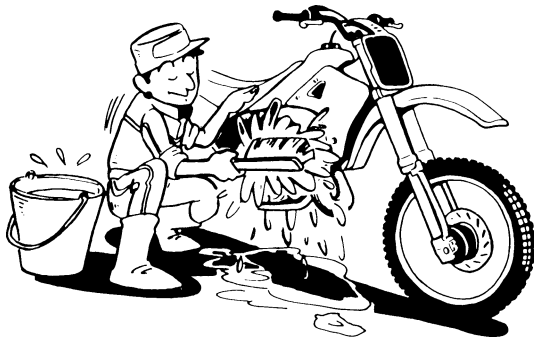
The engine serial number ① is stamped into the elevated part of the right-side of the engine.



EC124000

## MODEL LABEL

The model label ① is affixed to the frame under the rider's seat. This information will be needed to order spare parts.



EC130000

**IMPORTANT INFORMATION**

EC131010

**PREPARATION FOR REMOVAL AND DISASSEMBLY**

1. Remove all dirt, mud, dust, and foreign material before removal and disassembly. When washing the machine with high pressured water, cover the parts follows.
  - Silencer exhaust port
  - Side cover air intake port
  - Water pump housing hole at the bottom
  - Drain hole on the cylinder head (right side)
  - All electrical components
  
2. Use proper tools and cleaning equipment. Refer to "SPECIAL TOOLS" section.
  
3. When disassembling the machine, keep mated parts together. They include gears, cylinders, pistons, and other mated parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.
  
4. During the machine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled.
  
5. Keep away from fire.

EC132000

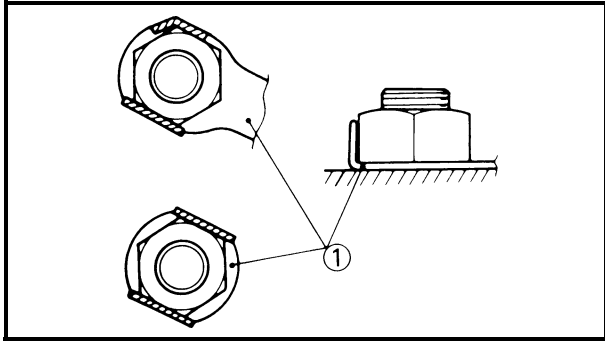
**ALL REPLACEMENT PARTS**

1. We recommend to use Yamaha genuine parts for all replacements. Use oil and/or grease recommended by Yamaha for assembly and adjustment.

EC133000

**GASKETS, OIL SEALS AND O-RINGS**

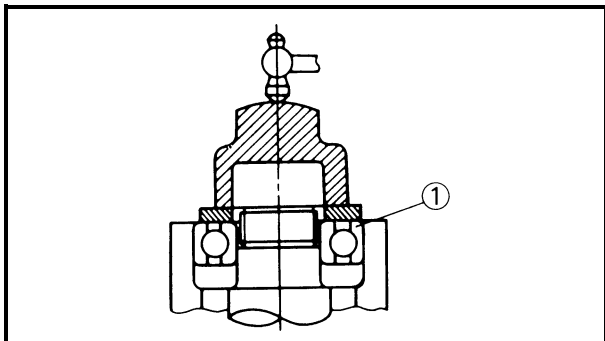
1. All gaskets, oil seals, and O-rings should be replaced when an engine is overhauled. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EC134000

**LOCK WASHERS/PLATES AND COTTER PINS**

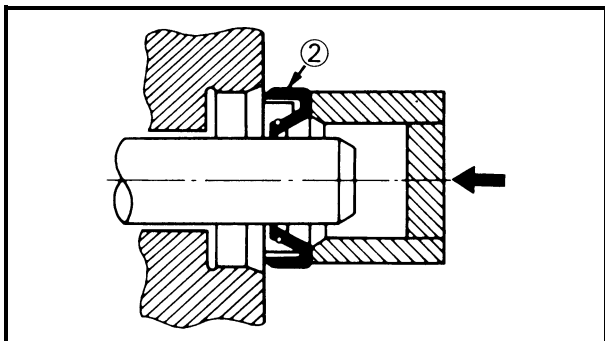
1. All lock washers/plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



EC135001

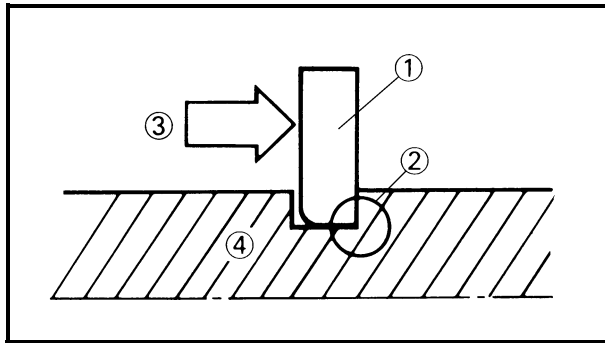
**BEARINGS AND OIL SEALS**

1. Install the bearing(s) ① and oil seal(s) ② with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of lightweight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.



**CAUTION:**

**Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces.**

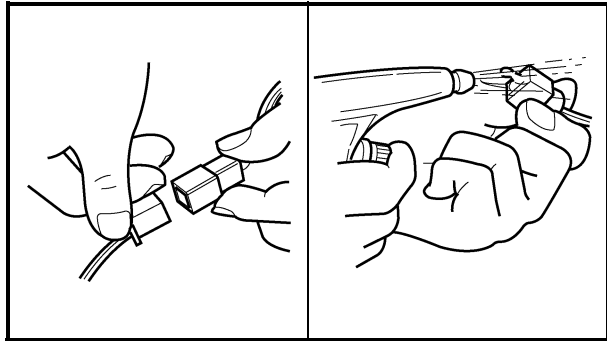


EC136000

**CIRCLIPS**

1. All circlips should be inspected carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite to the thrust ③ it receives. See the sectional view.

④ Shaft

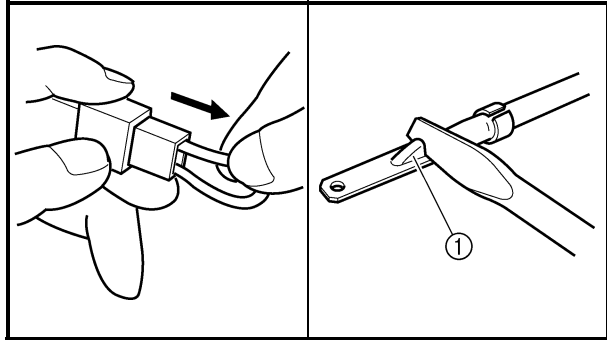


EC1C0001

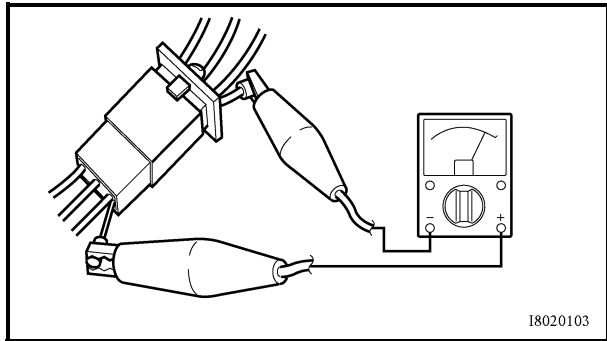
## CHECKING OF CONNECTION

Dealing with stains, rust, moisture, etc. on the connector.

1. Disconnect:
  - Connector
2. Dry each terminal with an air blower.



3. Connect and disconnect the connector two or three times.
4. Pull the lead to check that it will not come off.
5. If the terminal comes off, bend up the pin ① and reinsert the terminal into the connector.

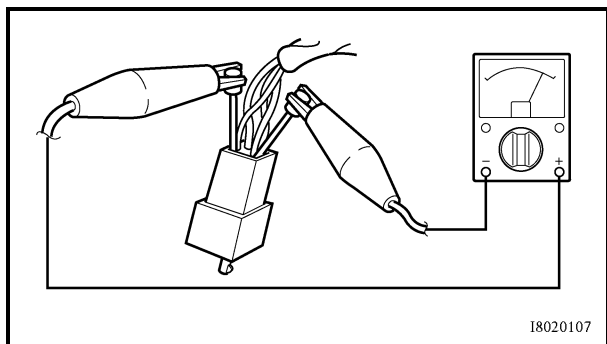


6. Connect:
  - Connector

**NOTE:** \_\_\_\_\_  
The two connectors “click” together.

7. Check for continuity with a tester.

**NOTE:** \_\_\_\_\_  
• If there is no continuity, clean the terminals.  
• Be sure to perform the steps 1 to 7 listed above when checking the wire harness.  
• For a field remedy, use a contact revitalizer available on the market.  
• Use the tester on the connector as shown.

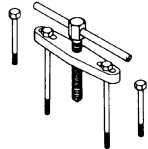
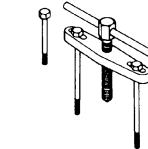
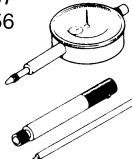

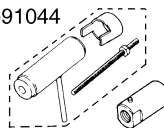
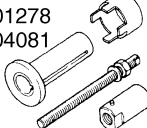
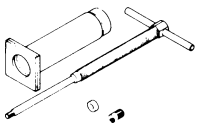
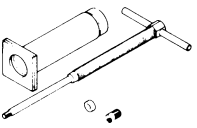
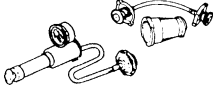
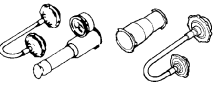
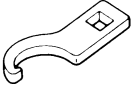
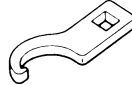
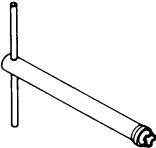
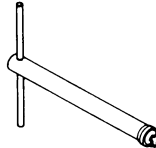


## SPECIAL TOOLS

The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques. The shape and part number used for the special tool differ by country, so two types are provided. Refer to the list provided to avoid errors when placing an order.

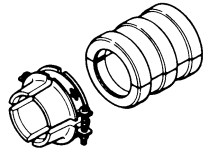
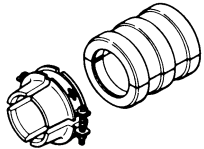
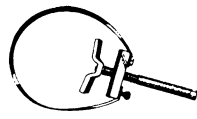
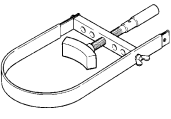

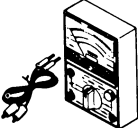
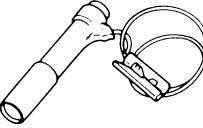
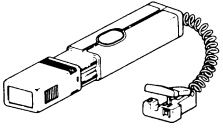
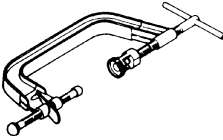
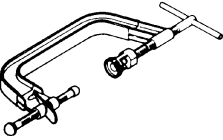
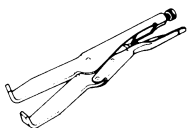
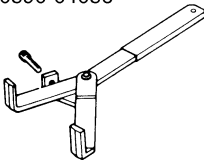

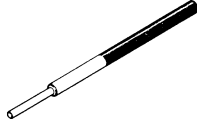
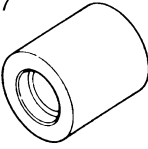
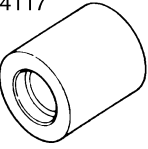
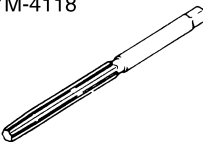
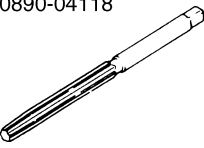
**NOTE:**

- For U.S.A. and Canada, use part number starting with “YM-”, “YU-” or “ACC-”.
- For others, use part number starting with “90890-”.

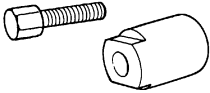
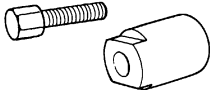
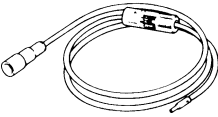
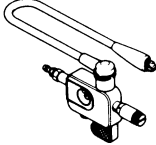
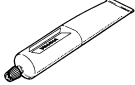
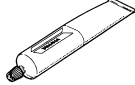
Part number	Tool name/How to use	Illustration	
YU-1135-A, 90890-01135	Crankcase separating tool  These tool is used to remove the crankshaft from either case.	YU-1135-A 	90890-01135 
YU-3097, 90890-01252 YU-1256	Dial gauge and stand Stand  These tools are used to check each part for runout or bent.	YU-3097 YU-1256 	90890-01252 
YU-90050, 90890-01274 YU-90050, 90890-01275 YM-91044, 90890-04081 YU-90063, 90890-01278	Crankshaft installing tool Crankshaft installing pot Crankshaft installing bolt Spacer (crankshaft installer) Adapter (M12) These tools are used to install the crankshaft.	YU-90050 YU-90063 YM-91044 	90890-01274 90890-01275 90890-01278 90890-04081 
YU-1304, 90890-01304	Piston pin puller set  This tool is used to remove the piston pin.	YU-1304 	90890-01304 
YU-24460-01, 90890-01325 YU-33984, 90890-01352	Radiator cap tester Radiator cap tester adapter  These tools are used for checking the cooling system.	YU-24460-01 YU-33984 	90890-01325 90890-01352 
YU-33975, 90890-01403	Steering nut wrench  This tool is used when tighten the steering ring nut to specification.	YU-33975 	90890-01403 
YM-1423, 90890-01423	Damper rod holder  Use this tool to remove and install the damper rod.	YM-1423 	90890-01423 

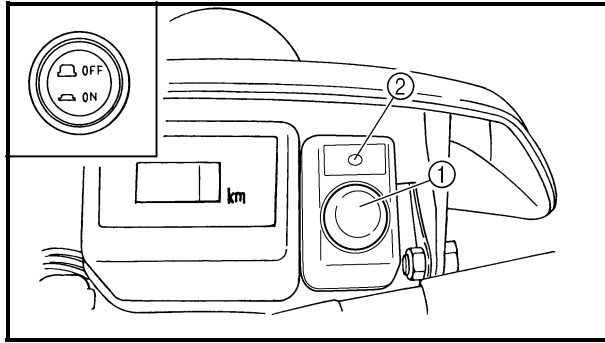
# SPECIAL TOOLS



Part number	Tool name/How to use	Illustration	
YM-01442, 90890-01442	Fork seal driver  This tool is used when install the fork oil seal.	YM-01442 	90890-01442 
YS-1880-A, 90890-01701	Sheave holder  This tool is used for when loosening or tightening the flywheel magneto securing nut	YS-1880-A 	90890-01701 
YU-3112-C, 90890-03112	Pocket tester  Use this tool to inspect the coil resistance, output voltage and amperage.	YU-3112-C 	90980-03112 
YM-33277-A, 90890-03141	Timing light  This tool is necessary for checking ignition timing.	YM-33277-A 	90890-03141 
YM-4019, 90890-04019	Valve spring compressor  This tool is needed to remove and install the valve assemblies.	YM-4019 	90890-04019 
YM-91042, 90890-04086	Clutch holding tool  This tool is used to hold the clutch when removing or installing the clutch boss securing nut.	YM-91042 	90890-04086 
YM-4111, 90890-04111 YM-4116, 90890-04116	Valve guide remover Intake 4.0 mm (0.16 in) Exhaust 4.5 mm (0.18 in)  This tool is needed to remove and install the valve guide.	YM-4111 YM-4116 	90980-04111 90980-04116 
YM-4112, 90890-04112 YM-4117, 90890-04117	Valve guide installer Intake 4.0 mm (0.16 in) Exhaust 4.5 mm (0.18 in)  This tool is needed to install the valve guide.	YM-4112 YM-4117 	90890-04112 90890-04117 
YM-4113, 90890-04113 YM-4118, 90890-04118	Valve guide reamer Intake 4.0 mm (0.16 in) Exhaust 4.5 mm (0.18 in)  This tool is needed to rebores the new valve guide.	YM-4113 YM-4118 	90890-04113 90890-04118 



Part number	Tool name/How to use	Illustration	
YM-04141, 90890-04141	<p>Rotor puller</p> <p>This tool is used to remove the flywheel magneto.</p>	<p>YM-04141</p> 	<p>90890-04141</p> 
YM-34487 90890-06754	<p>Dynamic spark tester Ignition checker</p> <p>This instrument is necessary for checking the ignition system components.</p>	<p>YM-34487</p> 	<p>90890-06754</p> 
ACC-QUICK-GS-KT 90890-85505	<p>Quick gasket® YAMAHA Bond No. 1215</p> <p>This sealant (Bond) is used for crankcase mating surface, etc.</p>	<p>ACC-QUICK-GS-KT</p> 	<p>90890-85505</p> 



EC150000

## CONTROL FUNCTIONS

### MAIN SWITCH

Functions of the respective switch positions are as follows:

**ON:**

The engine can be started only at this position.

**OFF:**

All electrical circuits are switched off.

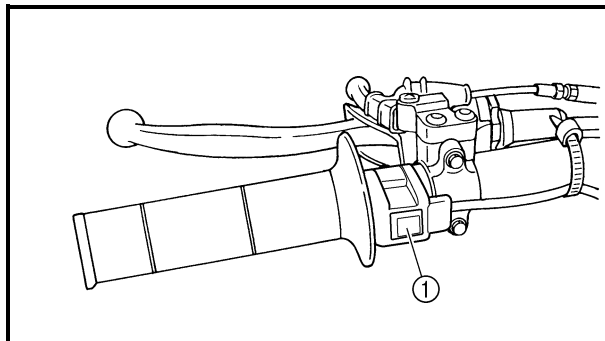
### Main switch indicator light

The main switch ① is equipped with an indicator light ② to avoid forgetting to turn it off. This light functions as follows.

- It lights up with the main switch "ON".
- It goes out when the engine increases its speed after being started.
- It lights up again when the engine is stopped.

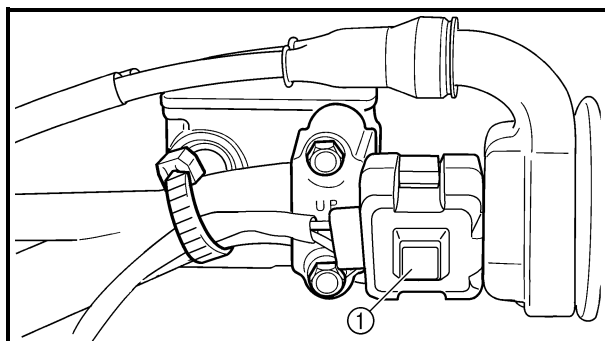
### NOTE:

If the indicator light will not light up with the main switch "ON", it shows a lack of the battery voltage. Recharge the battery.



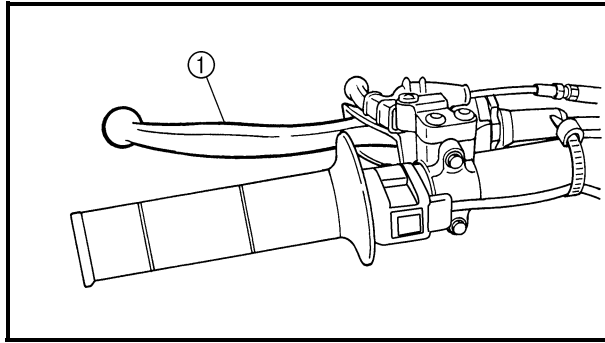
### ENGINE STOP SWITCH

The engine stop switch ① is located on the left handlebar. Continue pushing the engine stop switch till the engine comes to a stop.



### START SWITCH

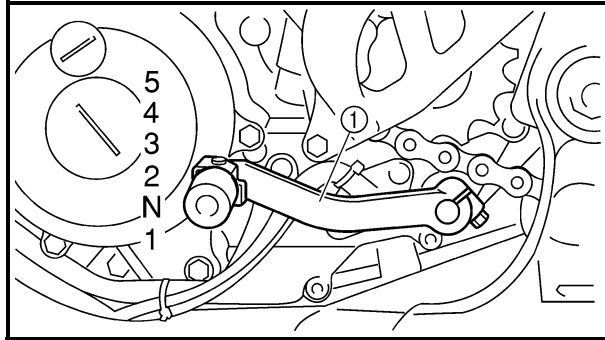
The start switch ① is located on the right handlebar. Push this switch to crank the engine with the starter.



EC152000

## CLUTCH LEVER

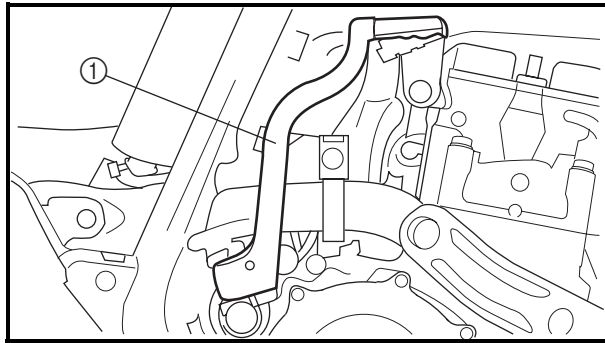
The clutch lever ① is located on the left handlebar; it disengages or engages the clutch. Pull the clutch lever to the handlebar to disengage the clutch, and release the lever to engage the clutch. The lever should be pulled rapidly and released slowly for smooth starts.



EC153000

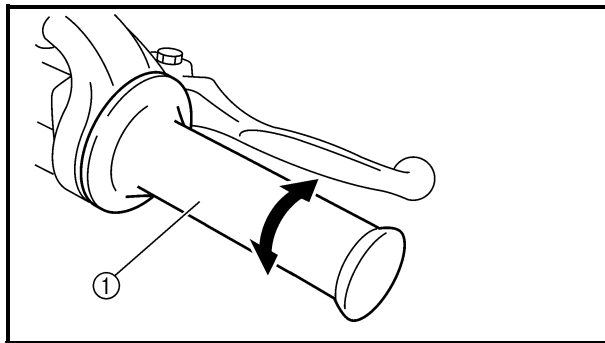
## SHIFT PEDAL

The gear ratios of the constant-mesh 5 speed transmission are ideally spaced. The gears can be shifted by using the shift pedal ① on the left side of the engine.



## KICKSTARTER CRANK

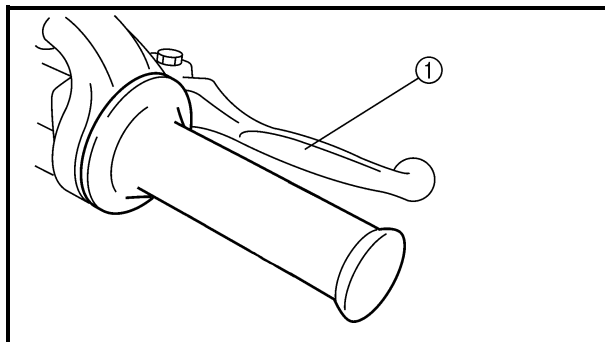
Rotate the kickstarter crank ① away from the engine. Push the starter down lightly with your foot until the gears engage, then kick smoothly and forcefully to start the engine. This model has a primary kickstarter crank so the engine can be started in any gear if the clutch is disengaged. In normal practices, however, shift to neutral before starting.



EC155001

## THROTTLE GRIP

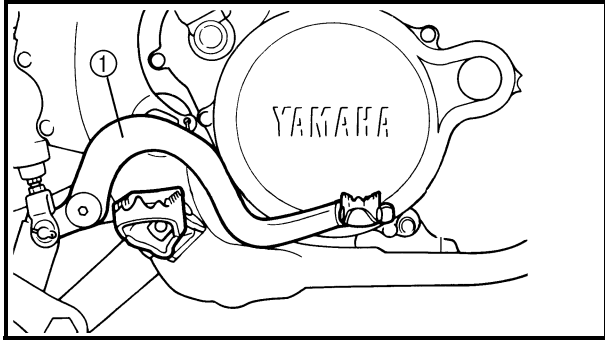
The throttle grip ① is located on the right handlebar; it accelerates or decelerates the engine. For acceleration, turn the grip toward you; for deceleration, turn it away from you.



EC156000

## FRONT BRAKE LEVER

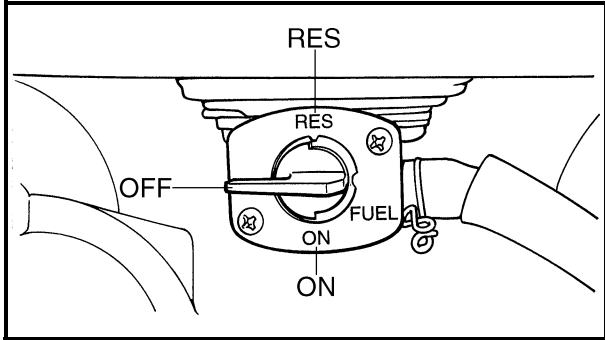
The front brake lever ① is located on the right handlebar. Pull it toward the handlebar to activate the front brake.



EC157000

## REAR BRAKE PEDAL

The rear brake pedal ① is located on the right side of the machine. Press down on the brake pedal to activate the rear brake.



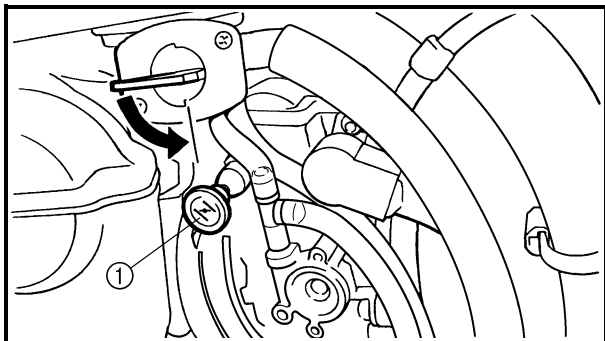
## FUEL COCK

The fuel cock supplies fuel from the tank to carburetor and also filters the fuel. The fuel cock has three positions:

**OFF:** With the lever in this position, fuel will not flow. Always return the lever to this position when the engine is not running.

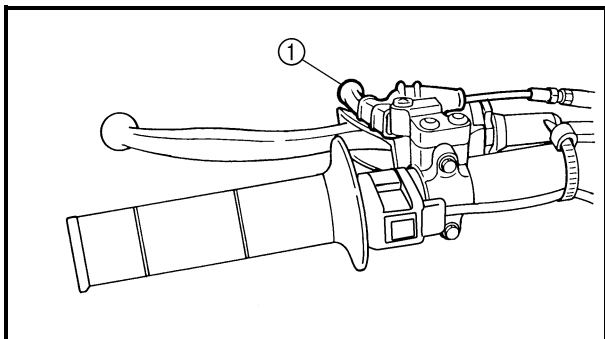
**ON:** With the lever in this position fuel flows to the carburetor. Normal riding is done with the lever in this position.

**RES:** With the lever in this position fuel flows to the carburetor from the reserve section of the fuel tank after the main supply of the fuel has been depleted. Normal riding is possible with the lever in this position, but it is recommended to add fuel as soon as possible.



## COLD STARTER KNOB

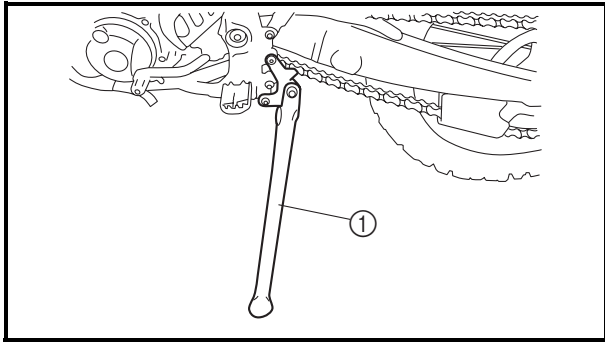
When cold, the engine requires a richer air-fuel mixture for starting. A separate starter circuit, which is controlled by the cold starter knob ①, supplies this mixture. Pull the cold starter knob out to open the circuit for starting. When the engine has warmed up, push it in to close the circuit.



## HOT STARTER LEVER

The hot starter lever ① is used when starting a warm engine.

Use the hot starter lever when starting the engine again immediately after it was stopped (the engine is still warm). Pulling the hot starter lever injects secondary air to thin the air-fuel mixture temporarily, allowing the engine to be started more easily.

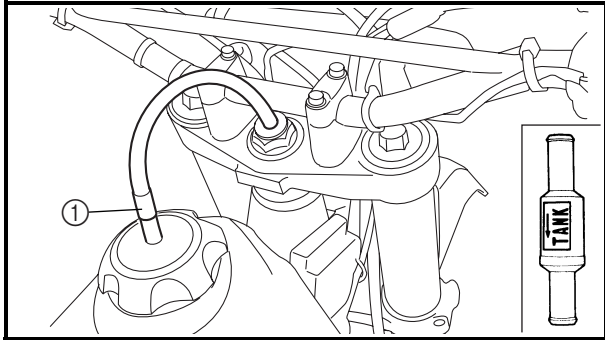


**SIDESTAND**

This sidestand ① is used to support only the machine when standing or transporting it.

**⚠ WARNING**

- Never apply additional force to the side-stand.
- Hold up the sidestand before starting out.



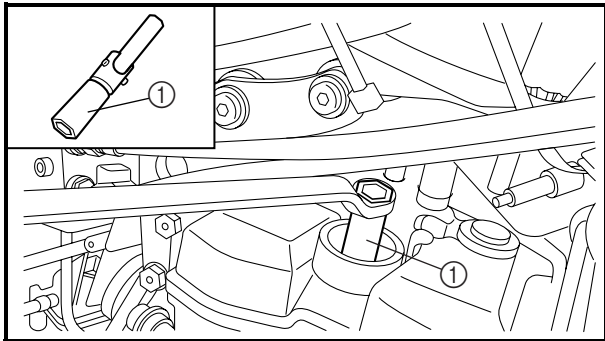
EC15F000

**VALVE JOINT**

This valve joint ① prevents fuel from flowing out and is installed to the fuel tank breather hose.

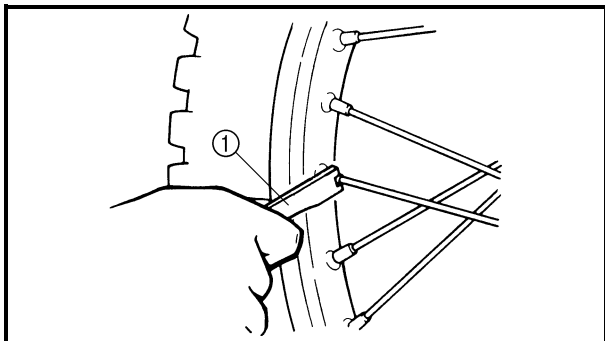
**CAUTION:**

**In this installation, make sure the arrow faces the fuel tank and also downward.**



**SPARK PLUG WRENCH**

This spark plug wrench ① is used to remove and install the spark plug.



**NIPPLE WRENCH**

This nipple wrench ① is used to tighten the spoke.



## FUEL

Always use the recommended fuel as stated below. Also, be sure to use new gasoline the day of a race.



### Recommended fuel:

#### Except for ZA:

Premium unleaded gasoline only with a research octane number of 95 or higher.

#### For ZA:

Premium gasoline

### CAUTION:

Use only unleaded gasoline. The use of leaded gasoline will cause severe damage to the engine internal parts such as valves, piston rings, and exhaust system, etc.

### NOTE:

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

### ⚠ WARNING

- For refueling, be sure to stop the engine and use enough care not to spill any fuel. Also be sure to avoid refueling close to a fire.
- Refuel after the engine, exhaust pipe, etc. have cooled off.

## STARTING AND BREAK-IN

### **⚠ WARNING**

Never start or run the engine in a closed area. The exhaust fumes are poisonous; they can cause loss of consciousness and death in a very short time. Always operate the machine in a well-ventilated area.

### **CAUTION:**

- The carburetor on this machine has a built-in accelerator pump. Therefore, when starting the engine, do not operate the throttle or the spark plug will foul.
- Unlike a two-stroke engine, this engine cannot be kick started when the throttle is open because the kickstarter may kick back. Also, if the throttle is open the air/fuel mixture may be too lean for the engine to start.
- Before starting the machine, perform the checks in the pre-operation check list.

### **AIR FILTER MAINTENANCE**

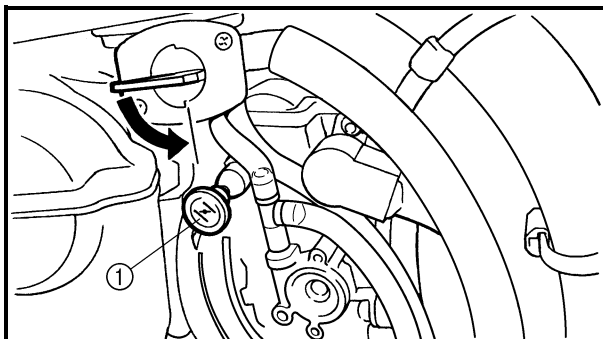
According to “AIR FILTER CLEANING” section in the CHAPTER 3, apply the foam-air-filter oil or its equivalent to the element. (Excess oil in the element may adversely affect engine starting.)

### **STARTING A COLD ENGINE**

#### **NOTE:**

This model is equipped with an ignition circuit cut-off system. The engine can be started under the following conditions.

- When the transmission is in neutral.
- When the clutch is disengaged with the transmission in any position. However, it is recommended to shift into neutral before starting the engine.



1. Inspect the coolant level.
2. Turn the fuel cock to “ON”.
3. Push on the main switch to “ON”.
4. Shift the transmission into neutral.
5. Fully open the cold starter knob ①.
6. Start the engine by pushing the start switch or by kicking the kickstarter crank.

**NOTE:** \_\_\_\_\_

If the engine fails to start by pushing the start switch, release the switch, wait a few seconds, and then try again. Each starting attempt should be as short as possible to preserve the battery. Do not crank the engine more than 10 seconds on any one attempt. If the engine does not start with the starter motor, try using the kickstarter crank.

---

**⚠ WARNING** \_\_\_\_\_

- If the starter motor will not turn when pushing the start switch, stop pushing it immediately and kick start the engine in order to avoid the load on the motor.
  - Do not open the throttle while kicking the kickstarter crank. Otherwise, the kickstarter crank may kick back.
- 

7. Return the cold starter knob to its original position and run the engine at 3,000 ~ 5,000 r/min for 1 or 2 minutes.

**NOTE:** \_\_\_\_\_

Since this model is equipped with an accelerator pump, if the engine is raced (the throttle opened and closed), the air/fuel mixture will be too rich and the engine may stall. Also unlike a two-stroke engine, this model can idle.

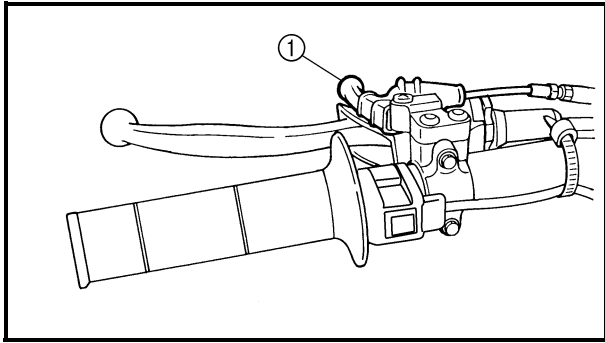
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**CAUTION:** \_\_\_\_\_

**Do not warm up the engine for extended periods of time.**

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**STARTING A WARM ENGINE**

Do not operate the cold starter knob and throttle. Pull the hot starter lever ① and start the engine by pushing the start switch or by kicking the kickstarter crank forcefully with a firm stroke.

As soon as the engine starts, Release the hot starter lever to close the air passage.

**Restarting an engine after a fall**

Pull the hot starter lever and start the engine. As soon as the engine starts, Release the hot starter lever to close the air passage.

**The engine fails to start**

Pull the hot starter lever all the way out and while holding the lever, kick the kickstarter crank 10 to 20 times to clear the engine.

Then, restart the engine.

Refer to “Restarting an engine after a fall”.

		Throttle grip operation*	Cold starter knob	Hot starter lever
Starting a cold engine	Air temperature = less than 5 °C (41 °F)	Open 3 or 4 times	ON	OFF
	Air temperature = more than 5 °C (41 °F)	None	ON	OFF
	Air temperature (normal temperature) = between 5 °C (41 °F) and 25 °C (77 °F)	None	ON/OFF	OFF
	Air temperature = more than 25 °C (77 °F)	None	OFF	OFF
Starting an engine after a long period of time		None	ON	OFF
Restarting a warm engine		None	OFF	ON
Restarting an engine after a fall		None	OFF	ON

\* Operate the throttle grip before kick starting.

**CAUTION:**

**Observe the following break-in procedures during initial operation to ensure optimum performance and avoid engine damage.**

**BREAK-IN PROCEDURES**

1. Before starting the engine, fill the fuel tank with the fuel.
2. Perform the pre-operation checks on the machine.
3. Start and warm up the engine. Check the idle speed, and check the operation of the controls and the engine stop switch. Then, restart the engine and check its operation within no more than 5 minutes after it is restarted.
4. Operate the machine in the lower gears at moderate throttle openings for five to eight minutes.
5. Check how the engine runs when the machine is ridden with the throttle 1/4 to 1/2 open (low to medium speed) for about one hour.
6. Restart the engine and check the operation of the machine throughout its entire operating range. Restart the machine and operate it for about 10 to 15 more minutes. The machine will now be ready to race.

**CAUTION:**

- **After the break-in or before each race, you must check the entire machine for loose fittings and fasteners as per "TORQUE-CHECK POINTS".**

**Tighten all such fasteners as required.**

- **When any of the following parts have been replaced, they must be broken in.**

**CYLINDER AND CRANKSHAFT:**

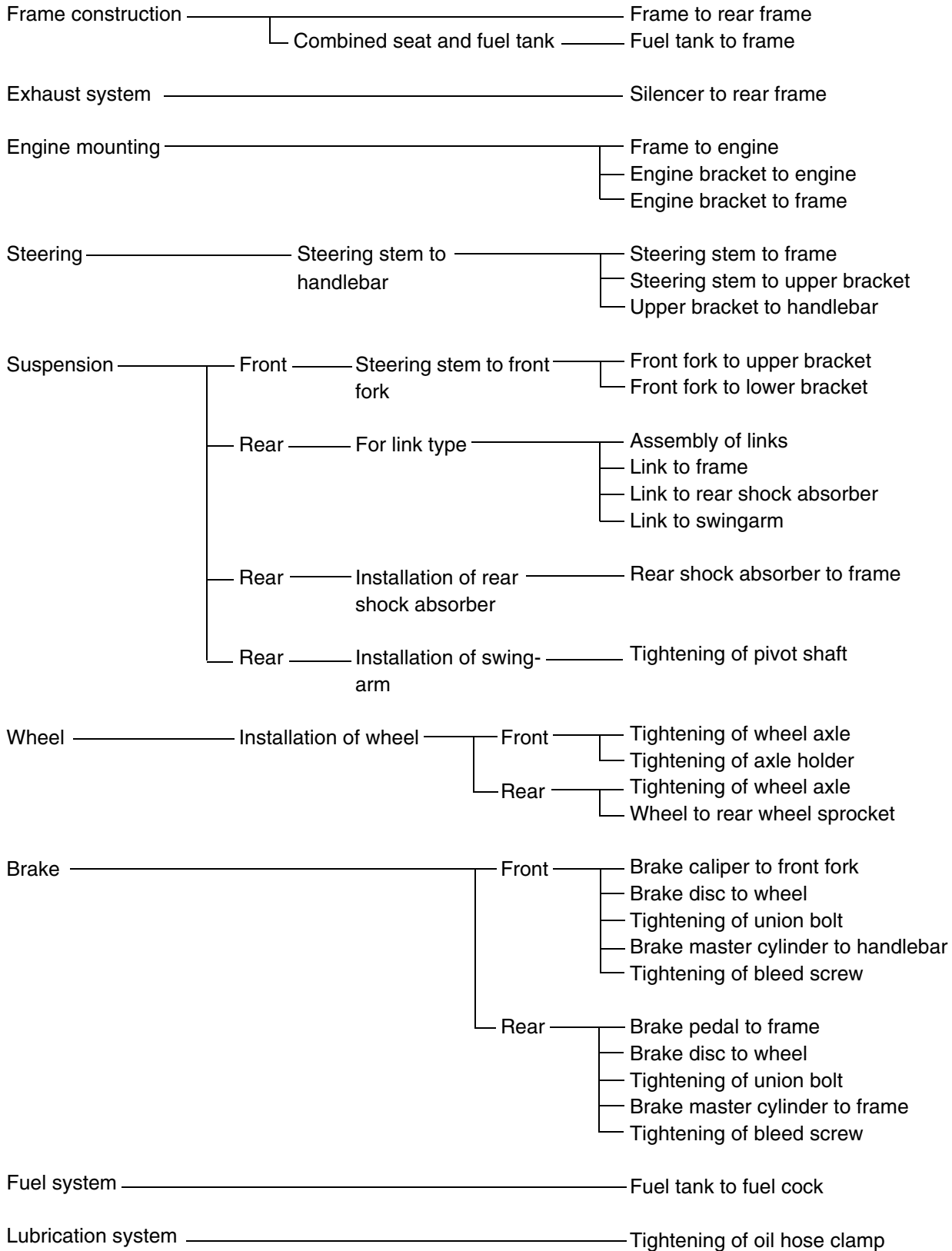
**About one hour of break-in operation is necessary.**

**PISTON, RING, VALVES, CAMSHAFTS AND GEARS:**

**These parts require about 30 minutes of break-in operation at half-throttle or less. Observe the condition of the engine carefully during operation.**

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## TORQUE-CHECK POINTS



**NOTE:** Concerning the tightening torque, refer to "MAINTENANCE SPECIFICATIONS" section in the CHAPTER 2.

EC1B0000

**CLEANING AND STORAGE**

EC1B1000

**CLEANING**

Frequent cleaning of your machine will enhance its appearance, maintain good overall performance, and extend the life of many components.

1. Before washing the machine, block off the end of the exhaust pipe to prevent water from entering. A plastic bag secured with a rubber band may be used for this purpose.
2. If the engine is excessively greasy, apply some degreaser to it with a paint brush. Do not apply degreaser to the chain, sprockets, or wheel axles.
3. Rinse the dirt and degreaser off with a garden hose; use only enough pressure to do the job.

**CAUTION:**

**Excessive hose pressure may cause water seepage and contamination of wheel bearings, front forks, brakes and transmission seals. Many expensive repair bills have resulted from improper high pressure detergent applications such as those available in coin-operated car washers.**

4. After the majority of the dirt has been hosed off, wash all surfaces with warm water and a mild detergent. Use an old toothbrush to clean hard-to-reach places.
5. Rinse the machine off immediately with clean water, and dry all surfaces with a soft towel or cloth.
6. Immediately after washing, remove excess water from the chain with a paper towel and lubricate the chain to prevent rust.
7. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
8. Automotive wax may be applied to all painted or chromed surfaces. Avoid combination cleaner-waxes, as they may contain abrasives.
9. After completing the above, start the engine and allow it to idle for several minutes.

EC1B2001

**STORAGE**

If your machine is to be stored for 60 days or more, some preventive measures must be taken to avoid deterioration. After cleaning the machine thoroughly, prepare it for storage as follows:

1. Drain the fuel tank, fuel lines, and the carburetor float bowl.
2. Remove the spark plug, pour a tablespoon of SAE 10W-30 motor oil in the spark plug hole, and reinstall the plug. With the engine stop switch pushed in, kick the engine over several times to coat the cylinder walls with oil.
3. Remove the drive chain, clean it thoroughly with solvent, and lubricate it. Reinstall the chain or store it in a plastic bag tied to the frame.
4. Lubricate all control cables.
5. Block the frame up to raise the wheels off the ground.
6. Tie a plastic bag over the exhaust pipe outlet to prevent moisture from entering.
7. If the machine is to be stored in a humid or salt-air environment, coat all exposed metal surfaces with a film of light oil. Do not apply oil to rubber parts or the seat cover.

**NOTE:** \_\_\_\_\_

Make any necessary repairs before the machine is stored.

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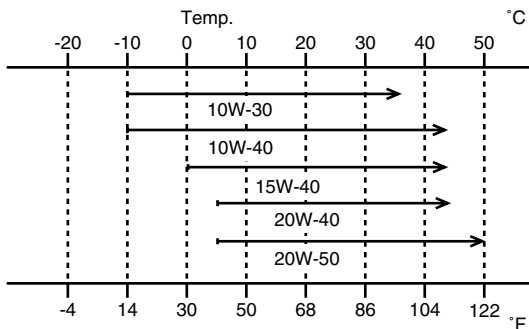
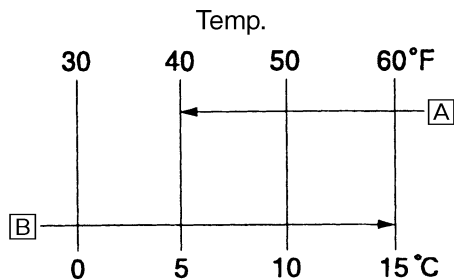
EC200000

**SPECIFICATIONS**

EC211000

**GENERAL SPECIFICATIONS**

Model name:	WR250FS (USA) WR250F (EUROPE) WR250F(S) (CDN, AUS, NZ, ZA)
Model code number:	5UM5 (USA) 5UM6 (EUROPE) 5UM7 (CDN, AUS, NZ, ZA)
Dimensions:	
Overall length	2,165 mm (85.2 in)
Overall width	827 mm (32.6 in)
Overall height	1,303 mm (51.3 in)
Seat height	998 mm (39.3 in)
Wheelbase	1,475 mm (58.1 in)
Minimum ground clearance	382 mm (15.0 in)
Dry weight:	
Without oil and fuel	105.5 kg (232.6 lb)
Engine:	
Engine type	Liquid cooled 4-stroke, DOHC
Cylinder arrangement	Single cylinder, forward inclined
Displacement	249 cm <sup>3</sup> (8.76 Imp oz, 8.42 US oz)
Bore × stroke	77.0 × 53.6 mm (3.03 × 2.11 in)
Compression ratio	12.5 : 1
Starting system	Kick and electric starter
Lubrication system:	Dry sump
Oil type or grade:	
Engine oil	(For USA and CDN) At 5 °C (40 °F) or higher <b>A</b> Yamalube 4 (20W-40) or SAE 20W-40 type SG motor oil (Non-Friction modified) At 15 °C (60 °F) or lower <b>B</b> Yamalube 4 (10W-30) or SAE 10W-30 type SG motor oil (Non-Friction modified) and/or Yamalube 4-R (15W-50) (Non-Friction modified)
	(Except for USA and CDN) API "SG" or higher grade





Oil capacity: Engine oil Periodic oil change With oil filter replacement Total amount	1.2 L (1.06 Imp qt, 1.27 US qt) 1.3 L (1.14 Imp qt, 1.37 US qt) 1.4 L (1.23 Imp qt, 1.48 US qt)
Coolant capacity (including all routes):	1.3 L (1.14 Imp qt, 1.37 US qt)
Air filter:	Wet type element
Fuel: Type  Tank capacity Reserve	Premium unleaded gasoline only with a research octane number of 95 or higher. (Except for ZA) Premium gasoline (For ZA) 10 L (2.2 Imp gal, 2.64 US gal) 1.2 L (0.26 Imp gal, 0.32 US gal)
Carburetor: Type Manufacturer	FCR-MX37 KEIHIN
Spark plug: Type/manufacturer Gap	CR8E/NGK (resistance type) 0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Clutch type:	Wet, multiple-disc
Transmission: Primary reduction system Primary reduction ratio Secondary reduction system Secondary reduction ratio Transmission type Operation Gear ratio: 1st 2nd 3rd 4th 5th	Gear 57/17 (3.353) Chain drive 52/13 (4.000) Constant mesh, 5-speed Left foot operation 31/13 (2.385) 28/16 (1.750) 28/21 (1.333) 25/24 (1.042) 22/27 (0.815)
Chassis: Frame type Caster angle Trail	Semi double cradle 27.1° 117.4 mm (4.62 in)
Tire: Type Size (front)  Size (rear)  Tire pressure (front and rear)	With tube 80/100-21 51M (For USA, CDN and ZA) 90/90-21 54R (For EUROPE, AUS and NZ) 100/100-18 59M (For USA, CDN and ZA) 130/90-18 69R (For EUROPE, AUS and NZ) 100 kPa (1.0 kgf/cm <sup>2</sup> , 15 psi)

# GENERAL SPECIFICATIONS

**SPEC**

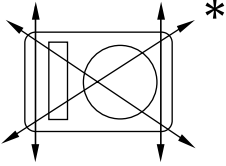
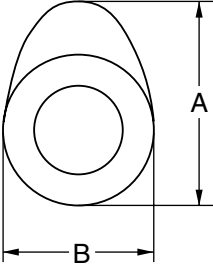
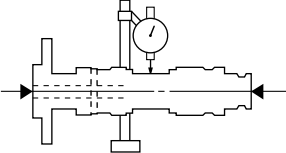


<b>Brake:</b> Front brake type Operation Rear brake type Operation	Single disc brake Right hand operation Single disc brake Right foot operation
<b>Suspension:</b> Front suspension Rear suspension	Telescopic fork Swingarm (link type monocross suspension)
<b>Shock absorber:</b> Front shock absorber Rear shock absorber	Coil spring/oil damper Coil spring/gas, oil damper
<b>Wheel travel:</b> Front wheel travel Rear wheel travel	300 mm (11.8 in) 315 mm (12.4 in)
<b>Electrical:</b> Ignition system Generator system Battery type Battery voltage/capacity Specific gravity	CDI AC magneto YTX5L-BS 12 V/4 AH 1.320
<b>Headlight type:</b>	Quartz bulb (halogen)
<b>Bulb wattage × quantity:</b> Headlight Taillight	12 V 60/55 W × 1 12 V 21/5 W × 1

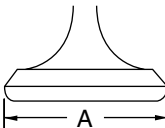
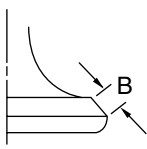
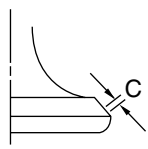
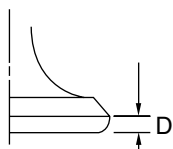




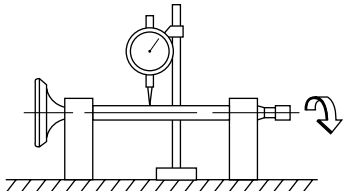
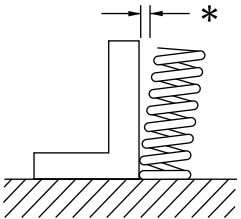
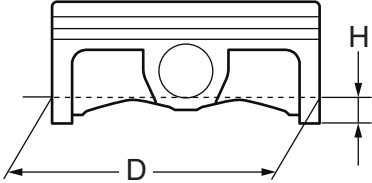
**MAINTENANCE SPECIFICATIONS**  
**ENGINE**

Item	Standard	Limit
Cylinder head: Warp limit 	----	0.05 mm (0.002 in)
Cylinder: Bore size Out of round limit	77.00 ~ 77.01 mm (3.0315 ~ 3.0319 in) ----	---- 0.05 mm (0.002 in)
Camshaft: Drive method Camshaft cap inside diameter Camshaft outside diameter Shaft-to-cap clearance Cam dimensions  Intake Exhaust Camshaft runout limit 	Chain drive (Left) 22.000 ~ 22.021 mm (0.8661 ~ 0.8670 in) 21.967 ~ 21.980 mm (0.8648 ~ 0.8654 in) 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in) "A" "B" "A" "B" ----	---- ---- ---- 0.08 mm (0.003 in) 30.296 ~ 30.346 mm (1.1923 ~ 1.1947 in) 22.45 ~ 22.55 mm (0.8839 ~ 0.8878 in) 30.399 ~ 30.499 mm (1.1968 ~ 1.2007 in) 22.45 ~ 22.55 mm (0.8839 ~ 0.8878 in) 0.03 mm (0.0012 in)


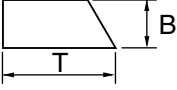
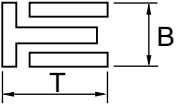
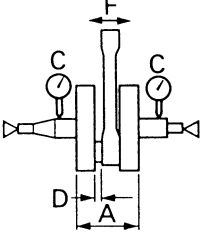


Item		Standard	Limit
Timing chain:			
Timing chain type/No. of links		92RH2010-114M/114	----
Timing chain adjustment method		Automatic	----
Valve, valve seat, valve guide:			
Valve clearance (cold)	IN	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in)	----
	EX	0.17 ~ 0.22 mm (0.0067 ~ 0.0087 in)	----
Valve dimensions:			
			
Head diameter	Face width	Seat width	Margin thickness
"A" head diameter	IN	22.9 ~ 23.1 mm (0.9016 ~ 0.9094 in)	----
	EX	24.4 ~ 24.6 mm (0.9606 ~ 0.9685 in)	----
"B" face width	IN	2.26 mm (0.089 in)	----
	EX	2.26 mm (0.089 in)	----
"C" seat width	IN	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
	EX	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in)
"D" margin thickness	IN	0.8 mm (0.0315 in)	----
	EX	0.7 mm (0.0276 in)	----
Stem outside diameter	IN	3.975 ~ 3.990 mm (0.1565 ~ 0.1571 in)	3.945 mm (0.1553 in)
	EX	4.460 ~ 4.475 mm (0.1756 ~ 0.1762 in)	4.430 mm (0.1744 in)
Guide inside diameter	IN	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in)	4.050 mm (0.1594 in)
	EX	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in)	4.550 mm (0.1791 in)
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.003 in)
	EX	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.10 mm (0.004 in)



Item	Standard	Limit
Stem runout limit 	----	0.01 mm (0.0004 in)
Valve seat width IN EX	0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in) 0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)	1.6 mm (0.0630 in) 1.6 mm (0.0630 in)
Valve spring: Free length IN EX Set length (valve closed) IN EX Compressed force (installed) IN EX Tilt limit * IN EX 	37.81 mm (1.49 in) 37.54 mm (1.48 in) 29.13 mm (1.15 in) 29.30 mm (1.15 in) 99 ~ 114 N at 29.13 mm (9.9 ~ 11.4 kg at 29.13 mm, 22.27 ~ 25.57 lb at 1.15 in) 126 ~ 144 N at 29.30 mm (12.6 ~ 14.4 kg at 29.30 mm, 28.44 ~ 32.41 lb at 1.15 in) ---- ----	36.81 mm (1.45 in) 36.54 mm (1.44 in) ---- ---- ---- 2.5°/ 1.7 mm (2.5°/0.067 in) 2.5°/1.6 mm (2.5°/0.063 in) ---- ----
Direction of winding (top view) IN EX Piston: Piston to cylinder clearance Piston size "D" 	Clockwise Clockwise 0.040 ~ 0.065 mm (0.0016 ~ 0.0026 in) 76.955 ~ 76.970 mm (3.0297 ~ 3.0303 in)	---- ---- 0.1 mm (0.004 in) ---- 8 mm (0.31 in) 0.5 mm (0.020 in)/IN-side ---- ----



Item	Standard	Limit
Piston pin bore inside diameter  Piston pin outside diameter	16.002 ~ 16.013 mm (0.6300 ~ 0.6304 in)  15.991 ~ 16.000 mm (0.6296 ~ 0.6299 in)	16.043 mm (0.6316 in)  15.971 mm (0.6288 in)
Piston rings: Top ring:   Type Dimensions (B × T) End gap (installed)  Side clearance (installed)  2nd ring:   Type Dimensions (B × T) End gap (installed)  Side clearance  Oil ring:   Dimensions (B × T) End gap (installed)	Barrel  0.90 × 2.75 mm (0.04 × 0.11 in)  0.15 ~ 0.25 mm (0.006 ~ 0.010 in)  0.030 ~ 0.065 mm (0.0012 ~ 0.0026 in)  Taper  0.80 × 2.75 mm (0.03 × 0.11 in)  0.30 ~ 0.45 mm (0.012 ~ 0.018 in)  0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in)  1.50 × 2.25 mm (0.06 × 0.09 in)  0.10 ~ 0.40 mm (0.004 ~ 0.016 in)	----  ----  0.50 mm (0.020 in)  0.12 mm (0.005 in)  ----  ----  0.80 mm (0.031 in)  0.12 mm (0.005 in)  ----  ----  ----
Crankshaft: Crank width "A"  Runout limit "C"  Big end side clearance "D"  Small end free play "F"  	55.95 ~ 56.00 mm (2.203 ~ 2.205 in)  0.03 mm (0.0012 in)  0.15 ~ 0.45 mm (0.0059 ~ 0.0177 in)  0.4 ~ 1.0 mm (0.02 ~ 0.04 in)	----  0.05 mm (0.002 in)  0.50 mm (0.02 in)  2.0 mm (0.08 in)



Item	Standard	Limit
<b>Clutch:</b>		
Friction plate thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)	2.7 mm (0.106 in)
Quantity	9	----
Clutch plate thickness	1.1 ~ 1.3 mm (0.043 ~ 0.051 in)	----
Quantity	8	----
Warp limit	----	0.1 mm (0.004 in)
Clutch spring free length	37.0 mm (1.46 in)	36.0 mm (1.42 in)
Quantity	5	----
Clutch housing thrust clearance	0.10 ~ 0.35 mm (0.0039 ~ 0.0138 in)	----
Clutch housing radial clearance	0.010 ~ 0.044 mm (0.0004 ~ 0.0017 in)	----
Clutch release method	Inner push, cam push	----
<b>Shifter:</b>		
Shifter type	Cam drum and guide bar	----
Guide bar bending limit	----	0.05 mm (0.002 in)
<b>Kickstarter:</b>		
Type	Kick and ratchet type	----
<b>Carburetor:</b>		
	USA	EUROPE, CDN, ZA, AUS, NZ
Type/manufacturer	FCR-MX37/KEIHIN	←
I. D. mark	5UM5 50	5UM6 60
Main jet (M.J)	#175	#170
Main air jet (M.A.J)	ø2.0	←
Jet needle (J.N)	OBDUS-4	OBEKQ-4
Cutaway (C.A)	1.5	←
Pilot jet (P.J)	#40	←
Pilot air jet (P.A.J)	#70	#60
Pilot outlet (P.O)	ø0.9	←
Pilot screw (example) (P.S)	2	1-1/2
Bypass (B.P)	ø1.0	←
Valve seat size (V.S)	ø3.8	←
Starter jet (G.S)	#72	←
Leak jet (Acc.P)	#70	#90
Float height (F.H)	8 mm (0.31 in)	←
Engine idle speed	1,900 ~ 2,100 r/min	←
Intake vacuum	26.7 ~ 32.0 kPa (200 ~ 240 mmHg, 7.87 ~ 9.45 inHg)	←
Hot starter lever free play	3 ~ 6 mm (0.12 ~ 0.24 in)	←

# MAINTENANCE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Lubrication system:</b>		
Oil filter type	Paper type	----
Oil pump type	Trochoid type	----
Tip clearance	0.12 mm or less (0.0047 in or less)	0.20 mm (0.008 in)
Side clearance	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in)	0.24 mm (0.009 in)
Housing and rotor clearance	0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)	0.17 mm (0.0067 in)
<b>Cooling:</b>		
Radiator core size		
Width	117.8 mm (4.6 in)	----
Height	220 mm (8.7 in)	----
Thickness	32 mm (1.26 in)	----
Radiator cap opening pressure	110 kPa (1.1 kg/cm <sup>2</sup> , 15.6 psi)	----
Radiator capacity (total)	0.6 L (0.53 Imp qt, 0.63 US qt)	----
Water pump		
Type	Single-suction centrifugal pump	----



Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m·kg	ft·lb
Spark plug	M10S × 1.0	1	13	1.3	9.4
Camshaft cap	M6 × 1.0	10	10	1.0	7.2
Cylinder head blind plug screw	M12 × 1.0	1	28	2.8	20
Cylinder head (stud bolt)	M6 × 1.0	2	7	0.7	5.1
(stud bolt)	M8 × 1.25	1	15	1.5	11
(bolt)	M9 × 1.25	4	38	3.8	27
(nut)	M6 × 1.0	2	10	1.0	7.2
Cylinder head cover	M6 × 1.0	2	10	1.0	7.2
Cylinder	M6 × 1.0	1	10	1.0	7.2
Balancer weight	M6 × 1.0	2	10	1.0	7.2
Balancer shaft driven gear	M14 × 1.0	1	50	5.0	36
Timing chain guide (intake side)	M6 × 1.0	2	10	1.0	7.2
Timing chain tensioner	M6 × 1.0	2	10	1.0	7.2
Timing chain tensioner cap bolt	M6 × 1.0	1	7	0.7	5.1
Impeller	M8 × 1.25	1	14	1.4	10
Radiator hose clamp	M6 × 1.0	8	2	0.2	1.4
Coolant drain bolt	M6 × 1.0	1	10	1.0	7.2
Water pump housing	M6 × 1.0	4	10	1.0	7.2
Radiator	M6 × 1.0	6	10	1.0	7.2
Radiator guard	M6 × 1.0	2	10	1.0	7.2
Radiator pipe	M6 × 1.0	1	10	1.0	7.2
Oil pump cover	M4 × 0.7	1	2	0.2	1.4
Oil pump	M6 × 1.0	3	10	1.0	7.2
Oil filter element drain bolt	M6 × 1.0	1	10	1.0	7.2
Oil filter element cover	M6 × 1.0	2	10	1.0	7.2
Oil strainer	M6 × 1.0	2	10	1.0	7.2
Oil delivery pipe 1 (M10)	M10 × 1.25	1	20	2.0	14
(M8)	M8 × 1.25	2	18	1.8	13
△ Oil hose	M6 × 1.0	2	8	0.8	5.8
△ Oil hose clamp	—	2	2	0.2	1.4
Oil strainer and frame	M14 × 1.5	1	70	7.0	50
Carburetor joint clamp	M4 × 0.7	2	3	0.3	2.2
Air filter joint clamp	M6 × 1.0	1	3	0.3	2.2
Throttle cable (pull)	M6 × 1.0	1	4	0.4	2.9
Throttle cable (return)	M12 × 1.0	1	11	1.1	8.0
Throttle cable cover	M5 × 0.8	2	4	0.4	2.9
Hot starter plunger	M12 × 1.0	1	2	0.2	1.4
△ Air filter case	M6 × 1.0	2	8	0.8	5.8
Air filter joint and air filter case	M5 × 0.8	1	4	0.4	2.9
Exhaust pipe (nut)	M8 × 1.25	1	13	1.3	9.4
(bolt)	M8 × 1.25	1	24	2.4	17
△ Exhaust pipe protector	M6 × 1.0	3	10	1.0	7.2

# MAINTENANCE SPECIFICATIONS

**SPEC**



Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m·kg	ft·lb
△ Silencer	M8 × 1.25	2	35	3.5	25
Silencer clamp	M8 × 1.25	1	16	1.6	11
Spark arrester (for USA)	M6 × 1.0	3	10	1.0	7.2
Silencer end pipe (for USA)	M6 × 1.0	1	10	1.0	7.2
Crankcase	M6 × 1.0	11	12	1.2	8.7
Crankcase bearing stopper	M6 × 1.0	11	10	1.0	7.2
Crankcase bearing stopper (crankshaft)	M6 × 1.0	4	10	1.0	7.2
Left crankcase cover	M6 × 1.0	8	10	1.0	7.2
Idle gear cover (starter motor)	M6 × 1.0	3	10	1.0	7.2
Idle gear plate	M6 × 1.0	2	10	1.0	7.2
Right crankcase cover	M6 × 1.0	8	10	1.0	7.2
Clutch cover	M6 × 1.0	7	10	1.0	7.2
Crankcase oil drain bolt	M10 × 1.25	1	20	2.0	14
Drive chain sprocket cover	M6 × 1.0	2	8	0.8	5.8
Kick shaft ratchet wheel guide	M6 × 1.0	2	12	1.2	8.7
Kickstarter crank	M8 × 1.25	1	33	3.3	24
Primary drive gear	M18 × 1.0	1	75	7.5	54
Clutch spring	M6 × 1.0	5	8	0.8	5.8
Clutch boss	M16 × 1.0	1	60	6.0	43
Push lever shaft	M6 × 1.0	1	10	1.0	7.2
Drive sprocket	M18 × 1.0	1	75	7.5	54
Drive axle oil seal stopper	M6 × 1.0	2	10	1.0	7.2
Segment	M8 × 1.25	1	30	3.0	22
Shift guide	M6 × 1.0	2	10	1.0	7.2
Stopper lever	M6 × 1.0	1	10	1.0	7.2
Shift pedal	M6 × 1.0	1	12	1.2	8.7

**NOTE:**

△ - marked portion shall be checked for torque tightening after break-in or before each race.





**CHASSIS**

Item	Standard			Limit
Steering system: Steering bearing type	Taper roller bearing			----
Front suspension:	USA, CDN	EUROPE	AUS, NZ, ZA	
Front fork travel	300 mm (11.8 in)	←	←	
Fork spring free length	460 mm (18.1 in)	←	←	
Spring rate, STD	K = 4.31 N/mm (0.44 kg/mm, 24.6 lb/in)	K = 4.12 N/mm (0.42 kg/mm, 23.5 lb/in)	K = 4.22 N/mm (0.43 kg/mm, 24.1 lb/in)	
Optional spring/spacer	Yes	←	←	
Oil capacity	578 cm <sup>3</sup> (20.3 Imp oz, 19.5 US oz)	573 cm <sup>3</sup> (20.2 Imp oz, 19.4 US oz)	←	
Oil level <Min. ~ Max.> (From top of outer tube with inner tube and damper rod fully com- pressed without spring.)	125 mm (4.92 in) 80 ~ 150 mm (3.15 ~ 5.91 in)	130 mm (5.12 in) ←	← ←	
Oil grade	Suspension oil "01"	←	←	
Inner tube outer diameter	46 mm (1.81 in)	←	←	
Front fork top end	5 mm (0.20 in)	←	10 mm (0.39 in)	
Rear suspension:	USA, CDN, AUS, NZ, ZA	EUROPE		
Shock absorber travel	132 mm (5.20 in)	←	----	
Spring free length	260 mm (10.24 in)	←	----	
Fitting length <Min. ~ Max.>	245 mm (9.65 in) 240.5~ 258.5 mm (9.47 ~ 10.18 in)	246.5 mm (9.70 in) ←	---- ----	
Spring rate, STD	K = 50.0 N/mm (5.10 kg/mm, 285.6 lb/in)	K = 46.0 N/mm (4.70 kg/mm, 263.2 lb/in)	----	
Optional spring	Yes	←	----	
Enclosed gas pressure	1,000 kPa (10 kg/cm <sup>2</sup> , 142 psi)	←	----	
Swingarm: Swingarm free play limit End	----			1.0 mm (0.04 in)



Item	Standard		Limit
Wheel: Front wheel type Rear wheel type Front rim size/material Rear rim size/material Rim runout limit: Radial Lateral	USA, CDN, ZA	EUROPE, AUS, NZ	
	Spoke wheel	←	----
	Spoke wheel	←	----
	21 × 1.60/Aluminum	←	----
	18 × 1.85/Aluminum	18 × 2.15/Aluminum	----
	----	----	2.0 mm (0.08 in)
	----	----	2.0 mm (0.08 in)
Drive chain: Type/manufacturer Number of links Chain slack Chain length (10 links)	DID520VM/DAIDO 113 links + joint 40 ~ 50 mm (1.6 ~ 2.0 in) ----		---- ---- ---- 150.1 mm (5.91 in)
Front disc brake: Disc outside dia. × Thickness Pad thickness Master cylinder inside dia. Caliper cylinder inside dia. Brake fluid type	250 × 3.0 mm (9.84 × 0.12 in) 4.4 mm (0.17 in) 11.0 mm (0.433 in) 27.0 mm (1.063 in) × 2 DOT #4		250 × 2.5 mm (9.84 × 0.10 in) 1.0 mm (0.04 in) ---- ---- ----
Rear disc brake: Disc outside dia. × Thickness Deflection limit Pad thickness Master cylinder inside dia. Caliper cylinder inside dia. Brake fluid type	245 × 4.0 mm (9.65 × 0.16 in) ---- 6.4 mm (0.25 in) 11.0 mm (0.433 in) 25.4 mm (1.000 in) × 1 DOT #4		245 × 3.5 mm (9.65 × 0.14 in) 0.15 mm (0.006 in) 1.0 mm (0.04 in) ---- ---- ----
Brake lever and brake pedal: Brake lever position Brake pedal height (vertical height above footrest top) Clutch lever free play (lever end) Throttle grip free play	95 mm (3.74 in) 5 mm (0.20 in) 8 ~ 13 mm (0.31 ~ 0.51 in) 3 ~ 5 mm (0.12 ~ 0.20 in)		---- ---- ---- ----



	Part to be tightened	Thread size	Q'ty	Tightening torque		
				Nm	m-kg	ft-lb
△	Upper bracket and outer tube	M8 × 1.25	4	23	2.3	17
△	Lower bracket and outer tube	M8 × 1.25	4	20	2.0	14
△	Upper bracket and steering stem	M24 × 1.0	1	145	14.5	105
△	Handlebar upper holder and upper bracket	M8 × 1.25	4	28	2.8	20
△	Steering stem and steering ring nut	M28 × 1.0	1	Refer to NOTE.		
	Front fork and front fork cap bolt	M48 × 1.0	2	30	3.0	22
	Front fork and base valve	M30 × 1.0	2	55	5.5	40
	Front fork cap bolt and damper rod	M12 × 1.25	2	29	2.9	21
	Front fork bleed screw and front fork cap bolt	M5 × 0.8	2	1	0.1	0.7
△	Front fork and front fork protector	M6 × 1.0	6	10	1.0	7.2
	Front fork and brake hose holder	M6 × 1.0	2	10	1.0	7.2
△	Front fork and brake hose cover (M8)	M8 × 1.25	1	16	1.6	11
△	(M6)	M6 × 1.0	1	7	0.7	5.1
	Throttle grip cap	M5 × 0.8	2	4	0.4	2.9
△	Front brake master cylinder	M6 × 1.0	2	9	0.9	6.5
	Brake lever mounting bolt	M6 × 1.0	1	6	0.6	4.3
	Brake lever mounting nut	M6 × 1.0	1	6	0.6	4.3
	Brake lever position locknut	M6 × 1.0	1	5	0.5	3.6
△	Front brake hose guide	M5 × 0.8	2	4	0.4	2.9
	Clutch lever holder	M5 × 0.8	2	4	0.4	2.9
	Clutch lever mounting nut	M6 × 1.0	1	4	0.4	2.9
	Hot starter lever holder	M5 × 0.8	2	4	0.4	2.9
	Hot starter lever mounting nut	M5 × 0.8	1	2	0.2	1.4
	Front brake master cylinder cap	M4 × 0.7	2	2	0.2	1.4
△	Front brake hose union bolt	M10 × 1.25	2	30	3.0	22
△	Front brake caliper	M8 × 1.25	2	23	2.3	17
	Pad pin plug	M10 × 1.0	2	3	0.3	2.2
△	Front brake caliper and pad pin	M10 × 1.0	1	18	1.8	13
△	Rear brake caliper and pad pin	M10 × 1.0	1	18	1.8	13
△	Brake caliper and bleed screw	M8 × 1.25	2	6	0.6	4.3
△	Front wheel axle and axle nut	M16 × 1.5	1	105	10.5	75
△	Front wheel axle holder	M8 × 1.25	4	23	2.3	17
△	Front brake disc	M6 × 1.0	6	12	1.2	8.7
△	Rear brake disc	M6 × 1.0	6	14	1.4	10
△	Brake pedal	M8 × 1.25	1	26	2.6	19
△	Rear brake master cylinder	M6 × 1.0	2	11	1.1	8.0
	Rear brake master cylinder cap	M4 × 0.7	2	2	0.2	1.4
△	Rear brake hose union bolt	M10 × 1.25	2	30	3.0	22
△	Rear wheel axle and axle nut	M20 × 1.5	1	125	12.5	90

**NOTE:**

1. First, tighten the steering nut approximately 38 Nm (3.8 m • kg, 27 ft • lb) by using the steering nut wrench, then loosen the steering nut one turn.
2. Retighten the steering nut 7 Nm (0.7 m • kg, 5.1 ft • lb).



	Part to be tightened	Thread size	Q'ty	Tightening torque		
				Nm	m-kg	ft-lb
△	Nipple (spoke)	—	72	3	0.3	2.2
△	Rear wheel sprocket	M8 × 1.25	6	50	5.0	36
△	Rear brake disc cover	M6 × 1.0	2	7	0.7	5.1
△	Rear brake caliper protector	M6 × 1.0	2	7	0.7	5.1
	Drive chain puller adjust bolt and locknut	M8 × 1.25	2	16	1.6	11
	Engine mounting:					
△	Engine and engine bracket (front)	M10 × 1.25	1	69	6.9	50
△	Engine and frame (lower)	M10 × 1.25	1	69	6.9	50
△	Engine bracket and frame	M8 × 1.25	6	34	3.4	24
△	Engine and engine bracket (upper)	M10 × 1.25	1	55	5.5	40
	Lower engine guard	M6 × 1.0	3	10	1.0	7.2
	Left engine guard	M8 × 1.25	2	23	2.3	17
	Right engine guard	M8 × 1.25	2	23	2.3	17
	Regulator bracket and frame	M6 × 1.0	2	7	0.7	5.1
	Regulator	M6 × 1.0	2	7	0.7	5.1
△	Pivot shaft and nut	M16 × 1.5	1	85	8.5	61
△	Relay arm and swingarm	M14 × 1.5	1	80	8.0	58
△	Relay arm and connecting rod	M14 × 1.5	1	80	8.0	58
△	Connecting rod and frame	M14 × 1.5	1	80	8.0	58
△	Rear shock absorber and frame	M10 × 1.25	1	56	5.6	40
△	Rear shock absorber and relay arm	M10 × 1.25	1	53	5.3	38
△	Rear frame (upper)	M8 × 1.25	1	32	3.2	23
△	Rear frame (lower)	M8 × 1.25	2	29	2.9	21
△	Swingarm and brake hose holder	M5 × 0.8	4	1	0.1	0.7
	Swingarm and patch	M4 × 0.7	4	2	0.2	1.4
	Upper drive chain tensioner	M8 × 1.25	1	19	1.9	13
	Lower drive chain tensioner	M8 × 1.25	1	20	2.0	14
	Drive chain support	M6 × 1.0	3	7	0.7	5.1
	Seal guard and swingarm	M5 × 0.8	4	6	0.6	4.3
△	Fuel tank	M6 × 1.0	2	10	1.0	7.2
△	Fuel cock	M6 × 1.0	2	7	0.7	5.1
	Seat set bracket and fuel tank	M6 × 1.0	1	7	0.7	5.1
	Hooking screw (fitting band) and fuel tank	M6 × 1.0	1	7	0.7	5.1
	Fuel tank bracket and fuel tank	M6 × 1.0	4	7	0.7	5.1
△	Air scoop and fuel tank	M6 × 1.0	6	6	0.6	4.3
△	Air scoop and radiator guard (lower)	M6 × 1.0	2	6	0.6	4.3
△	Front fender	M6 × 1.0	4	7	0.7	5.1
△	Rear fender (front)	M6 × 1.0	2	7	0.7	5.1
△	Rear fender (rear)	M6 × 1.0	2	11	1.1	8.0
△	Side cover	M6 × 1.0	2	7	0.7	5.1
△	Seat	M8 × 1.25	2	23	2.3	17
	Trip meter	M6 × 1.0	2	7	0.7	5.1
	Meter cable holder and front fork protector	M5 × 0.8	2	4	0.4	2.9
	Headlight stay (lower) and lower bracket	M8 × 1.25	2	7	0.7	5.1

# MAINTENANCE SPECIFICATIONS

**SPEC**



Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m-kg	ft-lb
Headlight body and headlight unit	M6 × 1.0	2	7	0.7	5.1
△ Headlight (left and right)	M6 × 1.0	2	10	1.0	7.2
△ Headlight (lower)	M6 × 1.0	1	7	0.7	5.1
Taillight	M6 × 1.0	3	4	0.4	2.9
Taillight lead clamp and rear fender	M4 × 1.59	2	0.5	0.05	0.36
△ Coolant reservoir	M6 × 1.0	2	7	0.7	5.1
Sidestand bracket and frame	M10 × 1.25	2	66	6.6	48
Drive chain stopper and sidestand bracket	M6 × 1.0	1	7	0.7	5.1
Sidestand	M8 × 1.25	1	25	2.5	18

**NOTE:**

△ - marked portion shall be checked for torque tightening after break-in or before each race.



EC212300

**ELECTRICAL**

Item	Standard	Limit
Ignition system: Advancer type	Electrical	----
CDI:		
Pickup coil resistance (color)	248 ~ 372 Ω at 20 °C (68 °F) (White – Red)	----
CDI unit-model/manufacturer	5UM-50/YAMAHA (For USA) 5UM-60/YAMAHA (Except for USA)	---- ----
Ignition coil:		
Model/manufacturer	5UL-10/DENSO	----
Minimum spark gap	6 mm (0.24 in)	----
Primary coil resistance	0.08 ~ 0.10 Ω at 20 °C (68 °F)	----
Secondary coil resistance	4.6 ~ 6.8 kΩ at 20 °C (68 °F)	----
Charging system:		
System type	AC magneto	----
Model (stator)/manufacturer	5UM-00/YAMAHA	----
Normal output	14 V/120 W at 5,000 r/min	----
Charging coil resistance (color)	0.288 ~ 0.432 Ω at 20 °C (68 °F) (White – Ground)	----
Lighting coil resistance (color)	0.224 ~ 0.336 Ω at 20 °C (68 °F) (Yellow – Ground)	----
Rectifier/regulator:		
Regulator type	Semiconductor short circuit	----
Model/manufacture	SH712AA/SHINDENGEN	----
Regulated voltage (AC)	13.0 ~ 14.0 V	----
Regulated voltage (DC)	14.1 ~ 14.9 V	----
Rectifier capacity (AC)	12 A	----
Rectifier capacity (DC)	8 A	----
Electric starting system:		
Type	Constant mesh	----
Starter motor:		
Model/manufacturer	5UM01/YAMAHA	----
Operation voltage	12 V	----
Output	0.35 kW	----
Armature coil resistance	0.0189 ~ 0.0231 Ω at 20 °C (68 °F)	----
Brush overall length	7 mm (0.28 in)	3.5 mm (0.14 in)
Brush quantity	2 pcs.	----
Spring force	3.92 ~ 5.88 N (400 ~ 600 g, 14.1 ~ 21.2 oz)	----
Commutator diameter	17.6 mm (0.69 in)	16.6 mm (0.65 in)
Mica undercut (depth)	1.5 mm (0.06 in)	----

# MAINTENANCE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Starter relay:</b>		
Model/manufacturer	2768090-A/JIDECO	----
Amperage rating	180 A	----
Coil winding resistance	4.2 ~ 4.6 Ω at 20 °C (68 °F)	----
<b>Starting circuit cut-off relay:</b>		
Model/manufacturer	ACM33221 M06/MATSUSHITA	----
Coil winding resistance	75.69 ~ 92.51 Ω at 20 °C (68 °F)	----
<b>Fuse (amperage × quantity):</b>		
Main fuse	10 A × 1	----
Reserve fuse	10 A × 1	----

Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m·kg	ft·lb
Stator	M5 × 0.8	2	7	0.7	5.1
Holder (AC magneto lead)	M5 × 0.8	2	7	0.7	5.1
Rotor	M12 × 1.25	1	Refer to NOTE.		
Neutral switch	M5 × 0.8	2	4	0.4	2.9
Starter motor	M6 × 1.0	2	10	1.0	7.2
Starter relay terminal	M6 × 1.0	2	4	0.4	2.9
Negative lead and cylinder head	M6 × 1.0	1	10	1.0	7.2

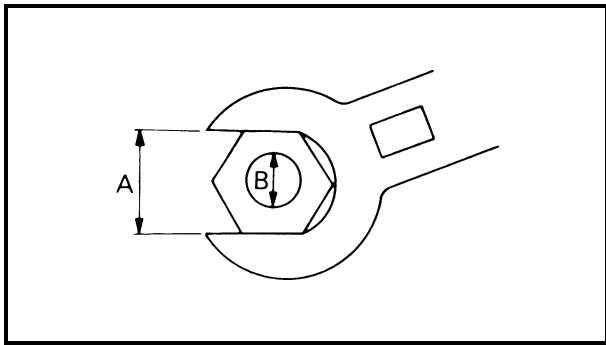
**NOTE:**

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

EC220001

## GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.



A: Distance between flats  
B: Outside thread diameter

A (Nut)	B (Bolt)	TORQUE SPECIFICATION		
		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	94

EC230000

## DEFINITION OF UNITS

Unit	Read	Definition	Measure
mm	millimeter	$10^{-3}$ meter	Length
cm	centimeter	$10^{-2}$ meter	Length
kg	kilogram	$10^3$ gram	Weight
N	Newton	$1 \text{ kg} \times \text{m}/\text{sec}^2$	Force
Nm	Newton meter	$\text{N} \times \text{m}$	Torque
m • kg	Meter kilogram	$\text{m} \times \text{kg}$	Torque
Pa	Pascal	$\text{N}/\text{m}^2$	Pressure
N/mm	Newton per millimeter	N/mm	Spring rate
L	Liter	—	Volume or capacity
cm <sup>3</sup>	Cubic centimeter	—	Volume or capacity
r/min	Revolution per minute	—	Engine speed

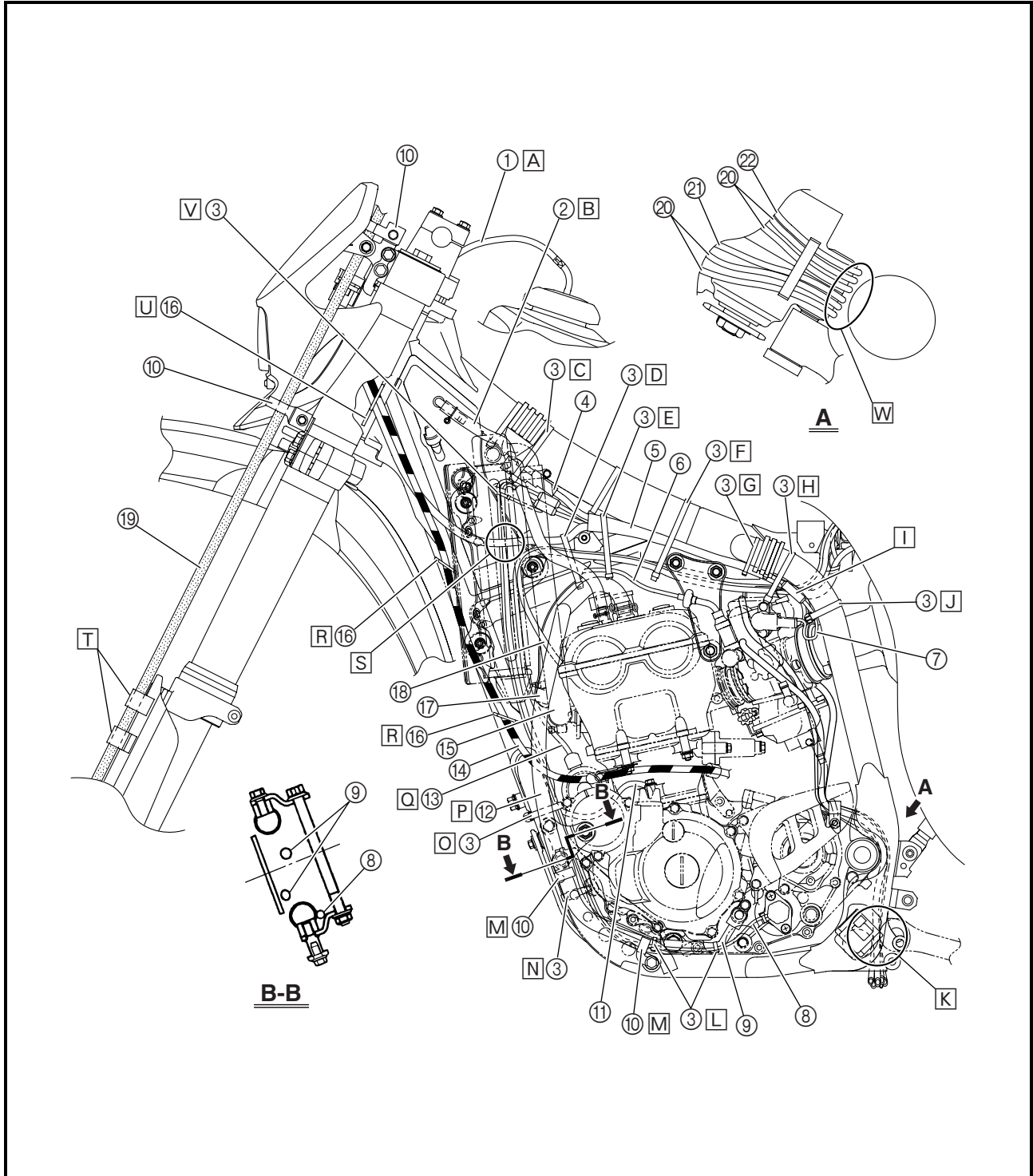




EC240000

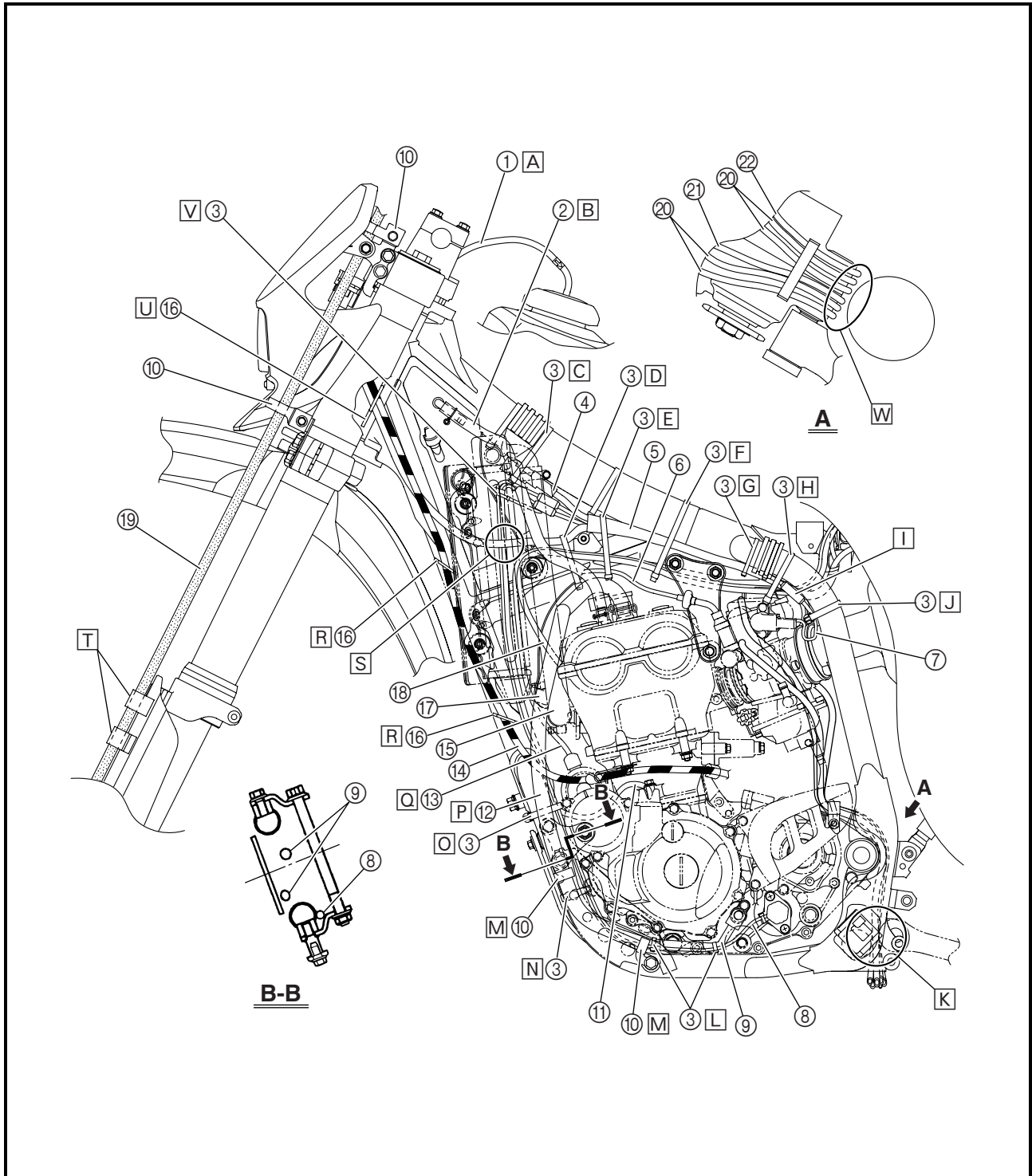
## CABLE ROUTING DIAGRAM

- |                                 |                               |                                   |
|---------------------------------|-------------------------------|-----------------------------------|
| ① Fuel tank breather hose       | ⑨ Oil hose                    | ⑰ Radiator pipe (radiator hose 4) |
| ② Oil tank breather hose        | ⑩ Hose guide                  | ⑱ Negative battery lead           |
| ③ Clamp                         | ⑪ AC magneto lead             | ⑲ Brake hose                      |
| ④ Diode                         | ⑫ Cylinder head breather hose | ⑳ Carburetor breather hose        |
| ⑤ Wire harness                  | ⑬ Starter motor lead          | ㉑ Carburetor overflow hose        |
| ⑥ Hot starter cable             | ⑭ Clutch cable                | ㉒ Coolant reservoir breather hose |
| ⑦ Throttle position sensor lead | ⑮ Radiator hose 1             |                                   |
| ⑧ Neutral switch lead           | ⑯ Cable guide                 |                                   |





- A** Insert the fuel tank breather hose into the hole in the steering stem cap.
- B** Pass the oil tank breather hose on the outside of the AC magneto lead, neutral switch lead, wire harness, starter motor lead, negative battery lead and cylinder head breather hose.
- C** Fasten the diode, rectifier/regulator lead and AC magneto coupler (connected to the CDI unit), with the diode at its white tape and the rectifier/regulator lead at its protecting tube.
- D** Fasten the wire harness, starter motor lead and negative battery lead so that the plastic locking tie ends do not contact the ignition coil lead.
- E** Fasten the wire harness, rectifier/regulator lead, coolant reservoir hose, hot starter cable, negative battery lead and starter motor lead.
- F** Fasten the wire harness, negative battery lead, starter motor lead, rectifier/regulator lead and coolant reservoir hose at the white tape for the negative battery lead.

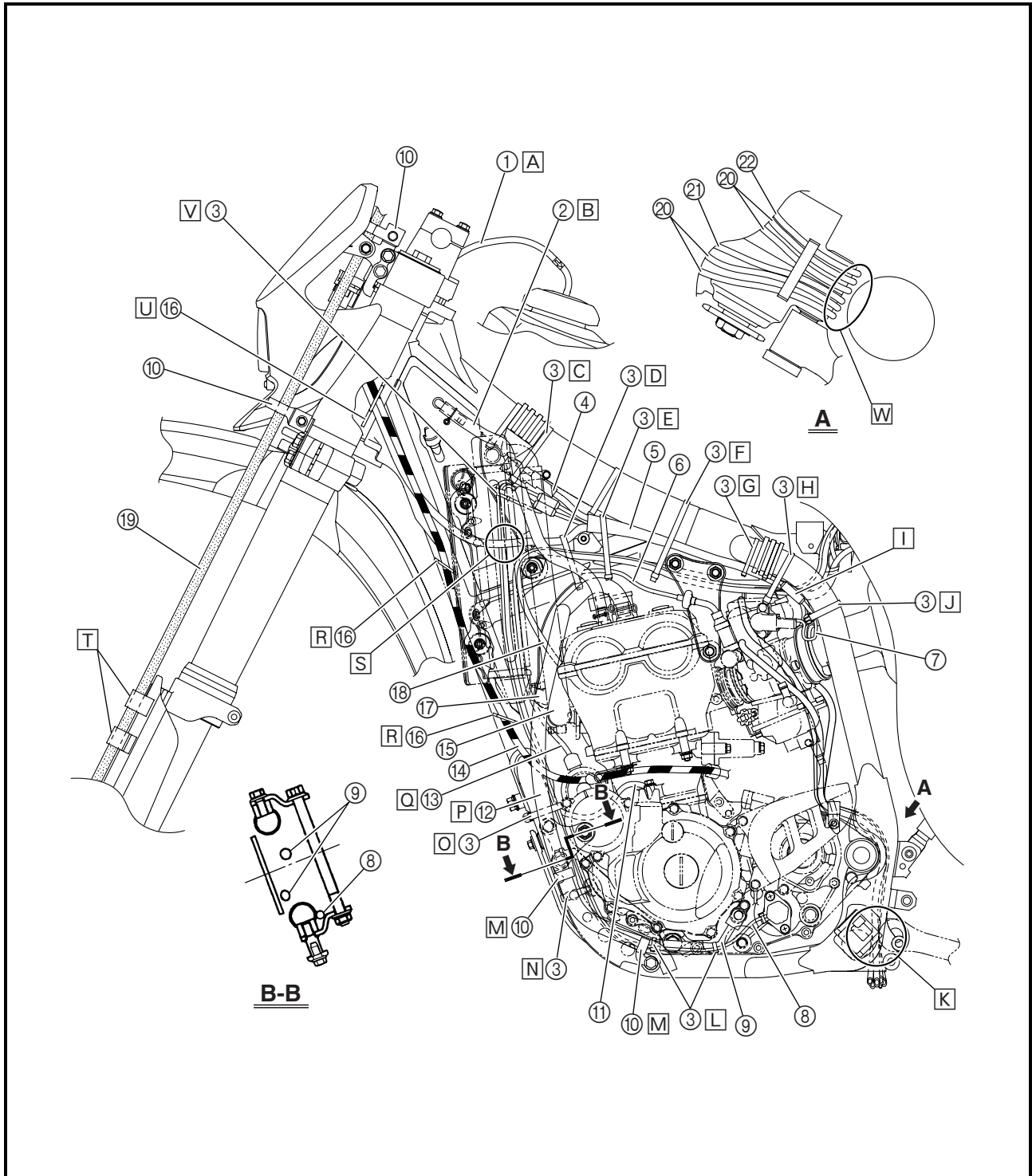


# CABLE ROUTING DIAGRAM

**SPEC**

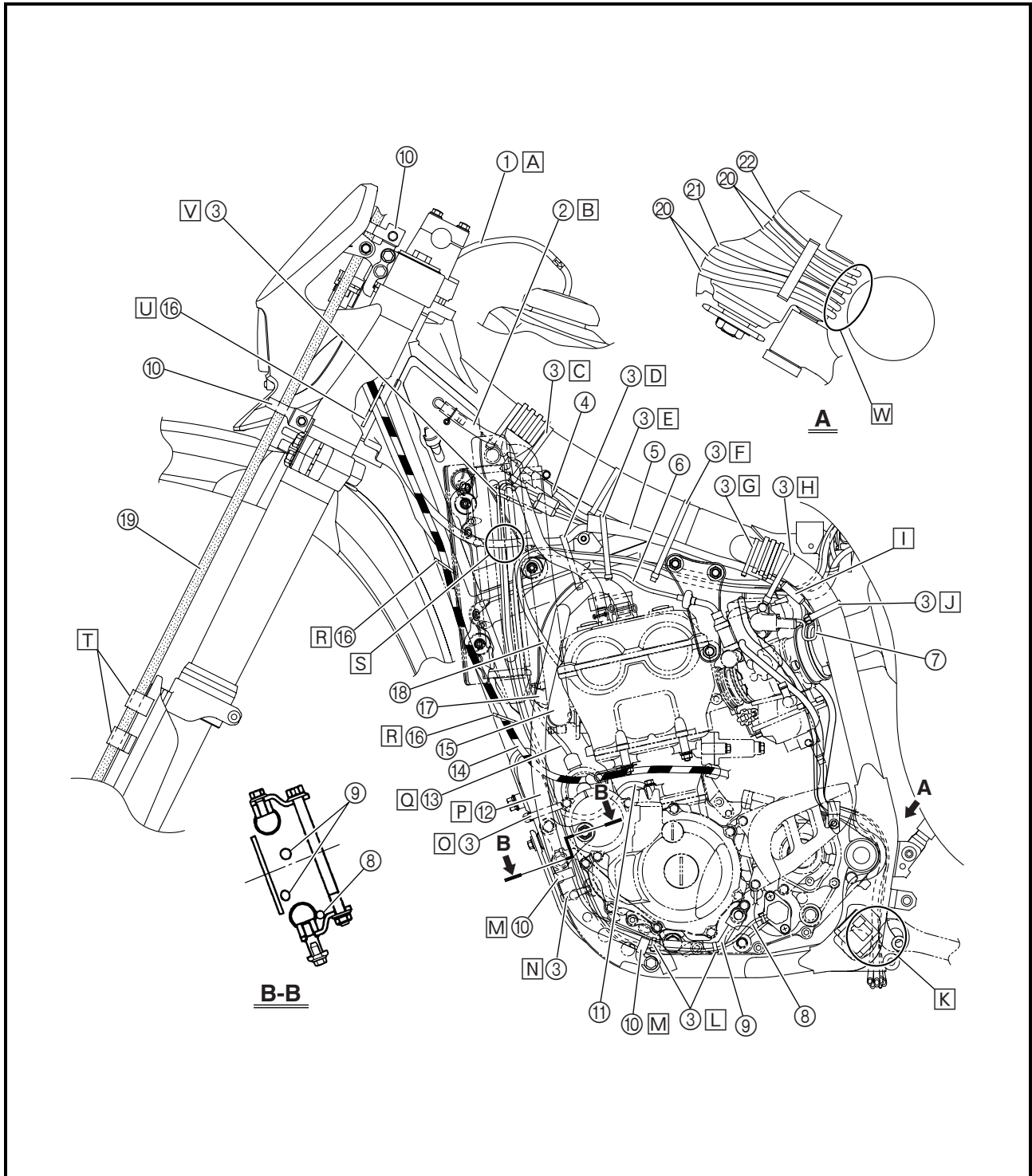


- G** Fasten the wire harness at its white tape.
- H** Fasten the wire harness, throttle position sensor lead (in the wire harness), starter motor lead and negative battery lead.
- I** Make sure that the throttle position sensor coupler does not go outside the chassis.
- J** Fasten the throttle position sensor lead.
- K** Pass the carburetor breather hoses, carburetor overflow hose and coolant reservoir breather hose between the connecting rod and cross tube (frame).
- L** Fasten the neutral switch lead and oil hose together with the plastic locking ties and cut off the tie ends.
- M** Pass the cylinder head breather hose through the hose guides.
- N** Fasten the neutral switch lead.
- O** Fasten the neutral switch lead and AC magneto lead.





- P** Pass the cylinder head breather hose on the inside of the radiator hose 1 and on the outside of the radiator pipe (radiator hose 4). Make sure that the cylinder head breather hose does not go forward of the chassis.
- Q** Pass the starter motor lead in front of the radiator hose 4.
- R** Pass the clutch cable through the cable guides.
- S** Pass the wire harness on the outside of the neutral switch lead and AC magneto lead.
- T** Fit the brake hose into the guides on the protector.
- U** Pass the wire harness and clutch cable through the cable guide.
- V** Fasten the AC magneto lead and neutral switch lead to the cable guide at their protecting tube.
- W** Pass the carburetor breather hoses, carburetor overflow hose and coolant reservoir breather hose so that the hoses do not contact the rear shock absorber.



# CABLE ROUTING DIAGRAM

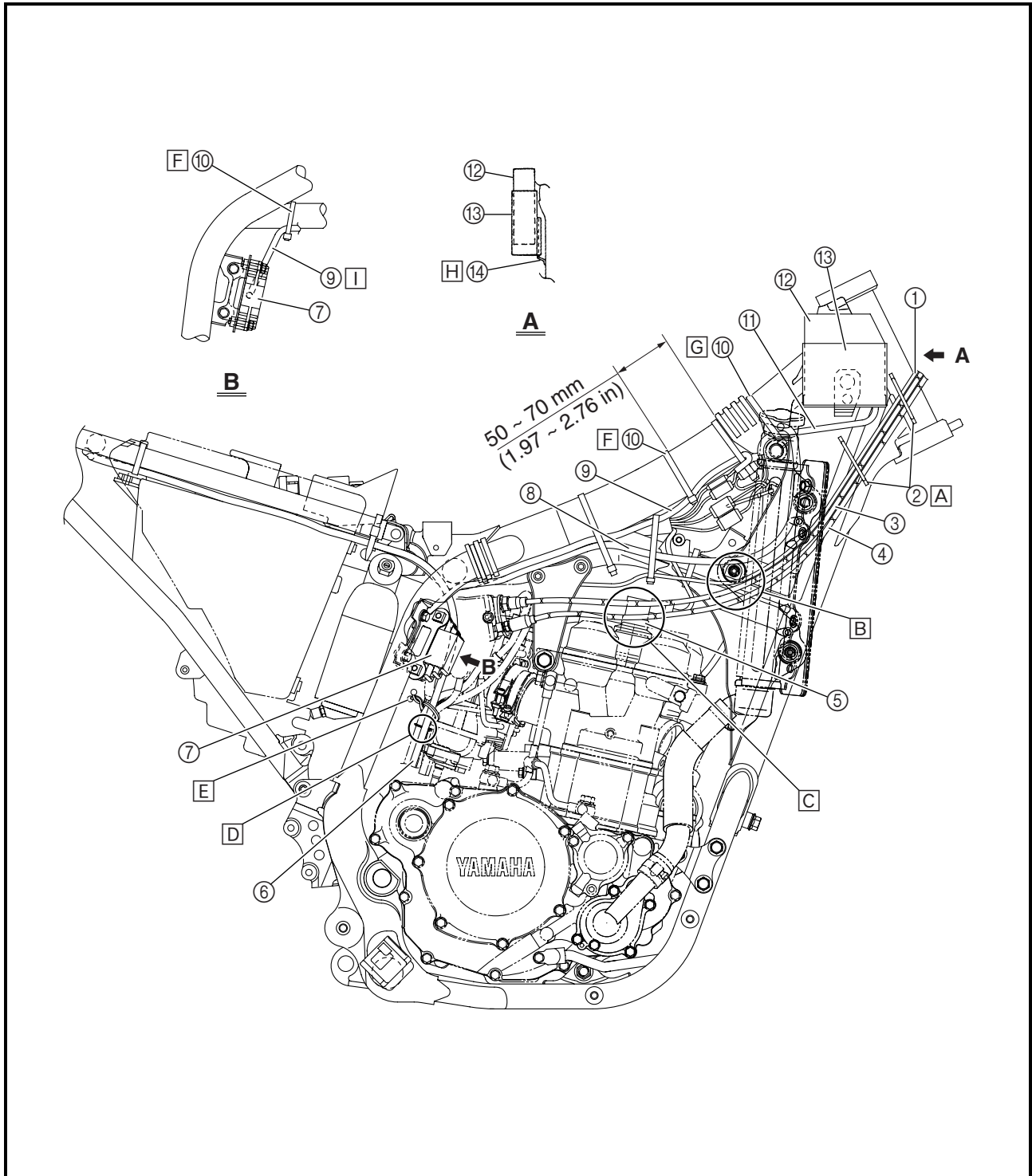
**SPEC**



- ① Hot starter cable
- ② Cable guide
- ③ Throttle cable (return)
- ④ Throttle cable (pull)
- ⑤ Ignition coil
- ⑥ Coolant reservoir breather hose
- ⑦ Rectifier/regulator
- ⑧ Coolant reservoir hose
- ⑨ Rectifier/regulator lead

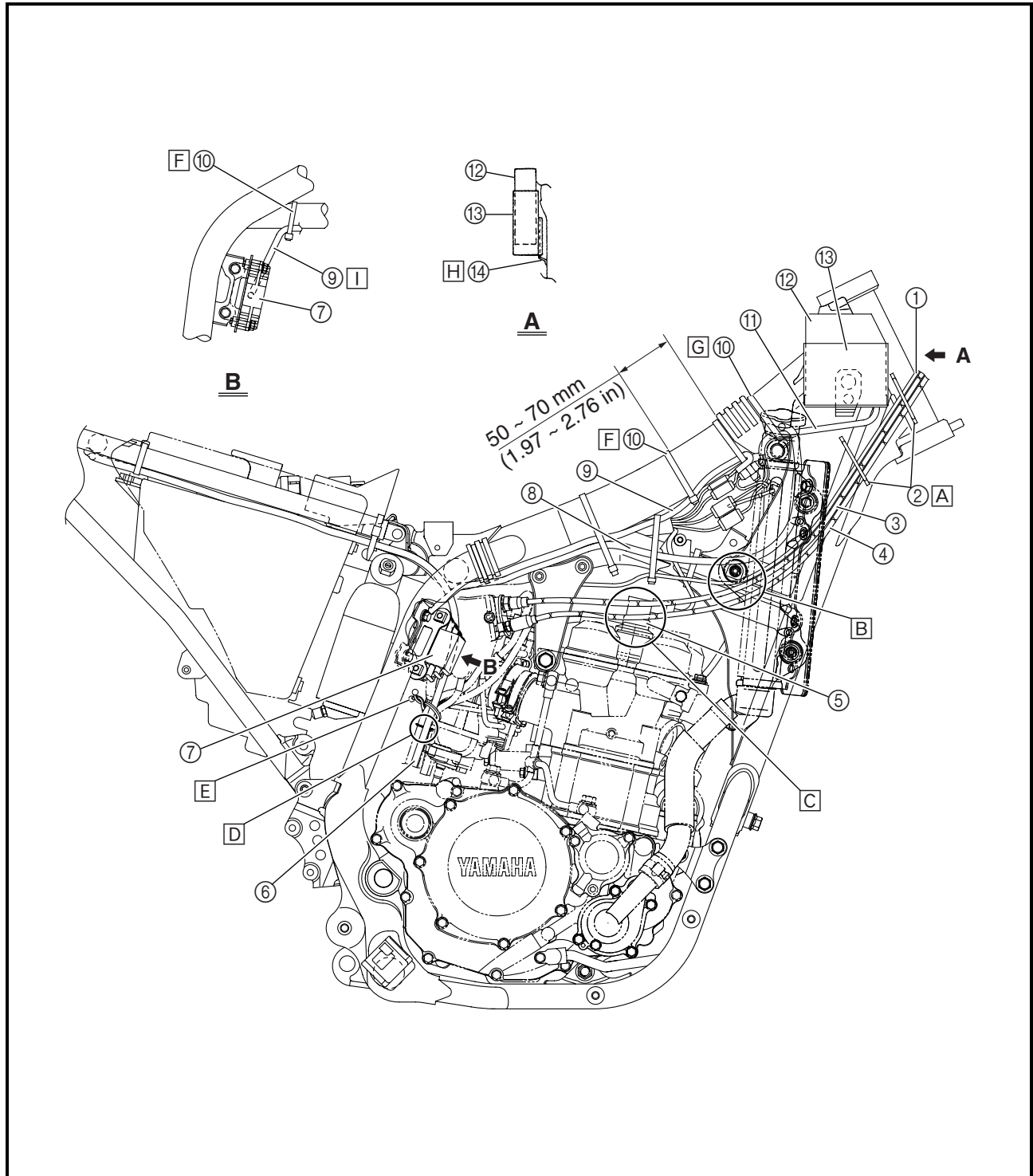
- ⑩ Clamp
  - ⑪ CDI unit lead
  - ⑫ CDI unit
  - ⑬ CDI unit band
  - ⑭ CDI unit stay
- A** Pass the throttle cables and hot starter cable through the cable guides.

- B** Pass the throttle cables and hot starter cable between the radiator and frame, then under the radiator mounting boss.
- C** Pass the throttle cables on the outside of the ignition coil.
- D** Pass the carburetor breather hose (of the throttle cable cover) through the hose holder.





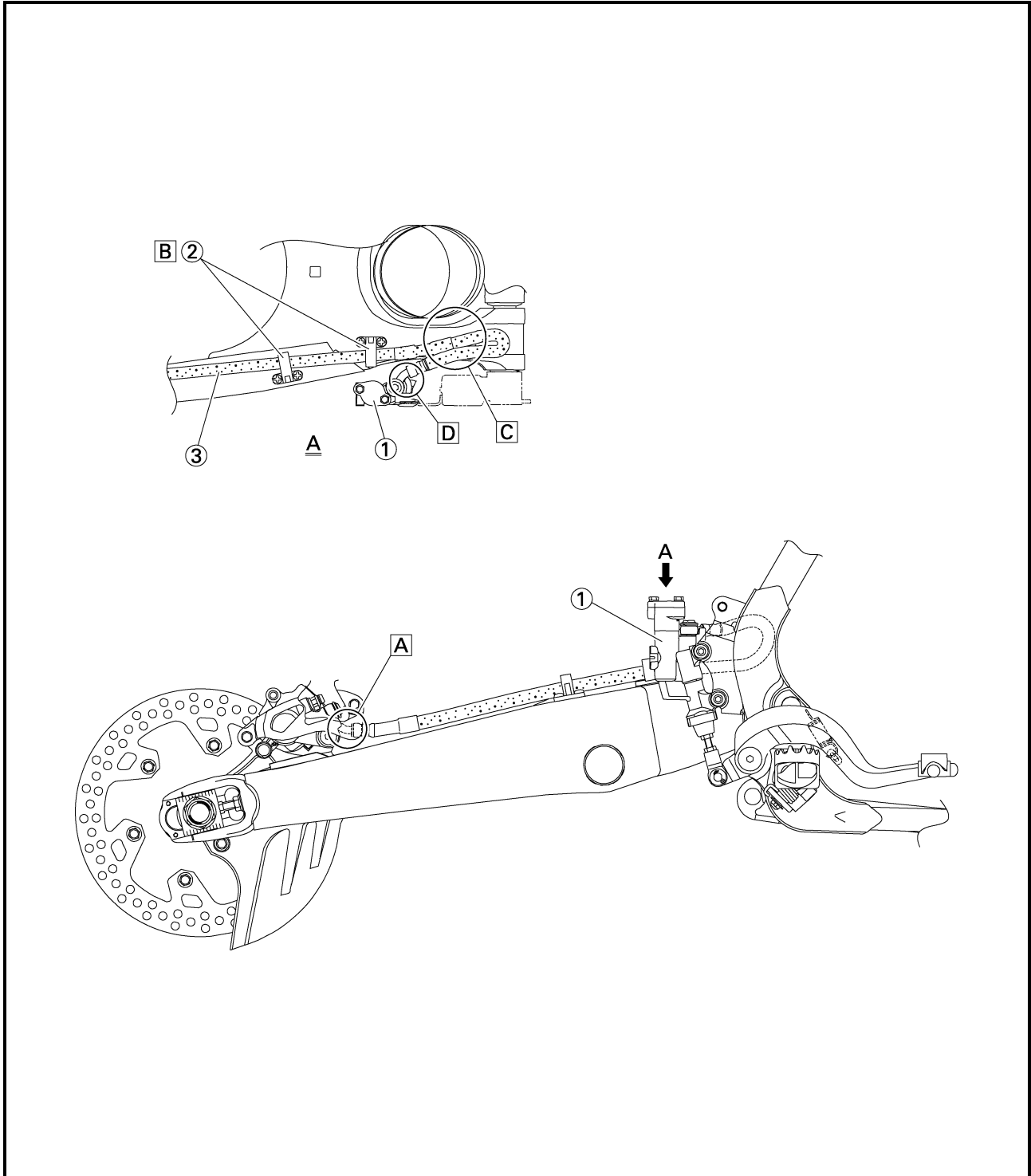
- E** Fasten the coolant reservoir breather hose and carburetor breather hoses together.
- F** Fasten the rectifier/regulator lead.
- G** Fasten the CDI unit lead.
- H** Insert the CDI unit band over the CDI unit stay as far as possible.
- I** Do not allow the rectifier/regulator lead to slacken.





- ① Brake master cylinder
- ② Brake hose holder
- ③ Brake hose

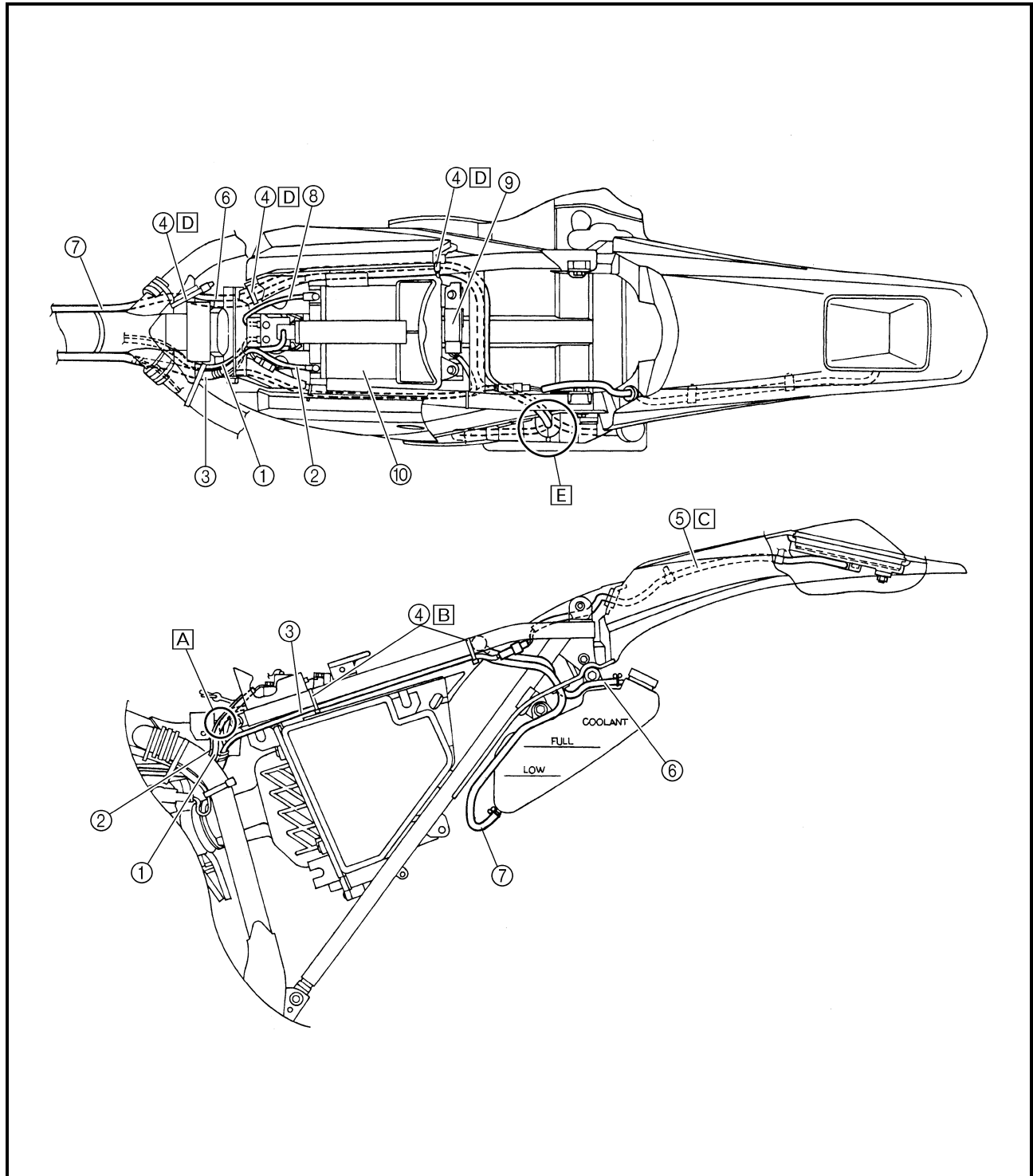
- A Install the brake hose so that its pipe portion directs as shown and lightly touches the projection on the brake caliper.
- B Pass the brake hose into the brake hose holders.
- C If the brake hose contacts the spring (rear shock absorber), correct its twist.
- D Install the brake hose so that its pipe portion directs as shown and lightly touches the projection on the brake master cylinder.





- ① Starter motor lead
- ② Negative battery lead
- ③ Wire harness
- ④ Clamp
- ⑤ Taillight lead
- ⑥ Coolant reservoir breather hose
- ⑦ Coolant reservoir hose
- ⑧ Positive battery lead
- ⑨ Starting circuit cut-off relay
- ⑩ Battery

- A Position the starter motor lead, negative battery lead and wire harness in the tank damper slit.
- B Fasten the wire harness.
- C Do not allow the taillight lead to slacken.
- D Fasten the coolant reservoir breather hose and coolant reservoir hose.
- E Pass the coolant reservoir hose on the outside of the coolant reservoir breather hose.





# CABLE ROUTING DIAGRAM

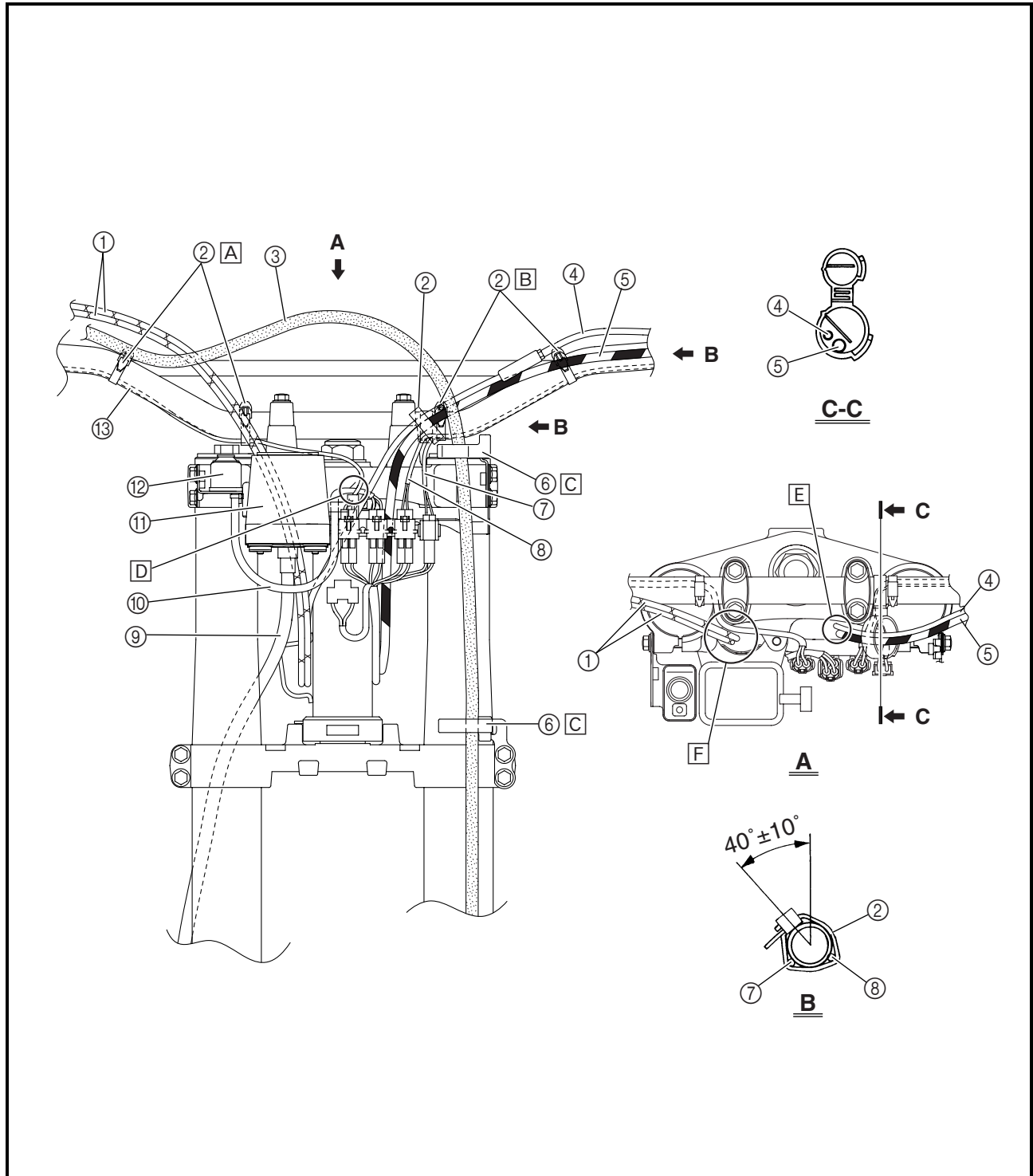
**SPEC**



- ① Throttle cable
- ② Clamp
- ③ Brake hose
- ④ Hot starter cable
- ⑤ Clutch cable
- ⑥ Hose guide
- ⑦ Clutch switch lead
- ⑧ Engine stop switch lead
- ⑨ Trip meter cable
- ⑩ Main switch lead
- ⑪ Trip meter

- ⑫ Main switch
- ⑬ Start switch lead
- A Fasten the start switch lead.
- B Fasten the engine stop switch lead and clutch switch lead.
- C Pass the brake hose through the hose guides.
- D Pass the start switch lead in front of the main switch lead.

- E Pass the hot starter cable and clutch cable between the upper bracket and coupler bracket.
- F Pass the throttle cables between the upper bracket and trip meter.



EC300000

# REGULAR INSPECTION AND ADJUSTMENTS

## MAINTENANCE INTERVALS

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

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

# MAINTENANCE INTERVALS



Item	After break-in	Every race	Every third (or 500 km)	Every fifth (or 1,000 km)	As required	Remarks
SHIFT FORK, SHIFT CAM, GUIDE BAR Inspect					●	Inspect wear
ROTOR NUT Retighten	●			●		
EXHAUST PIPE, SILENCER, PROTECTOR Inspect and retighten Clean Replace	●	●		●	●	* Whichever comes first
*SPARK ARRESTER Clean					● (Every six months)	
CRANK Inspect and clean				●	●	
CARBURETOR Inspect, adjust and clean	●	●				
SPARK PLUG Inspect and clean Replace	●		●		●	
DRIVE CHAIN Lubricate, slack, alignment Replace	●	●			●	Use chain lube Chain slack: 40 ~ 50 mm (1.6 ~ 2.0 in)
COOLING SYSTEM Check coolant level and leakage Check radiator cap operation Replace coolant Inspect hoses	●	●			● ●	Every two years
OUTSIDE NUTS AND BOLTS Retighten	●	●				Refer to "STARTING AND BREAK-IN" section in the CHAPTER 1.
AIR FILTER Clean and lubricate Replace	●	●			●	Use foam air-filter oil or equivalent oil
OIL FILTER Replace	●			●		
OIL STRAINER (frame) Clean				●		
FRAME Clean and inspect	●	●				
FUEL TANK, COCK Clean and inspect	●		●			
BRAKES Adjust lever position and pedal height Lubricate pivot point Check brake disc surface Check fluid level and leakage Retighten brake disc bolts, caliper bolts, master cylinder bolts and union bolts Replace pads Replace brake fluid	● ● ● ● ●	● ● ● ● ●			● ●	Every one year

3

# MAINTENANCE INTERVALS



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

\*marked: For USA

EC320000

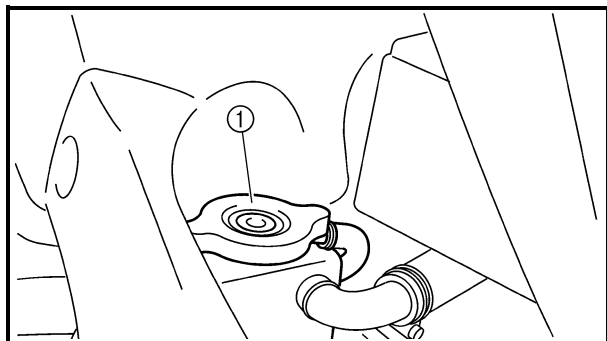
## PRE-OPERATION INSPECTION AND MAINTENANCE

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

Before using this machine, check the following points.

### GENERAL INSPECTION AND MAINTENANCE

Item	Routine	Page
Coolant	Check that coolant is filled up to the radiator cap. Check the cooling system for leakage.	P.3-5 ~ 9
Fuel	Check that a fresh gasoline is filled in the fuel tank. Check the fuel line for leakage.	P.1-14
Engine oil	Check that the oil level is correct. Check the crankcase and frame oil line for leakage.	P.3-14 ~ 18
Gear shifter and clutch	Check that gears can be shifted correctly in order and that the clutch operates smoothly.	P.3-9 ~ 10
Throttle grip/Housing	Check that the throttle grip operation and free play are correctly adjusted. Lubricate the throttle grip and housing, if necessary.	P.3-10 ~ 11
Brakes	Check the play of front brake and effect of front and rear brake.	P.3-25 ~ 31
Drive chain	Check drive chain slack and alignment. Check that the drive chain is lubricated properly.	P.3-32 ~ 35
Wheels	Check for excessive wear and tire pressure. Check for loose spokes and have no excessive play.	P.3-43 ~ 44
Steering	Check that the handlebar can be turned smoothly and have no excessive play.	P.3-44 ~ 45
Front forks and rear shock absorber	Check that they operate smoothly and there is no oil leakage.	P.3-35 ~ 42
Cables (wires)	Check that the clutch and throttle cables move smoothly. Check that they are not caught when the handlebars are turned or when the front forks travel up and down.	—
Exhaust pipe	Check that the exhaust pipe is tightly mounted and has no cracks.	P.4-3 ~ 4
Rear wheel sprocket	Check that the rear wheel sprocket tightening bolt is not loose.	P.3-32
Lubrication	Check for smooth operation. Lubricate if necessary.	P.3-46
Bolts and nuts	Check the chassis and engine for loose bolts and nuts.	P.1-19
Lead connectors	Check that the AC magneto, CDI unit, and ignition coil are connected tightly.	P.1-6
Settings	Is the machine set suitably for the condition of the racing course and weather or by taking into account the results of test runs before racing? Are inspection and maintenance completely done?	P.7-1 ~ 22



EC350000

## ENGINE

### COOLANT LEVEL INSPECTION

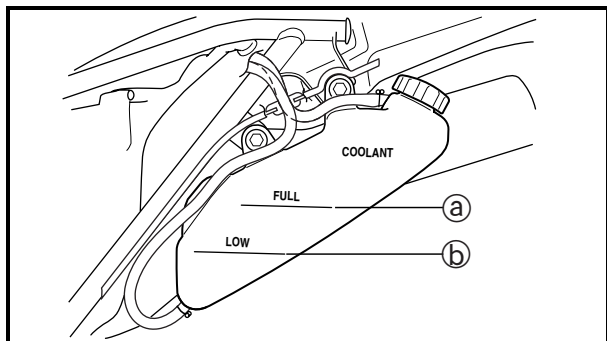
**⚠ WARNING**

Do not remove the radiator cap ①, drain bolt and hoses when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury.

When the engine has cooled, place a thick towel over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

**CAUTION:**

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



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

**NOTE:**

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

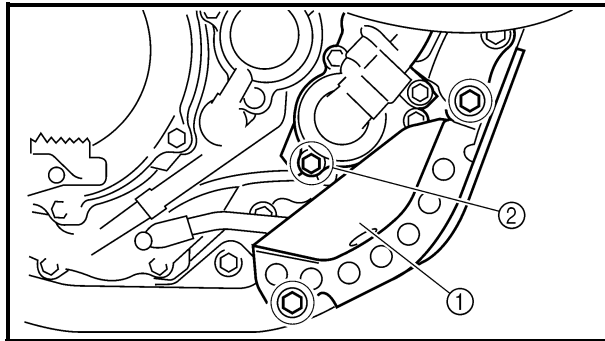
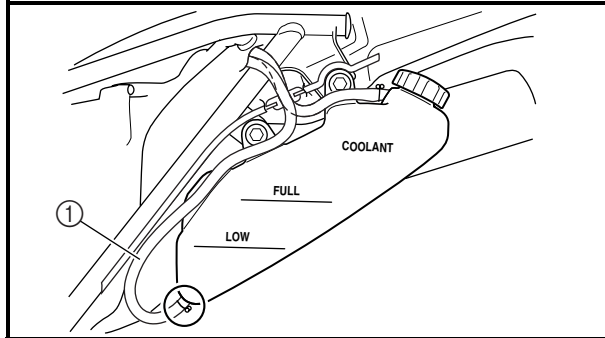
### COOLANT REPLACEMENT

**⚠ WARNING**


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


**CAUTION:**


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



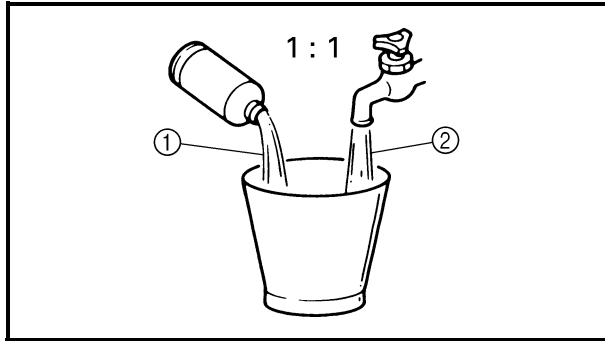
1. Place a container under the engine.
2. Remove:
  - Seat  
Refer to “SEAT, FUEL TANK AND SIDE COVERS” section in the CHAPTER 4.
3. Disconnect:
  - Coolant reservoir hose ①  
Drain the coolant completely.
4. Connect:
  - Coolant reservoir hose
5. Remove:
  - Engine guard ①
  - Coolant drain bolt ②
6. Remove:
  - Radiator cap  
Drain the coolant completely.
7. Clean:
  - Cooling system  
Thoroughly flush the cooling system with clean tap water.
8. Install:
  - Copper washer **New**
  - Coolant drain bolt  

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

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

	<b>23 Nm (2.3 m · kg, 17 ft · lb)</b>
---	---------------------------------------

# COOLANT REPLACEMENT



9. Fill:
- Radiator
  - Engine
- To specified level.



**Recommended coolant:**  
High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine  
**Coolant ① and water (soft water) ② mixing ratio:**  
50%/50%  
**Coolant capacity:**  
1.3 L (1.14 Imp qt, 1.37 US qt)

### CAUTION:

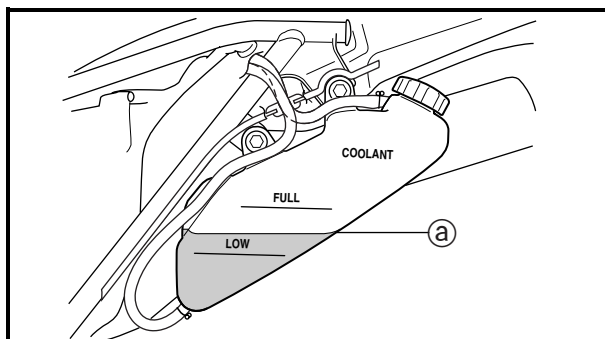
- Do not mix more than one type of ethylene glycol antifreeze containing corrosion inhibitors for aluminum engine.
- Do not use water containing impurities or oil.

### Handling notes of coolant:

The coolant is harmful so it should be handled with special care.

### ⚠ WARNING

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



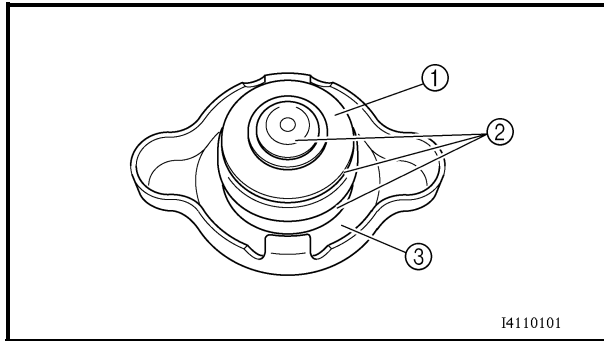
10. Install:
- Radiator cap
11. Fill:
- Coolant reservoir tank  
Midway @ between maximum and minimum marks on the tank.



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

**NOTE:**

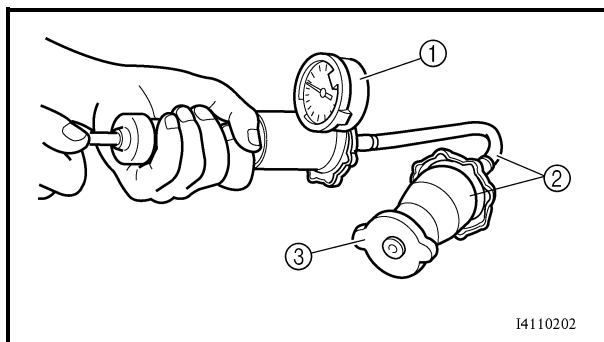
Before checking the coolant level wait a few minutes until the coolant settles.



EC355000

## RADIATOR CAP INSPECTION

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



## RADIATOR CAP OPENING PRESSURE INSPECTION

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



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

**NOTE:**

Apply water on the radiator cap seal.

- ③ Radiator cap

2. Apply the specified pressure.

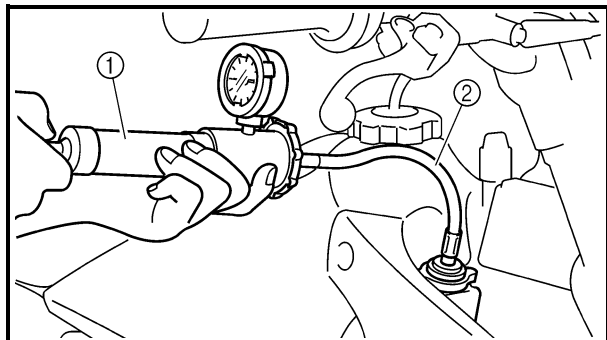


**Radiator cap opening pressure:**  
110 kPa (1.1 kg/cm<sup>2</sup>, 15.6 psi)

3. Inspect:

- Pressure

Impossible to maintain the specified pressure for 10 seconds → Replace.



## COOLING SYSTEM INSPECTION

1. Inspect:

- Coolant level

2. Attach:

- Radiator cap tester ① and adapter ②



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

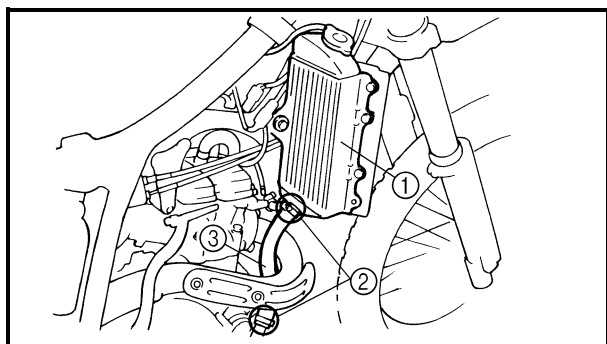
3. Apply the specified pressure.



**Standard pressure:**  
180 kPa (1.8 kg/cm<sup>2</sup>, 25.6 psi)

### NOTE:

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



4. Inspect:

- Pressure

Impossible to maintain the specified pressure for 10 seconds → Repair.

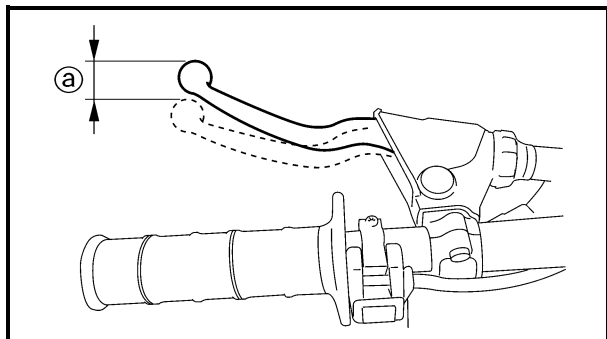
- Radiator ①
- Radiator hose joint ②  
Coolant leakage → Repair or replace.
- Radiator hose ③  
Swelling → Replace.

## CLUTCH ADJUSTMENT

1. Check:

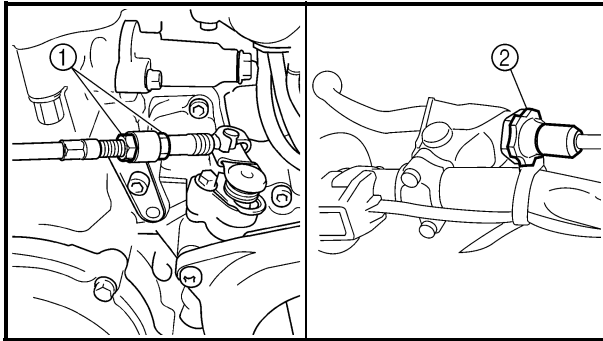
- Clutch lever free play ③

Out of specification → Adjust.



**Clutch lever free play ③:**  
8 ~ 13 mm (0.31 ~ 0.51 in)

## THROTTLE CABLE ADJUSTMENT



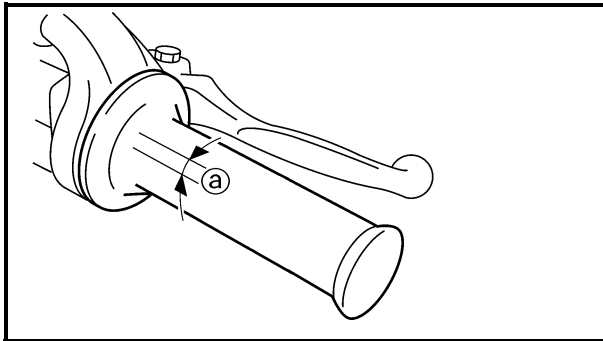
2. Adjust:
  - Clutch lever free play

### Clutch lever free play adjustment steps:

- Loosen the locknuts ①.
- Adjust the free play by changing their tightening position.
- Tighten the locknuts.

### NOTE:

- Make minute adjustment on the lever side using the adjuster ②.
- After adjustment, check proper operation of clutch lever.

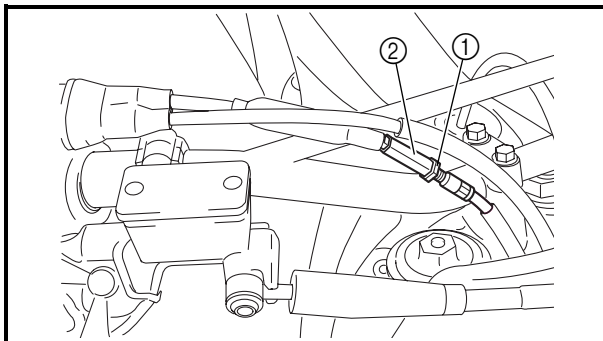


## THROTTLE CABLE ADJUSTMENT

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



**Throttle grip free play ①:**  
3 ~ 5 mm (0.12 ~ 0.20 in)



2. Adjust:
  - Throttle grip free play

### Throttle grip free play adjustment steps:

- Slide the adjuster cover.
- Loosen the locknut ①.
- Turn the adjuster ② until the specified free play is obtained.
- Tighten the locknut.

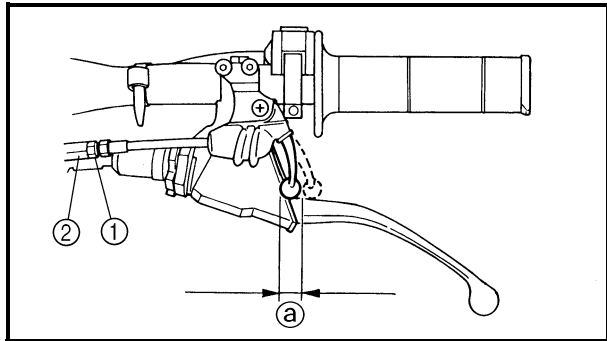
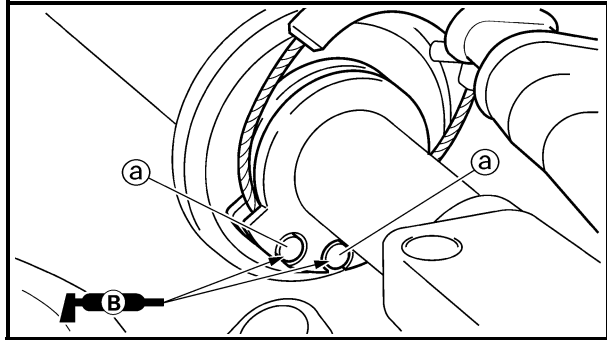
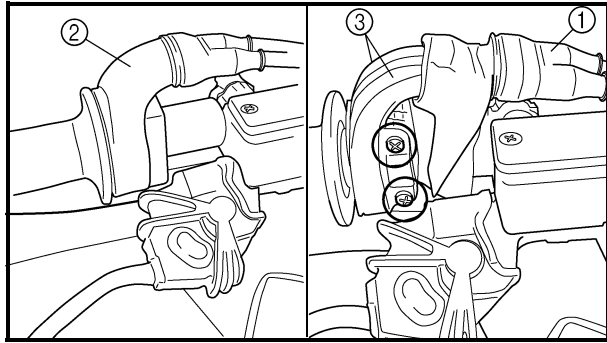
### NOTE:

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

### ⚠ WARNING

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

# THROTTLE LUBRICATION/ HOT STARTER LEVER ADJUSTMENT



## THROTTLE LUBRICATION

1. Remove:
  - Cover (throttle cable cap) ①
  - Cover (grip cap) ②
  - Throttle grip cap ③
2. Apply:
  - Lithium soap base grease  
On the throttle cable end (a).
3. Install:
  - Throttle grip cap
  - Screw (throttle grip cap)  
**4 Nm (0.4 m · kg, 2.9 ft · lb)**
  - Cover (grip cap)
  - Cover (throttle cable cap)

## HOT STARTER LEVER ADJUSTMENT

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

	<b>Hot starter lever free play (a): 3 ~ 6 mm (0.12 ~ 0.24 in)</b>
--	---

2. Adjust:
  - Hot starter lever free play

<b>Hot starter lever free play adjustment steps:</b> <ul style="list-style-type: none"><li>• Loosen the locknut ①.</li><li>• Turn the adjuster ② until free play (a) is within the specified limits.</li><li>• Tighten the locknut.</li></ul>
---

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

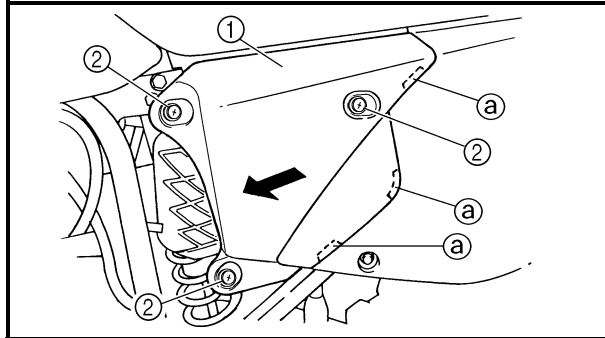
## AIR FILTER CLEANING

**NOTE:** \_\_\_\_\_

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

**CAUTION:** \_\_\_\_\_

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

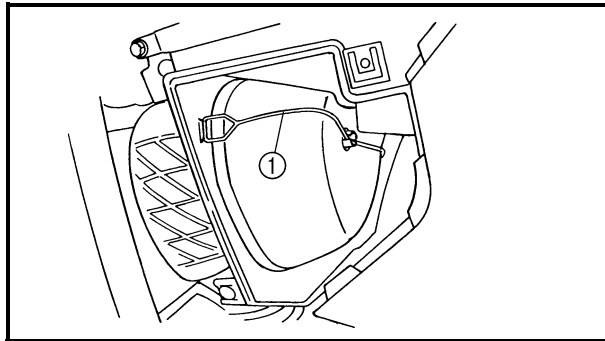


1. Remove:

- Air filter case cover ①

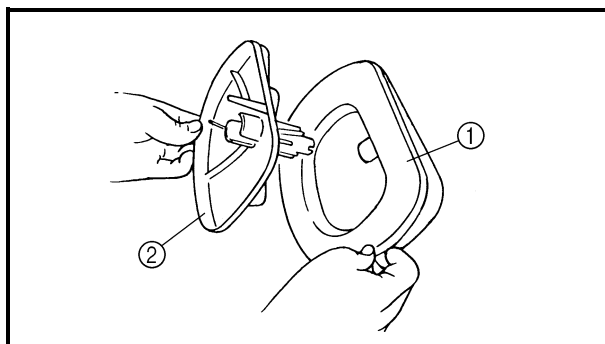
**NOTE:** \_\_\_\_\_

Loosen the quick screw ② and draw the air filter case cover to remove it because its claws ① are inserted in the side cover as shown.



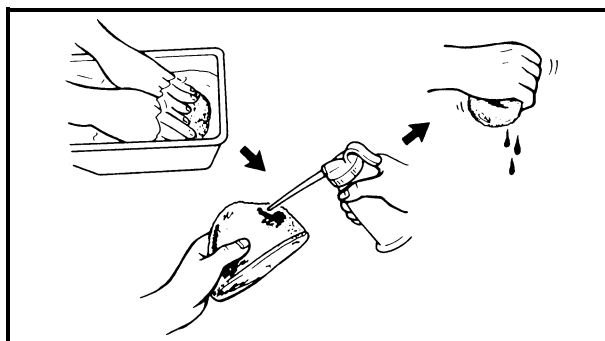
2. Unhook:

- Binder ①



3. Remove:

- Air filter element ①
- Filter guide ②



4. Clean:

- Air filter element
- Clean them with solvent.

**NOTE:** \_\_\_\_\_

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

**CAUTION:**

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

5. Inspect:

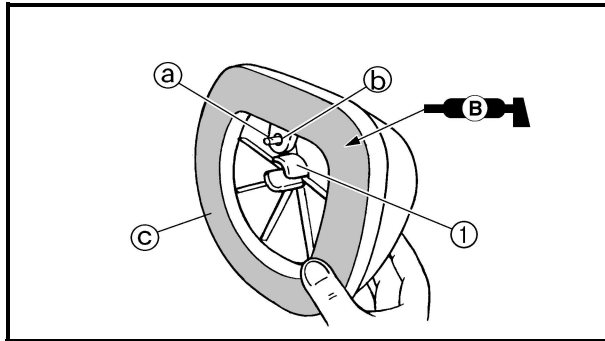
- Air filter element  
Damage → Replace.

6. Apply:

- Foam-air-filter oil or equivalent oil to the element

**NOTE:**

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

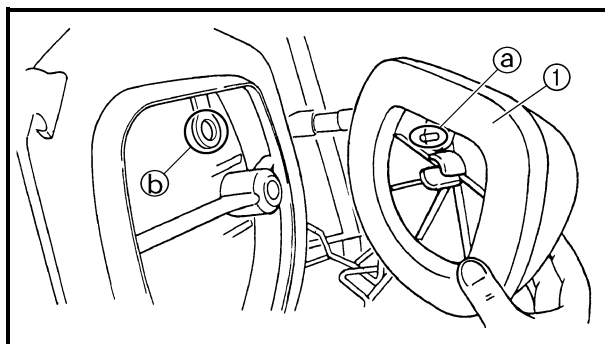


7. Install:

- Filter guide ①

**NOTE:**

- Align the projection ① on filter guide with the hole ② in air filter element.
- Apply the lithium soap base grease on the matching surface ③ on air filter element.

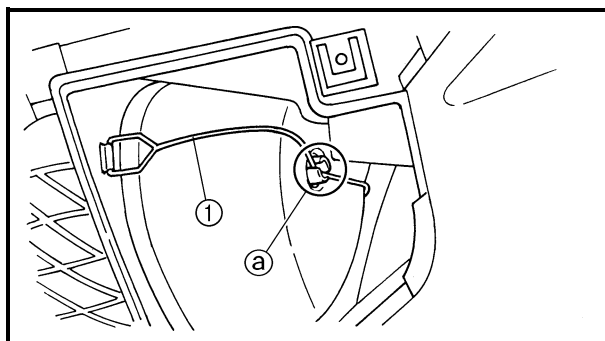


8. Install:

- Air filter element ①

**NOTE:**

- Align the projection ① on filter guide with the hole ② in air filter case.



9. Hook:

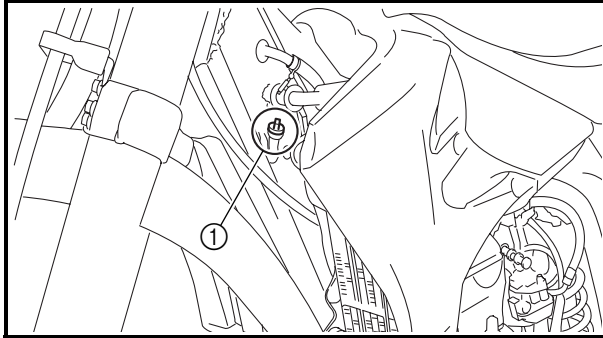
- Binder ①

**NOTE:**

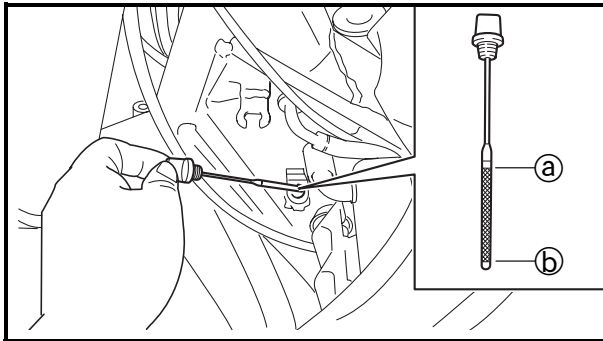
- Hook the binder ① so that it contacts the filter guide projections ②.

## ENGINE OIL LEVEL INSPECTION

1. Start the engine, warm it up for several minutes, and then turn off the engine and wait for five minutes.
2. Place the machine on a level place and hold it up on upright position by placing the suitable stand under the engine.



3. Remove:
  - Oil tank cap ①

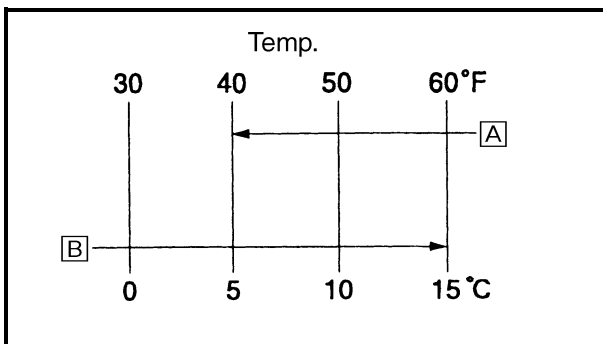


4. Inspect:
  - Oil level  
Oil level should be between maximum ① and minimum ② marks.  
Oil level is low → Add oil to proper level.

**NOTE:**

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

(For USA and CDN)



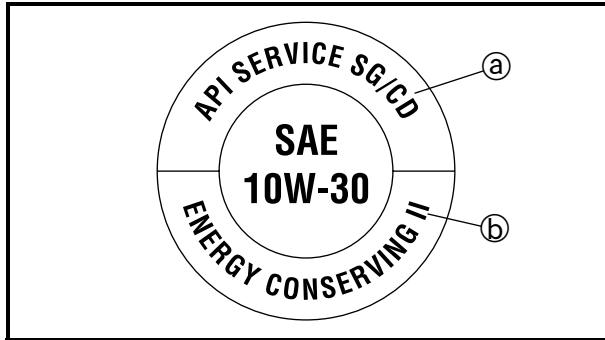
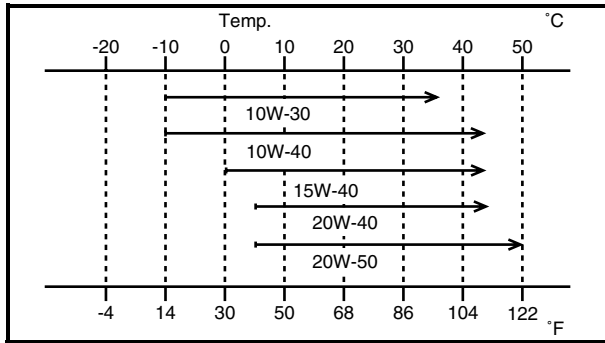
**Recommended oil:**

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

**CAUTION:**

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

# ENGINE OIL REPLACEMENT



(Except for USA and CDN)



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

**CAUTION:** \_\_\_\_\_

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

5. Install:
  - Oil tank cap
6. Start the engine and let it warm up for several minutes.
7. Turn off the engine and inspect the oil level once again.

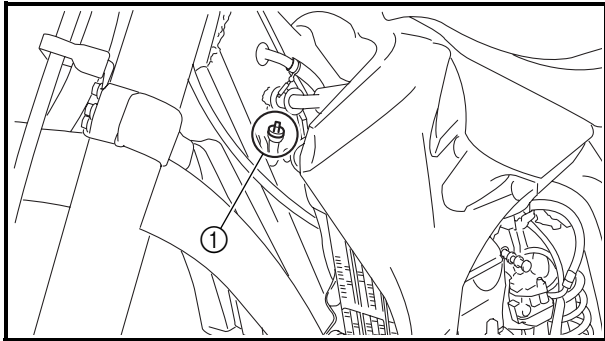
**NOTE:** \_\_\_\_\_

Wait a few minutes until the oil settles before inspecting the oil level.

## ENGINE OIL REPLACEMENT

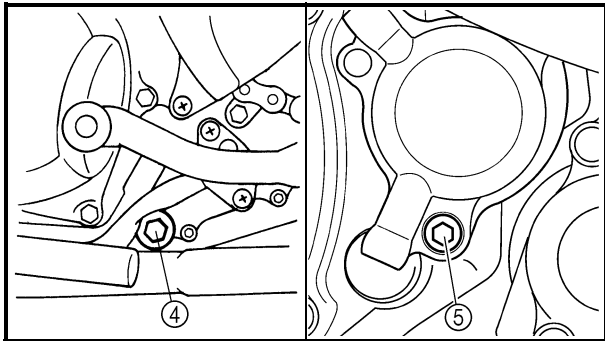
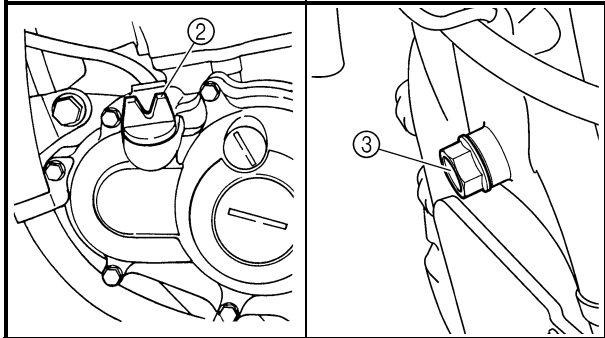
1. Start the engine and warm it up for several minutes, and then turn off the engine and wait for five minute.
2. Place the machine on a level place and hold it on upright position by placing the suitable stand under the engine.
3. Place a suitable container under the engine.





4. Remove:

- Oil tank cap ①
  - Oil filler cap ②
  - Frame oil drain bolt ③
  - Crankcase oil drain bolt ④
  - Oil filter element drain bolt ⑤
- Drain the crankcase and oil tank (frame) of its oil.



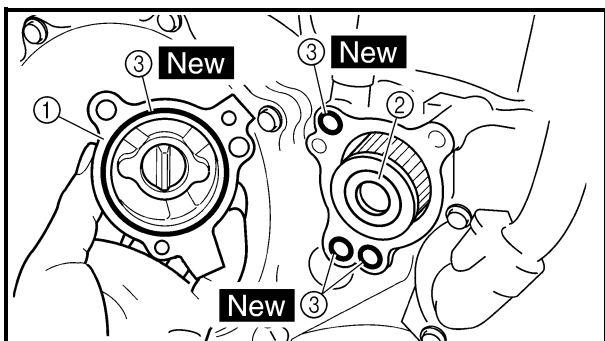
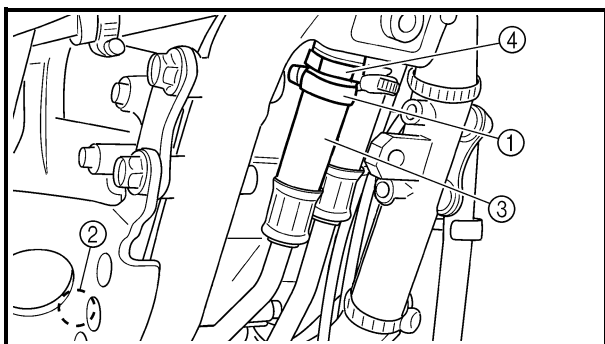
5. Remove:

- Lower engine bracket
- Oil hose clamp ①
- Bolt (oil hose) ②
- Oil hose ③
- Oil strainer (frame) ④

6. Inspect:

- Oil strainer (frame)
- Clogged → Blow.

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

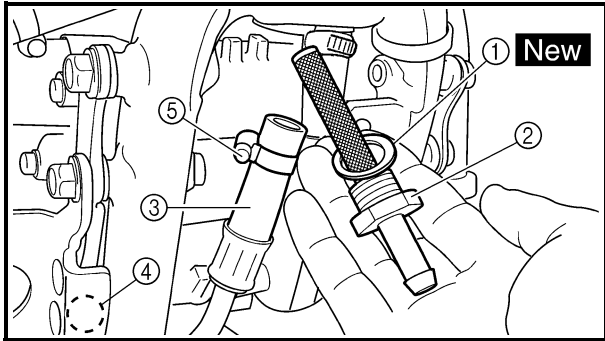


**Replacement steps:**

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



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



8. Install:

- Copper washer ① **New**
- Oil strainer (frame) ②  
🔧 70 Nm (7.0 m · kg, 50 ft · lb)
- Oil hose ③
- Bolt (oil hose) ④  
🔧 8 Nm (0.8 m · kg, 5.8 ft · lb)
- Oil hose clamp ⑤  
🔧 2 Nm (0.2 m · kg, 1.4 ft · lb)
- Lower engine bracket  
🔧 10 Nm (1.0 m · kg, 7.2 ft · lb)

9. Install:

- Copper washer **New**
- Oil filter element drain bolt  
🔧 10 Nm (1.0 m · kg, 7.2 ft · lb)
- Crankcase oil drain bolt  
🔧 20 Nm (2.0 m · kg, 14 ft · lb)
- Frame oil drain bolt  
🔧 23 Nm (2.3 m · kg, 17 ft · lb)

10. Fill:

- Engine oil



**Oil quantity:**

- Periodic oil change:**  
1.2 L (1.06 Imp qt, 1.27 US qt)
- With oil filter replacement:**  
1.3 L (1.14 Imp qt, 1.37 US qt)
- Total amount:**  
1.4 L (1.23 Imp qt, 1.48 US qt)

11. Check:

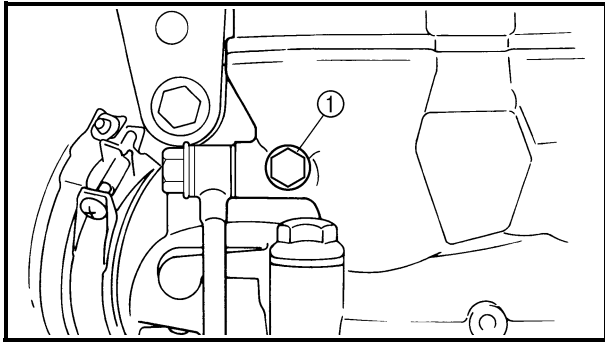
- Oil leakage

12. Install:

- Oil tank cap

13. Check:

- Engine oil level



## OIL PRESSURE INSPECTION

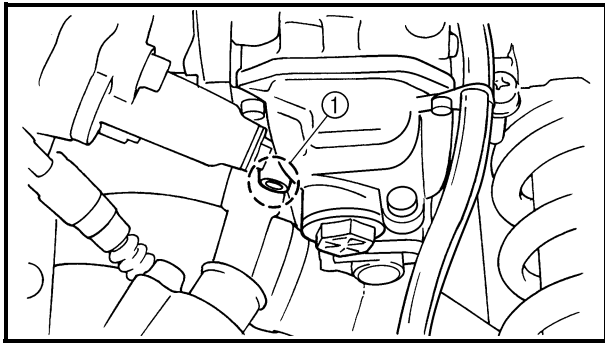
1. Check:
  - Oil pressure

### Checking steps:

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



**Oil pressure check bolt:**  
10 Nm (1.0 m • kg, 7.2 ft • lb)



## PILOT SCREW ADJUSTMENT

1. Adjust:
  - Pilot screw ①

### Adjustment steps:

#### NOTE:

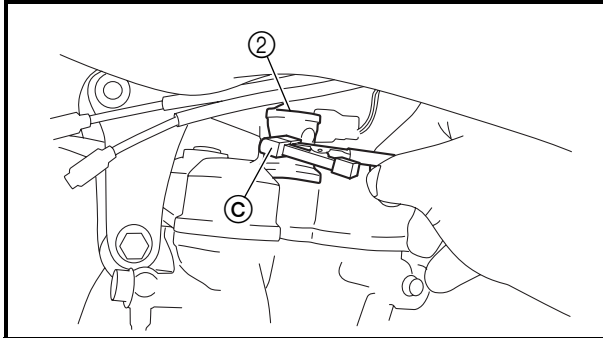
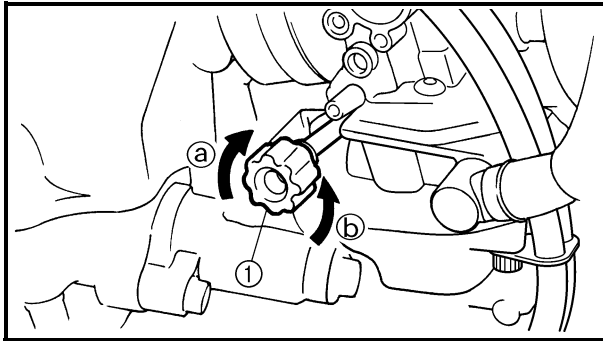
To optimize the fuel flow at a smaller throttle opening, each machine's pilot screw has been individually set at the factory. Before adjusting the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

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



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

\* Except for USA



## ENGINE IDLING SPEED ADJUSTMENT

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

### Adjustment steps:

- Adjust the pilot screw.  
Refer to “PILOT SCREW ADJUSTMENT” section.
- Turn the throttle stop screw ① until the specified engine idling speed.

### NOTE:

Using a digital engine tachometer for idle speed adjustment, detect the engine idling speed by bringing the sensing element © of the engine tachometer close to the ignition coil ②.

**To increase idle speed** → Turn the throttle stop screw ① in ①.

**To decrease idle speed** → Turn the throttle stop screw ① out ②.



**Engine idling speed:**  
**1,900 ~ 2,100 r/min**

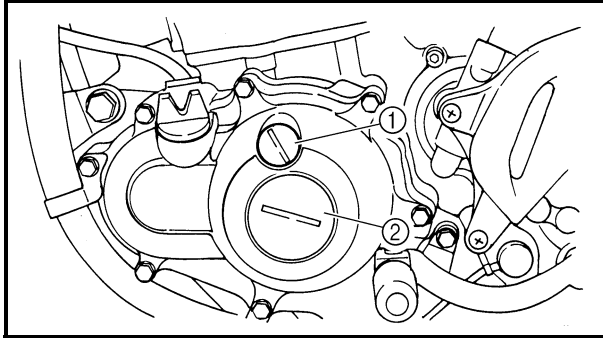
## VALVE CLEARANCE INSPECTION AND ADJUSTMENT

### NOTE:

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

1. Remove:
  - Seat
  - Fuel tank  
Refer to “SEAT, FUEL TANK AND SIDE COVERS” section in the CHAPTER 4.
2. Drain:
  - Coolant  
Refer to “COOLANT REPLACEMENT” section.

3. Remove:
  - Right radiator  
Refer to “RADIATOR” section in the CHAPTER 4.
  - Carburetor  
Refer to “CARBURETOR” section in the CHAPTER 4.
  - Spark plug
  - Upper engine bracket
  - Cylinder head cover  
Refer to “CAMSHAFTS” section in the CHAPTER 4.
4. Remove:
  - Timing mark accessing screw ①
  - Crankshaft end accessing screw ②
  - O-ring
5. Check:
  - Valve clearance  
Out of specification → Adjust.



**Valve clearance (cold):**

**Intake valve:**

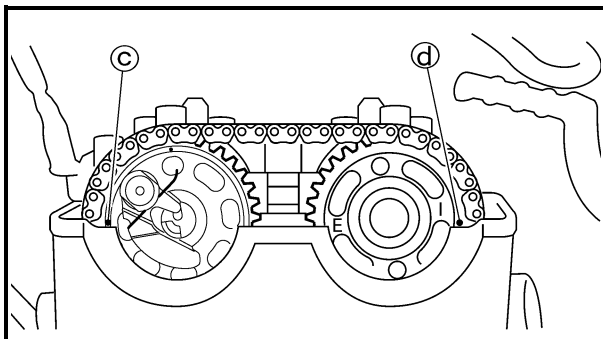
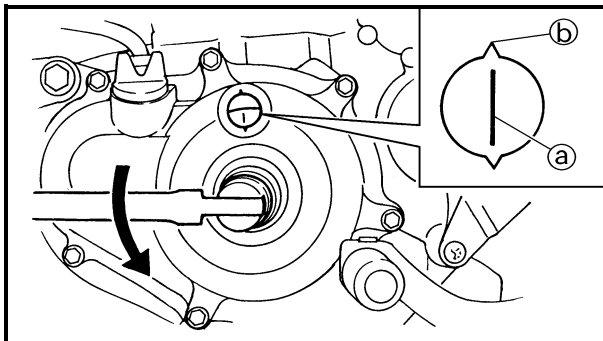
**0.10 ~ 0.15 mm**

**(0.0039 ~ 0.0059 in)**

**Exhaust valve:**

**0.17 ~ 0.22 mm**

**(0.0067 ~ 0.0087 in)**

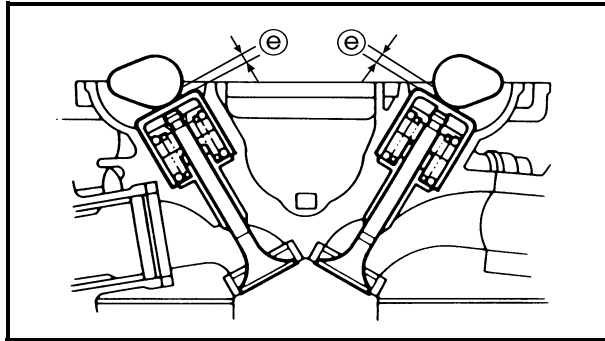


**Checking steps:**

- Turn the crankshaft counterclockwise with a wrench.
- Align the T.D.C. mark ① on the rotor with the align mark ② on the crankcase cover when piston is at T.D.C. on compression stroke.

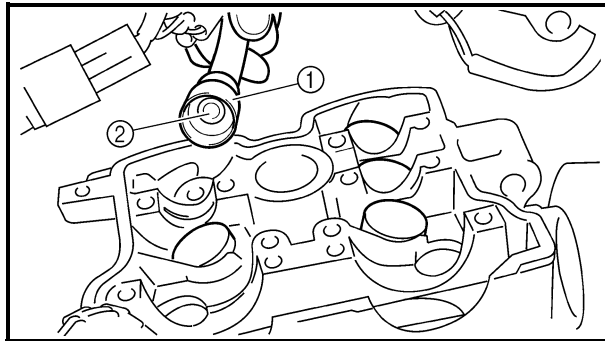
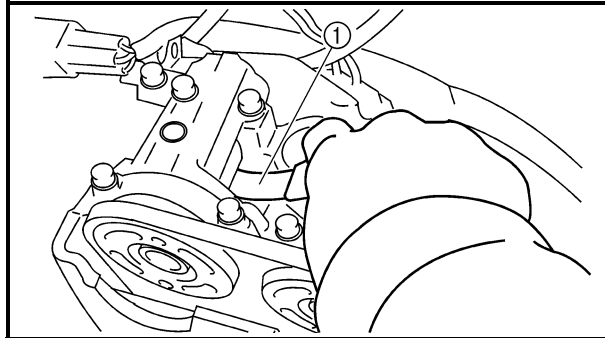
**NOTE:**

In order to be sure that the piston is at Top Dead Center, the punch mark ③ on the exhaust camshaft and the punch mark ④ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.



- Measure the valve clearance  $\text{⊖}$  using a feeler gauge  $\text{①}$ .

**NOTE:** \_\_\_\_\_  
Record the measured reading if the clearance is incorrect.  
\_\_\_\_\_



6. Adjust:
- Valve clearance

**Adjustment steps:**

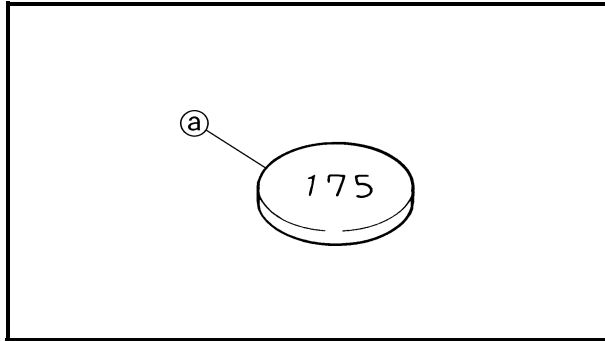
- Remove the camshaft (intake and exhaust). Refer to “CAMSHAFTS” section in the CHAPTER 4.
- Remove the valve lifters  $\text{①}$  and the pads  $\text{②}$ .

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

- Select the proper pad using the pad selecting table.

EX		
IN		

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



**NOTE:** \_\_\_\_\_  
 The thickness ③ of each pad is indicated in hundredths of millimeters on the pad upper surface.

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

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

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

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

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

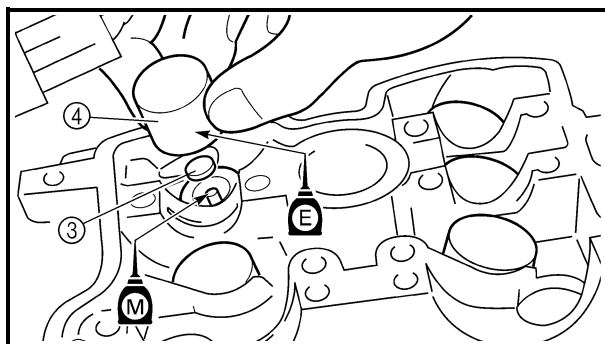
**NOTE:** \_\_\_\_\_  
 Use the new pad number only as a guide when verifying the valve clearance adjustment.

- Install the new pads ③ and the valve lifters ④.

**NOTE:** \_\_\_\_\_

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

- Install the camshafts (exhaust and intake). Refer to “CAMSHAFTS” section in the CHAPTER 4.



# VALVE CLEARANCE INSPECTION AND ADJUSTMENT



## INTAKE

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

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

## EXHAUST

MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225
0.05 ~ 0.09			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
0.10 ~ 0.16		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235
0.17 ~ 0.22	STANDARD CLEARANCE																								
0.23 ~ 0.25	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.26 ~ 0.30	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.31 ~ 0.35	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.36 ~ 0.40	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.41 ~ 0.45	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.46 ~ 0.50	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.51 ~ 0.55	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.56 ~ 0.60	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.61 ~ 0.65	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.66 ~ 0.70	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.71 ~ 0.75	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.76 ~ 0.80	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.81 ~ 0.85	185	190	195	200	205	210	215	220	225	230	235	240													
0.86 ~ 0.90	190	195	200	205	210	215	220	225	230	235	240														
0.91 ~ 0.95	195	200	205	210	215	220	225	230	235	240															
0.96 ~ 1.00	200	205	210	215	220	225	230	235	240																
1.01 ~ 1.05	205	210	215	220	225	230	235	240																	
1.06 ~ 1.10	210	215	220	225	230	235	240																		
1.11 ~ 1.15	215	220	225	230	235	240																			
1.16 ~ 1.20	220	225	230	235	240																				
1.21 ~ 1.25	225	230	235	240																					
1.26 ~ 1.30	230	235	240																						
1.31 ~ 1.35	235	240																							
1.36 ~ 1.40	240																								

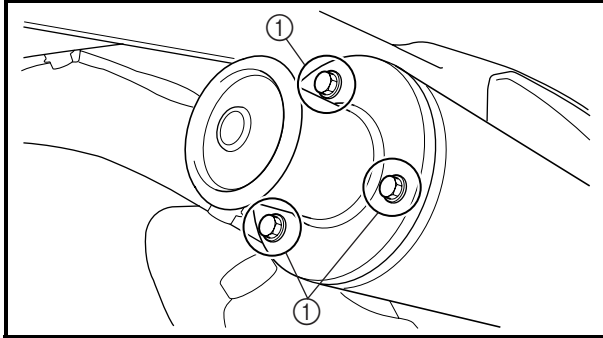
**VALVE CLEARANCE (cold):**  
 0.17 ~ 0.22 mm  
 Example: Installed is 175  
 Measured clearance is 0.27 mm  
 Replace 175 pad with 185 pad  
 Pad number: (example)  
 Pad No. 175 = 1.75 mm  
 Pad No. 185 = 1.85 mm



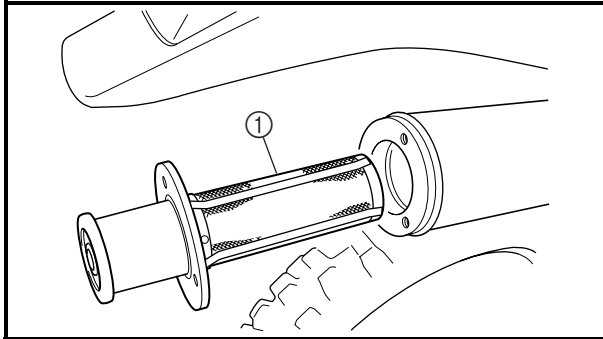
## SPARK ARRESTER CLEANING (For USA)

### **WARNING**

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




1. Remove:
  - Bolt (spark arrester) ①



2. Remove:
  - Spark arrester ①
  - Pull the spark arrester out of the muffler.

3. Clean:
  - Spark arrester
  - Tap the spark arrester lightly, then use a wire brush to remove any carbon deposits.
4. Install:
  - Spark arrester
  - Insert the spark arrester into the muffler and align the bolt holes.
  - Bolt (spark arrester)

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

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## CHASSIS

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### BRAKE SYSTEM AIR BLEEDING

#### **⚠ WARNING**

**Bleed the brake system if:**

- The system has been disassembled.
- A brake hose has been loosened or removed.
- The brake fluid is very low.
- The brake operation is faulty.

**A dangerous loss of braking performance may occur if the brake system is not properly bled.**

1. Remove:

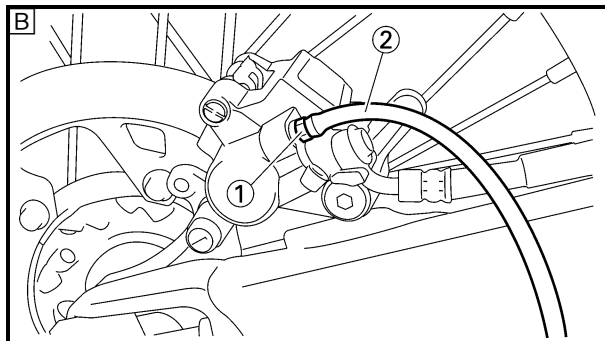
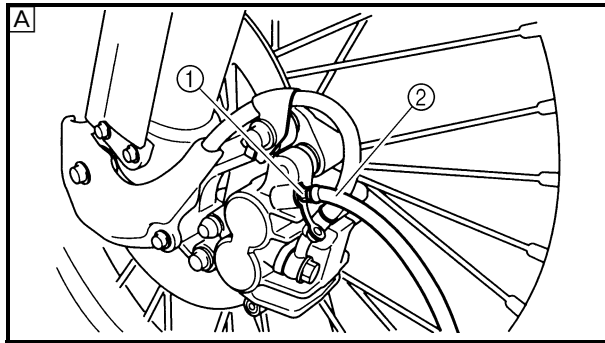
- Brake master cylinder cap
- Diaphragm
- Reservoir float (front brake)
- Protector (rear brake)

2. Bleed:

- Brake fluid

**A** Front

**B** Rear



#### **Air bleeding steps:**

- a. Add proper brake fluid to the reservoir.
- b. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
- c. Connect the clear plastic tube ② tightly to the caliper bleed screw ①.
- d. Place the other end of the tube into a container.
- e. Slowly apply the brake lever or pedal several times.
- f. Pull the lever in or push down on the pedal. Hold the lever or pedal in position.
- g. Loosen the bleed screw and allow the lever or pedal to travel towards its limit.
- h. Tighten the bleed screw when the lever or pedal limit has been reached; then release the lever or pedal.



#### **Bleed screw:**

**6 Nm (0.6 m • kg, 4.3 ft • lb)**

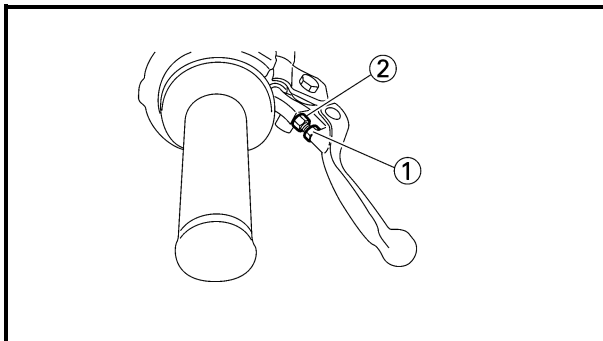
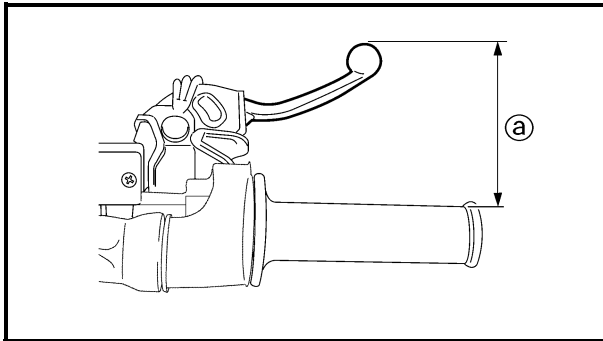
- i. Repeat steps (e) to (h) until of the air bubbles have been removed from the system.

**NOTE:** \_\_\_\_\_  
 If bleeding is difficult, it may be necessary to let the brake fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

j. Add brake fluid to the level line on the reservoir.


**⚠ WARNING** \_\_\_\_\_  
**Check the operation of the brake after bleeding the brake system.**

3. Install:
- Protector (rear brake)
  - Reservoir float (front brake)
  - Diaphragm
  - Brake master cylinder cap



EC362040  
**FRONT BRAKE ADJUSTMENT**


1. Check:
- Brake lever position ①

	<b>Brake lever position ①:</b>	
	<b>Standard position</b>	<b>Extent of adjustment</b>
	<b>95 mm (3.74 in)</b>	<b>76 ~ 97 mm (2.99 ~ 3.82 in)</b>

2. Remove:
- Brake lever cover
3. Adjust:
- Brake lever position

**Brake lever position adjustment steps:**

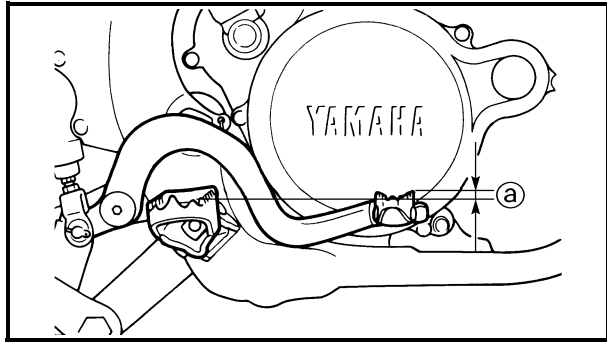
- Loosen the locknut ①.
- Turn the adjusting bolt ② until the lever position ① is within specified position.
- Tighten the locknut.

 **Locknut:**  
**5 Nm (0.5 m • kg, 3.6 ft • lb)**

**CAUTION:** \_\_\_\_\_  
**Be sure to tighten the locknut, as it will cause poor brake performance.**

4. Install:
- Brake lever cover

# REAR BRAKE ADJUSTMENT/ FRONT BRAKE PAD INSPECTION AND REPLACEMENT

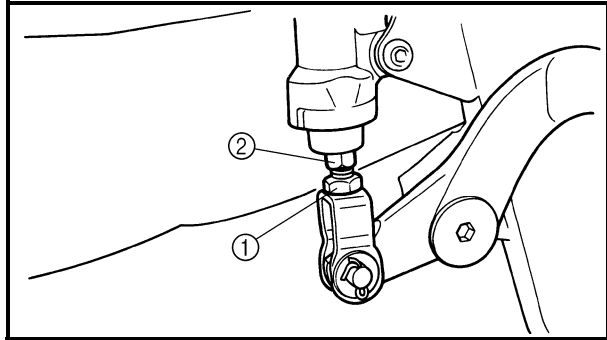


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## REAR BRAKE ADJUSTMENT

1. Check:
  - Brake pedal height ①
  - Out of specification → Adjust.

**Brake pedal height ①:**  
5 mm (0.20 in)



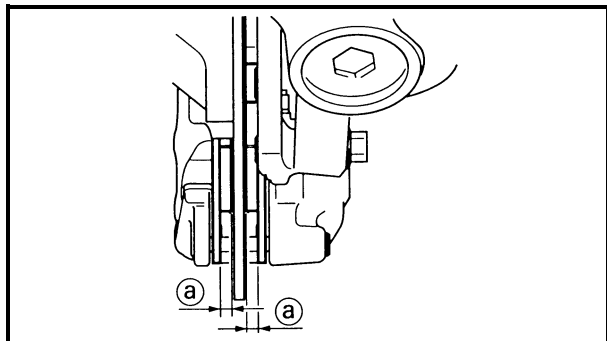
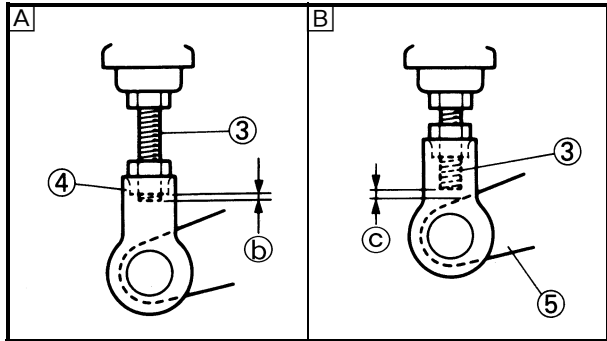
2. Adjust:
  - Brake pedal height

### Pedal height adjustment steps:

- Loosen the locknut ①.
- Turn the adjusting nut ② until the pedal height ① is within specified height.
- Tighten the locknut.

### ⚠ WARNING

- Adjust the pedal height between the maximum **A** and the minimum **B** as shown. (In this adjustment, the bolt ③ end **b** should protrude out of the threaded portion ④ but not be less than 2 mm (0.08 in) **c** away from the brake pedal ⑤).
- After the pedal height adjustment, make sure that the rear brake does not drag.



## FRONT BRAKE PAD INSPECTION AND REPLACEMENT

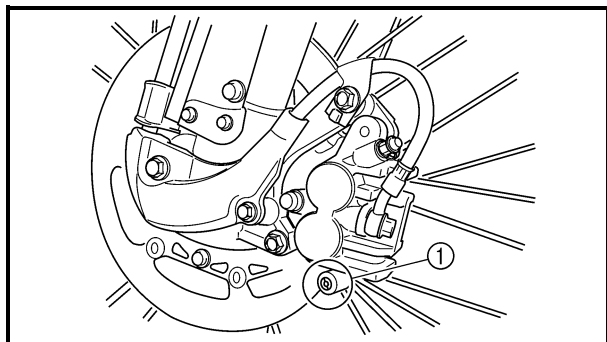
1. Inspect:
  - Brake pad thickness ①
  - Out of specification → Replace as a set.

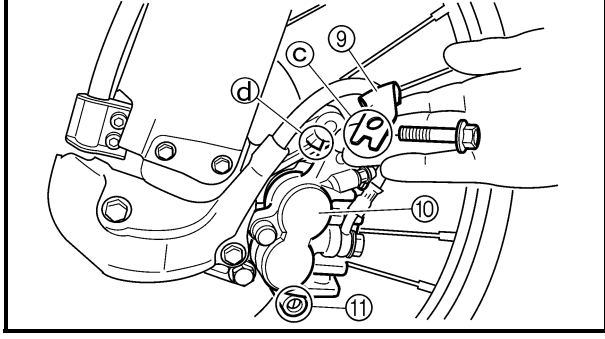
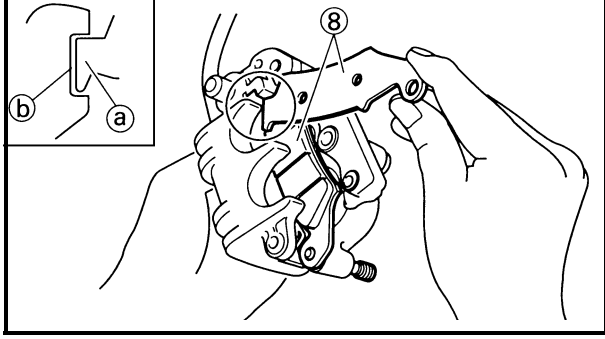
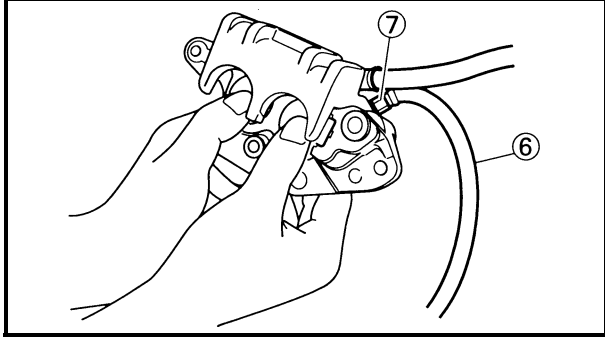
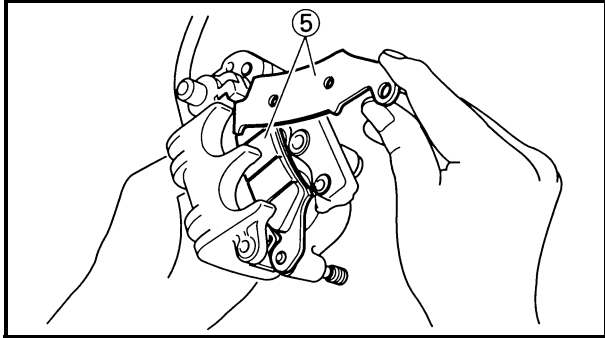
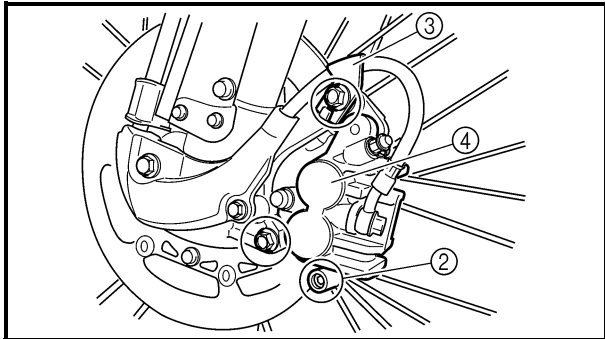
**Brake pad thickness:**  
4.4 mm (0.17 in)  
<Limit>: 1.0 mm (0.04 in)

2. Replace:
  - Brake pad

### Brake pad replacement steps:

- Remove the pad pin plug ①.





- Loosen the pad pin ②.
- Remove the brake hose holder ③ and brake caliper ④ from the front fork.
- Remove the pad pin and brake pads ⑤.
- Connect the transparent hose ⑥ to the bleed screw ⑦ and place the suitable container under its end.
- Loosen the bleed screw and push the brake caliper piston in.


**CAUTION:** \_\_\_\_\_  
**Do not reuse the drained brake fluid.**  
 \_\_\_\_\_

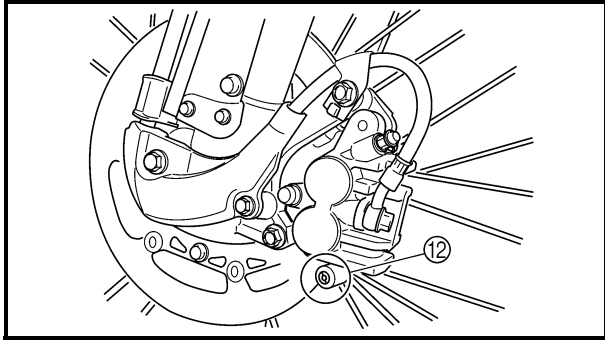
- Tighten the bleed screw.

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

- Install the brake pads ⑧ and pad pin.
- NOTE:** \_\_\_\_\_
- Install the brake pads with their projections ① into the brake caliper recesses ②.
  - Temporarily tighten the pad pin at this point.

- Install the brake hose holder ⑨ and brake caliper ⑩ and tighten the pad pin ⑪.
- NOTE:** \_\_\_\_\_
- Fit the brake hose holder cut ③ over the projection ④ on the front fork and clamp the brake hose.

 **Bolt (brake caliper):**  
**23 Nm (2.3 m • kg, 17 ft • lb)**  
**Pad pin:**  
**18 Nm (1.8 m • kg, 13 ft • lb)**

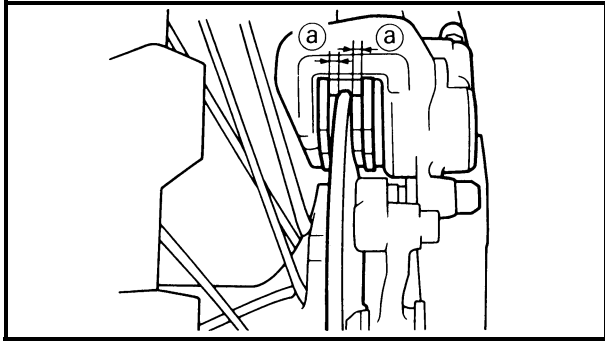


- Install the pad pin plug ⑫.



**Pad pin plug:**  
**3 Nm (0.3 m • kg, 2.2 ft • lb)**

3. Inspect:
  - Brake fluid level  
 Refer to “BRAKE FLUID LEVEL INSPECTION” section.
4. Check:
  - Brake lever operation  
 A softy or spongy feeling → Bleed brake system.  
 Refer to “BRAKE SYSTEM AIR BLEEDING” section.

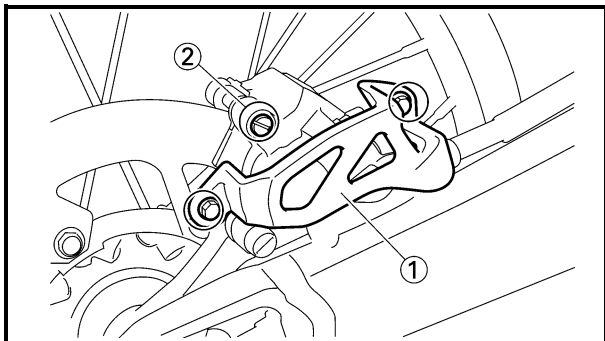


## REAR BRAKE PAD INSPECTION AND REPLACEMENT

1. Inspect:
  - Brake pad thickness ①  
 Out of specification → Replace as a set.



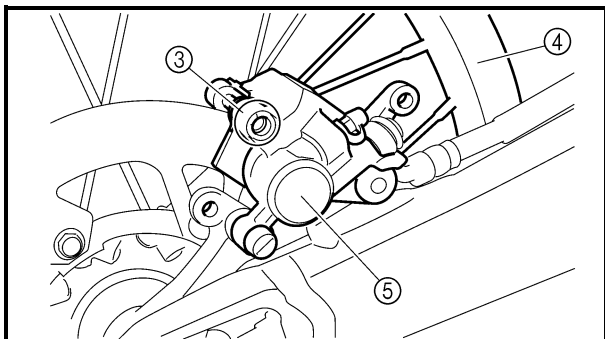
**Brake pad thickness:**  
**6.4 mm (0.25 in)**  
**<Limit>: 1.0 mm (0.04 in)**

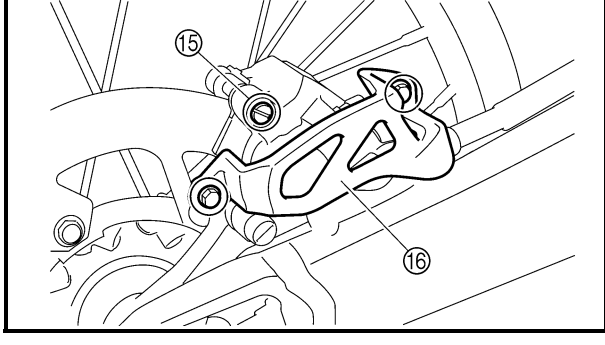
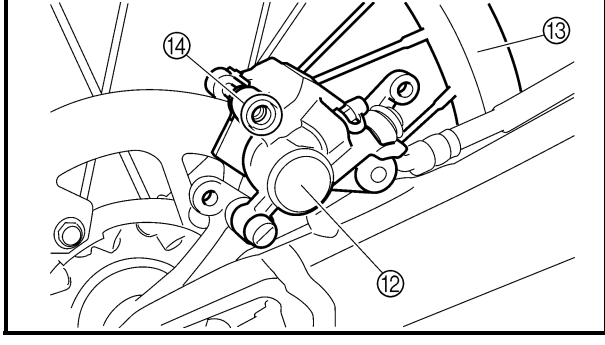
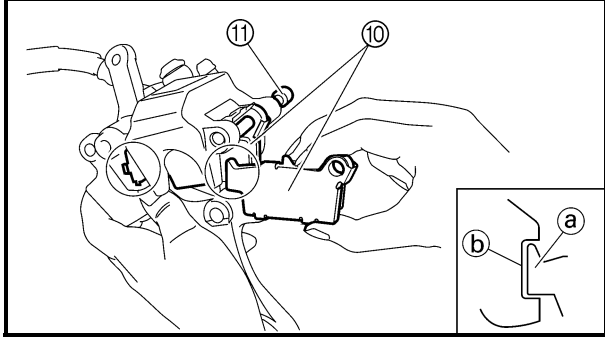
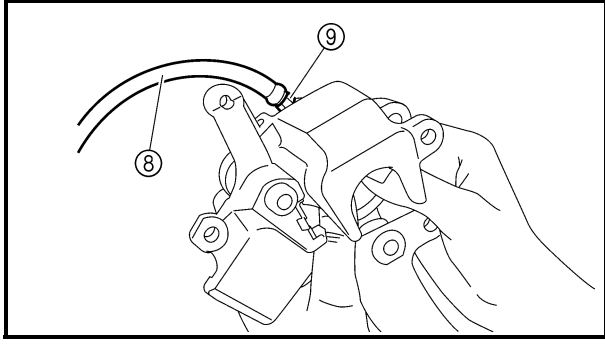
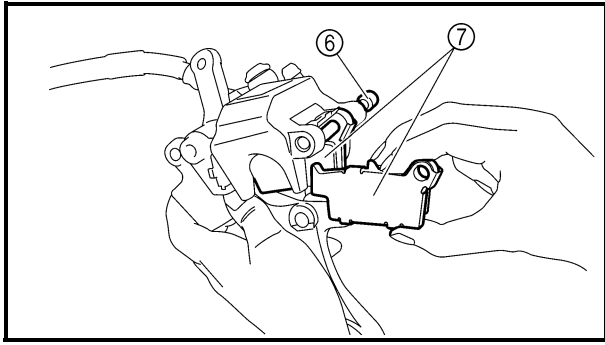


2. Replace:
  - Brake pad

### Brake pad replacement steps:

- Remove the protector ① and pad pin plug ②.
- Loosen the pad pin ③.
- Remove the rear wheel ④ and brake caliper ⑤.  
 Refer to “FRONT WHEEL AND REAR WHEEL” section in the CHAPTER 5.





- Remove the pad pin ⑥ and brake pads ⑦.
- Connect the transparent hose ⑧ to the bleed screw ⑨ and place the suitable container under its end.
- Loosen the bleed screw and push the brake caliper piston in.

**CAUTION:** \_\_\_\_\_  
**Do not reuse the drained brake fluid.**

- Tighten the bleed screw.

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


- Install the brake pad ⑩ and pad pin ⑪.

**NOTE:** \_\_\_\_\_  
• Install the brake pads with their projections ① into the brake caliper recesses ②.  
• Temporarily tighten the pad pin at this point.

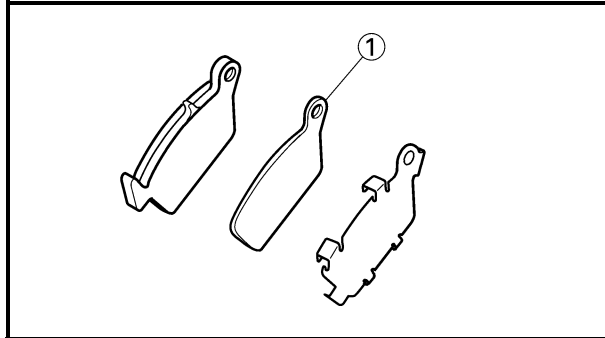
- Install the brake caliper ⑫ and rear wheel ⑬.  
Refer to “FRONT WHEEL AND REAR WHEEL” section in the CHAPTER 5.
- Tighten the pad pin ⑭.

 **Pad pin:**  
**18 Nm (1.8 m • kg, 13 ft • lb)**

- Install the pad pin plug ⑮ and protector ⑯.

 **Pad pin plug:**  
**3 Nm (0.3 m • kg, 2.2 ft • lb)**  
**Bolt (protector):**  
**7 Nm (0.7 m • kg, 5.1 ft • lb)**

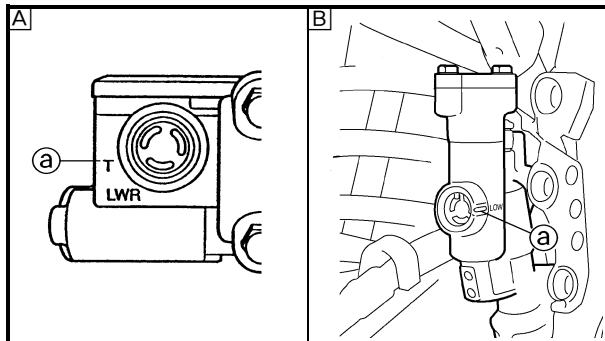
3. Inspect:
  - Brake fluid level  
Refer to “BRAKE FLUID LEVEL INSPECTION” section.
4. Check:
  - Brake pedal operation  
A softy or spongy feeling → Bleed brake system.  
Refer to “BRAKE SYSTEM AIR BLEEDING” section.



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**REAR BRAKE PAD INSULATOR INSPECTION**

1. Remove:
  - Brake pad  
Refer to “REAR BRAKE PAD INSPECTION AND REPLACEMENT” section.
2. Inspect:
  - Rear brake pad insulator ①  
Damage → Replace.



**BRAKE FLUID LEVEL INSPECTION**

1. Place the brake master cylinder so that its top is in a horizontal position.
2. Inspect:
  - Brake fluid level  
Fluid at lower level → Fill up.

- ⓐ Lower level
- Ⓐ Front
- Ⓑ Rear

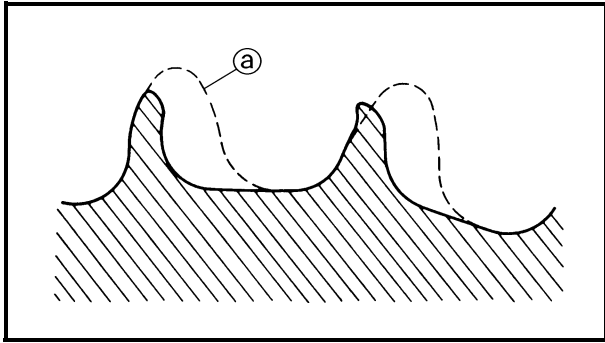


**Recommended brake fluid:  
DOT #4**

**⚠ WARNING**

- Use only designated quality brake fluid to avoid poor brake performance.
- Refill with same type and brand of brake fluid; mixing fluids could result in poor brake performance.
- Be sure that water or other contaminants do not enter master cylinder when refilling.
- Clean up spilled fluid immediately to avoid erosion of painted surfaces or plastic parts.



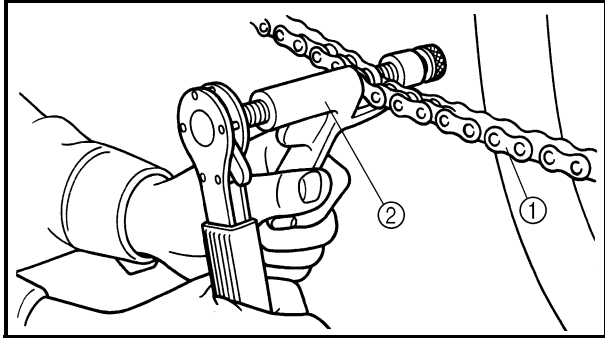


## SPROCKETS INSPECTION

1. Inspect:
  - Sprocket teeth ②  
Excessive wear → Replace.

### NOTE:

Replace the drive sprocket, rear wheel sprocket and drive chain as a set.

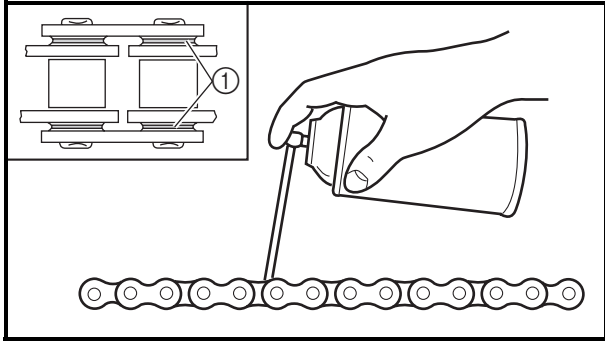


## DRIVE CHAIN INSPECTION

1. Remove:
  - Drive chain ①

### NOTE:

Remove the drive chain using a drive chain cutter ②.

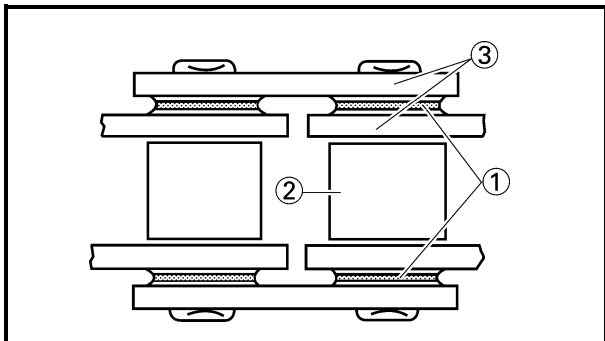


2. Clean:

- Drive chain  
Brush off as much dirt as possible. Then clean the drive chain using the chain cleaner.

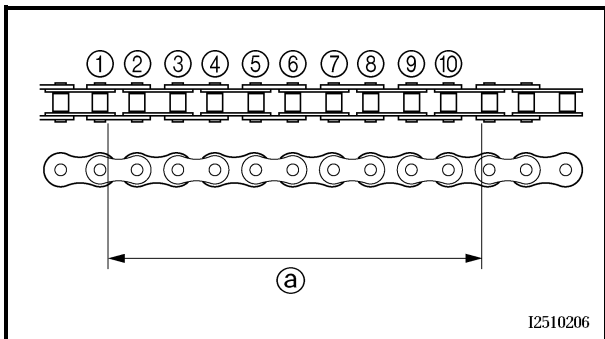
### CAUTION:

This machine has a drive chain with small rubber O-rings ① between the side plates. Steam cleaning, high-pressure washes, certain solvent and kerosene can damage these O-rings.



3. Inspect:

- O-ring ① (drive chain)  
Damage → Replace the drive chain.
- Roller ②
- Side plate ③  
Damage/wear → Replace the drive chain.

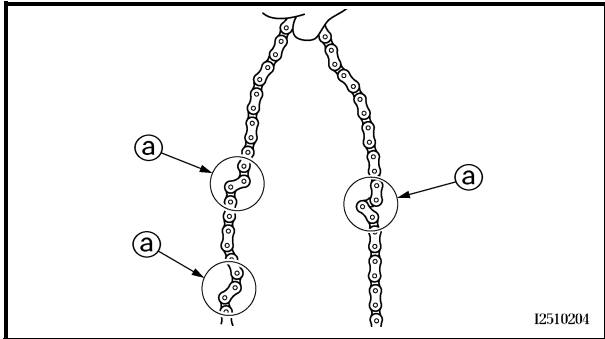


4. Measure:

- Drive chain length (10 links) ②  
Out of specification → Replace.

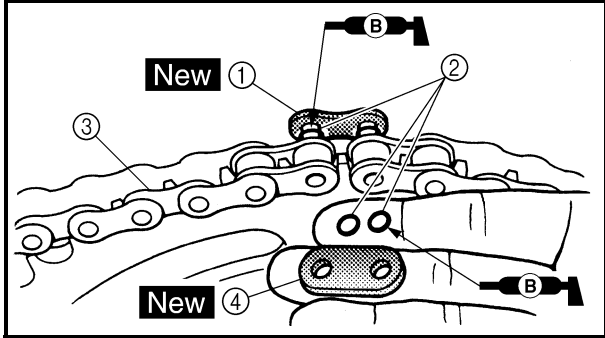


**Drive chain length (10 links):**  
**<Limit>: 150.1 mm (5.91 in)**



5. Check:

- Drive chain stiffness (a)  
Clean and oil the drive chain and hold as illustrated.  
Stiff → Replace the drive chain.

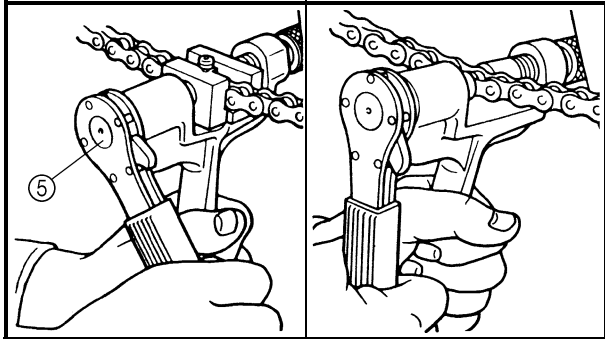


6. Install:

- Chain joint (1) **New**
- O-ring (2)
- Drive chain (3)

**NOTE:**

When installing the drive chain, apply the lithium soap base grease on the chain joint and O-rings.

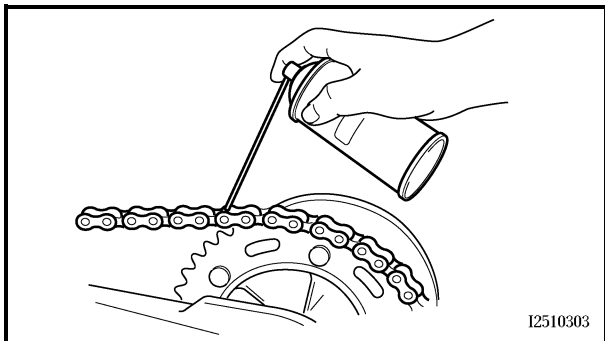


7. Install:

- Link plate (4) **New**


**NOTE:**

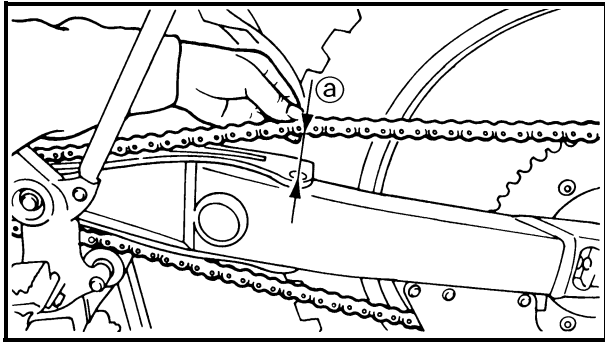
- Press the link plate onto the chain joint using a drive chain riveter (5).
- Rivet the end of the chain joint using a drive chain riveter.
- After riveting the chain joint, make sure its movement is smooth.



8. Lubricate:

- Drive chain

	<p><b>Drive chain lubricant:</b> SAE 10W-30 motor oil or suitable chain lubricants</p>
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## DRIVE CHAIN SLACK ADJUSTMENT

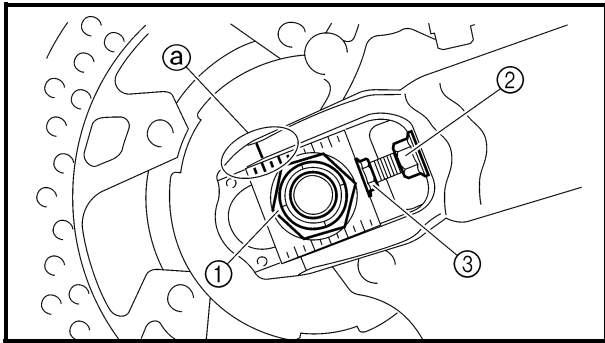
1. Elevate the rear wheel by placing the suitable stand under the engine.
2. Check:
  - Drive chain slack (a)  
Above the seal guard installation bolt.  
Out of specification → Adjust.



**Drive chain slack:**  
40 ~ 50 mm (1.6 ~ 2.0 in)

### NOTE:

Before checking and/or adjusting, rotate the rear wheel through several revolutions and check the slack several times to find the tightest point. Check and/or adjust the drive chain slack with the rear wheel in this “tight chain” position.



3. Adjust:
  - Drive chain slack

### Drive chain slack adjustment steps:

- Loosen the axle nut (1) and locknuts (2).
- Adjust the drive chain slack by turning the adjusters (3).

**To tighten** → Turn the adjuster (3) counterclockwise.

**To loosen** → Turn the adjuster (3) clockwise and push wheel forward.

- Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks (a) on each side of the drive chain puller alignment.)

### NOTE:

Turn the adjuster so that the drive chain is in line with the sprocket, as viewed from the rear.

### CAUTION:

Too small drive chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

- Tighten the axle nut while pushing down the drive chain.

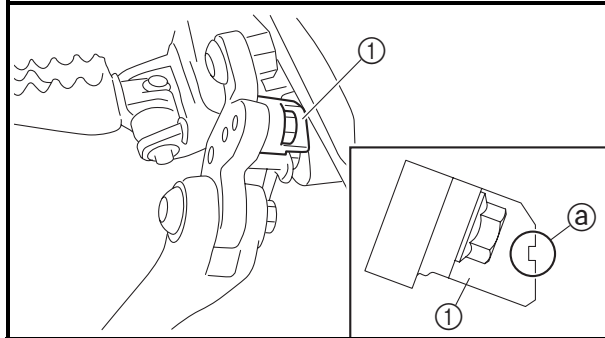


**Axle nut:**  
**125 Nm (12.5 m • kg, 90 ft • lb)**

- Tighten the locknuts.




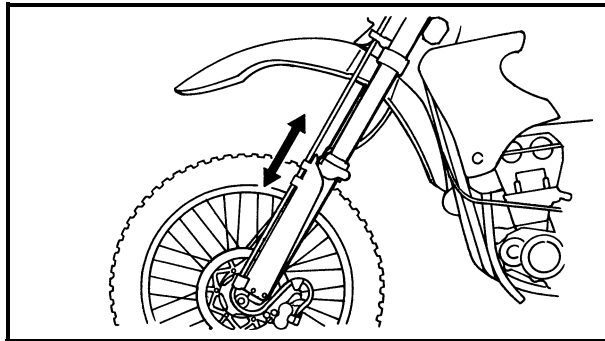
**Locknut:**  
**16 Nm (1.6 m • kg, 11 ft • lb)**



**DRIVE CHAIN STOPPER INSPECTION**

1. Inspect:
  - Drive chain stopper ①  
Wear indicator groove (a) has almost disappeared → Replace.
2. Replace:
  - Drive chain stopper

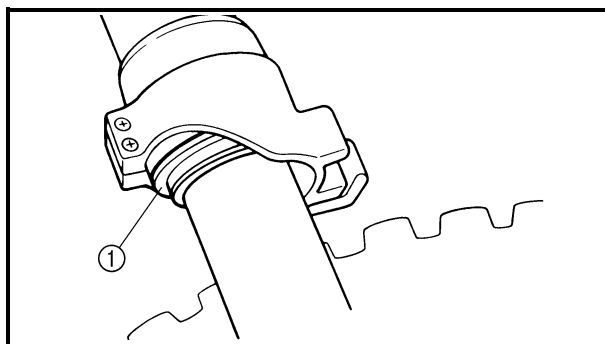
 **7 Nm (0.7 m • kg, 5.1 ft • lb)**



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**FRONT FORK INSPECTION**

1. Inspect:
  - Front fork smooth action  
Operate the front brake and stroke the front fork.  
Unsmooth action/oil leakage → Repair or replace.

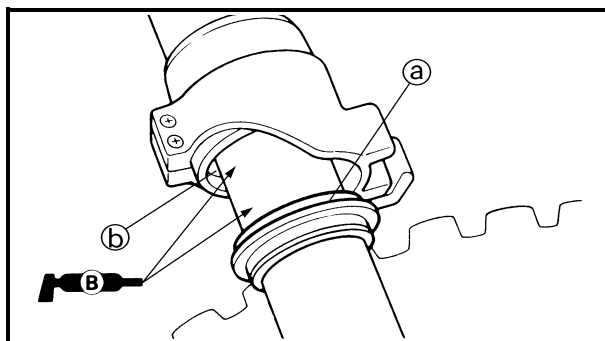


EC36D001

**FRONT FORK OIL SEAL AND DUST SEAL  
CLEANING**

1. Remove:
  - Protector
  - Dust seal ①

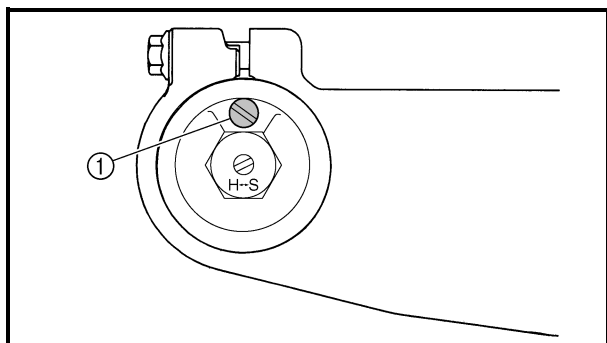
**NOTE:** \_\_\_\_\_  
Use a thin screw driver, and be careful not to damage the inner fork tube and dust seal.



2. Clean:
  - Dust seal (a)
  - Oil seal (b)

**NOTE:** \_\_\_\_\_  
• Clean the dust seal and oil seal after every run.  
• Apply the lithium soap base grease on the inner tube.

# FRONT FORK INTERNAL PRESSURE RELIEVING/FRONT FORK REBOUND DAMPING FORCE ADJUSTMENT



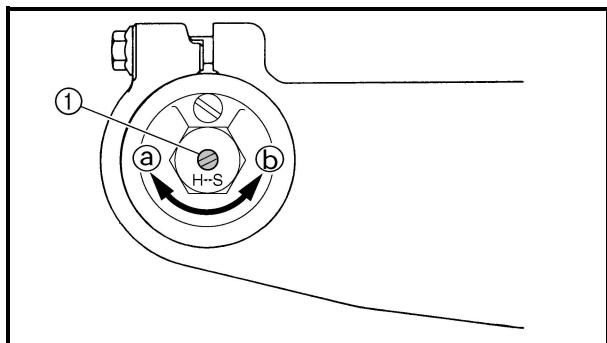
## FRONT FORK INTERNAL PRESSURE RELIEVING

**NOTE:** \_\_\_\_\_  
 If the front fork initial movement feels stiff during a run, relieve the front fork internal pressure.

1. Elevate the front wheel by placing a suitable stand under the engine.
2. Remove the air bleed screw ① and release the internal pressure from the front fork.
3. Install:

- Air bleed screw

1 Nm (0.1 m · kg, 0.7 ft · lb)



EC36H002

## FRONT FORK REBOUND DAMPING FORCE ADJUSTMENT

1. Adjust:
  - Rebound damping force
  - By turning the adjuster ①.

**Stiffer (a) → Increase the rebound damping force. (Turn the adjuster ① in.)**  
**Softer (b) → Decrease the rebound damping force. (Turn the adjuster ① out.)**



**Extent of adjustment:**

Maximum	Minimum
Fully turned in position	20 clicks out (from maximum position)

# FRONT FORK COMPRESSION DAMPING FORCE ADJUSTMENT



• **STANDARD POSITION:**

This is the position which is back by the specific number of clicks from the fully turned-in position.



**Standard position:**  
**8 clicks out**  
**\* 10 clicks out**

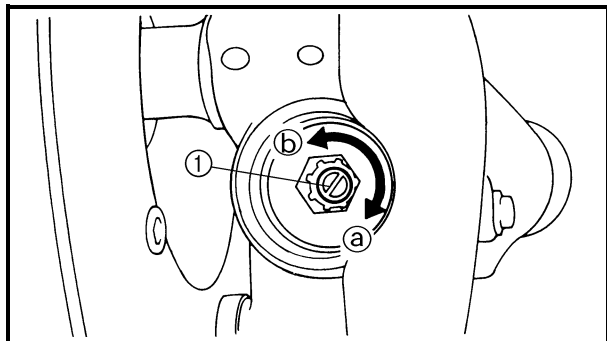
\* For AUS, NZ and ZA

**CAUTION:**

Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.

**WARNING**

Always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.



EC36J001

## FRONT FORK COMPRESSION DAMPING FORCE ADJUSTMENT

1. Remove:
  - Rubber cap
2. Adjust:
  - Compression damping force  
By turning the adjuster ①.

**Stiffer (a) → Increase the compression damping force. (Turn the adjuster ① in.)**  
**Softer (b) → Decrease the compression damping force. (Turn the adjuster ① out.)**



**Extent of adjustment:**

Maximum	Minimum
Fully turned in position	20 clicks out (from maximum position)

- **STANDARD POSITION:**  
This is the position which is back by the specific number of clicks from the fully turned-in position.



**Standard position:**  
**13 clicks out**  
**\* 14 clicks out**

\* For EUROPE, AUS, NZ and ZA

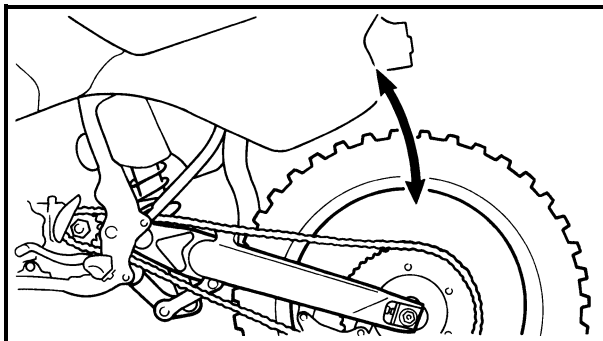
**CAUTION:**

**Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**

**WARNING**

**Always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.**

3. Install:
  - Rubber cap

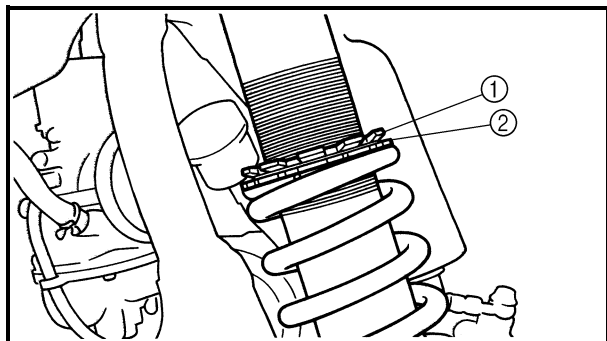


EC36K000

## REAR SHOCK ABSORBER INSPECTION

1. Inspect:
  - Swingarm smooth action  
Abnormal noise/unsmooth action → Grease the pivoting points or repair the pivoting points.  
Damage/oil leakage → Replace.

# REAR SHOCK ABSORBER SPRING PRELOAD ADJUSTMENT



## REAR SHOCK ABSORBER SPRING PRELOAD ADJUSTMENT

1. Elevate the rear wheel by placing the suitable stand under the engine.
2. Remove:
  - Rear frame
3. Loosen:
  - Locknut ①
4. Adjust:
  - Spring preload  
By turning the adjuster ②.

**Stiffer** → Increase the spring preload.  
(Turn the adjuster ② in.)  
**Softer** → Decrease the spring preload.  
(Turn the adjuster ② out.)



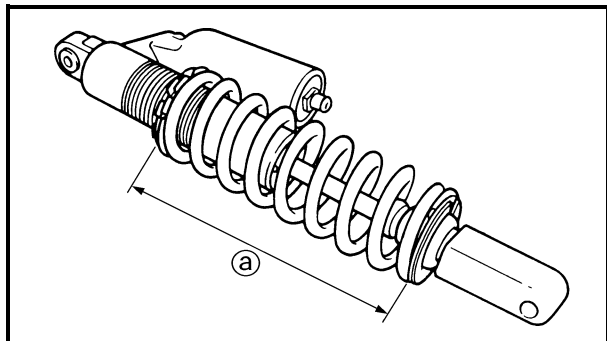
**Spring length (installed) ①a:**

Standard length	Extent of adjustment
245 mm (9.65 in)	240.5 ~ 258.5 mm
* 246.5 mm (9.70 in)	(9.47 ~ 10.18 in)

\* For EUROPE

**NOTE:**

- Be sure to remove all dirt and mud from around the locknut and adjuster before adjustment.
- The length of the spring (installed) changes 1.5 mm (0.06 in) per turn of the adjuster.



**CAUTION:**

**Never attempt to turn the adjuster beyond the maximum or minimum setting.**

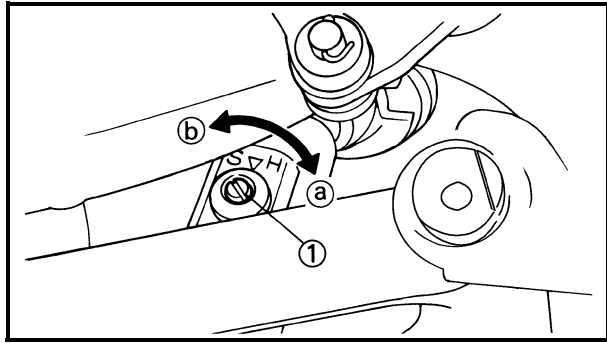
5. Tighten:
  - Locknut
6. Install:
  - Rear frame (upper)

32 Nm (3.2 m · kg, 23 ft · lb)

- Rear frame (lower)

29 Nm (2.9 m · kg, 21 ft · lb)





EC36N014

## REAR SHOCK ABSORBER REBOUND DAMPING FORCE ADJUSTMENT

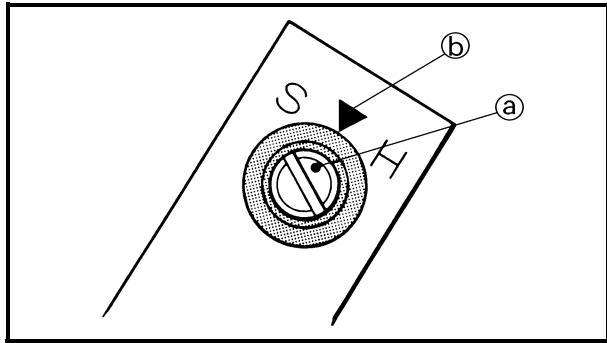
- Adjust:
  - Rebound damping force  
By turning the adjuster ①.

**Stiffer (a) → Increase the rebound damping force. (Turn the adjuster ① in.)**  
**Softer (b) → Decrease the rebound damping force. (Turn the adjuster ① out.)**



### Extent of adjustment:

Maximum	Minimum
Fully turned in position	20 clicks out (from maximum position)



- STANDARD POSITION:**  
This is the position which is back by the specific number of clicks from the fully turned-in position. (Which align the punch mark (a) on the adjuster with the punch mark (b) on the bracket.)



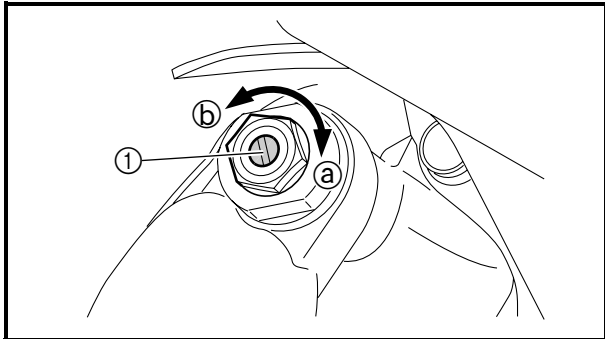
**Standard position:**  
**About 6 clicks out**  
**\* About 10 clicks out**  
**\*\* About 8 clicks out**

- \* For EUROPE
- \*\* For AUS, NZ and ZA

### CAUTION:

**Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**

# REAR SHOCK ABSORBER LOW COMPRESSION DAMPING FORCE ADJUSTMENT



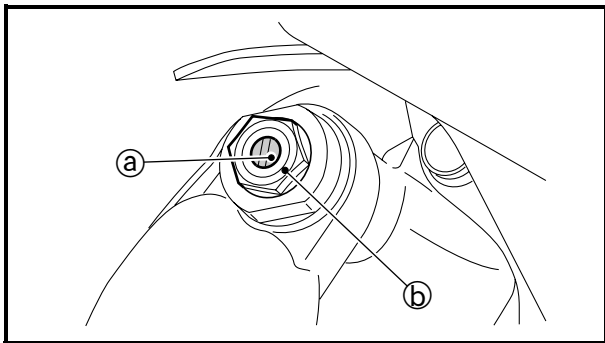
EC36c000

## REAR SHOCK ABSORBER LOW COMPRESSION DAMPING FORCE ADJUSTMENT

- Adjust:
  - Low compression damping force  
By turning the adjuster ①.

**Stiffer ① → Increase the low compression damping force. (Turn the adjuster ① in.)**  
**Softer ② → Decrease the low compression damping force. (Turn the adjuster ① out.)**

<b>Extent of adjustment:</b>	
<b>Maximum</b>	<b>Minimum</b>
<b>Fully turned in position</b>	<b>20 clicks out (from maximum position)</b>



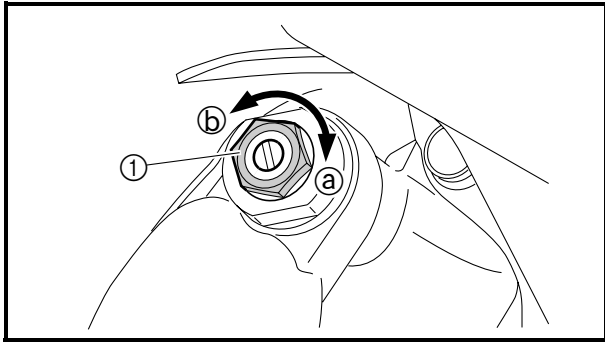
- STANDARD POSITION:**  
This is the position which is back by the specific number of clicks from the fully turned-in position. (Which align the punch mark ① on the adjuster with the punch mark ② on the high compression damping adjuster.)

**Standard position:**  
**About 10 clicks out**  
**\* About 9 clicks out**

\* For AUS, NZ and ZA

**CAUTION:** \_\_\_\_\_  
**Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**

# REAR SHOCK ABSORBER HIGH COMPRESSION DAMPING FORCE ADJUSTMENT



EC36d000

## REAR SHOCK ABSORBER HIGH COMPRESSION DAMPING FORCE ADJUSTMENT

- Adjust:
  - High compression damping force  
By turning the adjuster ①.

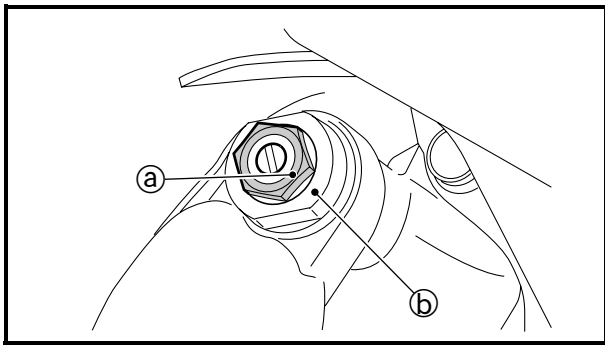
**Stiffer ① → Increase the high compression damping force. (Turn the adjuster ① in.)**

**Softer ② → Decrease the high compression damping force. (Turn the adjuster ① out.)**



### Extent of adjustment:

Maximum	Minimum
Fully turned in position	2 turns out (from maximum position)



- STANDARD POSITION:**  
This is the position which is back by the specific number of turns from the fully turned-in position. (Which align the punch mark ① on the adjuster with the punch mark ② on the adjuster body.)



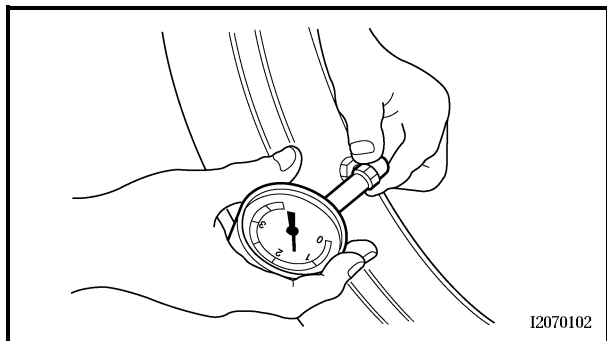
**Standard position:**  
**About 1-1/8 turns out**  
 \* About 1-1/4 turns out  
 \*\* About 1-1/2 turns out

\* For EUROPE

\*\* For AUS, NZ and ZA

### CAUTION:

**Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**



EC36Q000

## TIRE PRESSURE CHECK

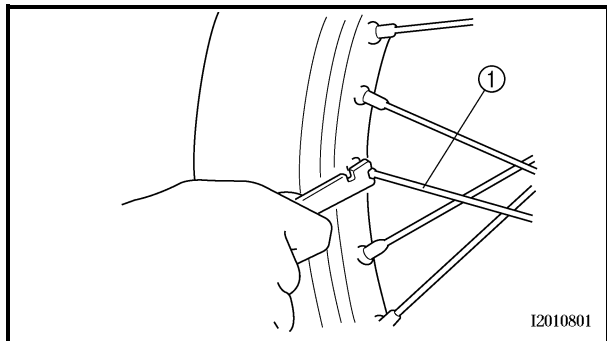
1. Measure:
  - Tire pressureOut of specification → Adjust.



**Standard tire pressure:**  
**100 kPa (1.0 kgf/cm<sup>2</sup>, 15 psi)**

### NOTE:


- Check the tire while it is cold.
- Loose bead stoppers allow the tire to slip off its position on the rim when the tire pressure is low.
- A tilted tire valve stem indicates that the tire slips off its position on the rim.
- If the tire valve stem is found tilted, the tire is considered to be slipping off its position. Correct the tire position.



EC36S002

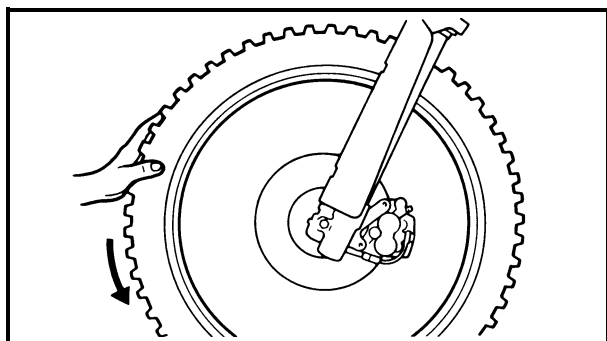
## SPOKES INSPECTION AND TIGHTENING

1. Inspect:
  - Spokes ①Bend/damage → Replace.  
Loose spoke → Retighten.
2. Tighten:
  - Spokes

 **3 Nm (0.3 m · kg, 2.2 ft · lb)**

### NOTE:

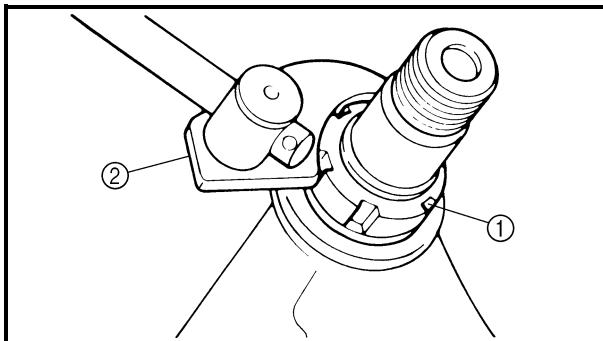
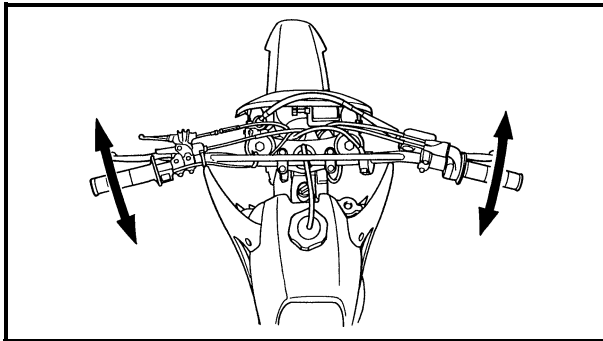
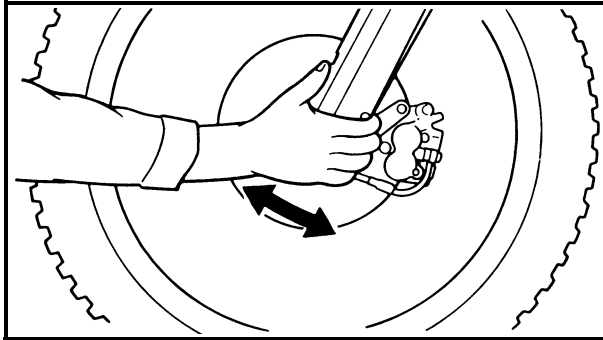
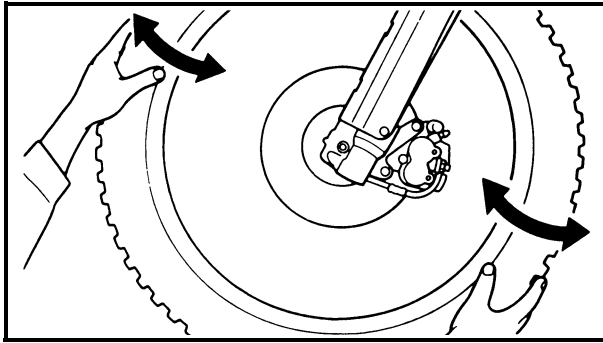
Be sure to retighten these spokes before and after break-in. After a practice or a race check spokes for looseness.



EC36T000

## WHEEL INSPECTION

1. Inspect:
  - Wheel runoutElevate the wheel and turn it.  
Abnormal runout → Replace.




2. Inspect:
  - Bearing free play  
Exist play → Replace.

EC36U013

## STEERING HEAD INSPECTION AND ADJUSTMENT

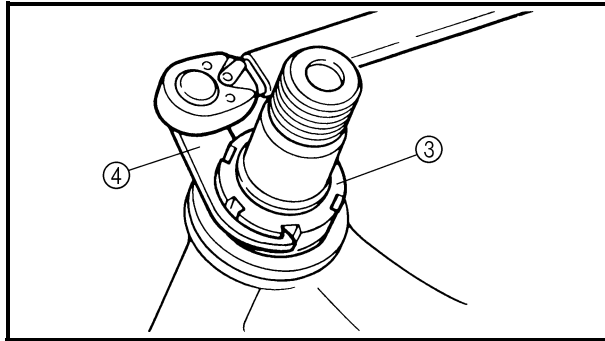
1. Elevate the front wheel by placing a suitable stand under the engine.
2. Check:
  - Steering stem  
Grasp the bottom of the forks and gently rock the fork assembly back and forth.  
Free play → Adjust steering head.
3. Check:
  - Steering smooth action  
Turn the handlebar lock to lock.  
Unsmooth action → Adjust steering ring nut.

4. Adjust:
  - Steering ring nut

<b>Steering ring nut adjustment steps:</b>	
<ul style="list-style-type: none"> <li>• Remove the headlight.</li> <li>• Remove the handlebar and handlebar upper bracket.</li> <li>• Loosen the steering ring nut ① using the steering nut wrench ②.</li> </ul>	
	<b>Steering nut wrench:</b> <b>YU-33975/90890-01403</b>

# STEERING HEAD INSPECTION AND ADJUSTMENT

**INSP**  
**ADJ**



- Tighten the steering ring nut ③ using steering nut wrench ④.

**NOTE:**

Set the torque wrench to the steering nut wrench so that they form a right angle.



**Steering nut wrench:**  
**YU-33975/90890-01403**



**Steering ring nut (initial tightening):**  
**38 Nm (3.8 m • kg, 27 ft • lb)**

- Loosen the steering ring nut one turn.
- Retighten the steering ring nut using the steering nut wrench.

**⚠ WARNING**

**Avoid over-tightening.**



**Steering ring nut (final tightening):**  
**7 Nm (0.7 m • kg, 5.1 ft • lb)**

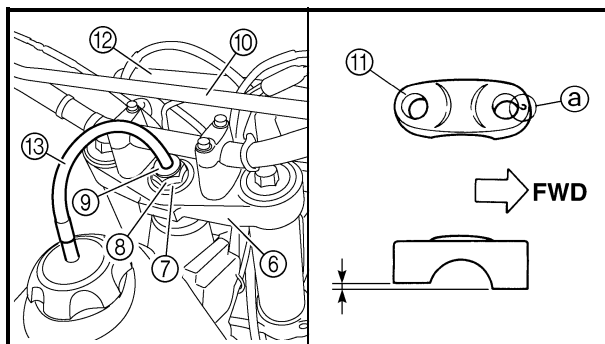
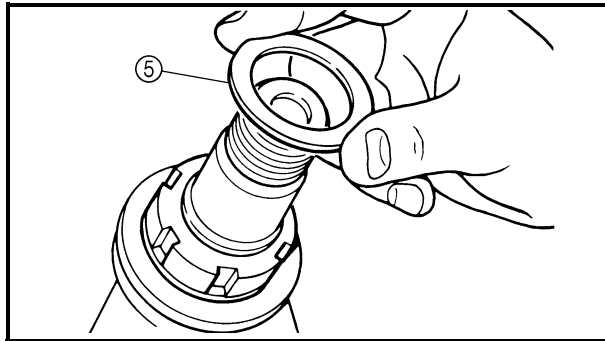
- Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings.
- Install the washer ⑤, upper bracket ⑥, washer ⑦, steering stem nut ⑧, steering stem cap ⑨, handlebar ⑩, handlebar upper holder ⑪ and headlight ⑫.

**NOTE:**

- The handlebar upper holder should be installed with the punched mark ① forward.
- Insert the end of the fuel breather hose ⑬ into the hole in the steering stem cap.

**CAUTION:**

**First tighten the bolts on the front side of the handlebar upper holder, and then tighten the bolts on the rear side.**



**Steering stem nut:**  
**145 Nm (14.5 m • kg, 105 ft • lb)**

**Handlebar upper holder:**  
**28 Nm (2.8 m • kg, 20 ft • lb)**

**Pinch bolt (upper bracket):**  
**23 Nm (2.3 m • kg, 17 ft • lb)**

**Headlight (left and right):**  
**10 Nm (1.0 m • kg, 7.2 ft • lb)**

**Headlight (lower):**  
**7 Nm (0.7 m • kg, 5.1 ft • lb)**

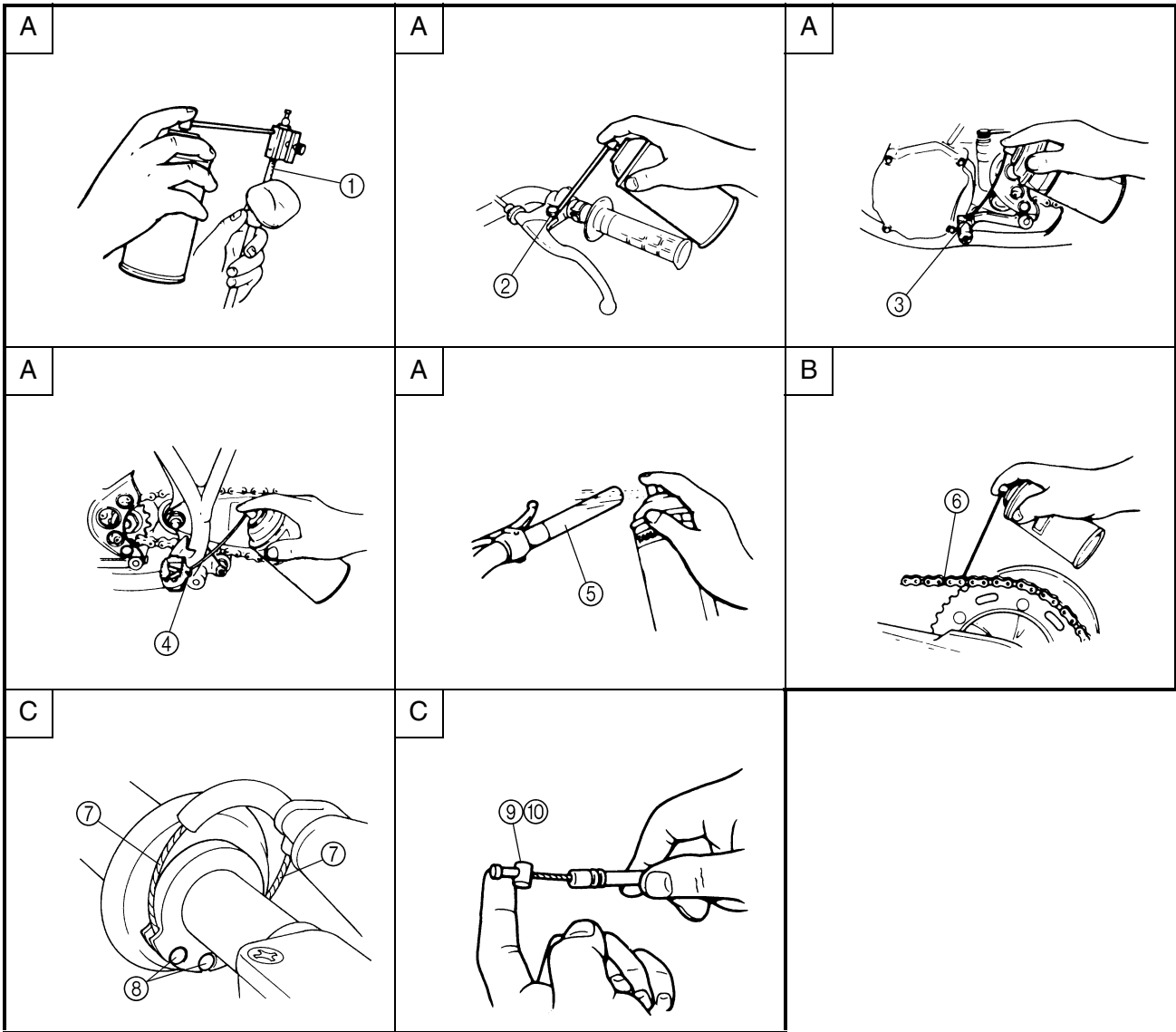
**LUBRICATION**

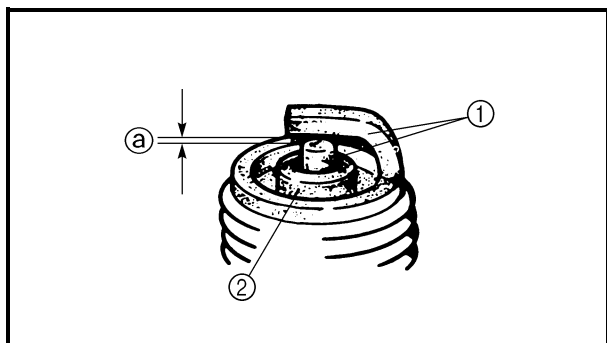
To ensure smooth operation of all components, lubricate your machine during setup, after break-in, and after every race.

- ① All control cable
- ② Clutch lever pivot
- ③ Shift pedal pivot
- ④ Footrest pivot
- ⑤ Throttle-to-handlebar contact
- ⑥ Drive chain
- ⑦ Tube guide cable winding portion
- ⑧ Throttle cable end
- ⑨ Clutch cable end
- ⑩ Hot starter cable end

- A** Use Yamaha cable lube or equivalent on these areas.
- B** Use SAE 10W-30 motor oil or suitable chain lubricants.
- C** Lubricate the following areas with high quality, lightweight lithium-soap base grease.

**CAUTION:** \_\_\_\_\_  
**Wipe off any excess grease, and avoid getting grease on the brake discs.**





EC370000

## ELECTRICAL

EC371001

### SPARK PLUG INSPECTION

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

#### NOTE:

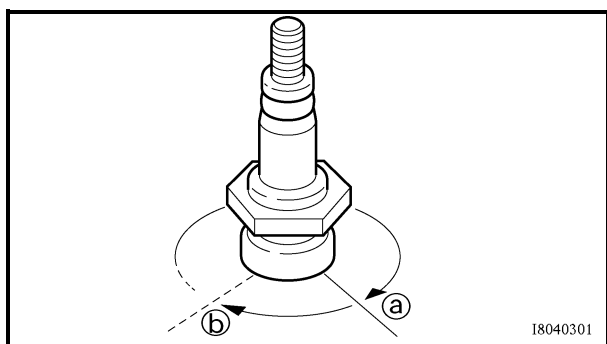
When the engine runs for many hours at low speeds, the spark plug insulator will become sooty, even if the engine and carburetor are in good operating condition.

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




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

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

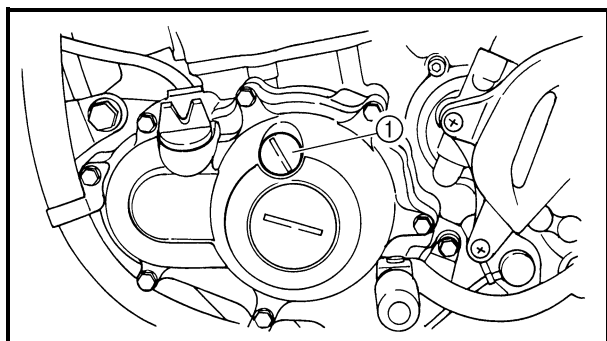


5. Tighten:
  - Spark plug

 **13 Nm (1.3 m · kg, 9.4 ft · lb)**

#### NOTE:

- Before installing a spark plug, clean the gasket surface and plug surface.
- Finger-tighten ④ the spark plug before torquing to specification ⑤.

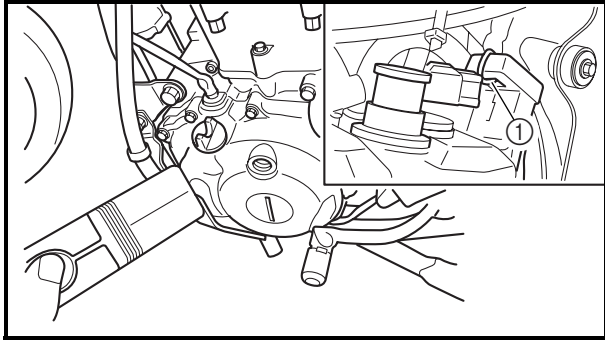


### IGNITION TIMING CHECK

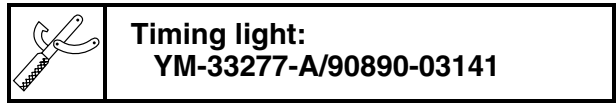
1. Remove:
  - Timing mark accessing screw ①



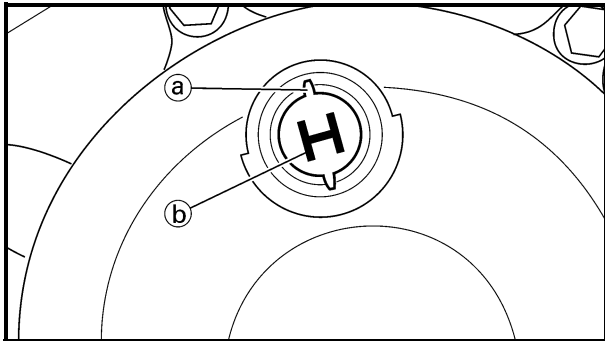
## IGNITION TIMING CHECK



2. Attach:
  - Timing light
  - Inductive tachometerTo the ignition coil lead (orange lead ①).



3. Adjust:
  - Engine idling speedRefer to “ENGINE IDLING SPEED ADJUSTMENT” section.



4. Check:
  - Ignition timingVisually check the stationary pointer (a) is within the firing range (b) on the rotor.  
Incorrect firing range → Check rotor and pickup assembly.

5. Install:
  - Timing mark accessing screw

## BATTERY INSPECTION AND CHARGING

### **⚠ WARNING**

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

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

### **FIRST AID IN CASE OF BODILY CONTACT: EXTERNAL**

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

### **INTERNAL**

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

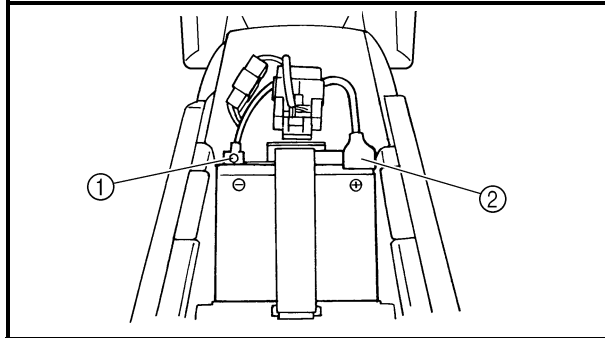
### **CAUTION:**

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

**NOTE:** \_\_\_\_\_

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

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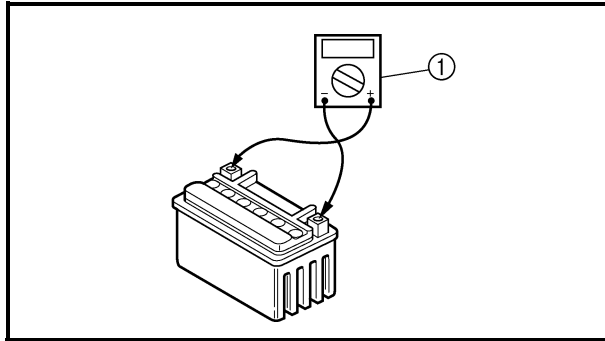
1. Remove:
  - Seat
2. Disconnect:
  - Battery leads  
(from the battery terminals)

**CAUTION:** \_\_\_\_\_

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

---

3. Remove:
  - Battery band
  - Battery



4. Measure:
- Battery charge

**Measurement steps:**

- Connect a pocket tester ① to the battery terminals.

**Tester positive probe** → battery positive terminal

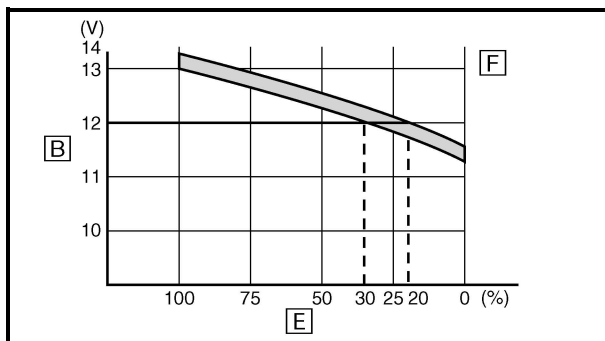
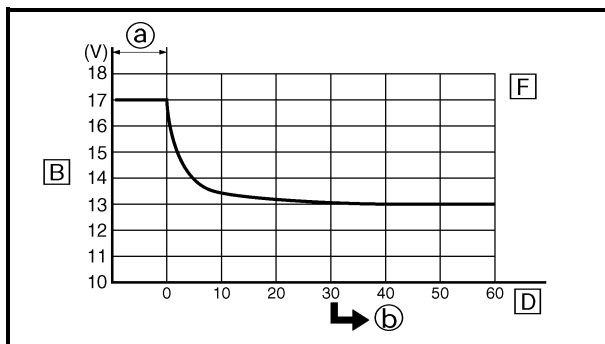
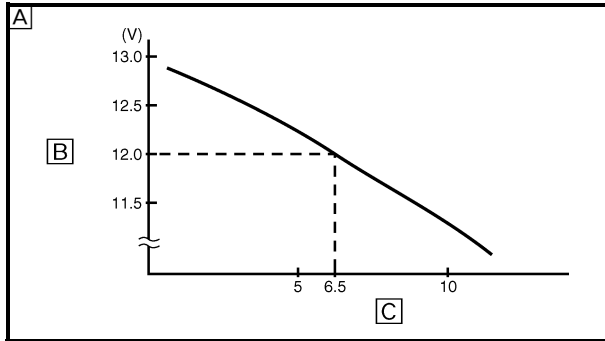
**Tester negative probe** → battery negative terminal

**NOTE:**

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

**Example**

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



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

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

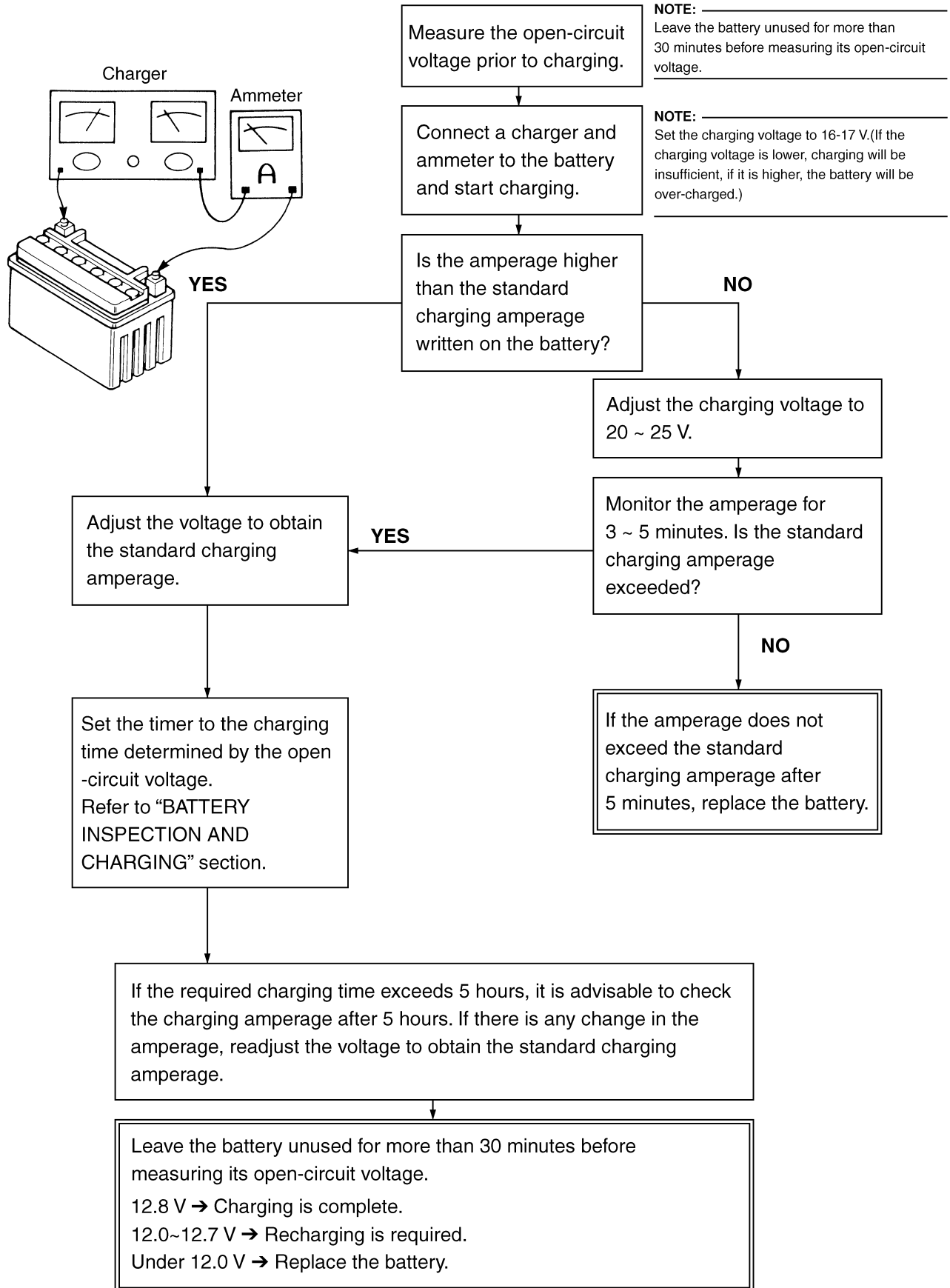
**⚠ WARNING**

**Do not quick charge a battery.**

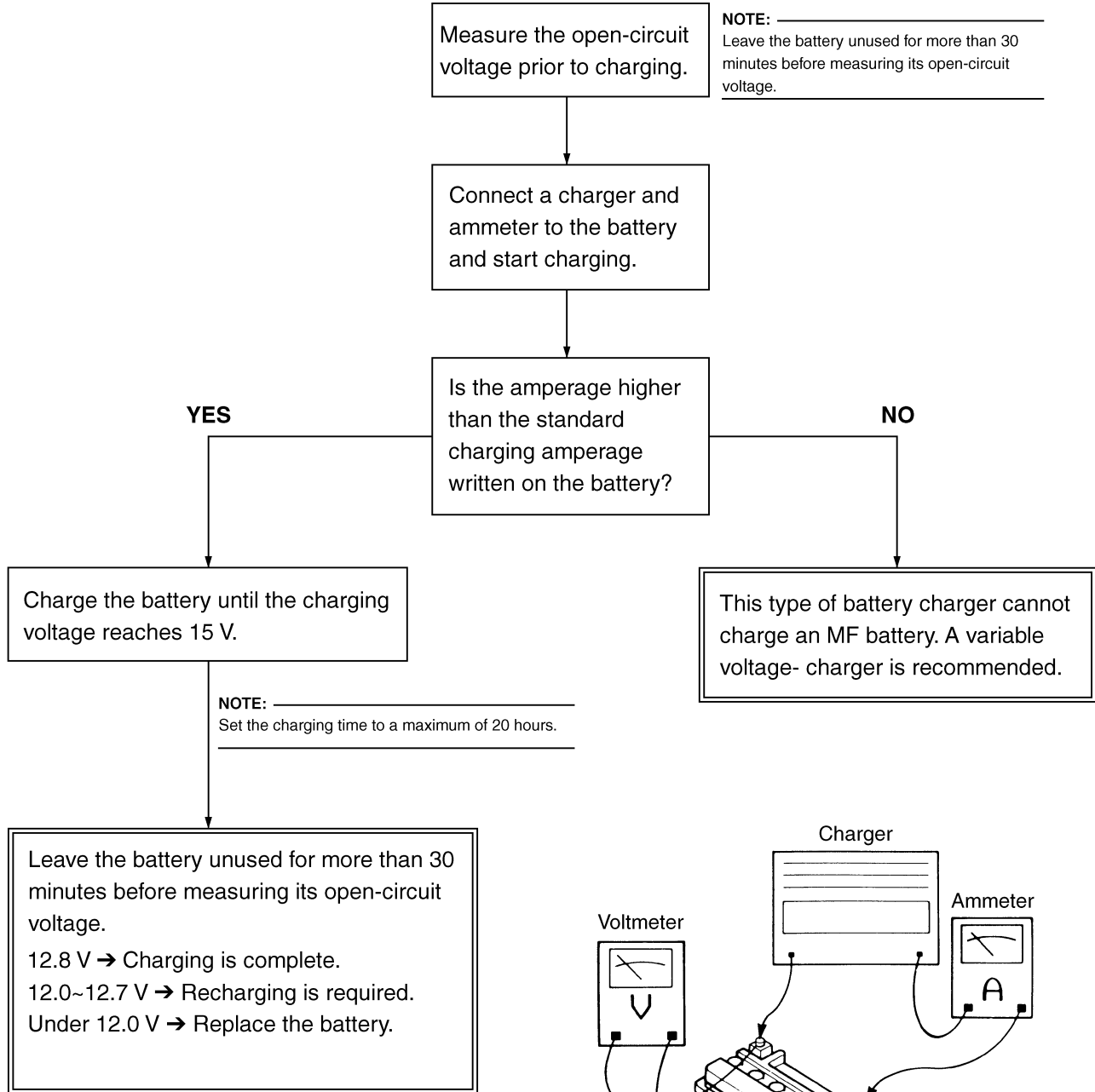
**CAUTION:**

- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the machine. (If charging has to be done with the battery mounted on the machine, disconnect the negative battery lead from the battery terminal.)
- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

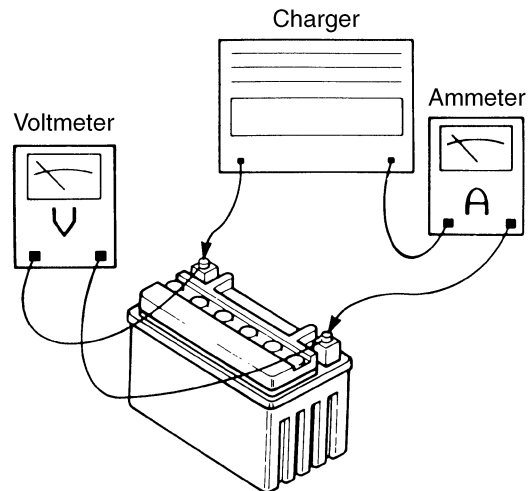
## Charging method using a variable voltage charger

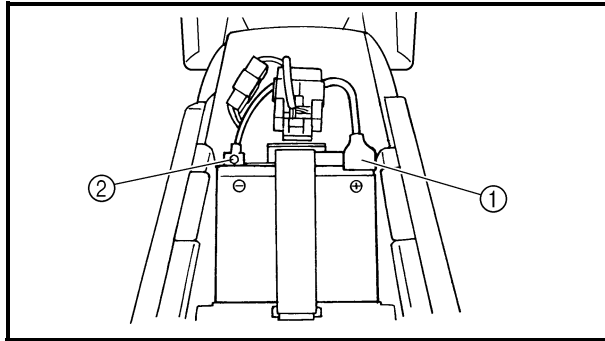


## Charging method using a constant voltage charger



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





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

**CAUTION:** \_\_\_\_\_

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

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



10. Install:
  - Seat

## BATTERY REPLACEMENT

1. Replace:
  - Battery

**CAUTION:** \_\_\_\_\_

**This battery is for YAMAHA WR250F.  
After filling the battery with electrolyte,  
either charge it for at least 3 hours at the  
amperage specified on the battery or let it  
sit for at least 15 hours before using it.**

EAS00181

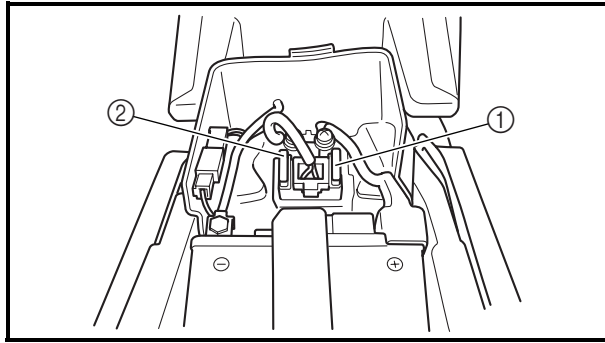
## FUSE INSPECTION

**CAUTION:** \_\_\_\_\_

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

1. Remove:
  - Seat
  - Fuse cover





2. Check:
  - Continuity

**Checking steps:**

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

**NOTE:**

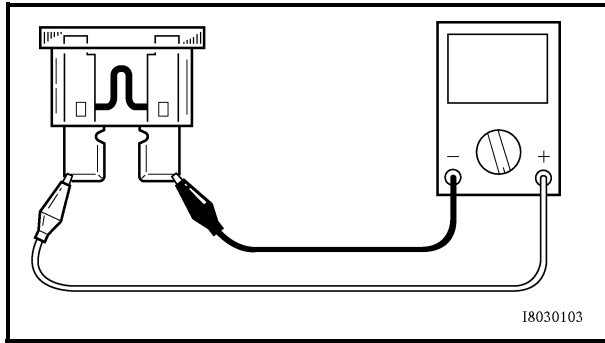
Set the pocket tester selector to “Ω × 1”.



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

- If the pocket tester indicates “∞”, replace the fuse.

- ② Reserve fuse



3. Replace:
  - Blown fuse

**Replacement steps:**

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

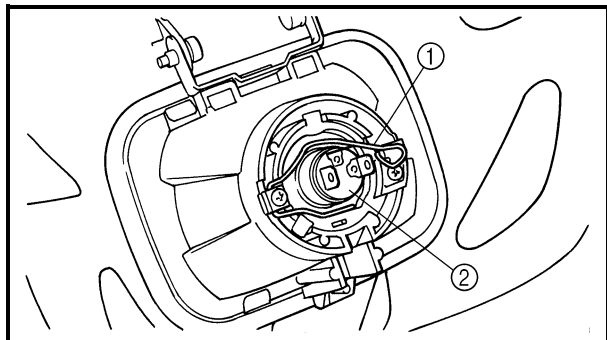
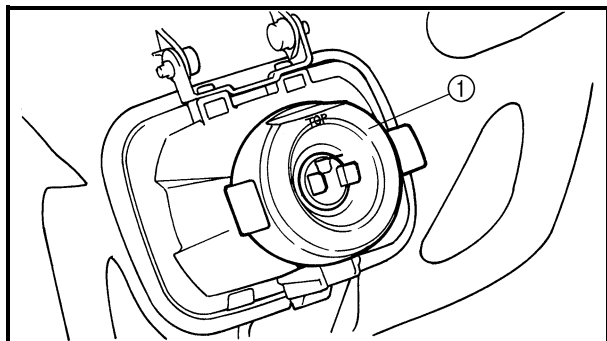
Items	Amperage rating	Q'ty
Main fuse	10 A	1

**⚠ WARNING**

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

4. Install:
  - Fuse cover
  - Seat

# REPLACING THE HEADLIGHT BULBS/ ADJUSTING THE HEADLIGHT BEAMS



## REPLACING THE HEADLIGHT BULBS

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

### ⚠ WARNING

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

5. Install:
  - Headlight bulb **New**  
Secure the new headlight bulb with the headlight bulb holder.

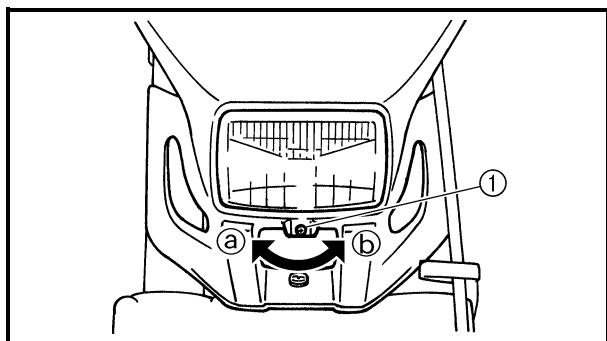
### CAUTION:

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.

6. Attach:
  - Headlight bulb holder
7. Install:
  - Headlight bulb holder cover
8. Install:
  - Headlight **7 Nm (0.7 m · kg, 5.1 ft · lb)**  
Refer to "SEAT, FUEL TANK AND SIDE COVERS" section in the CHAPTER 4.

## ADJUSTING THE HEADLIGHT BEAMS

1. Adjust:
  - Headlight beam (vertically)



### Adjusting steps:

- Turn the adjusting screw ① in direction ③ or ④.

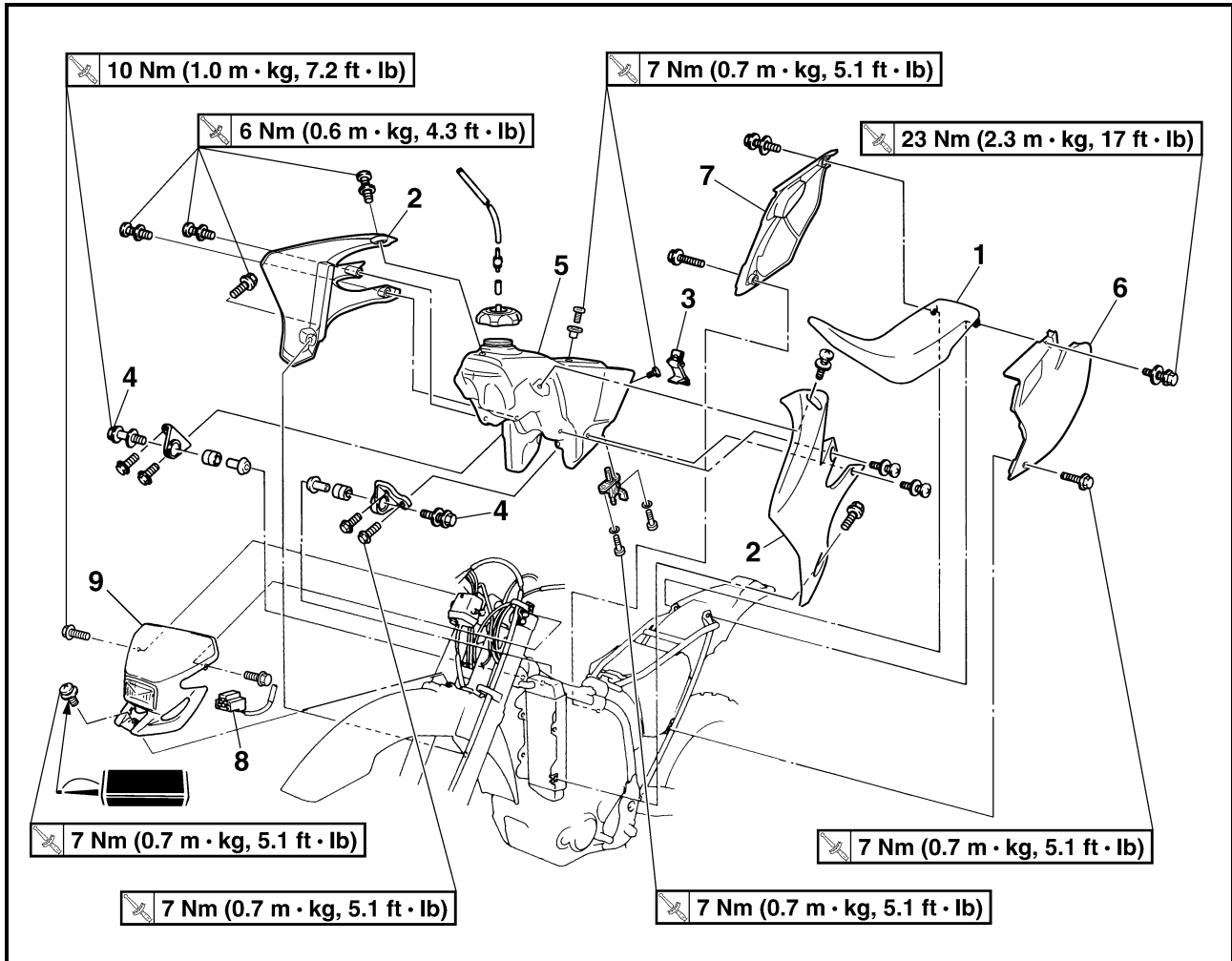
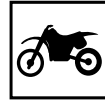
Direction ③	Headlight beam is raised.
Direction ④	Headlight beam is lowered.



EC400000

**ENGINE**

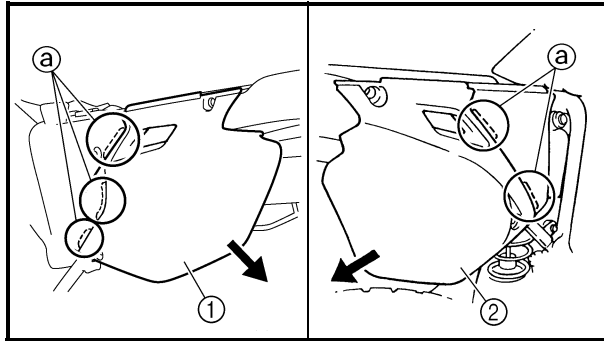
**SEAT, FUEL TANK AND SIDE COVERS**



Extent of removal:

- ① Seat removal
- ② Fuel tank removal
- ③ Side covers removal
- ④ Headlight removal

Extent of removal	Order	Part name	Q'ty	Remarks
<b>SEAT, FUEL TANK AND SIDE COVERS REMOVAL</b>				
Preparation for removal		Turn the fuel cock to "OFF". Disconnect the fuel hose.		
	1	Seat	1	
	2	Air scoop (left and right)	2	
	3	Fitting band	1	Remove on fuel tank side.
	4	Bolt (fuel tank)	2	
	5	Fuel tank	1	
	6	Left side cover	1	Refer to "REMOVAL POINTS".
	7	Right side cover	1	
	8	Headlight coupler	1	
	9	Headlight	1	



## REMOVAL POINTS

### Side cover

1. Remove:
  - Bolt (side cover)
  - Left side cover ①
  - Right side cover ②

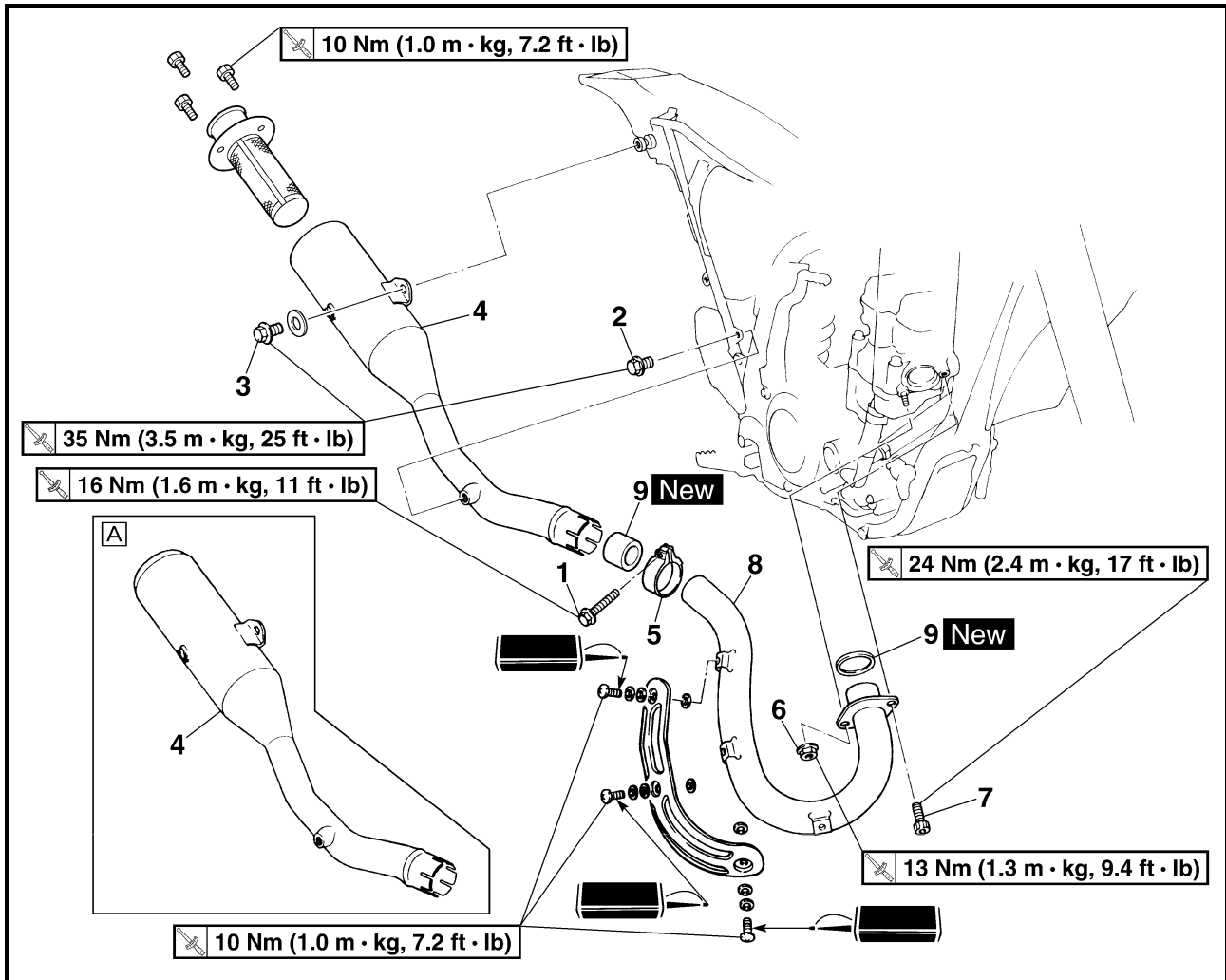
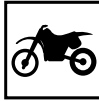
### NOTE:

Draw the side cover downward to remove it because its claws (a) are inserted in the air filter case.



EC4S0000

## EXHAUST PIPE AND SILENCER



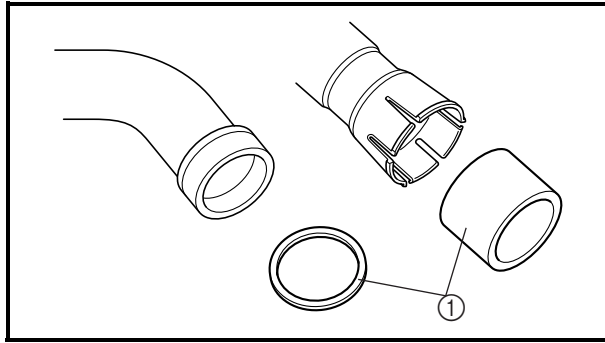
**A** Except for USA

Extent of removal:

① Silencer removal

② Exhaust pipe removal

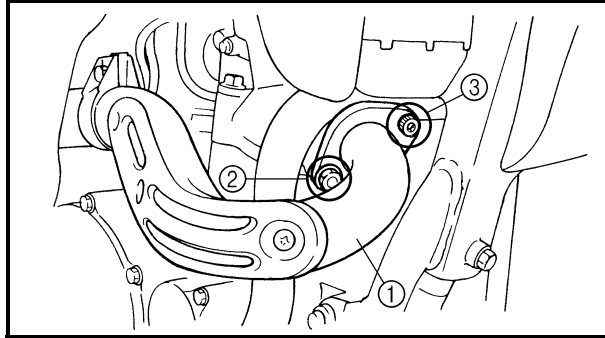
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>EXHAUST PIPE AND SILENCER REMOVAL</b>		
		Right side cover		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
	1	Bolt (silencer clamp)	1	Only loosening.
	2	Bolt [silencer (front)]	1	
	3	Bolt [silencer (rear)]	1	
	4	Silencer	1	
	5	Silencer clamp	1	
	6	Nut (exhaust pipe)	1	
	7	Bolt (exhaust pipe)	1	
	8	Exhaust pipe	1	
	9	Gasket	2	



### INSPECTION

#### Silencer and exhaust pipe

1. Inspect:
  - Gasket ①
  - Damage → Replace.



### ASSEMBLY AND INSTALLATION

#### Silencer and exhaust pipe

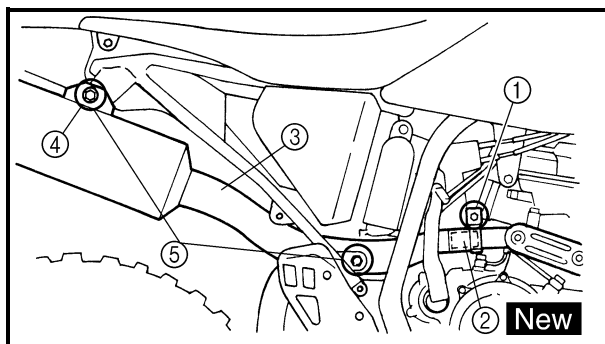
1. Install:
  - Gasket **New**
  - Exhaust pipe ①
  - Nut (exhaust pipe) ②
 

	<b>13 Nm (1.3 m · kg, 9.4 ft · lb)</b>
--	--
  - Bolt (exhaust pipe) ③
 

	<b>24 Nm (2.4 m · kg, 17 ft · lb)</b>
--	---------------------------------------

#### NOTE:

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



2. Install:
  - Silencer clamp ①
 

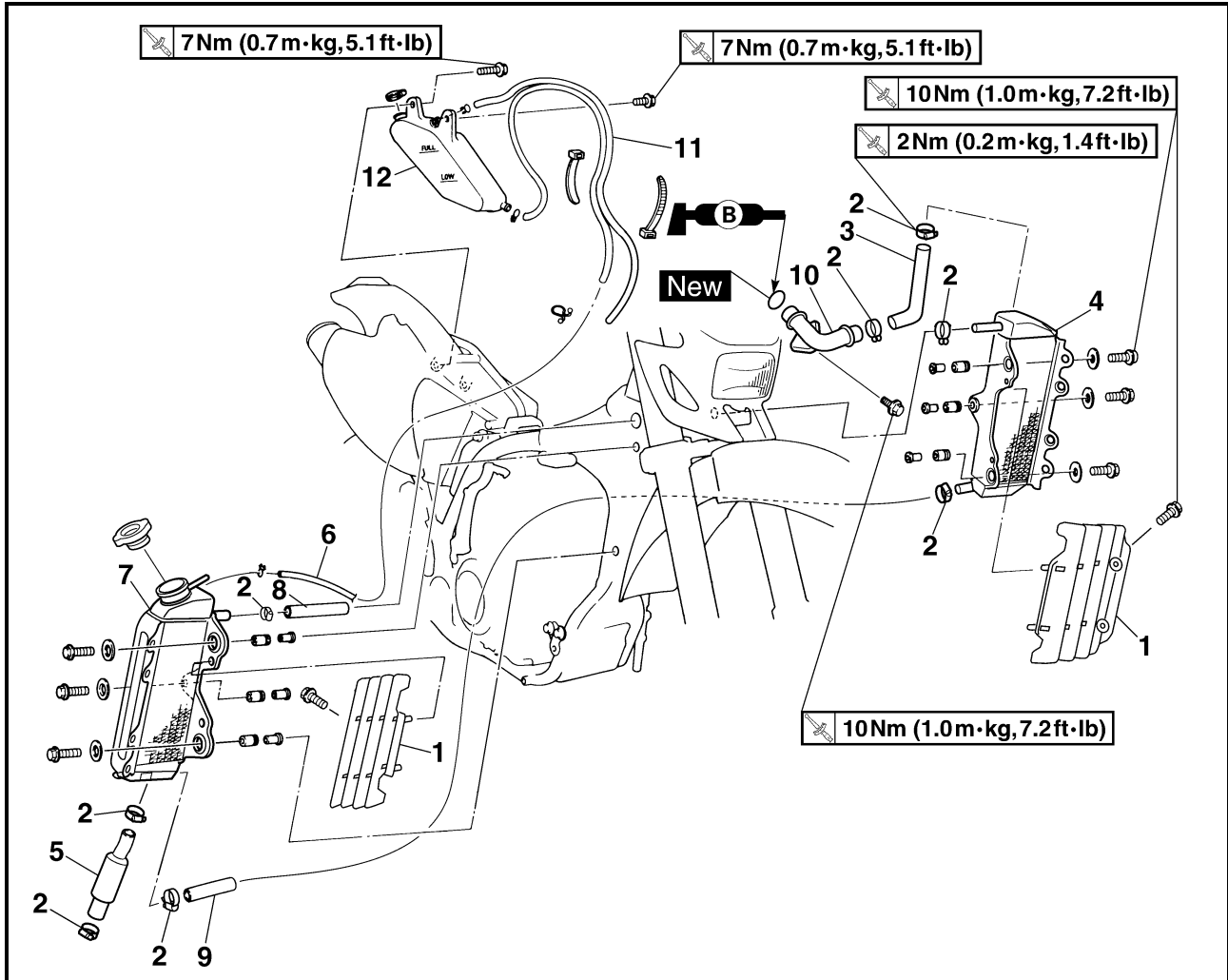
	<b>16 Nm (1.6 m · kg, 11 ft · lb)</b>
--	---------------------------------------
  - Gasket ② **New**
  - Silencer ③
  - Washer ④
  - Bolt (silencer) ⑤
 

	<b>35 Nm (3.5 m · kg, 25 ft · lb)</b>
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EC450001

RADIATOR



Extent of removal: ① Radiator removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>RADIATOR REMOVAL</b>		
		Drain the coolant.		Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3.
		Seat, fuel tank and left side cover		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
	1	Radiator guard	2	Only loosening.
	2	Radiator hose clamp	8	
	3	Radiator hose 1	1	
	4	Left radiator	1	
	5	Radiator hose 3	1	
	6	Coolant reservoir hose	1	
	7	Right radiator	1	
	8	Radiator hose 2	1	
	9	Radiator hose 4	1	
	10	Radiator pipe	1	
	11	Coolant reservoir breather hose	1	
	12	Coolant reservoir	1	



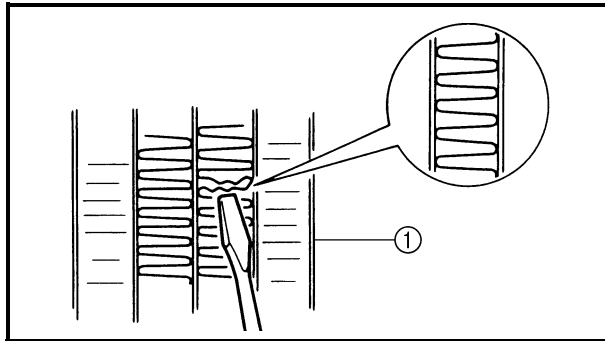
EC456000

**HANDLING NOTE****⚠ WARNING**

Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury.

When the engine has cooled, open the radiator cap by the following procedure:

Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.



EC454000

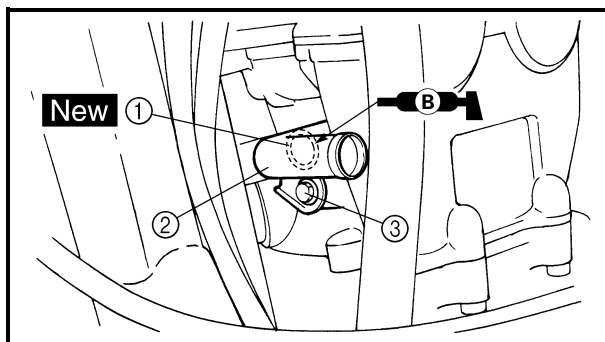
**INSPECTION**

EC444100

**Radiator**

## 1. Inspect:

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



EC455000

**ASSEMBLY AND INSTALLATION****Radiator**

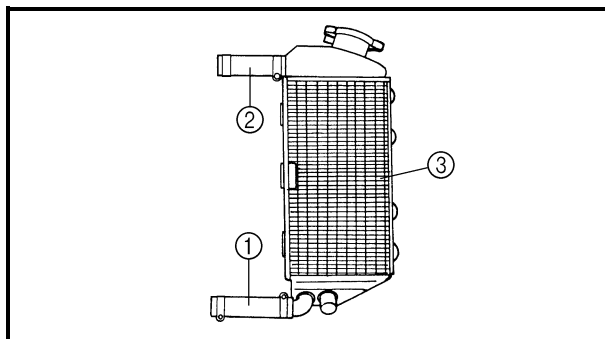
## 1. Install:

- O-ring ① **New**
- Radiator pipe ②
- Bolt (radiator pipe) ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

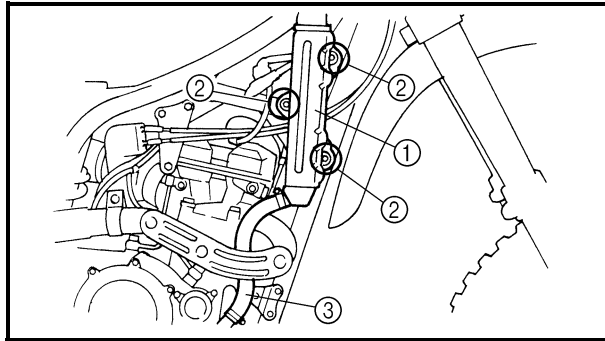
Apply the lithium soap base grease on the O-ring.



## 2. Install:

- Radiator hose 4 (longer) ①
- Radiator hose 2 (shorter) ②  
To right radiator ③.





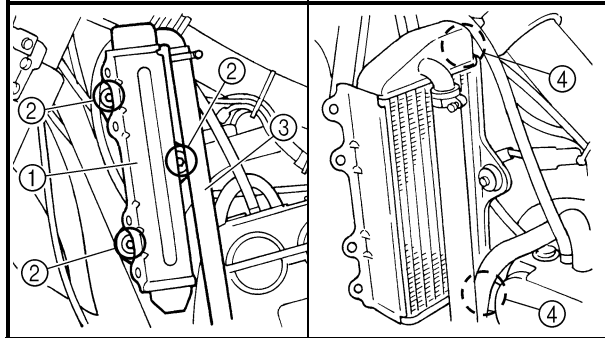
### 3. Install:

- Right radiator ①
- Bolt (right radiator) ②

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

- Radiator hose 3 ③

Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.



### 4. Install:

- Left radiator ①
- Bolt (left radiator) ②

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

- Radiator hose 1 ③

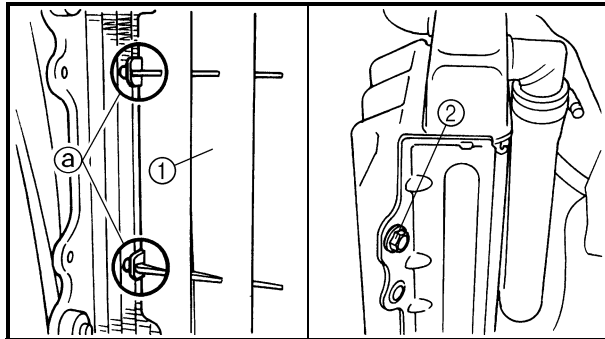
**2 Nm (0.2 m · kg, 1.4 ft · lb)**

Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.

### 5. Tighten:

- Radiator hose clamp ④

**2 Nm (0.2 m · kg, 1.4 ft · lb)**



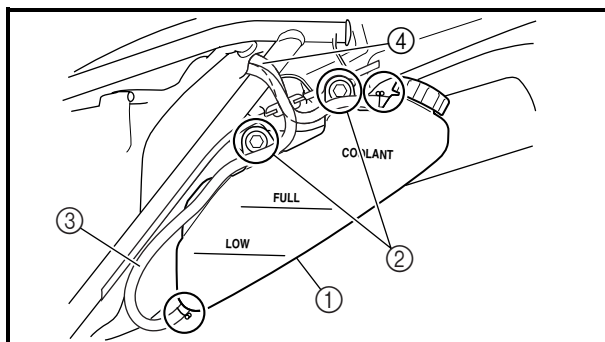
### 6. Install:

- Radiator guard ①
- Bolt (radiator guard) ②

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

### NOTE:

Fit the hook ③ on the inner side first into the radiator.



### 7. Install:

- Coolant reservoir ①
- Bolt (coolant reservoir) ②

**7 Nm (0.7 m · kg, 5.1 ft · lb)**

- Coolant reservoir hose ③

- Coolant reservoir breather hose ④

Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.

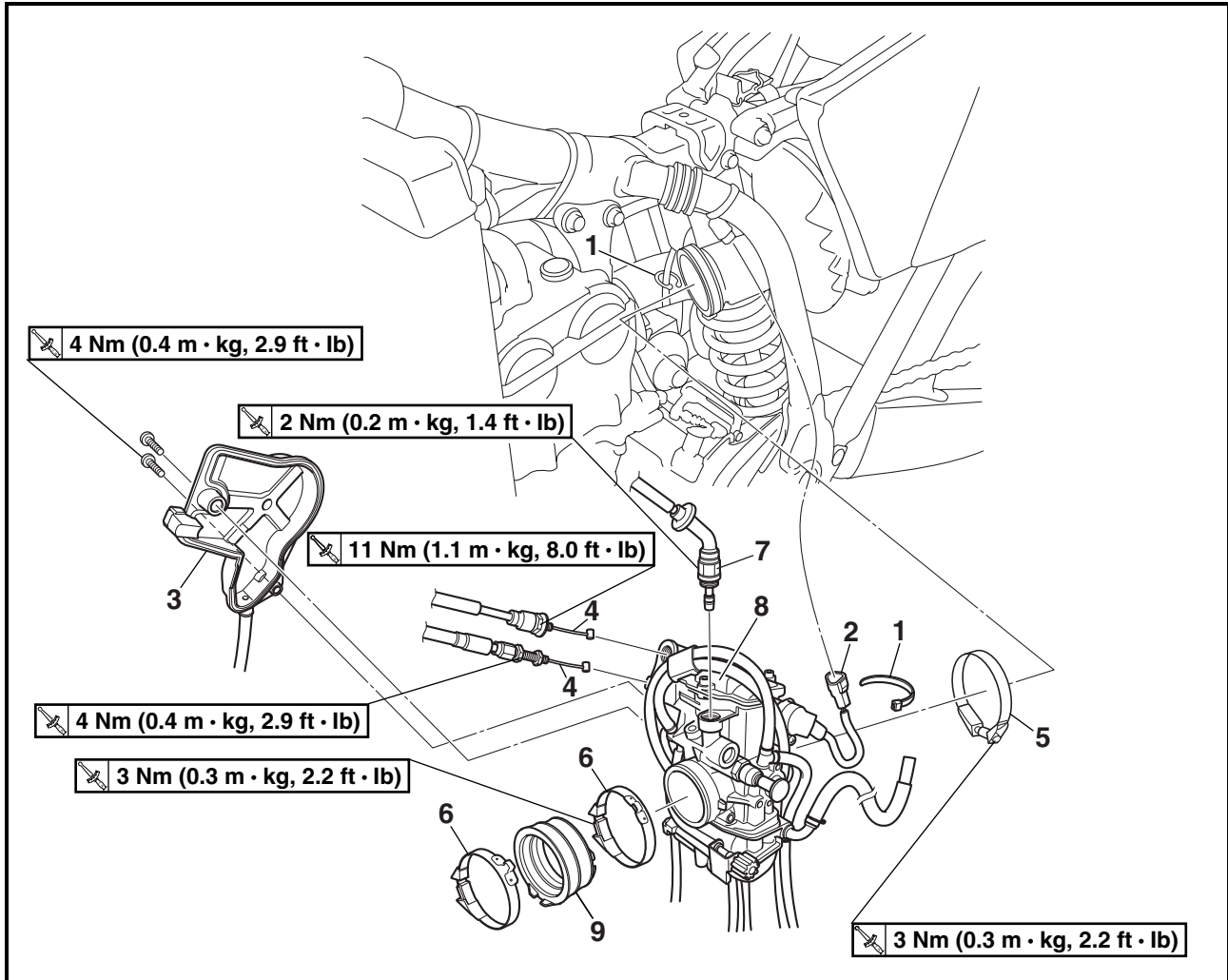
### 8. Fill:

- Radiator
- Engine
- Coolant reservoir

Refer to “COOLANT REPLACEMENT” section in the CHAPTER 3.



CARBURETOR



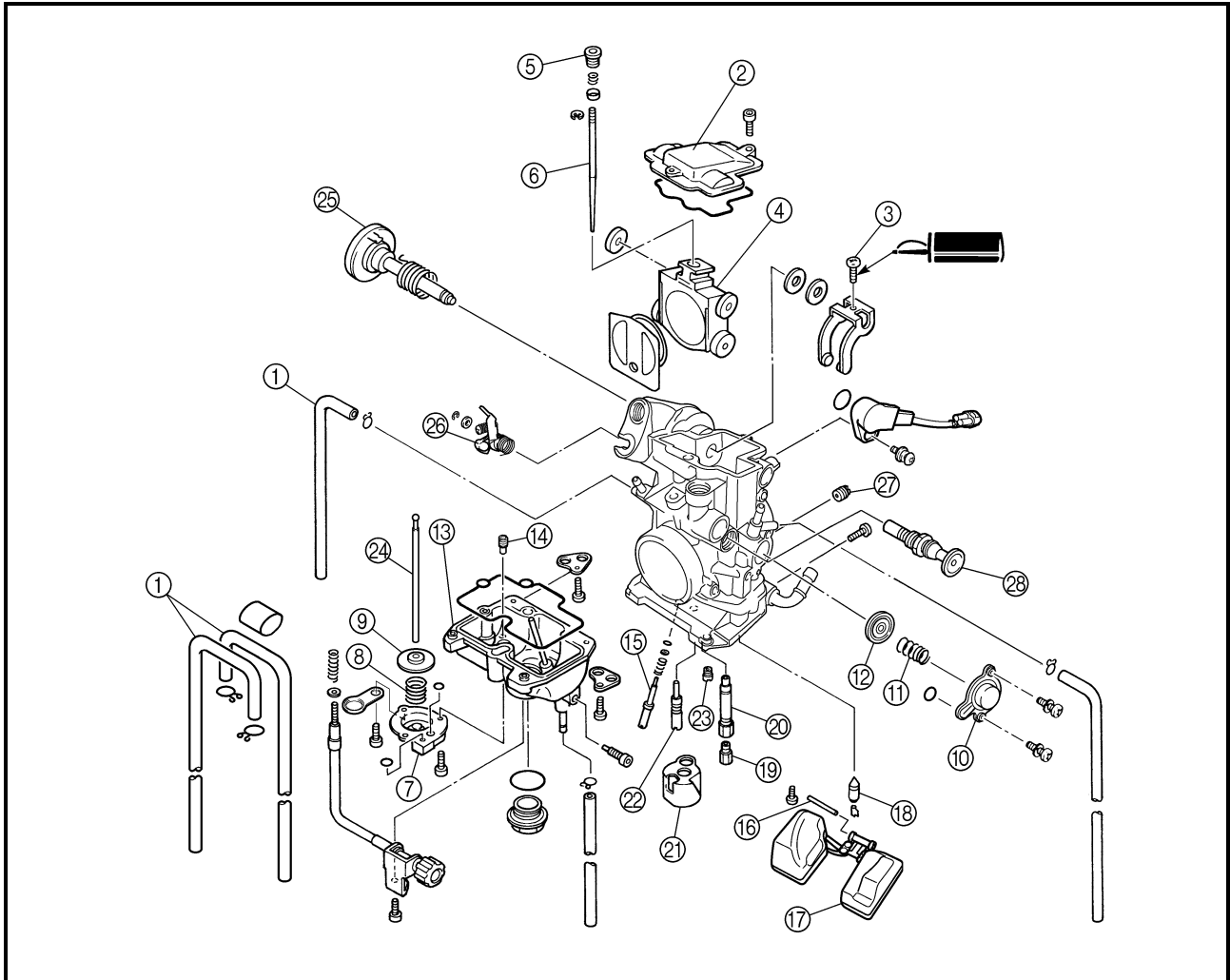
Extent of removal: ① Carburetor removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>CARBURETOR REMOVAL</b> Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
	1	Clamp	2	Loosen the screw (air filter joint). Loosen the screws (carburetor joint).
	2	Throttle position sensor lead coupler	1	
	3	Throttle cable cover	1	
	4	Throttle cable	2	
	5	Clamp (air filter joint)	1	
	6	Clamp (carburetor joint)	2	
	7	Hot starter plunger	1	
	8	Carburetor assembly	1	
	9	Carburetor joint	1	



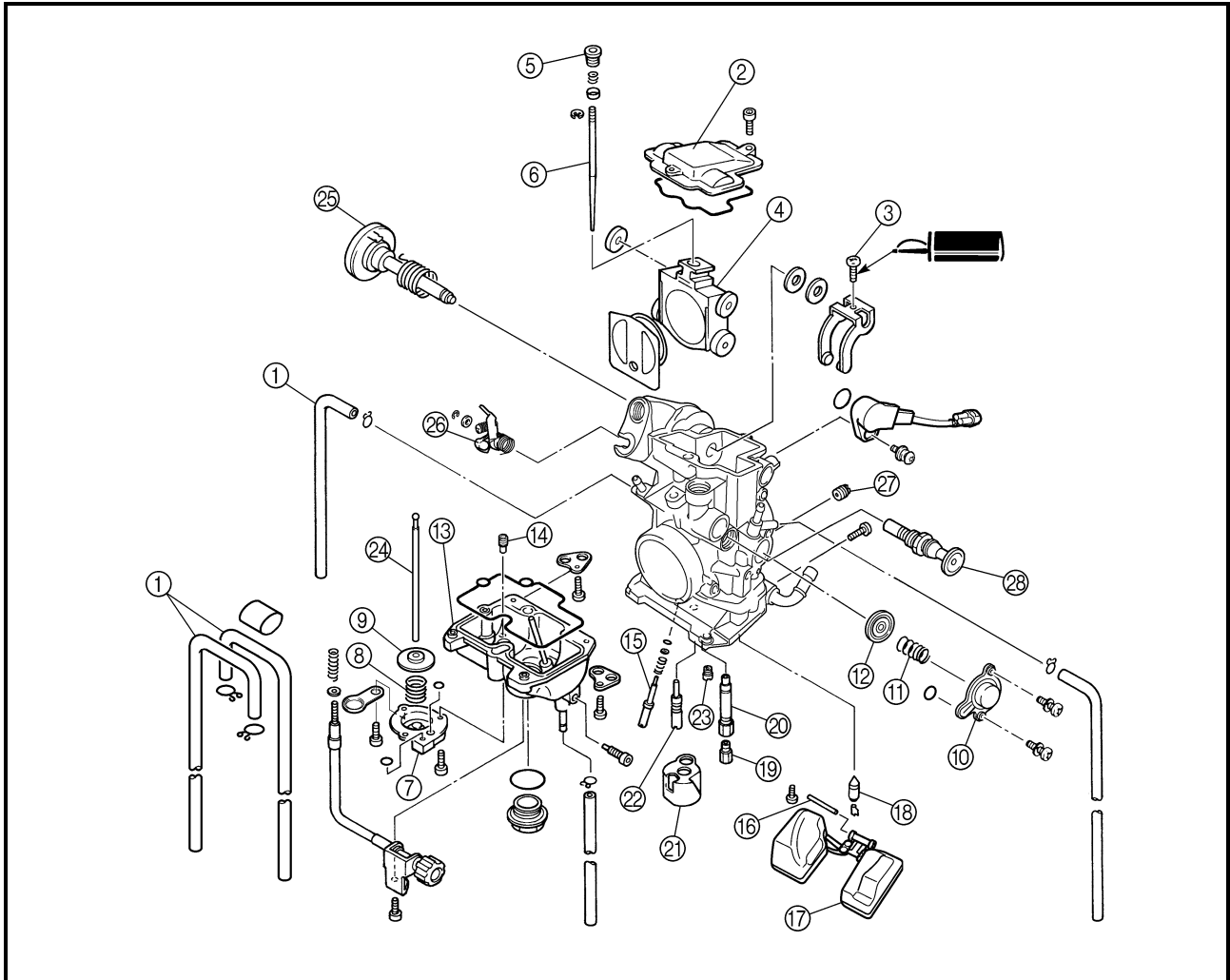
EC468000

CARBURETOR DISASSEMBLY

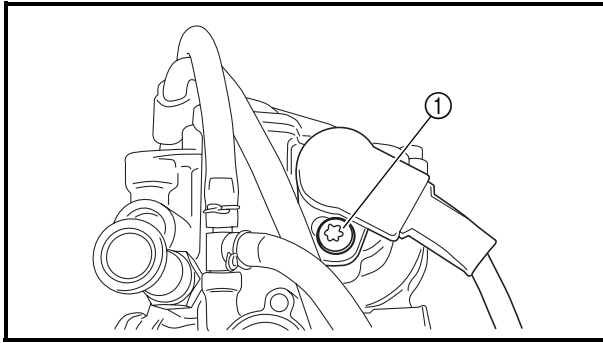


Extent of removal: ① Carburetor disassembly

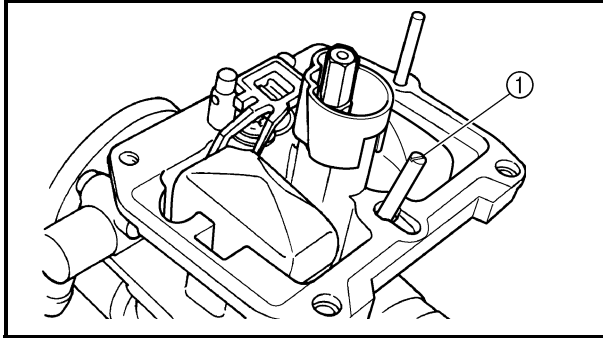
Extent of removal	Order	Part name	Q'ty	Remarks
		<b>CARBURETOR DISASSEMBLY</b>		
	①	Carburetor breather hose	4	
	②	Valve lever housing cover	1	
	③	Screw (throttle shaft)	1	
	④	Throttle valve	1	
	⑤	Needle holder	1	
	⑥	Jet needle	1	
	⑦	Accelerator pump cover	1	
	⑧	Spring	1	
	⑨	Diaphragm (accelerator pump)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



Extent of removal	Order	Part name	Q'ty	Remarks	
	⑬	Float pin	1		
	⑭	Float	1		
	⑮	Needle valve	1		
	⑯	Main jet	1		
	⑰	Needle jet	1		
	⑱	Spacer	1		
	⑲	Pilot jet	1		
	⑳	Starter jet	1		
	㉑	Push rod	1		Pull the push rod.
	㉒	Throttle shaft assembly	1		
		㉓	Push rod link lever assembly		1
		㉔	Pilot air jet		1
		㉕	Cold starter plunger		1

**HANDLING NOTE****CAUTION:**

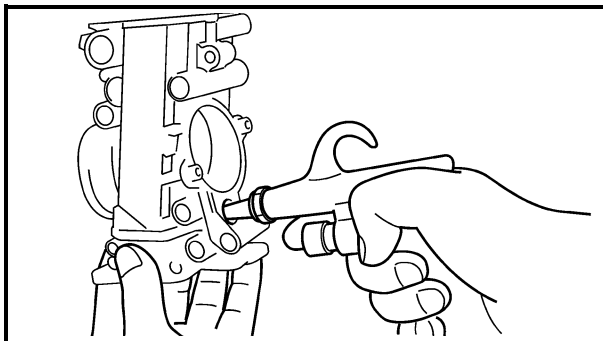
Do not loosen the screws (throttle position sensor) ① except when changing the throttle position sensor due to failure because it will cause a drop in engine performance.

**REMOVAL POINTS****Pilot screw**

1. Remove:
  - Pilot screw ①

**NOTE:**

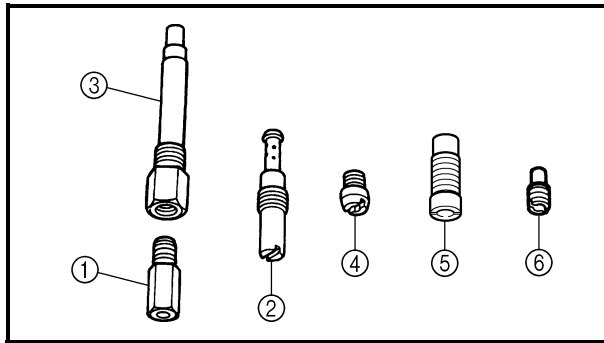
To optimize the fuel flow at a small throttle opening, each machine's pilot screw has been individually set at the factory. Before removing the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

**INSPECTION****Carburetor**

1. Inspect:
  - Carburetor body
 Contamination → Clean.

**NOTE:**

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

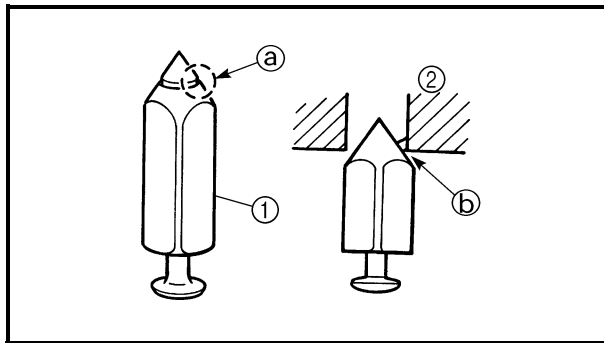


2. Inspect:

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

**NOTE:**

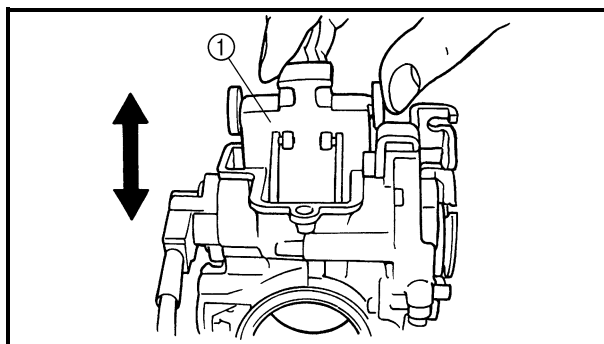
- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.
- Never use a wire.



**Needle valve**

1. Inspect:

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



EC464301

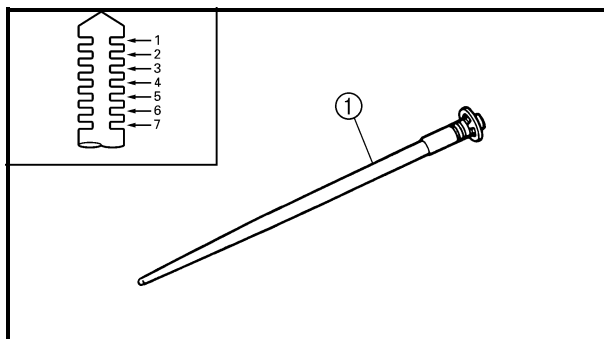
**Throttle valve**

1. Check:

- Free movement
- Stick → Repair or replace.

**NOTE:**

Insert the throttle valve ① into the carburetor body, and check for free movement.



EC464401

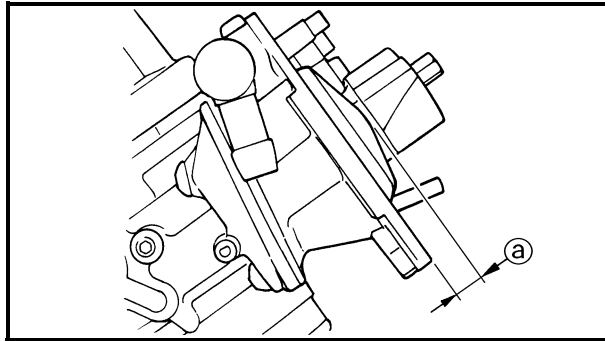
**Jet needle**

1. Inspect:

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



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



**Float height**

1. Measure:

- Float height ①

Out of specification → Adjust.



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

**Measurement and adjustment steps:**

- Hold the carburetor in an upside down position.

**NOTE:**

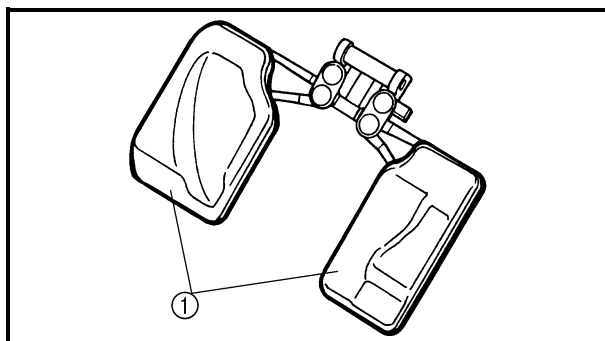
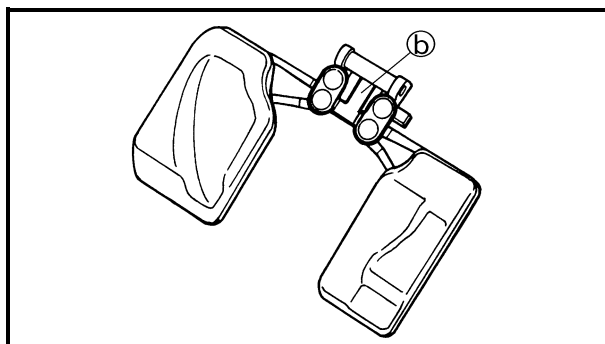
- Slowly tilt the carburetor in the opposite direction, then take the measurement when the needle valve aligns with the float arm.
- If the carburetor is level, the weight of the float will push in the needle valve, resulting in an incorrect measurement.

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

**NOTE:**

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

- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tab ② on the float.
- Recheck the float height.



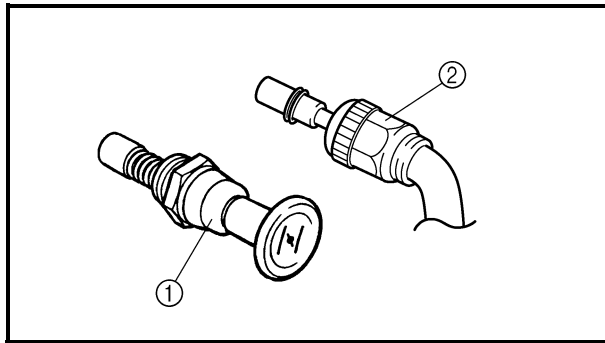
EC464600

**Float**

1. Inspect:

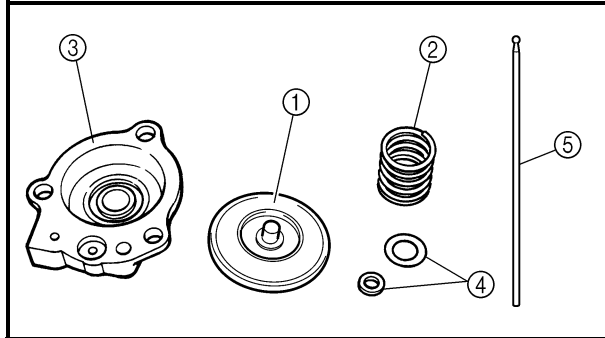
- Float ①

Damage → Replace.



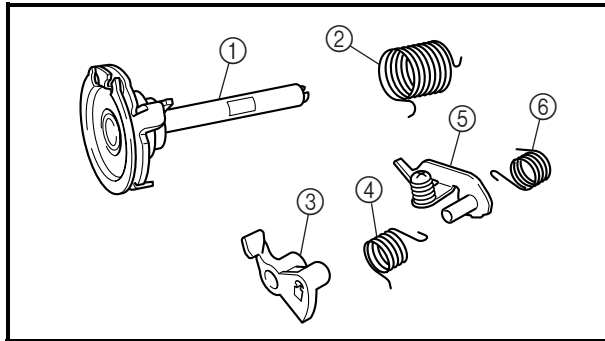
**Starter plunger**

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

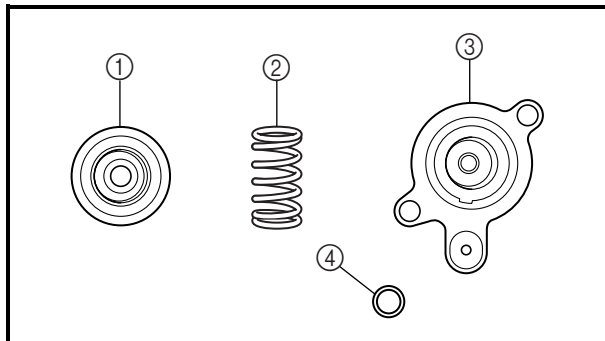


**Accelerator pump**

1. Inspect:
  - Diaphragm (accelerator pump) ①
  - Spring (accelerator pump) ②
  - Accelerator pump cover ③
  - O-ring ④
  - Push rod ⑤
 Tears (diaphragm)/damage → Replace.  
 Dirt → Clean.

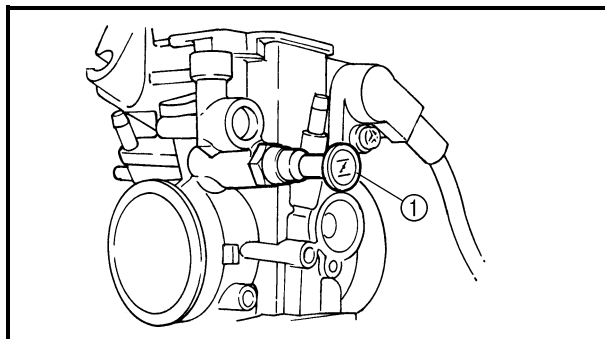


2. Inspect:
  - Throttle shaft ①
  - Spring ②
  - Lever 1 ③
  - Spring 1 ④
  - Lever 2 ⑤
  - Spring 2 ⑥
 Dirt → Clean.



**Air cut valve**

1. Inspect:
  - Diaphragm (air cut valve) ①
  - Spring (air cut valve) ②
  - Air cut valve cover ③
  - O-ring ④
 Tears (diaphragm)/damage → Replace.

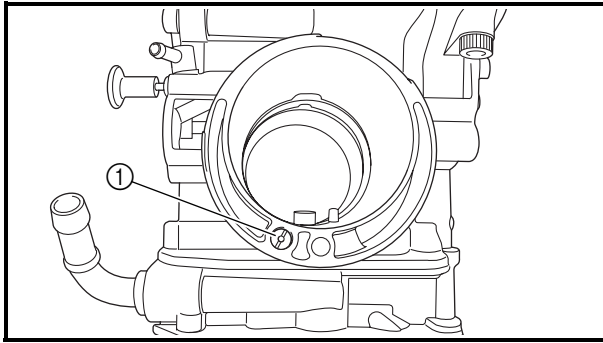


**ASSEMBLY AND INSTALLATION**

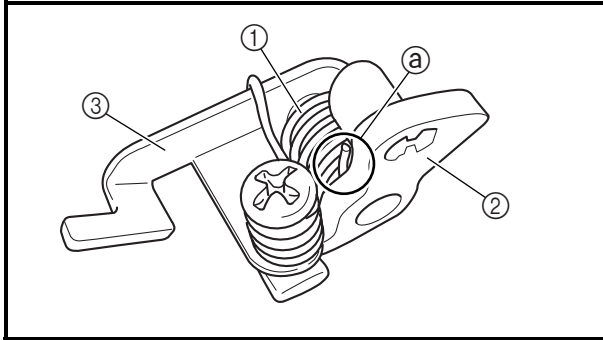
**Carburetor**

1. Install:
  - Cold starter plunger ①



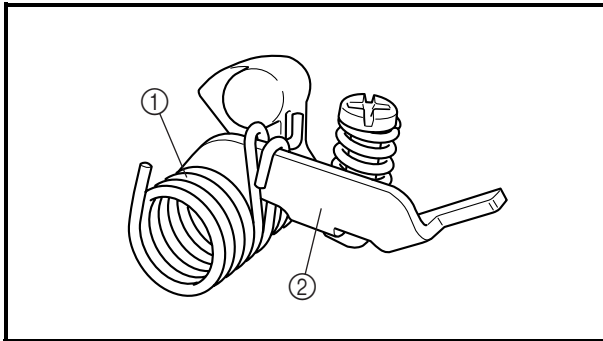


2. Install:
- Pilot air jet ①

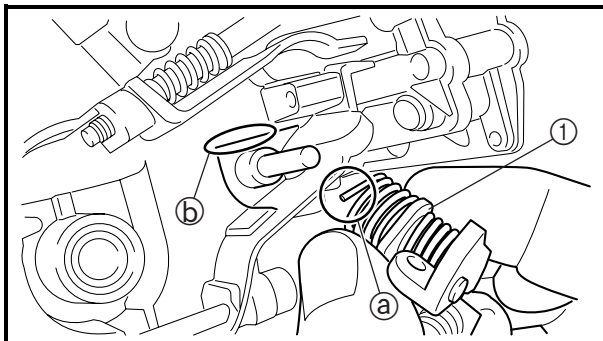


3. Install:
- Spring 1 ①
  - Lever 1 ②
  - To lever 2 ③.

**NOTE:** \_\_\_\_\_  
 Make sure the spring 1 fits on the stopper (a) of the lever 2.  
 \_\_\_\_\_

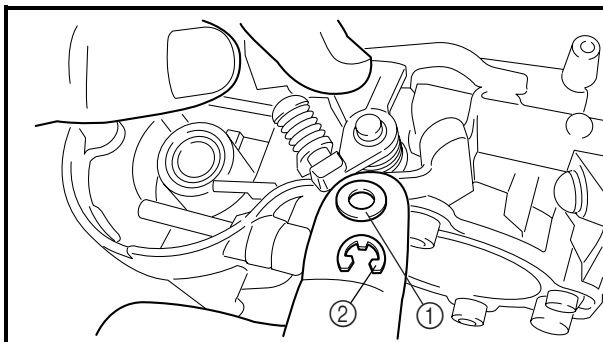


4. Install:
- Spring 2 ①
  - To lever 2 ②.

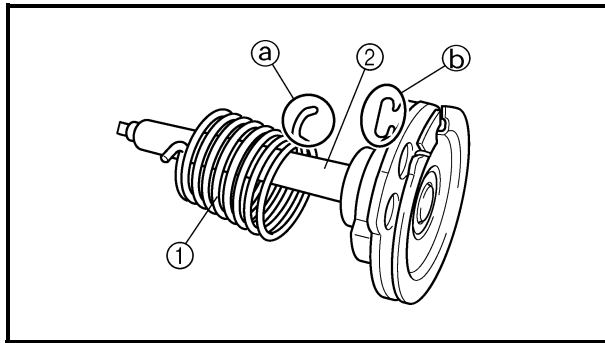


5. Install:
- Push rod link lever assembly ①

**NOTE:** \_\_\_\_\_  
 Make sure the stopper (a) of the spring 2 fits into the recess (b) in the carburetor.  
 \_\_\_\_\_

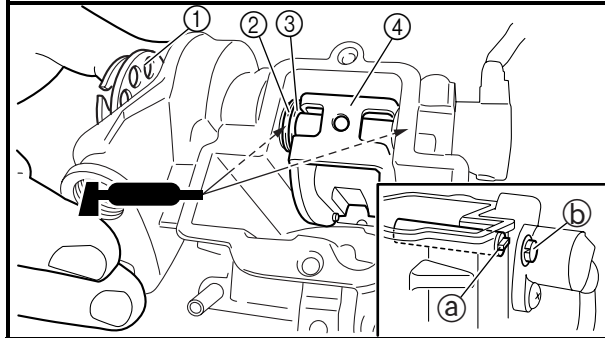


6. Install:
- Washer ①
  - Circlip ②



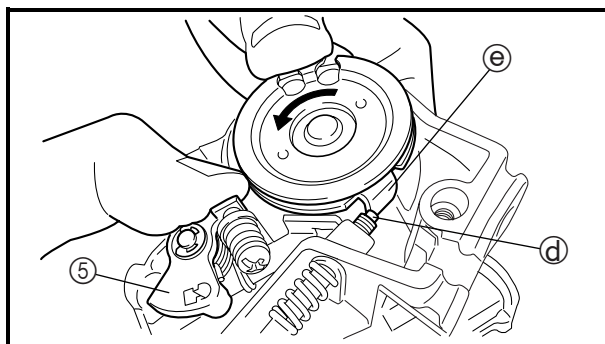
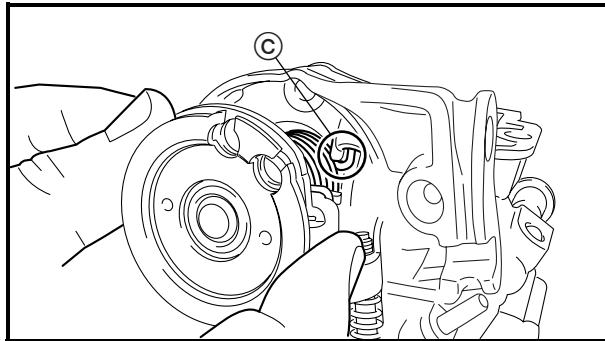
7. Install:
- Spring ①  
To throttle shaft ②.

**NOTE:** \_\_\_\_\_  
Install the bigger hook (a) of the spring fits on the stopper (b) of the throttle shaft pulley.



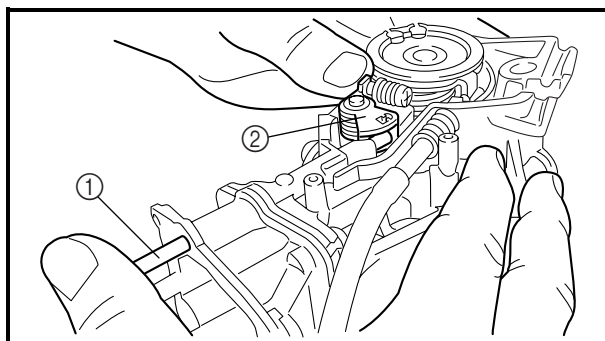
8. Install:
- Throttle shaft assembly ①
  - Washer (metal) ②
  - Washer (resin) ③
  - Valve lever ④

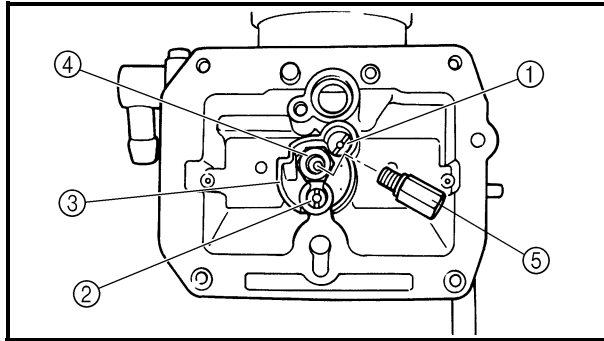
**NOTE:** \_\_\_\_\_  
• Apply the fluorochemical grease on the bearings.  
• Fit the projection (a) on the throttle shaft assembly into the slot (b) in the throttle position sensor.  
• Make sure the stopper (c) of the spring fits into the recess in the carburetor.  
• Turn the throttle shaft assembly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



9. Install:
- Push rod ①

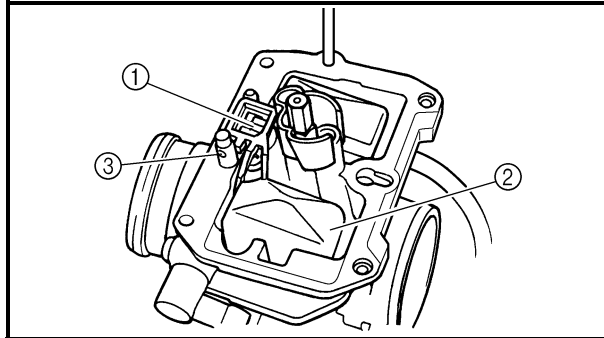
**NOTE:** \_\_\_\_\_  
While holding down the lever 1 (2), insert the push rod farthest into the carburetor.





### 10. Install:

- Starter jet ①
- Pilot jet ②
- Spacer ③
- Needle jet ④
- Main jet ⑤

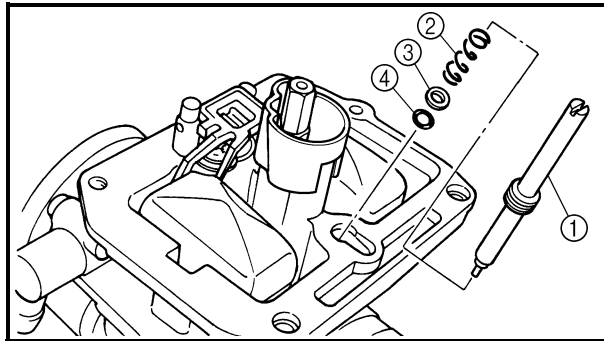


### 11. Install:

- Needle valve ①
- Float ②
- Float pin ③

### NOTE:

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



### 12. Install:

- Pilot screw ①
- Spring ②
- Washer ③
- O-ring ④

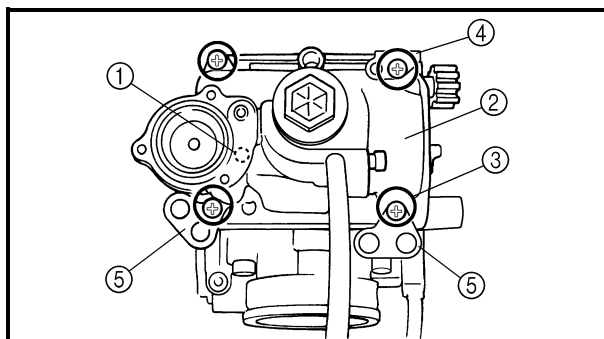
### Note the following installation points:

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



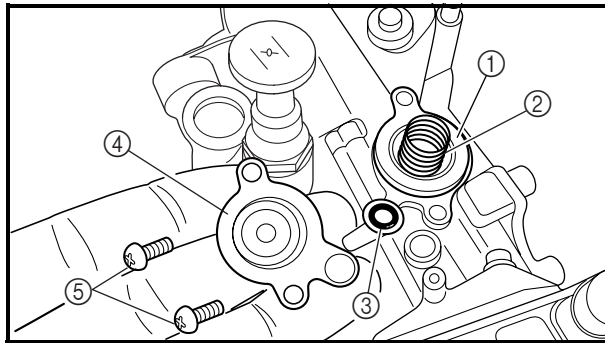
**Pilot screw:**  
**2 turns out (example)**  
 \* 1-1/2 turns out

\* Except for USA



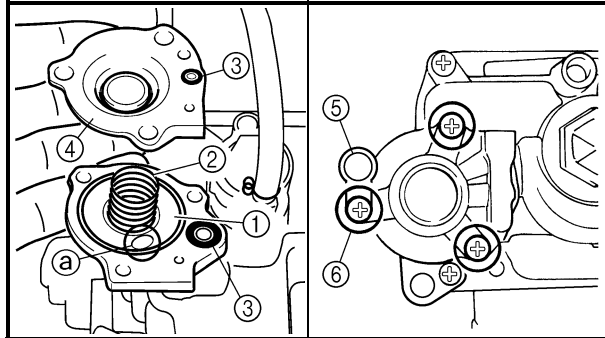
### 13. Install:

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



14. Install:

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

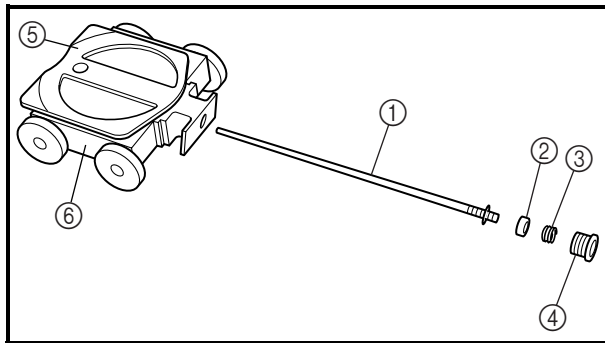


15. Install:

- Diaphragm (accelerator pump) ①
- Spring ②
- O-ring ③
- Accelerator pump cover ④
- Hose holder (drain hose) ⑤
- Screw (accelerator pump cover) ⑥

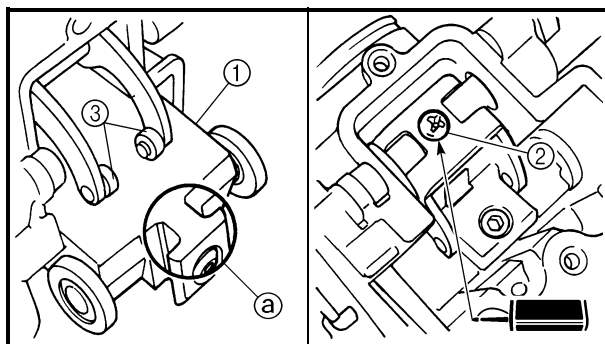
**NOTE:**

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



16. Install:

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

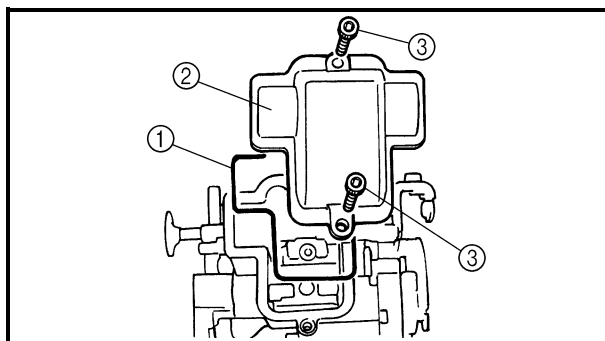


17. Install:

- Throttle valve assembly ①
- Screw (throttle shaft) ②

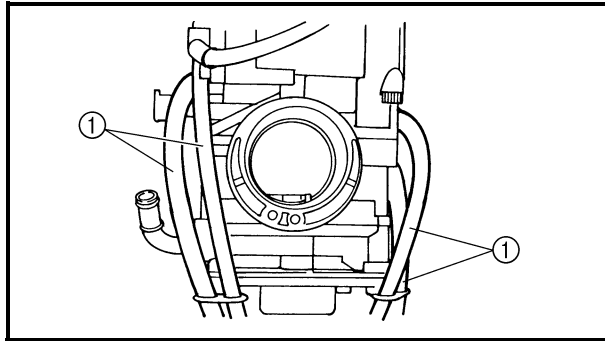
**NOTE:**

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



18. Install:

- O-ring ①
- Valve lever housing cover ②
- Bolt (valve lever housing cover) ③

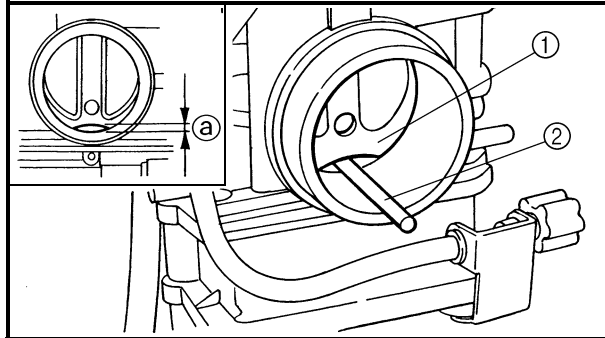


19. Install:

- Carburetor breather hose ①

**NOTE:**

Install the carburetor breather hoses to the carburetor so that the hoses do not bend near where they are installed.



**Accelerator pump timing adjustment**

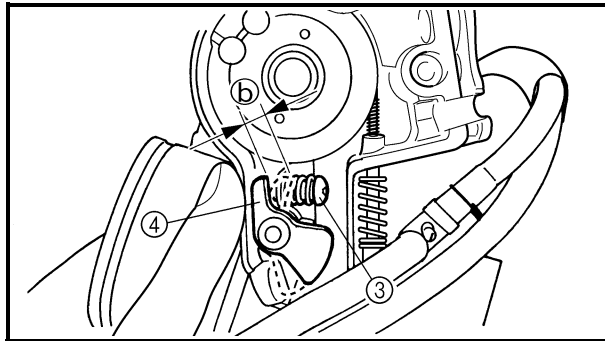
**Adjustment steps:**

**NOTE:**

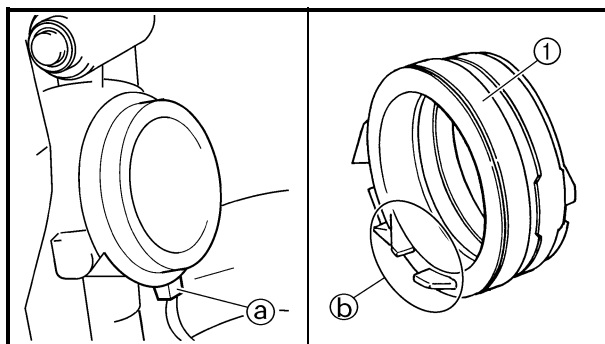
In order for the throttle valve height ② to achieve the specified value, tuck under the throttle valve plate ① the rod etc. with the same outer diameter as the specified value.



**Throttle valve height:  
1.5 mm (0.06 in)**



- Fully turn in the accelerator pump adjusting screw ③.
- Check that the link lever ④ has free play ⑤ by pushing lightly on it.
- Gradually turn out the adjusting screw while moving the link lever until it has no more free play.



**Carburetor installation**

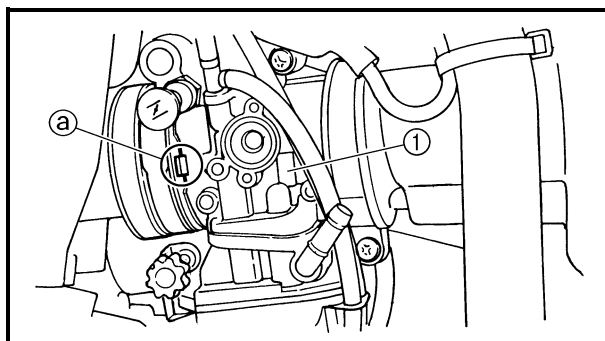
1. Install:

- Carburetor joint ①

**3 Nm (0.3 m · kg, 2.2 ft · lb)**

**NOTE:**

Install the projection ② on the cylinder between the carburetor joint slots ③.

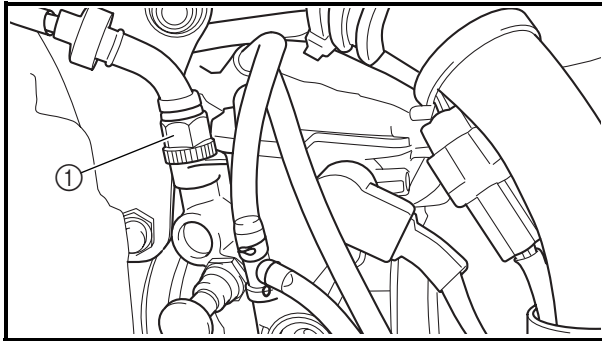


2. Install:

- Carburetor ①

**NOTE:**

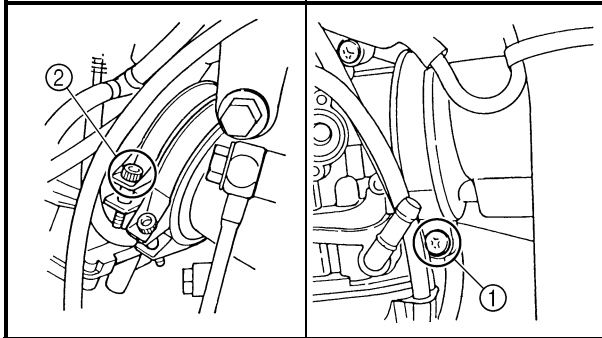
Install the projection ② between the carburetor joint slots.



### 3. Install:

- Hot starter plunger ①

2 Nm (0.2 m · kg, 1.4 ft · lb)



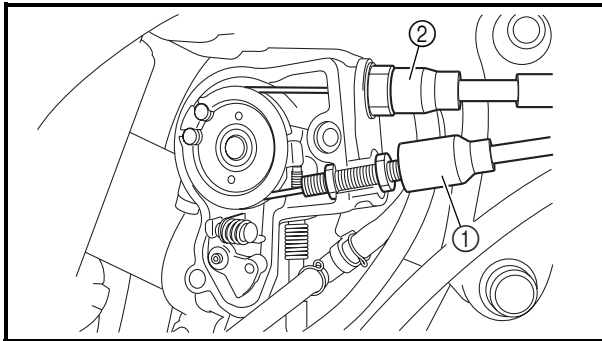
### 4. Tighten:

- Screw (air filter joint) ①

3 Nm (0.3 m · kg, 2.2 ft · lb)

- Screw (carburetor joint) ②

3 Nm (0.3 m · kg, 2.2 ft · lb)



### 5. Install:

- Throttle cable (pull) ①

4 Nm (0.4 m · kg, 2.9 ft · lb)

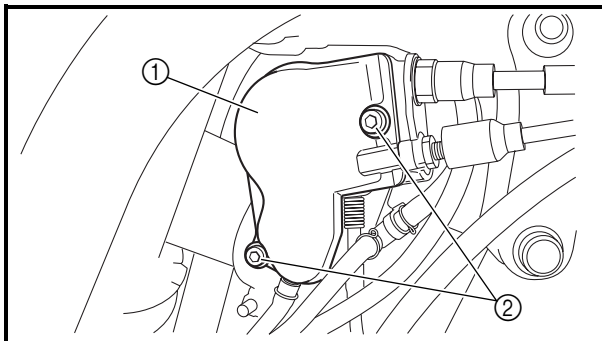
- Throttle cable (return) ②

11 Nm (1.1 m · kg, 8.0 ft · lb)

### 6. Adjust:

- Throttle grip free play

Refer to “THROTTLE CABLE ADJUSTMENT” section in the CHAPTER 3.

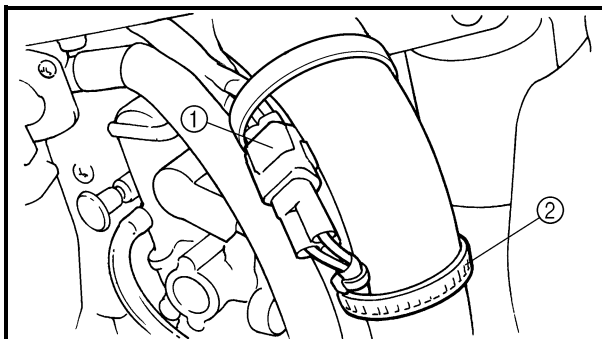


### 7. Install:

- Throttle cable cover ①

- Screw (throttle cable cover) ②

4 Nm (0.4 m · kg, 2.9 ft · lb)

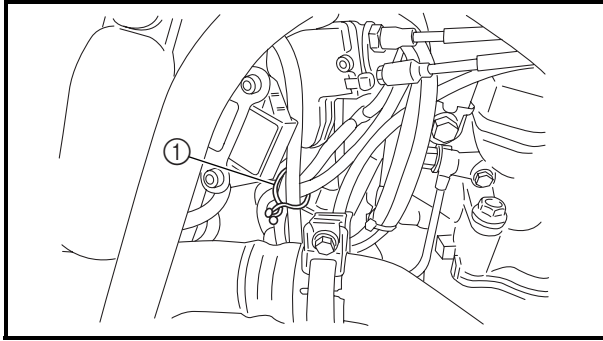


### 8. Install:

- Throttle position sensor lead coupler ①

- Clamp ②

Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.



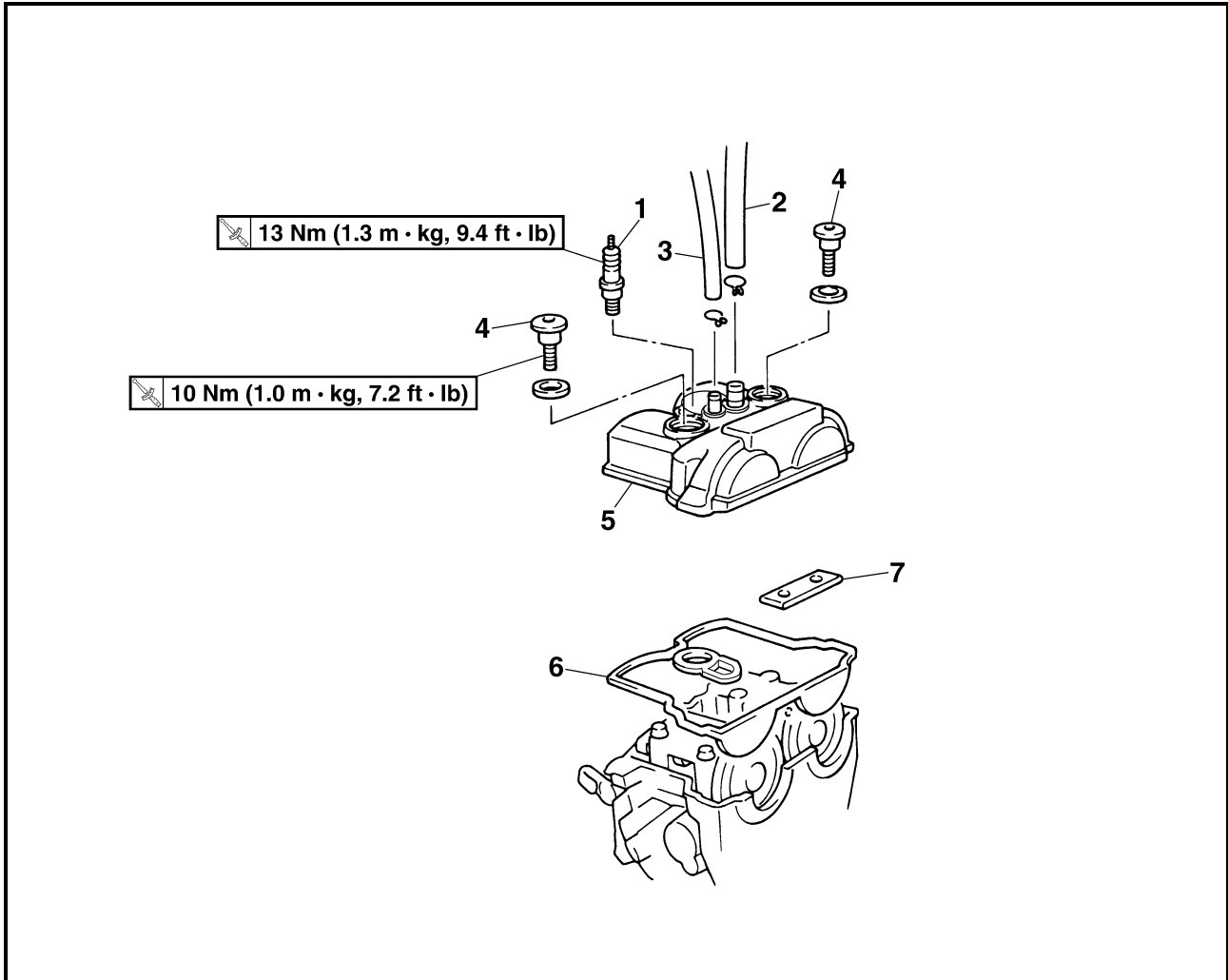
## 9. Install:

- Clamp ①

Refer to “CABLE ROUTING DIAGRAM”  
section in the CHAPTER 2.



**CAMSHAFTS**  
CYLINDER HEAD COVER



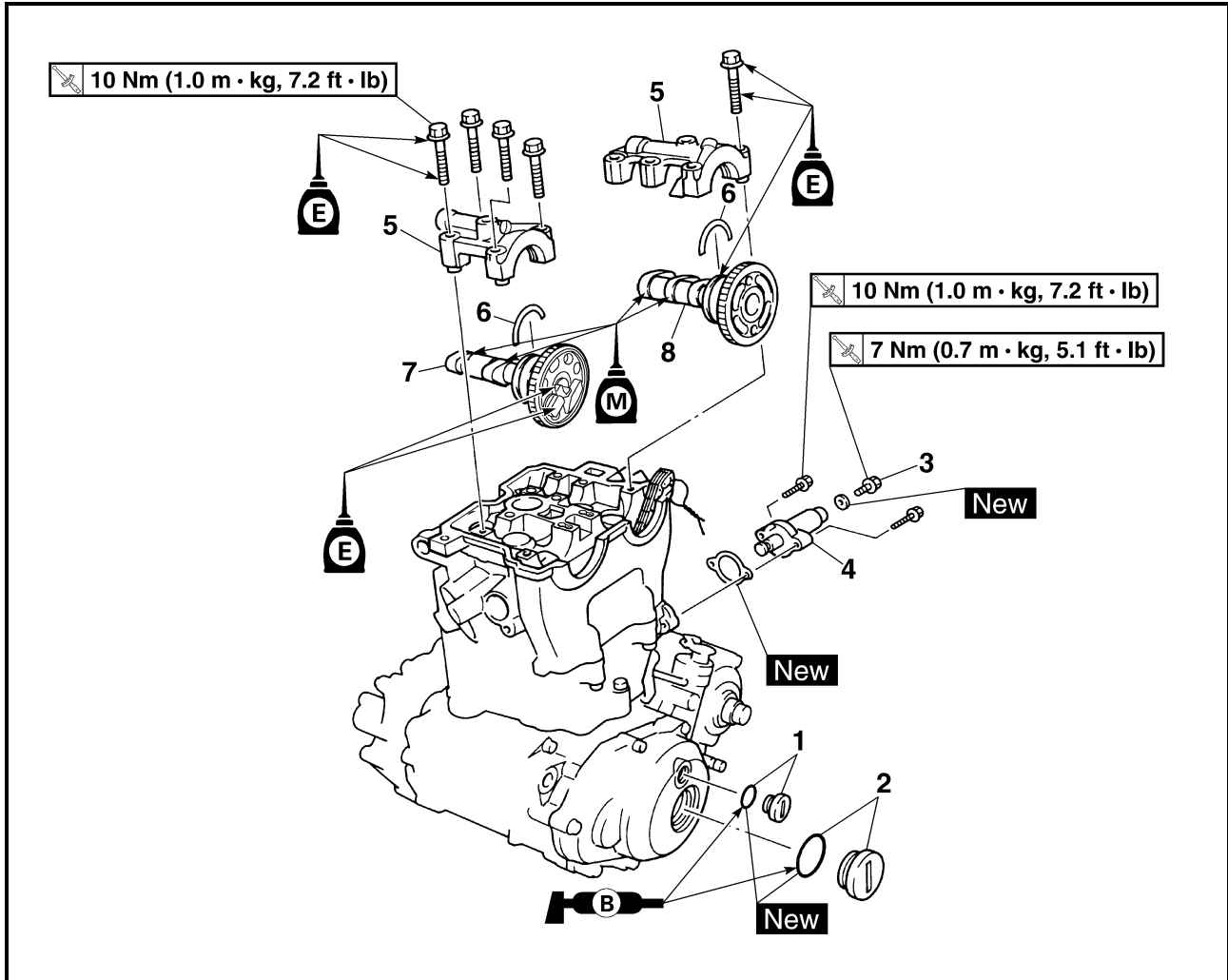
Extent of removal: ① Cylinder head cover removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>CYLINDER HEAD COVER REMOVAL</b>		
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Carburetor		Refer to "CARBURETOR" section.
	1	Spark plug	1	
	2	Cylinder head breather hose	1	
	3	Oil tank breather hose	1	
	4	Bolt (cylinder head cover)	2	
	5	Cylinder head cover	1	
	6	Cylinder head cover gasket	1	
	7	Timing chain guide (top side)	1	



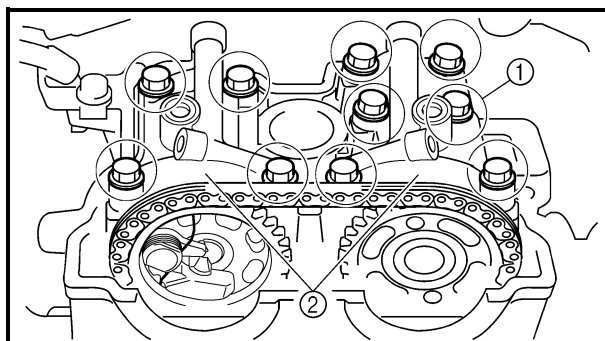
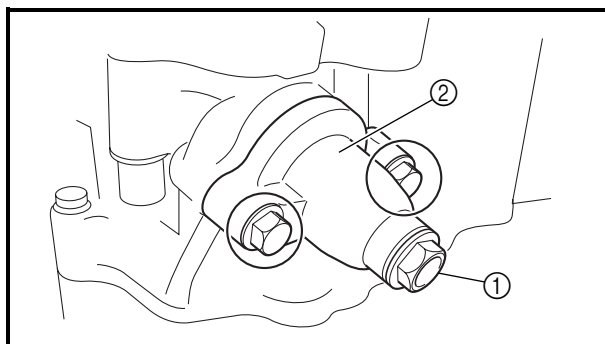
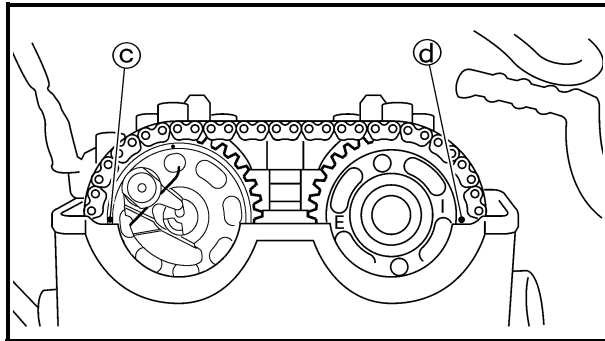
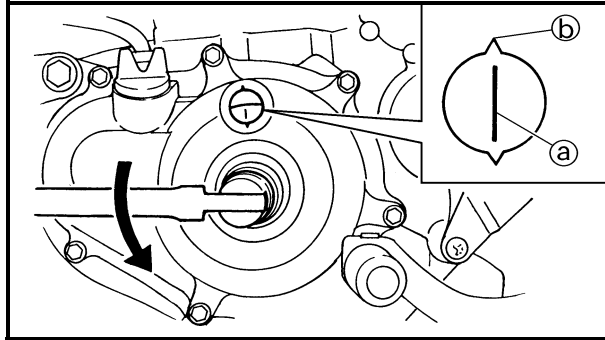
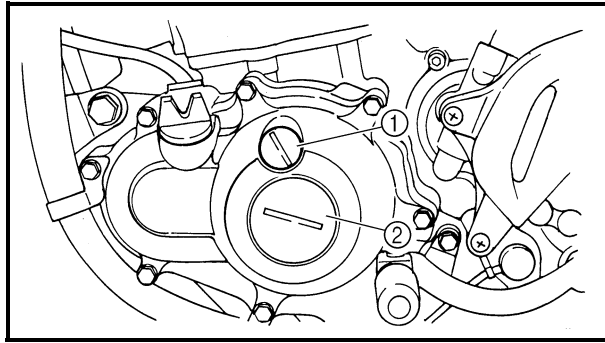


CAMSHAFTS



Extent of removal: ① Camshaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
	<b>CAMSHAFTS REMOVAL</b>			
	1	Timing mark accessing screw	1	Refer to "REMOVAL POINTS".
	2	Crankshaft end accessing screw	1	
	3	Timing chain tensioner cap bolt	1	
	4	Timing chain tensioner	1	
	5	Camshaft cap	2	
	6	Clip	2	
	7	Exhaust camshaft	1	
8	Intake camshaft	1		



## REMOVAL POINTS

### Camshaft

- Remove:
  - Timing mark accessing screw ①
  - Crankshaft end accessing screw ②

- Align:
  - T.D.C. mark  
With align mark.

### Checking steps:

- Turn the crankshaft counterclockwise with a wrench.
- Align the T.D.C. mark ① on the rotor with the align mark ② on the crankcase cover when piston is at T.D.C. on compression stroke.

### NOTE:

In order to be sure that the piston is at Top Dead Center, the punch mark ③ on the exhaust camshaft and the punch mark ④ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

- Remove:
  - Timing chain tensioner cap bolt ①
  - Timing chain tensioner ②
  - Gasket

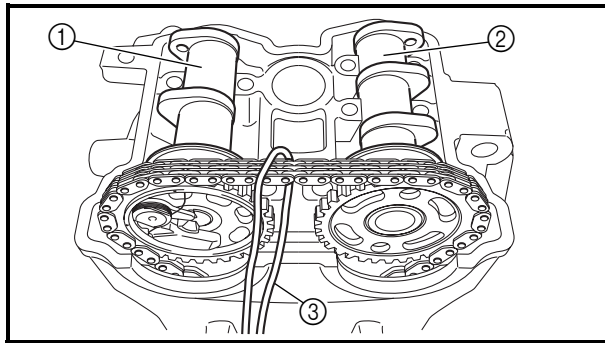
- Remove:
  - Bolt (camshaft cap) ①
  - Camshaft cap ②
  - Clip

### NOTE:

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

### CAUTION:

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

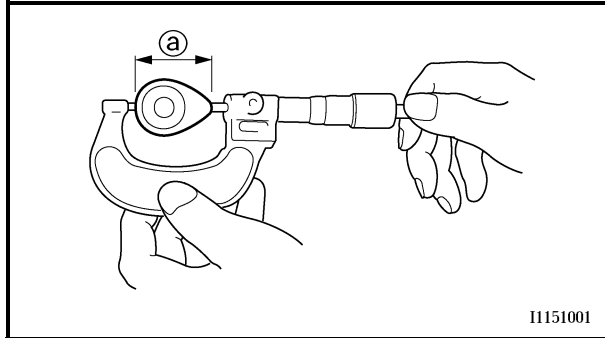


5. Remove:

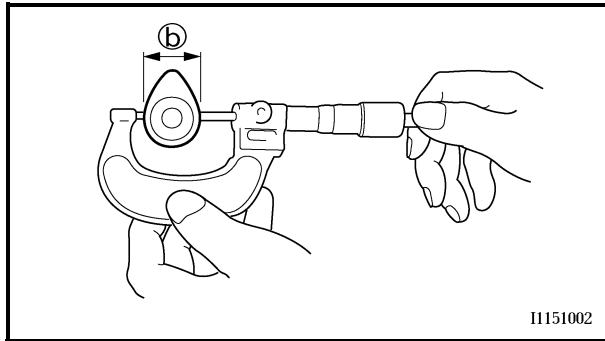
- Exhaust camshaft ①
- Intake camshaft ②

**NOTE:**

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



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**INSPECTION**

**Camshaft**

1. Inspect:

- Cam lobe  
Pitting/scratches/blue discoloration → Replace.

2. Measure:

- Cam lobe length ① and ②  
Out of specification → Replace.



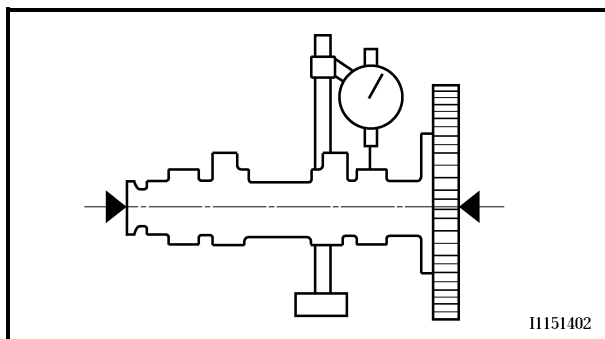
**Cam lobes length:**

**Intake:**

- ① 30.296 ~ 30.346 mm  
(1.1923 ~ 1.1947 in)  
<Limit>: 30.196 mm  
(1.1888 in)
- ② 22.45 ~ 22.55 mm  
(0.8839 ~ 0.8878 in)  
<Limit>: 22.35 mm  
(0.8799 in)

**Exhaust:**

- ① 30.399 ~ 30.499 mm  
(1.1968 ~ 1.2007 in)  
<Limit>: 30.299 mm  
(1.1929 in)
- ② 22.45 ~ 22.55 mm  
(0.8839 ~ 0.8878 in)  
<Limit>: 22.35 mm  
(0.8799 in)



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3. Measure:

- Runout (camshaft)  
Out of specification → Replace.



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



## 4. Measure:

- Camshaft-to-cap clearance  
Out of specification → Measure camshaft outside diameter.



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

**Measurement steps:**

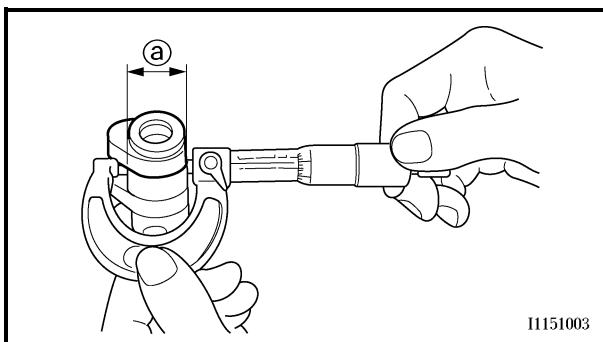
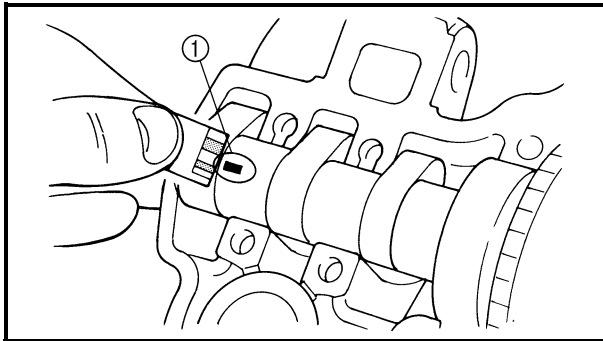
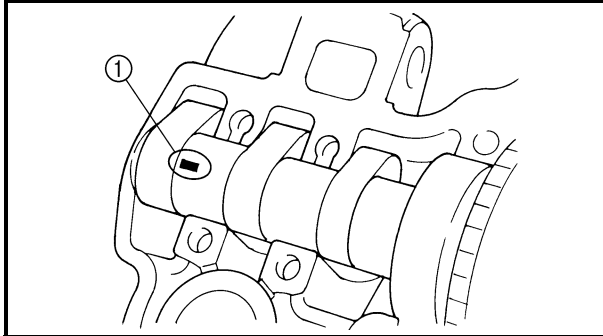
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the clip, dowel pins and camshaft caps.



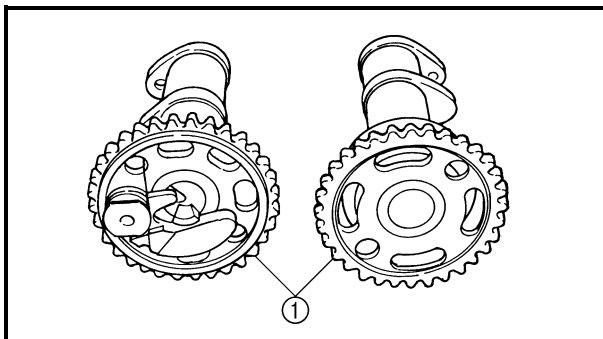
**Bolt (camshaft cap):**  
10 Nm (1.0 m • kg, 7.2 ft • lb)

**NOTE:**

- Tighten the bolts (camshaft cap) in a criss-cross pattern from innermost to outer caps.
- Do not turn the camshaft when measuring clearance with the Plastigauge®.
- Remove the camshaft caps and measure the width of the Plastigauge® ①.



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## 5. Measure:

- Camshaft outside diameter (a)  
Out of specification → Replace the camshaft.  
Within specification → Replace camshaft case and camshaft caps as a set.

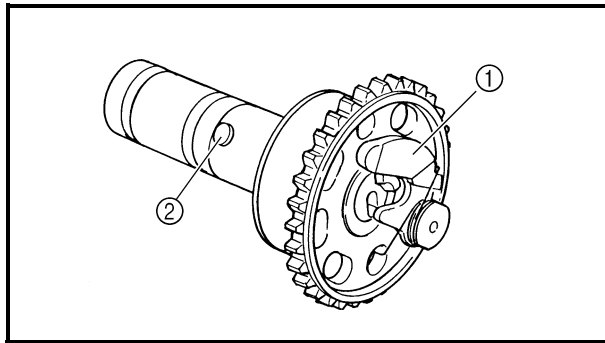


**Camshaft outside diameter:**  
21.967 ~ 21.980 mm  
(0.8648 ~ 0.8654 in)

**Camshaft sprocket**

## 1. Inspect:

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

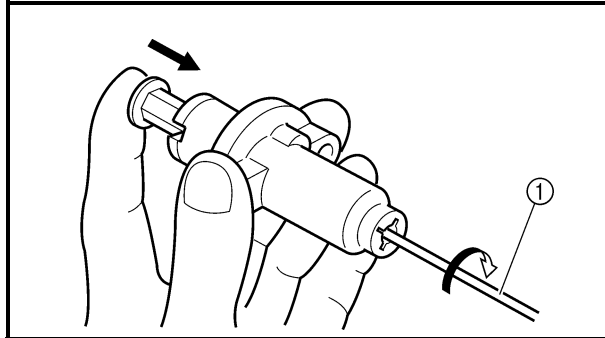


### Decompression system

1. Check:
  - Decompression system

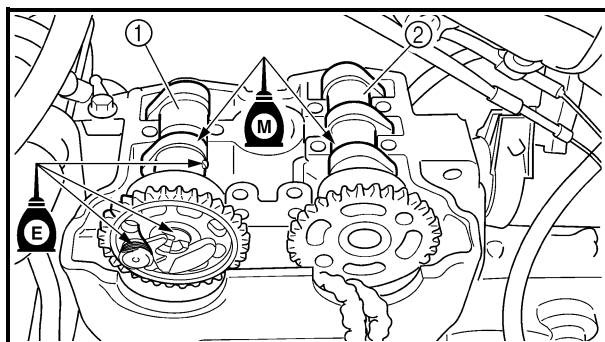
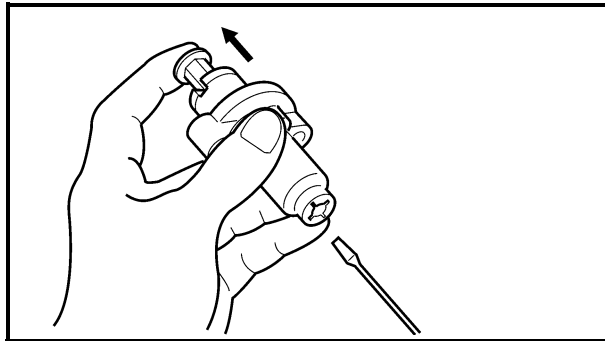
#### Checking steps:

- Check that the decompression mechanism cam ① moves smoothly.
- Check that the decompression mechanism cam lever pin ② projects from the camshaft.



### Timing chain tensioner

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



## ASSEMBLY AND INSTALLATION

### Camshaft

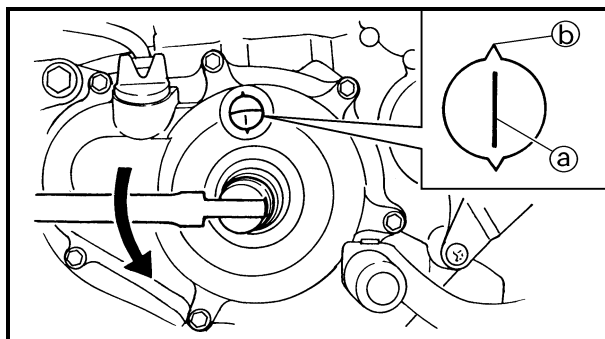
1. Install:
  - Exhaust camshaft ①
  - Intake camshaft ②

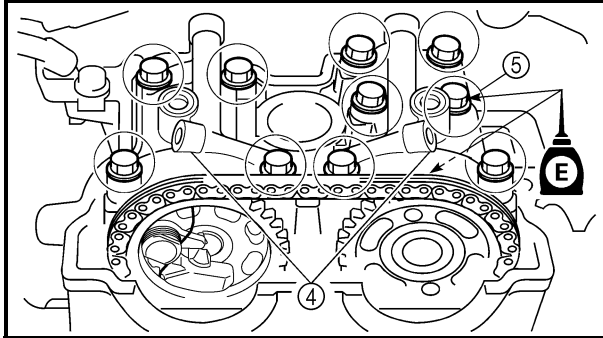
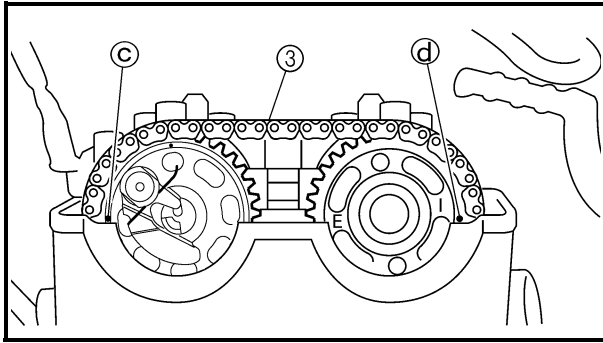
#### Installation steps:

- Turn the crankshaft counterclockwise with a wrench.

#### NOTE:

- Apply the molybdenum disulfide oil on the camshafts.
  - Apply the engine oil on the decompression system.
  - Squeezing the decompression lever allows the crankshaft to be turned easily.
- 
- Align the T.D.C. mark ① on the rotor with the align mark ② on the crankcase cover when piston is at T.D.C. on compression stroke.





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

**NOTE:**

The camshafts should be installed onto the cylinder head so that the punch mark © on the exhaust camshaft and the punch mark ⓓ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

**CAUTION:**

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

- Install the clips, camshaft caps ④ and bolts (camshaft cap) ⑤.

**Bolt (camshaft cap):**

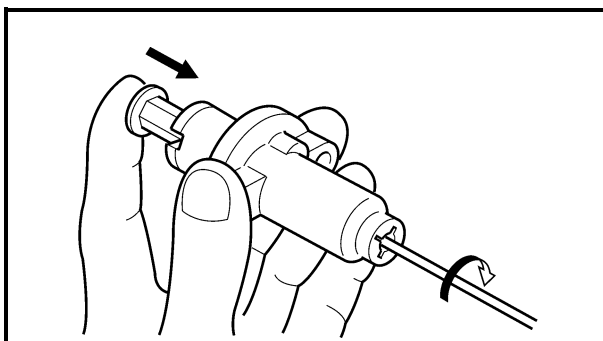
**10 Nm (1.0 m • kg, 7.2 ft • lb)**

**NOTE:**

- Before removing the clips, cover the cylinder head with a clean rag to prevent the clips from into the cylinder head cavity.
- Apply the engine oil on the thread and contact surface of the bolts (camshaft cap).
- Tighten the bolts (camshaft cap) in a criss-cross pattern.

**CAUTION:**

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

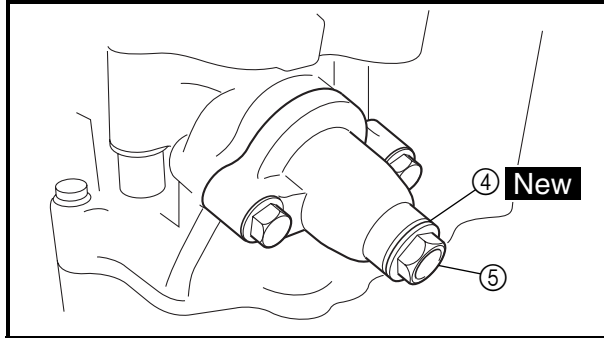
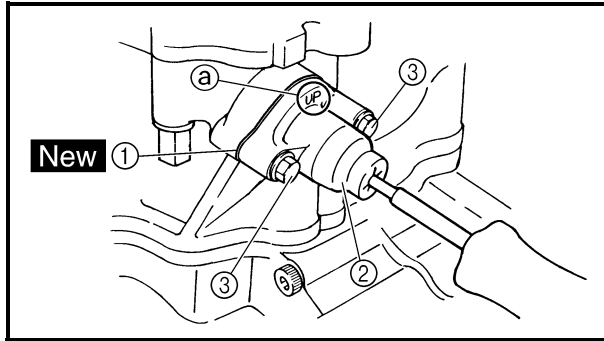


## 2. Install:

- Timing chain tensioner

**Installation steps:**

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



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



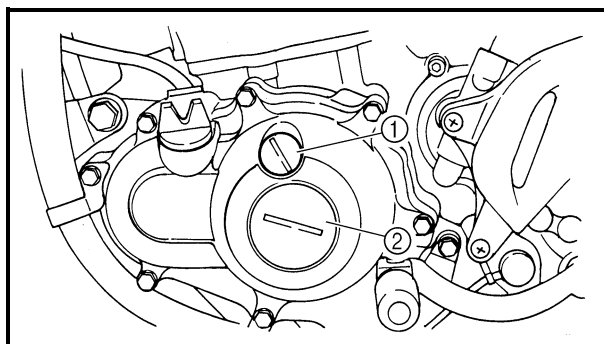
**Bolt (timing chain tensioner):**  
10 Nm (1.0 m • kg, 7.2 ft • lb)

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

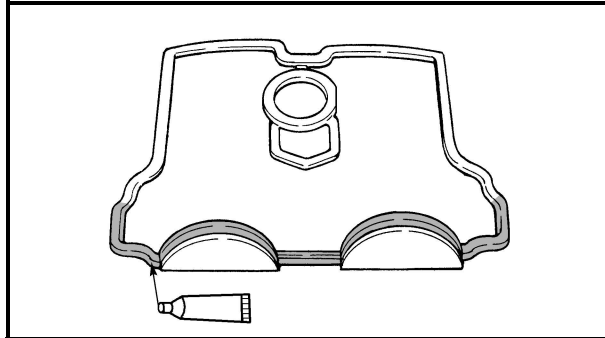
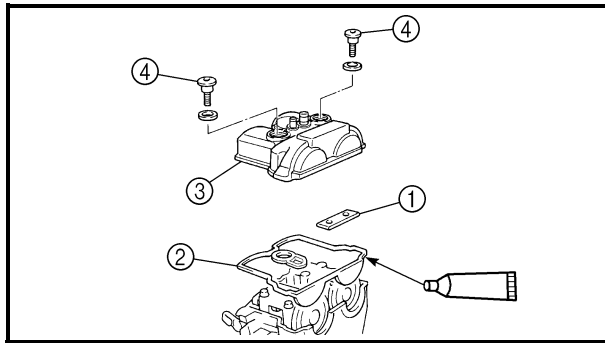


**Tensioner cap bolt:**  
7 Nm (0.7 m • kg, 5.1 ft • lb)

- Turn:
  - Crankshaft  
Counterclockwise several turns.
- Check:
  - Rotor T.D.C. mark  
Align with the crankcase align mark.
  - Camshaft match marks  
Align with the cylinder head surface.  
Out of alignment → Adjust.




- Install:
  - Timing mark accessing screw (1)
  - Crankshaft end accessing screw (2)



## 6. Install:

- Timing chain guide (top side) ①
- Cylinder head cover gasket ②
- Cylinder head cover ③
- Bolt (cylinder head cover) ④

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

**NOTE:**


Apply the sealant on the cylinder head cover gasket.



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

## 7. Install:

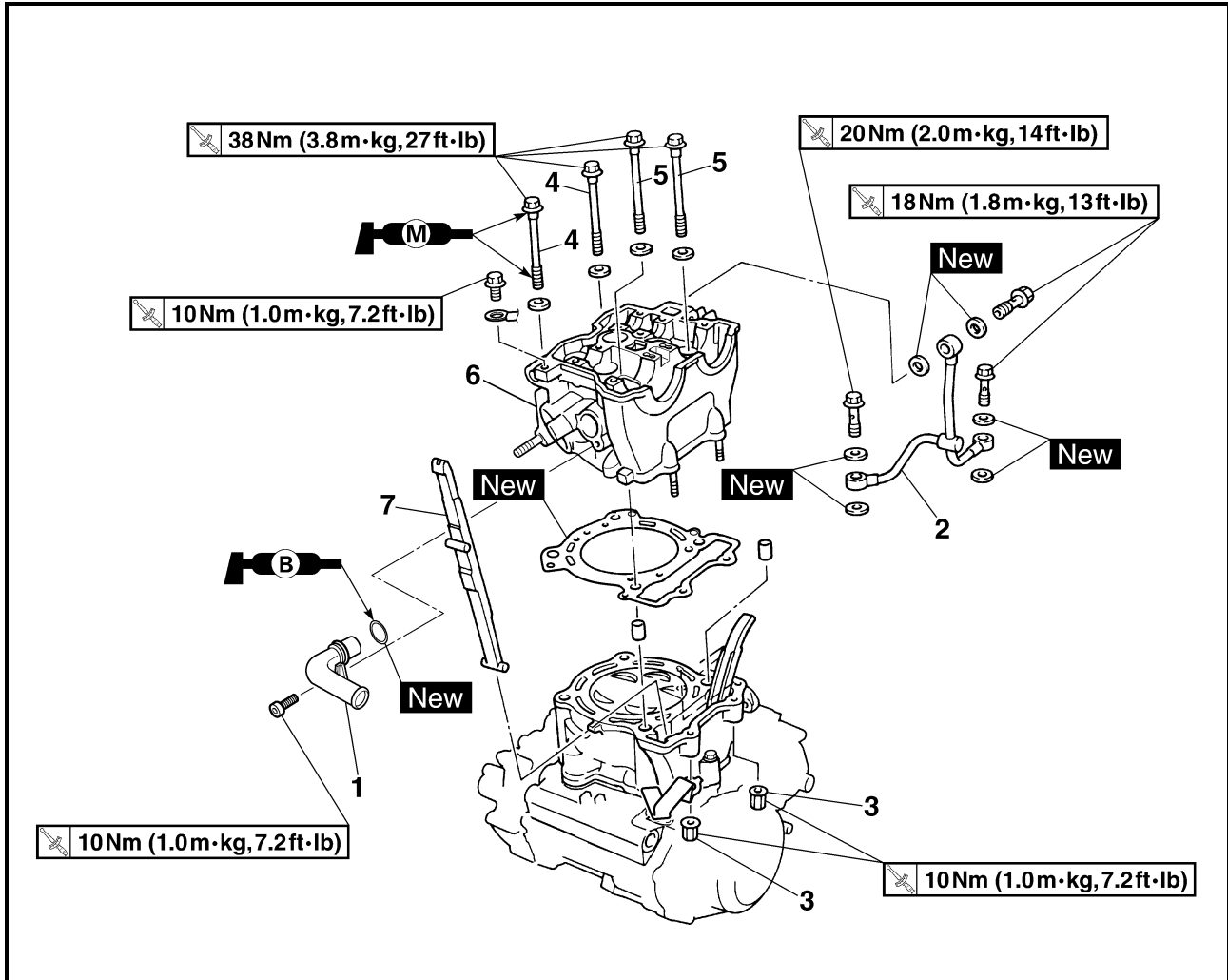
- Oil tank breather hose
- Cylinder head breather hose
- Spark plug

 **13 Nm (1.3 m · kg, 9.4 ft · lb)**



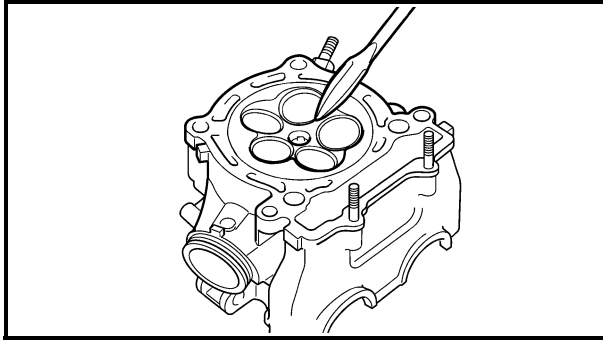


CYLINDER HEAD



Extent of removal: ① Cylinder head removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>CYLINDER HEAD REMOVAL</b>		
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Exhaust pipe and silencer		Refer to "EXHAUST PIPE AND SILENCER" section.
		Radiator hose 1		Disconnect at cylinder head side.
		Carburetor		Refer to "CARBURETOR" section.
		Camshaft		Refer to "CAMSHAFTS" section.
①		Upper engine bracket		Refer to "ENGINE REMOVAL" section.
	1	Radiator pipe	1	
	2	Oil delivery pipe	1	
	3	Nut	2	
	4	Bolt [L=135 mm (5.31 in)]	2	
	5	Bolt [L=145 mm (5.71 in)]	2	
	6	Cylinder head	1	
7	Timing chain guide (exhaust side)	1		

**INSPECTION****Cylinder head**

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

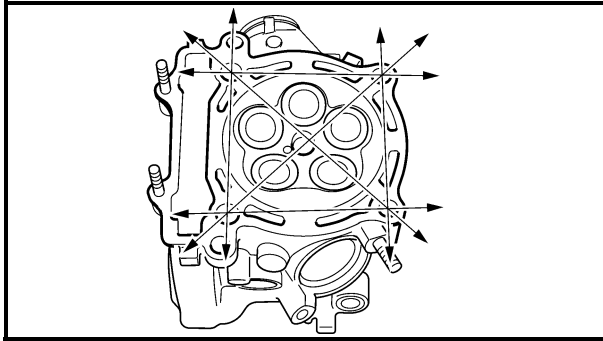
**NOTE:** \_\_\_\_\_

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

- Spark plug threads
- Valve seats

2. Inspect:

- Cylinder head  
Scratches/damage → Replace.



3. Measure:

- Cylinder head warpage  
Out of specification → Resurface.



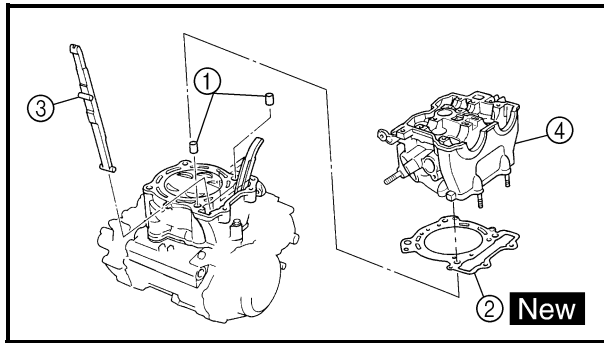
**Cylinder head warpage:**  
**Less than 0.05 mm (0.002 in)**

**Warpage measurement and resurfacing steps:**

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

**NOTE:** \_\_\_\_\_

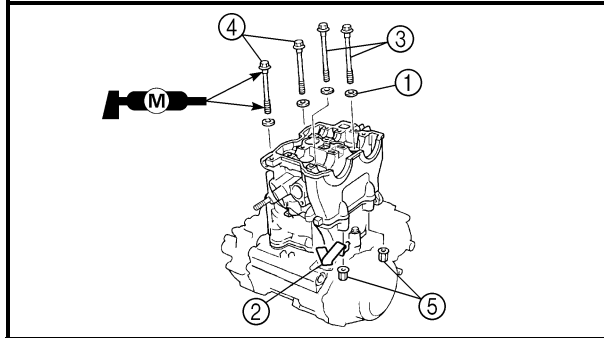
To ensure an even surface rotate the cylinder head several times.  
\_\_\_\_\_

**ASSEMBLY AND INSTALLATION****Cylinder head**

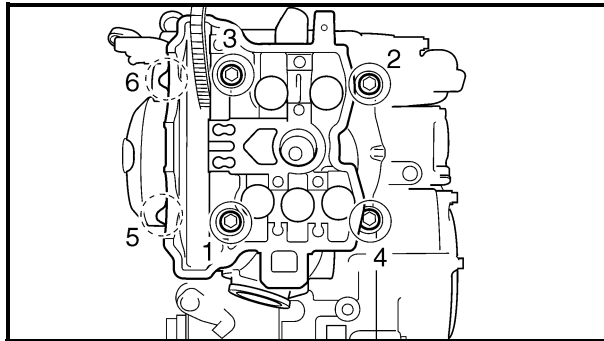
- Install:
  - Dowel pin ①
  - Cylinder head gasket ② **New**
  - Timing chain guide (exhaust side) ③
  - Cylinder head ④

**NOTE:**

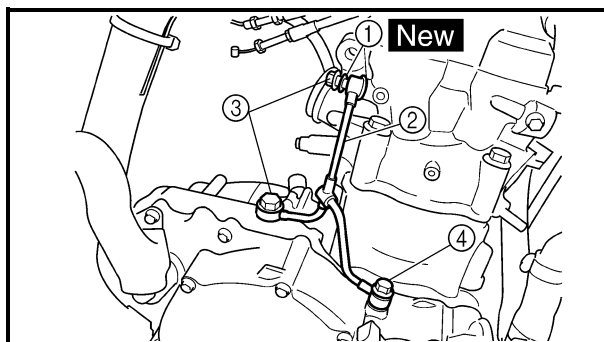
While pulling up the timing chain, install the timing chain guide (exhaust side) and cylinder head.



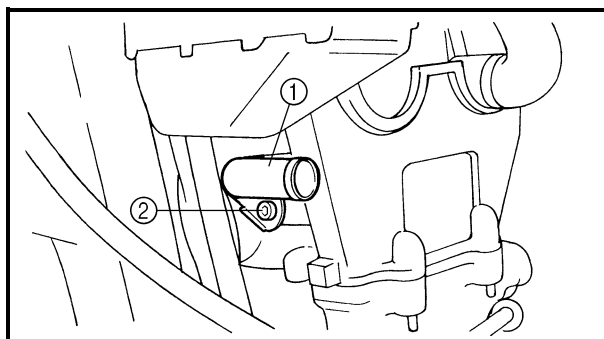
- Install:
  - Washer ①
  - Cable guide ②
  - Bolts [L=145 mm (5.71 in)] ③
    - 38 Nm (3.8 m · kg, 27 ft · lb)**
  - Bolts [L=135 mm (5.31 in)] ④
    - 38 Nm (3.8 m · kg, 27 ft · lb)**
  - Nuts ⑤
    - 10 Nm (1.0 m · kg, 7.2 ft · lb)**

**NOTE:**

- Apply the molybdenum disulfide grease on the thread and contact surface of the bolts.
- Follow the numerical order shown in the illustration. Tighten the bolts and nuts in two stages.

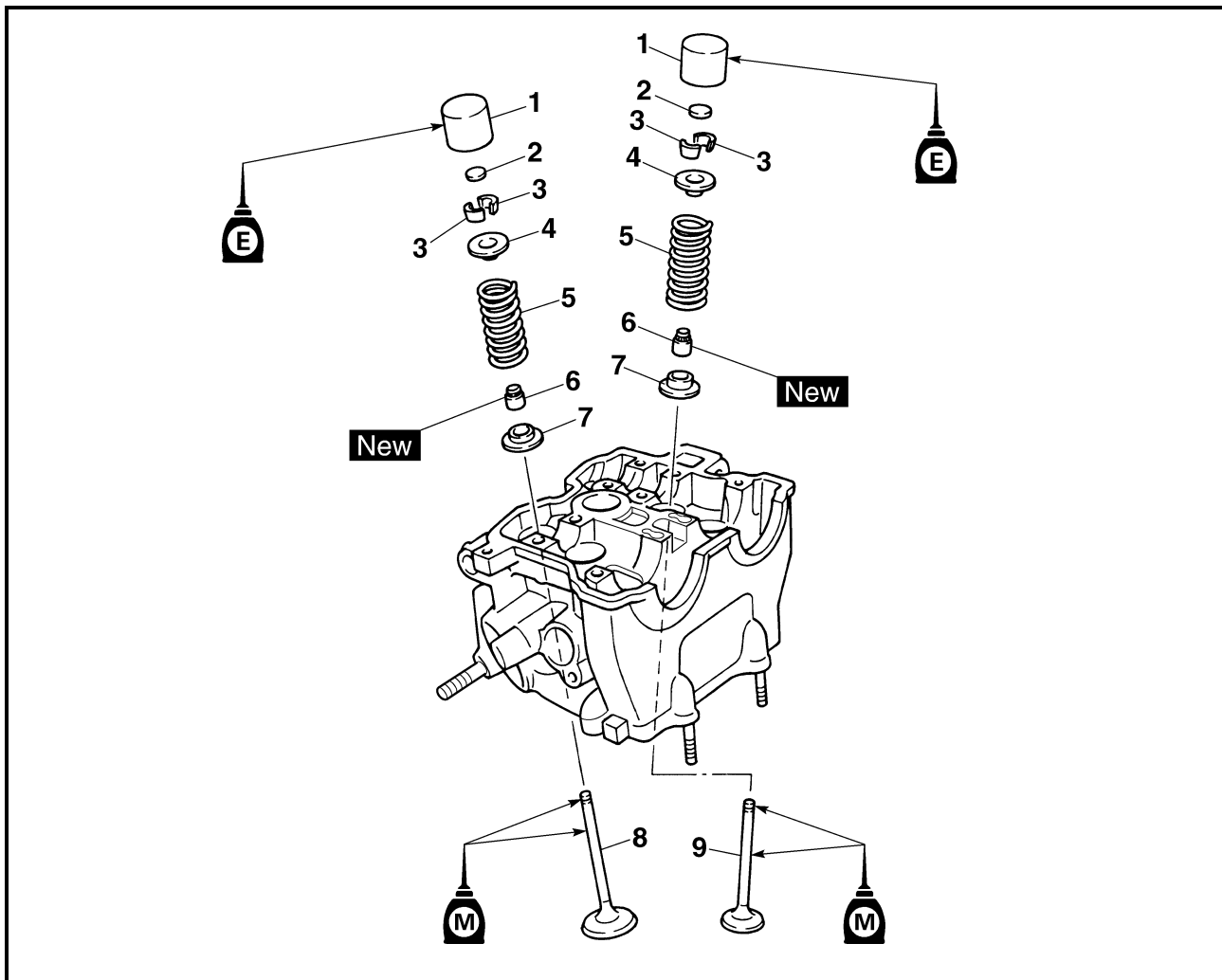


- Install:
  - Copper washer ① **New**
  - Oil delivery pipe ②
  - Union bolt (M8) ③
    - 18 Nm (1.8 m · kg, 13 ft · lb)**
  - Union bolt (M10) ④
    - 20 Nm (2.0 m · kg, 14 ft · lb)**




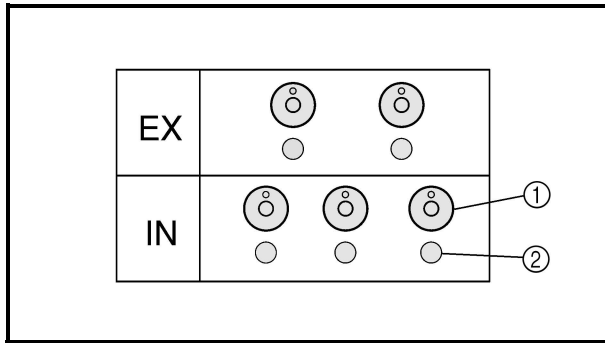
- Install:
  - Radiator pipe ①
  - Bolt (radiator pipe) ②
    - 10 Nm (1.0 m · kg, 7.2 ft · lb)**

VALVES AND VALVE SPRINGS



Extent of removal: ① Valve removal

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



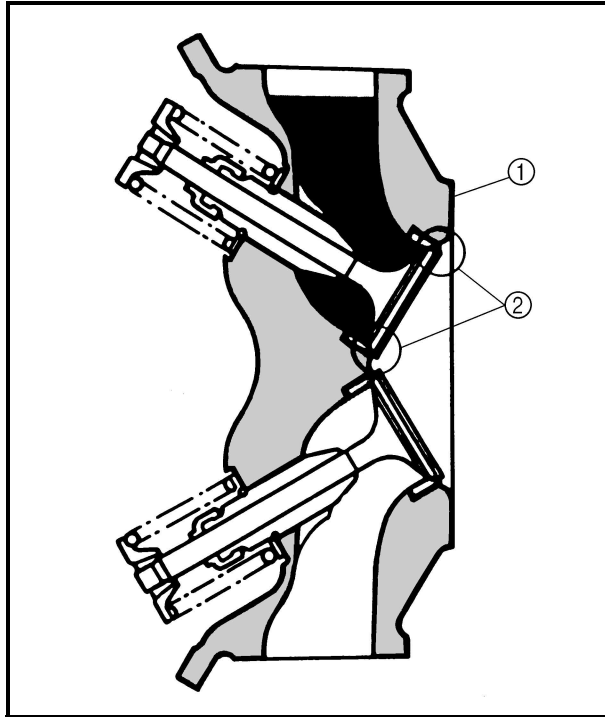
### REMOVAL POINTS

#### Valve lifter and valve cotter

1. Remove:
  - Valve lifter ①
  - Pad ②

#### NOTE:

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

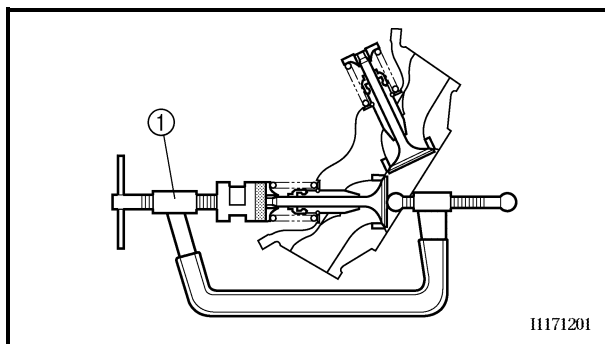


2. Check:

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

#### Checking steps:

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



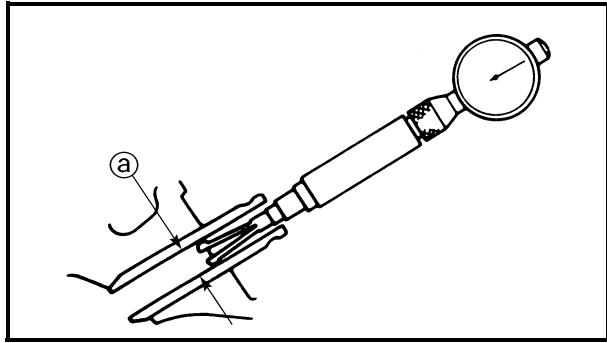
3. Remove:
  - Valve cotter

#### NOTE:

Attach a valve spring compressor ① between the valve spring retainer and the cylinder head to remove the valve coppers.



**Valve spring compressor:**  
**YM-4019/90890-04019**



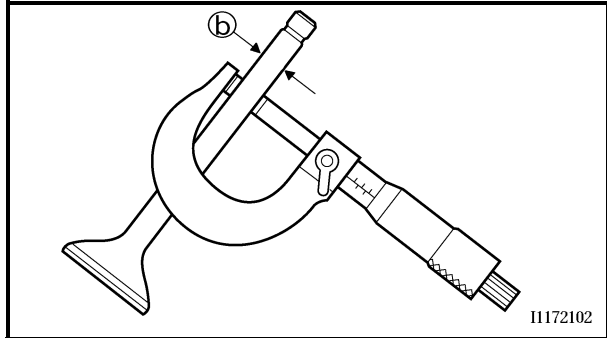
### INSPECTION

#### Valve

1. Measure:
  - Stem-to-guide clearance

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

Out of specification → Replace the valve guide.



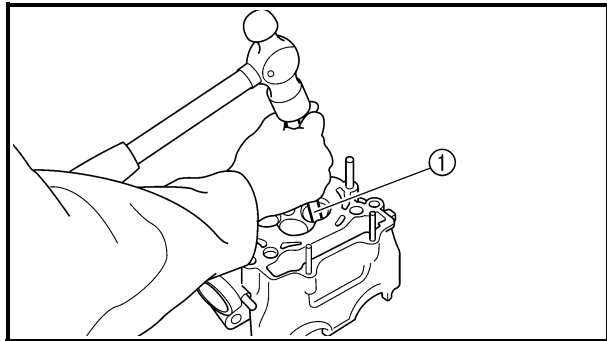
#### Clearance (stem to guide):

##### Intake:

0.010 ~ 0.037 mm  
 (0.0004 ~ 0.0015 in)  
 <Limit>: 0.08 mm (0.003 in)

##### Exhaust:

0.025 ~ 0.052 mm  
 (0.0010 ~ 0.0020 in)  
 <Limit>: 0.10 mm (0.004 in)



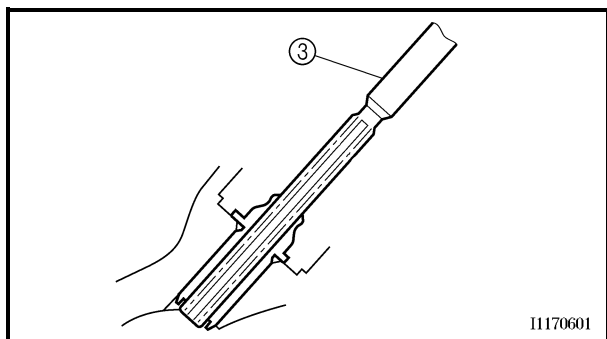
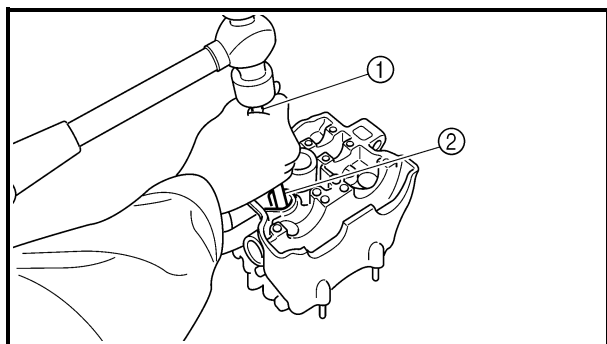
2. Replace:
  - Valve guide

#### Replacement steps:

##### NOTE:

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

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

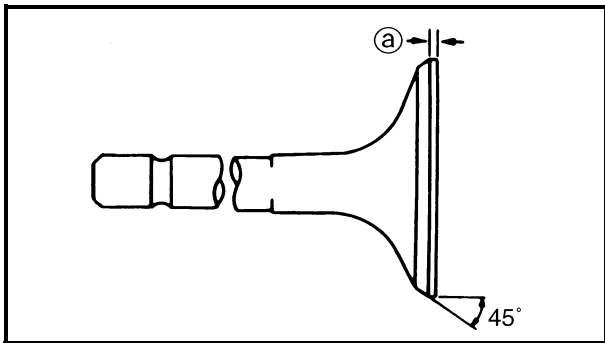




**Valve guide remover:**  
 Intake: 4.0 mm (0.16 in)  
 YM-4111/90890-04111  
 Exhaust: 4.5 mm (0.18 in)  
 YM-4116/90890-04116  
**Valve guide installer:**  
 Intake: 4.0 mm (0.16 in)  
 YM-4112/90890-04112  
 Exhaust: 4.5 mm (0.18 in)  
 YM-4117/90890-04117  
**Valve guide reamer:**  
 Intake: 4.0 mm (0.16 in)  
 YM-4113/90890-04113  
 Exhaust: 4.5 mm (0.18 in)  
 YM-4118/90890-04118

**NOTE:** \_\_\_\_\_  
 After replacing the valve guide reface the valve seat.  
 \_\_\_\_\_

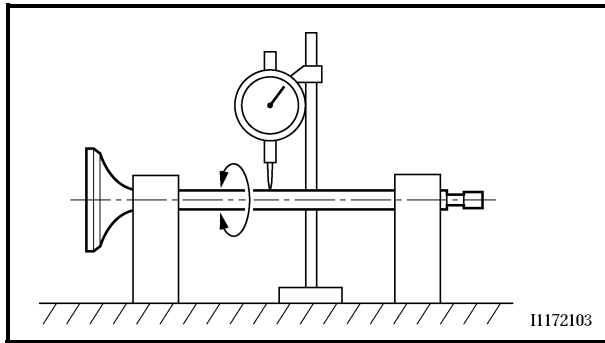
3. Inspect:
- Valve face  
 Pitting/wear → Grind the face.
  - Valve stem end  
 Mushroom shape or diameter larger than the body of the stem → Replace.



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



**Margin thickness:**  
 Intake:  
 0.8 mm (0.0315 in)  
 Exhaust:  
 0.7 mm (0.0276 in)



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



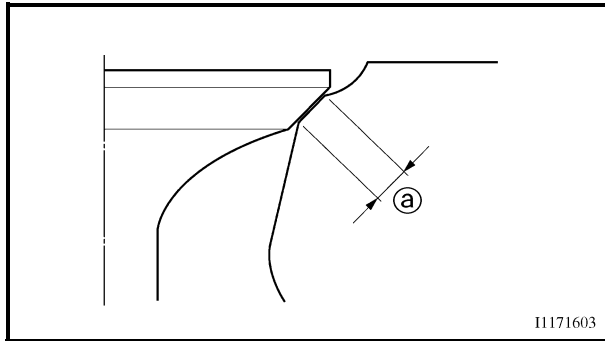
**Runout limit:**  
**0.01 mm (0.0004 in)**

**NOTE:**

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

6. Eliminate:
- Carbon deposits (from the valve face and valve seat)

7. Inspect:
- Valve seat
- Pitting/wear → Reface the valve seat.



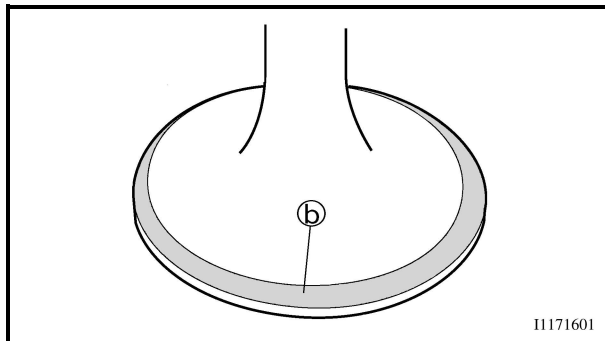
8. Measure:
- Valve seat width (a)
- Out of specification → Reface the valve seat.



**Valve seat width:**

**Intake:**  
0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)  
<Limit>: 1.6 mm (0.0630 in)

**Exhaust:**  
0.9 ~ 1.1 mm (0.0354 ~ 0.0433 in)  
<Limit>: 1.6 mm (0.0630 in)



**Measurement steps:**

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

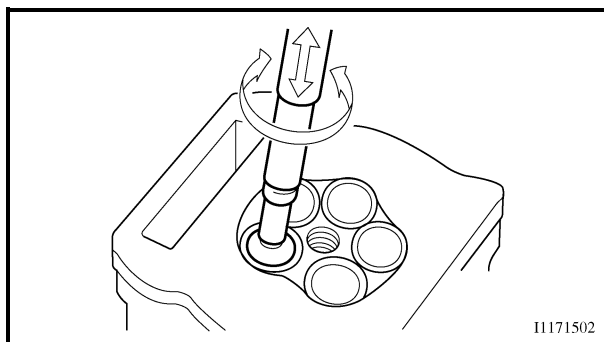
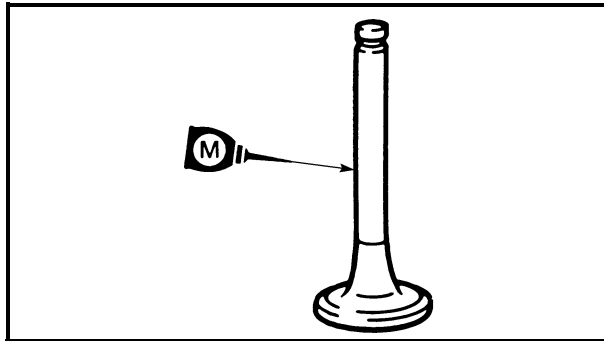
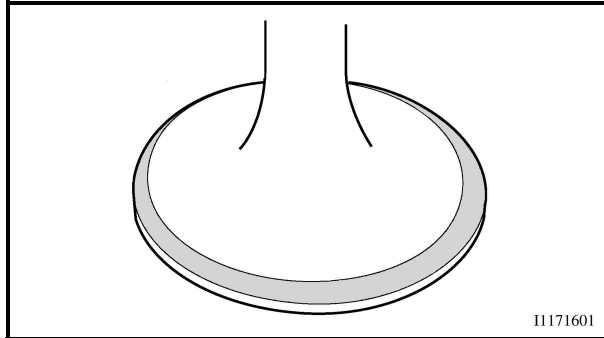




9. Lap:
- Valve face
  - Valve seat

**NOTE:** \_\_\_\_\_

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



**Lapping steps:**

- Apply a coarse lapping compound to the valve face.

**CAUTION:** \_\_\_\_\_

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

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

**NOTE:** \_\_\_\_\_

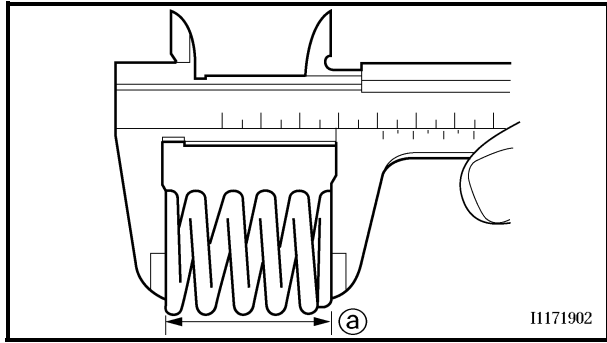
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

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

**NOTE:** \_\_\_\_\_

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

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



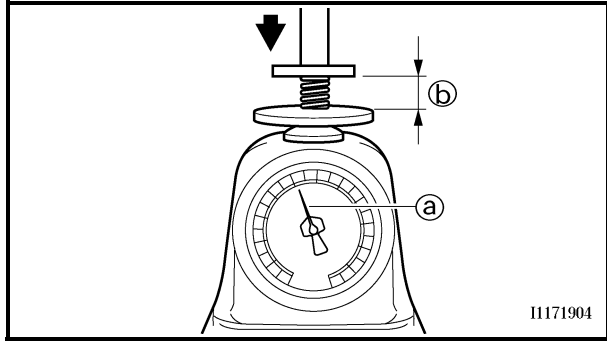
**Valve spring**

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

**Free length (valve spring):**  
**Intake:**  
 37.81 mm (1.49 in)  
 <Limit>: 36.81 mm (1.45 in)  
**Exhaust:**  
 37.54 mm (1.48 in)  
 <Limit>: 36.54 mm (1.44 in)

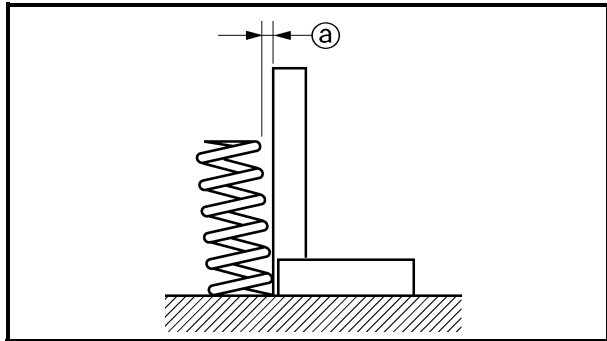
2. Measure:
  - Compressed spring force (a)  
Out of specification → Replace.

(b) Installed length



**Compressed spring force:**  
**Intake:**  
 99 ~ 114 N at 29.13 mm  
 (9.9 ~ 11.4 kg at 29.13 mm,  
 22.27 ~ 25.57 lb at 1.15 in)  
**Exhaust:**  
 126 ~ 144 N at 29.30 mm  
 (12.6 ~ 14.4 kg at 29.30 mm,  
 28.44 ~ 32.41 lb at 1.15 in)

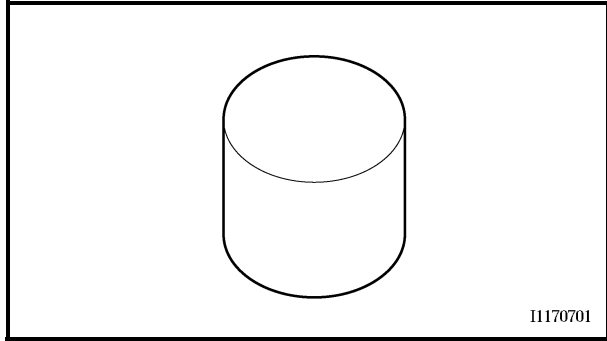
3. Measure:
  - Spring tilt (a)  
Out of specification → Replace.



**Spring tilt limit:**  
**Intake:**  
 2.5°/1.7 mm (0.067 in)  
**Exhaust:**  
 2.5°/1.6 mm (0.063 in)

**Valve lifter**

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

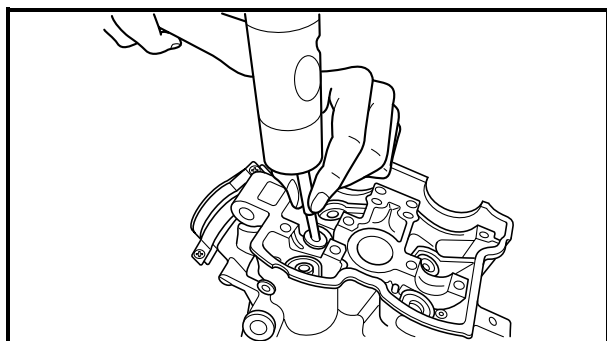
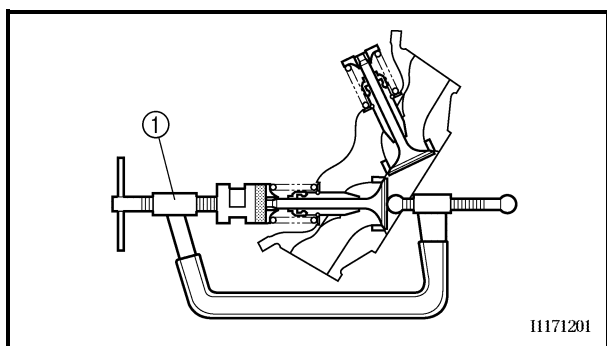
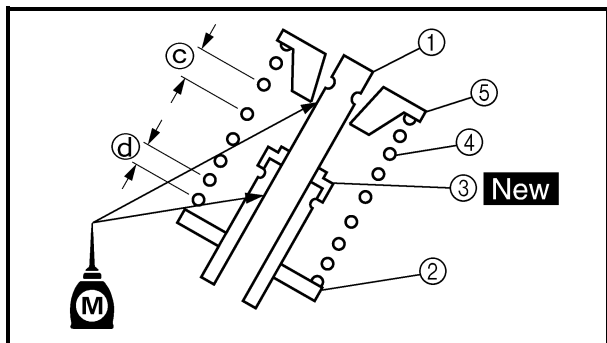
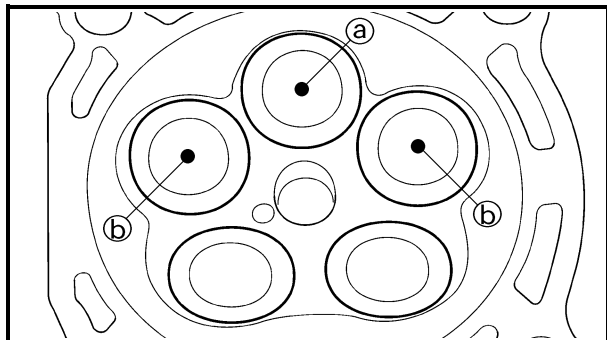




## ASSEMBLY AND INSTALLATION

### Valve and valve spring

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



- Install:
  - Valve ①
  - Valve spring seat ②
  - Valve stem seal ③ **New**
  - Valve spring ④
  - Valve spring retainer ⑤  
To cylinder head.

**NOTE:** \_\_\_\_\_

- Make sure that each valve is installed in its original place, also referring to the painted color as follows.

Intake (middle) ①: yellow

Intake (right/left) ②: white

Exhaust: no paint

- Install the valve springs with the larger pitch ③ facing upward.

④ Smaller pitch

- Install:
  - Valve cotter

**NOTE:** \_\_\_\_\_

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

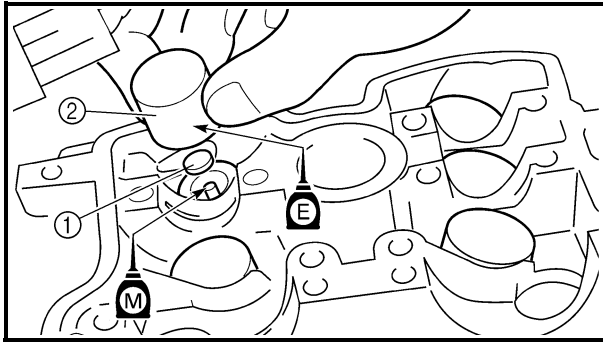


**Valve spring compressor:**  
**YM-4019/90890-04019**

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

**CAUTION:** \_\_\_\_\_

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



## 5. Install:

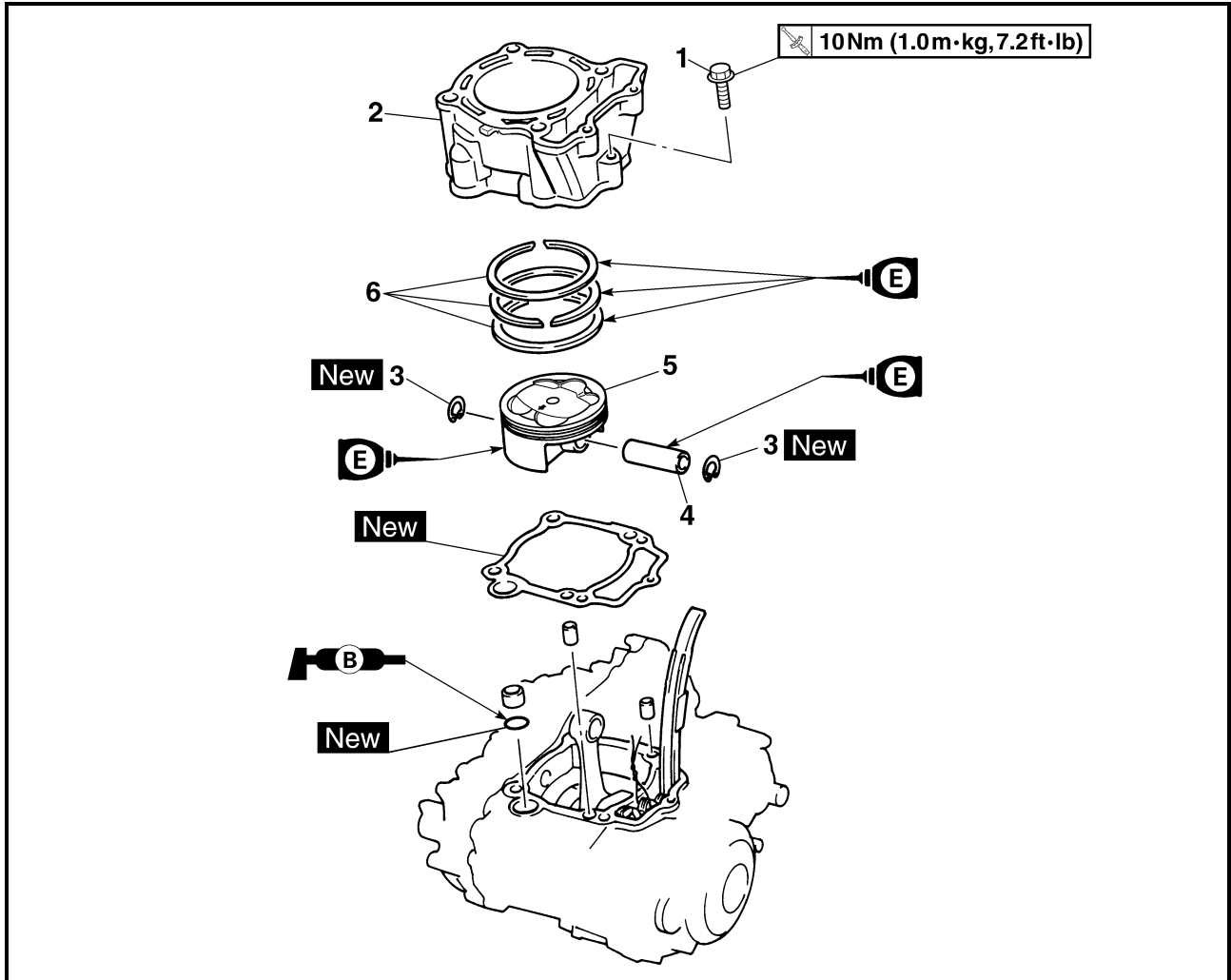
- Adjusting pad ①
- Valve lifter ②

**NOTE:**

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

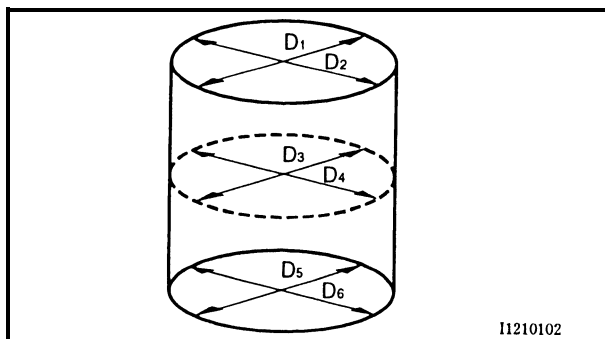
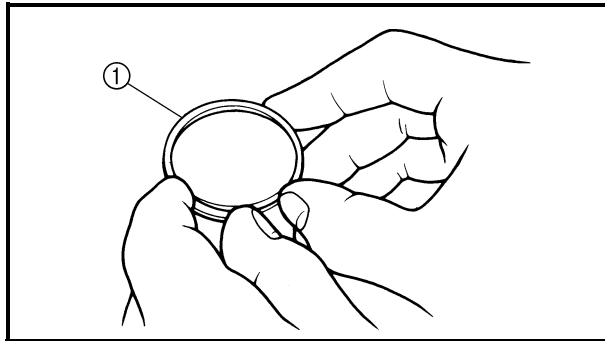
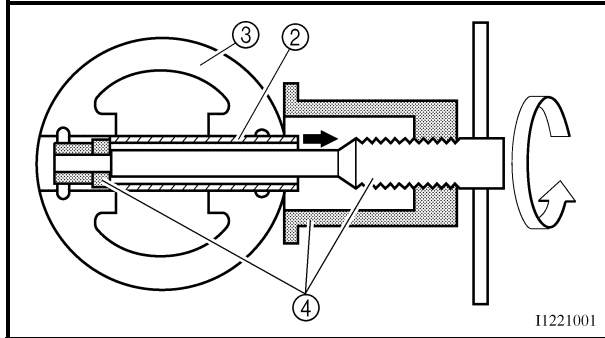
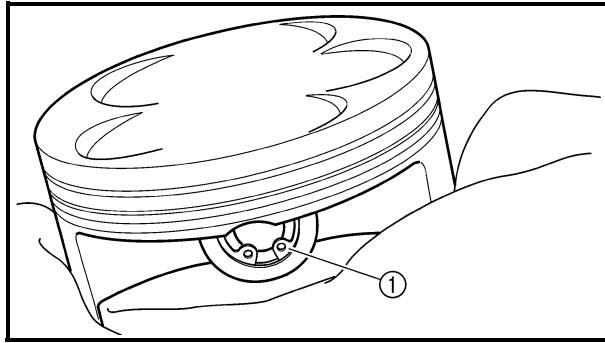


CYLINDER AND PISTON



Extent of removal:                      ① Cylinder removal                      ② Piston removal

Extent of removal	Order	Part name	Q'ty	Remarks
<b>CYLINDER AND PISTON REMOVAL</b>				
Preparation for removal		Cylinder head		Refer to "CYLINDER HEAD" section.
<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;">             ↑ ① ↓           </div> <div style="text-align: center; margin-right: 20px;">             ↑ ② ↓           </div> </div>	1	Bolt (cylinder)	1	Use special tool. Refer to "REMOVAL POINTS".
	2	Cylinder	1	
	3	Piston pin clip	2	
	4	Piston pin	1	
	5	Piston	1	
	6	Piston ring set	1	



### REMOVAL POINTS

#### Piston and piston ring

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

#### NOTE:

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



**Piston pin puller set:  
YU-1304/90890-01304**

#### CAUTION:

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

2. Remove:
  - Piston ring ①

#### NOTE:

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

### INSPECTION

#### Cylinder and piston

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

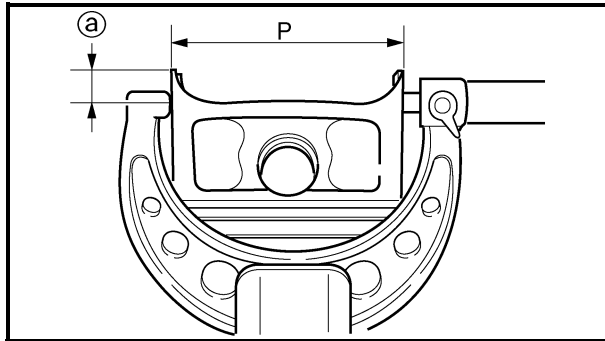
#### Measurement steps:


##### 1st step:

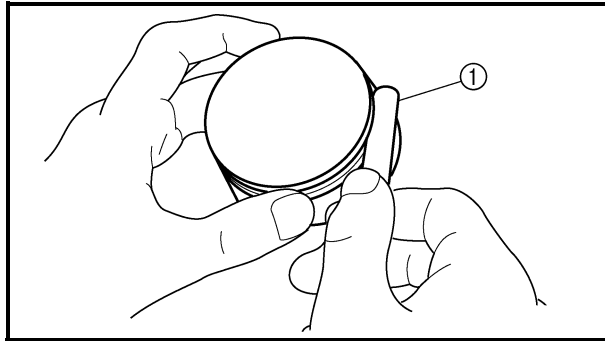
- Measure the cylinder bore "C" with a cylinder bore gauge.

#### NOTE:

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



Cylinder bore "C"	77.00 ~ 77.01 mm (3.0315 ~ 3.0319 in)
Taper limit "T"	0.05 mm (0.002 in)
Out of round "R"	0.05 mm (0.002 in)
<b>"C" = Maximum D</b>	
<b>"T" = (Maximum D<sub>1</sub> or D<sub>2</sub>) – (Maximum D<sub>5</sub> or D<sub>6</sub>)</b>	
<b>"R" = (Maximum D<sub>1</sub>, D<sub>3</sub> or D<sub>5</sub>) – (Minimum D<sub>2</sub>, D<sub>4</sub> or D<sub>6</sub>)</b>	
<ul style="list-style-type: none"> <li>If out of specification, replace the cylinder, and replace the piston and piston rings as set.</li> </ul>	
<b>2nd step:</b>	
<ul style="list-style-type: none"> <li>Measure the piston skirt diameter "P" with a micrometer.</li> </ul>	
<ul style="list-style-type: none"> <li>Ⓐ 8 mm (0.31 in) from the piston bottom edge</li> </ul>	
	<b>Piston size "P"</b>
<b>Standard</b>	<b>76.955 ~ 76.970 mm (3.0297 ~ 3.0303 in)</b>
<ul style="list-style-type: none"> <li>If out of specification, replace the piston and piston rings as a set.</li> </ul>	
<b>3rd step:</b>	
<ul style="list-style-type: none"> <li>Calculate the piston-to-cylinder clearance with following formula:</li> </ul>	
<b>Piston-to-cylinder clearance = Cylinder bore "C" – Piston skirt diameter "P"</b>	
	<b>Piston-to-cylinder clearance:</b> <b>0.040 ~ 0.065 mm (0.0016 ~ 0.0026 in)</b> <b>&lt;Limit&gt;: 0.1 mm (0.004 in)</b>
<ul style="list-style-type: none"> <li>If out of specification, replace the cylinder, and replace the piston and piston rings as set.</li> </ul>	



## Piston ring

### 1. Measure:

- Ring side clearance

Use a feeler gauge ①.

Out of specification → Replace the piston and rings as a set.

### NOTE:

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

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

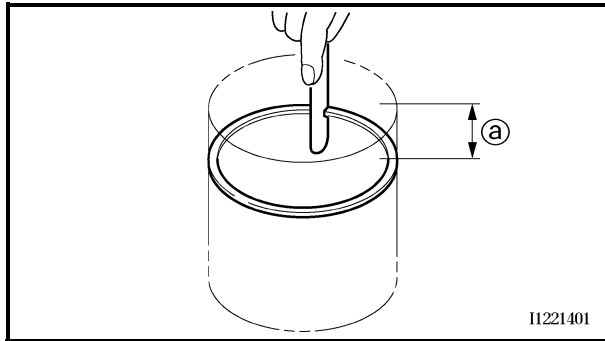
### 2. Position:

- Piston ring  
(in cylinder)

### NOTE:

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

① 10 mm (0.39 in)



11221401

### 3. Measure:

- Ring end gap

Out of specification → Replace.

### NOTE:

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

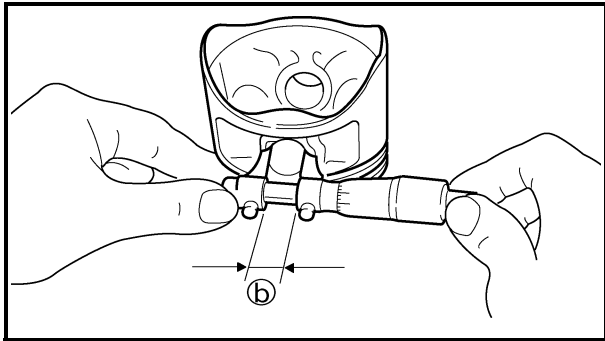
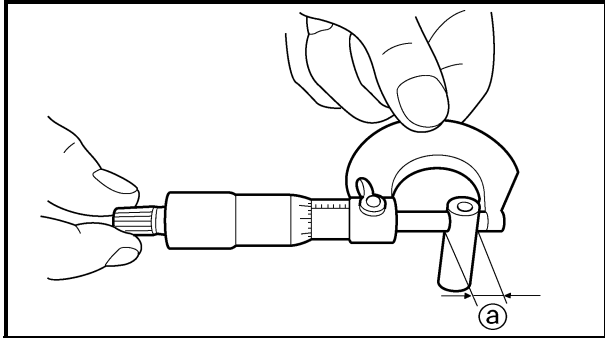
	End gap:	
	Standard	<Limit>
<b>Top ring</b>	<b>0.15 ~ 0.25 mm</b> <b>(0.006 ~ 0.010 in)</b>	<b>0.50 mm</b> <b>(0.020 in)</b>
<b>2nd ring</b>	<b>0.30 ~ 0.45 mm</b> <b>(0.012 ~ 0.018 in)</b>	<b>0.80 mm</b> <b>(0.031 in)</b>
<b>Oil ring</b>	<b>0.10 ~ 0.40 mm</b> <b>(0.004 ~ 0.016 in)</b>	—





**Piston pin**

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



**Measurement steps:**

- Measure the outside diameter (piston pin) ①.  
If out of specification, replace the piston pin.



**Outside diameter (piston pin):**  
15.991 ~ 16.000 mm  
(0.6296 ~ 0.6299 in)

- Measure the inside diameter (piston) ②.



**Inside diameter (piston):**  
16.002 ~ 16.013 mm  
(0.6300 ~ 0.6304 in)

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

**Piston pin-to-piston clearance =**  
**Inside diameter (piston) ② –**  
**Outside diameter (piston pin) ①**

- If out of specification, replace the piston.



**Piston pin-to-piston clearance:**  
0.002 ~ 0.022 mm  
(0.0001 ~ 0.0009 in)  
<Limit>: 0.07 mm (0.003 in)

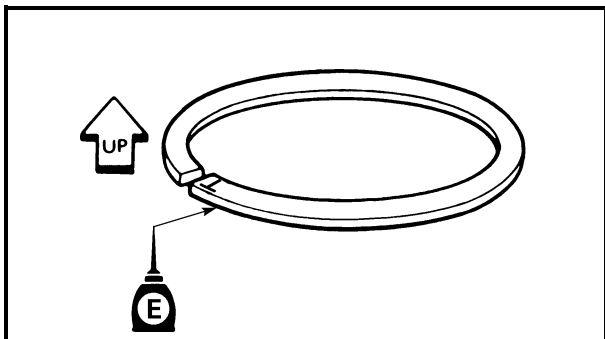
**ASSEMBLY AND INSTALLATION**

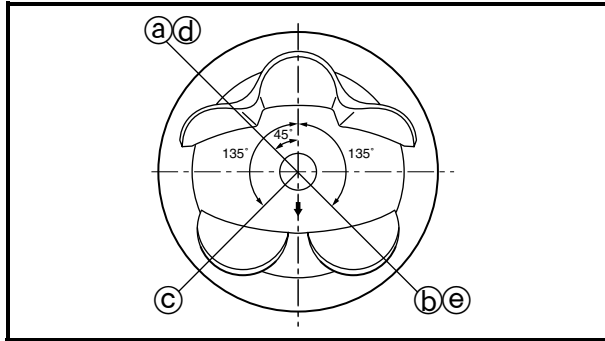
**Piston ring and piston**

1. Install:
  - Piston ring  
Onto the piston.

**NOTE:**

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



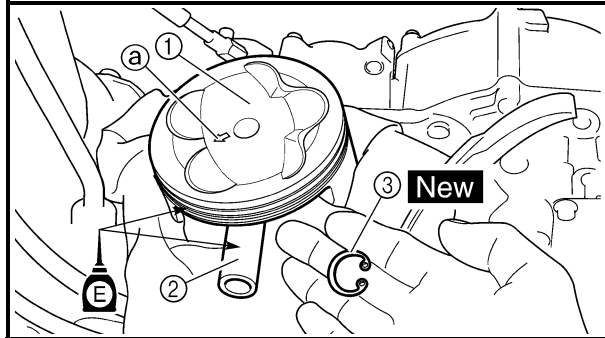


## 2. Position:

- Top ring
- 2nd ring
- Oil ring

Offset the piston ring end gaps as shown.

- Ⓐ Top ring end
- Ⓑ 2nd ring end
- Ⓒ Oil ring end (upper)
- Ⓓ Oil ring
- Ⓔ Oil ring end (lower)

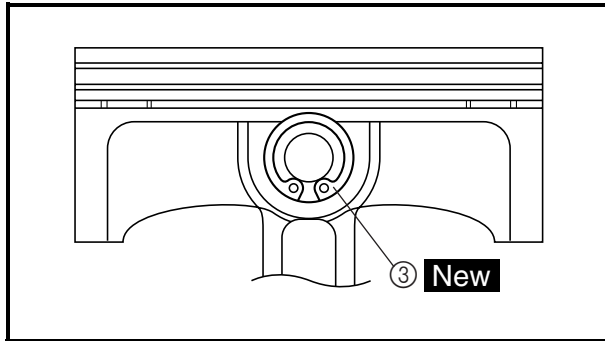


## 3. Install:

- Piston ①
- Piston pin ②
- Piston pin clip ③ **New**

## NOTE:

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



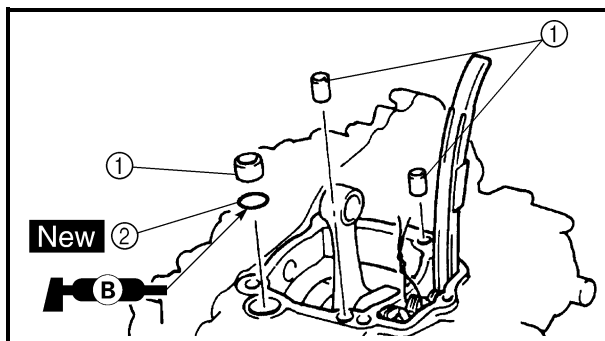
## Cylinder

### 1. Lubricate:

- Piston
- Piston ring
- Cylinder

## NOTE:

Apply a liberal coating of engine oil.

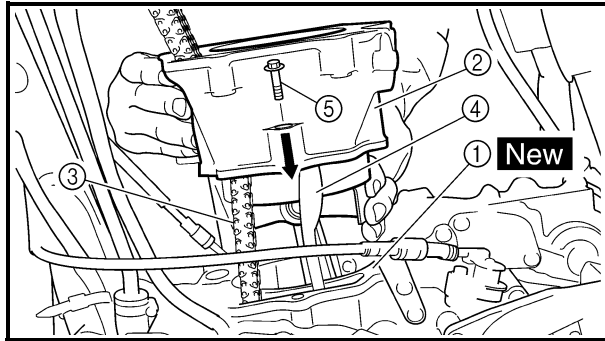


## 2. Install:

- Dowel pin ①
- O-ring ② **New**

## NOTE:

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



## 3. Install:

- Cylinder gasket ① **New**
- Cylinder ②

**NOTE:**


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

**CAUTION:**

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

## 4. Install:

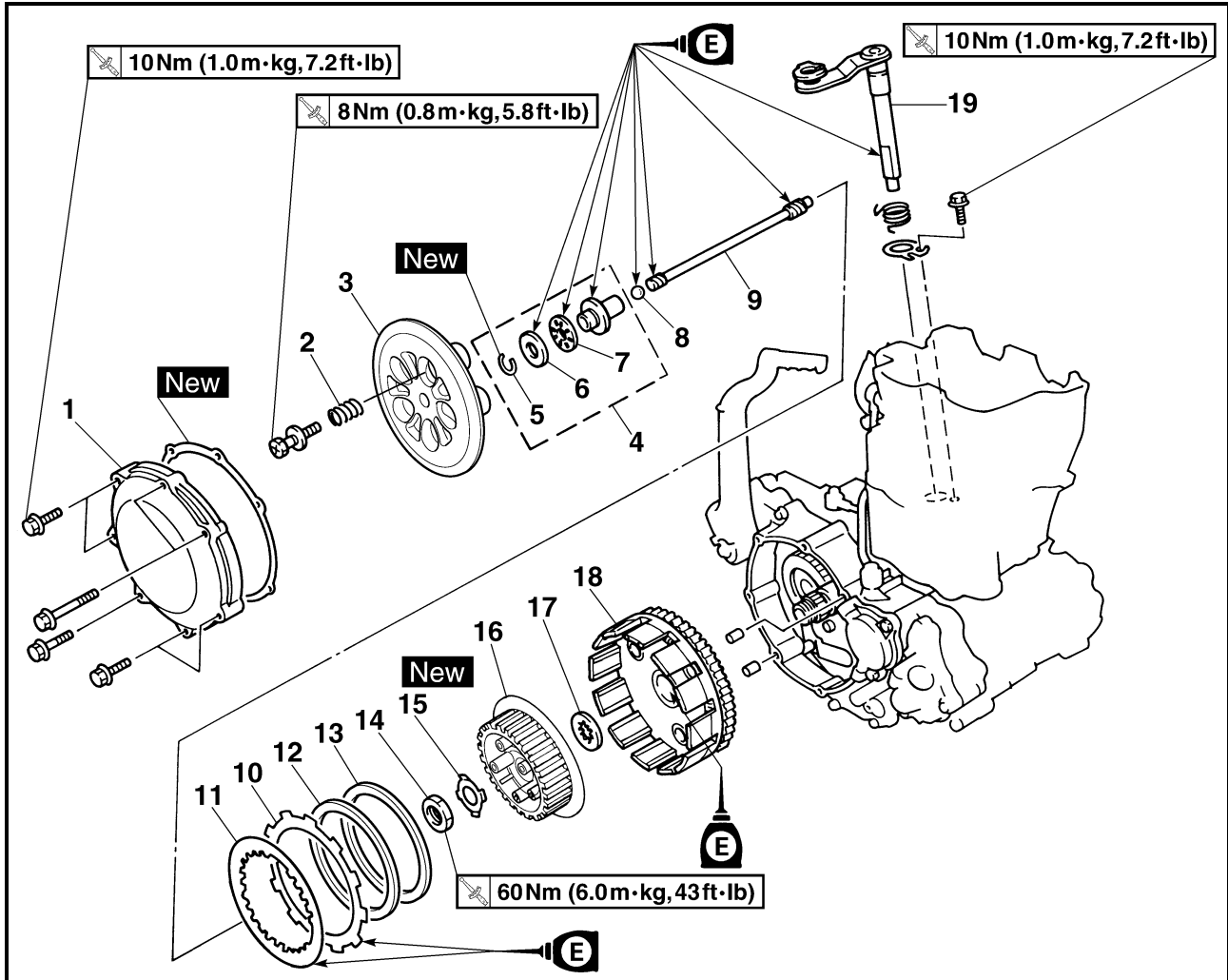
- Bolt (cylinder) ⑤

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**



EC4A0000

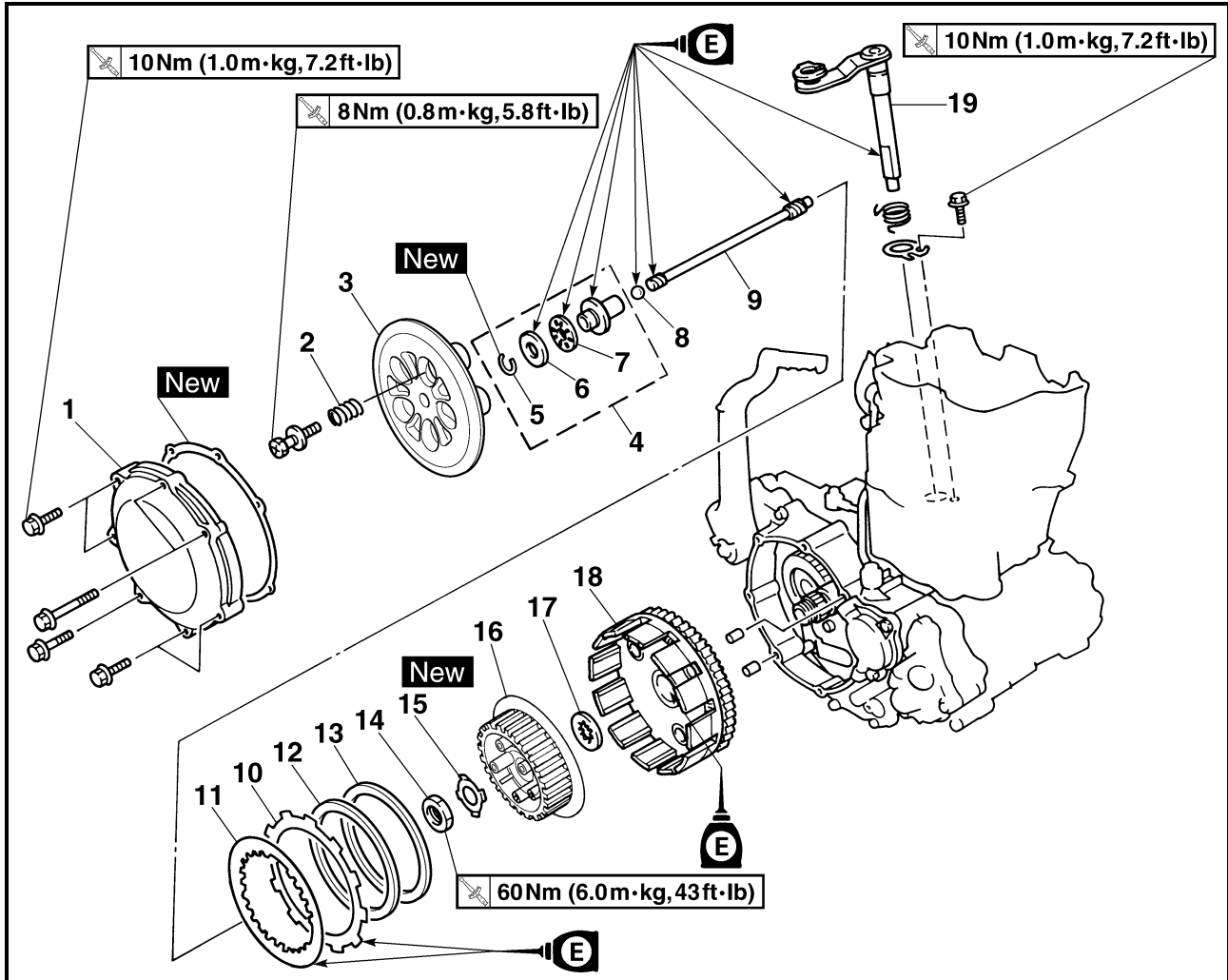
CLUTCH



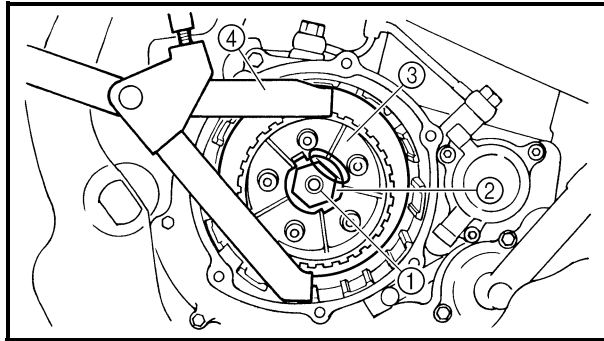
Extent of removal:

- ① Push rod 1, 2 and push lever shaft removal
- ② Push pod 1 disassembly
- ③ Friction plate and clutch plate removal
- ④ Primary driven gear removal

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



Extent of removal	Order	Part name	Q'ty	Remarks
	10	Friction plate	9	Use special tool. Refer to "REMOVAL POINTS".
	11	Clutch plate	8	
	12	Cushion spring	1	
	13	Seat plate	1	
	14	Nut (clutch boss)	1	
	15	Lock washer	1	
	16	Clutch boss	1	
	17	Thrust washer	1	
	18	Primary driven gear	1	
	19	Push lever shaft	1	



EC4A3000

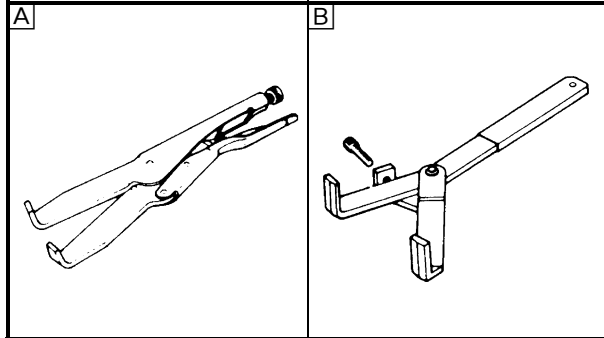
**REMOVAL POINTS**

**Clutch boss**

1. Remove:
  - Nut ①
  - Lock washer ②
  - Clutch boss ③

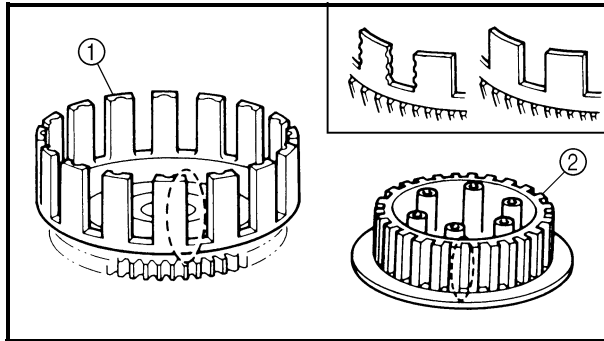
**NOTE:**

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



**Clutch holding tool:**  
YM-91042/90890-04086

- Ⓐ For USA and CDN
- Ⓑ Except for USA and CDN



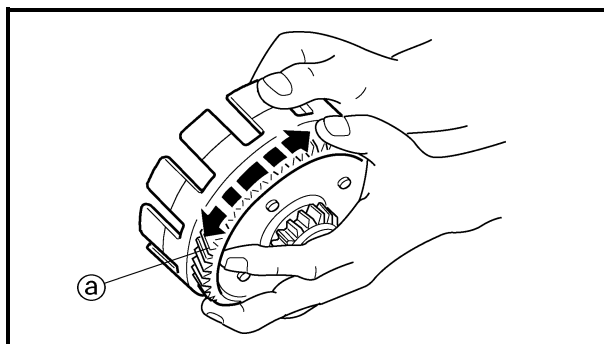
EC4A4000

**INSPECTION**

EC484100

**Clutch housing and boss**

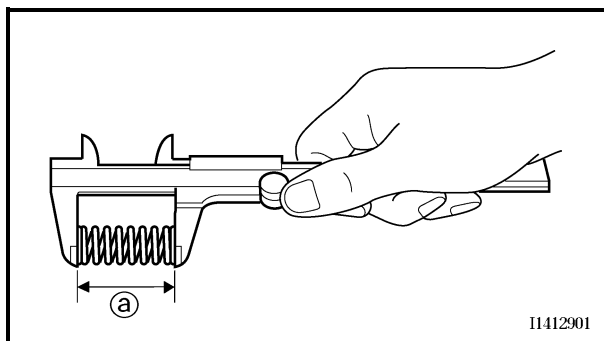
1. Inspect:
  - Clutch housing ①  
Cracks/wear/damage → Replace.
  - Clutch boss ②  
Scoring/wear/damage → Replace.



EC484201

**Primary driven gear**

1. Check:
  - Circumferential play  
Free play exists → Replace.
  - Gear teeth ①  
Wear/damage → Replace.



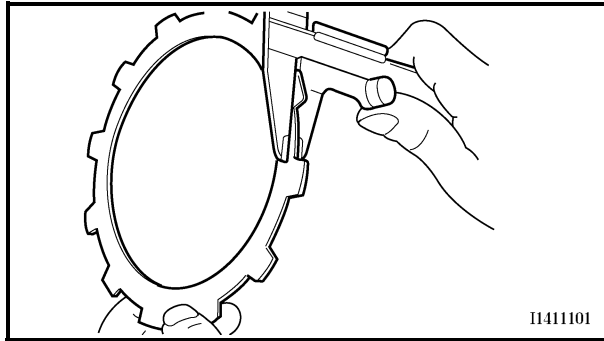
**Clutch spring**

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



**Clutch spring free length:**  
37.0 mm (1.46 in)  
<Limit>: 36.0 mm (1.42 in)

11412901



### Friction plate

#### 1. Measure:

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



**Friction plate thickness:**  
2.9 ~ 3.1 mm (0.114 ~ 0.122 in)  
<Limit>: 2.7 mm (0.106 in)

EC484600

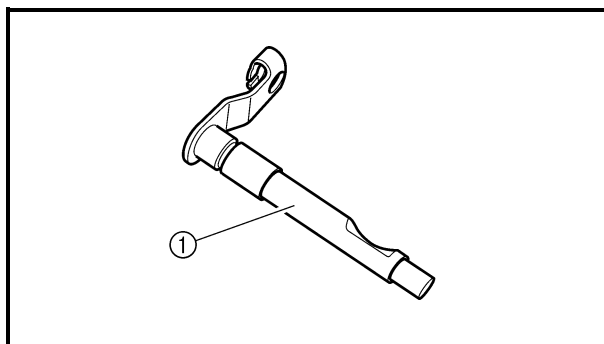
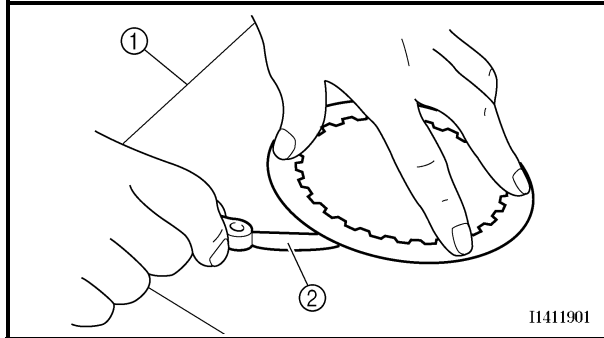
### Clutch plate

#### 1. Measure:

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



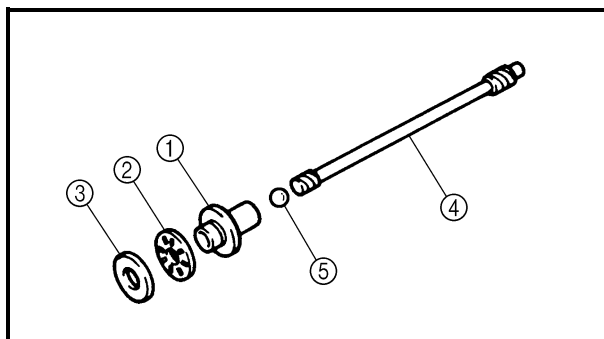
**Warp limit:**  
0.1 mm (0.004 in)



### Push lever shaft

#### 1. Inspect:

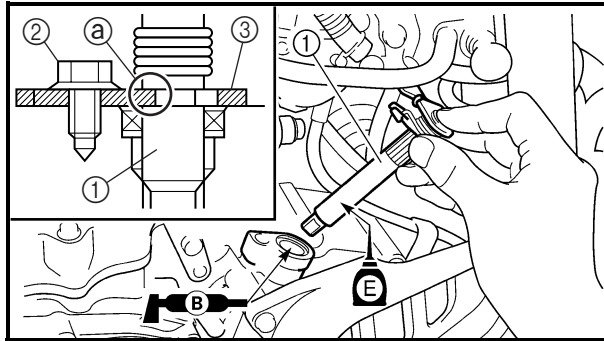
- Push lever shaft ①  
Wear/damage → Replace.



### Push rod

#### 1. Inspect:

- Push rod 1 ①
- Bearing ②
- Washer ③
- Push rod 2 ④
- Ball ⑤  
Wear/damage/bend → Replace.



EC4A5000

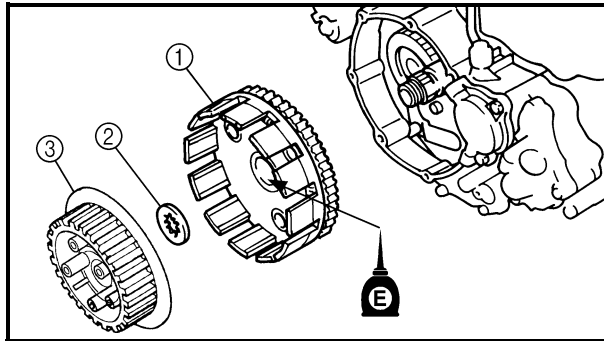
**ASSEMBLY AND INSTALLATION****Push lever shaft**

## 1. Install:

- Push lever shaft ①
- Bolt (push lever shaft) ②

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

- Apply the lithium soap base grease on the oil seal lip.
- Apply the engine oil on the push lever shaft.
- Fit the seat plate ③ in the groove ① of the push lever shaft and tighten the bolt (seat plate).

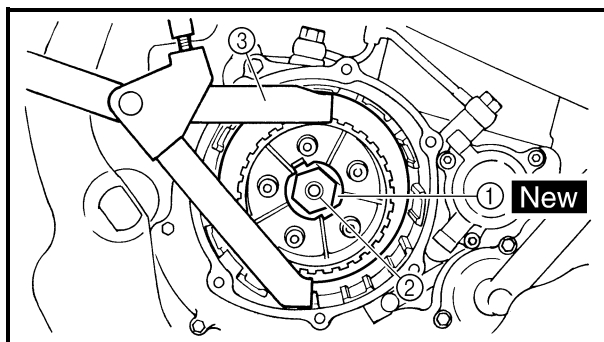
**Clutch**

## 1. Install:

- Primary driven gear ①
- Thrust washer ②
- Clutch boss ③

**NOTE:**

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



## 2. Install:

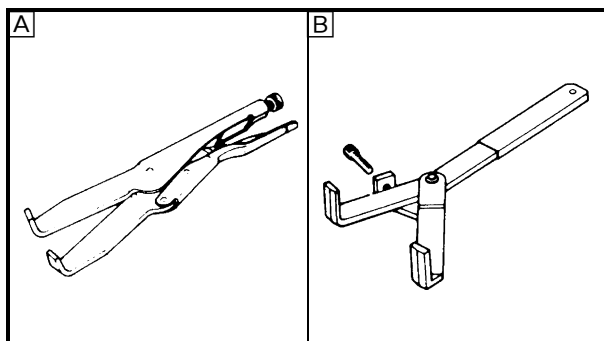
- Lock washer ① **New**
- Nut (clutch boss) ②

**60 Nm (6.0 m · kg, 43 ft · lb)**
**NOTE:**

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



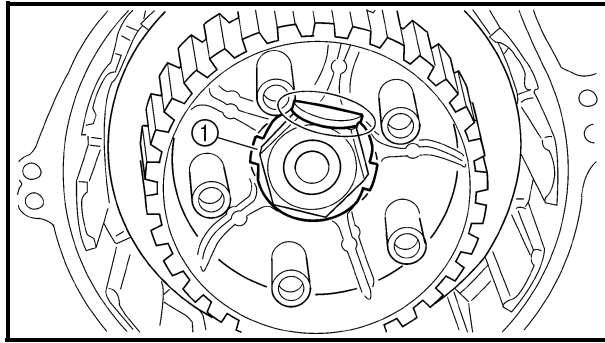
**Clutch holding tool:**  
**YM-91042/90890-04086**



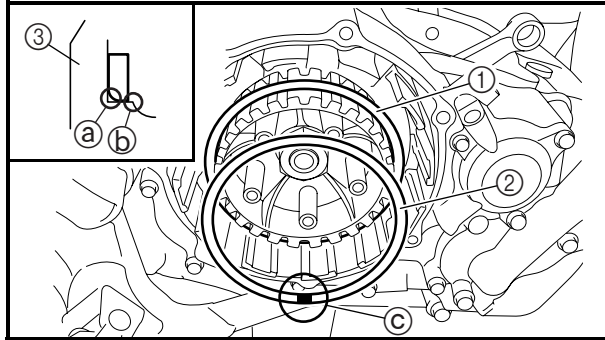
**A** For USA and CDN

**B** Except for USA and CDN





3. Bend the lock washer ① tab.

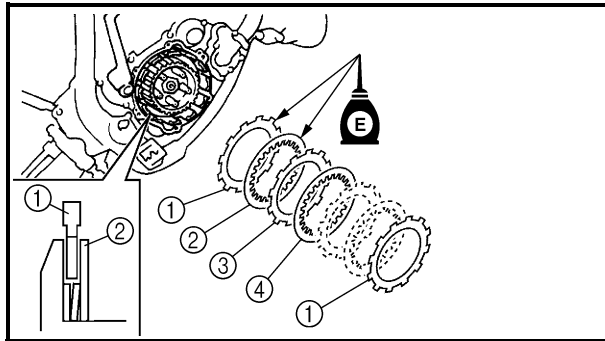


4. Install:

- Seat plate ①
- Cushion spring ②

**NOTE:**

- Install the seat plate with its chamfered portion ③ facing the clutch boss ③.
- Install the seat plate so that it is not caught on the step ④.
- Install the cushion spring with the paint ⑤ facing out.

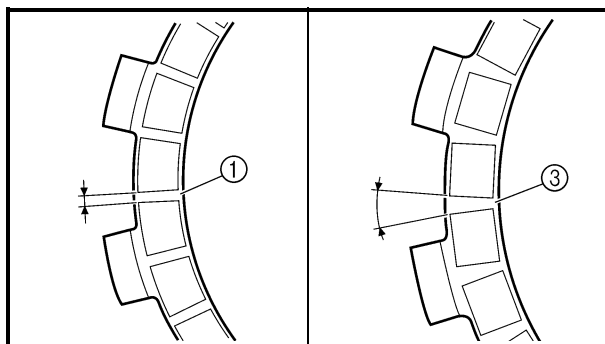


5. Install:

- Friction plate 1 ①
- Clutch plate 1 ②
- Friction plate 2 ③
- Clutch plate 2 ④

**NOTE:**

- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- Use the friction plates 1 for the first and final while paying attention to the difference in surface pattern.
- Apply the engine oil on the friction plates and clutch plates.
- Unlike the clutch plate 2, the clutch plate 1 has no surface gloss. Use the clutch plate 1 for the first while paying attention to the difference in surface gloss.



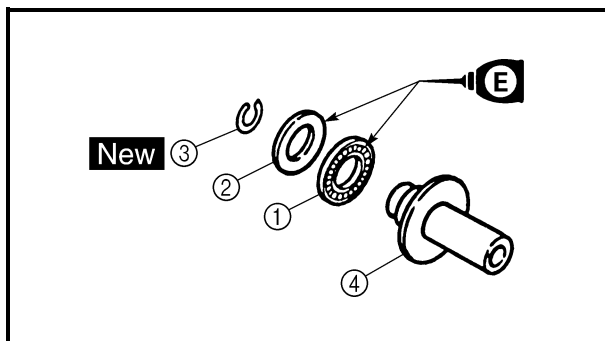
6. Install:

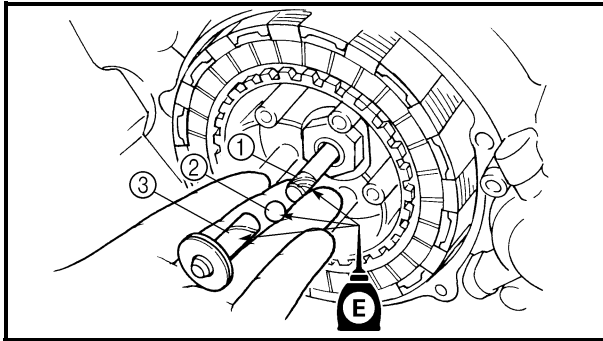
- Bearing ①
- Washer ②
- Circlip ③ **New**

To push rod 1 ④.

**NOTE:**

Apply the engine oil on the bearing and washer.

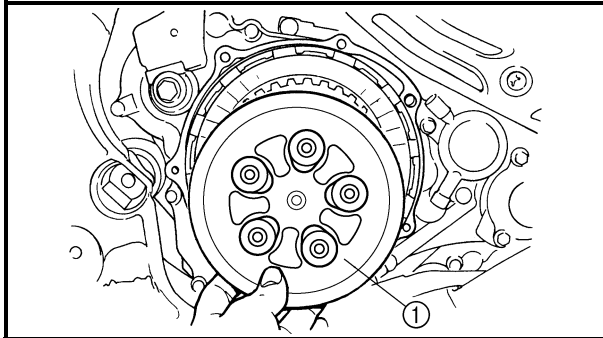




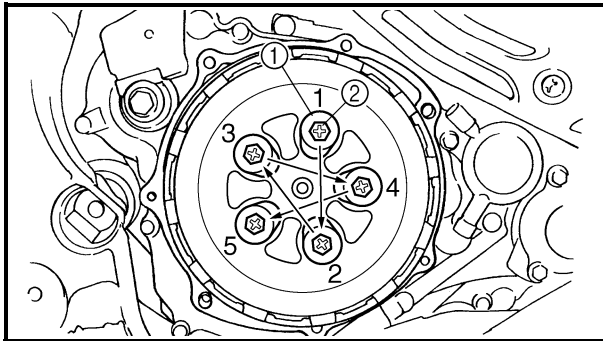
7. Install:
- Push rod 2 ①
  - Ball ②
  - Push rod 1 ③

**NOTE:**


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



8. Install:
- Pressure plate ①

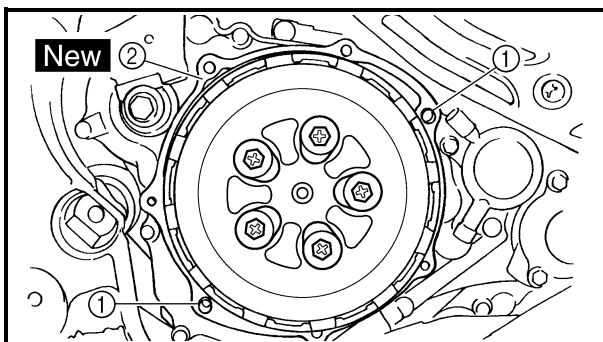


9. Install:
- Clutch spring ①
  - Bolt (clutch spring) ②

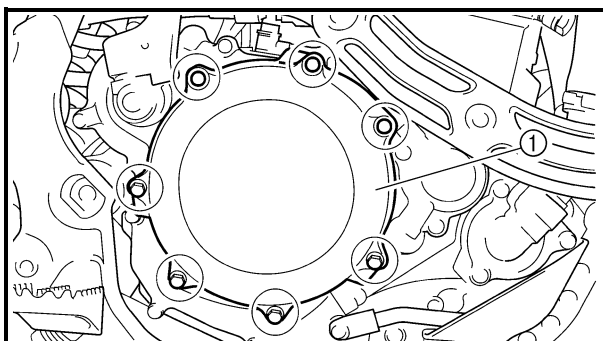
 **8 Nm (0.8 m · kg, 5.8 ft · lb)**

**NOTE:**


Tighten the bolts in stage, using a crisscross pattern.



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



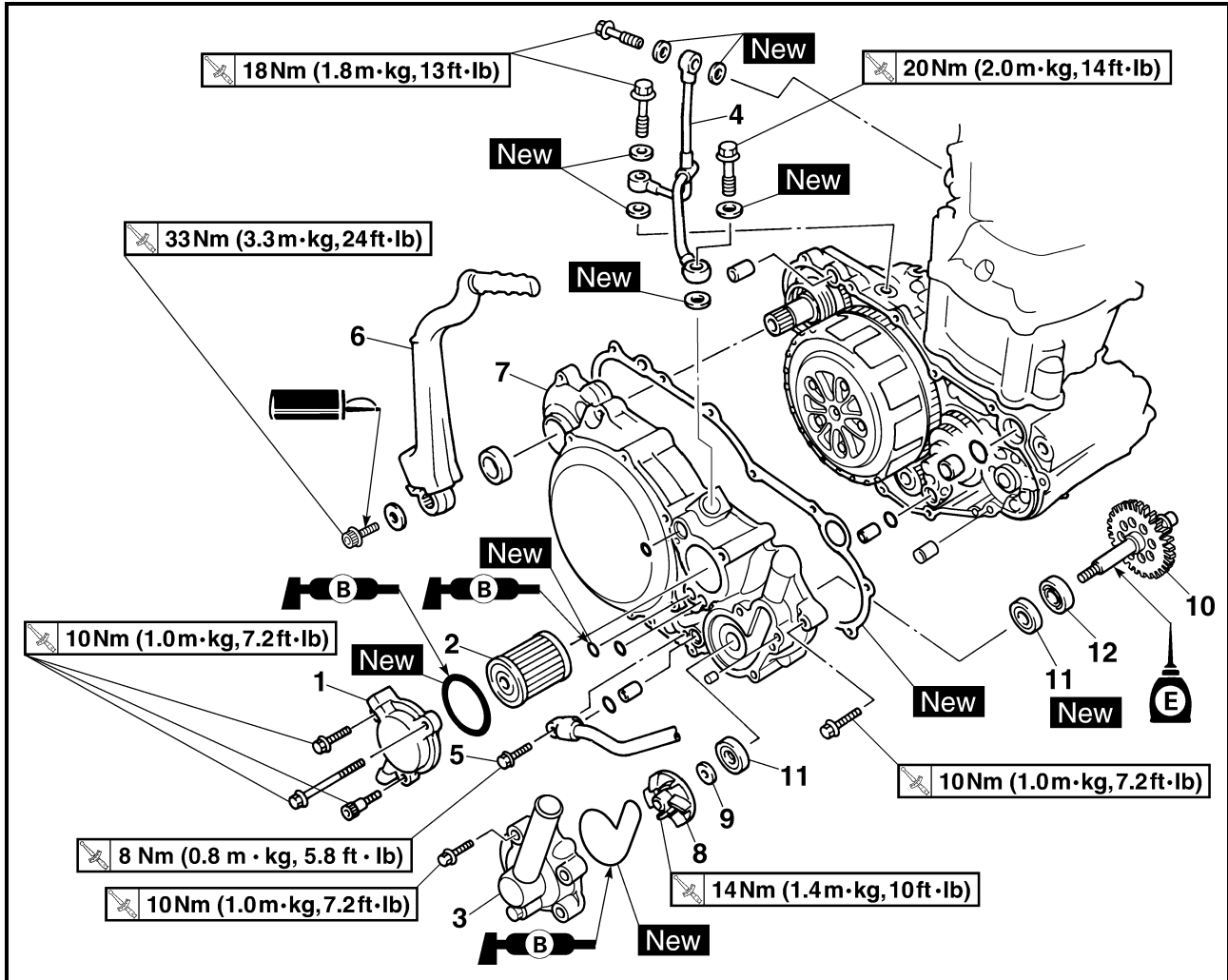
11. Install:
- Clutch cover ①
  - Bolt (clutch cover)

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

**NOTE:**

Tighten the bolts in stage, using a crisscross pattern.

## OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANKCASE COVER



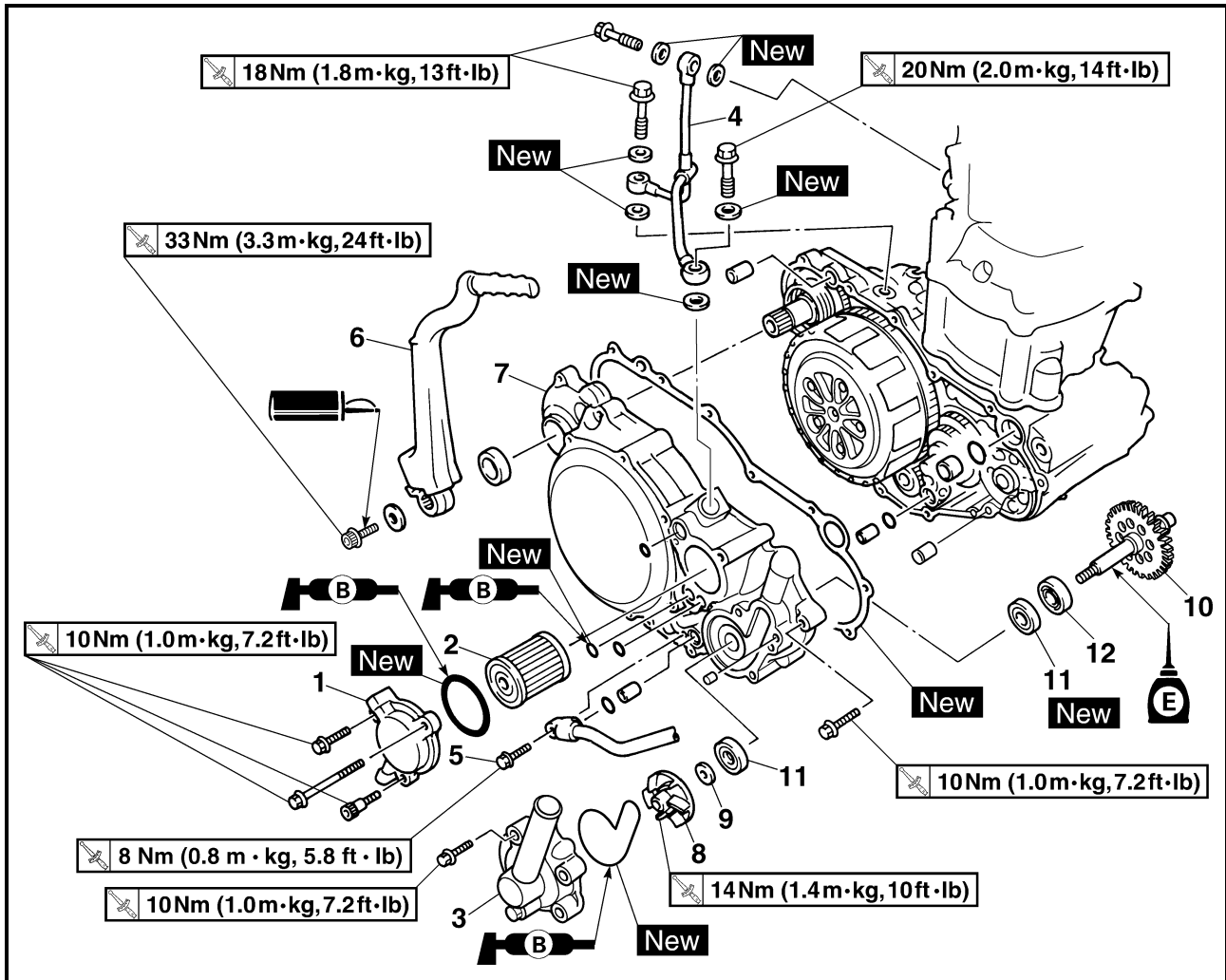
Extent of removal:

- ① Oil filter element removal
- ② Water pump removal
- ③ Right crankcase cover removal

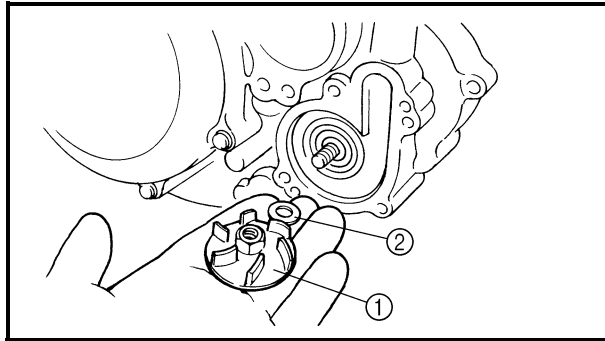
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANKCASE COVER REMOVAL</b>		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3. Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3. Radiator hose 3 Disconnect at water pump side. Exhaust pipe Refer to "EXHAUST PIPE AND SILENCER" section. Brake pedal Refer to "ENGINE REMOVAL" section. Right engine guard
		Drain the engine oil.		
		Drain the coolant.		
		Radiator hose 3		
		Exhaust pipe		
		Brake pedal		
		Right engine guard		
①	1	Oil filter element cover	1	
③	2	Oil filter element	1	

# OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANKCASE COVER

ENG



Extent of removal	Order	Part name	Q'ty	Remarks
	3	Water pump housing	1	Refer to "REMOVAL POINTS".
	4	Oil delivery pipe	1	
	5	Bolt (oil hose)	1	
	6	Kickstarter crank	1	
	7	Right crankcase cover	1	
	8	Impeller	1	
	9	Washer	1	
	10	Impeller shaft	1	
	11	Oil seal	2	
	12	Bearing	1	



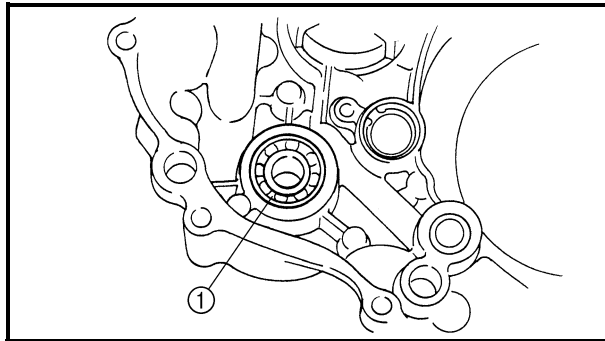
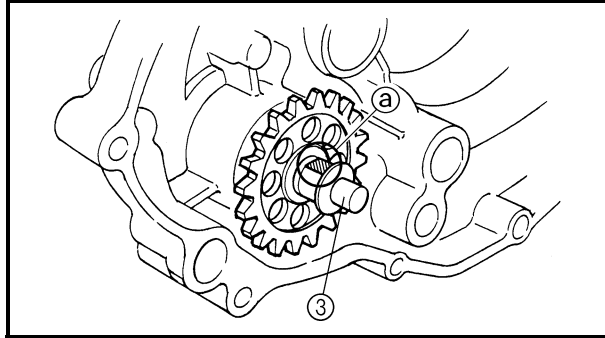
## REMOVAL POINTS

### Impeller shaft

1. Remove:
  - Impeller ①
  - Washer ②
  - Impeller shaft ③

### NOTE:

Hold the impeller shaft on its width across the flats ④ with spanners, etc. and remove the impeller.



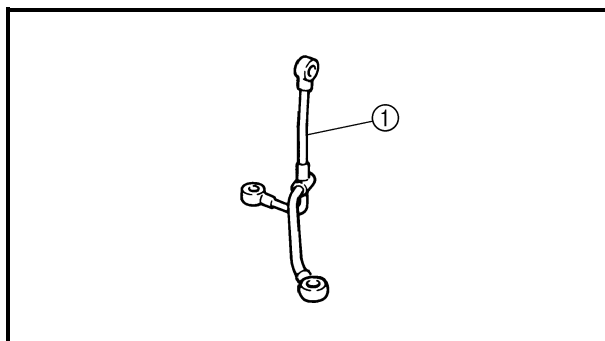
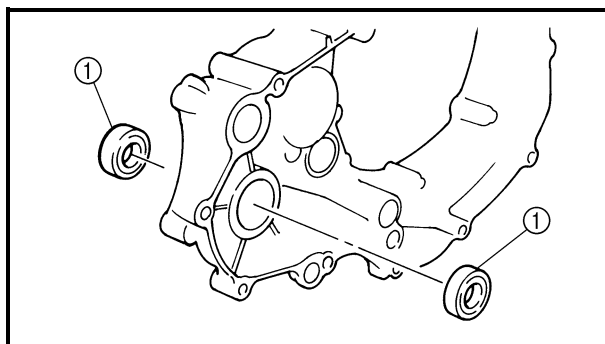
EC4G3210

### Oil seal

### NOTE:

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

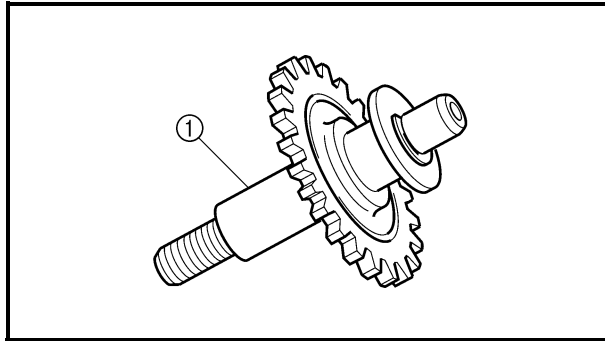
1. Remove:
  - Bearing ①
2. Remove:
  - Oil seal ①



## INSPECTION

### Oil delivery pipe

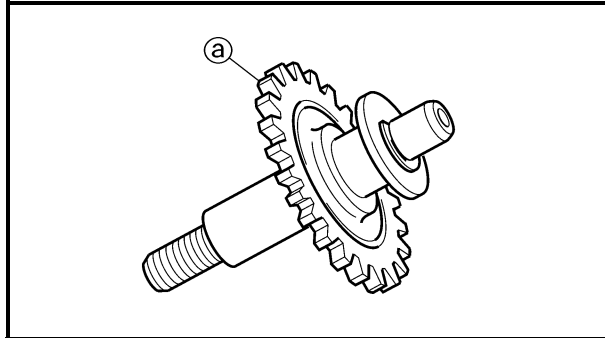
1. Inspect:
  - Oil delivery pipe ①
    - Bend/damage → Replace.
    - Clogged → Blow.



EC444200

### Impeller shaft

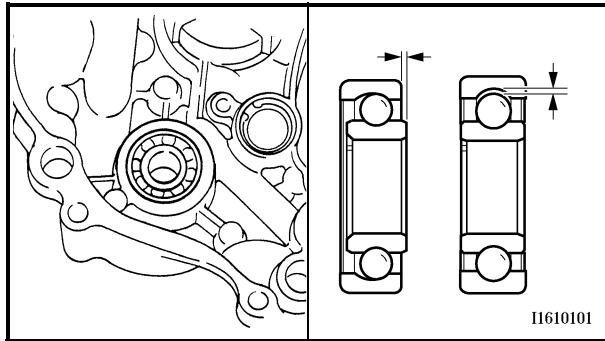
- Inspect:
  - Impeller shaft ①  
Bend/wear/damage → Replace.  
Fur deposits → Clean.



EC444300

### Impeller shaft gear

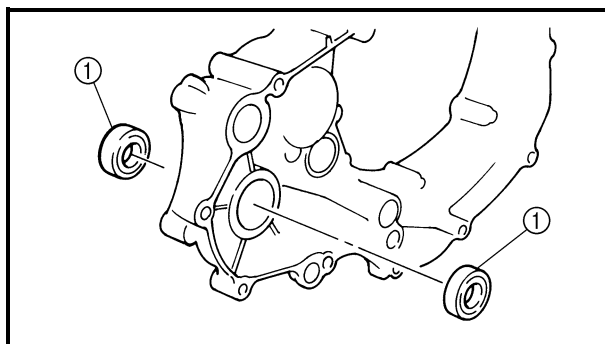
- Inspect:
  - Gear teeth ②  
Wear/damage → Replace.



EC4H4600

### Bearing

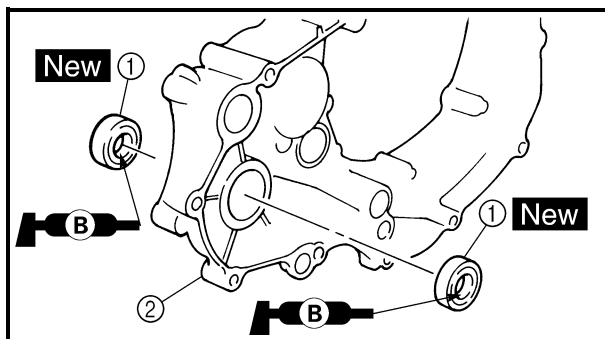
- Inspect:
  - Bearing  
Rotate inner race with a finger.  
Rough spot/seizure → Replace.



EC444400

### Oil seal

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



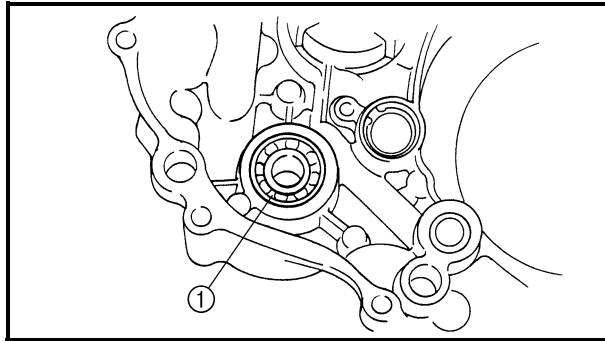
## ASSEMBLY AND INSTALLATION

### Oil seal

- Install:
  - Oil seal ① **New**

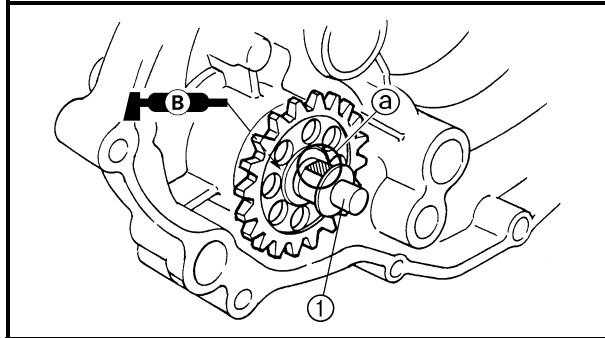
### NOTE:

- Apply the lithium soap base grease on the oil seal lip.
- Install the oil seal with its manufacture's marks or numbers facing the right crankcase cover ②.



2. Install:
- Bearing ①

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



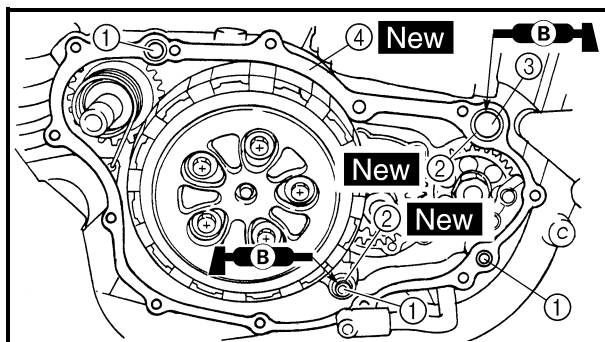
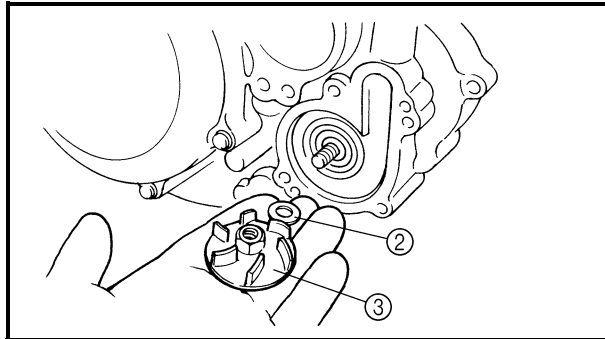
### Impeller shaft

1. Install:
- Impeller shaft ①
  - Washer ②
  - Impeller ③

14 Nm (1.4 m · kg, 10 ft · lb)

**NOTE:** \_\_\_\_\_

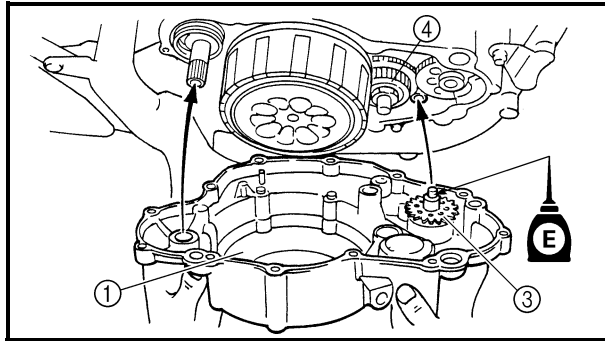
- Take care so that the oil seal lip is not damaged or the spring does not slip off its position.
- When installing the impeller shaft, apply the lithium soap base grease on the oil seal lip and impeller shaft. And install the shaft while turning it.
- Hold the impeller shaft on its width across the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



### Right crankcase cover


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

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



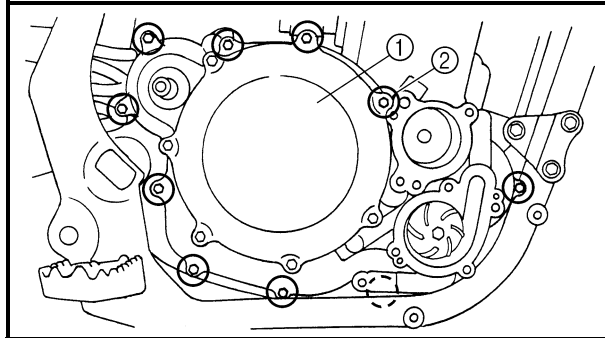
2. Install:

- Right crankcase cover ①
- Bolt (right crankcase cover) ②

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**


**NOTE:**


- Apply the engine oil on the impeller shaft end.
- Mesh the impeller shaft gear ③ with primary drive gear ④.
- Tighten the bolts in stage, using a crisscross pattern.



**Kickstarter crank**

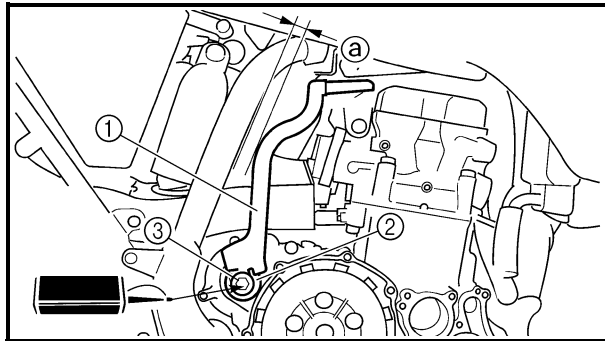
1. Install:

- Kickstarter crank ①
- Washer ②
- Bolt (kickstarter crank) ③ 

 **33 Nm (3.3 m · kg, 24 ft · lb)**


**NOTE:**

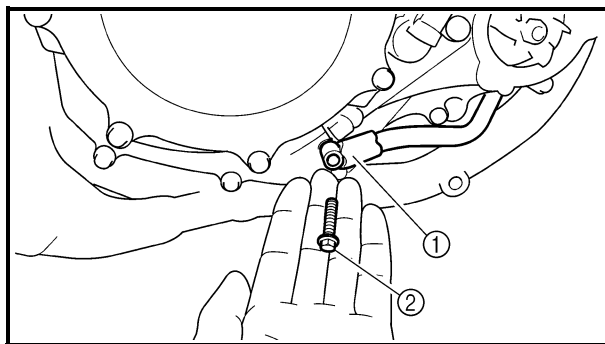
Install the kickstarter crank so that the kickstarter crank is as vertical as possible with the distance ① between the kickstarter crank and the frame being 8 mm (0.31 in) or more.



2. Install:


- Oil hose ①
- Bolt (oil hose) ②

 **8 Nm (0.8 m · kg, 5.8 ft · lb)**




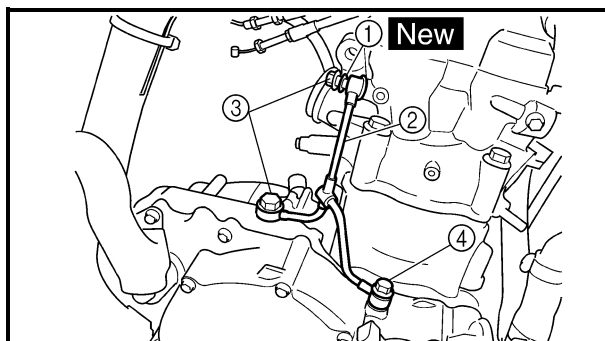
3. Install:

- Copper washer ① **New**
- Oil delivery pipe ②
- Union bolt (M8) ③

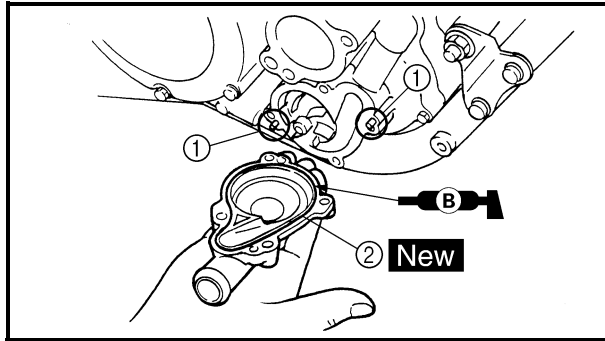
 **18 Nm (1.8 m · kg, 13 ft · lb)**

- Union bolt (M10) ④

 **20 Nm (2.0 m · kg, 14 ft · lb)**





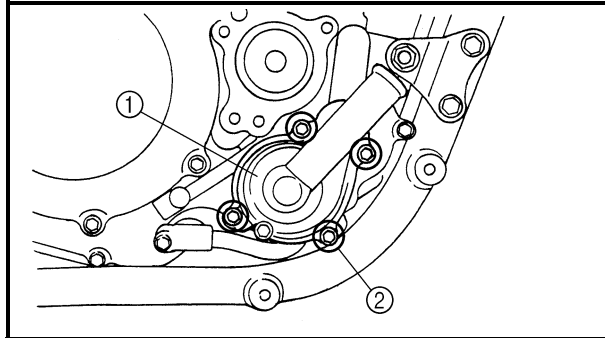


## Water pump housing

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


### NOTE:

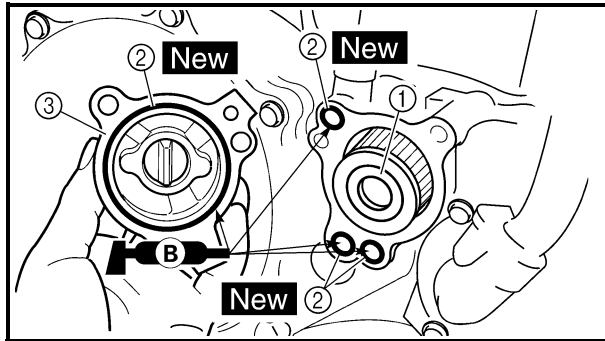
Apply the lithium soap base grease on the O-ring.



2. Install:


- Water pump housing ①
- Bolt (water pump housing) ②

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**



## Oil filter element

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

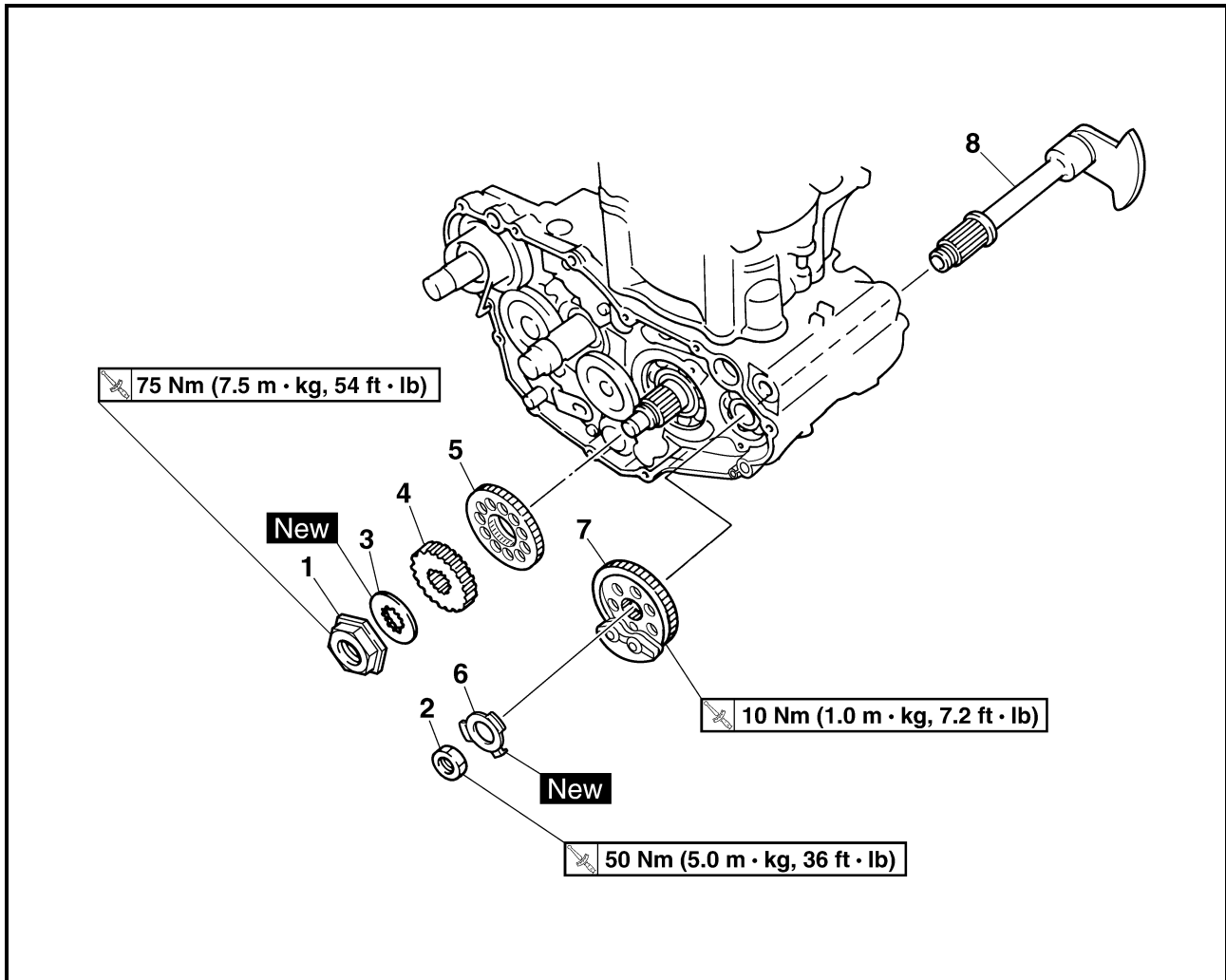
 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

### NOTE:

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

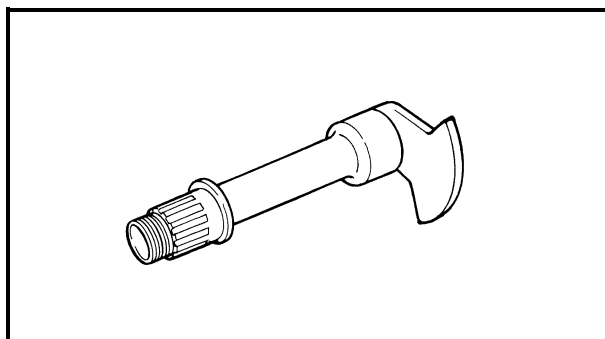
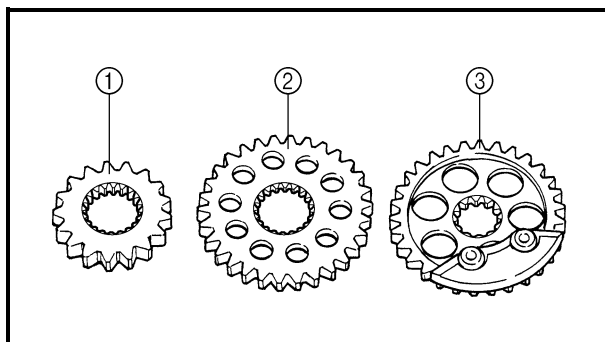
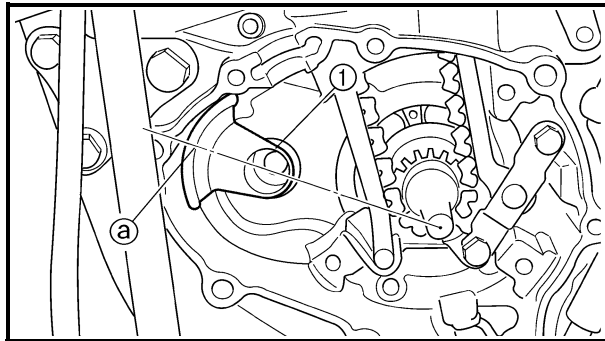
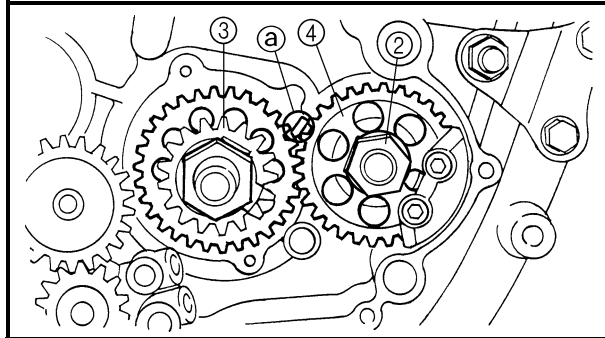
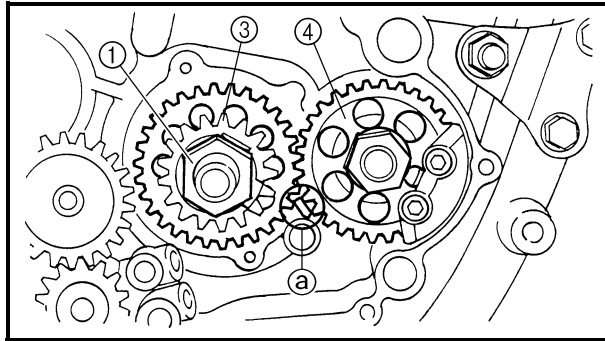


BALANCER



Extent of removal: ① Balancer shaft drive gear ② Balancer shaft

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



## REMOVAL POINTS

### Balancer shaft drive gear and balancer shaft driven gear

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

### NOTE:

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

### Balancer shaft

1. Remove:
  - Balancer shaft ①

### NOTE:

When removing the balancer shaft, align the center ③ of the balancer shaft weight along the line connecting the centers of the crankshaft and balancer shaft.

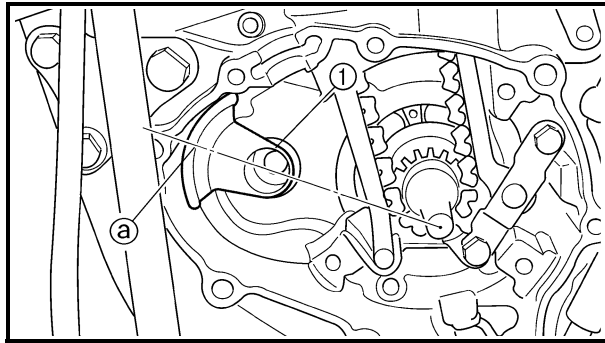
## INSPECTION

### Primary drive gear, balancer shaft drive gear and balancer shaft driven gear

1. Inspect:
  - Primary drive gear ①
  - Balancer shaft drive gear ②
  - Balancer shaft driven gear ③
 Wear/damage → Replace.

### Balancer shaft

1. Inspect:
  - Balancer shaft
 Cracks/damage → Replace.

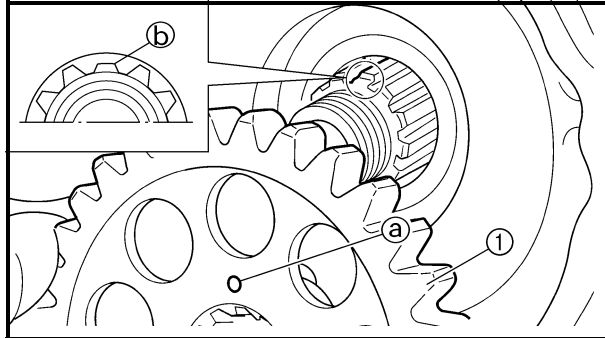
**ASSEMBLY AND INSTALLATION****Balancer shaft, balancer shaft drive gear and balancer shaft driven gear**

## 1. Install:

- Balancer shaft ①

**NOTE:**

- Apply the engine oil on the bearing.
- When installing the balancer shaft, align the center (a) of the balancer shaft weight along the line connecting the centers of the crankshaft and balancer shaft.

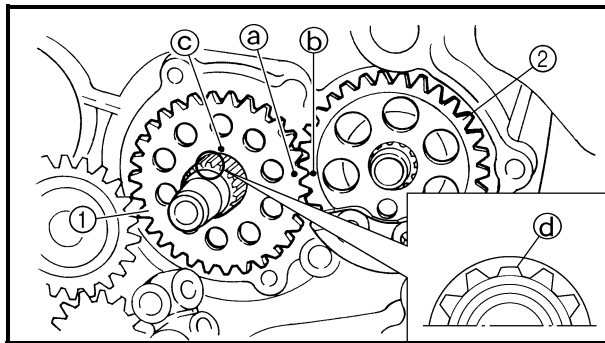


## 2. Install:

- Balancer shaft driven gear ①

**NOTE:**

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

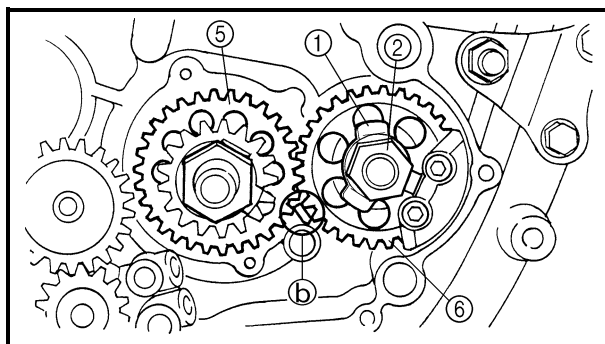


## 3. Install:

- Balancer shaft drive gear ①

**NOTE:**

- Align the punched mark (a) on the balancer shaft drive gear with the punched mark (b) on the balancer shaft driven gear (2).
- Align the punched mark (c) on the balancer shaft drive gear with the lower spline (d) on the crankshaft end.



## 4. Install:

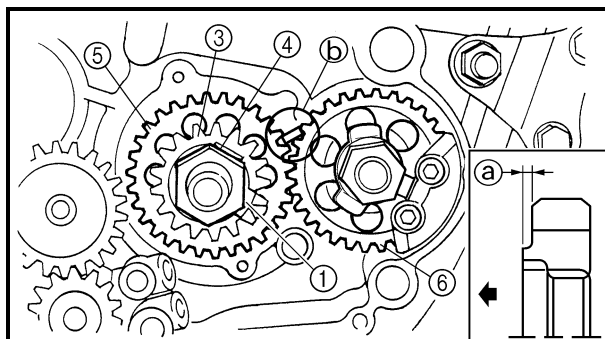
- Lock washer ①
- Nut (balancer shaft driven gear) ②
- Primary drive gear ③
- Nut (primary drive gear) ④

50 Nm (5.0 m · kg, 36 ft · lb)

75 Nm (7.5 m · kg, 54 ft · lb)

**NOTE:**

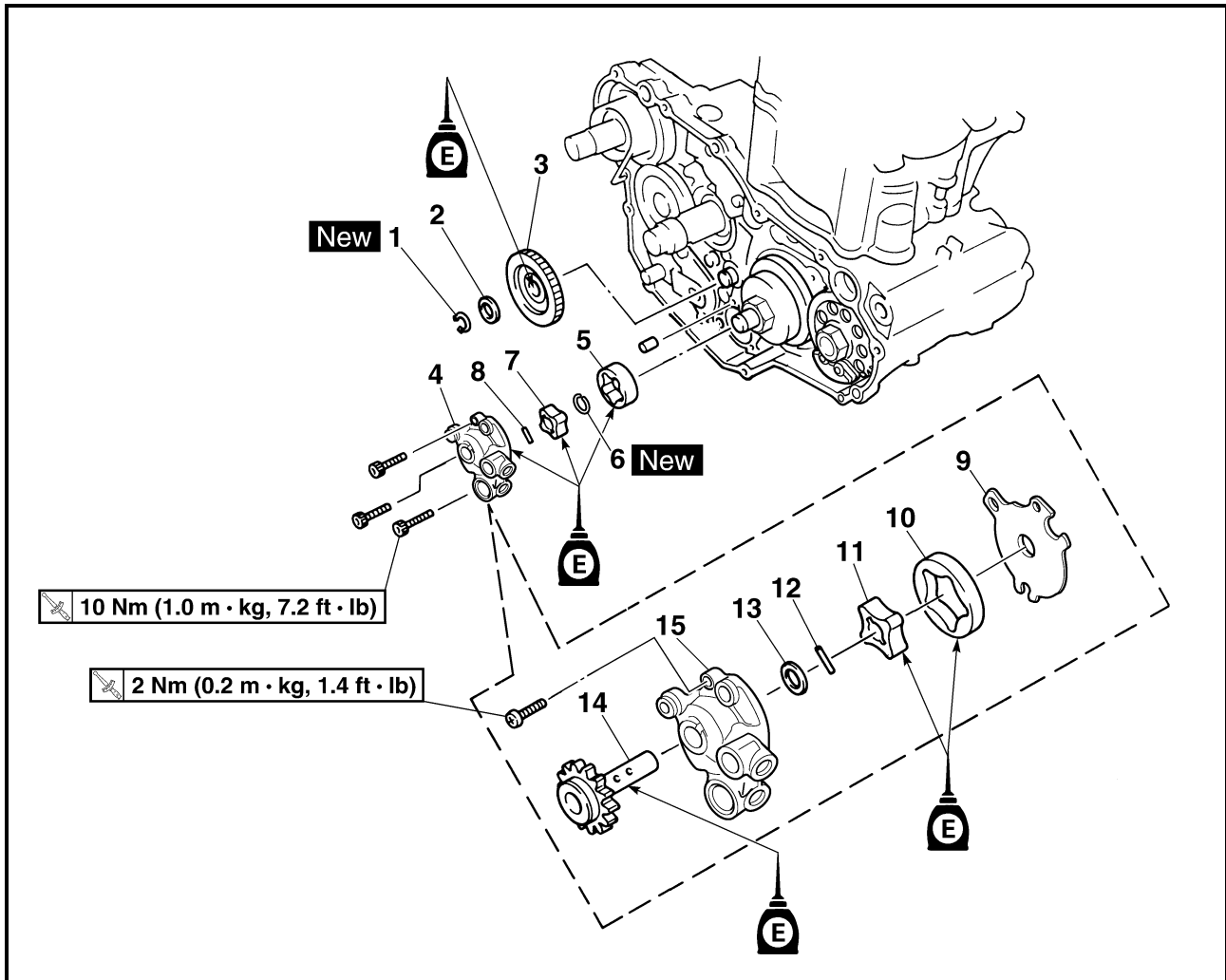
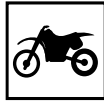
- Install the primary drive gear with its stepped side (a) facing the engine.
- Place an aluminum plate (b) between the teeth of the balancer shaft drive gear (5) and driven gear (6).



## 5. Bend the lock washer tab.



OIL PUMP

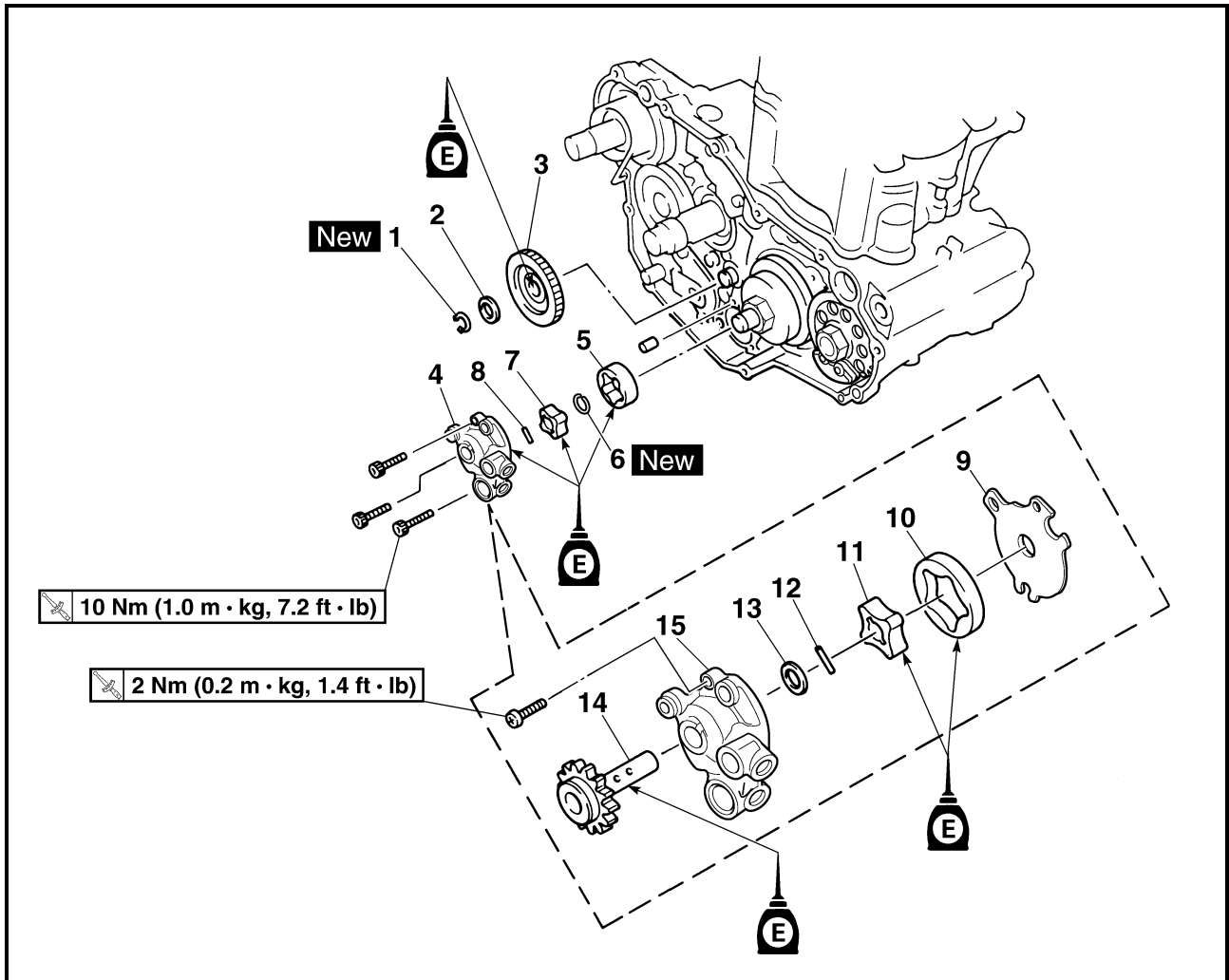


Extent of removal:

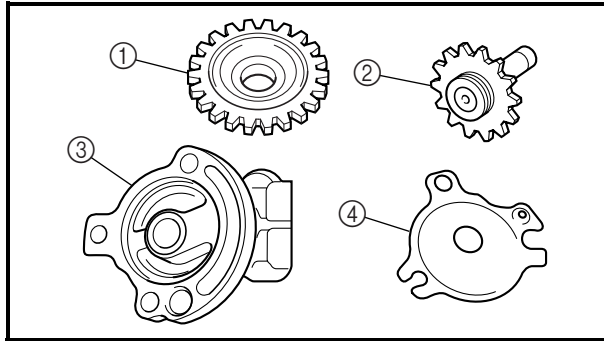
① Oil pump removal

② Oil pump disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>OIL PUMP REMOVAL AND DIS-ASSEMBLY</b>		
		Primary driven gear		Refer to "CLUTCH" section.
		Right crankcase cover		Refer to "OIL FILTER ELEMENT, WATER PUMP AND RIGHT CRANK-CASE COVER" section.
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>①</p> <p>↑</p> <p>↓</p> </div> <div style="margin-right: 20px;"> <p>②</p> <p>↑</p> <p>↓</p> </div> </div>	1	Circlip	1	
	2	Washer	1	
	3	Oil pump drive gear	1	
	4	Oil pump assembly	1	
	5	Outer rotor 2	1	
	6	Circlip	1	
	7	Inner rotor 2	1	
	8	Dowel pin	1	
	9	Oil pump cover	1	
	10	Outer rotor 1	1	
	11	Inner rotor 1	1	



Extent of removal	Order	Part name	Q'ty	Remarks
↑ ② ↓	12	Dowel pin	1	
	13	Washer	1	
	14	Oil pump drive shaft	1	
	15	Rotor housing	1	



## INSPECTION

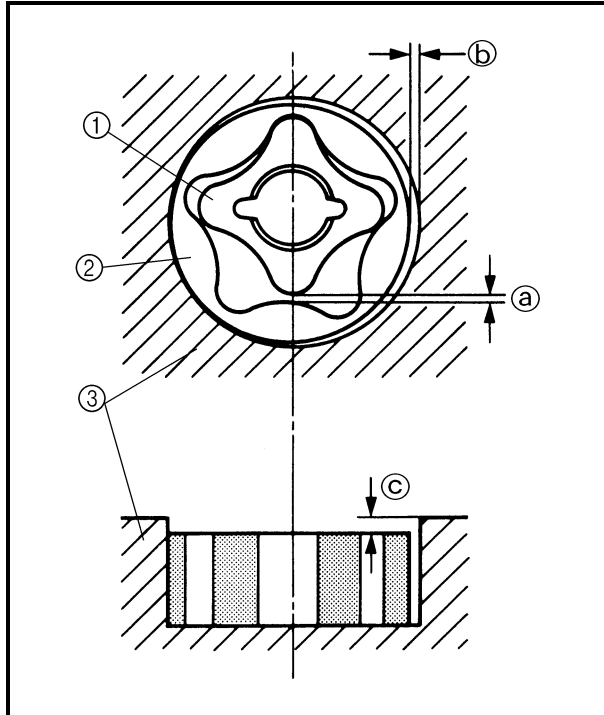
## Oil pump

## 1. Inspect:

- Oil pump drive gear ①
  - Oil pump drive shaft ②
  - Rotor housing ③
  - Oil pump cover ④
- Cracks/wear/damage → Replace.

## 2. Measure:

- Tip clearance ①  
(between the inner rotor ① and outer rotor ②)
  - Side clearance ②  
(between the outer rotor ② and rotor housing ③)
  - Housing and rotor clearance ③  
(between the rotor housing ③ and rotors ① ②)
- Out of specification → Replace the oil pump assembly.

**Tip clearance ①:**

**0.12 mm or less**  
**(0.0047 in or less)**

**<Limit>: 0.20 mm (0.008 in)**

**Side clearance ②:**

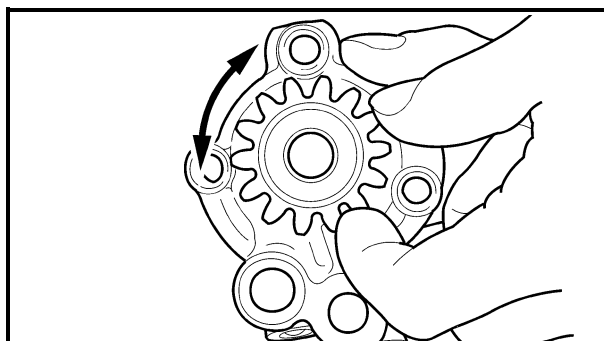
**0.09 ~ 0.17 mm**  
**(0.0035 ~ 0.0067 in)**

**<Limit>: 0.24 mm (0.009 in)**

**Housing and rotor clearance ③:**

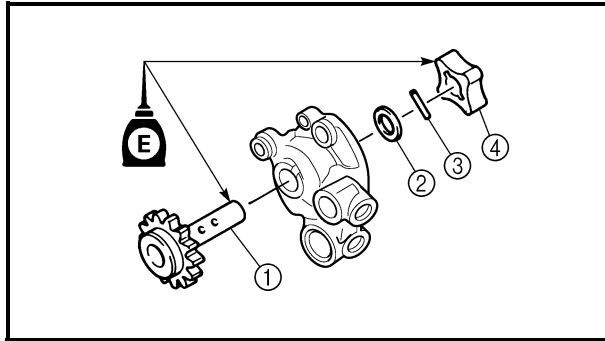
**0.03 ~ 0.10 mm**  
**(0.0012 ~ 0.0039 in)**

**<Limit>: 0.17 mm (0.0067 in)**



## 3. Check:

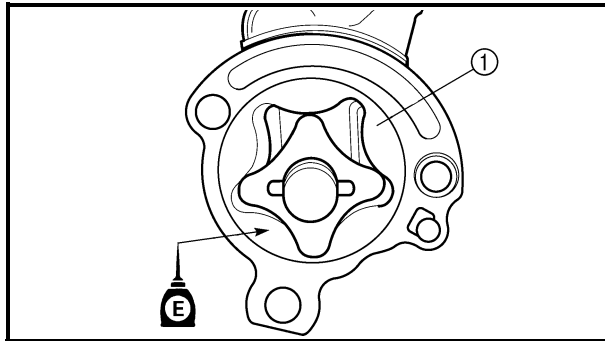
- Unsmooth → Repeat steps #1 and #2 or replace the defective parts.

**ASSEMBLY AND INSTALLATION****Oil pump****1. Install:**

- Oil pump drive shaft ①
- Washer ②
- Dowel pin ③
- Inner rotor 1 ④

**NOTE:** \_\_\_\_\_

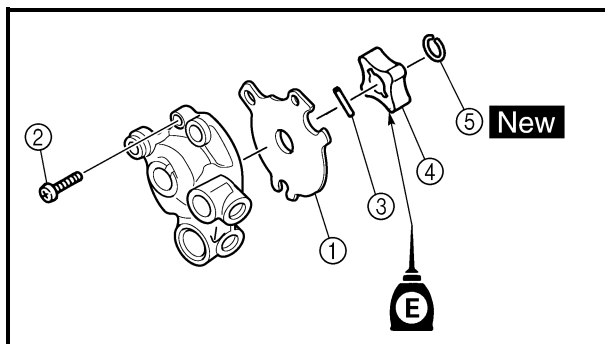
- Apply the engine oil on the oil pump drive shaft and inner rotor 1.
- Fit the dowel pin into the groove in the inner rotor 1.

**2. Install:**


- Outer rotor 1 ①

**NOTE:** \_\_\_\_\_

Apply the engine oil on the outer rotor 1.

**3. Install:**

- Oil pump cover ①
- Screw (oil pump cover) ②

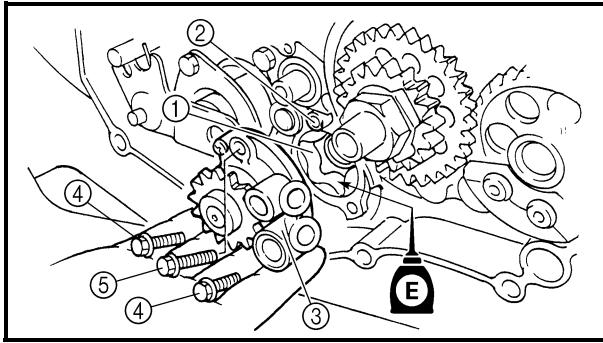
 **2 Nm (0.2 m · kg, 1.4 ft · lb)**

- Dowel pin ③
- Inner rotor 2 ④
- Circlip ⑤ **New**

**NOTE:** \_\_\_\_\_

- Apply the engine oil on the inner rotor 2.
- Fit the dowel pin into the groove in the inner rotor 2.






## 4. Install:

- Outer rotor 2 ①
- Dowel pin ②
- Oil pump assembly ③
- Bolt (oil pump assembly)  
[L = 25 mm (0.94 in)] ④

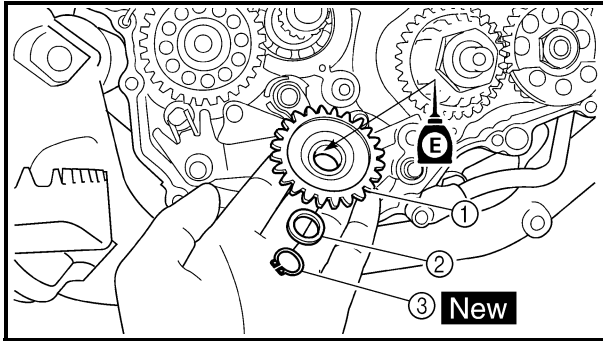
 10 Nm (1.0 m · kg, 7.2 ft · lb)

- Bolt (oil pump assembly)  
[L = 30 mm (1.18 in)] ⑤

 10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

Apply the engine oil on the outer rotor 2.



## 5. Install:

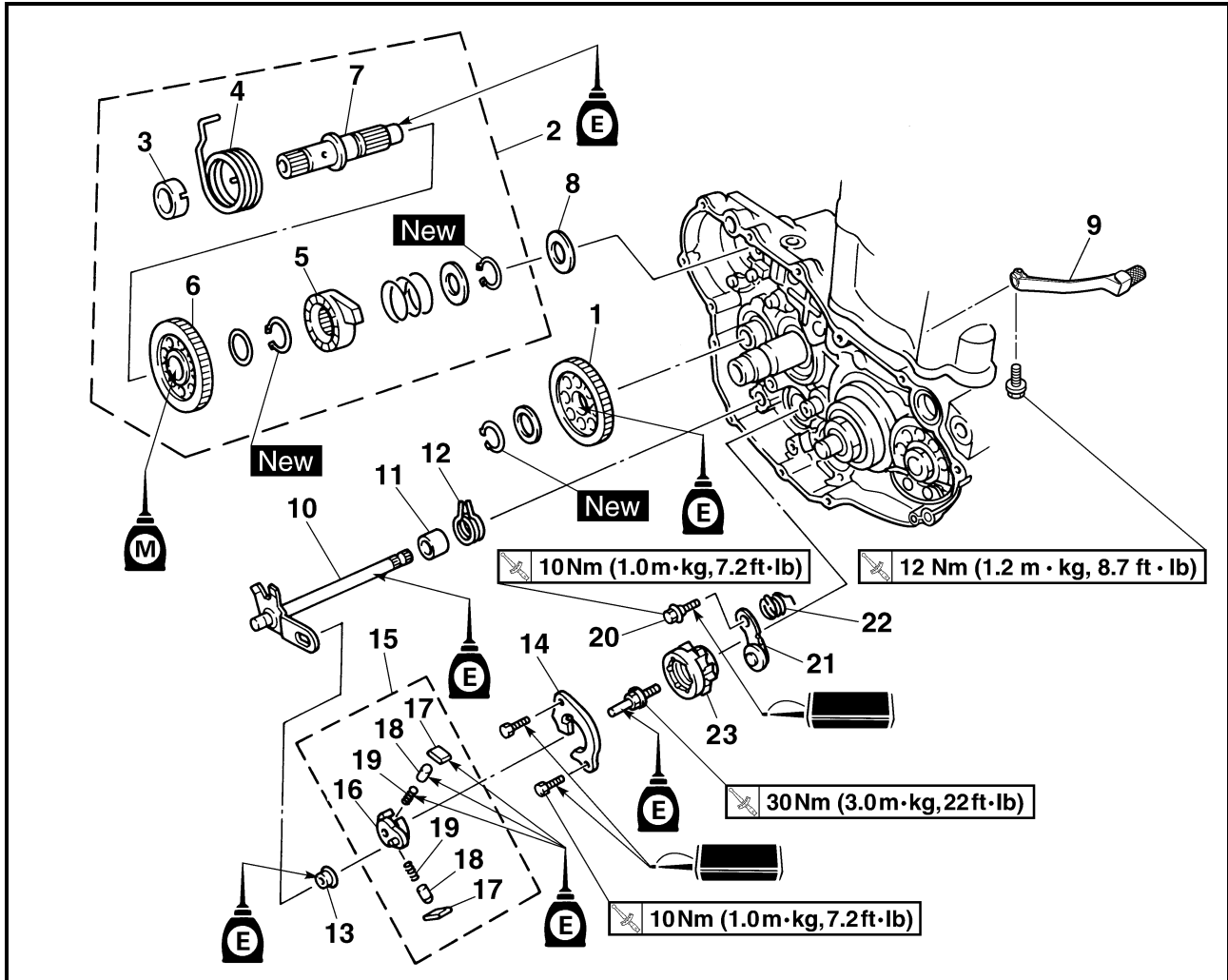
- Oil pump drive gear ①
- Washer ②
- Circlip ③ **New**

**NOTE:**

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



## KICK SHAFT AND SHIFT SHAFT

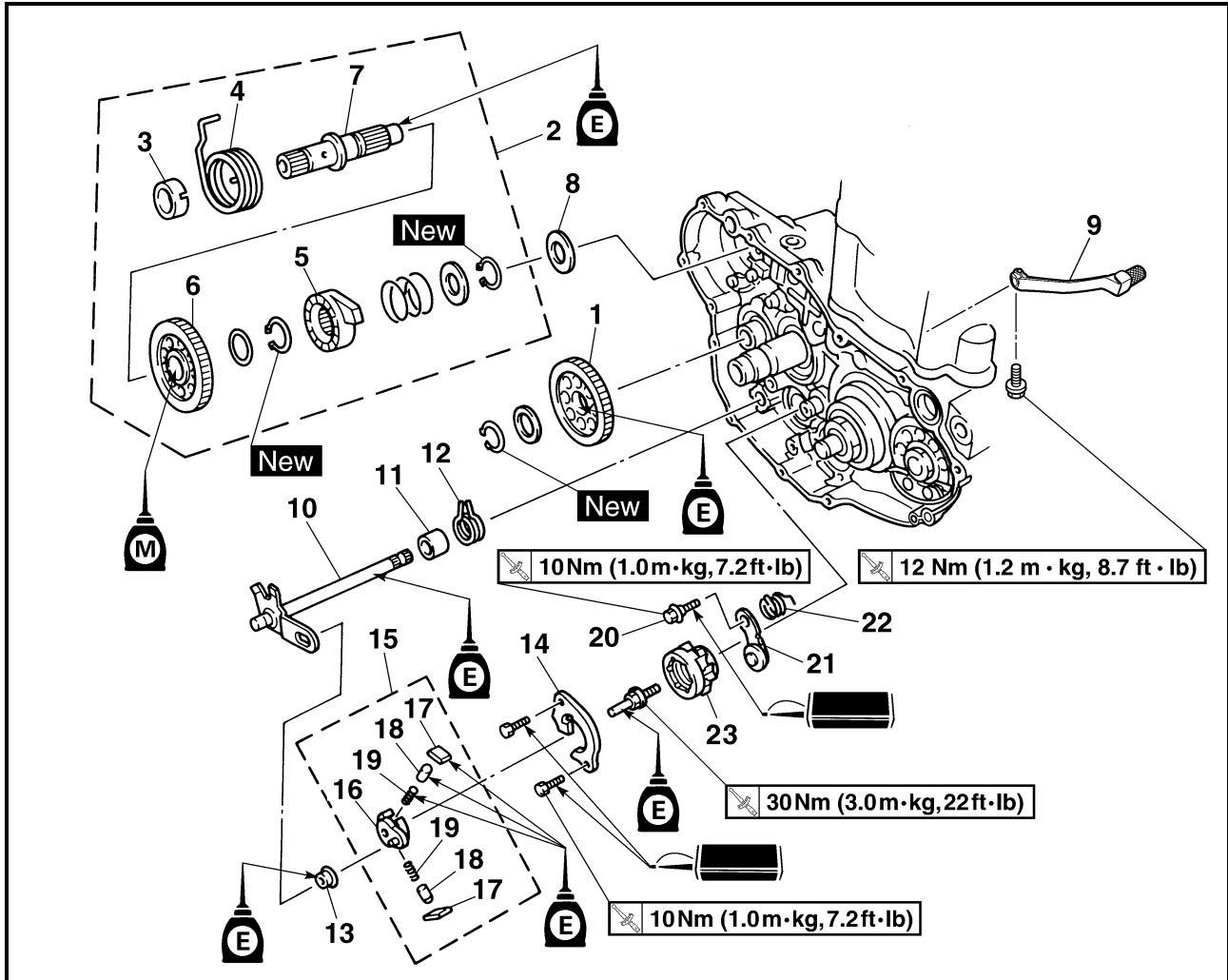


Extent of removal:

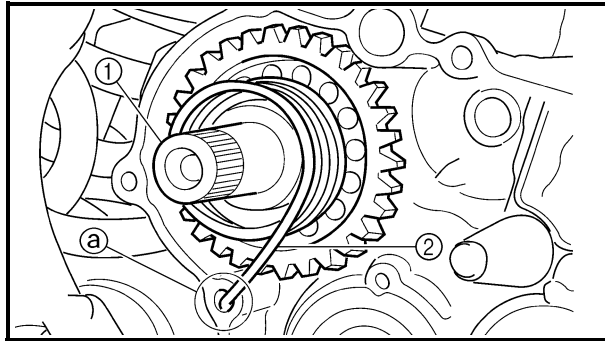
- ① Kick shaft removal
- ③ Shift shaft removal

- ② Kick shaft disassembly
- ④ Segment removal

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



Extent of removal	Order	Part name	Q'ty	Remarks	
③ ↓ ↑ ④	12	Torsion spring	1	Refer to "REMOVAL POINTS".	
	13	Roller	1		
	14	Shift guide	1		
	15	Shift lever assembly	1		
	16	Shift lever	1		
	17	Pawl	2		
	18	Pawl pin	2		
	19	Spring	2		
	20	Bolt (stopper lever)	1		
	21	Stopper lever	1		
	22	Torsion spring	1		
	23	Segment	1		Refer to "REMOVAL POINTS".



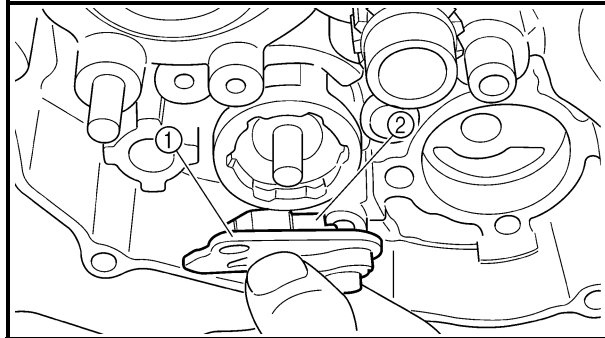
## REMOVAL POINTS

### Kick shaft assembly

- Remove:
  - Kick shaft assembly ①

### NOTE:

Unhook the torsion spring ② from the hole ① in the crankcase.



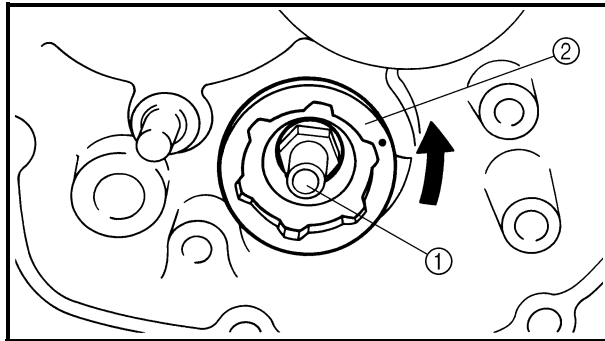
EC4C3101

### Shift guide and shift lever assembly

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

### NOTE:

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



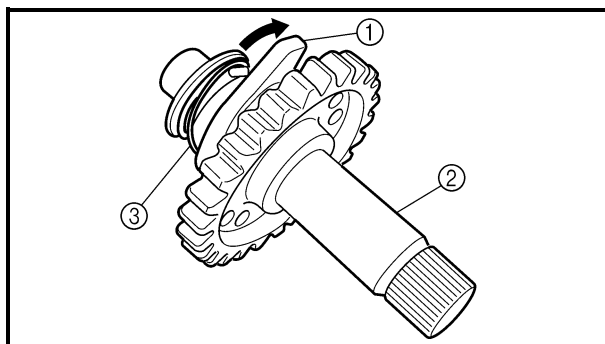
EC4N3100

### Segment

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

### NOTE:

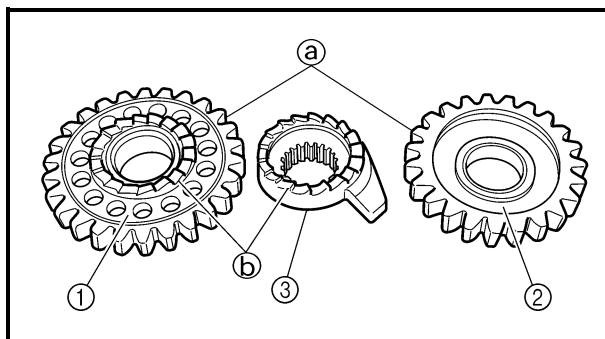
Turn the segment counterclockwise until it stops and loosen the bolt.



## INSPECTION

### Kick shaft and ratchet wheel

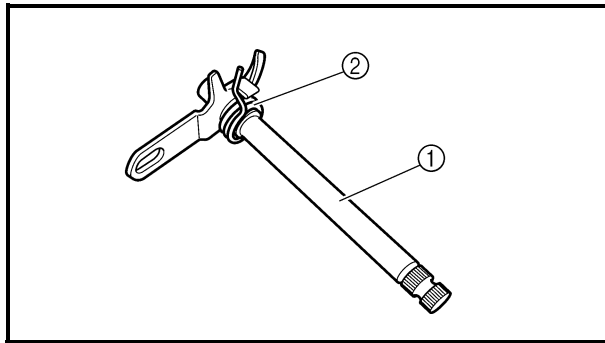
- Check:
  - Ratchet wheel ① smooth movement  
Unsmooth movement → Replace.
  - Kick shaft ②  
Wear/damage → Replace.
  - Spring ③  
Broken → Replace.



EC4C4300

### Kick gear, kick idle gear and ratchet wheel

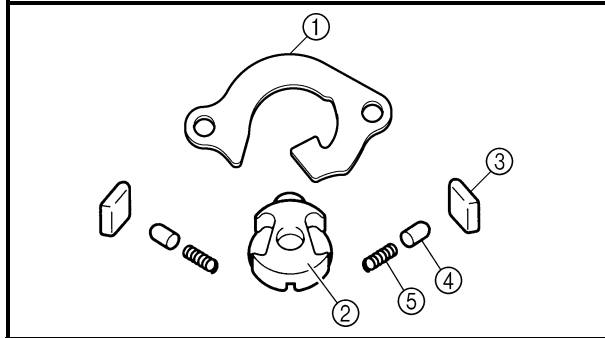
- Inspect:
  - Kick gear ①
  - Kick idle gear ②
  - Ratchet wheel ③
  - Gear teeth ①
  - Ratchet teeth ②
  - Wear/damage → Replace.



EC4B4400

## Shift shaft

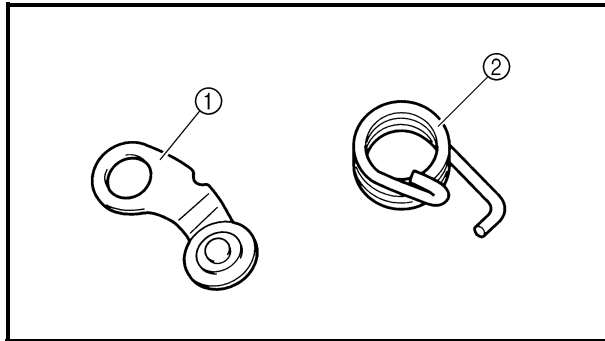
- Inspect:
  - Shift shaft ①  
Bend/damage → Replace.
  - Spring ②  
Broken → Replace.



EC4C4100

## Shift guide and shift lever assembly

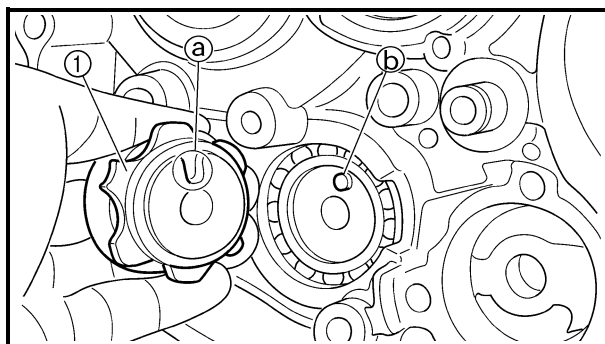
- Inspect:
  - Shift guide ①
  - Shift lever ②
  - Pawl ③
  - Pawl pin ④
  - Spring ⑤  
Wear/damage → Replace.



EC4B4500

## Stopper lever

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



## ASSEMBLY AND INSTALLATION

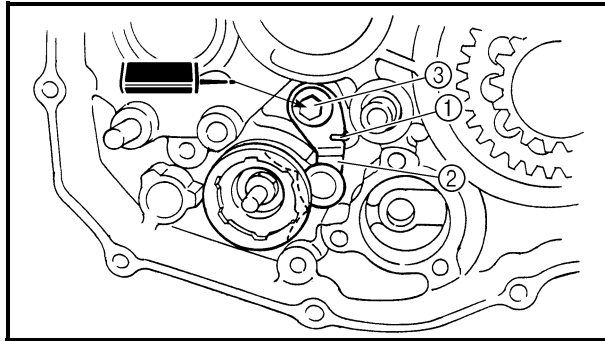
### Segment

- Install:
  - Segment ①
  - Bolt (segment)

30 Nm (3.0 m · kg, 22 ft · lb)

### NOTE:


Align the notch ① on the segment with the pin ② on the shift cam.




EC4B5111

### Stopper lever

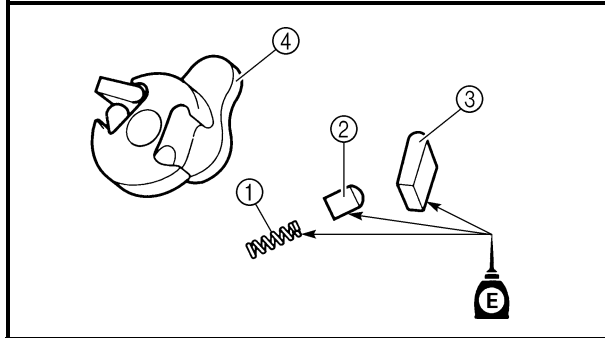
1. Install:

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

 10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:** \_\_\_\_\_

Align the stopper lever roller with the slot on segment.



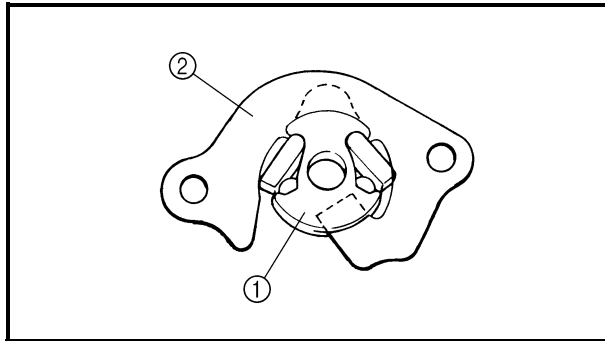
### Shift guide and shift lever assembly

1. Install:

- Spring ①
- Pawl pin ②
- Pawl ③
- To shift lever ④.

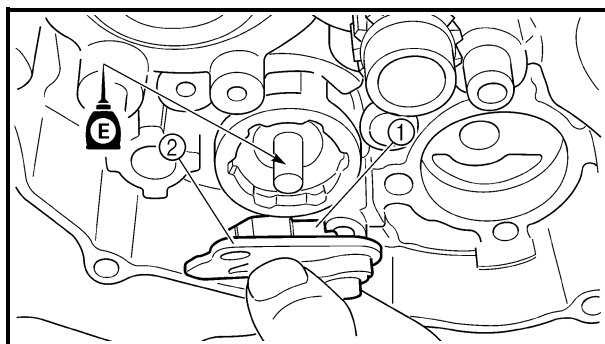
**NOTE:** \_\_\_\_\_

Apply the engine oil on the spring, pawl pin and pawl.



2. Install:

- Shift lever assembly ①
- To shift guide ②.

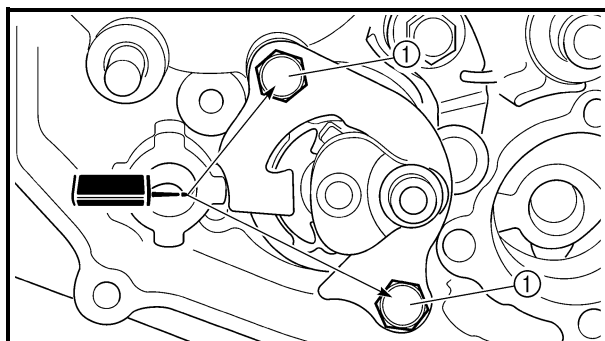


3. Install:


- Shift lever assembly ①
- Shift guide ②


**NOTE:** \_\_\_\_\_

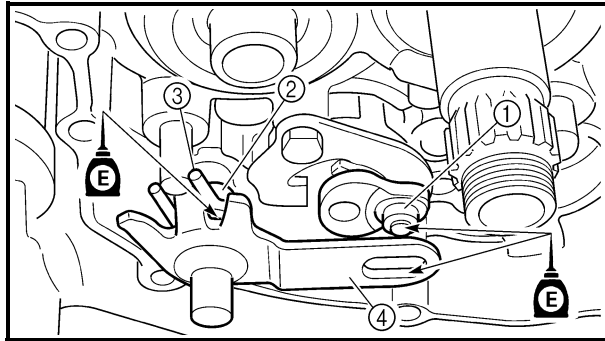
- The shift lever assembly is installed at the same time as the shift guide.
- Apply the engine oil on the bolt (segment) shaft.



4. Install:

- Bolt (shift guide) ① 

 10 Nm (1.0 m · kg, 7.2 ft · lb)



## Shift shaft

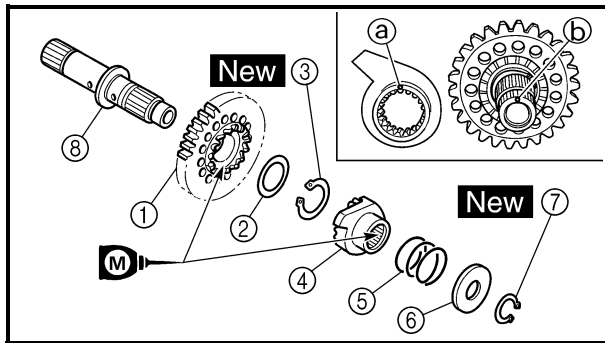
1. Install:
  - Roller ①
  - Collar ②
  - Torsion spring ③
  - Shift shaft ④

**NOTE:** \_\_\_\_\_

Apply the engine oil on the roller and shift shaft.

2. Install:
  - Shift pedal

Refer to “AC MAGNETO AND STARTER CLUTCH” section.



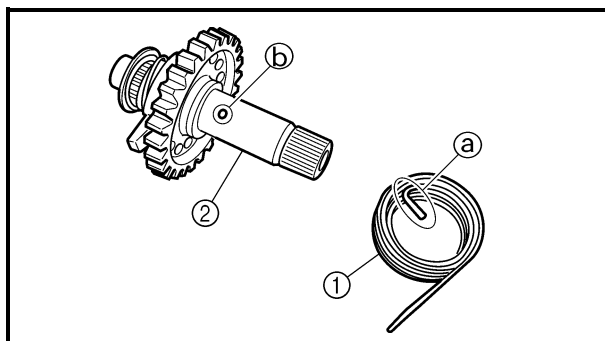
## Kick shaft assembly

1. Install:
  - Kick gear ①
  - Washer ②
  - Circlip ③ **New**
  - Ratchet wheel ④
  - Spring ⑤
  - Washer ⑥
  - Circlip ⑦ **New**

To kick shaft ⑧.

**NOTE:** \_\_\_\_\_

- Apply the molybdenum disulfide oil on the inner circumferences of the kick gear and ratchet wheel.
- Align the punch mark ① on the ratchet wheel with the punch mark ② on the kick shaft.

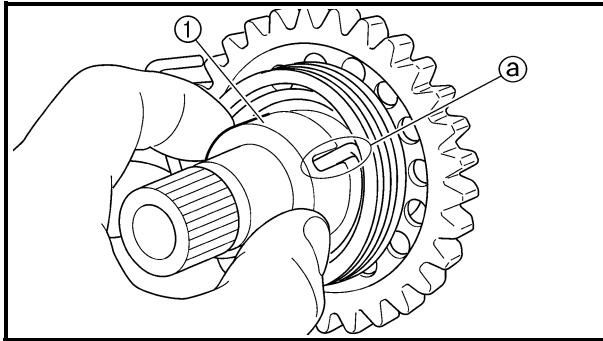


2. Install:
  - Torsion spring ①

To kick shaft ②.

**NOTE:** \_\_\_\_\_

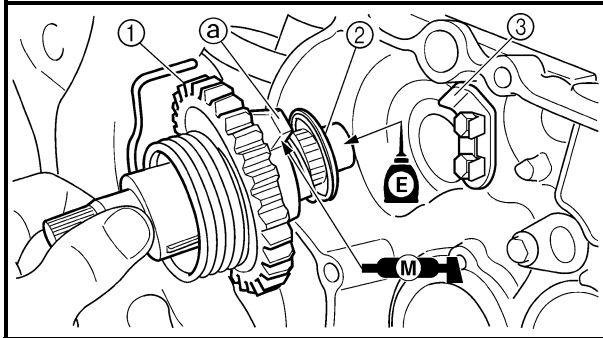
Make sure the stopper ① of the torsion spring fits into the hole ② on the kick shaft.



3. Install:
  - Spring guide ①

**NOTE:**

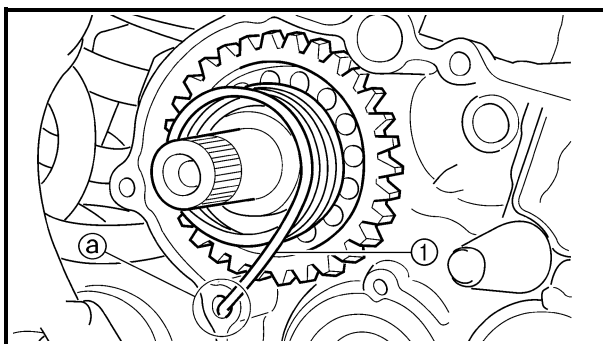
Slide the spring guide into the kick shaft, make sure the groove (a) in the spring guide fits on the stopper of the torsion spring.



4. Install:
  - Kick shaft assembly ①
  - Washer ②

**NOTE:**

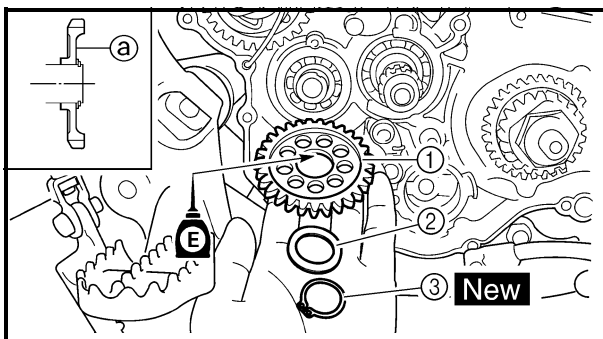
- Apply the molybdenum disulfide grease on the contacting surfaces of the kick shaft stopper (a) and stopper plate (3).
- Apply the engine oil on the kick shaft.
- Slide the kick shaft assembly into the crankcase and make sure the kick shaft stopper (a) fits into the stopper plate.



5. Hook:
  - Torsion spring ①

**NOTE:**

Turn the torsion spring clockwise and hook into the proper hole (a) in the crankcase.



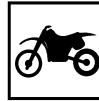
**Kick idle gear**

1. Install:
  - Kick idle gear ①
  - Washer ②
  - Circlip ③ **New**

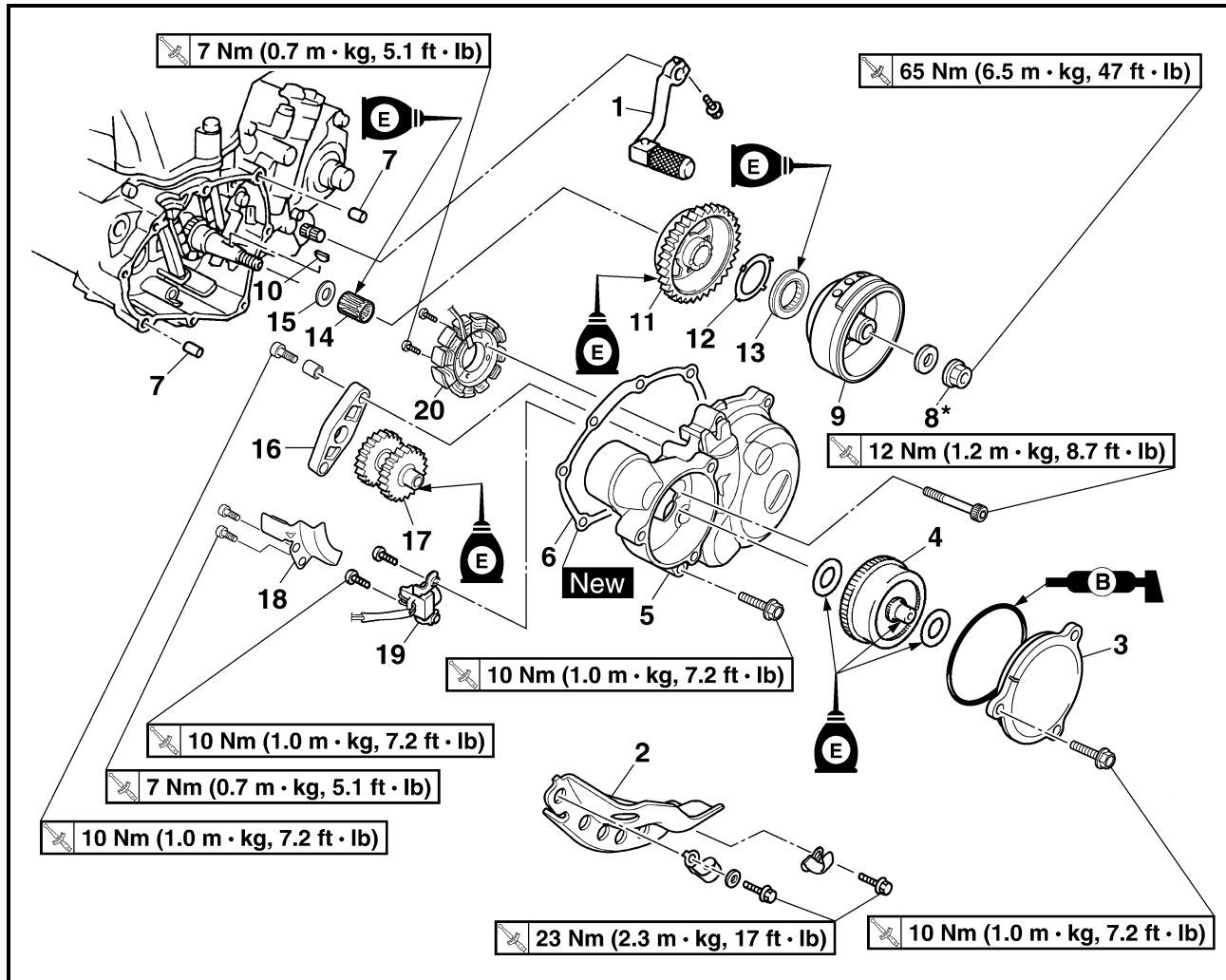
**NOTE:**

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





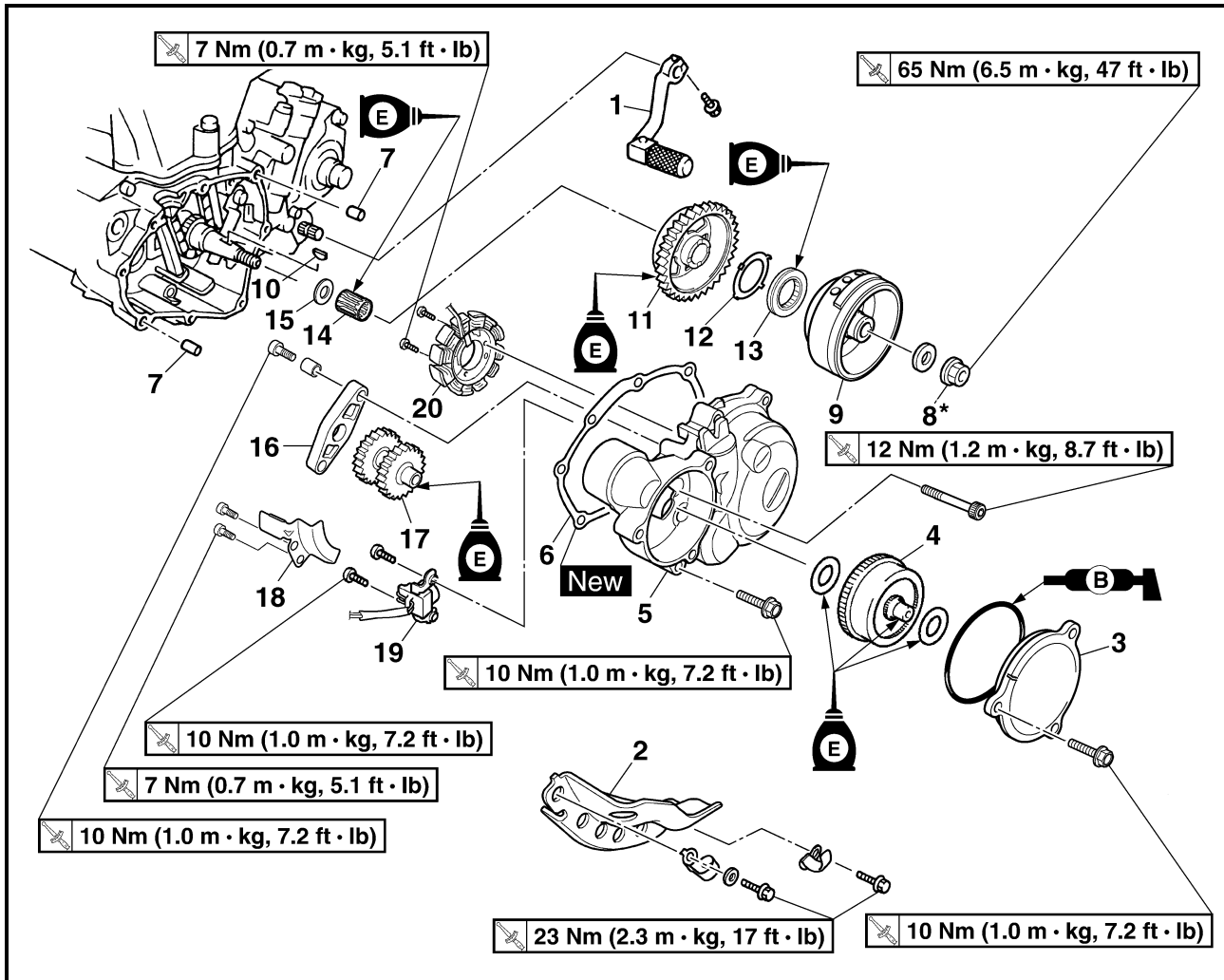
## AC MAGNETO AND STARTER CLUTCH



Extent of removal:

- ① Starter clutch/wheel gear removal
- ② Rotor removal
- ③ Pickup coil/stator removal

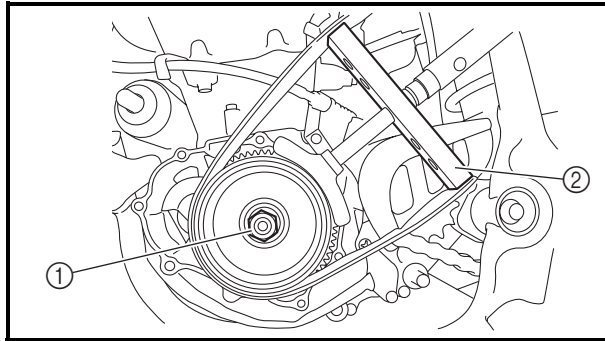
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>AC MAGNETO AND STATOR REMOVAL</b>		
		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Bolt [radiator (left)] Disconnect the AC magneto lead.		Refer to "RADIATOR" section.
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ↑ ① ↓           </div> <div style="text-align: center;">             ↑ ③ ↓           </div> </div>	1	Shift pedal	1	Do not disassemble.
	2	Engine guard (left)	1	
	3	Cover (torque limiter)	1	
	4	Torque limiter	1	
	5	Crankcase cover (left)	1	
	6	Gasket	1	
	7	Dowel pin	2	



Extent of removal	Order	Part name	Q'ty	Remarks
	8*	Nut (rotor)	1	Refer to NOTE.
	9	Rotor	1	Use special tool. Refer to "REMOVAL POINTS".
	10	Woodruff key	1	
	11	Starter clutch drive gear	1	
	12	Starter clutch assembly cover	1	
	13	Starter clutch	1	Refer to "REMOVAL POINTS".
	14	Bearing	1	
	15	Washer	1	
	16	Idle gear plate	1	
	17	Idle gear	1	
	18	Holder	1	
	19	Pickup coil	1	
	20	Stator	1	

**NOTE:**

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



EC4L3000

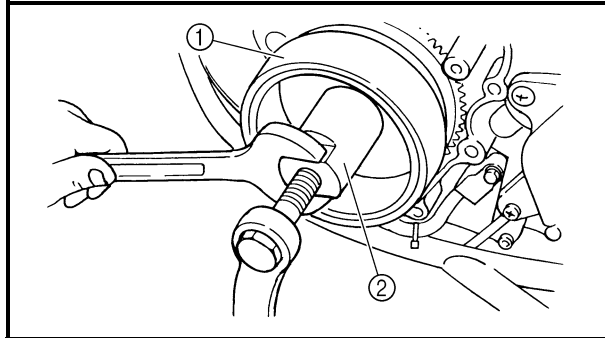
### REMOVAL POINTS

#### Rotor

- Remove:
  - Nut (rotor) ①
  - Washer
 Use the sheave holder ②.



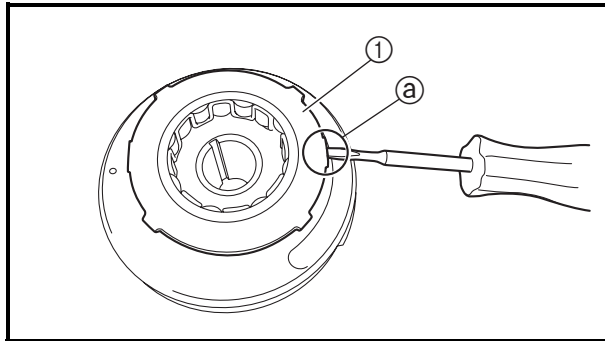
**Sheave holder:**  
YS-1880-A/90890-01701



- Remove:
  - Rotor ①
 Use the rotor puller ②.



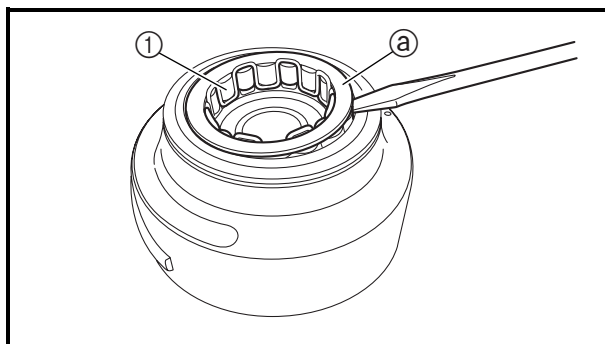
**Rotor puller:**  
YM-04141/90890-04141



#### Starter clutch

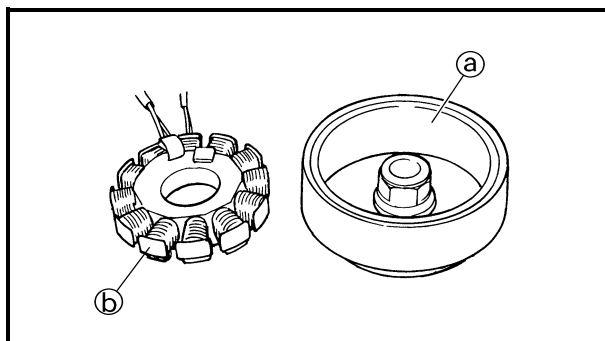
- Remove:
  - Starter clutch assembly cover ①

**NOTE:** \_\_\_\_\_  
Insert a thin screwdriver or the like under the convexity ① and remove the starter clutch assembly cover by prying it gently to void damage to the cover.



- Remove:
  - Starter clutch ①

**NOTE:** \_\_\_\_\_  
Using a thin screwdriver or the like, remove the plate ① while prying it upward little by little.

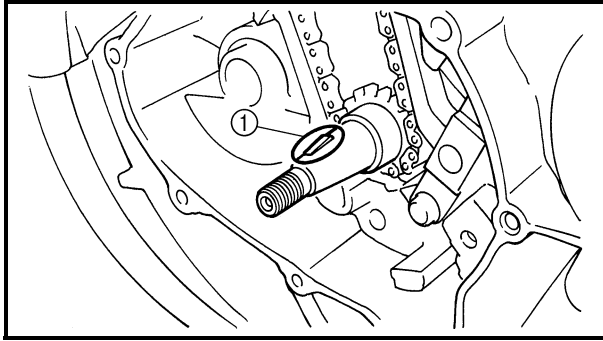


EC4L4000

### INSPECTION

#### AC magneto

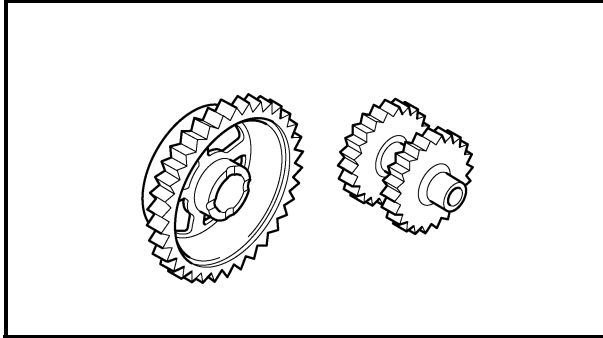
- Inspect:
  - Rotor inner surface ①
  - Stator outer surface ②
 Damage → Inspect the crankshaft runout and crankshaft bearing.  
If necessary, replace AC magneto and/or stator.



EC4L4200

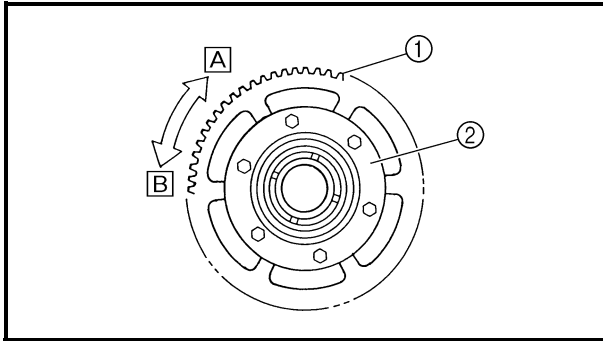
### Woodruff key

1. Inspect:
  - Woodruff key ①  
Damage → Replace.

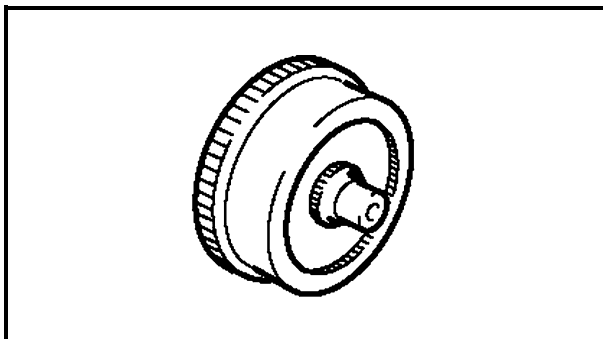


### Starter clutch

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

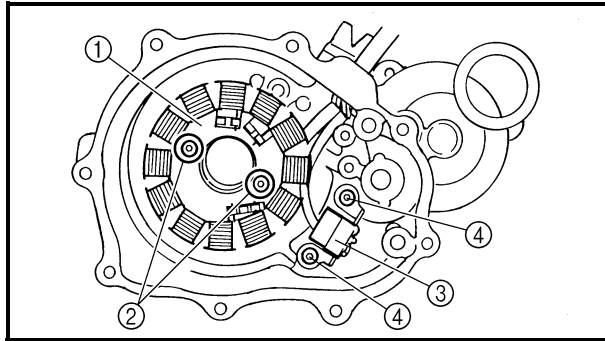


- Install the starter clutch drive gear ① onto the starter clutch ② and hold the starter clutch.
- When turning the starter clutch drive gear counterclockwise [B], the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the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



### Torque limiter

1. Check:
  - Torque limiter  
Damage/wear → Replace.



EC4L5000

### ASSEMBLY AND INSTALLATION

#### AC magneto and starter clutch

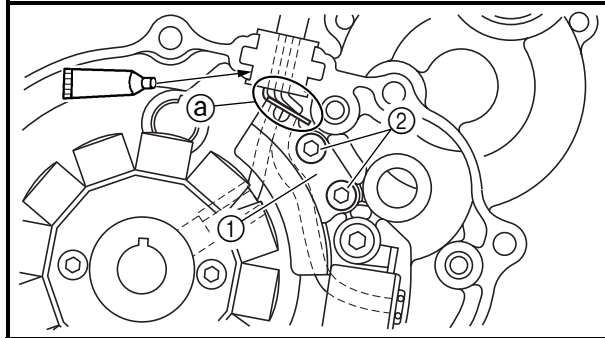
1. Install:

- Stator ①
- Bolt (stator) ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

- Pickup coil ③
- Bolt (pickup coil) ④

10 Nm (1.0 m · kg, 7.2 ft · lb)



2. Install:

- Holder ①
- Bolt ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

**CAUTION:**

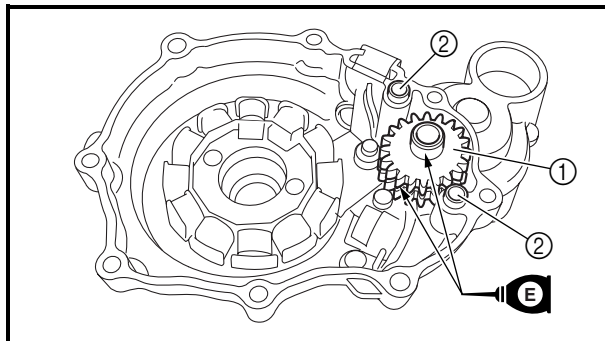
Pass the pickup coil lead and charging coil lead under the holder while taking care not to allow these leads to get caught with each other. Also take care to pass the leads so that they do not become loose at the bend of the holder ① in order to avoid their contacting the starter clutch drive gear.

**NOTE:**

Apply the sealant to the grommet of the AC magneto lead.



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

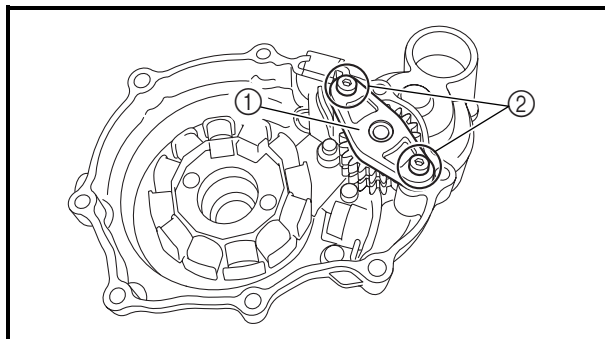


3. Install:

- Idle gear 2 ①
- Dowel pin 2 ②

**NOTE:**

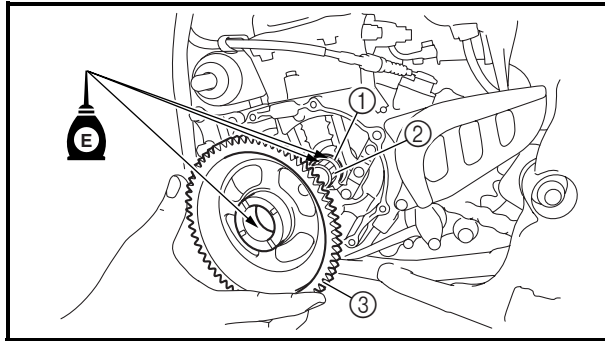
Apply the engine oil on the idle gear 2.



4. Install:

- Idle gear plate ①
- Bolt (idle gear plate) ②

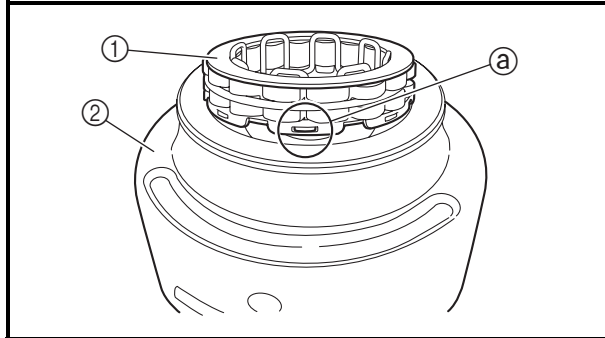
10 Nm (1.0 m · kg, 7.2 ft · lb)



5. Install:
- Washer ①
  - Bearing ②
  - Starter clutch drive gear ③

**NOTE:** \_\_\_\_\_

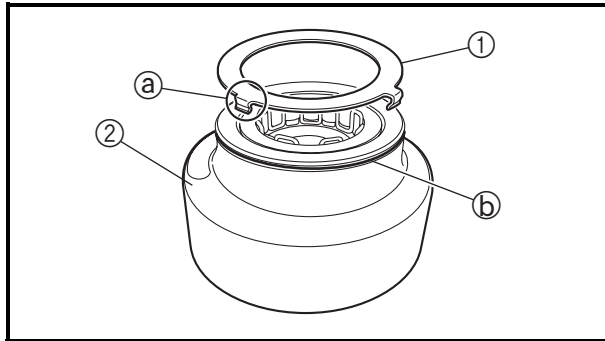
Apply the engine oil on the washer, bearing and starter clutch drive gear inner circumference.



6. Install:
- Starter clutch ①
  - To rotor ②.

**NOTE:** \_\_\_\_\_

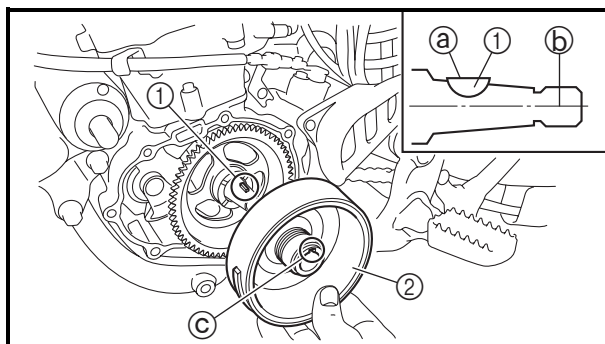
- Install the starter clutch with its plate side upward.
- While installing the starter clutch, push in the projections ① one by one on the clutch circumference.
- Push in the starter clutch until it hits the rotor.



7. Install:
- Starter clutch assembly cover ①
  - To rotor ②.

**NOTE:** \_\_\_\_\_

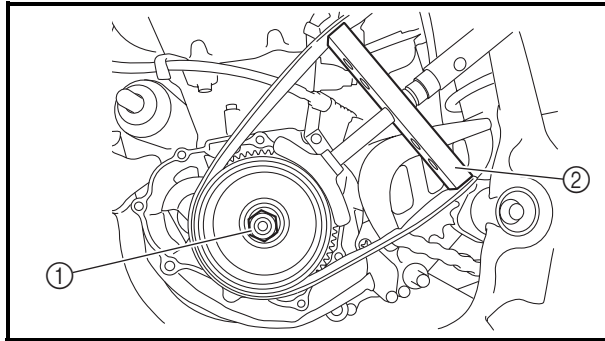
Install the starter clutch assembly cover by fitting its pawls ① into the groove ② in the rotor.



8. Install:
- Woodruff key ①
  - Rotor ②

**NOTE:** \_\_\_\_\_

- Clean the tapered portions of the crankshaft and rotor.
- When installing the woodruff key, make sure that its flat surface ① is in parallel with the crankshaft center line ②.
- When installing the rotor, align the keyway ③ of the rotor with the woodruff key.



9. Install:

- Washer (rotor)
- Nut (rotor) ①

65 Nm (6.5 m · kg, 47 ft · lb)

Use the sheave holder ②.

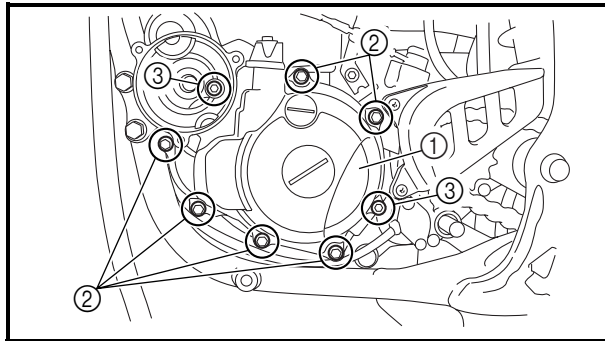
**NOTE:**

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



**Sheave holder:**

**YS-1880-A/90890-01701**



10. Install:

- Dowel pin
- Gasket [crankcase cover (left)] **New**
- Crankcase cover (left) ①
- Bolt [crankcase cover (left)] ②

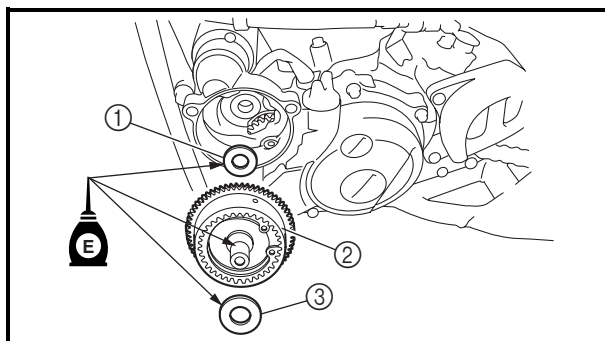
10 Nm (1.0 m · kg, 7.2 ft · lb)

- Bolt [crankcase cover (left)] ③

12 Nm (1.2 m · kg, 8.7 ft · lb)

**NOTE:**

Tighten the bolts in stage, using a crisscross pattern.

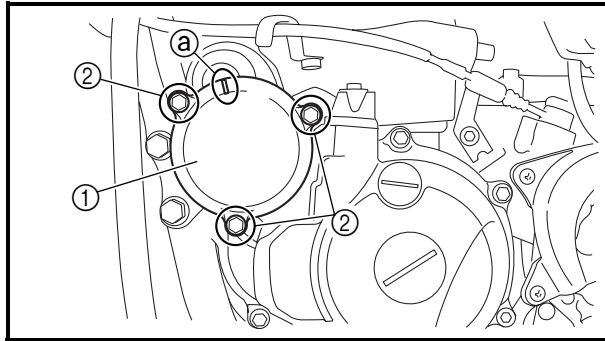


11. Install:

- Washer ①
- Torque limiter ②
- Washer ③

**NOTE:**

Apply the engine oil to the shaft and washers.



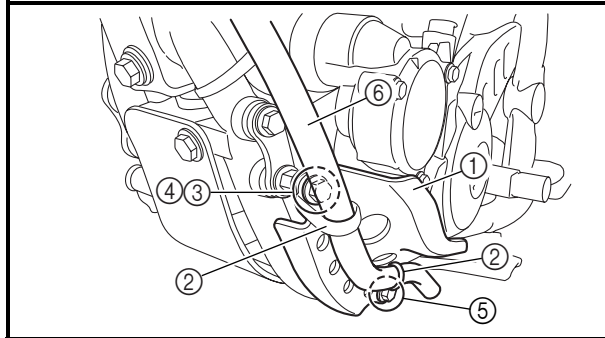
12. Install:

- Cover (idle gear 1) ①
- Bolt ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

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

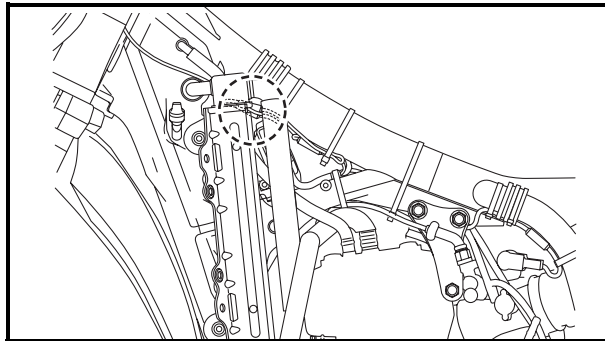


13. Install:

- Engine guard ①
- Clamp ②
- Washer ③
- Bolt [engine guard (front)] ④
- Bolt [engine guard (rear)] ⑤
- Cylinder head breather hose ⑥

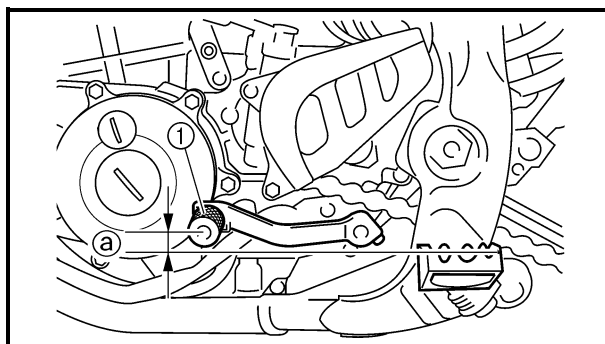
23 Nm (2.3 m · kg, 17 ft · lb)

23 Nm (2.3 m · kg, 17 ft · lb)



14. Connect:

- AC magneto lead
- Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.



15. Install:

- Shift pedal ①
- Bolt (shift pedal)

12 Nm (1.2 m · kg, 8.7 ft · lb)

**NOTE:**

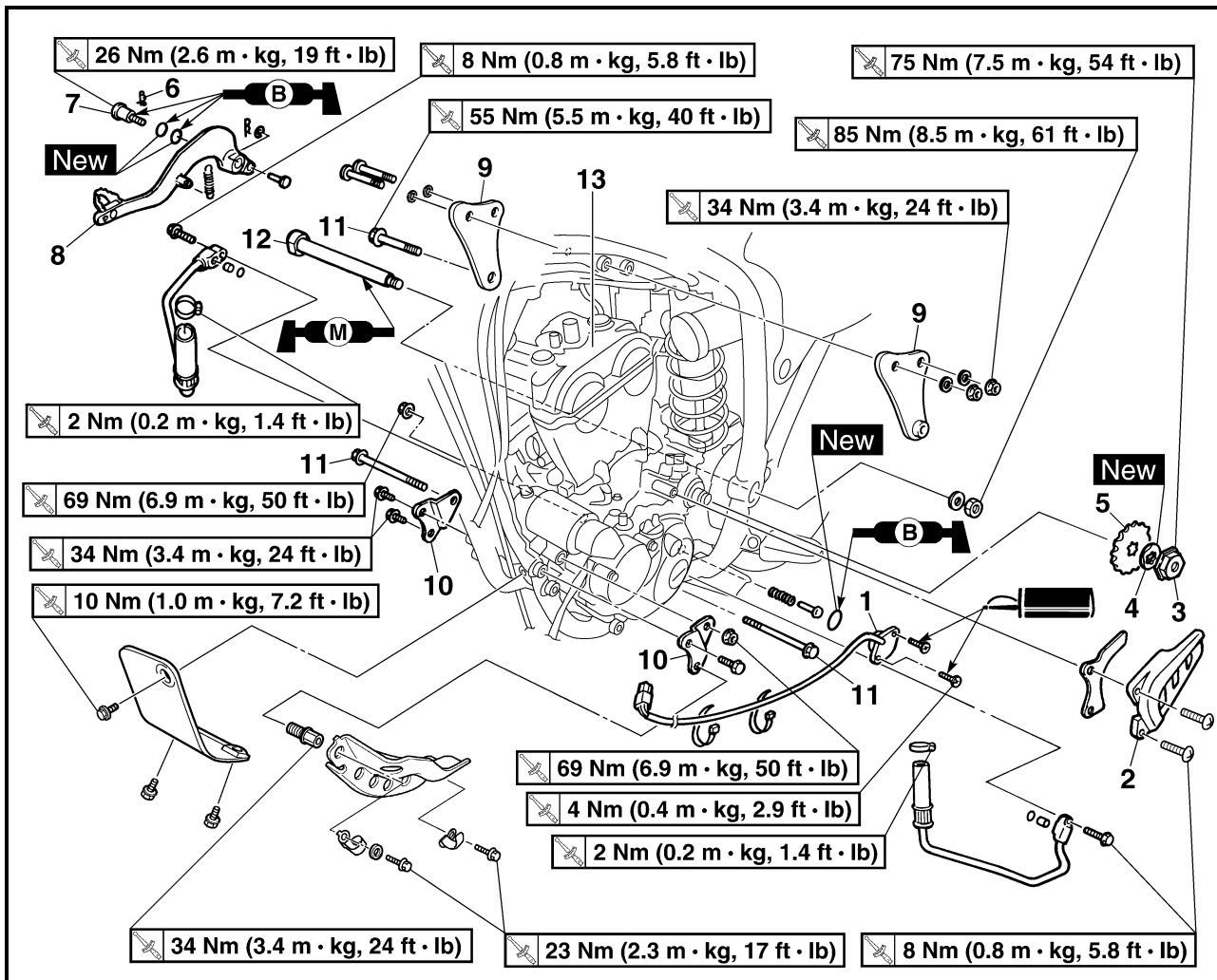
When installing the shift pedal onto the shift shaft, be sure that the center of the shift pedal is about 1 mm (0.04 in) (a) above the top of the footrest.



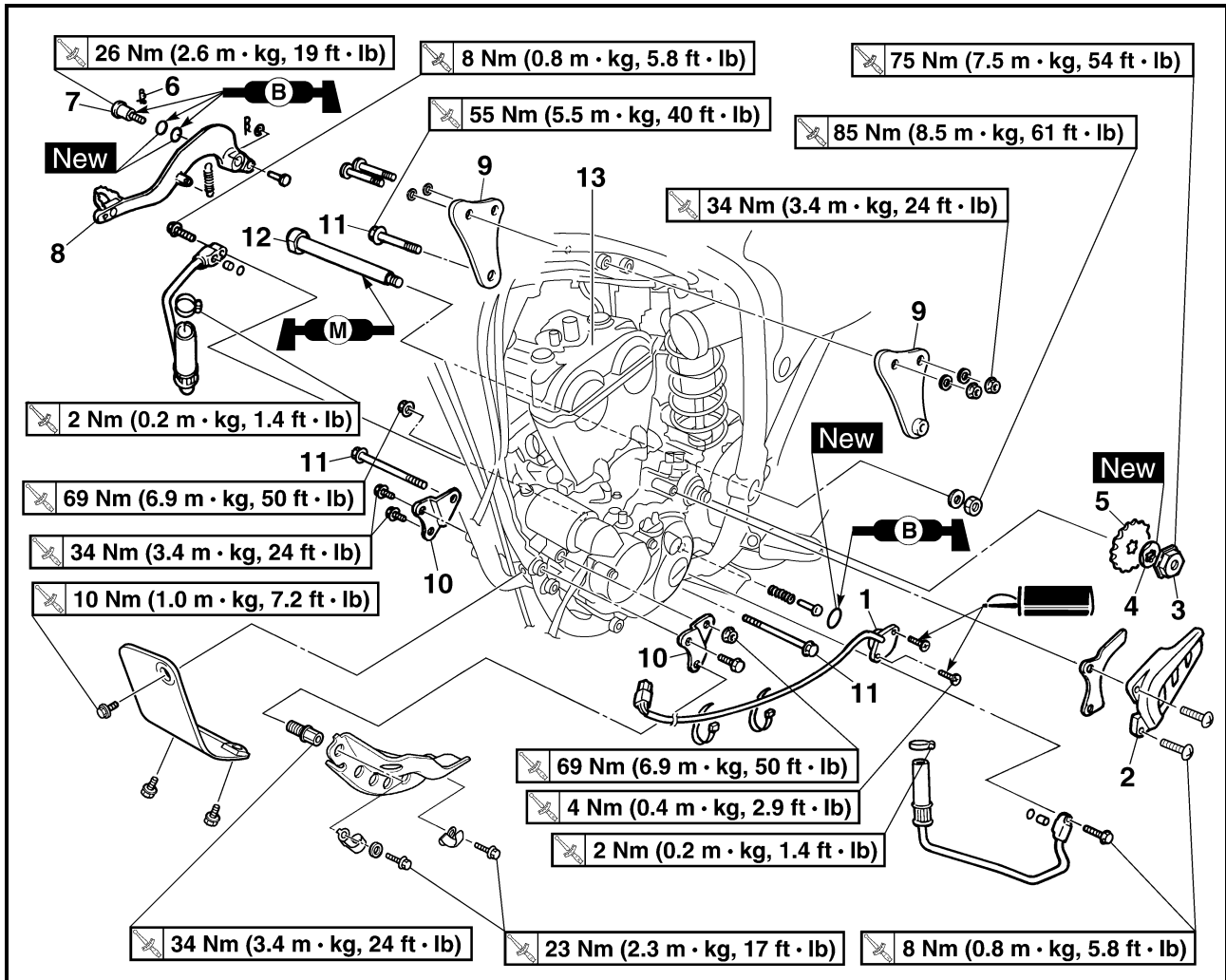


EC4M0000

## ENGINE REMOVAL

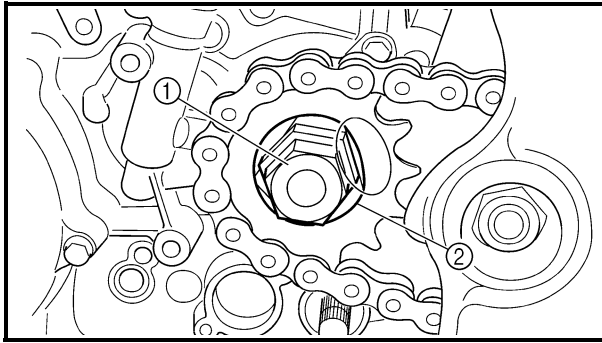


Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>ENGINE REMOVAL</b> Hold the machine by placing the suitable stand under the frame.  Drain the engine oil.  Seat and fuel tank  Carburetor Exhaust pipe and silencer  Clutch cable Radiator Shift pedal  Cylinder head breather hose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



Extent of removal: ① Engine removal

Extent of removal	Order	Part name	Q'ty	Remarks
		Ignition coil Disconnect the AC magneto lead. Starter motor lead Negative battery lead Right engine guard		Disconnect at the starter motor side. Disconnect at the engine side.
①	1	Neutral switch	1	Refer to "REMOVAL POINTS".
	2	Drive chain sprocket cover	1	
	3	Nut (drive sprocket)	1	
	4	Lock washer	1	
	5	Drive sprocket	1	
	6	Clip	1	
	7	Bolt (brake pedal)	1	
	8	Brake pedal	1	
	9	Upper engine bracket	2	
	10	Lower engine bracket	2	
	11	Engine mounting bolt	3	
	12	Pivot shaft	1	
	13	Engine	1	



EC4M3000

**REMOVAL POINTS**

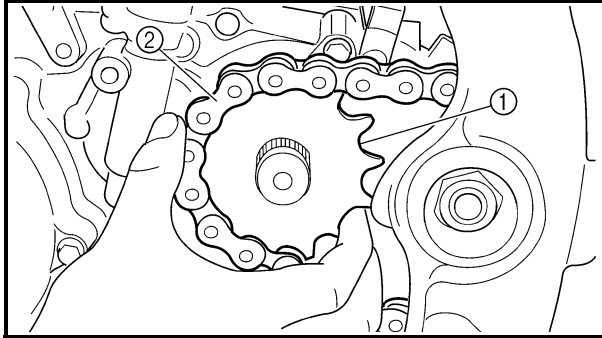
EC4F3100

**Drive sprocket**

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

**NOTE:** \_\_\_\_\_

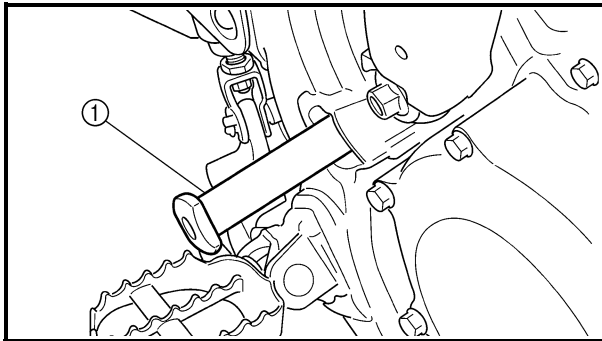
- Straighten the lock washer tab.
- Loosen the nut while applying the rear brake.



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

**NOTE:** \_\_\_\_\_

Remove the drive sprocket together with the drive chain.



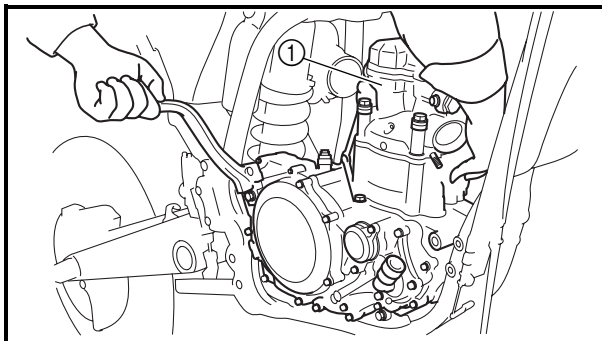
EC4M3301

**Engine removal**

1. Remove:
  - Pivot shaft ①

**NOTE:** \_\_\_\_\_

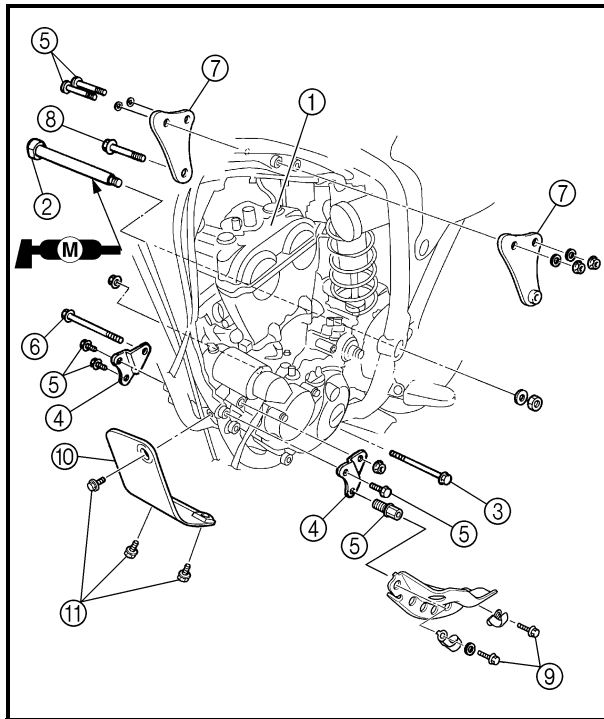
If the pivot shaft is pulled all the way out, the swingarm will come loose. If possible, insert a shaft of similar diameter into the other side of the swingarm to support it.



2. Remove:
  - Engine ①
 From right side.

**NOTE:** \_\_\_\_\_

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



EC4M5000

**ASSEMBLY AND INSTALLATION****Engine installation**

## 1. Install:

- Engine ①  
Install the engine from right side.

- Pivot shaft ②

85 Nm (8.5 m · kg, 61 ft · lb)

- Engine mounting bolt (lower) ③

69 Nm (6.9 m · kg, 50 ft · lb)

- Lower engine bracket ④

- Bolt (engine bracket) ⑤

34 Nm (3.4 m · kg, 24 ft · lb)

- Engine mounting bolt (front) ⑥

69 Nm (6.9 m · kg, 50 ft · lb)

- Upper engine bracket ⑦

- Engine mounting bolt (upper) ⑧

55 Nm (5.5 m · kg, 40 ft · lb)

- Bolt (left engine guard) ⑨

23 Nm (2.3 m · kg, 17 ft · lb)

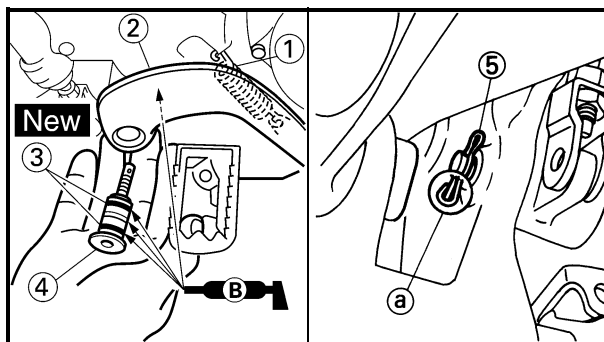
- Lower engine guard ⑩

- Bolt (lower engine guard) ⑪

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

Apply the molybdenum disulfide grease on the pivot shaft.



EC4M5211

**Brake pedal**

## 1. Install:

- Spring ①

- Brake pedal ②

- O-ring ③ **New**

- Bolt (brake pedal) ④

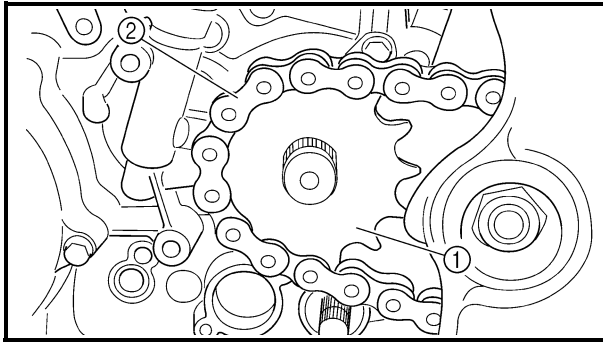
26 Nm (2.6 m · kg, 19 ft · lb)

- Clip ⑤

**NOTE:**

• Apply the lithium soap base grease on the bolt, O-rings and brake pedal bracket.

• Install the clip with its stopper portion ⑤ facing inward.

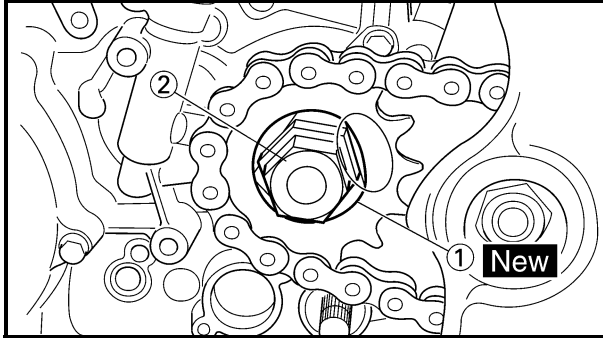


## Drive sprocket

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

### NOTE:

Install the drive sprocket together with the drive chain.

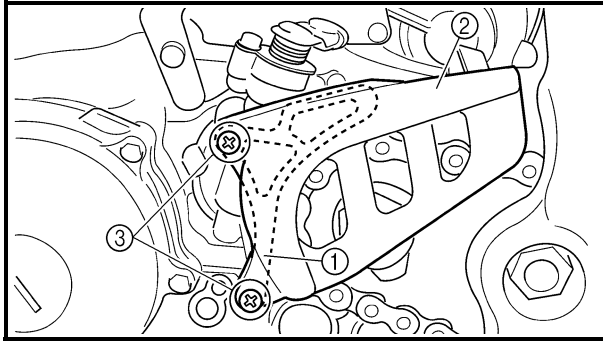


2. Install:
  - Lock washer ① **New**
  - Nut (drive sprocket) ②

75 Nm (7.5 m · kg, 54 ft · lb)

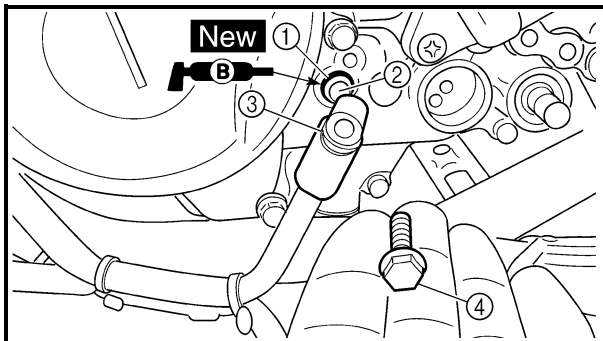
### NOTE:

Tighten the nut while applying the rear brake.



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

8 Nm (0.8 m · kg, 5.8 ft · lb)



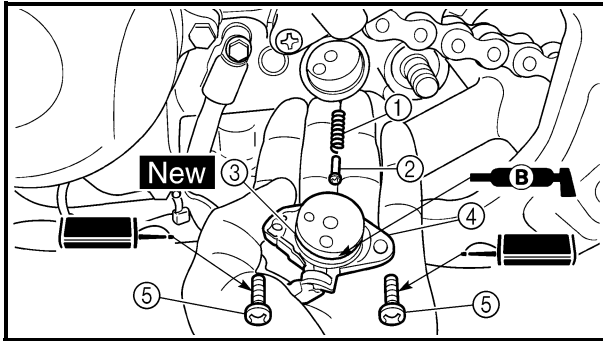
## Oil hose and neutral switch

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


8 Nm (0.8 m · kg, 5.8 ft · lb)


### NOTE:

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



## 2. Install:

- Spring ①
- Pin ②
- O-ring ③ **New**
- Neutral switch ④
- Screw (neutral switch) ⑤ 

 **4 Nm (0.4 m · kg, 2.9 ft · lb)**

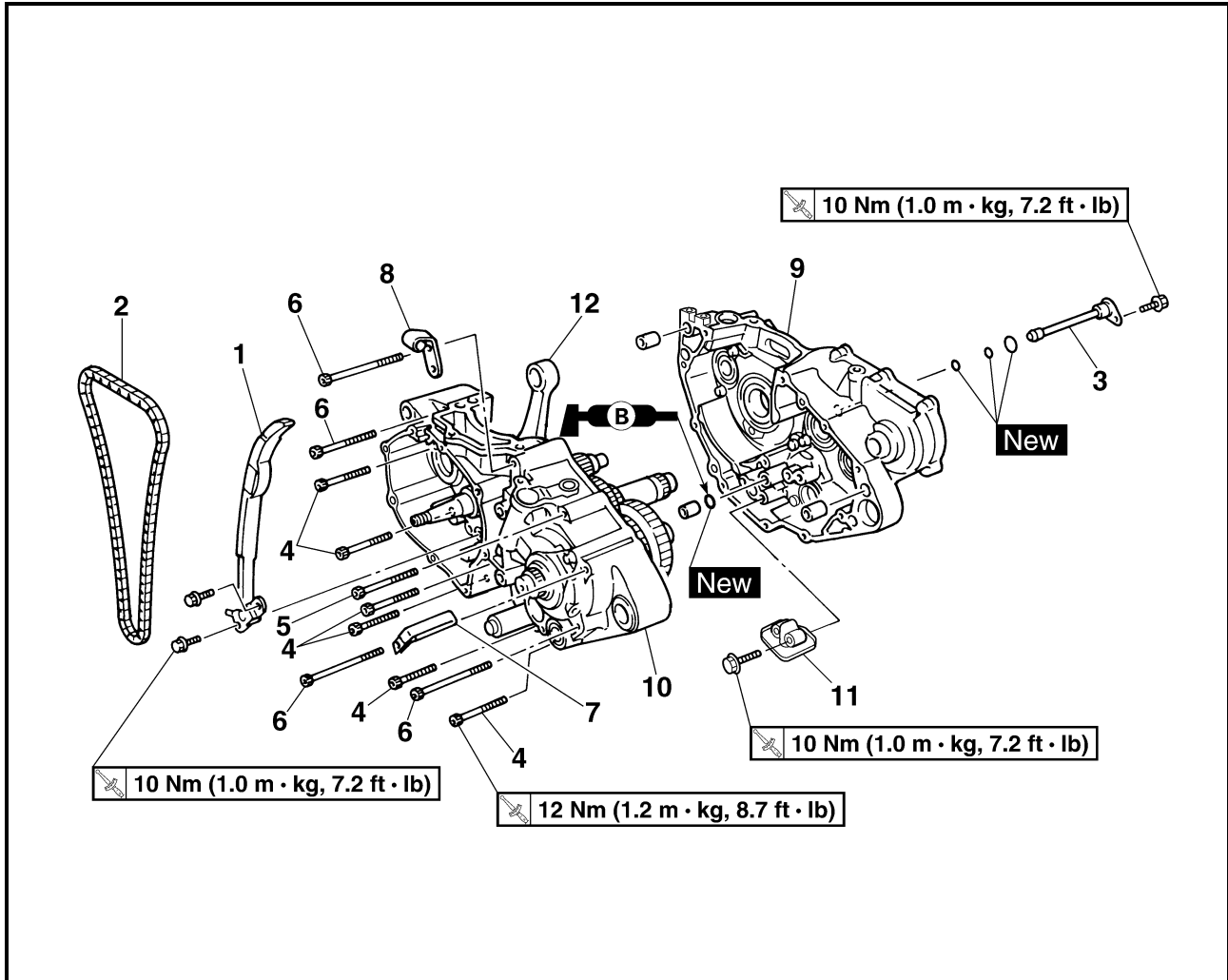
**NOTE:** \_\_\_\_\_

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

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### CRANKCASE AND CRANKSHAFT

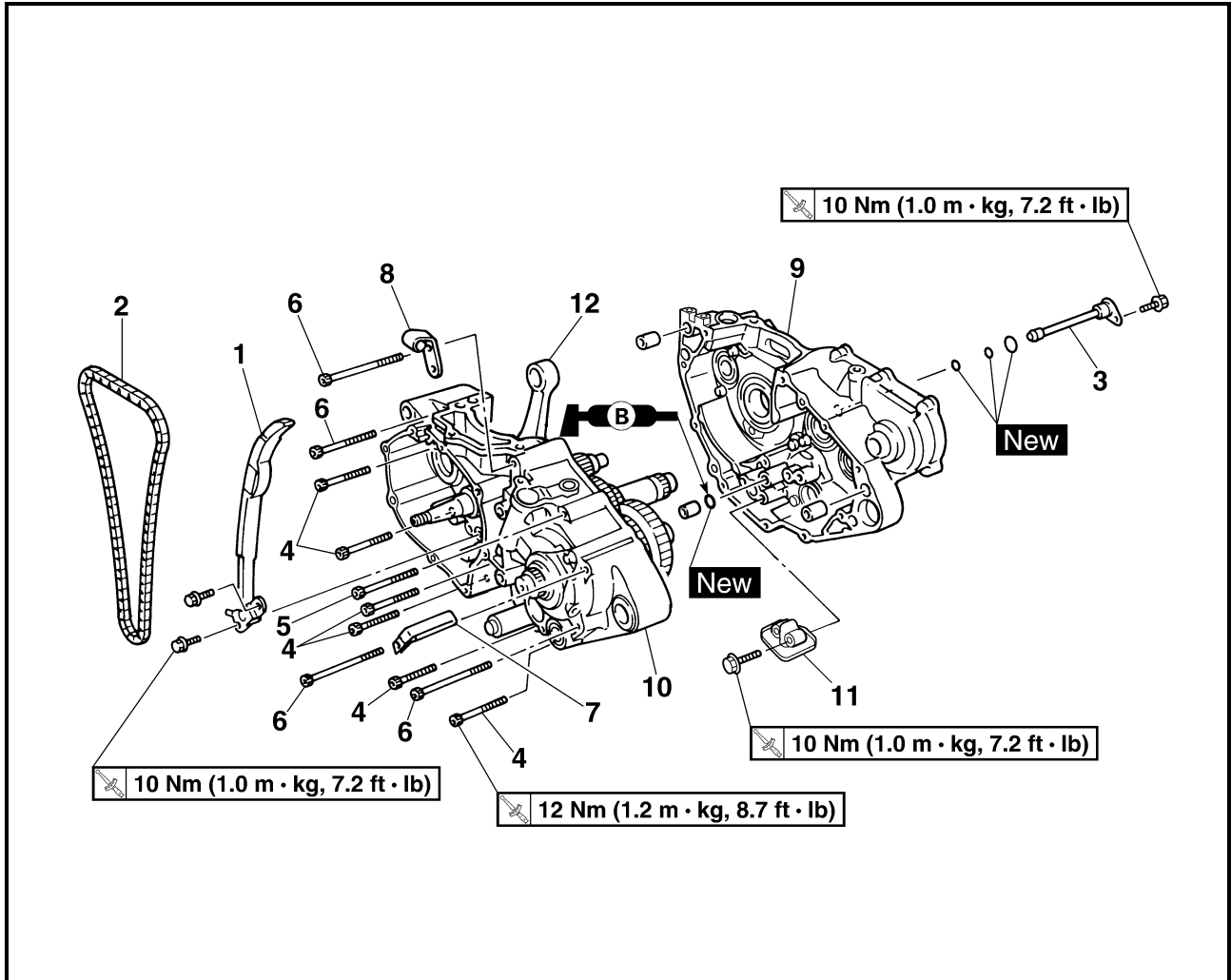


Extent of removal:

① Crankcase separation

② Crankshaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>CRANKCASE AND CRANK-SHAFT REMOVAL</b>		
		Engine		Refer to "ENGINE REMOVAL" section.
		Piston		Refer to "CYLINDER AND PISTON" section.
		Kick shaft assembly		Refer to "KICK SHAFT AND SHIFT SHAFT" section.
		Segment		
		Stator		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
	Balancer shaft		Refer to "BALANCER" section.	
①	1	Timing chain guide (intake side)	1	
②	2	Timing chain	1	
	3	Oil delivery pipe 2	1	

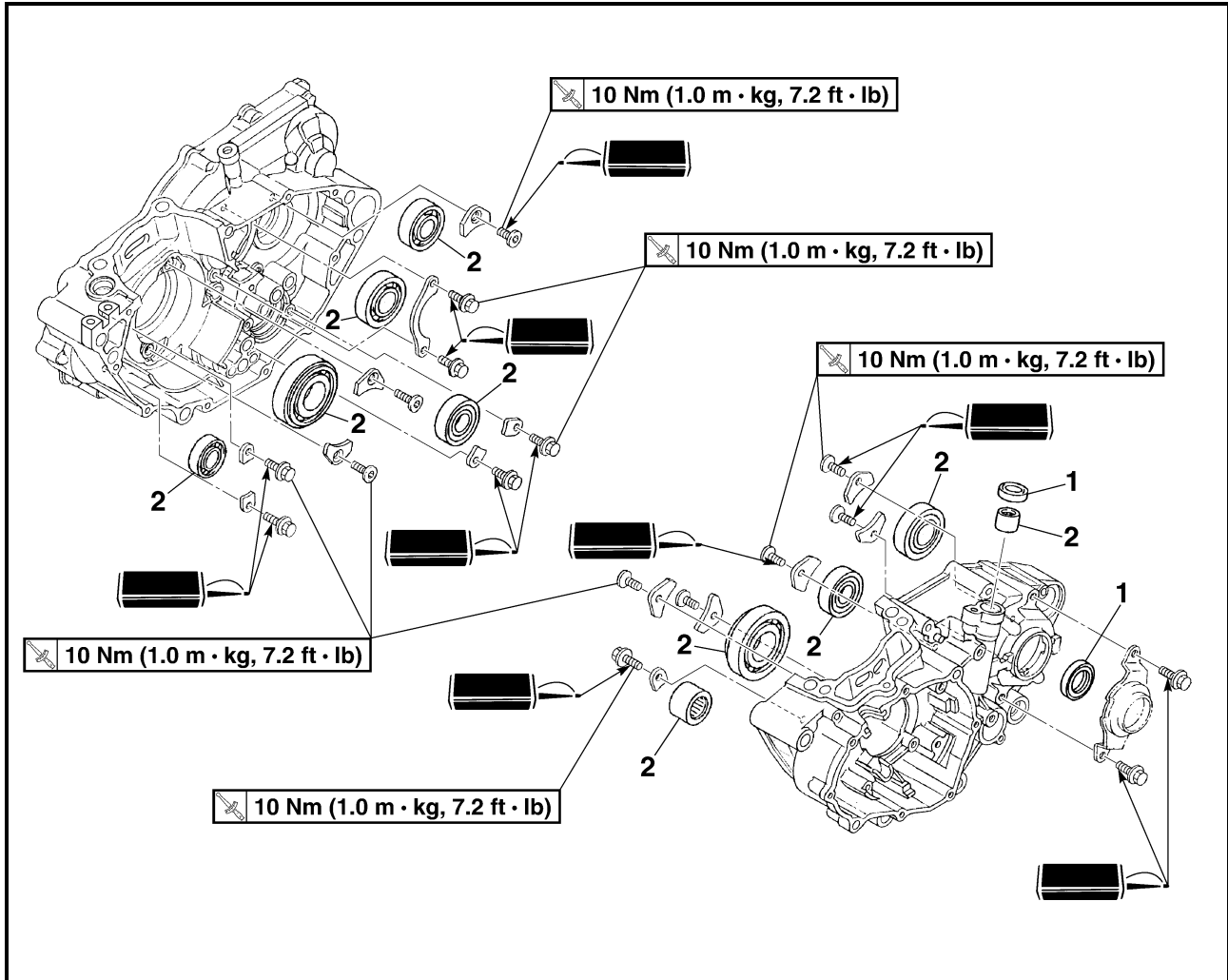


Extent of removal	Order	Part name	Q'ty	Remarks
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ① ↑ ↓           </div> <div style="text-align: center;">             ② ↑ ↓           </div> </div>	4	Bolt [L = 45 mm (1.77 in)]	6	Refer to "REMOVAL POINTS".
	5	Bolt [L = 55 mm (2.17 in)]	1	
	6	Bolt [L = 70 mm (2.76 in)]	4	
	7	Hose guide	1	
	8	Clutch cable holder	1	
	9	Right crankcase	1	
	10	Left crankcase	1	
	11	Oil strainer	1	
	12	Crankshaft	1	



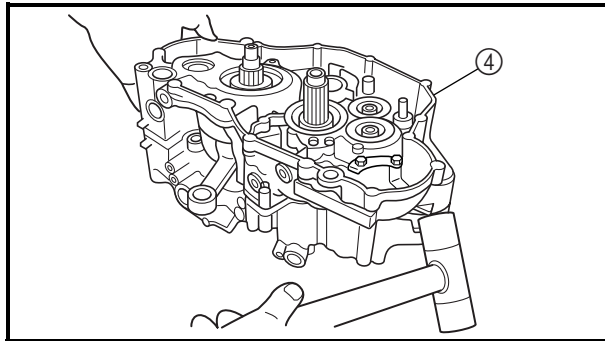
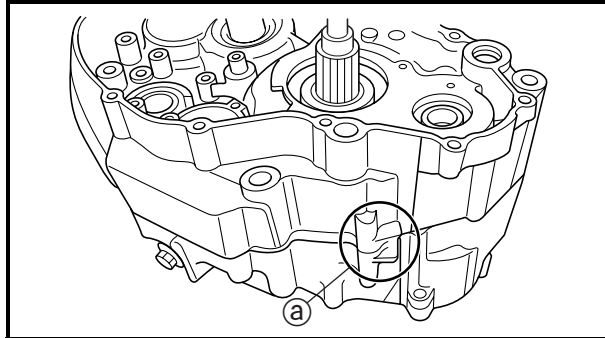
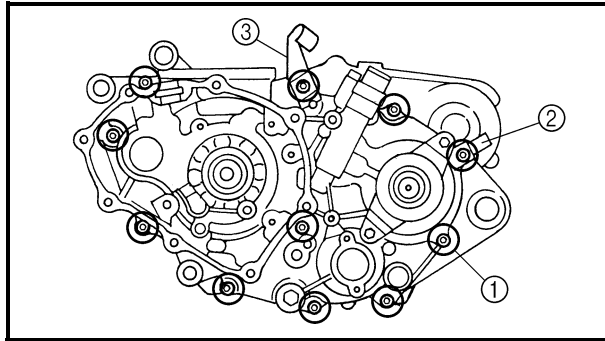


### CRANKCASE BEARING



Extent of removal: ① Crankcase bearing removal

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



### REMOVAL POINTS

#### Crankcase

1. Separate:
  - Right crankcase
  - Left crankcase

#### Separation steps:

- Remove the crankcase bolts ①, hose guide ② and clutch cable holder ③.

#### NOTE:

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

- Remove the right crankcase ④.

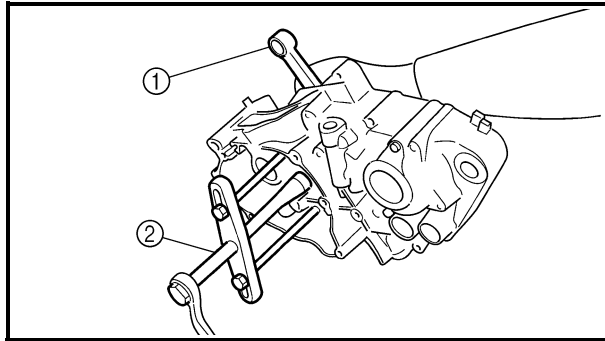
#### NOTE:

- Place the crankcase with its left side downward and split it by inserting a screwdriver tip into the splitting slit ① in the crankcase.
- Lift the right crankcase horizontally while lightly patting the case splitting slit and engine mounting boss using a soft hammer, and leave the crankshaft and transmission with the left crankcase.

#### CAUTION:

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

- Remove the dowel pins and O-ring.



### Crankshaft

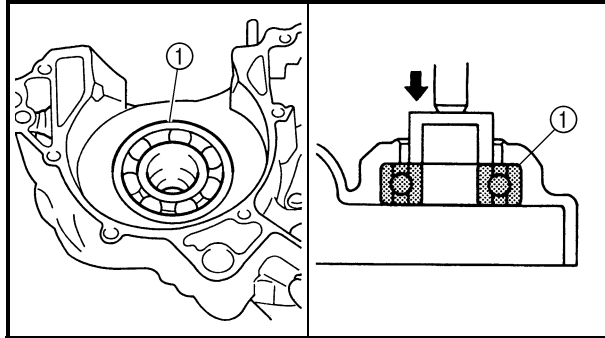
- Remove:
  - Crankshaft ①
 Use the crankcase separating tool ②.



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

### CAUTION:

**Do not use a hammer to drive out the crankshaft.**

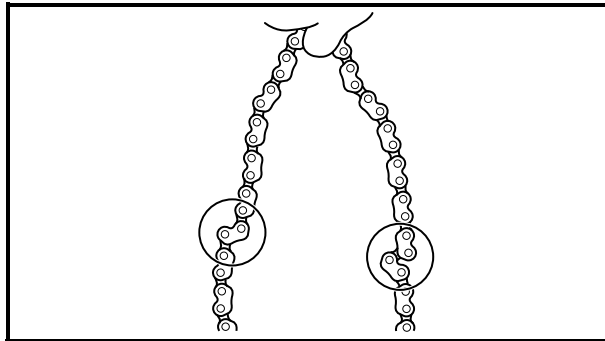


### Crankcase bearing

- Remove:
  - Bearing ①

### NOTE:

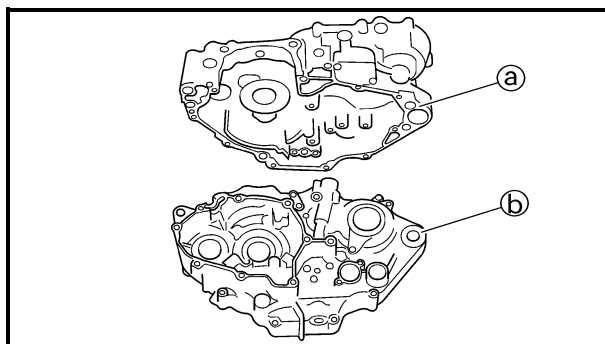
- Remove the bearing from the crankcase by pressing its inner race.
- Do not use the removed bearing.



### INSPECTION

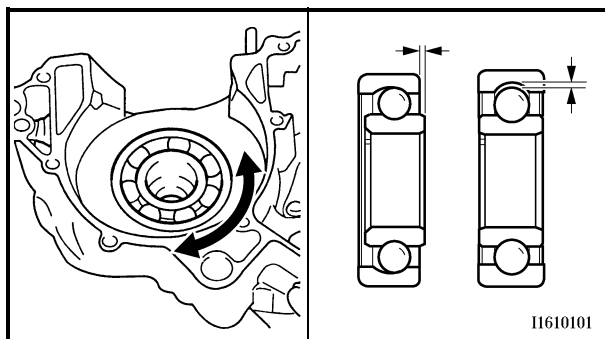
#### Timing chain and timing chain guide

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



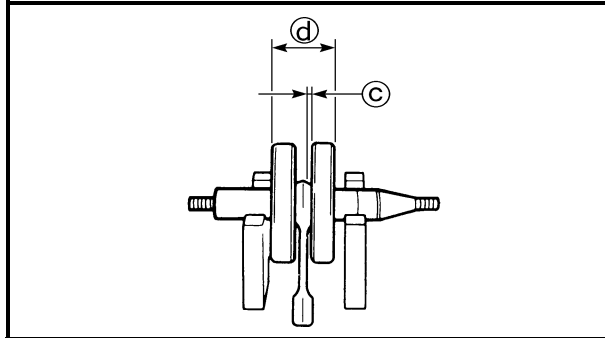
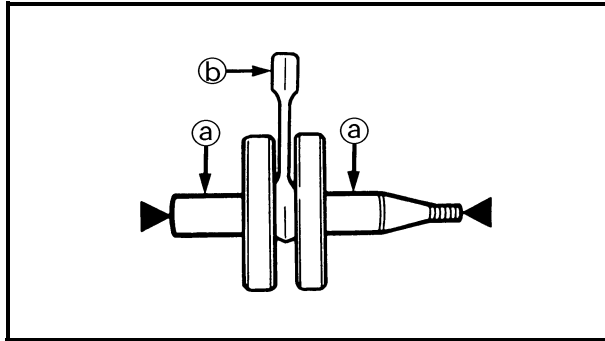
### Crankcase

- Inspect:
  - Contacting surface ①  
Scratches → Replace.
  - Engine mounting boss ②, crankcase  
Cracks/damage → Replace.



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

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### Crankshaft

1. Measure:


- Runout limit ①
- Small end free play limit ②
- Connecting rod big end side clearance ③
- Crank width ④

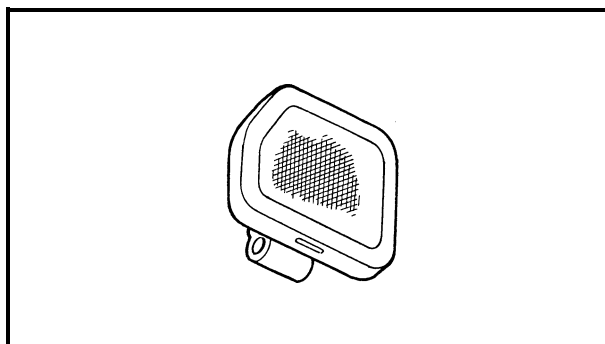
Out of specification → Replace.

Use the dial gauge and a thickness gauge.



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

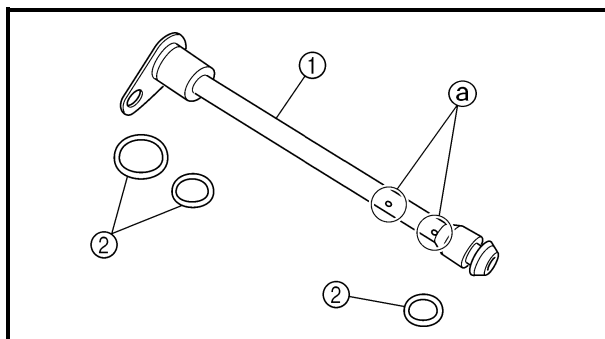
	Standard	<Limit>
<b>Runout limit:</b>	<b>0.03 mm</b> (0.0012 in)	<b>0.05 mm</b> (0.002 in)
<b>Small end free play:</b>	<b>0.4 ~ 1.0 mm</b> (0.016 ~ 0.039 in)	<b>2.0 mm</b> (0.08 in)
<b>Side clearance:</b>	<b>0.15 ~ 0.45 mm</b> (0.0059 ~ 0.0177 in)	<b>0.50 mm</b> (0.02 in)
<b>Crack width:</b>	<b>55.95 ~ 56.00 mm</b> (2.203 ~ 2.205 in)	—



### Oil strainer

1. Inspect:

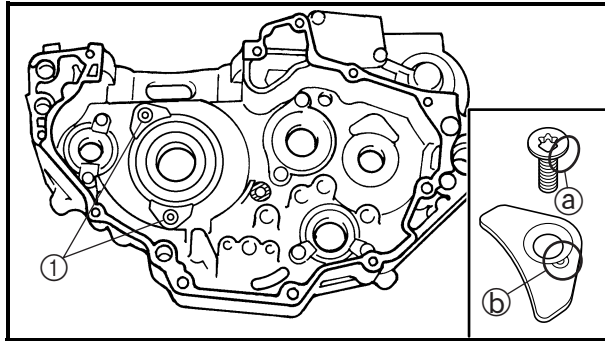
- Oil strainer
- Damage → Replace.



### Oil delivery pipe 2

1. Inspect:

- Oil delivery pipe 2 ①
  - O-ring ②
- Damage → Replace.
- Oil orifice ③
- Clogged → Blow.



EC4N5000

## ASSEMBLY AND INSTALLATION

### Crankcase bearing

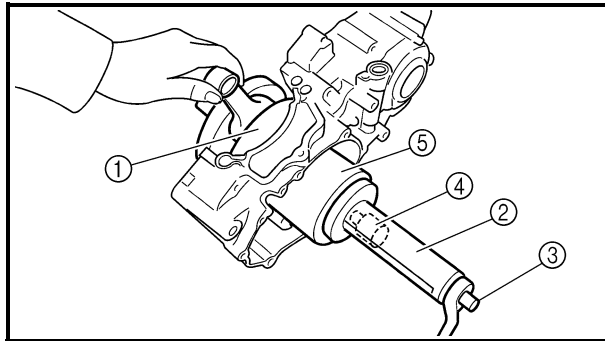
#### 1. Install:

- Bearing **New**
- Bearing stopper
- Bolt (bearing stopper) **10 Nm (1.0 m · kg, 7.2 ft · lb)**
- Screw (bearing stopper) **10 Nm (1.0 m · kg, 7.2 ft · lb)**
- Screw [bearing stopper (crankshaft)] ① **10 Nm (1.0 m · kg, 7.2 ft · lb)**

To left and right crankcase.

#### NOTE:

- Install the bearing by pressing its outer race parallel.
- To prevent the screw [bearing stopper (crankshaft)] from becoming loose, crush the screw head periphery ① into the concave ② using a punch etc. In so doing, take care not to damage the screwdriver receiving hole in the screw head.



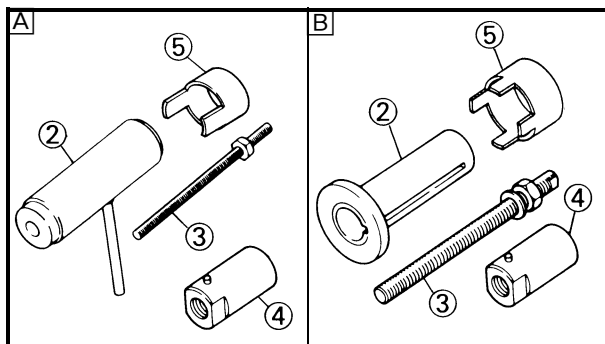
### Crankshaft

#### 1. Install:

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



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



**A** For USA and CDN

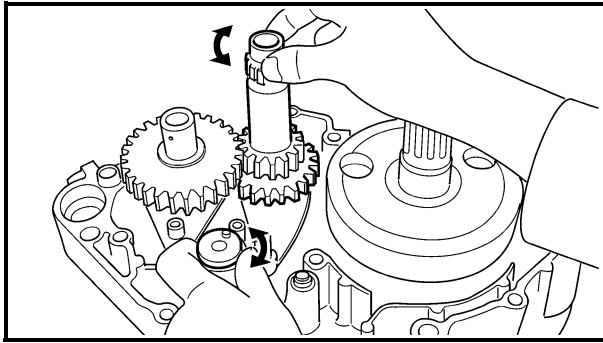
**B** Except for USA and CDN

#### NOTE:

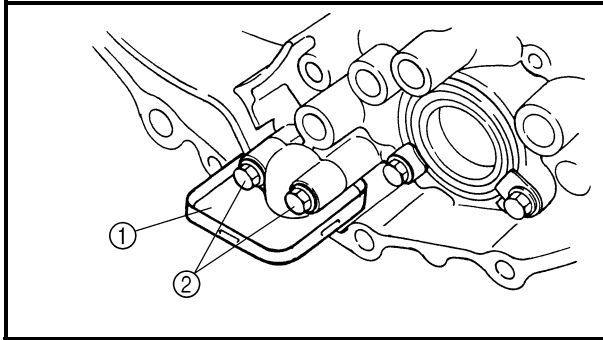
- Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.
- Before installing the crankshaft, clean the contacting surface of crankcase.

#### CAUTION:


**Do not use a hammer to drive in the crankshaft.**

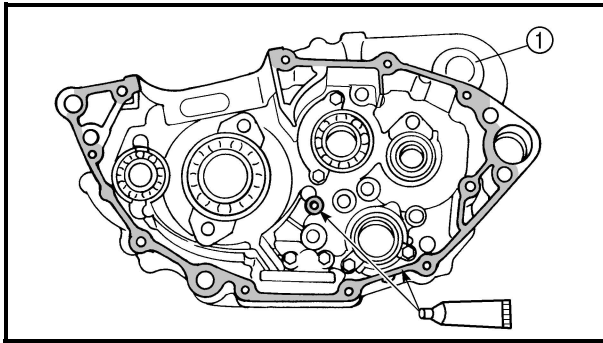


2. Check:
  - Shifter operation
  - Transmission operation
 Unsmooth operation → Repair.



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

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

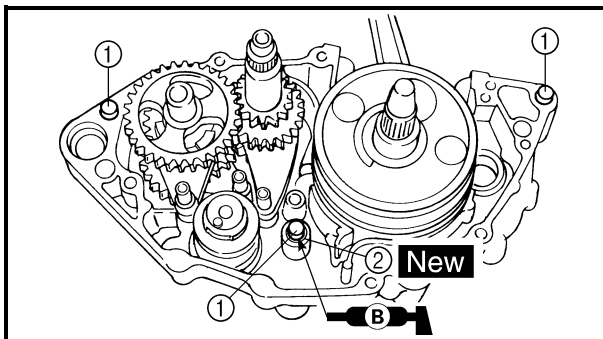


4. Apply:
  - Sealant
 On the right crankcase ①.



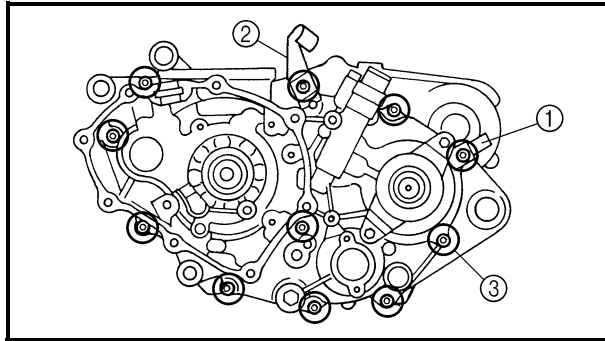
**Quick gasket®:**  
**ACC-QUICK-GS-KT**  
**YAMAHA Bond No. 1215:**  
**90890-85505**

**NOTE:** \_\_\_\_\_  
 Clean the contacting surface of left and right crankcase before applying the sealant.  
 \_\_\_\_\_



5. Install:
  - Dowel pin ①
  - O-ring ② **New**
  - Right crankcase
 To left crankcase.

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



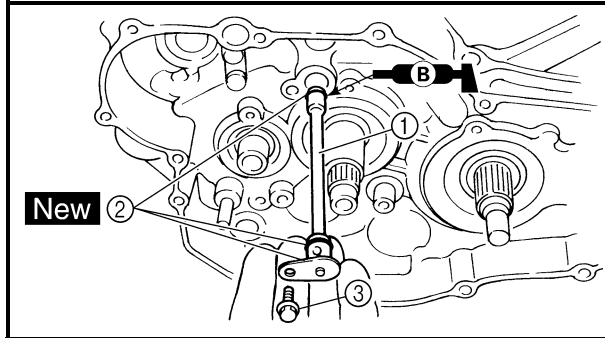
6. Tighten:

- Hose guide ①
- Clutch cable holder ②
- Bolt (crankcase) ③

 **12 Nm (1.2 m · kg, 8.7 ft · lb)**


**NOTE:**

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



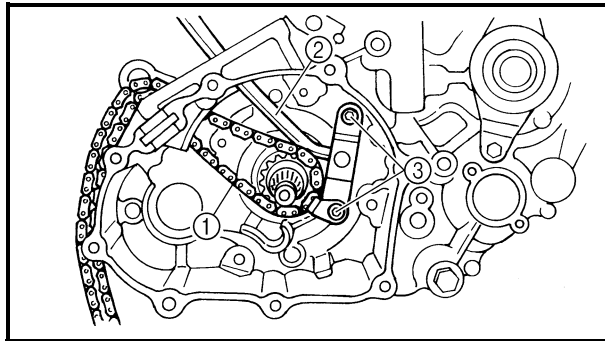
7. Install:

- Oil delivery pipe 2 ①
- O-ring ② **New**
- Bolt (oil delivery pipe 2) ③

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

**NOTE:**

Apply the lithium soap base grease on the O-rings.



8. Install:

- Timing chain ①
- Timing chain guide (intake side) ②
- Bolt (timing chain guide) ③

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

9. Remove:

- Sealant  
Forced out on the cylinder mating surface.

10. Apply:

- Engine oil  
To the crank pin, bearing and oil delivery hole.

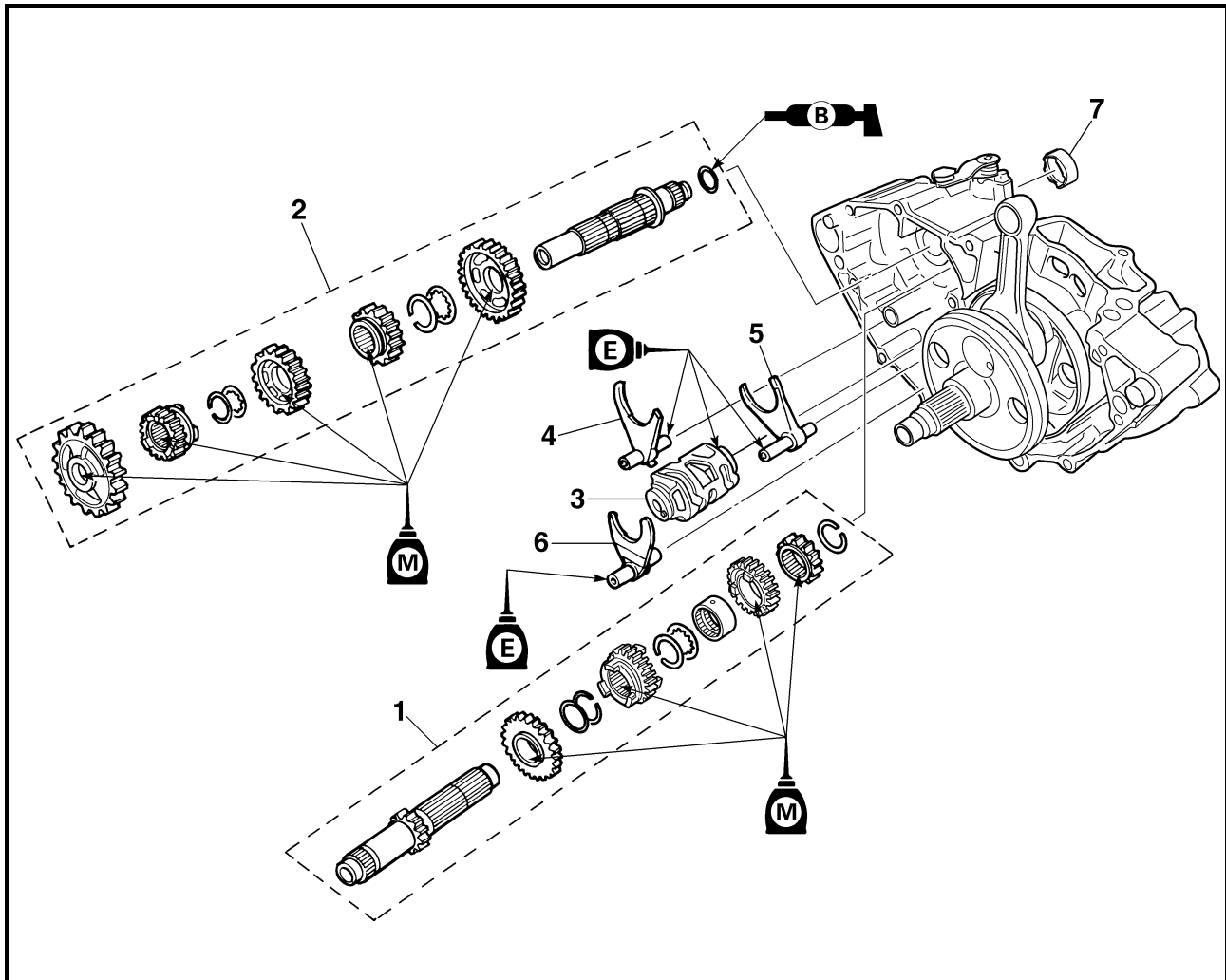
11. Check:

- Crankshaft and transmission operation.  
Unsmooth operation → Repair.



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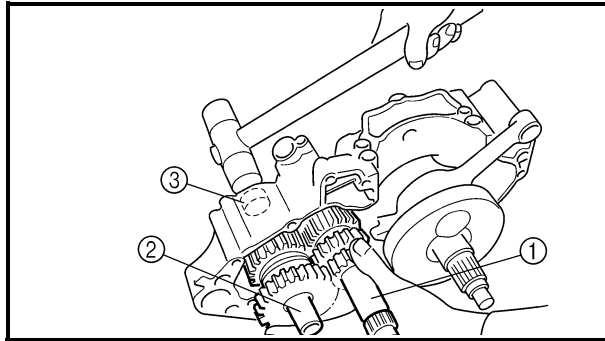
## TRANSMISSION, SHIFT CAM AND SHIFT FORK



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

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>TRANSMISSION, SHIFT CAM AND SHIFT FORK REMOVAL</b> Engine Separate the crankcase.		Refer to "ENGINE REMOVAL" section. Refer to "CRANKCASE AND CRANK-SHAFT" section.
<div style="text-align: center;">             ↑              ①              ↓           </div>	1	Main axle	1	Refer to "REMOVAL POINTS".
	2	Drive axle	1	
	3	Shift cam	1	
	4	Shift fork 3	1	
	5	Shift fork 2	1	
	6	Shift fork 1	1	
	7	Collar	1	





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## REMOVAL POINTS

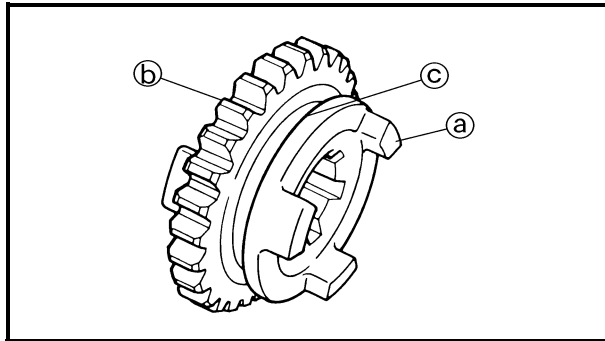
EC4H3230

### Transmission

1. Remove:
  - Main axle ①
  - Drive axle ②
  - Shift cam
  - Shift fork 3
  - Shift fork 2
  - Shift fork 1

### NOTE:

- Remove assembly with the collar ③ installed to the crankcase.
- Remove assembly carefully. Note the position of each part. Pay particular attention to the location and direction of shift forks.
- Remove the main axle, drive axle, shift cam and shift fork all together by tapping lightly on the transmission drive axle with a soft hammer.



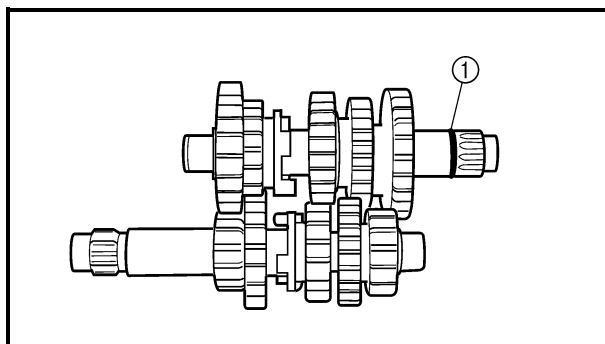
EC4H4000

## INSPECTION

EC4H4200

### Gears

1. Inspect:
  - Matching dog ①
  - Gear teeth ②
  - Shift fork groove ③
 Wear/damage → Replace.

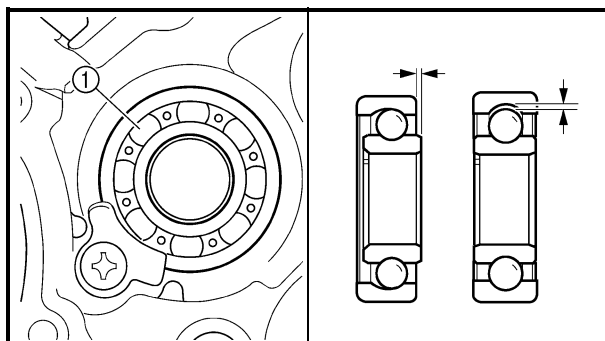


2. Inspect:

- O-ring ①
- Damage → Replace.

3. Check:

- Gears movement
- Unsmooth movement → Repair or replace.

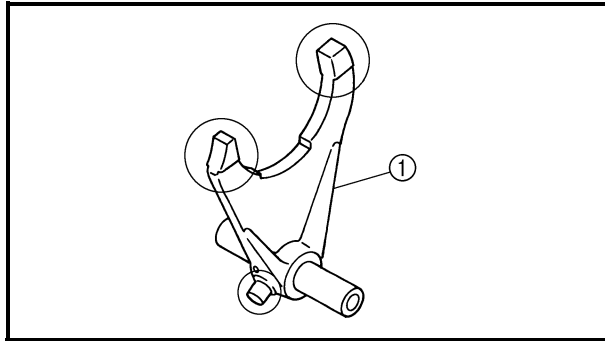


EC4H4600

### Bearing

1. Inspect:

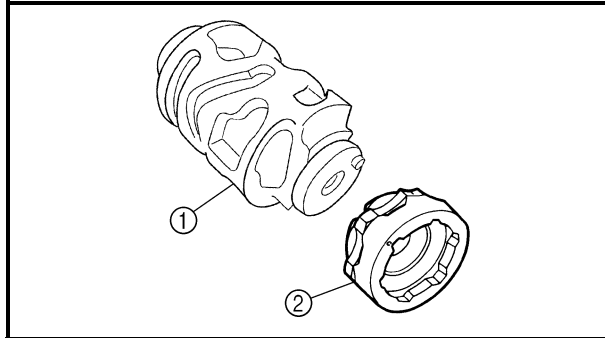
- Bearing ①
- Rotate inner race with a finger.  
Rough spot/seizure → Replace.



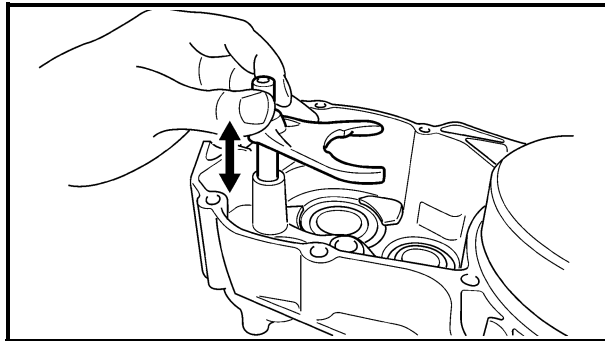
EC4H4810

### Shift fork, shift cam and segment

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



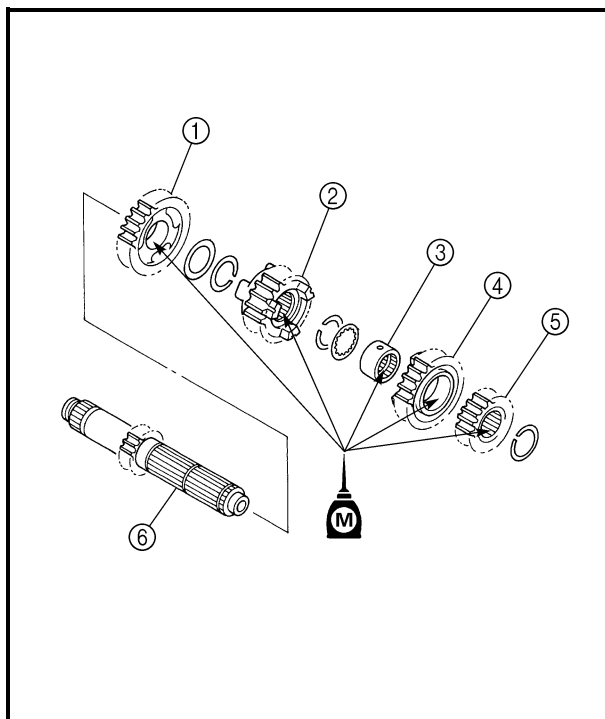
2. Inspect:
  - Shift cam ①
  - Segment ②  
Wear/damage → Replace.



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

### NOTE:

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



EC4H5000

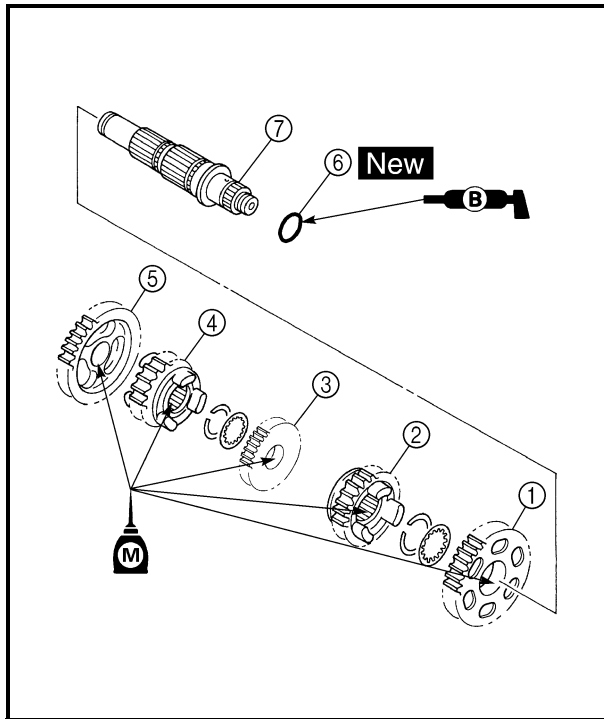
### ASSEMBLY AND INSTALLATION

#### Transmission

1. Install:
  - 5th pinion gear (27T) ①
  - 3rd pinion gear (21T) ②
  - Collar ③
  - 4th pinion gear (24T) ④
  - 2nd pinion gear (16T) ⑤  
To main axle ⑥.

### NOTE:

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

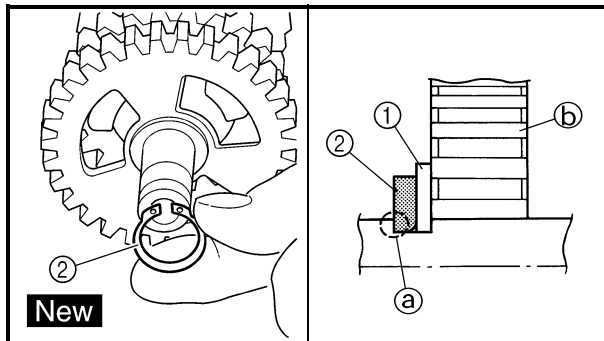


2. Install:

- 2nd wheel gear (28T) ①
- 4th wheel gear (25T) ②
- 3rd wheel gear (28T) ③
- 5th wheel gear (22T) ④
- 1st wheel gear (31T) ⑤
- O-ring ⑥ **New**
- To drive axle ⑦.

**NOTE:**

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

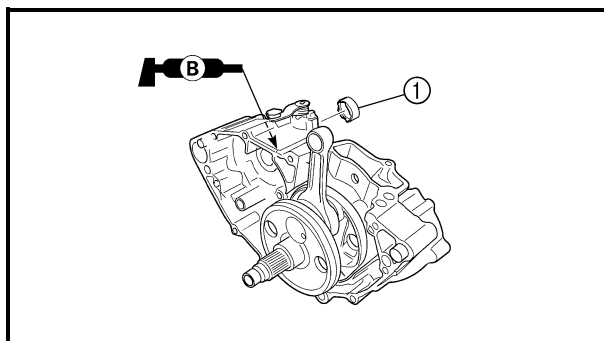
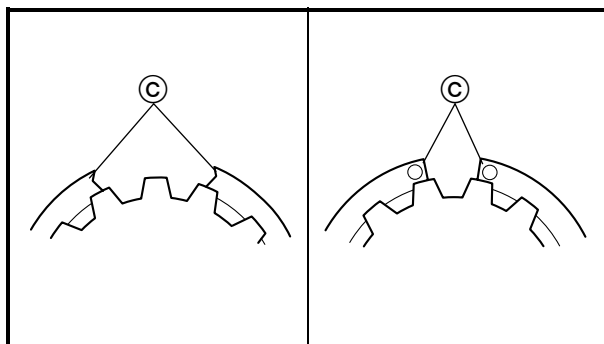


3. Install:

- Washer ①
- Circlip ② **New**

**NOTE:**

- Be sure the circlip sharp-edged corner (a) is positioned opposite side to the washer and gear (b).
- Install the circlip with its ends (c) settled evenly on the spline crests.

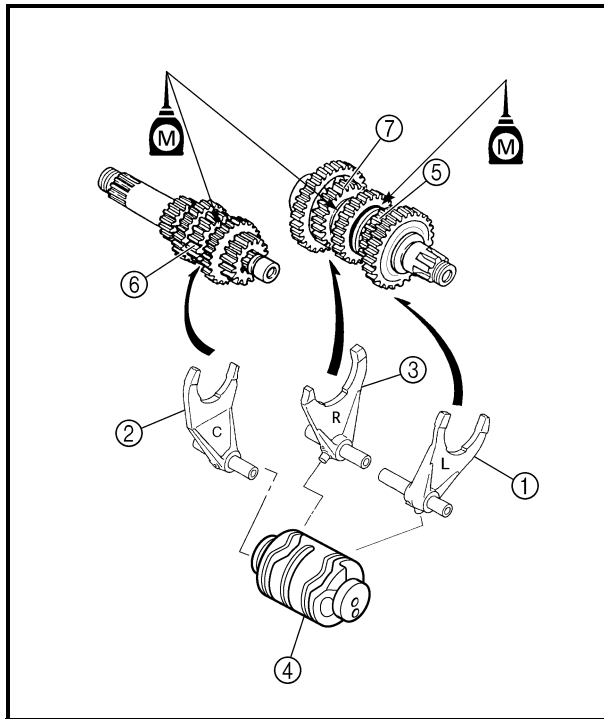


4. Install:

- Collar ①

**NOTE:**

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



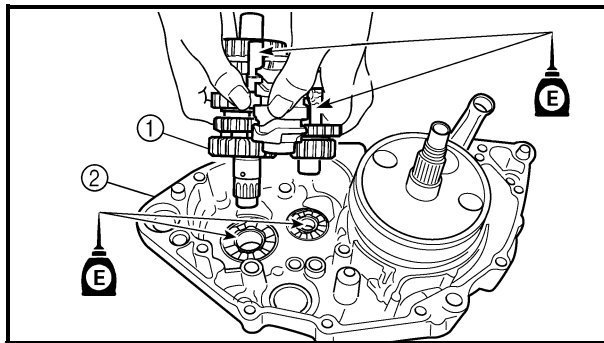
5. Install:

- Shift fork 1 (L) ①
- Shift fork 2 (C) ②
- Shift fork 3 (R) ③
- Shift cam ④

To main axle and drive axle.

**NOTE:**

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

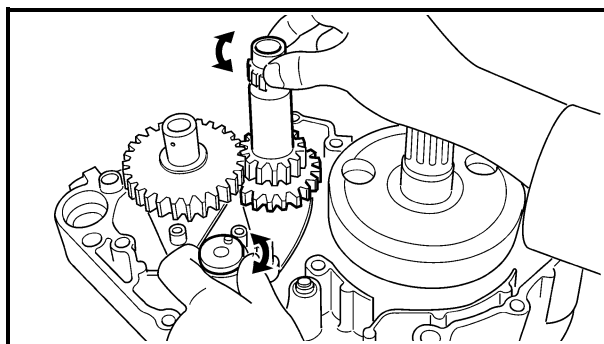


6. Install:

- Transmission assembly ①
- To left crankcase ②.

**NOTE:**

Apply the engine oil on the bearings and guide bars.



7. Check:

- Shifter operation
  - Transmission operation
- Unsmooth operation → Repair.



EC500000

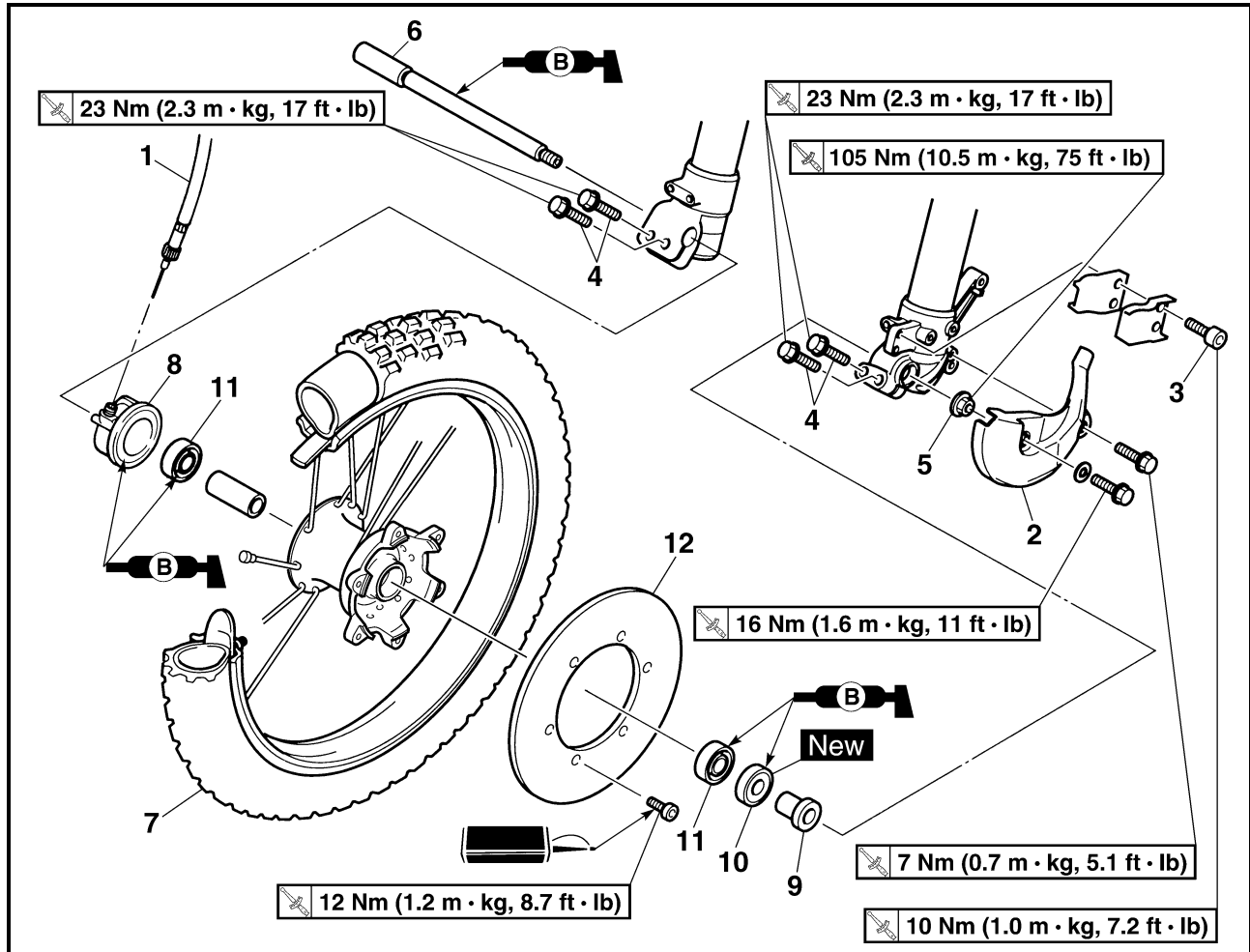
## CHASSIS

EC590000

## FRONT WHEEL AND REAR WHEEL

EC598000

### FRONT WHEEL



Extent of removal:

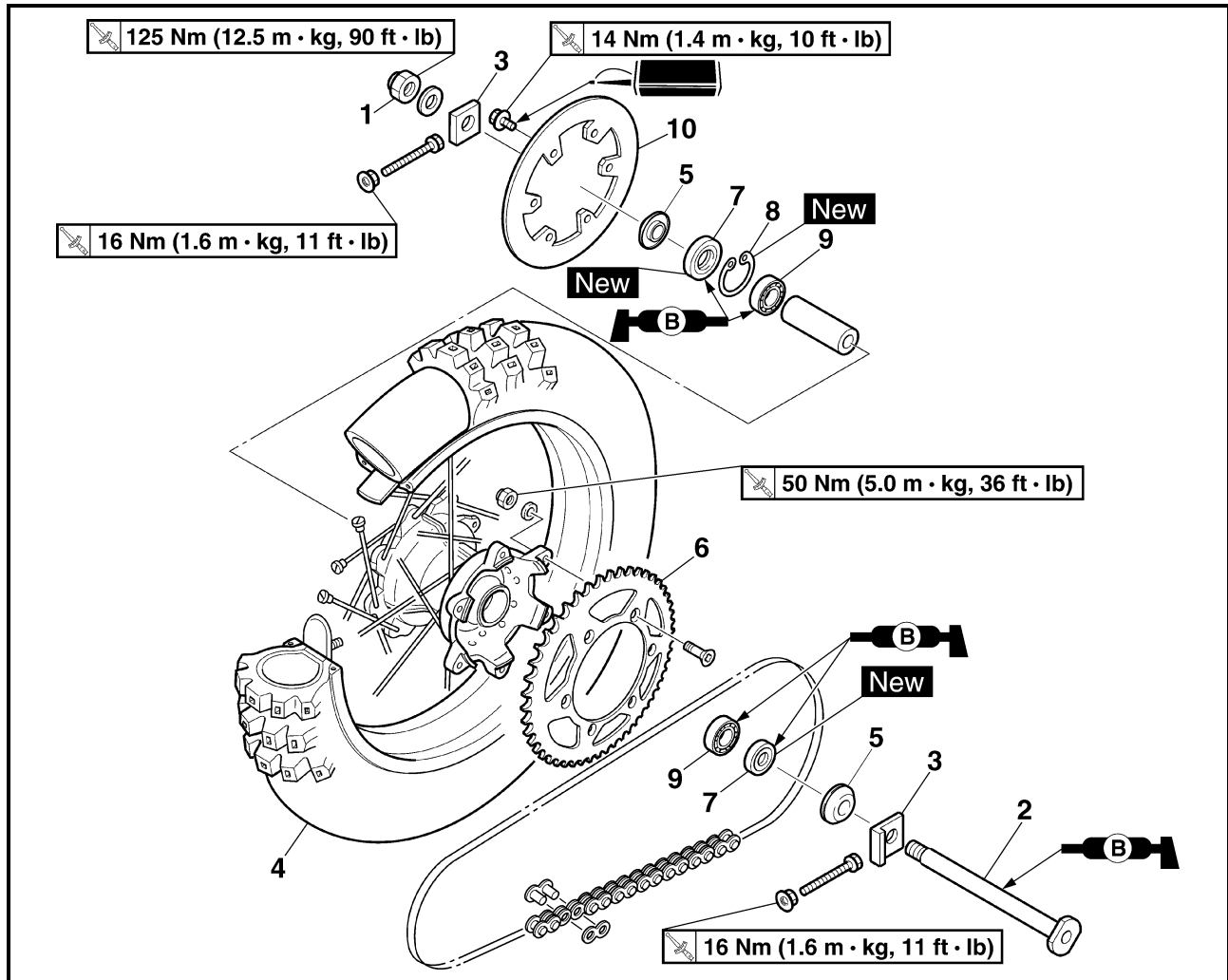
- ① Front wheel removal
- ③ Brake disc removal

- ② Wheel bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>FRONT WHEEL REMOVAL</b> Hold the machine by placing the suitable stand under the engine.		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ① ↓           </div> <div style="text-align: center;">             ② ↓           </div> <div style="text-align: center;">             ③ ↓           </div> </div>	1	Trip meter cable	1	
	2	Brake hose cover	1	
	3	Bolt (brake hose holder)	2	Only loosening.
	4	Bolt (axle holder)	4	Only loosening.
	5	Nut (front wheel axle)	1	
	6	Front wheel axle	1	
	7	Front wheel	1	
	8	Trip meter gear unit	1	
	9	Collar	1	
	10	Oil seal	1	
	11	Bearing	2	Refer to "REMOVAL POINTS".
	12	Brake disc	1	

EC598100

## REAR WHEEL

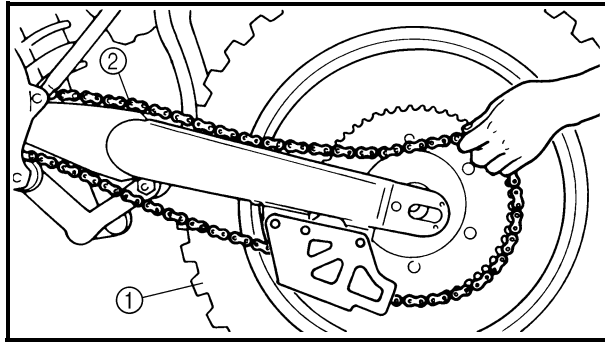


Extent of removal:

- ① Rear wheel removal
- ② Wheel bearing removal
- ③ Brake disc removal

② Wheel bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>REAR WHEEL REMOVAL</b> Hold the machine by placing the suitable stand under the engine.		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ① ↑ ↓           </div> <div style="text-align: center;">             ② ↑ ↓           </div> <div style="text-align: center;">             ③ ↑ ↓           </div> </div>	1	Nut (rear wheel axle)	1	Refer to "REMOVAL POINTS".
	2	Rear wheel axle	1	
	3	Drive chain puller	2	
	4	Rear wheel	1	
	5	Collar	2	
	6	Rear wheel sprocket	1	
	7	Oil seal	2	
	8	Circlip	1	
	9	Bearing	2	
	10	Brake disc	1	



EC593000

## REMOVAL POINTS

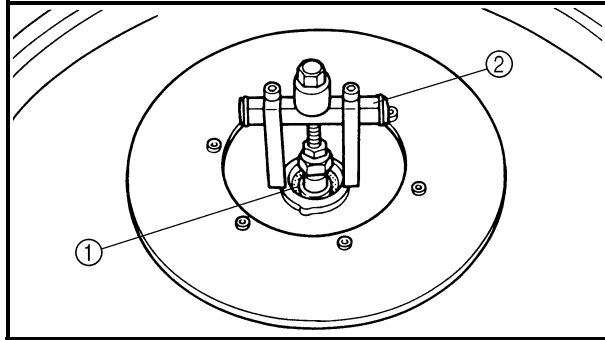
EC523101

### Rear wheel

- Remove:
  - Wheel ①

#### NOTE:

Push the wheel forward and remove the drive chain ②.



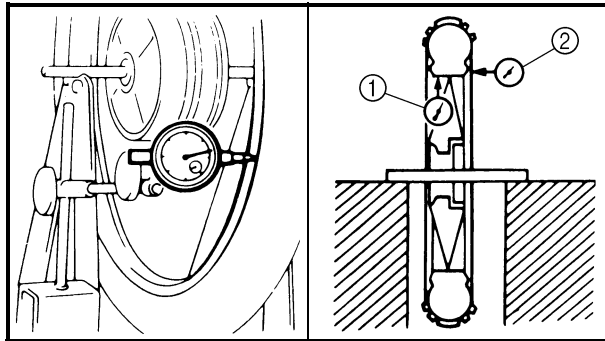
EC513201

### Wheel bearing (if necessary)

- Remove:
  - Bearing ①

#### NOTE:

Remove the bearing using a general bearing puller ②.



EC594000

## INSPECTION

EC514100

### Wheel

- Measure:
  - Wheel runout

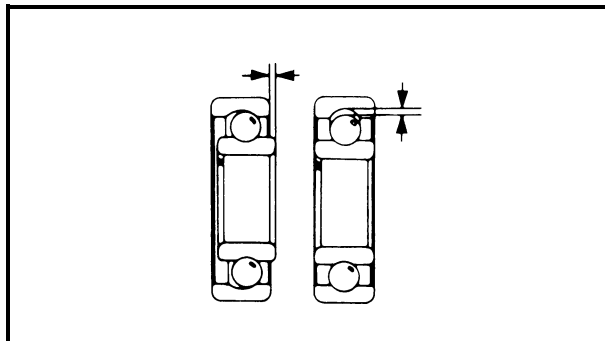
Out of limit → Repair/replace.



#### Wheel runout limit:

Radial ①: 2.0 mm (0.08 in)

Lateral ②: 2.0 mm (0.08 in)

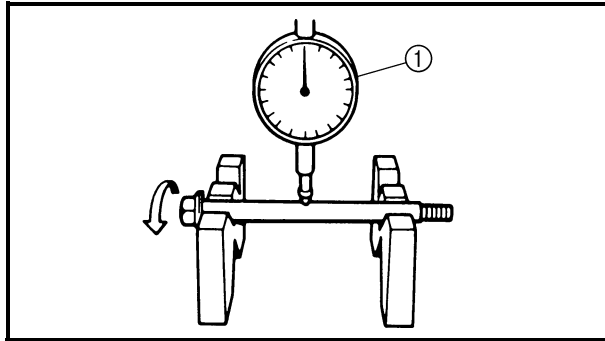


- Inspect:

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

#### NOTE:

Replace the bearings, oil seal and wheel collar as a set.



EC514200

### Wheel axle

1. Measure:
  - Wheel axle bends  
Out of specification → Replace.  
Use the dial gauge ①.



**Wheel axle bending limit:**  
**0.5 mm (0.020 in)**

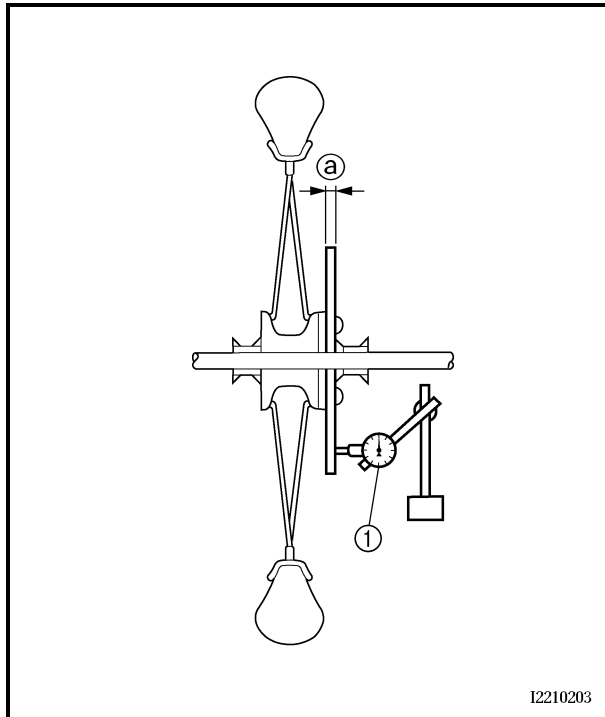
### NOTE:

The bending value is shown by one half of the dial gauge reading.



### WARNING

**Do not attempt to straighten a bent axle.**



I2210203

EC594200

### Brake disc

1. Measure:
  - Brake disc deflection (only rear brake disc)  
Use the dial gauge ①.  
Out of specification → Inspect wheel runout.  
If wheel runout is in good condition, replace the brake disc.



**Brake disc deflection limit:**  
**Rear:**  
**<Limit>: 0.15 mm (0.006 in)**

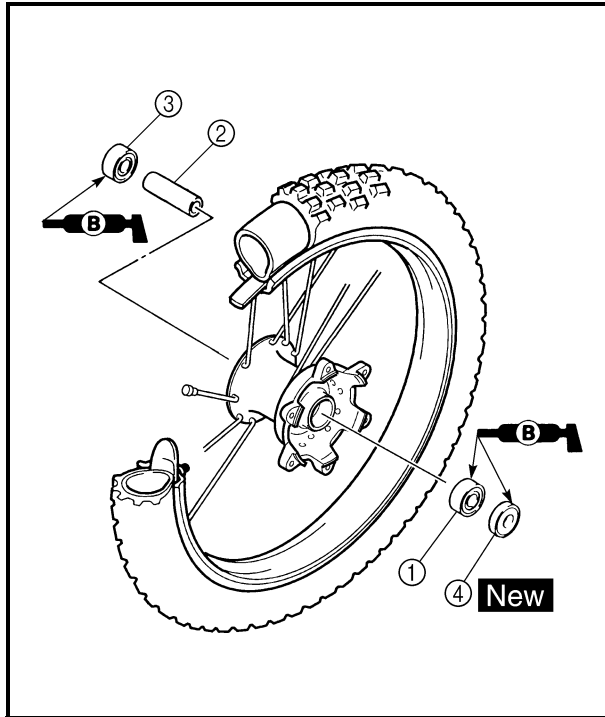
2. Measure:

- Brake disc thickness ②  
Out of limit → Replace.



**Brake disc thickness:**  
**Front:**  
**3.0 mm (0.12 in)**  
**<Limit>: 2.5 mm (0.10 in)**  
**Rear:**  
**4.0 mm (0.16 in)**  
**<Limit>: 3.5 mm (0.14 in)**





EC595000

## ASSEMBLY AND INSTALLATION

### Front wheel

#### 1. Install:

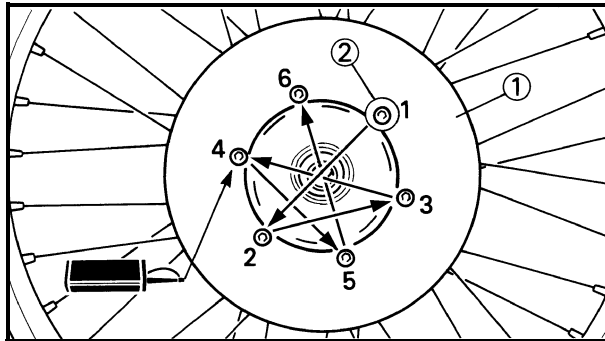
- Bearing (left) ①
- Spacer ②
- Bearing (right) ③
- Oil seal ④ **New**

#### NOTE:

- Apply the lithium soap base grease on the bearing and oil seal lip when installing.
- Use a socket that matches the outside diameter of the race of the bearing.
- Left side of bearing shall be installed first.
- Install the oil seal with its manufacturer's marks or numbers facing outward.

#### CAUTION:

**Do not strike the inner race of the bearing. Contact should be made only with the outer race.**



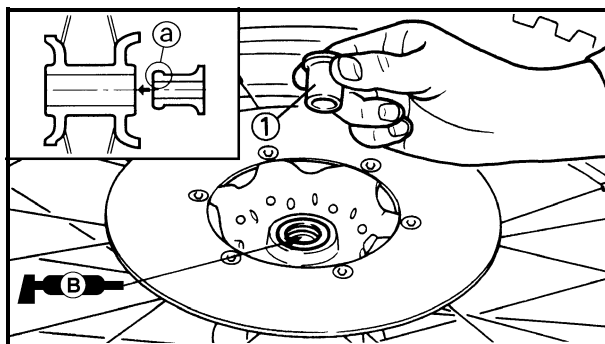
#### 2. Install:

- Brake disc ①
- Bolt (brake disc) ②

**12 Nm (1.2 m · kg, 8.7 ft · lb)**

#### NOTE:

Tighten the bolts in stage, using a crisscross pattern.

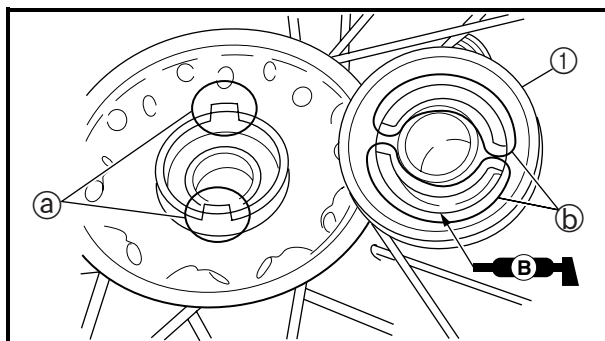


#### 3. Install:

- Collar ①

#### NOTE:

- Apply the lithium soap base grease on the oil seal lip.
- Install the collar with their projection ① facing the wheel.

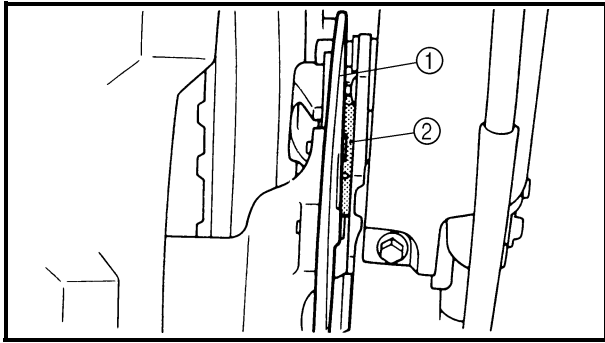


#### 4. Install:

- Trip meter gear unit ①

#### NOTE:

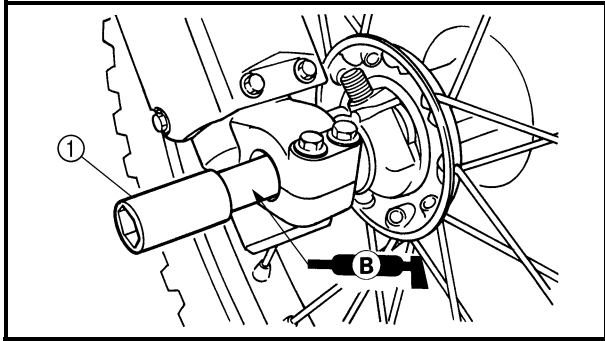
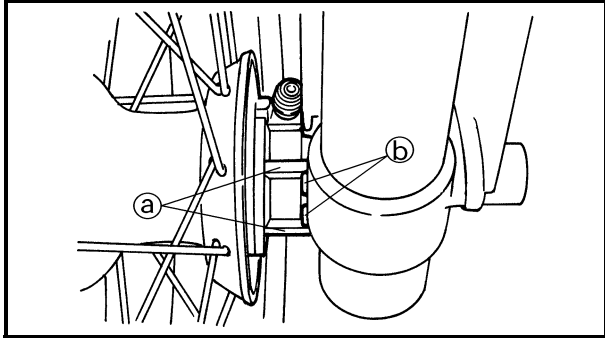
- Apply the lithium soap base grease on the oil seal lip of the trip meter gear unit.
- Make sure the two projections ① in the wheel hub are meshed with the two slots ② in the trip meter gear unit.



5. Install:
- Wheel

**NOTE:**

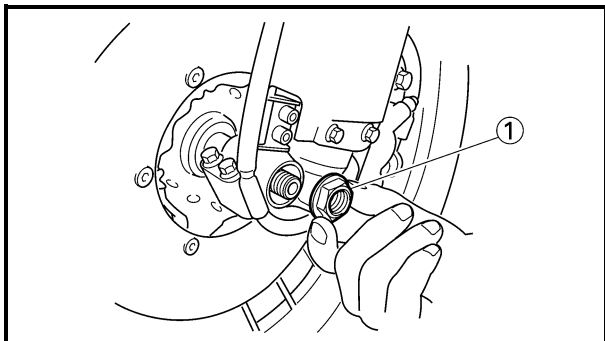
- Install the brake disc ① between the brake pads ② correctly.
- Make sure that the projections ③ in the trip meter gear unit fits over the stopper ④ on the front fork outer tube.




6. Install:
- Wheel axle ①

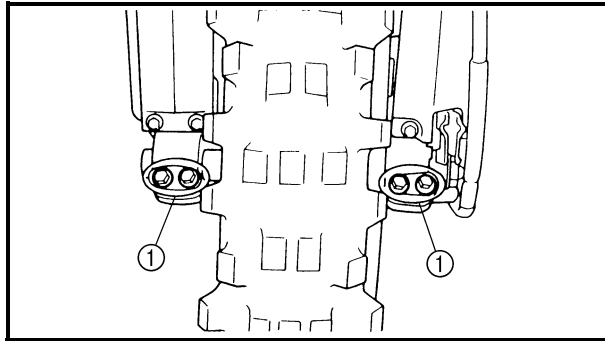
**NOTE:**

Apply the lithium soap base grease on the wheel axle.



7. Install:
- Nut (wheel axle) ①

 **105 Nm (10.5 m · kg, 75 ft · lb)**



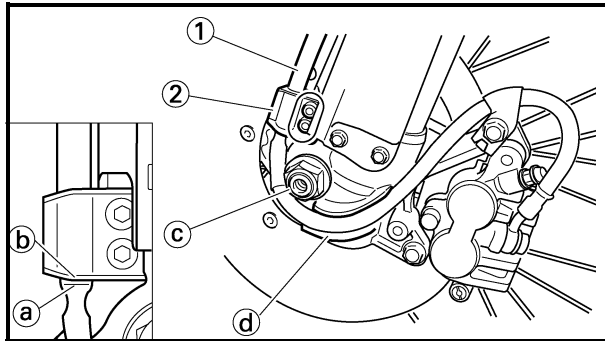
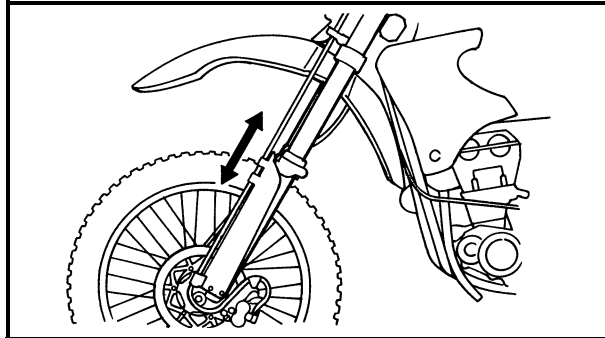
8. Tighten:

- Bolt (axle holder) ①

**23 Nm (2.3 m · kg, 17 ft · lb)**

**NOTE:**

Before tightening the bolt, fit the wheel axle to the axle holder by stroking the front fork several times with the front brake applied.



9. Install:

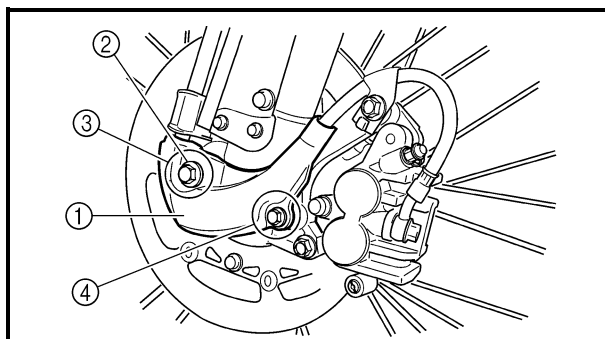
- Brake hose ①

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

To brake hose holder ②.

**NOTE:**

Before tightening the bolt (brake hose holder), align the top ① of the brake hose neck with the brake hose holder bottom ②. Then pass the brake hose in front of the axle boss ③ and fit it into the hose groove ④ so that the brake hose does not contact the nut (wheel axle).



10. Install:

- Brake hose cover ①

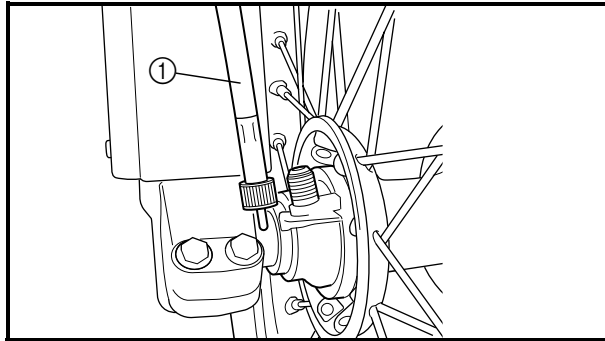
- Washer ②

- Bolt [brake hose cover (M8)] ③

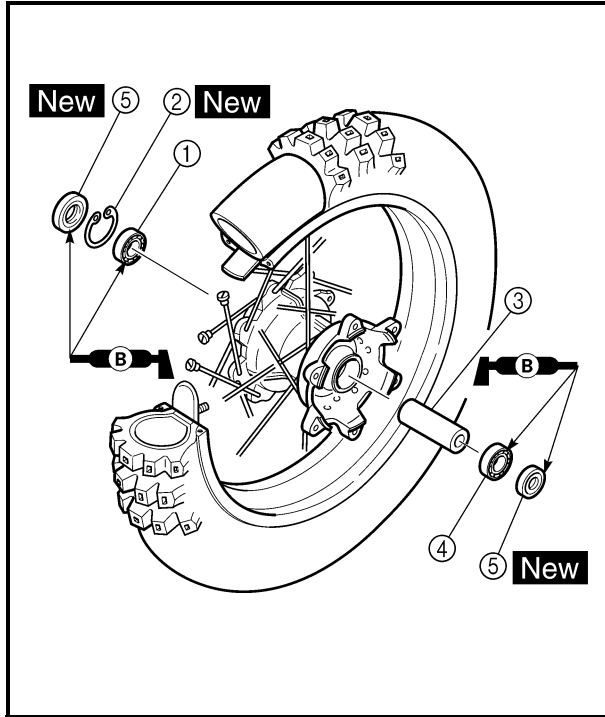
**16 Nm (1.6 m · kg, 11 ft · lb)**

- Bolt [brake hose cover (M6)] ④

**7 Nm (0.7 m · kg, 5.1 ft · lb)**



11. Install:
- Trip meter cable ①



### Rear wheel

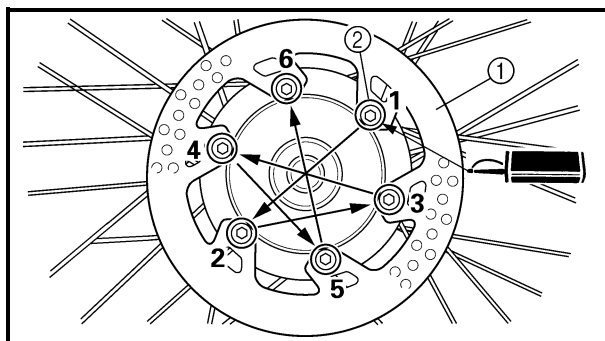
1. Install:
- Bearing (right) ①
  - Circlip ② **New**
  - Spacer ③
  - Bearing (left) ④
  - Oil seal ⑤ **New**

### NOTE:

- Apply the lithium soap base grease on the bearing and oil seal lip when installing.
- Install the bearing with seal facing outward.
- Use a socket that matches the outside diameter of the race of the bearing.
- Right side of bearing shall be installed first.
- Install the oil seal with its manufacture's marks or numbers facing outward.

### CAUTION:

**Do not strike the inner race of the bearing. Contact should be made only with the outer race.**

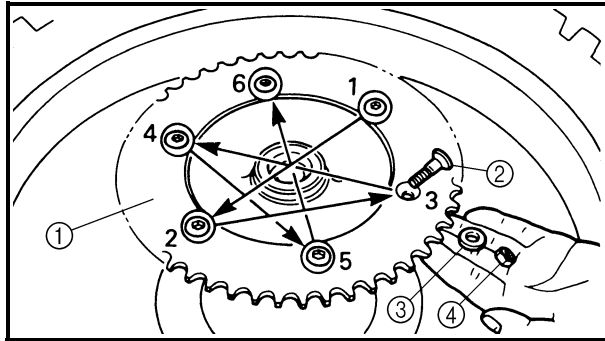


2. Install:
- Brake disc ①
  - Bolt (brake disc) ②

**14 Nm (1.4 m · kg, 10 ft · lb)**

### NOTE:

Tighten the bolts in stage, using a crisscross pattern.



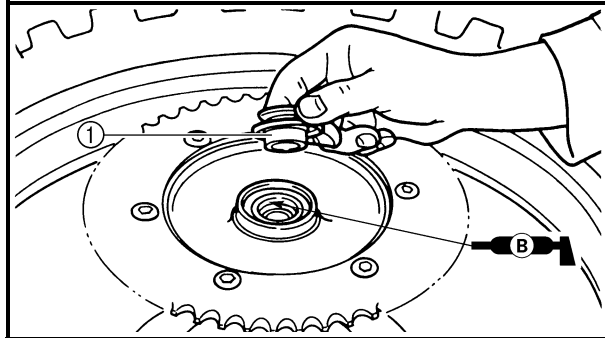
3. Install:

- Rear wheel sprocket ①
- Bolt (rear wheel sprocket) ②
- Washer (rear wheel sprocket) ③
- Nut (rear wheel sprocket) ④

50 Nm (5.0 m · kg, 36 ft · lb)

**NOTE:** \_\_\_\_\_

Tighten the nuts in stage, using a crisscross pattern.

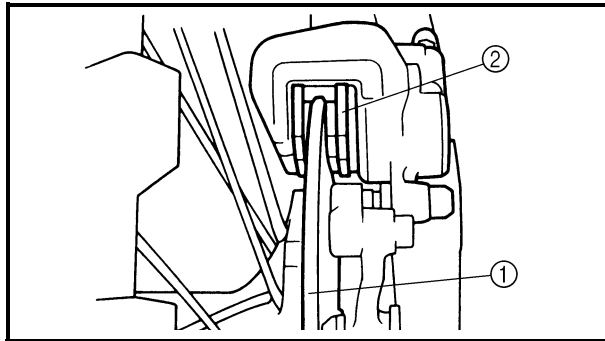


4. Install:

- Collar ①

**NOTE:** \_\_\_\_\_

Apply the lithium soap base grease on the oil seal lip.

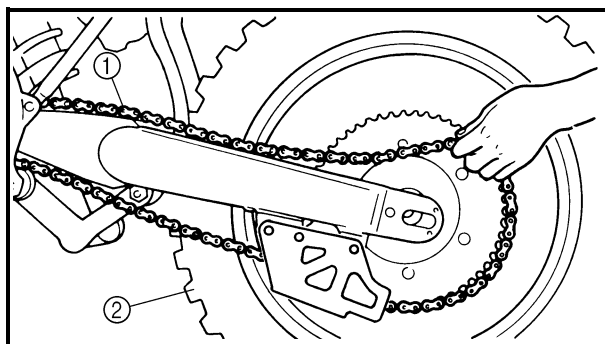


5. Install:

- Wheel

**NOTE:** \_\_\_\_\_

Install the brake disc ① between the brake pads ② correctly.

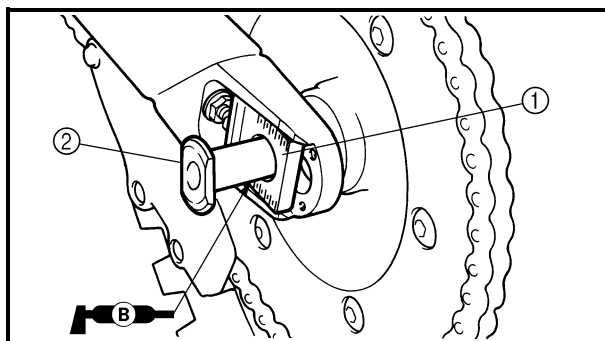


6. Install:

- Drive chain ①

**NOTE:** \_\_\_\_\_

Push the wheel ② forward and install the drive chain.

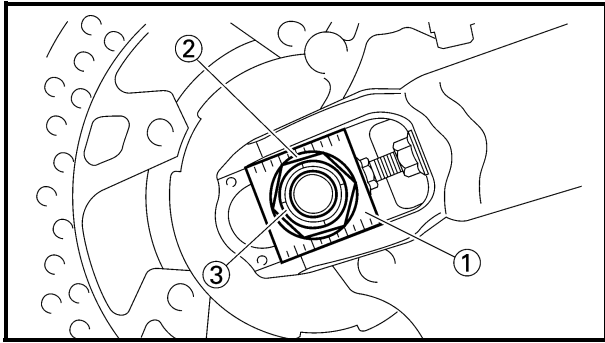


7. Install:

- Left drive chain puller ①
- Wheel axle ②

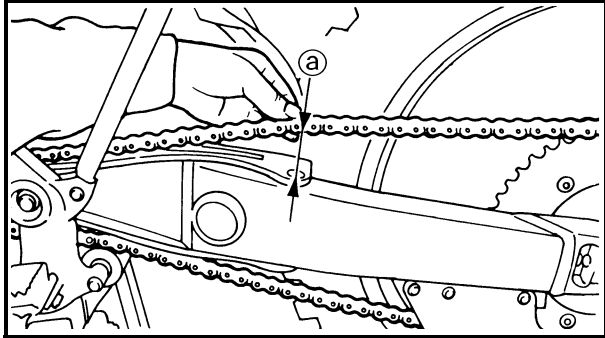
**NOTE:** \_\_\_\_\_

• Install the left drive chain puller, and insert the wheel axle from left side.  
• Apply the lithium soap base grease on the wheel axle.

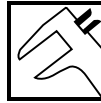


8. Install:
- Right drive chain puller ①
  - Washer ②
  - Nut (wheel axle) ③

**NOTE:** \_\_\_\_\_  
Temporarily tighten the nut (wheel axle) at this point.  
\_\_\_\_\_

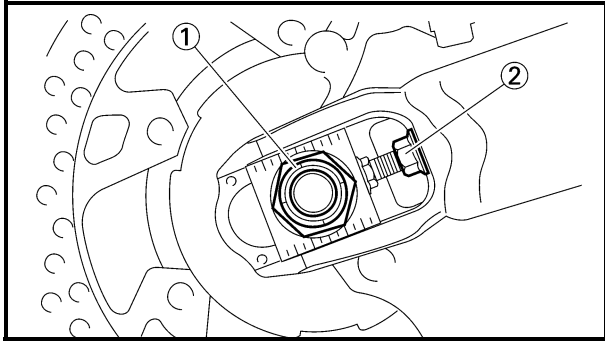


9. Adjust:
- Drive chain slack ①



**Drive chain slack:**  
40 ~ 50 mm (1.6 ~ 2.0 in)

Refer to “DRIVE CHAIN SLACK ADJUSTMENT” section in the CHAPTER 3.



10. Tighten:
- Nut (wheel axle) ①

125 Nm (12.5 m · kg, 90 ft · lb)

- Locknut ②

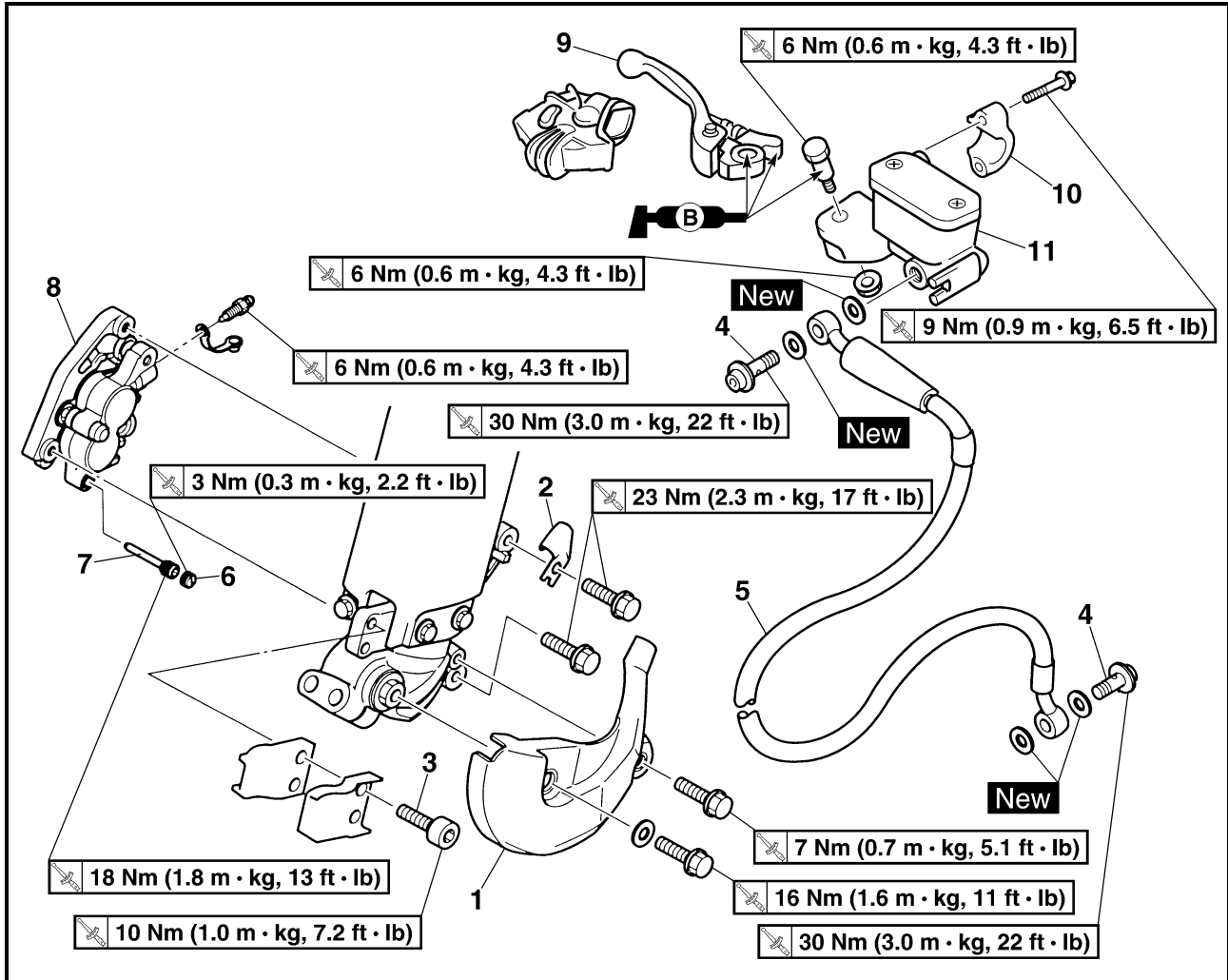
16 Nm (1.6 m · kg, 11 ft · lb)

EC5A0000

## FRONT BRAKE AND REAR BRAKE

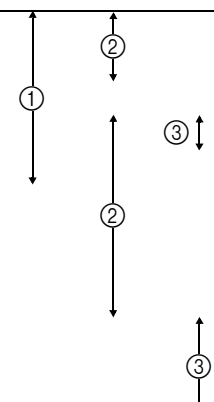
EC5A8000

### FRONT BRAKE



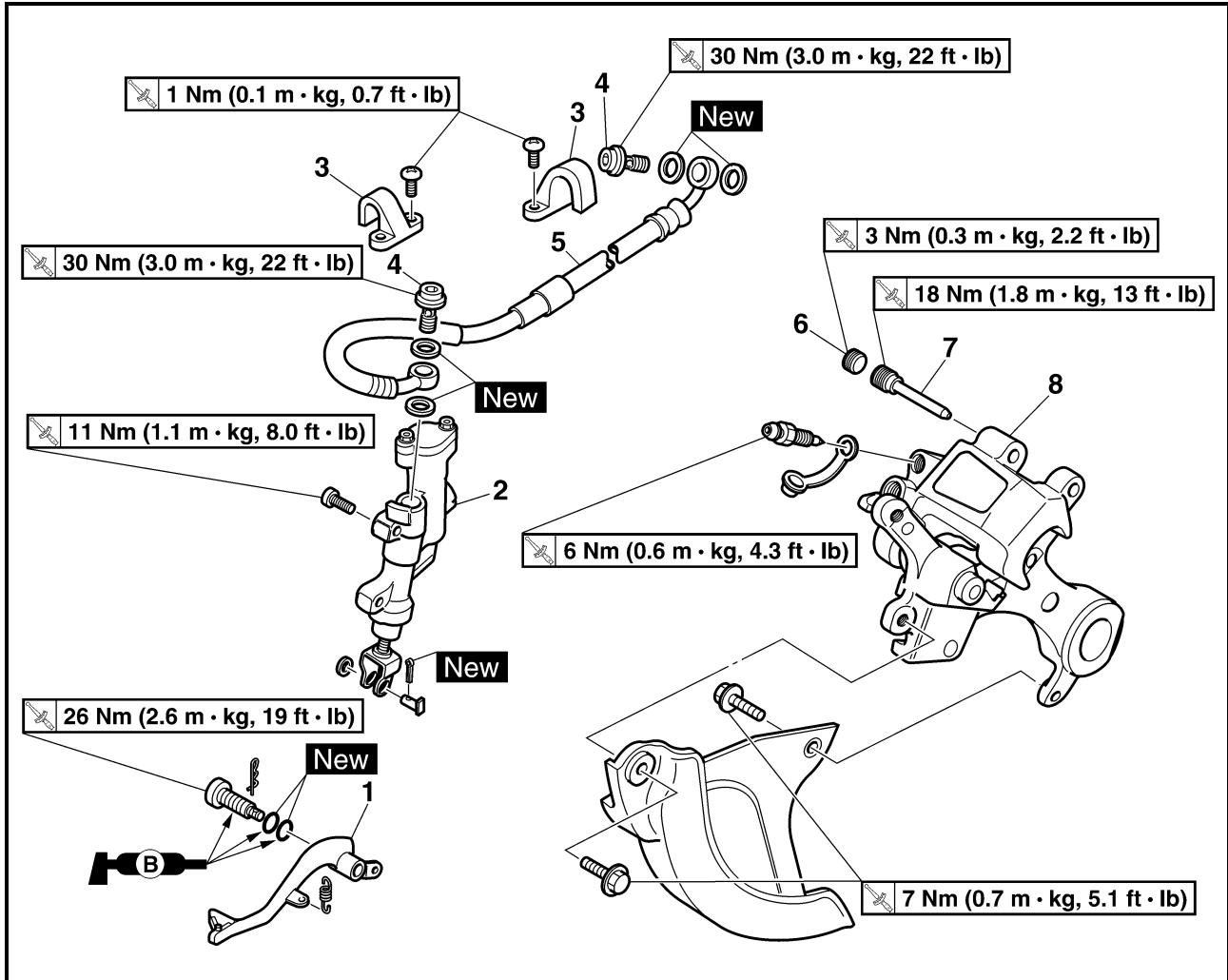
Extent of removal:

- ① Brake hose removal
- ② Brake caliper removal
- ③ Brake master cylinder removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>FRONT BRAKE REMOVAL</b> Hold the machine by placing the suitable stand under the engine.  Drain the brake fluid.		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.  Refer to "REMOVAL POINTS".
	1	Brake hose cover	1	Only loosening.  Remove when loosening the pad pin. Loosen when disassembling the brake caliper.
	2	Brake hose holder	1	
	3	Bolt (brake hose holder)	2	
	4	Union bolt	2	
	5	Brake hose	1	
	6	Pad pin plug	1	
	7	Pad pin	1	
	8	Brake caliper	1	
	9	Brake lever	1	
	10	Brake master cylinder bracket	1	
	11	Brake master cylinder	1	

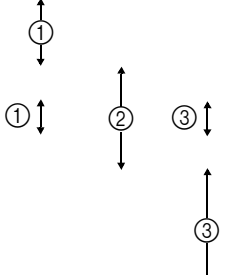
EC5A8100

## REAR BRAKE



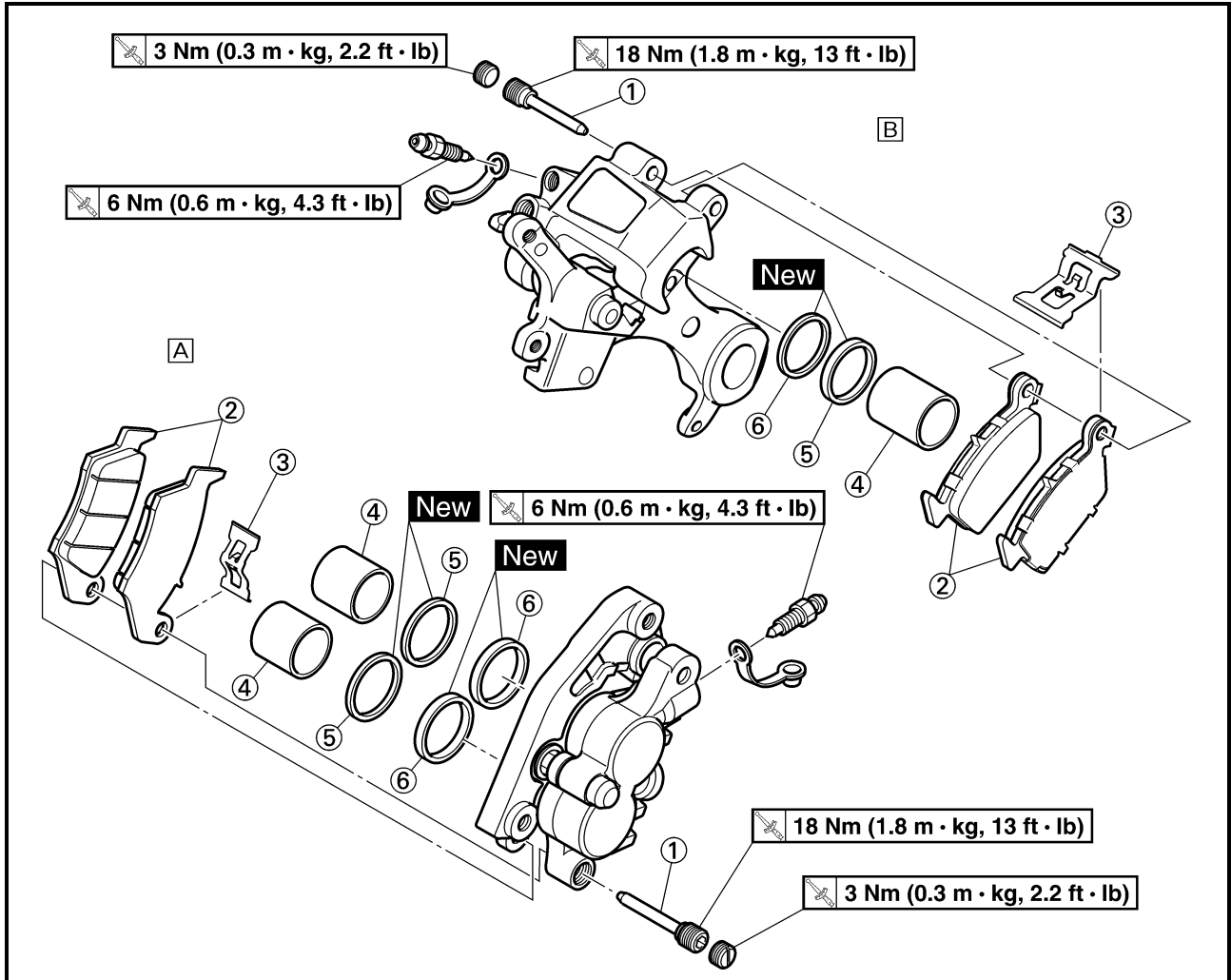
Extent of removal:

- ① Brake master cylinder removal
- ② Brake hose removal
- ③ Brake caliper removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>REAR BRAKE REMOVAL</b> Hold the machine by placing the suitable stand under the engine.  Rear wheel  Drain the brake fluid.		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.  Refer to "FRONT WHEEL AND REAR WHEEL" section. Refer to "REMOVAL POINTS".
	1	Brake pedal	1	
	2	Brake master cylinder	1	
	3	Brake hose holder	2	
	4	Union bolt	2	
	5	Brake hose	1	
	6	Pad pin plug	1	
	7	Pad pin	1	
	8	Brake caliper	1	



## BRAKE CALIPER DISASSEMBLY



**A** Front

**B** Rear

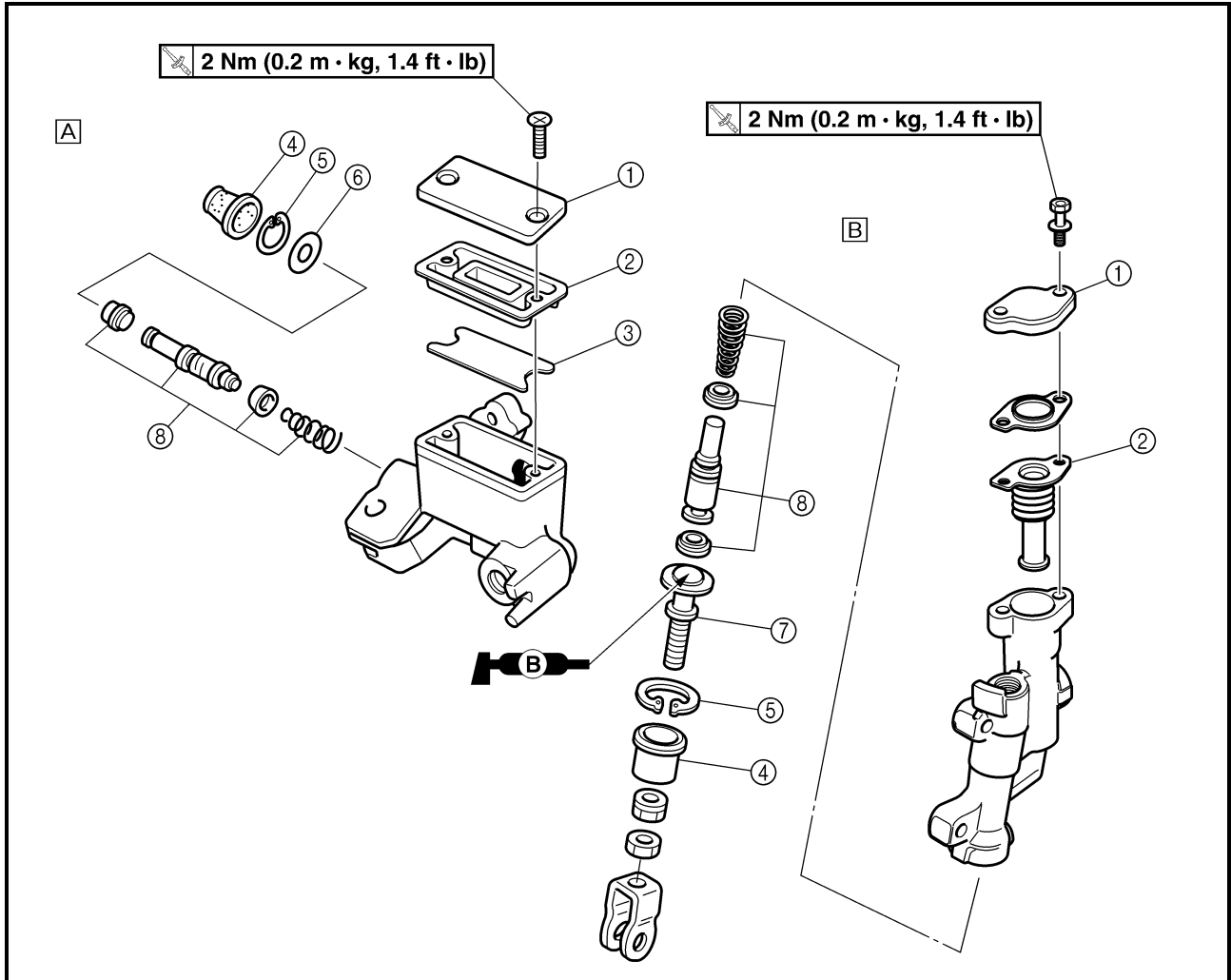
Extent of removal:

① Front brake caliper disassembly

② Rear brake caliper disassembly

Extent of removal	Order	Part name	Q'ty		Remarks
			A	B	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ↑ ① ↓           </div> <div style="text-align: center;">             ↑ ② ↓           </div> </div>		<b>BRAKE CALIPER DISASSEMBLY</b>	A	B	Refer to "REMOVAL POINTS".
	①	Pad pin	1	1	
	②	Brake pad	2	2	
	③	Pad support	1	1	
	④	Brake caliper piston	2	1	
	⑤	Dust seal	2	1	
	⑥	Piston seal	2	1	

## BRAKE MASTER CYLINDER DISASSEMBLY

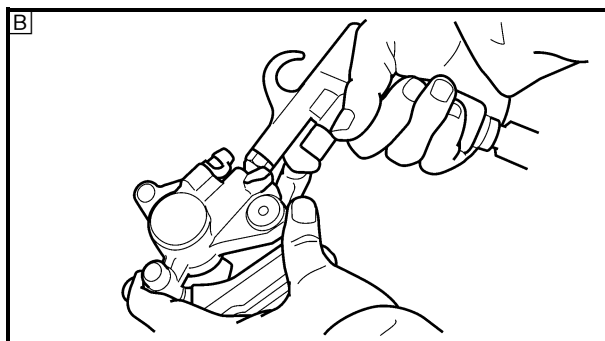
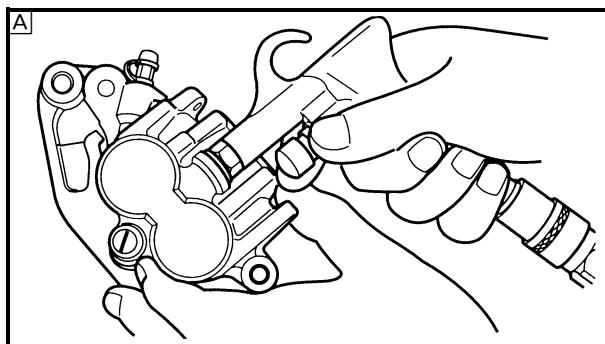
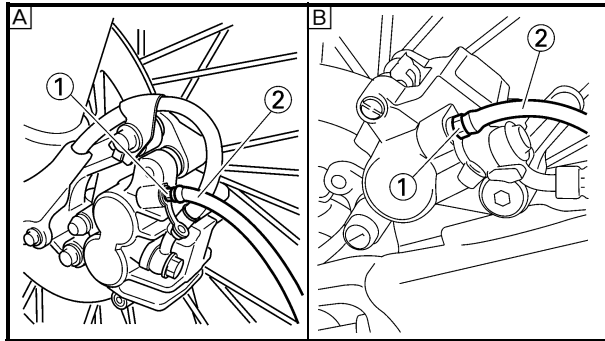
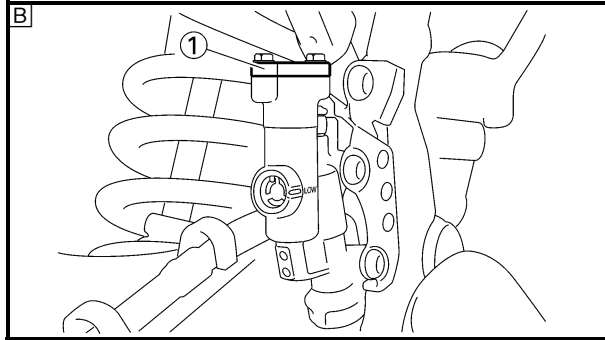
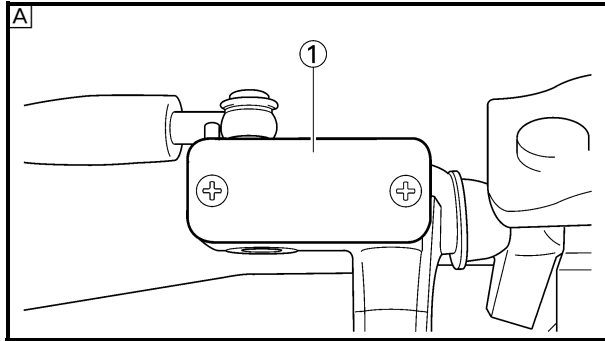


**A** Front

**B** Rear

Extent of removal:                      ① Front brake master cylinder disassembly      ② Rear brake master cylinder disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
<b>BRAKE MASTER CYLINDER DISASSEMBLY</b>				
↑ ① ↓	①	Brake master cylinder cap	1	Use a long nose circlip pliers.
↑ ② ↓	②	Diaphragm	1	
↑ ③ ↓	③	Reservoir float	1	
↑ ④ ↓	④	Brake master cylinder boot	1	
↑ ⑤ ↓	⑤	Circlip	1	
↑ ⑥ ↓	⑥	Washer	1	
↑ ⑦ ↓	⑦	Push rod	1	
↑ ⑧ ↓	⑧	Brake master cylinder kit	1	



EC5A3000

## REMOVAL POINTS

### Brake fluid

- Remove:
  - [Front]
    - Brake master cylinder cap ①
  - [Rear]
    - Brake master cylinder cap ①
    - Protector

### NOTE:

Do not remove the diaphragm.

- Ⓐ Front
- Ⓑ Rear

- Connect the transparent hose ② to the bleed screw ① and place a suitable container under its end.

- Ⓐ Front
- Ⓑ Rear

- Loosen the bleed screw and drain the brake fluid while pulling the lever in or pushing down on the pedal.

### CAUTION:

- Do not reuse the drained brake fluid.
- Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

### Brake caliper piston

- Remove:
  - Brake caliper piston
 Use compressed air and proceed carefully.

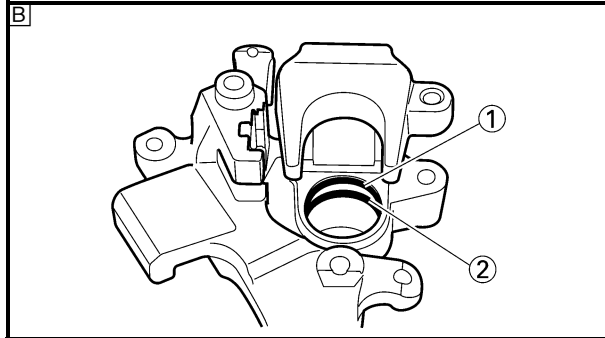
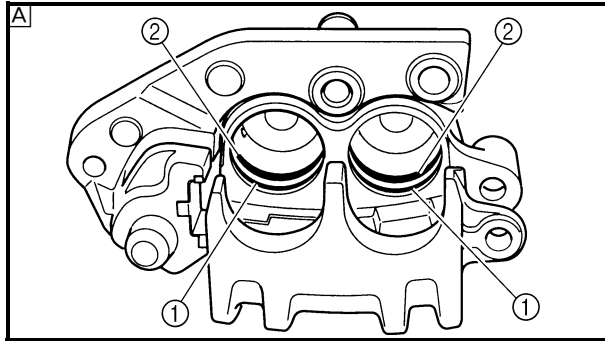
### ⚠ WARNING

- Cover piston with rag and use extreme caution when expelling piston from cylinder.
- Never attempt to pry out piston.

### Caliper piston removal steps:

- Insert a piece of rag into the brake caliper to lock one brake caliper.
- Carefully force the piston out of the brake caliper cylinder with compressed air.

- Ⓐ Front
- Ⓑ Rear



**Brake caliper piston seal kit**

1. Remove:
  - Dust seal ①
  - Piston seal ②

**NOTE:**

Remove the piston seals and dust seals by pushing them with a finger.

**CAUTION:**

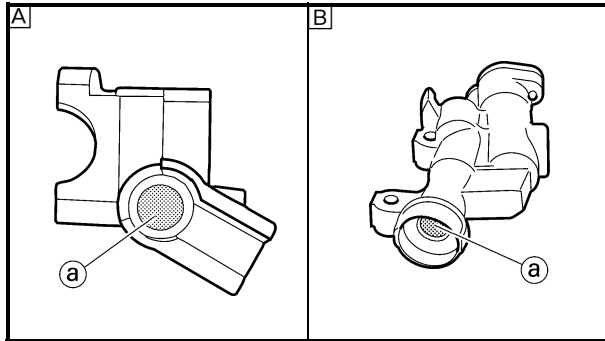
Never attempt to pry out piston seals and dust seals.

**⚠ WARNING**

Replace the piston seals and dust seals whenever a caliper is disassembled.

Ⓐ Front

Ⓑ Rear



EC5A4000

**INSPECTION**

**Brake master cylinder**

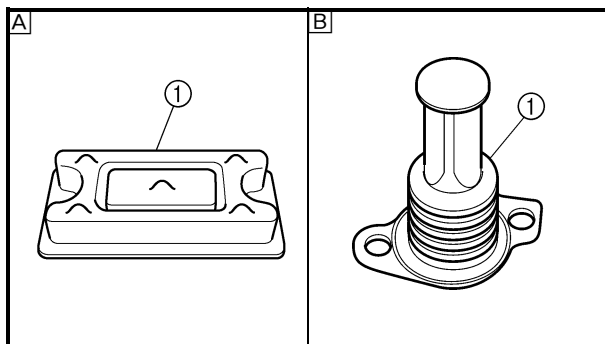
1. Inspect:
  - Brake master cylinder inner surface ②  
Wear/scratches → Replace master cylinder assembly.  
Stains → Clean.

**⚠ WARNING**

Use only new brake fluid.

Ⓐ Front

Ⓑ Rear

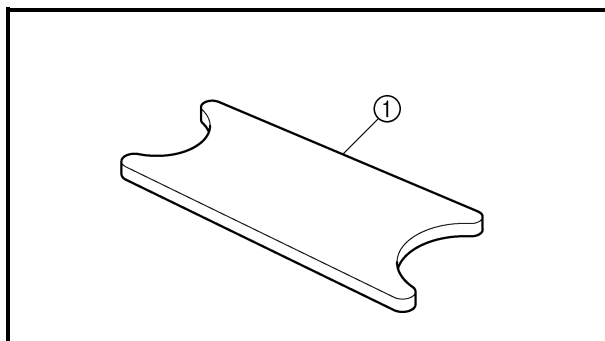


2. Inspect:

- Diaphragm ①  
Crack/damage → Replace.

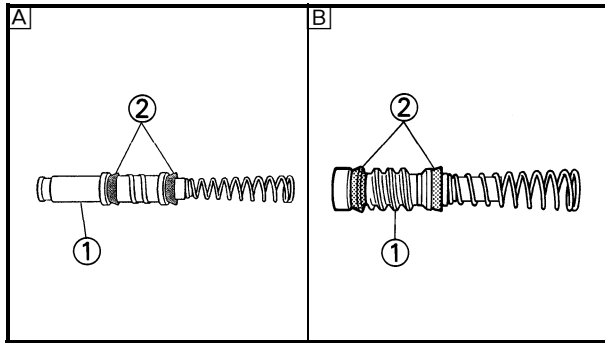
Ⓐ Front

Ⓑ Rear



3. Inspect: (front brake only)

- Reservoir float ①  
Damage → Replace.

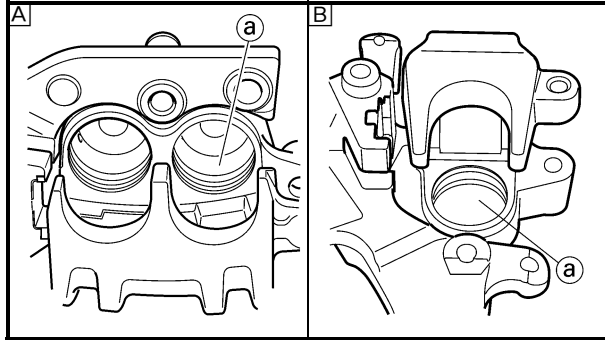


4. Inspect:

- Brake master cylinder piston ①
  - Brake master cylinder cup ②
- Wear/damage/score marks → Replace brake master cylinder kit.

**A** Front

**B** Rear



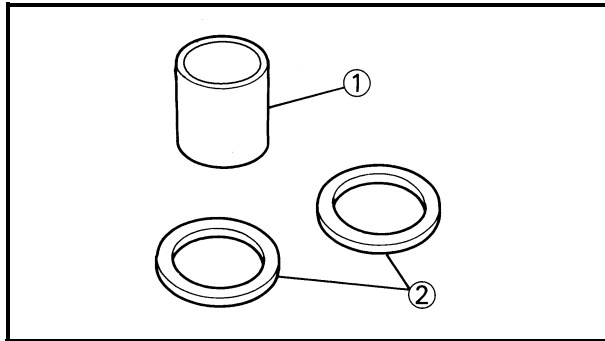
**Brake caliper**

1. Inspect:

- Brake caliper cylinder inner surface ①
- Wear/score marks → Replace brake caliper assembly.

**A** Front

**B** Rear

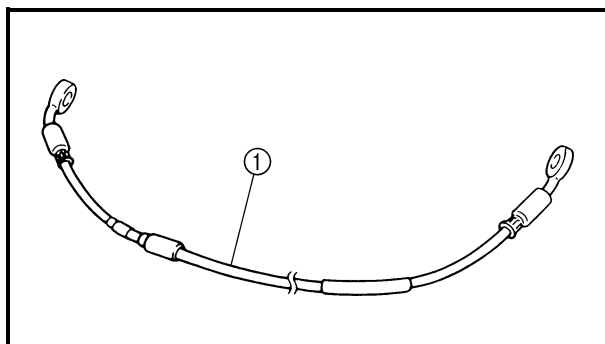


2. Inspect:

- Brake caliper piston ①
- Wear/score marks → Replace brake caliper piston assembly.

**⚠ WARNING**

**Replace the piston seals and dust seals ② whenever a caliper is disassembled.**



EC534301

**Brake hose**

1. Inspect:

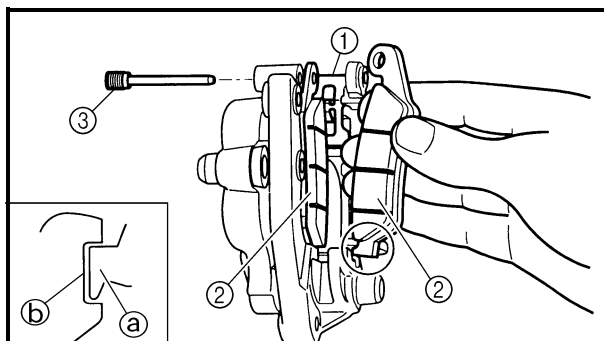
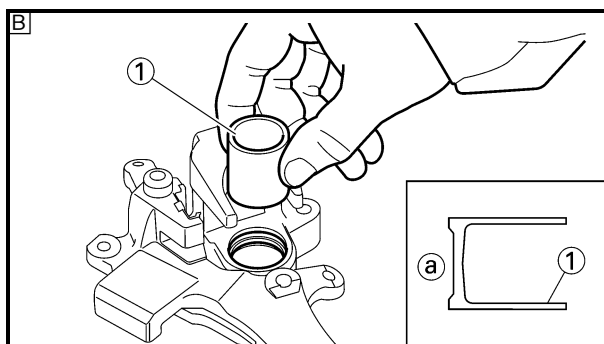
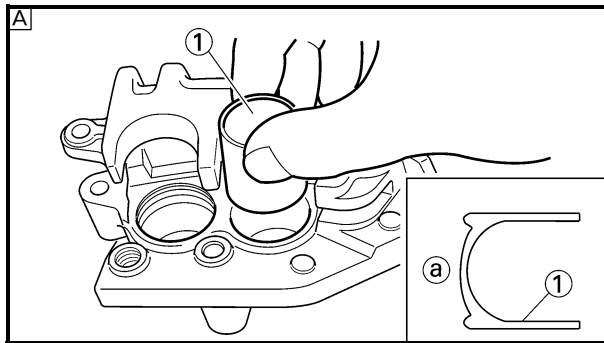
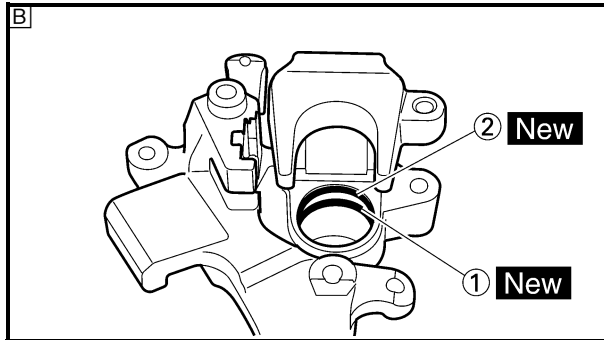
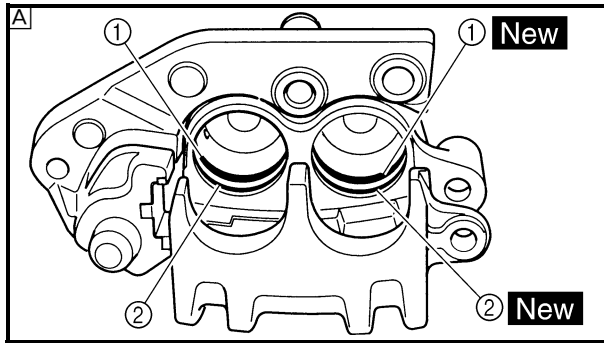
- Brake hose ①
- Crack/damage → Replace.

EC5A5000

**ASSEMBLY AND INSTALLATION**

**⚠ WARNING**

- All internal parts should be cleaned in new brake fluid only.
- Internal parts should be lubricated with brake fluid when installed.
- Replace the piston seals and dust seals whenever a caliper is disassembled.



## Brake caliper piston

1. Clean:
  - Brake caliper
  - Piston seal
  - Dust seal
  - Brake caliper piston
 Clean them with brake fluid.
2. Install:
  - Piston seal ① **New**
  - Dust seal ② **New**

### ⚠ WARNING

Always use new piston seals and dust seals.

### NOTE:

Fit the piston seals and dust seals onto the slot on brake caliper correctly.

Ⓐ Front

Ⓑ Rear

3. Install:

- Brake caliper piston ①

### NOTE:

Apply the brake fluid on the piston wall.

### CAUTION:

- Install the piston with its shallow depressed side ① facing the brake caliper.
- Never force to insert.

Ⓐ Front

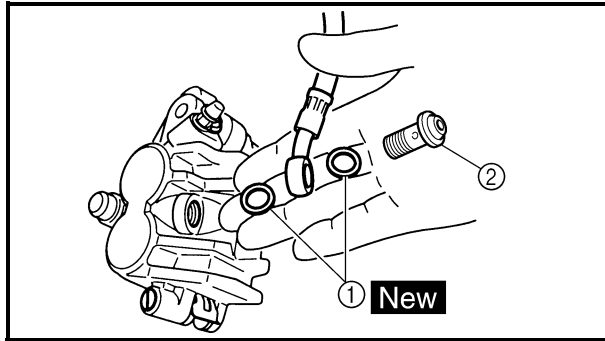
Ⓑ Rear

## Front brake caliper

1. Install:
  - Pad support ①
  - Brake pad ②
  - Pad pin ③

### NOTE:

- Install the brake pads with their projections ① into the brake caliper recesses ②.
- Temporarily tighten the pad pin at this point.



2. Install:

- Copper washer ① **New**
- Union bolt ②

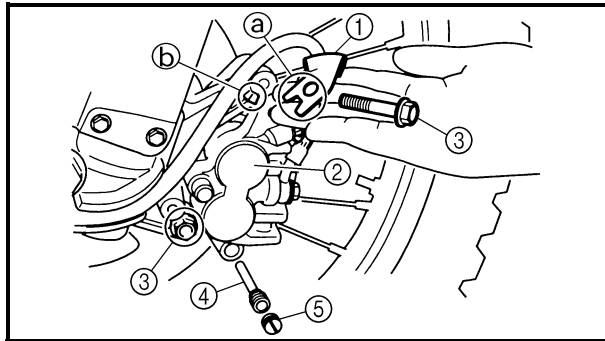
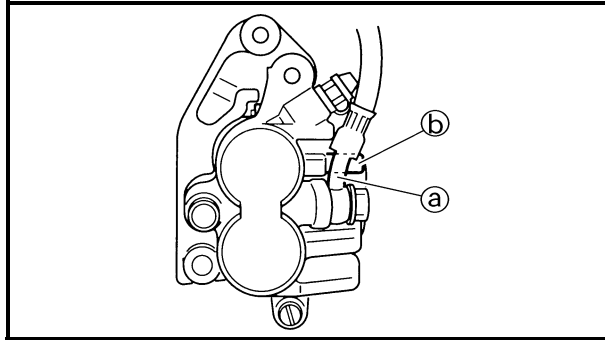
**30 Nm (3.0 m · kg, 22 ft · lb)**

**⚠ WARNING**

**Always use new copper washers.**

**CAUTION:**

Install the brake hose so that its pipe portion ① directs as shown and lightly touches the projection ② on the brake caliper.



3. Install:

- Brake hose holder ①
- Brake caliper ②
- Bolt (brake caliper) ③

**23 Nm (2.3 m · kg, 17 ft · lb)**

**NOTE:**

Fit the brake hose holder cut ① over the projection ② on the front fork and clamp the brake hose.

4. Tighten:

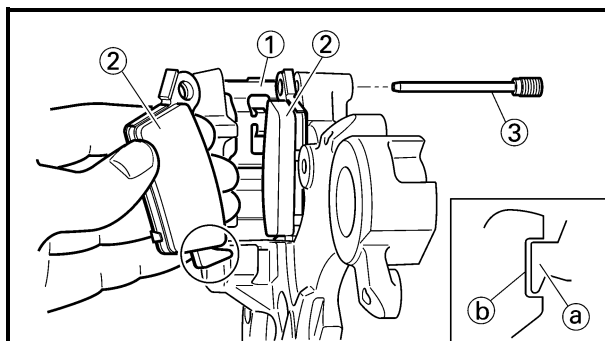
- Pad pin ④

**18 Nm (1.8 m · kg, 13 ft · lb)**

5. Install:

- Pad pin plug ⑤

**3 Nm (0.3 m · kg, 2.2 ft · lb)**



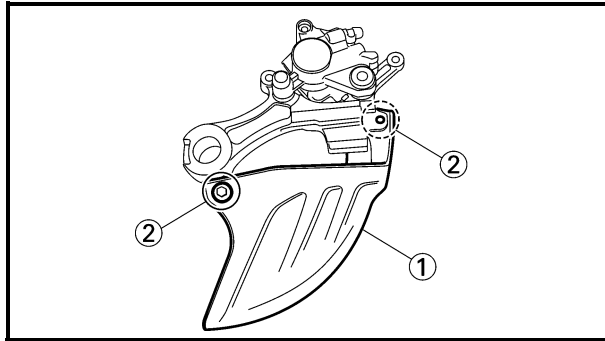
**Rear brake caliper**

1. Install:

- Pad support ①
- Brake pad ②
- Pad pin ③

**NOTE:**

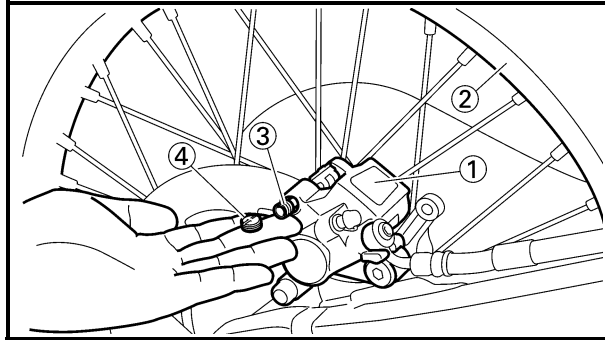
• Install the brake pads with their projections ① into the brake caliper recesses ②.  
• Temporarily tighten the pad pin at this point.



2. Install:

- Brake disc cover ①
- Bolt (brake disc cover) ②

7 Nm (0.7 m · kg, 5.1 ft · lb)



3. Install:

- Brake caliper ①
  - Rear wheel ②
- Refer to “FRONT WHEEL AND REAR WHEEL” section.

4. Tighten:

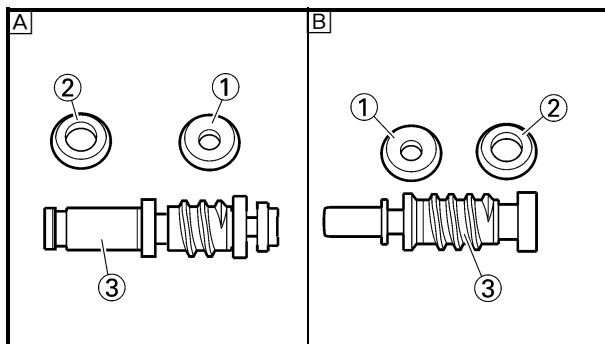
- Pad pin ③

18 Nm (1.8 m · kg, 13 ft · lb)

5. Install:

- Pad pin plug ④

3 Nm (0.3 m · kg, 2.2 ft · lb)



## Brake master cylinder kit

1. Clean:

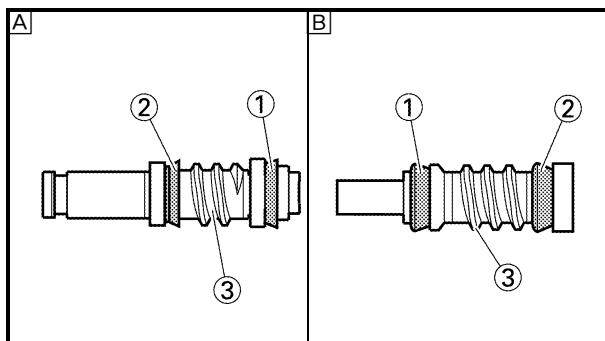
- Brake master cylinder
  - Brake master cylinder kit
- Clean them with brake fluid.

2. Install:

- Brake master cylinder cup (primary) ①
  - Brake master cylinder cup (secondary) ②
- To brake master cylinder piston ③.

### NOTE:

Apply the brake fluid on the brake master cylinder cup.



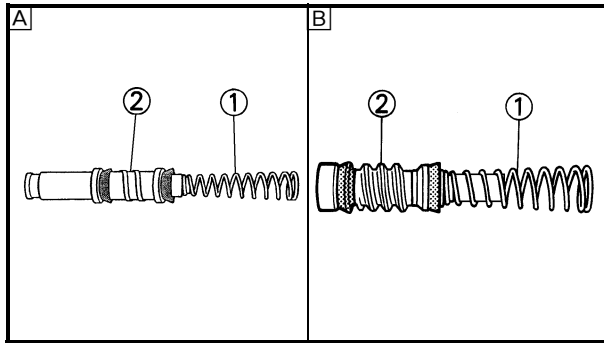
### WARNING

After installing, cylinder cup should be installed as shown direction. Wrong installation cause improper brake performance.

Front

Rear

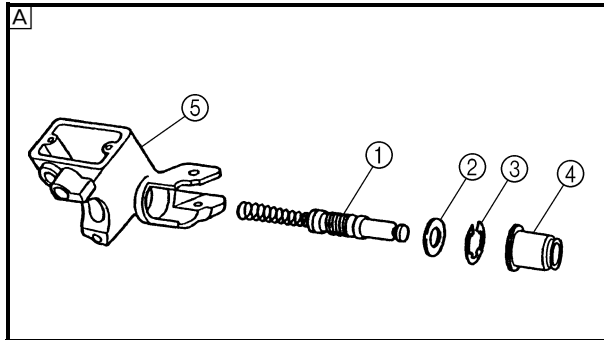




3. Install:
- Spring ①  
To brake master cylinder piston ②.

**NOTE:** Install the spring at the smaller dia. side.

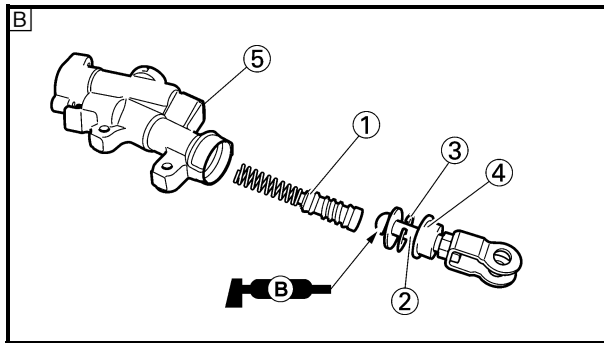
- [A] Front
- [B] Rear



4. Install:
- [Front]
- Brake master cylinder kit ①
  - Washer ②
  - Circlip ③
  - Brake master cylinder boot ④  
To brake master cylinder ⑤.

[Rear]

- Brake master cylinder kit ①
- Push rod ②
- Circlip ③
- Brake master cylinder boot ④  
To brake master cylinder ⑤.



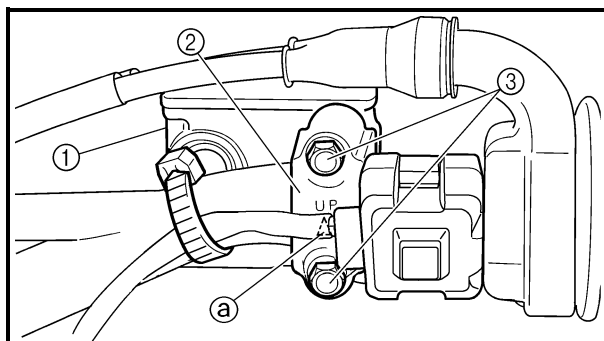
- NOTE:**
- Apply the brake fluid on the brake master cylinder kit.
  - Apply the lithium soap base grease on the tip of the push rod.
  - When installing the circlip, use a long nose circlip pliers.

- [A] Front
- [B] Rear

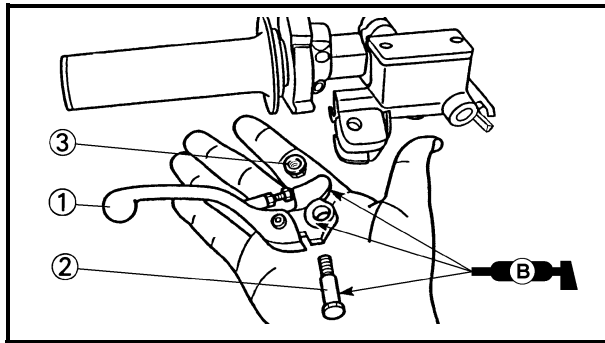
## Front brake master cylinder

1. Install:
- Brake master cylinder ①
  - Brake master cylinder bracket ②
  - Bolt (brake master cylinder bracket) ③

**9 Nm (0.9 m · kg, 6.5 ft · lb)**



- NOTE:**
- Install the bracket so that the arrow mark (a) face upward.
  - First tighten the bolts on the upper side of the brake master cylinder bracket, and then tighten the bolts on the lower side.



2. Install:

- Brake lever ①
- Bolt (brake lever) ②

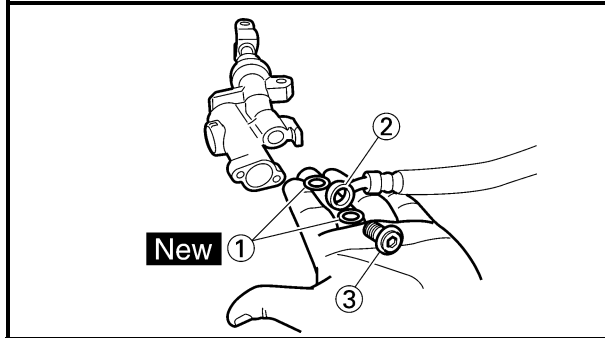
6 Nm (0.6 m · kg, 4.3 ft · lb)

- Nut (brake lever) ③

6 Nm (0.6 m · kg, 4.3 ft · lb)

**NOTE:**

Apply the lithium soap base grease on the brake lever sliding surface, bolt and contacting surface of the brake master cylinder piston.



**Rear brake master cylinder**

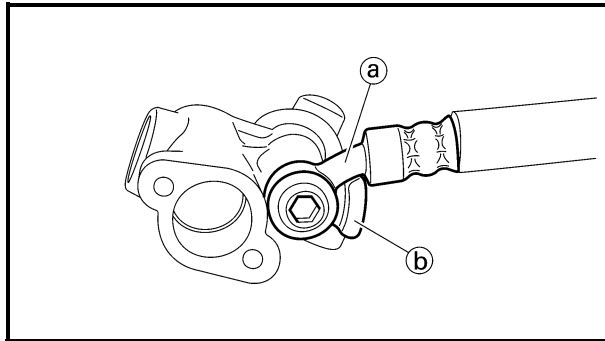
1. Install:

- Copper washer ① **New**
- Brake hose ②
- Union bolt ③

30 Nm (3.0 m · kg, 22 ft · lb)

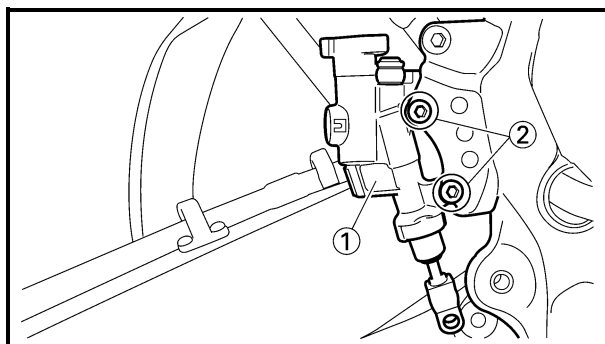
**⚠ WARNING**

Always use new copper washers.



**CAUTION:**

Install the brake hose so that its pipe portion ① directs as shown and lightly touches the projection ② on the brake master cylinder.



2. Install:

- Brake master cylinder ①
- Bolt (brake master cylinder) ②

11 Nm (1.1 m · kg, 8.0 ft · lb)

3. Install:

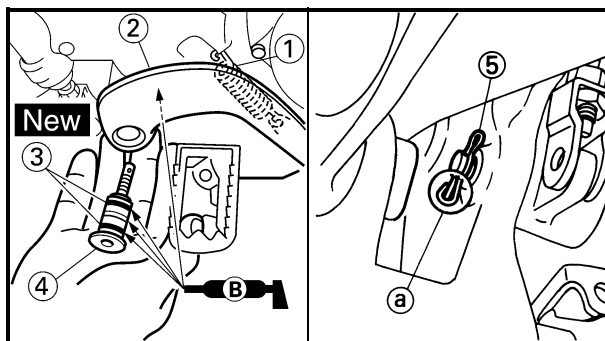
- Spring ①
- Brake pedal ②
- O-ring ③ **New**
- Bolt (brake pedal) ④

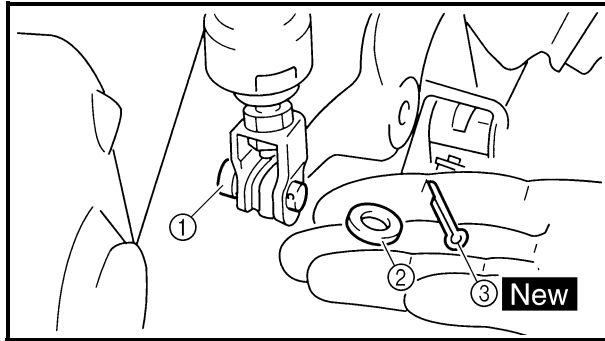
26 Nm (2.6 m · kg, 19 ft · lb)

- Clip ⑤

**NOTE:**

Apply the lithium soap base grease on the bolt, O-ring and brake pedal bracket. Install the clip with its stopper portion ① facing inward.

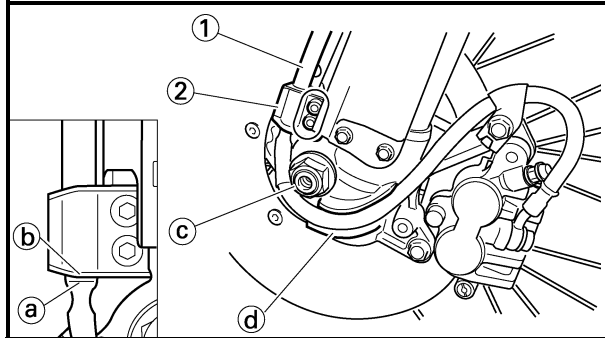




4. Install:
  - Pin ①
  - Washer ②
  - Cotter pin ③ **New**

**NOTE:**

After installing, check the brake pedal height. Refer to “REAR BRAKE ADJUSTMENT” section in the CHAPTER 3.



**Front brake hose**

1. Install:

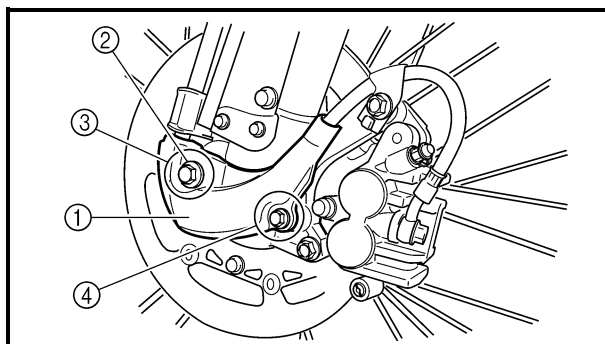
- Brake hose ①

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

To brake hose holder ②.

**NOTE:**

Before tightening the bolt (brake hose holder), align the top ① of the brake hose neck with the brake hose holder bottom ②. Then pass the brake hose in front of the axle boss ③ and fit it into the hose groove ④ so that the brake hose does not contact the nut (wheel axle).



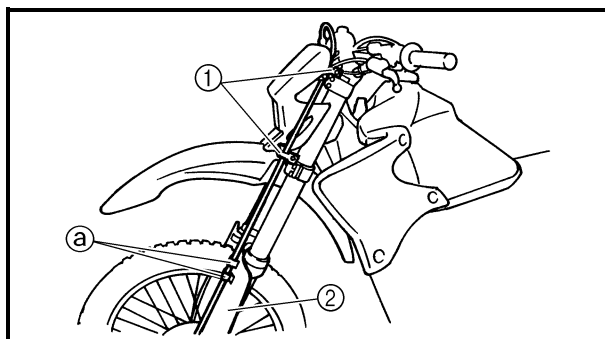
2. Install:

- Brake hose cover ①
- Washer ②
- Bolt [brake hose cover (M8)] ③

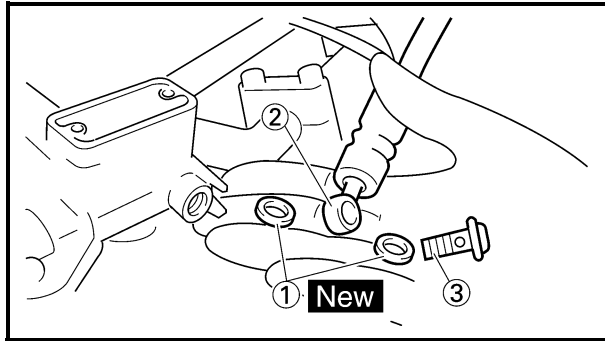
**16 Nm (1.6 m · kg, 11 ft · lb)**

- Bolt [brake hose cover (M6)] ④

**7 Nm (0.7 m · kg, 5.1 ft · lb)**



3. Pass the brake hose through the front brake hose guide ①, then through the guide ② on the protector ②.



4. Install:

- Copper washer ① **New**
- Brake hose ②
- Union bolt ③

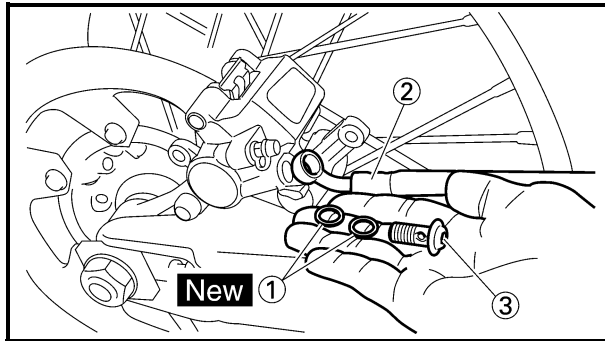
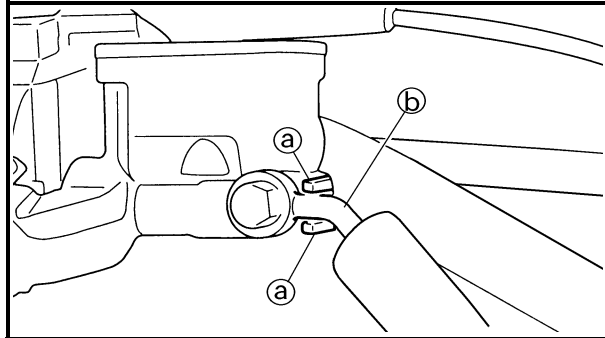
30 Nm (3.0 m · kg, 22 ft · lb)

**⚠ WARNING**

Always use new copper washers.

**CAUTION:**

Install the brake hose so that it contacts the brake master cylinder projection ① and that its bent portion ② faces downward.



Rear brake hose

1. Install:

- Copper washer ① **New**
- Brake hose ②
- Union bolt ③

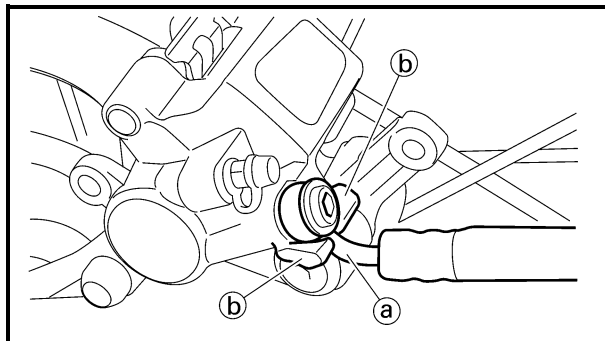
30 Nm (3.0 m · kg, 22 ft · lb)

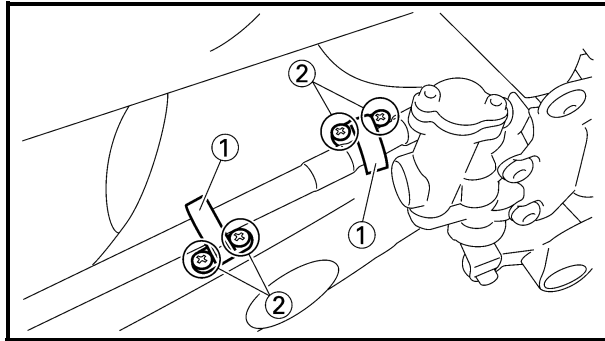
**⚠ WARNING**

Always use new copper washers.

**CAUTION:**

Install the brake hose so that its pipe portion ① directs as shown and lightly touches the projection ② on the brake caliper.





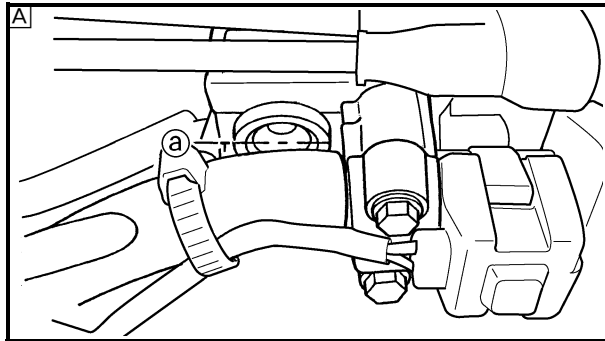
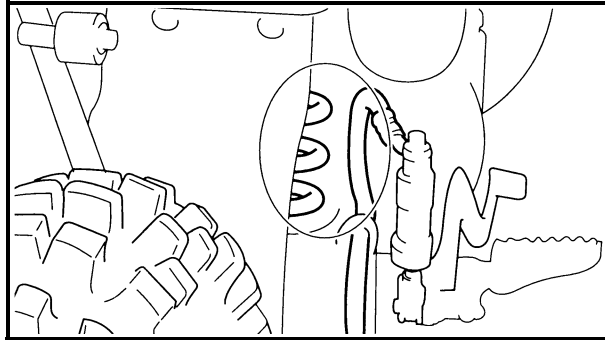
2. Install:

- Brake hose holder ①
- Screw (brake hose holder) ②

1 Nm (0.1 m · kg, 0.7 ft · lb)

**CAUTION:**

After installing the brake hose holders, make sure the brake hose does not contact the spring (rear shock absorber). If it does, correct its twist.



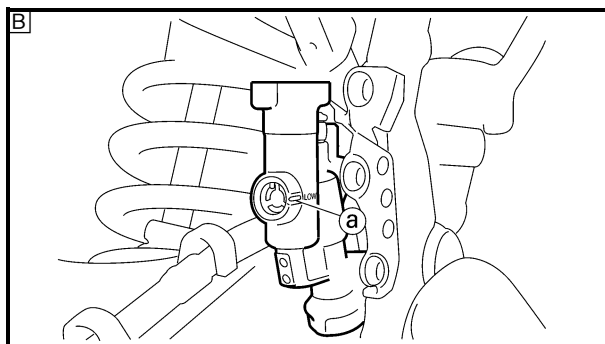
**Brake fluid**

1. Fill:

- Brake fluid  
Until the fluid level reaches “LOWER” level line ①.



**Recommended brake fluid:  
DOT #4**



**⚠ WARNING**

- Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.

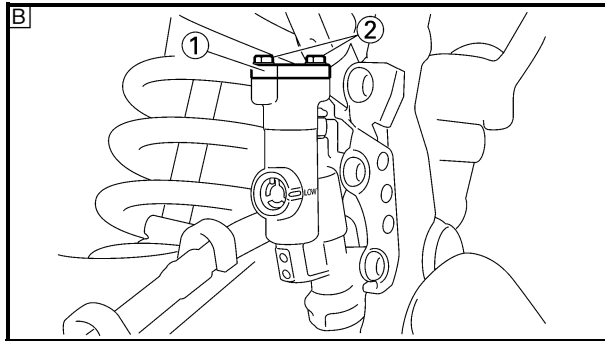
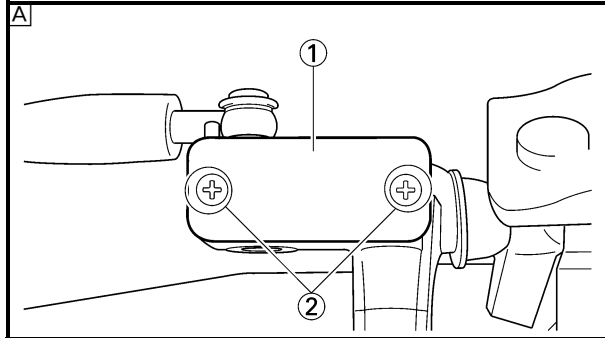
**CAUTION:**

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

- Ⓐ Front
- Ⓑ Rear



2. Air bleed:
  - Brake system  
Refer to “BRAKE SYSTEM AIR BLEEDING” section in the CHAPTER 3.
3. Inspect:
  - Brake fluid level  
Fluid at lower level → Fill up.  
Refer to “BRAKE FLUID LEVEL INSPECTION” section in the CHAPTER 3.



4. Install:

[Front]

- Reservoir float
- Diaphragm
- Brake master cylinder cap ①
- Screw (brake master cylinder cap) ②

2 Nm (0.2 m · kg, 1.4 ft · lb)

[Rear]

- Diaphragm
- Brake master cylinder cap ①
- Bolt (brake master cylinder cap) ②

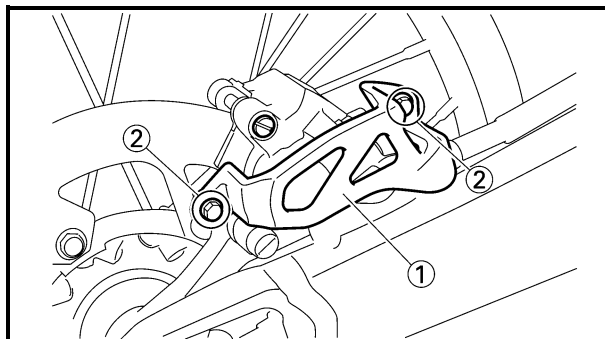
2 Nm (0.2 m · kg, 1.4 ft · lb)

**CAUTION:**

After installation, while pulling the brake lever in or pushing down on the brake pedal, check whether there is any brake fluid leaking where the union bolts are installed respectively at the brake master cylinder and brake caliper.

**A** Front

**B** Rear



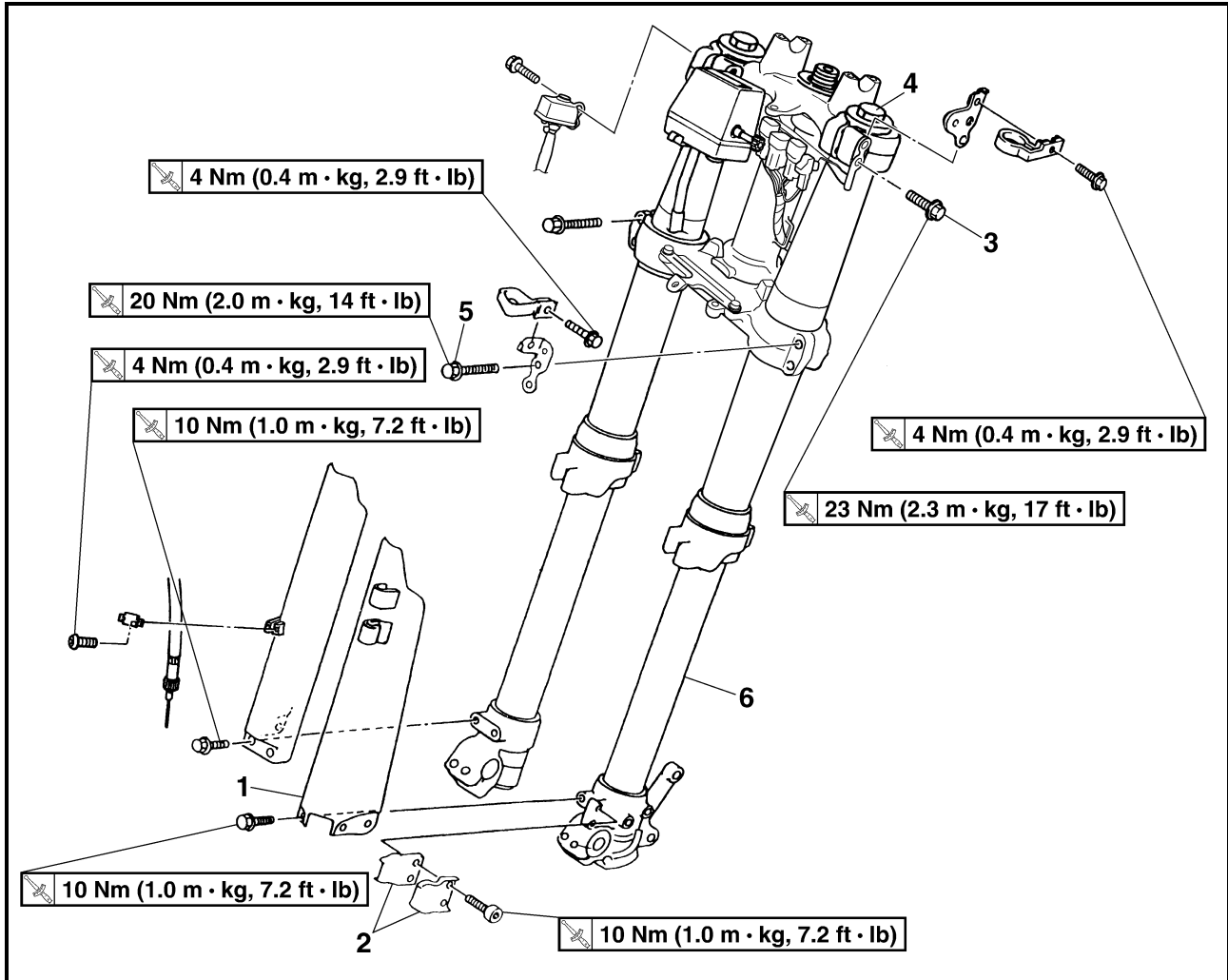
5. Install: (rear brake only)

- Protector ①
- Bolt (protector) ②

7 Nm (0.7 m · kg, 5.1 ft · lb)

EC550000

FRONT FORK

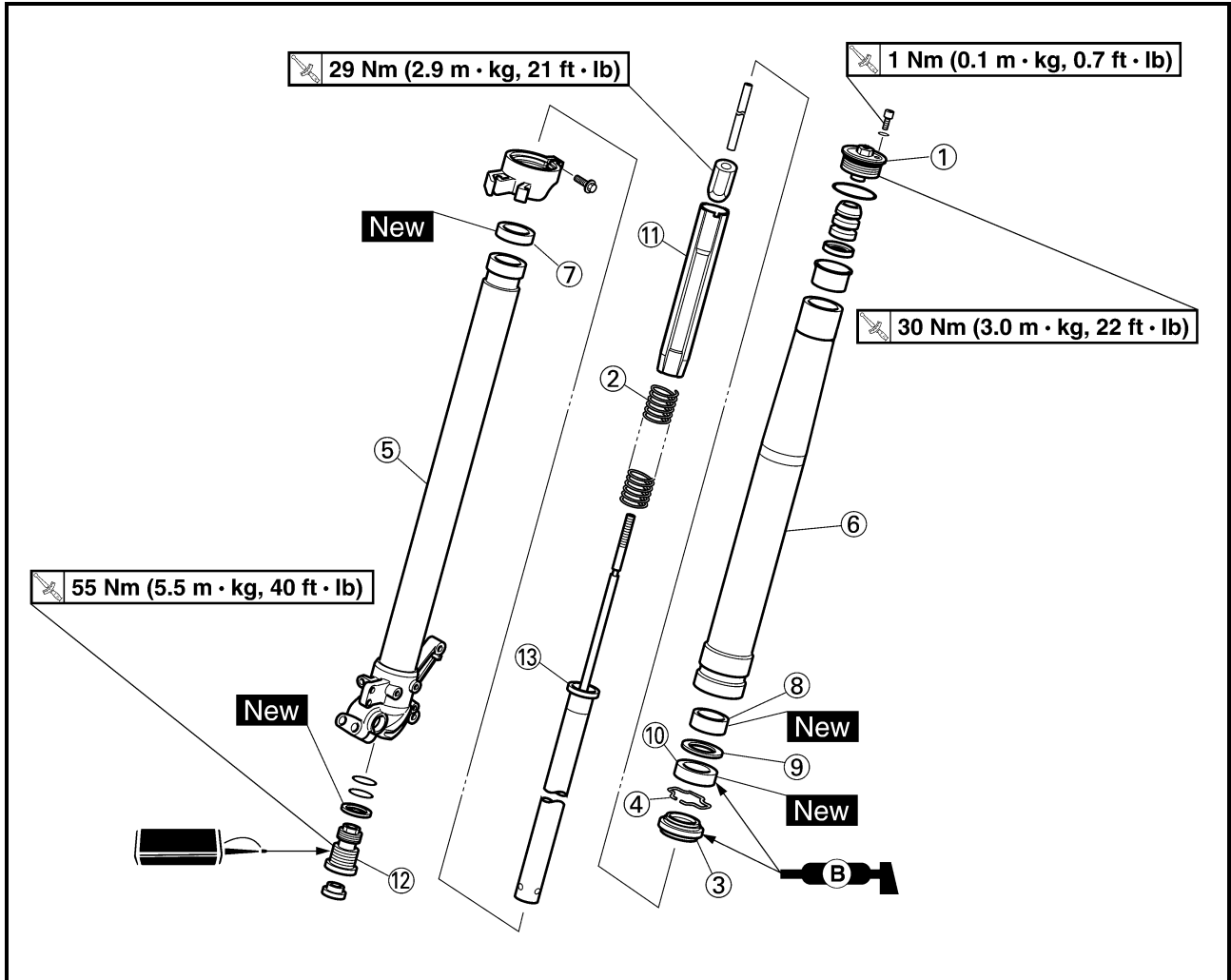


Extent of removal: ① Front fork removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>FRONT FORK REMOVAL</b> Hold the machine by placing the suitable stand under the engine.		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.
		Front wheel		Refer to "FRONT WHEEL AND REAR WHEEL" section.
		Front brake caliper		Refer to "FRONT BRAKE AND REAR BRAKE" section.
		Headlight Handlebar		Refer to "HANDLEBAR" section.
①	1	Protector	1	
	2	Brake hose holder	2	
	3	Pinch bolt (upper bracket)	2	Only loosening.
	4	Cap bolt	1	Loosen when disassembling the front fork.
	5	Pinch bolt (lower bracket)	2	Only loosening.
	6	Front fork	1	

EC558000

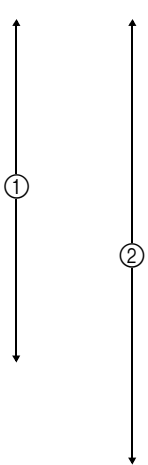
FRONT FORK DISASSEMBLY



Extent of removal:

① Oil seal removal

② Damper rod removal

Extent of removal	Order	Part name	Q'ty	Remarks
		<b>FRONT FORK DISASSEMBLY</b>		
	①	Front fork cap bolt	1	Refer to "REMOVAL POINTS".
	②	Fork spring	1	Drain the fork oil.
	③	Dust seal	1	Refer to "REMOVAL POINTS".
	④	Stopper ring	1	
	⑤	Inner tube	1	
	⑥	Outer tube	1	
	⑦	Piston metal	1	
	⑧	Slide metal	1	
	⑨	Oil seal washer	1	
	⑩	Oil seal	1	
	⑪	Spring guide	1	
	⑫	Base valve	1	Use special tool.
	⑬	Damper rod	1	Refer to "REMOVAL POINTS".





EC556000

**HANDLING NOTE****NOTE:**

The front fork requires careful attention. So it is recommended that the front fork be maintained at the dealers.

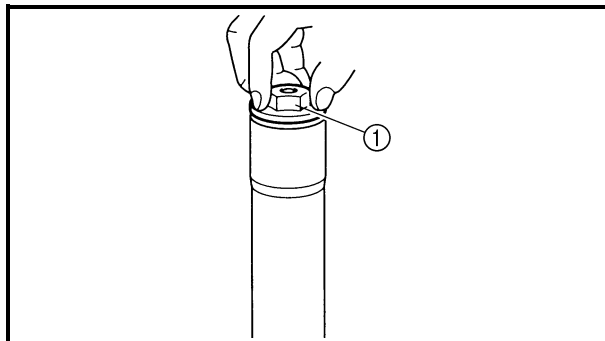
**CAUTION:**

To prevent an accidental explosion of air, the following instructions should be observed:

- The front fork with a built-in piston rod has a very sophisticated internal construction and is particularly sensitive to foreign material.

Use enough care not to allow any foreign material to come in when the oil is replaced or when the front fork is disassembled and reassembled.

- Before removing the cap bolts or front forks, be sure to extract the air from the air chamber completely.



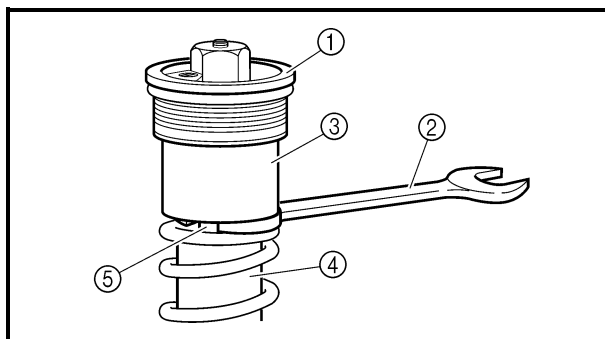
EC553000

**REMOVAL POINTS****Front fork cap bolt**

1. Remove:
  - Front fork cap bolt (1)  
From the outer tube.

**NOTE:**

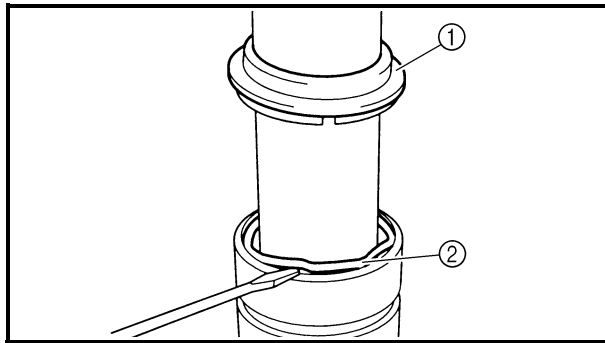
Before removing the front fork from the machine, loosen the front fork cap bolt.



2. Remove:
  - Front fork cap bolt (1)

**NOTE:**

- While compressing the fork spring, set the thin type spanners (2) between the spacer (3) and spring guide (4).
- Hold the locknut (5) and remove the front fork cap bolt.



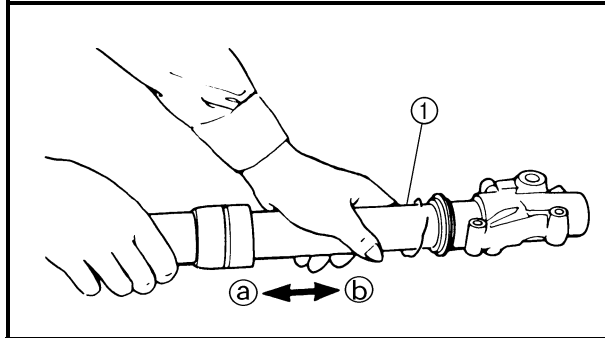
EC553201

**Inner tube**

- Remove:
  - Dust seal ①
  - Stopper ring ②
 Using slotted-head screwdriver.

**CAUTION:** \_\_\_\_\_

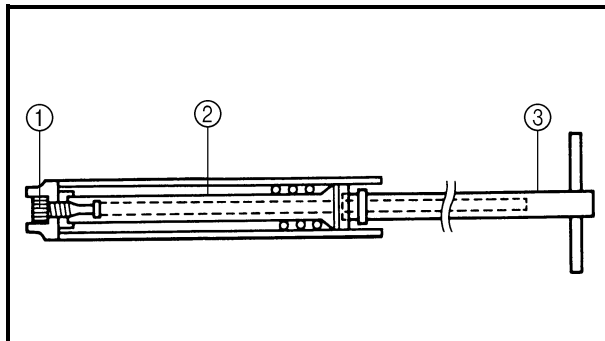
**Take care not to scratch the inner tube.**



- Remove:
  - Inner tube ①

**Oil seal removal steps:**

- Push in slowly (a) the inner tube just before it bottoms out and then pull it back quickly (b).
- Repeat this step until the inner tube can be pulled out from the outer tube.



EC553311

**Damper rod**

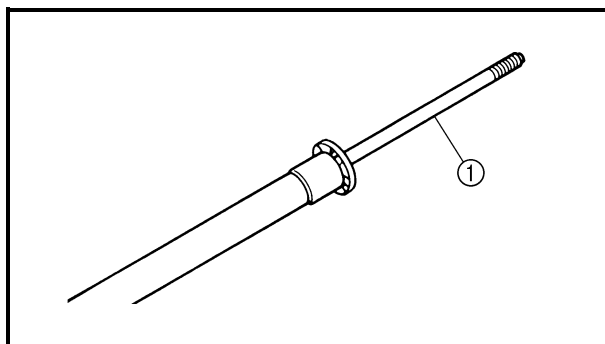
- Remove:
  - Base valve ①
  - Damper rod ②

**NOTE:** \_\_\_\_\_

Use a damper rod holder ③ to lock the damper rod.



**Damper rod holder:**  
YM-1423/90890-01423



EC554000

**INSPECTION**

EC554100

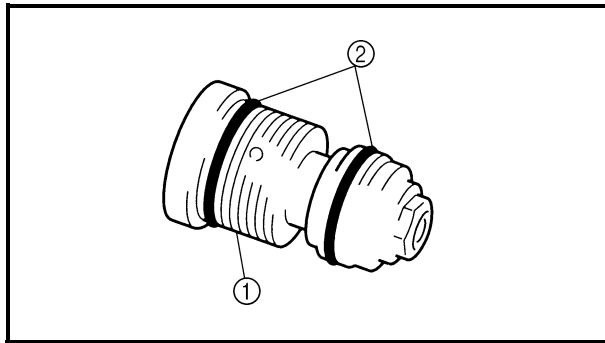
**Damper rod**

- Inspect:
  - Damper rod ①
 Bend/damage → Replace damper rod.

**CAUTION:** \_\_\_\_\_

The front fork with a built-in piston rod has a very sophisticated internal construction and is particularly sensitive to foreign material.

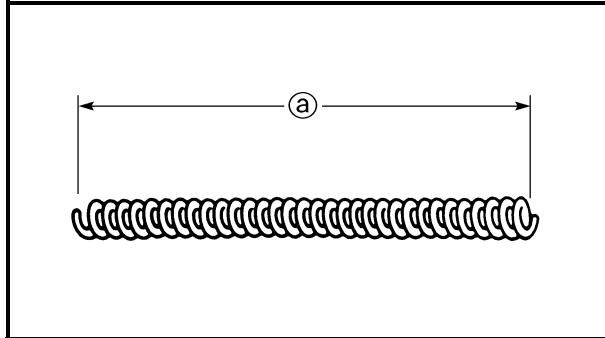
Use enough care not to allow any foreign material to come in when the oil is replaced or when the front fork is disassembled and reassembled.



EC554200

**Base valve**

1. Inspect:
  - Valve assembly ①  
Wear/damage → Replace.
  - O-ring ②  
Damage → Replace.



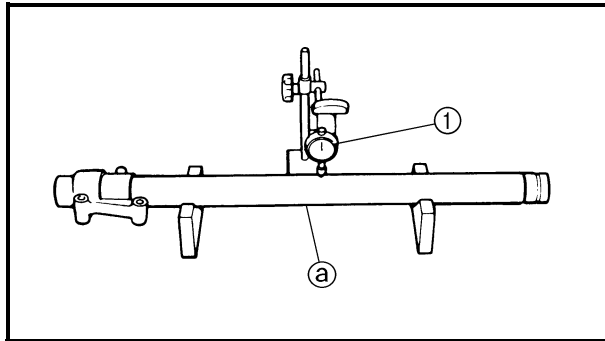
EC554400

**Fork spring**

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



**Fork spring free length:**  
460 mm (18.1 in)  
<Limit>: 455 mm (17.9 in)



EC554502

**Inner tube**

1. Inspect:
  - Inner tube surface ①  
Score marks → Repair or replace.  
Use #1,000 grit wet sandpaper.  
Damaged oil lock piece → Replace.
  - Inner tube bends  
Out of specification → Replace.  
Use the dial gauge ①.



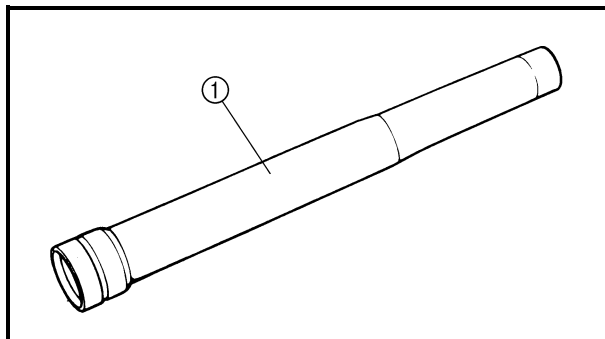
**Inner tube bending limit:**  
0.2 mm (0.008 in)

**NOTE:**

The bending value is shown by one half of the dial gauge reading.

**⚠ WARNING**

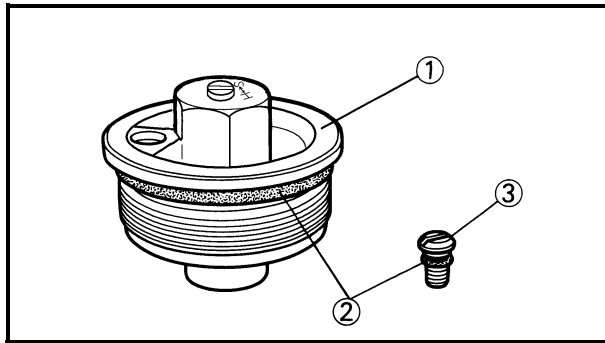
**Do not attempt to straighten a bent inner tube as this may dangerously weaken the tube.**



EC554600

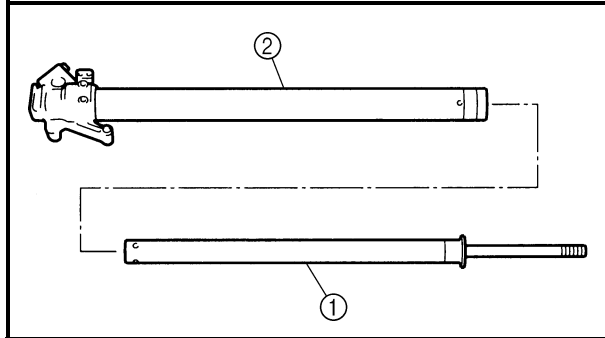
**Outer tube**

1. Inspect:
  - Outer tube ①  
Score marks/wear/damage → Replace.



**Front fork cap bolt**

1. Inspect:
  - Front fork cap bolt ①
  - O-ring ②
  - Air bleed screw ③
 Wear/damage → Replace.



EC555000

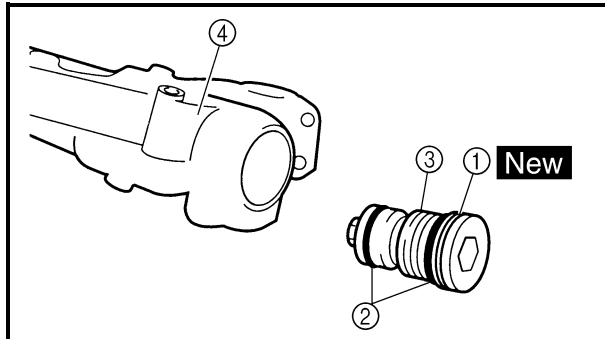
**ASSEMBLY AND INSTALLATION**

**Front fork assembly**

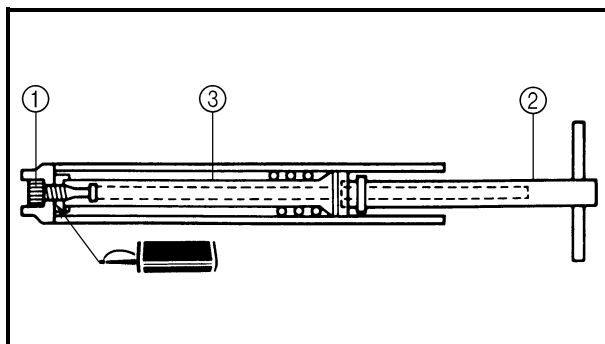
1. Wash the all parts in a clean solvent.
2. Install:
  - Damper rod ①
 To inner tube ②.

**CAUTION:**

To install the damper rod into the inner tube, hold the inner tube aslant. If the inner tube is held vertically, the damper rod may fall into it, damaging the valve inside.



3. Install:
  - Copper washer ① **New**
  - O-ring ②
  - Base valve ③
 To inner tube ④.



4. Tighten:
  - Base valve ①

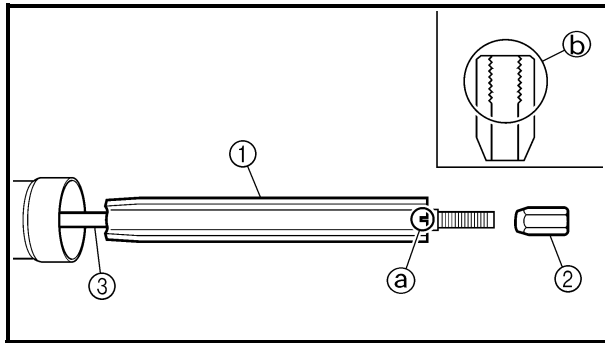
**55 Nm (5.5 m · kg, 40 ft · lb)**

**NOTE:**

- Use a damper rod holder ② to lock the damper rod ③.
- Apply the LOCTITE® on the base valve thread.



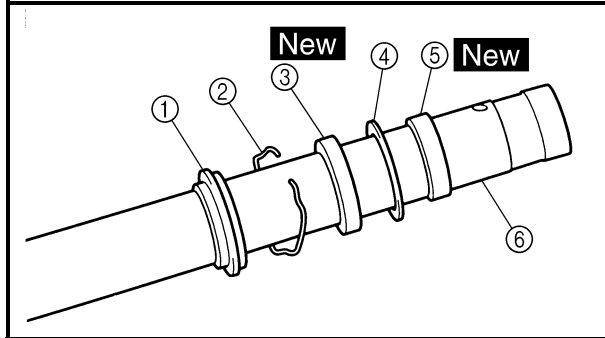
**Damper rod holder:  
YM-1423/90890-01423**



5. Install:
- Spring guide ①
  - Locknut ②
- To damper rod ③.

**NOTE:**

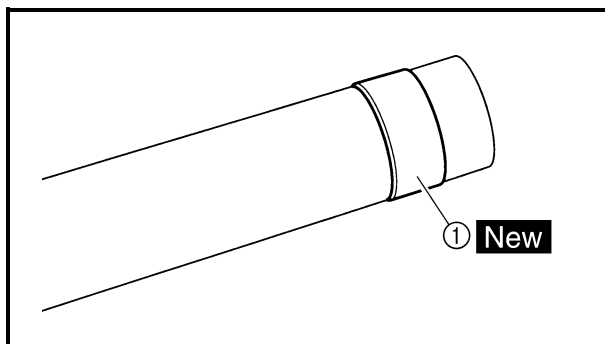
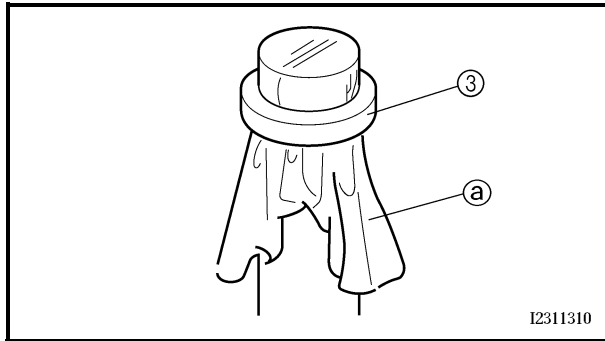
- Install the spring guide with its cut (a) facing upward.
- With its thread (b) facing upward, fully finger tighten the locknut onto the damper rod.



6. Install:
- Dust seal ①
  - Stopper ring ②
  - Oil seal ③ **New**
  - Oil seal washer ④
  - Slide metal ⑤ **New**
- To inner tube ⑥.

**NOTE:**

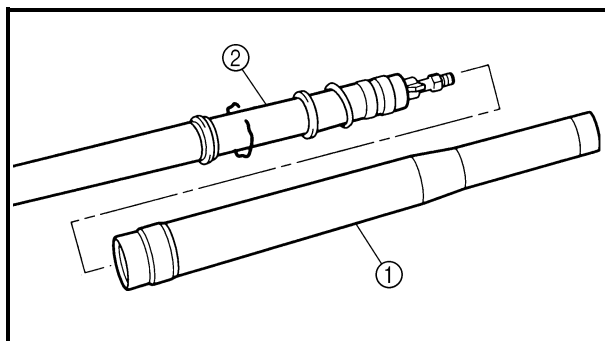
- Apply the fork oil on the inner tube.
- When installing the oil seal, use vinyl seat (a) with fork oil applied to protect the oil seal lip.
- Install the oil seal with its manufacture's marks or number facing the axle holder side.



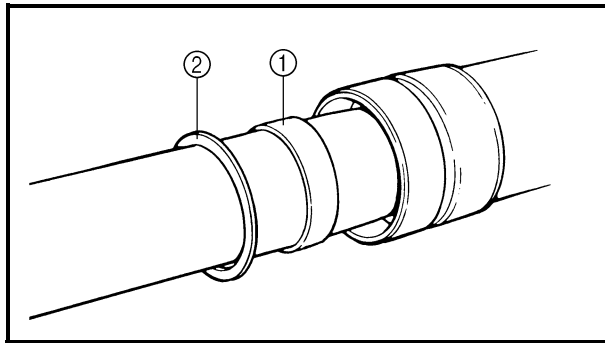
7. Install:
- Piston metal ① **New**

**NOTE:**

Install the piston metal onto the slot on inner tube.



8. Install:
- Outer tube ①
- To inner tube ②.

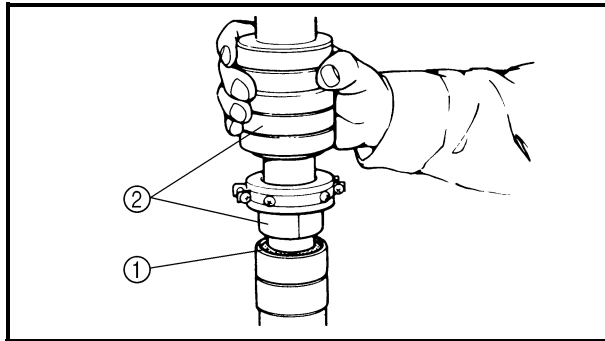
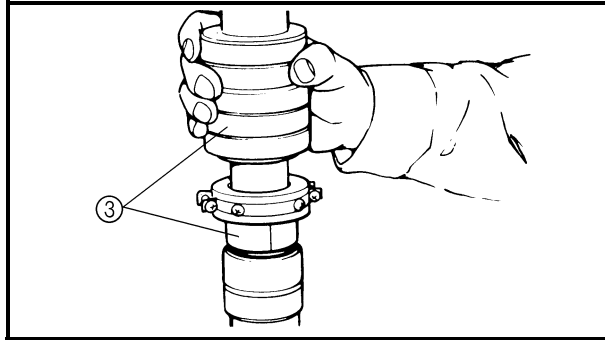


9. Install:
- Slide metal ①
  - Oil seal washer ②
- To outer tube slot.

**NOTE:** \_\_\_\_\_  
 Press the slide metal into the outer tube with fork seal driver ③.



**Fork seal driver:**  
 YM-01442/90890-01442

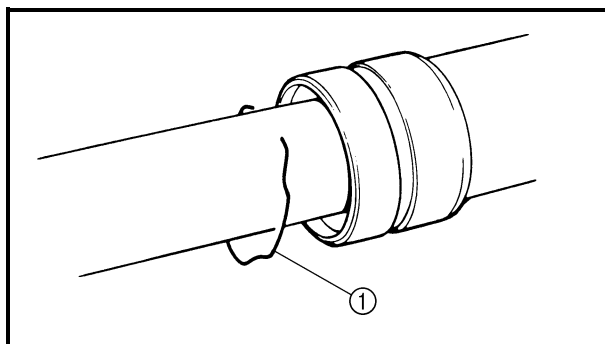


10. Install:
- Oil seal ①

**NOTE:** \_\_\_\_\_  
 Press the oil seal into the outer tube with fork seal driver ②.

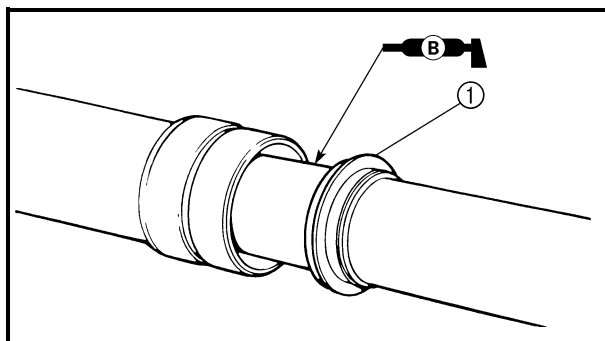


**Fork seal driver:**  
 YM-01442/90890-01442



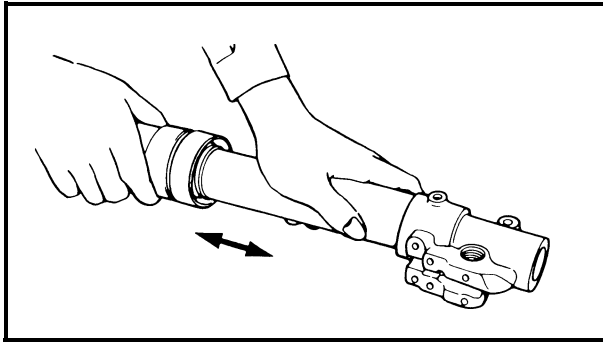
11. Install:
- Stopper ring ①

**NOTE:** \_\_\_\_\_  
 Fit the stopper ring correctly in the groove in the outer tube.



12. Install:
- Dust seal ①

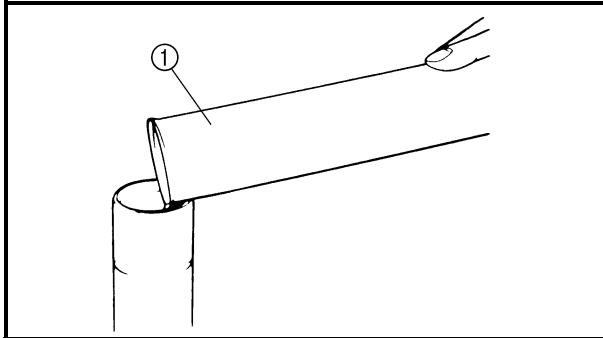
**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the inner tube.



13. Check:

- Inner tube smooth movement  
Tightness/binding/rough spots → Repeat the steps 2 to 12.

14. Compress the front fork fully.



15. Fill:

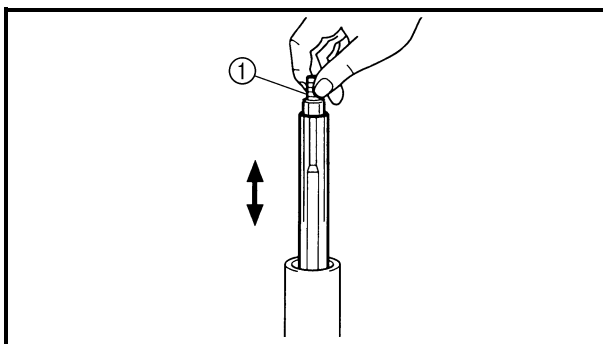
- Front fork oil  
Until outer tube top surface with recommended fork oil ①.



**Recommended oil:**  
Suspension oil "01"

**CAUTION:**

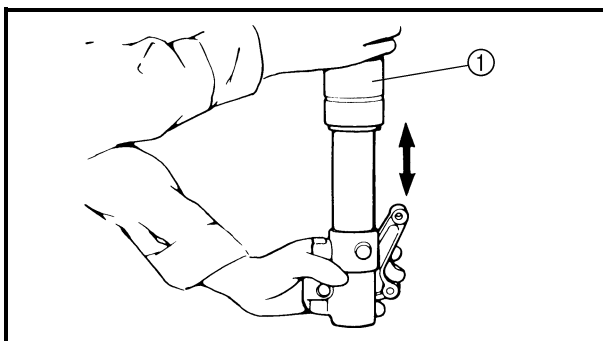
- Be sure to use recommended fork oil. If other oils are used, they may have an excessively adverse effect on the front fork performance.
- Never allow foreign materials to enter the front fork.



16. After filling, pump the damper rod ① slowly up and down more than 10 times to distribute the fork oil.

17. Fill:

- Front fork oil  
Until outer tube top surface with recommended fork oil once more.



18. After filling, pump the outer tube ① slowly up and down (about 200 mm (7.9 in) stroke) to distribute the fork oil once more.

**NOTE:**

Be careful not to excessive full stroke. A stroke of 200 mm (7.9 in) or more will cause air to enter. In this case, repeat the steps 15 to 18.

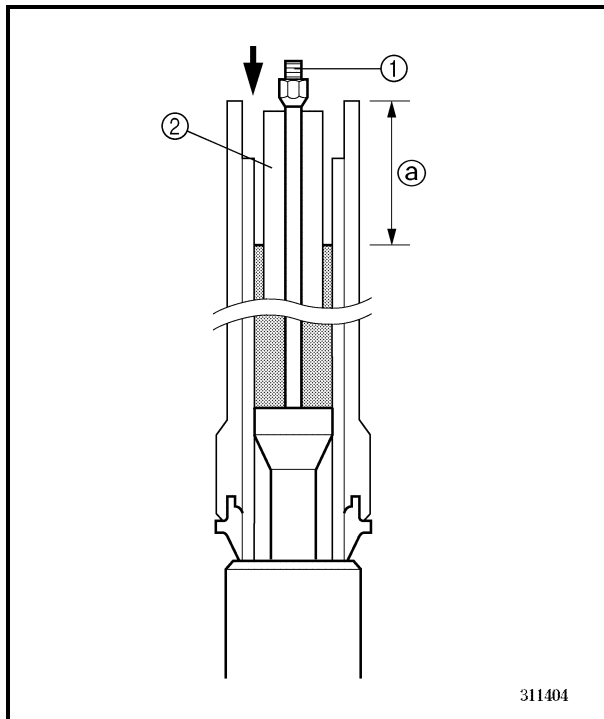


19. Wait ten minutes until the air bubbles have been removed from the front fork, and the oil has dispense evenly in system before setting recommended oil level.

**NOTE:**

Fill with the fork oil up to the top end of the outer tube, or the fork oil will not spread over to every part of the front forks, thus making it impossible to obtain the correct level.

Be sure to fill with the fork oil up to the top of the outer tube and bleed the front forks.



20. Measure:

- Oil level (left and right) (a)  
Out of specification → Adjust.



**Standard oil level:**  
125 mm (4.92 in)  
\* 130 mm (5.12 in)  
**Extent of adjustment:**  
80 ~ 150 mm (3.15 ~ 5.91 in)  
From top of outer tube with inner tube and damper rod (1) fully compressed without spring.

\* For EUROPE, AUS, NZ and ZA

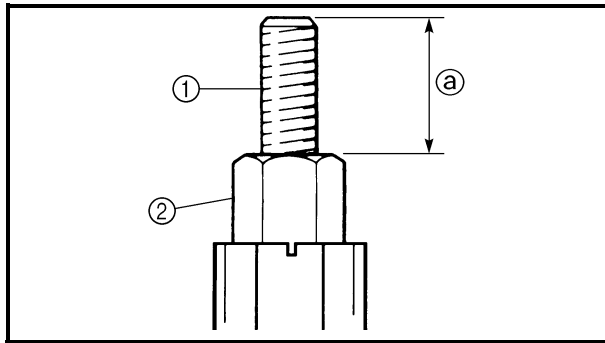
**NOTE:**

Be sure to install the spring guide (2) when checking the oil level.

**⚠ WARNING**

Never fail to make the oil level adjustment between the maximum and minimum level and always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.



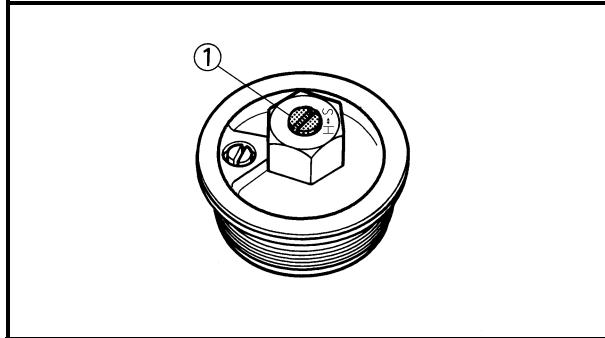


21. Measure:

- Distance ①  
Out of specification → Turn into the locknut.



**Distance ①:**  
20 mm (0.79 in) or more  
Between damper rod ① top and  
locknut ② top.

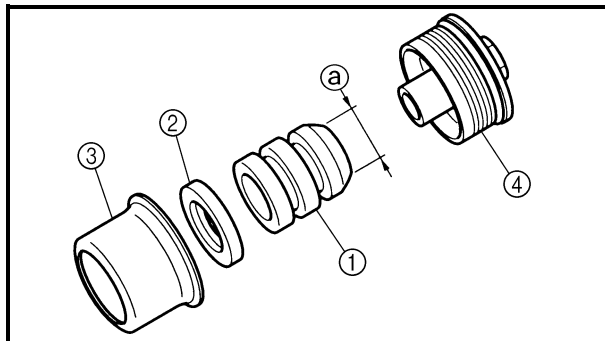


22. Loosen:

- Rebound damping adjuster ①

**NOTE:**

- Loosen the rebound damping adjuster finger tight.
- Record the set position of the adjuster (the amount of turning out the fully turned in position).

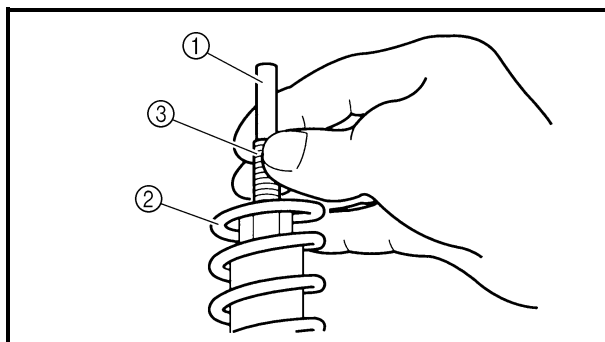


23. Install:

- Cushion rubber ①
- Washer ②
- Spacer ③  
To front fork cap bolt ④.

**NOTE:**

Install the cushion rubber with its smaller dia.end ① facing the front fork cap bolt.

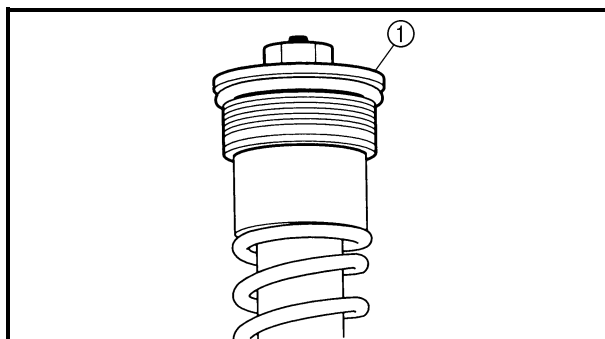


24. Install:

- Push rod ①
- Fork spring ②

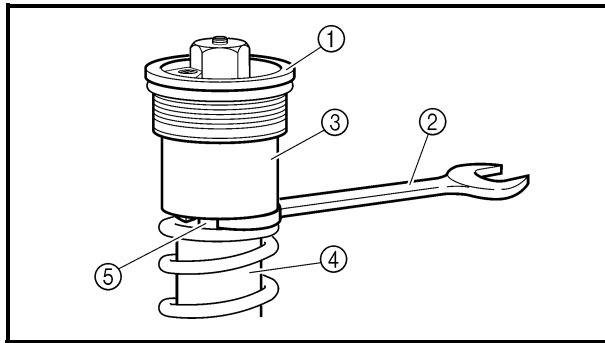
**NOTE:**

- Install the fork spring with the damper rod ③ pulled up.
- After installing the fork spring, hold the damper rod end so that it will not go down.



25. Install:

- Front fork cap bolt ①  
Fully tighten the front fork cap bolt onto the damper rod by hand.



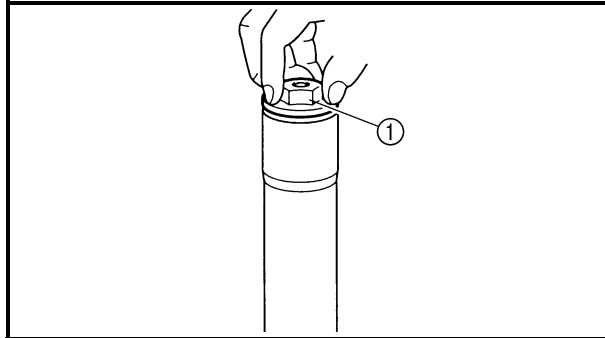
26. Tighten:

- Front fork cap bolt (locknut) ①

29 Nm (2.9 m · kg, 21 ft · lb)

**NOTE:**

- While compressing the fork spring, set the thin type spanners ② between the spacer ③ and spring guide ④.
- Hold the locknut ⑤ and tighten the front fork cap bolt with specified torque.

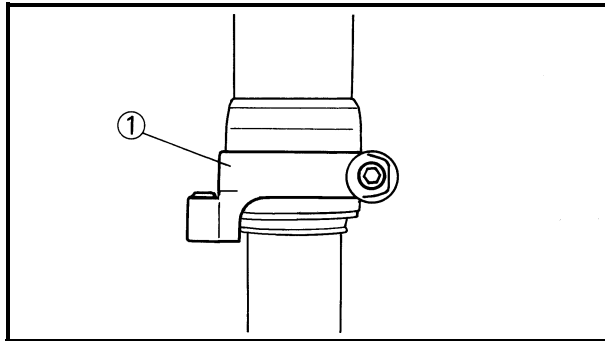


27. Install:

- Front fork cap bolt ①  
To outer tube.

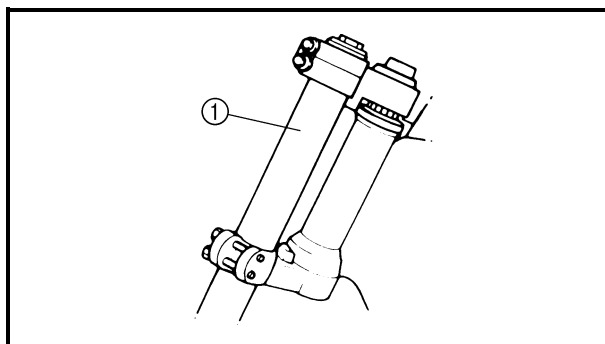
**NOTE:**

Temporarily tighten the cap bolt.



28. Install:

- Protector guide ①



**Installation**

1. Install:

- Front fork ①

**NOTE:**

- Temporarily tighten the pinch bolts (lower bracket).
- Do not tighten the pinch bolts (upper bracket) yet.

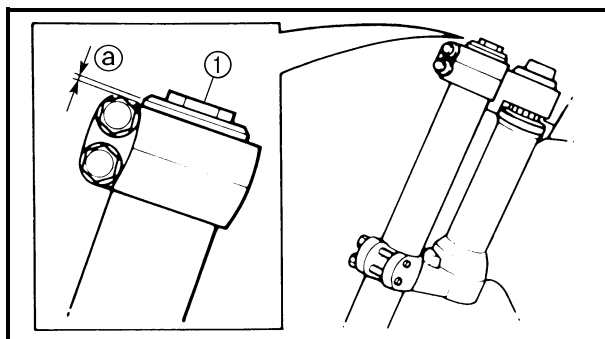
2. Tighten:

- Front fork cap bolt ①

30 Nm (3.0 m · kg, 22 ft · lb)

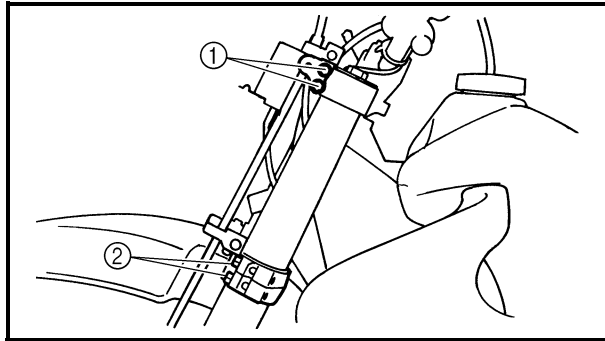
3. Adjust:

- Front fork top end ②



**Front fork top end (standard) ②:**  
5 mm (0.20 in)  
\* 10 mm (0.39 in)

\* For AUS, NZ and ZA



4. Tighten:

- Pinch bolt (upper bracket) ①

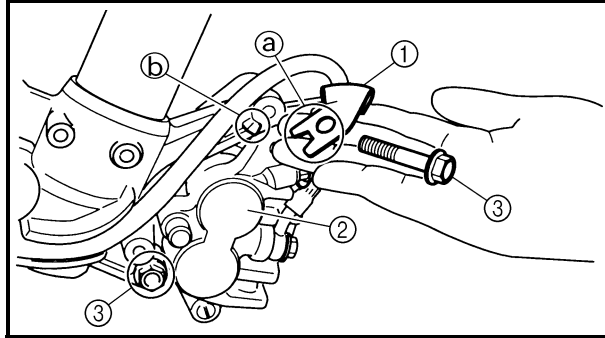
23 Nm (2.3 m · kg, 17 ft · lb)

- Pinch bolt (lower bracket) ②

20 Nm (2.0 m · kg, 14 ft · lb)

**CAUTION:**

**Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.**



5. Install:

- Brake hose holder ①

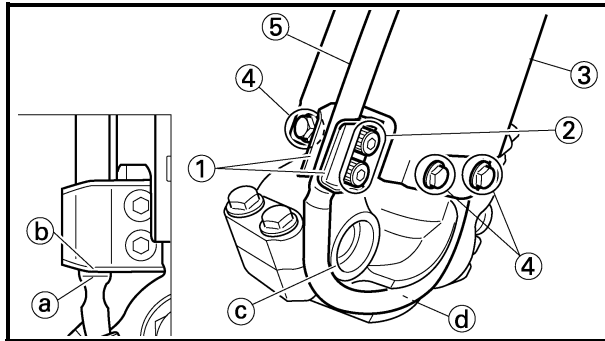
- Brake caliper ②

- Bolt (brake caliper) ③

23 Nm (2.3 m · kg, 17 ft · lb)

**NOTE:**

Fit the brake hose holder cut ① over the projection ② on the front fork and clamp the brake hose.



6. Install:

- Brake hose holder ①

- Bolt (brake hose holder) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)

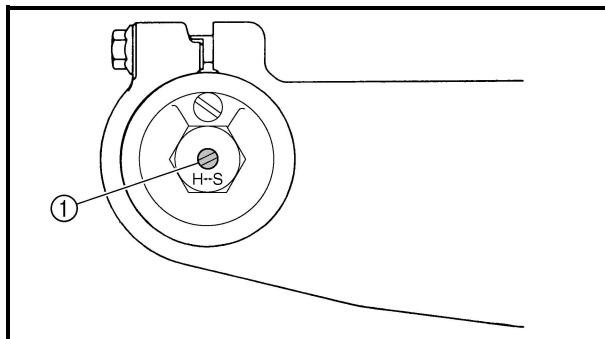
- Protector ③

- Bolt (protector) ④

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

When installing the brake hose holder, align the top ① of the brake hose neck with the brake hose holder bottom ②. Then pass the brake hose ③ in front of the axle boss ④ and fit it into the hose groove ⑤ so that the brake hose does not contact the nut (wheel axle).



7. Adjust:

- Rebound damping force

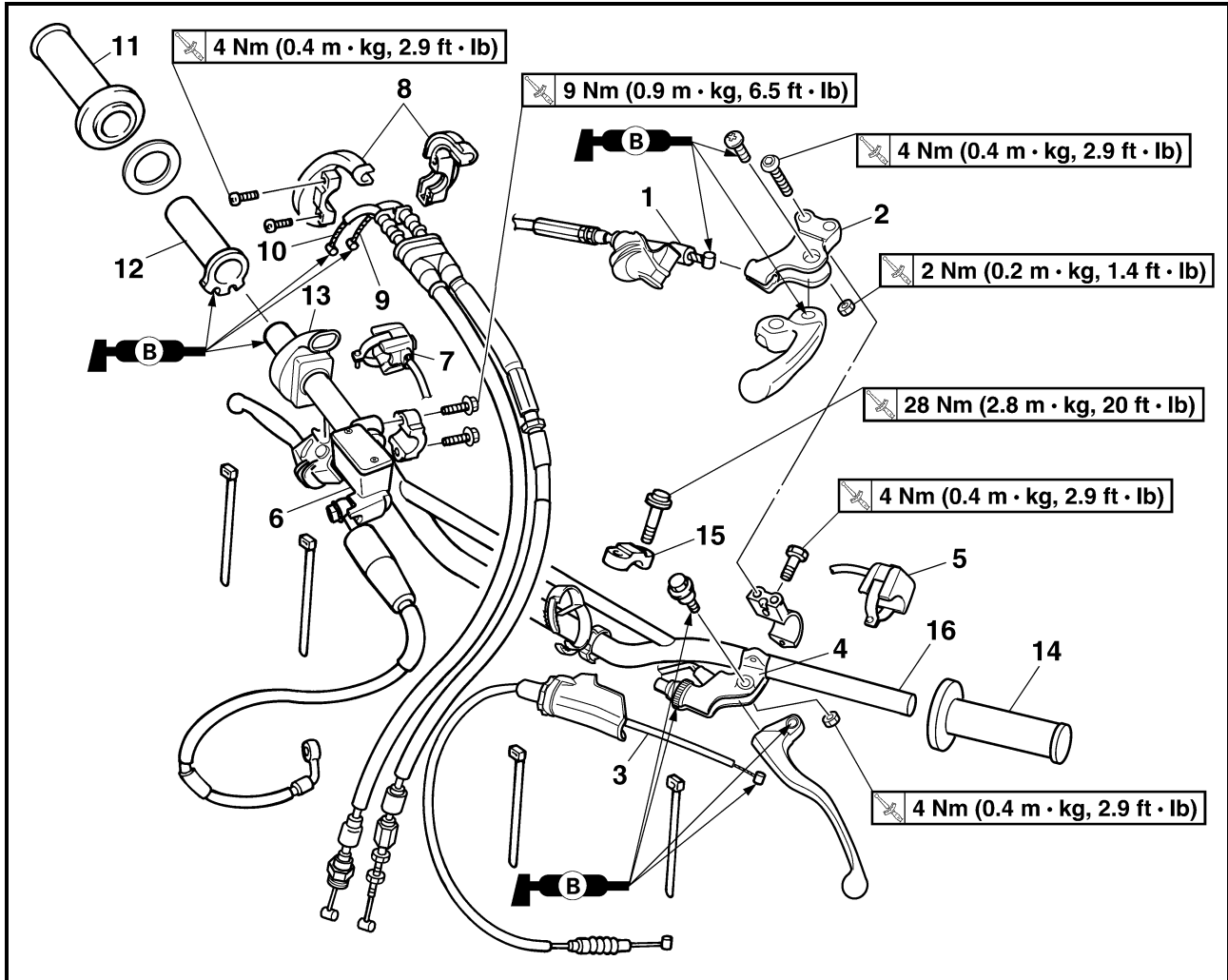
**NOTE:**

Turn in the damping adjuster ① finger-tight and then turn out to the originally set position.



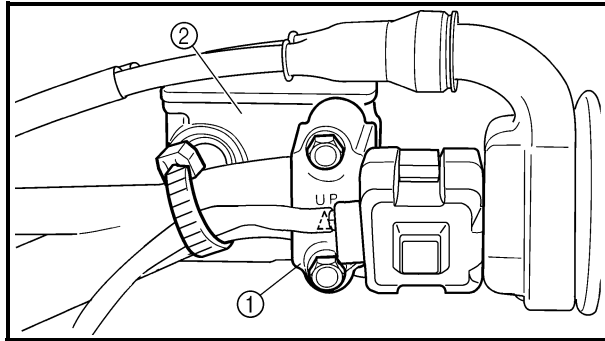
EC5B0000

HANDLEBAR



Extent of removal: ① Handlebar removal

Extent of removal	Order	Part name	Q'ty	Remarks
		<b>HANDLEBAR REMOVAL</b>		
Preparation for removal		Headlight		
	1	Hot starter cable	1	Disconnect at the lever side.
	2	Hot starter lever holder	1	
	3	Clutch cable	1	Disconnect at the lever side.
	4	Clutch lever holder	1	Disconnect the clutch switch lead.
	5	Engine stop switch	1	Disconnect the engine stop switch lead.
	6	Brake master cylinder	1	Refer to "REMOVAL POINTS".
	7	Start switch	1	Disconnect the start switch lead.
	8	Throttle cable cap	1	
	9	Throttle cable #2 (pushed)	1	Disconnect at the throttle side.
	10	Throttle cable #1 (pulled)	1	Disconnect at the throttle side.
	11	Right grip	1	Refer to "REMOVAL POINTS".
	12	Tube guide	1	
	13	Grip cap cover	1	
	14	Left grip	1	Refer to "REMOVAL POINTS".
	15	Handlebar upper holder	2	
	16	Handlebar	1	



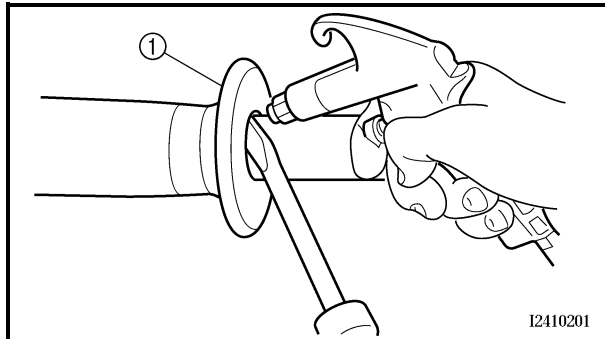
EC5B3000

**REMOVAL POINTS****Brake master cylinder**

1. Remove:
  - Brake master cylinder bracket ①
  - Brake master cylinder ②

**CAUTION:**

- Do not let the brake master cylinder hang on the brake hose.
- Keep the brake master cylinder cap side horizontal to prevent air from coming in.



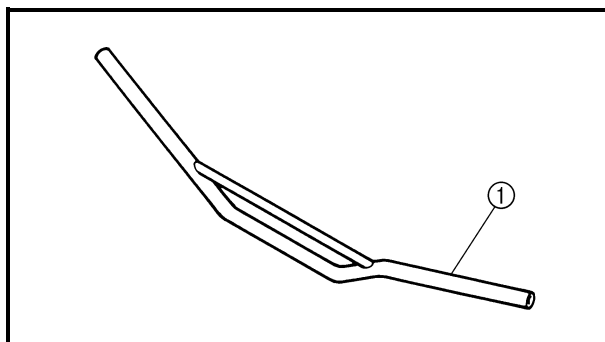
EC5B3200

**Grip**

1. Remove:
  - Grip ①

**NOTE:**

Blow in air between the handlebar or tube guide and the grip. Then remove the grip which has become loose.



EC5B4000

**INSPECTION**

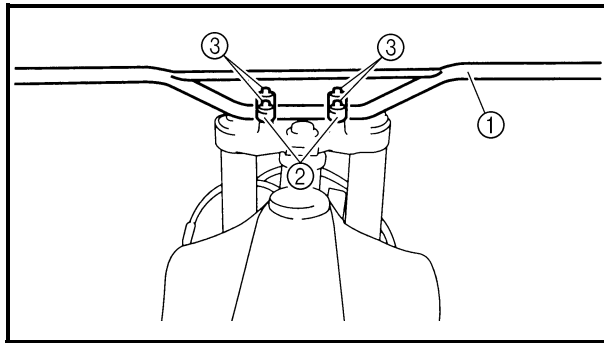
EC5B4100

**Handlebar**

1. Inspect:
  - Handlebar ①
 Bends/cracks/damage → Replace.

**⚠ WARNING**

Do not attempt to straighten a bent handlebar as this may dangerously weaken the handlebar.



EC5B5000

**ASSEMBLY AND INSTALLATION****Handlebar**

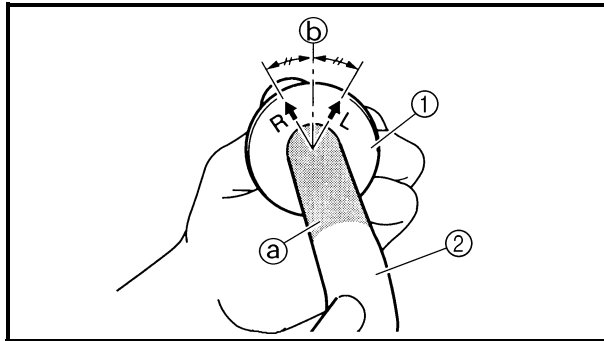
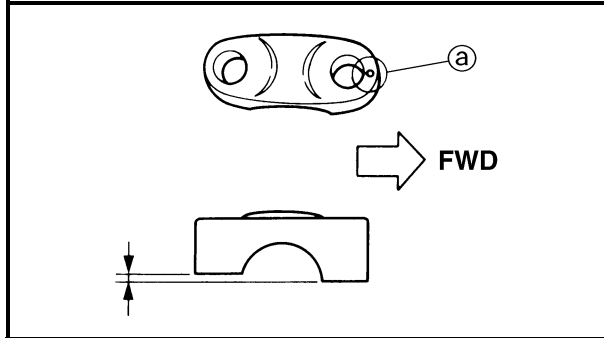
## 1. Install:

- Handlebar ①
- Handlebar upper holder ②
- Bolt (handlebar upper holder) ③

 **28 Nm (2.8 m · kg, 20 ft · lb)**

**NOTE:**

- The handlebar upper holder should be installed with the punched mark **Ⓐ** forward.
- First tighten the bolts on the front side of the handlebar upper holder, and then tighten the bolts on the rear side.

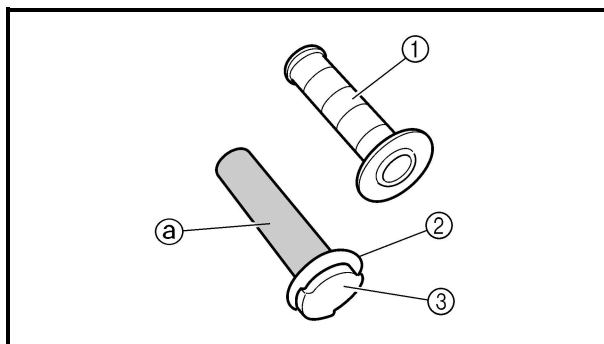


## 2. Install:

- Left grip ①
- Apply the adhesive to the handlebar ②.

**NOTE:**

- Before applying the adhesive, wipe off grease or oil on the handlebar surface **Ⓐ** with a lacquer thinner.
- Install the left grip to the handlebar so that the line **ⓑ** between the two arrow marks faces straight upward.

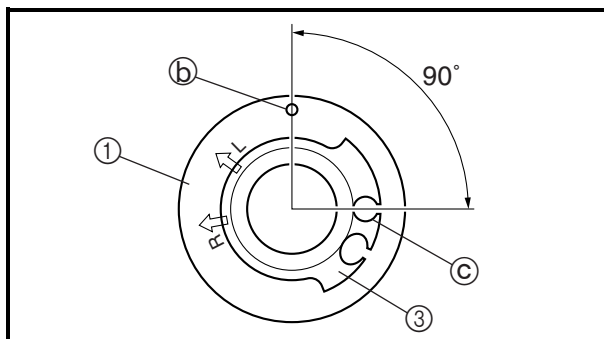


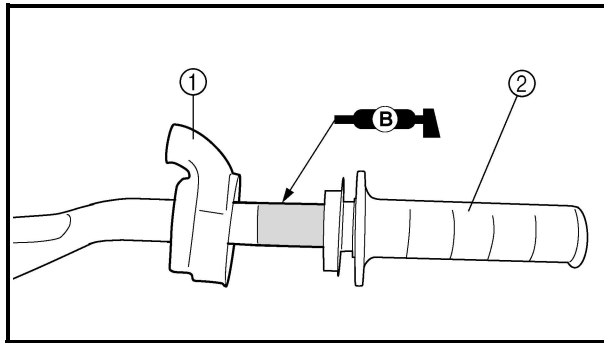
## 3. Install:

- Right grip ①
  - Collar ②
- Apply the adhesive on the tube guide ③.

**NOTE:**

- Before applying the adhesive, wipe off grease or oil on the tube guide surface **Ⓐ** with a lacquer thinner.
- Install the grip to the tube guide so that the grip match mark **ⓑ** and tube guide slot **ⓒ** form the angle as shown.

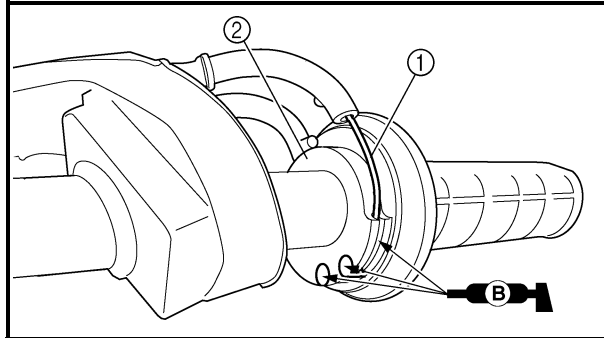




4. Install:
- Grip cap cover ①
  - Throttle grip ②

**NOTE:**

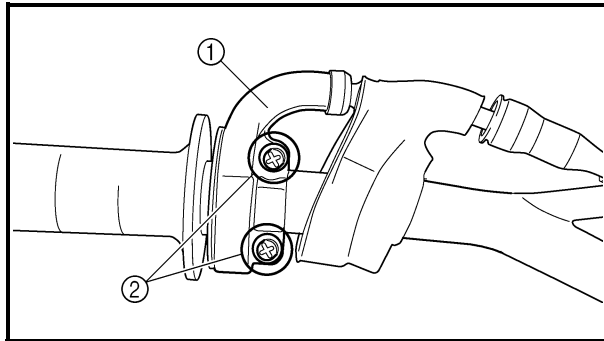
Apply the lithium soap base grease on the throttle grip sliding surface.



5. Install:
- Throttle cables ①
  - Tube guide ②.

**NOTE:**

Apply the lithium soap base grease on the throttle cable end and tube guide cable winding portion.

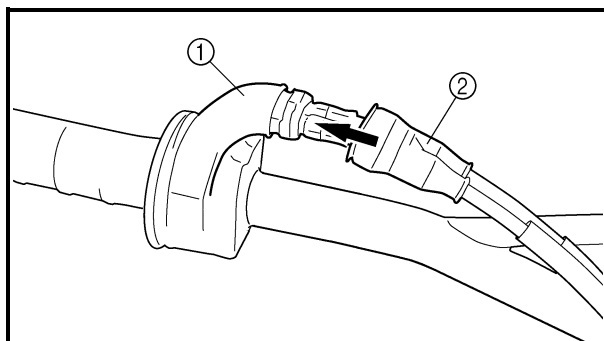
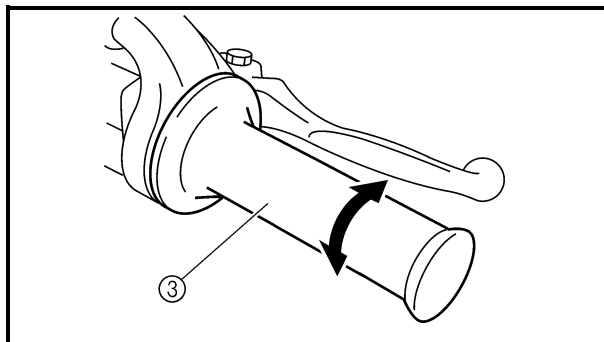


6. Install:
- Throttle cable cap ①
  - Screw (throttle cable cap) ②

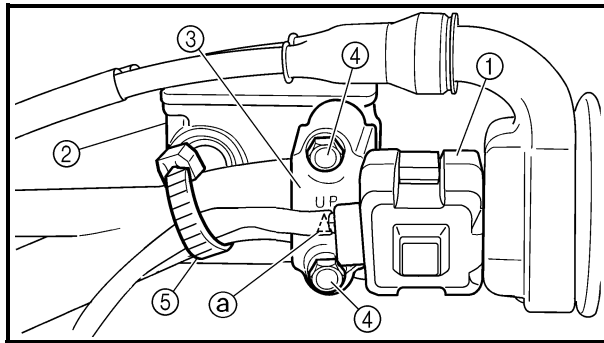
4 Nm (0.4 m · kg, 2.9 ft · lb)

**⚠ WARNING**

After tightening the screws, check that the throttle grip ③ moves smoothly. If it does not, retighten the bolts for adjustment.



7. Install:
- Grip cap cover ①
  - Cover (throttle cable cap) ②

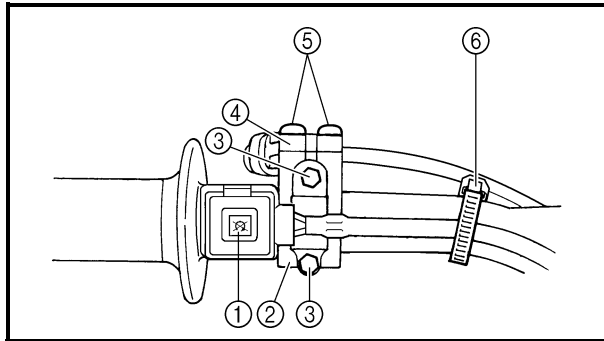
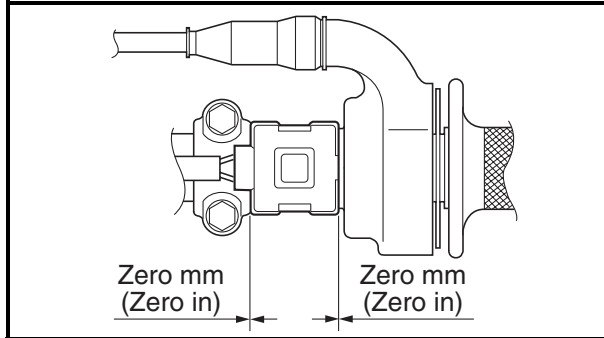


## 8. Install:

- Start switch ①
  - Brake master cylinder ②
  - Brake master cylinder bracket ③
  - Bolt (brake master cylinder bracket) ④
- 9 Nm (0.9 m · kg, 6.5 ft · lb)**
- Clamp ⑤

**NOTE:**

- The start switch and brake master cylinder bracket should be installed according to the dimensions shown.
- Install the bracket so that the arrow mark ① faces upward.
- First tighten the bolt on the upper side of the brake master cylinder bracket, and then tighten the bolt on the lower side.

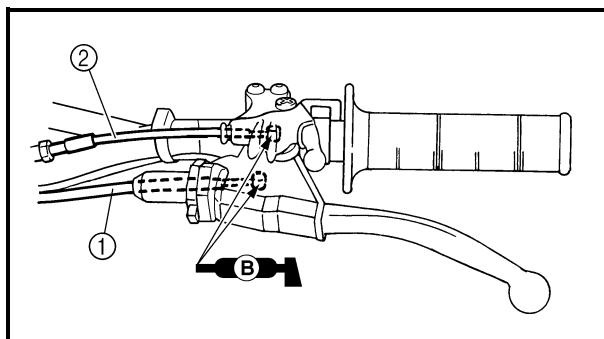
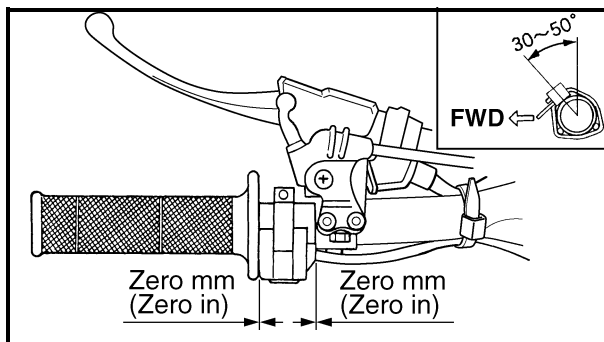


## 9. Install:

- Engine stop switch ①
  - Clutch lever holder ②
  - Bolt (clutch lever holder) ③
- 4 Nm (0.4 m · kg, 2.9 ft · lb)**
- Hot starter lever holder ④
  - Bolt (hot starter lever holder) ⑤
- 4 Nm (0.4 m · kg, 2.9 ft · lb)**
- Clamp ⑥

**NOTE:**

- The engine stop switch, clutch lever holder and clamp should be installed according to the dimensions shown.
- Pass the engine stop switch lead in the middle of the clutch lever holder.



## 10. Install:

- Clutch cable ①
- Hot starter cable ②

**NOTE:**

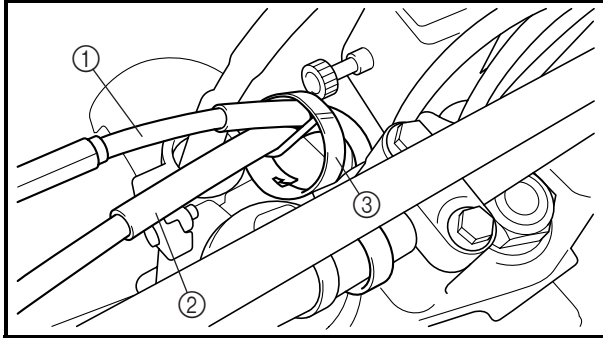
Apply the lithium soap base grease on the clutch cable end and hot starter cable end.



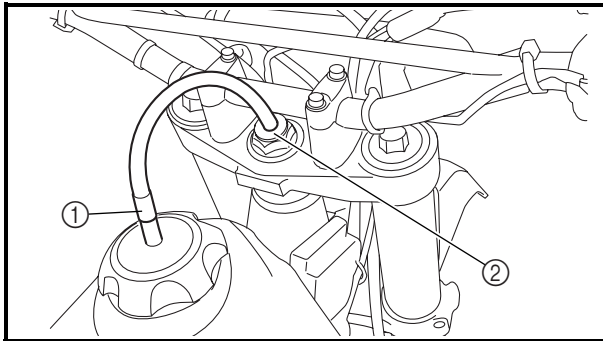


## 11. Adjust:

- Clutch lever free play  
Refer to “CLUTCH ADJUSTMENT” section in the CHAPTER 3.
- Hot starter lever free play  
Refer to “HOT STARTER LEVER ADJUSTMENT” section in the CHAPTER 3.



## 12. Fasten the hot starter cable ① and clutch cable ② with a clamp ③.

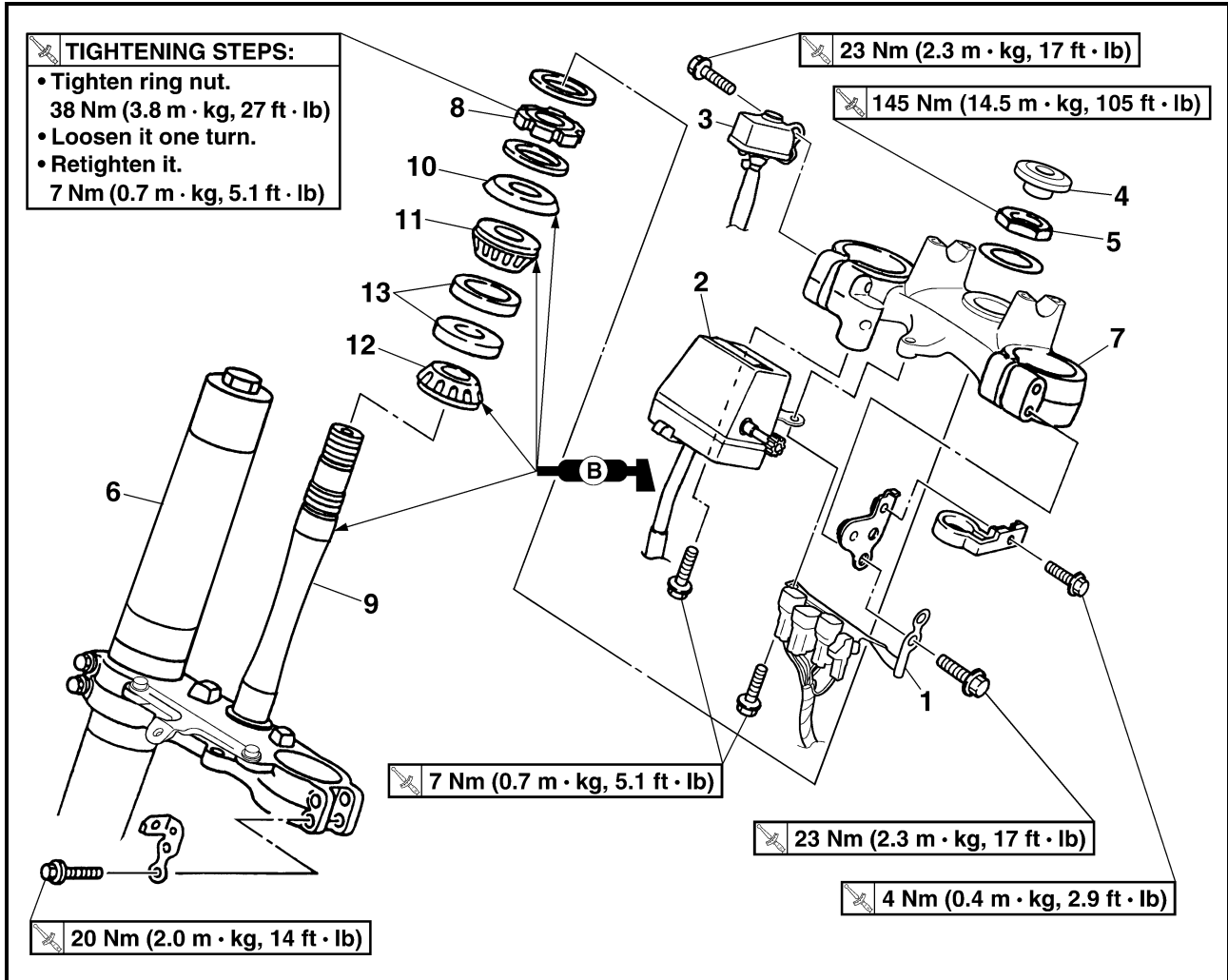


## 13. Insert the end of the fuel breather hose ① into the hole in the steering stem cap ②.



EC560000

STEERING

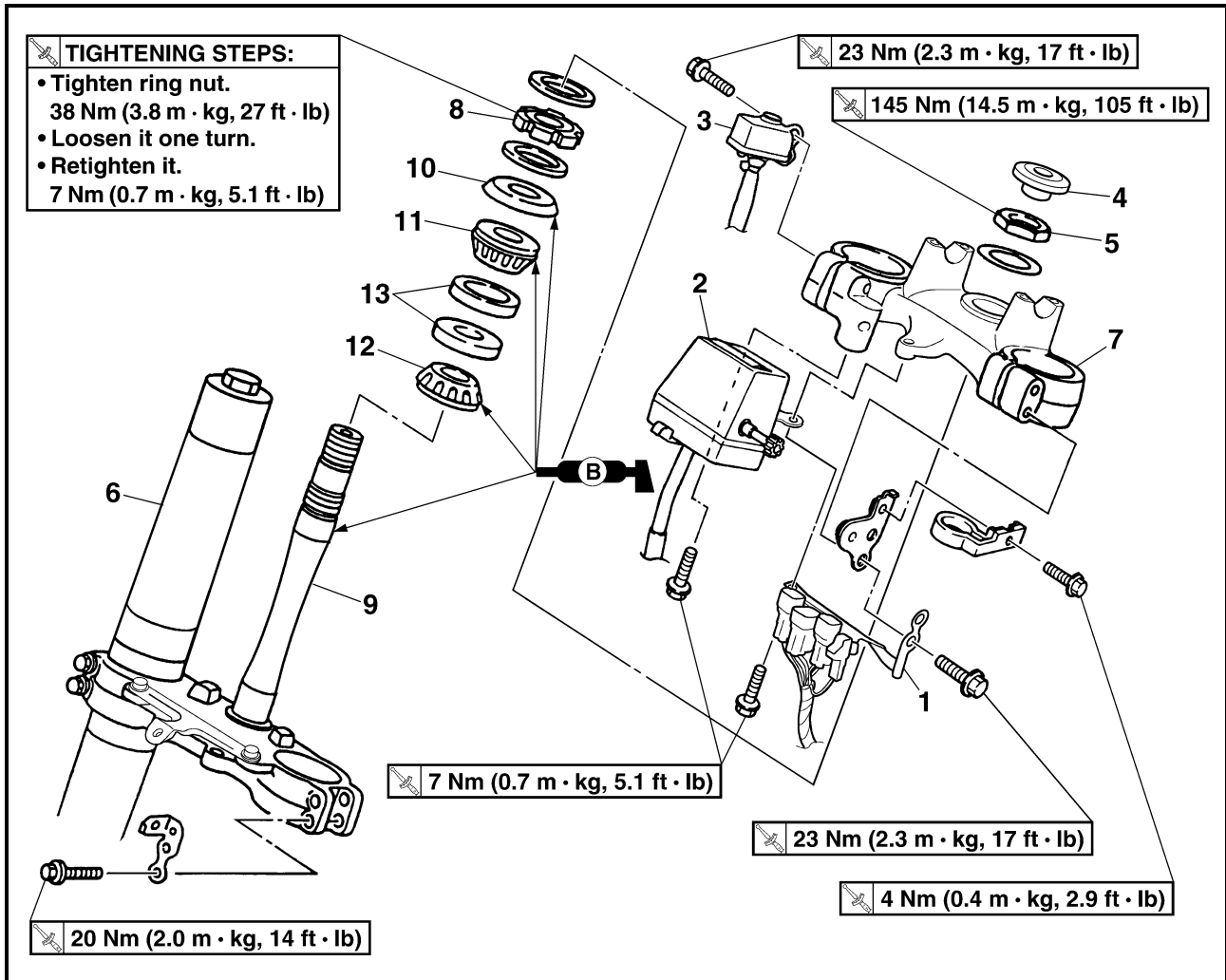


Extent of removal:

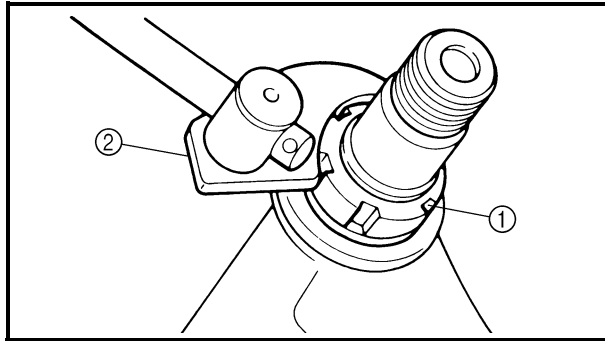
① Lower bracket removal

② Bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>STEERING REMOVAL</b>		<p><b>⚠ WARNING</b></p> <p>Support the machine securely so there is no danger of it falling over.</p> <hr/> <p>Refer to "HANDLEBAR" section.</p>
		Hold the machine by placing the suitable stand under the engine.		
		Headlight		
		Handlebar		
		Front brake hose guide		
	Front fender			
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>①</p> </div> <div style="text-align: center;"> <p>②</p> </div> </div>	1	Coupler bracket	1	<p>Disconnect the main switch lead.</p> <p>Refer to "FRONT FORK" section.</p> <p>Use special tool. Refer to "REMOVAL POINTS".</p>
	2	Trip meter	1	
	3	Main switch	1	
	4	Steering stem cap	1	
	5	Steering stem nut	1	
	6	Front fork	2	
	7	Upper bracket	1	
	8	Steering ring nut	1	
	9	Lower bracket	1	



Extent of removal	Order	Part name	Q'ty	Remarks
	10	Ball race cover	1	} Refer to "REMOVAL POINTS".
	11	Upper bearing	1	
	12	Lower bearing	1	
	13	Ball race	2	



EC563000

**REMOVAL POINTS**

**Steering ring nut**

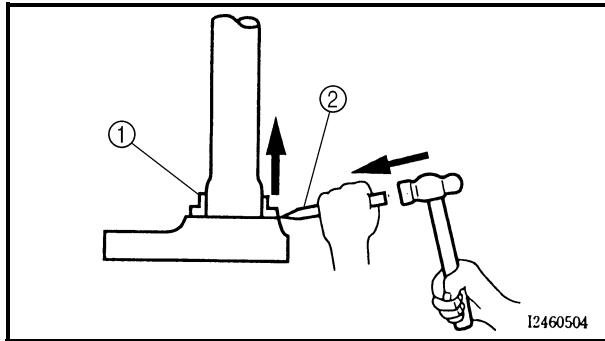
1. Remove:
  - Steering ring nut ①
  - Use the steering nut wrench ②.



**Steering nut wrench:**  
YU-33975/90890-01403

**⚠ WARNING**

**Support the steering stem so that it may not fall down.**

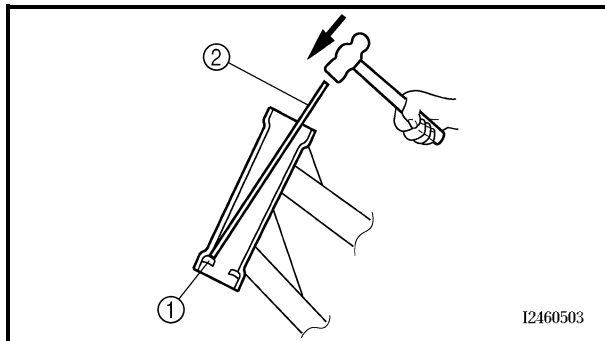


**Lower bearing**

1. Remove:
  - Lower bearing ①
  - Use the floor chisel ②.

**CAUTION:**

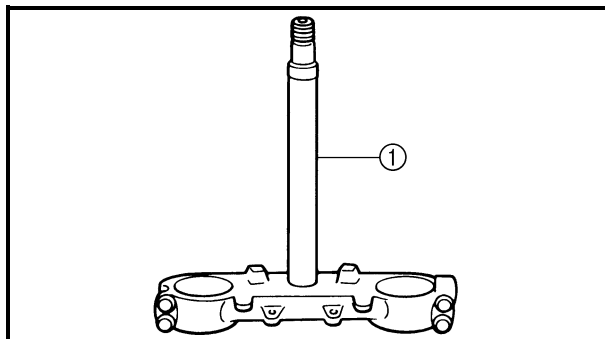
**Take care not to damage the steering shaft thread.**



EC563400

**Ball race**

1. Remove:
  - Ball race ①
  - Remove the ball race using long rod ② and the hammer.

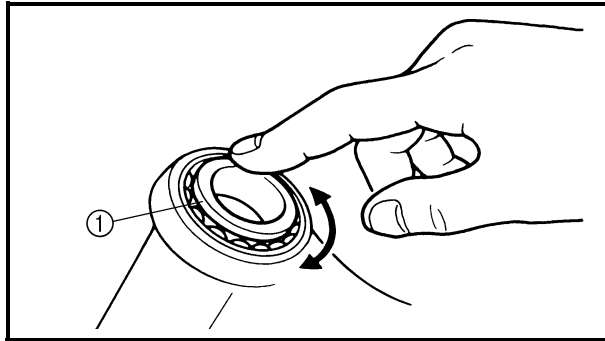


EC564000

**INSPECTION**

**Steering stem**

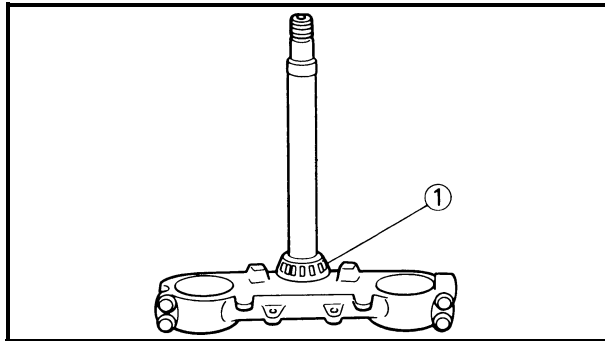
1. Inspect:
  - Steering stem ①
  - Bend/damage → Replace.



EC564101

**Bearing and ball race**

1. Wash the bearings and ball races with a solvent.
2. Inspect:
  - Bearing ①
  - Ball race
 Pitting/damage → Replace bearings and ball races as a set.  
 Install the bearing in the ball races. Spin the bearings by hand. If the bearings hang up or are not smooth in their operation in the ball races, replace bearings and ball races as a set.



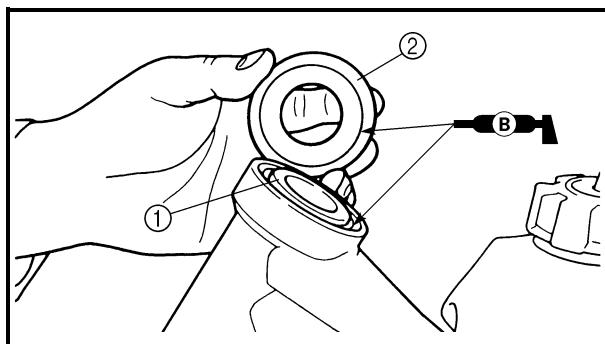
EC565000

**ASSEMBLY AND INSTALLATION**

**Lower bracket**

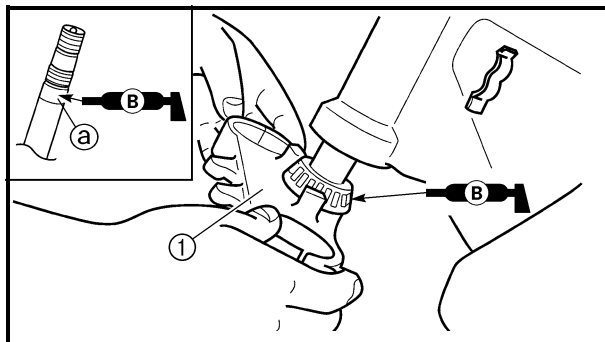
1. Install:
  - Lower bearing ①

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the dust seal lip and bearing inner circumference.



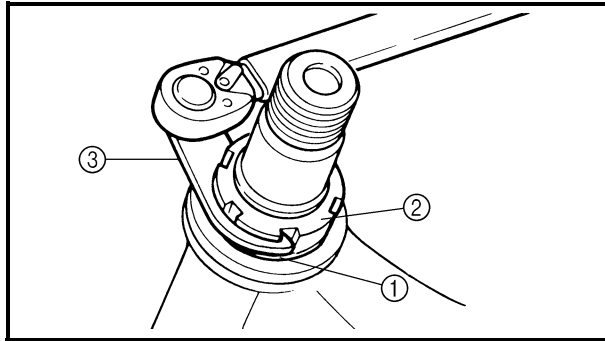
2. Install:
  - Ball race
  - Upper bearing ①
  - Ball race cover ②

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the bearing and ball race cover lip.



3. Install:
  - Lower bracket ①

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the bearing and the portion ① of the steering stem.



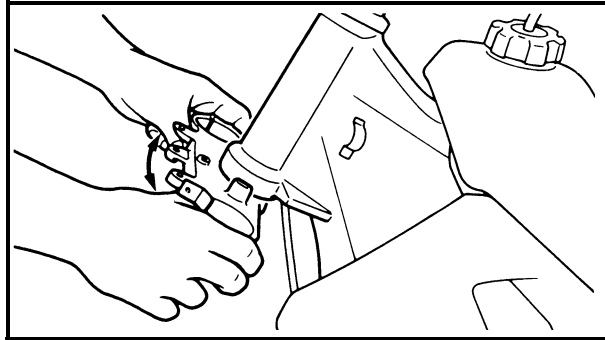
4. Install:

- Washer ①
- Steering ring nut ②

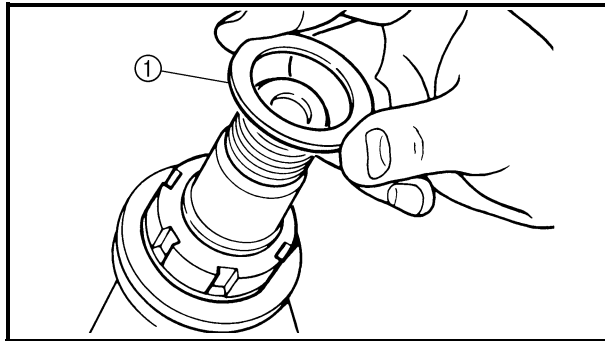
7 Nm (0.7 m · kg, 5.1 ft · lb)

Tighten the steering ring nut using the steering nut wrench ③.

Refer to “STEERING HEAD INSPECTION AND ADJUSTMENT” section in the CHAPTER 3.

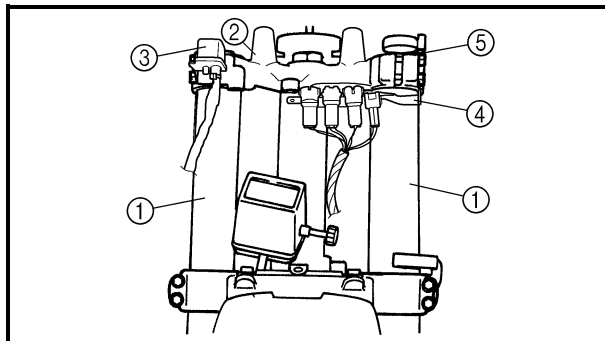


5. Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings.



6. Install:

- Washer ①

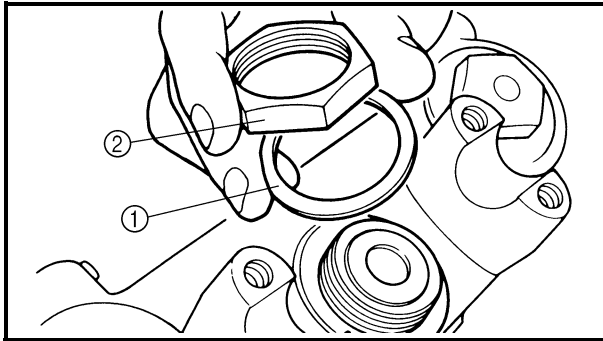


7. Install:

- Front fork ①
- Upper bracket ②
- Main switch ③
- Coupler bracket ④
- Front brake hose guide bracket ⑤

**NOTE:**

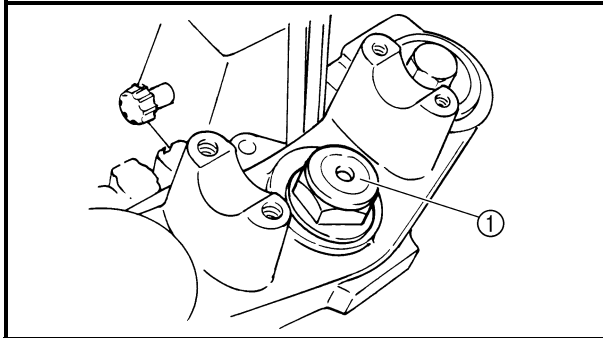
- Install the coupler bracket on the outside of the front brake hose guide bracket.
- Temporarily tighten the pinch bolts (lower bracket).
- Do not tighten the pinch bolts (upper bracket) yet.



8. Install:

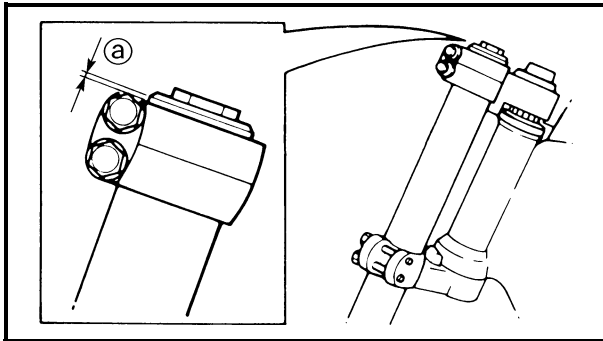
- Washer ①
- Steering stem nut ②

145 Nm (14.5 m · kg, 105 ft · lb)



9. Install:

- Steering stem cap ①



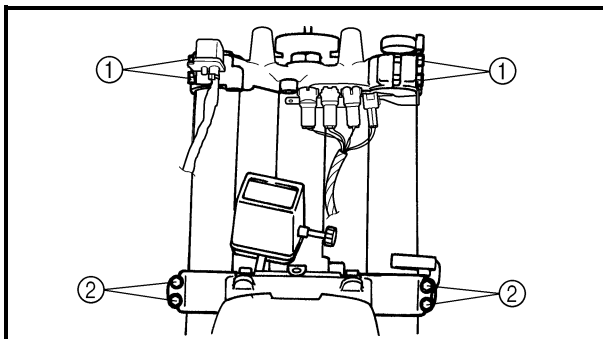
10. After tightening the nut, check the steering for smooth movement. If not, adjust the steering by loosening the steering ring nut little by little.

11. Adjust:

- Front fork top end ①

**Front fork top end (standard) ①:**  
 5 mm (0.20 in)  
 \* 10 mm (0.39 in)

\* For AUS, NZ and ZA



12. Tighten:

- Pinch bolt (upper bracket) ①

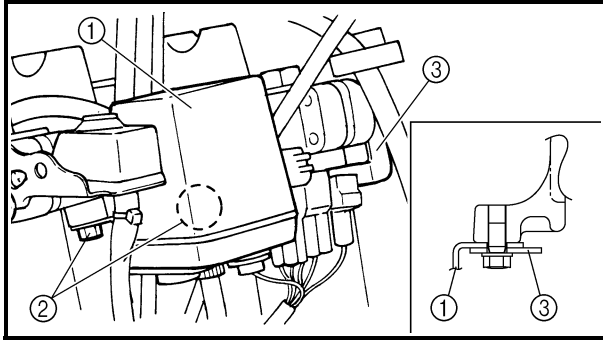
23 Nm (2.3 m · kg, 17 ft · lb)

- Pinch bolt (lower bracket) ②

20 Nm (2.0 m · kg, 14 ft · lb)


**CAUTION:**

**Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.**



13. Install:

- Trip meter ①
- Bolt (trip meter) ②

 7 Nm (0.7 m · kg, 5.1 ft · lb)

**NOTE:** \_\_\_\_\_

Install the trip meter over the coupler bracket

③.

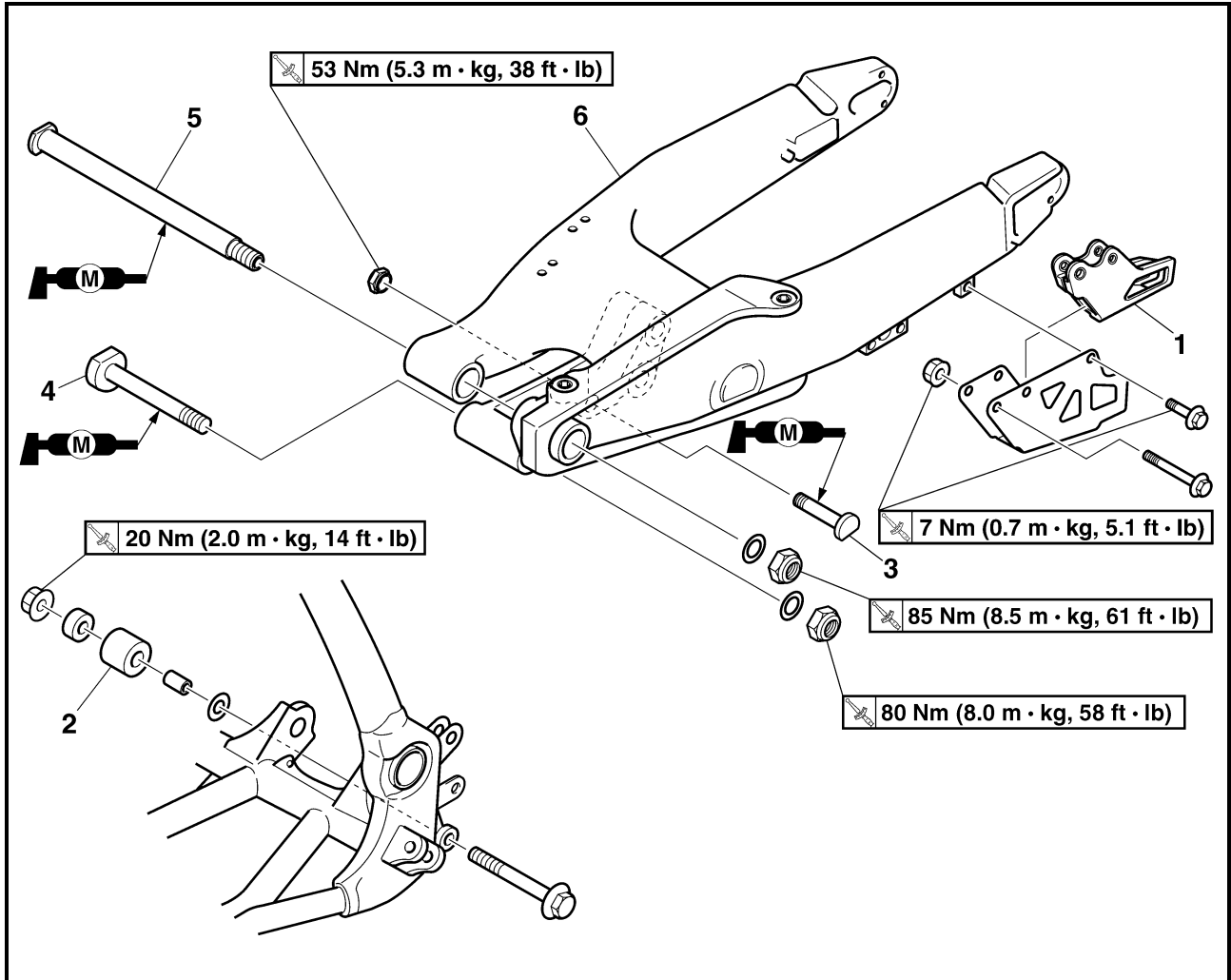
\_\_\_\_\_





EC570000

**SWINGARM**



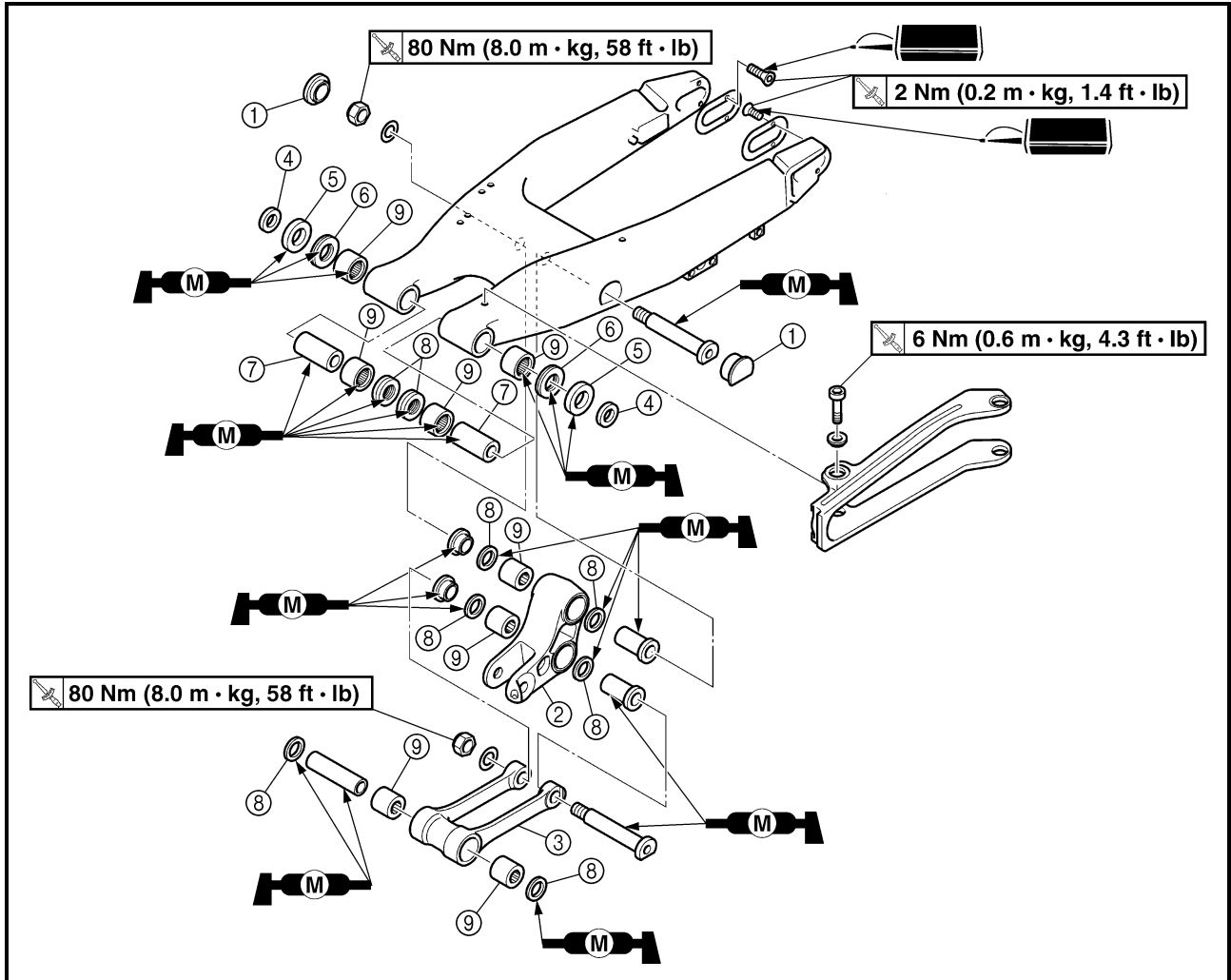
Extent of removal: ① Swingarm removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>SWINGARM REMOVAL</b> Hold the machine by placing the suitable stand under the engine.  Brake hose holder Rear brake caliper Bolt (brake pedal) Drive chain		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.  Refer to "FRONT BRAKE AND REAR BRAKE" section. Shift the brake pedal backward.
↑ ① ↓	1	Drive chain support	1	Hold the swingarm.
	2	Lower chain tensioner	1	
	3	Bolt (rear shock absorber-relay arm)	1	
	4	Bolt (connecting rod)	1	
	5	Pivot shaft	1	
	6	Swingarm	1	



EC578000

SWINGARM DISASSEMBLY



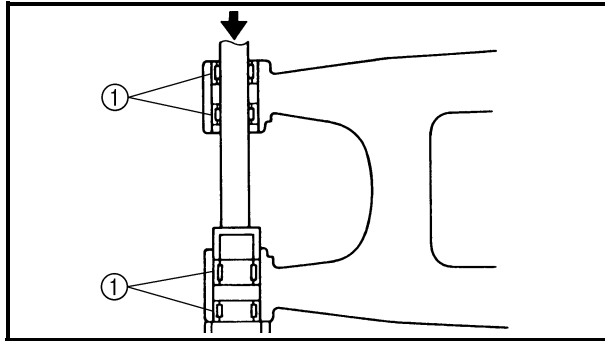
Extent of removal:

① Swingarm disassembly

② Connecting rod removal and disassembly

③ Relay arm removal and disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
		<b>SWINGARM DISASSEMBLY</b>		
↑ ① ↓	①	Cap	2	Refer to "REMOVAL POINTS".
	②	Relay arm	1	
↑ ② ↓	③	Connecting rod	1	
	④	Collar	2	
	⑤	Oil seal	2	
	⑥	Thrust bearing	2	
	⑦	Bushing	2	
	⑧	Oil seal	8	
↑ ② ↓    ↑ ③ ↓	⑨	Bearing	8	



EC573000

**REMOVAL POINTS**

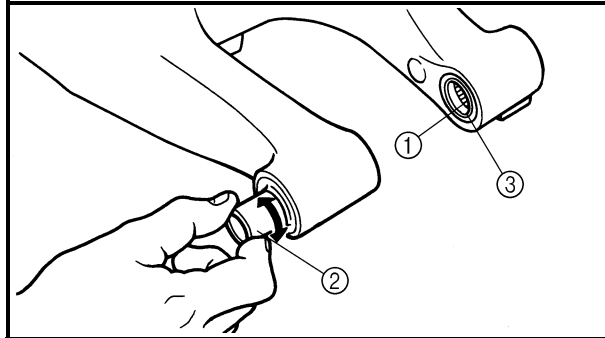
EC573200

**Bearing**

1. Remove:
  - Bearing ①

**NOTE:**

Remove the bearing by pressing its outer race.

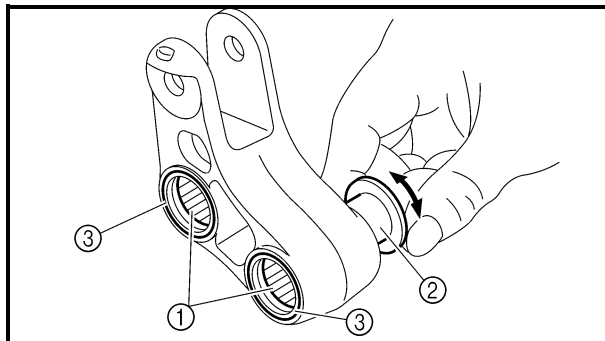


**INSPECTION**

Wash the bearings, bushings, collars, and covers in a solvent.

**Swingarm**

1. Inspect:
  - Bearing ①
  - Bushing ②
  - Free play exists/unsmooth revolution/rust  
→ Replace bearing and bushing as a set.
2. Inspect:
  - Oil seal ③
  - Damage → Replace.



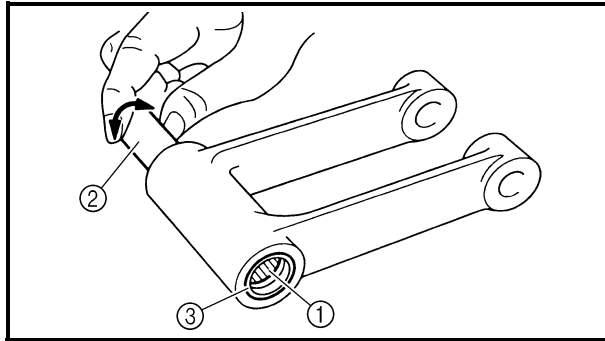
EC574210

**Relay arm**

1. Inspect:
  - Bearing (polylube bearing) ①
  - Collar ②
  - Free play exists/unsmooth revolution/rust  
→ Replace bearing and collar as a set.
2. Inspect:
  - Bearing (polylube bearing) ①
  - Loss of solid lubrication → Replace.
  - Oil seal ③
  - Damage → Replace.

**NOTE:**

Polylube bearings, with solid lubrication, have been adopted with the intent to make the needle bearings, used in this model, maintenance free. With polylube bearings, no grease nipple and regular lubrication is necessary. However, grease should be applied to all oil seals and collars when removed or installed.



EC574310

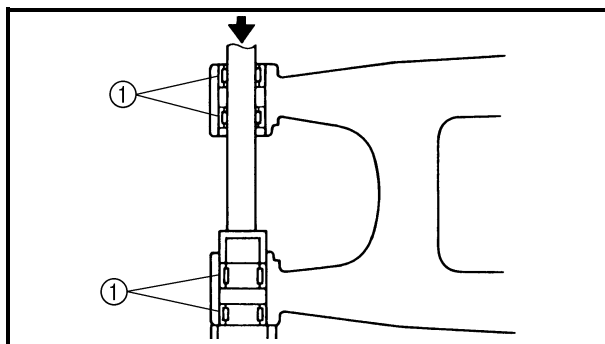
**Connecting rod**

1. Inspect:
  - Bearing (polylube bearing) ①
  - Collar ②

Free play exists/unsmooth revolution/rust  
→ Replace bearing and collar as a set.
2. Inspect:
  - Bearing (polylube bearing) ①
  - Loss of solid lubrication → Replace.
  - Oil seal ③
  - Damage → Replace.

**NOTE:**

Polylube bearings, with solid lubrication, have been adopted with the intent to make the needle bearings, used in this model, maintenance free. With polylube bearings, no grease nipple and regular lubrication is necessary. However, grease should be applied to all oil seals and collars when removed or installed.



EC575000

**ASSEMBLY AND INSTALLATION**

EC575201

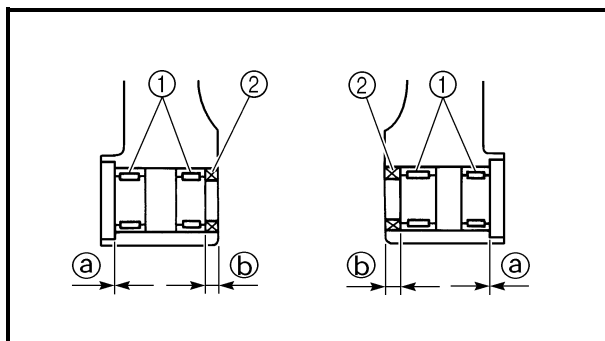
**Bearing and oil seal**

1. Install:
  - Bearing ①
  - Oil seal ②

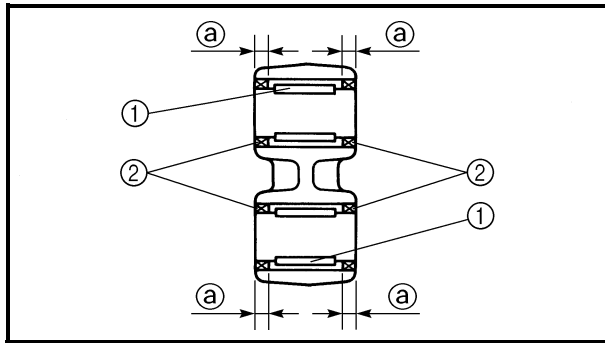
To swingarm.

**NOTE:**

- Apply the molybdenum disulfide grease on the bearing when installing.
- Install the bearing by pressing it on the side having the manufacture's marks or numbers.
- First install the outer and then the inner bearings to a specified depth from inside.



**Installed depth of bearings:**  
 Outer ①: Zero mm (Zero in)  
 Inner ②: 8.5 mm (0.33 in)



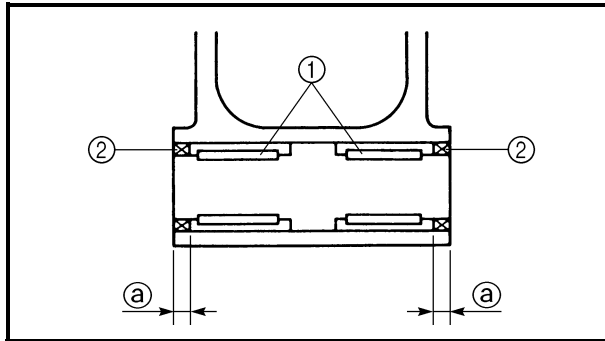
2. Install:
- Bearing ①
  - Oil seal ②
- To relay arm.

**NOTE:** \_\_\_\_\_

- Apply the molybdenum disulfide grease on the bearing when installing.
- Install the bearing by pressing it on the side having the manufacture's marks or numbers.



**Installed depth of bearings ②:**  
5 mm (0.20 in)



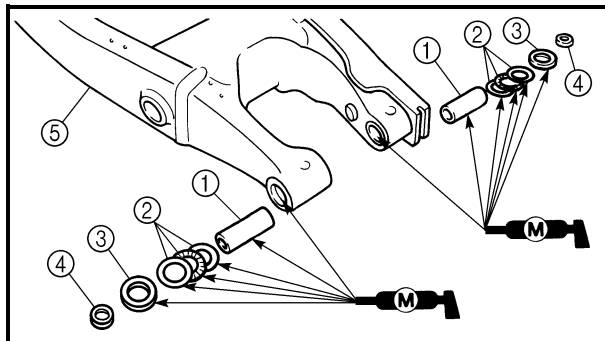
3. Install:
- Bearing ①
  - Oil seal ②
- To connecting rod.

**NOTE:** \_\_\_\_\_

- Apply the molybdenum disulfide grease on the bearing when installing.
- Install the bearing by pressing it on the side having the manufacture's marks or numbers.



**Installed depth of bearings ②:**  
5 mm (0.20 in)

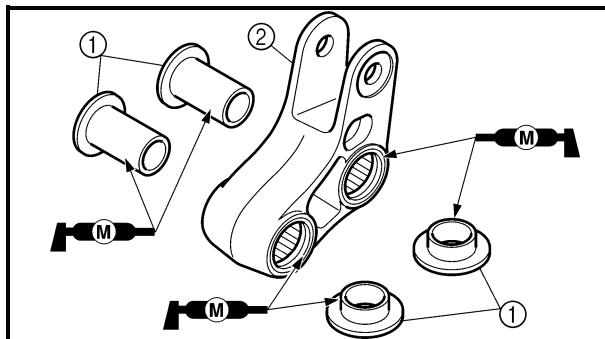


**Swingarm**

1. Install:
- Bushing ①
  - Thrust bearing ②
  - Oil seal ③
  - Collar ④
- To swingarm ⑤.

**NOTE:** \_\_\_\_\_

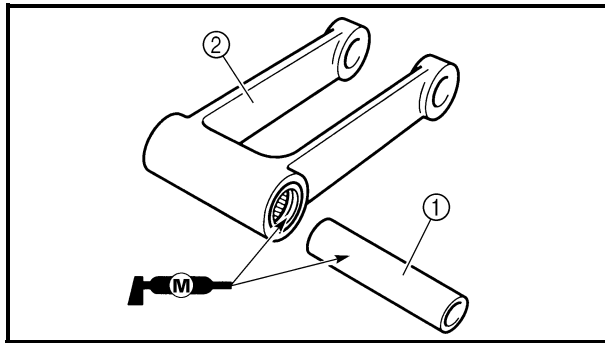
Apply the molybdenum disulfide grease on the bushings, thrust bearings and oil seal lips.



2. Install:
- Collar ①
- To relay arm ②.

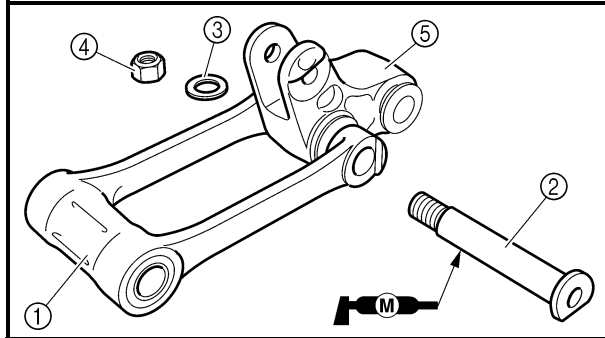
**NOTE:** \_\_\_\_\_

Apply the molybdenum disulfide grease on the collars and oil seal lips.



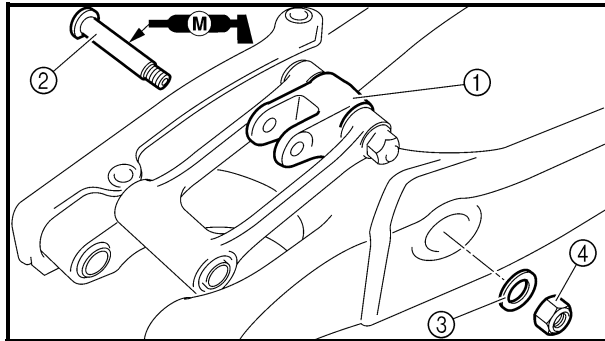
3. Install:
- Collar ①  
To connecting rod ②.

**NOTE:** \_\_\_\_\_  
Apply the molybdenum disulfide grease on the collar and oil seal lips.



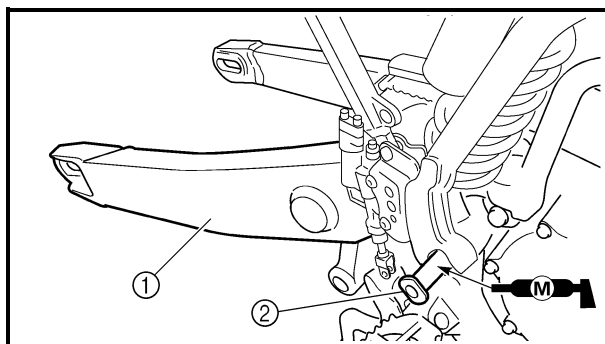
4. Install:
- Connecting rod ①
  - Bolt (connecting rod) ②
  - Washer ③
  - Nut (connecting rod) ④
- 80 Nm (8.0 m · kg, 58 ft · lb)**
- To relay arm ⑤.

**NOTE:** \_\_\_\_\_  
Apply the molybdenum disulfide grease on the bolt.



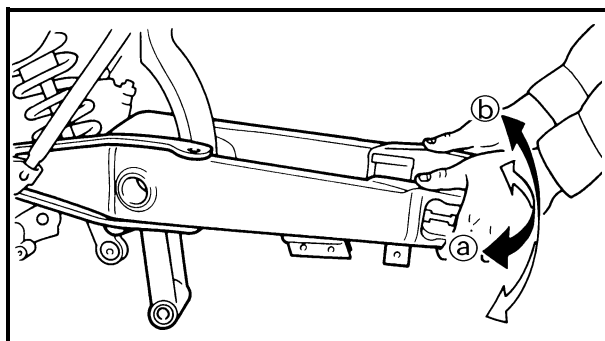
5. Install:
- Relay arm ①
  - Bolt (relay arm) ②
  - Washer ③
  - Nut (relay arm) ④
- To swingarm.

**NOTE:** \_\_\_\_\_  
• Apply the molybdenum disulfide grease on the bolt.  
• Do not tighten the nut yet.

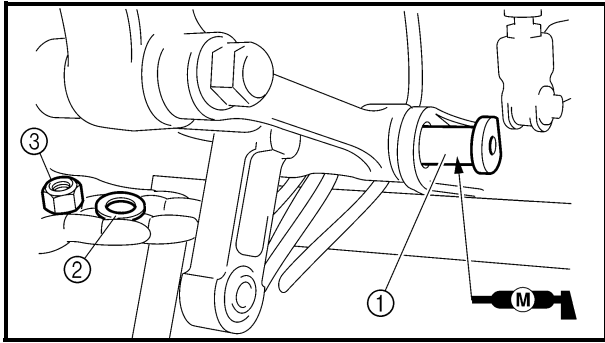


6. Install:
- Swingarm ①
  - Pivot shaft ②
- 85 Nm (8.5 m · kg, 61 ft · lb)**

**NOTE:** \_\_\_\_\_  
• Apply the molybdenum disulfide grease on the pivot shaft.  
• Insert the pivot shaft from right side.



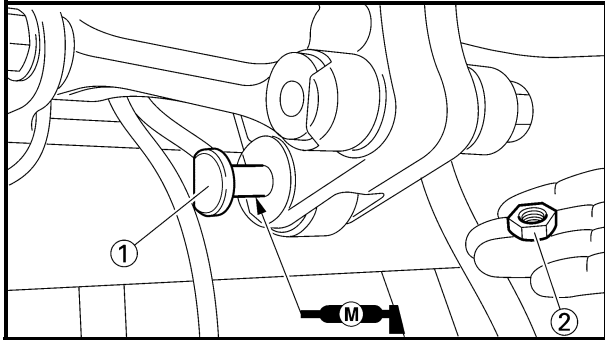
7. Check:
- Swingarm side play ①  
Free play exists → Replace thrust bearing.
  - Swingarm up and down movement ②  
Unsmooth movement/binding/rough spots → Grease or replace bearings, bushings and collars.



8. Install:
- Bolt (connecting rod) ①
  - Washer ②
  - Nut (connecting rod) ③

**NOTE:**

- Apply the molybdenum disulfide grease on the bolt.
- Do not tighten the nut yet.

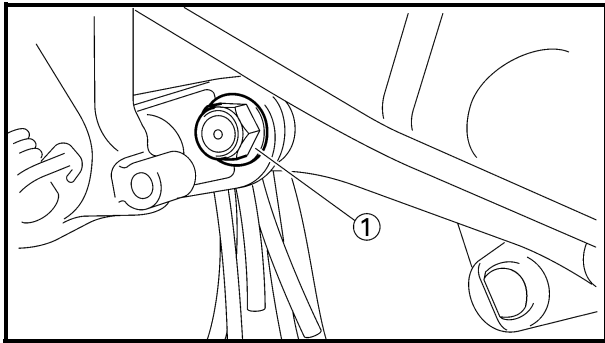


9. Install:
- Bolt (rear shock absorber-relay arm) ①
  - Nut (rear shock absorber-relay arm) ②

53 Nm (5.3 m · kg, 38 ft · lb)

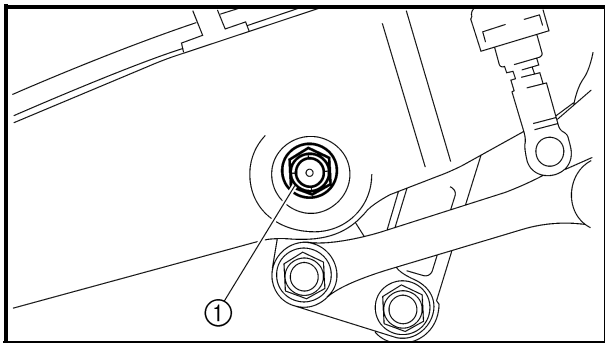
**NOTE:**

- Apply the molybdenum disulfide grease on the bolt.



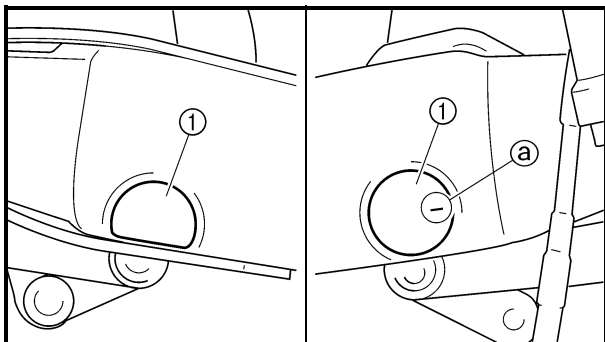
10. Tighten:
- Nut (connecting rod) ①

80 Nm (8.0 m · kg, 58 ft · lb)



11. Tighten:
- Nut (relay arm) ①

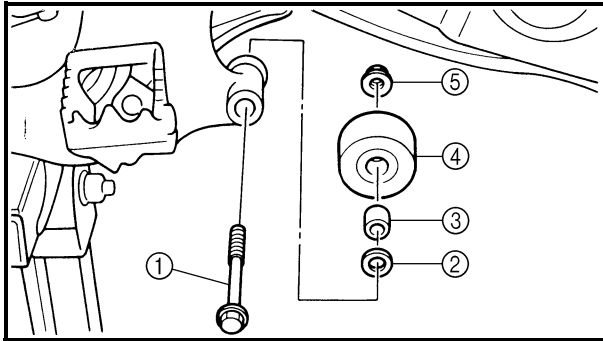
80 Nm (8.0 m · kg, 58 ft · lb)



12. Install:
- Cap ①

**NOTE:**

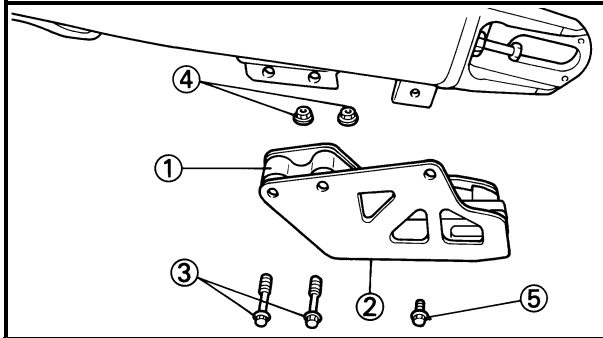
- Install the right cap with its mark (a) facing forward.



13. Install:

- Bolt (lower chain tensioner) ①
- Washer ②
- Collar ③
- Lower chain tensioner ④
- Nut (lower chain tensioner) ⑤

**20 Nm (2.0 m · kg, 14 ft · lb)**



14. Install:

- Drive chain support ①
- Drive chain support cover ②
- Bolt {drive chain support  
[ $\ell = 50 \text{ mm (1.97 in)}$ ]} ③
- Nut (drive chain support) ④

**7 Nm (0.7 m · kg, 5.1 ft · lb)**

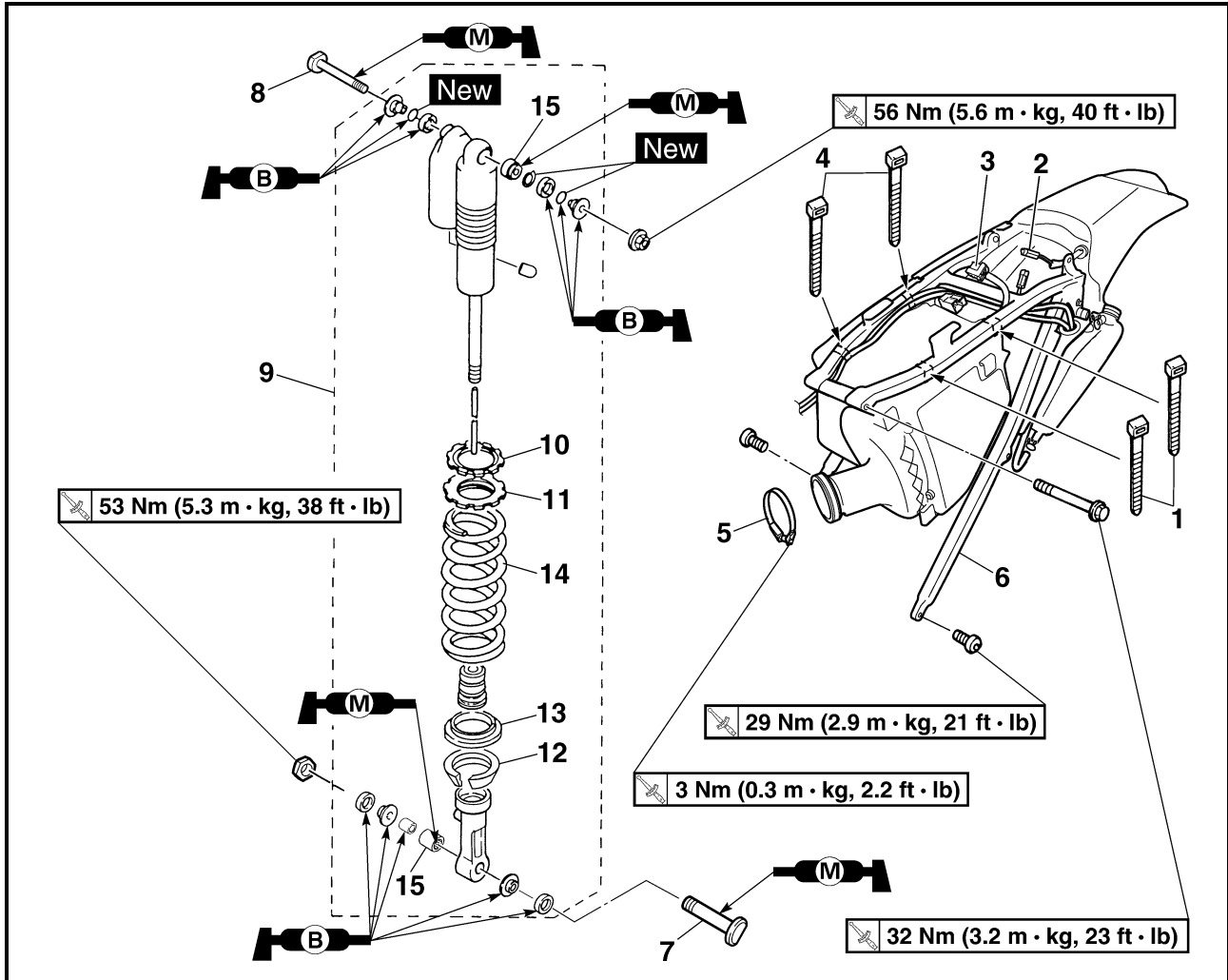
- Bolt {drive chain support cover  
[ $\ell = 10 \text{ mm (0.39 in)}$ ]} ⑤

**7 Nm (0.7 m · kg, 5.1 ft · lb)**



EC580000

## REAR SHOCK ABSORBER



Extent of removal:

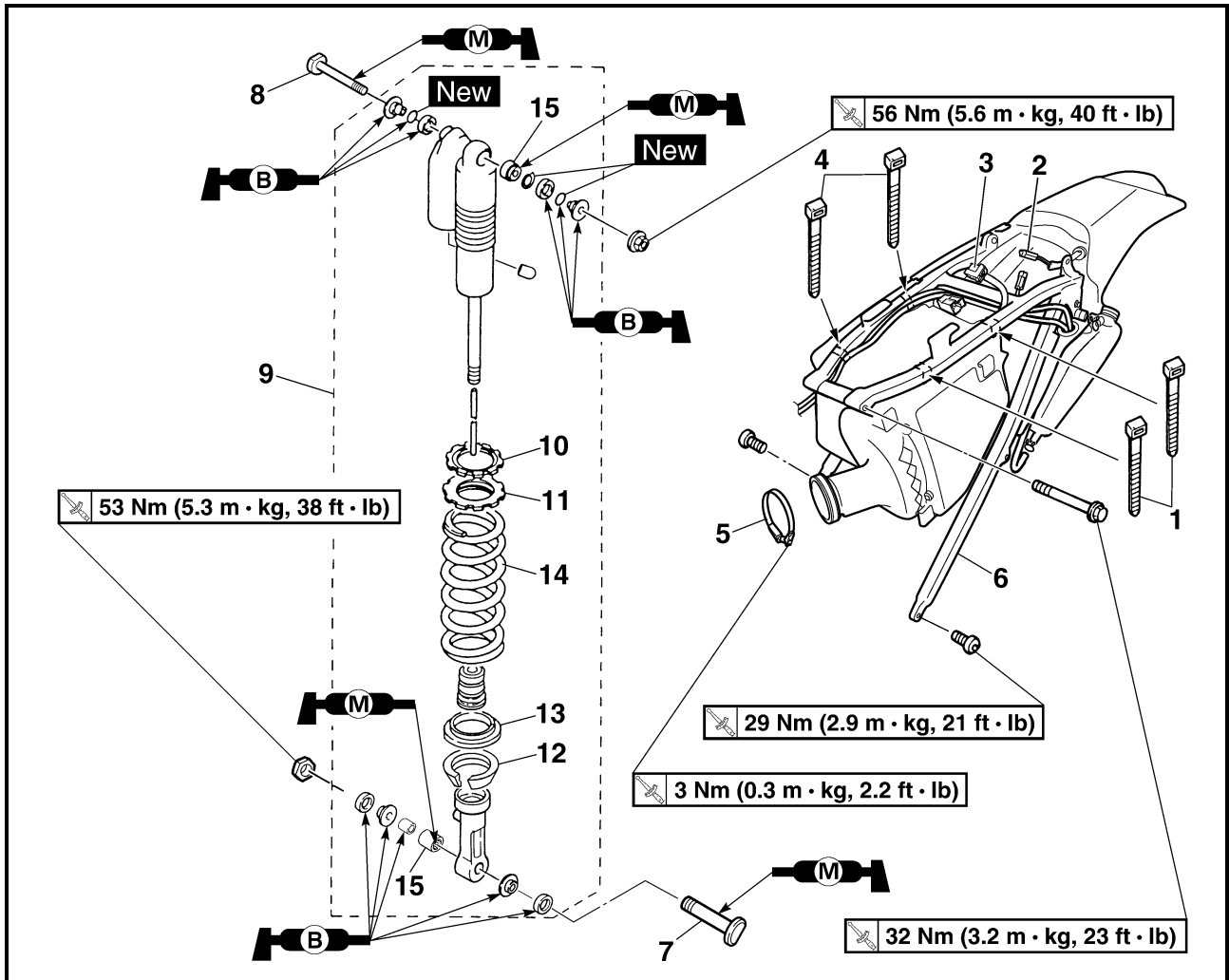
① Rear shock absorber removal

② Rear shock absorber disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>REAR SHOCK ABSORBER REMOVAL</b> Hold the machine by placing the suitable stand under the engine. Seat, fitting band and side covers  Air filter case cover  Silencer  Drain the coolant.  Coolant reservoir breather hose Coolant reservoir hose Battery  Disconnect the starter relay coupler. Starter motor lead		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.  Refer to "SEAT, FUEL TANK AND SIDE COVERS" section in the CHAPTER 4. Refer to "AIR FILTER CLEANING" section in the CHAPTER 3. Refer to "EXHAUST PIPE AND SILENCER" section in the CHAPTER 4. Refer to "COOLANT REPLACEMENT" section in the CHAPTER 3. Disconnect at the coolant reservoir side. Disconnect at the coolant reservoir side. Refer to "BATTERY INSPECTION AND CHARGING" section in the CHAPTER 3.  Disconnect at the starter relay side.

# REAR SHOCK ABSORBER

CHAS



Extent of removal	Order	Part name	Q'ty	Remarks
	1	Locking tie	2	
	2	Taillight coupler	1	
	3	Starting circuit cut-off relay coupler	1	
	4	Plastic band	2	
	5	Clamp (air filter joint)	1	Only loosening.
	6	Rear frame	1	
	7	Bolt (rear shock absorber-relay arm)	1	Hold the swingarm.
	8	Bolt (rear shock absorber-frame)	1	
	9	Rear shock absorber	1	
	10	Locknut	1	Only loosening.
	11	Adjuster	1	
	12	Lower spring guide	1	
	13	Upper spring guide	1	
	14	Spring (rear shock absorber)	1	
	15	Bearing	2	Refer to "REMOVAL POINTS".



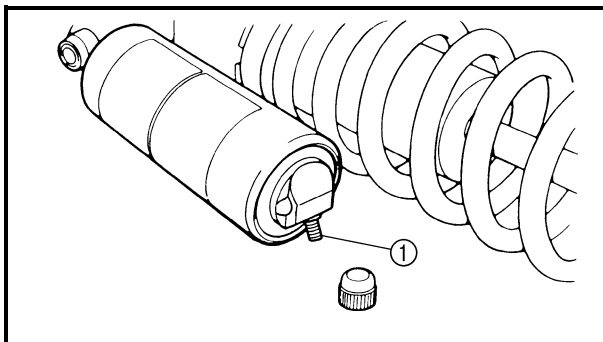
## HANDLING NOTE

**⚠ WARNING**

This rear shock absorber is provided with a separate type tank filled with high-pressure nitrogen gas. To prevent the danger of explosion, read and understand the following information before handling the shock absorber.

The manufacturer can not be held responsible for property damage or personal injury that may result from improper handling.

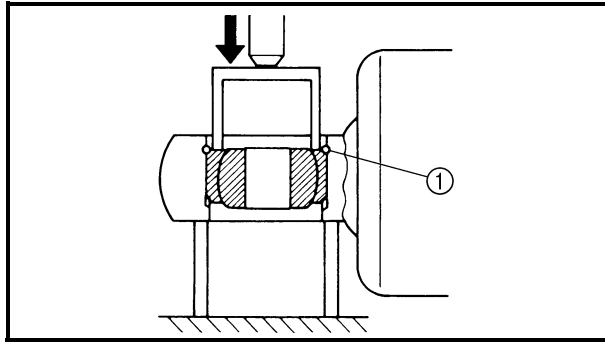
1. Never tamper or attempt to disassemble the cylinder or the tank.
2. Never throw the rear shock absorber into an open flame or other high heat. The rear shock absorber may explode as a result of nitrogen gas expansion and/or damage to the hose.
3. Be careful not to damage any part of the gas tank. A damaged gas tank will impair the damping performance or cause a malfunction.
4. Take care not to scratch the contact surface of the piston rod with the cylinder; or oil could leak out.
5. Never attempt to remove the plug at the bottom of the nitrogen gas tank. It is very dangerous to remove the plug.
6. When scrapping the rear shock absorber, follow the instructions on disposal.

**NOTES ON DISPOSAL (YAMAHA DEALERS ONLY)**

Before disposing the rear shock absorber, be sure to extract the nitrogen gas from valve ①. Wear eye protection to prevent eye damage from escaping gas and/or metal chips.

**⚠ WARNING**

To dispose of a damaged or worn-out rear shock absorber, take the unit to your Yamaha dealer for this disposal procedure.



EC583000

## REMOVAL POINTS

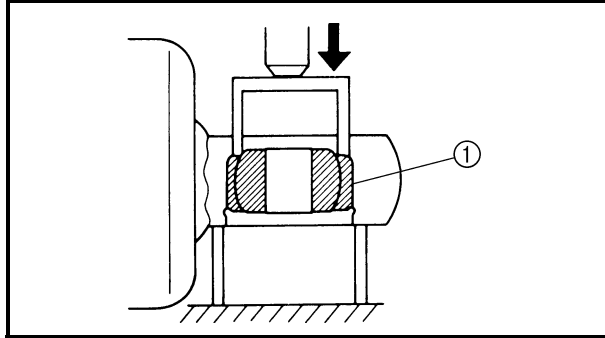
EC583320

### Bearing

- Remove:
  - Stopper ring (upper bearing) ①

#### NOTE:

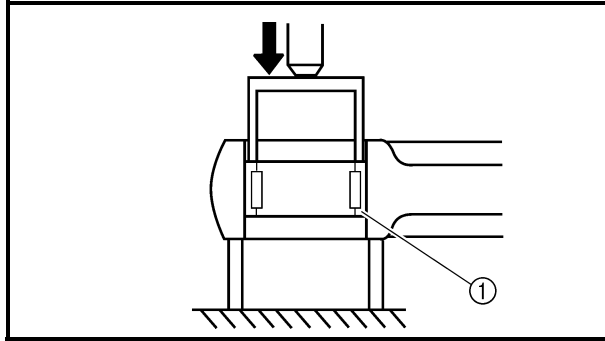
Press in the bearing while pressing its outer race and remove the stopper ring.



- Remove:
  - Upper bearing ①

#### NOTE:

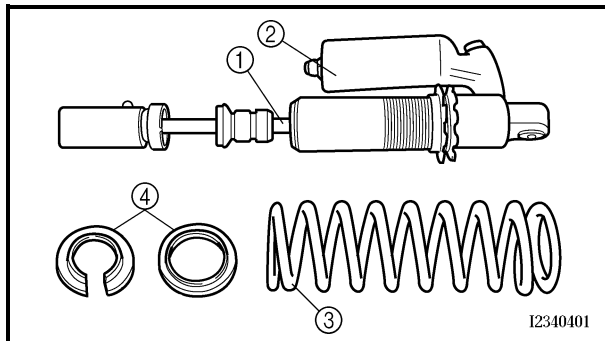
Remove the bearing by pressing its outer race.



- Remove:
  - Lower bearing ①

#### NOTE:

Remove the bearing by pressing its outer race.

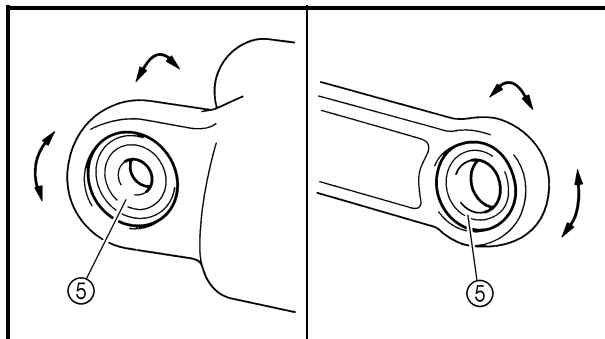


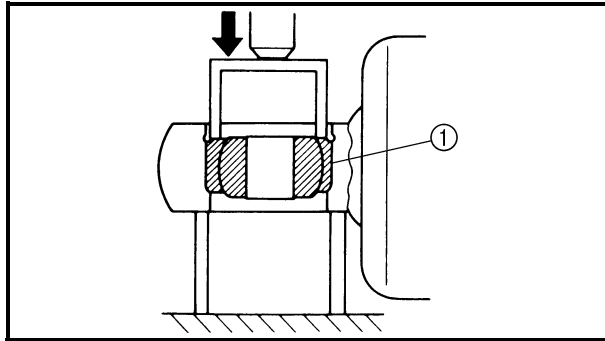
EC584000

## INSPECTION

### Rear shock absorber

- Inspect:
  - Damper rod ①  
Bends/damage → Replace rear shock absorber assembly.
  - Shock absorber ②  
Oil leaks → Replace rear shock absorber assembly.  
Gas leaks → Replace rear shock absorber assembly.
  - Spring ③  
Damage → Replace spring.  
Fatigue → Replace spring.  
Move spring up and down.
  - Spring guide ④  
Wear/damage → Replace spring guide.
  - Bearing ⑤  
Free play exists/unsmooth revolution/rust → Replace.





EC585000

## ASSEMBLY AND INSTALLATION

EC585300

### Bearing

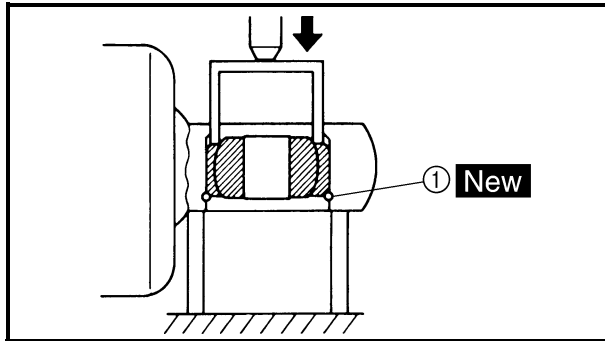
1. Install:
  - Upper bearing ①

#### NOTE:

Install the bearing parallel until the stopper ring groove appears by pressing its outer race.

#### CAUTION:

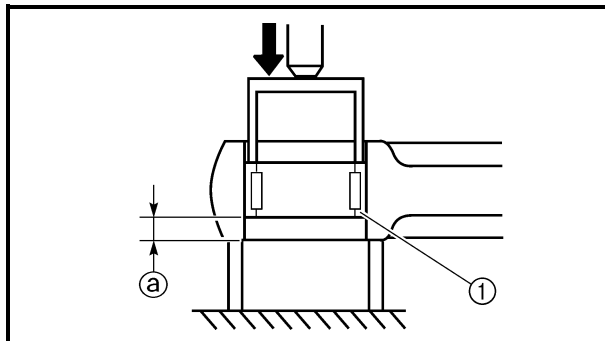
Do not apply the grease on the bearing outer race because it will wear the rear shock absorber surface on which the bearing is press fitted.



2. Install:
  - Stopper ring (upper bearing) ① **New**

#### NOTE:

After installing the stopper ring, push back the bearing until it contacts the stopper ring.



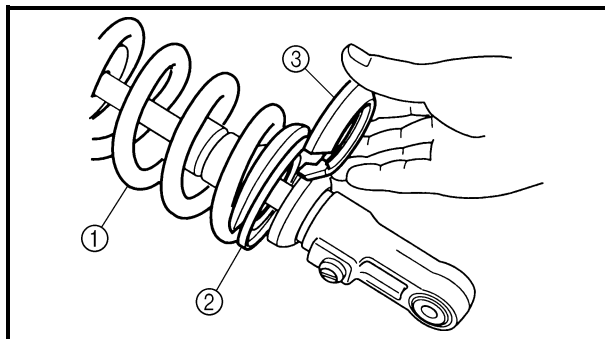
3. Install:
  - Lower bearing ①

#### NOTE:

Install the bearing by pressing it on the side having the manufacture's marks or numbers.

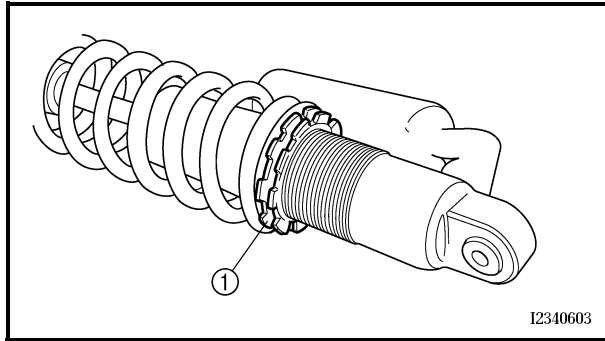


**Installed depth of the bearing ①:**  
4 mm (0.16 in)

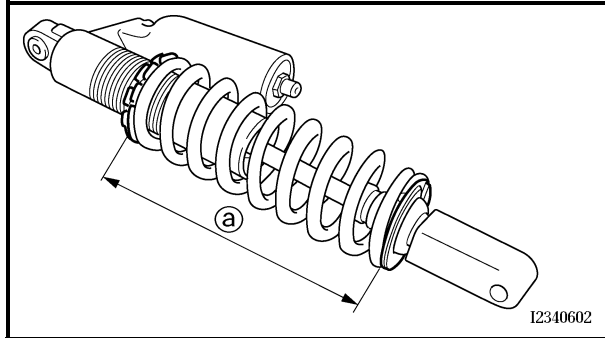


### Spring (rear shock absorber)

1. Install:
  - Spring ①
  - Upper spring guide ②
  - Lower spring guide ③



2. Tighten:
  - Adjuster ①



3. Adjust:
  - Spring length (installed) ②

Spring length (installed) ②:	
Standard length	Extent of adjustment
245 mm (9.65 in) * 246.5 mm (9.70 in)	240.5 ~ 258.5 mm (9.47 ~ 10.18 in)

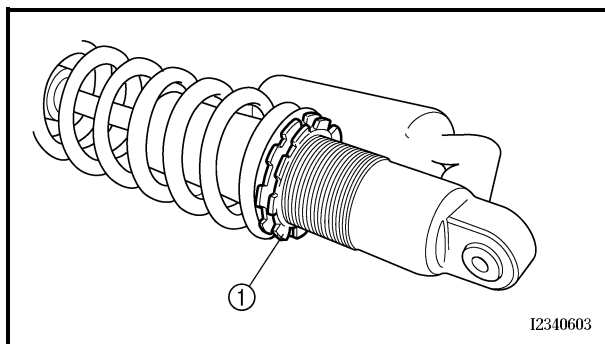
\* For EUROPE

**NOTE:**

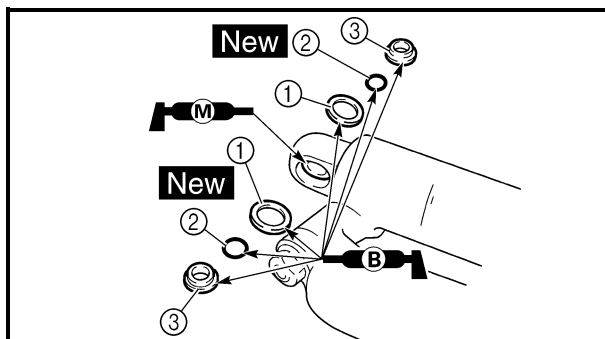
The length of the spring (installed) changes 1.5 mm (0.06 in) per turn of the adjuster.

**CAUTION:**

Never attempt to turn the adjuster beyond the maximum or minimum setting.



4. Tighten:
  - Locknut ①

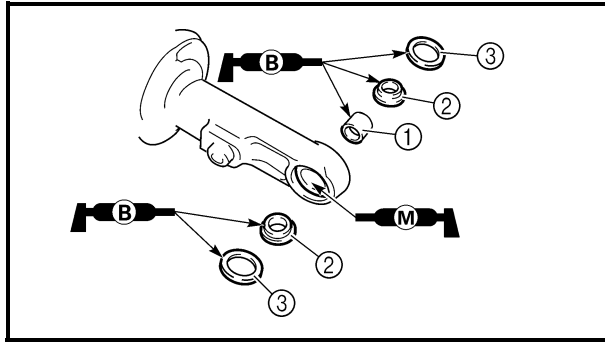


**Rear shock absorber**

1. Install:
  - Dust seal ①
  - O-ring ② **New**
  - Collar ③

**NOTE:**

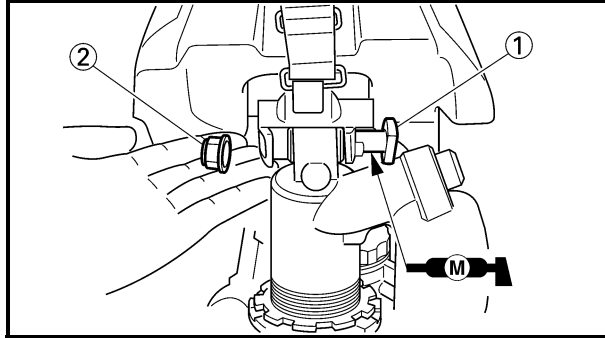
- Apply the molybdenum disulfide grease on the bearing.
- Apply the lithium soap base grease on the dust seals, O-rings and collars.



2. Install:
  - Bushing ①
  - Collar ②
  - Dust seal ③

**NOTE:**

- Apply the molybdenum disulfide grease on the bearing.
- Apply the lithium soap base grease on the bushing, collars and dust seals.
- Install the dust seals with their lips facing outward.



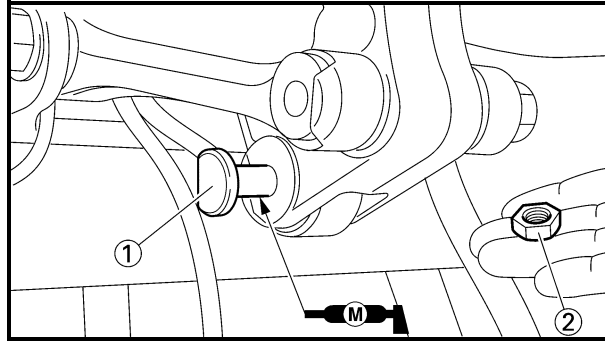
3. Install:
  - Rear shock absorber

4. Install:
  - Bolt (rear shock absorber-frame) ①
  - Nut (rear shock absorber-frame) ②

**56 Nm (5.6 m · kg, 40 ft · lb)**

**NOTE:**

Apply the molybdenum disulfide grease on the bolt.

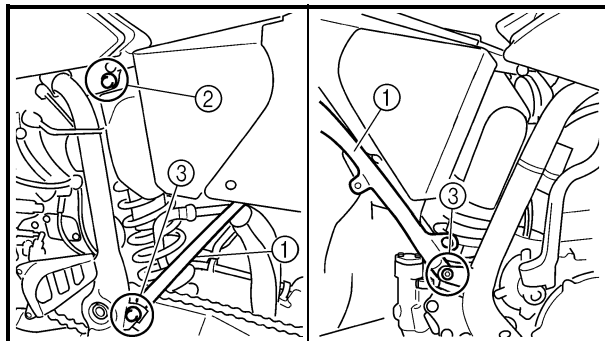


5. Install:
  - Bolt (rear shock absorber-relay arm) ①
  - Nut (rear shock absorber-relay arm) ②

**53 Nm (5.3 m · kg, 38 ft · lb)**

**NOTE:**

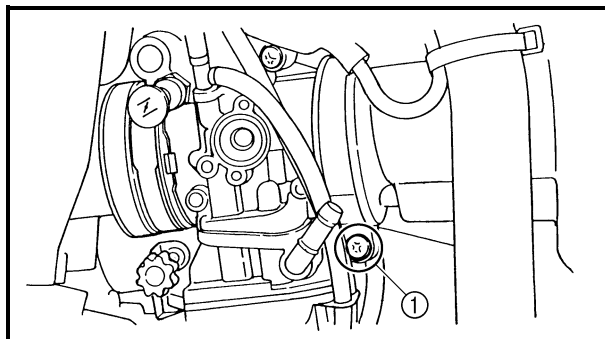
Apply the molybdenum disulfide grease on the bolt.



6. Install:
  - Rear frame ①
  - Bolt [rear frame (upper)] ②
  - Bolt [rear frame (lower)] ③

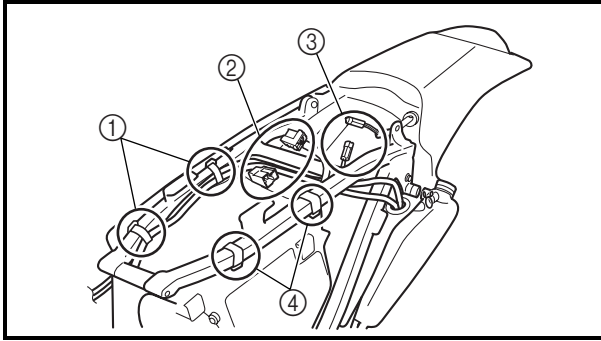
**32 Nm (3.2 m · kg, 23 ft · lb)**

**29 Nm (2.9 m · kg, 21 ft · lb)**



7. Tighten:
  - Screw (air filter joint) ①

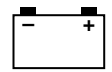
**3 Nm (0.3 m · kg, 2.2 ft · lb)**



## 8. Install:

- Plastic band ①
- Starting circuit cut-off relay coupler ②
- Taillight coupler ③
- Locking tie ④





EC600000

## ELECTRICAL

EC610000

## ELECTRICAL COMPONENTS AND WIRING DIAGRAM

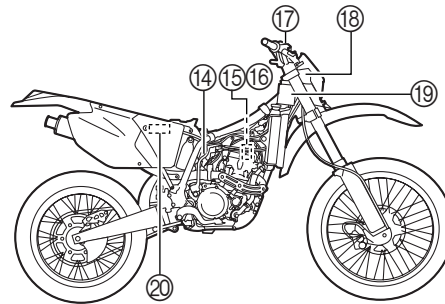
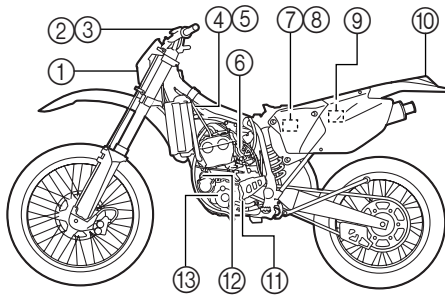
EC611000

### ELECTRICAL COMPONENTS

- |                                  |                       |
|----------------------------------|-----------------------|
| ① Headlight                      | ⑪ Neutral switch      |
| ② Engine stop switch             | ⑫ Starter motor       |
| ③ Clutch switch                  | ⑬ AC magneto          |
| ④ Diode                          | ⑭ Rectifier/regulator |
| ⑤ Starter relay diode            | ⑮ Ignition coil       |
| ⑥ Throttle position sensor       | ⑯ Spark plug          |
| ⑦ Starter relay                  | ⑰ Start switch        |
| ⑧ Fuse                           | ⑱ Main switch         |
| ⑨ Starting circuit cut-off relay | ⑲ CDI unit            |
| ⑩ Taillight                      | ⑳ Battery             |

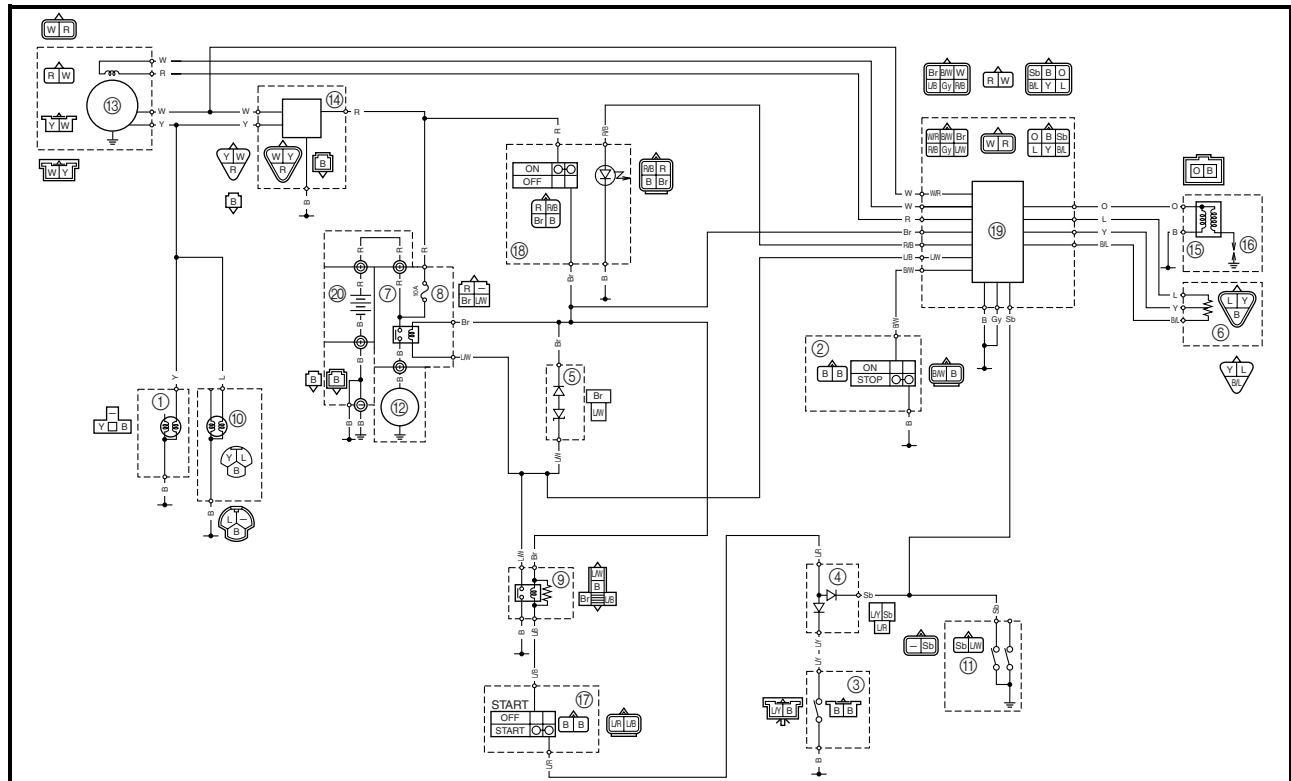
### COLOR CODE

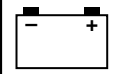
B.....	Black	B/W.....	Black/White
Br.....	Brown	L/B.....	Blue/Black
Gy.....	Gray	L/R.....	Blue/Red
L.....	Blue	L/Y.....	Blue/Yellow
O.....	Orange	L/W.....	Blue/White
R.....	Red	R/B.....	Red/Black
Sb.....	Sky blue		
W.....	White		
Y.....	Yellow		
B/L.....	Black/Blue		



EC612000

### WIRING DIAGRAM

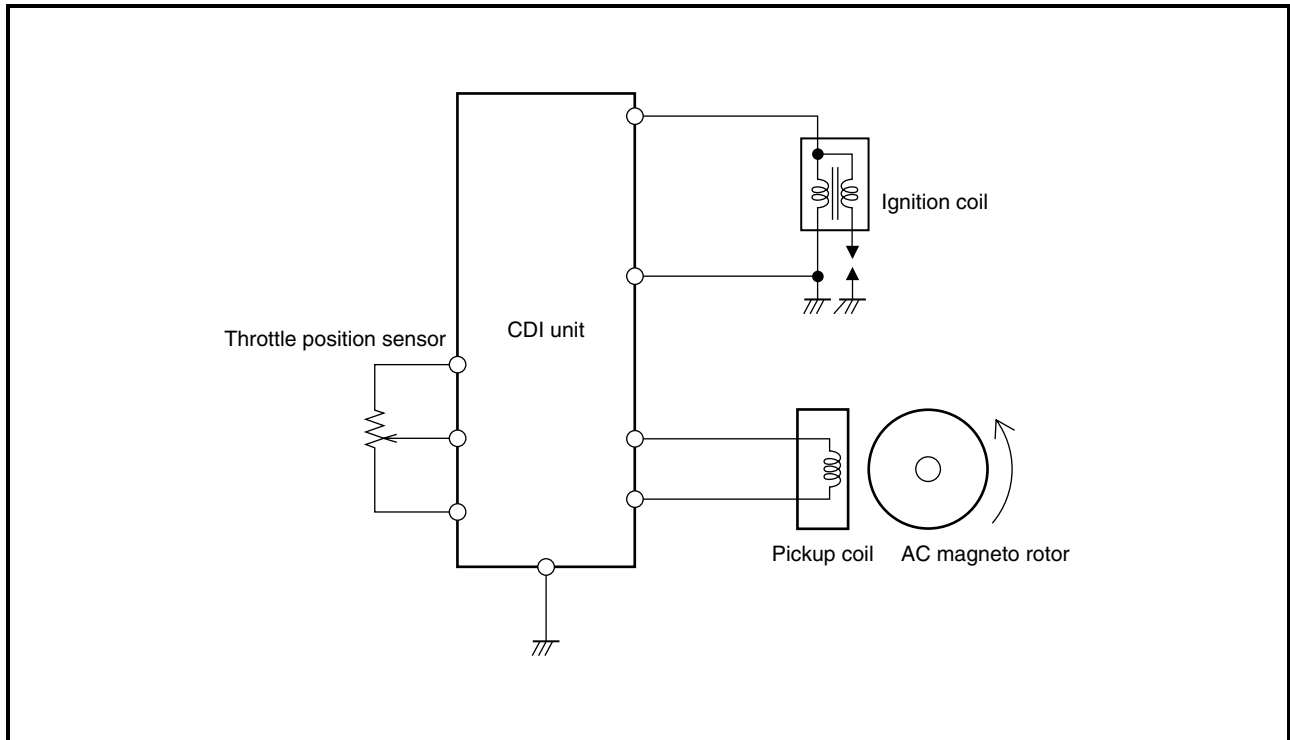




## MAP-CONTROLLED CDI UNIT

A map-controlled, CDI ignition system is used in the WR250F.

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

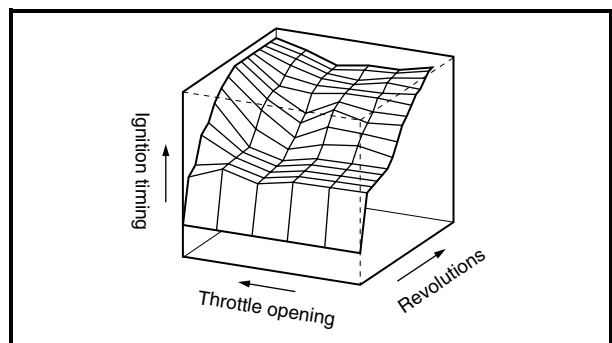


### Function of Component

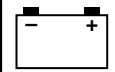
Component	Function
Throttle position sensor	Detects throttle valve opening and inputs it into the computer in the CDI unit as a throttle opening signal.
Pickup coil	Detects signal rotor revolutions and inputs them into the computer in the CDI unit as engine revolution signals.
CDI unit	The signals of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

### Principal of 3-Dimensional Control

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



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

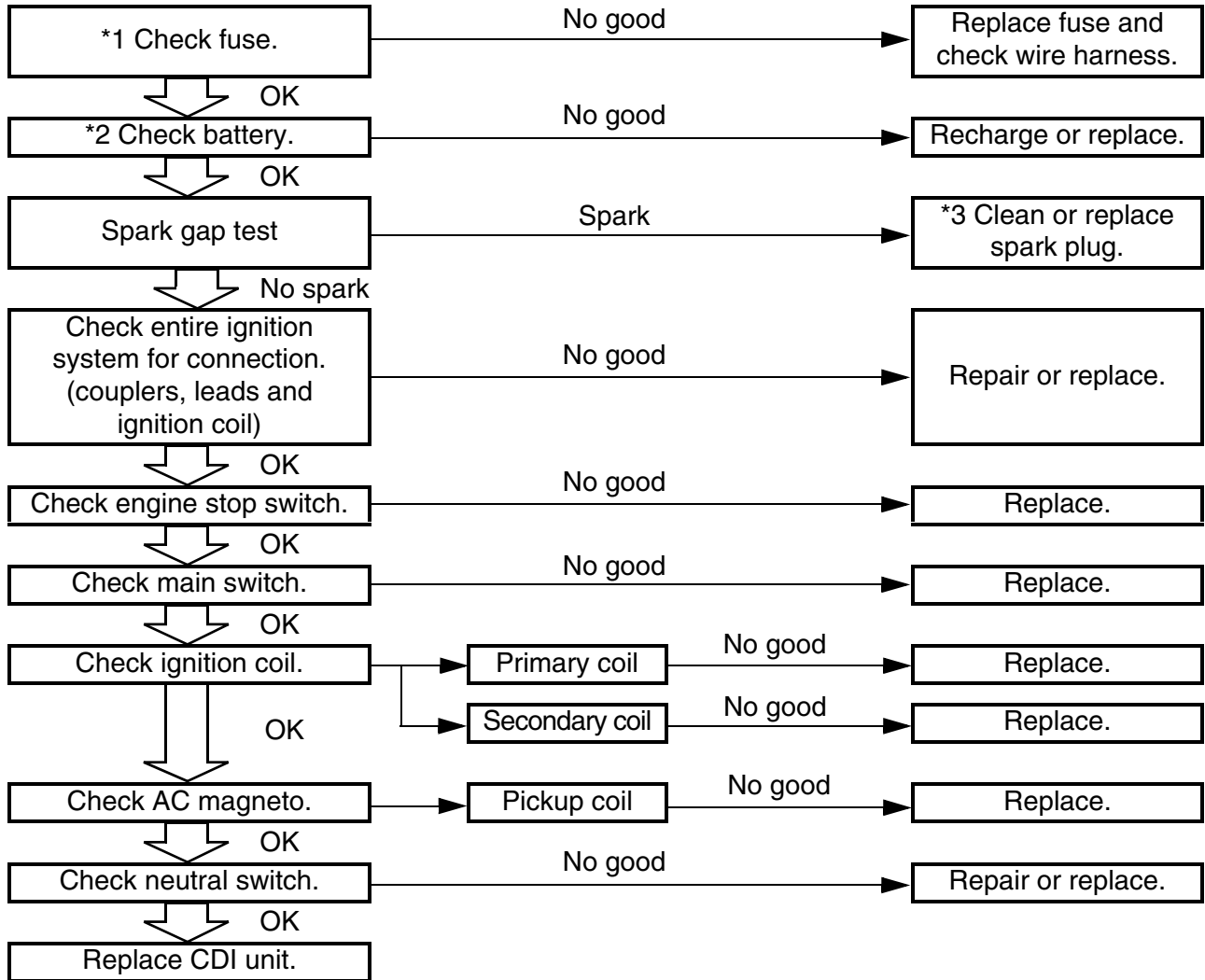


EC620000

**IGNITION SYSTEM**

**INSPECTION STEPS**

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



\*1 marked: Refer to “FUSE INSPECTION” section in the CHAPTER 3.

\*2 marked: Refer to “BATTERY INSPECTION AND CHARGING” section in the CHAPTER 3.

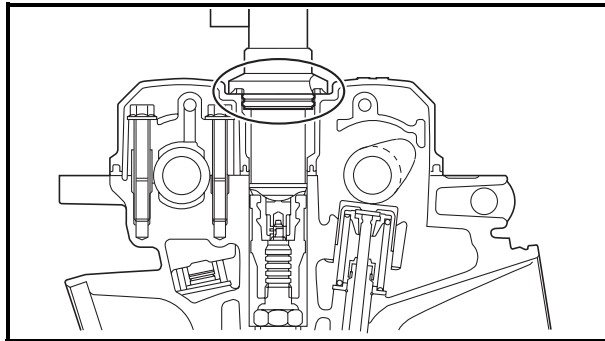
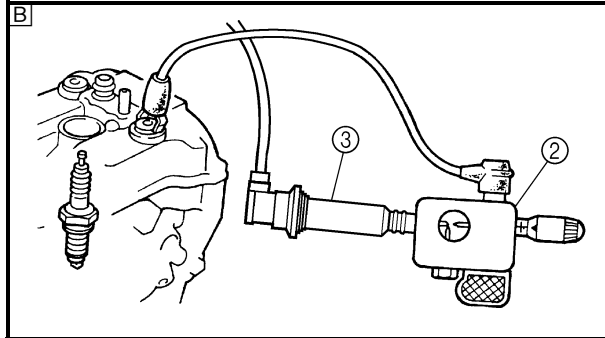
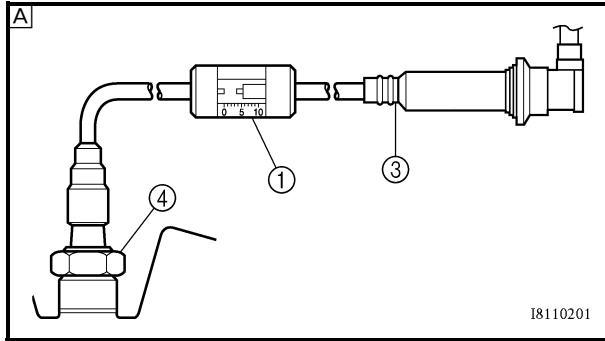
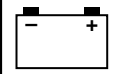
\*3 marked: Only when the ignition checker is used.

**NOTE:**

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

	<p><b>Dynamic spark tester:</b> YM-34487</p> <p><b>Ignition checker:</b> 90890-06754</p>
--	--

	<p><b>Pocket tester:</b> YU-3112-C/90890-03112</p>
--	--



**SPARK GAP TEST**

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

Ⓐ For USA and CDN

Ⓑ Except for USA and CDN

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

**Minimum spark gap:**  
**6.0 mm (0.24 in)**

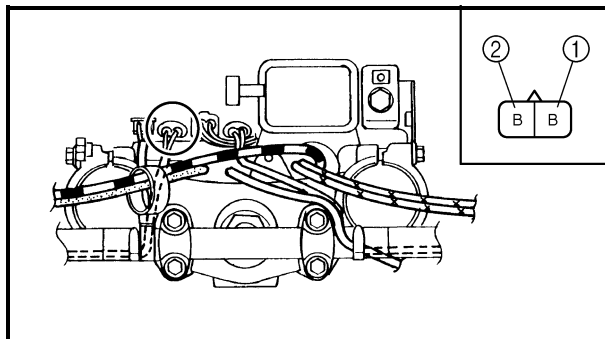
**COUPLERS, LEADS AND IGNITION COIL CONNECTION INSPECTION**

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

**ENGINE STOP SWITCH INSPECTION**

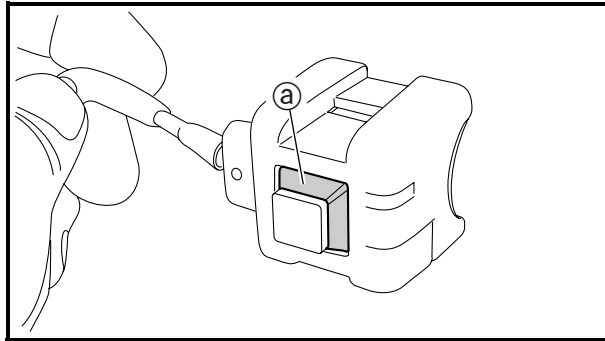
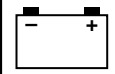
1. Inspect:
  - Engine stop switch conduct

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

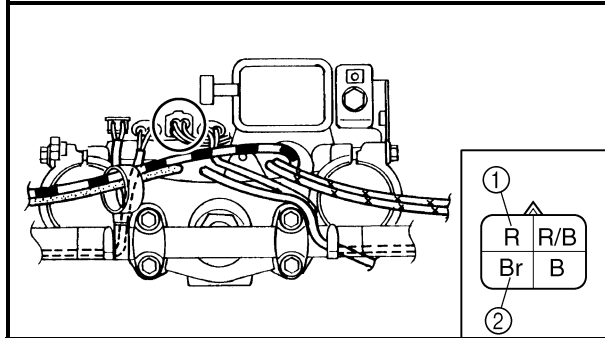


	B ①	B ②	Tester selector position
<b>PUSH IN</b>	○	○	$\Omega \times 1$
<b>FREE</b>			

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




2. Inspect:
- Rubber part ①  
Tears/damage → Replace.



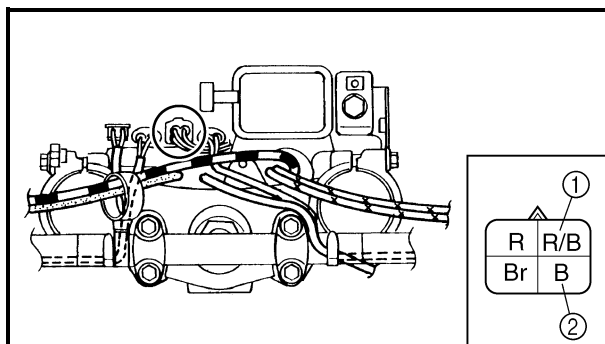
**MAIN SWITCH INSPECTION**

1. Inspect:
- Main switch conduct

**Tester (+) lead → Red lead ①**  
**Tester (-) lead → Brown lead ②**

	R ①	Br ②	Tester selector position
<b>ON</b>	○	○	$\Omega \times 1$
<b>OFF</b>			

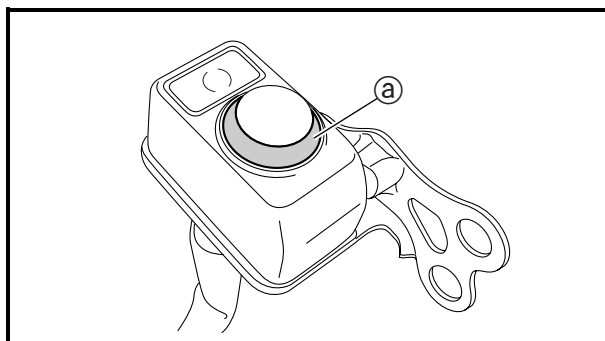
Continuous while the main switch is moved to “OFF” → Replace.  
 Not continuous while the main switch is moved to “ON” → Replace.



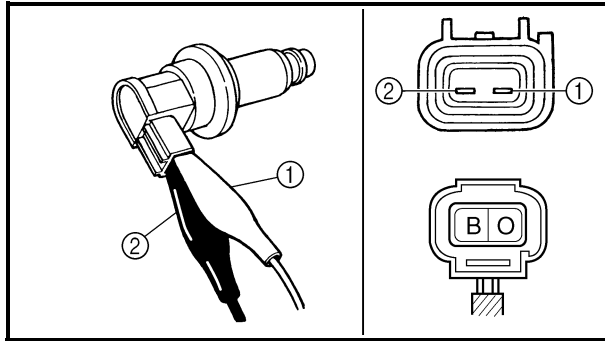
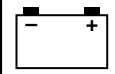
2. Inspect:
- Main switch indicator light  
Use 12 V battery.

**Battery (+) lead → Red/Black lead ①**  
**Battery (-) lead → Black lead ②**

Indicator light does not come on → Replace.



3. Inspect:
- Rubber part ①  
Tears/damage → Replace.



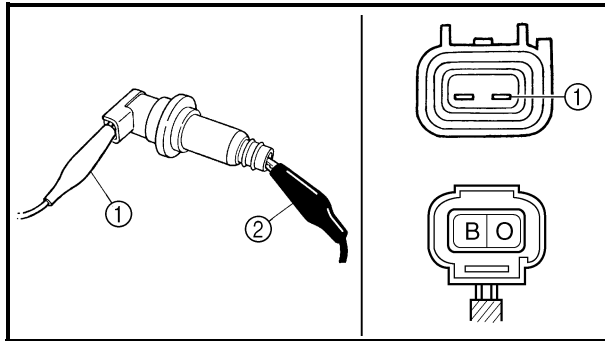
EC626002

**IGNITION COIL INSPECTION**

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

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

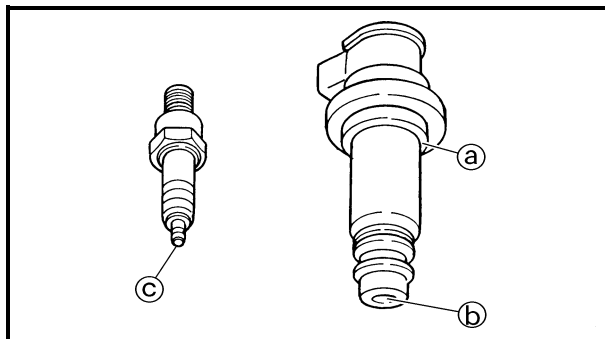
	<b>Primary coil resistance</b>	<b>Tester selector position</b>
	<b>0.08 ~ 0.10 Ω at 20 °C (68 °F)</b>	<b>Ω × 1</b>



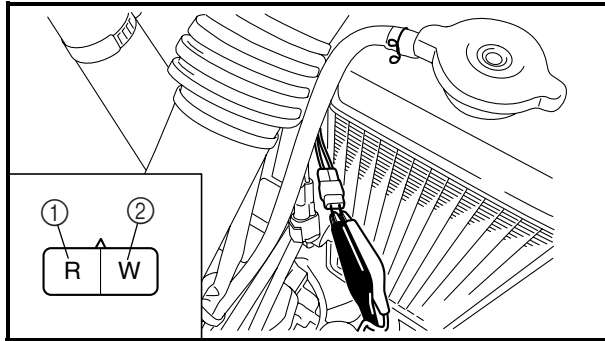
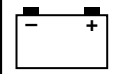
3. Inspect:
  - Secondary coil resistance
 Out of specification → Replace.

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

	<b>Secondary coil resistance</b>	<b>Tester selector position</b>
	<b>4.6 ~ 6.8 kΩ at 20 °C (68 °F)</b>	<b>kΩ × 1</b>



4. Inspect:
  - Sealed portion of ignition coil ①
  - Spark plug terminal pin ②
  - Threaded portion of spark plug ③
 Wear → Replace.

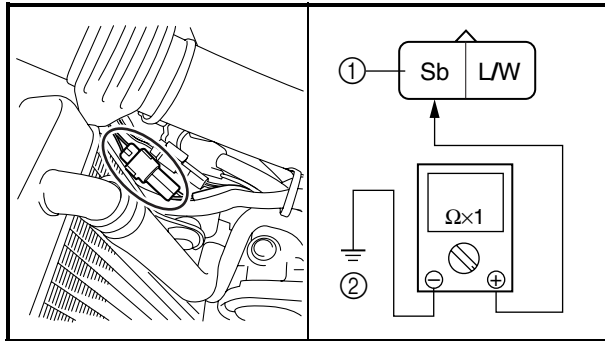


**AC MAGNETO INSPECTION**

- Inspect:
  - Pickup coil resistance  
Out of specification → Replace.

**Tester (+) lead → Red lead ①**  
**Tester (-) lead → White lead ②**

	<b>Pickup coil resistance</b>	<b>Tester selector position</b>
	<b>248 ~ 372 Ω at 20 °C (68 °F)</b>	<b>Ω × 100</b>



**NEUTRAL SWITCH INSPECTION**

- Inspect:
  - Neutral switch conduct

**Tester (+) lead → Sky blue lead ①**  
**Tester (-) lead → Ground ②**

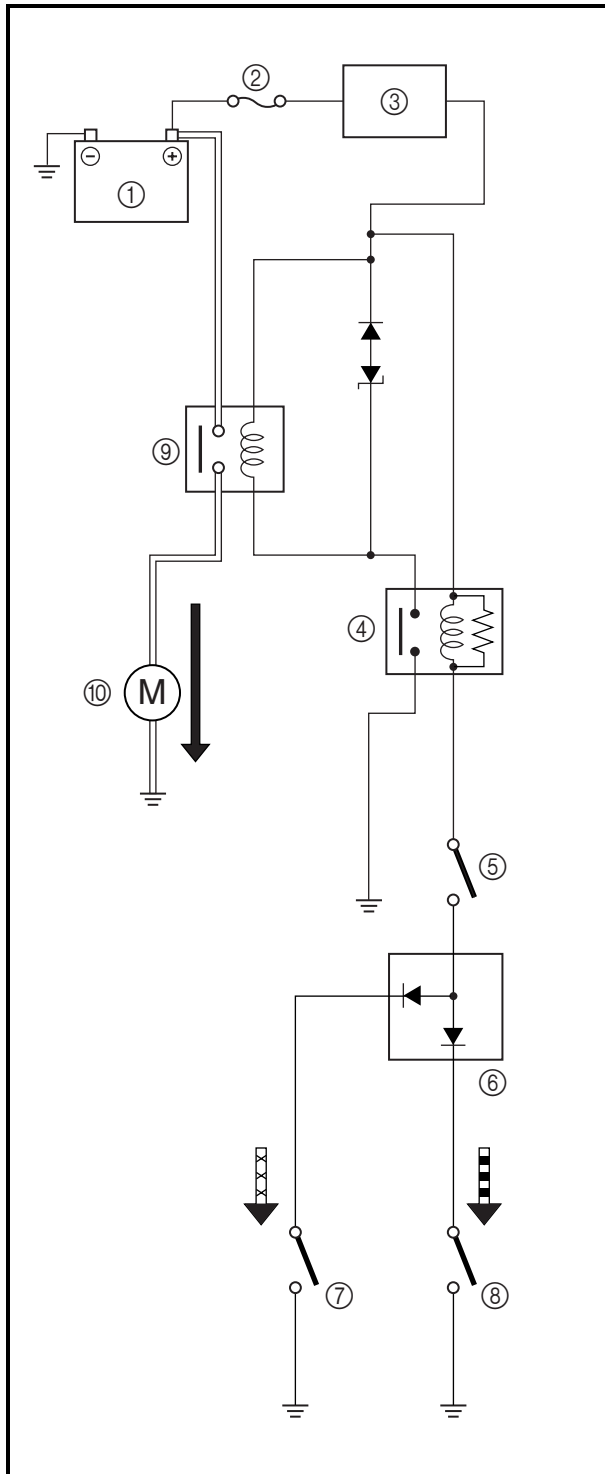
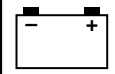
		<b>Sb</b> ①	<b>Ground</b> ②	<b>Tester selector position</b>
	<b>NEUTRAL</b>	○	○	<b>Ω × 1</b>
	<b>IN GEAR</b>			

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

EC628000

**CDI UNIT INSPECTION**

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



**ELECTRIC STARTING SYSTEM  
STARTING CIRCUIT CUT-OFF SYSTEM  
OPERATION**

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

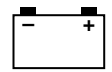
- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed).

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

- ← WHEN THE TRANSMISSION IS IN NEUTRAL
- ← WHEN THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR

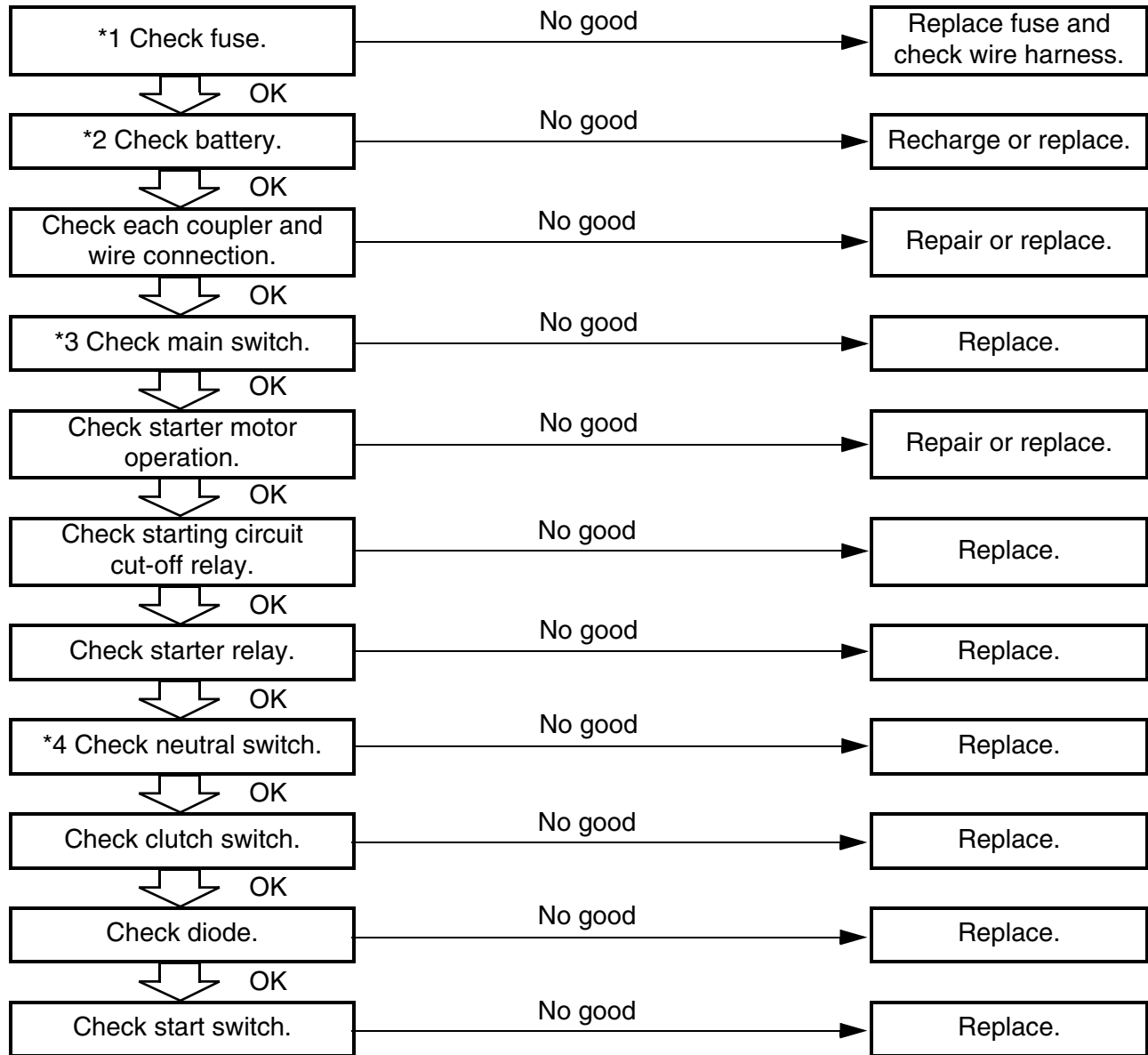
- ① Battery
- ② Main fuse
- ③ Main switch
- ④ Starting circuit cut-off relay
- ⑤ Start switch
- ⑥ Diode
- ⑦ Clutch switch
- ⑧ Neutral switch
- ⑨ Starter relay
- ⑩ Starter motor





## INSPECTION STEPS

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



\*1 marked: Refer to “FUSE INSPECTION” section in the CHAPTER 3.

\*2 marked: Refer to “BATTERY INSPECTION AND CHARGING” section in the CHAPTER 3.

\*3 marked: Refer to “MAIN SWITCH INSPECTION” section.

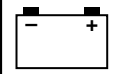
\*4 marked: Refer to “NEUTRAL SWITCH INSPECTION” section.

### NOTE:

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



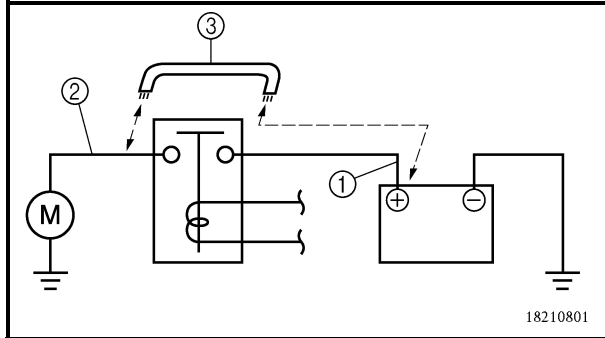
**Pocket tester:**  
YU-3112-C/90890-03112



EC624000

**COUPLERS AND LEADS CONNECTION INSPECTION**

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

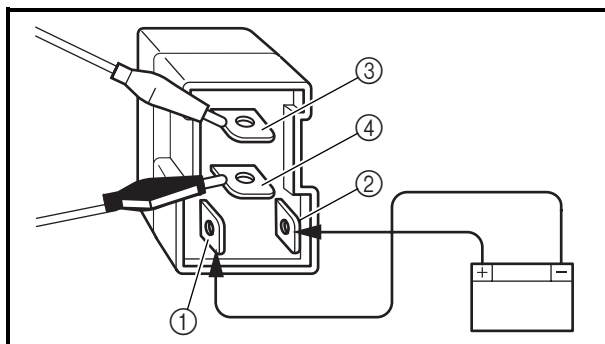


**STARTER MOTOR OPERATION**

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

**⚠ WARNING**


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

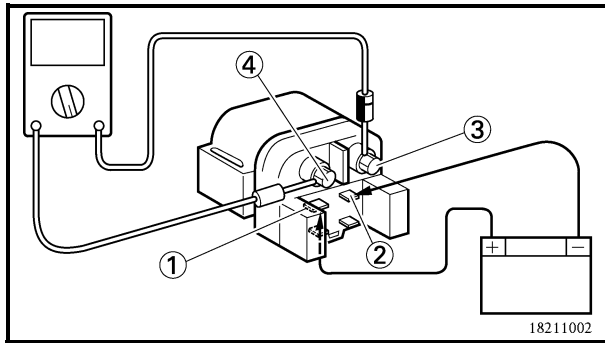
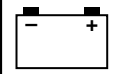


**STARTING CIRCUIT CUT-OFF RELAY INSPECTION**

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

<b>Battery (+) lead</b> → Blue/Black lead ①
<b>Battery (-) lead</b> → Brown lead ②
<b>Tester (+) lead</b> → Blue/White lead ③
<b>Tester (-) lead</b> → Black lead ④

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




## STARTER RELAY INSPECTION

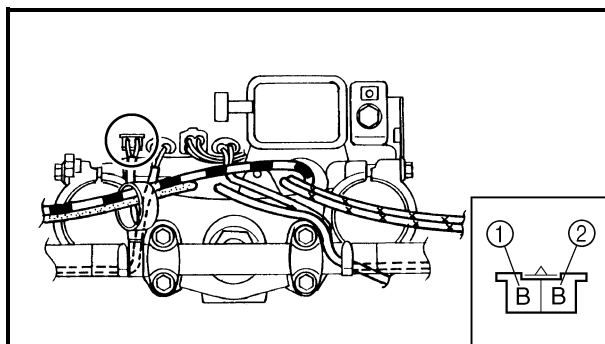
1. Remove:
  - Starter relay
2. Inspect:
  - Starter relay conduct
 Use 12 V battery.

**Battery (+) lead** → Starter relay terminal ①  
**Battery (-) lead** → Starter relay terminal ②

**Tester (+) lead** → Starter relay terminal ③  
**Tester (-) lead** → Starter relay terminal ④

	Ter- minal ③	Ter- minal ④	Tester selector position
<b>Connected to battery</b>	○	○	$\Omega \times 1$
<b>Not connected to battery</b>			


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



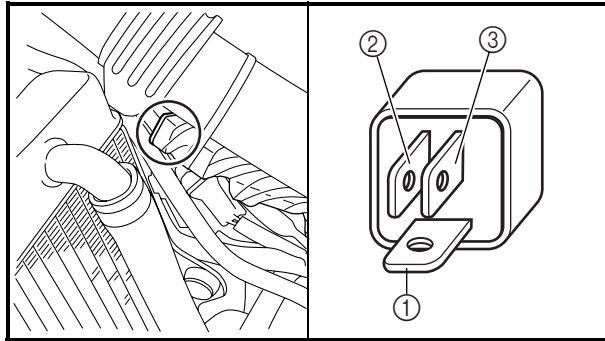
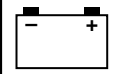
## CLUTCH SWITCH INSPECTION

1. Inspect:
  - Clutch switch continuity

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

	B ①	B ②	Tester selector position
<b>PULL</b>	○	○	$\Omega \times 1$
<b>FREE</b>			

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

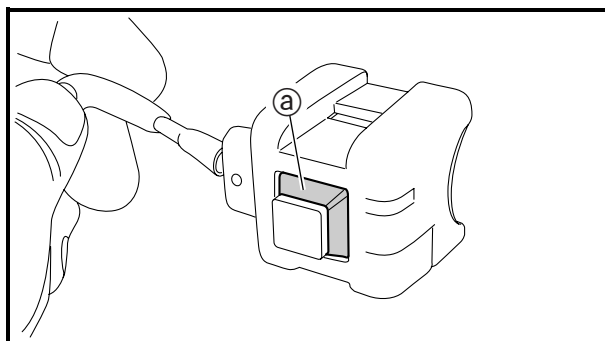
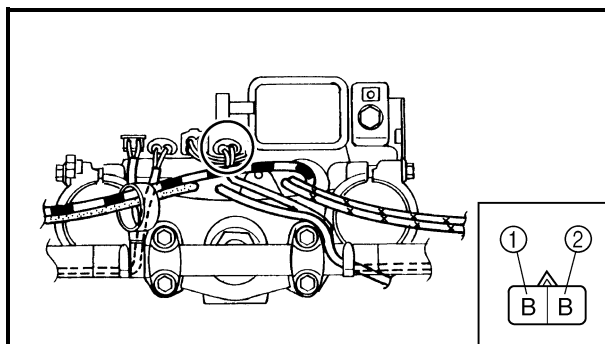


## DIODE INSPECTION

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

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


Incorrect continuity → Replace.



## START SWITCH INSPECTION

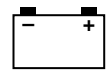
1. Inspect:
  - Start switch continuity

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

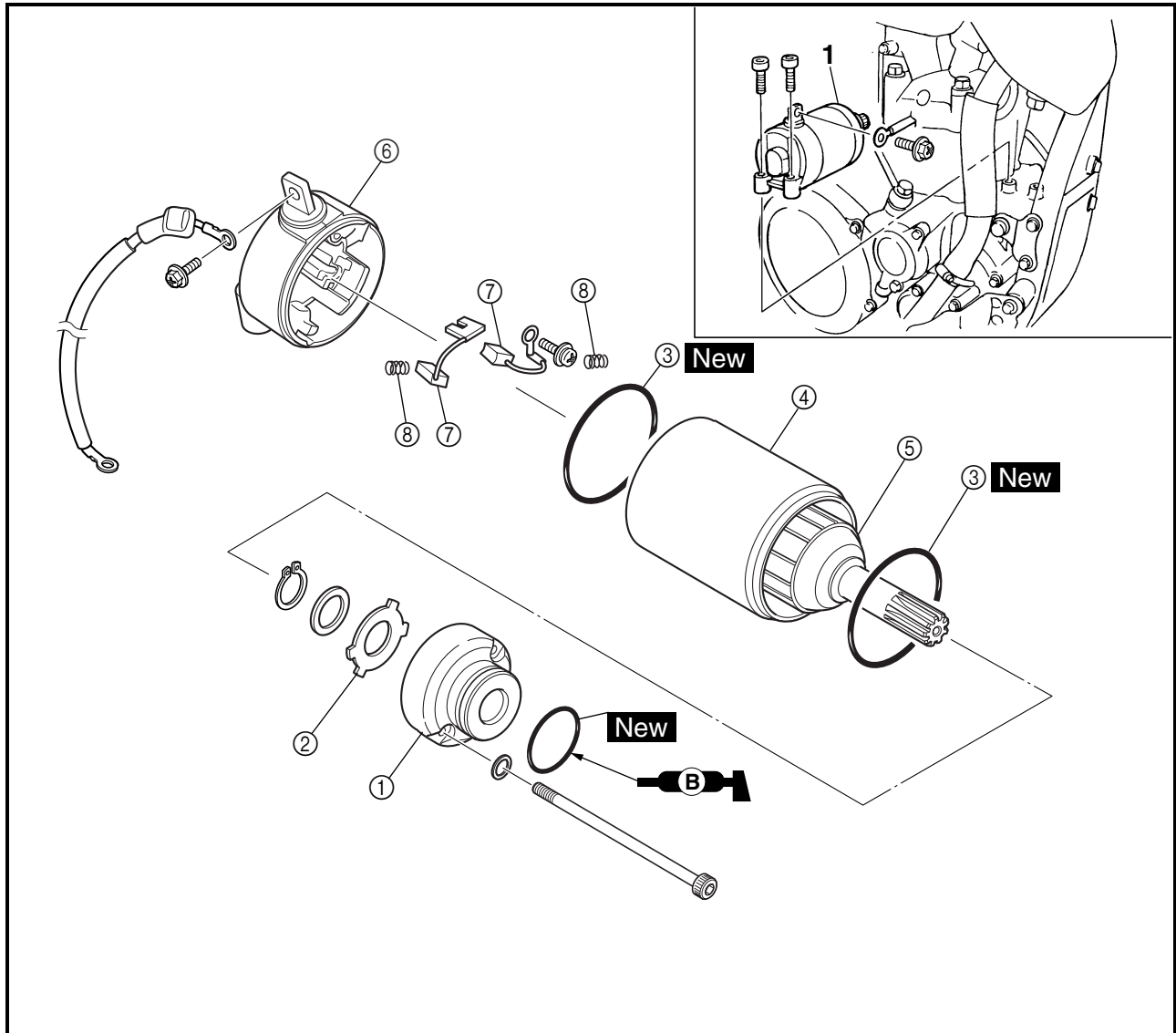
	B ①	B ②	Tester selector position
PUSH IN	○	○	$\Omega \times 1$
FREE			

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

2. Inspect:
  - Rubber part ①  
Tears/damage → Replace.

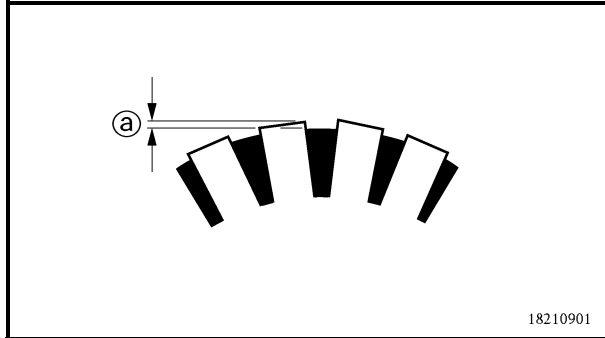
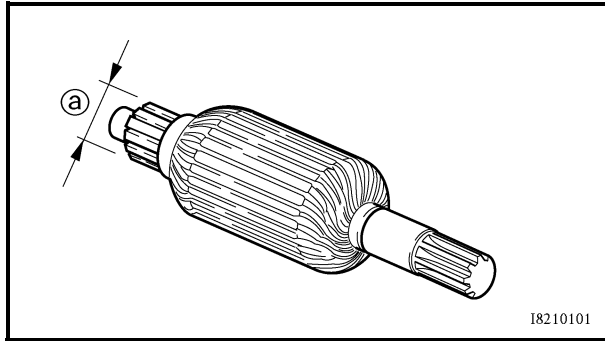
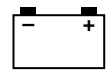


STARTER MOTOR



Extent of removal: ① Starter motor disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>STARTER MOTOR REMOVAL</b>		
		Exhaust pipe		Refer to "EXHAUST PIPE AND SILENCER" section in the CHAPTER 4.
	1	Starter motor	1	
		<b>STARTER MOTOR DISASSEMBLY</b>		
	①	Starter motor front cover	1	
	②	Washer (starter motor front cover)	1	
	③	Gasket	2	
	④	Starter motor yoke	1	
	⑤	Armature assembly	1	
	⑥	Starter motor rear cover	1	
	⑦	Brush	2	
⑧	Brush spring	2		



## INSPECTION AND REPAIR

1. Check:
  - Commutator  
Dirt → Clean with 600 grit sandpaper.
2. Measure:
  - Commutator diameter <sup>Ⓐ</sup>  
Out of specification → Replace the starter motor.



**Min. commutator diameter:**  
**16.6 mm (0.65 in)**

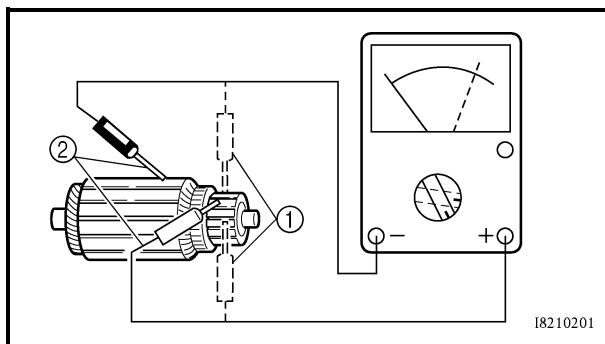
3. Measure:
  - Mica undercut <sup>Ⓐ</sup>  
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.



**Mica undercut:**  
**1.5 mm (0.06 in)**

### NOTE:

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



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

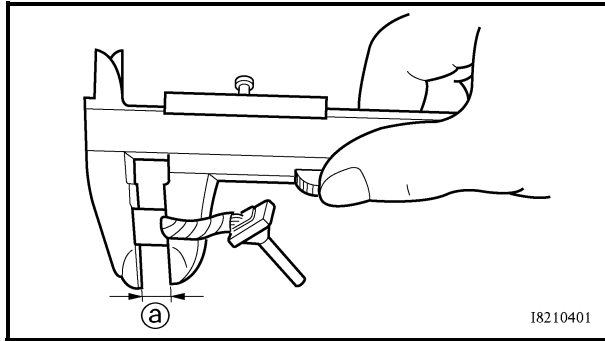
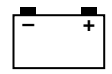


**Pocket tester:**  
**YU-3112-C/90890-03112**



**Armature assembly:**  
**Commutator resistance <sup>①</sup>:**  
**0.0189 ~ 0.0231 Ω at 20 °C (68 °F)**  
**Insulation resistance <sup>②</sup>:**  
**Above 1 MΩ at 20 °C (68 °F)**

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

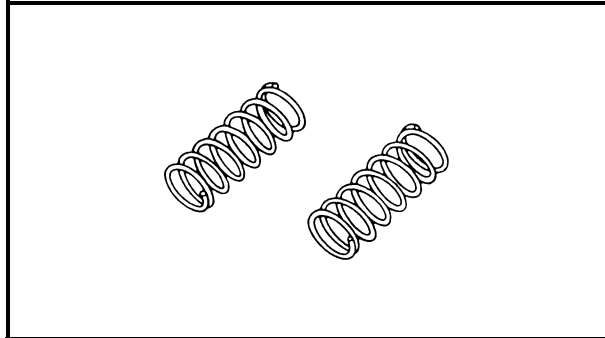


5. Measure:

- Brush length **a**  
Out of specification → Replace the brushes as a set.



**Min. brush length:**  
**3.5 mm (0.14 in)**

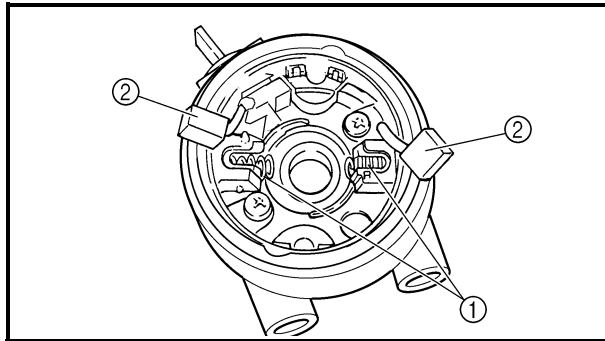


6. Measure:

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



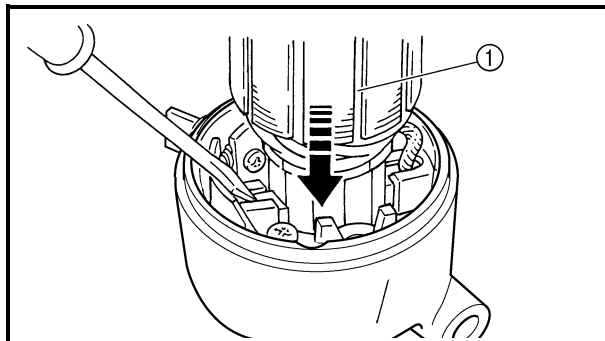
**Brush spring force:**  
**3.92 ~ 5.88 N**  
**(400 ~ 600 gf, 14.1 ~ 21.2 oz)**



**ASSEMBLY**

1. Install:

- Brush spring **①**
- Brush **②**

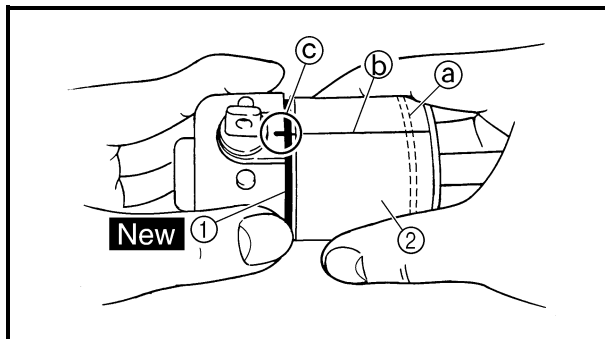


2. Install:

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

**CAUTION:**

**Be careful not to damage the brush during installation.**

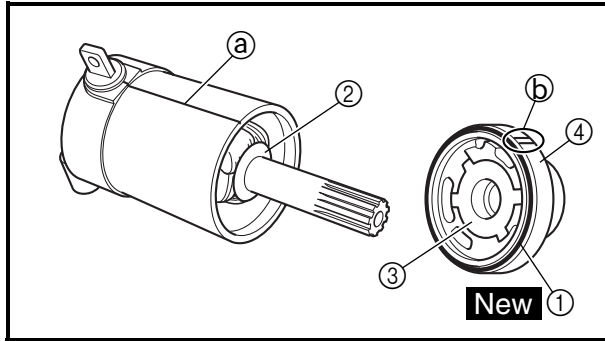
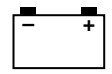


3. Install:

- Gasket **①** **New**
- Starter motor yoke **②**

**NOTE:**

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

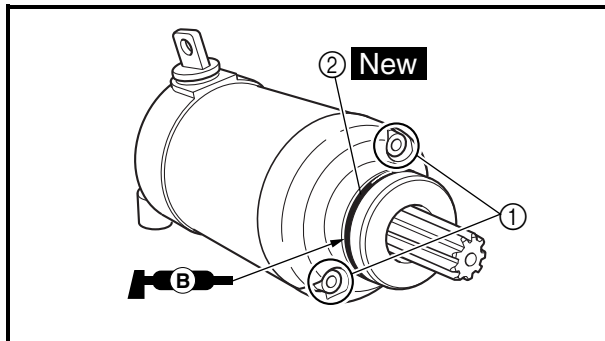


## 4. Install:

- Gasket ① **New**
- Circlip ④
- Plain washer ②
- Washer (starter motor front cover) ③
- Starter motor front cover ④

**NOTE:** \_\_\_\_\_

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



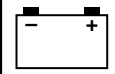
## 5. Install:

- Gasket
- Bolt ①
- O-ring ② **New**

**NOTE:** \_\_\_\_\_

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





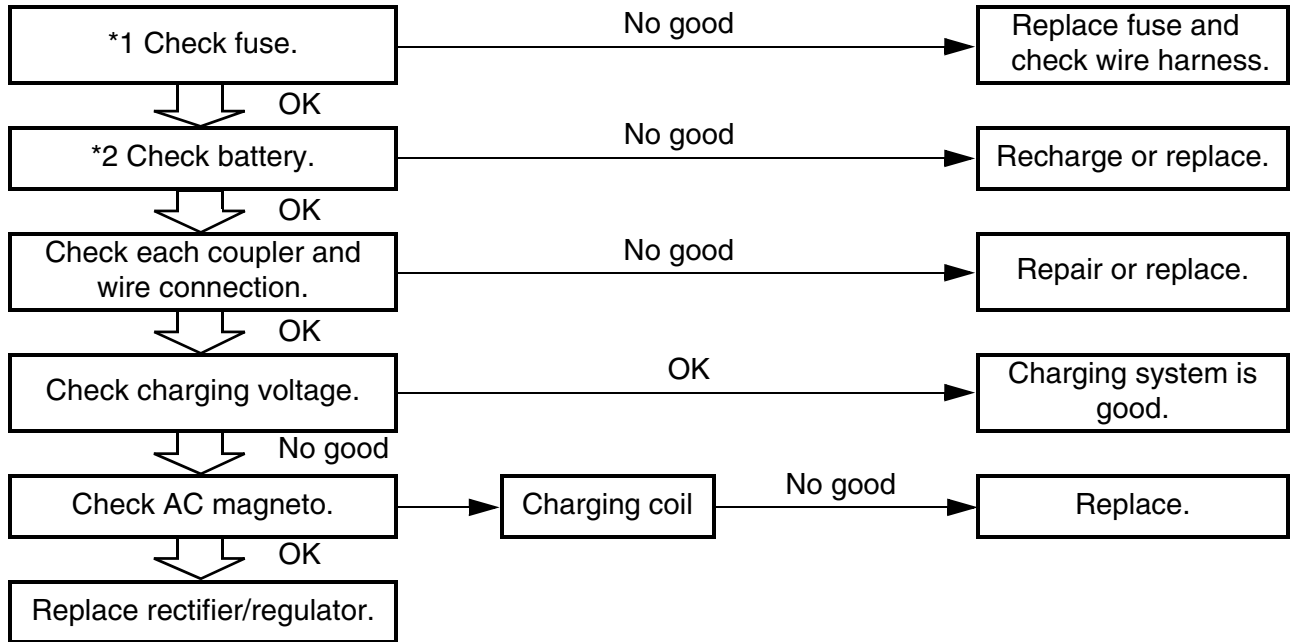
EC680000

**CHARGING SYSTEM**

EC681001

**INSPECTION STEPS**

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



\*1 marked: Refer to “FUSE INSPECTION” section in the CHAPTER 3.

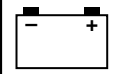
\*2 marked: Refer to “BATTERY INSPECTION AND CHARGING” section in the CHAPTER 3.

**NOTE:**

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



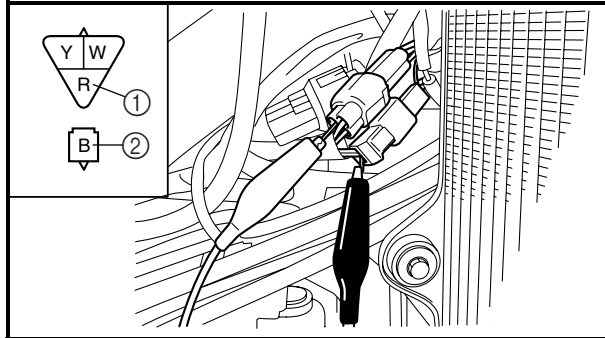
**Pocket tester:**  
YU-3112-C/90890-03112



EC624000

## COUPLERS AND LEADS CONNECTION INSPECTION


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

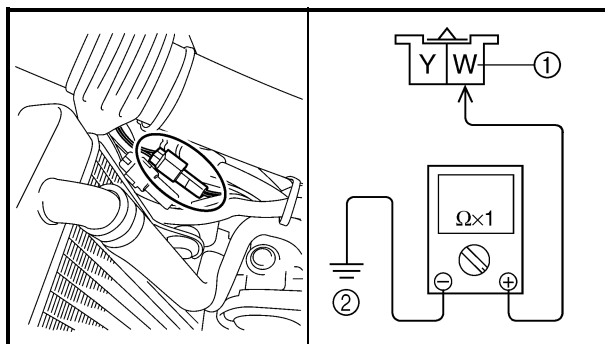


## CHARGING VOLTAGE INSPECTION

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


**Tester (+) lead → Red lead ①**  
**Tester (-) lead → Black lead ②**

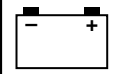
	Charging voltage	Tester selector position
	14.1 ~ 14.9 V at 5,000 r/min	DCV-20



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

**Tester (+) lead → White lead ①**  
**Tester (-) lead → Ground ②**

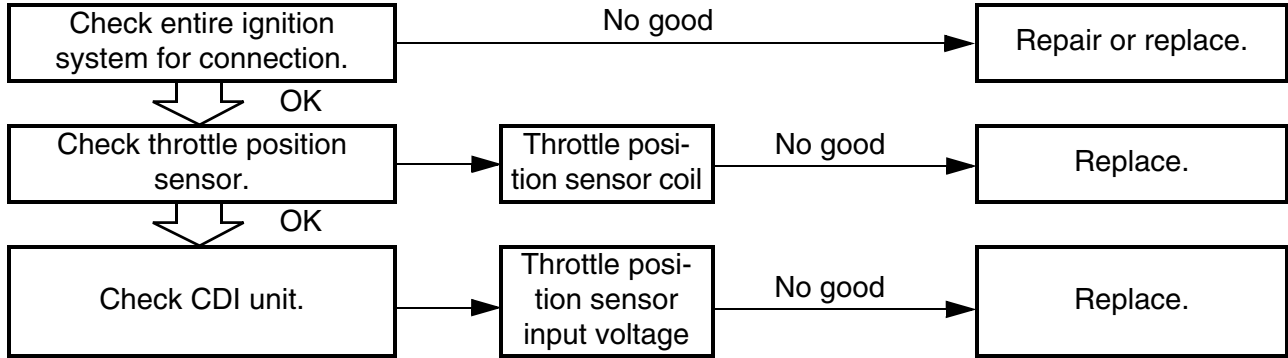
	Charging coil resistance	Tester selector position
	0.288 ~ 0.432 Ω at 20 °C (68 °F)	Ω × 1



**THROTTLE POSITION SENSOR SYSTEM**

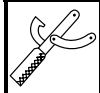
**INSPECTION STEPS**

If the throttle position sensor will not operate, use the following inspection steps.

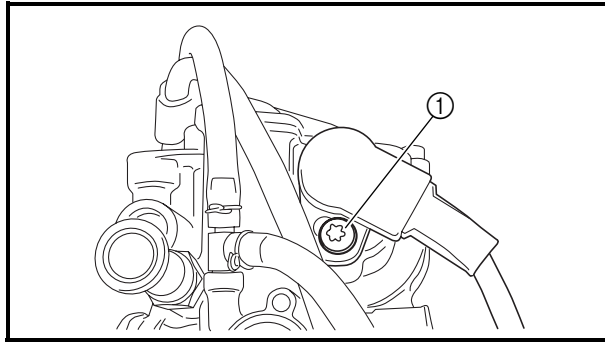
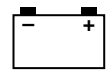


**NOTE:**

Use the following special tools in this inspection.



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



### HANDLING NOTE

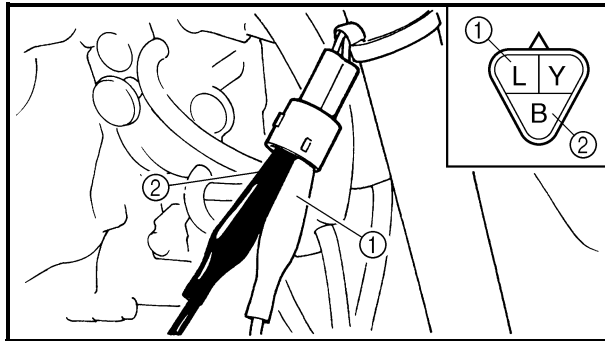
#### CAUTION:

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

EC624000

### COUPLERS AND LEADS CONNECTION INSPECTION


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

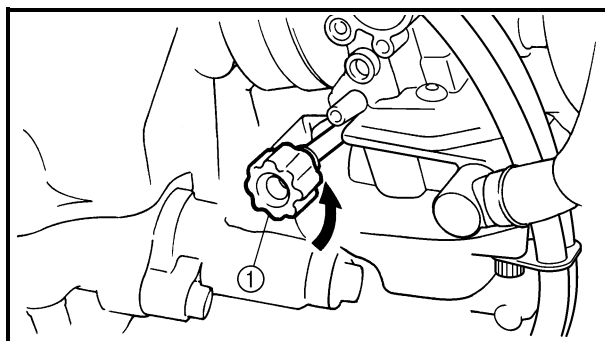


### THROTTLE POSITION SENSOR COIL INSPECTION

- Inspect:
  - Throttle position sensor coil resistance  
Out of specification → Replace.

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

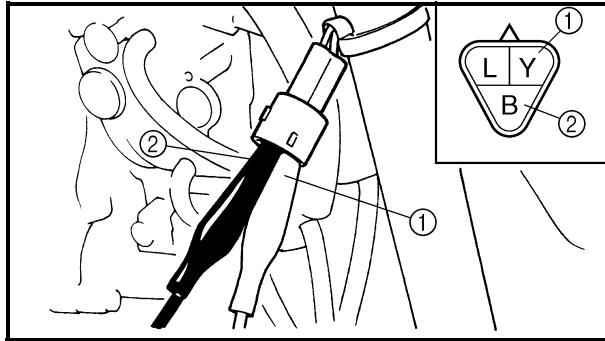
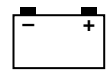
 Throttle position sensor coil resistance	Tester selector position
4 ~ 6 kΩ at 20 °C (68 °F)	kΩ × 1



- Loosen:
  - Throttle stop screw ①

#### NOTE:

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

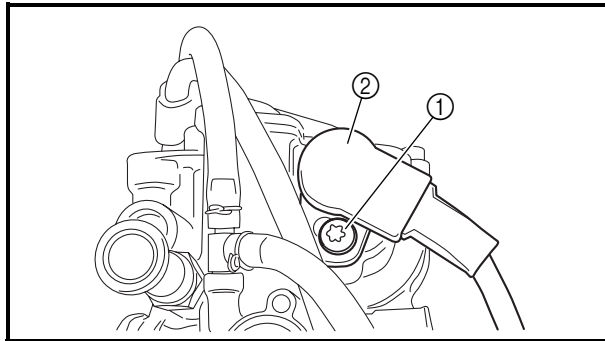


### 3. Inspect:

- Throttle position sensor coil variable resistance
- Check that the resistance is increased as the throttle grip is moved from the full close position to the full open position.  
Out of specification → Replace.

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Black lead ②**

	Throttle position sensor coil variable resistance		Tester selector position
	Full closed	Full opened	
	Zero ~ 3 kΩ at 20 °C (68 °F)	4 ~ 6 kΩ at 20 °C (68 °F)	kΩ × 1



## THROTTLE POSITION SENSOR REPLACEMENT AND ADJUSTMENT

### 1. Remove:

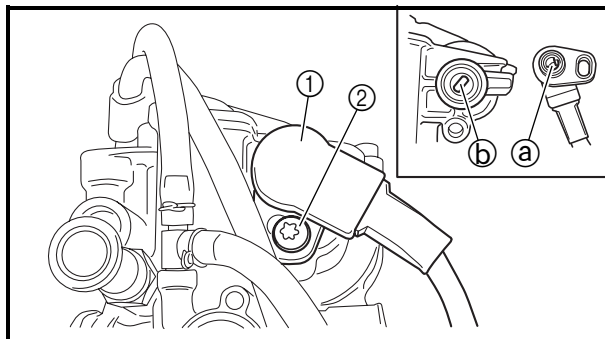
- Throttle position sensor coupler
- Screw (throttle position sensor) ①
- Throttle position sensor ②

### NOTE:

Loosen the screws (throttle position sensor) using the T25 bit.

### 2. Replace:

- Throttle position sensor

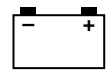


### 3. Install:

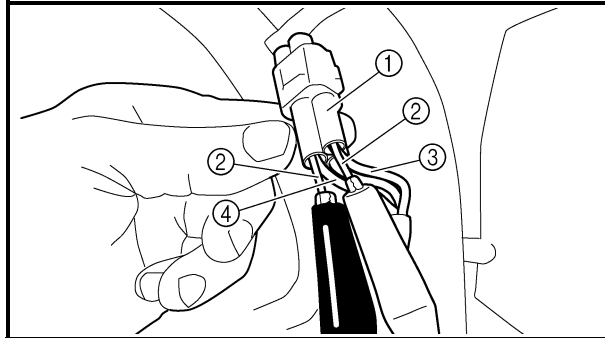
- Throttle position sensor ①
- Screw (throttle position sensor) ②
- Throttle position sensor coupler

### NOTE:

- Align the slot ① in the throttle position sensor with the projection ② on the carburetor.
- Temporarily tighten the screws (throttle position sensor).



4. Adjust:
  - Engine idling speed  
Refer to “ENGINE IDLING SPEED ADJUSTMENT” section in the CHAPTER 3.

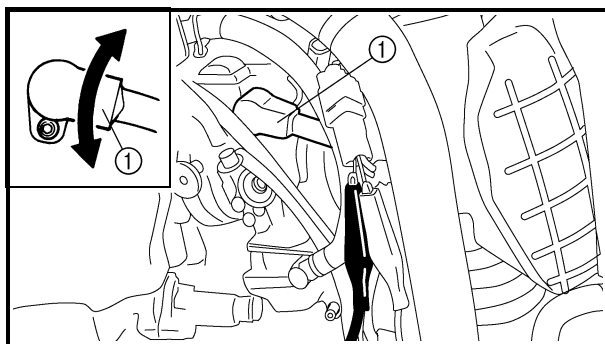


5. Insert the thin electric conductors ② (lead) into the throttle position sensor coupler ①, as shown, and connect the tester to them.

**Tester (+) lead → Yellow lead ③**  
**Tester (-) lead → Black lead ④**

**CAUTION:** \_\_\_\_\_

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




6. Start the engine.
7. Adjust:
  - Throttle position sensor output voltage

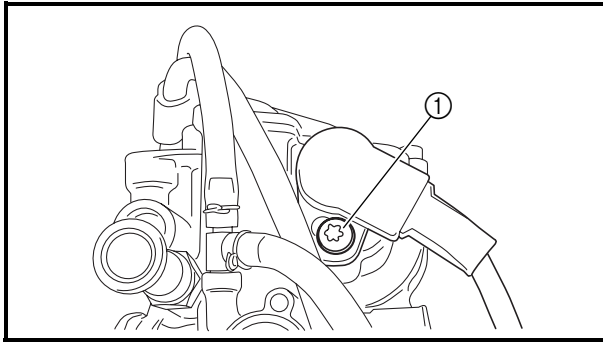
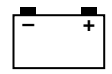
**Adjustment steps:**

Adjust the installation angle of the throttle position sensor ① to obtain the specified output voltage.

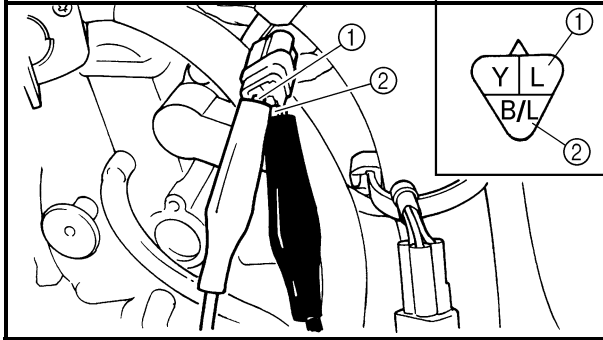
**NOTE:** \_\_\_\_\_

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

	<b>Throttle position sensor output voltage</b>	<b>Tester selector position</b>
	<b>0.58 ~ 0.78 V</b>	<b>DCV</b>



8. Tighten:
  - Screw (throttle position sensor) ①
9. Stop the engine.

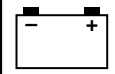


### THROTTLE POSITION SENSOR INPUT VOLTAGE INSPECTION

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

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

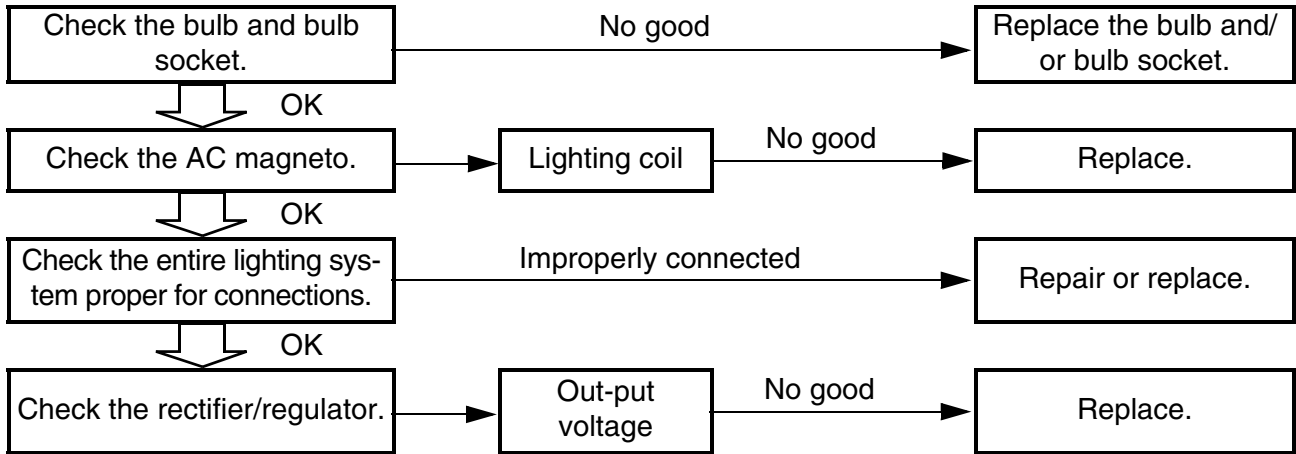
	Throttle position sensor input voltage	Tester selector position
	4 ~ 6 V	DCV-20



**LIGHTING SYSTEM**

**INSPECTION STEPS**

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



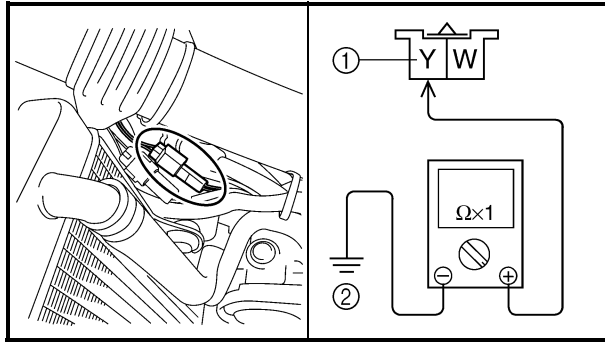
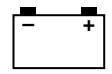
**NOTE:**

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



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




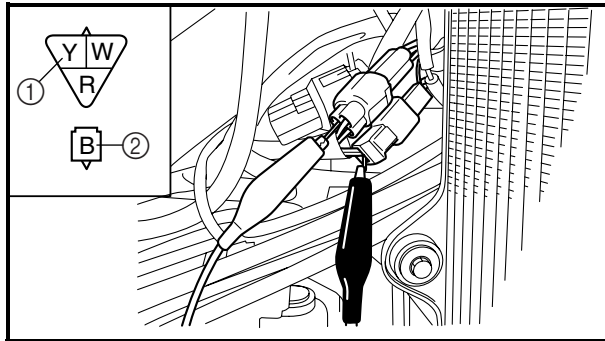


**AC MAGNETO INSPECTION**

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

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Ground ②**


 <b>Lighting coil resistance</b>	<b>Tester selector position</b>
<b>0.224 ~ 0.336 Ω at 20 °C (68 °F)</b>	<b>Ω × 1</b>



**RECTIFIER/REGULATOR INSPECTION**

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

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Black lead ②**

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



EC700000

## TUNING

EC710000

### ENGINE

#### Carburetor setting

- The air/fuel mixture will vary depending on atmospheric conditions. Therefore, it is necessary to take into consideration the air pressure, ambient temperature, humidity, etc., when adjusting the carburetor.
- Perform a test run to check for proper engine performance (e.g., throttle response) and spark plug(-s) discoloration or fouling. Use these readings to determine the best possible carburetor setting.

#### NOTE:

It is recommended to keep a record of all carburetor settings and external conditions (e.g., atmospheric conditions, track/surface conditions, lap times) to make future carburetor setting easier.

#### WARNING

- **The carburetor is a part of the fuel line. Therefore, be sure to install it in a well-ventilated area, away from flammable objects and any sources of fire.**
- **Never look into the carburetor intake. Flames may shoot out from the pipe if the engine backfires while it is being started. Gasoline may be discharged from the accelerator pump nozzle when the carburetor has been removed.**

**CAUTION:**

- The carburetor is extremely sensitive to foreign matter (dirt, sand, water, etc.). During installation, do not allow foreign matter to get into the carburetor.
- Always handle the carburetor and its components carefully. Even slight scratches, bends or damage to carburetor parts may prevent the carburetor from functioning correctly. Carefully perform all servicing with the appropriate tools and without applying excessive force.
- When the engine is stopped or when riding at no load, do not open and close the throttle unnecessarily. Otherwise, too much fuel may be discharged, starting may become difficult or the engine may not run well.
- After installing the carburetor, check that the throttle operates correctly and opens and closes smoothly.

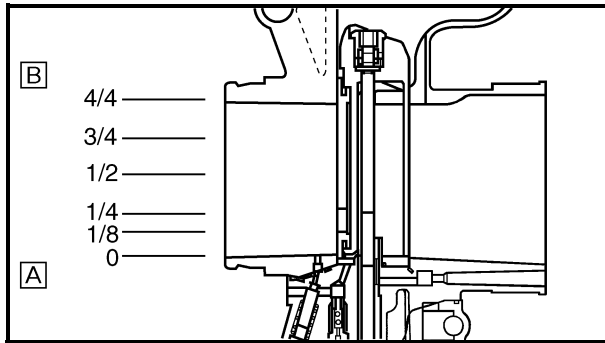
**Atmospheric conditions and carburetor settings**

Air temp.	Humidity	Air pressure (altitude)	Mixture	Setting
High	High	Low (high)	Richer	Leaner
Low	Low	High (low)	Leaner	Richer

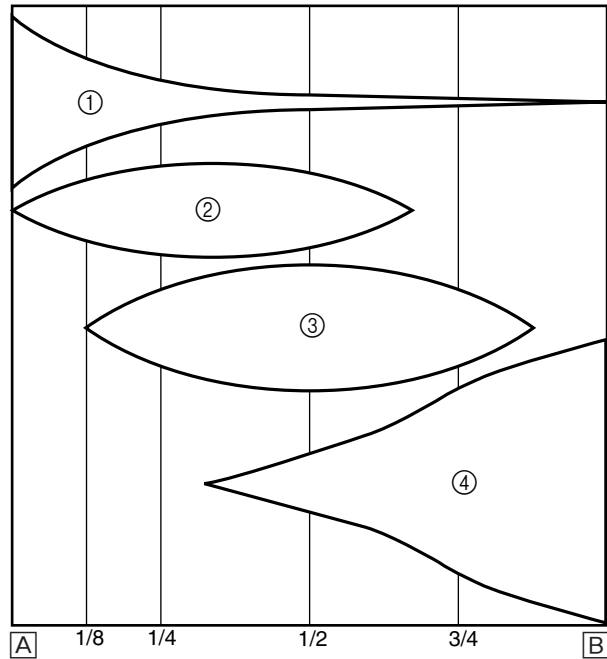
The air density (i.e., concentration of oxygen in the air) determines the richness or leanness of the air/fuel mixture. Therefore, refer to the above table for mixture settings.

That is:

- Higher temperature expands the air with its resultant reduced density.
- Higher humidity reduces the amount of oxygen in the air by so much of the water vapor in the same air.
- Lower atmospheric pressure (at a high altitude) reduces the density of the air.



**Effects of the setting parts on the throttle valve opening**



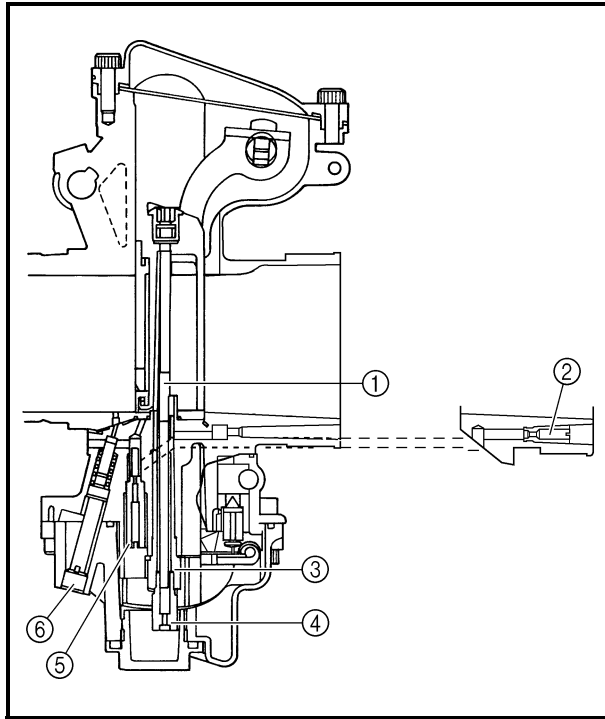
- A Closed
- B Fully open
- ① Pilot screw/pilot jet
- ② Throttle valve cutaway
- ③ Jet needle
- ④ Main jet

**Main system**

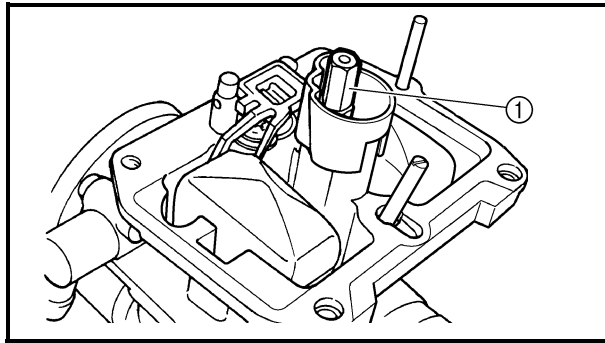
The FLATCR carburetor has a primary main jet. This type of main jet is perfect for racing motorcycles since it supplies an even flow of fuel, even at full load. Use the main jet and the jet needle to set the carburetor.

**Pilot system**

The FLATCR carburetor is manufactured with a pilot screw. The pilot screw adjustment ranges from fully closed throttle to 1/4 open throttle.



- ① Jet needle
- ② Pilot air jet
- ③ Needle jet
- ④ Main jet
- ⑤ Pilot jet
- ⑥ Pilot screw



**Main jet adjustment**

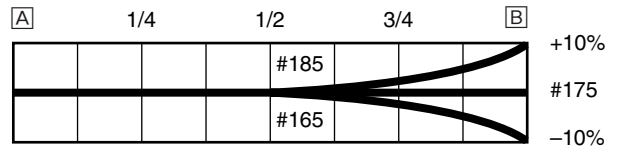
The richness of the air-fuel mixture at full throttle can be set by changing the main jet ①.

<b>Standard main jet</b>	<b>#175</b> * #170
--------------------------	-----------------------

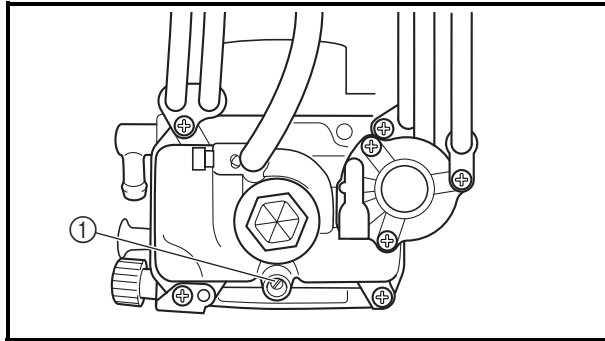
\* Except for USA

If the air-fuel mixture is too rich or too lean, the engine power will drop, resulting in poor acceleration.

**Effects of changing the main jet (reference)**



- [A] Idle
- [B] Fully open



**Pilot screw adjustment**

The richness of the air-fuel mixture with the throttle fully closed to 1/4 open can be set by turning the pilot screw ①. Turning in the pilot screw will make the mixture lean at low speeds, and turning it out will enrich it.

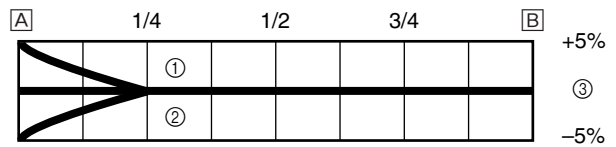
<b>Standard pilot screw position</b>	<b>2 (example) * 1-1/2</b>
--------------------------------------	--------------------------------

\* Except for USA

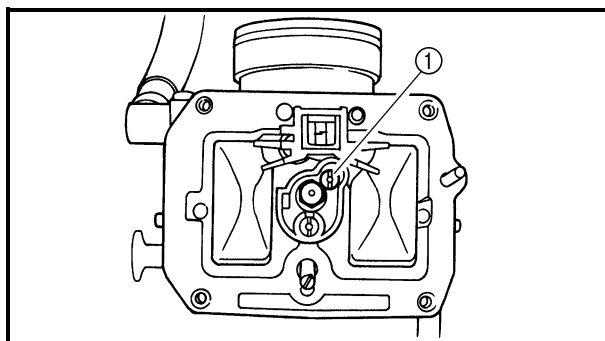
**NOTE:**

- If the engine idling speed fluctuates, turn the pilot screw only 1/2 of a turn in either direction.
- To optimize the fuel flow at a smaller throttle opening, each machine's pilot screw has been individually set at the factory. Before adjusting the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

**Effects of adjusting the pilot screw (reference)**



- Ⓐ Idle
- Ⓑ Fully open
- ① 2-1/2 turns out
- ② 1-1/2 turns out
- ③ 2 turns out



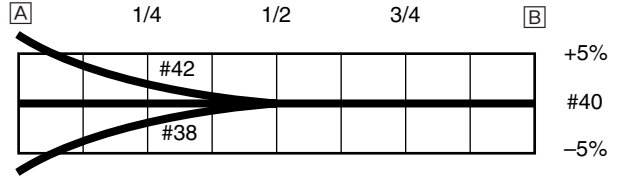
**Pilot jet adjustment**

The richness of the air-fuel mixture with the throttle open 1/4 or less can be set by adjusting the pilot jet ①.

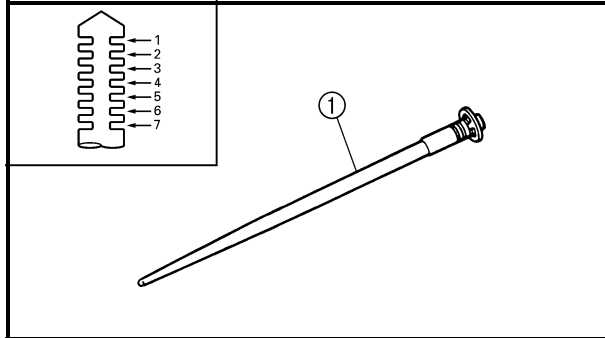
<b>Standard pilot jet</b>	<b>#40</b>
---------------------------	------------



**Effects of adjusting the pilot jet (reference)**



- A Idle
- B Fully open



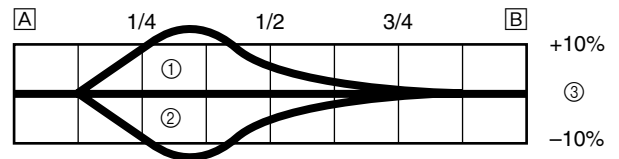
**Jet needle groove position adjustment**

Adjusting the jet needle ① position affects the acceleration when the throttle is 1/8 to 3/4 open.

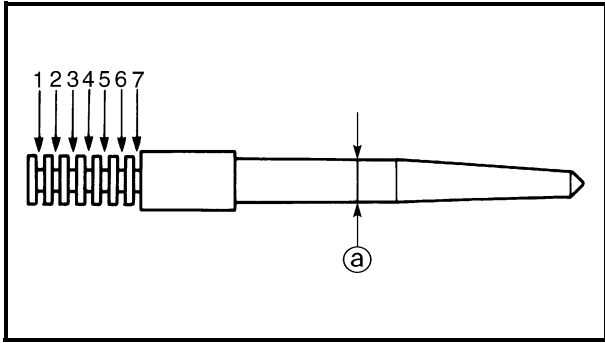
1. Too rich at intermediate speeds  
Rough engine operation is felt and the engine will not pick up speed smoothly. In this case, step up the jet needle clip by one groove and move down the needle to lean out the mixture.
2. Too lean at intermediate speeds  
The engine breathes hard and will not pick up speed quickly. Step down the jet needle clip by one groove and move up the needle to enrich the mixture.

<b>Standard clip position</b>	<b>No.4 groove</b>
-------------------------------	--------------------

**Effects of changing the jet needle groove position (reference)**



- A Idle
- B Fully open
- ① No.5 groove
- ② No.3 groove
- ③ No.4 groove



**Jet needle adjustment**

The jet needle is adjusted by changing it.

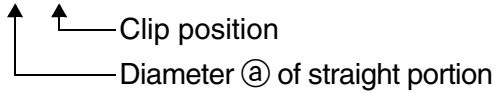
<b>Standard jet needle</b>	<b>OBDUS * OBEKQ</b>
----------------------------	--------------------------

\* Except for USA

The tapered sections of all jet needles have the same starting positions, but the needles are available with different straight-portion diameters.

<Example>

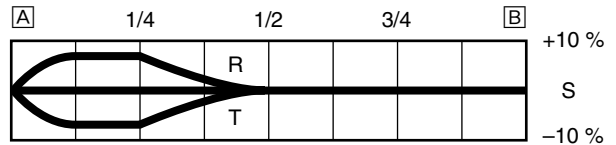
OBDUS - 4



**Effects of changing the jet needle (reference)**

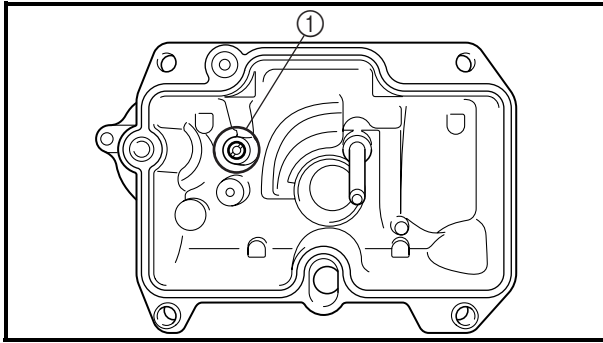
(Diameter of the straight portion)

Changing the diameter of the straight portion adjusts the air-fuel mixture when the throttle is 1/8 to 1/4 open.



- [A] Idle
- [B] Fully open





### Leak jet adjustment (accelerator pump adjustment)

The leak jet ① is a setting part that adjusts the flow of fuel discharged by the accelerator pump. Since the accelerator pump operates only when throttle is open, the leak jet is used to adjust a fuel mixture ratio for quick throttle opening and is therefore different from other setting parts that adjust a fuel mixture for each throttle opening (each engine speed).

1. The engine breathes hard in quick throttle opening.

Select a leak jet having lower calibrating No. than standard to enrich the mixture.

<Example> #70 → #60

2. Rough engine operation is felt in quick throttle opening.

Select a leak jet having higher calibrating No. than standard to lean out the mixture.

<Example> #70 → #80

<b>Standard leak jet</b>	<b>#70</b> <b>* #90</b>
--------------------------	----------------------------

\* Except for USA

### Relationship with throttle opening

The flow of the fuel through the carburetor main system is controlled by the main jet and then, it is further regulated by the area between the main nozzle and the jet needle.

The fuel flow relates to the diameter of the straight portion of the jet needle with the throttle 1/8 to 1/4 open and relates to the clip position with the throttle 1/8 to 3/4 open.

Therefore, the fuel flow is balanced at each stage of throttle opening by the combination of the jet needle straight portion diameter and clip position.



EC71Q000

Carburetor setting parts

Part name	Size	Part number
Main jet  (STD)  * (STD)	Rich	#188 4MX-14943-95
	▲	#185 4MX-14943-44
		#182 4MX-14943-94
		#180 4MX-14943-43
		#178 4MX-14943-93
		#175 4MX-14943-42
		#172 4MX-14943-92
		#170 4MX-14943-41
		#168 4MX-14943-91
		#165 4MX-14943-40
		#162 4MX-14943-90
		#160 4MX-14943-39
	Lean	#158 4MX-14943-89
Pilot jet  (STD)	Rich	#50 4MX-14948-07
	▲	#48 4MX-14948-06
		#45 4MX-14948-05
		#42 4MX-14948-04
		#40 4MX-14948-03
		#38 4MX-14948-02
		#35 4MX-14948-01
	Lean	
Jet needle  (STD)	Rich	OBDUP 5TJ-14916-DP
	▲	OBDUQ 5TJ-14916-D1
		OBDUR 5TJ-14916-DR
		OBDUS 5TJ-14916-DS
		OBDUT 5TJ-14916-DT
		OBDUU 5TJ-14916-DU
		OBDUV 5TJ-14916-DV
	Lean	
* Jet needle	Rich	OBEKM 5JG-14916-EM
	▲	OBEKN 5JG-14916-EN
		OBEKP 5JG-14916-EP
		OBEKQ 5JG-14916-E1
		OBEKR 5JG-14916-ER
		OBEKS 5JG-14916-ES
		OBEKT 5JG-14916-ET
	Lean	
Leak jet  (STD)  * (STD)	Rich	#40 4JT-1494F-03
	▲	#50 4JT-1494F-07
		#60 4JT-1494F-11
		#70 4JT-1494F-15
		#80 4JT-1494F-19
		#90 4JT-1494F-23
		#100 4JT-1494F-27
		#110 4JT-1494F-29
		#120 4JT-1494F-31
	Lean	

\* Except for USA



### Examples of carburetor setting depending on symptom

Symptom	Setting	Checking
At full throttle Hard breathing Shearing noise Whitish spark plug ↓ Lean mixture	Increase main jet calibration no. (Gradually)	Discoloration of spark plug → If tan color, it is in good condition. If cannot be corrected: Clogged float valve seat Clogged fuel hose Clogged fuel cock Check that the accelerator pump operates smoothly.
At full throttle Speed pick-up stops Slow speed pick-up Slow response Sooty spark plug ↓ Rich mixture	Decrease main jet calibration no. (Gradually)	Discoloration of spark plug → If tan color, it is in good condition. If cannot be corrected: Clogged air filter Fuel overflow from carburetor
Lean mixture	Lower jet needle clip position. (1 groove down)	
Rich mixture	Raise jet needle clip position. (1 groove up)	
1/4 ~ 3/4 throttle Hard breathing Lack of speed	Lower jet needle clip position. (1 groove down)	
1/4 ~ 1/2 throttle Slow speed pick-up Poor acceleration	Raise jet needle clip position. (1 groove up)	The clip position is the jet needle groove on which the clip is installed. The positions are numbered from the top. Check that the accelerator pump operates smoothly. (except for rich mixture symptom).
Closed to 1/4 throttle Hard breathing Speed down	Use jet needle with a smaller diameter.	Slow-speed-circuit passage Clogged → Clean. Overflow from carburetor
Closed to 1/4 throttle Poor acceleration	Use jet needle with a larger diameter. Raise jet needle clip position. (1 groove up)	
Poor response in the low to intermediate speeds	Raise jet needle clip position. If this has no effect, lower the jet needle clip position.	
Poor response when throttle is opened quickly	Check overall settings. Use main jet with a lower calibration no. Raise jet needle clip position. (1 groove up) If these have no effect, use a main jet with a higher calibration no. and lower the jet needle clip position.	Check air filter for fouling.  Check that the accelerator pump operates smoothly.

\* This should be taken simply for an example. It is necessary to set the carburetor while checking the operating conditions of the engine.



EC720000

## CHASSIS

### Selection of the secondary reduction ratio (Sprocket)

$$\text{Secondary reduction ratio} = \frac{\text{Number of rear wheel sprocket teeth}}{\text{Number of drive sprocket teeth}}$$

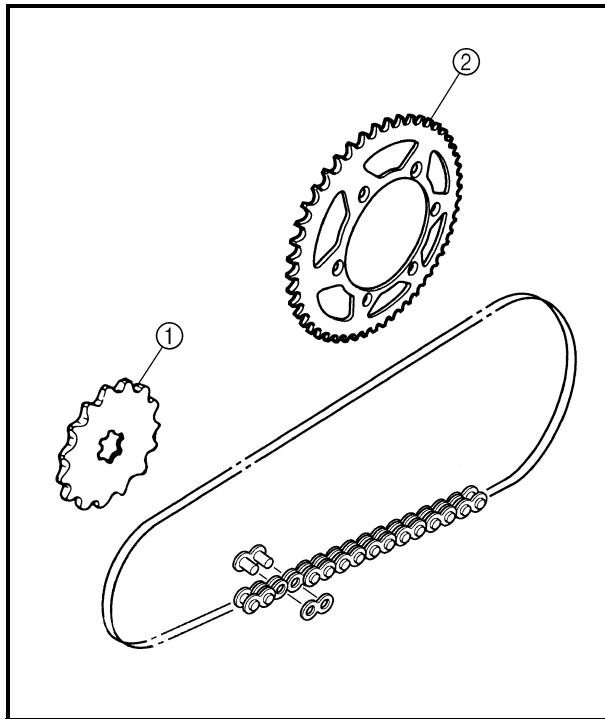
<b>Standard secondary reduction ratio</b>	<b>52/13 (4.000)</b>
---	----------------------

<Requirement for selection of secondary gear reduction ratio>

- It is generally said that the secondary gear ratio should be reduced for a longer straight portion of a speed course and should be increased for a course with many corners. Actually, however, as the speed depends on the ground condition of the day of the race, be sure to run through the circuit to set the machine suitable for the entire course.
- In actuality, it is very difficult to achieve settings suitable for the entire course and some settings may be sacrificed. Thus, the settings should be matched to the portion of the course that has the greatest effect on the race result. In such a case, run through the entire course while making notes of lap times to find the best balance; then, determine the secondary reduction ratio.
- If a course has a long straight portion where a machine can run at maximum speed, the machine is generally set such that it can develop its maximum revolutions toward the end of the straight line, with care taken to avoid the engine over-revving.

#### **NOTE:**

Riding technique varies from rider to rider and the performance of a machine also vary from machine to machine. Therefore, do not imitate other rider's settings from the beginning but choose your own setting according to the level of your riding technique.



EC72N000

### Drive and rear wheel sprockets setting parts

Part name	Size	Part number
Drive sprocket ① (STD)	13T	9383B-13218
	* 14T	9383B-14222
Rear wheel sprocket ②	48T	5GS-25448-50
	* 48T	5NY-25448-00
	* 49T	5NY-25449-00
	50T	5GS-25450-50
	* 50T	5NY-25450-00
	* 51T	5NY-25451-00
	(STD) 52T	5GS-25452-50
	* (STD) 52T	5NY-25452-00
	54T	5PH-25454-50

\* For AUS and NZ

EC721002

### Tire pressure

Tire pressure should be adjust to suit the road surface condition of the circuit.



**Standard tire pressure:**  
100 kPa (1.0 kgf/cm<sup>2</sup>, 15 psi)

- Under a rainy, muddy, sandy, or slippery condition, the tire pressure should be lower for a larger area of contact with the road surface.



**Extent of adjustment:**  
60 ~ 80 kPa  
(0.6 ~ 0.8 kgf/cm<sup>2</sup>, 9.0 ~ 12 psi)

- Under a stony or hard road condition, the tire pressure should be higher to prevent a flat tire.



**Extent of adjustment:**  
100 ~ 120 kPa  
(1.0 ~ 1.2 kgf/cm<sup>2</sup>, 15 ~ 18 psi)



EC722011

**Front fork setting**

The front fork setting should be made depending on the rider's feeling of an actual run and the circuit conditions.

The front fork setting includes the following three factors:

1. Setting of air spring characteristics
  - Change the fork oil level.
2. Setting of spring preload
  - Change the spring.
  - Install the adjustment washer.
3. Setting of damping force
  - Change the compression damping.
  - Change the rebound damping.

The spring acts on the load and the damping force acts on the cushion travel speed.

EC723001

**Change in level and characteristics of fork oil**

Damping characteristic near the final stroke can be changed by changing the fork oil amount.

**CAUTION:**

**Adjust the oil level in 5 mm (0.2 in) increments or decrements. Too low oil level causes the front fork to produce a noise at full rebound or the rider to feel some pressure on his hands or body. Alternatively, too high oil level will develop unexpectedly early oil lock with the consequent shorter front fork travel and deteriorated performance characteristics. Therefore, adjust the front fork within the specified range.**

**Standard oil level:**

125 mm (4.92 in)

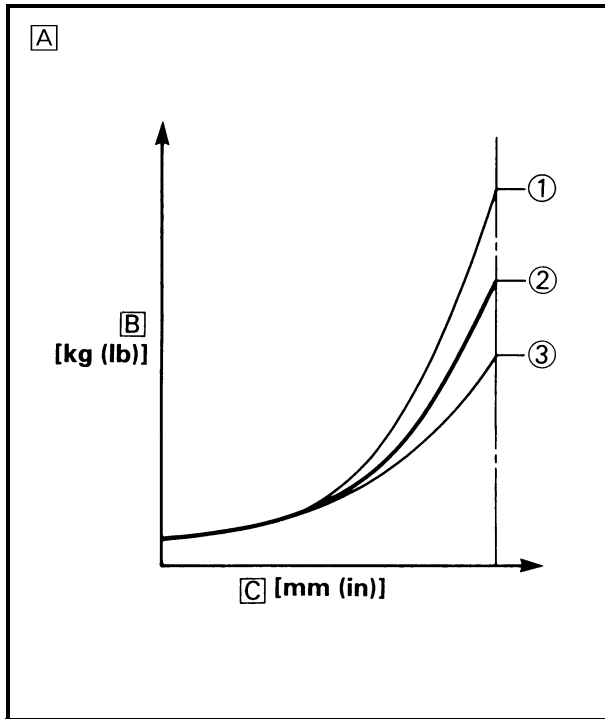
\* 130 mm (5.12 in)

**Extent of adjustment:**

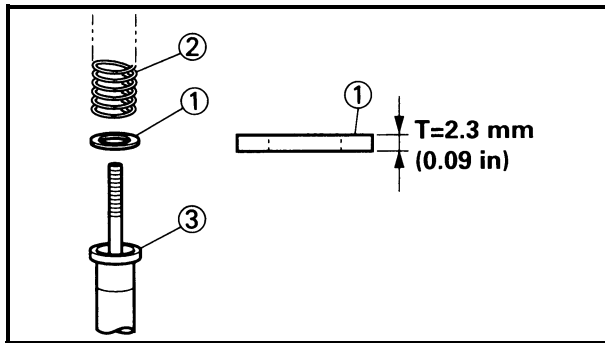
80 ~ 150 mm (3.15 ~ 5.91 in)

**From top of outer tube with inner tube and damper rod fully compressed without spring.**

\* For EUROPE, AUS, NZ and ZA



- A Air spring characteristics in relation to oil level change
- B Load
- C Stroke
- 1 Max. oil level
- 2 Standard oil level
- 3 Min. oil level



EC727020

**Spring preload adjustment**

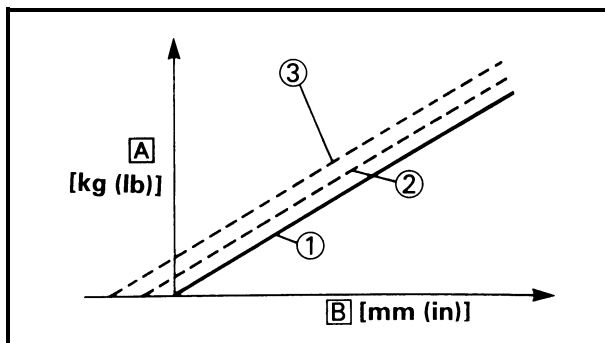
The spring preload is adjusted by installing the adjustment washer 1 between the fork spring 2 and damper rod 3.

**CAUTION:**

Do not install three or more adjustment washers for each front fork.

**WARNING**

Always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.



**Standard washer quantity:**  
Zero adjustment washers  
**Extent of adjustment:**  
Zero ~ 2 adjustment washers

- A Load
- B Fork stroke
- 1 Without adjustment washer (standard)
- 2 1 adjustment washer
- 3 2 adjustment washers



EC72A001

### Setting of spring after replacement

As the front fork setting can be easily affected by rear suspension, take care so that the machine front and rear are balanced (in position, etc.) when setting the front fork.

#### 1. Use of soft spring

Generally a soft spring gives a soft riding feeling. Rebound damping tends to become stronger and the front fork may sink deeply over a series of gaps.

To set a soft spring:

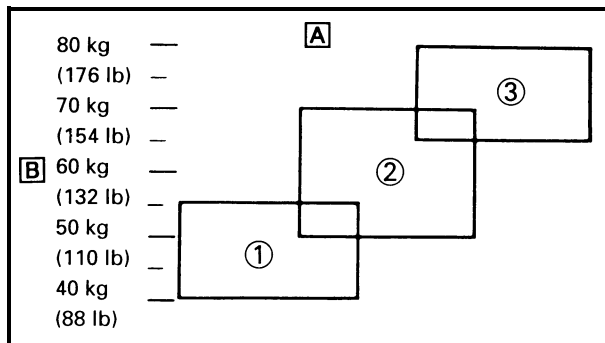
- Change the rebound damping.  
Turn out one or two clicks.
- Change the compression damping.  
Turn in one or two clicks.

#### 2. Use of stiff spring

Generally a stiff spring gives a stiff riding feeling. Rebound damping tends to become weaker, resulting in lack of a sense of contact with the road surface or in a vibrating handlebar.

To set a stiff spring:

- Change the rebound damping.  
Turn in one or two clicks.
- Change the compression damping.  
Turn out one or two clicks.



Ⓐ Coverage of spring by weight

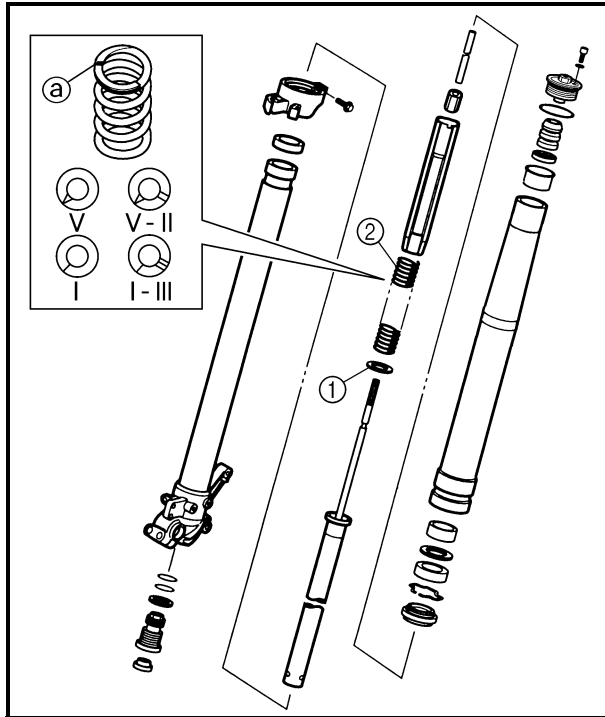
Ⓑ Rider weight

① Soft

② Standard

③ Stiff





EC72P000

**Front fork setting parts**

- Adjustment washer ①

TYPE (thickness)	PART NUMBER
T = 2.3 mm (0.09 in)	4SS-23364-L0

- Front fork spring ②

[Equal pitch spring]

TYPE	SPRING RATE	SPRING PART NUMBER	I.D. MARK (slits)
SOFT	0.380	4SS-23141-10	I-I
	0.390	4SS-23141-20	I-II
	0.400	4SS-23141-30	I-III
	0.410	4SS-23141-40	I
* STD	0.420	4SR-23141-L0	-
** STD	0.430	4XL-23141-L0	-
STD	0.440	5NL-23141-00	-
STIFF	0.450	5BE-23141-L0	-
	0.460	5BE-23141-00	IIIIII
	0.470	5GR-23141-00	II-II

\* For EUROPE

\*\* For AUS, NZ and ZA

[Unequal pitch spring]

TYPE	SPRING RATE (approx.)	SPRING PART NUMBER	I.D. MARK (slits)
SOFT	0.400	5ET-23141-20	V
	0.410	5ET-23141-00	V-I
	0.420	5ET-23141-30	V-II
	0.430	5ET-23141-10	V-III
STIFF	0.440	5ET-23141-40	V-IIII

**NOTE:**

- The unequal pitch spring is softer in initial characteristic than the equal pitch spring and is difficult to bottom out under full compression.
- The I.D. mark (slits) ② is proved on the end of the spring.



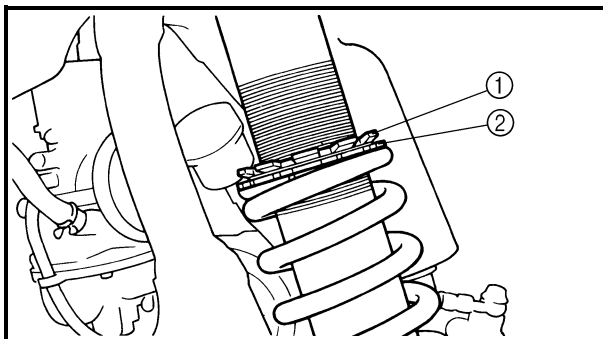
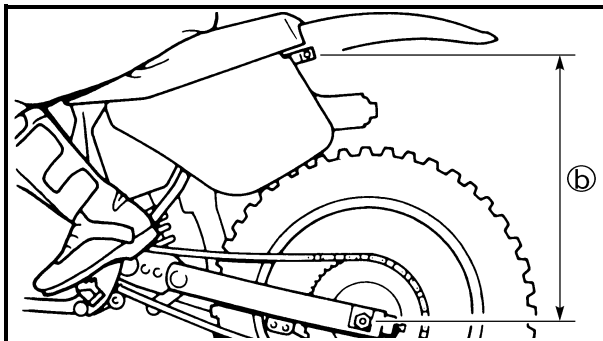
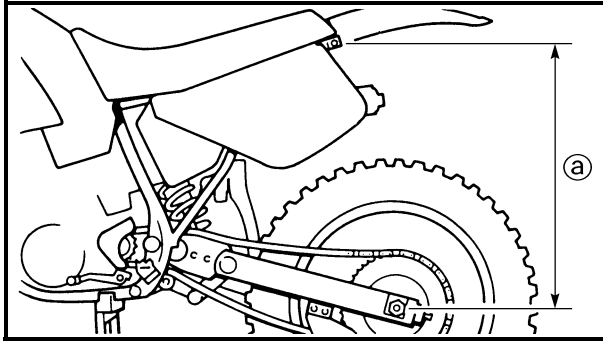
EC72B000

### Rear suspension setting

The rear suspension setting should be made depending on the rider's feeling of an actual run and the circuit conditions.

The rear suspension setting includes the following two factors:

1. Setting of spring preload
  - Change the set length of the spring.
  - Change the spring.
2. Setting of damping force
  - Change the rebound damping.
  - Change the compression damping.



EC72C001

### Choosing set length

1. Place a stand or block under the engine to put the rear wheel above the floor, and measure the length ① between the rear wheel axle center and the rear fender holding bolt.
2. Remove the stand or block from the engine and with a rider astride the seat, measure the sunken length ② between the rear wheel axle center and the rear fender holding bolt.
3. Loosen the locknut ① and make adjustment by turning the spring adjuster ② to achieve the standard figure from the subtraction of the length ② from the length ①.



**Standard figure:**  
90 ~ 100 mm (3.5 ~ 3.9 in)

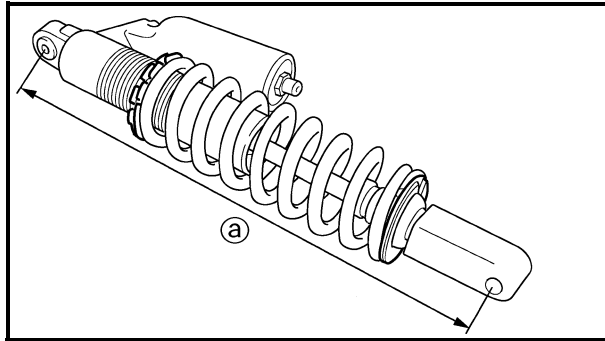
**NOTE:**

- If the machine is new and after it is broken in, the same set length of the spring may change because of the initial fatigue, etc. of the spring. Therefore, be sure to make re-evaluation.
- If the standard figure cannot be achieved by adjusting the spring adjuster and changing the spring set length, replace the spring with an optional one and make re-adjustment.

**Setting of spring after replacement**

After replacement, be sure to adjust the spring to the set length [sunken length 90 ~ 100 mm (3.5 ~ 3.9 in)] and set it.

1. Use of soft spring
    - Set the soft spring for less rebound damping to compensate for its less spring load. Run with the rebound damping adjuster one or two clicks on the softer side and readjust it to suit your preference.
  2. Use of stiff spring
    - Set the soft spring for more rebound damping to compensate for its greater spring load. Run with the rebound damping adjuster one or two clicks on the stiffer side and readjust it to suit your preference.
- \* Adjusting the rebound damping will be followed more or less by a change in the compression damping. For correction, turn the low compression damping adjuster on the softer side.

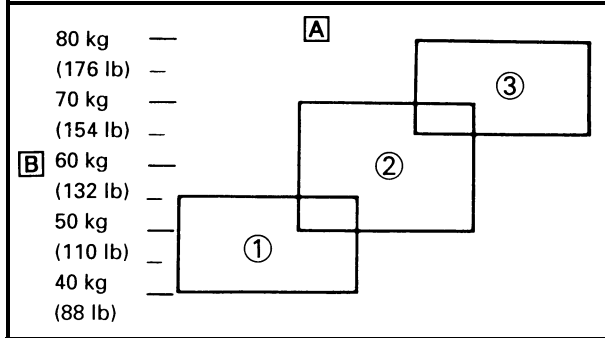


**CAUTION:**

When using a rear shock absorber other than currently installed, use the one whose overall length **a** does not exceed the standard as it may result in faulty performance. Never use one whose overall length is greater than standard.



**Length **a** of standard shock:  
490.5 mm (19.31 in)**



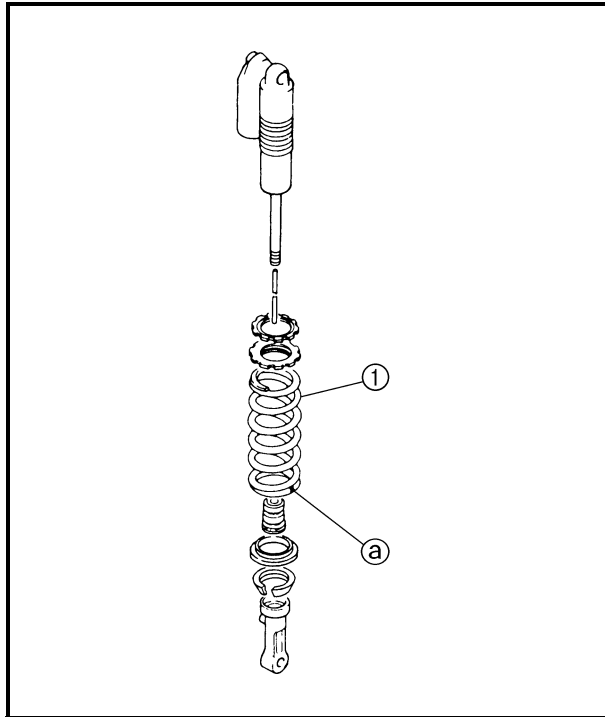
**A** Coverage of spring by weight

**B** Rider weight

① Soft

② Standard

③ Stiff



EC72Q000

**Rear shock absorber setting parts**

- Rear shock spring ①
- [Equal pitch spring]

TYPE	SPRING RATE	SPRING PART NUMBER	I.D. COLOR/ POINT	SPRING FREE LENGTH
SOFT	4.3	5UN-22212-00	Brown/1	260
	4.5	5UN-22212-10	Green/1	260
* STD	4.7	5UN-22212-20	Red/1	260
	4.9	5UN-22212-30	Black/1	260
STD	5.1	5UN-22212-40	Blue/1	260
STIFF	5.3	5UN-22212-50	Yellow/1	260
	5.5	5UN-22212-60	Pink/1	260
	5.7	5UN-22212-70	White/1	260

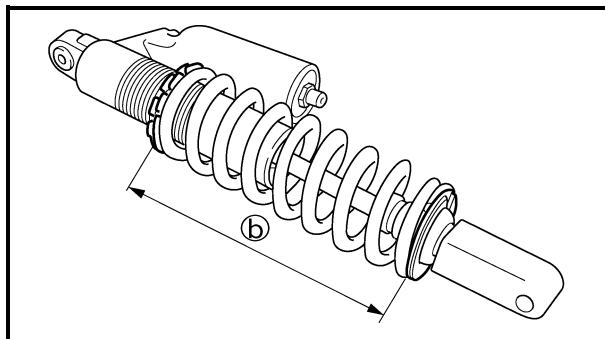
\* For EUROPE

[Unequal pitch spring]

TYPE	SPRING RATE (approx.)	SPRING PART NUMBER	I.D. COLOR/ POINT	SPRING FREE LENGTH
SOFT	4.5	5UN-22212-A0	Green/2	275
	4.7	5UN-22212-B0	Red/2	275
	4.9	5UN-22212-C0	Black/2	275
	5.1	5UN-22212-D0	Blue/2	275
	5.3	5UN-22212-E0	Yellow/2	275
	5.5	5UN-22212-F0	Pink/2	275
STIFF	5.7	5UN-22212-G0	White/2	275

**NOTE:**

- The unequal pitch spring is softer in initial characteristic than the equal pitch spring and is difficult to bottom out under full compression.
- The I.D. color ② is marked at the end of the spring.



- Extent of adjustment (spring length)

SPRING FREE LENGTH	EXTENT OF ADJUSTMENT ②
260 mm (10.24 in)	240.5 ~ 258.5 mm (9.47 ~ 10.18 in)
275 mm (10.83 in)	255.5 ~ 273.5 mm (10.06 ~ 10.77 in)



EC72H002

## Suspension setting

- Front fork

### NOTE:

- If any of the following symptoms is experienced with the standard position as the base, make resetting by reference to the adjustment procedure given in the same chart.
- Before any change, set the rear shock absorber sunken length to the standard figure 90 ~ 100 mm (3.5 ~ 3.9 in).

Symptom	Section				Check	Adjust
	Jump	Large gap	Medium gap	Small gap		
Stiff over entire range	○	○	○		Compression damping Oil level (oil amount) Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Decrease oil level by about 5 ~ 10 mm (0.2 ~ 0.4 in). Replace with soft spring.
Unsmooth movement over entire range	○	○	○	○	Outer tube Inner tube Under bracket tightening torque	Check for any bends, dents, and other noticeable scars, etc. If any, replace affected parts. Retighten to specified torque.
Poor initial movement				○	Rebound damping Oil seal	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Apply grease in oil seal wall.
Soft over entire range, bottoming out	○	○			Compression damping Oil level (oil amount) Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Increase oil level by about 5 ~ 10 mm (0.2 ~ 0.4 in). Replace with stiff spring.
Stiff toward stroke end	○				Oil level (oil amount)	Decrease oil level by about 5 mm (0.2 in).
Soft toward stroke end, bottoming out	○				Oil level (oil amount)	Increase oil level by about 5 mm (0.2 in).
Stiff initial movement	○	○	○	○	Compression damping	Turn adjuster counterclockwise (about 2 clicks) to decrease damping.
Low front, tending to lower front posture			○	○	Compression damping Rebound damping Balance with rear end Oil level (oil amount)	Turn adjuster clockwise (about 2 clicks) to increase damping. Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 95 ~ 100 mm (3.7 ~ 3.9 in) when one passenger is astride seat (lower rear posture). Increase oil level by about 5 mm (0.2 in).
“Obtrusive” front, tending to upper front posture			○	○	Compression damping Balance with rear end Spring Oil level (oil amount)	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 90 ~ 95 mm (3.5 ~ 3.7 in) when one passenger is astride seat (upper rear posture). Replace with soft spring. Decrease oil level by about 5 ~ 10 mm (0.2 ~ 0.4 in).



- Rear shock absorber

**NOTE:**

- If any of the following symptoms is experienced with the standard position as the base, make resetting by reference to the adjustment procedure given in the same chart.
- Adjust the rebound damping in 2-click increments or decrements.
- Adjust the low compression damping in 1-click increments or decrements.
- Adjust the high compression damping in 1/6 turn increments or decrements.

Symptom	Section				Check	Adjust
	Jump	Large gap	Medium gap	Small gap		
Stiff, tending to sink			○	○	Rebound damping Spring set length	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 90 ~ 100 mm (3.5 ~ 3.9 in) when one passenger is astride seat.
Spongy and unstable			○	○	Rebound damping Low compression damping Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Turn adjuster clockwise (about 1 click) to increase damping. Replace with stiff spring.
Heavy and dragging			○	○	Rebound damping Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Replace with soft spring.
Poor road gripping				○	Rebound damping Low compression damping High compression damping Spring set length Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Turn adjuster clockwise (about 1 clicks) to increase damping. Turn adjuster clockwise (about 1/6 clicks) to increase damping. Set sunken length for 90 ~ 100 mm (3.5 ~ 3.9 in) when one passenger is astride seat. Replace with soft spring.
Bottoming out	○	○			High compression damping Spring set length Spring	Turn adjuster clockwise (about 1/6 turn) to increase damping. Set sunken length for 90 ~ 100 mm (3.5 ~ 3.9 in) when one passenger in astride seat. Replace with stiff spring.
Bouncing	○	○			Rebound damping Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Replace with soft spring.
Stiff travel	○	○			High compression damping Spring set length Spring	Turn adjuster counterclockwise (about 1/6 turn) to decrease damping. Set sunken length for 90 ~ 100 mm (3.5 ~ 3.9 in) when one passenger is astride seat. Replace with soft spring.







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